SGH 3 & 5 TON

The SGH 3 and 5 ton (10.5 and 17.5 kW) units are configure to order units (CTO) with a wide selection of factory installed options. Units are available in the following heating inputs:

Gas heat sections are designed with Lennox aluminized or optional stainless steel tube heat exchangers.

SGH036/060 units are available in Standard 2 Stage 53/70 kBtuh (15.5/20.5 kW) and Medium 2 Stage 81/108 kBtuh (23.7/31.6 kW) heating inputs. SGH060 units have an additional High 2 Stage 113/150 kBtuh (33.1/43.9 kW) heating input. all heat input sizes are standard with Low NOx. Gas heat sections are designed with aluminized (stainless optional) steel tube heat exchangers.

The SGH is designed for R-410A refrigerant. Operating pressures and pressure switch settings are significantly higher than R-22 charged units. Service equipment must be rated for R-410A.

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.

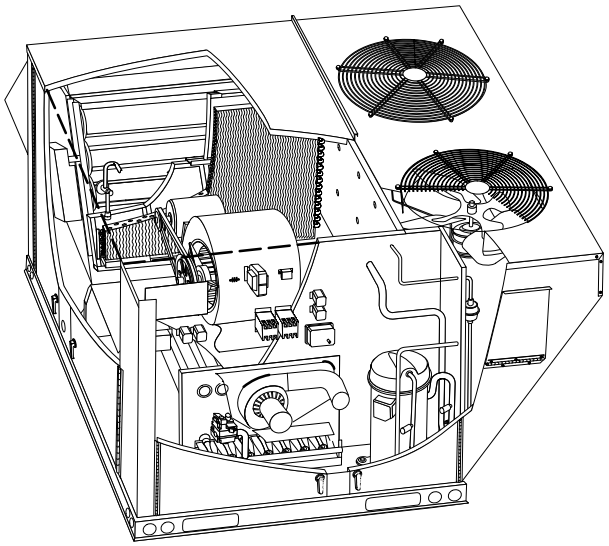
⚠ WARNING

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

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, service agency or the gas supplier.



⚠ CAUTION

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

⚠ WARNING

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.

Table of Contents

OPTIONS / ACCESSORIES

Item Description		Model Number	Catalog Number	Unit Model No. 036	060	120	240
COOLING SYSTEM							
Condensate Drain Trap			Factory	O	O	O	O
Corrosion Protection	Coated indoor/outdoor coil assemblies, painted cabinet interior		Factory	O	O	O	O
	Coated outdoor coil assembly		Factory	O	O	O	O
Drain Pan Overflow Switch		E1SNSR71AD1	**68W88**	OX	OX	OX	OX
HEATING SYSTEM							
Combustion Air Intake Extension		C1EXTN10FF1	**89L97**	X	X		[1] X
		C1EXTN10111	**33W62**			X	
Gas Heat Input	Standard 2 Stage - 53/70 kBtuh input (Low NOx)		Factory	O	O		
	Medium 2 Stage - 81/108 kBtuh input (Low NOx)		Factory	O	O		
	High 2 Stage - 113/150 kBtuh input (Low NOx)		Factory		O		
	Standard 2 Stage - 84.5/130 kBtuh input		Factory			O	
	Medium 2 Stage - 117/180 kBtuh input		Factory			O	
	High 2 Stage - 156/240 kBtuh input		Factory			O	
	Standard 2 Stage - 169/260 kBtuh input		Factory				O
	Medium 2 Stage - 234/360 kBtuh input		Factory				O
	High 2 Stage - 312/480 kBtuh input		Factory				O
LPG/Propane Kits	2 Stage Standard Heat - C1PROP28A11		**21A01**	X	X		
	2 Stage Medium and High Heat - C1PROP20AP2		**14N21**	X	X		
	Standard Heat - C1PROP25C11		**14N28**			X	[1] X
	Medium Heat - C1PROP26C11		**14N29**			X	[1] X
	High Heat - C1PROP27C11		**14N30**			X	[1] X
Low Temperature Vestibule Heater			Factory	O	O	O	O
Stainless Steel Heat Exchanger			Factory	O	O	O	O
Vertical Vent Extension		C1EXTN20FF1	**31W62**	X	X		
		LTAWEK10/15	**73M72**			X	
		C1EXTN2021	**42W16**				[1] X
BLOWER - SUPPLY AIR							
ECM Direct Drive, MSAV® (Multi-Stage Air Volume)	1.5 hp		Factory	O	O		
Belt Drive, MSAV® (Multi-Stage Air Volume)	3 hp		Factory			O	
	5 hp		Factory				O
	7.5 hp		Factory				O
CABINET							
Combination Coil/Hail Guards		S1GARD22101	**19H54**	OX	OX		
		S1GARD22111	**19H55**			OX	
		C1GARD52D-1	**13T16**				OX

[1] Order two.

NOTE - Catalog and model numbers shown are for ordering field installed accessories.
OX - Configure To Order (Factory Installed) or Field Installed
O = Configure To Order (Factory Installed)
X = Field Installed

OPTIONS / ACCESSORIES

Item Description		Model Number	Catalog Number	Unit Model No. 036	060	120	240
CONTROLS							
Blower Proving Switch			Factory	O	O	O	O
Commercial Controls	Prodigy® Control System - BACnet® Module		Factory	O	O	O	O
	Prodigy® Control System - LonTalk® Module		Factory	O	O	O	O
	CPC Einstein Integration		Factory	O	O	O	O
	L Connection® Network		Factory	O	O	O	O
Dirty Filter Switch		S1SNSR55S-1	**12P68**	OX	OX	OX	OX
Fresh Air Tempering		C1SNSR75AD1	**58W63**	X	X	X	X
[1] Smoke Detector	Supply		Factory	O	O	O	O
	Return		Factory	O	O	O	O
ELECTRICAL							
Voltage 60 hz	208/230V - 3 phase		Factory	O	O	O	O
	460V - 3 phase		Factory	O	O	O	O
	575V - 3 phase		Factory	O	O	O	O
GFI Service Outlets	20 amp non-powered, field-wired (all voltages)	C1GFCI20FF1	**67E01**	OX	OX	OX	OX
	15 amp, factory-wired and powered	C1GFCI15FF1	**74M70**				O
[2] Short-Circuit Current Rating (SCCR) of 100kA (includes Phase/Voltage Detection)			Factory				O
Weatherproof Cover for GFI		C1GFGCI99FF1	**10C89**	X	X	X	X
INDOOR AIR QUALITY							
Air Filters							
Healthy Climate® High Efficiency Air Filters	MERV 13 (16 x 20 x 2 - Order 4 per unit)	C1FLTR40A-1	**52W37**	X	X		
	MERV 13 (20 x 25 x 2 - Order 4 per unit)	C1FLTR40B-1	**52W41**			X	
	MERV 13 (20 x 20 x 2 - Order 12 per unit)	C1FLTR40D-1	**52W39**				X
Replacement Media Filter With Metal Mesh Frame 20 x 20 x 2 Order 12 per unit (includes non-pleated filter media)		C1FLTR30D-1-	**44N60**				X
Indoor Air Quality (CO_2) Sensors							
Sensor - Wall-mount, off-white plastic cover with LCD display		C0SNSR50AE1L	**77N39**	X	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display		C0SNSR52AE1L	**87N53**	X	X	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting		C0SNSR51AE1L	**87N52**	X	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting		C0MISC19AE1	**87N54**	X	X	X	X
CO_2 Sensor Duct Mounting Kit - for downflow applications		C0MISC19AE1-	**85L43**	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO_2 sensors (**87N53** or **77N39**)		C0MISC16AE1-	**90N43**	X	X	X	X
HUMIDITROL® CONDENSER REHEAT OPTION							
Humiditrol® Dehumidification Option			Factory	O	O	O	O
Humidity Sensor Kit, Remote mounted (required)		C0SNSR31AE-1	**17M50**	X	X	X	X

[1] Factory installed smoke detectors must be ordered for use with either 115V or 24V external power supply only.
[2] SCCR option not available with 208/230V units.

NOTE - Catalog and model numbers shown are for ordering field installed accessories.
OX - Configure To Order (Factory Installed) or Field Installed
O = Configure To Order (Factory Installed)
X = Field Installed

OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No. 036	060	120	240
ECONOMIZER						
High Performance Economizer (Approved for California Title 24 Building Standards / AMCA Class 1A Certified)						
Standard Economizer - Includes Outdoor Air Hood		Factory	O	O	O	
(Global Sensor, field provided, order Barometric Relief Dampers separately	E1ECON17D-2	**18X87**				OX
Economizer Controls (Not for Title 24)						
Single Enthalpy	C1SNSR64FF1	**53W64**	OX	OX	OX	OX
NOTE - For Differential Enthalpy Order 2 Single Enthalpy Controls						
Barometric Relief Dampers						
Barometric Relief Dampers (No Exhaust Hood)		**30W72**	OX	OX		
Barometric Relief Dampers With Power Exhaust Fans (Exhaust Hood Furnished)		**30W92**			OX	
Barometric Relief Dampers Without Power Exhaust Fans (No Exhaust Hood)		**47M14**			OX	
Barometric Relief Dampers Without Power Exhaust Fans (Exhaust Hood Furnished)		**76W17**				OX
POWER EXHAUST						
Standard Static		Factory			O	O
OUTDOOR AIR						
Manual Outdoor Air Damper with Outdoor Air Hood and Bird Screen		Factory				O
Motorized Outdoor Air Dampers with Outdoor Air Hood and Bird Screen		Factory				O
ROOF CURBS						
Hybrid Roof Curbs, Downflow, 14 in. height	S1CURB71101	**11F70**	X	X		
	S1CURB71111	**11F72**			X	
	Full Perimeter - S1CURB71121	**11F74**				X
Hybrid Roof Curbs, Downflow 24 in. height	S1CURB73101	**11F71**	X	X		
	S1CURB73111	**11F73**			X	
	Full Perimeter - S1CURB73121	**11F75**				X
Curb Alignment (Adapter plate mates new unit to existing roof curb for replacement of LGE240)		Factory				O

NOTE - Catalog and model numbers shown are for ordering field installed accessories.
OX - Configure To Order (Factory Installed) or Field Installed
O = Configure To Order (Factory Installed)
X = Field Installed

ELECTRICAL DATA

DIRECT DRIVE | 3 - 5 TON

Model No.		SGH036H4E			SGH060H4E		
[1] **Voltage - 60hz**		**208/230V-3ph**	**460V-3ph**	**575V-3ph**	**208/230V-3ph**	**460V-3ph**	**575V-3ph**
Compressor	Rated Load Amps	11.6	5.7	4	16.5	7.2	5.5
	Locked Rotor Amps	73	38	25.6	110	52	38.9
Outdoor Fan Motor(s)	Full Load Amps (total)	0.3 (0.6)	0.3 (0.6)	0.3 (0.6)	0.7 (1.4)	0.7 (1.4)	0.7 (1.4)
Service Outlet 115V GFI (Amps)		20	20	20	20	20	20
Indoor Blower Motor	Horsepower	1.5	1.5	1.5	1.5	1.5	1.5
	Type	Direct (ECM)	Direct (ECM)	Direct (ECM)	Direct (ECM)	Direct (ECM)	Direct (ECM)
	Full Load Amps	4.4	2.3	2.3	4.4	2.3	2.3
[2] **Maximum Overcurrent Protection**	Unit Only	30	15	15	40	15	15
[3] **Minimum Circuit Ampacity**	Unit Only	20	11	8	27	13	11

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 5000 amps.
[1] NOTE – Extremes of operating range are plus and minus 10% of line voltage.
[2] HACR type breaker or fuse.
[3] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

SPECIFICATIONS — DIRECT DRIVE | 3 - 5 TON

		3 Ton	5 Ton
General Data	**Nominal Tonnage**	**3 Ton**	**5 Ton**
	Model No.	**SGH036H4E**	**SGH060H4E**
	Efficiency Type	**High**	**High**
	Blower Type	MSAV® (Multi-Stage Air Volume) (Direct Drive ECM)	MSAV® (Multi-Stage Air Volume) (Direct Drive ECM)
Cooling Performance	Gross Cooling Capacity - Btuh	37,200	60,300
	[1] Net Cooling Capacity - Btuh	36,000	59,000
	AHRI Rated Air Flow - cfm	1200	1700
	Total Unit Power	2.6	4.5
	[1] SEER (Btuh/Watt) - 208/230V-3ph	19.3	17.8
	[1] SEER (Btuh/Watt) - 460V/575V-3ph	18.6	17.4
	[1] EER (Btuh/Watt) - 208/230V-3ph	14.2	13.0
	[1] EER (Btuh/Watt) - 460V/575V-3ph	13.9	12.8
Refrigerant Charge	Refrigerant Type	R-410A	R-410A
	Environ™ Coil System	7 lbs. 11 oz.	8 lbs. 3 oz.
	Environ™ Coil System With Humiditrol® Dehumidification Option	8 lbs. 4 oz.	8 lbs. 4 oz.
[2] Sound Rating Number (dBA)		67	78
Gas Heating Options Available - See page 23		Standard (2 Stage) Medium (2 Stage)	Standard (2 Stage) Medium (2 Stage) High (2 Stage)
Compressor Type (No.)		Two-Stage Scroll (1)	Two-Stage Scroll (1)
Condenser Coil	Net face area - sq. ft.	18.7	18.7
	Number of rows	1	1
	Fins per inch	23	23
Condenser Fan(s)	Motor (No.) horsepower	(2) 1/3 (ECM)	(2) 1/3 (ECM)
	Motor rpm	340-560	340-860
	Total Motor watts	90-136	90-354
	Diameter (No.) - in.	(2) 24	(2) 24
	Number of blades	3	3
	Total air volume - cfm	3900	6300
Evaporator Coil	Net face area - sq. ft.	7.78	7.78
	Tube diameter - in.	3/8	3/8
	Number of rows	4	4
	Fins per inch	14	14
	Drain connection - no. & size	(1) 1 NPT	(1) 1 NPT
	Expansion device type	Balance Port TXV, removable head	
[3] Indoor Blower	Nominal motor output HP	1.5 (ECM)	1.5 (ECM)
	Wheel nominal diameter x width - in.	(1) 14 x 5	(1) 14 x 5
Filters	Type of filter	MERV 8 or equivalent	
	Number and size - in.	(4) 16 x 20 x 2	(4) 16 x 20 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 210/240; 95°F outdoor air temperature and 80°F db/67°F wb entering evaporator air; minimum external duct static pressure.

[2] Sound Rating Number rated in accordance with test conditions included in AHRI Standard 270-95.

[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.

SPECIFICATIONS - GAS HEAT — 3 TON | 5 TON

Model No.		036 060	036 060	060
Heat Input Type		Standard (2 Stage)	Medium (2 Stage)	High (2 Stage)
Input Btuh	1st Stage	53,000	81,000	113,000
	2nd Stage	70,000	108,000	150,000
Output Btuh	2nd Stage	57,000	87,000	121,000
Temperature Rise Range - °F		15-45	25-55	40-70
[1] Thermal Efficiency		80%	80%	80%
Gas Supply Connections		3/4 in. npt	3/4 in. npt	3/4 in. npt
Rec. Gas Supply Pressure - Nat./ LPG		7 in. w.g. / 11 in. w.g.	7 in. w.g. / 11 in. w.g.	7 in. w.g. / 11 in. w.g.

[1] Thermal Efficiency at full input.

BLOWER DATA

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

Air Volume cfm	Humiditrol Dehumidification Coil	Economizer	Filters MERV 13
036, 060 MODELS			
800	0.00	0.04	0.05
1000	0.00	0.04	0.07
1200	0.01	0.04	0.07
1400	0.02	0.04	0.07
1600	0.03	0.04	0.07
1800	0.04	0.05	0.07
2000	0.04	0.05	0.08

SGH036H / SGH060H BLOWER PERFORMANCE

NOTE - Blower Table Includes Resistance For Base Unit With Gas Heat, Wet Indoor Coil And Air Filters In Place.

MINIMUM / MAXIMUM AIR VOLUME REQUIRED FOR USE WITH SGH036H MODELS WITH MEDIUM 2 STAGE HEAT OPTION - 1475 CFM

Air Volume cfm	EXTERNAL STATIC PRESSURE - In. w.g.																											
	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8		0.9		1.0		1.1		1.2		1.3		1.4	
	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
900	1296	48	1351	79	1408	110	1465	139	1523	167	1580	194	1636	220	1692	244	1746	268	1798	291	1849	312	1898	334	1945	355	1990	375
1000	1394	95	1449	125	1505	154	1562	182	1618	208	1674	234	1729	258	1782	282	1834	305	1884	328	1933	350	1980	372	2025	394	2069	417
1100	1495	141	1550	170	1606	197	1661	223	1717	249	1771	273	1824	297	1875	321	1925	344	1973	367	2020	390	2065	414	2108	438	2152	464
1200	1599	186	1654	213	1709	239	1764	264	1818	289	1870	313	1921	337	1970	362	2018	386	2064	411	2109	436	2153	461	2195	487	2238	516
1300	1707	230	1762	256	1816	281	1869	306	1921	331	1971	356	2020	381	2068	407	2114	433	2158	460	2202	486	2244	513	2285	542	2327	573
1400	1819	273	1873	299	1926	324	1977	350	2027	377	2075	404	2122	431	2168	459	2212	486	2255	515	2297	543	2338	572	2378	602	2419	635
1500	1935	318	1987	345	2037	372	2086	400	2134	429	2180	458	2225	487	2269	517	2312	546	2354	576	2395	607	2435	637	2474	669	2513	704
1600	2052	368	2102	397	2150	427	2197	457	2242	488	2287	519	2331	550	2373	582	2415	613	2455	645	2495	678	2534	710	2572	744	2610	779
1700	2169	426	2217	457	2263	489	2308	521	2352	554	2395	587	2437	621	2479	654	2519	688	2558	722	2597	757	2635	791	2672	827	2708	862
1800	2286	491	2332	524	2377	558	2420	593	2463	628	2505	664	2545	700	2585	735	2624	771	2663	808	2700	844	2737	882	2773	919	2808	956
1900	2404	565	2448	600	2491	637	2533	674	2574	711	2615	749	2654	787	2693	825	2731	863	2768	902	2805	941	2841	980	2875	1020	2910	1058
2000	2522	648	2564	685	2606	724	2647	764	2687	803	2726	843	2764	883	2802	924	2839	964	2875	1004	2910	1045	2945	1085	2979	1125	3013	1163
2100	2640	739	2681	779	2722	821	2761	863	2800	904	2838	946	2875	988	2911	1029	2947	1071	2982	1111	3017	1152	---	---	---	---	---	---
2200	2759	840	2799	884	2838	927	2876	970	2913	1013	2950	1055	2986	1097	3021	1139	---	---	---	---	---	---	---	---	---	---	---	---
2300	2878	950	2916	995	2954	1039	2991	1082	3027	1125	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2400	2997	1066	3033	1110	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2500	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

SGH036/060 PARTS ARRANGEMENT

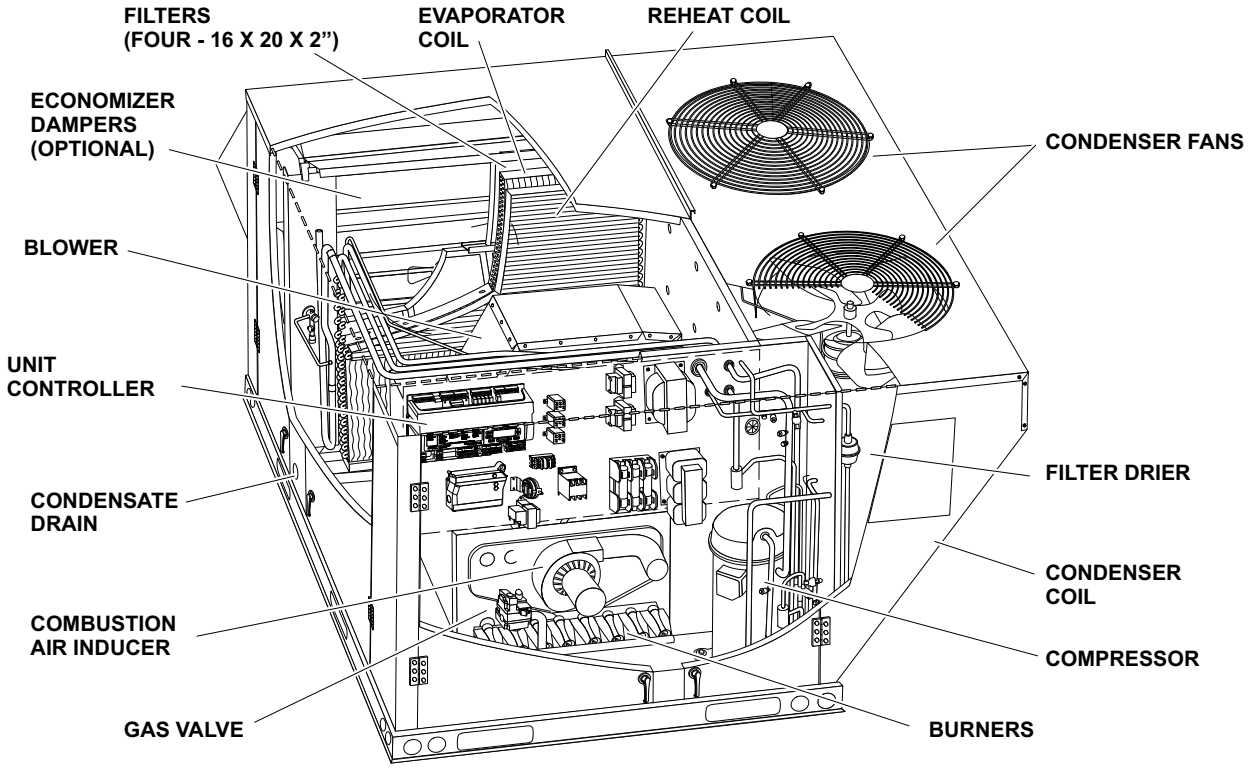


FIGURE 1

SGH036/060 CONTROL PANEL

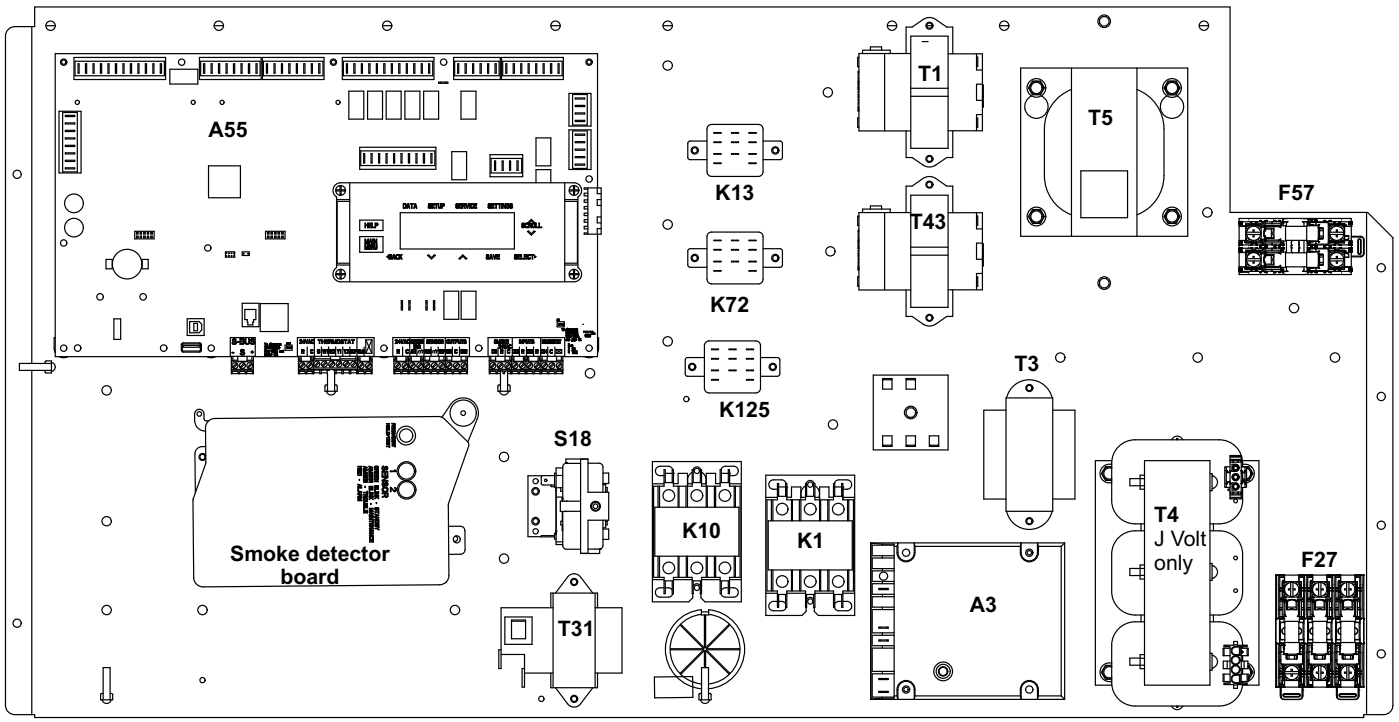


FIGURE 2

I-UNIT COMPONENTS

SGH units are configure to order units (CTO). The SGH unit components are shown in figure 1. L1, L2 and L3 wiring is color coded; L1 is red, L2 is yellow and L3 is blue.

A-Control Panel Components

⚠ CAUTION

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

SGH control panel components are shown in figure 2. The control panel is located in the upper left portion of the compressor compartment.

1-Circuit Breaker CB10

All units are equipped with circuit breaker CB10. Circuit breaker CB10 is a toggle switch which can be used by the service technician to disconnect power to the unit.

2-Control Transformer T1 (all units)

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

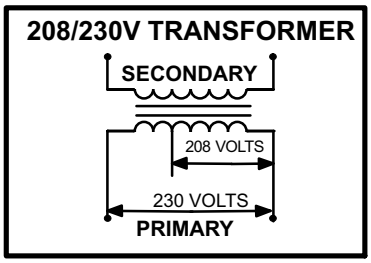


FIGURE 3

3-CAI Transformers T3 (J Voltage units)

All 575 (J) voltage units use one auto voltage to 230VAC transformer mounted in the compressor compartment. The transformer has an output rating of 0.75A. T3 transformer supplies 230 VAC power to combustion air inducer motor (B6).

4-Transformer T43 (all units)

All reheat units and units with phase detection components are equipped with T43 located in the control box. Transformer is rated at 70VA. T43 is connected to line voltage and is powered at all times.

5-Compressor Contactor K1 (all units)

K1 energizes compressor B3 in response to Unit Controller demand. Units use three pole double break contactors with a 24 volt coil.

NOTE-Contactor K1 is energized by the A55 Unit Controller. Refer to the operation sequence for the control system installed. There may be a 5 minute delay depending on the system installed.

6-Transformer T5 (G, J Voltage)

All 460 (G) and 575 (J) voltage units use transformer T5 mounted in the control box. T5 is a line voltage to 230V transformer to power the outdoor fan motors. It is connected to line voltage and is powered at all times.

7-Transformer T4 (J Voltage)

All 575 (J) voltage units use transformer T4 mounted in the control box. T4 is a line voltage to 460V transformer to power the indoor blower. It is connected to line voltage and is powered at all times.

8-Contactor K10 (all units)

K10 powers the outdoor fans, B4 & B5. Units use three pole double break contactors with a 24 volt coil.

9-Combustion Air Inducer Relay K13

Combustion air inducer relay K13, used in all SGH units, is a DPDT relay with a 24VAC coil. K13 is energized by the Unit Controller A55 after a heating demand from the thermostat. K13 remains energized throughout the heating demand. When energized, K13 N.O. contacts close to energize the combustion air blower and begin a heating sequence. Prove switch S18, located on the control panel, 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.

10-Gas Relay K72 (two-stage units)

Relay K72 is normally closed and controls combustion air inducer B6. K72 switches the inducer B6 to high speed in response to two-stage heat demand.

11-Combustion Air Prove Switch S18

The combustion air prove switch S18 is a SPST N.O. pressure switch located in the vestibule area. S18 monitors combustion air inducer operation. Switch S18 is wired to the ignition control A3. 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 at **0.10 ± 0.05 (24.8 ± 12.4**) (less negative pressure) and **close** at **0.25 ± 0.05 (62.3 ± 12.4)** The combustion air prove switch is factory set and not adjustable.

12-Unit Controller A55 (all units)

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

13-Burner Ignition Control A3

WARNING

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

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 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 NO TAG for a normal ignition sequence and figure NO TAG for the ignition attempt sequence with retrials (nominal timings given for simplicity). Specific timings for the ignition controls are shown in figure NO TAG.

Flame rectification sensing is used on all SGH units. Loss of flame during a heating cycle is indicated by an absence or low flame signal (0.09 or less 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 IV- System Service Check 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 Unit Controller A55. The ignition control then allows 30 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.

The main control box houses the burner control A3. See figure 2.

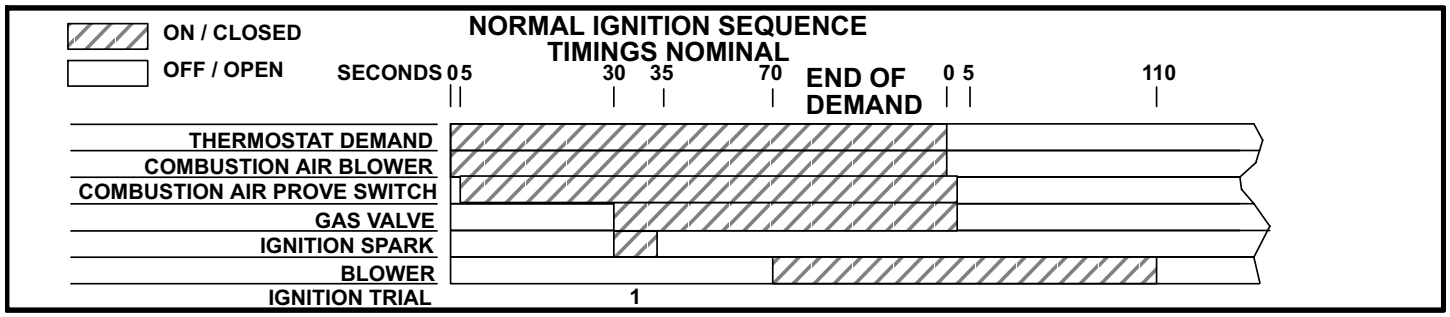


FIGURE 4

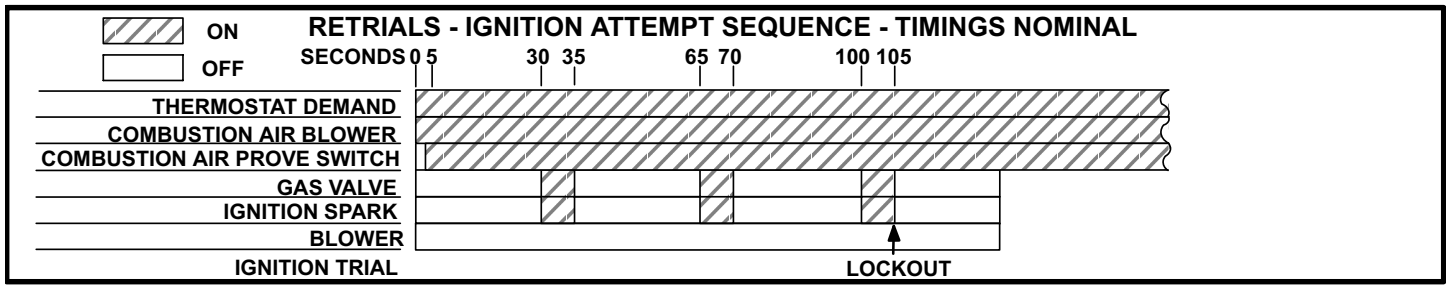


FIGURE 5

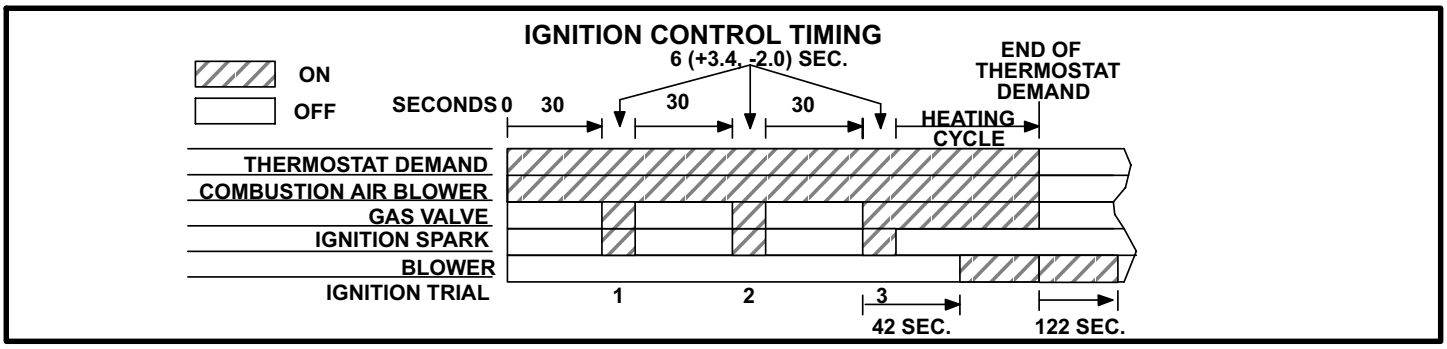


FIGURE 6

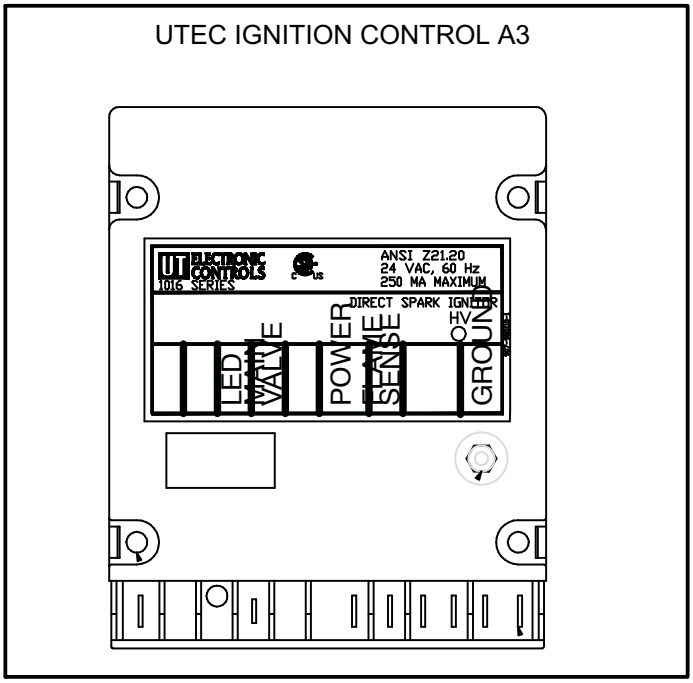


FIGURE 7

The ignition control provides three main functions: gas valve control, ignition, and flame sensing. The control has a green LED to show control status (table NO TAG).

TABLE 1

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.

Flame rectification sensing is used on all SGH 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.

Operation

On a heating demand, the ignition control checks for a closed limit switch. Once this check is complete and conditions are correct, the ignition control then allows 30 seconds for the combustion air inducer to vent exhaust gases from the burners. When the combustion air inducer is purging the exhaust gases, the combustion air prove switch closes proving that the combustion air inducer is operating before allowing the ignition control to energize. When the combustion air prove switch is closed and the delay is over, the ignition control activates the gas valve, the spark electrode and the flame sensing electrode. At the start of the ignition sequence, the adjustable 40 second (default) indoor blower delay period begins. Sparking stops immediately after flame is sensed or at the end of the 8 second trial for ignition. If flame is not sensed, the ignition control will wait 5 minutes before attempting ignition again. The unit will usually ignite on the first trial and A3 allows three trials for ignition before locking out. The lockout time is 1 hour. After lockout, the ignition control automatically resets and provides three more attempts at ignition. Manual reset after lockout requires holding the A55 Unit Controller left arrow key until the Unit Controller resets. See the Unit Controller manual provided with the unit.

Once the flame is sensed, the ignition control then proceeds to “steady state” mode where all inputs are monitored to ensure the limit switch, rollout switch and prove switch are closed as well as flame is present. When the heat call is satisfied the gas valve and combustion air inducer are de-energized. An adjustable 120-second (default) blower off delay begins.

COMPRESSOR AND COOLING COMPONENTS DETAIL

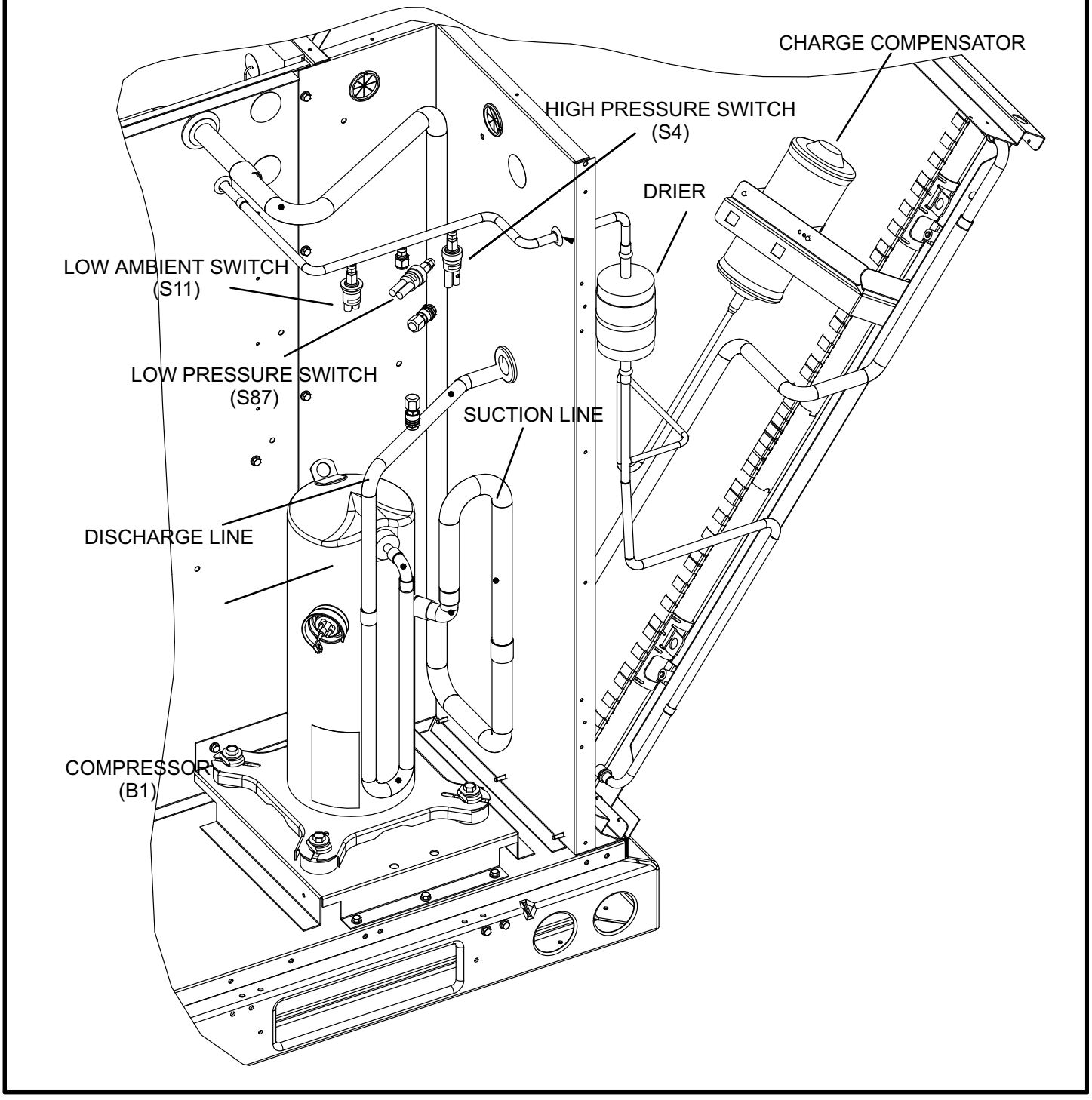


FIGURE 8

B-Cooling Components

See figure 8 for compressor and cooling components. Units are equipped with a draw-through type condenser fan. All units are equipped with direct drive blowers which draw air across the evaporator during unit operation.

Cooling may be supplemented by a factory- or field-installed economizer. The evaporator is slab type and 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 the low ambient switch and freezestat.

1-Compressors B1 (all units)

SGH units are equipped with scroll compressors. Compressors are supplied by various manufacturers. Compressor electrical specifications vary by manufacturer and type. See SPECIFICATIONS and ELECTRICAL DATA in this manual.

⚠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.

Compressor B1 is energized by a corresponding compressor contactor K1.

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

2-Filter Drier

SGH units have a filter drier located in the liquid line of each refrigerant circuit upstream of the TXV in the blower compartment. The drier removes contaminants and moisture from the system.

3-High Pressure Switch S4

The high pressure switch is an auto-reset SPST N.C. switch which opens on a pressure rise. All SGH units are equipped with this switch. The switch is located in the compressor discharge line. S4 is wired in series with the compressor contactor coil.

When discharge pressure rises to 640 ± 10 psig (4413± 69 kPa) (indicating a problem in the system) the switch opens and the 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 will allow 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 Switch S11

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

When liquid pressure rises to 450 ± 10 psig (3102 ± 69 kPa), the switch closes and the condenser fan is energized through the A55 control. When discharge pressure in the refrigerant circuit drops to 240 ± 10 psig (1655 ± 69 kPa), the switch opens and the condenser fan is de-energized. 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 Switch S87

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 is wired directly to the Unit Controller A55.

The Unit Controller A55 governs the low pressure switches by shunting the switches during start up until pressure is stabilized. After the shunt period, the control has a three-strike counter during first thermostat demand before the compressor is locked out. The control is reset by breaking and remaking the thermostat demand or manually resetting the control. When suction pressure drops to 40 ± 5 psig (276 ± 34 kPa) (indicating low pressure), the switch opens and the compressor is de-energized. The switch automatically resets when pressure in the suction line rises to 90 ± 5 psig (620 ± 34 kPa).

6-Condenser Fan B4 & B5

Units are equipped with electronically commutated condenser fan motors (ECM). The ECM motors are wired directly to 230VAC power. The motors do not operate until a pulse width modulated (PWM) control signal is sent from the A55 Unit Controller. The PWM signal determines the condenser fan speed. Fans B4 and B5 run on low speed with a Y1 demand and on high speed with a Y2 demand.

Both low and high voltage plugs are located in the control compartment in the indoor section of the unit. Condenser fan motors B4 & B5 high voltage plugs are J86 & J87 respectively. Low voltage plugs are J336 & J337 respectively. Refer to wiring diagrams to identify plugs.

If an ECM fan is not operating

1- Using a VAC meter, check the high voltage at the appropriate motor plug (J86 or J87). High voltage must be present before checking for low voltage.

2- Using the duty cycle (%) or a VDC meter setting, check for low voltage (J336 or J337) from the unit controller.

NOTE - *The VDC reading may fluctuate. This is normal for a PWM signal.*

7-Crankcase Heater HR1 & Thermostat S40

The compressor is protected by a crankcase heater HR1 and thermostat S40. The purpose of the crankcase heater is to prevent liquid from accumulating in the compressor. The crankcase heater and compressor never run at the same time.

Thermostat S40 is located on the compressor discharge line and will open when discharge line temperature reaches 94°, de-energizing HR1. Once temperature drops down to 74° the thermostat closes energizing HR1.

8-Freezestats S49

Each unit is equipped with a low temperature switch (freezestat) S49 located on a return bend of the evaporator coil.

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

If the freezestat is tripping frequently due to coil icing, check the airflow, filters, ductwork for any restrictions and unit charge, before allowing unit back in operation. Make sure to eliminate conditions which might promote evaporator ice buildup.

C-Blower Compartment

The blower housing can be removed for cleaning and inspection. In addition, removing blower allows access to the heat exchanger tubes for inspection.

Line and low voltage make-up in all models is located in the upper corner of the blower compartment. Electrical entrance is made through the base pan of the unit or through the corner mullion for horizontal position units. Low voltage connections can be accessed by removing the blower compartment front panel. High voltage can be accessed through the makeup box cover on corner mullion.

In all models, the evaporator coil, expansion valve and drain pan can be accessed by removing the blower compartment end panel.

1-Blower Wheel (all units)

Units are equipped with a direct drive blower assembly with a backward inclined blower wheel.

2-Indoor Blower Motor B3 (all units)

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

⚠IMPORTANT

Three phase scroll compressors must be phased sequentially for correct compressor and blower rotation. Follow "COOLING START-UP" section of installation instructions to ensure proper compressor and blower operation.

A-Blower Operation

Direct Drive Units - To check for proper voltage phasing, measure compressor suction and discharge pressures. Make sure suction pressure decreases and discharge pressure increases on start-up. *Checking blower rotation is not a valid method of determining voltage phasing for incoming power.*

Units Equipped With Factory-Installed Voltage or Phase Detection -

The Unit Controller checks the incoming power during start-up (A55 P269-1 and P269-2). If the voltage, phase, or frequency is incorrect, the Unit Controller will display an alarm and the unit will not start. After line voltage is corrected, the Unit Controller will energize the unit after five (default) minutes. While line voltage is continually checked by the Unit Controller, the voltage phasing is not. If one or more phases is interrupted, power to one or more transformers is interrupted and the unit is shut down by either the Unit Controller or the corresponding transformer.

Initiate blower demand at thermostat according to instructions provided with thermostat. Unit will cycle on thermostat demand.

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

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

B-Blower Access

1- Loosen the reusable wire tie which secures the controls and high voltage blower wiring to the blower housing.

2- Remove and retain screws in front and on either side of blower housing. Pull frame toward outside of unit. See figure 9.

3- Slide frame back into original position when finished servicing. Reattach the blower wiring in the previous location on the blower housing using the wire tie.

4- Replace retained screws in front and on either side of the blower housing.

C-Determining Unit CFM

1- Measure the indoor blower motor RPM. Air filters must be in place when measurements are taken.

2- With all access panels in place, measure static pressure external to unit (from supply to return). Blower performance data is based on static pressure taken in locations shown in figure 10.

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

3- Referring to BLOWER DATA tables (table of contents), use static pressure and RPM readings to determine unit CFM.

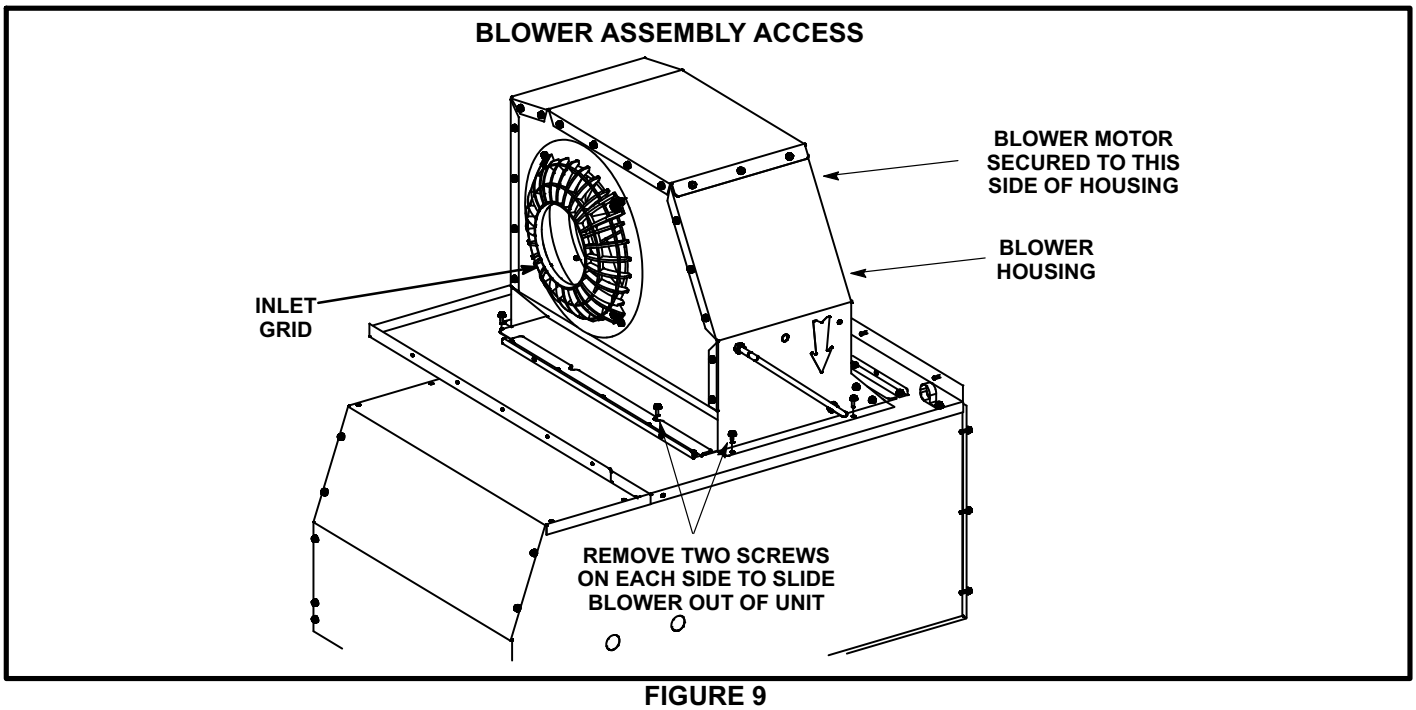


FIGURE 9

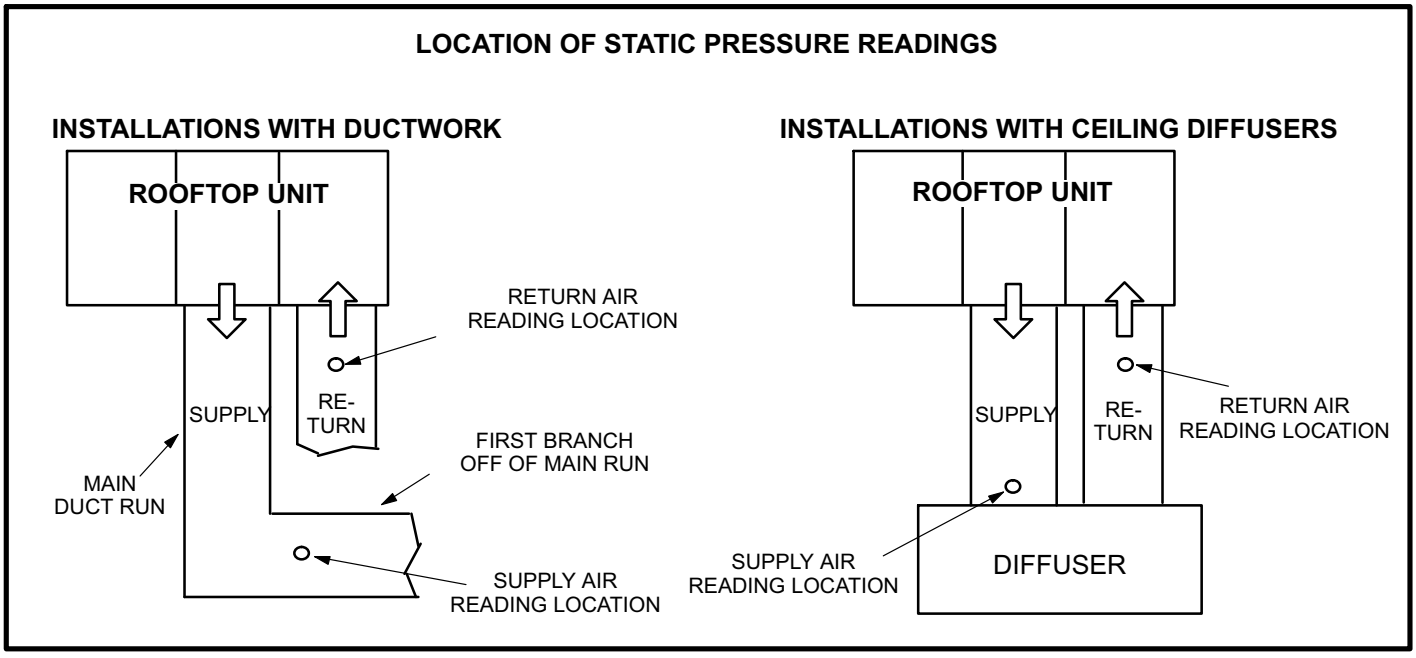


FIGURE 10

D-GAS HEAT COMPONENTS (SGH units)

SGH036/060 units are available in Standard 2 Stage - 70 kBtuh and Medium 2 Stage - 108 kBtuh heat sizes. SGH060 has an additional High 2 Stage - 150 kBtuh heat size. All heat sizes come standard with Low NOx inserts

1-Heat Exchanger (Figure 11)

SGH units use aluminized steel inshot burners with matching tubular aluminized or optional stainless steel heat exchangers and a two-stage redundant gas valve. SGH036 units use either a 3 (70 kBtuh) or 5 (108 kBtuh) tube/burner assembly. SGH060 units use either a 3 (70 kBtuh), 5 (108 kBtuh), or 7 (150 kBtuh) tube/burner assembly. Each burner uses a burner venturi to mix gas and air for proper combustion. Combustion takes place at each tube entrance. As hot combustion gases are drawn upward through each tube by the combustion air blower, exhaust gases are drawn out the top and fresh air/gas mixture is drawn in at the bottom. Heat is transferred to the air stream from all surfaces of the heat exchanger tubes. The supply air blower, controlled by the main control panel 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 valve accomplishes staging by allowing more or less gas to the burners as called for by heating demand.

2-Primary High Temperature Limit S10

S10 is the primary high temperature limits for gas heat. Primary limit S10 is wired in series to the main control panel A55 which energizes burner control (A3). Its N.C. contacts open to de-energize the ignition control when excessive temperature is reached in the blower compartment.

3-Flame Rollout Limit S47

Flame rollout limit S47 is a SPST N.C. high temperature limit located just above the burner air intake opening in the burner enclosure (see figure 11). S47 is wired to the main control panel A55. When S47 senses flame rollout (indicating a blockage in the combustion air passages), the flame rollout limit trips, and the ignition control immediately closes the gas valve.

Limit S47 is factory preset to open at 350°F ± 14°F (177°C ± 7.7°C) on a temperature rise. All flame rollout limits are manual reset.

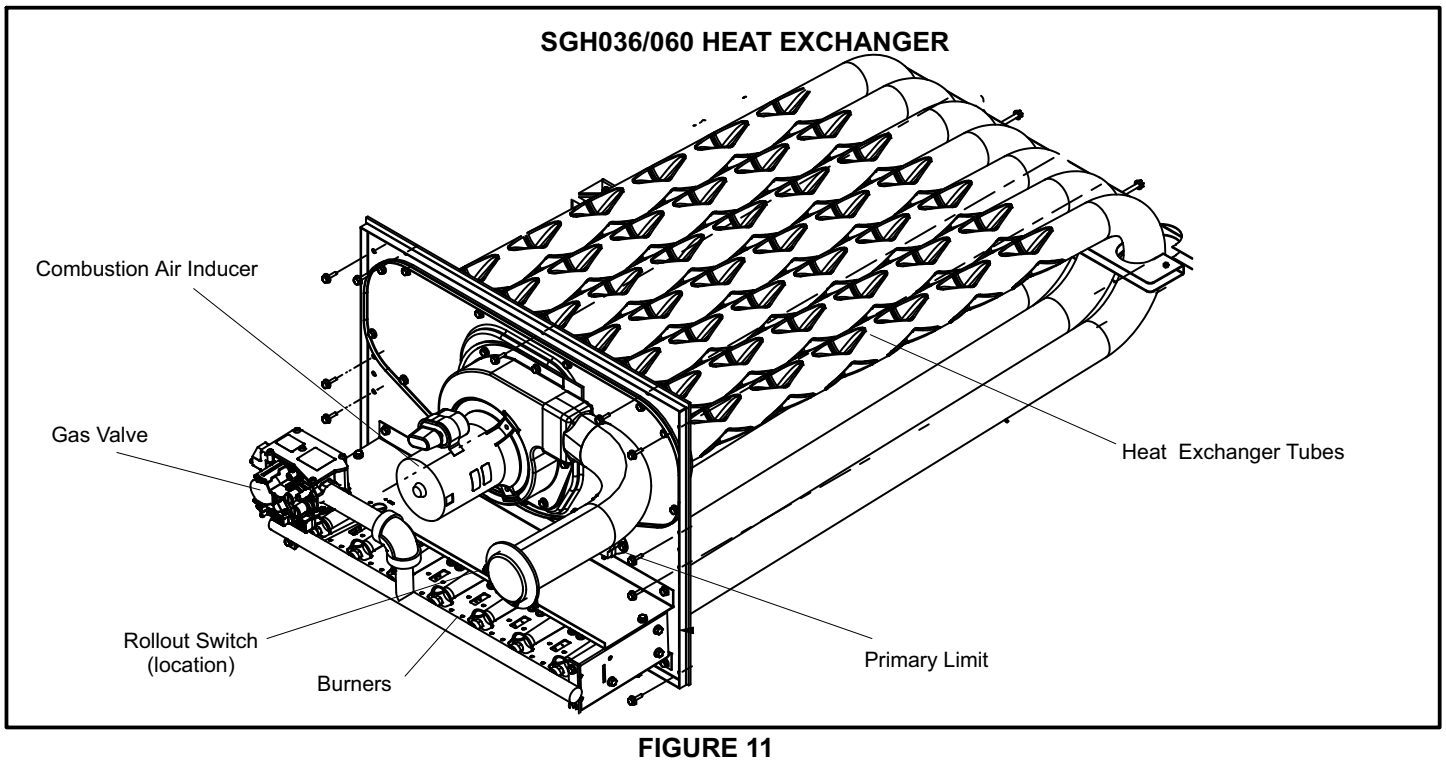


FIGURE 11

4-Burner Assembly (Figure 12)

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 main control panel A55.

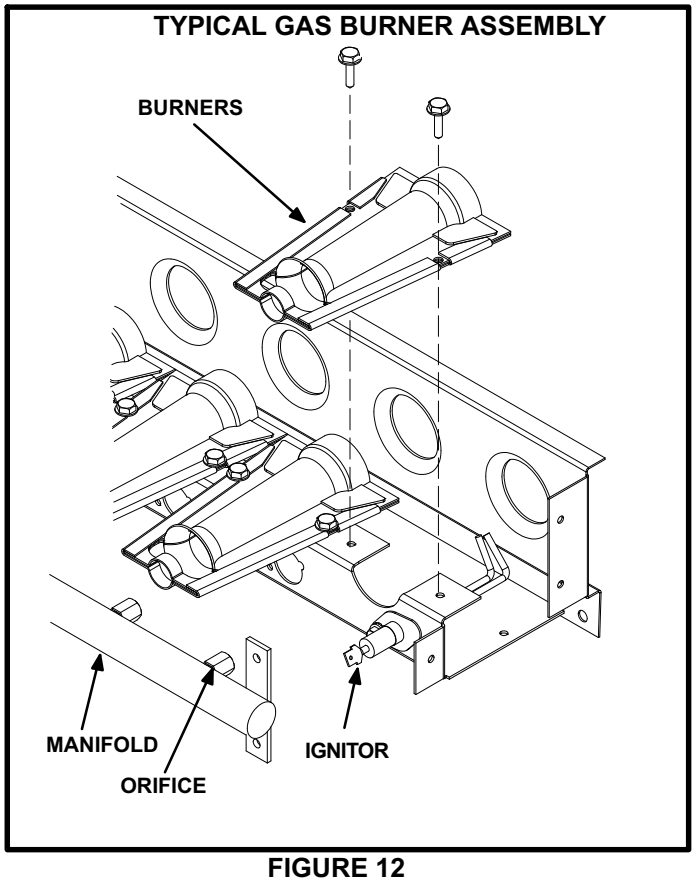


FIGURE 12

Burners

All units use inshot burners (see figure 12). Burners are factory set and do not require adjustment. A peep hole with cover is furnished in the heating access panel for flame viewing. Always operate the unit with the access panel in place. Burners can be removed individually for service. Burner maintenance and service is detailed in the SERVICE CHECKS sections of this manual.

Orifice

Each burner uses an orifice which is precisely matched to the burner input. The orifice is threaded into the manifold and supports the burner. Remove the two screws securing the burner and slide off of the orifice 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.

5-Combustion Air Inducer B6

Combustion air inducer B6 provides fresh air to the burners while clearing the combustion chamber of exhaust gases. The inducer begins operating immediately upon receiving a thermostat demand and is de-energized immediately when thermostat demand is satisfied.

On a heating demand (W1), the A55 Unit Controller through the ignition control A3 initiates the heating cycle. A3 then allows 30 seconds for the combustion air inducer to vent exhaust gases from the burners. When the combustion air inducer is purging the exhaust gases, the combustion air prove switch closes, proving that the combustion air inducer is operating before allowing the ignition sequence to continue. When the combustion air prove switch is closed *(See Control Panel Components for S18 Prove Switch)* and the delay is over, the A55 Unit Controller through the ignition control activates the appropriate stage operator of the gas valve, the spark and the flame sensing electrode. Sparking stops immediately after flame is sensed or at the end of the eight second trial for ignition. On two stage natural gas units the inducer will operate on low speed for first stage heat (W1) and ramp up to high speed for second stage heat (W2).

The inducer uses a 208/230V or 460V single-phase PSC motor and a 5.24in. x 0.96in. (120mm x 33.3mm) blower wheel. The motor operates at 3300RPM and is equipped with auto-reset overload protection. Two-speed units have reduced RPM for low speed.

Blowers are supplied by various manufacturers. Ratings may vary by manufacturer. Specific blower electrical ratings can be found on the unit rating plate.

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

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

6-Gas Valve GV1

Gas valve GV1 is a two stage redundant gas valve used in all SGH units.. First stage (low fire) is quick opening (on and off in less than 3 seconds). 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. The valve is adjustable for both high fire and low fire. A manual shut-off lever is provided on the valve for shut-off. Manual shut-off lever immediately closes both stages without delay. Figure 13 shows gas valve components..

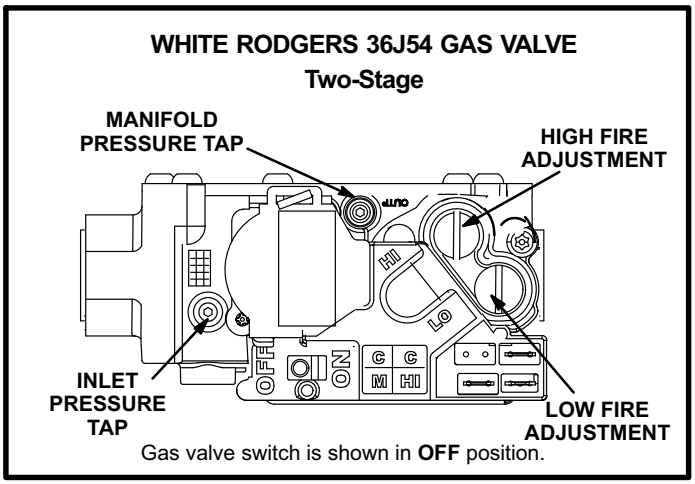


FIGURE 13

7-Spark Electrodes

An electrode assembly is used for ignition spark. The electrode is mounted through holes on the right 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 the spark electrode ignites the right burner. See figure 14. Flame travels from burner to burner until all are lit.

8-Flame Sensors

A flame sensor is located on the left side of the burner box. See figure 15. 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.

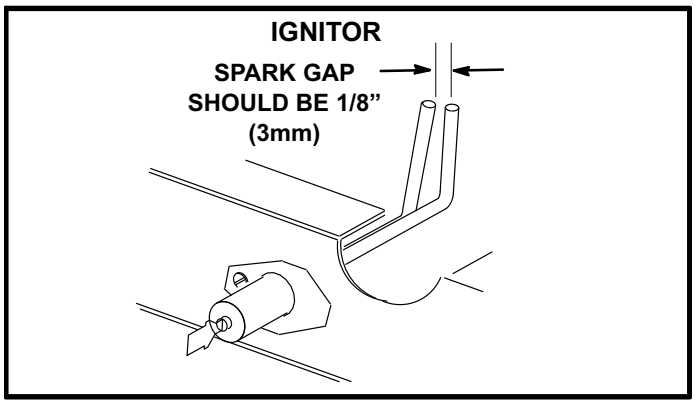


FIGURE 14

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.*

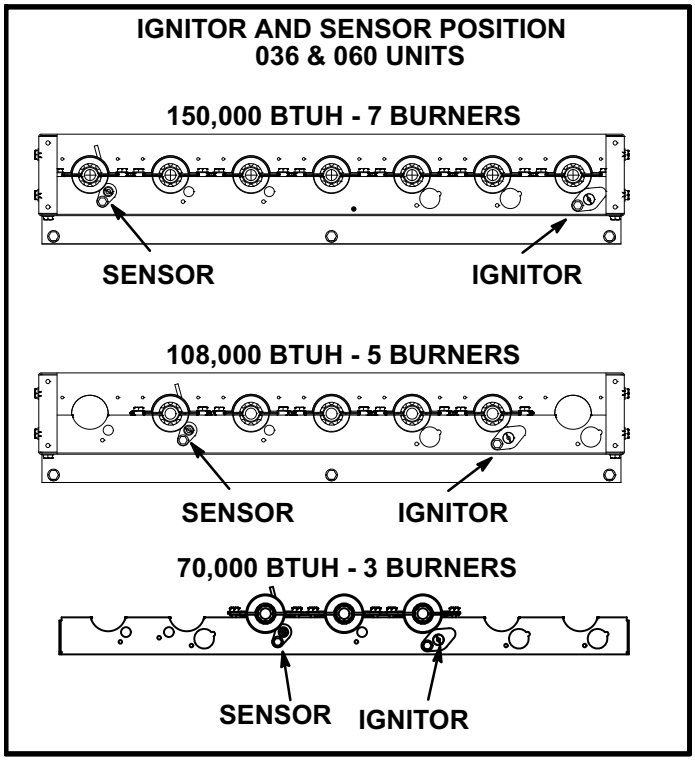


FIGURE 15

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.

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 (S1CURB1101).

III-CHARGING

A-Preliminary and Seasonal Checks

1- Make sure that 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.

3- Check to ensure that refrigerant lines do not rub against the cabinet or against other refrigerant lines.

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

5- Refer to unit diagram located on inside of compressor access door for unit wiring.

6- Adjust blower belt according to “Blower Operation and Adjustments” section.

7- Make sure filters are in place before start-up.

B-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:

IMPORTANT - Charge unit in standard cooling mode.

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

2- Check each system separately with all stages operating. Compare the normal operating pressures (see tables 2 - 5) to the pressures obtained from the gauges. Check unit components if there are significant differences.

3- Measure the outdoor ambient temperature and the suction pressure. Refer to the appropriate circuit charging curve to determine a target liquid temperature.

Note - Pressures are listed for sea level applications.

4- Use the same thermometer to accurately measure the liquid temperature (in the outdoor section).

- If measured liquid temperature is higher than the target liquid temperature, add refrigerant to the system.
- If measured liquid temperature is lower than the target liquid temperature, recover some refrigerant from the system.

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

6- Continue the process until measured liquid temperature agrees with the target liquid temperature. Do not go below the target liquid temperature when adjusting charge. Note that suction pressure can change as charge is adjusted.

7- Example: SG/SC 036 no reheat: At 95°F outdoor ambient and a measured suction pressure of 160psig, the target liquid temperature is 98°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquid temperature agrees with the target liquid temperature.

TABLE 2

SG/SC 036 Normal Operating Pressures - No Reheat - 580971-01											
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
120	229	117	269	122	316	125	363	127	418	130	488
128	230	131	268	132	313	134	361	135	417	138	482
147	239	147	273	152	314	154	360	158	413	161	474
165	254	167	282	172	325	174	368	176	424	180	489

TABLE 3

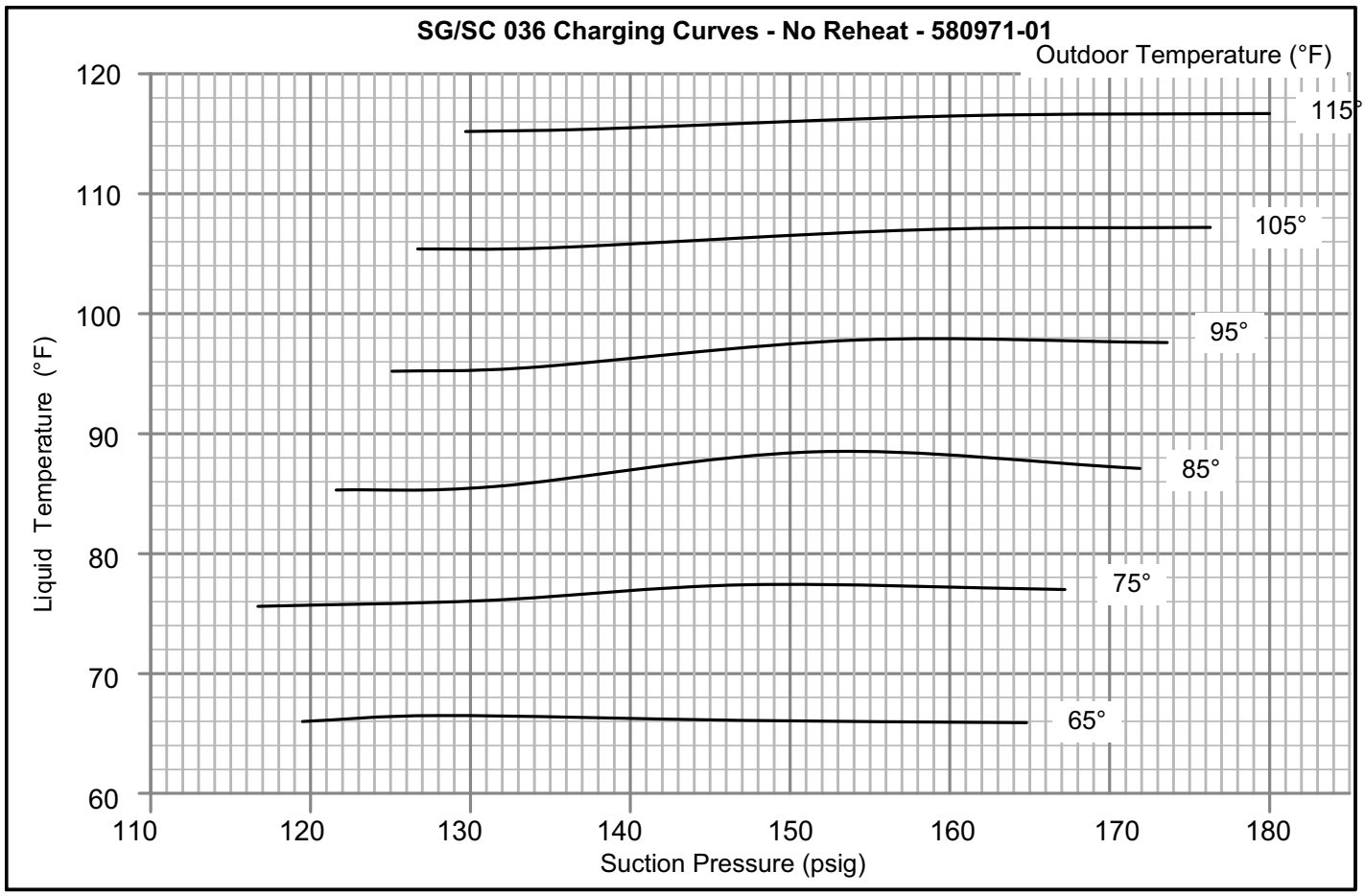
SG/SC 036 Normal Operating Pressures - Reheat - 580979-01											
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
113	246	114	293	113	363	115	439	119	534	125	561
121	249	125	276	124	352	125	423	129	475	133	540
136	264	143	288	147	324	148	380	151	440	152	514
154	278	160	307	168	339	171	382	174	439	176	507

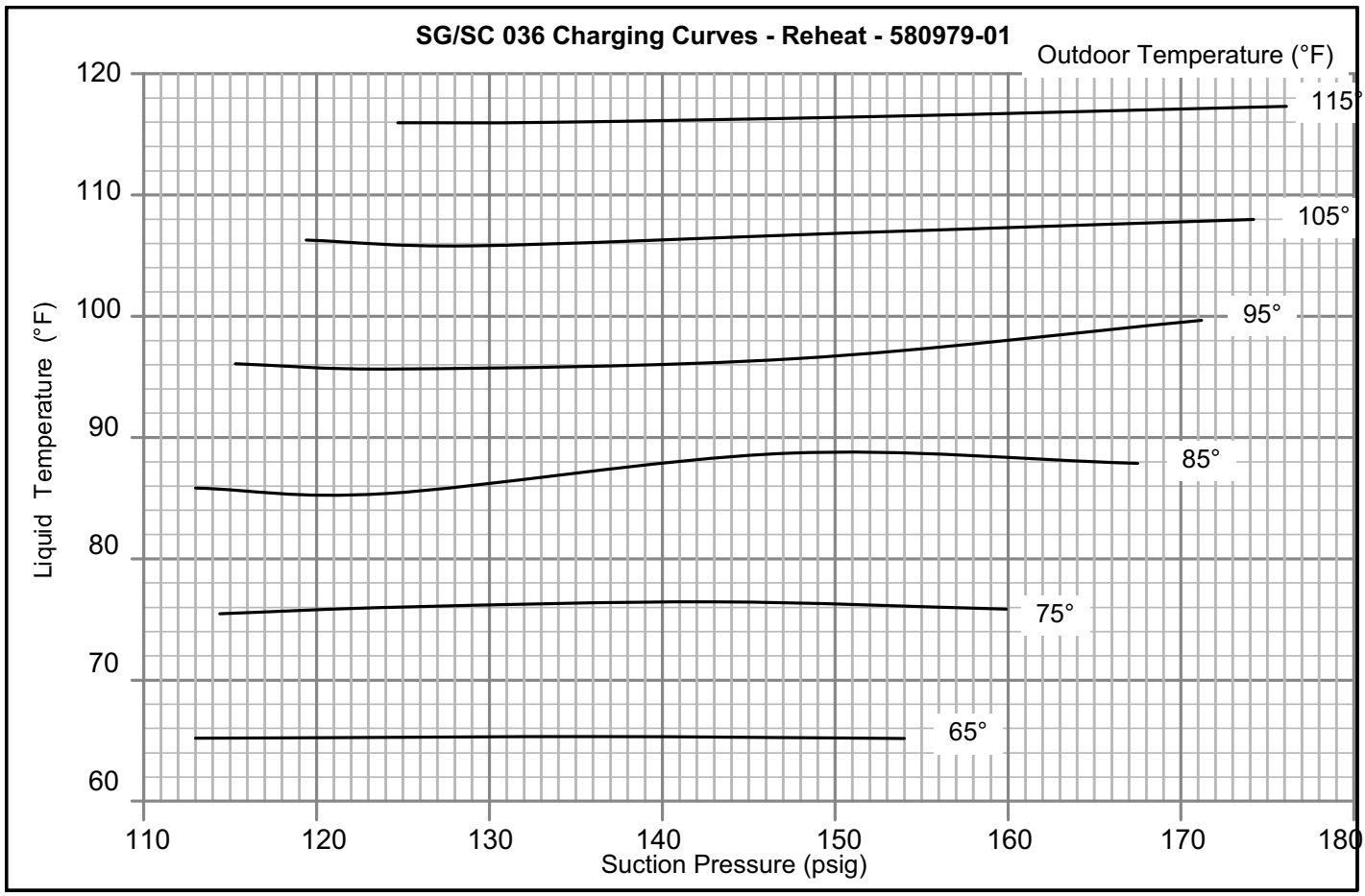
TABLE 4

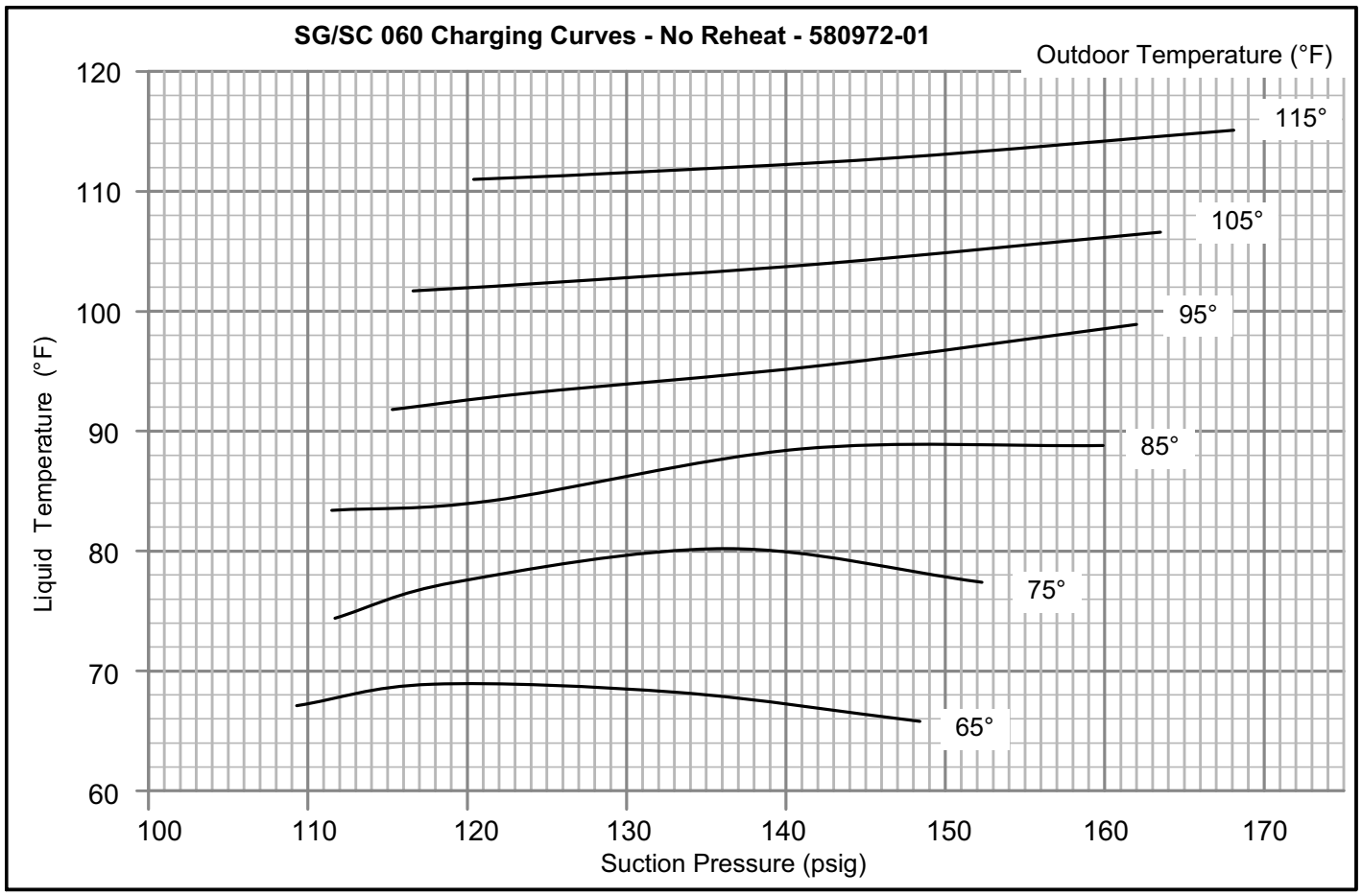
SG/SC 060 Normal Operating Pressures - No Reheat - 580972-01											
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
109	229	112	267	112	313	115	362	117	437	120	536
118	232	119	269	122	312	124	364	124	430	129	513
133	240	136	275	141	316	142	364	143	422	147	489
148	253	152	286	160	325	162	371	164	424	168	484

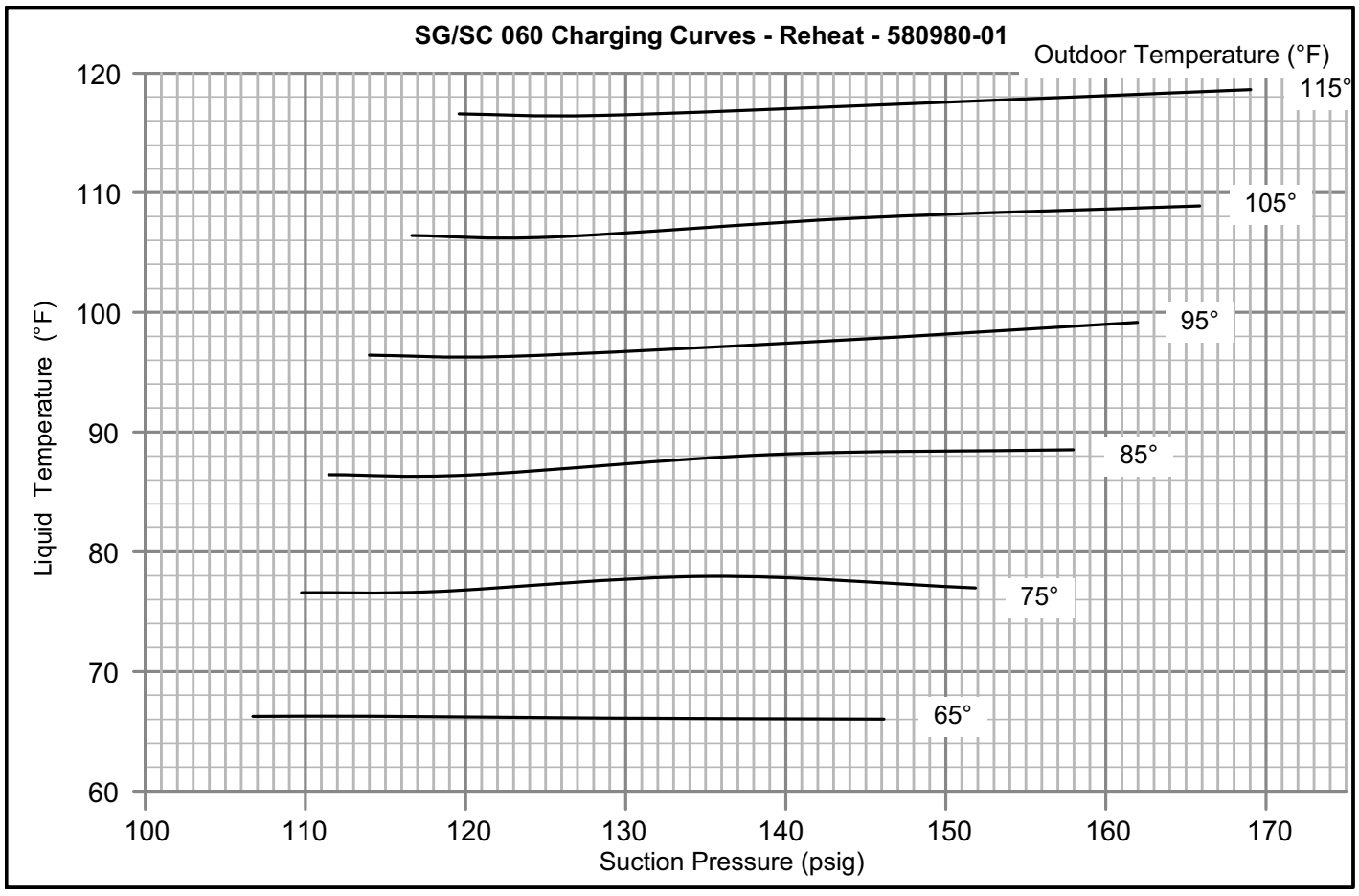
TABLE 5

SG/SC 060 Normal Operating Pressures - Reheat - 580980-01											
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
107	250	110	285	111	335	114	393	117	470	120	562
114	254	118	287	120	333	123	388	125	452	128	535
129	270	135	298	139	339	142	385	145	444	148	511
146	284	152	313	158	348	162	395	166	449	169	510


SG/SC 036 Charging Curves - No Reheat - 580971-01
Outdoor Temperature (°F)
115°
105°
95°
85°
75°
65°
Liquid Temperature (°F)
120
110
100
90
80
70
60
110
120
130
140
150
160
170
180
Suction Pressure (psig)


SG/SC 036 Charging Curves - Reheat - 580979-01
Outdoor Temperature (°F)
115°
105°
95°
85°
75°
65°
Liquid Temperature (°F)
120
110
100
90
80
70
60
110
120
130
140
150
160
170
180
Suction Pressure (psig)


SG/SC 060 Charging Curves - No Reheat - 580972-01
Outdoor Temperature (°F)
115°
105°
95°
85°
75°
65°
Liquid Temperature (°F)
120
110
100
90
80
70
60
100
110
120
130
140
150
160
170
Suction Pressure (psig)


SG/SC 060 Charging Curves - Reheat - 580980-01
Outdoor Temperature (°F)
115°
105°
95°
85°
75°
65°
Liquid Temperature (°F)
120
110
100
90
80
70
60
100
110
120
130
140
150
160
170
Suction Pressure (psig)

C-Cooling Start Up

IMPORTANT-*The crankcase heater must be energized for 24 hours before attempting to start compressor. Set thermostat so there is no demand to prevent compressor from cycling. Apply power to unit.*

1- Set fan switch to AUTO or ON and move system selection switch to cool. Adjust thermostat to a setting below room temperature to bring on the compressor. Compressor will start and cycle on demand from thermostat.

2- The refrigerant circuit is charged with R410A refrigerant. See unit rating plate for type of refrigerant and correct amount of charge.

3- Refer to Cooling Operation and Adjustment section for proper method to check refrigerant charge.

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

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, CB10 circuit breaker, or TB2 terminal strip.

5- Make sure the connections are tight.

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

R410A Refrigerant

Units charged with R-410A refrigerant operate at much higher pressures than R-22. The expansion valve and liquid line drier provided with the unit are approved for use with R-410A. Do not replace them with components designed for use with R-22.

R-410A refrigerant is stored in a pink cylinder.

Manifold gauge sets used with systems charged with R410A refrigerant must be capable of handling the higher system operating pressures. The gauges should be rated for use with pressures of 0-800 on the high side and a low side of 30" vacuum to 250 psi with dampened speed to 500 psi. Gauge hoses must be rated for use at up to 800 psi of pressure with a 4000 psi burst rating.

⚠IMPORTANT

Mineral oils are not compatible with R-410A. If oil must be added, it must be a polyol ester oil.

D-Heating Start-Up

FOR YOUR SAFETY READ BEFORE LIGHTING

BEFORE LIGHTING smell all around the furnace 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 the gas control lever. Never use tools. If the lever will not move or turn by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

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

⚠WARNING

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

⚠WARNING

SMOKE POTENTIAL

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

⚠WARNING

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

⚠WARNING

Do not use this furnace if any part has been under water. A flood-damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion. A qualified service agency should be contacted to inspect the furnace and to replace all gas controls, control system parts, electrical parts that have been wet or the furnace if deemed necessary.

⚠WARNING

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

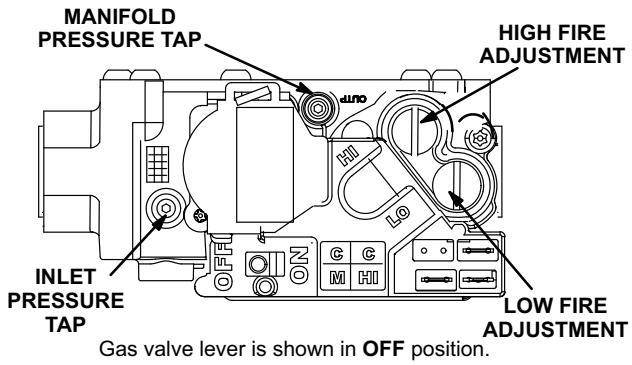
A-Placing Unit In Operation

⚠WARNING

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

Gas Valve Operation for Honeywell VR8305Q (figure 16)

WHITE RODGERS 36J54 GAS VALVE
Two-Stage



Gas valve lever is shown in **OFF** position.

FIGURE 16

1- Set thermostat to lowest setting.

2- Turn off all electrical power to furnace.

3- This furnace 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- Move the lever on the gas valve to **OFF.** Do not force.

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

7- Move the lever on the gas valve to **ON**. Do not force.

8- Close or replace the heat section access panel.

9- Turn on all electrical power to furnace.

10- Set thermostat to desired setting.

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

12- If the furnace 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 furnace will not operate, follow the instructions “Turning Off Gas to Furnace” and call your service technician or gas supplier.

Turning Off Gas to Furnace

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

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

3- Open or remove the heat section access panel.

4- Move the lever on the gas valve to **OFF**.

5- Replace heat section access panel.

IV- SYSTEMS SERVICE CHECKS

A-SGH Heating System Service Checks

All SGH units are ETL and CSA design certified without modification.

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

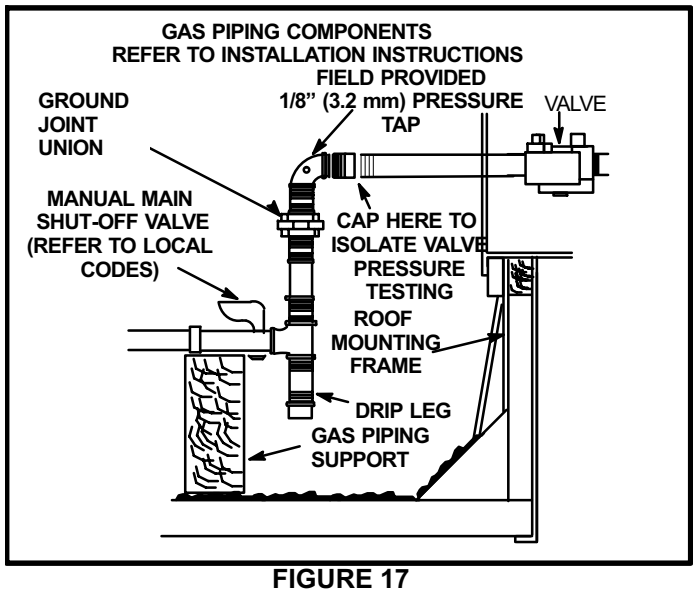


FIGURE 17

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 17.

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**.

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

3-Testing Gas Supply Pressure

When testing gas supply pressure, connect test gauge to the inlet pressure tap (field provided - figure 17). 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." Operating pressure at the unit gas connection must be within ranges shown in table 6.

TABLE 6

Operating Pressures @ Unit Gas Connection - "w.c. (Pa)	
Natural Gas	**LP/Propane Gas**
4.7-10.5 (1170-2610)	11.0-13.0 (2740-3230)

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 manifold outlet pressure tap located on unit gas valve GV1. See figure 16 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 attempts to adjust fail, the valve must be replaced. Refer to figure 13 for location of gas valve (manifold pressure) adjustment screw. See table 7 for normal operating manifold pressure. The valve is adjustable for both high fire and low fire.

All gas valves are factory adjusted. 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.

TABLE 7

TWO STAGE GAS VALVE FACTORY SETTING			
Natural (inlet-5.5" to 10.0")		**L.P. (11.0" to 13.0")**	
Low- Fire	**High- Fire**	**Low- Fire**	**High Fire**
2.0"± 0.3"	**3.5" ± 0.3**	**5.9"± 0.3**	**10.5" ± 0.5**

⚠ 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 for gas supply pressure (above).

⚠ CAUTION

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

5-Proper Gas Flow

1- Operate unit at least 15 minutes before checking gas flow. Determine the time in seconds for **two** revolutions of gas through the meter. (Two revolutions assures a more accurate time).

2- **Divide the number of seconds by two** and compare to the time in table 8. If manifold pressure is correct and rate is incorrect, check gas orifices for proper size and restriction.

3- Remove temporary gas meter if installed.

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

6-High Altitude Derate

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

At altitudes above 2000 ft. units must be derated to match information in the table 9.

At altitudes above 4500 ft. unit must be derated 2% for each 1000 ft. above sea level.

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

7-Inshot Burner

Periodically examine burner flames for proper appearance during the heating season. Before each heating season examine the burners for any deposits or blockage which may have occurred.

8- Turn off both electrical power and gas supply to unit.

9- Open burner compartment access panel.

10- Remove and retain screws securing burner box top cap.

TABLE 8

GAS METER CLOCKING CHART				
Unit Input Rate (Btuh)	Seconds for One Revolution			
	Natural		Natural	LP
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft Dial
75,000	48	96	120	240
105,000	34	69	86	171
125,000	29	58	72	144
130,000	28	55	69	138
150,000	24	48	60	120
180,000	20	40	50	100
240,000	15	30	38	75
260,000	14	28	35	69
360,000	10	20	25	50
480,000	8	15	19	38
Natural-1000 btu/cu ft LP-2500 btu/cu ft				

Note: Table assumes standard temperature (60°F), pressure (30in.Hg.) and fuel heating values (Btuh/Ft.^{3}). Apply pressure corrections in altitudes above 2000 ft.

TABLE 9

Model	Altitude-ft. (m)	Gas Manifold Pressure in. w.g.	
		Natural	LP (Propane)
036	2001-4500	3.4	9.0
060	2001-4500	1.6 / 3.4	5.5 / 9.0

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 mullions.

3- Disconnect combustion air blower. Draw wires through divider panel to allow for clearance of vest panel. Remove access panel(s) and unit center mullions.

4- Remove screws supporting heat exchanger.

5- 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. (4N.m) to ensure proper operation. Re-caulk corners of vest panel

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 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 below:

⚠WARNING

Electric shock hazard. Electrodes are not field-adjustable. Any alterations to the electrode can cause injury, death, or property damage.

1- Disconnect power to unit.

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

3- Reconnect power and adjust thermostat for heating demand.

4- After flame is established signal should be 0.5 to 1.0 . Drop out signal is 0.09.

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

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

10-Combustion Air Inducer

A combustion air proving switch checks combustion air inducer operation before allowing power to the gas controller. Gas controller will not operate if inducer is obstructed.

Under normal operating conditions, the combustion air blower wheel should be checked and cleaned prior t the heating season. However, it should be examined periodically during the heating season to establish an ideal cleaning schedule. With power supply disconnected, the condition of the blower wheel can be determined by looking through the vent opening.

Cleaning Combustion Air Inducer

1- Shut off power supply and gas to unit.

2- Disconnect pressure switch air tubing from combustion air inducer port.

3- Remove and retain screws securing combustion air inducer to flue box. Remove and retain two screws from bracket supporting vent connector. See figure 18.

4- Clean blower wheel blades with a small brush and wipe off any dust from housing. Clean accumulated dust from front of flue box cover.

5- Return combustion air blower motor and vent connector to original location and secure with retained screws. It is recommended that the combustion air inducer gasket be replaced during reassembly.

6- Clean combustion air inlet louvers on heat access panel using a small brush.

COMBUSTION AIR INDUCER CLEANING

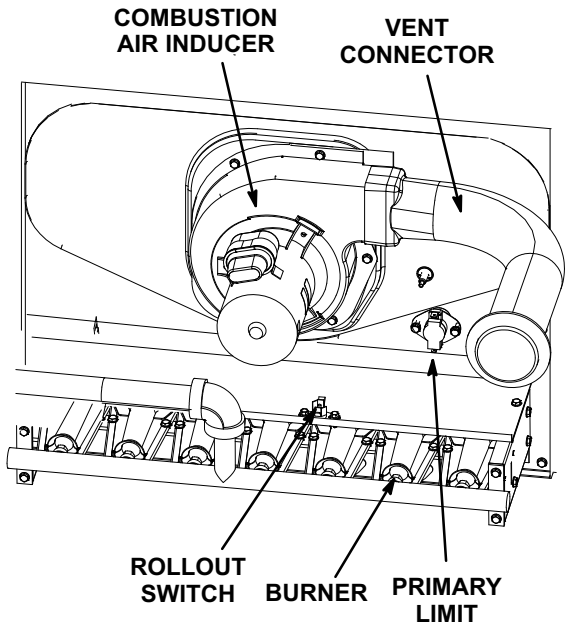


FIGURE 18

E-Flue Passageway and Flue Box

1- Remove combustion air inducer assembly as described in the previous section.

2- Remove flue box cover. Clean with a wire brush as required.

3- Clean tubes with a wire brush.

4- Reassemble the unit. The flue box cover gasket and combustion air inducer gasket should also be replaced during reassembly.

B-Cooling System Service Checks

SGH units are factory charged and require no further adjustment; however, charge should be checked. See section III Charging.

1-Gauge Manifold Attachment

Service gauge ports are identified in figure 8. Attach high pressure line to discharge line Schrader port and the low pressure line to the suction line Schrader port.

NOTE-When unit is properly charged discharge and suction line pressures should approximate those in tables 2 through 5.

V-MAINTENANCE

⚠ CAUTION

Electrical shock hazard. Turn off power to unit before performing any maintenance, cleaning or service operation on the unit.

A-Filters

Units are equipped with filters as shown in table 10. Units will accept 4" filters. Filters should be checked monthly and replaced when necessary with filters of like kind and size. Take note of air flow direction marking on filter frame when reinstalling filters.

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

TABLE 10
NUMBER AND SIZE OF FILTER BY UNIT

SGH Unit	Qty	Filter Size - inches (mm)
036, 060	4	16 X 20 X 2 (406 X 508 X 51)

B-Lubrication

All motors used in SGH 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.

⚠ CAUTION

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

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 refrigerant charge should be checked. See section III-Charging.

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____

VI-ACCESSORIES

A-S1CURB Mounting Frame

When installing either the SCH units on a combustible surface for downflow discharge applications, the Lennox S1CURB71101 14-inch or S1CURB73101 24-inch height roof mounting frame is used. The roof mounting frames are recommended in all other applications but not required. If the SCH 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 mounting frame is shown in figure 19. 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 20. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

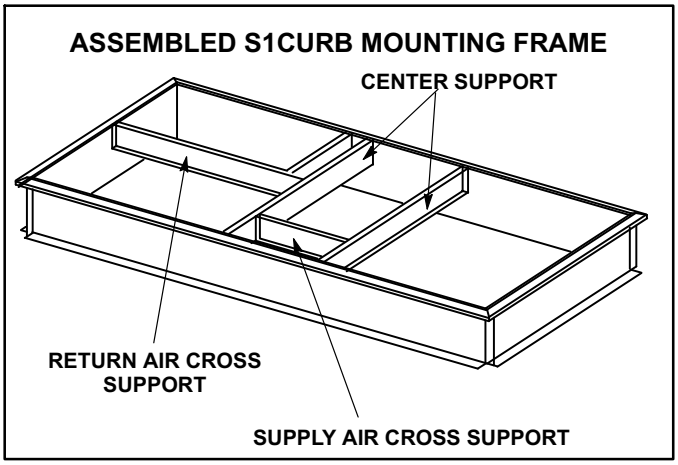


FIGURE 19

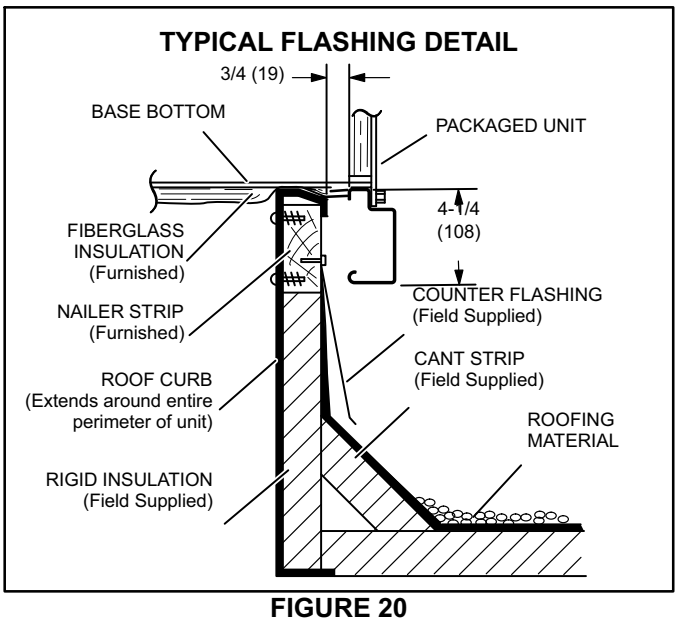


FIGURE 20

B-Outdoor Air Dampers

Dampers are manually operated to allow up to 25 percent outside air into the system at all times (see figure 21).

C-Economizer (Factory Installed)

Units may contain an optional economizer. The economizer uses outdoor air for free cooling when the outdoor temperature and/or humidity is suitable. The economizer is controlled by the A55 Unit Controller.

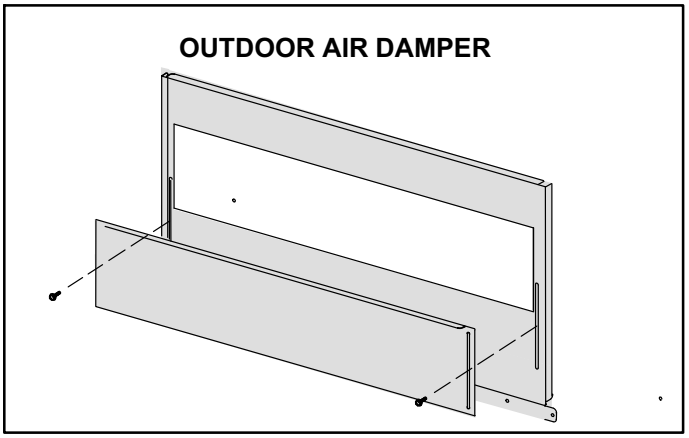


FIGURE 21

D- Gravity Exhaust Dampers

Gravity exhaust dampers may be used in downflow and horizontal air discharge applications. Gravity exhaust dampers are installed in the return air duct.

The 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.

E-Control Systems

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

F-Smoke Detectors A17 and A64

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

G-Blower Proving Switch S52

The blower proving switch monitors blower operation and locks out the unit in case of blower failure. The switch is N.O. and closes at 0.14" W.C. (34.9 Pa) The switch is mounted on the side of the front of the blower enclosure.

H-Indoor Air Quality (CO_2) Sensor A63

The indoor air quality sensor monitors CO_2 levels and reports the levels to the main control module A55. 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.

I-Drain Pan Overflow Switch S149 (optional)

The overflow switch is used to interrupt cooling operation when excessive condensate collects in the drain pan. The N.O. overflow switch is controlled by A55 Prodigy board located in the unit control panel. When the overflow switch closes, 24VAC power is interrupted and after a five-second delay unit compressors are de-energized. Once the condensate level drops below the set level, the switch will open. After a five-minute delay the compressor will be energized.

J-LP / Propane Kit

A natural to LP / propane gas changeover kit is required for gas conversion on SGH036/060 series units. The kit includes a gas valve and burner orifices.

K-Indoor Air Quality (CO_2) Sensor A63

The indoor air quality sensor monitors CO_2 levels and reports the levels to the Unit Controller A55. 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.

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 side 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-Factory Installed Hot Gas Reheat (option)

General

Hot gas reheat units provide a dehumidifying mode of operation. These units contain a reheat coil adjacent to and downstream of the evaporator coil. Reheat coil solenoid valve L14, routes 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 22 for reheat refrigerant routing.

L14 Reheat Coil Solenoid Valve

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

Reheat Setpoint

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

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

Check-Out

Test reheat 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- Use Unit Controller key pad to elect SERVICE > TEST > DEHUMIDIFIER.

The blower and compressor (reheat) should be operating. DEHUMIDIFIER 1 ON will be appear on the Unit Controller display.

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

Default Reheat Operation

During reheat mode free cooling is locked out.

No Y1 demand but a call for dehumidification:

Compressor is operating, blower is on, and the reheat valve is energized.

Y1 demand:

Compressor is operating, blower is on, and the reheat valve is energized.

Y2 demand:

Compressor is operating, blower is on, and the reheat valve is de-energized.

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.

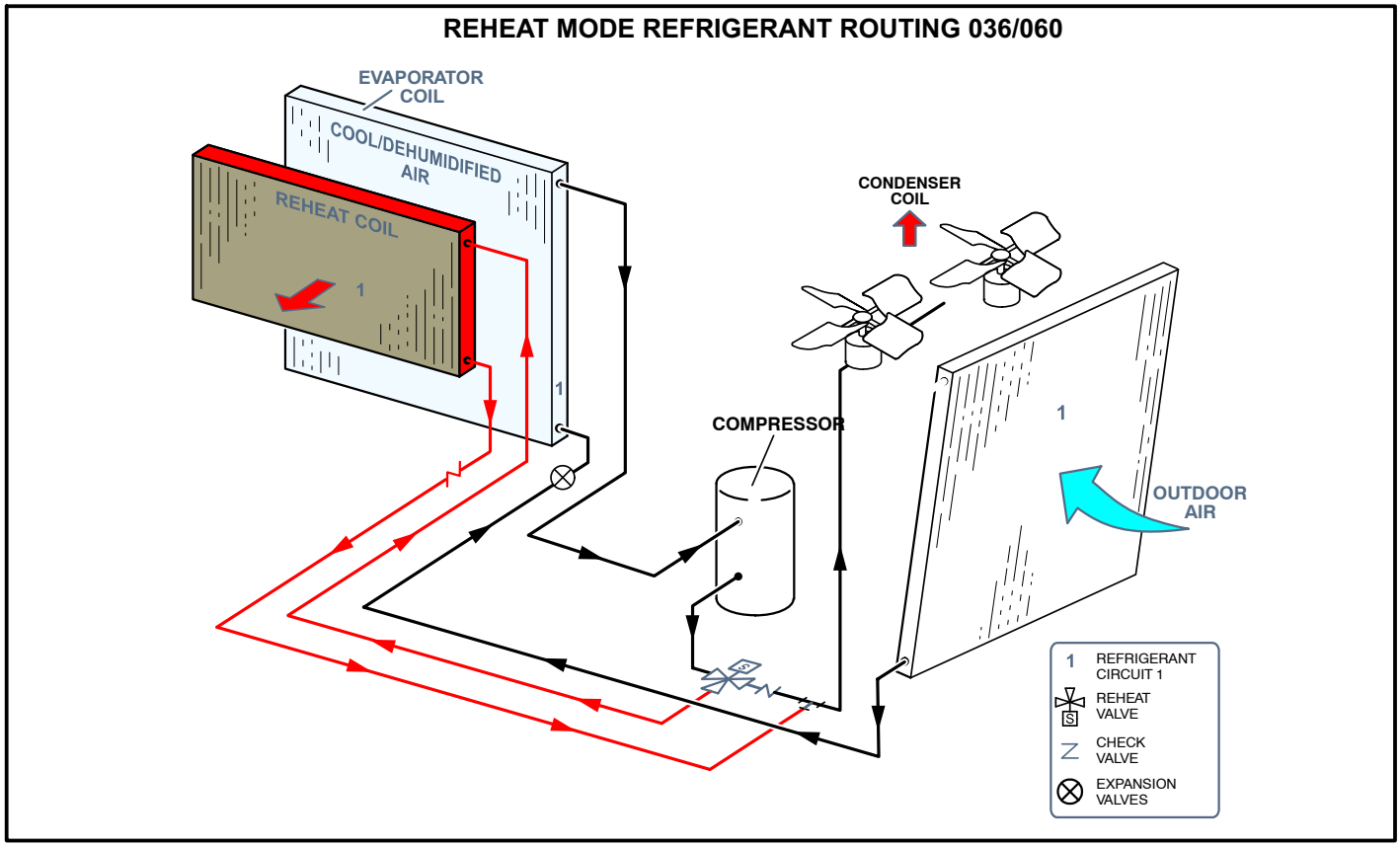
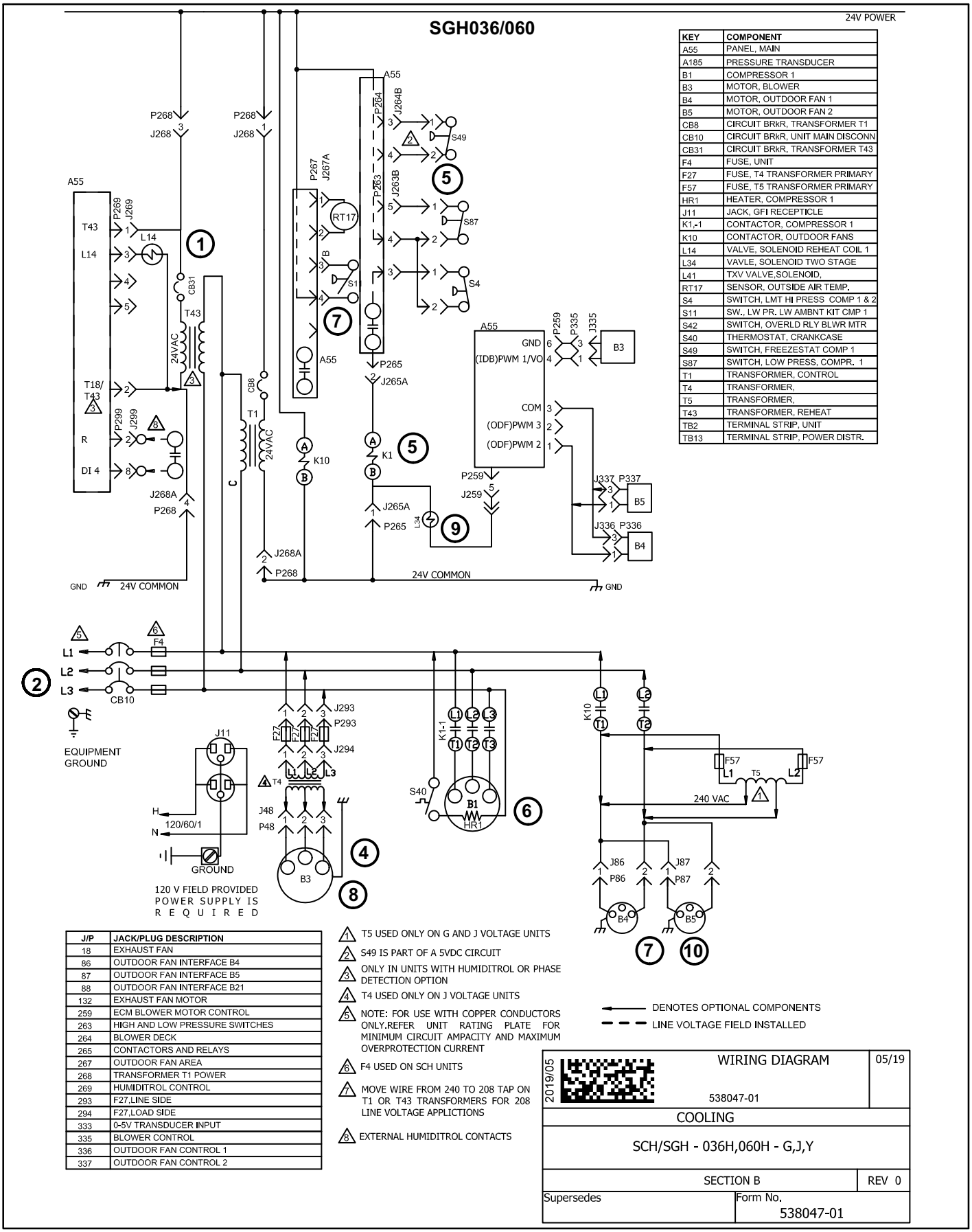

REHEAT MODE REFRIGERANT ROUTING 036/060
EVAPORATOR COIL
COOL/DEHUMIDIFIED AIR
REHEAT COIL
1
1
CONDENSER COIL
COMPRESSOR
1
OUTDOOR AIR
1 REFRIGERANT CIRCUIT 1
REHEAT VALVE
CHECK VALVE
EXPANSION VALVES

FIGURE 22

VII- WIRING DIAGRAMS / SEQUENCE OF OPERATION



KEY	COMPONENT
A55	PANEL, MAIN
A185	PRESSURE TRANSDUCER
B1	COMPRESSOR 1
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
CB8	CIRCUIT BRkR, TRANSFORMER T1
CB10	CIRCUIT BRkR, UNIT MAIN DISCONN
CB31	CIRCUIT BRkR, TRANSFORMER T43
F4	FUSE, UNIT
F27	FUSE, T4 TRANSFORMER PRIMARY
F57	FUSE, T5 TRANSFORMER PRIMARY
HR1	HEATER, COMPRESSOR 1
J11	JACK, GFI RECEPTICLE
K1,-1	CONTACTOR, COMPRESSOR 1
K10	CONTACTOR, OUTDOOR FANS
L14	VALVE, SOLENOID REHEAT COIL 1
L34	VAVLE, SOLENOID TWO STAGE
L41	TXV VALVE,SOLENOID,
RT17	SENSOR, OUTSIDE AIR TEMP.
S4	SWITCH, LMT HI PRESS COMP 1 & 2
S11	SW., LW PR. LW AMBNT KIT CMP 1
S42	SWITCH, OVERLD RLY BLWR MTR
S40	THERMOSTAT, CRANKCASE
S49	SWITCH, FREEZESTAT COMP 1
S87	SWITCH, LOW PRESS, COMPR. 1
T1	TRANSFORMER, CONTROL
T4	TRANSFORMER,
T5	TRANSFORMER,
T43	TRANSFORMER, REHEAT
TB2	TERMINAL STRIP, UNIT
TB13	TERMINAL STRIP, POWER DISTR.

J/P	JACK/PLUG DESCRIPTION
18	EXHAUST FAN
86	OUTDOOR FAN INTERFACE B4
87	OUTDOOR FAN INTERFACE B5
88	OUTDOOR FAN INTERFACE B21
132	EXHAUST FAN MOTOR
259	ECM BLOWER MOTOR CONTROL
263	HIGH AND LOW PRESSURE SWITCHES
264	BLOWER DECK
265	CONTACTORS AND RELAYS
267	OUTDOOR FAN AREA
268	TRANSFORMER T1 POWER
269	HUMIDITROL CONTROL
293	F27,LINE SIDE
294	F27,LOAD SIDE
333	0-5V TRANSDUCER INPUT
335	BLOWER CONTROL
336	OUTDOOR FAN CONTROL 1
337	OUTDOOR FAN CONTROL 2

1. T5 USED ONLY ON G AND J VOLTAGE UNITS
2. S49 IS PART OF A 5VDC CIRCUIT
3. ONLY IN UNITS WITH HUMIDITROL OR PHASE DETECTION OPTION
4. T4 USED ONLY ON J VOLTAGE UNITS
5. NOTE: FOR USE WITH COPPER CONDUCTORS ONLY.REFER UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERPROTECTION CURRENT
6. F4 USED ON SCH UNITS
7. MOVE WIRE FROM 240 TO 208 TAP ON T1 OR T43 TRANSFORMERS FOR 208 LINE VOLTAGE APPLICTIONS
8. EXTERNAL HUMIDITROL CONTACTS

2019/05	WIRING DIAGRAM 538047-01	05/19
COOLING		
SCH/SGH - 036H,060H - G,J,Y		
SECTION B		REV 0
Supersedes	Form No. 538047-01	

SGH036, SCH060 Y,G &Y Voltage Sequence of Operation

Power:

1 Line voltage from unit disconnect energizes transformer T1. T1 provides 24VAC power to the A55 Unit Controller. A55 provides 24VAC to the unit cooling, heating and blower controls.

2 Line voltage from unit disconnect provides voltage to compressor crankcase heaters HR1 (through discharge line thermostat) and compressor contactor K1. Voltage is distributed directly to blower motor B3 and outdoor fan motors B4 and B5.

Blower Operation:

The A55 Unit Controller receives a demand from thermostat terminal G. A55 energizes blower motor circuit follows:

3 A55, through motor control board energizes blower B3 via programmed motor settings. Motor settings are field-adjustable.

First-Stage Cooling

4 A55 Unit Controller receives a Y1 and G cooling demand and energizes blower B3 in low speed.

5 After A55 proves n.c. low pressure switch S87, n.c. freezestat S49, and n.c. high pressure switch S4, compressor contactor K1 is energized.

6 N.O. contacts K1-1 close energizing the compressor B1. On two-speed systems (3, 4, and 5 tons) compressor is energized on low speed.

7 S11 n.o. contact close below 62ºF. A55 energizes outdoor fan motors B4 and B5 on low speed.

Second-Stage Cooling

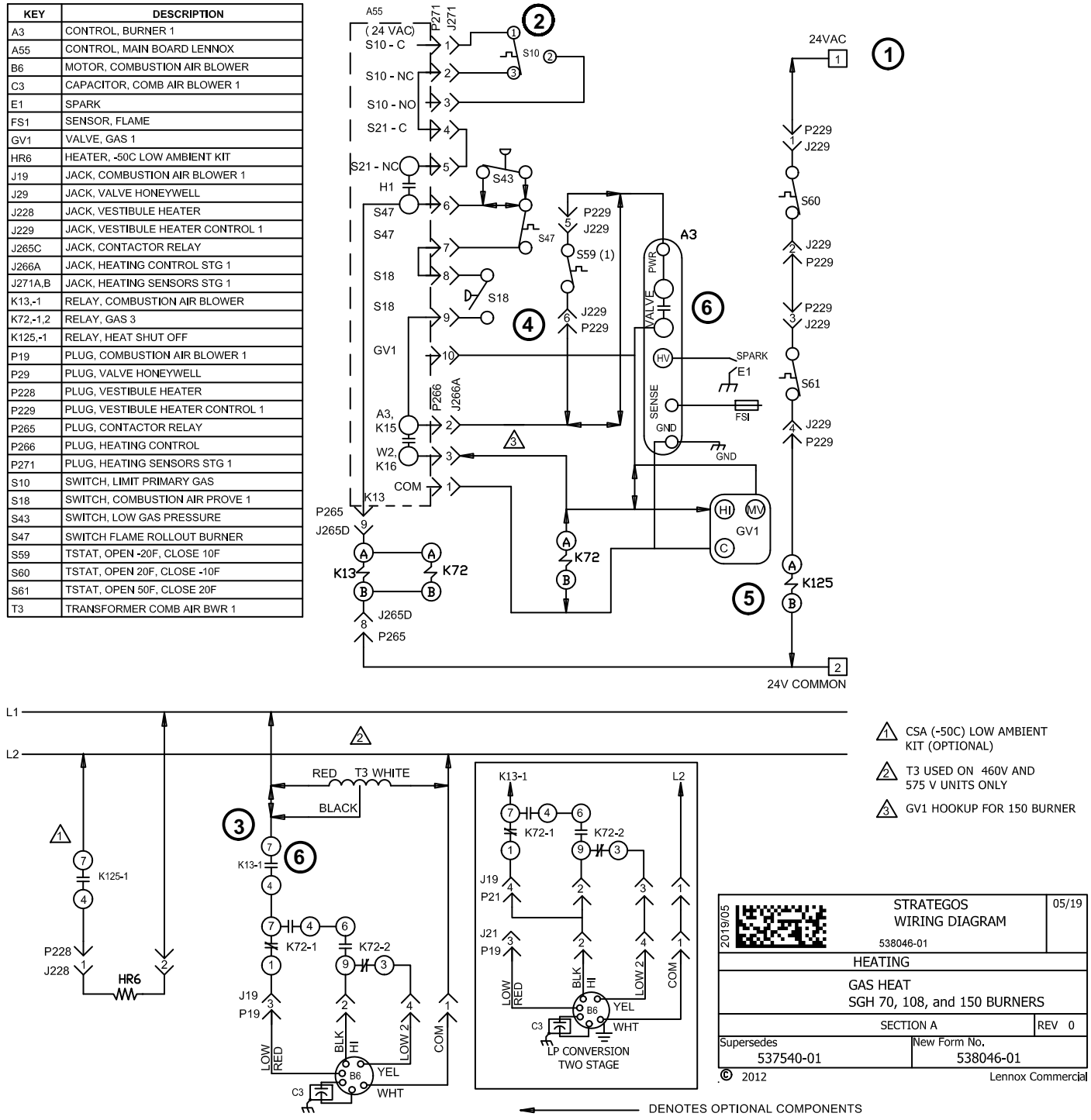
8 A55 receives a Y2 and G cooling demand and energizes blower B3 in high speed.

9 A55 energizes compressor solenoid L34, switching compressor to high speed.

10 - A55 energizes outdoor fan motors B4 and B5 on high speed.

SGH036, SGH060 GAS HEAT UNIT WIRING DIAGRAM

KEY	DESCRIPTION
A3	CONTROL, BURNER 1
A55	CONTROL, MAIN BOARD LENNOX
B6	MOTOR, COMBUSTION AIR BLOWER
C3	CAPACITOR, COMB AIR BLOWER 1
E1	SPARK
FS1	SENSOR, FLAME
GV1	VALVE, GAS 1
HR6	HEATER, -50C LOW AMBIENT KIT
J19	JACK, COMBUSTION AIR BLOWER 1
J29	JACK, VALVE HONEYWELL
J228	JACK, VESTIBULE HEATER
J229	JACK, VESTIBULE HEATER CONTROL 1
J265C	JACK, CONTACTOR RELAY
J266A	JACK, HEATING CONTROL STG 1
J271A,B	JACK, HEATING SENSORS STG 1
K13,-1	RELAY, COMBUSTION AIR BLOWER
K72,-1,2	RELAY, GAS 3
K125,-1	RELAY, HEAT SHUT OFF
P19	PLUG, COMBUSTION AIR BLOWER 1
P29	PLUG, VALVE HONEYWELL
P228	PLUG, VESTIBULE HEATER
P229	PLUG, VESTIBULE HEATER CONTROL 1
P265	PLUG, CONTACTOR RELAY
P266	PLUG, HEATING CONTROL
P271	PLUG, HEATING SENSORS STG 1
S10	SWITCH, LIMIT PRIMARY GAS
S18	SWITCH, COMBUSTION AIR PROVE 1
S43	SWITCH, LOW GAS PRESSURE
S47	SWITCH FLAME ROLLOUT BURNER
S59	TSTAT, OPEN -20F, CLOSE 10F
S60	TSTAT, OPEN 20F, CLOSE -10F
S61	TSTAT, OPEN 50F, CLOSE 20F
T3	TRANSFORMER COMB AIR BWR 1



2019/05	STRATEGOS WIRING DIAGRAM 538046-01	05/19
	HEATING	
	GAS HEAT SGH 70, 108, and 150 BURNERS	
	SECTION A	REV 0
Supersedes 537540-01	New Form No. 538046-01	

Heat Call

1- Heating demand initiates at W1 in the thermostat.

2- 24VAC is routed through TB34 to the Unit Controller A55. 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 to energize combustion air blower B6.

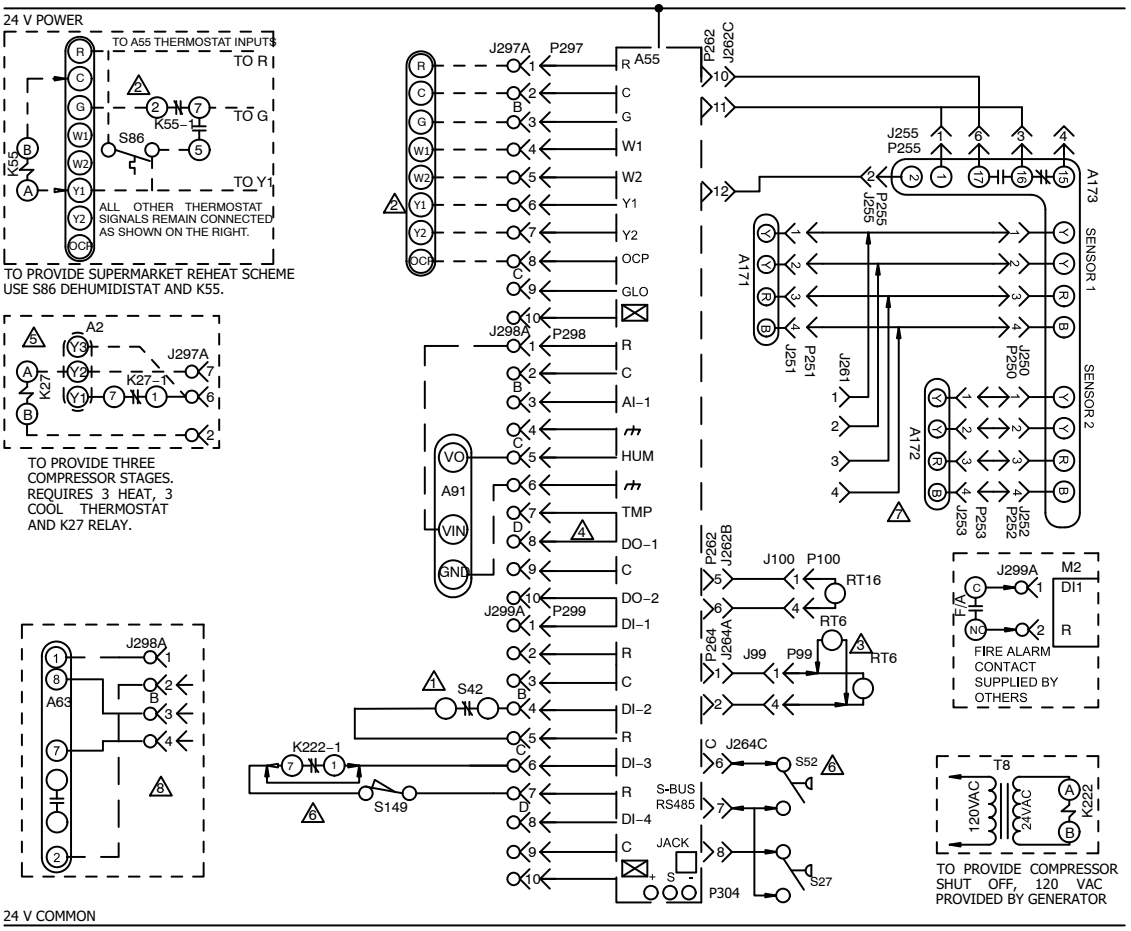
4- After the combustion air blower B6 has reached full speed, the combustion air proving switch S18 contacts close. The A55 routes 24VAC through N.C. burner flame rollout switch S47 and the closed contacts of combustion air proving switch S18 to energize the ignition module A3.

5- After a 30 second delay A3 energizes the ignitor and gas valve GV1.

End of Heat Call

6- Ignition A3 is de-energized by control module A55 in turn de-energizing GV1. Combustion air blower relay K13 is also de-energized.

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT



DESCRIPTION	
KEY	COMPONENT
A2	SENSOR, ELECTRONIC THERMOSTAT
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
K222, –1	RELAY, COMPRESSOR LOCKOUT
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
S86	SWITCH, DEHUMIDISTAT
S149	SWITCH, OVERFLOW ONE
T8	TRANSFORMER, 120 V GENERATOR POWERED

1. FOR MOTORS WITH S42 EXTERNAL OVERLOAD LESS INVERTER, SEE INVERTER WITH BY PASS FOR S42 HOOK UP
2. USE S86 DEHUMIDISTAT AND K55 FOR OPTIONAL SUPERMARKET REHEAT SCHEME, A55 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 A55 BOARD
6. A55 SETTINGS MUST BE MODIFIED WHEN K222, S42, S52, S149 OR S179 ARE INSTALLED
7. CONNECT A172 SENSOR TO J261 ON SUPPLY AIR SMOKE DETECTOR ONLY

DESIGNATES OPTIONAL WIRING
CLASS II FIELD WIRING

04/18	WIRING DIAGRAM 537985-01	04/18
ACCESSORIES		
ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT FOR STRATEGOS		
SECTION C		REV. 0
Supersedes 537108-01	New Form No. 537985-01	

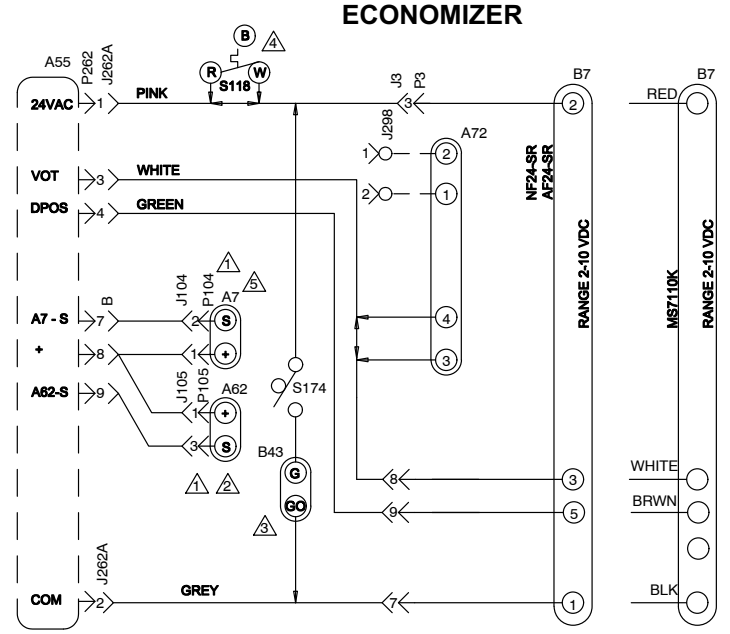
POWER:

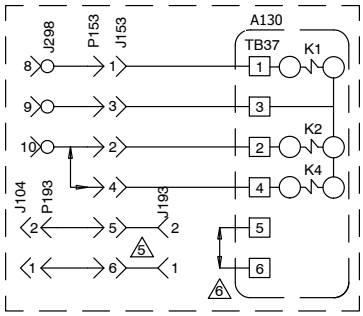
1- A55 Unit Controller, located in the main control box, supplies thermostat components with 24VAC.

OPERATION:

2- A55 receives data from the electronic thermostat A2 (Y1, Y2, W1, W2, G) and energizes the appropriate components for heat or cool demand.

ECONOMIZER





ENERGY RECOVERY WHEEL HOOK UP

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

△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

DESIGNATES OPTIONAL WIRING

CLASS II FIELD WIRING

04/18	WIRING DIAGRAM 537189-01	04/18
ACCESSORIES		
ENERGENCE/STRATEGOS SERIES ECONOMIZER AND MOTORIZED OAD PIVOTING WHEEL ENERGY RECOVERYSYSTEM OPTION		
SECTION D		REV 3
Supersedes	New Form No. 537189-01	

POWER:

1- Terminal strip TB34 energizes the economizer components with 24VAC.

OPERATION:

2- The main control module A55 along with outdoor enthalpy sensor A7 and indoor enthalpy sensor A62 (if differential enthalpy is used) communicates to the economizer control module A56 when to power the damper motor B7.

3- The economizer control module A56 supplies B7 with 0 - 10 VDC to control the positioning of economizer.

4- The damper actuator provides 2 to 10 VDC position feedback.