

UNIT INFORMATION

LGT SERIES
25 & 30 ton

100143

Service Literature

LGT302 - 360 With R-454B

The LGT302H / 360H (25 and 30 ton) units are configured to order units (CTO) with a wide selection of factory-installed options. The LGT gas/electric packaged rooftop units are available in 260,000 Btuh, 360,000 Btuh and 480,000 Btuh (76.2 kW, 105.5 and 137.7 kW) heating inputs. Gas heat sections are designed with aluminized steel tube heat exchangers.

Units may contain a supply air blower equipped with a variable frequency drive A96 (VFD) which varies supply air CFM.

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

! WARNING

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance, or an operating electric heater).

Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

! WARNING

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

! WARNING

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



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

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

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

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WARNING

To prevent serious injury or death:

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

WARNING

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

CAUTION

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

WARNING



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

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

CAUTION

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

IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HCFC's) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

WARNING

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

OPTIONS / ACCESSORIES

Item Description		Order Number	Size	
			302	360
COOLING SYSTEM				
Condensate Drain Trap	PVC	22H54	X	X
	Copper	76W27	X	X
Drain Pan Overflow Switch		21Z07	OX	OX
Stainless Steel Condensate Drain Pan		83W42	OX	OX
GAS HEAT				
Combustion Air Intake Extensions (Order 2 Kits)		89L97	X	X
Gas Heat Input	Standard - 260 kBtuh input	Factory	O	O
	Medium - 360 kBtuh input	Factory	O	O
	High - 480 kBtuh input	Factory	O	O
LPG/Propane Conversion Kits (Order 2 Kits)	Standard Heat	14N28	X	X
	Medium Heat	14N29	X	X
	High Heat	14N30	X	X
Low Temperature Vestibule Heater	208/230V-3ph	22H58	X	X
	460V-3ph	22H59	X	X
	575V-3ph	22V43	X	X
Stainless Steel Heat Exchanger		Factory	O	O
Vertical Vent Extension		42W16	X	X
BLOWER - SUPPLY AIR				
Blower Type	MSAV® Multi-Stage Air Volume	Factory	O	O
	VAV Variable Air Volume	Factory	O	O
Motors	Belt Drive (standard efficiency) - 5 HP	Factory	O	O
	Belt Drive (standard efficiency) - 7.5 HP	Factory	O	O
	Belt Drive (standard efficiency) - 10 HP	Factory	O	O
	Supply VFD Blower Bypass	Factory	O	O
Drive Kits See Blower Data Tables for usage and selection	Kit #1 740-895 rpm	Factory	O	O
	Kit #2 870-1045 rpm	Factory	O	O
	Kit #3 715-880 rpm	Factory	O	O
	Kit #4 770-965 rpm	Factory	O	O
	Kit #5 660-810 rpm	Factory	O	O
	Kit #6 770-965 rpm	Factory	O	O
	Kit #7 570-720 rpm	Factory	O	O
	Kit #8 480-630 rpm	Factory	O	O
	Kit #9 410-535 rpm	Factory	O	O
CABINET				
Combination Coil/Hail Guards		13T16	OX	OX
Corrosion Protection		Factory	O	O
Horizontal Return Air Panel Kit		38K48	X	X

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

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

O = Configure To Order (Factory Installed)

X = Field Installed

OPTIONS / ACCESSORIES

Item Description		Order Number	Size	
			302	360
CONTROLS				
Commercial Controls	LonTalk® Module	54W27	OX	OX
	Novar® LSE	Factory	O	O
Dirty Filter Switch		53W68	OX	OX
Fresh Air Tempering		21Z08	OX	OX
Smoke Detector - Supply or Return (Power board and one sensor)		37G73	OX	OX
Smoke Detector - Supply and Return (Power board and two sensors)		37G74	OX	OX
INDOOR AIR QUALITY				
Air Filters				
Healthy Climate® High Efficiency Air Filters 20 x 20 x 2 - order 12 per unit	MERV 8	54W21	OX	OX
	MERV 13	52W39	OX	OX
	MERV 16	21U40	X	X
Replaceable Media Filter with Metal Mesh Frame (includes Non-Pleated Filter Media) 20 x 20 x 2- order 12 per unit		44N60	X	X
Indoor Air Quality (CO ₂) Sensors				
Sensor - Wall-mount, off-white plastic cover with LCD display		77N39	X	X
Sensor - Wall-mount, off-white plastic cover, no display		23V86	X	X
Sensor - Black plastic case, LCD display, rated for plenum mounting		87N52	X	X
Sensor - Black plastic case, no display, rated for plenum mounting		23V87	X	X
CO ₂ Sensor Duct Mounting Kit - for downflow applications		23Y47	X	X
Aspiration Box - for duct mounting non-plenum rated CO ₂ sensors (77N39)		90N43	X	X
ELECTRICAL				
Voltage 60 hz	208/230V - 3 phase	Factory	O	O
	460V - 3 phase	Factory	O	O
	575V - 3 phase	Factory	O	O
² Short-Circuit Current Rating (SCCR) of 100kA (includes Phase/Voltage Detection)		Factory	O	O
³ Disconnect Switch - See Electrical Data Tables on page <?> for selection	80 amp	54W88	OX	OX
	150 amp	54W89	OX	OX
	250 amp	90W82	OX	OX
GFI Service Outlets	15 amp non-powered, field-wired (208/230V, 460V only)	74M70	OX	OX
	⁴ , ⁵ 15 amp factory-wired and powered (208/230V, 460V)	Factory	O	O
	⁶ 20 amp non-powered, field-wired (208/230V, 460V, 575V)	67E01	OX	OX
	⁶ 20 amp non-powered, field-wired (575V)	Factory	O	O
Weatherproof Cover for GFI		10C89	X	X
Phase/Voltage Detection		Factory	O	O

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).

¹SCCR option is not available if the MOCP of the configured unit is greater than 200A.

²Disconnect Switch is furnished and factory installed with SCCR option

⁴If a factory installed disconnect switch is ordered with a factory installed GFI, the default disconnect size is 150 amps.

⁵Unit powered GFI Service Outlets are not available with SCCR option.

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

⁶Canada requires a minimum 20 amp circuit. Select 20 amp, non-powered, field wired GFI.

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

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

O = Configure To Order (Factory Installed)

X = Field Installed

OPTIONS / ACCESSORIES

Item Description	Order Number	Size	
		302	360
7 HUMIDITROL® CONDENSER REHEAT OPTION			
Humiditrol® Dehumidification Option	Factory	O	O
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.	18X87	OX	OX
Economizer Controls			
Differential Enthalpy (Not for Title 24)	Order 2 21Z09	OX	OX
Sensible Control	Sensor is Furnished Factory	O	O
Single Enthalpy (Not for Title 24)	21Z09	OX	OX
Global	Sensor Field Provided Factory	O	O
Building Pressure Control	13J77	X	X
Differential Sensible	Sensor is Furnished Factory	O	O
Outdoor Air CFM Control	13J76	X	X
Barometric Relief Dampers With Exhaust Hood			
Downflow Barometric Relief Dampers	76W17	OX	OX
Horizontal Barometric Relief Dampers	33K78	OX	OX
OUTDOOR AIR			
Outdoor Air Dampers With Outdoor Air Hood			
Motorized	18X89	OX	OX
Manual	18X88	X	X
POWER EXHAUST			
Standard Static, SCCR Rated	208/230V 74W21	OX	OX
	460V 74W22	OX	OX
	575V 74W23	OX	OX
High Static with VFD 2 HP (731 - 932 rpm)	208/230V 83M89	X	X
	460V 83M90	X	X
	575V 83M91	X	X
Power Exhaust Control			
Pressure Transducer Control	13J77	X	X

Available for 302H and 360H models only with MSAV® Multi-Stage Air Volume option.

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

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

O = Configure To Order (Factory Installed)

X = Field Installed

SPECIFICATIONS			25 TON		
Model			LGT302H5V	LGT302H5M	
Nominal Tonnage			25 Ton	25 Ton	
Efficiency Type			High	High	
Blower Type			VAV	MSAV®	
			Variable Air Volume	Multi-Stage Air Volume	
Cooling Performance	Gross Cooling Capacity - Btuh		308,000	308,000	
	¹ Net Cooling Capacity (Btuh)		298,000	298,000	
	¹ AHRI Rated Air Flow (cfm)		8200	8200	
	Total Unit Power - kW		26.5	26.5	
	¹ IEER (Btuh/Watt)		14.3	15.6	
	¹ EER (Btuh/Watt)		11.2	11.2	
Sound Rating Number			dBA	95	
Refrigerant Type			R-454B	R-454B	
Refrigerant Charge	Without Reheat	Circuit 1	6 lbs. 12 oz.	6 lbs. 12 oz.	
		Circuit 2	6 lbs. 8 oz.	6 lbs. 8 oz.	
		Circuit 3	6 lbs. 11 oz.	6 lbs. 11 oz.	
		Circuit 4	6 lbs. 13 oz.	6 lbs. 13 oz.	
	With Reheat	Circuit 1	- - -	6 lbs. 12 oz.	
		Circuit 2	- - -	6 lbs. 8 oz.	
		Circuit 3	- - -	6 lbs. 11 oz.	
		Circuit 4	- - -	6 lbs. 13 oz.	
Gas Heating Options Available			See page 8		
Compressor Type (number)			Scroll (4)	Scroll (4)	
Outdoor Coils	Net face area - ft. ² (total)		68.3	68.3	
	Number of rows		1	1	
	Fins - in.		23	23	
Outdoor Coil Fans	Motor HP (number and type)		1/3 (6 PSC)	1/3 (6 PSC)	
	Rpm		1075	1075	
	Watts (total)		2500	2500	
	Diameter (Number) - in.		(6) 24	(6) 24	
	Blades		3	3	
	Total Air volume - cfm		21,500	21,500	
Indoor Coils	Net face area - ft. ² (total)		31.40	31.40	
	Tube diameter - in.		3/8	3/8	
	Rows		4	4	
	Fins - in.		14	14	
	Condensate drain size (NPT) - in.		(1) 1 in.	(1) 1 in.	
Expansion device type			Balanced Port Thermostatic Expansion Valve,removable power head		
³ Indoor Blower and Kit Selection	Nominal motor HP		5, 7.5, 10		
	Maximum usable motor output (US Only)		5.75, 8.63, 11.5		
	Motor - Drive kit number		5 HP Kit 5 660-810 rpm Kit 6 770-965 rpm Kit 7 570-720 rpm Kit 8 480-630 rpm Kit 9 410-535 rpm		
			7.5 HP Kit 3 715-880 rpm Kit 4 770-965 rpm		
			10 HP Kit 1 740-895 rpm Kit 2 870-1045 rpm		
	Wheel (Number) diameter x width - in.		(2) 18 x 15		
	Filters	Type of filter		Fiberglass, disposable	
		Number and size - in.		(12) 20 x 20 x 2	
	Line voltage data (Volts-Phase-Hz)			208/230-3-60, 460-3-60, 575-3-60	

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

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

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.

SPECIFICATIONS				30 TON	
Model		LGT360H5V		LGT360H5M	
Nominal Tonnage		30 Ton		30 Ton	
Efficiency Type		High		High	
Blower Type		VAV Variable Air Volume		MSAV® Multi-Stage Air Volume	
Cooling Performance	Gross Cooling Capacity - Btuh	359,000	359,000		
	¹ Net Cooling Capacity (Btuh)	348,000	348,000		
	¹ AHRI Rated Air Flow (cfm)	8650	8650		
	Total Unit Power - kW	33.0	33.0		
	¹ IEER (Btuh/Watt)	13.5	14		
	¹ EER (Btuh/Watt)	10.5	10.5		
Sound Rating Number		dBA	95	95	
Refrigerant Charge		Refrigerant Type	R-454B	R-454B	
Without Reheat Option	Circuit 1	6 lbs. 6 oz.	6 lbs. 6 oz.		
		6 lbs. 13 oz.	6 lbs. 13 oz.		
		6 lbs. 10 oz.	6 lbs. 10 oz.		
		6 lbs. 6 oz.	6 lbs. 6 oz.		
	Circuit 2	---	7 lbs. 12 oz.		
		---	7 lbs. 8 oz.		
		---	6 lbs. 14 oz.		
		---	6 lbs. 12 oz.		
Gas Heating Options Available		See page 8			
Compressor Type (number)		Scroll (4)	Scroll (4)		
Outdoor Coils	Net face area - ft. ² (total)	68.3	68.3		
	Number of rows	1	1		
	Fins - in.	23	23		
Outdoor Coil Fans	Motor HP (number and type)	1/3 (6 PSC)	1/3 (6 PSC)		
	Rpm	1075	1075		
	Watts (total)	2500	2500		
	Diameter (Number) - in.	(6) 24	(6) 24		
	Blades	3	3		
	Total Air volume - cfm	21,500	21,500		
	Net face area - ft. ² (total)	31.40	31.40		
Indoor Coils	Tube diameter - in.	3/8	3/8		
	Rows	4	4		
	Fins - in.	14	14		
	Condensate drain size (NPT) - in.	(1) 1 in.	(1) 1 in.		
	Expansion device type	Balanced Port Thermostatic Expansion Valve,removable power head			
³ Indoor Blower and Kit Selection	Nominal motor HP	5, 7.5, 10			
	Maximum usable motor output (US Only)	5.75, 8.63, 11.5			
	Motor - Drive kit number	5 HP Kit 5 660-810 rpm Kit 6 770-965 rpm Kit 7 570-720 rpm Kit 8 480-630 rpm Kit 9 410-535 rpm			
		7.5 HP Kit 3 715-880 rpm Kit 4 770-965 rpm			
		10 HP Kit 1 740-895 rpm Kit 2 870-1045 rpm			
	Wheel (Number) diameter x width - in.	(2) 18 x 15			
	Filters	Type of filter	Fiberglass, disposable		
		Number and size - in.	(12) 20 x 20 x 2		
	Line voltage data (Volts-Phase-Hz)		208/230-3-60, 460-3-60, 575-3-60		

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

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

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.

SPECIFICATIONS

GAS HEAT

Model			LGT302 LGT360		
Heat Input Type			Standard (S)	Medium (M)	High (H)
Number of Gas Heat Stages			2	2	2
Gas Heating Performance (Two-Stage)	Input - Btuh	First Stage	169,000	234,000	312,000
		Second Stage	260,000	360,000	480,000
	Output - Btuh	First Stage	---	---	---
		Second Stage	211,000	292,000	389,000
¹ Gas Heating Performance (Four-Stage)	Input - Btuh	First Stage	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	---	---	---
		Second Stage	---	---	---
		Third Stage	---	---	---
		Fourth Stage	211,000	292,000	389,000
Temperature Rise Range - °F			15 - 45	30 - 60	40 - 70
Thermal Efficiency			81%	81%	81%
Gas Supply Connections			1 in. npt	1 in. npt	1 in. npt
Recommended Gas Supply Pressure - in. w.g.	Natural		7	7	7
	LPG/Propane		11	11	11

Four-Stage Gas Heating is field configured.

HIGH ALTITUDE DERATE

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 unit must be derated 2% for each 1000 feet above sea level.

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

TWO-STAGE

Gas Heat Type (Two-Stage)	Altitude - ft.	Gas Manifold Pressure - in. w.g.		Input Rate Natural Gas or LPG/Propane - Btuh	
		Natural Gas	LPG/Propane Gas	First Stage	Second Stage
Standard (S)	2001 - 4500	3.4	9.6	169,000	249,000
Medium (M)	2001 - 4500	3.4	9.6	234,000	345,000
High (H)	2001 - 4500	3.4	9.6	312,000	460,000

FOUR-STAGE

¹ Gas Heat Type (Four-Stage)	Altitude - ft.	Gas Manifold Pressure - in. w.g.		Input Rate Natural Gas or LPG/Propane - Btuh			
		Natural Gas	LPG/Propane Gas	First Stage	Second Stage	Third Stage	Fourth Stage
Standard (S)	2001 - 4500	3.4	9.6	84,000	169,000	209,000	249,000
Medium (M)	2001 - 4500	3.4	9.6	117,000	234,000	289,000	345,000
High (H)	2001 - 4500	3.4	9.6	156,000	312,000	386,000	460,000

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 (duct resistance, diffuser, etc.)

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

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

See page 10 for factory installed drive kit specifications.

Air Volume cfm	TOTAL STATIC PRESSURE - In. w.g.																	
	0.20		0.40		0.60		0.80		1.00		1.20		1.40		1.60		1.80	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4000	372	0.26	433	0.65	497	0.99	565	1.27	630	1.54	687	1.79	738	2.04	784	2.30	824	2.56
4500	382	0.41	441	0.79	506	1.12	574	1.41	638	1.69	694	1.95	744	2.22	790	2.50	831	2.77
5000	392	0.56	451	0.93	516	1.25	584	1.55	646	1.85	702	2.12	751	2.41	796	2.70	837	3.00
5500	402	0.73	462	1.08	527	1.40	594	1.72	655	2.02	710	2.31	758	2.61	802	2.92	843	3.24
6000	414	0.89	473	1.24	539	1.56	605	1.90	665	2.21	718	2.51	766	2.83	809	3.16	850	3.51
6500	426	1.07	486	1.41	551	1.74	616	2.10	675	2.42	727	2.73	774	3.07	817	3.43	857	3.80
7000	439	1.26	499	1.60	565	1.93	628	2.31	685	2.64	737	2.97	782	3.34	825	3.72	864	4.11
7500	453	1.46	513	1.79	579	2.14	641	2.55	696	2.88	747	3.24	792	3.63	833	4.04	872	4.45
8000	467	1.66	528	2.00	593	2.38	653	2.81	708	3.15	757	3.53	801	3.95	843	4.39	881	4.82
8500	483	1.88	544	2.22	608	2.65	667	3.10	720	3.44	768	3.85	812	4.30	852	4.78	890	5.22
9000	499	2.11	561	2.47	624	2.95	681	3.41	733	3.76	780	4.20	823	4.69	862	5.19	900	5.65
9500	516	2.36	578	2.75	640	3.26	696	3.73	746	4.10	792	4.58	834	5.11	873	5.64	910	6.12
10,000	534	2.64	596	3.06	657	3.60	711	4.07	760	4.48	805	5.00	845	5.57	884	6.12	921	6.61
10,500	553	2.93	615	3.39	674	3.95	727	4.44	775	4.90	817	5.46	857	6.06	895	6.62	932	7.12
11,000	572	3.24	634	3.74	692	4.31	744	4.83	789	5.35	830	5.95	869	6.58	907	7.16	943	7.65
11,500	592	3.58	653	4.12	711	4.70	760	5.27	803	5.85	843	6.49	881	7.13	918	7.71	954	8.21
12,000	613	3.95	674	4.53	729	5.14	776	5.75	818	6.39	857	7.06	894	7.71	930	8.30	965	8.80
12,500	635	4.37	695	4.98	748	5.62	792	6.29	832	6.98	870	7.67	906	8.33	941	8.91	976	9.42
13,000	657	4.83	715	5.50	766	6.18	808	6.89	847	7.61	883	8.32	918	8.98	953	9.56	988	10.06
13,500	680	5.35	736	6.06	784	6.78	824	7.53	861	8.29	896	9.00	930	9.66	965	10.24	---	---
14,000	704	5.92	757	6.67	801	7.44	839	8.23	875	9.00	909	9.72	943	10.38	---	---	---	---
14,500	727	6.55	777	7.34	818	8.16	854	8.97	889	9.75	922	10.48	---	---	---	---	---	---
15,000	750	7.23	797	8.07	834	8.92	868	9.75	902	10.54	---	---	---	---	---	---	---	---

BLOWER DATA

DRIVE KIT SPECIFICATIONS

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

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.

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

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE

Air Volume cfm	Wet Indoor Coil	Reheat Coil	Gas Heat Exchanger			Economizer	Filters			Horizontal Roof Curb
			Standard Heat	Medium Heat	High Heat		MERV 8	MERV 13	MERV 16	
	in. w.g.	in. w.g.	in. w.g.	in. w.g.	in. w.g.	in. w.g.	in. w.g.	in. w.g.	in. w.g.	in. w.g.
4000	0.04	0.04	0.08	0.08	0.11	0.00	0.00	0.00	0.06	0.04
4500	0.04	0.04	0.09	0.10	0.13	0.00	0.00	0.00	0.07	0.05
5000	0.05	0.04	0.10	0.12	0.15	0.00	0.00	0.00	0.08	0.06
5500	0.06	0.06	0.11	0.14	0.17	0.01	0.00	0.01	0.09	0.07
6000	0.07	0.06	0.12	0.16	0.19	0.01	0.00	0.02	0.10	0.08
6500	0.08	0.08	0.13	0.18	0.21	0.01	0.01	0.02	0.11	0.09
7000	0.09	0.08	0.14	0.20	0.24	0.02	0.01	0.03	0.12	0.10
7500	0.10	0.10	0.15	0.21	0.25	0.02	0.01	0.04	0.13	0.11
8000	0.11	0.10	0.17	0.24	0.28	0.02	0.01	0.04	0.14	0.13
8500	0.12	0.10	0.20	0.27	0.31	0.03	0.01	0.04	0.15	0.15
9000	0.13	0.12	0.22	0.29	0.34	0.04	0.01	0.04	0.16	0.17
9500	0.14	0.14	0.24	0.32	0.38	0.04	0.02	0.06	0.17	0.19
10,000	0.15	0.16	0.27	0.36	0.42	0.05	0.02	0.06	0.18	0.21
10,500	0.16	0.17	0.30	0.40	0.46	0.06	0.02	0.06	0.19	0.24
11,000	0.18	0.18	0.33	0.43	0.50	0.07	0.02	0.07	0.20	0.27
11,500	0.19	0.19	0.37	0.48	0.55	0.08	0.02	0.08	0.22	0.30
12,000	0.20	0.20	0.40	0.52	0.60	0.10	0.02	0.08	0.23	0.33
12,500	0.21	0.22	0.44	0.57	0.65	0.11	0.03	0.10	0.24	0.37
13,000	0.23	0.23	0.48	0.61	0.70	0.13	0.03	0.10	0.25	0.40
13,500	0.24	0.25	0.53	0.67	0.76	0.14	0.03	0.11	0.26	0.44
14,000	0.26	0.26	0.57	0.72	0.82	0.16	0.03	0.12	0.27	0.49
14,500	0.27	0.27	0.62	0.78	0.89	0.18	0.04	0.13	0.28	0.53
15,000	0.29	0.29	0.68	0.84	0.95	0.21	0.04	0.13	0.29	0.58

BLOWER DATA

POWER EXHAUST PERFORMANCE - STANDARD STATIC

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

POWER EXHAUST - HIGH STATIC

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

BLOWER DATA

CEILING DIFFUSER AIR RESISTANCE - in. w.g.

Air Volume cfm	Step-Down Diffuser			Flush Diffuser
	LARTD30/36S			LAFD30/36S
	2 Ends Open	1 Side/2 Ends Open	All Ends & Sides Open	
7500	0.37	0.31	0.25	0.29
8000	0.42	0.36	0.29	0.34
8500	0.48	0.41	0.34	0.39
9000	0.55	0.47	0.39	0.44
9500	0.62	0.53	0.45	0.51
10,000	0.70	0.60	0.51	0.57
10,500	0.78	0.68	0.58	0.65
11,000	0.87	0.76	0.65	0.72
11,500	0.97	0.85	0.73	0.81
12,000	1.08	0.94	0.82	0.9
12,500	1.19	1.04	0.91	0.99
13,000	1.30	1.15	1.00	1.10
13,500	1.43	1.26	1.10	1.20
14,000	1.56	1.38	1.20	1.31
14,500	1.69	1.50	1.31	1.43
15,000	1.84	1.63	1.43	1.56

CEILING DIFFUSER AIR THROW DATA - ft.

Air Volume cfm	¹ Effective Throw Range - ft.	
	Step-Down	Flush
9000	40 - 47	29 - 35
9500	43 - 50	33 - 41
10,000	46 - 54	37 - 46
10,500	50 - 58	42 - 51
11,000	53 - 61	46 - 56
11,500	55 - 64	50 - 61
12,000	58 - 67	54 - 66
12,500	61 - 71	58 - 71
13,000	64 - 74	62 - 75
13,500	67 - 77	66 - 79

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.

MINIMUM R454B SPACE AND CFM REQUIREMENTS

Minimum Airflow		
Unit	Q_{min} (CFM)	Q_{min} (m ³ /h)
LCT/LGT302	178	303
LCT/LGT360	169	286

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

Minimum Room Area of Conditioned Space		
Unit	TA _{min} (ft ²)	TA _{min} (m ²)
LCT/LGT302	99	9.19
LCT/LGT360	94	8.68

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

Refrigerant Charge R-454B		
Unit	M _o (lbs)	M _o (kg)
LGT/LCT302 Stage 1	6.75	3.06
LGT/LCT302 Stage 2	6.50	2.95
LGT/LCT302 Stage 3	6.69	3.03
LGT/LCT302 Stage 4	6.81	3.09
LGT/LCT360 Stage 1	6.38	2.89
LGT/LCT360 Stage 2	6.81	3.09
LGT/LCT360 Stage 3	6.63	3.01
LGT/LCT360 Stage 4	6.38	2.89

Altitude Adjustment Factor									
Halt	0	200	400	600	800	1000	1200	1400	1600
AF	1	1	1	1	1.02	1.05	1.04	1.1	1.12
Halt	1600	1800	2000	2200	2400	2600	2800	3000	3200
AF	1.12	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.4

³ **NOTE** - Use the Altitude Adjustment Factor to adjust the values in the tables above to different altitudes. Find the relevant altitude above sea level in the two "Halt" rows and then multiply the value needed from the tables above by the altitude factor number. Example: For the minimum airflow in CFM for an LCT/LGT302 at 1000 ft. above sea level, multiply 178 by 1.05 to get 186.9 CFM as the new Q_{min} .

ELECTRICAL DATA

25 TON

Model No.		LGT302H5M, LGT302H5V								
¹ Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	22.4			9.1			7.2		
	Locked Rotor Amps	166.2			74.6			54		
Compressor 2	Rated Load Amps	22.4			9.1			7.2		
	Locked Rotor Amps	166.2			74.6			54		
Compressor 3	Rated Load Amps	22.4			9.1			7.2		
	Locked Rotor Amps	166.2			74.6			54		
Compressor 4	Rated Load Amps	22.4			9.1			7.2		
	Locked Rotor Amps	166.2			74.6			54		
Outdoor Fan Motors (6)	Full Load Amps (6 Non-ECM)	2.4			1.3			1		
	Total	14.4			7.8			6		
Standard Power Exhaust (3) 0.33 HP	Full Load Amps	2.4			1.3			1		
	Total	7.2			3.9			3		
High Static Power Exhaust (3) 2 HP	Full Load Amps	7.5			3.4			2.7		
	Total	22.5			10.2			8.1		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	HP	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
² Maximum Overcurrent Protection	Unit Only	150	150	150	60	60	70	45	50	50
	With (3) 0.33 HP Standard Power Exhaust	150	150	175	60	70	70	50	50	60
	With High Static Power Exhaust (3) 2 HP	150	175	175	70	70	80	60	60	60
³ Minimum Circuit Ampacity	Unit Only	127	135	143	55	58	62	43	47	49
	With (3) 0.33 HP Standard Power Exhaust	134	142	150	58	62	66	46	50	52
	With High Static Power Exhaust (3) 2 HP	149	157	165	65	69	72	51	55	57

ELECTRICAL ACCESSORIES

Disconnect	Unit Only	54W89	54W89	90W82	54W88	54W88	54W88	54W88	54W88	54W88
	Unit + Standard Power Exhaust (3) 0.33 HP	54W89	90W82	90W82	54W88	54W88	54W88	54W88	54W88	54W88
	Unit + High Static Power Exhaust (3) 2 HP	90W82	90W82	90W82	54W88	54W89	54W89	54W88	54W88	54W88
Terminal Block		30K75	30K75	30K75	30K75	30K75	30K75	30K75	30K75	30K75

Disconnects - 54W88 - 80A
54W89 - 150A
90W82 - 250A

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

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

HACR type breaker or fuse.

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

ELECTRICAL DATA

30 TON

Model No.		LGT360H5M, LGT360H5V								
¹ Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	30.9			12.8			10.1		
	Locked Rotor Amps	178.5			103			78		
Compressor 2	Rated Load Amps	30.9			12.8			10.1		
	Locked Rotor Amps	178.5			103			78		
Compressor 3	Rated Load Amps	30.9			12.8			10.1		
	Locked Rotor Amps	178.5			103			78		
Compressor 4	Rated Load Amps	30.9			12.8			10.1		
	Locked Rotor Amps	178.5			103			78		
Outdoor Fan Motors (6)	Full Load Amps (6 Non-ECM)	2.4			1.3			1		
	Total	14.4			7.8			6		
Standard Power Exhaust (3) 0.33 HP	Full Load Amps	2.4			1.3			1		
	Total	7.2			3.9			3		
High Static Power Exhaust (3) 2 HP	Full Load Amps	7.5			3.4			2.7		
	Total	22.5			10.2			8.1		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	HP	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
² Maximum Overcurrent Protection	Unit Only	175	200	⁴ 200	80	80	90	60	60	70
	With (3) 0.33 HP Standard Power Exhaust	⁴ 200	⁴ 200	⁴ 200	80	80	90	60	70	70
	With High Static Power Exhaust (3) 2 HP	⁴ 200	⁴ 200	⁴ 225	90	90	100	70	70	70
³ Minimum Circuit Ampacity	Unit Only	163	170	177	70	74	77	56	58	61
	With (3) 0.33 HP Standard Power Exhaust	170	178	184	74	78	81	59	61	64
	With High Static Power Exhaust (3) 2 HP	185	193	200	80	84	87	64	67	69

ELECTRICAL ACCESSORIES

Disconnect	Unit Only	90W82	90W82	90W82	54W88	54W88	54W89	54W88	54W88	54W88
	Unit + Standard Power Exhaust (3) 0.33 HP	90W82	90W82	90W82	54W88	54W89	54W89	54W88	54W88	54W88
	Unit + High Static Power Exhaust (3) 2 HP	90W82	90W82	90W82	54W89	54W89	54W89	54W88	54W88	54W88
Terminal Block		30K75	30K75	30K75	30K75	30K75	30K75	30K75	30K75	30K75

Disconnects - 54W88 - 80A
54W89 - 150A
90W82 - 250A

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

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

HACR type breaker or fuse.

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

Factory installed circuit breaker not available.

PART ARRANGEMENT

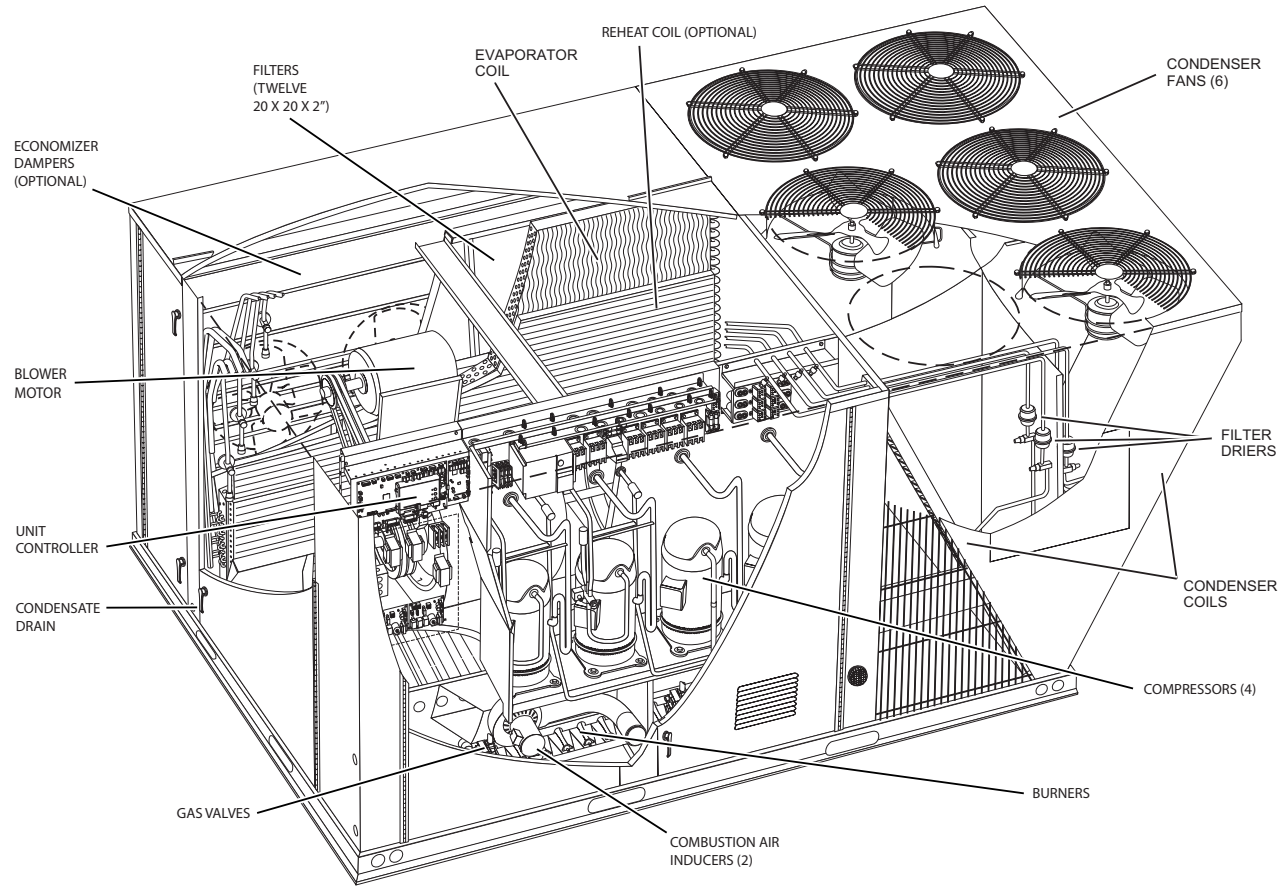
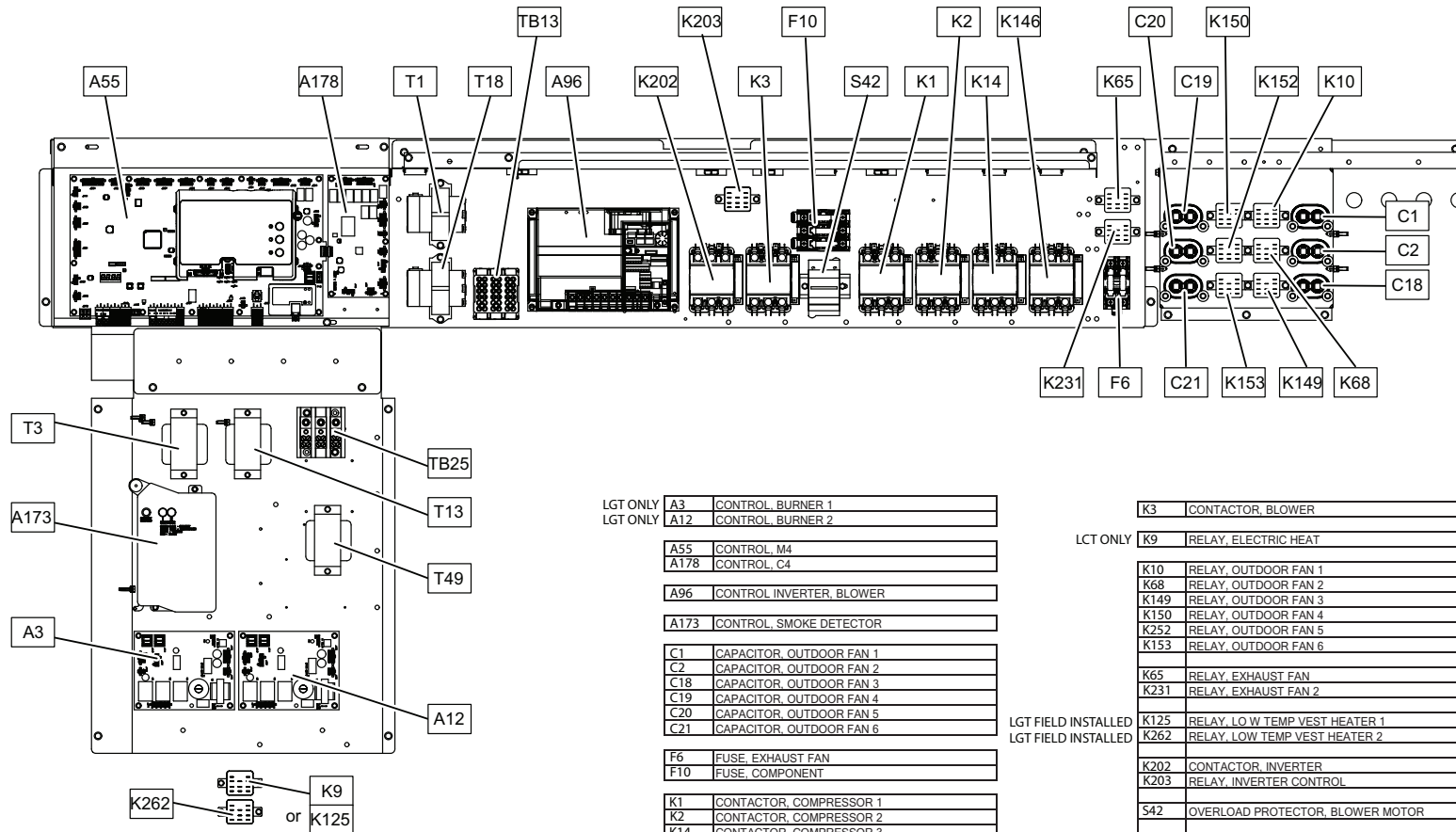


FIGURE 1

CONTROL BOX



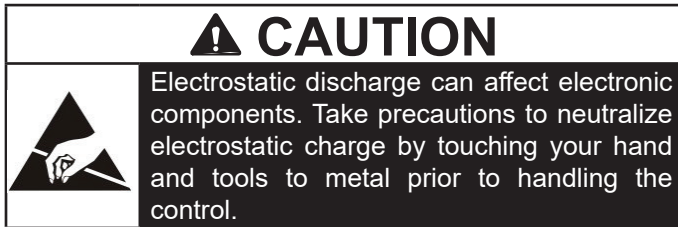
LGT ONLY	A3	CONTROL, BURNER 1
LGT ONLY	A12	CONTROL, BURNER 2
	A55	CONTROL, M4
	A178	CONTROL, C4
	A96	CONTROL INVERTER, BLOWER
	A173	CONTROL, SMOKE DETECTOR
	C1	CAPACITOR, OUTDOOR FAN 1
	C2	CAPACITOR, OUTDOOR FAN 2
	C18	CAPACITOR, OUTDOOR FAN 3
	C19	CAPACITOR, OUTDOOR FAN 4
	C20	CAPACITOR, OUTDOOR FAN 5
	C21	CAPACITOR, OUTDOOR FAN 6
	F6	FUSE, EXHAUST FAN
	F10	FUSE, COMPONENT
	K1	CONTACTOR, COMPRESSOR 1
	K2	CONTACTOR, COMPRESSOR 2
	K14	CONTACTOR, COMPRESSOR 3
	K146	CONTACTOR, COMPRESSOR 4

	K3	CONTACTOR, BLOWER
LCT ONLY	K9	RELAY, ELECTRIC HEAT
	K10	RELAY, OUTDOOR FAN 1
	K68	RELAY, OUTDOOR FAN 2
	K149	RELAY, OUTDOOR FAN 3
	K150	RELAY, OUTDOOR FAN 4
	K252	RELAY, OUTDOOR FAN 5
	K153	RELAY, OUTDOOR FAN 6
	K65	RELAY, EXHAUST FAN
	K231	RELAY, EXHAUST FAN 2
LGT FIELD INSTALLED	K125	RELAY, LOW TEMP VEST HEATER 1
LGT FIELD INSTALLED	K262	RELAY, LOW TEMP VEST HEATER 2
	K202	CONTACTOR, INVERTER
	K203	RELAY, INVERTER CONTROL
	S42	OVERLOAD PROTECTOR, BLOWER MOTOR
	T1	TRANSFORMER, CONTROL
LGT ONLY	T3	TRANSFORMER, COMBUSTION AIR BLOWER 1
LGT ONLY	T13	TRANSFORMER, COMBUSTION AIR BLOWER 2
LGT ONLY	T18	TRANSFORMER, CONTACTOR
	T49	TRANSFORMER, UV
	TB13	TERMINAL STRIP, POWER DISTRIBUTION
	TB25	TERMINAL STRIP, BLOWER

FIGURE 2

I-UNIT COMPONENTS

ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures



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

A-Control Box Components

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

1-Disconnect Switch S48 (Optional all units)

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

2-Transformer T1 (all units)

All units use a single line voltage to 24VAC transformer mounted in the control box. Transformer supplies power to control circuits in the unit. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB8). The 208/230 (Y) voltage transformers use two primary voltage taps as shown in figure 3, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

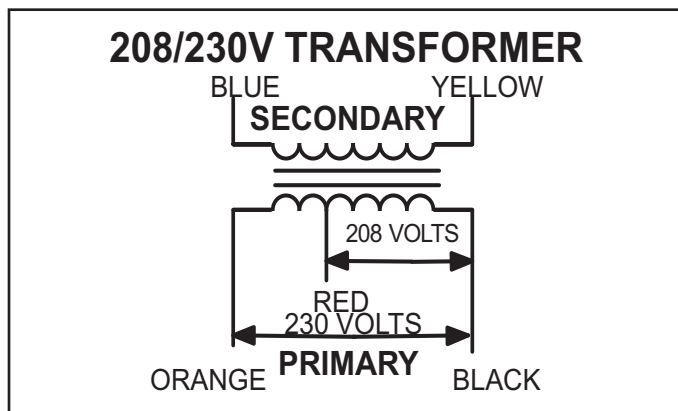


FIGURE 3

3-Transformer T18

T18 is a single line voltage to 24VAC transformer used in all 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.

4-C. A. B. Transformers T3 & T13 (575V)

All LGT 575 (J) voltage units use transformer T3 and T13. The auto voltage to 230VAC transformers are located in the control box. The transformers have an output rating of 0.75A. T3 transformer supplies 230VAC power to combustion air blower motor (B6) while T13 transformer supplies power to combustion air blower motor (B15) in all units. T3 and T13 also provide 230VAC to optional ultraviolet germicidal (UVC) lamps.

5-Terminal Block TB13

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

6-Terminal Block TB2

When unit is not equipped with an optional S48 disconnect switch, supply power is connected to TB2.

7-Outdoor Fan Motor Fuse Block & Fuses F10 and Power Exhaust Fan Motor Fuse Block and Fuses F6 (240 & 300 Y Volt Only)

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

8-Fuses F4

Fuse F4 is used only with single point power supply. F4 provides overcurrent protection to the compressor and other cooling components.

Note - F4, S48 and TB2 are located inside a sheet metal enclosure in the unit front left corner mullion.

9-Outdoor Fan Capacitors C1, C2, C18, C19, C20, C21

Fan capacitors C1, C2, C18, C19, C20 and C21 are 370V / 10 MFD capacitors used to assist in the start up of condenser fans B4, B5, B21, B22, B23 and B24. respectively.

10-Compressor Contactors K1, K2, K14, K146

All compressor contactors are three pole double break contactors with a 24VAC coil. In all units, K1, K2, K14 and K146 energize compressors B1, B2, B13, and B20 respectively.

11-Blower Contactor K3

Blower contactor K3, is a three-pole-double-break contactor with a 24VAC coil used to energize the indoor blower motor B3 in response to blower demand.

12-Outdoor Fan Relay K10, K68, K149, K150, K152, K153

Outdoor fan relays K10, K68, K149, K150, K152 and K153 used in all units, are DPDT relays with a 24VAC coil. In all units, K10 energizes fan 1 (B4), K68 energizes fan 2 (B5), K149 energizes fan 3 (B21), K150 energizes fan 4 (B22), K152 energizes fan 5 (B23) and K153 energizes fan 6 (B24).

13-Burner Controls A3 & A12 (LGT units)

All LGT units have two burner controls. A3 controls gas heat section one, while 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.

14-Power Exhaust Relay K65 (PEF units)

Power exhaust relay K65 is a N.O. DPDT relay with a 24VAC coil. K65 is used in all units equipped with optional power exhaust fans. K65 is energized by the Unit Controller (A55).

15-Blower Motor Overload Relay S42

The blower motor overload relay is used in all units equipped with M-volt unit blower motors manufactured before Dec. 19, 2010 as well as units with standard efficiency motors of 10 HP. 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 #4 in plug P299 of the A55 Unit Controller. A55 de-energizes all outputs. Units will be equipped with a relay manufactured by Telemecanique figure 4 or Siemens figure 5.

16-Ultraviolet Germicidal Lamp (UVC) and Transformer T49

UVC transformer T49 is used by units of all voltages except 208/230V. 575V LGT 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 0.75 amps. T49 transformer supplies 230VAC power to the UVC lamp.

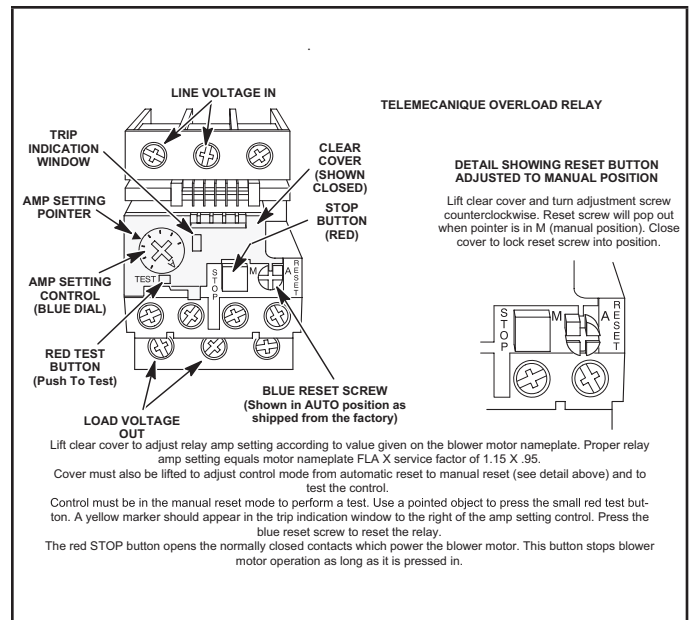


FIGURE 4

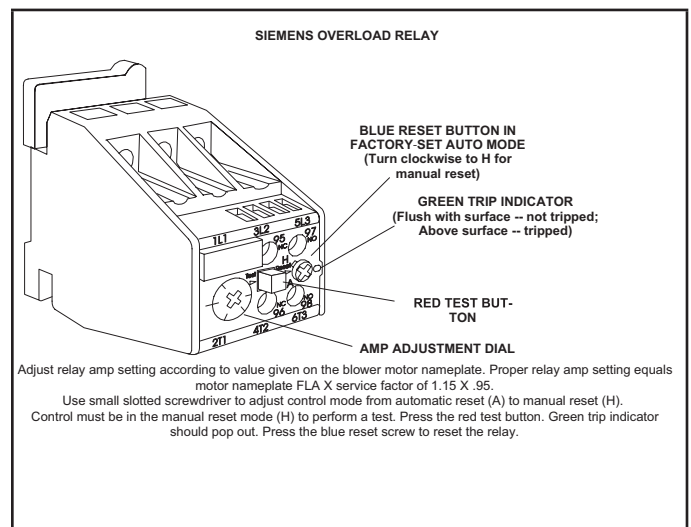


FIGURE 5

17-Unit Controller A55 (all units)

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.

18-Compressor 3 & 4 Control Module A178 (all units)

The compressor 3 & 4 control module A178 controls two additional compressor stages. A178 includes all inputs and outputs required for compressor and fan control, compressor stage diagnostics, and low ambient control.

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		

VAV Supply Static Sensor

The supply duct differential static pressure sensor (A30) is an analog sensor with a 0-10VDC output over a range of 0-5"w.c. as shown in the following table. The sensor is powered with 24VAC.

TABLE 4

Carbon Dioxide Range

Pressure "w.c.	DC Voltage	Pressure "w.c.	DC Voltage	Pressure "w.c.	DC Voltage	Pressure "w.c.	DC Voltage
0	0	1.5	3	3	6	4.5	9
0.5	1	2	4	3.5	7	5	10
1	2	2.5	5	4	8		

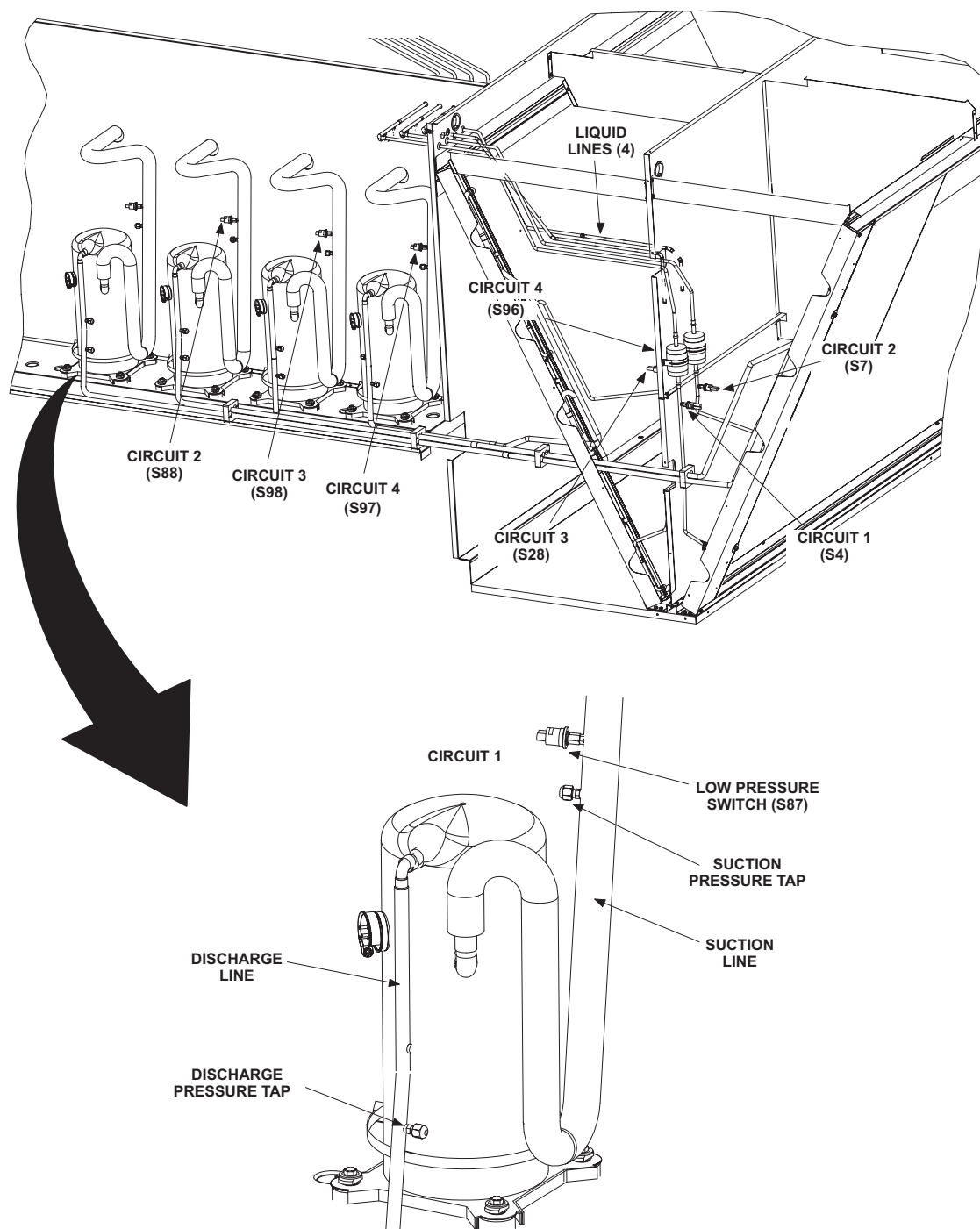


FIGURE 6

B-Cooling Components FIGURE 6

All units use independent cooling circuits consisting of separate compressors, condenser coils and evaporator coils. Six draw-through type condenser fans are used in all units. All units are equipped with belt-drive blowers which draw air across the evaporator during unit operation.

Cooling may be supplemented by a factory- or field-installed economizer. The evaporators are slab type and are stacked. 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. Additional protection is provided by low ambient switches and freezestats (on each evaporator).

1-Compressors B1, B2, B13, B20

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.

All units use four scroll compressors. 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. Compressor electrical specifications can be found in the SPECIFICATIONS section in this manual. 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, HR2, HR5, HR11

All units use bellyband-type crankcase heaters. Heater HR1 is installed around compressor B1, heater HR2 compressor B2, HR5 compressor B13, and HR11 compressor B20. Crankcase heater wattage varies by compressor size.

3-High Pressure Switches S4, S7, S28, S96

The high pressure switch is an auto-reset SPST N.C. switch which opens on a pressure rise. All units are equipped with this switch. The switch is located in the liquid line and is wired in series with the compressor contactor coil through A55 Unit Controller or A178 Compressor 3 and 4 Controller. S4 (first circuit), S7 (second circuit), S28 (third circuit), and S96 (fourth circuit) are wired in series with the respective compressor contactor coils.

When liquid pressure rises to 610 ± 15 psig (4206 ± 103 kPa) (indicating a problem in the system) the switch opens and the respective compressor is de-energized (the economizer can continue to operate). When liquid pressure drops to 475 ± 15 psig (3275 ± 103 kPa) the pressure switch will close.

Unit Controller A55 has a three-strike counter before locking out the particular compressor circuit. 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.

5-Low Pressure Switches S87, S88, S98, S97

The low pressure switch is an auto-reset SPST N.O. switch (held N.C. by refrigerant pressure) which opens on a pressure drop. All units are equipped with this switch. The switch is located in the compressor suction line. S87 (compressor one), S88 (compressor two), S98 (compressor three), and S97 (compressor four) 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 first thermostat demand, before the compressor is locked out. The control is reset by breaking and remaking the thermostat demand or manually resetting the control. When suction pressure drops to 40 ± 5 psig (276 ± 34 kPa) (indicating low pressure), the switch opens and the compressor is de-energized. The switch automatically resets when pressure in the suction line rises to 90 ± 5 psig (620 ± 34 kPa), due to many causes such as refrigerant being added.

6-Filter Drier (all units)

All 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, B24

See Specifications section in this manual for specifications of condenser fans. All condenser fans used have singlephase motors. All units are equipped with six condenser fans. The complete fan assembly may be removed for servicing and cleaning by removing the fan grill and turning the complete assembly until the motor brackets line up with the notches in the top panel. Lift the fan assembly out of the unit and disconnect the jack plug located on the motor.

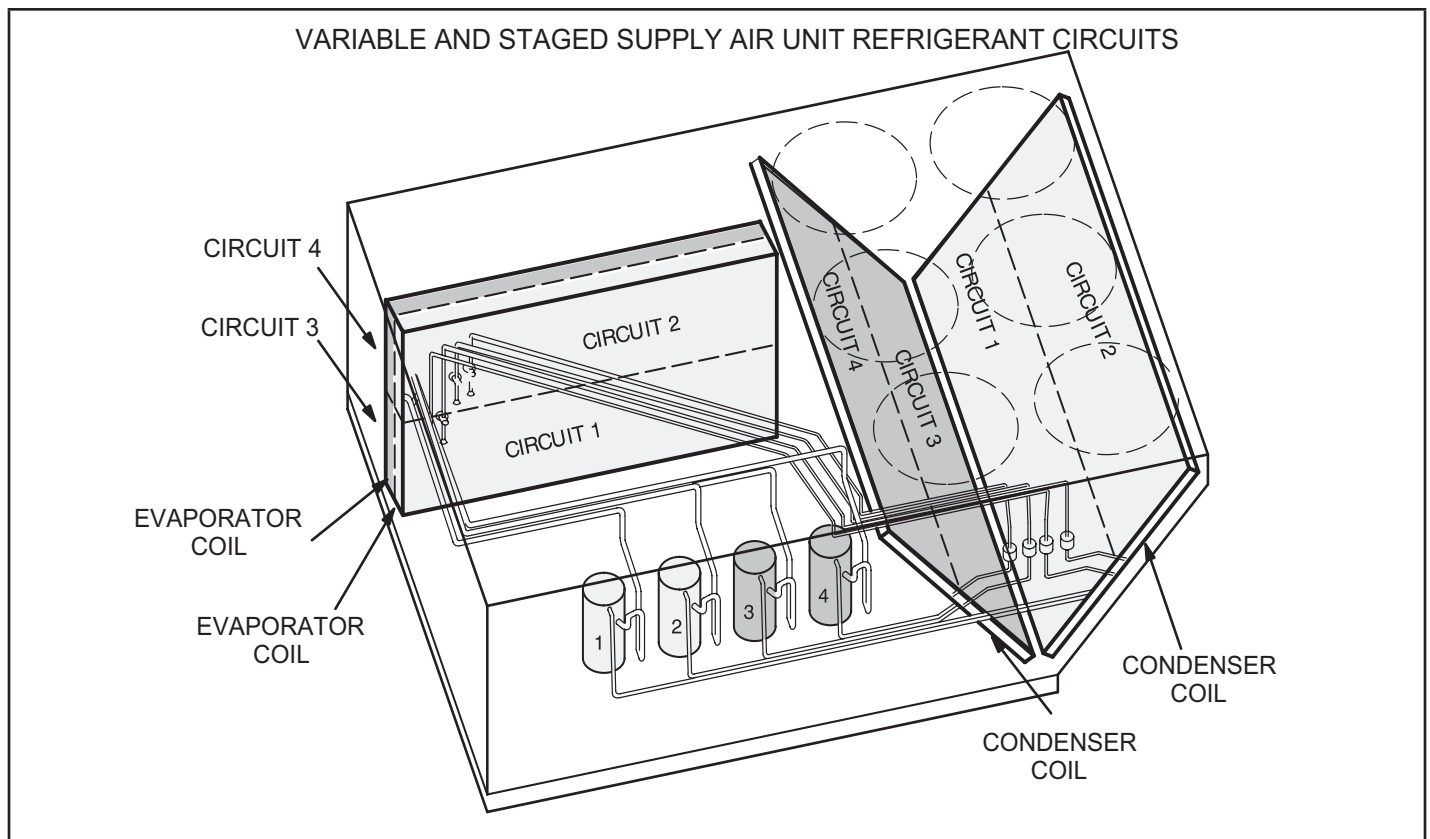


FIGURE 7

8-Diagnostic Sensors

Units are equipped with factory-installed thermistors located on different points on the refrigerant circuit.

The thermistors provide the Unit Controller with constant temperature readings of two specific locations on the refrigeration circuit. These temperatures are used as feedback in certain modes of unit operation.

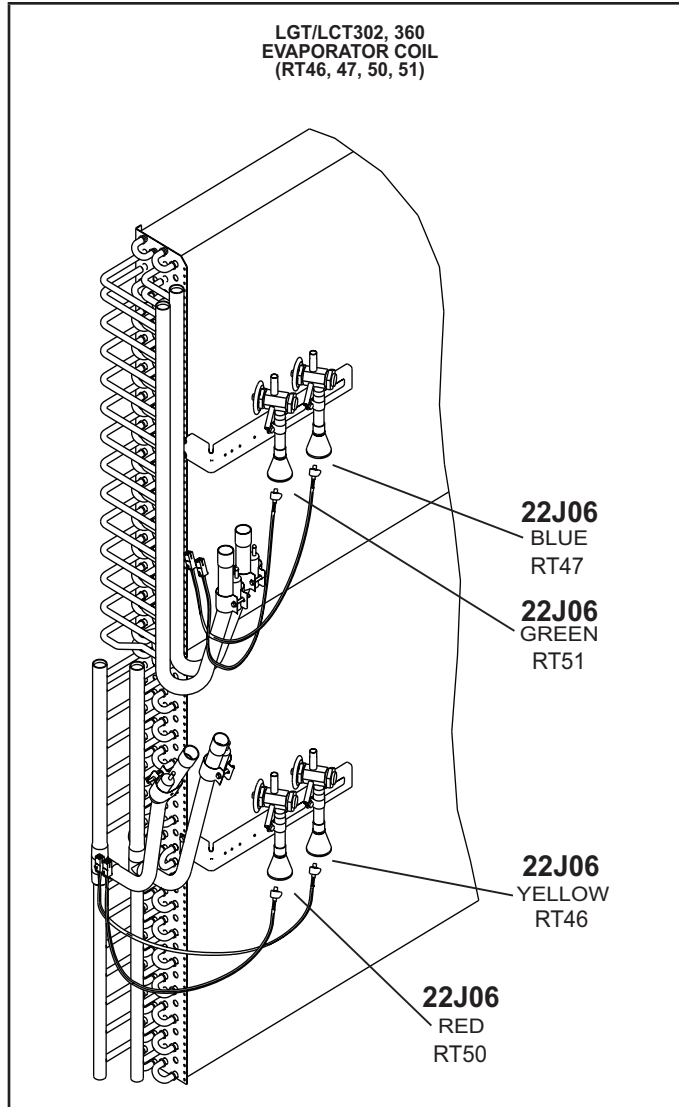


FIGURE 8

In addition, the Unit Controller uses these temperatures to initiate alarms such as loss of condenser or evaporator airflow and loss of charge.

Each thermistor must be specifically placed for proper unit operation and to initiate valid alarms. See FIGURE 8 (RT46, RT47, RT50, RT51) and FIGURE 9 (RT48, RT49, RT52, RT53) for proper locations.

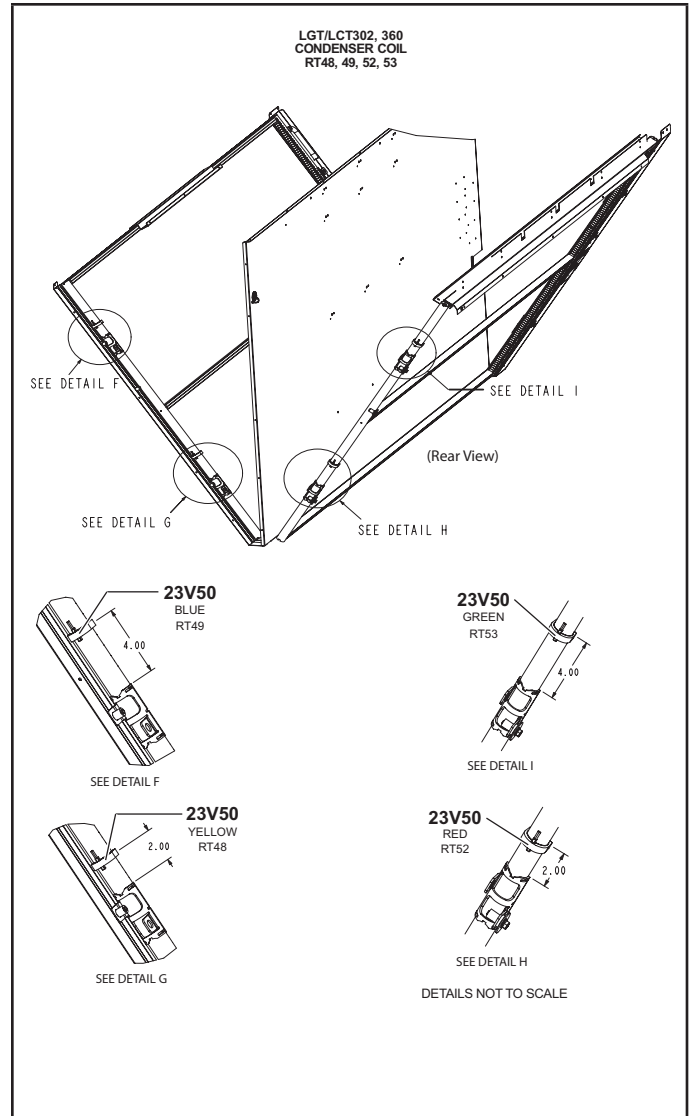


FIGURE 9

9-RDS Sensors

Units are equipped with factory-installed RDS Sensors located on different points on the unit. The RDS sensors provide the Unit Controller with continuous readings for leaked refrigerant concentration levels and sensor health status (Good or Fault). These readings are used to modify unit operation to disperse the leaked refrigerant and to remove possible ignition sources.

In addition, the Unit Controller uses these readings to initiate alarms to alert the operator of a refrigerant leak or faulty sensor(s).

Each sensor must be specifically placed for proper unit operation and to initiate valid alarms. See FIGURE 10 and FIGURE 11 for sensor locations.

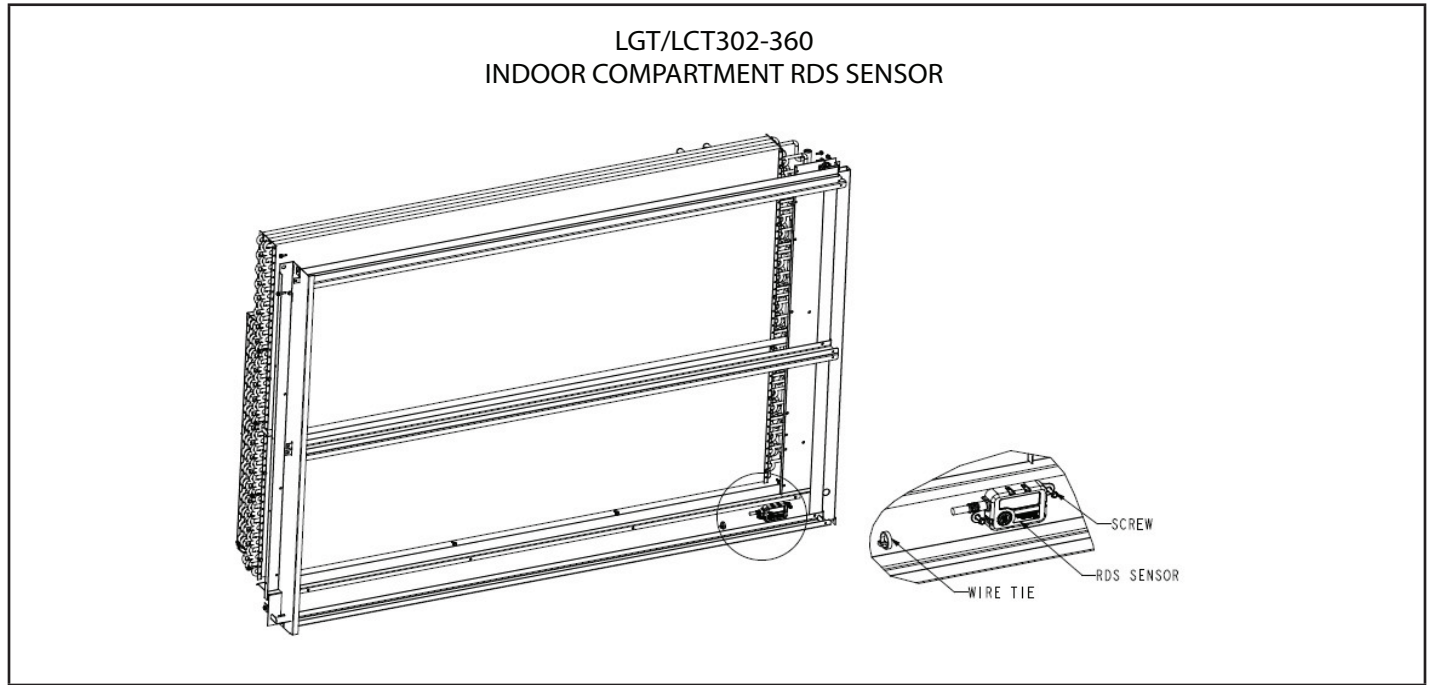


FIGURE 10

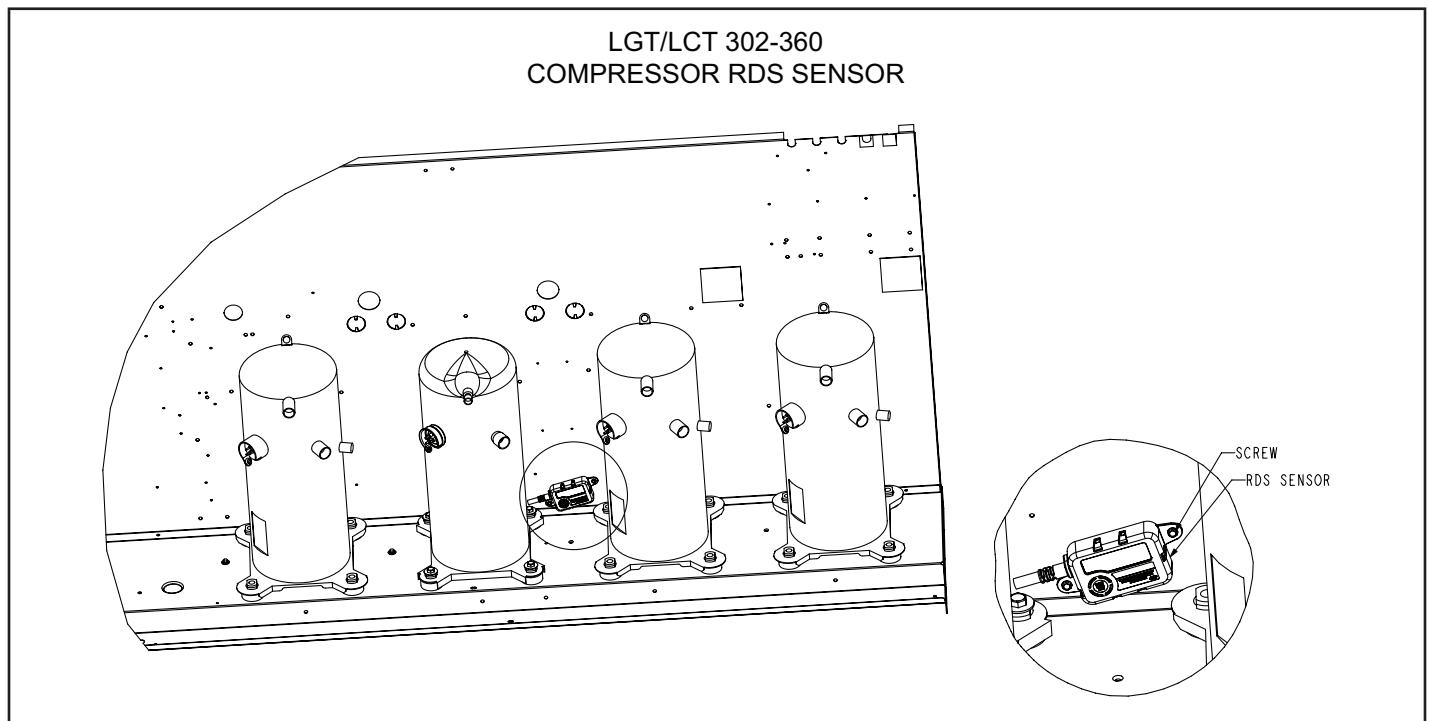


FIGURE 11

C-Blower Compartment

The blower compartment in all units 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)

All units have two 18 in. x 15 in. (457 mm x 381 mm) blower wheels. Both wheels are driven by one motor.

2-Indoor Blower Motor B3 (all units)

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 section in 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.

A-Blower Operation

NOTE-The following is a generalized procedure and does not apply to all thermostat control systems.

- 1 - Blower operation is dependent on the thermostat control system option that has been installed in the units. Refer to operation sequence of the control system installed for detailed descriptions of blower operation.
- 2 - Generally, blower operation is set at the thermostat fan switch. With the fan switch in "ON" position and the OCP input is "ON", the blower operates continuously. With the fan switch in "AUTO" position, the blower cycles with demand.
- 3 - In most cases, the blower and entire unit will be off when the system switch is in the "OFF" position. The only exception is immediately after a heating demand when the blower control keeps the blower on until all heat is extracted from the heat exchanger.

B-Blower Access

- 1 - Disconnect wiring connected to heating limit switches and mixed air sensor in units with an economizer. Disconnect blower harness at K3 contactor (CAV) or A96 inverter (VAV/Staged). Failure to do so could damage harness or components.
- 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.

Variable Air Volume Units - Refer to the Variable Air Volume Start-Up section.

- 1 - The following measurements must be made with a dry indoor coil. Run blower (G demand) without a cooling demand. Measure the indoor blower shaft RPM. Air filters must be in place when measurements are taken.
- 2 - With all access panels in place, measure static pressure external to unit (from supply to return). Blower performance data is based on static pressure readings taken in locations shown in FIGURE 13.

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

- 3 - See "BLOWER DATA" section (table of contents) to use static pressure and RPM readings to determine unit CFM, and when installing units with any of the optional accessories listed.
- 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 5.

TABLE 5

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.

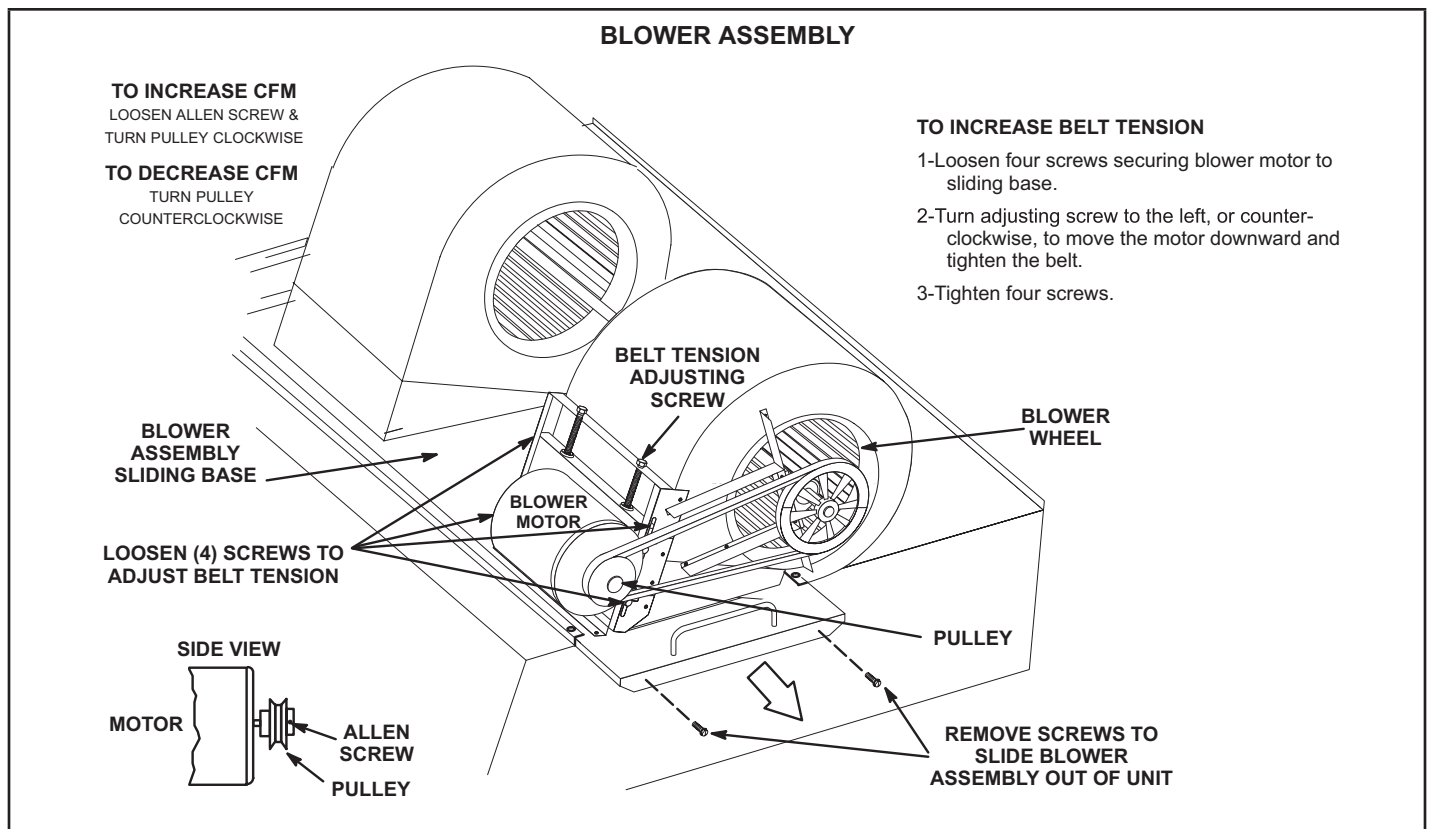


FIGURE 12

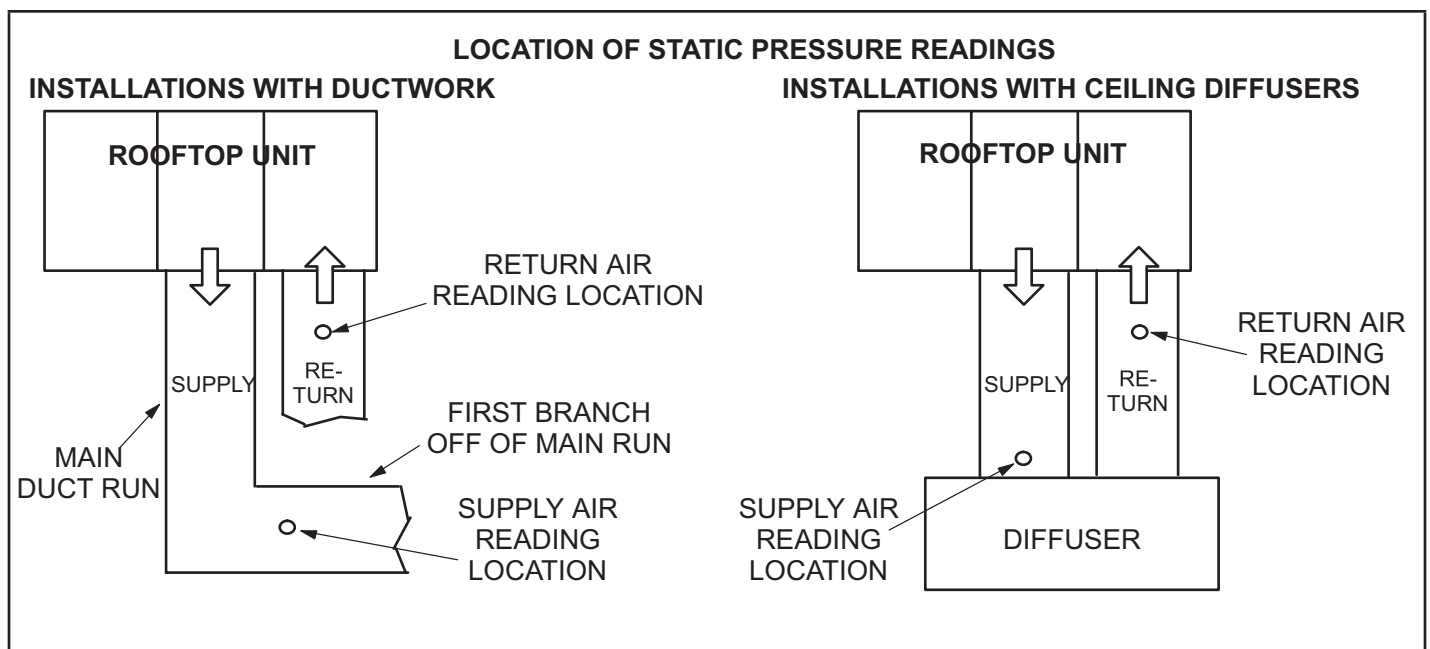


FIGURE 13

D-Blower Belt Adjustment

Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Tension new belts after a 24-48 hour period of operation. This will allow belt to stretch and seat into pulley grooves. Make sure blower and motor pulley are aligned. See FIGURE 14.

- 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.
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.

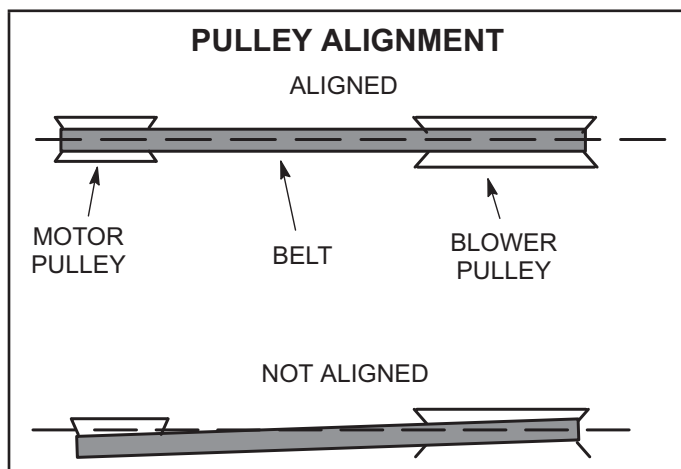


FIGURE 14

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 or 1.5mm per 100mm of span length.
Example: Deflection distance of a 40" span would be $40/64$ " or $5/8$ ".
Example: Deflection distance of a 400mm span would be 6mm.
- 3 - Measure belt deflection force. For a used belt, the deflection force should be 5 lbs. (35kPa). A new belt deflection force should be 7 lbs. (48kPa). A force below these values indicates an undertensioned belt. A force above these values indicates an overtensioned belt.

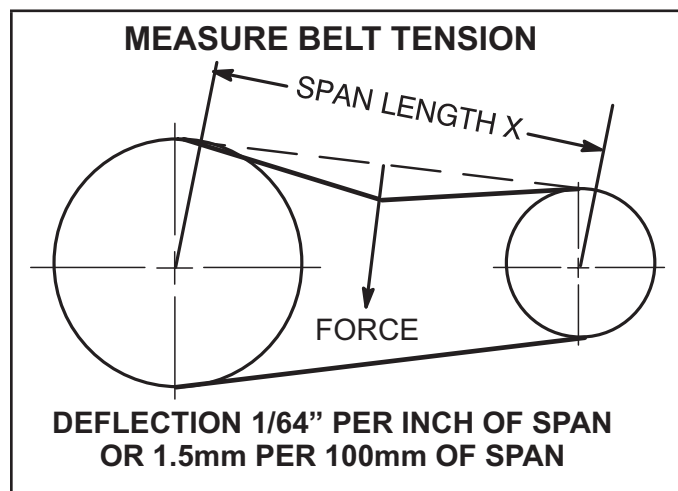


FIGURE 15

F-Field-Furnished Blower Drives

For field furnished blower drives, see BLOWER DATA (table of contents) for CFM and RPM. The BLOWER DATA section also has tables for drive numbers and manufacturer's model numbers. Reference the manufacturer's model numbers in the table below..

MANUFACTURER'S NUMBERS (60 HZ)

Drive No.	DRIVE COMPONENTS							
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS		SPLIT BUSHING	
	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
1	1VP71x1-3/8	100239-06	BK140H	100788-13	BX78	100245-44	H - 1-3/16	105616-02
2	1VP71x1-1/8	100239-06	BK120H	100788-07	BX75	31K9801	H - 1-3/16	105616-02
3	1VP65x1-3/8	78M7101	BK130H	100788-08	BX75	31K9801	H - 1-3/16	105616-02
4	1VP60x1-3/8	78L5501	BK110H	100788-06	BX71	31K9701	H - 1-3/16	105616-02
5	1VP56x1-1/8	P-8-1492	BK120H	100788-07	BX71	31K9701	H - 1-3/16	105616-02
6	1VP60x1-1/8	41C1301	BK110H	100788-06	BX70	31K9601	H - 1-3/16	105616-02
7	1VP50x1-1/8	P-8-1977	BK120H	100788-07	BX70	31K9601	H - 1-3/16	105616-02
8	1VP44x1-1/8	36C0701	BK120H	100788-07	BX70	31K9601	H - 1-3/16	105616-02
9	1VP44x1-1/8	36C0701	BK140H	100788-13	BX73	100245-41	H - 1-3/16	105616-02

D-GAS HEAT COMPONENTS

Units are available in 260,000 Btuh (76.2 kW) standard gas heat, 360,000 Btuh (105.5 kW) medium gas heat and 480,000 Btuh (140.6 kW) high gas heat sizes. See unit nameplate for capacities. All units are equipped with two identical gas heat sections (gas heat section one and gas heat section two). Flexible pipe will feed supply gas to both sections. If for service the flexible connection must be broken, hand tighten, then using a wrench turn additional 1/4 turn for metal to metal seal (do not over tighten).

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 6 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 retries (nominal timings given for simplicity). Specific timings for the ignition controls are shown in FIGURE 19.

TABLE 6

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 too 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

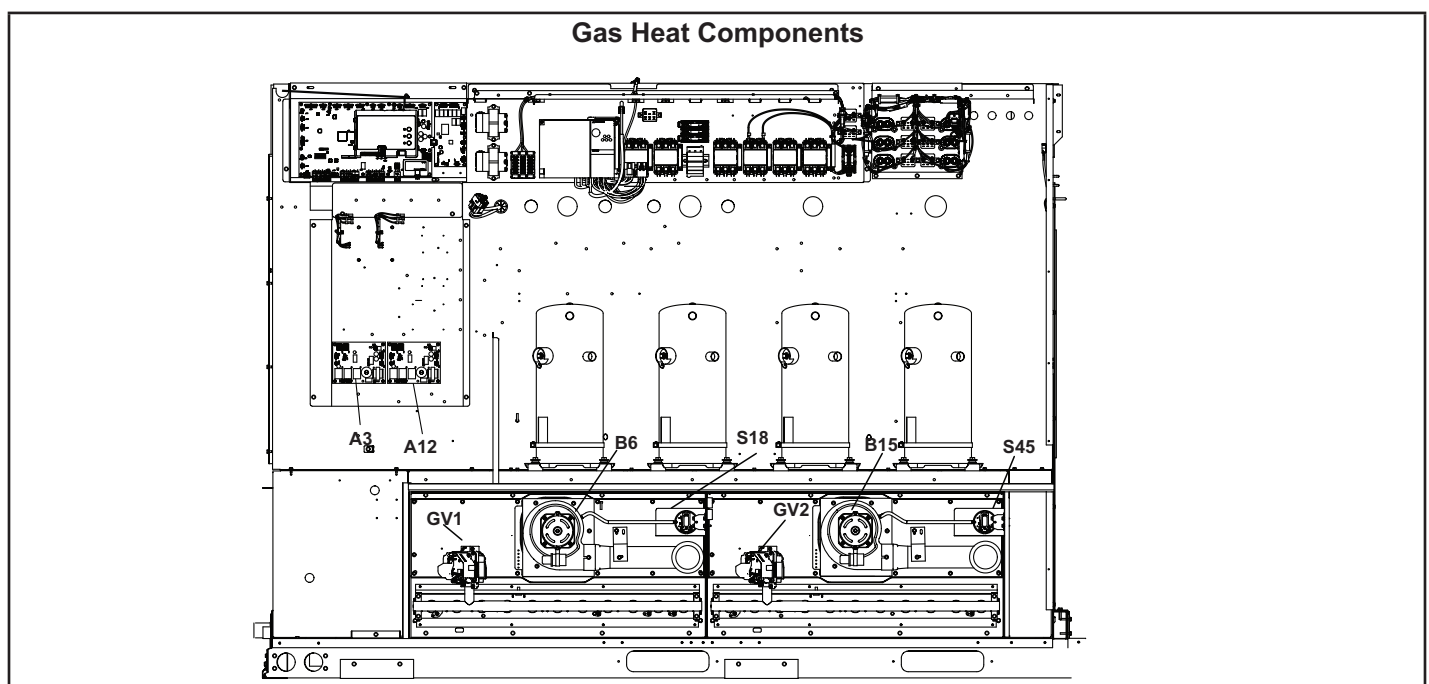


FIGURE 16

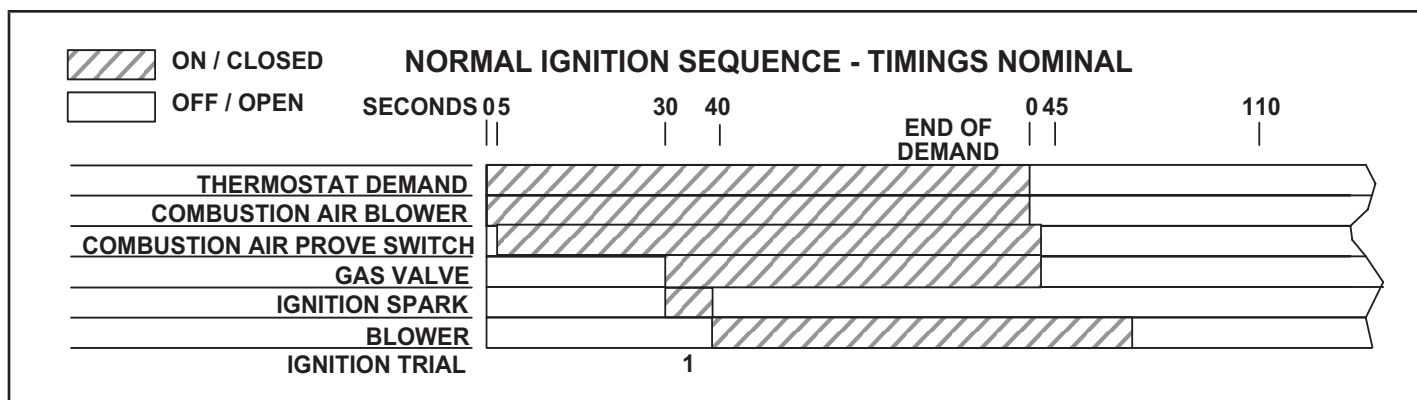


FIGURE 17

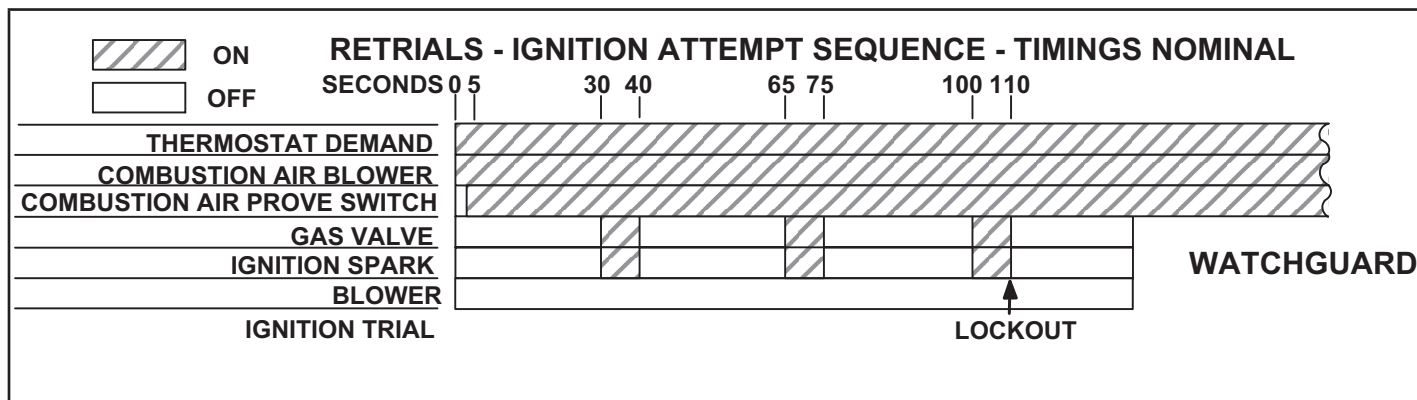


FIGURE 18

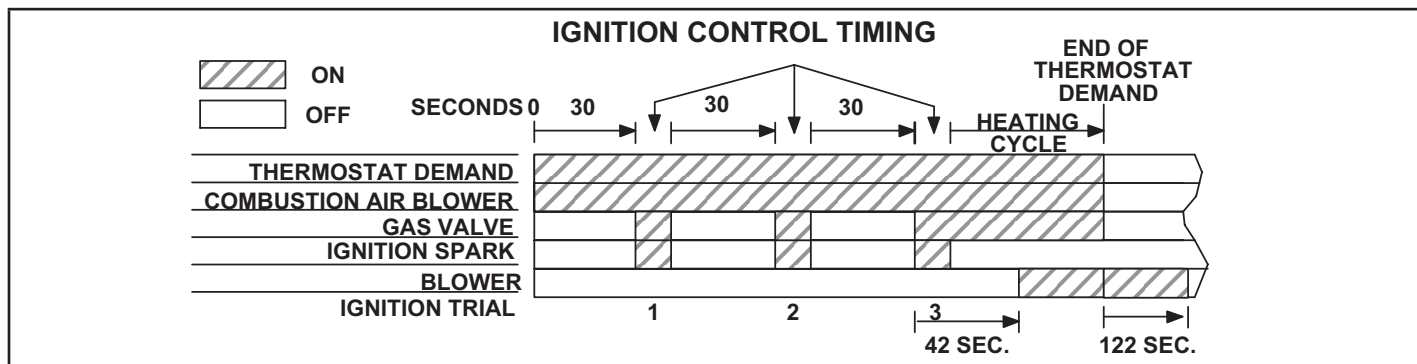


FIGURE 19

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 and FIGURE 21) Two Styles used

The LGT units use aluminized steel inshot burners with matching tubular aluminized steel (stainless steel is an option) heat exchangers and two-stage redundant gas valves. LGT uses two eleven-tube/burners for high heat, two nine-tube burners for medium heat (if applicable, see unit nameplate) and two six-tube/burners for standard heat. Each burner uses 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 transfer.

The gas valves accomplish staging by providing more or less gas to the burners as required by heating demand.

3-Burner Assembly (FIGURE 22)

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 inducer 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 individually for service. Burner maintenance and service is detailed in the SERVICE CHECKS sections of this manual.

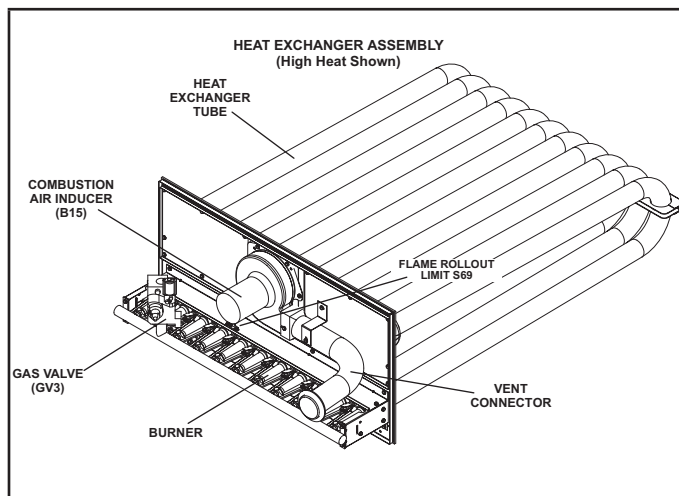


FIGURE 20

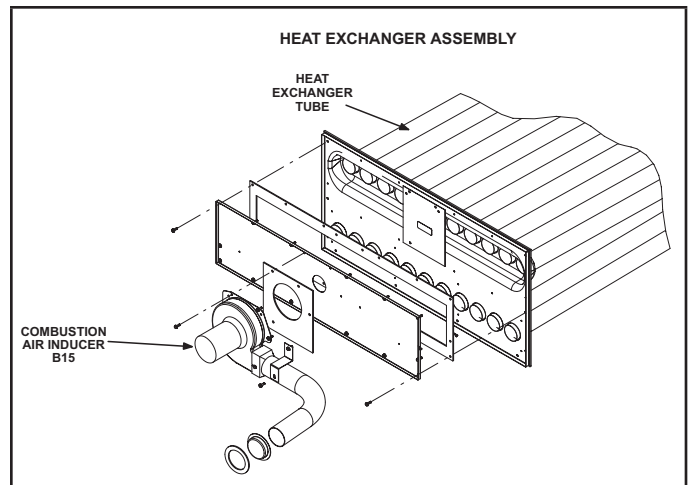


FIGURE 21

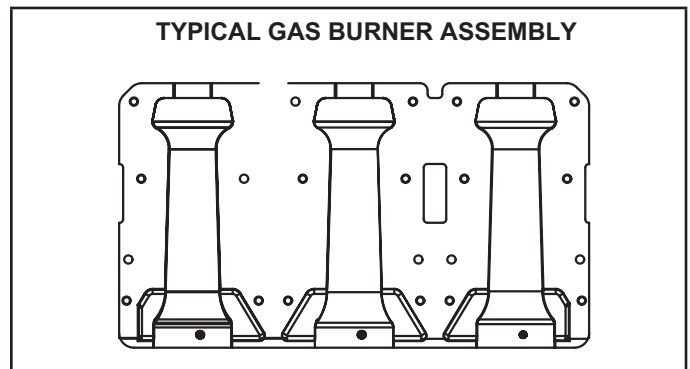


FIGURE 22

Orifice

Each burner uses an orifice (FIGURE 23) which is precisely matched to the burner input. Install only the orifices with the same threads. The orifice is threaded into the burner manifold. The burner is supported by the orifice and will easily slide off for service.

Each orifice and burner are sized specifically to the unit. Refer to Product Zone at www.LennoxPros.com for correct sizing information.

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.

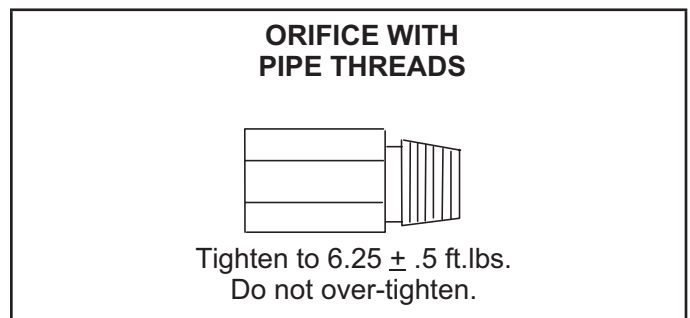


FIGURE 23

4-Primary High Temperature Limits S10 & S99 FIGURE 24

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

Figure 23 shows the location of S10 and S99 on the drip shield behind the blower housing. In this location, S10 and S99 serve as both primary and secondary limit.

Primary limit S10 is wired to the Unit Controller A55 which energizes burner 1 control (A3), while primary limit S99 is wired to the Unit Controller A178 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. Limit setpoints are factory-set and cannot be adjusted. If limit must be replaced, same type and setpoint must be used. See Product Zone at www.LennoxPros.com.

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.

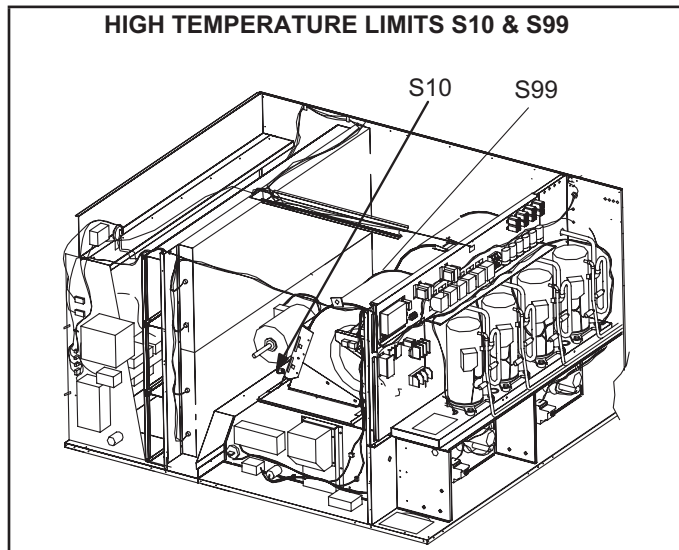


FIGURE 24

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 (FIGURE 20). 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 $290^{\circ}\text{F} \pm 12^{\circ}\text{F}$ on a temperature rise, while on high heat units both limits open at $270^{\circ}\text{F} \pm 12^{\circ}\text{F}$ 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 gas heat compartment. Switches are identical, SPST N.O. and monitor combustion air inducer operation. Switch S18 and S45 are wired to the Unit Controller A55. When the combustion air inducer is operating, a negative pressure is created in the compressor compartment. The switches close (on a pressure fall) allowing power to the heating sequence. When the combustion air inducer is not operating, the pressure builds in the compressor compartment. Switches open (on a pressure rise) to interrupt power to the heating sequence. The combustion air prove switches are factory-set and are not adjustable. TABLE 7 shows prove switch settings.

TABLE 7

S18 & S45 Prove Switch Settings

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

7-Combustion Air Inducers B6 and B15

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

Combustion air inducers use a 208/230V or 460V single-phase PSC motor and a 4.81in. x 1.25in. (122mm x 32mm) blower wheel. All motors operate at 3200 or 3450 RPM and are equipped with auto-reset overload protection. Inducers are supplied by various manufacturers. Ratings may vary by manufacturer. Specific inducer electrical ratings can be found on the unit rating plate. All combustion air inducer motors are sealed and cannot be oiled. The inducer cannot be adjusted but can be disassembled for cleaning.

8-Combustion Air Motor Capacitors C3 & C11

The combustion air inducer motors in all LGT units require run capacitors. Capacitor C3 is connected to combustion air inducer B6 and C11 is connected to combustion air inducer B15. Both capacitors are rated at 3 or 4 MFD for 208/230V inducers and 4 MFD for 460V inducers.

9-Gas Valves GV1 and GV3

Gas valves GV1 and GV3 are identical. The gas valves are two-stage redundant valves. Units are equipped with valves manufactured by WhiteRodgers. Both first-stage (low fire) and second-stage (high fire) are quick opening (on and off in less than 3 seconds). On a call for first stage heat (low fire), the valve is energized by the ignition control simultaneously with the spark electrode. On a call for second stage heat (high fire), the second stage operator is energized directly from A55 (GV1) and (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. TABLE 8 shows factory gas valve regulation for LGT series units. See "HIGH ALTITUDE" section (table of contents) for high altitude requirements.

TABLE 8
GAS VALVE REGULATION FOR LGT 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" (6.35 mm) 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.

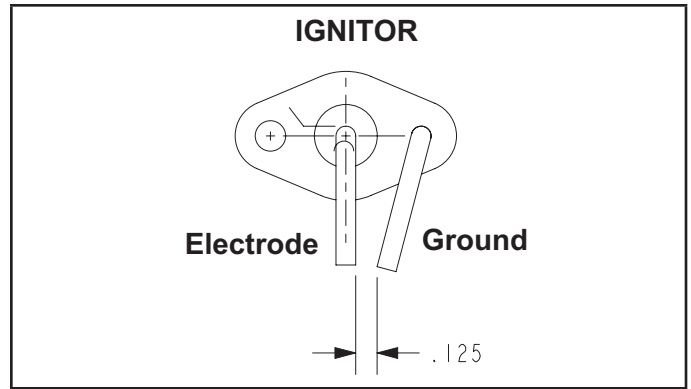


FIGURE 25

11-Flame Sensors FIGURE 26

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 the flame) is sensed.

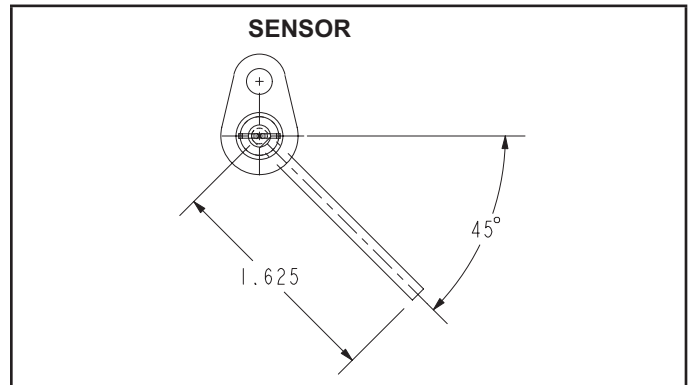


FIGURE 26

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 (LARMF18/36 or LARMFH30/36).

III-STARTUP - OPERATION - CHARGING

Refrigerant Charge R-454B		
Unit	M _c (lbs)	M _c (kg)
LGT/LCT302 Stage 1	6.75	3.06
LGT/LCT302 Stage 2	6.50	2.95
LGT/LCT302 Stage 3	6.69	3.03
LGT/LCT302 Stage 4	6.81	3.09
LGT/LCT360 Stage 1	6.38	2.89
LGT/LCT360 Stage 2	6.81	3.09
LGT/LCT360 Stage 3	6.63	3.01
LGT/LCT360 Stage 4	6.38	2.89

WARNING - Do not exceed nameplate charge under any condition.

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

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

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

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

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

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

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

- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i. e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt

- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

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

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

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

- 1 - Make sure outdoor coil is clean. Attach gauge manifolds and operate unit at full CFM in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure all outdoor air dampers are closed.
- 2 - Compare the normal operating pressures to the pressures obtained from the gauges. Check unit components if there are significant differences.
- 3 - Measure the outdoor ambient temperature and the suction pressure. Refer to the charging curve to determine a target liquid temperature.

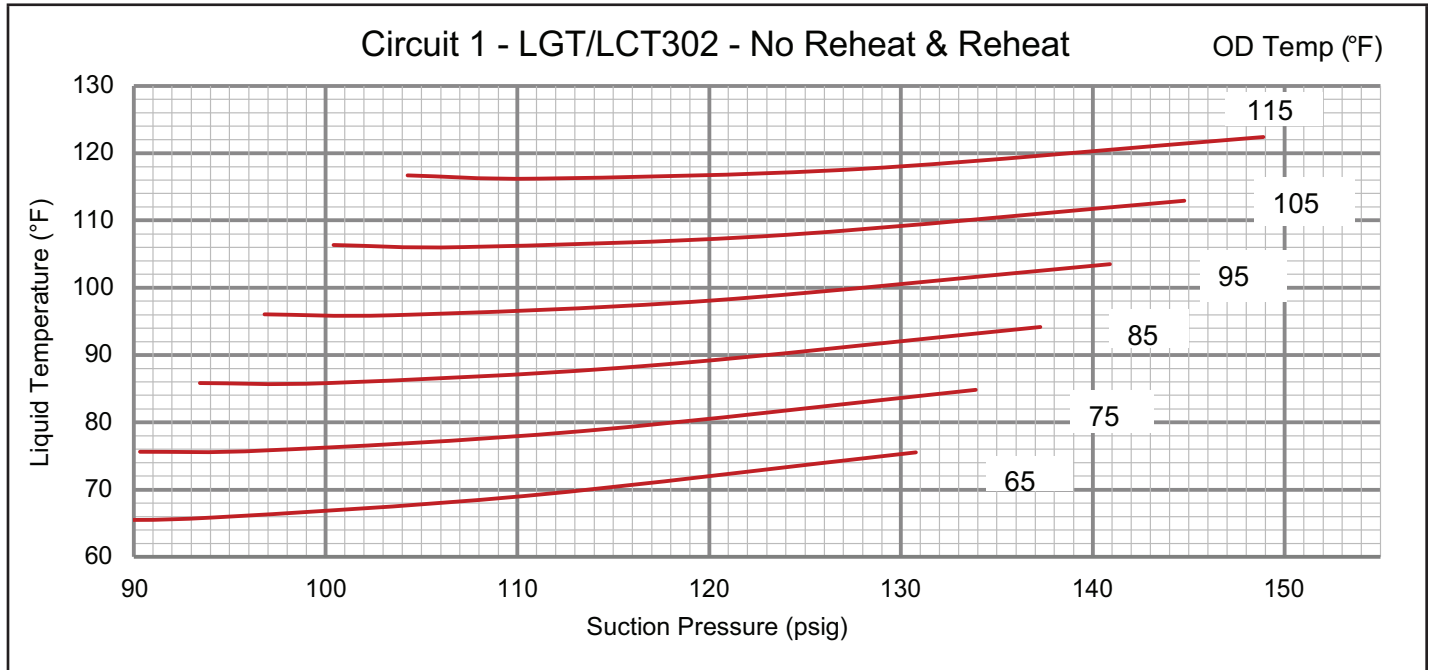
Note - *Pressures are listed for sea level applications.*

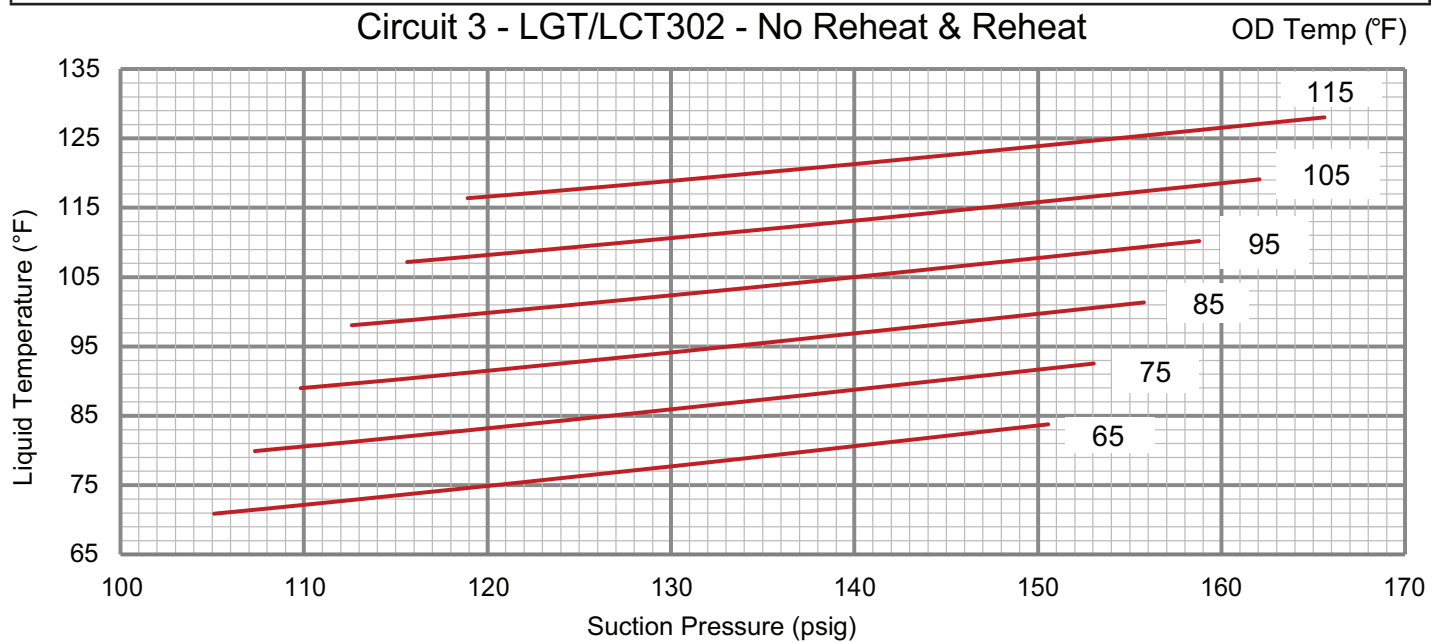
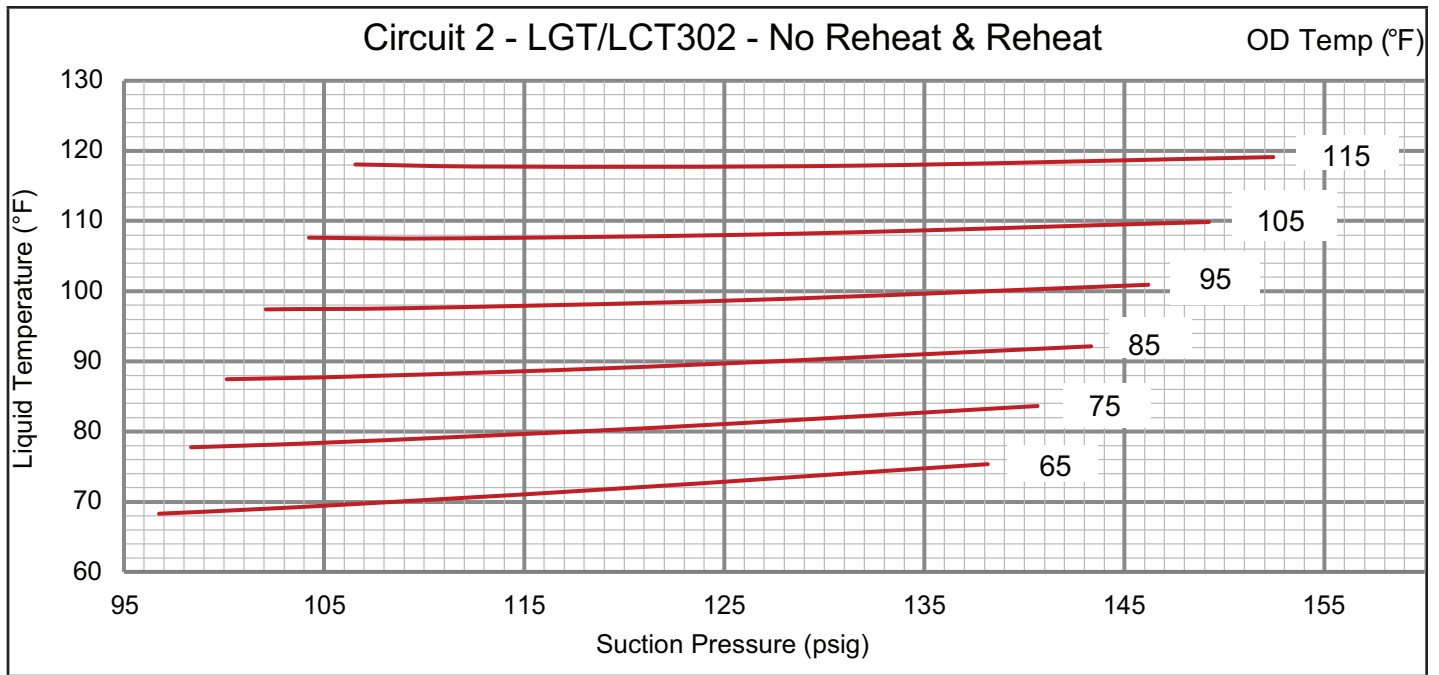
- 4 - Use the same thermometer to accurately measure the liquid temperature (in the outdoor section).
 - If measured liquid temperature is higher than the target liquid temperature, add refrigerant to the system.
 - If measured liquid temperature is lower than the target liquid temperature, recover some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

- When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i. e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
 - The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.
 - The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
 - If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.
- 5 - Add or remove charge in increments. Allow the system to stabilize each time refrigerant is added or removed.
 - 6 - Continue the process until measured liquid temperature agrees with the target liquid temperature. Do not go below the target liquid temperature when adjusting charge. Note that suction pressure can change as charge is adjusted.
 - 7 - Example LGT/LCT302H Circuit 1: At 95°F outdoor ambient and a measured suction pressure of 128 psig, the target liquid temperature is 100°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquid temperature agrees with the target liquid temperature.

TABLE 9
LGT/LCT302H Normal Operating Pressures

	Outdoor Coil Entering Air Temperature											
	65°F		75°F		85°F		95°F		105°F		115°F	
	Suct (psig)	Disc (Psig)	Suct (psig)	Disc (Psig)	Suct (psig)	Disc (Psig)	Suct (psig)	Disc (Psig)	Suct (psig)	Disc (Psig)	Suct (psig)	Disc (Psig)
Circuit 1	87	227	90	264	93	306	97	352	100	404	104	459
	94	229	97	266	100	308	104	355	107	406	111	462
	110	235	113	272	117	314	120	360	124	412	128	467
	131	244	134	280	137	322	141	368	145	419	149	475
Circuit 2	97	220	98	256	100	297	102	345	104	398	107	458
	103	221	105	256	107	298	109	345	112	398	114	457
	119	227	121	261	123	302	126	348	129	400	131	458
	138	237	141	271	143	310	146	355	149	406	152	463
Circuit 3	105	238	107	276	110	319	113	366	116	418	119	475
	113	241	115	279	118	321	120	368	123	420	127	477
	130	249	133	286	135	327	138	374	141	425	145	481
	151	259	153	295	156	336	159	382	162	432	166	488
Circuit 4	110	237	111	275	113	319	115	369	117	425	120	488
	117	240	119	277	121	320	123	370	125	425	128	487
	134	247	136	283	138	325	140	373	143	427	146	487
	154	257	156	292	158	332	161	379	163	432	167	491





Circuit 4 - LGT/LCT302 - No Reheat & Reheat

OD Temp (°F)

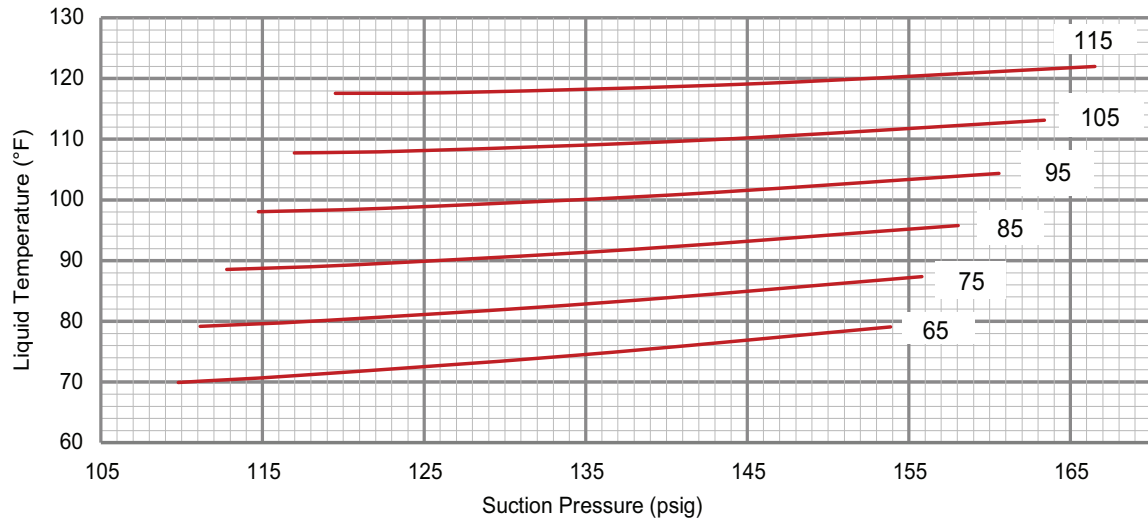
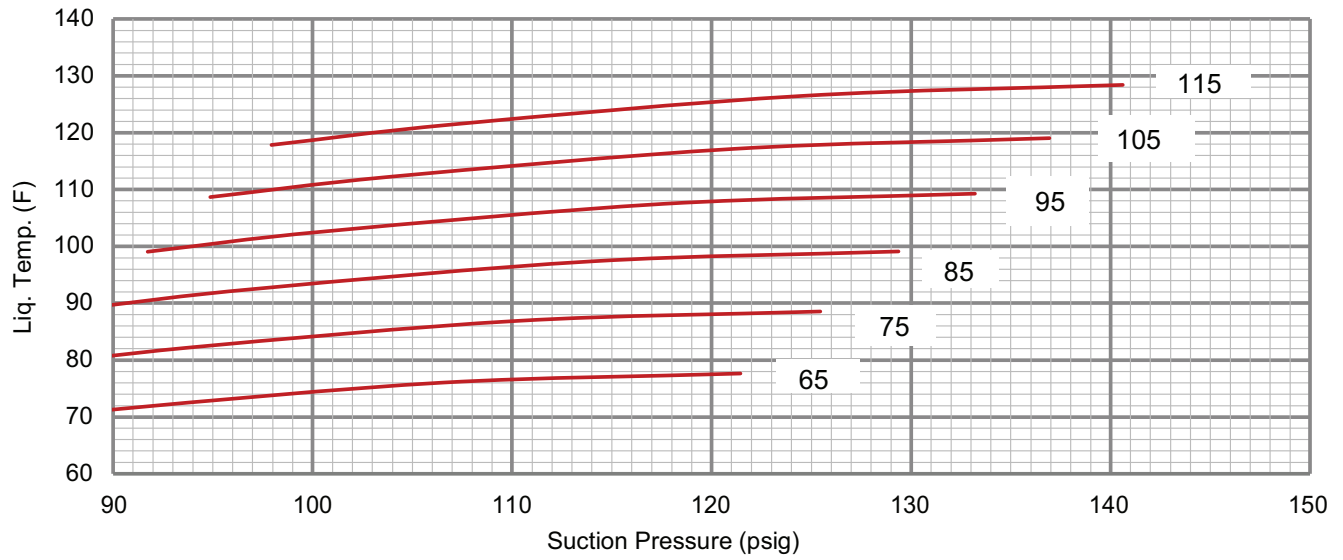


TABLE 10
LGT/LCT360H Normal Operating Pressures

	Outdoor Coil Entering Air Temperature											
	65°F		75°F		85°F		95°F		105°F		115°F	
	Suct (psig)	Disc (Psig)	Suct (psig)	Disc (Psig)	Suct (psig)	Disc (Psig)	Suct (psig)	Disc (Psig)	Suct (psig)	Disc (Psig)	Suct (psig)	Disc (Psig)
Circuit 1	82	232	85	269	89	309	92	355	95	404	98	457
	90	237	94	274	97	315	101	360	104	410	107	463
	107	247	110	284	114	325	118	370	121	420	125	473
	121	254	125	291	129	333	133	378	137	428	141	481
Circuit 2	91	228	93	265	94	307	96	354	98	406	99	463
	98	232	100	269	103	311	105	358	106	410	108	467
	114	240	117	276	119	318	122	364	124	415	126	472
	130	247	133	282	136	323	139	369	142	420	145	476
Circuit 3	99	254	101	293	103	337	105	386	107	439	109	497
	108	258	111	297	113	341	115	389	117	442	119	500
	126	268	129	306	131	350	134	398	136	450	138	508
	144	280	147	318	150	361	152	409	155	461	157	518
Circuit 4	105	245	106	283	107	325	109	372	110	425	111	482
	113	248	114	285	116	327	118	374	119	426	121	483
	128	256	131	293	134	334	136	381	138	432	141	489
	144	269	148	305	151	346	154	392	157	443	160	499

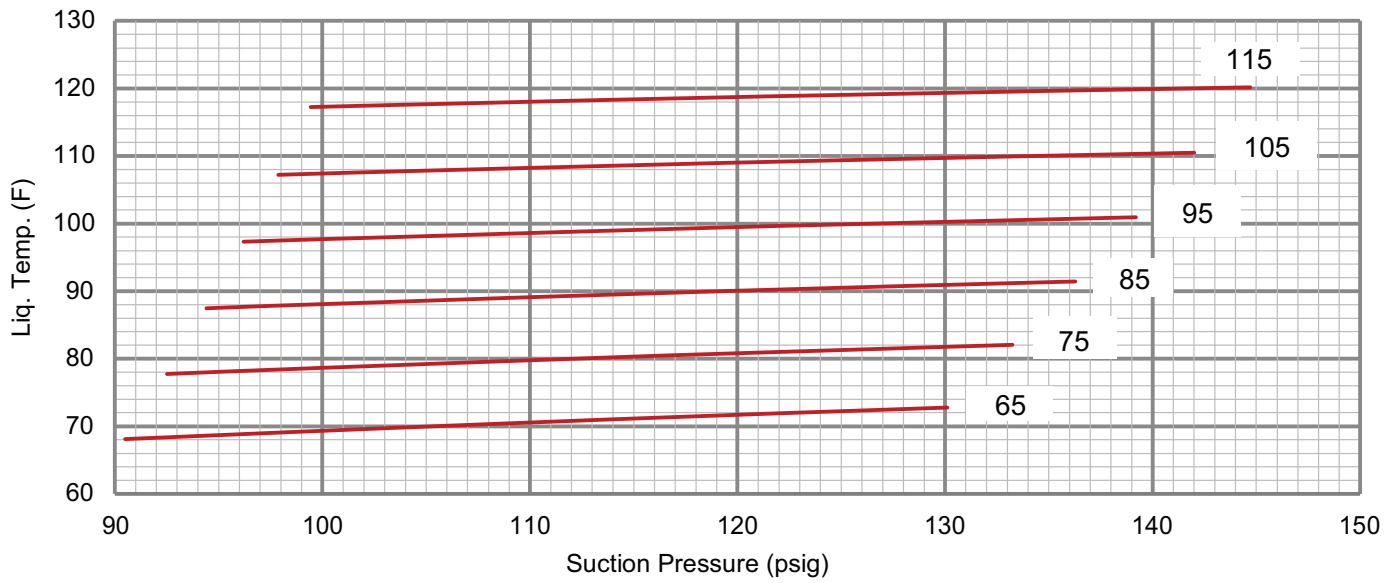
Circuit 1 - LGT/LCT360 - No Reheat

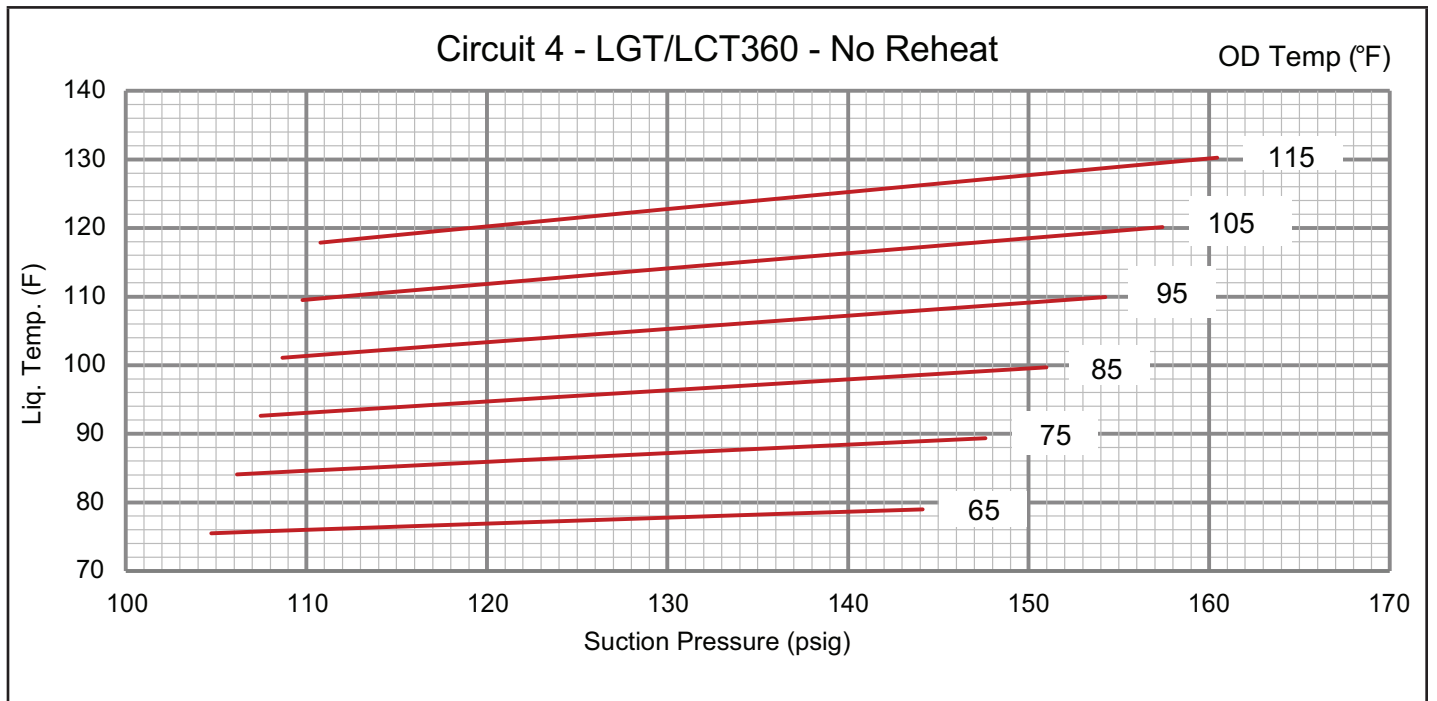
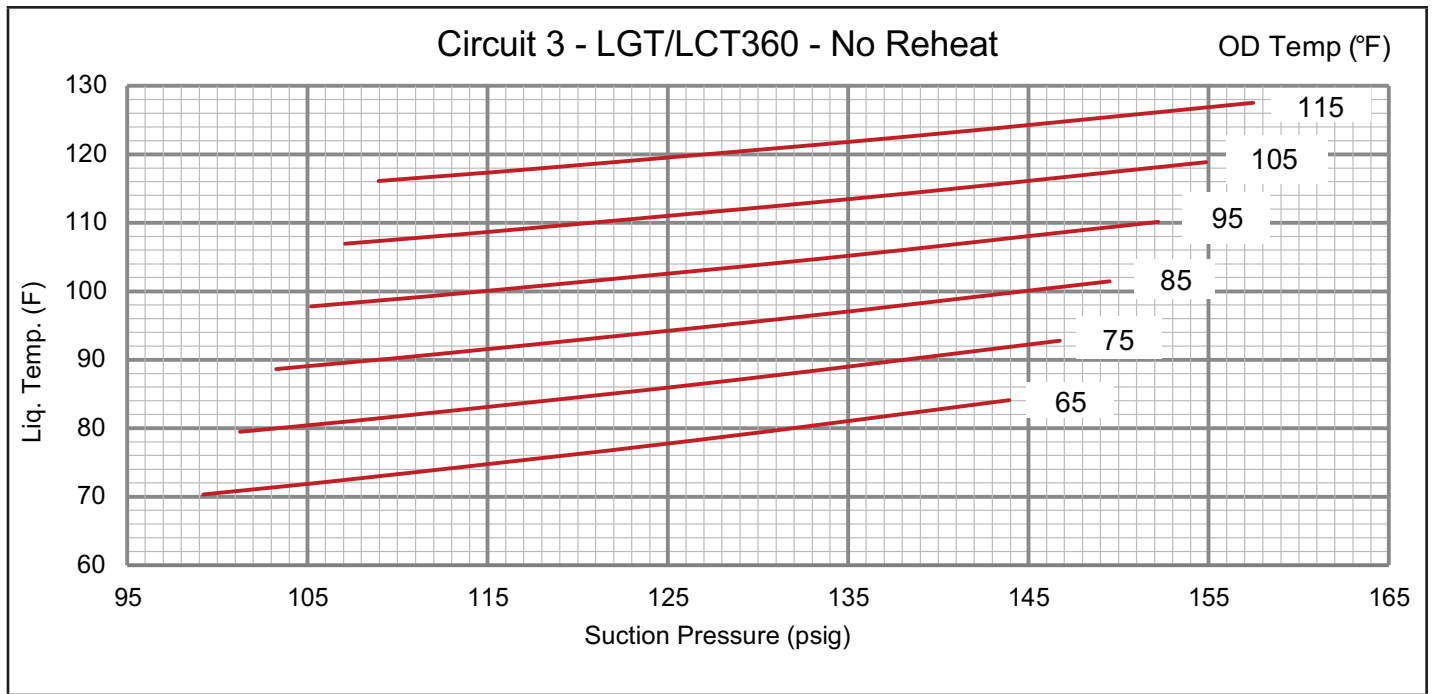
OD Temp (°F)



Circuit 2 - LGT/LCT360 - No Reheat

OD Temp (°F)





D-Heating Start Up

FOR YOUR SAFETY READ BEFORE LIGHTING

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

WARNING

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

WARNING

Danger of explosion. Can cause injury or product or property damage. Should the gas supply fail to shut off or if overheating occurs, shut off the gas valve to the furnace before shutting off the electrical supply.

WARNING

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

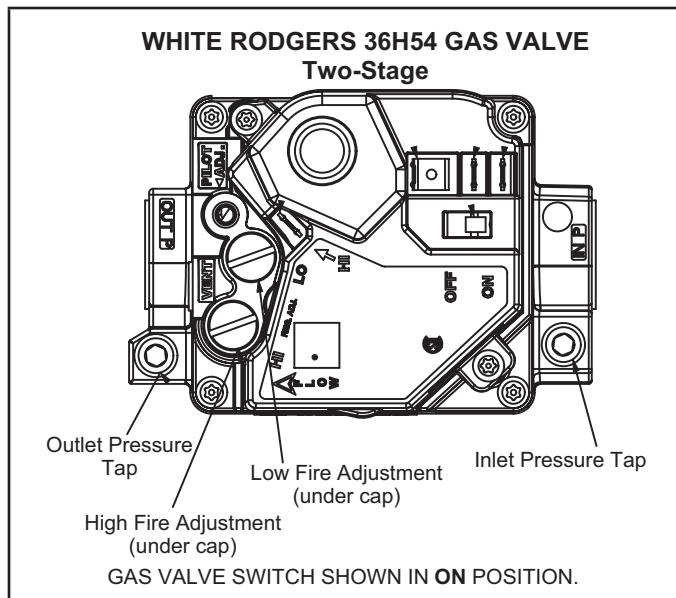


FIGURE 27

- 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 clockwise to OFF. Do not force.
- 6 - Wait five minutes to clear out any gas. If you then smell gas, STOP! Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas, go to the next step.
- 7 - Turn the knob on the gas valve counterclockwise to ON. Do not force.
- 8 - Close or replace the heat section access panel.
- 9 - Turn on all electrical power to unit.
- 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 Unit

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

E-Safety or Emergency Shutdown

Turn off power to unit.

IV- SYSTEMS SERVICE CHECKS

A-LGT Heating System Service Checks

All LGT 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 LGT Installation, Operation and Maintenance instruction for more information.

1-Gas Piping

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

2-Testing Gas Piping

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

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig [14"W.C. (3481 Pa)]. See FIGURE 28.

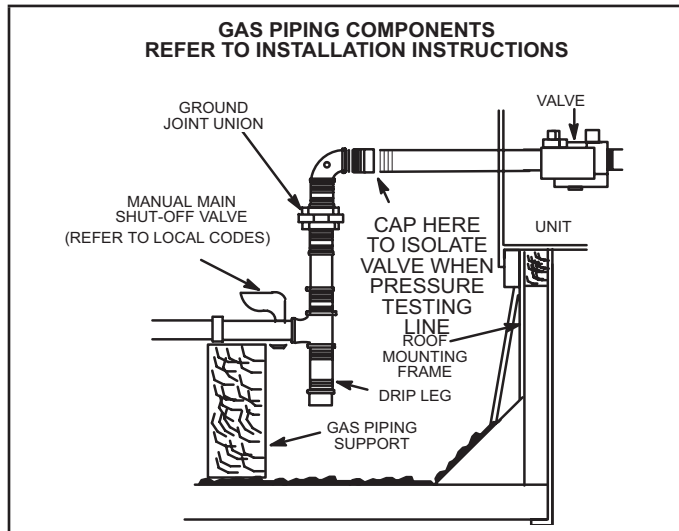


FIGURE 28

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.

3-Testing Gas Supply Pressure

When testing gas supply pressure, connect test gauge to the inlet pressure tap on the gas valve (figure 30). Test supply gas pressure with unit firing at maximum rate (both stages energized). Make sure the reading falls within the range of the following values. Low pressure may result in erratic operation or "underfire." High pressure can result in permanent damage to the gas valve or "overfire." For natural gas units, operating pressure at the unit gas connection must be between 4.7"W.C. and 10.5"W.C. (1168 Pa and 2610 Pa). For L.P. gas units, operating pressure at the unit gas connection must be between 10.8"W.C. and 13.0"W.C. (2685 Pa and 3232 Pa).

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

4-Check and Adjust Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Move test gauge to the outlet pressure tap located on unit gas valve GV1. See table 5 in GAS HEAT COMPONENT section for proper manifold pressure and figure 30 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. Refer to 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.

! IMPORTANT

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 for gas supply pressure in table 8.

! IMPORTANT

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

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 tables in the SPECIFICATIONS section of this manual. 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.

FIGURE 29 shows how to remove burner assembly.

- 1 - Turn off power to unit and shut off gas supply.
- 2 - Remove screws holding the burner support cap.
- 3 - Slide each burner off its orifice.
- 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 $0.125" \pm 0.015"$ (3.2 mm \pm .4 mm). See FIGURE 25.

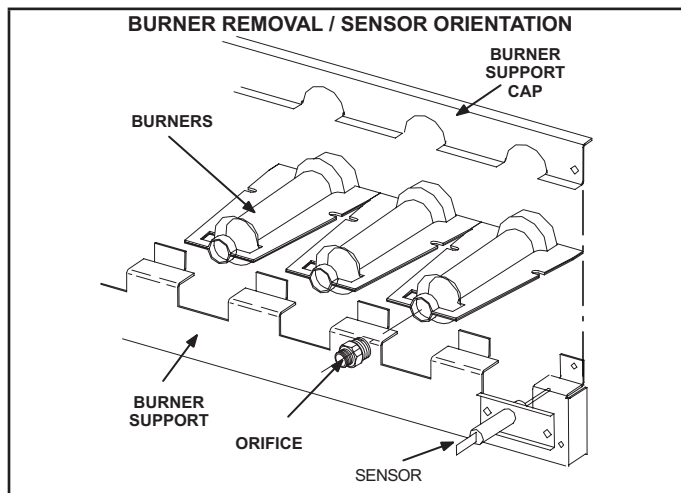


FIGURE 29

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 blower 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 and slide out.

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. (155.7 N) 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. See table 13 for flame signal range. 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 below:

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 11. 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 11

Manufacturer	Nominal Signal Microamps	Drop Out
UTEC	0.5 - 1.0	.09
FENWALL	1.7 - 3.6	.07

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 Unit Controller A55. 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

All units are factory charged and require no further adjustment; however, charge should be checked periodically using the normal operating pressure method.



1-Gauge Manifold Attachment

Attach high pressure line to discharge line Schrader port and the low pressure line to the suction line Schrader port.

NOTE-When unit is properly charged discharge line pressures should approximate those in Refrigerant Check and Charge section.

V-MAINTENANCE

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

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

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

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

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

hazards or ignition risks. "No Smoking" signs shall be displayed.

- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.

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

- Where electrical components are being changed, service technicians shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance. The following checks shall be applied to installations using flammable refrigerants as applicable:

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

NOTE - Sealed electrical components shall be replaced, not repaired.

NOTE - Intrinsically safe components must be replaced, not repaired.

- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.
- When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:
 - Safely remove refrigerant following local and national regulations,
 - Evacuate the circuit,
 - Purge the circuit with inert gas,
 - Evacuate,
 - Purge with inert gas,
 - Open the circuit.
- The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. Refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

A-Filters

All units are equipped with twelve 20" x 20" x 2" (508mm x 508mm x 51mm) pleated throw-away type filters. Filters may be accessed through the economizer / filter access door (left of the blower door). All filters are removed by pulling on the pull tab, located on the bottom of each row of filters. 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.

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

CAUTION

Be careful when servicing unit to avoid accidental contact with sharp metallic edges which may cause personal injury.

B-Lubrication

All motors and blower wheels used are prelubricated; 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. If balancing clips are removed, make sure they are reinstalled in the same location when cleaning is completed.

NOTE-*Do not lose balancing clips.*

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 water and inspect monthly during the cooling season. Access panels are provided on front and back of condenser section.

Clean the all-aluminum coil by spraying the coil steadily and uniformly from top to bottom. Do not exceed 900 psi or a 45 angle; nozzle must be at least 12 inches from the coil face. Take care not to fracture the braze between the fins and refrigerant tubes. Reduce pressure and work cautiously to prevent damage.

NOTE-*If owner complains of insufficient cooling, the unit should be gauged and refrigerant charge checked. Refer to Gauge Manifold Attachment and Charging sections in this manual.*

F-Electrical

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

Fan Motor Rating Plate ____ Actual ____

Indoor Blower Motor Rating Plate ____ Actual ____

VI-ACCESSORIES

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

A-LARMF18/36-14, 24 or LARMFH30/36-30, 41

Mounting Frames

When installing the LGT/ LCH units on a combustible surface for downflow discharge applications, the Lennox LARMF18/36 14-inch or 24-inch (356 mm or 610mm) height roof mounting frame is used. For horizontal discharge applications, use LARMFH30/36 30-inch or 41-inch (762mm or 1041mm) height roof mounting frame. This frame converts unit from down-flow to horizontal air flow. The 14 and 24 inch (356 and 610mm) downflow and 41 inch (1041mm) horizontal frame meets National Roofing Code requirements. The roof mounting frames are recommended in all other applications but not required. If the units are not mounted on a flat (roof) surface, they **MUST** be supported under all edges and under the middle of the unit to prevent sagging. The units **MUST** be mounted level within 1/16" per linear foot or 5mm per meter in any direction.

The assembled LARMF18/36 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.

B-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.

C-Transitions

Optional supply/return transitions LASRT30/36 are available for use with LGT/LCH series units utilizing optional LARMF18/36 roof mounting frame. Transition must be installed in the LARMF18/36 mounting frame before mounting the unit to the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

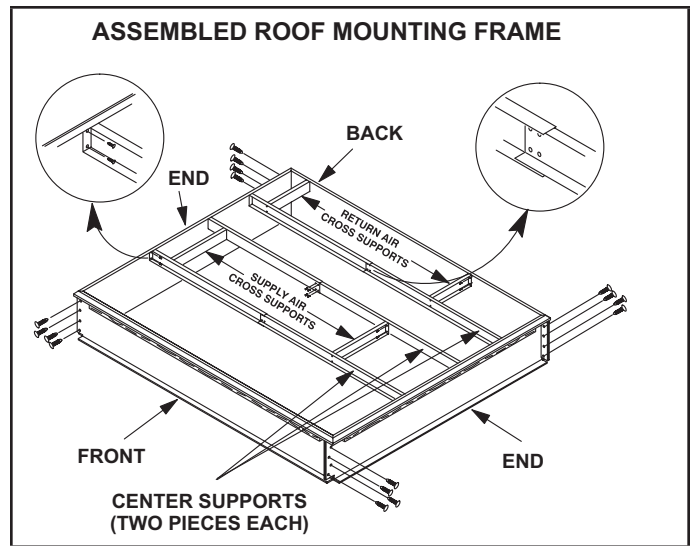


FIGURE 30

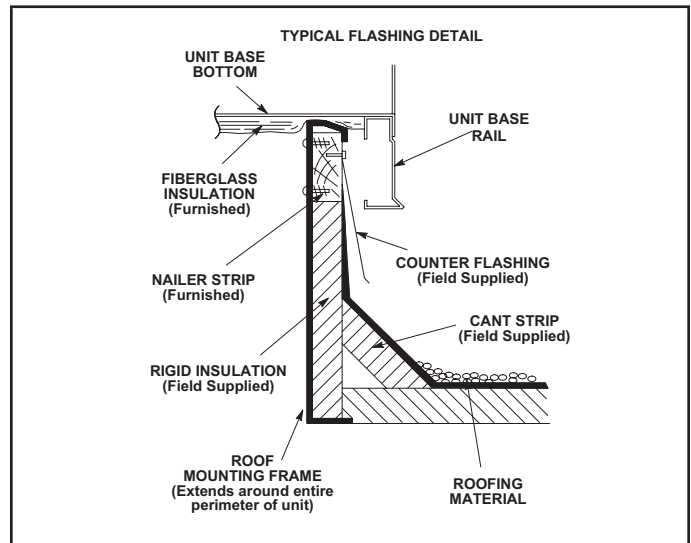


FIGURE 31

D-Supply and Return Diffusers

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

E-E1DAMP25D-1 & E1DAMO15D-1 Outdoor

Air Dampers

E1DAMP25D-1- & E1DAMO15D-1 consists 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 (FIGURE 32). Either air damper can be installed in LGT 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 Lennox Part No. P-8-5069.

F-E1ECON15D-1 Economizer

(Field or Factory Installed)

The optional economizer can be used with LGT units in 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. These settings are available through the main menu at SETUP > TEST & BALANCE > DAMPER. Each mode also requires different sensors.

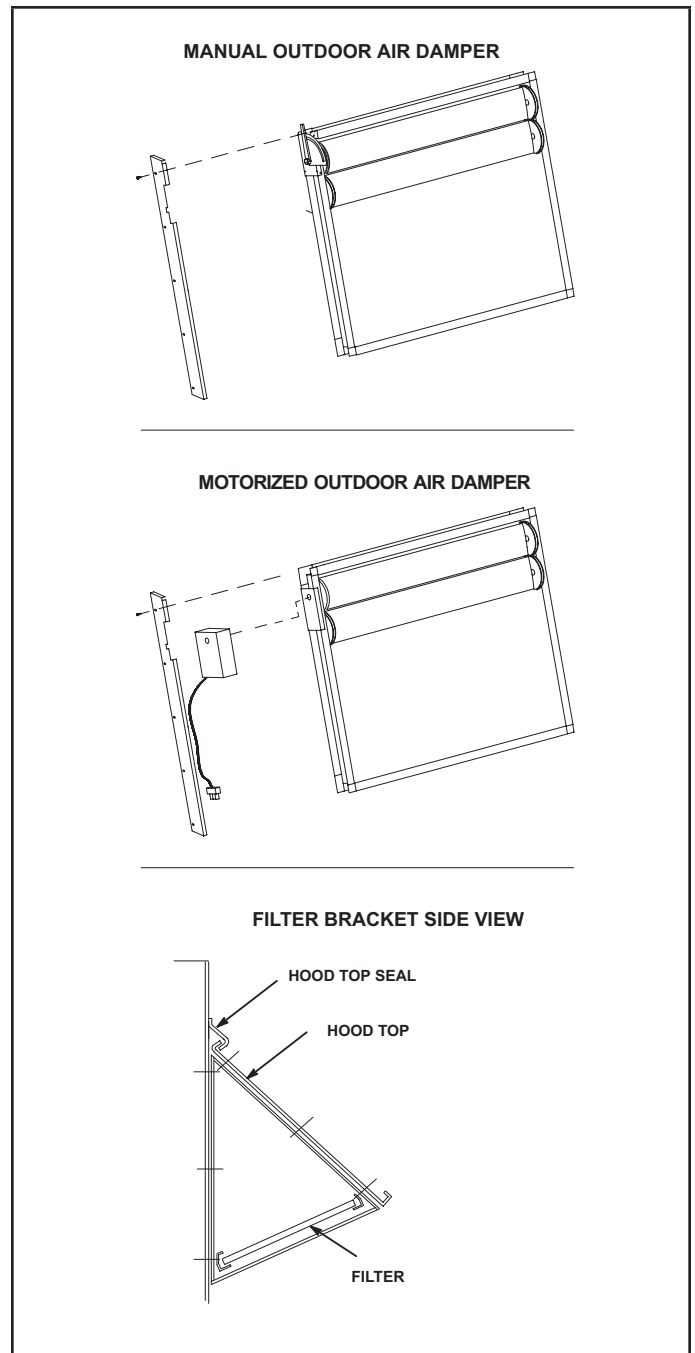


FIGURE 32

1-“TMP” MODE (SENSIBLE TEMPERATURE)

In the “TMP” mode, the A55 Unit Controller 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 factory or field-provided and -installed Honeywell C7400 enthalpy sensor (53W64). 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 factory or field-provided and -installed Honeywell C7400 enthalpy sensors (53W64). One sensor is installed in the outside air opening and the other sensor is installed in the return air opening. When the outdoor air enthalpy is below the return air enthalpy, the economizer opens to bring in outdoor air for free cooling.

4-“GLO” MODE (GLOBAL)

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

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

NOTE - All economizer modes of operation will modulate dampers to 55F (13C) supply air.

G-Gravity Exhaust Dampers

E1DAMP60D-1 dampers are used in downflow and LAGEDH30/ 36 are used in horizontal air discharge applications. E1DAMP60D-1 dampers are installed in the return air compartment of the unit (FIGURE 33). LAGEDH30/ 36 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 LGT series units. An exhaust hood is furnished with any type of 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. LAGED(H)30/36 dampers are used with LGT series units. See installation instructions for more detail.

H-LP / Propane Kit

Two natural to LP / propane gas changeover kits are required for gas conversion on LGT units (one for each gas heat section). 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.

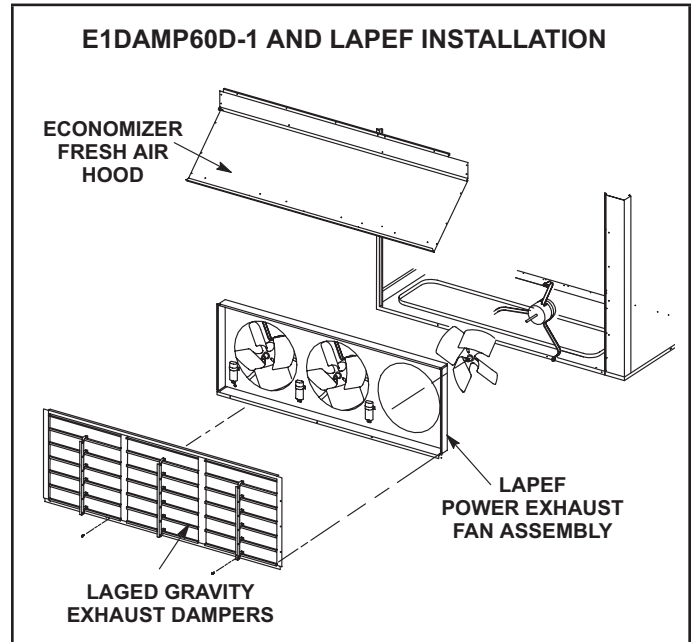


FIGURE 33

I- E1PWRE40D-1 Power Exhaust Fans

Power exhaust fans are used with LGT in downflow applications only. E1PWRE40D-1 power exhaust fans require optional E1DAMP60D-1 downflow gravity exhaust dampers and E1ECON15D-1 economizer. Power exhaust fans provide exhaust air pressure relief and run when return air dampers are closed and supply air blowers are operating. FIGURE 33 shows location of the power exhaust fans. See installation instructions for more detail.

J-Smoke Detectors A171, A172, A173

Photoelectric smoke detectors are a factory 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 0.15" W.C. (37.4 Pa) 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 0.85" W.C. (211.7 Pa). 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. Actuation of this switch does not affect unit operation.

M-Optional Cold Weather Kit (Canada only)

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

The kit includes the following parts:

- 1 - The strip heater (HR6) is located as close as possible to the gas valve. The strip heater is rated at 500 Watts.
- 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 -20°F (-28.9° C) the switch opens and the gas heat section is de-energized. The switch automatically resets when the heating compartment temperature reaches 10°F (-12.2° C).
 - 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 (-6.7° C) the switch opens and the electric heater is de-energized through K125. The switch automatically resets when the heating compartment temperature reaches -10° F (-23.3° C).
 - c. Thermostat switch (S61) is an auto-reset SPST N.O. switch which closes on a temperature drop. The switch is wired in series with K125 coil. When temperature drops below 20° F (-6.7° C) the switch closes and electric heater is energized through K125. The switch automatically opens when heating compartment temperature reaches 50° F (10° C).

N-Indoor Air Quality (CO2) Sensor A63

The indoor air quality sensor monitors CO2 levels and reports the levels to the Unit Controller A55. 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-Supply Air Variable Frequency Drive VAV units only

NOTE - Units equipped a Variable Frequency Drive (VFD) are designed to operate on balanced, three-phase power. Operating units on unbalanced three-phase power will reduce the reliability of all electrical components in the unit. Unbalanced power is a result of the power delivery system supplied by the local utility company. Factory-installed inverters are sized to drive blower motors with an equivalent current rating using balanced three-phase power. If unbalanced three-phase power is supplied; the installer must replace the existing factory-installed inverter with an inverter that has a higher current rating to allow for the imbalance.

Refer to the installation instructions for additional information and available replacements. VAV units contain a supply air blower equipped with a variable frequency drive A96 (VFD) which varies supply air CFM. As duct static increases, the supply air volume will decrease. As duct static decreases, the supply air volume will increase.

In VAV units, the Unit Controller uses input from a field-installed pressure transducer (A30) to maintain a 1.0" w.c. (default) static pressure. Refer to the Unit Controller manual parameter 388 and 389 to adjust the static pressure setpoint.

The pressure transducer is shipped in a box in the blower compartment. Install the transducer according to manufacturer's instructions.

Note -Make sure the transducer is installed in the main duct at least 2/3 of the distance away from the unit.

The supply air VFD (A96) is located near the compressors.

The Unit Controller will lock-out the unit for 5 minutes(default) if static pressure exceeds 2.0"w.c. for 20 seconds. The Unit Controller will permanently shut down the unit after three occurrences. Use the following parameters to adjust the default values:

Parameter 110; Error time off delay.

Parameter 42; Air Supply Static Shutdown Set Point.

Parameter 43; Static Pressure Lockout Counter Set Point.

VAV By-Pass Operation (Optional)

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

- 1 - Turn off all power to unit.
- 2- Locate K3, K203, J248 and J249 connectors near the VFD. See FIGURE 34.
- 3- Disconnect J248 from P248 and connect connect P248 jumper plug to J248. P248 jumper plug is attached to the J248 wire harness near the J248 jack connector. See FIGURE 35.
- 4- Disconnect P247 from J247 and connect J249 to P247. See FIGURE 36.

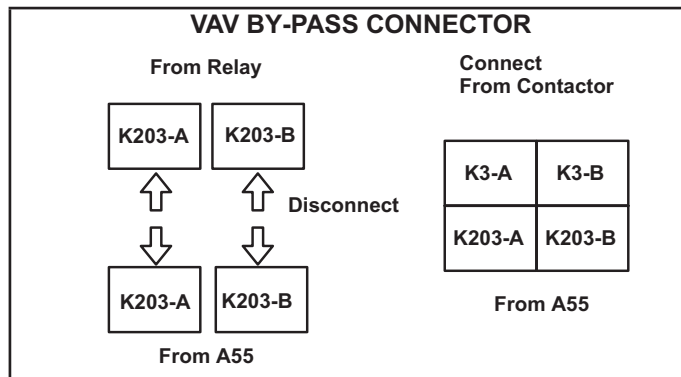


FIGURE 34

- 5 - Locate VFD control relay K203 on the lower control panel. See FIGURE 37.
- 6- Disconnect wires marked K203-A and K203-B
- 7- Connect K3-A (female terminal) to K203-A (male terminal) and K3-B (female terminal) to K3-B (male terminal)
- 8- Restore power to unit. Blower will operate in constant air volume (CAV) mode.
- 9- 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. Refer to the Indoor Blower Motor section. Do not exceed minimum and maximum number of pulley turns as shown in table 1.

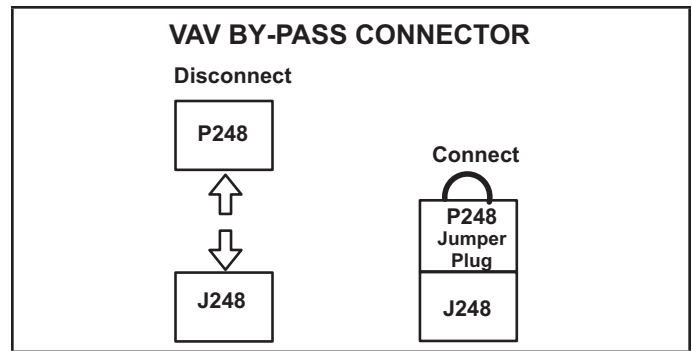


FIGURE 35

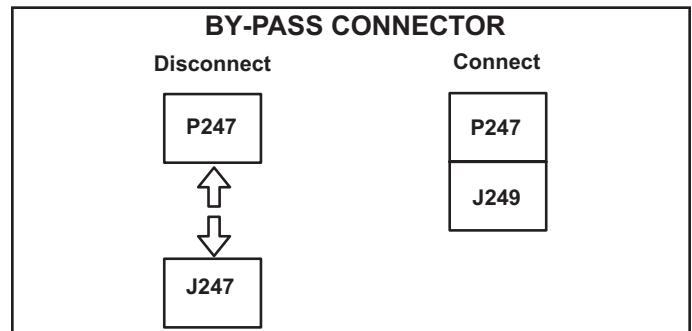


FIGURE 36

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.O. overflow switch is controlled by K220 and DL46 relays, located in the unit control panel. When the overflow switch closes, 24VAC power is interrupted and after a five-second delay the unit compressors are de-energized.

Once the condensate level drops below the set level, the switch will open. After a five-minute delay the compressor will be energized.

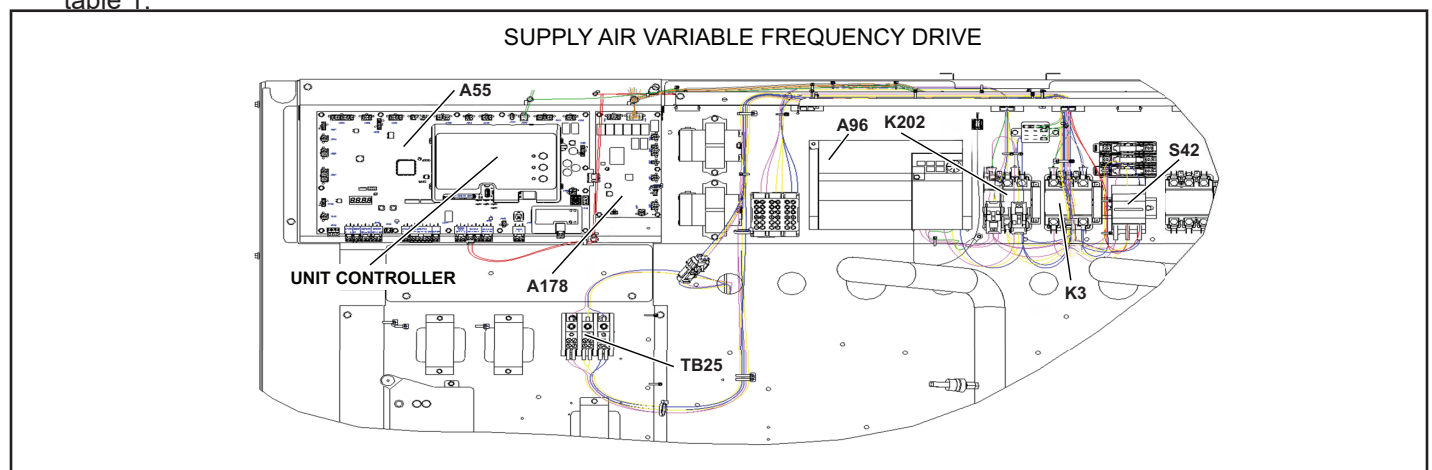


FIGURE 37

Q-Hot Gas Reheat Start-Up and Operation

General

Hot gas reheat units provide a dehumidifying mode of operation. These units contain a reheat coil adjacent to and downstream of the evaporator coil. Reheat coil solenoid valves, L14 and L30, route hot discharge gas from the compressor to the reheat coil. Return air pulled across the evaporator coil is cooled and dehumidified; the reheat coil adds heat to supply air.

See FIGURE 38 for reheat refrigerant routing. See FIGURE 39 for cooling only refrigerant routing.

L14/L30 Reheat Coil Solenoid Valve

When Unit Controller input (Unit Controller J298-5 or J299-8) indicates room conditions require dehumidification, L14/L30 reheat valve is energized (Unit Controller P269-3 or P269-4) and refrigerant is routed to the reheat coil.

Reheat Setpoint

Reheat is factory-set to energize when indoor relative humidity rises above 60% (default). The reheat setpoint can be adjusted by changing Unit Controller Settings - Control menu. A setting of 100% will operate reheat from an energy management system digital output

Reheat will terminate when the indoor relative humidity falls 3% (57% default) or the digital output de-energizes. The reheat deadband can be adjusted at *Settings - Control* menu.

A91 Humidity Sensor

Relative humidity should correspond to the sensor (A91) output voltage listed in the table below. For example: if indoor air relative humidity is $80\% \pm 3\%$, the humidity sensor output should read 8.00VDC.

Check the sensor output annually for accuracy. Keep the air intake openings on the sensor clean and free of obstructions and debris

Relative Humidity (%RH \pm 3%)	Sensor Output (VDC)
20	2.00
30	3.00
40	4.00
50	5.00
60	6.00
70	7.00
80	8.00
90	9.00

Check-Out

Test reheat operation using the following procedure.

- 1 - Make sure reheat is wired as shown in wiring section.

Make sure unit is in local thermostat mode.

Use the Unit Controller key pad to elect **SERVICE** → **TEST** → **DEHUMIDIFIER**

300, 360 - The blower, compressor 1, and compressor 2 (reheat) should be operating. L14 and L30 LEDs on the Unit Controller should also be ON, indicating the reheat valves are energized, REHEAT MODE will be appear on the Unit Controller display.

Press **BACK** on the Unit Controller display to stop the testing mode.

Default Reheat Operation

Reheat will operate as shown in TABLE 12 REHEAT OPERATION once three conditions are met.

- 1 - Blower must be operating.

System must be in occupied mode.

System must NOT be operating in heating mode.

IMPORTANT - Free cooling does not operate during reheat.

For other reheat control options, refer to the Unit Controller manual.

Additional Cooling Stages (3-Stage)

Units are shipped from the factory to provide two stages of cooling.

Three stages of cooling is available in zone sensor mode. Three stages of cooling is also available by installing a transfer relay and a three-stage thermostat. Refer to the Main Control Operation section in the Unit Controller manual when using the transfer relay.

Additional Cooling Stages (4-Stage)

Four stages of cooling is available in zone sensor mode on units with four compressors.

Compressors are not de-energized when unit operation changes from cooling to reheat or from reheat to cooling. Instead, L14 and L30 reheat valves are energized (reheat) or de-energized (cooling).

NOTE - Another thermostat staging option is available which allows both compressors to be energized during free cooling. See Unit Controller manual for details.

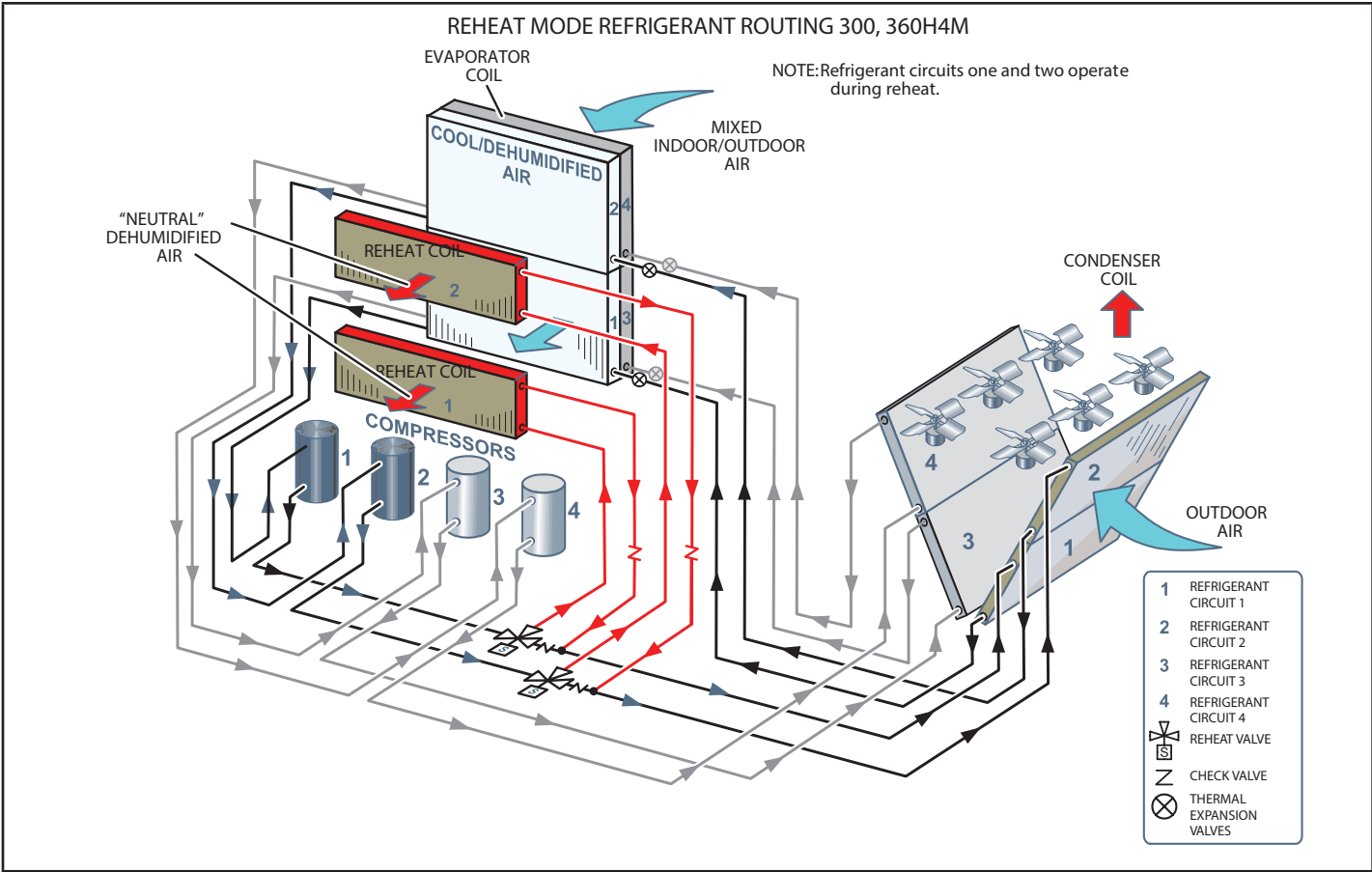


FIGURE 38

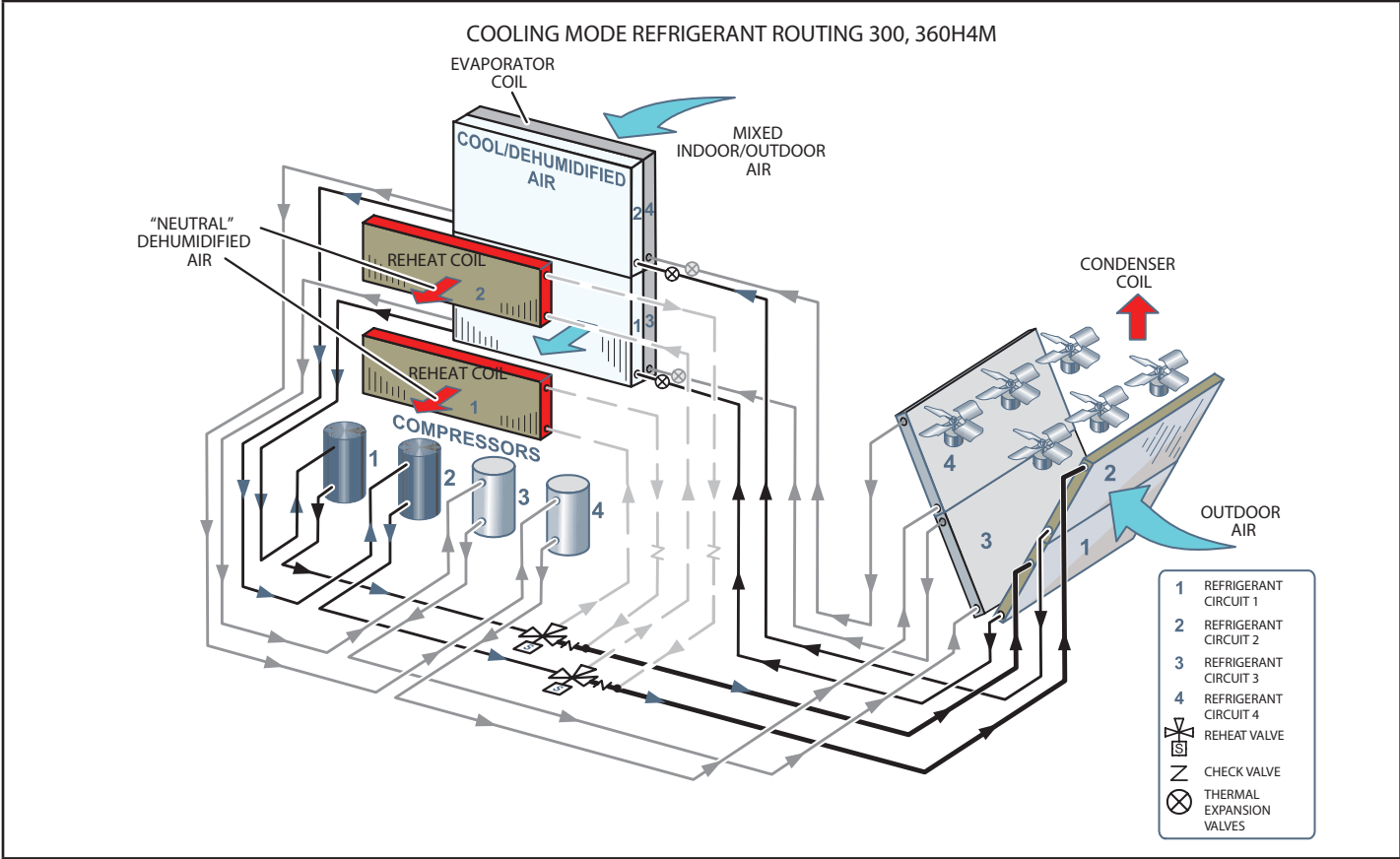


FIGURE 39

**TABLE 12
REHEAT OPERATION**

Two-Stage Thermostat - Default	
T'stat and Humidity Demands	Operation
	300, 360 (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat Compressor 3 Cooling ¹
Reheat & Y1 & Y2	Compressor 1, 2, 3, & 4 Cooling ³
Three-Stage Thermostat (Transfer relay required)	
T'stat and Humidity Demands	Operation
	300, 360 (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat Compressor 3 Cooling ¹
Reheat & Y1 & Y2	Compressor 1 & 2 Reheat Compressor 3 & 4 Cooling ³
Reheat & Y1 & Y2 & Y3	Compressor 1, 2, 3, & 4 Cooling ⁴
Four-Stage Zone Sensor Mode	
Cooling* and Humidity** Demands	Operation
	300, 360 (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat Compressor 3 Cooling ¹
Reheat & Y1 & Y2	Compressor 1 & 2 Reheat Compressor 3 & 4 Cooling ²
Reheat & Y1 & Y2 & Y3	Compressor 1 Reheat, Compressor 2, 3, & 4 Cooling ³
Reheat & Y1 & Y2 & Y3 & Y4	Compressor 1, 2, 3, & 4 Cooling ⁵

*Cooling stage is initiated when zone temperature is higher than the cooling setpoint plus the appropriate stage differential.

**Reheat demand is initiated when relative humidity is higher than relative humidity setpoint.

¹If there is no reheat demand and outdoor air is suitable, free cooling will operate.

²If there is no reheat demand and outdoor air is suitable, free cooling and compressor 1 will operate.

³If there is no reheat demand and outdoor air is suitable, free cooling and compressor 1 and 2 will operate.

⁴If there is no reheat demand and outdoor air is suitable, free cooling and compressor 1, 2, and 3 will operate.

⁵If there is no reheat demand and outdoor air is suitable, free cooling and compressor 1, 2, 3, and 4 will operate.

The following conditions must be met before reheat will be energized:
(factory-default; see Unit Controller manual for other options)

1 - Blower must be operation.

System must be in occupied mode.

System must NOT be operating in heating mode.

VIII-Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

Steps to ensure this are:

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

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

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

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

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

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

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

GAS HEAT

The diagram illustrates the wiring for a gas heat system with two burner sections, A and B. Each section includes a control board (A3, A12), a main control board (A55, A178), and an extension control board (A178). Key components include:

- Control Boards:** A3, A12, A55, A178, A178.
- Relays:** K125, K262, K125, K262.
- Sensors:** S10, S18, S59, S199, S198, S69, S69, S69, S69.
- Valves:** GV1, GV3, GV3.
- Igniter/Spark:** E1, E2.
- Flame Sensors:** FS1, FS2.
- Limit Switches:** S99, S99.
- Combustion Air Blower Proof Switches:** S45, S45.
- Wiring:** Various wires (P229, P230, P228, P228) connect components between sections and to the main system.

KEY LIST		
LOCATION	COMPONENT DESCRIPTION	
AA/EE02	A3, A12	CONTROL BOARD, DSI BURNER 1, 2
AA01	A55	CONTROL BOARD, MAIN
EE01	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/FF08	E1, E2	IGNITER, SPARK, BURNER 1, 2
CC/FF08	FS1, FS2	SENSOR, FLAME, BURNER 1, 2
BB/EE08	GV1, GV2	VALVE, GAS, BURNER 1, 2
DD/FF08	HR6, HR16	HEATER, -50C LOW TEMP VEST, BURNER 1, 2
CC/DD03	K125, K262	RELAY, LOW TEMP VEST HEATER, BURNER 1, 2
DD/EE08	K125, K262	RELAY, LOW TEMP VEST HEATER, BURNER 1, 2
AA/EE04	S10, S99	LIMIT, PRIMARY, BURNER 1, 2
BB/FF04	S18, S45	SWITCH, COMB AIR BLWR PROOF, BURNER 1, 2
AA/DD08	S47, S69	SWITCH, FLAME ROLL OUT, 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

The diagram shows the connection of low temperature vestibule heaters (HR6, HR16) to the burner sections. It includes relays K125 and K262, and wiring to the heaters. The heaters are connected to the burner sections via relays and wiring.

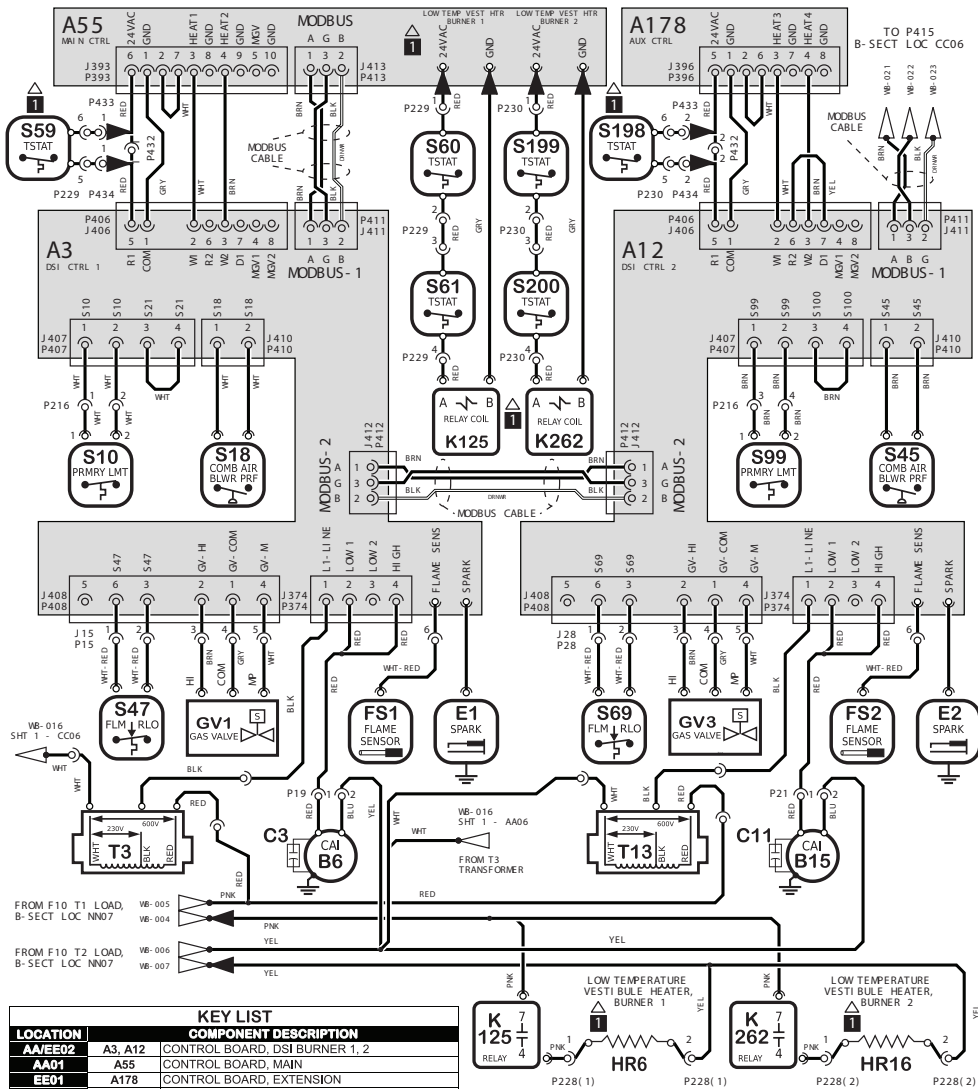
NOTES	
1	-50C LOW TEMPERATURE VESTIBULE HEATER - OPTIONAL
←	DENOTES OPTI ONAL COMPONENTS AND WIRING

Model: LG, LD, SG 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: 1

The diagram shows the connection of the gas heat system to the main system, including the heating section and the cooling section. It includes the heating section and the cooling section, with connections to the main system.

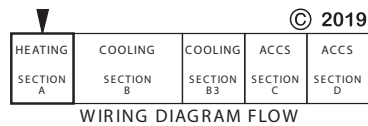
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GAS HEAT



Model: LG, LD, SG Series RTU - Gas Heat
 Input Heat Capacity 169k - 480k Btuh
 Voltage: 575V/3~/60Hz (J)
 Supersedes: N/A Form No: 538226- 01 Rev: 1

NOTES
 1 - 50C LOW TEMPERATURE VESTIBULE HEATER - OPTIONAL
 ▲ DENOTES OPTI ONAL COMPONENTS AND W I R I N G



SEQUENCE OF OPERATION GAS HEAT FOR LGT302 - 360 UNITS

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 relay K13 is energized.
- 3 - N.O. K13-1 contacts close allowing line voltage (or transformer T3 in 575V only) to energize combustion air blower B6.
- 4 - 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.
- 5 - As steps 2, 3 and 4 occur, A178 proves N.C. primary gas heat limit S99 and the combustion air blower relay K19 is energized.
- 6 - N.O. K19-1 contacts close allowing line voltage (or transformer T13 in 575V only) to energize combustion air blower B15.
- 7 - After the combustion air blower B15 has reached full speed, the combustion air proving switch (S45) contacts close. The A178 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.

SECOND STAGE HEAT:

- 8 - With first stage heat operating, an additional heating demand initiates W2 in the thermostat.
- 9 - A second stage heating demand is received by A55.
- 10 - 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):

- 11 - When heat section temperature drops below -20°F, S59 opens and de-energizes 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.
- 12 - 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.
- 13 - 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.

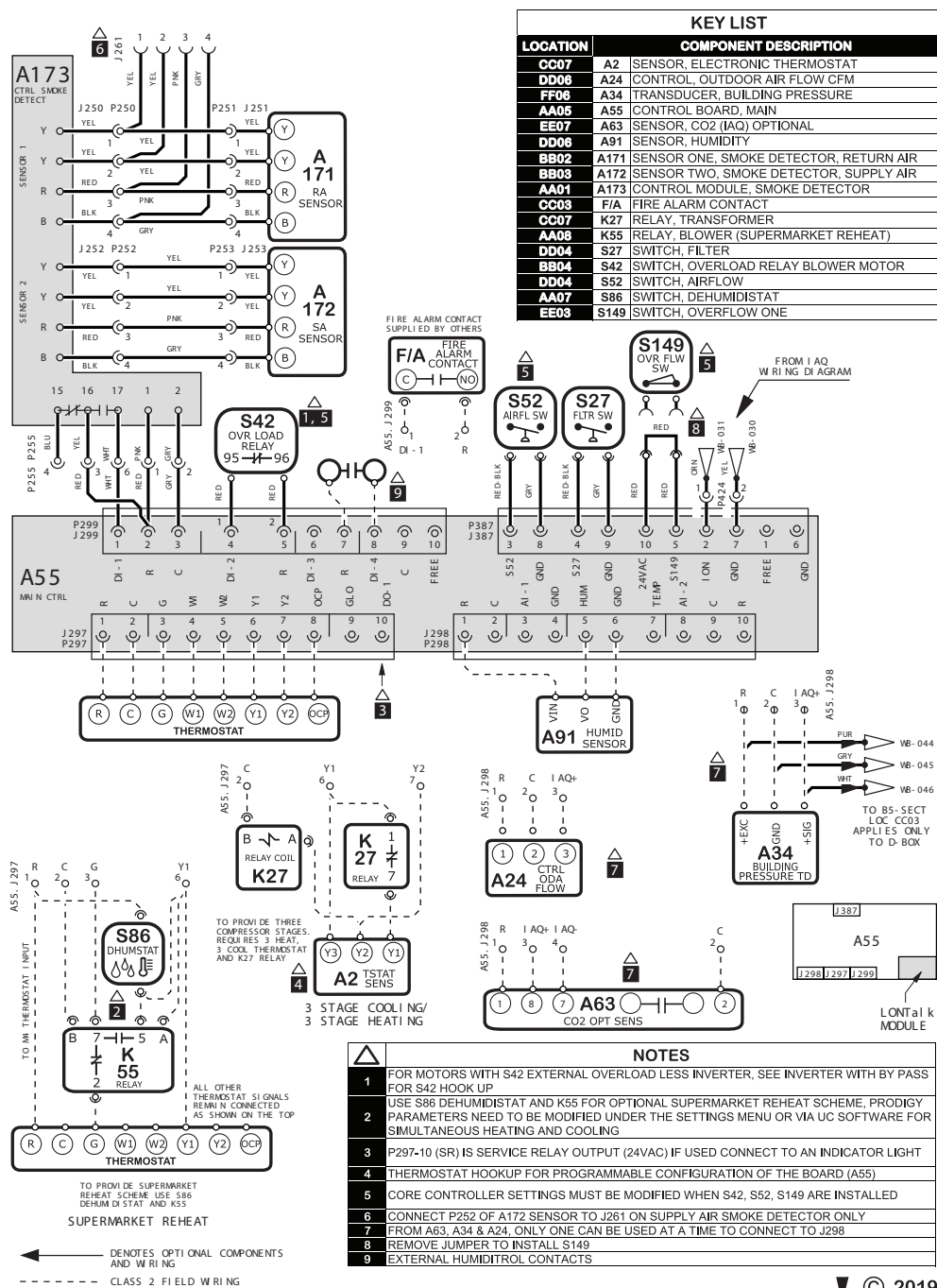
END OF SECOND STAGE HEAT:

- 14 - Heating demand is satisfied. Terminal W2 is de-energized.
- 15 - High fire on GV1 and GV3 are deenergized by the A55.

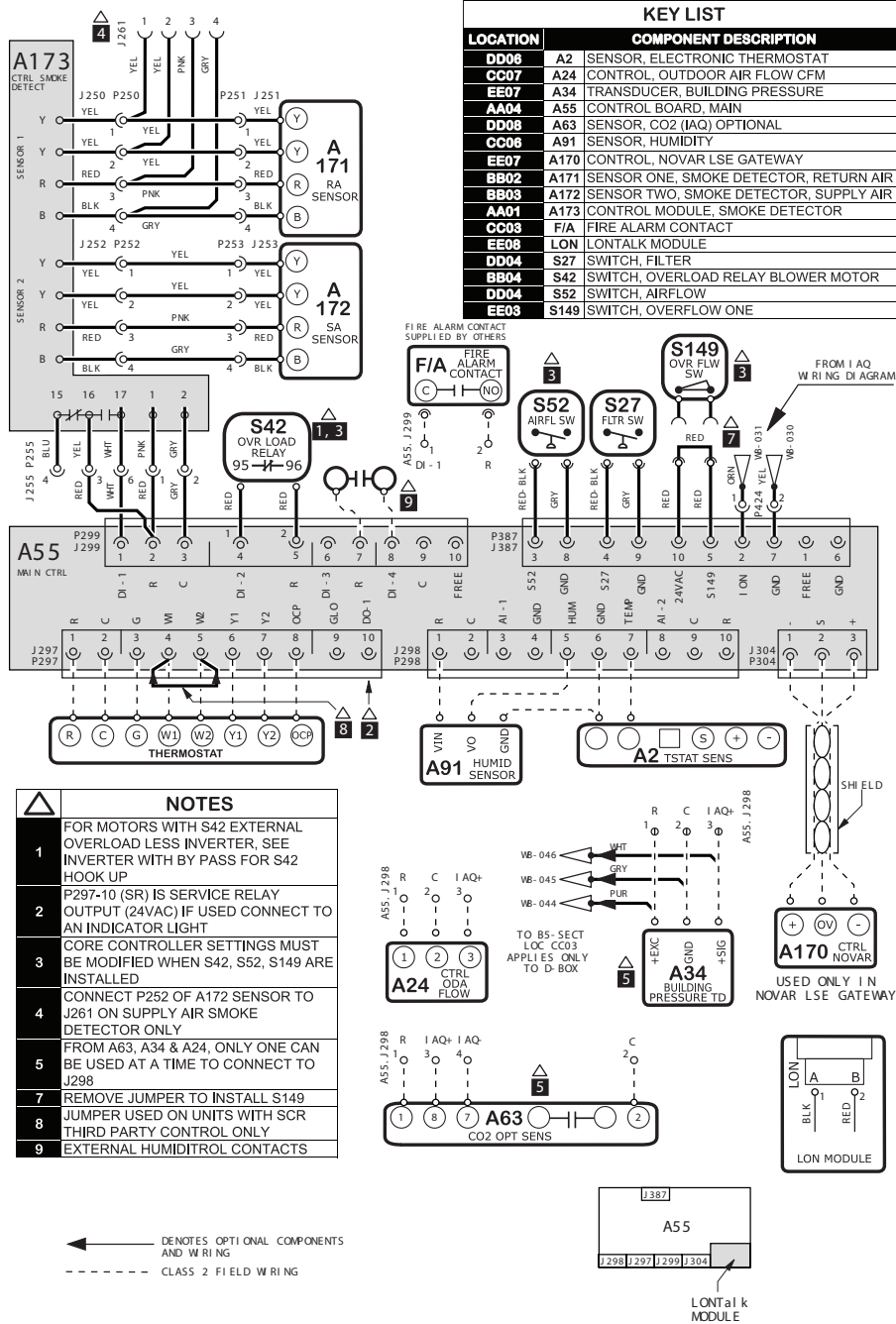
END OF FIRST STAGE HEAT:

- 16 - Heating demand is satisfied. Terminal W1 is de-energized.
- 17 - Ignition module A3 is de-energized by A55 in turn de-energizing GV1. Combustion blower relay K13 is also de-energized. At the same instant, ignition module A12 is de-energized by A55 in turn de-energizing GV3. K19 combustion air blower relay is also de-energized.

THERMOSTAT



GATEWAY THERMOSTAT

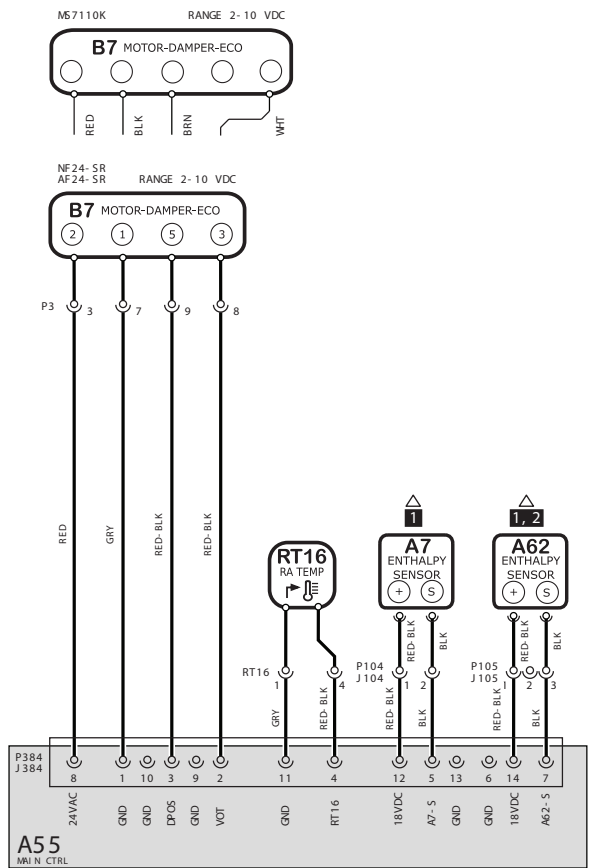


Model: LC, LG, LH, LD Series RTU
Thermostat- GATEWAY Controls
Voltage: All Voltages
Supersedes: 538079-01 Form No: 538079- 02 Rev: 0

HEATING	COOLING	COOLING	ACCS	ACCS
SECTION A	SECTION B	SECTION B3/5	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	
CC05	A7	SENSOR, SOLID STATE ENTHALPY
AA06	A55	CONTROL BOARD, MAIN
DD05	A62	SENSOR, ENTHALPY INDOOR
BB02	B7	MOTOR, DAMPER ECONOMIZER
CC05	RT16	SENSOR, RETURN AIR TEMP

Model: LC, LG, LH, LD, SC, SG Series
Economizer & Motorized OAD
Voltage: All Voltages
Supersedes: N/A

Form No: 538072- 01 Rev: 2

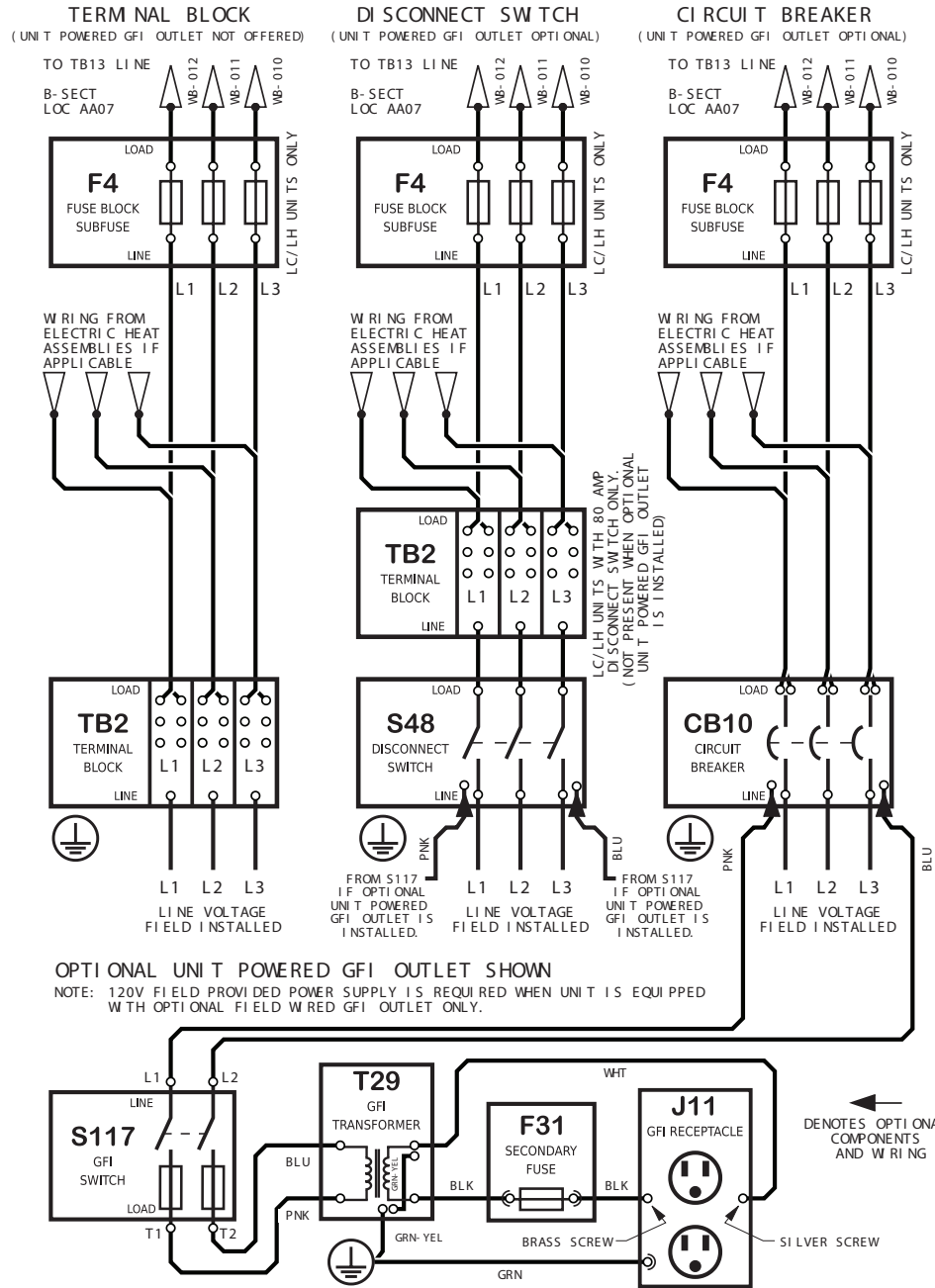
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HTG SEC A	CLG SEC B	CLG SEC B3	ACCS SEC C	ACCS SEC D
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WIRING DIAGRAM FLOW

Page 60

POWER ENTRY

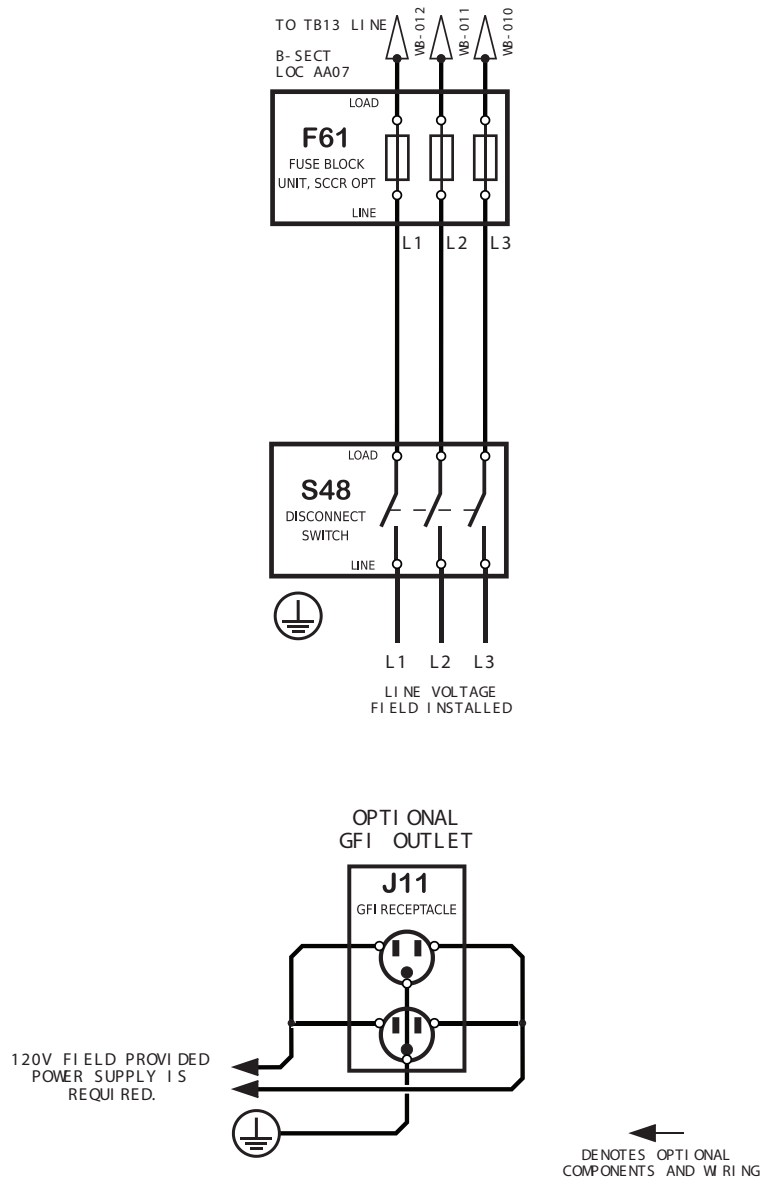


Model: LC, LG, LH, LD Series RTU
Power Entry Options 156 - 360

Voltage: All Voltages

Supersedes: 538103-01 Form No: 538103-02 Rev: 2

POWER ENTRY



Model: LG, LD Series RTU with SCCR
Power Entry Options 156 - 360

Voltage: All Voltages

Supersedes: 538104-01 Form No: 538104-02 Rev: 2

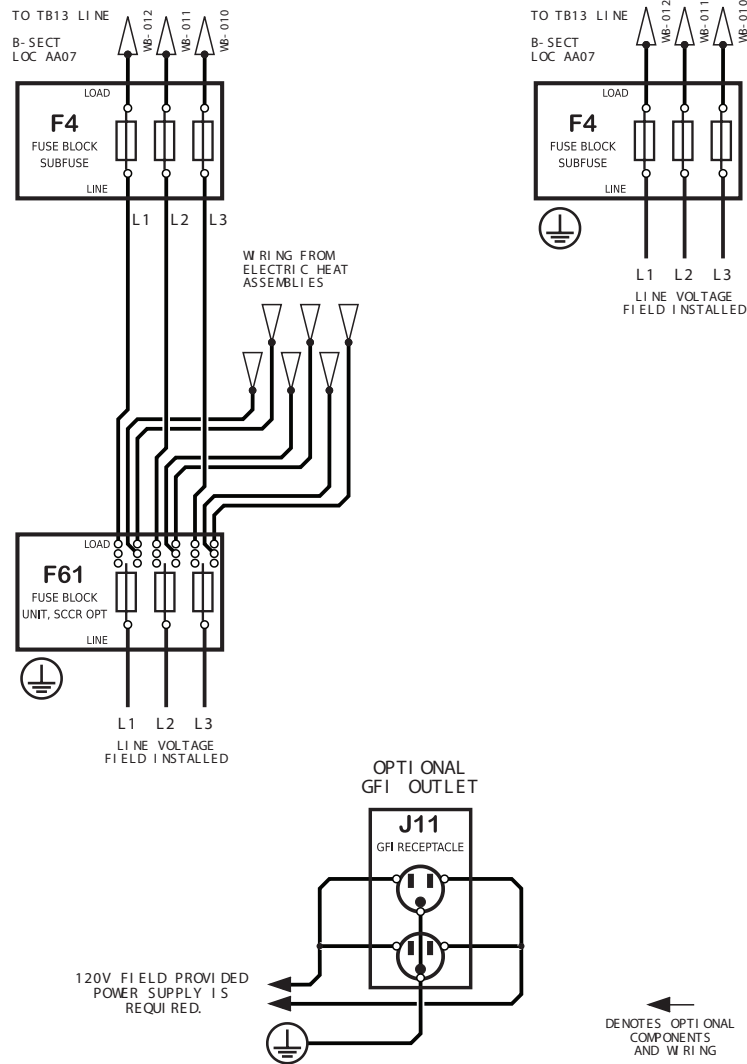


538104-02

POWER ENTRY

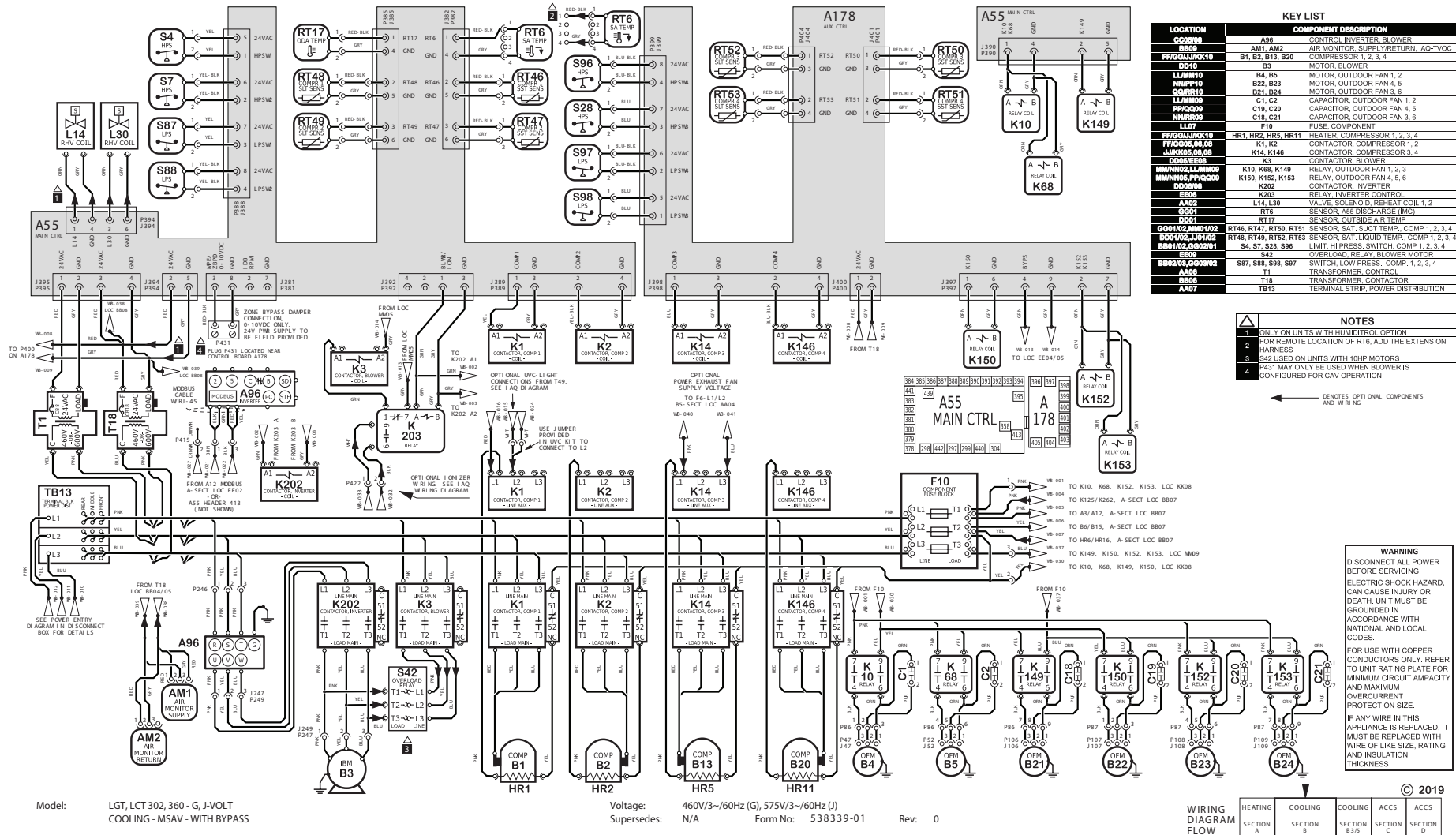
UNITS W/ ELECTRIC HEAT

UNITS W/O ELECTRIC HEAT

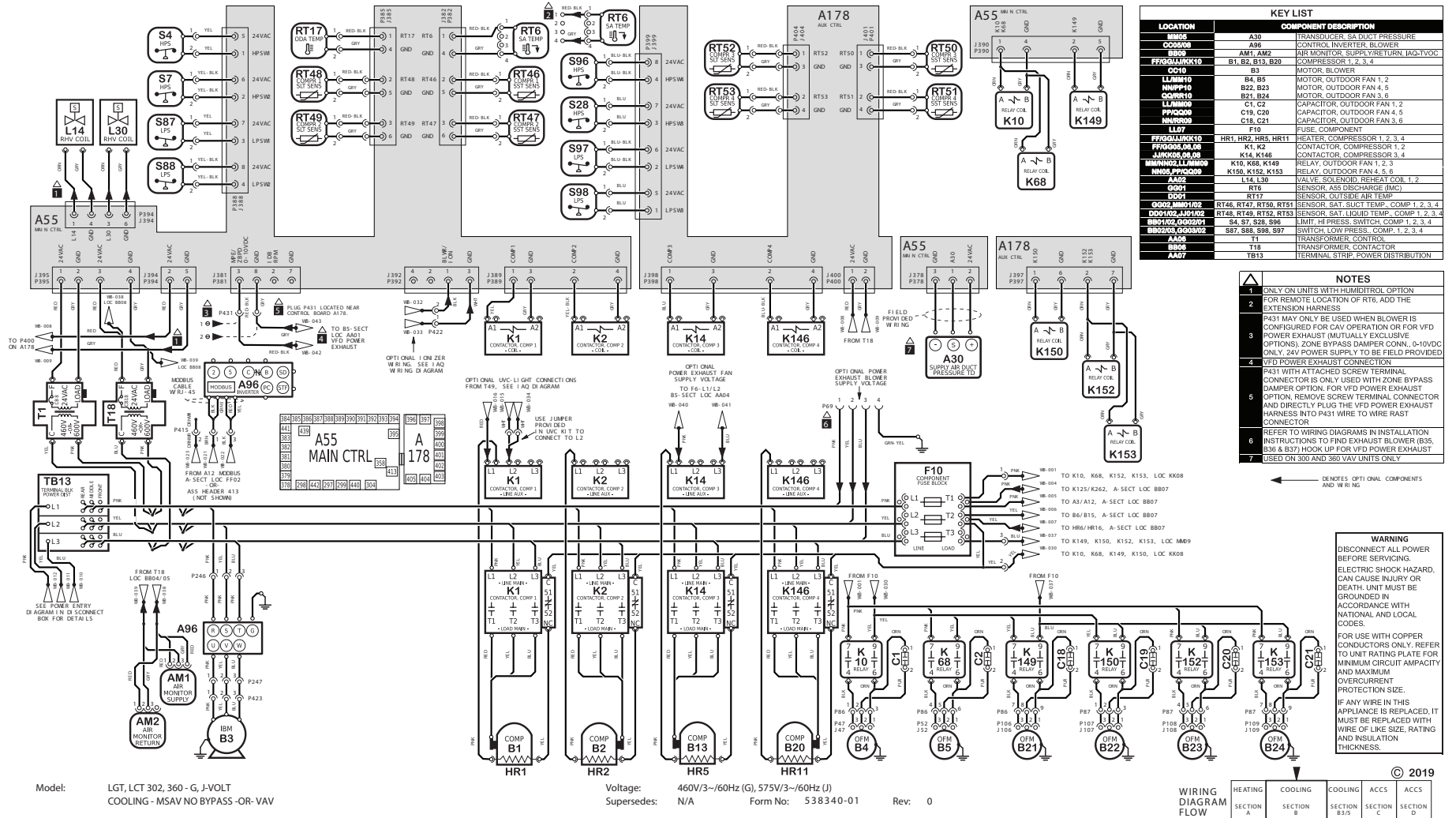


Model: LC, LH Series RTU with SCCR
Power Entry Options 156 - 360
Voltage: All Voltages
Supersedes: 538105-01 Form No: 538105- 02 Rev: 2

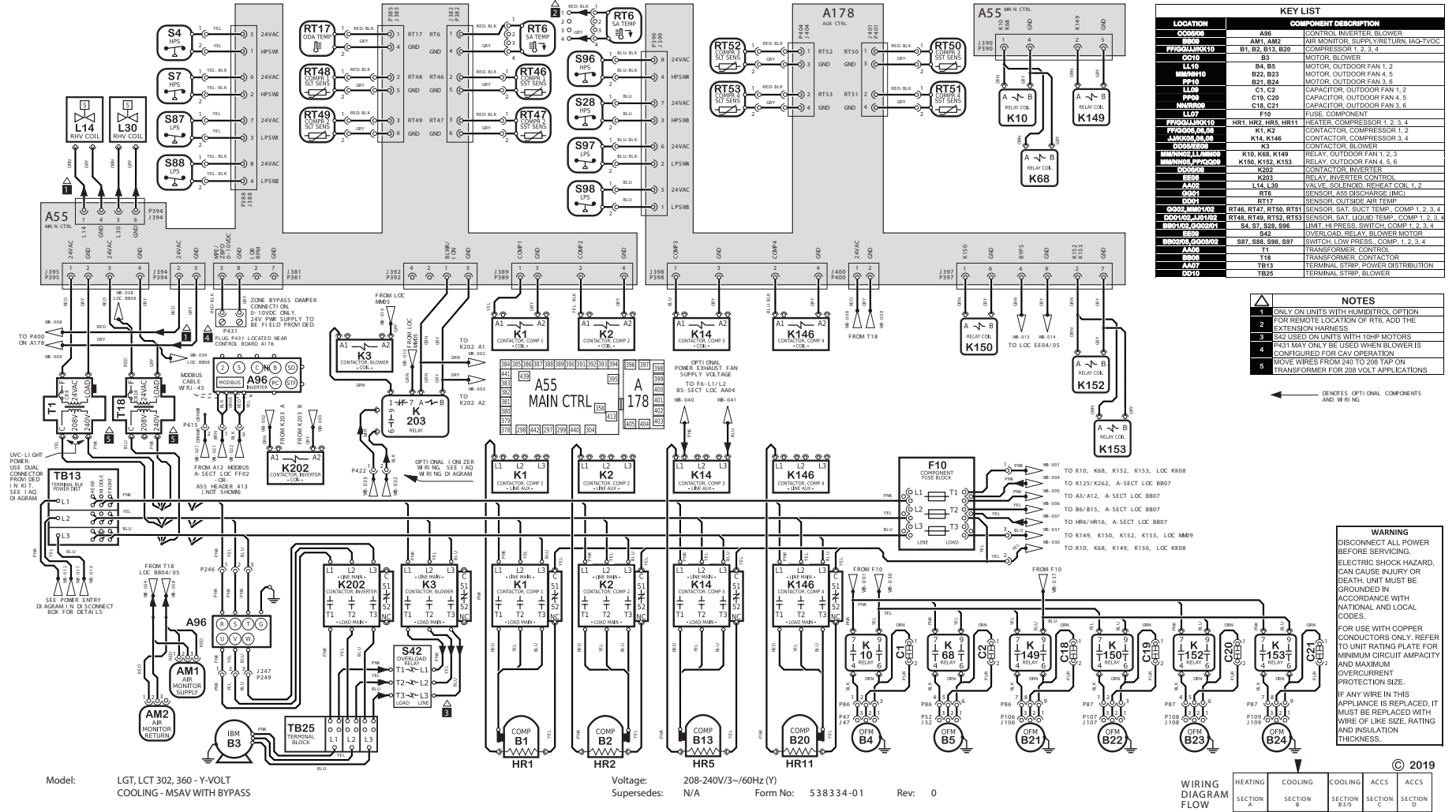
G / J VOLT WITH BY-PASS



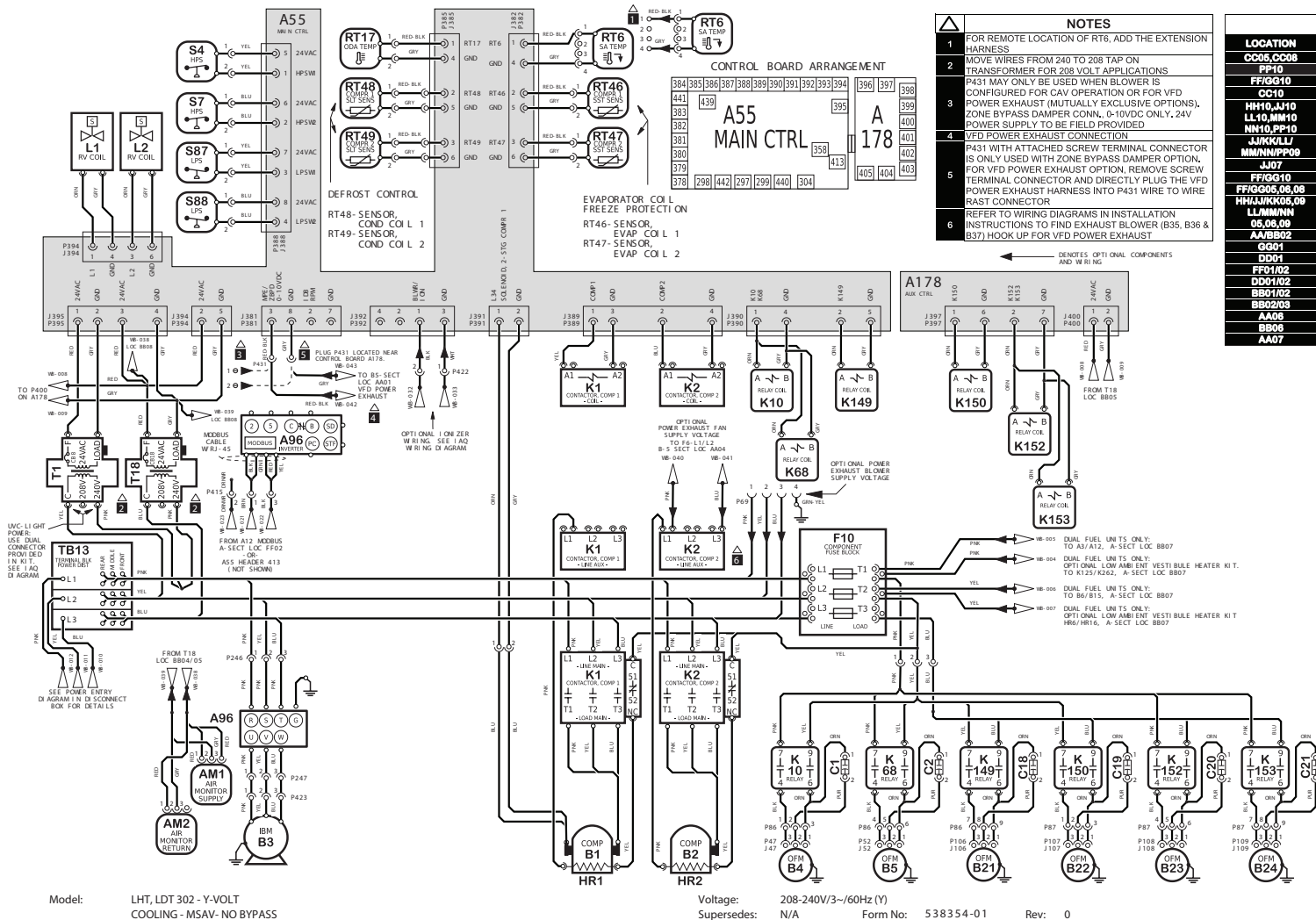
G / J VOLT NO BY-PASS



Y VOLT WITH BY-PASS

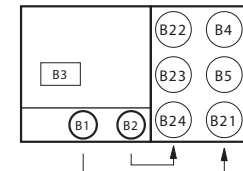


Y VOLT NO BYPASS



KEY LIST	
LOCATION	COMPONENT DESCRIPTION
CO06, CO08	A91
PF10	AM1, AM2
FFFG10	B1, B2
OC10	B3
WH10, J110	B4, B5
L10, MM10	B21, B22
NN10, PF10	B23, B24
JY1KJLL/	C1, C2, C18,
MMJNNPP09	C19, C20, C21
JU7	F10
FFFG10	H1, H2
FFG006, 08	K1, K2
MMJLJMKK09	K10, K68, K149,
LJ/	K150, K152, K153
05.09.09	
AAVB502	L1, L2
GG01	RT6
DD01	RT17
FFD1102	RT46, RT147
FFD1102	RT48, RT149
BB01102	S4, S7
BB02103	S87, S88
AA06	T1
BB06	T18
AA07	TB13

BASIC RTU LAYOUT



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.

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WIRING
DIAGRAM
FLOW

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

SEQUENCE OF OPERATION LGT302 - 360

POWER:

- 1- Line voltage from TB2, unit disconnect S48, or other factory or field installed optional power disconnects, such as CB10, energizes transformer T1 and T18. Transformer T1 provides 24VAC power to the A55 Unit Controller and T18 provides 24VAC power to A178 Compressor 3 and 4 Controller. The two controllers provide 24VAC power to the unit cooling, heating and blower controls and thermostat.
- 2- Terminal block TB13 is also energized when the unit disconnect closes. TB13 supplies line voltage to compressor crankcase heaters, compressors, blower motors and fan motors.

BLOWER OPERATION (OCP INPUT MUST BE ON):

- 3- The A55 Unit Controller receives a demand from thermostat terminal G. A55 energizes blower contactor K3 with 24VAC. On VFD units, A55 energizes relay K203.
- 4- N.O. K3-1 closes, energizing blower B3. On VFD units, N.O. K203-2 closes, sending a signal to the inverter, A96, to start forward rotation. P259 pin #4 sends a 0 -10VDC signal to A96 to control blower B3 speed.

POWER EXHAUST FANS/BLOWERS:

- 5- The A55 Unit Controller receives a demand and energizes exhaust fan relay K65 OR exhaust blower contactor K205 or exhaust blower relay K207.

1ST STAGE COOLING (B1 AND B2 ARE ENERGIZED):

- 6- First stage cooling demand energizes Y1 and G in the thermostat. G energizes blower, if blower is not already running (see step 3).

7- 24VAC is routed to the A55 Unit Controller. After A55 proves N.C. low pressure switch S87 and S88, N.C. freezestat S49 and S50 and N.C. high pressure switch S4 and S7, compressor contactors K1 and K2 are energized.

8- N.O. contacts K1-1 and K2-1 close energizing compressor B1 and B2.

9- A55 Unit Controller and A178 Controller energize fan contactor K10, K68, and K149 based on low ambient switch S11 and S84 inputs and predefined control logic.

10- N.O. contact K10-1, K68-1, K149-1 close energizing fan B4, B5 and B21 respectively.

11- N.C. Contacts K1-2 and K2-2 open de-energizing compressor 1 and 2 crankcase heater HR1 and HR2.

2ND STAGE COOLING:

12- Second stage cooling demand energizes Y2.

13- 24VAC is routed to A178 Compressor 3 and 4 Controller. After A178 proves N.C. low pressure switches S98 and S97, N.C. freezestats S53 and S95 and N.C. high pressure switches S28 and S96, compressor contactors K14 and K146 are energized.

14- N.O. contacts K14-1 close energizing compressor B13.

15- N.O. contacts K146-1 close energizing compressor B20.

16- A178 Controller energizes fan contactor K150, K152, K153 based on low ambient switch S85 and S94 inputs and predefined control logic.

17- N.O. contacts K150-1, K152-1 and K153-1 close energizing condenser fan B22, B23 and B24 respectively.

18- N.C. contacts K14-2 and K146-2 open de-energizing compressor 3 and 4 crankcase heater HR5 and HR11.