

KCA180 through 300S

KCA180, 210, 240 and 300 units are available in 176,000 to 270,000 Btuh (51.7 to 79.1kW) standard efficiency cooling capacities. The 180 utilizes two compressors, while the 210, 240 and 300 utilize three 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 180 units and 15kW to 90kW heat sections are available for the 210, 240 and 300.

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.



240/300 SHOWN

⚠ IMPORTANT

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

⚠ WARNING



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.

ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures

⚠ CAUTION

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

⚠ CAUTION

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

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OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	180	210	240	300
COOLING SYSTEM						
Condensate Drain Trap	PVC - LTACDKP09/36	76M18	X	X	X	X
	Copper - LTACDKC09/36	76M19	X	X	X	X
Corrosion Protection		Factory	O	O	O	O
Drain Pan Overflow Switch	K1SNSR71C-1-	68W89	X	X	X	X
Efficiency		Standard	O	O	O	O
Low Ambient Kit	K1SNSR33C-1	55W72	X	X	X	X
Refrigerant Type		R-410A	O	O	O	O
BLOWER - SUPPLY AIR						
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
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
CABINET						
Coil Guards	C1GARD20C11	54W79	X	X		
	C1GARD20C31	54W80			X	X
Hail Guards	C1GARD10C11	54W83	X	X		
	C1GARD10C31	54W84			X	X
CONTROLS						
Commercial Controls	L Connection® Building Automation System	- - -	X	X	X	X
Smoke Detector - Supply or Return (Power board and one sensor)	C1SNSR44C-1	53W82	X	X	X	X
Smoke Detector - Supply and Return (Power board and two sensors)	C1SNSR43C-1	53W83	X	X	X	X
INDOOR AIR QUALITY						
Air Filters						
Healthy Climate® High Efficiency Air Filters 24 x 24 x 2 (Order 6 per unit)	MERV 8 - C1FLTR15C-1-	54W67	X	X	X	X
	MERV 13 - C1FLTR40C-1-	52W40	X	X	X	X
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)	C1FLTR30C-1-	44N61	X	X	X	X
Indoor Air Quality (CO₂) Sensors						
Sensor - Wall-mount, off-white plastic cover with LCD display	C0SNSR50AE1L	77N39	X	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display	C0SNSR52AE1L	87N53	X	X	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting	C0SNSR51AE1L	87N52	X	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting	C0MISC19AE1	87N54	X	X	X	X
CO ₂ Sensor Duct Mounting Kit - for downflow applications	C0MISC19AE1-	85L43	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO ₂ sensors (87N53 or 77N39)	C0MISC16AE1-	90N43	X	X	X	X
UVC Germicidal Light Kit						
¹ Healthy Climate® UVC Light Kit (110/230v-1ph)	C1UVCL10C-1	54W65	X	X	X	X

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

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

OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	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 - C1DISC080C-1	54W85	OX	OX	OX	OX
	150 amp - C1DISC150C-1	54W86	OX	OX	OX	OX
	250 amp - C1DISC250C-1	54W87	OX	OX	OX	OX
GFI Service Outlets	Field wired - LTAGFIK10/15	74M70	OX	OX	OX	OX
ELECTRIC HEAT						
15 kW	208/230V-3ph - C1EH0150C-1Y	53W84	X	X	X	X
	460V-3ph - C1EH0150C-1G	53W86	X	X	X	X
	575V-3ph - C1EH0150C-1J	53W87	X	X	X	X
30 kW	208/230V-3ph - C1EH0300C21Y	53W92	X	X	X	X
	460V-3ph - C1EH0300C21G	53W94	X	X	X	X
	575V-3ph - C1EH0300C21J	53W95	X	X	X	X
45 kW	208/230V-3ph - C1EH0450C21Y	54W00	X	X	X	X
	460V-3ph - C1EH0450C21G	54W02	X	X	X	X
	575V-3ph - C1EH0450C21J	54W03	X	X	X	X
60 kW	208/230V-3ph - C1EH0600C21Y	54W08	X	X	X	X
	460V-3ph - C1EH0600C21G	54W10	X	X	X	X
	575V-3ph - C1EH0600C21J	54W11	X	X	X	X
90 kW	208/230V-3ph - C1EH0900C-1Y	54W12		X	X	X
	460V-3ph - C1EH0900C-1G	54W14		X	X	X
	575V-3ph - C1EH0900C-1J	54W15		X	X	X
ECONOMIZER						
Economizer						
Economizer - Downflow or Horizontal (Outdoor Air Hood furnished)	K1ECON20C-1	54W77	OX	OX	OX	OX
Economizer Controls						
Differential Enthalpy	Order 2 - C1SNSR64FF1	53W64	X	X	X	X
Single Enthalpy	C1SNSR64FF1	53W64	OX	OX	OX	OX
Downflow Barometric Relief Dampers						
Barometric Relief Dampers with Exhaust Hood	C1DAMP50C	54W78	OX	OX	OX	OX
Horizontal Barometric Relief Dampers						
Barometric Relief Dampers with ExhaustHood	LAGEDH18/24	16K99	X	X	X	X

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

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OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	180	210	240	300
OUTDOOR AIR						
Outdoor Air Dampers						
Motorized Dampers with Outdoor Air Hood	K1DAMP20C-1	58W62	OX	OX	OX	OX
Manual Dampers With Outdoor Air Hood	C1DAMP10C-1	54W76	OX	OX	OX	OX
POWER EXHAUST						
Standard Static	208/230V - C1PWRE10C-1Y	54W70	X	X	X	X
	460V - C1PWRE10C-1G	54W71	X	X	X	X
	575V - C1PWRE10C-1J	54W72	X	X	X	X
ROOF CURBS - DOWNFLOW						
Clip Curb						
8 in. height	C1CURB40CD1	26W32	X	X	X	X
14 in. height	LARMF18/30S-14	33K44	X	X	X	X
18 in. height	LARMF18/30S-18	33K45	X	X	X	X
24 in. height	LARMF18/30S-24	33K46	X	X	X	X
Standard						
14 in. height	LARMF18/36-14	16K87	X	X	X	X
24 in. height	LARMF18/36-24	16K88	X	X	X	X
Adjustable Pitched Curb						
14 in. height	L1CURB55C	43W26	X	X	X	X
ROOF CURBS - HORIZONTAL (REQUIRES HORIZONTAL RETURN AIR PANEL KIT)						
Standard						
26 in. height - slab applications	LARMFH18/24-26	97J33	X	X	X	
37 in. height - rooftop applications	LARMFH18/24-37	38K53	X	X	X	
30 in. height - slab applications	LARMFH30/36-30	33K79				X
41 in. height - rooftop applications	LARMFH30/36-41	38K54				X
Insulation Kit For Standard Horizontal Curbs						
for LARMFH18/24-26	C1INSU11C-1-	73K32	X	X	X	
for LARMFH18/24-37	C1INSU13C-1-	73K34	X	X	X	
for LARMFH30/36-30	C1INSU12C-1-	73K33				X
for LARMFH30/36-41	C1INSU14C-1-	73K35				X
Horizontal Return Air Panel Kit						
Required for Horizontal Applications with Roof Curb	C1HRAP10C-1-	87M00	X	X	X	X
CEILING DIFFUSERS						
Step-Down - Order one	RTD11-185	29G06	X			
	RTD11-275-R	29G07		X	X	X
	RTD11-150/180S (Canada only)	13K63	X			
	RTD11-275S (Canada only)	13K64		X	X	X
Flush - Order one	FD11-185	29G10	X			
	FD11-275-R	29G11		X	X	X
	FD11-150/180S (Canada only)	13K58	X			
	FD11-275S (Canada only)	13K59		X	X	X
Transitions (Supply and Return) - Order one	LASRT18	19K01	X			
	LASRT21/24	19K02		X	X	X
	LASRT18S (Canada only)	33K48	X			
	LASRT21/24S (Canada only)	33K49		X	X	X

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

General Data		Nominal Tonnage	15 Ton	17.5 Ton	20 Ton	25 Ton
		Model Number	KCA180S4B	KCA210S4B	KCA240S4B	KCA300S4B
		Efficiency Type	Standard	Standard	Standard	Standard
		Blower Type	Constant Air Volume CAV	Constant Air Volume CAV	Constant Air Volume CAV	Constant Air Volume CAV
Cooling Performance	Gross Cooling Capacity - Btuh		182,000	204,000	238,000	282,000
	¹ Net Cooling Capacity - Btuh		176,000	198,000	228,000	270,000
	AHRI Rated Air Flow - cfm		6000	6125	7700	8750
	Total Unit Power - kW		16.0	18.0	20.8	26.9
	¹ EER (Btuh/Watt)		11.0	11.0	11.0	10.0
	² IEER (Btuh/Watt)		11.2	11.2	11.2	10.1
	Refrigerant Type		R-410A	R-410A	R-410A	R-410A
	Refrigerant Charge Furnished	Circuit 1 Circuit 2 Circuit 3	14 lbs. 0 oz. 14 lbs. 0 oz. N/A	10 lbs. 8 oz. 10 lbs. 8 oz. 10 lbs. 8 oz.	14 lbs. 0 oz. 14 lbs. 0 oz. 14 lbs. 0 oz.	14 lbs. 8 oz. 14 lbs. 8 oz. 14 lbs. 8 oz.
Electric Heat Available, see page 3			15-30-45-60 kW	15-30-45-60-90 kW		
Compressor Type (number)			Scroll (2)	Scroll (3)	Scroll (3)	Scroll (3)
Outdoor Coils	Net face area (total) - sq. ft.		41.40	41.40	55.20	55.20
	Tube diameter - in.		3/8	3/8	3/8	3/8
	Number of rows		2	2	2	2
	Fins per inch		20	20	20	20
Outdoor Coil Fans	Motor - (No.) horsepower		(3) 1/3	(3) 1/3	(4) 1/3	(4) 1/3
	Motor rpm		1075	1075	1075	1075
	Total Motor watts		1100	1100	1500	1500
	Diameter - (No.) in.		(3) 24	(3) 24	(4) 24	(4) 24
	Number of blades		3	3	3	3
	Total Air volume - cfm		12,000	12,000	16,000	16,000
Indoor Coils	Net face area (total) - sq. ft.		18.60	21.40	21.40	21.40
	Tube diameter - in.		3/8	3/8	3/8	3/8
	Number of rows		3	3	4	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		Balance port TXV, removable head			
³ Indoor Blower and Drive Selection	Nominal motor output		3 hp, 5 hp, 7.5 hp	3 hp, 5 hp, 7.5 hp	5 hp, 7.5 hp, 10 hp	5 hp, 7.5 hp, 10 hp
	Maximum usable motor output (US Only)		3.45 hp, 5.75 hp, 8.62 hp	3.45 hp, 5.75 hp, 8.62 hp	5.75 hp, 8.62 hp, 11.5 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	(2) 15 x 15	(2) 15 x 15	(2) 15 x 15
Filters	Type of filter		Fiberglass, disposable			
	Number and size - in.		(6) 24 x 24 x 2			
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase			

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

¹ Certified in accordance with the ULE certification program, which is based on AHRI Standard 340/360; 95°F outdoor air temperature and 80°F db/67°F wb entering evaporator air; minimum external duct static pressure.

² Integrated Energy Efficiency Ratio certified and tested according to AHRI Standard 340/360.

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

BLOWER DATA

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

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

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

See page 7 for wet coil and option/accessory air resistance data.

See page 7 for factory installed drive kit specifications.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

All units require 6000 cfm minimum air with electric heat.

Air Volume cfm	TOTAL STATIC PRESSURE - In. w.g.																							
	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
4750	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	875	6.40	940	7.25	1000	8.05	1055	8.85	1105	9.65	1155	10.45	1200	11.20	---	---	---	---	---	---	---	---	---	---
11,000	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.

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

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

BLOWER DATA

CEILING DIFFUSER AIR RESISTANCE - in. w.g.

Air Volume cfm	Step-Down Diffuser						Flush Diffuser	
	RTD11-185			RTD11-275			FD11-185	FD11-275
	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.		
		RTD11-185 Step-Down	FD11-185 Flush			RTD11-275 Step-Down	FD11-275 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 outletor diffuser before the maximum velocity is reduced to 50 ft. per minute. Four sides open.

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

ELECTRICAL/ELECTRIC HEAT DATA 15 TON

15 TON STANDARD EFFICIENCY KCA180S4

¹ Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	25			12.2			9		
	Locked Rotor Amps	164			100			78		
Compressor 2	Rated Load Amps	25			12.2			9		
	Locked Rotor Amps	164			100			78		
Outdoor Fan Motors (3)	Full Load Amps	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			15		
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 Unit Only		90	100	110	45	50	50	35	35	40
Overcurrent Protection	With (2) 0.33 HP	100	100	110	50	50	50	35	40	40
	Power Exhaust									
³ Minimum Unit Only		75	81	88	37	39	43	28	30	33
Circuit Ampacity	With (2) 0.33 HP	79	85	93	39	42	45	30	32	35
	Power Exhaust									

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
² Maximum Overcurrent Protection	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	90	90	100	100	110	110	45	50	50	35	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
³ Minimum Circuit Ampacity	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	75	75	81	81	88	88	37	39	43	28	30	33
		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	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	100	100	100	100	110	110	50	50	50	35	40	40
		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	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	79	79	85	85	93	93	39	42	45	30	32	35
		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

ELECTRICAL ACCESSORIES

Disconnect	Unit Only	54W85	54W85	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 15 kW	54W85	54W85	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 30 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 45 kW	54W86	54W86	54W86	54W86	54W87	54W87	54W85	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 60 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 15 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 30 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 45 kW	54W86	54W86	54W86	54W86	54W87	54W87	54W85	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 60 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W85	54W85	54W85	54W85

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****17.5 TON STANDARD EFFICIENCY****KCA210S4**

¹ Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	19			9.7			7.4		
	Locked Rotor Amps	123			62			50		
Compressor 2	Rated Load Amps	19			9.7			7.4		
	Locked Rotor Amps	123			62			50		
Compressor 3	Rated Load Amps	19			9.7			7.4		
	Locked Rotor Amps	123			62			50		
Outdoor Fan Motors (3)	Full Load Amps (total)	2.4 (7.2)			1.3 (3.9)			1 (3)		
Power Exhaust (2) 0.33 HP	Full Load Amps (total)	2.4 (4.8)			1.3 (2.6)			1 (2)		
Service Outlet 115V GFI (amps)		15			15			15		
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	Unit Only	90	100	110	45	50	50	35	40	45
	With (2) 0.33 HP	100	100	110	50	50	60	40	40	45
	Power Exhaust									
³ Minimum Circuit Ampacity	Unit Only	80	86	95	41	44	47	31	34	37
	With (2) 0.33 HP	85	91	100	43	46	50	33	36	39
	Power Exhaust									

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
² Maximum Overcurrent Protection	Unit+ Electric Heat	15 kW	90	90	100	100	110	110	45	50	50	35	40	45
		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	Unit+ Electric Heat	15 kW	80	80	86	86	95	95	41	44	47	31	34	37
		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	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	100	100	100	100	110	110	50	50	60	40	40	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	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	85	85	91	91	100	100	43	46	50	33	36	39
		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

ELECTRICAL ACCESSORIES

Disconnect	Unit Only	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 15 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 30 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 45 kW	54W86	54W86	54W86	54W86	54W87	54W87	54W87	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 60 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W85	54W85	54W85
	Unit + Electric Heat 90 kW	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	54W86	54W86	54W86	54W86	54W86	54W86
	Unit + Power Exhaust + Elec. Heat 15 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 30 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 45 kW	54W86	54W86	54W86	54W86	54W87	54W87	54W87	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 60 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 90 kW	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	54W86	54W86	54W86	54W86	54W86	54W86

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.⁴ Disconnect must be field furnished.

ELECTRICAL/ELECTRIC HEAT DATA **20 TON****20 TON STANDARD EFFICIENCY****KCA240S4**

¹ Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	22.4			10.6			7.7		
	Locked Rotor Amps	149			75			54		
Compressor 2	Rated Load Amps	22.4			10.6			7.7		
	Locked Rotor Amps	149			75			54		
Compressor 3	Rated Load Amps	22.4			10.6			7.7		
	Locked Rotor Amps	149			75			54		
Outdoor Fan	Full Load Amps	2.4			1.3			1		
Motors (3)	(total)	(9.6)			(5.2)			(4)		
Power Exhaust	Full Load Amps	2.4			1.3			1		
(2) 0.33 HP	(total)	(4.8)			(2.6)			(2)		
Service Outlet 115V GFI (amps)		15			15			15		
Indoor Blower	Horsepower	5	7.5	10	5	7.5	10	5	7.5	10
Motor	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
² Maximum	Unit Only	110	125	125	50	60	60	40	45	50
Overcurrent	With (2) 0.33 HP	125	125	150	60	60	70	40	45	50
Protection	Power Exhaust									
³ Minimum	Unit Only	100	108	116	48	51	55	36	39	41
Circuit	With (2) 0.33 HP	104	112	121	50	54	58	38	41	43
Ampacity	Power Exhaust									

ELECTRIC HEAT DATA

Electric Heat Voltage		208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
² Maximum	Unit+	15 kW	110	110	125	125	125	50	60	60	40	45	50
	Electric Heat	30 kW	110	125	125	125	150	60	60	70	45	50	50
		45 kW	150	175	150	175	175	80	90	90	70	70	70
		60 kW	150	175	175	175	200	90	90	90	70	70	80
		90 kW	225	250	225	250	300	125	125	150	100	100	110
³ Minimum	Unit+	15 kW	100	100	108	108	116	48	51	55	36	39	41
	Electric Heat	30 kW	100	112	109	121	117	55	59	63	44	48	50
		45 kW	139	157	148	166	156	78	82	86	62	66	68
		60 kW	146	166	156	175	164	82	86	90	66	69	72
		90 kW	209	238	218	247	227	118	123	126	95	98	101
² Maximum	Unit+	15 kW	125	125	125	125	150	60	60	70	40	45	50
	Electric Heat	30 kW	125	125	125	150	150	60	70	70	50	50	60
		45 kW	150	175	175	175	200	90	90	90	70	70	80
		60 kW	175	175	175	200	175	200	90	100	70	80	80
		90 kW	225	250	225	300	250	300	125	150	100	110	110
³ Minimum	Unit+	15 kW	104	104	112	112	121	50	54	58	38	41	43
	Electric Heat	30 kW	106	118	115	127	123	58	63	66	47	50	53
		45 kW	145	163	154	172	162	81	85	89	65	68	71
		60 kW	152	172	162	181	170	85	90	93	68	72	74
		90 kW	215	244	224	253	233	122	126	130	97	101	103

ELECTRICAL ACCESSORIES

Disconnect	Unit Only	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 15 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 30 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 45 kW	54W86	54W86	54W87	54W87	54W87	54W87	54W87	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 60 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W85	54W85	54W85
	Unit + Electric Heat 90 kW	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	54W86	54W86	54W86	54W86	54W86	54W86
	Unit + Power Exhaust + Elec. Heat 15 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 30 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 45 kW	54W86	54W86	54W87	54W87	54W87	54W87	54W87	54W85	54W85	54W86	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 60 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W85	54W85	54W86
	Unit + Power Exhaust + Elec. Heat 90 kW	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	54W86	54W86	54W86	54W86	54W86	54W86

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.⁴ Disconnect must be field furnished.

ELECTRICAL/ELECTRIC HEAT DATA**25 TON****25 TON STANDARD EFFICIENCY****KCA300S4**

¹ Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	25			12.2			9		
	Locked Rotor Amps	164			100			78		
Compressor 2	Rated Load Amps	25			12.2			9		
	Locked Rotor Amps	164			100			78		
Compressor 3	Rated Load Amps	25			12.2			9		
	Locked Rotor Amps	164			100			78		
Outdoor Fan	Full Load Amps	2.4			1.3			1		
Motors (3)	(total)	(9.6)			(5.2)			(4)		
Power Exhaust	Full Load Amps	2.4			1.3			1		
(2) 0.33 HP	(total)	(4.8)			(2.6)			(2)		
Service Outlet 115V GFI (amps)		15			15			15		
Indoor Blower	Horsepower	5	7.5	10	5	7.5	10	5	7.5	10
Motor	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
² Maximum	Unit Only	125	125	150	60	60	70	45	50	50
Overcurrent	With (2) 0.33 HP	125	125	150	60	70	70	50	50	50
Protection	Power Exhaust									
³ Minimum	Unit Only	108	116	124	53	56	60	40	43	45
Circuit	With (2) 0.33 HP	113	120	128	56	59	62	42	45	47
Ampacity	Power Exhaust									

ELECTRIC HEAT DATA

Electric Heat Voltage		208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
² Maximum	Unit+	15 kW	125	125	125	150	150	60	60	70	45	50	50
Overcurrent Protection	Electric Heat	30 kW	125	125	125	150	150	60	60	70	45	50	50
		45 kW	150	175	150	175	175	80	90	90	70	70	70
		60 kW	150	175	175	175	200	90	90	90	70	70	80
		90 kW	225	250	225	250	300	125	125	150	100	100	110
³ Minimum	Unit+	15 kW	108	108	116	116	124	53	56	60	40	43	45
Circuit Ampacity	Electric Heat	30 kW	108	112	116	121	124	55	59	63	44	48	50
		45 kW	139	157	148	166	156	78	82	86	62	66	68
		60 kW	146	166	156	175	164	82	86	90	66	69	72
		90 kW	209	238	218	247	227	118	123	126	95	98	101
² Maximum	Unit+	15 kW	125	125	125	150	150	60	70	70	50	50	50
Overcurrent Protection	Electric Heat and (2) 0.33 HP	30 kW	125	125	125	150	150	60	70	70	50	50	60
		45 kW	150	175	175	175	200	90	90	90	70	70	80
		60 kW	175	175	175	200	175	200	90	100	70	80	80
		90 kW	225	250	225	300	250	300	125	150	100	110	110
³ Minimum	Unit+	15 kW	113	113	120	120	128	56	59	62	42	45	47
Circuit Ampacity	Electric Heat and (2) 0.33 HP	30 kW	113	118	120	127	128	58	63	66	47	50	53
		45 kW	145	163	154	172	162	81	85	89	65	68	71
		60 kW	152	172	162	181	170	85	90	93	68	72	74
		90 kW	215	244	224	253	233	122	126	130	97	101	103

ELECTRICAL ACCESSORIES

Disconnect	Unit Only	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 15 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 30 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 45 kW	54W86	54W86	54W87	54W87	54W87	54W87	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 60 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W85	54W85	54W85
	Unit + Electric Heat 90 kW	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	54W86	54W86	54W86	54W86	54W86	54W86
	Unit + Power Exhaust + Elec. Heat 15 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 30 kW	54W86	54W86	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 45 kW	54W86	54W86	54W87	54W87	54W87	54W87	54W85	54W85	54W86	54W85	54W85	54W85
	Unit + Power Exhaust + Elec. Heat 60 kW	54W87	54W87	54W87	54W87	54W87	54W87	54W86	54W86	54W86	54W85	54W85	54W86
	Unit + Power Exhaust + Elec. Heat 90 kW	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	⁴ N/A	54W86	54W86	54W86	54W86	54W86	54W86

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.⁴ Disconnect must be field furnished.

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

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	3	535	725	1VP40x7/8	79J0301	BK95X1-7/16	80K1601	BX59	59A5001	N/A	N/A
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

KCA PARTS ARRANGEMENT

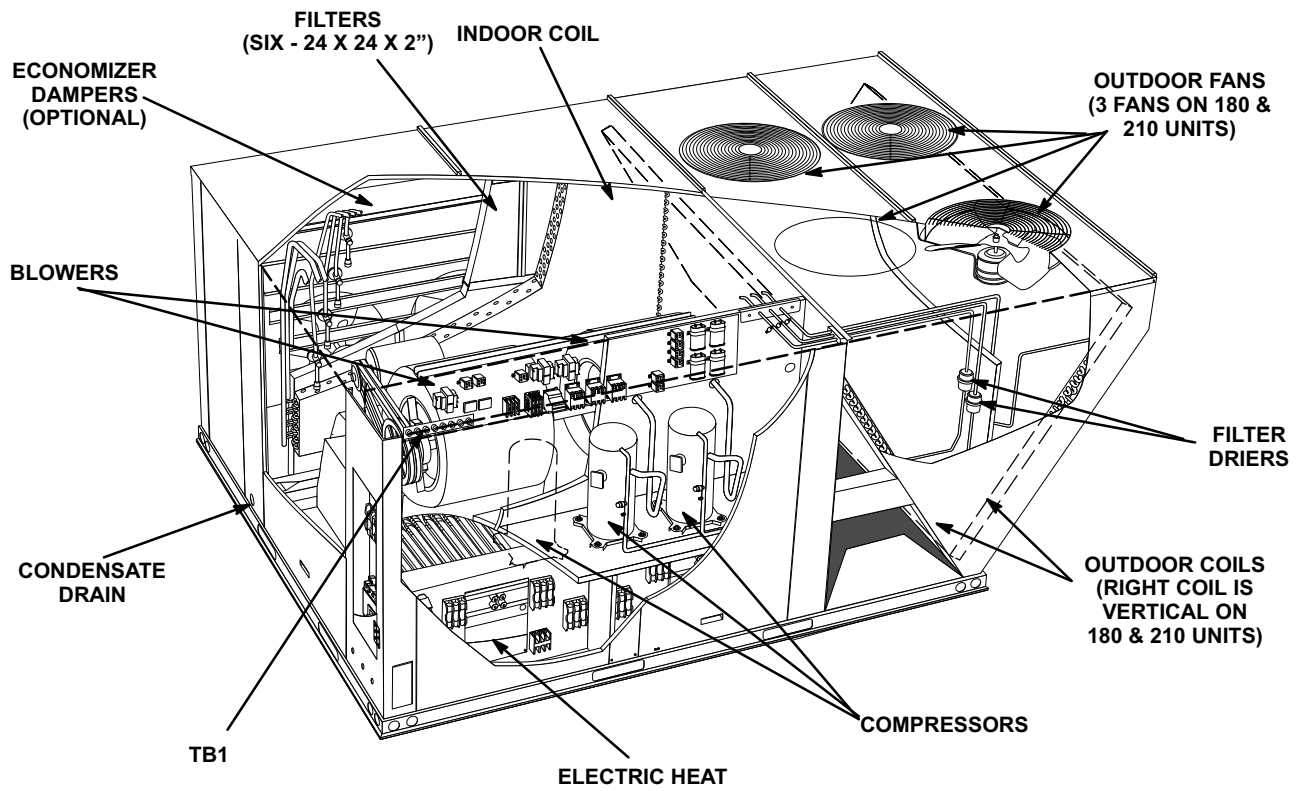


FIGURE 1

KCA CONTROL BOX

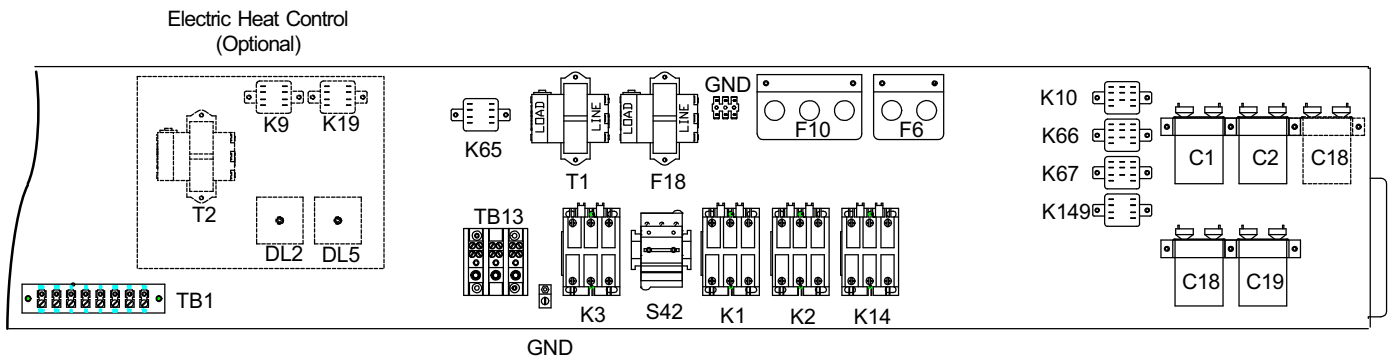


FIGURE 2

I-UNIT COMPONENTS

KCA 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.

A-Control Box Components

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

1-Disconnect Switch S48 (field- or factory-installed)

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.

2-Terminal Strip TB2

Unit without S48 will have supply power connected to TB2.

3-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.

4-Terminal Strip TB13

All units are equipped with TB13. TB13 is located on the control panel in the compressor compartment.

5-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 208/230V

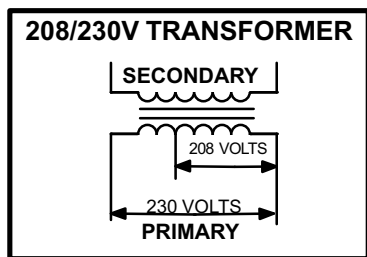


FIGURE 3

6-C. A. I. Transformers T3 & T13 575V Only

All KCA 575 (J) voltage units use transformers T3 and T13 mounted in the control box. The transformers have an output rating of 0.75A. T3 transformer supplies 230 VAC power to combustion air inducer motor B6 and T13 supplies 230 VAC to combustion air inducer motor B15.

7-Control Transformer T18 (210, 240, & 300 only)

T18 is a single line voltage to 24VAC transformer used in 210, 240 and 300 units only. 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.

8-Terminal Strip TB1

All indoor thermostat connections will be to TB1 located on the control panel. For thermostats with "occupied" and "un-occupied" 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

9-Outdoor Fan Capacitors C1, C2, C18 (all units) & C19 (240 & 300 only)

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

10-Outdoor Fan Relay K10 (all units) & K149 (240 & 300 only)

Outdoor fan relays K10 and K149, are DPDT relays with a 24VAC coil. For 180 and 210 units, K10 energizes condenser fans B4, B5 and B21. For 240 and 300 units, K10 energizes condenser fans B4 and B5 and K149 energizes condenser fans B21 and B22.

11-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 field installed power exhaust fans (Y volt 240 300 units) and are rated at 30A.

12-Compressor Contactor K1 & K2 (all units) K14 (210, 240, & 300 units only)

All compressor contactors are three-pole-double-break contactors with 24VAC coils. K1 and K2 energize compressors B1 and B2 respectively, in response to thermostat demand. For 210, 240 and 300 units, K14 energizes compressor B13 in response to thermostat demand.

13-Blower Contactor K3

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

14-Blower Motor Overload Relay S42

S42 is a manual reset overload relay, used in all M voltage units and in units with a 10 HP blower motor. 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 figure 4.

15-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. K67 is energized by a Y2 thermostat call. N.O. contacts K67-1 will close allowing 24VAC from T1 transformer (180 units) or T18 (210-300 units) to energize stage 2 compressor contactor(s).

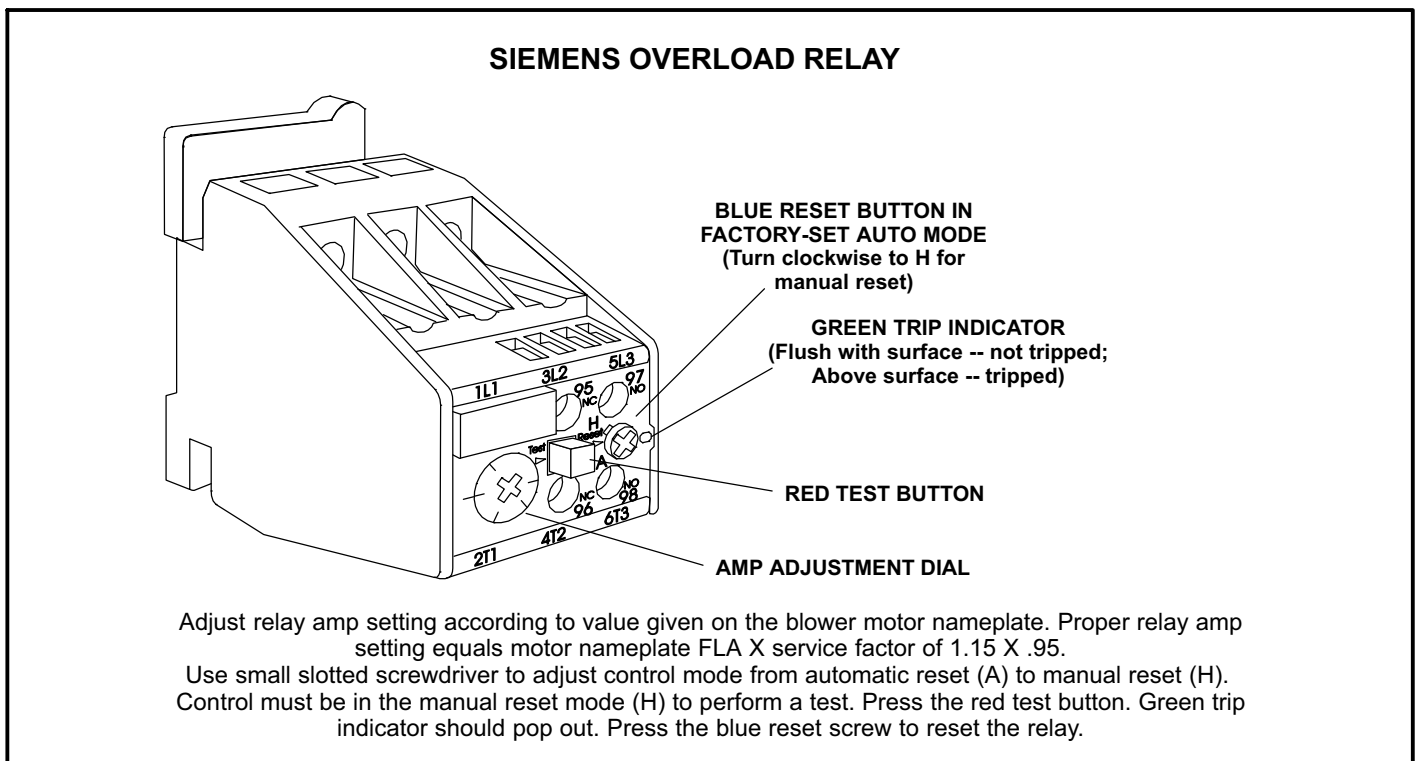


FIGURE 4

KCA180 PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL

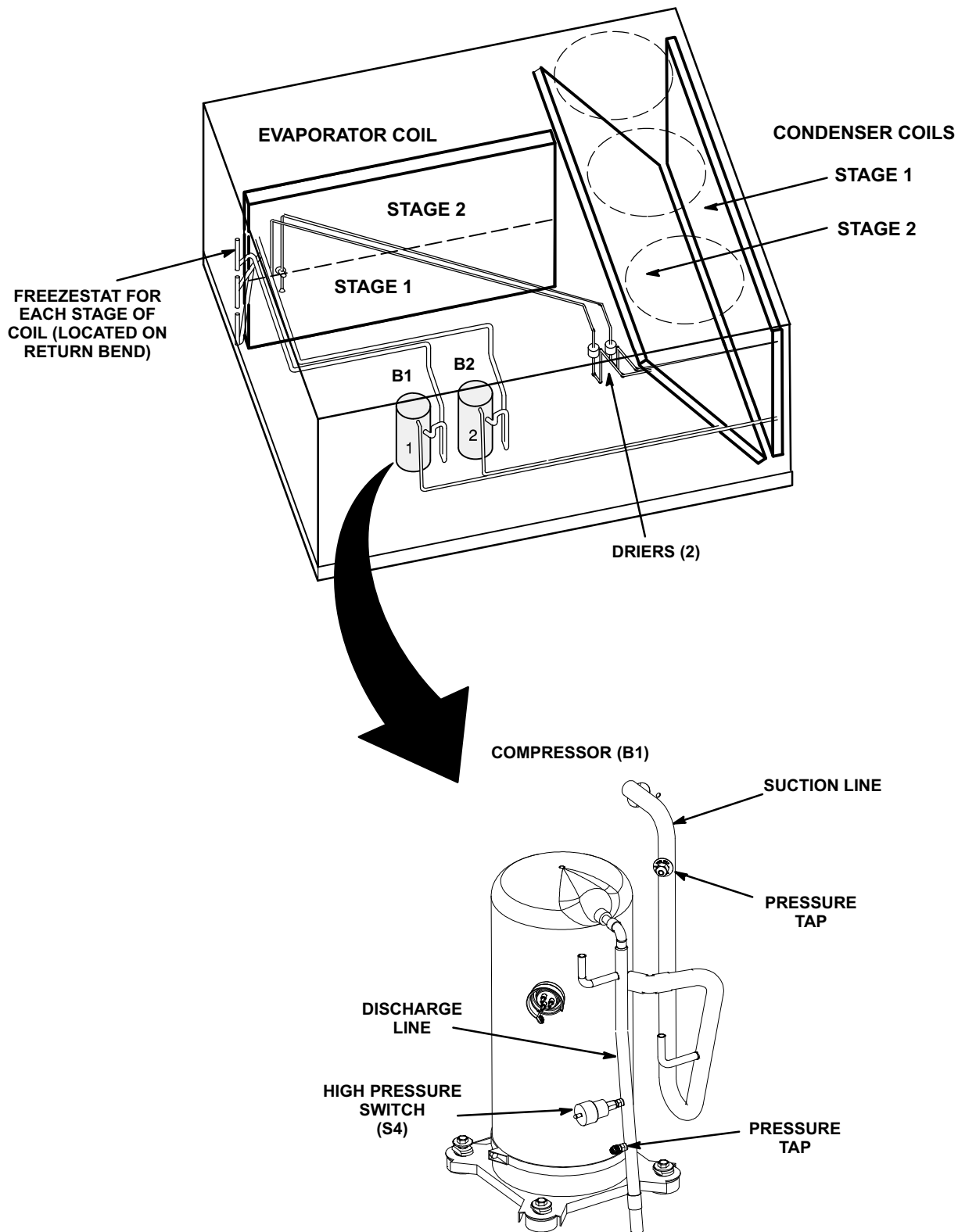


FIGURE 5

KCA210 PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL

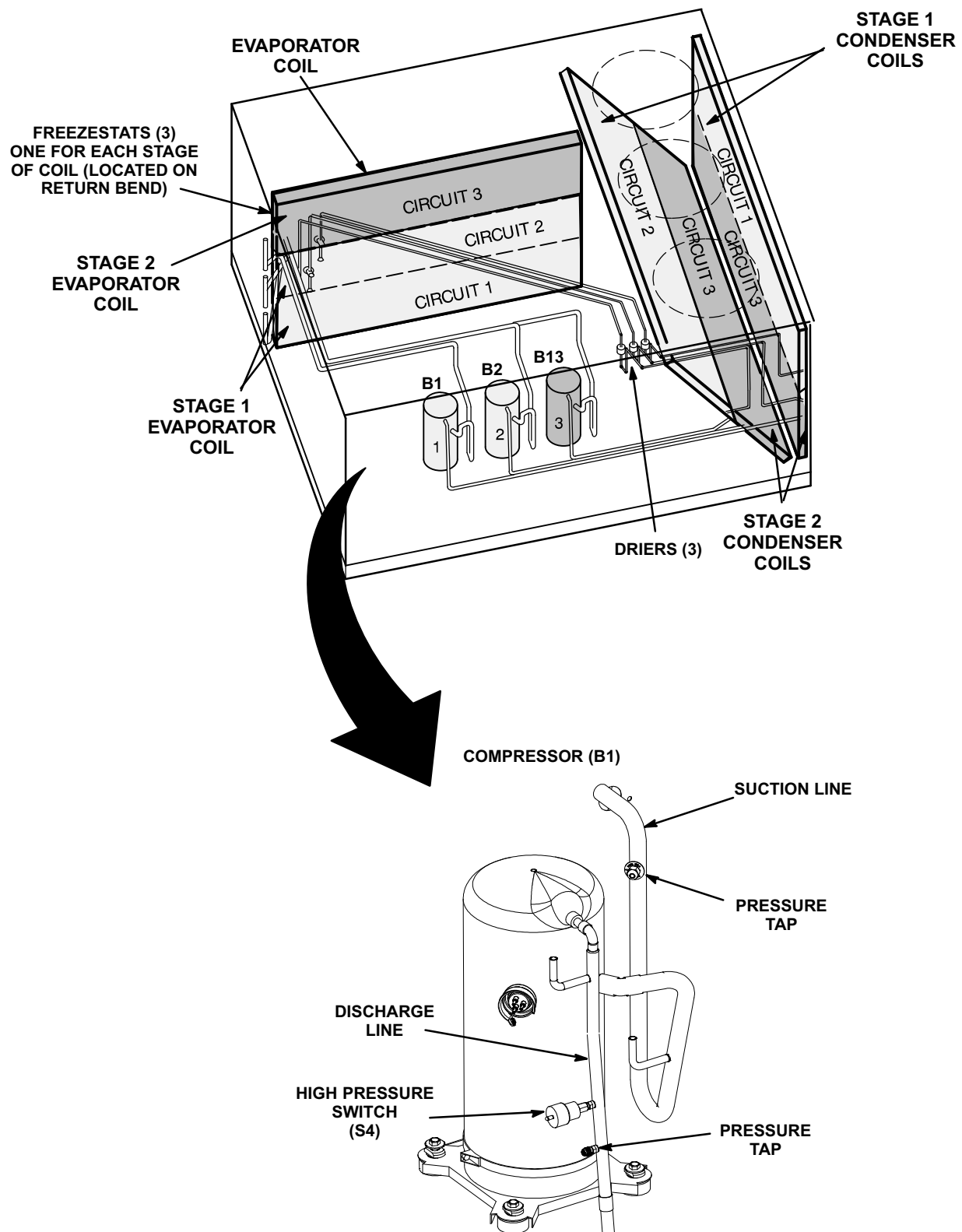


FIGURE 6

KCA240 & 300 PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL

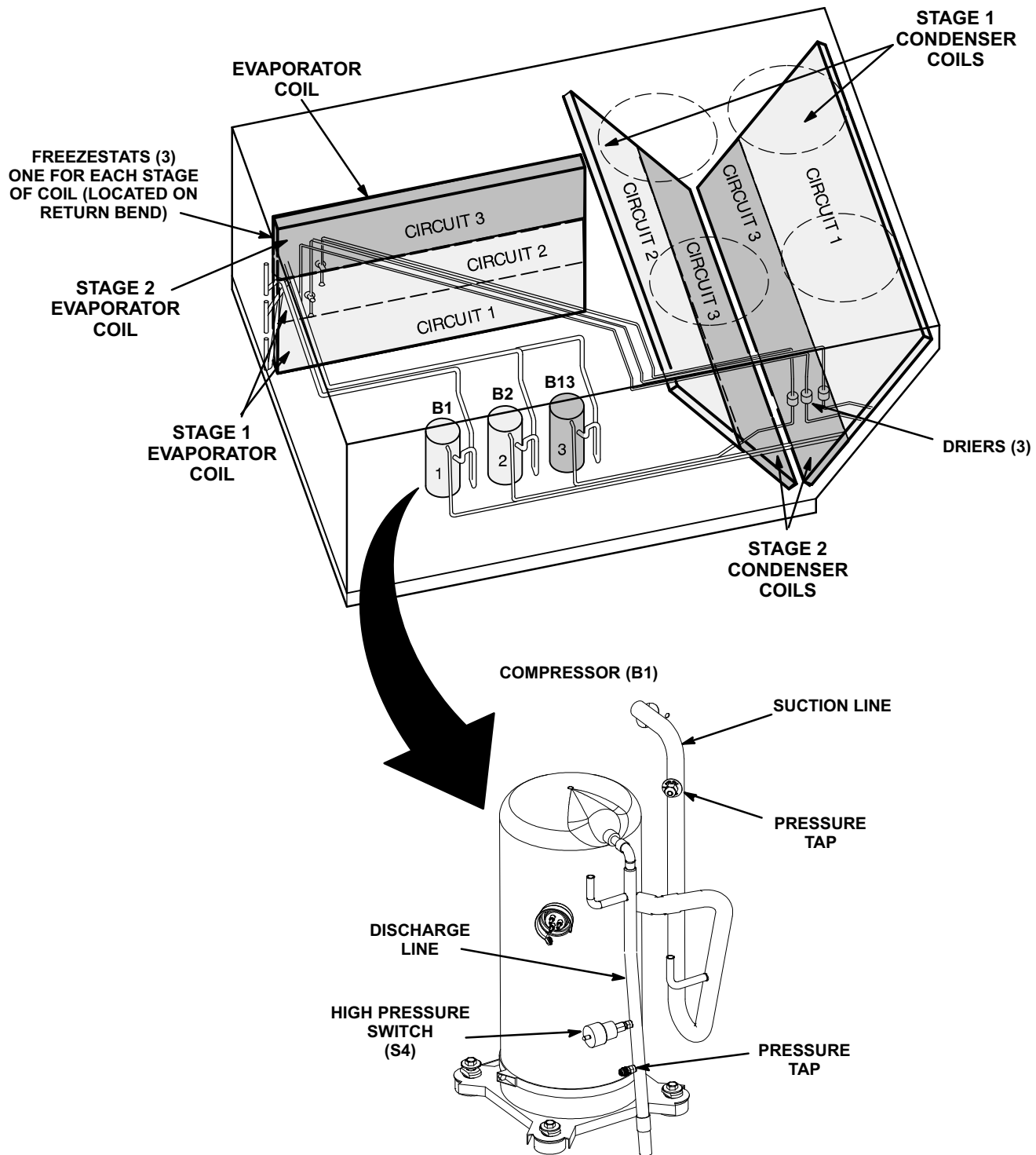


FIGURE 7

B-Cooling Components

All units use independent cooling circuits consisting of separate compressors, condenser coils and evaporator coils. See 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 uses a thermostatic expansion valve as the primary expansion device. Each evaporator is also equipped with enhanced fins and rifled tubing. In all units each compressor is protected by a 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 (all units) & B13 (210/240/300 only)

All KCA180/300 units use scroll compressors. KCA180 units uses two compressors and KCA210, 240 and 300S use three compressors. All compressors are equipped with independent cooling circuits. Compressor capacity may vary from stage to stage. In all cases, the capacity of each compressor is added to reach the total capacity of the unit. See "SPECIFICATIONS" and "ELECTRICAL DATA" (table of contents) or compressor nameplate for compressor specifications.

WARNING

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

Each compressor is energized by a corresponding compressor contactor.

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

2-High Pressure Switches S4, S7 (all units) S28 (210, 240, 300S only)

The high pressure switch is a manual reset N.C switch which opens on a pressure rise.

S4 (first circuit), S7 (second circuit) and S28 (third circuit) are wired in series with the respective compressor contactor coils.

When discharge pressure rises to 640 ± 10 psig (4413 ± 69 kPa) (indicating a problem in the system) the switch opens and the respective compressor is de-energized (the economizer can continue to operate).

3-Low Ambient Switches (optional) S11, S84 (all units) & S85 (210, 240, 300 units)

The low ambient switch is an optional field installed auto-reset N.O. pressure switch which allows for mechanical cooling operation at low outdoor temperatures. The switch is located in each liquid line prior to the indoor coil.

In 180 units, S11 and S84 are wired in parallel with outdoor fan relay K10 coil. Both S11 and S84 have to be open to de-energize condenser fans (all three fans will be de-energized at the same time). Either S11 or S84 closing will return all three condenser fans to operation.

In 210 units, S11, S84 and S85 are wired in parallel with outdoor fan relay K10 coil. All three low ambient switches; S11, S84 and S85 have to be open to de-energize condenser fans (all three fans will be de-energized at the same time). Any one low ambient switch, S11, S84, or S85 closing will return all three condenser fans to operation.

In 240 and 300 units, S11 is wired in series with outdoor fan relay K10 coil. When S11 opens, condenser fans 1 and 2 are de-energized. When S11 closes, both condenser fans 1 and 2 will return to operation. S84 and S85 are wired in parallel with outdoor fan relay coil K149. Both S84 and S85 have to be open to energize condenser fans 3 and 4. Either S84 or S85 closing will return condenser fans 3 and 4 to operation.

When liquid pressure rises to 450 ± 10 psig (3103 ± 69 kPa), pressure switch(es) close, energizing the appropriate condenser fan(s). When liquid pressure drops to 240 ± 10 psig (1655 ± 69 kPa), pressure switch(es) open, de-energizing the appropriate condenser fan(s). Intermittent fan operation results in higher evaporating temperature allowing the system to operate without icing the evaporator coil and losing capacity.

4-Filter Drier (all units)

KCA 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 (all units) S53 (210, 240, 300 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) and S53 (third 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 $29^{\circ}\text{F} \pm 3^{\circ}\text{F}$ ($-1.7^{\circ}\text{C} \pm 1.7^{\circ}\text{C}$) on a temperature drop and closes at $58^{\circ}\text{F} \pm 4^{\circ}\text{F}$ ($14.4^{\circ}\text{C} \pm 2.2^{\circ}\text{C}$) 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 (240 & 300 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 KCA180/300 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 KCA180/300 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

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 elector-mechanical thermostat.

- 1- Blower operation is manually set at the thermostat sub-base 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.

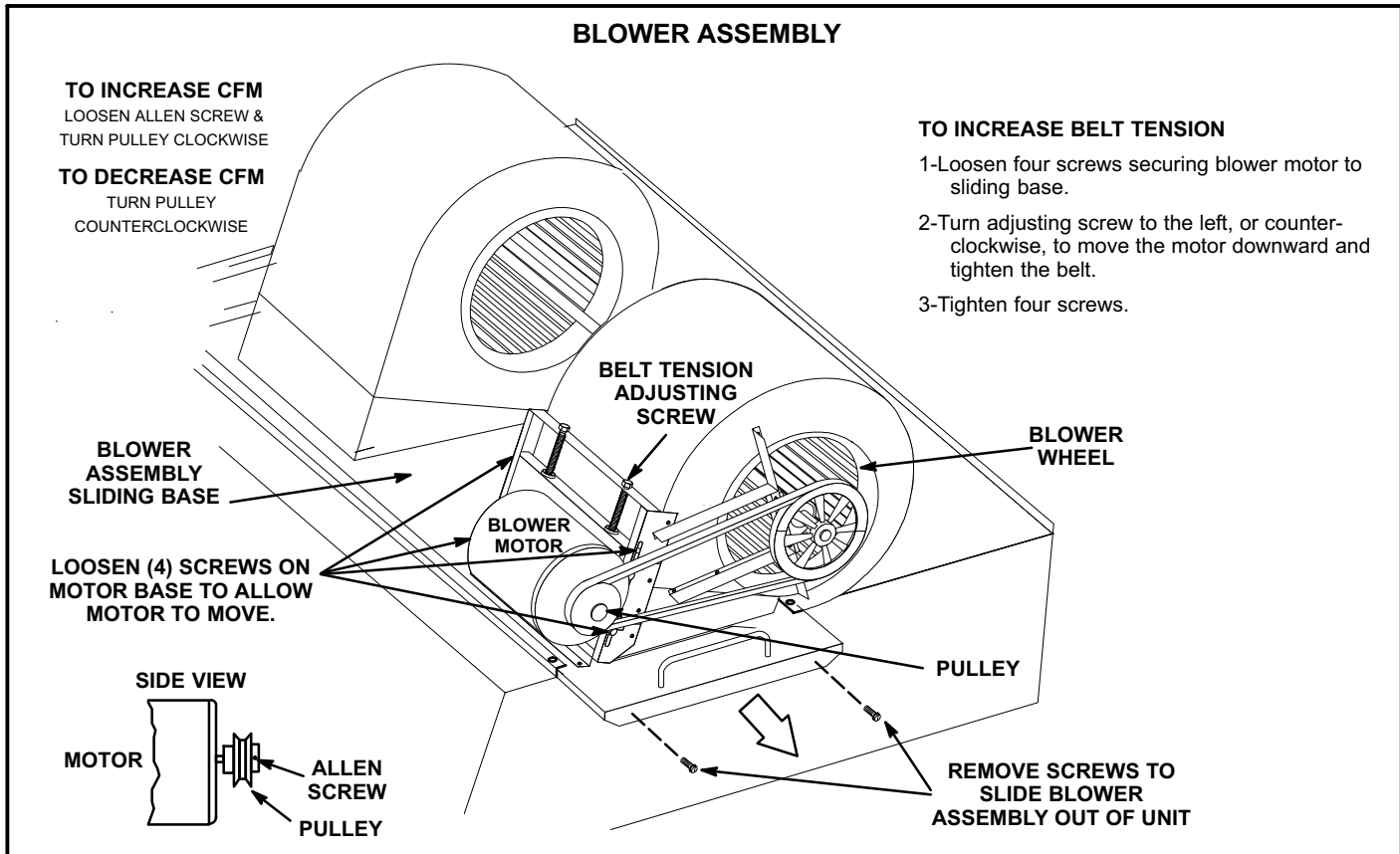


FIGURE 8

- 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

- 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).
- 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 for KCA180/300 units.

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 9.

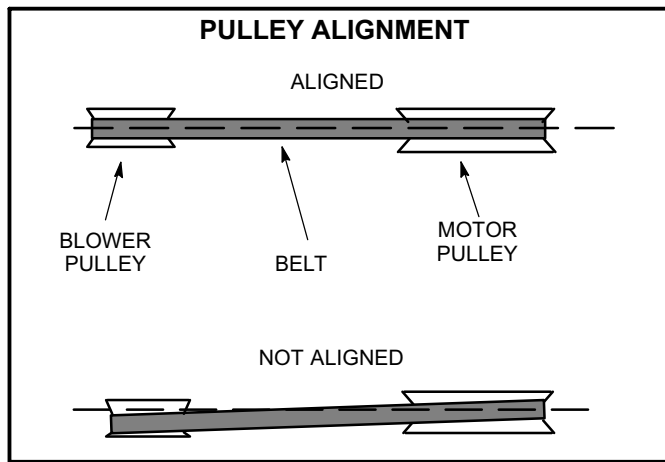


FIGURE 9

- 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 decreases 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.

Check Belt Tension

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

- 1- Measure span length X. See figure 10.
- 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.

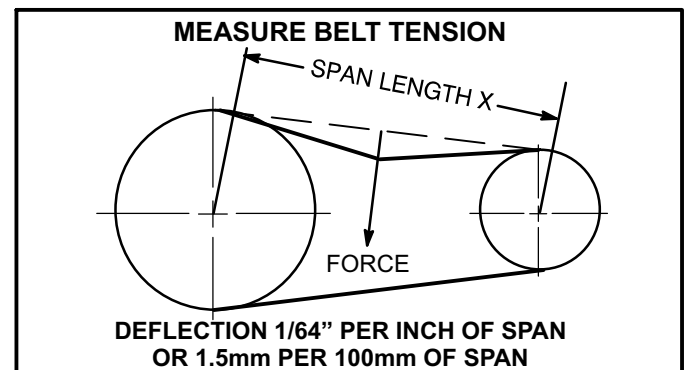


FIGURE 10

D-Optional Electric Heat Components

See ELECTRICAL / ELECTRIC HEAT (table of contents) for possible KCA to EHA match-ups and electrical ratings. All electric heat sections consist of electric heating elements exposed directly to the air stream. See figure 1. Two electric heat sections (first section and second section) are used in all 15kW through 90kW heaters used in KCA180/300 units. Multiple-stage elements are sequenced on and off in response to thermostat demand. EHA parts arrangement is shown in figures 12 and 13.

Control Box Components

The main control box (see figure 2) houses some electric heat components and the electric heat control “hat” section (figure 11).

Electric Heat Hat Section (Figure 11)

1-Electric Heat Relay K9

All KCA 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 KCA 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.

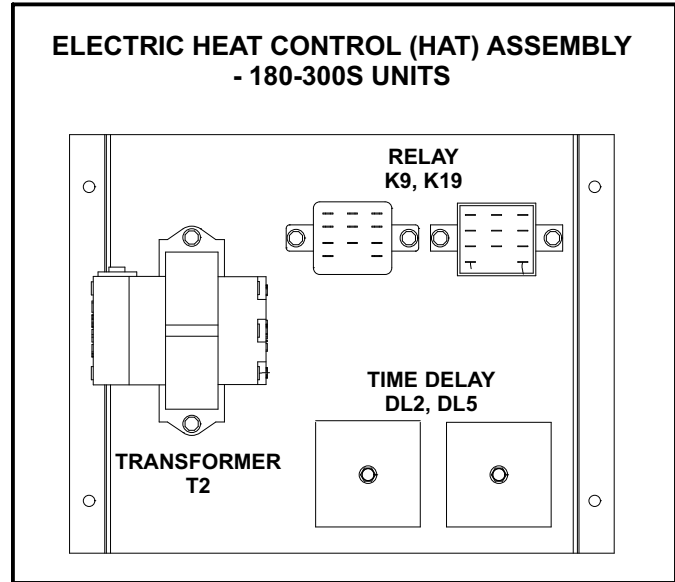


FIGURE 11

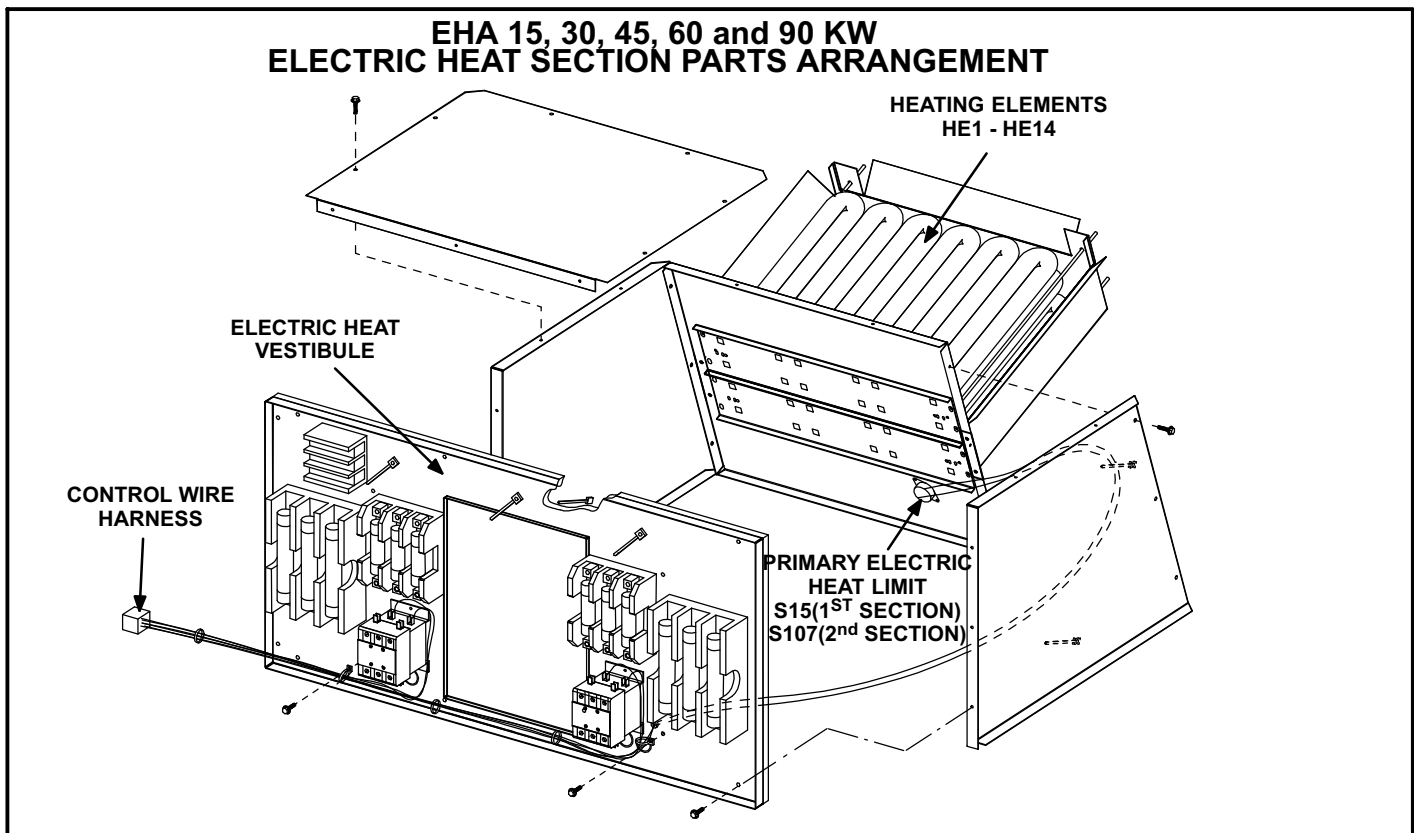
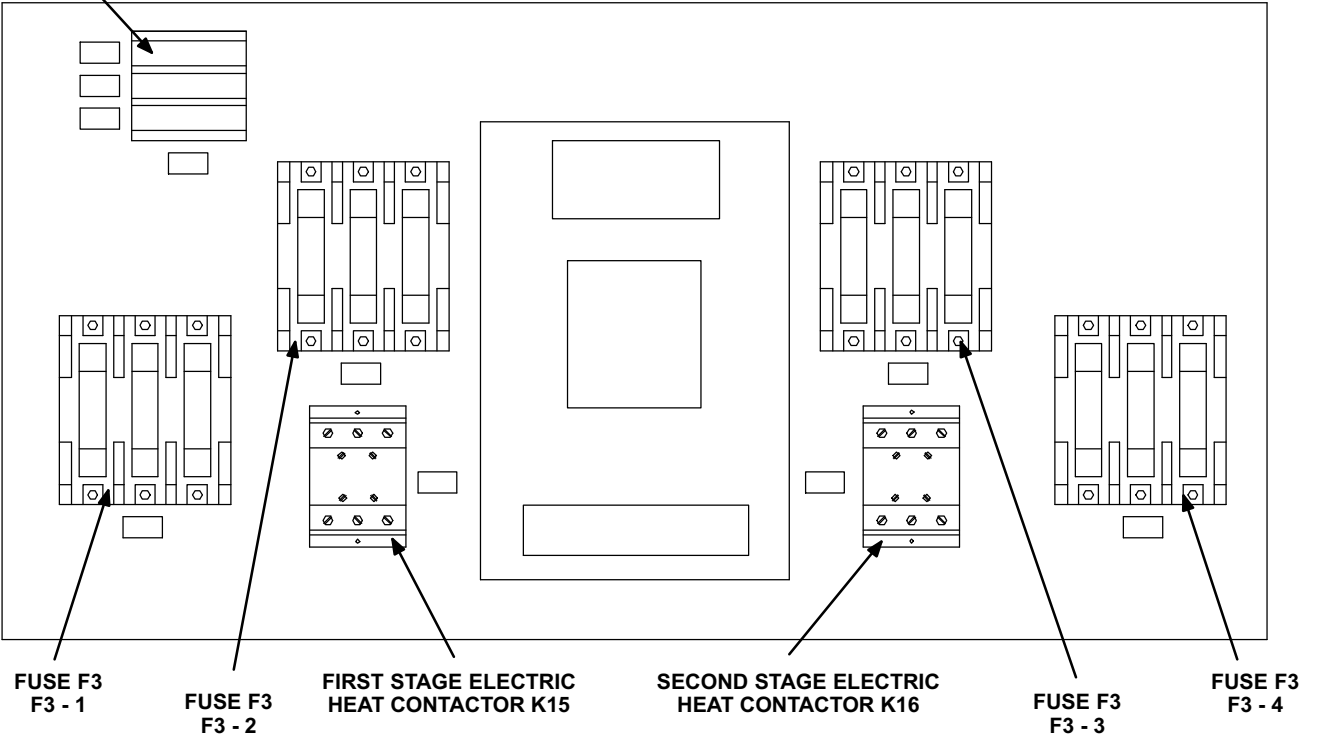


FIGURE 12

KCA180/300 ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT

FIRST HEAT SECTION (LEFT SIDE)

TERMINAL STRIP
(TB3)



TERMINAL STRIP
(TB3)

SECOND HEAT SECTION (RIGHT SIDE)

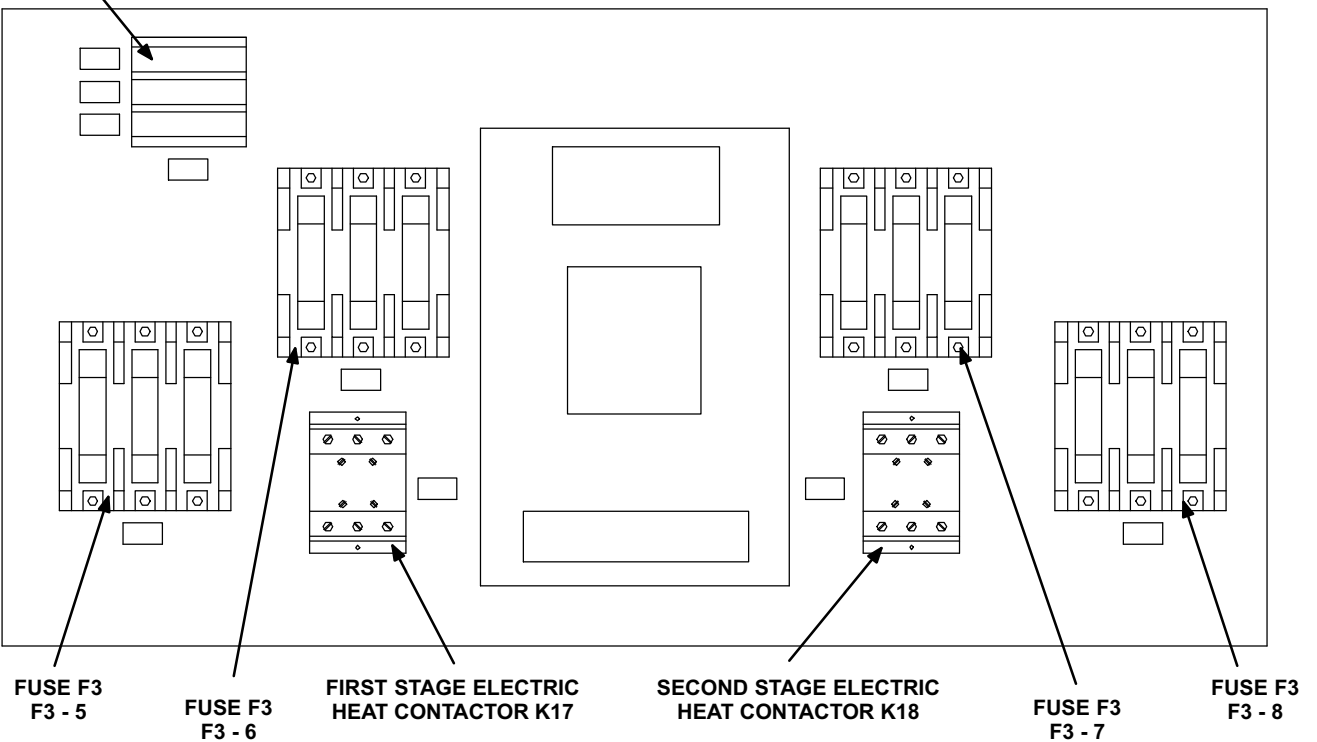


Figure 13

5-Electric Heat Transformer T2

All KCA 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 13 and table 2 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 EHA360-45-1 Y/G/J are factory set to open at $200^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($93.3^{\circ}\text{C} \pm 2.8^{\circ}\text{C}$) on a temperature rise and automatically reset at $160^{\circ}\text{F} \pm 6^{\circ}\text{F}$ ($71.1^{\circ}\text{C} \pm 3.3^{\circ}\text{C}$) on a temperature fall. All other electric heat section thermostats are factory set to open at $170^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($76.7^{\circ}\text{C} \pm 2.8^{\circ}\text{C}$) on a temperature rise and automatically reset at $130^{\circ}\text{F} \pm 6^{\circ}\text{F}$ ($54.4^{\circ}\text{C} \pm 3.3^{\circ}\text{C}$) 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 over-current protection is provided by fuses.

TABLE 2

KCA180/300 ELECTRIC HEAT SECTION FUSE RATING									
EHA QUANTITY & SIZE	VOLT-AGES	FUSE (3 each)							
		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)	208/230V	50 Amp 250V	—	—	—	—	—	—	—
	460V	25 Amp 600V	—	—	—	—	—	—	—
	575V	20 Amp 600V	—	—	—	—	—	—	—
(1) EHA360-15 & (1) EHA360S-15 (30 kW Total) or (1) EHA156-15 & (1) EHA156S-15	208/230V	60 Amp 250V	60 Amp 250V	—	—	—	—	—	—
	460V	50 Amp 600V	—	—	—	—	—	—	—
	575V	40 Amp 600V	—	—	—	—	—	—	—
(2) EHA360-22.5 (45 kW Total) or (2) EHA156-22.5	208/230V	50 Amp 250V	—	—	25 Amp 250V	50 Amp 250V	—	—	25 Amp 250V
	460V	25 Amp 600V	—	—	15 Amp 600V	25 Amp 600V	—	—	15 Amp 600V
	575V	20 Amp 600V	—	—	10 Amp 600V	20 Amp 600V	—	—	10 Amp 600V
(2) EHA150-30 (60 kW Total) or (2) EHA156-30	208/230V	50 Amp 250V	—	—	50 Amp 250V	50 Amp 250V	—	—	50 Amp 250V
	460V	25 Amp 600V	—	—	25 Amp 600V	25 Amp 600V	—	—	25 Amp 600V
	575V	20 Amp 600V	—	—	20 Amp 600V	20 Amp 600V	—	—	20 Amp 600V
(2) EHA360-45 (90 kW Total)	208/230V	50 Amp 250V	—	60 Amp 250V	60 Amp 250V	50 Amp 250V	—	60 Amp 250V	60 Amp 250V
	460V	25 Amp 600V	—	—	50 Amp 600V	25 Amp 600V	—	—	50 Amp 600V
	575V	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 (LARMF18/36 or LARMFH18/24).

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

A-Operation

1. Remove coil covers before starting unit.
2. Initiate first and second stage cooling demands according to instructions provided with thermostat.
3. *180 units -*
First-stage thermostat demand will energize compressor 1; a second-stage thermostat demand will energize compressor 2.
210-300 units -
First-stage thermostat demand will energize compressors 1 & 2; a second-stage thermostat demand will energize compressor 3.
On units with an economizer, when outdoor air is acceptable, a first-stage demand will energize the economizer; a second-stage demand will energize compressor 1 (and compressor 2 on 210-300 units).

4. *180 -*

Units contain two refrigerant circuits or systems. Evaporator and condenser coil refrigerant circuit 1 makes up stage 1 cooling. Evaporator and condenser coil refrigerant circuit 2 makes up stage 2 cooling. See figure 14.

210, 240, 300 -

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. See figure 15.

5. *180, 210 -*

First-stage thermostat demand will energize condenser fans 1, 2 and 3. Fans will continue to operate with additional thermostat demands. See figure 14.

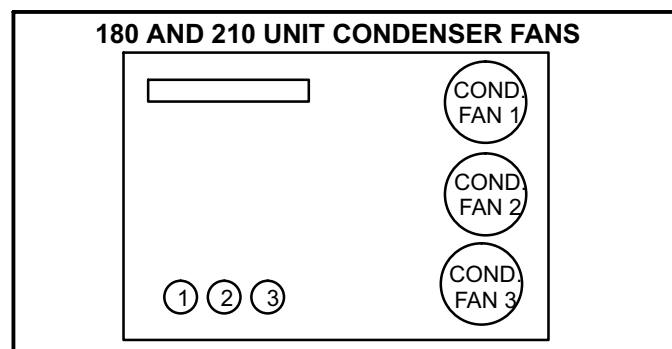


FIGURE 14

240, 300 -

First-stage thermostat demand will energize condenser fans 1, 2, 3 and 4. See figure 15. Fans will continue to operate with additional thermostat demands.

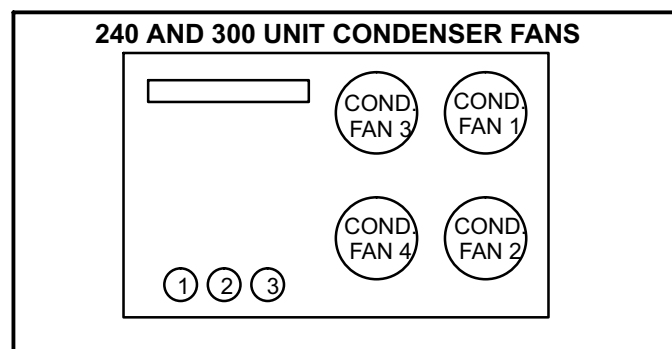


FIGURE 15

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

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 60°F (15°C). In temperatures below 60°F (15°C), the charge **must** be weighed into the system.

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

1. Attach gauge manifolds and operate unit in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure 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 3 through 6 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 3
KCA180 NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2	
	Dis. +10 psig	Suc. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	268	128	282	132
75°F	310	130	325	134
85°F	353	132	368	135
95°F	400	135	417	138
105°F	449	137	470	140
115°F	505	141	527	144

**TABLE 4
KCA210 NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. +10 psig	Suc. +5 psig	Dis. +10 psig	Suc. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	290	133	290	128	307	133
75°F	330	136	330	132	347	135
85°F	373	137	373	135	390	138
95°F	421	140	421	138	437	140
105°F	474	143	474	140	488	143
115°F	526	146	526	142	540	146

**TABLE 5
KCA240 NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. +10 psig	Suc. +5 psig	Dis. +10 psig	Suc. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	270	136	286	135	285	137
75°F	313	138	329	138	327	140
85°F	351	140	366	140	368	142
95°F	397	143	412	143	414	144
105°F	450	146	467	147	465	147
115°F	506	149	522	150	524	150

**TABLE 6
KCA300 NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. +10 psig	Suc. +5 psig	Dis. +10 psig	Suc. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	290	136	296	132	306	137
75°F	330	138	338	135	348	138
85°F	375	141	382	137	394	140
95°F	423	144	432	140	440	142
105°F	475	146	486	142	492	145
115°F	526	149	546	144	550	148

C-Charge Verification - Approach Method - AHRI Testing

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

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

2. Approach temperatures should match values in table 7. An approach temperature greater than this value indicates an undercharge. An approach temperature less than this value indicates an overcharge.

- 3- Do not use the approach method if system pressures do not match pressures in tables 3 through 6. The approach method is not valid for grossly over or under-charged systems.

**TABLE 7
APPROACH TEMPERATURES**

Unit	Liquid Temp. Minus Ambient Temp.		
	1st Stage	2nd Stage	3rd Stage
180	8°F ± 1 (4.4°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	NA
210	8°F ± 1 (4.4°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	10°F ± 1 (5.6°C ± 0.5)
240	8°F ± 1 (4.4°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)
300	7°F ± 1 (3.9°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)	9°F ± 1 (5.0°C ± 0.5)

V- SYSTEMS SERVICE CHECKS

A-Cooling System Service Checks

KCA 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.

NOTE-When unit is properly charged discharge line pressures should approximate those in tables 3 through 6.

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

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

⚠ CAUTION

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

⚠ WARNING

Product contains fiberglass wool. Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.) Fiberglass wool may also cause respiratory, skin and eye irritation. To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown on unit nameplate or contact your supervisor.

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 16.

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

B-Lubrication

All motors used in KCA 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.

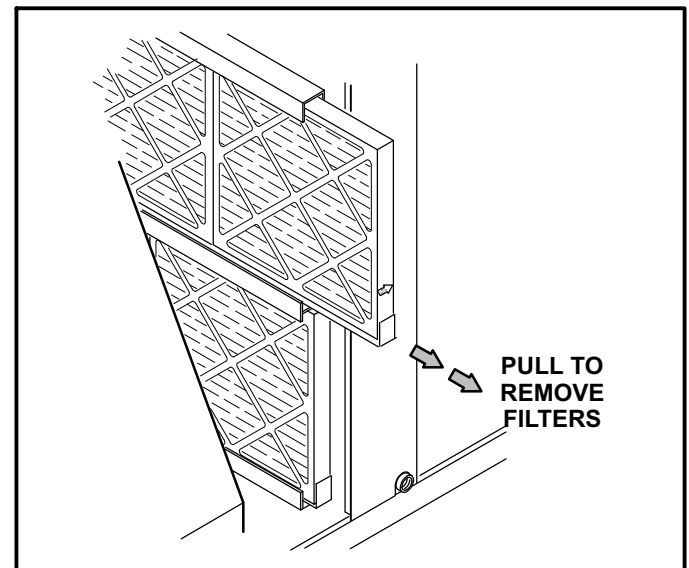


FIGURE 16

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 KCA units.

A-LARMF and LARMFH Mounting Frames

When installing either the KCA units on a combustible surface for downflow discharge applications, the Lennox LARMF18/36 14-inch or 24-inch (356 mm or 610mm) height roof mounting frame is used. For horizontal discharge applications, use LARMFH18/24 26-inch or 37-inch (660mm or 940mm) height roof mounting frame. This frame converts unit from down-flow to horizontal air flow. The 37 inch (940mm) horizontal frame meets National Roofing Code requirements. The roof mounting frames are recommended in all other applications but not required. If the KCA units are not mounted on a flat (roof) surface, they MUST be supported under all edges and under the middle of the unit to prevent sagging. The units MUST be mounted level within 1/16" per linear foot or 5mm per meter in any direction. The assembled LARMF18/36 mounting frame is shown in figure 17. Refer to the roof mounting frame installation instructions for details of proper assembly and mounting. The roof mounting frame MUST be squared to the roof and level before mounting. Plenum system MUST be installed before the unit is set on the mounting frame. Typical roof curbing and flashing is shown in figure 18. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

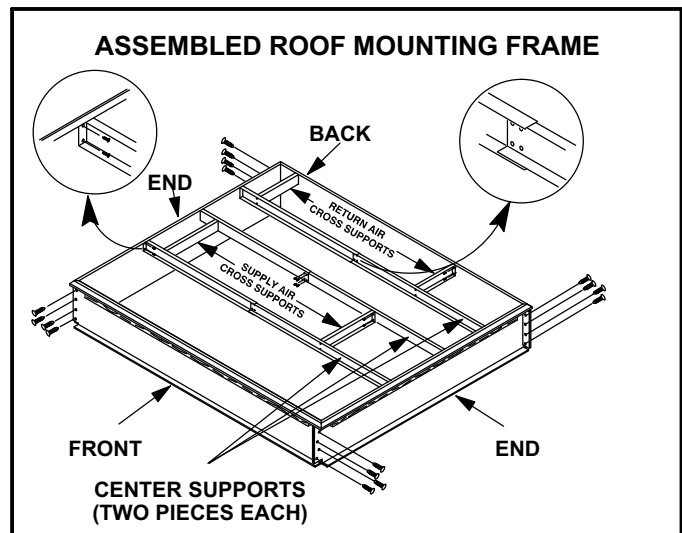


FIGURE 17

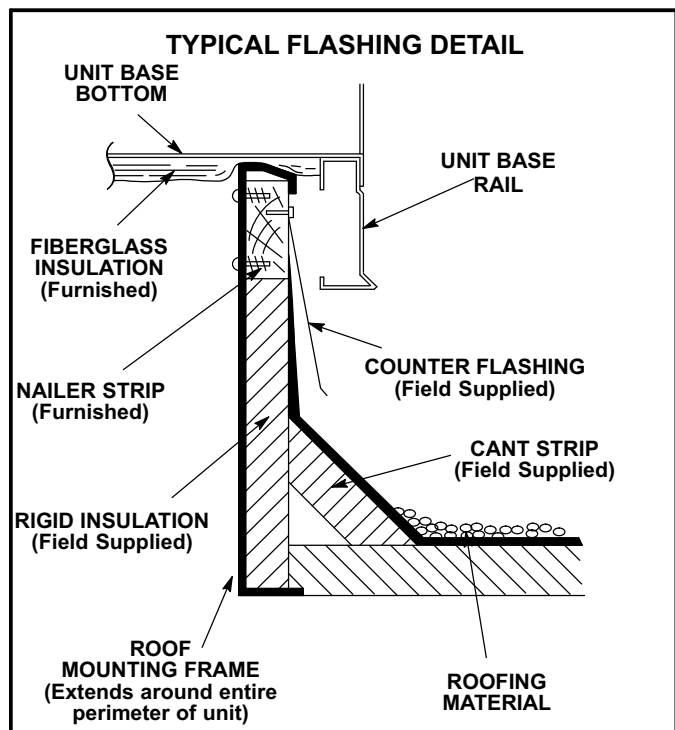


FIGURE 18

B-Transitions

Optional supply/return transitions LASRT18/24 are available for use with KCA series units utilizing optional LARMF18/36 roof mounting frame. Transition must be installed in the LARMF18/36 mounting frame before mounting the unit to the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

C-Supply and Return Diffusers (all units)

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

D-K1ECON

Unit may contain an optional modulating economizer equipped with an A6 enthalpy control and an S175 outdoor temperature sensor or A7 enthalpy sensor. The economizer modulates to use outdoor air for free cooling when temperature is suitable.

The A6 enthalpy control is located in the economizer access area. See figure 19. The S175 temperature sensor or A7 enthalpy sensor is located on the division panel between horizontal supply and return air sections.

Optional Sensors

An optional differential sensor (A62) may be used with the A7 outdoor sensor to compare outdoor air enthalpy to return air enthalpy. When the outdoor air enthalpy is below the return air enthalpy, outdoor air is used for free cooling.

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

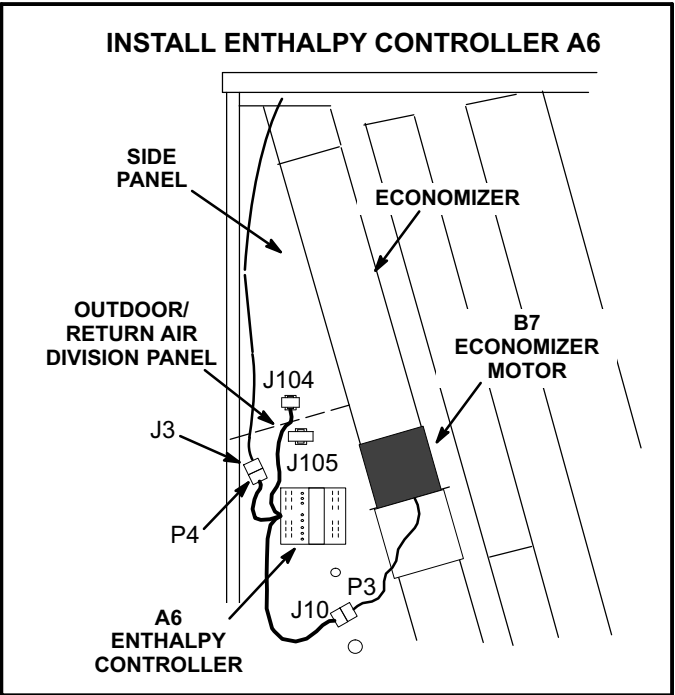


FIGURE 19

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 20.

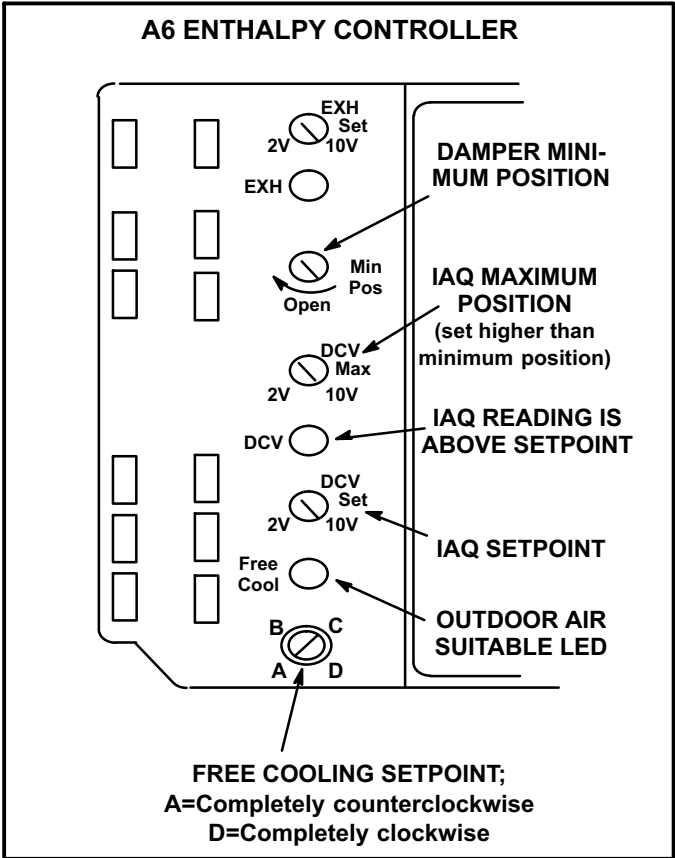


FIGURE 20

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 20.

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 8 shows the free cooling setpoints for enthalpy sensors. Use the recommended setpoint and adjust as necessary.

For example: At setting A (table 8), 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 8
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 21. 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.

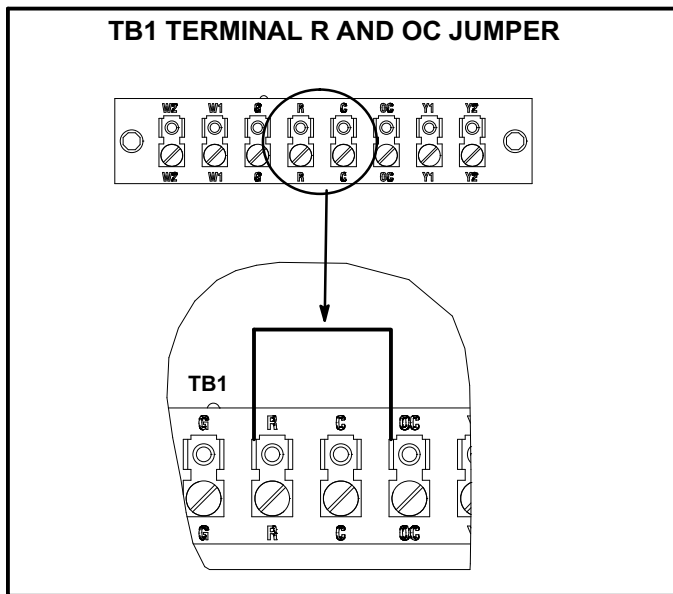


FIGURE 21

- 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°F, 4°C shown).

- 4- Measure return air temperature. Mark that point on the top line of chart 1 and label the point “B” (74°F, 23°C shown).
- 5- 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).
- 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 desired fresh 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 20.

The DCV MAX potentiometer is factory-set at approximately 50% of the potentiometer range or 6VDC. Dampers will open approximately half way when CO₂ rises above setpoint. Adjust the DCV MAX potentiometer to the approximate setting specified by the controls contractor. Refer to figure 20.

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 9 for economizer operation when outdoor air is suitable. See table 10 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).

CHART 1
CALCULATE MINIMUM FRESH AIR PERCENTAGE
 MIXED AND RETURN AIR TEMPERATURE

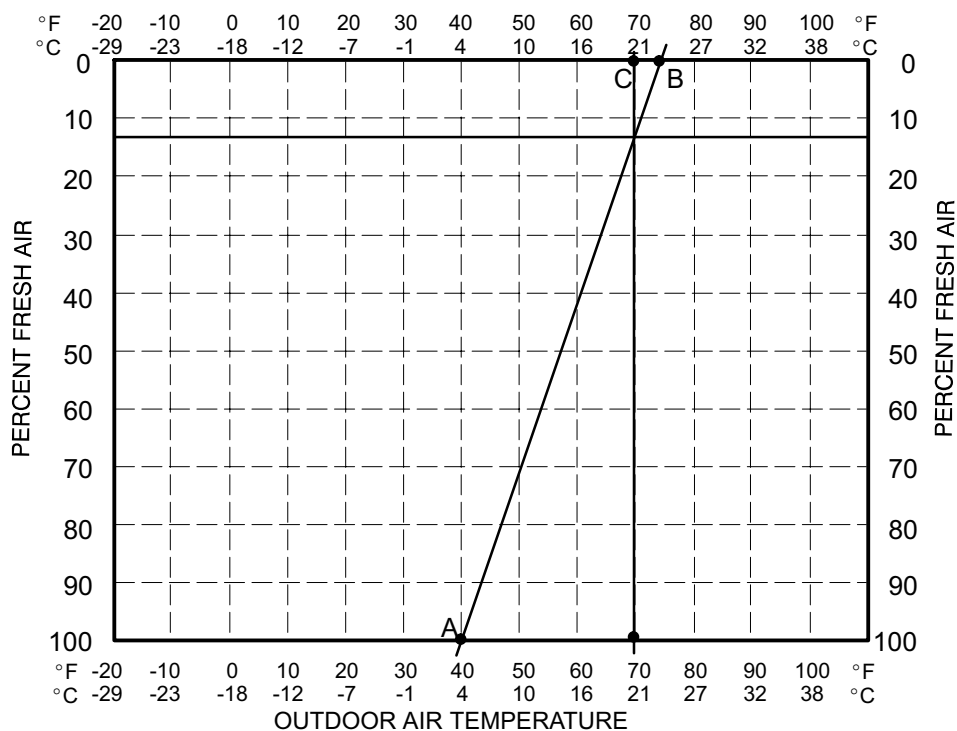


TABLE 9

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 10

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.

B-Outdoor Air Dampers

Outdoor air dampers used on KCA units consists of a set of dampers which may be manually or motor (M) operated to allow outside air into the system (see figure 22). Either air damper can be installed in KCA units. The motorized damper assembly opens to minimum position during the occupied time period and remains closed during the unoccupied period. Manual damper assembly is set at installation and remains in that position. See figure 23. Washable filter supplied with the outdoor air dampers can be cleaned with wa-

ter and a mild detergent. It should be sprayed with Filter Handicoater when dry prior to reinstallation. Filter Handicoater is R.P. Products coating no. 418 and is available as Lennox Part No. P-8-5069.

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

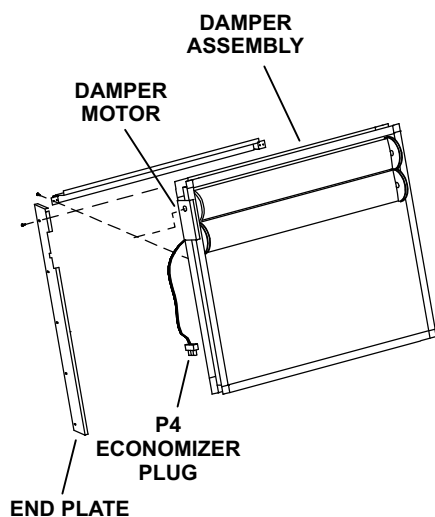
Follow the steps to determine fresh air percentage

- 1- Measure outdoor air temperature. Mark the point on the bottom line of chart 1 and label the point "A" (40°F, 4°C shown).
- 2- Measure return air temperature. Mark that point on the top line of chart 1 and label the point "B" (74°F, 23°C shown).
- 3- 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).
- 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 24.

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 24. Manual damper fresh air intake percentage can be determined in the same manner.

OUTDOOR AIR DAMPER



J3
UNIT JACK

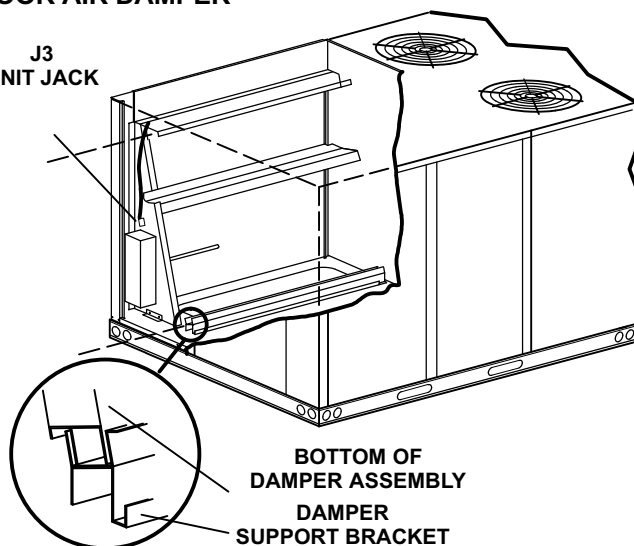


FIGURE 22

MANUAL OUTDOOR AIR DAMPER

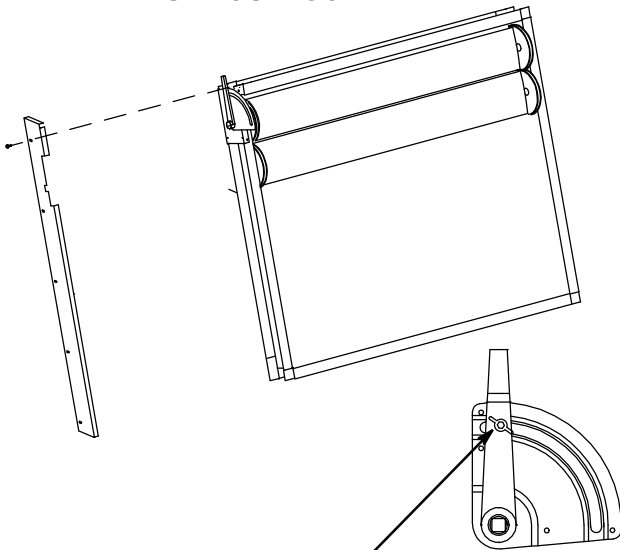


FIGURE 23

DAMPER MOTOR

THUMBWHEEL

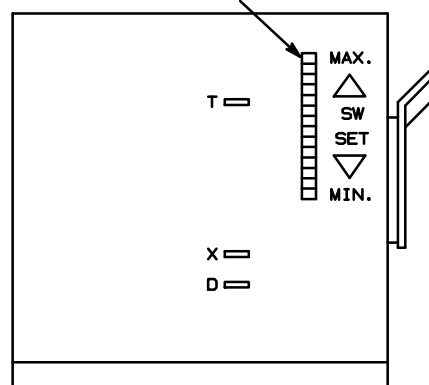


FIGURE 24

E-Gravity Exhaust Dampers

C1DAMP50 dampers (figure 25) available for KCA180/300 units, 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 KCA series units.

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

F-C1PWRE10C Power Exhaust Fans

C1PWRE10C available for KCA180/300 units are power exhaust fans used in downflow applications only. The fans require optional down-flow gravity exhaust 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 25 shows the location of the C1PWRE. See installation instructions for more detail.

G-Control Systems

Three different types of control systems may be used with the KCA 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.

1- Electro-mechanical thermostat (13F06)

The electro-mechanical thermostat is a two-stage heat / two-stage cool thermostat with dual temperature levers. A non-switching or manual system switch subbase may be used.

2- Electronic thermostat (see price book)

Any two-stage heat / two-stage cool electronic thermostat may be used.

3- Honeywell T7300 thermostat (81G59)

The Honeywell T7300 thermostat is a programmable, internal or optional remote temperature sensing thermostat. The T7300 provides occupied and unoccupied changeover control.

H-Smoke Detectors A171 and A172

Photoelectric smoke detectors are a field installed option. The smoke detectors can be installed in the supply air section (A172), return air section (A171), or in both the supply and return air section.

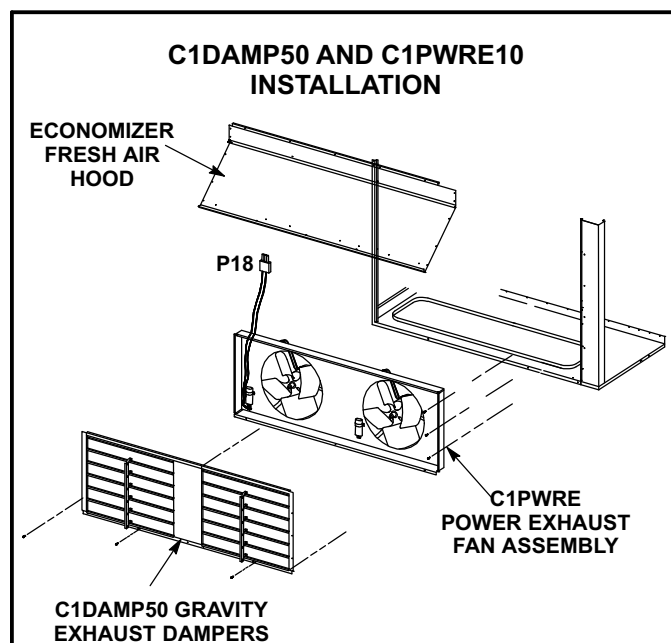


FIGURE 25

I-Indoor Air Quality (CO₂) Sensor A63

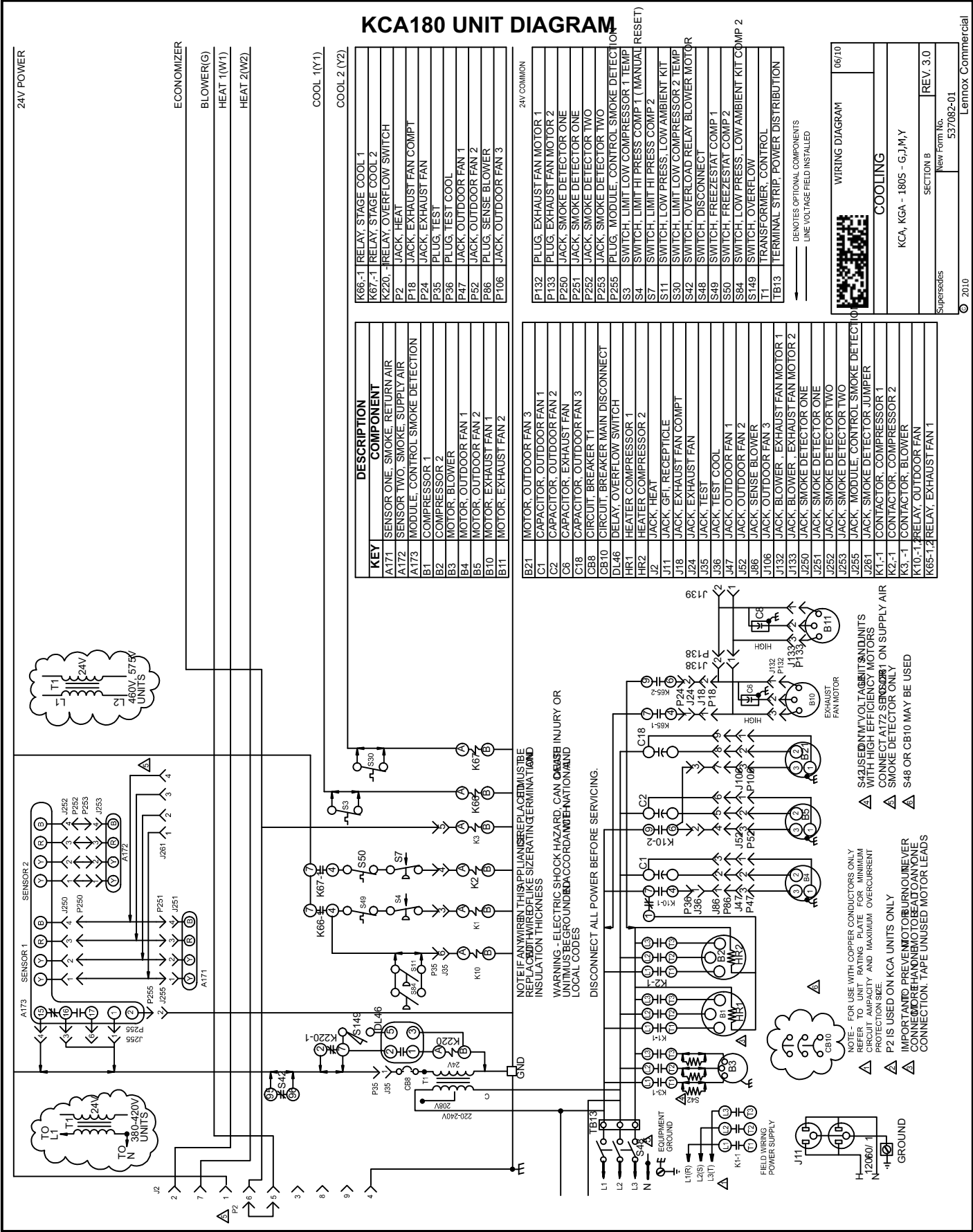
The indoor air quality sensor monitors CO₂ levels and reports the levels to the economizer control module A6. The board adjusts the economizer dampers according to the CO₂ levels. The sensor is mounted next to the indoor thermostat or in the return air duct. Refer to the indoor air quality sensor installation instructions for proper adjustment.

J-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.

K-Drain Pan Overflow Switch S149 (optional)

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



KCA180 SEQUENCE OF OPERATION

Power:

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

Blower Operation:

2. TB1 receives a demand from thermostat terminal and energizes blower contactor K3 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)

6. Y1 energizes the pilot relay K66 and N.O. K66-1 closes.
7. 24VAC is routed from T1 through N.C. freezestat S49 and N.C. high pressure switch S4 to energize compressor contactor K1.
8. N.O. contacts K1 close energizing compressor B1.
9. Optional N.O. low ambient switch S11 and/or S84 closes to energize condenser fan relay K10.
10. N.O. contacts K10-1 and K10-2 close energizing condenser fan B4, B5 and B21.

2nd Stage Cooling (compressor B2 is energized)

11. Y2 energizes the pilot relay K67 and N.O. K67-1 closes.
12. 24VAC is routed from T1 through N.C. freezestat S50 and N.C. high pressure switch S7 to energize compressor contactor K2.
13. N.O. K2 closes energizing compressor B2.

24V POWER



WIRING DIAGRAM

COOLING

KCA, KGA - 210S -G, J, M, Y

SECTION B

New Form No.

537083-01

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Lennox Commercial

KCA210 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. TB1 receives a demand from thermostat terminal G and 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. Optional N.O. low ambient switch S11 and/or S84 and/or S85 closes to energize condenser fan relay K10.
10. N.O. contacts K10-1 and K10-2 close energizing condenser fan B4, B5 and 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 and N.C. high pressure switch S28. Compressor contactor K14 is energized.
13. N.O. K14 closes energizing compressor B13.

KCA240 & 300 UNIT DIAGRAM

24V POWER

KEY	DESCRIPTION
A171	SENSOR ONE, SMOKE RETURN AIR
A172	SENSOR TWO, SMOKE SUPPLY AIR
A173	MODULE, CONTROL SMOKE DETECTION
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

KEY	DESCRIPTION
J252	JACK, SMOKE DETECTOR TWO
J253	JACK, SMOKE DETECTOR TWO
J255	JACK, SMOKE DETECTOR TWO
J261	JACK, SMOKE DETECTOR JUMPER
K1-1	CONTACTOR, COMPRESSOR 1
K2-1	CONTACTOR, COMPRESSOR 2
K3-1	CONTACTOR, BLOWER
K10-1,2	RELAY, OUTDOOR FAN
K14-1	RELAY, OUTDOOR FAN 1
K66-1,2	RELAY, EXHAUST FAN 1
K67-1	RELAY, STAGE COOL 1
K67-2	RELAY, STAGE COOL 2

ECONOMIZER

KEY	DESCRIPTION
BLOWING	
HEAT 1(W1)	
HEAT 2(W2)	

KEY	DESCRIPTION
K149-1	RELAY, OUTDOOR FAN 3
K220-1	RELAY, OVERFLOW SWITCH
P2	JACK, HEAT
P18	JACK, EXHAUST FAN

COOL 1(Y1)

KEY	DESCRIPTION
P24	JACK, EXHAUST FAN
P35	PLUG, TEST
P36	PLUG, TEST COOL
P47	JACK, OUTDOOR FAN 1
P52	JACK, OUTDOOR FAN 2
P53	PLUG, OUTDOOR FANS 1
P57	PLUG, OUTDOOR FANS 2
P106	JACK, OUTDOOR FAN 3
P107	JACK, OUTDOOR FAN 4
P132	PLUG, EXHAUST FAN MOTOR 1
P153	PLUG, EXHAUST FAN MOTOR 2
P158	PLUG, EXHAUST FAN 1

COOL 2 (Y2)

KEY	DESCRIPTION
P24	JACK, EXHAUST FAN
P35	PLUG, TEST
P36	PLUG, TEST COOL
P47	JACK, OUTDOOR FAN 1
P52	JACK, OUTDOOR FAN 2
P53	PLUG, OUTDOOR FANS 1
P57	PLUG, OUTDOOR FANS 2
P106	JACK, OUTDOOR FAN 3
P107	JACK, OUTDOOR FAN 4
P132	PLUG, EXHAUST FAN MOTOR 1
P153	PLUG, EXHAUST FAN MOTOR 2
P158	PLUG, EXHAUST FAN 1

24V COMMON

KEY	DESCRIPTION
P250	JACK, SMOKE DETECTOR ONE
P251	JACK, SMOKE DETECTOR ONE
P252	JACK, SMOKE DETECTOR TWO
P253	JACK, SMOKE DETECTOR TWO
P255	PLUG, MODULE, CONTROL SMOKE DETECTION
S1	SWITCH, LIMIT LOW COMPRESSOR 1 TEMP
S4	SWITCH, LIMIT HI PRESS COMP 1 (MANUAL RESET)
S7	SWITCH, LIMIT HI PRESS COMP 2
S11	SWITCH, LOW PRESS, LOW AMBIENT KIT
S28	SWITCH, LIMIT HI PRESS COMP 3
S30	SWITCH, LIMIT LOW COMPRESSOR 2 TEMP
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S48	SWITCH, DISCONNECT
S49	SWITCH, FREEZE/STAT COMP 1
S50	SWITCH, FREEZE/STAT COMP 2
S53	SWITCH, FREEZE/STAT COMP 3
S84	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 2
S85	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 3
S149	SWITCH, OVERFLOW
T1	TRANSFORMER, CONTROL
T18	TRANSFORMER, CONTACTOR CONTROL
TB13	TERMINAL STRIP, POWER DISTRIBUTION

DEVOTES OPTIONAL COMPONENTS

LINE VOLTAGE FIELD INSTALLED

WIRING DIAGRAM

06/10

COOLING

KCA, KGA - 240S, 300S- G, J, M, Y

SECTION B

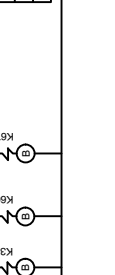
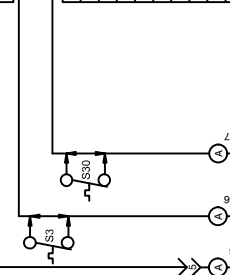
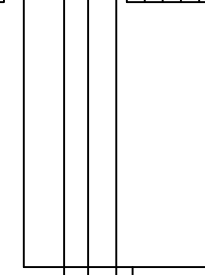
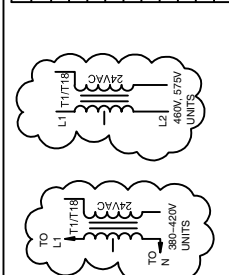
REV. 3.0

Supersedes

New Form No.

537084-01

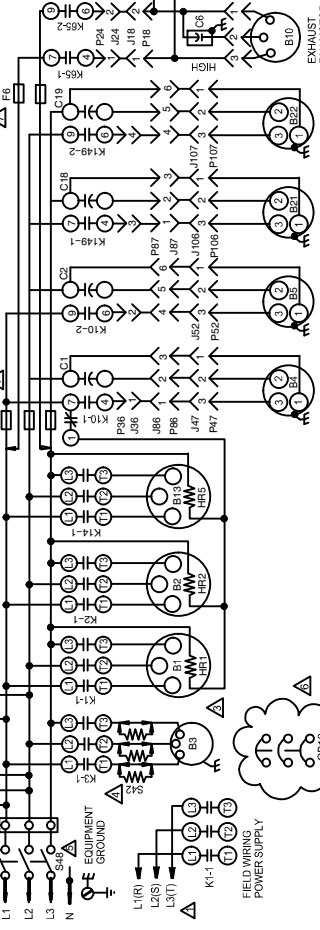
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NOTE: IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING, TERMINATION AND INSULATION THICKNESS.

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 F10



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.

IMPORTANT: TO PREVENT MOTOR BURNOUT, NEVER CONNECT MORE THAN ONE MOTOR LEAD TO ANY ONE CONNECTION. TAPE UNUSED MOTOR LEADS.

S42 USED ON "M" VOLTAGE UNITS AND UNITS WITH HIGH EFFICIENCY MOTORS.

CONNECT A173 SENSOR TO 261 ON SUPPLY AIR SMOKE DETECTOR ONLY.

S46 OR CB10 MAY BE USED.

F6 AND F10 ARE USED ON "Y" VOLTAGE UNITS ONLY.

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

EXHAUST FAN MOTOR

KCA240, 300 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. TB1 receives a demand from thermostat terminal G and 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. Optional N.O. low ambient switch S11 closes to energize condenser fan relay K10.
10. N.O. contacts K10-1 and K10-2 close energizing condenser fan B4 and B5.
11. Optional N.O. low ambient switch S84 and/or S85 close to energize condenser fan relay K149.
12. N.O. contacts K149-1 and K149-2 close energizing condenser fan B21 and B22.

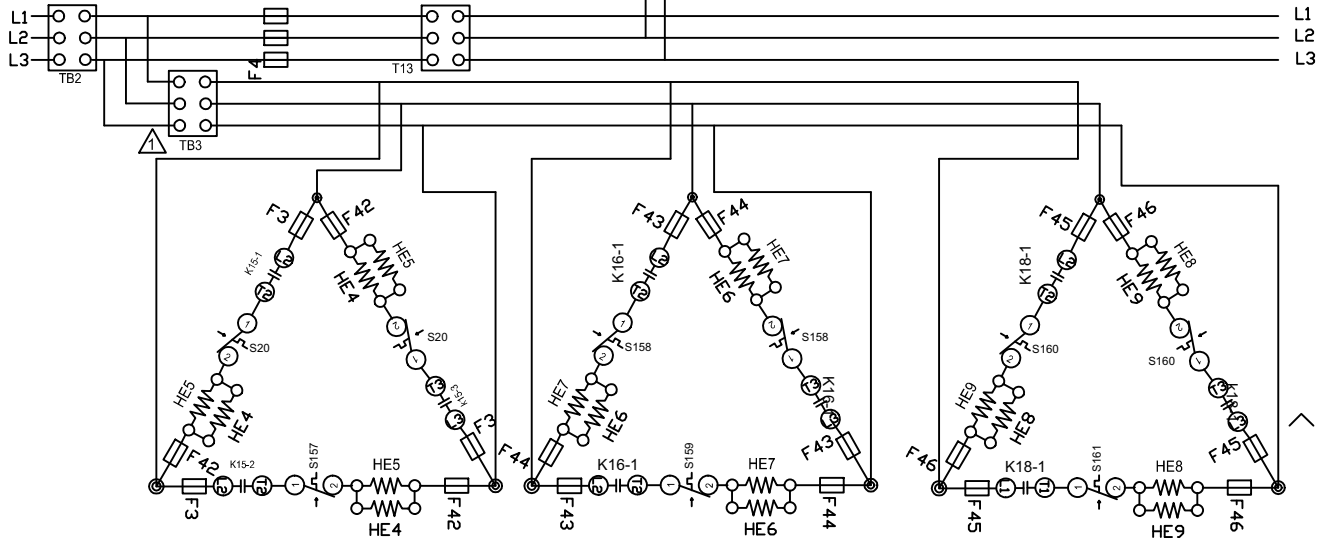
2nd Stage Cooling (compressor B13 is energized)

13. Y2 energizes the pilot relay K67 and N.O. K67-1 closes.
14. 24VAC is routed from T18 to N.C. freezestat S53 and N.C. high pressure switch S28. Compressor contactor K14 is energized.
15. N.O. K14 closes energizing compressor B13.

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

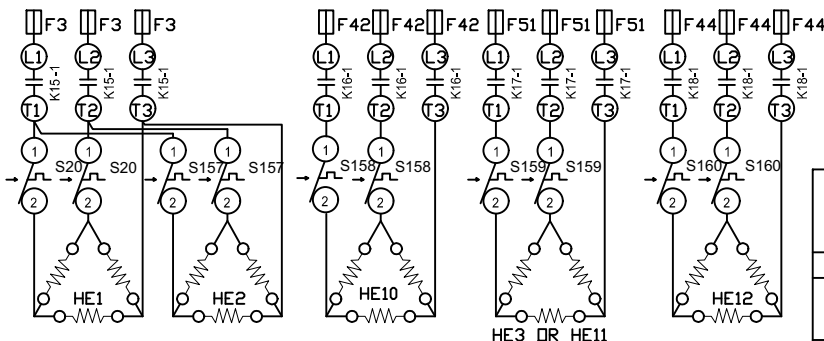
KEY	DESCRIPTION
KEY	COMPONENT
CB13	CIRCUIT, BREAKER TRNAS T2
DL2	DELAY, ELECTRIC HEAT
DL5	DELAY, ELECTRIC HEAT
F3	FUSE, ELECTRIC HEAT
F4	FUSE, UNIT
F42	FUSE, ELECTRIC HEAT
F43	FUSE, ELECTRIC HEAT
F44	FUSE, ELECTRIC HEAT
F45	FUSE, ELECTRIC HEAT
F46	FUSE, ELECTRIC HEAT
F51	FUSE, ELECTRIC HEAT
HE1	ELEMENT, 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




⚠ TB 3 IS USED IN SOME UNITS

C UNITS 180 TO 300



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 02/10
HEATING EHA - 15, 30, 45, 60, 90 - Y FOR USE WITH KCA AND KHA UNITS		
SECTION A		REV. 3.0
Supersedes 535066W	New Form No. 537060-01	

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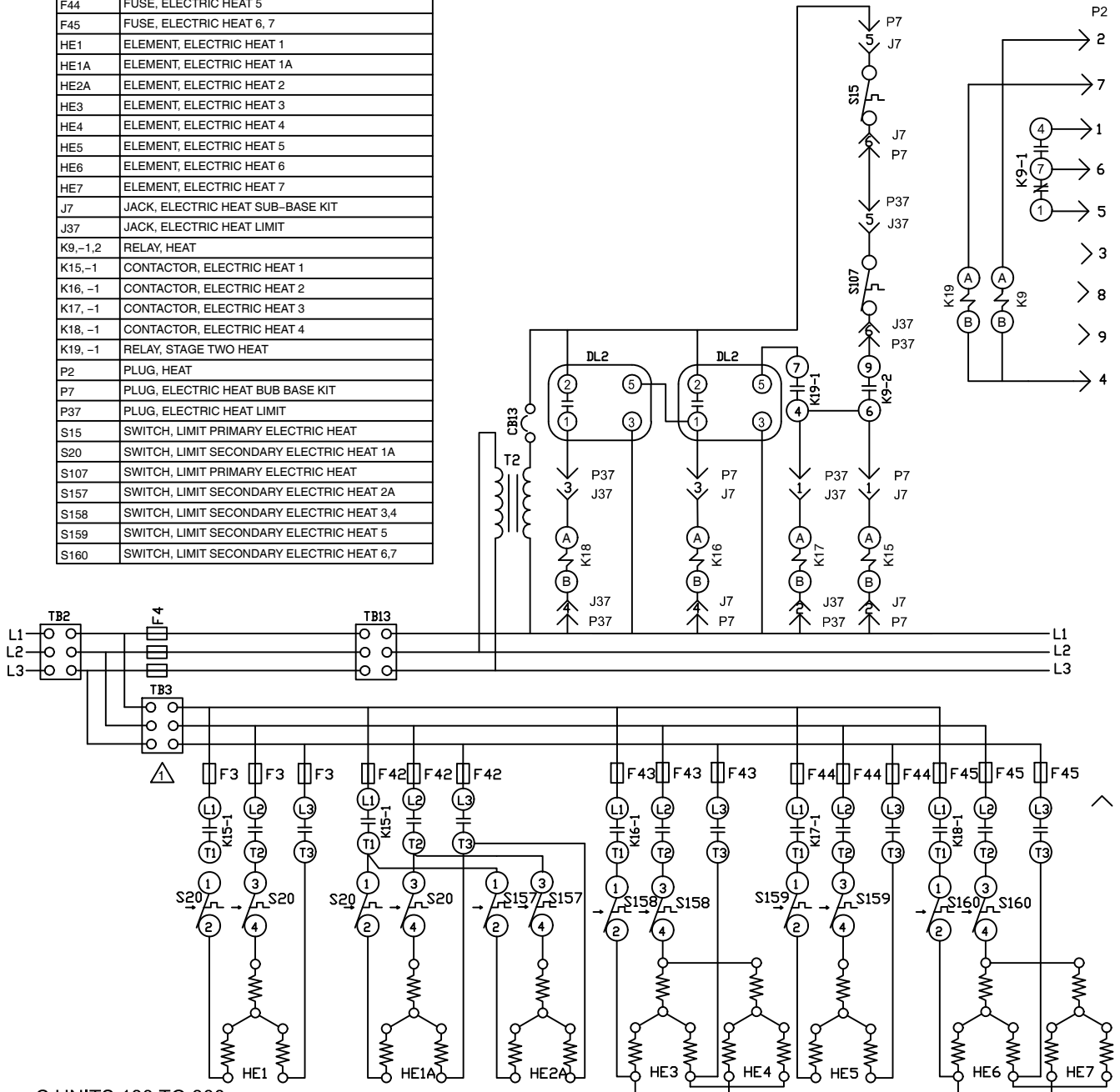
Lennox Commercial

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

KEY	DESCRIPTION
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 180 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

05/10

HEATING

EHA - 15, 30, 45, 60, 90 - G, J
FOR USE WITH KCA AND KHA UNITS

SECTION A

REV. 0.0

Supersedes

New Form No.

537059-02

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Sequence of Operation - EHA15 ,30, 45, 60, 90kW - Y, G, J and M

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:

Heating demand is satisfied. Terminal W2 in the thermostat is de-energized.

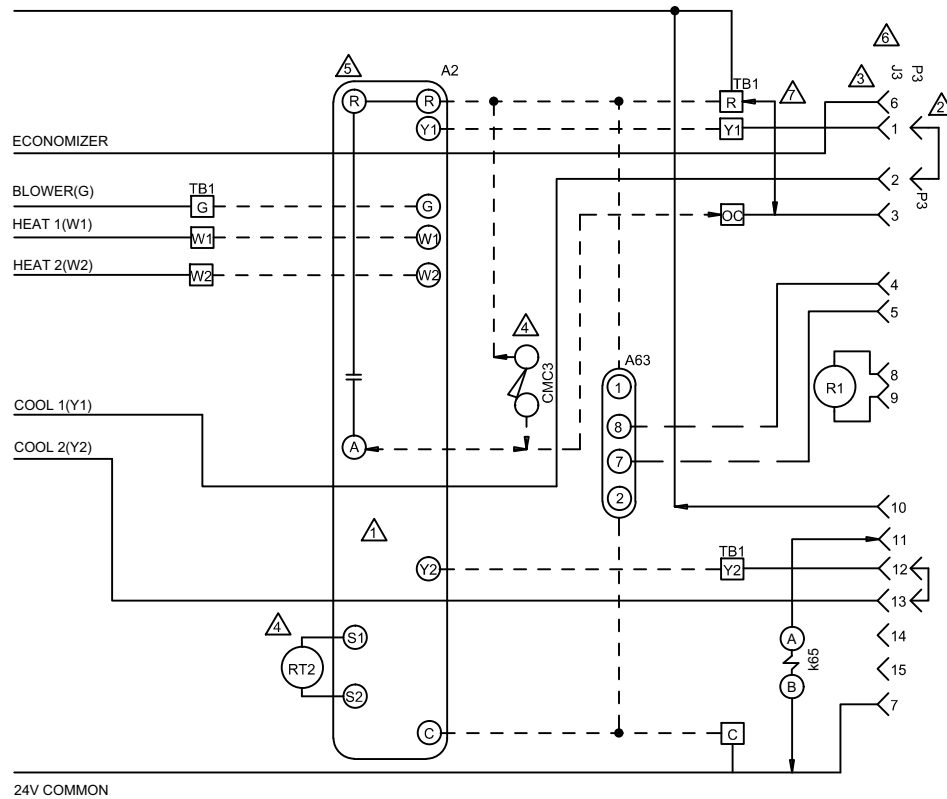
- 8 - Electric heat contactors K16 and K18 are de-energized.
- 9 - The fourth and third set of elements are de-energized.

END OF FIRST STAGE HEAT:

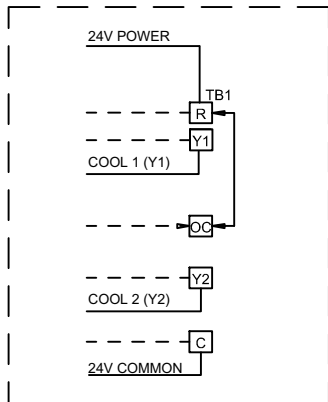
Heating demand is satisfied. Terminal W1 in the thermostat is de-energized.

- 10 - Electric heat contactors K15 and K17 are de-energized.
- 11 - The second and first set of electric heat elements are de-energized.

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT



24V COMMON



CONNECTION SCHEME FOR KCA, KGA AND KHA 092 THROUGH 150 UNITS WITHOUT ECONOMIZER ONLY

DESCRIPTION	
KEY	COMPONENT
A2	SENSOR, ELECTRONIC THERMOSTAT
A63	SENSOR, CO2
CMC3	CLOCK, TIME
J3	JACK, UNIT ECONOMIZER
K65	RELAY, EXHAUST FAN
P3	PLUG, ECONOMIZER BYPASS
R1	SENSOR, MIXED AIR OR SUPPLY AIR
RT2	SENSOR, REMOTE THERMOSTAT
TB1	TERMINAL STRIP, CLASS II VOLTAGE

- △ THERMOSTAT SUPPLIED BY USER
- △ REMOVE P3 WHEN ECONOMIZERS USED, ONLY ON KCA, KGA AND KHA 180 THROUGH 300 UNITS.
- △ J3 MAXIMUM LOAD 20VA 24VAC CLASS II
- △ TIME CLOCK CONTACTS (OPT) CLOSED OCCUPIED
- △ TOUCHSCREEN THERMOSTAT
- △ J3 AND P3 ARE NOT USED ON KCA, KGA AND KHA 092 THROUGH 150 UNITS WITHOUT ECONOMIZER
- △ REMOVE JUMPER BETWEEN TB1-R AND TB1-OC WHEN USING A NITE SETBACK THERMOSTAT

— DENOTES OPTIONAL COMPONENTS
 - - - CLASS II FIELD WIRING

WIRING DIAGRAM		12/09
ACCESSORIES		
ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT		
SECTION C		REV. 2.0
Supersedes	New Form No. 537077-01	

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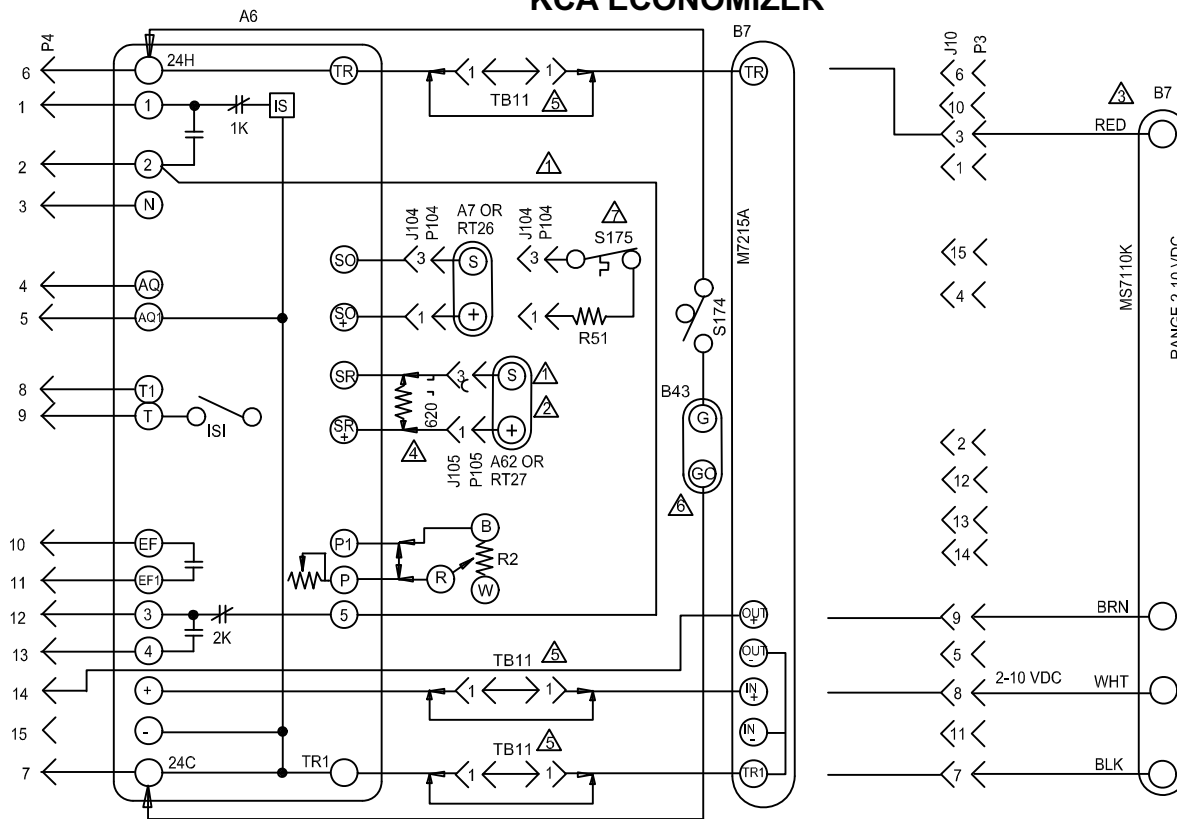
POWER:

- Terminal strip TB1 found on the control panel energizes thermostat components with 24VAC.

OPERATION:

- TB1 receives data from the electronic thermostat A2 (Y1, Y2, W1, W2, G, OCP)
 TB1 energizes the appropriate components for heat or cool demand.

KCA ECONOMIZER



KEY	DESCRIPTION
A6	CONTROL-SOLID STATE ENTHALPY
A7	SENSOR-SOLID STATE ENTHALPY
A62	SENSOR-ENTHALPY, INDOOR
B7	MOTOR-DAMPER, ECONOMIZER
B43	MOTOR-EXHAUST DAMPER
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

△ OPTIONAL OUTDOOR THERMOSTAT TO REPLACE RT26 SENSIBLE SENSOR

△ OPTIONAL EXHAUST DAMPER TO HOLD EXHAUST DAMPER CLOSED WHEN OUTSIDE AIR DAMPER IS CLOSED

△ TB11 USED ON "C" BOX ONLY WITH MOTOR M7215A

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

△ USED ON C BOX UNITS

△ A62 ENTHALPY SENSOR OR RT27 USED FOR DIFFERENTIAL SENSING

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

— DESIGNATES OPTIONAL WIRING
- - - CLASS II FIELD WIRING

	WIRING DIAGRAM	5/09
ACCESSORIES		
ECONOMIZER		
ECONOMIZER SECTION D1		
Supersedes Form No.	New Form No.	
	537080-01	

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SEQUENCE OF OPERATION

POWER:

1. Economizer control module A6 is energized through P4 when contactor K3 is energized.

OPERATION:

2. Temperature sensor S175 or enthalpy sensor A7 and A62 (if differential enthalpy is used) communicates to the economizer control module A6 when to power the damper motor B7.
3. Economizer control module A6 supplies B7 with 0 - 10 VDC to control the positioning of economizer.
4. The damper actuator provides 2 to 10 VDC position feedback.