UNIT INFORMATION

100147

LHT

6.5 / 7.5 / 8.5 / 10 / 12.5

Service Literature

LHT078-152 with R-454B

The LHT commercial heat pump is available in 6.5, 7.5, 8.5, 10 and 12.5 ton capacities. The refrigerant systems utilize two compressors, two reversing valves, two accumulators, and other parts common to a heat pump. Electric heat operates in single or multiple stages depending on the kW input size. 7.5kW through 60kW heat sections are available for the LHT heat pump.

LHT078-152 units are equipped with variable-volume, direct drive blowers. These units will provide supply air at lower speeds when cooling demand is low and increase to higher speeds when cooling demand is high. Refer to Supply Air Start-Up sections.

LHT units are designed to accept any of several different energy management thermostat control systems with minimum field wiring.

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

⚠ WARNING

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.

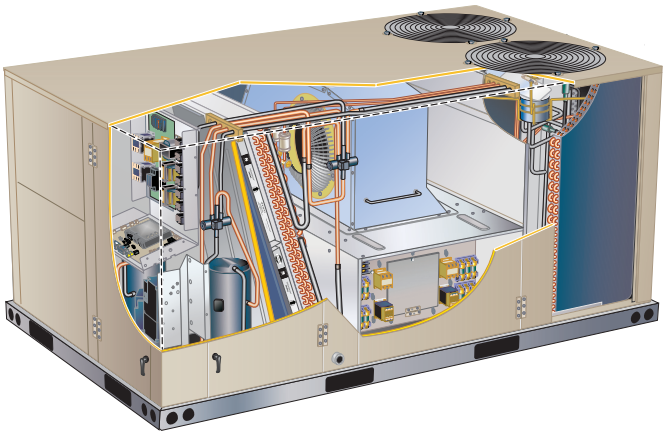
Be aware that refrigerants may not contain an odor.

⚠ WARNING

If this appliance is conditioning a space with an area smaller than TA min 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.

⚠ WARNING

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



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.

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⚠ 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.

⚠ WARNING

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

⚠ CAUTION

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

⚠ 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.

⚠ 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.

⚠ 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

• 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

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

Servicing shall be performed only as recommended by the manufacturer.

⚠ CAUTION

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

⚠ 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.

OPTIONS / ACCESSORIES

Item Description		Catalog Number	Unit Model No 078	092	102	120	152
COOLING SYSTEM							
Condensate Drain Trap	PVC	**22H54**	X	X	X	X	X
	Copper	**76W27**	X	X	X	X	X
Drain Pan Overflow Switch		**21Z07**	OX	OX	OX	OX	OX
BLOWER - SUPPLY AIR							
Blower Option	DirectPlus™ Blower System with MSAV®	Factory	O	O	O	O	O
CABINET							
Combination Coil/Hail Guards		**24C86**	OX	OX	OX		
		37A56					OX
Corrosion Protection		Factory	O	O	O	O	O
Horizontal Discharge Kit		**51W25**	X	X	X	X	X
Return Air Adaptor Plate (for LC/LG/LH and TC/TG/TH unit replacement)		**54W96**	OX	OX	OX	OX	OX
CONTROLS							
Commercial Controls	CPC Einstein Integration	Factory	O	O	O	O	O
	LonTalk® Module	**54W27**	OX	OX	OX	OX	OX
	Novar® LSE	Factory	O	O	O	O	O
Dirty Filter Switch		**53W67**	OX	OX	OX	OX	OX
Fresh Air Tempering		**21Z08**	OX	OX	OX	OX	OX
Smoke Detector - Supply or Return (Power board and one sensor)		**31A68**	OX	OX	OX	OX	OX
Smoke Detector - Supply and Return (Power board and two sensors)		**31A69**	OX	OX	OX	OX	OX
INDOOR AIR QUALITY							
Air Filters							
Healthy Climate® High Efficiency Air Filters	MERV 8	**50W61**	OX	OX	OX	OX	OX
20 x 25 x 2 in. (Order 4 per unit)	MERV 13	**52W41**	OX	OX	OX	OX	OX
	MERV 16	**21U41**	X	X	X	X	X
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)		**Y3063**	X	X	X	X	X
Indoor Air Quality (CO_2) Sensors							
Sensor - Wall-mount, off-white plastic cover with LCD display		**77N39**	X	X	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display		**23V86**	X	X	X	X	X
Sensor - Black plastic case, LCD display, rated for plenum mounting		**87N52**	X	X	X	X	X
Sensor - Black plastic case, no display, rated for plenum mounting		**23V87**	X	X	X	X	X
CO2 Sensor Duct Mounting Kit - for downflow applications		**23Y47**	X	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO2 sensors (**77N39**)		**90N43**	X	X	X	X	X
Needlepoint Bipolar Ionization (NPBI)							
Needlepoint Bipolar Ionization (NPBI) Kit		**22U15**	X	X	X	X	X
UVC Germicidal Lamps							
[1] Healthy Climate® UVC Light Kit (110/230v-1ph)		**21A93**	X	X	X	X	X
Step-Down Transformers	460V primary, 230V secondary	**10H20**	X	X	X	X	X
	575V primary, 230V secondary	**10H21**	X	X	X	X	X

[1] Lamps operate on 110-230V single-phase power supply. Step-down transformer may be ordered separately for 460V and 575V units. Alternately, 110V power supply may be used to directly power the UVC ballast(s).

NOTE - Catalog 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		Catalog Number	Unit Model No 078	092	102	120	152
ELECTRICAL							
Voltage 60 Hz	208/230V - 3 phase	Factory	O	O	O	O	O
	460V - 3 phase	Factory	O	O	O	O	O
	575V - 3 phase	Factory	O	O	O	O	O
Disconnect Switch	80 amp	**54W56**	OX	OX	OX	OX	OX
	150 amp	**54W57**	OX	OX	OX	OX	OX
[1] Short-Circuit Current Rating (SCCR) of 100kA (includes Phase/Voltage Detection)		Factory	O	O	O	O	O
GFI Service Outlets	15 amp non-powered, field-wired (208/230V, 460V only)	**74M70**	OX	OX	OX	OX	OX
	15 amp factory-wired and powered (208/230V, 460V)	Factory	O	O	O	O	O
	[2] 20 amp non-powered, field-wired (208/230V, 460V, 575V)	**67E01**	X	X	X	X	X
	[2] 20 amp non-powered, field-wired (575V only)	Factory	O	O	O	O	O
Weatherproof Cover for GFI		**10C89**	X	X	X	X	X
ELECTRIC HEAT							
7.5 kW	208/240V-3ph	**30U33**	OX	OX	OX		
	460V-3ph	**30U34**	OX	OX	OX		
	575V-3ph	**30U35**	OX	OX	OX		
15 kW	208/240V-3ph	**30U36**	OX	OX	OX	OX	OX
	460V-3ph	**30U37**	OX	OX	OX	OX	OX
	575V-3ph	**30U38**	OX	OX	OX	OX	OX
22.5 kW	208/240V-3ph	**30U39**	OX	OX	OX	OX	OX
	460V-3ph	**30U40**	OX	OX	OX	OX	OX
	575V-3ph	**30U41**	OX	OX	OX	OX	OX
30 kW	208/240V-3ph	**30U42**	OX	OX	OX	OX	OX
	460V-3ph	**30U43**	OX	OX	OX	OX	OX
	575V-3ph	**30U44**	OX	OX	OX	OX	OX
45 kW	208/240V-3ph	**30U45**		OX	OX	OX	OX
	460V-3ph	**30U46**		OX	OX	OX	OX
	575V-3ph	**30U47**		OX	OX	OX	OX
60 kW	208/240V-3ph	**30U48**				OX	OX
	460V-3ph	**30U49**				OX	OX
	575V-3ph	**30U50**				OX	OX

[1] Disconnect Switch not available with SCCR option.
SCCR option is only available with factory installed electric heat or no electric.
SCCR option is not available with 45 kW and 60 kW electric heat for 208/230V applications.

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

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OPTIONS / ACCESSORIES

Item Description		Catalog Number	Unit Model No 078	092	102	120	152
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 and Barometric Relief Dampers with Exhaust Hood Downflow Applications - Use furnished Outdoor Air Hood and Barometric Relief Dampers with Exhaust Hood Horizontal Applications - Use furnished Outdoor Air Hood and Barometric Relief Dampers with Exhaust Hood - Order Horizontal Discharge Kit separately Horizontal Applications (reduced height) - Order Horizontal Low Profile Barometric Relief Dampers with Exhaust Hood and Horizontal Discharge Kit (51W25) separately		**20U80**	OX	OX	OX	OX	OX
Horizontal Barometric Relief Dampers							
Horizontal Low Profile Barometric Relief Dampers (Exhaust hood furnished)		**53K04**	X	X	X	X	X
Economizer Controls							
Differential Enthalpy (Not for Title 24)	Order 2	**21Z09**	OX	OX	OX	OX	OX
Sensible Control	Sensor is Furnished	Factory	O	O	O	O	O
Single Enthalpy (Not for Title 24)		**21Z09**	OX	OX	OX	OX	OX
Building Pressure Control		**13J77**	X	X	X	X	X
Outdoor Air CFM Control		**13J76**	X	X	X	X	X
Global Control	Sensor Field Provided	Factory	O	O	O	O	O
OUTDOOR AIR							
Outdoor Air Dampers With Outdoor Air Hood							
Motorized		**14G28**	OX	OX	OX	OX	OX
Manual		**14G29**	X	X	X	X	X
POWER EXHAUST							
Standard Static	208/230V-3ph	**53W44**	OX	OX	OX	OX	OX
	460V-3ph	**53W45**	OX	OX	OX	OX	OX
	575V-3ph	**53W46**	OX	OX	OX	OX	OX
ROOF CURBS							
Hybrid Roof Curbs, Downflow							
8 in. height		**11F54**	X	X	X	X	X
14 in. height		**11F55**	X	X	X	X	X
18 in. height		**11F56**	X	X	X	X	X
24 in. height		**11F57**	X	X	X	X	X
Adjustable Pitch Curb							
14 in. height		**54W50**	X	X	X	X	X
CEILING DIFFUSERS							
Step-Down - Order one	RTD11-95S	**13K61**	X	X			
	RTD11-135S	**13K62**			X	X	
	RTD11-185S	**13K63**					X
Flush - Order one	FD11-95S	**13K56**	X	X			
	FD11-135S	**13K57**			X	X	
	FD11-185S	**13K58**					X
Transitions (Supply and Return) - Order one	C1DIFF30B-1	**12X65**	X	X			
	C1DIFF31B-1	**12X66**			X	X	
	C1DIFF32B-1	**12X67**					X

NOTE - Catalog numbers shown are for ordering field installed accessories.
OX = Configure To Order (Factory Installed) or Field Installed.
O = Configure To Order (Factory Installed).
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SPECIFICATIONS — 6.5 TON | 7.5 TON | 8.5 TON

Model			LHT078H5E	LHT092H5E	LHT102H5E
Nominal Tonnage			6.5 Ton	7.5 Ton	8.5 Ton
Efficiency Type			High	High	High
Blower Type			DirectPlus™ ECM Direct Drive with MSAV®	DirectPlus™ ECM Direct Drive with MSAV®	DirectPlus™ ECM Direct Drive with MSAV®
Cooling Performance		Gross Cooling Capacity - Btuh	79,000	92,000	101,000
		[1] Net Cooling Capacity - Btuh	78,000	90,000	98,000
		AHRI Rated Air Flow - cfm	2400	2600	2800
		[1] EER (Btuh/Watt)	17.0	16.8	16.8
		[1] IEER (Btuh/Watt)	12.7	12.3	12.1
		Total Unit Power (kW)	6.4	7.3	8.3
Heating Performance		[1] Total High Heat Capacity - Btuh	73,000	86,000	96,000
		[1] AHRI Rated Air Flow - cfm	2600	3200	3400
		[1] C.O.P.	3.5	3.5	3.5
		Total Unit Power - kW	6.0	7.2	7.8
		[1] Total Low Heat Capacity - Btuh	40,000	46,000	53,000
		[1] C.O.P.	2.25	2.25	2.25
		Total Unit Power (kW)	5.2	6.5	7.2
Sound Rating Number		dBA	88	88	88
Refrigerant Charge		Refrigerant Type	R-454B	R-454B	R-454B
Without Reheat Option		Circuit 1	11 lbs. 8 oz.	11 lbs. 0 oz.	10 lbs. 12 oz.
		Circuit 2	11 lbs. 0 oz.	11 lbs. 4 oz.	11 lbs. 4 oz.
Electric Heat Options Available			7.5, 15, 22.5, 30 kW	7.5, 15, 22.5, 30, 45 kW	
Compressor Type (number)			Two-Stage Scroll (1) Single-Stage Scroll (1)		
Outdoor Coil		Net face area - ft.² (total)	25.9	25.9	25.9
		Tube diameter - in.	3/8	3/8	3/8
		Rows	3	3	3
		Fins - in.	20	20	20
Outdoor Coil Fans		Motor HP (number and type)	1/3 (2 ECM)	1/3 (2 ECM)	1/3 (2 ECM)
		Rpm	300-1100	300-1100	300-1100
		Watts (total)	100-820	100-820	100-820
		Diameter (Number) - in.	(2) 24	(2) 24	(2) 24
		Blades	3	3	3
		Total Air volume - cfm	2000-7500	2000-7500	2000-7500
Indoor Coil		Net face area - ft.² (total)	13.5	13.5	13.5
		Tube diameter - in.	3/8	3/8	3/8
		Rows	4	4	4
		Fins - in.	14	14	14
		Condensate drain size (NPT) - in.	(1) 1		
		Expansion device type	Balanced Port Thermostatic Expansion Valve		
Indoor Blower		Nominal motor output	3.75 HP (ECM)	3.75 HP (ECM)	3.75 HP (ECM)
		Blower wheel nominal diameter x width - in.	(1) 22 x 19	(1) 22 x 19	(1) 22 x 19
Filters		Type of filter	MERV 4, Disposable		
		Number and size - in.	(4) 20 x 25 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.

[1] AHRI Certified to AHRI Standard 340/360:

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.

SPECIFICATIONS — 10 TON | 12.5 TON

Model				LHT120H5E	LHT152H5E
Nominal Tonnage				10 Ton	12.5 Ton
Efficiency Type				High	High
Blower Type				DirectPlus™ ECM Direct Drive with MSAV®	DirectPlus™ ECM Direct Drive with MSAV®
Cooling Performance			Gross Cooling Capacity - Btuh	119,000	140,000
			[1] Net Cooling Capacity - Btuh	116,000	136,000
			AHRI Rated Air Flow - cfm	3500	4100
			[1] EER (Btuh/Watt)	16.6	15.2
			[1] IEER (Btuh/Watt)	12.0	11.1
			Total Unit Power - kW	10.0	12.6
Heating Performance			[1] Total High Heat Capacity - Btuh	112,000	128,000
			[1] AHRI Rated Air Flow - cfm	3600	4100
			[1] C.O.P.	3.5	3.4
			Total Unit Power (kW).	9.3	11.4
			[1] Total Low Heat Capacity - Btuh	63,000	73,000
			[1] C.O.P	2.25	2.1
			Total Unit Power (kW)	8.2	10.3
Sound Rating Number			dBA	88	87
Refrigerant Charge			Refrigerant Type	R-454B	R-454B
	Without Reheat Option		Circuit 1	10 lbs. 11 oz.	15 lbs. 0 oz.
			Circuit 2	10 lbs. 10 oz.	12 lbs. 12 oz.
Electric Heat Options Available				15, 22.5, 30, 45, 60 kW	
Compressor Type (number)				Two-Stage Scroll (1) Single-Stage Scroll (1)	
Outdoor Coil			Net face area (total) - sq. ft.	25.9	29.4
			Tube diameter - in.	3/8	3/8
			Number of rows	3	3
			Fins per inch	20	20
Outdoor Coil Fans			Motor - (No.) hp	1/3 (2 ECM)	1/3 (4 ECM)
			Motor rpm	300-1100	300-1100
			Total Motor watts	100-820	200-1400
			Diameter - (No.) in.	(2) 24	(4) 24
			Number of blades	3	3
			Total Air volume - cfm	2000-7500	3000-9000
Indoor Coil			Net face area (total) - sq. ft.	13.54	13.54
			Tube diameter - in.	3/8	3/8
			Number of rows	4	4
			Fins per inch	14	14
			Condensate drain size (NPT) - in.	(1) 1	
			Expansion device type	Balanced Port Thermostatic Expansion Valve	
Indoor Blower			Nominal motor output	3.75 HP (ECM)	3.75 HP (ECM)
			Blower wheel nominal diameter x width - in.	(1) 22 x 9	(1) 22 x 9
Filters			Type of filter	MERV 4, Disposable	
			Number and size - in.	(4) 20 x 25 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.

[1] AHRI Certified to AHRI Standard 340/360:

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.

BLOWER DATA

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY (NO HEAT SECTION) WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:

1 − Wet indoor coil air resistance of selected unit.
2 − Any factory installed options air resistance (heat section, Economizer, etc.)
3 − Any field installed accessories air resistance (duct resistance, diffuser, etc.)
See page 9 for wet coil and option/accessory air resistance data.
See page 9 for minimum air volume required for use with optional electric heat.

Total Air Volume cfm	Total Static Pressure - in. w.g.													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
1750	644	137	740	235	796	302	833	343	873	373	996	558	1065	664
2000	675	165	768	260	821	330	861	386	960	507	1026	629	1094	753
2250	711	195	803	290	856	375	901	497	991	564	1058	703	1128	840
2500	764	241	852	335	904	439	951	568	1025	641	1097	789	1170	934
2750	847	316	901	399	946	543	1004	674	1074	746	1146	895	1220	1041
3000	944	426	980	511	1021	671	1074	803	1136	874	1205	1021	1276	1167
3250	1022	544	1057	640	1099	810	1149	942	1207	1012	1272	1156	1338	1304
3500	1092	666	1131	770	1174	948	1225	1081	1281	1151	1342	1297	1402	1451
3750	1161	780	1202	892	1248	1079	1298	1217	1353	1291	1409	1445	1463	1609
4000	1230	888	1273	1010	1319	1212	1369	1362	1421	1441	1471	1608	1518	1784
4250	1299	1006	1342	1140	1388	1362	1436	1526	1483	1612	1528	1790	1571	1975
4500	1366	1142	1409	1289	1454	1532	1498	1708	1542	1798	1583	1984	1623	2172
4750	1432	1295	1474	1457	1516	1719	1558	1903	1598	1997	1637	2187	1674	2377
5000	1496	1471	1537	1645	1577	1921	1616	2110	1654	2205	1690	2396	1726	2586
5250	1560	1667	1598	1849	1636	2132	1673	2324	1709	2419	1744	2609	1779	2796
5500	1623	1878	1659	2064	1695	2349	1731	2539	1765	2634	- - -	- - -	- - -	- - -
5750	1686	2097	1720	2284	1755	2567	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
6000	1748	2316	1781	2502	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

Total Air Volume cfm	Total Static Pressure - in. w.g.											
	1.6		1.8		2.0		2.2		2.4		2.6	
	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
1750	1134	775	1203	896	1275	1025	1356	1149	1422	1287	1470	1439
2000	1162	878	1231	1007	1302	1139	1379	1268	1440	1411	1486	1570
2250	1198	975	1268	1111	1338	1250	1409	1388	1464	1542	1507	1711
2500	1243	1075	1313	1217	1380	1365	1442	1517	1491	1685	1533	1860
2750	1293	1186	1361	1336	1423	1494	1477	1661	1520	1839	1561	2016
3000	1346	1317	1410	1474	1466	1642	1514	1818	1554	2000	1594	2180
3250	1402	1460	1460	1627	1511	1803	1553	1986	1591	2172	1631	2352
3500	1459	1616	1509	1793	1555	1976	1594	2165	1631	2352	1671	2531
3750	1512	1785	1557	1970	1599	2159	1636	2350	1673	2536	1713	2714
4000	1562	1969	1604	2157	1643	2347	1680	2538	1717	2722	1756	2896
4250	1611	2163	1650	2352	1688	2541	1724	2729	1762	2908	- - -	- - -
4500	1661	2362	1698	2552	1734	2739	1770	2922	- - -	- - -	- - -	- - -
4750	1710	2567	1746	2754	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
5000	1761	2774	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

BLOWER DATA

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE - in. w.g.

Air Volume cfm	Wet Indoor Coil		Electric Heat	Economizer	Filters			Return Air Adaptor Plate
	078, 092	102, 120, 152			MERV 8	MERV 13	MERV 16	
1750	0.04	0.04	0.03	0.05	0.01	0.03	0.06	0.00
2000	0.05	0.05	0.03	0.06	0.01	0.03	0.08	0.00
2250	0.06	0.06	0.04	0.08	0.01	0.04	0.09	0.00
2500	0.07	0.07	0.04	0.11	0.01	0.05	0.10	0.00
2750	0.08	0.08	0.05	0.12	0.02	0.05	0.11	0.00
3000	0.10	0.09	0.06	0.13	0.02	0.06	0.12	0.02
3250	0.11	0.10	0.06	0.15	0.02	0.06	0.13	0.02
3500	0.12	0.11	0.09	0.15	0.03	0.07	0.15	0.04
3750	0.14	0.13	0.09	0.15	0.03	0.08	0.16	0.07
4000	0.15	0.14	0.09	0.19	0.04	0.08	0.17	0.09
4250	0.17	0.15	0.13	0.19	0.04	0.09	0.19	0.11
4500	0.19	0.17	0.14	0.22	0.04	0.09	0.20	0.12
4750	0.20	0.18	0.17	0.25	0.05	0.10	0.21	0.16
5000	0.22	0.20	0.20	0.29	0.06	0.10	0.23	0.18
5250	0.24	0.22	0.22	0.32	0.06	0.11	0.24	0.19
5500	0.25	0.23	0.25	0.34	0.07	0.12	0.25	0.22
5750	0.27	0.25	0.31	0.45	0.07	0.12	0.27	0.25
6000	0.29	0.27	0.33	0.52	0.08	0.13	0.28	0.27

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

Electric Heat kW	Minimum cfm
7.5	1750
15	2250
22.5	2250
30	2750
45	2750
60	3500

POWER EXHAUST FAN PERFORMANCE

Return Air System Static Pressure	Air Volume Exhausted
in. w.g.	cfm
0	3175
0.05	2955
0.10	2685
0.15	2410
0.20	2165
0.25	1920
0.30	1420
0.35	1200

BLOWER DATA

CEILING DIFFUSERS AIR RESISTANCE - in. w.g.

Unit Size	RTD11 Step-Down Diffuser				FD11 Flush Diffuser
	Air Volume cfm	2 Ends Open	1 Side, 2 Ends Open	All Ends & Sides Open	
078 & 092 Models	2400	0.21	0.18	0.15	0.14
	2600	0.24	0.21	0.18	0.17
	2800	0.27	0.24	0.21	0.20
	3000	0.32	0.29	0.25	0.25
	3200	0.41	0.37	0.32	0.31
	3400	0.50	0.45	0.39	0.37
	3600	0.61	0.54	0.48	0.44
	3800	0.73	0.63	0.57	0.51
102 & 120 Models	3600	0.36	0.28	0.23	0.15
	3800	0.40	0.32	0.26	0.18
	4000	0.44	0.36	0.29	0.21
	4200	0.49	0.40	0.33	0.24
	4400	0.54	0.44	0.37	0.27
	4600	0.60	0.49	0.42	0.31
	4800	0.65	0.53	0.46	0.35
	5000	0.69	0.58	0.50	0.39
	5200	0.75	0.62	0.54	0.43
152 Models	4200	0.22	0.19	0.16	0.10
	4400	0.28	0.24	0.20	0.12
	4600	0.34	0.29	0.24	0.15
	4800	0.40	0.34	0.29	0.19
	5000	0.46	0.39	0.34	0.23
	5200	0.52	0.44	0.39	0.27
	5400	0.58	0.49	0.43	0.31
	5600	0.64	0.54	0.47	0.35
	5800	0.70	0.59	0.51	0.39

CEILING DIFFUSER AIR THROW DATA

Model No.	Air Volume	[1] Effective Throw Range	
		RTD11 Step-Down	FD11 Flush
	cfm	ft.	ft.
078, 092 Models	2600	24 - 29	19 - 24
	2800	25 - 30	20 - 28
	3000	27 - 33	21 - 29
	3200	28 - 35	22 - 29
	3400	30 - 37	22 - 30
102, 120 Models	3600	25 - 33	22 - 29
	3800	27 - 35	22 - 30
	4000	29- 37	24 - 33
	4200	32 - 40	26 - 35
	4400	34 - 42	28 - 37
152 Models	5600	39 - 49	28 - 37
	5800	42 - 51	29 - 38
	6000	44 - 54	40 - 50
	6200	45 - 55	42 - 51
	6400	46 - 55	43 - 52
	6600	47 - 56	45 - 56

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

ELECTRICAL/ELECTRIC HEAT DATA — 6.5 TON

		Model No.	**LHT078H5E**		
[1] **Voltage - 60Hz**			**208/230V-3ph**	**460V-3ph**	**575V-3ph**
Compressor 1 (Non-Inverter)		Rated Load Amps	11.9	6.8	4.8
		Locked Rotor Amps	112	61.8	39
Compressor 2 (Non-Inverter)		Rated Load Amps	9	4.1	3.3
		Locked Rotor Amps	70	39	29
Outdoor Fan Motors (2)		Full Load Amps (2 ECM)	2.8	1.4	1.1
		Total	5.6	2.8	2.2
Power Exhaust (1) 0.33 HP		Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)			15	15	20
Indoor Blower Motor		Horsepower	3.75	3.75	3.75
		Full Load Amps	8	4.2	3.6
[2] Maximum Overcurrent Protection (MOCP)		Unit Only	45	25	20
		With (1) 0.33 HP Power Exhaust	50	25	20
[3] Minimum Circuit Ampacity (MCA)		Unit Only	38	20	16
		With (1) 0.33 HP Power Exhaust	40	21	17

ELECTRIC HEAT DATA

Electric Heat Voltage			**208V**	**240V**	**480V**	**600V**
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**7.5 kW**	[4] 60	70	35	25
		15 kW	[4] 80	90	45	35
		22.5 kW	[4] 100	110	60	45
		30 kW	[4] 125	150	70	60
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**7.5 kW**	58	61	31	25
		15 kW	77	83	43	34
		22.5 kW	97	106	54	43
		30 kW	116	128	65	52
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**7.5 kW**	[4] 60	70	35	30
		15 kW	[4] 80	90	45	35
		22.5 kW	[4] 100	110	60	45
		30 kW	[4] 125	150	70	60
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**7.5 kW**	60	63	33	26
		15 kW	79	85	44	35
		22.5 kW	99	108	55	44
		30 kW	119	131	67	53

ELECTRICAL ACCESSORIES

Disconnect	**7.5 kW**	**54W56**	**54W56**	**54W56**	**54W56**
	15 kW	**54W56**	**54W57**	**54W56**	**54W56**
	22.5 kW	**54W57**	**54W57**	**54W56**	**54W56**
	30 kW	**54W57**	**54W57**	**54W56**	**54W56**

Disconnects - 54W56 - 80A
54W57 - 150A

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

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

[2] HACR type breaker or fuse.

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

[4] Factory installed circuit breaker not available.

ELECTRICAL/ELECTRIC HEAT DATA — 7.5 TON

		Model No.	LHT092H5E		
[1] Voltage - 60Hz			208/230V-3ph	460V-3ph	575V-3ph
Compressor 1 (Non-Inverter)		Rated Load Amps	11.9	6.8	4.8
		Locked Rotor Amps	112	61.8	39
Compressor 2 (Non-Inverter)		Rated Load Amps	12.8	6	5.8
		Locked Rotor Amps	120.4	49.4	41
Outdoor Fan Motors (2)		Full Load Amps (2 ECM)	2.8	1.4	1.1
		Total	5.6	2.8	2.2
Power Exhaust (1) 0.33 HP		Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)			15	15	20
Indoor Blower Motor		Horsepower	3.75	3.75	3.75
		Full Load Amps	8	4.2	3.6
[2] Maximum Overcurrent Protection (MOCP)		Unit Only	50	25	20
		With (1) 0.33 HP Power Exhaust	50	25	20
[3] Minimum Circuit Ampacity (MCA)		Unit Only	42	22	18
		With (1) 0.33 HP Power Exhaust	44	23	19

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**7.5 kW**	70	70	35	30
		15 kW	90	90	45	40
		22.5 kW	110	110	60	45
		30 kW	[4] 125	150	70	60
		45 kW	[4] 175	200	90	80
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**7.5 kW**	62	65	33	27
		15 kW	81	87	45	36
		22.5 kW	101	110	56	45
		30 kW	120	132	67	54
		45 kW	159	177	90	72
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**7.5 kW**	70	70	35	30
		15 kW	90	90	50	40
		22.5 kW	[4] 110	125	60	50
		30 kW	[4] 125	150	70	60
		45 kW	[4] 175	200	100	80
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**7.5 kW**	64	67	35	28
		15 kW	83	90	46	37
		22.5 kW	103	112	57	46
		30 kW	123	135	68	55
		45 kW	162	180	91	73

ELECTRICAL ACCESSORIES

Disconnect	**7.5 kW**	**54W56**	**54W56**	**54W56**	**54W56**
	15 kW	**54W57**	**54W57**	**54W56**	**54W56**
	22.5 kW	**54W57**	**54W57**	**54W56**	**54W56**
	30 kW	**54W57**	**54W57**	**54W56**	**54W56**
	45 kW	**N/A**	**N/A**	**54W57**	**54W56**

Disconnects - 54W56 - 80A
54W57 - 150A

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

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

[2] HACR type breaker or fuse.

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

[4] Factory installed circuit breaker not available.

ELECTRICAL/ELECTRIC HEAT DATA — 8.5 TON

		Model No.	LHT102H5E		
[1] Voltage - 60Hz			208/230V-3ph	460V-3ph	575V-3ph
Compressor 1 (Non-Inverter)		Rated Load Amps	11.9	6.8	4.8
		Locked Rotor Amps	112	61.8	39
Compressor 2 (Non-Inverter)		Rated Load Amps	16	7.1	6.4
		Locked Rotor Amps	156.4	69	47.8
Outdoor Fan Motors (2)		Full Load Amps (2 ECM)	2.8	1.4	1.1
		Total	5.6	2.8	2.2
Power Exhaust (1) 0.33 HP		Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)			15	15	20
Indoor Blower Motor		Horsepower	3.75	3.75	3.75
		Full Load Amps	8	4.2	3.6
[2] Maximum Overcurrent Protection (MOCP)		Unit Only	60	25	25
		With (1) 0.33 HP Power Exhaust	60	30	25
[3] Minimum Circuit Ampacity (MCA)		Unit Only	46	23	19
		With (1) 0.33 HP Power Exhaust	48	24	20

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**7.5 kW**	70	70	35	30
		15 kW	[4] 90	100	50	40
		22.5 kW	[4] 110	125	60	50
		30 kW	[4] 125	150	70	60
		45 kW	[4] 175	200	100	80
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**7.5 kW**	66	69	34	28
		15 kW	85	91	46	37
		22.5 kW	105	114	57	46
		30 kW	124	136	68	55
		45 kW	163	181	91	73
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**7.5 kW**	[4] 70	80	40	30
		15 kW	[4] 90	100	50	40
		22.5 kW	[4] 110	125	60	50
		30 kW	150	150	70	60
		45 kW	[4] 175	200	100	80
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**7.5 kW**	68	71	36	29
		15 kW	87	94	47	38
		22.5 kW	107	116	58	47
		30 kW	127	139	70	56
		45 kW	166	184	92	74

ELECTRICAL ACCESSORIES

Disconnect	**7.5 kW**	**54W56**	**54W56**	**54W56**	**54W56**
	15 kW	**54W57**	**54W57**	**54W56**	**54W56**
	22.5 kW	**54W57**	**54W57**	**54W56**	**54W56**
	30 kW	**54W57**	**54W57**	**54W56**	**54W56**
	45 kW	**N/A**	**N/A**	**54W57**	**54W56**

Disconnects - 54W56 - 80A
54W57 - 150A

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

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

[2] HACR type breaker or fuse.

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

[4] Factory installed circuit breaker not available.

ELECTRICAL/ELECTRIC HEAT DATA — 10 TON

		Model No.	LHT120H5E		
[1] Voltage - 60Hz			208/230V-3ph	460V-3ph	575V-3ph
Compressor 1 (Non-Inverter)		Rated Load Amps	13.8	6.9	5.8
		Locked Rotor Amps	150	58	47.8
Compressor 2 (Non-Inverter)		Rated Load Amps	18.6	8.3	7.7
		Locked Rotor Amps	155	58.1	47.8
Outdoor Fan Motors (3)		Full Load Amps (3 ECM)	2.8	1.4	1.1
		Total	5.6	2.8	2.2
Power Exhaust (1) 0.33 HP		Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)			15	15	20
Indoor Blower Motor		Horsepower	3.75	3.75	3.75
		Full Load Amps	8	4.2	3.6
[2] Maximum Overcurrent Protection (MOCP)		Unit Only	60	30	25
		With (1) 0.33 HP Power Exhaust	70	30	25
[3] Minimum Circuit Ampacity (MCA)		Unit Only	51	25	22
		With (1) 0.33 HP Power Exhaust	54	26	23

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**15 kW**	100	100	50	40
		22.5 kW	[4] 110	125	60	50
		30 kW	150	150	70	60
		45 kW	[4] 175	200	100	80
		60 kW	200	200	100	80
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**15 kW**	90	96	47	40
		22.5 kW	110	119	59	49
		30 kW	129	141	70	58
		45 kW	168	186	92	76
		60 kW	176	195	97	79
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**15 kW**	100	100	50	45
		22.5 kW	125	125	60	50
		30 kW	150	150	80	60
		45 kW	[4] 175	200	100	80
		60 kW	200	200	100	80
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**15 kW**	93	99	49	41
		22.5 kW	112	121	60	50
		30 kW	132	144	71	59
		45 kW	171	189	94	77
		60 kW	179	198	98	80

ELECTRICAL ACCESSORIES

Disconnect	**15 kW**	**54W57**	**54W57**	**54W56**	**54W56**
	22.5 kW	**54W57**	**54W57**	**54W56**	**54W56**
	30 kW	**54W57**	**54W57**	**54W56**	**54W56**
	45 kW	**N/A**	**N/A**	**54W57**	**54W56**
	60 kW	**N/A**	**N/A**	**54W57**	**54W57**

Disconnects - 54W56 - 80A
54W57 - 150A

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

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

[2] HACR type breaker or fuse.

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

[4] Factory installed circuit breaker not available.

ELECTRICAL/ELECTRIC HEAT DATA — 12.5 TON

		Model No.	LHT152H5E		
[1] Voltage - 60Hz			208/230V-3ph	460V-3ph	575V-3ph
Compressor 1 (Non-Inverter)		Rated Load Amps	19.2	9.1	6.2
		Locked Rotor Amps	162.3	70.8	58.2
Compressor 2 (Non-Inverter)		Rated Load Amps	22.4	9.1	7.2
		Locked Rotor Amps	166.2	74.6	54
Outdoor Fan Motors (3)		Full Load Amps (3 ECM)	2.8	1.4	1.1
		Total	11.2	5.6	4.4
Power Exhaust (1) 0.33 HP		Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)			15	15	20
Indoor Blower Motor		Horsepower	3.75	3.75	3.75
		Full Load Amps	8	4.2	3.6
[2] Maximum Overcurrent Protection (MOCP)		Unit Only	80	35	30
		With (1) 0.33 HP Power Exhaust	90	40	30
[3] Minimum Circuit Ampacity (MCA)		Unit Only	67	31	24
		With (1) 0.33 HP Power Exhaust	69	32	25

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**15 kW**	[4] 110	125	60	45
		22.5 kW	150	150	70	60
		30 kW	[4] 150	175	80	60
		45 kW	[4] 200	225	100	80
		60 kW	[4] 200	225	110	90
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**15 kW**	106	112	53	42
		22.5 kW	126	135	65	51
		30 kW	145	157	76	60
		45 kW	184	202	98	78
		60 kW	192	211	103	81
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**15 kW**	[4] 110	125	60	45
		22.5 kW	150	150	70	60
		30 kW	[4] 150	175	80	70
		45 kW	[4] 200	225	100	80
		60 kW	[4] 200	225	110	90
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**15 kW**	108	114	55	43
		22.5 kW	128	137	66	52
		30 kW	147	160	77	61
		45 kW	187	205	100	79
		60 kW	194	214	104	82

ELECTRICAL ACCESSORIES

Disconnect	**15 kW**	**54W57**	**54W57**	**54W56**	**54W56**
	22.5 kW	**54W57**	**54W57**	**54W56**	**54W56**
	30 kW	**54W57**	**N/A**	**54W56**	**54W56**
	45 kW	**N/A**	**N/A**	**54W57**	**54W56**
	60 kW	**N/A**	**N/A**	**54W57**	**54W57**

Disconnects - 54W56 - 80A
54W57 - 150A

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

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

[2] HACR type breaker or fuse.

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

[4] Factory installed circuit breaker not available.

Minimum R454B Space and CFM Requirements

Minimum Airflow[1]		
Unit	Q_{min}(CFM)	Q_{min}(m^3h)
LHT078	304	516
LHT092	297	505
LHT102	297	505
LHT120	283	480
LHT152	396	674

[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)
LHT078	169	15.7
LHT092	165	15.3
LHT102	165	15.3
LHT120	157	14.5
LHT152	220	20.4

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

Refrigerant Charge R-454B			
Unit	Stage	M_c(lbs)	M_c(kg)
LHT 078	Stage 1	11.50	5.22
	Stage 2	11.00	4.99
LHT 092	Stage 1	11.00	4.99
	Stage 2	11.25	5.10
LHT 102	Stage 1	10.85	4.92
	Stage 2	11.25	5.10
LHT 120	Stage 1	10.69	4.85
	Stage 2	10.63	4.82
LHT 152	Stage 1	15.00	6.80
	Stage 2	12.75	5.78

Altitude Adjustment Factor[3]									
Halt	0	200	400	600	800	1000	1200	1400	1600
AF	1	1	1	1	1.02	1.05	1.04	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 LHT/LDT078 at 1000 ft. above see level, multiply 304 by 1.05 to get 319.2 CFM as the new Q_{min}.*

Parts Arrangement

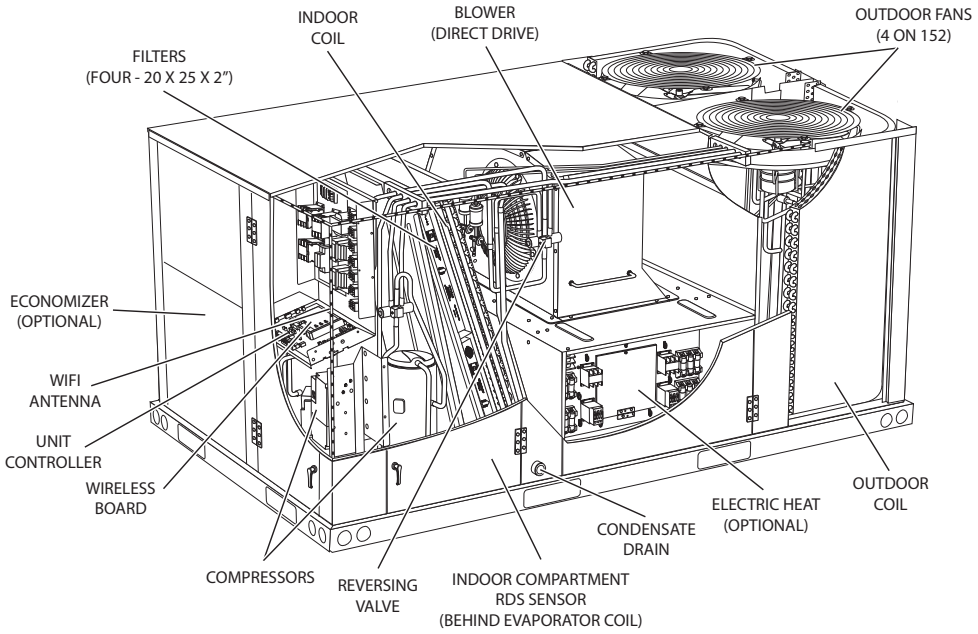


FIGURE 1

LHT078-152 CONTROL BOX

SHADED AREA IS A HINGED PANEL IN FRONT OF CONTROLS AREA (OPTIONAL A173 LOCATION)

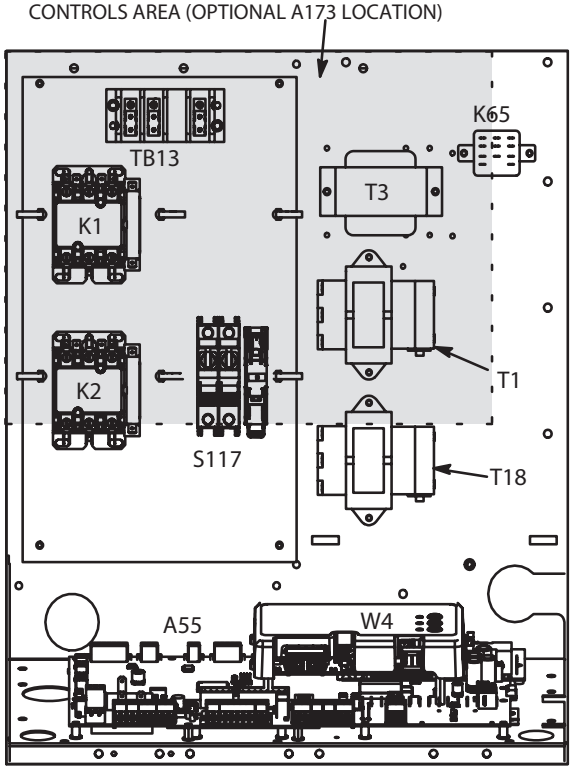


FIGURE 2

I-UNIT COMPONENTS

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.

The LHT unit parts arrangement are shown in FIGURE 1. All L1, L2, and L3 wiring is color coded; L1 is red, L2 is yellow, and L3 is blue. See wiring diagrams in the back of this manual for complete call out of components per LHT unit. All 7.5 through 12.5 ton units are configure to order units (CTO).

A-Control Box Components

LHT control box components are shown in FIGURE 2. The control box is located in the upper portion of the compressor compartment.

1-Disconnect Switch S48 (Optional)

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

2-Control Transformer T1

All 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 92VA and is protected by a 6 amp circuit breaker (CB8). The 208/230 (Y) voltage transformers use primary voltage taps as shown in FIGURE 3, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

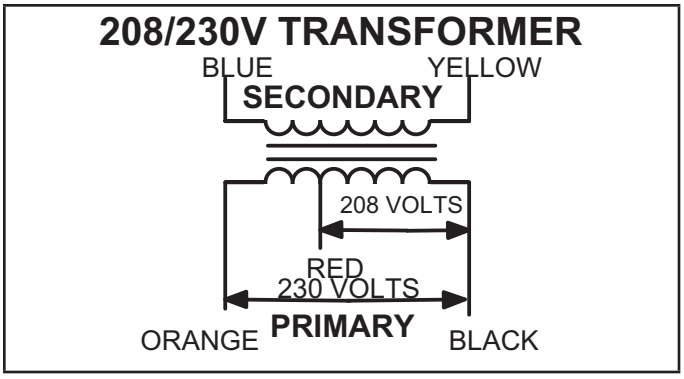


FIGURE 3

3-Transformer T18

T18 is a single line voltage to 24VAC transformer used in all LHT units. T18 is rated at 70VAC and is protected by a 3.5 amp circuit breaker (CB18).

4-Compressor Contactor K1, K2

All compressor contactors are three-pole-double-break contactors with a 24VAC coil. In all LHT units, K1 and K2 energize compressors B1 and B2 respectively in response to first, second or third stage cooling demands. The auxiliary N.C. contacts are opened to disable the crankcase heaters when compressor is energized.

5-Power Exhaust Relay K65 (PED units)

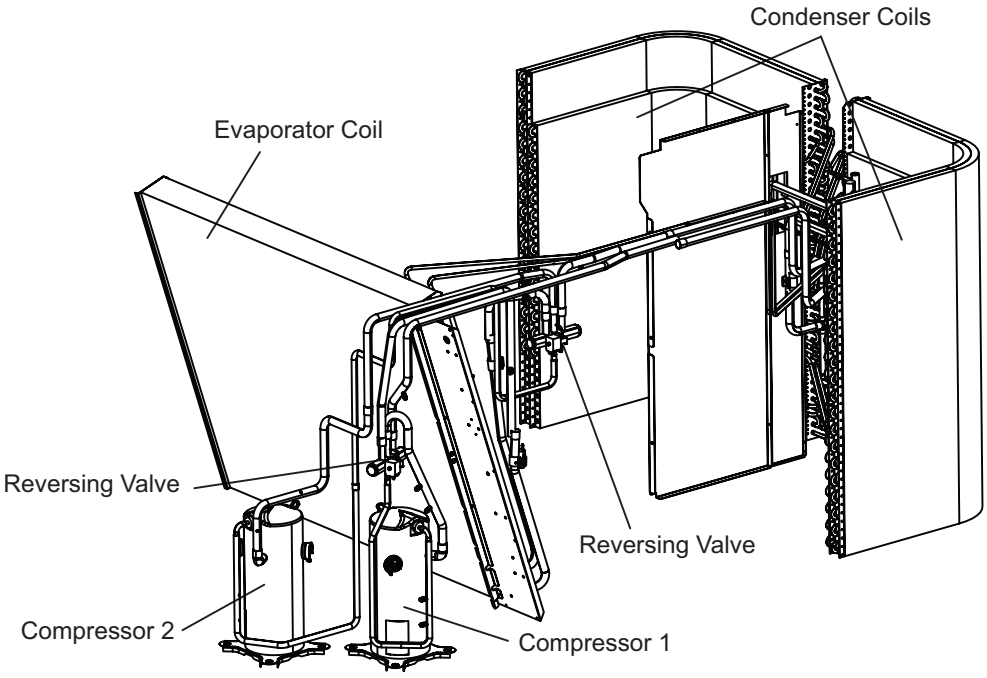
Power exhaust relay K65 is a N.O. DPDT relay with a 24VAC coil. K65 is used in all LHT units equipped with the optional power exhaust dampers. K65 is energized by the economizer control panel (A56), after the economizer dampers reach 50% open (adjustable in CORE). When K65 closes, the exhaust fan B10 is are energized.

6-Terminal Block (TB13)

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

PLUMBING COMPONENTS

LHT078-120



LHT152

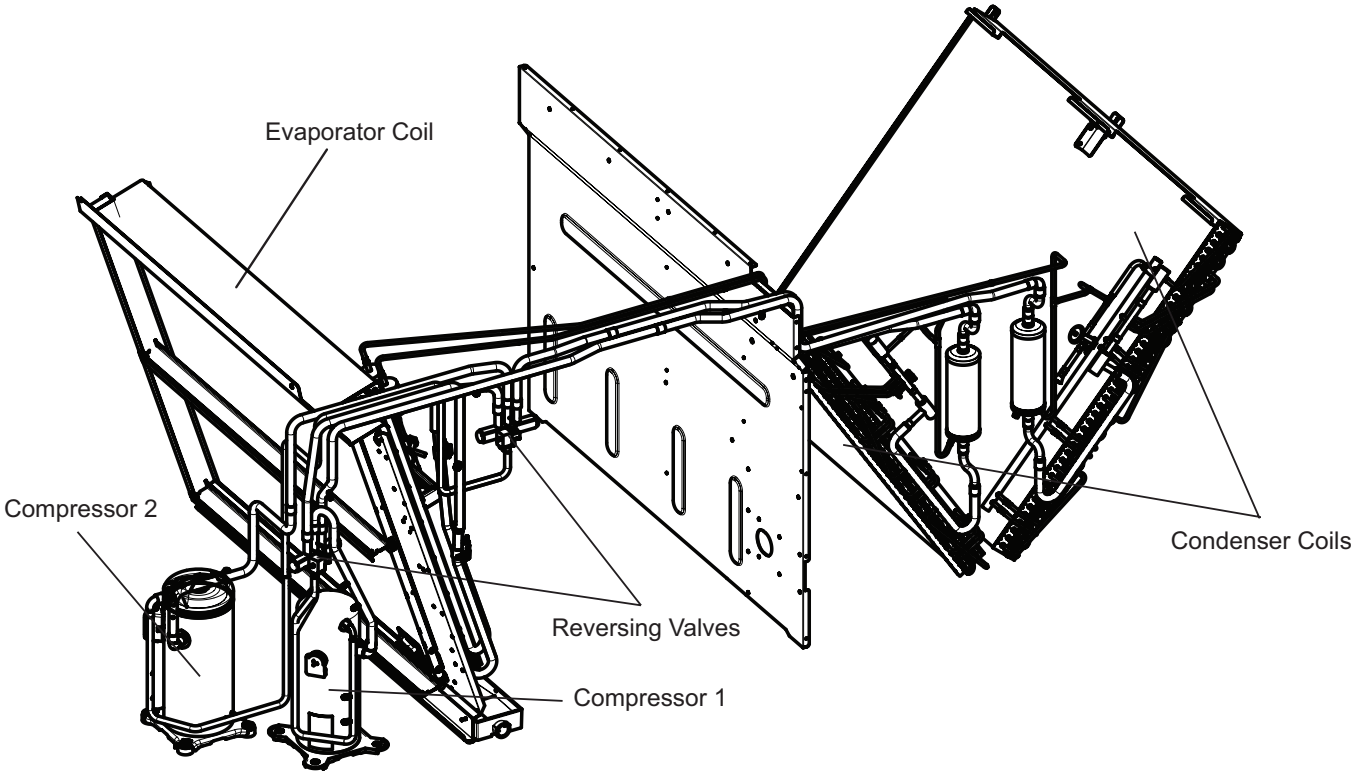


FIGURE 4

B-Cooling Components

LHT units use independent cooling circuits consisting of separate compressors, outdoor coils and indoor coil (with 2 separate stages). See FIGURE 4. Units are equipped with two or three draw-through type condenser fans. and directdrive blowers. The blower draws air across the indoor coil during unit operation.

Cooling may be supplemented by a factory-or-field-installed economizer. The indoor coils are slab type and are stacked. Each indoor coil uses a thermostatic expansion valve as the primary expansion device. Each indoor coil is also equipped with enhanced fins and rifled tubing. In all units, each compressor is protected by a crankcase heater, high pressure switch and low pressure switch. Additional protection is provided by by thermistors for low ambient control and freezing prevention.

1-Compressors B1 and B2

Units use two scroll compressors and two independent cooling circuits. Compressor capacity may vary from stage to stage. In all cases, the capacity of each compressor is added to reach the total capacity of the unit. See “SPECIFICATIONS” and “ELECTRICAL DATA” (table of contents) or compressor nameplate for compressor specifications.

⚠ WARNING

Electrical shock hazard. Compressor must be grounded. Do not operate without protective coverover 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.

⚠ 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-High Pressure Switches S4 and S7

The high pressure switch is an auto-reset SPST N.C. switch which opens on a pressure rise. All units are equipped with this switch. On fin/tube outdoor coils, the switch is located in the compressor discharge line. On all-aluminum outdoor coils, the switch is located on the liquid line in the blower section. Switches are wired in series with the compressor contactor coil.

On standard and high efficiency units, S4 (first circuit) and S7 (second circuit) are wired in series with the respective compressor contactor coils. On ultra high efficiency units, only S4 is used. S4 is located on the common compressor discharge line and is wired to both compressor contactors via the A55 Unit Controller.

When discharge pressure rises to 640 ± 20 psig (4413 ± 138 kPa) (indicating a problem in the system) the switch opens and the respective compressor is de-energized (the economizer can continue to operate). When discharge pressure drops to 475 ± 20 psig (3275 ± 138 kPa) the pressure switch will close.

The A55 Unit Controller 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.

3-Reversing Valve L1 and L2

A refrigerant reversing valve with a 24 volt solenoid coil is used to reverse refrigerant flow during unit operation in all 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 and L2 are controlled by the M4 controller in response to cooling demand or by defrost.

4-Low Pressure Switches S87, 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.

S87 (compressor one) and S88 (compressor two) are wired to A55 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 first thermostat demand, before the compressor is locked out. The control is reset by breaking and remaking the thermostat demand or manually resetting the control.

When suction pressure drops to 25 $\pm$ 5 psig, (indicating low pressure), the switch opens and the compressor(s) is(are) de-energized. The switch automatically resets when pressure in the suction line rises to 40 $\pm$ 5 psig due to many causes such as refrigerant being added.

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 sensors 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. Electric heat is energized during defrost

6-Filter Drier (all units)

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

7-Condenser Fan Motors B4, B5, B21, B22

See specifications section of this manual for specifications of condenser fans B4 , B5, B21 and B22 (B21 and B22 on 152 units only). All LHT motors are electrically commutated condenser fan motors (ECM). The ECM motors are wired directly to 230VAC power but do not operate until a pulse width modulated (PWM) control signal is sent from the M4 controller. All outdoor fans will run at the same speed when the appropriate PWM signal is received. The fans may be removed for servicing and cleaning by removing the fan grilles.

Transformer T5 and Fuse F57
460VAC & 575VAC Only:

460VAC and 575VAC units will use a Transformer T5 to step-down the line voltage to the correct 230VAC. There are two fuses F57 located next to the T5 transformer. The location of the T5 transformer is behind the disconnect box just above the bottom power entry cover.

8-Crankcase Heaters HR1, HR2

Heater HR1 is installed around compressor B1 and heater HR2 is installed around compressor B2. Crankcase heater wattage varies by compressor manufacturer.

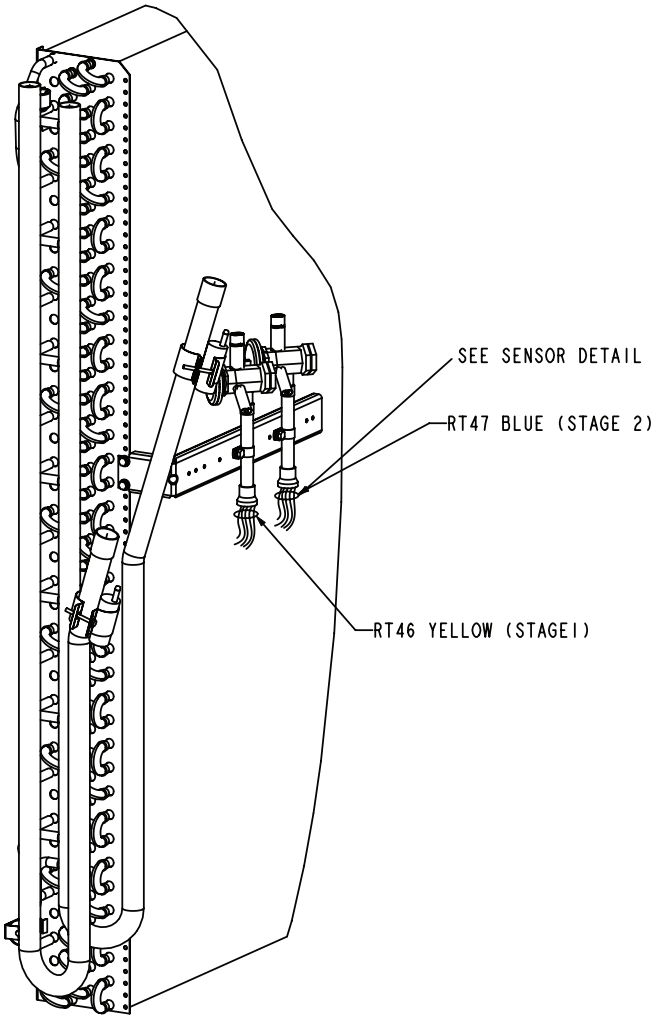
9-Temperature Sensors RT46, RT47, RT48 & RT49

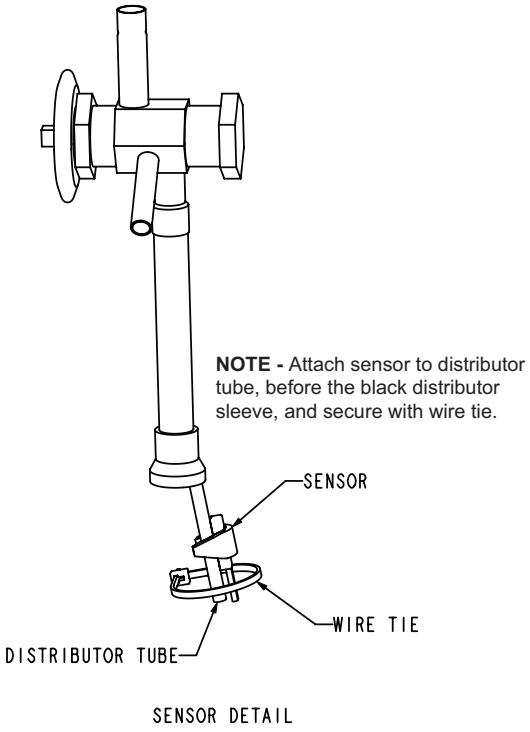
Units are equipped with four factory-installed thermistors (RT46-RT49) located on different points on the refrigerant circuit.

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.

Each thermistor must be specifically placed for proper unit operation and to initiate valid alarms. See FIGURE 5 and FIGURE 6 proper locations.

LHT078, 092, 102, 120, 152
INDOOR COIL
RT46, RT47



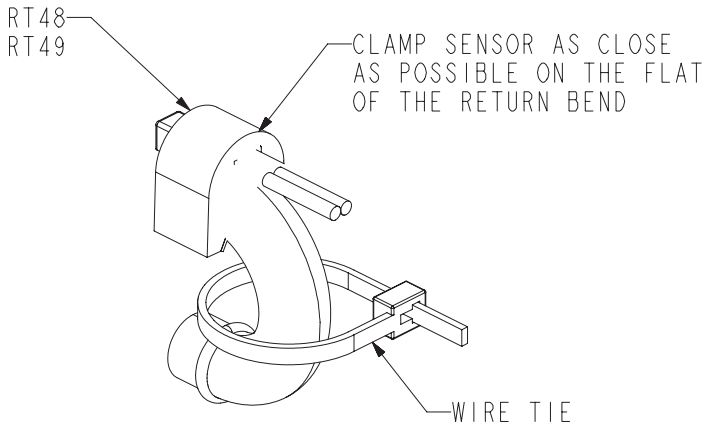


SENSOR DETAIL

DETAILS NOT TO SCALE

FIGURE 5

LHT078, 092, 102, 120, 152
OUTDOOR COIL
RT48, RT49



SENSOR DETAIL

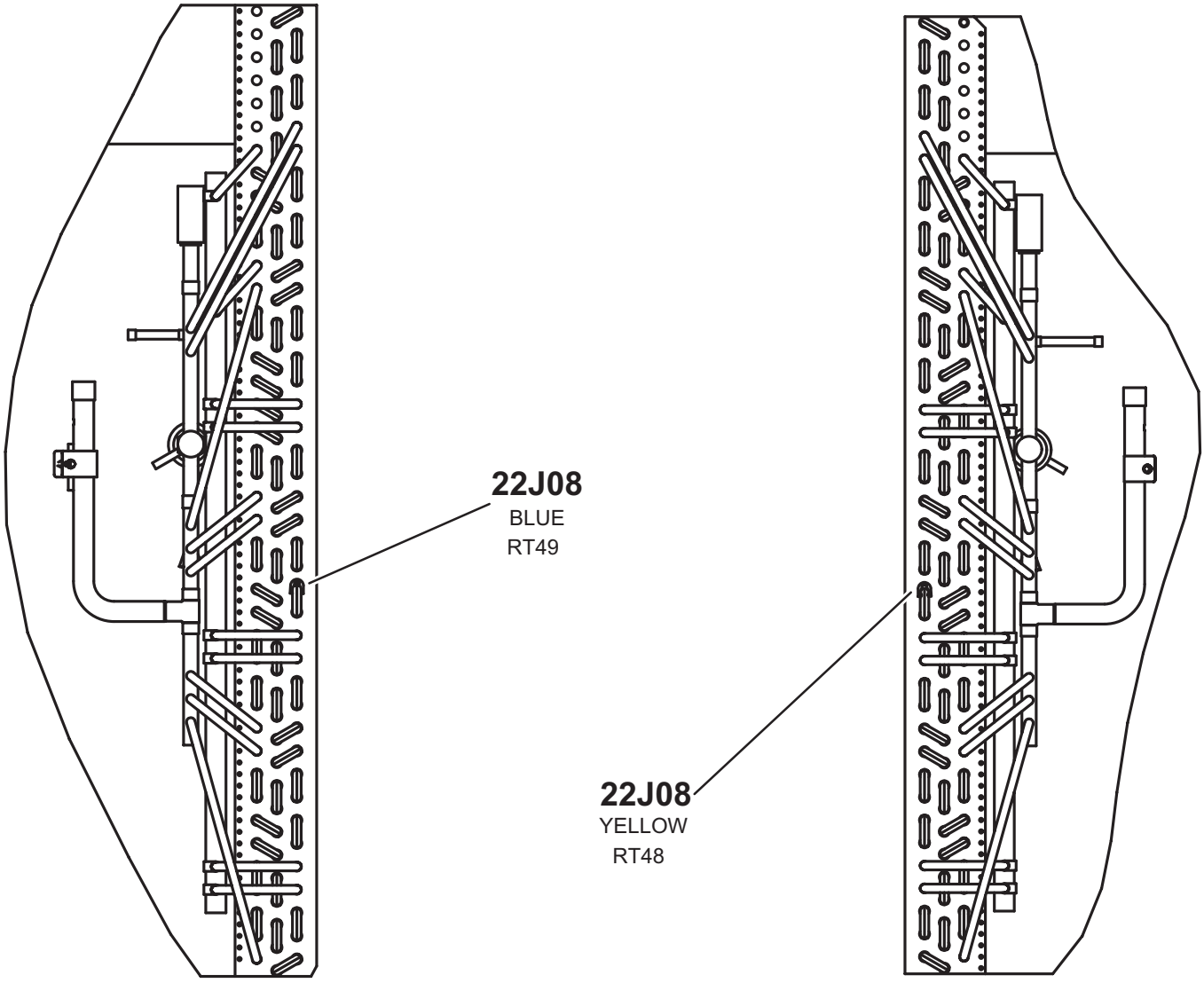


FIGURE 6

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 FIGURE 7.

LH 078-152
INDOOR COMPARTMENT RDS SENSOR

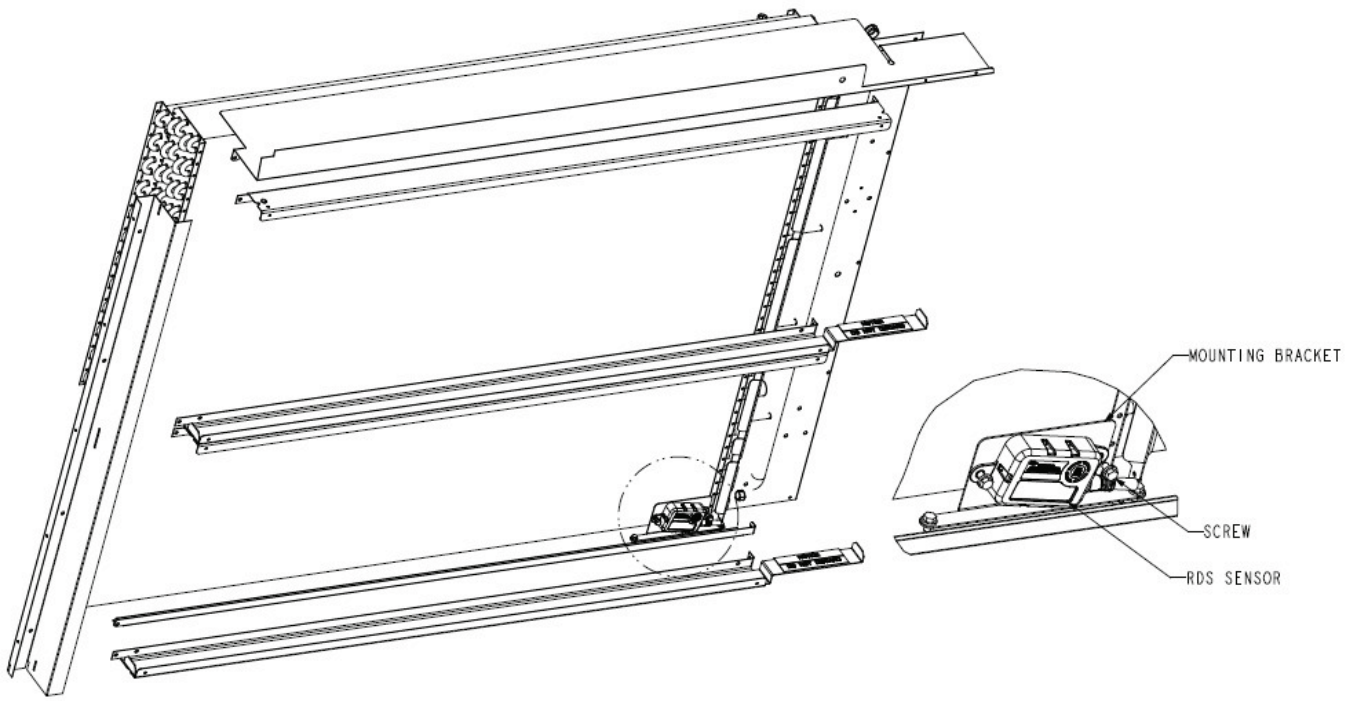


FIGURE 7

C-Blower Compartment

The blower compartment in all LHT078-152H units is located between the indoor coil and the outdoor coil section. The blower assembly is accessed by disconnecting the blower motor and all other plugs and removing the screws in front of the blower housing.

1-Blower Wheels

Units are be equipped with a backward inclined blower wheel. See “SPECIFICATIONS” at the front this manual for more detail.

2-Indoor Blower Motor B3

Units are equipped with a direct drive blower assembly with a three-phase, variable speed, direct drive blower motor.

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 name plate for information specific to your unit.

A-Blower Operation

Refer to the Unit Controller Setup Guide to energize blower. Use the mobile service app menu; see SERVICE > TEST.

In both thermostat and zone control mode, the Unit Controller will stage the blower between low and high speed.

⚠ 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 factoryinstalled, 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.

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

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

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

NOTE - *Blower operation mode can also be initiated by the mobile service app.*

Direct-drive motor may not immediately stop when power is interrupted to the Unit Controller. Disconnect unit power before opening the blower compartment. The Controller’s digital inputs must be used to shut down the blower. See Unit Controller manual for operation sequences.

B-Blower Access

The blower assembly is secured to a sliding frame which allows the blower assembly to be pulled out of the unit. See FIGURE 9.

1 - Loosen the reusable wire tie which secures the controls and high voltage blower wiring to the blower housing. Disconnect the pressure sensor low voltage wire harness.

2 - Remove and retain screws on either side (and on the front for direct drive) of sliding frame. Use the metal handle to pull frame toward outside of unit.

3 - Slide frame back into original position when finished servicing. Reattach the blower wiring in the previous location using the wire tie. Reconnect pressure sensor low voltage wire harness.

4 - Replace retained screws.

The supply CFM can be adjusted by changing the percentage of motor output using the Unit Controller settings Refer to TABLE 1 for menu paths and default settings.. Record any RPM% changes on the parameter settings label located on the inside of the compressor access panel.

⚠ CAUTION

The BLOWER CALIBRATION process starts the indoor blower at operational speeds and moves the economizer damper blades. Before starting this process, replace any access panels and close all unit doors except compressor compartment door.

Blower calibration is required only on units that are newly installed or if there is a change in the duct work or air filters after installation. Use the mobile service app to navigate to the SETUP>TEST & BALANCE>BLOWER menu. After the new RPM% values are entered, select START CALIBRATION. The blower calibration status is displayed as a % complete. Upon successful completion, the mobile service app will display CALIBRATION SUCCESS and go back to the blower calibration screen.

IMPORTANT - *The default value for Cooling Low motor speed is lower than a traditional singe- or two-speed unit. If operating the unit with a 2- or 3-stage controller (2- or 3-stage thermostat, DDC controller, etc.), it is recommended to increase the Cooling Low CFM default value to a suitable level for part load cooling (typically 60% of full load CFM).*

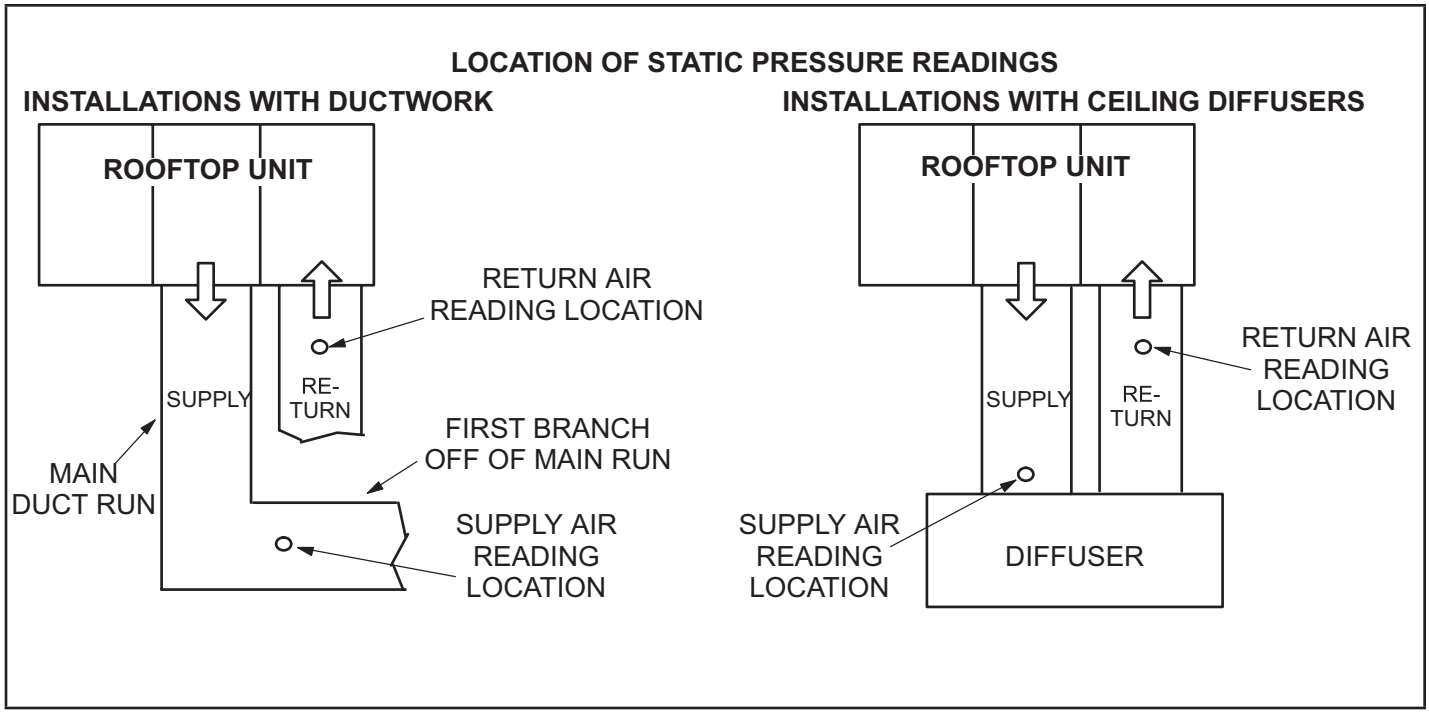


FIGURE 8

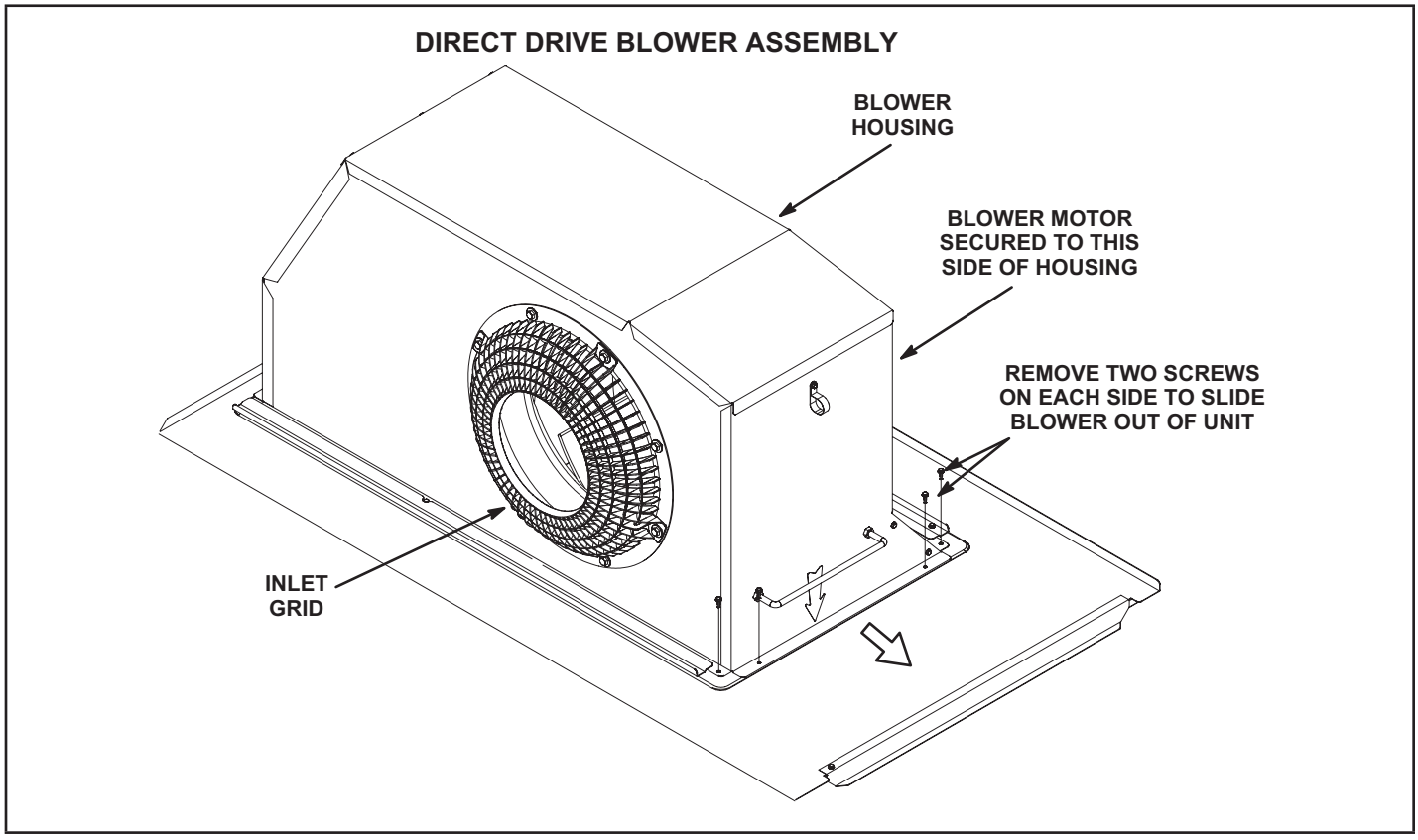


FIGURE 9

TABLE 1

DIRECT DRIVE PARAMETER SETTINGS - 581102-01

Parameter	Field Setting	Description
Note: Any changes to Smoke CFM setting must be adjusted before the other CFM settings. Use SETTINGS > RTU OPTIONS > EDIT PARAMETERS = 12 for EBM, 6 for ECM		
BLOWER SMOKE CFM	%	Percentage of RPM for blower smoke speed.
SETUP > TEST & BALANCE > BLOWER		
BLOWER HEATING HIGH CFM	%	Percentage of RPM for blower heating high speed.
BLOWER HEATING LOWCFM	%	Percentage of RPM for blower heating low speed (P volt gas heat only).
BLOWER COOLING HIGH CFM	%	Percentage of RPM for blower cooling high speed.
BLOWER COOLING LOW CFM	%	Percentage of RPM for blower cooling low speed and vent speed for standard static blowers.
BLOWER VENTILATION CFM	%	Percentage of RPM for high static blower ventilation speed.
SETUP > TEST & BALANCE > DAMPER		
BLOWER HIGH CFM DAMPER POS %	%	Minimum damper position for high speed blower operation. Default 0%.
BLOWER LOW CFM DAMPER POS %	%	Minimum damper position for low speed blower operation. Default 0%.
POWER EXHAUST DAMPER POS %	%	Minimum damper position for low power exhaust operation. Default 50%.
SETTINGS > RTU OPTIONS > EDIT PARAMETERS = 216		
POWER EXHAUST DEADBAND %	%	Deadband % for power exhaust operation. Default 10%.
SETTINGS > RTU OPTIONS > EDIT PARAMETERS = 10 (Applies to Thermostat Mode ONLY)		
FREE COOLING STAGE-UP DELAY	sec	Number of seconds to hold blower at low speed before switching to blower at high speed. Default 300 seconds.

Installer: Record any parameter changes under “Field Setting” column. Settings need to be recorded by installer for use when Unit Controller is replaced or reprogrammed.

D-Optional Electric Heat Components

Table 2 shows electric heat fuse ratings. See Options/Accessories section (see table of contents) for LHT to EHO match-ups. See Electrical/Electric Heat Data section (see table of contents) of this manual for electrical ratings and capacities.

All electric heat sections consist of electric heating elements exposed directly to the air stream. See FIGURE 10 and FIGURE 11.

EHO parts arrangement is shown in FIGURE 10 and FIGURE 11. Multiple-stage elements are sequenced on and off in response to thermostat demand.

1-Contactors K15, K16

Contactors K15 and K16 are three-pole double-break contactors located on the electric heat vestibule. All contactors are equipped with a 24VAC coil. The coils in the K15 and K16 contactors are energized by a W2 thermostat demand, K9, and DL2. Contactor K15 energizes the first stage heating elements, while K16 energizes the second stage heating elements.

2-High Temperature Limits S15 (Primary)

S15 is a SPST N.C. auto-reset thermostat located on the back panel of the electric heat section below the heating elements. S15 is the high temperature limit for the electric heat section. When S15 opens, indicating a problem in the system, contactor K15 is de-energized.

When K15 is de-energized, first stage and all subsequent stages of heat are de-energized. For EHO102-150 units, the electric heat section thermostat is factory set to open at 170ºF ± 5ºF (76ºC ± 2.8ºC) on a temperature rise and automatically reset at 130F ± 6F (54.4C ± 3.3C) on a temperature fall.

For EHO100 units, the electric heat section thermostat is factory set to open at 160F ± 5ºF (71.0ºC ± 2.8ºC) on a temperature rise and automatically reset at 120ºF ± 6ºF (49.0ºC ± 3.3ºC) on a temperature fall. The thermostat is not adjustable.

3-High Temperature Limit S20, S157, S158, S15, S160 & S161 (Secondary)

Limits are SPST N.C. manual-reset thermostat . Like the primary temperature limit, S20 is wired in series with the first stage contactor coil (K15) and second stage contactor coil (K16). When S20 opens, contactors (K15, K16) are de-energized. When the contactors are de-energized, first stage and all subsequent stages of heat are de-energized. The thermostat is factory set to open at 220ºF + 6ºF (104ºC + 3.3ºC) on a temperature rise and can be manually reset when temperature falls below 160ºF (71.0ºC).

4-Terminal Strip TB2

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

5-Terminal Strip TB3

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

6-Heating Elements HE1 through HE6

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.

7-Fuse F3

Fuse F3 are housed in a fuse block which holds three fuses. Each F3 fuse is connected in series with each leg of electric heat. FIGURE 11 and TABLE 2 show the fuses used with each electric heat section. For simplicity, the service manual labels the fuses F3 - 1 through F3 - 4.

8-Unit Fuse Block & Fuse F3 and F4

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

TABLE 2

ELECTRIC HEAT SECTION FUSE RATING					
EHA QUANTITY & SIZE	**VOLTAGES**	**FUSE (3 each)**			
		F-3-1	**F3-2**	**F42-1**	**F42-2**
EHO075-1, 7.5	208/230		25 Amp 250V		
	460		15 Amp 600V		
	575		10 Amp 600V		
EHO150-1, 15	208/230		50 Amp 250V		
	460		25 Amp 600V		
	575		20 Amp 600V		
EHO225-1, 22.5	208/230	50 Amp 250V		25 Amp 250V	
	460	25 Amp 600V		15 Amp 600V	
	575	20 Amp 600V		10 Amp 600V	
EHO300-1, 30	208/230	50 Amp 250V		50 Amp 250V	
	460	25 Amp 600V		25 Amp 600V	
	575	20 Amp 600V		20 Amp 600V	
EHO450-1, 45	208/230	50 Amp 250V		60 Amp 250V	60 Amp 250V
	460	25 Amp 600V		50 Amp 600V	
	575	20 Amp 600V		40 Amp 600V	
EHO600-1, 60	208/230	60 Amp 250V	60 Amp 250V	60 Amp 250V	60 Amp 250V
	460	50 Amp 600V		50 Amp 600V	
	575	40 Amp 600V		40 Amp 600V	

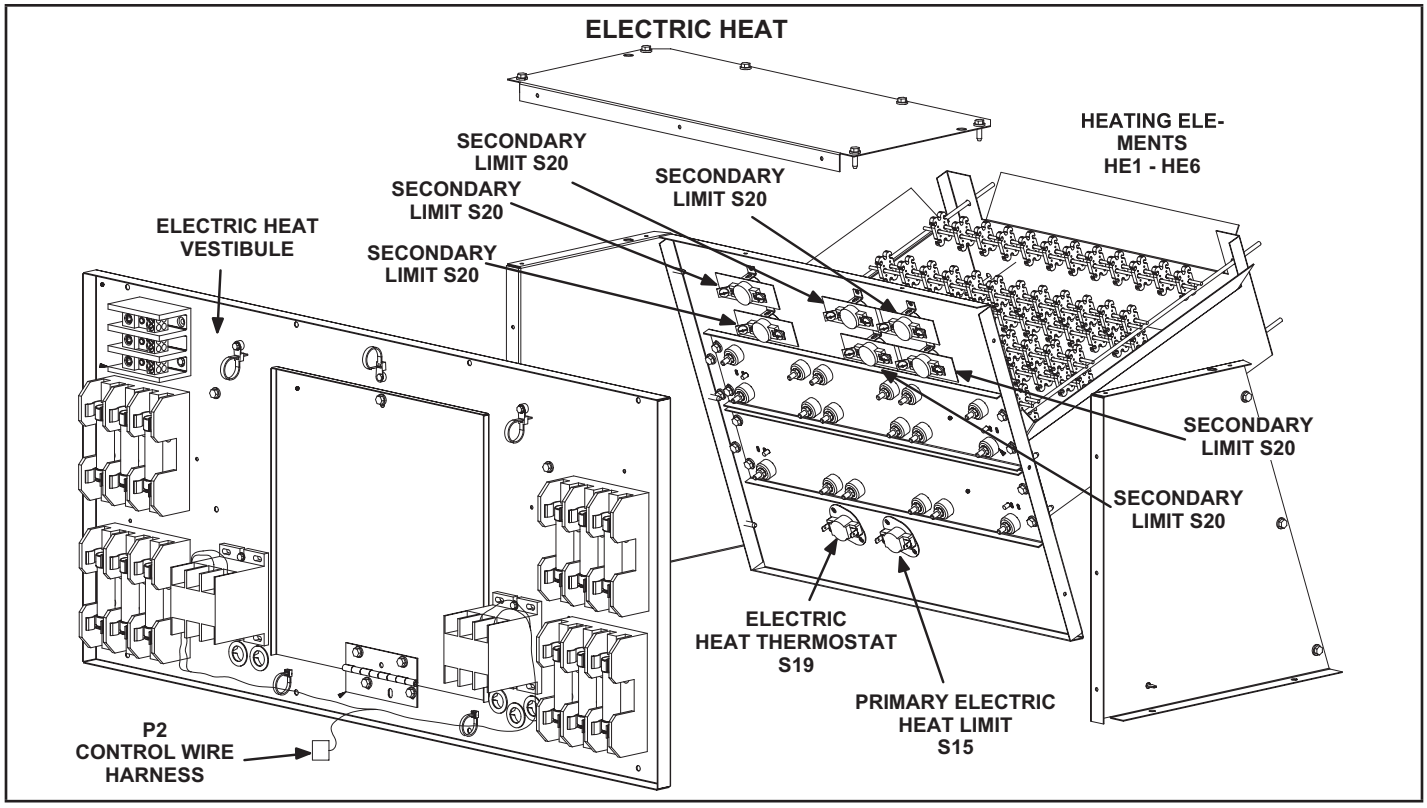


FIGURE 10

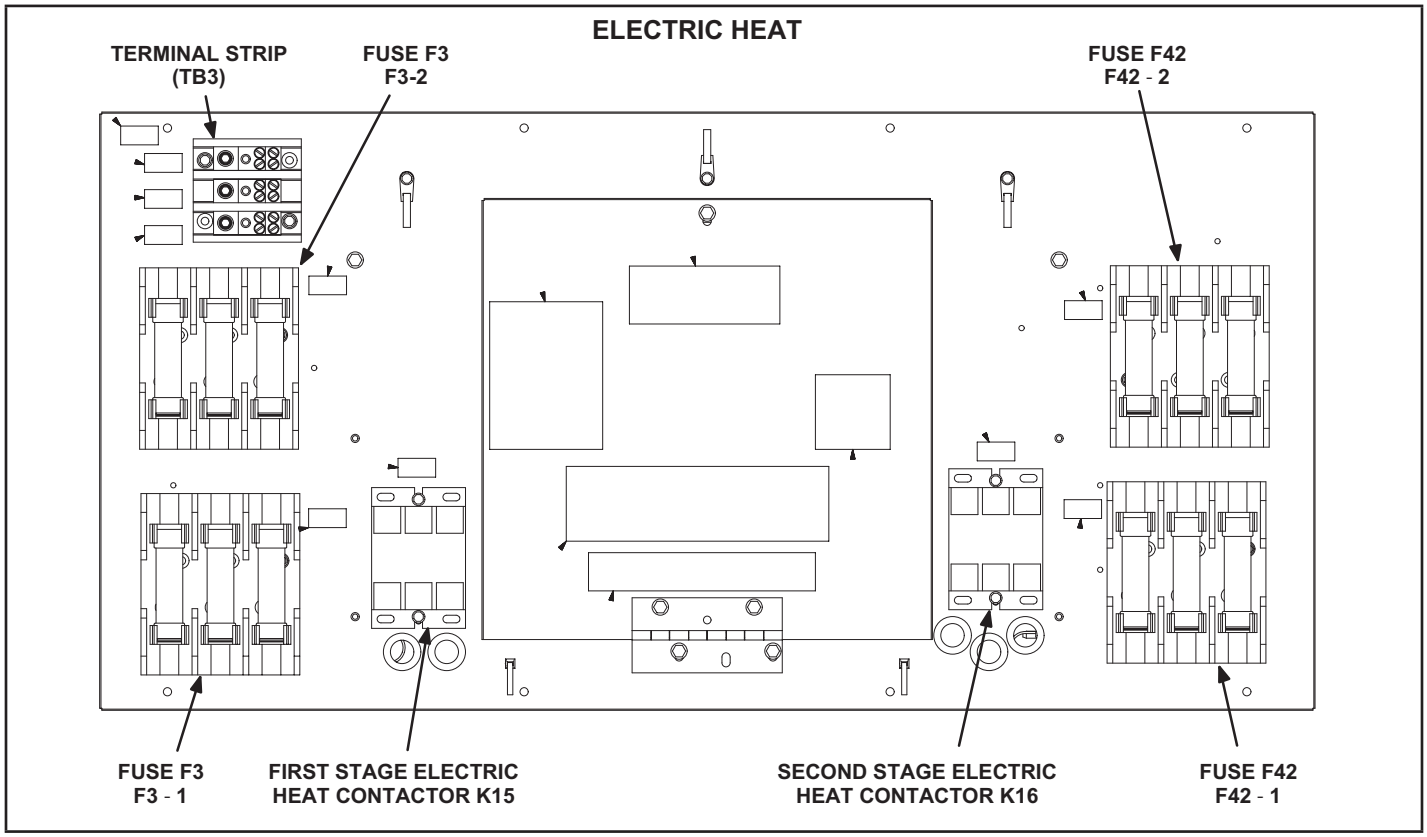


FIGURE 11

II-PLACEMENT AND INSTALLATION

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

III-START UP - OPERATION

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

A-Preliminary and Seasonal Checks

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

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

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

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

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

B-Heat Pump Start Up

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

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

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

2 - An increased heating demand (W2) will energize electric heat if available.

C-Cooling Start Up

⚠ IMPORTANT

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

1 - Initiate full load cooling operation using the following mobile service app menu path:

RTU MENU > SERVICE > COMPONENT TEST > COOLING > COOLING STAGE 3

2 - Refer to Cooling Operation section for cooling start-up.

3 - Units have two refrigerant circuits. See FIGURE 12 or FIGURE 13.

4 - Each refrigerant circuit is charged with R454B refrigerant. See unit rating plate for correct amount of charge.

5 - Refer to Refrigerant Check and Charge section for proper method to check refrigerant charge.

Three Phase Scroll Compressor Voltage Phasing

Three phase power supplied to the unit disconnect switch must be phased sequentially to ensure the scroll compressors rotate in the correct direction. Compressors 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 on unit start-up.

2 - Suction pressure must drop, discharge pressure must rise.

If pressure differential is not observed:

3 - Disconnect all remote electrical power supplies.

4 - Reverse any two field-installed wires connected to the power entry component, disconnect switch (S48), circuit breaker (CB10), or terminal block (TB2).

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

D-Safety or Emergency Shutdown

Turn off power to the unit. Close manual and main gas valves.

REFRIGERANT STAGES - TWO FANS
LHT078, 092, 102, 120:

Two-Stage Thermostat/Control:

Y1 Demand = Outdoor Fan 1 HIGH Speed, Fan 2 OFF
Y2 Demand = Outdoor Fans 1 & 2 HIGH Speed
W1 Demand (Heat Pump Heating) =
Outdoor Fans 1 & 2 HIGH Speed

Three-Stage Thermostat/Control:

Y1 Demand = Outdoor Fan 1 LOW Speed, Fan 2 OFF
Y2 Demand = Outdoor Fans 1, 2 MEDIUM Speed
Y3 Demand = Outdoor fans 1, 2, HIGH Speed
W1 Demand (HP Heating)=
Outdoor Fans 1, 2 High Speed

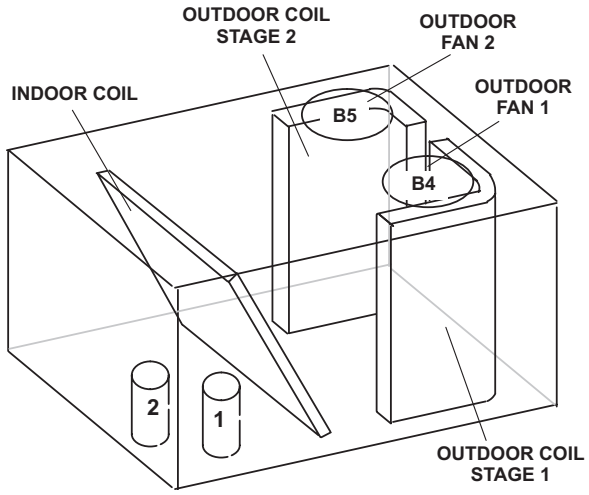


FIGURE 12

REFRIGERANT STAGES - FOUR FANS
LHT152H:

Two-Stage Thermostat/Control:

Y1 Demand = Outdoor Fans 1 & 3, HIGH Speed, 2 & 4 OFF
Y2 Demand = Outdoor Fans 1, 2, 3, & 4 HIGH Speed
W1 Demand (Heat Pump Heating) =
Outdoor Fans 1, 2, 3, & 4 HIGH Speed

Three-Stage Thermostat/Control:

Y1 Demand = Outdoor Fans 1 & 3, LOW Speed
Y2 Demand = Outdoor Fans 1, 2, 3, & 4 MEDIUM Speed
Y3 Demand = Outdoor Fans 1, 2, 3, & 4 HIGH Speed
W1 Demand (HP Heating)=
Outdoor Fans 1, 2, 3, & 4 HIGH Speed

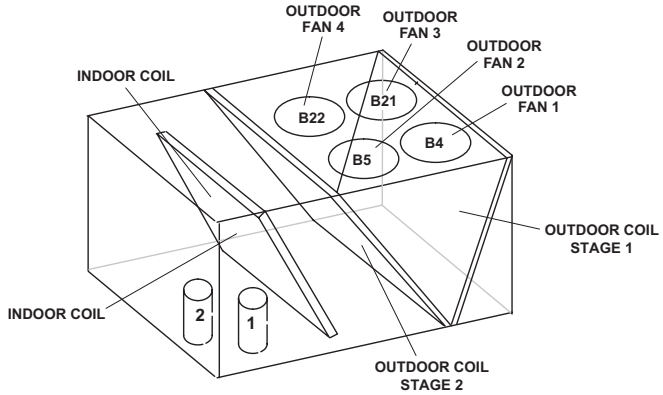


FIGURE 13

IV- SYSTEMS SERVICE CHECKS

⚠ WARNING

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

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

A-Charging

WARNING-Do not exceed nameplate charge under any condition.

This unit is factory charged and should require no further adjustment. If the system requires 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 includ-ing, when applicable, flammable refrigerants. In ad-dition, 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 manu-facturer 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 60°F (15°C). In temperatures below 60°F (15°C) , the charge must be weighed into the system.*

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

IMPORTANT - Charge unit in standard cooling mode.

1 - Attach gauge manifolds to discharge and suction lines. With the economizer disabled, operate the unit in cooling mode at high speed using the following mobile service app menu path:

SERVICE > COMPONENT TEST > COOLING > COOLING STAGE 3

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

3 - Apply the outdoor temperature to TABLE 5 through TABLE 9 to determine normal operating pressures.

4 - Pressures are listed for sea level applications at 80F dry bulb and 67F wet bulb return air.

5 - Compare the normal operating pressures to the pressures obtained from the gauges. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. Correct any system problems before proceeding.

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

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

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

- 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.

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

7 - 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 3 581257-01
LHT078

OD Coil Entering Air Temp	Circuit 1			Circuit 2		
	Disch. ± 10 psig	Suct. ± 5 psig	Appr. Temp ±1 °F	Disch. ± 10 psig	Suct. ± 5 psig	Appr. Temp ± 1 °F
65°F	238	127	2	220	131	5
75°F	274	130	2	254	135	3
85°F	314	131	2	292	137	1
95°F	357	132	2	333	138	1
100°F	404	133	3	376	140	1
115°F	452	136	2	431	143	2

TABLE 4 581258-01
LHT092

OD Coil Entering Temp.	CIRCUIT 1			CIRCUIT 2		
	Disch. ± 10 psig	Suct. ± 5 psig	Appr. Temp±1 °F	Disch. ± 10 psig	Suct. ± 5 psig	Appr. Temp±1 °F
65 °F	232	120	4	235	125	7
75 °F	269	125	2	271	129	6
85 °F	308	127	2	311	131	3
95 °F	352	130	3	356	133	4
105 °F	398	132	3	401	136	4
115 °F	450	134	4	453	139	5

TABLE 5 581259-01
LHT102

OD Coil Entering Temp.	CIRCUIT 1			CIRCUIT 2		
	Disch. ± 10 psig	Suct. ± 5 psig	Appr. Temp±1 °F	Disch. ± 10 psig	Suct. ± 5 psig	Appr. Temp±1 °F
65 °F	233	122	5	246	121	8
75 °F	271	127	3	282	125	8
85 °F	309	127	3	323	127	4
95 °F	351	129	3	365	129	4
105 °F	398	130	3	413	132	5
115 °F	447	132	4	464	135	6

TABLE 6 581260-01
LHT120

OD Coil Entering Temp.	CIRCUIT 1			CIRCUIT 2		
	Disch. ± 10 psig	Suct. ± 5 psig	Appr. Temp±1 °F	Disch. ± 10 psig	Suct. ± 5 psig	Appr. Temp±1 °F
65 °F	247.2	121.2	9	255.6	122	12
75 °F	284.3	124.7	8	293.2	125.2	8
85 °F	325.1	129.6	6	335.1	127.5	8
95 °F	368.1	132.7	6	376.4	130.6	7
105 °F	416	135.5	7	426.6	134.4	8
115 °F	464.2	137.9	8	473.1	137.2	9

TABLE 7 581261-01
LHT152

OD Coil Entering Temp.	CIRCUIT 1			CIRCUIT 2		
	Disch. ± 10 psig	Suct. ± 5 psig	Appr. Temp±1 °F	Disch. ± 10 psig	Suct. ± 5 psig	Appr. Temp±1 °F
65 °F	239	122	9	258	122	10
75 °F	276	125	8	296	124	4
85 °F	318	127	2	336	126	4
95 °F	363	132	3	389	129	5
105 °F	412	133	4	425	129	5
115 °F	467	135	4	475	131	5

B-Charging - Approach Method

1 - Attach gauge manifolds to discharge and suction lines. With the economizer disabled, operate the unit in cooling mode at high speed using the following mobile service app menu path:

RTU MENU > SERVICE > COMPONENT TEST > COOLING > COOL STAGE 3

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

3 - Approach Temperature = Liquid temperature (at liquid line close to pressure tap) minus ambient temperature.

4 - Refer to TABLE 3 through TABLE 7 for approach temperatures. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.

5 - The approach method is not valid for grossly over or undercharged systems. Use TABLE 3 through TABLE 7 as a guide for typical operating pressures

V-Maintenace

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.

⚠ 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

This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm.

Prior to beginning work on systems containing refigerant 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 flameable 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 refigerant 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-Lubrication

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

B-Filters

Units are equipped with four 18 X 24 X 2” filters. Filters should be checked and replaced when necessary with filters of like kind and size. Take note of air flow direction marking on filter frame when reinstalling filters. See FIGURE 14.

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

C-Supply Air Blower Wheel

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

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

E-Outdoor Coil

Clean outdoor coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season. For LHT078-120H models, outdoor coils are made of two formed slabs. Dirt and debris may become trapped between the slabs. To clean between slabs, carefully separate coil slabs (no more than 4 inches) and wash them thoroughly. See FIGURE 17. Flush coils with water following cleaning.

F-Filter Drier

The unit is equipped with a bi-flow filter drier. If replacement is necessary, order another of like design.

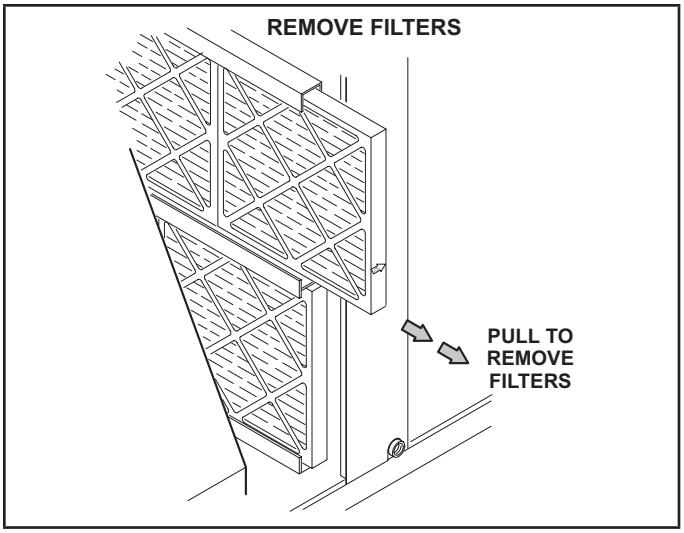
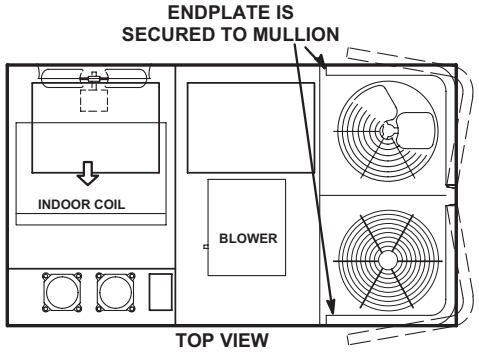


FIGURE 14

CLEAN OUTDOOR COIL



1- Remove screws securing coil end plate to mullion.

2- Remove clips connecting coils slabs and separate slabs 3-4" (76-102mm).

3- Clean coils with detergent or commercial coil cleaner.

4- Rinse thoroughly with water and reassemble.

FIGURE 17

VI-ACCESSORIES

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

A-C1CURB Mounting Frames

When installing the LHT units on a combustible surface for downflow discharge applications, the C1CURB roof mounting frame is used. The roof mounting frames are available in heights from 8 to 24 inches and 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.

The assembled C1CURB mounting frame is shown in FIGURE 15. 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 16. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

ASSEMBLED ROOF MOUNTING FRAME

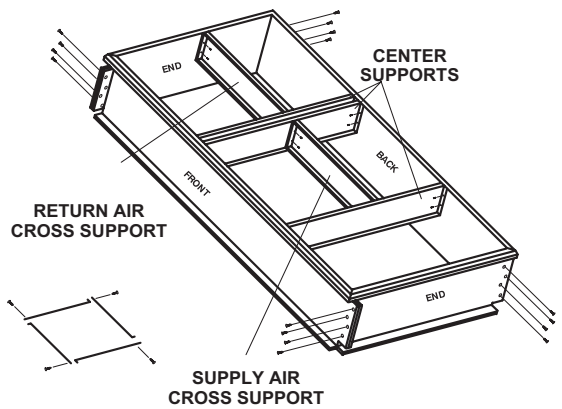


FIGURE 15

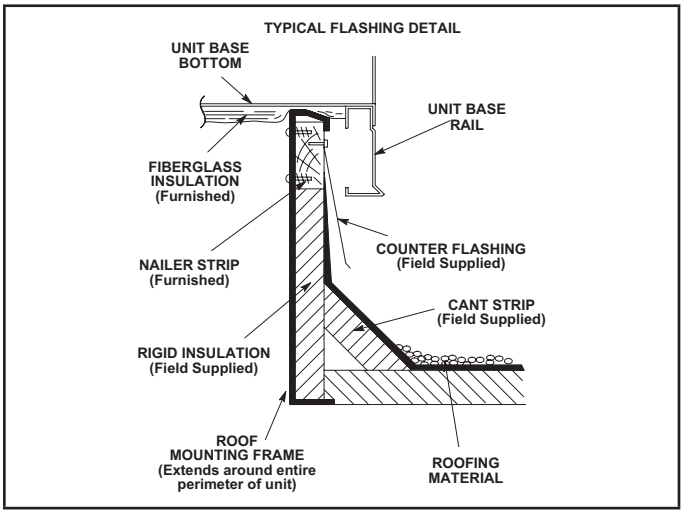


FIGURE 16

B-Transitions

Optional supply/return transition C1DIFF30B-1 is available for use with LHT 7.5-ton units. C1DIFF31B-1 is available for 8.5 and 10-ton units and C1DIFF32B-1 is available for use with LHT 12.5 ton units. All transitions are used with the appropriate C1CURB roof mounting frame. Transition must be installed in the mounting frame before installing the unit on the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

C-Supply and Return Diffusers

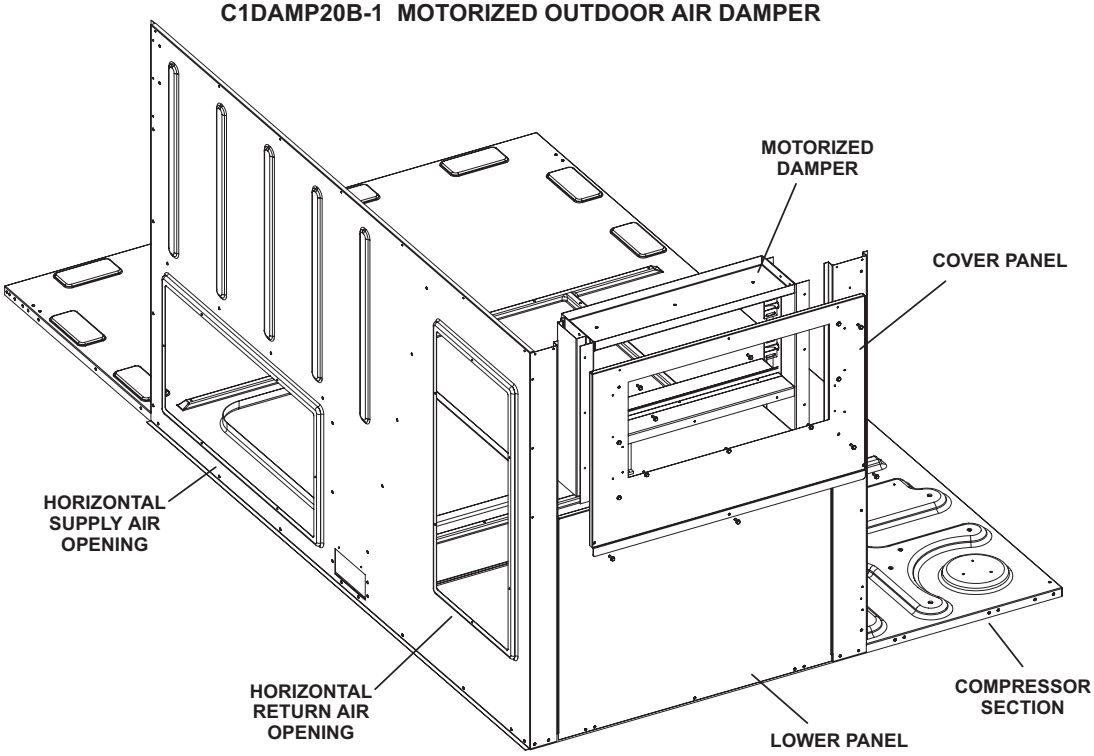
Optional flush mount diffuser/return FD11 and extended mount diffuser/return RTD11 are available for use with all LHT units. Refer to manufacturer's instructions included with transition for detailed installation procedures.

D-C1DAMP Outdoor Air Dampers

Field- or Factory-Installed

Optional manual (C1DAMP10B-1) and motorized (C1DAMP20B-1) outdoor air dampers provide up to 25 percent fresh air for return. Motorized damper opens to minimum position simultaneously with the blower during the occupied period and remains closed during the unoccupied period. Manual damper assembly is manually operated; damper position is manually set at installation and remains in that position.

C1DAMP20B-1 MOTORIZED OUTDOOR AIR DAMPER



C1DAMP10B-2 MANUAL OUTDOOR AIR DAMPER

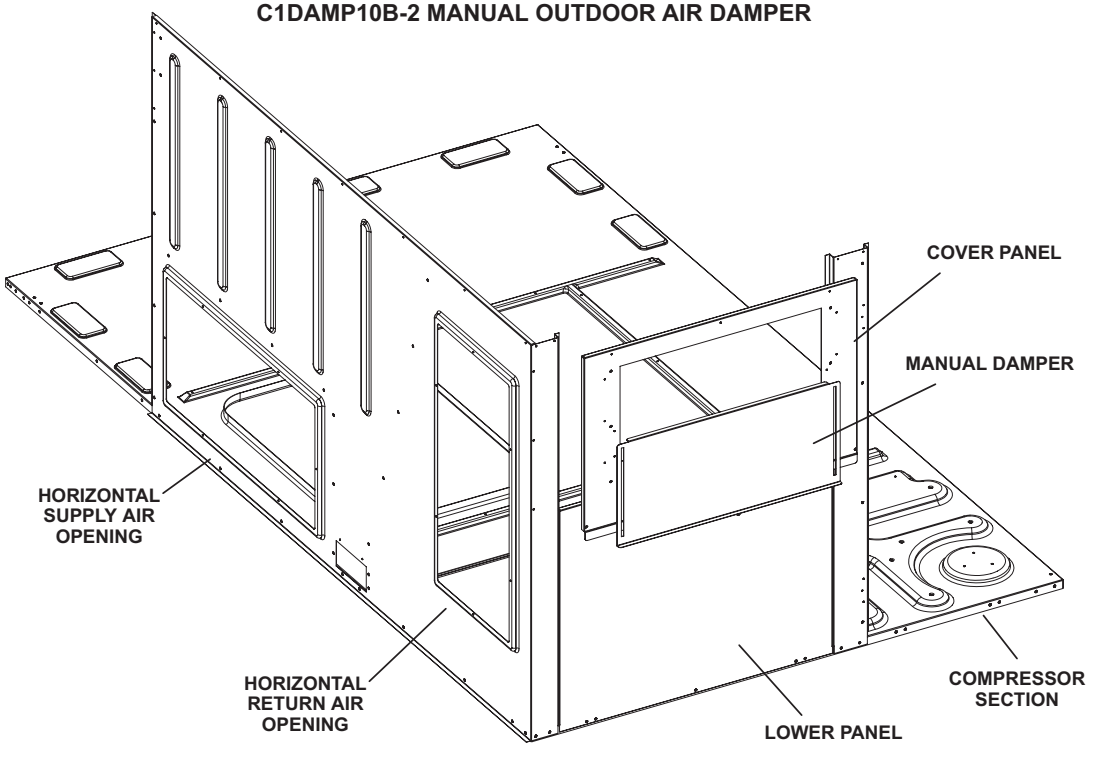


FIGURE 18

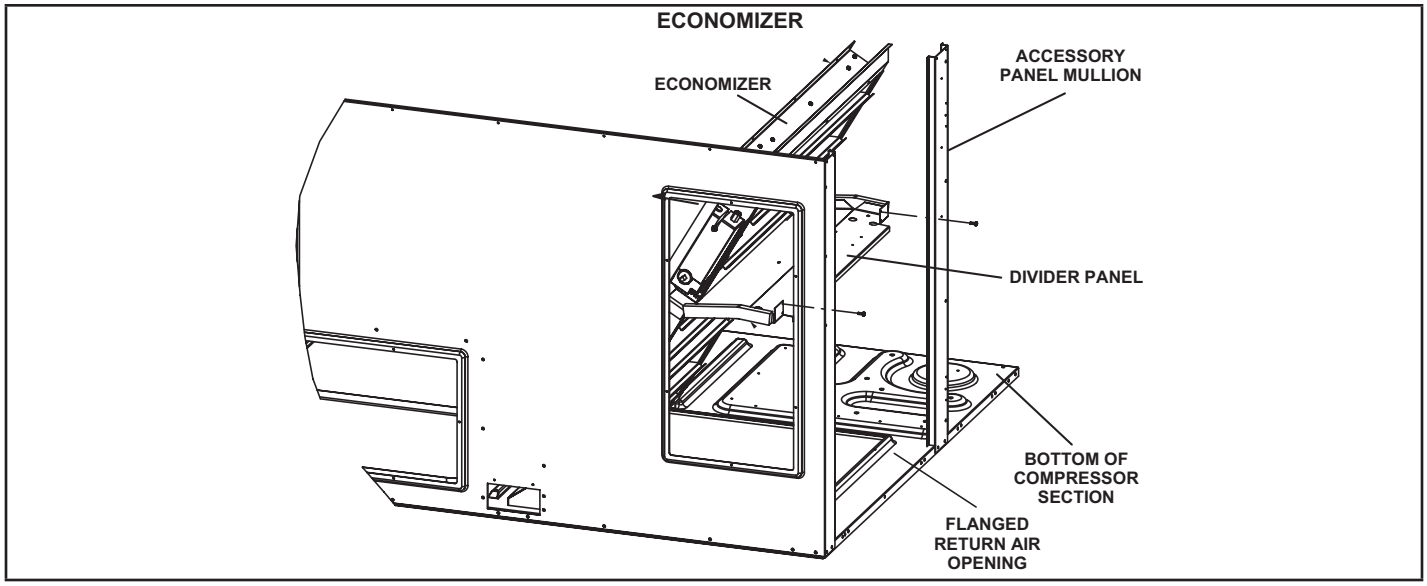


FIGURE 19

TABLE 8

ECONOMIZER MODES AND SETPOINT

Free Cooling Mode	Free Cooling Set Point	Field Provided Sensors	Dampers will modulate to 55°F (default, parameter 159) discharge air (RT6) when outdoor air is suitable:	Input Ranges
TEMP	OFFSET	None Needed	Outdoor air temperature (RT17) is less than return air temperature (RT16) by at least the OFFSET value (10°F default; parameter 161).	0-40°F
TEMP	OAT STPT	None Needed	Outdoor air temperature (RT17) is less than the OAT STPT value (75°F default; parameter 160).	41-75°F
Remote	Remote	Energy Management System**	Either of the TEMP modes can be used when a network OAS signal is provided by an energy management or building control system, via BACnet, LonTalk, or L Connection. The network can command OAS, NOT OAS, or AUTO. AUTO returns to local control of OAS, which is the selected TEMP mode.	NA
ENTH	DIFF OFFSET	(Two) C7400	Outdoor air enthalpy* (A7) is less than return air enthalpy (A62) by at least the OFFSET value (1mA = 2°F default; parameter 163).	0mA-4mA
ENTH	ODE STPT	C7400	Outdoor air enthalpy (A7) is less than free cooling setpoint (12mA = 75°F default, parameter 162).	12-19mA
GLOBAL	GLOBAL	24VAC Input Signal	Global input is energized by (P297-9). This setting is also used for outdoor air damper applications. Global input also brings on the blower. (This mode is NOT used when OAS signal is provided via network connection. GLO is only used when a 24VAC signal is used to energize the P297-9 GLO input.)	NA

*Enthalpy includes effects of both temperature and humidity.

**Energy management systems may require additional field-provided sensors; refer to manufacturer's instructions.

E-K1ECON20B Economizer

(Field- or Factory-Installed)

The optional E1ECON15 economizer can be used with downflow and horizontal air discharge applications. See FIGURE 19. The economizer uses outdoor air for free cooling when outdoor temperature and/or humidity is suitable. The economizer is controlled by the A55 Unit Controller.

Free Cooling Mode

The Unit Controller will allow free cooling in one of five modes. Each mode uses different combinations of sensors to determine outdoor air suitability. See TABLE 9 for modes. Temperature offset is the default free cooling mode.

NOTE - *All free cooling modes of operation will modulate dampers to 55F (13C) supply / discharge air.*

Unit Controller Settings

On early versions, switches are located on the Unit Controller to adjust settings. On newer versions, the display and keypad on the Unit Controller are used to navigate through menus to adjust settings. Some versions require a configuration ID be entered to enable the economizer. Refer to economizer installation instructions and Unit Controller installation and application manuals

F-Barometric Relief Dampers

Dampers are used in downflow (FIGURE 20) and horizontal (FIGURE 21) air discharge applications. Horizontal barometric relief dampers are installed in the return air duct. The dampers must be used any time an economizer and a power exhaust fan is applied to LHT series units.

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

NOTE- *Barometric relief damper is optional except required with power exhaust dampers.*

G-Power Exhaust Fan

The power exhaust fan (K1PWRE10B) requires an optional gravity exhaust damper and economizer and is used in downflow applications only. See FIGURE 22. The power exhaust fan provides exhaust air pressure relief and also runs when return air dampers are closed and the supply air blower is operating. See installation instructions for more detail.

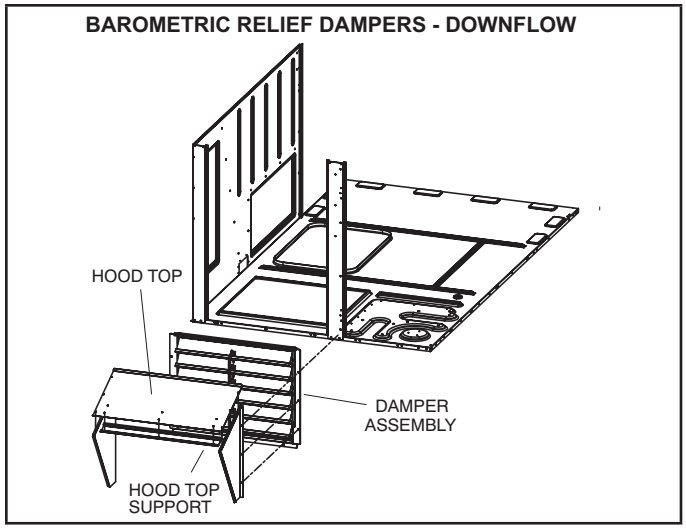


FIGURE 20

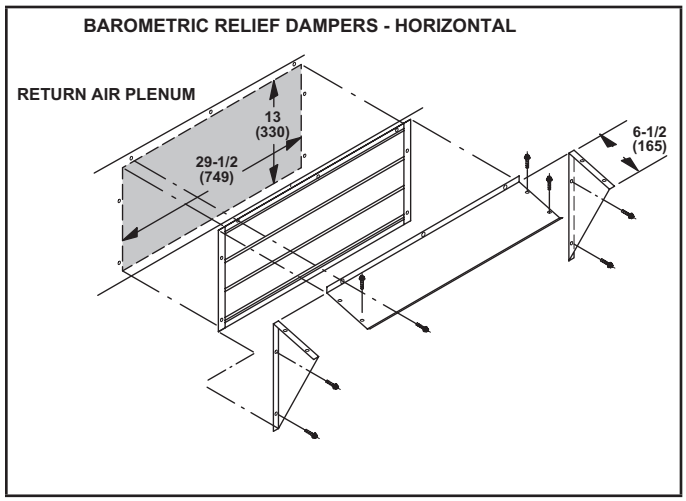


FIGURE 21

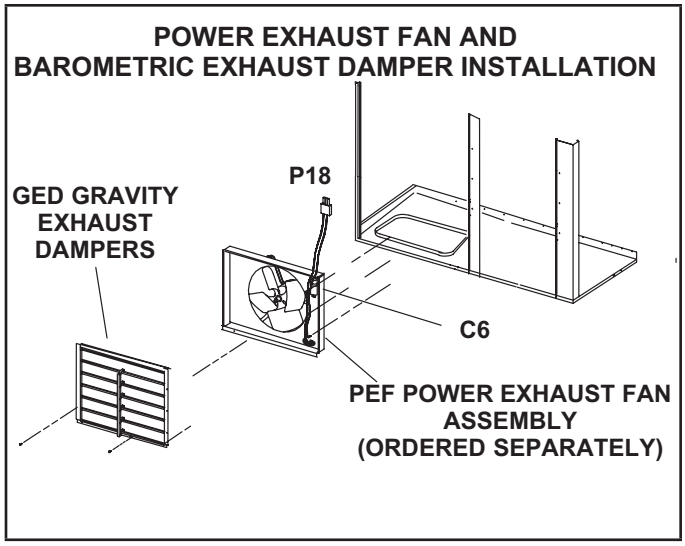


FIGURE 22

H-Control Systems

Any two-heat, two-cool thermostat may be used. All thermostat wiring is connected to terminal block TB1. Each thermostat has additional control options available. See thermostat installation instructions for more detail.

I-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.O. overflow switch is controlled by K220 and DL46 relays, located in the unit control panel. When the overflow switch closes, 24VAC power is interrupted and after a fivesecond delay unit compressors are de-energized. Once the condensate level drops below the set level, the switch will open. After a five-minute delay the compressor will be energized.

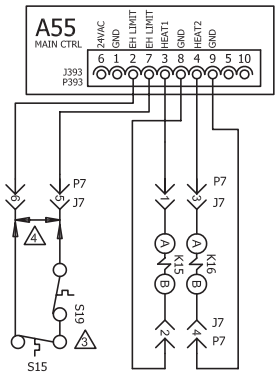
J-Smoke Detectors A171 and A172

Photoelectric smoke detectors are a field installed option. The smoke detectors can be installed in the supply air section (A64), return air section (A17), or in both the supply and return air section.

VII-Wiring Diagrams and Sequence of Operation

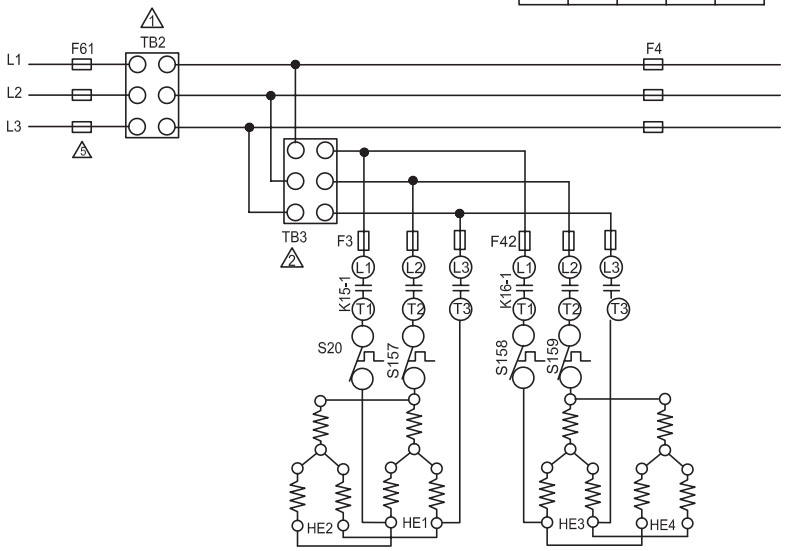
J/P	JACK/PLUG DESCRIPTION
7	ELECTRIC HEAT SUB BASE KIT
271	HEATING SENSORS STG 1

KEY	DESCRIPTION
A55	PANEL MAIN
F3	FUSE, ELECTRIC HEAT 1
F4	FUSE, UNIT
F42	FUSE, ELECTRIC HEAT 2
F43	FUSE, ELECTRIC HEAT 3 ,4
F44	FUSE, ELECTRIC HEAT 5
F61	FUSE, UNIT - SCCR
HE1	ELEMENT, ELECTRIC HEAT 1
HE2	ELEMENT, ELECTRIC HEAT 2
HE3	ELEMENT, ELECTRIC HEAT 3
HE4	ELEMENT, ELECTRIC HEAT 4
HE5	ELEMENT, ELECTRIC HEAT 5
HE6	ELEMENT, ELECTRIC HEAT 6
K15-1	CONTACTOR, ELECTRIC HEAT 1, 2
K16-1	CONTACTOR, ELECTRIC HEAT 3, 4
S15	SWITCH, LIMIT PRIMARY ELECTRIC HEAT
S19	THERMOSTAT, ELECTRIC HEAT LIMIT
S20	SWITCH, LIMIT SECONDARY ELEC. HEAT 1 (NO RESET)
S157	SWITCH, LIMIT SECONDARY ELEC. HEAT 2 (NO RESET)
S158	SWITCH, LIMIT SECONDARY ELEC. HEAT 3 (NO RESET)
S159	SWITCH, LIMIT SECONDARY ELEC. HEAT 4 (NO RESET)
TB2	TERMINAL STRIP, UNIT
TB3	TERMINAL STRIP, ELECTRC HEAT



G, J VOLT UNITS

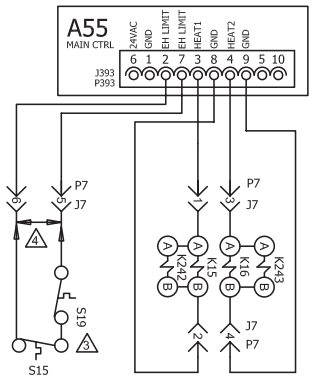
KW	HE1	HE2	HE3	HE4
7.5	7.5			
15	15			
22.5	15		7.5	
30	15		15	
45	15		15	15
60	15	15	15	15



1. TB2,S48 OR CB10 MAY BE USED
2. TB3 IS USED ON SOME UNITS
3. S19 IS USED ON HEAT PUMP APPLICATIONS ONLY
4. REMOVE JUMPER PLUG WHEN FIELD INSTALLATING ELECTRIC HEAT
5. F61 USED ON UNITS WITH SCCR OPTION

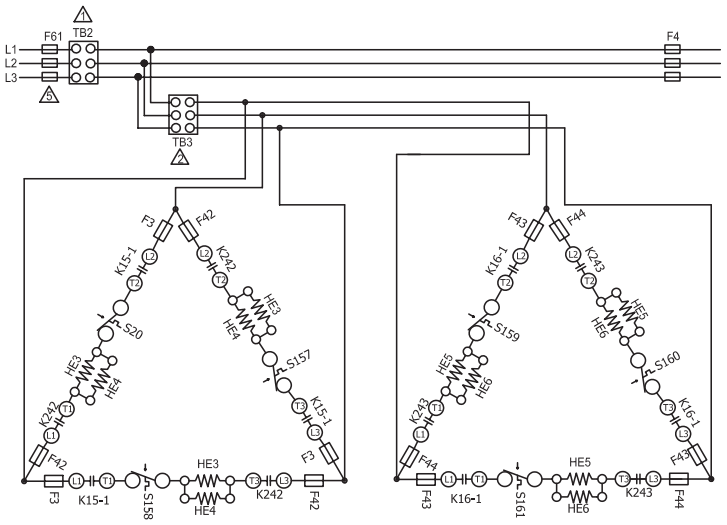
DENOTES OPTIONAL COMPONENTS

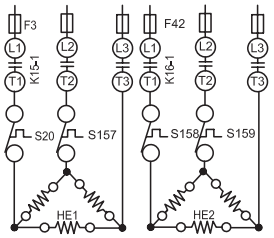
2021/09	WIRING DIAGRAM 538121-02	9/21
HEATING-ELECTRIC		
7.5, 15, 22.5, 30, 45, 60 - G, J		
	SECTION A	REV. 0
Supersedes 538121-01	New Form No. 538121-02	



KEY	DESCRIPTION
A55	PANEL MAIN
F3	FUSE, ELECTRIC HEAT 1
F4	FUSE, UNIT
F42	FUSE, ELECTRIC HEAT 2
F43	FUSE, ELECTRIC HEAT 3 ,4
F44	FUSE, ELECTRIC HEAT 5
F61	FUSE, UNIT - SCCR
HE1	ELEMENT, ELECTRIC HEAT 1
HE2	ELEMENT, ELECTRIC HEAT 2
HE3	ELEMENT, ELECTRIC HEAT 3
HE4	ELEMENT, ELECTRIC HEAT 4
HE5	ELEMENT, ELECTRIC HEAT 5
HE6	ELEMENT, ELECTRIC HEAT 6
K15-1	CONTACTOR, ELECTRIC HEAT 1, 2
K16-1	CONTACTOR, ELECTRIC HEAT 3, 4
K242-1	CONTACTOR, ELECTRIC HEAT 1
K243-1	CONTACTOR, ELECTRIC HEAT 2
S15	SWITCH, LIMIT PRIMARY ELECTRIC HEAT
S19	THERMOSTAT, ELECTRIC HEAT LIMIT
S20	SWITCH, LIMIT SECONDARY ELEC. HEAT 1 (NO RESET)
S157	SWITCH, LIMIT SECONDARY ELEC. HEAT 2 (NO RESET)
S158	SWITCH, LIMIT SECONDARY ELEC. HEAT 3 (NO RESET)
S159	SWITCH, LIMIT SECONDARY ELEC. HEAT 4 (NO RESET)
S160	SWITCH, LIMIT SECONDARY ELEC. HEAT 5 (NO RESET)
S161	SWITCH, LIMIT SECONDARY ELEC. HEAT 6 (NO RESET)
TB2	TERMINAL STRIP, UNIT
TB3	TERMINAL STRIP, ELECTRC HEAT

J/P	JACK/PLUG DESCRIPTION
7	ELECTRIC HEAT SUB BASE KIT





KW	HE1	HE2	HE3	HE4	HE5	HE6
7,5	7,5					
15	15					
22,5	15	7,5				
30	15	15				
45	15				15	15
60			15	15	15	15

1. TB2,S48 OR CB10 MAY BE USED
2. TB3 IS USED ON SOME UNITS
3. S19 IS USED ON HEAT PUMP APPLICATIONS ONLY
4. REMOVE JUMPER PLUG WHEN FIELD INSTALLING ELECTRIC HEAT
5. F61 USED ON UNITS WITH SCCR OPTION

DENOTES OPTIONAL COMPONENTS

2020/10	WIRING DIAGRAM 538120-01	10/20
HEATING - ELECTRIC		
ELECTRIC HEAT 7.5, 15, 22.5, 30, 45, 60 - Y		
SECTION A		REV 0
Supersedes	New Form No. 538120-01	

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

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

HEATING ELEMENTS:

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

SECOND STAGE HEAT:

2 - Heating demand initiates at W1 in thermostat.

3 - 24VAC W2 signal is routed through from the thermostat to TB1. After S15 N.C. primary limit and S20 secondary limit is proved, the electric heat contactor K15 is energized.

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

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

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

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

END OF SECOND STAGE HEAT:

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

9 - Electric heat contactor K16 is de-energized.

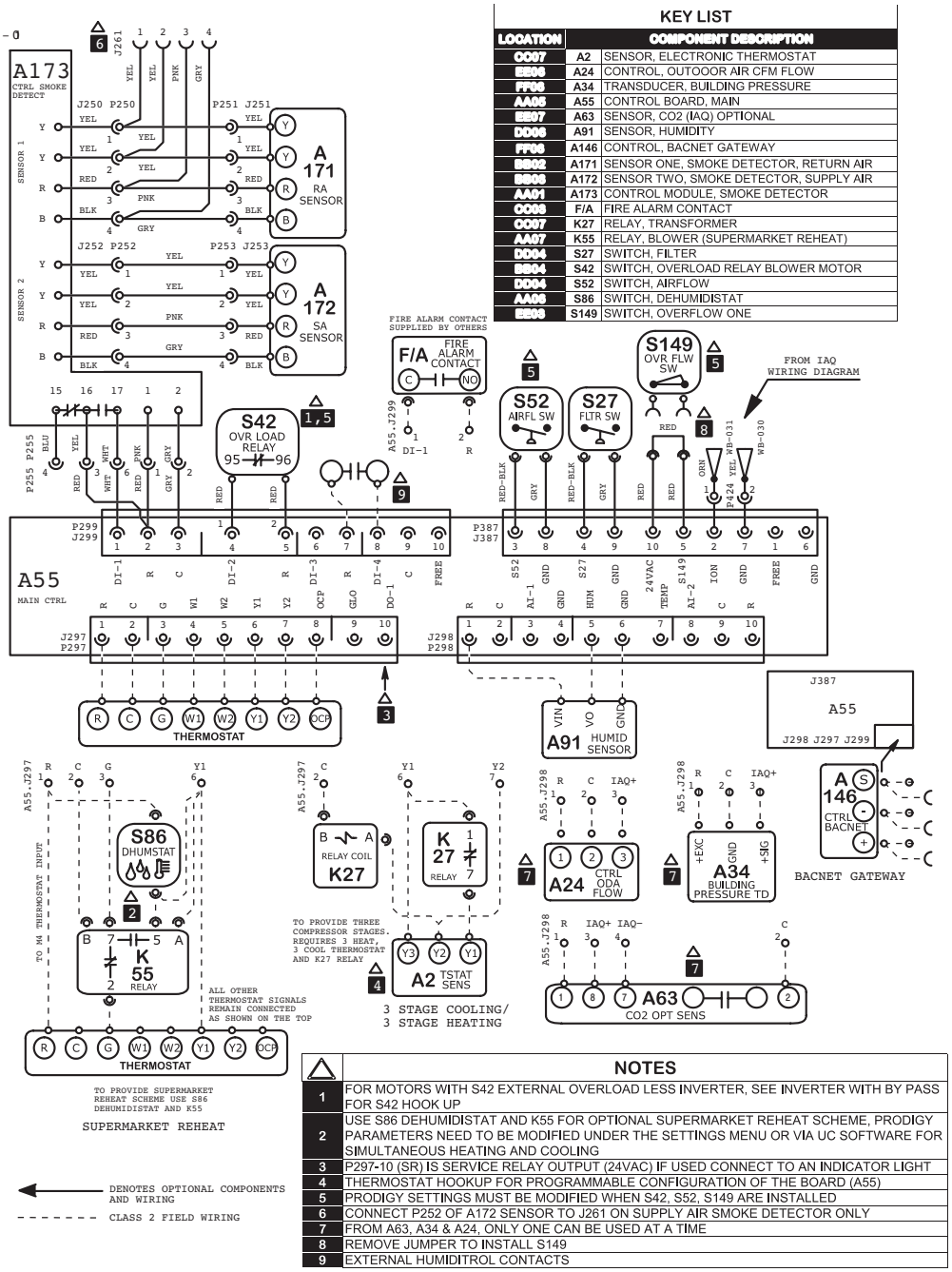
10 - The second set of electric heat elements are de-energized.

11 - Electric heat contactor K15 is de-energized.

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

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT

KEY LIST		
LOCATION	COMPONENT DESCRIPTION	
CC07	A2	SENSOR, ELECTRONIC THERMOSTAT
BB08	A24	CONTROL, OUTOOOR AIR CFM FLOW
FF08	A34	TRANSDUCER, BUILDING PRESSURE
AA06	A55	CONTROL BOARD, MAIN
BB07	A63	SENSOR, CO2 (IAQ) OPTIONAL
DD06	A91	SENSOR, HUMIDITY
FF06	A146	CONTROL, BACNET GATEWAY
BB05	A171	SENSOR ONE, SMOKE DETECTOR, RETURN AIR
BB06	A172	SENSOR TWO, SMOKE DETECTOR, SUPPLY AIR
AA01	A173	CONTROL MODULE, SMOKE DETECTOR
CC08	F/A	FIRE ALARM CONTACT
CC07	K27	RELAY, TRANSFORMER
AA07	K55	RELAY, BLOWER (SUPERMARKET REHEAT)
DD04	S27	SWITCH, FILTER
BB04	S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
DD04	S52	SWITCH, AIRFLOW
AA08	S86	SWITCH, DEHUMIDISTAT
BB08	S149	SWITCH, OVERFLOW ONE



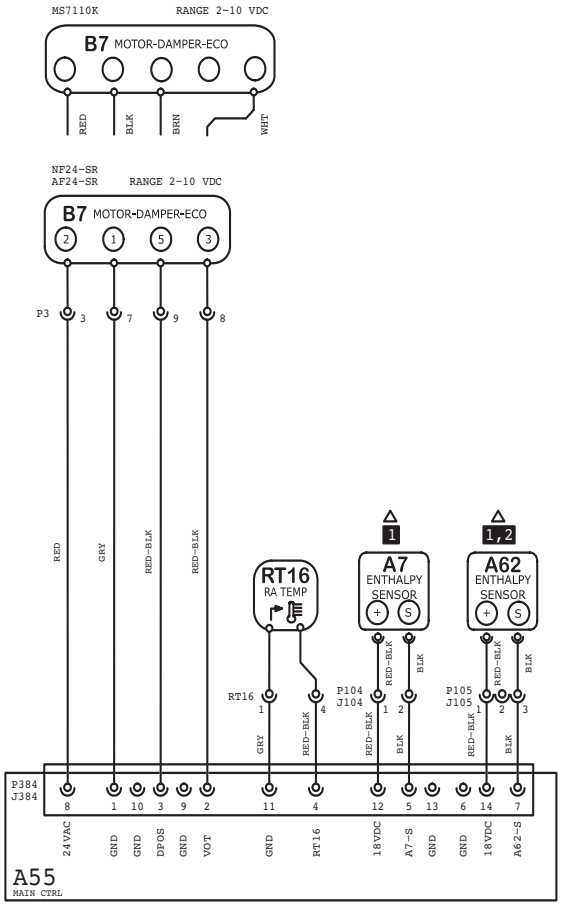
NOTES	
1	FOR MOTORS WITH S42 EXTERNAL OVERLOAD LESS INVERTER, SEE INVERTER WITH BY PASS FOR S42 HOOK UP
2	USE S86 DEHUMIDISTAT AND K55 FOR OPTIONAL SUPERMARKET REHEAT SCHEME, PRODIGY PARAMETERS NEED TO BE MODIFIED UNDER THE SETTINGS MENU OR VIA UC SOFTWARE FOR SIMULTANEOUS HEATING AND COOLING
3	P297-10 (SR) IS SERVICE RELAY OUTPUT (24VAC) IF USED CONNECT TO AN INDICATOR LIGHT
4	THERMOSTAT HOOKUP FOR PROGRAMMABLE CONFIGURATION OF THE BOARD (A55)
5	PRODIGY SETTINGS MUST BE MODIFIED WHEN S42, S52, S149 ARE INSTALLED
6	CONNECT P252 OF A172 SENSOR TO J261 ON SUPPLY AIR SMOKE DETECTOR ONLY
7	FROM A63, A34 & A24, ONLY ONE CAN BE USED AT A TIME
8	REMOVE JUMPER TO INSTALL S149
9	EXTERNAL HUMIDITROL CONTACTS

Model: LC, LG, LH, LD Series RTU Thermostat
Voltage: All Voltages
Supersedes: N/A Form No: 538078-01 Rev: 1

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

WIRING DIAGRAM FLOW

ECONOMIZER



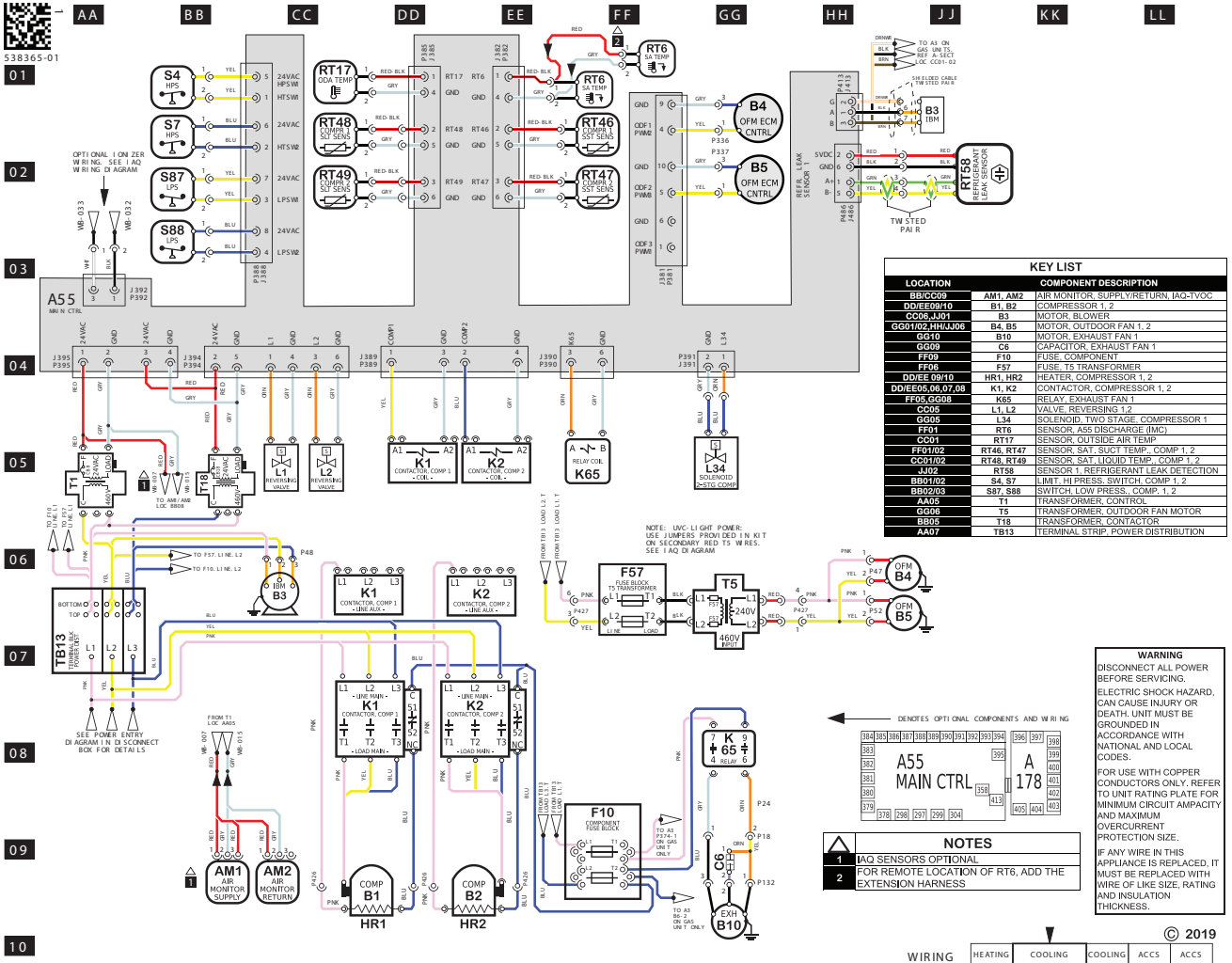
△	NOTES
1	A7 AND A62 NOT USED FOR SENSIBLE TEMPERATURE CONTROL
2	FOR UNIT DIFFERENTIAL ENTHALPY CONTROL, ADD A62 RETURN AIR ENTHALPY SENSOR

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

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

WIRING DIAGRAM FLOW

Model: LC, LG, LH, LD Series RTU
Economizer & Motorized OAD
Voltage: All Voltages
Supersedes: N/A Form No: 538072-01 Rev: 1



KEY LIST		
LOCATION		**COMPONENT DESCRIPTION**
BB/CC09	AM1, AM2	AIR MONITOR, SUPPLY/RETURN, IAQ-TVOC
DD/EE09/10	B1, B2	COMPRESSOR 1, 2
CC06,JJ01	B3	MOTOR, BLOWER
GG01/02,HH/JJ06	B4, B5	MOTOR, OUTDOOR FAN 1, 2
GG10	B10	MOTOR, EXHAUST FAN 1
GG09	C6	CAPACITOR, EXHAUST FAN 1
FF09	F10	FUSE, COMPONENT
FF06	F57	FUSE, T5 TRANSFORMER
DD/EE 09/10	HR1, HR2	HEATER, COMPRESSOR 1, 2
DD/EE05,06,07,08	K1, K2	CONTACTOR, COMPRESSOR 1, 2
FF05,GG08	K65	RELAY, EXHAUST FAN 1
CC05	L1, L2	VALVE, REVERSING 1,2
GG05	L34	SOLENOID, TWO STAGE, COMPRESSOR 1
FF01	RT6	SENSOR, A55 DISCHARGE (IMC)
CC01	RT17	SENSOR, OUTSIDE AIR TEMP
FF01/02	RT46, RT47	SENSOR, SAT, SUCT TEMP., COMP 1, 2
CC01/02	RT48, RT49	SENSOR, SAT, LIQUID TEMP., COMP 1, 2
JJ02	RT58	SENSOR 1, REFRIGERANT LEAK DETECTION
BB01/02	S4, S7	LIMIT, HI PRESS. SWITCH, COMP 1, 2
BB02/03	S87, S88	SWITCH, LOW PRESS., COMP. 1, 2
AA05	T1	TRANSFORMER, CONTROL
GG06	T5	TRANSFORMER, OUTDOOR FAN MOTOR
BB05	T18	TRANSFORMER, CONTACTOR
AA07	TB13	TERMINAL STRIP, POWER DISTRIBUTION

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.

NOTES	
1	IAQ SENSORS OPTIONAL
2	FOR REMOTE LOCATION OF RT6, ADD THE EXTENSION HARNESS

WIRING DIAGRAM FLOW

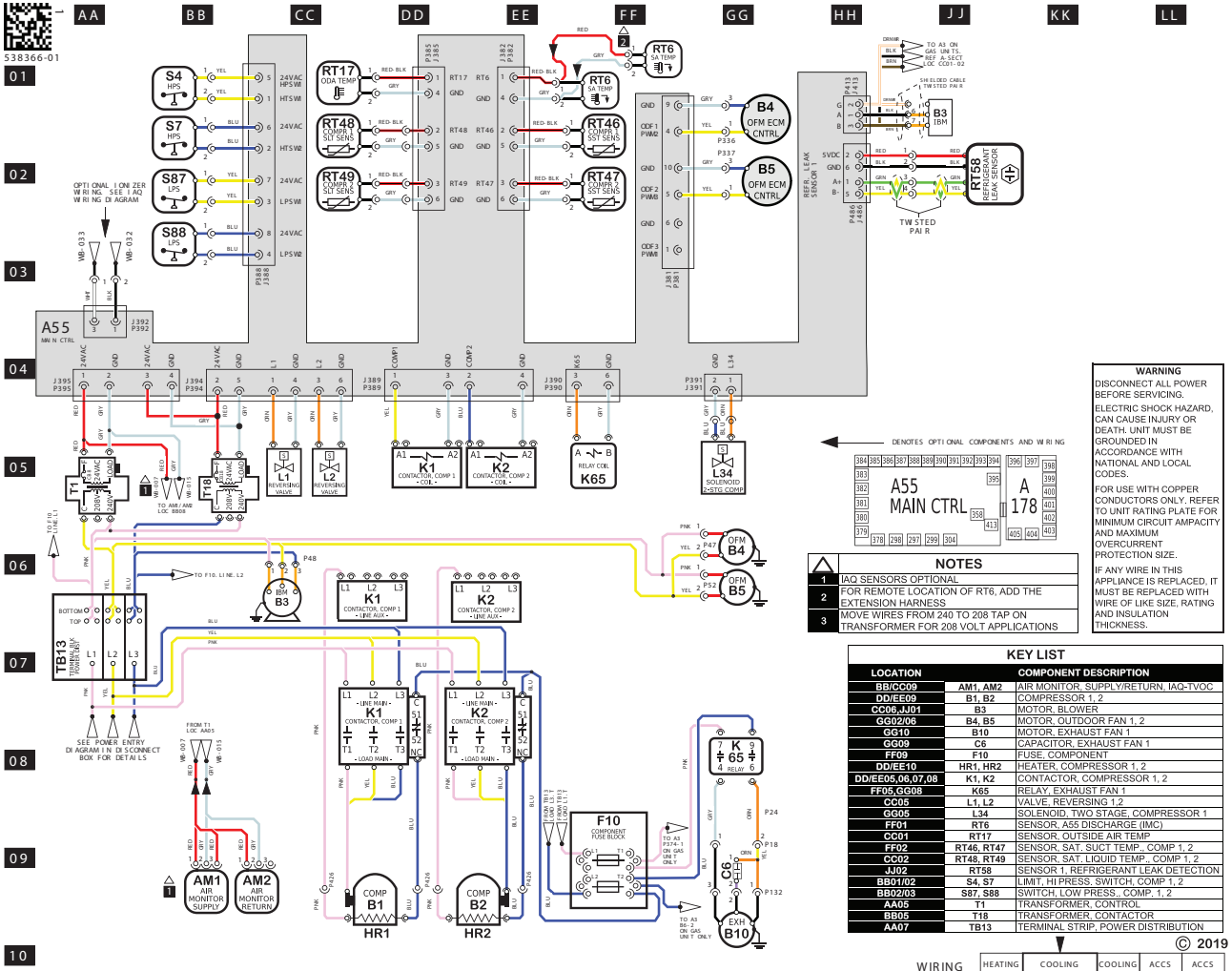
HEATING	COOLING	COOLING	ACCS	ACCS
SECTION A	SECTION B	SECTION B3/5	SECTION C	SECTION D

Product: LHT, LDT B Box - G & J VOLT 078-120
Heat Pump Diagram with Higher SCCR

Voltage: 460V/3~/60Hz (G)
Supersedes: XXXXXX-XX Form No: 538365-01 Rev: 1

10x12 CUT SIZE

REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012081C	04-29-2024	FEP	MCF	ORIGINATED AT PD&R CARROLLTON, TX
001	CN-012081W	10-07-2024	FEP	FXY	UPDATED P18 CONNECTORS FROM 3 & 4 TO 1 & 2



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.

NOTES

1	IAQ SENSORS OPTIONAL
2	FOR REMOTE LOCATION OF RT6, ADD THE EXTENSION HARNESS
3	MOVE WIRES FROM 240 TO 208 TAP ON TRANSFORMER FOR 208 VOLT APPLICATIONS

KEY LIST

LOCATION		COMPONENT DESCRIPTION
BB/CC09	AM1, AM2	AIR MONITOR, SUPPLY/RETURN, IAQ-TVOC
DD/EE09	B1, B2	COMPRESSOR 1, 2
CC06,JJ01	B3	MOTOR, BLOWER
GG02/06	B4, B5	MOTOR, OUTDOOR FAN 1, 2
GG10	B10	MOTOR, EXHAUST FAN 1
GG09	C6	CAPACITOR, EXHAUST FAN 1
FF09	F10	FUSE, COMPONENT
DD/EE10	HR1, HR2	HEATER, COMPRESSOR 1, 2
DD/EE05,06,07,08	K1, K2	CONTACTOR, COMPRESSOR 1, 2
FF05,GG08	K65	RELAY, EXHAUST FAN 1
CC05	L1, L2	VALVE, REVERSING 1,2
GG05	L34	SOLENOID, TWO STAGE, COMPRESSOR 1
FF01	RT6	SENSOR, A55 DISCHARGE (IMC)
CC01	RT17	SENSOR, OUTSIDE AIR TEMP
FF02	RT46, RT47	SENSOR, SAT, SUCT TEMP., COMP 1, 2
CC02	RT48, RT49	SENSOR, SAT, LIQUID TEMP., COMP 1, 2
JJ02	RT58	SENSOR 1, REFRIGERANT LEAK DETECTION
BB01/02	S4, S7	LIMIT, HI PRESS. SWITCH, COMP 1, 2
BB02/03	S87, S88	SWITCH, LOW PRESS., COMP. 1, 2
AA05	T1	TRANSFORMER, CONTROL
BB05	T18	TRANSFORMER, CONTACTOR
AA07	TB13	TERMINAL STRIP, POWER DISTRIBUTION

Product: LHT, LDT B Box - Y VOLT 078-120
Heat Pump Diagram with Higher SCCR

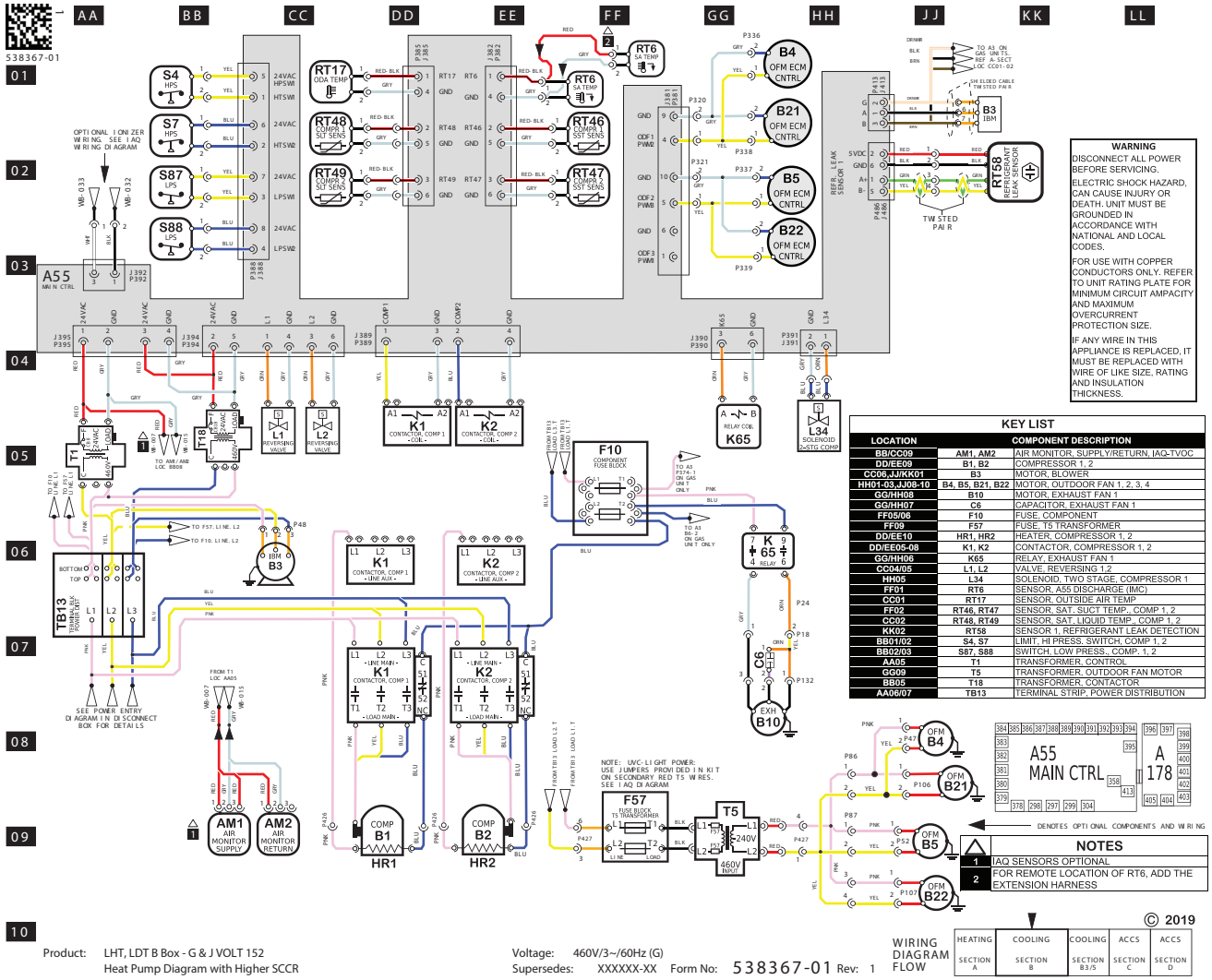
Voltage: 208-230V/3~/60Hz (Y)
Supersedes: XXXXXX-XX Form No: 538366-01 Rev: 1

WIRING DIAGRAM FLOW

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

10x12 CUT SIZE

REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012081C	04-29-2024	FEP	MCF	ORIGINATED AT PD&R CARROLLTON, TX
001	CN-012081W	10-07-2024	FEP	FXY	UPDATED P18 CONNECTORS FROM 3 & 4 TO 1 & 2

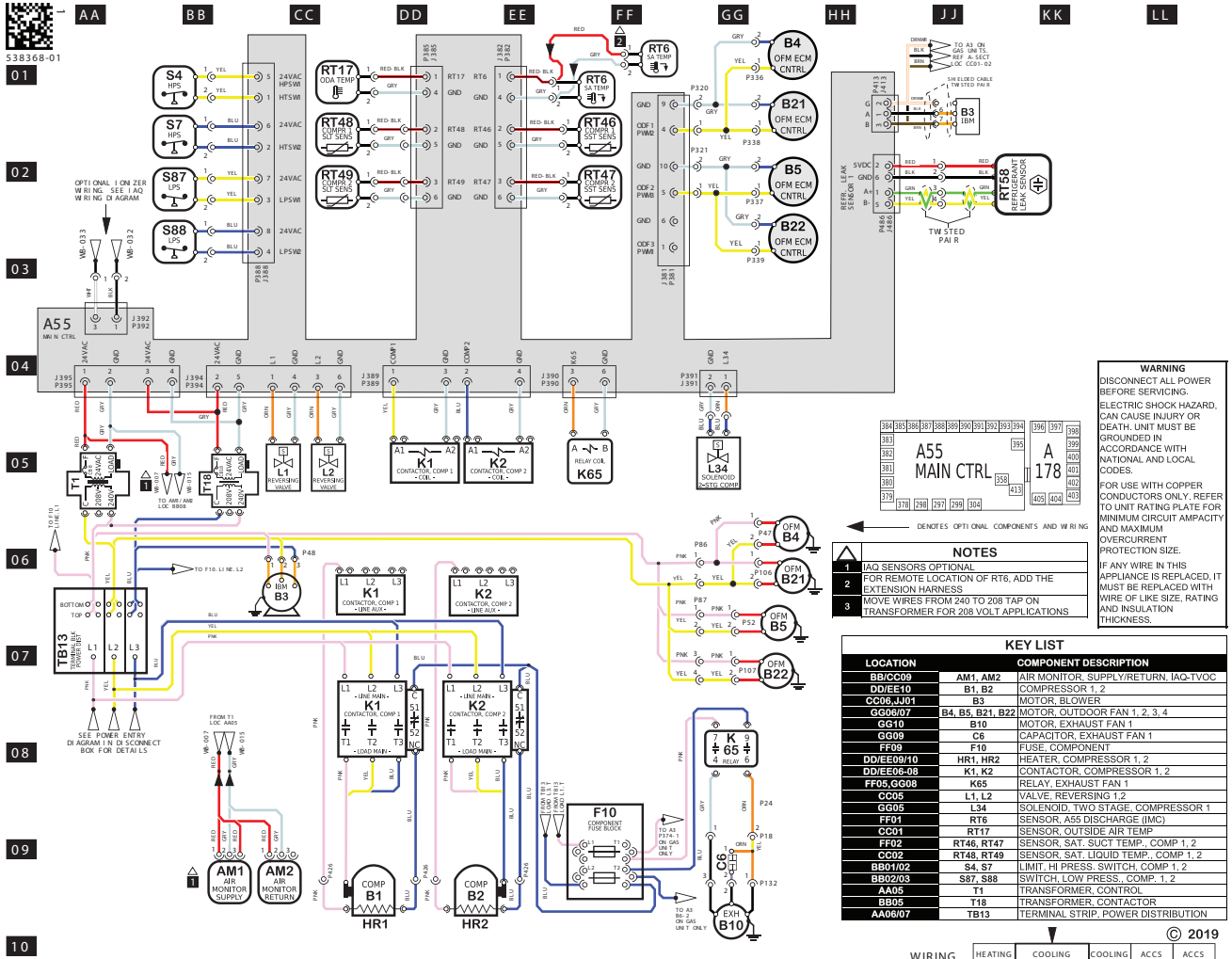


Product: LHT, LDT B Box - G & J VOLT 152
Heat Pump Diagram with Higher SCCR

Voltage: 460V/3~/60Hz (G)
Supersedes: XXXXXX-XX Form No: 538367-01 Rev: 1

10x12 CUT SIZE

REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012081C	04-29-2024	FEP	MCF	ORIGINATED AT PD&R CARROLLTON, TX
001	CN-012081W	10-07-2024	FEP	FXY	UPDATED P18 CONNECTOR FROM 3 & 4 TO 1 & 2



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.

NOTES

1	IAQ SENSORS OPTIONAL
2	FOR REMOTE LOCATION OF RT6, ADD THE EXTENSION HARNESS
3	MOVE WIRES FROM 240 TO 208 TAP ON TRANSFORMER FOR 208 VOLT APPLICATIONS

KEY LIST

LOCATION	COMPONENT DESCRIPTION	
BB/CC09	AM1, AM2	AIR MONITOR, SUPPLY/RETURN, IAQ-TVOC
DD/EE10	B1, B2	COMPRESSOR 1, 2
CC06,JJ01	B3	MOTOR, BLOWER
GG06/07	B4, B5, B21, B22	MOTOR, OUTDOOR FAN 1, 2, 3, 4
GG10	B10	MOTOR, EXHAUST FAN 1
GG09	C6	CAPACITOR, EXHAUST FAN 1
FF09	F10	FUSE, COMPONENT
DD/EE09/10	HR1, HR2	HEATER, COMPRESSOR 1, 2
DD/EE06-08	K1, K2	CONTACTOR, COMPRESSOR 1, 2
FF05,GG08	K65	RELAY, EXHAUST FAN 1
CC05	L1, L2	VALVE, REVERSING 1,2
GG05	L34	SOLENOID, TWO STAGE, COMPRESSOR 1
FF01	RT6	SENSOR, A55 DISCHARGE (IMC)
CC01	RT17	SENSOR, OUTSIDE AIR TEMP
FF02	RT46, RT47	SENSOR, SAT. SUCT TEMP., COMP 1, 2
CC02	RT48, RT49	SENSOR, SAT. LIQUID TEMP., COMP 1, 2
BB01/02	S4, S7	LIMIT, HI PRESS. SWITCH, COMP 1, 2
BB02/03	S87, S88	SWITCH, LOW PRESS., COMP. 1, 2
AA05	T1	TRANSFORMER, CONTROL
BB05	T18	TRANSFORMER, CONTACTOR
AA06/07	TB13	TERMINAL STRIP, POWER DISTRIBUTION

WIRING DIAGRAM FLOW

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

Product: LHT, LDT B Box - Y VOLT 152
Heat Pump Diagram with Higher SCCR

Voltage: 208-230V/3~/60Hz (Y)
Supersedes: XXXXXX-XX Form No: 538368-01 Rev: 1

10x12 CUT SIZE

REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012081C	04-29-2024	FEP	MCF	ORIGINATED AT PD&R CARROLLTON, TX
001	CN-012081W	10-07-2024	FEP	FXY	UPDATED P18 CONNECTORS FROM 3 & 4 TO 1 & 2

SEQUENCE OF OPERATION LHT078-152

Power:

1 - Line voltage through the S48 unit disconnect, TB2 terminal block, or CB10 circuit breaker energizes the T1 transformer. T1 provides 24VAC power to A55 Unit Controller which provides 24VAC to the unit cooling, heating and blower controls.

2 - Line voltage is also routed to compressor crankcase heaters, compressor contactors, the blower motor, condenser fan relays and exhaust fan relays.

Blower Operation:

3 - The A55 Unit Controller module receives a demand from thermostat terminal G.

4 - B3 receives the pre-set blower setting through MODUS.

Economizer Operation:

5 - A55 receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% outside air damper open (adjustable).

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

First Stage Cooling Demand (compressor B1)

7 - A55 receives a Y1 thermostat demand.

8 - After A55 proves N.C. low pressure switch S87, RT46 reading above freeze point and N.C. high pressure switch S4, compressor contactor K1 is energized.

9 - N.O. contacts K1-1 close energizing compressor B1. Crankcase heater HR1 is de-energized.

10 - At the same time condenser fans B4 and B5 and are energized.

Second Stage Cooling Demand (compressor B2)

11 - A55 receives a Y2 thermostat demand.

12 - After A55 proves N.C. low pressure switch S88, RT47 reading above freeze point, and N.C. high pressure switch S7, compressor contactor K2 is energized.

13 - N.O. contacts K2-1 close energizing compressor B2. Crankcase heater HR2 is de-energized.

3nd Stage Cooling (compressor B1 in full load and compressor 2 energized)

14 - A55 receives a Y3 thermostat demand (Y1 + Y2 thermostat inputs).

15 - A55 sends 24VAC to B1 compressor solenoid (L14), B1 compressor runs at full load.

First Stage Heat - Thermostat or Zone Sensor

1 - Unit controller A55 receives W1 demand. HP heating is initiated.

2 - After A55 proves N.C. low pressure switches S87, S88, high pressure switches S4, S7, compressor contactors K1, K2 are energized.

3 - K1-1 and K2-1 close energizing compressor B1 and B2. K1 and K2 auxiliary switch open de-energizing crankcase heaters

4 - Outdoor ECM fans B4, B5 and (B21, B22 in LHT152 units) receive pre-set fan settings at high speed from A55 unit controller

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

Units With Optional Electric Heat:

1 - 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:

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

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

NOTE - *Compressors 1 and 2 stay energized.*

3 - See sequence of operation for electric heat.

Defrost Mode:

1 - Defrost is enabled when outdoor coil temperature is below 35F. The Unit Controller will cycle in and out of defrost depending on the temperature difference between the outdoor coil and outdoor air temperature. Defrost is also initiated when the accumulated run time with the outdoor coil temperature below 35F reaches six hours. Electric heat is energized during a defrost cycle to maintain discharge air temperature.

NOTE - *Only one refrigerant circuit will go into defrost at a time.*

DIRECT DRIVE BLOWER SEQUENCE OF OPERATION / TROUBLESHOOTING

Blower Operation:

1 - Line voltage is routed to B3 blower motor through TB2 terminal strip, TB13 terminal strip and J/P48 terminals 1, 2 and 3.

2 - B3 blower motor runs internal diagnostics to check for proper temperature, voltage, etc. (KL2-2 and -3). This process takes approximately 10 seconds. Refer to the Failure Handling/Troubleshooting section.

3 - A55 Unit Controller receives a thermostat demand. After theA55 proves (P259-7 and -6) that B3 blower motor internal relay (KL2-2 and -3) is closed, B3 blower motor is energized (0-10VDC from P259-4 to KL3-4). B3 blower motor controls are grounded through KL2-2 and -3 to A55 P259-6.

4 - If configured, A55 checks S52 blower proving switch to make sure it closes within 16 seconds of the 0-10VCD signal being sent to B3 blower motor.

Blower Fault Sequence Direct Drive Motor - No S52:

1 - Line voltage is provided to B3 blower motor.

2 - After 10 seconds, the B3 blower motor internal relay does not close.

3 - Alarm 186 is set by the A55 Unit Controller, de-energizing unit. If one of the “Error” failures listed in table 10 occurs (“Warning” failures will not set Alarm 186), service is required. Refer to the Failure Handling/Troubleshooting section.

4 - If B3 blower motor internal relay closes continue to next step.

5 - A55 sends 0-10VDC signal to B3 blower motor.

6 - During B3 blower motor operation, the internal motor relay opens.

7 - Alarm 186 is set by A55 and de-energizes the unit. Service is required. Refer to the Failure Handling/Troubleshooting section.

Blower Fault Sequence Direct Drive Motor - With S52 (If Configured):

1 - A55 Unit Controller sends 0-10VDC signal to B3 blower motor.

2 - After 16 seconds, if S52 blower proving switch remains open, A55 will remove 0-10VDC signal for 5 minutes.

3 - A55 sends 0-10VDC signal to B3 blower motor.

4 - After 16 seconds, if S52 blower proving switch remains open, A55 will remove 0-10VDC signal for another 5 minutes.

5 - After the third try, A55 will de-energize the unit. Service is required.

Failure Handling/Troubleshooting:

1 - Follow TABLE 10 to troubleshoot possible failures that would cause Alarm 186 to set.

2 - *BEFORE DETERMINING THAT THE BLOWER ASSEMBLY HAS FAILED*, use the A55 Unit Controller to clear delays and operate the blower.

3 - Main Menu > Service > Offline > Clear Delays > Yes > Save

4 - Main Menu > Service > Test > Blower

5 - Observe if the blower operates or if Alarm 186 sets again.

6 - If blower does not operate and Alarm 186 is set again, blower assembly must be replaced.

7 - If blower assembly does operate, wait a minimum of 30 minutes to ensure Alarm 186 is not set again.

TABLE 9

DIRECT DRIVE BLOWER MOTOR TROUBLESHOOTING

Failure	Error	Warning	Reason	Troubleshoot
Locked Rotor	o		No changes in hall signals within 2000ms	Check for obstruction keeping impeller from rotating
Braking Mode		o	Warning, no error code set, Motor start not possible after 20 sec	Check for secondary airflow source in the system causing the impeller to rotate backwards when off
Hall Error	o		Combination of 3 hall signals gives false signal after one rotation	Measure voltage across each leg, Check electrical connections
Power Module Overheated	o		Temperature > 115°C	Check operating conditions in blower compartment, Check for high motor load (current draw), Check for corrosion-free and secure electrical connections
Motor Overheated	o		Motor over-temperature protector opens	
Gate Driver Error	o		Internal software fault	Measure voltage across each leg, Check electrical connections
Phase Failure	o		Input voltage has phase imbalance	Measure voltage across each leg, Check electrical connections, Repair low/high voltage leg(s)
DC Link Voltage Low	o		Rectified DC link voltage is too low	
DC Link Over-voltage	o		Rectified DC link voltage is too high	
Line Over-voltage	o		Line voltage too high	
Line Under-voltage	o		Line voltage too low	
Communication Error			Internal communication failure. Not connected with master/slave wiring	Check low voltage wiring connections
DC Link Voltage Low		o	Warning, not low enough to set error code	Measure voltage across each leg, Check electrical connections, Repair low/high voltage leg(s)
Electronics Temp High		o	Warning, not high enough to set error code, Temperature > 95°C	Check operating conditions in blower compartment, Check for high motor load (current draw), Check for corrosion-free and secure electrical connections
Power Module Temp High		o	Warning, not high enough to set error code, Temperature > 105°C	
Motor Temp High		o	Warning, not high enough to set error code, Temperature > 130°C	

VIII-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 befor the task is commenced.

Steps to ensure this are:

- Become familiar with the equipment and its operation,
- Isolate the system electrically,
- Ensure that before attempting the procedure that mechanical handling equipment is available, if required, for handling refrigerant cylinders, and that all personal protective equipment is available and being used correctly while the recovery process is supervised at all times by a competent person and that the recovery equipment and cylinders conform to the appropriate standards.

Additionally, pump down refrigerant system, if possible, and if a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system. Make sure that cylinders are situated on the scales before recovery takes place. Start the recovery machine and operate in accordance with instructions. Do not overfill cylinders (no more than 80 % volume liquid charge). Do not exceed the maximum working pressure of the cylinder, even temporarily. 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. Recovered refrigerant shall not be charged into another refrigerating system unless it has been cleaned and checked.

Equipment shall be labeled stating that it has been decommissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing flammable refrigerants, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

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:

- 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.