UNIT INFORMATION

LDT

6.5 / 7.5 / 8.5 / 10 / 12.5

100086

Service Literature

LDT DUAL FUEL SERIES

⚠ 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

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.

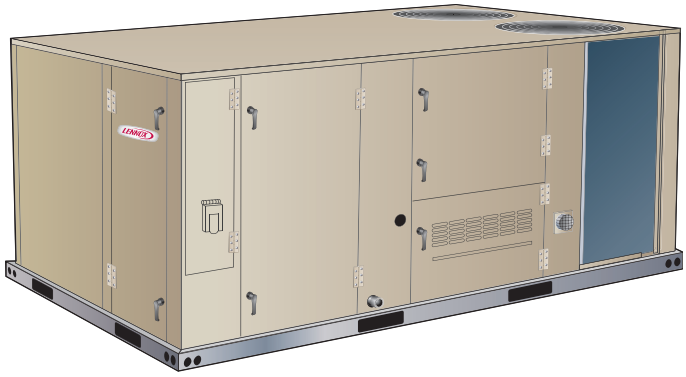
The LDT commercial combination heat pump and gas heat unit is available in 6.5 / 7.5 / 8.5 / 10 / 12.5 ton cooling capacities. The LDT078, 092, 102, 122 and 150 refrigerant systems utilize two compressors, two reversing valves, two accumulators (122, 150 only), and other parts common to a heat pump. Units are available in 130,000, 180,000 or 240,000Btuh (38.1, 52.7 or 70.3 kW) heating inputs. Gas heat sections are designed with stainless steel tube heat exchangers.

LDT078-150 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.

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

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

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



⚠ WARNING

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

Table of Contents

OPTIONS / ACCESSORIES

Item Description		Catalog Number	Unit Model No 078	092	102	122	150
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
GAS HEATING SYSTEM							
Bottom Gas Piping Kit		**54W95**	X	X	X	X	X
Combustion Air Intake Extensions		**19W51**	X	X	X	X	X
Gas Heat Input	130,000 Btuh	Factory	O	O	O	O	O
	180,000 Btuh	Factory	O	O	O	O	O
	240,000 Btuh	Factory		O	O	O	O
Low Temperature Vestibule Heater	208/230V-3ph	**22A51**	X	X	X	X	X
	460V	**22A55**	X	X	X	X	X
	575V	**13X65**	X	X	X	X	X
LPG/Propane Conversion Kits	Standard Heat	**14N22**	X	X	X	X	X
	Medium Heat	**14N23**	X	X	X	X	X
	High Heat	**14N25**	X	X	X	X	X
Vertical Vent Extension		**42W16**	X	X	X	X	X
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		
		24C87				OX	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							
Blower Proving Switch		**21Z10**	OX	OX	OX	OX	OX
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)		**11K76**	OX	OX	OX	OX	OX
Smoke Detector - Supply and Return (Power board and two sensors)		**11K80**	OX	OX	OX	OX	OX

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	122	150
INDOOR AIR QUALITY							
Air Filters							
Healthy Climate® High Efficiency Air Filters 20 x 25 x 2 in. (Order 4 per unit)	MERV 8	**50W61**	OX	OX	OX	OX	OX
	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 with LCD display, rated for plenum mounting		**87N52**	X	X	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting		**87N54**	X	X	X	X	X
CO_2 Sensor Duct Mounting Kit - for downflow applications		**85L43**	X	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO_2 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
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
[2] 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
	[3] 20 amp non-powered, field-wired (208/230V, 460V, 575V)	**67E01**	X	X	X	X	X
	[3] 20 amp non-powered, field-wired (575V only)	Factory	O	O	O	O	O
Weatherproof Cover for GFI		**10C89**	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).

[2] Disconnect Switch not available with higher SCCR option. Short-Circuit Current Rating option not available on field installed electric heat.

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

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	122	150
ECONOMIZER							
High Performance Economizer (Approved for California Title 24 Building Standards / AMCA Class 1A Certified)							
High Performance Economizer Downflow or Horizontal - Includes Outdoor Air Hood and Downflow Barometric Relief Dampers with Exhaust Hood Order Horizontal Barometric Relief Dampers 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	X
Flush - Order one	FD11-95S	**13K56**	X	X			
	FD11-135S	**13K57**			X	X	X
Transitions (Supply and Return) - Order one	C1DIFF30B-1	**12X65**	X	X			
	C1DIFF31B-1	**12X66**			X	X	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).
X = Field Installed.

SPECIFICATIONS — 6.5 TON | 7.5 TON | 8.5 TON

			6.5 Ton	7.5 Ton	8.5 Ton
General Data		**Nominal Tonnage**	**6.5 Ton**	**7.5 Ton**	**8.5 Ton**
		Efficiency Type	**High**	**High**	**High**
		Model Number	**LDT078H4E**	**LDT092H4E**	**LDT102H4E**
		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	100,000
		[1] Net Cooling Capacity - Btuh	78,000	90,000	98,000
		AHRI Rated Air Flow - cfm	2400	2800	2800
		Total Unit Power - kW	6.4	7.6	8.3
		[1] EER (Btuh/Watt)	12.2	11.9	11.9
		[1] IEER (Btuh/Watt)	16.5	16.0	15.5
		Refrigerant Type	R410A	R410A	R410A
	Refrigerant Charge Furnished	Circuit 1	12 lbs. 0 oz.	11 lbs. 10 oz.	12 lbs. 8 oz.
		Circuit 2	12 lbs. 8 oz.	11 lbs. 10 oz.	13 lbs. 12 oz.
Heating Performance		[1] Total High Heat Capacity - Btuh	73,000	84,000	94,000
		[1] AHRI Rated Air Flow - cfm	2600	3000	3400
		Total Unit Power - kW	6.1	7.0	7.9
		[1] C.O.P.	3.5	3.5	3.5
		[1] Total Low Heat Capacity - Btuh	40,000	46,000	53,000
		Total Unit Power (kW)	5.2	6.0	6.9
		[1] C.O.P.	2.25	2.25	2.25
Gas Heating Options Available			Standard (2 stage), Medium (2 Stage)	Standard (2 stage), Medium (2 Stage), High (2 Stage)	
Compressor Type (number)			Two-Stage Scroll (1) Single-Stage Scroll (1)		
Outdoor Coil		Net face area (total) - sq. ft.	25.9	25.9	25.9
		Tube diameter - in.	3/8	3/8	3/8
		Number of rows	3	3	3
		Fins per inch	20	20	20
Outdoor Coil Fans		Motor - (No.) hp	(2) 1/3 ECM	(2) 1/3 ECM	(2) 1/3 ECM
		Motor rpm	530-950	530-950	650-1010
		Total Motor watts	140-620	140-620	220-700
		Diameter - (No.) in.	(2) 24	(2) 24	(2) 24
		Number of blades	3	3	3
		Total Air volume - cfm	3600-7000	3600-7000	4600-7500
Indoor Coil		Net face area (total) - sq. ft.	12.8	12.8	12.8
		Tube diameter - in.	3/8	3/8	3/8
		Number of rows	4	4	4
		Fins per inch	14	14	14
		Drain connection - Number and size	(1) 1 in. NPT coupling		
		Expansion device type	Balanced Port Thermostatic Expansion Valve (removable element head)		
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		
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase		

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

[1] 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

General Data		**Nominal Tonnage**	**10 Ton**	**12.5 Ton**
		Efficiency Type	**High**	**High**
		Model Number	**LDT122H4E**	**LDT150H4E**
		Blower Type	**DirectPlus™ ECM Direct Drive with MSAV®**	**DirectPlus™ ECM Direct Drive with MSAV®**
Cooling Performance		Gross Cooling Capacity - Btuh	121,000	141,000
		[1] Net Cooling Capacity - Btuh	118,000	136,000
		AHRI Rated Air Flow - cfm	3400	4200
		Total Unit Power - kW	9.9	12.6
		[1] EER (Btuh/Watt)	11.9	10.8
		[1] IEER (Btuh/Watt)	15.5	14.3
		Refrigerant Type	R410A	R410A
	Refrigerant Charge Furnished	Circuit 1	21 lbs. 8 oz.	22 lbs. 8 oz.
		Circuit 2	20 lbs. 8 oz.	21 lbs. 8 oz.
Heating Performance		[1] Total High Heat Capacity - Btuh	114,000	128,000
		[1] AHRI Rated Air Flow - cfm	3600	4200
		Total Unit Power - kW	9.5	11
		[1] C.O.P.	3.45	3.35
		[1] Total Low Heat Capacity - Btuh	65,000	73,000
		Total Unit Power (kW)	8.5	10.2
		[1] C.O.P.	2.25	2.10
Gas Heating Options Available - See page 227			Standard (2 stage), Medium (2 Stage), High (2 Stage)	
Compressor Type (number)			Two-Stage Scroll (1) Single-Stage Scroll (1)	
Outdoor Coil		Net face area (total) - sq. ft.	40.4	40.4
		Tube diameter - in.	3/8	3/8
		Number of rows	3	3
		Fins per inch	20	20
Outdoor Coil Fans		Motor - (No.) hp	(3) 1/3 ECM	(3) 1/3 ECM
		Motor rpm	530-950	530-950
		Total Motor watts	180-800	180-800
		Diameter - (No.) in.	(3) 24	(3) 24
		Number of blades	3	3
		Total Air volume - cfm	5500-10,600	5500-10,600
Indoor Coil		Net face area (total) - sq. ft.	12.8	12.8
		Tube diameter - in.	3/8	3/8
		Number of rows	4	4
		Fins per inch	14	14
		Drain connection - Number and size	(1) 1 in. NPT coupling	
		Expansion device type	Balanced Port Thermostatic Expansion Valve (removable element head)	
Indoor Blower		Nominal motor output	3.75 hp (ECM)	3.75 hp (ECM)
		Blower wheel nominal diameter x width - in.	(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	
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase	

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

[1] 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 — GAS HEAT

			Heat Input Type	Standard	Medium	High
			Number of Gas Heat Stages	**2**	**2**	**2**
Gas Heating Performance	Input - Btuh	First Stage		84,500	117,000	156,000
		Second Stage		130,000	180,000	240,000
	Output - Btuh	Second Stage		104,000	144,000	194,000
			Temperature Rise Range - °F	15 - 45	30 - 60	40 - 70
Minimum Air Volume - cfm				2150	2250	2600
			Thermal Efficiency	80%	80%	81%
			Gas Supply Connections	3/4 in. NPT	3/4 in. NPT	3/4 in. NPT.
Recommended Gas Supply Pressure - Nat. / LPG				7 in. w.g. / 11 in. w.g.		
Gas Supply Pressure Range		Min./Max. (Natural)		4.7 - 10.5 in. w.g.		
		Min./Max. (LPG)		10.8 - 13.5 in. w.g.		

HIGH ALTITUDE DERATE

NOTE - Units may be installed at altitudes up to 2000 feet above sea level without any modifications.

At altitudes above 2000 feet units must be derated to match gas manifold pressures shown in table below.

At altitudes above 4500 feet unit must be derated 2% (130K through 180K) and 4% (240K) for each 1000 feet above sea level.

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

Refer to the Installation Instructions for more detailed information.

Heat Input Type	Altitude Feet	Gas Manifold Pressure in. w.g.		Input Rate (Btuh)
		Natural Gas	LPG/ Propane	
Standard (2 stage)	2001 - 4500	1.6 / 3.4	4.4 / 9.7	84,500 / 125,000
Medium (2 stage)	2001 - 4500	1.6 / 3.4	4.4 / 9.7	117,000 / 173,000
High (2 stage)	2001 - 4500	1.6 / 3.4	4.4 / 9.7	156,000 / 221,000

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.

Maximum Static Pressure With Gas Heat - 2.0 in. w.g.
Minimum Air Volume Required For Different Gas Heat Sizes:
Standard - 2150 cfm; Medium - 2250 cfm; High - 2600 cfm

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	759	223	864	298	961	359	1049	420	1128	508	1199	607	1260	704
2000	846	271	943	345	1035	410	1117	488	1189	598	1255	704	1313	804
2250	945	303	1030	391	1111	476	1184	577	1247	697	1310	806	1367	905
2500	1035	366	1109	476	1180	583	1245	688	1306	797	1368	903	1426	1008
2750	1113	476	1182	601	1248	715	1310	809	1371	902	1432	1011	1491	1129
3000	1195	596	1261	718	1324	827	1385	922	1444	1024	1503	1146	1559	1279
3250	1282	711	1346	827	1406	935	1464	1044	1521	1167	1576	1306	1629	1460
3500	1372	821	1432	940	1489	1060	1544	1192	1598	1337	1650	1494	1700	1663
3750	1461	949	1517	1081	1571	1221	1624	1373	1675	1532	1725	1700	1773	1875
4000	1549	1109	1602	1256	1653	1413	1703	1576	1753	1743	1801	1916	1847	2091
4250	1637	1298	1687	1458	1735	1625	1784	1795	1831	1966	1877	2139	1923	2310
4500	1724	1510	1772	1678	1818	1851	1864	2023	1910	2195	1955	2365	2000	2530
4750	1811	1738	1856	1910	1901	2083	1946	2254	1990	2423	2034	2587	2079	2746
5000	1897	1973	1941	2144	1985	2314	2028	2480	2071	2644	2114	2805	2158	2959
5250	1983	2205	2026	2373	2069	2538	2111	2699	2153	2860	2195	3017	- - -	- - -
5500	2070	2428	2112	2595	2153	2756	2194	2912	- - -	- - -	- - -	- - -	- - -	- - -
5750	2156	2643	2197	2809	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

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	1316	793	1373	875	1432	963	1491	1064	1548	1175	1604	1300
2000	1368	894	1425	982	1483	1081	1540	1196	1596	1322	1650	1458
2250	1423	1001	1480	1101	1537	1216	1593	1344	1647	1483	1700	1629
2500	1483	1117	1539	1236	1594	1368	1648	1509	1700	1657	1752	1810
2750	1547	1256	1601	1394	1654	1539	1705	1690	1756	1846	1806	2004
3000	1612	1425	1664	1577	1715	1734	1765	1893	1815	2053	1864	2213
3250	1680	1623	1729	1787	1778	1949	1828	2110	1876	2269	1925	2426
3500	1748	1835	1796	2003	1844	2165	1893	2324	1942	2479	1991	2633
3750	1819	2048	1866	2214	1914	2374	1963	2530	2012	2684	2061	2837
4000	1893	2260	1940	2423	1988	2581	2036	2737	2084	2891	2134	3044
4250	1969	2475	2016	2634	2063	2790	2111	2945	2159	3098	- - -	- - -
4500	2046	2689	2093	2844	2140	2998	2187	3153	- - -	- - -	- - -	- - -
4750	2124	2900	2170	3053	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
5000	2203	3111	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
5250	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
5500	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

BLOWER DATA

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

Air Volume cfm	Wet Indoor Coil		Gas Heat Exchanger			Economizer	Filters			Return Air Adaptor Plate
	092, 102	122	Standard Heat	Medium Heat	High Heat		MERV 8	MERV 13	MERV 16	
1750	0.04	0.04	0.06	0.02	0.02	0.05	0.01	0.03	0.06	0.00
2000	0.05	0.05	0.07	0.05	0.06	0.06	0.01	0.03	0.08	0.00
2250	0.06	0.06	0.07	0.07	0.08	0.08	0.01	0.04	0.09	0.00
2500	0.07	0.07	0.09	0.10	0.11	0.11	0.01	0.05	0.10	0.00
2750	0.08	0.08	0.09	0.11	0.12	0.12	0.02	0.05	0.11	0.00
3000	0.10	0.09	0.11	0.12	0.13	0.13	0.02	0.06	0.12	0.02
3250	0.11	0.10	0.12	0.15	0.16	0.15	0.02	0.06	0.13	0.02
3500	0.12	0.11	0.12	0.16	0.17	0.15	0.03	0.07	0.15	0.04
3750	0.14	0.13	0.14	0.19	0.20	0.15	0.03	0.08	0.16	0.07
4000	0.15	0.14	0.14	0.21	0.22	0.19	0.04	0.08	0.17	0.09
4250	0.17	0.15	0.14	0.24	0.28	0.19	0.04	0.09	0.19	0.11
4500	0.19	0.17	0.15	0.26	0.32	0.22	0.04	0.09	0.20	0.12
4750	0.20	0.18	0.16	0.29	0.37	0.25	0.05	0.10	0.21	0.16
5000	0.22	0.20	0.16	0.34	0.43	0.29	0.06	0.10	0.23	0.18
5250	0.24	0.22	0.16	0.37	0.47	0.32	0.06	0.11	0.24	0.19
5500	0.25	0.23	0.18	0.44	0.54	0.34	0.07	0.12	0.25	0.22
5750	0.27	0.25	0.19	0.49	0.59	0.45	0.07	0.12	0.27	0.25
6000	0.29	0.27	0.20	0.54	0.64	0.52	0.08	0.13	0.28	0.27

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 & 122 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
150 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, 122 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
150 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 DATA — 6.5 TON

	Model No.	LDT078H4E		
[1] Voltage - 60Hz		208/230V-3ph	460V-3ph	575V-3ph
Compressor 1 (Non-Inverter)	Rated Load Amps	12.9	7.1	4.6
	Locked Rotor Amps	105	62	39
Compressor 2 (Non-Inverter)	Rated Load Amps	8.5	3.8	3.5
	Locked Rotor Amps	70	31	27
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	8.7	4.7	4.1
[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	39	21	16
	With (1) 0.33 HP Power Exhaust	42	22	17

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.

ELECTRICAL DATA — 7.5 TON

	Model No.	LDT092H4E		
[1] Voltage - 60Hz		208/230V-3ph	460V-3ph	575V-3ph
Compressor 1 (Non-Inverter)	Rated Load Amps	12.9	7.1	4.6
	Locked Rotor Amps	105	62	39
Compressor 2 (Non-Inverter)	Rated Load Amps	13.7	6.1	4.8
	Locked Rotor Amps	83.1	43	33
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	8.7	4.7	4.1
[2] Maximum Overcurrent Protection (MOCP)	Unit Only	50	25	20
	With (1) 0.33 HP Power Exhaust	60	30	20
[3] Minimum Circuit Ampacity (MCA)	Unit Only	45	23	17
	With (1) 0.33 HP Power Exhaust	47	24	18

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.

ELECTRICAL DATA — 8.5 TON

	Model No.	LDT102H4E		
[1] Voltage - 60Hz		208/230V-3ph	460V-3ph	575V-3ph
Compressor 1 (Non-Inverter)	Rated Load Amps	12.9	7.1	4.6
	Locked Rotor Amps	105	62	39
Compressor 2 (Non-Inverter)	Rated Load Amps	16	7.8	5.7
	Locked Rotor Amps	110	52	38.9
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	8.7	4.7	4.1
[2] Maximum Overcurrent Protection (MOCP)	Unit Only	60	30	20
	With (1) 0.33 HP Power Exhaust	60	30	20
[3] Minimum Circuit Ampacity (MCA)	Unit Only	48	25	19
	With (1) 0.33 HP Power Exhaust	50	26	20

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.

ELECTRICAL DATA — 10 TON

	Model No.	LDT122H4E		
[1] Voltage - 60Hz		208/230V-3ph	460V-3ph	575V-3ph
Compressor 1 (Non-Inverter)	Rated Load Amps	16.7	7.1	5.7
	Locked Rotor Amps	110	54.7	47.8
Compressor 2 (Non-Inverter)	Rated Load Amps	19.6	8.2	6.6
	Locked Rotor Amps	136	66.1	55.3
Outdoor Fan Motors (2)	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	8.7	4.7	4.1
[2] Maximum Overcurrent Protection (MOCP)	Unit Only	70	30	25
	With (1) 0.33 HP Power Exhaust	80	35	25
[3] Minimum Circuit Ampacity (MCA)	Unit Only	59	27	22
	With (1) 0.33 HP Power Exhaust	61	28	23

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.

LDT078-150 PARTS ARRANGEMENT

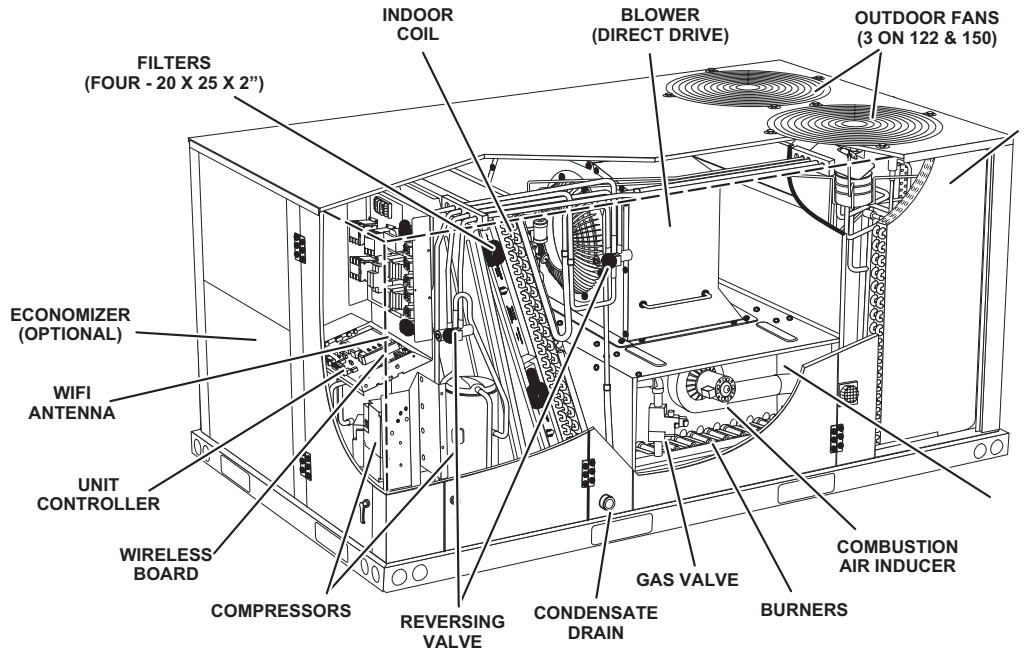


FIGURE 1

LDT078-150 CONTROL BOX

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

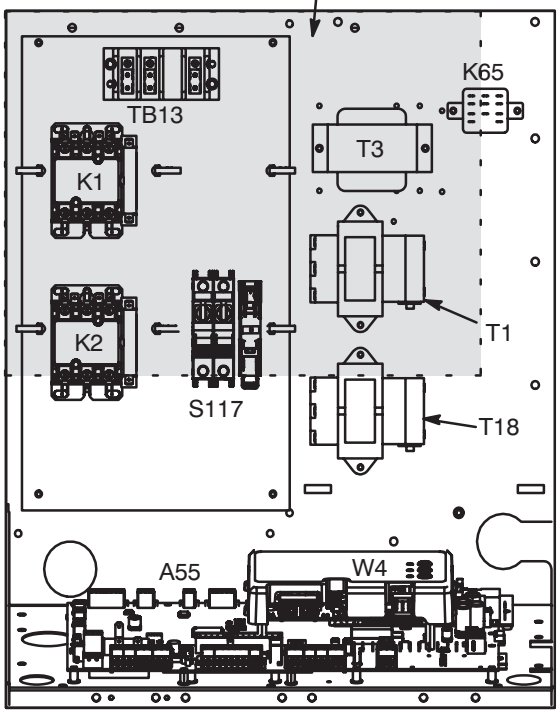


FIGURE 2

I-UNIT COMPONENTS

⚠ 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.

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 LDT 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 LDT unit. All 7.5 through 12.5 ton units are configure to order units (CTO).

A-Control Box Components

LDT 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.

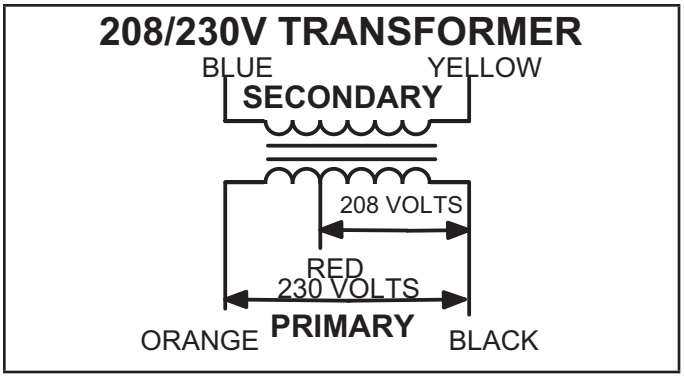


FIGURE 3

3-C. A. I. Transformers T3 575V Units

All LDT 575 (J) voltage units use transformer T3. The auto voltage to 230VAC transformer is mounted in the control box. The transformer has an output rating of 0.5A. T3 transformer supplies 230 VAC power to combustion air blower motor (B6).

4-Transformer T18

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

5-Compressor Contactor K1, K2

All compressor contactors are three-pole, double-break contactors with 24VAC coils. K1 and K2 (both energized by A55) energize compressors B1 and B2.

6-Power Exhaust Relay K65 (PED units)

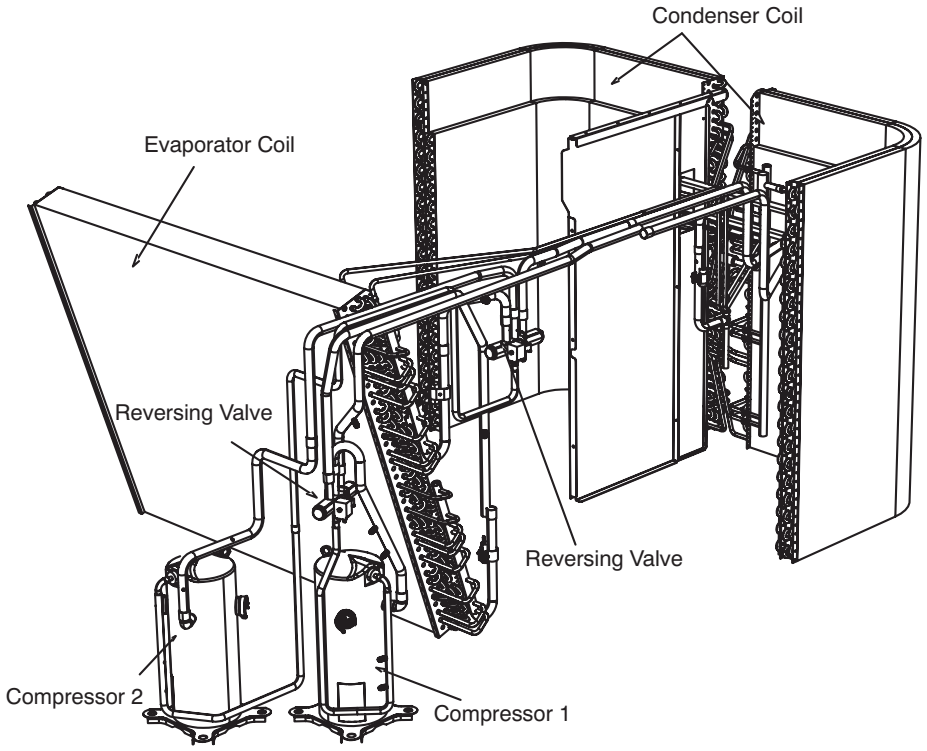
Power exhaust relay K65 is a N.O. DPDT relay with a 24VAC coil. K65 is used in all LDT units equipped with the optional power exhaust dampers. K65 is energized by the economizer control panel (A56), after the economizer dampers reach 50% open (adjustable in CORE). When K65 closes, the exhaust fan B10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

7-Terminal Block (TB13)

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

PLUMBING COMPONENTS

LDT078-102



LDT122-150

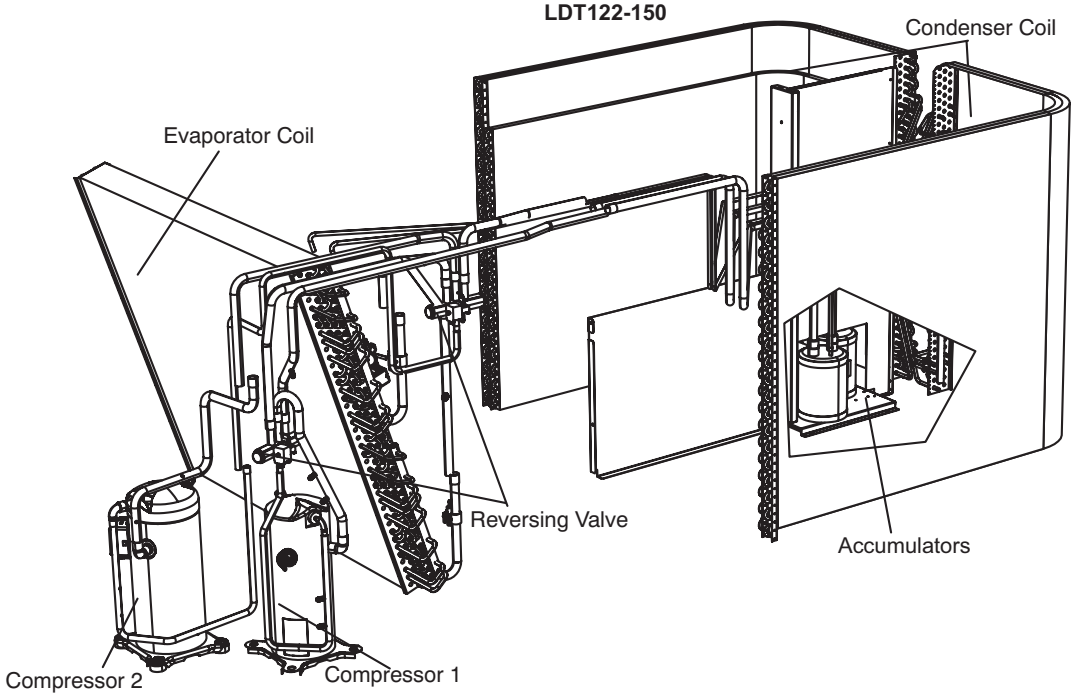


FIGURE 4

B-Cooling Components

LDT 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-Freezestats S49 and S50

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

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

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

3-High Pressure Switches S4 and S7

The high pressure switches is a manual reset SPST N.C. switch which opens on a pressure rise. The switch is located in the compressor discharge line and is wired in series with the compressor contactor coil.

S4 (first circuit) and S7 (second circuit) are wired in series with the respective compressor contactor coils. When discharge pressure rises to 640 ± 10 psig (4412 ± 69 kPa) (indicating a problem in the system) the switch opens and the respective compressor is de-energized (the economizer can continue to operate).

4-Low 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 ± 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 ± 5 psig due to many causes such as refrigerant being added.

When discharge pressure reaches 450 ± 10 psig (3102 ± 69 kPa) in either circuit (indicating defrost is completed) the appropriate switch opens. The switches automatically reset when pressure in the suction line drops to 300 ± 20 psig (2068 ± 138 kPa).

5-Reversing Valve L1 and L2

A refrigerant reversing valve with a 24 volt solenoid coil is used to reverse refrigerant flow during unit operation in all LDT 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.

6-Defrost Pressure Switch S46 and S104

The defrost pressure switch S46 and S104 are auto-reset SPST N.C. pressure switches which open on a pressure rise. All LDT units are equipped with these switches. The switches are located on the discharge line. S46 and S104 are wired in series with the CMC1 control board.

When discharge pressure reaches 450 ± 10 psig (3102 ± 69 kPa) in either circuit (indicating defrost is completed) the appropriate switch opens. The switches automatically reset when pressure in the suction line drops to 300 ± 20 psig (2068 ± 138 kPa).

7-Defrost Temperature Switch S6 and S9

Defrost thermostat switches S6 and S9 have S.P.S.T. N.O. contacts which close on a temperature fall (initiating defrost). The switches are located on the expansion valve distributor assembly at the inlet to the outdoor coil. The switch monitors the outdoor coil suction temperature to determine when defrost is needed. When the outdoor coil suction temperature falls to 35ºF ± 4ºF (1.7ºC ± 2.2ºC) the switch closes (initiating defrost after minimum run time of 30, 60, or 90 minutes). When the temperature rises to 60ºF ± 5ºF (15.6ºC ± 2.8ºC) the switch opens.

8-Filter Drier (all units)

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

9-Condenser Fan Motors B4, B5, B21

See specifications section of this manual for specifications of condenser fans B4 , B5, and B21 (B21 on 122 and 150 units only). All LDT 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.

10-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.

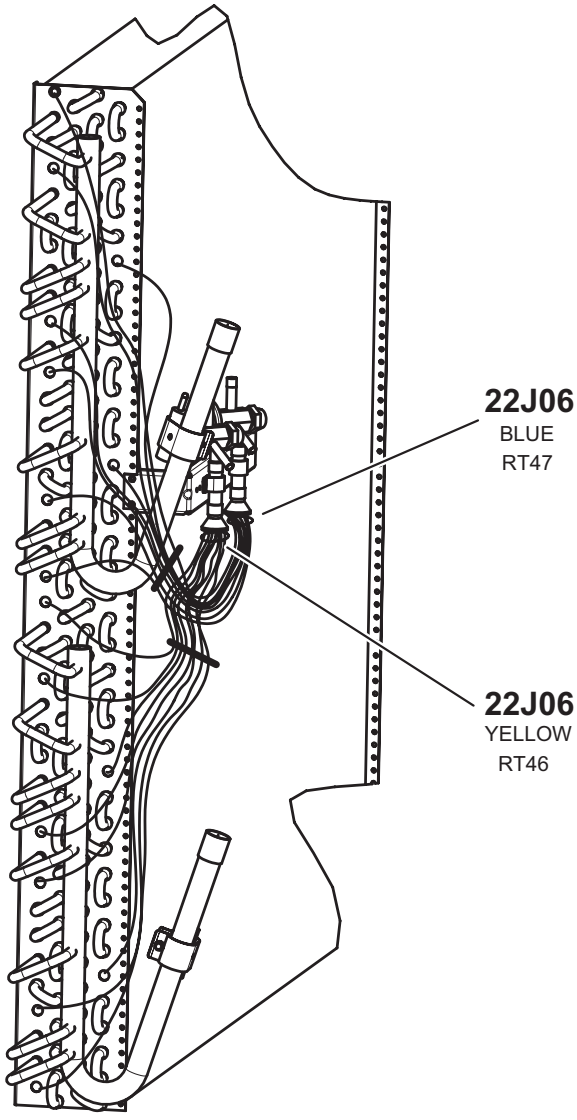
11-Temperature Sensors RT46, RT47, RT48 & RT49

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.

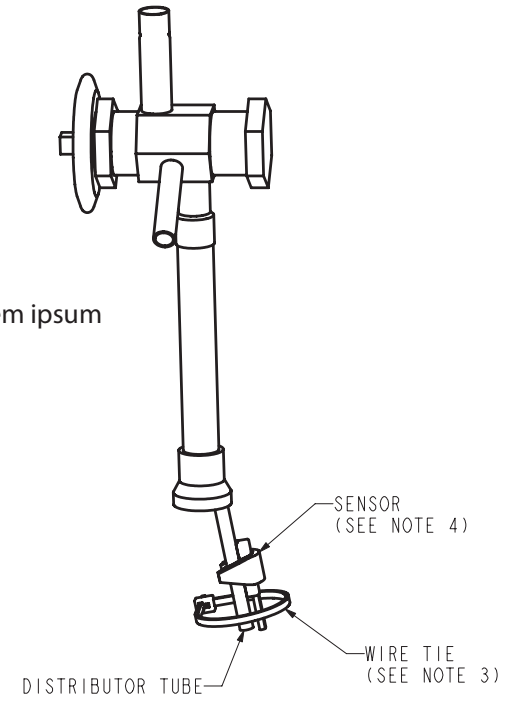
LDT078, 092, 102, 122, 150
INDOOR COIL
RT46, RT47



22J06
BLUE
RT47

22J06
YELLOW
RT46

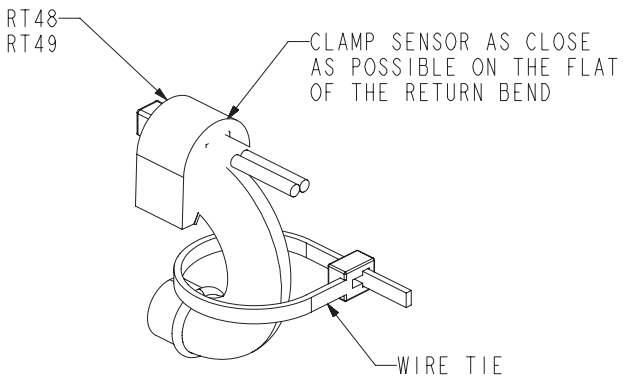
Lorem ipsum



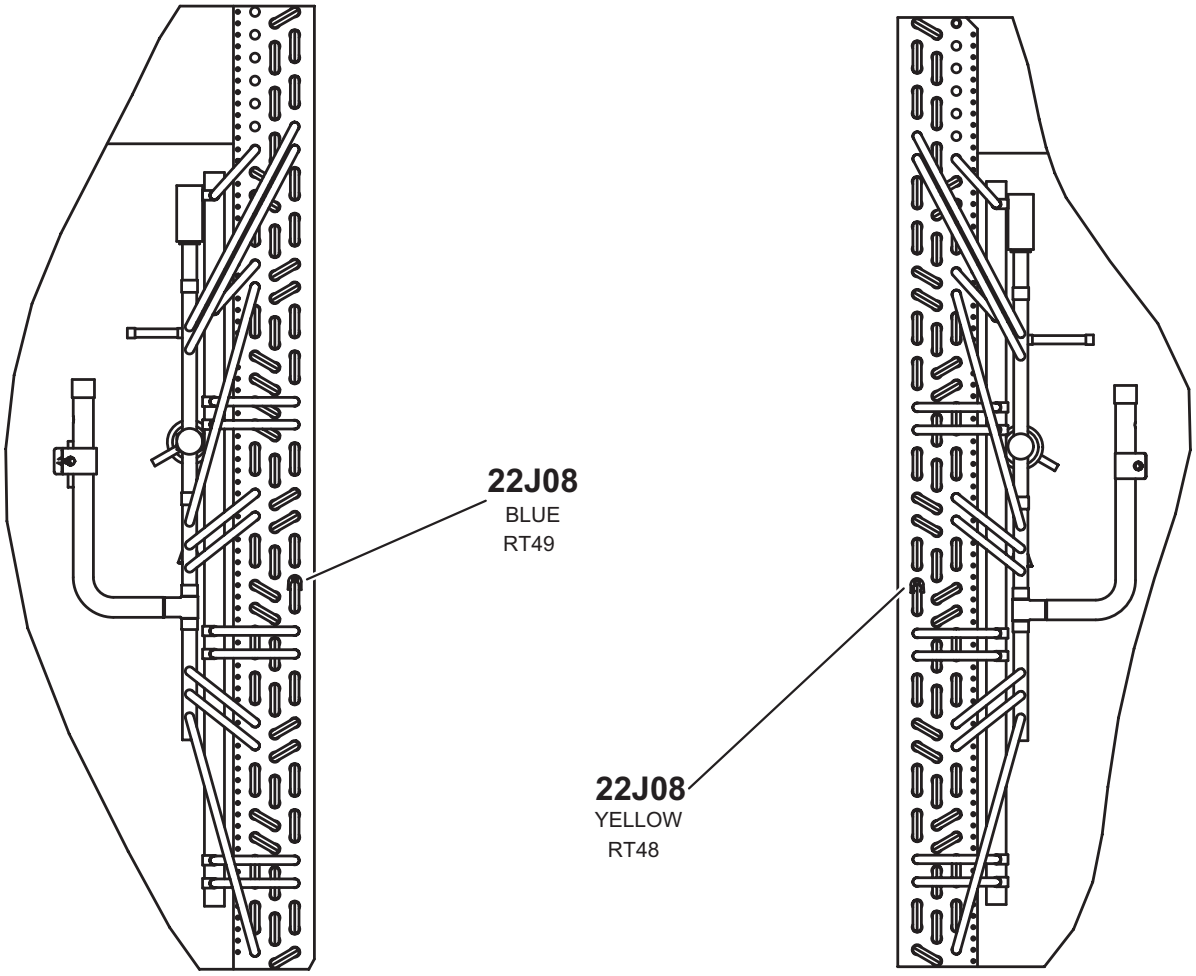
DETAILS NOT TO SCALE

FIGURE 5

LDT078, 092, 102, 122, 150
OUTDOOR COIL
RT48, RT49



SENSOR DETAIL



STAGE 2

DETAILS NOT TO SCALE

FIGURE 6

C-Blower Compartment

The blower compartment in all LDT078-150H 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 8.

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).*

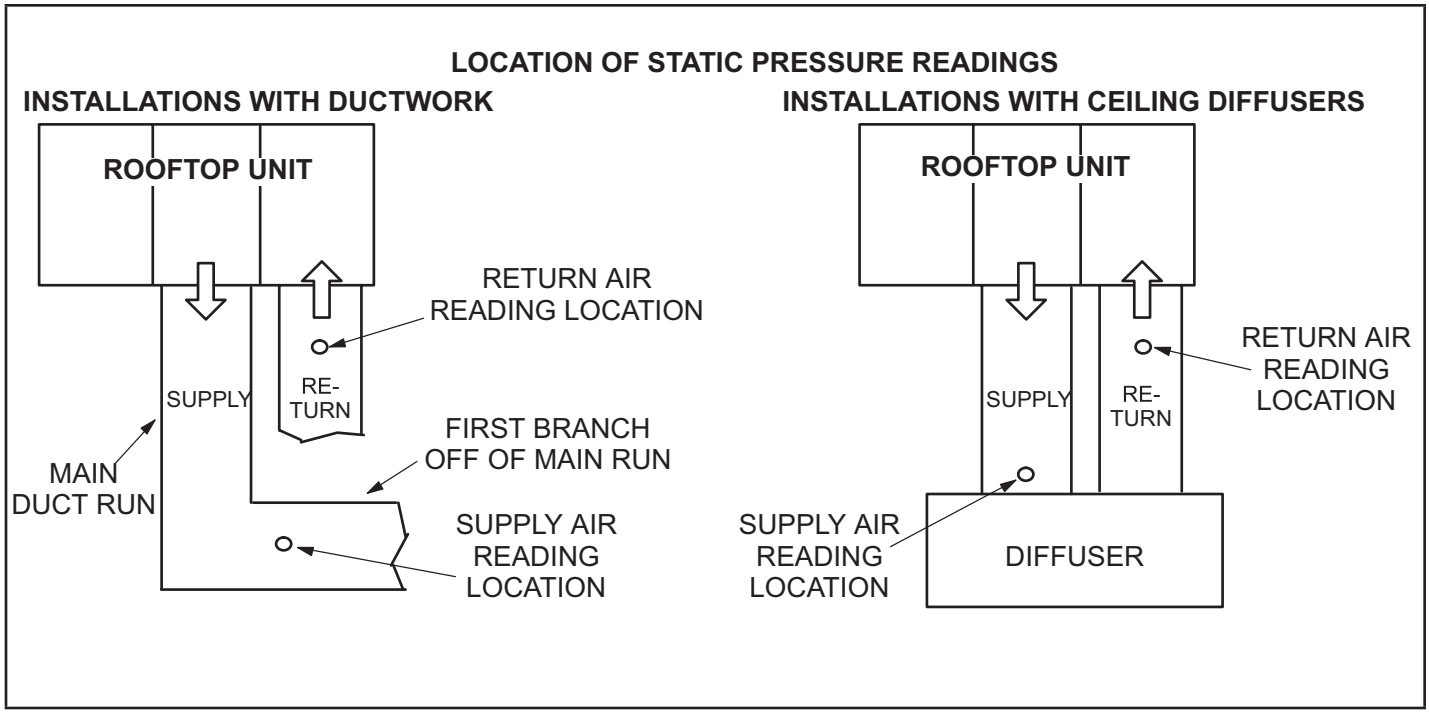


FIGURE 7

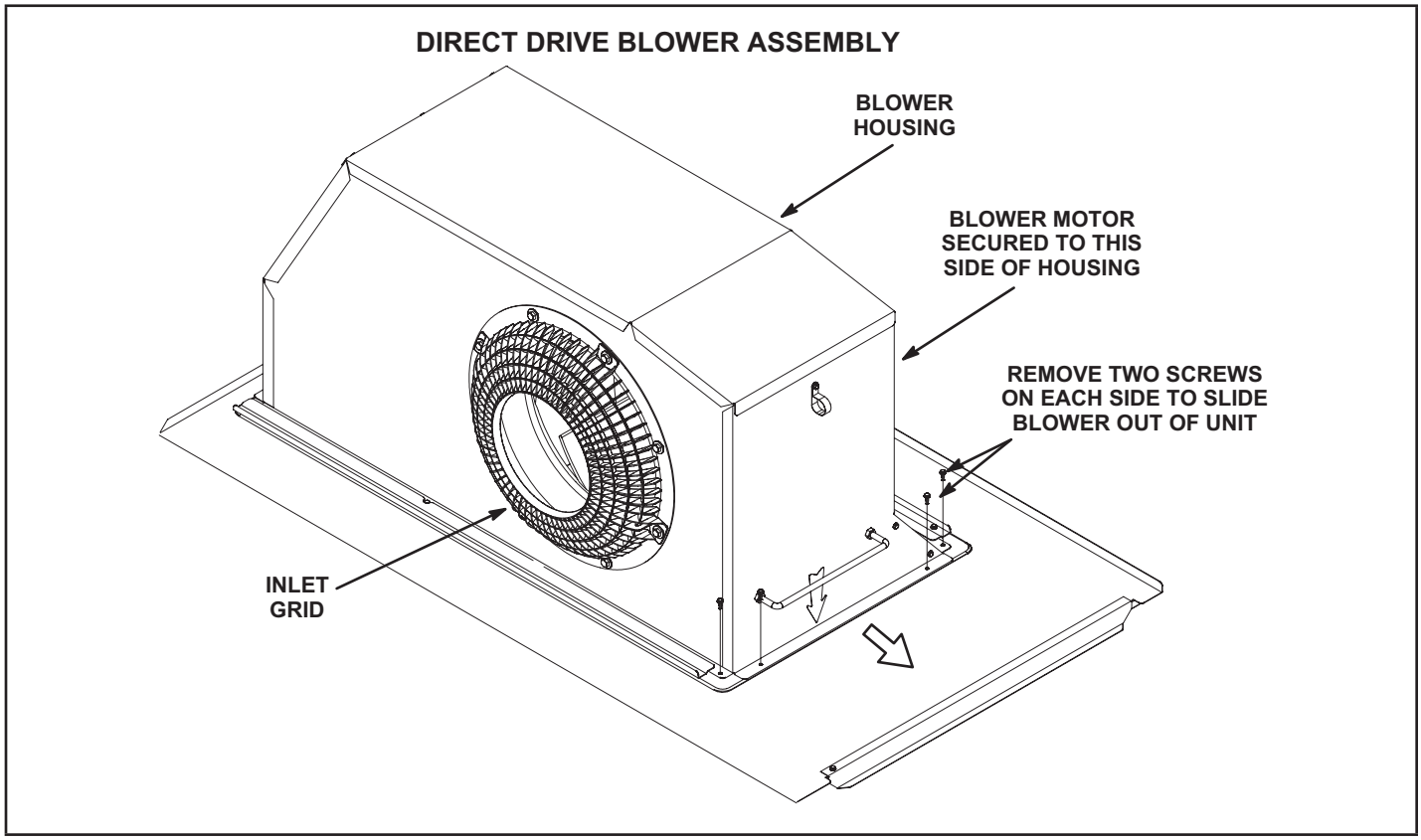


FIGURE 8

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-GAS HEAT COMPONENTS

1-Heat Exchanger FIGURE 9

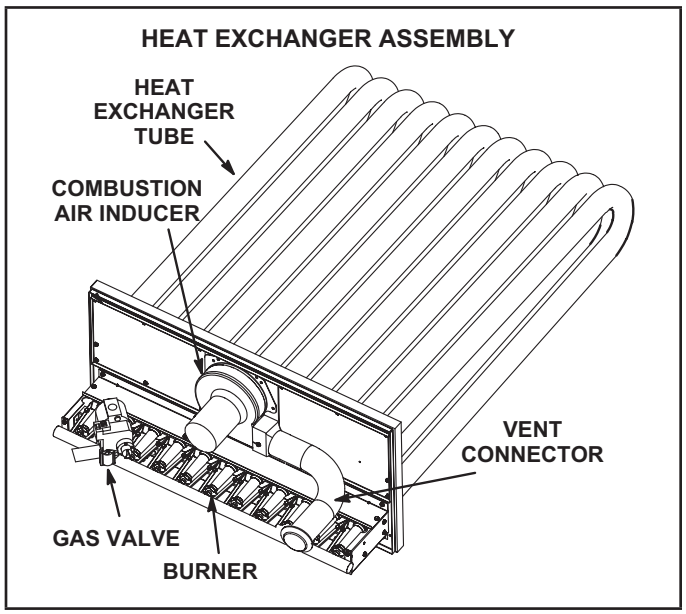


FIGURE 9

LDT units use stainless steel steel inshot burners with tubular stainless steel heat exchangers and two-stage redundant gas valves. LDT092, 102, 122 and 150 units use one eleven tube/burner for high heat, one nine tube/burner for medium heat and one six tube/burner for standard heat.

LDT078 units use one eight tube/burner for medium heat and 0ne six tube/burner for standard heat. Burners in all units use a burner venturi to mix gas and air for proper combustion.

Combustion takes place at each tube entrance. As hot combustion gases are drawn upward through each tube by the combustion air inducer, exhaust gases are drawn out the top and fresh air/gas mixture is drawn in at the bottom. Heat is transferred to the air stream from all surfaces of the heat exchanger tubes. The supply air blower forces air across the tubes to extract the heat of combustion. The shape of the tubes ensures maximum heat exchange. The gas valves accomplish staging by allowing more or less gas to the burners as called for by heating demand.

2-Gas Heat Exchanger Inserts (Some LDT Units)

Inserts are installed on standard (130,000Btuh) heat exchangers in tubes one and three. Medium and high heat exchangers do not require inserts. See FIGURE 10. Inserts are used to maintain even temperature distribution through the heat exchanger. Temperature distribution can vary depending on supply air flow, number of heat exchanger tubes and the blower deck opening.

3-Burner Box Assembly FIGURE 11

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

Burners

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

Burners can be removed for service as an assembly. Burner maintenance and service is detailed in the SERVICE CHECKS section of this manual.

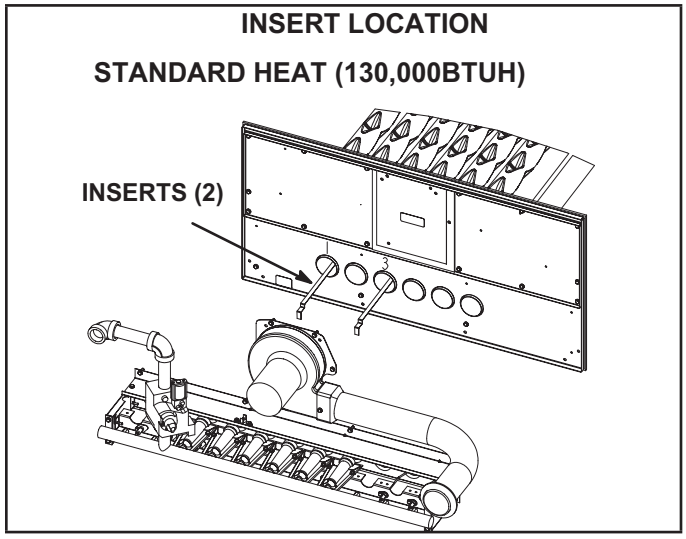


FIGURE 10

Orifice

Each burner uses an orifice which is precisely matched to the burner input. Install only the orifices with the same threads. The orifice is threaded into the burner manifold. The burner is supported by the orifice and will easily slide off for service. Each orifice and burner are sized specifically to the unit. Refer to ProductZone@ www.davenet.com for correct sizing information.

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

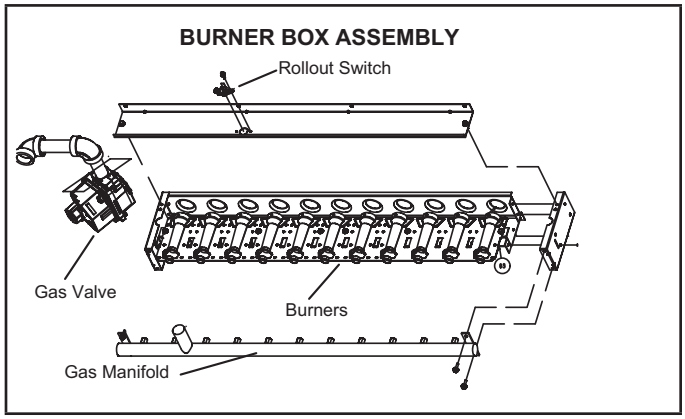


FIGURE 11

4-Primary High Temperature Limit S10

S10 is a SPST N.C. high temperature primary limit for gas heat and is located on the blower deck to the left of the blower housing.

Primary limit S10 is wired to the A55 unit controller. Its N.C. contacts open to de-energize the ignition control when excessive temperature is reached in the blower compartment. If the limit trips the blower will be energized. Two limits with different actuating temperatures are used for limits S10. Limit settings are factory set and cannot be adjusted. If limit must be replaced, the same type and set point must be used.

5-Flame Roll-out Limit Switch S47

Flame roll-out limit switch S47 is a SPST N.C. high temperature limit located just above the burner air intake opening in the burner enclosures (see figure 11). S47 is wired to the ignition control A3. When S47 senses flame roll-out (indicating a blockage in the combustion air passages), the flame roll-out limit trips and the ignition control immediately closes the gas valve.

Limit S47 is factory preset to open at 290F $\pm$ 12ºF (143ºC $\pm$ 6.7ºC) on a temperature rise on all units. All flame roll-out limits are manual reset.

6-Combustion Air Prove Switch S18

Prove switch S18 is a SPST N.O. switch located to the right of the induced draft assembly. S18 monitors combustion air inducer operation. Switch S18 is wired to the A55 Unit controller. The switch closes on a negative pressure fall. This negative pressure fall and switch actuation allows the ignition sequence to continue (proves, by closing, that the combustion air inducer is operating before allowing the gas valve to open.) The combustion air prove switch is factory set and not adjustable. The switch will automatically open on a pressure rise (less negative pressure). TABLE 2 shows prove switch settings.

TABLE 2

S18 Prove Switch Settings

Close“ w.c. (Pa)	Open “ w.c. (Pa)
0.25 $\pm$ 5 (62.3 $\pm$ 12.4)	0.10 $\pm$ 5 (24.8 $\pm$ 12.4)

7-Combustion Air Inducer B6

The combustion air inducer provides fresh air to the burner while clearing the combustion chamber of exhaust gases. The inducer is energized by the A55 Unit Controller via K13 relay..

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

On a heating demand (W1), the A55 unit controller initiates the heating cycle. A55 then allows 30 seconds for the combustion air inducer to vent exhaust gases from the burners.

When the combustion air inducer is purging the exhaust gases, the combustion air prove switch closes, proving that the combustion air inducer is operating before allowing the ignition sequence to continue. When the combustion air prove switch is closed and the delay is over, the ignition control activates the first stage operator of the gas valve (low fire), the spark and the flame sensing electrode. Sparking stops immediately after flame is sensed or at the end of the eight second trial for ignition. All combustion air inducer motors are sealed and cannot be oiled. The inducer cannot be adjusted but can be disassembled for cleaning.

8-Combustion Air Motor Capacitor C3

The combustion air inducer motors in all LDT units require run capacitors. Capacitor C3 is connected to combustion air inducer B6. Ratings will be on side of capacitor or combustion air motor nameplate.

9-Gas Valves GV1

Gas valve GV1 is a two-stage redundant valve.. On first stage (low fire) is quick opening (on and off in less than 3 seconds). Second stage is slow opening (on to high fire pressure in 40 seconds and off to low fire pressure in 30 seconds). On a call for first stage heat (low fire), the valve is energized by the ignition control simultaneously with the spark electrode. On a call for second stage heat (high fire), the second stage operator is energized directly from A55.

The valve is adjustable for high fire only. Low fire is not ad justable. A manual shut-off knob is provided on the valve for shut-off. Manual shut-off knob immediately closes both stages without delay. FIGURE 17 shows gas valve compo nents. TABLE 3 shows factory gas valve regulation for LDT units.

TABLE 3

GAS VALVE REGULATION FOR LDT UNITS

Max Inlet Pressure "W.C.	Operating Pressure "W.C. (outlet) Factory Setting			
	Natural		L.P. Propane	
	Low	High	Low	High
13.0	1.6±0.2.	3.7±0.3	5.5±0.3	0.5±0.5

10-Spark Electrodes FIGURE 12

An electrode assembly is used for ignition spark. The electrode is mounted through holes under the left most burner location. The electrode tip protrudes into the flame envelope of the adjacent burner. The electrode assembly is fastened to burner supports and can be removed for service without removing any part of the burners.

During ignition, spark travels through the spark electrode (FIGURE 12) and ignites the left burner. Flame travels from burner to burner until all are lit.

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

NOTE - If electrode wire is replaced, wire and suppression must be same type cable.

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

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

Spark gap may be checked with appropriately sized twist drills or feeler gauges. Disconnect power to the unit and remove electrode assembly. The gap should be between 0.125" + 0.015" (3.2 mm + .4 mm). See FIGURE 12.

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

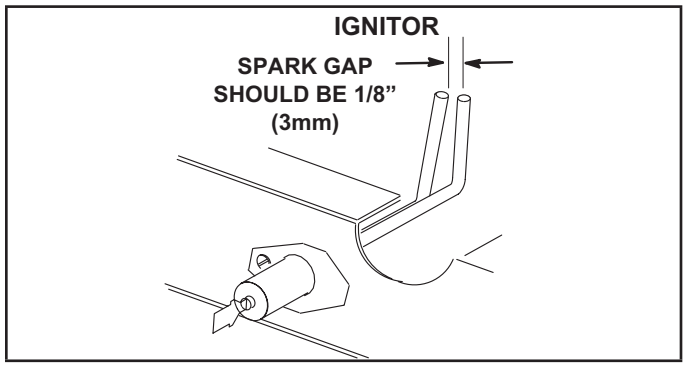


FIGURE 12

11-Flame Sensor (Figure 13)

A flame sensor is located under the right most side burner.

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

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

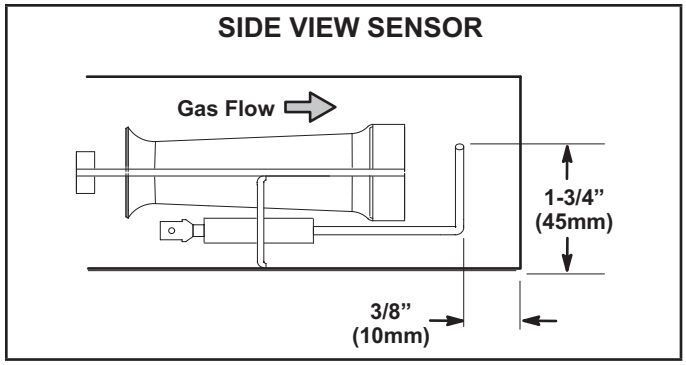


FIGURE 13

12-Burner Control A3

⚠ WARNING

Shock hazard. Spark related components contain high voltage which can cause personal injury or death. Disconnect power before servicing. Control is not field repairable. Unsafe operation will result. If control is inoperable, simply replace the entire control.

The ignition controls are located in the heat section areas below the compressors. The controls are manufactured UTEC. See TABLE 4 for LED codes.

The ignition control provides three main functions: gas valve control, ignition and flame sensing. The unit will usually ignite on the first attempt; however, the ignition attempt sequence provides three trials for ignition before locking out. The lockout time for the control is 5 minutes. After lockout, the ignition control automatically resets and provides three more attempts at ignition. Manual reset after lockout requires breaking and remaking power to the ignition control. See FIGURE 14 for a normal ignition sequence and FIGURE 15 for the ignition attempt sequence with retrials (nominal timings given for simplicity). Specific timings for the ignition controls are shown in FIGURE 16.

TABLE 4

LED Flashes	Indicates
Slow Flash	Control ok, no call for heat
Fast Flash	Control ok, call for heat present.
Steady Off	Internal control fault or no power
Steady On Failure	Control internal failure
1 Flash	Rollout switch open
2 Flashes	Limit open or lockout from to many tries during a single heat demand
3 Flashes	Pressure switch open with inducer on/ open during 5 minute inducer off time.
4 Flashes	Ignition lockout from no flame detected or from too many flame losses.
5 Flashes	Flame sensed out of sequence
6 Flashes	Pressure switch closed with inducer off
7 Flashes	Gas valve relay failure
8 Flashes	Lockout due to too many pressure switch openings during one heat demand

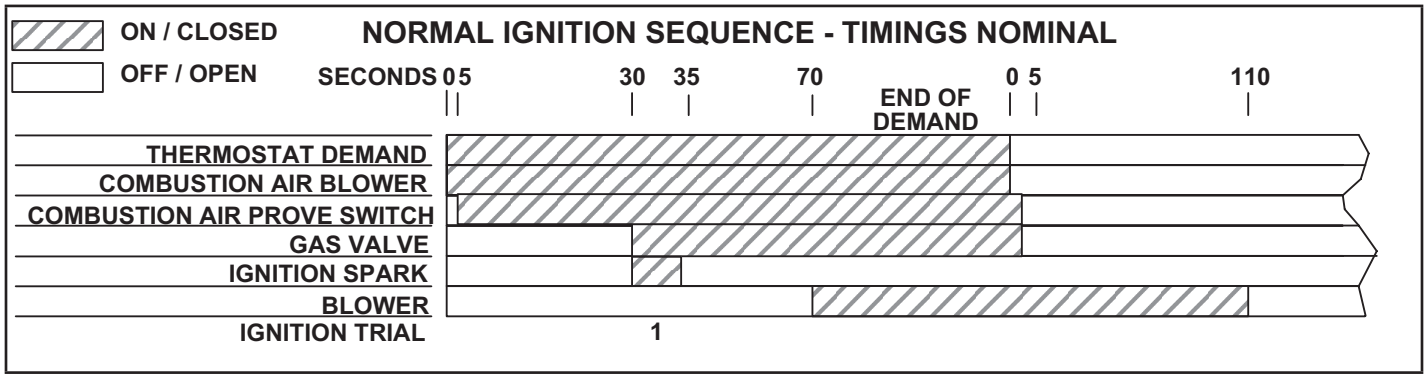


FIGURE 14

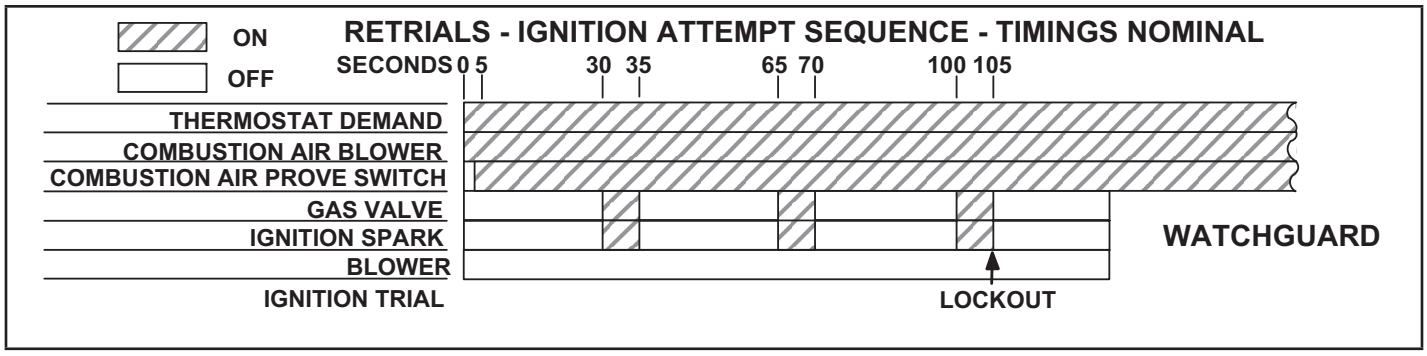


FIGURE 15

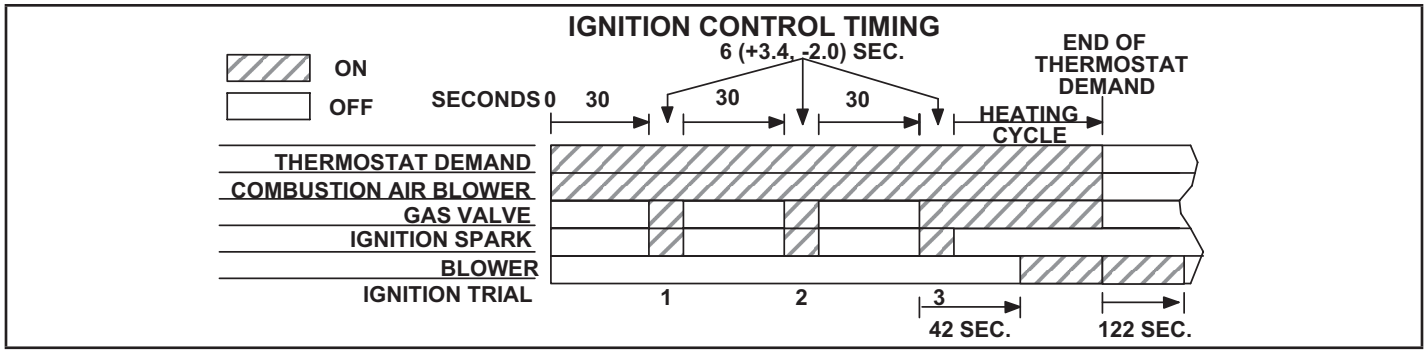


FIGURE 16

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

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

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

13-Balance Point Thermostat A526

When outdoor air temperature is above setpoint (35°F ± 5F° default), the unit will operate in heat pump mode. When outdoor air temperature falls below setpoint, the unit willoperate in gas heat mode. The balance point setpoint can be adjusted using the following mobile service app menu path:

Go to RTU MENU > SETTINGS > RTU OPTIONS > EDIT PARAMETER = 526 (HP DF BALANCE POINT)

Note - Only stage one is used; stage 2 is not used.

Although the recommended balance point setpoint is 35F, the setpoint can be adjusted. Weigh the comfort / cost benefit when increasing the setpoint.

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.

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

B-Heat Pump Start Up

Note - The outdoor air ambient temperature must be above the heat pump balance point setpoint (35_F default) to enable heat pump operation. The balance point setpoint can be adjusted using the following mobile service app menu path: Go to RTU MENU > SETTINGS > RTU OPTIONS > EDIT PARAMETER = 526 (HP DF BALANCE POINT)

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 high gas heat and de-energize heat pump operation.

C-Gas Heating Start Up

FOR YOUR SAFETY READ BEFORE LIGHTING

⚠ WARNING

Danger of explosion. Can cause injury or product or property damage. If overheating occurs or if gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off electrical supply.

⚠ WARNING

Electric shock hazard. Can cause injury or death. Do not use this unit if any part has been under water. Immediately call a qualified service technician to inspect the unit and to replace any part of the control system and any gas control which has been under water.

⚠ 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

SMOKE POTENTIAL

The heat exchanger in this unit could be a source of smoke on initial firing. Take precautions with respect to building occupants and property. Vent initial supply air outside when possible.

BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

⚠ WARNING

Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.

This unit is equipped with an automatic spark ignition system. There is no pilot. In case of a safety shutdown, move thermostat switch to **OFF** and return the thermostat switch to **HEAT** to reset ignition control.

Placing Unit In Operation

⚠ WARNING

Danger of explosion and fire. Can cause injury or product or property damage. You must follow these instructions exactly.

Gas Valve Operation for White Rodgers 36H54 FIGURE 17

1 - Set HP balance point thermostat setpoint above the outdoor ambient temperature to disable heat pump operation.

2 - Turn off all electrical power to appliance.

3 - This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

4 - Open or remove the heat section access panel.

5 - Turn gas valve switch to **"OFF"**. Do not force.

6 - Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas, go to the next step.

7 - Turn gas valve switch to **"ON"**. Do not force.

8 - Close or replace the heat section access panel.

9 - Turn on all electrical power to appliance.

10 - Set thermostat to desired setting.

11 - The combustion air inducer will start. The burners will light within 40 seconds.

12 - If the appliance does not light the first time (gas line not fully purged), it will attempt two more ignitions before locking out.

13 - If lockout occurs, repeat steps 1 through 10.

14 - If the appliance will not operate, follow the instructions "Turning Off Gas to Appliance" and call your service technician or gas supplier.

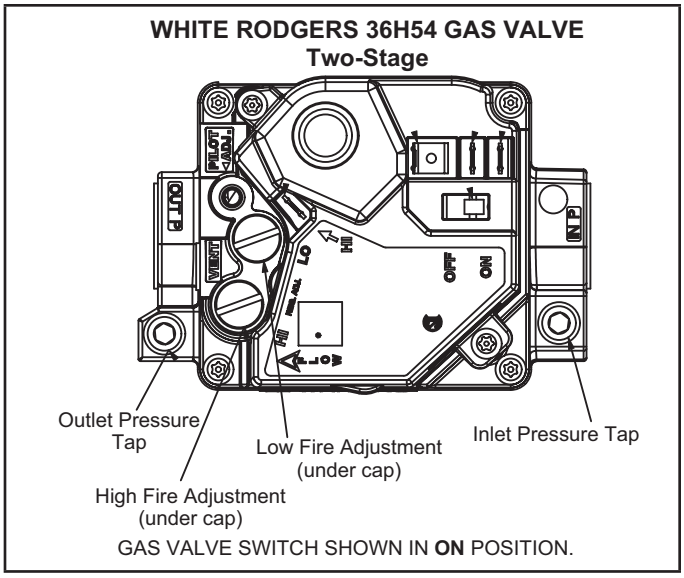


FIGURE 17

Turning Off Gas to Appliance

1 - If using an electromechanical thermostat, set to the lowest setting.
2 - Before performing any service, turn off all electrical power to the appliance.
3 - Open or remove the heat section access panel.
4 - Turn gas valve clockwise to **"OFF"**. Do not force.

D-Safety or Emergency Shutdown

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

⚠ WARNING

Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.

E-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 18 or FIGURE 19.
4 - Each refrigerant circuit is charged with R410A 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 compressor and indoor blower rotate in the correct direction. Compressor and blower are wired in phase at the factory. Power wires are color-coded as follows: line 1-red, line 2-yellow, line 3-blue.

1 - Observe suction and discharge pressures and blower rotation on unit start-up.
2 - Suction pressure must drop, discharge pressure must rise and blower rotation must match rotation marking.

If pressure differential is not observed or blower rotation is not correct:

3 - Disconnect all remote electrical power supplies.
4 - Reverse any two field-installed wires connected to the line side of K2 contactor or disconnect switch if installed. Do not reverse wires at blower contactor.
5 - Make sure the connections are tight. Discharge and suction pressures should operate at their normal start-up ranges.

F-Safety or Emergency Shutdown

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

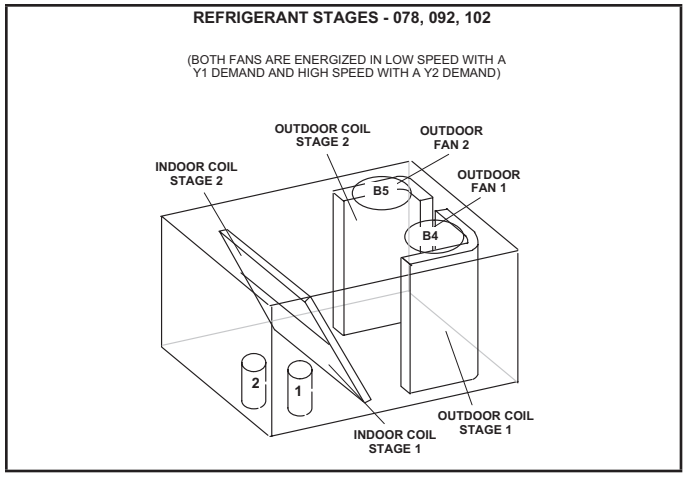


FIGURE 18

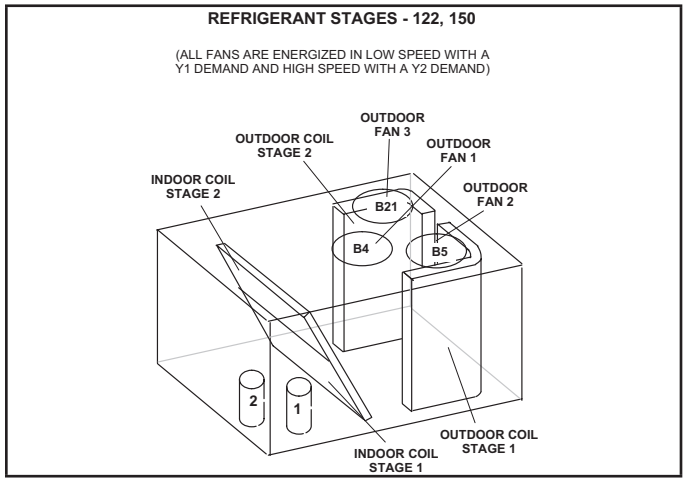


FIGURE 19

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.

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

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

1 - Attach gauge manifolds 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. Pressures are listed for sea level applications at 80F dry bulb and 67F wet bulb return air.

4 - 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.

5 - 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.

6 - Use the following subcooling method along with the normal operating pressures to confirm readings.

TABLE 5

LDT078 - 581118-01

Outdoor Coil Entering Air Temp º F	CIRCUIT 1		CIRCUIT 1	
	Discharge +10 psig	Suction +5 psig	Discharge +10 psig	Suction +5 psig
65	244	132	236	145
75	281	134	271	146
85	322	136	309	148
95	366	138	354	150
105	415	139	399	152
115	464	141	449	154

TABLE 6

LDT092 - 581119-01

Outdoor Coil Entering Air Temp º F	CIRCUIT 1		CIRCUIT 1	
	Discharge +10 psig	Suction +5 psig	Discharge +10 psig	Suction +5 psig
65	250	139	253	139
75	286	140	291	140
85	326	141	331	141
95	370	142	376	143
105	417	144	426	146
115	468	146	481	148

TABLE 7

LDT102 - 581120-01

Outdoor Coil Entering Air Temp º F	CIRCUIT 1		CIRCUIT 1	
	Discharge +10 psig	Suction +5 psig	Discharge +10 psig	Suction +5 psig
65	245	139	258	130
75	283	142	296	133
85	321	141	336	133
95	370	146	389	138
105	417	148	435	141
115	469	151	492	144

TABLE 8

LDT120 - 581121-01

Outdoor Coil Entering Air Temp º F	CIRCUIT 1		CIRCUIT 1	
	Discharge +10 psig	Suction +5 psig	Discharge +10 psig	Suction +5 psig
65	248	126	256	125
75	285	128	293	127
85	326	130	334	129
95	372	132	379	131
105	420	135	426	134
115	475	139	477	137

TABLE 9

LDT150 - 581122-01

Outdoor Coil Entering Air Temp º F	CIRCUIT 1		CIRCUIT 1	
	Dis-charge +10 psig	Suction +5 psig	Dis-charge +10 psig	Suction +5 psig
65	255	125	252	112
75	295	128	293	124
85	337	130	335	130
95	382	134	381	133
105	430	136	427	135
115	485	139	476	137

B-Charging - Subcooling

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 - Use the liquid line pressure and a PT chart to determine the saturated liquid temperature.

3 - Measure the liquid line temperature at the condenser outlet.

Subcooling Temperature = Liquid Saturated Temperature Minus Liquid Temperature.

4 - Refer to TABLE 10 for subcooling temperatures. A subcooling temperature greater than this value indicates an overcharge. A subcooling temperature less than this value indicates an undercharge.

TABLE 10

SUBCOOLING TEMPERATURE

Unit	Liquid Temp. Minus Ambient Temp.	
	1st Stage	2nd Stage
078	2°F ± 1 (1.1°C ± 0.5)	3°F ± 1 (1.7°C ± 0.5)
092, 102	2°F ± 1 (1.1°C ± 0.5)	5°F ± 1 (2.8°C ± 0.5)
120,150	1°F ± 1 (0.5°C ± 0.5)	1°F ± 1 (0.5°C ± 0.5)

C-Heating System Service Checks

All LDT units are ETL/CSA design certified without modification.

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

1-Gas Piping

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

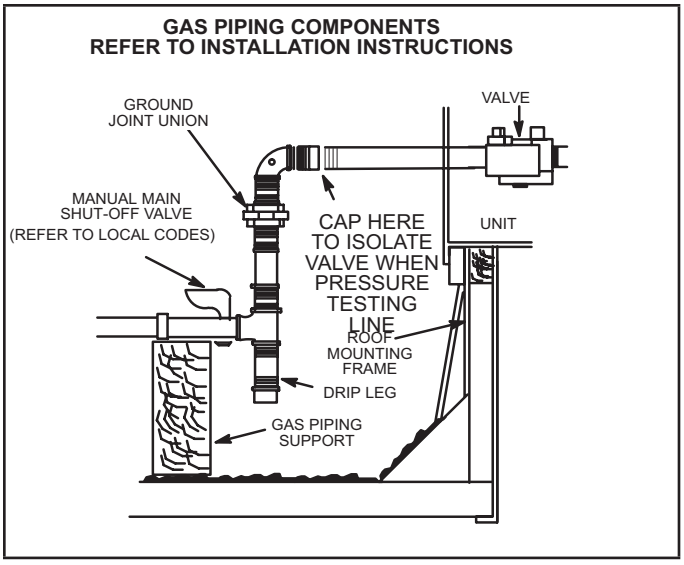


FIGURE 20

2-Testing Gas Piping

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

When pressure testing gas lines, the gas valve must be disconnected and isolated. ***Gas valves can be damaged if subjected to more than 0.5 psig [14”W.C. (3481 Pa)].*** See FIGURE 20.

When checking piping connection for gas leaks, use the preferred means. Common kitchen detergents can cause harmful corrosion on various metals used in gas piping.

The use of specialty Gas Leak Detector is strongly recommended.

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

3-Testing Gas Supply Pressure

When testing gas supply pressure, connect test gauge to the inlet pressure tap located on unit gas valve GV1. Test supply gas pressure with unit firing at maximum rate (both stages energized). Make sure the reading falls within the range of the following values.

Low pressure may result in erratic operation or “underfire.” High pressure can result in permanent damage to the gas valve or “overfire.”

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

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

4-Check and Adjust Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Move test gauge to the outlet pressure tap located on unit gas valve GV1. See FIGURE 17 for location of pressure tap on the gas valve.

The manifold pressure is factory set and should not require adjustment. If manifold pressure is incorrect and no other source of improper manifold pressure can be found, the valve must be replaced. See FIGURE 17 for location of gas valve (manifold pressure) adjustment screw.

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

⚠ CAUTION

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

Manifold Adjustment Procedure

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

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

3 - After allowing the unit to stabilize for five minutes, record the manifold pressure and compare to the values given in table 7.

⚠ CAUTION

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

5-Proper Gas Flow

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for two revolutions of gas through the meter. (Two revolutions assures a more accurate time.) Divide by two and compare to time in TABLE 11. Seconds in TABLE 11 are based on a 1 cu.ft. dial and gas value of 1000 btu's for natural and 2500 btu's for LP. Adjust manifold pressure on gas valve to match time needed.

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

TABLE 11

Unit in Btu's	Seconds for Natural	Seconds for Propane
130,000	28	69
180,000	20	50
240,000	15	37

6-Heat Exchanger

To Access or Remove Heat Exchanger From Unit:

1 - Turn off gas and electric power.

2 - Remove access panel(s) and unit center mullion.

3 - Remove gas valve, manifold assembly and burners.

4 - Remove combustion air inducer and flue box cover. Pay careful attention to the order in which gaskets and orifice are removed.

5 - Support heat exchanger (to prevent it from falling when final screws are removed.)

6 - Remove screws supporting heat exchanger.

7 - To install heat exchanger, reverse procedure. Be sure to secure all wires and check plumbing and burner plate for airtight seal. Screws must be torqued to 35 in.-lbs. to ensure proper operation.

7-Flame Sensing

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

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

1 - Disconnect power to unit.

2 - Remove lead from sensing electrode and install a 0-50DC microamp meter in series between the sensing electrode and the sensing lead.

3 - Reconnect power and adjust thermostat for heating demand.

4 - When flame is established, microamp reading should be 0.5 to 1.0. Do not bend electrodes. Drop out signal is .09 or less.

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

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

D-Cooling System Service Checks

LDT units are factory charged and require no further adjustment; however, charge should be checked periodically using the approach method. The approach method compares actual liquid temperature with the outdoor ambient temperature. See Charging - Approach Method section.

NOTE-*When unit is properly charged discharge line pressures should approximate those in TABLE 5 through TABLE 9.*

VI-MAINTENANCE

⚠ 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.

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 21.

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

C-Supply Air Blower Wheel

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

D-Indoor Coil

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

E-Outdoor Coil

Clean outdoor coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season. Outdoor coils are made of two formed slabs. Dirt and debris may become trapped between the slabs. To clean between slabs, carefully separate coil slabs (no more than 4 inches) and wash them thoroughly. See FIGURE 22. 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.

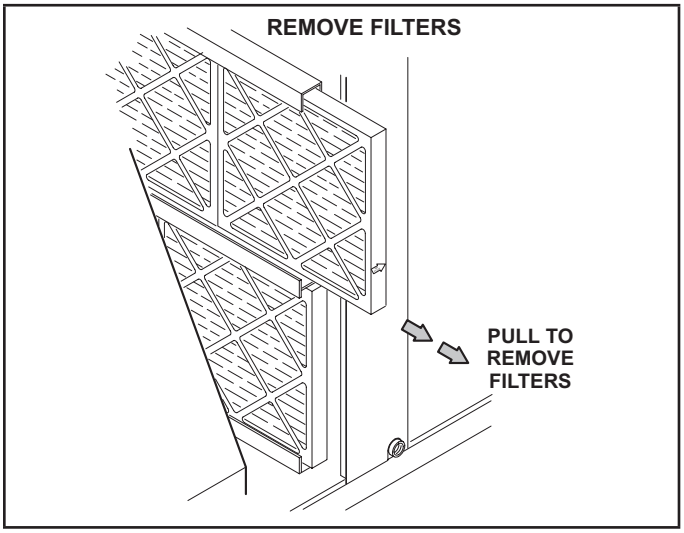
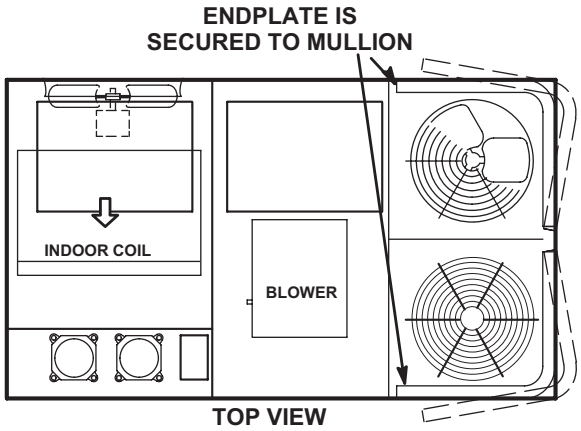


FIGURE 21

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 22

VII-ACCESSORIES

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

A-C1CURB Mounting Frames

When installing the LDT 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 LDT 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 23. 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 24. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

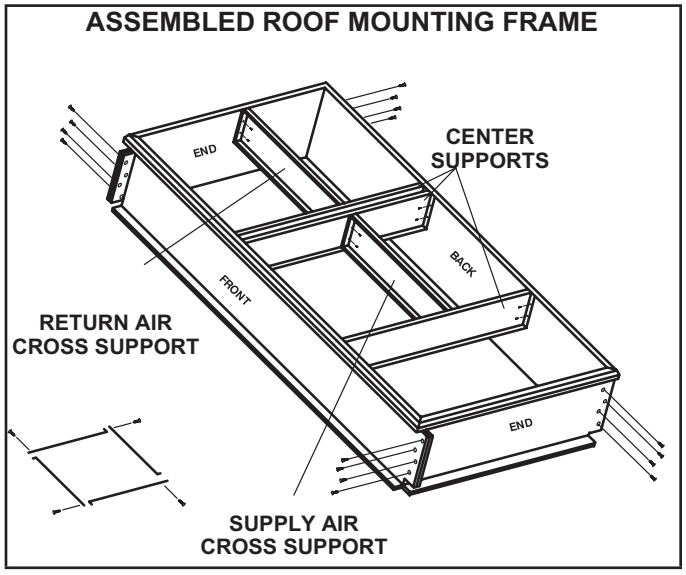


FIGURE 23

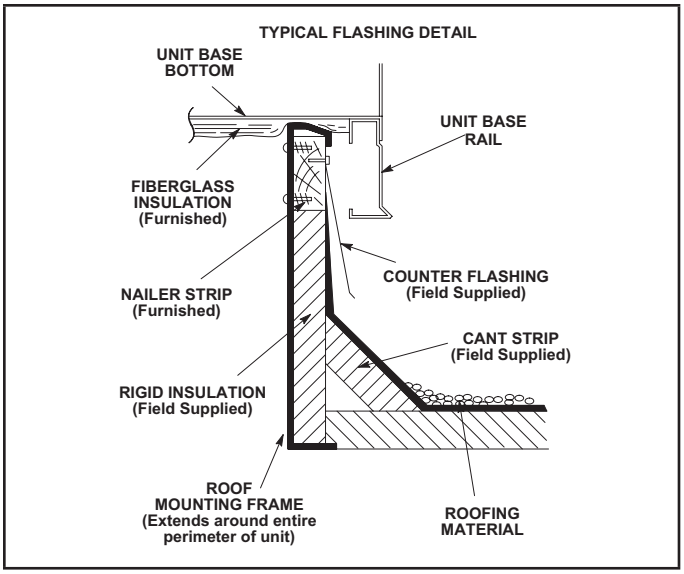


FIGURE 24

B-Transitions

Optional supply/return transition C1DIFF30B-1 is available for use with LDT 7.5-ton units. C1DIFF31B-1 is available for 8.5 and 10-ton units and C1DIFF32B-1 is available for use with LDT 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.

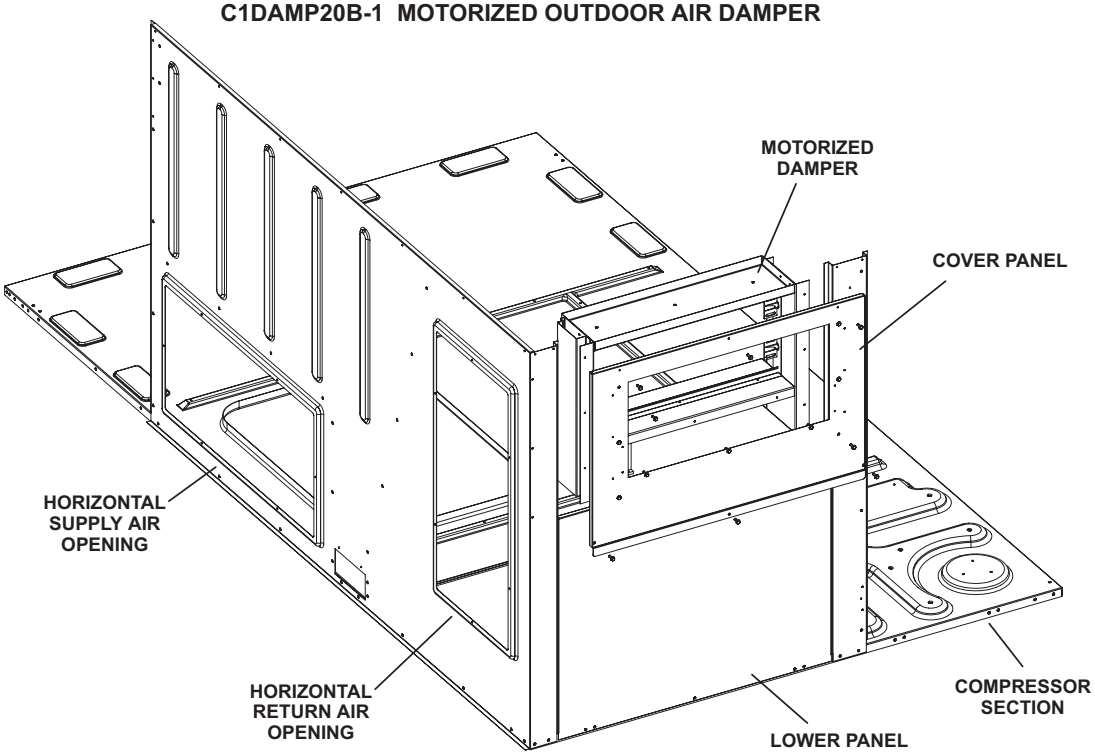
C-Supply and Return Diffusers

Optional flush mount diffuser/return FD11 and extended mount diffuser/return RTD11 are available for use with all LDT 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-2) 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

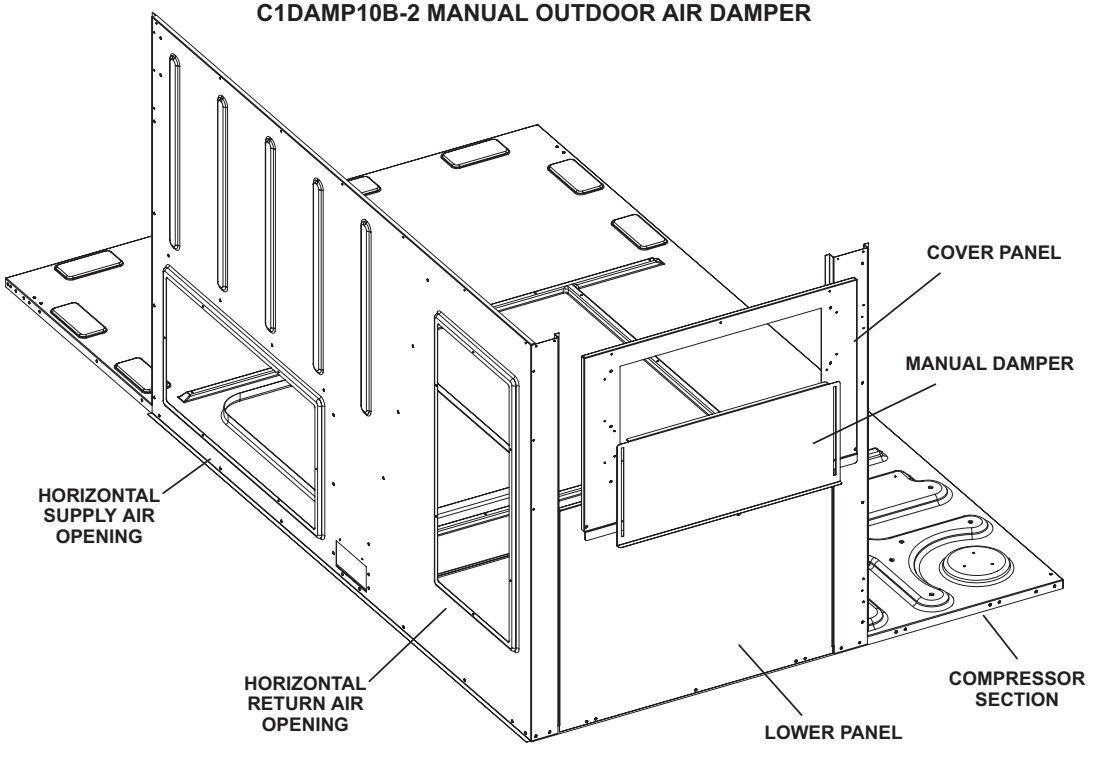


FIGURE 25

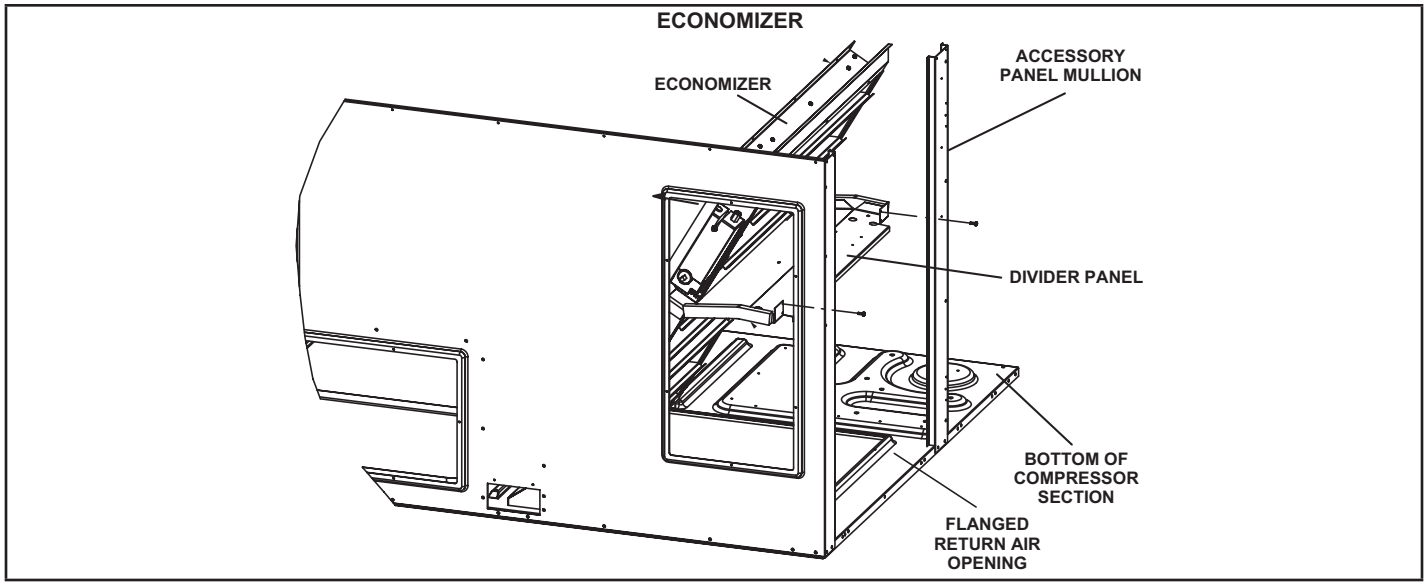


FIGURE 26

TABLE 12

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 26. 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 12 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 27) and horizontal (FIGURE 28) 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 LDT 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 29. 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.

Power Exhaust Setpoint Adjustment

Locate the A6 enthalpy control in the control area. The EXH SET potentiometer is factory-set at approximately 50% of the dial range. See FIGURE 30. Power exhaust fans will be energized 30 seconds after dampers are 50% open. Adjust the EXH SET potentiometer higher (clockwise toward 10V) to energize fans when dampers are further open. Adjust the EXH SET potentiometer lower (counterclockwise toward 2V) to energize fans when dampers are further closed. (Thirty-second delay allows dampers to partially open before exhaust fan starts.)

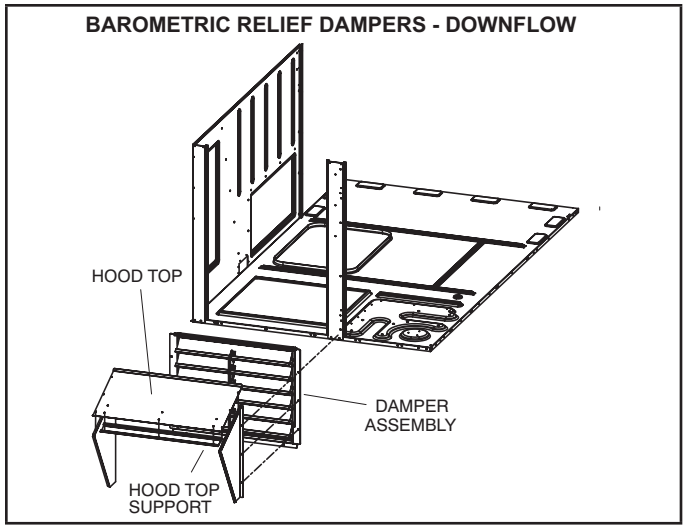


FIGURE 27

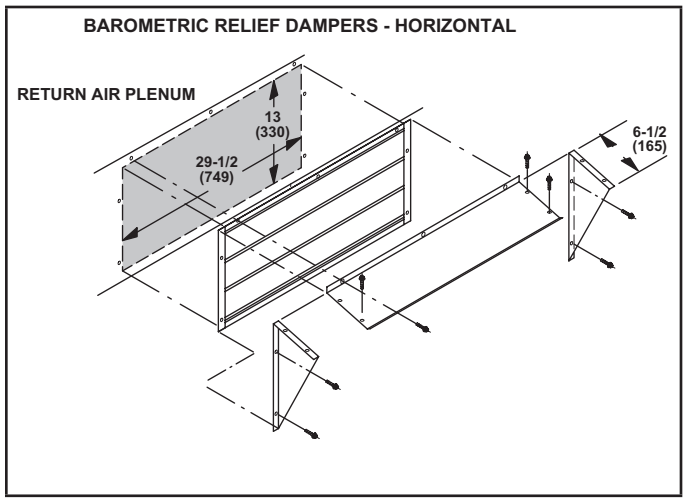


FIGURE 28

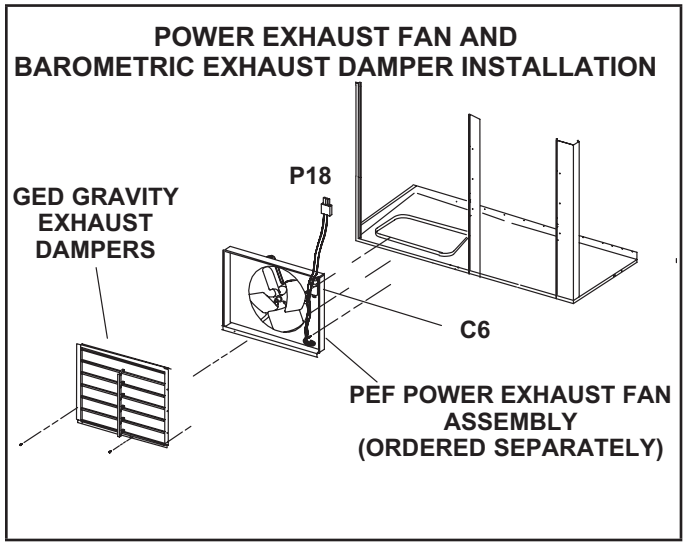


FIGURE 29

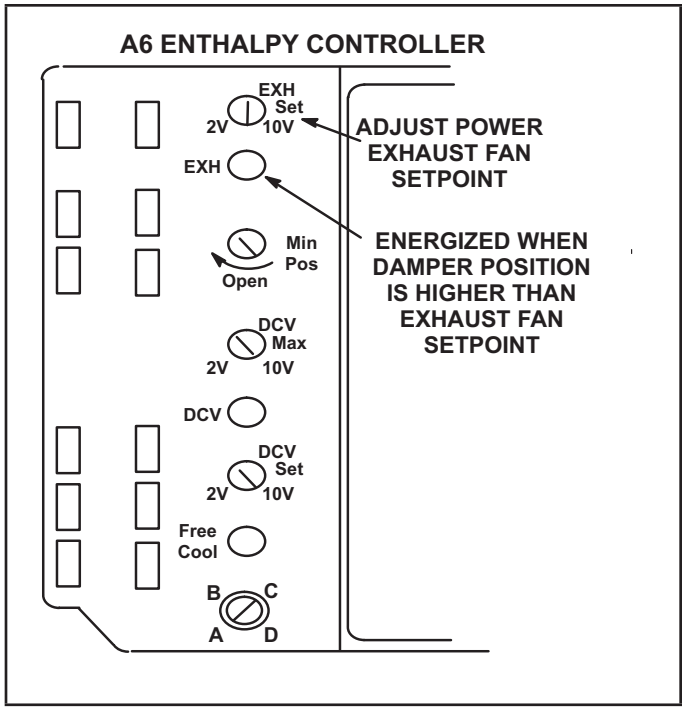


FIGURE 30

H-Control Systems

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

I-Drain Pan Overflow Switch S149 (optional)

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

J-Smoke Detectors A17 and A64

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

K-LP / Propane Kit

Units require a natural to LP /propane kit. The kit includes one LP spring conversion kit, up to eleven burner orifices and three stickers. For more detail refer to the natural to LP gas changeover kit installation instructions.

L-Optional Cold Weather Kit (Canada only)

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

The kit includes the following parts:

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

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

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

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

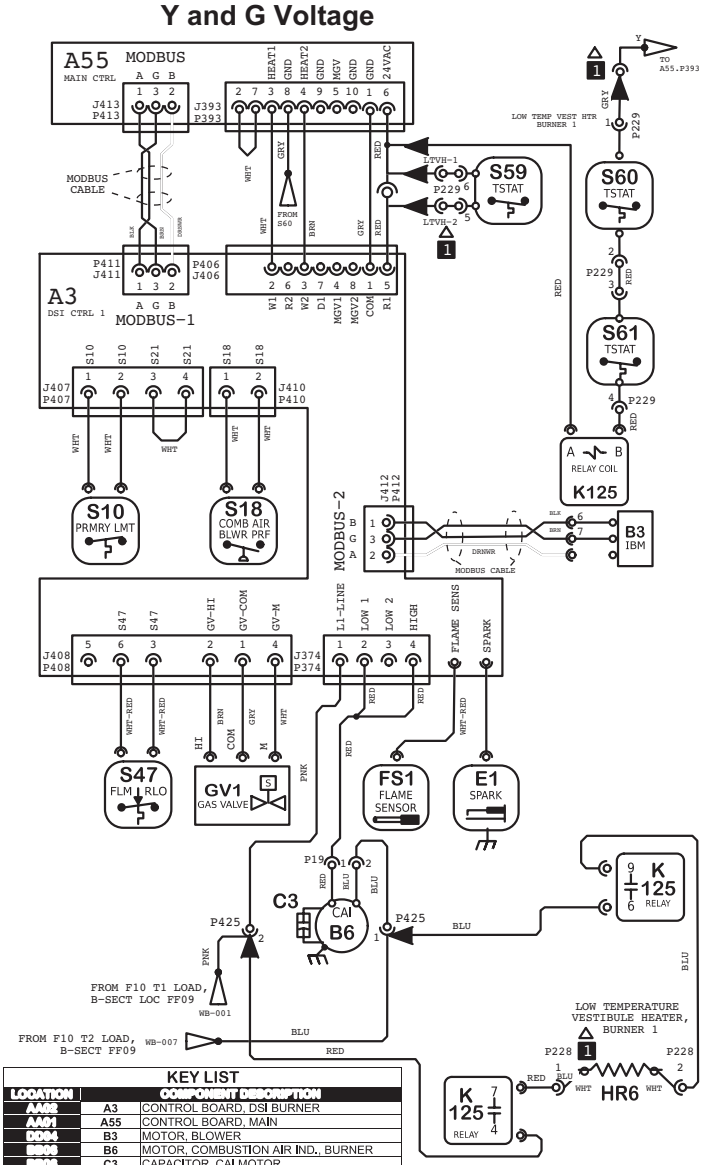
a. Thermostat switch (S59) is an auto-reset SPST N.C. switch which opens on a temperature drop. The switch is wired in series with 24v power and the combustion air blower switch. When the temperature drops below -30° F (-35°C) the switch opens and the gas heat section is deenergized. The switch automatically resets when the heating compartment temperature reaches -10° F (-12° C).

b. Thermostat switch (S60) is an auto-reset SPST N.C. switch which opens on a temperature rise. The sitch is wired in series with HR6 and T20. When the temperature rises above 20° F (-7° C) the switch opens and the electric heater is deenergized. The switch automatically resets when the heating compartment temperature reaches -10° F (23.3° C).

c. Thermostat switch (S61) is an auto-reset SPST N.O. switch which closes on a temperature drop. The switch is wired in series with HR6 and T20. When temperature drops below 20° F (-7° C) the switch closes and electric heater is energized. The switch automatically opens when heating compartment temperature reaches 76° F (24° C).

X-Wiring Diagrams and Sequence of Operation

GAS HEAT
Y and G Voltage



KEY LIST		
LOCATION	COMPONENT DESIGNATION	
A3	A3	CONTROL BOARD, DSI BURNER
A55	A55	CONTROL BOARD, MAIN
B3	B3	MOTOR, BLOWER
B6	B6	MOTOR, COMBUSTION AIR IND., BURNER
C3	C3	CAPACITOR, CAI MOTOR
E1	E1	IGNITER, SPARK, BURNER
FS1	FS1	SENSOR, FLAME, BURNER
GV1	GV1	VALVE, GAS, BURNER
HR6	HR6	HEATER, -50C LOW TEMP VEST, BURNER
K125	K125	RELAY, LOW TEMP VEST HEATER, BURNER
K125	K125	RELAY, LOW TEMP VEST HEATER, BURNER
S10	S10	LIMIT, PRIMARY, BURNER
S18	S18	SWITCH, COMB AIR BLWR PROOF, BURNER
S47	S47	SWITCH, FLAME ROLLOUT, BURNER
S59	S59	TSTAT, OPEN -20F, CLOSE 10F, BURNER
S60	S60	TSTAT, OPEN 20F, CLOSE -10F, BURNER
S61	S61	TSTAT, OPEN 50F, CLOSE 20F, BURNER

DENOTES OPTIONAL COMPONENTS AND WIRING

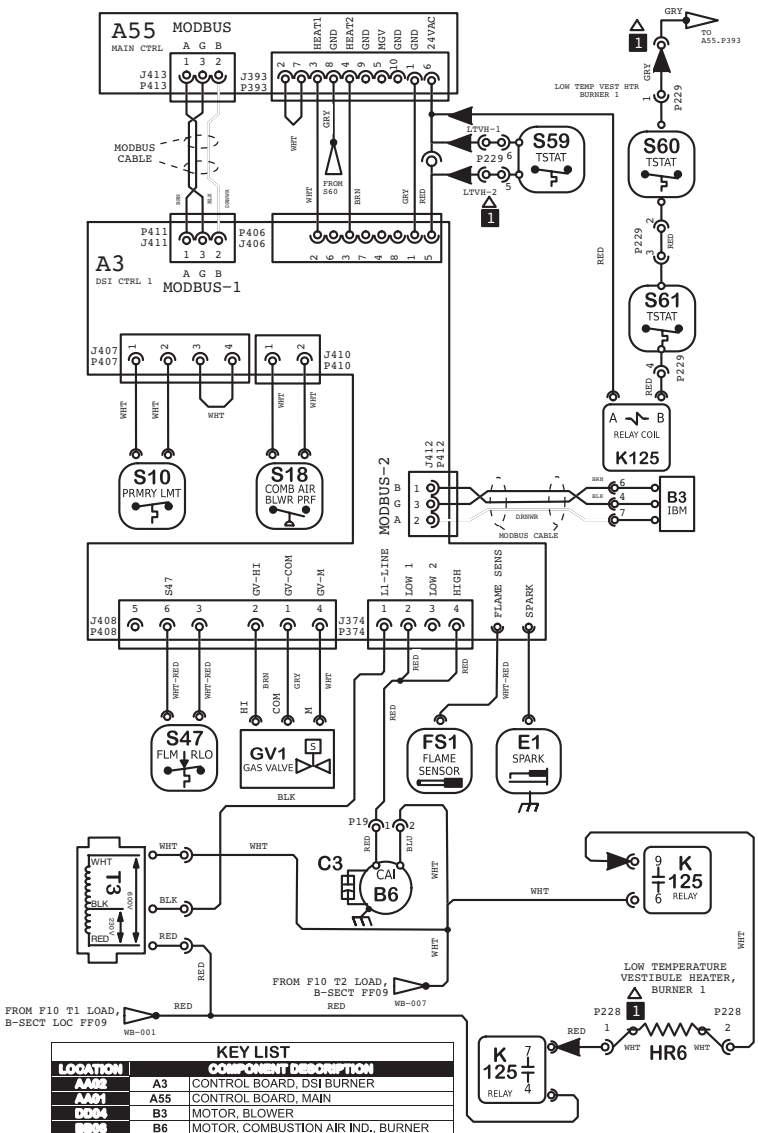
NOTES	
1	- 50C LOW TEMPERATURE VESTIBULE HEATER - OPTIONAL

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

WIRING DIAGRAM FLOW

Model: LG* Series RTU – Gas Heat
130k, 180k, 240k BtuH
Voltage: 208/240/3/60(Y),460/3/60(G)
Supersedes: XXXXXX-XX Form No: 538149-03 Rev: 0

GAS HEAT FOR
J Voltage



KEY LIST		
LOCATION	COMPONENT	DESCRIPTION
AA02	A3	CONTROL BOARD, DSI BURNER
AA01	A55	CONTROL BOARD, MAIN
DD04	B3	MOTOR, BLOWER
BB06	B6	MOTOR, COMBUSTION AIR IND., BURNER
BB05	C3	CAPACITOR, CAI MOTOR
CC08	E1	IGNITER, SPARK, BURNER
CC09	FS1	SENSOR, FLAME, BURNER
BB08	GV1	VALVE, GAS, BURNER
DD06	HR6	HEATER, -50C LOW TEMP VEST, BURNER
CCDDDD08	K125	RELAY, LOW TEMP VEST HEATER, BURNER
AA04	S10	LIMIT, PRIMARY, BURNER
BB04	S18	SWITCH, COMB AIR BLWR PROOF, BURNER
AA03	S47	SWITCH, FLAME ROLLOUT, BURNER
AA01	S59	TSTAT, OPEN -20F, CLOSE 10F, BURNER
CC02	S60	TSTAT, OPEN 20F, CLOSE -10F, BURNER
CC03	S61	TSTAT, OPEN 50F, CLOSE 20F, BURNER
AA08AA07	T3	TRANSFORMER, COMBUSTION AIR BLOWER

DENOTES OPTIONAL COMPONENTS AND WIRING

NOTES
1 - 50C LOW TEMPERATURE VESTIBULE HEATER - OPTIONAL

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

WIRING DIAGRAM FLOW

Model: LG* Series RTU – Gas Heat
130k, 180k, 240k BtuH
Voltage: 575/3/60 (J)
Supersedes: XXXXXX-XX Form No: 538173-02 Rev: 0

GAS HEAT SEQUENCE OF OPERATION LDT078H-150H

First Stage Heat:

1 - Heating demand initiates at W1 in the thermostat.

2 - 24VAC is routed through the A55 unit controller to A3 Ignition Control. The Ignition control then routes the 24VAC to the N.C. primary limit S10. The A3 Ignition control energizes the combustion air blower B6.

3 - After the combustion air blower B6 has reached full speed, the combustion air proving switch S18 contacts close. The A3 routes 24VAC through N.C. burner flame roll-out switch S47 and the closed contacts of combustion air proving switch S18 to energize the ignition module A3.

4 - After a 30 second delay A3 energizes the ignitor and LO terminal (low fire) of gas valve GV1.

Second Stage Heat:

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

6 - A second stage heating demand is received by A55 Unit Controller.

7 - A55 provides the 24VAC to the A3 Ignition control. This is routed to the HI Terminal (high fire) of gas valve GV1.

End of Second Stage Heat:

8 - Heating demand is satisfied. Terminal W2 (high fire) is de-energized.

9 - Terminal HI of GV1 is de-energized by A3 control module.

End of First Stage Heat:

10 - Heating demand is satisfied. Terminal W1 (low fire) is de-energized.

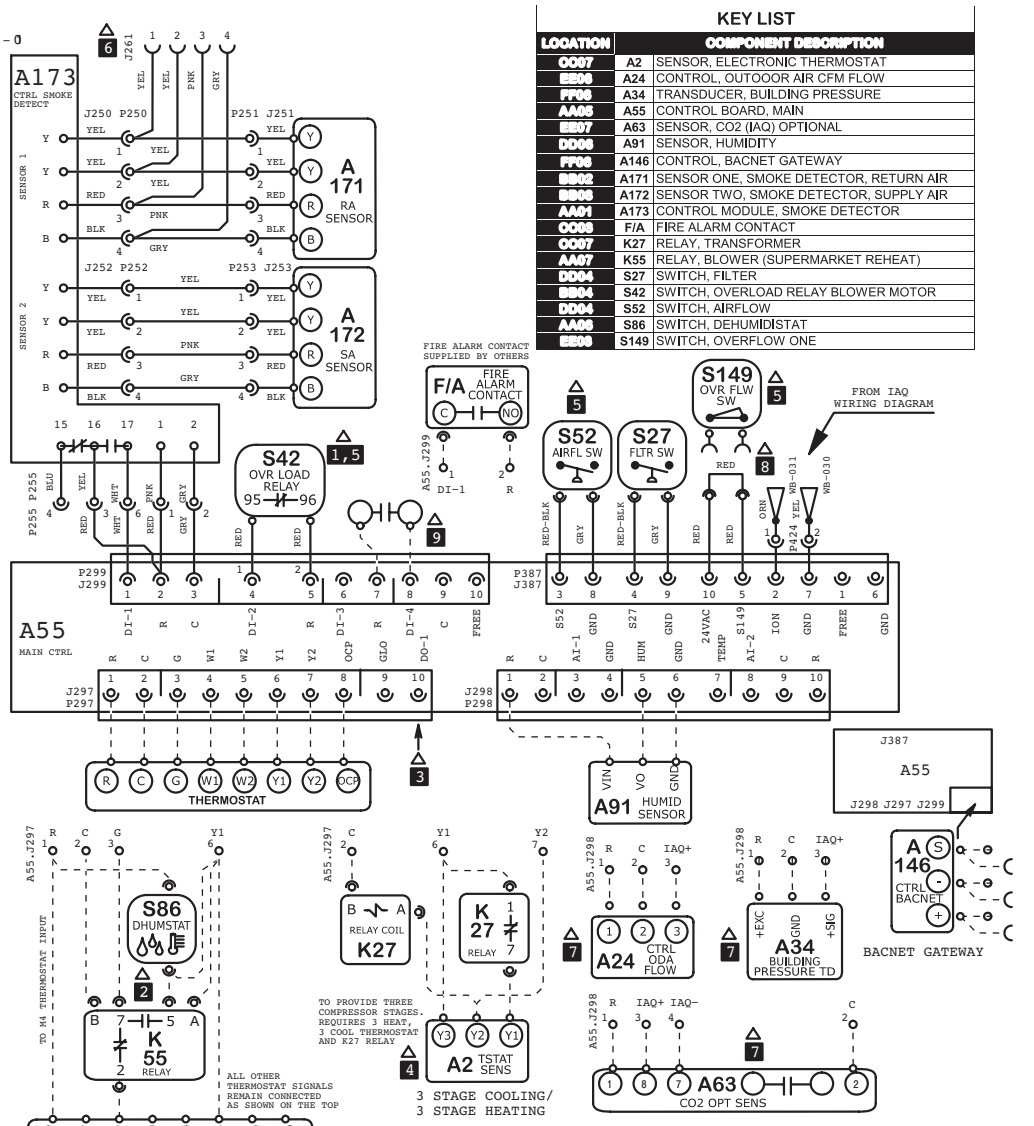
11 - Ignition A3 is de-energized by control module A55 in turn de-energizing terminal LO of GV1. Combustion air blower relay K13 located in the A3 ignition control is also de-energized.

Optional Low Ambient Kit:

(C.S.A. -50° C Low Ambient Kit)

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

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT



KEY LIST

LOCATION		COMPONENT DESCRIPTION
C007	A2	SENSOR, ELECTRONIC THERMOSTAT
EB08	A24	CONTROL, OUTOOOR AIR CFM FLOW
FF08	A34	TRANSDUCER, BUILDING PRESSURE
AA08	A55	CONTROL BOARD, MAIN
EB07	A63	SENSOR, CO2 (IAQ) OPTIONAL
DD08	A91	SENSOR, HUMIDITY
FF08	A146	CONTROL, BACNET GATEWAY
BB02	A171	SENSOR ONE, SMOKE DETECTOR, RETURN AIR
BB08	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
EB08	S149	SWITCH, OVERFLOW ONE

NOTES

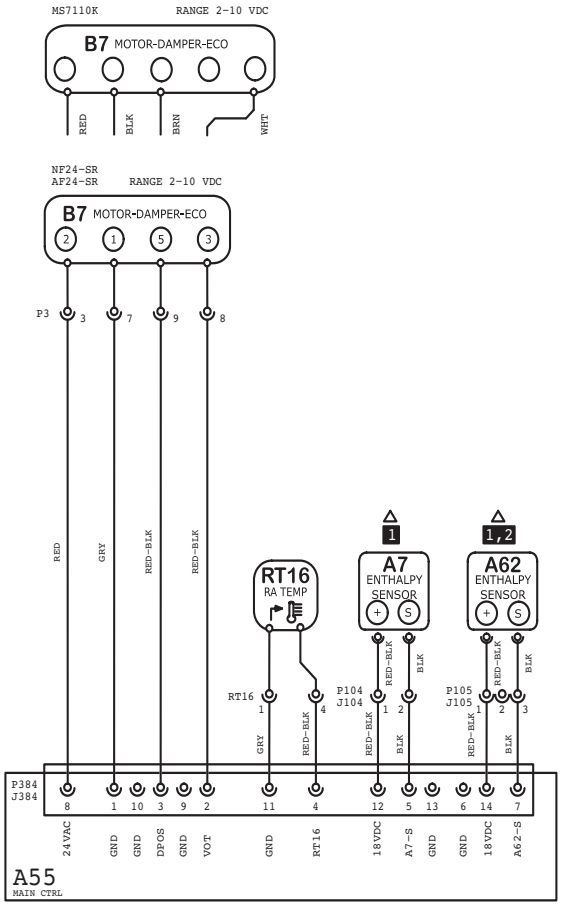
1	FOR MOTORS WITH S42 EXTERNAL OVERLOAD LESS INVERTER, SEE INVERTER WITH BY PASS FOR S42 HOOK UP
2	USE S86 DEHUMIDISTAT AND K55 FOR OPTIONAL SUPERMARKET REHEAT SCHEME, PRODIGY PARAMETERS NEED TO BE MODIFIED UNDER THE SETTINGS MENU OR VIA UC SOFTWARE FOR SIMULTANEOUS HEATING AND COOLING
3	P297-10 (SR) 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 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

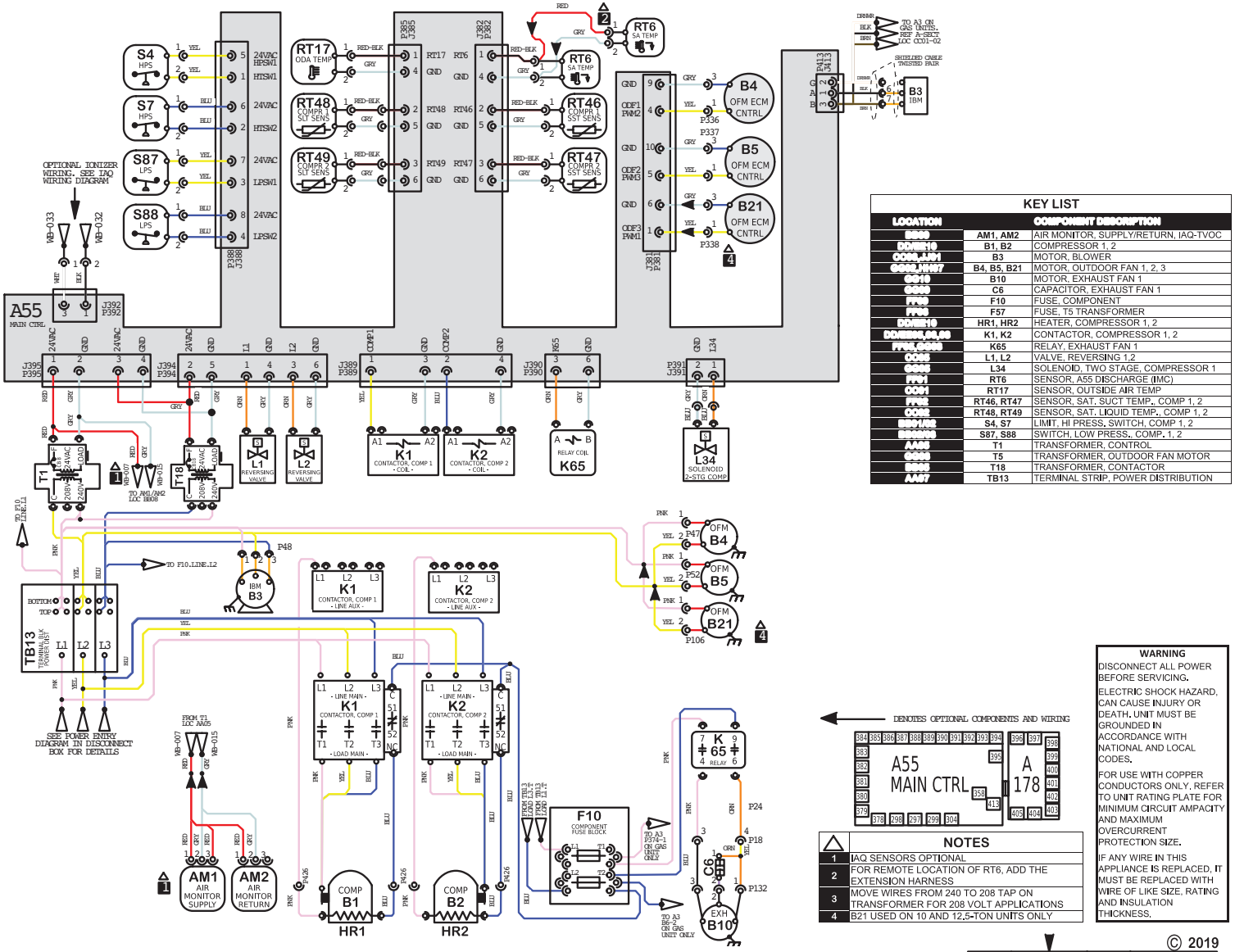
KEY LIST		
LOCATION	COMPONENT DESCRIPTION	
CC05	A7	SENSOR, SOLID STATE ENTHALPY
AA06	A55	CONTROL BOARD, MAIN
DD05	A62	SENSOR, ENTHALPY INDOOR
BB02	B7	MOTOR, DAMPER ECONOMIZER
CC05	RT16	SENSOR, RETURN AIR TEMP

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

Y Voltage With Higher SCCR



KEY LIST		
LOCATION		COMPONENT DESCRIPTION
	AM1, AM2	AIR MONITOR, SUPPLY/RETURN, IAQ-TVOC
	B1, B2	COMPRESSOR 1, 2
	B3	MOTOR, BLOWER
	B4, B5, B21	MOTOR, OUTDOOR FAN 1, 2, 3
	B10	MOTOR, EXHAUST FAN 1
	C6	CAPACITOR, EXHAUST FAN 1
	F10	FUSE, COMPONENT
	F57	FUSE, T5 TRANSFORMER
	HR1, HR2	HEATER, COMPRESSOR 1, 2
	K1, K2	CONTACTOR, COMPRESSOR 1, 2
	K65	RELAY, EXHAUST FAN 1
	L1, L2	VALVE, REVERSING 1,2
	L34	SOLENOID, TWO STAGE, COMPRESSOR 1
	RT6	SENSOR, A55 DISCHARGE (IMC)
	RT17	SENSOR, OUTSIDE AIR TEMP
	RT46, RT47	SENSOR, SAT. SUCT TEMP., COMP 1, 2
	RT48, RT49	SENSOR, SAT. LIQUID TEMP., COMP 1, 2
	S4, S7	LIMIT, HI PRESS. SWITCH, COMP 1, 2
	S87, S88	SWITCH, LOW PRESS., COMP. 1, 2
	T1	TRANSFORMER, CONTROL
	T5	TRANSFORMER, OUTDOOR FAN MOTOR
	T18	TRANSFORMER, CONTACTOR
	TB13	TERMINAL STRIP, POWER DISTRIBUTION

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
4	B21 USED ON 10 AND 12.5-TON UNITS ONLY

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.

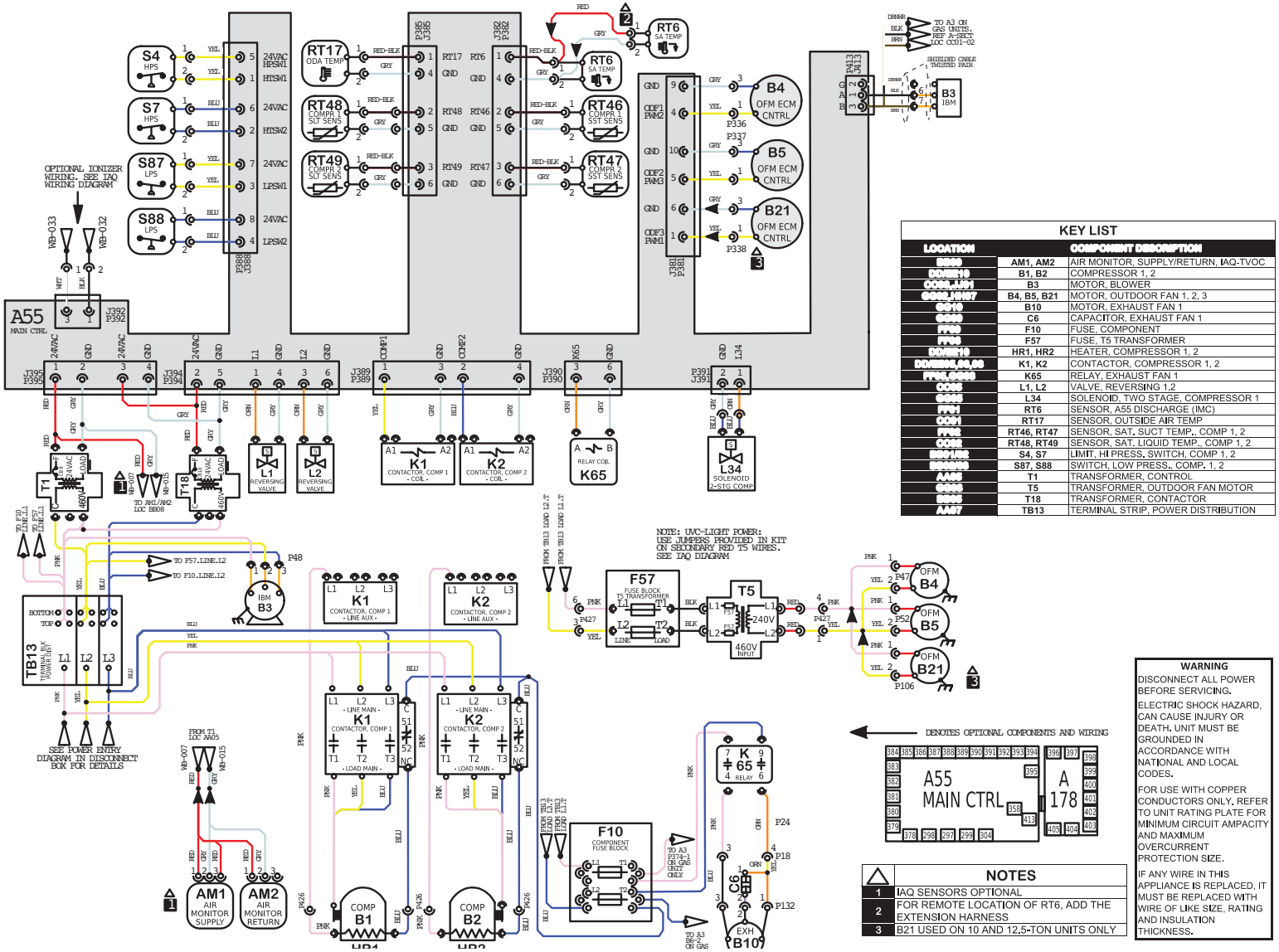
IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING AND INSULATION THICKNESS.

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

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

Voltage: 208-230V/3~/60Hz (Y)
Supersedes: XXXXXX-XX Form No: 538206-0 Rev: 0

G Voltage With Higher SCCR



KEY LIST

LOCATION		COMPONENT DESCRIPTION
[illegible]	AM1, AM2	AIR MONITOR, SUPPLY/RETURN, IAQ-TVOC
[illegible]	B1, B2	COMPRESSOR 1, 2
[illegible]	B3	MOTOR, BLOWER
[illegible]	B4, B5, B21	MOTOR, OUTDOOR FAN 1, 2, 3
[illegible]	B10	MOTOR, EXHAUST FAN 1
[illegible]	C6	CAPACITOR, EXHAUST FAN 1
[illegible]	F10	FUSE, COMPONENT
[illegible]	F57	FUSE, T5 TRANSFORMER
[illegible]	HR1, HR2	HEATER, COMPRESSOR 1, 2
[illegible]	K1, K2	CONTACTOR, COMPRESSOR 1, 2
[illegible]	K65	RELAY, EXHAUST FAN 1
[illegible]	L1, L2	VALVE, REVERSING 1,2
[illegible]	L34	SOLENOID, TWO STAGE, COMPRESSOR 1
[illegible]	RT6	SENSOR, A55 DISCHARGE (IMC)
[illegible]	RT17	SENSOR, OUTSIDE AIR TEMP
[illegible]	RT46, RT47	SENSOR, SAT. SUCT TEMP., COMP 1, 2
[illegible]	RT48, RT49	SENSOR, SAT. LIQUID TEMP., COMP 1, 2
[illegible]	S4, S7	LIMIT, HI PRESS. SWITCH, COMP 1, 2
[illegible]	S87, S88	SWITCH, LOW PRESS., COMP. 1, 2
[illegible]	T1	TRANSFORMER, CONTROL
[illegible]	T5	TRANSFORMER, OUTDOOR FAN MOTOR
[illegible]	T18	TRANSFORMER, CONTACTOR
[illegible]	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.

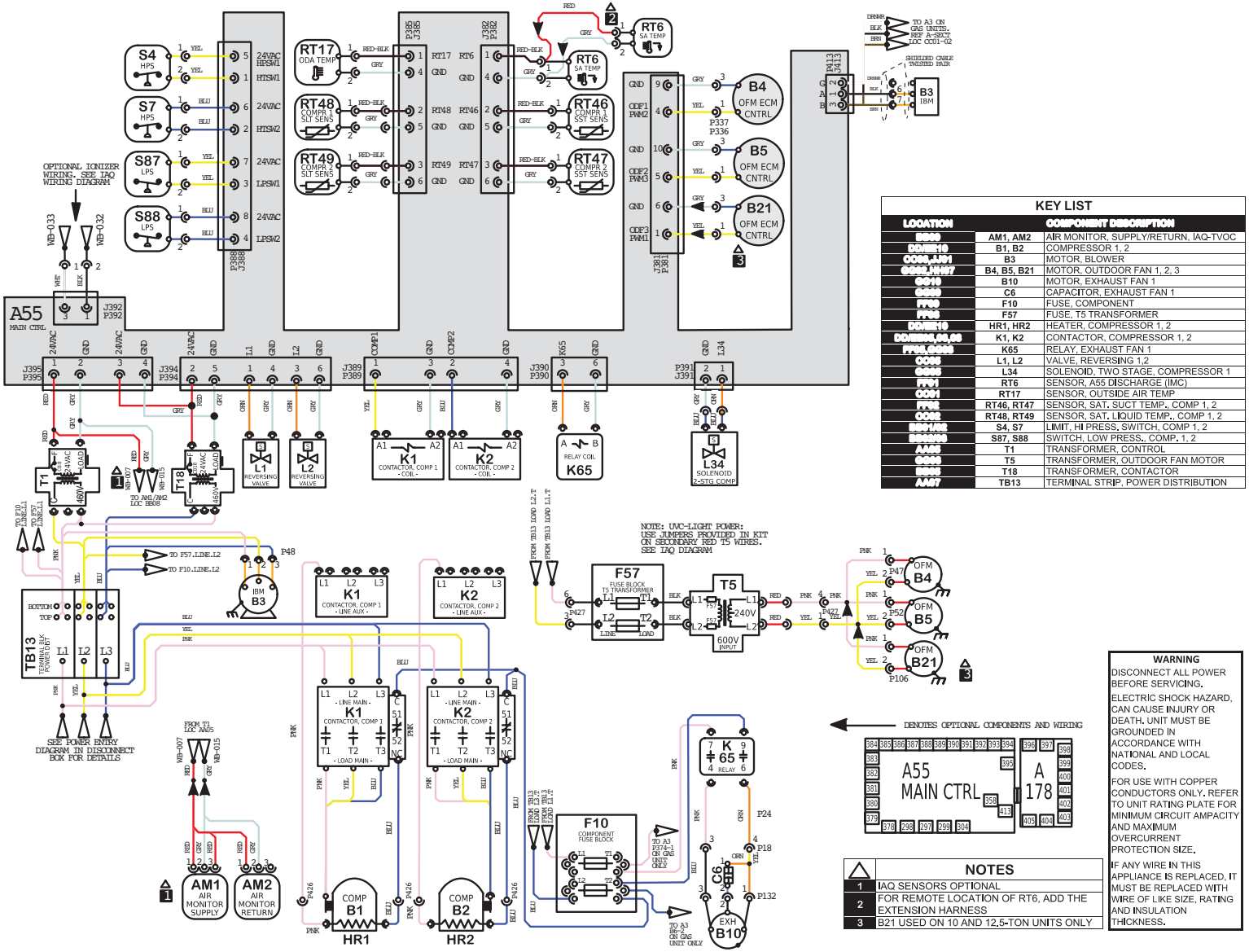
NOTES

1	IAQ SENSORS OPTIONAL
2	FOR REMOTE LOCATION OF RT6, ADD THE EXTENSION HARNESS
3	B21 USED ON 10 AND 12.5-TON UNITS ONLY

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

Voltage: 460V/3~/60Hz (G)
Supersedes: XXXXXX-XX Form No: 538204-0 Rev: 0

J Voltage With Higher SCCR



KEY LIST

LOCATION	COMPONENT DESCRIPTION
AM1, AM2	AIR MONITOR, SUPPLY/RETURN, IAQ-TVOC
B1, B2	COMPRESSOR 1, 2
B3	MOTOR, BLOWER
B4, B5, B21	MOTOR, OUTDOOR FAN 1, 2, 3
B10	MOTOR, EXHAUST FAN 1
C6	CAPACITOR, EXHAUST FAN 1
F10	FUSE, COMPONENT
F57	FUSE, T5 TRANSFORMER
HR1, HR2	HEATER, COMPRESSOR 1, 2
K1, K2	CONTACTOR, COMPRESSOR 1, 2
K65	RELAY, EXHAUST FAN 1
L1, L2	VALVE, REVERSING 1,2
L34	SOLENOID. TWO STAGE, COMPRESSOR 1
RT6	SENSOR, A55 DISCHARGE (IMC)
RT17	SENSOR, OUTSIDE AIR TEMP
RT46, RT47	SENSOR, SAT. SUCT TEMP., COMP 1, 2
RT48, RT49	SENSOR, SAT. LIQUID TEMP., COMP 1, 2
S4, S7	LIMIT, HI PRESS. SWITCH, COMP 1, 2
S87, S88	SWITCH, LOW PRESS., COMP. 1, 2
T1	TRANSFORMER, CONTROL
T5	TRANSFORMER, OUTDOOR FAN MOTOR
T18	TRANSFORMER, CONTACTOR
TB13	TERMINAL STRIP, POWER DISTRIBUTION

NOTES

1	IAQ SENSORS OPTIONAL
2	FOR REMOTE LOCATION OF RT6, ADD THE EXTENSION HARNESS
3	B21 USED ON 10 AND 12.5-TON UNITS ONLY

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.

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

Voltage: 575V/3~/60Hz (J)
Supersedes: XXXXXX-XX Form No: 538205-01 Rev: 0

LDT078-150H SEQUENCE OF OPERATION

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 is 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.

Outdoor Ambient Temperature	W1 Demand	W2 Demand
Above Balance Point *Temperature Setting**	Compr. 1 & 2 On* Gas Heat Off	Compr. 1 & 2 Off Gas Heat High
Below Balance Point Temperature Setting**	Compr. 1 & 2 Off Gas Heat Low	Compr. 1 & 2 Off Gas Heat High

*L1 and L2 reversing valves are de-energized with a heating demand. The heat pump will heat only, not cool.

**Balance Point temperature setting can be adjusted using the following mobile service app menu path:

RTU MENU > SETTING > RTU OPTIONS > EDIT PARAMETER = 526 (HP DF BALANCE POINT)

First Stage Heat - OD Temp **ABOVE** Balance Point (35°F Default)

1 - Unit controller A55 receives W1 demand. If the OD air temperature is above the balance point setpoint (35 F default), HP heating is initiated.

2 - After A55 proves N.C. low pressure switch S87, high pressure switch S4, compressors 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 in 122, 150 units) receive pre-set fan settings at high speed from A55 unit controller.

First Stage Heat - OD Temp **BELOW** Balance Point (35°F Default)

5 - Unit controller A55 receives W1 demand. If the OD air temperature is BELOW the balance point setpoint (35 F default), it will activate for low gas heat.

6 - See sequence of operation for gas heat.

NOTE - *For first stage heat, the OD temp is only checked upon a change in demand. The controller will continue with the selected heat source until a change in heating demand is received.*

NOTE - *If the OAT sensor on an LHT unit fails, the controller will assume OAT is not suitable for HP and will use gas heat.*

Second Stage Heat - Regardless of OD Temperature

7 - Second stage heat demand energizes W2 in the thermostat. A55 unit controller will activate electric heat in addition to heat pump operation.

8 - See sequence of operation for gas heat.

Defrost Mode:

Defrost is enabled when outdoor coil temperature is below 35°F. 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 35°F reaches six hours.

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 14 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 13 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 13

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	