UNIT INFORMATION

LDT SERIES
13 to 20 ton

100083
02/2024

Service Literature

LDT156 through 240

The LDT156, 180and 240 are configure to order units (CTO) with a wide selection of factory installed options.

The LDT156 is available in 169,000 to 360,000 Btuh. The LDT180/240 is available in 169,000 to 480,000 Btuh.

Gas heat sections are designed with aluminized steel tube heat exchangers with stainless steel as an option.

Cooling capacities range from 13 to 20 tons. The LDT 156, 180 & 240 utilize two compressors and six condenser fans.

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

All LDT units are designed to accept any of several different energy management thermostat control systems with minimum field wiring. Factory- or field-provided control options connect to the unit through Smartwire connectors. When “plugged in” the controls become an integral part of the unit wiring.

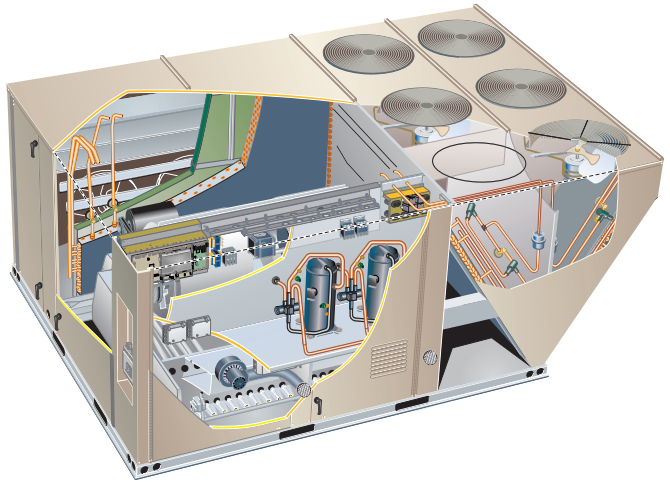
The CORE Control System is designed to accelerate equipment install and service. Standard with all Enlight rooftop units, control system integrates key technologies that lower installation costs, drive system efficiency, and protect your investments.

The CORE Unit Controller is a microprocessor-based controller that provides flexible control of all unit functions. 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



⚠ 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.

Table of Contents

OPTIONS / ACCESSORIES

Item Description		Catalog Number	Unit Model No 156	180	240
COOLING SYSTEM					
Condensate Drain Trap	PVC	**22H54**	X	X	X
	Copper	**76W27**	X	X	X
Conventional Fin/Tube Condenser Coil		Factory	O	O	O
Drain Pan Overflow Switch		**21Z07**	OX	OX	OX
Refrigerant Type		R-410A	O	O	O
HEATING SYSTEM					
Bottom Gas Piping Kit		**85M31**	X	X	X
Combustion Air Intake Extensions (order two)		**89L97**	X	X	X
Gas Heat Input	Low - 169,000 Btuh	Factory	O	O	
	Standard - 260,000 Btuh	Factory	O	O	O
	Medium - 360,000 Btuh	Factory	O	O	O
	High - 480,000 Btuh	Factory		O	O
Low Temperature Vestibule Heater	208/230V-3ph	**22H58**	X	X	X
	460V-3ph	**22H59**	X	X	X
	575V-3ph	**13X68**	X	X	X
LPG/Propane Conversion Kits (Order 2 kits)	Low Heat	**14N28**	X	X	
	Standard Heat	**14N28**	X	X	X
	Medium Heat	**14N29**	X	X	X
	High Heat	**14N30**	X	X	X
Vertical Vent Extension Kit (Order two kits)		**42W16**	X	X	X
BLOWER - SUPPLY AIR					
Blower Option	MSAV® Multi-Stage Air Volume (With VFD Bypass Control)	Factory	O	O	
	MSAV® Multi-Stage Air Volume (Without VFD Bypass Control)	Factory	O	O	O
Motors	Belt Drive - 3 hp	Factory	O	O	
	Belt Drive - 5 hp	Factory	O	O	O
	Belt Drive - 7.5 hp	Factory		O	O
	Belt Drive - 10 hp	Factory			O
Drive Kits	Kit #1 535-725 rpm	Factory	O	O	
See Blower Data Tables for usage and selection	Kit #2 710-965 rpm	Factory	O	O	
	Kit #3 685-856 rpm	Factory	O	O	O
	Kit #4 850-1045 rpm	Factory	O	O	O
	Kit #5 945-1185 rpm	Factory	O	O	O
	Kit #6 850-1045 rpm	Factory		O	O
	Kit #7 945-1185 rpm	Factory		O	O
	Kit #8 1045-1285 rpm	Factory		O	O
	Kit #10 1045-1285 rpm	Factory			O
	Kit #11 1135-1365 rpm	Factory			O
	Blower Belt Auto-Tensioner	**24B80**	X	X	X
CABINET					
Combination Coil/Hail Guards		**23U71**	OX	OX	OX
Corrosion Protection		Factory	O	O	O

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

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OPTIONS / ACCESSORIES

Item Description		Catalog Number	Unit Model No 156	180	240
CONTROLS					
Blower Proving Switch		**21Z10**	OX	OX	OX
Commercial Controls	CPC Einstein Integration	Factory	O	O	O
	LonTalk® Module	**54W27**	OX	OX	OX
	Novar® LSE	Factory	O	O	O
Dirty Filter Switch		**53W68**	OX	OX	OX
Fresh Air Tempering		**21Z08**	OX	OX	OX
Smoke Detector - Supply or Return (Power board and one sensor)		**22H56**	OX	OX	OX
Smoke Detector - Supply and Return (Power board and two sensors)		**22H57**	OX	OX	OX
INDOOR AIR QUALITY					
Air Filters					
Healthy Climate® High Efficiency Air Filters 24 x 24 x 2 (Order 6 per unit)	MERV 8	**54W67**	OX	OX	OX
	MERV 13	**52W40**	OX	OX	OX
	MERV 16	**21U42**	X	X	X
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)		**44N61**	X	X	X
Indoor Air Quality (CO_2) Sensors					
Sensor - Wall-mount, off-white plastic cover with LCD display		**77N39**	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display		**23V86**	X	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting		**87N52**	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting		**87N54**	X	X	X
CO_2 Sensor Duct Mounting Kit - for downflow applications		**85L43**	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO2 sensors (**77N39**)		**90N43**	X	X	X
Needlepoint Bipolar Ionization (NPBI)					
Needlepoint Bipolar Ionization (NPBI) Kit		**21U37**	X	X	
		21U38			X
UVC Germicidal Light Kit					
[1] Healthy Climate® UVC Light Kit (110/230v-1ph)		**21A94**	X	X	X
Step-Down Transformers	460V primary, 230V secondary	**10H20**	X	X	X
	575V primary, 230V secondary	**10H21**	X	X	X
ELECTRICAL					
Voltage 60 Hz	208/230V - 3 phase	Factory	O	O	O
	460V - 3 phase	Factory	O	O	O
	575V - 3 phase	Factory	O	O	O
HACR Circuit Breakers		Factory	O	O	O
[2] Short-Circuit Current Rating (SCCR) of 100kA (includes Phase/Voltage Detection)		Factory	O	O	O
Disconnect Switch (see Disconnect Table for usage, page <PB>)	80 amp	**54W88**	OX	OX	OX
	150 amp	**54W89**	OX	OX	OX
	250 amp	**90W82**	OX	OX	OX
GFI Service Outlets	15 amp non-powered, field-wired (208/230V, 460V, 575V)	**74M70**	OX	OX	OX
	15 amp factory-wired and powered (208/230V, 460V)	Factory	O	O	O
	[3] 20 amp non-powered, field-wired (208/230V, 460V, 575V)	**67E01**	X	X	X
	[3] 20 amp non-powered, field-wired (575V)	Factory	O	O	O
Weatherproof Cover for GFI		**10C89**	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 is furnished and factory installed with High SCCR option.

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

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OPTIONS / ACCESSORIES

Item Description		Catalog Number	Unit Model No 156	180	240
ECONOMIZER					
High Performance Economizer (Approved for California Title 24 Building Standards AMCA Class 1A Certified)					
High Performance Economizer Downflow or Horizontal Applications - Includes Outdoor Air Hood. Order Downflow or Horizontal Barometric Relief Dampers separately.		**22J18**	OX	OX	OX
Economizer Controls					
Differential Enthalpy (Not for Title 24)	Order 2	**21Z09**	OX	OX	OX
Sensible Control	Sensor is Furnished	Factory	O	O	O
Single Enthalpy (Not for Title 24)		**21Z09**	OX	OX	OX
Global Control	Sensor Field Provided	Factory	O	O	O
Building Pressure Control		**13J77**	X	X	X
Outdoor Air CFM Control		**13J76**	X	X	X
Barometric Relief Dampers With Exhaust Hood					
Downflow Barometric Relief Dampers		**54W78**	OX	OX	OX
Horizontal Barometric Relief Dampers		**16K99**	X	X	X
OUTDOOR AIR					
Outdoor Air Dampers With Outdoor Air Hood					
Motorized		**22J27**	OX	OX	OX
Manual		**13U05**	X	X	X
[1] POWER EXHAUST (DOWNFLOW APPLICATIONS ONLY)					
Standard Static, SCCR Rated	208/230V	**22H90**	OX	OX	OX
	460V	**22H91**	OX	OX	OX
	575V	**22V34**	OX	OX	OX

[1] Field installed Power Exhaust requires Economizer with Outdoor Air Hood and Downflow Barometric Relief Dampers with Exhaust Hood. Must be ordered separately.

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OPTIONS / ACCESSORIES

Item Description		Catalog Number	Unit Model No 156	180	240
ROOF CURBS					
Hybrid Roof Curbs, Downflow					
8 in. height		**11F58**	X	X	X
14 in. height		**11F59**	X	X	X
18 in. height		**11F60**	X	X	X
24 in. height		**11F61**	X	X	X
Adjustable Pitch Curb					
14 in. height		**43W26**	X	X	X
Standard Roof Curbs, Horizontal - Requires Horizontal Return Air Panel Kit					
26 in. height - slab applications		**11T89**	X	X	X
37 in. height - rooftop applications		**11T96**	X	X	X
Insulation Kit For Standard Horizontal Roof Curbs					
For 26 in. Curb		**73K32**	X	X	X
For 37 in. Curb		**73K34**	X	X	X
Horizontal Return Air Panel Kit					
Required for Horizontal Applications with Roof Curb		**87M00**	X	X	X
CEILING DIFFUSERS					
Step-Down - Order one	RTD11-185S	**13K63**	X	X	
	RTD11-275S	**13K64**			X
Flush - Order one	FD11-185S	**13K58**	X	X	
	FD11-275S	**13K59**			X
Transitions (Supply and Return) - Order one	C1DIFF33C-1	**12X68**	X	X	
	C1DIFF34C-1	**12X70**			X

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

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SPECIFICATIONS

General Data		Nominal Tonnage	13 Ton	15 Ton	20 Ton
		Model Number	**LDT156H4M**	**LDT180H4M**	**LDT240H4M**
		Efficiency Type	**High**	**High**	**High**
		Blower Type	MSAV® Multi-Stage Air Volume	MSAV® Multi-Stage Air Volume	MSAV® Multi-Stage Air Volume
Cooling Performance		Gross Cooling Capacity - Btuh	154,000	182,000	233,000
		[1] Net Cooling Capacity - Btuh	150,000	176,000	224,000
		[1] AHRI Rated Air Flow - cfm	4500	5500	7000
		Total Unit Power - kW	12.6	16.1	20.5
		[1] IEER (Btuh/Watt)	15.5	15.3	15.3
		[1] EER (Btuh/Watt)	11.9	10.9	10.9
Refrigerant Charge		Refrigerant Type	R-410A	R-410A	R-410A
		Circuit 1	21 lbs. 0 oz.	22 lbs. 12 oz.	22 lbs. 8 oz.
		Circuit 2	21 lbs. 0 oz.	21 lbs. 12 oz.	21 lbs. 8 oz.
Heating Performance		[1] Total High Heat Capacity - Btuh	144,000	174,000	224,000
		Total Unit Power - kW	12.4	14.8	19.3
		[1] C.O.P.	3.40	3.40	3.40
		[1] Total Low Heat Capacity - Btuh	80,000	96,000	128,000
		Total Unit Power (kW)	11.1	13.3	17.8
		[1] C.O.P.	2.10	2.10	2.10
Gas Heating Options Available			See page 22		
Compressor Type (number)			Scroll (2)	Scroll (2)	Scroll (2)
Outdoor Coils		Net face area (total) - sq. ft.	55.1	55.1	55.1
		Number of rows	2	2	2
		Fins per inch	20	20	20
Outdoor Coil Fans		Motor - (No.) horsepower	(6) 1/3	(6) 1/3	(6) 1/3
		Motor rpm	1075	1075	1075
		Total Motor watts	2150	2150	2150
		Diameter - (No.) in.	(6) 24	(6) 24	(6) 24
		Number of blades	3	3	3
		Total Air volume - cfm	16,300	16,300	16,300
Indoor Coils		Net face area (total) - sq. ft.	21.4	21.4	21.4
		Tube diameter - in.	3/8	3/8	3/8
		Number of rows	4	4	4
		Fins per inch	14	14	14
		Drain connection - No. and size	(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT
		Expansion device type	Balance Port Thermostatic Expansion Valve (removable element head)		
[2] **Indoor Blower and Drive Selection**		Nominal motor output	3 hp, 5 hp	3 hp, 5 hp, 7.5 hp	5 hp, 7.5 hp, 10 hp
		Max. usable motor output (US)	3.45 hp, 5.75 hp	3.45 hp, 5.75 hp, 8.63 hp	5.75 hp, 8.62 hp, 11.5 hp
		Motor - Drive kit number	3 hp Kit 1 535-725 rpm Kit 2 710-965 rpm 5 hp Kit 3 - 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm	3 hp Kit 1 535-725 rpm Kit 2 710-965 rpm 5 hp Kit 3 - 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm 7.5 hp Kit 6 850-1045 rpm Kit 7 945-1185 rpm Kit 8 1045-1285 rpm	5 hp Kit 3 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm 7.5 hp Kit 6 850-1045 rpm Kit 7 945-1185 rpm Kit 8 1045-1285 rpm 10 hp Kit 7 945-1185 rpm Kit 10 1045-1285 rpm Kit 11 1135-1365 rpm
		Blower wheel nominal D x W - in.	(2) 15 x 15 in.	(2) 15 x 15 in.	(2) 15 x 15
Filters		Type of filter	MERV 4, Disposable		
		Number and size - in.	(6) 24 x 24 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.

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

NOTE – Motor service factor limit - 1.0.

SPECIFICATIONS — GAS HEAT

Usage Data	Model Number	LDT156 LDT180	LDT156 LDT180 LDT240		LDT180 LDT240
	Heat Input Type	Low (L)	Standard (S)	Medium (M)	High (H)
	Number of Gas Heat Stages	One	[1] Two	[1] Two	[1] Two
[1] Gas Heating Performance	Input - Btuh First Stage	169,000	85,000	117,000	156,000
	Second Stage	- - -	169,000	234,000	312,000
	Third Stage	- - -	214,000	297,000	396,000
	Fourth Stage	- - -	260,000	360,000	480,000
	Output - Btuh First Stage	135,000	- - -	- - -	- - -
	Second Stage	- - -	- - -	- - -	- - -
	Third Stage	- - -	- - -	- - -	- - -
	Fourth Stage	- - -	211,000	292,000	389,000
Temperature Rise Range - °F	First Stage	15-45	15-45	30-60	40-70
	Second Stage	- - -	- - -	- - -	- - -
Minimum Air Volume - cfm		4500	4500	4500	5125
Thermal Efficiency		80%	81%	81%	81%
Gas Supply Connections		1 in. NPT	1 in. NPT	1 in. NPT	1 in. NPT
Recommended Gas Supply Pressure - in. w.g.	Natural	7	7	7	7
	LPG/Propane	11	11	11	11
Gas Supply Pressure Range	Min./Max. (Natural)	4.7 - 10.5 in. w.g.			
	Min./Max. (LPG)	10.8 - 13.5 in. w.g.			

[1] Two-stage heat models can be operated with four stages of gas heating when controlled in either zone sensor, Discharge Air Control, or fresh air tempering mode on the Lennox® CORE unit controller (available when using the CS8500 thermostat or when connected to Building Automation Systems using BACnet, LonTalk, or S-Bus protocols).

HIGH ALTITUDE DERATE

NOTE - Units may be installed at altitudes up to 2000 feet above sea level without any modification. At altitudes above 2000 feet, units must be derated to match gas manifold pressures shown in table below.

At altitudes above 4500 feet units must be derated 4% 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.

ONE STAGE HEAT

No Adjustment Required

TWO STAGE HEAT

Heat Input Type	Altitude Feet	Gas Manifold Pressure - in. w.g.		Input Rate (Btuh)	
		Natural Gas	LPG/Propane Gas	First Stage	Second Stage
Standard (2 stage)	2001 - 4500	1.6 / 3.1	4.4 / 8.9	169,000	239,000
Medium (2 stage)	2001 - 4500	1.6 / 3.1	4.4 / 8.9	234,000	331,000
High (2 stage)	2001 - 4500	1.6 / 3.1	4.4 / 8.9	312,000	442,000

FOUR STAGE HEAT

[1] Heat Input Type	Altitude Feet	Gas Manifold Pressure - in. w.g.		Input Rate (Btuh)			
		Natural Gas	LPG/Propane Gas	First Stage	Second Stage	Third Stage	Fourth Stage
Standard (4 stage)	2001 - 4500	1.6 / 3.1	4.4 / 8.9	85,000	169,000	204,000	239,000
Medium (4 stage)	2001 - 4500	1.6 / 3.1	4.4 / 8.9	117,000	234,000	283,000	331,000
High (4 stage)	2001 - 4500	1.6 / 3.1	4.4 / 8.9	156,000	312,000	377,000	442,000

[1] Four-Stage Gas Heating is field configured.

BLOWER DATA

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

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

Then determine from blower table blower motor output and drive required.
See page 9 for wet coil, option/accessory air resistance data, and factory installed drive kit specifications.

Minimum Air Volume Required For Different Gas Heat Sizes:
Low, Standard and Medium Heat - 4500 cfm; High Heat - 5125 cfm

Air Volume cfm	TOTAL STATIC PRESSURE - Inches Water Gauge (Pa)																									
	0.20		0.40		0.60		0.80		1.00		1.20		1.40		1.60		1.80		2.00		2.20		2.40		2.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2750	385	0.30	505	0.50	600	0.70	680	0.90	755	1.10	820	1.30	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3000	395	0.35	515	0.55	610	0.75	685	1.00	760	1.20	825	1.45	885	1.70	---	---	---	---	---	---	---	---	---	---	---	---
3250	405	0.40	520	0.60	615	0.85	695	1.10	765	1.30	830	1.60	890	1.85	950	2.10	---	---	---	---	---	---	---	---	---	---
3500	415	0.45	530	0.70	620	0.95	700	1.20	775	1.45	840	1.70	900	2.00	955	2.25	1005	2.55	---	---	---	---	---	---	---	---
3750	425	0.50	540	0.75	630	1.05	710	1.30	780	1.60	845	1.85	905	2.15	960	2.45	1010	2.70	1060	3.00	1110	3.30	---	---	---	---
4000	435	0.55	545	0.85	635	1.10	715	1.40	785	1.70	850	2.00	910	2.30	965	2.60	1020	2.90	1070	3.25	1115	3.55	1160	3.85	1205	4.15
4250	445	0.60	555	0.90	645	1.25	725	1.55	795	1.85	855	2.15	915	2.45	970	2.80	1025	3.10	1075	3.45	1120	3.75	1165	4.10	1210	4.45
4500	455	0.70	565	1.00	655	1.35	730	1.65	800	2.00	865	2.35	925	2.65	980	3.00	1030	3.30	1080	3.65	1130	4.05	1175	4.35	1215	4.70
4750	470	0.75	575	1.10	660	1.45	740	1.80	810	2.15	870	2.50	930	2.85	985	3.20	1040	3.55	1085	3.90	1135	4.25	1180	4.65	1225	5.00
5000	480	0.85	585	1.25	670	1.60	750	1.95	815	2.30	880	2.70	940	3.05	995	3.40	1045	3.80	1095	4.15	1140	4.50	1185	4.90	1230	5.30
5250	495	0.95	595	1.35	680	1.70	755	2.10	825	2.50	890	2.90	945	3.25	1000	3.65	1050	4.00	1100	4.40	1150	4.80	1195	5.20	1235	5.60
5500	505	1.05	605	1.45	690	1.85	765	2.25	835	2.65	895	3.05	955	3.45	1010	3.85	1060	4.25	1110	4.70	1155	5.10	1200	5.50	1240	5.90
5750	520	1.15	615	1.60	700	2.00	775	2.45	840	2.85	905	3.25	960	3.65	1015	4.10	1065	4.50	1115	4.95	1160	5.35	1205	5.80	1250	6.25
6000	530	1.30	630	1.75	710	2.15	785	2.60	850	3.05	910	3.45	970	3.90	1025	4.35	1075	4.80	1120	5.20	1170	5.65	1215	6.10	1255	6.55
6250	545	1.40	640	1.90	720	2.35	795	2.80	860	3.25	920	3.70	975	4.15	1030	4.60	1080	5.05	1130	5.50	1175	5.95	1220	6.45	1265	6.90
6500	560	1.55	650	2.05	730	2.50	805	3.00	870	3.45	930	3.95	985	4.40	1040	4.85	1090	5.35	1140	5.85	1185	6.30	1225	6.75	1270	7.25
6750	570	1.70	665	2.20	745	2.70	815	3.20	880	3.70	940	4.20	995	4.65	1045	5.10	1095	5.60	1145	6.10	1190	6.60	1235	7.10	1275	7.60
7000	585	1.85	675	2.35	755	2.90	825	3.40	890	3.95	950	4.45	1005	4.95	1055	5.40	1105	5.95	1155	6.45	1200	6.95	1240	7.45	1285	8.00
7250	600	2.00	690	2.60	765	3.10	835	3.65	900	4.15	955	4.65	1015	5.25	1065	5.75	1115	6.25	1160	6.75	1205	7.30	1250	7.85	1290	8.35
7500	615	2.20	700	2.75	775	3.30	845	3.85	910	4.45	965	4.95	1020	5.50	1075	6.05	1125	6.60	1170	7.15	1215	7.65	1260	8.25	1300	8.75
7750	630	2.40	715	3.00	790	3.55	855	4.10	920	4.70	975	5.25	1030	5.80	1080	6.35	1130	6.90	1180	7.50	1225	8.05	1265	8.60	1305	9.15
8000	640	2.55	725	3.20	800	3.80	865	4.35	930	4.95	985	5.50	1040	6.10	1090	6.70	1140	7.25	1185	7.85	1230	8.40	1275	9.00	1315	9.60
8250	655	2.80	740	3.40	810	4.00	880	4.65	940	5.25	995	5.85	1050	6.45	1100	7.05	1150	7.65	1195	8.25	1240	8.85	1280	9.40	1325	10.05
8500	670	3.00	750	3.65	825	4.30	890	4.90	950	5.55	1005	6.15	1060	6.80	1110	7.40	1160	8.05	1205	8.65	1250	9.25	1290	9.85	1330	10.45
8750	685	3.25	765	3.90	835	4.55	900	5.20	960	5.85	1015	6.45	1070	7.15	1120	7.75	1165	8.35	1215	9.05	1255	9.65	1300	10.30	1340	10.90
9000	700	3.50	780	4.20	850	4.85	910	5.50	970	6.15	1025	6.80	1080	7.50	1130	8.15	1175	8.75	1220	9.40	1265	10.10	1310	10.80	1350	11.40
9250	715	3.75	790	4.45	860	5.15	925	5.85	985	6.55	1040	7.20	1090	7.85	1140	8.55	1185	9.20	1230	9.85	1275	10.55	1315	11.20	---	---
9500	730	4.00	805	4.75	875	5.45	935	6.15	995	6.90	1050	7.60	1100	8.25	1150	8.95	1195	9.60	1240	10.30	1285	11.05	---	---	---	---
9750	745	4.30	820	5.05	885	5.75	950	6.55	1005	7.20	1060	7.95	1110	8.65	1160	9.40	1205	10.05	1250	10.80	1295	11.50	---	---	---	---
10,000	760	4.60	835	5.40	900	6.15	960	6.85	1015	7.60	1070	8.35	1120	9.05	1170	9.80	1215	10.50	1260	11.25	---	---	---	---	---	---
10,250	775	4.90	845	5.65	910	6.45	970	7.20	1030	8.00	1080	8.75	1135	9.55	1180	10.25	1225	11.00	---	---	---	---	---	---	---	---
10,500	790	5.20	860	6.00	925	6.85	985	7.65	1040	8.40	1095	9.20	1145	10.00	1190	10.70	1235	11.45	---	---	---	---	---	---	---	---
10,750	805	5.55	875	6.40	940	7.25	1000	8.05	1055	8.85	1105	9.65	1155	10.45	1200	11.20	---	---	---	---	---	---	---	---	---	---
11,000	820	5.90	890	6.80	950	7.60	1010	8.45	1065	9.30	1115	10.05	1165	10.90	---	---	---	---	---	---	---	---	---	---	---	---

BLOWER DATA

FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

Nominal hp	Maximum hp	Drive Kit Number	RPM Range
3	3.45	1	535 - 725
3	3.45	2	710 - 965
5	5.75	3	685 - 856
5	5.75	4	850 - 1045
5	5.75	5	945 - 1185
7.5	8.63	6	850 - 1045
7.5	8.63	7	945 - 1185
7.5	8.63	8	1045 - 1285
10	11.50	7	945 - 1185
10	11.50	10	1045 - 1285
10	11.50	11	1135 - 1365

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

NOTE – Motor service factor limit - 1.0

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE

Air Volume cfm	Wet Indoor Coil	Gas Heat Exchanger			Economizer	Filters			Horizontal Roof Curb
		Low/ Standard Heat	Medium Heat	High Heat					
	in. w.g.	in. w.g.	in. w.g.	in. w.g.	in. w.g.	MERV 8	MERV 13	MERV 16	in. w.g.
2750	.02	.02	.04	.05	- - -	.01	.03	.06	.03
3000	.02	.03	.04	.05	- - -	.01	.03	.06	.04
3250	.03	.03	.05	.06	- - -	.01	.04	.07	.04
3500	.03	.03	.05	.06	- - -	.01	.04	.08	.05
3750	.03	.04	.06	.07	- - -	.01	.04	.08	.05
4000	.04	.04	.06	.07	- - -	.01	.04	.09	.06
4250	.04	.04	.06	.08	- - -	.01	.05	.10	.07
4500	.05	.05	.07	.09	- - -	.01	.05	.10	.07
4750	.05	.05	.08	.10	- - -	.02	.05	.11	.08
5000	.05	.05	.09	.11	- - -	.02	.06	.12	.08
5250	.06	.06	.10	.12	- - -	.02	.06	.12	.09
5500	.07	.06	.10	.13	- - -	.02	.06	.13	.10
5750	.07	.06	.11	.14	- - -	.02	.07	.14	.11
6000	.08	.07	.12	.15	- - -	.03	.07	.14	.11
6250	.08	.07	.12	.16	.01	.03	.07	.15	.12
6500	.09	.08	.13	.17	.02	.03	.08	.16	.13
6750	.10	.08	.14	.18	.03	.03	.08	.17	.14
7000	.10	.09	.15	.19	.04	.04	.08	.17	.15
7250	.11	.09	.16	.20	.05	.04	.09	.18	.16
7500	.12	.10	.17	.21	.06	.04	.09	.19	.17
8000	.13	.11	.19	.24	.09	.05	.10	.21	.19
8500	.15	.12	.20	.26	.11	.05	.10	.22	.21
9000	.16	.13	.23	.29	.14	.06	.11	.24	.24
9500	.18	.14	.25	.32	.16	.07	.12	.25	.26
10,000	.20	.16	.27	.35	.19	.07	.12	.27	.29
10,500	.22	.17	.30	.38	.22	.08	.13	.29	.31
11,000	.24	.18	.31	.40	.25	.09	.14	.30	.34

BLOWER DATA

POWER EXHAUST FAN PERFORMANCE

Return Air System Static Pressure	Air Volume Exhausted
in. w.g.	cfm
0.00	8630
0.05	8210
0.10	7725
0.15	7110
0.20	6470
0.25	5790
0.30	5060
0.35	4300
0.40	3510
0.45	2690
0.50	1840

CEILING DIFFUSER AIR RESISTANCE - in. w.g.

Air Volume cfm	Step-Down Diffuser						Flush Diffuser	
	RTD11-185S			RTD11-275S			FD11-185S	FD11-275S
	2 Ends Open	1 Side/2 Ends Open	All Ends & Sides Open	2 Ends Open	1 Side/2 Ends Open	All Ends & Sides Open		
5000	.51	.44	.39	- - -	- - -	- - -	.27	- - -
5200	.56	.48	.42	- - -	- - -	- - -	.30	- - -
5400	.61	.52	.45	- - -	- - -	- - -	.33	- - -
5600	.66	.56	.48	- - -	- - -	- - -	.36	- - -
5800	.71	.59	.51	- - -	- - -	- - -	.39	- - -
6000	.76	.63	.55	.36	.31	.27	.42	.29
6200	.80	.68	.59	- - -	- - -	- - -	.46	- - -
6400	.86	.72	.63	- - -	- - -	- - -	.50	- - -
6500	- - -	- - -	- - -	.42	.36	.31	- - -	.34
6600	.92	.77	.67	- - -	- - -	- - -	.54	- - -
6800	.99	.83	.72	- - -	- - -	- - -	.58	- - -
7000	1.03	.87	.76	.49	.41	.36	.62	.40
7200	1.09	.92	.80	- - -	- - -	- - -	.66	- - -
7400	1.15	.97	.84	- - -	- - -	- - -	.70	- - -
7500	- - -	- - -	- - -	.51	.46	.41	- - -	.45
7600	1.20	1.02	.88	- - -	- - -	- - -	.74	- - -
8000	- - -	- - -	- - -	.59	.49	.43	- - -	.50
8500	- - -	- - -	- - -	.69	.58	.50	- - -	.57
9000	- - -	- - -	- - -	.79	.67	.58	- - -	.66
9500	- - -	- - -	- - -	.89	.75	.65	- - -	.74
10,000	- - -	- - -	- - -	1.00	.84	.73	- - -	.81
10,500	- - -	- - -	- - -	1.10	.92	.80	- - -	.89
11,000	- - -	- - -	- - -	1.21	1.01	.88	- - -	.96

CEILING DIFFUSER AIR THROW DATA - ft.

Model No.	Air Volume cfm	[1] Effective Throw Range - ft.		Model No.	Air Volume cfm	[1] Effective Throw Range - ft.	
		RTD11-185S Step-Down	FD11-185S Flush			RTD11-275S Step-Down	FD11-275S Flush
156, 180	5600	39 - 49	28 - 37	240	7200	33 - 38	26 - 35
	5800	42 - 51	29 - 38		7400	35 - 40	28 - 37
	6000	44 - 54	40 - 50		7600	36 - 41	29 - 38
	6200	45 - 55	42 - 51		7800	38 - 43	40 - 50
	6400	46 - 55	43 - 52		8000	39 - 44	42 - 51
	6600	47 - 56	45 - 56		8200	41 - 46	43 - 52
					8400	43 - 49	44 - 54
					8600	44 - 50	46 - 57
					8800	47 - 55	48 - 59

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

ELECTRICAL DATA — 13 TON

	Model No.	LDT156H4					
[1] Voltage - 60Hz		208/230V - 3 Ph		460V - 3 Ph		575V - 3 Ph	
Compressor 1 (Non-Inverter)	Rated Load Amps	17.6		8.5		6.3	
	Locked Rotor Amps	136		66.1		55.3	
Compressor 2 (Non-Inverter)	Rated Load Amps	22.4		10.6		7.7	
	Locked Rotor Amps	149		75		54	
Outdoor Fan Motors (6)	Full Load Amps (6 Non-ECM)	2.4		1.3		1	
	Total	14.4		7.8		6	
Power Exhaust (2) 0.33 HP	Full Load Amps	2.4		1.3		1	
	Total	4.8		2.6		2	
Service Outlet 115V GFI (amps)		15		15		20	
Indoor Blower Motor	Horsepower	3	5	3	5	3	5
	Full Load Amps	10.6	16.7	4.8	7.6	3.9	6.1
[2] Maximum Overcurrent Protection (MOCP)	Unit Only	90	90	40	45	30	35
	With (2) 0.33 HP Power Exhaust	90	100	45	50	35	35
[3] Minimum Circuit Ampacity (MCA)	Unit Only	71	77	35	38	26	29
	With (2) 0.33 HP Power Exhaust	76	82	37	40	28	31

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 5000 amps.
[1] Extremes of operating range are plus and minus 10% of line voltage.
[2] HACR type breaker or fuse.
[3] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
[4] Factory installed circuit breaker not available.

ELECTRICAL DATA — 15 TON

	Model No.	LDT180H4								
[1] Voltage - 60Hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1 (Non-Inverter)	Rated Load Amps	25.3			9.6			8.4		
	Locked Rotor Amps	184			84			60		
Compressor 2 (Non-Inverter)	Rated Load Amps	25			12.2			9		
	Locked Rotor Amps	164			100			78		
Outdoor Fan Motors (6)	Full Load Amps (6 Non-ECM)	2.4			1.3			1		
	Total	14.4			7.8			6		
Power Exhaust (2) 0.33 HP	Full Load Amps	2.4			1.3			1		
	Total	4.8			2.6			2		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	3	5	7.5	3	5	7.5	3	5	7.5
	Full Load Amps	10.6	16.7	24.2	4.8	7.6	11	3.9	6.1	9
[2] Maximum Overcurrent Protection (MOCP)	Unit Only	100	110	110	45	50	50	35	40	40
	With (2) 0.33 HP Power Exhaust	110	110	125	50	50	50	40	40	45
[3] Minimum Circuit Ampacity (MCA)	Unit Only	82	88	96	38	41	44	30	32	35
	With (2) 0.33 HP Power Exhaust	87	93	101	41	43	47	32	34	37

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 5000 amps.
[1] Extremes of operating range are plus and minus 10% of line voltage.
[2] HACR type breaker or fuse.
[3] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
[4] Factory installed circuit breaker not available.

ELECTRICAL DATA — 20 TON

20 TON HIGH EFFICIENCY — **LDT240H4**

[1] Voltage - 60Hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1 (Non-Inverter)	Rated Load Amps	32.6			14.8			11.1		
	Locked Rotor Amps	240			130			93.7		
Compressor 2 (Non-Inverter)	Rated Load Amps	31.1			13			11		
	Locked Rotor Amps	255			123			93.7		
Outdoor Fan Motors (6)	Full Load Amps (6 Non-ECM)	2.4			1.3			1		
	Total	14.4			7.8			6		
Power Exhaust (2) 0.33 HP	Full Load Amps	2.4			1.3			1		
	Total	4.8			2.6			2		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
[2] Maximum Overcurrent Protection (MOCP)	Unit Only	125	125	125	60	60	60	45	50	50
	With (2) 0.33 HP Power Exhaust	125	125	150	60	60	70	50	50	50
[3] Minimum Circuit Ampacity (MCA)	Unit Only	103	111	118	47	51	54	37	40	42
	With (2) 0.33 HP Power Exhaust	108	116	122	50	53	56	39	42	44

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

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

[2] HACR type breaker or fuse.

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

[4] Factory installed circuit breaker not available.

ELECTRICAL ACCESSORIES - DISCONNECTS

13 TON | LDT156H4

Motor Horsepower	**3**		**5**		**3**	**5**	**3**	**5**
Electric Heat Voltage	**208V**	**240V**	**208V**	**240V**	**480V**	**480V**	**600V**	**600V**
Unit Only	**54W88**	**54W88**	**54W89**	**54W89**	**54W88**	**54W88**	**54W88**	**54W88**
Unit + Power Exhaust	**54W89**	**54W89**	**54W89**	**54W89**	**54W88**	**54W88**	**54W88**	**54W88**

15 TON | LDT180H4

Motor Horsepower	**3**		**5**		**7.5**		**3**	**5**	**7.5**	**3**	**5**	**7.5**
Electric Heat Voltage	**208V**	**240V**	**208V**	**240V**	**208V**	**240V**	**480V**	**480V**	**480V**	**600V**	**600V**	**600V**
Unit Only	**54W89**	**54W89**	**54W89**	**54W89**	**54W89**	**54W89**	**54W88**	**54W88**	**54W88**	**54W88**	**54W88**	**54W88**
Unit + Power Exhaust	**54W89**	**54W89**	**54W89**	**54W89**	**54W89**	**54W89**	**54W88**	**54W88**	**54W88**	**54W88**	**54W88**	**54W88**

20 TON | LDT240H4

Motor Horsepower	**5**		**7.5**		**10**		**5**	**7.5**	**10**	**5**	**7.5**	**10**
Electric Heat Voltage	**208V**	**240V**	**208V**	**240V**	**208V**	**240V**	**480V**	**480V**	**480V**	**600V**	**600V**	**600V**
Unit Only	**54W89**	**54W89**	**54W89**	**54W89**	**54W89**	**54W89**	**54W88**	**54W88**	**54W88**	**54W88**	**54W88**	**54W88**
Unit + Power Exhaust	**54W89**	**54W89**	**54W89**	**54W89**	**54W89**	**54W89**	**54W88**	**54W88**	**54W88**	**54W88**	**54W88**	**54W88**

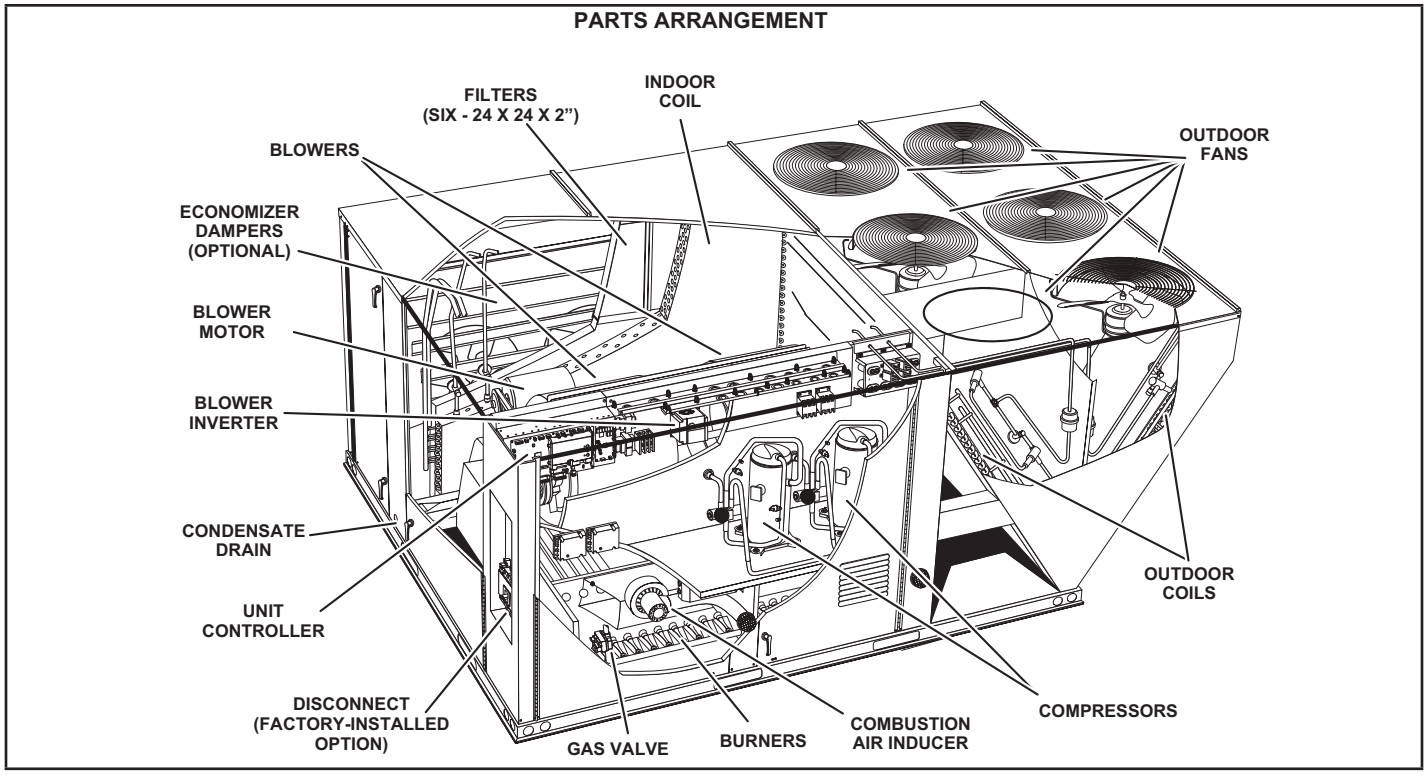


FIGURE 1

I-UNIT COMPONENTS

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

⚠ CAUTION

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

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

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

A-Control Box Components

Control box components are shown in FIGURE 3 and FIGURE 4. The control box is located in the upper portion of the compressor compartment.

1-Disconnect Switch S48

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

2-Control Transformer T1

All use a single line voltage to 24VAC transformer mounted in the control box. Transformer supplies power to control circuits in the unit. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB8). The 208/230 (Y) voltage transformers use two primary voltage taps as shown in figure 2, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

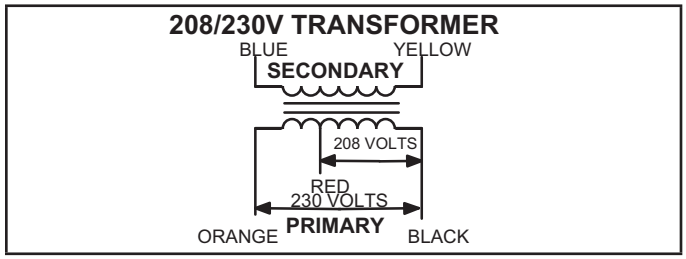


FIGURE 2

3-Contactor Transformer T18

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

Components Arrangement

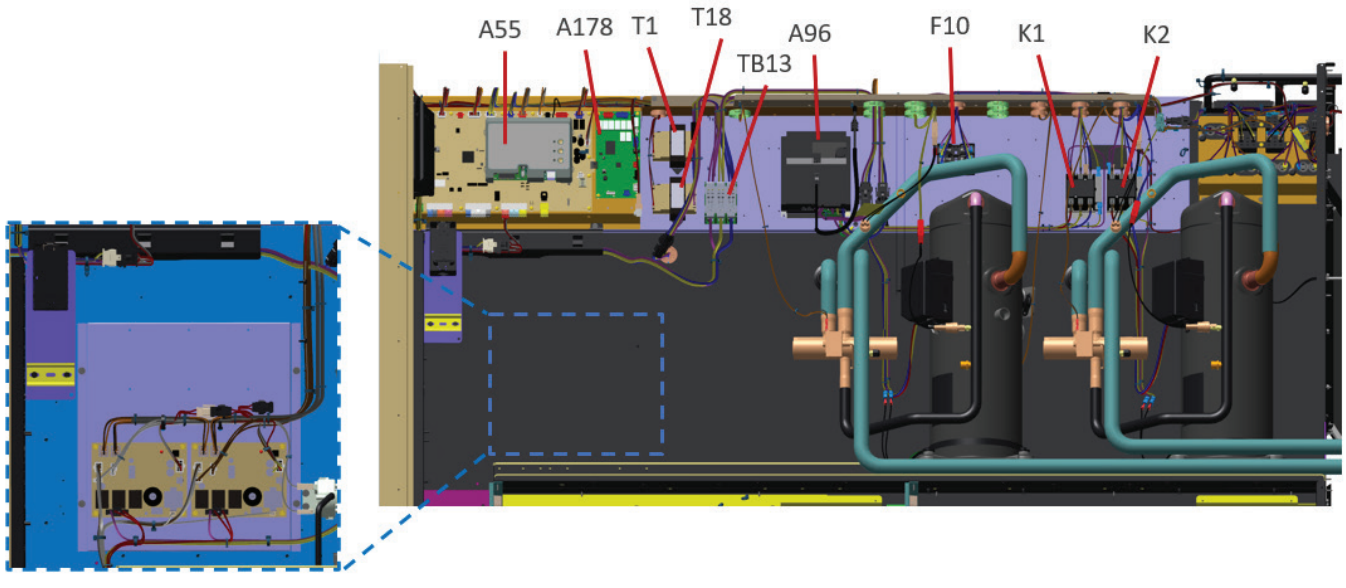


FIGURE 3

Components Arrangement

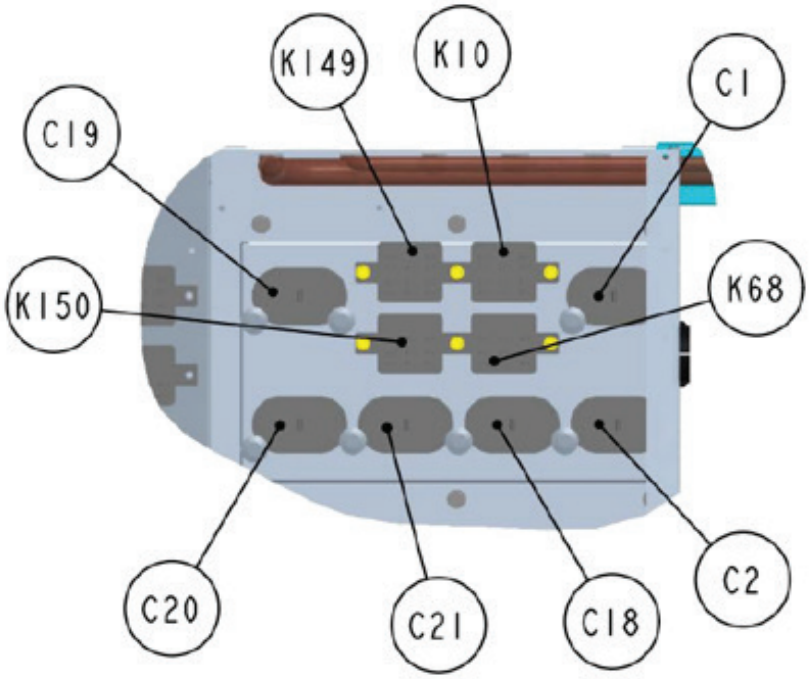


FIGURE 4

4-Terminal Block TB13

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

5-Outdoor Fan Motor Fuse Block & Fuses

F10 Power Exhaust Fan Motor Fuse Block and Fuses F6. STD SCCR 240V, 300V and higher rated SCCR units have three line voltage fuses F10 provide overcurrent protection to all condenser fans. Two line voltage fuses F6 provide overcurrent protection to the two optional power exhaust fans. The fuses are rated at 30A in all 208/230V units but 10A in the 208/230V 240U and 300U models.

6-Compressor Contactor K1 and K2

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

7-Blower Contactor K3

Blower contactor K3, used in all units, is a three-pole-double-break contactor with a 24VAC coil used to energize the indoor blower motor B3 in response to blower demand. K3 is energized by Unit Controller (A55). Optional Staged-Blower units which are not equipped with a bypass option will not have a K3.

8-Ultraviolet Germicidal Lamp (UVC) Transformer T49

UVC transformer T49 is used in 460V and 575V units which are equipped with a UVC. The auto voltage to 230VAC transformer is installed in the control box. The transformer has an output rating of 0.5 amps. T49 transformer supplies 230VAC power to the UVC lamp.

9-Burner Controls A3 & A12

Units have two burner controls. A3 controls gas heat section one and A12 controls gas heat section two. The first gas heat section and the second gas heat section burner controls are identical. Both burner controls are factory set and are not adjustable. The control makes three attempts at ignition and then locks out the system if ignition is not obtained after the third trial. Reset after lockout requires only breaking and remaking thermostat demand. The control shuts off gas flow immediately in the event of a gas or power failure.

Upon restoration of gas and power, the control will restart the ignition sequence and continue until flame is established or system locks out. For a more detailed description see the Gas Heat Components section.

10-Power Exhaust Relay K65 & K231 (PED units)

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

11-Variable Frequency Drive A96 (optional)

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

12-VFD Power To Motor Contactor K202 (optional)

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

13-Inverter Start Forward Rotation Relay K203 (optional)

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

14-Unit Controller A55

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

Relative Humidity Sensor - Optional

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

Enthalpy Sensor - Optional

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

Economizer Differential Pressure Sensor - Optional

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

Temperature Sensors

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

TABLE 1

Resistance vs. Temperature

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

Room Sensors

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

TABLE 2

Two-Wire Thermistor

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

Carbon Dioxide Sensor

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

TABLE 3

Carbon Dioxide Range

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

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

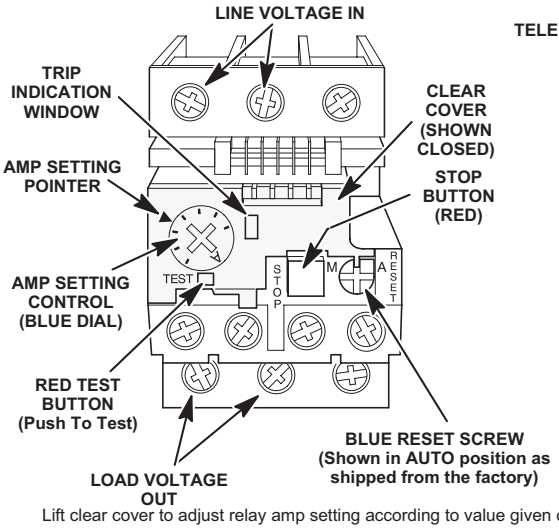
The second power exhaust fan is controlled by K231. A133 will enable K231 only when the blower reaches 70% of full speed (adjustable ECTO). This prevents a negative building pressure when the blower is operating in low speed. Refer to the Unit Controller manual and ECTO labels on the unit.

16-Fuse F61 (Higher SCCR units only)

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

17-Blower Motor Overload Relay S42

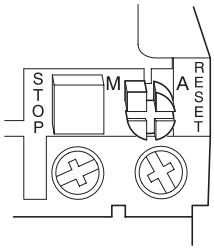
The relay (S42) is connected in line with the blower motor to monitor the current flow to the motor. When the relay senses an overload condition, a set of normally closed contacts open to de-energize pin #1 in plug P299 of the A55 Unit Controller. A55 de-energizes all outputs. Units will be equipped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



TELEMECANIQUE OVERLOAD RELAY

DETAIL SHOWING RESET BUTTON ADJUSTED TO MANUAL POSITION

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



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

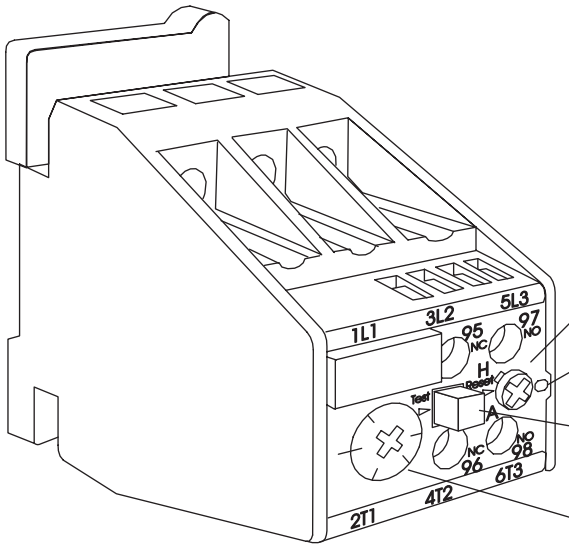
Cover must also be lifted to adjust control mode from automatic reset to manual reset (see detail above) and to test the control.

Control must be in the manual reset mode to perform a test. Use a pointed object to press the small red test button. A yellow marker should appear in the trip indication window to the right of the amp setting control. Press the blue reset screw to reset the relay.

The red STOP button opens the normally closed contacts which power the blower motor. This button stops blower motor operation as long as it is pressed in.

FIGURE 5

SIEMENS OVERLOAD RELAY



BLUE RESET BUTTON IN FACTORY-SET AUTO MODE (Turn clockwise to H for manual reset)

GREEN TRIP INDICATOR (Flush with surface -- not tripped; Above surface -- tripped)

RED TEST BUTTON

AMP ADJUSTMENT DIAL

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

FIGURE 6

Compressor Detail
B1, B2

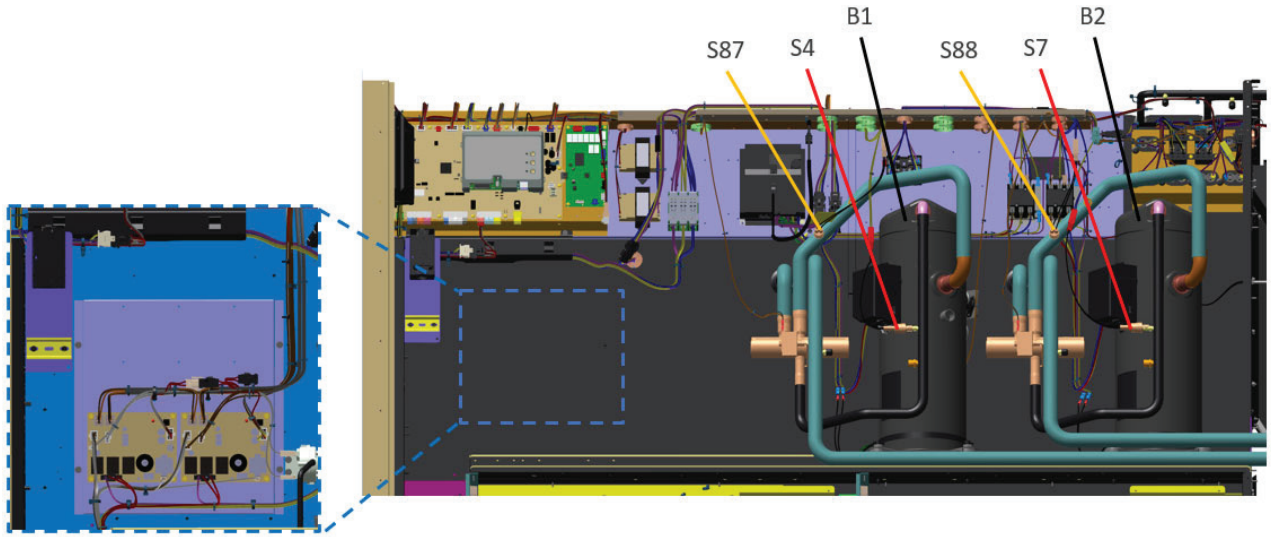


FIGURE 7

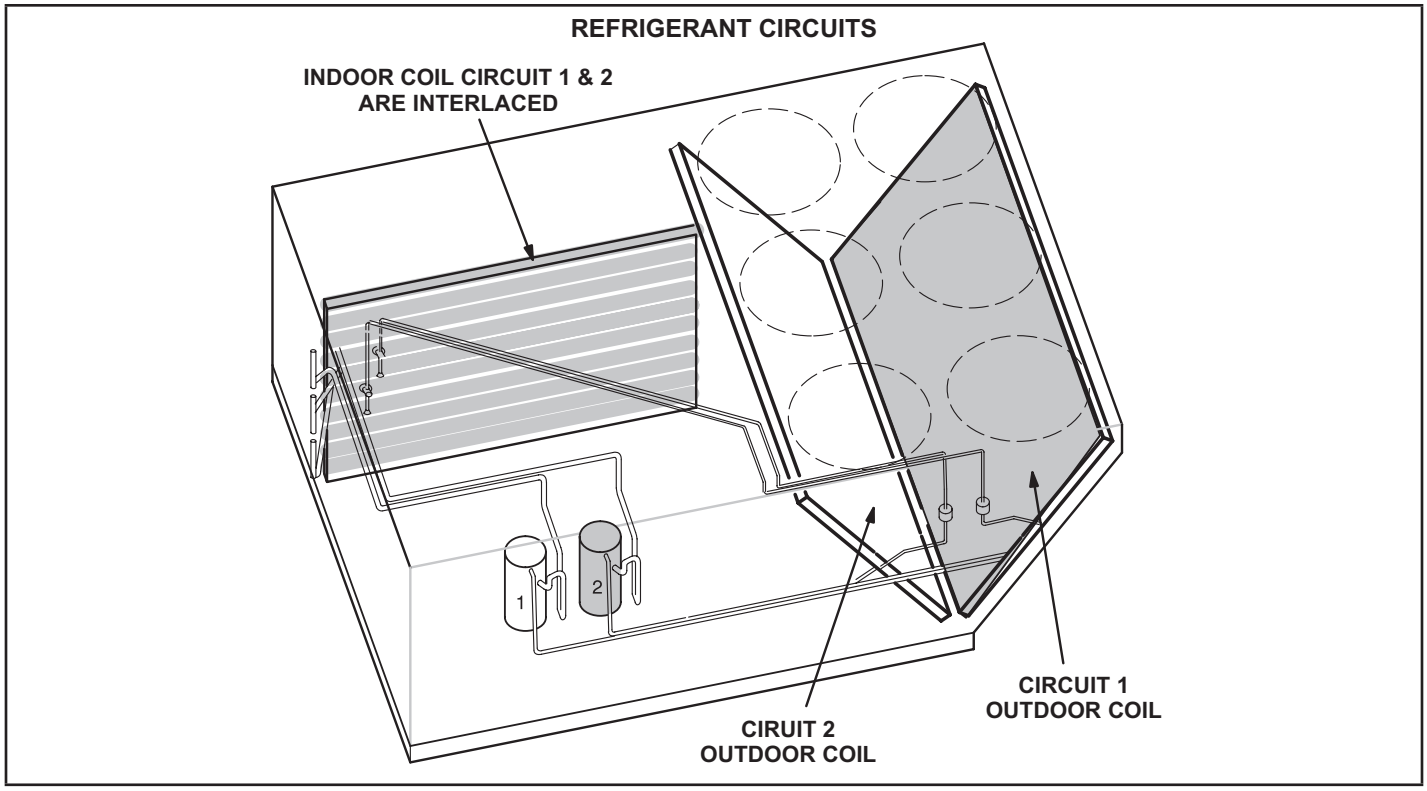


FIGURE 8

B-Cooling Components

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

Six draw-through type condenser fans are used in LDT156, 180 & 240.

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

1-Compressors B1 and B2

All units use scroll compressors. All units use 2 compressors, the first stage compressor is a 2-speed and the second stage compressor is fixed speed. Compressor capacity may vary from stage to stage. In all cases, the capacity of each compressor is added to reach the total capacity of the unit. See “SPECIFICATIONS” and “ELECTRICAL DATA” (table of contents) or compressor nameplate for compressor specifications.

⚠ WARNING

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

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

⚠ IMPORTANT

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

2-Crankcase Heaters HR1 and HR2

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

3-High Pressure Switches S4 and S7

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

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

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

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

4-Low Pressure Switches S87 and S88

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

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

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

When suction pressure drops to 40 $\pm$ 5 psig (indicating low pressure), the switch opens and the compressor(s) is de-energized. The switch automatically resets when pressure in the suction line rises to 90 $\pm$ 5 psig.

5-Defrost Control

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

6-Filter Drier (all units)

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

7-Condenser Fans

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

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

8-Reversing Valve

A refrigerant reversing valve with a 24 volt solenoid coil is used to reverse refrigerant flow during unit operation in all LDT/LHT units. The reversing valve is connected in the vapor line of the refrigerant circuit. The reversing valve coil is energized during cooling demand and during defrost. Reversing valve L1 & L2 are controlled by the A55 Control board in response to a cooling demand or by defrost.

9-Temperature Thermistor

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

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

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

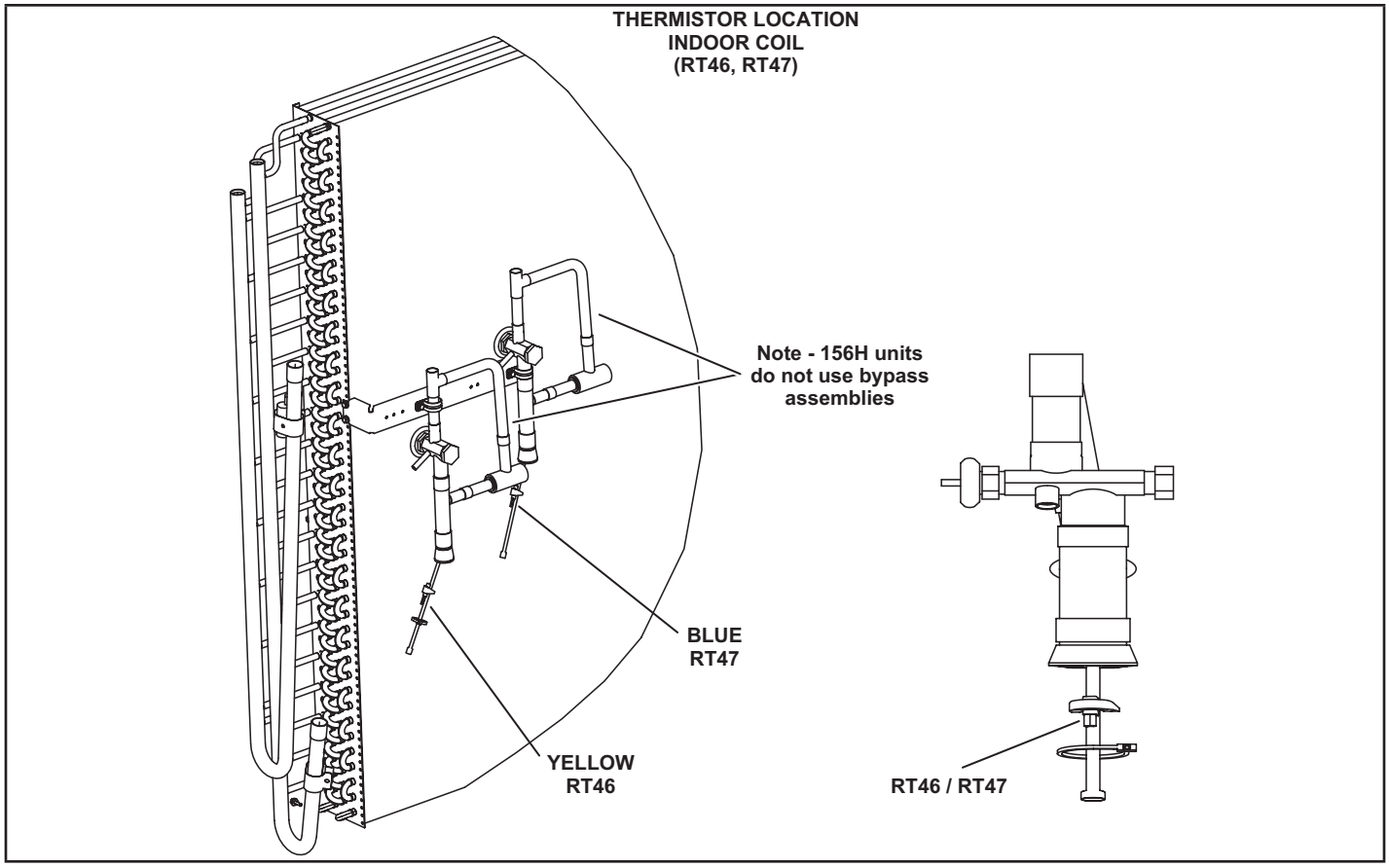


FIGURE 9

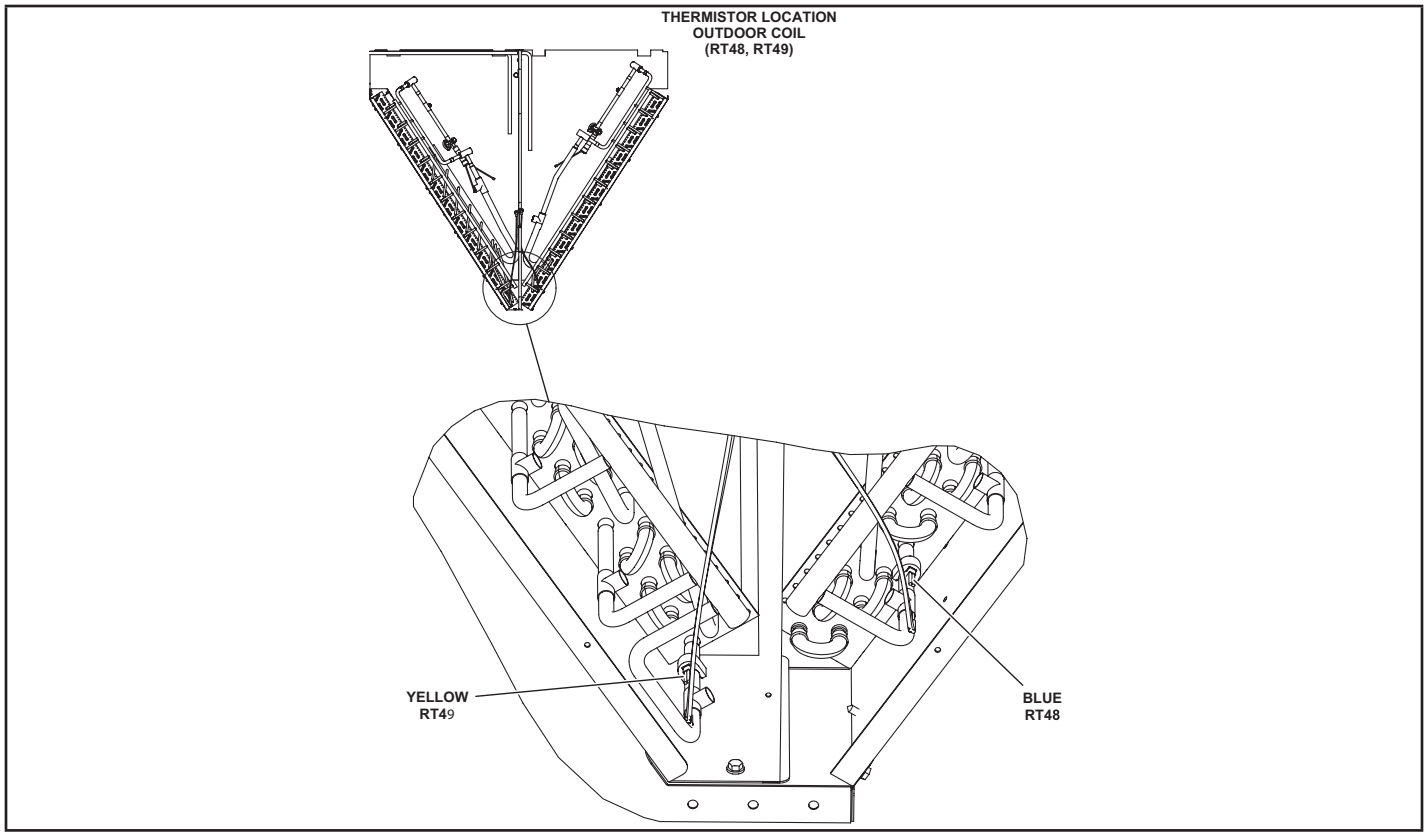


FIGURE 10

C-Blower Compartment

The blower compartment is located between the evaporator coil and the compressor / control section on the opposite side of the condenser coil. The blower assembly is accessed by disconnecting the blower motor wiring (and all other plugs) and removing the screws on either side of the sliding base. The base pulls out as shown in FIGURE 12.

1-Blower Wheels

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

2-Indoor Blower Motor B3

All units use three-phase single-speed blower motors. CFM adjustments are made by adjusting the motor pulley (sheave). Motors are equipped with sealed ball bearings. All motor specifications are listed in the SPECIFICATIONS (table of contents) in the front of this manual. Units may be equipped with motors manufactured by various manufacturers, therefore electrical FLA and LRA specifications will vary. See unit rating plate for information specific to your unit.

OPERATION / ADJUSTMENT

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

A-Blower Operation

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

SERVICE > TEST > BLOWER

Instructions provided with the thermostat may also be used to initiate blower only (G) demand. Unit will cycle on thermostat demand. The following steps apply to applications using a typical electro-mechanical thermostat.

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

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

⚠ IMPORTANT

Three Phase Scroll Compressor Voltage Phasing

Three phase scroll compressors must be phased sequentially to ensure correct compressor and blower* rotation and operation. Compressor and blower are wired in phase at the factory. Power wires are color-coded as

follows: line 1-red, line 2-yellow, line 3-blue.

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

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

3-Disconnect all remote electrical power supplies.

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

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

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

⚠ WARNING

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

2-Inspect all electrical wiring, both field- and 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.

B-Blower Access

1 - Disconnect jack/plug connector to blower motor. Also disconnect jack/plug connector heating limit switches on gas units.

2 - Remove screws on either side of blower assembly sliding base. See FIGURE 12.

3 - Pull base toward outside of unit.

C-Determining Unit CFM

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

1 - The following measurements must be made with a dry indoor coil. Run blower (G demand) without a cooling demand. Measure the indoor blower shaft RPM. Air filters must be in place when measurements are taken.

2 - With all access panels in place, measure static pressure external to unit (from supply to return). Blower performance data is based on static pressure readings taken in locations shown in FIGURE 11.

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

3 - See table of contents for Blower Data and or Optional Accessories. Use static pressure and RPM readings to determine unit CFM.

4 - The blower RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase CFM. Turn counterclockwise to decrease CFM. See FIGURE 12. Do not exceed minimum and maximum number of pulley turns as shown in TABLE 4.

TABLE 4

MINIMUM AND MAXIMUM PULLEY ADJUSTMENT

Belt	Min Turns Open	Max Turns Open
A Section	No Minimum	5
B Section	1*	6

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

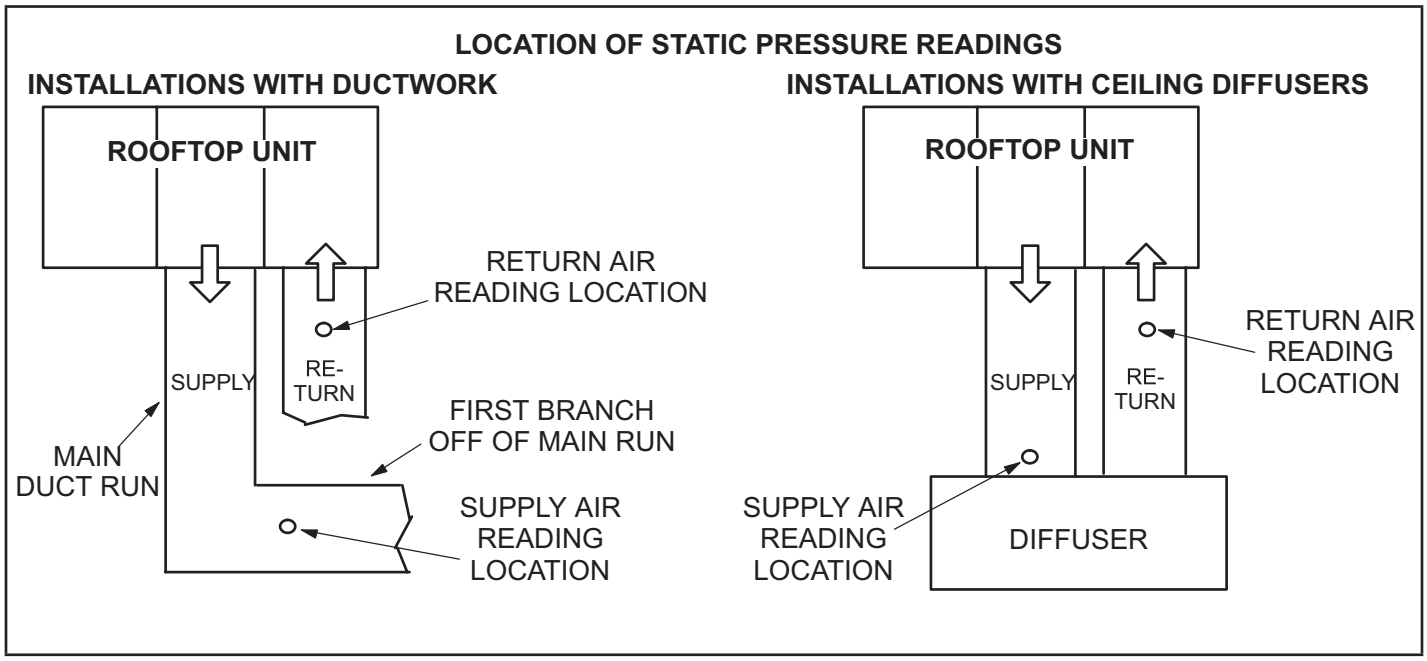


FIGURE 11

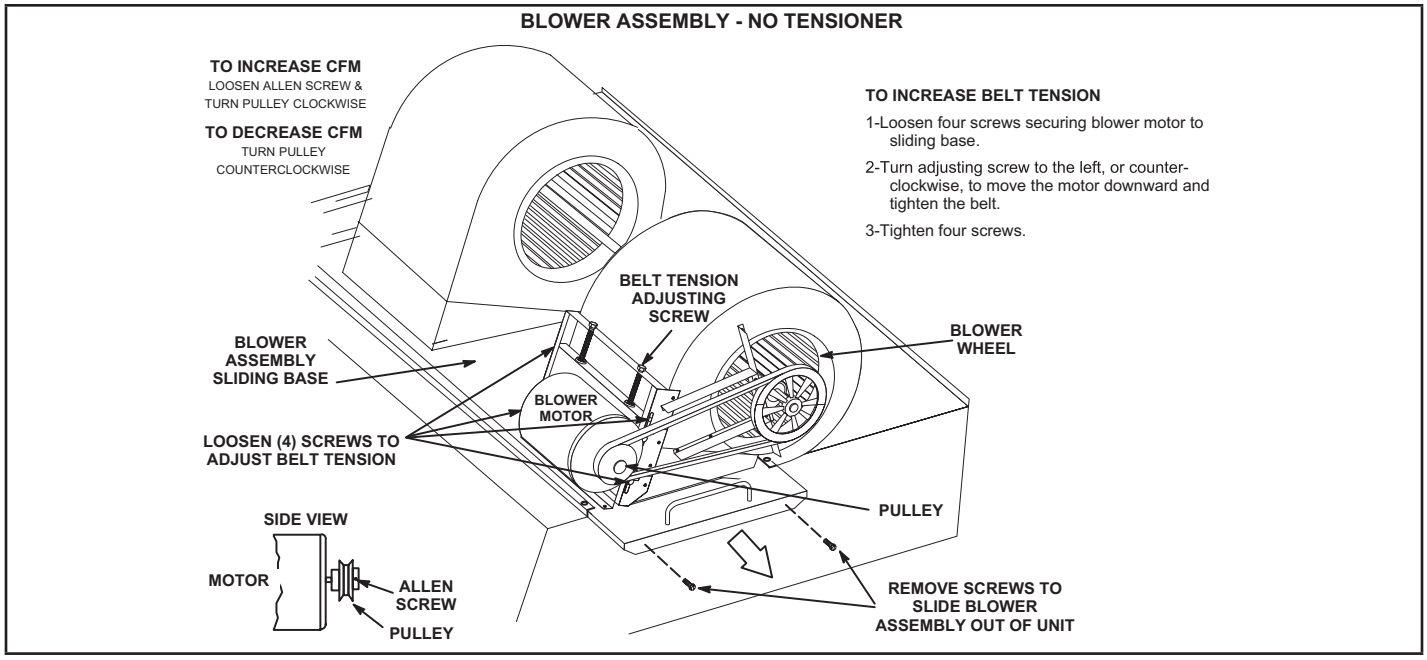


FIGURE 12

D-Blower Belt Adjustment

Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Tension new belts after a 24-48 hour period of operation. This will allow belt to stretch and seat into pulley grooves. Make sure blower and motor pulley are aligned. See FIGURE 13 for blowers not equipped with a tensioner and FIGURE 14 for units equipped with an optional belt tensioner.

Blowers Without Belt Tensioner

1 - Loosen four screws securing blower motor to sliding base. See FIGURE 12.

2 - *To increase belt tension -*

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

3 - To loosen belt tension -

Turn the adjusting screw to the right, or clockwise to loosen belt tension. 3- Tighten four screws securing blower motor to sliding base once adjustments have been made.

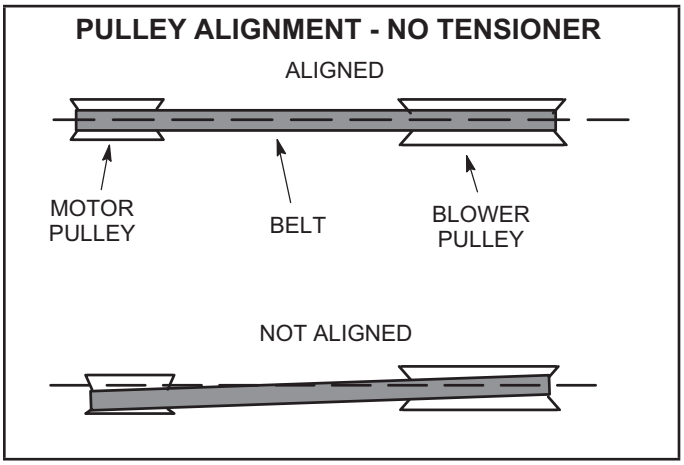


FIGURE 13

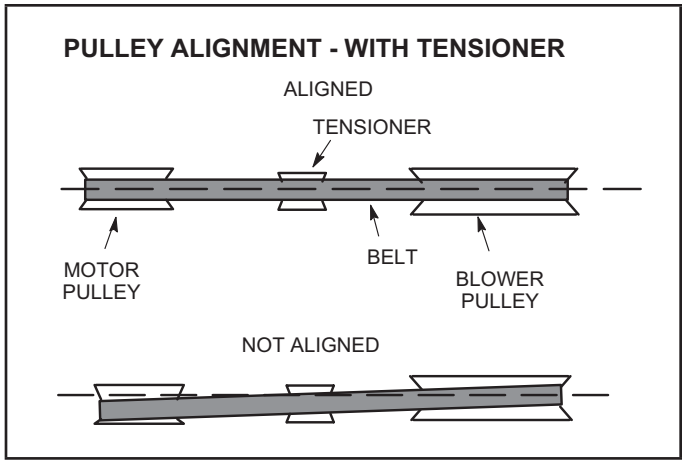


FIGURE 14

E-Check Belt Tension

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

1 - Measure span length X. See FIGURE 15.

2 - Apply perpendicular force to center of span (X) with enough pressure to deflect belt 1/64” for every inch of span length.

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

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

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

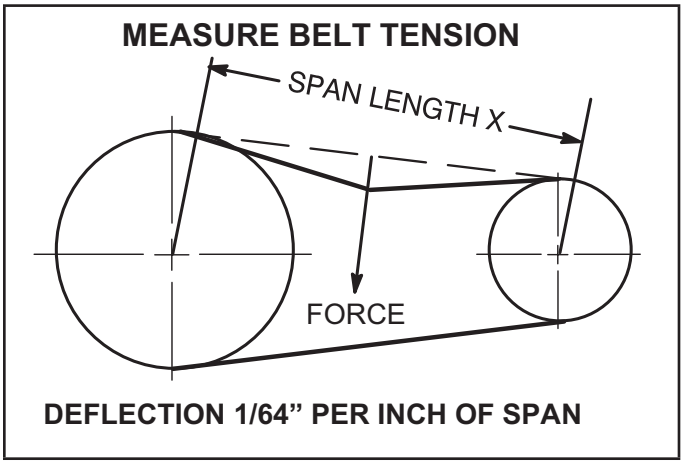


FIGURE 15

F-Field-Furnished Blower Drives

See BLOWER DATA tables for blower drives.

D-GAS HEAT COMPONENTS

See SPECIFICATIONS tables or unit nameplate for Btuh capacities. Units are equipped with two identical gas heat sections (gas heat section one and gas heat section two) see FIGURE 16. Stainless steel flex pipe will feed supply gas to the right side and black pipe will feed the left side. If for service the flexible connection must broken, hand tighten then turn additional 1/4" with a wrench for metal to metal seal (do not overtighten).

NOTE - *Do not use thread sealing compound on flex pipe flare connections.*

1-Control Box Components A3, A12, A55

⚠ 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.

Burner Ignition Control A3, A12

The ignition controls are located in the heat section areas (FIGURE 16) below the compressors. The controls are manufactured UTEC. See TABLE 5 for LED codes. The ignition control provides three main functions: gas valve control, ignition and flame sensing. There are three trials for ignition. Each trial is 10 second long with 30 seconds in between trial. After the third attempt for ignition the unit will lockout for 60 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 17 for a normal ignition sequence and FIGURE 18 for the ignition attempt sequence with retrials (nominal timings given for simplicity). Specific timings for the ignition controls are shown in FIGURE 19.

TABLE 5

LED Flashes	Indicates
Slow Flash	Control ok, no call for heat
Fast Flash	Control ok, call for heat present.
Steady Off	Control ok, call for heat present.
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

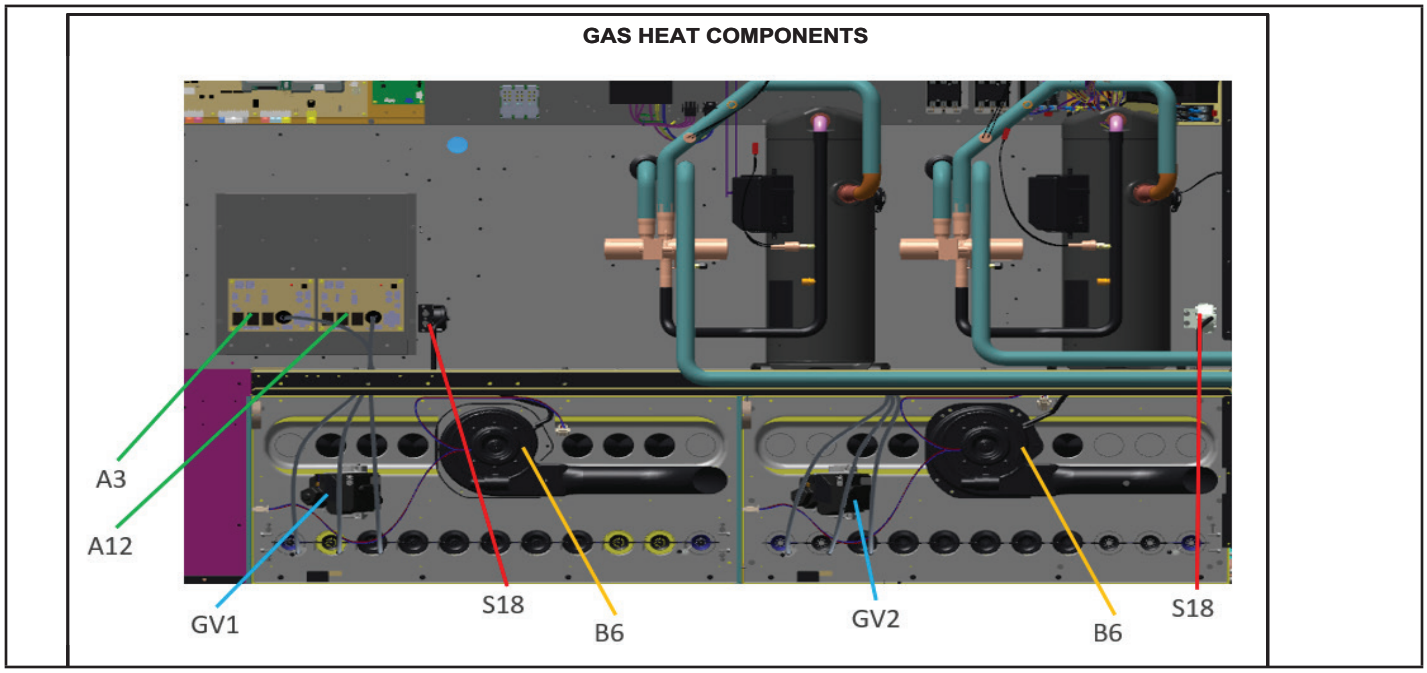


FIGURE 16

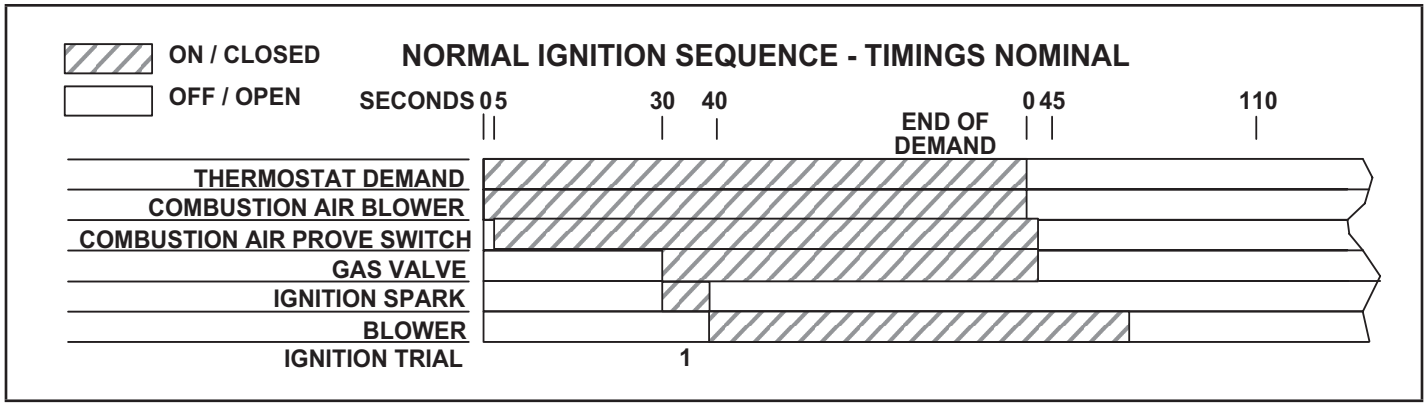


FIGURE 17

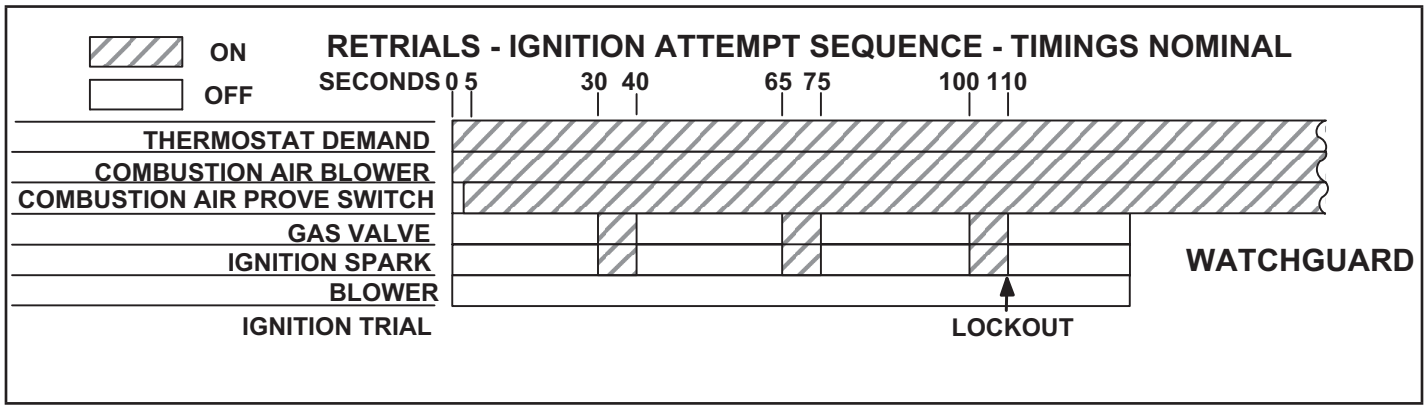


FIGURE 18

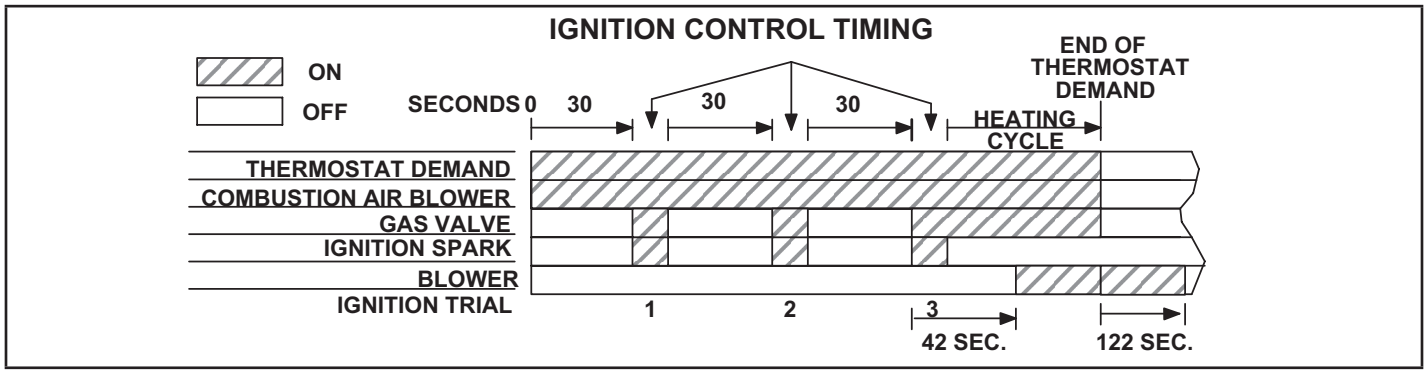


FIGURE 19

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

2-Heat Exchanger (FIGURE 20)

Units use aluminized steel cluster inshot burners with matching tubular aluminized (stainless steel is an option) steel heat exchangers and two-stage redundant gas valves. LDT180/240 uses two eleven-tube/burners for high heat. LDT156/240 uses two six-tube/burners for standard or low heat and two nine-tube/burners for medium 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 blower, exhaust gases are drawn out the top and fresh air/gas mixture is drawn in at the bottom. Heat is transferred to the air stream from all surfaces of the heat exchanger tubes. The supply air blowers, controlled by the Unit Controller A55, force air across all surfaces of the tubes to extract the heat of combustion. The shape of the tubes ensures maximum heat exchange.

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

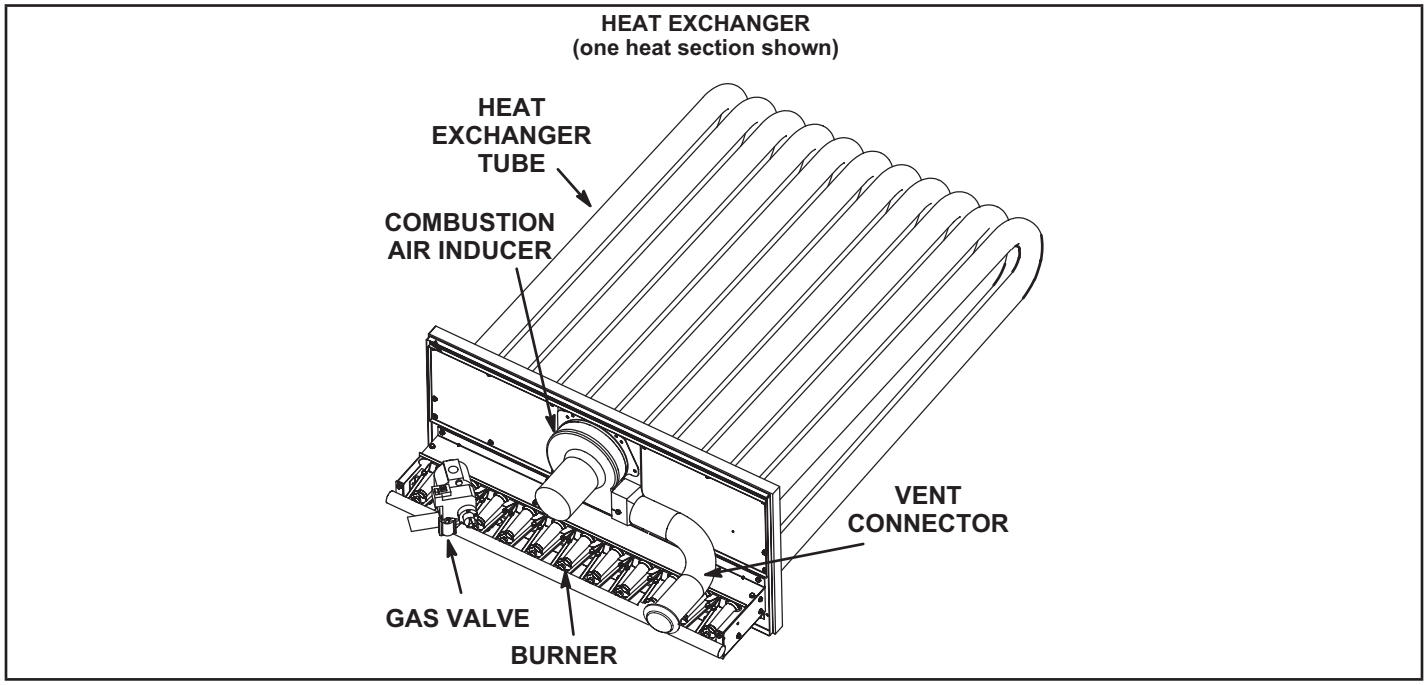


FIGURE 20

3-Burner Assembly (FIGURE 21)

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 Unit Controller A55.

Burners

All units use cluster 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. Burner maintenance and service is detailed in the SERVICE CHECKS section of this manual.

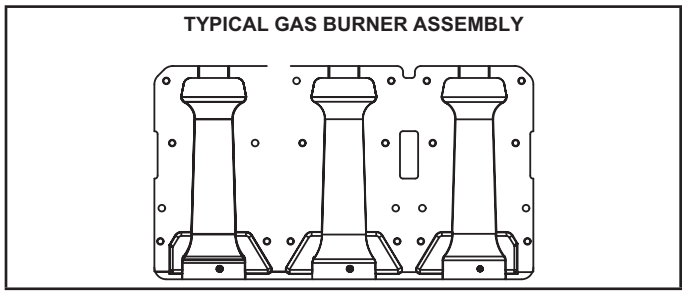


FIGURE 21

Orifice

Each burner uses an orifice (FIGURE 22) 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.

NOTE-*Do not use thread sealing compound on the orifices. Using thread sealing compound may plug the orifices. Natural gas orifice size is on nameplate. The LP gas orifice size is on the label provided in the LP kit.*

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

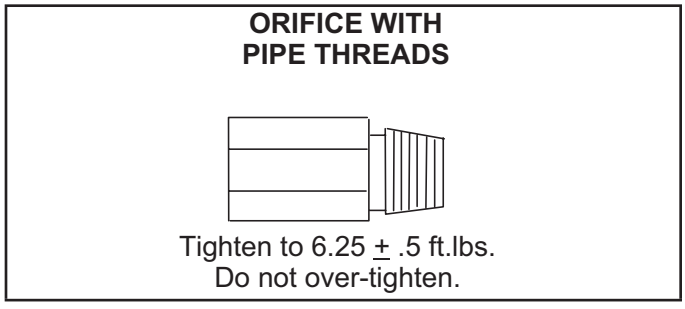


FIGURE 22

4-Primary High Temperature Limits S10 & S99

S10 is the primary high temperature limit for gas heat section one and S99 is the primary high temperature limit for gas heat section two.

In LDT156/240 units, S10 and S99 are located on the drip shield behind the blower housing. In this location S10 and S99 also serve as secondary limits. See FIGURE 23.

Primary limit S10 is wired to the Unit Controller A55 which energizes burner 1 control (A3), while primary limit S99 is wired to the A55 Unit Controller which energizes burner 2 control (A12). Its N.C. contacts open to de-energize the ignition control when excessive temperature is reached in the blower compartment. At the same time, the N.O. contacts of S10 and S99 close energizing the blower relay coil K3 through control A55. If either limit trips the blower will be energized. Limits settings are factory set and cannot be adjusted. If limit must be replaced same type and set point must be used. See Repair Parts Handbook.

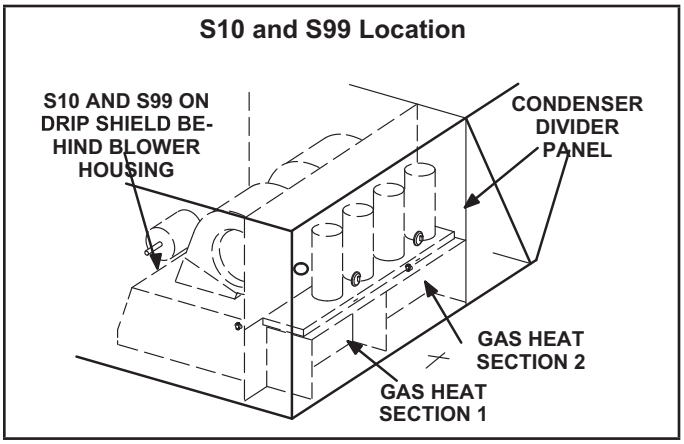


FIGURE 23

5-Flame Rollout Limits S47, S69

Flame rollout limits S47 on first heat section and S69 on second heat section are SPST N.C. high temperature limits located just above the burner air intake opening in the burner enclosures. Both switches are wired to the A55 Unit Controller. When S47 or S69 senses flame rollout (indicating a blockage in the combustion air passages), the corresponding flame rollout limit trips and the ignition control immediately closes the gas valve. Limit S47 and S69 in standard heat units are factory preset to open at 290F ± 12F on a temperature rise, while on high heat units both limits open at 270F ± 12F on a temperature rise. All flame rollout limits are manual reset.

6-Combustion Air Prove Switches S18, S45

Prove switches S18 (first heat section) and S45 (second heat section) are located in the compressor compartment. Each has its own control box. Both are identical SPST N.O. switches and monitor combustion air inducer operation. Switch S18 and S45 are 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 6 shows prove switch settings.

TABLE 6

S18 & S45 Prove Switch Settings

Close“ w.c.	Open “ w.c.
0.25 ± 5	0.10±5

7-Combustion Air Inducers B6 & B15

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

Both combustion air blowers use a 208/230 or 460V single-phase PSC motor and a 4.81in. x 1.25in blower wheel. All motors operate at 3200 or 3450 RPM and are equipped with auto-reset overload protection. Blowers are supplied by various manufacturers. Ratings may vary by manufacturer. Specific blower electrical ratings can be found on the unit rating plate.

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

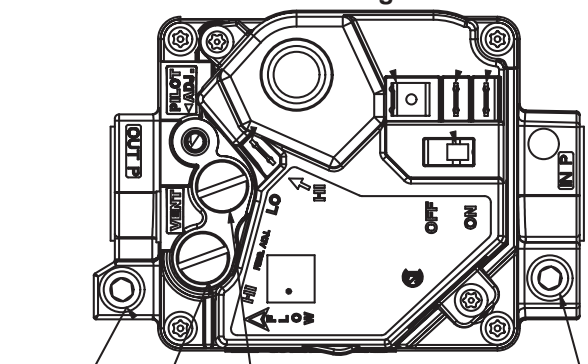
8-Combustion Air Motor Capacitors C3 & C11

The combustion air blower motors in all LDT units require run capacitors. Capacitor C3 is connected to combustion air blower B6 and C11 is connected to combustion air blower B15. Capacitors are rated at 208/230V CAB has 4uF 450V capacitors 460V CAB has 2uF 450V capacito3 or 4 MFD for 208/230 CAB.

9-Gas Valves GV1 & GV3

Gas valves GV1 and GV3 are identical. The gas valves are two-stage redundant valves. Units are equipped with valves manufactured by WhiteRodgers.. On a call for first stage heat (low fire), the valve is energized by the ignition control simultaneously with the spark electrode. On a call for second stage heat (high fire), the second stage operator is energized directly from A55 (GV1, GV3). The valve is adjustable for both low fire and high fire. A manual shut-off knob is provided on the valve for shut-off. Manual shut-off knob immediately closes both stages without delay. FIGURE 24 shows gas valve components. TABLE 7 shows factory gas valve regulation for LDT series units.

WHITE RODGERS 36H54 GAS VALVE
Two-Stage



Outlet Pressure Tap
Low Fire Adjustment (under cap)
Inlet Pressure Tap
High Fire Adjustment (under cap)

GAS VALVE SWITCH SHOWN IN **ON** POSITION.

FIGURE 24

TABLE 7

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

An electrode assembly is used for ignition spark. Two identical electrodes are used (one for each gas heat section). The electrode is mounted through holes on the left-most end of the burner support. The electrode tip protrudes into the flame envelope of the adjacent burner.

The electrode assembly is fastened to burner supports and can be removed for service without removing any part of the burners.

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

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

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

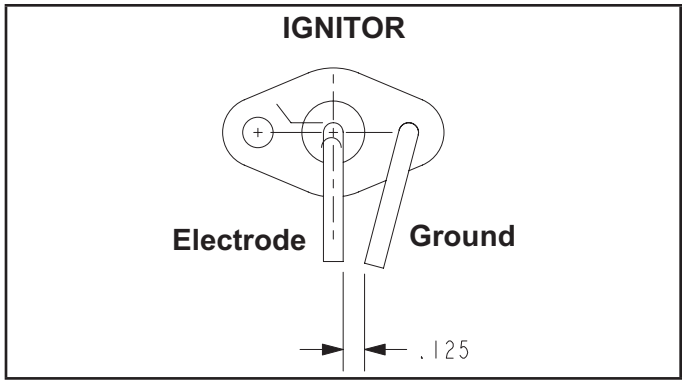


FIGURE 25

11-Flame Sensors

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

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

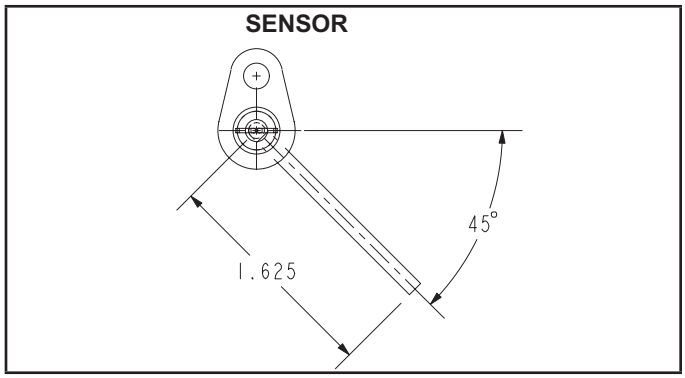


FIGURE 26

II-PLACEMENT AND INSTALLATION

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

III-CHARGING

A-Refrigerant Charge and Check - Fin/Tube Coil-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 60F, In temperatures below 60F, the charge* ***must*** *be weighed into the system.*

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

IMPORTANT - Charge unit in normal cooling mode.

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

SERVICE>TEST>COOL>COOL 3

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

3 - Apply the outdoor temperature to TABLE 8 to TABLE 10 to determine normal operating pressures. Pressures are listed for sea level applications at 80°F dry bulb and 67°F 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 approach method along with the normal operating pressures to confirm readings.

TABLE 8

156 Compressor 1 Frequency 56Hz - 581167-01

Outdoor Coil Entering Air TempºF	Circuit 1		Circuit 2	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65	218	110	232	118
75	262	129	279	138
85	305	146	319	144
95	350	149	365	148
105	400	152	416	150
110	454	155	471	153

TABLE 9

180 Compressor 1 Frequency 56Hz - 581168-01

Outdoor Coil Entering Air Temp°F	Circuit 1		Circuit 2	
	Dis. +10 psig	Suc. +5 psig	Dis. +10 psig	Suc. +5 psig
65	243	133	248	132
75	280	137	286	135
85	321	141	328	138
95	366	144	374	140
105	415	146	424	143
110	469	149	477	146

TABLE 10

240 Compressor 1 Frequency 68Hz - 581169-01

Outdoor Coil Entering Air Temp°F	Circuit 1		Circuit 2	
	Dis. +10 psig	Suc. +5 psig	Dis. +10 psig	Suc. +5 psig
65	260	135	264	135
75	297	136	304	136
85	338	138	346	138
95	384	140	394	140
105	434	142	443	142
110	485	144	494	144

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

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

Approach Temperature = Liquid temperature (at outdoor coil outlet) minus ambient temperature.

2 - Approach temperature should match values in TABLE 11. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.

3 - The approach method is not valid for grossly over or undercharged systems. Use TABLE 8 to TABLE 10 as a guide for typical operating pressures.

TABLE 11

APPROACH TEMPERATURES - FIN/TUBE COIL

Unit	Liquid Temp. Minus Ambient Temp.	
	1st Stage	2nd Stage
156	5°F ± 1 (2.8°C ±0.5)	4.0°F ± 1 (2.2°C ±0.5)
180	2°F ± 1 (1.1°C ±0.5)	5.0°F ± 1 (2.8°C +0.5)
240	6°F ± 1 (3.3°C +0.5)	6°F ± 1 (3.3°C ±0.5)

IV- START-UP OPERATION

A-Preliminary and Seasonal Checks

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

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

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

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

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

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

B-Cooling Start-up

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

1 - Initiate first and second stage cooling demands according to instructions provided with thermostat.

2 - First-stage thermostat demand will energize indoor blower in Low Cooling CFM. Second-stage thermostat demand will energize indoor blower in High Cooling CFM. Both demands energize compressor 1. The remaining compressors will be energized as needed to meet cooling demand.

3 - 156, 180 and 240 units contain two refrigerant circuits or systems.

4 - Each refrigerant circuit is separately charged with R410A refrigerant. See unit rating plate for correct amount of charge.

5 - Refer to the Refrigerant Check and Charge section to check refrigerant charge.

C-Heating Startup

Heat Pump Mode

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

2 - Outdoor Temperature **ABOVE** Balance Point Set-point (35°F default):

A first-stage heating demand (W1) will energize compressor heat pump heating, the outdoor fans, and the blower.

A second-stage heating demand (W2) will de-energize compressor heat pump heating and High Gas Heat will be energized..

3 - Outdoor Temperature **BELOW** Balance Point Set-point (35°F default):

A first-stage heating demand (W1) will energize low gas heat and the blower motor. A second-stage heating demand (W2) will energize high gas heat.

Gas Heat Mode

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.

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.

⚠ IMPORTANT

This unit is equipped with an automatic spark ignition system. Do not attempt to light manually.

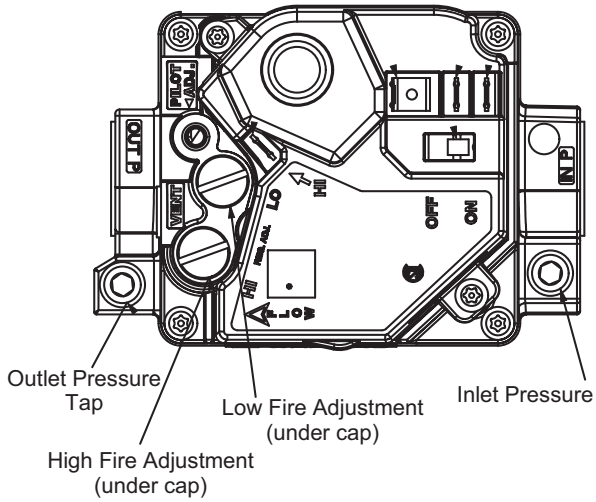
In case of a safety shutdown, move thermostat switch to **OFF** and return the thermostat switch to **HEAT** to reset ignition control.

Placing Furnace In Operation

Gas Valve Operation FIGURE 27

1 - Set thermostat to lowest setting.
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 the knob on the gas valve 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.

WHITE RODGERS 36H54 GAS VALVE
Two-Stage



GAS VALVE SWITCH SHOWN IN **ON** POSITION.

FIGURE 27

7 - Turn the knob on the gas valve 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 up to 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.

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 the knob on the gas valve to "OFF". Do not force.

D-Safety or Emergency Shutdown

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

V- SYSTEMS SERVICE CHECKS

A-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, Operation and Maintenance instruction for more information.

1-Gas Piping

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

2-Testing Gas Piping

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

When pressure testing gas lines, the gas valve must be disconnected and isolated. **Gas valves can be damaged if subjected to more than 0.5 psig.** See FIGURE 28.

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

The use of specialty Gas Leak Detector is strongly recommended. It is available through under part number 31B2001. See CORP 8411-L10, for further details. Do not use matches, candles, flame or any other source of ignition to check for gas leaks.

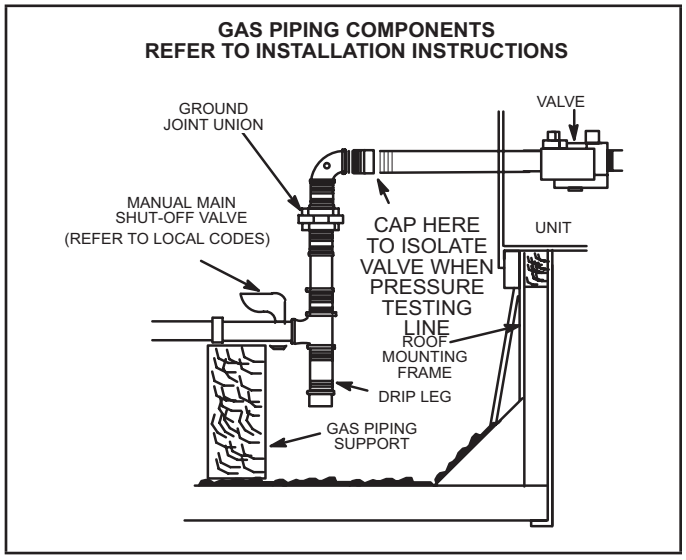


FIGURE 28

3-Testing Gas Supply Pressure

When testing gas supply pressure, connect test gauge to the inlet pressure tap located on unit gas valve GV1 and or GV3. 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." See table 12 for supply pressures.

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 and or GV3. See FIGURE 27 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 27 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 12.

⚠ IMPORTANT

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

TABLE 12

Manifold Pressure "W.C.				Supply Pressure "W.C.	
Natural		LP.Propane		Nat	LP
Low	High	Low	High	4.7-10.5	10.8-13.5
1.6± 0.2	3.7±0.3	5.5± 0.3	10.5± 0.5		

Combustion gases

Flue products must be analyzed and compared to the unit specifications. Problems detected during the inspection may make it necessary to temporarily shut down the furnace until the items can be repaired or replaced.

5-Proper Gas Flow

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

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

6-Inshot Burner

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

Follow steps below to remove burner assembly.

1 - Turn off power to unit and shut off gas supply.
2 - Remove screws holding the burner support cap.
3 - Burner assembly is a cluster assembly (FIGURE 29) and can be removed as one.
4 - Clean and reassemble (reverse steps 1-3).
5 - Be sure to secure all wires and check plumbing.
6 - Turn on power to unit. Follow lighting instructions attached to unit and operate unit in heating mode. Check burner flames. They should be blue with yellow streaks.

7-Spark Electrode Gap

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

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

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

TYPICAL GAS BURNER ASSEMBLY

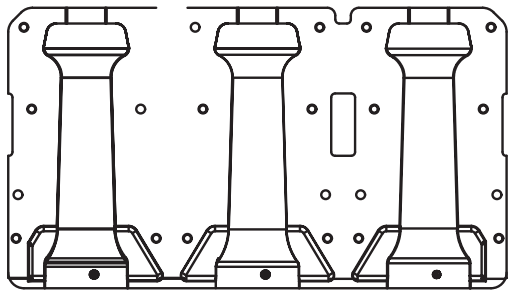


FIGURE 29

8-Heat Exchanger

To Access or Remove Heat Exchanger From Unit:

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

9-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, compare reading to TABLE 13. Do not bend electrodes.
5 - Disconnect power to unit before disconnecting meter. Make sure sensor wire is securely reconnected before reconnecting power to unit.

TABLE 13

Manufacturer	Nominal Signal Microamps	Drop Out
UTEC	0.5 - 1.0	.09

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

10-Combustion Air Inducer

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

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 inducer to vent exhaust gases from the burners. When the combustion air inducer is purging the exhaust gases, the combustion air prove switch is closing proving that the combustion air inducer is operating before allowing the ignition control to energize. When the combustion air prove switch is closed and the delay is over, the ignition control activates the first stage operator of the gas valve (low fire), the spark and the flame sensing electrode. Sparking stops immediately after flame is sensed.

B-Cooling System Service Checks

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

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.

A-Filters

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

B-Lubrication

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

C-Supply Air Blower Wheel

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

D-Evaporator Coil

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

E-Condenser Coil

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

F-Electrical

1 - Check all wiring for loose connections.

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

3 - Check amp-draw on both condenser fan motor and blower motor.

Fan Motor Rating Plate ____ Actual _____

Indoor Blower Motor Rating Plate____ Actual____

VII-ACCESSORIES

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

A-Roof Curbs

When installing the LDT units on a combustible surface for downflow discharge applications, the hybrid C1CURB70C-1 8-in height, C1CURB71C-1 14-in height, C1CURB72C-01 18-in height and C1CURB73C-1 24-in roof mounting frame is used. The assembled hybribd mounting frame is shown in FIGURE 30. 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 31. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

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

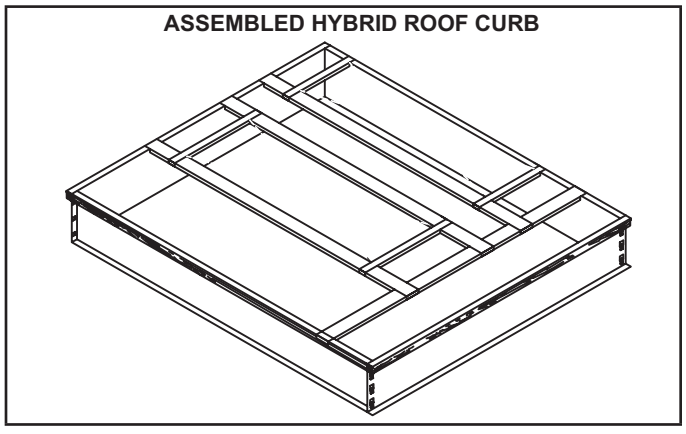


FIGURE 30

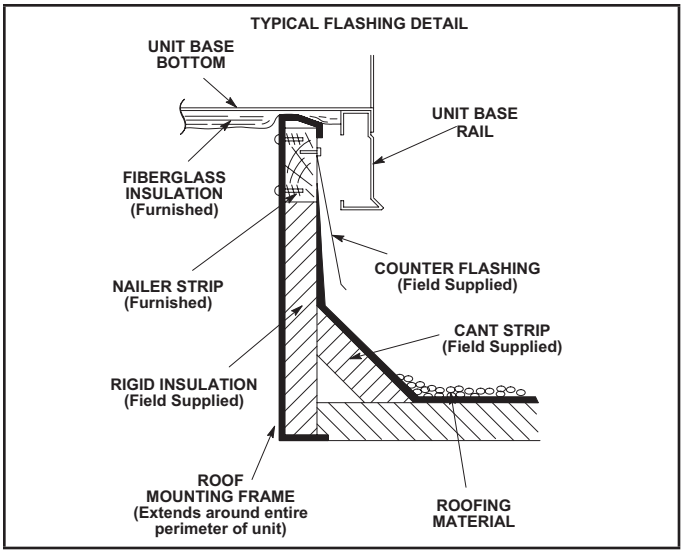


FIGURE 31

B-Transitions

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

C-C1DAMP10 & E1DAMP20 Outdoor Air Dampers

C1DAMP10C and E1DAMP20C (figure 32) consist of a set of dampers which may be manually or motor operated to allow up to 25 percent outside air into the system at all times. See FIGURE 32. Either air damper can be installed in LDT units. Washable filter supplied with the outdoor air dampers can be cleaned with water and a mild detergent. It should be sprayed with Filter Handicoater when dry prior to reinstallation. Filter Handicoater is R.P. Products coating no. 418 and is available as Part No. P-8-5069.

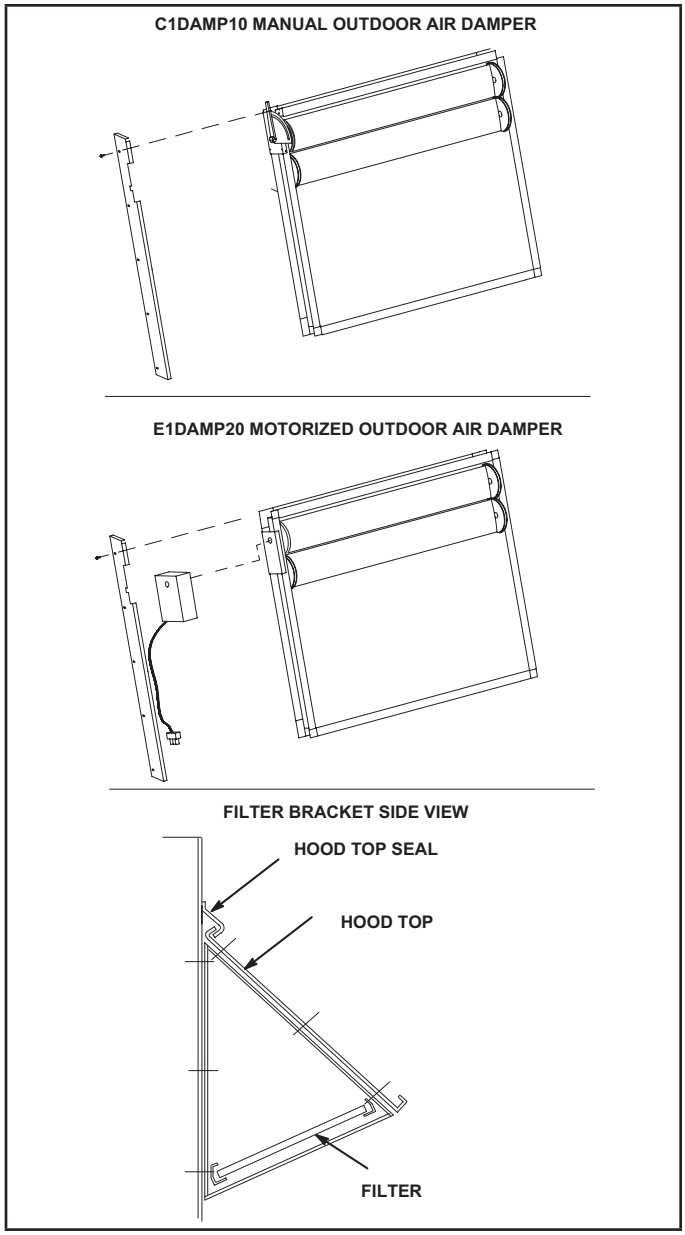


FIGURE 32

D-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.

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

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

NOTE - *Gravity exhaust dampers are required with power exhaust.*

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

1-"TMP" MODE (SENSIBLE TEMPERATURE)

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

2-"ODE" MODE (OUTDOOR ENTHALPY)

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

3-"DIF" MODE (DIFFERENTIAL ENTHALPY)

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

4-"GLO" MODE (GLOBAL)

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

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

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

F-Gravity Exhaust Dampers

C1DAMP50C dampers (FIGURE 33) are used in downflow and LAGEDH are used in horizontal air discharge applications. LAGEDH gravity exhaust dampers are installed in the return air plenum . The dampers must be used any time an economizer or power exhaust fans are applied to LDT series units. An exhaust hood is furnished with the gravity exhaust damper.

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

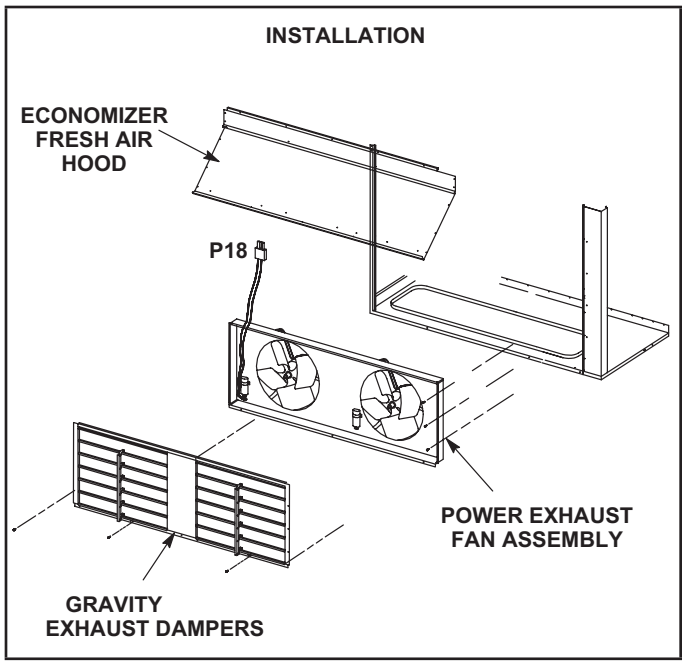


FIGURE 33

G-C1PWRE10 Power Exhaust Fans

C1PWRE10 power exhaust fans are used in downflow applications only. C1PWRE10 fans require optional downflow gravity exhaust dampers and E1ECON15 economizers. Power exhaust fans provide exhaust air pressure relief and also run when return air dampers are closed and supply air blowers are operating. FIGURE 33 shows the location of the power exhaust fans. See installation instructions for more detail.

H-Optional Cold Weather Kit (Canada only)

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

The kit includes the following parts:

1 - The strip heater (HR6) is located as close as possible to the gas valve. The strip heater is rated at 500 Watts (line voltage).

2 - 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 the switch opens and the gas heat section is de-energized. The switch automatically resets when the heating compartment temperature reaches -10° F.

b. Thermostat switch (S60) is an auto-reset SPST N.C. switch which opens on a temperature rise. The switch is wired in series with K125 coil. When the temperature rises above 20° F the switch opens and the electric heater is de-energized through K125. The switch automatically resets when the heating compartment temperature reaches -10° F.

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 K125 coil. When temperature drops below 20° F the switch closes and electric heater is energized through K125. The switch automatically opens when heating compartment temperature reaches 76° F.

I-Control Systems

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

J-Smoke Detectors A171, A172, A173

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

K-Blower Proving Switch S52

The blower proving switch monitors blower operation and locks out the unit in case of blower failure. The switch is N.O. and closes at .15" W.C. The switch is mounted on the middle left corner of the blower support panel. Wiring for the blower proving switch is shown on the temperature control section (C) wiring diagram in back of this manual.

L-Dirty Filter Switch S27

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

M-LP / Propane Kit

Units require two (one for each gas heat section) natural to LP/propane kit. The kit includes one gas valve, eleven burner orifices and three stickers. For more detail refer to the natural to LP gas changeover kit installation instructions.

N-Indoor Air Quality (CO2) Sensor A63

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

O-Optional UVC Lights

The Healthy Climate germicidal light emits ultraviolet (UVC) energy that has been proven effective in reducing microbial life forms (viruses, bacteria, yeasts and molds) in the air.

UVC germicidal lamps greatly reduce the growth and proliferation of mold and other bio-aerosols (bacteria and viruses) on illuminated surfaces.

Germicidal lamps are NOT intended to be used for removal of active mold growth. Existing mold growth must be appropriately removed PRIOR to installation of the germicidal lamp.

Refer closely to UVC light installation instruction warnings when servicing units.

P-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.

Q-Indoor Air Quality Sensor

If a sensor fails, use the following procedures to physically remove the failed sensor from the unit. All units will have two IAQ sensors installed, one in the return air and the second one in the supply side. See FIGURE 34. The sensors are secured to the tray by two screws. The power cable assembly will need to be detached from the connector located on the bottom of the sensor as well.

Removing the Sensor

1 - Go to Menu > Network Integrations > Wireless Sensor Network Setup > Wireless Sensor Network.

2 - From the Network Nodes list, select the IAQ sensor that is being replaced.

3 - On the Sensor Information Screen, select the Remove Sensor option at the bottom of the screen.

4 - Type in the sensor name that is to be removed and select Proceed.

Replacing the Sensor

1 - Open the CORE Service App and navigate to Menu > (Setup) Network Integration > Wireless Sensor Network Setup > Wireless Sensor Network.

2 - Click Add node on the Network Nodes screen. This triggers the CORE Service App to scan for both the WIAQ Return Sensor and WIAQ Discharge Sensor.

3 - Follow the prompts on the screen to finish the adding process.

4 - Verify that the CORE Service App displays the “Node Provisioned” on the Provision Sensor Network.

5 - Verify if CORE Service app is showing PM2.5 counts for both return and supply mounted sensors and TVOC counts from return mounted sensor.

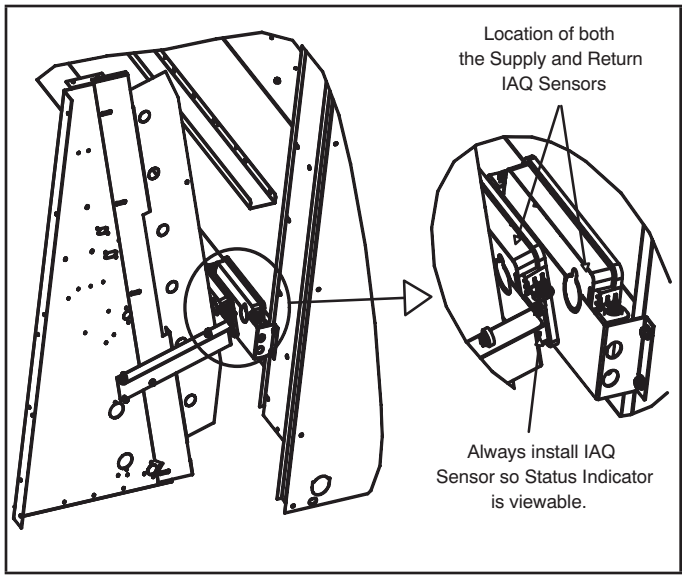


FIGURE 34

R-Bipolar Ionizer

The Needlepoint Bipolar Ionizer (NBPI) kit is specifically designed for LG/LC/LH/LD/KG/KC/KH 024-300 units. The ionizer is equipped with dry contacts which allow a Building Automation System (BAS) to interface and indicate ionizer functionality.

Note - *The BAS will be able to monitor units equipped with M4 Unit Controllers only. Units with an M3 Unit Controller or no controller need to be connected to a separate monitoring system.*

The Ionizers are also equipped with a green LED which indicates power is on. When the blower is in operation, power is delivered to the Ionizers and ions are generated. See TABLE 14 for unit application.

TABLE 14

LDT Unit	Part No.	
156	21U37	622688-03
240	21U38	622688-04
300	21U39	622688-05

VIII--Multi-Staged Blower

A-Design Specifications

Use the “Blower CFM Design Specifications” TABLE 15 to fill in test and balance values when setting up the unit. If only high and low cooling design specifications are provided, set the medium cooling CFM at the high or low cooling design spec or any CFM between.

B-Set Maximum CFM

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

C-Set Blower Speeds

1 - Use the following mobile service app menu to enter the blower design specified CFM into the Unit Controller. Make sure blower CFM is within limitations shown in table TABLE 15 or TABLE 16. Refer to the Unit Controller manual provided with unit.

RTU MENU > RTU OPTIONS > BLOWER > SPEED

2 - Enter the following design specifications as shown in TABLE 15.

3 - *Blower /*

Heat CFM

Cooling High CFM

Cooling Low CFM

Vent CFM

4 - Adjust the blower RPM to deliver the target CFM based on the measured static pressure using the blower table.

5 - Measure the static pressure again and apply the static pressure and RPM to the blower tables to determine adjusted CFM.

6 - Repeat adjustments until design CFM is reached.

D-Set Damper Minimum Position

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

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

CFM.

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

The Unit Controller will calculate the “midpoint” CFM.

*Available blower speeds vary by unit and thermostat stages.

Set Minimum Position 1

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

RTU MENU > SETTINGS > RTU OPTIONS > DAMPER

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

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

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

Set Minimum Position 2

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

RTU MENU > SETTINGS > RTU OPTIONS > DAMPER

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

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

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

E-Inverter Bypass Option

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

SETTINGS > RTU OPTIONS > BLOWER > VFD BYPASS

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

SETUP > INSTALL

Press SAVE until the menu reads:

CONFIGURATION ID 1

Change the 6th character position to “A” for automatic by-pass option.

Press SAVE

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

F-Unit Operation

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

G-Manual Supply Air VFD Bypass

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

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

Manually change blower operation to constant air volume as follows:

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

⚠ WARNING

ELECTRICAL SHOCK HAZARD.

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

2 - Locate P246 and P247 connectors near the VFD. See FIGURE 35.

3 - Disconnect P246 from P246 (power in to VFD) and P247 from P247 (power out to blower). See FIGURE 36.

4 - Connect P246 to P247. See FIGURE 37.

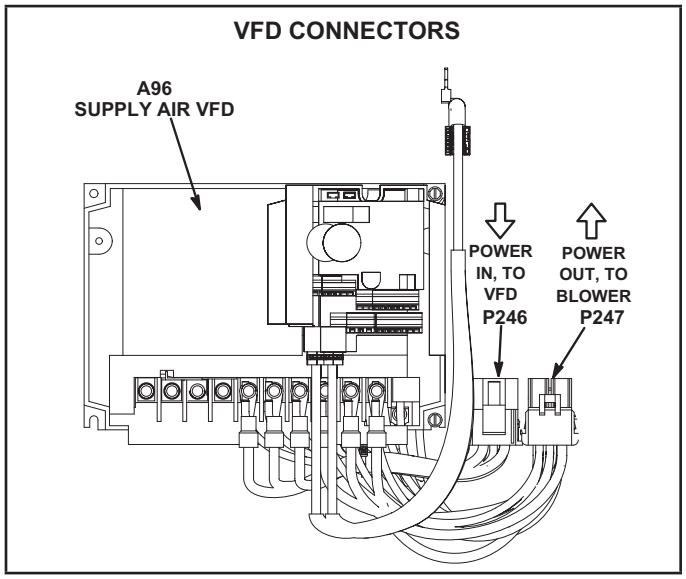


FIGURE 35

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

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

6 - Check the indoor blower motor nameplate for full load amperage (FLA) value. Measure the amp readings from the indoor blower motor operating in bypass mode. If measured amps are higher than nameplate FLA value, decrease the CFM by opening (turning counterclockwise) the motor pulley. See FIGURE 12. Do not exceed minimum and maximum number of pulley turns as shown in table 4.

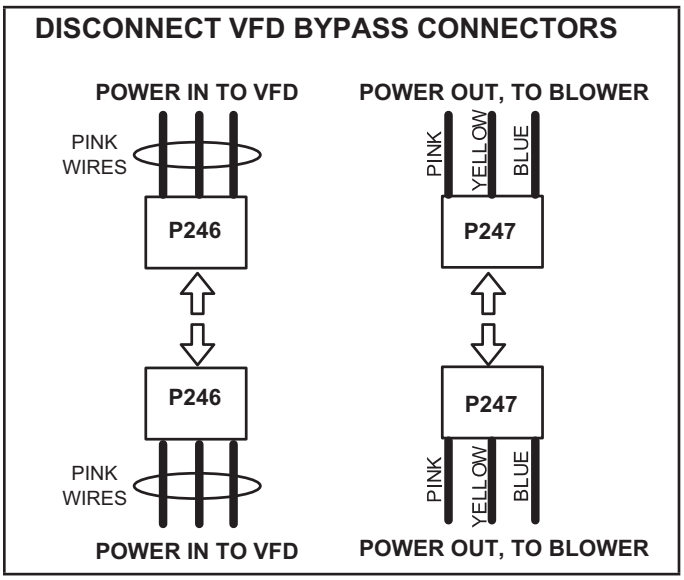


FIGURE 36

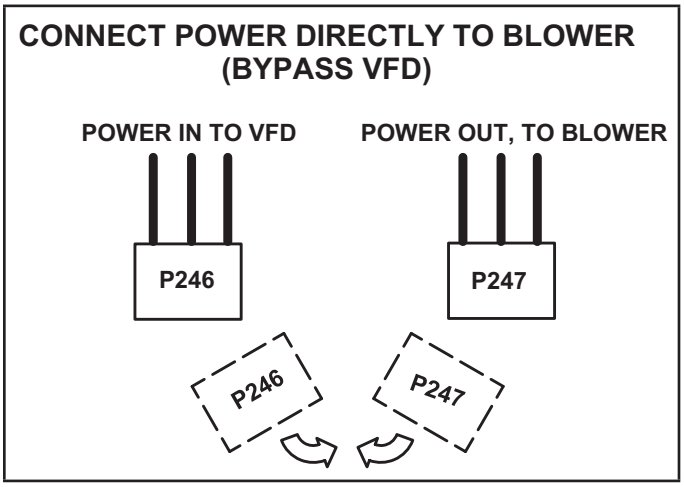


FIGURE 37

TABLE 15

HEATING, VENTILATION & SMOKE MINIMUM AND MAXIMUM CFM

Unit			Heating CFM			Vent CFM			Smoke CFM		
Model	Speed	Heat Code	Default	Min	Max	Default	Min	Max	Default	Min	Max
LDT156H	Low	L	6000	2725	6250	5200	1950	62500	5200	1950	6250
	Std	S		4325							
	Med	M		4500							
LHT156H	HP W/O EH	N		3900							
	15, 30, 45, 60, 90 KW	E, J, K, L,		6000							
LDT180H	Low	L	6000	2725	7200	6000	2250	7200	6000	2250	7200
	Std	S		4325							
	Med	M		4500							
	High	H		5125							
LHT180H	HP W/O EH	N		4500							
	15, 30, 45, 60, 90 KW	E, J, K, L, P		6000							
LDT240H	Low, Std, Med	L, S, M	8000	4500	9600	8000	3000	9600	8000	3000	9600
	High	H		5125							
LHT240H	HP W/O EH	N		6000							
	15, 30, 45, 60, 90 KW	E, J, K, L, P		6000							

*Use highest value between Heating and Cooling High CFM Max.
*Use highest value between Heating and Cooling High CFM Max.

TABLE 16

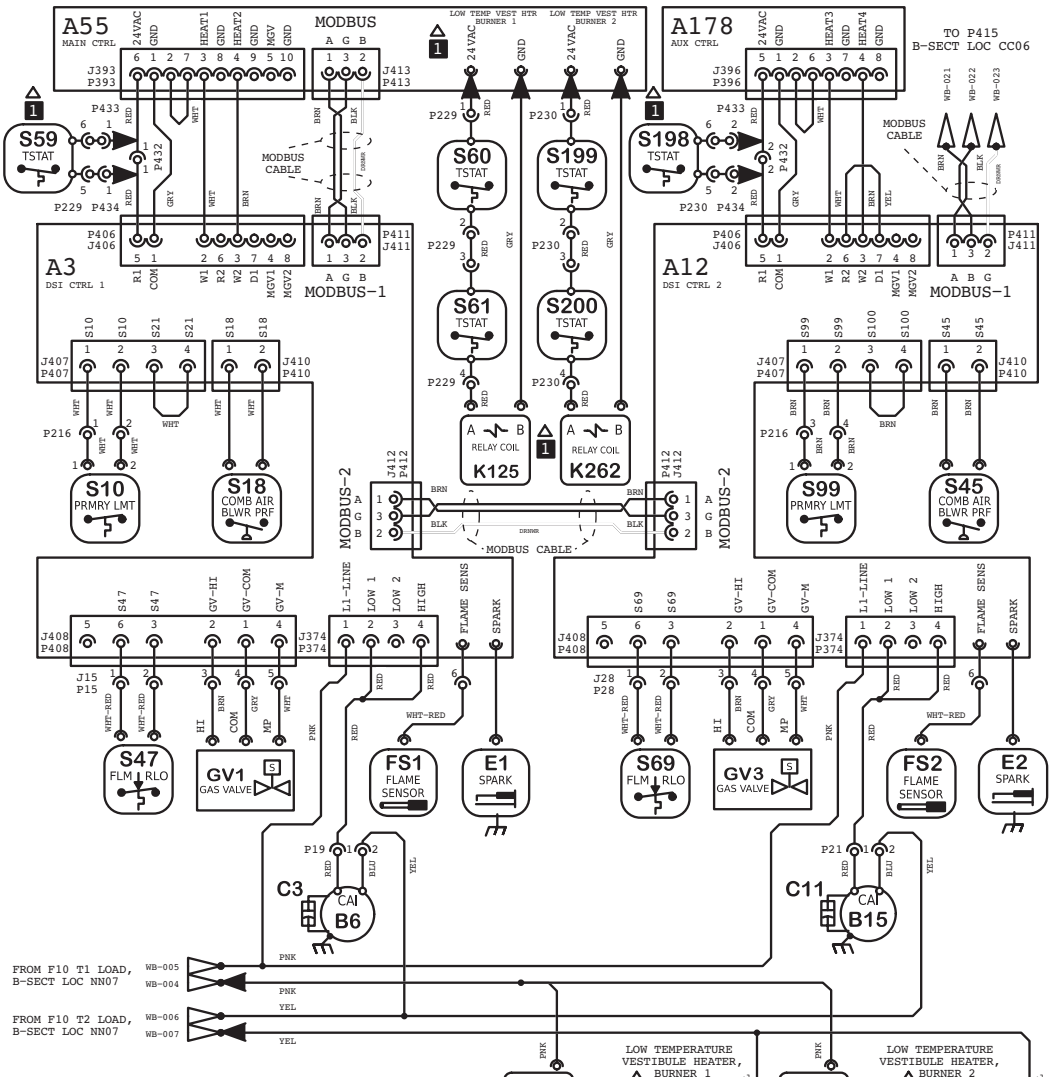
COOLING MINIMUM AND MAXIMUM CFM

LDT Unit	Cooling Low CFM			Cooling High CFM		
	De-fault	Min	Max	De-fault	Min	Max
156H	3380	1500	6250	4675	4000	6250
180H	3900	2000	7200	5400	5000	7200
240H	5200	3000	9600	7200	6250	9600

*Use Cooling High CFM Max

IX-Wiring Diagrams and Sequence of Operation

GAS HEAT DIAGRAM



KEY LIST		
LOCATION	COMPONENT DESCRIPTION	
A3/A12	A3, A12	CONTROL BOARD, DSI BURNER 1, 2
A55	A55	CONTROL BOARD, MAIN
A178	A178	CONTROL BOARD, EXTENSION
B6/B15	B6, B15	MOTOR, COMBUSTION AIR IND., BURNER 1, 2
C3/C11	C3, C11	CAPACITOR, CAI MOTOR 1, 2
E1/E2	E1, E2	IGNITER, SPARK, BURNER 1, 2
FS1/FS2	FS1, FS2	SENSOR, FLAME, BURNER 1, 2
GV1/GV2	GV1, GV2	VALVE, GAS, BURNER 1, 2
HR6/HR16	HR6, HR16	HEATER, -50C LOW TEMP VEST, BURNER 1, 2
K125/K262	K125, K262	RELAY, LOW TEMP VEST HEATER, BURNER 1, 2
K125/K262	K125, K262	
S10/S99	S10, S99	LIMIT, PRIMARY, BURNER 1, 2
S18/S45	S18, S45	SWITCH, COMB AIR BLWR PROOF, BURNER 1, 2
S47/S69	S47, S69	SWITCH, FLAME ROLLOUT, BURNER 1, 2
S59/S198	S59, S198	TSTAT, OPEN -20F, CLOSE 10F, BURNER 1, 2
S60/S199	S60, S199	TSTAT, OPEN 20F, CLOSE -10F, BURNER 1, 2
S61/S200	S61, S200	TSTAT, OPEN 50F, CLOSE 20F, BURNER 1, 2

NOTES	
1	- 50C LOW TEMPERATURE VESTIBULE HEATER - OPTIONAL

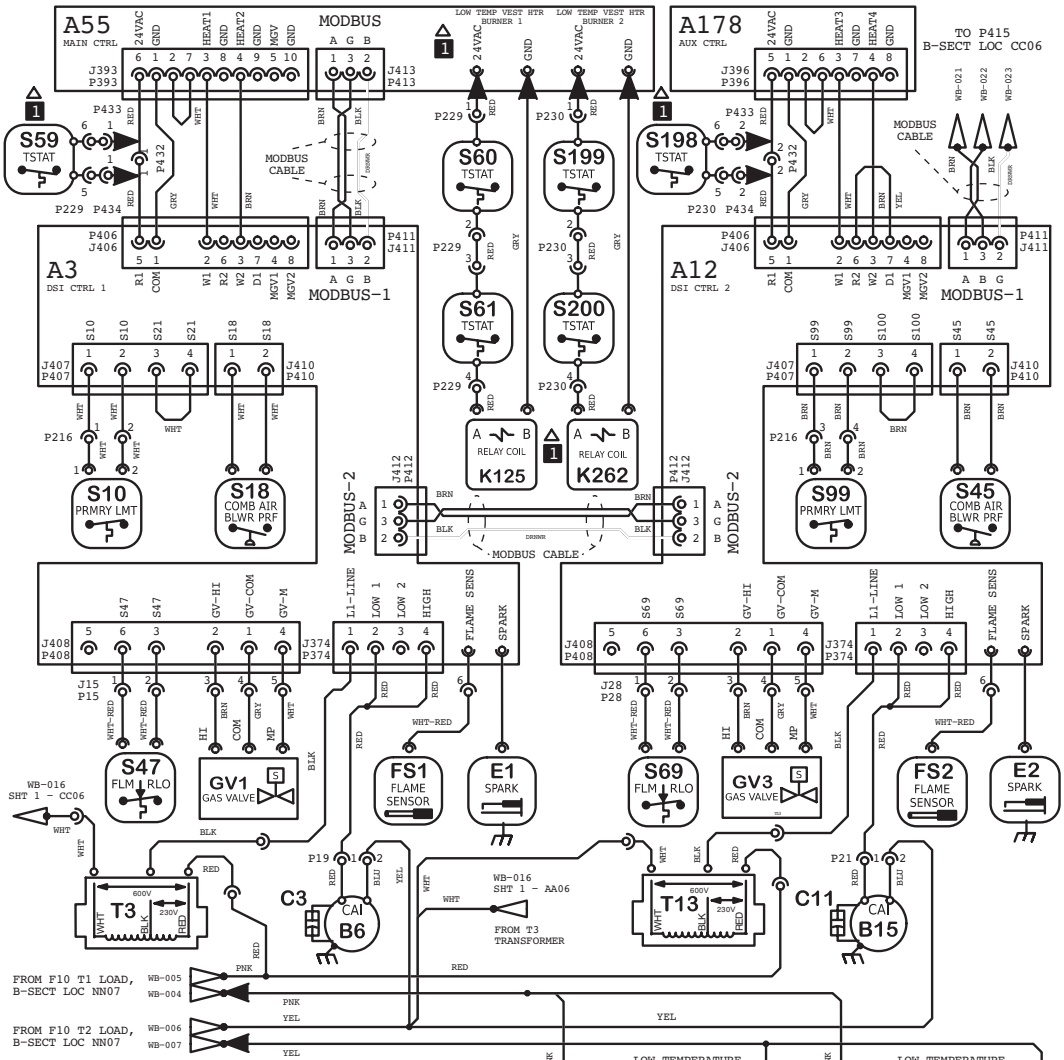
DENOTES OPTIONAL COMPONENTS AND WIRING

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

WIRING DIAGRAM FLOW

Model: LGT, LDT Series RTU - Gas Heat
Input Heat Capacity 169k - 480k Btuh
Voltage: 208-240V/3~/60Hz (Y), 460V/3~/60Hz (G)
Supersedes: N/A Form No: 538225-01 Rev: 0

GAS HEAT DIAGRAM



KEY LIST		
LOCATION		COMPONENT DESCRIPTION
AA/EE02	A3, A12	CONTROL BOARD, DSI BURNER 1, 2
AA01	A55	CONTROL BOARD, MAIN
BB01	A178	CONTROL BOARD, EXTENSION
BB/EE07	B6, B15	MOTOR, COMBUSTION AIR IND., BURNER 1, 2
BB/EE08	C3, C11	CAPACITOR, CAI MOTOR 1, 2
CC/FF06	E1, E2	IGNITER, SPARK, BURNER 1, 2
CC/FF09	FS1, FS2	SENSOR, FLAME, BURNER 1, 2
DD/EE09	GV1, GV2	VALVE, GAS, BURNER 1, 2
DD/FF06	HR6, HR16	HEATER, -50C LOW TEMP VEST, BURNER 1, 2
CC/DD08	K125, K262	RELAY, LOW TEMP VEST HEATER, BURNER 1, 2
DD/EE08	K125, K262	
AA/EE04	S10, S99	LIMIT, PRIMARY, BURNER 1, 2
BB/FF04	S18, S45	SWITCH, COMB AIR BLWR PROOF, BURNER 1, 2
AA/DD09	S47, S69	SWITCH, FLAME ROLLOUT, BURNER 1, 2
AA/DD02	S59, S198	TSTAT, OPEN -20F, CLOSE 10F, BURNER 1, 2
CC/DD02	S60, S199	TSTAT, OPEN 20F, CLOSE -10F, BURNER 1, 2
CC/DD03	S61, S200	TSTAT, OPEN 50F, CLOSE 20F, BURNER 1, 2
AA06	T3	TRANSFORMER, CAB MOTOR 1
BB06	T13	TRANSFORMER, CAB MOTOR 2

NOTES	
1	- 50C LOW TEMPERATURE VESTIBULE HEATER - OPTIONAL

DENOTES OPTIONAL COMPONENTS AND WIRING

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

WIRING DIAGRAM FLOW

Model: LGT, LDT Series RTU - Gas Heat
Input Heat Capacity 169k - 480k Btuh
Voltage: 575V/3~/60Hz (J)
Supersedes: N/A Form No: 538226-01 Rev: 0

Sequence of Operation Gas Heat LDT156/240

Heating Type Determination - On a heating demand if the outdoor air temperature is above Balance Set Point, proceed to Heat Pump Heat. If outdoor temperature is below the Balance Point Set Point, proceed to First Stage Heat.

BLOWER OPERATION

Control Inverter A96 energizes B3 on a G demand.

HEAT PUMP HEAT:

1 - A55 Unit Controller receives W1 heating demand.

2 - A55 energizes outdoor fans B4, B5 & B21 through K10 & K68 respectively.

3 - After A55 proves N.C. lower pressure switch S87 and N.C. high pressure switch S4, contactor K1 is energized

4 - N.O. K1 closes energizing compressor B1, and N.C. K1-52 opens de-energizing HR1.

5 - A55 energizes outdoor fans B22, B23 & B24 through K149 & K150 respectively.

6 - After A55 proves N.C. lower pressure switch S88 and N.C. high pressure switch S7, contactor K2 is energized.

7 - N.O. K2 closes energizing compressor B2, and N.C. K2-52 opens de-energizing HR2.

FIRST STAGE HEAT:

1 - Heating demand initiates at W1 in thermostat.

2 - 24VAC is routed to the A55 Unit Controller. After A55 proves N.C. primary limit S10, the combustion air blower B6 is energized.

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

4 - As steps 2, 3 and 4 occur, A55 proves N.C. primary gas heat limit S99 and the combustion air blower B15 is energized.

5 - After the combustion air blower B15 has reached full speed, the combustion air proving switch (S45) contacts close. The A55 routes 24VAC through N.C. burner 2 flame rollout switch S69 and the closed contacts of the combustion air proving switch (S45) to energize the ignition module A12. After a 30 second delay A12 energizes gas valve GV3 on low fire.

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SECOND STAGE HEAT:

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

7 - A second stage heating demand is received by A55.

8 - A55 will energize the corresponding gas valves GV1 and GV3 on high fire

OPTIONAL LOW AMBIENT KIT

(C.G.A. -50° C LOW AMBIENT KIT):

9 - When heat section temperature drops below -20°F, S59 opens and de-energized A3 and A12 ignition controls. At the same temperature, S60 closes and energizes K125. K125-1 contacts close energizing HR6 Cold Weather Kit electric heat.

10 - When heat section temperature rises to 10°F, S59 closes allowing power to A3 and A12 ignition controls. At the same temperature, S60 opens and de-energizes K125. K125-1 contacts open de-energizing HR6 Cold Weather Kit electric heat.

11 - If heat section temperature rises above 50°F, S61 will open and de-energize K125. K125-1 contacts will open and de-energize HR6 Cold Weather Kit electric heat. If heat section temperature drops to 20°F, S61 will close and allow power to K125.

END OF SECOND STAGE HEAT:

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

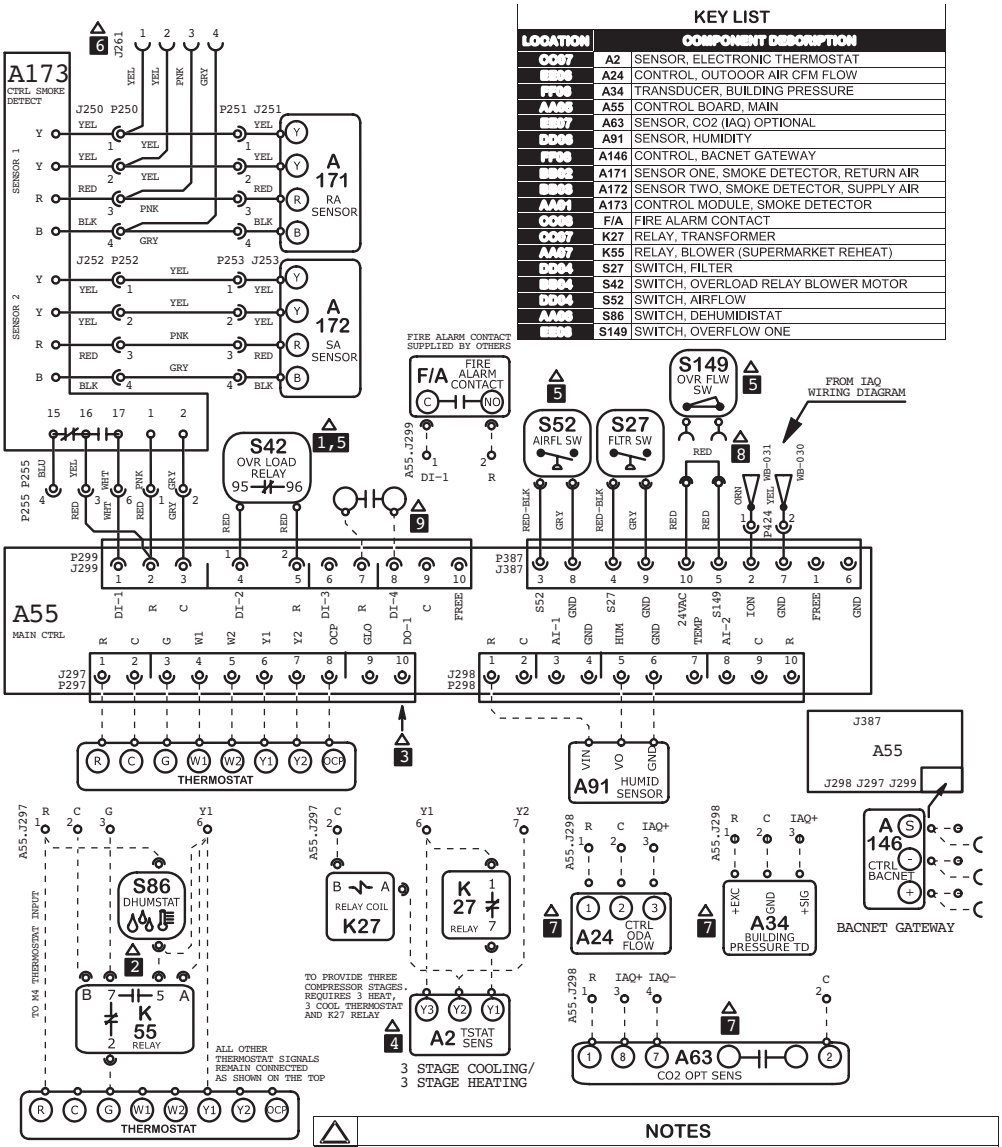
13 - High fire on GV1 and GV3 are de-energized by the A55.

END OF FIRST STAGE HEAT:

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

15 - Ignition module A3 is de-energized by A55 in turn de-energizing GV1. Combustion blower air blower B6 is also de-energized. At the same instant, ignition module A12 is de-energized by A55 in turn de-energizing GV3. B6 combustion air blower is also de-energized.

THERMOSTAT



KEY LIST

LOCATION		COMPONENT DESCRIPTION
[illegible]	A2	SENSOR, ELECTRONIC THERMOSTAT
[illegible]	A24	CONTROL, OUTOOOR AIR CFM FLOW
[illegible]	A34	TRANSDUCER, BUILDING PRESSURE
[illegible]	A55	CONTROL BOARD, MAIN
[illegible]	A63	SENSOR, CO2 (IAQ) OPTIONAL
[illegible]	A91	SENSOR, HUMIDITY
[illegible]	A146	CONTROL, BACNET GATEWAY
[illegible]	A171	SENSOR ONE, SMOKE DETECTOR, RETURN AIR
[illegible]	A172	SENSOR TWO, SMOKE DETECTOR, SUPPLY AIR
[illegible]	A173	CONTROL MODULE, SMOKE DETECTOR
[illegible]	F/A	FIRE ALARM CONTACT
[illegible]	K27	RELAY, TRANSFORMER
[illegible]	K55	RELAY, BLOWER (SUPERMARKET REHEAT)
[illegible]	S27	SWITCH, FILTER
[illegible]	S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
[illegible]	S52	SWITCH, AIRFLOW
[illegible]	S86	SWITCH, DEHUMIDISTAT
[illegible]	S149	SWITCH, OVERFLOW ONE

NOTES

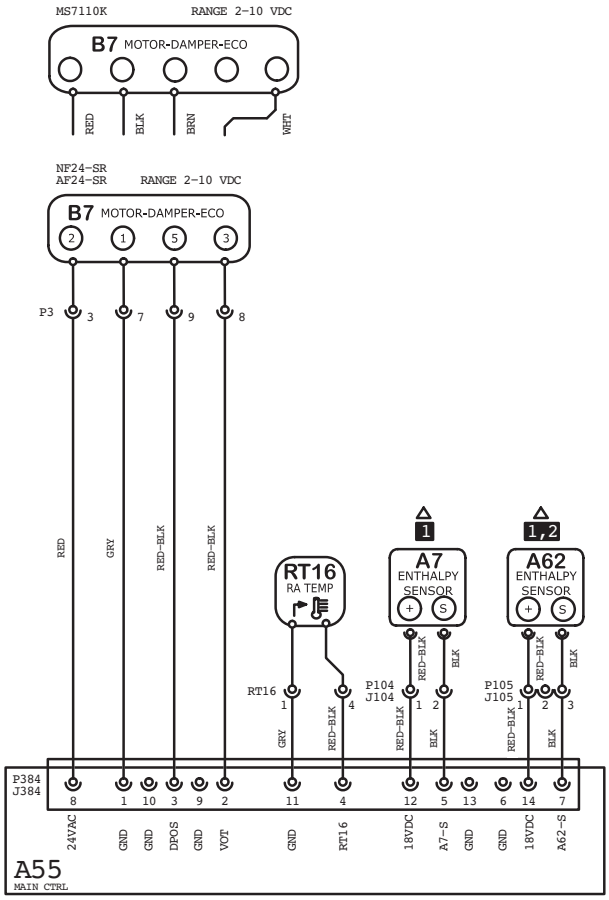
1	FOR MOTORS WITH S42 EXTERNAL OVERLOAD LESS INVERTER, SEE INVERTER WITH BY PASS FOR S42 HOOK UP
2	USE S86 DEHUMIDISTAT AND K55 FOR OPTIONAL SUPERMARKET REHEAT SCHEME, PRODIGY PARAMETERS NEED TO BE MODIFIED UNDER THE SETTINGS MENU OR VIA UC SOFTWARE FOR SIMULTANEOUS HEATING AND COOLING
3	P297-10 (SR) 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	COOLING	COOLING	ACCS	ACCS
SECTION A	SECTION B	SECTION B3	SECTION C	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	
C006	A7	SENSOR, SOLID STATE ENTHALPY
AA06	A55	CONTROL BOARD, MAIN
D006	A62	SENSOR, ENTHALPY INDOOR
BB02	B7	MOTOR, DAMPER ECONOMIZER
C006	RT16	SENSOR, RETURN AIR TEMP

Model: LC, LG, LH, LD Series RTU Economizer & Motorized OAD

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

WIRING DIAGRAM FLOW

Voltage: All Voltages

Supersedes: N/A Form No: 538072-01 Rev: 1

Sequence of Operation LDT156/180/240

1 - Line voltage from TB13 energizes transformer T1 and T18. Transformer T1 and T18 provides 24VACpower to the main controller A55. The transformers also provides 24VAC power to the unit cooling, heating and blower controls and thermostat.

ECONOMIZER OPERATION

2 - The A55 Unit Controller receives a demand and energizes exhaust fan relay K65 and K231 with 24VAC at 50% (travel) outside air damper open (adjustable).

3 - N.O. K65-1, K65-2, K231-01 and K231-02 close, energizing exhaust fan motors B10 and B11.

1ST STAGE COOLING

4 - First stage cooling demand energizes Y1 and G in the thermostat. G energizes blower, if blower is not already running.

5 - 24VAC is routed to the A55 Unit Controller. After A55 proves N.C. low pressure switch S87 and high pressure switch S4, compressor contactor K1 and L34 are energized.

6 - A55 energizes outdoor fan B21 directly and fans B4 and B5 through K10.

7 - N.O. K1 closes energizing compressor B1, and N.C. K1-52 opens denergizing HR1.

2ND STAGE COOLING

8 - Second stage cooling demand energizes Y2.

9 - After A55 proves N.C. low pressure switch S88 and N.C. high pressure switch S7, contacotor K2 is energized.

10 - N.O. K2 closes energizing compressor B2 and K2-52 opens de-energizing crankcase heater HR2.

BLOWER OPERATION

With By Pass Installed - Active

1 - Main control A55 de-energizes relays K202 and K203

2 - K202 contacts open to interrupt power to B3 blower motor from A96 blower inverter.

3 - Main control A55 energizes relay K203-7.

4 - K203-1 N.C. contacts close allowing power to K3.

5 - K3 contacts close to allow power to B3 blower motor.

With By Pass Installed - Inactive

1 - Main control A55 energizes relays K202 and K203.

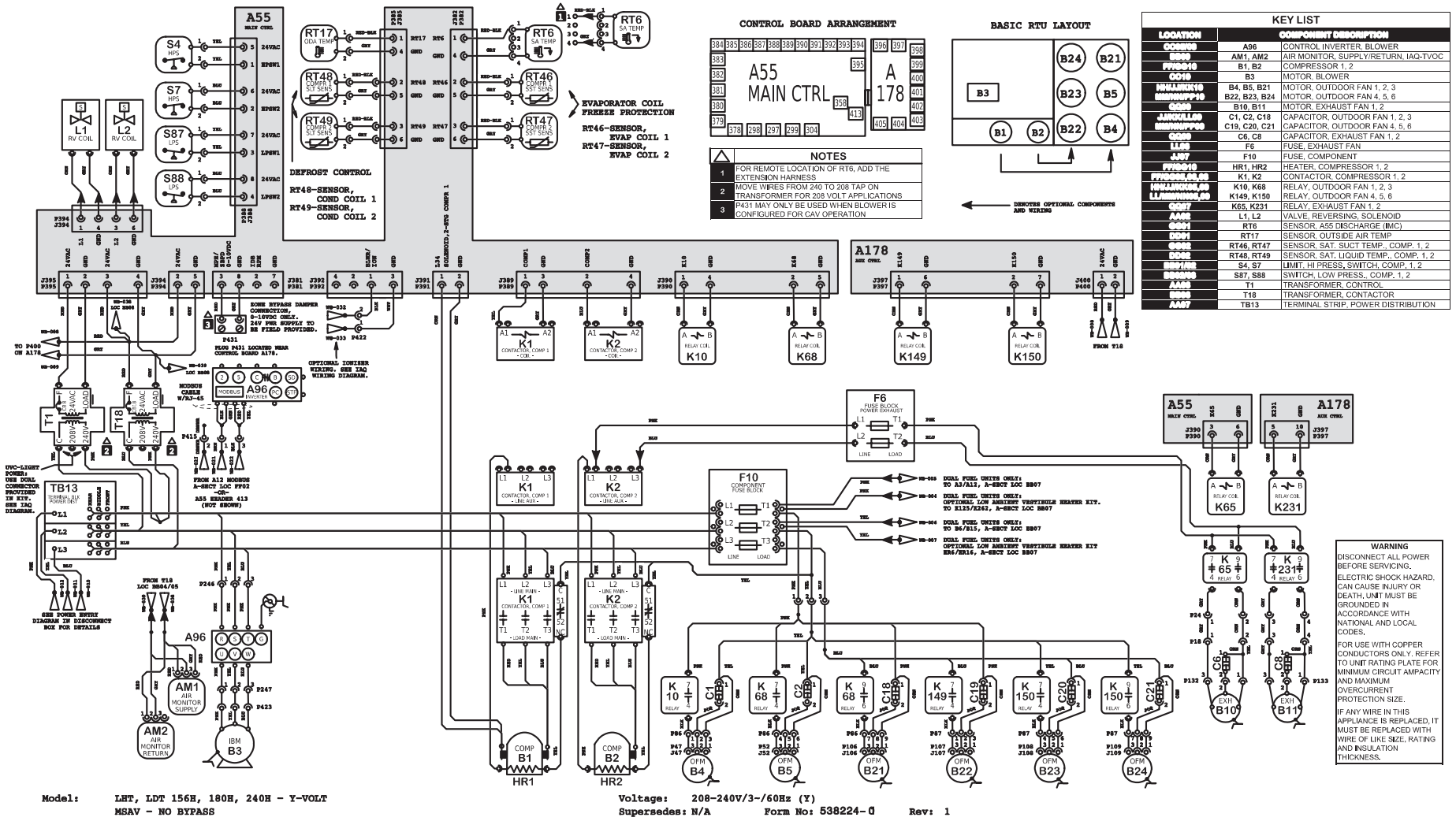
2 - K203-1 N.C. contacts open to de-energize K3 relay coil. K3 contacts open to interrupt power to B3 blower motor through K3 N.O. contacts.

3 - K202 contacts close to allow power to B3 blower motor from A96 blower inverter.

By-Pass Not Installed

1 - Control inverter A96 energizes B3.

LHT,LDT156/180/240 Y Voltage No By-Pass
538224-01

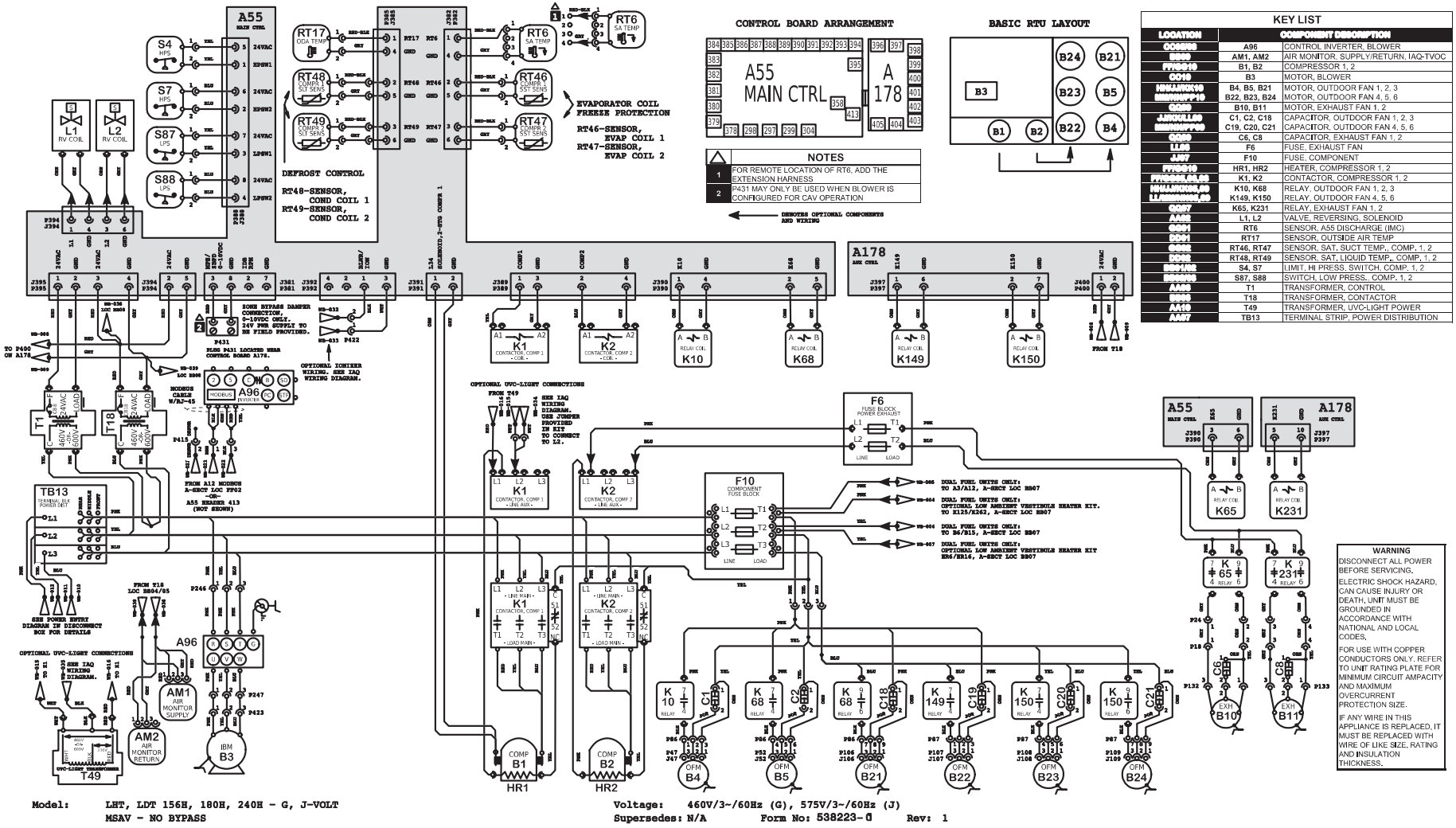


KEY LIST	
LOCATION	COMPONENT DESCRIPTION
A55	CONTROL INVERTER, BLOWER
A96	AM1, AM2
B1, B2	AIR MONITOR, SUPPLY/RETURN, IAQ-TVOC
B3	COMPRESSOR 1, 2
B4, B5, B21	MOTOR, BLOWER
B22, B23, B24	MOTOR, OUTDOOR FAN 1, 2, 3
B10, B11	MOTOR, OUTDOOR FAN 4, 5, 6
C1, C2, C18	MOTOR, EXHAUST FAN 1, 2
C19, C20, C21	CAPACITOR, OUTDOOR FAN 1, 2, 3
C6, C8	CAPACITOR, OUTDOOR FAN 4, 5, 6
F6	CAPACITOR, EXHAUST FAN 1, 2
F10	FUSE, EXHAUST FAN
HR1, HR2	FUSE, COMPONENT
K1, K2	HEATER, COMPRESSOR 1, 2
K10, K68	CONTACTOR, COMPRESSOR 1, 2
K149, K150	RELAY, OUTDOOR FAN 1, 2, 3
K65, K231	RELAY, OUTDOOR FAN 4, 5, 6
L1, L2	RELAY, EXHAUST FAN 1, 2
RT6	VALVE, REVERSING, SOLENOID
RT17	SENSOR, A55 DISCHARGE (IMC)
RT46, RT47	SENSOR, OUTSIDE AIR TEMP
RT48, RT49	SENSOR, SAT, SUCT TEMP., COMP. 1, 2
S4, S7	SENSOR, SAT, LIQUID TEMP., COMP. 1, 2
S87, S88	LIMIT, HI PRESS. SWITCH, COMP, 1, 2
T1	SWITCH, LOW PRESS., COMP. 1, 2
T18	TRANSFORMER, CONTROL
TB13	TRANSFORMER, CONTACTOR
	TERMINAL STRIP, POWER DISTRIBUTION

Model: LHT, LDT 156H, 180H, 240H - Y-VOLT
MSAV - NO BYPASS

Voltage: 208-240V/3-/60Hz (Y)
Supersedes: N/A Form No: 538224-0 Rev: 1

LHT, LDT156/180/240 G, J Voltage No By-Pass
538223-01



NOTES	
1	FOR REMOTE LOCATION OF RT6, ADD THE EXTENSION HARNESS
2	P431 MAY ONLY BE USED WHEN BLOWER IS CONFIGURED FOR CAV OPERATION

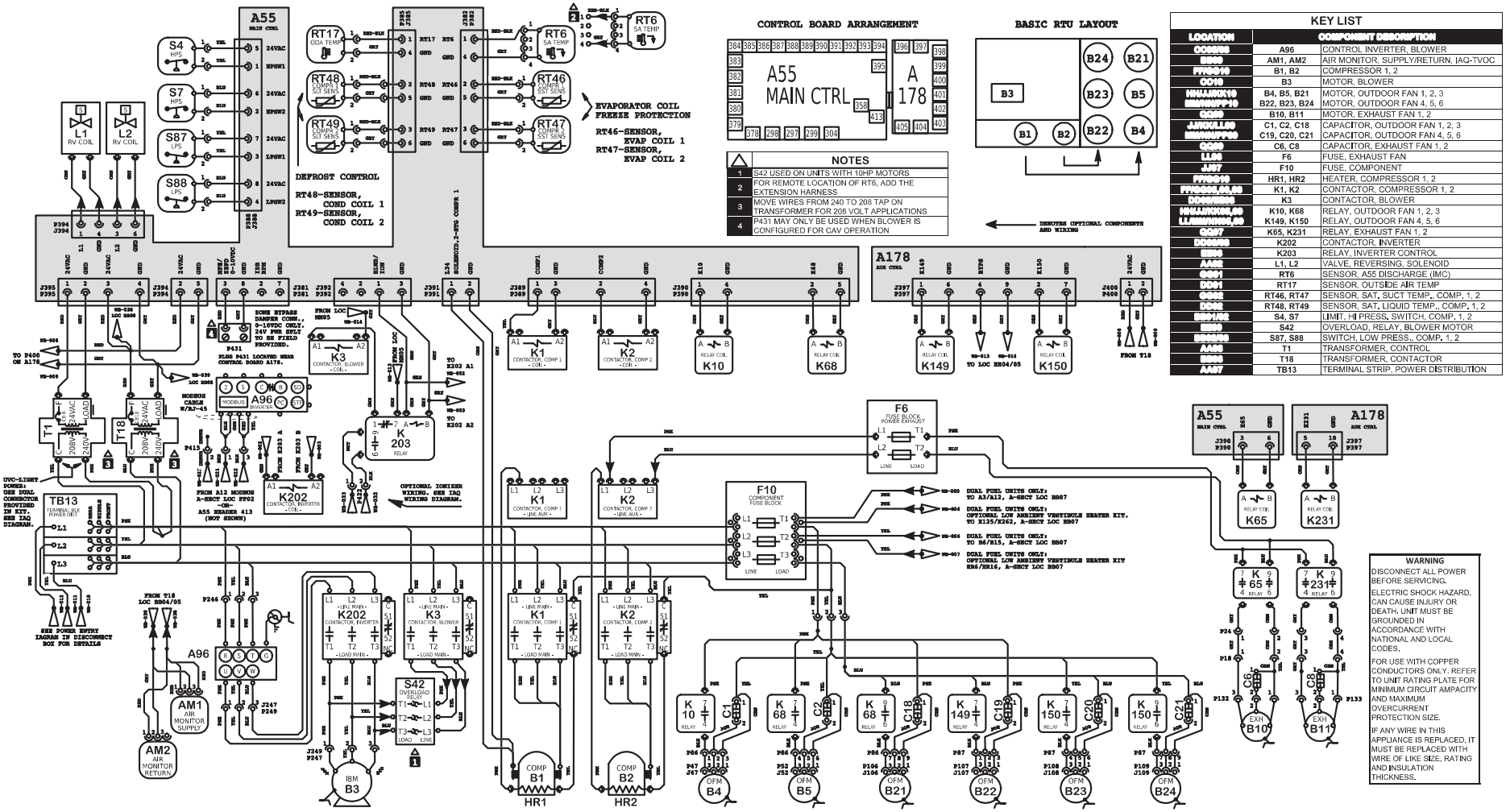
DENOTES OPTIONAL COMPONENTS AND WIRING

KEY LIST	
LOCATION	COMPONENT DESCRIPTION
A96	CONTROL INVERTER, BLOWER
AM1, AM2	AIR MONITOR, SUPPLY/RETURN, IAQ-TVOC
B1, B2	COMPRESSOR 1, 2
B3	MOTOR, BLOWER
B4, B5, B21 B22, B23, B24	MOTOR, OUTDOOR FAN 1, 2, 3 MOTOR, OUTDOOR FAN 4, 5, 6
B10, B11	MOTOR, EXHAUST FAN 1, 2
C1, C2, C18 C19, C20, C21	CAPACITOR, OUTDOOR FAN 1, 2, 3 CAPACITOR, OUTDOOR FAN 4, 5, 6
C6, C8	CAPACITOR, EXHAUST FAN 1, 2
F6	FUSE, EXHAUST FAN
F10	FUSE, COMPONENT
HR1, HR2	HEATER, COMPRESSOR 1, 2
K1, K2	CONTACTOR, COMPRESSOR 1, 2
K10, K68 K149, K150	RELAY, OUTDOOR FAN 1, 2, 3 RELAY, OUTDOOR FAN 4, 5, 6
K65, K231	RELAY, EXHAUST FAN 1, 2
L1, L2	VALVE, REVERSING, SOLENOID
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
T18	TRANSFORMER, CONTACTOR
T49	TRANSFORMER, UVC-LIGHT POWER
TB13	TERMINAL STRIP, POWER DISTRIBUTION

Model: LHT, LDT 156H, 180H, 240H – G, J-VOLT
MSAV – NO BYPASS

Voltage: 460V/3~/60Hz (G), 575V/3~/60Hz (J)
Supersedes: N/A **Form No:** 538223-0 **Rev:** 1

LHT, LDT156/180 Y Voltage With By-Pass
538222-01

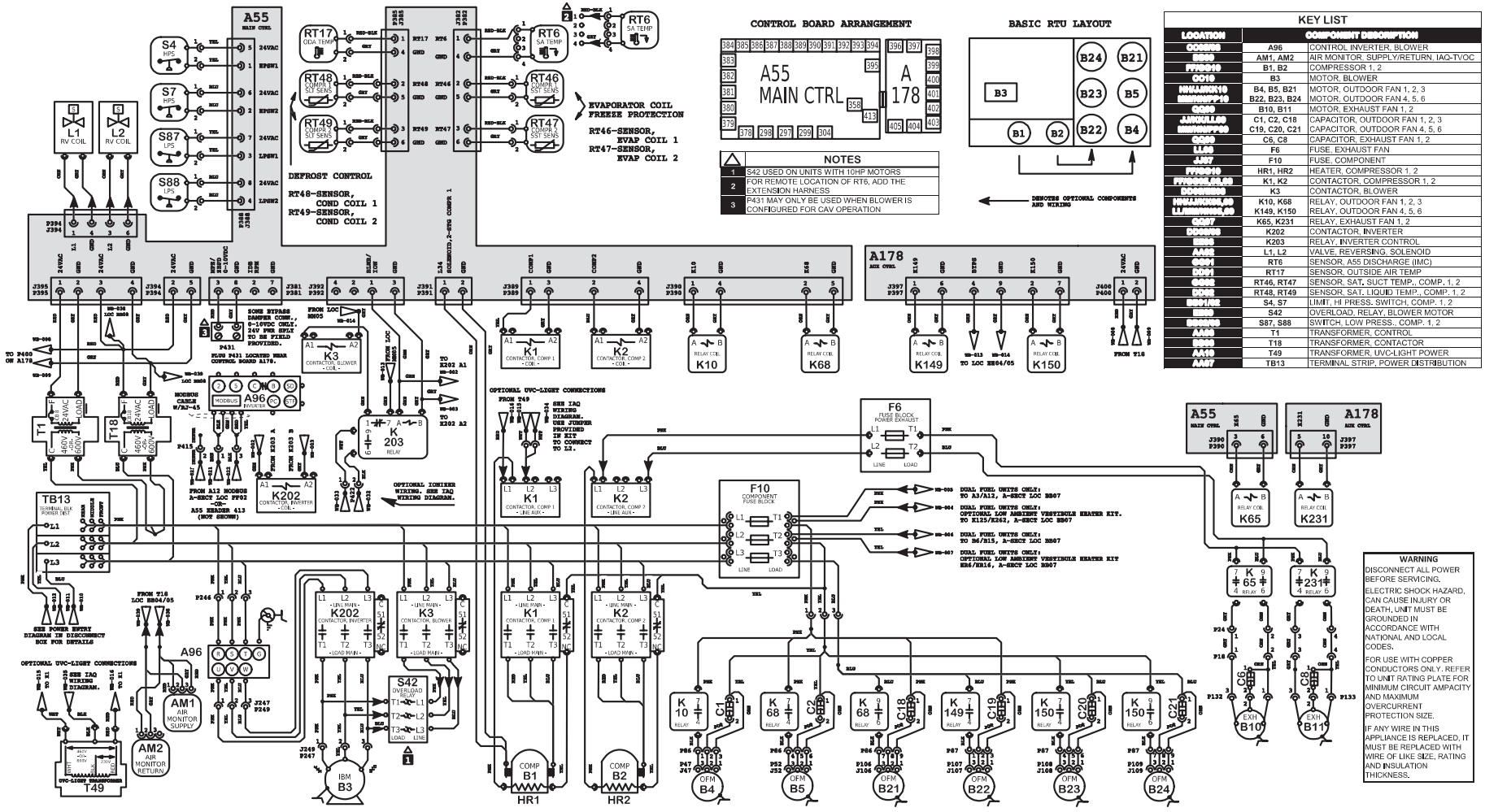


KEY LIST		
LOCATION	COMPONENT DESCRIPTION	
CONTRL	A96	CONTROL INVERTER, BLOWER
AIRMON	AM1, AM2	AIR MONITOR, SUPPLY/RETURN, IAQ-TVOC
PRESSOR	B1, B2	COMPRESSOR 1, 2
COMTR	B3	MOTOR, BLOWER
MNTR/EXH	B4, B5, B21	MOTOR, OUTDOOR FAN 1, 2, 3
MNTR/EXH	B22, B23, B24	MOTOR, OUTDOOR FAN 4, 5, 6
EXHMTR	B10, B11	MOTOR, EXHAUST FAN 1, 2
CAP/FLDR	C1, C2, C18	CAPACITOR, OUTDOOR FAN 1, 2, 3
CAP/FLDR	C19, C20, C21	CAPACITOR, OUTDOOR FAN 4, 5, 6
CAP/EXH	C6, C8	CAPACITOR, EXHAUST FAN 1, 2
FU/EXH	F6	FUSE, EXHAUST FAN
FU/ST	F10	FUSE, COMPONENT
HTR/CPH	HR1, HR2	HEATER, COMPRESSOR 1, 2
CTR/CPR	K1, K2	CONTACTOR, COMPRESSOR 1, 2
CTR/BLWR	K3	CONTACTOR, BLOWER
RLY/FLDR	K10, K68	RELAY, OUTDOOR FAN 1, 2, 3
RLY/FLDR	K149, K150	RELAY, OUTDOOR FAN 4, 5, 6
RLY/EXH	K65, K231	RELAY, EXHAUST FAN 1, 2
CTR/INV	K202	CONTACTOR, INVERTER
RLY/INV	K203	RELAY, INVERTER CONTROL
VALVE	L1, L2	VALVE, REVERSING, SOLENOID
SENSR	RT6	SENSOR, A55 DISCHARGE (IMC)
SENSR	RT17	SENSOR, OUTSIDE AIR TEMP
SENSR	RT46, RT47	SENSOR, SAT, SUCT TEMP., COMP. 1, 2
SENSR	RT48, RT49	SENSOR, SAT, LIQUID TEMP., COMP. 1, 2
SWITCH	S4, S7	LIMIT, HI PRESS. SWITCH, COMP. 1, 2
SWITCH	S42	OVERLOAD, RELAY, BLOWER MOTOR
SWITCH	S87, S88	SWITCH, LOW PRESS., COMP. 1, 2
XFMR	T1	TRANSFORMER, CONTROL
XFMR	T18	TRANSFORMER, CONTACTOR
TERMBD	TB13	TERMINAL STRIP, POWER DISTRIBUTION

Model: LHT, LDT 156H, 180H – Y-VOLT
MSAV – WITH BYPASS

Voltage: 208-240V/3-/60Hz (Y)
Supersedes: N/A Form No: 538222-0 Rev: 1

LHT, LDT156/180 G, J Voltage With By-Pass
538221-01



NOTES	
1	S42 USED ON UNITS WITH 10HP MOTORS
2	FOR REMOTE LOCATION OF RT6, ADD THE EXTENSION HARNESS
3	P431 MAY ONLY BE USED WHEN BLOWER IS CONFIGURED FOR CAV OPERATION

KEY LIST	
LOCATION	COMPONENT DESCRIPTION
A55	CONTROL INVERTER, BLOWER
AM1, AM2	AIR MONITOR, SUPPLY/RETURN, IAQ-TVOC
B1, B2	COMPRESSOR 1, 2
B3	MOTOR, BLOWER
B4, B5, B21 B22, B23, B24	MOTOR, OUTDOOR FAN 1, 2, 3 MOTOR, OUTDOOR FAN 4, 5, 6
B10, B11	MOTOR, EXHAUST FAN 1, 2
C1, C2, C18 C19, C20, C21	CAPACITOR, OUTDOOR FAN 1, 2, 3 CAPACITOR, OUTDOOR FAN 4, 5, 6
C6, C8	CAPACITOR, EXHAUST FAN 1, 2
F6	FUSE, EXHAUST FAN
F10	FUSE, COMPONENT
HR1, HR2	HEATER, COMPRESSOR 1, 2
K1, K2	CONTACTOR, COMPRESSOR 1, 2
K3	CONTACTOR, BLOWER
K10, K68 K149, K150	RELAY, OUTDOOR FAN 1, 2, 3 RELAY, OUTDOOR FAN 4, 5, 6
K65, K231	RELAY, EXHAUST FAN 1, 2
K202	CONTACTOR, INVERTER
K203	RELAY, INVERTER CONTROL
L1, L2	VALVE, REVERSING, SOLENOID
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
S42	OVERLOAD, RELAY, BLOWER MOTOR
S87, S88	SWITCH, LOW PRESS., COMP. 1, 2
T1	TRANSFORMER, CONTROL
T18	TRANSFORMER, CONTACTOR
T49	TRANSFORMER, UVC-LIGHT POWER
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.