

**KCA156 through 300S**

KCA156H through 300 units are available in 176,000 to 270,000 Btuh (51.7 to 79.1kW) high efficiency cooling capacities. 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 180S utilizes two compressors, the 156H, 180H, 210S, 240S and 300S utilize three compressors and the 240H and 300H utilize four compressors.

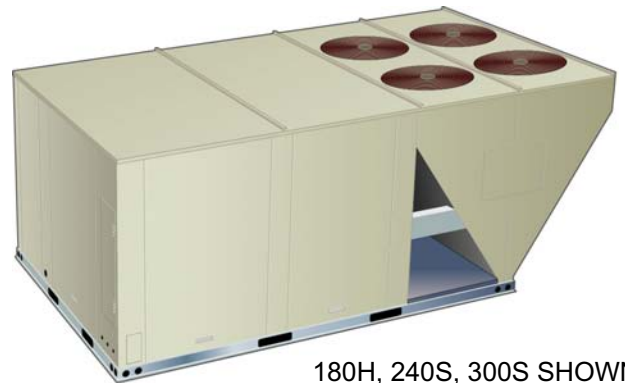
Optional electric heat is field-installed. Electric heat operates in single or multiple stages depending on the kW input size. 15kW to 60kW heat sections are available for 156H and 180 units. 15kW to 90kW heat sections are available for the 210, 240 and 300.

Units equipped with an optional supply air inverter (VFD) are available. The blower will operate at lower speeds when cooling demand is low and increase to higher speeds when cooling demand is high. Refer to Supply Air Inverter Start-Up section.

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.



180H, 240S, 300S 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.

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**⚠ WARNING**

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

**⚠ CAUTION**

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

## OPTIONS / ACCESSORIES - STANDARD EFFICIENCY MODELS

Item Description	Model Number	Catalog Number	180S	210S	240S	300S
<b>COOLING SYSTEM</b>						
Condensate Drain Trap	PVC - C1TRAP20AD2	<b>76W26</b>	X	X	X	X
	Copper - C1TRAP10AD2	<b>76W27</b>	X	X	X	X
Corrosion Protection		Factory	O	O	O	O
Drain Pan Overflow Switch	C1SNSR71FF1-	<b>10C24</b>	X	X	X	X
Efficiency		Standard	O	O	O	O
Low Ambient Control	K1LOAM52C11	<b>10T62</b>	X			
	K1LOAM53C11	<b>10T63</b>		X		
	K1LOAM53C21	<b>10T64</b>			X	X
Refrigerant Type		R-410A	O	O	O	O
<b>BLOWER - SUPPLY AIR</b>						
Blower Option	CAV (Constant Air Volume)	Factory	O	O	O	O
	VFD Driven	Factory	O	O	O	O
Motors - Constant Air Volume (CAV)	Belt Drive (standard efficiency) - 3 hp	Factory	O	O		
	Belt Drive (standard efficiency) - 5 hp	Factory	O	O	O	O
	Belt Drive (standard efficiency) - 7.5 hp	Factory	O	O	O	O
	Belt Drive (standard efficiency) - 10 hp	Factory			O	O
Motors - VFD Driven	Belt Drive (standard efficiency) - 3 hp	Factory	O	O		
	Belt Drive (standard efficiency) - 5 hp	Factory	O	O	O	O
	Belt Drive (standard efficiency) - 7.5 hp	Factory	O	O	O	O
	Belt Drive (standard efficiency) - 10 hp	Factory			O	O
VFD Manual Bypass Kit (for VFD equipped units)	3 hp, 5 hp (208/230V)	KVFDB11C-1	<b>90W52</b>	X	X	X
	3 hp, 5 hp, 7.5 hp, 10 hp (460V and 575V)					
	7.5 hp, 10 hp (208/230V)	KVFDB10C-1	<b>90W51</b>	X	X	X
Drive Kits  See Blower Data Tables for usage and selection	Kit #1 535-725 rpm	Factory	O	O		
	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
	<b>CABINET</b>					
Coil Guards	E1GARD22C11	<b>98W76</b>	X	X		
	E1GARD21C11	<b>93W17</b>			X	X
Hail Guards	E1GARD12C11	<b>98W77</b>	X	X		
	E1GARD11C11	<b>93W16</b>			X	X
Hinged Access Panels		Factory	O	O	O	O
<b>CONTROLS</b>						
Commercial Controls	Building Automation System	- - -	X	X	X	X
BACnet®	K0CTRL31B-1	<b>96W15</b>	OX	OX	OX	OX
BACnet® Thermostat with Display	K0SNSR01FF1	<b>97W23</b>	X	X	X	X
BACnet® Thermostat without Display	K0SNSR00FF1	<b>97W24</b>	X	X	X	X
Novar® 2051	K0CTRL30B-1	<b>96W12</b>	OX	OX	OX	OX
Plenum Cable (75 ft.)	K0MISC00FF1	<b>97W25</b>	X	X	X	X
Smoke Detector - Supply or Return (Power board and one sensor)	C1SNSR44C-1	<b>83W40</b>	X	X	X	X
Smoke Detector - Supply and Return (Power board and two sensors)	C1SNSR43C-1	<b>83W41</b>	X	X	X	X

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

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## OPTIONS / ACCESSORIES - STANDARD EFFICIENCY MODELS

Item Description	Model Number	Catalog Number	180S	210S	240S	300S
<b>ELECTRICAL</b>						
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	<b>54W85</b>	OX	OX	OX	OX
	150 amp - C1DISC150C-1	<b>54W86</b>	OX	OX	OX	OX
	250 amp - C1DISC250C-1	<b>54W87</b>	OX	OX	OX	OX
GFI Service Outlets	15 amp non-powered, field-wired (208/230V, 460V only)	LTAGFIK10/15	<b>74M70</b>	OX	OX	OX
	20 amp non-powered, field-wired (575V only)	C1GFCI20FF1	<b>67E01</b>	X	X	X
Weatherproof Cover for GFI	C1GFCI99FF1	<b>10C89</b>	X	X	X	X
<sup>1</sup> Phase Monitor	C1PHZM01FF1-	<b>10C25</b>	X	X	X	X
<b>INDOOR AIR QUALITY</b>						
<b>Air Filters</b>						
High Efficiency Air Filters	MERV 8 - C1FLTR15C-1-	<b>54W67</b>	X	X	X	X
24 x 24 x 2 (Order 6 per unit)	MERV 13 - C1FLTR40C-1-	<b>52W40</b>	X	X	X	X
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)	C1FLTR30C-1-	<b>44N61</b>	X	X	X	X
<b>Indoor Air Quality (CO<sub>2</sub>) Sensors</b>						
Sensor - Wall-mount, off-white plastic cover with LCD display	C0SNSR50AE1L	<b>77N39</b>	X	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display	C0SNSR52AE1L	<b>87N53</b>	X	X	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting	C0SNSR51AE1L	<b>87N52</b>	X	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting	C0MISC19AE1	<b>87N54</b>	X	X	X	X
CO <sub>2</sub> Sensor Duct Mounting Kit - for downflow applications	C0MISC19AE1-	<b>85L43</b>	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO <sub>2</sub> sensors ( <b>87N53</b> or <b>77N39</b> )	C0MISC16AE1-	<b>90N43</b>	X	X	X	X
<b>UVC Germicidal Light Kit</b>						
UVC Light Kit (110/230V-1ph)	C1UVCL10C-1	<b>54W65</b>	X	X	X	X
<b>ELECTRIC HEAT</b>						
15 kW	208/230V-3ph - C1EH0150C-1Y	<b>53W84</b>	X	X	X	X
	460V-3ph - C1EH0150C-1G	<b>53W86</b>	X	X	X	X
	575V-3ph - C1EH0150C-1J	<b>53W87</b>	X	X	X	X
30 kW	208/230V-3ph - C1EH0300C21Y	<b>53W92</b>	X	X	X	X
	460V-3ph - C1EH0300C21G	<b>53W94</b>	X	X	X	X
	575V-3ph - C1EH0300C21J	<b>53W95</b>	X	X	X	X
45 kW	208/230V-3ph - C1EH0450C21Y	<b>54W00</b>	X	X	X	X
	460V-3ph - C1EH0450C21G	<b>54W02</b>	X	X	X	X
	575V-3ph - C1EH0450C21J	<b>54W03</b>	X	X	X	X
60 kW	208/230V-3ph - C1EH0600C21Y	<b>54W08</b>	X	X	X	X
	460V-3ph - C1EH0600C21G	<b>54W10</b>	X	X	X	X
	575V-3ph - C1EH0600C21J	<b>54W11</b>	X	X	X	X
90 kW	208/230V-3ph - C1EH0900C-1Y	<b>54W12</b>		X	X	X
	460V-3ph - C1EH0900C-1G	<b>54W14</b>		X	X	X
	575V-3ph - C1EH0900C-1J	<b>54W15</b>		X	X	X
<b>ECONOMIZER</b>						
<b>Economizer</b>						
Economizer - Downflow or Horizontal (Outdoor Air Hood furnished)	K1ECON20C-2	<b>54W77</b>	OX	OX	OX	OX
<b>Economizer Controls</b>						
Differential Enthalpy	Order 2 - C1SNSR64FF1	<b>53W64</b>	X	X	X	X
Single Enthalpy	C1SNSR64FF1	<b>53W64</b>	OX	OX	OX	OX
<b>Downflow Barometric Relief Dampers</b>						
Barometric Relief Dampers with Exhaust Hood	C1DAMP50C	<b>54W78</b>	OX	OX	OX	OX
<b>Horizontal Barometric Relief Dampers</b>						
Barometric Relief Dampers with Exhaust Hood	LAGEDH18/24	<b>16K99</b>	X	X	X	X

<sup>1</sup> Factory installed on all VFD equipped units.

<sup>2</sup> Lamps operate on 110-230V single-phase power supply. Step-down transformer must be field supplied for field installation in 460V and 575V rooftop units (transformer is furnished for factory installed light kits). Alternately, a separate 110V power supply may be used to directly power the UVC ballast(s)

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## OPTIONS / ACCESSORIES - STANDARD EFFICIENCY MODELS

Item Description	Model Number	Catalog Number	180S	210S	240S	300S
<b>OUTDOOR AIR</b>						
<b>Outdoor Air Dampers</b>						
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
<b>POWER EXHAUST (DOWNFLOW APPLICATIONS ONLY)</b>						
Standard Static	208/230V - C1PWRE11C-1Y	75W90	X	X	X	X
	460V - C1PWRE11C-1G	75W91	X	X	X	X
	575V - C1PWRE11C-1J	75W92	X	X	X	X
<b>ROOF CURBS - DOWNFLOW</b>						
<b>Clip Curb</b>						
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
<b>Standard</b>						
14 in. height	LARMF18/36-14	16K87	X	X	X	X
24 in. height	LARMF18/36-24	16K88	X	X	X	X
<b>Adjustable Pitched Curb</b>						
14 in. height	L1CURB55C	43W26	X	X	X	X
<b>ROOF CURBS - HORIZONTAL (REQUIRES HORIZONTAL RETURN AIR PANEL KIT)</b>						
<b>Standard</b>						
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
<b>Insulation Kit For Standard Horizontal Curbs</b>						
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
<b>Horizontal Return Air Panel Kit</b>						
Required for Horizontal Applications with Roof Curb	C1HRAP10C-1-	87M00	X	X	X	X
<b>CEILING DIFFUSERS</b>						
Step-Down - Order one	RTD11-185	29G06	X			
	RTD11-275-R	29G07		X	X	X
Flush - Order one	FD11-185	29G10	X			
	FD11-275-R	29G11		X	X	X
Transitions (Supply and Return) - Order one	LASRT18	19K01	X			
	LASRT21/24	19K02		X	X	X

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## OPTIONS / ACCESSORIES - HIGH EFFICIENCY MODELS

Item Description	Model Number	Catalog Number	156H	180H	210H	240H	300H
<b>COOLING SYSTEM</b>							
Condensate Drain Trap	PVC - C1TRAP20AD2	<b>76W26</b>	X	X	X	X	X
	Copper - C1TRAP10AD2	<b>76W27</b>	X	X	X	X	X
Corrosion Protection		Factory	O	O	O	O	O
Drain Pan Overflow Switch	C1SNSR71FF1-	<b>10C24</b>	X	X	X	X	X
Efficiency		High	O	O	O	O	O
Low Ambient Control	K1LOAM53C11	<b>10T63</b>	X				
	K1LOAM53C21	<b>10T64</b>		X	X		
	K1LOAM54C21	<b>10T65</b>				X	X
Refrigerant Type		R-410A	O	O	O	O	O
<b>BLOWER - SUPPLY AIR</b>							
Blower Option	CAV (Constant Air Volume)	Factory	O	O	O	O	O
	VFD Driven	Factory	O	O	O	O	O
Motors - Constant Air Volume (CAV)	Belt Drive (standard efficiency) - 2 hp	Factory	O				
	Belt Drive (standard efficiency) - 3 hp	Factory	O	O	O		
	Belt Drive (standard efficiency) - 5 hp	Factory	O	O	O	O	O
	Belt Drive (standard efficiency) - 7.5 hp	Factory		O	O	O	O
	Belt Drive (standard efficiency) - 10 hp	Factory				O	O
Motors - VFD Driven	Belt Drive (high efficiency) - 2 hp	Factory	O				
	Belt Drive (standard efficiency) - 3 hp	Factory	O	O	O		
	Belt Drive (standard efficiency) - 5 hp	Factory	O	O	O	O	O
	Belt Drive (standard efficiency) - 7.5 hp	Factory		O	O	O	O
	Belt Drive (standard efficiency) - 10 hp	Factory				O	O
VFD Manual Bypass Kit (for VFD equipped units)	2, 3, 5 hp (208/230V)	KVFDB11C-1	<b>90W52</b>	X	X	X	X
	2, 3, 5, 7.5, 10 hp (460V and 575V)						
	7.5, 10 hp (208/230V)	KVFDB10C-1	<b>90W51</b>		X	X	X
Drive Kits  See Blower Data Tables for usage and selection	Kit #1 535-725 rpm	Factory	O	O	O		
	Kit #2 710-965 rpm	Factory	O	O	O		
	Kit #3 685-856 rpm	Factory	O	O	O	O	O
	Kit #4 850-1045 rpm	Factory	O	O	O	O	O
	Kit #5 945-1185 rpm	Factory	O	O	O	O	O
	Kit #6 850-1045 rpm	Factory		O	O	O	O
	Kit #7 945-1185 rpm	Factory		O	O	O	O
	Kit #8 1045-1285 rpm	Factory		O	O	O	O
	Kit #10 1045-1285 rpm	Factory				O	O
	Kit #11 1135-1365 rpm	Factory				O	O
	<b>CABINET</b>						
Coil Guards	E1GARD22C11	<b>98W76</b>	X				
	E1GARD21C11	<b>93W17</b>		X	X	X	X
Hail Guards	E1GARD12C11	<b>98W77</b>	X				
	E1GARD11C11	<b>93W16</b>		X	X	X	X
Hinged Access Panels		Factory	O	O	O	O	O
<b>CONTROLS</b>							
Commercial Controls	Building Automation System	---	X	X	X	X	X
BACnet®	K0CTRL31B-1	<b>96W15</b>	OX	OX	OX	OX	OX
BACnet® Thermostat with Display	K0SNSR01FF1	<b>97W23</b>	X	X	X	X	X
BACnet® Thermostat without Display	K0SNSR00FF1	<b>97W24</b>	X	X	X	X	X
Novar® 2051	K0CTRL30B-1	<b>96W12</b>	OX	OX	OX	OX	OX
Plenum Cable (75 ft.)	K0MISC00FF1	<b>97W25</b>	X	X	X	X	X
Smoke Detector - Supply or Return (Power board and one sensor)	C1SNSR44C-1	<b>83W40</b>	X	X	X	X	X
Smoke Detector - Supply and Return (Power board and two sensors)	C1SNSR43C-1	<b>83W41</b>	X	X	X	X	X

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## OPTIONS / ACCESSORIES - HIGH EFFICIENCY MODELS

Item Description	Model Number	Catalog Number	156H	180H	210H	240H	300H
<b>ELECTRICAL</b>							
Voltage 60 hz	208/230V - 3 phase	Factory	O	O	O	O	O
	460V - 3 phase	Factory	O	O	O	O	O
	575V - 3 phase	Factory	O	O	O	O	O
Disconnect Switch (see Electric Heat Tables for usage)	80 amp - C1DISC080C-1	<b>54W85</b>	OX	OX	OX	OX	OX
	150 amp - C1DISC150C-1	<b>54W86</b>	OX	OX	OX	OX	OX
	250 amp - C1DISC250C-1	<b>54W87</b>	OX	OX	OX	OX	OX
GFI Service	15 amp non-powered, field-wired (208/230V, 460V only)	LTAGFIK10/15	<b>74M70</b>	X	OX	OX	OX
Outlets	20 amp non-powered, field-wired (575V only)	C1GFCI20FF1	<b>67E01</b>	X	X	X	X
Weatherproof Cover for GFI		C1GFCI99FF1	<b>10C89</b>	X	X	X	X
<sup>1</sup> Phase Monitor		C1PHZM01FF1-	<b>10C25</b>	X	X	X	X
<b>INDOOR AIR QUALITY</b>							
<b>Air Filters</b>							
High Efficiency Air Filters	MERV 8 - C1FLTR15C-1-	<b>54W67</b>	X	X	X	X	X
24 x 24 x 2 (Order 6 per unit)	MERV 13 - C1FLTR40C-1-	<b>52W40</b>	X	X	X	X	X
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)	C1FLTR30C-1-	<b>44N61</b>	X	X	X	X	X
<b>Indoor Air Quality (CO<sub>2</sub>) Sensors</b>							
Sensor - Wall-mount, off-white plastic cover with LCD display	C0SNSR50AE1L	<b>77N39</b>	X	X	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display	C0SNSR52AE1L	<b>87N53</b>	X	X	X	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting	C0SNSR51AE1L	<b>87N52</b>	X	X	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting	C0MISC19AE1	<b>87N54</b>	X	X	X	X	X
CO <sub>2</sub> Sensor Duct Mounting Kit - for downflow applications	C0MISC19AE1-	<b>85L43</b>	X	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO <sub>2</sub> sensors ( <b>87N53</b> or <b>77N39</b> )	C0MISC16AE1-	<b>90N43</b>	X	X	X	X	X
<b>UVC Germicidal Light Kit</b>							
UVC Light Kit (110/230V-1ph)	C1UVCL10C-1	<b>54W65</b>	X	X	X	X	X
<b>ELECTRIC HEAT</b>							
15 kW	208/230V-3ph - C1EH0150C-1Y	<b>53W84</b>	OX	OX	OX	OX	OX
	460V-3ph - C1EH0150C-1G	<b>53W86</b>	OX	OX	OX	OX	OX
	575V-3ph - C1EH0150C-1J	<b>53W87</b>	OX	OX	OX	OX	OX
30 kW	208/230V-3ph - C1EH0300C11Y	<b>53W88</b>	OX				
	460V-3ph - C1EH0300C11G	<b>53W90</b>	OX				
	575V-3ph - C1EH0300C11J	<b>53W91</b>	OX				
	208/230V-3ph - C1EH0300C21Y	<b>53W92</b>		OX	OX	OX	OX
	460V-3ph - C1EH0300C21G	<b>53W94</b>		OX	OX	OX	OX
	575V-3ph - C1EH0300C21J	<b>53W95</b>		OX	OX	OX	OX
45 kW	208/230V-3ph - C1EH0450C11Y	<b>53W96</b>	OX				
	460V-3ph - C1EH0450C11G	<b>53W98</b>	OX				
	575V-3ph - C1EH0450C11J	<b>53W99</b>	OX				
	208/230V-3ph - C1EH0450C21Y	<b>54W00</b>		OX	OX	OX	OX
	460V-3ph - C1EH0450C21G	<b>54W02</b>		OX	OX	OX	OX
	575V-3ph - C1EH0450C21J	<b>54W03</b>		OX	OX	OX	OX
60 kW	208/230V-3ph - C1EH0600C11Y	<b>54W04</b>	OX				
	460V-3ph - C1EH0600C11G	<b>54W06</b>	OX				
	575V-3ph - C1EH0600C11J	<b>54W07</b>	OX				
	208/230V-3ph - C1EH0600C21Y	<b>54W08</b>		OX	OX	OX	OX
	460V-3ph - C1EH0600C21G	<b>54W10</b>		OX	OX	OX	OX
	575V-3ph - C1EH0600C21J	<b>54W11</b>		OX	OX	OX	OX
90 kW	208/230V-3ph - C1EH0900C-1Y	<b>54W12</b>			OX	OX	OX
	460V-3ph - C1EH0900C-1G	<b>54W14</b>			OX	OX	OX
	575V-3ph - C1EH0900C-1J	<b>54W15</b>			OX	OX	OX

<sup>1</sup> Factory installed on all VFD equipped units.

<sup>2</sup> 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 - HIGH EFFICIENCY MODELS

Item Description	Model Number	Catalog Number	156H	180H	210H	240H	300H
<b>ECONOMIZER</b>							
Economizer - Downflow or Horizontal (Outdoor Air Hood furnished)	K1ECON20C-2	54W77	OX	OX	OX	OX	OX
<b>Economizer Controls</b>							
Differential Enthalpy	Order 2 - C1SNSR64FF1	53W64	X	X	X	X	X
Single Enthalpy	C1SNSR64FF1	53W64	OX	OX	OX	OX	OX
<b>Downflow Barometric Relief Dampers</b>							
Barometric Relief Dampers with Exhaust Hood	C1DAMP50C	54W78	OX	OX	OX	OX	OX
<b>Horizontal Barometric Relief Dampers</b>							
Barometric Relief Dampers with Exhaust Hood	LAGEDH18/24	16K99	X	X	X	X	X
<b>OUTDOOR AIR</b>							
<b>Outdoor Air Dampers</b>							
Motorized Dampers with Outdoor Air Hood	K1DAMP20C-1	58W62	OX	OX	OX	OX	OX
Manual Dampers With Outdoor Air Hood	C1DAMP10C-1	54W76	OX	OX	OX	OX	OX
<b>POWER EXHAUST (DOWNFLOW APPLICATIONS ONLY)</b>							
Standard Static	208/230V - C1PWRE11C-1Y	75W90	X	X	X	X	X
	460V - C1PWRE11C-1G	75W91	X	X	X	X	X
	575V - C1PWRE11C-1J	75W92	X	X	X	X	X
<b>ROOF CURBS - DOWNFLOW</b>							
<b>Clip Curb</b>							
8 in. height	C1CURB40CD1	26W32	X	X	X	X	X
14 in. height	LARMF18/30S-14	33K44	X	X	X	X	X
18 in. height	LARMF18/30S-18	33K45	X	X	X	X	X
24 in. height	LARMF18/30S-24	33K46	X	X	X	X	X
<b>Standard</b>							
14 in. height	LARMF18/36-14	16K87	X	X	X	X	X
24 in. height	LARMF18/36-24	16K88	X	X	X	X	X
<b>Adjustable Pitched Curb</b>							
14 in. height	L1CURB55C	43W26	X	X	X	X	X
<b>ROOF CURBS - HORIZONTAL (REQUIRES HORIZONTAL RETURN AIR PANEL KIT)</b>							
<b>Standard</b>							
26 in. height - slab applications	LARMFH18/24-26	97J33	X	X	X	X	
37 in. height - rooftop applications	LARMFH18/24-37	38K53	X	X	X	X	
30 in. height - slab applications	LARMFH30/36-30	33K79					X
41 in. height - rooftop applications	LARMFH30/36-41	38K54					X
<b>Insulation Kit For Standard Horizontal Curbs</b>							
for LARMFH18/24-26	C1INSU11C-1	73K32	X	X	X	X	
for LARMFH18/24-37	C1INSU13C-1	73K34	X	X	X	X	
for LARMFH30/36-30	C1INSU12C-1	73K33					X
for LARMFH30/36-41	C1INSU14C-1	73K35					X
<b>Horizontal Return Air Panel Kit</b>							
Required for Horizontal Applications with Roof Curb	C1HRAP10C-1	87M00	X	X	X	X	X
<b>CEILING DIFFUSERS</b>							
Step-Down - Order one	RTD11-185	29G06	X	X			
	RTD11-275-R	29G07			X	X	X
Flush - Order one	FD11-185	29G10	X	X			
	FD11-275-R	29G11			X	X	X
Transitions (Supply and Return) - Order one	LASRT18	19K01	X	X			
	LASRT21/24	19K02			X	X	X

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

## SPECIFICATIONS - STANDARD EFFICIENCY MODELS

General Data		Nominal Tonnage	15 Ton	15 Ton	17.5 Ton	17.5 Ton
		Model Number	KCA180S4B	KCA180S4M	KCA210S4B	KCA210S4M
		Efficiency Type	Standard	Standard	Standard	Standard
		Blower Type	Constant Air Volume (CAV)	VFD Driven	Constant Air Volume (CAV)	
<b>Cooling Performance</b>	Gross Cooling Capacity - Btuh		182,000	182,000	204,000	204,000
	<sup>1</sup> Net Cooling Capacity - Btuh		176,000	176,000	198,000	198,000
	AHRI Rated Air Flow - cfm		5750	5750	6125	6125
	Total Unit Power - kW		16.0	16.0	18.0	18.0
	<sup>1</sup> EER (Btuh/Watt)		11.0	11.0	11.0	11.0
	<sup>2</sup> IEER (Btuh/Watt)		11.2	12.8	12.2	13.3
	Refrigerant Type		R-410A	R-410A	R-410A	R-410A
	Refrigerant Charge Furnished	Circuit 1	7 lbs. 8 oz.	7 lbs. 8 oz.	5 lbs. 12 oz.	5 lbs. 12 oz.
	Circuit 2	7 lbs. 8 oz.	7 lbs. 8 oz.	5 lbs. 8 oz.	5 lbs. 8 oz.	
	Circuit 3	---	---	5 lbs. 8 oz.	5 lbs. 8 oz.	
<b>Electric Heat Available, see page 3</b>			15-30-45-60 kW		15-30-45-60-90 kW	
<b>Compressor Type (number)</b>			Scroll (2)	Scroll (2)	Scroll (3)	Scroll (3)
<b>Outdoor Coils</b>	Net face area (total) - sq. ft.		41.4	41.4	41.4	41.4
	Number of rows		1	1	1	1
	Fins per inch		23	23	23	23
<b>Outdoor Coil Fans</b>	Motor - (No.) horsepower		(3) 1/3	(3) 1/3	(3) 1/3	(3) 1/3
	Motor rpm		1075	1075	1075	1075
	Total Motor watts		1100	1100	1100	1100
	Diameter - (No.) in.		(3) 24	(3) 24	(3) 24	(3) 24
	Number of blades		3	3	3	3
	Total Air volume - cfm		12,000	12,000	12,000	12,000
<b>Indoor Coils</b>	Net face area (total) - sq. ft.		18.6	18.6	21.4	21.4
	Tube diameter - in.		3/8	3/8	3/8	3/8
	Number of rows		3	3	3	3
	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		Refrigerant Metering Orifice (RFC)				
<sup>3</sup> <b>Indoor Blower and Drive Selection</b>	Nominal motor output	3 hp, 5 hp, 7.5 hp				
	Maximum usable motor output (US Only)	3.45 hp, 5.75 hp, 8.62 hp				
	Motor - Drive kit number	<p style="text-align: center;"><b>3 hp</b>  <b>Kit 1</b> 535-725 rpm  <b>Kit 2</b> 710-965 rpm  <b>5 hp</b>  <b>Kit 3</b> 685-856 rpm  <b>Kit 4</b> 850-1045 rpm  <b>Kit 5</b> 945-1185 rpm  <b>7.5 hp</b>  <b>Kit 6</b> 850-1045 rpm  <b>Kit 7</b> 945-1185 rpm  <b>Kit 8</b> 1045-1285 rpm</p>				
	Blower wheel nominal diameter x width - in.	(2) 15 x 15	(2) 15 x 15	(2) 15 x 15	(2) 15 x 15	(2) 15 x 15
<b>Filters</b>	Type of filter	Fiberglass, disposable				
	Number and size - in.	(6) 24 x 24 x 2				
<b>Electrical characteristics</b>			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.

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

<sup>2</sup> Integrated Energy Efficiency Ratio tested according to AHRI Standard 340/360.

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

NOTE - Units equipped with a VFD option are limited to a motor service factor of 1.0.



## SPECIFICATIONS - STANDARD EFFICIENCY MODELS

General Data		Nominal Tonnage	20 Ton	20 Ton	25 Ton	25 Ton
		Model Number	KCA240S4B	KCA240S4M	KCA300S4B	KCA300S4M
		Efficiency Type	Standard	Standard	Standard	Standard
		Blower Type	Constant Air Volume (CAV)	VFD Driven	Constant Air Volume (CAV)	VFD Driven
<b>Cooling Performance</b>	Gross Cooling Capacity - Btuh		238,000	238,000	282,000	282,000
	<sup>1</sup> Net Cooling Capacity - Btuh		228,000	228,000	270,000	270,000
	AHRI Rated Air Flow - cfm		7700	7700	8750	8750
	Total Unit Power - kW		20.8	20.8	26.7	26.7
	<sup>1</sup> EER (Btuh/Watt)		11.0	11.0	10.1	10.1
	<sup>2</sup> IEER (Btuh/Watt)		11.2	13.2	10.1	12.1
	Refrigerant Type		R-410A	R-410A	R-410A	R-410A
	Refrigerant Charge Furnished	Circuit 1 Circuit 2 Circuit 3	7 lbs. 4 oz. 7 lbs. 4 oz. 6 lbs. 14 oz.	7 lbs. 4 oz. 7 lbs. 4 oz. 6 lbs. 14 oz.	7 lbs. 4 oz. 7 lbs. 4 oz. 6 lbs. 14 oz.	7 lbs. 4 oz. 7 lbs. 4 oz. 6 lbs. 14 oz.
<b>Electric Heat Available, see page 3</b>			15-30-45-60-90 kW		15-30-45-60-90 kW	
<b>Compressor Type (number)</b>			Scroll (3)	Scroll (3)	Scroll (3)	Scroll (3)
<b>Outdoor Coils</b>	Net face area (total) - sq. ft.		55.2	55.2	55.2	55.2
	Number of rows		1	1	1	1
	Fins per inch		23	23	23	23
<b>Outdoor Coil Fans</b>	Motor - (No.) horsepower		(4) 1/3	(4) 1/3	(4) 1/3	(4) 1/3
	Motor rpm		1075	1075	1075	1075
	Total Motor watts		1500	1500	1500	1500
	Diameter - (No.) in.		(4) 24	(4) 24	(4) 24	(4) 24
	Number of blades		3	3	3	3
	Total Air volume - cfm		16,000	16,000	16,000	16,000
<b>Indoor Coils</b>	Net face area (total) - sq. ft.		21.4	21.4	21.4	21.4
	Tube diameter - in.		3/8	3/8	3/8	3/8
	Number of rows		4	4	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	Refrigerant Metering Orifice (RFC)			
<sup>3</sup> <b>Indoor Blower and Drive Selection</b>	Nominal motor output		5 hp, 7.5 hp, 10 hp			
	Maximum usable motor output (US Only)		5.75 hp, 8.62 hp, 11.5 hp			
	Motor - Drive kit number		<p style="text-align: center;"><b>5 hp</b>  <b>Kit 3</b> 685-856 rpm  <b>Kit 4</b> 850-1045 rpm  <b>Kit 5</b> 945-1185 rpm  <b>7.5 hp</b>  <b>Kit 6</b> 850-1045 rpm  <b>Kit 7</b> 945-1185 rpm  <b>Kit 8</b> 1045-1285 rpm  <b>10 hp</b>  <b>Kit 7</b> 945-1185 rpm  <b>Kit 10</b> 1045-1285 rpm  <b>Kit 11</b> 1135-1365 rpm</p>			
	Blower wheel nominal diameter x width - in.		(2) 15 x 15	(2) 15 x 15	(2) 15 x 15	(2) 15 x 15
<b>Filters</b>	Type of filter		Fiberglass, disposable			
	Number and size - in.		(6) 24 x 24 x 2			
<b>Electrical characteristics</b>			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.

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

<sup>2</sup> Integrated Energy Efficiency Ratio tested according to AHRI Standard 340/360.

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

NOTE – Units equipped with a VFD option are limited to a motor service factor of 1.0.

## SPECIFICATIONS - HIGH EFFICIENCY MODELS

General Data		Nominal Tonnage	13 Ton	13 Ton	15 Ton	15 Ton
		Model Number	KCA156H4B	KCA156H4M	KCA180H4B	KCA180H4M
		Efficiency Type	High	High	High	High
		Blower Type	Constant Air Volume (CAV)	VFD Driven	Constant Air Volume (CAV)	VFD Driven
<b>Cooling Performance</b>	Gross Cooling Capacity - Btuh		156,000	156,000	176,000	176,000
	<sup>1</sup> Net Cooling Capacity - Btuh		152,000	152,000	172,000	172,000
	AHRI Rated Air Flow - cfm		5200	5200	5250	5250
	Total Unit Power - kW		12.7	12.7	14.3	14.3
	<sup>1</sup> EER (Btuh/Watt)		12.0	12.0	12.0	12.0
	<sup>2</sup> IEER (Btuh/Watt)		13.6	14.1	13.5	13.7
	Refrigerant Type		R-410A	R-410A	R-410A	R-410A
	Refrigerant Charge Furnished	Circuit				
	1	5 lbs. 12 oz.	5 lbs. 12 oz.	6 lbs. 0 oz.	6 lbs. 0 oz.	
	2	5 lbs. 6 oz.	5 lbs. 6 oz.	5 lbs. 10 oz.	5 lbs. 10 oz.	
	3	5 lbs. 10 oz.	5 lbs. 10 oz.	5 lbs. 14 oz.	5 lbs. 14 oz.	
<b>Electric Heat Available, see page 3</b>			15-30-45-60 kW		15-30-45-60 kW	
<b>Compressor Type (number)</b>			Scroll (3)	Scroll (3)	Scroll (3)	Scroll (3)
<b>Outdoor Coils</b>	Net face area (total) - sq. ft.		41.4	41.4	55.2	55.2
	Number of rows		1	1	1	1
	Fins per inch		23	23	23	23
<b>Outdoor Coil Fans</b>	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		12000	12000	16,000	16,000
<b>Indoor Coils</b>	Net face area (total) - sq. ft.		21.4	21.4	21.4	21.4
	Tube diameter - in.		3/8	3/8	3/8	3/8
	Number of rows		3	3	3	3
	Fins per inch		14	14	14	14
	Drain connection - No. and size		(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT	(1) 1 in. FPT
Expansion device type		Balanced port TXV, removable head				
<sup>3</sup> <b>Indoor Blower and Drive Selection</b>	Nominal motor output		2 hp, 3 hp, 5 hp		3 hp, 5 hp, 7.5 hp	
	Maximum usable motor output (US Only)		2.3 hp, 3.45 hp, 5.75 hp		3.45 hp, 5.75 hp, 8.62 hp	
	Motor - Drive kit number		<b>2 hp</b> Kit 1 535-725 rpm Kit 2 710-965 rpm <b>3 hp</b> Kit 1 535-725 rpm Kit 2 710-965 rpm <b>5 hp</b> Kit 3 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm		<b>3 hp</b> Kit 1 535-725 rpm Kit 2 710-965 rpm <b>5 hp</b> Kit 3 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm <b>7.5 hp</b> Kit 6 850-1045 rpm Kit 7 945-1185 rpm Kit 8 1045-1285 rpm	
	Blower wheel nominal diameter x width - in.		(2) 15 x 15	(2) 15 x 15	(2) 15 x 15	(2) 15 x 15
<b>Filters</b>	Type of filter	Fiberglass, disposable				
	Number and size - in.	(6) 24 x 24 x 2				
<b>Electrical characteristics</b>			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.

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

<sup>2</sup> Integrated Energy Efficiency Ratio tested according to AHRI Standard 340/360.

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

NOTE - Units equipped with a VFD option are limited to a motor service factor of 1.0.

## SPECIFICATIONS - HIGH EFFICIENCY MODELS

General Data		Nominal Tonnage	17.5 Ton	17.5 Ton	20 Ton	20 Ton
		Model Number	KCA210H4B	KCA210H4M	KCA240H4B	KCA240H4M
		Efficiency Type	High	High	High	High
		Blower Type	Constant Air Volume (CAV)	VFD Driven	Constant Air Volume (CAV)	VFD Driven
<b>Cooling Performance</b>	Gross Cooling Capacity - Btuh		204,000	204,000	238,000	238,000
	<sup>1</sup> Net Cooling Capacity - Btuh		198,000	198,000	230,000	230,000
	AHRI Rated Air Flow - cfm		6125	6125	6400	6400
	Total Unit Power - kW		16.5	16.5	19.2	19.2
	<sup>1</sup> EER (Btuh/Watt)		12.0	12.0	12.0	12.0
	<sup>2</sup> IEER (Btuh/Watt)		13.0	14.0	13.2	14.5
	Refrigerant Type		R-410A	R-410A	R-410A	R-410A
	Refrigerant Charge Furnished	Circuit 1	6 lbs. 12 oz.	6 lbs. 12 oz.	6 lbs. 4 oz.	6 lbs. 4 oz.
		Circuit 2	6 lbs. 14 oz.	6 lbs. 14 oz.	6 lbs. 2 oz.	6 lbs. 2 oz.
	Circuit 3	6 lbs. 14 oz.	6 lbs. 14 oz.	5 lbs. 14 oz.	5 lbs. 14 oz.	
	Circuit 4	---	---	5 lbs. 6 oz.	5 lbs. 6 oz.	
<b>Electric Heat Available, see page 3</b>			15-30-45-60-90 kW		15-30-45-60-90 kW	
<b>Compressor Type (number)</b>			Scroll (3)	Scroll (3)	Scroll (4)	Scroll (4)
<b>Outdoor Coils</b>	Net face area (total) - sq. ft.		55.2	55.2	55.2	55.2
	Number of rows		1	1	1	1
	Fins per inch		23	23	23	23
<b>Outdoor Coil Fans</b>	Motor - (No.) horsepower		(6) 1/3	(6) 1/3	(6) 1/3	(6) 1/3
	Motor rpm		1075	1075	1075	1075
	Total Motor watts		1950	1950	1950	1950
	Diameter - (No.) in.		(6) 24	(6) 24	(6) 24	(6) 24
	Number of blades		3	3	3	3
	Total Air volume - cfm		20,000	20,000	20,000	20000
<b>Indoor Coils</b>	Net face area (total) - sq. ft.		21.4	21.4	21.4	21.4
	Tube diameter - in.		3/8	3/8	3/8	3/8
	Number of rows		4	4	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		Balanced port TXV, removable head				
<sup>3</sup> <b>Indoor Blower and Drive Selection</b>	Nominal motor output		3 hp, 5 hp, 7.5 hp		5 hp, 7.5 hp, 10hp	
	Maximum usable motor output (US Only)		3.45 hp, 5.75 hp, 8.62 hp		5.75 hp, 8.62 hp, 11.5 hp	
	Motor - Drive kit number		<b>3 hp</b> Kit 1 535-725 rpm Kit 2 710-965 rpm <b>5 hp</b> Kit 3 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm <b>7.5 hp</b> Kit 6 850-1045 rpm Kit 7 945-1185 rpm Kit 8 1045-1285 rpm		<b>5 hp</b> Kit 3 685-856 rpm Kit 4 850-1045 rpm Kit 5 945-1185 rpm <b>7.5 hp</b> Kit 6 850-1045 rpm Kit 7 945-1185 rpm Kit 8 1045-1285 rpm <b>10 hp</b> 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
<b>Filters</b>	Type of filter	Fiberglass, disposable				
	Number and size - in.	(6) 24 x 24 x 2				
<b>Electrical characteristics</b>			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.

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

<sup>2</sup> Integrated Energy Efficiency Ratio tested according to AHRI Standard 340/360.

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

NOTE – Units equipped with a VFD option are limited to a motor service factor of 1.0.

## SPECIFICATIONS - HIGH EFFICIENCY MODELS

General Data		25 Ton	25 Ton
Nominal Tonnage		<b>25 Ton</b>	<b>25 Ton</b>
Model Number		<b>KCA300H4B</b>	<b>KCA300H4M</b>
Efficiency Type		<b>High</b>	<b>High</b>
Blower Type		Constant Air Volume (CAV)	VFD Driven
<b>Cooling Performance</b>	Gross Cooling Capacity - Btuh	282,000	282,000
	<sup>1</sup> Net Cooling Capacity - Btuh	270,000	270,000
	AHRI Rated Air Flow - cfm	8400	8400
	Total Unit Power - kW	25.7	25.7
	<sup>1</sup> EER (Btuh/Watt)	10.5	10.5
	<sup>2</sup> IEER (Btuh/Watt)	10.9	13.8
	Refrigerant Type	R-410A	R-410A
	Refrigerant Charge Furnished	Circuit 1 6 lbs. 8 oz.	6 lbs. 8 oz.
		Circuit 2 6 lbs. 6 oz.	6 lbs. 6 oz.
		Circuit 3 6 lbs. 6 oz.	6 lbs. 6 oz.
	Circuit 4 5 lbs. 14 oz.	5 lbs. 14 oz.	
<b>Electric Heat Available, see page 3</b>		15-30-45-60-90 kW	15-30-45-60-90 kW
<b>Compressor Type (number)</b>		Scroll (4)	Scroll (4)
<b>Outdoor Coils</b>	Net face area (total) - sq. ft.	55.2	55.2
	Number of rows	1	1
	Fins per inch	23	23
<b>Outdoor Coil Fans</b>	Motor - (No.) horsepower	(6) 1/3	(6) 1/3
	Motor rpm	1075	1075
	Total Motor watts	1950	1950
	Diameter - (No.) in.	(6) 24	(6) 24
	Number of blades	3	3
	Total Air volume - cfm	20,000	20,000
<b>Indoor Coils</b>	Net face area (total) - sq. ft.	21.4	21.4
	Tube diameter - in.	3/8	3/8
	Number of rows	4	4
	Fins per inch	14	14
	Drain connection - No. and size	(1) 1 in. FPT	(1) 1 in. FPT
	Expansion device type	Balanced port TXV, removable head	
<b><sup>3</sup> Indoor Blower and Drive Selection</b>	Nominal motor output	5 hp, 7.5 hp, 10 hp	
	Maximum usable motor output (US Only)	5.75 hp, 8.62 hp, 11.5 hp	
	Motor - Drive kit number	<b>5 hp</b> <b>Kit 3</b> 685-856 rpm <b>Kit 4</b> 850-1045 rpm <b>Kit 5</b> 945-1185 rpm <b>7.5 hp</b> <b>Kit 6</b> 850-1045 rpm <b>Kit 7</b> 945-1185 rpm <b>Kit 8</b> 1045-1285 rpm <b>10 hp</b> <b>Kit 7</b> 945-1185 rpm <b>Kit 10</b> 1045-1285 rpm <b>Kit 11</b> 1135-1365 rpm	
	Blower wheel nominal diameter x width - in.	(2) 15 x 15	(2) 15 x 15
<b>Filters</b>	Type of filter	Fiberglass, disposable	
	Number and size - in.	(6) 24 x 24 x 2	
<b>Electrical characteristics</b>		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.

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

<sup>2</sup> Integrated Energy Efficiency Ratio tested according to AHRI Standard 340/360.

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

NOTE – Units equipped with a VFD option are limited to a motor service factor of 1.0.

# BLOWER DATA

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

FOR ALL UNITS ADD:

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

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

See page 14 for wet coil and option/accessory air resistance data.

See page 14 for factory installed drive kit specifications.

### MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

KCA156H units require 5200 cfm minimum air with electric heat.

All other units require 6000 cfm minimum air with electric heat.

Air Volume cfm	TOTAL STATIC PRESSURE - Inches Water Gauge (Pa)																									
	0.20		0.40		0.60		0.80		1.00		1.20		1.40		1.60		1.80		2.00		2.20		2.40		2.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2750	385	0.30	505	0.50	600	0.70	680	0.90	755	1.10	820	1.30	885	1.50	950	1.70	1005	1.90	1060	2.10	1115	2.30	1170	2.50	1225	2.70
3000	395	0.35	515	0.55	610	0.75	685	1.00	760	1.20	825	1.45	890	1.65	955	1.85	1010	2.05	1065	2.25	1120	2.45	1175	2.65	1230	2.85
3250	405	0.40	520	0.60	615	0.85	695	1.10	765	1.30	830	1.60	895	1.80	955	2.00	1005	2.20	1060	2.40	1115	2.60	1170	2.80	1225	3.00
3500	415	0.45	530	0.70	620	0.95	700	1.20	775	1.45	840	1.70	900	1.90	955	2.10	1005	2.30	1060	2.50	1115	2.70	1170	2.90	1225	3.10
3750	425	0.50	540	0.85	630	1.05	710	1.30	780	1.60	845	1.85	905	2.05	960	2.25	1010	2.45	1065	2.65	1120	2.85	1175	3.05	1230	3.25
4000	435	0.55	545	0.95	635	1.10	715	1.40	785	1.70	850	2.00	910	2.20	965	2.40	1010	2.60	1065	2.80	1120	3.00	1175	3.20	1230	3.40
4250	445	0.60	555	1.00	645	1.25	725	1.55	795	1.85	855	2.15	915	2.35	970	2.55	1015	2.75	1065	2.95	1120	3.15	1175	3.35	1230	3.55
4500	455	0.70	565	1.10	655	1.35	730	1.65	800	2.00	860	2.30	920	2.50	975	2.70	1015	2.90	1065	3.10	1120	3.30	1175	3.50	1230	3.70
4750	470	0.75	575	1.15	660	1.40	740	1.70	810	2.10	870	2.40	930	2.60	985	2.80	1025	3.00	1075	3.20	1130	3.40	1185	3.60	1240	3.80
5000	480	0.85	585	1.25	670	1.60	750	1.95	815	2.30	880	2.70	940	2.90	995	3.10	1045	3.30	1095	3.50	1150	3.70	1205	3.90	1255	4.10
5250	495	0.95	595	1.35	680	1.70	755	2.10	825	2.50	890	2.90	945	3.10	1000	3.30	1050	3.50	1100	3.70	1155	3.90	1210	4.10	1265	4.30
5500	505	1.05	605	1.45	690	1.85	765	2.25	835	2.65	895	3.05	955	3.25	1010	3.45	1060	3.65	1110	3.85	1165	4.05	1220	4.25	1275	4.45
5750	520	1.15	615	1.60	700	2.00	775	2.45	840	2.85	905	3.25	960	3.45	1015	3.65	1065	3.85	1115	4.05	1170	4.25	1225	4.45	1280	4.65
6000	530	1.30	630	1.75	710	2.15	785	2.60	850	3.05	910	3.45	970	3.65	1025	3.85	1075	4.05	1125	4.25	1180	4.45	1235	4.65	1290	4.85
6250	545	1.40	640	1.90	720	2.35	795	2.80	860	3.25	920	3.70	975	3.85	1030	4.05	1080	4.25	1130	4.45	1185	4.65	1240	4.85	1300	5.05
6500	560	1.55	650	2.05	730	2.50	805	3.00	870	3.45	930	3.95	985	4.10	1040	4.30	1090	4.50	1140	4.70	1195	4.90	1250	5.10	1310	5.30
6750	570	1.70	665	2.20	745	2.70	815	3.20	880	3.70	940	4.20	995	4.35	1050	4.55	1100	4.75	1150	4.95	1205	5.15	1260	5.35	1320	5.55
7000	585	1.85	675	2.35	755	2.90	825	3.40	890	3.95	950	4.45	1005	4.60	1060	4.80	1110	5.00	1160	5.20	1215	5.40	1270	5.60	1330	5.80
7250	600	2.00	690	2.60	765	3.10	835	3.65	900	4.15	955	4.65	1010	4.80	1065	5.00	1115	5.20	1165	5.40	1220	5.60	1275	5.80	1335	6.00
7500	615	2.20	700	2.75	775	3.30	845	3.85	910	4.45	965	4.95	1020	5.10	1075	5.30	1125	5.50	1175	5.70	1230	5.90	1285	6.10	1340	6.30
7750	630	2.40	715	3.00	790	3.55	855	4.10	920	4.70	975	5.25	1030	5.40	1080	5.60	1130	5.80	1180	6.00	1235	6.20	1290	6.40	1350	6.60
8000	640	2.55	725	3.20	800	3.80	865	4.35	930	4.95	985	5.50	1040	5.70	1090	5.90	1140	6.10	1190	6.30	1245	6.50	1300	6.70	1360	6.90
8250	655	2.80	740	3.40	810	4.00	880	4.65	940	5.25	995	5.85	1050	6.00	1100	6.20	1150	6.40	1200	6.60	1255	6.80	1310	7.00	1370	7.20
8500	670	3.00	750	3.65	825	4.30	890	4.90	950	5.55	1005	6.15	1060	6.35	1110	6.55	1160	6.75	1210	6.95	1265	7.15	1320	7.35	1380	7.55
8750	685	3.25	765	3.90	835	4.55	900	5.20	960	5.85	1015	6.45	1070	6.65	1120	6.85	1170	7.05	1220	7.25	1275	7.45	1330	7.65	1390	7.85
9000	700	3.50	780	4.20	850	4.85	910	5.50	970	6.15	1025	6.70	1080	6.90	1130	7.10	1180	7.30	1230	7.50	1285	7.70	1340	7.90	1400	8.10
9250	715	3.75	790	4.45	860	5.15	925	5.85	985	6.55	1040	7.20	1095	7.40	1145	7.60	1200	7.80	1250	8.00	1305	8.20	1360	8.40	1420	8.60
9500	730	4.00	805	4.75	875	5.45	935	6.15	995	6.90	1050	7.50	1105	7.70	1155	7.90	1210	8.10	1260	8.30	1315	8.50	1370	8.70	1430	8.90
9750	745	4.30	820	5.05	885	5.75	950	6.55	1005	7.20	1060	7.95	1110	8.15	1160	8.35	1210	8.55	1260	8.75	1315	8.95	1370	9.15	1430	9.35
10,000	760	4.60	835	5.40	900	6.15	960	6.85	1015	7.60	1070	8.35	1120	8.55	1170	8.75	1220	8.95	1270	9.15	1325	9.35	1380	9.55	1440	9.75
10,250	775	4.90	845	5.65	910	6.45	970	7.20	1030	8.00	1080	8.75	1130	8.95	1180	9.15	1230	9.35	1280	9.55	1335	9.75	1390	9.95	1450	10.15
10,500	790	5.20	860	6.00	925	6.85	985	7.65	1040	8.40	1095	9.20	1145	9.40	1190	9.60	1240	9.80	1290	10.00	1345	10.20	1400	10.40	1460	10.60
10,750	805	5.55	875	6.40	940	7.25	1000	8.05	1055	8.85	1105	9.65	1155	9.85	1200	10.05	1250	10.25	1300	10.45	1350	10.65	1410	10.85	1470	11.05
11,000	820	5.90	890	6.80	950	7.60	1010	8.45	1065	9.30	1115	10.05	1165	10.25	1210	10.45	1260	10.65	1310	10.85	1360	11.05	1420	11.25	1480	11.45

## BLOWER DATA

### FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

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

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

NOTE - Units equipped with a VFD option are limited to a motor service factor of 1.0.

### 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	156H 180H 210S	210H 240H 240S 300H 300S			MERV 8	MERV 13	156H 180H 180S 210H 210S 240H 240S	300H 300S
2750	0.01	0.01	0.02	---	---	0.01	0.03	0.03	---
3000	0.01	0.01	0.02	---	---	0.01	0.03	0.04	---
3250	0.02	0.01	0.03	---	---	0.01	0.04	0.04	0.01
3500	0.02	0.01	0.03	---	---	0.01	0.04	0.05	0.01
3750	0.02	0.01	0.03	---	---	0.01	0.04	0.05	0.01
4000	0.02	0.02	0.04	---	---	0.01	0.04	0.06	0.02
4250	0.02	0.02	0.04	---	---	0.01	0.05	0.07	0.02
4500	0.02	0.02	0.05	---	---	0.01	0.05	0.07	0.02
4750	0.02	0.02	0.05	---	---	0.02	0.05	0.08	0.03
5000	0.03	0.02	0.05	---	---	0.02	0.06	0.08	0.03
5250	0.03	0.02	0.06	---	---	0.02	0.06	0.09	0.04
5500	0.03	0.02	0.07	---	---	0.02	0.06	0.10	0.04
5750	0.03	0.03	0.07	---	---	0.02	0.07	0.11	0.05
6000	0.04	0.03	0.08	0.01	---	0.03	0.07	0.11	0.06
6250	0.04	0.03	0.08	0.01	0.01	0.03	0.07	0.12	0.07
6500	0.04	0.03	0.09	0.01	0.02	0.03	0.08	0.13	0.08
6750	0.05	0.04	0.10	0.01	0.03	0.03	0.08	0.14	0.08
7000	0.05	0.04	0.10	0.01	0.04	0.04	0.08	0.15	0.09
7250	0.06	0.04	0.11	0.01	0.05	0.04	0.09	0.16	0.10
7500	0.06	0.05	0.12	0.01	0.06	0.04	0.09	0.17	0.11
8000	0.07	0.05	0.13	0.02	0.09	0.05	0.10	0.19	0.13
8500	0.08	0.06	0.15	0.02	0.11	0.05	0.10	0.21	0.15
9000	0.09	0.07	0.16	0.04	0.14	0.06	0.11	0.24	0.17
9500	0.10	0.08	0.18	0.05	0.16	0.07	0.12	0.26	0.19
10,000	0.11	0.08	0.20	0.06	0.19	0.07	0.12	0.29	0.21
10,500	0.12	0.09	0.22	0.09	0.22	0.08	0.13	0.31	0.24
11,000	0.14	0.11	0.24	0.11	0.25	0.09	0.14	0.34	0.27



## 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	<sup>1</sup> Effective Throw Range - ft.		Model No.	Air Volume cfm	<sup>1</sup> Effective Throw Range - ft.	
		RTD11-185 Step-Down	FD11-185 Flush			RTD11-275 Step-Down	FD11-275 Flush
156 180	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

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

### 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**

<sup>1</sup> 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			20		
Indoor Blower Motor	Horsepower	3	5	7.5	3	5	7.5	3	5	7.5
	Full Load Amps	10.6	16.7	24.2	4.8	7.6	11	3.9	6.1	9
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	90	100	110	45	50	50	35	35	40
	With (2) 0.33 HP Power Exhaust	100	100	110	50	50	50	35	40	40
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	75	81	88	37	39	43	28	30	33
	With (2) 0.33 HP Power Exhaust	79	85	93	39	42	45	30	32	35

**ELECTRIC HEAT DATA**

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat	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
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat	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
<sup>2</sup> 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
<sup>3</sup> 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	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	54W85	54W85	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 + 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

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

<sup>1</sup> Extremes of operating range are plus and minus 10% of line voltage.

<sup>2</sup> HACR type breaker or fuse.

<sup>3</sup> 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**

<sup>1</sup> Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Compressor 2	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Compressor 3	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
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			20		
Indoor Blower Motor	Horsepower	3	5	7.5	3	5	7.5	3	5	7.5
	Full Load Amps	10.6	16.7	24.2	4.8	7.6	11	3.9	6.1	9
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	100	100	110	40	45	50	30	35	40
	With (2) 0.33 HP Power Exhaust	100	110	125	45	45	50	35	35	45
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	82	88	97	36	39	43	29	31	35
	With (2) 0.33 HP Power Exhaust	87	93	102	38	41	45	31	33	37

**ELECTRIC HEAT DATA**

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

**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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> 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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	54W86	54W86	54W86	54W86	54W86	54W86	

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

<sup>1</sup> Extremes of operating range are plus and minus 10% of line voltage.

<sup>2</sup> HACR type breaker or fuse.

<sup>3</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

<sup>4</sup> Disconnect must be field furnished.

**ELECTRICAL/ELECTRIC HEAT DATA**

**20 TON**

**20 TON STANDARD EFFICIENCY**

**KCA240S4**

<sup>1</sup> 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 Motors (4)	Full Load Amps	2.4			1.3			1		
	(total)	(9.6)			(5.2)			(4)		
Power Exhaust (2) 0.33 HP	Full Load Amps	2.4			1.3			1		
	(total)	(4.8)			(2.6)			(2)		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	110	125	125	50	60	60	40	45	50
	With (2) 0.33 HP Power Exhaust	125	125	150	60	60	70	40	45	50
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	100	108	116	48	51	55	36	39	41
	With (2) 0.33 HP Power Exhaust	104	112	121	50	54	58	38	41	43

**ELECTRIC HEAT DATA**

Electric Heat Voltage		208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat	<b>15 kW</b>	110	110	125	125	125	50	60	60	40	45	50
		<b>30 kW</b>	110	125	125	125	125	150	60	60	70	45	50
		<b>45 kW</b>	150	175	150	175	175	175	80	90	90	70	70
		<b>60 kW</b>	150	175	175	175	175	200	90	90	90	70	70
		<b>90 kW</b>	225	250	225	250	250	300	125	125	150	100	100
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat	<b>15 kW</b>	100	100	108	108	116	116	48	51	55	36	39
		<b>30 kW</b>	100	112	109	121	117	129	55	59	63	44	48
		<b>45 kW</b>	139	157	148	166	156	174	78	82	86	62	66
		<b>60 kW</b>	146	166	156	175	164	183	82	86	90	66	69
		<b>90 kW</b>	209	238	218	247	227	256	118	123	126	95	98
<sup>2</sup> Maximum Overcurrent Protection and (2) 0.33 HP Power Exhaust	Unit+ Electric Heat	<b>15 kW</b>	125	125	125	125	150	150	60	60	70	40	45
		<b>30 kW</b>	125	125	125	150	150	150	60	70	70	50	50
		<b>45 kW</b>	150	175	175	175	175	200	90	90	90	70	70
		<b>60 kW</b>	175	175	175	200	175	200	90	90	100	70	80
		<b>90 kW</b>	225	250	225	300	250	300	125	150	150	100	110
<sup>3</sup> Minimum Circuit Ampacity and (2) 0.33 HP Power Exhaust	Unit+ Electric Heat	<b>15 kW</b>	104	104	112	112	121	121	50	54	58	38	41
		<b>30 kW</b>	106	118	115	127	123	135	58	63	66	47	50
		<b>45 kW</b>	145	163	154	172	162	180	81	85	89	65	68
		<b>60 kW</b>	152	172	162	181	170	189	85	90	93	68	72
		<b>90 kW</b>	215	244	224	253	233	262	122	126	130	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	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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> 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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	54W86	54W86	54W86	54W86	54W86	54W86	

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

<sup>1</sup> Extremes of operating range are plus and minus 10% of line voltage.

<sup>2</sup> HACR type breaker or fuse.

<sup>3</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

<sup>4</sup> Disconnect must be field furnished.

**ELECTRICAL/ELECTRIC HEAT DATA**

**25 TON**

**25 TON STANDARD EFFICIENCY**

**KCA300S4**

<sup>1</sup> 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 (4)	(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			20		
Indoor Blower Motor	Horsepower	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	125	125	150	60	60	70	45	50	50
	With (2) 0.33 HP Power Exhaust	125	125	150	60	70	70	50	50	50
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	108	116	124	53	56	60	40	43	45
	With (2) 0.33 HP Power Exhaust	113	120	128	56	59	62	42	45	47

**ELECTRIC HEAT DATA**

Electric Heat Voltage		208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V	
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat	<b>15 kW</b>	125	125	125	150	150	60	60	70	45	50	50	
		<b>30 kW</b>	125	125	125	150	150	60	60	70	45	50	50	
		<b>45 kW</b>	150	175	150	175	175	80	90	90	70	70	70	
		<b>60 kW</b>	150	175	175	175	175	90	90	90	70	70	80	
		<b>90 kW</b>	225	250	225	250	250	300	125	125	150	100	100	110
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat	<b>15 kW</b>	108	108	116	116	124	124	53	56	60	40	43	45
		<b>30 kW</b>	108	112	116	121	124	129	55	59	63	44	48	50
		<b>45 kW</b>	139	157	148	166	156	174	78	82	86	62	66	68
		<b>60 kW</b>	146	166	156	175	164	183	82	86	90	66	69	72
		<b>90 kW</b>	209	238	218	247	227	256	118	123	126	95	98	101
<sup>2</sup> Maximum Overcurrent Protection and (2) 0.33 HP Power Exhaust	Unit+ Electric Heat	<b>15 kW</b>	125	125	125	150	150	60	70	70	50	50	50	
		<b>30 kW</b>	125	125	125	150	150	60	70	70	50	50	60	
		<b>45 kW</b>	150	175	175	175	175	200	90	90	90	70	70	80
		<b>60 kW</b>	175	175	175	200	175	200	90	90	100	70	80	80
		<b>90 kW</b>	225	250	225	300	250	300	125	150	150	100	110	110
<sup>3</sup> Minimum Circuit Ampacity and (2) 0.33 HP Power Exhaust	Unit+ Electric Heat	<b>15 kW</b>	113	113	120	120	128	128	56	59	62	42	45	47
		<b>30 kW</b>	113	118	120	127	128	135	58	63	66	47	50	53
		<b>45 kW</b>	145	163	154	172	162	180	81	85	89	65	68	71
		<b>60 kW</b>	152	172	162	181	170	189	85	90	93	68	72	74
		<b>90 kW</b>	215	244	224	253	233	262	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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> 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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	54W86	54W86	54W86	54W86	54W86	54W86	

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

<sup>1</sup> Extremes of operating range are plus and minus 10% of line voltage.

<sup>2</sup> HACR type breaker or fuse.

<sup>3</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

<sup>4</sup> Disconnect must be field furnished.

**ELECTRICAL/ELECTRIC HEAT DATA**

**13 TON**

**13 TON high EFFICIENCY**

**KCA156H4**

<sup>1</sup> Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	14.5			6.3			6		
	Locked Rotor Amps	98			55			41		
Compressor 2	Rated Load Amps	14.5			6.3			6		
	Locked Rotor Amps	98			55			41		
Compressor 3	Rated Load Amps	14.5			6.3			6		
	Locked Rotor Amps	98			55			41		
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			20		
Indoor Blower Motor	Horsepower	2	3	5	2	3	5	2	3	5
	Full Load Amps	7.5	10.6	16.7	3	5	8	3	4	6
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	70	70	80	30	35	35	30	30	30
	With (2) 0.33 HP Power Exhaust	80	80	90	35	35	40	30	30	35
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	62	65	72	28	30	33	26	27	29
	With (2) 0.33 HP Power Exhaust	67	70	77	31	32	35	28	29	31

**ELECTRIC HEAT DATA**

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat	15 kW	70	70	70	70	80	80	30	35	35	30	30	30
		30 kW	90	100	100	110	100	125	50	60	60	40	45	45
		45 kW	150	150	150	150	150	175	80	80	80	60	60	70
		60 kW	150	175	150	175	150	175	80	80	90	70	70	70
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat	15 kW	62	62	65	65	72	72	28	30	33	26	27	29
		30 kW	88	100	92	104	100	112	50	52	55	40	41	44
		45 kW	127	145	131	149	139	157	72	74	78	58	60	62
		60 kW	135	154	139	158	146	166	77	79	82	62	63	66
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	80	80	80	80	90	90	35	35	40	30	30	35
		30 kW	100	110	100	110	110	125	60	60	60	45	45	50
		45 kW	150	175	150	175	150	175	80	80	90	70	70	70
		60 kW	150	175	150	175	175	175	80	90	90	70	70	70
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	67	67	70	70	77	77	31	32	36	28	29	31
		30 kW	94	106	98	110	106	118	53	55	58	42	44	47
		45 kW	133	151	137	155	145	163	76	77	81	61	62	65
		60 kW	141	160	145	164	152	172	80	82	85	64	66	68

**ELECTRICAL ACCESSORIES**

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

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

<sup>1</sup> Extremes of operating range are plus and minus 10% of line voltage.

<sup>2</sup> HACR type breaker or fuse.

<sup>3</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.



**ELECTRICAL/ELECTRIC HEAT DATA**

**15 TON**

**15 TON high EFFICIENCY**

**KCA180H4**

<sup>1</sup> Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Compressor 2	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Compressor 3	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Outdoor Fan Motors (4)	Full Load Amps	2.4			1.3			1		
	(total)	(9.6)			(5.2)			(4)		
Power Exhaust (2) 0.33 HP	Full Load Amps	2.4			1.3			1		
	(total)	(4.8)			(2.6)			(2)		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	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
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	70	80	100	40	45	50	25	30	35
	With (2) 0.33 HP Power Exhaust	80	90	100	45	45	50	30	30	40
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	65	71	81	36	39	43	25	27	31
	With (2) 0.33 HP Power Exhaust	69	76	86	39	42	46	27	29	33

**ELECTRIC HEAT DATA**

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat	15 kW	70	70	80	80	100	100	40	45	50	25	30	35
		30 kW	100	110	100	125	110	125	60	60	60	45	45	50
		45 kW	150	150	150	175	150	175	80	80	90	60	70	70
		60 kW	150	175	150	175	175	175	80	90	90	70	70	70
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat	15 kW	65	65	71	71	81	81	36	39	43	25	27	31
		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
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	80	80	90	90	100	100	45	45	50	30	30	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
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	69	69	76	76	86	86	39	42	46	27	29	33
		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	54W85	54W85	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Power Exhaust	54W85	54W85	54W86	54W86	54W86	54W86	54W85	54W85	54W85	54W85	54W85	54W85
	Unit + Electric Heat 15 kW	54W85	54W85	54W85	54W85	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	54W86	54W86	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 + Power Exhaust + Elec. Heat 15 kW	54W85	54W85	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	54W86	54W86	54W87	54W87	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

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

<sup>1</sup> Extremes of operating range are plus and minus 10% of line voltage.

<sup>2</sup> HACR type breaker or fuse.

<sup>3</sup> 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 high EFFICIENCY**

**KCA210H4**

<sup>1</sup> Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	15.6			7.8			5.8		
	Locked Rotor Amps	110			52			38.9		
Compressor 2	Rated Load Amps	15.6			7.8			5.8		
	Locked Rotor Amps	110			52			38.9		
Compressor 3	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Outdoor Fan	Full Load Amps	2.4			1.3			1		
Motors (6)	(total)	(14.4)			(7.8)			(6)		
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			20		
Indoor Blower Motor	Horsepower	3	5	7.5	3	5	7.5	3	5	7.5
	Full Load Amps	10.6	16.7	24.2	5	8	11	3.9	6.1	9
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	100	100	110	45	45	50	35	35	40
	With (2) 0.33 HP Power Exhaust	100	110	110	45	50	50	35	40	45
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	81	87	96	39	42	46	30	32	36
	With (2) 0.33 HP Power Exhaust	86	92	101	42	44	48	32	34	38

**ELECTRIC HEAT DATA**

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat	15 kW	100	100	100	100	110	110	45	45	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
		90 kW	225	250	225	250	225	250	125	125	125	100	100	100
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat	15 kW	81	81	87	87	96	96	39	42	46	30	32	36
		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
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	100	100	110	110	110	110	45	50	50	35	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
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	86	86	92	92	101	101	42	44	48	32	34	38
		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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> 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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	54W86	54W86	54W86	54W86	54W86	54W86	

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

<sup>1</sup> Extremes of operating range are plus and minus 10% of line voltage.

<sup>2</sup> HACR type breaker or fuse.

<sup>3</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

<sup>4</sup> Disconnect must be field furnished.

**ELECTRICAL/ELECTRIC HEAT DATA**

**20 TON**

**20 TON high EFFICIENCY**

**KCA240H4**

<sup>1</sup> Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Compressor 2	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Compressor 3	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Compressor 4	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Outdoor Fan Motors (6)	Full Load Amps	2.4			1.3			1		
	(total)	(14.4)			(7.8)			(6)		
Power Exhaust (2) 0.33 HP	Full Load Amps	2.4			1.3			1		
	(total)	(4.8)			(2.6)			(2)		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	8	11	14	6	9	11
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	100	110	125	50	60	70	35	45	50
	With (2) 0.33 HP Power Exhaust	110	125	125	60	60	70	40	45	50
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	90	99	107	50	54	58	34	38	40
	With (2) 0.33 HP Power Exhaust	95	104	112	53	57	60	36	40	42

**ELECTRIC HEAT DATA**

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat	15 kW	100	100	110	110	125	125	50	60	70	35	45	50
		30 kW	100	125	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	250	300	125	125	150	100	100	110
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat	15 kW	90	90	99	99	107	107	50	54	58	34	38	40
		30 kW	100	112	109	121	117	129	55	59	63	44	48	50
		45 kW	139	157	148	166	156	174	78	82	86	62	66	68
		60 kW	146	166	156	175	164	183	82	86	90	66	69	72
		90 kW	209	238	218	247	227	256	118	123	126	95	98	101
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	110	110	125	125	125	125	60	60	70	40	45	50
		30 kW	110	125	125	150	125	150	60	70	70	50	50	60
		45 kW	150	175	175	175	175	200	90	90	90	70	70	80
		60 kW	175	175	175	200	175	200	90	90	100	70	80	80
		90 kW	225	250	225	300	250	300	125	150	150	100	110	110
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	95	95	104	104	112	112	53	57	60	36	40	42
		30 kW	106	118	115	127	123	135	58	63	66	47	50	53
		45 kW	145	163	154	172	162	180	81	85	89	65	68	71
		60 kW	152	172	162	181	170	189	85	90	93	68	72	74
		90 kW	215	244	224	253	233	262	122	126	130	97	101	103

**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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> 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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	54W86	54W86	54W86	54W86	54W86	54W86

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

<sup>1</sup> Extremes of operating range are plus and minus 10% of line voltage.

<sup>2</sup> HACR type breaker or fuse.

<sup>3</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

<sup>4</sup> Disconnect must be field furnished.

**ELECTRICAL/ELECTRIC HEAT DATA**

**25 TON**

**25 TON high EFFICIENCY**

**KCA300H4**

<sup>1</sup> Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Compressor 2	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Compressor 3	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Compressor 4	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Outdoor Fan Motors (6)	Full Load Amps	2.4			1.3			1		
	(total)	(14.4)			(7.8)			(6)		
Power Exhaust (2) 0.33 HP	Full Load Amps	2.4			1.3			1		
	(total)	(4.8)			(2.6)			(2)		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	8	11	14	6	9	11
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	125	125	150	60	60	70	45	50	50
	With (2) 0.33 HP Power Exhaust	125	150	150	60	60	70	45	50	50
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	115	124	132	51	55	59	41	44	47
	With (2) 0.33 HP Power Exhaust	120	128	137	53	57	61	43	46	49

**ELECTRIC HEAT DATA**

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat	15 kW	125	125	125	125	150	150	60	60	70	45	50	50
		30 kW	125	125	125	125	150	150	60	60	70	45	50	50
		45 kW	150	175	150	175	175	175	80	90	90	70	70	70
		60 kW	150	175	175	175	175	200	90	90	90	70	70	80
		90 kW	225	250	225	250	250	300	125	125	150	100	100	110
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat	15 kW	115	115	124	124	132	132	51	55	59	41	44	47
		30 kW	115	115	124	124	132	132	55	59	63	44	48	50
		45 kW	139	157	148	166	156	174	78	82	86	62	66	68
		60 kW	146	166	156	175	164	183	82	86	90	66	69	72
		90 kW	209	238	218	247	227	256	118	123	126	95	98	101
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	125	125	150	150	150	150	60	60	70	45	50	50
		30 kW	125	125	150	150	150	150	60	70	70	50	50	60
		45 kW	150	175	175	175	175	200	90	90	90	70	70	80
		60 kW	175	175	175	200	175	200	90	90	100	70	80	80
		90 kW	225	250	225	300	250	300	125	150	150	100	110	110
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	15 kW	120	120	128	128	137	137	53	57	61	43	46	49
		30 kW	120	120	128	128	137	137	58	63	66	47	50	53
		45 kW	145	163	154	172	162	180	81	85	89	65	68	71
		60 kW	152	172	162	181	170	189	85	90	93	68	72	74
		90 kW	215	244	224	253	233	262	122	126	130	97	101	103

**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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> 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	54W85	54W86	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	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	<sup>4</sup> N/A	54W86	54W86	54W86	54W86	54W86	54W86	

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

<sup>1</sup> Extremes of operating range are plus and minus 10% of line voltage.

<sup>2</sup> HACR type breaker or fuse.

<sup>3</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

<sup>4</sup> 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

## KCA PARTS ARRANGEMENT

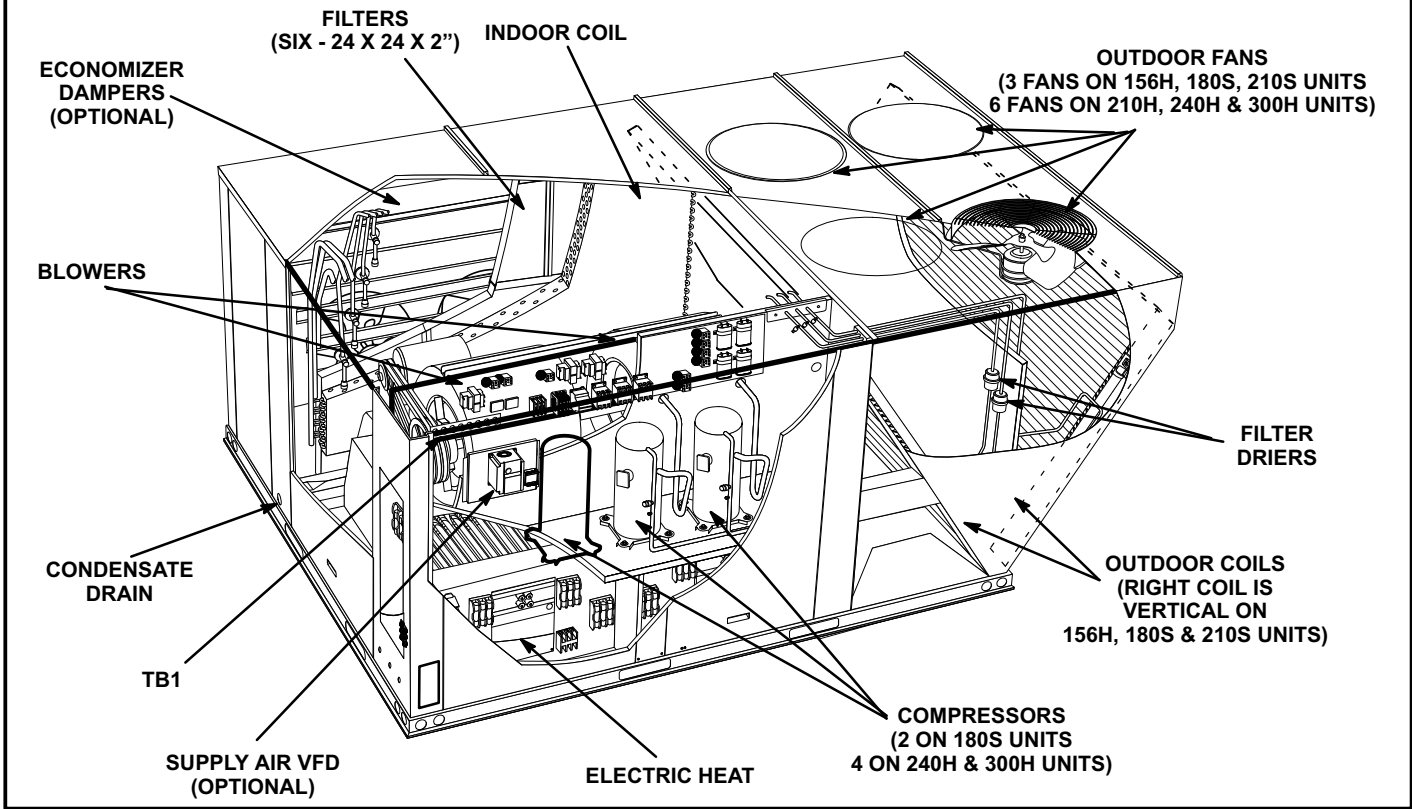


FIGURE 1

## KCA CONTROL BOX

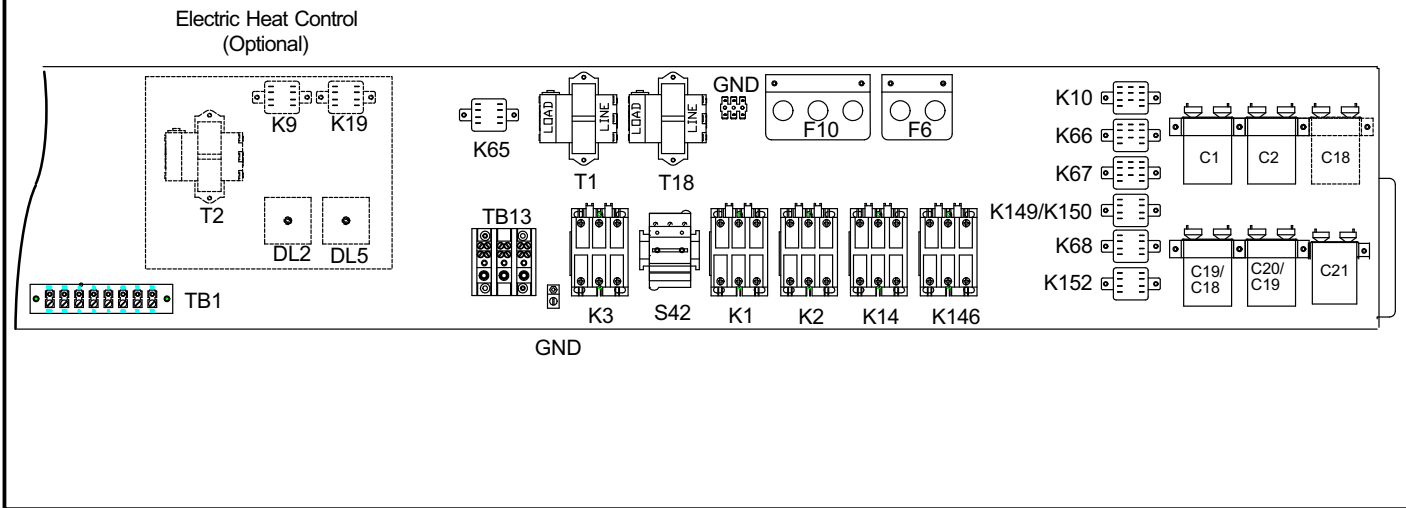


FIGURE 2



## 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.

### 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 blower deck, before performing any service procedure.

## 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-Terminal Strip TB13

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

### 4-Control Transformer T1

All use a single line voltage to 24VAC transformer mounted in the control box. Transformer supplies power to control circuits in the unit. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB8) which is located on the transformer itself. The 208/230

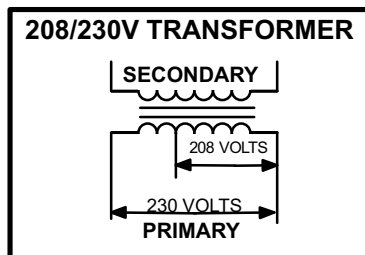


FIGURE 3

(Y) voltage transformers have two primary voltage taps, but only one may be used depending on supply voltage. See figure 3. 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

## 5-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.

### 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 (all units except 180S)

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 "unoccupied" modes, a factory installed jumper across terminals R and OC should be removed. Unit wiring is designed for a two-stage thermostat. See table 1.

TABLE 1

TB1 TERMINAL DESIGNATIONS	
Y1	Cool Stage 1
Y2	Cool Stage 2
W1	Heat Stage 1
W2	Heat Stage 2
OC	Occupied
G	Indoor Blower
R	24V To Thermostat
C	Ground

### 9-Outdoor Fan Capacitors C1, C2, C18 (all units) & C19 (180H, 240 & 300 only), C20, C21 (210H, 240H, 300H only)

Fan capacitors C1, C2, C18, C19, C20, C21 are 10 MFD / 370V capacitors used to assist in the start up of condenser fans B4, B5, B21 (all units), B22 (180H, 240 & 300 only), B23, B24 (210H, 240H, 300H only) respectively.

### 10-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.

## 11-Outdoor Fan Relay K10, K68, K149, K150, K152

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

**TABLE 2**

KCA Unit	Relay	Fan Energized
180S, 156H, 210S	K10	B4
	K68	B5, B21
180H, 240S, 300S	K10	B4, B5
	K149	B21, B22
210H, 240H, 300H	K10	B4
	K68	B5, B21
	K150	B22
	K152	B23, B24

## 12-Compressor Contactor K1 & K2 (all units), K14 (156H, 180H, 210, 240, & 300 units) and K146 (240H & 300H only)

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

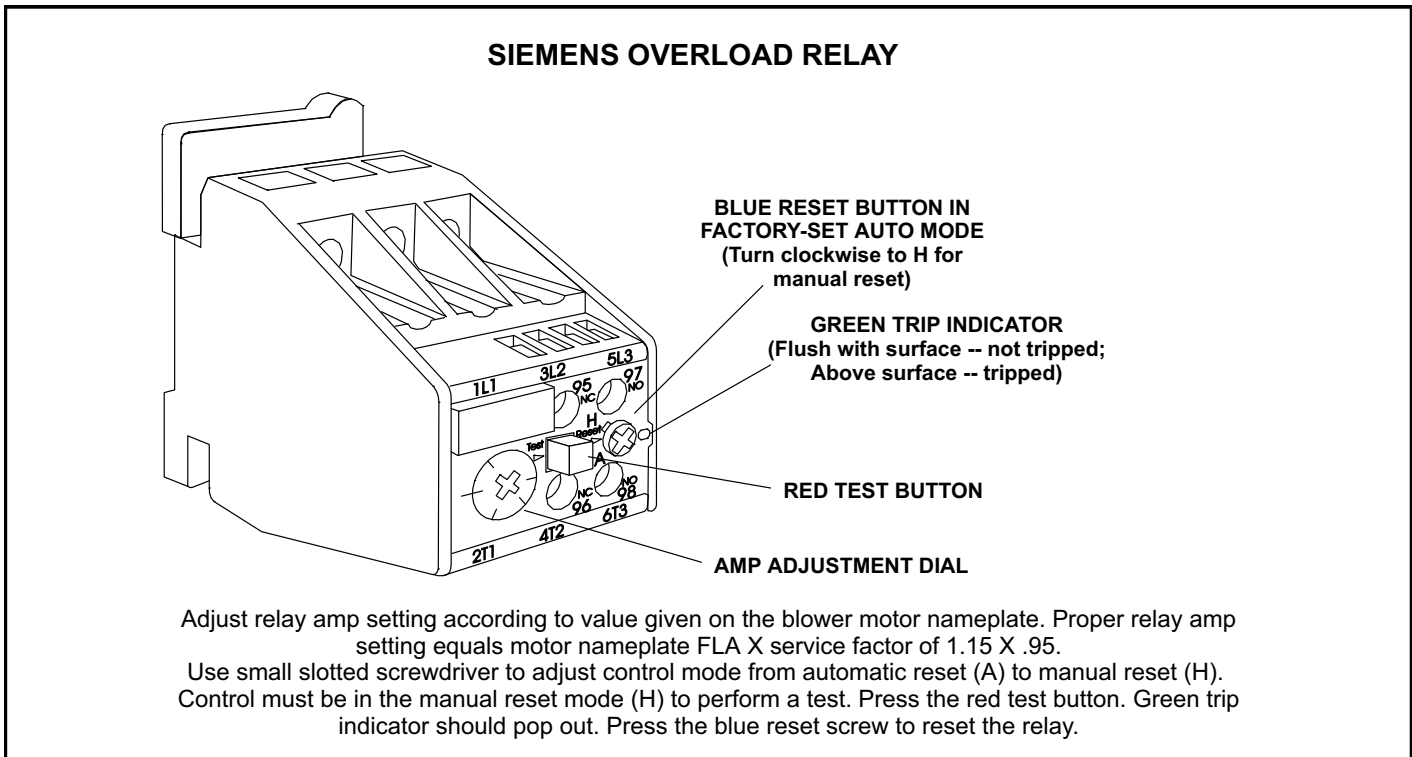
S42 is a manual reset overload relay, used in all M voltage units and in units with a 10 HP blower motor. The relay is connected in line with the blower motor to monitor the current flow to the motor. When the relay senses an overload condition, a set of normally closed contacts opens de-energizing the 24 volt output of T1. See figure 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 (180S units) or T18 (all other units) to energize stage 2 compressor contactor(s).



**FIGURE 4**

# KCA180S PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL

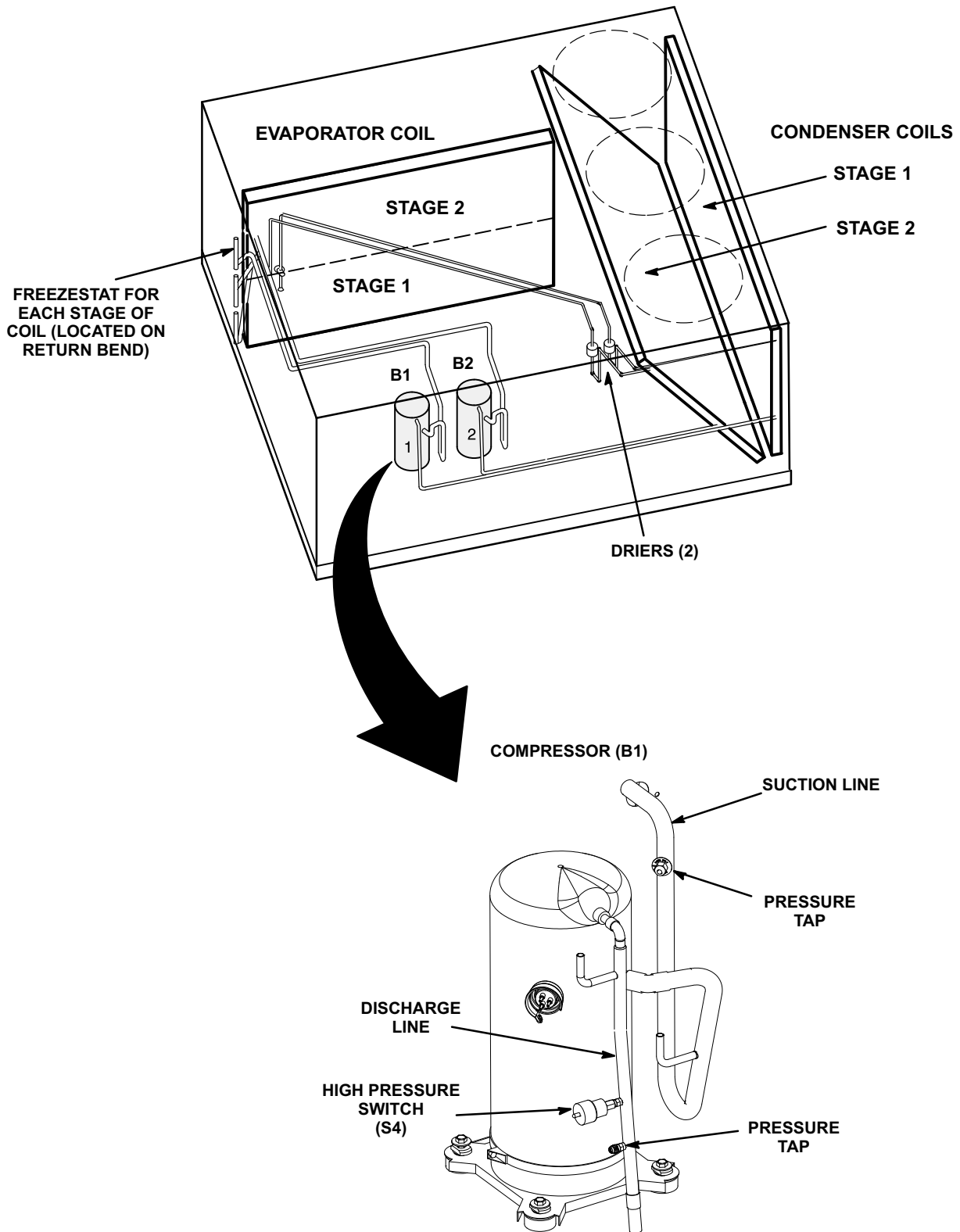
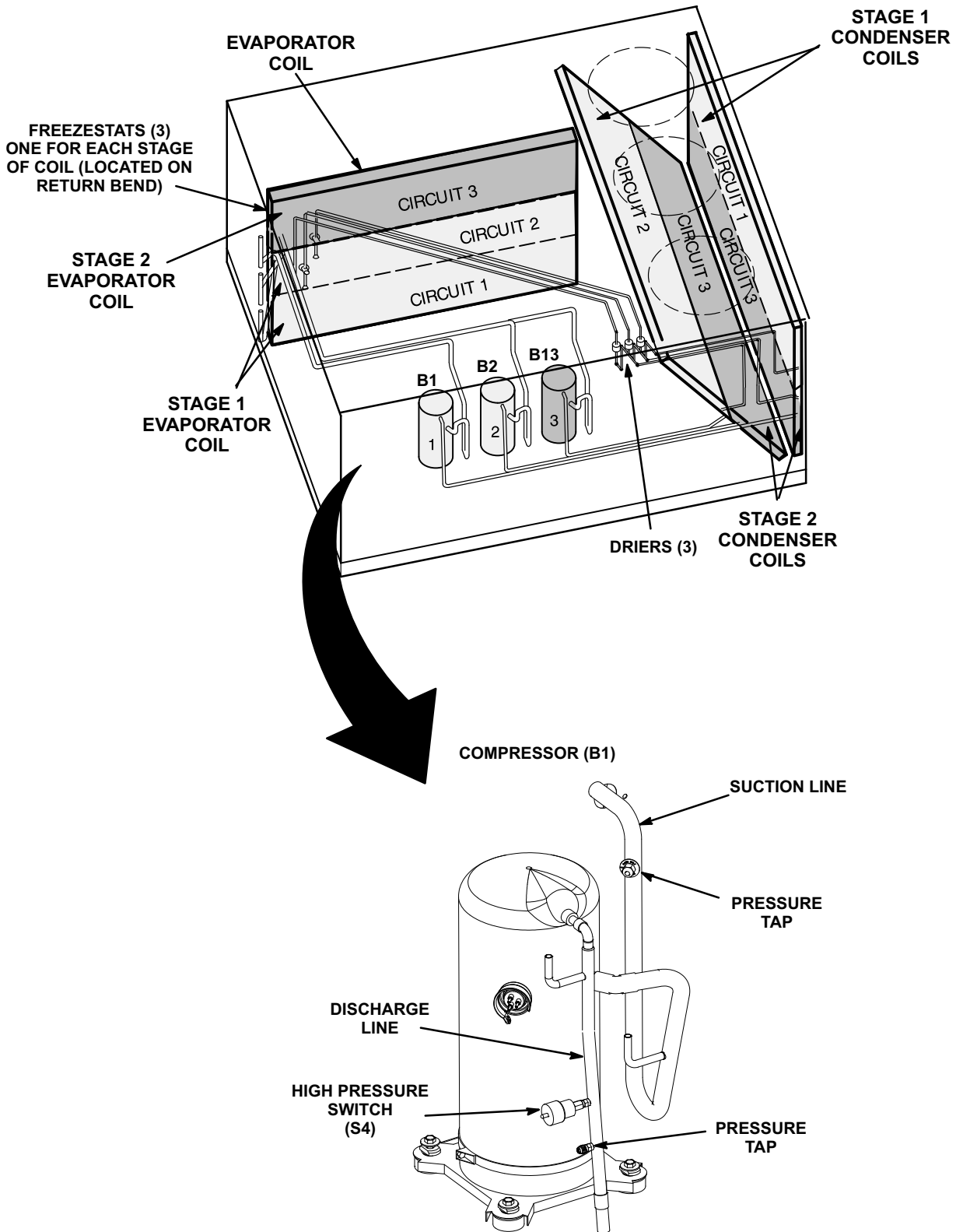


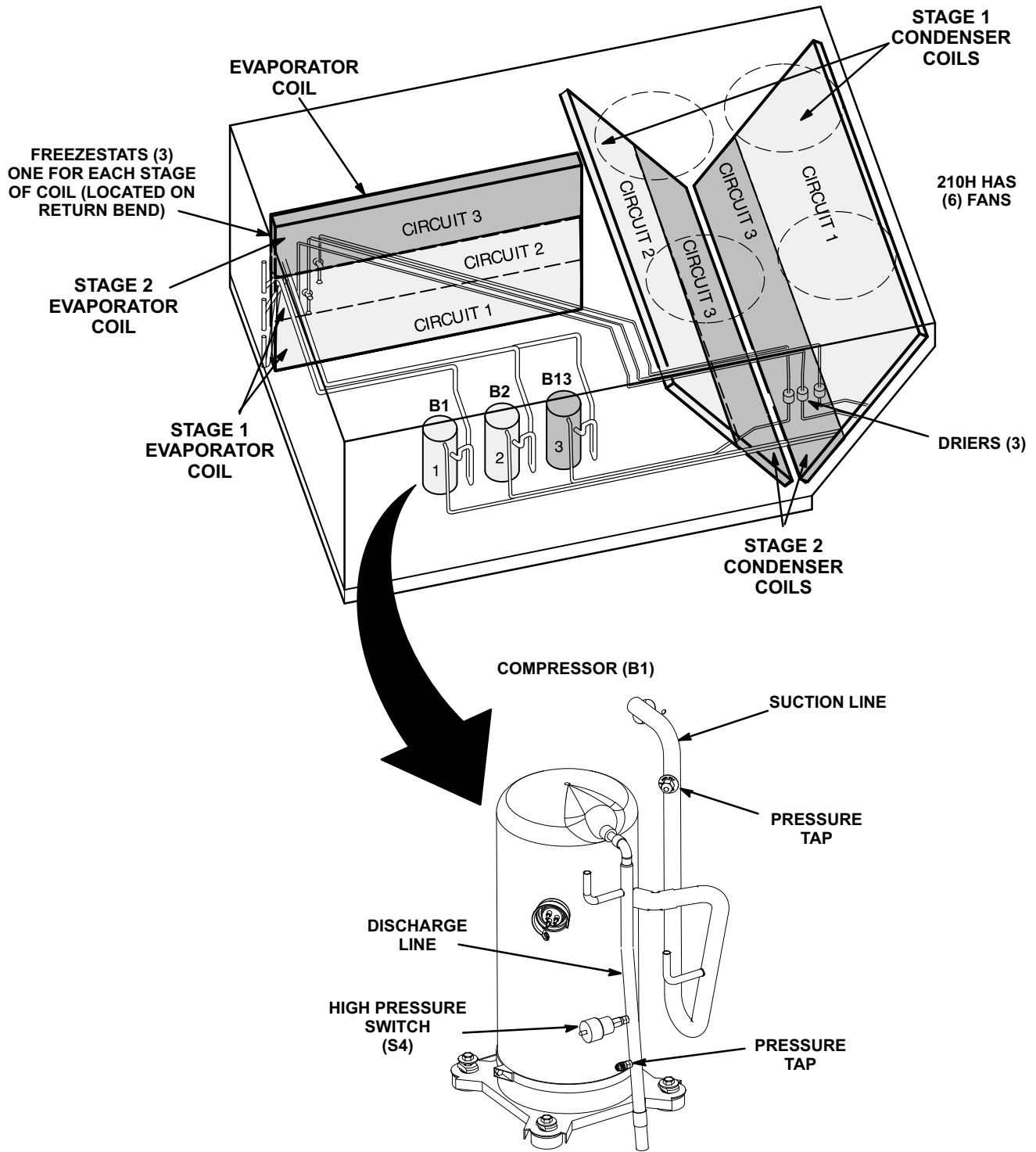
FIGURE 5

**KCA156H, 210S PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL**



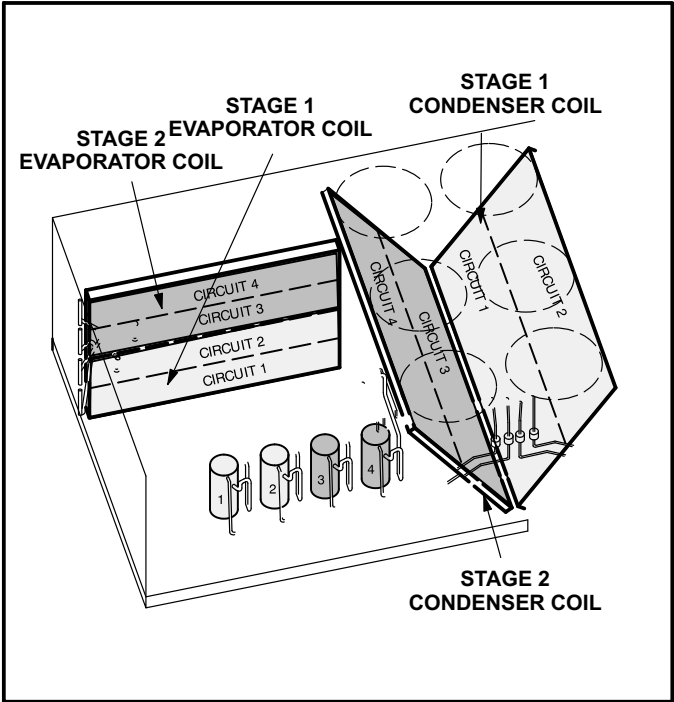
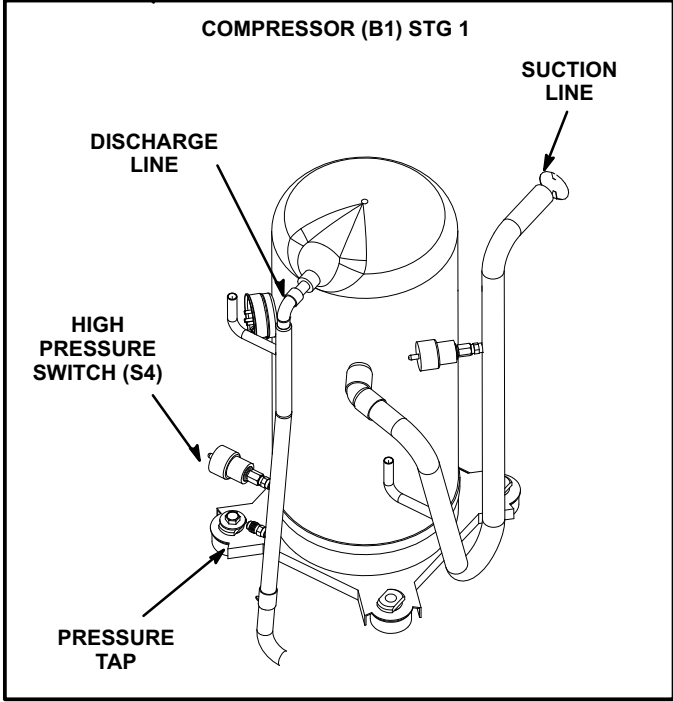
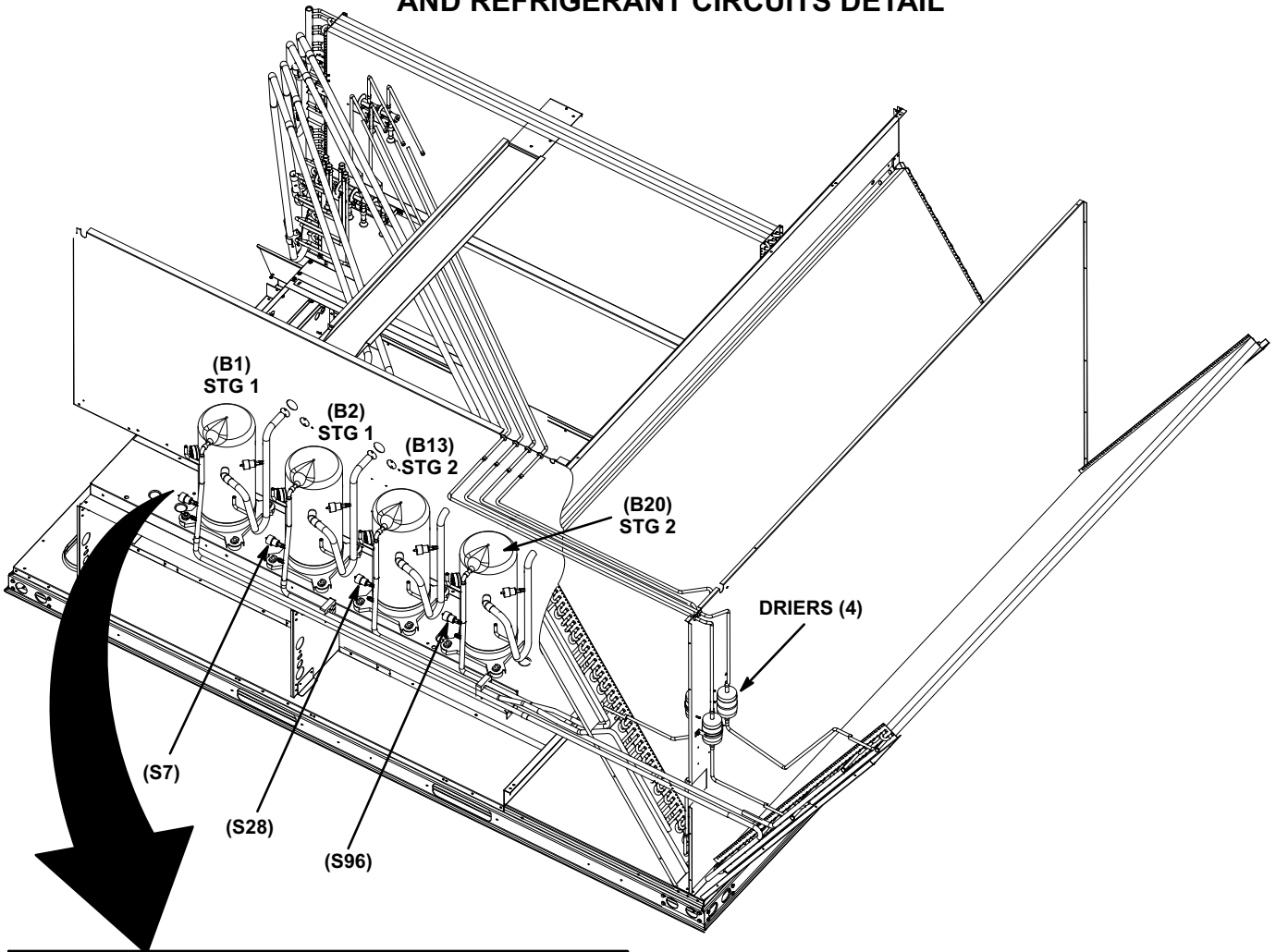
**FIGURE 6**

**KCA180H, 210H, 240S & 300S PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL**



**FIGURE 7**

**KCA240H, 300H PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL**



**FIGURE 8**



## 16-Variable Frequency Drive A96 (optional)

Units equipped with a VFD alter the supply power frequency and voltage to the blower motor. Blower speed is staged depending on the compressor stages, heating demand, or ventilation demand. The amount of airflow for each stage is preset from the factory. Full speed airflow can be adjusted by changing the variable sheave on the blower motor. Part load cooling speed is  $\frac{2}{3}$  of full speed. The VFD is located below the upper control panel.

## 17-Inverter Default Relay K232 (optional)

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

## 18-Phase Monitor A42 (Optional)

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

## 19-VFD Control Board A183 (Optional)

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

## B-Cooling Components

All units use independent cooling circuits consisting of separate compressors, condenser coils and evaporator coils. See figures 5, 6, 7 and 8. Draw-through type condenser fans are used in all units. All units are equipped with belt-drive blowers which draw air across the evaporator during unit operation.

Cooling may be supplemented by an optional factory- or field-installed economizer. The evaporators are slab type and are stacked. Each evaporator is equipped with enhanced fins and rifled tubing. In all units each compressor is protected by a freestat (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 (156H, 180H, 210, 240, 300) and B20 (240H & 300H)

All units use scroll compressors. KCA180 units use two compressors, KCA156H, 180H, 210, 240S and 300S use three compressors and KCA240H and 300H use four compressors. All compressors are equipped with independent cooling circuits. Compressor capacity may vary from stage to stage. In all cases, the capacity of each compressor is added to reach the total capacity of the unit. See "SPECIFICATIONS" and "ELECTRICAL DATA" (table of contents) or compressor nameplate for compressor specifications.

### **WARNING**

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

Each compressor is energized by a corresponding compressor contactor.

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

## 2-High Pressure Switches S4, S7 (all units) S28 (156H, 180H, 210, 240, 300), S96 (240H & 300H units)

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

S4 (first circuit), S7 (second circuit), S28 (third circuit) and S96 (fourth circuit) are wired in series with the respective compressor contactor coils.

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

## 3-Low Ambient Switches (optional) S11, S84 (all units), S85 (156H, 180H, 210, 240, 300 units) & S96 (240H & 300H)

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.

*180S Units -*

S11 and S84 are wired in series with outdoor fan relay K10 and K68 coils. 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.

#### *156H & 210S Units -*

S11, S84 and S85 are wired in series with outdoor fan relay K10 and K68 coils. 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.

#### *180H, 240S and 300S 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 series with outdoor fan relay coil K149. Both S84 and S85 have to be open to de-energize condenser fans 3 and 4. Either S84 or S85 closing will return condenser fans 3 and 4 to operation.

#### *210H Units -*

S11 is wired in series with outdoor fan relay K10 and K68 coils. When S11 opens, condenser fans 1, 2 and 3 are de-energized. When S11 closes, condenser fans 1, 2 and 3 will return to operation. S84 and S85 are wired in series with outdoor fan relay K150 and K152 coils. Both S84 and S85 have to be open to de-energize condenser fans 4, 5 and 6. Either S84 or S85 closing will return condenser fans 3, 4 and 5 to operation.

#### *240H and 300H Units -*

S11 is wired in series with outdoor fan relay K10 and K68 coils. When S11 opens, condenser fans 1, 2 and 3 are de-energized. When S11 closes, condenser fans 1, 2 and 3 will return to operation. S84 and S85 are wired in series with outdoor fan relay K150 and K152 coils. Both S84 and S85 have to be open to de-energize condenser fans 4, 5 and 6. Either S84 or S85 closing will return condenser fans 4, 5 and 6 to operation.

#### *All Units -*

When liquid pressure rises to  $450 \pm 10$  psig ( $3103 \pm 69$  kPa), pressure switch(es) close, energizing the appropriate condenser fan(s). When liquid pressure drops to  $240 \pm 10$  psig ( $1655 \pm 69$  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 (156H, 180H, 210, 240, 300) & S95 (240H, 300H)**

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

Each freezestat is wired in series with the corresponding compressor contactor. Each freezestat is an auto-reset switch which opens at  $29^{\circ}\text{F} \pm 3^{\circ}\text{F}$  ( $-1.7^{\circ}\text{C} \pm 1.7^{\circ}\text{C}$ ) 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 (180H, 210H, 240 & 300) & B23, B24 (210H, 240H & 300H)**

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 KCA156H-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 9.

### 1-Blower Wheels

All KCA156H-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

### Three Phase Scroll Compressor Voltage Phasing

Three phase scroll compressors must be phased sequen-

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

- 1- Observe suction and discharge pressures and blower rotation on unit start-up.
- 2- Suction pressure must drop, discharge pressure must rise, and blower rotation must match rotation marking.

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

- 3- Disconnect all remote electrical power supplies.
- 4- Reverse any two field-installed wires connected to the line side of TB2. Do not reverse wires at blower contactor.
- 5- Make sure the connections are tight.

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

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

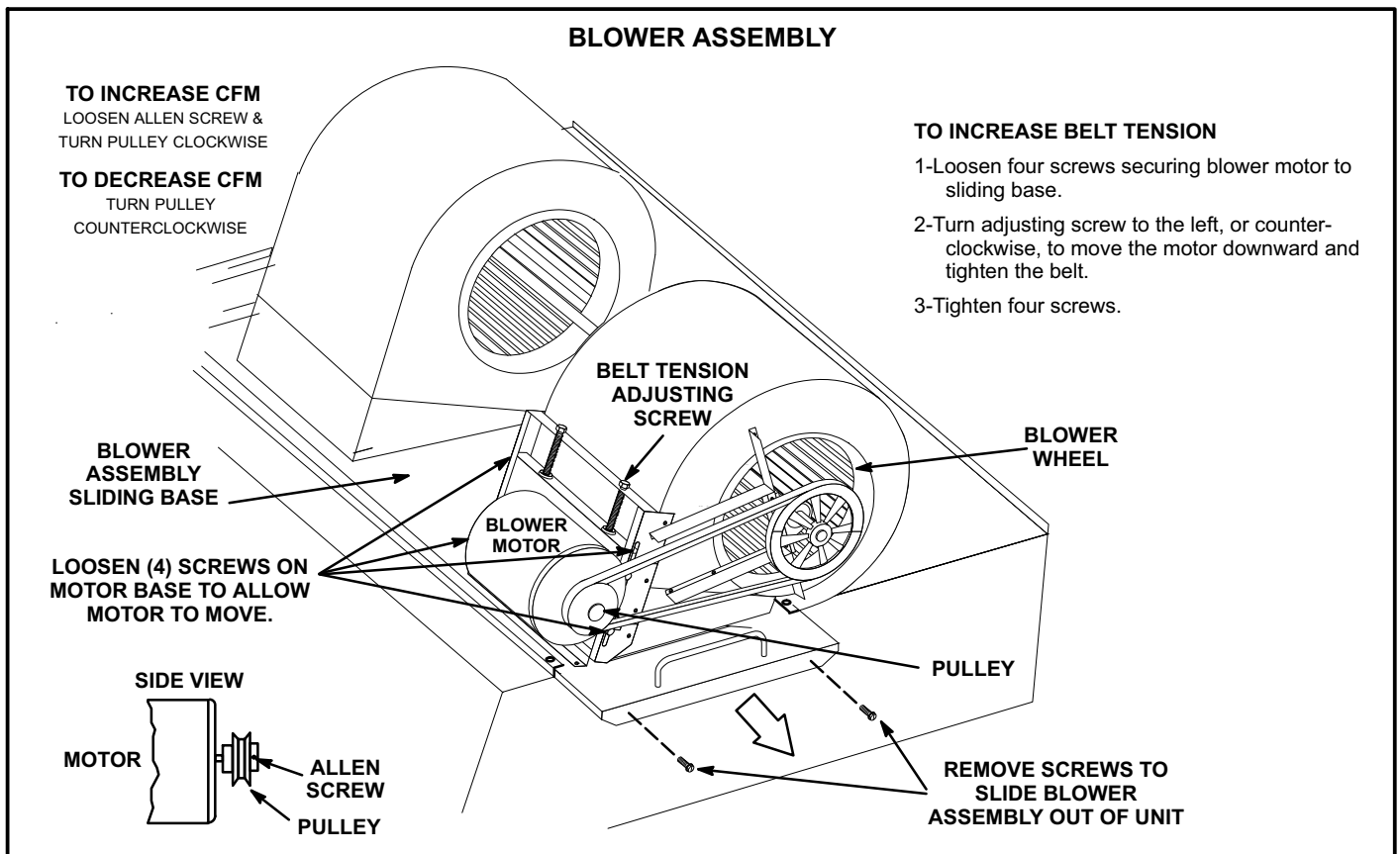


FIGURE 9

## Blower Operation

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

- 1- Blower operation is manually set at the thermostat 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 9.

- 1- Remove the clamp which secures the blower wiring to the blower motor base.
- 2- Remove and retain screws on either side of sliding base. Pull base toward outside of unit. When pulling the base out further than 12" (305mm), disconnect wiring to K3 blower contactor T1, T2 and T3. Pull wiring toward blower to allow enough slack to slide the base out further.
- 3- Slide base back into original position when finished servicing. Replace the clamp and blower wiring in the previous location on the blower motor base. Reconnect wiring to K3 if it was disconnected.
- 4- Replace retained screws on either side of the sliding base.

## Determining Unit Air Volume

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

- 1- The following measurements must be made with a dry indoor coil. Run blower without cooling demand. Air filters must be in place when measurements are taken.
- 2- With all access panels in place, measure static pressure external to unit (from supply to return). Blower performance data is based on static pressure readings taken in locations shown in figure 10.

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

- 3- Measure the indoor blower wheel RPM.
- 4- Refer to blower tables in BLOWER DATA (table of contents) in the front of this manual. Use static pressure and RPM readings to determine unit air volume.
- 5- The RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase RPM. Turn counterclockwise to decrease RPM. See figure 9.

## 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 11.

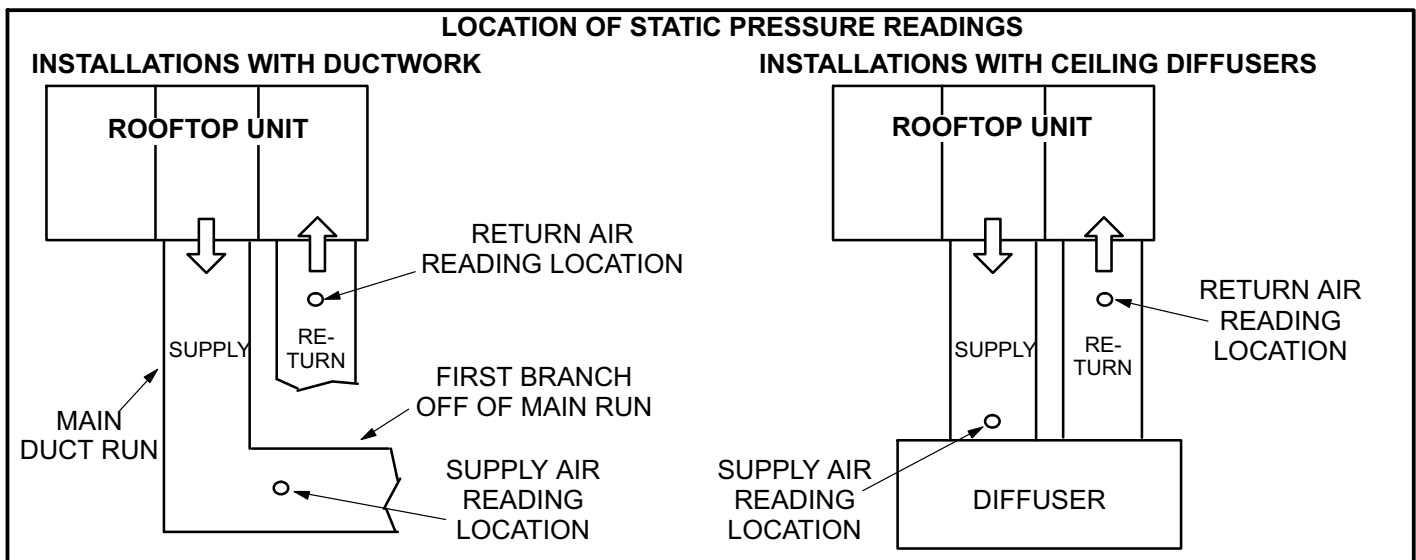
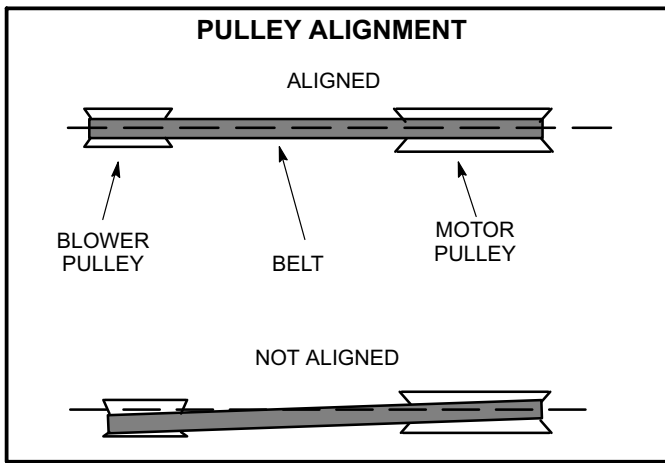


FIGURE 10



**FIGURE 11**

- 1- Loosen four bolts securing motor base to mounting frame. See figure 9.
- 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.

**Field-Furnished Blower Drives**

For field-furnished blower drives, use blower tables in the front of this manual to determine BHP and RPM required and to determine the drive number. Table 3 shows the drive component manufacturer's model number.

**Check Belt Tension**

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

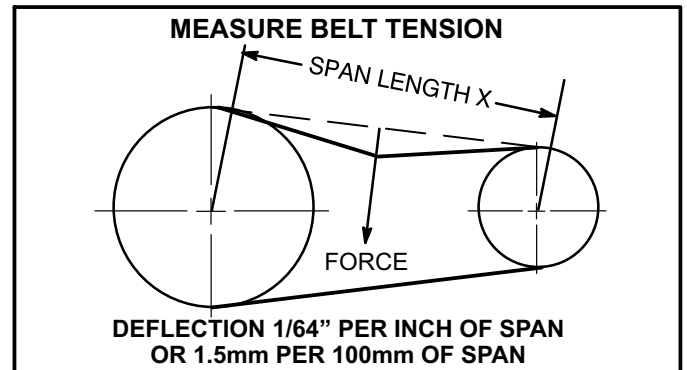
- 1- Measure span length X. See figure 12.
- 2- Apply perpendicular force to center of span (X) with enough pressure to deflect belt 1/64" for every inch of span length or 1.5mm per 100mm of span length.

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 12**

**TABLE 3  
MANUFACTURER'S NUMBERS**

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

## D-Optional Electric Heat Components

See ELECTRICAL / ELECTRIC HEAT (table of contents) for possible 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 14 and 15.

## Control Box Components

The main control box (see figure 2) houses some electric heat components and the electric heat control "hat" section (figure 13).

## Electric Heat Hat Section (Figure 13)

### 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.

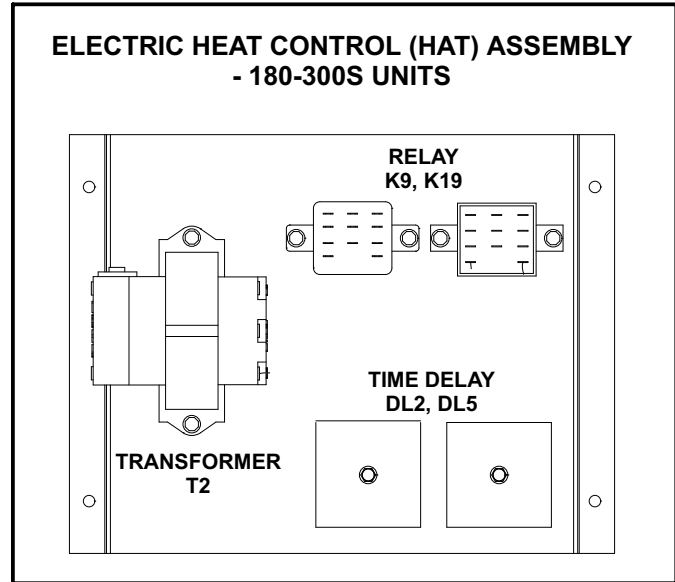


FIGURE 13

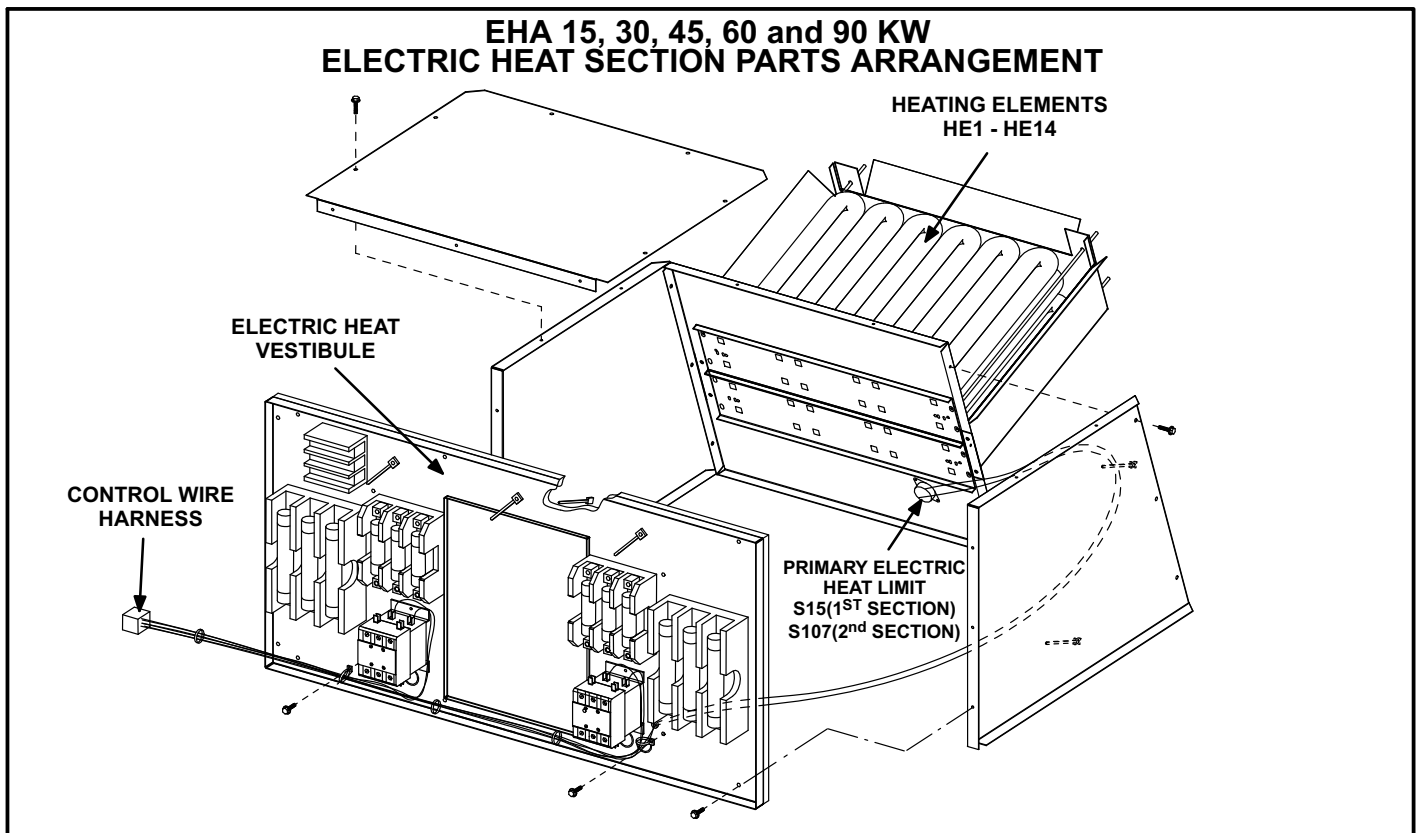
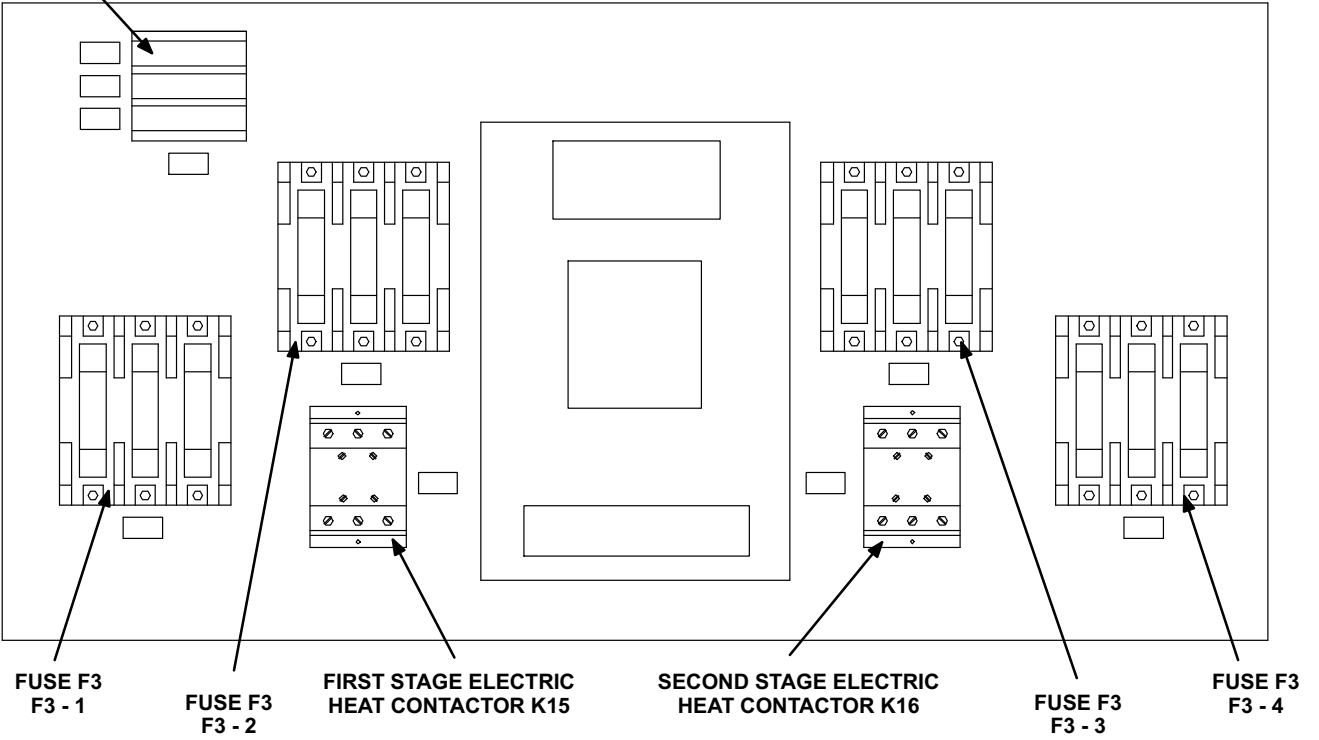


FIGURE 14

# KCA180/300 ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT

TERMINAL STRIP  
(TB3)

## FIRST HEAT SECTION (LEFT SIDE)



TERMINAL STRIP  
(TB3)

## SECOND HEAT SECTION (RIGHT SIDE)

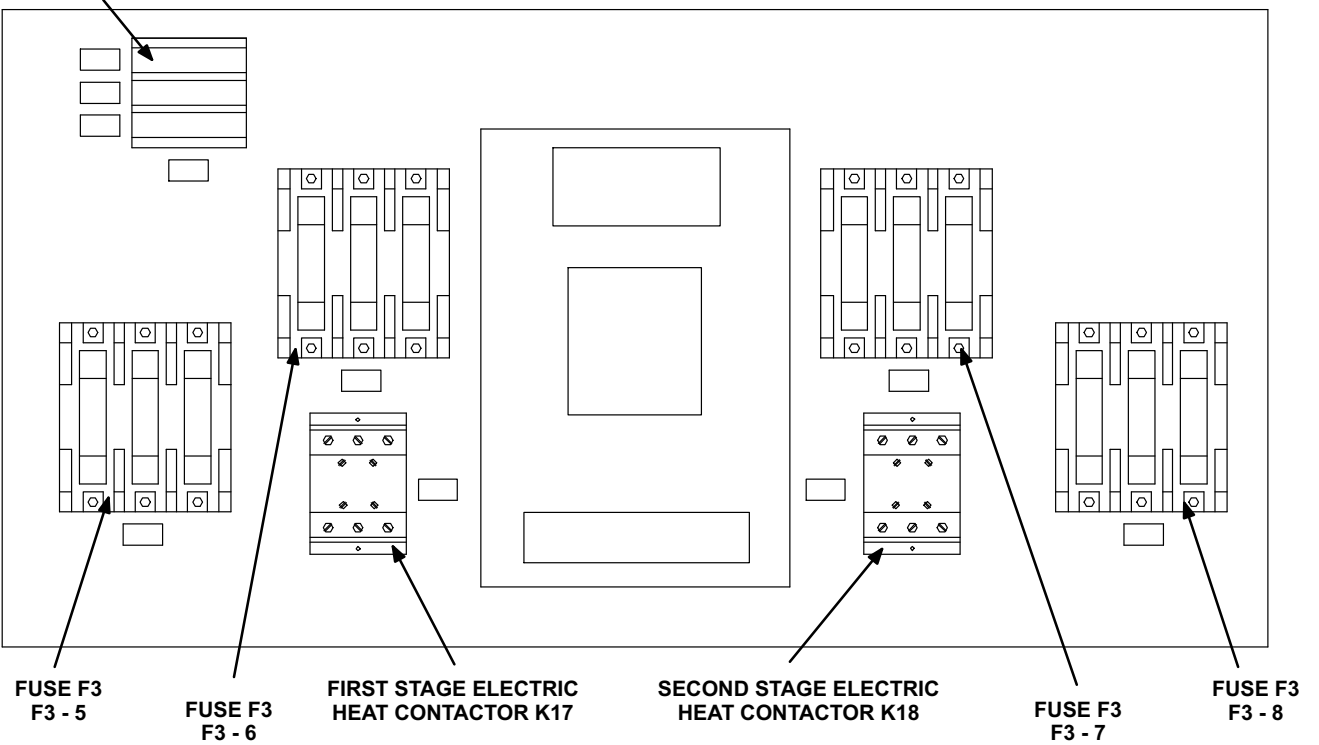


Figure 15

## 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 15 and table 4 show the fuses used with each electric heat section. For simplicity, the service manual labels the fuses F3 - 1 through F3 - 8.

### 8-Terminal Strip TB3

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

## 9-High Temperature Limits S15 and S107 (Primary)

S15 and S107 are SPST N.C. auto-reset thermostats located on the back panel of the electric heat section below the heating elements. S15 is the high temperature limit for the first electric heat section, while S107 is the high temperature limit for the second electric heat section. Both thermostats are identical and are wired in series with the first stage contactor coil. When either S15 or S107 opens, indicating a problem in the system, contactor K15 is de-energized. When K15 is de-energized, first stage and all subsequent stages of heat are de-energized. The thermostats used on EHA360-45-1 Y/G/J are factory set to open at 200°F ± 5°F (93.3°C ± 2.8°C) on a temperature rise and automatically reset at 160°F ± 6°F (71.1°C ± 3.3°C) on a temperature fall. All other electric heat section thermostats are factory set to open at 170°F ± 5°F (76.7°C ± 2.8°C) on a temperature rise and automatically reset at 130°F ± 6°F (54.4°C ± 3.3°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 4

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

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

#### A-Operation

- 1- Remove coil covers before starting unit.
- 2- Initiate first and second stage cooling demands according to instructions provided with thermostat.

#### Compressor Stages

- 3- *180S units -*  
First-stage thermostat demand will energize compressor 1; a second-stage thermostat demand will energize compressor 2.  
*156H, 180H, 210, 240S, 300S units -*  
First-stage thermostat demand will energize compressors 1 & 2; a second-stage thermostat demand will energize compressor 3.  
*240H, 300H units -*  
First-stage thermostat demand will energize compressors 1 & 2; a second-stage thermostat demand will energize compressors 3 & 4.

On units with an economizer, when outdoor air is acceptable, a first-stage demand will energize the economizer; a second-stage demand will energize compressor 1 (and compressor 2 on 156H, 180H, 210, 240 & 300 units).

### Refrigerant Circuits

#### 4- 180S -

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.

#### 156H, 180H, 210, 240S, 300S -

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.

#### 240H, 300H -

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

### Outdoor Fan Operation

#### 5- 156H, 180S, 210S -

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

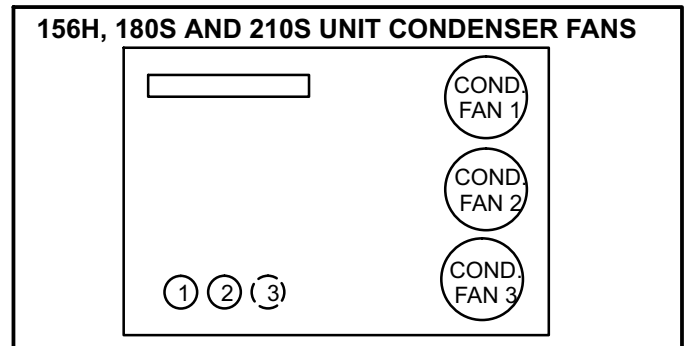


FIGURE 16

#### 180H, 240S, 300S -

First-stage thermostat demand will energize condenser fans 1, 2, 3 and 4. See figure 17. Fans will continue to operate with additional thermostat demands.

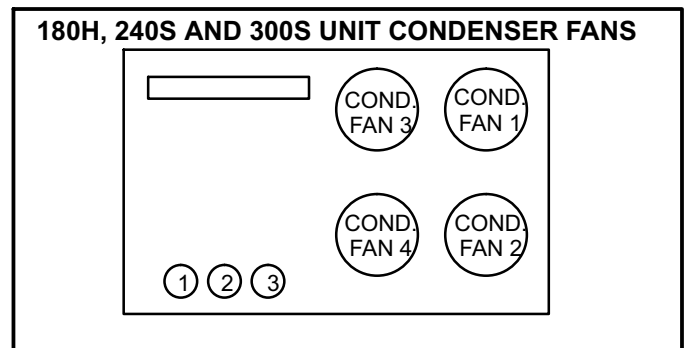


FIGURE 17

### 210H -

First-stage thermostat demand will energize condenser fans 1, 2, 3, 4, 5 and 6. See figure 18. Fans will continue to operate with additional thermostat demands.

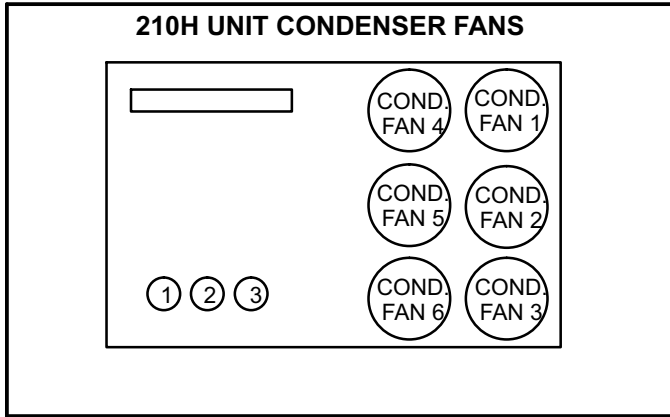


FIGURE 18

### 240H, 300H -

First-stage thermostat demand will energize condenser fans 1, 2 and 3. Second-stage thermostat demand will energize condenser fans 4, 5 and 6. See figure 19.

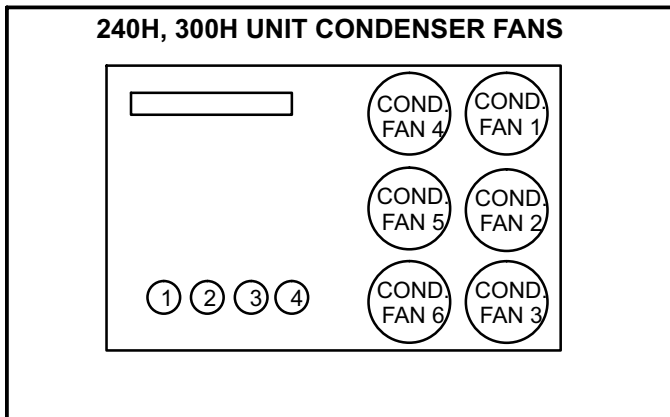


FIGURE 19

- 6- Each refrigerant circuit is separately charged with R-410A refrigerant. See unit rating plate for correct amount of charge.
- 7- Refer to Cooling Operation and Adjustment section for proper method to check refrigerant charge.

## IV-CHARGING

### A-Fin/Tube Outdoor Coil

#### **⚠ WARNING**

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

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

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

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

*NOTE - System charging is not recommended below 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 5 through 8 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 5  
KCA180S NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2	
	Dis. $\pm 10$ psig	Suc. $\pm 5$ psig	Dis. $\pm 10$ psig	Suc. $\pm 5$ 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 6  
KCA210S NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. $\pm 10$ psig	Suc. $\pm 5$ psig	Dis. $\pm 10$ psig	Suc. $\pm 5$ psig	Dis. $\pm 10$ psig	Suc. $\pm 5$ 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 7  
KCA240S NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. $\pm 10$ psig	Suc. $\pm 5$ psig	Dis. $\pm 10$ psig	Suc. $\pm 5$ psig	Dis. $\pm 10$ psig	Suc. $\pm 5$ 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 8  
KCA300S NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	Circuit 1		Circuit 2		Circuit 3	
	Dis. $\pm 10$ psig	Suc. $\pm 5$ psig	Dis. $\pm 10$ psig	Suc. $\pm 5$ psig	Dis. $\pm 10$ psig	Suc. $\pm 5$ 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 9. 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 5 through 8. The approach method is not valid for grossly over or under-charged systems.

**TABLE 9  
APPROACH TEMPERATURES**

Unit	Liquid Temp. Minus Ambient Temp.		
	1st Stage	2nd Stage	3rd Stage
<b>180S</b>	8°F $\pm 1$ (4.4°C $\pm 0.5$ )	8°F $\pm 1$ (4.4°C $\pm 0.5$ )	NA
<b>210S</b>	8°F $\pm 1$ (4.4°C $\pm 0.5$ )	8°F $\pm 1$ (4.4°C $\pm 0.5$ )	10°F $\pm 1$ (5.6°C $\pm 0.5$ )
<b>240S</b>	8°F $\pm 1$ (4.4°C $\pm 0.5$ )	8°F $\pm 1$ (4.4°C $\pm 0.5$ )	8°F $\pm 1$ (4.4°C $\pm 0.5$ )
<b>300S</b>	7°F $\pm 1$ (3.9°C $\pm 0.5$ )	7°F $\pm 1$ (3.9°C $\pm 0.5$ )	9°F $\pm 1$ (5.0°C $\pm 0.5$ )

## B-All-Aluminum Outdoor Coil

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

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

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

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

### IMPORTANT - Charge unit in standard cooling mode.

- 1- Make sure outdoor coil is clean. Attach gauge manifolds and operate unit at full CFM in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure all outdoor air dampers are closed.
- 2- Check each system separately with all stages operating. Compare the normal operating pressures (see tables 10 -18) to the pressures obtained from the gauges. Check unit components if there are significant differences.
- 3- Measure the outdoor ambient temperature and the suction pressure. Refer to the appropriate circuit charging

curve on Page 50 through Page 66 to determine a target liquid temperature.

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

- 4- Use the same thermometer to accurately measure the liquid temperature (in the outdoor section).
  - If measured liquid temperature is higher than the target liquid temperature, add refrigerant to the system.
  - If measured liquid temperature is lower than the target liquid temperature, recover some refrigerant from the system.
- 5- Add or remove charge in increments. Allow the system to stabilize each time refrigerant is added or removed.
- 6- Continue the process until measured liquid temperature agrees with the target liquid temperature. Do not go below the target liquid temperature when adjusting charge. Note that suction pressure can change as charge is adjusted.
- 7- Example KCA180S Circuit 1: At 95°F outdoor ambient and a measured suction pressure of 130psig, the target liquid temperature is 99.5°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquid temperature agrees with the target liquid temperature.

**TABLE 10  
KC 180S NORMAL OPERATING PRESSURES**

Normal Operating Pressures												
	Outdoor Coil Entering Air Temperature											
	65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	103	253	106	290	109	333	112	377	114	426	116	482
	110	260	113	295	117	337	120	385	123	435	125	492
	123	278	127	313	131	354	136	401	140	454	143	513
	136	298	142	336	147	378	152	426	156	477	161	533
Circuit 2	105	255	109	294	111	337	113	381	116	428	119	486
	112	262	116	300	119	342	122	389	124	437	127	496
	125	279	129	315	134	356	138	404	142	457	146	514
	139	300	144	338	149	380	154	428	158	480	163	537

**TABLE 11  
KC 210S NORMAL OPERATING PRESSURES**

Normal Operating Pressures												
	Outdoor Coil Entering Air Temperature											
	65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	107	266	110	303	113	345	116	392	118	441	119	492
	115	274	118	311	121	353	124	399	127	450	127	504
	130	292	133	302	137	370	141	418	144	471	147	529
	147	321	151	356	155	397	159	447	163	502	167	559
Circuit 2	105	262	107	300	110	341	112	385	115	434	116	484
	112	269	115	306	118	349	120	394	123	442	124	493
	127	284	131	321	134	363	138	411	140	463	143	521
	142	308	147	345	151	388	155	437	159	489	163	544
Circuit 3	109	276	113	316	115	360	118	408	119	459	125	516
	117	284	120	324	124	368	126	415	127	468	131	524
	131	301	135	342	139	385	144	434	147	487	147	550
	146	323	151	364	156	410	160	461	165	517	165	578

**TABLE 12  
KC 240S NORMAL OPERATING PRESSURES**

Normal Operating Pressures												
	Outdoor Coil Entering Air Temperature											
	65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	109	250	112	286	115	328	117	376	119	430	121	478
	116	255	119	289	123	336	126	381	128	432	130	486
	132	272	136	309	139	351	143	398	146	449	149	510
	148	291	152	330	157	372	160	417	165	473	170	528
Circuit 2	111	259	113	295	116	334	118	382	120	434	123	483
	118	263	121	297	124	342	127	387	129	438	131	492
	134	282	138	318	141	360	144	406	148	457	151	519
	151	303	155	341	160	384	162	428	167	486	171	541
Circuit 3	111	258	113	297	116	336	120	384	121	436	124	488
	118	261	121	296	124	345	127	390	130	443	131	495
	134	277	137	314	141	359	144	407	148	457	151	519
	150	295	155	333	159	378	162	424	167	481	170	535

**TABLE 13  
KC 300S NORMAL OPERATING PRESSURES**

Normal Operating Pressures												
	Outdoor Coil Entering Air Temperature											
	65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	107	264	110	303	112	344	114	393	116	443	120	502
	113	271	117	308	120	352	123	400	125	453	127	508
	128	289	131	324	135	367	139	414	143	466	145	528
	141	308	146	345	151	388	156	437	160	487	164	545
Circuit 2	107	276	110	315	112	357	114	402	117	452	120	511
	114	284	118	319	120	362	123	412	126	465	128	521
	129	306	132	341	136	382	140	429	143	481	146	539
	144	329	148	365	153	410	157	458	162	507	166	561
Circuit 3	107	267	110	307	113	349	115	396	117	446	121	507
	113	273	117	311	120	356	123	404	126	458	128	513
	128	289	131	326	135	370	139	419	143	473	145	531
	142	307	147	346	151	389	156	440	160	491	164	546

**TABLE 14  
KC 156H NORMAL OPERATING PRESSURES**

Normal Operating Pressures												
	Outdoor Coil Entering Air Temperature											
	65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	111	245	112	285	115	329	117	379	120	462	122	554
	121	244	121	282	123	329	128	371	128	447	131	551
	139	251	142	287	145	328	148	374	148	431	151	506
	157	260	161	298	164	338	167	383	170	435	174	492
Circuit 2	109	243	110	280	112	325	115	374	116	445	118	514
	118	244	119	279	121	325	123	371	125	429	127	506
	136	250	139	286	141	328	143	374	144	428	146	489
	154	258	158	298	161	337	164	382	167	432	169	488
Circuit 3	112	249	113	289	114	344	116	398	120	452	122	530
	121	251	119	298	122	343	124	396	127	455	130	534
	140	259	143	298	144	343	146	396	148	453	151	512
	157	268	161	310	165	350	168	398	170	451	174	509

**TABLE 15  
KC 180H NORMAL OPERATING PRESSURES**

Normal Operating Pressures												
	Outdoor Coil Entering Air Temperature											
	65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	104	235	106	275	105	326	106	389	110	466	113	552
	114	238	118	275	115	319	117	378	119	447	122	527
	130	245	134	281	136	320	136	365	138	424	141	483
	146	253	153	289	157	330	159	374	162	421	165	478
Circuit 2	100	241	103	281	104	327	105	379	109	442	112	513
	111	244	112	282	113	327	115	379	116	445	119	507
	128	249	132	286	131	331	132	377	135	434	139	488
	144	257	151	295	154	336	158	382	158	439	161	498
Circuit 3	106	241	110	278	110	326	111	380	114	447	117	536
	118	242	115	282	120	326	120	380	123	437	126	512
	134	250	138	287	140	328	139	378	142	431	145	491
	151	260	157	298	160	340	163	385	165	435	167	494



**TABLE 16  
KC 210H NORMAL OPERATING PRESSURES**

<b>Normal Operating Pressures</b>													
	<b>Outdoor Coil Entering Air Temperature</b>												
	<b>65 °F</b>		<b>75 °F</b>		<b>85 °F</b>		<b>95 °F</b>		<b>105 °F</b>		<b>115 °F</b>		
	<b>Suct (psig)</b>	<b>Disc (psig)</b>	<b>Suct (psig)</b>	<b>Disc (psig)</b>	<b>Suct (psig)</b>	<b>Disc (psig)</b>	<b>Suct (psig)</b>	<b>Disc (psig)</b>	<b>Suct (psig)</b>	<b>Disc (psig)</b>	<b>Suct (psig)</b>	<b>Disc (psig)</b>	
<b>Circuit 1</b>	110	228	113	262	114	302	116	349	118	402	119	466	
	119	231	121	266	123	305	125	352	127	405	128	466	
	136	238	139	271	141	312	143	358	146	409	149	464	
	152	246	157	277	161	319	165	363	169	414	171	472	
<b>Circuit 2</b>	112	232	111	267	113	312	115	358	116	414	119	479	
	121	235	123	272	125	311	127	357	126	415	129	476	
	137	242	141	278	144	317	146	365	149	415	151	471	
	153	253	159	289	164	333	168	374	171	425	174	478	
<b>Circuit 3</b>	105	241	106	284	108	327	110	375	112	429	115	489	
	112	244	115	282	118	323	121	369	121	428	123	487	
	130	251	132	289	135	332	138	378	141	428	145	484	
	146	261	151	297	156	339	159	386	163	437	165	495	

**TABLE 17  
KC 240H NORMAL OPERATING PRESSURES**

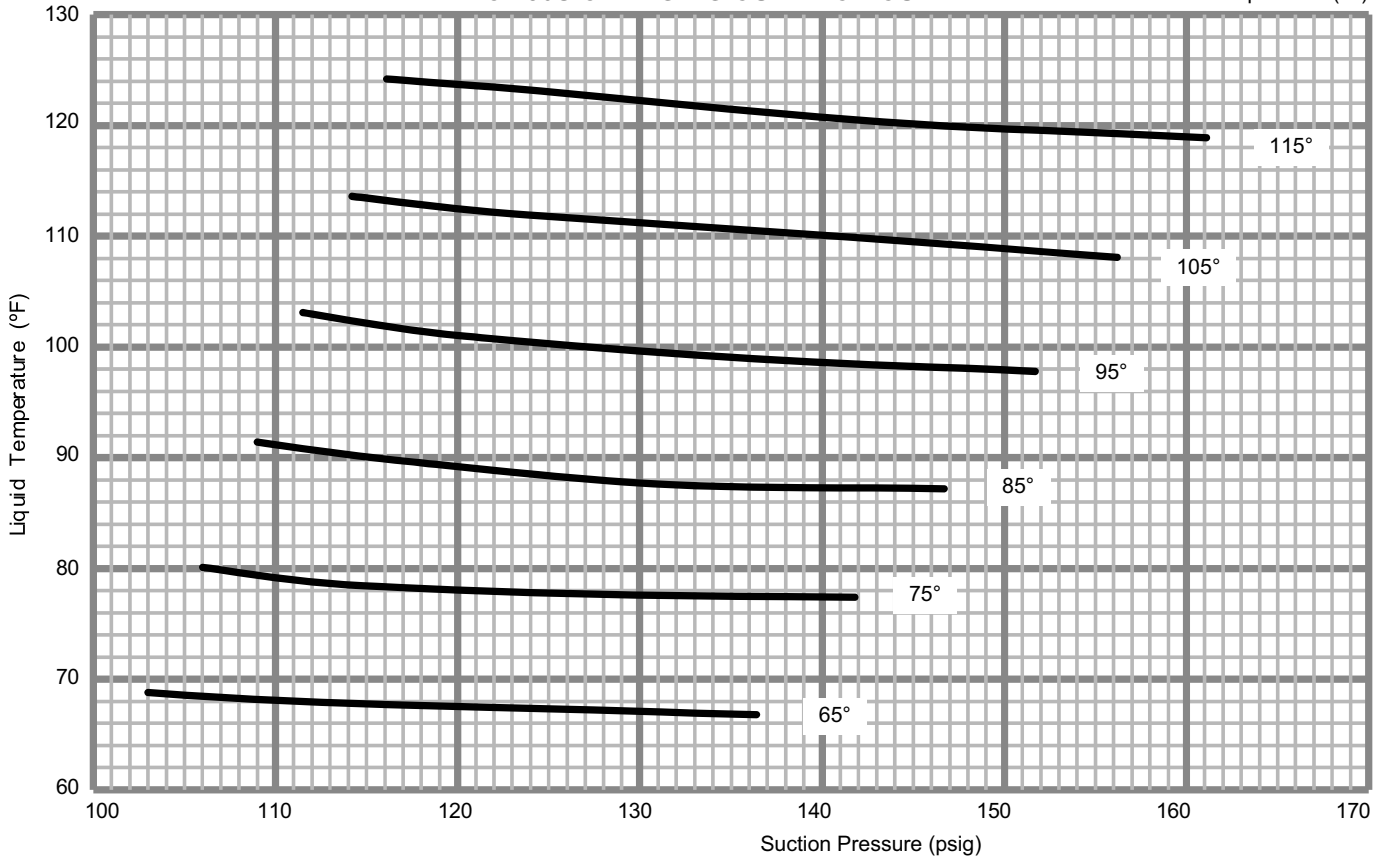
<b>Normal Operating Pressures</b>													
	<b>Outdoor Coil Entering Air Temperature</b>												
	<b>65 °F</b>		<b>75 °F</b>		<b>85 °F</b>		<b>95 °F</b>		<b>105 °F</b>		<b>115 °F</b>		
	<b>Suct (psig)</b>	<b>Disc (psig)</b>	<b>Suct (psig)</b>	<b>Disc (psig)</b>	<b>Suct (psig)</b>	<b>Disc (psig)</b>	<b>Suct (psig)</b>	<b>Disc (psig)</b>	<b>Suct (psig)</b>	<b>Disc (psig)</b>	<b>Suct (psig)</b>	<b>Disc (psig)</b>	
<b>Circuit 1</b>	107	249	109	286	111	331	113	391	116	450	118	513	
	115	251	118	285	120	332	122	383	125	443	128	513	
	134	255	136	291	139	334	141	383	143	441	146	506	
	156	269	160	305	164	352	163	393	166	451	168	508	
<b>Circuit 2</b>	105	236	106	277	109	320	112	373	114	445	116	538	
	114	239	116	275	117	323	119	372	122	438	125	530	
	131	245	134	279	136	322	138	372	140	427	144	489	
	153	257	157	291	161	337	161	377	164	433	167	486	
<b>Circuit 3</b>	110	247	112	286	114	330	115	386	117	444	119	507	
	119	251	121	289	122	334	123	384	126	442	128	512	
	136	259	139	298	141	341	144	389	145	445	147	506	
	157	276	162	314	166	358	166	399	168	457	170	511	
<b>Circuit 4</b>	104	240	106	276	108	319	110	372	111	435	115	492	
	113	244	114	280	117	320	117	371	120	432	123	497	
	128	251	131	289	133	331	136	376	139	430	142	486	
	149	264	154	301	157	345	157	387	161	442	165	493	

**TABLE 18  
KC 300H NORMAL OPERATING PRESSURES**

Normal Operating Pressures												
	Outdoor Coil Entering Air Temperature											
	65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	107	252	109	290	111	335	113	385	115	440	118	500
	115	256	118	295	120	339	122	388	124	442	127	502
	130	268	134	305	138	348	140	395	143	450	146	506
	146	283	150	321	154	363	159	410	163	462	166	521
Circuit 2	106	240	108	278	110	322	112	371	115	427	117	486
	114	244	117	282	119	326	121	376	123	429	126	490
	129	254	133	290	137	333	139	379	142	433	144	493
	145	266	149	304	154	344	158	392	162	446	166	509
Circuit 3	110	252	111	294	112	342	114	394	118	447	121	509
	118	258	121	298	123	345	124	398	127	451	129	512
	133	270	137	307	141	352	143	399	146	457	148	517
	150	282	153	323	158	369	162	416	167	470	170	533
Circuit 4	105	247	107	286	110	330	112	379	113	434	116	496
	112	252	115	292	117	336	120	386	123	437	125	500
	128	263	131	300	134	345	136	392	140	448	143	507
	143	274	146	313	151	359	155	407	159	461	164	523

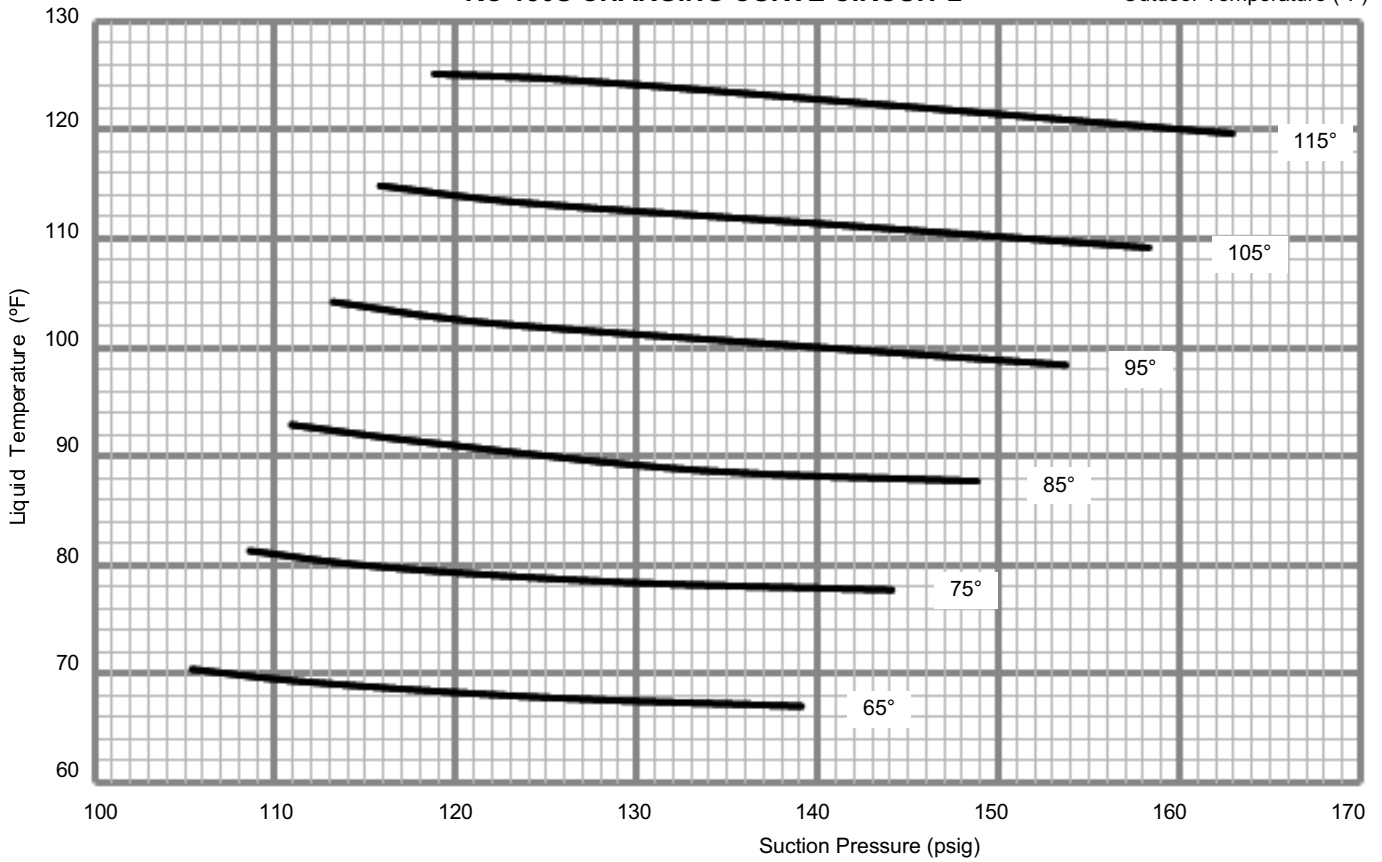
### KC 180S CHARGING CURVE CIRCUIT 1

Outdoor Temperature (°F)



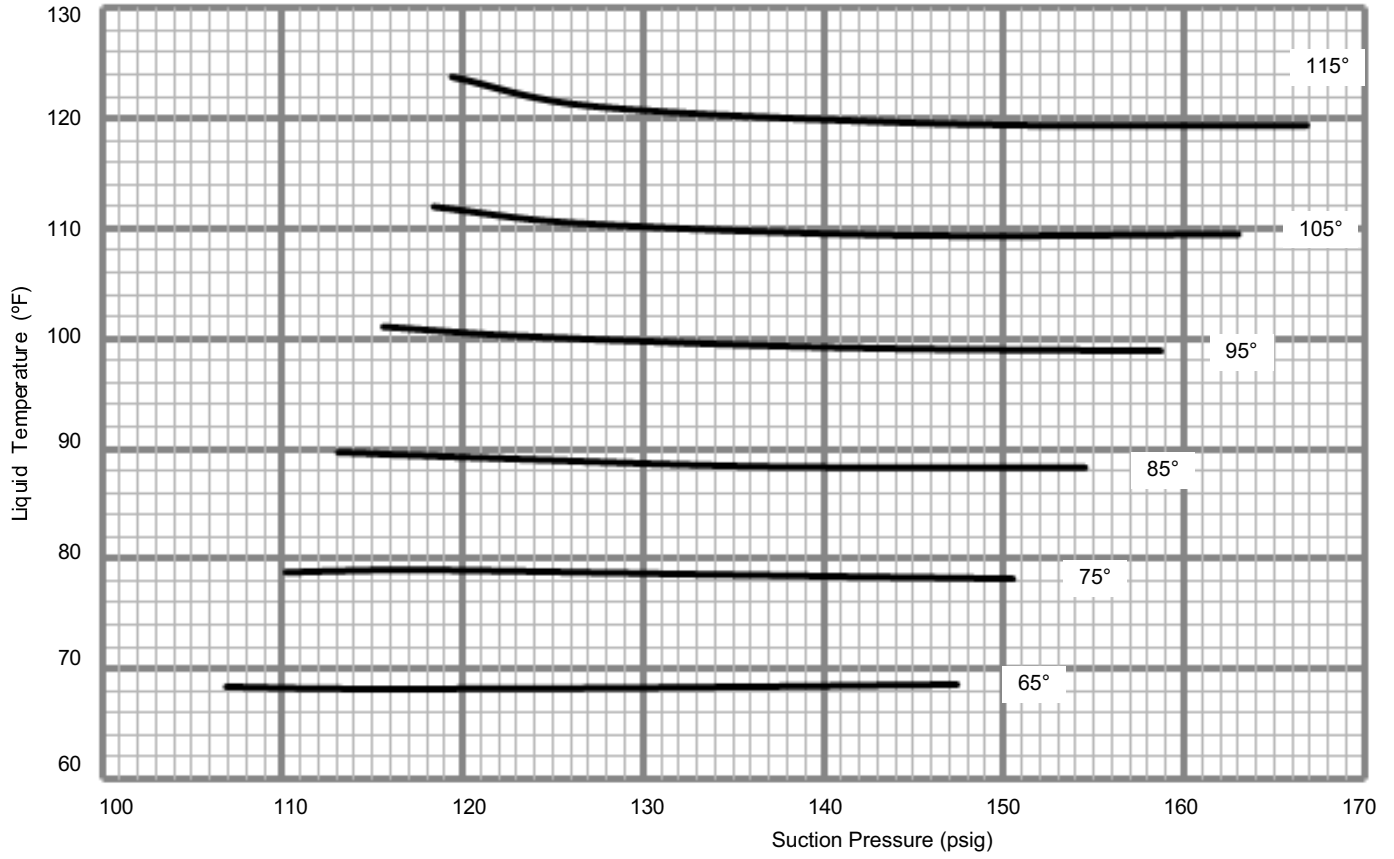
### KC 180S CHARGING CURVE CIRCUIT 2

Outdoor Temperature (°F)



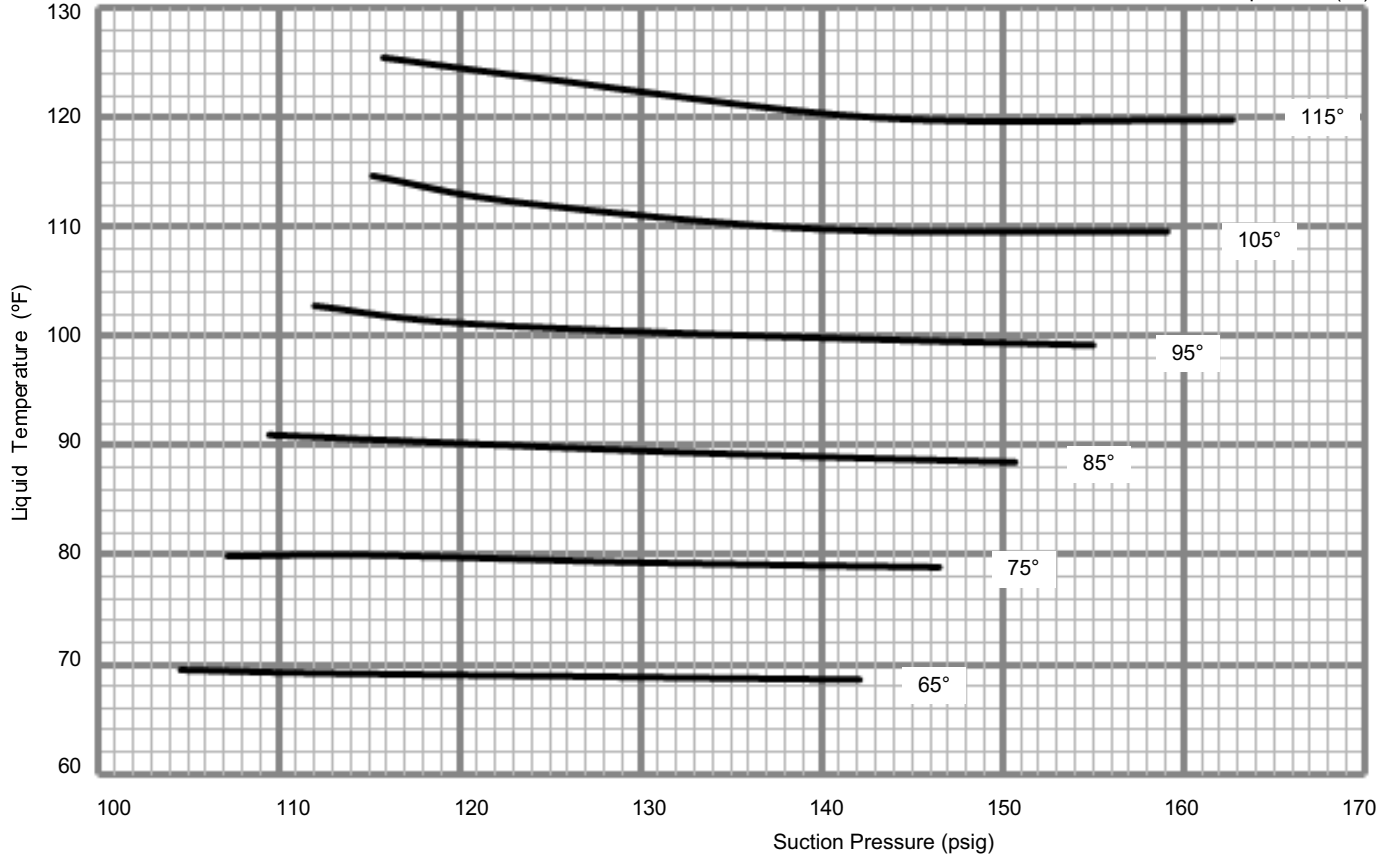
### KC 210S CHARGING CURVE CIRCUIT 1

Outdoor Temperature (°F)



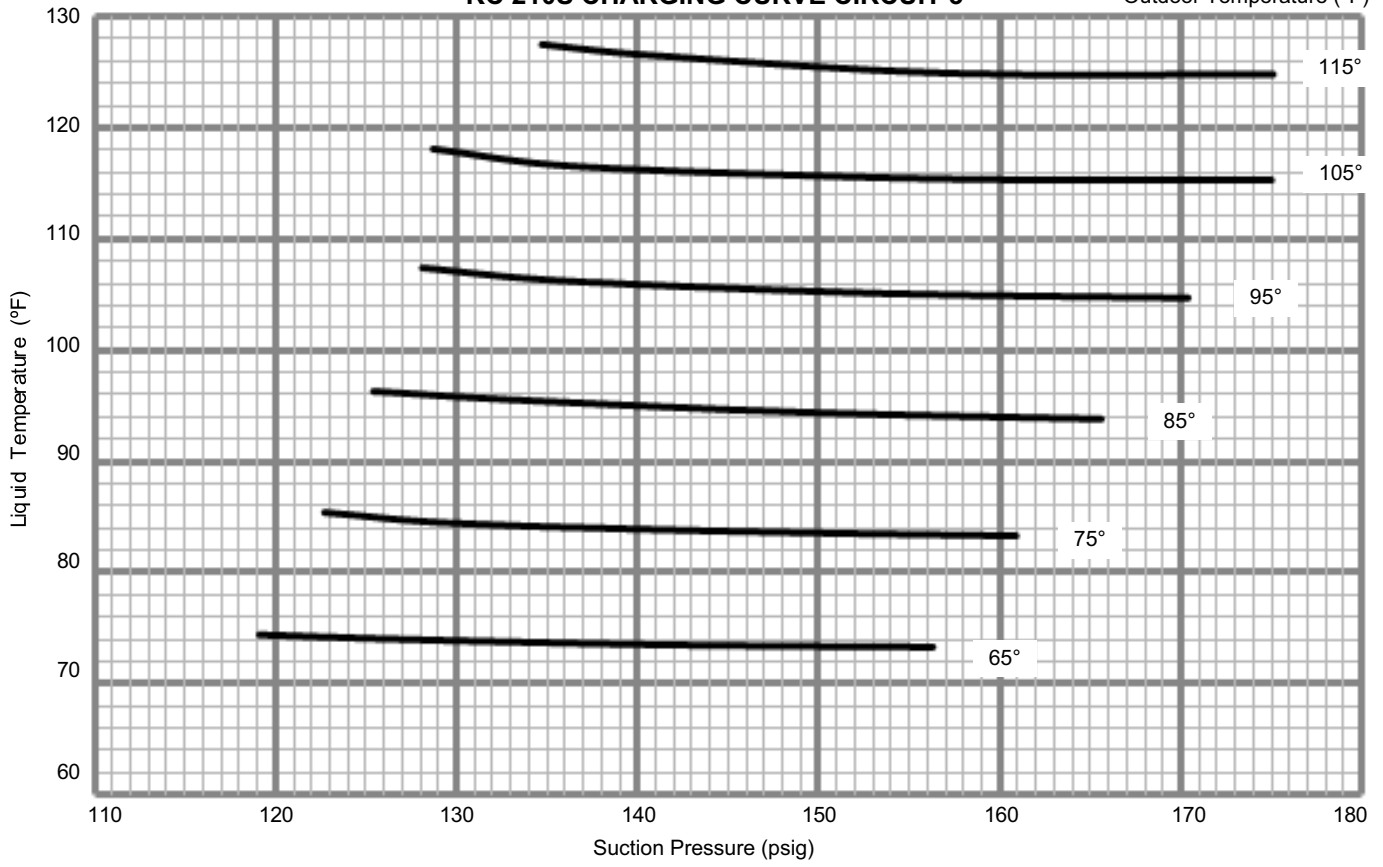
### KC 210S CHARGING CURVE CIRCUIT 2

Outdoor Temperature (°F)



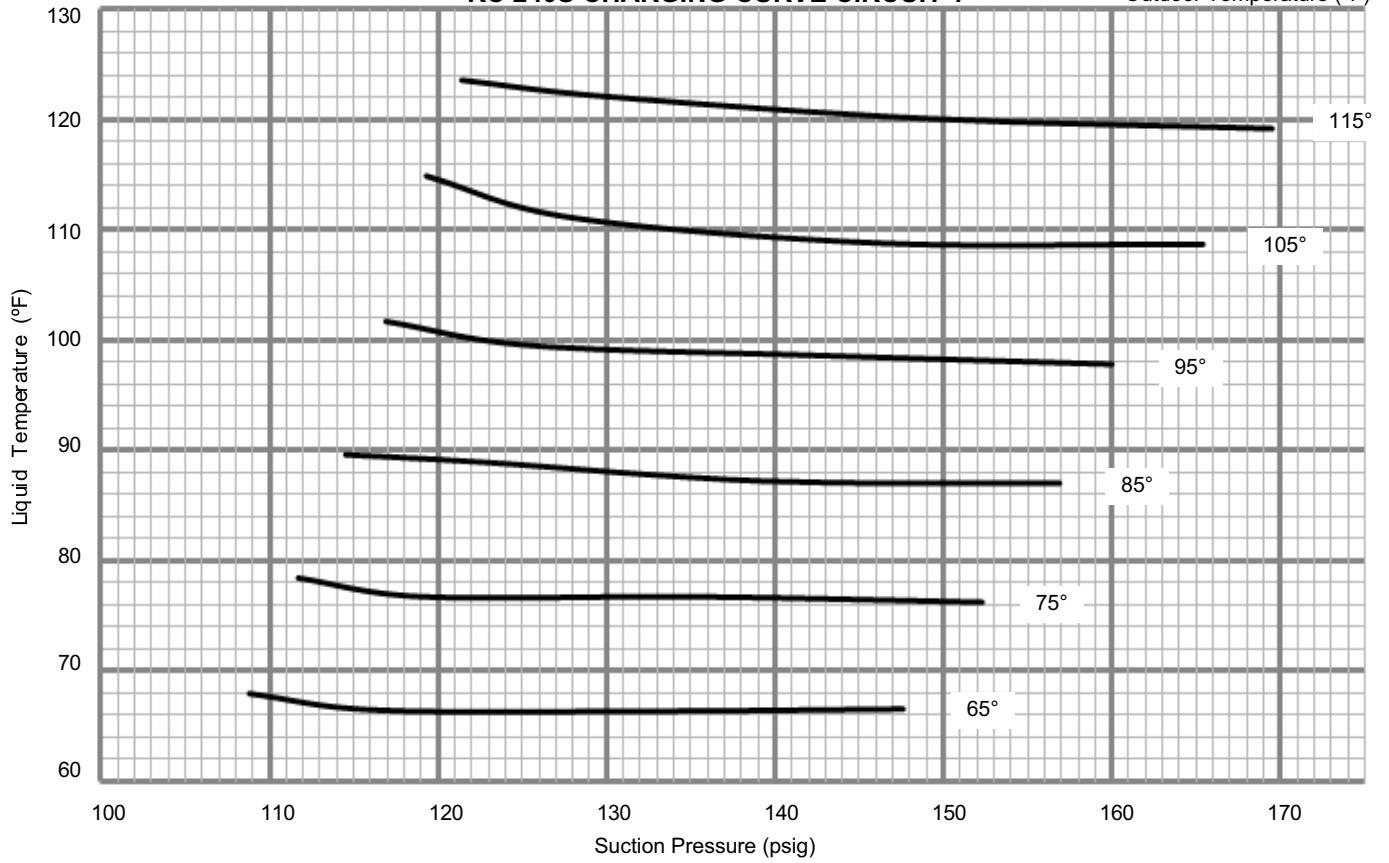
# KC 210S CHARGING CURVE CIRCUIT 3

Outdoor Temperature (°F)



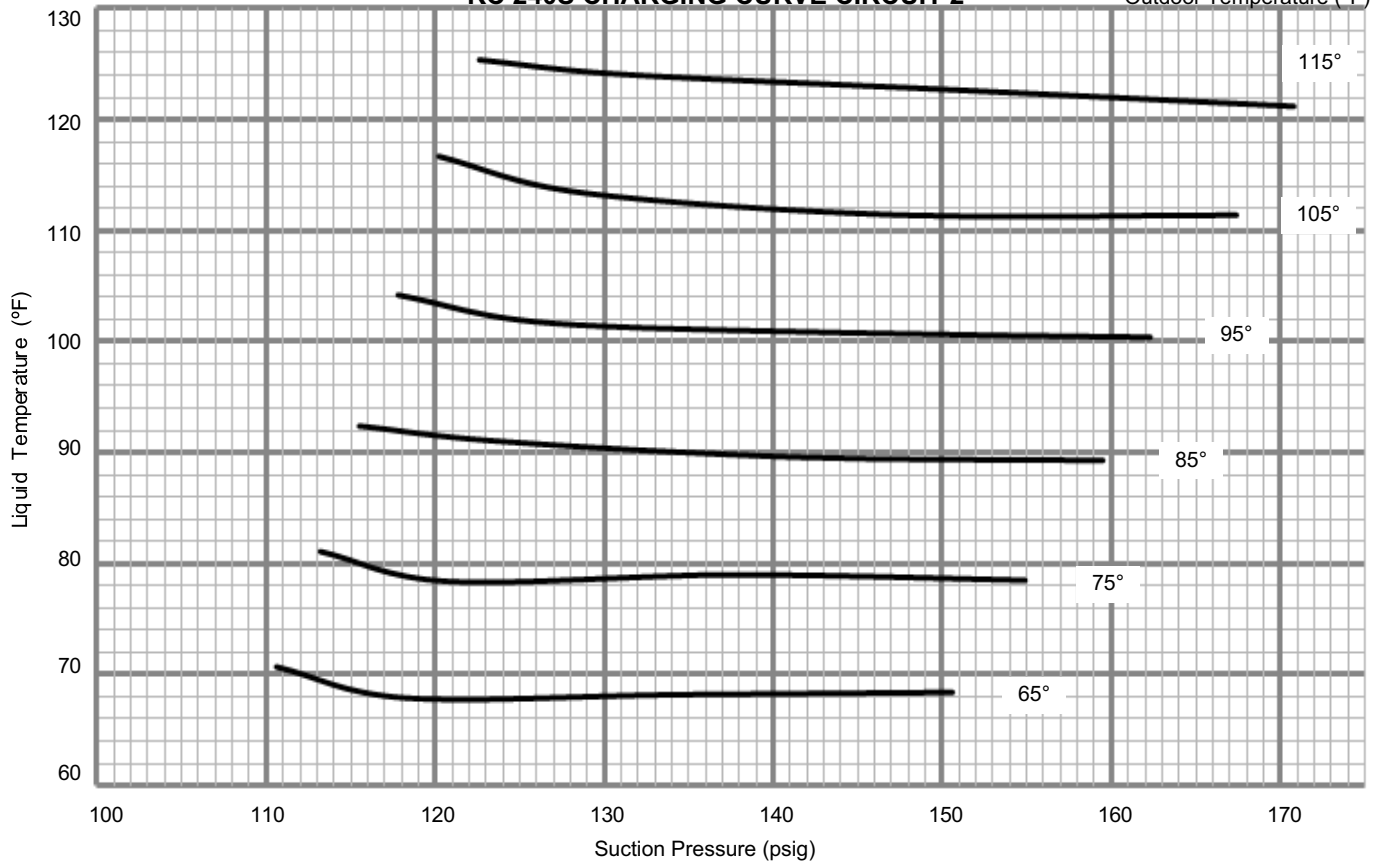
### KC 240S CHARGING CURVE CIRCUIT 1

Outdoor Temperature (°F)



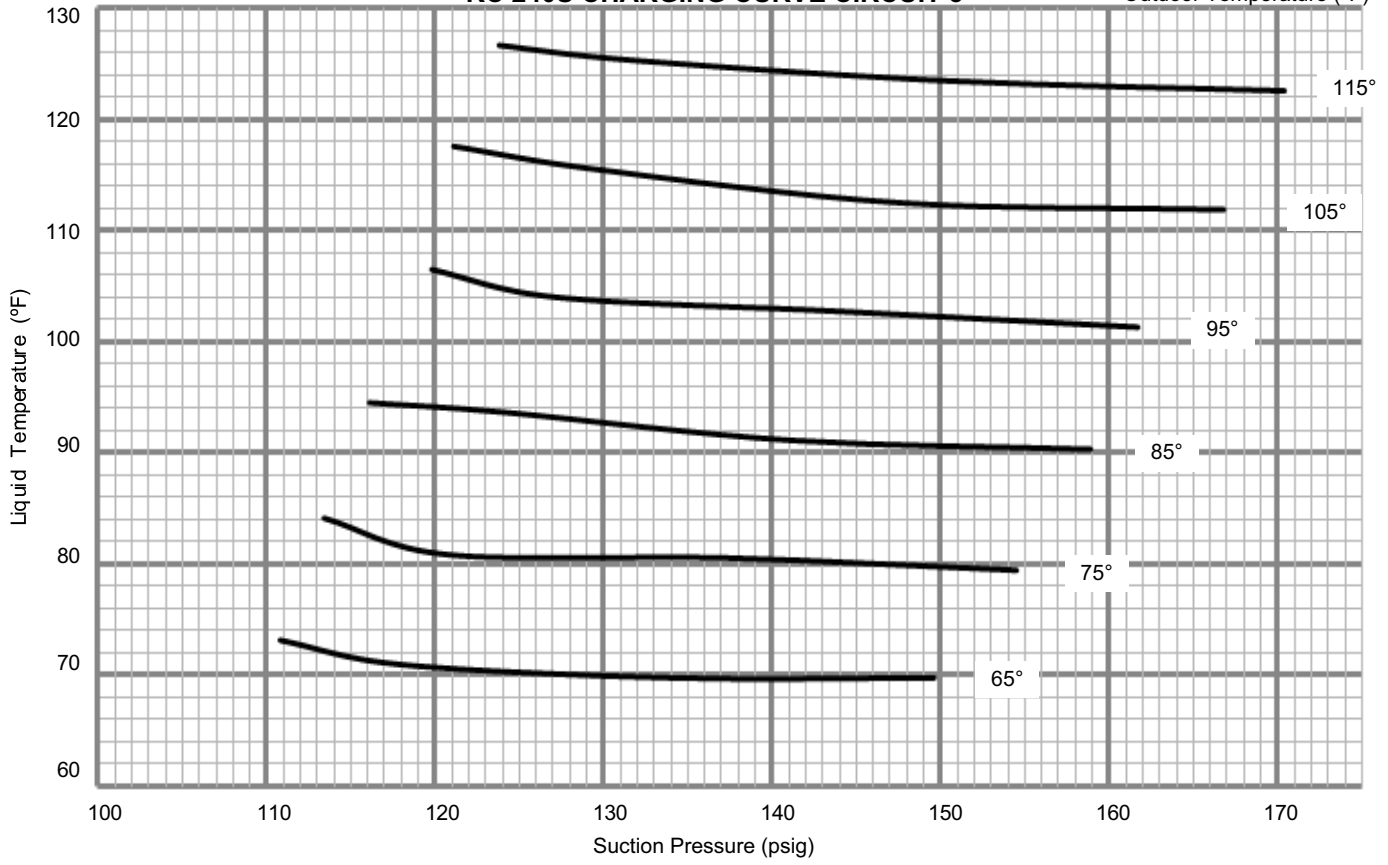
### KC 240S CHARGING CURVE CIRCUIT 2

Outdoor Temperature (°F)



# KC 240S CHARGING CURVE CIRCUIT 3

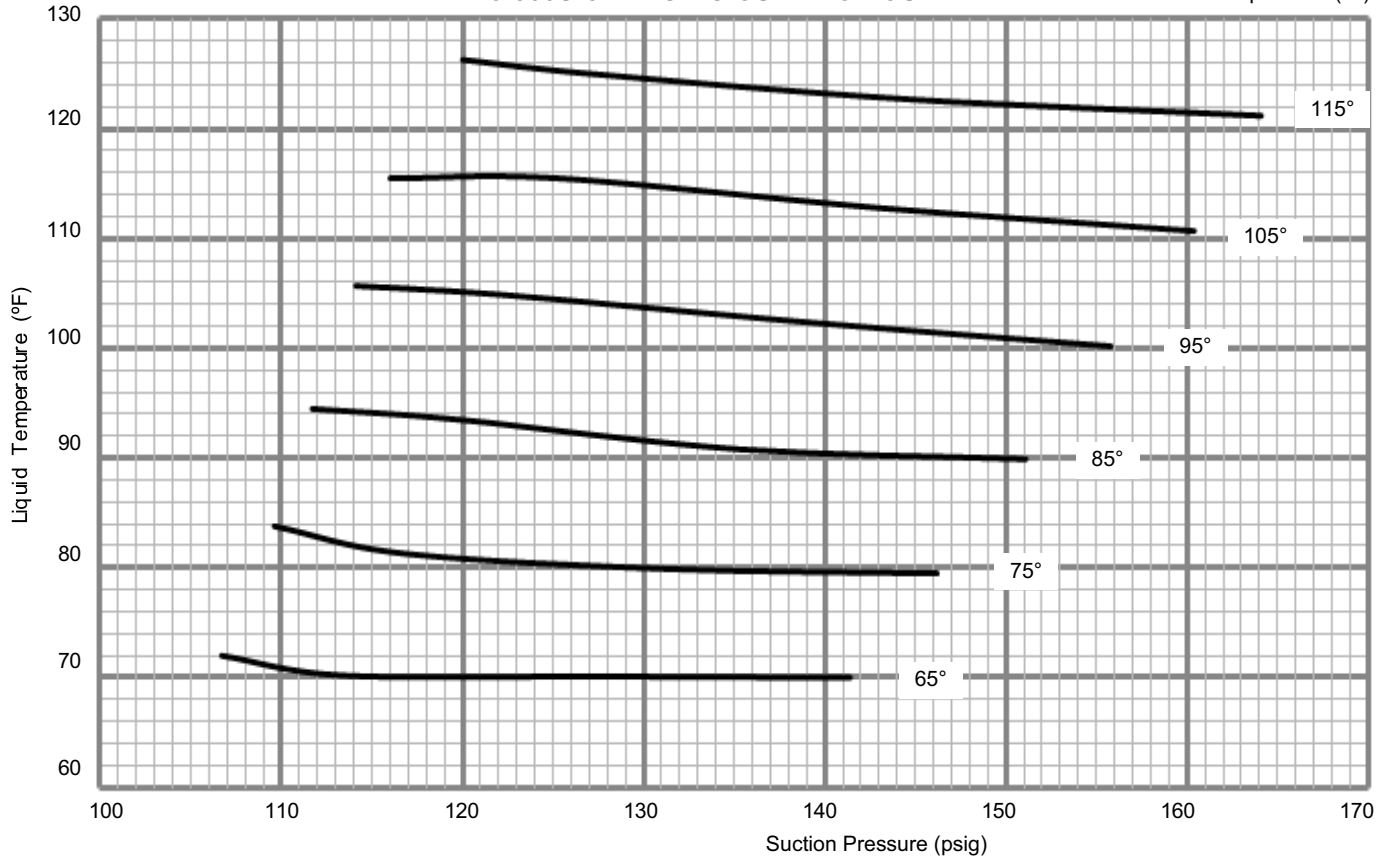
Outdoor Temperature (°F)





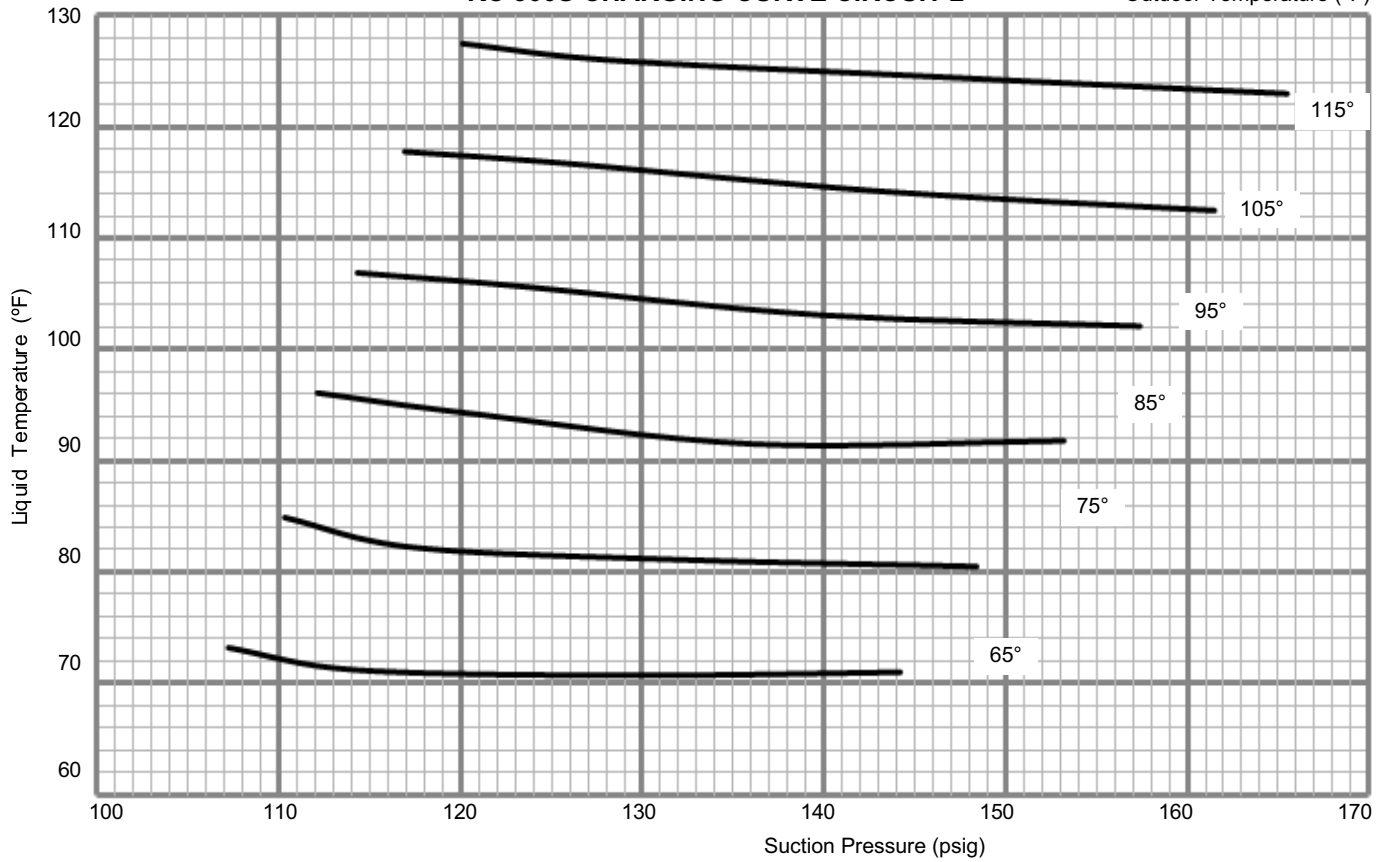
### KC 300S CHARGING CURVE CIRCUIT 1

Outdoor Temperature (°F)



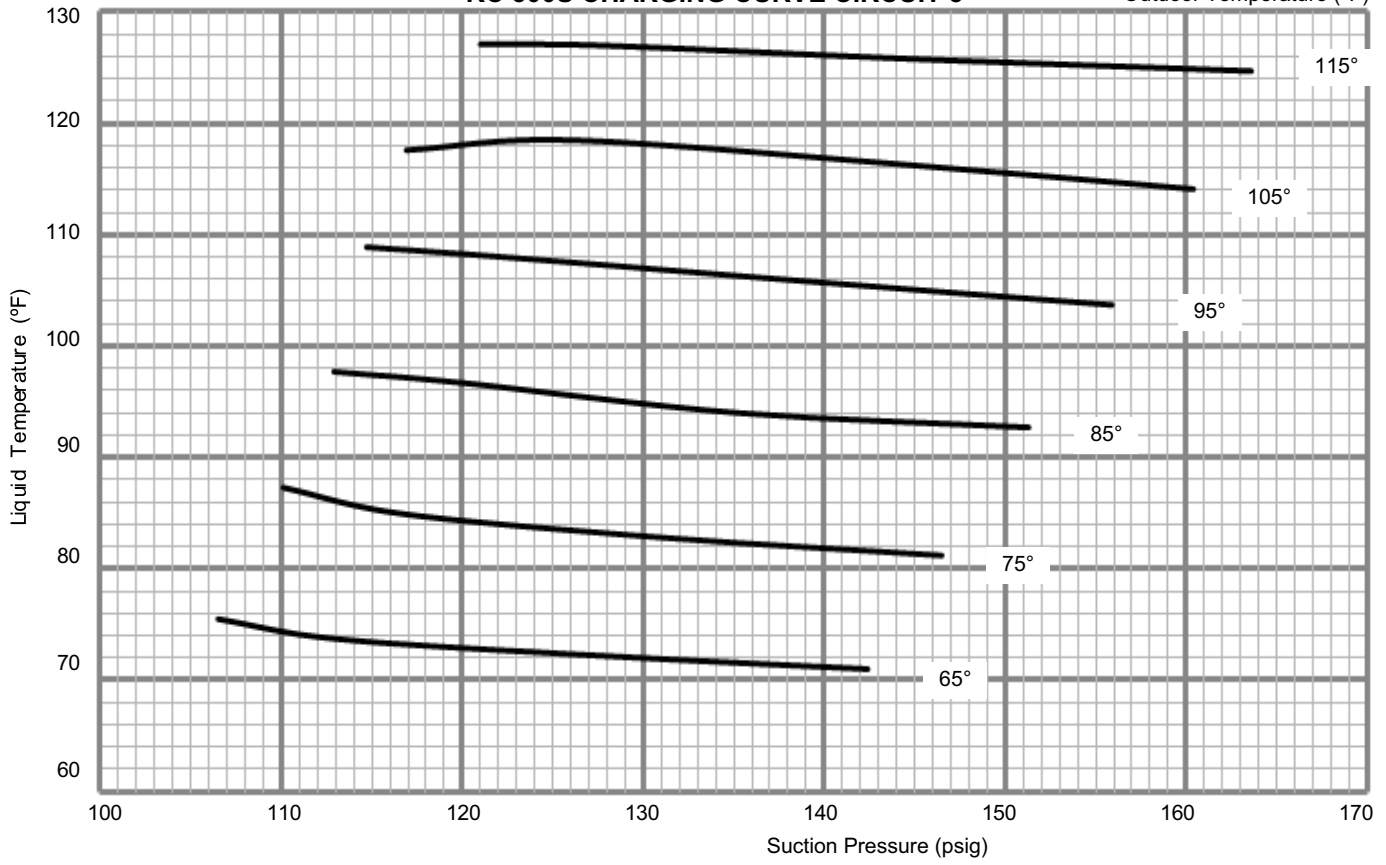
### KC 300S CHARGING CURVE CIRCUIT 2

Outdoor Temperature (°F)



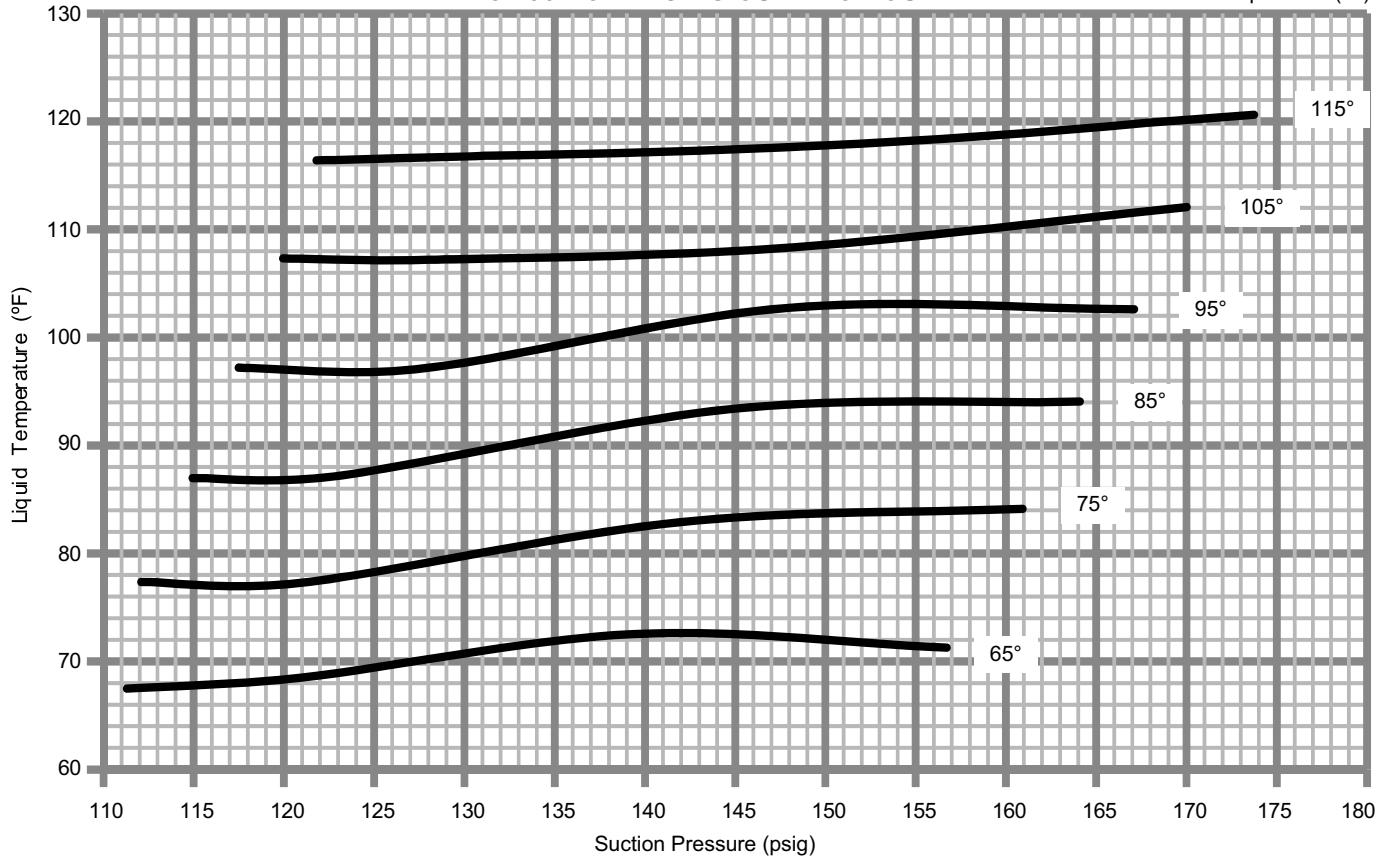
# KC 300S CHARGING CURVE CIRCUIT 3

Outdoor Temperature (°F)



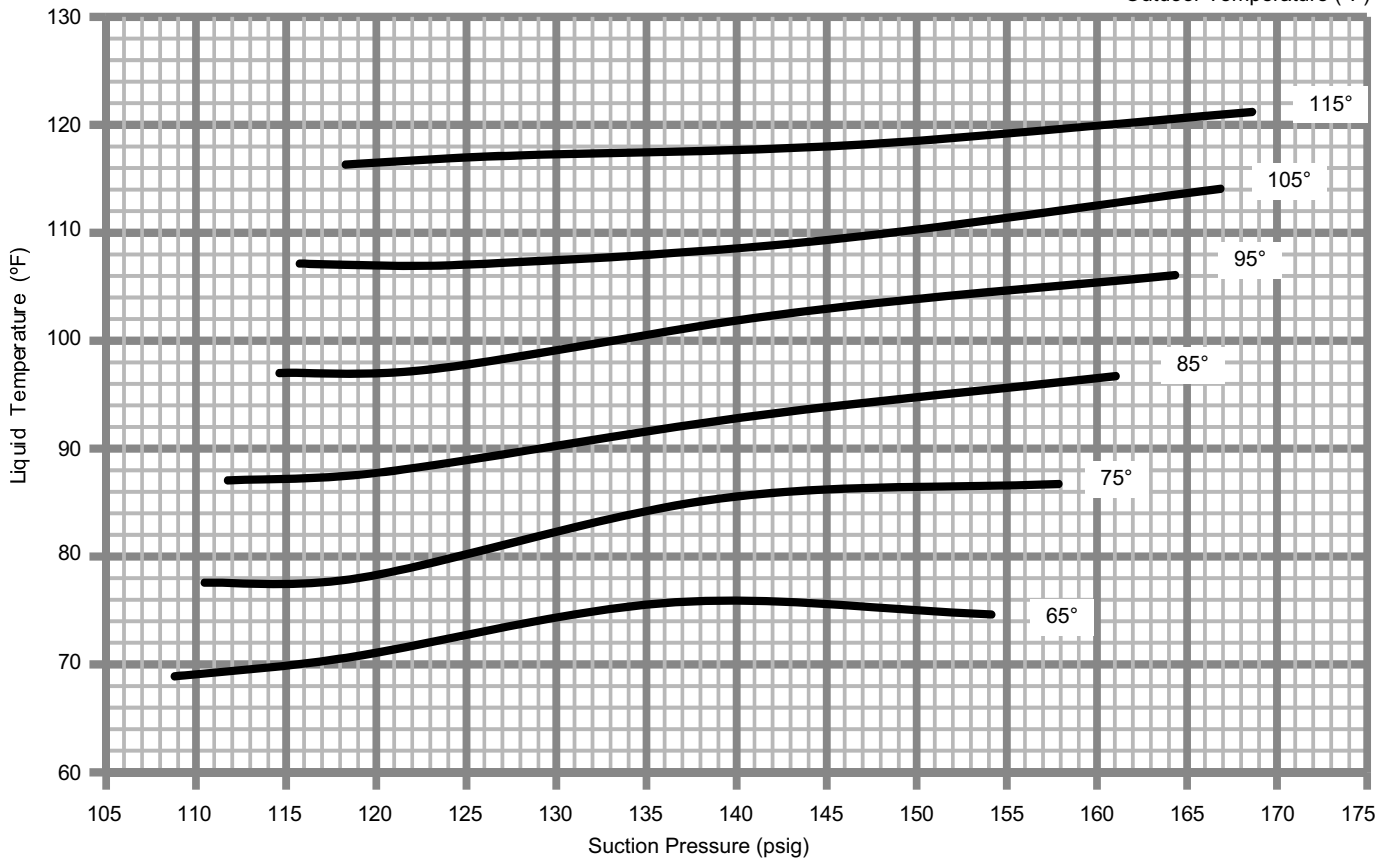
### KC 156H CHARGING CURVE CIRCUIT 1

Outdoor Temperature (°F)



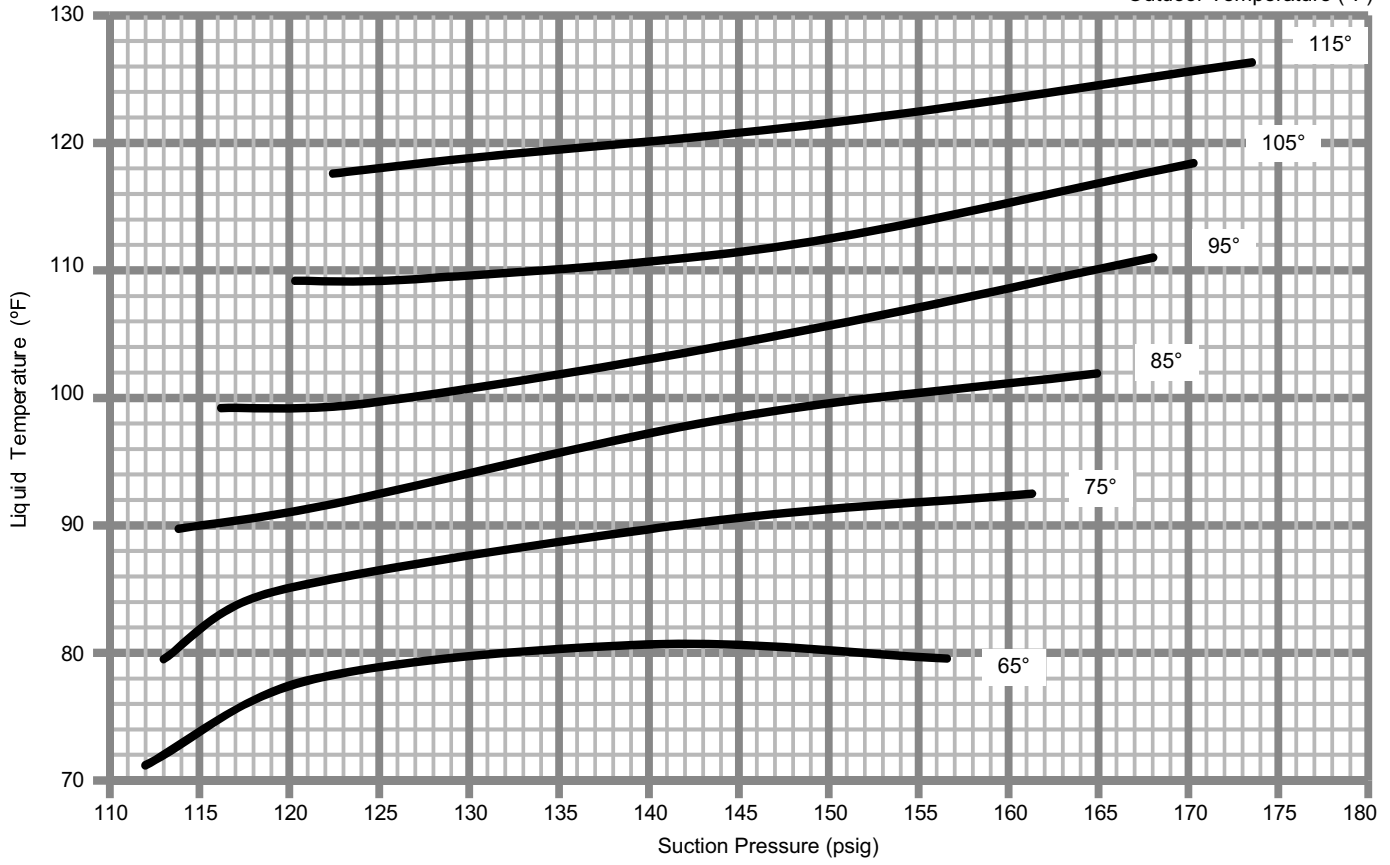
### KC 156H CHARGING CURVE CIRCUIT 2

Outdoor Temperature (°F)



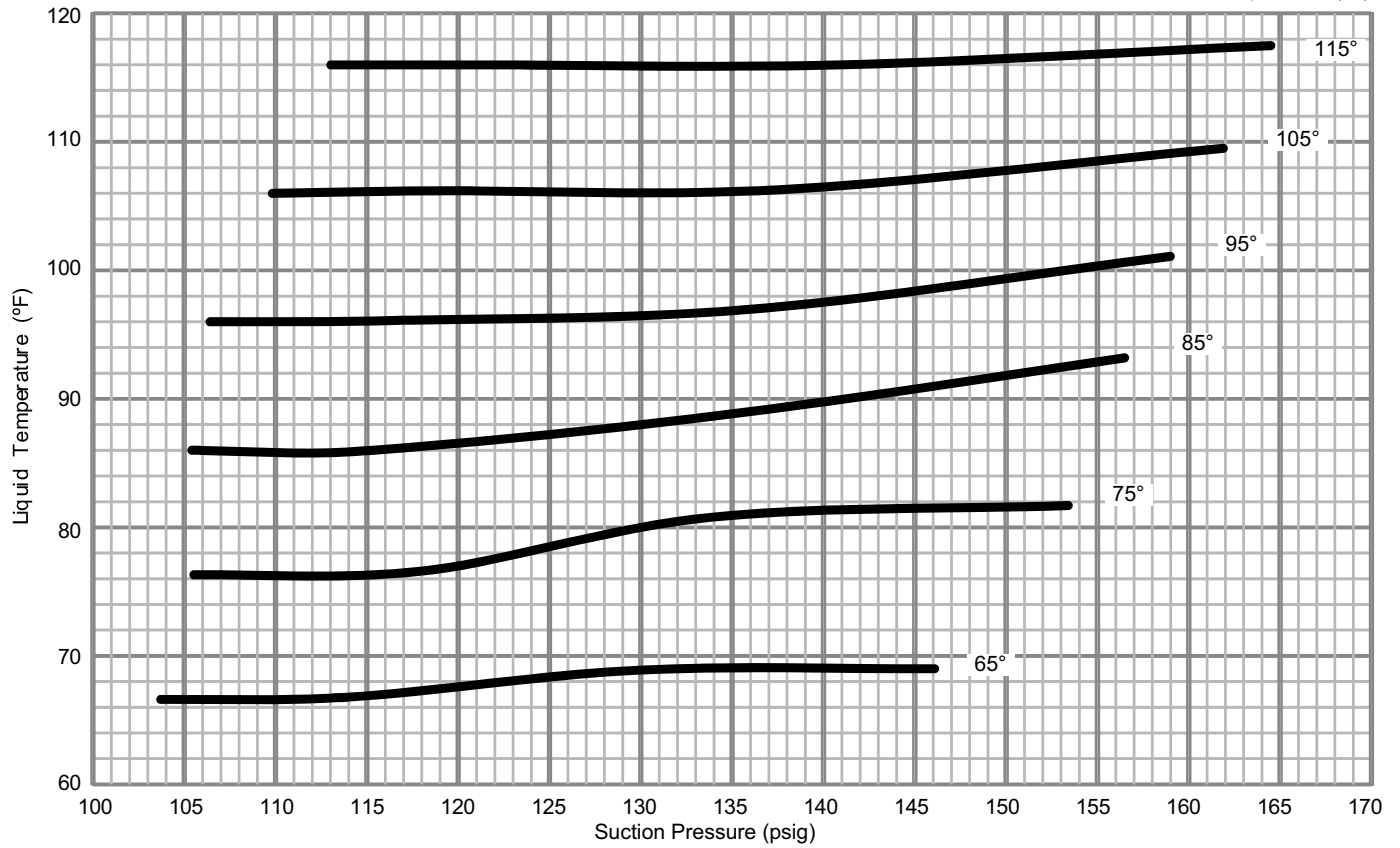
# KC 156H CHARGING CURVE CIRCUIT 3

Outdoor Temperature (°F)



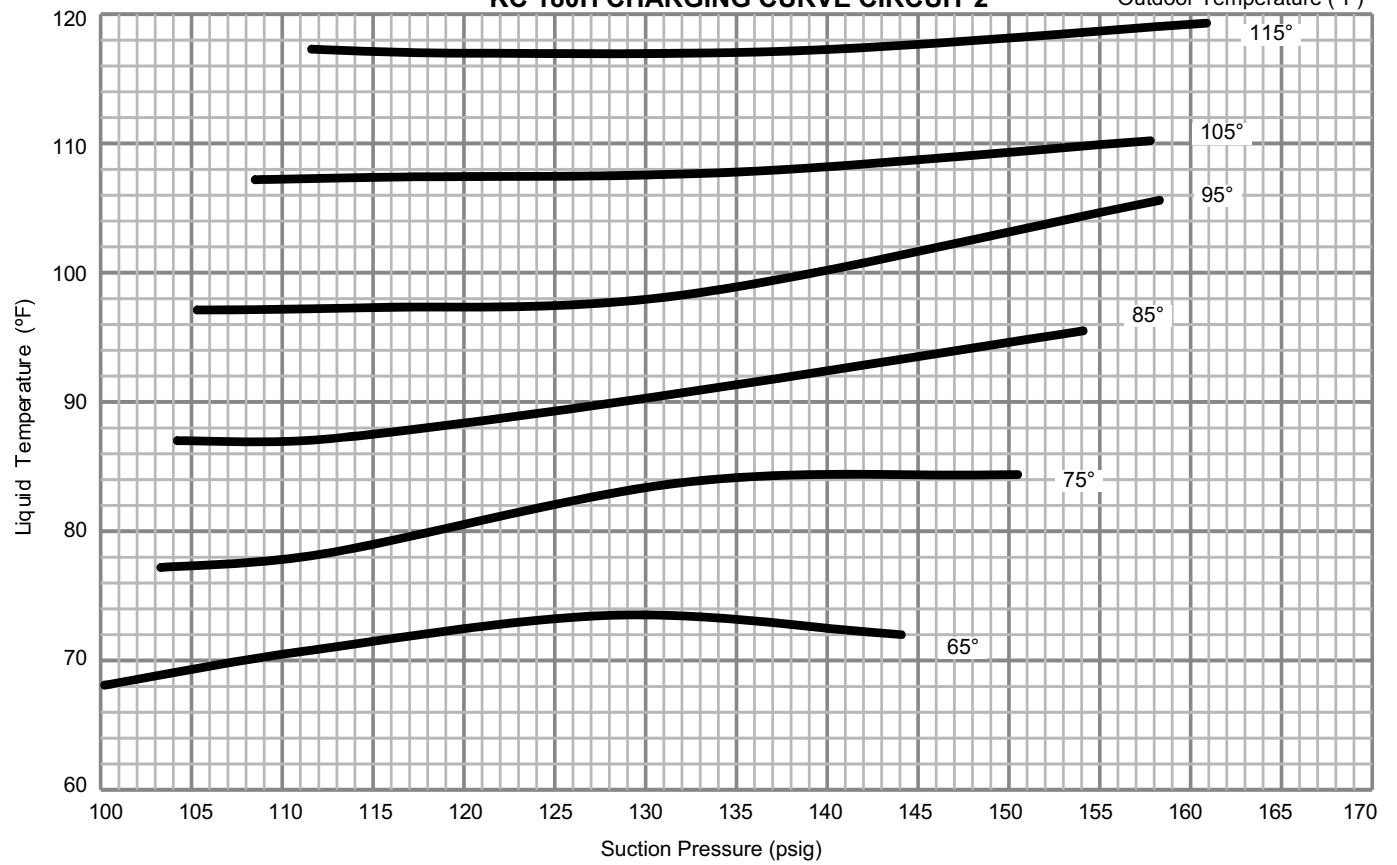
### KC 180H CHARGING CURVE CIRCUIT 1

Outdoor Temperature (°F)

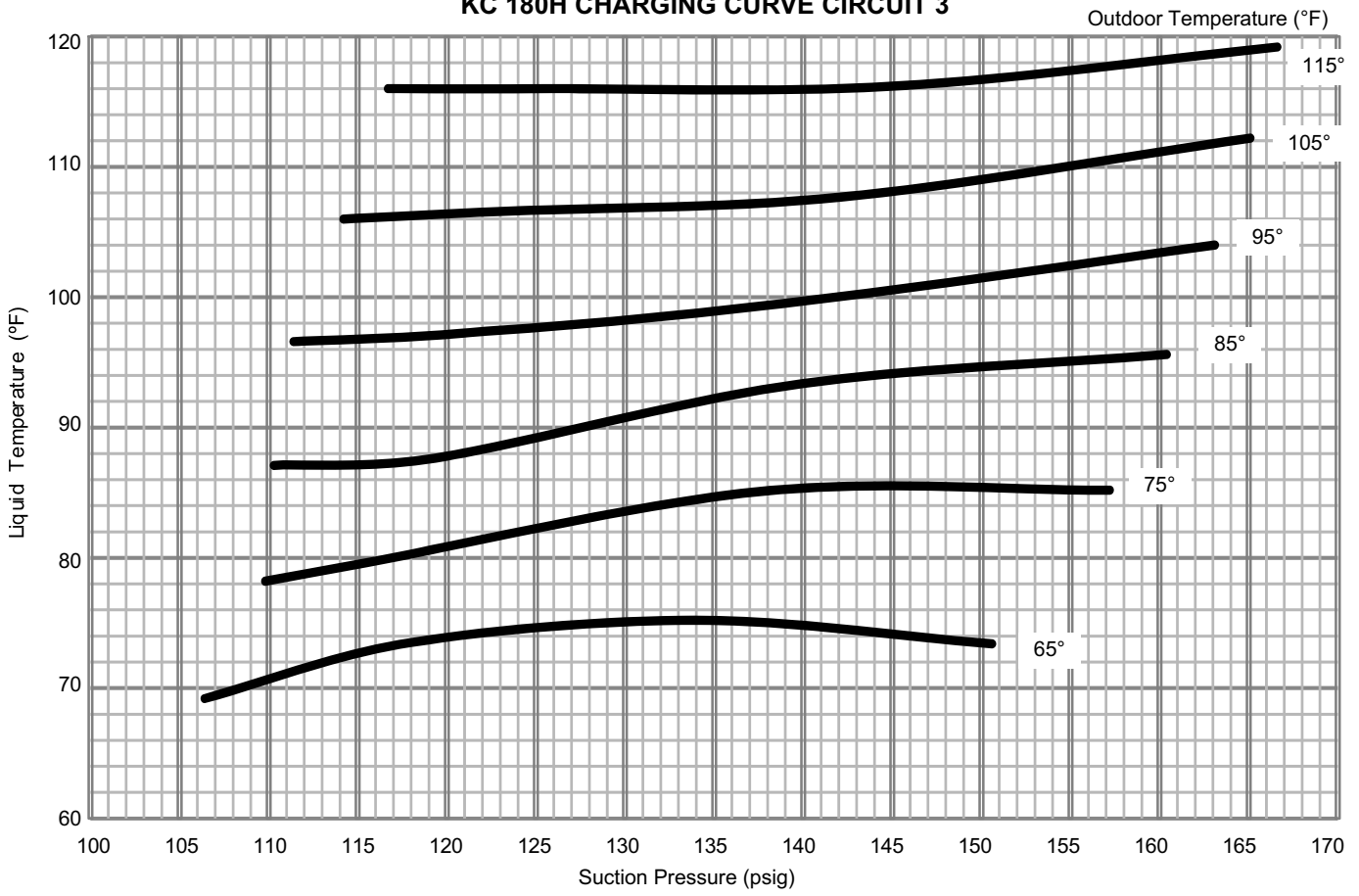


### KC 180H CHARGING CURVE CIRCUIT 2

Outdoor Temperature (°F)

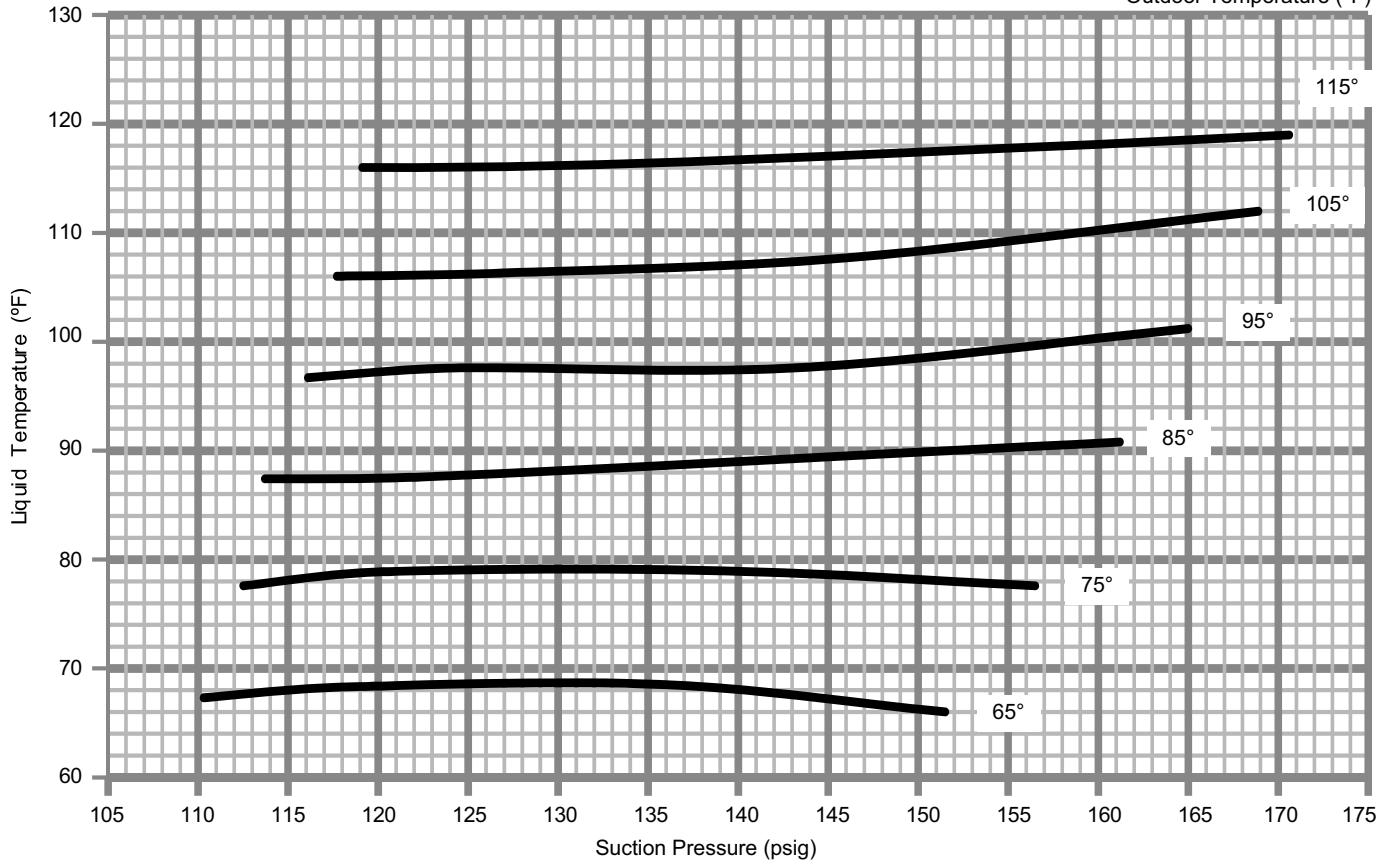


# KC 180H CHARGING CURVE CIRCUIT 3



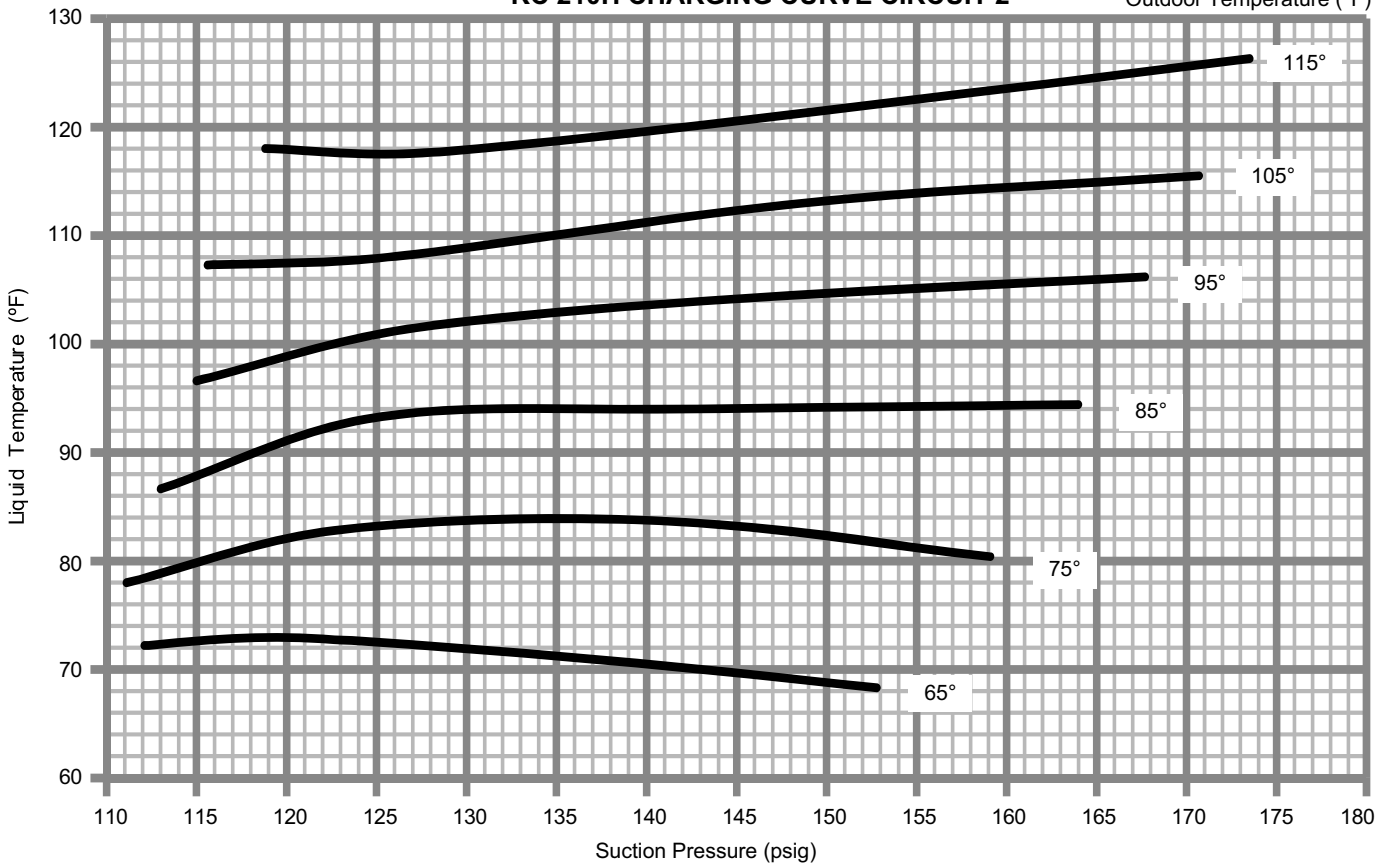
### KC 210H CHARGING CURVE CIRCUIT 1

Outdoor Temperature (°F)



### KC 210H CHARGING CURVE CIRCUIT 2

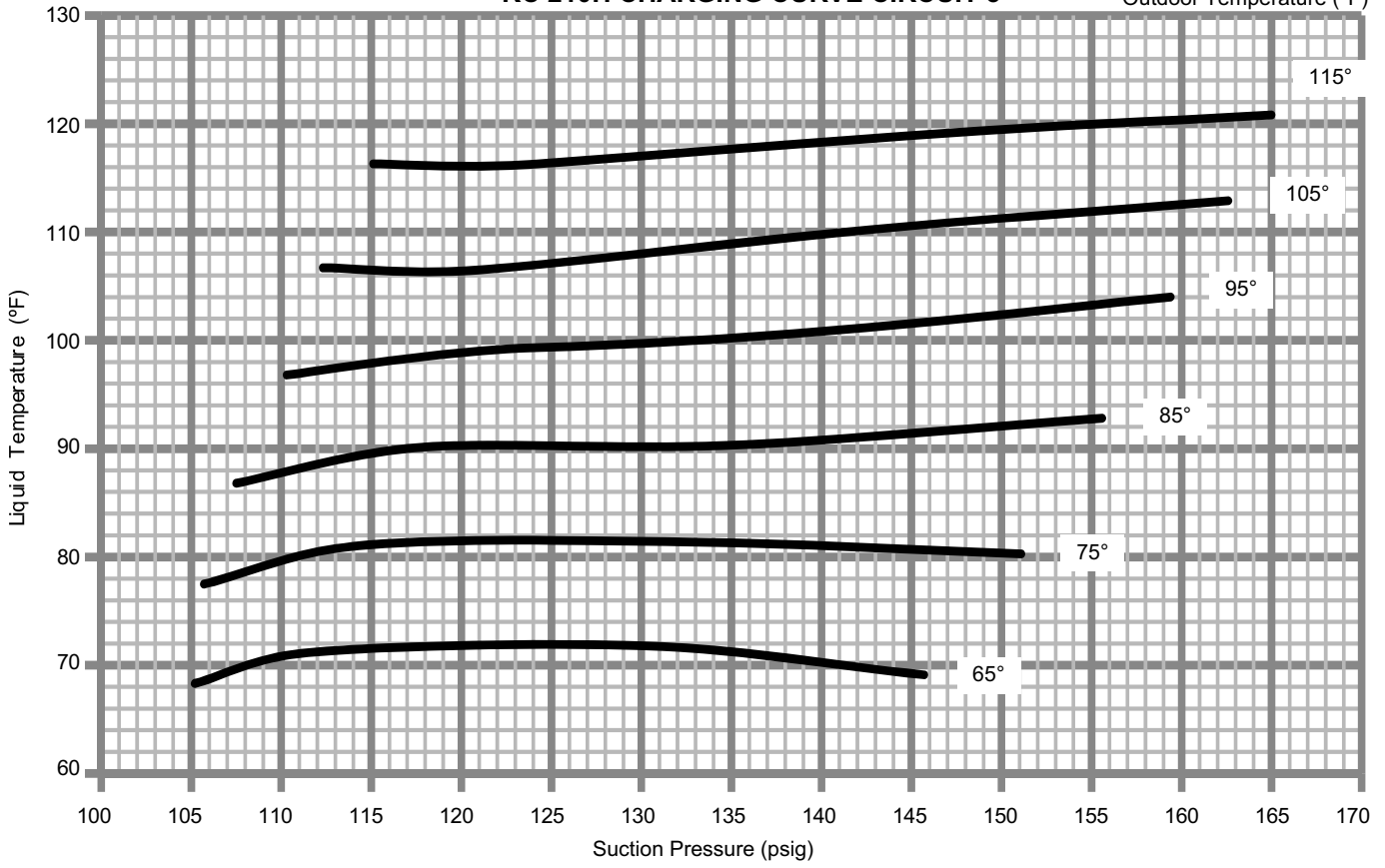
Outdoor Temperature (°F)





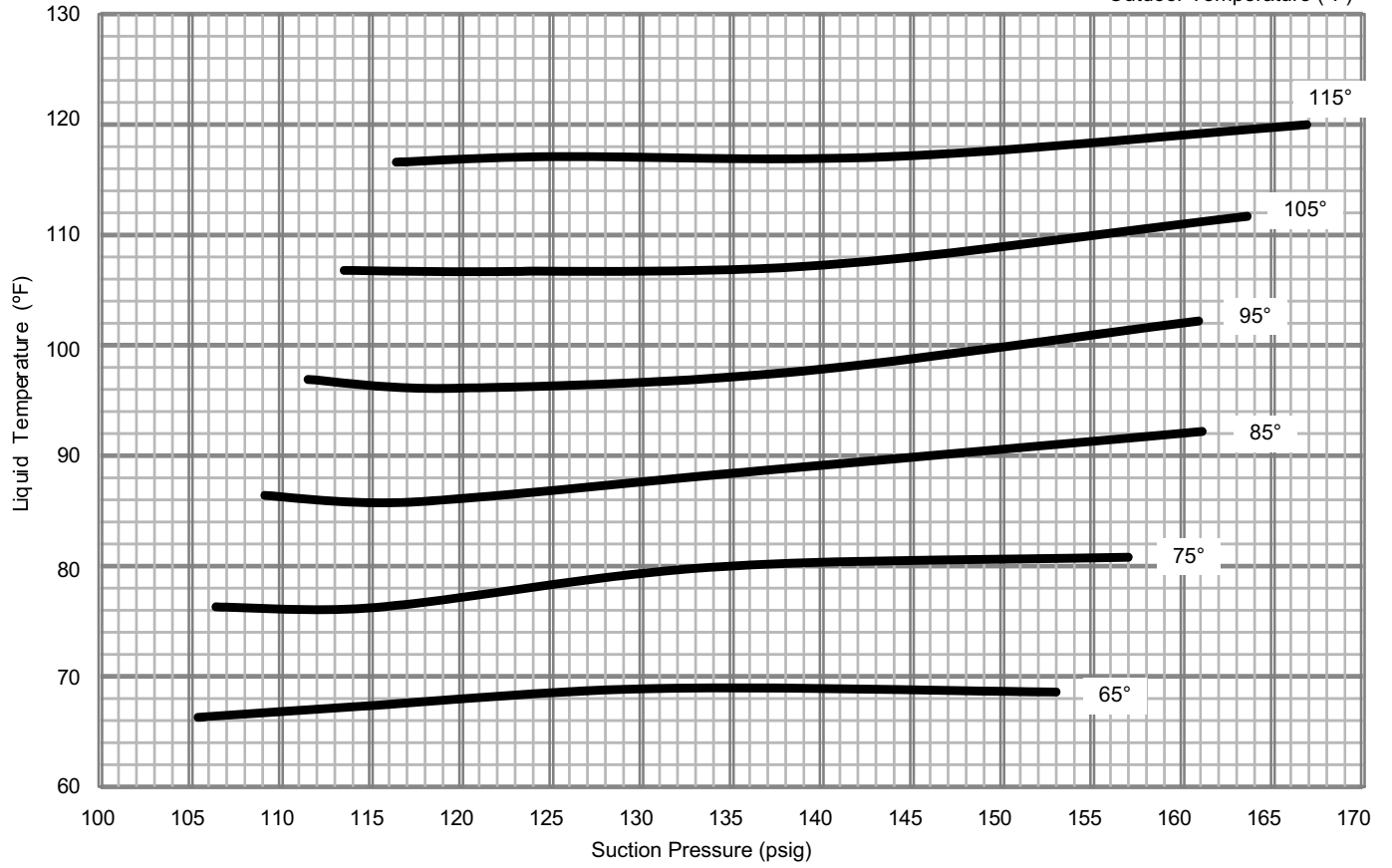
# KC 210H CHARGING CURVE CIRCUIT 3

Outdoor Temperature (°F)



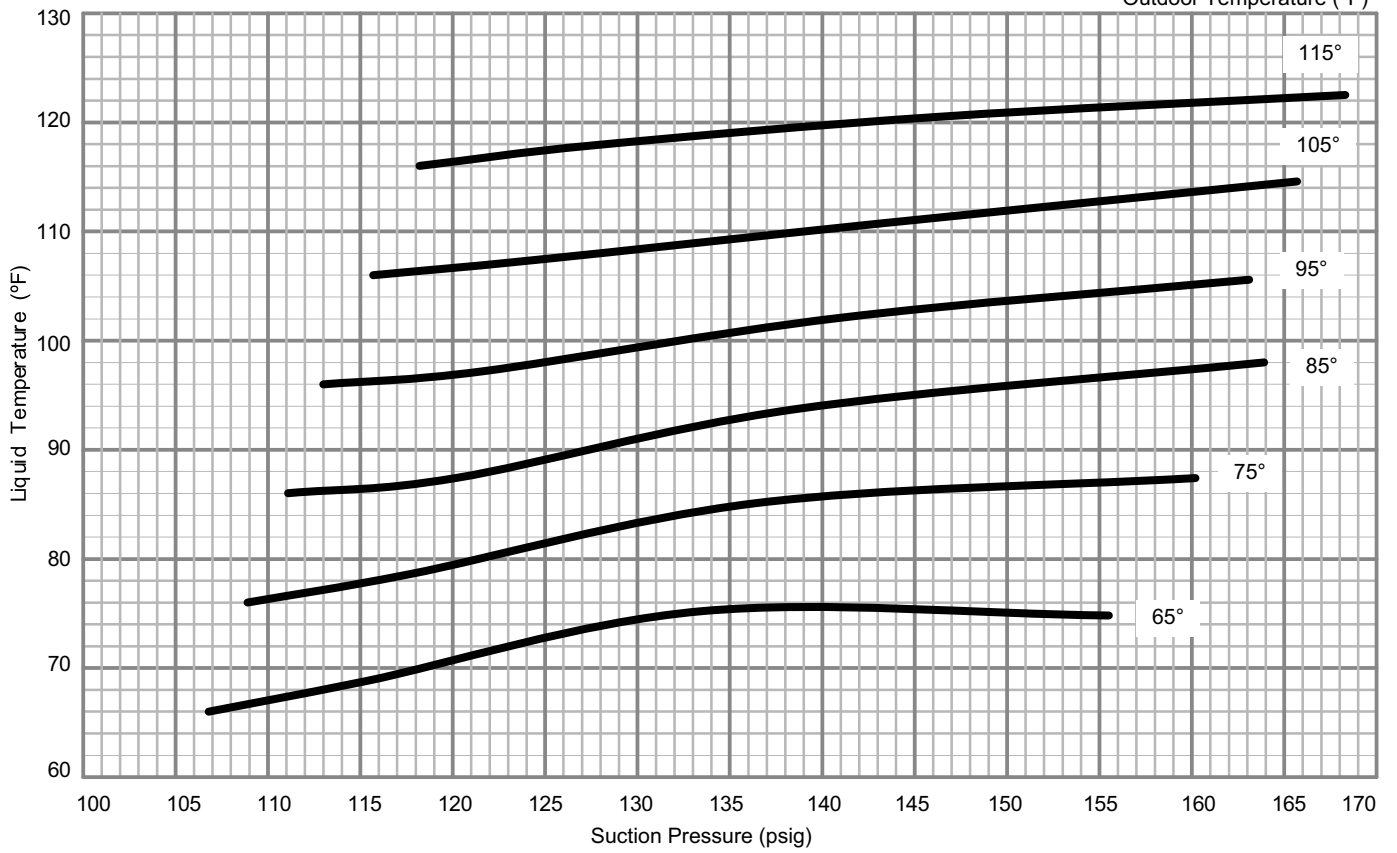
### KC 240H CHARGING CURVE CIRCUIT 1

Outdoor Temperature (°F)

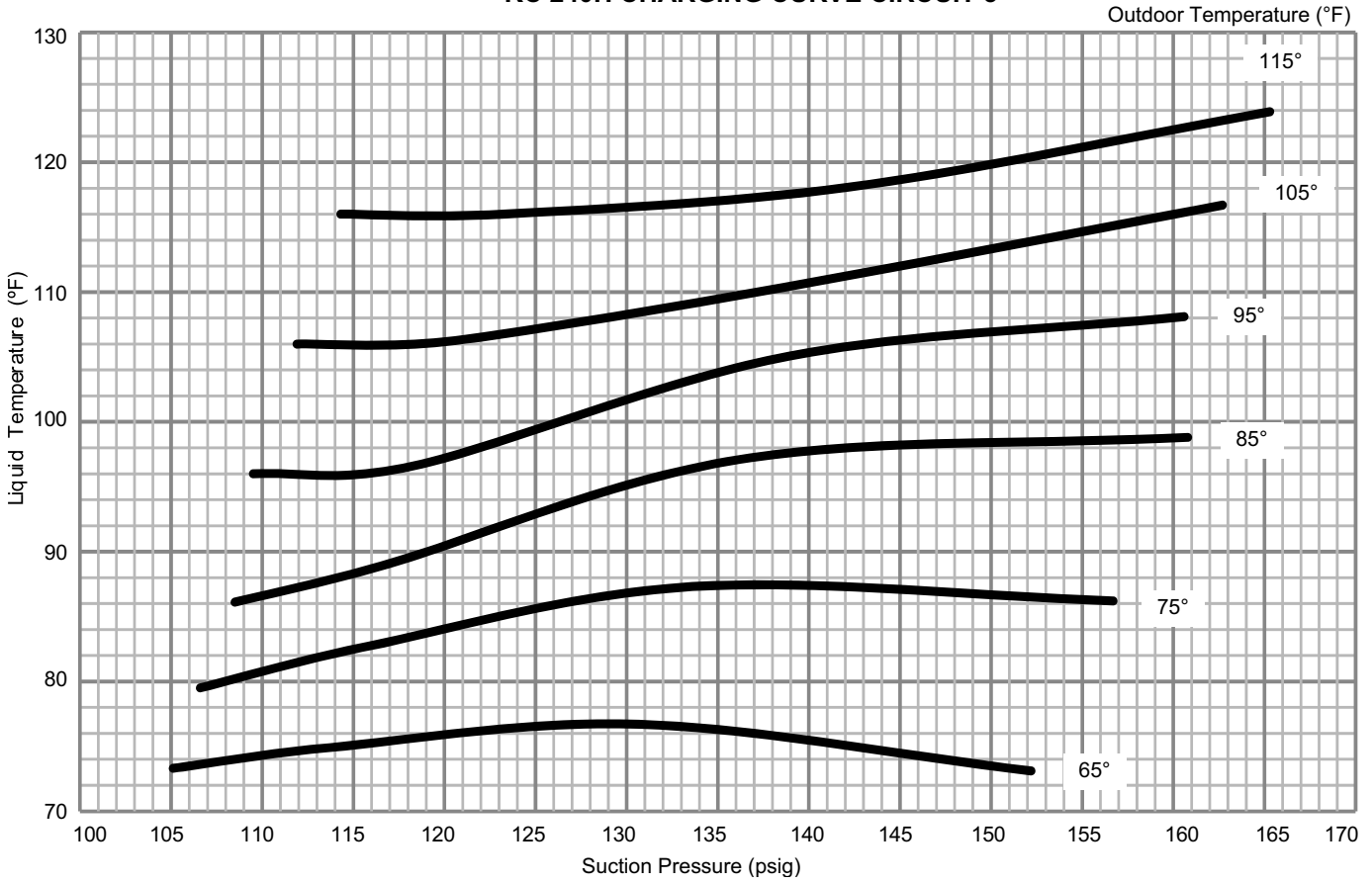


### KC 240H CHARGING CURVE CIRCUIT 2

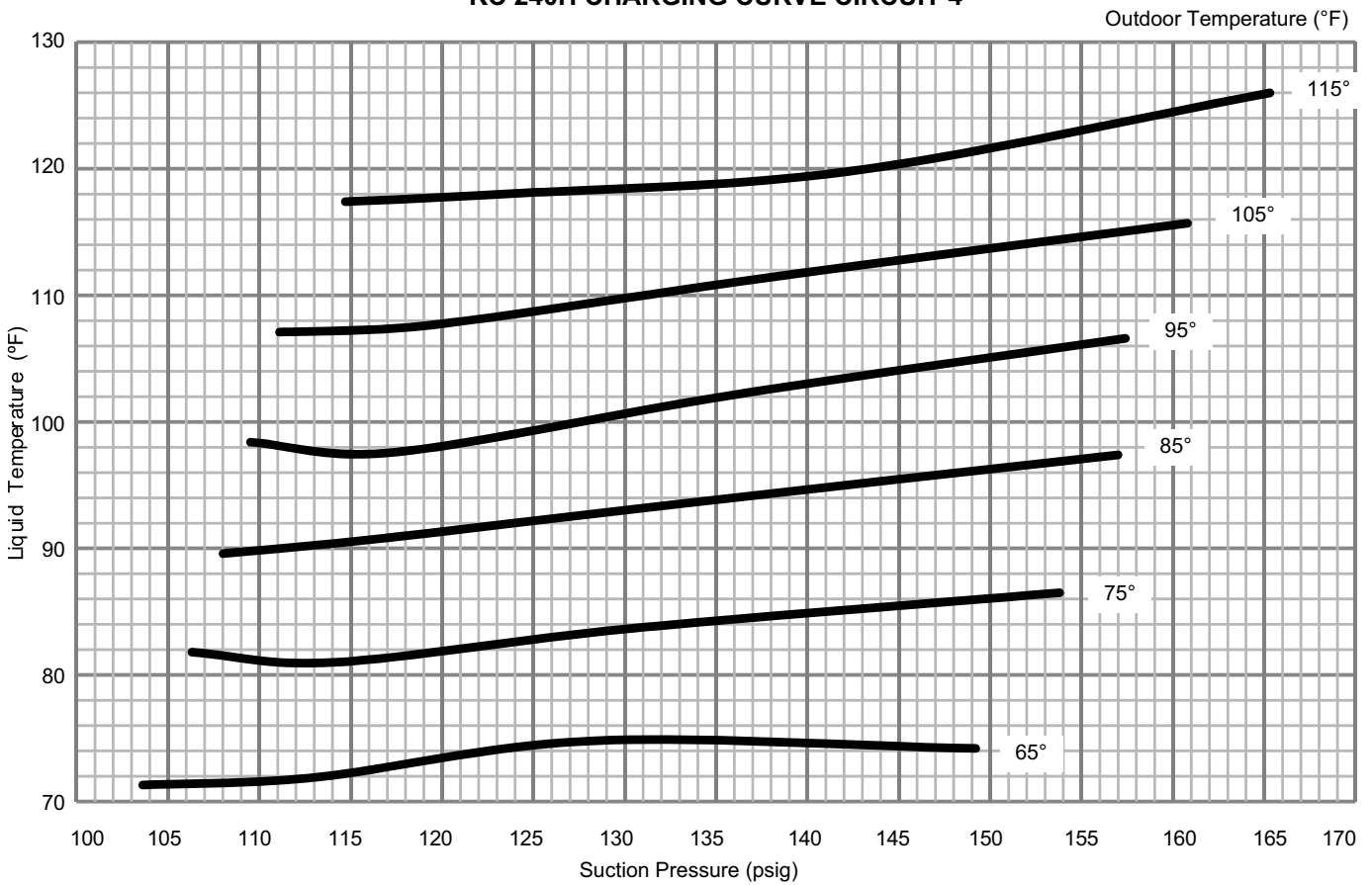
Outdoor Temperature (°F)



### KC 240H CHARGING CURVE CIRCUIT 3

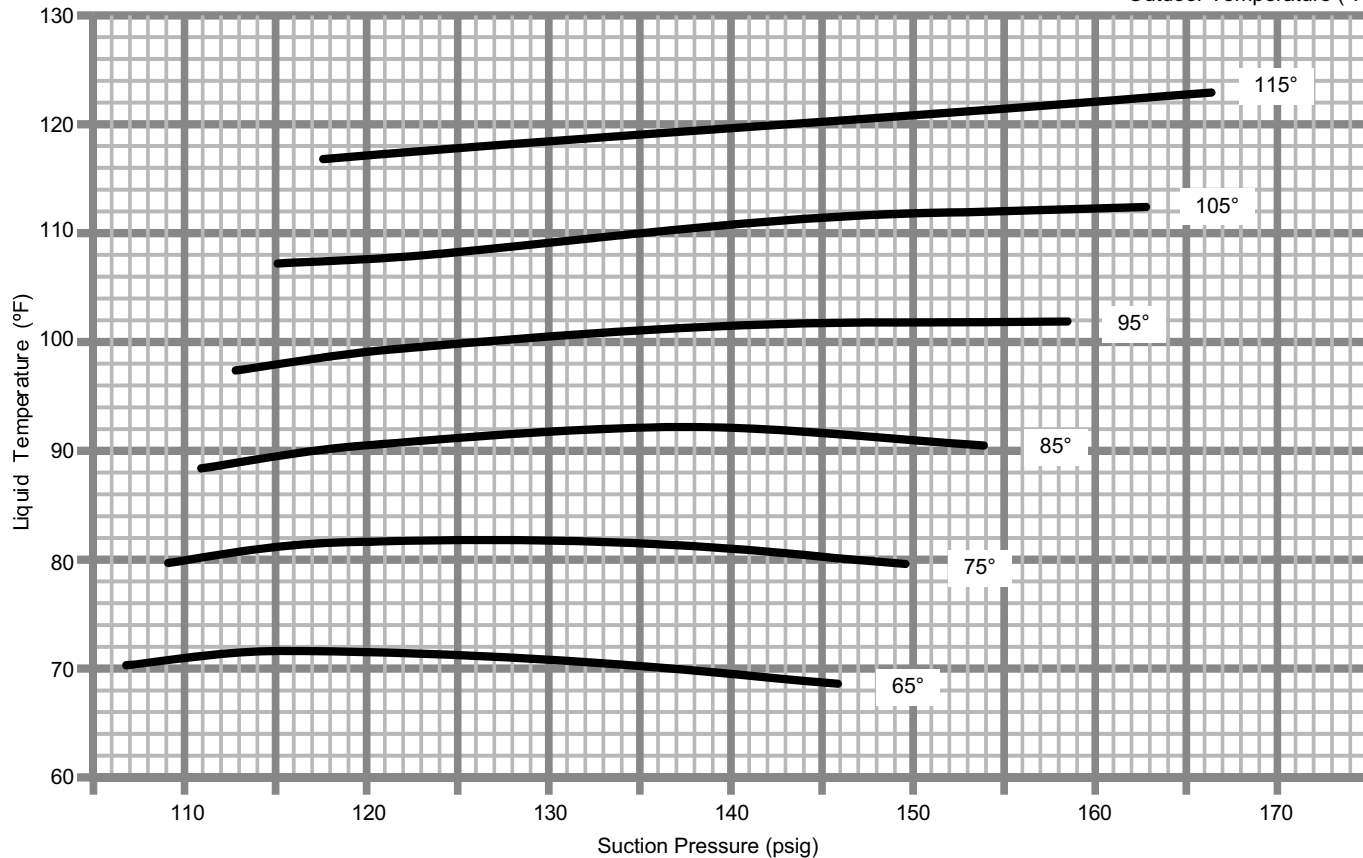


### KC 240H CHARGING CURVE CIRCUIT 4



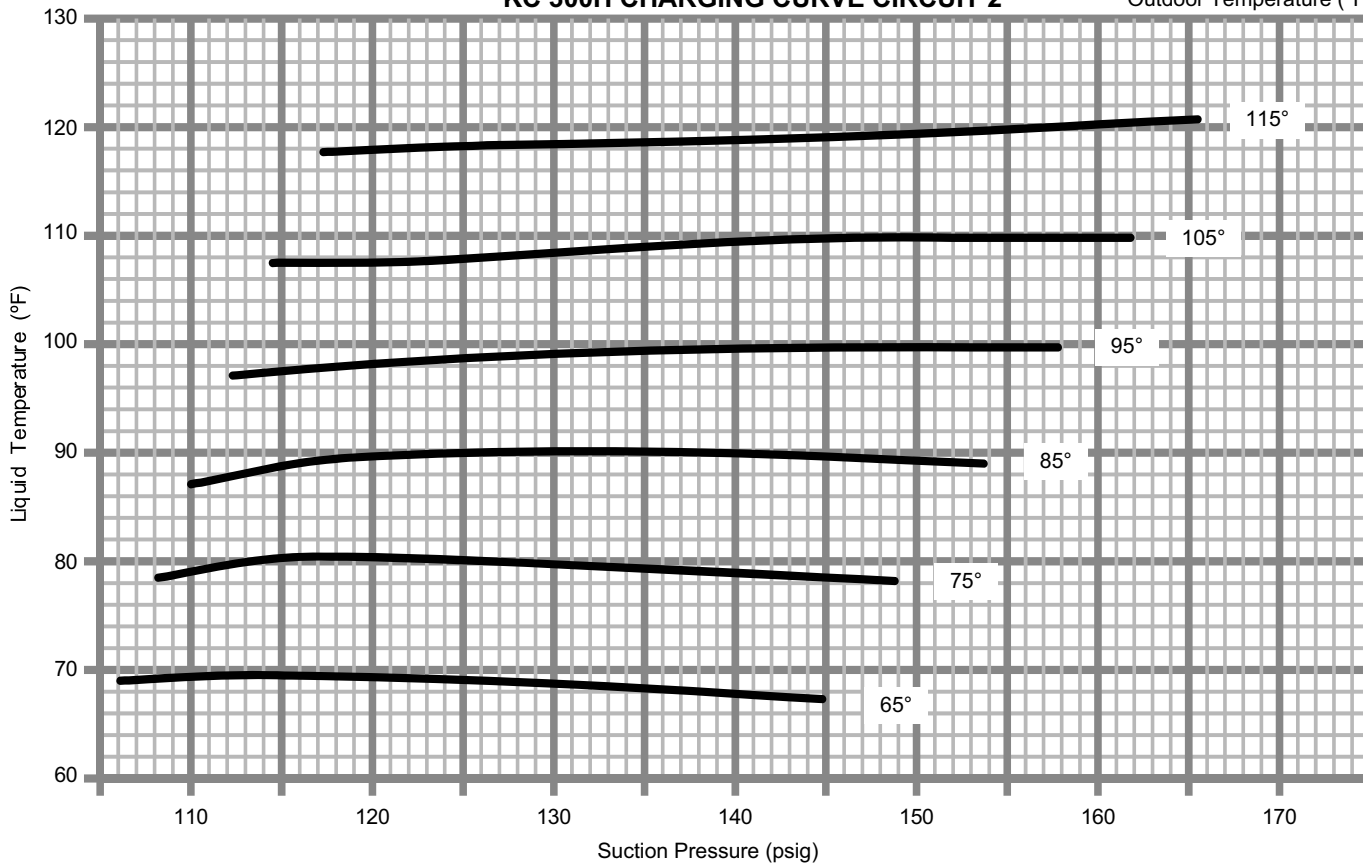
### KC 300H CHARGING CURVE CIRCUIT 1

Outdoor Temperature (°F)



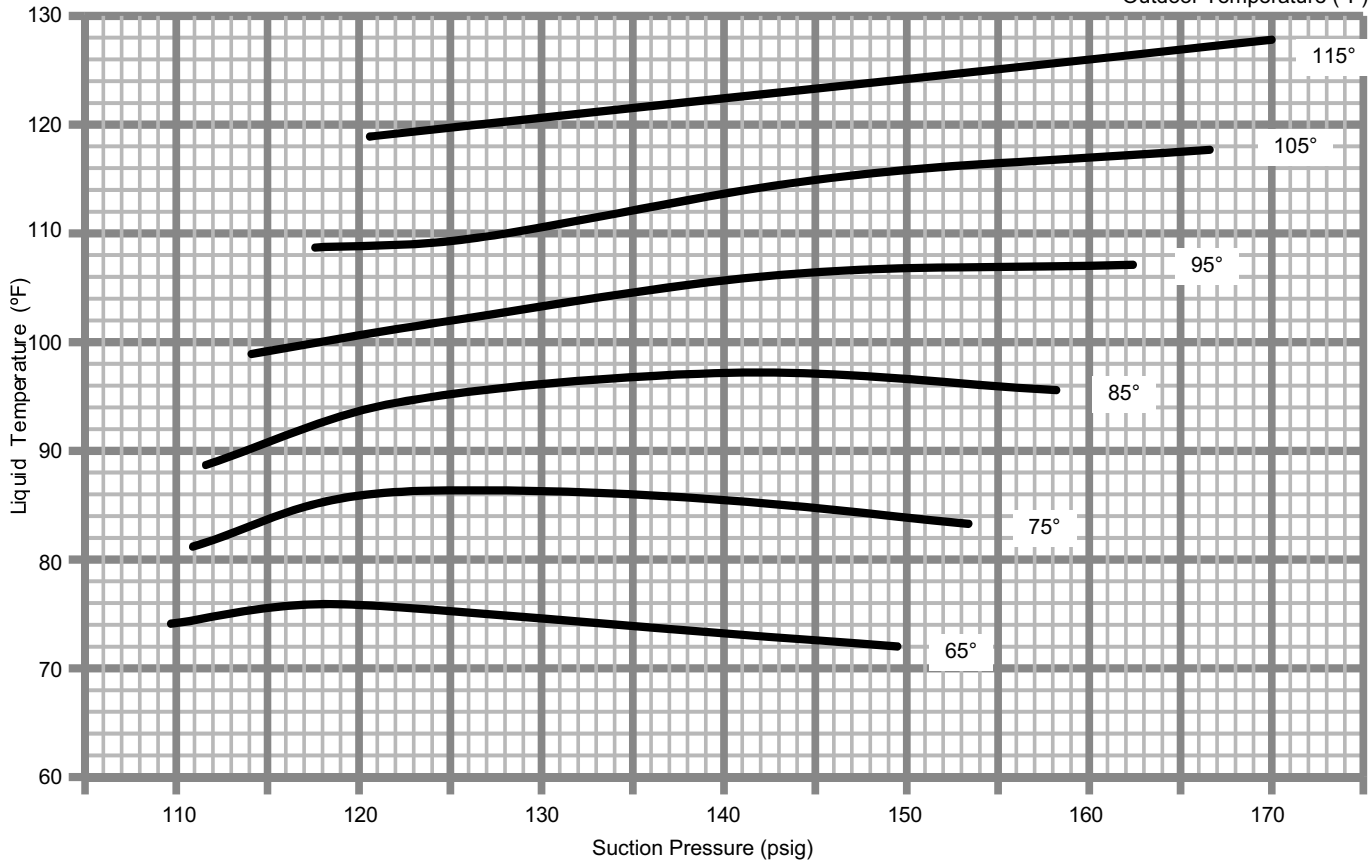
### KC 300H CHARGING CURVE CIRCUIT 2

Outdoor Temperature (°F)



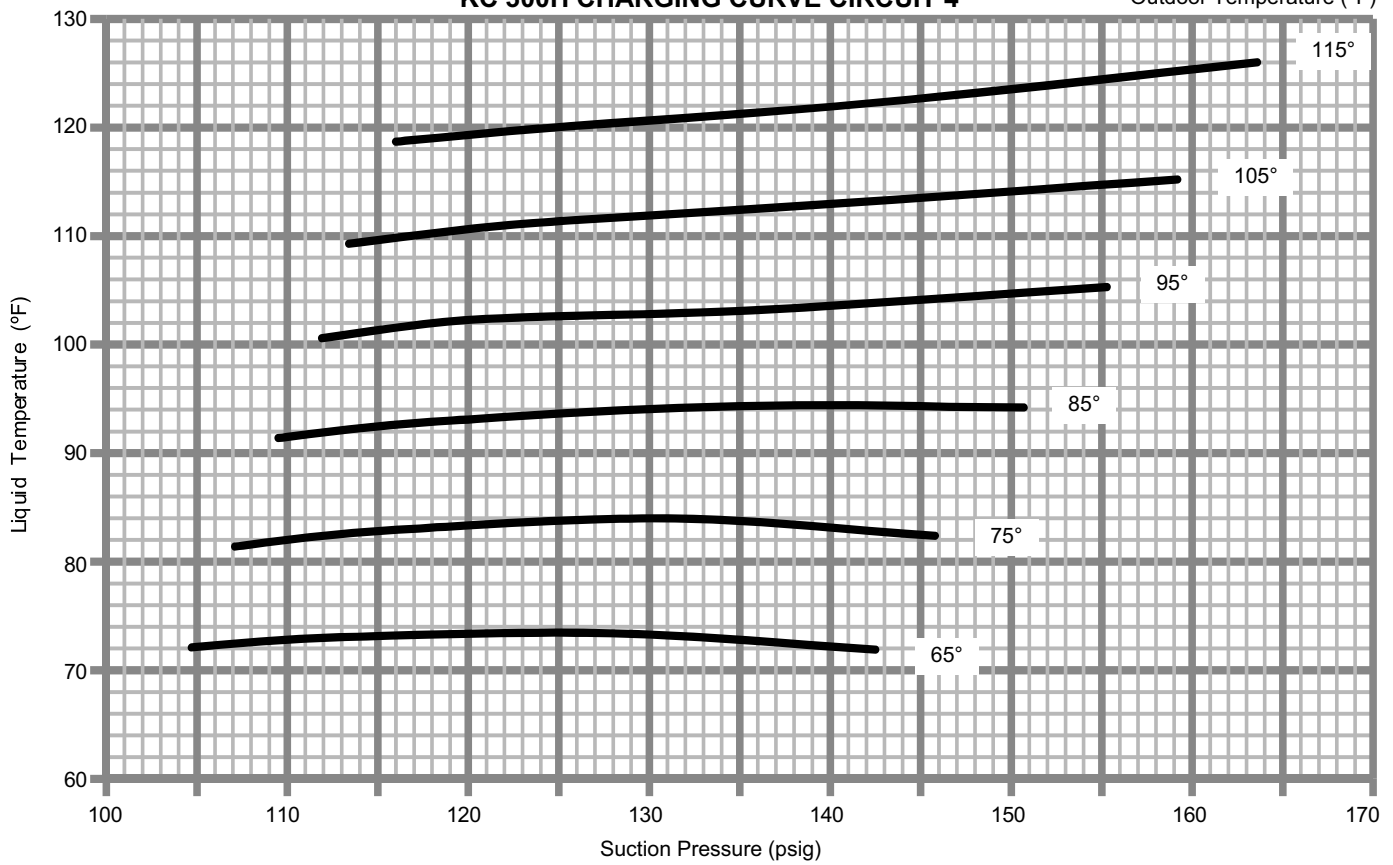
### KC 300H CHARGING CURVE CIRCUIT 3

Outdoor Temperature (°F)



### KC 300H CHARGING CURVE CIRCUIT 4

Outdoor Temperature (°F)




## 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 5 through 8.*

## VI-MAINTENANCE

<b>⚠ WARNING</b>	
	<b>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.</b>

<b>⚠ CAUTION</b>	
<b>Electrical shock hazard. Turn off power to unit before performing any maintenance, cleaning or service operation on the unit.</b>	

<b>⚠ CAUTION</b>	
<b>Danger of sharp metallic edges. Can cause injury. Take care when servicing unit to avoid accidental contact with sharp edges.</b>	

### 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 20.

*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.

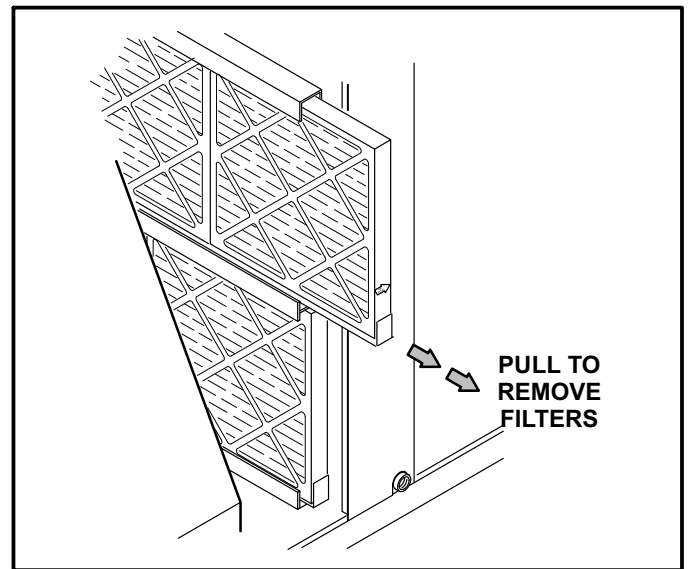


FIGURE 20

### 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-Mounting Frames

When installing units on a combustible surface for down-flow discharge applications, the C1CURB roof mounting frame is used. 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 C1CURB mounting frame is shown in figure 21. 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 22. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

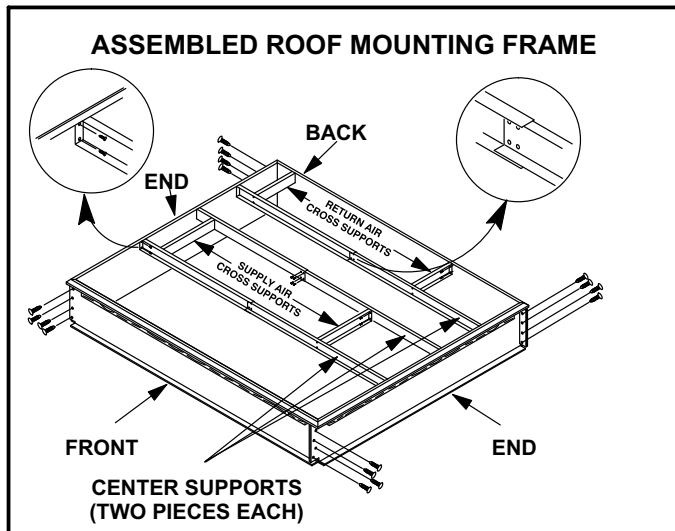


FIGURE 21

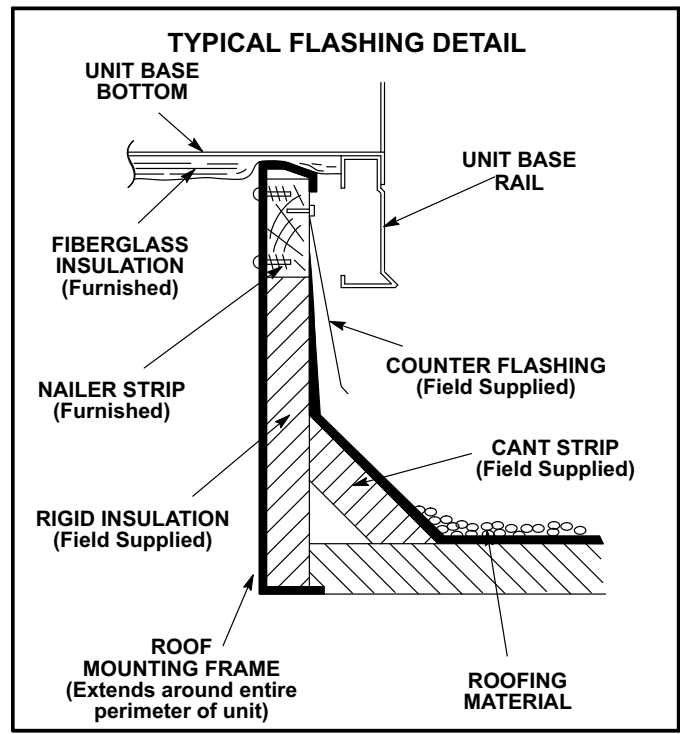


FIGURE 22

### B-Transitions

Optional supply/return transitions C1DIFF33C-1 is available for use with -156 and -180 units utilizing optional C1CURB roof mounting frame. C1DIFF34C-1 is available for use with -210, -240 and -300 units. Transition must be installed in the mounting frame before setting the unit on the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

### C-Supply and Return Diffusers (all units)

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

## D-K1ECON Economizer (Field- or factory-installed)

The K1ECON economizer is available for use with the units. 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 23. 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.

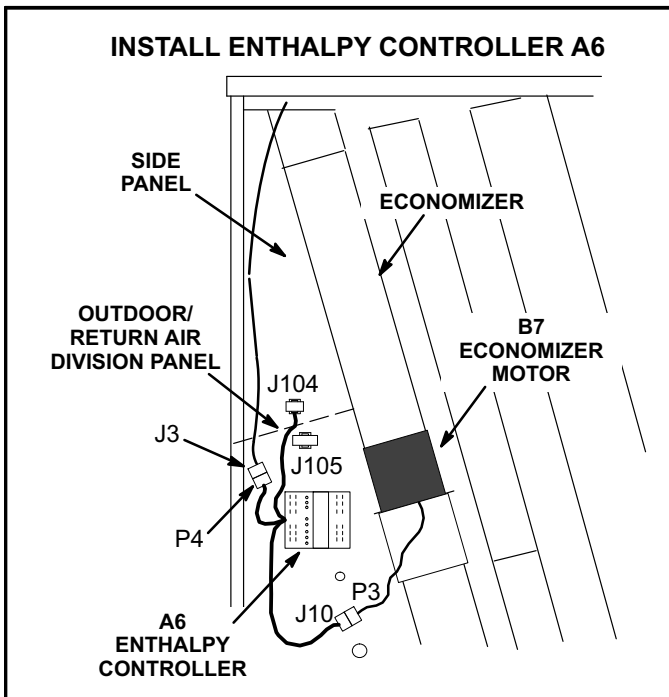


FIGURE 23

An optional IAQ sensor (A63) may be used to lower operating costs by controlling outdoor air based on CO<sub>2</sub> 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 CO<sub>2</sub> 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 24.

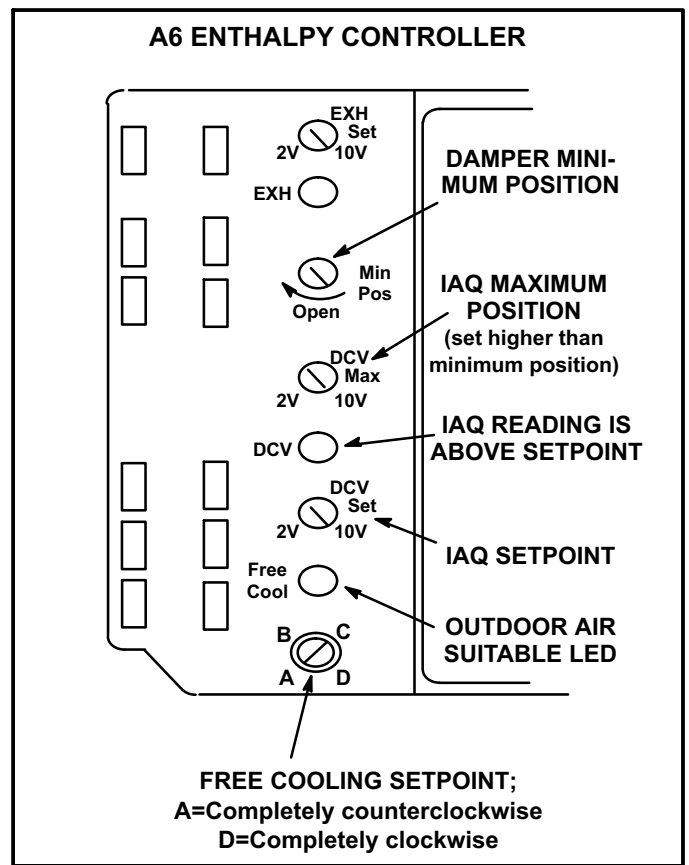


FIGURE 24

### 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 24.

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

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

TABLE 19  
ENTHALPY FREE COOLING SETPOINTS

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

\*Setting A is recommended.



## Differential Sensing:

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

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

### Damper Minimum Position

*NOTE - A jumper is factory-installed between TB1 R and OC terminals to maintain occupied status (allowing minimum fresh air). See figure 25. 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.*

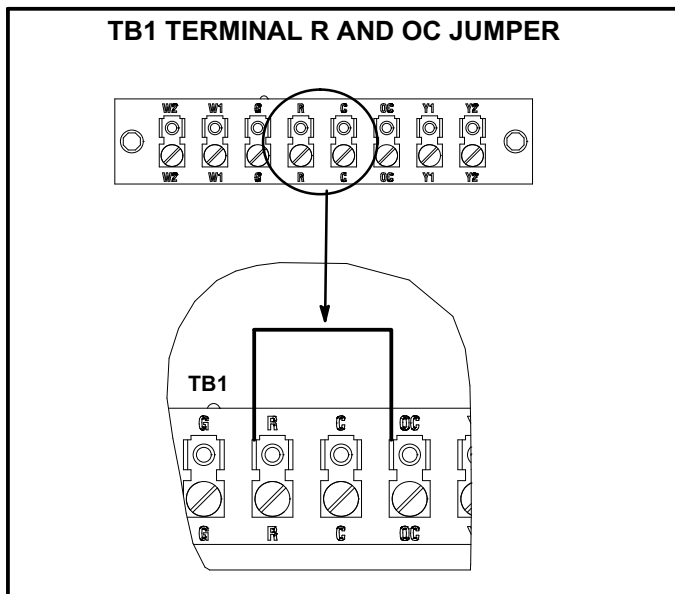


FIGURE 25

- 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 CO<sub>2</sub> 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 24.

The DCV MAX potentiometer is factory-set at approximately 50% of the potentiometer range or 6VDC. Dampers will open approximately half way when CO<sub>2</sub> rises above setpoint. Adjust the DCV MAX potentiometer to the approximate setting specified by the controls contractor. Refer to figure 24.

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

### Economizer Operation

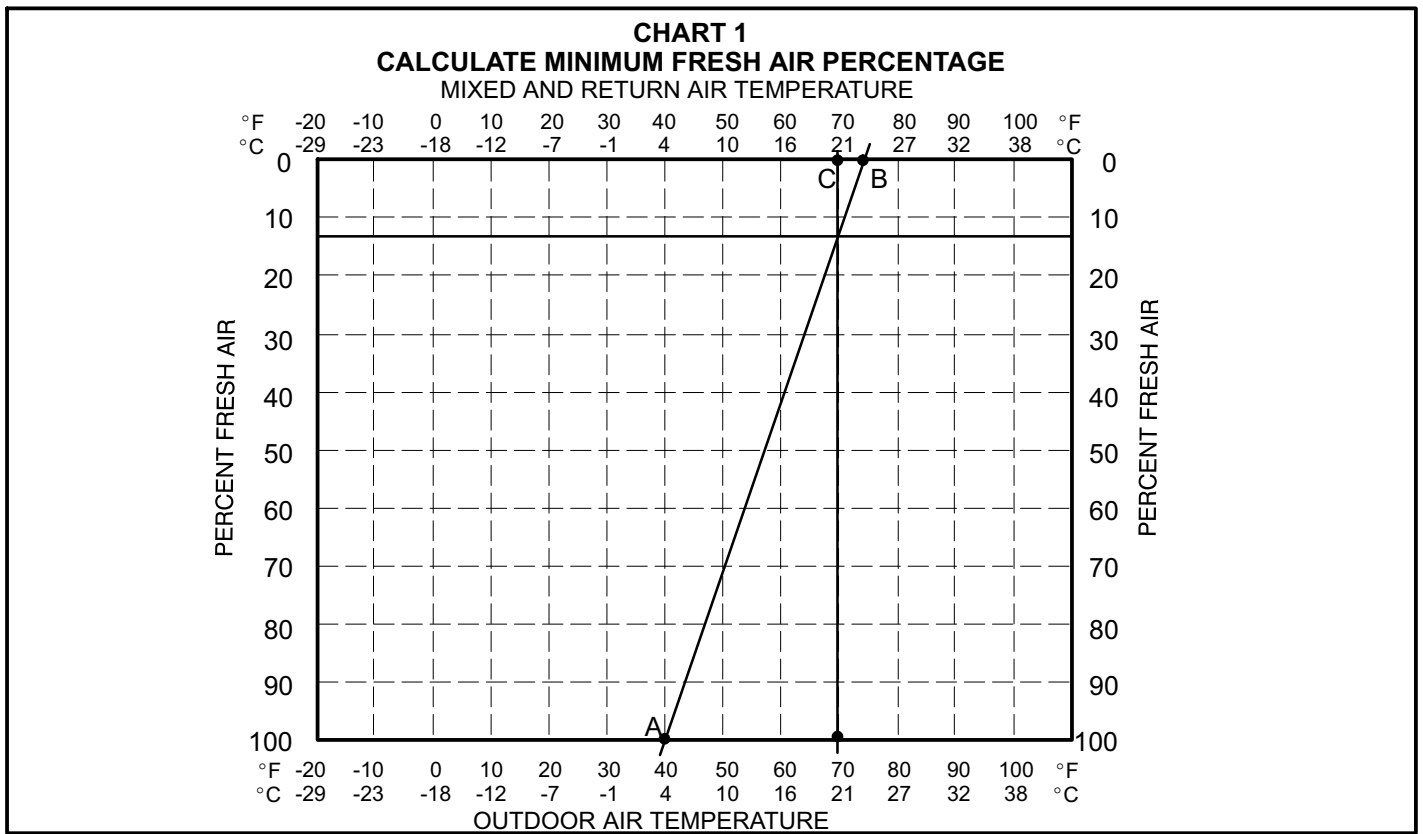
When the outdoor air is suitable, dampers will modulate between minimum position and full open to maintain 55°F (12.8°C) supply air.

See table 20 for economizer operation when outdoor air is suitable. See table 21 for economizer operation when outdoor air is NOT suitable.

### IAQ Sensor

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

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



**TABLE 20**  
**ECONOMIZER OPERATION-OUTDOOR AIR IS SUITABLE FOR FREE COOLING – FREE COOL LED “ON”**

THERMOSTAT DEMAND	DAMPER POSITION		MECHANICAL COOLING
	UNOCCUPIED	OCCUPIED	
Off	Closed	Closed	No
G	Closed	Minimum	No
Y1	Modulating	Modulating	No
Y2	Modulating	Modulating	Stage 1

**TABLE 21**  
**ECONOMIZER OPERATION-OUTDOOR AIR IS NOT SUITABLE FOR FREE COOLING – FREE COOL LED “OFF”**

THERMOSTAT DEMAND	DAMPER POSITION		MECHANICAL COOLING
	UNOCCUPIED	OCCUPIED	
Off	Closed	Closed	No
G	Closed	Minimum*	No
Y1	Closed	Minimum*	Stage 1
Y2	Closed	Minimum*	Stage 2

\*IAQ sensor can open damper to DCV max.

**B-Outdoor Air Dampers**

Both manual (C1DAMP10C) and motorized (K1DAMP20C) outdoor air dampers are available for use with KCA units to allow outside air into the system (see figure 26). The motorized damper assembly opens to minimum position during the occupied time period and remains closed during the unoccupied period. Manual damper assembly position is set at installation and remains in that position. See figure 27. Washable filter supplied with the outdoor air dampers can be cleaned with water and a mild

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

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 thumb wheel higher. If fresh air percentage is more than desired, adjust thumb wheel lower. Repeat steps until calculation reads desired fresh air percentage. See figure 28.

Set damper minimum position in the same manner as economizer minimum position. Adjust motorized damper position using the thumb wheel on the damper motor. See figure 28. Manual damper fresh air intake percentage can be determined in the same manner.

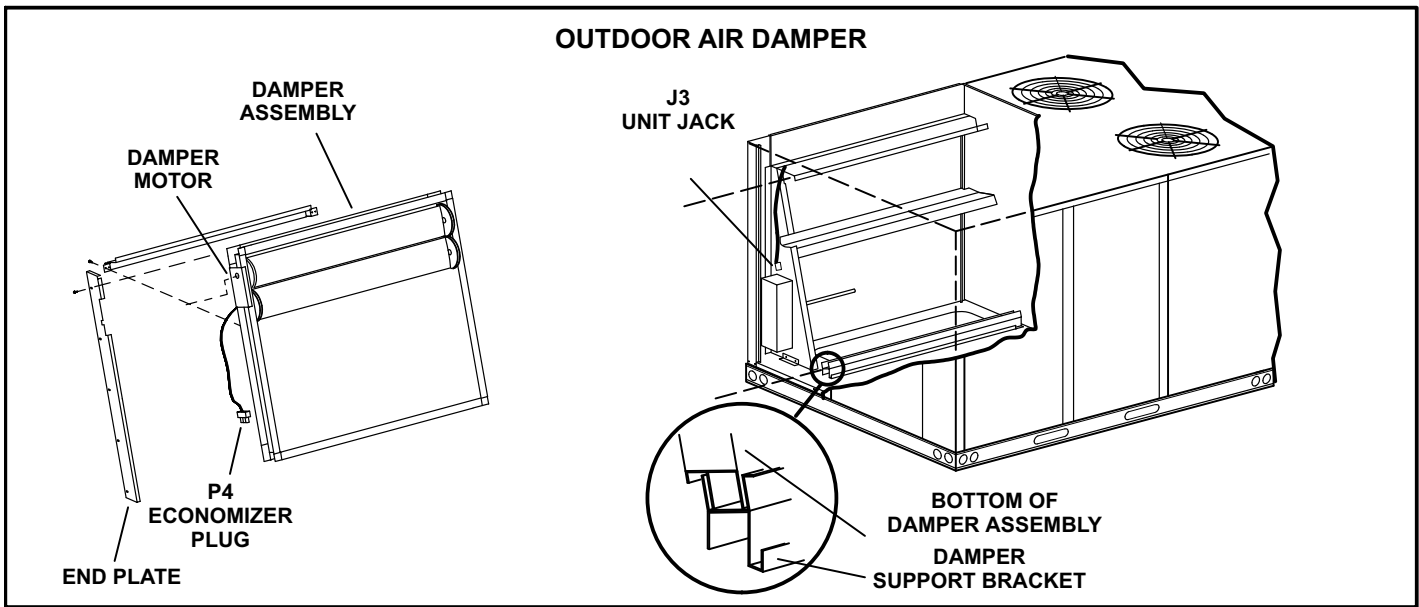


FIGURE 26

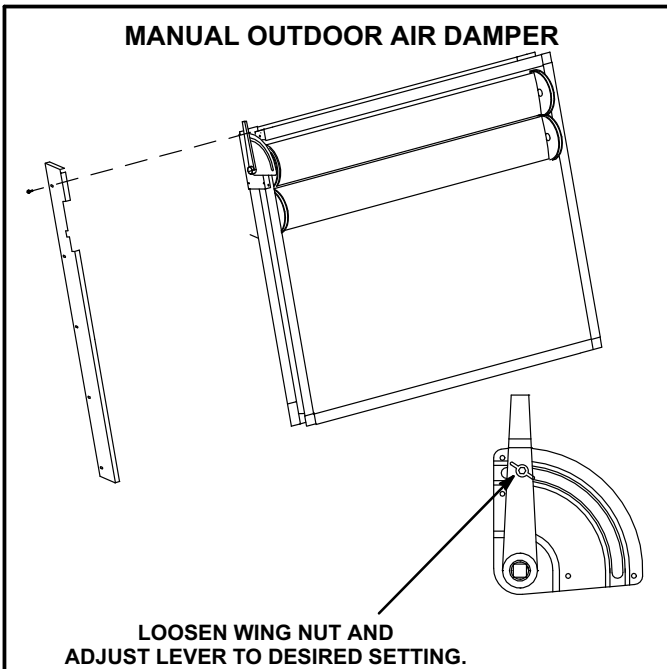


FIGURE 27

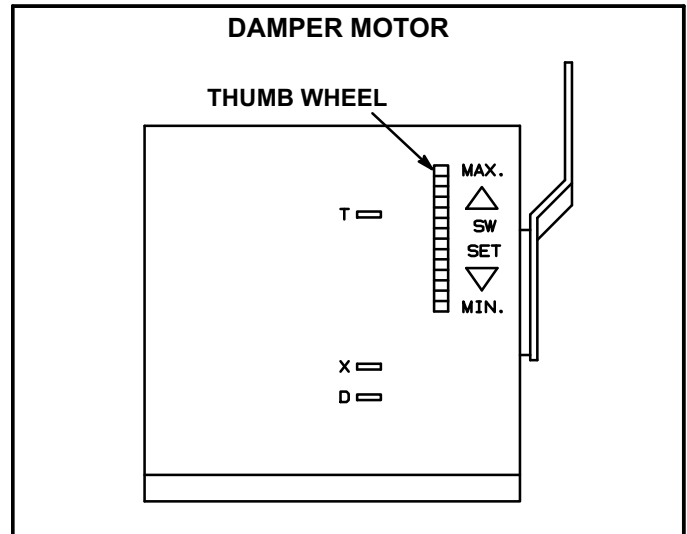


FIGURE 28

## E-Barometric Relief/Gravity Exhaust Dampers

C1DAMP50C dampers (figure 29) are used in downflow and LAGED(H)18/24 are used in horizontal air discharge applications. LAGED(H) barometric relief / gravity exhaust dampers are installed in the return air plenum. The dampers must be used any time an economizer or power exhaust fan is applied to KCA series units.

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

## F-C1PWRE11C Power Exhaust Fans

C1PWRE11C power exhaust fans are used in downflow applications only. The fans require optional downflow barometric relief / 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 29 shows the location of the C1PWRE11C. See installation instructions for more detail.

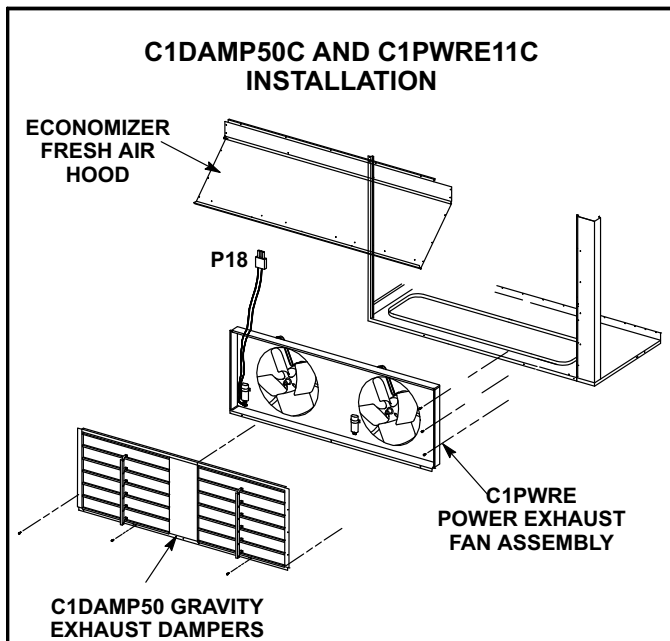


FIGURE 29

## G-Control Systems

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.

## 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.

## I-Indoor Air Quality (CO<sub>2</sub>) Sensor A63

The indoor air quality sensor monitors CO<sub>2</sub> levels and reports the levels to the economizer control module A6. The board adjusts the economizer dampers according to the CO<sub>2</sub> 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.

## L-Supply Air Inverter Start-Up

### A-General

Optional VFD units are available which provide two blower speeds. The blower will operate at lower speeds when cooling demand is low and higher speeds when cooling demand is high. This results in lower energy consumption.

VFD units will operate at high speed during ventilation (blower "G" only signal) but can be adjusted to operate at low speed.

Low speed is approximately 2/3 of the full speed RPM.

### B-Set Maximum Blower CFM

- 1- Initiate a blower (G) only signal from the room thermostat or control system.
- 2- Adjust the blower pulley to deliver the full (high speed) CFM in the typical manner. See *Determining Unit CFM* in the Blower Operation and Adjustment section.

### C-Set Blower Speed During Ventilation

To save energy during ventilation, the blower speed can be set to low. This is accomplished by changing the ventilation speed switch on the VFD control board to "LO". See figure 30.

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

### D-Set Damper Minimum Position (Units W/ Economizer)

To maintain required minimum ventilation air volumes when the unit is in the occupied mode, two minimum damper positions must be set. A high and a low speed potentiometer are provided on the VFD control board to adjust minimum damper position. See figure 30.

#### Set High Speed Minimum Position

1. Initiate a blower (G) only AND occupied demand from the room thermostat or control system.
2. Set the ventilation speed switch on the VFD control board to "HI".
3. Rotate the high speed potentiometer on the VFD control board to set the high speed minimum damper position.
4. Measure the intake air CFM. If the CFM is lower than the design specified CFM for ventilation air, use the potentiometer to increase the damper percent open. If the CFM is higher than specified, decrease the damper percent open.

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

#### Set Low Speed Minimum Position

1. Initiate a blower (G) only AND occupied demand from the room thermostat or control system.
2. Set the ventilation speed switch on the VFD control board to "LO".
3. Rotate the low speed potentiometer on the VFD control board to set the low speed minimum damper position.
4. Measure the intake air CFM. If the CFM is lower than the design specified CFM for ventilation air, use the potentiometer to increase the damper percent open. If the CFM is higher than specified, decrease the damper percent open.

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

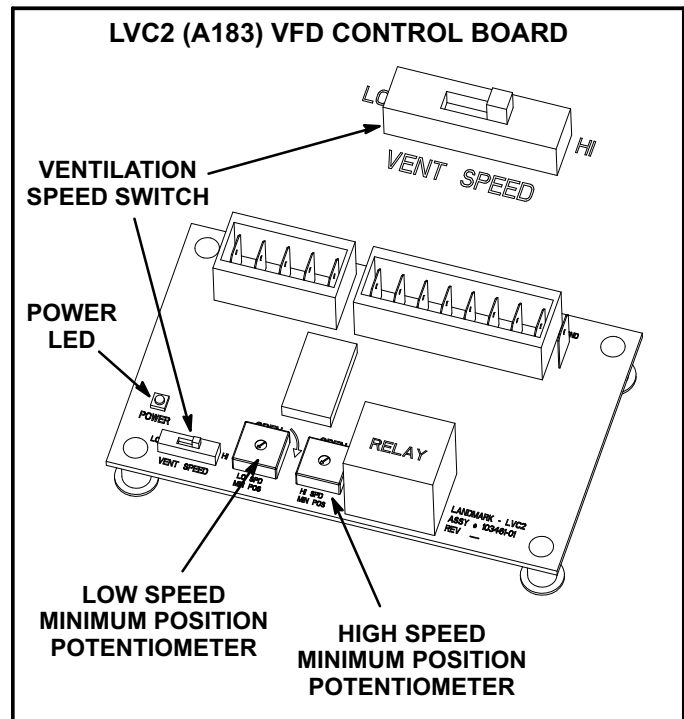


FIGURE 30

### Troubleshoot LVC2 Board (A183)

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

- 1- Inspect the LVC2 for damaged components. Replace the LVC2 if damaged components are found.
- 2- Check all wire connections to LVC2; secure if loose.
- 3- Check for 24VAC signal at the thermostat blower input (G to GND terminal). See figure 31.

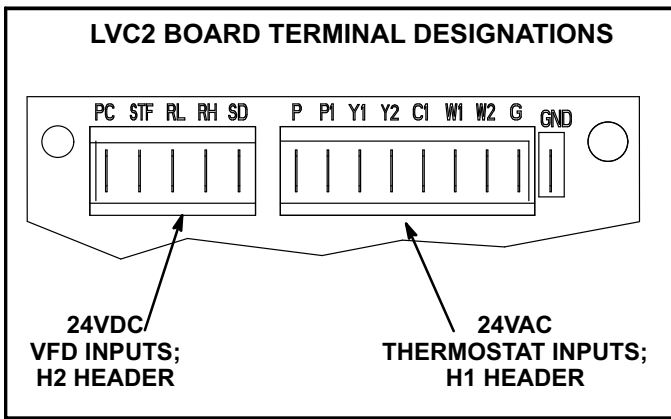


FIGURE 31

- 4- If there is no thermostat signal, troubleshoot back toward the thermostat.
- 5- Check the power LED on the board. See figure 30.
- 6- If the power LED is not on, check voltage between LVC2 terminals PC (H2-1) and SD (H2-5). Voltage should read 24VDC.
- 7- If voltage does not read 24VDC, disconnect the H2 header from the LVC2 VFD inputs terminal block (to make sure the LVC2 is not shorting 24VDC supply from the inverter). Measure the voltage between the end terminals on the H2 header. If 24VDC is present, replace

the LVC2 board. If no voltage is read, troubleshoot the VFD.

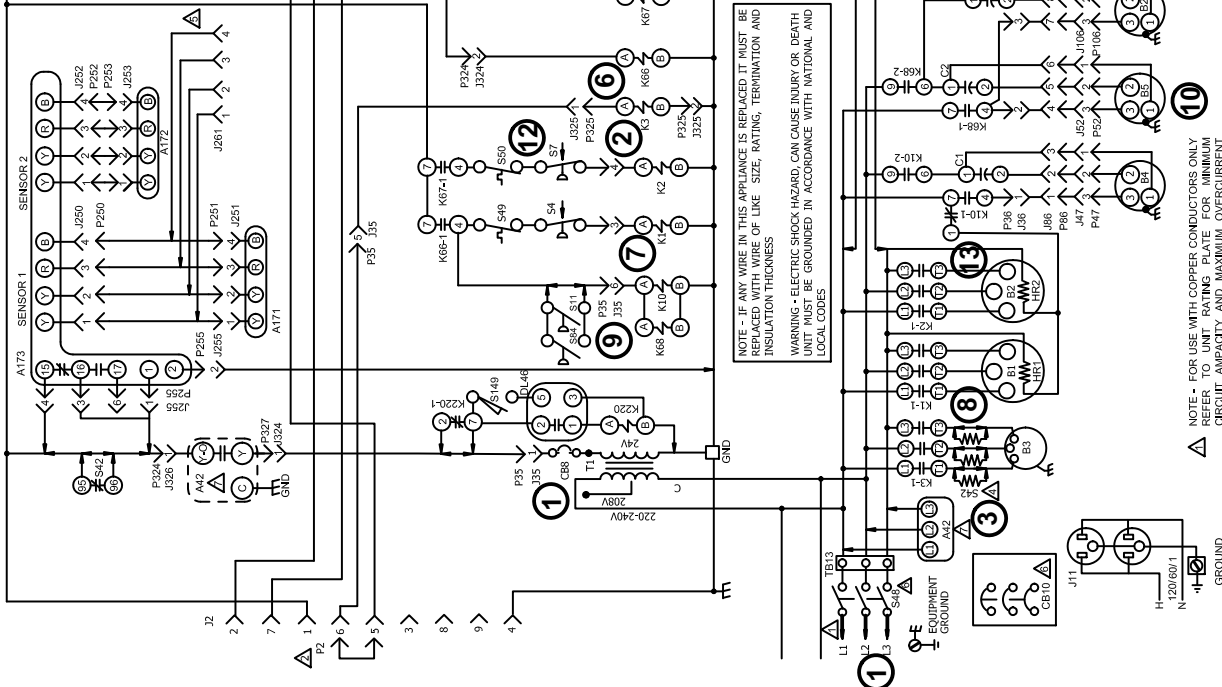
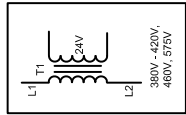
- 8- When LVC2 24VAC thermostat blower (G) input and 24VDC power are present, check the LVC2 low and high speed outputs. The LVC2 uses inverse logic to enable the blower; 1VDC will be read at the enabled blower speed terminal. See table 22.
- 9- If all inputs are correct and the unit still does not operate as intended, replace LVC2 board.

TABLE 22  
LVC2 BOARD BLOWER OUTPUTS

Output Terminals	Voltage	Blower Operation
RL-SD	1VDC	Low Speed
RH-SD	24VDC	
RL-SD	24VDC	High Speed
RH-SD	1VDC	
RL-SD	1VDC	Illegal State (replace board)
RH-SD	1VDC	
RL-SD	24VDC	Blower Off (replace board)
RH-SD	24VDC	

# KCA180S UNIT DIAGRAM

24V POWER



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

- ⚠ NOTE - FOR USE WITH COPPER CONDUCTORS ONLY REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
- ⚠ F2 IS USED ON KCA UNITS ONLY
- ⚠ F6 ONLY USED ON 4-VOLT UNITS WITH FIELD INSTALLED POWER EXHAUST
- ⚠ S42 USED ON 1/4" VOLTAGE UNITS
- ⚠ CONNECT A177 SENSOR TO J261 ON SUPPLY AIR SMOKE DETECTOR ONLY
- ⚠ S48 OR CB10 MAY BE USED
- ⚠ A42 USED AS A FIELD INSTALLED OPTION

J/P	JACK/PLUG DESCRIPTION
2	HEAT
18	EXHAUST FAN COMP1
24	EXHAUST FAN
36	TEST COOL
47	OUTDOOR FAN 1
52	OUTDOOR FAN 2
86	SENSE BLOWER
106	OUTDOOR FAN 3
133	BLOWER, EXHAUST FAN MOTOR 1
260	BLOWER, EXHAUST FAN MOTOR 2
251	SMOKE DETECTOR ONE
252	SMOKE DETECTOR TWO
253	SMOKE DETECTOR TWO
255	MODULE CONTROL SMOKE DETECTION
261	SMOKE DETECTOR JUMPER
324	VFD OPTION CONNECTION
325	K3 BLOWER CONTROL
326	PHASE MONITOR/VFD CONTROL ADD ON
327	PHASE MONITOR/VFD CONTROL ADD ON

KEY	COMPONENT DESCRIPTION
A42	MONITOR, PHASE RETURN
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
B21	MOTOR, OUTDOOR FAN 3
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
CB8	CIRCUIT BREAKER T1
CB10	CIRCUIT BREAKER MAIN DISCONNECT
DL46	RELAY, OVERFLOW SWITCH
F6	FUSE, EXHAUST FANS
HR1	HEATER COMPRESSOR 1
HR2	HEATER COMPRESSOR 2
J11	GFI RECEPTACLE JACK
K1-1	CONTACTOR, COMPRESSOR 1
K2-1	CONTACTOR, COMPRESSOR 2
K3-1	CONTACTOR, BLOWER
K10-1,2	RELAY, OUTDOOR FAN
K85-1,2	RELAY, EXHAUST FAN 1
K85-1	RELAY, STAGE COOL 1
K67-1	RELAY, STAGE COOL 2
K65-2	RELAY, OUTDOOR FAN 2
K20-1	RELAY, OVERFLOW SWITCH
S4	SWITCH, LIMIT HI PRESS COMP 1 (MANUAL RESET)
S7	SWITCH, LIMIT HI PRESS COMP 2 (MANUAL RESET)
S11	SWITCH, LOW PRESS, LOW AMBIENT KIT
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S46	SWITCH, DISCONNECT
S49	SWITCH, FREEZE/STAT COMP 1
S50	SWITCH, FREEZE/STAT COMP 2
S84	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 2
S148	SWITCH, OVERFLOW
T1	TRANSFORMER, CONTROL
TB13	TERMINAL STRIP, POWER DISTRIBUTION

01/13

WIRING DIAGRAM

537602-01

COOLING

KCA/KGA - 180S - GJM/Y

SECTION B

REV 0

Supersesdes  
New Form No. 537602-03

⚡ DENOTES OPTIONAL COMPONENTS  
 — LINE VOLTAGE FIELD INSTALLED

## KCA180S 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 K1-1 close energizing compressor B1.
- 9- Optional N.O. low ambient switch S11 and/or S84 closes to energize condenser fan relay K10 and K68.
- 10- N.O. contacts K10-1 close energizing condenser fan B4. N.O. K68-1 and K68-2 close energizing condenser fan 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.



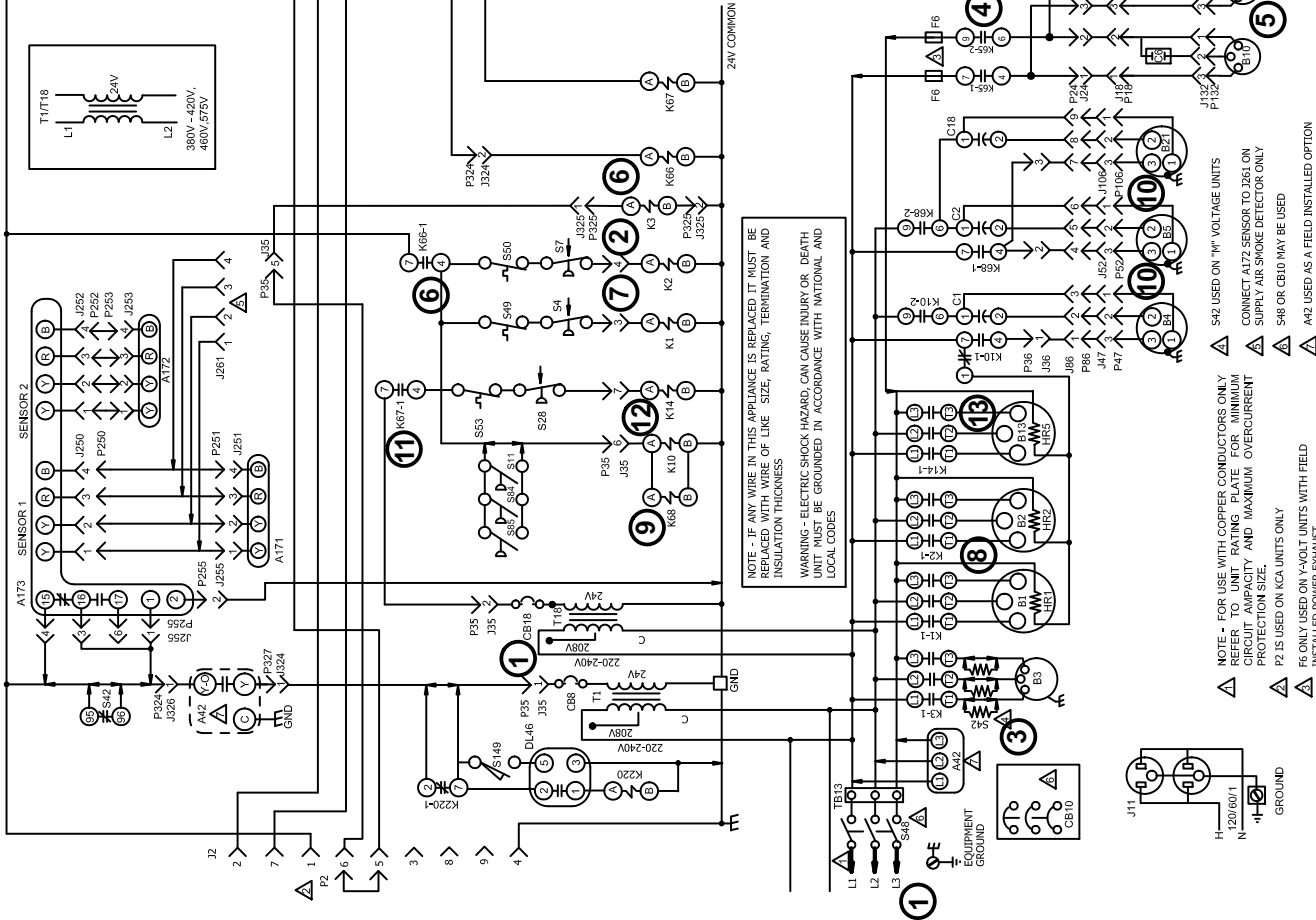
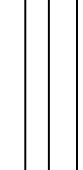
# KCA156H, 210S UNIT DIAGRAM

KEY	COMPONENT DESCRIPTION
A42	MONITOR, PHASE DETECTION
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
B13	COMPRESSOR 3

KEY	COMPONENT DESCRIPTION
S28	SWITCH, LIMIT HI PRESS COMP 3 (MANUAL RESET)
S48	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S49	SWITCH, DISCONNECT
S49	SWITCH, FREEZESTAT COMP 1
S50	SWITCH, FREEZESTAT COMP 2
S53	SWITCH, FREEZESTAT COMP 3
S54	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 2
S55	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 3
S149	SWITCH, OVERFLOW
T1	TRANSFORMER, CONTROL
T18	TRANSFORMER, CONTACTOR CONTROL
TE13	TERMINAL STRIP, POWER DISTRIBUTION

J/P	JACKPLUG DESCRIPTION
2	HEAT
18	EXHAUST FAN COMPT
24	EXHAUST FAN
35	TEST
36	TEST COOL
47	OUTDOOR FAN 1
52	OUTDOOR FAN 2
86	OUTDOOR FANS 1,2,3
106	OUTDOOR FAN 3
132	BLOWER, EXHAUST FAN MOTOR 1
133	BLOWER, EXHAUST FAN MOTOR 2
260	SMOKE DETECTOR ONE
261	SMOKE DETECTOR ONE
262	SMOKE DETECTOR TWO
263	SMOKE DETECTOR TWO
265	MODULE, CONTROL SMOKE DETECTION
281	K3 BLOWER CONTROL
324	VFD OPTION CONNECTION
325	K3 BLOWER CONTROL
326	PHASE MONITOR VFD CONTROL, ADD ON
327	PHASE MONITOR VFD CONTROL, ADD ON

J/P	JACKPLUG DESCRIPTION
B21	MOTOR, OUTDOOR FAN 3
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
CB8	CIRCUIT BREAKER T1
CB10	CIRCUIT BREAKER MAIN DISCONNECT
CB16	CIRCUIT BREAKER T18
DL48	DELAY, OVERFLOW SWITCH
F6	FUSE, EXHAUST FANS
HR1	HEATER, COMPRESSOR 1
HR2	HEATER, COMPRESSOR 2
HR5	HEATER, COMPRESSOR 3
J11	GPI RECEIVER
K1-1	CONTACTOR, COMPRESSOR 1
K2-1	CONTACTOR, COMPRESSOR 2
K3-1	CONTACTOR, BLOWER
K10-1,2	RELAY, OUTDOOR FAN
K14-1	CONTACTOR, COMPRESSOR 3
K65-1,2	RELAY, EXHAUST FAN 1
K67-1	RELAY, STAGE COOL 2
K68-1,2	RELAY, OUTDOOR FAN 2 & 3
KZ20-1	RELAY, OVERFLOW SWITCH
S4	SWITCH, LIMIT HI PRESS COMP 1 (MANUAL RESET)
S7	SWITCH, LIMIT HI PRESS COMP 2 (MANUAL RESET)
S11	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 1



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

- ▲ 5K2 USED ON "M" VOLTAGE UNITS
- ▲ CONNECT A172 SENSOR TO J261 ON SUPPLY AIR SMOKE DETECTOR ONLY
- ▲ 5#8 OR CB10 MAY BE USED
- ▲ A42 USED AS A FIELD INSTALLED OPTION
- ▲ F5 ONLY USED ON 1-VOLT UNITS WITH FIELD INSTALLED POWER EXHAUST
- ▲ 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
- ▲ F5 ONLY USED ON 1-VOLT UNITS WITH FIELD INSTALLED POWER EXHAUST

01/13

WIRING DIAGRAM

537603-01

COOLING

KCA/KGA - 210S, 156H - G,J,M,Y

SECTION B

REV 0

Supersedes 537083-03

New Form No. 537603-01

## KCA156H, 210S SEQUENCE OF OPERATION

### **Power:**

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

### **Blower Operation:**

- 2- 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 and K68.
- 10- N.O. contacts K10-1 and K10-2 close energizing condenser fan B4. N.O. Contacts K68-1 and K68-2 close energizing 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.

# KCA180H, 240S & 300S UNIT DIAGRAM

24V POWER

KEY	COMPONENT
A42	MONITOR, PHASE PROTECTION
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
B13	COMPRESSOR 3
S4	SWITCH, LIMIT HI PRESS COMP 1 (MANUAL RESET)
S5	SWITCH, LIMIT HI TEMP LIMIT COMP 1
S7	SWITCH, LIMIT HI PRESS COMP 2 (MANUAL RESET)
S8	SWITCH, LIMIT HI TEMP LIMIT COMP 2
S11	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 1
S28	SWITCH, LIMIT HI PRESS COMP 3 (MANUAL RESET)
S31	SWITCH, HI TEMP LIMIT COMP 3
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S46	SWITCH, DISCONNECT
S49	SWITCH, FREEZE/STAT COMP 1
S50	SWITCH, FREEZE/STAT COMP 2
S53	SWITCH, FREEZE/STAT COMP 3
S94	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 2 BLOWER(G)

B21	MOTOR, OUTDOOR FAN 3
B22	MOTOR, OUTDOOR FAN 4
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
C19	CAPACITOR, OUTDOOR FAN 4
CB8	CIRCUIT BREAKER T1
CB10	CIRCUIT BREAKER MAIN DISCONNECT
CB18	CIRCUIT BREAKER T8
DL46	DELAY, OVERFLOW SWITCH
HR1	CRANKCASE HEATER, COMPRESSOR 1
HR2	CRANKCASE HEATER, COMPRESSOR 2
HR5	CRANKCASE HEATER, COMPRESSOR 3
FE	FUSE, EXHAUST FANS
F10	FUSE, OUTDOOR FANS
J11	JACK, GFI, RECEPTACLE
J261	JACK, SMOKE DETECTOR LUMPER
K1-1	CONTACTOR, COMPRESSOR 1
K2-1	CONTACTOR, COMPRESSOR 2
K3-1	CONTACTOR, BLOWER
K10-1,2	RELAY, OUTDOOR FAN
K14-1,2	RELAY, OUTDOOR FAN
K68-1,2	RELAY, EXHAUST FAN 1
K86-1	RELAY, STAGE COOL 1
K87-1	RELAY, STAGE COOL 2
K149-1	RELAY, OUTDOOR FAN 3
K220-1	RELAY, OVERFLOW SWITCH

J/P	JACK/PLUG DESCRIPTION
2	HEAT
18	EXHAUST FAN
24	EXHAUST FAN
35	TEST
36	TEST COOL
47	OUTDOOR FAN 1
52	OUTDOOR FAN 2
66	OUTDOOR FANS 1,2
67	OUTDOOR FANS 3,4
106	OUTDOOR FAN 3
107	OUTDOOR FAN 4
132	EXHAUST BLOWER FAN MOTOR 1
133	EXHAUST BLOWER FAN MOTOR 2
250	SMOKE DETECTOR ONE
251	SMOKE DETECTOR TWO
252	SMOKE DETECTOR TWO
253	SMOKE DETECTOR TWO
255	CONTROL MODULE SMOKE DETECTION
324	VFD OPTION CONNECTION
325	K3 BLOWER CONTROL
326	PHASE MONITOR/ VFD CONTROL ADD-ON
327	PHASE MONITOR/ VFD CONTROL ADD-ON

01/13

WIRING DIAGRAM

437586-01

COOLING

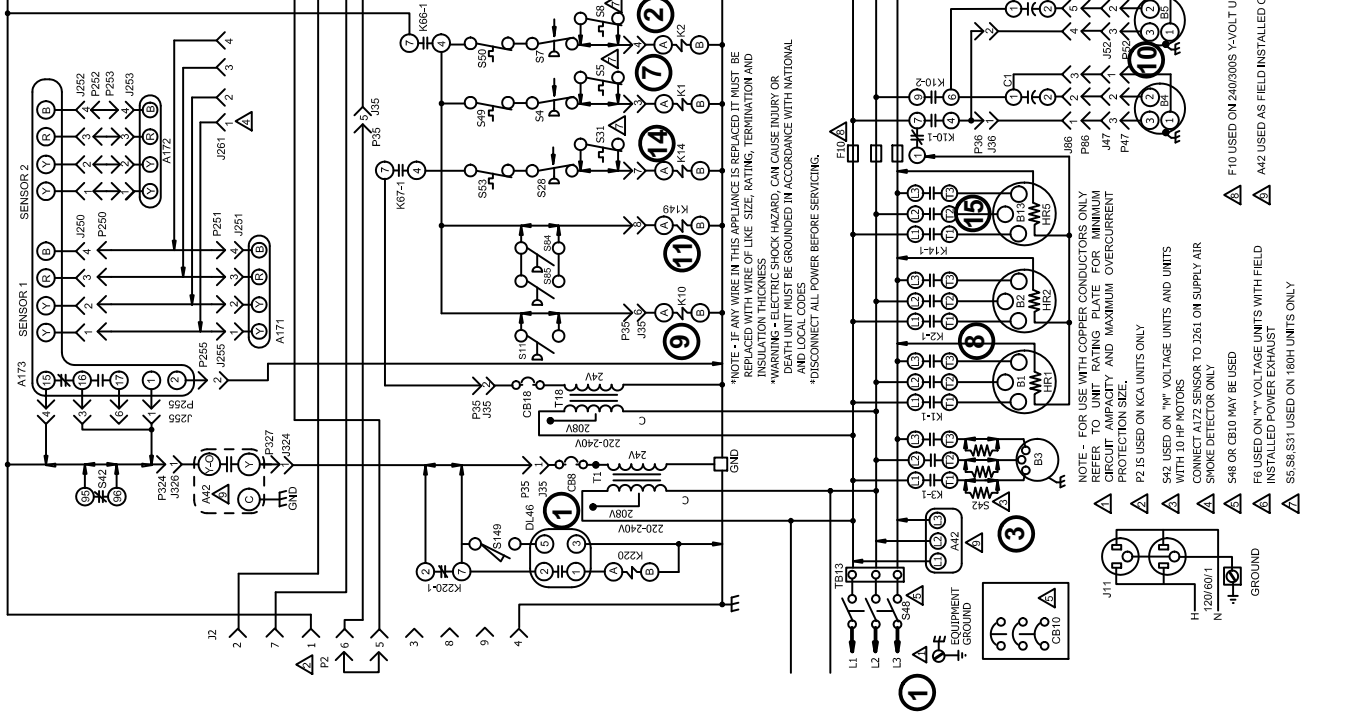
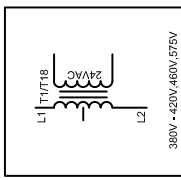
KCA/KGA - 240/300S, 180H - G,J,M,Y

SECTION B

REV 0

Supersedes 537084-03

New Form No. 537586-01



\*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.

- ▲ NOTE - FOR USE WITH COPPER CONDUCTORS ONLY REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
- ▲ S42 USED ON "M" VOLTAGE UNITS AND UNITS WITH 10 HP MOTORS
- ▲ CONNECT A172 SENSOR TO J261 ON SUPPLY AIR SMOKE DETECTOR ONLY
- ▲ S46 OR CB10 MAY BE USED
- ▲ FR USED ON "Y" VOLTAGE UNITS WITH FIELD INSTALLED POWER EXHAUST
- ▲ S5, S9, S31 USED ON 180H UNITS ONLY
- ▲ F10 USED ON 240/300S "Y" VOLT UNITS ONLY
- ▲ A42 USED AS FIELD INSTALLED OPTION

DEMOTES OPTIONAL COMPONENTS  
LINE VOLTAGE FIELD INSTALLED

## KCA180H, 240S, 300S 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.

# KCA210H UNIT DIAGRAM

24V POWER

KEY	COMPONENT
A42	MONITOR, PHASE PROTECTION
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
B13	COMPRESSOR 3
B21	MOTOR, OUTDOOR FAN 3
K2-1	CONTACTOR, COMPRESSOR 2
K3-1	CONTACTOR, BLOWER
K10-1,2	RELAY, OUTDOOR FAN
K14-1	CONTACTOR, COMPRESSOR 3
K65-1,2	RELAY, EXHAUST FAN 1
K66-1	RELAY, STAGE COOL 1
K67-1	RELAY, STAGE COOL 2
K68-1,2	RELAY, OUTDOOR FAN 2&3
K150-1,2	RELAY, OUTDOOR FAN 4
K152-1,2	RELAY, OUTDOOR FAN 5&6
K220-1	RELAY, OVERBLOW SWITCH
S4	SWITCH, LIMIT HI PRESS COMP 1 (MANUAL RESET)
S7	SWITCH, LIMIT HI PRESS COMP 2

KEY	COMPONENT
B22	MOTOR, OUTDOOR FAN 4
B23	MOTOR, OUTDOOR FAN 5
B24	MOTOR, OUTDOOR FAN 6
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
C19	CAPACITOR, OUTDOOR FAN 4
C20	CAPACITOR, OUTDOOR FAN 5
C21	CAPACITOR, OUTDOOR FAN 6
CB8	CIRCUIT BREAKER T1
CB10	CIRCUIT BREAKER MAIN DISCONNECT
CB18	CIRCUIT BREAKER T18
DL46	DELAY, OVERFLOW SWITCH
F6	FUSE, EXHAUST FANS
HR1	HEATER, COMPRESSOR 1
HR2	HEATER, COMPRESSOR 2
HR5	HEATER, COMPRESSOR 3
J11	JACK, GFT RECEPTACLE
K1-1	CONTACTOR, COMPRESSOR 1

S11	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 1
S28	SWITCH, LIMIT HI PRESS COMP 3

COOL 1(V1)

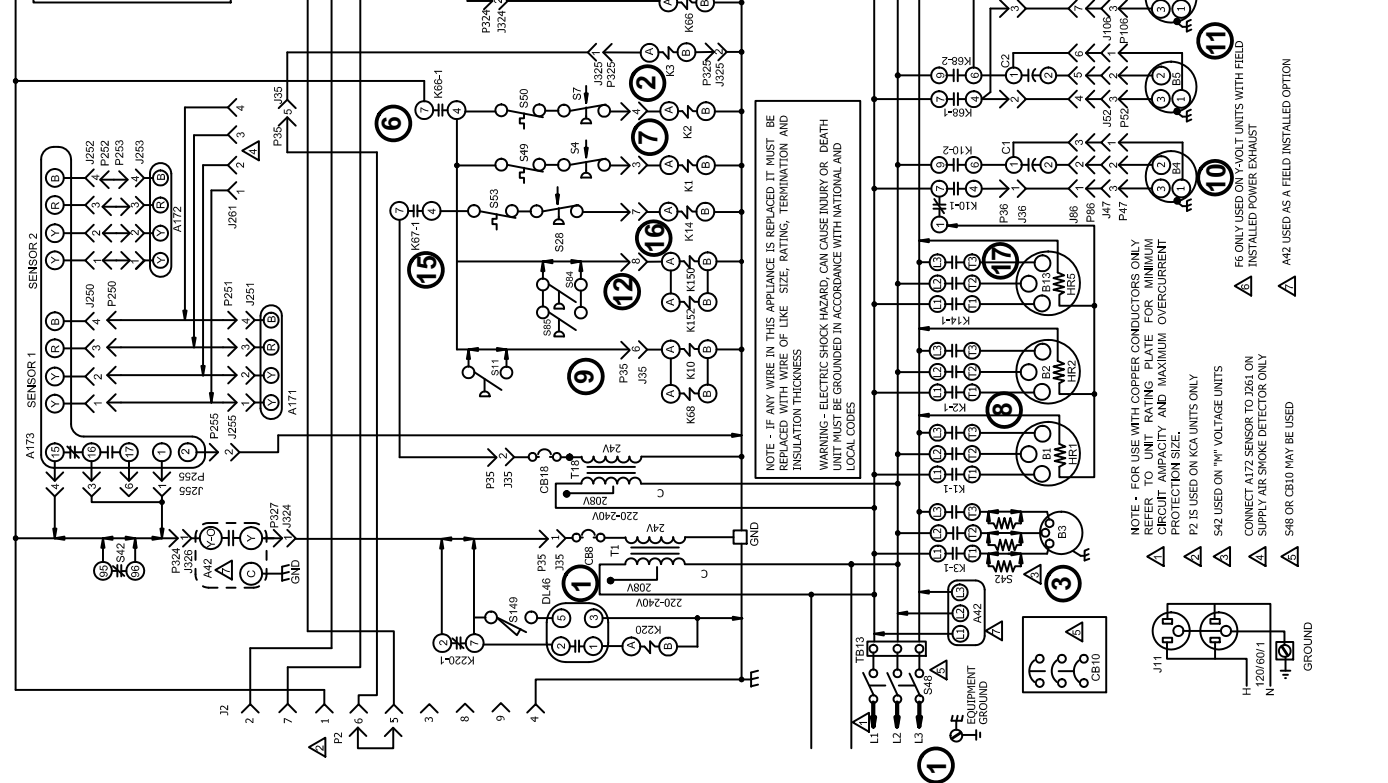
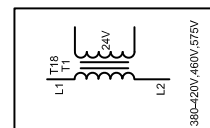
COOL 2 (V2)

J1P #	JACK/PLUG DESCRIPTION
2	HEAT
18	EXHAUST FAN COMPT
24	EXHAUST FAN
35	TEST
36	TEST COOL
47	OUTDOOR FAN 1
52	OUTDOOR FAN 2
86	OUTDOOR FANS 1,2,3
87	OUTDOOR FANS 4,5,6
106	OUTDOOR FAN 3
107	OUTDOOR FAN 4
108	OUTDOOR FAN 5
109	OUTDOOR FAN 6
132	BLOWER, EXHAUST FAN MOTOR 1
133	BLOWER, EXHAUST FAN MOTOR 2
251	SMOKE DETECTOR ONE
252	SMOKE DETECTOR TWO
253	SMOKE DETECTOR TWO
255	MODULE, CONTROL SMOKE DETECTION
281	SMOKE DETECTOR JUMPER
324	VFD OPTION CONNECTION
325	K3 BLOWER CONTROL
326	PHASE MONITOR/VFD CONTROL ADD ON
327	PHASE MONITOR/VFD CONTROL ADD ON

J1P #	JACK/PLUG DESCRIPTION
2	HEAT
18	EXHAUST FAN COMPT
24	EXHAUST FAN
35	TEST
36	TEST COOL
47	OUTDOOR FAN 1
52	OUTDOOR FAN 2
86	OUTDOOR FANS 1,2,3
87	OUTDOOR FANS 4,5,6
106	OUTDOOR FAN 3
107	OUTDOOR FAN 4
108	OUTDOOR FAN 5
109	OUTDOOR FAN 6
132	BLOWER, EXHAUST FAN MOTOR 1
133	BLOWER, EXHAUST FAN MOTOR 2
251	SMOKE DETECTOR ONE
252	SMOKE DETECTOR TWO
253	SMOKE DETECTOR TWO
255	MODULE, CONTROL SMOKE DETECTION
281	SMOKE DETECTOR JUMPER
324	VFD OPTION CONNECTION
325	K3 BLOWER CONTROL
326	PHASE MONITOR/VFD CONTROL ADD ON
327	PHASE MONITOR/VFD CONTROL ADD ON

01/13	WIRING DIAGRAM
537587-01	537587-01
01/13	01/13

COOLING	
KCA/KGA - 210H - G, J, M, Y	
SECTION B	
Supersedes	New Form No. 537587-01
REV. 0	



NOTE - IF ANY WIRE IN THIS APPLIANCE IS REPLACED IT MUST BE THE SAME TYPE, 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.

- ▲ FOR USE WITH COPPER CONDUCTORS ONLY
- ▲ REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
- ▲ P2 IS USED ON KCA UNITS ONLY
- ▲ S42 USED ON "M" VOLTAGE UNITS
- ▲ CONNECT A172 SENSOR TO J26 ON SUPPLY AIR SMOKE DETECTOR ONLY
- ▲ S48 OR CB10 MAY BE USED
- ▲ F6 ONLY USED ON Y-VOLT UNITS WITH FIELD INSTALLED POWER EXHAUST
- ▲ A42 USED AS A FIELD INSTALLED OPTION

— DENOTES OPTIONAL COMPONENTS  
 — LINE VOLTAGE FIELD INSTALLED

## KCA210H 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). See thermostat diagram.
- 5- N.O. K65-1 and N.O. K65-2 both close, energizing exhaust fan motors B10 and B11.

### **1st Stage Cooling (compressor B1 and B2)**

- 6- Y1 energizes the pilot relay K66 and N.O. K66-1 closes.
- 7- 24VAC is routed from T1 to N.C. freezestats S49 and S50 and N.C. high pressure switches S4 and S7. Compressor contactor K1 and K2 is energized.
- 8- N.O. contacts K1 and K2 close energizing compressor B1 and B2.
- 9- Optional N.O. low ambient switch S11 closes to energize condenser fan relay K10 and K68.
- 10- N.O. contacts K10-1 and K10-2 close energizing condenser fan B4.
- 11- N.O. contacts K68-1 and K68-2 close energizing condenser fans B5 and B21.
- 12- Optional N.O. low ambient switch S84 and/or S85 close to energize condenser fan relay K150 and K152.
- 13- N.O. contacts K150-1 and K150-2 close energizing condenser fan B22.
- 14- N.O. contacts K152-1 and K152-2 close energizing condenser fans B23 and B24.

### **2nd Stage Cooling (compressor B13 is energized)**

- 15- Y2 energizes the pilot relay K67 and N.O. K67-1 closes.
- 16- 24VAC is routed from T18 to N.C. freezestat S53 and N.C. high pressure switch S28. Compressor contactor K14 is energized.
- 17- N.O. K14 closes energizing compressor B13.

# KCA240H, 300H UNIT DIAGRAM

24V POWER

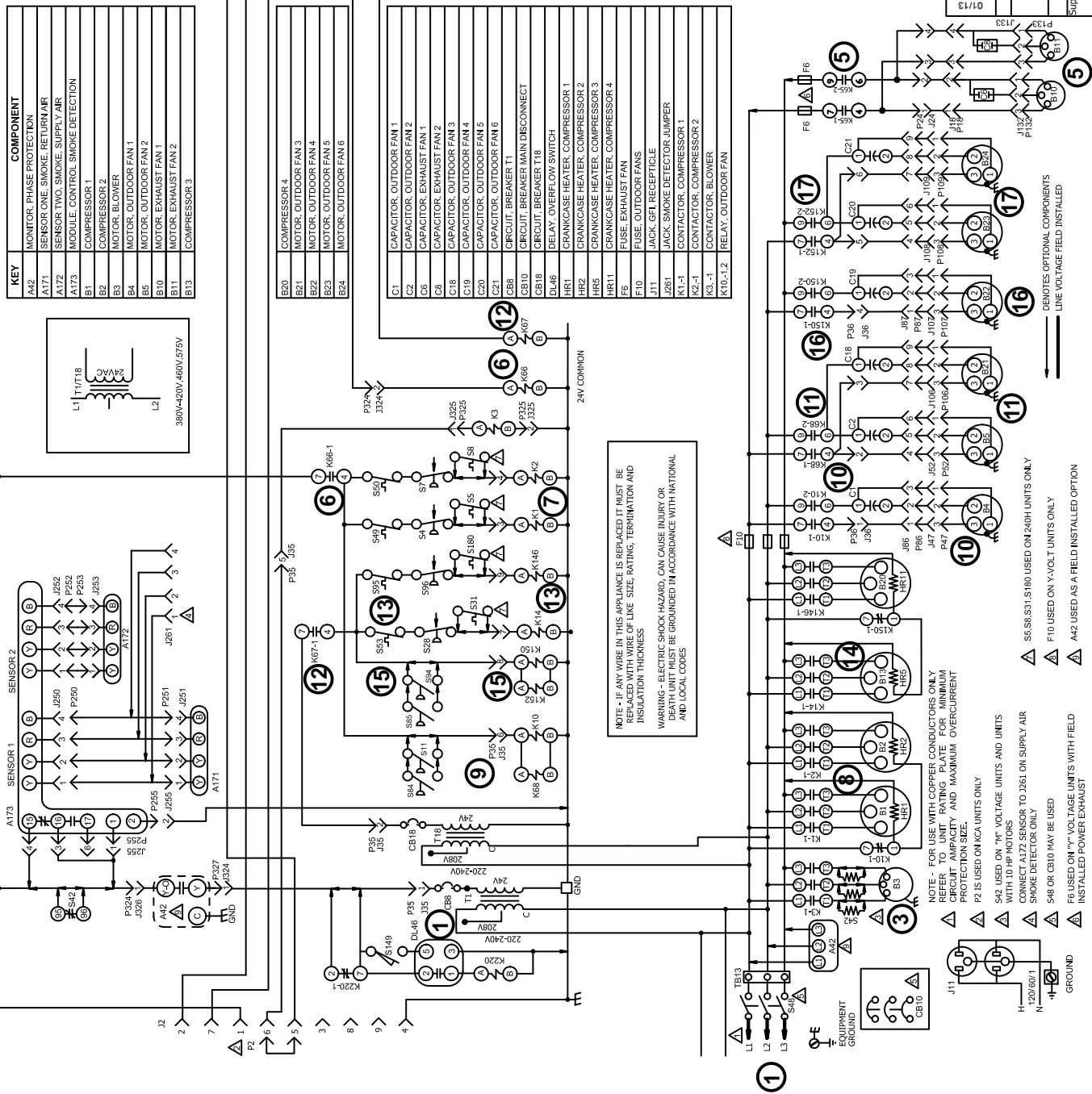
KEY	COMPONENT
A42	MONITOR, PHASE PROTECTION
A171	SENSOR ONE, SMOKE RETURN AIR
A172	SENSOR TWO, SMOKE SUPPLY AIR
A173	MODULE, CONTROL SMOKE DETECTION
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
B13	COMPRESSOR 3
K14-1	CONTACTOR, COMPRESSOR 3
K5-1,2	RELAY, EXHAUST FAN 1
K6-1	RELAY, STAGE COOL 1
K67-1	RELAY, STAGE COOL 2
K68-1,2	RELAY, OUTDOOR FAN 2 & 3
K146-1	CONTACTOR, COMPRESSOR 4
K150-1,2	RELAY, OUTDOOR FAN 4
K220-1	RELAY, OUTDOOR FAN 5 & 6
S4	SWITCH, LIMIT HI PRESS COMP 1 (MANUAL, RESET)
S5	SWITCH, LIMIT HI TEMP LIMIT COMP 1
S7	SWITCH, LIMIT HI PRESS COMP 2 (MANUAL, RESET)
S8	SWITCH, LIMIT HI TEMP LIMIT COMP 2
S11	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 1

S28	SWITCH, LIMIT HI PRESS COMP 3 (MANUAL, RESET)
S31	SWITCH, HI TEMP LIMIT COMP 3
S32	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S48	SWITCH, DISCONNECT
S49	SWITCH, FREEZER/ST COMP 1

C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
C19	CAPACITOR, OUTDOOR FAN 4
C20	CAPACITOR, OUTDOOR FAN 5
C21	CAPACITOR, OUTDOOR FAN 6
CB8	CIRCUIT, BREAKER T1
CB10	CIRCUIT, BREAKER MAIN DISCONNECT
CB18	CIRCUIT, BREAKER T18
DL46	DELAY, OVERFLOW SWITCH
HR1	CRANKCASE HEATER, COMPRESSOR 1
HR2	CRANKCASE HEATER, COMPRESSOR 2
HR3	CRANKCASE HEATER, COMPRESSOR 3
HR11	CRANKCASE HEATER, COMPRESSOR 4
F6	FUSE, EXHAUST FAN
F10	FUSE, OUTDOOR FANS
J11	JACK, GFI RECEPTACLE
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

J/P	JACK/PLUG DESCRIPTION
2	HEAT
18	EXHAUST FANS
24	EXHAUST FAN
35	TEST
36	TEST COOL
47	OUTDOOR FAN 1
52	OUTDOOR FAN 2
86	OUTDOOR FANS 1,2,3
87	OUTDOOR FANS 4,5,6
106	OUTDOOR FAN 3
107	OUTDOOR FAN 4
108	OUTDOOR FAN 5
109	OUTDOOR FAN 6
132	EXHAUST BLOWER FAN MOTOR 1
133	EXHAUST BLOWER FAN MOTOR 2
250	SMOKE DETECTOR ONE
251	SMOKE DETECTOR ONE
252	SMOKE DETECTOR TWO
253	SMOKE DETECTOR TWO
255	CONTROL MODULE SMOKE DETECTION
324	VFD OPTION CONNECTION
325	K3 BLOWER CONTROL
326	PHASE MONITOR/VFD CONTROL ADD ON
327	PHASE MONITOR/VFD CONTROL ADD ON

WIRING DIAGRAM	
01/13	
537588-01	
COOLING	
KCA/KGA - 240/300H - G,J,M,Y	
SECTION B	
REV 0	
Supersedes	New Form No. 537588-01



## KCA240H, 300H 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). See thermostat diagram.
- 5- N.O. K65-1 and N.O. K65-2 both close, energizing exhaust fan motors B10 and B11.

### **1st Stage Cooling (compressor B1 and B2)**

- 6- Y1 energizes the pilot relay K66 and N.O. K66-1 closes.
- 7- 24VAC is routed from T1 to N.C. freezestats S49 and S50 and N.C. high pressure switches S4 and S7. Compressor contactor K1 and K2 is energized.
- 8- N.O. contacts K1 and K2 close energizing compressor B1 and B2.
- 9- Optional N.O. low ambient switches S11 and/or S84 close to energize condenser fan relay K10 and K68.
- 10- N.O. contacts K10-1 and K10-2 close energizing condenser fan B4.
- 11- N.O. contacts K68-1 and K68-2 close energizing condenser fans B5 and B21.

### **2nd Stage Cooling (compressor B13 is energized)**

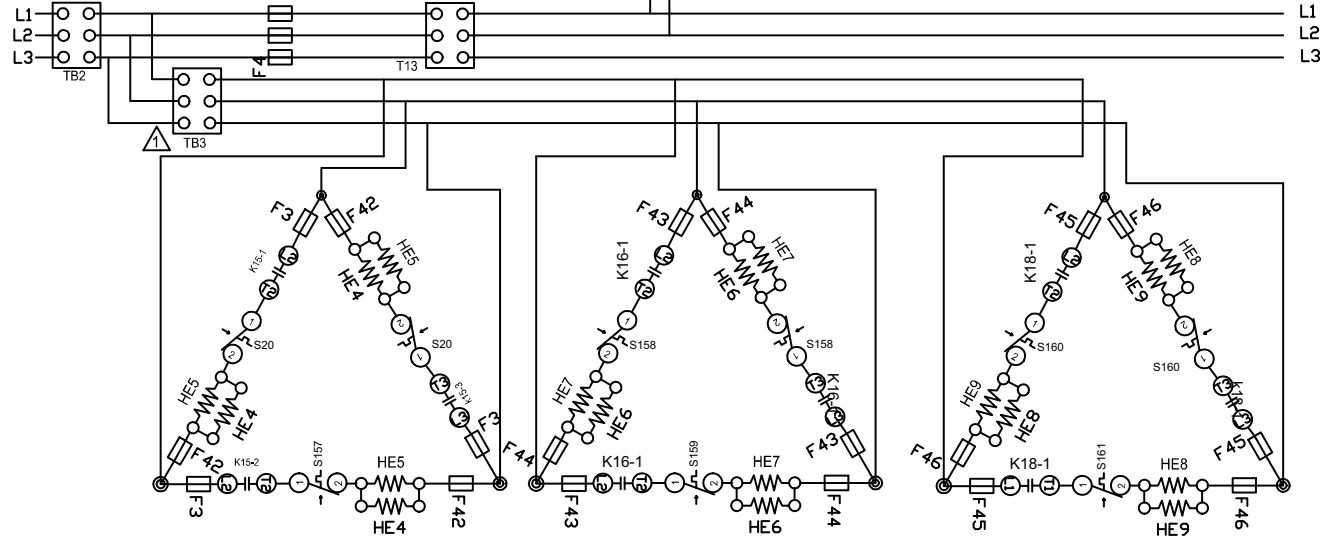
- 12- Y2 energizes the pilot relay K67 and N.O. K67-1 closes.
- 13- 24VAC is routed from T18 to N.C. freezestat S53, S95 and N.C. high pressure switch S28 and S96. Compressor contactors K14 and K146 are energized.
- 14- N.O. Contacts K14-1 close energizing compressor B13. N.O. Contacts K146-1 close energizing compressor B20.
- 15- Optional N.O. low ambient switches S85 and/or S94 close to energize condenser fan relay K150 and K152.
- 16- N.O. contacts K150-1 and K150-2 close energizing condenser fan B22.
- 17- N.O. contacts K152-1 and K152-2 close energizing condenser fans B23 and B24.



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

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

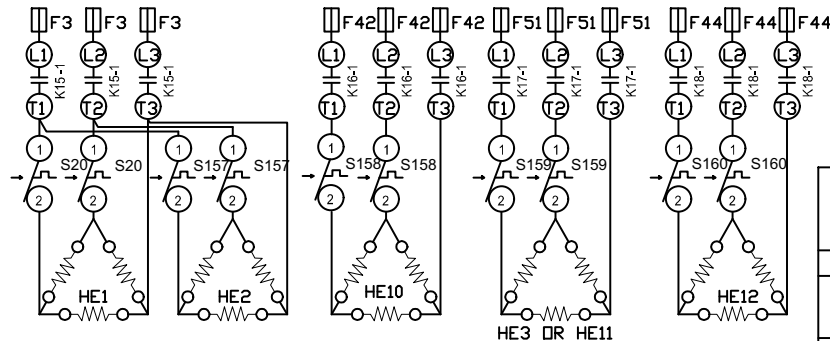
P2	PLUG, HEAT
P7	PLUG, ELECTRIC HEAT BUB BASE KIT
P37	PLUG, ELECTRIC HEAT LIMIT
S15	SWITCH, LIMIT PRIMARY ELECTRIC HEAT
S20	SWITCH, LIMIT SECONDARY ELECTRIC HEAT
S107	SWITCH, LIMIT PRIMARY ELECTRIC HEAT
S157	SWITCH, LIMIT SECONDARY ELECTRIC HEAT
S158	SWITCH, LIMIT SECONDARY ELECTRIC HEAT
S159	SWITCH, 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				



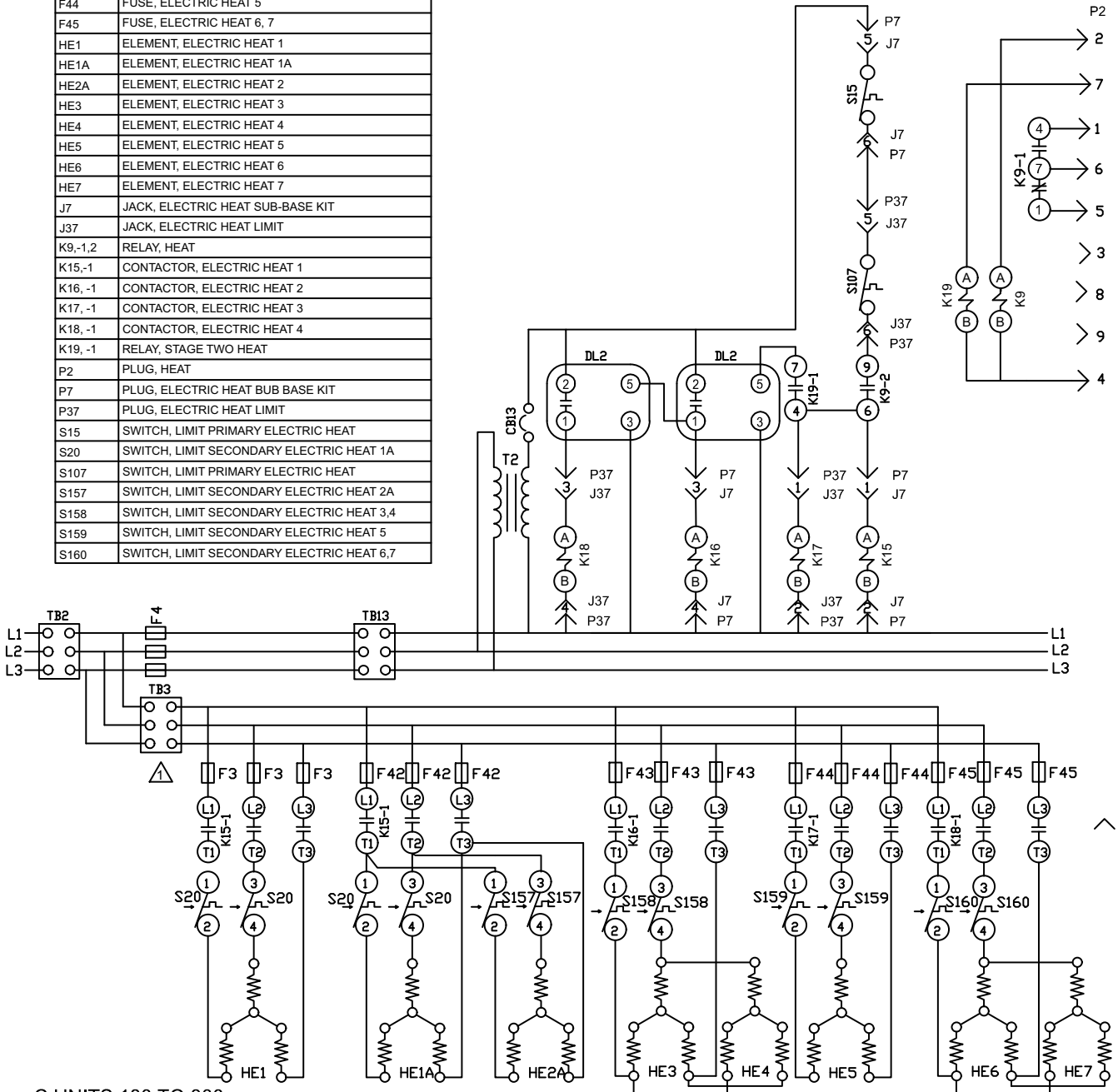
	WIRING DIAGRAM	01/10
	<b>HEATING</b> EHA - 15, 30, 45, 60, 90 - Y FOR USE WITH KCA AND KHA UNITS	
SECTION A		REV. 2.0
Supersedes 535066W	New Form No. 537060-01	

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

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.

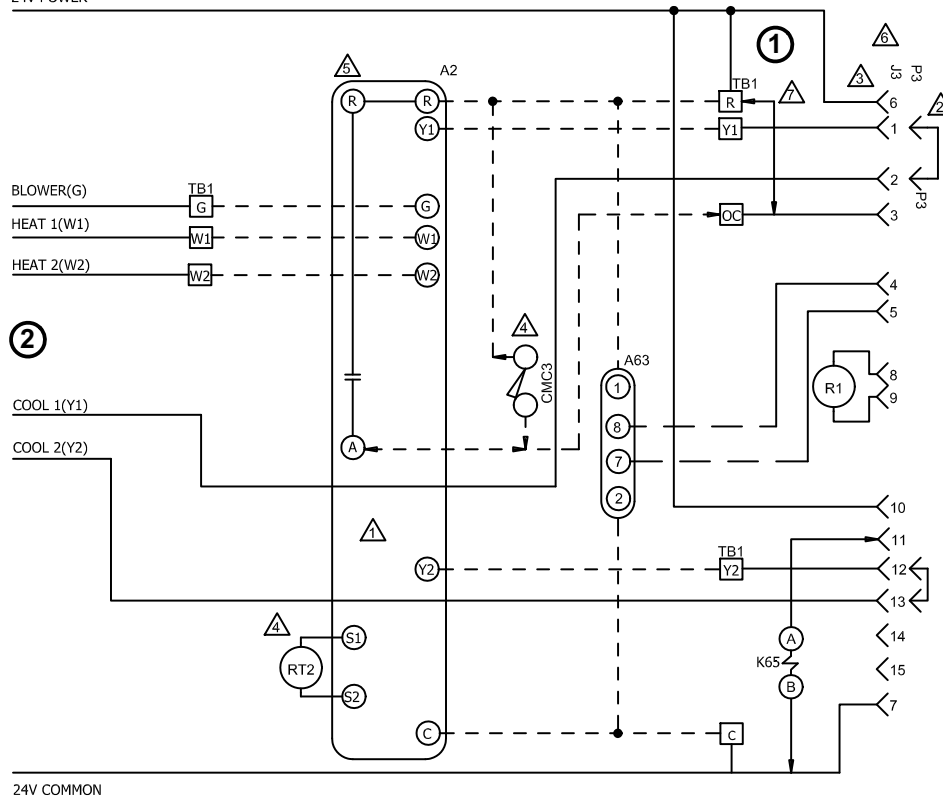
### END OF FIRST STAGE HEAT:

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

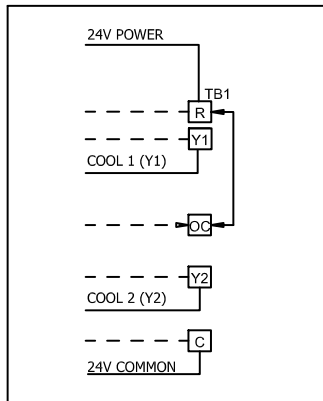
- 10 - Electric heat contactors K15 and K17 are de-energized.
- 11 - The second and first set of electric heat elements are de-energized.

# ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT

24V POWER



24V COMMON




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

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 ECONOMIZER IS USED, ONLY ON KCA, KGA AND KHA 156 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-OCP WHEN USING A NITE SETBACK THERMOSTAT

- DENOTES OPTIONAL COMPONENTS
- - - CLASS II FIELD WIRING

01/13		WIRING DIAGRAM	01/13
		537612-01	
CONTROL			
ELECTRONIC/ELECTROMECHANICAL THERMOSTAT			
SECTION C			REV. 0
Supersedes	New Form No. 537612-01		

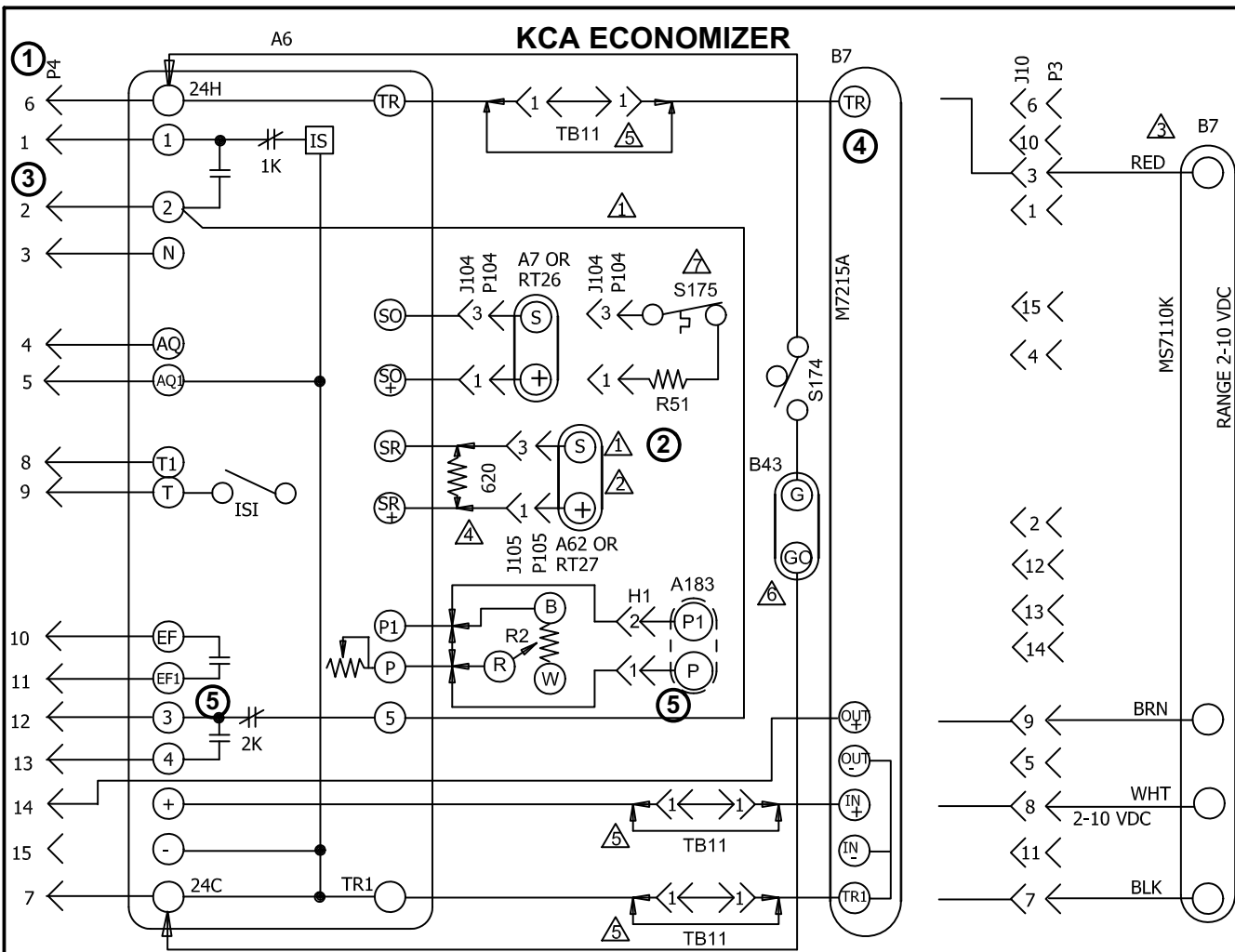
©

**POWER:**

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

**OPERATION:**

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



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

- ⚠ RT26 AND RT27, TEMPERATURE SENSORS MAY BE USED INSTEAD OF A7 AND A62 ENTHALPY SENSORS
- ⚠ A62 ENTHALPY SENSOR OR RT27 USED FOR DIFFERENTIAL SENSING
- ⚠ USED ON C BOX UNITS
- ⚠ REPLACE A7 OR RT26 WITH 620 OHM RESISTOR FOR CONTROLS WITH GLOBAL ECON
- ⚠ TB11 USED ON "C" BOX ONLY WITH MOTOR M7215A
- ⚠ OPTIONAL EXHAUST DAMPER TO HOLD EXHAUST DAMPER CLOSED WHEN OUTSIDE AIR DAMPER IS CLOSED
- ⚠ OPTIONAL OUTDOOR THERMOSTAT TO REPLACE RT26 SENSIBLE SENSOR

———— DESIGNATES OPTIONAL WIRING  
 - - - - CLASS II FIELD WIRING

**SEQUENCE OF OPERATION**

**POWER:**

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

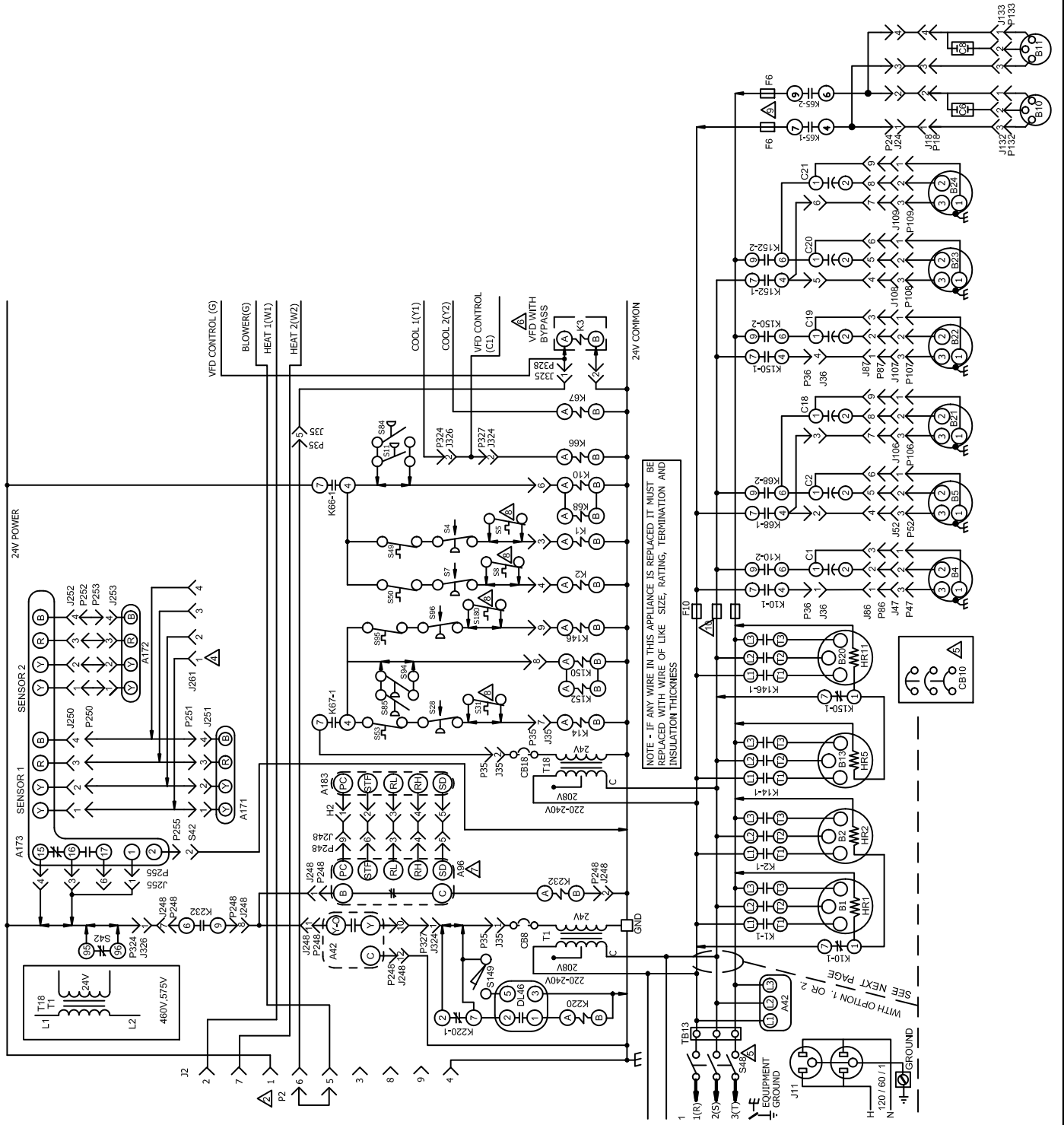
**OPERATION:**

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

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

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# TYPICAL SUPPLY AIR INVERTER UNIT DIAGRAM



# TYPICAL SUPPLY AIR INVERTER UNIT DIAGRAM (continued)

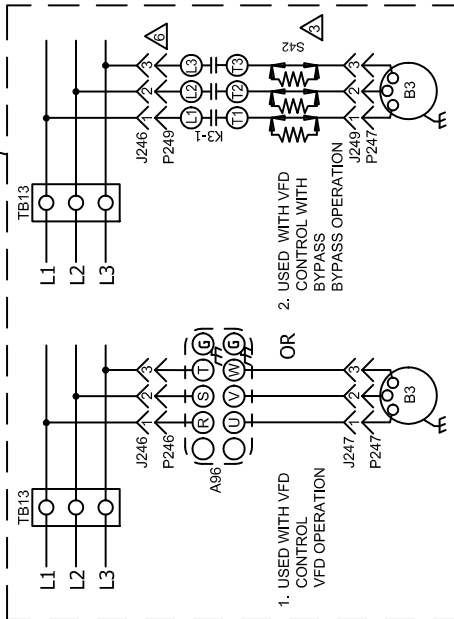
K10,-1,2	RELAY, OUTDOOR FAN
K14,-1	CONTACTOR, COMPRESSOR 3
K65-1,2	RELAY, EXHAUST FAN 1
K86-1	RELAY, STAGE COOL 1
K67-1	RELAY, STAGE COOL 2
K88,-1,2	RELAY, OUTDOOR FAN 2&3
K146-1	CONTACTOR, COMPRESSOR 4
K150,-1,2	RELAY, OUTDOOR FAN 4
K162,-1,2	RELAY, OUTDOOR FAN 5&6
K220,-1	RELAY, OVERFLOW SWITCH
K232	RELAY, INVERTER PROTECTION
S4	SWITCH, LIMIT HI PRESS COMP 1 (MANUAL RESET)
S7	SWITCH, LIMIT HI PRESS COMP 2 (MANUAL RESET)
S11	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 1
S28	SWITCH, LIMIT HI PRESS COMP 3 (MANUAL RESET)
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S48	SWITCH, DISCONNECT
S49	SWITCH, FREEZESTAT COMP 1
S50	SWITCH, FREEZESTAT COMP 2
S53	SWITCH, FREEZESTAT COMP 3
S54	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 2
S65	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 3
S84	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 4
S95	SWITCH, FREEZESTAT COMP 4
S96	SWITCH, LIMIT HI PRESS COMP 4 (MANUAL RESET)
S149	SWITCH, OVERFLOW
T1	TRANSFORMER, CONTROL
T18	TRANSFORMER, CONTACTOR CONTROL
TB13	TERMINAL STRIP, POWER DISTRIBUTION

- NOTE - FOR USE WITH COPPER CONDUCTORS ONLY  
REFER TO UNIT RATING PLATE FOR MINIMUM  
CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT  
PROTECTION SIZE.
- △ P2 IS USED ON KCA UNITS ONLY
- △ S42 USED ON UNIT WITH 10 HP MOTOR AND VFD BYPASS
- △ CONNECT A172 SENSOR TO J261 ON  
SUPPLY AIR SMOKE DETECTOR ONLY
- △ S48 OR CB10 MAY BE USED
- △ TO BYPASS A96 VFD:  
DISCONNECT ALL POWER  
UNPLUG - J246 FROM P246; AND UNPLUG J247 FROM P247.  
PLUG - P249 INTO J246; AND PLUG J249 INTO P247.  
UNPLUG - J326 FROM P324; AND UNPLUG J324 FROM P327  
PLUG - P324 INTO J324

02/13	WIRING DIAGRAM	02/13
		
537608-01		
COOLING		
KCA/KGA - 240/300H - G,J,Y - VFD		
Supersedes		SECTION B
New Form No.		REV 0
537608-01		

KEY	COMPONENT
A42	MONITOR, PHASE PROTECTION
A96	CONTROL INVERTER
A171	SENSOR ONE, SMOKE, RETURN AIR
A172	SENSOR TWO, SMOKE, SUPPLY AIR
A173	MODULE, CONTROL SMOKE DETECTION
A183	CONTROL, VFD BOARD
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
B10	MOTOR, EXHAUST FAN 1
B11	MOTOR, EXHAUST FAN 2
B13	COMPRESSOR 3
B20	COMPRESSOR 4
B21	MOTOR, OUTDOOR FAN 3
B22	MOTOR, OUTDOOR FAN 4
B23	MOTOR, OUTDOOR FAN 5
B24	MOTOR, OUTDOOR FAN 6
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
C18	CAPACITOR, OUTDOOR FAN 3
C19	CAPACITOR, OUTDOOR FAN 4
C20	CAPACITOR, OUTDOOR FAN 5
C21	CAPACITOR, OUTDOOR FAN 6
CB8	CIRCUIT, BREAKER T1
CB10	CIRCUIT, BREAKER MAIN DISCONNECT
CB18	CIRCUIT, BREAKER T18
DL46	DELAY, OVERFLOW SWITCH
F6	FUSE, EXHAUST FANS
F10	FUSE, OUTDOOR FANS
H2	HEADER 2, LVC1
HR1	HEATER, COMPRESSOR 1
HR2	HEATER, COMPRESSOR 2
HR5	HEATER, COMPRESSOR 3
HR11	HEATER, COMPRESSOR 4
J11	JACK, GFI, RECEPTACLE
K1,-1	CONTACTOR, COMPRESSOR 1
K2,-1	CONTACTOR, COMPRESSOR 2
K3,-1	CONTACTOR, BLOWER

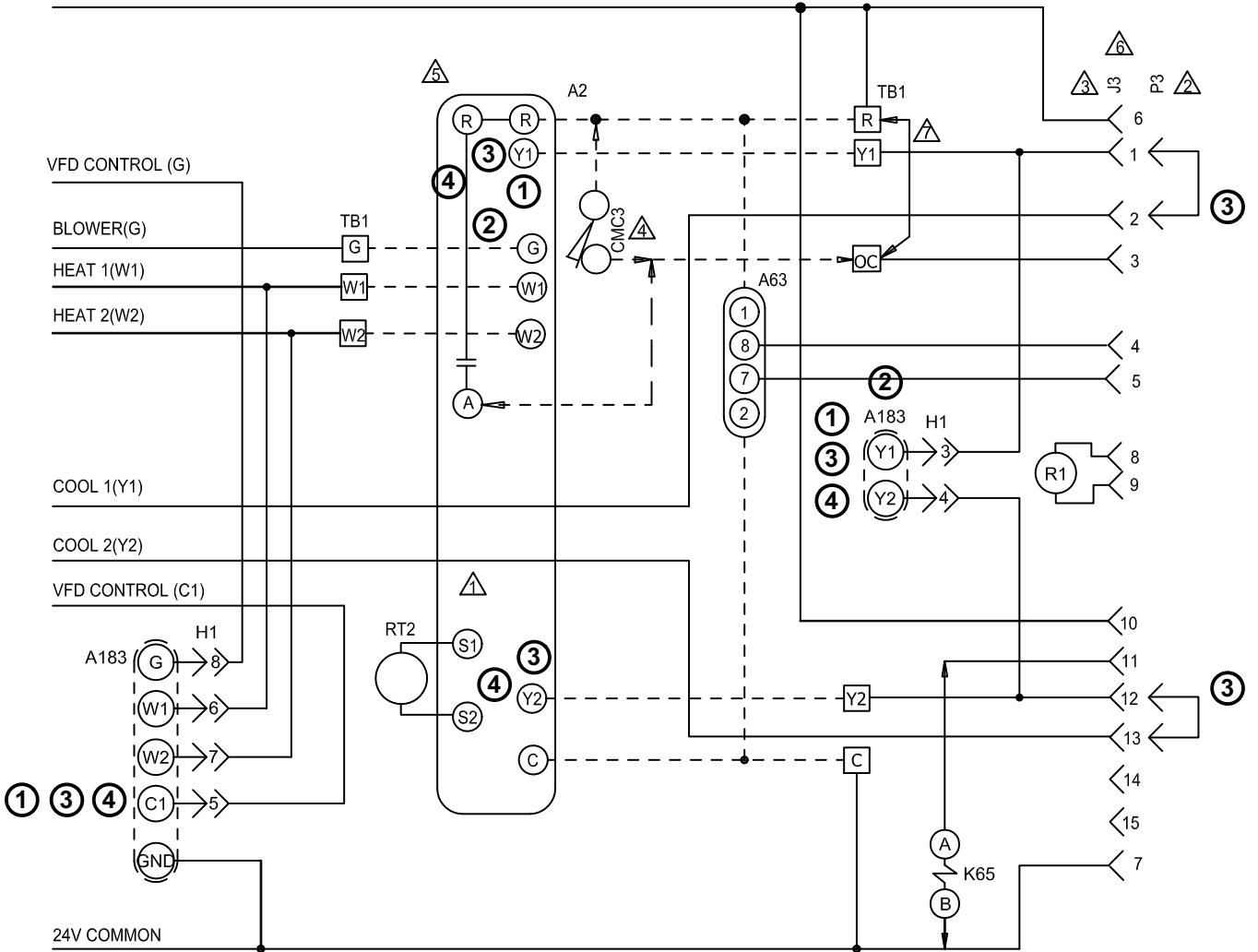
- △ MITSUBISHI VFD
- △ S5, S8, S31, S180 USED ON 240H UNITS ONLY
- △ F6 USED ON Y-VOLT UNITS WITH FIELD  
INSTALLED POWER EXHAUST
- △ F10 USED ON Y-VOLT UNITS ONLY
- DENOTES OPTIONAL COMPONENTS  
— LINE VOLTAGE FIELD INSTALLED



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

# ELECTROMECHANICAL OR ELECTRONIC THERMOSTAT WITH VFD

24V POWER

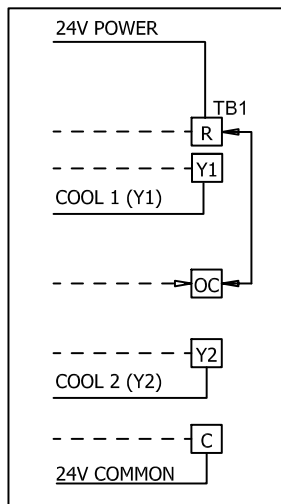


① ③ ④

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③

24V COMMON



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

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

- ⚠ THERMOSTAT SUPPLIED BY USER
- ⚠ REMOVE P3 WHEN ECONOMIZER IS USED; ONLY ON KCA, KGA AND KHA 156 THRU 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 THRU 150 UNITS WITHOUT ECONOMIZER
- ⚠ REMOVE JUMPER BETWEEN TB1-R AND TB1-OC WHEN USING A NITE SETBACK THERMOSTAT

← — — — — — → DESIGNATES OPTIONAL WIRING  
 - - - - - CLASS II FIELD WIRING

01/13	WIRING DIAGRAM	01/13
	537615-01	
CONTROL - VFD		
ELECTRONIC/ELECTROMECHANICAL THERMOSTAT		
SECTION C		REV. 0
Supersedes	New Form No. 537615-01	



## VFD BLOWER OPERATION

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

During heating, the blower operates on high speed.

See table 23 for blower speed during cooling.

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

**TABLE 23**

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

\*C1 is energized via A6 enthalpy control.

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

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

**Y1 thermostat demand, outdoor air SUITABLE for free cooling:**

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

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

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

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

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