

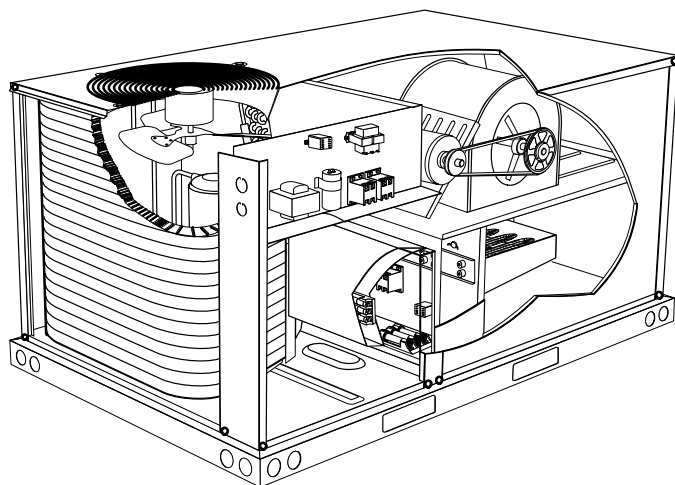
## ZCA036, 048, 060

The ZCA packaged electric cooling units are available in standard cooling efficiency (036S, 048S, 060S). Cooling capacities are 3, 4 and 5 tons (10.6 to 17.6kW).

Optional electric heat is field-installed and is available in 5kW through 22.5kW. Electric heat operates in single stage only.

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. Stacking brackets can be removed or left on the unit permanently. If brackets are removed, any screws removed during installation must be replaced.



### 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.

#### ⚠ 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 installer (or equivalent).

#### ⚠ WARNING



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

#### ⚠ CAUTION

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

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OPTIONS / ACCESSORIES					
Item		Catalog No.	036	048	060
<b>COOLING SYSTEM</b>					
Condensate Drain Trap	PVC - C1TRAP20AD2	76W26	X	X	X
	Copper - C1TRAP10AD2	76W27	X	X	X
Compressor Crankcase Heater	208/230V-1 or 3ph - Z1CCHT10A-1P	99W61	X		
	208/230V-1 or 3 ph - Z1CCHT11A-1P	99W64		X	X
	460V - 3 ph - Z1CCHT10A-1G	99W62	X		
	460V - 3 ph - Z1CCHT11A-1G	99W65		X	X
	575V - 3 ph - Z1CCHT10A-1J	99W63	X		
	575V - 3 ph - Z1CCHT11A-1J	99W66		X	X
Drain Pan Overflow Switch	Z1SNSR90A1	99W59	X	X	X
Low Ambient Kit	Z1SNSR33A-1	99W67	X	X	X
<b>BLOWER - SUPPLY AIR</b>					
Motors	<sup>1</sup> Belt Drive - 1 hp Standard Efficiency	Factory	O	O	O
	Belt Drive - 1.5 hp Standard Efficiency	Factory	O	O	O
Drive Kits	Kit #Z01 - 678-1035 rpm	Factory	O		
See Blower Data Tables for selection	Kit #Z02 - 803-1226 rpm	Factory		O	
	Kit #Z03 - 906-1383 rpm	Factory			O
	Kit #Z04 - 964-1471 rpm	Factory	O		
	<sup>2</sup> Kit #Z05 - 1098-1490 rpm	Factory		O	
	<sup>2</sup> Kit #Z06 - 1262-1634 rpm	Factory			O
<b>CABINET</b>					
Coil/Hail Guards	Z1GARD10A-1	97W53	X	X	X
Corrosion Protection		Factory	O	O	O
<b>ELECTRICAL</b>					
Voltage 60 hz	208/230V - 1 phase	Factory	O	O	O
	208/230V - 3 phase	Factory	O	O	O
	460V - 3 phase	Factory	O	O	O
	575V - 3 phase	Factory	O	O	O
Bottom Power Entry Kit	Z1PEKT01A-1	98W08	X	X	X
<b>ELECTRIC HEAT</b>					
5 kW	208/230V-1ph - Z1EH0050AN1P	98W96	X	X	X
	208/230V-3ph - Z1EH0050AN1Y	99W01	X	X	X
	460V-3ph - Z1EH0050AN1G	99W06	X	X	X
	575V-3ph - Z1EH0050AN1J	99W11	X	X	X
7.5 kW	208/230V-1ph - Z1EH0075AN1P	98W97	X	X	X
	208/230V-3ph - Z1EH0075AN1Y	99W02	X	X	X
	460V-3ph - Z1EH0075AN1G	99W07	X	X	X
	575V-3ph - Z1EH0075AN1J	99W12	X	X	X
10 kW	208/230V-1ph - Z1EH0100AN1P	98W98	X	X	X
	208/230V-3ph - Z1EH0100AN1Y	99W03	X	X	X
	460V-3ph - Z1EH0100AN1G	99W08	X	X	X
	575V-3ph - Z1EH0100AN1J	99W13	X	X	X
15 kW	208/230V-1ph - Z1EH0150AN1P	98W99	X	X	X
	208/230V-3ph - Z1EH0150AN1Y	99W04	X	X	X
	460V-3ph - Z1EH0150AN1G	99W09	X	X	X
	575V-3ph - Z1EH0150AN1J	99W14	X	X	X
22.5 kW	208/230V-1ph - Z1EH0225AN1P	99W00		X	X
	208/230V-3ph - Z1EH0225AN1Y	99W05		X	X
	460V-3ph - Z1EH0225AN1G	99W10		X	X
	575V-3ph - Z1EH0225AN1J	99W15		X	X
<b>ELECTRIC HEAT ACCESSORIES</b>					
Unit Fuse Block - See Electrical/Electric Heat Tables for Selection			X	X	X

<sup>1</sup> 1 hp blower motor is not available for 208/230V-1ph applications.

<sup>2</sup> 1.5 hp motor is required with Z05 and Z06 drive kits.

NOTE - The catalog and model numbers that appear here are for ordering field installed accessories only.

OX - Field Installed or Configure to Order (Factory Installed)

O - Configure to Order (Factory Installed)

X - Field Installed.

OPTIONS / ACCESSORIES					
Item		Catalog No.	036	048	060
<b>ECONOMIZER</b>					
Economizer - With Barometric Relief Dampers and Exhaust Hood (Downflow)	Z1ECON30A-1	98W09	OX	OX	OX
Economizer - With Barometric Relief Dampers and Exhaust Hood (Horizontal)	Z1ECON16A-1	98W68	X	X	X
<b>Economizer Controls</b>					
Single Enthalpy Control	C1SNSR64FF1	53W64	X	X	X
<b>OUTDOOR AIR</b>					
<b>Outdoor Air Dampers - Includes Outdoor Air Hood</b>					
Motorized	Z1DAMP21A-1	95W74	X	X	X
Manual	Z1DAMP11A-1	95W73	X	X	X
<b>POWER EXHAUST FAN</b>					
Standard Static (Downflow)	208/230V-1 or 3ph - Z1PWRE10A-1P	21E01	X	X	X
	460V-3ph - Z1PWRE10A-1G	23E01	X	X	X
Standard Static (Horizontal)	208/230V-1 or 3ph - Z1PWRE15A-1P	24E01	X	X	X
	460V-3ph - Z1PWRE15A-1G	28E01	X	X	X
575V Transformer Kit	575V-3ph - Z1TRFM20A-1J	59E02	X	X	X
NOTE - Order 575V Transformer Kit with 208/230V Power Exhaust Fan for 575V applications.					
<b>INDOOR AIR QUALITY</b>					
<b>Indoor Air Quality (CO<sub>2</sub>) Sensors</b>					
Sensor - Wall-mount, off-white plastic cover with LCD display	C0SNSR50AE1L	77N39	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting	C0SNSR53AE1L	87N54	X	X	X
CO <sub>2</sub> Sensor Duct Mounting Kit - for downflow applications	C0MISC19AE1	85L43	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO <sub>2</sub> sensor (77N39)	C0MISC16AE1	90N43	X	X	X
<b>ROOF CURBS - DOWNFLOW</b>					
<b>Clip Curb</b>					
8 in. height	Z1CURB40A-1	95W18	X	X	X
14 in. height	Z1CURB41A-1	95W19	X	X	X
18 in. height	Z1CURB42A-1	95W20	X	X	X
24 in. height	Z1CURB43A-1	95W21	X	X	X
<b>Standard Curb</b>					
14 in. height	Z1CURB10A-1	92W50	X	X	X
<b>CEILING DIFFUSERS</b>					
Step-Down - Order one	RTD9-65-R	27G87	X	X	X
Flush - Order one	FD9-65-R	27G86	X	X	X
NOTE - Ceiling Diffuser Transitions are not furnished and must be field fabricated.					
NOTE - The catalog and model numbers that appear here are for ordering field installed accessories only.					
OX - Field Installed or Configure to Order (Factory Installed)					
O - Configure to Order (Factory Installed)					
X - Field Installed.					

## SPECIFICATIONS

General Data		Nominal Tonnage	3 Ton	4 Ton	5 Ton
		Model No.	ZCA036S4B	ZCA048S4B	ZCA060S4B
		Efficiency Type	Standard	Standard	Standard
Cooling Performance	Gross Cooling Capacity - Btuh	36,100	47,000	58,900	
	<sup>1</sup> Net Cooling Capacity - Btuh	34,600	45,000	57,000	
	AHRI Rated Air Flow - cfm	1200	1550	1650	
	<sup>2</sup> Sound Rating Number (SRN) (dBA)	77	80	83	
	Total Unit Power - kW	3.0	4.3	5.3	
	<sup>1</sup> SEER (Btuh/Watt)	13.00	13.00	13.00	
	<sup>1</sup> EER (Btuh/Watt)	11.50	10.60	10.70	
Refrigerant	Type	R-410A	R-410A	R-410A	
	Charge Furnished	4 lbs. 1 oz.	4 lbs. 6 oz.	5 lbs. 6 oz.	
Electric Heat Available - See page 2		5, 7.5, 10, 15 kW	5, 7.5, 10, 15, 22.5 kW		
Compressor Type (one per unit)		Scroll	Scroll	Scroll	
Outdoor Coil	Net face area - sq. ft.	12.8	12.8	15.2	
	Number of rows	1	1	1	
	Fins / inch	23	23	23	
Outdoor Coil Fan	Motor HP	(1) 1/6 (PSC)	(1) 1/4 (PSC)	(1) 1/3 (PSC)	
	Motor rpm	825	825	1075	
	Total motor watts	200	310	360	
	Diameter - in.	(1) 22	(1) 22	(1) 22	
	Number of blades	4	4	3	
	Total air volume - cfm	2700	3300	3800	
	Indoor Coil	Net face area - sq. ft.	8.4	8.4	8.4
Tube diameter - in.		3/8	3/8	3/8	
Number of rows		2	2	3	
Fins per inch		14	14	14	
Drain Connection (no.and size) - in.		(1) 1 NPT	(1) 1 NPT	(1) 1 NPT	
Expansion device type		Fixed Orifice	Fixed Orifice	Fixed Orifice	
<sup>3</sup> Indoor Blower & Drive Selection		Nominal Motor HP	<sup>4</sup> 1 hp, 1.5 hp	<sup>4</sup> 1 hp, 1.5 hp	<sup>4</sup> 1 hp, 1.5 hp
	Maximum Usable Motor HP	1.15 hp, 1.7 hp	1.15 hp, 1.7 hp	1.15 hp, 1.7 hp	
	Available Drive Kits	Kit #Z01 678-1035 rpm	Kit #Z02 803-1226 rpm	Kit #Z03 906-1383 rpm	
		Kit #Z04 964-1471 rpm	<sup>5</sup> Kit #Z05 1098-1490 rpm	<sup>5</sup> Kit #Z06 1262-1634 rpm	
Wheel nominal diameter x width - in.		10 x 10	10 x 10	10 x 10	
Filters	Type	Disposable			
	Number and size - in.	(4) 14 x 20 x 2			
Electrical Characteristics - 60 Hz		208/230V 1 phase	208/230V, 1 phase	208/230V, 1 phase	
		208/230V, 460V & 575V 3 phase	208/230V 460V & 575V 3 phase	208/230V 460V & 575V 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 210/240: 95°F outdoor air temperature and 80°F db/67°F wb entering evaporator air; minimum external duct static pressure.

<sup>2</sup> Sound Rating Number (SRN) rated in accordance with test conditions included in ANSI/AHRI Standard 270-2008.

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

<sup>4</sup> 1 hp blower motor is not available for 208/230V-1ph applications.

<sup>5</sup> 1.5 hp motor is required with Z05 and Z06 drive kits.

## BLOWER DATA - BELT DRIVE - ZCA036

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

FOR ALL UNITS ADD:

1 - Any factory installed options air resistance (heat section, economizer, wet coil, etc.).

2 - Any field installed accessories air resistance (duct resistance, diffuser, etc.).

See page 8 for blower motors and drives and wet coil and options/accessory air resistance data.

### DOWNFLOW

Air Volume cfm	External Static - in. w.g.															
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Furnished				Kit Z01											
900	555	0.16	621	0.17	691	0.19	763	0.20	832	0.22	897	0.24	956	0.26	1010	0.29
1000	577	0.18	644	0.19	715	0.21	786	0.23	855	0.24	919	0.27	976	0.29	1028	0.32
1100	601	0.20	670	0.22	741	0.23	812	0.25	879	0.28	941	0.30	996	0.33	1047	0.37
1200	629	0.22	698	0.24	770	0.26	840	0.28	905	0.31	965	0.34	1018	0.38	1066	0.41
1300	659	0.25	729	0.27	800	0.30	869	0.32	932	0.35	989	0.39	1040	0.43	1087	0.47
1400	692	0.28	763	0.31	833	0.34	899	0.37	960	0.40	1014	0.44	1063	0.48	1108	0.52
1500	728	0.32	798	0.35	866	0.38	930	0.41	987	0.45	1039	0.50	1086	0.54	1130	0.58

Air Volume cfm	External Static - in. w.g.															
	0.90		1.00		1.10		1.20		1.30		1.40		1.50		1.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Kit Z04															
900	1060	0.31	1108	0.34	1154	0.37	1197	0.40	1239	0.44	1279	0.47	1319	0.51	1359	0.55
1000	1077	0.35	1123	0.38	1168	0.42	1211	0.45	1252	0.49	1291	0.52	1330	0.56	1370	0.60
1100	1094	0.40	1139	0.43	1183	0.46	1225	0.50	1266	0.54	1305	0.58	1343	0.62	1382	0.66
1200	1112	0.45	1156	0.48	1199	0.52	1241	0.55	1281	0.59	1319	0.64	1357	0.68	1394	0.72
1300	1131	0.50	1174	0.54	1216	0.57	1257	0.61	1296	0.66	1334	0.70	1371	0.74	1408	0.78
1400	1151	0.56	1193	0.60	1234	0.64	1274	0.68	1313	0.72	1351	0.77	1387	0.81	1423	0.86
1500	1172	0.62	1213	0.66	1253	0.71	1293	0.75	1331	0.79	1368	0.84	1404	0.89	1440	0.93

### HORIZONTAL

Air Volume cfm	External Static - in. w.g.															
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Furnished				Kit Z01											
900	572	0.14	641	0.16	712	0.19	785	0.22	860	0.24	931	0.27	991	0.29	1039	0.32
1000	602	0.16	671	0.19	742	0.22	815	0.24	887	0.27	954	0.30	1010	0.33	1055	0.36
1100	636	0.19	706	0.22	776	0.25	847	0.28	916	0.31	977	0.34	1028	0.37	1070	0.41
1200	674	0.23	744	0.26	813	0.29	881	0.32	944	0.35	999	0.38	1045	0.42	1087	0.45
1300	716	0.26	784	0.29	851	0.33	914	0.36	971	0.40	1020	0.43	1064	0.47	1106	0.50
1400	759	0.30	824	0.34	888	0.37	946	0.41	998	0.45	1043	0.49	1086	0.52	1129	0.55
1500	803	0.35	865	0.39	925	0.43	979	0.47	1027	0.52	1070	0.55	1113	0.58	1156	0.61

Air Volume cfm	External Static - in. w.g.															
	0.90		1.00		1.10		1.20		1.30		1.40		1.50		1.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Kit Z04															
900	1085	0.35	1135	0.38	1183	0.40	1227	0.42	1268	0.45	1305	0.49	1342	0.53	1379	0.57
1000	1099	0.39	1148	0.42	1195	0.44	1239	0.47	1279	0.50	1316	0.54	1352	0.58	1389	0.62
1100	1114	0.44	1163	0.46	1210	0.49	1253	0.52	1292	0.55	1329	0.59	1364	0.64	1401	0.68
1200	1131	0.48	1180	0.51	1226	0.54	1269	0.57	1308	0.61	1343	0.66	1378	0.70	1414	0.75
1300	1151	0.53	1199	0.56	1245	0.59	1287	0.63	1324	0.68	1359	0.72	1394	0.77	1429	0.82
1400	1175	0.58	1222	0.62	1266	0.66	1306	0.70	1342	0.75	1376	0.80	1410	0.85	1446	0.89
1500	1201	0.65	1246	0.68	1289	0.73	1327	0.78	1362	0.83	1395	0.88	1429	0.93	1464	0.98

## BLOWER DATA - BELT DRIVE - ZCA048

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

FOR ALL UNITS ADD:

1 - Any factory installed options air resistance (heat section, economizer, wet coil, etc.).

2 - Any field installed accessories air resistance (duct resistance, diffuser, etc.).

See page 8 for blower motors and drives and wet coil and options/accessory air resistance data.

### DOWNFLOW

Air Volume cfm	External Static - in. w.g.															
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Furnished						Kit Z02									
1200	629	0.22	698	0.24	770	0.26	840	0.28	905	0.31	965	0.34	1018	0.38	1066	0.41
1300	659	0.25	729	0.27	800	0.30	869	0.32	932	0.35	989	0.39	1040	0.43	1087	0.47
1400	692	0.28	763	0.31	833	0.34	899	0.37	960	0.40	1014	0.44	1063	0.48	1108	0.52
1500	728	0.32	798	0.35	866	0.38	930	0.41	987	0.45	1039	0.50	1086	0.54	1130	0.58
1600	766	0.37	835	0.40	900	0.43	960	0.47	1015	0.51	1065	0.55	1110	0.60	1152	0.65
1700	806	0.42	871	0.45	934	0.48	991	0.52	1043	0.56	1091	0.61	1134	0.66	1176	0.71
1800	845	0.47	908	0.50	967	0.54	1021	0.58	1071	0.63	1117	0.68	1159	0.73	1200	0.78
1900	884	0.53	944	0.56	1000	0.60	1051	0.64	1099	0.69	1143	0.75	1185	0.80	1225	0.86
2000	923	0.59	979	0.63	1032	0.67	1082	0.72	1128	0.77	1171	0.83	1211	0.89	1251	0.95

Air Volume cfm	External Static - in. w.g.															
	0.90		1.00		1.10		1.20		1.30		1.40		1.50		1.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Kit Z02						Kit Z05									
1200	1112	0.45	1156	0.48	1199	0.52	1241	0.55	1281	0.59	1319	0.64	1357	0.68	1394	0.72
1300	1131	0.50	1174	0.54	1216	0.57	1257	0.61	1296	0.66	1334	0.70	1371	0.74	1408	0.78
1400	1151	0.56	1193	0.60	1234	0.64	1274	0.68	1313	0.72	1351	0.77	1387	0.81	1423	0.86
1500	1172	0.62	1213	0.66	1253	0.71	1293	0.75	1331	0.79	1368	0.84	1404	0.89	1440	0.93
1600	1193	0.69	1234	0.73	1273	0.78	1313	0.82	1350	0.87	1387	0.92	1422	0.97	1457	1.01
1700	1216	0.76	1255	0.81	1295	0.86	1333	0.90	1370	0.95	1406	1.00	1441	1.05	1475	1.10
1800	1239	0.84	1279	0.89	1317	0.94	1355	0.99	1391	1.04	1426	1.09	1461	1.14	1494	1.19
1900	1264	0.92	1303	0.98	1341	1.03	1378	1.08	1413	1.14	1448	1.19	1481	1.24	1514	1.29
2000	1290	1.01	1328	1.07	1366	1.13	1402	1.19	1436	1.24	1470	1.29	1503	1.35	1535	1.40

### HORIZONTAL

Air Volume cfm	External Static - in. w.g.															
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Furnished						Kit Z02									
1200	674	0.23	744	0.26	813	0.29	881	0.32	944	0.35	999	0.38	1045	0.42	1087	0.45
1300	716	0.26	784	0.29	851	0.33	914	0.36	971	0.40	1020	0.43	1064	0.47	1106	0.50
1400	759	0.30	824	0.34	888	0.37	946	0.41	998	0.45	1043	0.49	1086	0.52	1129	0.55
1500	803	0.35	865	0.39	925	0.43	979	0.47	1027	0.52	1070	0.55	1113	0.58	1156	0.61
1600	847	0.40	905	0.45	961	0.50	1013	0.54	1058	0.58	1100	0.62	1142	0.65	1185	0.68
1700	890	0.47	944	0.52	997	0.57	1047	0.62	1091	0.66	1132	0.69	1173	0.72	1216	0.76
1800	930	0.54	982	0.60	1033	0.65	1081	0.70	1124	0.74	1165	0.77	1206	0.80	1248	0.84
1900	970	0.62	1020	0.68	1069	0.73	1116	0.78	1158	0.81	1199	0.85	1239	0.89	1280	0.93
2000	1009	0.71	1058	0.76	1106	0.81	1151	0.86	1193	0.9	1233	0.94	1273	0.98	1312	1.04

Air Volume cfm	External Static - in. w.g.															
	0.90		1.00		1.10		1.20		1.30		1.40		1.50		1.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Kit Z02						Kit Z05									
1200	1131	0.48	1180	0.51	1226	0.54	1269	0.57	1308	0.61	1343	0.66	1378	0.70	1414	0.75
1300	1151	0.53	1199	0.56	1245	0.59	1287	0.63	1324	0.68	1359	0.72	1394	0.77	1429	0.82
1400	1175	0.58	1222	0.62	1266	0.66	1306	0.70	1342	0.75	1376	0.80	1410	0.85	1446	0.89
1500	1201	0.65	1246	0.68	1289	0.73	1327	0.78	1362	0.83	1395	0.88	1429	0.93	1464	0.98
1600	1229	0.72	1273	0.76	1313	0.81	1350	0.86	1384	0.92	1416	0.97	1450	1.02	1485	1.07
1700	1258	0.80	1300	0.85	1338	0.90	1374	0.96	1407	1.02	1440	1.07	1473	1.12	1508	1.17
1800	1289	0.89	1328	0.94	1365	1.00	1399	1.06	1432	1.13	1465	1.18	1498	1.23	1532	1.28
1900	1319	0.99	1357	1.05	1392	1.11	1426	1.18	1459	1.24	1491	1.30	1524	1.35	1558	1.39
2000	1350	1.10	1387	1.16	1421	1.23	1454	1.30	1486	1.36	1518	1.42	1551	1.47	1584	1.51



## BLOWER DATA - BELT DRIVE - ZCA060

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

FOR ALL UNITS ADD:

1 - Any factory installed options air resistance (heat section, economizer, wet coil, etc.).

2 - Any field installed accessories air resistance (duct resistance, diffuser, etc.).

See page 8 for blower motors and drives and wet coil and options/accessory air resistance data.

### DOWNFLOW

Air Volume cfm	External Static - in. w.g.															
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Furnished				Kit Z03											
1600	787	0.38	854	0.41	918	0.44	976	0.48	1030	0.52	1078	0.56	1123	0.61	1164	0.66
1700	827	0.43	892	0.46	952	0.49	1007	0.53	1058	0.58	1105	0.63	1148	0.68	1189	0.73
1800	868	0.48	929	0.52	986	0.55	1038	0.59	1087	0.64	1132	0.69	1174	0.75	1214	0.80
1900	907	0.54	966	0.58	1019	0.62	1069	0.66	1116	0.71	1160	0.77	1200	0.82	1240	0.88
2000	946	0.60	1001	0.65	1053	0.69	1101	0.74	1146	0.79	1188	0.85	1228	0.91	1267	0.98
2100	984	0.68	1037	0.72	1086	0.77	1132	0.83	1176	0.89	1217	0.95	1256	1.01	1295	1.08
2200	1021	0.75	1072	0.81	1120	0.86	1165	0.92	1207	0.99	1247	1.05	1286	1.12	1324	1.19
2300	1059	0.84	1108	0.90	1154	0.96	1197	1.03	1239	1.10	1278	1.17	1316	1.24	1354	1.32
2400	1097	0.95	1144	1.01	1188	1.08	1231	1.15	1271	1.22	1310	1.30	1348	1.38	1385	1.45

Air Volume cfm	External Static - in. w.g.															
	0.90		1.00		1.10		1.20		1.30		1.40		1.50		1.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Kit Z03								Kit Z06							
1600	1205	0.70	1245	0.75	1284	0.79	1323	0.84	1361	0.88	1397	0.93	1432	0.98	1467	1.03
1700	1228	0.78	1268	0.82	1307	0.87	1345	0.92	1382	0.97	1417	1.02	1452	1.07	1486	1.11
1800	1253	0.85	1292	0.91	1331	0.96	1368	1.01	1404	1.06	1439	1.11	1473	1.16	1506	1.21
1900	1279	0.94	1317	1.00	1355	1.05	1392	1.10	1427	1.16	1461	1.21	1494	1.26	1527	1.31
2000	1305	1.04	1343	1.10	1380	1.15	1416	1.21	1450	1.26	1484	1.32	1516	1.37	1549	1.42
2100	1333	1.14	1370	1.21	1407	1.26	1442	1.32	1475	1.38	1508	1.43	1540	1.48	1572	1.53
2200	1361	1.26	1398	1.32	1434	1.38	1468	1.44	1501	1.50	1533	1.55	1564	1.61	1596	1.66
2300	1391	1.39	1427	1.45	1462	1.51	1495	1.57	1527	1.63	1559	1.68	1590	1.73	1622	1.78
2400	1421	1.52	1456	1.59	1490	1.65	1523	1.71	1555	1.76	1586	1.82	1617	1.87	1649	1.92

### HORIZONTAL

Air Volume cfm	External Static - in. w.g.															
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Furn.		Kit Z03													
1600	864	0.42	921	0.46	976	0.51	1027	0.56	1072	0.60	1113	0.63	1155	0.66	1198	0.69
1700	907	0.48	961	0.53	1013	0.58	1061	0.63	1105	0.67	1146	0.70	1187	0.73	1230	0.77
1800	948	0.56	999	0.61	1049	0.66	1096	0.71	1139	0.75	1180	0.78	1221	0.82	1262	0.86
1900	987	0.64	1037	0.69	1086	0.74	1132	0.79	1174	0.83	1214	0.86	1255	0.90	1295	0.95
2000	1028	0.73	1076	0.78	1123	0.83	1168	0.87	1210	0.91	1250	0.96	1289	1.00	1328	1.06
2100	1071	0.81	1117	0.86	1163	0.91	1206	0.96	1247	1.01	1286	1.06	1324	1.12	1362	1.18
2200	1116	0.91	1160	0.96	1204	1.01	1245	1.07	1285	1.12	1323	1.18	1360	1.25	1396	1.31
2300	1161	1.02	1204	1.07	1245	1.13	1285	1.19	1323	1.25	1360	1.32	1396	1.38	1432	1.45
2400	1207	1.14	1248	1.20	1288	1.26	1326	1.32	1362	1.39	1398	1.46	1433	1.53	1468	1.60

Air Volume cfm	External Static - in. w.g.															
	0.90		1.00		1.10		1.20		1.30		1.40		1.50		1.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Kit Z03								Kit Z06							
1600	1242	0.73	1284	0.77	1324	0.82	1360	0.88	1394	0.93	1426	0.99	1460	1.04	1495	1.08
1700	1272	0.81	1312	0.86	1350	0.92	1385	0.98	1418	1.04	1451	1.09	1485	1.14	1519	1.19
1800	1302	0.90	1341	0.96	1377	1.02	1411	1.08	1444	1.15	1477	1.20	1510	1.25	1544	1.30
1900	1334	1.01	1371	1.07	1406	1.13	1439	1.20	1471	1.26	1504	1.32	1537	1.37	1571	1.41
2000	1365	1.12	1401	1.19	1435	1.25	1468	1.32	1500	1.38	1532	1.44	1565	1.49	1598	1.53
2100	1398	1.25	1433	1.31	1466	1.38	1497	1.45	1529	1.51	1561	1.56	1594	1.61	1626	1.65
2200	1431	1.38	1465	1.45	1497	1.52	1528	1.58	1560	1.64	1591	1.69	1623	1.73	1656	1.77
2300	1466	1.52	1498	1.59	1529	1.66	1560	1.72	1591	1.77	1623	1.82	1654	1.86	1686	1.90
2400	1500	1.67	1532	1.74	1563	1.80	1593	1.86	1624	1.91	1655	1.96	1686	2.00	1718	2.04

## BLOWER DATA

### DRIVE KIT SPECIFICATIONS

Model No.	Blower Motor Choice (HP)				Drive Kit No.	RPM Range
	Nominal	Maximum	Nominal	Maximum		
036	1	1.15	1.5	1.7	Z01	678 - 1035
					Z04	964 - 1471
048	1	1.15	1.5	1.7	Z02	803 - 1226
					<sup>1</sup> Z05	1098 - 1490
060	1	1.15	1.5	1.7	Z03	906 - 1383
					<sup>1</sup> Z06	1262 - 1634

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

<sup>1</sup> 1.5 hp motor is required with Z05 and Z06 drive kits.

### POWER EXHAUST FAN PERFORMANCE

Return Air System Static Pressure - in. w.g.	Air Volume Exhausted cfm
0.00	1865
0.05	1785
0.10	1710
0.15	1630
0.20	1545
0.25	1450
0.30	1350
0.35	1240

### OPTIONS / ACCESSORIES AIR RESISTANCE - in. w.g.

Air Volume cfm	Wet Indoor Coil		Electric Heat	Economizer	
	036-048	060		Downflow	Horizontal
900	0.01	---	0.02	0.04	0.05
1000	0.01	---	0.04	0.04	0.05
1100	0.02	---	0.05	0.04	0.06
1200	0.02	---	0.06	0.05	0.06
1300	0.02	---	0.08	0.05	0.07
1400	0.03	---	0.09	0.06	0.07
1500	0.03	---	0.10	0.07	0.08
1600	0.03	0.04	0.12	0.08	0.09
1700	0.04	0.05	0.13	0.08	0.10
1800	0.04	0.05	0.15	0.09	0.11
1900	0.04	0.06	0.16	0.10	0.12
2000	0.05	0.06	0.17	0.12	0.13
2100	---	0.07	0.19	0.13	0.14
2200	---	0.08	0.20	0.14	0.15
2300	---	0.08	0.21	0.15	0.17
2400	---	0.09	0.23	0.17	0.18

### CEILING DIFFUSERS AIR RESISTANCE (in. w.g.)

Air Volume cfm	RTD9-65 Step-Down Diffuser			FD9-65 Flush Diffuser
	2 Ends Open	1 Side & 2 Ends Open	All Ends & Sides Open	
800	0.15	0.13	0.11	0.11
1000	0.19	0.16	0.14	0.14
1200	0.25	0.20	0.17	0.17
1400	0.33	0.26	0.20	0.20
1600	0.43	0.32	0.20	0.24
1800	0.56	0.40	0.30	0.30
2000	0.73	0.50	0.36	0.36
2200	0.95	0.63	0.44	0.44

### CEILING DIFFUSER AIR THROW DATA

Air Volume - cfm	<sup>1</sup> Effective Throw - ft.	
Model No.	RTD9-65	FD9-65
800	10 - 17	14 - 18
1000	10 - 17	15 - 20
1200	11 - 18	16 - 22
1400	12 - 19	17 - 24
1600	12 - 20	18 - 25
1800	13 - 21	20 - 28
2000	14 - 23	21 - 29
2200	16 - 25	22 - 30

<sup>1</sup> Effective throw based on terminal velocities of 75 ft. per minute.



## ELECTRICAL DATA

### ZCA036S4

<sup>1</sup> Voltage - 60hz		208/230V - 1 Ph	208/230V - 3 Ph		460V - 3 Ph		575V - 3 Ph	
Compressor	Rated Load Amps	15.3	8.7		4		3.6	
	Locked Rotor Amps	70	70		31		27	
Outdoor Fan Motor	Full Load Amps	1	1		0.6		0.45	
Power Exhaust (1) 0.5 HP	Full Load Amps	1.5	1.5		0.6		0.6	
Indoor Blower Motor	Horsepower	1.5	1	1.5	1	1.5	1	1.5
	Full Load Amps	11	4.6	6.6	2.1	3	1.7	2.4
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	45	25	25	15	15	15	15
	With (1) 0.5 HP Power Exhaust	45	25	25	15	15	15	15
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	32	17	19	8	9	7	8
	With (1) 0.5 HP Power Exhaust	33	18	20	9	10	8	8

## ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	600V	600V
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat	5 kW	45	45	25	25	25	25	15	15	15	15
		7.5 kW	50	60	30	30	30	35	15	20	15	15
		10 kW	60	70	35	40	35	40	20	20	15	20
		15 kW	90	100	45	60	50	60	30	30	25	25
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat	5 kW	37	40	19	21	22	24	11	12	9	10
		7.5 kW	48	53	26	29	28	31	14	16	12	13
		10 kW	59	66	32	36	35	39	18	19	15	16
		15 kW	82	92	45	51	48	54	26	27	21	22
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	45	45	25	25	25	30	15	15	15	15
		7.5 kW	50	60	30	35	30	35	15	20	15	15
		10 kW	70	70	35	40	40	45	20	20	15	20
		15 kW	90	100	50	60	50	60	30	30	25	25
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	39	42	21	23	24	26	11	13	9	10
		7.5 kW	50	55	28	31	30	33	15	16	12	13
		10 kW	61	68	34	38	37	41	19	20	15	16
		15 kW	84	94	47	53	50	56	26	28	21	22

## ELECTRIC HEAT ACCESSORIES

Unit Fuse Block	Unit Only	10A26	10A27	10A27	10A29	10A29	10A29	10A29
	Unit + Power Exhaust	10A26	10A27	10A27	10A29	10A29	10A29	10A29

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 DATA

4 TON

## ZCA048S4

<sup>1</sup> Voltage - 60hz		208/230V - 1 Ph	208/230V - 3 Ph		460V - 3 Ph		575V - 3 Ph	
Compressor	Rated Load Amps	20	11		5.5		4.7	
	Locked Rotor Amps	99	86		37		34	
Outdoor Fan Motor	Full Load Amps	1.7	1.7		0.9		0.7	
Power Exhaust (1) 0.5 HP	Full Load Amps	1.5	1.5		0.6		0.6	
Indoor Blower Motor	Horsepower	1.5	1	1.5	1	1.5	1	1.5
	Full Load Amps	11	4.6	6.6	2.1	3	1.7	2.4
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	50	30	30	15	15	15	15
	With (1) 0.5 HP Power Exhaust	50	30	30	15	15	15	15
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	38	21	23	10	11	9	9
	With (1) 0.5 HP Power Exhaust	40	22	24	11	12	9	10

# ELECTRIC HEAT DATA

Electric Heat Voltage		208V	240V	208V	240V	208V	240V	480V	480V	600V	600V
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat 5 kW	50	50	30	30	30	30	15	15	15	15
	7.5 kW	50	60	30	30	30	35	15	20	15	15
	10 kW	60	70	35	40	35	40	20	20	15	20
	15 kW	90	100	45	60	50	60	30	30	25	25
	22.5 kW	125	150	70	80	70	80	40	40	30	35
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat 5 kW	38	40	21	21	23	24	11	12	9	10
	7.5 kW	48	53	26	29	28	31	14	16	12	13
	10 kW	59	66	32	36	35	39	18	19	15	16
	15 kW	82	92	45	51	48	54	26	27	21	22
	22.5 kW	116	131	65	74	67	76	37	38	30	31
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust 5 kW	50	50	30	30	30	30	15	15	15	15
	7.5 kW	50	60	30	35	30	35	15	20	15	15
	10 kW	70	70	35	40	40	45	20	20	15	20
	15 kW	90	100	50	60	50	60	30	30	25	25
	22.5 kW	125	150	70	80	70	80	40	40	30	35
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust 5 kW	40	42	22	23	24	26	11	13	9	10
	7.5 kW	50	55	28	31	30	33	15	16	12	13
	10 kW	61	68	34	38	37	41	19	20	15	16
	15 kW	84	94	47	53	50	56	26	28	21	22
	22.5 kW	118	133	67	76	69	78	38	39	30	31

# ELECTRIC HEAT ACCESSORIES

Unit Fuse Block	Unit Only	10A26	10A27	10A27	10A29	10A29	10A29	10A29
	Unit + Power Exhaust	10A26	10A27	10A27	10A29	10A29	10A29	10A29

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 DATA

5 TON

ZCA060S4

<sup>1</sup> Voltage - 60hz		208/230V - 1 Ph	208/230V - 3 Ph		460V - 3 Ph		575V - 3 Ph	
Compressor	Rated Load Amps	22.1	13.5		8		5	
	Locked Rotor Amps	125	109		59		40	
Outdoor Fan Motor	Full Load Amps	1.7	1.7		1		0.9	
Power Exhaust (1) 0.5 HP	Full Load Amps	1.5	1.5		0.6		0.6	
Indoor Blower Motor	Horsepower	1.5	1	1.5	1	1.5	1	1.5
	Full Load Amps	11	4.6	6.6	2.1	3	1.7	2.4
<sup>2</sup> Maximum Overcurrent Protection	Unit Only	60	35	35	20	20	15	15
	With (1) 0.5 HP Power Exhaust	60	35	40	20	20	15	15
<sup>3</sup> Minimum Circuit Ampacity	Unit Only	41	24	26	14	14	9	10
	With (1) 0.5 HP Power Exhaust	42	25	27	14	15	10	11

# ELECTRIC HEAT DATA

Electric Heat Voltage		208V	240V	208V	240V	208V	240V	480V	480V	600V	600V
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat 5 kW	60	60	35	35	35	35	20	20	15	15
	7.5 kW	60	60	35	35	35	35	20	20	15	15
	10 kW	60	70	35	40	35	40	20	20	15	20
	15 kW	90	100	45	60	50	60	30	30	25	25
	22.5 kW	125	150	70	80	70	80	40	40	30	35
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat 5 kW	41	41	24	24	26	26	14	14	9	10
	7.5 kW	48	53	26	29	28	31	14	16	12	13
	10 kW	59	66	32	36	35	39	18	19	15	16
	15 kW	82	92	45	51	48	54	26	27	21	22
	22.5 kW	116	131	65	74	67	76	37	38	30	31
<sup>2</sup> Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust 5 kW	60	60	35	35	40	40	20	20	15	15
	7.5 kW	60	60	35	35	40	40	20	20	15	15
	10 kW	70	70	35	40	40	45	20	20	15	20
	15 kW	90	100	50	60	50	60	30	30	25	25
	22.5 kW	125	150	70	80	70	80	40	40	30	35
<sup>3</sup> Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust 5 kW	42	42	25	25	27	27	14	15	10	11
	7.5 kW	50	55	28	31	30	33	15	16	12	13
	10 kW	61	68	34	38	37	41	19	20	15	16
	15 kW	84	94	47	53	50	56	26	28	21	22
	22.5 kW	118	133	67	76	69	78	38	39	30	31

# ELECTRIC HEAT ACCESSORIES

Unit Fuse Block	Unit Only	10A26	10A28	10A28	10A29	10A29	10A29	10A29
	Unit + Power Exhaust	10A26	10A28	10A28	10A29	10A29	10A29	10A29

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.

## ELECTRIC HEAT CAPACITIES

Input Voltage	5 kW			7.5 kW			10 kW			15 kW			22.5 kW		
	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	kW input	Btuh Output
208	1	3.8	12,800	1	5.6	19,200	1	7.5	25,600	1	11.2	38,400	1	16.9	57,700
220	1	4.2	14,300	1	6.3	21,500	1	8.4	28,700	1	12.6	43,000	1	18.9	64,500
230	1	4.6	15,700	1	6.9	23,500	1	9.2	31,400	1	13.8	47,000	1	20.7	70,700
240	1	5.0	17,100	1	7.5	25,600	1	10.0	34,200	1	15.0	51,200	1	22.5	76,800
440	1	4.2	14,300	1	6.3	21,500	1	8.4	28,700	1	12.6	43,000	1	18.9	64,500
460	1	4.6	15,700	1	6.9	23,500	1	9.2	31,400	1	13.8	47,000	1	20.7	70,700
480	1	5.0	17,100	1	7.5	25,600	1	10.0	34,200	1	15.0	51,200	1	22.5	76,800
550	1	4.2	14,300	1	6.3	21,500	1	8.4	28,700	1	12.6	43,000	1	18.9	64,500
575	1	4.6	15,700	1	6.9	23,500	1	9.2	31,400	1	13.8	47,000	1	20.7	70,700
600	1	5.0	17,100	1	7.5	25,600	1	10.0	34,200	1	15.0	51,200	1	22.5	76,800

## ZCA PARTS ARRANGEMENT

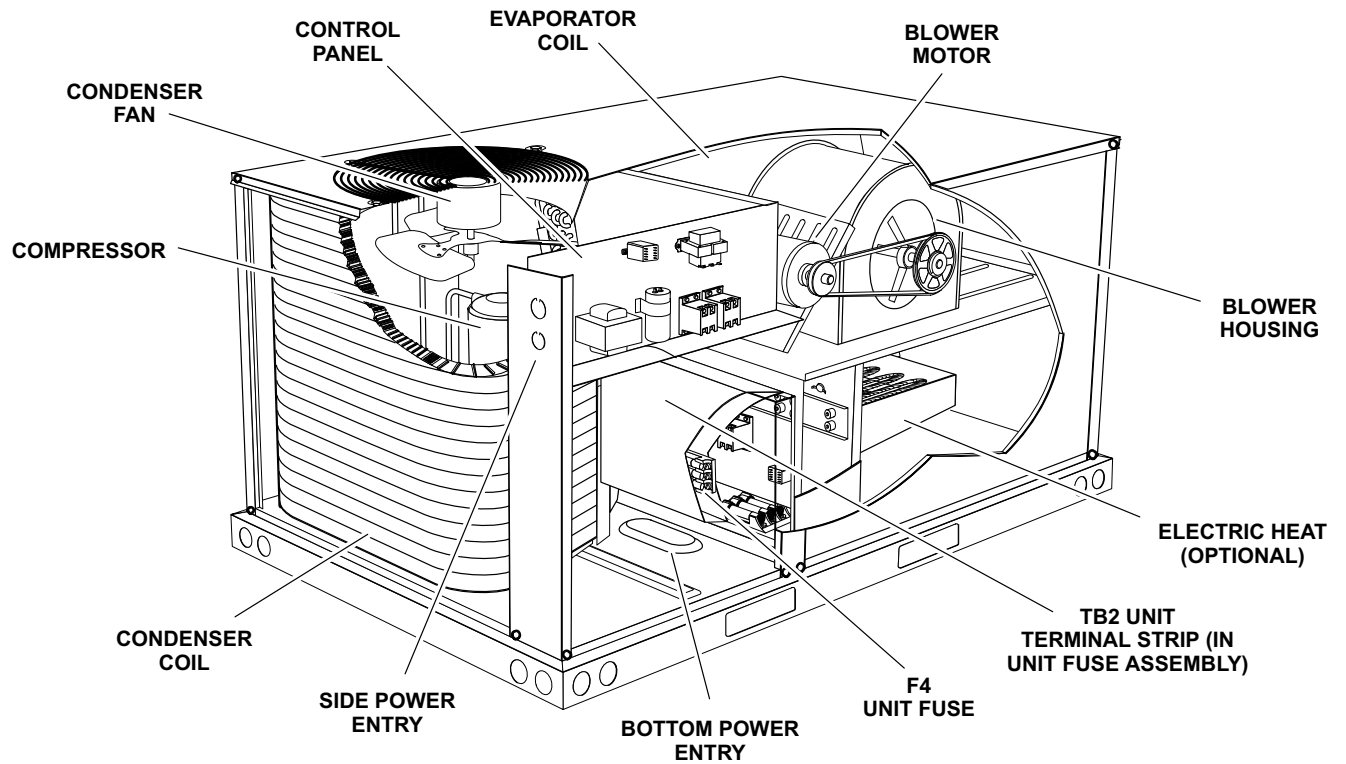


FIGURE 1

## ZCA CONTROL BOX

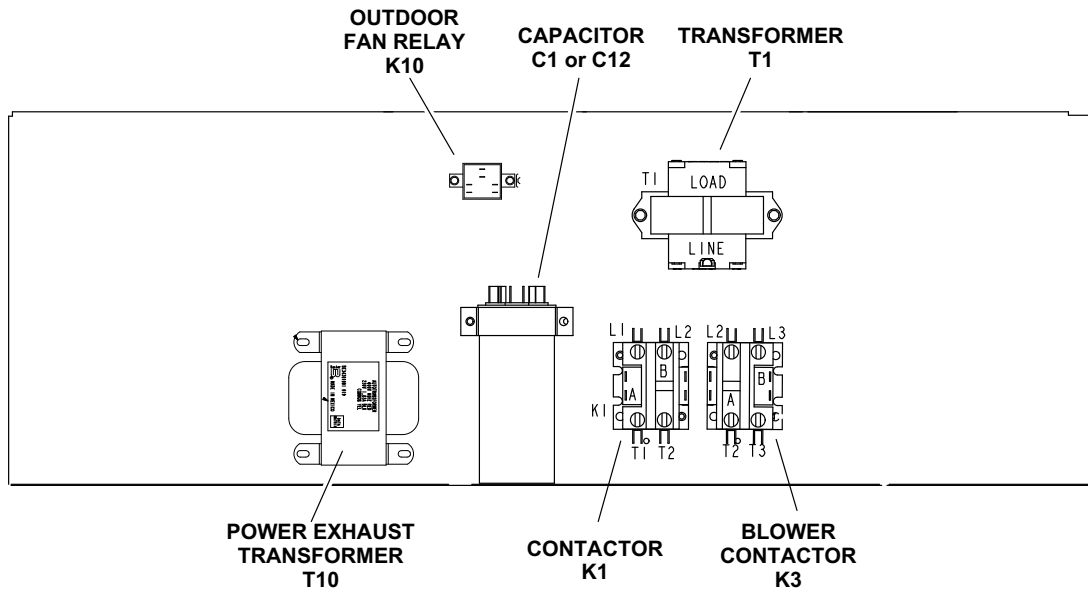


FIGURE 2

## I-UNIT COMPONENTS

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

### A-Control Box Components

ZCA control box components are shown in figure 2. The control box is in the outdoor section to the left of the blower and heat section.

#### 1-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 amp (auto) fuse F1. The 208/230 (Y) voltage transformers use two primary voltage

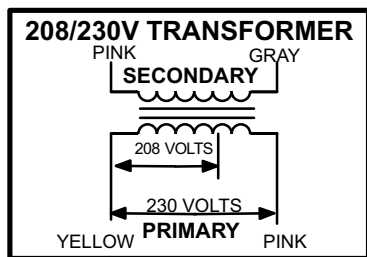


FIGURE 3

age taps as shown in figure 3, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

#### 2-Fan Capacitor C1 (three phase)

Fan capacitors C1 is used to assist in the start up of condenser fan B4. Ratings will be on side of capacitor or outdoor fan motor nameplate.

#### 3-Dual Capacitor C12 (single phase)

A single dual capacitor is used for both the outdoor fan and compressor (see unit diagram). The fan side and the compressor side have different MFD ratings. See side of capacitor for ratings.

#### 4-Compressor Contactor K1

In all ZCA units, K1 energizes compressors B1 in response to thermostat demand. Three phase units use two pole double break contactors with a 24 volt coil. Single phase units use single pole double break contactors with a 24 volt coil.

#### 5-Blower Contactor K3

On three phase units, K3 is a two pole double-break contactor with a 24VAC coil and on single phase units is a single pole double break contactor with a 24 volt coil. K3 energizes the indoor blower motor B3 in response to blower demand.

#### 6-Outdoor Fan Relay K10 (G, J voltage)

Outdoor fan relay K10 is an optional, field-installed DPDT relay with a 24VAC coil. K10 relay coil is in series with S11 low ambient pressure switch and cycles B4 outdoor fan via K10-1 n.o. contacts.

#### 7-Exhaust Fan Transformer T10 (J voltage)

Transformer T10 is a field-installed 600/230V transformer which provides power to the 208/230V power exhaust fan in 575V applications.

#### 8-Compressor B1

### ! 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 re-claiming must be followed. Fines and/or incarceration may be levied for non-compliance.

All units use one scroll compressor. 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.



## ZCA PLUMBING

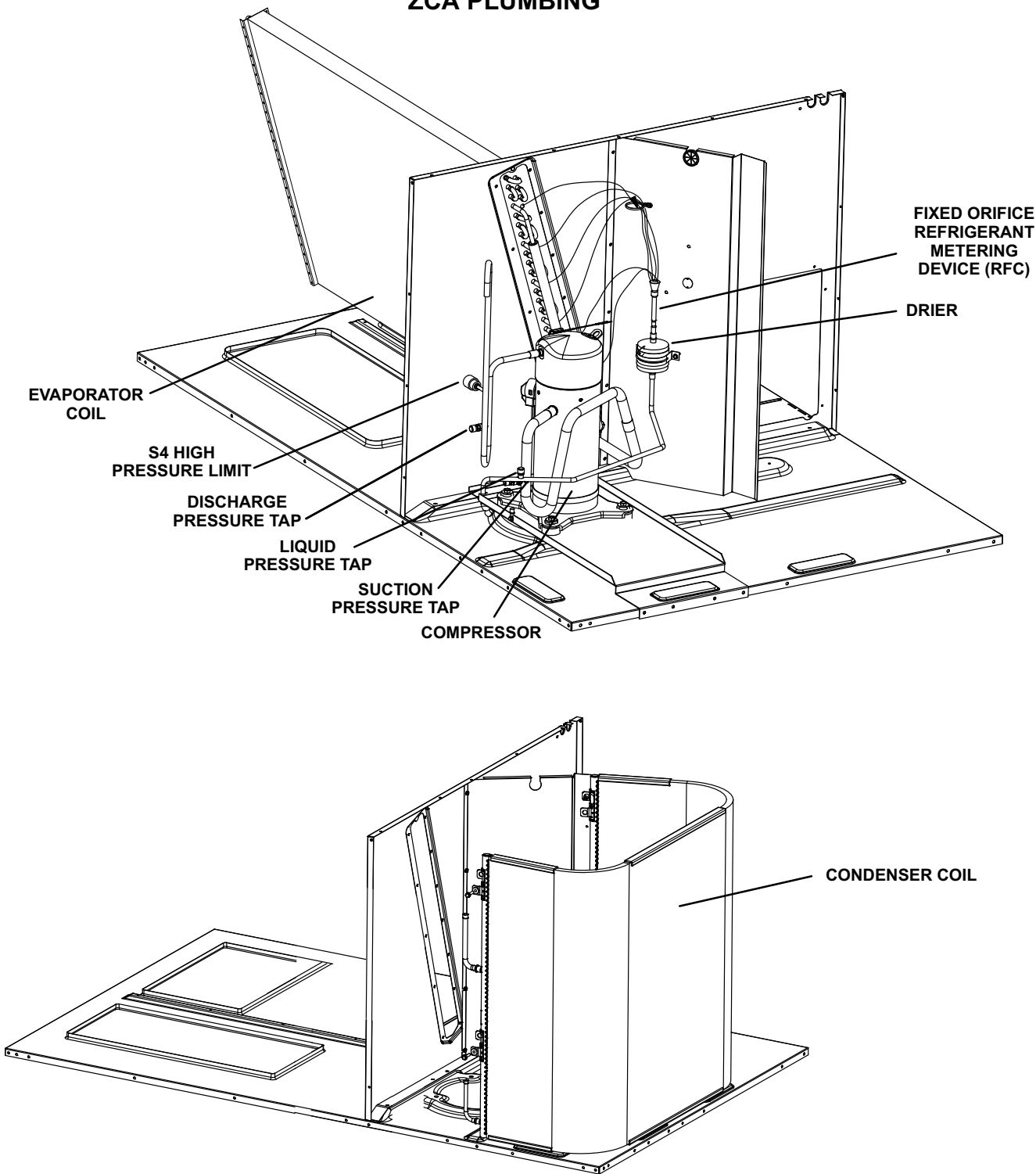


FIGURE 4

The compressor is energized by a compressor contactor.

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

If Interlink compressor replacement is necessary, call 1-800-4-LENNOX (1-800-453-6669).

### ⚠ IMPORTANT

Some scroll compressors have an internal vacuum protector that will unload scrolls when suction pressure goes below 20 psig. A hissing sound will be heard when the compressor is running unloaded. Protector will reset when low pressure in system rises above 40 psig. **DO NOT REPLACE COMPRESSOR.**

## 9-High Pressure Switch S4

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

S4 is located in the compressor discharge line and wired in series with the compressor contactor coil.

When discharge pressure rises to  $640 \pm 10$  psig ( $4412 \pm 69$  kPa) (indicating a problem in the system) the switch opens and the compressor is de-energized (the economizer can continue to operate).

When discharge pressure drops to  $475 \pm 20$  ( $3275 \pm 138$  kPa) psig, the switch closes and the compressor is energized. The CMC1 board monitors the pressure switch when the compressor demand Y1 is active, allowing five strike lockout. The compressor is shut down indefinitely in this condition. A pressure switch may open and close again four times during a current demand cycle without causing a lockout condition by resetting the count at the end of the demand cycle (CMC1 Y1 input OFF). The five-strike lockout can only be reset by one of the following actions:

- Power cycle the controller
- Apply the TEST mode

## 10-Low Ambient Switches S11 (field-installed option)

The low ambient switch is an auto-reset SPST N.O. pressure switch which allows for mechanical cooling operation at low outdoor temperatures. The switch is located in the liquid line in the compressor section.

On P and Y volt units, S11 is wired in series with the common (black) lead to K10 outdoor fan motor.

On G and J volt units, S11 is wired in series with outdoor fan relay K10 coil and when opened breaks 24 volts to the coil, de-energizing outdoor fan B4.

When liquid pressure rises to  $450 \pm 10$  psig ( $3102 \pm 69$  kPa), the switch closes and the condenser fan is energized. When discharge pressure in drops to  $240 \pm 10$  psig ( $1655 \pm 69$  kPa), the switch opens and the condenser fan is de-energized. This intermittent fan operation results in higher evaporating temperature allowing the system to operate without icing the evaporator coil and losing capacity.

## 11-Compressor Low Discharge Temperature Limit S3 (field-supplied option)

S3 is a thermostat which opens on temperature drop. It is wired in line with the 24VAC compressor contactor.

## 12-Compressor High Temperature Limit S5

The compressor thermal protector is located on top of the compressor. S5 is wired in series with S4 high pressure limit. The protector opens at  $248^{\circ}\text{F} \pm 9^{\circ}\text{F}$  ( $120^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ) and closes at  $169^{\circ}\text{F} \pm 18^{\circ}\text{F}$  ( $76^{\circ}\text{C} \pm 10^{\circ}\text{C}$ ).

## B-Blower Compartment

All units are equipped with belt drive blowers. See unit nameplate for blower type.

### 1-Blower Wheels

ZCA belt drive units use 10" x 10" (254 mm x 254 mm) blower wheels.

### 2-Indoor Blower Motor B3

Belt drive units use single or three phase motors (same as supply voltage). 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 (see table of contents) section 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.

## IMPORTANT

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

### A-Blower Operation

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.

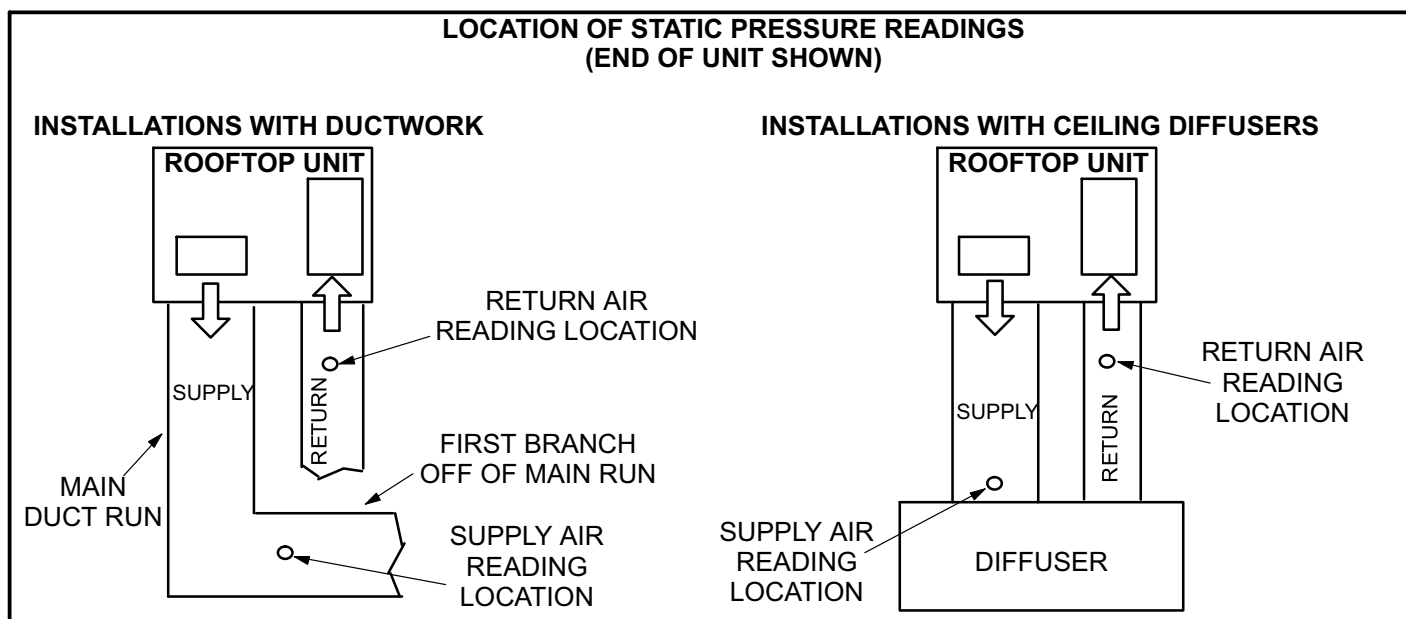
- 1- Blower operation is manually set at the thermostat sub-base fan switch. With fan switch in **ON** position, blowers will operate continuously.
- 2- With fan switch in **AUTO** position, the blowers will cycle with demand. Blowers and entire unit will be off when system switch is in **OFF** position.

### B-Determining Unit CFM

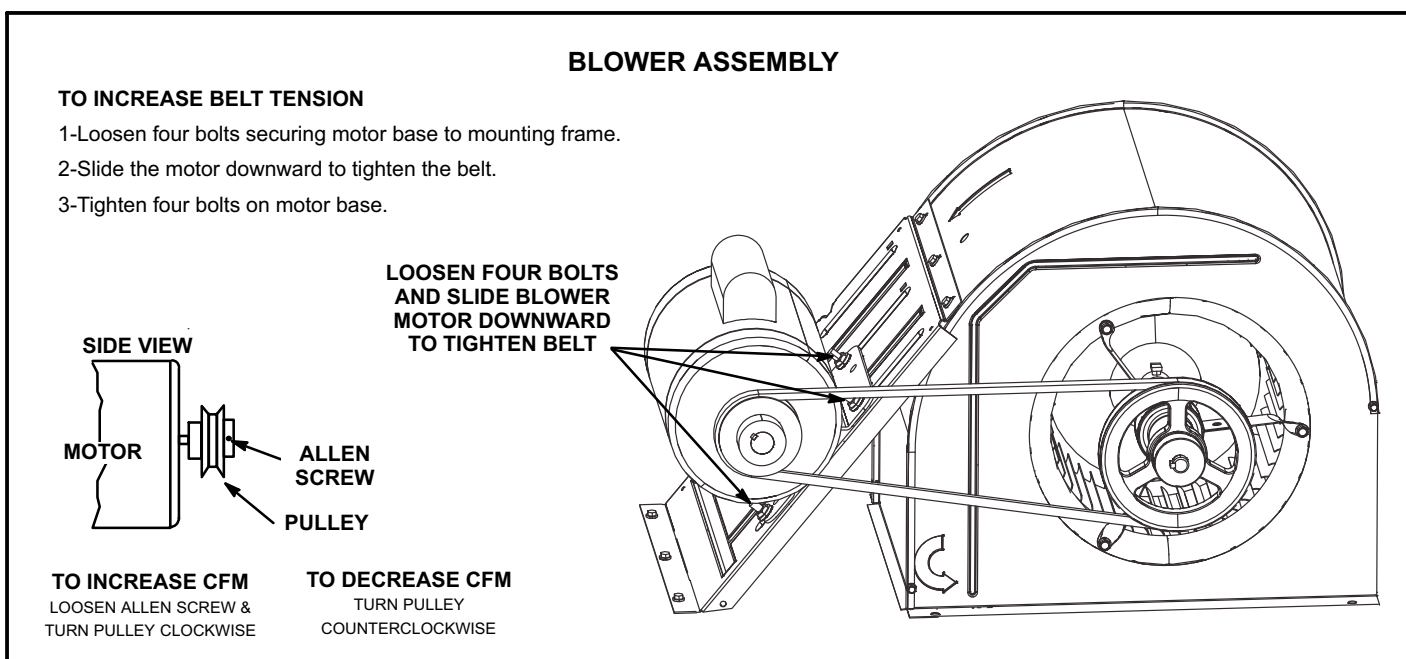
- 1- The following measurements must be made with air filters in place and no cooling demand.
- 2- With all access panels in place, measure static pressure external to unit (from supply to return). Blower performance data is based on static pressure readings taken in locations shown in figure 5.

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

- 3- Referring to the blower tables starting on Page 5, use static pressure and RPM readings to determine unit CFM. Use air resistance table when installing units with any of the options or accessories listed.
- 4- The blower RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase CFM. Turn counterclockwise to decrease CFM. See figure 6. Do not exceed minimum and maximum number of pulley turns as shown in table 1.



**FIGURE 5**



**FIGURE 6**

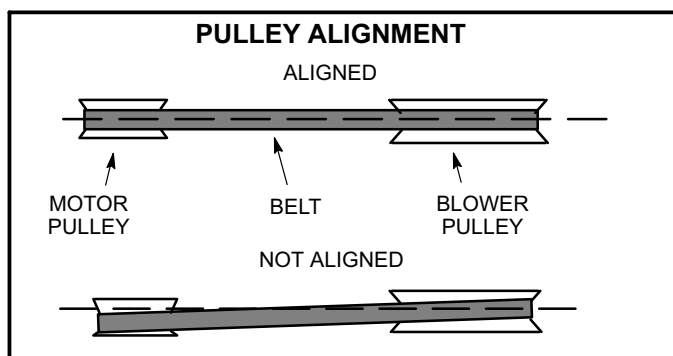
**TABLE 1  
MINIMUM AND MAXIMUM PULLEY ADJUSTMENT**

Belt	Min. Turns Open	Maxi. Turns Open
A Section	No minimum	5

### C-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 7.

- 1- Loosen four bolts securing motor base to mounting frame. See figure 6.
- 2- *To increase belt tension -*  
Slide blower motor downward to tighten the belt. This increases the distance between the blower motor and the blower housing.
- 3- *To loosen belt tension -*  
Slide blower motor upward to loosen the belt. This decreases the distance between the blower motor and the blower housing.
- 4- Tighten four bolts securing motor base to the mounting frame.



**FIGURE 7**

#### D-Check Belt Tension

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

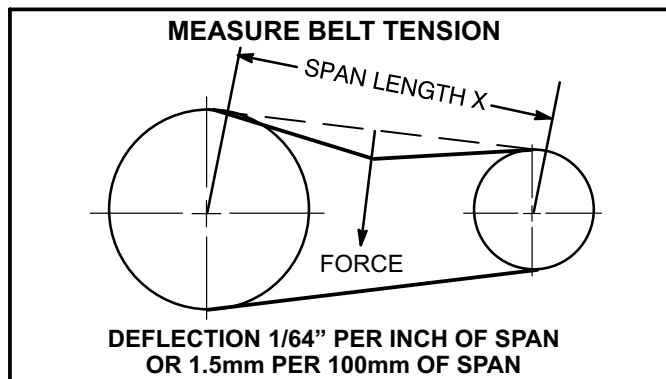
- 1- Measure span length X. See figure 8.
- 2- Apply perpendicular force to center of span (X) with enough pressure to deflect belt 1/64" for every inch of span length or 1.5mm per 100mm of span length.

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 8**

#### F-Field-Furnished Blower Drives

See blower data tables for field-furnished blower drives to determine BHP and RPM required. See table 2 for drive component manufacturers numbers.

**TABLE 2  
DRIVE COMPONENT MANUFACTURER'S NUMBERS**

Drive No.	DRIVE COMPONENT PART NUMBERS					
	Motor Pulley		Blower Pulley		Belts	
	Browning	OEM	Browning	OEM	Browning	OEM
Z01	1VP34 X 7/8	31K6901	AK54 X 5/8	100244-30	A40	100245-17
Z02	1VP34 X 7/8	31K6901	AK46 X 5/8	100244-31	A39	100245-16
Z03	1VP34 X 7/8	31K6901	AK41 X 5/8	100244-28	A39	100245-16
Z04	1VP34 X 7/8	31K6901	AK39 X 5/8	100244-32	A38	100245-15
Z05	1VP44 X 7/8	P-8-1488	AK49 X 5/8	100244-26	A41	100245-18
Z06	1VP50 X 7/8	53J1501	AK51 X 5/8	100244-29	A42	100245-19

## C-ELECTRIC HEAT COMPONENTS

Electric heat match-ups are found in the ELECTRICAL DATA tables. See table of contents.

All electric heat sections consist of electric heating elements exposed directly to the air stream. See figure 9. See figure 10 for vestibule parts arrangement.

### 1-Contactors K15, K16

All contactors are double break and either single, double or three pole (see diagram) and equipped with a 24VAC coil. The coils in the K15 and K16 contactors are energized by the indoor thermostat. In all units K15 energizes the heating elements, while in the 10 and 22.5 kW P volt units, K15 and K16 energize the heating elements simultaneously.

### 2-High Temperature Limits S15 (Primary)

S15 is a SPST N.C. auto-reset thermostat high temperature limit for the electric heat section. When S15 opens, indicating a problem in the system, contactor K15 is de-energized (including K16 in 10 and 22.5 kW P volt units). When K15 is de-energized, all stages of heat are de-energized. See table 3 for S15 set points. Set points are factory set and not adjustable.

### 3-Terminal Strip TB2

Terminal strip TB2 is used for single point power installations only. TB2 distributes power to TB3. Units with multi-point power connections will not use TB2.

### 4-Terminal Strip TB3

P and Y voltage units are equipped with terminal strip TB3. Electric heat line voltage connections are made to TB3, which distributes power to the electric heat components and is located on the vestibule. See figure 10.

### 5-High Temperature Limit S20, S157, S158 (Secondary)

Switches are SPST N.C. manual-reset thermostats. All are wired in series with the heating elements. See wiring diagrams. When either limit opens K15 and K16 are de-energized. When the contactors are de-energized, all stages of heat are de-energized. The thermostat is factory-set to open at  $180^{\circ}\text{F} \pm 6^{\circ}\text{F}$  ( $82^{\circ}\text{C} \pm 3.3^{\circ}\text{C}$ ) on a temperature rise and can be manually reset when temperature falls below  $160^{\circ}\text{F}$  ( $71.0^{\circ}\text{C}$ ). See figure 10 for location. On 22.5kW (P, G and J volt) units, S15 opens at  $190^{\circ}\text{F} \pm 6^{\circ}\text{F}$  ( $88^{\circ}\text{C} \pm 3.3^{\circ}\text{C}$ ).

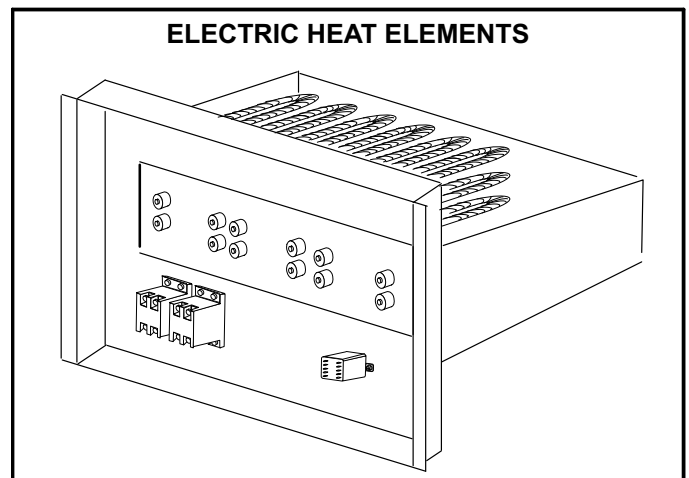


FIGURE 9

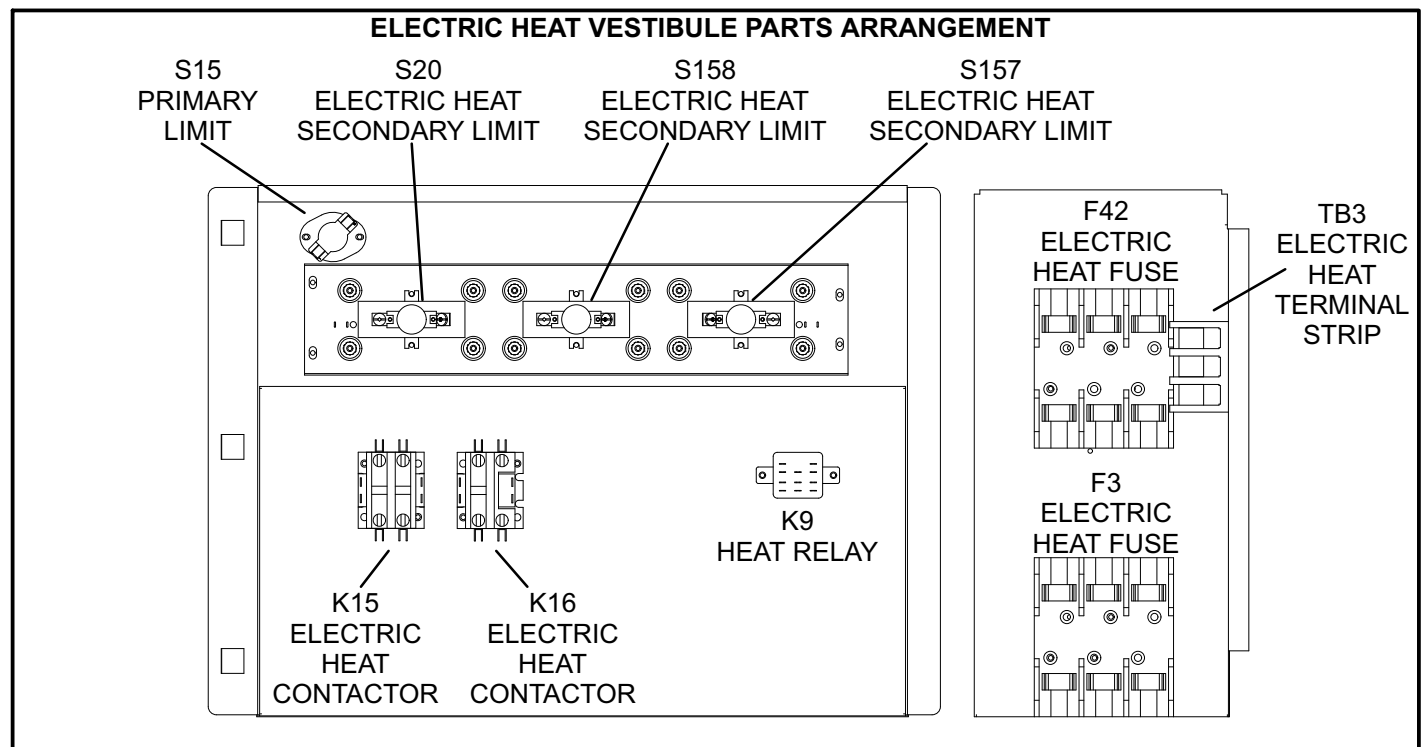


FIGURE 10

**TABLE 3**  
**S15 PRIMARY HIGH TEMPERATURE LIMIT SETPOINTS**

Unit kW	Voltage	S15 Opens ° F	S15 Closes ° F
5.0, 7.5, 10.0, 15.0	P	160	120
7.5, 15.0	G		
5.0, 7.5, 10.0	J		
22.5	P	170	130
7.5, 10.0, 15.0, 22.5	Y		
5.0, 10.0	G		
15.0, 22.5	J		
5.0	Y	140	95
22.5	G	180	140

### 6-Heating Elements HE1 through HE3

Heating elements are composed of helix wound bare nichrome wire exposed directly to the air stream. Three elements are connected in a three-phase arrangement. The elements in 208/230V units are connected in a "Delta" arrangement. Elements in 460 and 575V units are connected in "Wye" arrangement. Each stage is energized independently by the corresponding contactors located on the electric heat vestibule panel. Once energized, heat transfer is instantaneous. High temperature protection is provided by primary and redundant high temperature limits and overcurrent protection is provided by fuses.

### 7-Fuse F3 and F42

Fuse F3 and F42 are housed in a fuse block. Each fuse is connected in series with each leg of electric heat. Figure 10 and table 4 show the fuses used with each electric heat section.

### 8-Unit Fuse Block & Fuse F4

Line voltage fuses F4 provide short circuit and ground fault protection to all cooling components in ZCA units with electric heat. Single phase units are equipped with two fuses and three phase units are equipped with three fuses. The fuses are rated in accordance with the amperage of the cooling components. The F4 fuse block is located inside a sheet metal enclosure.

### 9-Electric Heat Relay K9

K9 is a SPDT pilot relay intended to energize blower contactor K3 and electrically isolate the unit's 24V circuit from the electric heat 24V circuit. K9 is energized by the indoor thermostat. K9-1 closes, energizing blower contactor K3.

## 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 (Z1CURB).

**TABLE 4**

kW	Voltage	Fuse F3	Qty
5.0	P	30A - 250V	2
7.5	P	40A - 250V	2
10*	P	35A - 250V	2
15	P	40A - 250V	4
22.5	P	40A - 250V	6
5.0	Y	20A - 250V	3
7.5	Y	25A - 250V	3
10	Y	35A - 250V	3
15	Y	50A - 250V	3
22.5	Y	40A - 250V	6
5.0	G	15A - 600V	3
7.5	G	15A - 600V	3
10	G	20A - 600V	3
15	G	25A - 600V	3
22.5	G	35A - 600V	3
5.0	J	15A - 600V	3
7.5	J	15A - 600V	3
10	J	15A - 600V	3
15	J	20A - 600V	3
22.5	J	30A - 600V	3

\*This heater is equipped with two F42, 20A, 250V fuses.

## III-START UP - OPERATION

### 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 control panel.
- 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. Voltage must be within the range listed on the nameplate. If not, consult the power company and have the voltage corrected before starting the unit.
- 5- Recheck voltage and amp draw with unit running. If voltage is not within range listed on unit nameplate, stop unit and consult power company. Refer to unit nameplate for maximum rated load amps.
- 6- Inspect and adjust blower belt (see section on Blower Compartment - Blower Belt Adjustment).



## B-Cooling Start-Up

### A-Operation

- 1- Initiate first and second stage cooling demands according to instructions provided with thermostat.
- 2- *No Economizer Installed in Unit -*  
A first-stage cooling demand (Y1) will energize compressor 1 and the condenser fan. An increased cooling demand (Y2) will not change operation.  
*Units Equipped With Economizer -*  
When outdoor air is acceptable, a first-stage cooling demand (Y1) will energize the economizer. An increased cooling demand (Y2) will energize compressor 1 and the condenser fan. When outdoor air is not acceptable unit will operate as though no economizer is installed.
- 3- Units contain one refrigerant circuit or stage.
- 4- Unit is charged with R-410A refrigerant. See unit rating plate for correct amount of charge.
- 5- Refer to Refrigerant Charge and Check section for proper method to check refrigerant charge.

### B-Three Phase Scroll Compressor Voltage Phasing

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

- 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 K1 contactor. 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.

### C-Safety or Emergency Shutdown

Turn off power to unit.

## IV-CHARGING

**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 high stage only.**

- 1- Make sure outdoor coil is clean. Attach gauge manifolds and operate unit at full CFM in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure all outdoor air dampers are closed.
- 2- Compare the normal operating pressures (see tables 5 - 7) to the pressures obtained from the gauges. Check unit components if there are significant differences.
- 3- Measure the outdoor ambient temperature and the suction pressure. Refer to the appropriate circuit charging curve to determine a target liquid temperature.

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

- 4- Use the same thermometer to accurately measure the liquid temperature (in the outdoor section).
  - If measured liquid temperature is higher than the target liquid temperature, add refrigerant to the system.
  - If measured liquid temperature is lower than the target liquid temperature, recover some refrigerant from the system.
- 5- Add or remove charge in increments. Allow the system to stabilize each time refrigerant is added or removed.
- 6- Continue the process until measured liquid temperature agrees with the target liquid temperature. Do not go below the target liquid temperature when adjusting charge. Note that suction pressure can change as charge is adjusted.
- 7- Example ZC 036: At 95°F outdoor ambient and a measured suction pressure of 130psig, the target liquid temperature is 102°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquid temperature agrees with the target liquid temperature.

**TABLE 5**  
**ZC 036 NORMAL OPERATING PRESSURES - ALL-ALUMINUM COIL**

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)
112	242	115	281	117	327	121	375	119	421	125	490
118	244	121	283	125	326	128	375	132	429	134	488
132	254	137	293	140	338	145	387	149	442	147	499
147	269	152	308	157	351	161	400	166	454	170	516

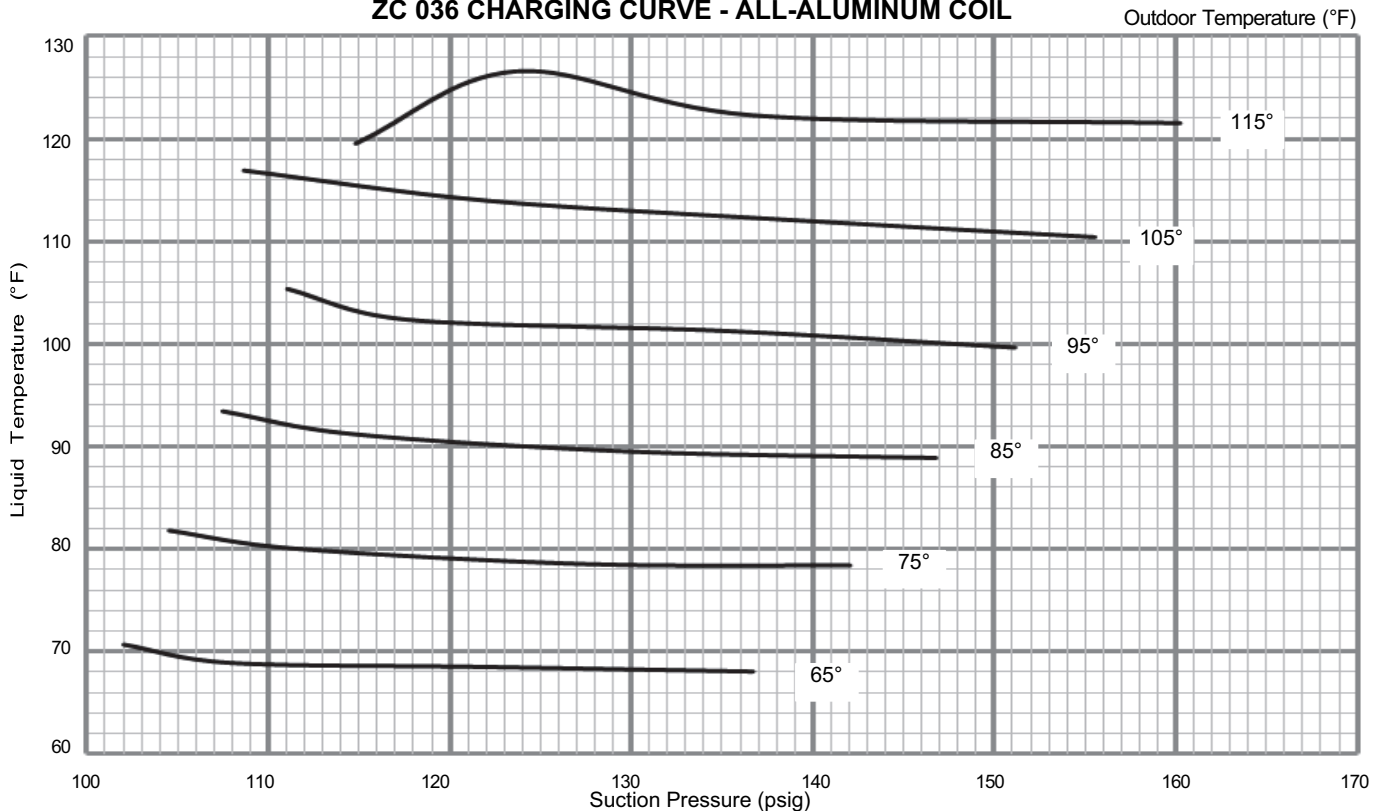
**TABLE 6**  
**ZC 048 NORMAL OPERATING PRESSURES - ALL-ALUMINUM COIL**

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)
108	254	111	295	115	338	118	386	121	437	122	491
114	259	118	299	122	344	125	392	129	445	130	502
128	273	133	314	137	358	141	408	145	462	148	524
149	310	150	342	155	388	158	436	163	474	167	556

**TABLE 7**  
**ZC 060 NORMAL OPERATING PRESSURES - ALL-ALUMINUM COIL**

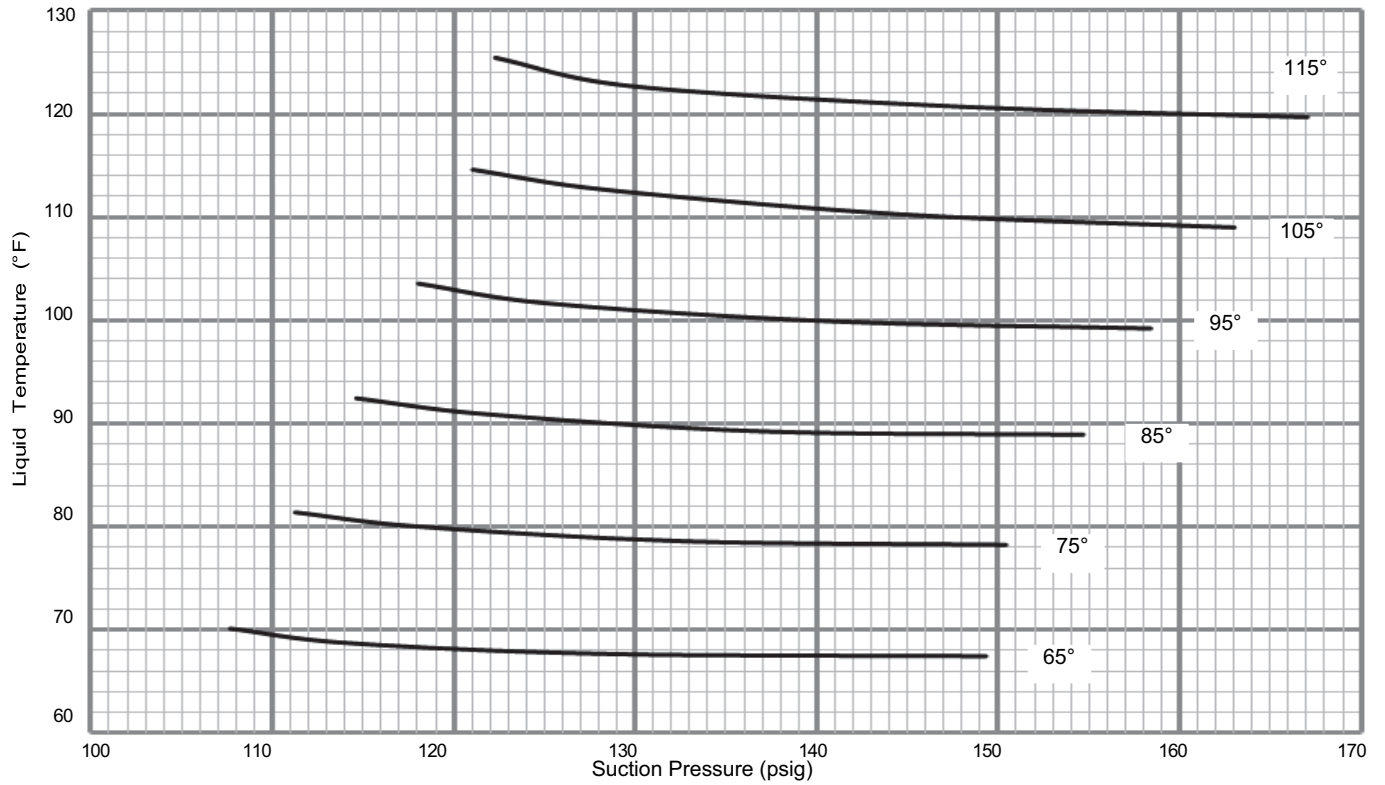
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
107	257	110	299	114	343	117	388	120	440	122	498
115	277	117	304	120	350	124	396	128	446	131	501
137	297	135	320	138	366	141	419	144	473	149	530
147	312	151	352	156	397	160	449	165	505	169	576

**ZC 036 CHARGING CURVE - ALL-ALUMINUM COIL**



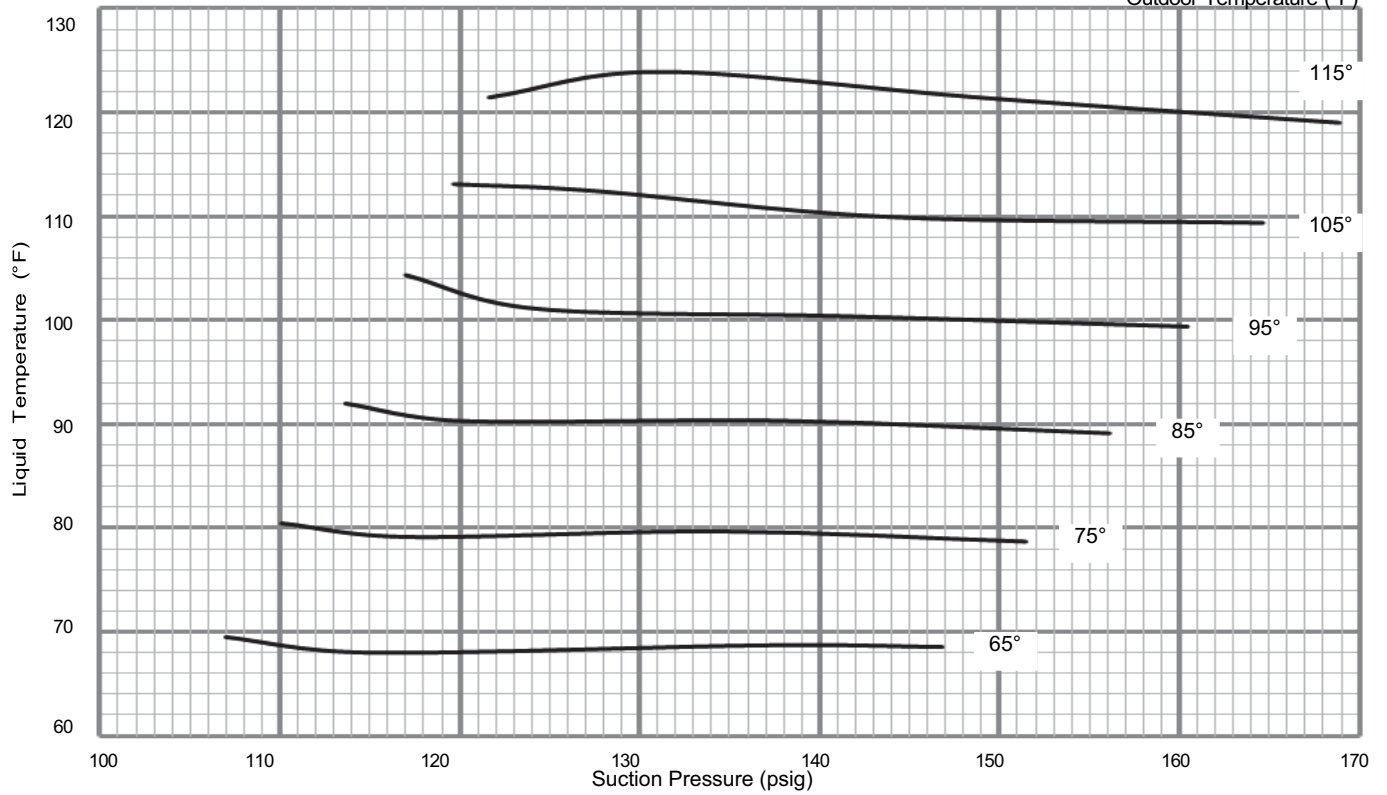
### ZC 048 CHARGING CURVE - ALL-ALUMINUM COIL

Outdoor Temperature (°F)



### ZC 060 CHARGING CURVE - ALL-ALUMINUM COIL

Outdoor Temperature (°F)



## V- SYSTEM SERVICE CHECKS

### A-Cooling System Service Checks

ZCA units are factory charged and require no further adjustment; however, charge should be checked periodically. See section IV- CHARGING.

*NOTE-When unit is properly charged discharge and suction pressures should approximate those in tables 5 through 7.*

## VI-MAINTENANCE

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


**WARNING**



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

**CAUTION**

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

**WARNING**

The State of California has determined that this product may contain or produce a chemical or chemicals, in very low doses, which may cause serious illness or death. It may also cause cancer, birth defects, or reproductive harm.

### A-Filters

Units are equipped with temporary filters which must be replaced prior to building occupation. All units use 14 X 20 X 2" (352 X 508 X 51mm) filters. Refer to local codes or appropriate jurisdiction for approved filters. Filters should be checked monthly and replaced when necessary with filters of like kind and size. Take note of air flow direction marking on filter frame when reinstalling filters.

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

To change filters, open filter access panel on back side of unit. See figure 11. Lift filter stop to remove filters. See figure 12.

**WARNING**

Units are shipped from the factory with temporary filters. Replace filters before building is occupied. Damage to unit could result if filters are not replaced with approved filters. Refer to appropriate codes.

## B-Lubrication

All motors are lubricated at the factory. No further lubrication is required.

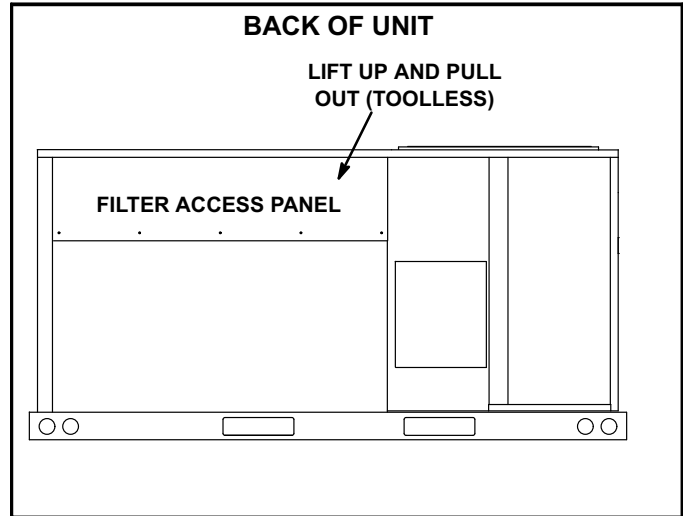


FIGURE 11

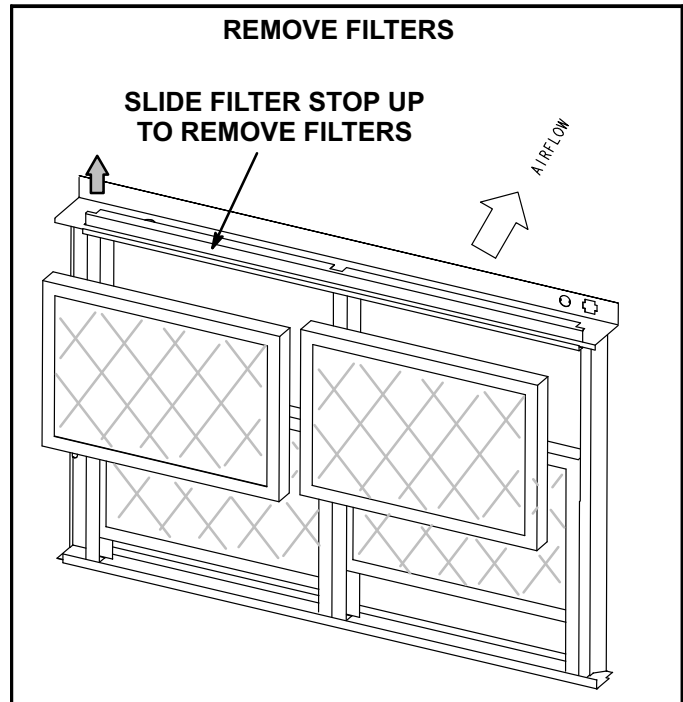


FIGURE 12

### **C-Evaporator Coil**

Inspect and clean coil at beginning of each cooling season. Clean using mild detergent or commercial coil cleanser. 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 water and inspect monthly during the cooling season.

*Note - Do not use commercial coil cleaner on the all aluminum coil. Using anything other than water could result in corrosion and/or leaks.*

Clean the all-aluminum coil by spraying the coil steadily and uniformly from top to bottom. Do not exceed 900 psi or a 45 degree angle; nozzle must be at least 12 inches from the coil face. Take care not to fracture the braze between the fins and refrigerant tubes. Reduce pressure and work cautiously to prevent damage.

### **E-Supply 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.

## VII-ACCESSORIES

The accessories section describes the application of most of the optional accessories which can be factory or field installed to the ZCA units.

### A-Z1CURB

When installing the ZCA units on a combustible surface for downflow discharge applications, a Z1CURB 8-inch, 14-inch, 18-inch, or 24-inch height roof mounting frame is used. The roof mounting frames are recommended in all other applications but not required. If the ZCA units are not mounted on a flat (roof) surface, they **MUST** be supported under all edges and under the middle of the unit to prevent sagging. The units **MUST** be mounted level within 1/16" per linear foot or 5mm per meter in any direction.

The assembled mounting frame is shown in figure 13. 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 and block-off panels **MUST** be installed before the unit is set on the mounting frame. Typical roof curbing and flashing is shown in figure 14. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

### B-Transitions

Supply/return transitions are field-provided.

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

Optional flush mount diffuser/return FD9-65 and extended mount diffuser/return RTD9-65 are available for use with all ZCA units. Refer to manufacturer's instructions included with transition for detailed installation procedures.

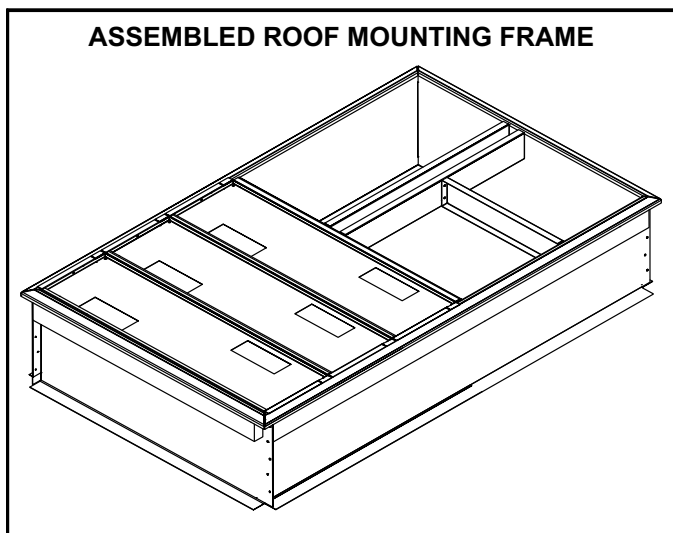


FIGURE 13

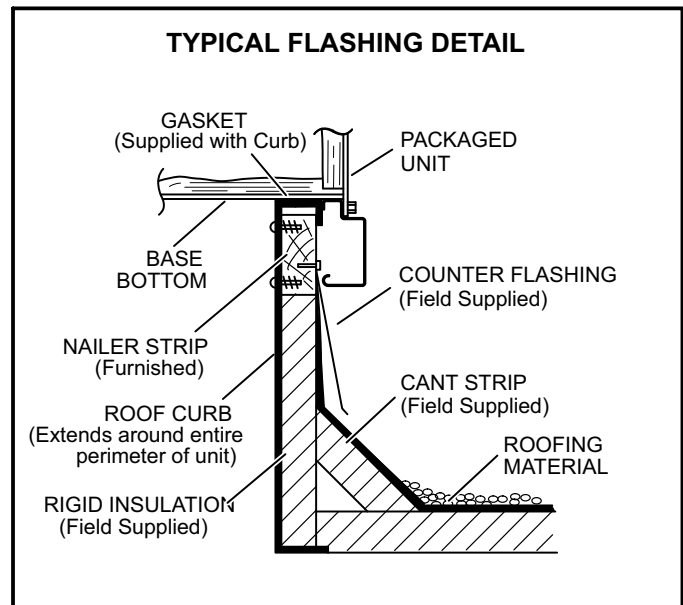


FIGURE 14

### D-Economizer

(Field or Factory Installed)

Downflow economizers are a factory-installed option. Downflow and horizontal air flow economizers are a factory- or field-installed option. Economizers are equipped with an A6 enthalpy control, an R1 mixed air sensor and an S175 outdoor sensible sensor. The modulating economizer opens fully to use outdoor air for free cooling when temperature is suitable and opens to minimum position during the occupied time period.

When A6 determines outdoor air is suitable (via input from S175 outdoor air sensor), dampers will modulate open (via B7 damper motor) to maintain 55°F (13°C) supply air (determined by input from R1 mixed/supply air sensor).

The A6 enthalpy control and B7 damper motor are shown in figure 15 for downflow air discharge and figure 16 for horizontal air discharge. The R1 mixed air sensor is shown in figure 17. An A7 outdoor enthalpy sensor is optional and replaces the S175 sensible sensor. See figure 18.

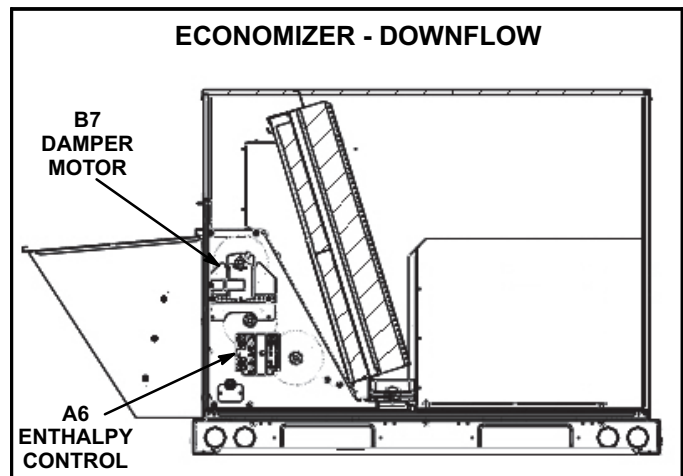
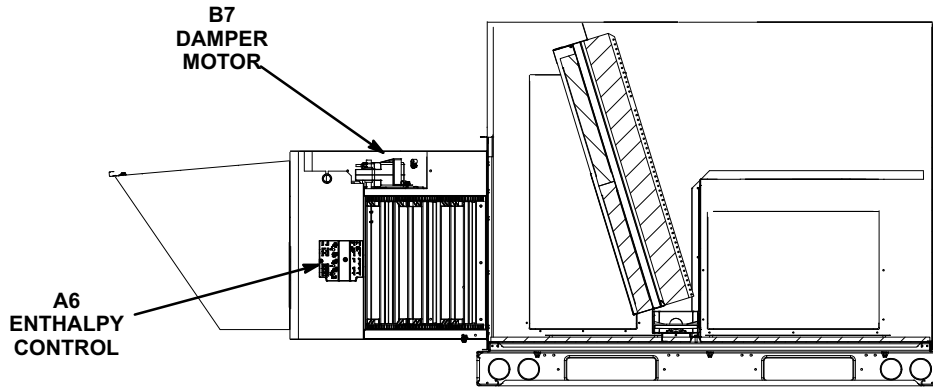


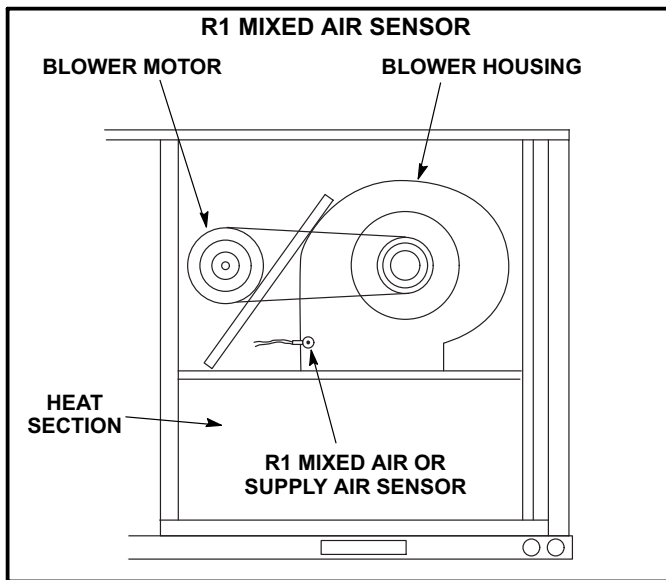
FIGURE 15



### ECONOMIZER - HORIZONTAL (FIELD-INSTALLED OPTION)



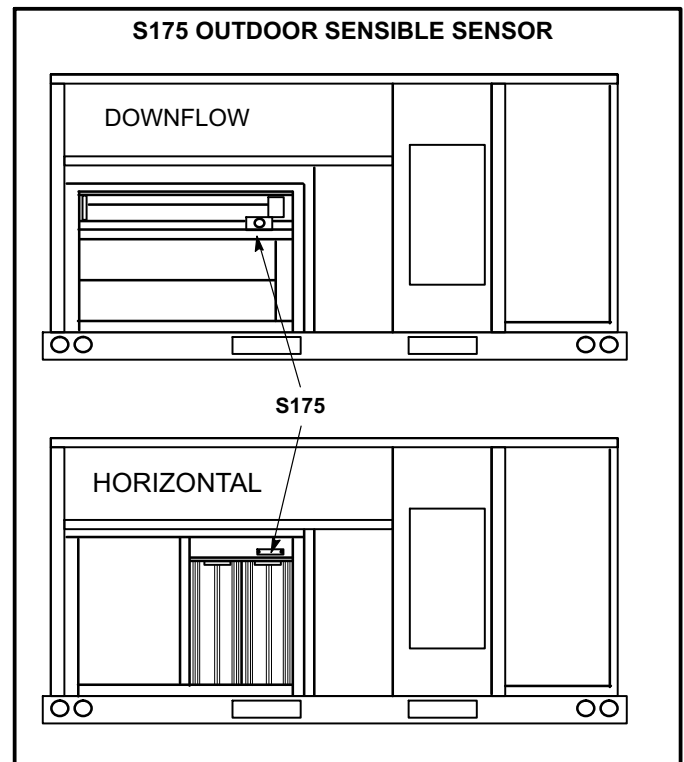
**FIGURE 16**



**FIGURE 17**

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.



**FIGURE 18**

### 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 19.

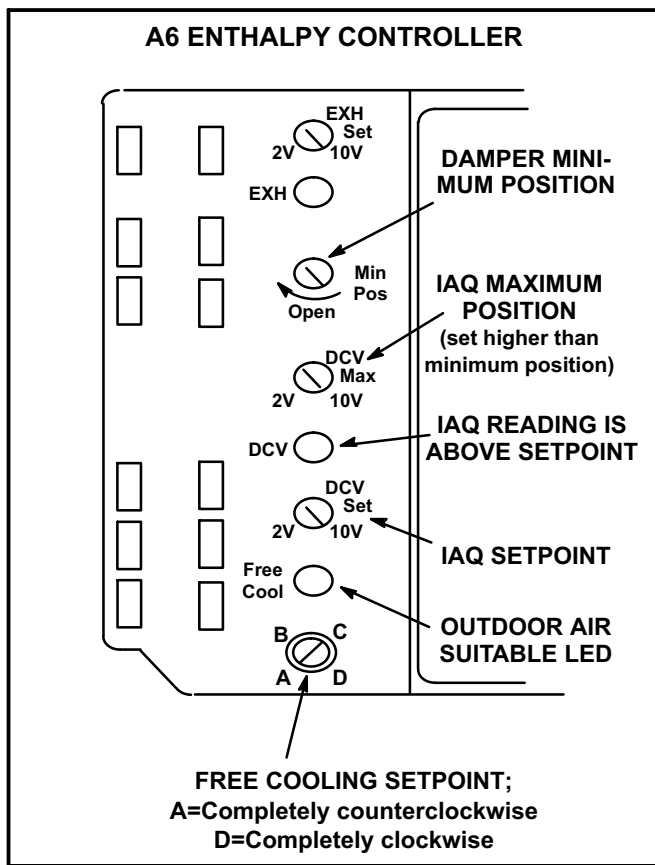


FIGURE 19

### Free Cooling Setpoint

Outdoor air is considered suitable when temperature and humidity are less than the free cooling setpoints shown in table 8. Setting A is recommended. See figure 19. At setting A, free cooling will be energized when outdoor air is approximately 73°F (23°C) and 50% relative humidity. If indoor air is too warm or humid, lower the setpoint to B. At setting B, free cooling will be energized at 70°F (21°C) and 50% relative humidity.

When an optional A62 differential sensor is installed, turn A6 enthalpy control free cooling setpoint potentiometer completely clockwise to position "D".

TABLE 8  
ENTHALPY CONTROL SETPOINTS

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

### Damper Minimum Position

- 1- Set thermostat to occupied mode if the feature is available. Make sure unit 24V control leads R and OC are connected 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. Dampers will open to DCV MAX setting (if CO2 is above setpoint) to meet traditional ventilation requirements.*

- 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 higher. If fresh air percentage is more than desired, adjust MIN POS SET potentiometer lower. Repeat steps 3 through 8 until calculation reads desired fresh air percentage.

### DCV Set and Max Settings

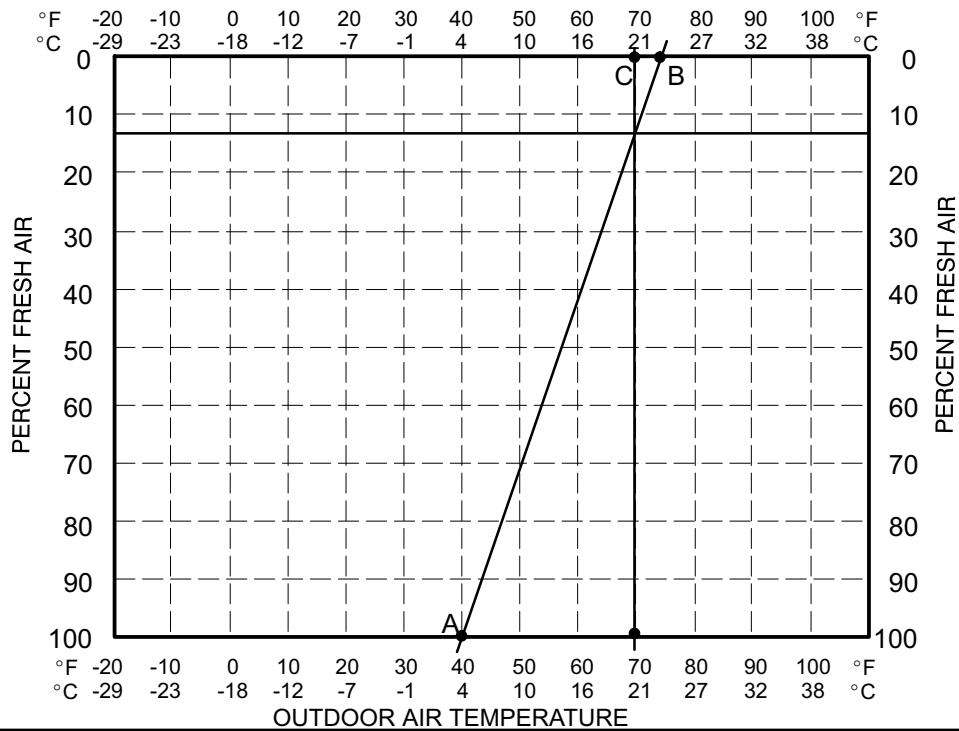
Adjust settings when an optional IAQ sensor is installed.

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 19.

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 19.

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

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



**Economizer Operation**

The occupied time period is determined by the thermostat or energy management system.

**Outdoor Air Not Suitable:**

During the unoccupied time period dampers are closed.

During the occupied time period a cooling demand will open dampers to minimum position and mechanical cooling functions normally.

During the occupied time period dampers will open to DCV MAX when IAQ reading is above setpoint (regardless of thermostat demand or outdoor air suitability).

**Outdoor Air Suitable:**

See table 9 for economizer operation with a standard two-stage thermostat.

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. When an R1 mixed air sensor for modulating dampers is installed, DCV MAX may override damper free cooling position when occupancy is high and outdoor air temperatures are low. If R1 senses discharge air temperature below 45°F (7°C), dampers will move to minimum position until discharge air temperature rises to 48°F (9°C).

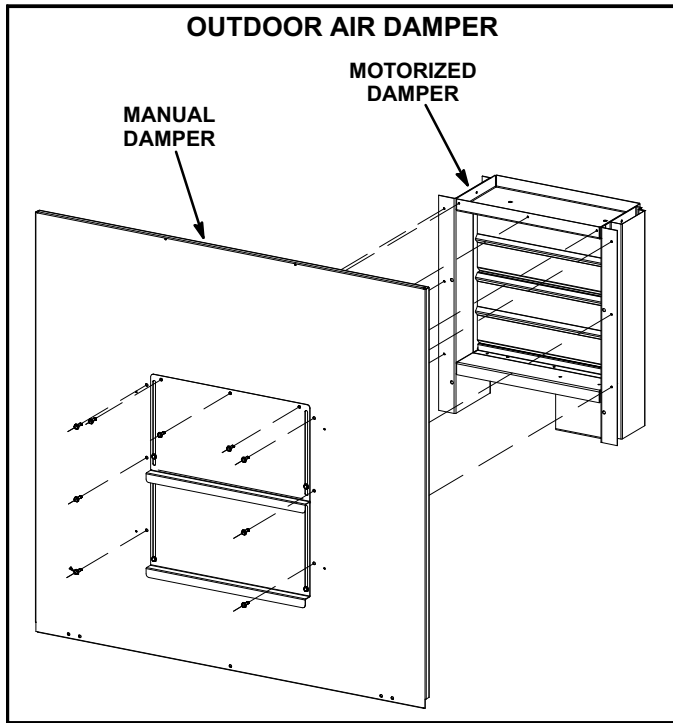
**TABLE 9**  
**ECONOMIZER OPERATION**

OUTDOOR AIR IS SUITABLE FOR FREE COOLING – FREE COOL LED “ON”

THERMOSTAT DEMAND	DAMPER POSITION		MECHANICAL COOLING
	UNOCCUPIED	OCCUPIED	
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Y1	OPEN*	OPEN*	NO
Y2	OPEN*	OPEN*	STAGE 1

\*Dampers will modulate to maintain 55°F (13°C) supply air when an R1 mixed air sensor is installed.

## E-Outdoor Air Dampers



**FIGURE 20**

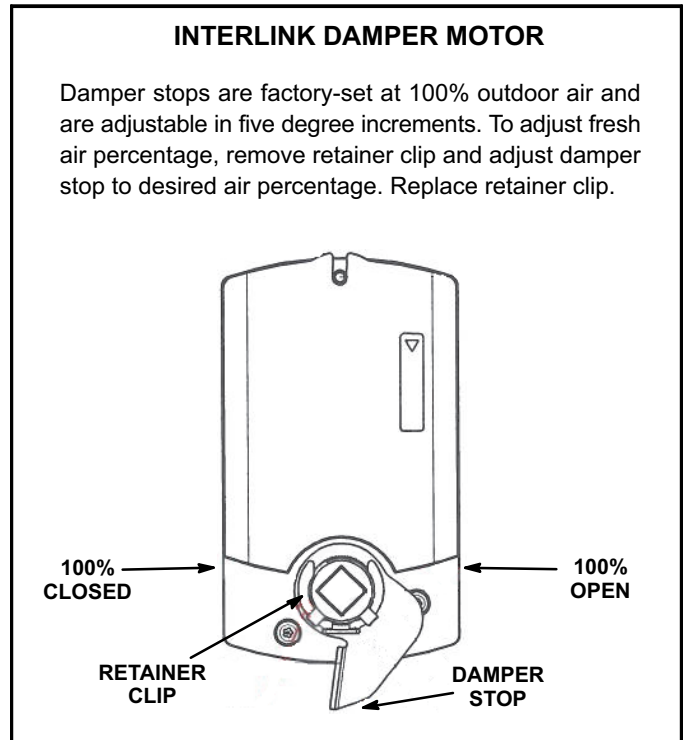
Z1DAMP21 is a motorized outdoor air damper and Z1DAMP11 is a manual outdoor air damper. See figure 20. Both sets include the outdoor air hood. The dampers provide motorized or manual operation to allow up to 35 percent outside air into the system at all times. Washable filter supplied with the outdoor 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 Lennox Part No. P-8-5069.

Optional manual and motorized outdoor air dampers provide fresh outdoor air. The motorized damper assembly opens to minimum position during the occupied time period and remains closed during the unoccupied period. Manual damper assembly is set at installation and remains in that position.

Set damper minimum position in the same manner as economizer minimum position. Adjust motorized damper position as shown in figure 21. Manual damper fresh air intake percentage can be determined in the same manner.

## F-Power Exhaust Relay K65 (power exhaust units)

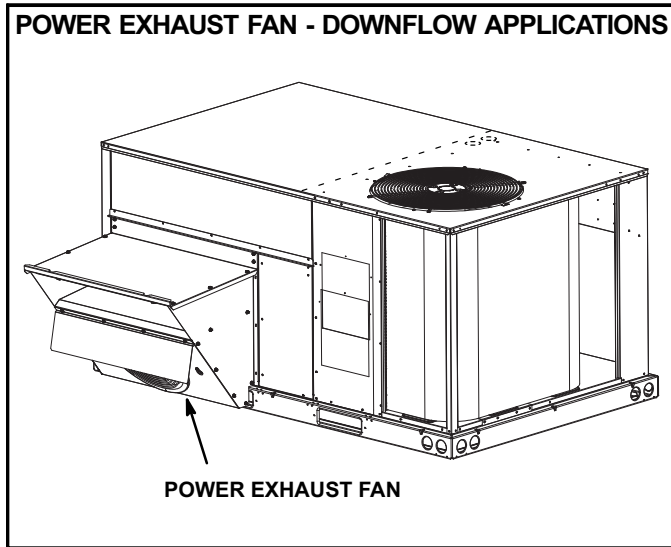
Power exhaust relay K65 is a DPDT relay with a 24VAC coil. K65 is used in all ZCA units equipped with the optional power exhaust dampers. K65 is energized by the economizer enthalpy control A6, after the economizer dampers reach 50% open (adjustable) When K65 closes, exhaust fan B10 is energized.



**FIGURE 21**

## G-Power Exhaust Fans (Field-Installed)

Z1PWRE10 is available for downflow units and Z1PWRE15 is available for horizontal air flow units. Fans provide exhaust air pressure relief and also run when return air dampers are closed and supply air blowers are operating. See figure 22, 23 and installation instructions for more detail.



**FIGURE 22**

## H-Control Systems

Different types of control systems may be used with the ZCA series units. All thermostat wiring is connected to low voltage pigtailed located in the control box. Each thermostat has additional control options available. See thermostat installation instructions for more detail.

### 1- Electro-mechanical thermostat (13F06)

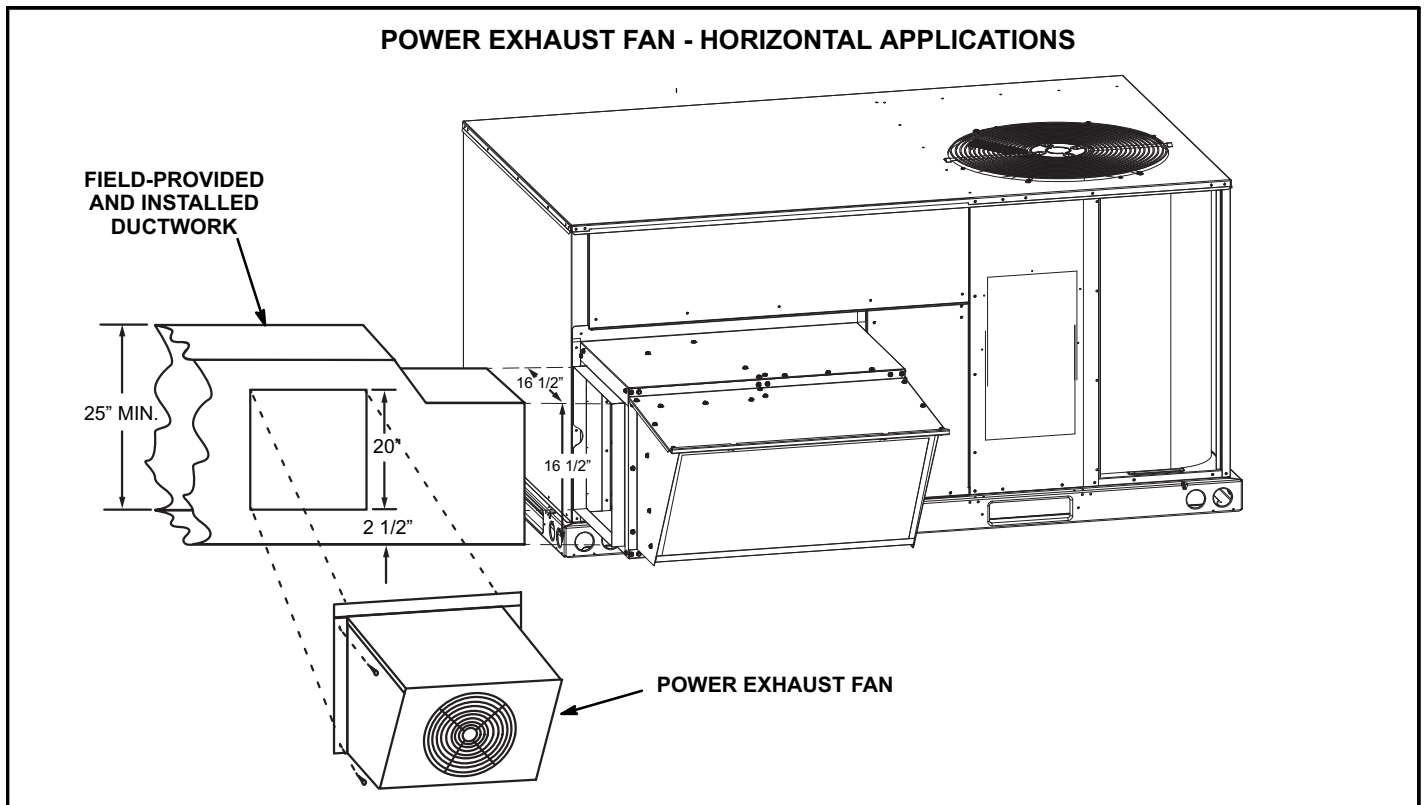
The electro-mechanical thermostat is a two stage heat / two stage cool thermostat with dual temperature levers. A non-switching or manual system switch subbase may be used.

### 2- Electronic thermostat (see price book)

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

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

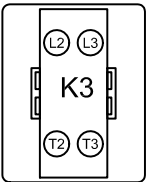
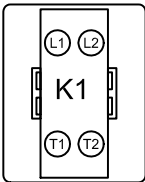
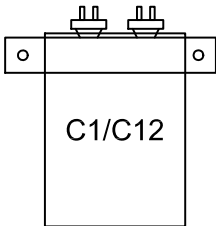
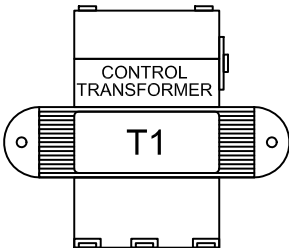
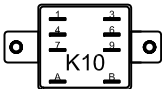
The indoor air quality sensor monitors CO<sub>2</sub> levels and reports the levels to the economizer enthalpy control A6. Controller A6 adjusts the economizer dampers according to the CO<sub>2</sub> levels. The sensor is mounted next to the indoor thermostat or in the return air duct. Refer to the indoor air quality sensor installation instructions for proper adjustment.



**FIGURE 23**

ZCA CONTROL BOX ARRANGEMENT

OPTION FOR LOW AMBIENT KIT  
460, 575, 380/420

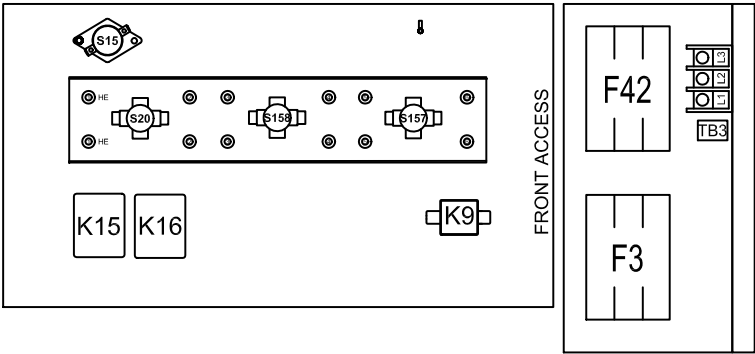



KEY	COMPONENT
A2	ELECTRONIC SENSOR
A6	SOLID STATE ENTHALPY CONTROL
A7	SOLID STATE ENTHALPY SENSOR
A63	CO2 SENSOR (IAQ)
B1	COMPRESSOR 1
B3	BLOWER MOTOR
B4	OUTDOOR FAN MOTOR
B7	ECONOMIZER OR DAMPER MOTOR
B10	EXHAUST FAN MOTOR
C1	OUTDOOR FAN CAPACITOR
C6	CAPACITOR, EXHAUST FAN 1
C7	COMPRESSOR 1 HARD START CAPACITOR
C12	DUAL CAPACITOR
CMC3	TIME CLOCK
F1	TRANSFORMER 1 FUSE
F3	ELECTRIC HEAT 1 FUSE
F4	UNIT FUSE
F42	ELECTRIC HEAT 2 FUSE
HE1	ELECTRIC HEAT ELEMENT 1
HE2	ELECTRIC HEAT ELEMENT 2
HE3	ELECTRIC HEAT ELEMENT 3
HR1	HEATER, COMPRESSOR 1
K1	COMPRESSOR 1 CONTACTOR
K3	BLOWER CONTACTOR
K9	HEAT RELAY
K10	OUTDOOR FAN RELAY
K15	ELECTRIC HEAT 1 CONTACTOR
K16	ELECTRIC HEAT 2 CONTACTOR
K31	HARD START RELAY
K65	EXHAUST FAN RELAY
R1	MIXED AIR OR SUPPLY SENSOR
R2	MINIMUM POSITION POTENTIOMETER
RT2	REMOTE THERMOSTAT SENSOR
S3	LOW DISCHARGE TEMP LIMIT, COMPRESSOR 1
S4	HIGH PRESSURE LIMIT, COMPRESSOR 1
S5	HIGH TEMPERATURE LIMIT, COMPRESSOR 1
S11	LOW AMBIENT LOW PRESSURE SWITCH
S15	ELECTRIC HEAT 1 PRIMARY LIMIT
S20	ELECTRIC HEAT 1 SECONDARY LIMIT
S149	OVERFLOW SWITCH
S157	ELECTRIC HEAT 2 SECONDARY LIMIT
S158	ELECTRIC HEAT 3 SECONDARY LIMIT
S175	SENSIBLE (55-70) TEMPERATURE THERMOSTAT
T1	TRANSFORMER, CONTROL
T10	EXHAUST FAN TRANSFORMER
TB2	UNIT TERMINAL STRIP
TB3	ELECTRIC HEAT 1 TERMINAL STRIP

KEY LIST

J/P #	JACK/PLUG DESCRIPTION
2	HEAT
3	ECONOMIZER
4	ECONOMIZER
9	ECONOMIZER
18	EXHAUST FAN
24	EXHAUST FAN
39	CONTROL INTERFACE

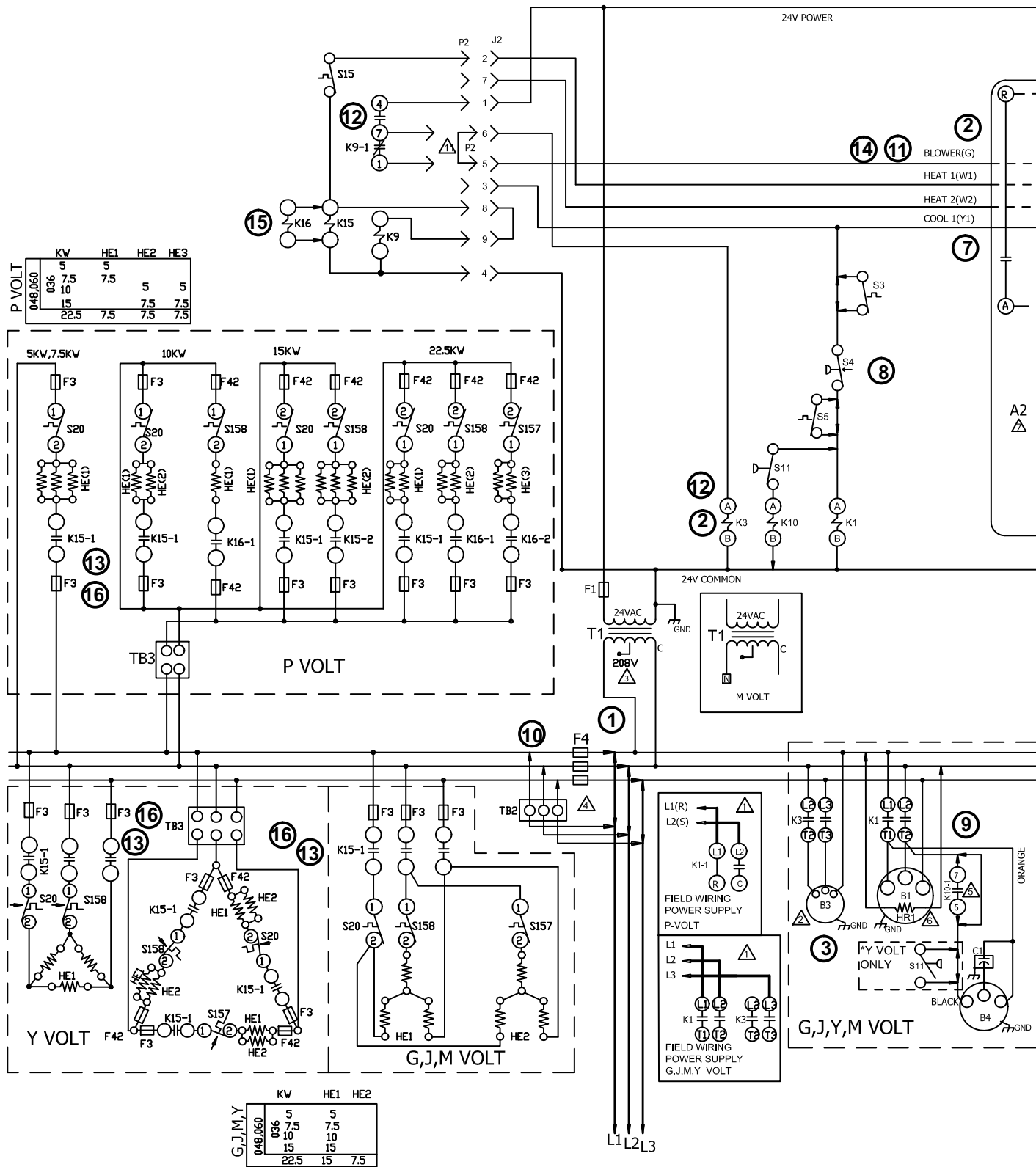
ELECTRIC HEAT SECTION



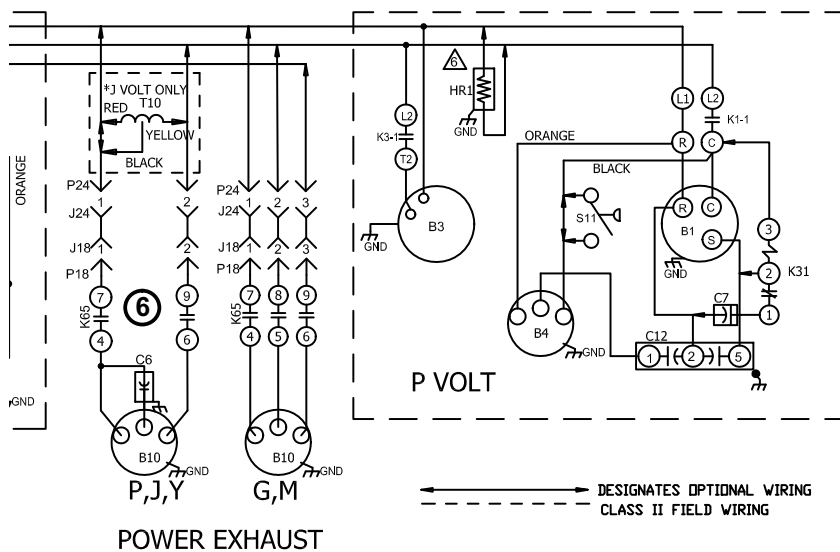
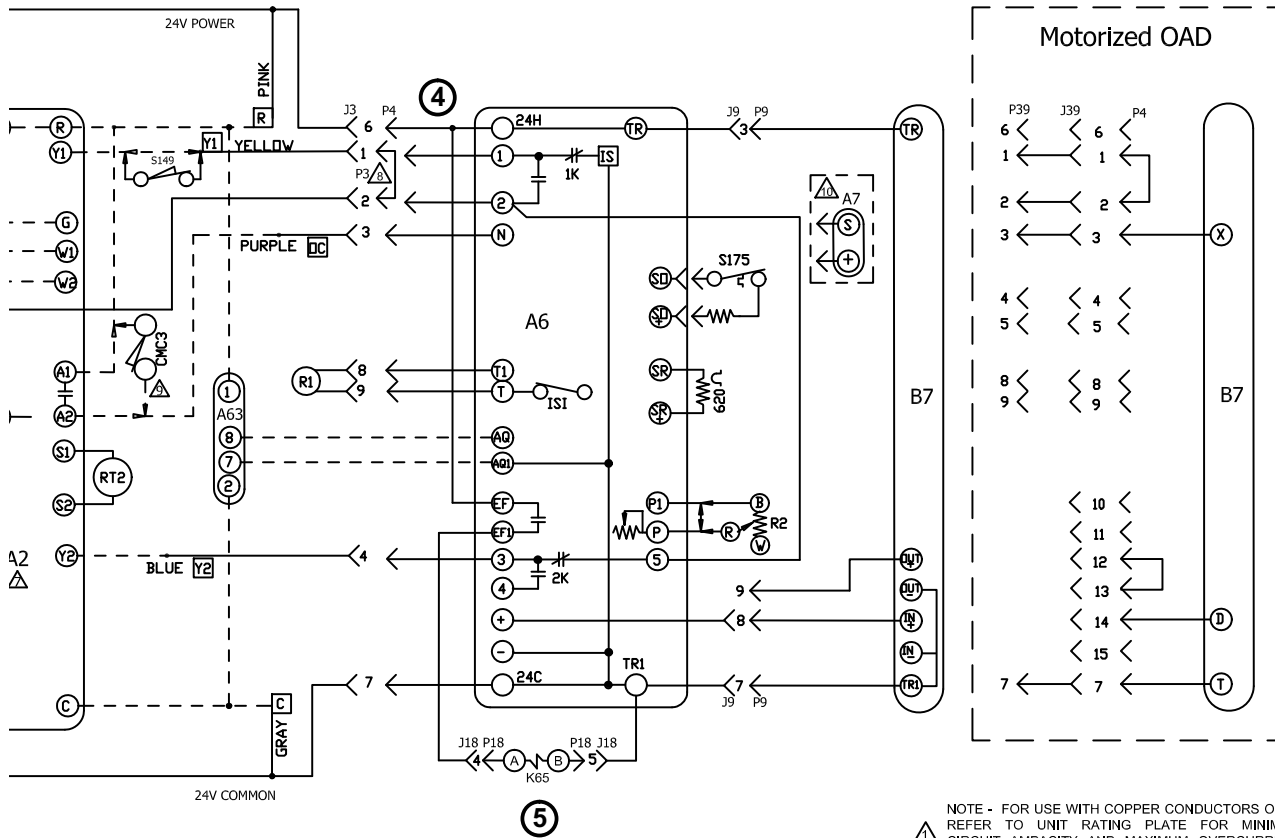
01/13		WIRING DIAGRAM	01/13
		537583-01	
KEY LIST			
ZC_KEY LIST AND COMPONENT ARRANGEMENT			
			Rev. 0
Supersedes		Form No. 537583-01	



ZCA036, 048, 060 UNIT DIAGRAM



# ZCA036, 048, 060 UNIT DIAGRAM



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

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

P, Y VOLT T1 WITH 208V TAP

ELECTRIC HEAT FIELD OPTION

LOW AMBIENT KIT

HR1 FIELD INSTALLED

THERMOSTAT/SENSOR SUPPLIED BY USER

REMOVE P3 WHEN ECONOMIZER OR OADM IS USED

TIME CLOCK CONTACTS (OPT) CLOSED OCCUPIED

A7 ENTHALPY SENSOR MAY BE USED INSTEAD OF  
S175 TEMPERATURE SWITCH AND RESISTOR

REMOVE P2 WHEN ELECTRIC HEAT IS USED

01/13	WIRING DIAGRAM	01/13
537581-01		
UNIT DIAGRAM		
ZC - 036, 048, 060		
SECTION ALL		REV. 0
Supersedes	New Form No. 537581-01	

## **ZCA036, 048, 060 P, Y, G, J & M Voltage Sequence of Operation**

### **Power:**

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

### **Blower Operation:**

- 2- Indoor thermostat terminal G energizes blower contactor K3 with 24VAC.
- 3- N.O. K3 closes, energizing blower B3.

### **Economizer Operation:**

- 4- The A6 economizer control module receives a Y1 thermostat demand. If outdoor air is suitable, economizer modulates open (see table 9 in *VII-ACCESSORIES* section).

### **Power Exhaust Fan Operation:**

- 5- The A6 economizer control module receives a Y1 thermostat demand and energizes exhaust fan relay K65 with 24VAC at 50% outside air damper open (adjustable).
- 6- N.O. K65-1 closes, energizing exhaust fan motor B10.

### **Cooling Demand**

- 7- First stage cooling demand Y1 and G is energized by the thermostat. G energizes blower.
- 8- 24VAC is routed through low voltage Y1 lead to optional N.C. compressor low discharge temperature limit S3, N.C. high pressure switch S4 and N.C. compressor high temperature limit S5. Compressor contactor K1 is energized.
- 9- N.O. K1-1 close energizing compressor B1 and outdoor fan B4.

### **Heating Demand:**

- 10- Terminal Strip TB2 is energized when the unit disconnect closes. TB2 supplies line voltage to TB3 or F3. Elements are protected by fuses F3 and F42.
- 11- Heating demand initiates at W1 in thermostat.
- 12- 24VAC is routed from the indoor thermostat through N.C. primary limit S15. Electric heat contactors K15, K16 (on P volt 10 and 22.5kW heaters) and heat relay K9 are energized. K9 energizes blower contactor K3 and economizer.
- 13- N.O. contacts K15-1, K15-2, K16-1 and K16-2 close energizing HE1, HE2 and HE3.

### **End of Heating Demand:**

- 14- Heating demand is satisfied. Terminal W1 in the thermostat is de-energized.
- 15- Electric heat contactors K15 and K16 are de-energized.
- 16- N.O. contacts K15-1, K15-2, K16-1 and K16-2 open de-energizing HE1, HE2 and HE3.