LENNOX Service Literature™

UNIT INFORMATION

Corp. 1013-L2
Revised 6-2016

LGH SERIES
13 to 25 ton
45.7 to 88 kW

LGH156H through 300S

The LGH156H, 180H, 210H, 240H and 300S (LGH156H/300S) units are configure to order units (CTO) with a wide selection of factory installed options.

LGH156H is available in 260,000 Btuh or 360,000 Btuh (76.2 or 105.5 kW) and has the option for single stage heat in 169,000 Btuh (49.5 kW).

LGH180H, 210H, 240H and 300S units are available in 260,000, 360,000 or 480,00 Btuh (76.2, 105.5 or 140.7 kW) heating inputs.

The LGH180H and 210H also has an optional single stage heat in 169,000 Btuh (49.5 kW).

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

Cooling capacities range from 13 to 25 tons (45.7 to 88 kW). LGH156H, 180H, and 210H utilize three compressors while LGH240H and 300S utilize four compressors.

Units are designed for R410A refrigerant. See unit nameplate. Operating pressures and pressure switch settings are significantly higher than R22 charged units. Service equipment must be rated for R410A.

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

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

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

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

⚠WARNING

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

⚠WARNING

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

⚠CAUTION

Danger of sharp metallic edges. Can cause injury. Take care when servicing unit to avoid accidental contact with sharp edges.

Table of Contents

OPTIONS / ACCESSORIES (High / Standard Models)

Item Description	Model Number	Catalog Number	Unit Model No 156	180	210	240	300
COOLING SYSTEM							
Condensate Drain Trap	PVC - C1TRAP20AD2	76W26	OX	OX	OX	OX	OX
	Copper - C1TRAP10AD2	76W27	OX	OX	OX	OX	OX
Conventional Fin/Tube Condenser Coil (replaces Environ™ Coil System)		Factory	O	O	O	O	O
Corrosion Protection		Factory	O	O	O	O	O
Drain Pan Overflow Switch	E1SNSR71AD1	68W88	OX	OX	OX	OX	OX
Efficiency		High	O	O	O	O	
		Standard					O
Refrigerant Type		R-410A	O	O	O	O	O
Service valves (not for Environ™ Coil System or Humiditrol equipped units)		Factory	O	O	O	O	O
HEATING SYSTEM							
Bottom Gas Piping Kit	C1GPKT01C-1	85M31	OX	OX	OX	OX	OX
Combustion Air Intake Extensions (order two)	LTACAIK10/15	89L97	X	X	X	X	X
Gas Heat Input	Low - 169,000 Btuh	Factory	O	O	O		
	Standard - 260,000 Btuh	Factory	O	O	O	O	O
	Medium - 360,000 Btuh	Factory	O	O	O	O	O
	High - 480,000 Btuh	Factory		O	O	O	O
Low Temperature Vestibule Heater	208/230V-3ph - C1LTVH10C-2Y	13X66	OX	OX	OX	OX	OX
	460V-3ph - C1LTVH10C-2G	13X67	OX	OX	OX	OX	OX
	575V-3ph - C1LTVH10C-2J	13X68	OX	OX	OX	OX	OX
LPG/Propane Conversion Kits (Order 2 kits)	Low Heat - C1PROP25C11	14N28	X	X	X		
	Standard Heat - C1PROP25C11	14N28	X	X	X	X	X
	Medium Heat - C1PROP26C11	14N29	X	X	X	X	X
	High Heat - C1PROP27C11	14N30		X	X	X	X
Stainless Steel Heat Exchanger		Factory	O	O	O	O	O
Vertical Vent Extension Kit (Order two kits)	C1EXTN2021	42W16	X	X	X	X	X
BLOWER - SUPPLY AIR							
Blower Option	CAV (Constant Air Volume)	Factory	O	O	O	O	O
	MSAV (Multi-Stage Air Volume) supply air blower option (With VFD Bypass Control)	Factory	O	O	O	O	O
	MSAV (Multi-Stage Air Volume) supply air blower option (Without VFD Bypass Control)	Factory	O	O	O	O	O
Motors - Constant Air Volume (CAV)	Belt Drive (standard efficiency) - 2 hp	Factory	O				
	Belt Drive (standard or high efficiency) - 3 hp	Factory	O	O	O		
	Belt Drive (standard efficiency) - 5 hp	Factory	O	O	O	O	O
	Belt Drive (standard efficiency) - 7.5 hp	Factory		O	O	O	O
	Belt Drive (standard efficiency) - 10 hp	Factory				O	O
Motors - MSAV® Multi-Stage Air Volume	Belt Drive (standard efficiency) - 2 hp	Factory	O				
	Belt Drive (standard efficiency) - 3 hp	Factory	O	O	O		
	Belt Drive (standard efficiency) - 5 hp	Factory	O	O	O	O	O
	Belt Drive (standard efficiency) - 7.5 hp	Factory		O	O	O	O
	Belt Drive (standard efficiency) - 10 hp	Factory				O	O
Drive Kits	Kit #1 535-725 rpm	Factory	O	O	O		
See Blower Data Tables for usage and selection	Kit #2 710-965 rpm	Factory	O	O	O		
	Kit #3 685-856 rpm	Factory	O	O	O	O	O
	Kit #4 850-1045 rpm	Factory	O	O	O	O	O
	Kit #5 945-1185 rpm	Factory	O	O	O	O	O
	Kit #6 850-1045 rpm	Factory		O	O	O	O
	Kit #7 945-1185 rpm	Factory		O	O	O	O
	Kit #8 1045-1285 rpm	Factory		O	O	O	O
	Kit #10 1045-1285 rpm	Factory				O	O
	Kit #11 1135-1365 rpm	Factory				O	O
	Blower Belt Auto-Tensioner	Factory	O	O	O	O	O

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

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

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OPTIONS / ACCESSORIES (High / Standard Models)

Item Description		Model Number	Catalog Number	Unit Model No 156	180	210	240	300
CONTROLS								
Blower Proving Switch		C1SNSR35FF1	53W65	OX	OX	OX	OX	OX
Commercial Controls	Prodigy® Control System - BACnet® Module	C0CTRL60AE1L	**59W51**	OX	OX	OX	OX	OX
	Prodigy® Control System - LonTalk® Module	C0CTRL65FF1	54W27	OX	OX	OX	OX	OX
	Novar® ETM-2051	E0CTRLO30C1	64W74	OX	OX	OX	OX	OX
	Novar® LSE		Factory	O	O	O	O	O
	L Connection® Building Automation System		- - -	X	X	X	X	X
Dirty Filter Switch		C1SNSR55C-1	53W68	OX	OX	OX	OX	OX
Fresh Air Tempering		C1SNSR75AD1	58W63	OX	OX	OX	OX	OX
General Purpose Control Kit		E1GPBK30C1	13J78	X	X	X	X	X
Smoke Detector - Supply or Return (Power board and one sensor)		C1SNSR44C-1	83W40	OX	OX	OX	OX	OX
Smoke Detector - Supply and Return (Power board and two sensors)		C1SNSR43C-1	83W41	OX	OX	OX	OX	OX
INDOOR AIR QUALITY								
Air Filters								
Healthy Climate® High Efficiency Air Filters 24 x 24 x 2 (Order 6 per unit)	MERV 8	C1FLTR15C-1-	54W67	OX	OX	OX	OX	OX
	MERV 13	C1FLTR40C-1-	52W40	OX	OX	OX	OX	OX
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)		C1FLTR30C-1-	44N61	OX	OX	OX	OX	OX
Indoor Air Quality (CO_2) Sensors								
Sensor - Wall-mount, off-white plastic cover with LCD display		C0SNSR50AE1L	77N39	X	X	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display		C0SNSR52AE1L	87N53	X	X	X	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting		C0SNSR51AE1L	87N52	X	X	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting		C0MISC19AE1	87N54	X	X	X	X	X
CO_2 Sensor Duct Mounting Kit - for downflow applications		C0MISC19AE1-	85L43	X	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO_2 sensors (**87N53** or **77N39**)		C0MISC16AE1-	90N43	X	X	X	X	X
UVC Germicidal Light Kit								
[1] Healthy Climate® UVC Light Kit (110/230v-1ph)			54W65	OX	OX	OX	OX	OX
ELECTRICAL								
Voltage 60 hz	208/230V - 3 phase		Factory	O	O	O	O	O
	460V - 3 phase		Factory	O	O	O	O	O
	575V - 3 phase		Factory	O	O	O	O	O
HACR Circuit Breakers			Factory	O	O	O	O	O
Disconnect Switch (see Disconnect Table for usage, page 13)	80 amp	E1DISC080C-1	54W88	OX	OX	OX	OX	OX
	150 amp	E1DISC150C-1	54W89	OX	OX	OX	OX	OX
	250 amp	C1DISC250A-D1	90W82					OX
GFI Service Outlets	15 amp non-powered, field-wired (208/230V, 460V, 575V)	LTAGFIK10/15	74M70	OX	OX	OX	OX	OX
	15 amp factory-wired and powered (208/230V, 460V, 575V)		Factory	O	O	O	O	O
	20 amp non-powered, field-wired (575V only)	C1GFCI20FF1	67E01	OX	OX	OX	OX	OX
Weatherproof Cover for GFI		C1GFCI99FF1	10C89	X	X	X	X	X
Phase/Voltage Detection			Factory	O	O	O	O	O

[1] Lamps operate on 110-230V single-phase power supply. Step-down transformer must be field supplied for field installation in 460V and 575V rooftop units (transformer is furnished for factory installed light kits). Alternately, a separate 110V power supply may be used to directly power the UVC ballast(s).

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

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OPTIONS / ACCESSORIES (High / Standard Models)

Item Description	Model Number	Catalog Number	Unit Model No 156	180	210	240	300
ECONOMIZER							
Standard Economizer (Not for Title 24)							
Standard Economizer Downflow or Horizontal Applications - Includes Outdoor Air Hood. Order Downflow or Horizontal Barometric Relief Dampers separately.	E1ECON15C-2	13U47	OX	OX	OX	OX	OX
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.	E1ECON17C-1	10U60	OX	OX	OX	OX	OX
Economizer Controls							
Differential Enthalpy (Not for Title 24)	Order 2 - C1SNSR64FF1	53W64	OX	OX	OX	OX	OX
Sensible Control	Sensor is Furnished	Factory	O	O	O	O	O
Single Enthalpy (Not for Title 24)	C1SNSR64FF1	53W64	OX	OX	OX	OX	OX
Global Control	Sensor Field Provided	Factory	O	O	O	O	O
Building Pressure Control	E1GPBK20C1	13J77	X	X	X	X	X
Outdoor Air CFM Control	E1GPBK10C1	13J76	X	X	X	X	X
Barometric Relief Dampers With Exhaust Hood							
Downflow Barometric Relief Dampers	C1DAMP50C	54W78	OX	OX	OX	OX	OX
Horizontal Barometric Relief Dampers	LAGEDH18/24	16K99	X	X	X	X	X
OUTDOOR AIR							
Outdoor Air Dampers With Outdoor Air Hood							
Motorized	C1DAMP20C-1	13U04	OX	OX	OX	OX	OX
Manual	C1DAMP10C-2	13U05	OX	OX	OX	OX	OX
POWER EXHAUST							
Standard Static	208/230V - C1PWRE11C-1Y	75W90	OX	OX	OX	OX	OX
	460V - C1PWRE11C-1G	75W91	OX	OX	OX	OX	OX
	575V - C1PWRE11C-1J	75W92	OX	OX	OX	OX	OX
HUMIDITROL® CONDENSER REHEAT OPTION							
Humiditrol Dehumification Option		Factory	O	O	O	O	O
Humidity Sensor Kit, Remote mounted (required)	C0SNSR31AE-1	17M50	X	X	X	X	X
CABINET							
Combination Coil/Hail Guards	Environ™ Coil System - C1GARD52C12	15T92	X				
	Environ™ Coil System - C1GARD52C22	15T93		X	X	X	X
	Conventional Fin/Tube Condenser Coil - C1GARD51C11	13T08	X				
	Conventional Fin/Tube Condenser Coil - C1GARD51C21	13T12		X	X	X	X

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OPTIONS / ACCESSORIES (High / Standard Models)

Item Description	Model Number	Catalog Number	Unit Model No 156	180	210	240	300
ROOF CURBS							
Hybrid Roof Curbs, Downflow							
8 in. height	C1CURB70C-1	11F58	X	X	X	X	X
14 in. height	C1CURB71C-1	11F59	X	X	X	X	X
18 in. height	C1CURB72C-1	11F60	X	X	X	X	X
24 in. height	C1CURB73C-1	11F61	X	X	X	X	X
Adjustable Pitch Curb							
14 in. height	L1CURB55C	43W26	X	X	X	X	X
Standard Roof Curbs, Horizontal - Requires Horizontal Return Air Panel Kit							
26 in. height - slab applications	C1CURB14C-1	11T89	X	X	X	X	
30 in. height - slab applications	C1CURB15C-1	11T90					X
37 in. height - rooftop applications	C1CURB16C-1	11T96	X	X	X	X	
41 in. height - rooftop applications	C1CURB17C-1	11T97					X
Insulation Kit For Standard Horizontal Roof Curbs							
for C1CURB14C-1 (26 in.)	C1INSU11C-1-	73K32	X	X	X	X	
for C1CURB15C-1 (30 in.)	C1INSU12C-1-	73K33					X
for C1CURB16C-1 (37 in.)	C1INSU13C-1-	73K34	X	X	X	X	
for C1CURB17C-1 (41 in.)	C1INSU14C-1-	73K35					X
Horizontal Return Air Panel Kit							
Required for Horizontal Applications with Roof Curb	C1HRAP10C-1-	87M00	X	X	X	X	X
CEILING DIFFUSERS							
Step-Down - Order one	RTD11-185S	13K63	X	X			
	RTD11-275S	13K64			X	X	X
Flush - Order one	FD11-185S	13K58	X	X			
	FD11-275S	13K59			X	X	X
Transitions (Supply and Return) - Order one	C1DIFF33C-1	12X68	X	X			
	C1DIFF34C-1	12X70			X	X	X
Sunsource® Commercial Energy System							
Solar Module CE Kit	One 285W Solar Module (silver frame), One PanelClaw Polar Bear III Mounting System and One Enphase M250 Microinverter	10U67	X	X	X	X	X
Solar Power Entry with Disconnect		Factory	O	O	O	O	O
Enphase Envoy Communications Gateway (with Wireless Capability)		**13L89**	X	X	X	X	X
Line Communication Filter (external)	C1C400D11A	10F93	X	X	X	X	X
[1] Transformer (6 kW)	E1TRFM15AD3Y (208Y to 208 VAC Delta)	11H71	X	X	X	X	X
	E1TRFM15AD2Y (230 VAC Delta)	11H28	X	X	X	X	X
	E1TRFM15AD3G (460 VAC Delta or Wye)	11H29	X	X	X	X	X

[1] Order one 6 kW transformer per array (up to 24 solar modules each). Up to two arrays can be used per rooftop unit (total 48 modules). Arrays are field wired in parallel to the Solar Power Entry

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

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OPTIONS / ACCESSORIES (Ultra Models)

Item Description	Model Number	Catalog Number	Unit Model No. 180	Unit Model No. 240
COOLING SYSTEM				
Condensate Drain Trap	PVC - C1TRAP20AD2	76W26	OX	OX
	Copper - C1TRAP10AD2	76W27	OX	OX
Corrosion Protection		Factory	O	O
Drain Pan Overflow Switch	E1SNSR71AD1	68W88	OX	OX
Refrigerant Type		R-410A	O	O
HEATING SYSTEM				
Bottom Gas Piping Kit	C1GPKT01C-1	85M31	OX	OX
Combustion Air Intake Extensions (order two)	LTACAIK10/15	89L97	X	X
Gas Heat Input	Low - 169,000 Btuh	Factory	O	
	Standard - 260,000 Btuh	Factory	O	O
	Medium - 360,000 Btuh	Factory	O	O
	High - 480,000 Btuh	Factory	O	O
Low Temperature Vestibule Heater	208/230V-3ph - C1LTVH10C-2Y	13X66	OX	OX
	460V-3ph - C1LTVH10C-2G	13X67	OX	OX
	575V-3ph - C1LTVH10C-2J	13X68	OX	OX
LPG/Propane Conversion Kits (Order 2 kits)	Low Heat - C1PROP25C11	14N28	X	
	Standard Heat - C1PROP25C11	14N28	X	X
	Medium Heat - C1PROP26C11	14N29	X	X
	High Heat - C1PROP27C11	14N30	X	X
Stainless Steel Heat Exchanger		Factory	O	O
Vertical Vent Extension Kit (Order two kits)	C1EXTN2021	42W16	X	X
BLOWER - SUPPLY AIR				
Blower MSAV (Multi-Stage Air Volume) supply air blower option (With VFD Bypass Control)		Factory	O	O
MSAV (Multi-Stage Air Volume) supply air blower option (Without VFD Bypass Control)		Factory	O	O
Motors - MSAV® Multi-Stage Air Volume	Belt Drive (standard efficiency) - 3 hp	Factory	O	
	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
Drive Kits	Kit #1 535-725 rpm	Factory	O	
See Blower Data Tables for usage and selection	Kit #2 710-965 rpm	Factory	O	
	Kit #3 685-856 rpm	Factory	O	O
	Kit #4 850-1045 rpm	Factory	O	O
	Kit #5 945-1185 rpm	Factory	O	O
	Kit #6 850-1045 rpm	Factory	O	O
	Kit #7 945-1185 rpm	Factory	O	O
	Kit #8 1045-1285 rpm	Factory	O	O
	Kit #10 1045-1285 rpm	Factory		O
	Kit #11 1135-1365 rpm	Factory		O
	Blower Belt Auto-Tensioner	Factory	O	O

[1] Lamps operate on 110-230V single-phase power supply. Step-down transformer must be field supplied for field installation in 460V and 575V rooftop units (transformer is furnished for factory installed light kits). Alternately, a separate 110V power supply may be used to directly power the UVC ballast(s).

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OPTIONS / ACCESSORIES (Ultra Models)

Item Description	Model Number	Catalog Number	Unit Model No. 180	Unit Model No. 240
OUTDOOR AIR				
Outdoor Air Dampers With Outdoor Air Hood				
Motorized	C1DAMP20C-1	13U04	OX	OX
Manual	C1DAMP10C-2	13U05	OX	OX
POWER EXHAUST				
Standard Static	208/230V - C1PWRE11C-1Y	75W90	OX	OX
	460V - C1PWRE11C-1G	75W91	OX	OX
	575V - C1PWRE11C-1J	75W92	OX	OX
CABINET				
Combination Coil/Hail Guards	C1GARD51C21	13T12	X	X
ROOF CURBS				
Hybrid Roof Curbs, Downflow				
8 in. height	C1CURB70C-1	11F58	X	X
14 in. height	C1CURB71C-1	11F59	X	X
18 in. height	C1CURB72C-1	11F60	X	X
24 in. height	C1CURB73C-1	11F61	X	X
Adjustable Pitch Curb				
14 in. height	L1CURB55C	43W26	X	X
Standard Roof Curbs, Horizontal - Requires Horizontal Return Air Panel Kit				
26 in. height - slab applications	C1CURB14C-1	11T89	X	X
37 in. height - rooftop applications	C1CURB16C-1	11T96	X	X
Insulation Kit For Standard Horizontal Roof Curbs				
for C1CURB14C-1	C1INSU11C-1-	73K32	X	X
for C1CURB16C-1	C1INSU13C-1-	73K34	X	X
Horizontal Return Air Panel Kit				
Required for Horizontal Applications with Roof Curb	C1HRAP10C-1-	87M00	X	X
CEILING DIFFUSERS				
Step-Down - Order one	RTD11-185S	13K63	X	
	RTD11-275S	13K64		X
Flush - Order one	FD11-185S	13K58	X	
	FD11-275S	13K59		X
Transitions (Supply and Return) - Order one	C1DIFF33C-1	12X68	X	
	C1DIFF34C-1	12X70		X
Sunsource® Commercial Energy System				
Solar Module CE Kit	One 285W Solar Module (silver frame), One PanelClaw Polar Bear III Mounting System and One Enphase M250 Microinverter	10U67	X	X
Solar Power Entry with Disconnect		Factory	O	O
Enphase Envoy Communications Gateway (with Wireless Capability)		**13L89**	X	X
Line Communication Filter (external)		10F93	X	X
[1] Transformer (6 kW)	E1TRFM15AD3Y (208Y to 208 VAC Delta)	11H71	X	X
	E1TRFM15AD2Y (230 VAC Delta)	11H28	X	X
	E1TRFM15AD3G (460 VAC Delta or Wye)	11H29	X	X

[1] Order one 6 kW transformer per array (up to 24 solar modules each). Up to two arrays can be used per rooftop unit (total 48 modules). Arrays are field wired in parallel to the Solar Power Entry

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SPECIFICATIONS (High Models)

General Data	Nominal Tonnage		13 Ton	13 Ton	15 Ton	15 Ton	17.5 Ton
	Model Number		LGH156H4B	LGH156H4M	LGH180H4B	LGH180H4M	LGH210H4B
	Efficiency Type		High	High	High	High	High
	Blower Type		Constant Air Volume CAV	MSAV (Multi-Stage Air Volume)	Constant Air Volume CAV	MSAV (Multi-Stage Air Volume)	Constant Air Volume CAV
Cooling Performance	Gross Cooling Capacity - Btuh		156,000	156,000	176,000	176,000	204,000
	[1] Net Cooling Capacity - Btuh		152,000	152,000	172,000	172,000	198,000
	AHRI Rated Air Flow - cfm		5000	5000	5250	5250	6125
	Total Unit Power - kW		12.7	12.7	14.3	14.3	16.5
	[1] EER (Btuh/Watt)		12.0	12.0	12.0	12.0	12.0
	[2] IEER (Btuh/Watt)		13.6	14.1	13.5	13.7	13.0
	Refrigerant Type		R-410A	R-410A	R-410A	R-410A	R-410A
Refrigerant Charge	Environ™ Coil System	Circuit 1	5 lbs. 14 oz.	5 lbs. 14 oz.	6 lbs. 0 oz.	6 lbs. 0 oz.	6 lbs. 12 oz.
		Circuit 2	5 lbs. 8 oz.	5 lbs. 8 oz.	5 lbs. 10 oz.	5 lbs. 10 oz.	6 lbs. 14 oz.
		Circuit 3	5 lbs. 12 oz.	5 lbs. 12 oz.	5 lbs. 14 oz.	5 lbs. 14 oz.	6 lbs. 14 oz.
	Conventional Fin/Tube Coil Option	Circuit 1	10 lbs. 2 oz.	10 lbs. 2 oz.	12 lbs. 8 oz.	12 lbs. 8 oz.	13 lbs. 0 oz.
		Circuit 2	10 lbs. 0 oz.	10 lbs. 0 oz.	12 lbs. 8 oz.	12 lbs. 8 oz.	13 lbs. 0 oz.
		Circuit 3	10 lbs. 2 oz.	10 lbs. 2 oz.	12 lbs. 8 oz.	12 lbs. 8 oz.	13 lbs. 0 oz.
	Conventional Fin/Tube With Humiditrol® Option	Circuit 1	12 lbs. 10 oz.	12 lbs. 10 oz.	14 lbs. 8 oz.	14 lbs. 8 oz.	15 lbs. 0 oz.
		Circuit 2	12 lbs. 8 oz.	12 lbs. 8 oz.	14 lbs. 8 oz.	14 lbs. 8 oz.	15 lbs. 0 oz.
		Circuit 3	10 lbs. 2 oz.	10 lbs. 2 oz.	12 lbs. 8 oz.	12 lbs. 8 oz.	13 lbs. 0 oz.
Gas Heating Options Available			See page <?>				
Compressor Type (number)			Scroll (3)	Scroll (3)	Scroll (3)	Scroll (3)	Scroll (3)
Outdoor Coils Environ™ (Fin/Tube)	Net face area (total) - sq. ft.		41.4	41.4	55.2	55.2	55.2
	Number of rows		1 (2)	1 (2)	1 (2)	1 (2)	1 (2)
	Fins per inch		23 (20)	23 (20)	23 (20)	23 (20)	23 (20)
Outdoor Coil Fans	Motor - (No.) horsepower		(3) 1/3	(3) 1/3	(4) 1/3	(4) 1/3	(6) 1/3
	Motor rpm		1075	1075	1075	1075	1075
	Total Motor watts		1100	1100	1500	1500	1950
	Diameter - (No.) in.		(3) 24	(3) 24	(4) 24	(4) 24	(6) 24
	Number of blades		3	3	3	3	3
	Total Air volume - cfm		12,000	12,000	16,000	16,000	20,000
Indoor Coils	Net face area (total) - sq. ft.		21.4	21.4	21.4	21.4	21.4
	Tube diameter - in.		3/8	3/8	3/8	3/8	3/8
	Number of rows		3	3	3	3	4
	Fins per inch		14	14	14	14	14
	Drain connection - No. and size		(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT
	Expansion device type		Balance port TXV, removable head				
[3] Indoor Blower and Drive Selection	Nominal motor output		2 hp, 3 hp, 5 hp		3 hp, 5 hp, 7.5 hp		
	Maximum usable motor output (US Only)		2.3 hp, 3.45 hp, 5.75 hp		3.45 hp, 5.75 hp, 8.62 hp		
	Motor - Drive kit number		2 hp Kit 1 535-725 rpm Kit 2 710-965 rpm 3 hp Std. Eff. Kit 1 535-725 rpm Kit 2 710-965 rpm 3 hp High. Eff. Kit 3 685-856 rpm Kit 4 850-1045 rpm 5 hp Kit 3 - 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm		3 hp Std. Eff. Kit 1 535-725 rpm Kit 2 710-965 rpm 3 hp High. Eff. Kit 3 - 685-856 rpm Kit 4 850-1045 rpm 5 hp Kit 3 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm 7.5 hp Kit 6 850-1045 rpm Kit 7 945-1185 rpm Kit 8 1045-1285 rpm	
	Blower wheel nominal D x W - in.		(2) 15 x 15 in.		(2) 15 x 15 in.		
Filters	Type of filter		Fiberglass, disposable				
	Number and size - in.		(6) 24 x 24 x 2				
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase				

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

[1] AHRI Certified to AHRI Standard 340/360; 95°F outdoor air temperature and 80°F db/67°F wb entering evaporator air; minimum external duct static pressure.

[2] Integrated Energy Efficiency Ratio tested according to AHRI Standard 340/360.

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

NOTE – Units equipped with MSAV® (Multi-Stage Air Volume) option are limited to a motor service factor of 1.0.

SPECIFICATIONS (HIGH / STANDARD MODELS)

General Data		Nominal Tonnage	17.5 Ton	20 Ton	20 Ton	25 Ton	25 Ton
		Model Number	LGH210H4M	LGH240H4B	LGH240H4M	LGH300S4B	LGH300S4M
		Efficiency Type	High	High	High	Standard	Standard
		Blower Type	MSAV (Multi-Stage Air Volume)	Constant Air Volume CAV	MSAV (Multi-Stage Air Volume)	Constant Air Volume CAV	MSAV (Multi-Stage Air Volume)
Cooling Performance		Gross Cooling Capacity - Btuh	204,000	238,000	238,000	281,000	281,000
		[1] Net Cooling Capacity - Btuh	198,000	230,000	230,000	270,000	270,000
		AHRI Rated Air Flow - cfm	6125	6400	6400	8400	8400
		Total Unit Power - kW	16.5	19.2	19.2	25.7	25.7
		[1] EER (Btuh/Watt)	12.0	12.0	12.0	10.5	10.5
		[2] IEER (Btuh/Watt)	14.0	13.2	14.5	11.4	13.8
		Refrigerant Type	R-410A	R-410A	R-410A	R-410A	R-410A
Refrigerant Charge	Environ™ Coil System	Circuit 1	6 lbs. 12 oz.	6 lbs. 4 oz.	6 lbs. 4 oz.	6 lbs. 4 oz.	6 lbs. 4 oz.
		Circuit 2	6 lbs. 14 oz.	6 lbs. 2 oz.	6 lbs. 2 oz.	5 lbs. 10 oz.	5 lbs. 10 oz.
		Circuit 3	6 lbs. 14 oz.	5 lbs. 14 oz.	5 lbs. 14 oz.	6 lbs. 6 oz.	6 lbs. 6 oz.
		Circuit 4	N/A	5 lbs. 6 oz.	5 lbs. 6 oz.	6 lbs. 0 oz.	6 lbs. 0 oz.
	Conventional Fin/Tube Coil Option	Circuit 1	13 lbs. 0 oz.	10 lbs. 0 oz.	10 lbs. 0 oz.	10 lbs. 8 oz.	10 lbs. 8 oz.
		Circuit 2	13 lbs. 0 oz.	10 lbs. 0 oz.	10 lbs. 0 oz.	10 lbs. 0 oz.	10 lbs. 0 oz.
		Circuit 3	13 lbs. 0 oz.	10 lbs. 0 oz.	10 lbs. 0 oz.	9 lbs. 12 oz.	9 lbs. 12 oz.
		Circuit 4	N/A	8 lbs. 12 oz.	8 lbs. 12 oz.	9 lbs. 12 oz.	9 lbs. 12 oz.
	Conventional Fin/Tube With Humiditrol® Option	Circuit 1	15 lbs. 0 oz.	12 lbs. 0 oz.	12 lbs. 0 oz.	12 lbs. 12 oz.	12 lbs. 12 oz.
		Circuit 2	15 lbs. 0 oz.	12 lbs. 0 oz.	12 lbs. 0 oz.	11 lbs. 12 oz.	11 lbs. 12 oz.
		Circuit 3	13 lbs. 0 oz.	10 lbs. 0 oz.	10 lbs. 0 oz.	9 lbs. 12 oz.	9 lbs. 12 oz.
		Circuit 4	N/A	8 lbs. 12 oz.	8 lbs. 12 oz.	9 lbs. 12 oz.	9 lbs. 12 oz.
Gas Heating Options Available			See page <?>				
Compressor Type (number)			Scroll (3)	Scroll (4)	Scroll (4)	Scroll (4)	Scroll (4)
Outdoor Coils Environ (Fin/Tube)		Net face area (total) - sq. ft.	55.2	55.2	55.2	55.2	55.2
		Number of rows	1 (2)	1 (2)	1 (2)	1 (2)	1 (2)
		Fins per inch	23 (20)	23 (20)	23 (20)	23 (20)	23 (20)
Outdoor Coil Fans		Motor - (No.) horsepower	(6) 1/3	(6) 1/3	(6) 1/3	(6) 1/3	(6) 1/3
		Motor rpm	1075	1075	1075	1075	1075
		Total Motor watts	1950	1950	1950	1950	1950
		Diameter - (No.) in.	(6) 24	(6) 24	(6) 24	(6) 24	(6) 24
		Number of blades	3	3	3	3	3
		Total Air volume - cfm	20,000	20,000	20,000	20,000	20,000
Indoor Coils		Net face area (total) - sq. ft.	21.4	21.4	21.4	21.4	21.4
		Tube diameter - in.	3/8	3/8	3/8	3/8	3/8
		Number of rows	4	4	4	4	4
		Fins per inch	14	14	14	14	14
		Drain connection - No. and size	(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT
		Expansion device type	Balance port TXV, removable head				
[3] Indoor Blower and Drive Selection		Nominal motor output	3 hp, 5 hp, 7.5 hp	5 hp, 7.5 hp, 10 hp			
		Maximum usable motor output (US Only)	3.45 hp, 5.75 hp, 8.62 hp	5.75 hp, 8.62 hp, 11.5 hp			
		Motor - Drive kit number	3 hp Std. Eff. Kit 1 535-725 rpm Kit 2 710-965 rpm 3 hp High. Eff. Kit 3 - 685-856 rpm Kit 4 850-1045 rpm 5 hp Kit 3 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm 7.5 hp Kit 6 850-1045 rpm Kit 7 945-1185 rpm Kit 8 1045-1285 rpm	5 hp Kit 3 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm 7.5 hp Kit 6 850-1045 rpm Kit 7 945-1185 rpm Kit 8 1045-1285 rpm 10 hp Kit 7 945-1185 rpm Kit 10 1045-1285 rpm Kit 11 1135-1365 rpm			
		Blower wheel nominal D x W - in.	(2) 15 x 15 in.				
Filters		Type of filter	Fiberglass, disposable				
		Number and size - in.	(6) 24 x 24 x 2				
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase				

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

[1] AHRI Certified to AHRI Standard 340/360; 95°F outdoor air temperature and 80°F db/67°F wb entering evaporator air; minimum external duct static pressure.

[2] Integrated Energy Efficiency Ratio tested according to AHRI Standard 340/360.

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

NOTE – Units equipped with MSAV® (Multi-Stage Air Volume) option are limited to a motor service factor of 1.0.

SPECIFICATIONS - GAS HEAT (All Models)

Usage Data			Model Number	LGH156 LGH180 LGH210	LGH156 LGH180 LGH210 LGH240 LGH300		LGH180 LGH210 LGH240 LGH300
			Heat Input Type	Low (L)	Standard (S)	Medium (M)	High (H)
			Number of Gas Heat Stages	1	2	2	2
Gas Heating Performance (Two-Stage)	Input - Btuh		First Stage	169,000	169,000	234,000	312,000
			Second Stage	N/A	260,000	360,000	480,000
	Output - Btuh		First Stage	135,000	- - -	- - -	- - -
			Second Stage	N/A	208,000	288,000	384,000
[1] Gas Heating Performance (Four-Stage)	Input - Btuh		First Stage	N/A	84,500	117,000	156,000
			Second Stage	N/A	169,000	234,000	312,000
			Third Stage	N/A	214,000	297,000	396,000
			Fourth Stage	N/A	260,000	360,000	480,000
	Output - Btuh		First Stage	135,000	- - -	- - -	- - -
			Second Stage	N/A	- - -	- - -	- - -
			Third Stage	N/A	- - -	- - -	- - -
			Fourth Stage	N/A	208,000	288,000	384,000
			Temperature Rise Range - °F	15 - 45	15 - 45	30 - 60	40 - 70
			Thermal Efficiency	80.0%	80.0%	80.0%	80.0%
			Gas Supply Connections	1 in. npt	1 in. npt	1 in. npt	1 in. npt
Recommended Gas Supply Pressure - in. w.g.			Natural	7	7	7	7
			LPG/Propane	11	11	11	11

[1] Four-stage gas heating is enabled when zone sensor, Discharge Air Control, or fresh air tempering mode is selected. (Available when using the CS8500 thermostat or when connected to Building Automation Systems using BACnet, LonTalk, or S-Bus protocols)

HIGH ALTITUDE DERATE (All Models)

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
Low (L)	No adjustment required				
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
Low (L)	No adjustment required						
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

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

BLOWER DATA

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

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

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

MINIMUM AIR VOLUME REQUIRED FOR DIFFERENT GAS HEAT SIZES

Low (L), Standard (S) and Medium Heat (M) - 4500 cfm minimum
High Heat (H) - 5125 cfm minimum

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

BLOWER DATA (HIGH / STANDARD)

FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS (ALL MODELS)

Motor Efficiency	Nominal hp	Maximum hp	Drive Kit Number	RPM Range
Standard or High	2	2.30	1	535 - 725
Standard or High	2	2.30	2	710 - 965
Standard	3	3.45	1	535 - 725
Standard	3	3.45	2	710 - 965
High	3	3.45	3	685 - 856
High	3	3.45	4	850 - 1045
Standard	5	5.75	3	685 - 856
Standard	5	5.75	4	850 - 1045
Standard	5	5.75	5	945 - 1185
Standard	7.5	8.63	6	850 - 1045
Standard	7.5	8.63	7	945 - 1185
Standard	7.5	8.63	8	1045 - 1285
Standard	10	11.50	7	945 - 1185
Standard	10	11.50	10	1045 - 1285
Standard	10	11.50	11	1135 - 1365

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

NOTE – Units equipped with MSAV® (Multi-Stage Air Volume) Models option are limited to a motor service factor of 1.0.

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE (HIGH / STANDARD MODELS)

Air Volume cfm	Wet Indoor Coil		Humiditrol Condenser Reheat Coil	Gas Heat Exchanger			Economizer	Filters		Horizontal Roof Curb	
	156H, 180H	210H, 240H, 300S		Low/Standard Heat	Medium Heat	High Heat				156H thru 240H	300S
	in. w.g.	in. w.g.	in. w.g.	in. w.g.	in. w.g.	in. w.g.	in. w.g.	MERV 8	MERV 13	in. w.g.	in. w.g.
2750	.01	.02	.01	.02	.04	.05	- - -	.01	.03	.03	-
3000	.01	.02	.01	.03	.04	.05	- - -	.01	.03	.04	-
3250	.01	.03	.01	.03	.05	.06	- - -	.01	.04	.04	.01
3500	.01	.03	.02	.03	.05	.06	- - -	.01	.04	.05	.01
3750	.01	.03	.02	.04	.06	.07	- - -	.01	.04	.05	.01
4000	.02	.04	.02	.04	.06	.07	- - -	.01	.04	.06	.02
4250	.02	.04	.02	.04	.06	.08	- - -	.01	.05	.07	.02
4500	.02	.05	.02	.05	.07	.09	- - -	.01	.05	.07	.02
4750	.02	.05	.02	.05	.08	.10	- - -	.02	.05	.08	.03
5000	.02	.05	.02	.05	.09	.11	- - -	.02	.06	.08	.03
5250	.02	.06	.03	.06	.10	.12	- - -	.02	.06	.09	.04
5500	.02	.07	.03	.06	.10	.13	- - -	.02	.06	.10	.04
5750	.03	.07	.03	.06	.11	.14	- - -	.02	.07	.11	.05
6000	.03	.08	.03	.07	.12	.15	- - -	.03	.07	.11	.06
6250	.03	.08	.03	.07	.12	.16	.01	.03	.07	.12	.07
6500	.03	.09	.04	.08	.13	.17	.02	.03	.08	.13	.08
6750	.04	.10	.04	.08	.14	.18	.03	.03	.08	.14	.08
7000	.04	.10	.04	.09	.15	.19	.04	.04	.08	.15	.09
7250	.04	.11	.04	.09	.16	.20	.05	.04	.09	.16	.10
7500	.05	.12	.05	.10	.17	.21	.06	.04	.09	.17	.11
8000	.05	.13	.05	.11	.19	.24	.09	.05	.10	.19	.13
8500	.06	.15	.05	.12	.20	.26	.11	.05	.10	.21	.15
9000	.07	.16	.06	.13	.23	.29	.14	.06	.11	.24	.17
9500	.08	.18	.07	.14	.25	.32	.16	.07	.12	.26	.19
10,000	.08	.20	.07	.16	.27	.35	.19	.07	.12	.29	.21
10,500	.09	.22	.08	.17	.30	.38	.22	.08	.13	.31	.24
11,000	.11	.24	.08	.18	.31	.40	.25	.09	.14	.34	.27

BLOWER DATA (ULTRA MODELS)

FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

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

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

NOTE – MSAV® (Multi-Stage Air Volume) drive is limited to a motor service factor of 1.0.

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE

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

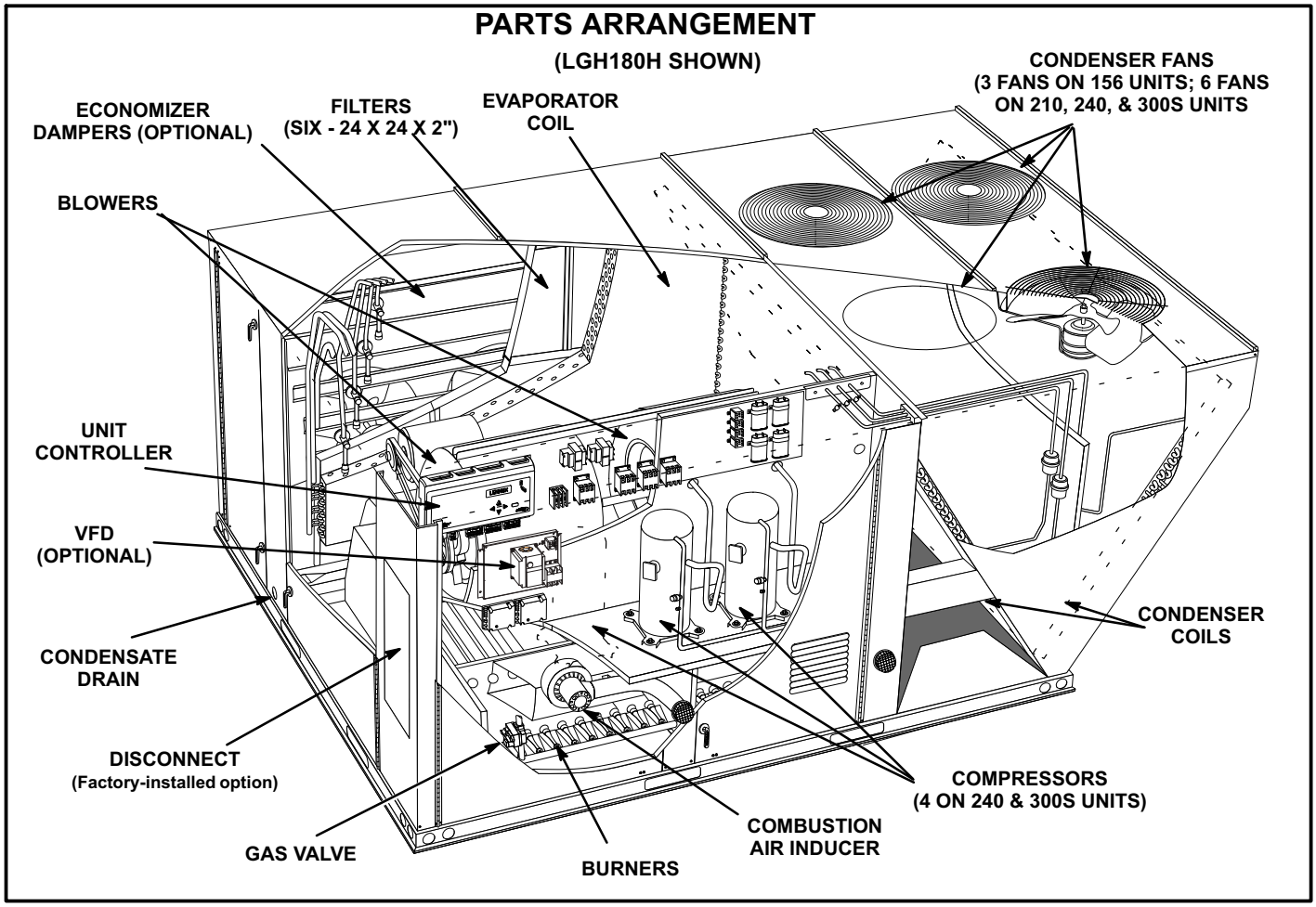


FIGURE 1

I-UNIT COMPONENTS

All 13 through 25 ton (45.7 through 88 kW) units are configure to order units (CTO). Unit components are shown in figures 1. All units come standard with hinged unit panels. The unit panels may be held open with the door rod located inside the unit. All L1, L2 and L3 wiring is color coded; L1 is red, L2 is yellow and L3 is blue.

A-Control Box Components

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface, such as the gas valve or blower deck, before performing any service procedure.

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

1-Disconnect Switch S48 (optional)

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

2-Control Transformer T1

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

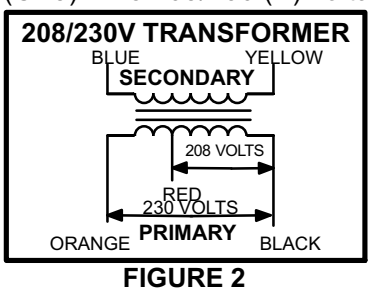


FIGURE 2

3-Contactor Transformer T18

T18 is a single line voltage to 24VAC transformer used in all LGH 13 to 25 ton units. Transformer T18 is protected by a 3.5 amp circuit breaker (CB18). T18 is identical to transformer T1. The transformer supplies 24VAC power to the contactors.

CONTROL BOX PARTS ARRANGEMENT

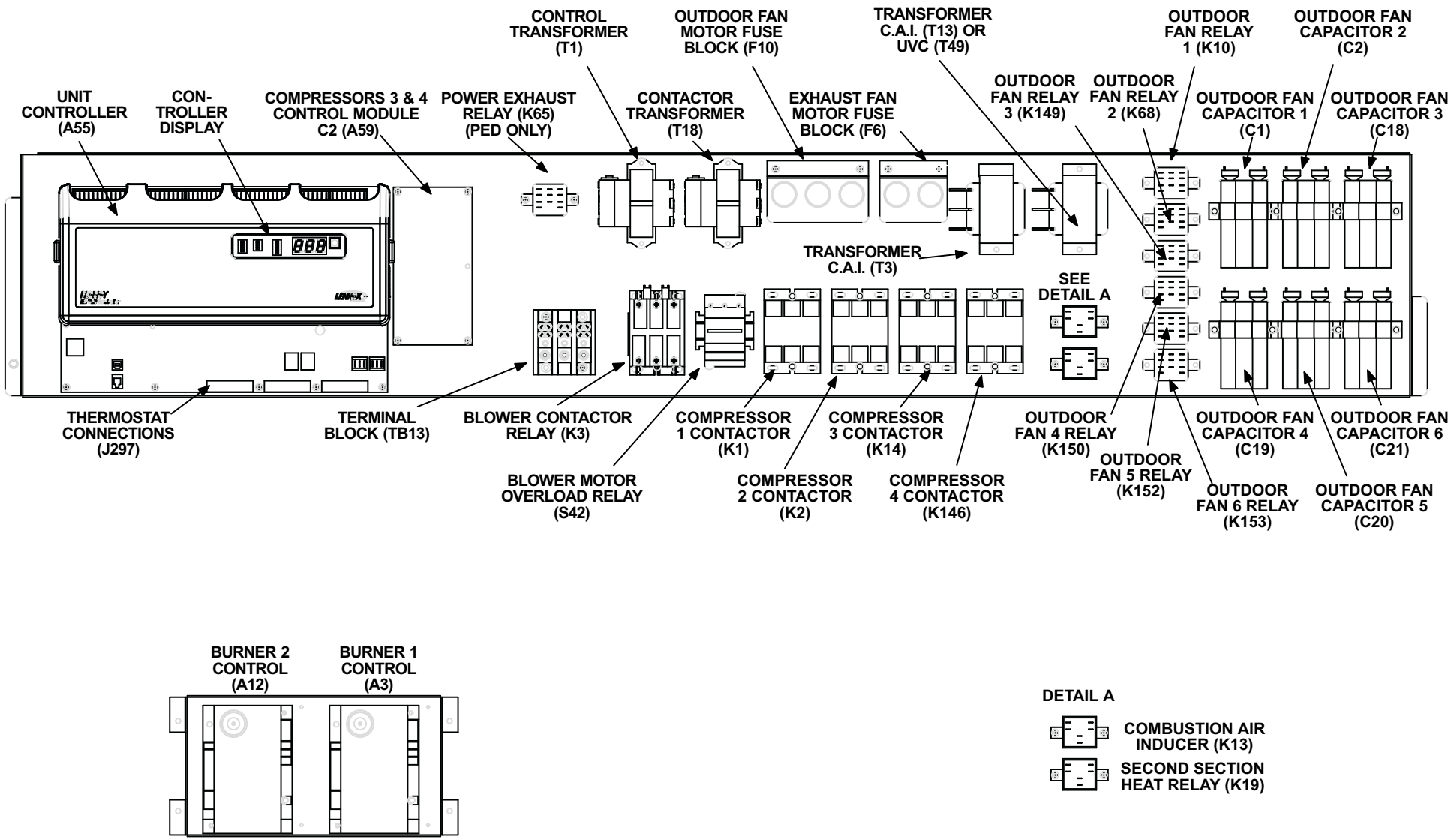


FIGURE 3

4-C. A. I. Transformers T3, T13 (575V units)

All 575 (J) voltage units use transformer T3 and T13. The auto voltage to 230VAC transformers are mounted in the control box. The transformers have an output rating of 0.5A. T3 transformer supplies 230 VAC power to combustion air blower motor (B6), while T13 transformer supplies power to combustion air blower motor (B15) in all units.

T13 also provides 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-Outdoor Fan Motor Fuse Block & Fuses F10 Power Exhaust Fan Motor Fuse Block and Fuses F6 (240 and 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.

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

C1, C2, & C18:	All units
C19:	180, 210, 240, 300 Units
C20 & C21:	210, 240, 300 Units

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.

8-Compressor Contactor K1, K2, K14, K146

K1, K2, K14:	All units
K146:	240, 300

All compressor contactors are three-pole-double-break contactors with 24VAC coils. K1 and K2 (energized by A55) energizes compressors B1 and B2 in response to first stage cool demand. K14 and K146 (energized by A59) energize compressors B13 and B20 in response to second stage cool demand.

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

K10 & K68:	All units
K149 & K150:	180, 210, 240, 300
K152 & K153:	210, 240, 300

Outdoor fan relays are DPDT relays with a 24VAC coil.

In 156 units, K10 energizes fan 1 B4 and K68 energizes fan 2 B5 and fan 3 B21.

In 180 units, K10 energizes fan 1 B4, K68 energizes fan 2 B5, K149 energizes fan 3 B21 and K150 energizes fan 4 B22.

In 210, 240 and 300 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.

10-Blower Contactor K3

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

11-Combustion Air Inducer Relay K13

Combustion air inducer relay K13, used in all units, is a DPDT relay with a 24VAC coil. K13 is energized by the A55 Unit Controller after a first stage heating demand from the thermostat. K13 remains energized throughout the heating demand. When energized, K13 N.O. contacts close to energize combustion air blower and begin a heating sequence. Pressure switch S18, located in the compressor compartment, closes as combustion air static pressure falls to “prove” combustion air inducer operation. When S18 closes, the ignition controls and gas valves are energized to begin a heating sequence.

12-Combustion Air Inducer Relay K19 (second burner section)

Combustion air inducer relay K19 is a DPDT relay with a 24 VAC coil. K19 is energized by A55 Unit Controller after a first stage heating demand from the thermostat. K19 remains energized throughout the first stage heating demand. When energized, K19 N.O. contacts close to energize the second heat section combustion air blower and begin second section heating sequence. Prove switch S45, located in the compressor compartment, closes as combustion air static pressure falls to “prove” combustion air blower operation. When S45 closes, the second section of the ignition control and gas valve are energized to begin the second section heating sequence.

13-Ultraviolet Germicidal Lamp (UVC) Transformer T49

UVC transformer T49 is used by units of all voltages except 208/230V and 575V which are equipped with a UVC. The auto voltage to 230VAC transformer is installed in the control box. The transformer has an output rating of 0.5 amps. T49 transformer supplies 230VAC power to the UVC lamp.

14-Burner Controls A3 & A12

Units have two burner controls. A3 controls gas heat section one and A12 controls gas heat section two. The first gas heat section and the second gas heat section burner controls are identical. Both burner controls are factory set and are not adjustable. The control makes three attempts at ignition and then locks out the system if ignition is not obtained after the third trial. Reset after lockout requires only breaking and remaking thermostat demand. The control shuts off gas flow immediately in the event of a gas or power failure. Upon restoration of gas and power, the control will restart the ignition sequence and continue until flame is established or system locks out. For a more detailed description see the Gas Heat Components section.

15-Power Exhaust Relay K65 (PED units)

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

16-Blower Motor Overload Relay S42

Two hp high efficiency blower motors and M-volt unit blower motors are equipped with an overload relay. High efficiency blower motors and M-volt unit blower motors manufactured before Dec. 19, 2010, are equipped with the relay.

The relay (S42) is connected in line with the blower motor to monitor the current flow to the motor. When the relay senses an overload condition, a set of normally closed contacts open to de-energize pin #1 in plug P299 of the A55 Unit Controller. A55 de-energizes all outputs. Units will be equipped with a relay manufactured by Telemecanique figure 4 or Siemens figure 5.

17-Variable Frequency Drive A96 (optional)

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

18-VFD Power To Motor Contactor K202 (optional)

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

19-Inverter Start Forward Rotation Relay K203 (optional)

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

20-Unit Controller A55

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

21-Compressor 3 & 4 Controller A59

The compressor 3 & 4 control module A59 controls two additional compressor stages. A59 includes all inputs and outputs required for compressor and fan control, compressor stage diagnostics and low ambient control.

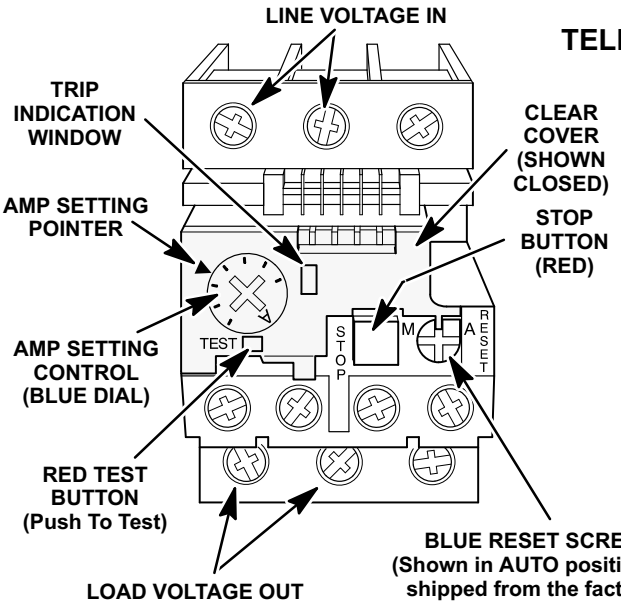
22-VFD Controller (GP board) A133 (MSAV units)

The GP board A133 controls and monitors the status of the VFD A96. The board sends the signal to start the VFD forward rotation and also sends a 0-10VDC signal to the VFD to control the speed of the blower rotation. A133 also reports VFD malfunctions to the A55.

23-Second-Stage Power Exhaust Relay K231 (MSAV units equipped with power exhaust)

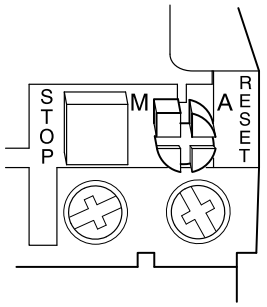
The second power exhaust fan is controlled by K231. A133 will enable K231 only when the blower reaches 70% of full speed (adjustable ECTO). This prevents a negative building pressure when the blower is operating in low speed. Refer to the Unit Controller manual and ECTO labels on the unit.

TELEMECANIQUE OVERLOAD RELAY



DETAIL SHOWING RESET BUTTON ADJUSTED TO MANUAL POSITION

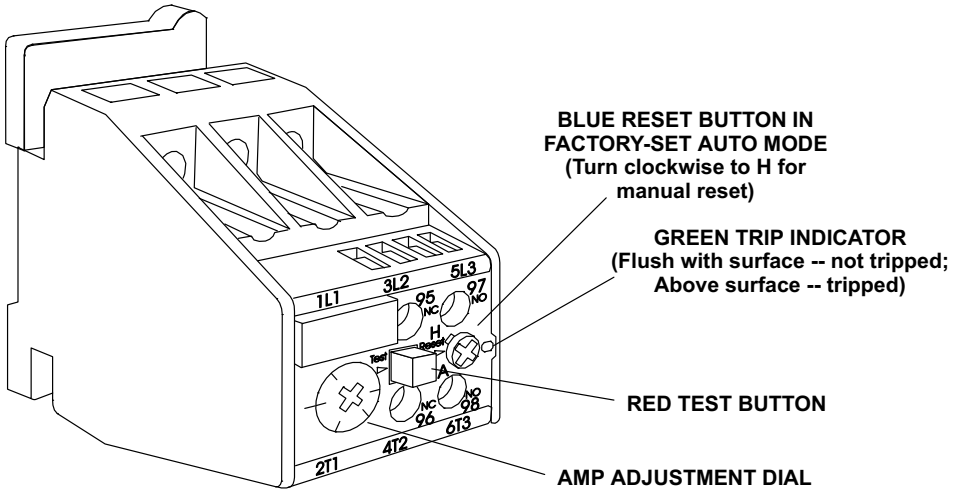
Lift clear cover and turn adjustment screw counterclockwise. Reset screw will pop out when pointer is in M (manual position). Close cover to lock reset screw into position.



Lift clear cover to adjust relay amp setting according to value given on the blower motor nameplate. Proper relay amp setting equals motor nameplate FLA X service factor of 1.15 X .95.
Cover must also be lifted to adjust control mode from automatic reset to manual reset (see detail above) and to test the control.
Control must be in the manual reset mode to perform a test. Use a pointed object to press the small red test button. A yellow marker should appear in the trip indication window to the right of the amp setting control. Press the blue reset screw to reset the relay.
The red STOP button opens the normally closed contacts which power the blower motor. This button stops blower motor operation as long as it is pressed in.

FIGURE 4

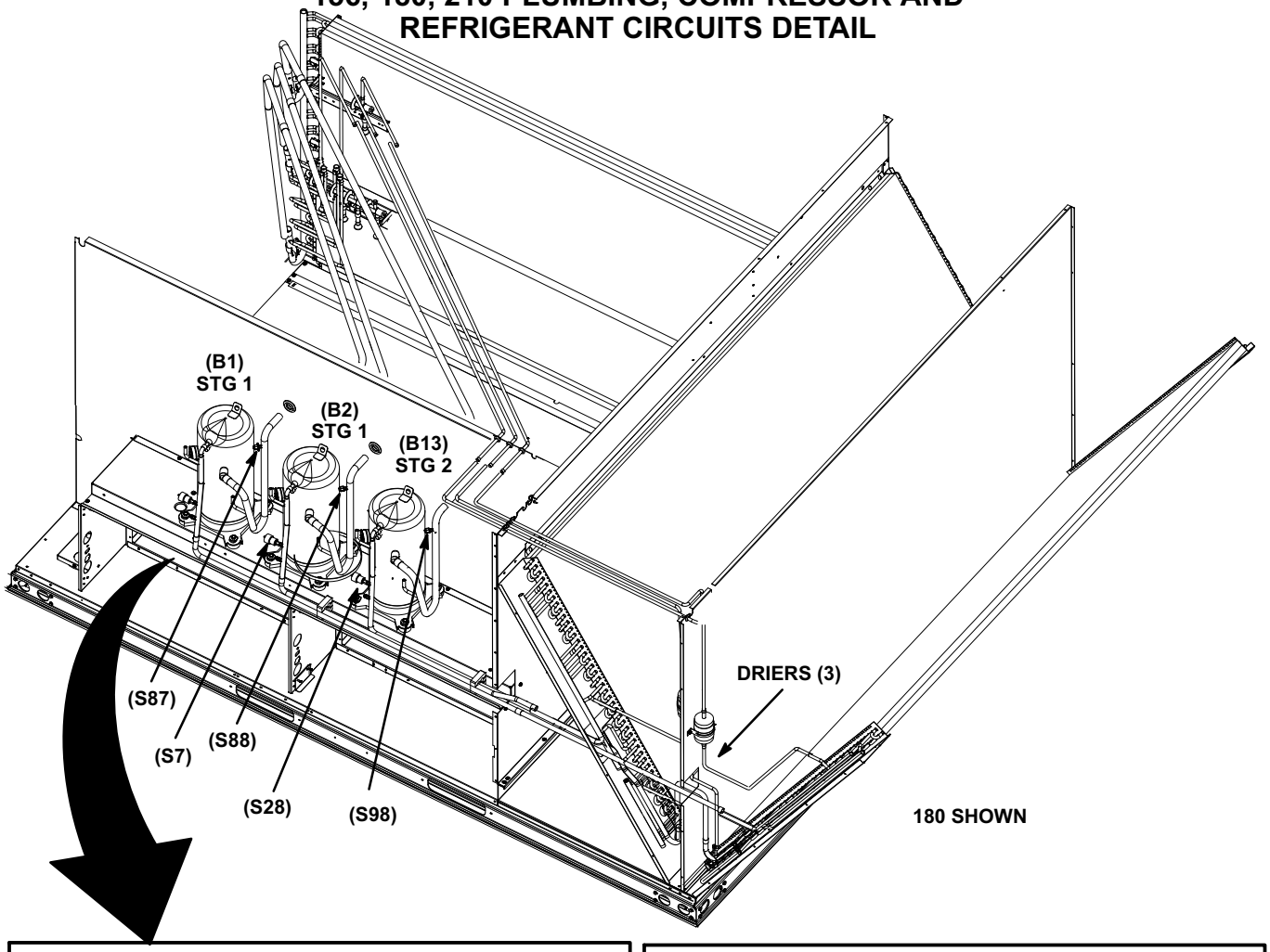
SIEMENS OVERLOAD RELAY

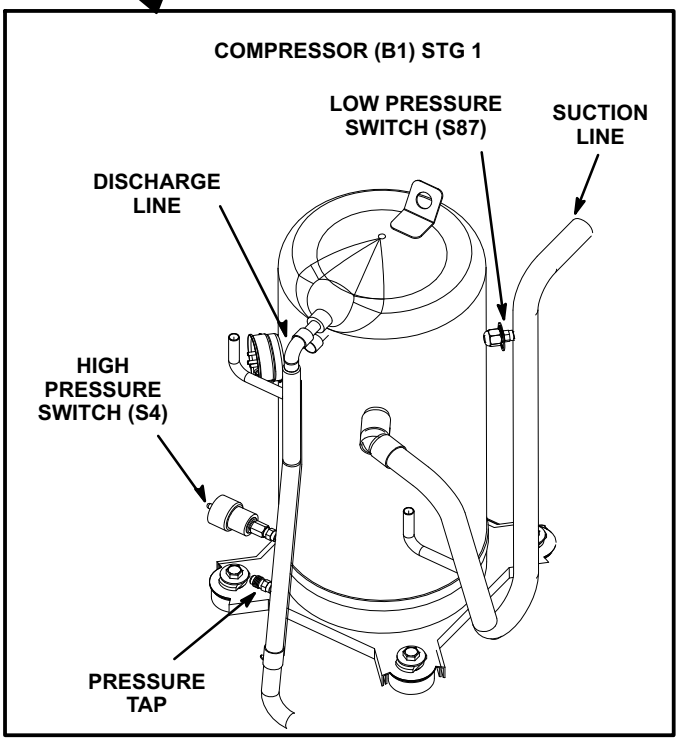


Adjust relay amp setting according to value given on the blower motor nameplate. Proper relay amp setting equals motor nameplate FLA X service factor of 1.15 X .95.
Use small slotted screwdriver to adjust control mode from automatic reset (A) to manual reset (H).
Control must be in the manual reset mode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

FIGURE 5

156, 180, 210 PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL





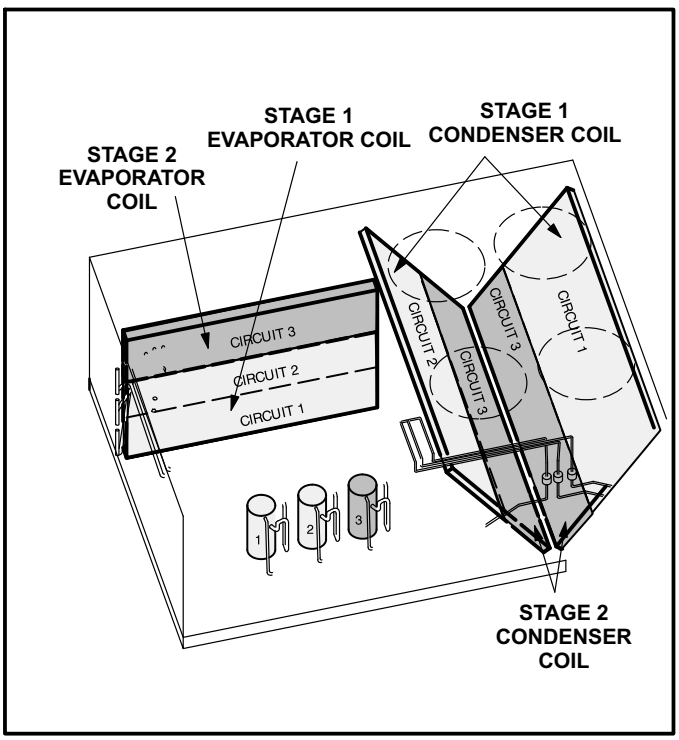


FIGURE 6

240, 300 PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL

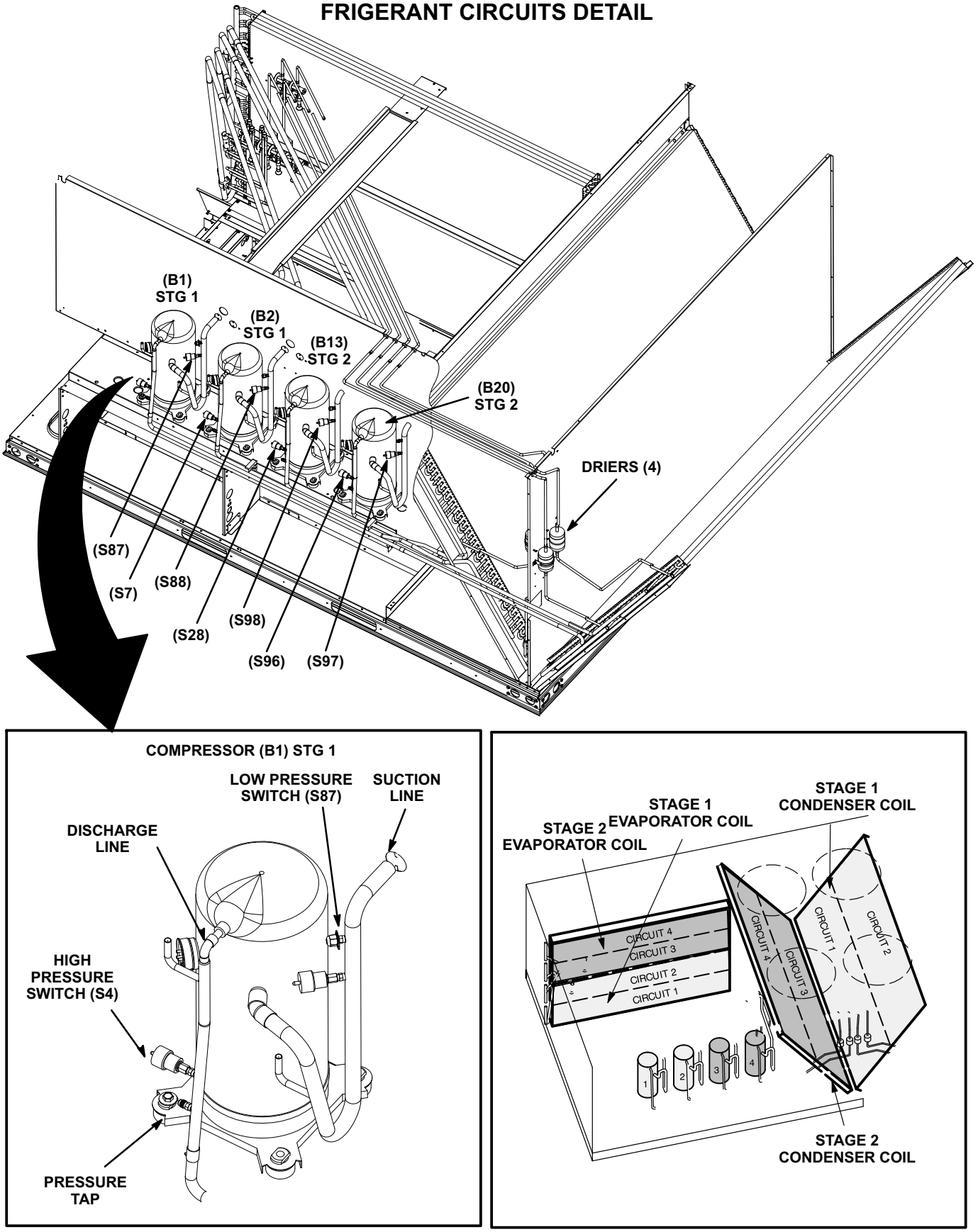


FIGURE 7

B-Cooling Components

All units use independent cooling circuits consisting of separate compressors, condenser coils and evaporator coils. See figure 6 for 156, 180 and 210 units and figure 7 for 240 and 300 units.

Three draw-through type condenser fans are used in LGH156 units, four draw-through type condenser fans are used in LGH180 units and six draw-through type condenser fans are used in LGH210, 240 and 300 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 (all units) B20 (240, 300)

All units use scroll compressors. LGH156, 180 and 210 use 3 compressors and LGH240 and 300 use four compressors. All compressors are equipped with independent cooling circuits. Compressor capacity may vary from stage to stage. In all cases, the capacity of each compressor is added to reach the total capacity of the unit. See “SPECIFICATIONS” and “ELECTRICAL DATA” (table of contents) or compressor nameplate for compressor specifications.

⚠ WARNING

Electrical shock hazard. Compressor must be grounded. Do not operate without protective cover over terminals. Disconnect power before removing protective cover. Discharge capacitors before servicing unit. Failure to follow these precautions could cause electrical shock resulting in injury or death.

Each compressor is energized by a corresponding compressor contactor.

NOTE-Refer to the wiring diagram section for specific unit operation.

If Interlink compressor replacement is necessary, call 1-800-4-LENNOX (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 (all units) HR11 (240, 300)

All LGH units use insertion type heaters. Heater HR1 is installed around compressor B1, heater HR2 compressor B2, HR5 compressor B13 and HR11 compressor B20.

3-High Pressure Switches S4, S7, S28 (all units) S96 (240, 300)

The high pressure switches is an auto-reset SPST N.C. switch which opens on a pressure rise. All units are equipped with this switch. The switch is located in the compressor discharge line and is wired in series with the compressor contactor coil through A55 Unit Controller or A59 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 discharge pressure rises to 640 ± 10 psig (4413 ± 69 kPa) (indicating a problem in the system) the switch opens and the respective compressor is de-energized (the economizer can continue to operate). When discharge pressure drops to 475 ± 20 psig (3275 ± 138 kPa) the pressure switch will close.

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

4-Low Ambient Switches S11, S84, S85 (all units) S94 (240, 300)

The low ambient switch is an auto-reset SPST N.O. pressure switch which allows for mechanical cooling operation at low outdoor temperatures. All units are equipped with this switch. In all models a switch is located in each liquid line prior to the indoor coil section.

In LGH156/210 units, S11 (compressor one) is wired to the Unit Controller (A55) and S84 (compressor two) and S85 (compressor three) are wired in parallel to the Unit Controller. In LGH240/300 units, S11 (compressor one) and S84 (compressor 2) are wired in parallel to the Unit Controller; S85 (compressor 3) and S94 (compressor four) are wired in parallel to the Unit Controller.

When liquid pressure rises to 450 ± 10 psig (3102 ± 69 kPa), the switch closes. When liquid pressure drops to 240 ± 10 psig (1655 ± 69 kPa), the switch opens and the Unit Controller will cycle condenser fans via the following outdoor fan relays:

K10 and K68 (all units)
K149 and K150 (180/300 units)
K152 and K153 (210/300 units)

The Unit Controller cycles fans based on the low ambient pressure switch inputs and outdoor ambient temperature.

This intermittent fan operation results in higher evaporating temperature allowing the system to operate without icing the evaporator coil and losing capacity.

5-Low Pressure Switches S87, S88, S98 (all units), S97 (LGH240, 300)

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 $\pm$ 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 $\pm$ 5 psig (620 ± 34 kPa) due to many causes such as refrigerant being added.

6-Service Valve (optional)

Units may be equipped with service valves located in the discharge and liquid lines. The service valves are manually operated valves used for service operation.

7-Filter Drier (all units)

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

8-Freezestats S49, S50, S53 (all units) and S95 (240, 300)

Each unit is equipped with a low temperature switch (freezestat) located on the return bend of each evaporator coil. S49 (first circuit), S50 (second circuit), S53 (third circuit) and S95 (fourth circuit) are located on the corresponding evaporator coils.

Each freezestat is wired in series with the compressor contactor coil through the unit control box to the A55 Unit Controller. Each freezestat is a SPST N.C. auto-reset switch which opens at 29°F $\pm$ 3°F (-1.7°C $\pm$ 1.7°C) on a temperature drop and closes at 58°F $\pm$ 4°F (14.4°C $\pm$ 2.2°C) on a temperature rise. To prevent coil icing, freezestats open during compressor operation to temporarily disable the respective compressor until the coil warms sufficiently to melt any accumulated frost.

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

9-Condenser Fans B4, B5, B21 (all units), B22 (180/300), B23, B24 (210/300)

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

C-Blower Compartment

The blower compartment is located between the evaporator coil and the compressor / control section on the opposite side of the condenser coil. The blower assembly is accessed by disconnecting the blower motor wiring (and all other plugs) and removing the screws on either side of the sliding base. The base pulls out as shown in figure 8.

1-Blower Wheels

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

2-Indoor Blower Motor B3

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

OPERATION / ADJUSTMENT

MSAV® Units - The blower rotation will always be correct on MSAV™ units. Checking blower rotation is not a valid method of determining voltage phasing for incoming power.

MSAV® Units and Units Equipped With Optional Voltage or Phase Detection - The Unit Controller checks the incoming power during start-up. If the voltage or phase is incorrect, the Unit Controller will display an alarm and the unit will not start.

⚠IMPORTANT

Three Phase Scroll Compressor Voltage Phasing

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

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

2-Suction pressure must drop, discharge pressure must rise and blower* rotation must match rotation marking.

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

3-Disconnect all remote electrical power supplies.

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

5-Make sure the connections are tight.

Discharge and suction pressures should operate at their normal start-up ranges.

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

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.

Determining Unit Air Volume

IMPORTANT - MSAV® *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* MSAV® *Start-Up section to set blower CFM for all modes once the motor pulley is set.*

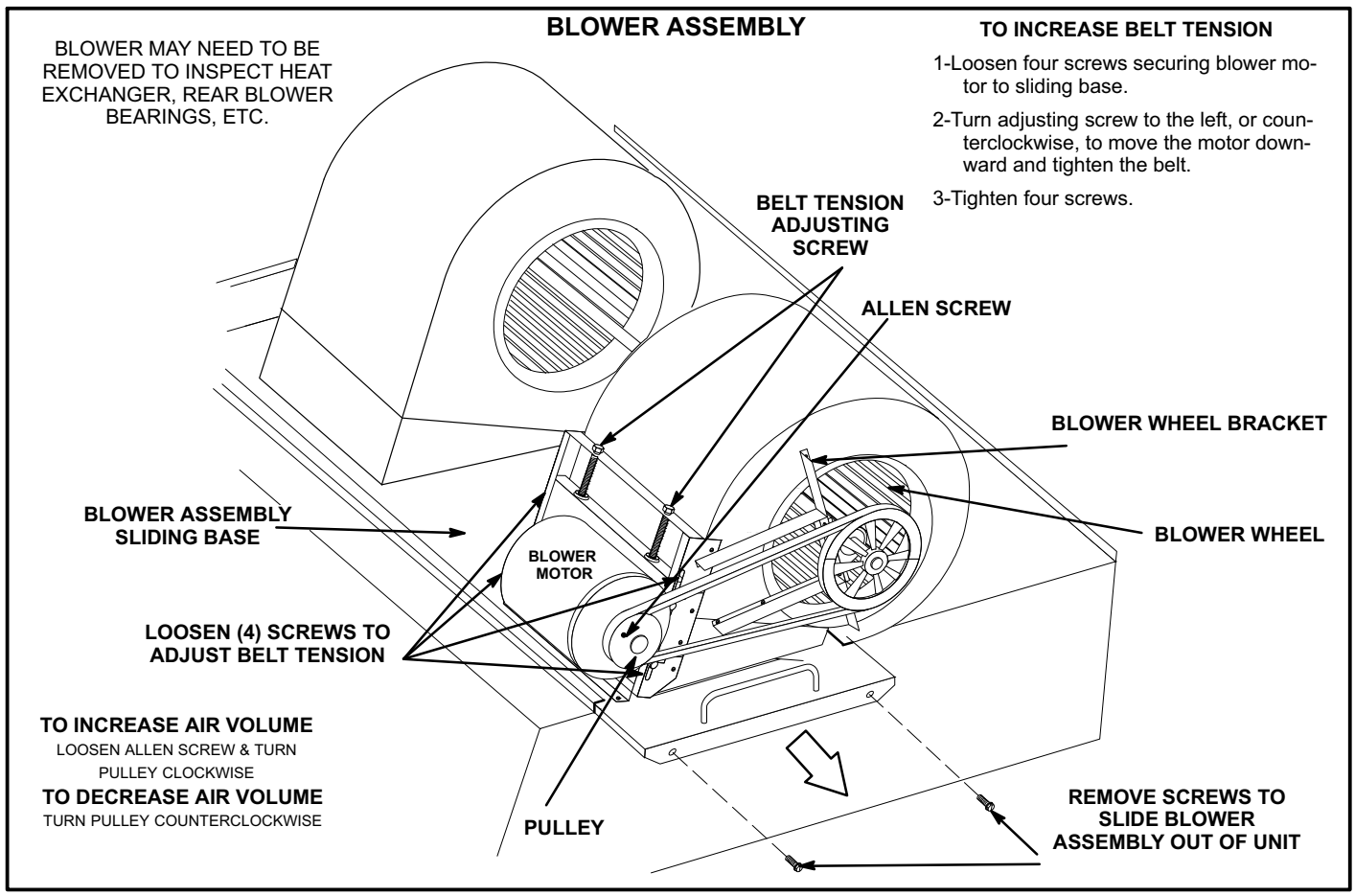


FIGURE 8

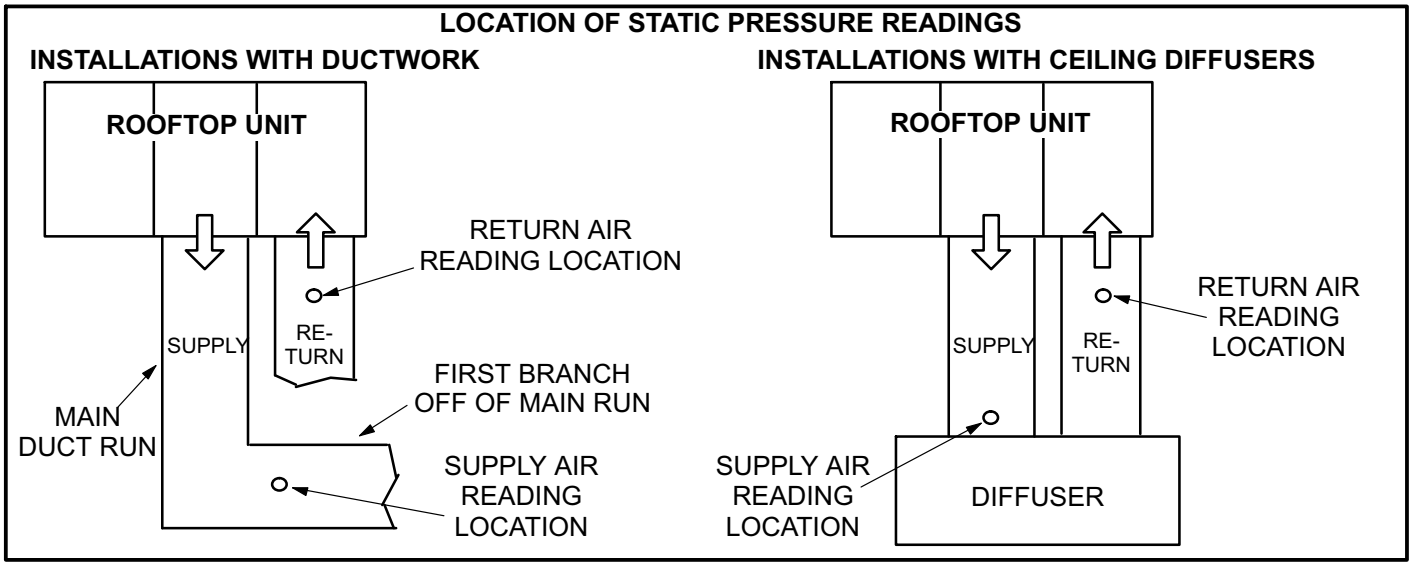


FIGURE 9

1- The following measurements must be made with a dry indoor coil. Run blower without cooling demand. 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 9.

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

3- Measure the indoor blower wheel RPM.

4- Refer to blower tables in BLOWER DATA (table of contents) in the front of this manual. Use static pressure and RPM readings to determine unit air volume.

5- The RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase RPM. Turn counterclockwise to decrease RPM. See figure 8.

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 as shown in figure 10 for standard blowers and figure 11 for units equipped with an optional belt tensioner.

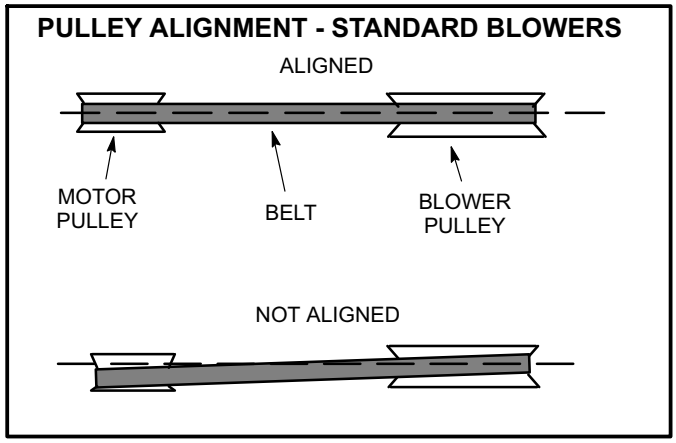


FIGURE 10

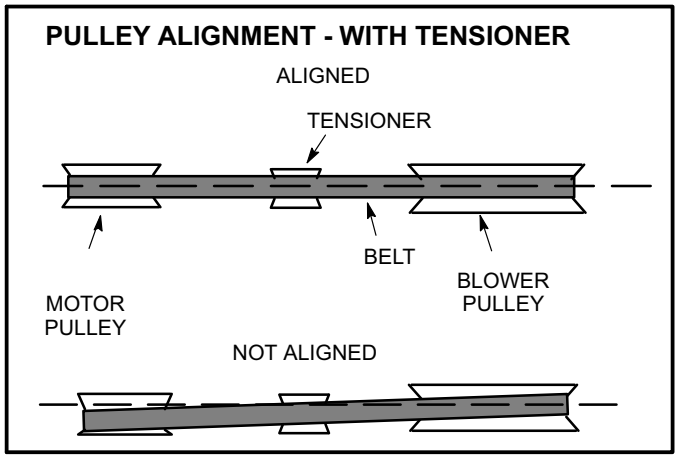


FIGURE 11

Standard Blowers

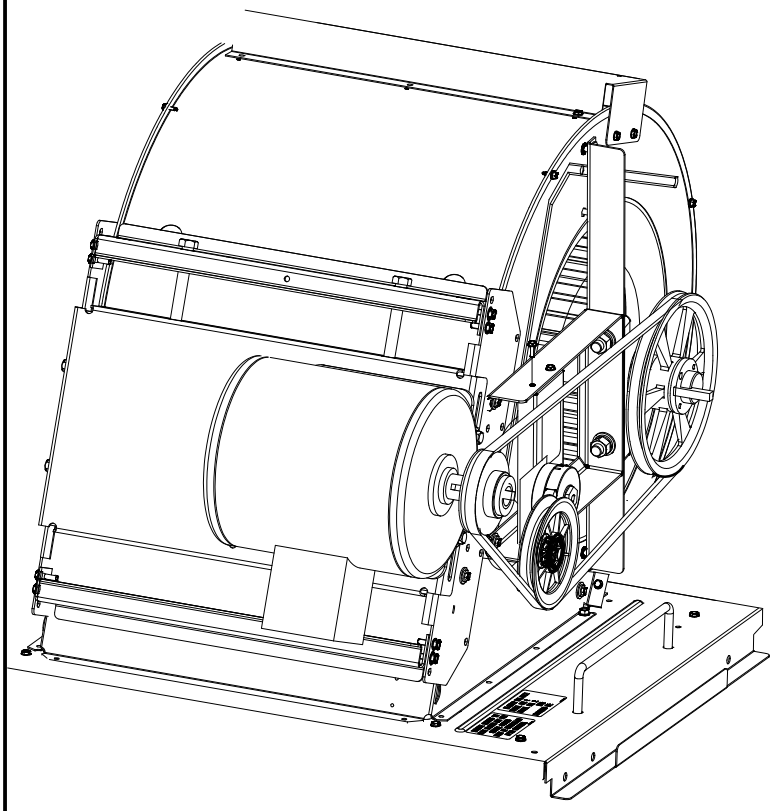
1. Loosen four screws securing blower motor to sliding base. See figure 8.
2. *To increase belt tension -*
   Turn belt tension adjusting screw to the left, or counterclockwise, to tighten the belt. This increases the distance between the blower motor and the blower housing.

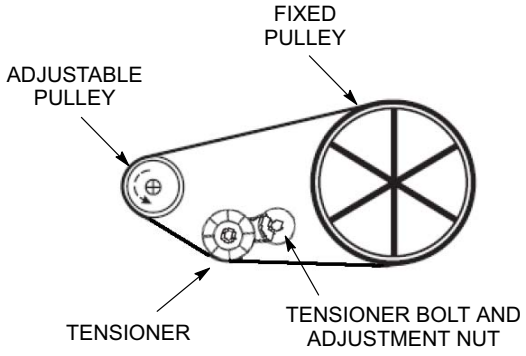
   To loosen belt tension -
   Turn the adjusting screw to the right, or clockwise to loosen belt tension.
3. Tighten four screws securing blower motor to sliding base once adjustments have been made.

Blowers Equipped With Belt Tensioner

1. Loosen the bolt in the center of the tensioner. See figure 12.
2. Place belt over all three pulleys.
3. Using a 15/16” wrench, turn the tensioner nut until marks align as shown in figure 12.
4. Hold the tensioner with marks aligned and tighten the bolt to 22 ft.lbs. using the 9/16” wrench.

PULLEY ALIGNMENT - WITH TENSIONER





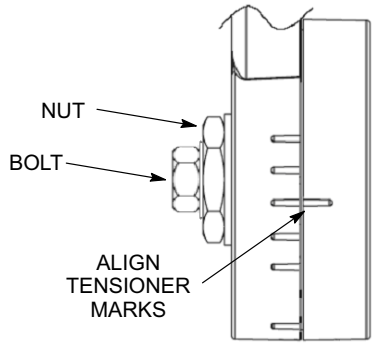


FIGURE 12

Check Belt Tension

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

1. Measure span length X. See figure 13.
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 and undertensioned belt. A force above these values indicates an overtensioned belt.

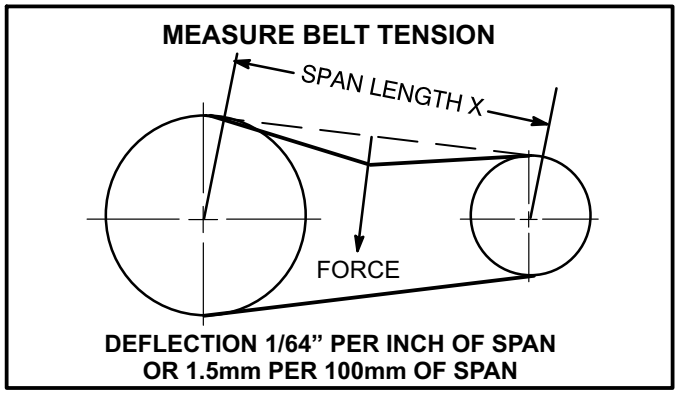


FIGURE 13

Field-Furnished Blower Drives

For field-furnished blower drives, Refer to blower tables in BLOWER DATA section to determine BHP and RPM required. Reference table 1 and 2 to determine the manufacturer's model number.

TABLE 1

Drive No.	H.P.	DRIVE COMPONENTS					
		RPM		ADJUSTABLE SHEAVE		FIXED SHEAVE	
		Min	Max	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
1	2 & 3 Std.	535	725	1VP40x7/8	79J0301	BK95 x 1-7/16	80K1601
2	2 & 3 Std.	710	965	1VP40x7/8	79J0301	BK72 x 1-7/16	100244-13
3	3 High & 5	685	865	1VP50x1-1/8	P-8-1977	BK100 x 1-7/16	39L1301
4	3 High & 5	850	1045	1VP65x1-1/8	100239-03	BK110H	100788-06
5	5	945	1185	1VP60x1-1/8	41C1301	BK90H x 1-7/16	100788-04
6	7.5	850	1045	1VP65x1-3/8	78M7101	BK110H	100788-06
7	7.5 & 10	945	1185	1VP60x1-3/8	78L5501	BK90H x 1-7/16	100788-04
8	7.5	1045	1285	1VP65x1-3/8	78M7101	BK90H x 1-7/16	100788-04
10	10	1045	1285	1VP65x1-3/8	78M7101	1B5V86	78M8301
11	10	1135	1365	1VP65x1-3/8	78M7101	1B5V80	100240-05

TABLE 2

Drive No.	H.P.	DRIVE COMPONENTS							
		RPM		BELTS (STD.)		BELTS (WITH TENSIONER)		SPLIT BUSHING	
		Min	Max	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
1	2 & 3 Std.	535	725	BX59	59A5001	BX60	100245-10	N/A	N/A
2	2 & 3 Std.	710	965	BX55	63K0501	BX56	100245-11	N/A	N/A
3	3 High & 5	685	865	BX61	93J9801	BX62	57A7701	N/A	N/A
4	3 High & 5	850	1045	BX65	100245-08	BX67	100245-09	H-1-7/16	49M6201
5	5	945	1185	BX61	93J9801	BX62	57A7701	H-1-7/16	49M6201
6	7.5	850	1045	BX66	97J5901	BX67	100245-09	H-1-7/16	49M6201
7	7.5 & 10	945	1185	BX62	57A7701	BX64	97J5801	H-1-7/16	49M6201
8	7.5	1045	1285	BX64	97J5801	BX65	100245-08	H-1-7/16	49M6201
10	10	1045	1285	5VX660	100245-20	5VX680	100245-35	B-1-7/16	100246-01
11	10	1135	1365	5VX660	100245-20	5VX670	100245-21	B-1-7/16	100246-01

D-GAS HEAT COMPONENTS

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

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

1-Control Box Components A3, A12, A55, T3, T13, K13 and K19

⚠WARNING

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

The main control box (see figure 3) houses the burner controls A3 and A12, A55 Unit Controller, combustion air blower transformers T3 and T13, combustion air blower relay K13 and second heat section relay K19. For a description of the components see section I-A. A more detailed description of burner controls A3 and A12 is given below.

Burner Ignition Control A3, A12

The ignition controls are located in the control box and are manufactured by UTEC or Kidde Fenwal. See table 3 for LED codes.

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

TABLE 3

UTEC	
LED Flashes	Indicates
Steady Off	No power or control hardware fault.
Steady On	Power applied. Control OK.
3 Flashes	Ignition lockout from too many trials.
4 Flashes	Ignition lockout from too many flame losses within single call for heat.
5 Flashes	Control hardware fault detected.
Kidde Fenwal	
LED Flashes	Indicates
Steady On	Internal control failure.
2 Flashes	Flame with no call for heat.
3 Flashes	Ignition lockout.

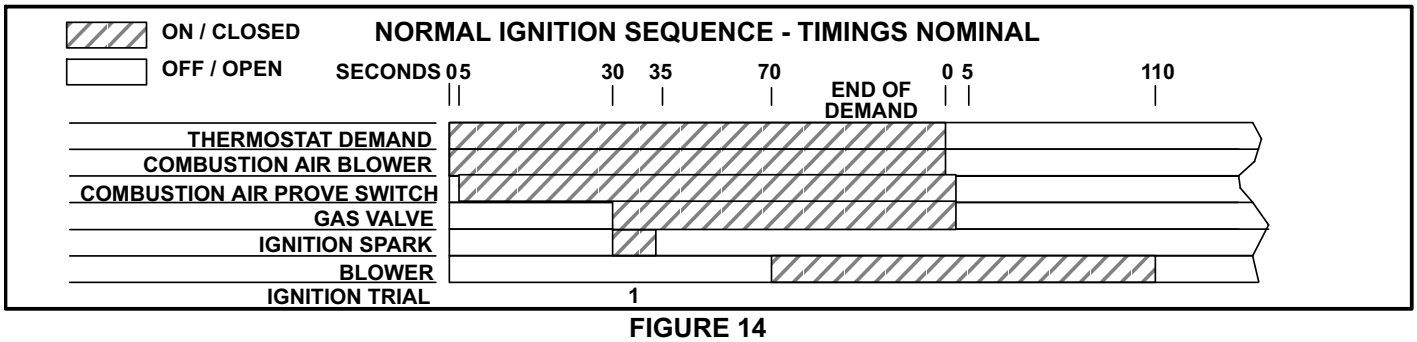


FIGURE 14

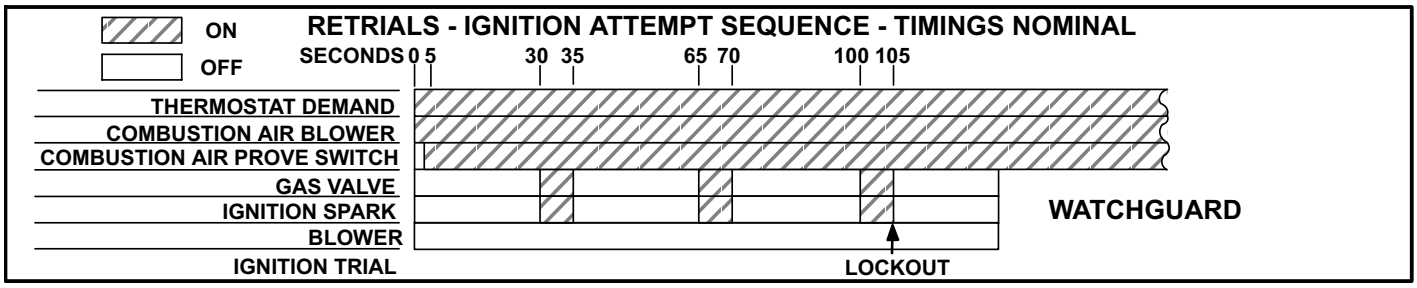


FIGURE 15

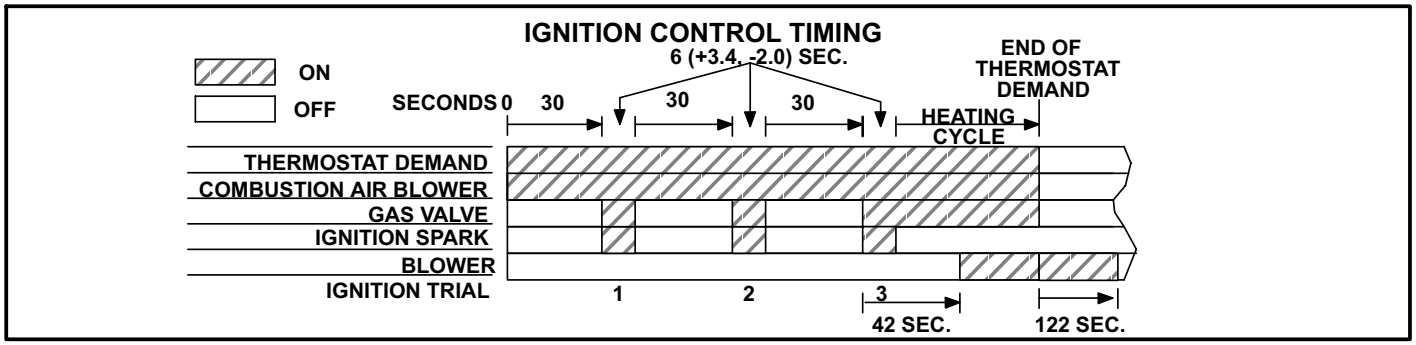


FIGURE 16

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

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

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

2-Heat Exchanger (Figure 17)

Units use aluminized steel inshot burners with matching tubular aluminized (stainless steel is an option) steel heat exchangers and two-stage redundant gas valves. LGH156/300 uses two eleven-tube/burners for high heat, two six-tube/burners for standard or low heat and two nine-tube/burners for medium heat. Burners in all units use a burner venturi to mix gas and air for proper combustion. Combustion takes place at each tube entrance. As hot combustion gases are drawn upward through each tube by the combustion air blower, exhaust gases are drawn out the top and fresh air/gas mixture is drawn in at the bottom. Heat is transferred to the air stream from all surfaces of the heat exchanger tubes. The supply air blowers, controlled by the Unit Controller A55, force air across all surfaces of the tubes to extract the heat of combustion. The shape of the tubes ensures maximum heat exchange.

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

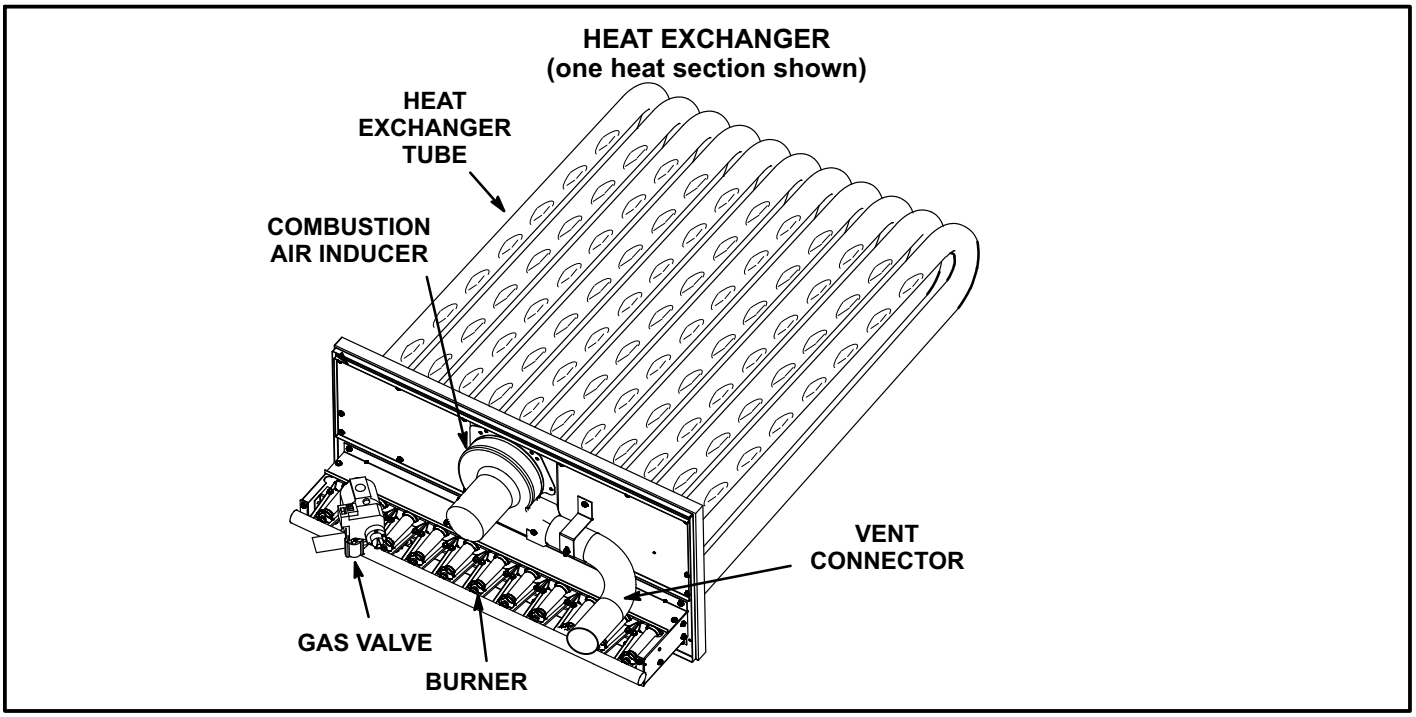


FIGURE 17

3-Burner Assembly (Figure 18)

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

Burners

All units use inshot burners (see figures 18 and 19). 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 section of this manual.

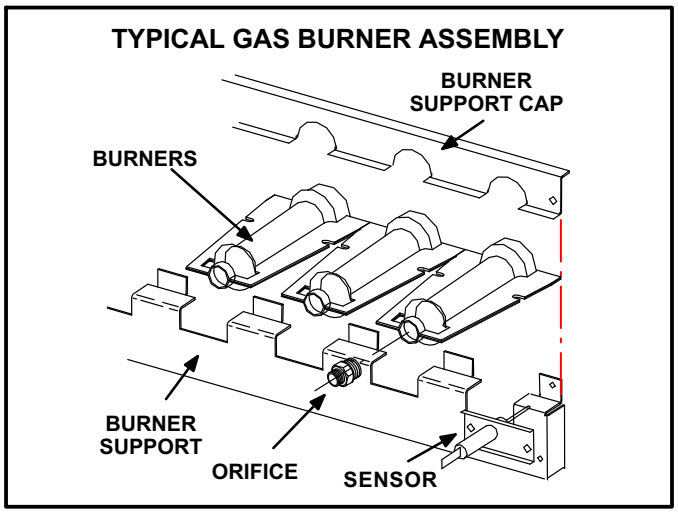


FIGURE 18

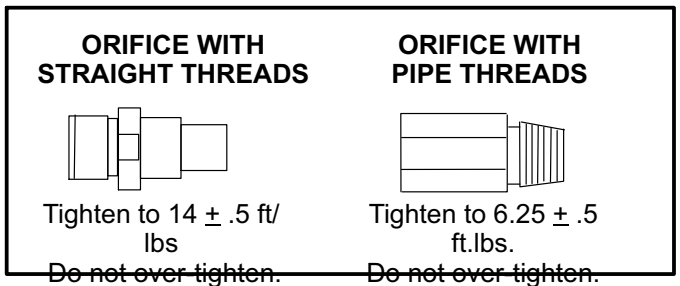


FIGURE 19

Orifice

Each burner uses an orifice (two types figure 19) which is precisely matched to the burner input. **Install only the orifices with the same threads.** The orifice is threaded into the burner manifold. The burner is supported by the orifice and will easily slide off for service.

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

Each orifice and burner are sized specifically to the unit. Refer to Lennox Repair Parts Listing for correct sizing information.

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.

4-Primary High Temperature Limits S10 & S99

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

In LGH156/300 units, S10 and S99 are located on the drip shield behind the blower housing. In this location S10 and S99 also serve as secondary limits. See figure 20.

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

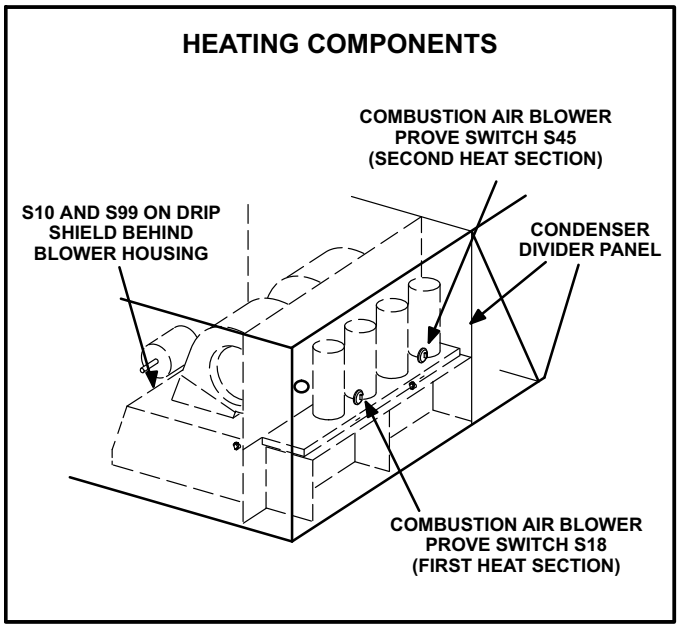


FIGURE 20

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 (see figure17). 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 250°F ± 12°F (121.1°C ± 6.7°C) on a temperature rise, while on high heat units both limits open at 270°F ± 12°F (132.2°C ± 6.7°C) on a temperature rise. All flame rollout limits are manual reset.

6-Combustion Air Prove Switches S18, S45

Prove switches S18 (first heat section) and S45 (second heat section) are located in the compressor compartment. Both are identical SPST N.O. switches and monitor combustion air inducer operation. Switch S18 and S45 are wired to the A55 Unit Controller.

The switch closes on a *negative* pressure fall. This negative pressure fall and switch actuation allows the ignition sequence to continue (proves, by closing, that the combustion air inducer is operating before allowing the gas valve to open.) The combustion air prove switch is factory set and not adjustable. The switch will automatically open on a pressure rise (less negative pressure). Table 4 shows prove switch settings.

TABLE 4
S18 & S45 Prove Switch Settings

Close“ w.c. (Pa)	Open “ w.c. (Pa)
0.25 ± 5 (62.3±12.4)	0.10±5 (24.8±12.4)

7-Combustion Air Inducers B6 & B15

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

Both combustion air blowers use a 208/230 or 460V single-phase PSC motor and a 4.81in. x 1.25in. (122mm x 32mm) blower wheel. All motors operate at 3200 or 3450 RPM and are equipped with auto-reset overload protection. Blowers are supplied by various manufacturers. Ratings may vary by manufacturer. Specific blower electrical ratings can be found on the unit rating plate.

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

8-Combustion Air Motor Capacitors C3 & C11

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

9-Gas Valves GV1 & GV3

Gas valves GV1 and GV3 are identical. The gas valves are two-stage redundant valves. Units are equipped with valves manufactured by Honeywell. On both valves first stage (low fire) is quick opening (on and off in less than 3 seconds). On the Honeywell second stage is quick opening. On a call for first stage heat (low fire), the valve is energized by the ignition control simultaneously with the spark electrode. On a call for second stage heat (high fire), the second stage operator is energized directly from A55 (GV1, GV3). The Honeywell valve is adjustable for both low fire and high fire. A manual shut-off knob is provided on the valve for shut-off. Manual shut-off knob immediately closes both stages without delay. Figure 21 shows gas valve components. Table 5 shows factory gas valve regulation for LGH series units. Optional factory installed gas valves for single stage heat only, are available for the LGH156, 180 and 210. Gas valves are wired without W2 eliminating two stage heat.

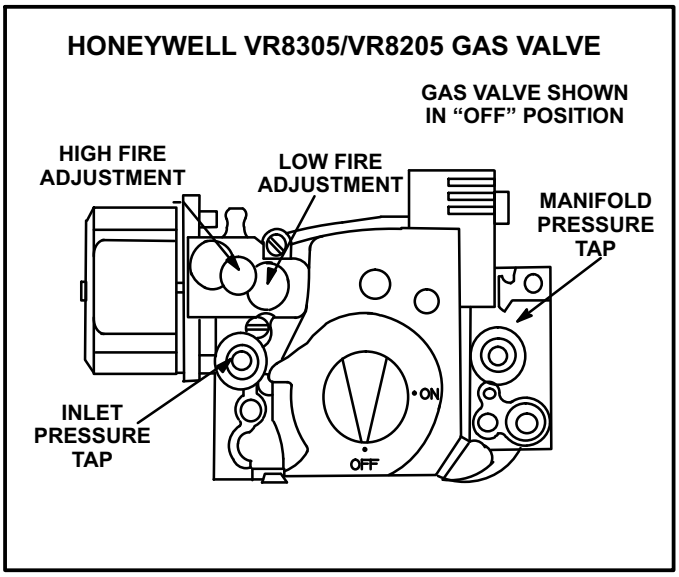


FIGURE 21

TABLE 5

GAS VALVE REGULATION FOR LGH UNITS				
Maximum Inlet Pressure	Operating Pressure (outlet) Factory Setting			
	Natural		L.P	
	Low	High	Low	High
13.0”W.C. 3232Pa	1.6±0.2”W.C. 398±50Pa	3.7±0.3”W.C. 920±75Pa	5.5±0.3”W.C. 1368±75Pa	10.5±0.5”W.C 2611±7124Pa

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 22) 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.

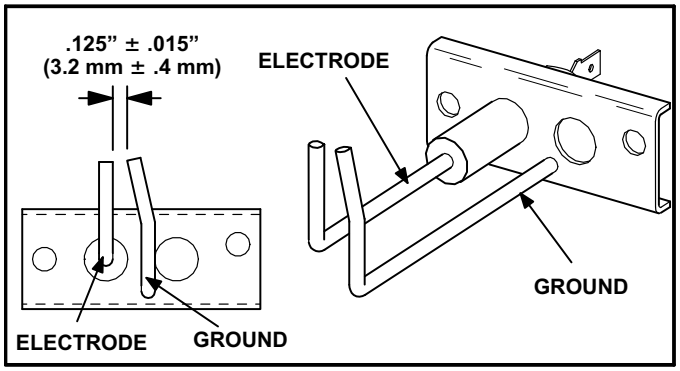


FIGURE 22

11-Flame Sensors

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

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

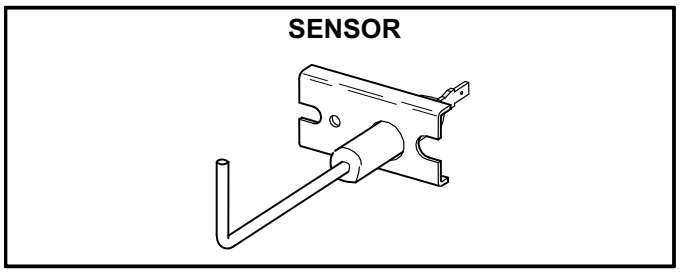


FIGURE 23

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 LARMFH18/24).

III-CHARGING

⚠ WARNING

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

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

⚠ IMPORTANT

Units equipped with Humiditrol system MUST be charged in standard cooling mode.

A-Refrigerant Charge and Check

WARNING-Do not exceed nameplate charge under any condition.

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

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

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

1- Attach gauge manifolds and operate unit in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure all outdoor air dampers are closed.

2- Check each system separately with all stages operating.

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

4- Apply the outdoor temperature to tables 6 through 15 and to determine normal operating pressures. Pressures are listed for sea level applications at 80°F dry bulb and 67°F wet bulb return air.

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

6- If discharge pressure is high, remove refrigerant from the system. If discharge pressure is low, add refrigerant to the system.
   - Add or remove charge in increments.
   - Allow the system to stabilize each time refrigerant is added or removed.

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

TABLE 6
LGH156H Std.

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F*	265	140	258	135	275	139
75°F	300	141	294	137	314	141
85°F	342	143	334	140	355	145
95°F	389	147	381	142	403	147
105°F	440	148	432	144	454	150
115°F	495	153	485	147	506	153

TABLE 7
LGH156H Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F*	275	138	268	134	275	139
75°F	310	140	304	136	314	141
85°F	352	142	344	139	355	145
95°F	399	146	391	141	403	147
105°F	450	147	442	143	454	150
115°F	505	152	495	146	506	153

TABLE 8
LGH180H Std.

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F*	248	137	257	135	259	137
75°F	285	139	294	137	296	137
85°F	328	143	336	139	338	140
95°F	374	146	383	141	385	144
105°F	425	148	433	144	435	147
115°F	479	151	488	147	488	151

TABLE 9
LGH180H Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F*	258	136	267	133	259	137
75°F	295	138	304	135	296	137
85°F	338	142	346	137	338	140
95°F	384	145	393	139	385	144
105°F	435	147	443	142	435	147
115°F	488	150	498	145	488	151

TABLE 10
LGH210H Std.

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F*	246	138	252	142	264	138
75°F	284	142	294	145	306	140
85°F	326	145	335	147	348	142
95°F	373	148	380	149	393	144
105°F	422	150	430	151	441	145
115°F	472	153	482	154	492	148

TABLE 11
LGH210H Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F*	258	136	264	141	264	138
75°F	296	140	306	144	306	140
85°F	338	143	347	146	348	142
95°F	385	146	392	148	393	144
105°F	434	148	442	150	441	145
115°F	484	151	494	153	492	148

TABLE 12
LGH240H Std.

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3		Circuit 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F*	255	137	246	132	260	141	252	135
75°F	291	140	284	137	298	144	290	137
85°F	332	142	325	140	340	146	331	139
95°F	378	145	371	142	385	148	377	141
105°F	428	148	421	145	436	150	428	143
115°F	481	151	473	148	488	153	479	145

TABLE 13
LGH240H Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3		Circuit 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F*	270	13	261	130	260	141	252	135
75°F	306	137	299	135	298	144	290	137
85°F	347	140	340	137	340	146	331	139
95°F	393	143	386	140	385	148	377	141
105°F	443	145	436	143	436	150	428	143
115°F	496	148	488	145	488	153	479	145

TABLE 14
LGH300S Std.

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3		Circuit 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F*	289	133	278	130	284	135	274	131
75°F	326	136	316	135	323	138	312	135
85°F	369	139	359	138	367	141	357	138
95°F	418	141	409	141	420	143	407	141
105°F	469	144	462	144	474	146	461	143
115°F	526	147	519	145	531	149	516	146

TABLE 15
LGH300S Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3		Circuit 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F*	289	133	278	130	284	135	274	131
75°F	326	136	316	135	323	138	312	135
85°F	369	139	359	138	367	141	357	138
95°F	418	141	409	141	420	143	407	141
105°F	469	144	462	144	474	146	461	143
115°F	526	147	519	145	531	149	516	146

B-Charge Verification - Approach Method- AHRI Testing

1- Using the same thermometer, compare liquid temperature to outdoor ambient temperature.
Approach Temperature = Liquid temperature (at condenser outlet) minus ambient temperature.

2- Approach temperature should match values in table 16. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.

3- The approach method is not valid for grossly over or undercharged systems. Use tables 6 through 15 as a guide for typical operating pressures.

TABLE 16
APPROACH TEMPERATURES

LGH Unit	Liquid Temp. Minus Ambient Temp.			
	1st Stage	2nd Stage	3rd Stage	4th Stage
156 Std.	9°F ± 1 (5.0°C ±0.5)	9°F ± 1 (5.0°C ±0.5)	11°F ± 1 (6.1°C ±0.5)	NA
156 Reheat	6°F±1 (3.3°C±0.5)	6°F±1 (3.3°C±0.5)	11°F±1 (6.1°C±0.5)	NA
180 Std.	6°F ± 1 (3.3°C ±0.5)	6°F ± 1 (3.3°C ±0.5)	6°F ± 1 (3.3°C ±0.5)	NA
180 Reheat	4°F ± 1 (2.2°C ±0.5)	4°F ± 1 (2.2°C ±0.5)	6°F ± 1 (3.3°C ±0.5)	NA
210 Std.	6°F ± 1 (4.4°C ±0.5)	6°F ± 1 (4.4°C ±0.5)	7°F ± 1 (3.9°C ±0.5)	NA
210 Reheat	4°F ± 1 (2.2°C ±0.5)	4°F ± 1 (2.2°C ±0.5)	7°F ± 1 (3.9°C ±0.5)	NA
240 Std.	6°F ± 1 (4.4°C ±0.5)	6°F ± 1 (4.4°C ±0.5)	7°F ± 1 (3.9°C ±0.5)	7°F ± 1 (3.9°C ±0.5)
240 Reheat	4°F ± 1 (2.2°C ±0.5)	4°F ± 1 (2.2°C±0.5)	8°F ± 1 (4.4°C ±0.5)	8°F ± 1 (4.4°C ±0.5)
300 Std. & Reheat	6°F±1 (3.3°C±0.5)	6°F±1 (3.3°C±0.5)	6°F±1 (3.3°C±0.5)	6°F±1 (3.3°C±0.5)

IV-STARTUP - OPERATION

Refer to startup directions and to the unit wiring diagram when servicing. See unit nameplate for minimum circuit ampacity and maximum fuse size.

A-Preliminary and Seasonal Checks

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

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

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

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

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

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

B-Cooling Startup See figure 24 for circuits

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

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

2- First-stage thermostat demand will energize compressors 1 and 2 on all units. Second-stage thermostat demand will energize compressor 3 on all units and compressor 4 on LGH240/300.

3- Units contain three or four refrigerant circuits or stages.

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

NOTE - Refer to III-CHARGING for proper method to check refrigerant charge.

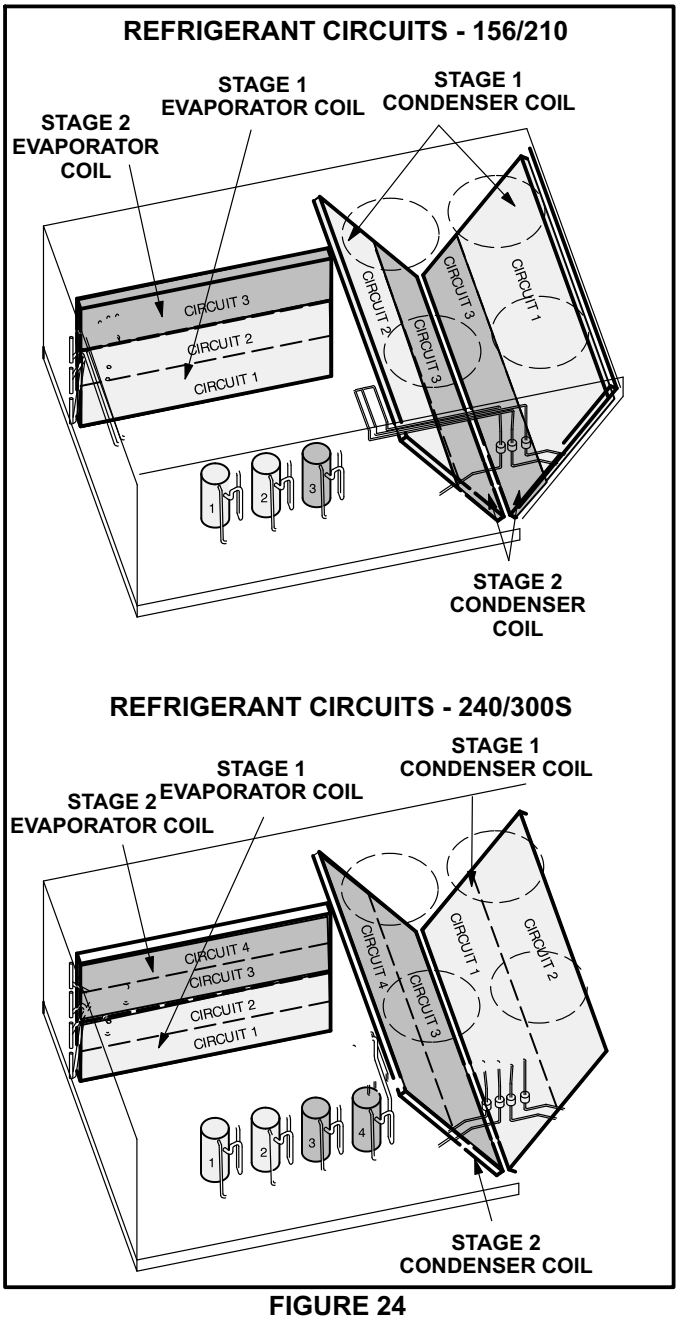


FIGURE 24

C-Heating Startup

FOR YOUR SAFETY READ BEFORE LIGHTING

⚠ WARNING

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

⚠ WARNING

Electric shock hazard. Can cause injury or death. 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.

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

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

⚠ IMPORTANT

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

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

Placing Furnace In Operation

Gas Valve Operation for Honeywell VR8205Q/VR8305Q (figure 25)

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

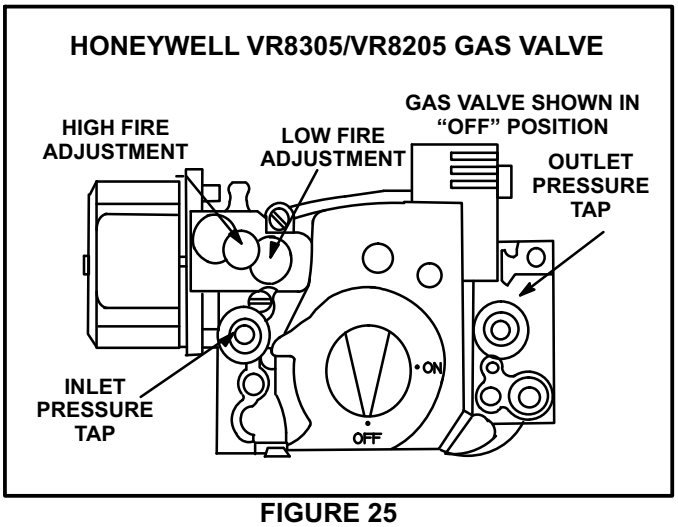


FIGURE 25

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 appliance.

10- Set thermostat to desired setting.

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

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

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

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

Turning Off Gas to Appliance

1- If using an electromechanical thermostat, set to the lowest setting.

2- Before performing any service, turn off all electrical power to the appliance.

3- Open or remove the heat section access panel.

4- Turn the knob on the gas valve clockwise ↷ to **"OFF"**. Do not force.

D-Safety or Emergency Shutdown

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

V- SYSTEMS SERVICE CHECKS

A-Heating System Service Checks

All LGH 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 LGH 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 26.

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 Lennox under part number 31B2001. See CORP 8411-L10, for further details.

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

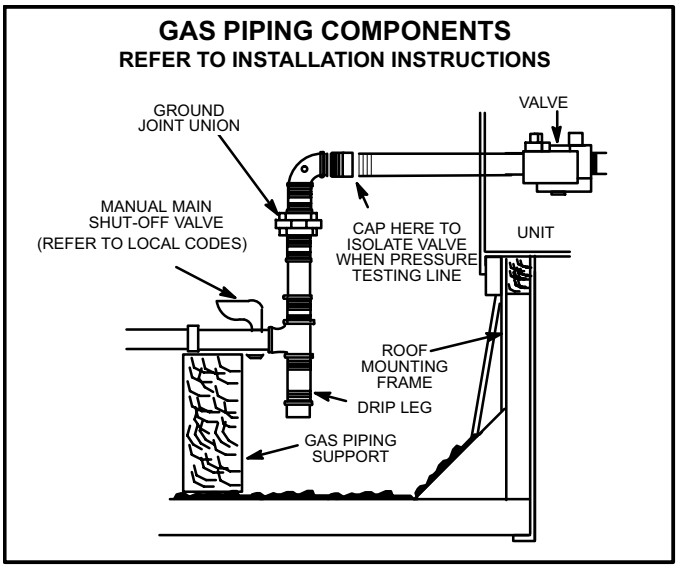


FIGURE 26

3-Testing Gas Supply Pressure

When testing gas supply pressure, connect test gauge to the inlet pressure tap located on unit gas valve GV1 and or GV3. Test supply gas pressure with unit firing at maximum rate (both stages energized). Make sure the reading falls within the range of the following values. Low pressure may result in erratic operation or "underfire." High pressure can result in permanent damage to the gas valve or "overfire." For natural gas units, operating pressure at the unit gas connection must be between 4.7"W.C. and 10.5"W.C. (1168 Pa and 2610 Pa). For L.P. gas units, operating pressure at the unit gas connection must be between 10.8"W.C. and 13.5"W.C. (2685.3 Pa and 3356.7 Pa).

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

4-Check and Adjust Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Move test gauge to the outlet pressure tap located on unit gas valve GV1 and or GV3. See figure 25 for location of pressure tap on the gas valve.

The manifold pressure is factory set and should not require adjustment. If manifold pressure is incorrect and no other source of improper manifold pressure can be found, the valve must be replaced. See figure 25 for location of gas valve (manifold pressure) adjustment screw.

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

⚠ CAUTION

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

Manifold Adjustment Procedure

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

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

3- After allowing the unit to stabilize for five minutes, record the manifold pressure and compare to the values given in table 5.

⚠ CAUTION

Disconnect 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 in the SPECIFICATIONS tables. Divide this input rating by the Btuh per cubic foot of available gas. Result is the number of cubic feet per hour required. Determine the flow of gas through gas meter for two minutes and multiply by 30 to get hourly flow of gas to the burners.

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

6-Inshot Burner

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

Figure 27 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" ± 0.015" (3.2 mm ± .4 mm). See figure 22.

TYPICAL GAS BURNER ASSEMBLY

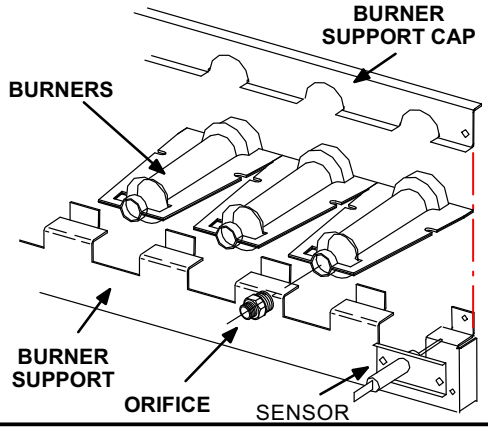


FIGURE 27

8-Heat Exchanger

To Access or Remove Heat Exchanger From Unit:

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

9-Flame Sensing

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

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

1- Disconnect power to unit.
2- Remove lead from sensing electrode and install a 0-50DC microamp meter in series between the sensing electrode and the sensing lead.
3- Reconnect power and adjust thermostat for heating demand.
4- When flame is established, compare reading to table 17. 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 17

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

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

10-Combustion Air Inducer

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

On a heating demand, the ignition control is energized by the A55 Unit Controller. The ignition control then allows 30 to 40 seconds for the combustion air inducer to vent exhaust gases from the burners. When the combustion air inducer is purging the exhaust gases, the combustion air prove switch is closing proving that the combustion air inducer is operating before allowing the ignition control to energize. When the combustion air prove switch is closed and the delay is over, the ignition control activates the first stage operator of the gas valve (low fire), the spark and the flame sensing electrode. Sparking stops immediately after flame is sensed.

11-High Altitude

Units may be installed at altitudes up to 2000 feet (610 m) above sea level without any modification. At altitudes above 2000 feet (610 m), units must be derated to match gas manifold pressures shown in table below.

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

Altitude - ft. (m)	Natural Gas		LPG/Propane	
	in. w.g.	kPa	in. w.g.	kPa
2001 - 3000 (610 - 915)	3.6	0.90	10.2	2.54
3001 - 4000 (915 - 1220)	3.5	0.87	9.9	2.46
4001 - 5000 (1220 - 1525)	3.4	0.85	9.6	2.39
5001 - 6000 (1525 - 1830)	3.3	0.82	9.4	2.34
6001 - 7000 (1830 - 2135)	3.2	0.80	9.1	2.26

B-Cooling System Service Checks

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

NOTE-When unit is properly charged discharge line pressures should approximate those in tables 6 through 15.

VI-MAINTENANCE

⚠WARNING

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

A-Filters

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

B-Lubrication

All motors and blower wheels used in LGH units 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.

D-Evaporator Coil

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

E-Condenser Coil

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

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

1- Check all wiring for loose connections.

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

3- Check amp-draw on both condenser fan motor and blower motor.
Fan Motor Rating Plate ____ Actual _____
Indoor Blower Motor Rating Plate____ Actual____

VII-ACCESSORIES

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

A-LARMF and LARMFH Mounting Frames

When installing either the LGH 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 LARMFH18/24 26-inch or 37-inch (660mm or 940mm) height roof mounting frame. This frame converts unit from down-flow to horizontal air flow. The 37 inch (940mm) horizontal frame meets National Roofing Code requirements. The roof mounting frames are recommended in all other applications but not required. If the LGH 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 28. 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 29. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

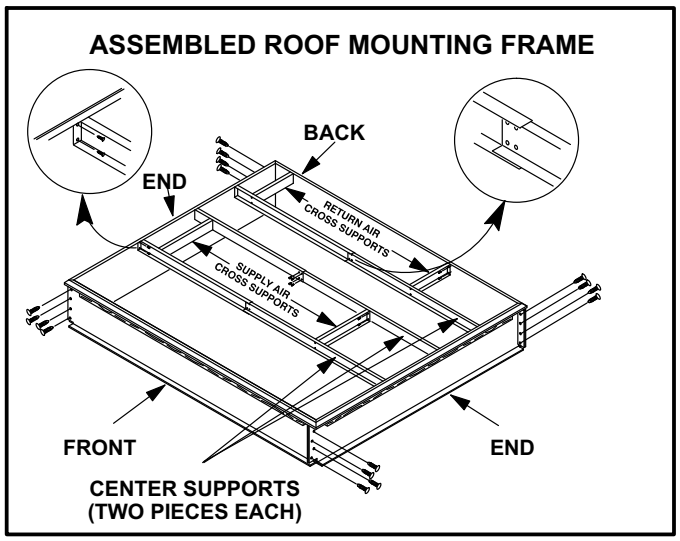


FIGURE 28

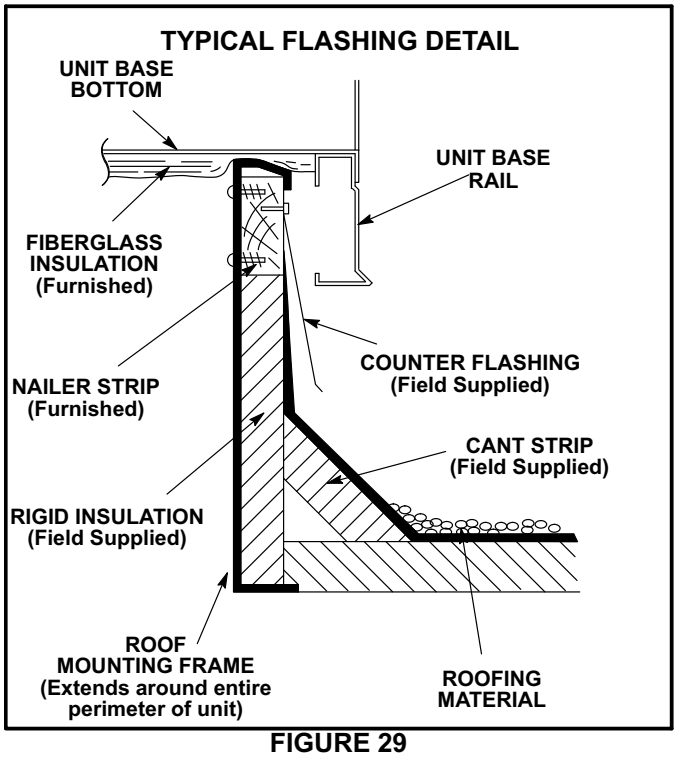


FIGURE 29

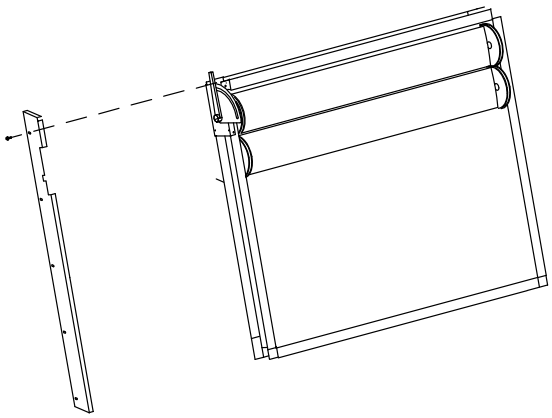
B-Transitions

Optional supply/return transitions LASRT18/24 are available for use with LGH 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.

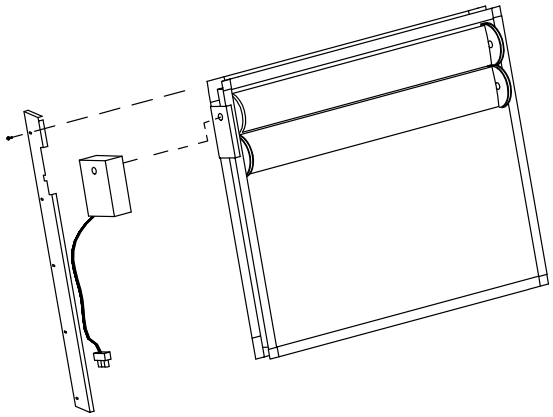
C-C1DAMP10 & E1DAMP20 Outdoor Air Dampers

C1DAMP10C and E1DAMP20C (figure 30) consist of a set of dampers which may be manually or motor operated to allow up to 25 percent outside air into the system at all times (see figure 30). Either air damper can be installed in LGH 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.

C1DAMP10 MANUAL OUTDOOR AIR DAMPER



E1DAMP20 MOTORIZED OUTDOOR AIR DAMPER



FILTER BRACKET SIDE VIEW

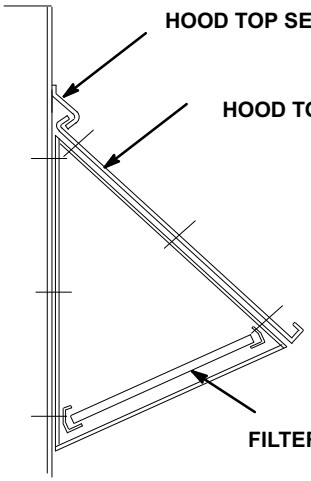


FIGURE 30

D-Supply and Return Diffusers

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

E-E1ECON15 Economizer

(Field or Factory Installed)

The optional E1ECON15 economizer can be used with downflow and horizontal air discharge applications. The economizer uses outdoor air for free cooling when temperature and/or humidity is suitable. An economizer hood is furnished with the economizer.

NOTE - Gravity exhaust dampers are required with power exhaust.

The economizer is controlled by the A55 Unit Controller.

The economizer will operate in one of four modes. Each mode requires a different A55 Unit Controller DIP switch setting. Each mode also requires different sensors.

1-"TMP" MODE (SENSIBLE TEMPERATURE)

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

2-"ODE" MODE (OUTDOOR ENTHALPY)

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

3-"DIF" MODE (DIFFERENTIAL ENTHALPY)

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

4-"GLO" MODE (GLOBAL)

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

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

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

F-Gravity Exhaust Dampers

C1DAMP50C dampers (figure 31) are used in downflow and LAGEDH are used in horizontal air discharge applications. LAGEDH gravity exhaust dampers are installed in the return air plenum . The dampers must be used any time an economizer or power exhaust fans are applied to LGH series units. An exhaust hood is furnished with the gravity exhaust damper.

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

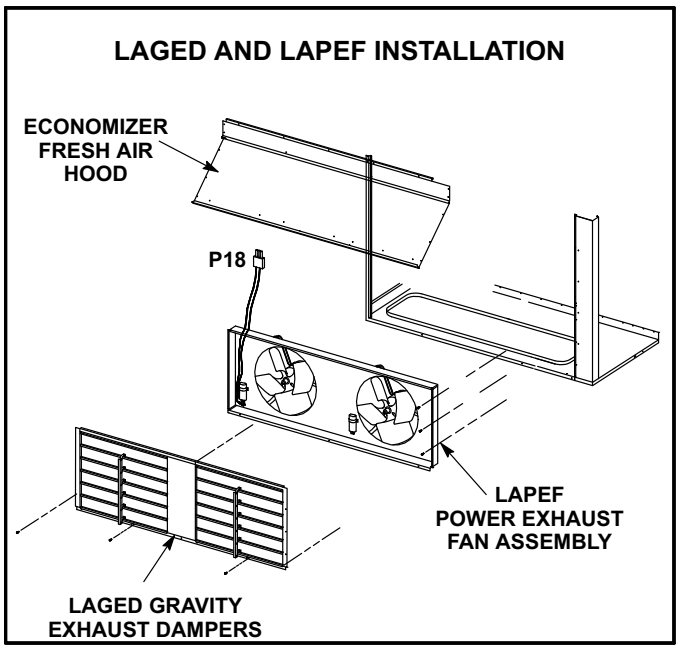


FIGURE 31

G-C1PWRE10 Power Exhaust Fans

C1PWRE10 power exhaust fans are used in downflow applications only. C1PWRE10 fans require optional downflow gravity exhaust dampers and E1ECON15 economizers. Power exhaust fans provide exhaust air pressure relief and also run when return air dampers are closed and supply air blowers are operating. Figure 31 shows the location of the power exhaust fans. See installation instructions for more detail.

H-Optional Cold Weather Kit (Canada only)

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

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

a - Thermostat switch (S59) is an auto-reset SPST N.C. switch which opens on a temperature drop. The switch is wired in series with 24v power and the combustion air blower switch. When the temperature drops below -30° F (-35° 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° 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 (-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 (-7° C) the switch closes and electric heater is energized through K125. The switch automatically opens when heating compartment temperature reaches 76° F (24° C).

I-Control Systems

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

J-Smoke Detectors A171, A172, A173

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

K-Blower Proving Switch S52

The blower proving switch monitors blower operation and locks out the unit in case of blower failure. The switch is N.O. and closes at .15" W.C. (3.3 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 1" W.C. (248.6 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.

M-LP / Propane Kit

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

N-Indoor Air Quality (CO_2) Sensor A63

The indoor air quality sensor monitors CO_2 levels and reports the levels to the A55 Unit Controller. The board adjusts the economizer dampers according to the CO_2 levels. The sensor is mounted next to the indoor thermostat or in the return air duct. Refer to the indoor air quality sensor installation instructions for proper adjustment. Wiring for the indoor air quality switch is shown on the temperature control section (C) wiring diagram in back of this manual.

O-Optional UVC Lights

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

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

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

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

P-Drain Pan Overflow Switch S149 (optional)

The overflow switch is used to interrupt cooling operation when excessive condensate collects in the drain pan.

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

VIII-FACTORY-INSTALLED HUMIDITROL

General

Humiditrol 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 32 for 156, 180 and 210 reheat refrigerant routing, figure 33 for 156, 180 and 210 normal cooling refrigerant routing, figure 34 for 240 and 300S reheat refrigerant routing and figure 35 for 240 and 300S normal cooling refrigerant routing.

L14 and L30 Reheat Coil Solenoid Valves

When Unit Controller (P298-5 or J299-8) indicates room conditions require dehumidification, L14 and L30 reheat valves are 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. The reheat setpoint can also be adjusted using an optional Network Control Panel (NCP).

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 table 18. For example: if indoor air relative humidity is 80% ± 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.

TABLE 18

Relative Humidity (%RH ± 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

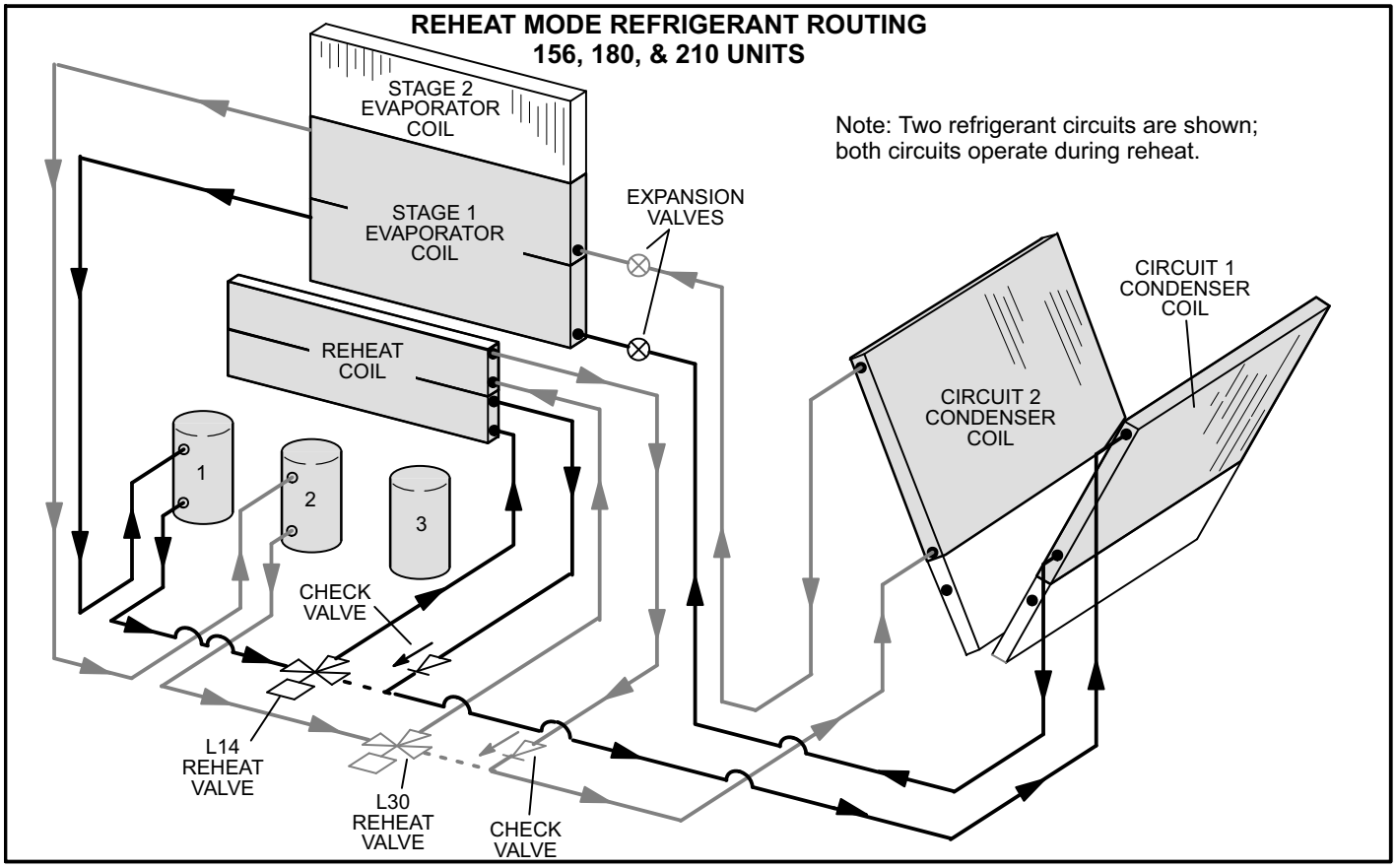


FIGURE 32

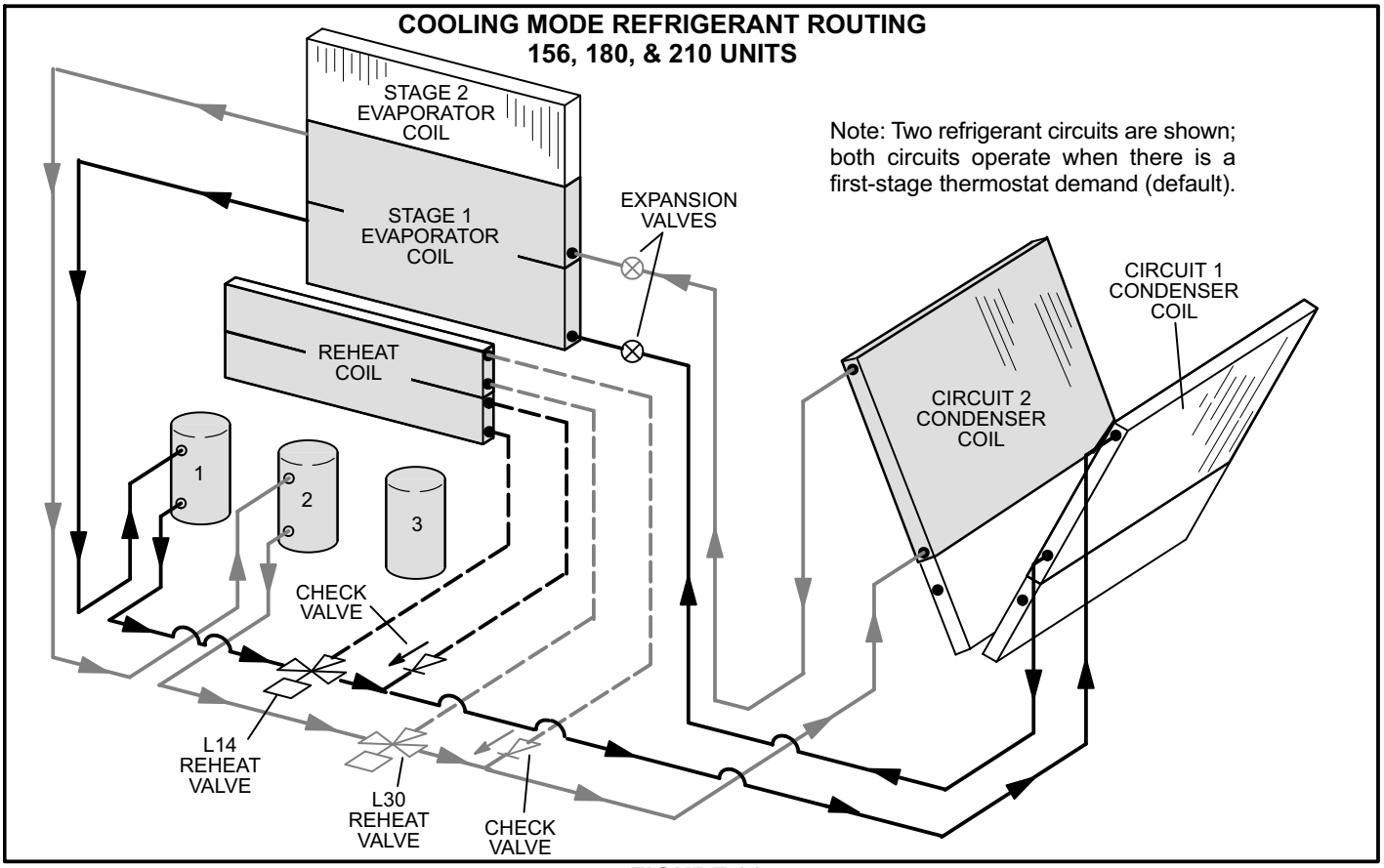


FIGURE 33

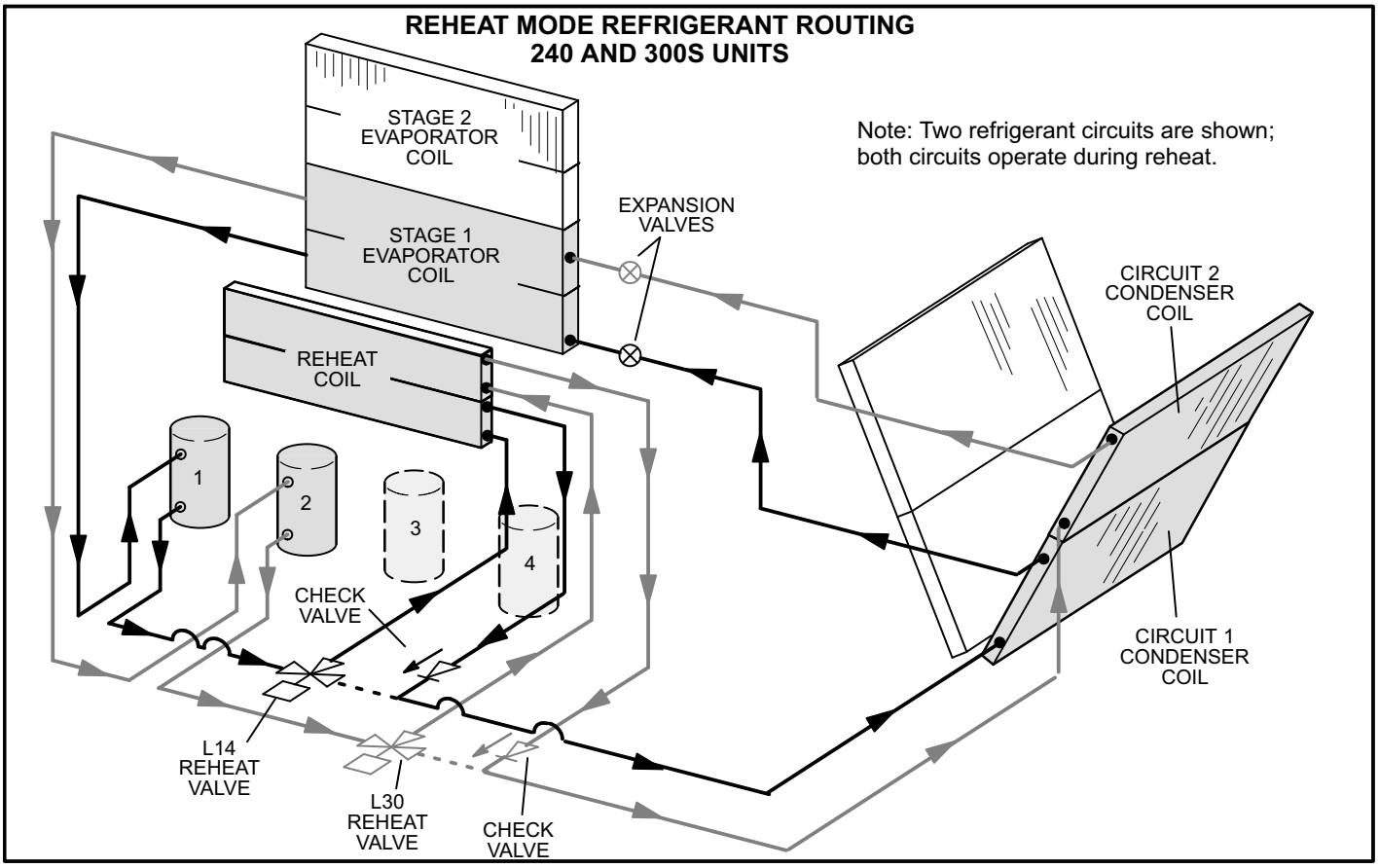


FIGURE 34

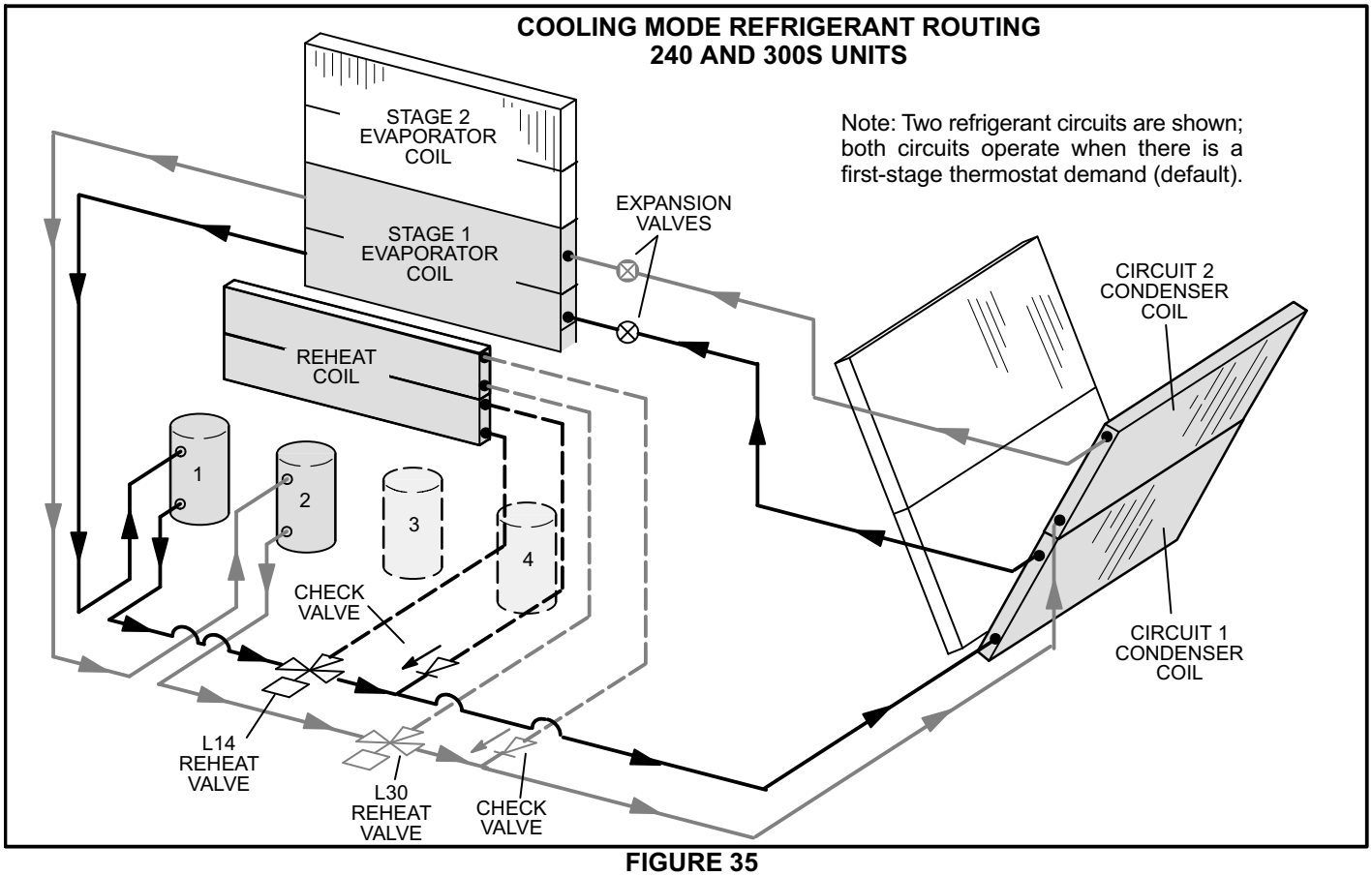


FIGURE 35

Check-Out

Test Humiditrol operation using the following procedure.

1. Make sure reheat is wired as shown in wiring section.
2. Make sure unit is in local thermostat mode.
3. Select Unit Controller *Service - Test.*

The blower, compressor 1 and compressor 2 (reheat) should be operating. Reheat mode will appear on the Unit Controller display.

4. Deselect Unit Controller *Service - Test.*

Compressor 1 and 2 (reheat) should de-energize,, blower should still be energized.

Default Reheat Operation

Reheat will operate as shown in table 19 once three conditions are met:

1. Blower must be operating.
2. System must be in occupied mode.
3. 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

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.

Four stages of cooling is available in zone sensor mode on units with four compressors (240, 300S).

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.

TABLE 19
REHEAT OPERATION

Two-Stage Thermostat - Default		
T'stat and Humidity Demands	Operation	
	156, 180, 210 (3-Compressors)	240, 300S (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat and Compressor 3 Cooling[1]	Compressor 1 & 2 Reheat and Compressor 3 & 4 Cooling[1]
Reheat &Y1 & Y2	Compressor 1, 2, & 3 Cooling[3]	Compressor 1, 2, 3 & 4 Cooling[3]
Three-Stage Thermostat (Transfer relay required)		
T'stat and Humidity Demands	Operation	
	156, 180, 210 (3-Compressors)	240, 300S (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat and Compressor 3 Cooling[1]	Compressor 1 & 2 Reheat and Compressor 3 Cooling[1]
Reheat Y1 & Y2	Compressor 1, & 2, Cooling[2]	Compressor 1 & 2 Reheat and Compressor 3, & 4 Cooling[3]
Reheat Y1 & Y2 & Y3	Compressor 1, 2, & 3 Cooling[3]	Compressor 1, 2, 3, & 4 Cooling[4]
Four-Stage Zone Sensor Mode		
Cooling* and Humidity** Demands	Operation	
	156, 180, 210 (3-Compressors)	240, 300S (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat and Compressor 3 Cooling[1]	Compressor 1 & 2 Reheat and Compressor 3 Cooling[1]
Reheat & Y1 & Y2	Compressor 1, & 2, Cooling[2]	Compressor 1 & 2 Reheat and Compressor 3 & 4 Cooling[2]
Reheat & Y1 & Y2 & Y3	Compressor 1, 2, & 3 Cooling[3]	Compressor 1, 2, & 3 Cooling[3]
Reheat & Y1 & Y2 & Y3 & Y4	Compressor 1, 2, & 3 Cooling[4]	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.

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

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

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

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

[5]If there is no reheat demand and outdoor air is suitable, free cooling, 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 operating.

2- System must be in occupied mode.

3- System must NOT be operating in heating mode.

IX--MSAV®

Start-Up

A-Design Specifications

Use table 20 to fill in field-provided, design specified blower CFM for appropriate unit.

If only high and low cooling design specifications are provided, set the medium cooling CFM at the high or low cooling design spec or any CFM between.

B-Set Maximum CFM

Use table 20 to determine highest blower CFM for appropriate unit. Adjust the blower pulley to deliver that amount of CFM with only the blower operating. See *Determining Unit CFM* in the Blower Operation and Adjustment section.

TABLE 20
Blower CFM Design Specifications

Unit	T'Stat or Zone Control Stages	Blower Speed	Design Specified CFM
156, 180, 210	2	Htg.	
		Clg. High	
		Clg. Low	
		Ventilation	
156, 180, 210	3 or 4	Htg.	
		Clg. High	
		Clg. Med.	
		Clg. Low	
		Ventilation	
240, 300	2	Htg.	
		Clg. High	
		Clg. Low	
		Ventilation	
240, 300	3	Htg.	
		Clg. High	
		Clg. Med.	
		Clg. Low	
		Ventilation	
240, 300	4	Htg.	
		Clg. High	
		Clg. Med. High	
		Clg. Med. Low	
		Clg. Low	
		Ventilation	

*Available blower speeds vary by unit and thermostat stages.

C-Enter Design Specifications Into Controller

Use the following menu to enter the blower design specified CFM into the Unit Controller. Make sure blower CFM is within limitations shown in table 21. Refer to the Unit Controller manual provided with unit.

Settings / Control / Guided Setup (enter information as prompted by the Unit Controller if not already done).

Advanced Guided Setup (enter information as prompted by the Unit Controller if not already done).

Setup Equipment / Change MSAV® *Settings? / Yes*

Blower / Heat CFM
Cooling High CFM[1]
Cooling Low CFM[1]
Vent CFM

[1]The Unit Controller will prompt when more cooling stages are available depending on the number of compressors and the control mode.

D-Set Damper Minimum Position

To maintain required minimum ventilation air volumes when the unit is in the occupied mode, two minimum damper positions must be set. The Unit Controller will open the dampers to “Min OCP Blwr Low” when blower CFM is BELOW a “midpoint” CFM. The Unit Controller will open the damper to “Min OCP Blwr High” when blower CFM is at or ABOVE the “midpoint” CFM.

The Unit Controller will calculate the “midpoint” CFM.

Set Minimum Position 1

Use the following menu in the Unit Controller to set “Min OCP Blwr Low” for the blower CFM below the “midpoint” CFM. When navigating into this menu, the Unit Controller will bring on the corresponding blower speed and allow damper position adjustment.

Settings / Control / MSAV / Damper / Low Speed

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

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

Set Minimum Position 2

Use the same menu in the Unit Controller to set “Min OCP Blwr High” for the blower CFM above the “midpoint” CFM. When navigating into this menu, the Unit Controller will bring on the corresponding blower speed and allow damper position adjustment.

Settings / Control / MSAV / Damper / High Speed

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

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

E-VFD Bypass Option

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

Settings / Control / MSAV / VFD Bypass

To configure the unit to by-pass the VFD automatically, use the following Unit Controller menu and set to “automatic”:

Settings / Install / New M2 / MSAV VFD Bypass

Caution - Units not equipped with a VFD will be set to Settings / Control / MSAV VFD Bypass / None. The blower motor could be damaged and/or result in product or property damage if the setting is changed to automatic or manual.

TABLE 21
MINIMUM AND MAXIMUM CFM

Gas Heat Minimum CFM		
Unit	Gas Heat Size	Airflow CFM
LGH156-300S	Low, Std. Med.	4500
LGH180-300S	High	5125
Electric Heat Minimum CFM		
Unit	Heat Size (kW)	Airflow CFM
LCH156	All	5200
LCH180-300S	All	6000
Cooling Minimum CFM - 220 CFM/ton		
Unit	Blower Speed	Airflow CFM
LGH/LCH156	Low, Med. Low, Med., Med. High	2860
LGH/LCH180	Low, Med. Low, Med., Med. High	3300
LGH/LCH210	Low, Med. Low, Med., Med. High	3850
LGH/LCH240	Low, Med. Low, Med., Med. High	4400
LGH/LCH300S	Low, Med. Low, Med., Med. High	5500
Cooling Minimum CFM - 280 CFM/ton		
Unit	Blower Speed	Airflow CFM
LGH/LCH156	High	3640
LGH/LCH180	High	4200
LGH/LCH210	High	4900
LGH/LCH240	High	5600
LGH/LCH300S	High	7000
Smoke and Ventilation Minimum CFM - 150 CFM/ton		
Unit	Not Applicable	Airflow CFM
LGH/LCH156	NA	1950
LGH/LCH180	NA	2250
LGH/LCH210	NA	2625
LGH/LCH240	NA	3000
LGH/LCH300S	NA	3750
Heating and Cooling Maximum CFM - 480 CFM/ton		
Unit	Blower Speed	Airflow CFM
LGH/LCH156	High	6240
LGH/LCH180	High	7200
LGH/LCH210	High	8400
LGH/LCH240	High	9600
LGH/LCH300S	High	12000

Operation

This is a summary of cooling operation. Refer to the sequence of operation provided in the Engineering Handbook or Service Manual for more detail.

Note - During a dehumidification demand the blower operates at the highest speed. Free cooling is locked-out during reheat operation. Refer to Humiditrol start-up and operation section for details.

A-Two-Stage T'Stat; 3- and 4-Compressor Units

1-Economizer With Outdoor Air Suitable

Y1 Demand -
- Compressors Off
- Blower Cooling Low
- Dampers modulate

Y2 Demand -
- Compressors Off
- Blower Cooling High
- Dampers Modulate

Note - If dampers are at maximum open for three minutes, compressor 1 and 2 are energized and blower stays on cooling high.

2-No Economizer or Outdoor Air Not Suitable

Y1 Demand -
- First-stage Compressors On
- Blower Cooling Low
- Dampers Minimum Position

Y2 Demand -
- All Compressors On
- Blower Cooling High
- Dampers Minimum Position

B-Three-Stage T'Stat, 3 and 4 Compressor Units AND Zone Sensor (4 Clg. Stages), 3-Compressor Units

1-Economizer With Outdoor Air Suitable

Three-Compressor Units:

Y1 Demand -
- Compressors Off
- Blower Cooling Low
- Dampers Modulate

Y2 Demand -
- Compressors Off
- Blower Cooling High
- Dampers Modulate

Note - If dampers are at maximum open for three minutes, compressor 1 is energized and blower stays on cooling high.

Y3 Demand -
- Compressors 1 and 2 On
- Blower Cooling High
- Dampers Maximum Open

Y4 Demand -
- All Compressors On
- Blower Cooling High
- Dampers Maximum Open

Four-Compressor Units:

Y1 Demand -
- Compressors Off
- Blower Cooling Low
- Dampers modulate

Y2 Demand -
- Compressors Off
- Blower Cooling High
- Dampers Modulate

Note - If dampers are at maximum open for three minutes, compressors 1 and 2 are energized and blower stays on cooling high.

Y3 Demand -
- Compressors 1, 2 and 3 On
- Blower Cooling High
- Dampers Maximum Open

2-No Economizer or Outdoor Air Not Suitable

Three-Compressor Units:

Y1 Demand -
- Compressor 1 On
- Blower Cooling Low

Y2 Demand -
- Compressors 1 and 2 On
- Blower Cooling Medium

Y3 or Y4 Demand -
- All Compressors On
- Blower Cooling High

Four-Compressor Units:

Y1 Demand -
Compressors 1 and 2 On
Blower Cooling Low

Y2 Demand -
Compressors 1, 2 and 3 On
Blower Cooling Medium

Y3 Demand -
All Compressors On
Blower Cooling High

C-Zone Sensor (4 Clg. Stages), 4-Compressor Units

1-Economizer With Outdoor Air Suitable

Y1 Demand -
Compressors Off
Blower Cooling Low
Dampers modulate

Y2 Demand -
Compressors Off
Blower Cooling High
Dampers Modulate

Note - If dampers are at maximum open for three minutes, compressor 1 is energized and blower stays on cooling high.

Y3 Demand -
Compressors 1 and 2 On
Blower Cooling High
Dampers Maximum Open

Y4 Demand -
All Compressors On
Blower Cooling High
Dampers Maximum Open

2-No Economizer or Outdoor Air Not Suitable

Y1 Demand -
Compressor 1 On
Blower Cooling Low

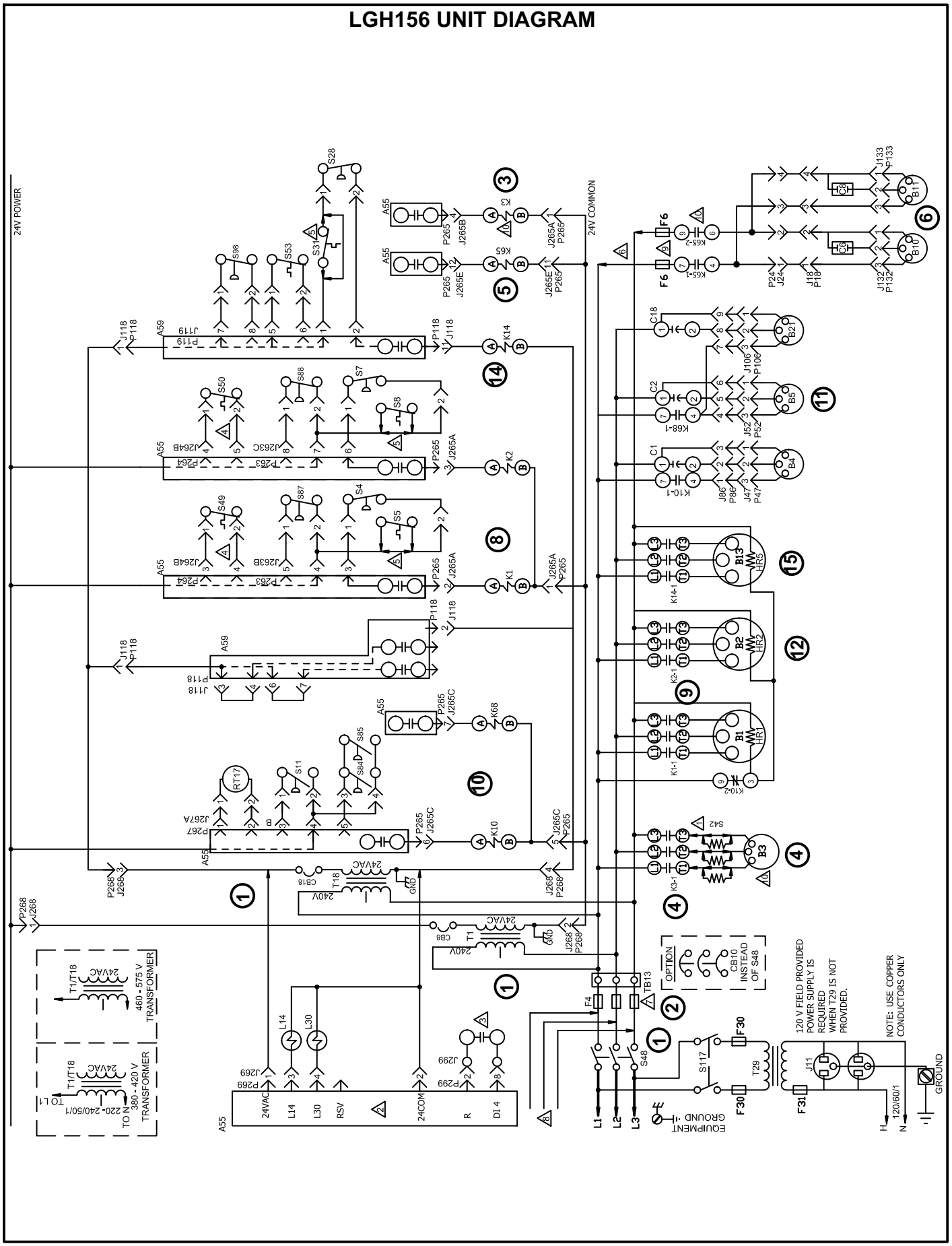
Y2 Demand -
Compressors 1 and 2 On
Blower Cooling Medium Low

Y3 Demand -
Compressors 1, 2 and 3 On
Blower Cooling Medium High

Y4 Demand -
All Compressors On
Blower Cooling High

X-Wiring Diagrams and Sequence of Operation

LGH156 UNIT DIAGRAM



LGH156 UNIT DIAGRAM

KEY	COMPONENT
A55	PANEL, MAIN BOARD LENNOX
A59	PANEL, C-2 BOARD LENNOX
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
B13	COMPRESSOR 3
B21	MOTOR, OUTDOOR FAN 3
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
CB8	CIRCUIT, BREAKER T1
CB10	CIRCUIT BREAKER, MAIN DISCONNECT UNIT
CB18	CIRCUIT, BREAKER T18
F4	FUSE, MAIN UNIT
F6	FUSE, EXHAUST FAN
F30	FUSE, TRANSFORMER T29 PRIMARY
F31	FUSE, TRANSFORMER T29 SECONDARY
HR1	HEATER COMPRESSOR 1
HR2	HEATER COMPRESSOR 2
HR5	HEATER COMPRESSOR 3
J11	JACK, GFI, RECEPTACLE
K1, -1	CONTACTOR, COMPRESSOR 1
K2, -1	CONTACTOR, COMPRESSOR 2
K3, -1	CONTACTOR, BLOWER
K10,-1,2	RELAY, OUTDOOR FAN 1
K14	CONTACTOR, COMPRESSOR 3
K65-1,2	RELAY, EXHAUST FAN
K68,-1	RELAY, OUTDOOR FAN 2
L14	VALVE, SOLENOID REHEAT VALVE 1
L30	VALVE, SOLENOID REHEAT VALVE 2
RT17	SENSOR, OUTDOOR AIR
S4	SWITCH, LIMIT HI PRESS COMPRESSOR 1
S5	SWITCH, LIMIT TEMP COMPRESSOR 1
S7	SWITCH, LIMIT HI PRESS COMPRESSOR 2
S8	SWITCH, LIMIT HI TEMP COMPRESSOR 2
S11	SWITCH, LOW PRESS, LOW AMBIENT COMP 1
S28	SWITCH, LIMIT HI PRESS COMPRESSOR 3
S31	SWITCH, LIMIT HI TEMP COMPRESSOR 3
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S48	SWITCH, DISCONNECT
S49	SWITCH, FREEZE STAT COMPRESS 1
S50	SWITCH, FREEZE STAT COMPRESS 2
S53	SWITCH, FREEZE STAT COMPRESS 3
S84	SWITCH, LOW PRESS, LOW AMBIENT COMP 2
S85	SWITCH, LOW PRESS, LOW AMBIENT COMP 3
S87	SWITCH, LOW PRESS, COMP 1
S88	SWITCH, LOW PRESS, COMP 2
S98	SWITCH, LOW PRESS, COMP 3
S117	SWITCH, GFI
T1	TRANSFORMER, CONTROL
T18	TRANSFORMER, CONTACTOR
T29	TRANSFORMER, GFI
TB13	TERMINAL STRIP, POWER DISTRIBUTION

J/P	JACK/PLUG DESCRIPTION
18	EXHAUST FAN COMP
24	EXHAUST FAN
47	OUTDOOR FAN 1
52	OUTDOOR FAN 2
86	OUTDOOR FAN INTERFACE
106	OUTDOOR FAN 3
118	COMPRESSOR 3 AND 4, CONTROL
119	COMPRESSOR 3 AND 4, INPUT
132	EXHAUST FAN MOTOR 1
133	EXHAUST FAN MOTOR 2
263	HIGH AND LOW PRESSURE SWITCHES
264	BLOWER DECK
265	CONTACTORS AND RELAYS
267	OUTDOOR FAN AREA
268	TRANFORMER POWER
269	REHEAT CONTROL
299	HUMIDITROL SAFETY INTERFACE

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

WARNING - ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH . UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES

DISCONNECT ALL POWER BEFORE SERVICING.

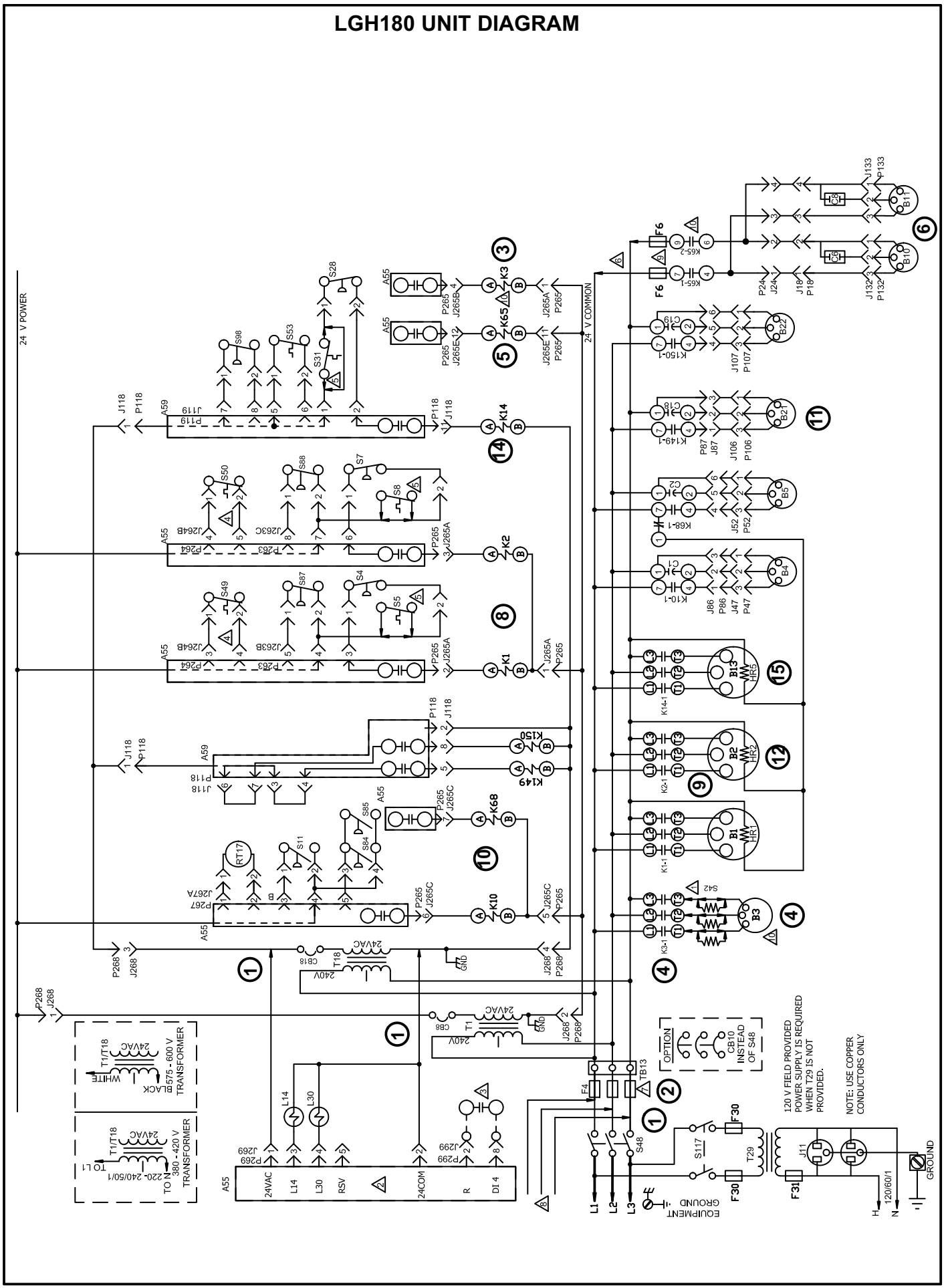
1. S42 USED ON "M" VOLTAGE UNITS AND UNITS WITH HIGH EFFICIENCY MOTORS
2. ONLY USED IN UNIT WITH HUMIDITROL OPTION
3. EXTERNAL HUMIDITROL CONTACTS
4. S49 AND S50 ARE PART OF 5VDC CIRCUIT
5. S5, S8, S31 USED ON UNITS WITH INTERLINK COMPRESSORS ONLY
6. B10 AND B11 NOT USED ON UNITS WITH ERV
7. USED ON LCH AND UNITS WITH ERV SINGLE POINT POWER. SEE ERV DIAGRAM
8. USED ON UNITS WITH ERV SINGLE POINT POWER
9. F6 ONLY USED ON Y-VOLT UNITS WITH FIELD INSTALLED POWER EXHAUST
10. REFER TO UNIT DIAGRAM SECTION B3 WHEN INVERTER IS USED

DENOTES OPTIONAL COMPONENTS

LINE VOLTAGE FIELD INSTALLED

	ENERGENCE C-BOX WIRING DIAGRAM	06/11
COOLING		
LCH/LGH 156 - G, J, M, Y		
SECTION B		REV 0
Supersedes	New Form No. 537191-04	

LGH180 UNIT DIAGRAM



LGH180 UNIT DIAGRAM

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

WARNING - ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH . UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES

DISCONNECT ALL POWER BEFORE SERVICING.

KEY	COMPONENT
A55	PANEL, MAIN
A59	PANEL, COMPRESSORS 3 AND 4
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
B13	COMPRESSOR 3
B21	MOTOR, OUTDOOR FAN 3
B22	MOTOR, OUTDOOR FAN 4
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
C19	CAPACITOR, OUTDOOR FAN 4
CB8	CIRCUIT, BREAKER T1
CB10	CIRCUIT BREAKER, MAIN DISCONNECT UNIT
CB18	CIRCUIT, BREAKER T18
F4	FUSE, MAIN UNIT
F6	FUSE, EXHAUST FAN
F30	FUSE, TRANSFORMER T29 PRIMARY
F31	FUSE, TRANSFORMER T29 SECONDARY
HR1	HEATER COMPRESSOR 1
HR2	HEATER COMPRESSOR 2
HR5	HEATER COMPRESSOR 3
J11	JACK, GFI, RECEPTACLE
K1,-1	CONTACTOR, COMPRESSOR 1
K2,-1	CONTACTOR, COMPRESSOR 2
K3, -1	CONTACTOR, BLOWER
K10,-1	RELAY, OUTDOOR FAN 1
K14,-1	CONTACTOR, COMPRESSOR 3
K65-1,2	RELAY, EXHAUST FAN
K68,-1	RELAY, OUTDOOR FAN 2
K149, -1	RELAY, OUTDOOR FAN 3
K150,-1	RELAY, OUTDOOR FAN 4
L14	VALVE, SOLENOID REHEAT VALVE 1
L30	VALVE, SOLENOID REHEAT VALVE 2
RT17	SENSOR, OUTDOOR AIR
S4	SWITCH, LIMIT HI PRESS COMPRESS 1
S5	SWITCH, LIMIT HI TEMP COMPRESSOR 1
S7	SWITCH, LIMIT HI PRESS COMPRESS 2
S8	SWITCH, LIMIT HI TEMP COMPRESSOR 2
S11	SWITCH, LOW PRESS, LOW AMBIENT COMP 1
S28	SWITCH, LIMIT HI PRESS COMPRESS 3
S31	SWITCH, LIMIT HI TEMP COMPRESSOR 3
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR

S48	SWITCH, DISCONNECT
S49	SWITCH, FREEZE STAT COMPRESS 1
S50	SWITCH, FREEZE STAT COMPRESS 2
S53	SWITCH, FREEZE STAT COMPRESS 3
S84	SWITCH, LOW PRESS, LOW AMBIENT COMP 2
S85	SWITCH, LOW PRESS, LOW AMBIENT COMP 3
S87	SWITCH, LOW PRESS, COMP 1
S88	SWITCH, LOW PRESS, COMP 2
S98	SWITCH, LOW PRESS, COMP 3
S117	SWITCH, GFI
T1	TRANSFORMER, CONTROL
T18	TRANSFORMER, CONTACTOR
T29	TRANSFORMER, GFI
TB13	TERMINAL STRIP, POWER DISTRIBUTION

J/P	JACK/PLUG DESCRIPTION
18	EXHAUST FAN COMP
24	EXHAUST FAN
47	OUTDOOR FAN 1
52	OUTDOOR FAN 2
86	OUTDOOR FAN INTERFACE 1
87	OUTDOOR FAN INTERFACE 2
106	OUTDOOR FAN 3
107	OUTDOOR FAN 4
118	COMPRESSOR 3 AND 4, CONTROL
119	COMPRESSOR 3 AND 4, INPUT
132	EXHAUST FAN MOTOR 1
133	EXHAUST FAN MOTOR 2
263	HIGH AND LOW PRESSURE SWITCHES
264	BLOWER DECK
265	CONTACTORS AND RELAYS
267	OUTDOOR FAN AREA
268	TRANSFORMER POWER
269	REHEAT CONTROL
299	HUMIDITROL INTERFACE/SAFETY

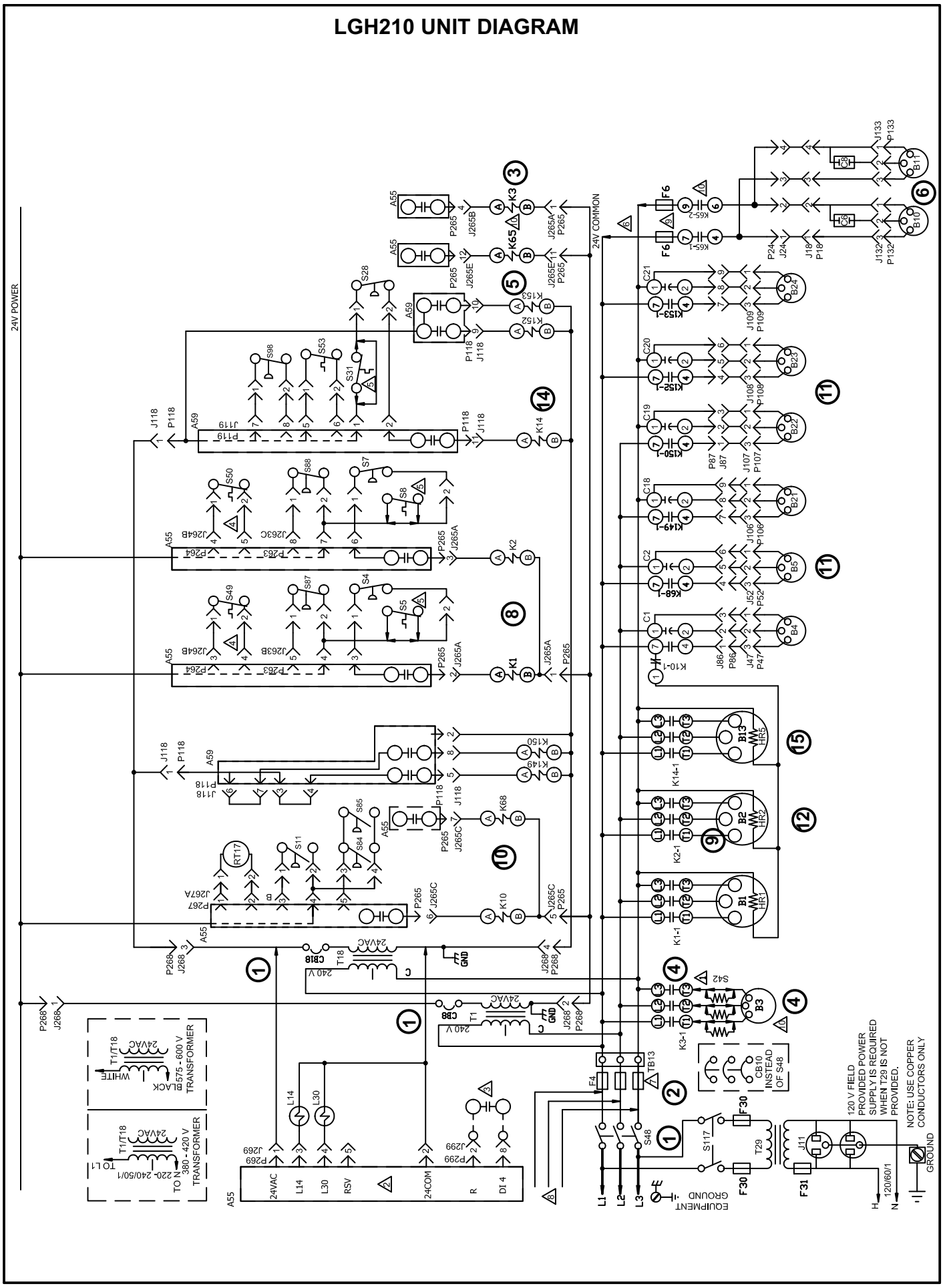
1. S42 USED ON "M" VOLTAGE UNITS
2. ONLY IN UNITS WITH HUMIDITROL OPTION
3. EXTERNAL HUMIDITROL CONTACTS
4. S49 AND S50 ARE PART OF 5VDC CIRCUIT
5. S5, S8, S31 USED ON UNITS WITH INTERLINK COMPRESSORS ONLY
6. B10 AND B11 NOT USED ON UNITS WITH ERV
7. USED ON LCH AND UNITS WITH ERV SINGLE POINT POWER. SEE ERV DIAGRAM
8. USED ON UNITS WITH ERV SINGLE POINT POWER
9. F6 ONLY USED ON Y-VOLT UNITS WITH FIELD INSTALLED POWER EXHAUST
10. REFER TO UNIT DIAGRAM SECTION B3 WHEN INVERTER IS USED

DENOTES OPTIONAL COMPONENTS

LINE VOLTAGE FIELD INSTALLED

ENERGENCE C-BOX WIRING DIAGRAM	06/11
COOLING	
LCH/LGH 180 - G, J, M, Y	
SECTION B	REV 0
Supersedes	New Form No. 537192-04

LGH210 UNIT DIAGRAM



LGH210 UNIT DIAGRAM

KEY	COMPONENT
A55	PANEL, MAIN
A59	PANEL, COMPRESSORS 3 AND 4
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
B13	COMPRESSOR 3
B21	MOTOR, OUTDOOR FAN 3
B22	MOTOR, OUTDOOR FAN 4
B23	MOTOR, OUTDOOR FAN 5
B24	MOTOR, OUTDOOR FAN 6
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
C19	CAPACITOR, OUTDOOR FAN 4
C20	CAPACITOR, OUTDOOR FAN 5
C21	CAPACITOR, OUTDOOR FAN 6
CB8	CIRCUIT, BREAKER T1
CB10	CIRCUIT BREAKER, MAIN DISCONNECT UNIT
CB18	CIRCUIT, BREAKER T18
F4	FUSE, MAIN UNIT
F6	FUSE, EXHAUST FAN
F30	FUSE, TRANSFORMER T29 PRIMARY
F31	FUSE, TRANSFORMER T29 SECONDARY
HR1	HEATER COMPRESSOR 1
HR2	HEATER COMPRESSOR 2
HR5	HEATER COMPRESSOR 3
J11	JACK, GFI, RECEPTACLE
K1,-1	CONTACTOR, COMPRESSOR 1
K2,-1	CONTACTOR, COMPRESSOR 2
K3, -1	CONTACTOR, BLOWER
K10,-1	RELAY, OUTDOOR FAN 1
K14,-1	CONTACTOR, COMPRESSOR 3
K65-1,2	RELAY, EXHAUST FAN
K68,-1	RELAY, OUTDOOR FAN 2
K149,-1	RELAY, OUTDOOR FAN 3
K150,-1	RELAY, OUTDOOR FAN 4
K152,-1	RELAY, OUTDOOR FAN 5
K153,-1	RELAY, OUTDOOR FAN 6
L14	VALVE, SOLENOID REHEAT COIL 1
L30	VALVE, SOLENOID REHEAT COIL 2
RT17	SENSOR, OUTDOOR AIR
S4	SWITCH, LIMIT HI PRESS COMPRESS 1
S5	SWITCH, LIMIT HI TEMP COMPRESSOR 1
S7	SWITCH, LIMIT HI PRESS COMPRESS 2
S8	SWITCH, LIMIT HI TEMP COMPRESSOR 2
S11	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 1
S28	SWITCH, LIMIT HI PRESS COMPRESS 3
S31	SWITCH, LIMIT HI TEMP COMPRESSOR 3
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR

S48	SWITCH, DISCONNECT
S49	SWITCH, FREEZE STAT COMPRESS 1
S50	SWITCH, FREEZE STAT COMPRESS 2
S53	SWITCH, FREEZE STAT COMPRESS 3
S84	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 2
S85	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 3
S87	SWITCH, LOW PRESS, COMP 1
S88	SWITCH, LOW PRESS, COMP 2
S98	SWITCH, LOW PRESS, COMP 3
S117	SWITCH, GFI
T1	TRANSFORMER, CONTROL
T18	TRANSFORMER, CONTACTOR
T29	TRANSFORMER, GFI
TB13	TERMINAL STRIP, POWER DISTRIBUTION

J/P	JACK/PLUG DESCRIPTION
18	EXHAUST FAN COMP
24	EXHAUST FAN
47	OUTDOOR FAN 1
52	OUTDOOR FAN 2
86	OUTDOOR FAN INTERFACE
87	OUTDOOR FAN INTERFACE 2
106	OUTDOOR FAN 3
107	OUTDOOR FAN 4
108	OUTDOOR FAN 5
109	OUTDOOR FAN 6
118	COMPRESSOR 3 AND 4, CONTROL
119	COMPRESSOR 3 AND 4, INPUT
132	EXHAUST FAN MOTOR 1
133	EXHAUST FAN MOTOR 2
263	HIGH AND LOW PRESSURE SWITCHES
264	BLOWER DECK
265	CONTACTORS AND RELAYS
267	OUTDOOR FAN AREA
268	TRANSFORMER POWER
269	HUMIDITROL POWER/CONTROL
299	HUMIDITROL INTERFACE/SAFETY

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

WARNING - ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH . UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES

DISCONNECT ALL POWER BEFORE SERVICING.

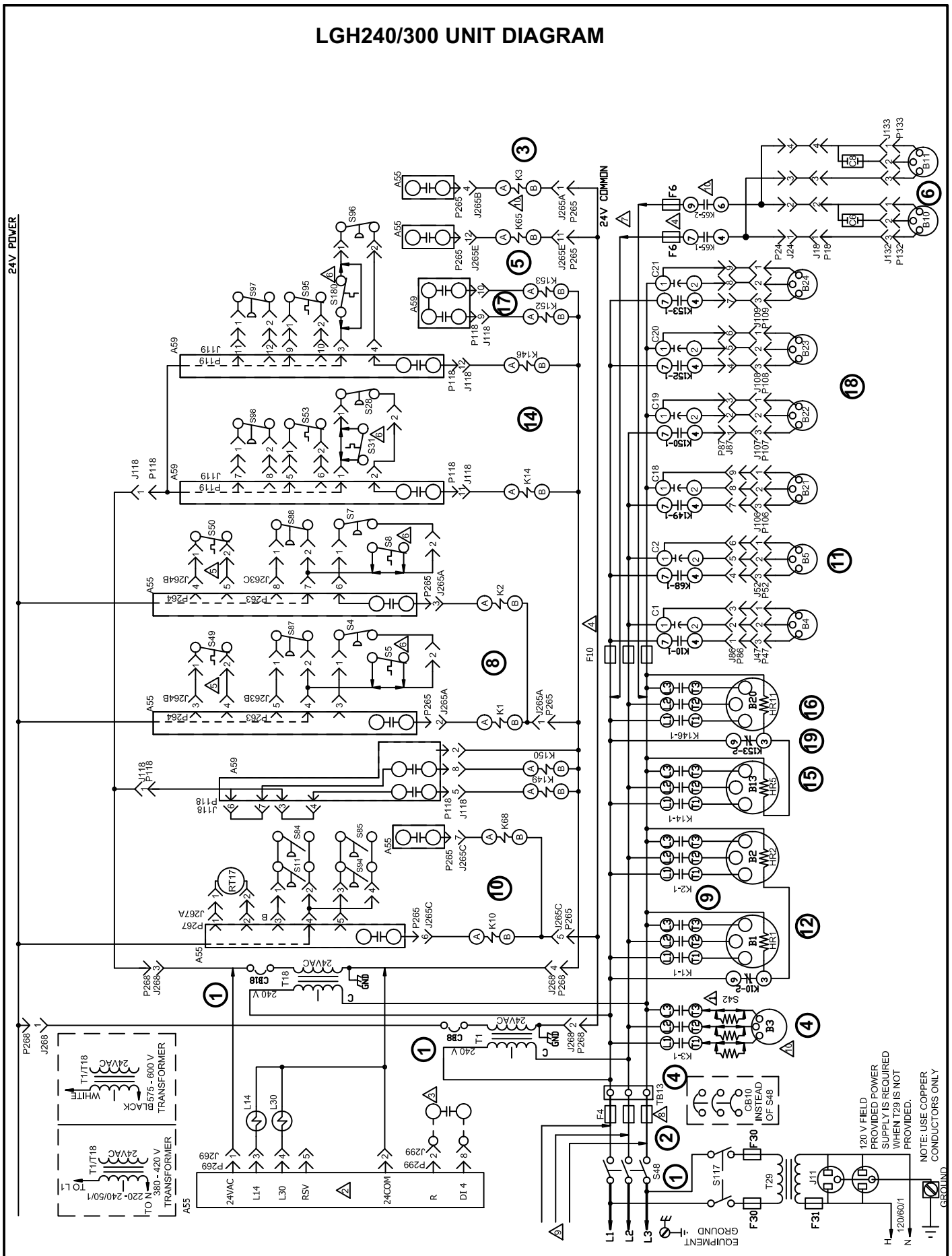
1. S42 USED ON "M" VOLTAGE UNITS
2. ONLY IN UNITS WITH HUMIDITROL OPTION
3. EXTERNAL HUMIDITROL CONTACTS
4. S49 AND S50 ARE PART OF 5VDC CIRCUIT
5. S5, S8, S31 USED ON UNITS WITH INTERLINK COMPRESSORS ONLY
6. B10, B11 NOT USED ON UNITS WITH ERV
7. USED ON LCH AND UNITS WITH ERV SINGLE POINT POWER. SEE ERV DIAGRAM
8. USED ON UNITS WITH ERV SINGLE POINT POWER
9. F6 ONLY USED ON Y-VOLT UNITS WITH FIELD INSTALLED POWER EXHAUST
10. REFER TO UNIT DIAGRAM SECTION B3 WHEN INVERTER IS USED

DENOTES OPTIONAL COMPONENTS

LINE VOLTAGE FIELD INSTALLED

ENERGENCE C-BOX WIRING DIAGRAM	06/11
COOLING	
LCH/LGH - 210 G,J,Y	
SECTION B	REV 0
Supersedes	New Form No. 537193-04

LGH240/300 UNIT DIAGRAM



LGH240/300 UNIT DIAGRAM

KEY	COMPONENT
A55	MAIN CONTROL BOARD
A59	PANEL, COMPRESSORS 3 AND 4
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
B13	COMPRESSOR 3
B20	COMPRESSOR 4
B21	MOTOR, OUTDOOR FAN 3
B22	MOTOR, OUTDOOR FAN 4
B23	MOTOR, OUTDOOR FAN 5
B24	MOTOR, OUTDOOR FAN 6
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
C19	CAPACITOR, OUTDOOR FAN 4
C20	CAPACITOR, OUTDOOR FAN 5
C21	CAPACITOR, OUTDOOR FAN 6
CB8	CIRCUIT, BREAKER T1
CB10	CIRCUIT BREAKER, MAIN DISCONNECT UNIT
CB18	CIRCUIT, BREAKER T18
F4	FUSE, MAIN UNIT
F6	FUSE, EXHAUST FAN
F10	FUSE, OUTDOOR FAN MOTOR
F30	FUSE, TRANSFORMER T29 PRIMARY
F31	FUSE, TRANSFORMER T29 SECONDARY
HR1	HEATER COMPRESSOR 1
HR2	HEATER COMPRESSOR 2
HR5	HEATER COMPRESSOR 3
HR11	HEATER COMPRESSOR 4
J11	JACK, GFI, RECEPTACLE
K1, -1	CONTACTOR, COMPRESSOR 1
K2, -1	CONTACTOR, COMPRESSOR 2
K3, -1	CONTACTOR, BLOWER
K10,-1,2	RELAY, OUTDOOR FAN 1
K14, -1	CONTACTOR, COMPRESSOR 3
K65-1,2	RELAY, EXHAUST FAN
K68,-1	RELAY, OUTDOOR FAN 2
K146,-1	CONTACTOR, COMPRESSOR 4
K149,-1	RELAY, OUTDOOR FAN 3
K150,-1	RELAY, OUTDOOR FAN 4
K152,-1	RELAY, OUTDOOR FAN 5
K153,-1,2	RELAY, OUTDOOR FAN 6
L14	VALVE, SOLENOID REHEAT COIL 1
L30	VALVE, SOLENOID REHEAT COIL 2
RT17	SENSOR, OUTDOOR AIR
S4	SWITCH, LIMIT HI PRESS COMPRESS 1
S5	SWITCH, LIMIT HI TEMP COMPRESSOR 1
S7	SWITCH, LIMIT HI PRESS COMPRESS 2
S8	SWITCH, LIMIT HI TEMP COMPRESSOR 2
S11	SWITCH, LOW PRESS, LOW AMBIENT COMP 1
S28	SWITCH, LIMIT HI PRESS COMPRESS 3
S31	SWITCH, LIMIT HI TEMP COMPRESSOR 3
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S48	SWITCH, DISCONNECT

S49	SWITCH, FREEZE STAT COMPRESS 1
S50	SWITCH, FREEZE STAT COMPRESS 2
S53	SWITCH, FREEZE STAT COMPRESS 3
S84	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 2
S85	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 3
S87	SWITCH, LOW PRESS, COMP 1
S88	SWITCH, LOW PRESS, COMP 2
S94	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 4
S95	SWITCH, FREEZE STAT COMPRESS 4
S96	SWITCH, LIMIT HI PRESS COMPRESS 4
S97	SWITCH, LOW PRESS, COMP 4
S98	SWITCH, LOW PRESS, COMP 3
S117	SWITCH, GFI
S180	SWITCH, LIMIT HI TEMP COMPRESSOR 4
T1	TRANSFORMER, CONTROL
T18	TRANSFORMER, CONTACTOR
T29	TRANSFORMER, GFI
TB13	TERMINAL STRIP, POWER DISTRIBUTION

J/P	JACK/PLUG DESCRIPTION
18	POWER EXHAUST HARNESS
24	RELAY TO EXHAUST FANS
47	POWER TO OUTDOOR FAN 1
52	POWER TO OUTDOOR FAN 2
86	OUTDOOR FAN INTERFACE
87	OUTDOOR FAN INTERFACE 2
106	POWER TO OUTDOOR FAN 3
107	POWER TO OUTDOOR FAN 4
108	POWER TO OUTDOOR FAN 5
109	POWER TO OUTDOOR FAN 6
118	COMPRESSOR 3 AND 4, CONTROL
119	COMPRESSOR 3 AND 4, INPUT
132	POWER TO EXHAUST FAN MOTOR 1
133	POWER TO EXHAUST FAN MOTOR 2
263	HIGH AND LOW PRESSURE SWITCHES
264	BLOWER DECK
265	CONTACTORS AND RELAYS
267	OUTDOOR FAN AREA
268	24V POWER FROM TRANSFORMERS TO A55
269	HUMIDITROL
299	HUMIDITROL INTERFACE TO A55

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

WARNING - ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH . UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES

DISCONNECT ALL POWER BEFORE SERVICING.

DENOTES OPTIONAL COMPONENTS

LINE VOLTAGE FIELD INSTALLED

1. S42 USED ON "M" VOLTAGE UNITS AND UNITS WITH 10HP MOTORS
2. ONLY ON UNITS WITH HUMIDITROL OPTION
3. EXTERNAL HUMIDITROL CONTACTS
4. F6 AND F10 FUSES ARE USED ON "Y" VOLTAGE UNITS ONLY
5. S49 AND S50 ARE PART OF 5VDC CIRCUIT
6. S5, S8, S31, S180 USED ON UNITS WITH INTERLINK COMPRESSORS ONLY
7. B10, B11 NOT USED ON UNITS WITH ERV
8. USED ON LCH AND UNITS WITH ERV SINGLE POINT POWER. SEE ERV DIAGRAM
9. USED ON UNITS WITH ERV SINGLE POINT POWER
10. REFER TO UNIT DIAGRAM SECTION B3 WHEN INVERTER IS USED

	ENERGENCE C-BOX WIRING DIAGRAM	06/11
COOLING		
LCH/LGH - 240, 300 - G, J, M, Y		
SECTION B		REV 0
Supersedes	New Form No. 537194-04	

Sequence of Operation

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 A59 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.
4. N.O. K3-1 closes, energizing blower B3.

ECONOMIZER OPERATION:

5. The A55 Unit Controller receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% (travel) outside air damper open (adjustable).
6. N.O. K65-1 and K65-2 both close, energizing exhaust fan motors B10 and B11.

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

7. First stage cooling demand energizes Y1 and G in the thermostat. G energizes blower, if blower is not already running (see step 3).
8. 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.
9. N.O. contacts K1-1 and K2-1 close energizing compressor B1 and B2.
10. A55 Unit Controller and A59 Compressor 3 and 4 Controller energize fan contactor K10 (all units), K68 (all units), K149 (180H-300S only), K150 (180/210H only), K152 (210H only), K153 (210H only) based on low ambient switch S11 and S84 inputs and predefined control logic.
11. N.O. contact K10-1 (all units), K68-1 (all units), K149-1 (180H-300S only), K150-1 (180H/210H only), K152-1 (210H only), K153-1 (210H only) close energizing fan B4 (all units), B5 (all units), B21 (all units), B22 (180H/210H only), B23 (210H only), B24 (210H only).
12. Relay contacts K10-1 (210H), K10-2 (156H, 240H, 300S) or K68-1 (180H) open de-energizing compressor 1, 2 and 3 crankcase heater HR1 (all units), HR2 (all units) and HR5 (156H-210H only).

2ND STAGE COOLING (B13 IN 156H-210H AND BOTH B13 AND B20 IN 240H AND 300S ARE ENERGIZED):

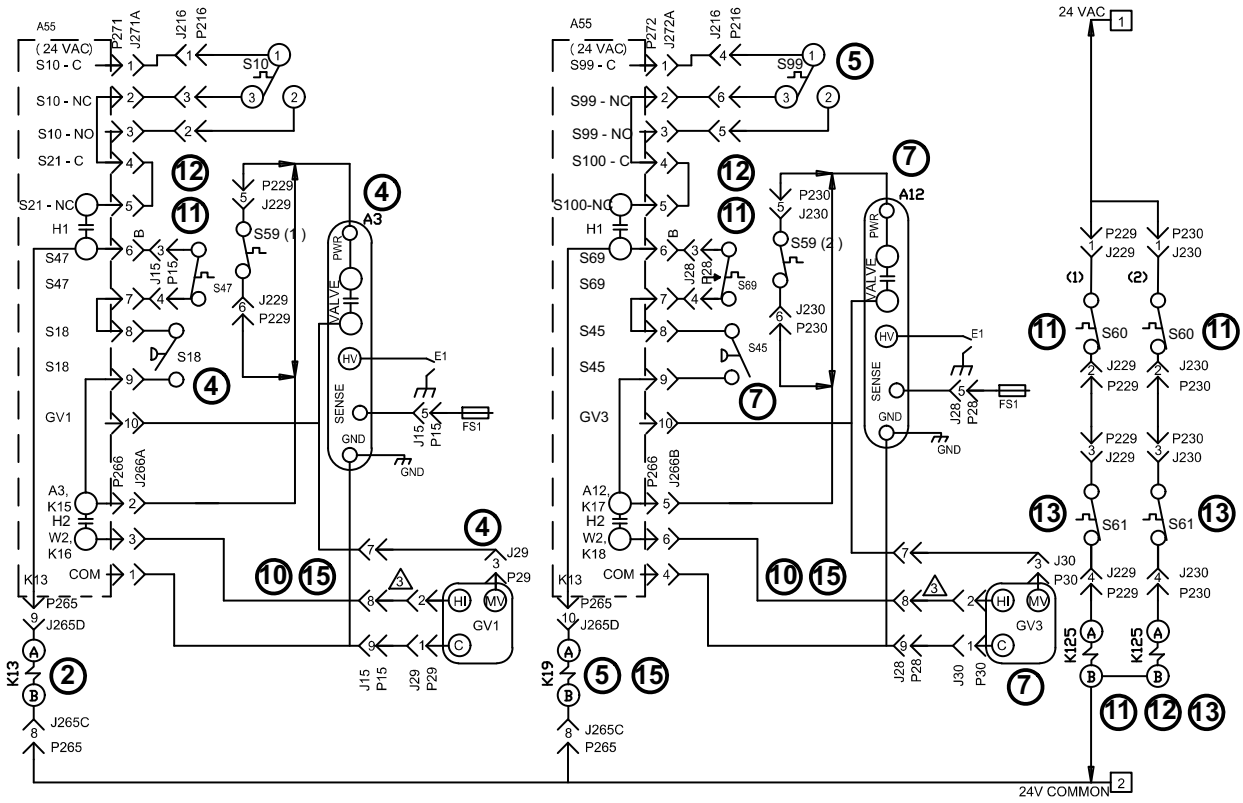
13. Second stage cooling demand energizes Y2.
14. 24VAC is routed to A59 Compressor 3 and 4 Controller. After A59 proves N.C. low pressure switches S98 and S97, N.C. freezestats S53 and S95 and N.C. high pressure switches S28 and S96, compressor contactors K14 and K146 are energized.

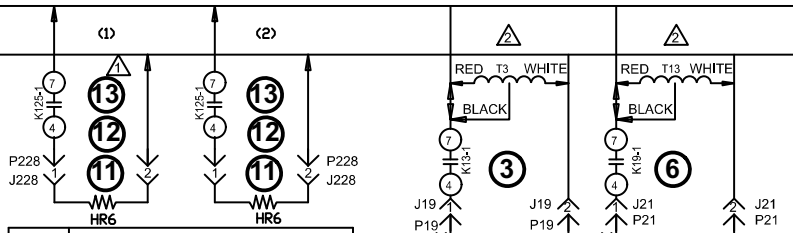
NOTE: LGH156-210 units will be equipped with S98, S53, S28 and K14 only.

15. N.O. contacts K14-1 close energizing compressor B13.
16. N.O. contacts K146-1 close energizing compressor B20 (LGH240/300 only).
17. A59 Compressor 3 and 4 Controller energizes fan contactor K150, K152, K153 (240H/300S only) based on low ambient switch S85 and S94 inputs and predefined Controller logic.
18. N.O. contacts K150-1, K152-1 and K153-1 (240H/300S only) close energizing condenser fan B22, B23 and B24 (240H/300S only).
19. N.C. contacts K153-2 (240H/300S only) open de-energizing compressor 3 and 4 crankcase heater HR5 and HR11 (240/300S only).

GAS HEAT DIAGRAM

NOTE - On single stage heat, terminal H1 on gas valve GV1 and GV3 is not connected to terminal H2 on A55 Unit Controller.





DESCRIPTION	
KEY	DESCRIPTION
A3	CONTROL, BURNER 1
A12	CONTROL, BURNER 2
A55	PANEL, MAIN CONTROL LENNOX
B6	MOTOR COMBUSTION AIR BLOWER 1
B15	MOTOR COMBUSTION AIR BLOWER 2
C3	CAPACITOR, COMB AIR BLOWER 1
C11	CAPACITOR, COMB AIR BLOWER 2
E1	SPARK
FS1	SENSOR, FLAME
GV1	VALVE, GAS 1
GV3	VALVE, GAS 2
HR6	HEATER, -50C LOW AMBIENT KIT
J15	JACK, BURNER 1
J19	JACK, COMBUSTION AIR BLOWER 1
J21	JACK, COMBUSTION AIR BLOWER 2
J28	JACK, BURNER 2
J29	JACK, GAS 1 HONEYWELL VALVE
J30	JACK, GAS 2 HONEYWELL VALVE
J216	JACK, PRIMARY LIMIT 1
J228	JACK, VESTIBULE HEATER
J229	JACK, VESTIBULE HEATER CONTROL 1
J230	JACK, VESTIBULE HEATER CONTROL 2
J265C	JACK, CONTACTOR RELAY
J266A	JACK, HEATING CONTROL STG 1
J271A,B	JACK, HEATING SENSORS STG 1
J272A,B	JACK, HEATING SENSORS STG 2
K13,-1	RELAY, COMBUSTION AIR BLOWER 1
K19,-1	RELAY, COMBUSTION AIR BLOWER 2
K125,-1	RELAY, HEAT SHUT OFF
P15	PLUG, BURNER 1
P19	PLUG, COMBUSTION AIR BLOWER 1
P21	PLUG, COMBUSTION AIR BLOWER 2
P28	PLUG, BURNER 2
P29	PLUG, GAS 1 HONEYWELL VALVE
P30	PLUG, GAS 2 HONEYWELL VALVE
P228	PLUG, VESTIBULE HEATER
P229	PLUG, VESTIBULE HEATER CONTROL 1
P230	PLUG, VESTIBULE HEATER CONTROL 2
P216	PLUG, PRIMARY LIMIT 1
P265	PLUG, CONTACTOR RELAY
P266	PLUG, HEATING CONTROL
P271	PLUG, HEATING SENSORS STG 1
P272	PLUG, HEATING SENSORS STG 2
S10	SWITCH, LIMIT PRIMARY GAS
S18	SWITCH, COMB AIR BLOWER 1 PROOF
S45	SWITCH, COMB AIR BLOWER 2 PROOF
S47	SWITCH, FLAME ROLLOUT BURNER
S59	TSTAT, OPEN -20F, CLOSE 10F
S60	TSTAT, OPEN 20F, CLOSE -10F
S61	TSTAT, OPEN 50F, CLOSE 20F
S69	SWITCH, FLAME ROLLOUT 2
S99	SWITCH, LIMIT PRIMARY BURNER 2
T3	TRANSFORMER, COMB AIR BLOWER 1

1. CSA (-50C) LOW AMBIENT KIT (OPTIONAL)
2. T3 AND T13 USED ON 575 V UNITS ONLY
3. P15-8 TO J29-2, P28-8 TO J30-2, ARE OMITTED FOR LOW FIRE UNITS

DENOTES OPTIONAL COMPONENTS

	WIRING DIAGRAM	02/10
HEATING		
GAS HEAT FOR ENERGENCE™ LGH 260, 360 AND 480		
SECTION A		REV. 2.0
Supersedes	New Form No. 537185-01	

SEQUENCE OF OPERATION
GAS HEAT FOR LGH156/300 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, A55 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 A55 routes 24VAC through N.C. burner 2 flame rollout switch S69 and the closed contacts of the combustion air proving switch (S45) to energize the ignition module A12. After a 30 second delay A12 energizes gas valve GV3 on low fire.

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-energized A3 and A12 ignition controls. At the same temperature, S60 closes and energizes K125. K125-1 contacts close energizing HR6 Cold Weather Kit electric heat.
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.

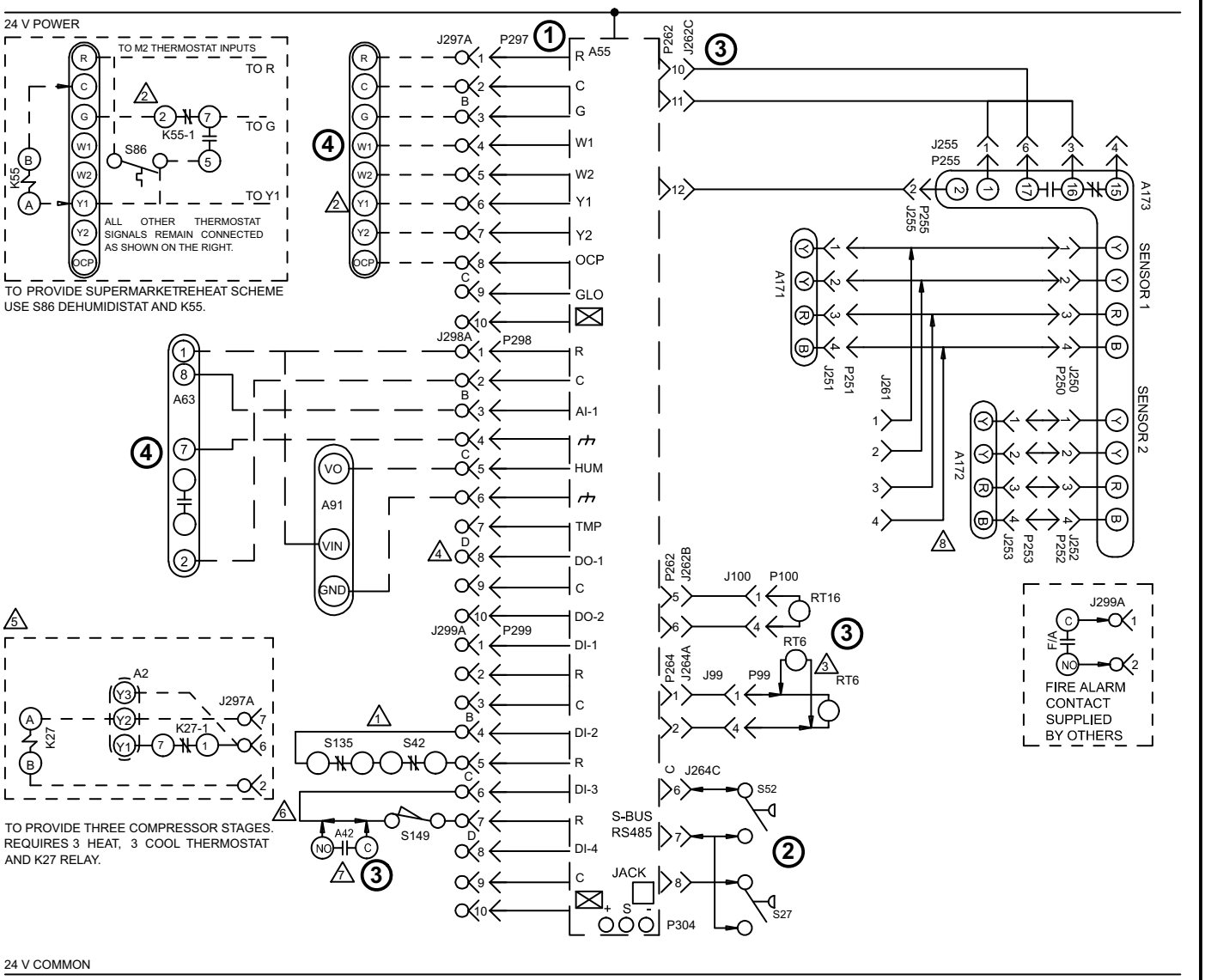
END OF SECOND STAGE HEAT:

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

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT



1. FOR MOTORS WITH S42 AND S135 EXTERNAL OVERLOAD LESS INVERTER, SEE INVERTER WITH BY PASS FOR S42 HOOK UP
2. USE S86 DEHUMIDISTAT AND K55 FOR OPTIONAL SUPERMARKET REHEAT SCHEME, M2 PARAMETERS NEED TO BE MODIFIED UNDER THE SETTINGS MENU OR VIA UC SOFTWARE FOR SIMULTANEOUS HEATING AND COOLING.
3. REMOTE LOCATION OF RT6
4. P298-8 (DO-1) IS SERVICE RELAY OUTPUT (24VAC) IF USED CONNECT TO AN INDICATOR LIGHT
5. THERMOSTAT HOOKUP FOR PROGRAMMABLE CONFIGURATION OF THE M2 BOARD (A55).
6. M2 SETTINGS MUST BE MODIFIED WHEN A42, S42, S52, S135 OR S149 ARE INSTALLED
7. A42 USED ON 036 THROUGH 72 UNITS ONLY
8. CONNECT A172 SENSOR TO J261 ON SUPPLY AIR SMOKE DETECTOR ONLY

DESIGNATES OPTIONAL WIRING
CLASS II FIELD WIRING

WIRING DIAGRAM	11/09
ACCESSORIES	
ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT FOR ENERGENCE™	
SECTION C	REV. 3.0
Supersedes	New Form No. 537108-01

POWER:

1. Terminal block P297 on the A55 Unit Controller energizes the thermostat components with 24VAC.

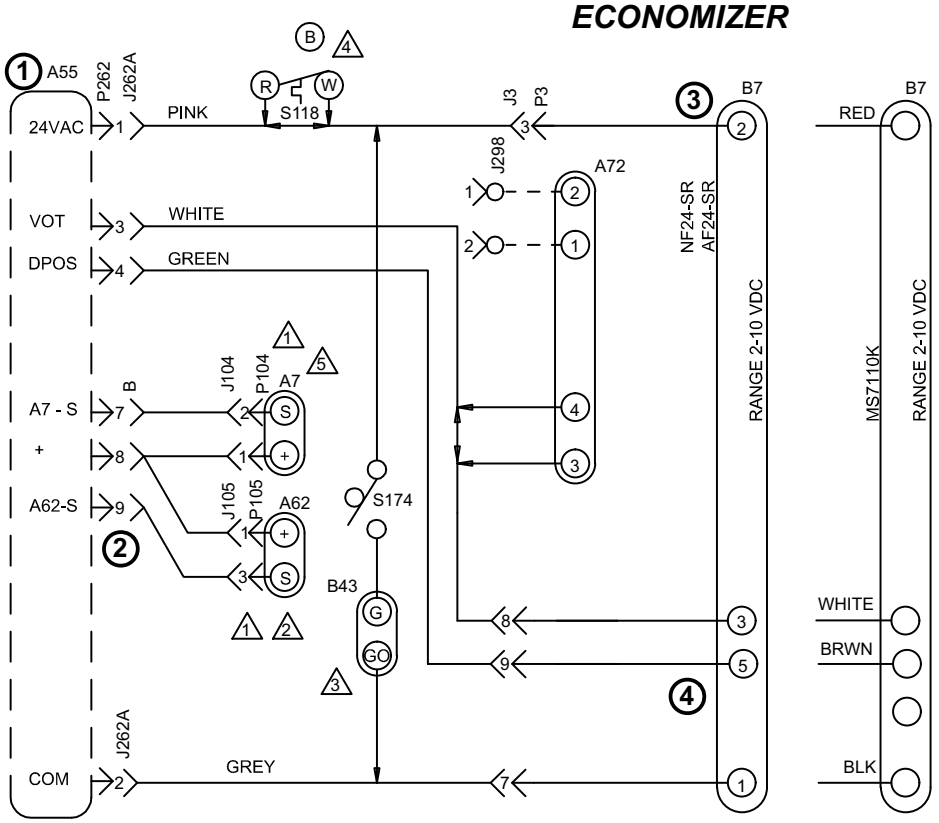
OPERATION:

2. The A55 Unit Controller proves the optional N.O. filter switch S27 (indicates dirty filter when closed) and optional N.O. air flow switch S52 (indicates no air [i.e. broken belt] system shuts down).
3. The A55 receives data from the supply and return smoke detectors A171 and A172, blower motor overload relay S42, discharge sensor RT6 and return air sensor RT16.
4. The A55 receives data from the electronic thermostat A2 (Y1, Y2, W1, W2, G, OCP) and the CO_2 sensor (if economizer is used) via terminal block P297. A55 energizes the appropriate components.

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT KEY DESCRIPTION

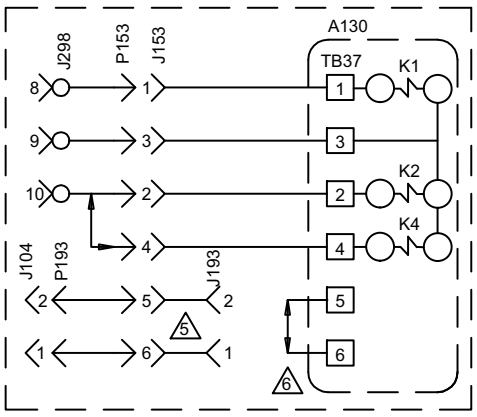
DESCRIPTION	
KEY	**COMPONENT**
A2	SENSOR, ELECTRONIC THERMOSTAT
A42	MONITOR, PHASE PROTECTOR
A55	PANEL, MAIN
A63	SENSOR, CO2 (IAQ) OPTIONAL
A91	SENSOR, HUMIDITY
A171	SENSOR ONE, SMOKE, RETURN AIR
A172	SENSOR TWO, SMOKE, SUPPLY AIR
A173	MODULE, CONTROL SMOKE DETECTION
J99	JACK, RT16 RETURN AIR SENSOR
J100	JACK, RT6 SUPPLY AIR SENSOR
J250	JACK, SMOKE DETECTOR ONE
J251	JACK, SMOKE DETECTOR ONE
J252	JACK, SMOKE DETECTOR TWO
J253	JACK, SMOKE DETECTOR TWO
J255	JACK, MODULE, CONTROL SMOKE DETECTION
J261	JACK, SUPPLY SMOKE DETECTOR JUMPER
J262	JACK, ECONOMIZER
J264	JACK, BLOWER DECK
J297	JACK, THERMOSTAT - DDC INTERFACE
J298	JACK, IAQ INTERFACE
J299	JACK, SAFETY INTERFACE
K27, -1	RELAY, TRANSFER
K55,-1	RELAY, BLOWER
P99	PLUG, RT16 RETURN AIR SENSOR
P100	PLUG, RT6 SUPPLY AIR SENSOR
P250	PLUG, SMOKE DETECTOR ONE
P251	PLUG, SMOKE DETECTOR ONE
P252	PLUG, SMOKE DETECTOR TWO
P253	PLUG, SMOKE DETECTOR TWO
P255	PLUG, MODULE, CONTROL SMOKE DETECTION
P262	PLUG, ECONOMIZER
P264	PLUG, BLOWER DECK
P297	PLUG, THERMOSTAT - DDC INTERFACE
P298	PLUG, IAQ INTERFACE
P299	PLUG, SAFETY INTERFACE
P304	PLUG, SYS BUS
RT6	SENSOR, SUPPLY AIR TEMP
RT16	SENSOR, RETURN AIR TEMP
S27	SWITCH, FILTER
S52	SWITCH, AIRFLOW
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR LO
S86	SWITCH, DEHUMIDISTAT
S135	SWITCH, OVERLOAD RELAY BLOWER MOTOR HI
S149	SWITCH, OVERFLOW

ECONOMIZER



1. DELETE A7 AND A62 (IF USED) FOR EITHER GLOBAL ENTHALPY OR SENSIBLE TEMPERATURE CONTROL
2. FOR UNIT DIFFERENTIAL ENTHALPY CONTROL, ADD A62 RETURN AIR ENTHALPY SENSOR
3. OPTIONAL EXHAUST DAMPER ACTUATOR TO HOLD EXHAUST DAMPER CLOSED WHEN OUTSIDE AIR DAMPER IS CLOSED
4. S118 USED ON 35 TO 50 TON ENERGENCE UNITS WITH ENERGY RECOVERY WHEEL (ERW)
5. REPOSITION A7 ENTHALPY SENSOR FROM ROOFTOP UNIT ECONOMIZER INTO INTAKE HOOD OF THE ERW ROOFTOP UNIT
6. REMOVE JUMPER WHEN INSTALLING OPTIONAL LOW AMBIENT SWITCH

DESCRIPTION	
KEY	COMPONENT
A7	SENSOR, SOLID STATE ENTHALPY
A130	CONTROL, ERS
A55	CONTROL, MAIN PANEL LENNOX
A62	SENSOR, ENTHALPY INDOOR
A72	CONTROL, REMOTE MIN POS (OPT)
B7	MOTOR, DAMPER ECONOMIZER
B43	MOTOR, EXHAUST DAMPER
J3	JACK, UNIT ECONOMIZER
J104	JACK, SENSOR OUTDOOR ENTHALPY
J105	JACK, SENSOR RETURN AIR ENTHALPY
J153	JACK, ENTHALPY / DAMPER MOTOR
J193	JACK, ENTHALPY SENSOR
J298A	JACK, IAQ INTERFACE
J262A	JACK, DAMPER MOTOR
J262B	JACK, ENTHALPY SENSORS
P3	PLUG, ECONOMIZER BYPASS
P153	PLUG, ENTHALPY / DAMPER MOTOR
P193	PLUG, ENTHALPY SENSOR
P262	PLUG, ECONOMIZER OUTPUT
S118	THERMOSTAT, DESICANT DEFROST
S174	SWITCH, EXHAUST DAMPER



ENERGY RECOVERY WHEEL HOOK UP

NOTE- THIS DIAGRAM USED ONLY WHEN ECONOMIZER OR MOTORIZED OUTDOOR AIR DAMPERS ARE INSTALLED.

DESIGNATES OPTIONAL WIRING
CLASS II FIELD WIRING

WIRING DIAGRAM	09/09
ACCESSORIES	
ENERGENCE™ SERIES ECONOMIZER AND MOTORIZED OAD PIVOTING WHEEL ENERGY RECOVERY SYSTEM OPTION	
SECTION D	
Supersedes	New Form No. 537189-01

ECONOMIZER SEQUENCE OF OPERATION

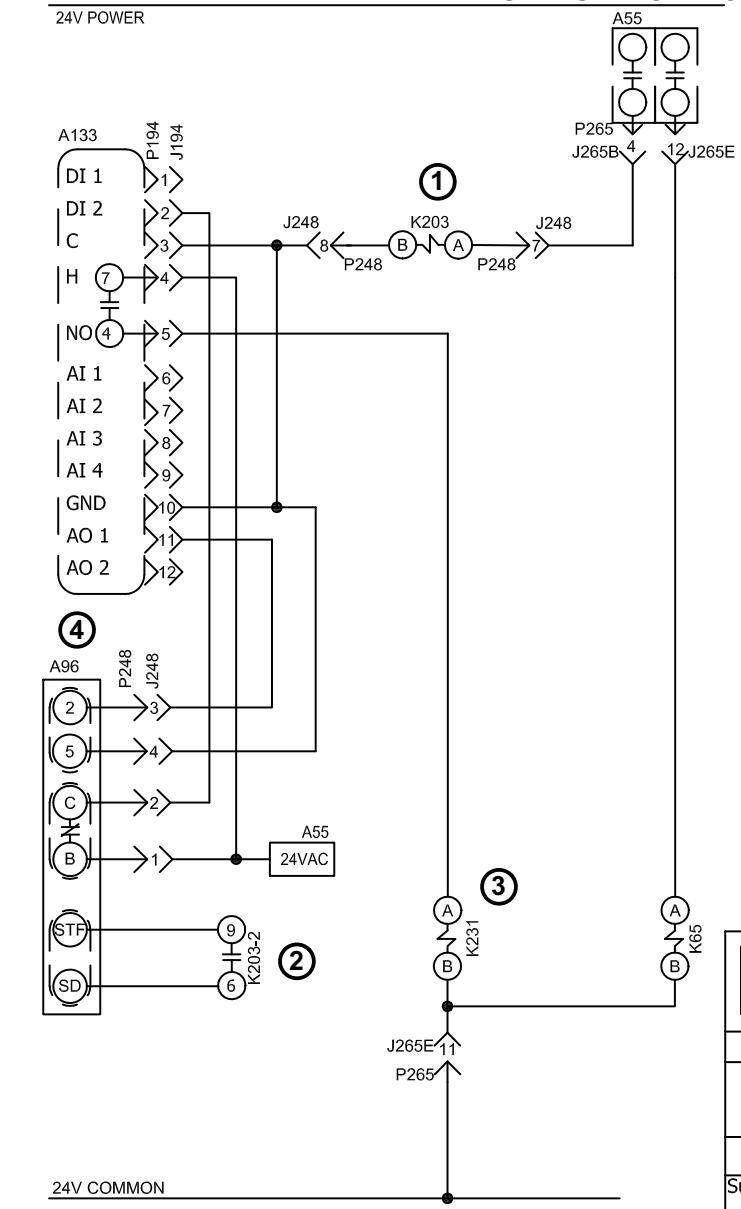
POWER:

1. A55 Unit Controller energizes the economizer components with 24VAC.

OPERATION:

2. The A55 along with outdoor enthalpy sensor A7 and indoor enthalpy sensor A62 (if differential enthalpy is used) determine when to power the damper motor B7.
3. A55 supplies B7 with 0 - 10 VDC to control the positioning of economizer.
4. The damper actuator provides 2 to 10 VDC position feedback.

MSAV UNITS - NO BYPASS

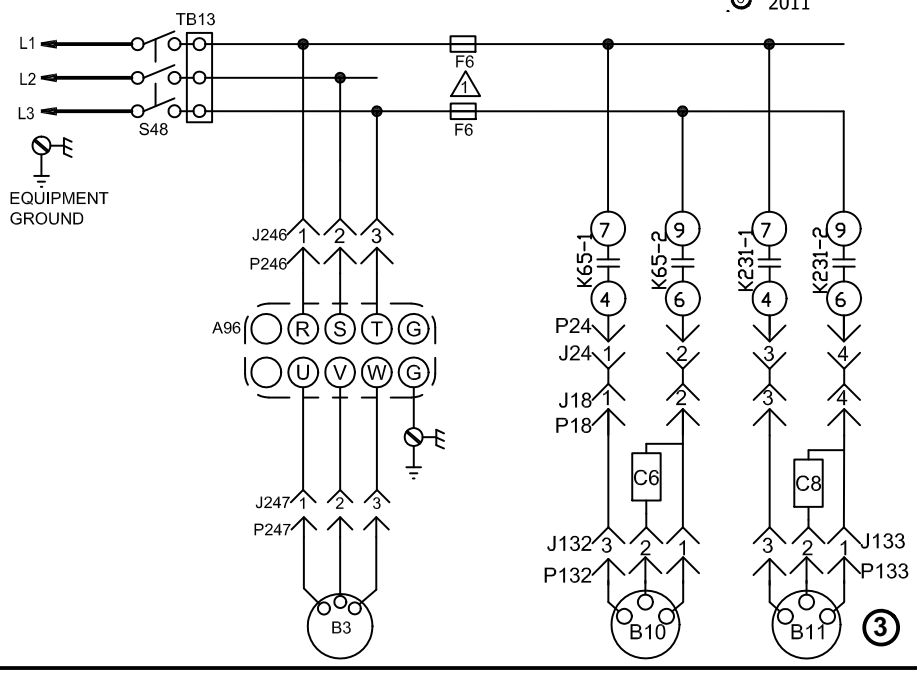


KEY	COMPONENT
A55	PANEL, MAIN CONTROL
A96	CONTROL, INVERTER
A133	CONTROL, GENERAL PURPOSE
B3	MOTOR, BLOWER
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
F6	FUSE, EXHAUST FAN
K65	RELAY, EXHAUST FAN
K203	RELAY, INVERTER START FWD ROTATION
K231	RELAY, EXHAUST FAN 2
S48	SWITCH, DISCONNECT
TB13	TERMINAL STRIP, POWER DISTRIBUTION

J/P	JACK/PLUG DESCRIPTION
18	POWER EXHAUST HARNESS
24	POWER, RELAY TO EXHAUST FANS
132	POWER TO EXHAUST FAN MOTOR 1
133	POWER TO EXHAUST FAN MOTOR 2
194	GP CONTROL INPUT, OUTPUT
246	POWER TO VFD
247	POWER, VFD TO MTR
248	VFD CONTROL
265	A55 TO CONTACTORS AND RELAYS

⚠1 F6 FUSES ARE USED ON 240/300 Y-VOLT UNITS WITH FACTORY INSTALLED POWER EXHAUST

F6 FUSES ARE USED ON ALL Y-VOLT UNITS WITH FIELD INSTALLED POWER EXHAUST



ENERGENCE C-BOX WIRING DIAGRAM

06/11

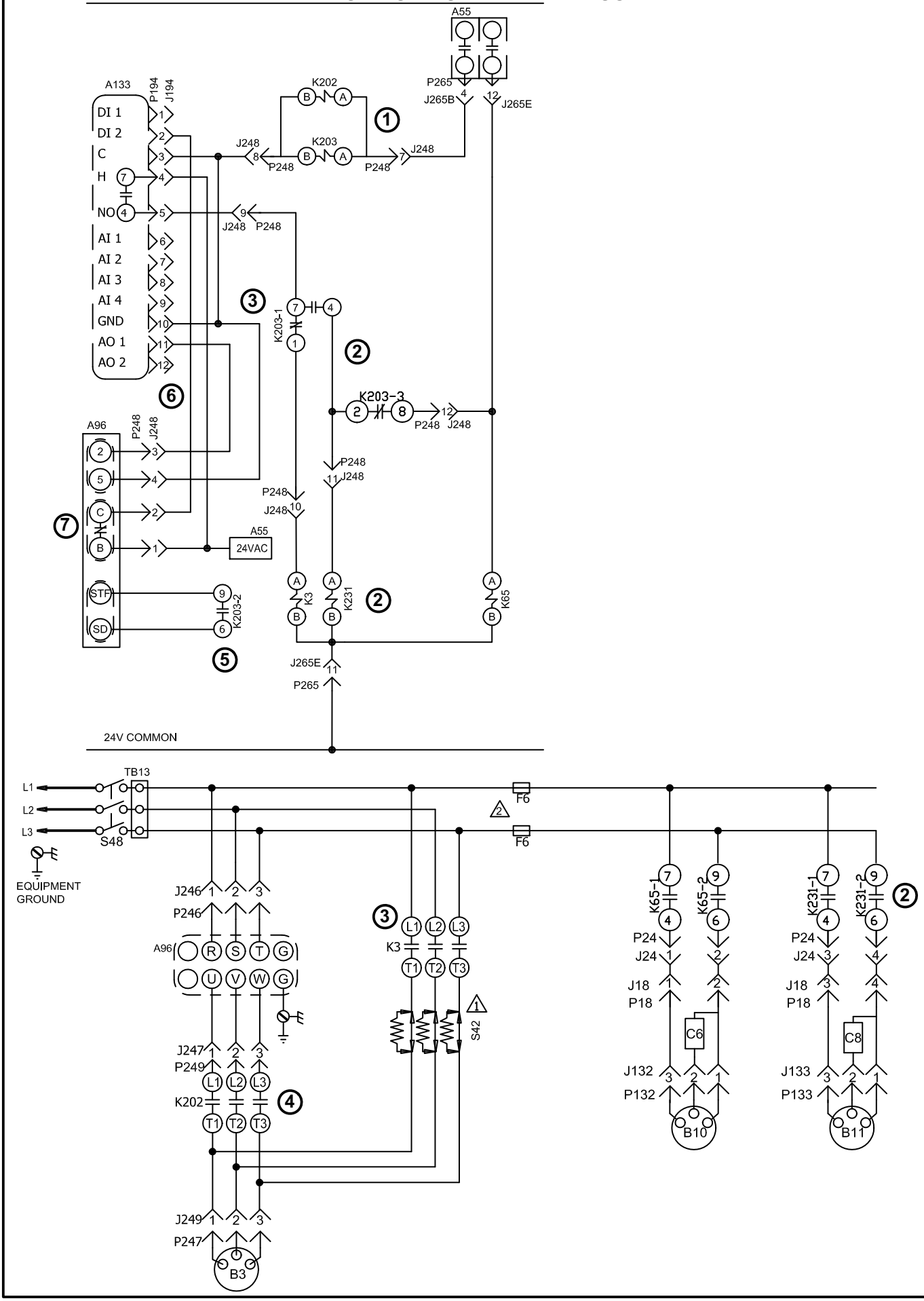
COOLING

MSAV BLOWER - NO BYPASS

SECTION B3 | REV 0

Supersedes | New Form No. 537390-01

MSAV UNITS - WITH BYPASS



MSAV UNITS - WITH BYPASS

KEY	COMPONENT
A55	PANEL, MAIN CONTROL
A96	CONTROL, INVERTER
A133	CONTROL, GENERAL PURPOSE
B3	MOTOR, BLOWER
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
F6	FUSE, EXHAUST FAN
K3	CONTACTOR, BLOWER
K65	RELAY, EXHAUST FAN
K202	CONTACTOR, VFD POWER TO MOTOR
K203	RELAY, INVERTER START FWD ROTATION
K231	RELAY, EXHAUST FAN 2
S42	SWITCH, OVERLOAD RELAY BLWR MOTOR
S48	SWITCH, DISCONNECT
TB13	TERMINAL STRIP, POWER DISTRIBUTION

J/P	JACK/PLUG DESCRIPTION
18	POWER EXHAUST HARNESS
24	POWER, RELAY TO EXHAUST FANS
132	POWER TO EXHAUST FAN MOTOR 1
133	POWER TO EXHAUST FAN MOTOR 2
194	GP CONTROL INPUT, OUTPUT
246	POWER TO VFD
247	POWER, VFD TO MTR
248	VFD CONTROL
249	POWER, CONTACTOR BYPASS
265	A55 TO CONTACTORS & RELAYS

1. S42 USED ON M-VOLT UNITS AND UNITS WITH HIGH EFFICIENCY MOTORS AND MOTORS LESS INTERNAL OVERLOAD PROTECTION

2. F6 FUSES ARE USED ON 240/300 Y-VOLT UNITS WITH FACTORY INSTALLED POWER EXHAUST

   F6 FUSES ARE USED ON ALL Y-VOLT UNITS WITH FIELD INSTALLED POWER EXHAUST

	ENERGENCE C-BOX WIRING DIAGRAM	08/11
COOLING		
MSAV BLOWER - WITH BYPASS		
SECTION B3		REV 1.0
Supersedes	New Form No. 537391-01	

MSAV - NO BYPASS SEQUENCE OF OPERATION

OPERATION:

1. A55 energizes the K203 relay coil.
2. K203-2 N.O. contacts close to start A96 forward rotation signal STF.
3. A133 controls the second stage power exhaust relay K231 coil through pin #5. K231-1 and -2 N.O. contacts will close to start the second power exhaust fan when A133 energizes the K231 coil.
4. Blower B3 speed is controlled by a 0-10VDC signal from A133 AO1 to A96 terminal 2.
5. A96 status is monitored by A133 through N.C. contacts B-C on A96.

MSAV - WITH BYPASS SEQUENCE OF OPERATION

OPERATION:

1. A55 energizes K202 and K203 relay coils.
2. K203-1 N.O. contacts close and K203-3 N.C. contacts open to allow A133 to control the second stage power exhaust relay K231 coil through pin #5. K231-1 and -2 N.O. contacts will close to start the second power exhaust fan B11 when A133 energizes K231 coil.
3. K203-1 N.C. contacts open to de-energize K3 relay coil. K3 contacts open to interrupt power to B3 blower motor through K3 N.O. relay contacts.
4. K202 contacts close to allow power to B3 blower motor from A96.
5. K203-2 N.O. contacts close to start A96 forward rotation signal STF.
6. Blower B3 speed is controlled by a 0-10VDC signal from A133 AO1 to A96 terminal 2.
7. A96 status is monitored by A133 through N.C. contacts B-C on A96.