UNIT INFORMATION KCC SERIES

15 to 25 ton

100071

Service Literature

KCC180 through 300

KCC units are available in standard cooling efficiencies only. Cooling capacities range from 15 to 25 tons. The KCC180S, 210S and 240S use three compressors; and the KCC300S use four compressors.

Optional electric heat is field-installed. Electric heat operates in single or multiple stages depending on the kW input size. 15kW to 60kW heat sections are available for 180S units. 15kW to 90kW heat sections are available for the 210, 240 and 300.

All models have Multi-Stage Air Volume. The blower will operate at lower speeds when cooling demand is low and increase to higher speeds when cooling demand is high.

All units are designed to accept any of several different energy management thermostat control systems with minimum field wiring.

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

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

⚠ WARNING

To prevent serious injury or death:

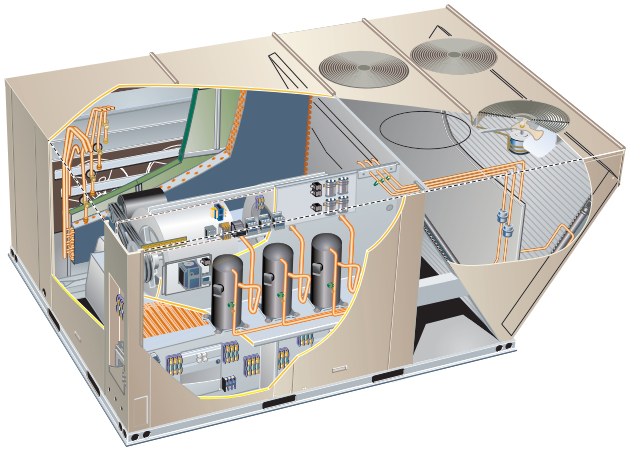
1- Lock-out/tag-out before performing maintenance.

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

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.

⚠ 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		Catalog Number	180	210	240	300
COOLING SYSTEM						
Condensate Drain Trap	PVC	**22H54**	X	X	X	X
	Copper	**76W27**	X	X	X	X
Conventional Fin/Tube Condenser Coil (replaces Environ™ Coil System) (Required for Humiditrol® option on 180, 210 and 240 models)		Factory	O	O	O	O
Drain Pan Overflow Switch		**10C24**	X	X	X	X
Low Ambient Kits (0°F)		**23V24**	X	X		
		23V25			X	
		23V25				X
BLOWER - SUPPLY AIR						
Blower Motors	Belt Drive - 3 hp	Factory	O	O		
	Belt Drive - 5 hp	Factory	O	O	O	O
	Belt Drive 7.5 hp	Factory	O	O	O	O
	Belt Drive 10 hp	Factory			O	O
VFD Manual Bypass Kit	3, 5 hp (208/230V) 3, 5, 7.5, 10 hp (460V and 575V)	**90W52**	X	X	X	X
	7.5, 10 hp (208/230V)	**90W51**	X	X	X	X
Drive Kits	Kit #1 535-725 rpm	Factory	O	O		
See Blower Data Tables for usage and selection	Kit #2 710-965 rpm	Factory	O	O		
	Kit #3 685-856 rpm	Factory	O	O	O	O
	Kit #4 850-1045 rpm	Factory	O	O	O	O
	Kit #5 945-1185 rpm	Factory	O	O	O	O
	Kit #6 850-1045 rpm	Factory	O	O	O	O
	Kit #7 945-1185 rpm	Factory	O	O	O	O
	Kit #8 1045-1285 rpm	Factory	O	O	O	O
	Kit #10 1045-1285 rpm	Factory			O	O
	Kit #11 1135-1365 rpm	Factory			O	O
	Blower Belt Auto-Tensioner	**24B80**	X	X	X	X
CABINET						
Combination Coil/Hail Guards		**23U69**	OX	OX		
		23U71			OX	OX
Hinged Access Panels		Factory	O	O	O	O
CONTROLS						
NOTE - Also see Conventional Thermostat Control Systems on page 11 for additional control options.						
Smoke Detector - Supply or Return (Power board and one sensor)		**22H56**	X	X	X	X
Smoke Detector - Supply and Return (Power board and two sensors)		**22H57**	X	X	X	X

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

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OPTIONS / ACCESSORIES

Item Description		Catalog Number	180	210	240	300
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
Disconnect Switch (see Electric Heat Tables for usage)	80 amp	**54W85**	OX	OX	OX	OX
	150 amp	**54W86**	OX	OX	OX	OX
	250 amp	**54W87**	OX	OX	OX	OX
GFI Service Outlets	15 amp non-powered, field-wired (208/230V, 460V only)	**74M70**	OX	OX	OX	OX
	[1] 20 amp non-powered, field-wired (208/230V, 460V, 575V)	**67E01**	X	X	X	X
	[1] 20 amp non-powered, field-wired (575V)	Factory	O	O	O	O
Weatherproof Cover for GFI		**10C89**	X	X	X	X
ELECTRIC HEAT						
15 kW	208/240V-3ph	**22H66**	X	X	X	X
	460V-3ph	**22H67**	X	X	X	X
	575V-3ph	**22V35**	X	X	X	X
30 kW	208/240V-3ph	**22H68**	X	X	X	X
	460V-3ph	**22H69**	X	X	X	X
	575V-3ph	**22V36**	X	X	X	X
45 kW	208/240V-3ph	**22H72**	X	X	X	X
	460V-3ph	**22H73**	X	X	X	X
	575V-3ph	**22V38**	X	X	X	X
60 kW	208/240V-3ph	**22H76**	X	X	X	X
	460V-3ph	**22H77**	X	X	X	X
	575V-3ph	**22V40**	X	X	X	X
90 kW	208/240V-3ph	**22H80**		X	X	X
	460V-3ph	**22H81**		X	X	X
	575V-3ph	**22V42**		X	X	X
HUMIDITROL® DEHUMIDIFICATION REHEAT OPTION						
Humiditrol® Dehumidification Option		Factory	O	O	O	O

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

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OPTIONS / ACCESSORIES

Item Description		Catalog Number	180	210	240	300
INDOOR AIR QUALITY						
Air Filters						
Healthy Climate® High Efficiency Air Filters 24 x 24 x 2 in. (Order 6 per unit)	MERV 8	**54W67**	X	X	X	X
	MERV 13	**52W40**	X	X	X	X
	MERV 16	**21U42**	X	X	X	X
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)		**44N61**	X	X	X	X
Indoor Air Quality (CO_2) Sensors						
Sensor - Wall-mount, off-white plastic cover with LCD display		**77N39**	X	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display		**23V86**	X	X	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting		**87N52**	X	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting		**87N54**	X	X	X	X
CO_2 Sensor Duct Mounting Kit - for downflow applications		**85L43**	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO_2 sensors (**77N39**)		**90N43**	X	X	X	X
UVC Germicidal Light Kit						
[1] Healthy Climate® UVC Light Kit (110/230V-1ph)		**21A94**	X	X	X	X
Step-Down Transformers	460V primary, 230V secondary	**10H20**	X	X	X	X
	575V primary, 230V secondary	**10H21**	X	X	X	X
Needlepoint Bipolar Ionization (NPBI)						
Needlepoint Bipolar Ionization (NPBI) Kits		**21U37**	X	X		
		21U38			X	
		21U39				X
ECONOMIZER						
Standard Economizer With Outdoor Air Hood (Not for Title 24)						
Standard Economizer Downflow or Horizontal Applications - Includes Outdoor Air Hood, order Downflow or Horizontal Barometric Relief Dampers separately		**13U48**	X	X	X	X
Standard Economizer Controls (Not for Title 24)						
Single Enthalpy Control		**21Z09**	X	X	X	X
Differential Enthalpy Control (order 2)		**21Z09**	X	X	X	X
High Performance Economizer With Outdoor Air Hood (For Title 24) / AMCA Class 1A Certified						
High Performance Economizer Downflow or Horizontal Applications - Includes Outdoor Air Hood, order Downflow or Horizontal Barometric Relief Dampers separately Factory Installed Economizer - Enthalpy control is furnished as standard. Field programmable for Sensible Control without additional hardware Field Installed Economizer - Sensible Sensible Sensor is furnished as standard		**23G24**	OX	OX	OX	OX
High Performance Economizer Controls						
Single Enthalpy Control (Not for Title 24)		**23G26**	X	X	X	X
Differential Enthalpy Control (order 1 for factory. order 2 for field) (Not for Title 24)		**23G26**	X	X	X	X
Economizer Accessories						
WLAN Stick (For High Performance Economizer only)		**23K58**	X	X	X	X
Barometric Relief Dampers With Exhaust Hood						
Downflow Barometric Relief Dampers		**54W78**	OX	OX	OX	OX
Horizontal Barometric Relief Dampers		**16K99**	X	X	X	X

[1] Lamps operate on 110-230V single-phase power supply. Step-down transformer may be ordered separately for 460V and 575V units. Alternately, 110V power supply may be used to directly power the UVC ballast(s).

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OPTIONS / ACCESSORIES

Item Description		Catalog Number	180	210	240	300
OUTDOOR AIR						
Outdoor Air Dampers With Outdoor Air Hood						
Motorized		**22J27**	X	X	X	X
Manual		**13U05**	X	X	X	X
[1] POWER EXHAUST (DOWNFLOW APPLICATIONS ONLY)						
Standard Static, SCCR Rated	208/230V	**22H90**	X	X	X	X
	460V	**22H91**	X	X	X	X
	575V	**22V34**	X	X	X	X
ROOF CURBS						
Hybrid Roof Curbs, Downflow						
8 in. height		**11F58**	X	X	X	X
14 in. height		**11F59**	X	X	X	X
18 in. height		**11F60**	X	X	X	X
24 in. height		**11F61**	X	X	X	X
Adjustable Pitch Curb						
14 in. height		**43W26**	X	X	X	X
Standard Roof Curbs, Horizontal - Requires Horizontal Return Air Panel Kit						
26 in. height - slab applications		**11T89**	X	X	X	
30 in. height - slab applications		**11T90**				X
37 in. height - rooftop applications		**11T96**	X	X	X	
41 in. height - rooftop applications		**11T97**				X
Insulation Kit For Standard Horizontal Curbs						
For 26 in. Curb		**73K32**	X	X	X	
For 30 in. Curb		**73K33**				X
For 37 in. Curb		**73K34**	X	X	X	
For 41 in. Curb		**73K35**				X
Horizontal Return Air Panel Kit						
Required for Horizontal Applications with Roof Curb		**87M00**	X	X	X	X
CEILING DIFFUSERS						
Step-Down - Order one	RTD11-185S	**13K63**	X			
	RTD11-275S	**13K64**		X	X	X
Flush - Order one	FD11-185S	**13K58**	X			
	FD11-275S	**13K59**		X	X	X
Transitions (Supply and Return) - Order one	C1DIFF33C-1	**12X68**	X			
	C1DIFF34C-1	**12X70**		X	X	X

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

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SPECIFICATIONS

General Data			15 Ton	17.5 Ton	20 Ton	25 Ton
	Nominal Tonnage		15 Ton	17.5 Ton	20 Ton	25 Ton
	Model Number		KCC180S4M	KCC210S4M	KCC240S4M	KCC300S4M
	Efficiency Type		Standard	Standard	Standard	Standard
	Blower Type		MSAV® Multi-Stage Air Volume	MSAV® Multi-Stage Air Volume	MSAV® Multi-Stage Air Volume	MSAV® Multi-Stage Air Volume
Cooling Performance	Gross Cooling Capacity - Btuh		178,000	206,000	236,000	282,000
	[1] Net Cooling Capacity - Btuh		172,000	200,000	228,000	270,000
	[1] AHRI Rated Air Flow - cfm		7200	6125	7000	7500
	Total Unit Power - kW		15.6	18.2	20.7	27
	[1] IEER (Btuh/Watt)		14.2	14.2	14.2	13.2
	[1] EER (Btuh/Watt)		11.0	11.0	11.0	10.0
Refrigerant Charge	Refrigerant Type		R-410A	R-410A	R-410A	R-410A
	Environ™ Coil System	Circuit 1	7 lbs. 3 oz.	8 lbs. 0 oz.	8 lbs. 12 oz.	7 lbs. 13 oz.
		Circuit 2	6 lbs. 10 oz.	7 lbs. 2 oz.	8 lbs. 7 oz.	6 lbs. 8 oz.
		Circuit 3	6 lbs. 3 oz.	7 lbs. 6 oz.	8 lbs. 10 oz.	5 lbs. 13 oz.
		Circuit 4	- - -	- - -	- - -	5 lbs. 13 oz.
	Conventional Fin Tube Coil Option	Circuit 1	11 lbs. 8 oz.	12 lbs. 12 oz.	13 lbs. 10 oz.	10 lbs. 8 oz.
		Circuit 2	9 lbs. 14 oz.	12 lbs. 0 oz.	14 lbs. 8 oz.	10 lbs. 0 oz.
		Circuit 3	8 lbs. 15 oz.	11 lbs. 2 oz.	13 lbs. 4 oz.	9 lbs. 12 oz.
		Circuit 4	- - -	- - -	- - -	9 lbs. 12 oz.
	Conventional Fin/Tube with Reheat Option	Circuit 1	15 lbs. 4 oz.	14 lbs. 8 oz.	14 lbs. 12 oz.	- - -
		Circuit 2	13 lbs. 0 oz.	13 lbs. 9 oz.	15 lbs. 4 oz.	- - -
		Circuit 3	8 lbs. 15 oz.	11 lbs. 2 oz.	13 lbs. 4 oz.	- - -
		Circuit 4	- - -	- - -	- - -	- - -
	Environ™ Coil System with Reheat Option	Circuit 1	- - -	- - -	- - -	7 lbs. 7 oz.
		Circuit 2	- - -	- - -	- - -	7 lbs. 2 oz.
		Circuit 3	- - -	- - -	- - -	5 lbs. 15 oz.
		Circuit 4	- - -	- - -	- - -	6 lbs. 1 oz.
Electric Heat Available			15-30-45-60 kW	15-30-45-60-90 kW		
Compressor Type (number)			Scroll (3)	Scroll (3)	Scroll (3)	Scroll (4)
Outdoor Coils Environ™ (Fin/Tube)	Net face area (total) - sq. ft.		41.1	41.1	55.0	55.0
	Number of rows		1 (2)	1 (2)	1 (2)	1 (2)
	Fins per inch		23 (20)	23 (20)	23 (20)	23 (20)
Outdoor Coil Fans	No. and type		(3) PSC	(3) PSC	(4) PSC	(6) PSC
	Motor - horsepower		1/3	1/3	1/3	1/3
	Motor rpm		1075	1075	1075	1075
	Total Motor watts		1100	1100	1665	1950
	Diameter - (No.) in. / No. of blades		(3) 24 / 3	(3) 24 / 3	(4) 24 / 3	(6) 24 / 3
	Total Air volume - cfm		12,000	12,000	16,000	20,000
Indoor Coils	Net face area (total) - sq. ft.		21.4	21.4	21.4	21.4
	Tube diameter - in. / No. of rows		3/8 / 3	3/8 / 4	3/8 / 4	3/8 / 4
	Fins per inch		14	14	14	14
	Drain connection - No. and size		(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT
	Expansion device type		Balanced Port Thermostatic Expansion Valve, removable element head			
[2] Indoor Blower and Drive Selection	Nominal motor output		3 hp, 5 hp, 7.5 hp		5 hp, 7.5 hp, 10 hp	
	Maximum usable motor output (US)		3.45 hp, 5.75 hp, 8.62 hp		5.75 hp, 8.62 hp, 11.5 hp	
	Motor - Drive kit number		**3 hp** **Kit 1** 535-725 rpm **Kit 2** 710-965 rpm **5 hp** **Kit 3** 685-856 rpm **Kit 4** 850-1045 rpm **Kit 5** 945-1185 rpm **7.5 hp** **Kit 6** 850-1045 rpm **Kit 7** 945-1185 rpm **Kit 8** 1045-1285 rpm		**5 hp** **Kit 3** 685-856 rpm **Kit 4** 850-1045 rpm **Kit 5** 945-1185 rpm **7.5 hp** **Kit 6** 850-1045 rpm **Kit 7** 945-1185 rpm **Kit 8** 1045-1285 rpm **10 hp** **Kit 7** 945-1185 rpm **Kit 10** 1045-1285 rpm **Kit 11** 1135-1365 rpm	
	Blower wheel nominal diameter x width - in.		(2) 15 x 15			
Filters	Type of filter / No. and size (in.)		MERV 4, Disposable / (6) 24 x 24 x 2			
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase			

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

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

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

NOTE – Motor service factor limit - 1.0.

BLOWER DATA

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

FOR ALL UNITS ADD:

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

Then determine from blower table blower motor output and drive required.
See page 8 for wet coil, option/accessory air resistance data, and factory installed drive kit specifications.
See page 9 for minimum air volume required for use with optional electric heat.

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

BLOWER DATA

FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

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

NOTE - Using total air volume and system static pressure requirements determine from blower performance tables rpm and motor output required. Maximum usable output of motors furnished are shown. In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.
NOTE – Motor service factor limit - 1.0.

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

Air Volume cfm	Wet Indoor Coil		Reheat Coil	Electric Heat	Economizer	Filters			Horizontal Roof Curb	
	180	210 240 300				MERV 8	MERV 13	MERV 16	180 thru 240	300
2750	.01	.02	.01	- - -	- - -	.01	.03	.06	.03	- - -
3000	.01	.02	.01	- - -	- - -	.01	.03	.06	.04	- - -
3250	.01	.03	.01	- - -	- - -	.01	.04	.07	.04	.01
3500	.01	.03	.02	- - -	- - -	.01	.04	.08	.05	.01
3750	.01	.03	.02	- - -	- - -	.01	.04	.08	.05	.01
4000	.02	.04	.02	- - -	- - -	.01	.04	.09	.06	.02
4250	.02	.04	.02	- - -	- - -	.01	.05	.10	.07	.02
4500	.02	.05	.02	- - -	- - -	.01	.05	.10	.07	.02
4750	.02	.05	.02	- - -	- - -	.02	.05	.11	.08	.03
5000	.02	.05	.02	- - -	- - -	.02	.06	.12	.08	.03
5250	.02	.06	.03	- - -	- - -	.02	.06	.12	.09	.04
5500	.02	.07	.03	- - -	- - -	.02	.06	.13	.10	.04
5750	.03	.07	.03	- - -	- - -	.02	.07	.14	.11	.05
6000	.03	.08	.03	.01	- - -	.03	.07	.14	.11	.06
6250	.03	.08	.03	.01	.01	.03	.07	.15	.12	.07
6500	.03	.09	.04	.01	.02	.03	.08	.16	.13	.08
6750	.04	.10	.04	.01	.03	.03	.08	.17	.14	.08
7000	.04	.10	.04	.01	.04	.04	.08	.17	.15	.09
7250	.04	.11	.04	.01	.05	.04	.09	.18	.16	.10
7500	.05	.12	.05	.01	.06	.04	.09	.19	.17	.11
8000	.05	.13	.05	.02	.09	.05	.10	.21	.19	.13
8500	.06	.15	.05	.02	.11	.05	.10	.22	.21	.15
9000	.07	.16	.06	.04	.14	.06	.11	.24	.24	.17
9500	.08	.18	.07	.05	.16	.07	.12	.25	.26	.19
10,000	.08	.20	.07	.06	.19	.07	.12	.27	.29	.21
10,500	.09	.22	.08	.09	.22	.08	.13	.29	.31	.24
11,000	.11	.24	.08	.11	.25	.09	.14	.30	.34	.27

BLOWER DATA

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

Electric Heat kW	Minimum cfm
15	5200
30	5200
45	5200
60	5200
90	6000

POWER EXHAUST FAN PERFORMANCE

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

CEILING DIFFUSER AIR RESISTANCE - in. w.g.

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

CEILING DIFFUSER AIR THROW DATA

Model No.	Air Volume cfm	[1] Effective Throw Range - ft.		Model No.	Air Volume cfm	[1] Effective Throw Range - ft.	
		RTD11-185S Step-Down	FD11-185S Flush			RTD11-275S Step-Down	FD11-275S Flush
180	5600	39 - 49	28 - 37	210 240 300	7200	33 - 38	26 - 35
	5800	42 - 51	29 - 38		7400	35 - 40	28 - 37
	6000	44 - 54	40 - 50		7600	36 - 41	29 - 38
	6200	45 - 55	42 - 51		7800	38 - 43	40 - 50
	6400	46 - 55	43 - 52		8000	39 - 44	42 - 51
	6600	47 - 56	45 - 56		8200	41 - 46	43 - 52
					8400	43 - 49	44 - 54
					8600	44 - 50	46 - 57
					8800	47 - 55	48 - 59

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

ELECTRICAL/ELECTRIC HEAT DATA — 15 TON

		Model No.	KCC180S4								
[1] Voltage - 60Hz			208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1 (Non-Inverter)	Rated Load Amps		13.2			6.3			4.9		
	Locked Rotor Amps		93			60			41		
Compressor 2 (Non-Inverter)	Rated Load Amps		13.2			6.3			4.9		
	Locked Rotor Amps		93			60			41		
Compressor 3 (Non-Inverter)	Rated Load Amps		13.2			6.3			4.9		
	Locked Rotor Amps		93			60			41		
Outdoor Fan Motors (3)	Full Load Amps (3 ECM)		2.4			1.3			1		
	Total		7.2			3.9			3		
Power Exhaust (2) 0.33 HP	Full Load Amps		2.4			1.3			1		
	Total		4.8			2.6			2		
Service Outlet 115V GFI (amps)			15			15			20		
Indoor Blower Motor	Horsepower		3	5	7.5	3	5	7.5	3	5	7.5
	Full Load Amps		10.6	16.7	24.2	4.8	7.6	11	3.9	6.1	9
[2] Maximum Overcurrent Protection (MOCP)	Unit Only		70	80	100	35	35	45	25	30	35
	With (2) 0.33 HP Power Exhaust		70	80	100	35	40	50	25	30	35
[3] Minimum Circuit Ampacity (MCA)	Unit Only		61	68	78	30	33	37	23	26	29
	With (2) 0.33 HP Power Exhaust		66	72	82	32	35	40	25	28	31

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**15 kW**	70	70	80	80	100	100	35	35	45	25	30	35
		30 kW	100	110	100	125	110	125	60	60	60	45	45	50
		45 kW	150	150	150	175	150	175	80	80	90	60	70	70
		60 kW	150	175	150	175	175	175	80	90	90	70	70	70
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**15 kW**	61	61	68	68	78	78	30	33	37	23	26	30
		30 kW	92	104	100	112	109	121	52	55	59	41	44	48
		45 kW	131	149	139	157	148	166	74	78	82	60	62	66
		60 kW	139	158	146	166	156	175	79	82	86	63	66	69
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	70	70	80	80	100	100	35	40	50	30	30	35
		30 kW	100	110	110	125	125	150	60	60	70	45	50	50
		45 kW	150	175	150	175	175	175	80	90	90	70	70	70
		60 kW	150	175	175	175	175	200	90	90	90	70	70	80
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	66	66	72	72	82	82	32	36	40	26	29	32
		30 kW	98	110	106	118	115	127	55	58	63	44	47	50
		45 kW	137	155	145	163	154	172	77	81	85	62	65	68
		60 kW	145	164	152	172	162	181	82	85	90	66	68	72

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

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

[2] HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA — 17.5 TON

		Model No.	KCC210S4								
[1] Voltage - 60Hz			208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1 (Non-Inverter)	Rated Load Amps		19.6			8.2			6.6		
	Locked Rotor Amps		136			66.1			55.3		
Compressor 2 (Non-Inverter)	Rated Load Amps		19.6			8.2			6.6		
	Locked Rotor Amps		136			66.1			55.3		
Compressor 3 (Non-Inverter)	Rated Load Amps		19.6			8.2			6.6		
	Locked Rotor Amps		136			66.1			55.3		
Outdoor Fan Motors (3)	Full Load Amps (3 ECM)		2.4			1.3			1		
	Total		7.2			3.9			3		
Power Exhaust (2) 0.33 HP	Full Load Amps		2.4			1.3			1		
	Total		4.8			2.6			2		
Service Outlet 115V GFI (amps)			15			15			20		
Indoor Blower Motor	Horsepower		3	5	7.5	3	5	7.5	3	5	7.5
	Full Load Amps		10.6	16.7	24.2	4.8	7.6	11	3.9	6.1	9
[2] Maximum Overcurrent Protection (MOCP)	Unit Only		100	100	110	40	45	50	30	35	40
	With (2) 0.33 HP Power Exhaust		100	110	125	45	45	50	35	35	45
[3] Minimum Circuit Ampacity	Unit Only		82	88	97	36	39	43	29	31	35
	With (2) 0.33 HP Power Exhaust		87	93	102	38	41	45	31	33	37

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**15 kW**	100	100	100	100	110	110	40	45	50	30	35	40
		30 kW	100	110	100	125	110	125	60	60	60	45	45	50
		45 kW	150	150	150	175	150	175	80	80	90	60	70	70
		60 kW	150	175	150	175	175	175	80	90	90	70	70	70
		90 kW	225	250	225	250	225	250	125	125	125	100	100	100
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**15 kW**	82	82	88	88	97	97	36	39	43	29	31	35
		30 kW	92	104	100	112	109	121	52	55	59	41	44	48
		45 kW	131	149	139	157	148	166	74	78	82	60	62	66
		60 kW	139	158	146	166	156	175	79	82	86	63	66	69
		90 kW	201	230	209	238	218	247	115	118	123	92	95	98
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	100	100	110	110	125	125	45	45	50	35	35	45
		30 kW	100	110	110	125	125	150	60	60	70	45	50	50
		45 kW	150	175	150	175	175	175	80	90	90	70	70	70
		60 kW	150	175	175	175	175	200	90	90	90	70	70	80
		90 kW	225	250	225	250	225	300	125	125	150	100	100	110
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	87	87	93	93	102	102	38	41	45	31	33	37
		30 kW	98	110	106	118	115	127	55	58	63	44	47	50
		45 kW	137	155	145	163	154	172	77	81	85	62	65	68
		60 kW	145	164	152	172	162	181	82	85	90	66	68	72
		90 kW	207	236	215	244	224	253	118	122	126	94	97	101

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

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

[2] HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA — 20 TON

Model No.		KCC240S4								
[1] Voltage - 60Hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1 (Non-Inverter)	Rated Load Amps	22.6			10			7.5		
	Locked Rotor Amps	166.2			74.6			54		
Compressor 2 (Non-Inverter)	Rated Load Amps	22.6			10			7.5		
	Locked Rotor Amps	166.2			74.6			54		
Compressor 3 (Non-Inverter)	Rated Load Amps	25			12.8			9.6		
	Locked Rotor Amps	164			100			78		
Outdoor Fan Motors (4)	Full Load Amps (4 ECM)	2.4			1.3			1		
	Total	9.6			5.2			4		
Power Exhaust (2) 0.33 HP	Full Load Amps	2.4			1.3			1		
	Total	4.8			2.6			2		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
[2] Maximum Overcurrent Protection (MOCP)	Unit Only	125	125	125	60	60	60	45	45	50
	With (2) 0.33 HP Power Exhaust	125	125	150	60	60	70	45	50	50
[3] Minimum Circuit Ampacity (MCA)	Unit Only	103	111	119	49	53	56	38	40	43
	With (2) 0.33 HP Power Exhaust	108	116	124	52	55	59	40	42	45

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**15 kW**	125	125	125	125	125	125	60	60	60	45	45	50
		30 kW	125	125	125	125	125	150	60	60	70	45	50	50
		45 kW	150	175	150	175	175	175	80	90	90	70	70	70
		60 kW	150	175	175	175	175	200	90	90	90	70	70	80
		90 kW	225	250	225	250	250	300	125	125	150	100	100	110
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**15 kW**	103	103	111	111	119	119	49	53	56	38	40	43
		30 kW	103	112	111	121	119	129	55	59	63	44	48	50
		45 kW	139	157	148	166	156	174	78	82	86	62	66	68
		60 kW	146	166	156	175	164	183	82	86	90	66	69	72
		90 kW	209	238	218	247	227	256	118	123	126	95	98	101
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	125	125	125	125	150	150	60	60	70	45	50	50
		30 kW	125	125	125	150	150	150	60	70	70	50	50	60
		45 kW	150	175	175	175	175	200	90	90	90	70	70	80
		60 kW	175	175	175	200	175	200	90	90	100	70	80	80
		90 kW	225	250	225	300	250	300	125	150	150	100	110	110
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	108	108	116	116	124	124	52	55	59	40	42	45
		30 kW	108	118	116	127	124	135	58	63	66	47	50	53
		45 kW	145	163	154	172	162	180	81	85	89	65	68	71
		60 kW	152	172	162	181	170	189	85	90	93	68	72	74
		90 kW	215	244	224	253	233	262	122	126	130	97	101	103

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

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

[2] HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA — 25 TON

Model No.		KCC300S4								
[1] Voltage - 60Hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1 (Non-Inverter)	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Compressor 2 (Non-Inverter)	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Compressor 3 (Non-Inverter)	Rated Load Amps	22.4			10.6			7.7		
	Locked Rotor Amps	149			75			54		
Compressor 4 (Non-Inverter)	Rated Load Amps	22.4			10.6			7.7		
	Locked Rotor Amps	149			75			54		
Outdoor Fan Motors (6)	Full Load Amps (6 ECM)	2.4			1.3			1		
	Total	14.4			7.8			6		
Power Exhaust (2) 0.33 HP	Full Load Amps	2.4			1.3			1		
	Total	4.8			2.6			2		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
[2] Maximum Overcurrent Protection (MOCP)	Unit Only	125	150	150	60	70	70	50	50	50
	With (2) 0.33 HP Power Exhaust	150	150	150	60	70	70	50	50	60
[3] Minimum Circuit Ampacity (MCA)	Unit Only	121	129	137	56	60	63	43	46	49
	With (2) 0.33 HP Power Exhaust	126	134	142	59	62	66	45	48	51

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**15 kW**	125	125	150	150	150	150	60	70	70	50	50	50
		30 kW	125	125	150	150	150	150	60	70	70	50	50	50
		45 kW	150	175	150	175	175	175	80	90	90	70	70	70
		60 kW	150	175	175	175	175	200	90	90	90	70	70	80
		90 kW	225	250	225	250	250	300	125	125	150	100	100	110
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**15 kW**	121	121	129	129	137	137	56	60	63	43	46	49
		30 kW	121	121	129	129	137	137	56	60	63	44	48	50
		45 kW	139	157	148	166	156	174	78	82	86	62	66	68
		60 kW	146	166	156	175	164	183	82	86	90	66	69	72
		90 kW	209	238	218	247	227	256	118	123	126	95	98	101
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	150	150	150	150	150	150	60	70	70	50	50	60
		30 kW	150	150	150	150	150	150	60	70	70	50	50	60
		45 kW	150	175	175	175	175	200	90	90	90	70	70	80
		60 kW	175	175	175	200	175	200	90	90	100	70	80	80
		90 kW	225	250	225	300	250	300	125	150	150	100	110	110
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	126	126	134	134	142	142	59	62	66	45	48	51
		30 kW	126	126	134	134	142	142	59	63	66	47	50	53
		45 kW	145	163	154	172	162	180	81	85	89	65	68	71
		60 kW	152	172	162	181	170	189	85	90	93	68	72	74
		90 kW	215	244	224	253	233	262	122	126	130	97	101	103

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

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

[2] HACR type breaker or fuse.

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

ELECTRIC HEAT CAPACITIES

Volts Input	15 kW			30 kW			45 kW			60 kW			90 kW		
	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages
208	11.3	38,600	1	22.5	76,800	1	33.8	115,300	2	45.0	153,600	2	67.6	230,700	2
220	12.6	43,000	1	25.2	86,000	1	37.8	129,000	2	50.4	172,000	2	75.6	258,000	2
230	13.8	47,100	1	27.5	93,900	1	41.3	141,000	2	55.1	188,000	2	82.7	282,200	2
240	15.0	51,200	1	30.0	102,400	1	45.0	153,600	2	60.0	204,800	2	90.0	307,100	2
440	12.6	43,000	1	25.2	86,000	1	37.8	129,000	2	50.4	172,000	2	75.6	258,000	2
460	13.8	47,100	1	27.5	93,900	1	41.3	141,000	2	55.1	188,000	2	82.7	282,200	2
480	15.0	51,200	1	30.0	102,400	1	45.0	153,600	2	60.0	204,800	2	90.0	307,100	2
550	12.6	43,000	1	25.2	86,000	1	37.8	129,000	2	50.4	172,000	2	75.6	258,000	2
575	13.8	47,100	1	27.5	93,900	1	41.3	141,000	2	55.1	188,000	2	82.7	282,200	2
600	15.0	51,200	1	30.0	102,400	1	45.0	153,600	2	60.0	204,800	2	90.0	307,100	2

KCC PARTS ARRANGEMENT

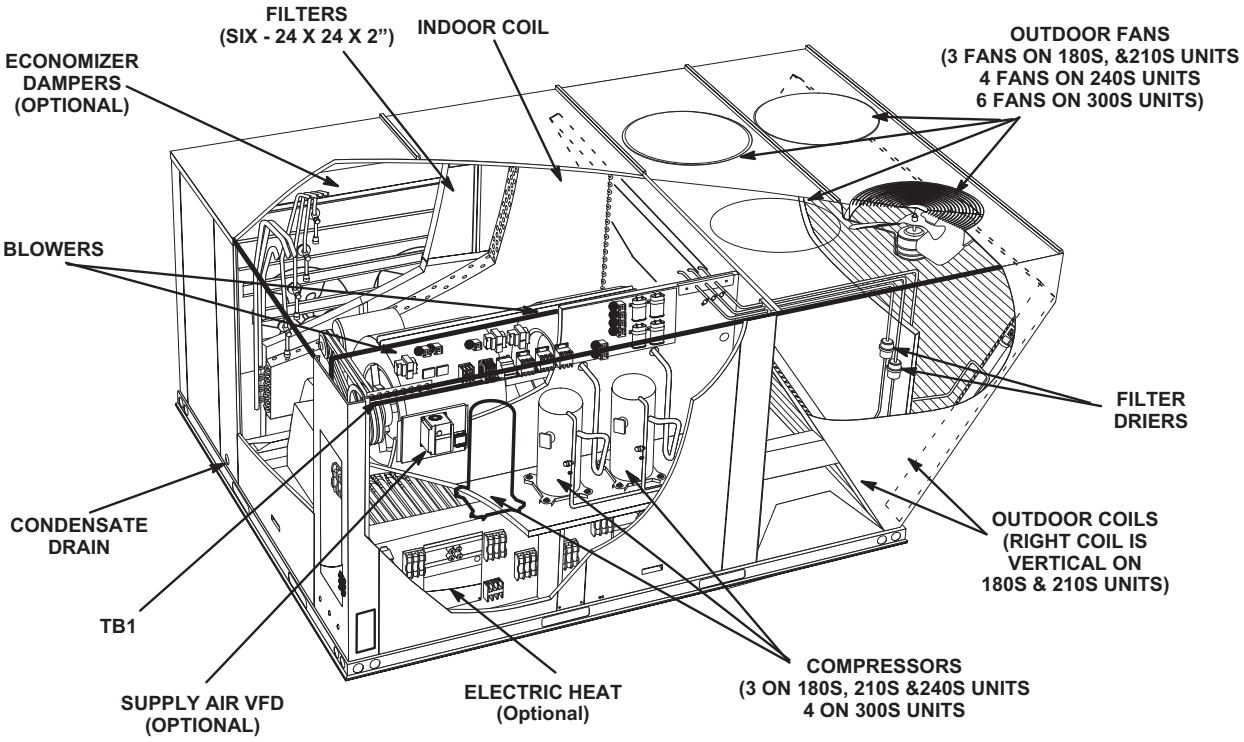


FIGURE 1

CONTROL BOX

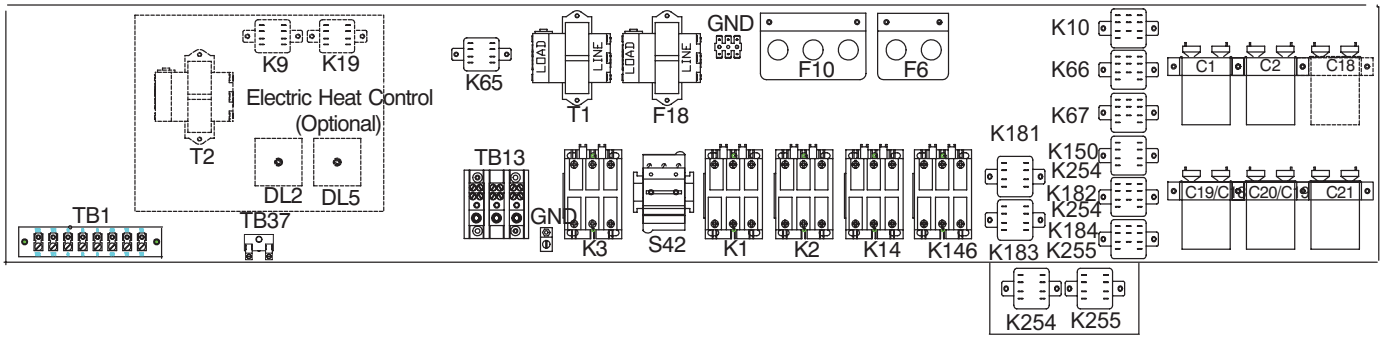


FIGURE 2

I-UNIT COMPONENTS

KCC unit components are shown in figure 1. All units come standard with removeable unit panels. All L1, L2 and L3 wiring is color coded; L1 is red, L2 is yellow and L3 is blue.

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

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

A-Control Box Components

KCC control box components are shown in figure 2. The control box is located in the compressor compartment.

1-Disconnect Switch S48

All units may be equipped with an optional disconnect switch S48. S48 can be a toggle switch or a twist style switch. Both types can be used by the service technician to disconnect power to the unit. Units without S48 will be equipped with terminal strip TB2.

2-Terminal Strip TB13

All units are equipped with TB13. Units without S48 will have incoming power connected to TB13.

3-Control Transformer T1

All use a single line voltage to 24VAC transformer mounted in the control box. Transformer supplies power to control circuits in the unit. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB8) which is located on the transformer itself. The 208/230 (Y) voltage transformers have two primary voltage taps, but only one may be used depending on supply voltage. See figure 3.

460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

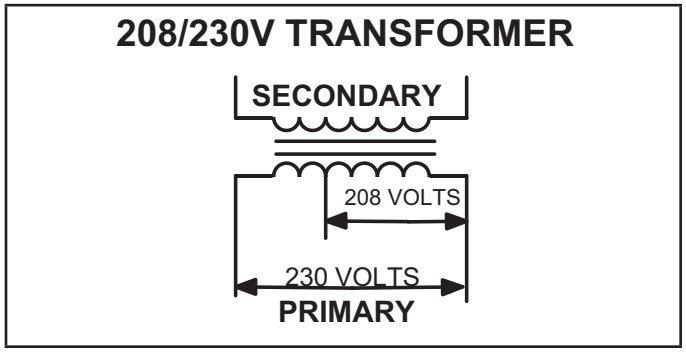


FIGURE 3

4-Fuse F4

Fuse F4 is used only with single point power supply. F4 gives over amperage protection to the compressor and other cooling components. F4, S48 and TB2 are located inside a sheet metal enclosure in the unit left front corner mullion.

5- Control Transformer T18

T18 is a single line voltage to 24VAC transformer used in all models. Transformer T18 is protected by a 3.5 amp circuit breaker (CB18) located on the transformer itself. T18 is identical to transformer T1. The transformer supplies 24VAC power to the contactors.

6- Terminal Strip TB1

All indoor thermostat connections will be to TB1 located on the control panel. For thermostats with “occupied “ and “unoccupied” modes, a factory-installed jumper across terminals R and OC should be removed. Unit wiring is designed for a two-stage thermostat. See table 1.

TABLE 1

TB1 TERMINAL DESIGNATIONS

Y1	Cool Stage 1
Y2	Cool Stage 2
W1	Heat Stage 1
W2	Heat Stage 2
OC	Occupied
G	Indoor Blower
R	24V To Thermostat
C	Ground

7- Outdoor Fan Capacitors C1, C2, C18 (all units), C19 (240S only),C20, C21 (300S only)

Fan capacitors C1, C2, C18, C19, C20, C21 are 10 MFD / 370V capacitors used to assist in the start up of condenser fans B4, B5, B21, B22 (240S only), B23, B24 (300S only) respectively.

8- Outdoor Fan Relay K10, K150, K254, K255

Outdoor fan relays are DPDT relays with a 24VAC coil. See table 2 to determine which fan each relay energizes.

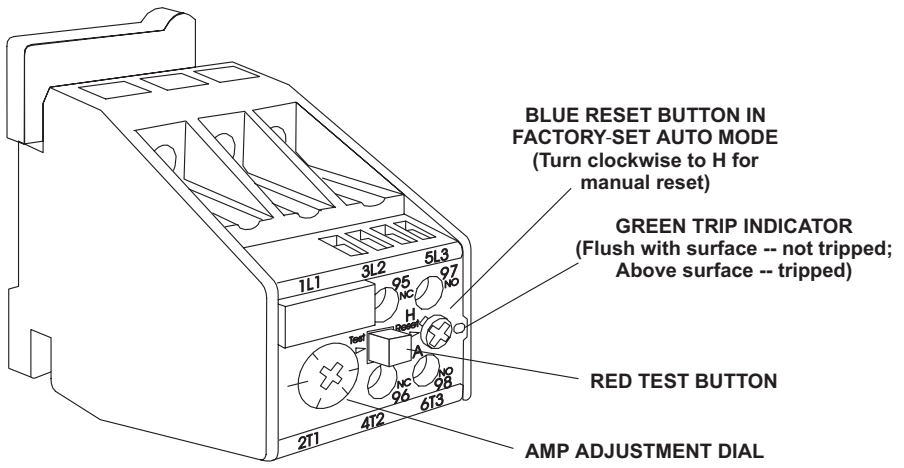
TABLE 2

KCC Unit	Relay	Fan Energized
180S, 210S	K10	B4, B5
	K254	B21
240S	K10	B4, B21
	K254	B5, B22
300S	K10	B4, B5
	K150*	B4, B5
	K254	B21
	K255*	B24

*Not all units will be equipped with K150 or K255

9-Fuses F10 and F6 (240 & 300 Y volt only)

Three F10 line voltage fuses provide overcurrent protection to condenser fans and are rated at 30A. Two F6 line voltage fuses provide overcurrent protection for optional ield installed power exhaust fans (Y volt 240S 300S units) and are rated at 30A.



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

FIGURE 4

10-Compressor Contactor K1, K2, K14 (180S, 210S, 240S units) K146 (300S units only)

All compressor contactors are three-pole-double-break contactors with 24VAC coils. K1, K2, K14 and K146 energize compressors B1, B2, B13 and B20 respectively, in response to thermostat demand.

11-Blower Contactor K3

Blower contactor K3 is used in all units with the VFD bypass option. The contactor is three-pole-double-break with a 24VAC coil used to energize the indoor blower motor B3, in response to blower demand. K3 is energized from terminal G on TB1.

12-Blower Motor Overload Relay S42

S42 is a manual reset overload relay, used in all units with a 10 HP blower motor and VFD by-pass. The relay is connected in line with the blower motor to monitor the current flow to the motor. When the relay senses an overload condition, a set of normally closed contacts opens de-energizing the 24 volt output of T1. See figure 4.

13-Power Exhaust Relay K65 (PED units)

Power exhaust relay K65 is a DPDT relay with a 24VAC coil. K65 is used in units equipped with the field installed optional power exhaust dampers. K65 is energized by the economizer enthalpy control A6, after the economizer dampers reach 50% open (adjustable) When K65 closes, exhaust fans B10 and B11 are energized.

14-Cooling Stage Pilot Relays K66 and K67

Cooling stage pilot relays are DPDT relays with a 24VAC coil. These relays prevent voltage drop caused by long thermostat wiring when the thermostat is used to energize compressor contactors directly. K66 is energized by a Y1 thermostat call. N.O. contact K66-1 will close allowing 24VAC from T1 transformer to energize stage 1 compressor contactors. Some not all units will be equipped with relay K67. K67 is energized by a Y2 thermostat call. N.O. contacts K67-1 will close allowing 24VAC from T18 transformer to energize stage 2 compressor contactor(s). Units without K67; Y2 demand will energize compressor contactor K14 allowing second stage cool.

180S and 210S
PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL

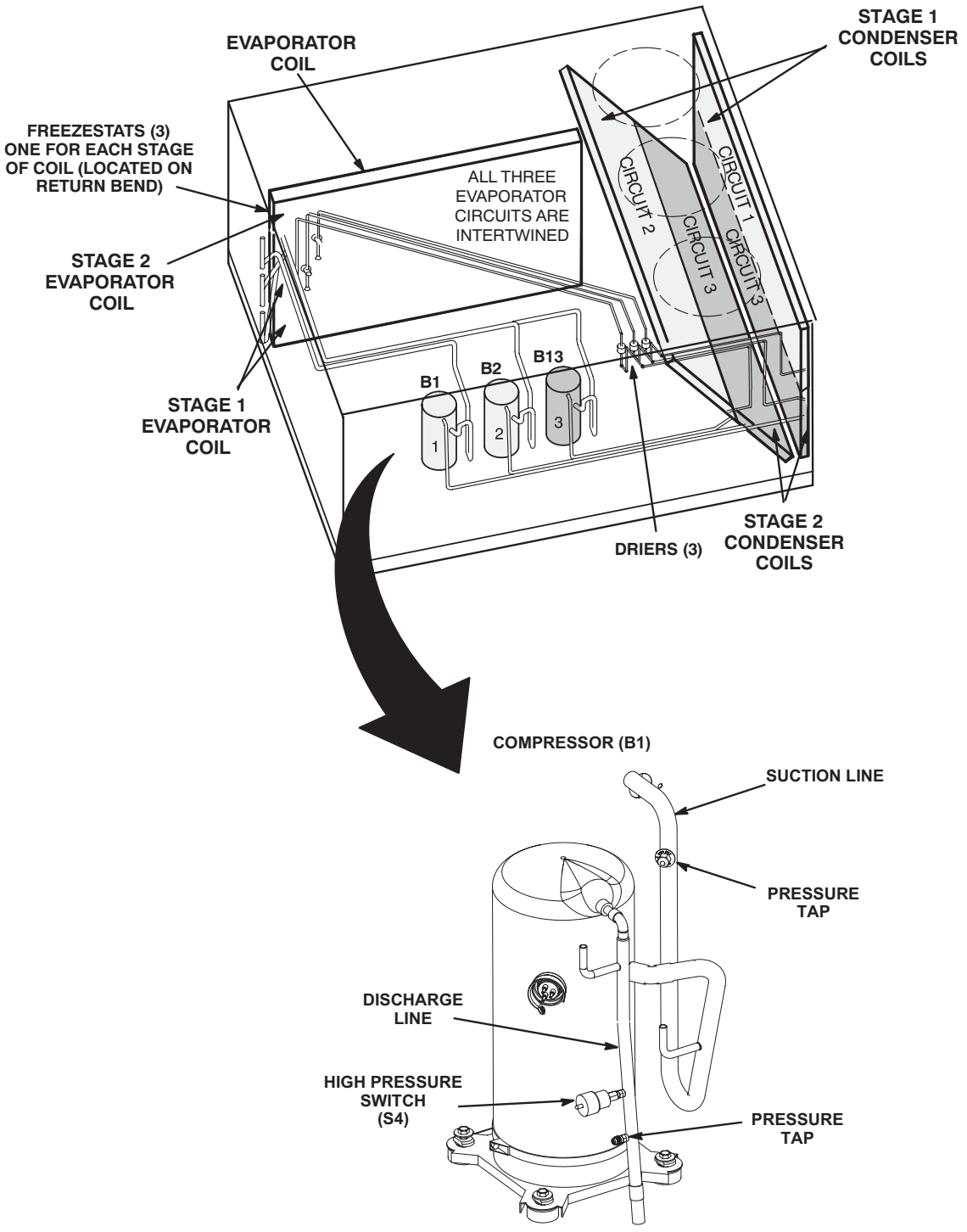


FIGURE 5

240S
PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL

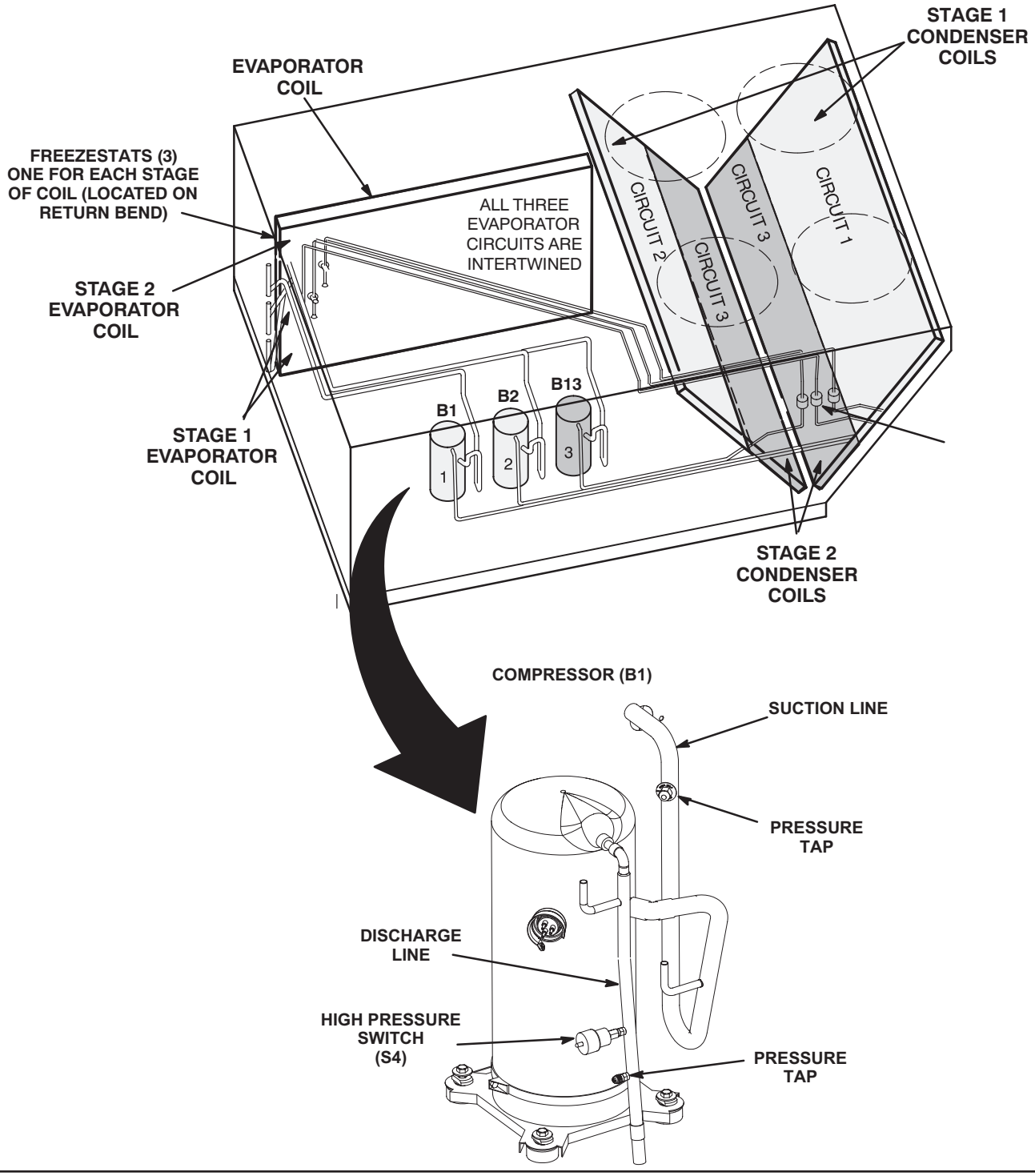


FIGURE 6

300S PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL

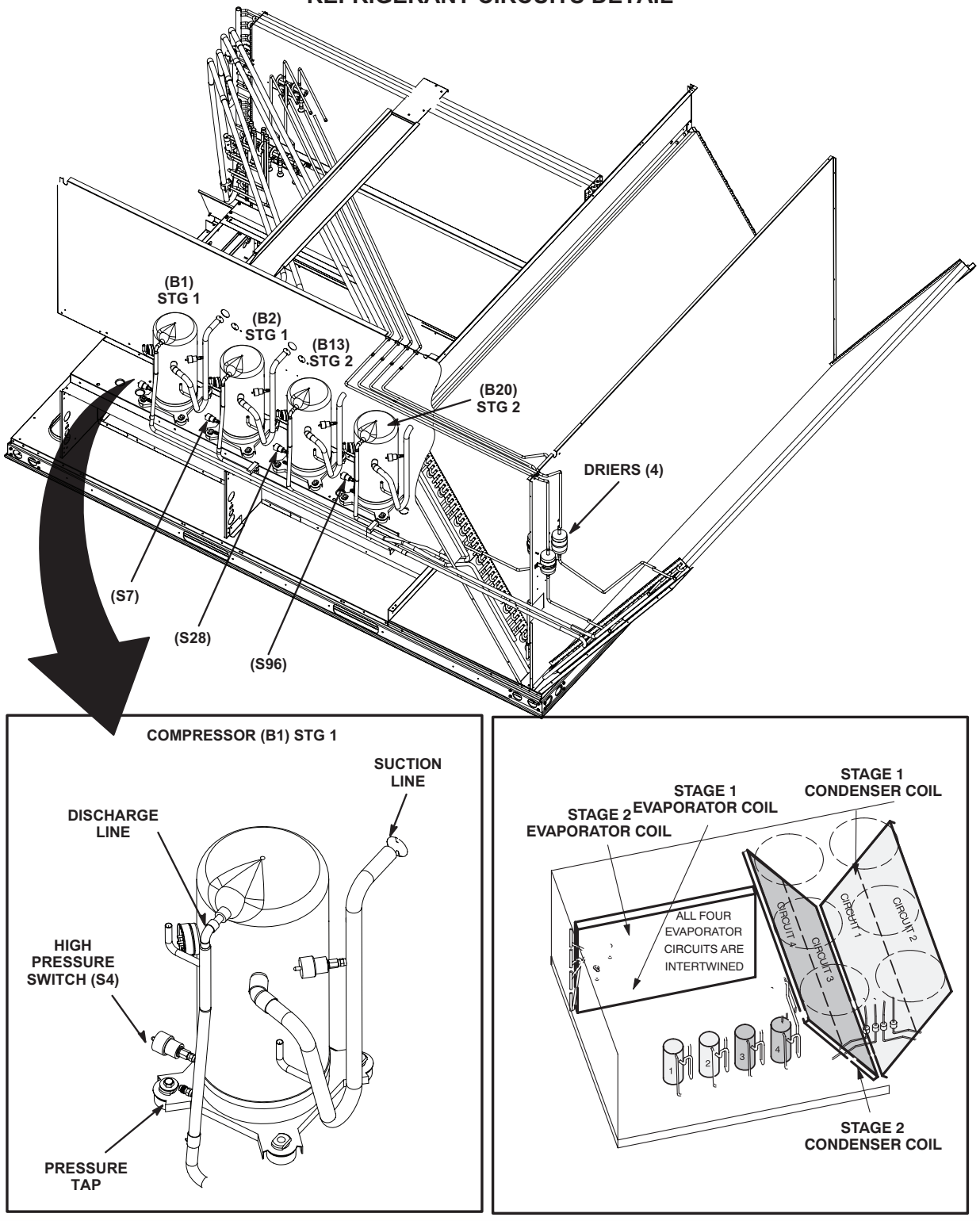


FIGURE 7

16-Variable Frequency Drive A96

MSAV® units are equipped with a VFD which alters the supply power frequency and voltage to the blower motor. Blower speed is staged depending on the compressor stages, heating demand, or ventilation demand. The amount of airflow for each stage is preset from the factory. Full speed airflow can be adjusted by changing the variable sheave on the blower motor. Part load cooling speed is ⅔ of full speed. The VFD is located below the upper control panel.

17-Inverter Default Relay K232

Relay is used in optional MSAV units and is a two-pole, double-throw relay with a 24VAC coil. K232 is energized through the A96 VFD B-C normally closed contact. If the VFD fails, the B-C contact will open and de-energize the K232 coil and cut the 24VAC power to the thermostat and the whole unit. K232 is located beside A96.

18-Phase Monitor A42

Phase monitor detects the phasing of incoming power. If the incoming power is out of phase or if any of the three phases are lost, an indicator LED on the phase monitor will turn red and the unit will not start. In normal operation with correct incoming power phasing, the LED will be green. A42 is located beside A96.

19-VFD Control Board A183

VFD control board A183 is a solid-state control board powered with 24VDC from the variable frequency drive A96. This option is used on MSAV units. A183 gets signals from the thermostat, ignition control and economizer modules to determine blower speeds and damper minimum positions. For more information on the A183, refer to the MSAV Start Up section. A183 is located on the left side of the control area.

B-Cooling Components

⚠ 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.

All units use independent cooling circuits consisting of separate compressors, condenser coils and evaporator coils. See figures 5, 6 and 7. Draw-through type condenser fans are used in all units. All units are equipped with belt-drive blowers which draw air across the evaporator during unit operation.

Cooling may be supplemented by an optional factory- or field-installed economizer. The evaporators are slab type and are stacked. Each evaporator is equipped with enhanced fins and rifled tubing. In all units each compressor is protected by a freezestat (on each evaporator) and a high pressure switch (on each discharge line). Optional field installed low ambient switches are available for additional compressor protection.

1-Compressors B1, B2, B13 (all units) & B20 (300S only)

All units use scroll compressors. KCC180S, 210S and 240S use three compressors and KCC300S units use four compressors. All compressors are equipped with independent cooling circuits. Compressor capacity may vary from stage to stage. In all cases, the capacity of each compressor is added to reach the total capacity of the unit. See "SPECIFICATIONS" and "ELECTRICAL DATA" (table of contents) or compressor nameplate for compressor specifications.

⚠ WARNING

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

Each compressor is energized by a corresponding compressor contactor.

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

2-High Pressure Switches S4, S7, S28 (all units), S96 (300S units)

The high pressure switch is an automatic reset N.C switch which opens on a pressure rise. S4 (first circuit), S7 (second circuit), S28 (third circuit) and S96 (fourth circuit) are wired in series with the respective compressor contactor coils.

When discharge pressure rises to 640 ± 20 psig (4413 ± 138 kPa) (indicating a problem in the system) the switch opens and the respective compressor is de-energized (the economizer can continue to operate). The switch will reset when discharge pressure drops below 475 ± 20 psig (3275 ± 138 kPa) and the respective compressor will restart.

3-Low Ambient Kit (field installed)

The Low ambient kit is optional and field installed. This kit has temperature switch and head pressure controller. This kit allows mechanical cooling operation by maintaining liquid pressures at low outdoor temperatures, by stopping or slowing the outdoor fans.

180S & 210S Units - S201

When ambient temperature drops below 55°F,S201 temperature switch opens to de-energize K10relay coil, de-energizing condenser fans 1 (B4) and 2 (B5). The liquid line pressure transducers A188 convert the pressure to an analog signal which is sent to the head pressure control (A190). The head pressure control provides a variable output which slows condenser fan 3 (B21) operation at lower ambient temperatures

240S Units - S201

When ambient temperature drops below 55°F, S201 temperature switch opens to de-energize K10relay coil, de-energizing condenser fans 1 (B4) and 3 (B21). The liquid line

pressure transducers A188 convert the pressure to an analog signal which is sent to the head pressure control (A190). The head pressure control provides a variable output which slows condenser fan 2 (B5) and 4 (B22) operation at lower ambient temperatures.

300S Units - S201, S202

When ambient temperature drops below 55°F,temperature switches S201 and S202 opens to de-energize K10 and K150 relay coils, de-energizing condenser fans 1 (B4), 2 (B5), 4 (B22) & 5 (B23). The liquid line pressure transducers A188, A189 convert the pressure to analog signal which is sent to the head pressure control units (A190, A191). The head pressure control provides a variable output which slows condenser fans 3 (B21) and 6 (B24) operation at lower ambient temperature.

All Units -

When liquid pressure rises to 450 ± 10 psig (3103 ± 69 kPa), pressure switches close, energizing the appropriate condenser fans. At low ambient temperatures, when the liquid pressure falls below 355psig, the head pressure controller A190 and A191 cycles the fans slowly allowing the system to operate without icing the evaporator coil and losing capacity. The fans cycles to full speed above 355 psig and in heating mode.

At low ambient conditions, when the temperature falls below 55F the appropriate switch (S201 and or S202) opens and stops cycling of the appropriate fans. The fans cycle to full speed when the temperature move above 70F.

4-Filter Drier (all units)

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

5-Freezestats S49, S50, S53 (all units) S95 (300S units only)

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

Each freezestat is wired in series with the corresponding compressor contactor. Each freezestat is an 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 respective compressor until the coil temperature rises.

6-Condenser Fans B4, B5, B21 (all units), B22 (240S & 300S only) B23, B24 (300S only)

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

C-Blower Compartment

The blower compartment in KCC180S-300S units is located between the evaporator coil and the compressor / control section on the opposite side of the condenser coil. The blower assembly is accessed by removing the screws on either side of the sliding base. The base pulls out as shown in figure 8.

1-Blower Wheels

All KCC180S-300S units have two 15 in. x 15 in. (381 mm x 381 mm) blower wheels. Both wheels are driven by one motor mounted on a single shaft. Shaft bearings are equipped with grease ports for service.

2-Indoor Blower Motor B3

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

.

OPERATION / ADJUSTMENT

Three Phase Scroll Compressor Voltage Phasing

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

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

1 - Disconnect all remote electrical power supplies.

2 - Reverse any two field-installed wires connected to the line side of TB2. *Do not reverse wires at blower contactor.*

3 - Make sure the connections are tight.

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

MSAV Units - All MSAV units are equipped with a phase monitor located in the control compartment. The phase monitor will detect the phasing of incoming power. If the incoming power is out of phase or if any of the three phases are lost, the indicating LED on the phase monitor will turn red and the unit will not start. In normal operation with correct incoming power phasing, the LED will be green.

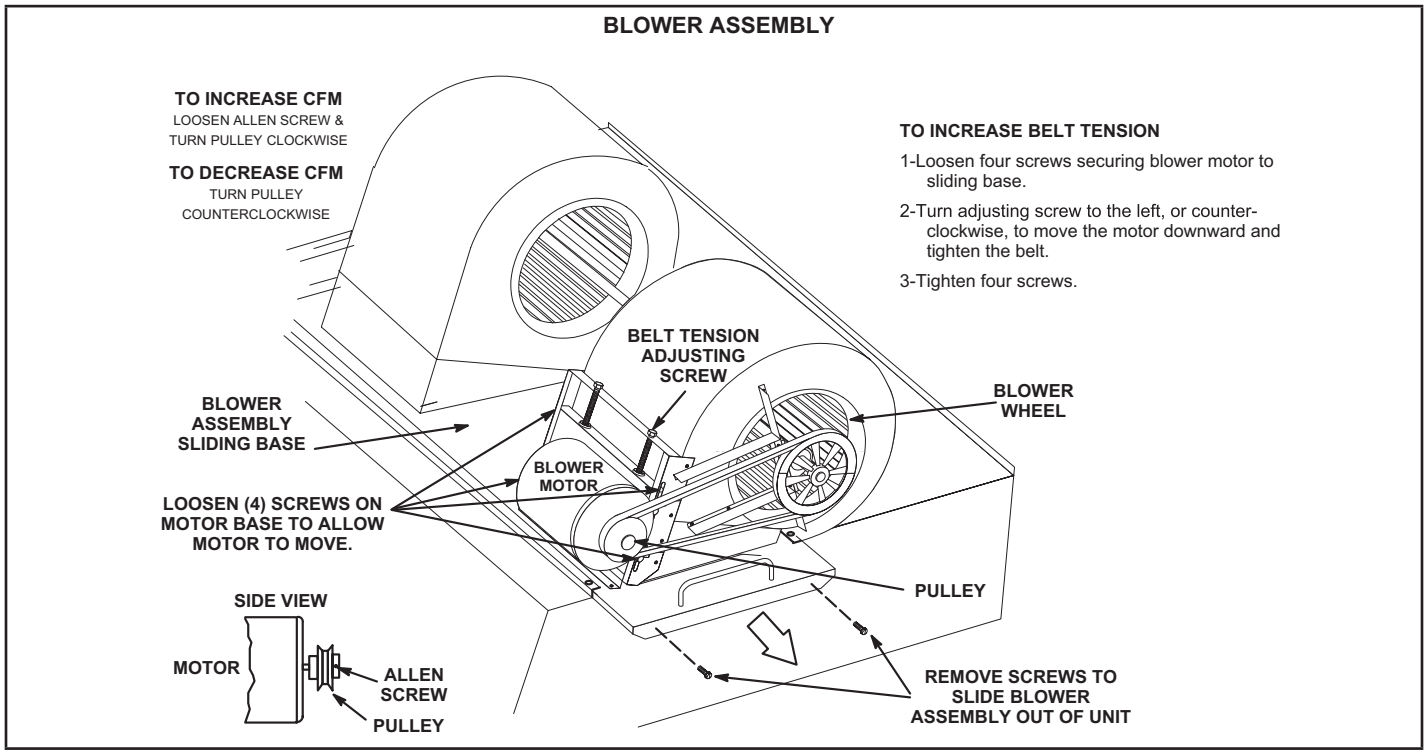


FIGURE 8

Blower Operation

Initiate blower demand at thermostat according to instructions provided with thermostat. Unit will cycle on thermostat demand. The following steps apply to applications using a typical electro-mechanical thermostat.

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

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

Blower Access

The blower assembly is secured to a sliding base which allows the entire assembly to be pulled out of the unit. See figure 8.

1 - Remove the clamp which secures the blower wiring to the blower motor base.

2 - Remove and retain screws on either side of sliding base. Pull base toward outside of unit. When pulling the base out further than 12" (305mm), disconnect wiring to K3 blower contactor T1, T2 and T3. Pull wiring toward blower to allow enough slack to slide the base out further.

3 - Slide base back into original position when finished servicing. Replace the clamp and blower wiring in the previous location on the blower motor base. Reconnect wiring to K3 if it was disconnected.

4 - Replace retained screws on either side of the sliding base.

Determining Unit Air Volume

IMPORTANT - *MSAV units are factory-set to run the blower at full speed when there is a blower (G) demand without a heating or cooling demand. Use the following procedure to adjust motor pulley to deliver the full load cooling or heating CFM. See MSAV Start-Up section to set blower CFM for all modes once the motor pulley is set.*

1 - The following measurements must be made with a dry indoor coil. Run blower without cooling demand. Air filters must be in place when measurements are taken.

2 - With all access panels in place, measure static pressure external to unit (from supply to return). Blower performance data is based on static pressure readings taken in locations shown in figure 9.

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

3 - Measure the indoor blower wheel RPM.

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

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

Blower Belt Adjustment

Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Tension new belts after a 24-48 hour period of operation. This will allow belt to stretch and seat grooves. Make sure blower and motor pulley are aligned as shown in figure 10.

1 - Loosen four bolts securing motor base to mounting frame. See figure 8.

2 - *To relieve belt tension -*

Turn adjusting bolt to the right, or clockwise, to move the motor upward and loosen the belt. This decrease the distance between the blower motor pulley and the blower housing pulley.

To increase belt tension -

Turn the adjusting bolt to the left, or counterclockwise to increase belt tension. This increases the distance between motor pulley and blower housing pulley (motor moves downward and tightens belt).

3 - Tighten four bolts securing motor base to mounting frame.

IMPORTANT - *Align top edges of blower motor base and mounting frame base parallel before tightening bolts on the both sides of base. Motor shaft and blower shaft must be parallel.*

Field-Furnished Blower Drives

For field-furnished blower drives, use blower tables in the front of this manual to determine BHP and RPM required and to determine the drive number. Table 6 shows the drive component manufacturer's model number.

Check Belt Tension

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

1 - Measure span length X. See figure 11.

2 - Apply perpendicular force to center of span (X) with enough pressure to deflect belt 1/64" for every inch of span length or 1.5mm per 100mm of span length.

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

Example: Deflection distance of a 400mm span would be 6mm.

3 - Measure belt deflection force. For a used belt, the deflection force should be 5 lbs. (35kPa). A new belt deflection force should be 7 lbs. (48kPa). A force below these values indicates an undertensioned belt. A force above these values indicates an overtensioned belt.

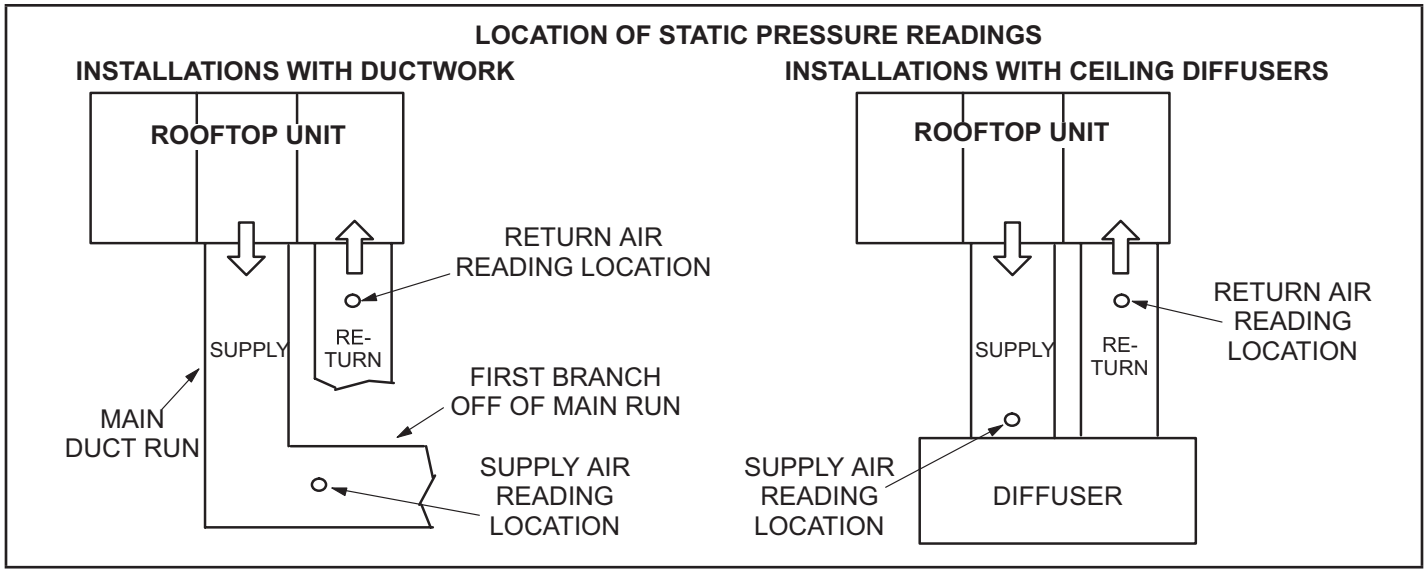


FIGURE 9

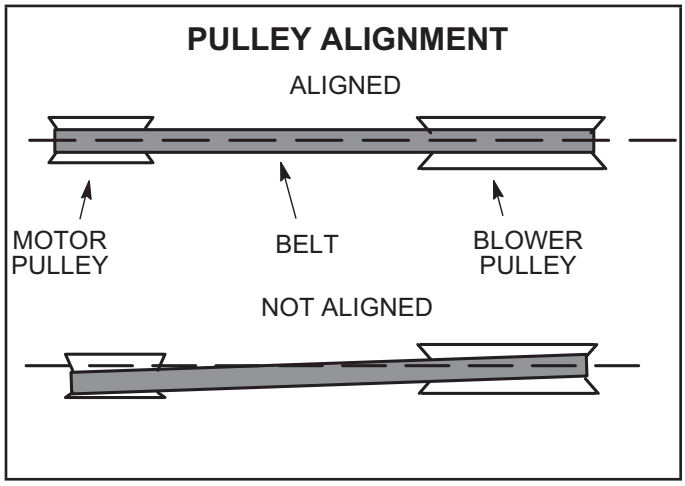


FIGURE 10

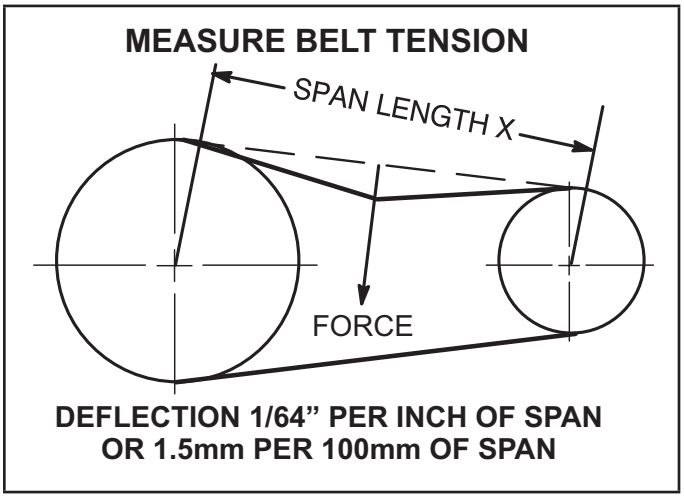


FIGURE 11

TABLE 3
MANUFACTURER'S NUMBERS

Drive No.	H.P.	DRIVE COMPONENTS									
		RPM		ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS		SPLIT BUSHING	
		Min	Max	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
1	2, 3	535	725	1VP40x7/8	79J0301	BK95X1-7/16	80K1601	BX59	59A5001	N/A	N/A
2	2, 3	710	965	1VP40x7/8	79J0301	BK72x1-7/16	100244-13	BX55	63K0501	N/A	N/A
3	5	685	865	1VP50x1-1/8	P-8-1977	BK100x1-7/16	39L1301	BX61	93J9801	N/A	N/A
4	5	850	1045	1VP65x1-1/8	100239-03	BK110H	100788-06	BX65	100245-08	H-1-7/16	49M6201
5	5	945	1185	1VP60x1-1/8	41C1301	BK90H	100788-04	BX61	93J9801	H-1-7/16	49M6201
6	7.5	850	1045	1VP65x1-3/8	78M7101	BK110H	100788-06	BX66	97J5901	H-1-7/16	49M6201
7	7.5, 10	945	1185	1VP60x1-3/8	78L5501	BK90H	100788-04	BX63	97J5501	H-1-7/16	49M6201
8	7.5	1045	1285	1VP65x1-3/8	78M7101	BK90H	100788-04	BX64	97J5801	H-1-7/16	49M6201
10	10	1045	1285	1VP65x1-3/8	78M7101	1B5V86	78M8301	5VX670	100245-21	B-1-7/16	100246-01
11	10	1135	1365	1VP65x1-3/8	78M7101	1B5V80	100240-05	5VX660	100245-20	B-1-7/16	100246-01

D-Optional Electric Heat Components

See ELECTRICAL / ELECTRIC HEAT (table of contents) for possible KCC to EHA match-ups and electrical ratings. All electric heat sections consist of electric heating elements exposed directly to the air stream. Two electric heat sections (first section and second section) are used in all 15kW through 90kW heaters used in KCC180/300 units. Multiple-stage elements are sequenced on and off in response to thermostat demand. EHA parts arrangement is shown in figures 13 and 14.

Control Box Components

The main control box (see figure 2) houses some electric heat components and the electric heat control "hat" section (figure 12).

Electric Heat Hat Section (Figure 12)

1-Electric Heat Relay K9

All KCC series units with electric heat use an electric heat relay K9. K9 is a N.O. DPDT pilot relay intended to electrically isolate the unit's 24V circuit from the electric heat assembly 24V circuit. K9 is energized by W1 TB1. K9-1 closes, enabling T2 to energize the electric heat.

2-Electric Heat Relay K19

All KCC series units with electric heat use an electric heat relay K19. K19 is a N.O. SPDT pilot relay intended to electrically isolate the unit's 24V circuit from the electric heat assembly 24V circuit. K19 is energized by TB1 (once K9 is energized). K19-1 closes, enabling T2 to energize the remaining electric heat.

3-Time Delay DL2

DL2 is a solid state timer used in all electric heat units. DL2 staggers the energizing of the first (W1) and second (W2) stage heating elements by providing a timed interval. When the timer is de-energizing, the contacts are delayed 1 second before opening.

4-Time Delay DL5

Time delay DL5 is identical to DL2. DL5 further staggers the (W2) second stage heating elements by providing a timed interval between the energizing of the elements activated by DL2 and elements activated by DL5.

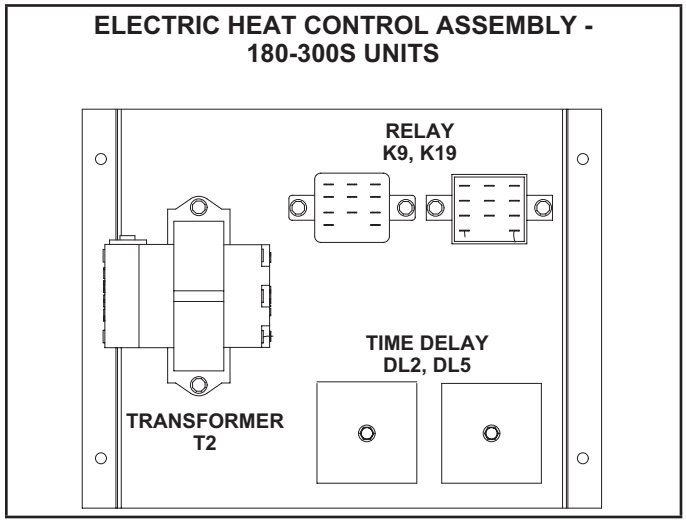


FIGURE 12

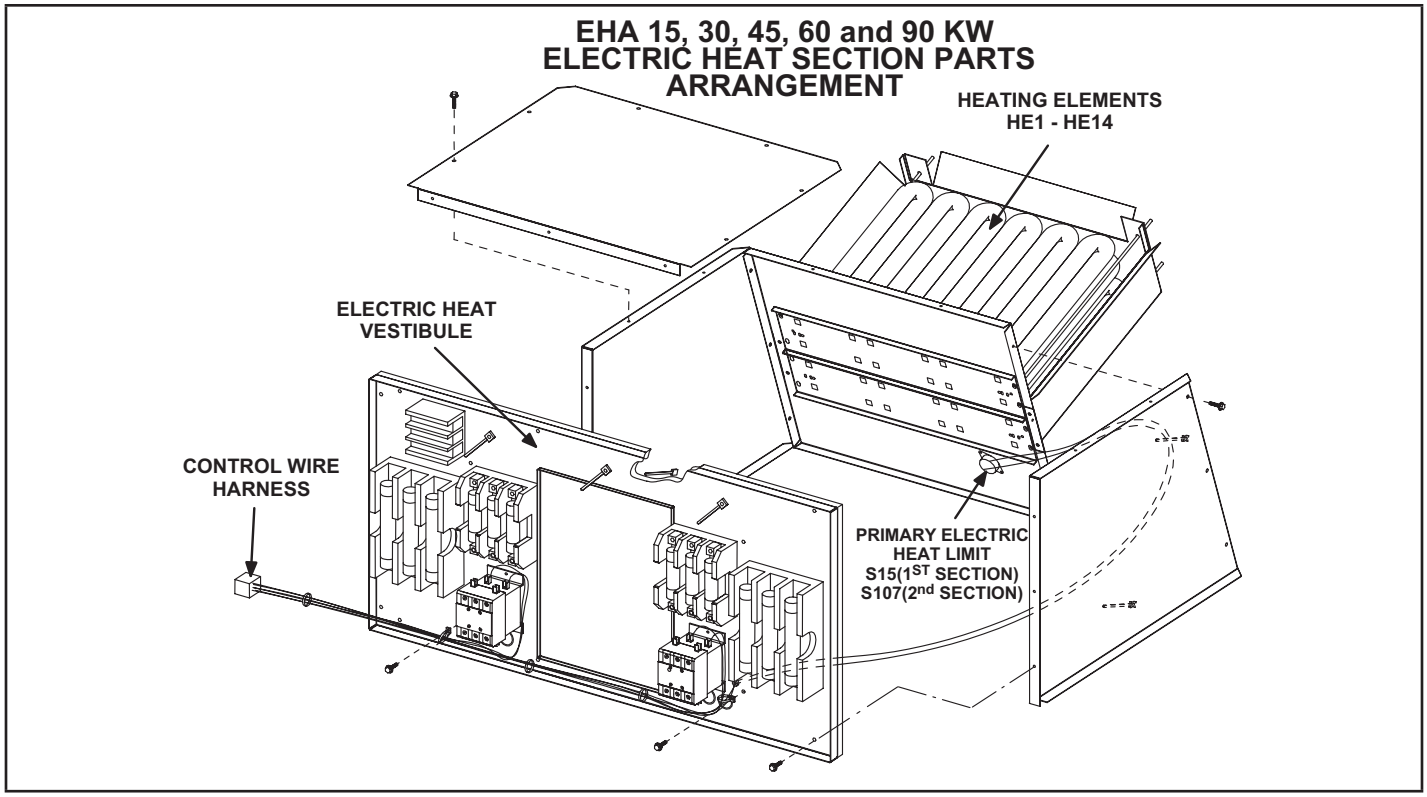
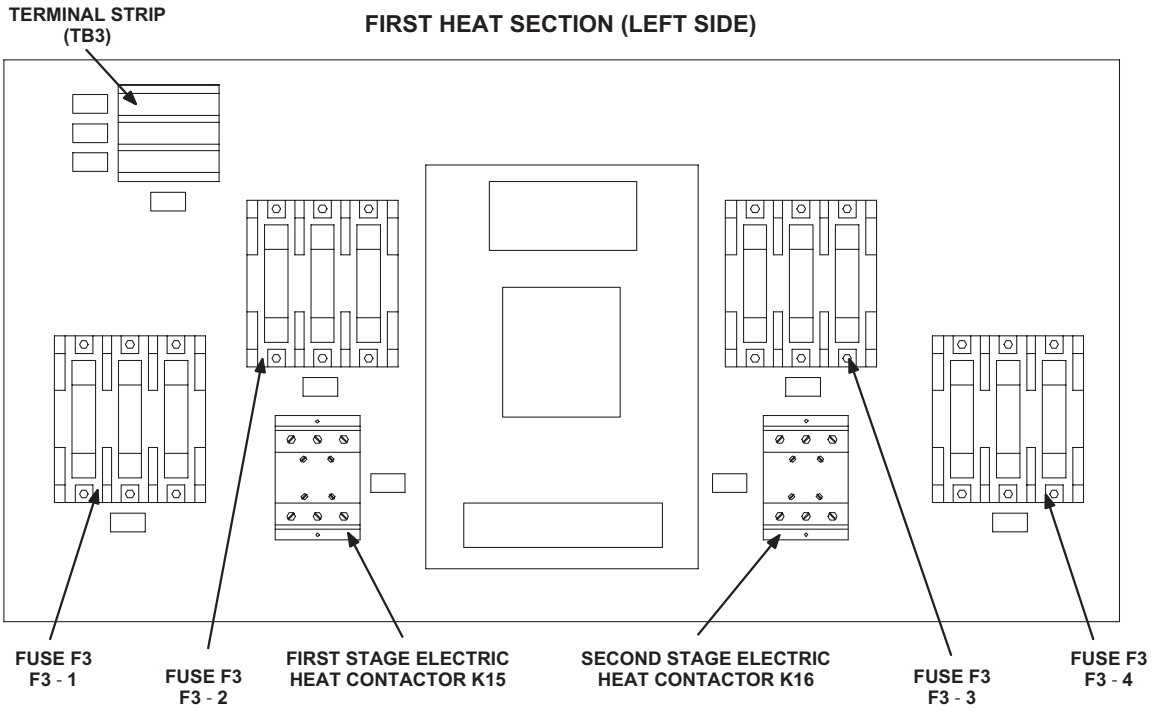


FIGURE 13

KCC180/300 ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT



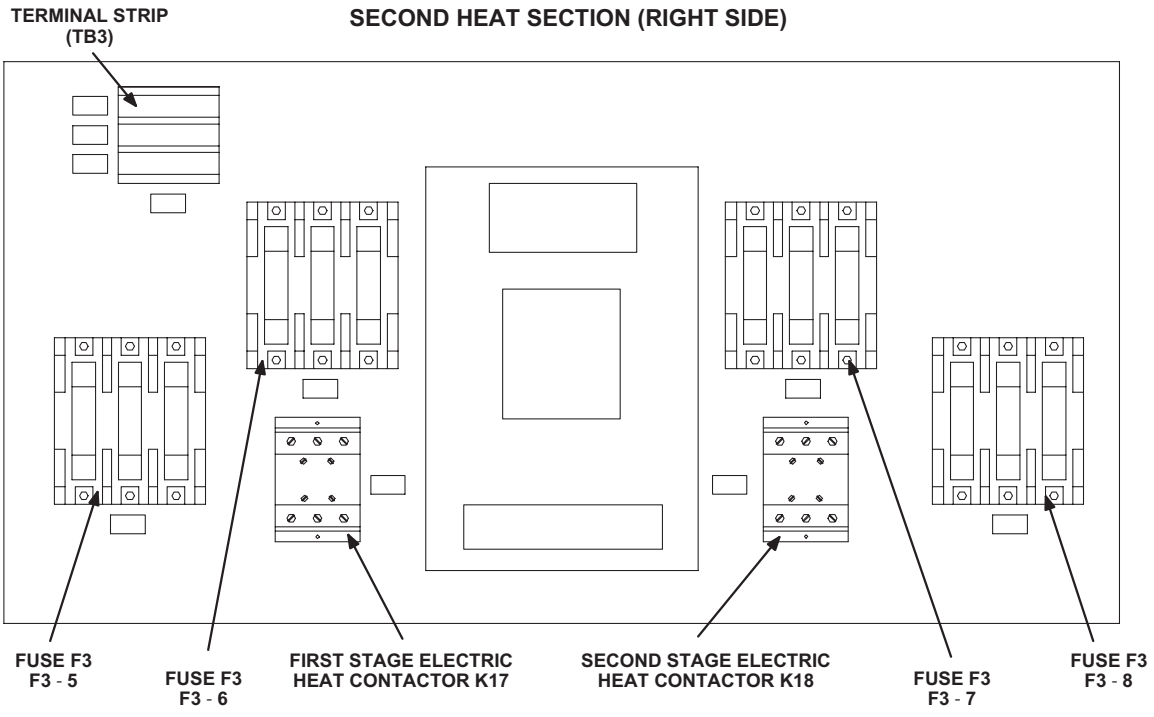


FIGURE 14

5-Electric Heat Transformer T2

All KCC series units with electric heat use a single line voltage to 24VAC transformer mounted in the electric heat control hat section in the control box. The transformer supplies power to all electric heat controls (contactors and coils). The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker CB13 located on the body of T2. The 208/230 (Y) voltage transformers use two primary voltage taps as shown in figure 3. Transformer T2 is identical to T1.

Electric Heat Sections

6-Contactors K15, K16, K17 and K18

Contactors K15, K16, K17 and K18 are all three-pole double- break contactors located on the electric heat vestibule. K15 and K16 are located on the first electric heat section, while K17 and K18 are located on the second electric heat section. However, in the 15 and 30kW heaters, the first section houses all contactors and fuses. All contactors are equipped with a 24VAC coil. The coils in the K15, K16, K17 and K18 contactors are energized by the main panel A45. Contactors K15 and K17 energize the first stage heating elements, while K16 and K18 energize the second stage heating elements.

7-Fuse F3

Fuse F3 are housed in a fuse block which holds three fuses. Each F3 fuse is connected in series with each leg of electric heat. Figure 14 and table 4 show the fuses used with each electric heat section. For simplicity, the service manual labels the fuses F3 - 1 through F3 - 8.

8-Terminal Strip TB3

Electric heat line voltage connections are made to terminal strip TB3 (or a fuse block on some models) located in the upper left corner of the electric heat vestibule.

9-High Temperature Limits S15 and S107

(Primary)

S15 and S107 are SPST N.C. auto-reset thermostats located on the back panel of the electric heat section below the heating elements. S15 is the high temperature limit for the first electric heat section, while S107 is the high temperature limit for the second electric heat section. Both thermostats are identical and are wired in series with the first stage contactor coil. When either S15 or S107 opens, indicating a problem in the system, contactor K15 is de-energized.

When K15 is de-energized, first stage and all subsequent stages of heat are de-energized. The thermostats used on EHA360-45- Y/G/J are factory set to open at 200F $\pm$ 5^{0}F (93.3^{0}C $\pm$ 2.8^{0}C) on a temperature rise and automatically reset at 160^{0}F $\pm$ 6^{0}F (71.1^{0}C $\pm$ 3.3^{0}C) on a temperature fall. All other electric heat section thermostats are factory set to open at 170^{0}F $\pm$ 5^{0}F (76.7^{0}C $\pm$ 2.8^{0}C) on a temperature rise and automatically reset at 130^{0}F $\pm$ 6^{0}F (54.4^{0}C $\pm$ 3.3^{0}C) on a temperature fall. The thermostats are not adjustable.

10-Heating Elements HE1 through HE14

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. The elements in 208/230V units are connected in a “Delta” arrangement.

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

KCC180/300 ELECTRIC HEAT SECTION FUSE RATING

EHA QUANTITY & SIZE	VOLTAGES	FUSE (3EACH)							
		F3-1	F3-2	F3-3	F3-4	F3-5	F3-6	F3-7	F3-8
(1) EHA240-7.5 & (1) EHA240S-7.5 (15 kW Total)	208/230	50 Amp 250V	-	-	-	-	--	-	-
	460	25 Amp 600V	-	-	-	-	-	-	-
	575	20 Amp 600V	-	-	-	-	-	-	-
(1) EHA360-15 & (1) EHA360S-15 (30 kW Total) or (1) EHA156-15 & (1) EHA156S-15	208/230	60 Amp 250V	60 Amp 250V	-	-	-	-	-	-
	460	50 Amp 600V	-	-	-	-	-	-	-
	575	40 Amp 600V	-	-	-	-	-	-	-
(2) EHA360-22.5 (45 kW Total) or (2) EHA156-22.5	208/230	50 Amp 250V	-	-	25 Amp 250V	50 Amp 250V	-	-	25 Amp 250V
	460	25 Amp 600V	-	-	15 Amp 600V	25 Amp 600V	-	-	15 Amp 600V
	575	20 Amp 600V	-	-	10 Amp 600V	20 Amp 600V	-	-	10 Amp 600V
(2) EHA150-30 (60 kW Total) or (2) EHA156-30	208/230	50 Amp 250V	-	-	50 Amp 250V	50 Amp 250V	-	-	50 Amp 250V
	460	25 Amp 600V	-	-	25 Amp 600V	25 Amp 600V	-	-	25 Amp 600V
	575	20 Amp 600V	-	-	20 Amp 600V	20 Amp 600V	-	-	20 Amp 600V
(2) EHA360-45 (90 kW Total)	208/230	50 Amp 250V	-	60 Amp 250V	60 Amp 250V	50 Amp 250V	-	60 Amp 250V	60 Amp 250V
	460	25 Amp 600V	-	-	50 Amp 600V	25 Amp 600V	-	-	50 Amp 600V
	575	20 Amp 600V	-	-	40 Amp 600V	20 Amp 600V	-	-	40 Amp 600V

II-PLACEMENT AND INSTALLATION

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

III-STARTUP - OPERATION

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

A-Preliminary and Seasonal Checks

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

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

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

4 - Check voltage at the disconnect switch (if applicable) or TB2. Voltage must be within the range listed on the nameplate. If not, consult the power company and have the voltage corrected before starting the unit.

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

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

B-Cooling Start Up

Supply Air Invert Units - Refer to the Supply Air Inverter Start-Up section.

Operation

1 - Remove coil covers before starting unit.

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

Compressor Stages

3 - *180S, 210S, 240S units -*

First-stage thermostat demand will energize compressors 1 and 2; a second-stage thermostat demand will energize compressor 3.

300S units -

First-stage thermostat demand will energize compressors

1 & 2; a second-stage thermostat demand will energize compressors 3 and 4.

On units with an economizer, when outdoor air is acceptable, a first-stage demand will energize the economizer; a second-stage demand will energize compressors 1 and 2 on 180S, 210S, 240S & 300S units.

Refrigerant Circuits

4 - *180S, 210S, 240S -*

Units contain three refrigerant circuits or systems. Evaporator and condenser coil refrigerant circuits 1 and 2 make up stage 1 cooling. Evaporator and condenser refrigerant circuit 3 makes up stage 2 cooling.

300S -

Units contain four refrigerant circuits or systems. Evaporator and condenser coil refrigerant circuits 1 and 2 make up stage 1 cooling. Evaporator and condenser refrigerant circuit 3 and 4 make up stage 2 cooling.

Outdoor Fan Operation

5 - *180S, 210S -*

First-stage thermostat demand will energize condenser fans 1, 2 and 3. Fans will continue to operate with additional thermostat demands. See figure 15.

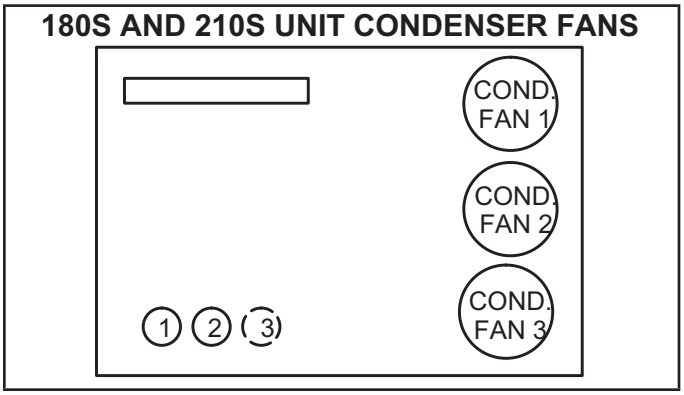


FIGURE 15

240S -

First-stage thermostat demand will energize condenser fans 1, 2, 3 and 4. See figure 16. Fans will continue to operate with additional thermostat demands.

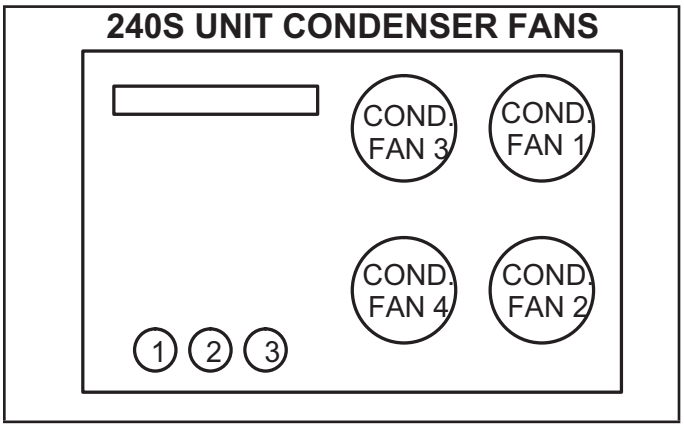


FIGURE 16

300S -

First-stage thermostat demand will energize condenser fans 1, 2 and 3. Second-stage thermostat demand will energize condenser fans 4, 5 and 6. See figure 17.

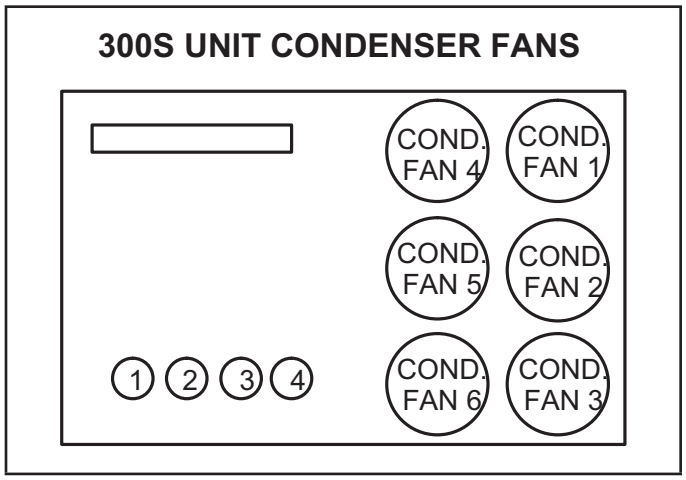


FIGURE 17

6 - Each refrigerant circuit is separately charged with R-410A refrigerant. See unit rating plate for correct amount of charge.

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

IV-CHARGING

A-All Aluminum Outdoor Coil

⚠ 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.

WARNING-Do not exceed nameplate charge under any condition.

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

NOTE - *System charging is not recommended below 60F (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 - Check each system separately with all stages operating. Compare the normal operating pressures (see tables 5 - 9) 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 compressor compartment where the liquid lines enter from the condenser 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.

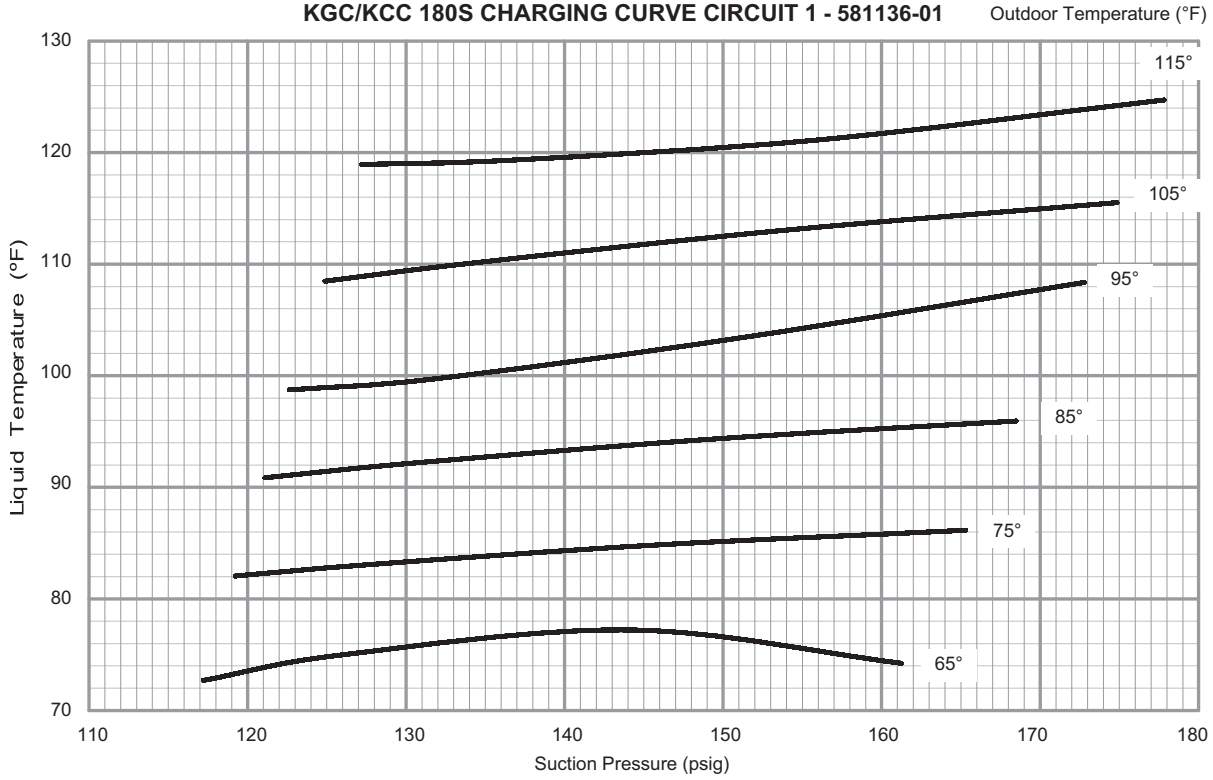
7 - Example KG/KC 180S units, Circuit 1: At 95°F outdoor ambient and a measured suction pressure of 130psig, the target liquid temperature is 99.5°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquid temperature agrees with the target liquid temperature.

TABLE 5

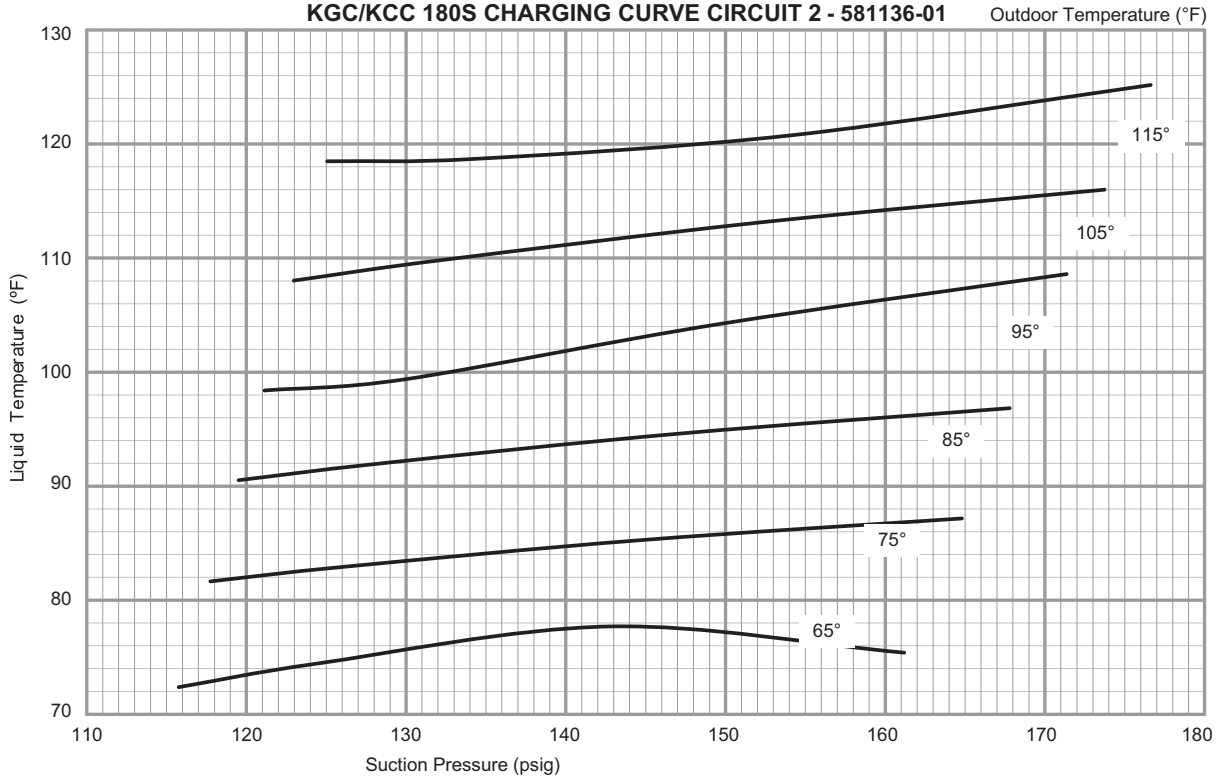
KGC/KCC 180S ALL-ALUMINUM COIL NORMAL OPERATING PRESSURES - 581137-01

	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)
Circuit 1	117	239	119	279	121	324	123	375	125	431	127	493
	126	242	128	282	130	327	132	376	134	433	137	493
	144	250	146	288	149	333	151	383	154	437	156	498
	161	259	165	297	168	341	173	390	175	444	178	504
Circuit 2	116	239	118	279	120	324	121	374	123	431	125	486
	124	242	126	282	128	327	130	375	132	433	134	489
	143	250	145	288	147	333	150	381	152	437	154	493
	161	259	165	297	168	341	171	390	174	444	177	500
Circuit 3	115	249	117	289	119	334	121	384	122	439	124	499
	124	252	126	292	128	337	130	386	132	441	134	501
	142	260	144	300	147	344	149	393	152	448	154	507
	159	270	163	310	167	354	171	403	173	457	176	515

KGC/KCC 180S CHARGING CURVE CIRCUIT 1 - 581136-01



KGC/KCC 180S CHARGING CURVE CIRCUIT 2 - 581136-01



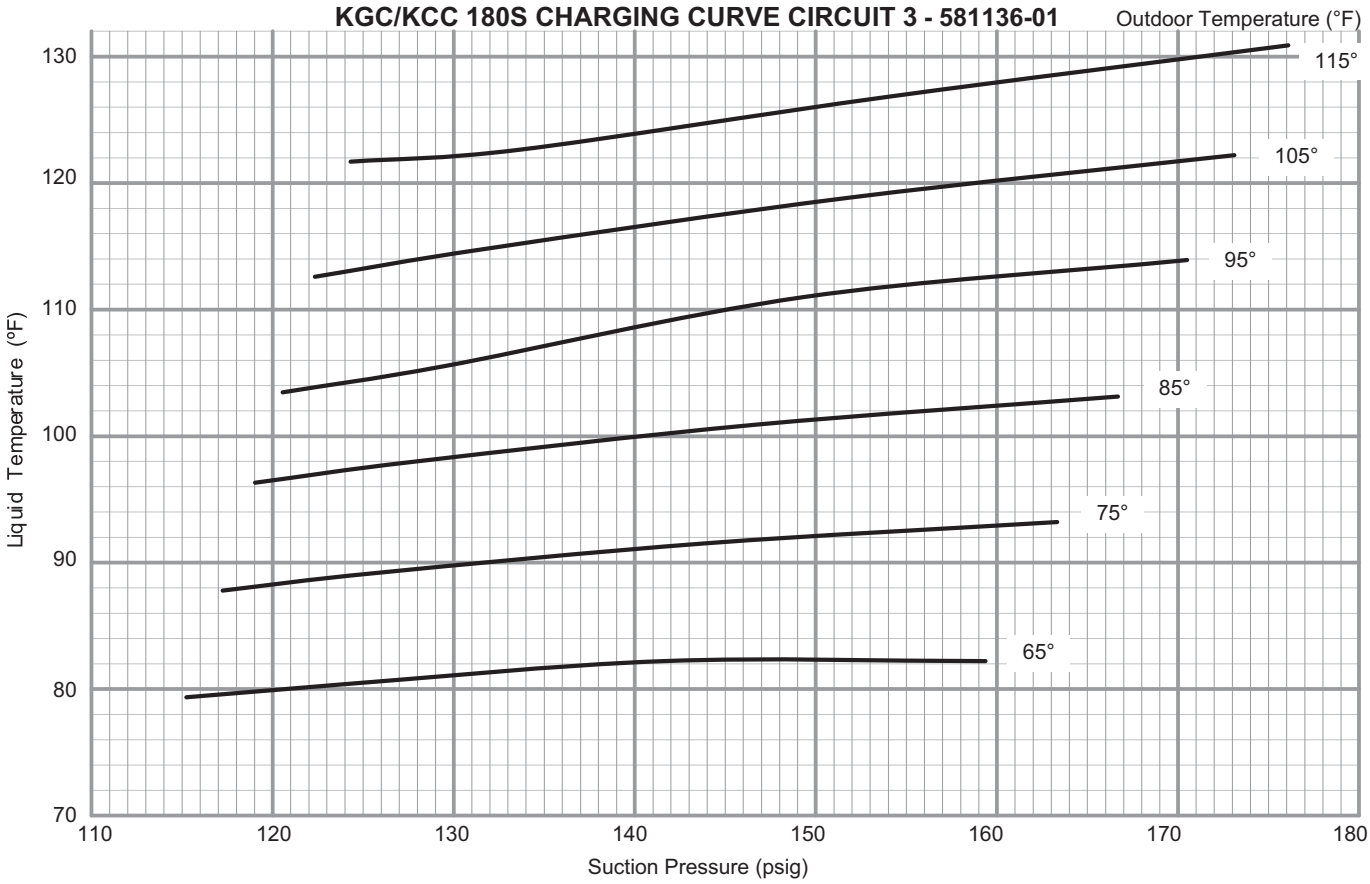
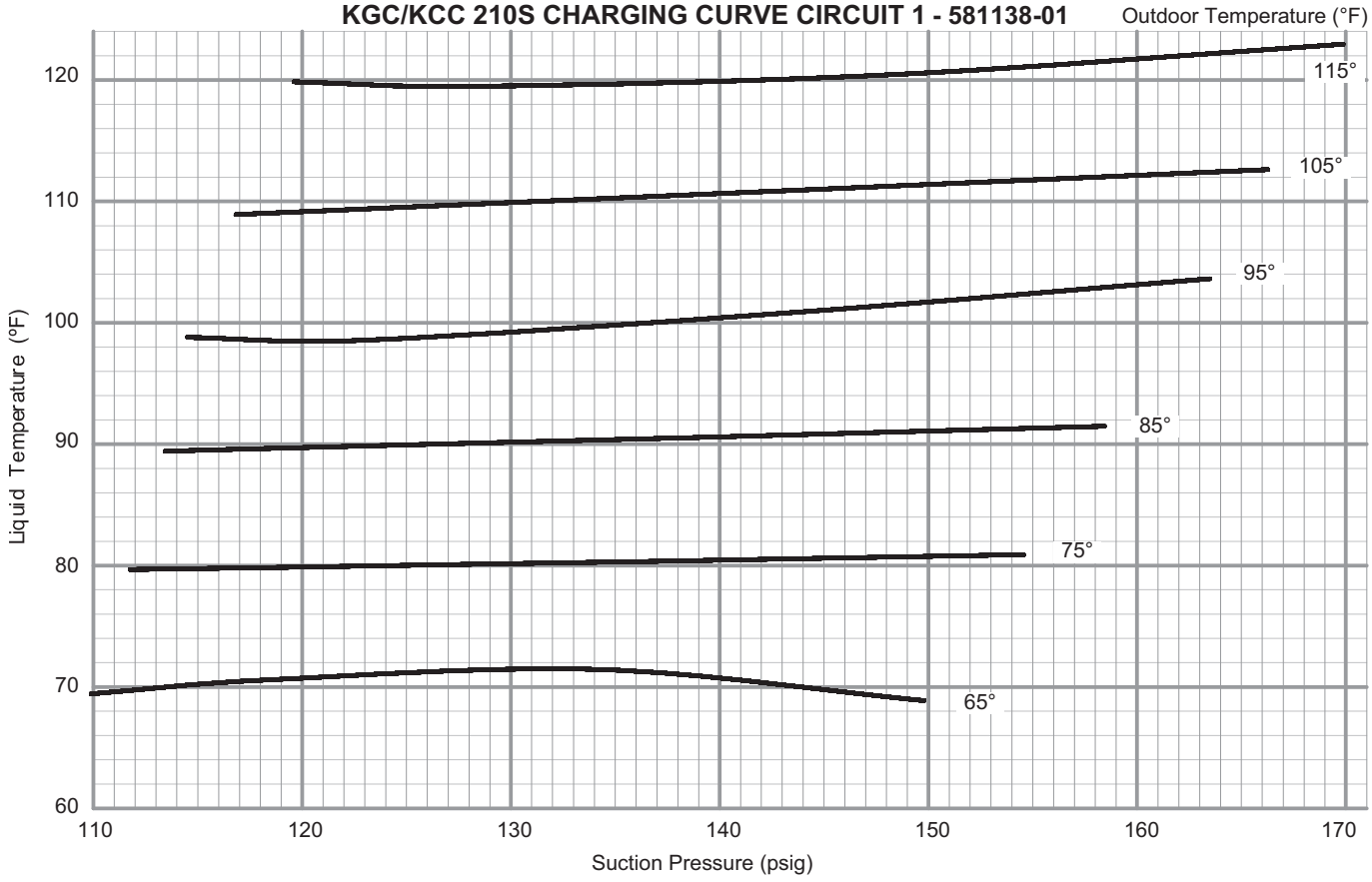
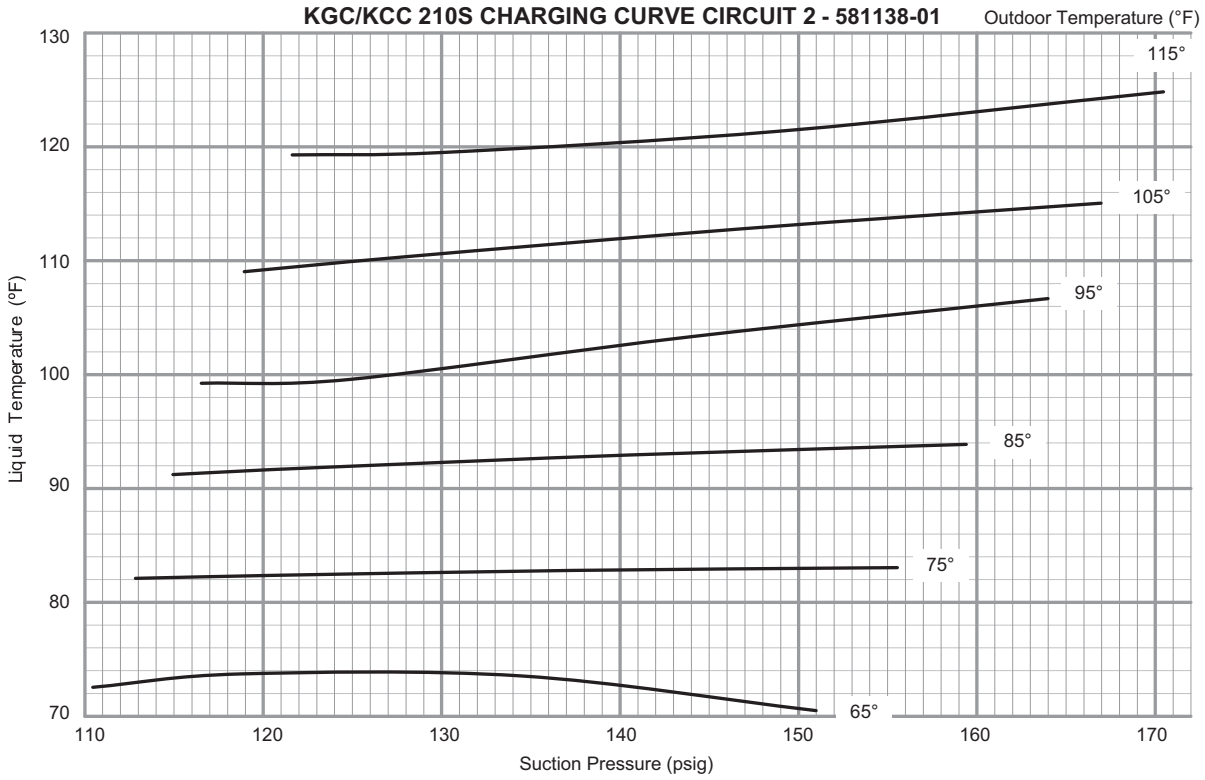

KGC/KCC 180S CHARGING CURVE CIRCUIT 3 - 581136-01
Outdoor Temperature (°F)
115°
105°
95°
85°
75°
65°
Liquid Temperature (°F)
130
120
110
100
90
80
70
110
120
130
140
150
160
170
180
Suction Pressure (psig)

TABLE 6

KGC/KCC 210S ALL-ALUMINUM OD COIL, NORMAL OPERATING PRESSURES - 581139-01

	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)
Circuit 1	110	250	112	292	113	346	115	405	117	484	120	576
	118	252	120	290	122	341	123	397	126	475	128	558
	134	260	137	294	140	340	143	401	146	464	148	538
	150	272	155	307	158	348	163	405	166	462	170	533
Circuit 2	110	250	113	292	115	340	117	393	119	456	122	527
	119	253	121	293	123	340	125	393	128	454	130	518
	134	263	137	300	141	344	144	395	147	454	149	520
	151	276	156	314	159	357	164	408	167	462	170	524
Circuit 3	110	261	112	303	114	352	116	407	119	467	122	534
	118	264	120	307	123	355	125	408	128	469	131	534
	135	276	138	317	141	364	144	418	147	475	150	539
	153	292	157	331	160	377	164	427	167	484	171	547




KGC/KCC 210S CHARGING CURVE CIRCUIT 2 - 581138-01
Outdoor Temperature (°F)
115°
105°
95°
85°
75°
65°
Liquid Temperature (°F)
130
120
110
100
90
80
70
110
120
130
140
150
160
170
Suction Pressure (psig)

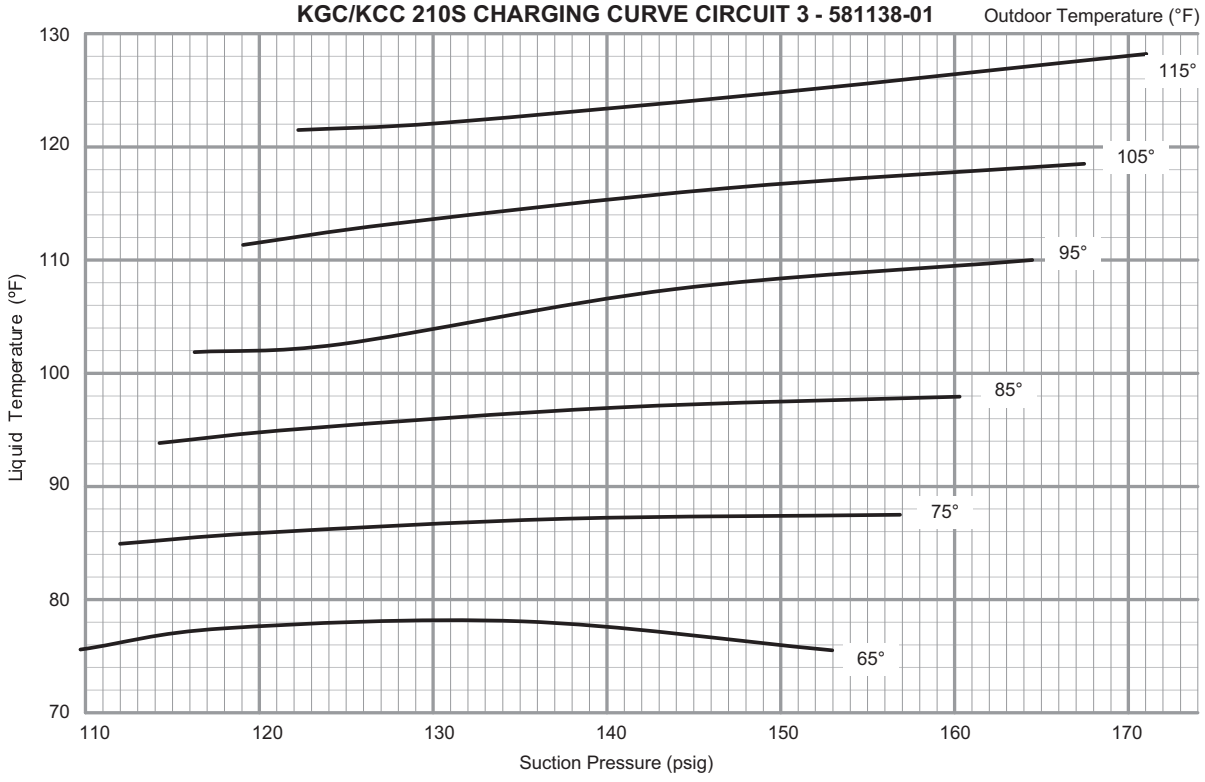
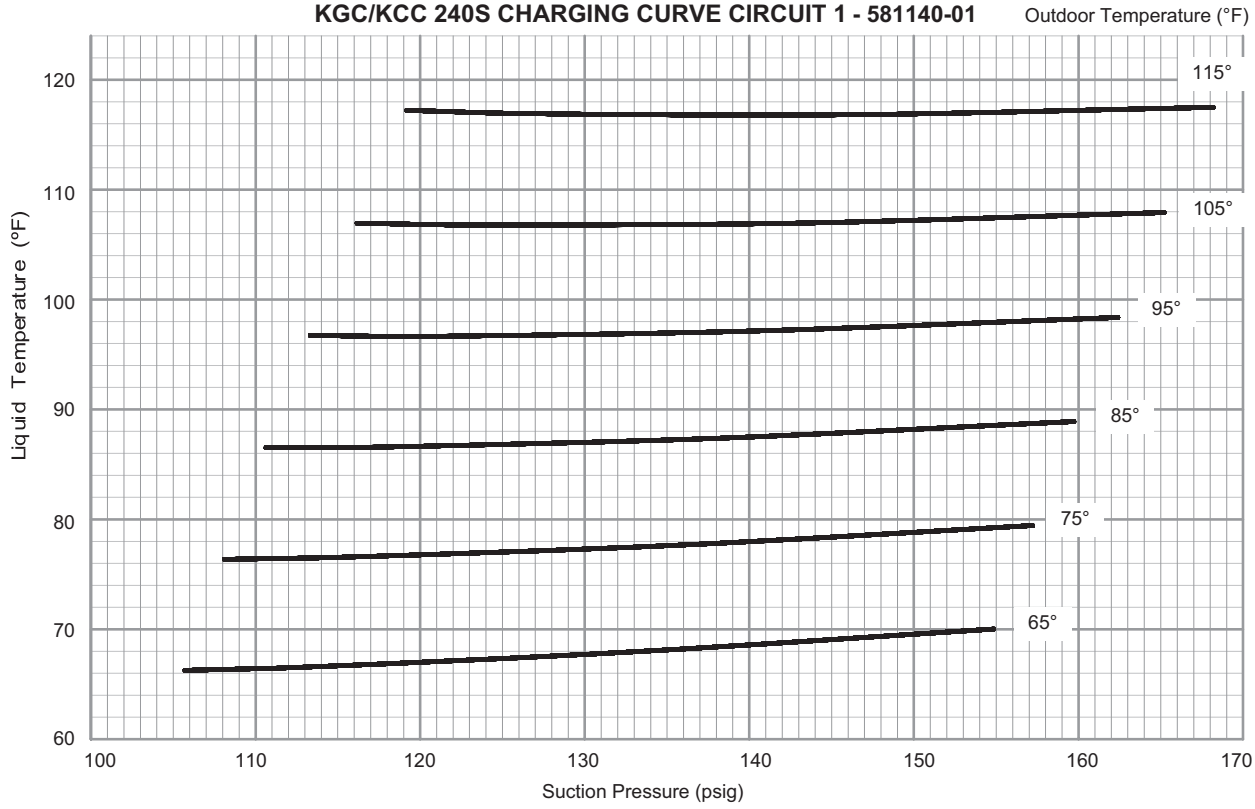

KGC/KCC 210S CHARGING CURVE CIRCUIT 3 - 581138-01
Outdoor Temperature (°F)
115°
105°
95°
85°
75°
65°
Liquid Temperature (°F)
130
120
110
100
90
80
70
110
120
130
140
150
160
170
Suction Pressure (psig)

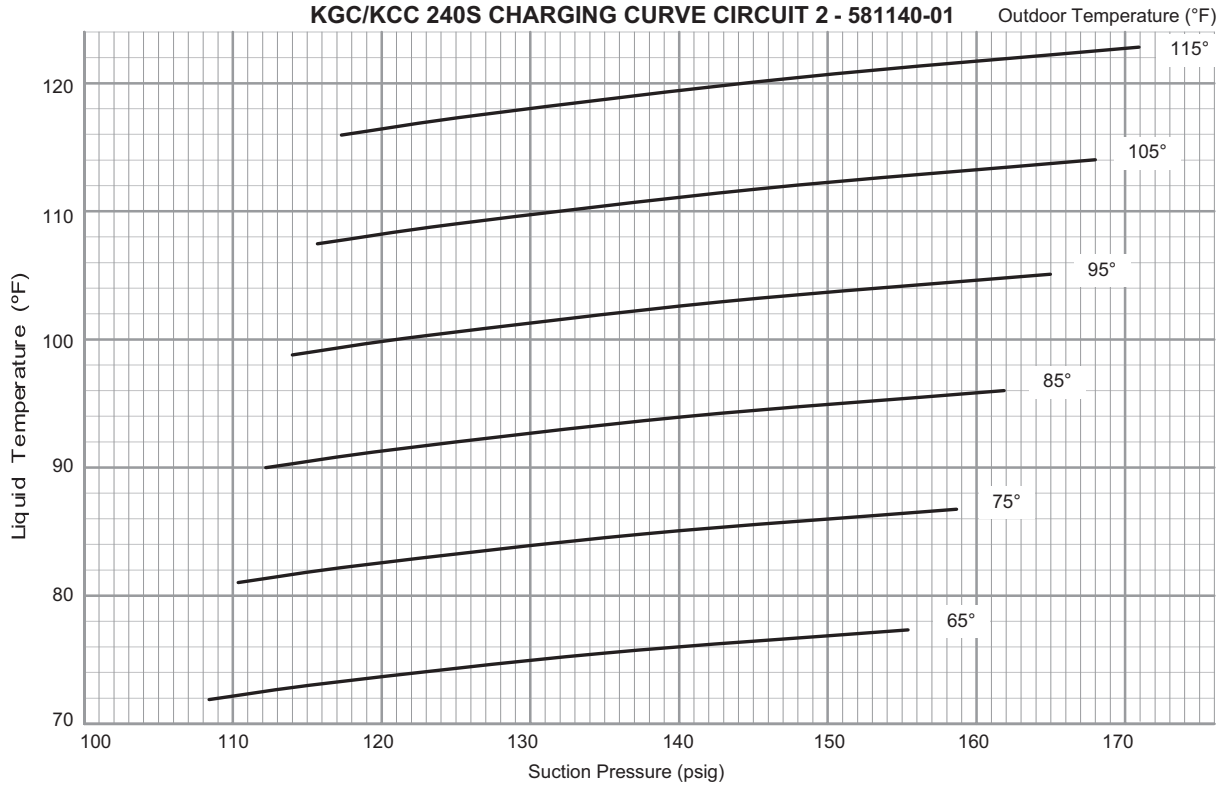
TABLE 7

KGC/KCC 240S ALL-ALUMINUM OD COIL NORMAL OPERATING PRESSURES - 581141-01

	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)
Circuit 1	106	250	108	293	111	347	113	413	116	490	119	579
	114	248	117	288	119	339	122	402	125	476	128	562
	133	255	135	288	138	334	141	391	144	459	147	540
	155	276	157	304	160	344	162	395	165	458	168	532
Circuit 2	108	250	110	291	112	339	114	393	116	453	117	521
	117	252	119	292	121	339	123	392	125	452	127	518
	135	260	138	298	140	343	143	394	145	452	148	517
	155	273	159	309	162	352	165	401	168	457	171	519
Circuit 3	104	260	107	303	109	353	111	408	113	470	116	539
	113	262	115	304	117	352	120	407	122	468	124	535
	131	271	133	310	136	356	139	409	141	468	144	533
	152	285	154	323	157	367	160	417	163	474	166	537

KGC/KCC 240S CHARGING CURVE CIRCUIT 1 - 581140-01




KGC/KCC 240S CHARGING CURVE CIRCUIT 2 - 581140-01
Outdoor Temperature (°F)
115°
105°
95°
85°
75°
65°
Liquid Temperature (°F)
120
110
100
90
80
70
100
110
120
130
140
150
160
170
Suction Pressure (psig)

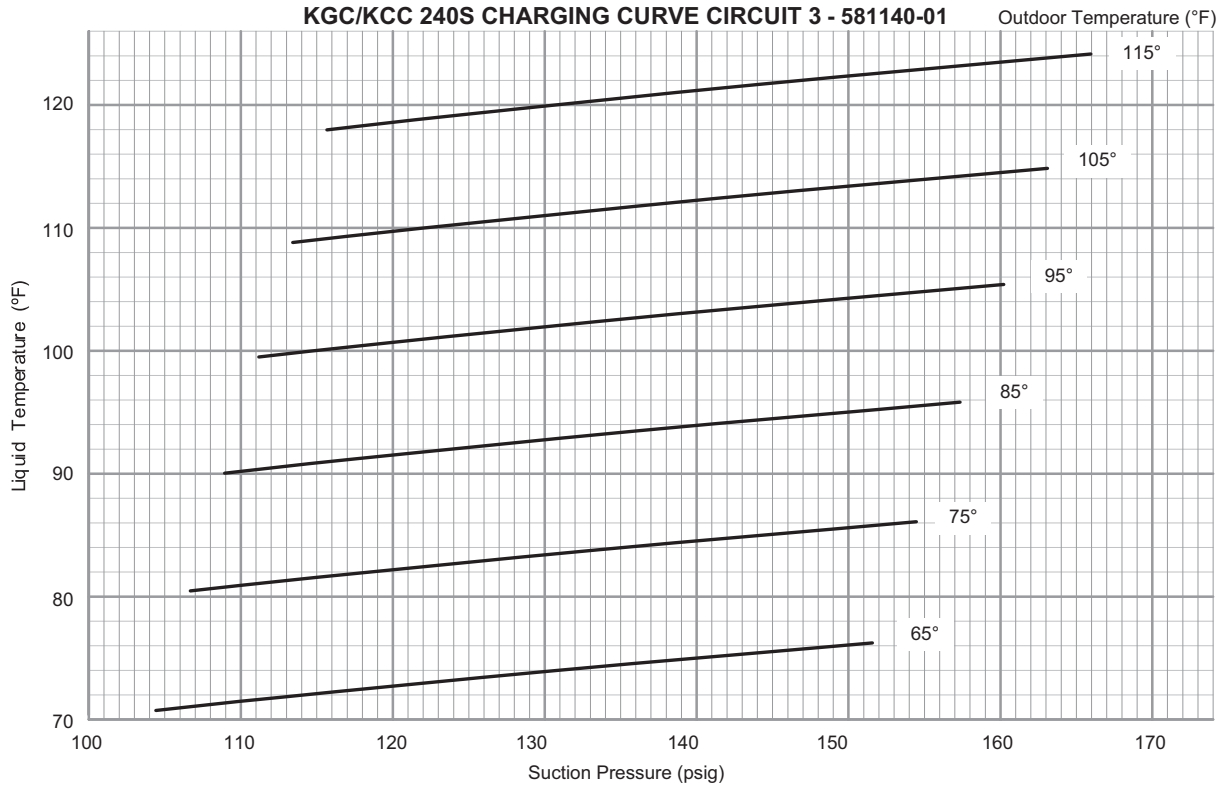
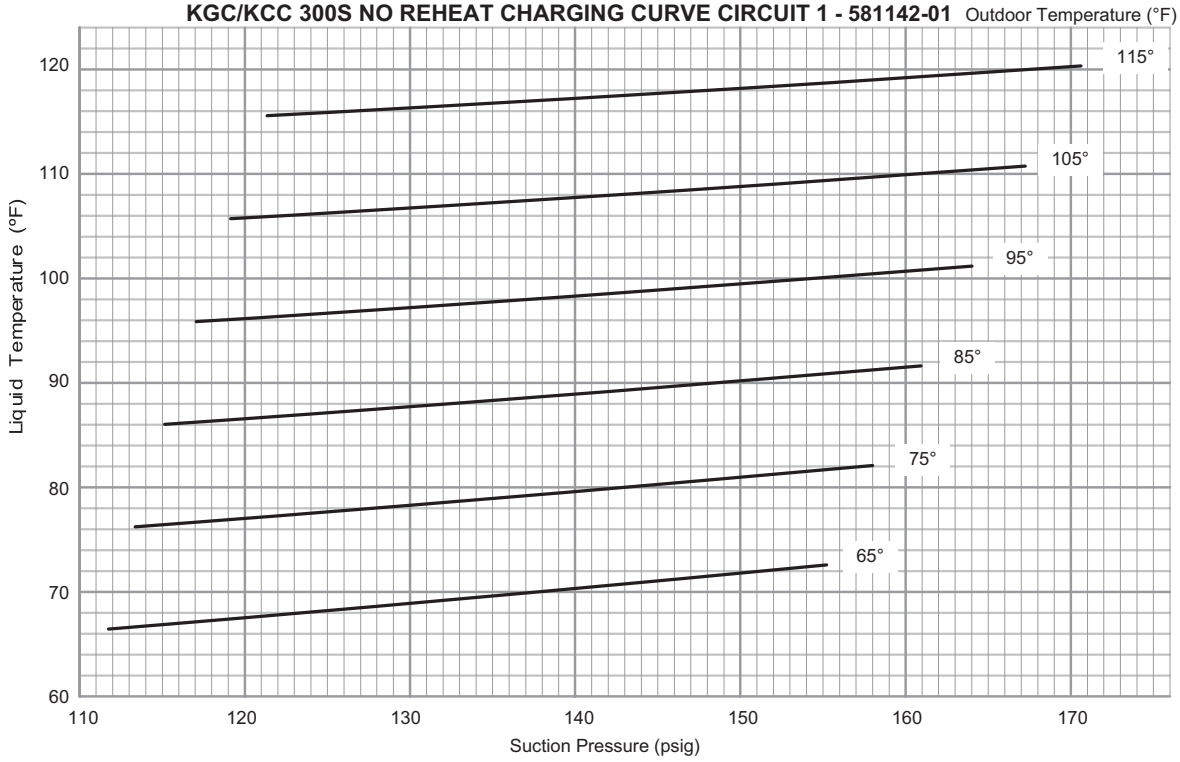

KGC/KCC 240S CHARGING CURVE CIRCUIT 3 - 581140-01
Outdoor Temperature (°F)
115°
105°
95°
85°
75°
65°
Liquid Temperature (°F)
120
110
100
90
80
70
100
110
120
130
140
150
160
170
Suction Pressure (psig)

TABLE 8

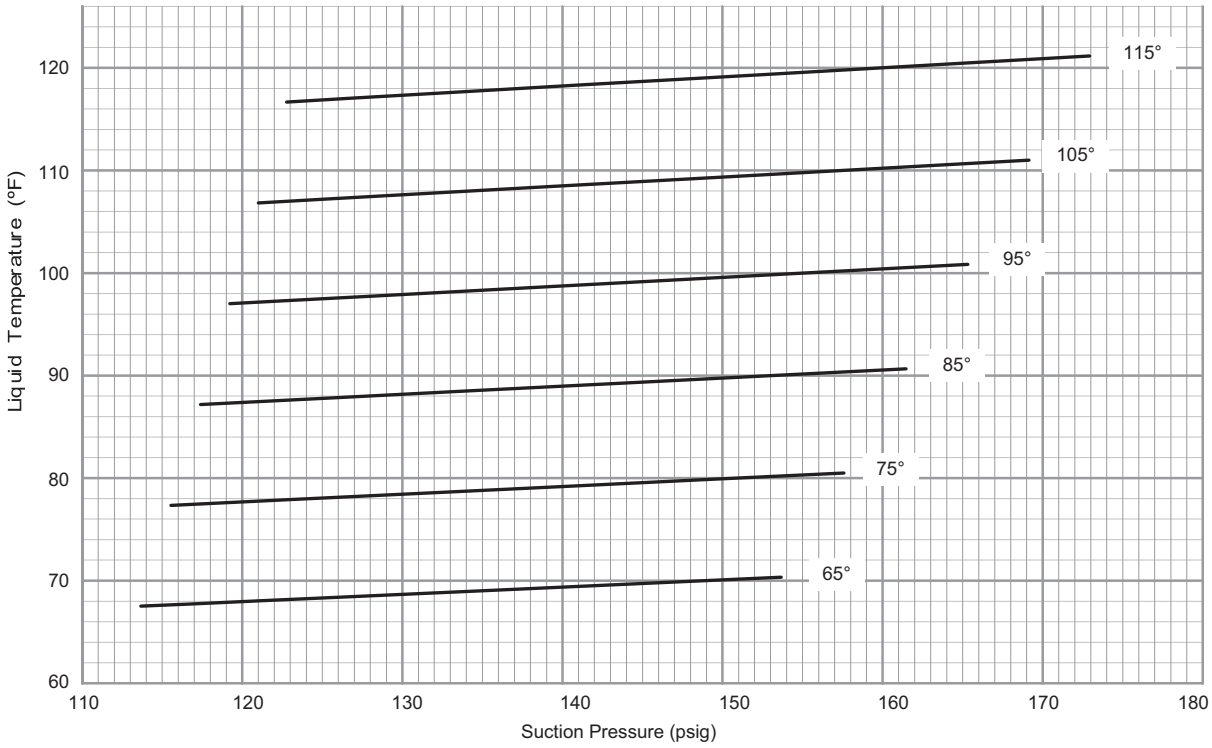
KGC/KCC 300S ALL-ALUMINUM OD COIL, NO REHEAT NORMAL OPERATING PRESSURES - 581143-01

	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)
Circuit 1	112	260	113	302	115	349	117	401	119	459	121	523
	120	264	122	305	124	352	126	404	128	462	131	525
	137	273	140	313	142	359	145	410	147	467	150	529
	155	283	158	322	161	367	164	417	167	473	171	535
Circuit 2	114	245	116	285	117	329	119	379	121	434	123	494
	121	249	124	289	126	333	128	383	130	438	133	497
	137	257	140	297	144	341	147	390	150	445	153	505
	154	265	158	304	161	348	165	397	169	451	173	511
Circuit 3	95	259	97	300	99	346	102	398	104	454	107	515
	102	264	105	306	107	352	110	403	113	459	115	520
	118	274	121	315	124	362	127	413	130	469	134	530
	135	282	138	323	142	370	146	421	149	478	153	539
Circuit 4	98	251	100	294	102	341	104	393	106	450	108	511
	105	259	107	301	110	347	112	399	115	456	117	517
	121	269	124	310	127	357	130	408	133	464	136	524
	137	274	141	315	145	360	148	411	152	466	156	526

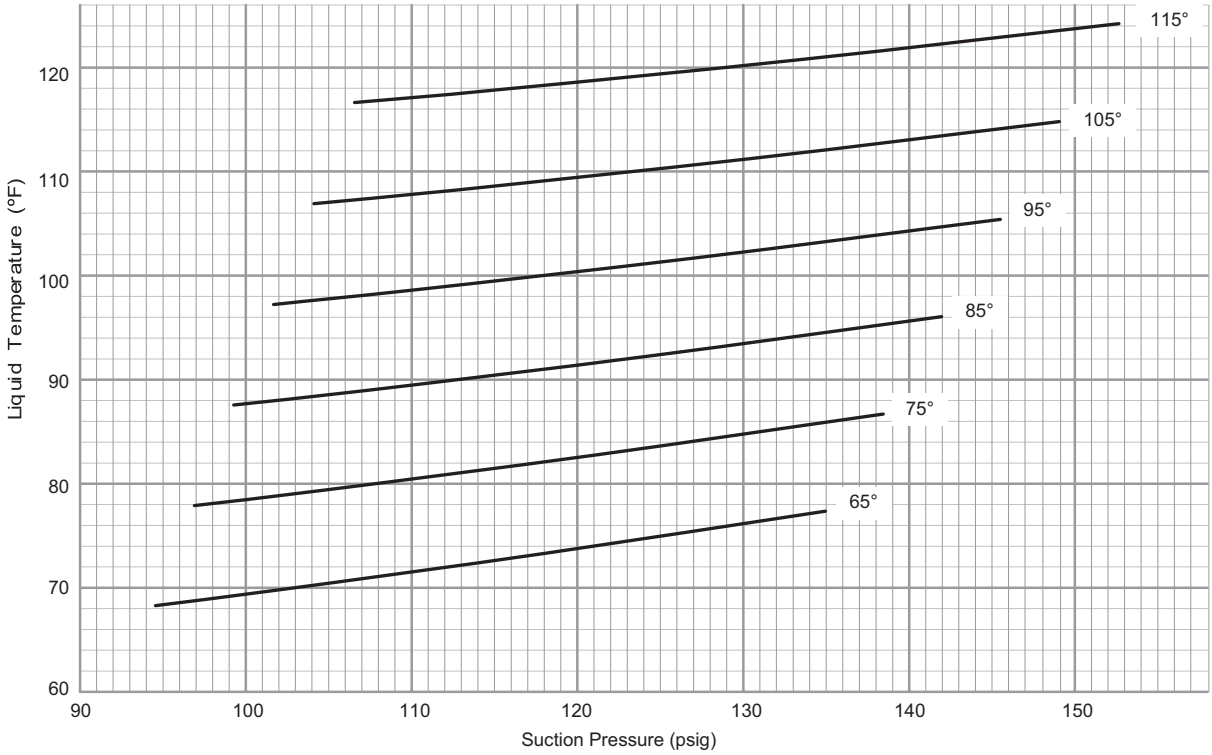
KGC/KCC 300S NO REHEAT CHARGING CURVE CIRCUIT 1 - 581142-01 Outdoor Temperature (°F)



KGC/KCC 300S NO REHEAT CHARGING CURVE CIRCUIT 2 - 581142-01 Outdoor Temperature (°F)



KGC/KCC 300S NO REHEAT CHARGING CURVE CIRCUIT 3 - 581142-01 Outdoor Temperature (°F)



KGC/KCC 300S NO REHEAT CHARGING CURVE CIRCUIT 4 - 581142-01 Outdoor Temperature (°F)

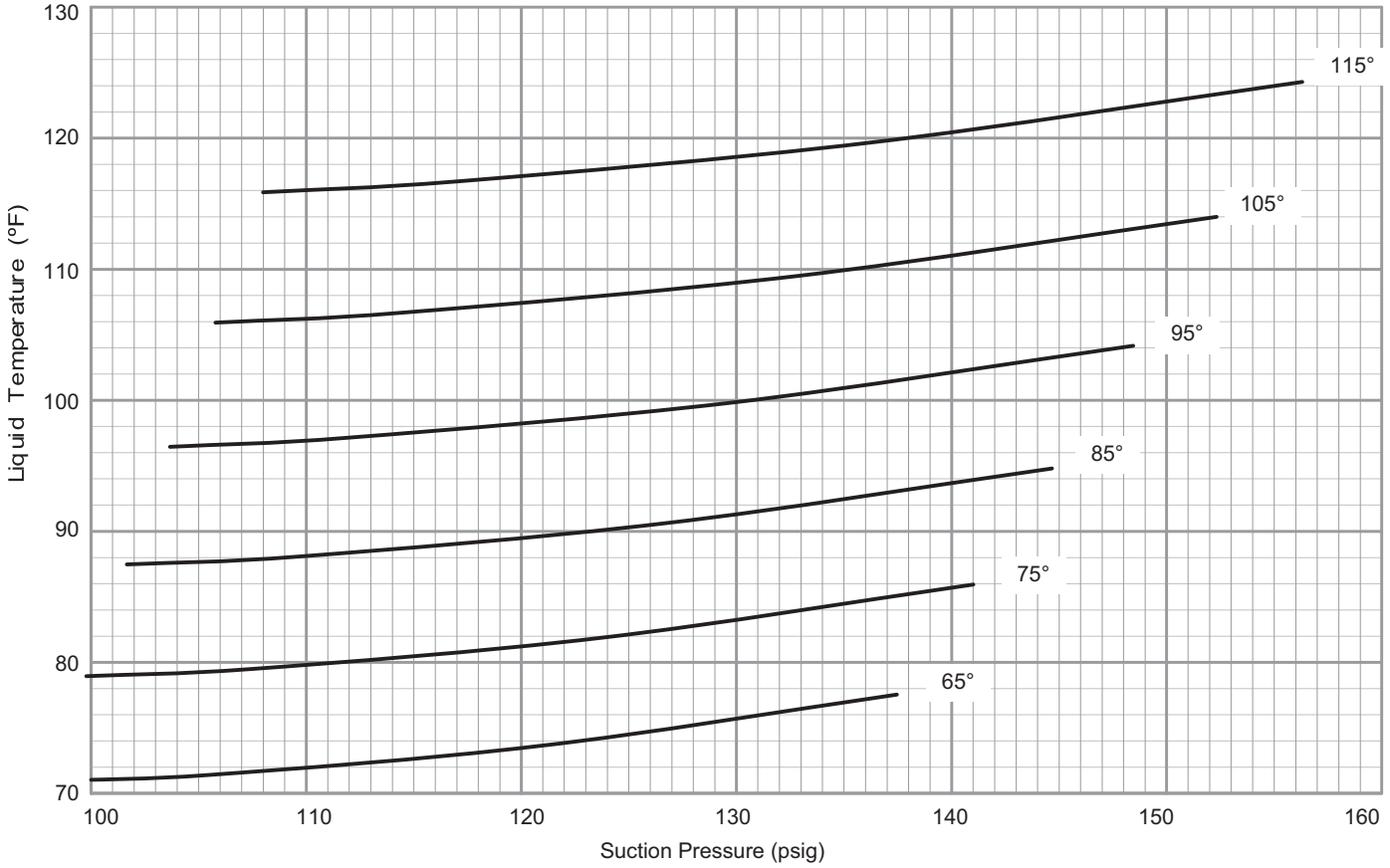
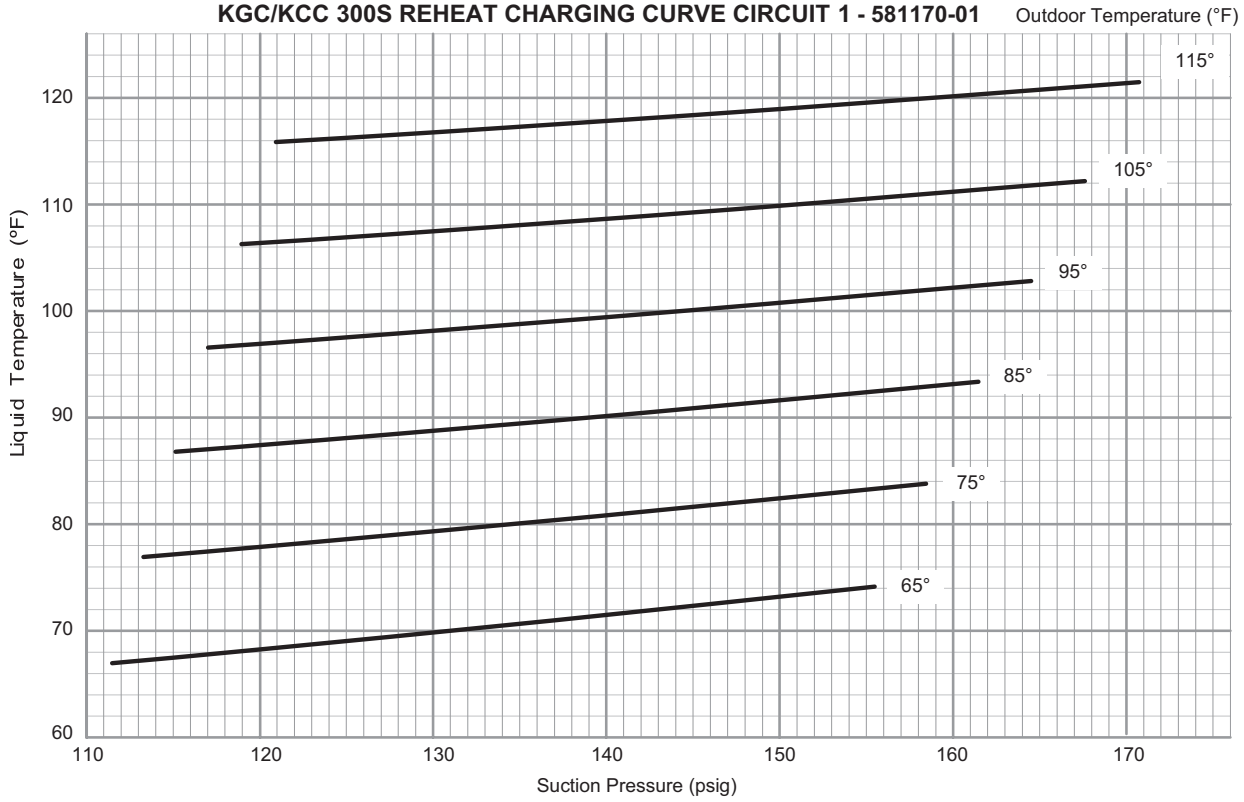


TABLE 9

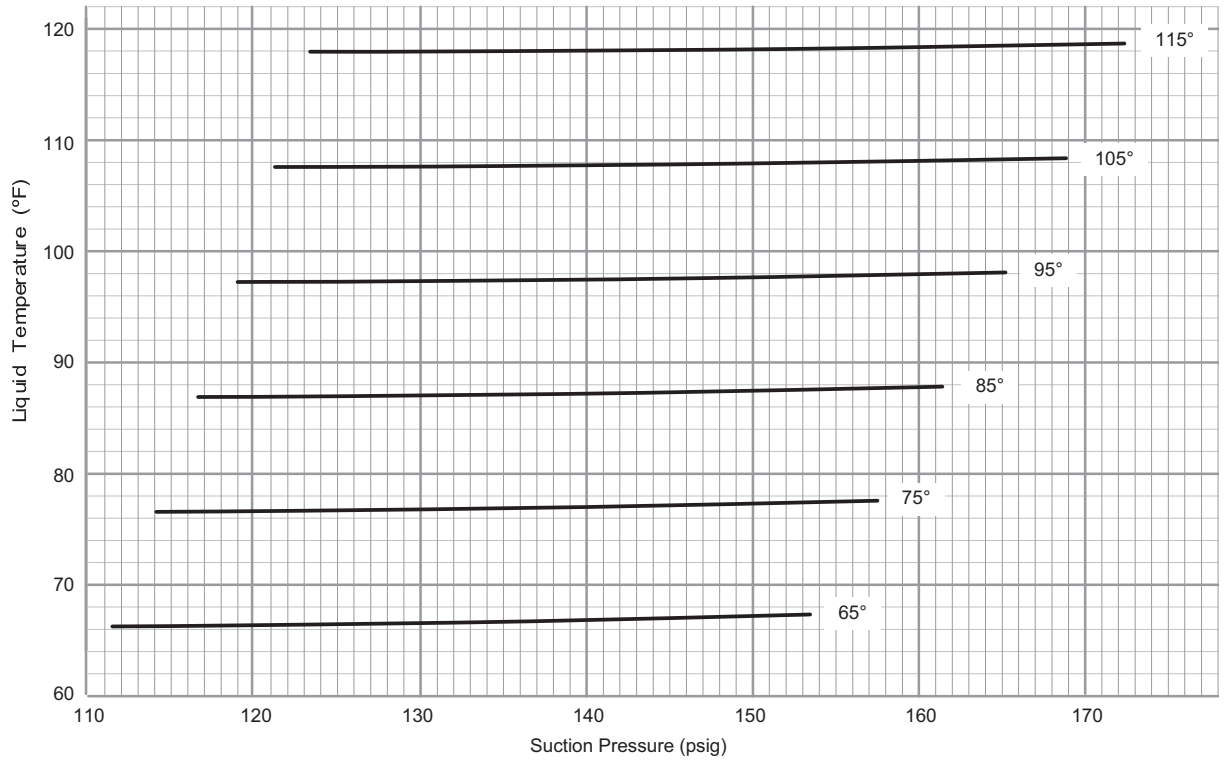
KGC/KCC 300S ALL-ALUMINUM OD COIL, REHEAT NORMAL OPERATING PRESSURES - 581175-01

	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)
Circuit 1	111	270	113	310	115	355	117	405	119	461	121	522
	120	274	122	314	124	358	126	408	128	463	130	524
	137	285	140	323	142	367	145	416	147	470	150	529
	155	298	158	335	161	378	165	425	168	478	171	537
Circuit 2	111	260	114	297	117	340	119	389	121	443	123	502
	120	268	123	306	126	349	128	398	131	452	133	512
	137	280	140	319	143	363	147	413	150	468	153	529
	153	287	158	326	161	372	165	422	169	479	172	540
Circuit 3	95	263	97	304	100	350	102	401	104	458	106	519
	102	266	105	307	108	353	110	405	112	461	115	522
	118	274	122	315	125	361	128	412	130	468	133	529
	136	284	140	324	143	370	147	421	150	477	153	537
Circuit 4	97	258	99	300	101	346	103	398	105	456	108	518
	105	263	107	304	109	351	112	402	114	459	117	521
	120	272	123	312	126	358	129	409	132	466	136	527
	137	280	141	320	145	365	148	416	152	472	156	532

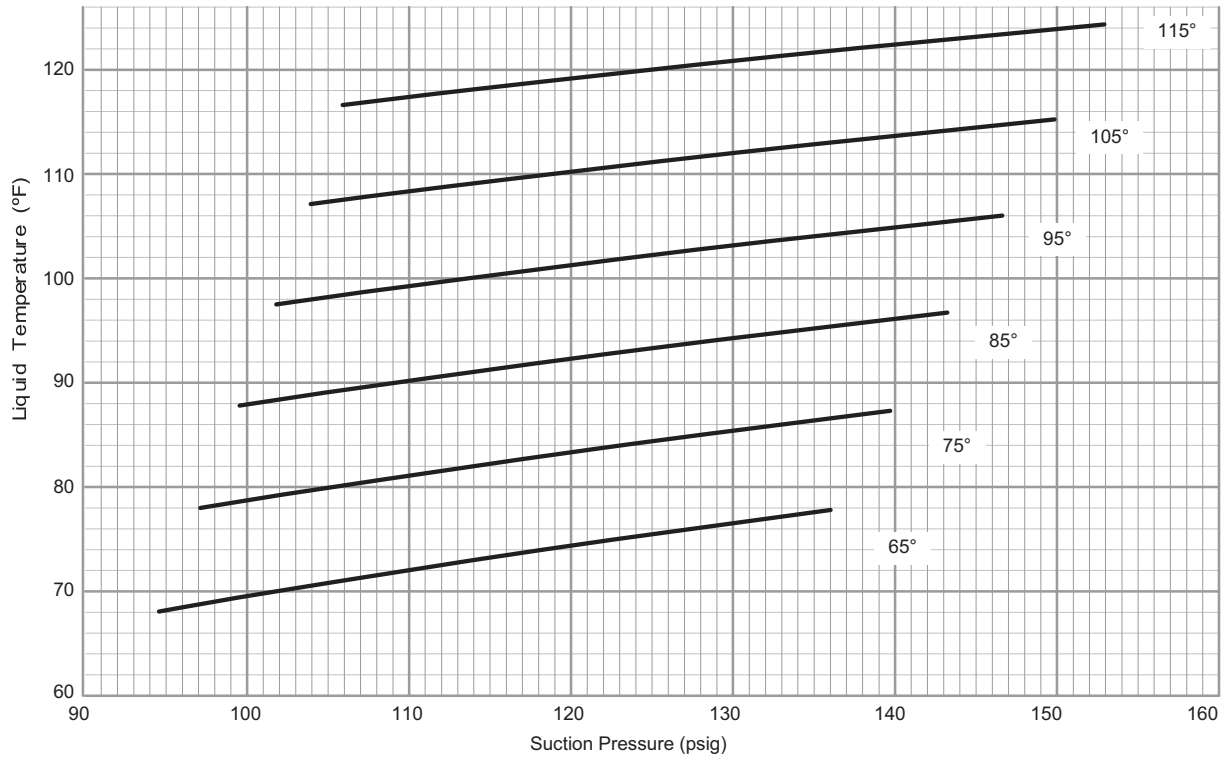
KGC/KCC 300S REHEAT CHARGING CURVE CIRCUIT 1 - 581170-01

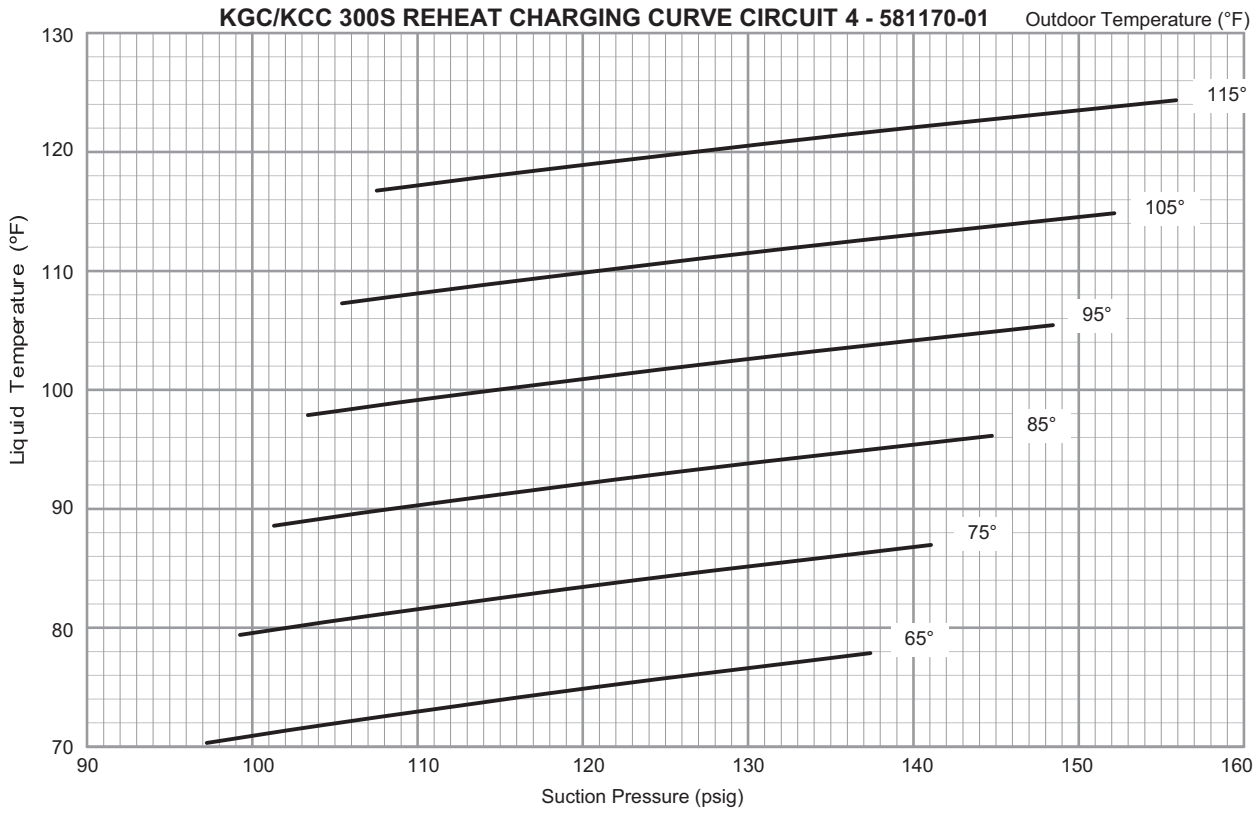


KGC/KCC 300S REHEAT CHARGING CURVE CIRCUIT 2 - 581170-01 Outdoor Temperature (°F)



KGC/KCC 300S REHEAT CHARGING CURVE CIRCUIT 3 - 581170-01 Outdoor Temperature (°F)





B-Refrigerant Charge and Check - Fin/Tube Coil

WARNING-Do not exceed nameplate charge under any condition.

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

NOTE - *System charging is not recommended below 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 normal cooling mode.

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

2 - Check each system separately with all stages operating.

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

4 - Apply the outdoor temperature to tables 14 through 20 to determine normal operating pressures. Pressures are listed for sea level applications at 80°F dry bulb and 67°F wet bulb return air.

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

6 - If discharge pressure is high, remove refrigerant from the system. If discharge pressure is low, add refrigerant to the system.

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

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

TABLE 10 - 581144-01

KGC/KCC180S Fin/Tube No Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65F	271	143	272	142	287	141
75F	310	146	310	145	326	144
85F	353	149	353	147	369	146
95F	400	151	399	150	417	149
105F	451	153	448	152	467	151
115F	508	157	501	155	522	155

TABLE 11 - 581173-01

KGC/KCC180S Fin/Tube With Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65F	289	143	291	138	307	136
75F	329	145	331	140	347	138
85F	373	148	375	142	391	140
95F	422	150	424	145	440	142
105F	477	153	478	148	493	145
115F	537	156	537	151	549	148

TABLE 12 - 581145-01

KGC/KCC210S Fin/Tube No Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65F	282	133	291	138	307	136
75F	322	137	331	140	347	138
85F	368	140	374	142	391	140
95F	418	143	422	145	440	142
105F	472	146	475	148	493	145
115F	532	149	530	151	549	148

TABLE 13 - 581172-01

KGC/KCC210S Fin/Tube With Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65F	301	134	305	137	308	136
75F	340	138	344	140	348	138
85F	386	140	387	143	393	140
95F	438	143	433	146	442	143
105F	492	146	485	148	494	145
115F	554	150	539	151	551	149

TABLE 14 - 581146-01

KGC/KCC240S Fin/Tube No Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65F	279	135	288	135	301	133
75F	317	138	331	138	341	135
85F	357	141	373	141	385	138
95F	405	143	427	143	432	140
105F	461	145	477	146	482	143
115F	514	148	533	149	534	146

TABLE 15 - 581171-01

KGC/KCC240S Fin/Tube With Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65F	293	135	305	136	300	133
75F	332	138	340	138	335	135
85F	369	139	382	140	377	137
95F	423	142	433	143	429	140
105F	464	144	488	146	472	143
115F	528	148	549	150	540	147

TABLE 16 - 581147-01

KGC/KCC300S Fin/Tube No Reheat

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3		Circuit 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65F	274	124	262	124	277	113	276	114
75F	316	132	305	133	322	119	319	121
85F	361	137	351	141	366	122	365	125
95F	407	140	397	144	415	125	412	128
105F	461	143	455	147	469	128	465	131
115F	517	146	513	149	528	132	522	134

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

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

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

2 - Approach temperature should match values in table 21. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.

3 - The approach method is not valid for grossly over or undercharged systems. Use tables 10 through 16 as a guide for typical operating pressures.

TABLE 17

Approach Temperatures - Fin/Tube Coil

KG/KC Unit	Liquid Temp. Minus Ambient Temp.			
	1st Stage	2nd Stage	3rd Stage	4th Stage
180S	6.7°F ± 1 (3.7°C 0.5)	7.2°F ± 1 (4.0°C ±0.5)	11.5°F ± 1 (6.4°C +0.5)	
180S Reheat	4.6°F ± 1 (2.5°C +0.5)	4.5°F ± 1 (2.5°C +0.5)	12.0°F ± 1 (6.7°C +0.5)	
210s	6.3°F ± 1 (3.5°C +0.5)	6.1°F ± 1 (3.4°C ±0.5)	9.8°F ± 1 (5.4°C +0.5)	
210s Reheat	5.5°F ± 1 (3.1°C +0.5)	6.2°F ± 1 (3.4°C +0.5)	10.2°F ± 1 (5.7°C +0.5)	
240S	7.6°F ± 1 (4.2°C +0.5)	4.9°F ± 1 (2.7°C ±0.5)	8.5°F±1 (4.7°C+0.5)	
240S Reheat	5.0°F ± 1 (2.8°C +0.5)	3.5°F ± 1 (1.9°C ±0.5)	7.1°F±1 (3.9°C+0.5)	
300S	5.8°F ± 1 (3.2°C +0.5)	3.8.0°F ± 1 (2.2°C ±0.5)	8.7°F ± 1 (4.4°C +0.5)	8.4°F ± 1 (4.7°C +0.5)

D-Compressor Controls

See unit wiring diagram to determine which controls are used on each unit. Optional controls are identified on wiring diagrams by arrows at junction points.

1 - Freezestats (S49, S50, S53, S95)

Switches de-energize compressors when evaporator coil temperature falls below 29°F (-2°C) to prevent evaporator freeze-up. Switches reset when evaporator coil temperature reaches 58°F (15°C).

2 - High Pressure Switches (S4, S7, S28, S96)

Switches open to de-energize appropriate compressor at 640 psig + 20 psig (4413kPa + 138kPa). Switch must be manually reset.

3 - Thermal Protector (S5, S8, S31, S180)

The compressors used on 180S, 210S, 240S and 300S units are each protected by an internal thermal protector switch.

4 - Crankcase Heater (HR1, HR2, HR5, HR11)

Units have compressors which contain a belly band compressor oil heater which must be on 24 hours before running compressors. Energize by setting thermostat so that there is no cooling demand, to prevent compressor from cycling, and apply power to unit.

V- SYSTEMS SERVICE CHECKS

A-Cooling System Service Checks

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

VI-MAINTENANCE

⚠ WARNING

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

⚠ 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.

A-Filters

Units are equipped with six 24 X 24 X 2" filters. Filters should be checked and replaced when necessary with filters of like kind and size. Take note of air flow direction marking on filter frame when reinstalling filters. See figure 18.

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

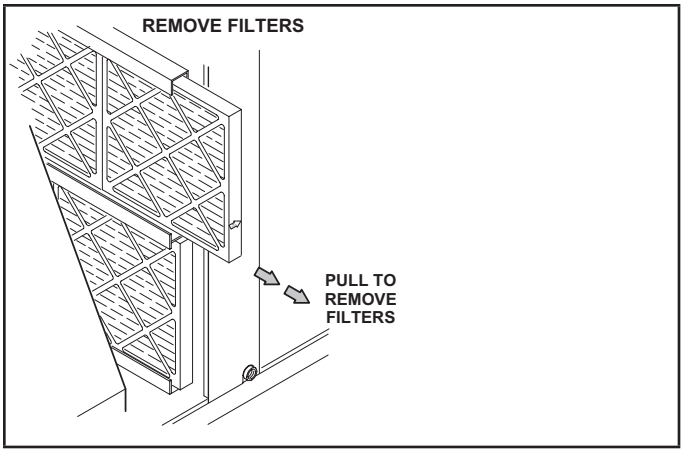


FIGURE 18

B-Lubrication

All motors used in KCC units are factory lubricated, no further lubrication is required.

Blower shaft bearings are prelubricated. For extended bearing life, relubricate at least once every two years with a lithium base grease such as Alvania 3 (Shell Oil), Chevron BRB2 (Standard OIl) or Regal AFB2 (Texas Oil). Use a hand grease gun for lubrication. Add only enough grease to purge through the bearings so that a bead of grease appears at the seal lip contacts.

C-Evaporator Coil

Inspect and clean coil at beginning of each cooling season. Clean using mild detergent or commercial coil cleaner. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet.

D-Condenser Coil

Clean condenser coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season.

Access panels are provided on the front and back of the condenser section.

E-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.

F-Electrical

1 - Check all wiring for loose connections.

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

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

Fan Motor Rating Plate ____ Actual _____

Indoor Blower Motor Rating Plate____ Actual____

VII-OPTIONAL ACCESSORIES

The accessories section describes the application of most of the optional accessories which can be installed to the KCC units.

A-C1CURB Mounting Frames

When installing the KCC units on a combustible surface for downflow discharge applications, the C1CURB70C-1 (8-inch), C1CURB71C-1 (14-inch), C1CURB72C-1 (18-inch) or C1CURB73C-1 (24-inch) roof mounting frames are used. For horizontal discharge applications, use C1CURB14C-1 (26-inch) or C1CURB15C-1 (30-inch) roof mounting frames when the unit is installed on a slab.

Use C1CURB16C-1 (37-inch) or C1CURB17C-1 (41-inch) roof mounting frames for horizontal rooftop applications. These frames convert the unit from downflow to horizontal air flow. The rooftop frames meet National Roofing Code requirements. The roof mounting frames are recommended in all other applications but not required. If the KCC 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 C1CURB mounting frame is shown in figure 19. Refer to the roof mounting frame installation instructions for details of proper assembly and installation. The roof mounting frame MUST be squared to the roof and leveled before the unit is set on the frame. The plenum system MUST also 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.

ASSEMBLED HYBRID ROOF CURB

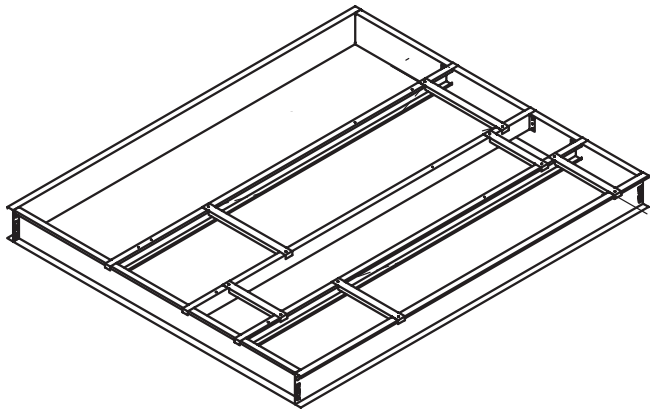


FIGURE 19

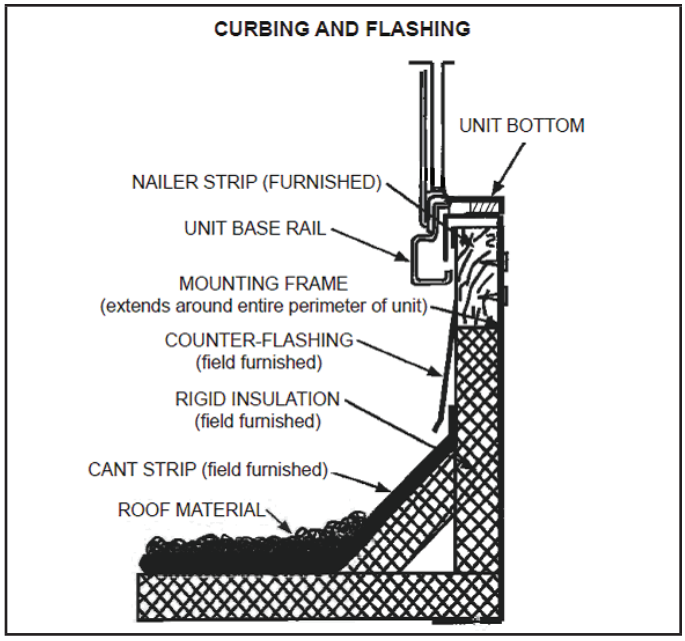


FIGURE 20

B-Transitions

Optional supply/return transitions are available for use with

KCC series units installed with the roof mounting frame.

Transition C1DIFF33CC-1 is used with the 180S units.

Transition C1DIFF34CC-1 is used with the -210s, -240s and -300S units. The transition must be installed in the mounting frame before setting the unit on the frame. Refer to the manufacturer's instructions included with the transition

for detailed installation procedures.

C-Supply and Return Diffusers (all units)

Optional flush-mount diffuser/return FD11 and extendedmount

diffuser/return RTD11 are available for use with all

KCC units. Refer to manufacturer's instructions included with transition for detailed installation procedures.

D-Standard Economizer & High Performance Economizer

Standard Economizer

The standard economizer is equipped with a W7212 economizer control module A6. The default OA temperature sensor is the OA thermostat, S175, provided in this kit. See table 18 for outdoor and return air (OA and RA) sensor options. Refer to instructions provided with sensors for installation.

The A6 enthalpy control is located in the economizer access area. See figure 21. The S175 temperature sensor or A7 enthalpy sensor is located on the division panel between horizontal supply and return air sections.

A mixed air sensor (R1) is used in modulating the dampers to 55°F (13°C) blower compartment air temperature.

TABLE 18

STANDARD ECONOMIZER SENSORS

Sensors	Dampers will modulate to 55°F discharge air (RT6) when:
Single OA Sensible	OA temperature (S175) is lower than free cooling setpoint.
Single OA Enthalpy	OA temperature and humidity (A7) is lower than free cooling setpoint.
Differential Enthalpy - 1 in OA and 1 in RA	OA temperature and humidity (A7) is lower than RA temperature and humidity (A62).
IAQ Sensorw	CO2 sensed (A63) is higher than CO2 setpoint.

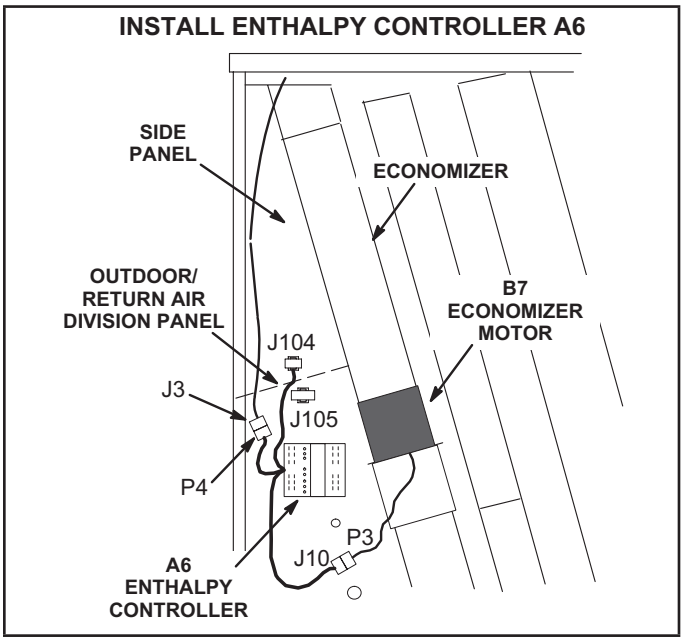


FIGURE 21

An optional IAQ sensor (A63) may be used to lower operating costs by controlling outdoor air based on CO2 level or room occupancy (also called demand control ventilation or DCV). Damper minimum position can be set lower than traditional minimum air requirements; dampers open to traditional ventilation requirements when CO2 level reaches DCV (IAQ) setpoint.

Refer to instructions provided with sensors for installation.

A6 Enthalpy Control LEDs

A steady green Free Cool LED indicates that outdoor air is suitable for free cooling.

When an optional IAQ sensor is installed, a steady green DCV LED indicates that the IAQ reading is higher than setpoint requiring more fresh air. See figure 22.

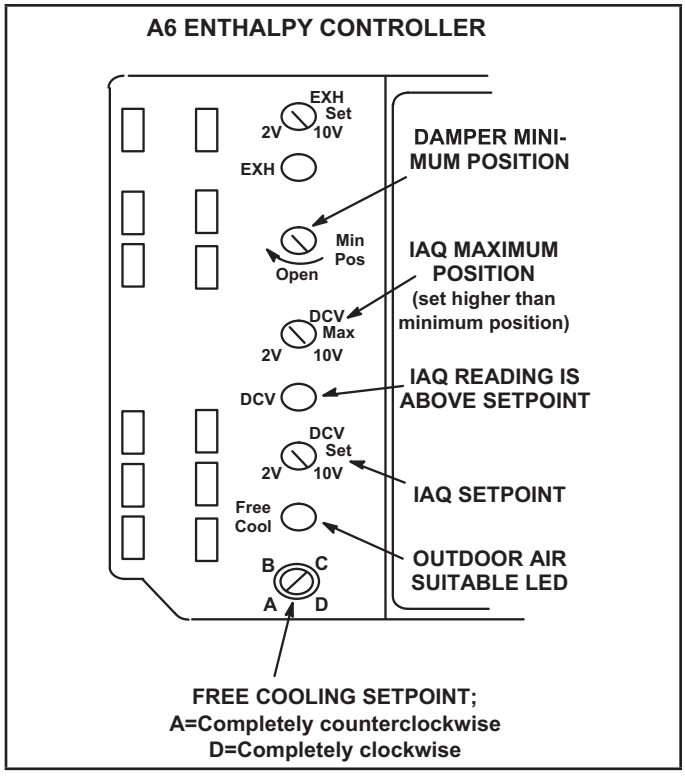


FIGURE 22

Free Cooling Setpoint

Single Temperature or Enthalpy Sensing:

The enthalpy control (A6) setpoint may be adjusted when an enthalpy (A7) sensor is used to determine outdoor air suitability, See figure 22.

Free cooling will be enabled when outdoor air temperature or enthalpy are lower than the free cooling setpoint. The free cooling setpoints for sensible temperature sensors is 55°F. Table 19 shows the free cooling setpoints for enthalpy sensors. Use the recommended setpoint and adjust as necessary.

For example: At setting A (table 19), free cooling will be enabled when outdoor air enthalpy is lower than 73°F and 50% RH. If indoor air is too warm or humid, lower the setpoint to B. At setting B, free cooling will be enabled at 70°F and 50% RH.

TABLE 19

ENTHALPY FREE COOLING SETPOINTS

Control Setting	Enthalpy Setpoint At 50% RH
A	73° F (23° C)
B	70° F (21° C)
C	67° F (19° C)
D	63° F (17° C)

*Setting A is recommended

Differential Sensing:

Two sensors can be used to compare outdoor air to return air. When outdoor air is cooler than return air, outdoor air is suitable for free cooling. Adjust the free cooling setpoint to “D” in this application.

When return air is cooler than outdoor air, the damper will modulate to the minimum position.

Damper Minimum Position

NOTE - *A jumper is factory-installed between TB1 R and OC terminals to maintain occupied status (allowing minimum fresh air). See figure 23. When using an electronic thermostat or energy management system with an occupied/ unoccupied feature, remove jumper. Make wire connections to R and OC as shown in literature provided with thermostat or energy management system literature. Either the jumper wire or optional device must be connected to R and OC for the economizer to function.*

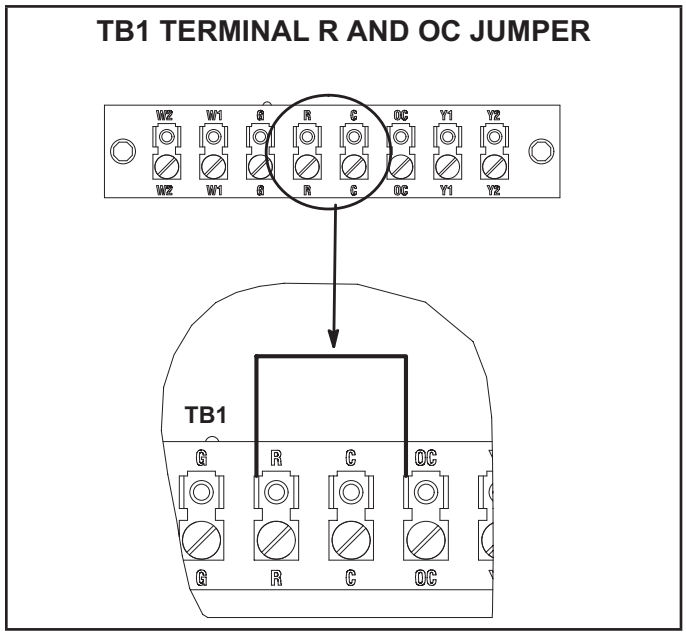


FIGURE 23

1 - Set thermostat to occupied mode if the feature is available. Make sure jumper is in place between TB1 terminals R and OC if using a thermostat which does not have the feature.

2 - Rotate MIN POS SET potentiometer to approximate desired fresh air percentage.

NOTE - *Damper minimum position can be set lower than traditional minimum air requirements when an IAQ sensor is specified.*

3 - Measure outdoor air temperature. Mark the point on the bottom line of chart 1 and label the point “A” (40^0F, 40^0C shown).

4 - Measure return air temperature. Mark that point on the top line of chart 1 figure 24 and label the point “B” (74^0F, 23^0C shown).

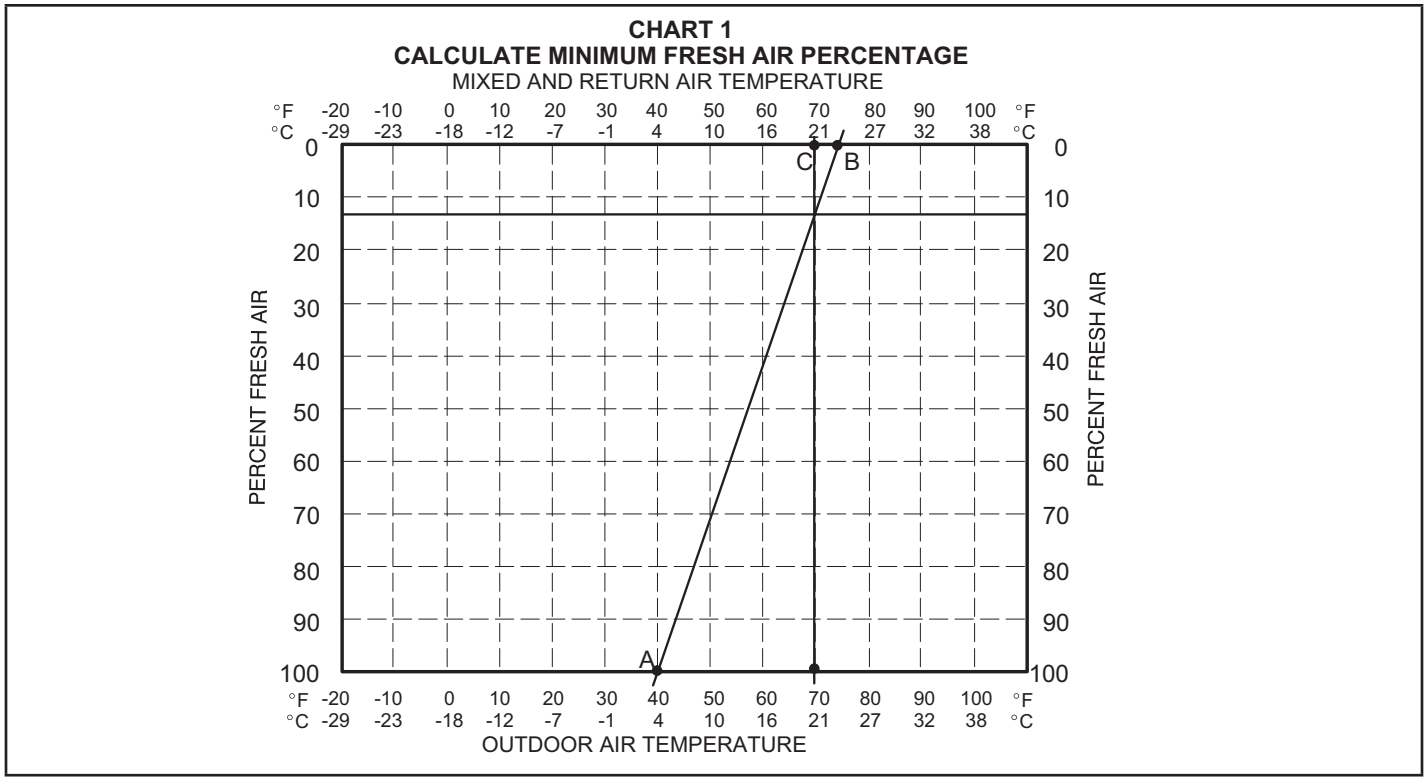


FIGURE 24

5 - Measure mixed air (outdoor and return air) temperature. Mark that point on the top line of chart 1 and label point "C" (70^0F, 21^0C shown).

6 - Draw a straight line between points A and B.

7 - Draw a vertical line through point C.

8 - Draw a horizontal line where the two lines meet. Read the percent of fresh air intake on the side.

9 - If fresh air percentage is less than desired, adjust MIN POS SET potentiometer clockwise (further open). If fresh air percentage is more than desired, adjust MIN POS SET potentiometer counterclockwise (less open). Repeat steps 3 through 8 until calculation reads desiredfresh air percentage.

DCV Set and Max Settings

The DCV SET potentiometer is factory-set at approximately 50% of the potentiometer range. Using a standard 1-2000ppm CO2 sensor, dampers will start to open when the IAQ sensor reads approximately 1000ppm. Adjust the DCV SET potentiometer to the approximate setting specified by the controls contractor. Refer to figure 32. The DCV MAX potentiometer is factory-set at approximately 50% of the potentiometer range or 6VDC.

Dampers will open approximately half way when CO_2 rises above setpoint. Adjust the DCV MAX potentiometer to the approximate setting specified by the controls contractor. Refer to figure 32.

NOTE - *DCV Max must be set higher than economizer minimum position setting for proper demand control ventilation.*

Economizer Operation

When the outdoor air is suitable, dampers will modulate between minimum position and full open to maintain 55°F (12.8°C) supply air.

See table 28 for economizer operation when outdoor air is suitable. See table 20 for economizer operation when outdoor air is NOT suitable.

IAQ Sensor

During the occupied period, dampers will open to DCV MAX when IAQ reading is above setpoint (regardless of thermostat demand or outdoor air suitability). DCV MAX will NOT override damper full-open position. The DCV MAX setting may override damper free cooling position when occupancy is high and outdoor air temperatures are low.

NOTE - *R1 senses mixed air temperature below 45°F (7°C), dampers will move to minimum position until mixed air temperature rises to 48°F (9°C).*

TABLE 20

ECONOMIZER OPERATION-OUTDOOR AIR IS **SUITABLE** FOR FREE COOLING -- FREE COOL LED "ON"

Thermostat Demand	Damper Position		Mechanical Cooling
	Unoccupied	**Occupied**	
Off	Closed	Closed	No
G	Closed	Minimum	No
Y1	Modulating	Modulating	No
Y2	Modulating	Modulating	Stage 1

TABLE 21

ECONOMIZER OPERATION-OUTDOOR AIR IS **NOT SUITABLE** FOR FREE COOLING -- FREE COOL LED "OFF"

Thermostat Demand	Damper Position		Mechanical Cooling
	Unoccupied	**Occupied**	
Off	Closed	Closed	No
G	Closed	Minimum*	No
Y1	Closed	Minimum*	Stage 1
Y2	Closed	Minimum*	Stage 2

*IAQ sensor can open damper to DCV max.

Standard and High Performance

Economizer Minimum Position

NOTE - *24 volts must be provided at unit TB1 terminals R and OC to enable economizer operation (allowing minimum fresh air). Typically a separately ordered thermostat or energy management system with an occupied/unoccupied output is connected between TB1 R and OC terminals. The thermostat will provide 24 volts to the A6 economizer control during the occupied time period to enable economizer minimum position. If a device is not used to enablethe economizer, install a jumper wire between TB1 terminals R and OC to maintain minimum position continuously.*

Make wire connections to ***TB1*** *terminals* ***R*** *and* ***OC*** *as shown in literature provided with thermostat or energy management system.*

1 - Set thermostat to occupied mode if the feature is available. Make sure jumper is in place between TB1 terminals R and OCP if using a thermostat which does not have the feature.

2 - Turn on the blower using the thermostat or a jumper between TB1 terminals R and G.

IMPORTANT - *On unit equipped with an inverter (VFD) driven supply air blower motor, the VFD control board controls the economizer minimum damper position. Refer to the unit installation instructions for additional setup requirements.*

3 - *Standard Economizers -*

Rotate MIN POS SET potentiometer to approximate desired fresh air percentage.

High Performance Economizers-

On units with single-speed blowers, navigate to the "BASIC SETTINGS" menu and select "2FAN H ACT". Adjust value (2-10VDC) to the approximate desired fresh air percentage.

On units with two-speed blowers, once high speed minimum position is set (steps 4. through 11.), adjust "2FAN L ACT" in the same manner.

3.0 VDC 12% Open Damper
3.5 VDC 18% Open Damper
4.0 VDC 25% Open Damper
4.5 VDC 31% Open Damper
5.0 VDC 37% Open Damper
5.5 VDC 43% Open Damper
6.0 VDC 50% Open Damper

NOTE - *Damper minimum position can be set lower than traditional minimum air requirements when an IAQ sensor is specified.*

4 - High Performance Economizers -

Navigate through the "BASIC SETTINGS" menu and select "7DAMPER MIN POS". Damper will drive to the setpoint value stored in step 3.

5 - Measure outdoor air temperature. Mark the point on the bottom line of chart 1 and label the point "A" (40°F, 4°C shown).

6 - Measure return air temperature. Mark that point on the top line of chart 1 and label the point "B" (74°F, 23°C shown).

7 - Measure mixed air (outdoor and return air) temperature. Mark that point on the top line of chart 1 and label point "C" (70°F, 21°C shown).

8 - Draw a straight line between points A and B.

9 - Draw a vertical line through point C.

10 - Draw a horizontal line where the two lines meet. Read the percent of fresh air intake on the side.

11 - *Standard Economizers* -

If fresh air percentage is less than desired, adjust MIN POS SET potentiometer clockwise (further open). If fresh air percentage is more than desired, adjust MIN POS SET potentiometer counterclockwise (less open). Repeat steps 5. through 10. until calculation reads desired fresh air percentage.

High Performance Economizers -

If fresh air percentage is less than desired, use the A6 keypad to adjust “2FAN H ACT” values higher (further open). If fresh air percentage is more than desired, adjust “2FAN H ACT” values lower (less open). Repeat steps 4. through 10. until calculation reads desired fresh air percentage.

On units with two-speed blowers, after high speed is adjusted, use “2FAN L ACT” in the same manner.

High Performance Economizer Installation

NOTE - *Refer to the General section when replacing a factory- installed economizer with shipping screws.*

1 - Disconnect all power to unit and open filter access panel.

2 - Remove horizontal return air panel.

3 - Align bottom of economizer with economizer support bracket and slide economizer into unit. Make sure the flanges align as shown in figure 28.

4 - Fit economizer end plate over end of economizer and secure end plate with #10 self drilling screws.

ECONOMIZER CONTROL (A6) INSTALLATION

1-Install A6 economizer control on economizer side panel as shown in figure 29. Secure with #6-32 X 7/8” TFS screws provided.

MIXED AIR SENSOR (R1) INSTALLATION

1 - Remove blower access panel.

2 - Install sensor on bracket as shown in figure 26 and 27.

OUTDOOR AIR SENSOR (RT26) INSTALLATION

1 - Install RT26 sensor onto the divider panel as shown in figure 30. Use #6-32 X 7/8” TFS screws provided.

NOTE - *When enthalpy sensing is specified, A7 enthalpy sensor is installed in the same location as RT26.*

CHART 1
CALCULATE MINIMUM FRESH AIR PERCENTAGE

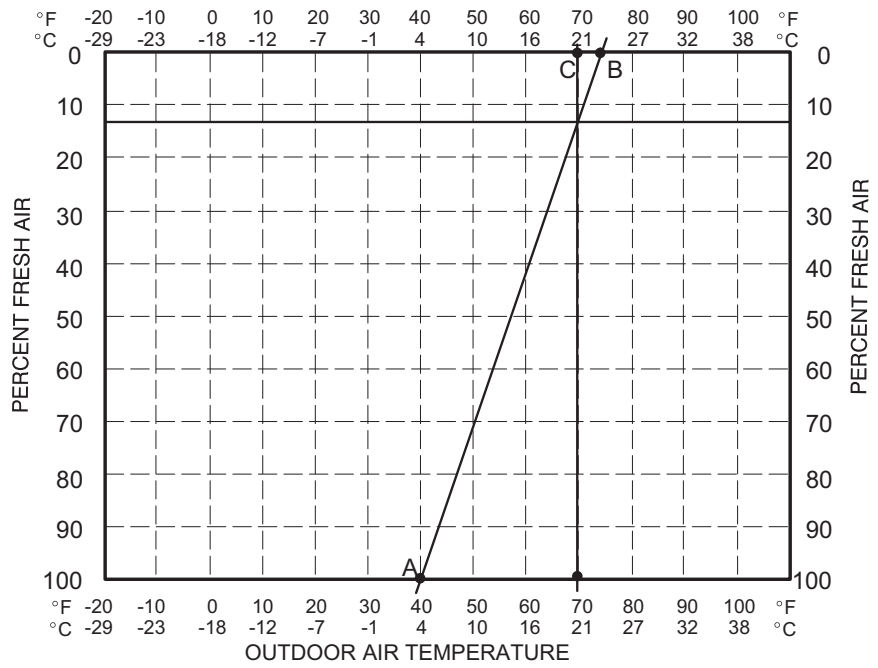


FIGURE 25

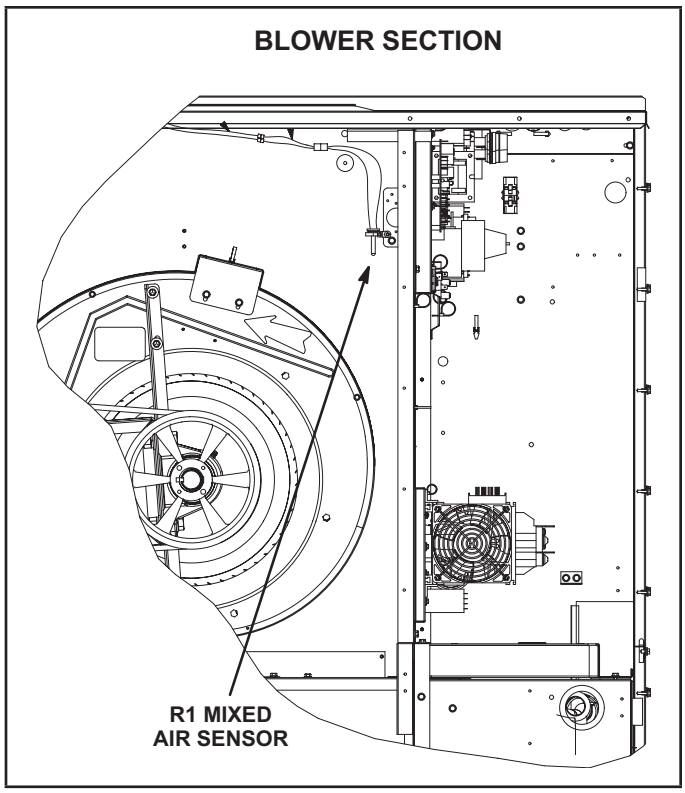


FIGURE 26

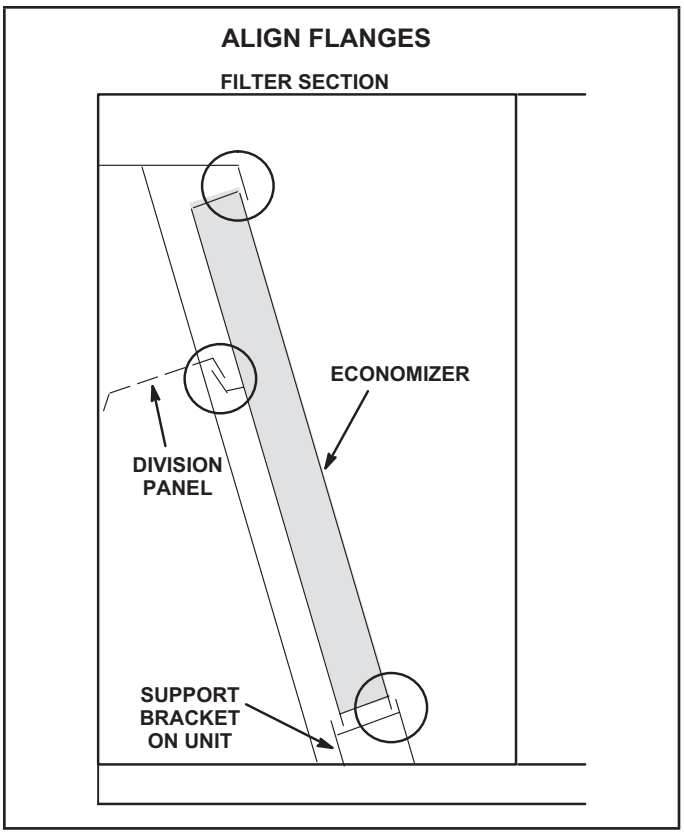


FIGURE 28

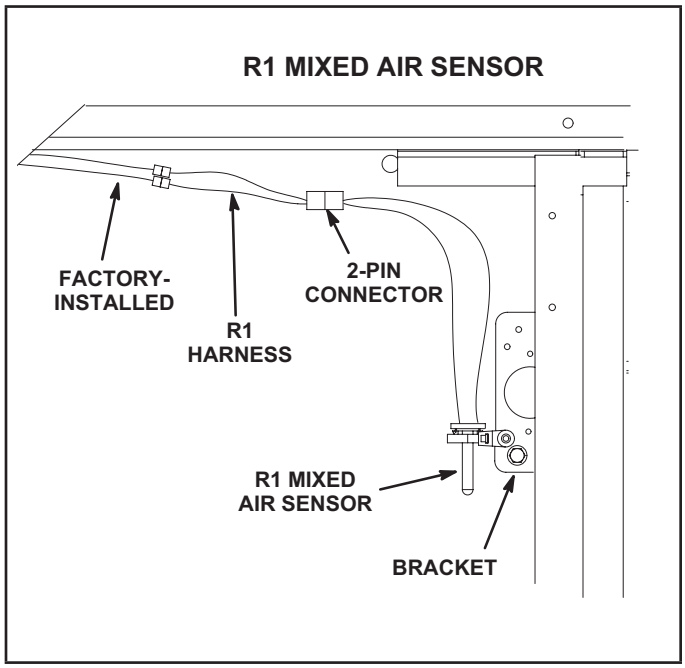


FIGURE 27

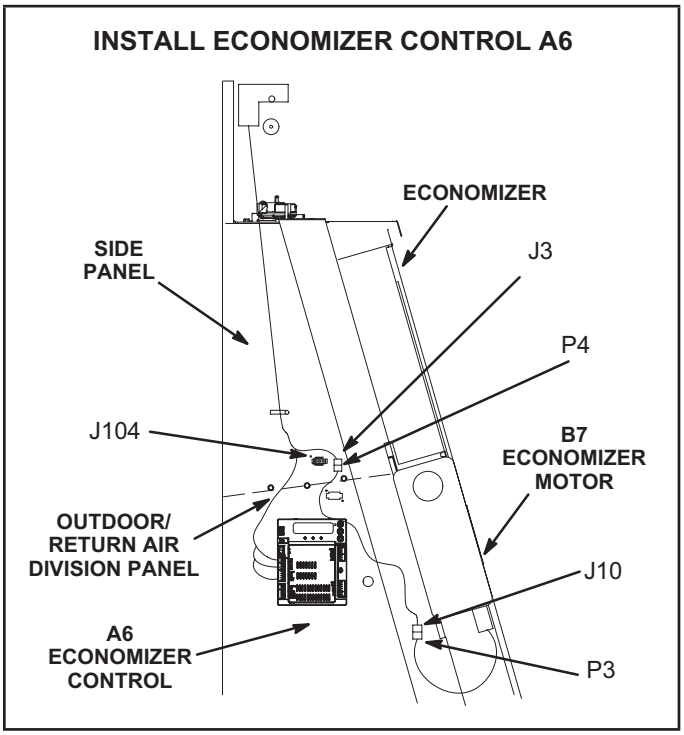


FIGURE 29

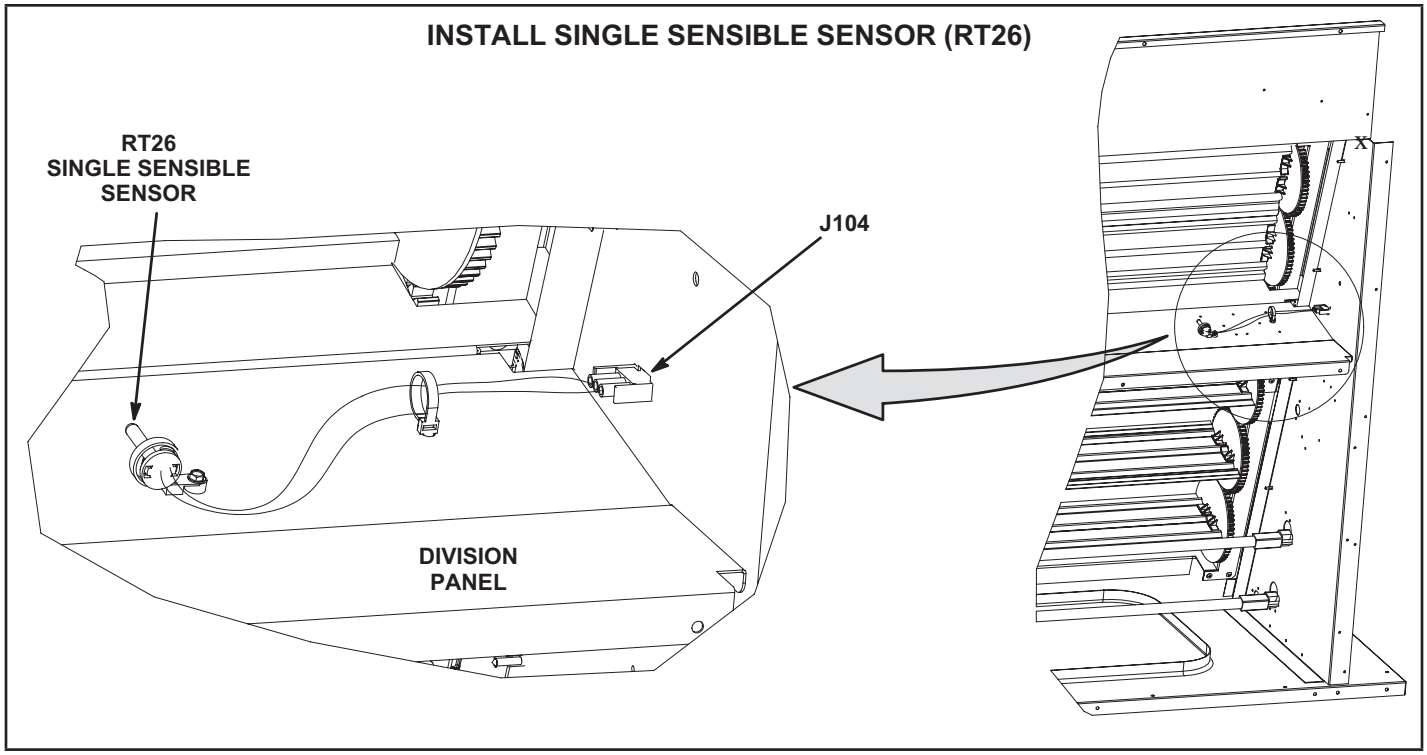


FIGURE 30

High Performance Economizer Electrical

ECONOMIZER CONTROL (A6) HARNESS CONNECTIONS

NOTE - *Wires marked P and P1 are hanging in the control section. These wires are connected on units equipped with standard economizers AND a VFD only.*

1 - Locate 15-pin J3 unit control harness hanging on left side of filter compartment. See figure 39. Disconnect P3 jumper plug from J3 and retain jumper plug for future troubleshooting.

2 - Connect the 15-pin male plug P4 from the economizer control (A6) harness to the 15-pin female jack J3 on the unit control harness. See figure 29.

3 - Locate brown and yellow kit harness with wires labeled J104-1 & J104-2 on one end and A6-OAT, A6-COM, & A6-AUX-A1 on the other end. Insert the connector with wires labeled J104-1 & 2 into the opening on economizer side panel and snap into place. See figure 29.

4 - Connect the 15-pin female plug J10 to the 15-pin male plug P3 from the damper motor. See figure 39.

5 - Affix D1 economizer wiring diagram section to inside of compressor access panel. Position diagram to the right of “C” control wiring diagram section.

MIXED AIR SENSOR CONNECTION (R1)

1 - Locate two wires labeled R1 in wire bundle in top of blower section. Connect spade terminals on R1 harness to the wires from the bundle. Connect the R1 harness 2-pin connector to the R1 2-pin connector. See figure 27. Make sure to secure wires away from moving parts.

RT26 HARNESS CONNECTIONS (Single Sensible Sensing)

1 - Locate brown and white kit harness with wires labeled P104-1 & P104-2 one one end and RT26-1 & 2 on the other end. Insert the connector with wires labeled P104-1 & 2 into J104 jack previously installed on the side of the economizer. See figure 40. Connect wires on other end of P104 harness to RT26 on divider panel. See figure 31.

A63 OPTIONAL SENSOR CONNECTIONS (CO2 Sensing)

An optional CO2 sensor (A63) can be added for demand control ventilation (DCV). The IAQ sensor must provide a 0-10VDC signal to the A6 controller.

Refer to installation instructions shipped with optional sensor for more details.

1 - Locate the blue wire labeled A63-8 and brown wire labeled A63-7 from the harness in the control section. Strip ends.

2 - Connect blue A63-8 wire to CO2 sensor Vout lead. Connect brown A63-7 wire to CO2 sensor COM lead. Securewith wire nut. See figure 31.

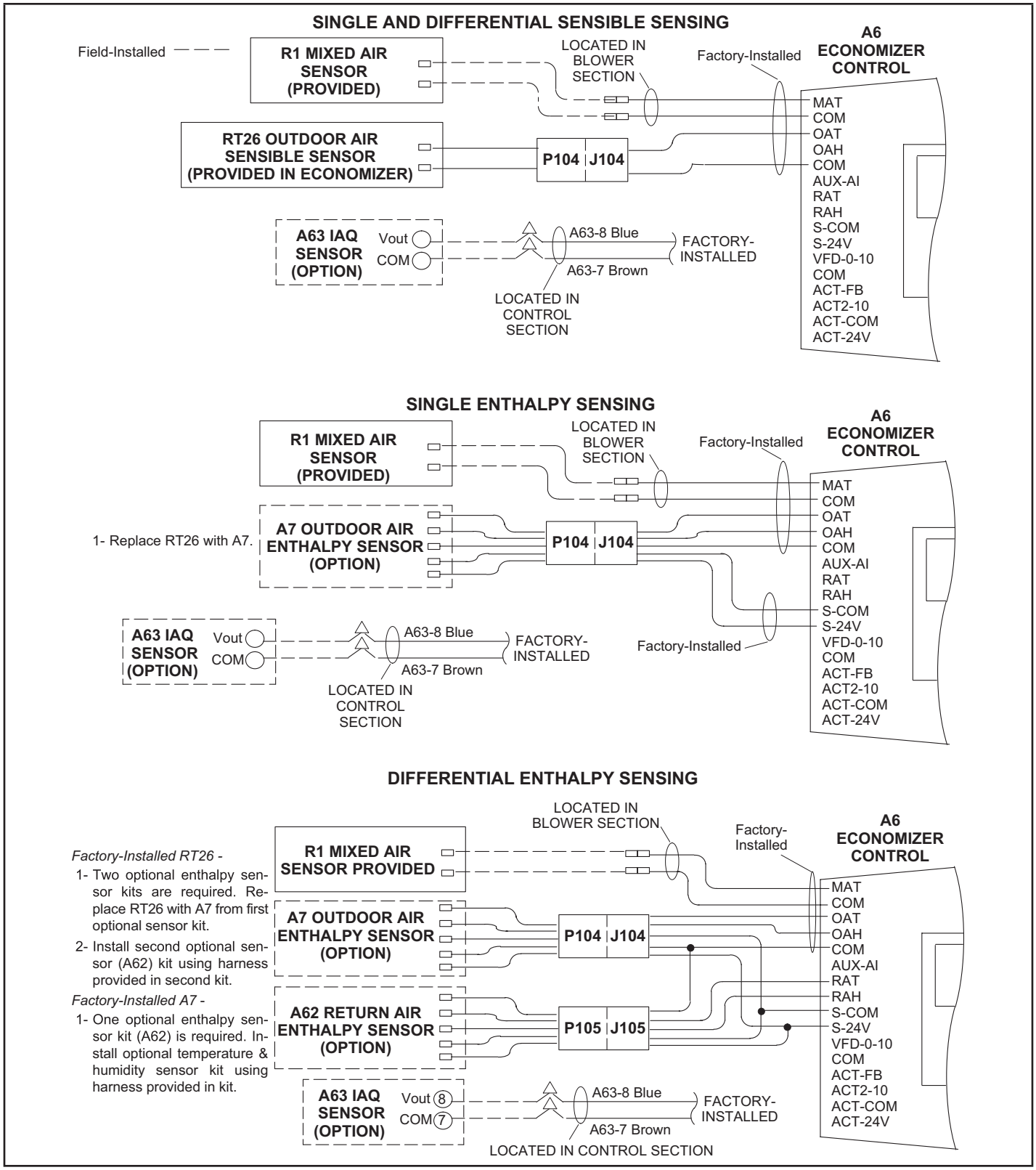

SINGLE AND DIFFERENTIAL SENSIBLE SENSING
Field-Installed
R1 MIXED AIR SENSOR (PROVIDED)
LOCATED IN BLOWER SECTION
Factory-Installed
A6 ECONOMIZER CONTROL
RT26 OUTDOOR AIR SENSIBLE SENSOR (PROVIDED IN ECONOMIZER)
P104 J104
MAT
COM
OAT
OAH
COM
AUX-AI
RAT
RAH
S-COM
S-24V
VFD-0-10
COM
ACT-FB
ACT2-10
ACT-COM
ACT-24V
A63 IAQ SENSOR (OPTION)
Vout
COM
A63-8 Blue
A63-7 Brown
FACTORY-INSTALLED
LOCATED IN CONTROL SECTION
SINGLE ENTHALPY SENSING
R1 MIXED AIR SENSOR (PROVIDED)
LOCATED IN BLOWER SECTION
Factory-Installed
A6 ECONOMIZER CONTROL
1- Replace RT26 with A7.
A7 OUTDOOR AIR ENTHALPY SENSOR (OPTION)
P104 J104
A63 IAQ SENSOR (OPTION)
Vout
COM
A63-8 Blue
A63-7 Brown
FACTORY-INSTALLED
LOCATED IN CONTROL SECTION
Factory-Installed
DIFFERENTIAL ENTHALPY SENSING
LOCATED IN BLOWER SECTION
Factory-Installed
A6 ECONOMIZER CONTROL
Factory-Installed RT26 -
1- Two optional enthalpy sensor kits are required. Replace RT26 with A7 from first optional sensor kit.
2- Install second optional sensor (A62) kit using harness provided in second kit.
Factory-Installed A7 -
1- One optional enthalpy sensor kit (A62) is required. Install optional temperature & humidity sensor kit using harness provided in kit.
R1 MIXED AIR SENSOR PROVIDED
A7 OUTDOOR AIR ENTHALPY SENSOR (OPTION)
P104 J104
A62 RETURN AIR ENTHALPY SENSOR (OPTION)
P105 J105
A63 IAQ SENSOR (OPTION)
Vout 8
COM 7
A63-8 Blue
A63-7 Brown
FACTORY-INSTALLED
LOCATED IN CONTROL SECTION

FIGURE 31

High Performance Economizer Control

USER INTERFACE

See figure 32

1 - One-line LCD. After a period of inactivity, the controller displays the default HMI screen (free cooling status: “1FREECOOL YES” or “1FREECOOL NO”).

2 - Operation button (Up button) - Move to the previous value, step or category.

3 - Operation button (Down button)- Move to the next value, step or category.

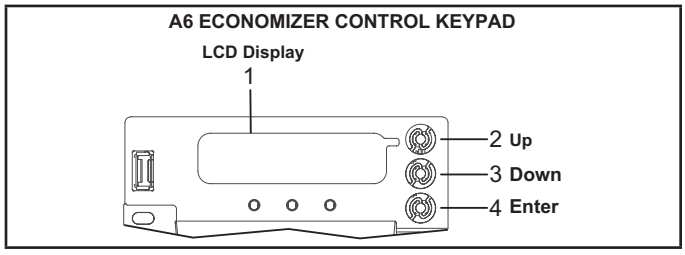


FIGURE 32

4 - Operation button (Enter button):

- Press to edit the current value or option.
- Press to confirm a newly selected value or option.
- Press Enter + Up to jump up one entire category.
- Press Enter + Down to jump down one entire category.

MENU STRUCTURE

See figure 33

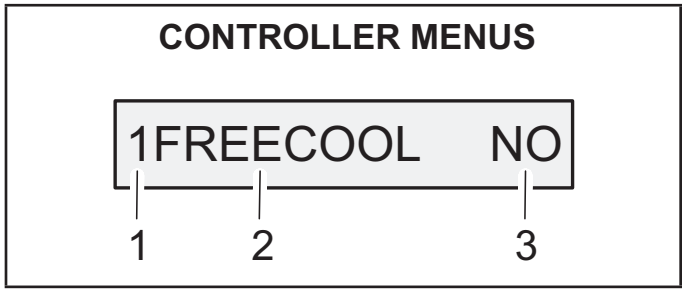


FIGURE 33

1 - Menus are displayed in the Economizer Controller as per categories. There are eight first-level menus. Each menu is represented by a number at the beginning of the line on the LCD. Press Enter + Up or Down to toggle between different first-level menus.

- 1: Status Display
- 2: Basic Settings
- 3: Advanced Settings
- 4: Alarms
- 5: Enter Configuration State and Reset
- 6: I/O Config.
- 7: Testing
- 8: Enter Running State

2 - Sub-menus follow the numbered first-level menus closely. Pressing Up or Down can toggle between different sub-menus.

3 - At the end of the line, the LCD displays the value of the current sub-menu (if any). Enter the Edit mode by pressing Enter (if the value is editable). Press Up or Down to change the highlighted value. Press Enter to confirm the change and exit the Edit mode.

For a complete list of parameters refer to the Siemens installation

manual provided in this kit.

FREE COOLING SETPOINT

Single OA Sensible Sensing (Default)

The default free cooling setpoint or high limit setpoint is 63^0F. This means that the outdoor air is suitable for free cooling at 62F and below and not suitable at 64F and above. This setpoint is adjustable.

For California Title 24 compliance, adjust the free cooling

setpoint based on:

-The climate zone where the unit is installed. See table 22.

-The setpoint requirement published by the California Energy Commission. See Section 140.4 - Prescriptive Requirements for Space Conditioning Systems of the 2013 Building Energy Efficiency Standards.

NOTE - *Values in the referenced standard will supersede values listed in table 22.*

TABLE 22

FREE COOLING SETPOINT - SINGLE SENSIBLE

Climate Zone	Setppoint °F
1, 3, 5, 11-16	75
2, 4, 10	73
6, 8, 9	71
7	69

To adjust the setpoint, navigate to the “BASIC SETTINGS” menu and change the “2TEMP OFF” parameter accordingly.

Single OA Enthalpy Sensing (Optional) -

To adjust the enthalpy setpoint, navigate to the “BASIC

SETTINGS” menu and change the “2ENTH OFF” parameter accordingly.

Differential Sensing (Optional) Two

sensors can be used to compare outdoor air to return air. When outdoor air is cooler than return air, outdoor air is suitable for free cooling. When return air is cooler than outdoor air, the damper will modulate to the minimum position.

SETUP AND CONFIGURATION - FACTORY-INSTALLED ECONOMIZER

Program the following parameters into the controller. Navigate to the specific menus to make the changes required.

1INS

- (MM/DD/YY) enter installation date

2FAN L ACT*

- ( ) adjust VDC value until desired resh air setpoint is reached when fan runs at low speed. *Appears only *if unit is configured as 2SPEED.*

2FAN H ACT

- ( ) adjust VDC value until desired fresh air setpoint is reached

SETUP AND CONFIGURATION - FIELD-INSTALLED ECONOMIZER

Program the following parameters into the controller. Navigate to the specific menus to make the changes required.

IMPORTANT - Before setup and configuration, it is recommended to obtain some location-based values such as shutoff points or utilize the location services in the Climatix mobile application.

Menus are displayed in the Economizer Controller as per categories. There are eight first-level menus. Each of them is represented by a number at the beginning of the line on the LCD. Press Enter + Up or Down to toggle between different first-level menus.

Navigate to the applicable menus and set the following parameters based on the unit configuration:

1INS

- (MM/DD/YY) enter installation date

2FAN L ACT

- ( ) adjust VDC value until desired fresh ir set point is reached when fan runs at low speed (*Appears only if unit is configured as 2SPEED)

2FAN H ACT

- ( ) adjust VCD value until desired fresh air set point is reached

3DIF T LOC (LAT)

3STG3 DLY (120)

6Y2O

- (NONE) For single-stage units
- (COOL 2) For 2-stage units

6FAN

- (1 SPEED) For CAV units
- (2 SPEED) For MSAV units

ALARM MONITORING

The controller is equipped with a 24V output signal that can be configured for remote alarm monitoring. Field-wire to provided blue wire marked “Aux2-O” near the controller for remote alarm monitoring.

Note - Newer units are factory-wired to facilitate feedback wiring connections when a BACnetTM option is installed. Newer units can be identified by a P372 plug located near TB1 in the control box. One white and one gray wire are connected to P372. On older units, call 1-800-453-6669 for wiring assistance. **DEMAND CONTROL VENTILATION (DCV)**

When a 010VDC CO2 sensor is wired to the POL224.00 economizer control A6 (leads provided), the 2DCV, 2VENTMAX L, 2VENTMAX H, 2 VENTMIN L and 2VENTMIN H parameters will appear under “BASIC SETTINGS“ menu. Navigate to the “BASIC SETTINGS“ menu to adjust setpoints as desired. Refer to the Siemens manual provided for more details.

For proper operation, the IAQ sensor must provide a 0-10VDC signal to the A6 controller.

CO_2 Sensor Used With High Performance Economizers-

When using any 0-10VDC sensor, set the ppm range using the POL224.00 economizer control A6 menu. Set the 6CO2 Rng L to 400 ppm and the 6CO2 Rng H to 1600 ppm.

High Performance Economizer Sequence of Operation

Refer to tables 23, 24, 25 or 26.

When the outdoor air is suitable and a thermostat demand calls for 1st. stage cooling (Y1), the economizer will modulate the dampers between the minimum and fully open positions to maintain a 55F (12.8C) mixed air temperature. When there is an increased thermostat demand for second stage cooling (Y2), the economizer damper opens 100% and the economizer controller (A6) will bring on the compressor. The damper will stay open 100% with the compressor running simultaneously until Y2 demand is met.

NOTE – *If a two-speed fan is installed, the economizer controller (A6) will delay the compressor start for 5 minutes (default). To adjust the delay from 1 to 20 minutes, adjust the “2FAN DLY” setting.*

NOTE – *When there is a Y1 cooling demand, the economizer controller (A6) will display the mixed air temperature (R1). When there is a Y2 cooling demand and compressors are operating, the economizer controller (A6) will display the outdoor air temperature (RT26 or A7). In either case, the economizer controller (A6) will use the mixed air sensor for low temperature lock-out.*

TROUBLESHOOTING, ALARMS AND\ CHECKOUT TESTS

Refer to the Siemens manual provided for details.

TABLE 23

ECONOMIZER OPERATION - NO DCV (CO2 SENSOR, 1-SPEED SUPPLY FAN)

DCV	OA Good to Economize ?	Y1-I	Y2-I	Y1-0	Y2-0	Occupied	Unoccupied
None	No	Off	Off	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	24-v/On	0-v/Off	MIN POS	Closed
		On	On	24-v/On	24-v/On	MIN POS	Closed
None	Yes	Off	Off	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	On	24-v/On	0-v/Off	Full-Open	Full-Open

TABLE 24

ECONOMIZER OPERATION - WITH DCV (CO2 SENSOR, 1-SPEED SUPPLY FAN)

DVC	OA Good to Economize ?	Y1-I	Y2-I	Y1-0	Y2-0	Occupied	Unoccupied
Below Set	No	Off	Off	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	24v-/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	0-v/Off	0-v/Off	VENTMIN to Full Open	Closed to Full Open
		On	On	24-v/On	0-v/Off	Full Open	Full Open
Above Set	No	Off	Off	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	24-v/On	0-v/Off	VENTMIN to VENTMAX	Closed
		On	On	24-v/On	24-v/On	VENTMIN to VENTMAX	Closed
	Yes	Off	Off	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	0-v/Off	0-v/Off	VENTMIN to Full Open	Closed to Full Open
		On	On	24-v/On	0-v/Off	Full-Open	Full-Open

TABLE 25

ECONOMIZER OPERATION - NO DCV (CO2 SENSOR, 2-SPEED SUPPLY FAN)

DCV	OA Good to Economize ?	Y1-I	Y2-I	Fan Speed	Y1-0	Y2-0	Occupied	Unoccupied
None	No	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	24-v/On	0-v/Off	MIN POS L	Closed
		On	On	High	24-v/On	24-v/On	MIN POS H	Closed
None	Yes	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS L to Full-Open	Closed to Full-Open
		On	On	High	Delay (b) -v/On	0-v/Off	Full-Open	Full-Open

(b) With 2FAN DLY (Basic Settings Menu), when in the economizing mode, there is a delay for the high speed fan to try to satisfy the call for second-stage cooling by turning on the fan to high and opening the OA dampers to 100% before the first-stage mechanical cooling is enabled.

TABLE 26

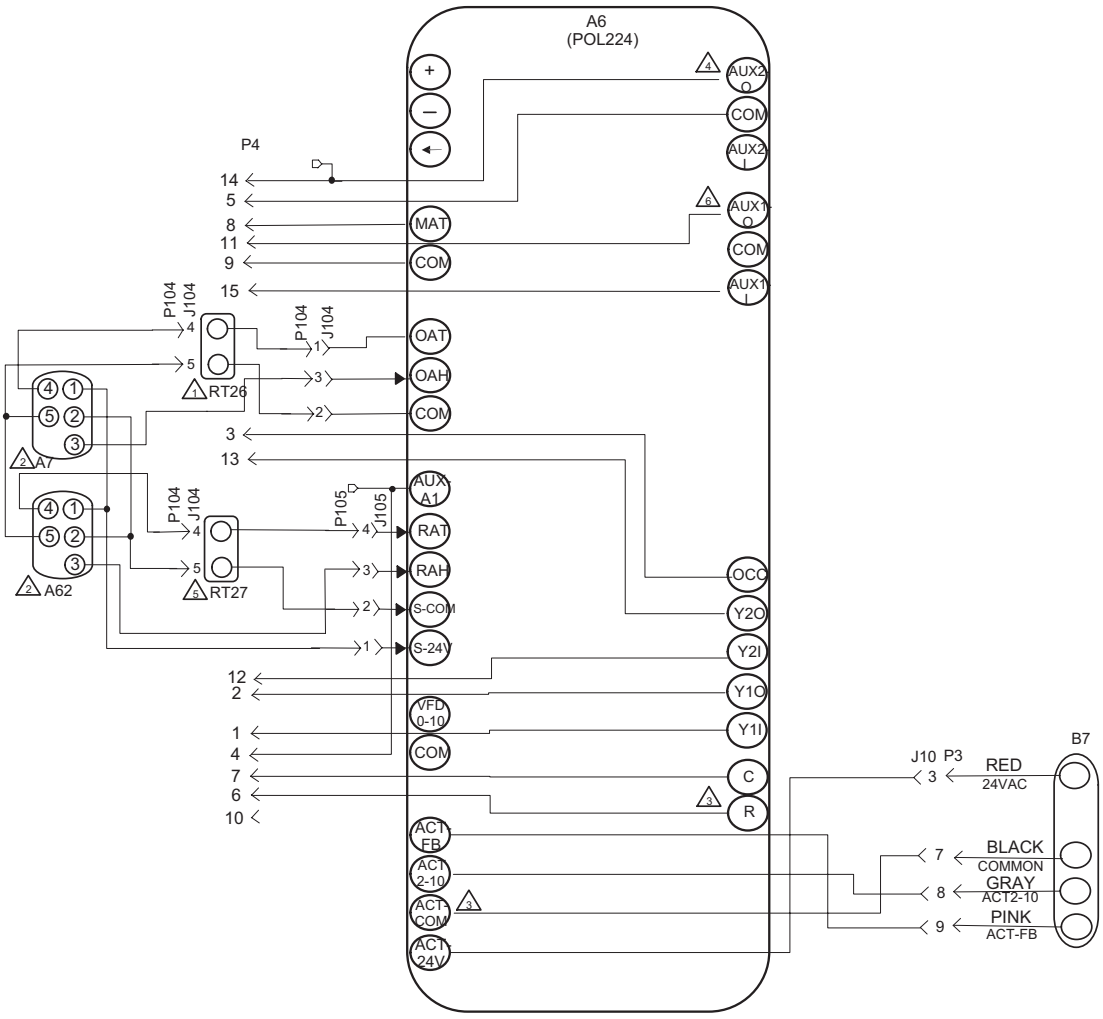
ECONOMIZER OPERATION - WITH DCV (CO2 SENSOR, 2-SPEED SUPPLY FAN)

DVC	OA Good to Economize ?	Y1-I	Y2-I	Fan Speed	Y1-0	Y2-0	Occupied	Unoccupied
Below Set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L	Closed
		On	On	High	24v-/On	24-v/On	VENTMIN H	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN L to Full Open	Closed to Full Open
		On	On	High	Delay (b) 24-v/On	0-v/Off	Full Open	Full Open
Above Set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN L to Full Open	Closed to Full Open
		On	On	High	Delay (b) 24-v/On	0-v/Off	Full-Open	Full-Open

(b) With 2FAN DLY (Basic Settings Menu), when in the economizing mode, there is a delay for the high speed fan to try to satisfy the call for second-stage cooling by turning on the fan to high and opening the OA dampers to 100% before the first-stage mechanical cooling is enabled.

High Performance Economizer Wiring Diagram

TYPICAL ECONOMIZER WIRING DIAGRAM - KG, KC & KH UNITS



KEY	COMPONENT
A6	CONTROL - ECONOMIZER
A7	SENSOR - OUTDOOR ENTHALPY
A62	SENSOR - INDOOR ENTHALPY
B7	MOTOR - DAMPER ECONOMIZER
J10	JACK - ECONOMIZER MOTOR
J104	JACK - SENSOR OUTDOOR
J105	JACK - SENSOR RETURN AIR
P3	PLUG - ECONOMIZER MOTOR
P4	PLUG - ECONOMIZER
P104	PLUG - SENSOR OUTDOOR
P105	PLUG - SENSOR RETURN AIR
RT26	SENSOR - OUTDOOR AIR TEMP
RT27	SENSOR - RETURN AIR TEMP

1. OUTDOOR AIR TEMP SENSOR RT26 OR OUTDOOR AIR ENTHALPY SENSOR A7 MAY BE USED.
2. FOR DIFFERENTIAL ENTHALPY SENSING USE OUTDOOR ENTHALPY SENSOR A7 AND RETURN AIR ENTHALPY SENSOR A62.
3. REFER ALSO TO MAIN UNIT WIRING DIAGRAM SECTION C.
4. PROGRAMMABLE, USE FOR SYSTEM ALARM OUTPUT.
5. FOR DIFFERENTIAL TEMPERATURE SENSING USE RT26 & RT27 SENSORS.
6. PROGRAMMABLE, USE FOR POWER EXHAUST FAN 2 OUTPUT.

E-Outdoor Air Dampers

Outdoor air dampers used on KCC units consist of a set of dampers which may be manually operated (C1DAMP10C-1) or motorized (C1DAMP20C-1) to allow outside air into the system (see figure 34). Either air damper can be installed in KCC units. See outdoor air damper installation instructions for more detail. The motorized damper assembly opens to minimum position during the occupied time period and remains closed during the unoccupied period.

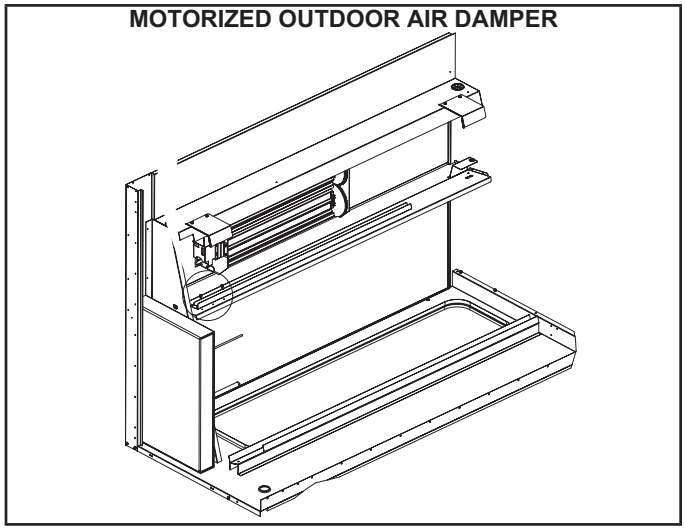


FIGURE 34

Manual damper assembly is set at installation and remains in that position. Washable filter supplied with the outdoor air dampers can be cleaned with water and a mild detergent. It should be sprayed with Filter Handicoater when dry prior to reinstallation. Filter Handicoater is R.P. Products coating no. 418 and is available as Part No. P-8-5069.

Optional manual and motorized outdoor air dampers provide fresh outdoor air.

Follow the steps to determine fresh air percentage

1 - Measure outdoor air temperature. Mark the point on the bottom line of chart 1 figure 24 and label the point “A” (40^{0}F, 4^{0}C shown).

2 - Measure return air temperature. Mark that point on the top line of chart 1 figure 24 and label the point “B” (74^{0}F, 23^{0}C shown).

3 - Measure mixed air (outdoor and return air) temperature. Mark that point on the top line of chart 1 figure 24 and label point “C” (70^{0}F, 21^{0}C shown).

4 - Draw a straight line between points A and B.

5 - Draw a vertical line through point C.

6 - Draw a horizontal line where the two lines meet. Read the percent of fresh air intake on the side.

7 - If fresh air percentage is less than desired, adjust thumbwheel higher. If fresh air percentage is more than desired, adjust thumbwheel lower. Repeat steps until calculation reads desired fresh air percentage. See figure 35.

Set damper minimum position in the same manner as economizer minimum position. Adjust motorized damper position using the thumbwheel on the damper motor. See figure 35. Manual damper fresh air intake percentage can be determined in the same manner.

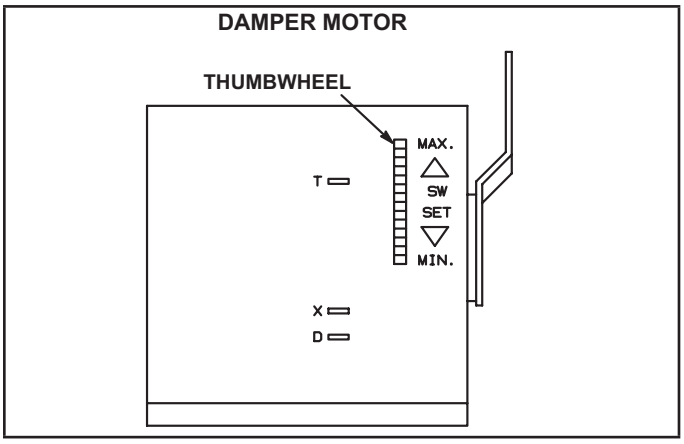


FIGURE 35

F-Barometric Relief Dampers

C1DAMP50 dampers (figure 36) are used in downflow and LAGED(H)18/24 are used in horizontal air discharge applications. LAGED(H) gravity exhaust dampers are installed in the return air plenum . The dampers must be used any time an economizer or power exhaust fans are applied to KCC series units.

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

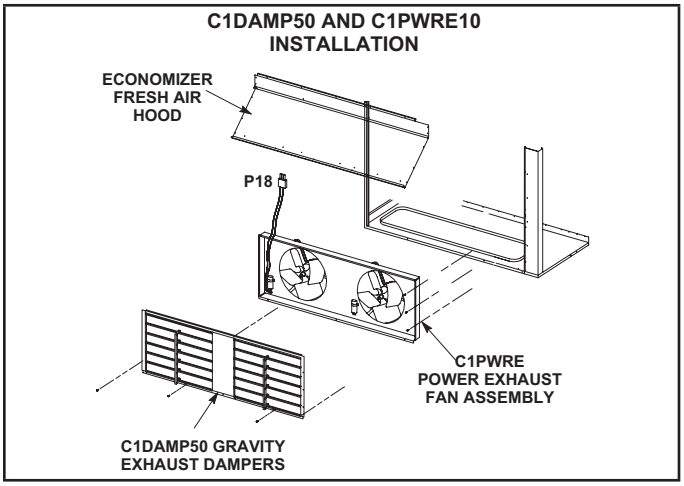


FIGURE 36

G-C1PWRE10C Power Exhaust Fans

Power exhaust fans are used in downflow applications only. The fans require optional downflow barometric relief dampers and K1ECON economizers. Power exhaust fans provide exhaust air pressure relief and also run when return air dampers are closed and supply air blowers are operating.

Figure 36 shows the location of the C1PWRE. See installation instructions for more detail.

H-Indoor Air Quality (CO2) Sensor A63

The indoor air quality sensor monitors CO2 levels and reports the levels to the economizer control module A6. 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-Smoke Detectors A17 and A64

Photoelectric smoke detectors are a field 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.**K-Control Systems**

Three different types of control systems may be used with the KCC series units. All thermostat wiring is connected to terminal block TB1 located in the control box of the unit. Each thermostat has additional control options available. See thermostat installation instructions for more detail.

J-LP / Propane Kit

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

K-UVC Kit

UVC germicidal lamps are a field-installed option. The lamp emits ultraviolet light that greatly reduces the growth and proliferation of mold and other bio-aerosols on illuminated surfaces. The lamp is mounted in the blower compartment with the light directed towards the indoor coil. For more details refer to the installation instructions provided with the UVC lamp.

L-Drain Pan Overflow Switch S149 (option)

The overflow switch is used to interrupt cooling operation when excessive condensate collects in the drain pan. The N.O. overflow switch is controlled by K220 and DL46 relays, located in the unit control panel. When the overflow switch closes, 24VAC power is interrupted and after a fivesecond 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.

M-Multi-Stage Air Volume Start-Up

a-General

The optional Multi-Stage Air Volume units provide two blower speeds. The blower operates at lower speeds when cooling demand is low and at higher speeds when cooling demand is high. This results in lower energy consumption.

The multi-stage air volume units are set to operate at high speed during ventilation (blower “G” only signal); however, the unit can be adjusted to operate at low speed. Low speed is approximately 2/3 of the full speed RPM.

b-Set Maximum Blower CFM

1 - Initiate a blower (G) only signal from the room thermostat or control system.

2 - Adjust the blower pulley to deliver the full (high speed) CFM in the typical manner. See Determining Unit CFM in the Blower Operation and Adjustment section.

c-Set Blower Speed During Ventilation

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

To save energy during ventilation, the blower speed can be set to low. This is accomplished by changing the ventilation speed switch on the VFD control board to “LO”. See figure 37.

NOTE - *On units equipped with an economizer, set damper minimum position as shown in the next section. After adjusting the low speed minimum position, the ventilation speed switch will be in the “LO” position.*

d-Set Damper Minimum Position (Units W/ Economizer)

To maintain required minimum ventilation air volumes when the unit is in the occupied mode, two minimum damper positions must be set. A high and a low speed potentiometer are provided on the VFD control board to adjust minimum damper position. See figure 37.

Set High Speed Minimum Position

1 - Initiate a blower (G) only AND occupied demand from the room thermostat or control system.

2 - Set the ventilation speed switch on the VFD control board to “HI”.

3 - Rotate the high speed potentiometer on the VFD control board to set the high speed minimum damper position.

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

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

Set Low Speed Minimum Position

1 - Initiate a blower (G) only AND occupied demand from the room thermostat or control system.

2 - Set the ventilation speed switch on the VFD control board to “LO”.

3 - Rotate the low speed potentiometer on the VFD control board to set the low speed minimum damper position.

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

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

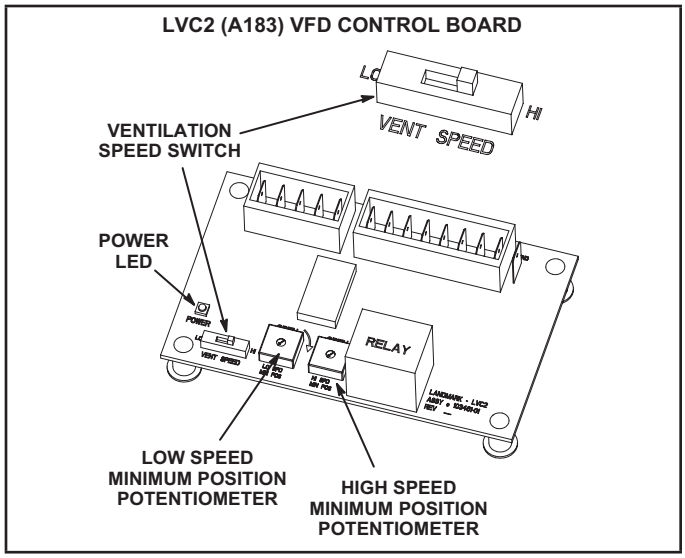


FIGURE 37

Troubleshoot LVC2 Board (A183)

Refer to wiring diagram sections B (unit), C (control) and D (economizer) located on inside of unit panels.

1 - Inspect the LVC2 for damaged components. Replace the LVC2 if damaged components are found.

2 - Check all wire connections to LVC2; secure if loose.

3 - Check for 24VAC signal at the thermostat blower input (G to GND terminal). See figure 38

4 - If there is no thermostat signal, troubleshoot back toward the thermostat.

5 - Check the power LED on the board. See figure 37.

6 - If the power LED is not on, check voltage between LVC2 terminals PC (H2-1) and SD (H2-5). Voltage should read 24VDC..

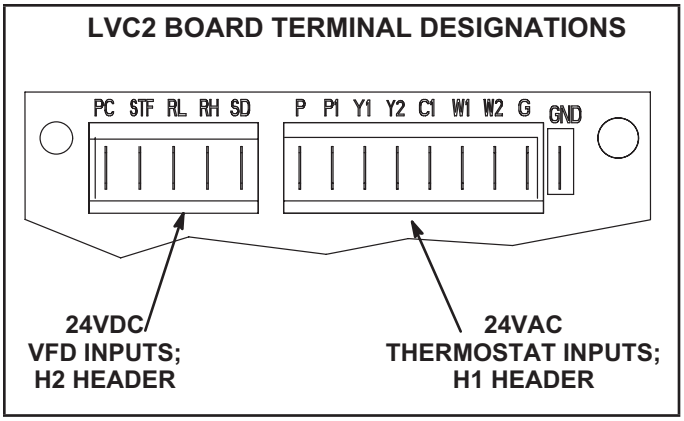


FIGURE 38

7 - If voltage does not read 24VDC, disconnect the H2 header from the LVC2 VFD inputs terminal block(make sure the LVC2 is not shorting 24VDC supply from the inverter). Measure the voltage between the end terminals on the H2 header. If 24VDC is present, replace the LVC2 board. If no voltage is read, troubleshoot the VFD.

8 - When LVC2 24VAC thermostat blower (G) input and 24VDC power are present, check the LVC2 low and high speed outputs. The LVC2 uses inverse logic to enable the blower; 1VDC will be read at the enabled blower speed terminal. See table 27.

9 - If all inputs are correct and the unit still does not operate as intended, replace LVC2 board.

TABLE 27

OutputTerminals	Voltage	Blower Operation
RL-SD	1VDC	Low Speed
RH-SD	24VDC	
RL-SD	24VDC	High Speed
RH-SD	1VDC	
RL-SD	1VDC	Illegal Sate (replace board)
RH-SD	VDC	
RL-SD	24VDC	Blower Off (replace board)
RH-SD	24VDC	

N-Hot Gas Re-Heat Operation

General

Hot gas reheat units provide a dehumidifying mode of operation.

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

See figure 39 for 180S, 210S, and 240S reheat refrigerant routing and figure 40 for 180S, 210S, and 240S normal cooling refrigerant routing. See figure 41 for 300S reheat refrigerant routing and figure 42 for 300S normal cooling refrigerant routing.

L14 and L30 Reheat Coil Solenoid Valves

Check-Out

Test hot gas reheat operation using the following procedure.

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

2 - Initiate a dehumidification demand by adjusting dehumidistat setpoint knob BELOW indoor relative humidity. The blower , compressor 1 and compressor 2 should be operating.

3 - End a dehumidification demand by adjusting setpoint knob ABOVE indoor relative humidity. The blower, compressor 1, and compressor 2 should de-energize.

Note - *When a reheat demand is present, the blower will operate on high speed.*

Default Reheat Operation

Reheat will operate as shown in table 28 once three conditions are met:

4 - Blower must be operating.

5 - System must be in occupied mode.

6 - System must NOT be operating in heating mode.

IMPORTANT - *Free cooling does not operate during reheat.*

TABLE 28

REHEAT OPERATION

Two-Stage Thermostat		
T'stat and Humidity Demands	Operation	
	180S, 210S, 240S (3-Compressors)	300S (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat and Compressor 3 Cooling[1]	Compressor 1 & 2 Reheat and Compressor 3 & 4 Cooling[1]
Reheat & Y1 & Y2	Compressor 1, 2, & 3 Cooling[2]	Compressor 1, 2, 3 & 4 Cooling[2]

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

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

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

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

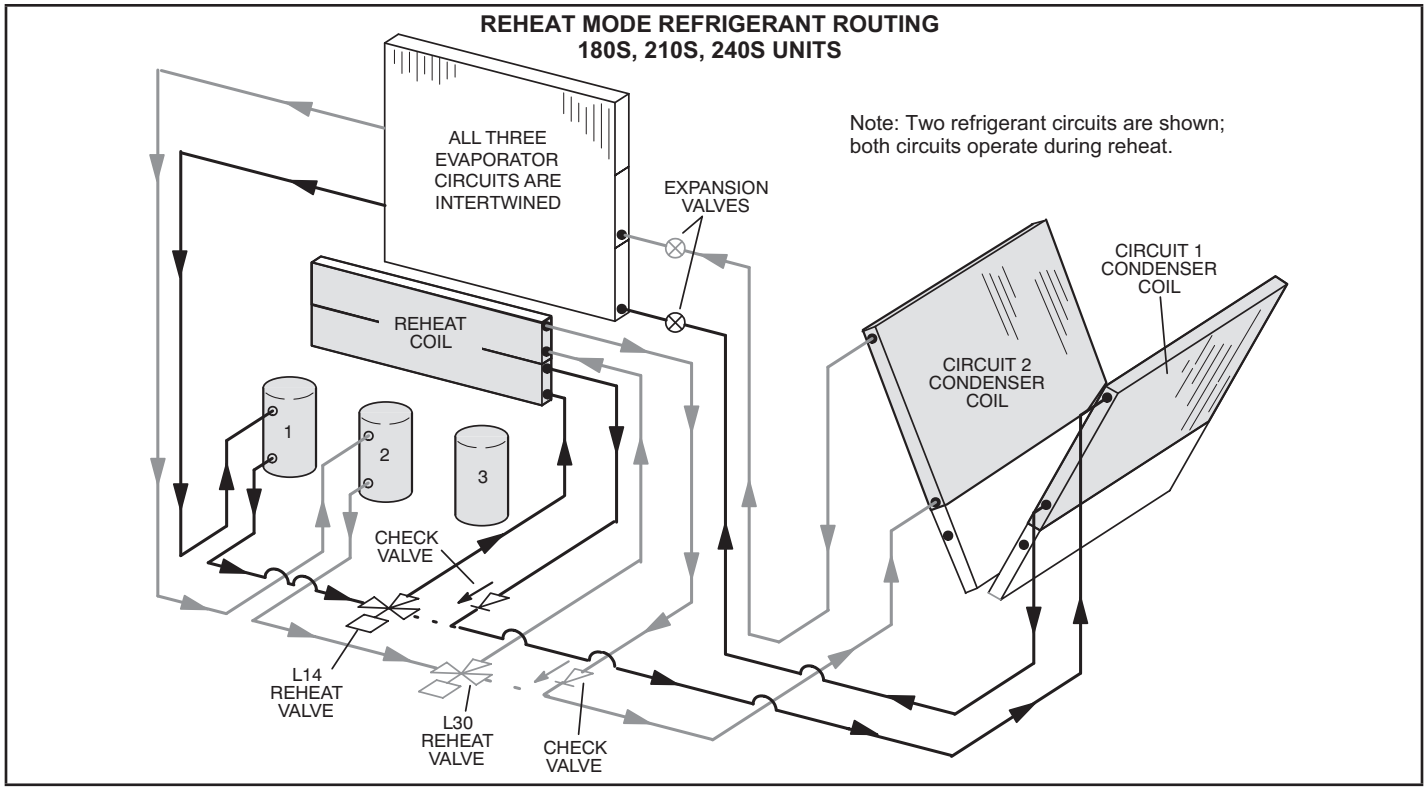


FIGURE 39

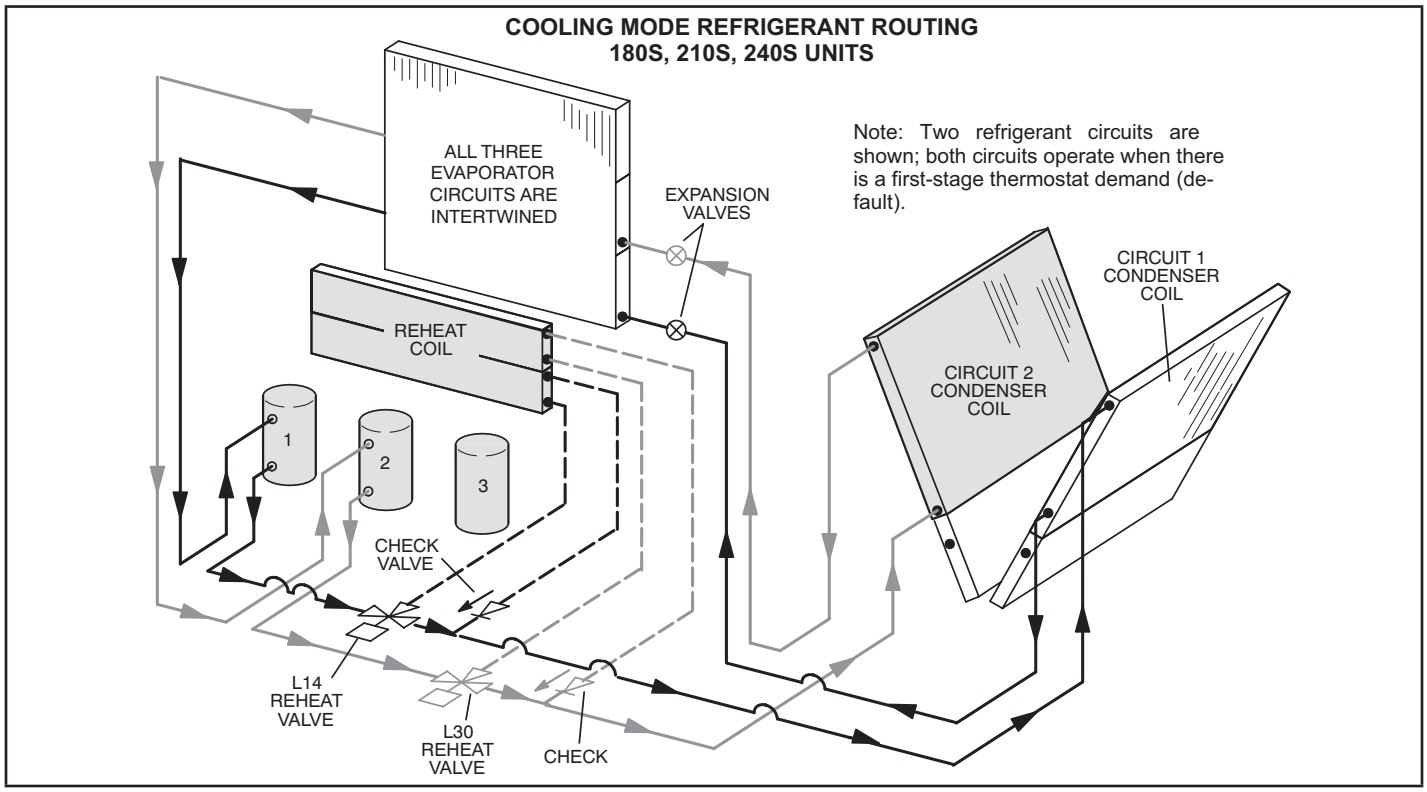


FIGURE 40

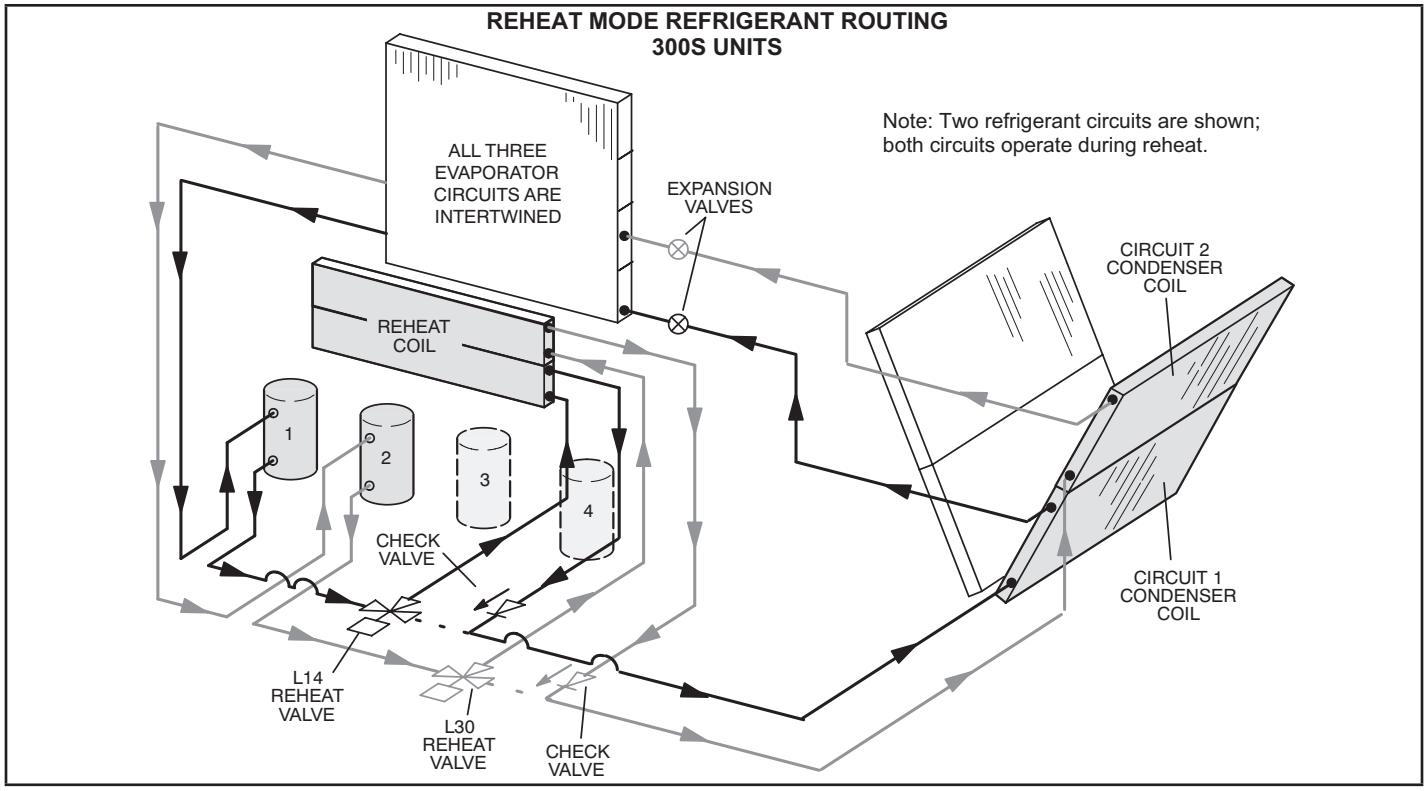


FIGURE 41

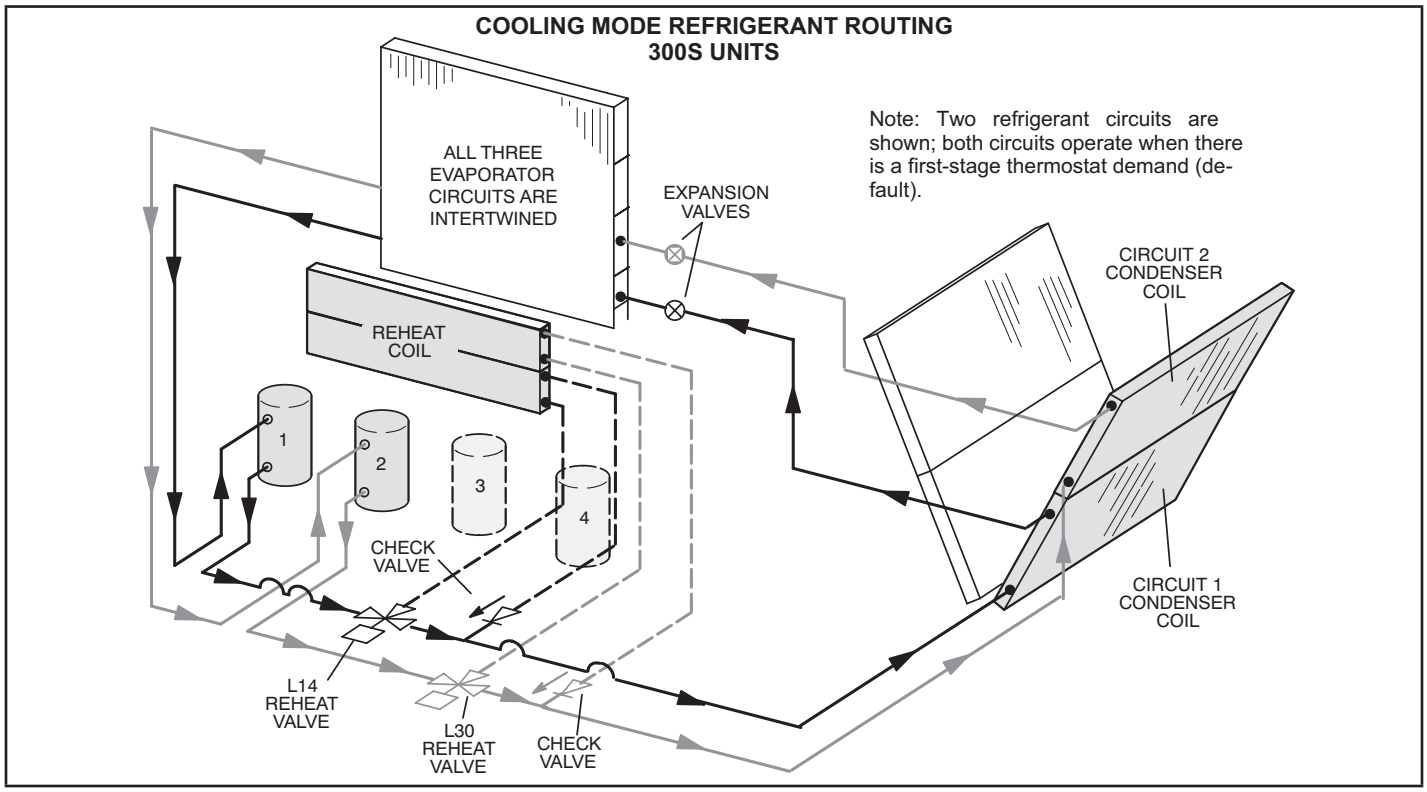
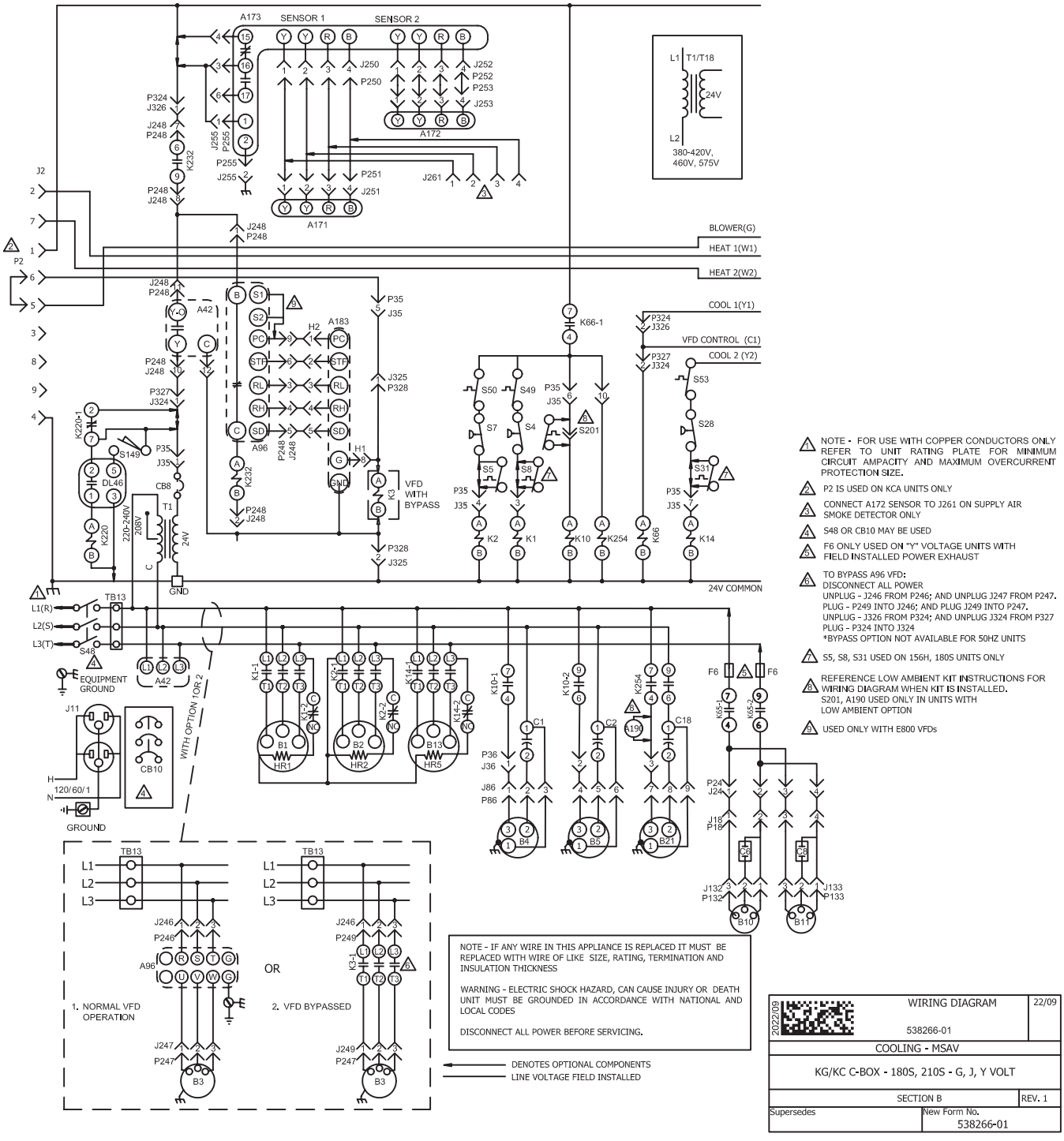


FIGURE 42

KG/KC180S, 210S UNIT DIAGRAM



KG/KC180S, 210S UNIT DIAGRAM KEY

J/P	JACK/PLUG DESCRIPTION
2	HEAT
18	EXHAUST FAN COMPT
24	EXHAUST FAN
35	RUN TEST
36	RUN TEST OUTDOOR FANS
86	OUTDOOR FANS 1,2,3
132	EXHAUST FAN MOTOR 1
133	EXHAUST FAN MOTOR 2
246	POWER TO VFD
247	POWER VFD TO MOTOR
248	VFD CONTROL
249	K3 CONTACTOR, INVERTER BYPASS
250	SMOKE DETECTOR ONE
251	SMOKE DETECTOR ONE
252	SMOKE DETECTOR TWO
253	SMOKE DETECTOR TWO
255	MODULE, CONTROL SMOKE DETECTION
261	SMOKE DETECTOR JUMPER
324	VFD OPTION CONNECTION
325	K3 BLOWER CONTROL
326	PHASE MONITOR/ VFD CONTROL ADD ON
327	PHASE MONITOR/ VFD CONTROL ADD ON
328	VFD BLOWER CONTROL

KEY	COMPONENT
A42	MONITOR, PHASE PROTECTION
A96	CONTROL INVERTER
A171	SENSOR ONE, SMOKE, RETURN AIR
A172	SENSOR TWO, SMOKE, SUPPLY AIR
A173	MODULE, CONTROL SMOKE DETECTION
A183	CONTROL, VFD BOARD
A190	PRESSURE CONTROLLER, COMP 2, LOW AMBIENT KIT
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
B13	COMPRESSOR 3
B21	MOTOR, OUTDOOR FAN 3
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
CB8	CIRCUIT, BREAKER T1
CB10	CIRCUIT, BREAKER MAIN DISCONNECT
DL46	DELAY, OVERFLOW SWITCH
F6	FUSE, EXHAUST FANS
H2	HEADER 2, A183 - LVC2 BOARD
HR1	HEATER, COMPRESSOR 1
HR2	HEATER, COMPRESSOR 2
HR5	HEATER, COMPRESSOR 3
J11	JACK, GFI, RECEPTICLE
K1,-1,2	CONTACTOR, COMPRESSOR 1
K2,-1,2	CONTACTOR, COMPRESSOR 2
K3,-1	CONTACTOR, BLOWER
K10,-1,2	RELAY, OUTDOOR FANS 1 & 2
K14, -1,2	CONTACTOR, COMPRESSOR 3
K65-1,2	RELAY, EXHAUST FAN 1
K66,-1	RELAY, STAGE COOL 1
K150	RELAY, OUTDOOR FAN 3
K220, -1	RELAY, OVERFLOW SWITCH
K232	RELAY, INVERTER PROTECTION
K254	RELAY, LOW AMBIENT KIT FAN 3
S4	SWITCH, LIMIT HI PRESS COMP 1
S5	SWITCH, HIGH TEMP LIMIT COMP 1
S7	SWITCH, LIMIT HI PRESS COMP 2
S8	SWITCH, HIGH TEMP LIMIT COMP 2
S28	SWITCH, LIMIT HI PRESS COMP 3
S31	SWITCH, HIGH TEMP LIMIT COMP 3
S48	SWITCH, DISCONNECT
S49	SWITCH, FREEZESTAT COMP 1
S50	SWITCH, FREEZESTAT COMP 2
S53	SWITCH, FREEZESTAT COMP 3
S149	SWITCH, OVERFLOW
S201	SWITCH, LOW AMBIENT TEMP SENSOR
T1	TRANSFORMER, CONTROL
TB13	TERMINAL STRIP, POWER DISTRIBUTION

KG/KC180S, 210S SEQUENCE OF OPERATION

Power:

1 - Line voltage from unit disconnect S48 or TB13 energizes transformer T1 and T18. T1 and T18 provide 24VAC to the unit cooling, heating and blower controls and TB1.

Blower Operation:

2 - Demand from thermostat terminal G energizes blower contactor K3 with 24VAC.

3 - N.O. K3 closes, energizing blower B3.

Optional Power Exhaust Operation:

4 - The economizer control module receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% outside air damper open (adjustable).

5 - N.O. K65-1 and N.O. K65-2 both close, energizing exhaust fan motors B10 and B11.

1st Stage Cooling (compressor B1 and B2)

6 - Y1 energizes the pilot relay K66 and N.O. K66-1 closes.

7 - 24VAC is routed from T1 to N.C. freezestats S49 and S50 and N.C. high pressure switch S4 and S7. Compressor contactors K1 and K2 are energized.

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

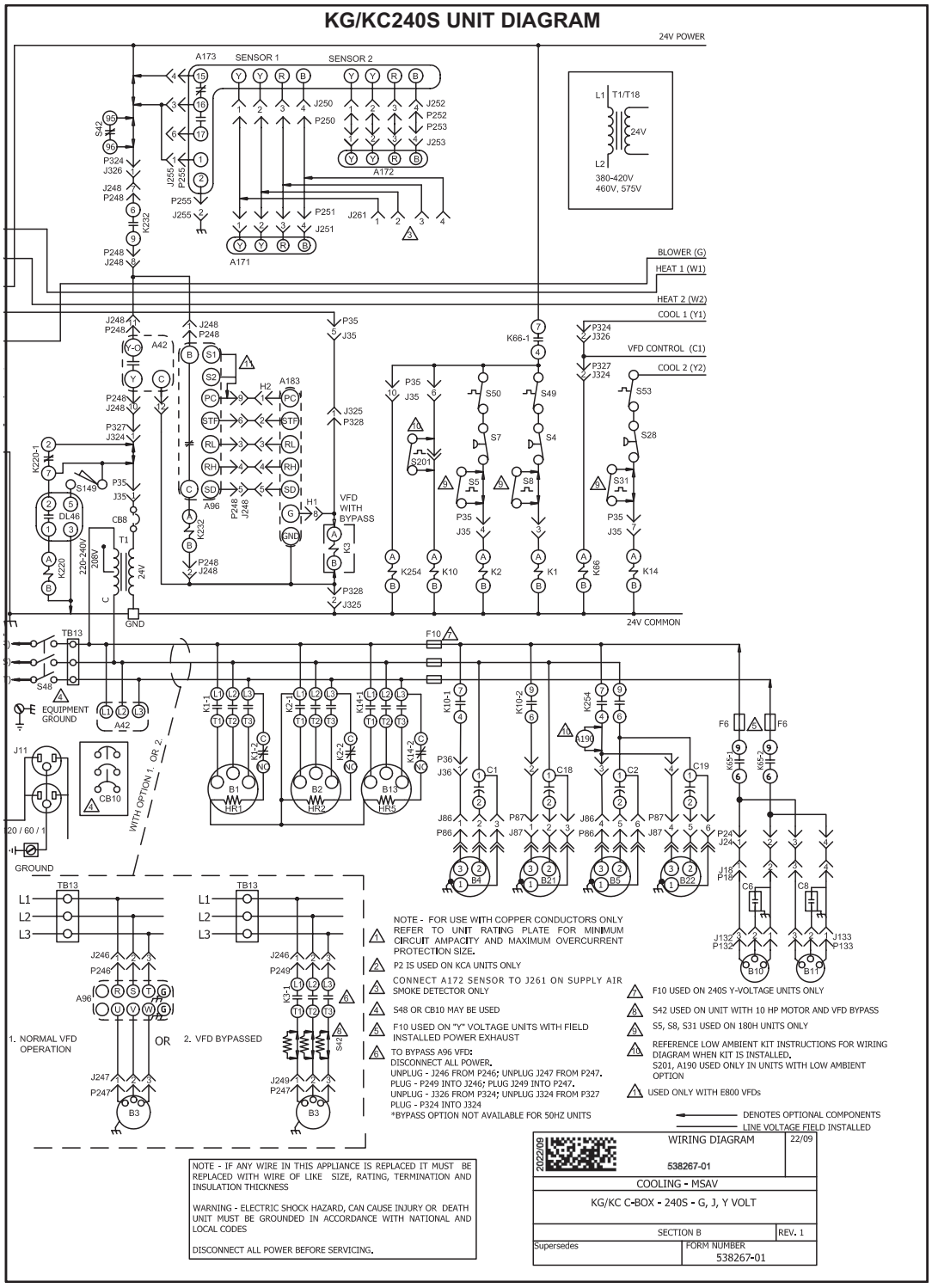
9 - N.O. contacts K10 close energizing condenser fan B4, B5.

10 - N.O. contacts K254 close energizing condenser fan B21.

2nd Stage Cooling (compressor B13 is energized)

11 - Y2 energizes the compressor contactor K14.

12 - N.O. K14 closes energizing compressor B13.


KG/KC240S UNIT DIAGRAM
24V POWER
BLOWER (G)
HEAT 1 (W1)
HEAT 2 (W2)
COOL 1 (Y1)
VFD CONTROL (C1)
COOL 2 (Y2)
24V COMMON
SENSOR 1
SENSOR 2
A173
A172
A171
A42
A96
A183
A190
A201
VFD WITH BYPASS
TB13
CB10
CB8
T1
L1 T1/T18
L2
24V
380-420V
460V, 575V
220-240V
208V
EQUIPMENT GROUND
GROUND
WITH OPTION 1 OR 2
1. NORMAL VFD OPERATION
OR
2. VFD BYPASSED
NOTE - FOR USE WITH COPPER CONDUCTORS ONLY REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
P2 IS USED ON KCA UNITS ONLY
CONNECT A172 SENSOR TO J261 ON SUPPLY AIR SMOKE DETECTOR ONLY
S48 OR CB10 MAY BE USED
F10 USED ON "Y" VOLTAGE UNITS WITH FIELD INSTALLED POWER EXHAUST
TO BYPASS A96 VFD:
DISCONNECT ALL POWER.
UNPLUG - J246 FROM P246; UNPLUG J247 FROM P247.
PLUG - P249 INTO J246; PLUG J249 INTO P247.
UNPLUG - J326 FROM P324; UNPLUG J324 FROM P327
PLUG - P324 INTO J324
*BYPASS OPTION NOT AVAILABLE FOR 50HZ UNITS
F10 USED ON 240S Y-VOLTAGE UNITS ONLY
S42 USED ON UNIT WITH 10 HP MOTOR AND VFD BYPASS
S5, S8, S31 USED ON 180H UNITS ONLY
REFERENCE LOW AMBIENT KIT INSTRUCTIONS FOR WIRING DIAGRAM WHEN KIT IS INSTALLED.
S201, A190 USED ONLY IN UNITS WITH LOW AMBIENT OPTION
USED ONLY WITH E800 VFDs
DENOTES OPTIONAL COMPONENTS
LINE VOLTAGE FIELD INSTALLED
NOTE - IF ANY WIRE IN THIS APPLIANCE IS REPLACED IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING, TERMINATION AND INSULATION THICKNESS
WARNING - ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES
DISCONNECT ALL POWER BEFORE SERVICING.
2022/09
WIRING DIAGRAM
22/09
538267-01
COOLING - MSAV
KG/KC C-BOX - 240S - G, J, Y VOLT
SECTION B
REV. 1
Supersedes
FORM NUMBER
538267-01

KG/KC240S UNIT DIAGRAM KEY

J/P	JACK/PLUG DESCRIPTION
2	HEAT
18	EXHAUST FAN COMPT
24	EXHAUST FAN
35	RUN TEST
36	RUN TEST OUTDOOR FANS
86	OUTDOOR FANS 1,2
87	OUTDOOR FANS 3,4
132	EXHAUST FAN MOTOR 1
133	EXHAUST FAN MOTOR 2
246	POWER TO VFD
247	POWER VFD TO MOTOR
248	VFD CONTROL
249	K3 CONTACTOR, INVERTER BYPASS
250	SMOKE DETECTOR ONE
251	SMOKE DETECTOR ONE
252	SMOKE DETECTOR TWO
253	SMOKE DETECTOR TWO
255	MODULE, CONTROL SMOKE DETECTION
261	SMOKE DETECTOR JUMPER
324	VFD OPTION CONNECTION
325	K3 BLOWER CONTROL
326	PHASE MONITOR/ VFD CONTROL ADD ON
327	PHASE MONITOR/ VFD CONTROL ADD ON
328	VFD BLOWER CONTROL

KEY	COMPONENT
A42	MONITOR, PHASE PROTECTION
A96	CONTROL INVERTER
A171	SENSOR ONE, SMOKE, RETURN AIR
A172	SENSOR TWO, SMOKE, SUPPLY AIR
A173	MODULE, CONTROL SMOKE DETECTION
A183	CONTROL, VFD BOARD
A190	PRESSURE CONTROLLER, COMP 2, LOW AMBIENT KIT
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
B13	COMPRESSOR 3
B21	MOTOR, OUTDOOR FAN 3
B22	MOTOR, OUTDOOR FAN 4
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
C19	CAPACITOR, OUTDOOR FAN 4
CB8	CIRCUIT, BREAKER T1
CB10	CIRCUIT, BREAKER MAIN DISCONNECT
DL46	DELAY, OVERFLOW SWITCH
F6	FUSE, EXHAUST FAN
H2	HEADER 2, A183 - LVC2 BOARD
HR1	HEATER, COMPRESSOR 1
HR2	HEATER, COMPRESSOR 2
HR5	HEATER, COMPRESSOR 3
J11	JACK, GFI, RECEPTICLE
K1,-1,2	CONTACTOR, COMPRESSOR 1
K2,-1,2	CONTACTOR, COMPRESSOR 2
K3,-1	CONTACTOR, BLOWER
K10,-1, 2	RELAY, OUTDOOR FANS 1 & 2
K14, -1,2	CONTACTOR, COMPRESSOR 3
K65,-2	RELAY, EXHAUST FAN 1
K66,-1	RELAY, STAGE COOL 1
K220, -1	RELAY, OVERFLOW SWITCH
K232	RELAY, INVERTER PROTECTION
K254	RELAY, LOW AMBIENT KIT FANS 2 & 4
S4	SWITCH, LIMIT HI PRESS COMP 1
S5	SWITCH, LIMIT HI TEMP COMP 1
S7	SWITCH, LIMIT HI PRESS COMP 2
S8	SWITCH, LIMIT HI TEMP COMP 2
S28	SWITCH, LIMIT HI PRESS COMP 3
S31	SWITCH, LIMIT HI TEMP COMP 3
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S48	SWITCH, DISCONNECT
S49	SWITCH, FREEZESTAT COMP 1
S50	SWITCH, FREEZESTAT COMP 2
S53	SWITCH, FREEZESTAT COMP 3
S149	SWITCH, OVERFLOW
S201	SWITCH, LOW AMBIENT TEMP SENSOR
T1	TRANSFORMER, CONTROL
T18	TRANSFORMER, REHEAT
TB13	TERMINAL STRIP, POWER DISTRIBUTION

KG/KC240S SEQUENCE OF OPERATION

Power:

1 - Line voltage from unit disconnect S48 or TB13, energizes transformer T1 and T18. T1 and T18 provide 24VAC to the unit cooling, heating and blower controls and TB1.

Blower Operation:

2 - Demand from thermostat terminal G energizes blower contactor K3 with 24VAC.

3 - N.O. K3 closes, energizing blower B3.

Optional Power Exhaust Operation:

4 - The economizer control module receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% outside air damper open (adjustable).

5 - N.O. K65-1 and N.O. K65-2 both close, energizing exhaust fan motors B10 and B11.

1st Stage Cooling (compressor B1 and B2)

6 - Y1 energizes the pilot relay K66 and N.O. K66-1 closes.

7 - 24VAC is routed from T1 to N.C. freezestats S49 and S50 and N.C. high pressure switches S4 and S7. Compressor contactor K1 and K2 is energized.

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

9 - N.O. contacts K10 close energizing condenser fan B4 and B21.

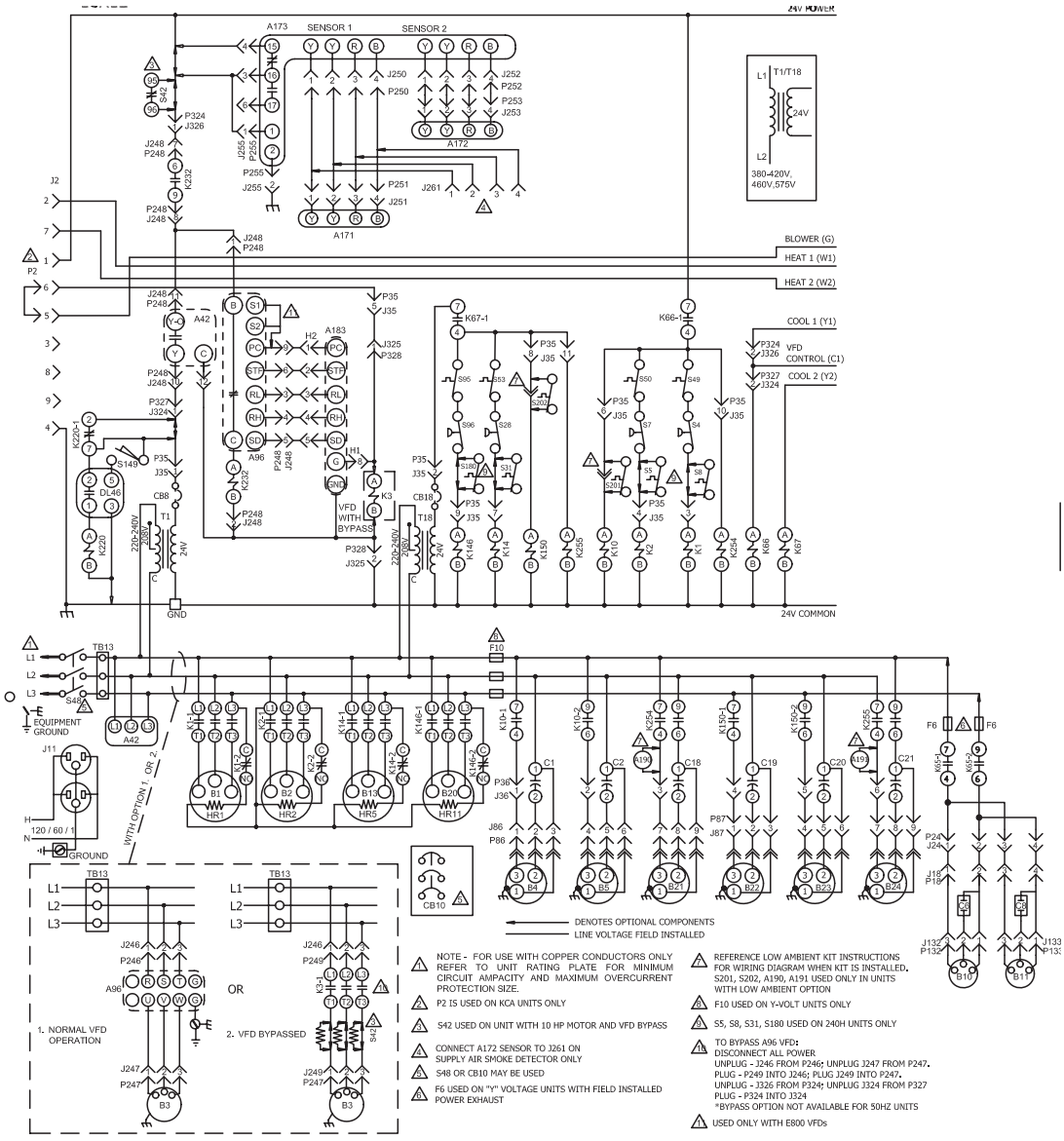
10 - \N.O. contacts K254 close energizing condenser fan B5 and B22.

2nd Stage Cooling (compressor B13 is energized)

11 - 24VAC is routed from T18 to N.C. freezestat S53 and N.C. high pressure switch S28. Compressor contactor K14 is energized.

12 - N.O. K14 closes energizing compressor B13.

KG/KC300S UNIT DIAGRM



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

P2 IS USED ON KCA UNITS ONLY

S42 USED ON UNIT WITH 10 HP MOTOR AND VFD BYPASS

CONNECT A172 SENSOR TO J261 ON SUPPLY AIR SMOKE DETECTOR ONLY

S48 OR CB10 MAY BE USED

F6 USED ON "Y" VOLTAGE UNITS WITH FIELD INSTALLED POWER EXHAUST

REFERENCE LOW AMBIENT KIT INSTRUCTIONS FOR WIRING DIAGRAM WHEN KIT IS INSTALLED. S201, S202, A190, A191 USED ONLY IN UNITS WITH LOW AMBIENT OPTION

F10 USED ON Y-VOLT UNITS ONLY

S5, S8, S31, S180 USED ON 240H UNITS ONLY

TO BYPASS A96 VFD:
DISCONNECT ALL POWER
UNPLUG - J246 FROM P246; UNPLUG J247 FROM P247.
PLUG - P249 INTO J246; PLUG J249 INTO P247.
UNPLUG - J326 FROM P324; UNPLUG J324 FROM P327
PLUG - P324 INTO J324
*BYPASS OPTION NOT AVAILABLE FOR 50HZ UNITS

USED ONLY WITH E800 VFDs

KEY	COMPONENT
A42	MONITOR, PHASE PROTECTION
A96	CONTROL INVERTER
A171	SENSOR ONE, SMOKE, RETURN AIR
A172	SENSOR TWO, SMOKE, SUPPLY AIR

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

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

DISCONNECT ALL POWER BEFORE SERVICING.

2022/09	WIRING DIAGRAM 538268-01	22/09
COOLING - MSAV		
KG/KC C-BOX - 300S - G, J, Y VOLT		
SECTION B		REV. 1
Supersedes	New Form No. 538268-01	

KG/KC300S UNIT DIAGRM KEY

J/P	JACK/PLUG DESCRIPTION
2	HEAT
18	EXHAUST FAN COMPT
24	EXHAUST FAN
35	RUN TEST
36	RUN TEST OUTDOOR FANS
86	OUTDOOR FANS 1,2,3
87	OUTDOOR FANS 4,5,6
132	EXHAUST FAN MOTOR 1
133	EXHAUST FAN MOTOR 2
246	POWER TO VFD
247	POWER VFD TO MOTOR
248	VFD CONTROL
249	CONTACTOR BYPASS
250	SMOKE DETECTOR ONE
251	SMOKE DETECTOR ONE
252	SMOKE DETECTOR TWO
253	SMOKE DETECTOR TWO
255	MODULE, CONTROL SMOKE DETECTION
261	SMOKE DETECTOR JUMPER
324	VFD OPTION CONNECTION
325	K3 BLOWER CONTROL
326	PHASE MONITOR/ VFD CONTROL ADD ON
327	PHASE MONITOR/ VFD CONTROL ADD ON
328	VFD BLOWER CONTROL

KEY	COMPONENT
A173	MODULE, CONTROL SMOKE DETECTION
A183	CONTROL, VFD BOARD
A190	PRESSURE CONTROLLER, COMP 2, LOW AMBIENT KIT
A191	PRESSURE CONTROLLER, COMP 4, LOW AMBIENT KIT
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
B13	COMPRESSOR 3
B20	COMPRESSOR 4
B21	MOTOR, OUTDOOR FAN 3
B22	MOTOR, OUTDOOR FAN 4
B23	MOTOR, OUTDOOR FAN 5
B24	MOTOR, OUTDOOR FAN 6
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
C19	CAPACITOR, OUTDOOR FAN 4
C20	CAPACITOR, OUTDOOR FAN 5
C21	CAPACITOR, OUTDOOR FAN 6
CB8	CIRCUIT, BREAKER T1
CB10	CIRCUIT, BREAKER MAIN DISCONNECT
CB18	CIRCUIT, BREAKER T18
DL46	DELAY, OVERFLOW SWITCH
F6	FUSE, EXHAUST FAN
H2	HEADER 2, LVC2 BOARD
HR1	HEATER, COMPRESSOR 1
HR2	HEATER, COMPRESSOR 2
HR5	HEATER, COMPRESSOR 3
HR11	HEATER, COMPRESSOR 4
J11	JACK, GFI, RECEPTICLE
K1,-1,2	CONTACTOR, COMPRESSOR 1
K2,-1,2	CONTACTOR, COMPRESSOR 2
K3,-1	CONTACTOR, BLOWER
K10,-1, 2	RELAY, OUTDOOR FANS 1, 2
K14,-1,2	CONTACTOR, COMPRESSOR 3
K65,-1,2	RELAY, EXHAUST FAN 1
K66,-1	RELAY, STAGE COOL 1
K67,-1	RELAY, STAGE COOL 2
K146,-1,2	CONTACTOR, COMPRESSOR 4
K150,-1,2	RELAY, OUTDOOR FANS 4, 5
K220, -1	RELAY, OVERFLOW SWITCH
K232	RELAY, INVERTER PROTECTION
K254	RELAY, LOW AMBIENT KIT FAN 3
K255	RELAY, LOW AMBIENT KIT FAN 6
S4	SWITCH, LIMIT HI PRESS COMP 1
S5	SWITCH, HIGH TEMP LIMIT COMP 1
S7	SWITCH, LIMIT HI PRESS COMP 2
S28	SWITCH, LIMIT HI PRESS COMP 3
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S48	SWITCH, DISCONNECT
S49	SWITCH, FREEZESTAT COMP 1
S50	SWITCH, FREEZESTAT COMP 2
S53	SWITCH, FREEZESTAT COMP 3
S95	SWITCH, FREEZESTAT COMP 4
S96	SWITCH, LIMIT HI PRESS COMP 4
S149	SWITCH, OVERFLOW
S180	SWITCH, HIGH TEMP LIMIT COMP 4
S201	SWITCH, LOW AMBIENT TEMP SENSOR 1
S202	SWITCH, LOW AMBIENT TEMP SENSOR 2
T1	TRANSFORMER, CONTROL
T18	TRANSFORMER, CONTACTOR CONTROL
TB13	TERMINAL STRIP, POWER DISTRIBUTION

KG/KC300S SEQUENCE OF OPERATION

Power:

1 - Line voltage from unit disconnect S48 or TB13, energizes transformer T1 and T18. T1 and T18 provide 24VAC to the unit cooling, heating and blower controls and TB1.

Blower Operation:

2 - Demand from thermostat terminal G energizes blower contactor K3 with 24VAC.

3 - N.O. K3 closes, energizing blower B3.

Optional Power Exhaust Operation:

4 - The economizer control module receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% outside air damper open (adjustable).

5 - N.O. K65-1 and N.O. K65-2 both close, energizing exhaust fan motors B10 and B11.

1st Stage Cooling (compressor B1 and B2)

6 - Y1 energizes the pilot relay K66 and N.O. K66-1 closes.

7 - 24VAC is routed from T1 to N.C. freezestats S49 and S50 and N.C. high pressure switches S4 and S7. Compressor contactor K1 and K2 is energized.

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

9 - N.O. contacts K10 close energizing condenser fans B4 and B5.

10 - N.O. contacts K254 close energizing condenser fan B21.

2nd Stage Cooling (compressor B13 is energized)

11 - Y2 energizes the pilot relay K67 and N.O. K67-1 closes.

12 - 24VAC is routed from T18 to N.C. freezestat S53, S95 and N.C. high pressure switch S28 and S96. Compressor contactors K14 and K146 are energized.

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

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

15 - N.O. contacts K150 close energizing condenser fan B22 and B23.

16 - N.O. contacts K255 close energizing condenser fan B24.

MSAV BLOWER OPERATION

Cooling and heating operate the same as non-MSAV units except for blower operation.

During ventilation, the blower speed is determined by the low/high switch on the A183 VFD control board.

During heating, the blower operates on high speed. See table 29 for blower speed during cooling.

TABLE 29

Diagram Reference No.	Diagram Reference No.	Thermostat Demand	A183 Terminals Energized	Blower Speed
1	Not Suitable (or no economizer)	Y1	Y1 and C1*	Low
2	Suitable	Y1	Y1	High
3	Not Suitable (or no economizer)	Y1 and Y2	Y1, C1* and Y2	High
4	Suitable	Y1 and Y2	Y1, C1* and Y2	High

*C1 is energized via A6 enthalpy control.

Y1 thermostat demand, outdoor air NOT suitable for free cooling (or no economizer):

1 - 24v is routed to A183 VFD control board Y1 and C1 (via A6-2) terminals. A183 operates the blower in low speed.

Y1 thermostat demand, outdoor air SUITABLE for free cooling:

2 - 24v is routed to A183 VFD control board Y1 terminal. A183 operates the blower in high speed.

Y1 and Y2 thermostat demand, outdoor air NOT suitable for free cooling (or no economizer)

3 - 24v is routed to A183 VFD control board Y1, Y2 and C1 (via A6-2) terminals. A183 operates the blower in high speed.

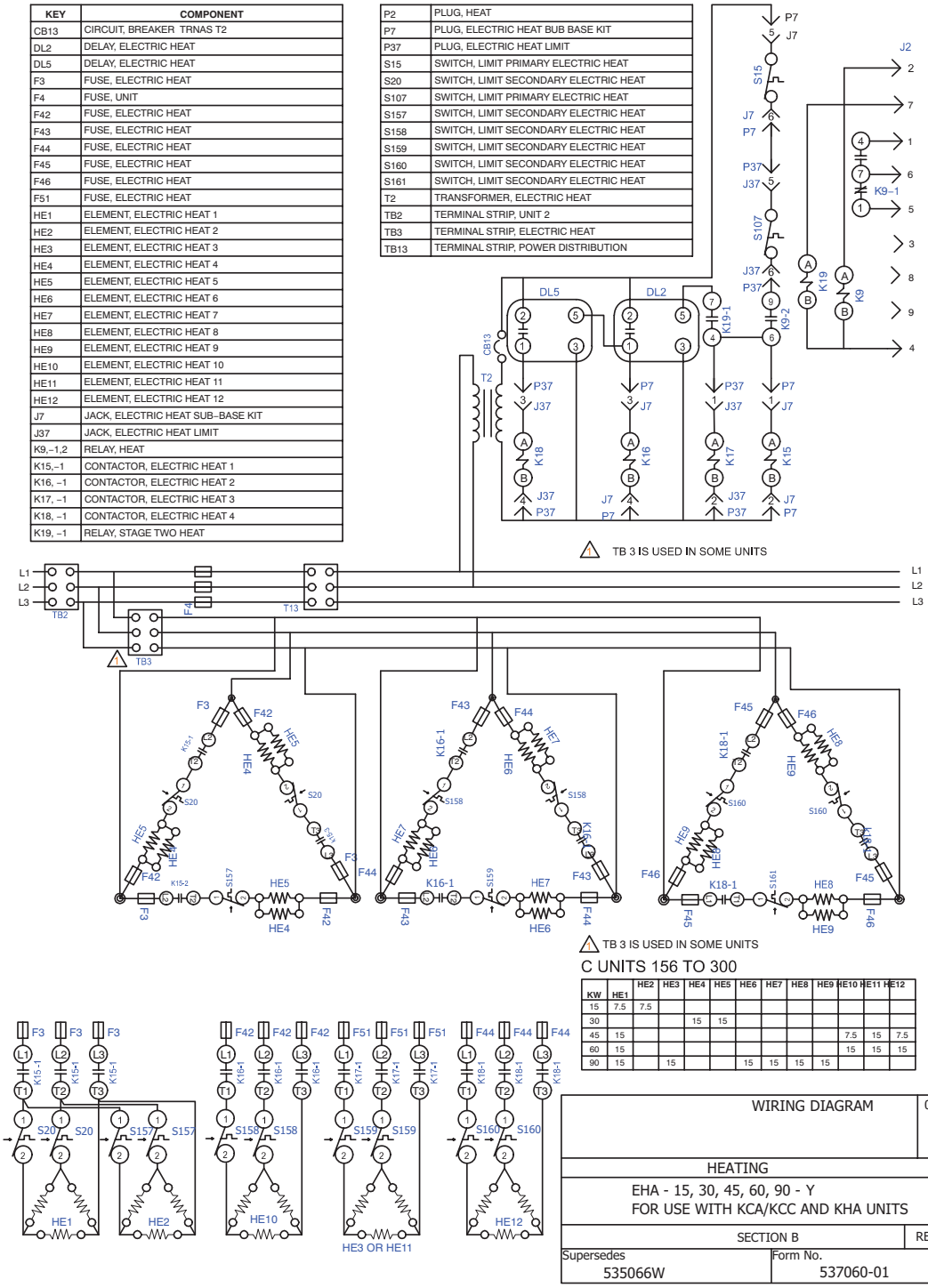
Y1 and Y2 thermostat demand, outdoor air SUITABLE for free cooling:

4 - 24v is routed to A183 VFD control board Y1, Y2 and C1 (via A6-3) terminals. A183 operates the blower in high speed.

EHA-15, 30, 45, 60, 90kW Y VOLTAGE

KEY	COMPONENT
CB13	CIRCUIT, BREAKER TRNAS T2
DL2	DELAY, ELECTRIC HEAT
DL5	DELAY, ELECTRIC HEAT
F3	FUSE, ELECTRIC HEAT
F4	FUSE, UNIT
F42	FUSE, ELECTRIC HEAT
F43	FUSE, ELECTRIC HEAT
F44	FUSE, ELECTRIC HEAT
F45	FUSE, ELECTRIC HEAT
F46	FUSE, ELECTRIC HEAT
F51	FUSE, ELECTRIC HEAT
HE1	ELEMENT, ELECTRIC HEAT 1
HE2	ELEMENT, ELECTRIC HEAT 2
HE3	ELEMENT, ELECTRIC HEAT 3
HE4	ELEMENT, ELECTRIC HEAT 4
HE5	ELEMENT, ELECTRIC HEAT 5
HE6	ELEMENT, ELECTRIC HEAT 6
HE7	ELEMENT, ELECTRIC HEAT 7
HE8	ELEMENT, ELECTRIC HEAT 8
HE9	ELEMENT, ELECTRIC HEAT 9
HE10	ELEMENT, ELECTRIC HEAT 10
HE11	ELEMENT, ELECTRIC HEAT 11
HE12	ELEMENT, ELECTRIC HEAT 12
J7	JACK, ELECTRIC HEAT SUB–BASE KIT
J37	JACK, ELECTRIC HEAT LIMIT
K9,–1,2	RELAY, HEAT
K15,–1	CONTACTOR, ELECTRIC HEAT 1
K16, –1	CONTACTOR, ELECTRIC HEAT 2
K17, –1	CONTACTOR, ELECTRIC HEAT 3
K18, –1	CONTACTOR, ELECTRIC HEAT 4
K19, –1	RELAY, STAGE TWO HEAT

P2	PLUG, HEAT
P7	PLUG, ELECTRIC HEAT BUB BASE KIT
P37	PLUG, ELECTRIC HEAT LIMIT
S15	SWITCH, LIMIT PRIMARY ELECTRIC HEAT
S20	SWITCH, LIMIT SECONDARY ELECTRIC HEAT
S107	SWITCH, LIMIT PRIMARY ELECTRIC HEAT
S157	SWITCH, LIMIT SECONDARY ELECTRIC HEAT
S158	SWITCH, LIMIT SECONDARY ELECTRIC HEAT
S159	SWITCH, LIMIT SECONDARY ELECTRIC HEAT
S160	SWITCH, LIMIT SECONDARY ELECTRIC HEAT
S161	SWITCH, LIMIT SECONDARY ELECTRIC HEAT
T2	TRANSFORMER, ELECTRIC HEAT
TB2	TERMINAL STRIP, UNIT 2
TB3	TERMINAL STRIP, ELECTRIC HEAT
TB13	TERMINAL STRIP, POWER DISTRIBUTION



KW	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11	HE12
15	7.5	7.5										
30				15	15							
45	15									7.5	15	7.5
60	15									15	15	15
90	15		15			15	15	15	15			

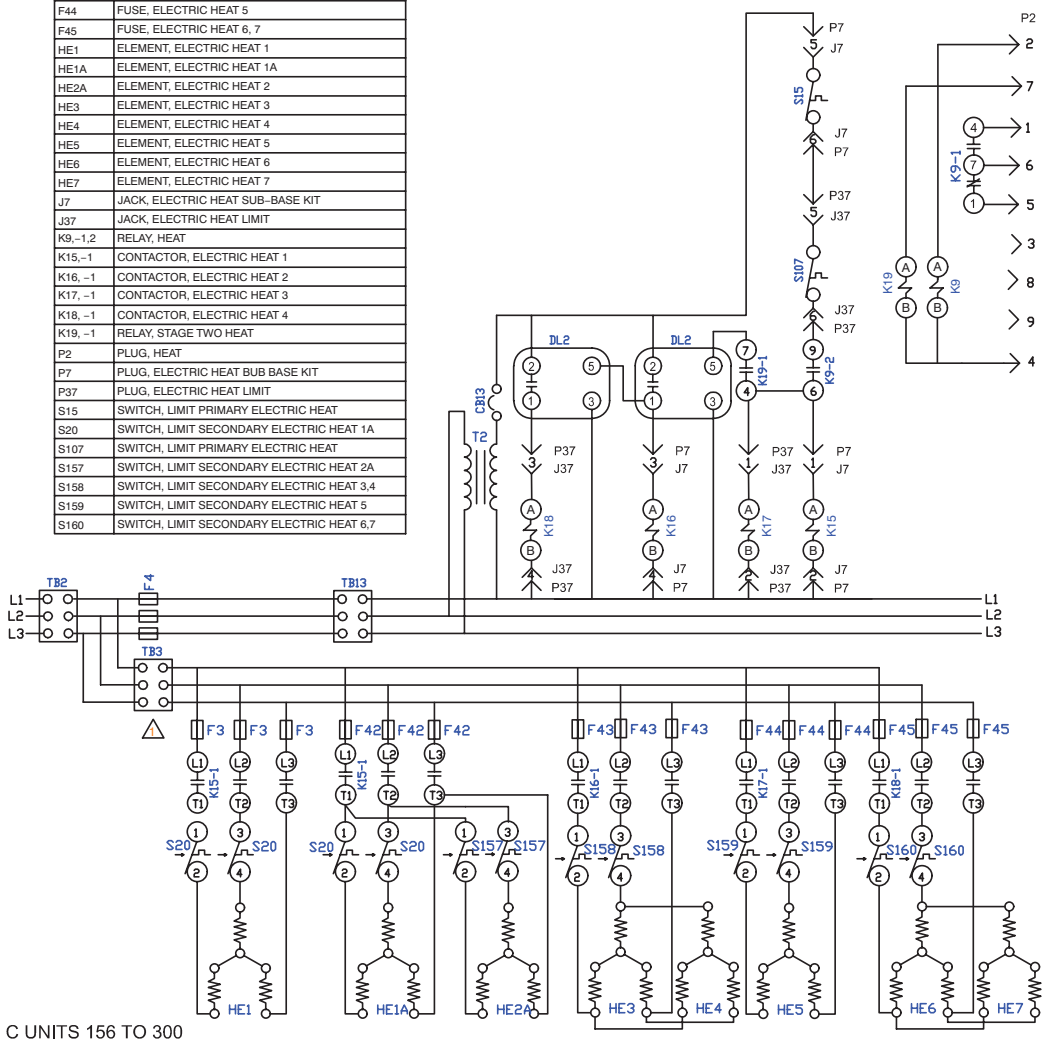
WIRING DIAGRAM	02/18
HEATING	
EHA - 15, 30, 45, 60, 90 - Y FOR USE WITH KCA/KCC AND KHA UNITS	
SECTION B	REV. 3
Supersedes: 535066W	Form No.: 537060-01

EHA-15, 30, 45, 60, 90kW - G, J, M VOLTAGE

KEY	COMPONENT
CB13	CIRCUIT, BREAKER TRNAS T2
DL2	DELAY, ELECTRIC HEAT
DL5	DELAY, ELECTRIC HEAT
F3	FUSE, ELECTRIC HEAT 1, 1A, 2A
F4	FUSE, UNIT
F43	FUSE, ELECTRIC HEAT 3, 4
F44	FUSE, ELECTRIC HEAT 5
F45	FUSE, ELECTRIC HEAT 6, 7
HE1	ELEMENT, ELECTRIC HEAT 1
HE1A	ELEMENT, ELECTRIC HEAT 1A
HE2A	ELEMENT, ELECTRIC HEAT 2
HE3	ELEMENT, ELECTRIC HEAT 3
HE4	ELEMENT, ELECTRIC HEAT 4
HE5	ELEMENT, ELECTRIC HEAT 5
HE6	ELEMENT, ELECTRIC HEAT 6
HE7	ELEMENT, ELECTRIC HEAT 7
J7	JACK, ELECTRIC HEAT SUB-BASE KIT
J37	JACK, ELECTRIC HEAT LIMIT
K9,-1,2	RELAY, HEAT
K15,-1	CONTACTOR, ELECTRIC HEAT 1
K16, -1	CONTACTOR, ELECTRIC HEAT 2
K17, -1	CONTACTOR, ELECTRIC HEAT 3
K18, -1	CONTACTOR, ELECTRIC HEAT 4
K19, -1	RELAY, STAGE TWO HEAT
P2	PLUG, HEAT
P7	PLUG, ELECTRIC HEAT BUB BASE KIT
P37	PLUG, ELECTRIC HEAT LIMIT
S15	SWITCH, LIMIT PRIMARY ELECTRIC HEAT
S20	SWITCH, LIMIT SECONDARY ELECTRIC HEAT 1A
S107	SWITCH, LIMIT PRIMARY ELECTRIC HEAT
S157	SWITCH, LIMIT SECONDARY ELECTRIC HEAT 2A
S158	SWITCH, LIMIT SECONDARY ELECTRIC HEAT 3,4
S159	SWITCH, LIMIT SECONDARY ELECTRIC HEAT 5
S160	SWITCH, LIMIT SECONDARY ELECTRIC HEAT 6,7

T2	TRANSFORMER, ELECTRIC HEAT
TB 2	TERMINAL STRIP, UNIT 2
TB 3	TERMINAL STRIP, ELECTRIC HEAT
TB15	TERMINAL STRIP, UNIT 2

⚠ TB3 IS USED IN SOME UNITS



C UNITS 156 TO 300

KW	HE1	HE1A	HE2A	HE3	HE4	HE5	HE6	HE7
15		7.5	7.5					
30		15	15					
45	15			7.5		15	7.5	
60	15			15		15	15	
90	15			15	15	15	15	15

WIRING DIAGRAM	02/18
HEATING	
EHA - 15,30,45,60,90 - G,J FOR USE WITH KCA/KCC AND KHA UNITS	
SECTION B	REV. 1
Supersedes	New Form No. 537059-02

NOTE - *This sequence of operation is for all Electric Heat kW ratings Y, G, J and M voltages.*

HEATING ELEMENTS:

1 - Terminal Strip TB2 supplies power to TB3. TB3 supplies line voltage to electric heat elements HE1 through HE14. Each element is protected by fuse F3.

FIRST STAGE HEAT:

Heating demand initiates at W1 in thermostat.

1 - TB1 receives W1 demand and energizes relay K9. N.O. K9-1 closes which allows 24VAC from TB1 to energize blower contactor K3.

2 - 24VAC is routed from T2, proving N.C. primary limits S15 (first heat section) and S107 (second heat section). Voltage then energizes contactors K15 and K17.

3 - N.O. contact K15-1 closes allowing the first bank of elements to be energized. N.O. K17-1 closes allowing the second bank of elements to be energized.

SECOND STAGE HEAT:

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

4 - Relay K19 is energized. N.O. contacts K19-1 close energizing timer DL2.

5 - After a 30 second delay, DL2 closes energizing contactor K16 and timer DL5.

6 - N.O. contacts K16-1 close allowing the third bank of elements to be energized.

7 - After a 30 second delay, DL5 closes energizing contactor K18. K18-1 closes allowing the fourth bank of elements to be energized.

END OF SECOND STAGE HEAT:

8 - Electric heat contactors K16 and K18 are de-energized.

9 - 9The fourth and third set of elements are de-energized.

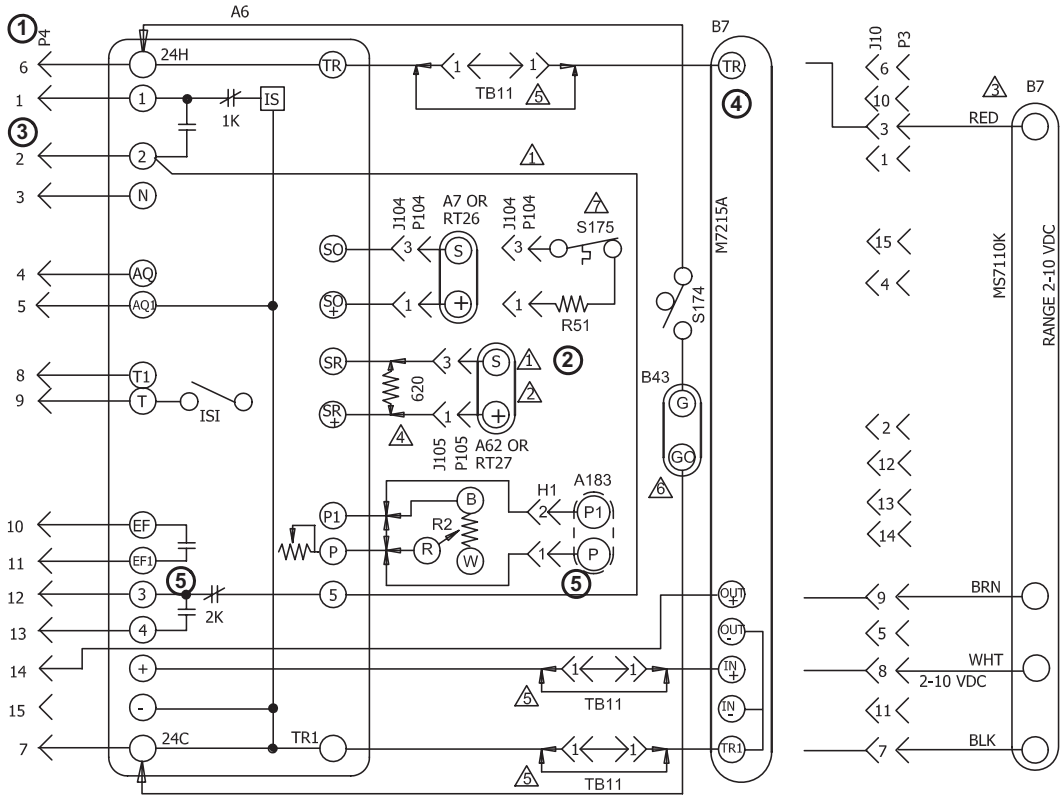
END OF FIRST STAGE HEAT:

Heating demand is satisfied. Terminal W1 in the thermostat is de-energized.

10 - Electric heat contactors K15 and K17 are de-energized.

11 - The second and first set of electric heat elements are de-energized.

ECONOMIZER



KEY	COMPONENT
A6	CONTROL-SOLID STATE ENTHALPY
A7	SENSOR-SOLID STATE ENTHALPY
A62	SENSOR-ENTHALPY, INDOOR
A183	CONTROL, VFD BOARD
B7	MOTOR-DAMPER, ECONOMIZER
B43	MOTOR-EXHAUST DAMPER
H1	HEADER 1 ON LANDMARK VFD BOARD
J10	JACK-ECONOMIZER
J104	JACK-SENSOR,OUTDOOR ENTHALPY
J105	JACK-SENSOR,RETURN AIR ENTHALPY
P3	PLUG-LESS ECONOMIZER
P4	PLUG-ECONOMIZER
P104	PLUG-SENSOR,OUTDOOR ENTHALPY
P105	PLUG-SENSOR,RETURN AIR ENTHALPY
R2	POT-MINIMUM POSITION
R51	RESISTOR-SENSIBLE 820 OHM
RT26	SENSOR-OUTDOOR AIR TEMP
RT27	SENSOR-INDOOR AIR TEMP
S175	THERMOSTAT-SENSIBLE TEMP 55-70F
S174	SWITCH-EXHAUST DAMPER
TB11	TERMINAL STRIP-CLASS II VOLT

⚠1 RT26 AND RT27, TEMPERATURE SENSORS MAY BE USED INSTEAD OF A7 AND A62 ENTHALPY SENSORS

⚠2 A62 ENTHALPY SENSOR OR RT27 USED FOR DIFFERENTIAL SENSING

⚠3 USED ON C BOX UNITS

⚠4 REPLACE A7 OR RT26 WITH 620 OHM RESISTOR FOR CONTROLS WITH GLOBAL ECON

⚠5 TB11 USED ON "C" BOX ONLY WITH MOTOR M7215A

⚠6 OPTIONAL EXHAUST DAMPER TO HOLD EXHAUST DAMPER CLOSED WHEN OUTSIDE AIR DAMPER IS CLOSED

⚠7 OPTIONAL OUTDOOR THERMOSTAT TO REPLACE RT26 SENSIBLE SENSOR

DESIGNATES OPTIONAL WIRING

CLASS II FIELD WIRING

LANDMARK WIRING DIAGRAM	11/11
ACCESSORIES	
ECONOMIZER	
SECTION D	REV 0
Supersedes	New Form No. 537080-02

SEQUENCE OF OPERATION

POWER:

1- Economizer control module A6 is energized through P4-6.

OPERATION:

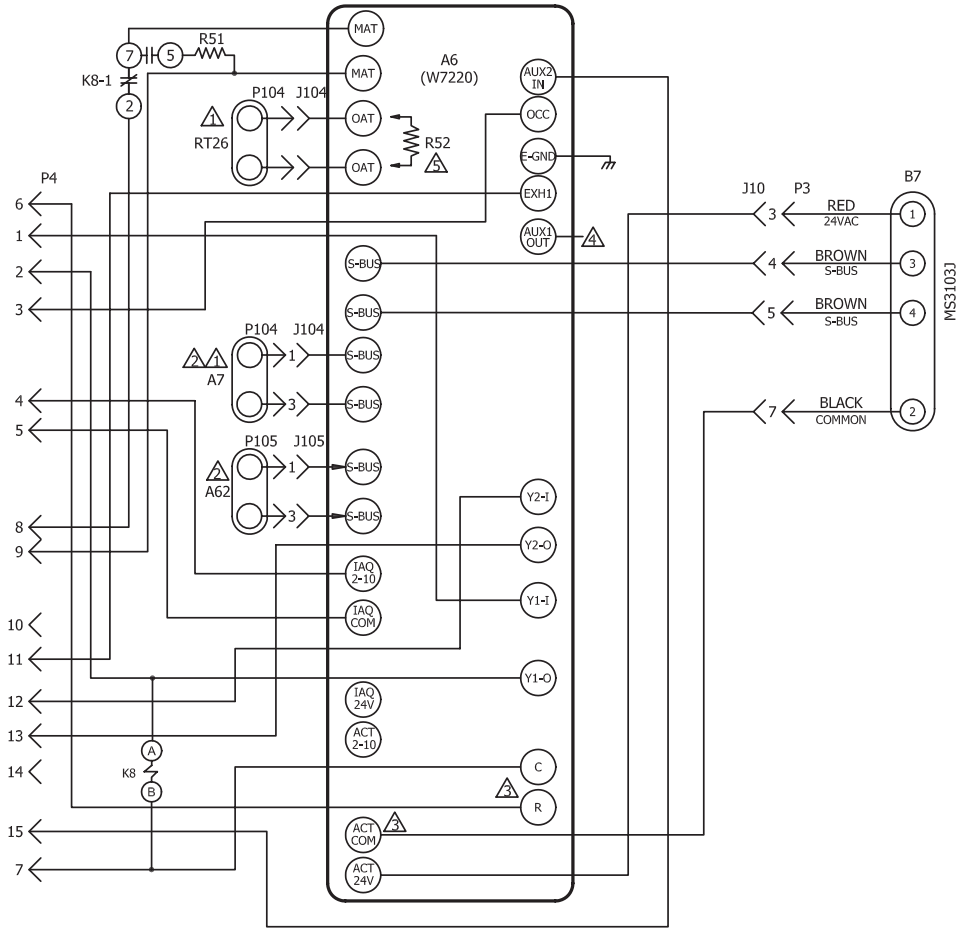
2- Temperature sensor S175 or enthalpy sensor A7 and A62 (if differential enthalpy is used) communicates to the economizer control module A6 when outdoor air is suitable for free cooling.

3. A6 energizes the economizer.

4. Economizer control module A6 supplies B7 with 0 - 10 VDC to control the positioning of economizer.

5. The damper actuator provides 2 to 10 VDC position feedback.

JADE CONTROL ECONOMIZER



KEY	COMPONENT
A6	CONTROL - ECONOMIZER
A7	SENSOR - OUTDOOR ENTHALPY
A62	SENSOR - INDOOR ENTHALPY
B7	MOTOR - DAMPER, ECONOMIZER
J10	JACK - ECONOMIZER MOTOR
J104	JACK - SENSOR OUTDOOR
J105	JACK - SENSOR RETURN AIR
K8	TRANSFER RELAY
P3	PLUG - ECONOMIZER MOTOR
P4	PLUG - ECONOMIZER
P104	PLUG - SENSOR OUTDOOR
P105	PLUG - SENSOR RETURN AIR
RT26	SENSOR - OUTDOOR AIR TEMP
R51	RESISTOR, MAT BYPASS
R52	RESISTOR, OAT BYPASS

DESIGNATES OPTIONAL WIRING

CLASS II FIELD WIRING

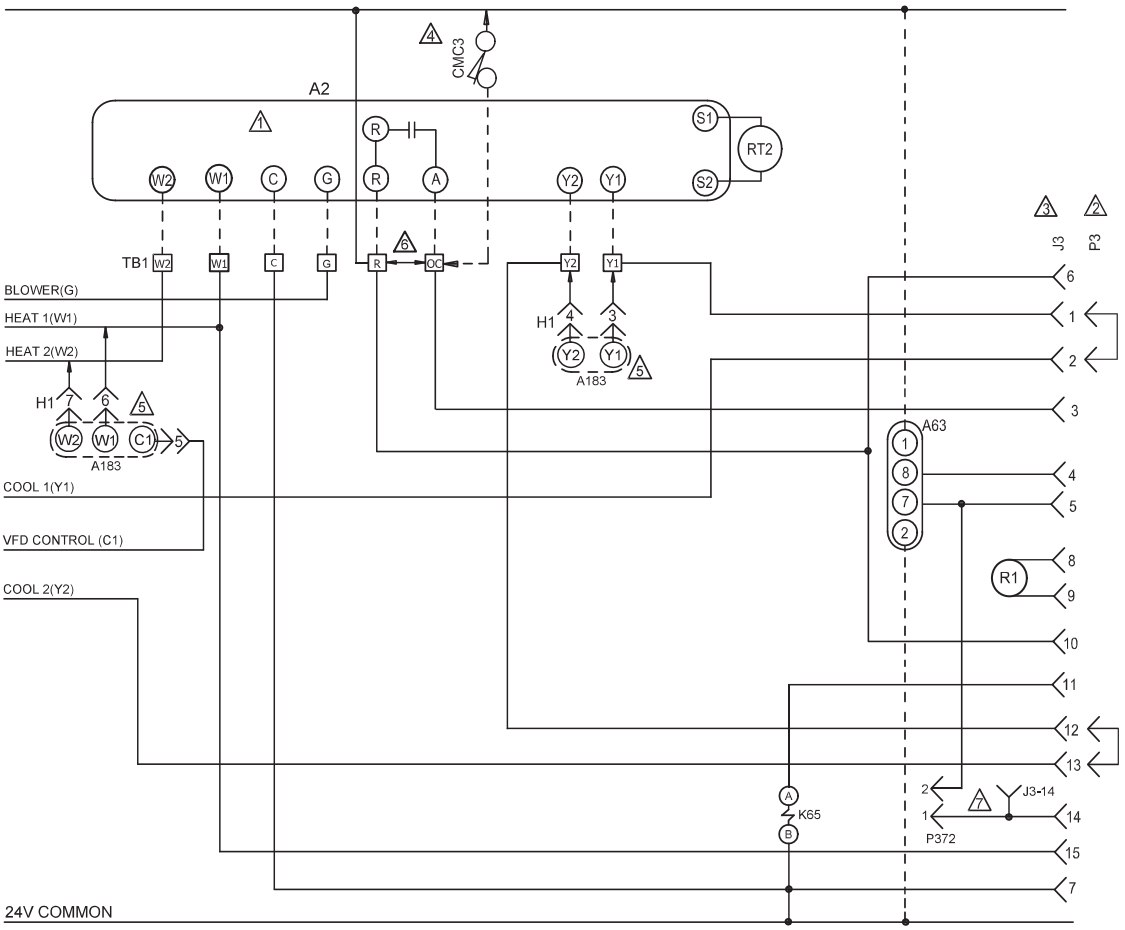
1. OUTDOOR AIR TEMP SENSOR RT26 OR OUTDOOR AIR ENTHALPY SENSOR A7 MAY BE USED
2. FOR DIFFERENTIAL ENTHALPY SENSING USE OUTDOOR ENTHALPY SENSOR A7 AND INDOOR ENTHALPY SENSOR A62
3. REFER ALSO TO MAIN UNIT WIRING DIAGRAM SECTION C
4. PROGRAMMABLE, USE FOR EXHAUST FAN 2 OUTPUT OR ERV OR SYSTEM ALARM OUTPUT
5. R52 USED WITH NOVAR 2024 OR 2051 DDC CONTROLS.

10/13	WIRING DIAGRAM 537636-01	10/13
ACCESSORIES		
JADE CONTROL ECONOMIZER (B & C-BOX)		
SECTION B		REV 0
Supersedes	New Form No. 537636-01	

OPERATION:

When the outdoor air is suitable and a thermostat demand calls for 1st. stage cooling (Y1), the economizer will modulate the dampers between the minimum and fully open positions to maintain a 55°F (12.8°C) mixed air temperature. When there is an increased thermostat demand for second stage cooling (Y2), the economizer damper opens 100% and the economizer controller (A6) will bring on the compressor. At that point, K8 relay will switch from the R1 mixed air sensor to R51 resistor allowing the economizer

ELECTROMECHANICAL OR ELECTRONIC THERMOSTAT
(No Reheat)



KEY	COMPONENT
A2	SENSOR, THERMOSTAT
A63	SENSOR, CO2
A183	CONTROL, VFD BOARD
CMC3	CLOCK, TIME
H1	HEADER 1 ON VFD BOARD
J3	JACK, UNIT ECONOMIZER
K65	RELAY, EXHAUST FAN
P3	PLUG, LESS ECONOMIZER
P372	PLUG, BACNET/JADE ALARM
R1	SENSOR, MIXED/SUPPLY AIR
RT2	SENSOR, REMOTE THERMOSTAT
TB1	TERMINAL STRIP, THERMOSTAT

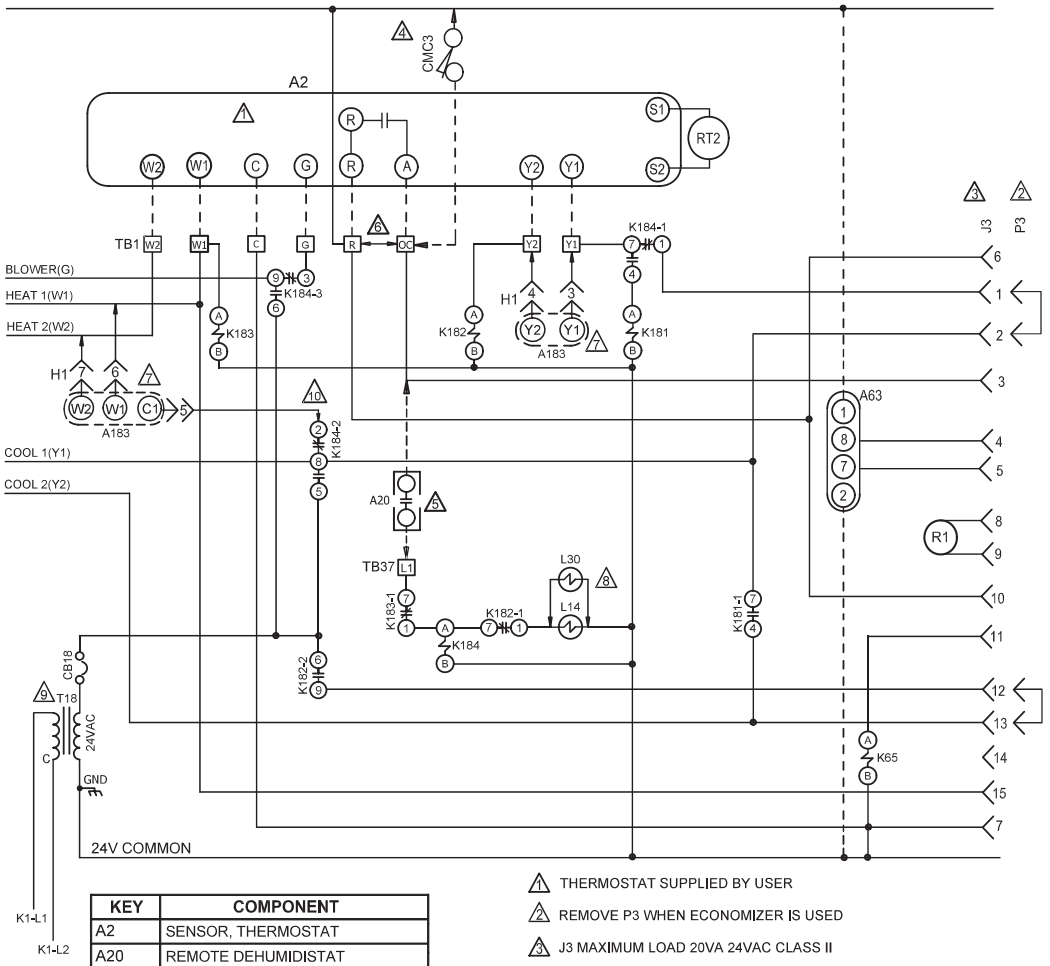
— — — CLASS II FIELD WIRING

◄——► DESIGNATES OPTIONAL WIRING

1. THERMOSTAT SUPPLIED BY USER
2. REMOVE P3 WHEN ECONOMIZER IS USED
3. J3 MAXIMUM LOAD 20VA 24VAC CLASS II
4. TIME CLOCK CONTACTS (OPTIONAL) CLOSED OCCUPIED
5. A183 IS USED ON UNITS WITH VFD ONLY
6. REMOVE JUMPER BETWEEN TB1-R AND TB1-OC WHEN USING A NITE SETBACK THERMOSTAT
7. P372 USED FOR ALARM FEEDBACK SIGNAL FOR UNITS EQUIPPED WITH JADE ECONOMIZER CONTROL AND BACNET, TITLE 24 APPLICATION

2018/07	WIRINGDIAGRAM	18/07
	537641-02	
CONTROL		
ELECTRONIC/ELECTROMECHANICAL THERMOSTAT		
SECTION C		REV 0
Supersedes 537641-01, 537642-01	Form No. 537641-02	

ELECTROMECHANICAL OR ELECTRONIC THERMOSTAT
(With Reheat)



KEY	COMPONENT
A2	SENSOR, THERMOSTAT
A20	REMOTE DEHUMIDISTAT
A63	SENSOR, CO2
A183	CONTROL, VFD BOARD
CB18	CIRCUIT BREAKER, T18
CMC3	CLOCK, TIME
J3	JACK, UNIT ECONOMIZER
K65	RELAY, EXHAUST FAN
K181,-2	RELAY, Y1
K182,-2	RELAY, Y2
K183,-2	RELAY, W1
K184,-3	RELAY, DEHUMIDIFICATION
L14	VALVE, REHEAT COMP 1
L30	VALVE, REHEAT COMP 2
P3	PLUG, LESS ECONOMIZER
R1	SENSOR, MIXED/SUPPLY AIR
RT2	SENSOR, REMOTE THERMOSTAT
T18	TRANSFORMER, REHEAT
TB1	TERMINAL STRIP, THERMOSTAT
TB37	TERMINAL STRIP, REHEAT

1. THERMOSTAT SUPPLIED BY USER
2. REMOVE P3 WHEN ECONOMIZER IS USED
3. J3 MAXIMUM LOAD 20VA 24VAC CLASS II
4. TIME CLOCK CONTACTS (OPTIONAL) CLOSED OCCUPIED
5. REMOTE DEHUMIDISTAT CONTACTS CLOSED WHEN HUMIDITY IS ABOVE SET POINT
6. REMOVE JUMPER BETWEEN TB1-R AND TB1-OC WHEN USING A NITE SETBACK THERMOSTAT
7. A183 IS USED ON UNITS WITH VFD ONLY
8. L30 IS USED ON 180S-300S UNITS ONLY
9. SEE B SECTION DIAGRAM FOR VOLTAGE SPECIFIC WIRING
10. FOR 092-150S UNITS WITH VFD ONLY, UNPLUG C1/K184-2 FROM C1-M AND CONNECT C1/K184-2 TO TERMINAL 2 ON K184 RELAY

DESIGNATES OPTIONAL WIRING

CLASS II FIELD WIRING

2018/07	WIRING DIAGRAM 538001-01	18/07
CONTROL		
ELECTRONIC/ELECTROMECHANICAL THERMOSTAT WITH REHEAT		
SECTION C		REV 0
Supersedes	Form No. 538001-01	