

UNIT INFORMATION

LHT SERIES
25 ton

Service Literature

100240
10/2026

LHT302 with R454B

The LHT302 is a configured to order unit (CTO) with a wide selection of factory installed options.

Optional electric heat is factory- or field-installed. Electric heat operates in single or multiple stages depending on the kW input size. 30kW to 90 kW heat sections are available.

The unit has a 25 ton cooling capacity and utilizes two compressors and six condenser fans.

Multi-Stage Air Volume MSAV® blower option is available. The VFD-driven blower will operate at lower speeds when demand is low and increase to higher speeds when demand is high.

All LHT 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 through Smartwire connectors. When “plugged in” the controls become an integral part of the unit wiring.

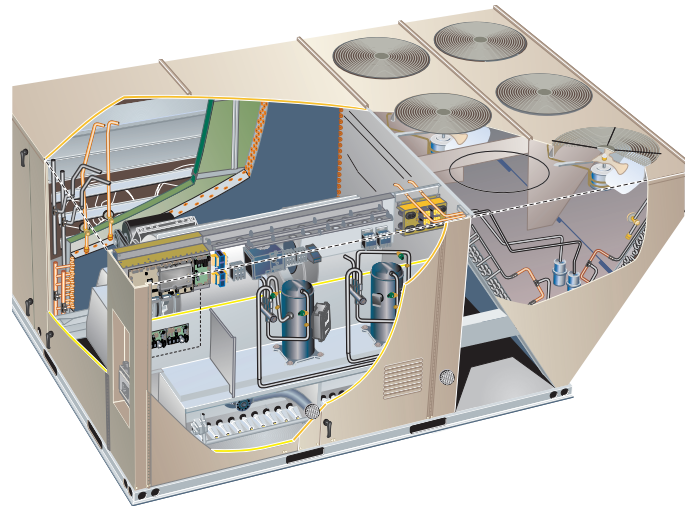
False ceilings or drop ceiling may be used as a return air plenum only if the unit being installed has a Refrigerant Detection System

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out with work in confined spaces being avoided.

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

⚠ 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 licensed professional HVAC installer or equivalent, service agency, or the gas supplier



⚠ WARNING

To prevent serious injury or death:

- 1- Lock-out/tag-out before performing maintenance.**
- 2- If system power is required (e.g., smoke detector maintenance), disable power to blower, remove fan belt where applicable, and ensure all controllers and thermostats are set to the “OFF” position before performing maintenance.**
- 3- Always keep hands, hair, clothing, jewelry, tools, etc., away from moving parts.**

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CAUTION

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

WARNING

Only manufacturer approved auxiliary devices are permitted to be installed in this unit.

WARNING

If this appliance is conditioning a space with an area smaller than T_{Amin} or stored in a space with an area smaller than A_{min} as defined by this instruction, then that space must be without continuously operating open flames (e.g. an operating gas appliance) or other potential ignition sources (e.g. an operating electric heater or similar hot surface). A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest system.

CAUTION

Auxiliary devices which may be a potential ignition source shall not be installed in the duct work. Examples of such potential ignition sources are hot surfaces with a temperature exceeding 700°C and electric switching devices.

CAUTION

The appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction

CAUTION

Children should be supervised not to play with the appliance.

CAUTION

Any personnel installing, decommissioning, or performing maintenance on the unit must be properly trained with A2L refrigerants.

CAUTION

Servicing shall be performed only as recommended by the manufacturer.

WARNING

- This appliance must be installed in accordance with local and national wiring regulations.
- If the appliance is not fitted with an option for full disconnection from power, a means of disconnection must be incorporated in the fixed wiring in accordance with national and local wiring regulations.

CAUTION

Leak Detection System installed. Unit must be powered except for service.

WARNING

- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance, or an operating electric heater).
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odor

WARNING

Ducts connected to an appliance shall not contain a potential ignition source.

IMPORTANT

Pipe work, including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.

IMPORTANT

Refrigerant sensors for refrigerant detection systems shall only be replaced with sensors specified by the appliance manufacture.

CAUTION

This unit is equipped with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.

A2L Refrigerant Considerations

Ensure that the work area is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects, taking into account the effects of aging or continual vibration from sources such as compressors or fans.

Under no circumstances shall potential sources of ignition be used when searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practices be followed since flammability is a consideration. The following procedure shall be adhered to:

- Safely remove refrigerant following local and national regulations.
- Evacuate the circuit.
- Purge the circuit with inert gas.
- Evacuate.
- Purge the circuit with inert gas.
- Open the circuit

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. Refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be vented down to atmospheric pressure to enable work to take place. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

OPTIONS / ACCESSORIES

Item Description		Order Number	Size
			302
COOLING SYSTEM			
Condensate Drain Trap	PVC	22H54	X
	Copper	76W27	X
Drain Pan Overflow Switch		21Z07	OX
Stainless Steel Condensate Drain Pan		83W42	OX
BLOWER - SUPPLY AIR			
Motors	Belt Drive (standard efficiency) - 5 hp	Factory	O
	Belt Drive (standard efficiency) - 7.5 hp	Factory	O
	Belt Drive (standard efficiency) - 10 hp	Factory	O
	Automatic VFD Bypass Option (MSAV® Models Only)	Factory	O
Drive Kits	Kit #1 740-895 rpm	Factory	O
See Blower Data Tables for usage and selection	Kit #2 870-1045 rpm	Factory	O
	Kit #3 715-880 rpm	Factory	O
	Kit #4 770-965 rpm	Factory	O
	Kit #5 660-810 rpm	Factory	O
	Kit #6 770-965 rpm	Factory	O
	Kit #7 570-720 rpm	Factory	O
	Kit #8 480-630 rpm	Factory	O
	Kit #9 410-535 rpm	Factory	O
	Blower Belt Auto-Tensioner	38C61	X
CABINET			
Burglar Bars		Y1036	X
Combination Coil/Hail Guards		13T16	OX
Corrosion Protection		Factory	O
Horizontal Return Air Panel Kit		38K48	X
CONTROLS			
Commercial Controls	LonTalk® Module	54W27	OX
	Novar® LSE	Factory	O
Dirty Filter Switch		53W68	OX
Fresh Air Tempering		21Z08	OX
Smoke Detector - Supply or Return (Power board and one sensor)		37G73	OX
Smoke Detector - Supply and Return (Power board and two sensors)		37G74	OX

NOTE - Order numbers shown are for ordering field installed accessories.

OX - Configure To Order (Factory Installed) or Field Installed

O = Configure To Order (Factory Installed)

X = Field Installed

OPTIONS / ACCESSORIES

Item Description	Order Number	Size	
		302	
INDOOR AIR QUALITY			
Air Filters			
Healthy Climate® High Efficiency Air Filters 20 x 20 x 2 - order 12 per unit	MERV 8	54W21	OX
	MERV 13	52W39	OX
	MERV 16	21U40	X
Replaceable Media Filter with Metal Mesh Frame (includes Non-Pleated Filter Media) 20 x 20 x 2- order 12 per unit		44N60	X
Indoor Air Quality (CO2) Sensors			
Sensor - Wall-mount, off-white plastic cover with LCD display		77N39	X
Sensor - Wall-mount, off-white plastic cover, no display		87N53	X
Sensor - Black plastic case, LCD display, rated for plenum mounting		87N52	X
Sensor - Black plastic case, no display, rated for plenum mounting		87N54	X
CO2 Sensor Duct Mounting Kit - for downflow applications		23Y47	X
Aspiration Box - for duct mounting non-plenum rated CO2 sensors (77N39)		90N43	X
ELECTRICAL			
Voltage 60 Hz	208/230V - 3 phase	Factory	O
	460V - 3 phase	Factory	O
	575V - 3 phase	Factory	O
¹ Short-Circuit Current Rating (SCCR) of 100kA (includes Phase/Voltage Detection)		Factory	O
HACR Circuit Breakers		Factory	O
² Disconnect Switch	80 amp	54W85	OX
	150 amp	54W86	OX
	250 amp	54W87	OX
GFI Service Outlets	15 amp non-powered, field-wired (208/230V, 460V only)	74M70	OX
	³ , ⁴ 15 amp factory-wired and powered (208/230V, 460V)	Factory	O
	⁵ 20 amp non-powered, field-wired (208/230V, 460V, 575V)	67E01	X
	⁵ 20 amp non-powered, field-wired (575V)	Factory	O
Weatherproof Cover for GFI		10C89	X
Phase/Voltage Detection		Factory	O
ELECTRIC HEAT			
30 kW	208/230V-3ph	30U68	OX
	460V-3ph	30U69	OX
	575V-3ph	30U70	OX
45 kW	208/230V-3ph	30U74	OX
	460V-3ph	30U75	OX
	575V-3ph	30U76	OX
60 kW	208/230V-3ph	30U80	OX
	460V-3ph	30U81	OX
	575V-3ph	30U82	OX
90 kW	460V-3ph	30U84	OX
	575V-3ph	30U85	OX
HUMIDITROL® CONDENSER REHEAT OPTION			
Humiditrol® Dehumidification Option		Factory	O
Humidity Sensor Kit, Remote mounted (required)		17M50	X

SCCR option is only available with factory installed electric heat or no electric heat.

SCCR option is not available if the MOCP of the configured unit is greater than 200A.

Disconnect Switch is furnished and factory installed with SCCR option

If a factory installed disconnect switch is ordered with a factory installed GFI, the default disconnect size is 150 amps.

Unit powered GFI Service Outlets are not available with SCCR option.

Disconnect Switch or Circuit Breaker is required with unit powered GFI Service Outlets.

Canada requires a minimum 20 amp circuit. Select 20 amp, non-powered, field wired GFI.

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OPTIONS / ACCESSORIES

Item Description	Order Number	Size
		302
ECONOMIZER		
High Performance Economizer (Approved for California Title 24 Building Standards / AMCA Class 1A Certified)		
High Performance Economizer (Downflow or Horizontal) Includes Economizer Dampers with Outdoor Air Hood Downflow Applications - Use furnished Outdoor Air Hood - Order Downflow Barometric Relief Dampers with Exhaust Hood separately Horizontal Applications - Use furnished Outdoor Air Hood - Order Horizontal Barometric Relief Dampers with Exhaust Hood separately	18X87	OX
Economizer Controls		
Differential Enthalpy (Not for Title 24)	Order 2 21Z09	OX
Sensible Control	Sensor is Furnished Factory	O
Single Enthalpy (Not for Title 24)	21Z09	OX
Global	Sensor Field Provided Factory	O
Building Pressure Control	13J77	X
Differential Sensible	Sensor is Furnished Factory	O
Outdoor Air CFM Control	13J76	OX
Barometric Relief Dampers With Exhaust Hood		
Downflow Barometric Relief Dampers	76W17	OX
Horizontal Barometric Relief Dampers	33K78	OX
OUTDOOR AIR		
Outdoor Air Dampers With Outdoor Air Hood		
Motorized	18X89	OX
Manual	18X88	X
POWER EXHAUST		
Standard Static, SCCR Rated	208/230V 74W21	OX
	460V 74W22	OX
	575V 74W23	OX
High Static with VFD 2 hp (731-932 rpm)	208/230V 83M89	X
	460V 83M90	X
	575V 83M91	X
Power Exhaust Control		
Pressure Transducer Control	13J77	X

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OPTIONS / ACCESSORIES

Item Description	Order Number	Size
		302
ROOF CURBS		
Hybrid Roof Curbs, Downflow		
14 in. height	11F62	X
18 in. height	11F63	X
24 in. height	11F64	X
Standard Roof Curbs, Horizontal - Requires Horizontal Return Air Panel Kit		
30 in. height - slab applications	11T90	X
41 in. height - rooftop applications	11T97	X
Horizontal Return Air Panel Kit		
Required for Horizontal Applications with Roof Curb	38K48	X
Insulation Kit For Standard Horizontal Curbs		
For 30 in. Curb	73K33	X
For 41 in. Curb	73K35	X
CEILING DIFFUSERS		
Step-Down - Order one	LARTD30/36S 45K74	X
Flush - Order one	LAFD30/36S 45K75	X
Transitions (Supply and Return) - Order one	LASRT30/36 33K80	X

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SPECIFICATIONS

Model			LHT302H5M		
Nominal Tonnage			25 Ton		
Efficiency Type			High		
Blower Type			MSAV® Multi-Stage Air Volume		
Cooling Performance	Gross Cooling Capacity - Btuh		285,000		
	¹ Net Cooling Capacity (Btuh)		274,000		
	¹ AHRI Rated Air Flow (cfm)		8500		
	Total Unit Power - kW		25.9		
	¹ IEER (Btuh/Watt)		14.8		
	¹ EER (Btuh/Watt)		10.5		
Heating Performance	¹ Total High Heat Capacity - Btuh		270,000		
	¹ C.O.P.		3.3		
	Total Unit Power - kW		23.6		
	¹ Total Low Heat Capacity - Btuh		154,000		
	¹ C.O.P.		2.1		
	Total Unit Power - kW		21.3		
Sound Rating Number			dBA 95		
Refrigerant Charge	Refrigerant Type		R-454B		
	Without Reheat Option	Circuit 1	25 lbs. 0 oz.		
		Circuit 2	23 lbs. 0 oz.		
	With Reheat Option	Circuit 1	29 lbs. 0 oz.		
		Circuit 2	23 lbs. 8 oz.		
Electric Heat Available			See page 13		
Compressor Type (number)			Two-Stage Scroll (1), Single-Stage Scroll (1)		
Outdoor Coils	Net face area - ft.² (total)		55.1		
	Number of rows		2		
	Fins - in.		20		
Outdoor Coil Fans	Motor HP (number and type)		1/2 (6 PSC)		
	Rpm		1075		
	Watts (total)		3000		
	Diameter (Number) - in.		(6) 24		
	Blades		3		
	Total Air volume - cfm		21,500		
Indoor Coils	Net face area - ft.² (total)		26.0		
	Tube diameter - in.		3/8		
	Rows		4		
	Fins - in.		14		
	Condensate drain size (NPT) - in.		(1) 1 in.		
	Expansion device type		Balanced Port Thermostatic Expansion Valve		
³ Indoor Blower and Kit Selection	Nominal motor HP		5, 7.5, 10		
	Maximum usable motor output (US Only)		5.75, 8.63, 11.5		
	Motor - Drive kit number		5 HP Kit 5 660-810 rpm Kit 6 770-965 rpm Kit 7 570-720 rpm Kit 8 480-630 rpm Kit 9 410-535 rpm		
			7.5 HP Kit 3 715-880 rpm Kit 4 770-965 rpm		
			10 HP Kit 1 740-895 rpm Kit 2 870-1045 rpm		
	Wheel (Number) diameter x width - in.		(2) 18 x 15		
	Filters	Type of filter		Fiberglass, disposable	
		Number and size - in.		(12) 20 x 20 x 2	
	Line voltage data (Volts-Phase-Hz)			208/230-3-60 460-3-60 575-3-60	

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

Tested at conditions included in with AHRI Standard 340/360; 95°F outdoor air temperature and 80°F db/67°F wb entering evaporator air; minimum external duct static pressure.

Cooling Ratings - 95°F outdoor air temperature and 80°F db/67°F wb entering indoor coil air.

High Temperature Heating Ratings - 47°F db/43°F wb outdoor air temperature and 70°F entering indoor coil air.

Low Temperature Heating Ratings - 17°F db/15°F wb outdoor air temperature and 70°F entering indoor coil air.

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 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

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

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

Then determine from blower table blower motor output and drive required.

See page 10 for wet coil and option/accessory air resistance data.

See page 10 for factory installed drive kit specifications.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

All units require 8,000 cfm minimum air with electric heat.

Air Volume cfm	TOTAL STATIC PRESSURE - In. w.g.																									
	0.20		0.40		0.60		0.80		1.00		1.20		1.40		1.60		1.80		2.00		2.20		2.40		2.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4000	372	0.26	433	0.65	497	0.99	565	1.27	630	1.54	687	1.79	738	2.04	784	2.30	824	2.56	861	2.82	897	3.10	932	3.40	---	---
4500	382	0.41	441	0.79	506	1.12	574	1.41	638	1.69	694	1.95	744	2.22	790	2.50	831	2.77	868	3.05	903	3.35	938	3.66	974	4.01
5000	392	0.56	451	0.93	516	1.25	584	1.55	646	1.85	702	2.12	751	2.41	796	2.70	837	3.00	874	3.30	909	3.61	944	3.93	980	4.30
5500	402	0.73	462	1.08	527	1.40	594	1.72	655	2.02	710	2.31	758	2.61	802	2.92	843	3.24	880	3.56	916	3.88	951	4.22	987	4.60
6000	414	0.89	473	1.24	539	1.56	605	1.90	665	2.21	718	2.51	766	2.83	809	3.16	850	3.51	887	3.84	922	4.18	957	4.52	994	4.91
6500	426	1.07	486	1.41	551	1.74	616	2.10	675	2.42	727	2.73	774	3.07	817	3.43	857	3.80	894	4.15	929	4.49	964	4.85	1001	5.24
7000	439	1.26	499	1.60	565	1.93	628	2.31	685	2.64	737	2.97	782	3.34	825	3.72	864	4.11	901	4.48	937	4.83	971	5.19	1008	5.59
7500	453	1.46	513	1.79	579	2.14	641	2.55	696	2.88	747	3.24	792	3.63	833	4.04	872	4.45	909	4.83	945	5.20	979	5.56	1016	5.97
8000	467	1.66	528	2.00	593	2.38	653	2.81	708	3.15	757	3.53	801	3.95	843	4.39	881	4.82	918	5.22	953	5.59	988	5.96	1025	6.37
8500	483	1.88	544	2.22	608	2.65	667	3.10	720	3.44	768	3.85	812	4.30	852	4.78	890	5.22	927	5.63	962	6.01	997	6.39	1034	6.81
9000	499	2.11	561	2.47	624	2.95	681	3.41	733	3.76	780	4.20	823	4.69	862	5.19	900	5.65	936	6.07	972	6.46	1007	6.85	1044	7.28
9500	516	2.36	578	2.75	640	3.26	696	3.73	746	4.10	792	4.58	834	5.11	873	5.64	910	6.12	946	6.54	982	6.93	1018	7.34	1055	7.78
10,000	534	2.64	596	3.06	657	3.60	711	4.07	760	4.48	805	5.00	845	5.57	884	6.12	921	6.61	957	7.03	992	7.43	1028	7.86	1066	8.32
10,500	553	2.93	615	3.39	674	3.95	727	4.44	775	4.90	817	5.46	857	6.06	895	6.62	932	7.12	967	7.55	1003	7.96	1039	8.40	1077	8.89
11,000	572	3.24	634	3.74	692	4.31	744	4.83	789	5.35	830	5.95	869	6.58	907	7.16	943	7.65	978	8.09	1013	8.51	1050	8.98	1089	9.49
11,500	592	3.58	653	4.12	711	4.70	760	5.27	803	5.85	843	6.49	881	7.13	918	7.71	954	8.21	989	8.65	1025	9.10	1062	9.59	1101	10.12
12,000	613	3.95	674	4.53	729	5.14	776	5.75	818	6.39	857	7.06	894	7.71	930	8.30	965	8.80	1000	9.25	1036	9.71	1073	10.22	---	---
12,500	635	4.37	695	4.98	748	5.62	792	6.29	832	6.98	870	7.67	906	8.33	941	8.91	976	9.42	1011	9.87	1048	10.35	---	---	---	---

BLOWER DATA

DRIVE KIT SPECIFICATIONS

Motor Efficiency	Nominal hp	Maximum hp	Drive Kit Number	RPM Range
Standard	5	5.75	5	660 - 810
Standard	5	5.75	6	770 - 965
Standard	5	5.75	7	570 - 720
Standard	5	5.75	8	480 - 630
Standard	5	5.75	9	410 - 535
Standard	7.5	8.63	3	715 - 880
Standard	7.5	8.63	4	770 - 965
Standard	10	11.50	1	740 - 895
Standard	10	11.50	2	870 - 1045

NOTES

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 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.

For VFD applications, nominal motor output is also maximum usable motor output.

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE

Air Volume cfm	Wet Indoor Coil in. w.g.	Electric Heat in. w.g.	Economizer in. w.g.	Filters			Horizontal Roof Curb in. w.g.
				MERV 8 in. w.g.	MERV 13 in. w.g.	MERV 16 in. w.g.	
4000	0.04	0.01	0.00	0.00	0.00	0.06	0.04
4500	0.04	0.01	0.00	0.00	0.00	0.07	0.05
5000	0.05	0.01	0.00	0.00	0.00	0.08	0.06
5500	0.06	0.02	0.01	0.00	0.01	0.09	0.07
6000	0.07	0.02	0.01	0.00	0.02	0.10	0.08
6500	0.08	0.02	0.01	0.01	0.02	0.11	0.09
7000	0.09	0.03	0.02	0.01	0.03	0.12	0.10
7500	0.10	0.03	0.02	0.01	0.04	0.13	0.11
8000	0.11	0.03	0.02	0.01	0.04	0.14	0.13
8500	0.12	0.04	0.03	0.01	0.04	0.15	0.15
9000	0.13	0.04	0.04	0.01	0.04	0.16	0.17
9500	0.14	0.05	0.04	0.02	0.06	0.17	0.19
10,000	0.15	0.05	0.05	0.02	0.06	0.18	0.21
10,500	0.16	0.06	0.06	0.02	0.06	0.19	0.24
11,000	0.18	0.06	0.07	0.02	0.07	0.20	0.27
11,500	0.19	0.07	0.08	0.02	0.08	0.22	0.30
12,000	0.20	0.07	0.10	0.02	0.08	0.23	0.33
12,500	0.21	0.08	0.11	0.03	0.10	0.24	0.37

BLOWER DATA

POWER EXHAUST PERFORMANCE - STANDARD STATIC

Return Duct Negative Static Pressure	Air Volume Exhausted
in. w.g.	cfm
0.00	12,800
0.05	12,200
0.10	11,500
0.15	10,800
0.20	9900
0.25	9000
0.30	7900
0.35	6750
0.40	5450
0.45	4150
0.50	2900

POWER EXHAUST - HIGH STATIC

Air Volume cfm	Return Duct Negative Static Pressure - In. w.g.																					
	0		0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
8500	487	0.43	501	0.44	521	0.46	548	0.49	584	0.53	625	0.58	667	0.64	708	0.70	746	0.75	783	0.81	818	0.87
9000	515	0.51	528	0.52	547	0.54	570	0.57	601	0.61	638	0.66	678	0.71	717	0.77	755	0.83	791	0.90	826	0.96
9500	544	0.60	556	0.61	573	0.63	594	0.66	620	0.69	652	0.74	689	0.80	727	0.86	765	0.93	800	0.99	834	1.05
10,000	572	0.70	584	0.71	599	0.73	618	0.76	641	0.79	669	0.83	702	0.89	738	0.95	774	1.02	810	1.09	843	1.15
10,500	601	0.81	612	0.82	626	0.84	643	0.87	663	0.90	688	0.94	718	0.99	750	1.05	785	1.12	819	1.19	853	1.27
11,000	629	0.93	640	0.95	653	0.97	668	0.99	687	1.02	709	1.06	735	1.11	764	1.16	796	1.23	830	1.31	862	1.38
11,500	658	1.06	668	1.08	680	1.10	694	1.12	711	1.15	731	1.19	754	1.24	780	1.29	810	1.36	841	1.43	872	1.50
12,000	686	1.21	696	1.22	707	1.24	721	1.27	736	1.30	754	1.34	774	1.38	798	1.43	825	1.49	853	1.56	883	1.64

BLOWER DATA

CEILING DIFFUSER AIR RESISTANCE - in. w.g.

Air Volume cfm	Step-Down Diffuser			Flush Diffuser
	LARTD30/36S			LAFD30/36S
	2 Ends Open	1 Side/2 Ends Open	All Ends & Sides Open	
7500	0.37	0.31	0.25	0.29
8000	0.42	0.36	0.29	0.34
8500	0.48	0.41	0.34	0.39
9000	0.55	0.47	0.39	0.44
9500	0.62	0.53	0.45	0.51
10,000	0.70	0.60	0.51	0.57
10,500	0.78	0.68	0.58	0.65
11,000	0.87	0.76	0.65	0.72
11,500	0.97	0.85	0.73	0.81
12,000	1.08	0.94	0.82	0.9

CEILING DIFFUSER AIR THROW DATA - ft.

Air Volume cfm	¹ Effective Throw Range - ft.	
	Step-Down	Flush
9000	40 - 47	29 - 35
9500	43 - 50	33 - 41
10,000	46 - 54	37 - 46
10,500	50 - 58	42 - 51
11,000	53 - 61	46 - 56
11,500	55 - 64	50 - 61
12,000	58 - 67	54 - 66

¹ Throw is the horizontal or vertical distance an airstream travels on leaving the outlet or diffuser before the maximum velocity is reduced to 50 ft. per minute. Four sides open.

ELECTRICAL DATA

Model		LHT302H5M								
¹ Voltage - 60Hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1 (Non-Inverter)	Rated Load Amps	37.2			19.7			16.9		
	Locked Rotor Amps	270			147			109		
Compressor 2 (Non-Inverter)	Rated Load Amps	33.3			15.4			13		
	Locked Rotor Amps	255			140			107.6		
Outdoor Fan Motors (6)	Full Load Amps (6 Non-ECM)	3			1.5			1.2		
	Total	18			9			7.2		
Standard Power Exhaust (3) 0.33 HP	Full Load Amps	2.4			1.3			1		
	Total	7.2			3.9			3		
High Static Power Exhaust (3) 2 HP	Full Load Amps	7.5			3.4			2.7		
	Total	22.5			10.2			8.1		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	HP	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
² Maximum Overcurrent Protection (MOCP)	Unit Only	150	150	150	70	70	80	60	60	60
	With (3) 0.33 HP Standard Power Exhaust	150	150	150	80	80	80	60	70	70
	With High Static Power Exhaust (3) 2 HP	150	175	175	80	80	90	70	70	70
³ Minimum Circuit Ampacity (MCA)	Unit Only	115	122	129	57	61	64	48	51	53
	With (3) 0.33 HP Standard Power Exhaust	122	130	136	61	64	67	51	54	56
	With High Static Power Exhaust (3) 2 HP	137	145	152	67	71	74	56	59	61

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 5000 amps.

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

HACR type breaker or fuse.

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

ELECTRIC HEAT DATA

Model			LHT302H5M											
1 Voltage - 60Hz			208/230V - 3 Ph						460V - 3 Ph			575V - 3 Ph		
Indoor Blower Motor - HP			5		7.5		10		5	7.5	10	5	7.5	10
Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
2 Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	30 kW	4 200	225	225	225	225	225	110	110	110	90	90	90
		45 kW	250	250	4 250	4 300	4 250	4 300	125	150	150	110	110	110
		60 kW	4 250	4 300	4 250	4 300	300	4 300	150	150	150	110	110	125
		90 kW	N/A	N/A	N/A	N/A	N/A	N/A	175	175	175	150	150	150
3 Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	30 kW	193	205	201	213	207	219	102	106	109	84	87	89
		45 kW	232	250	240	258	246	264	125	128	131	102	105	107
		60 kW	240	259	248	267	254	273	129	133	136	106	109	111
		90 kW	N/A	N/A	N/A	N/A	N/A	N/A	165	169	172	135	137	139
2 Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and Standard Power Exhaust (3) 0.33 HP	30 kW	4 200	225	225	225	4 225	250	110	110	125	90	90	100
		45 kW	4 250	4 300	4 250	4 300	300	4 300	150	150	150	110	110	110
		60 kW	4 250	4 300	300	4 300	300	4 300	150	150	150	125	125	125
		90 kW	N/A	N/A	N/A	N/A	N/A	N/A	175	175	200	150	150	150
3 Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and Standard Power Exhaust (3) 0.33 HP	30 kW	200	212	208	220	214	227	106	110	113	87	90	92
		45 kW	239	258	247	265	254	272	129	132	135	105	108	110
		60 kW	247	267	255	274	261	281	133	137	140	109	112	114
		90 kW	N/A	N/A	N/A	N/A	N/A	N/A	169	173	176	138	140	142
2 Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and High Static Power Exhaust (3) 2 HP	30 kW	4 225	250	4 225	250	250	250	125	125	125	100	100	100
		45 kW	300	4 300	300	4 300	300	4 300	150	150	150	110	125	125
		60 kW	300	4 300	300	4 300	300	4 300	150	150	150	125	125	125
		90 kW	---	---	---	---	---	---	200	200	200	150	150	150
3 Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and High Static Power Exhaust (3) 2 HP	30 kW	216	228	223	235	230	242	112	116	119	92	95	97
		45 kW	255	273	262	280	269	287	135	138	141	110	113	115
		60 kW	263	282	270	289	277	296	139	143	146	114	117	119
		90 kW	---	---	---	---	---	---	176	179	182	143	146	148

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

HACR type breaker or fuse.

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

Factory installed circuit breaker not available.

ELECTRIC HEAT CAPACITIES

Volts Input	30 kW			45 kW			60 kW			90 kW		
	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages
208	22.5	76,800	1	33.8	115,300	2	45.0	153,600	2	N/A	N/A	N/A
220	25.2	86,000	1	37.8	129,000	2	50.4	172,000	2	N/A	N/A	N/A
230	27.5	93,900	1	41.3	141,000	2	55.1	188,000	2	N/A	N/A	N/A
240	30.0	102,400	1	45.0	153,600	2	60.0	204,800	2	N/A	N/A	N/A
440	25.2	86,000	1	37.8	129,000	2	50.4	172,000	2	75.6	258,000	2
460	27.5	93,900	1	41.3	141,000	2	55.1	188,000	2	82.7	282,200	2
480	30.0	102,400	1	45.0	153,600	2	60.0	204,800	2	90.0	307,100	2
550	25.2	86,000	1	37.8	129,000	2	50.4	172,000	2	75.6	258,000	2
575	27.5	93,900	1	41.3	141,000	2	55.1	188,000	2	82.7	282,200	2
600	30.0	102,400	1	45.0	153,600	2	60.0	204,800	2	90.0	307,100	2

ELECTRICAL ACCESSORIES - DISCONNECTS

Motor HP		5		7.5		10		5	7.5	10	5	7.5	10
Electric Heat Voltage		208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
Unit Only		54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
Unit + Electric Heat	30 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W86	54W86	54W86
	45 kW	54W87	54W87	N/A	N/A	N/A	N/A	54W86	54W86	54W86	54W86	54W86	54W86
	60 kW	N/A	N/A	N/A	N/A	N/A	N/A	54W86	54W86	54W86	54W86	54W86	54W86
	90 kW	N/A	N/A	N/A	N/A	N/A	N/A	54W87	54W87	54W87	54W86	54W87	54W87
Unit + Standard Power Exhaust		54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
Unit + Electric Heat and Standard Power Exhaust	30 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W86	54W86	54W86
	45 kW	N/A	N/A	N/A	N/A	N/A	N/A	54W86	54W86	54W86	54W86	54W86	54W86
	60 kW	N/A	N/A	N/A	N/A	N/A	N/A	54W86	54W87	54W87	54W86	54W86	54W86
	90 kW	N/A	N/A	N/A	N/A	N/A	N/A	54W87	54W87	54W87	54W87	54W87	54W87
Unit + High Static Power Exhaust		54W86	54W86	54W87	54W87	54W87	54W87	54W85	54W85	54W85	54W85	54W85	54W85
Unit + Electric Heat and High Static Power Exhaust	30 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W86	54W86	54W86
	45 kW	N/A	N/A	N/A	N/A	N/A	N/A	54W86	54W86	54W86	54W86	54W86	54W86
	60 kW	N/A	N/A	N/A	N/A	N/A	N/A	54W86	54W87	54W87	54W86	54W86	54W86
	90 kW	N/A	N/A	N/A	N/A	N/A	N/A	54W87	54W87	54W87	54W87	54W87	54W87

Disconnects - 54W85 - 80A
54W86 - 150A
54W87 - 250A

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 5000 amps.

Minimum R454B Space and CFM Requirements

Minimum Airflow ¹		
Unit	Q _{min} (CFM)	Q _{min} (m ³ h)
LHT302	767	1302

¹ **NOTE** - The minimum airflow is the lowest CFM allowed during venting operation (leak mitigation).

Minimum Room Area of Conditioned Space ²		
Unit	TA _{min} (ft ²)	TA _{min} (m ²)
LHT302	100	9.27

² **NOTE** - The minimum room area of conditioned space is the smallest area the unit can service.

Refrigerant Charge R-454B		
Unit	M _c (lbs)	M _c (kg)
LHT302 Stage 1	25.00	11.34
LHT302 Stage 2	23.00	10.43

Refrigerant Charge R-454B - with Humiditrol		
Unit	M _c (lbs)	M _c (kg)
LHT302 Stage 1	29.00	13.15
LHT302 Stage 2	23.50	10.66

Altitude Adjustment Factor ³									
Halt	0	200	400	600	800	1000	1200	1400	1600
AF	1	1	1	1	1.02	1.05	1.07	1.1	1.12
Halt	1600	1800	2000	2200	2400	2600	2800	3000	3200
AF	1.12	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.4

³ **NOTE** - Use the Altitude Adjustment Factor to adjust the values in the tables above to different altitudes. Find the relevant altitude above sea level in the two "Halt" rows and then multiply the value needed from the tables above by the altitude factor number. Example: For the minimum airflow in CFM for an LHT302 at 1000 ft. above sea level, multiply 767 by 1.05 to get 805.35 CFM as the new Q_{min}.

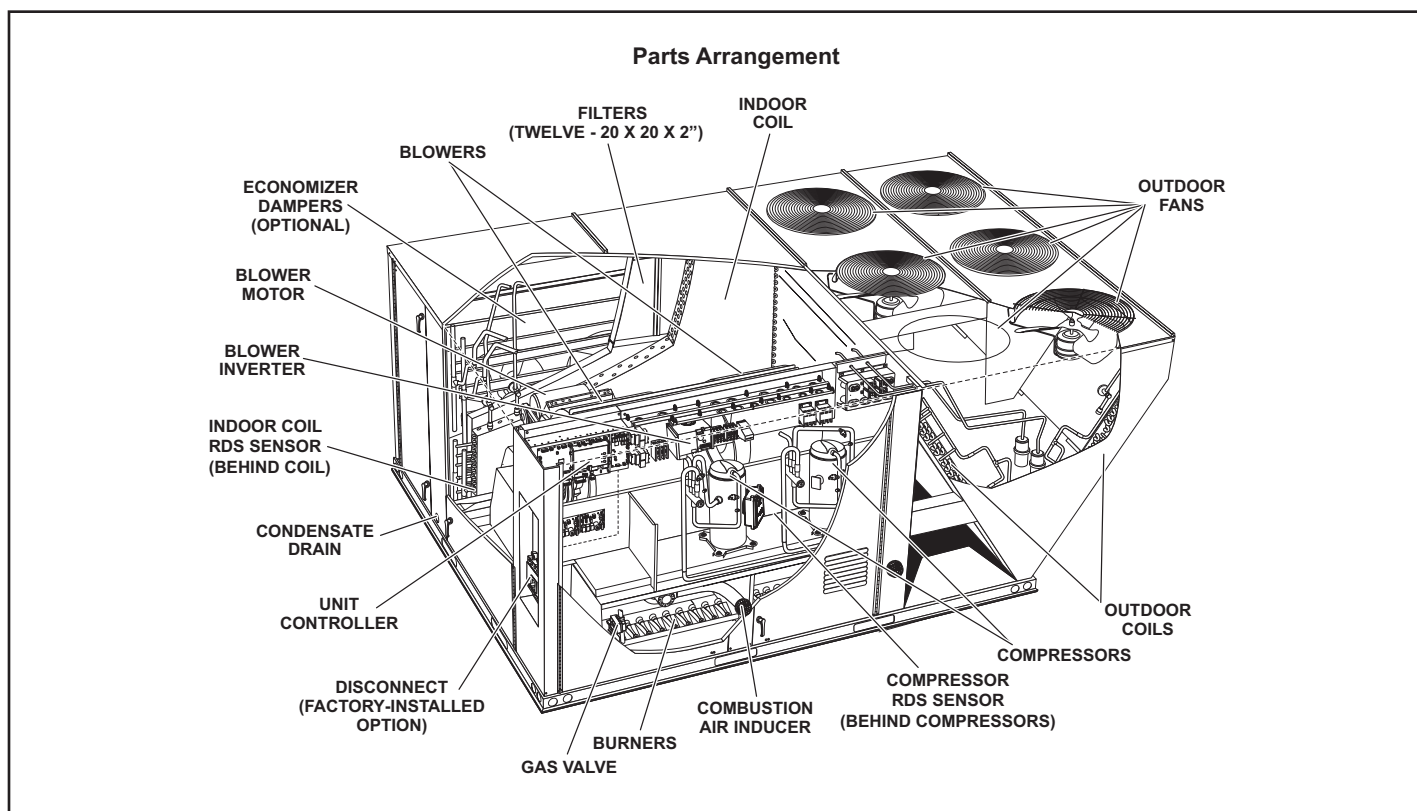


FIGURE 1

I-UNIT COMPONENTS

All 13 through 20 ton units are configured to order units (CTO). Unit components are shown in FIGURE 1. All units come standard with hinged unit panels. The unit panels may be held open with the door rod located inside the unit. All L1, L2 and L3 wiring is color coded; L1 is red, L2 is yellow and L3 is blue.

⚠ CAUTION

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures

⚠ CAUTION



Electrostatic discharge can affect electronic components. Take precautions to neutralize electrostatic charge by touching your hand and tools to metal prior to handling the control.

A-CONTROL BOX COMPONENTS

Control box components are shown in FIGURE 3. The control box is located in the upper portion of the compressor compartment

1-Disconnect Switch S48

Units with higher SCCR rating may be equipped with an disconnect switch S48. Other factory or field installed optional circuit breakers may be used, such as CB10. S48 and CB10 are toggle or twist-style switches, which can be used by the service technician to disconnect power to the unit

2-Control Transformer T1

All 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 2, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

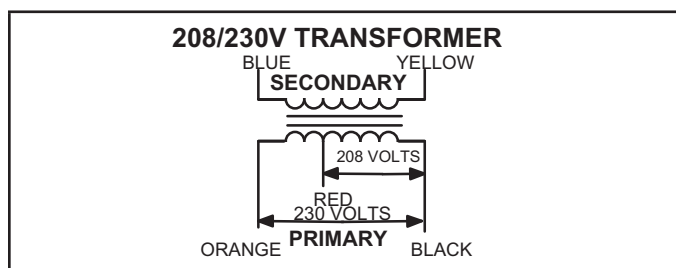
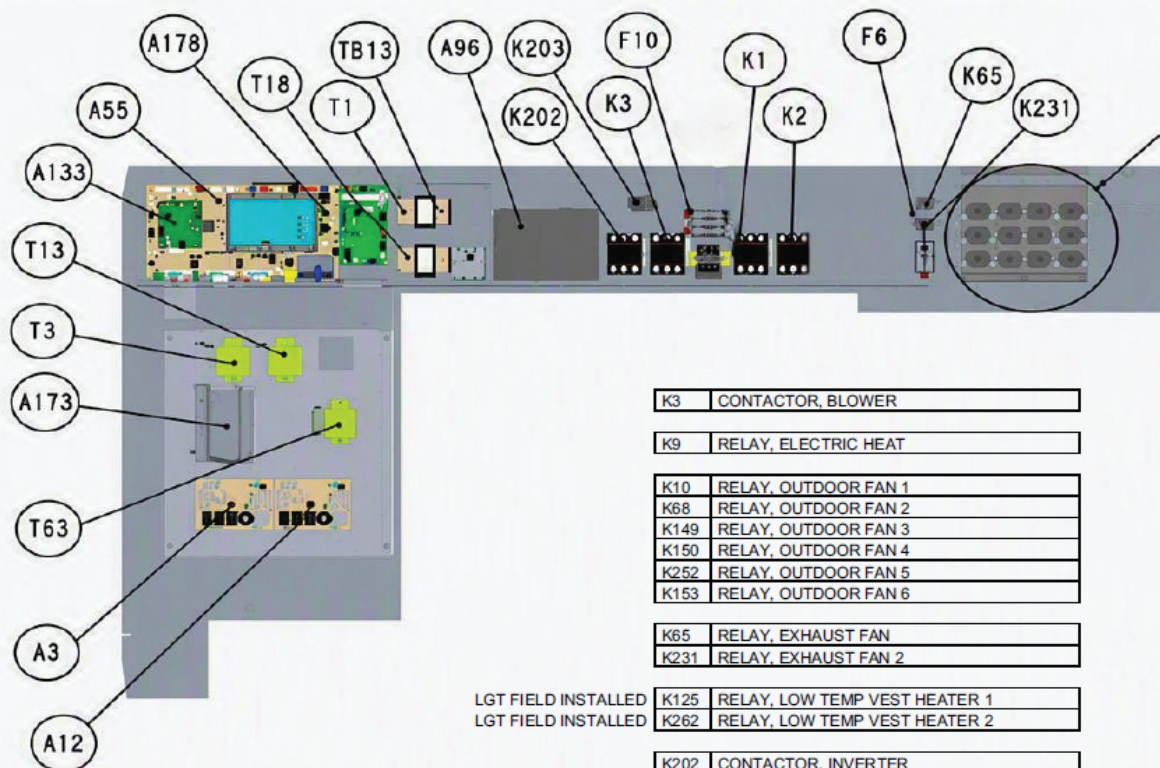


FIGURE 2

3-Contactor Transformer T18

T18 is a single line voltage to 24VAC transformer used in all LHT 13 to 20 ton units. Transformer T18 is protected by a 3.5 amp circuit breaker (CB18). T18 is identical to transformer T1. The transformer supplies 24VAC power to the contactors.

CONTROL BOX



SEE DETAIL A

LGT ONLY	A3	CONTROL, BURNER 1
LGT ONLY	A12	CONTROL, BURNER 2

A55	CONTROL, M4
A178	CONTROL, C4

A96	CONTROL, INVERTER, BLOWER
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A133	CONTROL, SP4
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A173H	CONTROL, SMOKE DETECTOR
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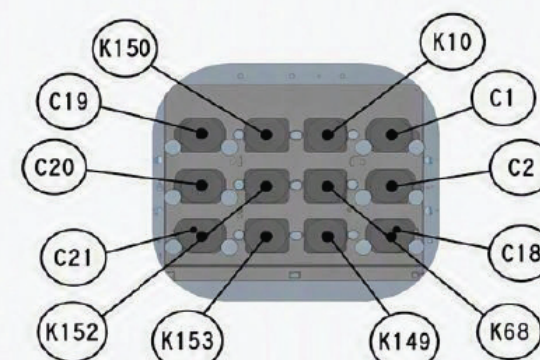
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
C19	CAPACITOR, OUTDOOR FAN 4
C20	CAPACITOR, OUTDOOR FAN 5
C21	CAPACITOR, OUTDOOR FAN 6

F6	FUSE, EXHAUST FAN
F10	FUSE, COMPONENT

K1	CONTACTOR, COMPRESSOR 1
K2	CONTACTOR, COMPRESSOR 2

K3	CONTACTOR, BLOWER
K9	RELAY, ELECTRIC HEAT
K10	RELAY, OUTDOOR FAN 1
K68	RELAY, OUTDOOR FAN 2
K149	RELAY, OUTDOOR FAN 3
K150	RELAY, OUTDOOR FAN 4
K252	RELAY, OUTDOOR FAN 5
K153	RELAY, OUTDOOR FAN 6
K65	RELAY, EXHAUST FAN
K231	RELAY, EXHAUST FAN 2
K125	RELAY, LOW TEMP VEST HEATER 1
K262	RELAY, LOW TEMP VEST HEATER 2
K202	CONTACTOR, INVERTER
K203	RELAY, INVERTER CONTROL
S42	OVERLOAD PROTECTOR, BLOWER MOTOR
T1	TRANSFORMER, CONTROL
T3	TRANSFORMER, COMBUSTION AIR BLOWER 1
T13	TRANSFORMER, COMBUSTION AIR BLOWER 2
T18	TRANSFORMER, CONTACTOR
T63	TRANSFORMER, UV
TB13	TERMINAL STRIP, POWER DISTRIBUTION
TB25	TERMINAL STRIP, BLOWER

LGT FIELD INSTALLED
LGT FIELD INSTALLED



DETAIL A

FIGURE 3

4–Terminal Block TB13

TB13 terminal block distributes line voltage power to the line voltage items in the unit.

5–Outdoor Fan Motor Fuse Block & Fuses F10, Power Exhaust Fan Motor Fuse Block and Fuses F6.

Three line voltage fuses, F10, provide overcurrent protection to all condenser fans. Two line voltage fuses, F6, provide overcurrent protection to the two optional power exhaust fans. The fuses are rated at 30A in 208/230V units.

6–Compressor Contactor K1 and K2

All compressor contactors are three-pole-double-break contactors with 24VAC coils. In all units, K1 (energized by A55) energizes compressors B1 in response to first stage cool demand, and K2 (energized by A55) energizes B2 in response to second stage cool demand.

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 Unit Controller (A55). Optional Staged-Blower units which are not equipped with a bypass option will not have a K3.

8–Power Exhaust Relay K65 & K231 (PED units)

Power exhaust relays K65 and K231 are N.O. DPDT relays with a 24VAC coil. The relays are used in units equipped with the optional power exhaust dampers. K65 and K231 are energized by the A55 Unit Controller, after the economizer dampers reach 50% open (adjustable in ECTO). When K65 closes, exhaust fan B10 is energized and when K231 closes B11 is energized.

9–Variable Frequency Drive A96 (optional)

Staged-Blower units are equipped with a VFD which alters the supply power frequency and voltage to the blower motor. Blower speed is staged depending on the compressor stages, heating demand, ventilation demand, or smoke alarm. The amount of airflow for each stage is preset from the factory. Airflow can be adjusted by changing ECTO parameters in the A55 Unit Controller. The VFD is located below the Unit Controller.

10–VFD Power To Motor Contactor K202 (optional)

Contactor is used in Staged-Blower units equipped with a VFD bypass option. The three pole 40 amp contactor with a 24VAC coil is energized by the A55 Unit Controller. K202 allows power from the VFD to the B3 blower motor in response to blower demand.

11–Inverter Start Forward Rotation Relay K203 (optional)

Relay is used in optional Staged-Blower units and is a three-pole double-throw relay with a 24VAC coil. K203 is energized by the A55 Unit Controller and provides input to the A96 VFD to start blower forward rotation. K203 also de-energizes K3 allowing A96 to control B3 blower.

12–Unit Controller A55

The Unit Controller provides all unit control functions, unit status information, unit diagnostics, programmable parameters and USB verification and profile sharing. Refer to the Unit Controller guide provided with the unit. Thermostat wires are connected to J297 on the Unit Controller.

Relative Humidity Sensor - Optional

The indoor relative humidity sensor (A91) is an analog sensor with a 0-10VDC output over a relative humidity range of 0-100% relative humidity. The sensor is powered with 24VAC.

Enthalpy Sensor - Optional

The optional enthalpy sensors (A7 and A63) used with the economizer have an output of 4-20mA. The sensor is powered with 18VAC provided by M3 unit control.

Economizer Differential Pressure Sensor - Optional

Rooftop units installed with Smart Airflow™ will have a Pressure Transducer (PT5) present in the economizer. PT5 requires 5VDC power supply (P266-5 and {P266-6) and gives 0.25 VDC to 4 VDC output (P266-4) corresponding to 0" water column and 2" water column respectively. For all practical purposes the output should be less than 1.2" water column if not an error code is stored and service alarm output is turned on.

Temperature Sensors

The return air (RT16) and discharge air (RT6) duct probes and the outdoor air (RT17) are all two wire thermistors. The resistance vs. temperature table is shown below:

TABLE 1
Resistance vs. Temperature

Temp. °F (°C)	Resistance +/-2%	Temperature °F (°C)	Resistance +/-2%	Temp. °F (°C)	Resistance +/-2%
-40 (-40)	335,671	40 (4.4)	26,106	90 (32.2)	7,332
-20 (-28.9)	164,959	50 (10)	19,904	100 (37.8)	5,826
0 (-17.8)	85,323	60 (15.6)	15,313	120 (48.9)	3,756
20 (-6.7)	46,218	70 (21.1)	11,884	130 (54.4)	3,047
30 (-1.1)	34,566	80 (26.7)	9,298		

Room Sensors

Room sensor (A2) is a two-wire thermistor with 1k series resistor.

TABLE 2
Two-Wire Thermistor

Temp. °F (°C)	Resistance +/-2%	Temperature °F (°C)	Resistance +/-2%	Temp. °F (°C)	Resistance +/-2%
40 (4.4)	27,102	60 (15.6)	16,313	80 (26.7)	10,299
45 (7.2)	23,764	65 (18.3)	14,474	85 (29.4)	9,249
50 (10)	20,898	70 (21.1)	12,882	90 (32.2)	8,529
55 (12.8)	18,433	75 (23.9)	11,498		

Carbon Dioxide Sensor

The indoor carbon dioxide sensor (A63) is an analog sensor with a 0-10VDC output over a carbon dioxide range of 0-2000 ppm as shown in the following table. The sensor is powered with 24VAC.

TABLE 3
Carbon Dioxide Range

Carbon Dioxide PPM	DC Voltage	Carbon Dioxide PPM	DC Voltage	Carbon Dioxide PPM	DC Voltage	Carbon Dioxide PPM	DC Voltage
0	0	600	3	1200	6	1800	9
200	1	800	4	1400	7	2000	10
400	2	1000	5	1600	8		

13–Second-Stage Power Exhaust Relay K231 (Staged-Blower units equipped with power exhaust)

The second power exhaust fan is controlled by K231. A133 will enable K231 only when the blower reaches 70% of full speed (adjustable ECTO). This prevents a negative building pressure when the blower is operating in low speed. Refer to the Unit Controller manual and ECTO labels on the unit.

14–Fuse F61 (Higher SCCR units only)

Fuse F61 is used on units with higher SCCR rating. F61 provides overcurrent protection to compressor and other cooling components. F61 and S48 are located inside a sheet metal enclosure in the unit left front corner mullion.

15–Blower Motor Overload Relay S42

The relay (S42) is connected in line with the blower motor to monitor the current flow to the motor. When the relay senses an overload condition, a set of normally closed contacts open to de-energize pin #1 in plug P299 of the A55 Unit Controller. A55 de-energizes all outputs. Units will be equipped with a relay manufactured by Telemecanique FIGURE 5 or Siemens FIGURE 6.

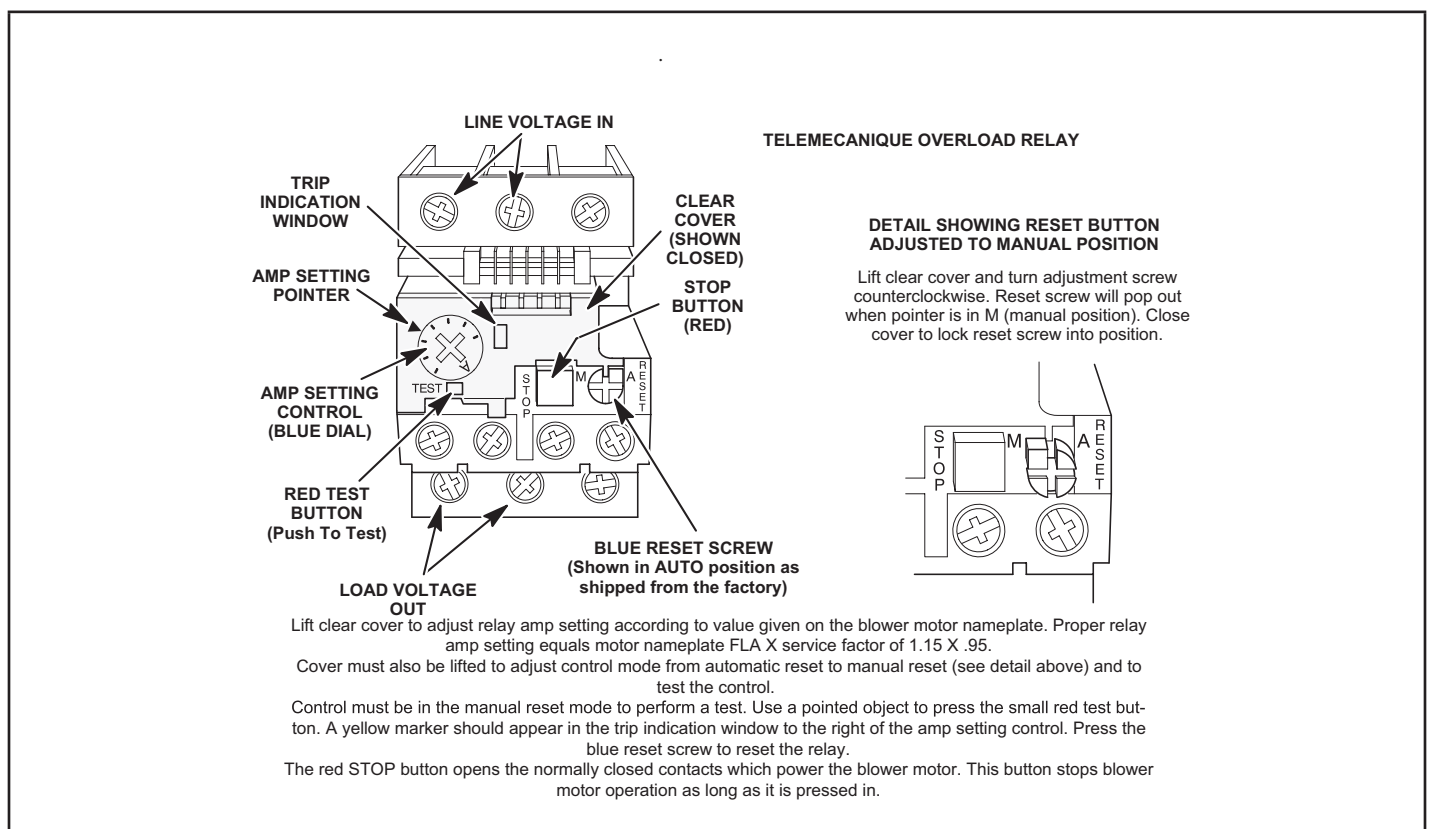
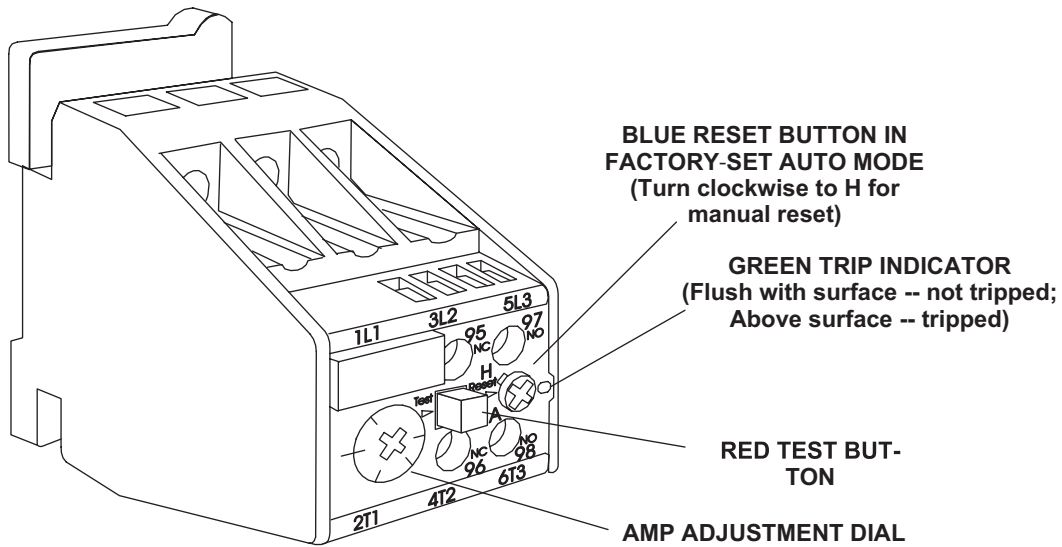


FIGURE 4

SIEMENS OVERLOAD RELAY



Adjust relay amp setting according to value given on the blower motor nameplate. Proper relay amp setting equals motor nameplate FLA X service factor of 1.15 X .95.

Use small slotted screwdriver to adjust control mode from automatic reset (A) to manual reset (H). Control must be in the manual reset mode (H) to perform a test. Press the red test button. Green trip indicator should pop out. Press the blue reset screw to reset the relay.

FIGURE 5

COMPRESSOR COMPONENTS

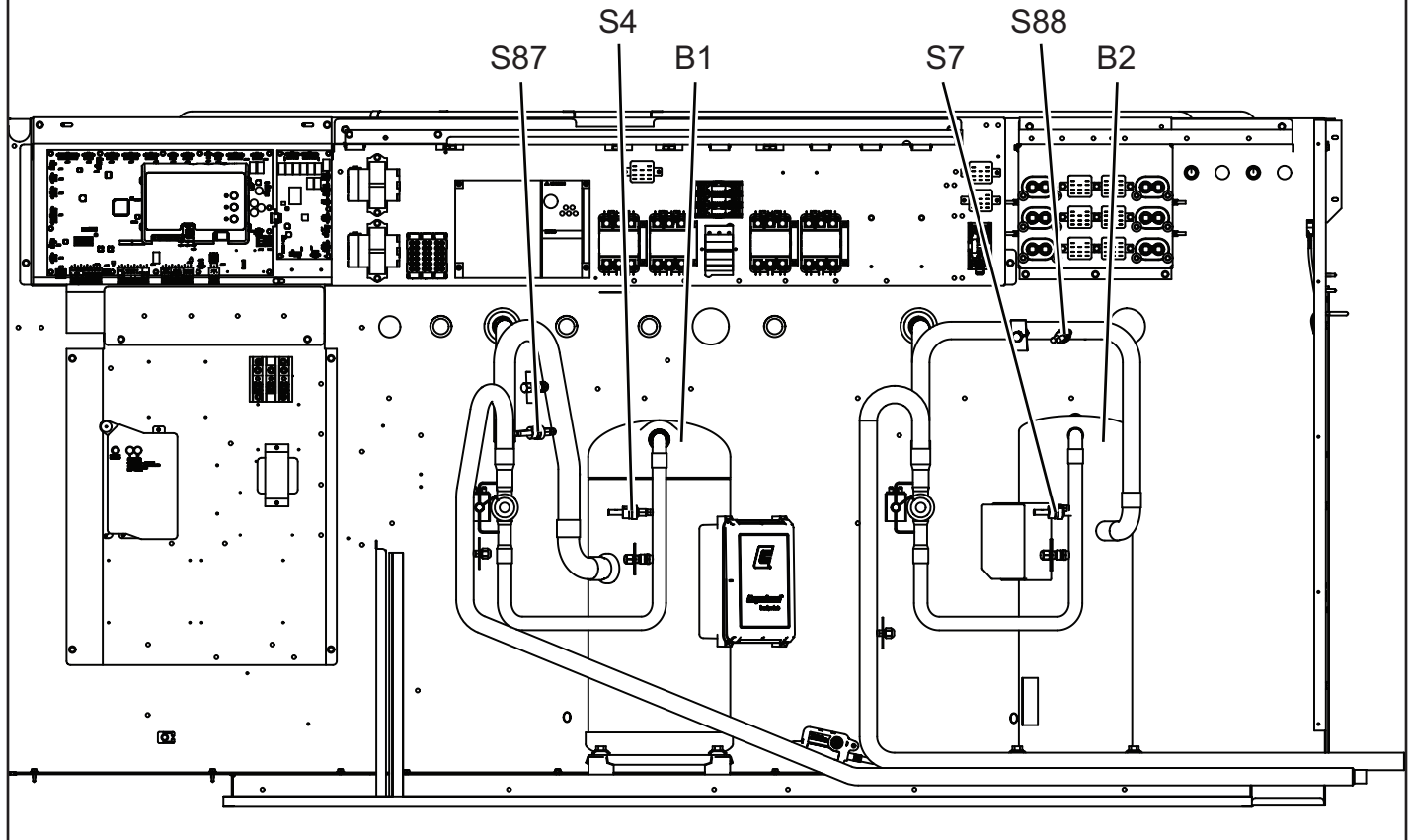


FIGURE 6

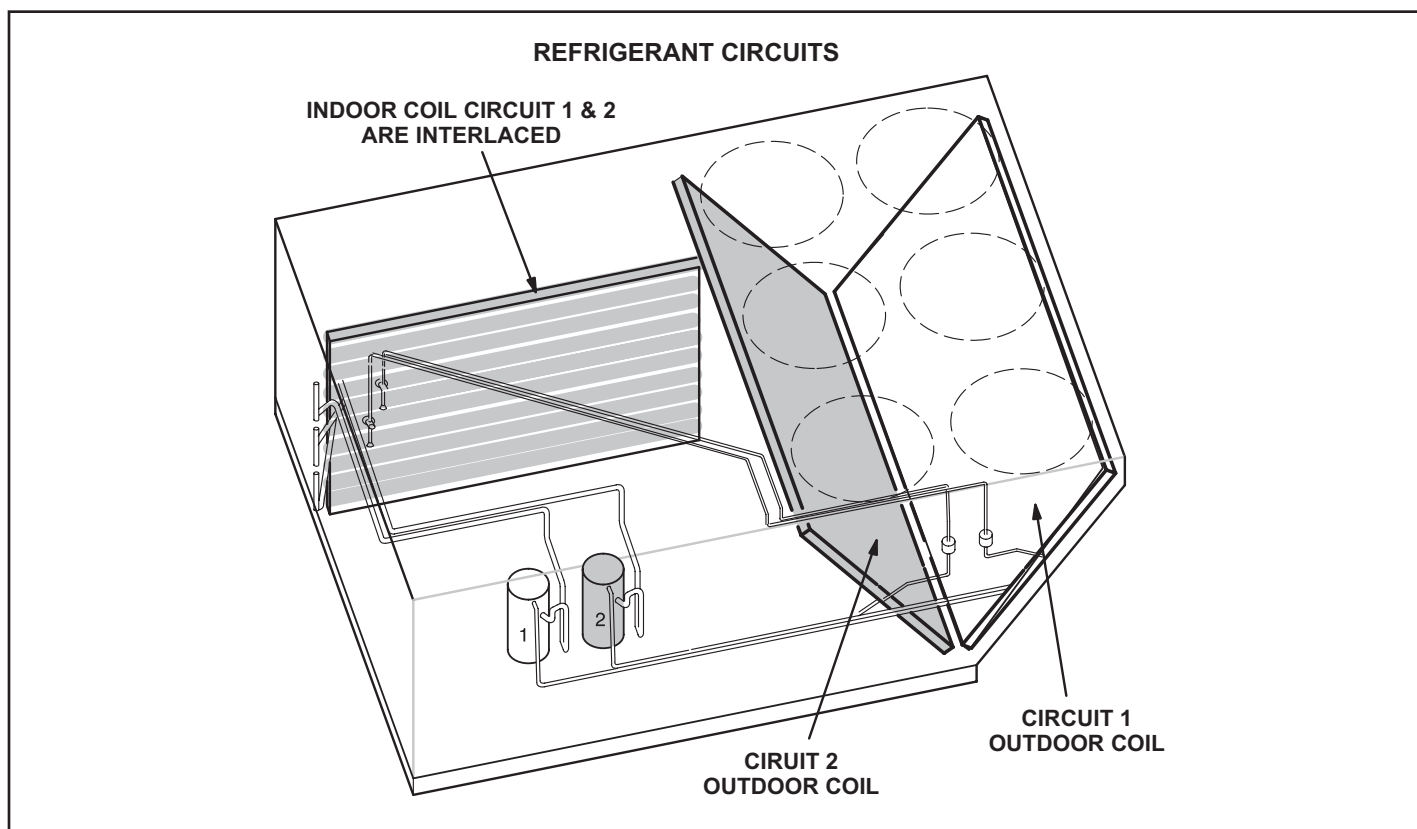


FIGURE 7

B-COOLING COMPONENTS

Units use independent cooling circuits consisting of one compressor, one condenser coil, and one evaporator coil per circuit.

Six draw-through type condenser fans are used in all units..

Cooling may be supplemented by a factory- or field-installed economizer. All units intertwined evaporators. Each evaporator uses a thermostatic expansion valve as the primary expansion device. Each evaporator is also equipped with enhanced fins and rifled tubing. In all units each compressor is protected by a crankcase heater, high pressure switch and low pressure switch.

1-Compressors B1 and B2

All units use scroll compressors. All units use 2 compressors, the first stage compressor is a 2-speed and the second stage compressor is fixed speed. 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.

If a compressor replacement is necessary, call 1-800-453-6669.

⚠ IMPORTANT

Some scroll compressors have an internal vacuum protector that will unload scrolls when suction pressure goes below 20 psig. A hissing sound will be heard when the compressor is running unloaded. Protector will reset when low pressure in system rises above 40 psig. DO NOT REPLACE COMPRESSOR.

2–Crankcase Heaters HR1 and HR2

All LHT units use insertion type heaters. Heater HR1 is installed around compressor B1 and HR2 compressor B2.

3–High Pressure Switches S4 and S7

The high pressure switches is an auto-reset SPST N.C. switch which opens on a pressure rise. All units are equipped with this switch. The switch is located in the compressor discharge line and is wired in series with the compressor contactor coil through A55 unit controller or A178 compressor 3 and 4 controller.

S4 and S7 are is wired in series with B1 and B2 compressor contactors.

When discharge pressure rises to 640 ± 10 psig (indicating a problem in the system) the switch opens and the respective compressor(s) is de-energized (the economizer can continue to operate). When discharge pressure drops to 475 ± 20 psig the pressure switch will close re-energizing the compressor(s).

Main control A55 has a three-strike counter before locking out. This means the control allows three high pressure trips per one thermostat demand. The control can be reset by breaking and remaking the thermostat demand or manually resetting the control

4–Low Pressure Switches S87 and S88

The low pressure switch is an auto-reset SPST N.O. switch (held N.C. by refrigerant pressure) which opens on a pressure drop. All units are equipped with this switch. The switch is located in the compressor suction line. See FIGURE 7.

S87 and S88 (compressor one and two) are wired in series with the contactor coils through the A55 Unit Controller

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

When suction pressure drops to 25 ± 5 psig (indicating low pressure), the switch opens and the compressor(s) is de-energized. The switch automatically resets when pressure in the suction line rises to 40 ± 5 psig.

5–Defrost Control

The defrost control ensures that the heat pump outdoor coil does not ice excessively during the heating mode. The defrost control uses input from the coil and ambient sensor to initiate demand defrost cycles from the M4 Board. If the system fails to calibrate or obtain readings for demand defrost, defrost will run-time at field setting. Low gas heat (LDT) or electric heat (LHT) is energized during defrost.

6–Filter Drier (all units)

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

7–Condenser Fans

B4, B5, B21, B22, B23 and B24 (All Units)

See SPECIFICATIONS tables at the front of this manual for specifications of condenser fans used in all units. All condenser fans used have single-phase motors. The fan assembly may be removed for servicing and cleaning.

8–Reversing Valve

A refrigerant reversing valve with a 24 volt solenoid coil is used to reverse refrigerant flow during unit operation in all LHT 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 valve L1 & L2 are controlled by the A55 Control board in response to a cooling demand or by defrost.

9–Temperature Thermistor

Units are equipped with four factory-installed thermistors (RT46 - RT49) located on different points on the refrigerant circuit.

The thermistors provide the Unit Controller with constant temperature readings of four specific locations on the refrigeration circuit. These temperatures are used as feedback in certain modes of unit operation. In addition, the Unit Controller uses these temperatures to initiate alarms such as loss of outdoor or indoor coil airflow and loss of charge.

Each thermistor must be specifically placed for proper unit operation and to initiate valid alarms. See FIGURE 9 for indoor coil location and FIGURE 10 for outdoor coil location.

**LHT/LDT302
INDOOR COIL
RT46, RT47**

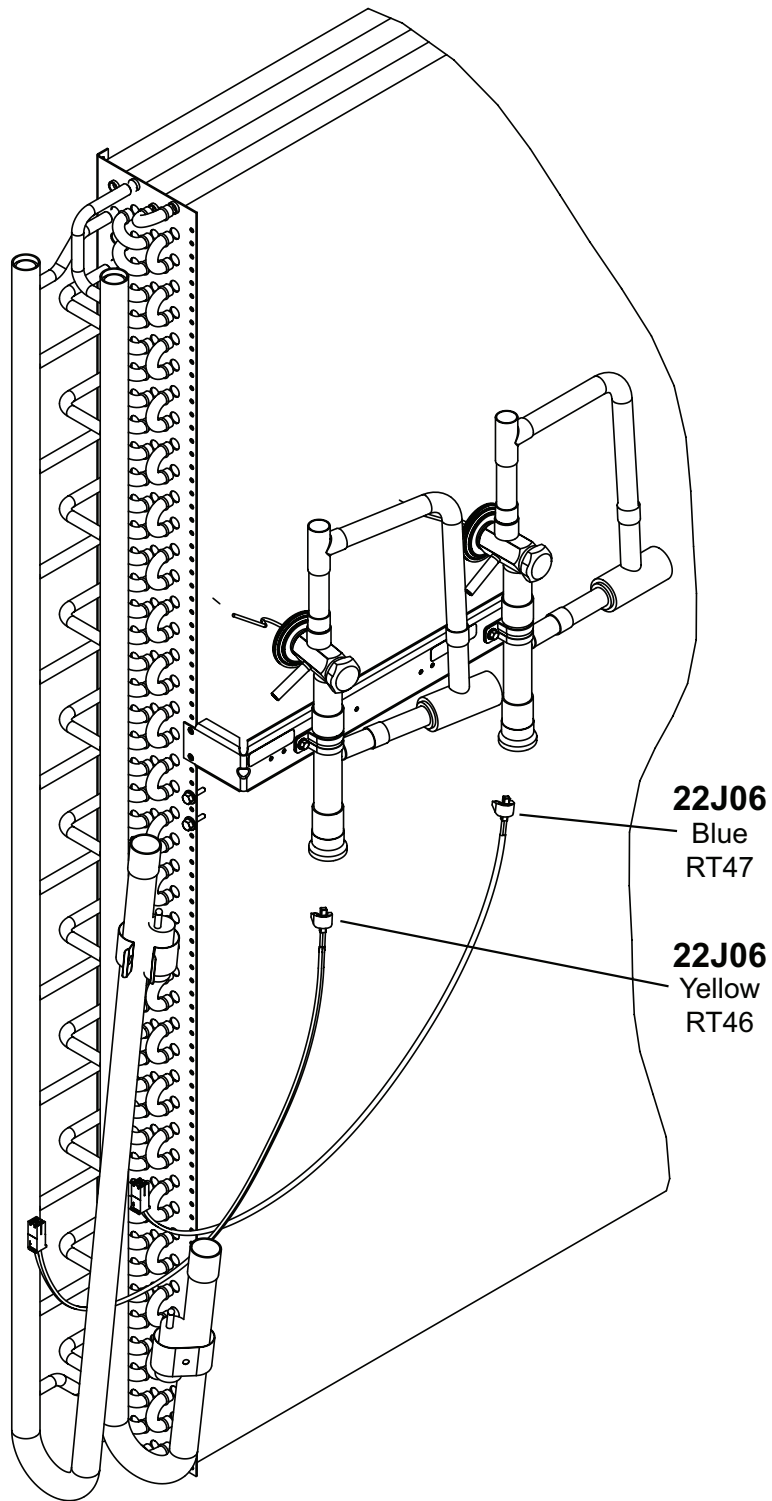


FIGURE 8

**LHT/LDT302
OUTDOOR COIL
RT48, RT49**

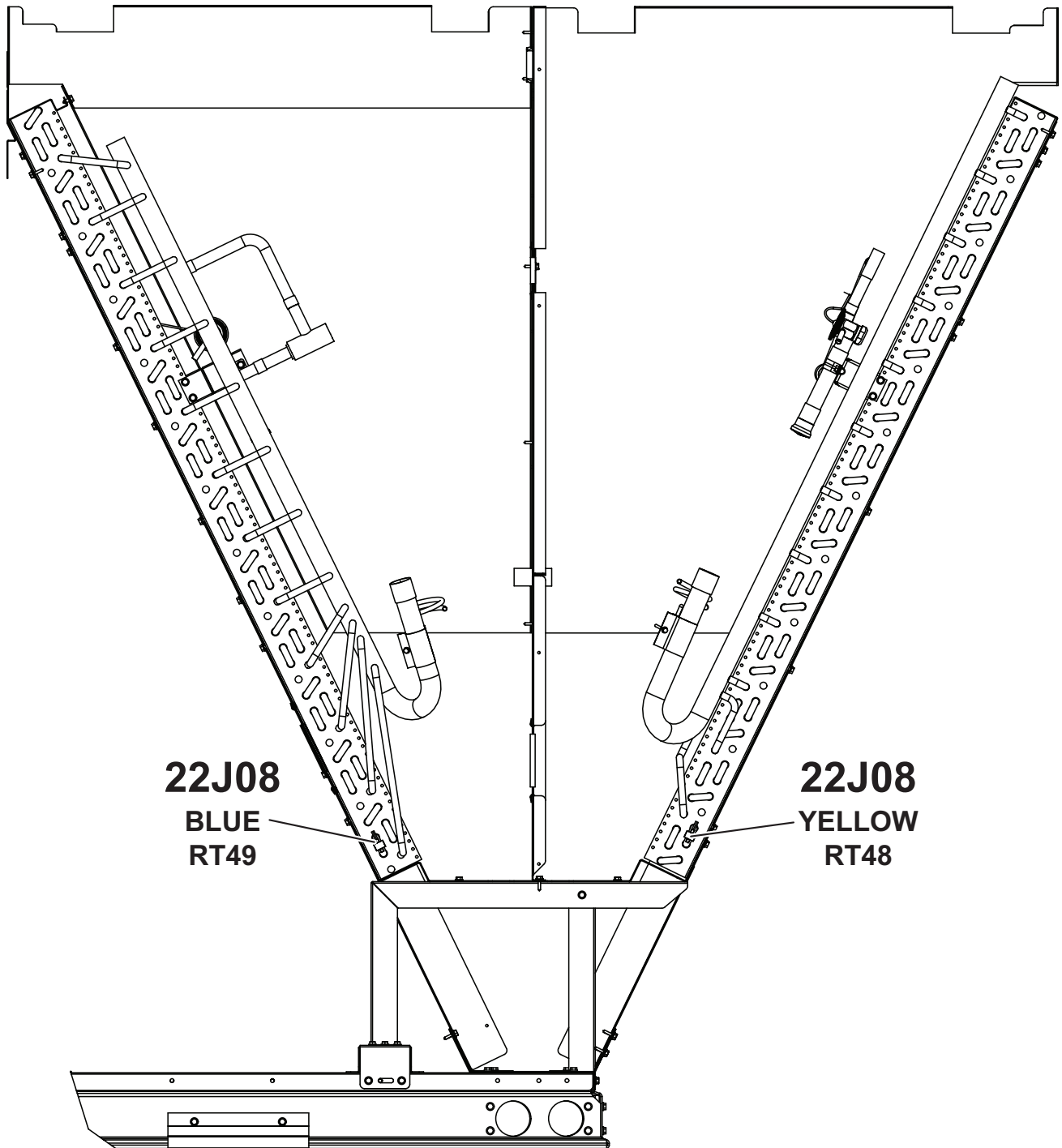


FIGURE 9

10-RDS Sensors

Units are equipped with factory-installed RDS Sensors located on different points on the unit. The RDS sensors provide the Unit Controller with continuous readings for leaked refrigerant concentration levels and sensor health status (Good or Fault). These readings are used to modify unit operation to disperse the leaked refrigerant and to remove possible ignition sources. In addition, the Unit Controller uses these readings to initiate alarms to alert the operator of a refrigerant leak or faulty sensor(s).

Each sensor must be specifically placed for proper unit operation and to initiate valid alarms. To identify sensor locations see TABLE 4.

TABLE 4

RDS Sensor Figures

Model	Qty.	Type	Figure
LHT302	2 sensors	INDOOR SENSOR	FIGURE 10
		COMPRESSOR SENSOR	FIGURE 11

TABLE 5 - RDS Alarms

Alarm	Alarm description	RDS Sensor Location
257	Refrigerant leak sensor fault in the Indoor section (sensor #1)	Indoor compartment
258	Refrigerant leak sensor fault in the control panel/compressor section (sensor #2)	"Control/Compressor or Compressor compartment"

**LHT 302
INDOOR COMPARTMENT RDS SENSOR**

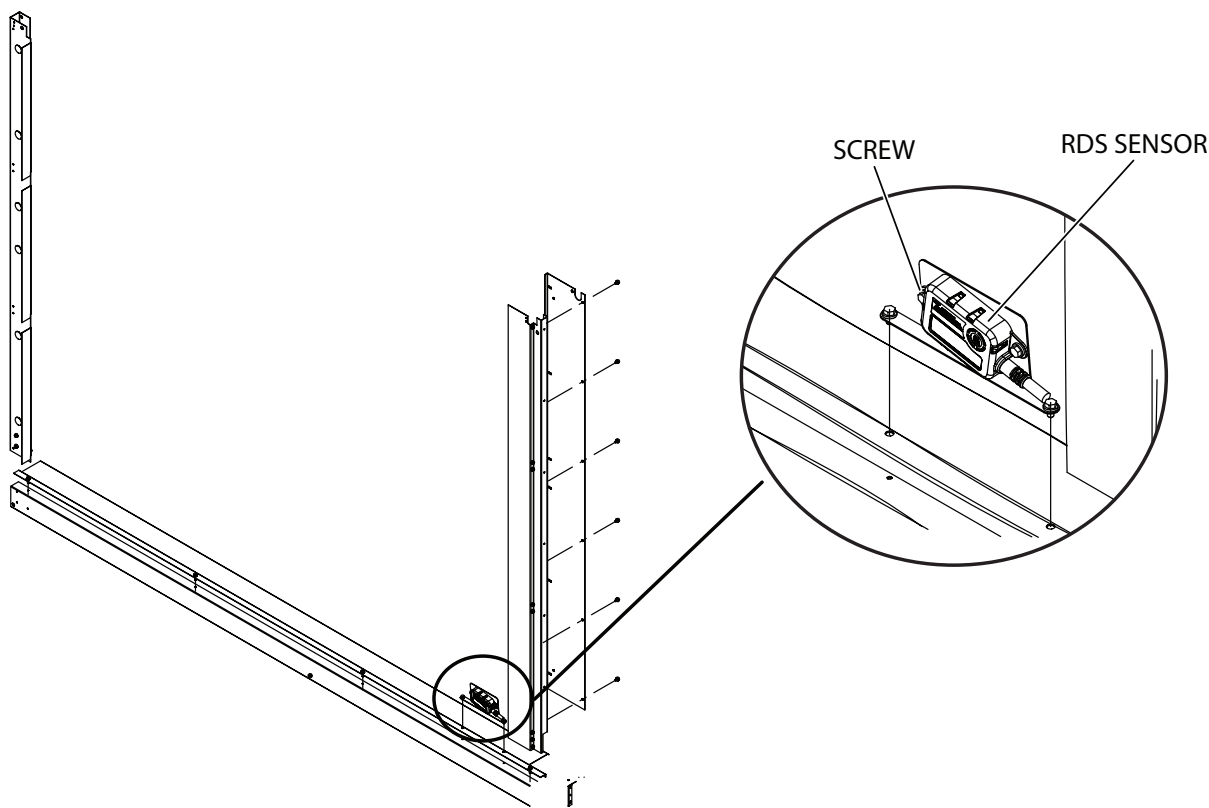
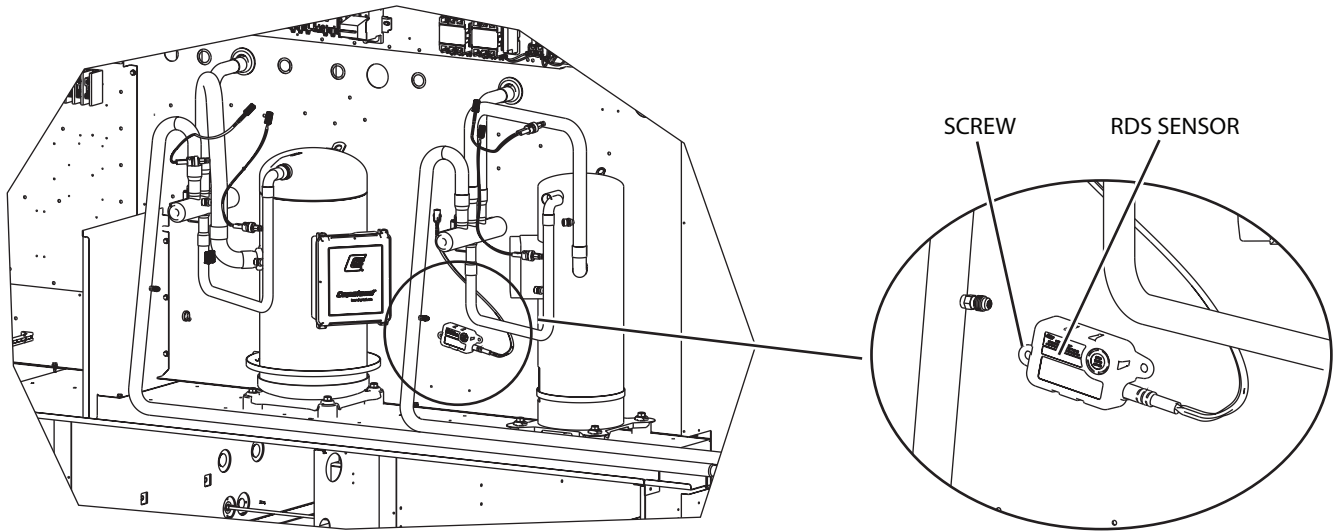


FIGURE 10

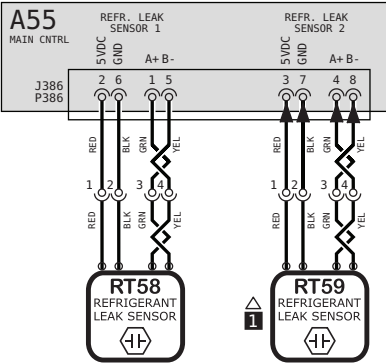
LHT 302
COMPRESSOR RDS SENSOR



USE WIRE TIES TO KEEP HARNESS WIRES
AWAY FROM HOT OR SHARP SURFACES.

FIGURE 11

RDS SENSOR



KEY LIST	
COMPONENT DESCRIPTION	
A55	CONTROL BOARD, MAIN
RT58	SENSOR 1, REFR. LEAK DETECTION
RT59	SENSOR 2, REFR. LEAK DETECTION

NOTES	
1	REFRIGERANT LEAK SENSOR 2 (RT59), MAY NOT BE PRESENT IN ALL UNITS.

WARNING
DISCONNECT ALL POWER BEFORE SERVICING.
ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.
FOR USE WITH COPPER CONDUCTORS ONLY. REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING AND INSULATION THICKNESS.

MODEL: Units w/CORE Contr.
Refr. Leak Detection
VOLT: All
SUPSDS: N/A
NO: 538440-01



Rev 0



REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012295C	04-03-2024	MXR6	MXT5	ORIGINATED AT PD&R CARROLLTON, TX

FIGURE 12

C-BLOWER COMPARTMENT

The blower compartment is located between the evaporator coil and the compressor / control section on the opposite side of the condenser coil. The blower assembly is accessed by disconnecting the blower motor wiring (and all other plugs) and removing the screws on either side of the sliding base. The base pulls out as shown in FIGURE 14.

1-Blower Wheels

All units have two 15 in. x 15 in. blower wheels. Both wheels are driven by one motor.

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

Supply Air Staged Units - The blower rotation will always be correct on units equipped with an inverter. Checking blower rotation is not a valid method of determining voltage phasing for incoming power. **Supply Air Staged Units and Units Equipped With Optional Voltage or Phase Detection** - The Unit Controller checks the incoming power during start-up. If the voltage or phase is incorrect, the Unit Controller will display an alarm and the unit will not start.

A-Blower Operation

Refer to the Unit Controller Setup Guide to energize blower. Use this mobile service app (the QR is located in the control area) menu:

SERVICE > TEST > BLOWER

Instructions provided with the thermostat may also be used to initiate blower only (G) demand. 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.



IMPORTANT

Three Phase Scroll Compressor Voltage Phasing

Three phase scroll compressors must be phased sequentially to ensure correct compressor and blower* rotation and operation. Compressor and blower are wired in phase at the factory. Power wires are color-coded as follows: line 1-red, line 2-yellow, line 3-blue.

1-Observe suction and discharge pressures and blower* rotation on unit start-up.

2-Suction pressure must drop, discharge pressure must rise and blower* rotation must match rotation marking. If pressure differential is not observed or blower* rotation is not correct:

3-Disconnect all remote electrical power supplies.

4-Reverse any two field-installed wires connected to the line side of S48 disconnect or TB13 terminal strip. Do not reverse wires at blower contactor.

5-Make sure the connections are tight. Discharge and suction pressures should operate at their normal start-up ranges.

*Supply air inverter blower motors should rotate in the correct direction; verify scroll compressor rotation separately. Contact technical support if the blower is rotating incorrectly.



WARNING

1-Make sure that 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.

3-Check to ensure that refrigerant lines do not rub against the cabinet or against other refrigerant lines.

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

5-Make sure filters are new and in place before start-up.

B-Blower Access

1. Disconnect jack/plug connector to blower motor. Also disconnect jack/plug connector heating limit switches on gas units.
2. Remove screws on either side of blower assembly sliding base. See FIGURE 14.
3. Pull base toward outside of unit.

C-Determining Unit CFM

⚠ WARNING

Multi-staged supply air units are factory-set to run the blower at full speed when there is a blower (G) demand without a heating or cooling demand. Refer to the field-provided, design specified CFM for all modes of operation. Use the following procedure to adjust motor pulley to deliver the highest CFM called for in the design spec. See Inverter Start-Up section to set blower CFM for all modes once the motor pulley is set.

1. The following measurements must be made with a dry indoor coil. Run blower (G demand) 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). Blower performance data is based on static pressure readings taken in locations shown in FIGURE 13.

NOTE - Static pressure readings can vary if not taken where shown.

3. See table of contents for Blower Data and or Optional Accessories. Use static pressure and RPM readings to determine unit CFM.
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 15. Do not exceed minimum and maximum number of pulley turns as shown in TABLE 6.

TABLE 6

MINIMUM AND MAXIMUM PULLEY ADJUSTMENT

Belt	Min Turns Open	Max 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.

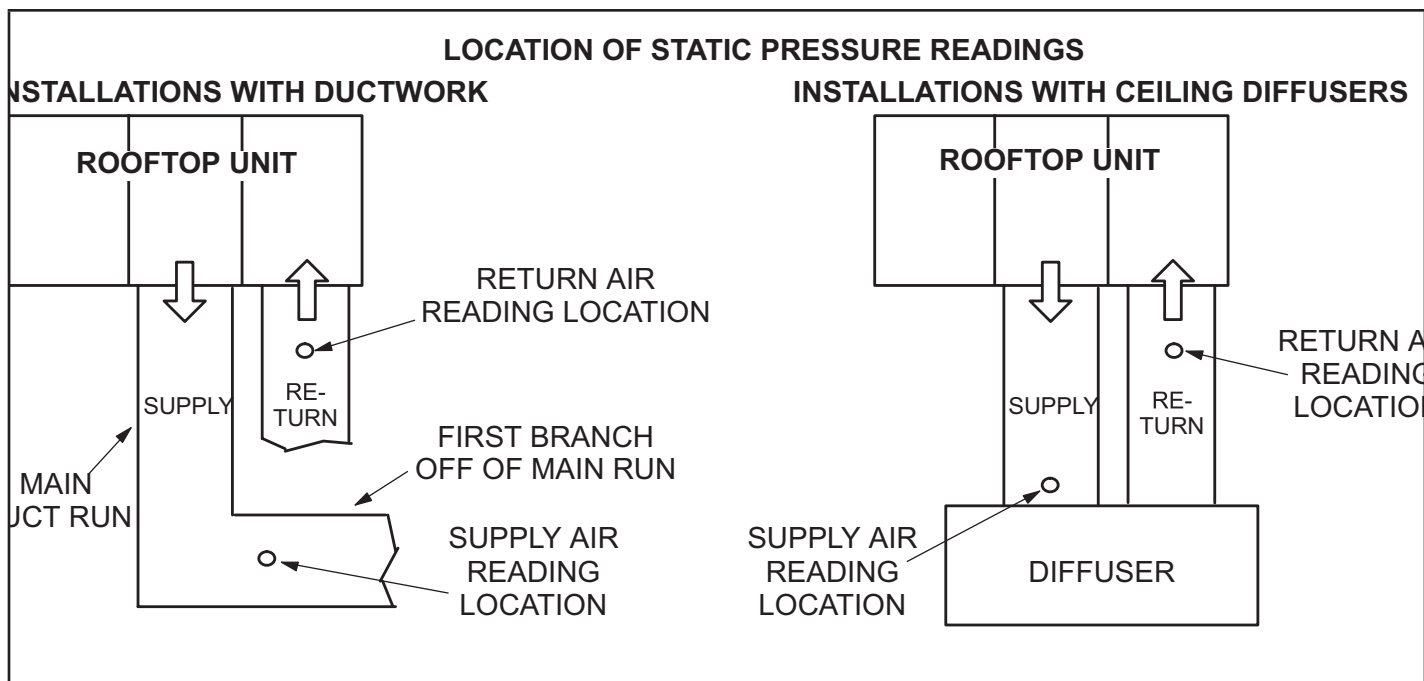


FIGURE 13

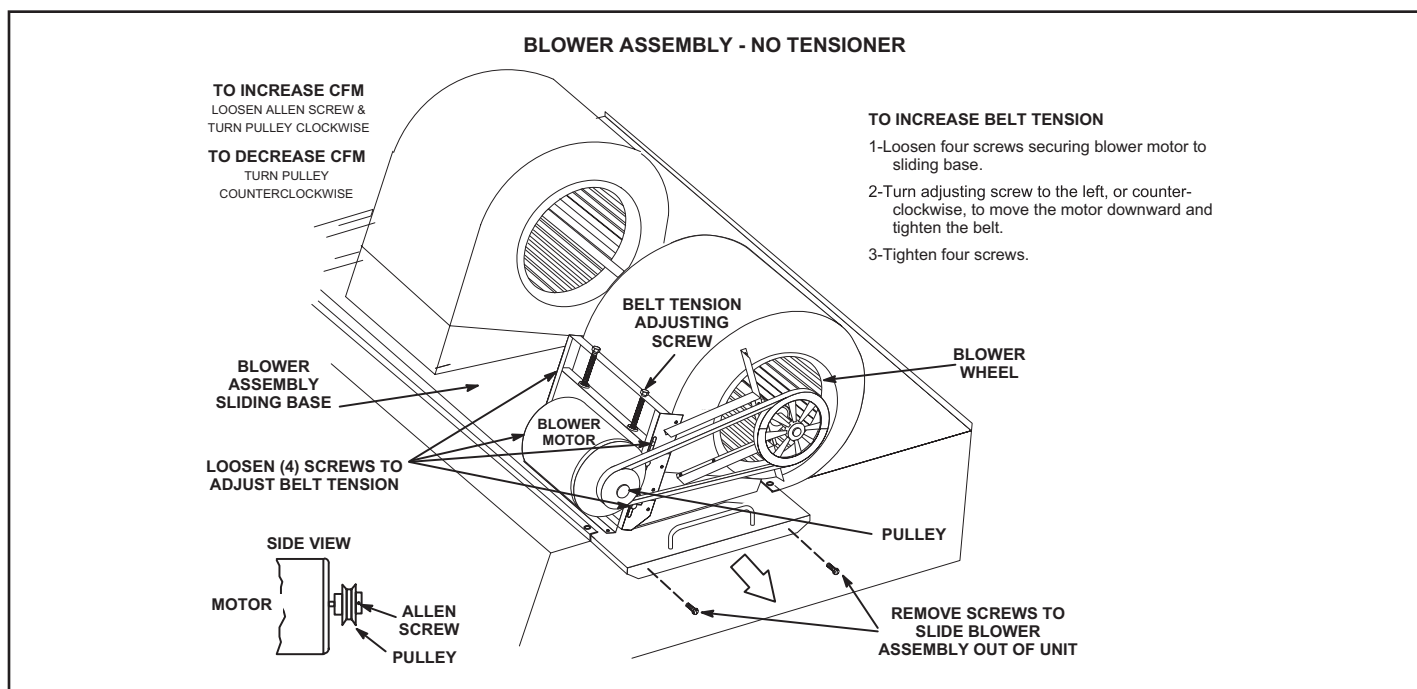


FIGURE 14

D-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 into pulley grooves. Make sure blower and motor pulley are aligned. See FIGURE 14 for blowers not equipped with a tensioner and FIGURE 16 for units equipped with an optional belt tensioner.

Blowers Without Belt Tensioner

1. Loosen four screws securing blower motor to sliding base. See FIGURE 14.
2. *To increase belt tension -*
Turn belt tension adjusting screw to the left, or counterclockwise, to tighten the belt. This increases the distance between the blower motor and the blower housing.
3. *To loosen belt tension -*
Turn the adjusting screw to the right, or clockwise to loosen belt tension. 3- Tighten four screws securing blower motor to sliding base once adjustments have been made.

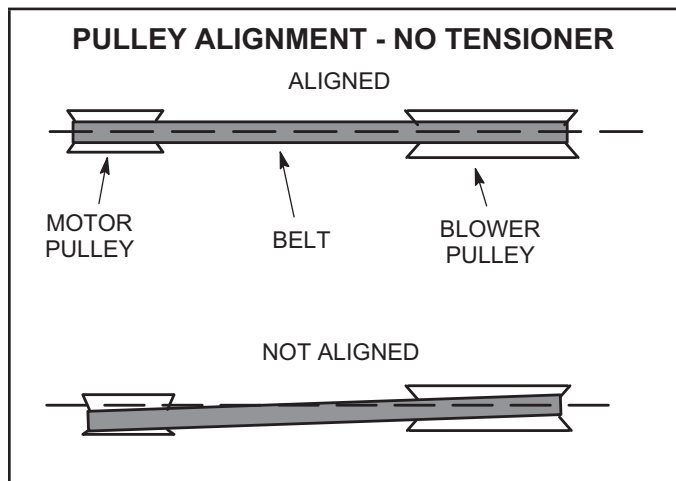


FIGURE 15

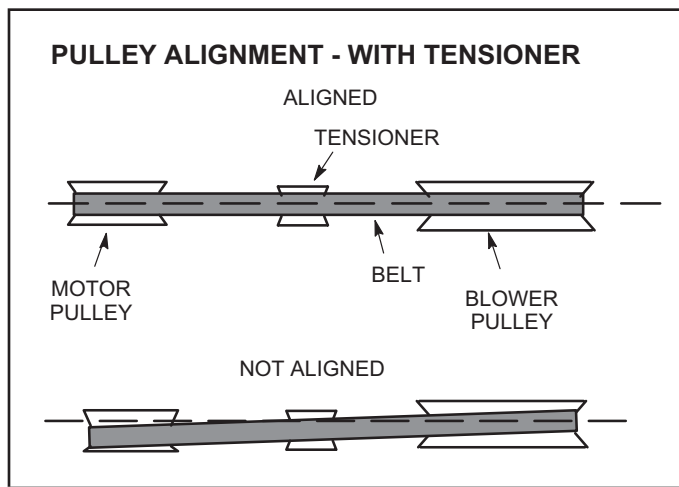


FIGURE 16

E-Check Belt Tension

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

1. Measure span length X. See FIGURE 17.
2. Apply perpendicular force to center of span (X) with enough pressure to deflect belt $\frac{1}{64}$ " for every inch of span length.

Example: Deflection distance of a 40" span would be $\frac{40}{64}$ " or $\frac{5}{8}$ ".

3. Measure belt deflection force. For a used belt, the deflection force should be 5 lbs. A new belt deflection force should be 7 lbs

A force below these values indicates an under tensioned belt. A force above these values indicates an over tensioned belt.

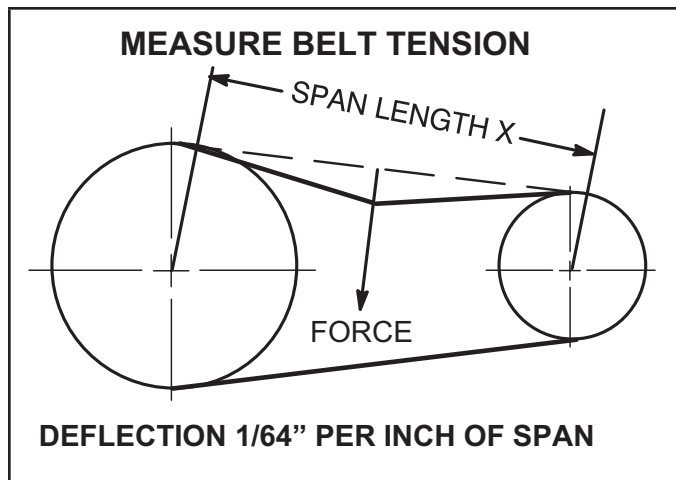


FIGURE 17

F-Field-Furnished Blower Drives

See BLOWER DATA tables for blower drives.

D-OPTIONAL ELECTRIC HEAT

See ELECTRICAL / ELECTRIC HEAT DATA and ELECTRIC HEAT CAPACITIES (table of contents) for LHT to EHA match-ups and electrical ratings.

EHA parts arrangement is shown in FIGURE 19 and FIGURE 20. All electric heat sections consist of electric heating elements exposed directly to the air stream. Two electric heat sections (first section and second section) are used in all 15kW through 90kW heaters. See FIGURE 18. Multiple-stage elements are sequenced on and off in response to thermostat demand.

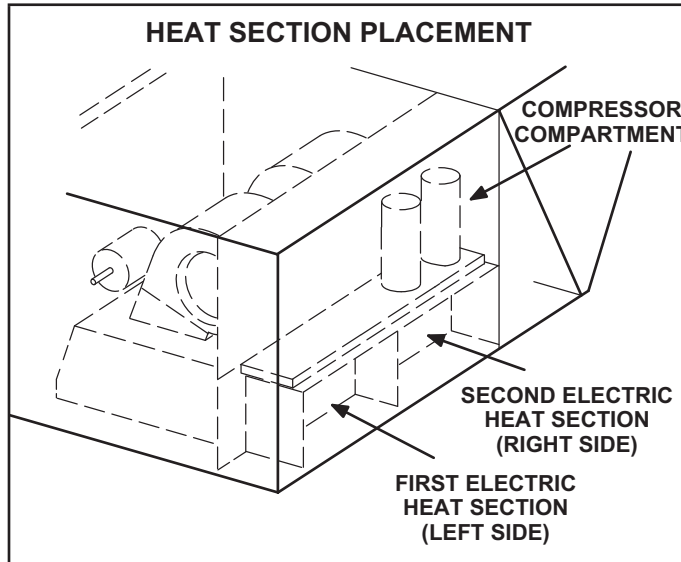


FIGURE 18

1–Main Control Box Components A55, K9

The main control box (FIGURE 3) houses the A55 Unit Controller and the K9 electric heat relay.

2–Contactors K15, K16, K17 and K18

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

3–High Temperature Limits S15 and S107 (Primary)

S15 and S107 are SPST N.C. auto-reset thermostats located on the back panel of the electric heat section below the heating elements. S15 is the high temperature limit for the first electric heat section, while S107 is the high temperature limit for the second electric heat section. Both thermostats are identical and are wired to the A55 Unit Controller. When either S15 or S107 opens, indicating a problem in the system, contactor K15 is de-energized. When K15 is de-energized, first stage and all subsequent stages of heat are de-energized. The thermostats used on EHA360-45-1 Y/G/J are factory set to open at $200\text{F} \pm 5\text{F}$ on a temperature rise and automatically reset at $160\text{F} \pm 6\text{F}$ on a temperature fall. All other electric heat section thermostats are factory set to open at $170\text{F} \pm 5\text{F}$ on a temperature rise and automatically reset at $130\text{F} \pm 6\text{F}$ on a temperature fall. The thermostats are not adjustable.

4–Terminal Strip TB3

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

5–Heating Elements HE1 through HE14

Heating elements are composed of helix wound bare nichrome wire exposed directly to the air stream. 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.

6–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 19, FIGURE 20 and TABLE 7 show the fuses used with each electric heat section. For simplicity, the service manual labels the fuses F3 - 1 through F3 - 8

TYPICAL ELECTRIC HEAT SECTION COMPONENT LAYOUT

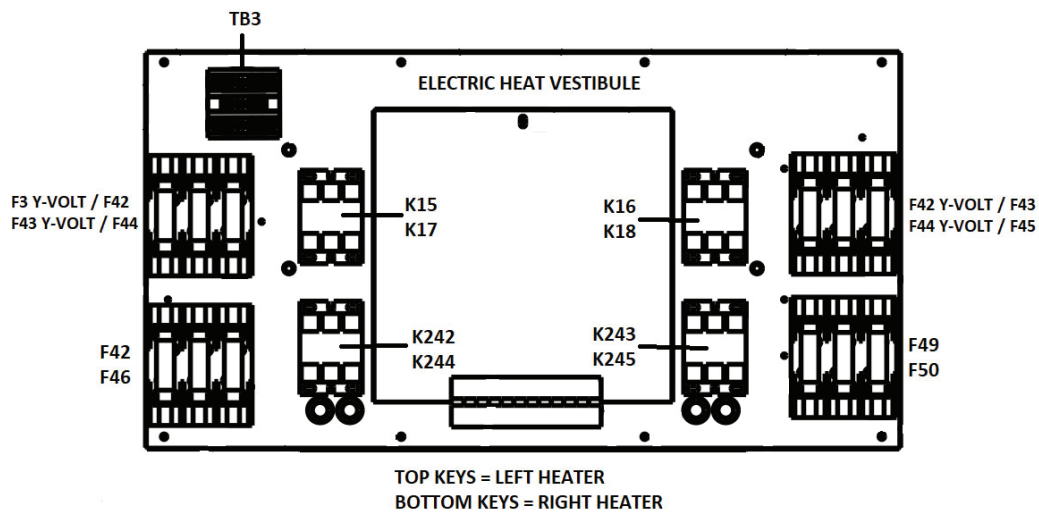


FIGURE 19

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

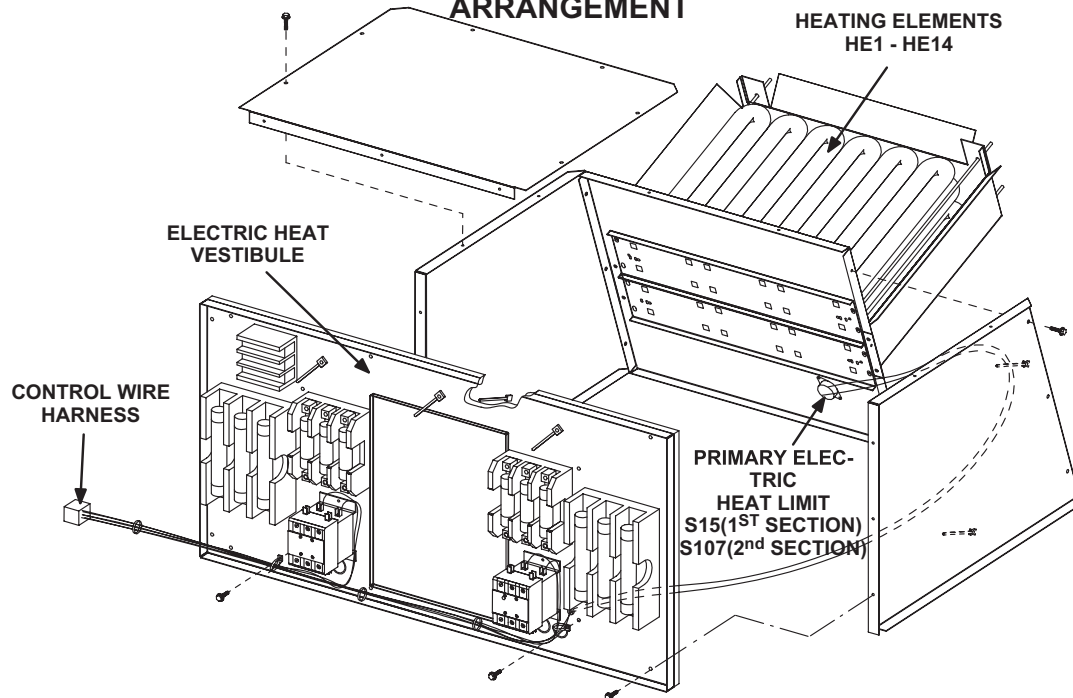


FIGURE 20

TABLE 7

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

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.

III-CHARGING

A-Unit Charging - Tube & Fin Coil



IMPORTANT

Units equipped with a Hot Gas Reheat system MUST be charged in standard cooling mode.

WARNING – Do not exceed nameplate charge under any condition.

Refrigerant Charge R-454B		
Unit	M _c (lbs)	M _c (kg)
LHT302 Stage 1	25.00	11.34
LHT302 Stage 2	23.00	10.43

Refrigerant Charge R-454B - with Humiditrol		
Unit	M _c (lbs)	M _c (kg)
LHT302 Stage 1	29.00	13.15
LHT302 Stage 2	23.50	10.66

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

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed and, since flammability is a consideration, the following procedure shall be adhered to:

- Safely remove refrigerant following local and national regulations,
- Evacuate the circuit,
- Purge the circuit with inert gas,
- Evacuate,
- Purge with inert gas,
- Open the circuit

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. Refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the refrigerating unit is earthed prior to charging the system with refrigerant.
 - Label the system when charging is complete (if not already).
 - Extreme care shall be taken not to overfill the refrigerating unit.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i. e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

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

IMPORTANT - Charge unit in normal cooling mode.

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

- 1 - Make sure outdoor coil is clean. Attach gauge manifolds and operate unit at full CFM in cooling mode with economizer disabled until system stabilizes (approximately five
 - The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
 - If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.
- 2 - Add or remove charge in increments. Allow the system to stabilize each time refrigerant is added or removed.

- 3 - Continue the process until measured liquid temperature agrees with the target liquid temperature. Do not go below the target liquid temperature when adjusting charge. Note that suction pressure can change as charge is adjusted.
- 4 - Compare the normal operating pressures to the pressures obtained from the gauges. Check unit components if there are significant differences.
- 5 - Measure the outdoor ambient temperature and the suction pressure. Refer to the charging curve to determine a target liquid temperature.

NOTE – Pressures are listed for sea level applications.

- 6 - Use the same thermometer to accurately measure the liquid temperature (in the outdoor section). If measured liquid temperature is higher than the target liquid temperature, add refrigerant to the system.
 - If measured liquid temperature is lower than the target liquid temperature, recover some refrigerant from the system.
 - When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i. e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
 - The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt. The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
 - If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

- 7 - Add or remove charge in increments. Allow the system to stabilize each time refrigerant is added or removed.
- 8 - Continue the process until measured liquid temperature agrees with the target liquid temperature. Do not go below the target liquid temperature when adjusting charge. Note that suction pressure can change as charge is adjusted.

TABLE 8
Normal Operating Pressures - 581455-02

Outdoor Coil Entering Temp.	CIRCUIT 1		CIRCUIT 2	
	Discharge ± 10 psig	Suction ± 5 psig	Discharge ± 10 psig	Suction ± 5 psig
65 °F	242	112	257	123
75 °F	278	119	294	125
85 °F	323	122	339	127
95 °F	369	124	386	128
105 °F	420	128	437	131
115 °F	475	131	492	133

TABLE 9
Normal Operating Pressures w/ Reheat - 581456-02

Outdoor Coil Entering Temp.	CIRCUIT 1		CIRCUIT 2	
	Discharge ± 10 psig	Suction ± 5 psig	Discharge ± 10 psig	Suction ± 5 psig
65 °F	276	115	253	123
75 °F	312	122	290	125
85 °F	360	125	335	127
95 °F	403	127	382	128
105 °F	452	131	433	131
115 °F	505	134	488	133

B—Charge Verification - Approach Method - AHRI
Testing (Fin/Tube Coil)

- 1 - Using the same thermometer, compare liquid temperature to outdoor ambient temperature.
Approach Temperature = Liquid temperature (at outdoor coil outlet) minus ambient temperature.
- 2 - Approach temperature should match values in TABLE 8. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.
- 3 - The approach method is not valid for grossly over or undercharged systems. Use TABLE 10 as a guide for typical operating pressures.

TABLE 10
APPROACH TEMPERATURES - FIN/TUBE COIL

Unit	Liquid Temp. Minus Ambient Temp.	
	1st Stage	2nd Stage
302	6.7°F ± 1 (3.7°C ± 0.5)	8.2°F ± 1 (4.5°C ± 0.5)

IV-START-UP OPERATION

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. Voltage must be within the range listed on the nameplate. If not, consult power company and have the voltage corrected before starting the unit.
5. Recheck voltage and amp draw with unit running. If voltage is not within range listed on unit nameplate, stop unit and consult power company. Refer to unit nameplate for maximum rated load amps.
6. Inspect and adjust blower belt (see section on Blower Compartment - Blower Belt Adjustment).

B-Cooling Start-up

NOTE – Crankcase heaters must be energized 24 hours before attempting to start compressor. Set thermostat so that there is no demand to prevent compressor from cycling. Apply power to unit.

1. Initiate first and second stage cooling demands according to instructions provided with thermostat.
2. First-stage thermostat demand will energize indoor blower in Low Cooling CFM. Second-stage thermostat demand will energize indoor blower in High Cooling CFM. Both demands energize compressor 1. The remaining compressors will be energized as needed to meet cooling demand.
3. The unit contain two refrigerant circuits or systems.
4. Each refrigerant circuit is separately charged with R454B refrigerant. See unit rating plate for correct amount of charge.
5. Refer to the Refrigerant Check and Charge section to check refrigerant charge.

C-Heating Startup

1. Set thermostat or temperature control device to initiate a first-stage heating demand.
2. A first-stage heating demand (W1) will energize compressor heat pump heating, the outdoor fans, and the blower..
3. A second-stage heating demand (W2) will energize the electrical heaters if available.

V-SYSTEMS SERVICE CHECKS

A-Cooling System Service Checks

LHT units are factory charged and require no further adjustment; however, charge should be checked periodically using the liquid temperature plots in section III – CHARGING.

VI-MAINTENANCE

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

⚠ 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.

⚠ IMPORTANT

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

⚠ WARNING

Any service personnel installing, decommissioning, or performing maintenance on the unit must be properly trained with A2L refrigerants

Prior to beginning work on systems containing refrigerant to ensure the risk of ignition is minimized:

- All work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i. e. non-sparking, adequately sealed or intrinsically safe.
- If any hot work is to be conducted on the refrigerating equipment or any associated parts, the appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
- No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed.
- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.

A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

- Where electrical components are being changed, service technicians shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance. The following checks shall be applied to installations using flammable refrigerants as applicable:
 1. The actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed.
 2. The ventilation machinery and outlets are operating adequately and are not obstructed.
 3. If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
 4. Markings on the equipment should be visible and legible. Markings and signs that are illegible shall be corrected.
 5. Refrigerating pipes or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.
- For systems containing refrigerant all repair and maintenance to electrical components shall include initial safety checks and component inspection procedures such as that capacitors are discharged in a safe manner to avoid possibility of sparking, that no live electrical components and wiring are exposed while charging, recovering, or purging the system, and that there is continuity of earth bonding. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used that is reported to the owner of the equipment, so all parties are advised.

NOTE – *Sealed electrical components shall be replaced, not repaired.*

NOTE - *Intrinsically safe components must be replaced, not repaired. Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.*

- When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:
 - a. Safely remove refrigerant following local and national regulations,
 - b. Evacuate the circuit,
 - c. Purge the circuit with inert gas,
 - d. Evacuate,
 - e. Purge with inert gas,
 - f. Open the circuit.
- The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. Refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

A—Filters

LHT units use six 24 X 24 X 2" fiberglass throw-away type filters. Filters may be accessed through the economizer / filter access door. Filters should be checked monthly (or more frequently in severe use) and cleaned or replaced regularly. Take note of the "AIR FLOW DIRECTION" marking on the filter frame when re-installing.

B—Lubrication

All motors and blower wheels used in LHT units are lubricated; no further lubrication is required.

C—Supply Air Blower Wheel

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

D—Evaporator Coil

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

E—Condenser Coil

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

F—Electrical

1. Check all wiring for loose connections.
2. Check for correct voltage at unit (unit operating).
3. Check amp-draw on both condenser fan motor and blower motor.

Fan Motor Rating Plate ____ Actual ____

Indoor Blower Motor Rating Plate ____ Actual ____

VII-ACCESSORIES

The accessories section describes the application of most of the optional accessories which can be factory or field installed to the LHT units.

A-Roof Curbs

When installing the LHT units on a combustible surface for downflow discharge applications, the hybrid C1CURB70C-1 8-in height, C1CURB71C-1 14-in height, C1CURB72C-01 18-in height and C1CURB73C-1 24-in roof mounting frame is used. The assembled hybrid mounting frame is shown in FIGURE 21. 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 22. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

For horizontal discharge applications, use the standard C1URB14C-1 26-in or C1CURB16C-1 37-in height roof mounting frame. This frame converts unit from down-flow to horizontal air flow. The 37 inch horizontal frame meets National Roofing Code requirements. The roof mounting frames are recommended in all other applications but not required. If the LHT 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.

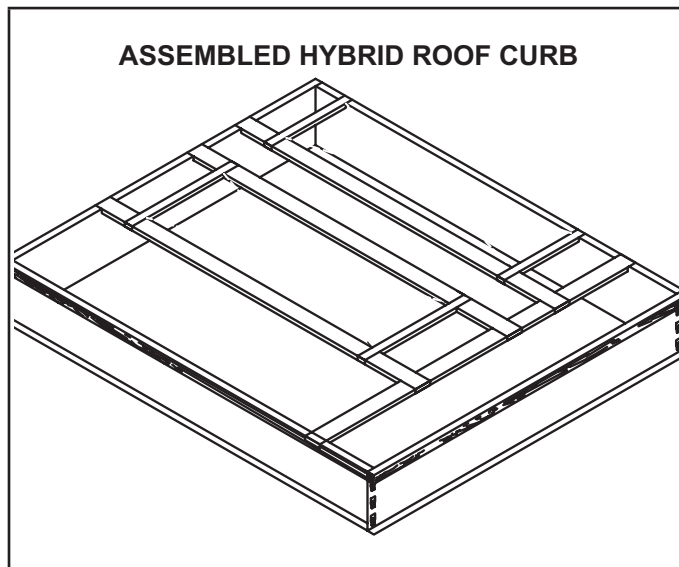


FIGURE 21

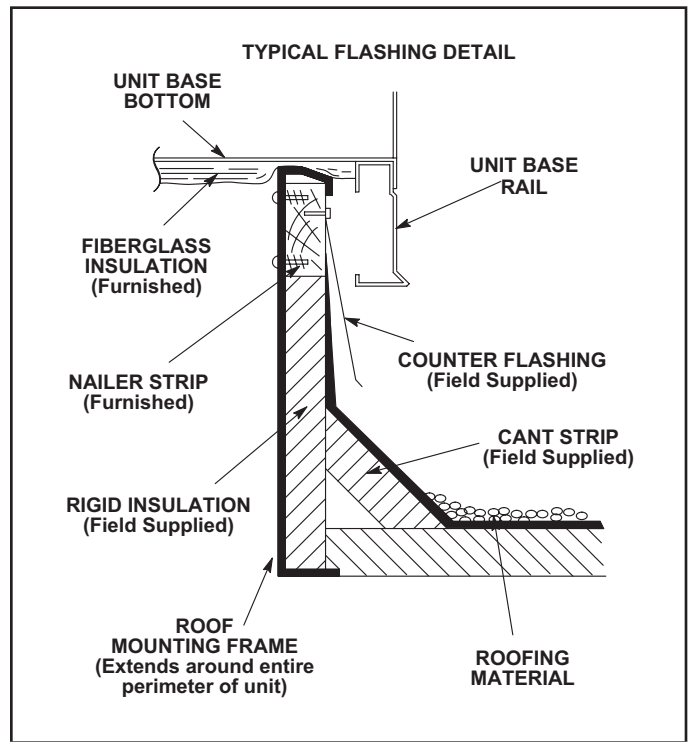


FIGURE 22

B-Transitions

Optional supply/return transitions C1DIFF33C-1 and C1DIFF34C-1 are available for use with LHT series units utilizing optional C1CURB roof curbs. Transition must be installed in the roof curb before mounting the unit to the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

C-C1DAMP10 & E1DAMP20 Outdoor Air Dampers

C1DAMP10C and E1DAMP20C (FIGURE 23) consist of a set of dampers which may be manually or motor operated to allow up to 25 percent outside air into the system at all times. Either air damper can be installed in LHT units. Washable filter supplied with the outdoor air dampers can be cleaned with water and a mild detergent. It should be sprayed with Filter Handicoater when dry prior to re-installation. Filter Handicoater is R.P. Products coating no. 418 and is available as Part No. P-8-5069.

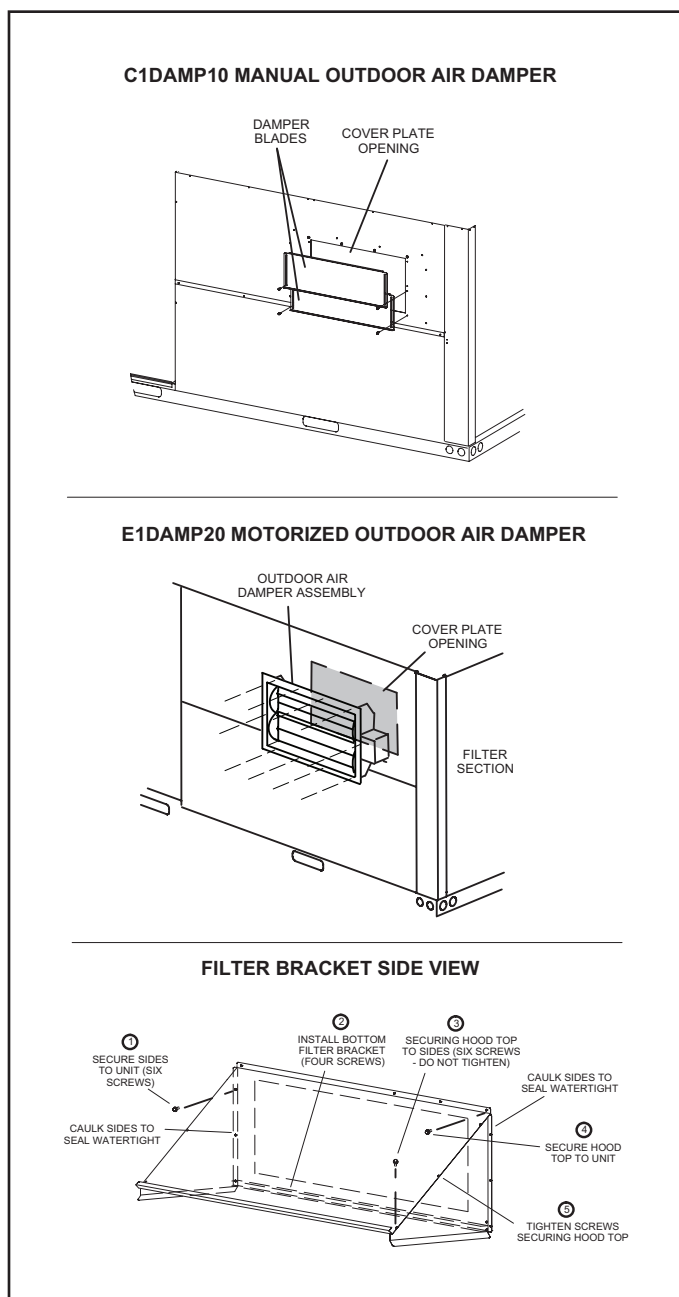


FIGURE 23

D—Supply and Return Diffusers

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

E—E1ECON15C-2 Standard and E1ECON17C-1 High Performance Economizer (Field or Factory Installed)

The optional economizer can be used with downflow and horizontal air discharge applications. The economizer uses outdoor air for free cooling when temperature and/or humidity is suitable. An economizer hood is furnished with the economizer.

NOTE – Gravity exhaust dampers are required with power exhaust.

The economizer is controlled by the A55 Unit Controller. The economizer will operate in one of four modes. Each mode requires a different A55 Unit Controller DIP switch setting. Each mode also requires different sensors. The following is a brief description. See economizer installation instruction for more detail.

1—"TMP" MODE (SENSIBLE TEMPERATURE)

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

2—"ODE" MODE (OUTDOOR ENTHALPY)

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

3—"DIF" MODE (DIFFERENTIAL ENTHALPY)

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

4—"GLO" MODE (GLOBAL)

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

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

NOTE – All economizer modes of operation will modulate dampers to 55F supply air.

F–Gravity Exhaust Dampers

C1DAMP50C dampers (FIGURE 24) are used in downflow and LAGEDH are used in horizontal air discharge applications. LAGEDH gravity exhaust dampers are installed in the return air plenum. The dampers must be used any time an economizer or power exhaust fans are applied to LHT series units. An exhaust hood is furnished with the gravity exhaust damper.

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

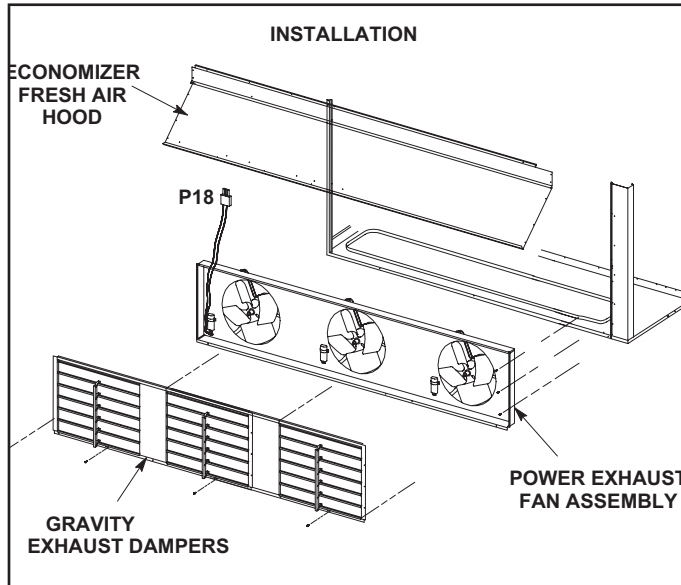


FIGURE 24

G–C1PWRE10 Power Exhaust Fans

C1PWRE10 power exhaust fans are used in downflow applications only. C1PWRE10 fans require optional downflow gravity exhaust dampers and E1ECON15 economizers. Power exhaust fans provide exhaust air pressure relief and also run when return air dampers are closed and supply air blowers are operating. FIGURE 24 shows the location of the power exhaust fans. See installation instructions for more detail.

H–Control Systems

The A55 Unit Controller provides all control function for the rooftop unit. Default operation requires a standard room thermostat or direct digital controller (DDC). The A55 can also control the unit from a zone temperature sensor. The A55 Unit Controller is a network controller when daisy-chained to the L Connection® Network Control System. For ease of configuration, the A55 can be connected to a PC with Unit Controller PC software installed.

I–Smoke Detectors A171, A172, A173

Photoelectric smoke detectors are a factory- and field-installed option. The smoke detectors can be installed in the supply air section (A172), return air section (A171), or in both the supply and return air section. Smoke detection control module (A173) is located below the control panel. Wiring for the smoke detectors are shown on the temperature control section (C) wiring diagram in back of this manual.

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 .15" W.C. The switch is mounted on the middle left corner of the blower support panel. Wiring for the blower proving switch is shown on the temperature control section (C) wiring diagram in back of this manual.

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. The switch is mounted on the top corner of the economizer. Wiring for the dirty filter switch is shown on the temperature control section (C) wiring diagram in back of this manual.

L–Indoor Air Quality (CO2) Sensor A63

The indoor air quality sensor monitors CO2 levels and reports the levels to the A55 Unit Controller. The board adjusts the economizer dampers according to the CO2 levels. The sensor is mounted next to the indoor thermostat or in the return air duct. Refer to the indoor air quality sensor installation instructions for proper adjustment. Wiring for the indoor air quality switch is shown on the temperature control section (C) wiring diagram in back of this manual.

M–Drain Pan Overflow Switch S149 (optional)

The overflow switch is used to interrupt cooling operation when excessive condensate collects in the drain pan. The N.C. overflow switch is connected to the M2 Unit Controller (A55) through DI-3. When the switch opens, the Unit Controller will shut off the unit. After a five-minute time out, the Unit Controller will verify the overflow switch position and restart the unit (if the switch has closed). The Unit Controller has a three-strike counter before the unit locks out. This means the Unit Controller will allow the overflow switch to open three times per thermostat demand. If the unit locks out, a reset of the Unit Controller is required after the switch has closed to restore unit operation.

VIII–MULTI-STAGED BLOWER COMPONENTS

A–Design Specifications

Use the TABLE 11 to fill in test and balance values when setting up the unit. If only high and low cooling design specifications are provided, set the medium cooling CFM at the high or low cooling design spec or any CFM between.

TABLE 11
Blower CFM Design Specifications

Unit	T'Stat or Zone Control Stages	Blower Speed	Design Specified CFM
302	2	Htg.	
		Clg. High	
		Clg. Low	
		Ventilation	

*Available blower speeds vary by unit and thermostat stages.

B–Set Maximum CFM

Use attached table to determine highest blower CFM for appropriate unit. Adjust the blower pulley to deliver that amount of CFM with only the blower operating. See Determining Unit CFM in the Blower Operation and Adjustment section.

C–Set Blower Speeds

1. Use the following mobile service app menu to enter the blower design specified CFM into the Unit Controller. Make sure blower CFM is within limitations shown in TABLE 12 or TABLE 13. Refer to the Unit Controller manual provided with unit.

RTU MENU > RTU OPTIONS > BLOWER > SPEED

2. Enter the following design specifications as shown in TABLE 12.

Blower /

Heat CFM

Cooling High CFM

Cooling Low CFM

Vent CFM

3. Adjust the blower RPM to deliver the target CFM based on the measured static pressure using the blower table.
4. Measure the static pressure again and apply the static pressure and RPM to the blower tables to determine adjusted CFM.
5. Repeat adjustments until design CFM is reached.

D–Set Damper Minimum Position

To maintain required minimum ventilation air volumes when the unit is in the occupied mode, two minimum damper positions must be set.

The Unit Controller will open the damper to “Min OCP Blwr High” when blower CFM is at or ABOVE the “midpoint” CFM.

The Unit Controller will open the dampers to “Min OCP Blwr Low” when blower CFM is BELOW a “midpoint” CFM.

The Unit Controller will calculate the “midpoint” CFM.

*Available blower speeds vary by unit and thermostat stages.

Set Minimum Position 1

Use the following mobile service app menu to set “Min OCP Blwr High” for the blower CFM above the “midpoint” CFM. When navigating into this menu, the Unit Controller will run damper calibration and allow damper position adjustment.

RTU MENU > SETTINGS > RTU OPTIONS > DAMPER

Tap “Next” to skip tabs and complete damper position calibration until “Damper Calibration Blower Speed High” tab appears.

Measure the intake air CFM. If the CFM is lower than the design specified CFM for ventilation air, use the Unit Controller to increase the damper percent open. If the CFM is higher than specified, decrease the damper percent open.

NOTE – *Intake air CFM can also be determined using the outdoor air temperature, return air temperature and mixed air temperature. Refer to the economizer or outdoor air damper installation instructions.*

Set Minimum Position 2

Use the following mobile service app menu in the Unit Controller to set “Min OCP Blwr Low” for the blower CFM below the “midpoint” CFM. When navigating into this menu, the Unit Controller will run damper calibration and allow damper position adjustment.

RTU MENU > SETTINGS > RTU OPTIONS > DAMPER

Tap “Next” to skip tabs and complete damper position calibration until “Damper Calibration Blower Speed High” tab appears.

Measure the intake air CFM. If the CFM is lower than the design specified CFM for ventilation air, use the Unit Controller to increase the damper percent open. If the CFM is higher than specified, decrease the damper percent open.

NOTE – *Intake air CFM can also be determined using the outdoor air temperature, return air temperature and mixed air temperature. Refer to the economizer or outdoor air damper installation instructions.*

E–Inverter Bypass Option

The supply air inverter is factory-set to by-pass the inverter manually. To by-pass the inverter and operate the blower in the constant air volume mode, use the following Unit Controller menu and set to “engaged”:

SETTINGS > RTU OPTIONS > BLOWER > VFD BYPASS

To configure the unit to by-pass the inverter automatically, use the following Unit Controller menu.

SETUP > INSTALL

Press SAVE until the menu reads:

CONFIGURATION ID 1

Change the 6th character position to “A” for automatic bypass option.

Press SAVE

⚠ WARNING

Units not equipped with an inverter will have the 6th character set to "N", indicating the inverter is not bypassed. The blower motor could be damaged and/or result in product or property damage if the setting is changed to automatic or manual.

F–Unit Operation

Use the mobile app to check unit mechanical operation. See the Service - Test section of the Unit Controller manual.

G–Manual Supply Air VFD Bypass

⚠ IMPORTANT

All dampers must be open to prevent damage to duct work and dampers.

NOTE – This section does not apply to units equipped with optional automatic VFD bypass. That option will automatically change from multi-stage air volume to constant air volume operation in the event of VFD failure.

Manually change blower operation to constant air volume as follows:

1. Disconnect all power to unit and WAIT AT LEAST 10 MINUTES before opening the VFD cover.

⚠ WARNING

ELECTRICAL SHOCK HAZARD.

STOP! Before you continue, make sure that power to the VFD has been off for at least 10 minutes. The capacitor in the VFD holds high voltage power for up to 10 minutes after power has been disconnected.

2. Locate P246 and P247 connectors near the VFD. See FIGURE 25.
3. Disconnect P246 from P246 (power in to VFD) and P247 from P247 (power out to blower). See FIGURE 26.
4. Connect P246 to P247. See FIGURE 27.

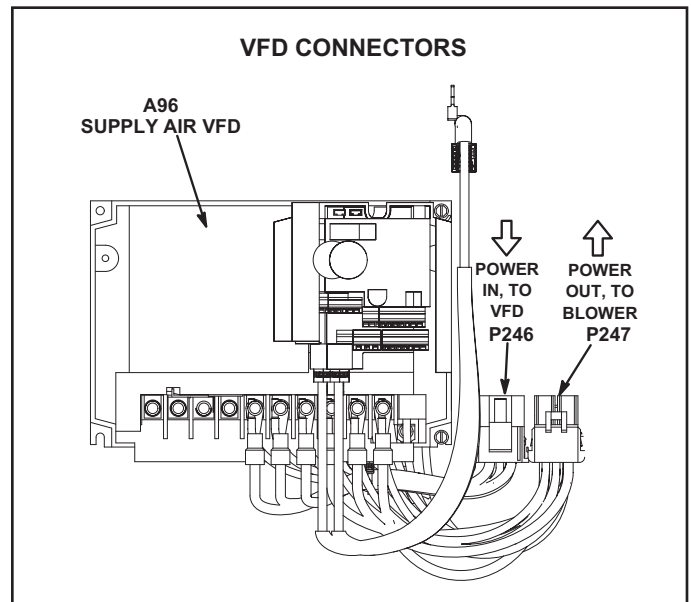


FIGURE 25

5. Restore power to unit. Blower will operate in constant air volume (CAV) mode.

NOTE - The indoor blower motor will start as soon as the main unit power is restored. In manual bypass, the blower will run regardless of thermostat signals until main unit power is turned off. Manual bypass is meant for emergency operation only and not long-term usage.

6. Check the indoor blower motor nameplate for full load amperage (FLA) value. Measure the amp readings from the indoor blower motor operating in bypass mode. If measured amps are higher than nameplate FLA value, decrease the CFM by opening (turning counterclockwise) the motor pulley. See FIGURE 15. Do not exceed minimum and maximum number of pulley turns as shown in TABLE 6.

DISCONNECT VFD BYPASS CONNECTORS

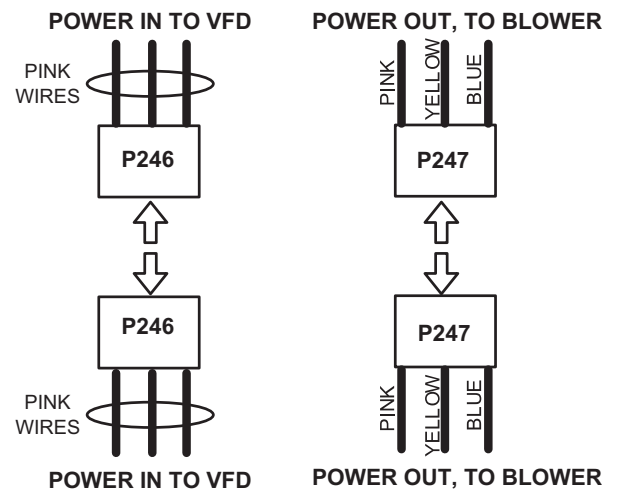


FIGURE 26

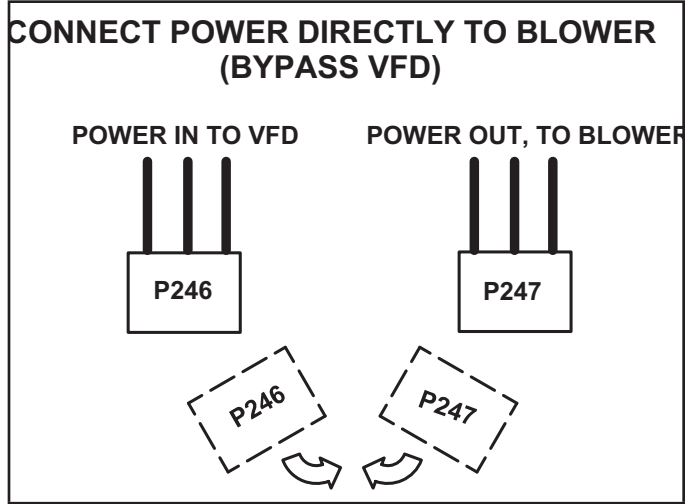


FIGURE 27

**TABLE 12
COOLING MINIMUM AND MAXIMUM CFM**

LHT / LDT Unit	Cooling Low CFM			Cooling High CFM		
	Default	Min	Max	Default	Min	Max
302H	6500	4000	12000	9000	7000	12000

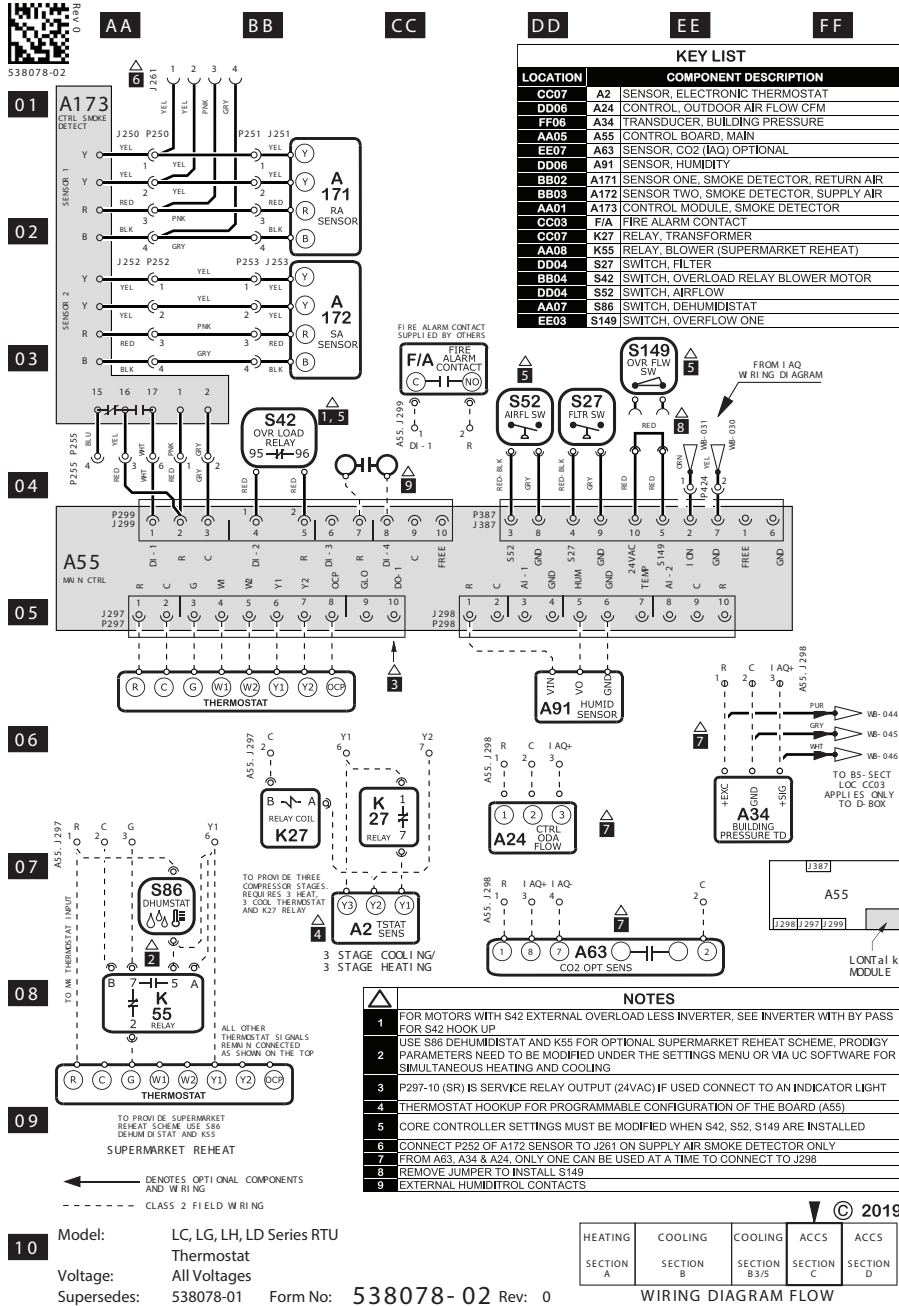
*Use Cooling High CFM Max

**TABLE 13
HEATING, VENTILATION & SMOKE MINIMUM AND MAXIMUM CFM**

Unit				Heating CFM (ECTO 0.04)			Vent CFM			Smoke CFM		
Model	Tonnage	Heat Option	Heat Code	Default	Min	Max	Default	Min	Max	Default	Min	Max
LDT302H	25	Medium	S, M	10500	5925	12000	10500	3750	12000	10500	3750	12000
		High	H		7125							
LHT302H		All	N, J, K, L, P, S		8000							

*Use highest value between Heating and Cooling High CFM max

THERMOSTAT



REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012295C	04-03-2024	MXR6	MXT5	ORIGINATED AT PD&R CARROLLTON, TX

HUMIDITROL OPTIONS – WIRING



AA

BB

CC

DD

EE

-----HUMIDITROL OPTIONS-----

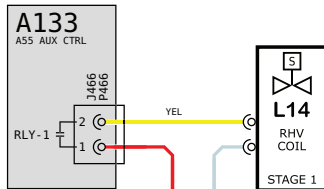
01

ON/OFF REHEAT
LH, LD UNITS ONLY

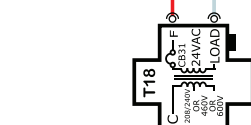
CONNECTIONS SHOWN BELOW ARE FOR
UNITS WITH OPT. ON/OFF REHEAT ONLY.
REVERSING VALVE CONNECTIONS FOR
HEAT PUMP OPERATION ARE SHOWN
ON COOLING DIAGRAM, LOCATION AA02.

02

03



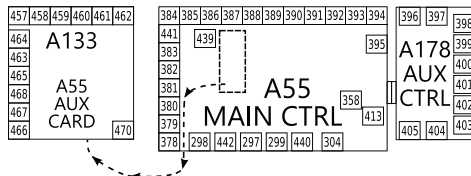
04



05

FROM TB13, B-SECT LOC AA07

06



07

08

KEY LIST		
LOCATION		COMPONENT DESCRIPTION
AA03	A133	CONTROL BOARD, AUX. BOARD ON A55
BB03	L14	VALVE, SOLENOID, REHEAT COIL 1
BB04	T18	TRANSFORMER, 24VAC

09

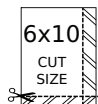
10

Model: LH, LD Series RTU - Humiditrol Options
On/Off Reheat
Voltage: All Voltages
Supersedes: N/A Form No: 538647-01 Rev: 0

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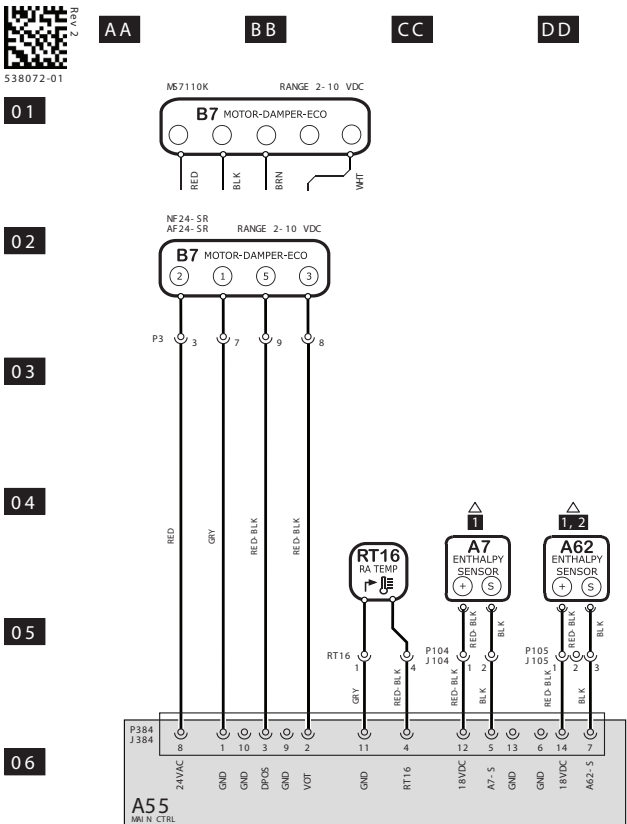
HTG	CLG	CLG	ACCS	ACCS
SEC A	SEC B	SEC B3	SEC C	SEC D

WIRING DIAGRAM FLOW



REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-014011	12-01-2025	MRX6	JAL21	ORIGINATED AT PD&R CARROLLTON, TX

ECONOMIZER



NOTES
1 A7 AND A62 NOT USED FOR SENSIBLE TEMPERATURE CONTROL
2 FOR UNIT DIFFERENTIAL ENTHALPY CONTROL, ADD A62 RETURN AIR ENTHALPY SENSOR

KEY LIST	
LOCATION	COMPONENT DESCRIPTION
CC05	A7 SENSOR, SOLID STATE ENTHALPY
AA06	A55 CONTROL BOARD, MAIN
DD05	A62 SENSOR, ENTHALPY INDOOR
BB02	B7 MOTOR, DAMPER ECONOMIZER
CC05	RT16 SENSOR, RETURN AIR TEMP

10 Model: LC,LG,LH,LD,SC,SG Series
Economizer & Motorized OAD
Voltage: All Voltages
Supersedes: N/A Form No: 538072- 01 Rev: 2

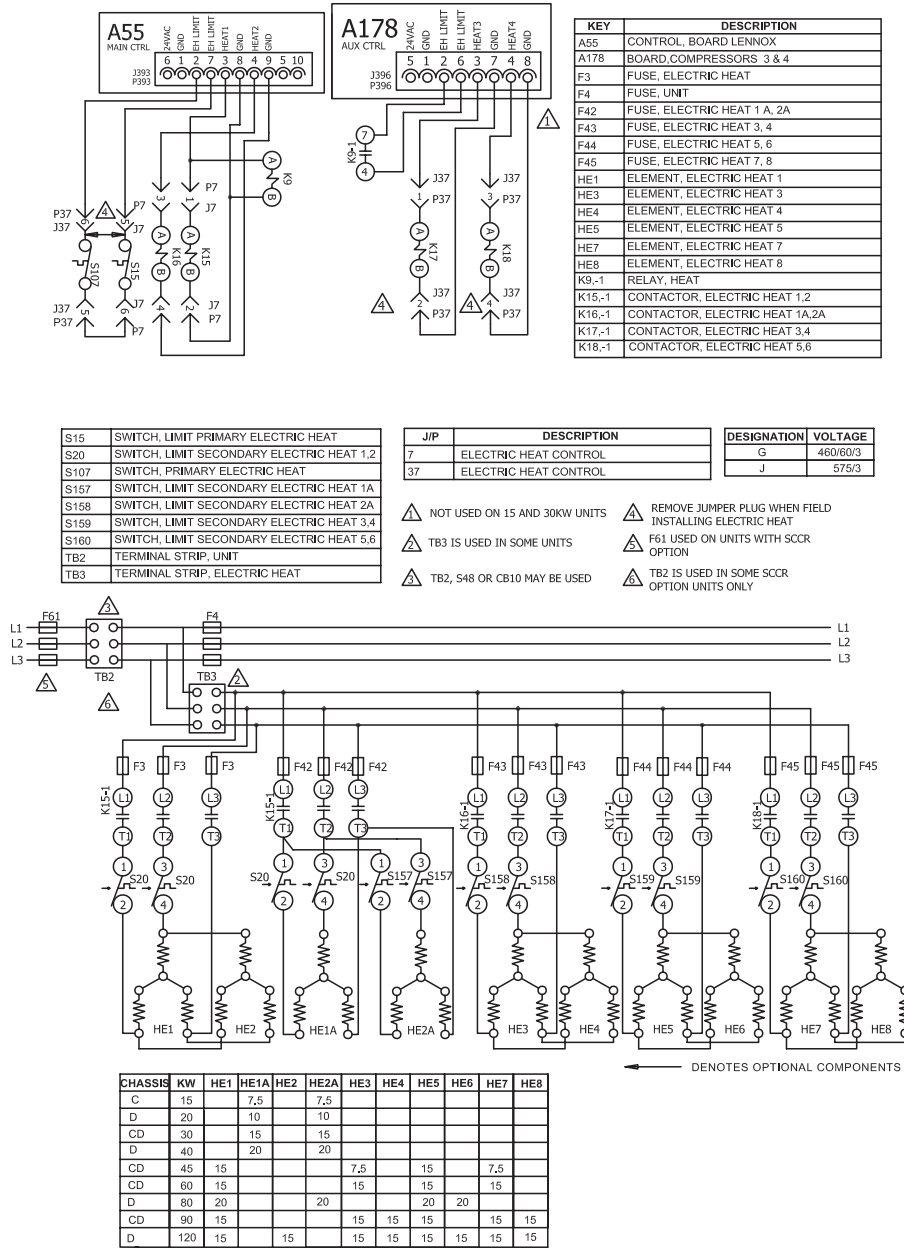
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HTG SEC A	CLG SEC B	CLG SEC B3	ACCS SEC C	ACCS SEC D
-----------------	-----------------	------------------	------------------	------------------

WIRING DIAGRAM FLOW

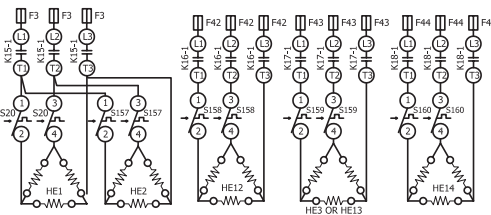
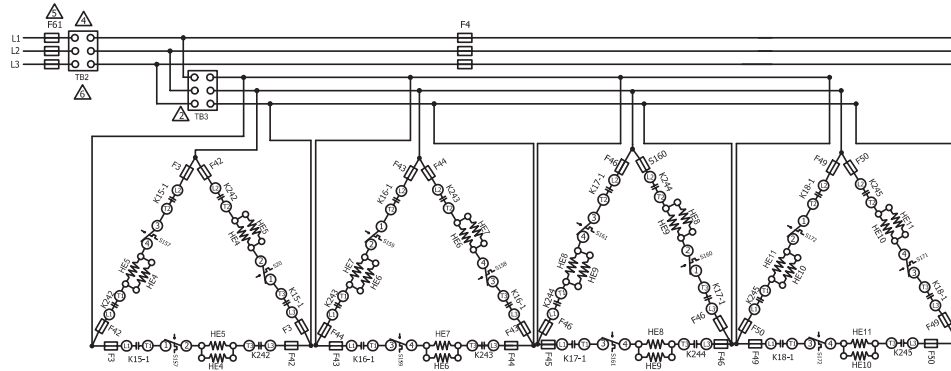
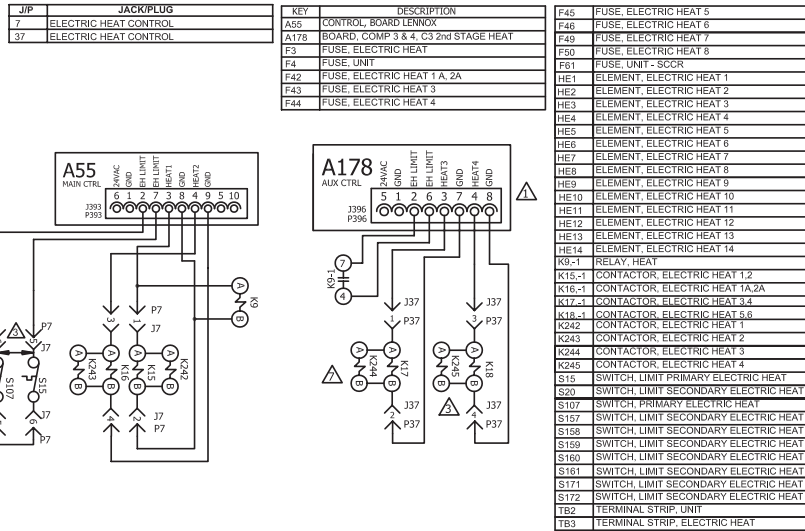
REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-008594	10/15/2020	RV	MXR6	ORIGINATED AT PD&R CARROLLTON, TX
001	CN-010356B	03/24/2022	MXR6	JAL21	UPDATED APPLICABLE MODEL NUMBERS.
002	CN-012457P	03/06/2024	AXL	AAH	A) ADDED SC, SG TO MODELS

EHA-15/90 G VOLTAGE



2024/07		WIRING DIAGRAM		07/24	
		538126-03			
		HEATING			
		ELECTRIC HEAT LCT/LHT/LCX/LHX E1EH,EHA-15, 20, 30, 40, 45,60, 80, 90, 120 - G, J			
		SECTION A			REV.0
		Supersedes 538126-02		New Form No. 538126-03	

EHA-15/90 Y VOLTAGE



DESIGNATION	VOLTAGE
Y	208-230/50/3
C	UNITS 156 TO 300
D	UNITS 240 TO 360

NOT USED ON 15 AND 30KW UNITS
 TB3 IS USED IN SOME UNITS
 REMOVE PLUG WHEN FIELD INSTALLING ELECTRIC HEAT
 TB2, CB10 OR 548 MAY BE USED ON NON SCRR UNITS
 F61 USED ON SCRR OPTION UNITS ONLY
 TB2 IS USED IN SOME SCRR OPTION UNITS ONLY
 ONLY USED ON 120 KW D-BOX UNITS

← DENOTES OPTIONAL COMPONENTS

CHASSIS	KW	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11	HE12	HE13	HE14
C	15	7.5	7.5												
C.D	30			15	15										
C.D	45	15													
C.D	60	15													
C.D	90	15		15		15	15			15	15				
D	120			15	15	15	15	15	15	15	15				

2024/03

03/24

WIRING DIAGRAM

538127-02

HEATING

ELECTRIC HEAT

E1EH, EHA - 15, 30, 45, 60, 90, 120 - Y

SECTION A

REV 0

Supersedes

538127-01

New Form No.

538127-02

SEQUENCE OF OPERATION

HEAT PUMP

1. A55 Unit Controller receives W1 heating demand
2. A55 energizes outdoor fans B4, B5 & B21 through K10 & K68 respectively.
3. After A55 proves N.C. lower pressure switch S87 and N.C. high pressure switch S4, contactor K1 is energized.
4. N.O. K1 closes energizing compressor B1, and N.C. K1-52 opens de-energizing HR1.
5. A55 energizes outdoor fans B22, B23 & B24 through K149 & K150 respectively.
6. After A55 proves N.C. lower pressure switch S88 and N.C. high pressure switch S7, contactor K2 is energized.
7. N.O. K2 closes energizing compressor B2, and N.C. K2-52 opens de-energizing HR2.

EHA-15, 30, 45, 60, 90 - Y & G

NOTE – Two electric heat sections are used in all 15kW through 90kW heaters. The heat sections are labeled first electric heat section (left side) and second electric heat section (right side). See FIGURE 18.

NOTE – In the case of EHA 15 and 30kW, the second heat section (right side) is a slave (only has electric heat elements and a limit). Line voltage is supplied to elements in both heat section one (left side) and two (right side) by the contactors in heat section one (left side).

HEATING ELEMENTS:

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

FIRST STAGE HEAT:

2. Heating demand initiates at W1 in thermostat.
3. 24VAC is routed to the main control module A55. After A55 proves N.C. primary limits S15 (heat section one, left side), S107 (heat section two, right side), the electric heat contactor K15 and heat relay K9 are energized.

4. N.O. contact K15-1 closes allowing the first bank of elements in heat section one (left side) to be energized.
5. At the same time, N.O. contacts K9-1 close. A N.O. contact in A55 closes, energizing electric heat relay K17.
6. N.O. contacts K17-1 close allowing the first set of elements in heat section two (right side) to be energized.

SECOND STAGE HEAT:

7. With the first stage heat operating, an additional heating demand initiates at W2 in the thermostat.
8. 24VAC is routed through the main control module A55, which in turn energizes the electric heat contactor K16.
9. N.O. contacts K16-1 close allowing the second set of elements in heat section one (left side) to be energized.
10. Simultaneous with step eight, a N.O. contact in the A55 Unit controller closes, allowing 24VAC to energize electric heat contactor K18.
11. N.O. contacts K18-1 close allowing the second set of elements in heat section two (right side) to be energized.

END OF SECOND STAGE HEAT:

12. Heating demand is satisfied. Terminal W2 in the thermostat is de-energized.
13. Electric heat contactors K16 and K18 are de-energized.
14. The second set of electric heat elements in heat sections one (left side) and two (right side) are de-energized.

END OF FIRST STAGE HEAT:

15. Heating demand is satisfied. Terminal W1 in the thermostat is de-energized.
16. Electric heat contactors K15 and K17 are de-energized.
17. The first set of electric heat elements in heat sections one (left side) and two (right side) are de-energized.

SEQUENCE OF OPERATION - MSAV® MULTI-STAGE AIR VOLUME

Objective: Outline the unit functions as a result of room thermostat or zone sensor demands.

Given: When economizer is present, it will function as an integral part of the unit cooling system. When not present, unit will function as if economizer is present but outdoor ambient is high and sensed as not suitable.

UNIT OPERATION WITH 2-STAGE THERMOSTAT (2 COOL AND 2 HEAT STAGES, Y1, Y2, W1, W2)

SUPPLY AIR BLOWER SPEED

Unit has following supply air blower speed setting:

- Ventilation speed
- Cooling Speed - Low
- Cooling Speed - High
- Heating speed
- Smoke speed (Used only in smoke removal option - not discussed)

COOLING

¹ Unit Features An Economizer And Outdoor Air Is Suitable

Thermostat Mode (Y1, Y2)

Y1 Demand:

All compressors are off, supply air blower is on low cooling speed to minimize blower power consumption, economizer modulates (minimum to maximum open position) to maintain 55°F supply air temperature (default unit controller setting).

Y2 Demand:

All compressors are off, supply air blower is on high cooling speed providing higher cooling capacity, and economizer modulates to maintain 55°F supply air temperature. If economizer stays at maximum open for 3 minutes, compressor 1 is energized while supply air blower stays on high cooling speed providing maximum cooling capacity.

¹ Outdoor air suitability is determined by the energy state of outdoor ambient (enthalpy or sensible) and its ability to achieve the desired free cooling effects. Outdoor air suitability can also be determined by a third party controller and provided to the rooftop unit via a network connection.

Unit Does Not Feature An Economizer Or Outdoor Air Is Not Suitable

Thermostat Mode (Y1, Y2)

Y1 Demand:

Compressor 1 operates, and supply air blower operates at low cooling speed.

Y2 Demand:

All compressors operate and supply air blower operates at high cooling speed.

SEQUENCE OF OPERATION - MSAV® MULTI-STAGE AIR VOLUME

UNIT OPERATION WITH 3-STAGE THERMOSTAT OR ZONE SENSOR (3 COOL AND 2 HEAT STAGES, Y1, Y2, Y3 AND W1, W2)

SUPPLY AIR BLOWER SPEED

Unit has following supply air blower speed setting:

- Ventilation speed
- Cooling Speed - Low
- Cooling Speed - Medium
- Cooling Speed - High
- Heating speed
- Smoke speed (Used only in smoke removal option - not discussed)

COOLING

¹ Unit Features An Economizer And Outdoor Air Is Suitable

Thermostat or Zone Sensor Mode (Y1, Y2, Y3)

Y1 Demand:

All compressors are off, supply air blower is on low cooling speed to minimize blower power consumption, economizer modulates (minimum to maximum open position) to maintain 55°F supply air temperature (default unit controller setting).

Y2 Demand:

All compressors are off, supply air blower is on high cooling speed providing higher cooling capacity, and economizer modulates to maintain 55°F supply air temperature. If economizer stays at maximum open for 3 minutes, compressor 1 is energized while supply air blower stays on high cooling speed providing maximum cooling capacity. After compressors are energized the economizer stays at maximum open.

Y3 Demand:

Compressors 1 and 2 are energized while supply air blower stays on high cooling speed.

¹ Outdoor air suitability is determined by the energy state of outdoor ambient (enthalpy or sensible) and its ability to achieve the desired free cooling effects. Outdoor air suitability can also be determined by a third party controller and provided to the rooftop unit via a network connection.

Unit Does Not Feature An Economizer or Outdoor Air Is Not Suitable

Thermostat or Zone Sensor Mode (Y1, Y2, Y3)

Y1 Demand:

Compressor 1 operates at part load and supply air blower operates at low cooling speed.

Y2 Demand:

Compressor 1 operates at part load with compressor 2 ON, and supply air blower operates at medium cooling speed.

Y3 Demand:

All compressors operate and supply air blower operates at high cooling speed.

DEFROST

Coil Sensors (RT48 - Circuit 1 and RT49 - Circuit 2) and Ambient Sensor (RT17) provides input to the Lennox® CORE Unit Controller to initiate a defrost cycle if needed.

Coil sensors are located on a return bend for each circuit on the front of the outdoor coil.

Ambient sensor is located on the inside of the corner mullion on the back of the outdoor coil section.

If a coil sensor measures a temperature below 35°F during mechanical heating mode, defrost logic is enabled. The system will constantly monitor coil and ambient temperatures and will initiate a defrost cycle if the controller determines that the target temperature difference between the coil and ambient temperature has been satisfied, or when the accumulated run time with coil temperature below 35°F reaches 6 hours.

Defrost will not be activated on more than one circuit at the time.

If the ambient sensor fails, or the circuit is in uncalibrated state, the controller will switch to time/temperature defrost operation.

Electric heat is energized during a defrost cycle to maintain discharge air temperature.

SEQUENCE OF OPERATION - MSAV® MULTI-STAGE AIR VOLUME

HEATING

Thermostat or Zone Sensor

W1/H1 Demand:

A first-stage heating demand (W1/H1) will energize compressors 1 and 2 and the outdoor fans.

NOTE – L1 & L2 reversing valves are de-energized in the heating mode.

Units With Optional Electric Heat:

An increased heating demand (W2/H2) will energize electric heat.

NOTE – Compressors 1 and 2 stay energized.

Units With Optional Two-Stage Electric Heat and Zone Sensor mode:

An increased heating demand (H2) will energize 1st stage of electric heat.

An increased heating demand (H3) will energize 2nd stage of electric heat.

NOTE – Compressors 1 and 2 stay energized.

All Electric heat modules are energized during the defrost cycle (W1).

ACCESSORIES

Modulating Outdoor Air Damper

The minimum damper position for “occupied low blower” and “occupied high blower” is adjusted during unit setup to provide minimum fresh air requirements per ASHRAE 62.1 at the corresponding supply air blower speeds.

- When supply air blower is off or the unit is in unoccupied mode, the outdoor air damper is closed.
- When unit is in occupied mode and supply air blower is operating at a speed below the “midpoint” blower speed, the outdoor air damper is at minimum “low blower” position.
- When unit is in occupied mode and supply air blower is operating at a speed equal to or above the “midpoint” blower speed, the outdoor air damper is at minimum “high blower” position.

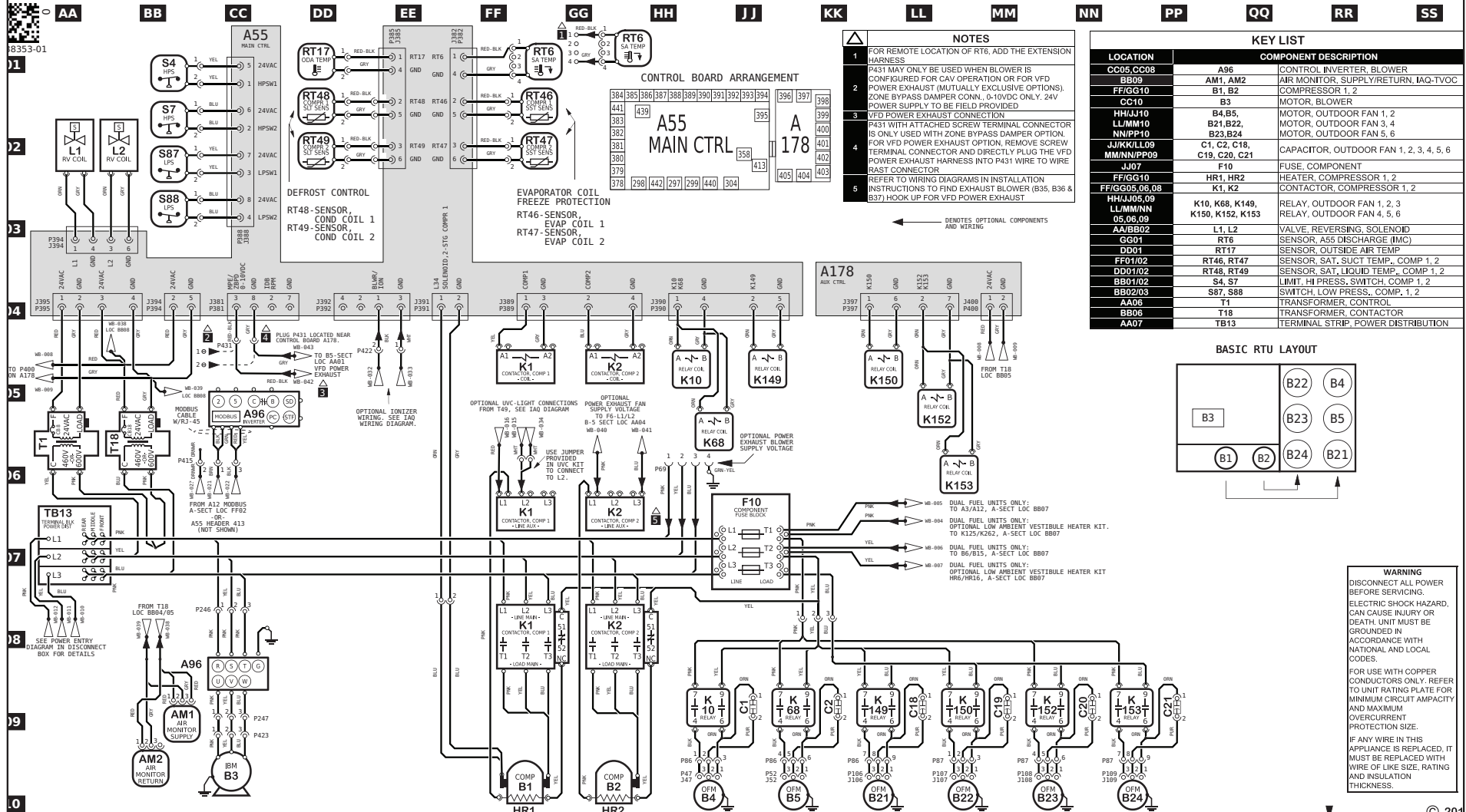
NOTE - The “midpoint” blower speed is an average of the minimum and maximum blower speed (minimum speed + maximum speed divided by 2).

Power Exhaust Operation

NOTE - POWER EXHAUST OPERATION IS THE SAME FOR ALL CONTROL OPTIONS

MSAV® models are equipped with 2-stage power exhaust fans. Power exhaust fans operate when economizer outdoor air dampers are 50% open (adjustable). Power exhaust operates in 1st stage (one fan) up to 70% of supply air blower speed. 2nd stage power exhaust fans (both fans) operate when supply air blower speed is above 70% (adjustable) of full speed.

LHT/LDT302 G & J VOLT COOLING DIAGRAM MSAV - NO BYPASS



Model: LHT, LDT 302 - G, J-VOLT
COOLING - MSAV- NO BYPASS

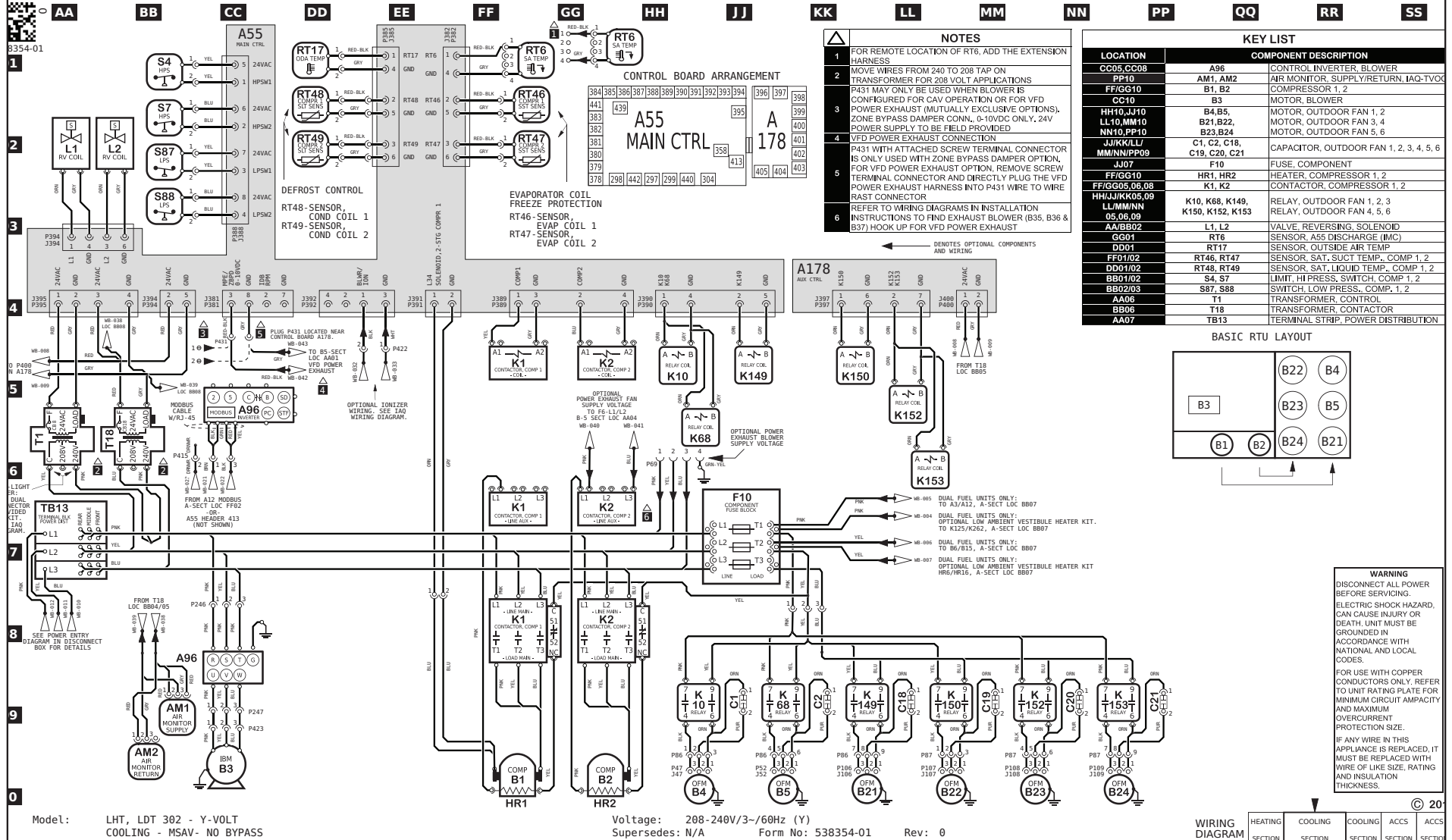
Voltage: 460V/3-60Hz (G), 575V/3-60Hz (J)
Supersedes: N/A Form No: 538353-01 Rev: 0

WIRING DIAGRAM FLOW				
HEATING SECTION A	COOLING SECTION B	COOLING SECTION B3/5	ACCS SECTION C	ACCS SECTION D

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REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012295C	04-02-2024	MXR6	MXT5	ORIGINATED AT PD&R CARROLLTON, TX

LHT/LDT302 Y VOLT COOLING DIAGRAM MSAV - NO BYPASS



Model: LHT, LDT 302 - Y-VOLT COOLING - MSAV- NO BYPASS

Voltage: 208-240V/3-/60Hz (Y)
Supersedes: N/A Form No: 538354-01 Rev: 0

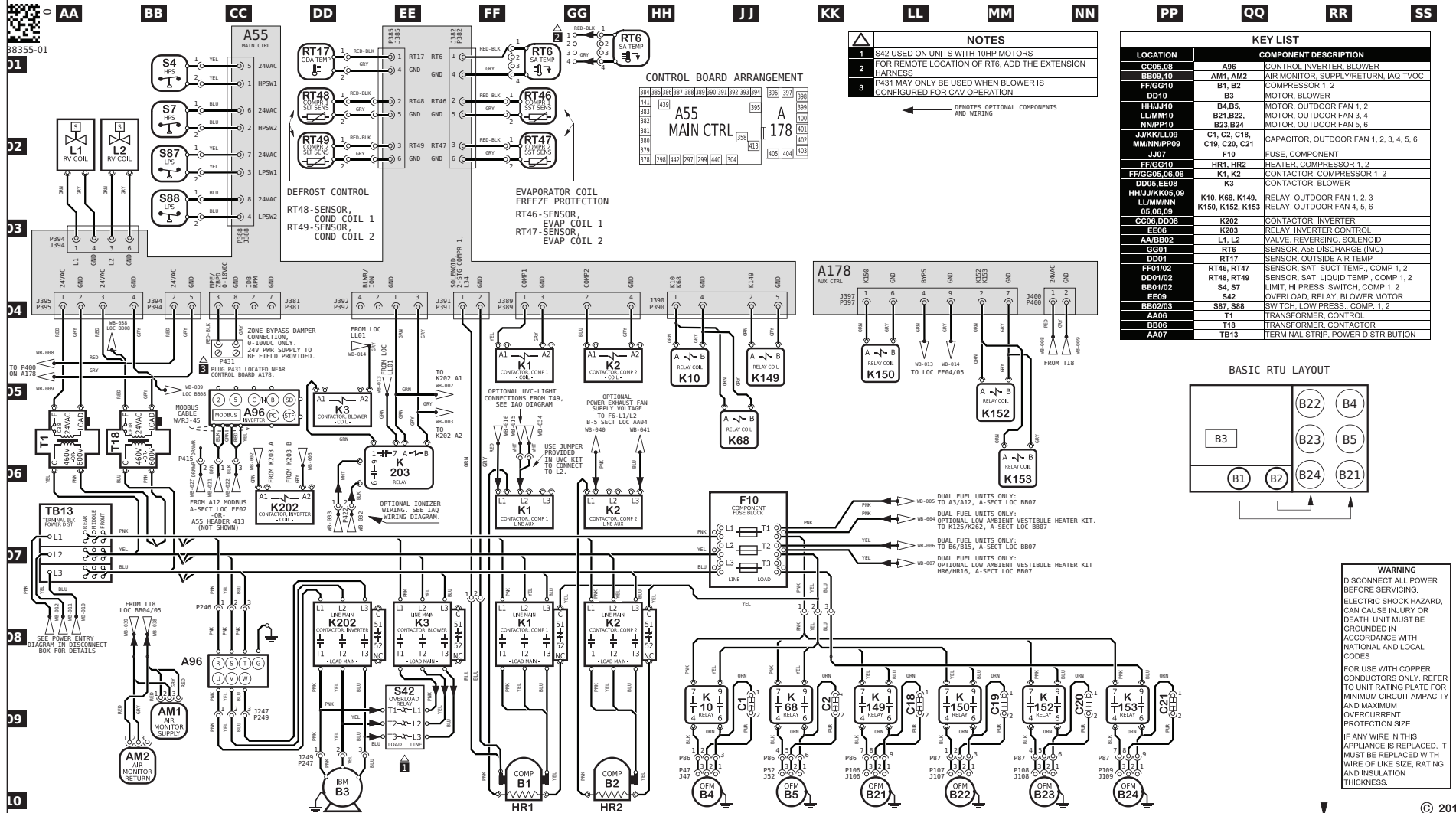
WIRING DIAGRAM FLOW

HEATING SECTION A	COOLING SECTION B	COOLING SECTION C	ACCS SECTION C	ACCS SECTION D
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REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012295C	04-02-2024	MXR6	MXTS	ORIGINATED AT PD&R CARROLLTON, TX

10x17 CUT SIZE

LHT/LDT302 G & J VOLT COOLING DIAGRAM MSAV - WITH BYPASS



Model: LHT, LDT 302 - G, J-VOLT
COOLING - MSAV - WITH BYPASS

Voltage: 460V/3-/60Hz (G), 575V/3-/60Hz (J)
Supersedes: N/A Form No: 538355-01 Rev: 0

WIRING DIAGRAM FLOW

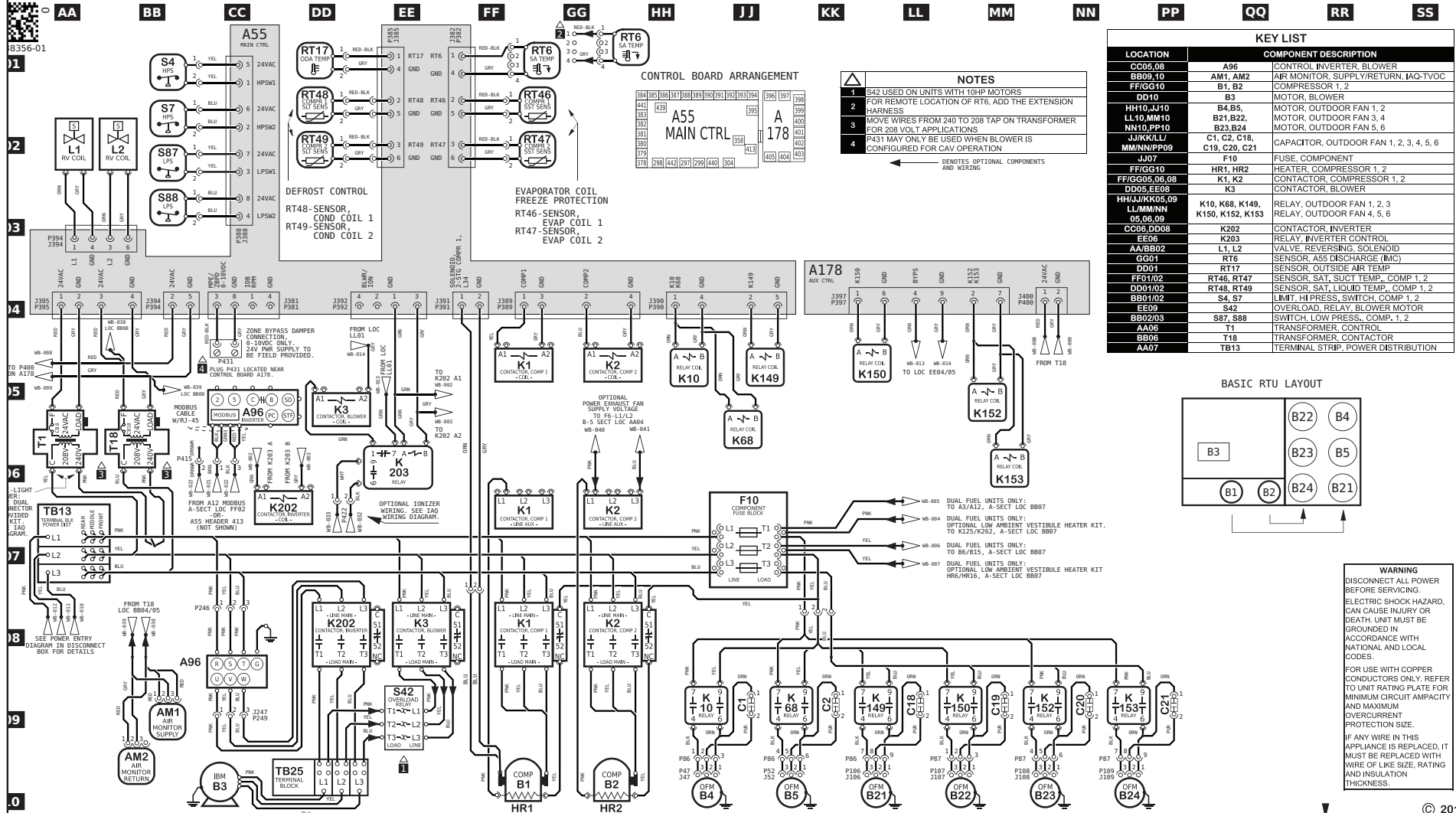
HEATING	COOLING	COOLING	ACCS	ACCS
SECTION A	SECTION B	SECTION B3/5	SECTION C	SECTION D

© 201

REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012295C	04-02-2024	RV	MXT5	ORIGINATED AT PD&R CARROLLTON, TX

10x17
CUT SIZE

LHT/LDT302 Y VOLT COOLING DIAGRAM MSAV - WITH BYPASS



Model: LHT, LDT 302 - Y-VOLT
Cooling - MSAV - WITH BYPASS

Voltage: 208-240V/3~60Hz (Y)
Supersedes: N/A Form No: 538356-01 Rev: 0

REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012295C	04-03-2024	RV	MXTS	ORIGINATED AT PD&R CARROLLTON, TX

10x17 CUT SIZE

X-Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely.

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before starting decommissioning.

- a) Become familiar with the equipment and its operation.
- b) Isolate system electrically.
- c) Before attempting the procedure, ensure that:
 - mechanical handling equipment is available, if required, for handling refrigerant cylinders;
 - all personal protective equipment is available and being used correctly;
 - the recovery process is supervised at all times by a competent person;
 - recovery equipment and cylinders conform to the appropriate standards.
- d) Pump down refrigerant system, if possible.
- e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- f) Make sure that cylinder is situated on the scales before

recovery takes place.

- g) Start the recovery machine and operate in accordance with instructions.
- h) Do not overfill cylinders (no more than 80% volume liquid charge).
- i) Do not exceed the maximum working pressure of the cylinder, even temporarily.
- j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
- k) Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

IMPORTANT

Equipment shall be labeled stating that it has been decommissioned and emptied of refrigerant. The label shall be signed and dated. Ensure that there are labels on the equipment that state the flammability of the refrigerant used.