UNIT INFORMATION

SCH SERIES
3 & 5 ton

100116

Service Literature

SCH036 & 060 With R-454B

The SCH 3 and 5 ton (10.5 and 17.5 kW) units units are configure to order units (CTO) with a wide selection of factory installed options.

Electric heat operates in single or multiple stages depending on the kW input size. 10, 15, 20, and 30kW heat sections are available. SCH units have identical refrigerant circuits with 3, and 5 ton (10.5 and 17.5 kW) cooling capacities. All units utilize one compressor.

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

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

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

Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

⚠ WARNING

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

⚠ WARNING

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

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

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

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

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⚠ WARNING

To prevent serious injury or death:

1- Lock-out/tag-out before performing maintenance.

2- If system power is required (e.g., smoke detector maintenance), disable power to blower, remove fan belt where applicable, and ensure all controllers and thermostats are set to the "OFF" position before performing maintenance.

3- Always keep hands, hair, clothing, jewelry, tools, etc., away from moving parts.

⚠ WARNING

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

⚠ CAUTION

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

⚠ WARNING

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

⚠ WARNING

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

⚠ CAUTION

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

⚠ IMPORTANT

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

⚠ WARNING

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

OPTIONS / ACCESSORIES

Item Description			Order Number	Size 036	Size 060
COOLING SYSTEM					
Corrosion Protection	Coated indoor/outdoor coil assemblies, painted cabinet interior		Factory	O	O
	Coated outdoor coil assembly		Factory	O	O
Drain Pan Overflow Switch			**21Z07**	OX	OX
BLOWER - SUPPLY AIR					
ECM DirectPlus™, Direct Drive, MSAV® (Multi-Stage Air Volume)		1.5 hp	Factory	O	O
Belt Drive, MSAV® (Multi-Stage Air Volume)		3 hp	Factory		
		5 hp	Factory		
		7.5 hp	Factory		
CABINET					
Combination Coil/Hail Guards			**19H54**	X	X
			19H55		
			13T16		
CONTROLS					
Commercial Controls		LonTalk® Module	Factory	O	O
Dirty Filter Switch			Factory	O	O
Smoke Detectors	Supply or Return (Power board and one sensor)		**10B40**	OX	OX
			10B42		
	Supply and Return (Power board and two sensors)		**10B41**	OX	OX
			10B43		
ELECTRICAL					
Voltage 60 Hz		460V - 3 phase	Factory	O	O
		575V - 3 phase	Factory	O	O
GFI Service Outlets (**REQUIRED**)	20 amp non-powered, field-wired (all voltages)		Factory	O	O
Weatherproof Cover for GFI			**10C89**	X	X
ELECTRIC HEAT					
10 kW		460V-3ph	Factory	O	O
15 kW		460V or 575V-3ph	Factory	O	O
20 kW		460V-3ph	Factory		O
30 kW		460V or 575V-3ph	Factory		O
40 kW		460V or 575V-3ph	Factory		
45 kW		460V or 575V-3ph	Factory		
60 kW		460V or 575V-3ph	Factory		
90 kW		460V or 575V-3ph	Factory		
HUMIDITROL® CONDENSER REHEAT OPTION					
Humiditrol® Dehumidification Option			Factory	O	O

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

OPTIONS / ACCESSORIES

Item Description		Order Number	Size 036	Size 060
INDOOR AIR QUALITY				
Air Filters				
Standard Air Filters	MERV 8 (16 x 20 x 2 - Order 4 per unit)	**54W20**	OX	OX
	MERV 8 (20 x 25 x 2 - Order 4 per unit)	**50W61**		
	MERV 8 (20 x 20 x 2 - Order 12 per unit)	**54W21**		
Healthy Climate® High Efficiency Air Filters	MERV 13 (16 x 20 x 2 - Order 4 per unit)	**52W37**	OX	OX
	MERV 13 (20 x 25 x 2 - Order 4 per unit)	**52W41**		
	MERV 13 (20 x 20 x 2 - Order 12 per unit)	**52W39**		
Replacement Media Filter With Metal Mesh Frame 20 x 20 x 2 Order 12 per unit (includes non-pleated filter media)		**44N60**		
Indoor Air Quality (CO_2) Sensors				
Sensor - Wall-mount, off-white plastic cover with LCD display		**77N39**	X	X
Sensor - Wall-mount, off-white plastic cover, no display		**23V86**	X	X
Sensor - Black plastic case, LCD display, rated for plenum mounting		**87N52**	X	X
Sensor - Black plastic case, no display, rated for plenum mounting		**23V87**	X	X
CO_2 Sensor Duct Mounting Kit - for downflow applications		**23Y47**	X	X
Aspiration Box - for duct mounting non-plenum rated CO_2 sensors (**77N39**)		**90N43**	X	X
ECONOMIZER				
High Performance Economizer (Approved for California Title 24 Building Standards / AMCA Class 1A Certified)				
ULL Performance Economizer - Includes Outdoor Air Hood		Factory	O	O
(Global Sensor, field provided, order Barometric Relief Dampers separately)		**18X87**		
Economizer Controls				
Differential Enthalpy (Not for Title 24)	Order 2	**21Z09**	OX	OX
Global Control	Sensor Field Provided	Factory	O	O
Barometric Relief Dampers				
Barometric Relief Dampers (No Hood)		Factory	O	O
Barometric Relief Dampers With Power Exhaust Fans (Hood Furnished)		Factory		
Barometric Relief Dampers Without Power Exhaust Fans (No Hood)		Factory		
Barometric Relief Dampers Without Power Exhaust Fans (Hood Furnished)		Factory		
POWER EXHAUST				
Standard Static		Factory		
OUTDOOR AIR				
Motorized Outdoor Air Dampers with Outdoor Air Hood and Bird Screen		**18X89**		
Manual Outdoor Air Damper with Outdoor Air Hood and Bird Screen		**18X88**		
ROOF CURBS				
Hybrid Roof Curbs, Downflow, 14 in. height		**11F70**	X	X
		11F72		
	Full Perimeter	**11F74**		
Hybrid Roof Curbs, Downflow 24 in. height		**11F71**	X	X
		11F73		
	Full Perimeter	**11F75**		
Curb Alignment (Adapter plate mates new unit to existing roof curb for replacement of LCE240)		Factory		

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

SPECIFICATIONS — DIRECT DRIVE | 3 - 5 TON

Model		SCH036H5E	SCH060H5E
Nominal Tonnage		3	5
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	37,000	60,300
	[1] Net Cooling Capacity - Btuh	35,500	57,900
	AHRI Rated Air Flow - Cfm	1200/850	1750/1300
	Total Unit Power	2.6	4.7
	[1] SEER2 (Btuh/Watt) - 460V/575V-3ph	17.0	16.1
	[1] EER2 (Btuh/Watt) - 460V/575V-3ph	13.5	12.4
Refrigerant Charge	Refrigerant Type	R-454B	R-454B
	Without Reheat Option	5 lbs. 2 oz.	5 lbs. 6 oz.
	With Reheat Option	5 lbs. 8 oz.	5 lbs. 5 oz.
[2] Sound Rating Number	dBA	67	78
Electric Heat Options Available		See Page 8	
Compressor Type (Number)		Two-Stage Scroll (1)	Two-Stage Scroll (1)
Condenser Coil	Net face area - ft.^{2}	18.7	18.7
	Rows	1	1
	Fins - in.	23	23
Condenser Fan(s)	Motor (number) HP (type)	(2) 1/3 (ECM)	(2) 1/3 (ECM)
	Rpm	340-560	340-860
	Watts	90-136	90-354
	Diameter (Number) - in.	(2) 24	(2) 24
	Blades	3	3
	Total air volume - Cfm	3900	6300
Evaporator Coil	Net face area - ft.^{2}	7.02	7.02
	Rows	1	1
	Fins - in.	20	20
	Condensate drain size (NPT) - in.	(1) 1	(1) 1
	Expansion device type	Balance Port TXV, removable head	
[3] Indoor Blower	Nominal motor HP (type)	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 13	
	Number and size - in.	(4) 16 x 20 x 2	(4) 16 x 20 x 2
Line voltage data (Volts-Phase-Hz)		460-3-60, 575-3-60	

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

[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.

MINIMUM R454B SPACE AND CFM REQUIREMENTS

Minimum Airflow[1]		
Unit	Q_{min}(CFM)	Q_{min}(m^3h)
SCH036	135	230
/SCH060	142	241
SCH036 W/ Humidtrol	145	247
SCH060 W/ Humidtrol	140	238

[1]The minimum airflow is the lowest cfm allowed during venting option (leak mitigation)

Minimum Room Area of Conditioned Space[2]		
Unit	TA_{min}(ft^2)	TA_{min}(m^2)
SCH036	75.07	6.97
SCH060	78.74	7.31
SCH036 W/ Humidtrol	80.57	7.49
SCH060 W/ Humidtrol	77.64	7.21

[2] The minimum room area of conditioned space is trhe smallest are the unit can service.

Refrigerant Charge R-454B		
Unit	M_c(lbs)	M_c(kg)
SCH036	5.13	2.32
SCH060	5.38	2.44
SCH036 W/ Humidtrol	5.50	2.49
SCH060 W/ Humidtrol	5.30	2.40

Altitude Adjustment Factor[3]									
Halt	0	200	400	600	800	1000	1200	1400	1600
AF	1	1	1	1	1.02	1.05	1.04	1.1	1.12
Halt	1600	1800	2000	2200	2400	2600	2800	3000	3200
AF	1.12	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.4

[3] Use the Altitude Ajustment Factor to adjust the values in the table above to different altitudes. Find the relevant altitude above sea level in two “Halt” rows and then multiply the value from the table above by the factor number. Example for a SCH036 at 1000 ft. above sea level, multiply 135 by 1.05 to get 141.75Q_{min}

SCH036H5E / SCH060H5E BLOWER PERFORMANCE

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

NOTE - MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT:

SCH036H - 1020 CFM

SCH060H - 1650 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	
	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
900	1163	129	1253	148	1341	165	1428	181	1512	191	1587	206	1653	232	1714	266	1775	301	1835	333
1000	1315	129	1396	152	1475	174	1552	195	1626	216	1692	242	1752	277	1810	316	1870	351	1928	382
1100	1463	131	1531	164	1599	197	1666	229	1730	261	1791	295	1850	331	1907	367	1964	400	2021	432
1200	1576	173	1640	210	1705	247	1769	283	1832	319	1893	353	1952	387	2010	420	2067	452	2124	485
1300	1683	225	1749	263	1814	300	1878	337	1941	372	2002	407	2061	441	2119	474	2176	507	2235	538
1400	1796	279	1862	317	1927	354	1991	391	2054	427	2114	463	2173	497	2231	530	2289	563	2345	595
1500	1912	332	1977	371	2042	409	2105	446	2168	482	2228	517	2287	552	2345	585	2401	618	2453	652
1600	2037	368	2100	410	2163	452	2224	492	2284	532	2343	570	2399	607	2454	643	2507	679	2553	716
1700	2161	403	2221	453	2280	502	2338	548	2393	594	2445	637	2496	678	2545	718	2592	757	2633	798
1800	2271	463	2329	519	2384	574	2437	625	2487	674	2533	721	2578	765	2621	808	2663	851	2701	892
1900	2372	545	2429	602	2482	657	2533	709	2579	758	2623	805	2665	850	2705	893	2745	936	2782	977
2000	2475	631	2530	687	2582	741	2631	792	2676	840	2718	886	2758	930	2797	973	2836	1015	2872	1056
2100	2582	719	2635	774	2684	827	2731	876	2774	923	2814	968	2853	1011	2892	1054	2928	1095	2964	1136
2200	2694	811	2742	863	2789	914	2833	962	2874	1007	2913	1051	2951	1094	2987	1136	3023	1176	3058	1216
2300	2807	904	2852	954	2896	1002	2937	1048	2976	1093	3013	1136	3050	1177	3085	1218	3119	1258	3153	1298
2400	2921	998	2963	1045	3003	1091	3042	1136	3079	1179	3114	1220	3149	1261	3183	1301	3216	1341	3249	1379
Air Volume cfm	**1.1**		**1.2**		**1.3**		**1.4**		**1.5**		**1.6**		**1.7**		**1.8**		**1.9**		**2.0**	
	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
900	1892	364	1946	393	1997	422	2047	449	2095	476	2141	501	2186	524	2229	546	2271	569	2313	592
1000	1983	413	2036	442	2086	471	2136	498	2184	525	2232	550	2278	575	2322	600	2364	625	2403	653
1100	2076	462	2128	492	2179	521	2229	549	2279	576	2328	603	2375	630	2418	659	2456	689	2489	721
1200	2180	516	2233	546	2285	575	2336	604	2386	632	2434	660	2477	690	2515	721	2547	755	2574	791
1300	2291	569	2343	600	2392	632	2437	663	2482	694	2524	726	2562	759	2595	793	2623	829	2648	866
1400	2397	628	2440	663	2477	701	2511	739	2549	775	2585	810	2619	845	2651	880	2680	916	2709	952
1500	2496	690	2529	732	2554	776	2580	820	2614	858	2648	895	2682	931	2715	965	2747	1000	2779	1034
1600	2589	758	2616	803	2638	851	2662	895	2696	932	2735	958	2775	977	2814	996	2852	1018	2887	1046
1700	2667	841	2694	886	2720	931	2747	974	2782	1008	2825	1022	2870	1026	2913	1035	2951	1056	2982	1096
1800	2736	933	2769	974	2801	1014	2833	1054	2869	1087	2911	1102	2952	1115	2988	1143	3015	1195	3031	1277
1900	2818	1017	2852	1055	2887	1094	2921	1132	2955	1167	2991	1197	3023	1238	3045	1303	3055	1400	3053	1529
2000	2907	1095	2942	1134	2976	1173	3010	1211	3043	1248	3072	1295	3092	1366	3100	1469	3094	1608	3076	1780
2100	2999	1175	3033	1214	3067	1252	3100	1290	3132	1330	3155	1394	3163	1494	3156	1635	3134	1817	3100	2032
2200	3092	1255	3125	1294	3158	1331	3191	1369	3222	1411	3238	1492	3235	1622	3213	1801	3175	2026	3124	2283
2300	3186	1336	3218	1373	3250	1411	3283	1448	3312	1493	3321	1590	3307	1750	3270	1967	3215	2234	3147	2535
2400	3280	1417	3311	1453	3342	1490	3374	1526	3402	1574	3405	1689	3379	1878	3327	2134	3256	2443	3171	2787

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 Size			
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

ELECTRICAL/ELECTRIC HEAT DATA — DIRECT DRIVE | 3 - 5 TON

Model			SCH036H5E		SCH060H5E	
[1] Voltage - 60Hz			460V-3ph	575V-3ph	460V-3ph	575V-3ph
Compressor (Non-Inverter)		Rated Load Amps	4.6	3.5	6.5	4.8
		Locked Rotor Amps	39	28.9	60	41
Outdoor Fan Motor		Full Load Amps (2 ECM)	0.3	0.3	0.7	0.7
		Total	0.6	0.6	1.4	1.4
Service Outlet 115V GFI (Amps)			20	20	20	20
Indoor Blower Motor		HP	1.5	1.5	1.5	1.5
		Type	Direct (ECM)	Direct (ECM)	Direct (ECM)	Direct (ECM)
		Full Load Amps	2.3	2.3	2.3	2.3
[2] Maximum Overcurrent Protection (MOCP)		Unit Only	15	15	15	15
[3] Minimum Circuit Ampacity (MCA)		Unit Only	9	8	12	10

ELECTRIC HEAT DATA

Electric Heat Voltage			480V	575V	480V	575V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**10 kW**	20	- - -	20	- - -
		15 kW	30	25	30	25
		20 kW	- - -	- - -	35	- - -
		30 kW	- - -	- - -	50	40
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**10 kW**	18	- - -	18	- - -
		15 kW	26	21	26	21
		20 kW	- - -	- - -	33	- - -
		30 kW	- - -	- - -	48	39

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 35kA.

[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.

ELECTRIC HEAT CAPACITIES

Volts Input	10 kW			15 kW			20 kW			30 kW		
	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages
440	8.4	28,700	1	12.6	43,000	1	18.3	62,600	1	25.2	86,000	2
460	9.2	31,400	1	13.8	47,100	1	19.2	65,400	1	27.5	93,900	2
480	10.0	34,200	1	15.0	51,200	1	20.0	68,200	1	30.0	102,400	2
550	8.4	28,700	1	12.6	43,000	1	18.3	62,600	1	25.2	86,000	2
575	9.2	31,400	1	13.8	47,100	1	19.2	65,400	1	27.5	93,900	2
600	10.0	34,200	1	15.0	51,200	1	20.0	68,200	1	30.0	102,400	2

SCH036/060 Parts Arrangement

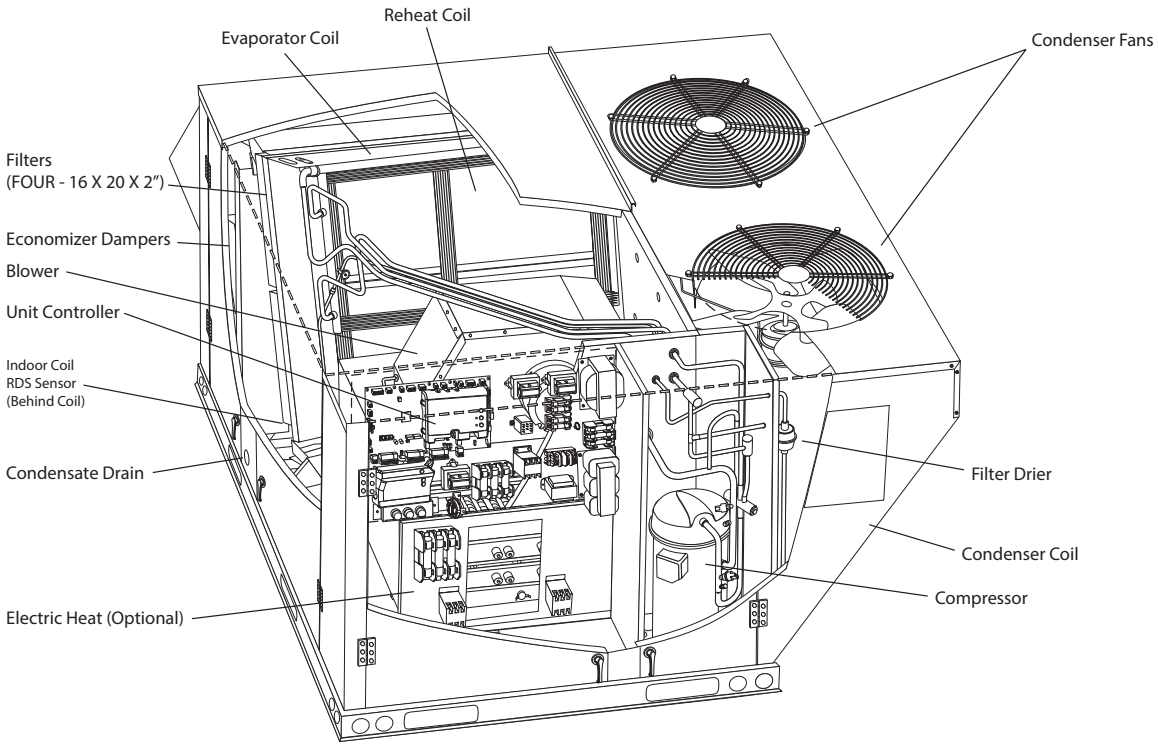


FIGURE 1

SCH036/060 Control Box

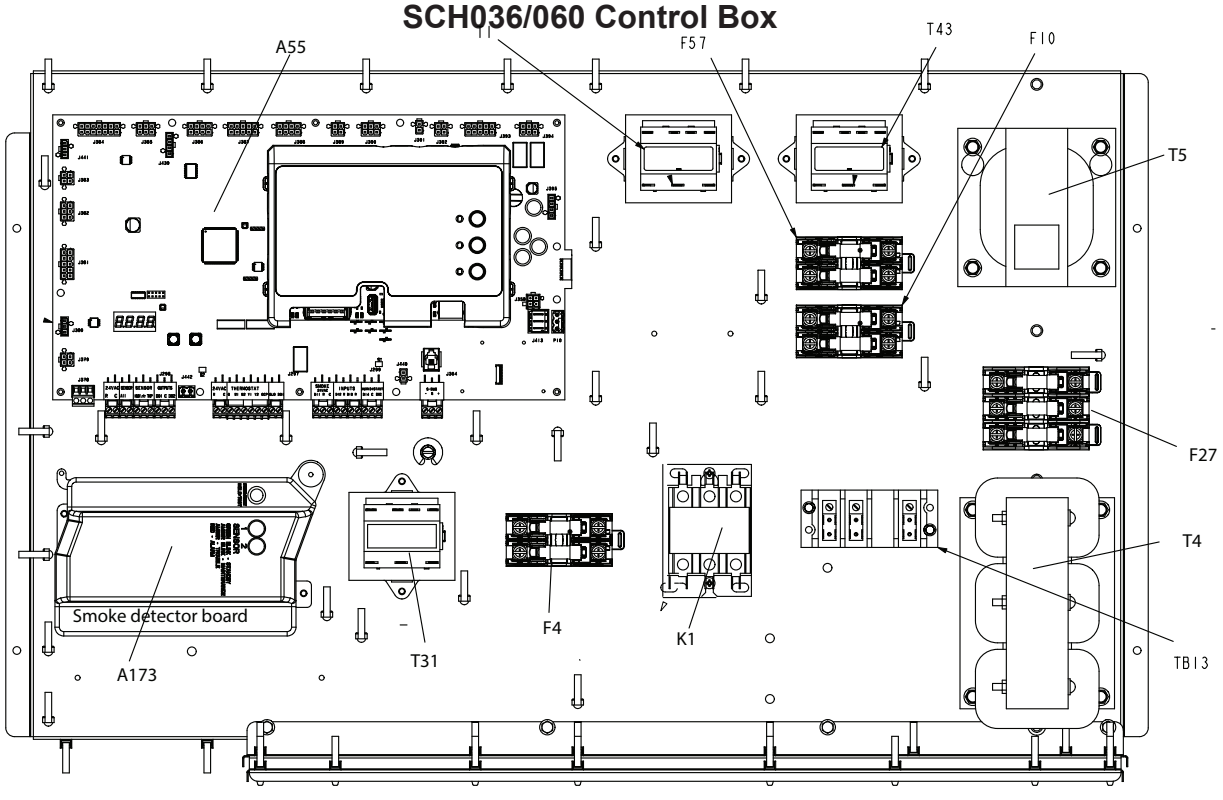


FIGURE 2

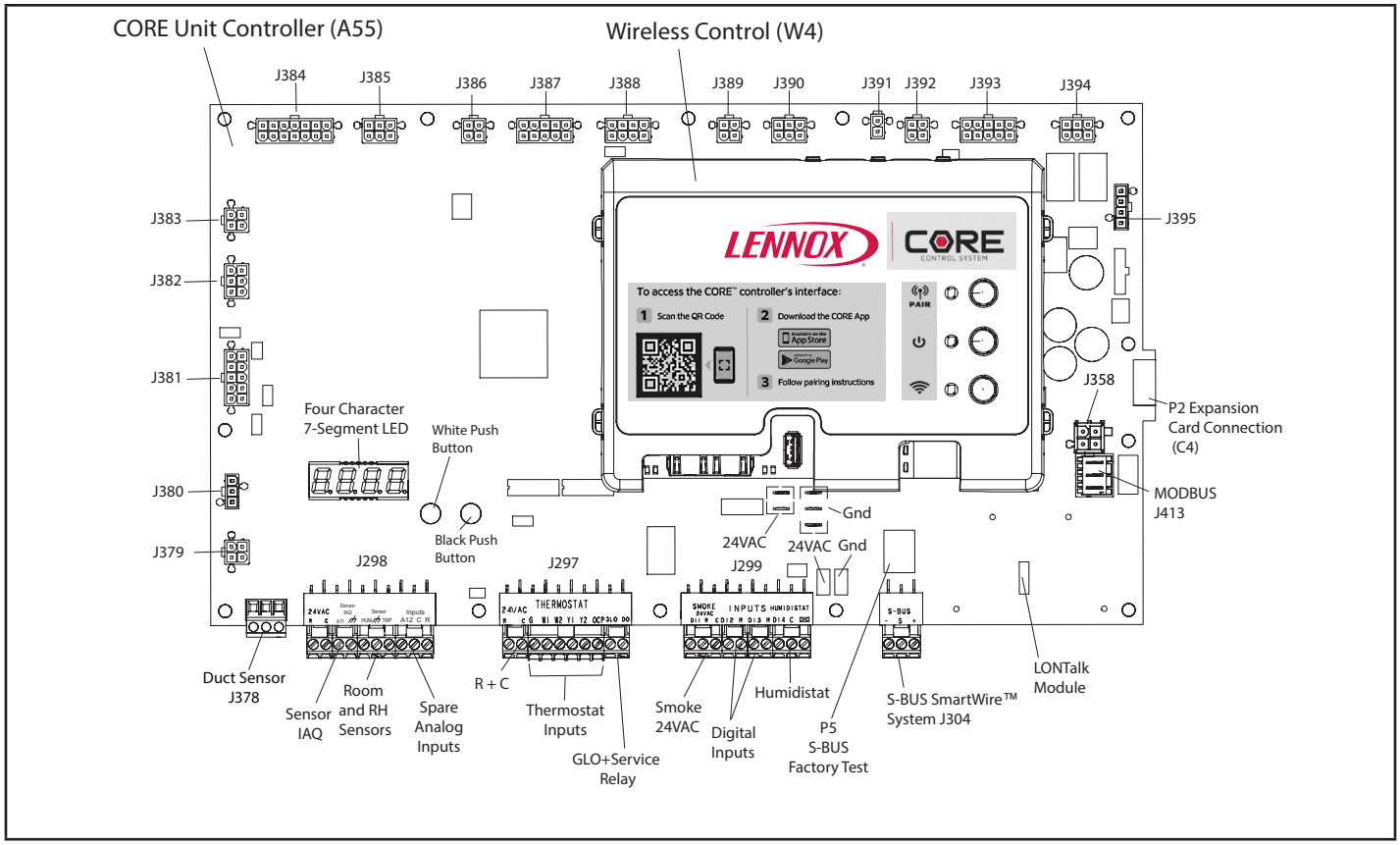

CORE Unit Controller (A55)
Wireless Control (W4)
J384
J385
J386
J387
J388
J389
J390
J391
J392
J393
J394
J383
J382
J381
J380
J379
J395
J358
P2 Expansion Card Connection (C4)
MODBUS J413
Four Character 7-Segment LED
White Push Button
Black Push Button
J298
J297
J299
Gnd
24VAC
24VAC
Gnd
Duct Sensor J378
Sensor IAQ
Room and RH Sensors
Spare Analog Inputs
R + C
Thermostat Inputs
GLO+Service Relay
Smoke 24VAC
Digital Inputs
Humidistat
P5 S-BUS Factory Test
S-BUS SmartWire™ System J304
LONTalk Module
LENNOX
CORE
CONTROL SYSTEM
To access the CORE™ controller's interface:
1 Scan the QR Code
2 Download the CORE App
3 Follow pairing instructions
PAIR

FIGURE 3

I-UNIT COMPONENTS

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

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

SCH units are configure to order units (CTO). The SCH unit components are shown in figure 1 and 2. L1, L2, and L3 wiring is color coded; L1 is red/pink, L2 is yellow, and L3 is blue.

A-Control Box Components

SCH control box components are shown in FIGURE 2. The control box is located in the upper 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 SCH series units use a single line voltage to 24VAC transformer mounted in the control box. Transformer supplies power to control circuits in the unit. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB8). The 460(G) and 575 (J) voltage transformers use a single primary tap.

3-Transformer T43 (all units)

All reheat units and units with phase detection components are equipped with transformer T43 located in the control box. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB31). The 460(G) and 575(J) voltage transformers use a single primary tap.

4-Transformer T5

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

5-Compressor Contactor K1 (all units)

K1 is a 24V to line voltage contactor used to energize the compressor in response to thermostat demand. SCH units use three-pole-double-break contactors.

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

7-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.

8- Blower Transformer T4 (J voltage)

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

9- Fuse F57

Fuse F57 is housed in a fuse block which holds two fuses. F57 provides short circuit protection to the T5 transformer

10- Fuse F27

Fuse F27 is housed in a fuse block which holds three fuses. F27 provides short circuit protection to the T4 transformer.

11- Fuse F10

Fuse F10 is housed in a fuse block which holds two fuses. F10 provides Short Circuit Current Rating protection up to 35kA to components connected to F10.

12- Terminal Strip TB13

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

B-Cooling Components

See FIGURE 4 for 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 installed economizer. The evaporator is slab type and uses a thermostatic expansion valve as the primary expansion device.

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 diagnostic sensors.

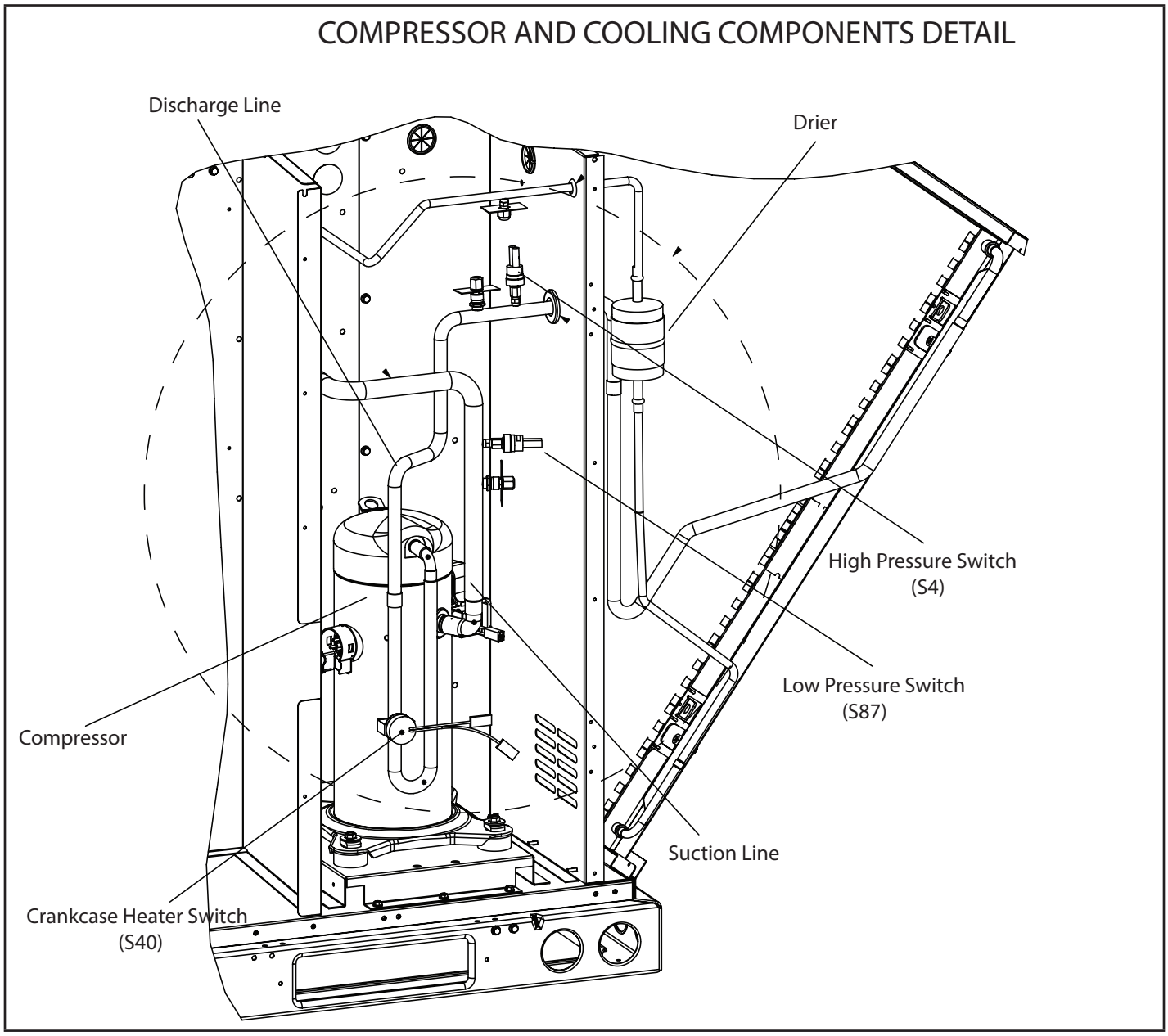


FIGURE 4

1-Compressors B1 (all units)

SCH units are equipped with with one two-stage scroll compressor. 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 coverover terminals. Disconnect power before removing protective cover. Discharge capacitors before servicing unit. Failure to follow these precautions could cause electrical shock resulting in injury or death.

Compressor B1 is energized by a corresponding compressor contactor.

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

2-Crankcase Heaters 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 in 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.

3-High Pressure Switch S4

The high pressure switch is an auto-reset SPST N.C. switch which opens on a pressure rise. All SCH 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 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 main control module A55. The main control module 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).

5-Filter Drier

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

6-Condenser Fans 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-Temperature Thermistor

RT46 and RT48

Units are equipped with two factory-installed thermistors (RT46 and RT48) located on different points on the refrigerant circuit.

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

The SCH036 and 060 units use the RT46 sensor on the indoor evaporator coil, and the RT48 sensor on the outdoor condenser coil. Each thermistor must be specifically placed for proper unit operation and to initiate valid alarms. See TABLE 1 for proper locations.

TABLE 1

THERMISTOR LOCATION		
Unit	**Sensor**	**Figure**
036, 060 Indoor Coil	RT46	FIGURE 5
036, 060 Outdoor Coil	RT48	FIGURE 6

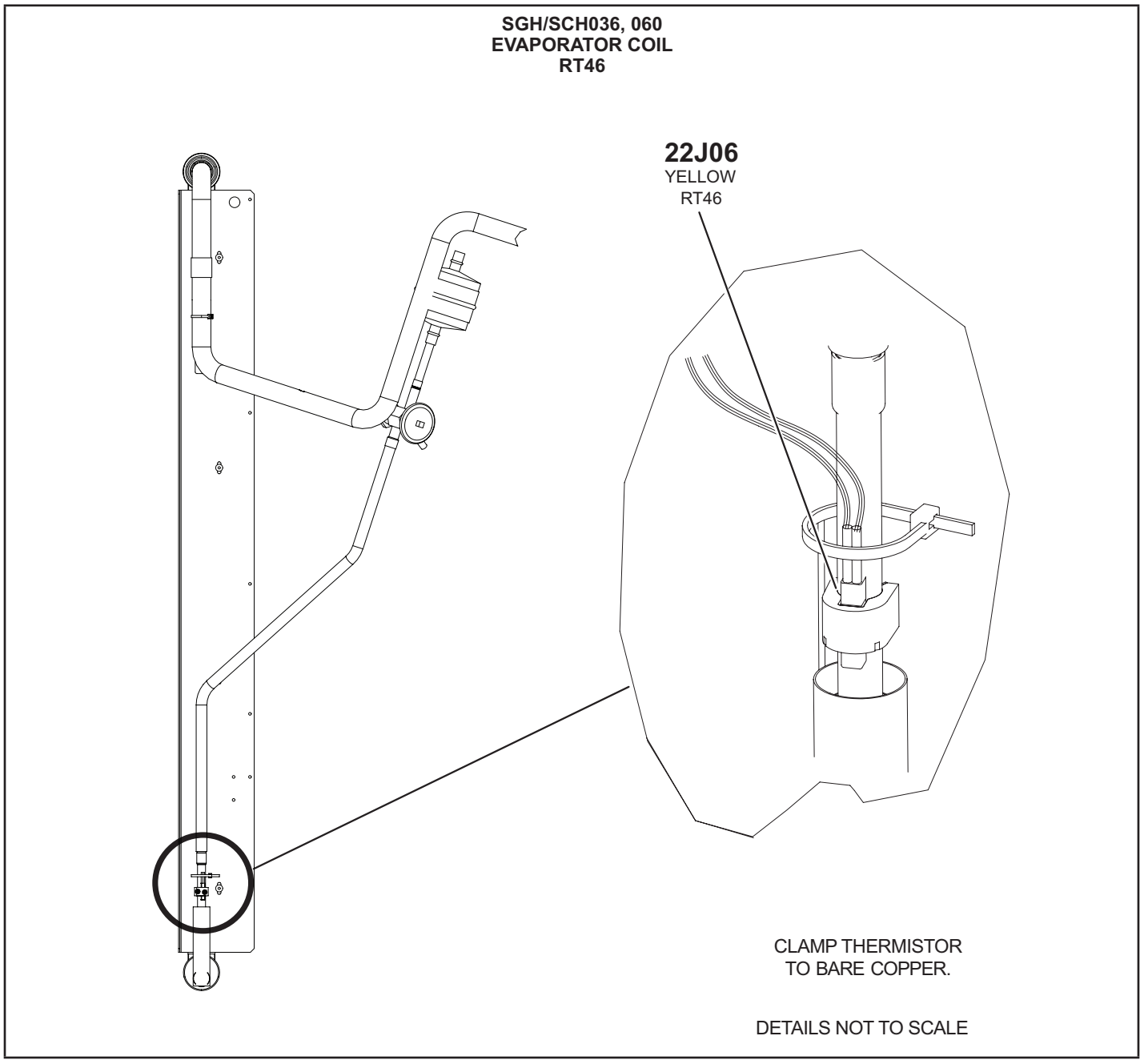


FIGURE 5

SGH/SCH036, 060
CONDENSER COIL
RT48

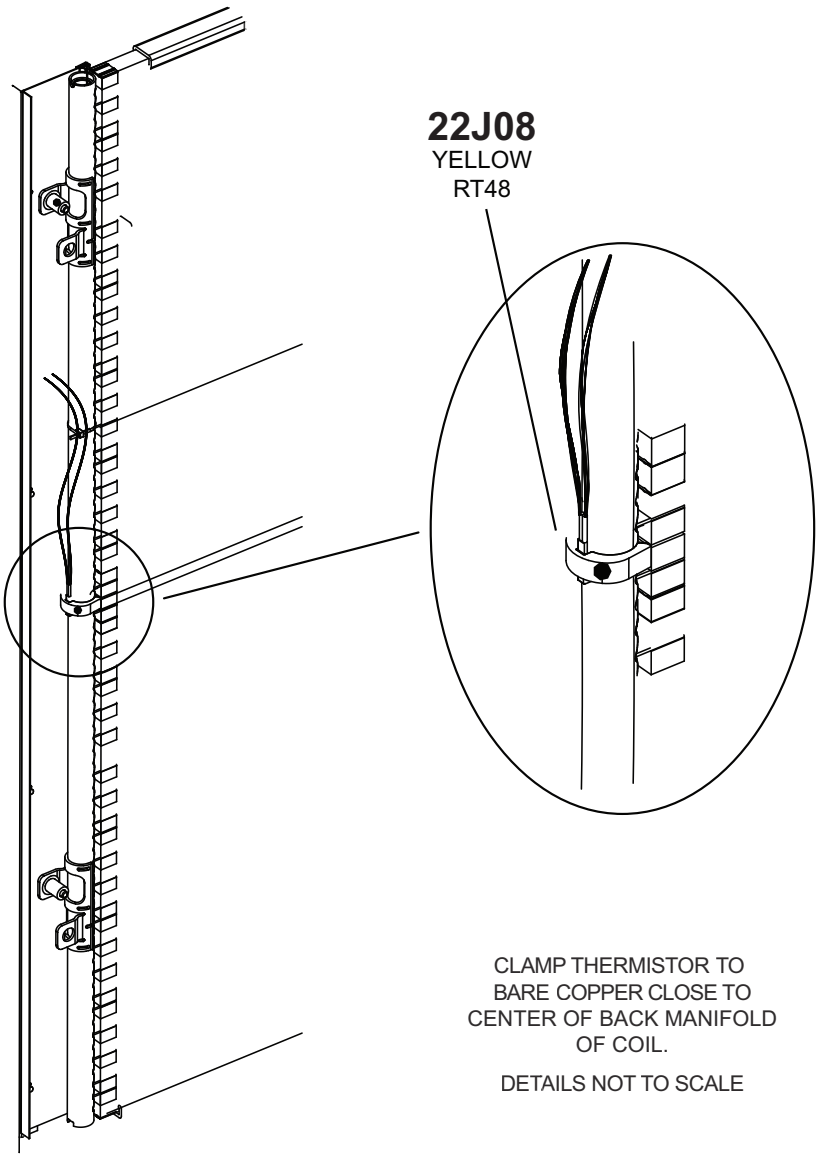


FIGURE 6

8-RDS Sensor RT58

Units are equipped with factory-installed RDS Sensors located on different points on the unit. The RDS sensors provide the Unit Controller with continuous readings for leaked refrigerant concentration levels and sensor health status (Good or Fault). These readings are used to modify unit operation to disperse the leaked refrigerant and to remove possible ignition sources. In addition, the Unit Controller uses these readings to initiate alarms to alert the operator of a refrigerant leak or faulty sensor(s).

Each sensor must be specifically placed for proper unit operation and to initiate valid alarms. To identify sensor locations see TABLE 2.

TABLE 2

RDS Sensor Figures

Model	Qty.	Type	Figure
SCH036/060	1 sensors	RT58 INDOOR SENSOR	FIGURE 7

Refrigerant Sensors and Detection Systems shall only be replaced with approved parts from the manufacturer.

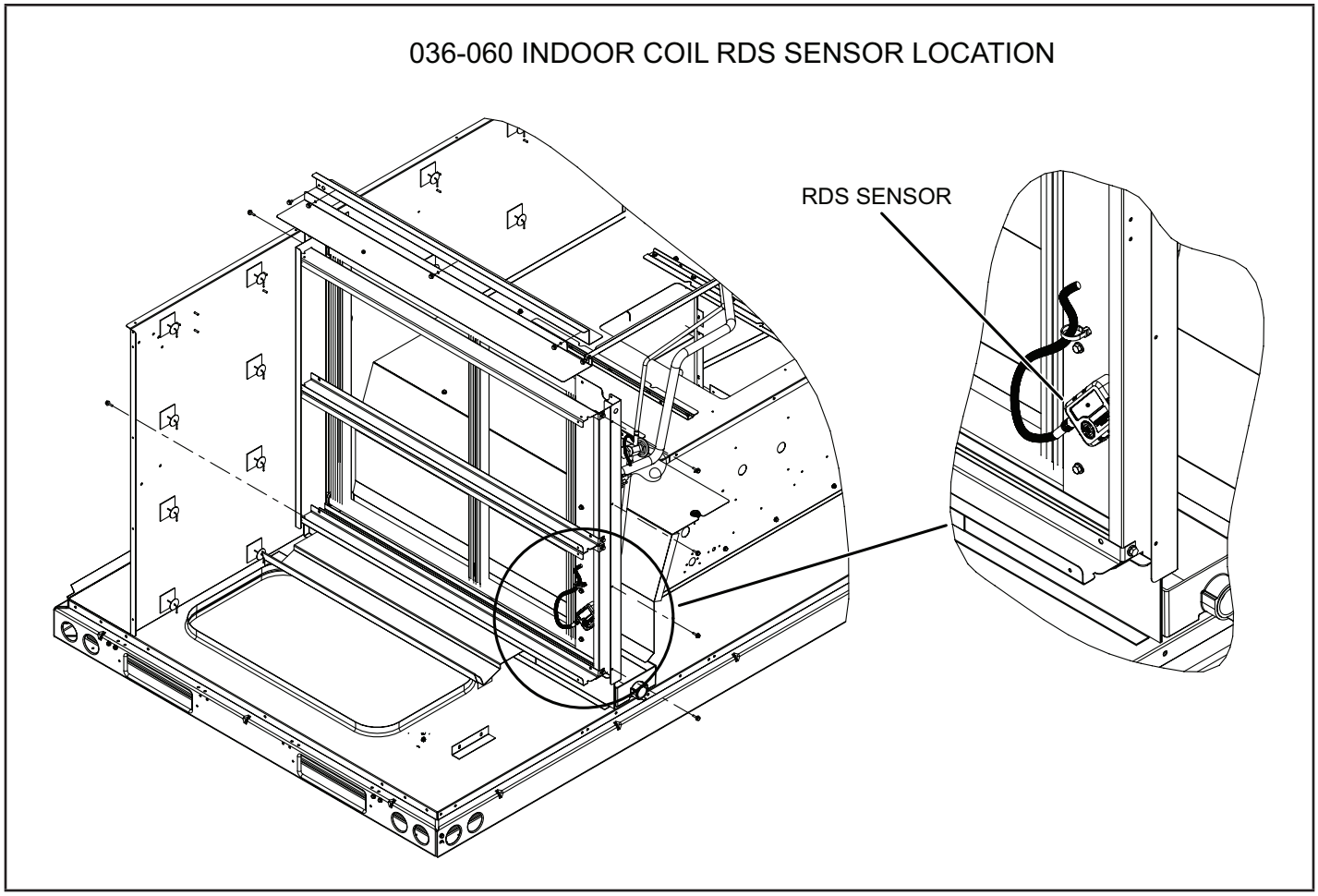


FIGURE 7

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 P394-1 and P394-02). 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 8.

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 9.

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.

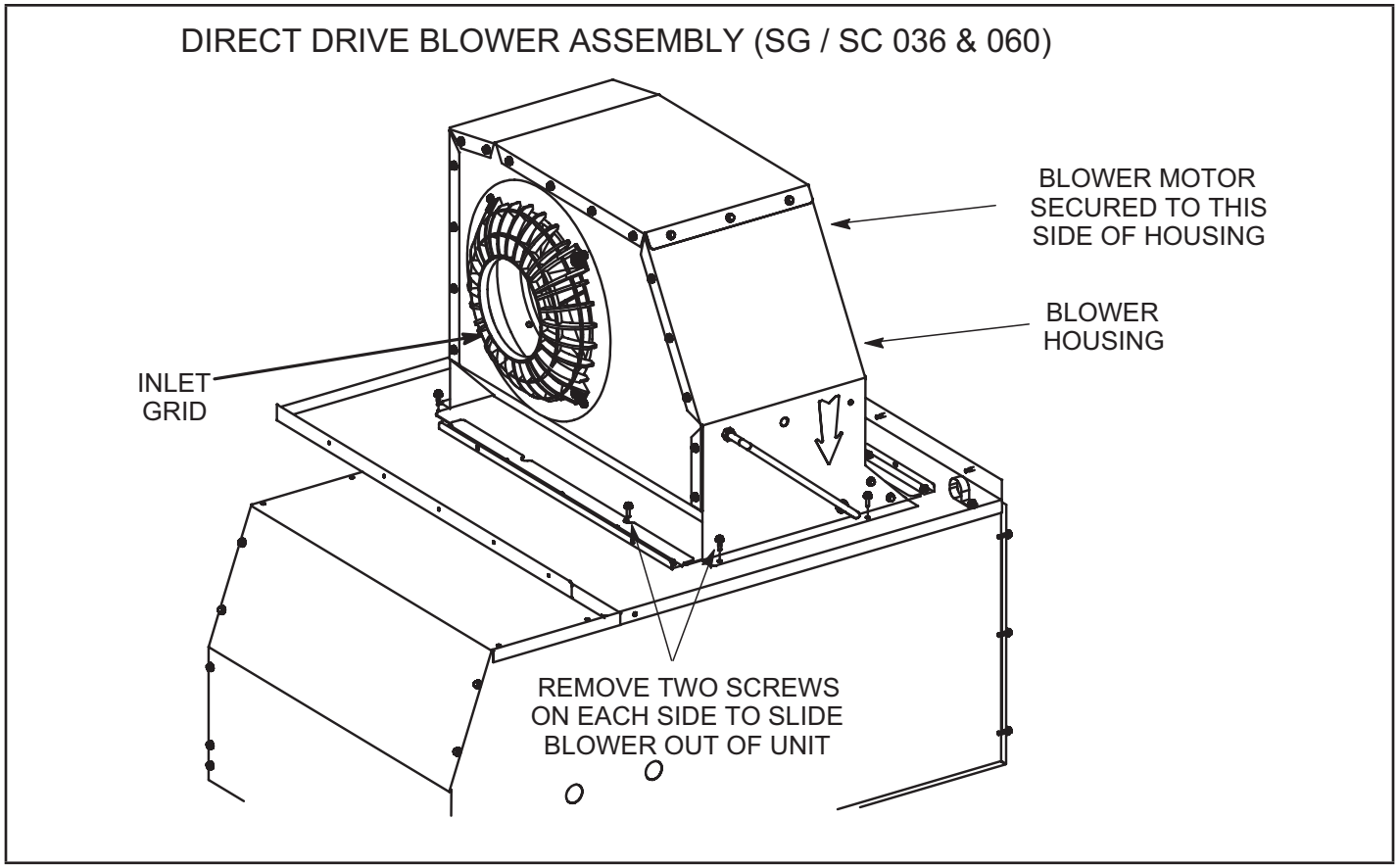


FIGURE 8

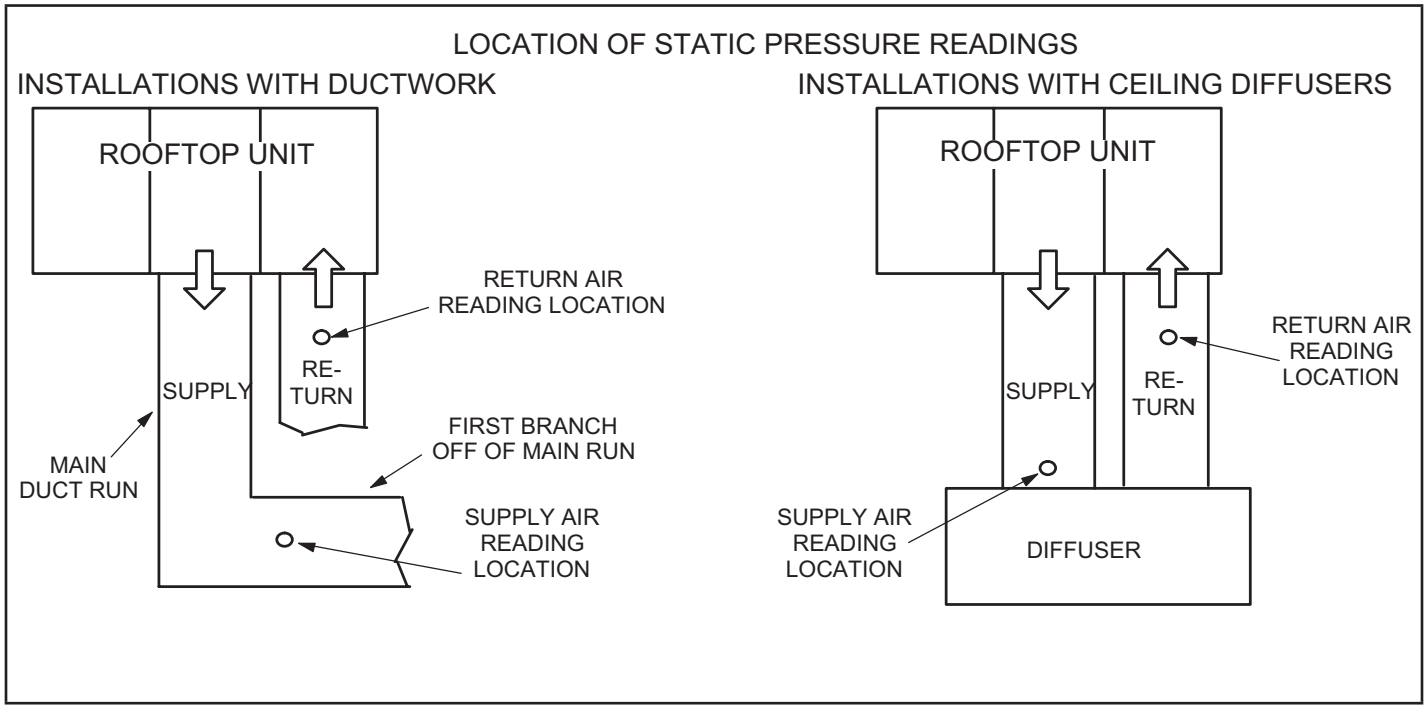


FIGURE 9

D-Optional Electric Heat Components FIGURE 10

See ELECTRIC HEAT AND ELECTRICAL DATA (table of contents) for all possible SCH to EHC matchups and electrical ratings.

All electric heat sections consist of electric heating elements exposed directly to the airstream. Multiple-stage elements are sequenced on and off in response to thermostat demand.

The electric heat assembly is fixed in place with 12 screws as shown in FIGURE 11.

1-Contactors K15, K16

All contactors are double break and either single, double or three pole (see diagram) and equipped with a 24VAC coil. The coils in the K15 and K16 contactors are energized by the indoor thermostat. In all units K15 energizes the heating elements, while in the 20 & 30 kW units, K15 and K16 energize the heating elements simultaneously.

2-High Temperature Limit S15 (Primary)

S15 is a SPST N.C. auto-reset thermostat located on the electric heat section. S15 is the high temperature limit for the electric heat section. When S15 opens, indicating a problem in the system, contactors K15 and K16 are deenergized. See TABLE 3 for set points. Set points are factory set and not adjustable.

TABLE 3

Unit kW (Voltage)	Opens ºF	Closes ºF
10 (G)	160	120
15 (Y,G,J)	125	85
20 (G)	150	110
30 (Y,G, J)	150	110

3-High Temperature Limit S20 and S157 (Secondary)

S20 and S157 are SPST N.C. manual-reset thermostats. S20 and S157 are wired in series with the heating elements. See EHC wiring diagrams. When S20 or S157 open, power is interrupted to the heating elements which are wired in series with the limits. K15/K16 are only de-energized when S15 opens. When the contactors are de-energized, all stages of heat are de-energized. The thermostat is factory set to open at 220F ± 6F (104C ± 3.3C) on a temperature rise and can be manually reset when temperature falls below 160F (71.0C).

4-Heating Elements HE1 & HE2

Heating elements are composed of helix wound bare nichrome wire exposed directly to the air stream. Three elements are connected in a three-phase arrangement. T Elements in 460 and 575V units are connected in “Wye” arrangement. Each stage is energized independently by the corresponding contactors located on the electric heat vestibule panel. Once energized, heat transfer is instantaneous. High temperature protection is provided by primary and redundant high temperature limits and overcurrent protection is provided by fuses.

TABLE 4

Unit	Quantity	Rating	
		Amp	Voltage
ECH060-15-1G	3	25	600
ECH060-30-1G	3	50	600
ECH060-10-1G	3	15	600
ECH060-20-1G	3	35	600
ECH060-15-1J	3	20	600
ECH-060-30-1J	3	40	600

5-Fuse F3

Fuse F3 is housed in a fuse block which holds two or three fuses. Each F3 fuse is connected in series with each leg of electric heat. FIGURE 10 and TABLE 4 show the fuses used with each electric heat section.

6-Unit Fuse Block & Fuse F4

Three line voltage fuses F4 provide short circuit and ground fault protection to all cooling components in the SCH units with electric heat. The fuses are rated in accordance with the amperage of the cooling components. The F4 fuse block is located on the control panel.

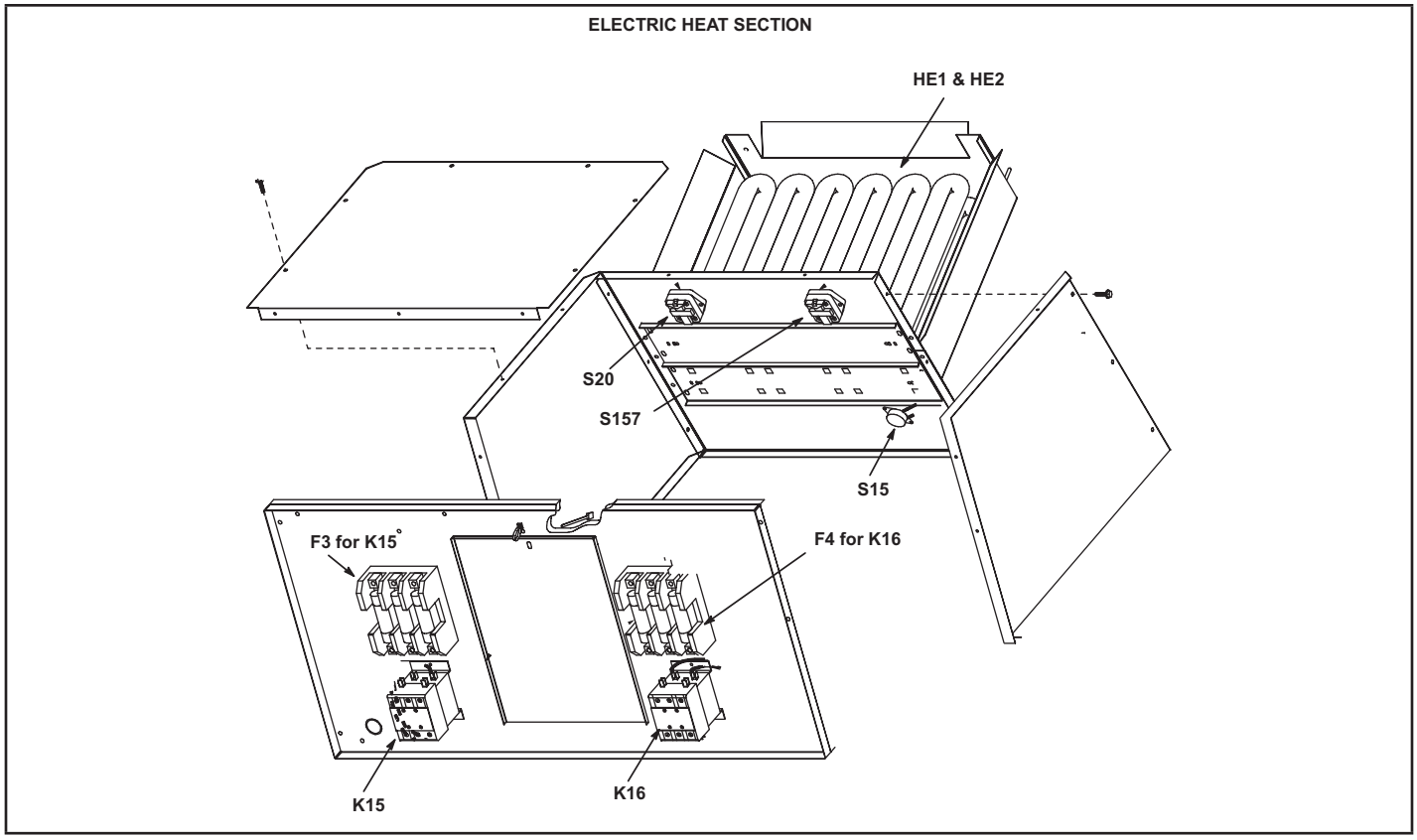


FIGURE 10

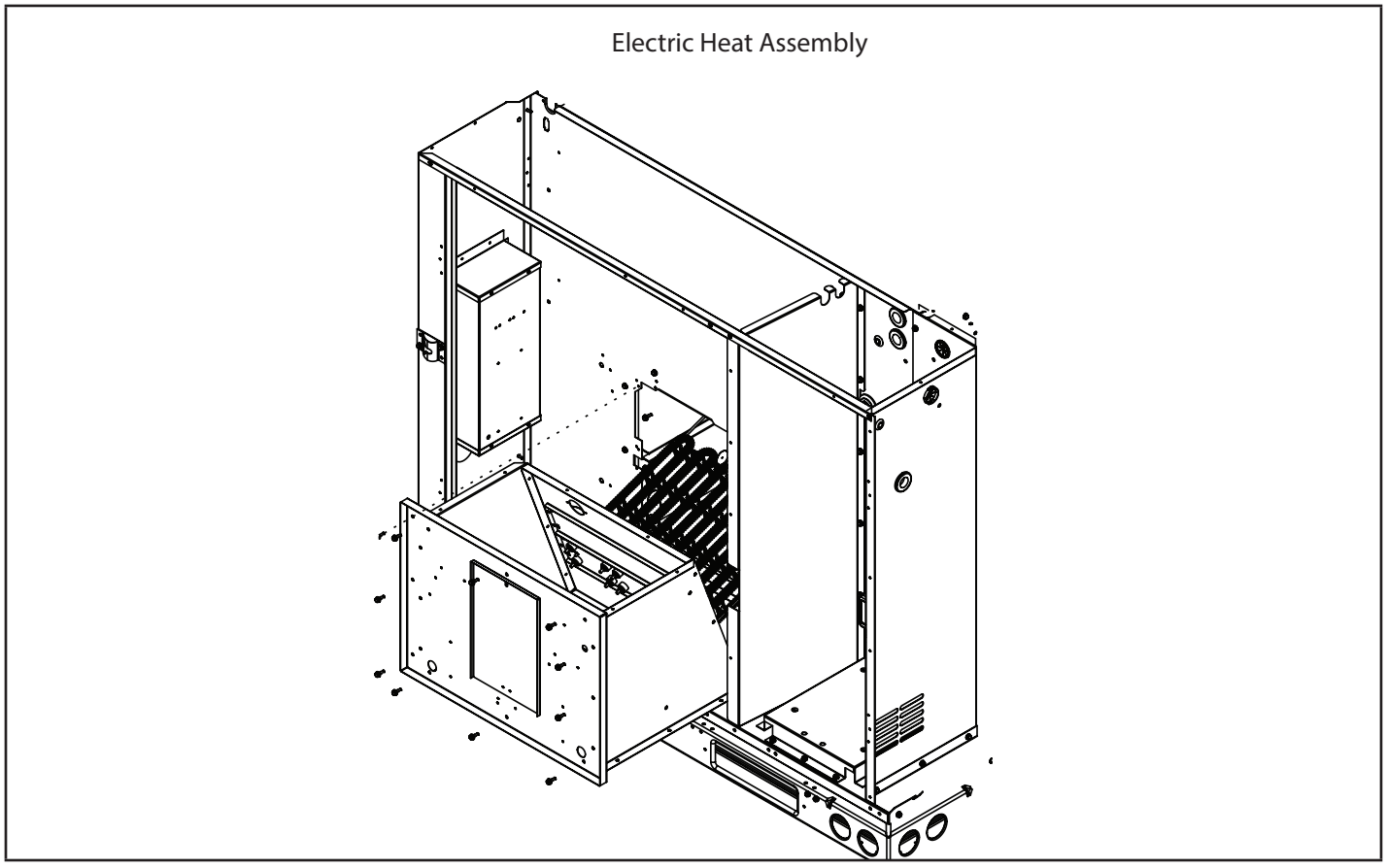


FIGURE 11

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 - All-Aluminum Coil

***WARNING**-Do not exceed nameplate charge under any condition.*

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

Refrigerant Charge R-454B		
Unit	M_c(lbs)	M_c(kg)
SCH036	5.13	2.32
SCH060	5.38	2.44
SCH036 W/ Humidtrol	5.50	2.49
SCH060 W/ Humidtrol	5.30	2.40

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

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

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

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

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

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

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

- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants includ-ing, when applicable, flammable refrigerants. In ad-dition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manu-facturer if in doubt.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

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

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

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 - Compare the normal operating pressures to the pressures obtained from the gauges. Check unit components if there are significant differences.

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

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

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

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

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.

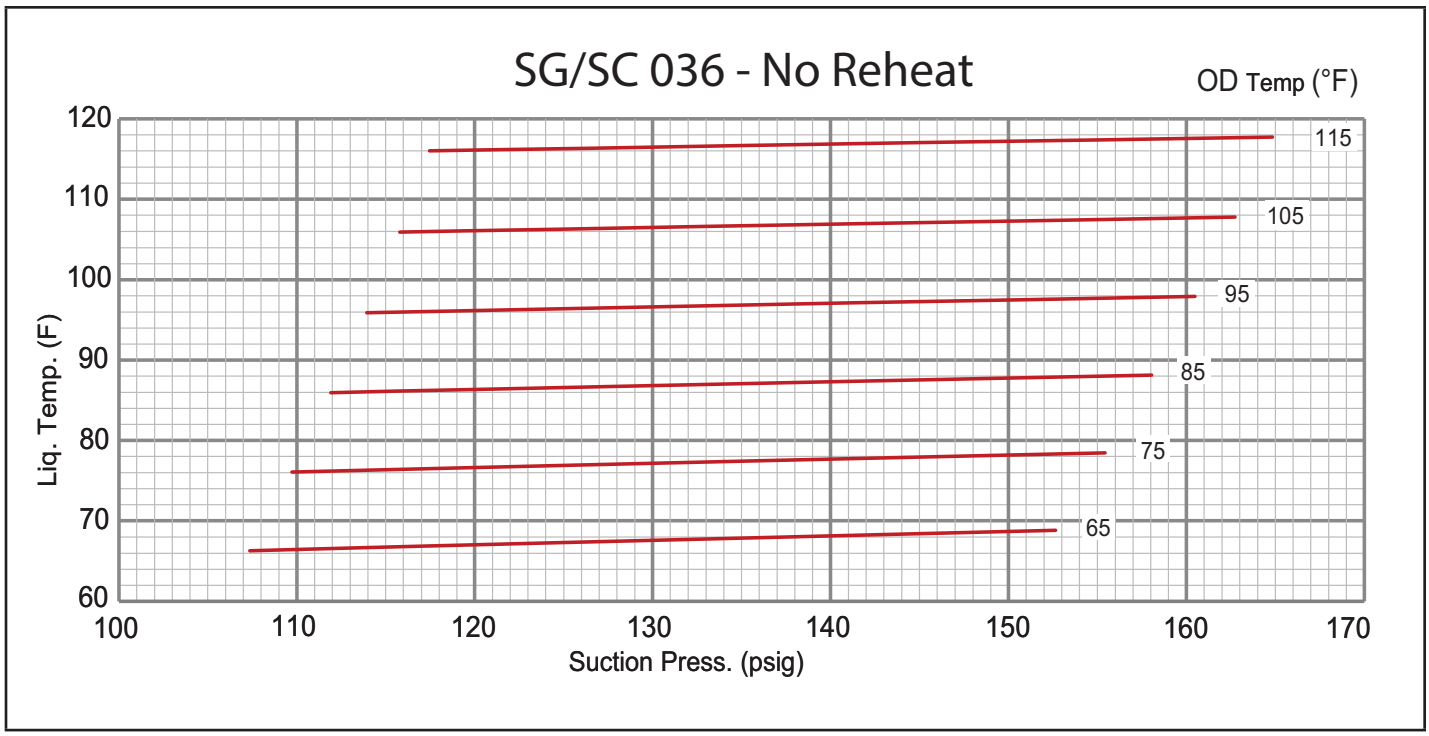
7 - Example: At 95°F outdoor ambient and a measured suction pressure of 130psig, the target liquid temperature is 97°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquidtemperature agrees with the target liquid temperature.

TABLE 5

SG/SC 036 Normal Operating Pressures - No Reheat - 581193-01											
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	220	110	256	112	297	114	342	116	392	117	447
116	222	118	259	121	300	123	345	125	396	126	451
134	227	136	264	139	306	141	352	143	403	145	459
153	232	155	270	158	312	160	359	163	411	165	467

TABLE 6

SG/SC 036 Normal Operating Pressures - Reheat - 581194-01											
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	220	110	256	112	297	114	342	116	392	117	447
116	222	118	259	121	300	123	345	125	396	126	451
134	227	136	264	139	306	141	352	143	403	145	459
153	232	155	270	158	312	160	359	163	411	165	467


SG/SC 036 - No Reheat
OD Temp (°F)
115
105
95
85
75
65
120
110
100
90
80
70
60
Liq. Temp. (F)
100
110
120
130
140
150
160
170
Suction Press. (psig)

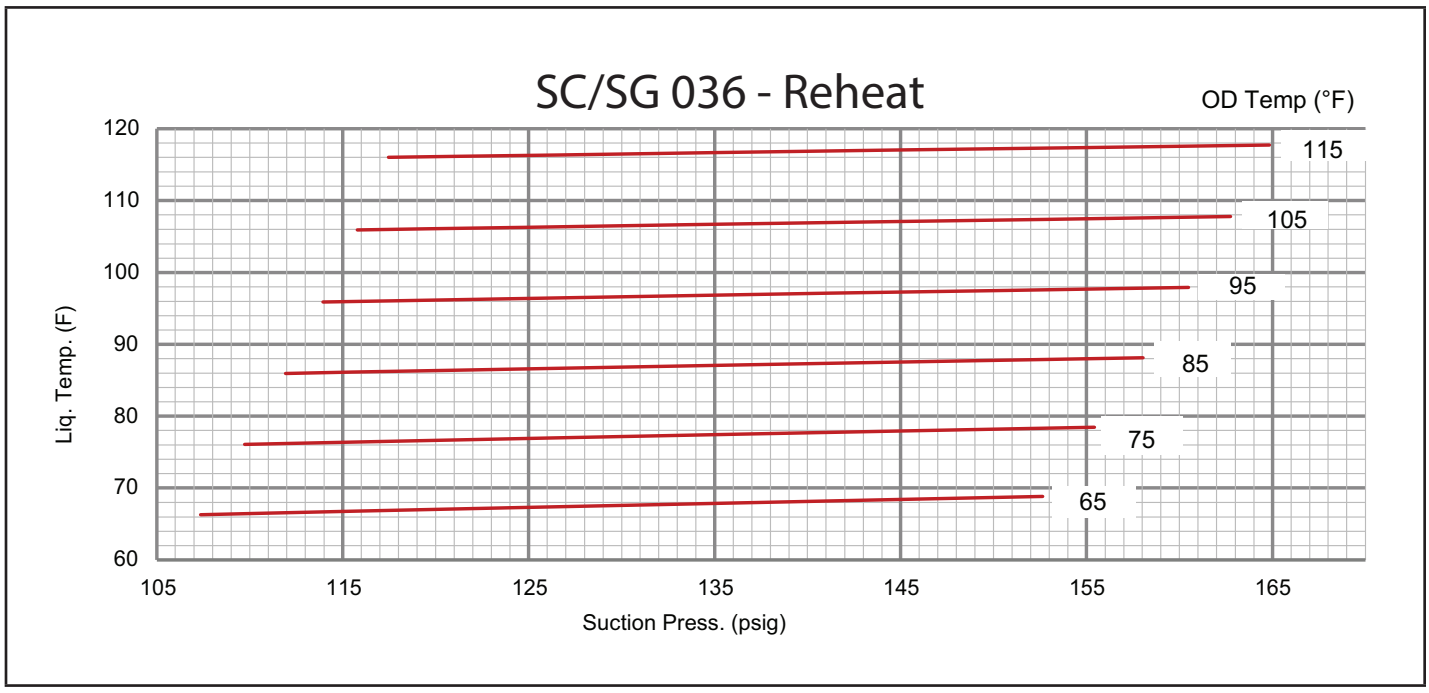
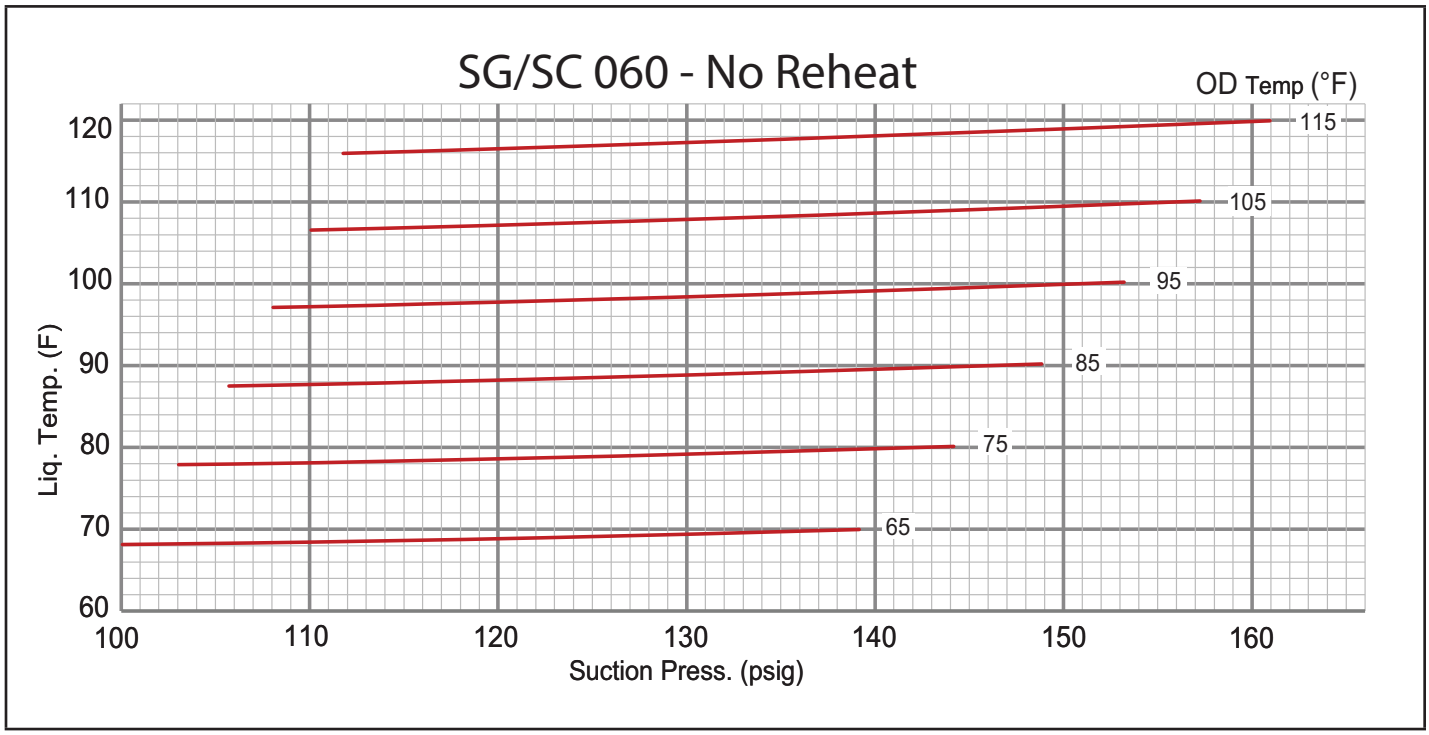

SC/SG 036 - Reheat
OD Temp (°F)
115
105
95
85
75
65
120
110
100
90
80
70
60
Liq. Temp. (F)
105
115
125
135
145
155
165
Suction Press. (psig)

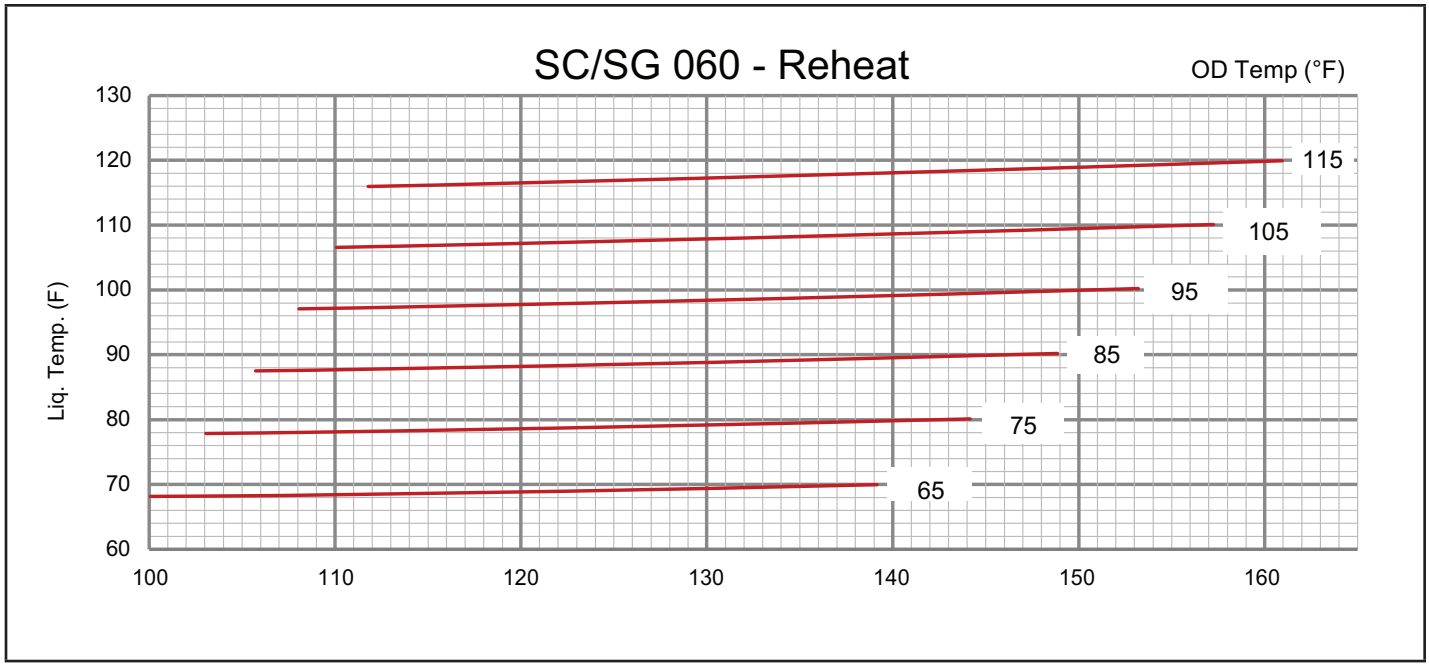
TABLE 7

SG/SC 060 Normal Operating Pressures - No Reheat - 581195-01											
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)
100	229	103	265	106	306	108	352	110	404	112	462
107	230	110	266	114	308	116	354	119	406	121	464
122	236	127	272	130	313	134	360	137	412	140	470
139	243	144	280	149	322	153	369	157	421	161	479

TABLE 8

SG/SC 060 Normal Operating Pressures - Reheat - 581196-01											
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)
100	229	103	265	106	306	108	352	110	404	112	462
107	230	110	266	114	308	116	354	119	406	121	464
122	236	127	272	130	313	134	360	137	412	140	470
139	243	144	280	149	322	153	369	157	421	161	479





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 R-454B 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.

R-454B Refrigerant

Units charged with R-454B 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-454B. Do not replace them with components designed for use with R-22.

R-454B refrigerant is stored in a *blank* cylinder.

Manifold gauge sets used with systems charged with R-454B 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-454B. If oil must be added, it must be a polyol ester oil.

D-Electric Heat Start Up

Optional electric heat will stage on and cycle with thermostat demand. See electric heat wiring diagram on unit for sequence of operation.

IV- SYSTEMS SERVICE CHECKS

Prior to beginning work on systems containing refrigerant, checking that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects, taking into account the effects of aging or continual vibration from sources such as compressors or fans.

A-Cooling System Service Checks

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

V-MAINTENANCE

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

⚠ WARNING

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

⚠ IMPORTANT

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

⚠ WARNING

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

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

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

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

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

1 - The actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed.

2 - The ventilation machinery and outlets are operating adequately and are not obstructed.

3 - If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.

4 - Markings on the equipment should be visible and legible. Markings and signs that are illegible shall be corrected.

5 - Refrigerating pipes or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

- For systems containing refigerant all repair and maintenance to electrical components shall include initial safety checks and component inspection procedures such as that capacitors are discharged in a safe manner to avoid possibility of sparking, that no live electrical components and wiring are exposed while charging, recovering, or purging the system, and that there is continuity of earth bonding. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used that is reported to the owner of the equipment, so all parties are advised.

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

  NOTE - *Intrinsically safe components must be replaced, not repaired.*
- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.
- When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

  a. Safely remove refrigerant following local and national regulations,

  b. Evacuate the circuit,

  c. Purge the circuit with inert gas,

  d. Evacuate,

  e. Purge with inert gas,

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

A-Filters

SCH units are equipped with (4) 16” X 20” X 2” filters and can 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.

B-Lubrication

All motors used in SCH units are prelubricated; no further lubrication is required.

C-Supply Air Blower Wheel

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

D-Evaporator Coil

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

E-Condenser Coil

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

NOTE-If owner complains of insufficient cooling, the units refrigerant charge should be checked. See section III.

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 12. Refer to the roof mounting frame installation instructions for details ofproper 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 13. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

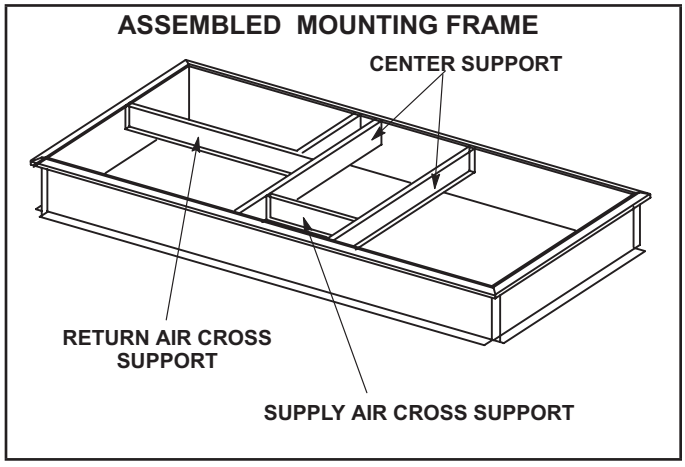


FIGURE 12

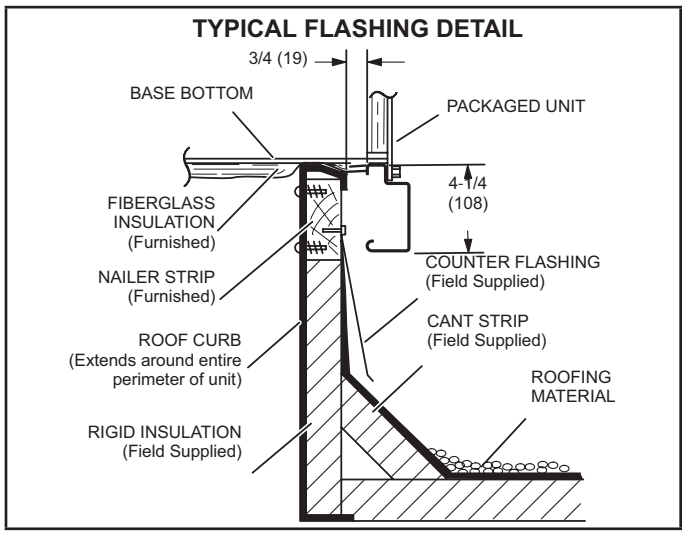


FIGURE 13

B-Outdoor Air Dampers

Dampers are manually operated to allow up to 25 percent outside air into the system at all times. See FIGURE 14.

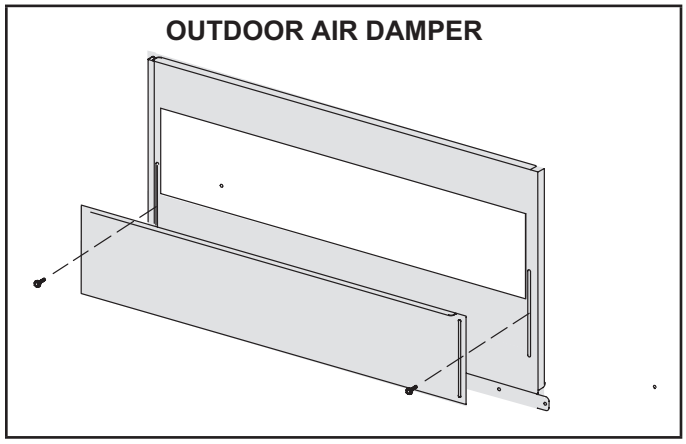


FIGURE 14

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.

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 A171, A172, A173

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

The Smoke Detector Transformer T31 a 120VAC to 24VAC transformer that supplies power to the smoke detector board A173.

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 (CO2) Sensor A63

The indoor air quality sensor monitors CO2 levels and reports the levels to the main control module A55. The board adjusts the economizer dampers according to the CO2 levels. The sensor is mounted next to the indoor thermostat or in the return air duct. Refer to the indoor air quality sensor installation instructions for proper adjustment.

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-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.

K-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 15 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 P394-3 or P394-) 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.

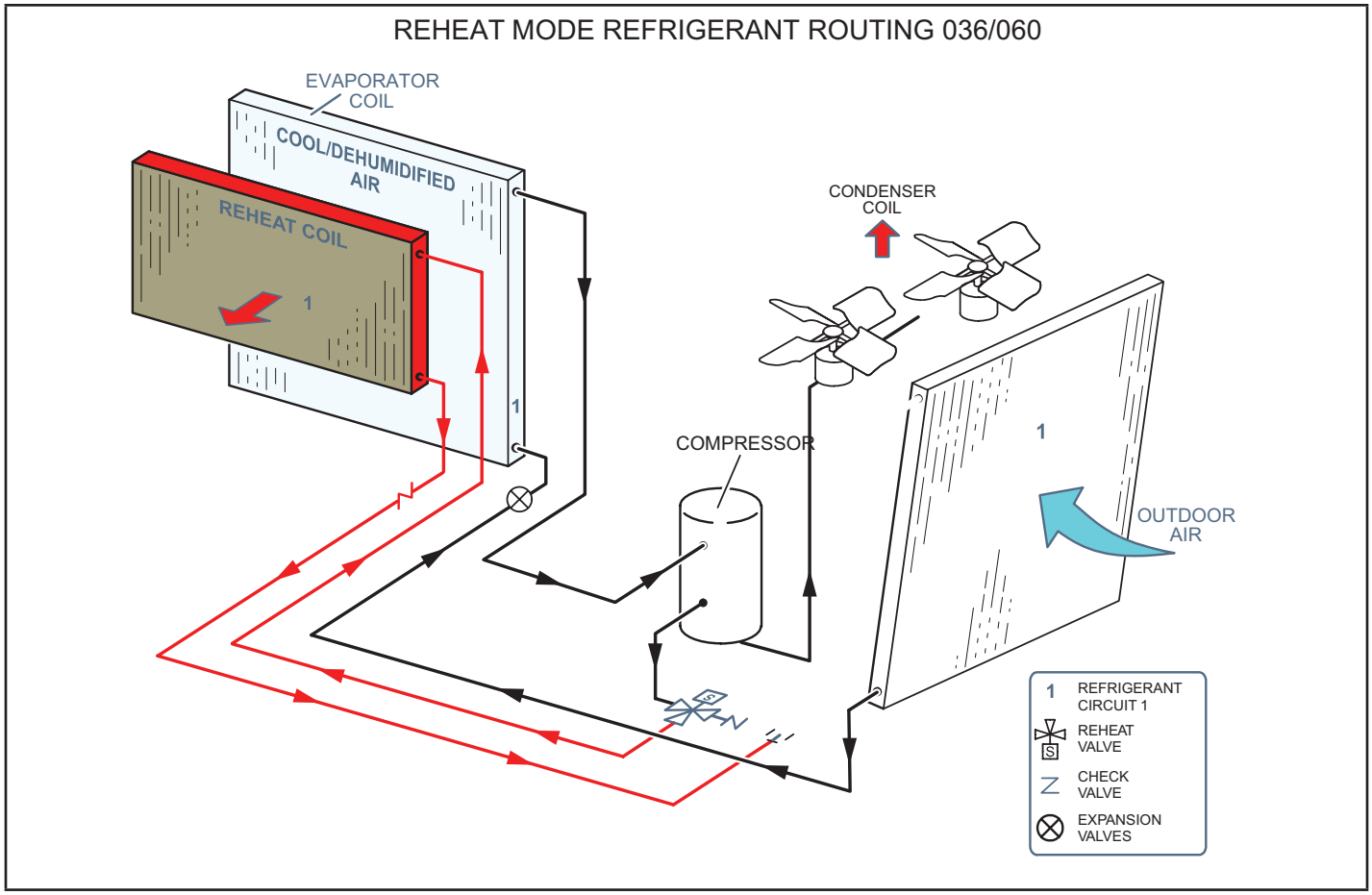
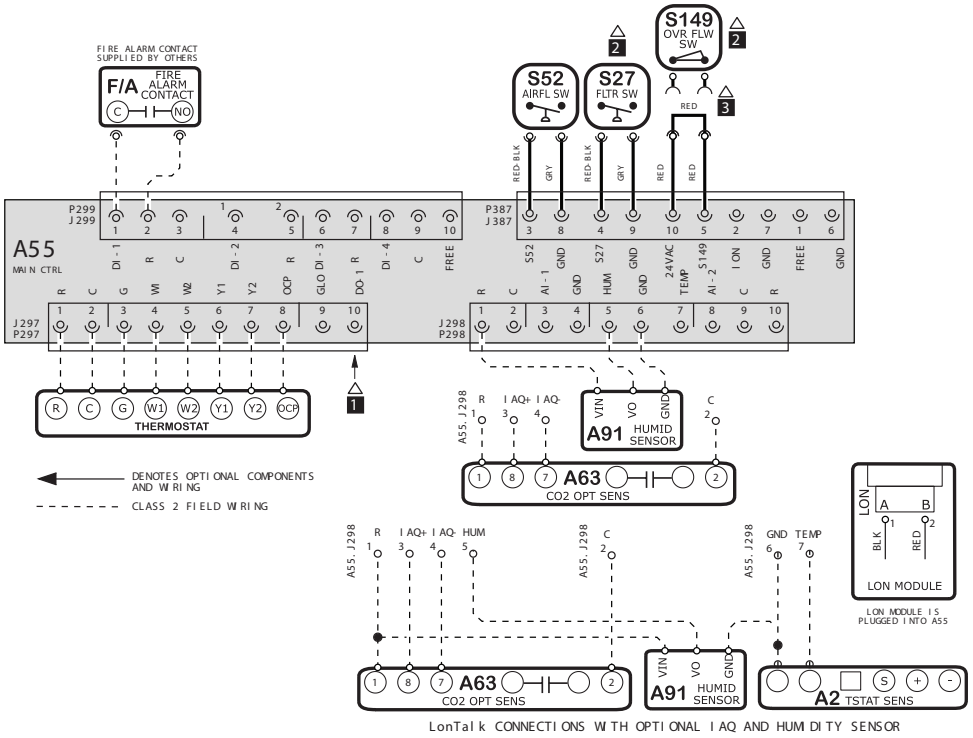

REHEAT MODE REFRIGERANT ROUTING 036/060
EVAPORATOR COIL
COOL/DEHUMIDIFIED AIR
REHEAT COIL
1
1
CONDENSER COIL
COMPRESSOR
1
OUTDOOR AIR
1 REFRIGERANT CIRCUIT 1
REHEAT VALVE
CHECK VALVE
EXPANSION VALVES

FIGURE 15

VII- WIRING DIAGRAMS / SEQUENCE OF OPERATION

Thermostat

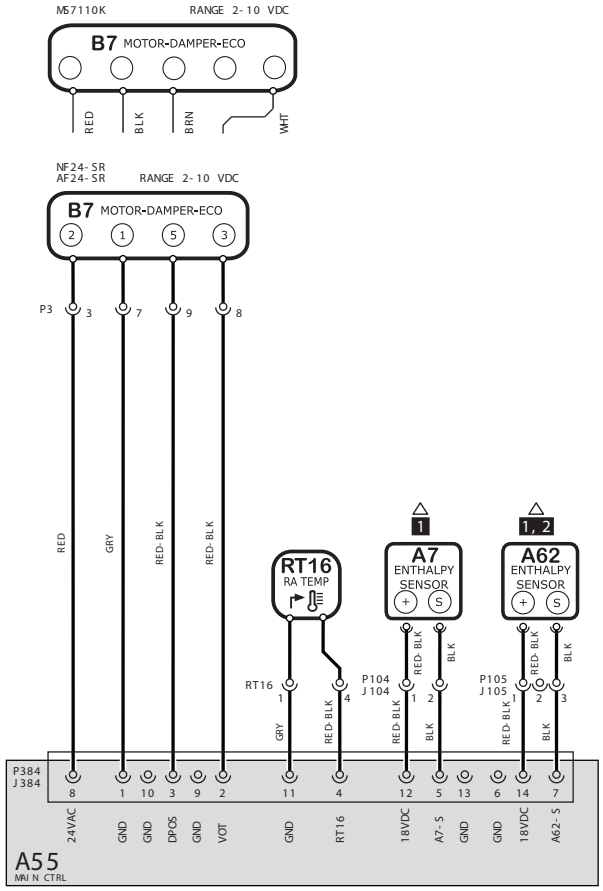


KEY LIST		
LOCATION	**COMPONENT DESCRIPTION**	
FF05	**A2**	SENSOR, ELECTRONIC THERMOSTAT
AA03	**A55**	CONTROL BOARD, MAIN
DD04/05	**A63**	SENSOR, CO2 (IAQ)
DD04/05	**A91**	SENSOR, HUMIDITY
AA01	**F/A**	FIRE ALARM CONTACT
DD01	**S27**	SWITCH, FILTER
DD01	**S52**	SWITCH, AIRFLOW
EE01	**S149**	SWITCH, OVERFLOW ONE

△	NOTES
1	P297-10 (SR) IS SERVICE RELAY OUTPUT (24VAC) IF USED CONNECT TO AN INDICATOR LIGHT
2	CORE CONTROLLER SETTINGS MUST BE MODIFIED WHEN S27, S149 ARE INSTALLED
3	REMOVE JUMPER TO INSTALL S149

Model: SC, SG Series RTU
Thermostat and LonTalk
Voltage: All Voltages
Supersedes: N/A Form No: 538391-01 Rev: 0

Economizer



△	NOTES
1	A7 AND A62 NOT USED FOR SENSIBLE TEMPERATURE CONTROL
2	FOR UNIT DIFFERENTIAL ENTHALPY CONTROL, ADD A62 RETURN AIR ENTHALPY SENSOR

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

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

WIRING DIAGRAM FLOW

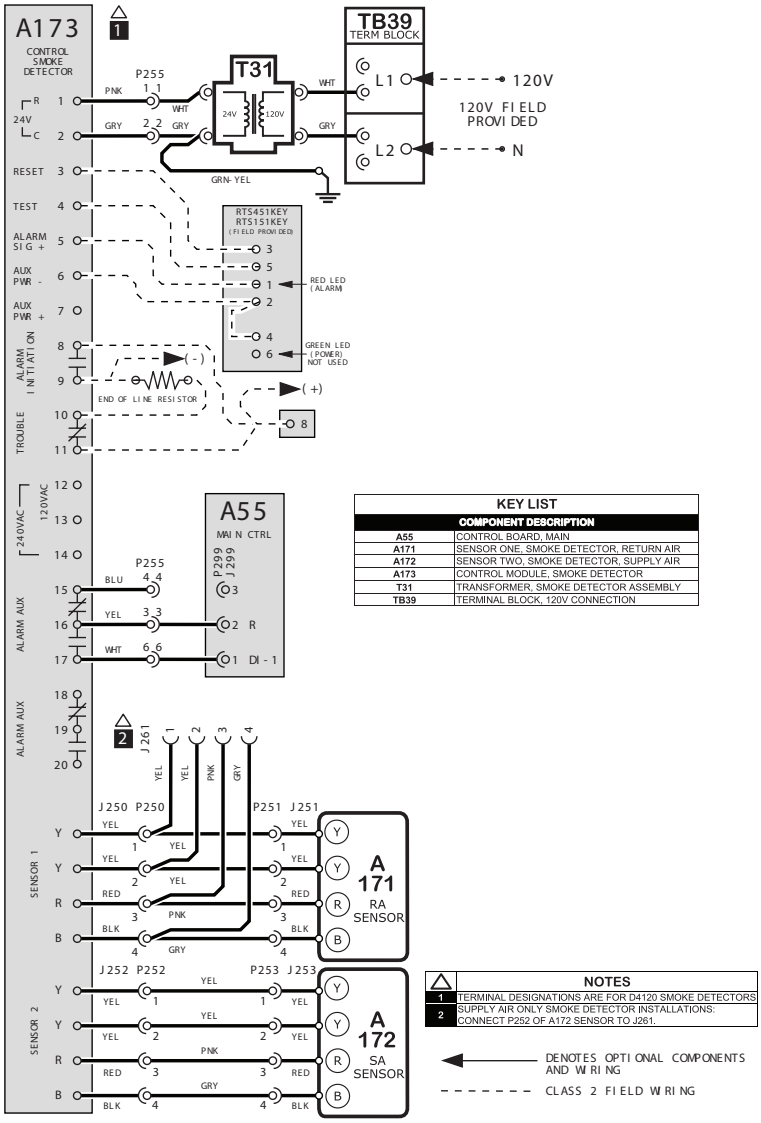
Model: LC,LG,LH,LD,SC,SG Series
Economizer & Motorized OAD
Voltage: All Voltages
Supersedes: N/A Form No: 538072-01 Rev: 2

OPERATION:

1 - 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.

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

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



KEY LIST	
COMPONENT	**DESCRIPTION**
A55	CONTROL BOARD, MAIN
A171	SENSOR ONE, SMOKE DETECTOR, RETURN AIR
A172	SENSOR TWO, SMOKE DETECTOR, SUPPLY AIR
A173	CONTROL MODULE, SMOKE DETECTOR
T31	TRANSFORMER, SMOKE DETECTOR ASSEMBLY
TB39	TERMINAL BLOCK, 120V CONNECTION

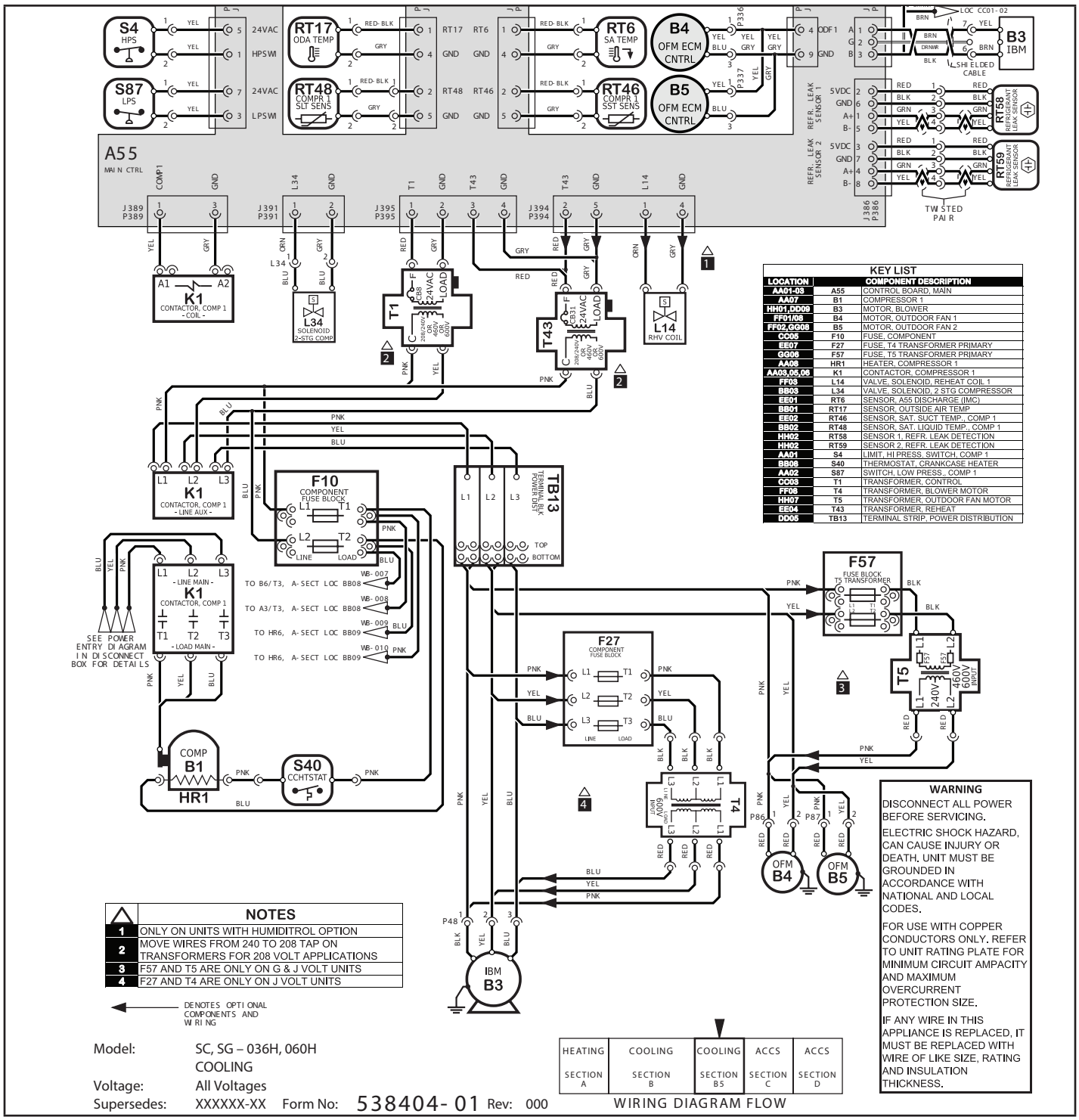
△	NOTES
1	TERMINAL DESIGNATIONS ARE FOR D4120 SMOKE DETECTORS
2	SUPPLY AIR ONLY SMOKE DETECTOR INSTALLATIONS: CONNECT P252 OF A172 SENSOR TO J261.

DENOTES OPTIONAL COMPONENTS AND WIRING

CLASS 2 FIELD WIRING

Model: SC, SG Series RTU
Smoke Detector
Voltage: All Voltages
Supersedes: 537486-01 Form No: 538397-01 Rev: 0

SCH036 / 060 G and J Voltage



KEY LIST		
LOCATION		COMPONENT DESCRIPTION
AA01-03	A55	CONTROL BOARD, MAIN
AA07	B1	COMPRESSOR 1
HH01,DD09	B3	MOTOR, BLOWER
FF01/08	B4	MOTOR, OUTDOOR FAN 1
FF02,GG08	B5	MOTOR, OUTDOOR FAN 2
CC03	F10	FUSE, COMPONENT
EE07	F27	FUSE, T4 TRANSFORMER PRIMARY
GG06	F57	FUSE, T5 TRANSFORMER PRIMARY
AA06	HR1	HEATER, COMPRESSOR 1
AA03,05,06	K1	CONTACTOR, COMPRESSOR 1
FF08	L14	VALVE, SOLENOID, REHEAT COIL 1
BB03	L34	VALVE, SOLENOID, 2 STG COMPRESSOR
EE01	RT6	SENSOR, A55 DISCHARGE (IMC)
BB01	RT17	SENSOR, OUTSIDE AIR TEMP
EE02	RT46	SENSOR, SAT. SUCT TEMP., COMP 1
BB02	RT48	SENSOR, SAT. LIQUID TEMP., COMP 1
HH02	RT58	SENSOR 1, REFR. LEAK DETECTION
HH02	RT59	SENSOR 2, REFR. LEAK DETECTION
AA01	S4	LIMIT, HI PRESS. SWITCH, COMP 1
BB03	S40	THERMOSTAT, CRANKCASE HEATER
AA02	S87	SWITCH, LOW PRESS., COMP 1
CC03	T1	TRANSFORMER, CONTROL
FF08	T4	TRANSFORMER, BLOWER MOTOR
HH07	T5	TRANSFORMER, OUTDOOR FAN MOTOR
EE04	T43	TRANSFORMER, REHEAT
DD05	TB13	TERMINAL STRIP, POWER DISTRIBUTION

NOTES	
1	ONLY ON UNITS WITH HUMIDITROL OPTION
2	MOVE WIRES FROM 240 TO 208 TAP ON TRANSFORMERS FOR 208 VOLT APPLICATIONS
3	F57 AND T5 ARE ONLY ON G & J VOLT UNITS
4	F27 AND T4 ARE ONLY ON J VOLT UNITS

DENOTES OPTIONAL COMPONENTS AND WIRING

WARNING

DISCONNECT ALL POWER BEFORE SERVICING.

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

FOR USE WITH COPPER CONDUCTORS ONLY. REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.

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

Model: SC, SG – 036H, 060H COOLING

Voltage: All Voltages

Supersedes: XXXXXX-XX Form No: 538404-01 Rev: 000

HEATING SECTION A	COOLING SECTION B	COOLING SECTION B5	ACCS SECTION C	ACCS SECTION D

WIRING DIAGRAM FLOW

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 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.

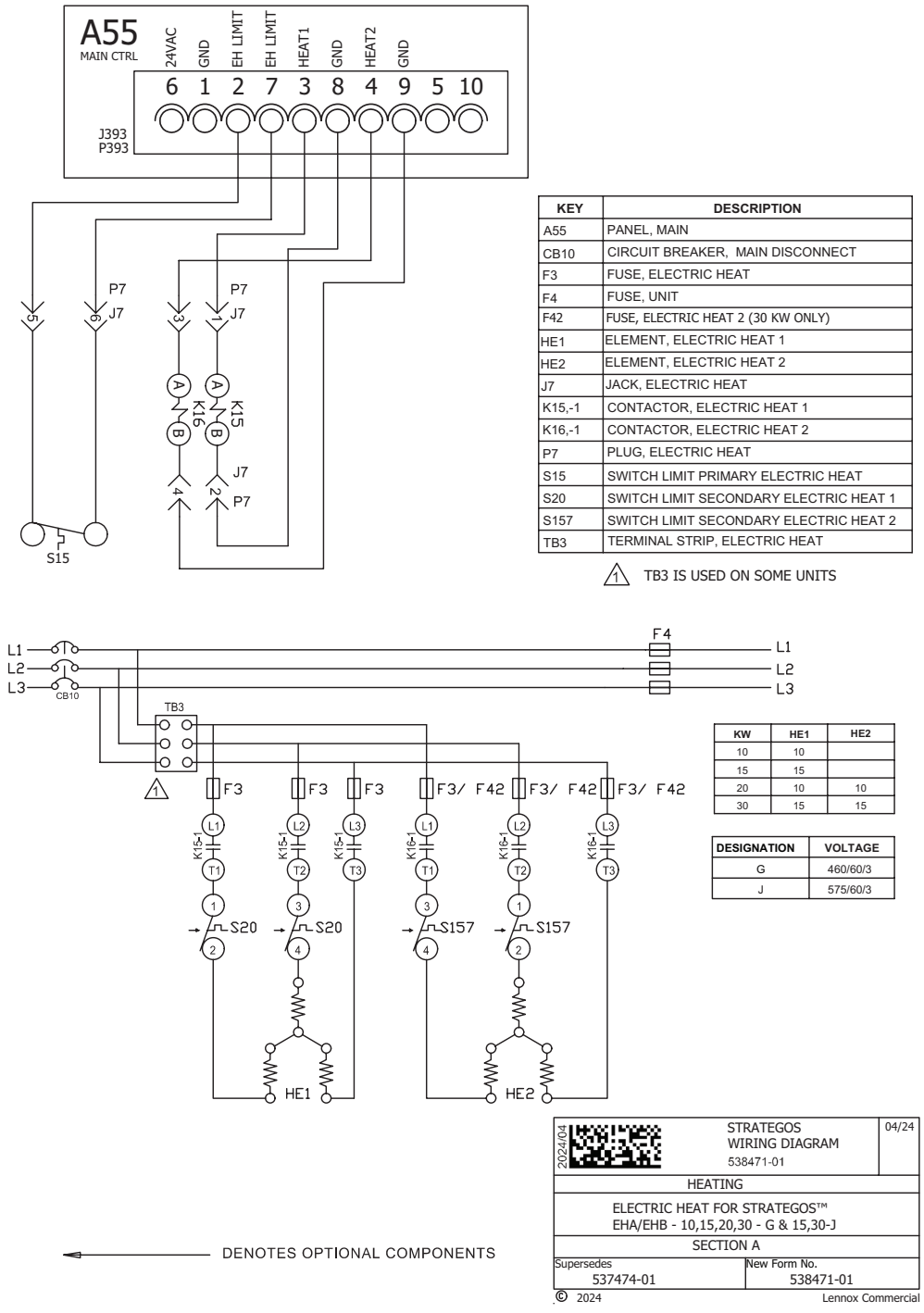
7 - S11 n.o. contact close below 62ºF. A55 energizes outdoor fan motors B4 and B5 on low speed.

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.



KEY	DESCRIPTION
A55	PANEL, MAIN
CB10	CIRCUIT BREAKER, MAIN DISCONNECT
F3	FUSE, ELECTRIC HEAT
F4	FUSE, UNIT
F42	FUSE, ELECTRIC HEAT 2 (30 KW ONLY)
HE1	ELEMENT, ELECTRIC HEAT 1
HE2	ELEMENT, ELECTRIC HEAT 2
J7	JACK, ELECTRIC HEAT
K15,-1	CONTACTOR, ELECTRIC HEAT 1
K16,-1	CONTACTOR, ELECTRIC HEAT 2
P7	PLUG, ELECTRIC HEAT
S15	SWITCH LIMIT PRIMARY ELECTRIC HEAT
S20	SWITCH LIMIT SECONDARY ELECTRIC HEAT 1
S157	SWITCH LIMIT SECONDARY ELECTRIC HEAT 2
TB3	TERMINAL STRIP, ELECTRIC HEAT

1 TB3 IS USED ON SOME UNITS

KW	HE1	HE2
10	10	
15	15	
20	10	10
30	15	15

DESIGNATION	VOLTAGE
G	460/60/3
J	575/60/3

2024/04 STRATEGOS WIRING DIAGRAM 538471-01 04/24

HEATING

ELECTRIC HEAT FOR STRATEGOS™
EHA/EHB - 10,15,20,30 - G & 15,30-J

SECTION A

Supersedes 537474-01 | New Form No. 538471-01

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Sequence of Operation -EHC 10, 15, 20 & 30kW - G, J

1 - When the unit disconnect closes. The disconnect supplies line voltage to electric heat elements HE1 and HE2 are protected by F42

First Stage Heat:

2 - Heating demand initiates at W1 in the thermostat.

3 - 24VAC is routed through A55 Unit Controller. After A55 proves N.C. primary limit S15 contactor K15 is energized.

4 - N.O. K15 contacts close energizing HE1.

Second Stage Heat:

5 - ***20KW, 30KW*** - With first stage heat operating, an additional heating demand initiates W2 in the thermostat.

6 - A second stage heating demand is received by A55 control module. After A55 proves N.C. primary limit S15, contactor K16 is energized.

7 - N.O. K16 contacts close energizing HE2.

VIII-Decommissioning

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

Steps to ensure this are:

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

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

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

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area)

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

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

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

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