

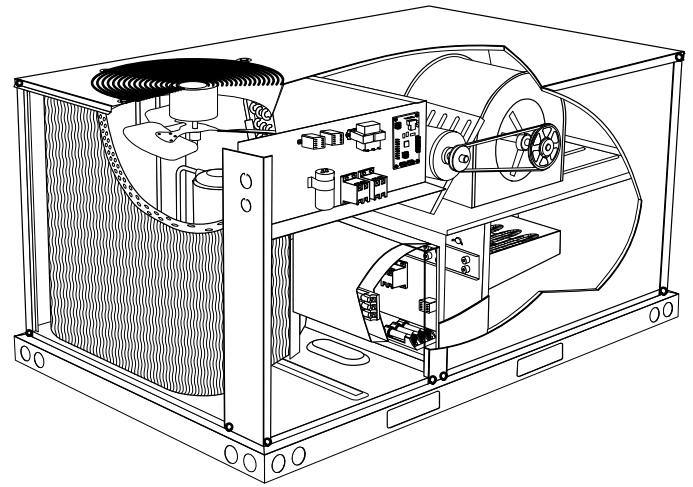
ZHA/ZHB036, 048, 060, 072

The ZHA/ZHB packaged electric heat pump units are available in standard cooling efficiency (036S, 048S, 060S and 072S). Cooling capacities are 3, 4, 5 and 6 tons (10.6 to 20kW).

Optional electric heat is field-installed and is available in 5kW through 30kW. 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 to neutralize electrostatic charge by touching your hand and tools to metal prior to handling the control.

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

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

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OPTIONS / ACCESSORIES

Item	Catalog No.	ZHA	ZHA	ZHA		
		ZHB 036	ZHB 048	ZHB 060	ZHB 072	
COOLING SYSTEM						
Condensate Drain Trap	PVC - C1TRAP20AD2	76W26	X	X	X	X
	Copper - C1TRAP10AD2	76W27	X	X	X	X
Drain Pan Overflow Switch	Z1SNSR90A1	99W59	X	X	X	X
Low Ambient Kit	Z1SNSR34A-1	99W68	X	X	X	X
Blower - SUPPLY AIR						
Motors	Belt Drive - 0.75 hp (208/230V-1ph) Standard Efficiency	Factory	³ O	³ O	³ O	
	Belt Drive - 1 hp (208/230V, 460V, 575V-3ph) Standard Efficiency	Factory	O	O	O	O
	Belt Drive - 1.5 hp (208/230V-1ph or 3 ph, 460V, 575V-3ph) Standard Efficiency	Factory	O	O	O	O
	Belt Drive-2 hp (208/230V, 460V, 575V-3ph) Standard Efficiency	Factory				O
Drive Kits See Blower Data Tables for selection	Kit #ZA01 - 678-1035 rpm	Factory	O			
	Kit #ZA02 - 803-1226 rpm	Factory		O		
	Kit #ZA03 - 906-1383 rpm	Factory			⁴ O	
	Kit #ZA04 - 964-1471 rpm	Factory	O			
	¹ Kit #ZA05 - 1098-1490 rpm	Factory		O		
	¹ Kit #ZA06 - 1262-1634 rpm	Factory			⁴ O	
	Kit #ZAA01 - 522-784 rpm	Factory			³ O	
	Kit #ZAA02 - 632-875 rpm	Factory			³ O	O
	¹ Kit #ZAA03 - 798-1105 rpm	Factory			³ O	O
	Kit #ZAA04 - 921-1228 rpm	Factory				² O
CABINET						
Coil/Hail Guards	ZHA models only - Z1GARD52A-1	12X19	X	X		
	ZHA060 and ZHB models only - Z1GARD20AT1	12X20	X	X	X	
	ZHB072 model only - Z1GARD20AL1	16A41				X
Corrosion Protection	Factory	O	O	O	O	
ELECTRICAL						
Voltage 60 hz	208/230V - 1 phase	Factory	³ O	³ O	³ O	
	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
Bottom Power Entry Kit	Z1PEKT01A-1	98W08	X	X	X	X
ELECTRIC HEAT						
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	X
	460V-3ph - Z1EH0075AN1G	99W07	X	X	X	X
	575V-3ph - Z1EH0075AN1J	99W12	X	X	X	X
10 kW	208/230V-1ph - Z1EH0100AN1P	98W98	X	X	X	
	208/230V-3ph - Z1EH0100AN1Y	99W03	X	X	X	X
	460V-3ph - Z1EH0100AN1G	99W08	X	X	X	X
	575V-3ph - Z1EH0100AN1J	99W13	X	X	X	X
15 kW	208/230V-1ph - Z1EH0150AN1P	98W99	X	X	X	
	208/230V-3ph - Z1EH0150AN1Y	99W04	X	X	X	X
	460V-3ph - Z1EH0150AN1G	99W09	X	X	X	X
	575V-3ph - Z1EH0150AN1J	99W14	X	X	X	X
22.5 kW	208/230V-1ph - Z1EH0225AN1P	99W00		X	X	
	208/230V-3ph - Z1EH0225AN1Y	99W05		X	X	X
	460V-3ph - Z1EH0225AN1G	99W10		X	X	X
	575V-3ph - Z1EH0225AN1J	99W15		X	X	X
30 kW	208/230V-3ph - Z1EH0300AN1Y	13U01				X
	460V-3PH - Z1EH0300AN1G	13U02				X
	575V-3PH - Z1EH0300AN1J	13U03				X
ELECTRIC HEAT ACCESSORIES						
Unit Fuse Block (required) - See Electrical/Electric Heat Tables for Selection			X	X	X	X

¹ 1.5 hp blower motor is the minimum required with the ZA05, ZA06 and ZAA03 drive kits.

² 2 hp blower motor is required with the ZAA04 drive kit.

³ ZHB models only.

⁴ ZHA models only.

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.		ZHA	ZHA	ZHA	
			ZHB 036	ZHB 048	ZHB 060	ZHB 072
ECONOMIZER						
Standard Economizer With Outdoor Air Hood (Not for Title 24)						
Standard Economizer (Downflow) Includes Barometric Relief Dampers and Exhaust Hood	Z1ECON30A-2	14D94	OX	OX	OX	OX
Standard Economizer (Horizontal) Includes Barometric Relief Dampers and Exhaust Hood	Z1ECON16A-2	14D92	X	X	X	X
Standard Economizer Controls (Not for Title 24)						
Single Enthalpy Control	C1SNSR64FF1	53W64	X	X	X	X
High Performance Economizer With Outdoor Air Hood (Approved for California Title 24 Building Standards / AMCA Class 1A Certified)						
High Performance Economizer (Downflow) Includes Barometric Relief Dampers and Exhaust Hood	Z1ECON32A-2	14D95	OX	OX	OX	OX
High Performance Economizer (Horizontal) Includes Barometric Relief Dampers and Exhaust Hood	Z1ECON33A-2	14D93	X	X	X	X
High Performance Economizer Controls (Not for Title 24)						
Single Enthalpy Control	C1SNSR61FF1	11G21	X	X	X	X
OUTDOOR AIR						
Outdoor Air Dampers - Includes Outdoor Air Hood						
Motorized	Z1DAMP21A-2	15D19	X	X	X	X
Manual	Z1DAMP11A-2	15D20	X	X	X	X
Power EXhaust FAN						
Standard Static (Downflow)	208/230V-1 or 3ph - Z1PWRE10A-1P	21E01	X	X	X	X
	460V-3ph - Z1PWRE10A-1G	23E01	X	X	X	X
Standard Static (Horizontal)	208/230V-1 or 3ph - Z1PWRE15A-1P	24E01	X	X	X	X
	460V-3ph - Z1PWRE15A-1G	28E01	X	X	X	X
575V Transformer Kit	575V-3ph - Z1TRFM20A-1J	59E02	X	X	X	X
NOTE - Order 575V Transformer Kit with 208/230V Power Exhaust Fan for 575V applications.						
Indoor Air Quality						
Indoor Air Quality (CO ₂) Sensors						
Sensor - Wall-mount, off-white plastic cover with LCD display	C0SNSR50AE1L	77N39	X	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting	C0SNSR53AE1L	87N54	X	X	X	X
CO ₂ Sensor Duct Mounting Kit - for downflow applications	C0MISC19AE1	85L43	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO ₂ sensor (77N39)	C0MISC16AE1	90N43	X	X	X	X
ROOF CURBS						
Hybrid Roof Curbs, Downflow						
8 in. height	Z1CURB70A-1	11F76	X	X	X	X
14 in. height	Z1CURB71A-1	11F77	X	X	X	X
18 in. height	Z1CURB72A-1	11F78	X	X	X	X
24 in. height	Z1CURB73A-1	11F79	X	X	X	X
CEILING DIFFUSERS						
Step-Down - Order one	RTD9-65S	13K60	X	X	X	
	RTD11-95S	13K61				X
Flush - Order one	FD9-65S	13K55	X	X	X	
	FD11-95S	13K56				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 - ZHA

General Data		Nominal Tonnage	3 Ton	4 Ton	5 Ton
	Model No.		ZHA036S4B	ZHA048S4B	ZHA060S4B
	Efficiency Type		Standard	Standard	Standard
Cooling Performance	Gross Cooling Capacity - Btuh		37,600	48,500	60,700
	¹ Net Cooling Capacity - Btuh		36,200	46,500	58,000
	AHRI Rated Air Flow - cfm		1310	1610	1940
	² Sound Rating Number (SRN) (dBA) Cooling		79	79	83
	Heating		80	80	83
	Total Unit Power - kW		3.1	4.3	5.3
	¹ SEER (Btuh/Watt)		13.00	13.00	13.00
	¹ EER (Btuh/Watt)		11.3	10.8	10.9
Refrigerant	Type		R-410A	R-410A	R-410A
	Charge Furnished		11 lbs. 12 oz.	12 lbs. 8 oz.	15 lbs. 3 oz.
Heating Performance	Total High Heating Capacity - Btuh		34,200	45,000	58,500
	Total Unit Power - kW		2.9	3.9	4.9
	¹ COP		3.42	3.40	3.50
	HSPF - Region IV (Region V)		7.70 (6.70)	7.70 (6.70)	7.70 (6.70)
	Total Low Heating Capacity - Btuh		20,400	27,400	33,400
	Total Unit Power - kW		2.8	3.6	4.5
	COP		2.18	2.24	2.20
Electric Heat Available		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.		16.1	16.1	19.9
	Tube diameter - in.		3/8	3/8	3/8
	Number of rows		2	2	2
	Fins / inch		20	20	20
	Expansion device type		Balanced port TXV, removable head		
Outdoor Coil Fan	Motor HP		(1) 1/4 (PSC)	(1) 1/4 (PSC)	(1) 1/3 (PSC)
	Motor rpm		825	825	1075
	Total motor watts		300	300	340
	Diameter - in.		(1) 22	(1) 22	(1) 22
	Number of blades		4	4	3
	Total air volume - cfm		3200	3200	3600
	Indoor Coil	Net face area - sq. ft.		8.4	8.4
Tube diameter - in.			3/8	3/8	3/8
Number of rows			3	3	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
³ Indoor Blower & Drive Selection		Nominal Motor HP		1 hp, 1.5 hp	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 #ZA01 678-1035 rpm	Kit #ZA02 803-1226 rpm	Kit #ZA03 906-1383 rpm
			Kit #ZA04 964-1471 rpm	⁵ Kit #ZA05 1098-1490 rpm	⁵ Kit #ZA06 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	(4) 14 x 20 x 2	(4) 16 x 20 x 2
Electrical Characteristics - 60 Hz			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.

¹ AHRI Certified to AHRI Standard 210/240:

Cooling Ratings - 95°F outdoor air temperature and 80°F db/67°F wb entering indoor coil air.

High Temperature Heating Ratings - 47°F db/43°F wb outdoor air temperature and 70°F entering indoor coil air.

Low Temperature Heating Ratings - 17°F db/15°F wb outdoor air temperature and 70°F entering indoor coil air.

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

³ 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.

⁵ 1.5 hp motor is the minimum required with ZA05 and ZA06 drive kits.

SPECIFICATIONS - ZHB

General Data		Nominal Tonnage	3 Ton	4 Ton	5 Ton	6 Ton
Model No.			ZHB036S4B	ZHB048S4B	ZHB060S4B	ZHB072S4B
Efficiency Type			Standard	Standard	Standard	Standard
Cooling Performance	Gross Cooling Capacity - Btuh		36,300	47,900	59,700	71,000
	Net Cooling Capacity - Btuh		¹ 35,000	¹ 46,500	¹ 58,000	² 69,000
	AHRI Rated Air Flow - cfm		1260	1520	2015	1860
	³ Sound Rating Number (SRN) (dBA) Cooling		79	78	82	86
	Total Unit Power - kW		3.1	4.2	5.2	6.4
	SEER (Btuh/Watt)		¹ 14.00	¹ 14.00	¹ 14.00	---
	IEER (Btuh/Watt)		---	---	---	² 12.20
Refrigerant	EER (Btuh/Watt)		¹ 11.40	¹ 11.20	¹ 11.20	² 11.00
	Type		R-410A	R-410A	R-410A	R-410A
Charge Furnished			14 lbs. 8 oz.	16 lbs. 5 oz.	14 lbs. 4 oz.	18 lbs. 0 oz.
Heating Performance	Total High Heating Capacity - Btuh		34,200	45,000	55,000	70,000
	Total Unit Power - kW		2.9	3.8	4.5	6.3
	¹ COP		3.50	3.50	3.60	3.30
	HSPF - Region IV (Region V)		8.00 (6.70)	8.00 (6.70)	8.00 (6.70)	---
	Total Low Heating Capacity - Btuh		20,000	26,100	32,500	40,000
	Total Unit Power - kW		2.7	3.5	4.2	5.4
	COP		2.20	2.20	2.25	2.25
Electric Heat Available			5, 7.5, 10, 15 kW	5, 7.5, 10, 15, 22.5 kW	7.5, 10, 15, 22.5, 30 kW	
Compressor Type (one per unit)			Scroll	Scroll	Scroll	Scroll
Outdoor Coil	Net face area - sq. ft.		19.9	19.9	19.9	25.0
	Tube diameter - in.		3/8	3/8	3/8	3/8
	Number of rows		2	2	2	2
	Fins / inch		20	20	20	20
	Expansion device type		Balanced port TXV, removable head			
Outdoor Coil Fan	Motor HP		(1) 1/4	(1) 1/4	(1) 1/3	(1) 1/3
	Motor rpm		825	825	1075	1050
	Total motor watts		300	300	350	350
	Diameter - in.		(1) 22	(1) 22	(1) 22	(1) 24
	Number of blades		4	4	3	3
	Total air volume - cfm		3335	3335	3600	4350
Indoor Coil	Net face area - sq. ft.		9.6	10.8	10.8	10.8
	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) - in.		(1) 1 NPT	(1) 1 NPT	(1) 1 NPT	(1) 1 NPT
	Expansion device type		Fixed Orifice	Fixed Orifice	Fixed Orifice	Balanced port TXV, removable power head
	⁴ Indoor Blower & Drive Selection	Nominal Motor HP		⁵ 0.75 hp, ⁶ 1 hp, 1.5 hp	⁵ 0.75 hp, ⁶ 1 hp, 1.5 hp	⁵ 0.75 hp, ⁶ 1 hp, 1.5 hp
Maximum Usable Motor HP			0.86 hp, 1.15 hp, 1.7 hp	0.86 hp, 1.15 hp, 1.7 hp	0.86 hp, 1.15 hp, 1.7 hp	1.15 hp, 1.7 hp, 2.3 hp
Available Drive Kits			Kit #ZA01 678-1035 rpm	Kit #ZA02 803-1226 rpm	Kit #ZAA01 522-784 rpm	Kit #ZAA02 632-875 rpm
			Kit #ZA04 964-1471 rpm	⁷ Kit #ZA05 1098-1490 rpm	Kit #ZAA02 632-875 rpm	⁷ Kit #ZAA03 798-1105 rpm
Wheel nominal diameter x width - in.		10 x 10	10 x 10	15 x 9	15 x 9	
Filters	Type		Disposable			
	Number and size - in.		(4) 16 x 20 x 2	(2) 16 x 20 x 2 (2) 20 x 20 x 2	(2) 16 X 20 X 2 (2) 20 X 20 X 2	(2) 20 x 20 x 2 (2) 16 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	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.

^{1,2} AHRI Certified to AHRI Standard ¹ 210/240 or ² 340/360:

Cooling Ratings - 95°F outdoor air temperature and 80°F db/67°F wb entering indoor coil air.

High Temperature Heating Ratings - 47°F db/43°F wb outdoor air temperature and 70°F entering indoor coil air.

Low Temperature Heating Ratings - 17°F db/15°F wb outdoor air temperature and 70°F entering indoor coil air.

³ Sound Rating Number (SRN) rated in accordance with test conditions included in ANSI/AHRI Standard 270-2008.

⁴ 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.

⁵ 0.75 hp motor is only available for 208/230V-1ph applications.

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

⁷ 1.5 hp motor is the minimum required with ZA05 and ZAA03 drive kits.

⁸ 2.0 hp motor is required with ZAA04 drive kits.

BLOWER DATA - BELT DRIVE - ZHA036

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 13 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
900	562	0.16	629	0.18	699	0.19	771	0.2	840	0.22	904	0.24	962	0.26	1015	0.29
1000	586	0.18	654	0.2	725	0.21	796	0.23	864	0.25	927	0.27	983	0.3	1034	0.33
1100	612	0.2	681	0.22	752	0.24	823	0.26	890	0.28	950	0.31	1004	0.34	1054	0.37
1200	641	0.23	711	0.25	783	0.27	852	0.29	917	0.32	975	0.35	1027	0.39	1074	0.42
1300	673	0.25	744	0.28	815	0.3	882	0.33	944	0.36	1000	0.4	1050	0.44	1096	0.48
1400	709	0.29	779	0.32	849	0.34	914	0.37	973	0.41	1026	0.45	1074	0.49	1118	0.53
1500	747	0.33	816	0.36	883	0.39	945	0.42	1001	0.46	1052	0.51	1098	0.55	1141	0.59

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
900	1065	0.32	1112	0.35	1158	0.38	1202	0.41	1243	0.44	1284	0.48	1323	0.52	1364	0.55
1000	1082	0.36	1128	0.39	1173	0.42	1216	0.45	1257	0.49	1297	0.53	1336	0.57	1375	0.6
1100	1100	0.4	1145	0.44	1189	0.47	1231	0.51	1272	0.54	1311	0.58	1349	0.62	1388	0.66
1200	1119	0.45	1163	0.49	1206	0.52	1247	0.56	1287	0.6	1326	0.64	1364	0.68	1402	0.72
1300	1139	0.51	1182	0.55	1224	0.58	1265	0.62	1304	0.66	1342	0.71	1379	0.75	1416	0.79
1400	1160	0.57	1202	0.61	1243	0.65	1283	0.69	1322	0.73	1359	0.78	1396	0.82	1432	0.87
1500	1182	0.64	1223	0.68	1263	0.72	1303	0.76	1341	0.81	1378	0.85	1414	0.9	1449	0.94

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
900	580	0.14	649	0.17	721	0.19	794	0.22	868	0.24	938	0.27	998	0.3	1045	0.33
1000	612	0.17	681	0.19	752	0.22	825	0.25	897	0.27	963	0.3	1017	0.33	1061	0.37
1100	647	0.2	717	0.23	788	0.26	858	0.28	926	0.31	986	0.34	1036	0.38	1077	0.41
1200	687	0.23	757	0.26	826	0.29	893	0.32	955	0.35	1008	0.39	1054	0.42	1095	0.46
1300	730	0.27	798	0.3	864	0.33	926	0.37	982	0.4	1030	0.44	1073	0.47	1116	0.51
1400	775	0.31	840	0.34	902	0.38	959	0.42	1009	0.46	1054	0.5	1096	0.53	1140	0.56
1500	820	0.36	881	0.4	939	0.44	993	0.49	1039	0.53	1082	0.56	1124	0.59	1168	0.62

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
900	1091	0.36	1140	0.38	1188	0.4	1232	0.43	1272	0.46	1309	0.49	1346	0.53	1383	0.57
1000	1105	0.4	1154	0.42	1201	0.45	1245	0.47	1284	0.5	1321	0.54	1357	0.58	1394	0.62
1100	1121	0.44	1169	0.47	1216	0.49	1259	0.52	1298	0.56	1335	0.6	1370	0.64	1406	0.69
1200	1139	0.49	1187	0.52	1234	0.54	1276	0.58	1314	0.62	1350	0.66	1385	0.71	1421	0.75
1300	1161	0.54	1208	0.57	1254	0.6	1295	0.64	1332	0.69	1366	0.73	1401	0.78	1436	0.83
1400	1185	0.59	1232	0.63	1276	0.67	1315	0.71	1351	0.76	1384	0.81	1419	0.86	1454	0.9
1500	1212	0.66	1257	0.7	1299	0.74	1337	0.79	1371	0.84	1404	0.89	1438	0.94	1473	0.99

BLOWER DATA - BELT DRIVE - ZHA048

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 13 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
1200	641	0.23	711	0.25	783	0.27	852	0.29	917	0.32	975	0.35	1027	0.39	1074	0.42
1300	673	0.25	744	0.28	815	0.30	882	0.33	944	0.36	1000	0.40	1050	0.44	1096	0.48
1400	709	0.29	779	0.32	849	0.34	914	0.37	973	0.41	1026	0.45	1074	0.49	1118	0.53
1500	747	0.33	816	0.36	883	0.39	945	0.42	1001	0.46	1052	0.51	1098	0.55	1141	0.59
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

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
1200	1119	0.45	1163	0.49	1206	0.52	1247	0.56	1287	0.60	1326	0.64	1364	0.68	1402	0.72
1300	1139	0.51	1182	0.55	1224	0.58	1265	0.62	1304	0.66	1342	0.71	1379	0.75	1416	0.79
1400	1160	0.57	1202	0.61	1243	0.65	1283	0.69	1322	0.73	1359	0.78	1396	0.82	1432	0.87
1500	1182	0.64	1223	0.68	1263	0.72	1303	0.76	1341	0.81	1378	0.85	1414	0.90	1449	0.94
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

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
1200	687	0.23	757	0.26	826	0.29	893	0.32	955	0.35	1008	0.39	1054	0.42	1095	0.46
1300	730	0.27	798	0.30	864	0.33	926	0.37	982	0.40	1030	0.44	1073	0.47	1116	0.51
1400	775	0.31	840	0.34	902	0.38	959	0.42	1009	0.46	1054	0.50	1096	0.53	1140	0.56
1500	820	0.36	881	0.40	939	0.44	993	0.49	1039	0.53	1082	0.56	1124	0.59	1168	0.62
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

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
1200	1139	0.49	1187	0.52	1234	0.54	1276	0.58	1314	0.62	1350	0.66	1385	0.71	1421	0.75
1300	1161	0.54	1208	0.57	1254	0.60	1295	0.64	1332	0.69	1366	0.73	1401	0.78	1436	0.83
1400	1185	0.59	1232	0.63	1276	0.67	1315	0.71	1351	0.76	1384	0.81	1419	0.86	1454	0.90
1500	1212	0.66	1257	0.70	1299	0.74	1337	0.79	1371	0.84	1404	0.89	1438	0.94	1473	0.99
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

BLOWER DATA - BELT DRIVE - ZHA060

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 13 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
1600	764	0.35	822	0.39	880	0.42	936	0.46	991	0.51	1042	0.55	1091	0.60	1136	0.64
1700	801	0.40	857	0.44	913	0.48	968	0.52	1020	0.57	1070	0.61	1117	0.66	1162	0.71
1800	838	0.46	893	0.50	947	0.54	1000	0.58	1051	0.63	1099	0.68	1145	0.73	1188	0.78
1900	876	0.52	929	0.56	982	0.61	1033	0.65	1082	0.70	1129	0.75	1173	0.80	1215	0.85
2000	914	0.59	966	0.63	1017	0.68	1067	0.72	1115	0.77	1160	0.83	1203	0.88	1244	0.94
2100	953	0.66	1004	0.71	1054	0.76	1102	0.81	1148	0.86	1192	0.92	1233	0.98	1273	1.04
2200	993	0.74	1042	0.79	1090	0.85	1137	0.90	1181	0.96	1224	1.02	1264	1.09	1303	1.15
2300	1033	0.83	1081	0.89	1128	0.94	1173	1.01	1216	1.07	1257	1.14	1296	1.20	1334	1.27
2400	1074	0.93	1120	0.99	1166	1.05	1209	1.12	1251	1.19	1291	1.26	1329	1.33	1366	1.41

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
1600	1180	0.68	1222	0.72	1263	0.76	1303	0.80	1341	0.85	1378	0.90	1414	0.94	1449	0.99
1700	1204	0.75	1245	0.79	1285	0.84	1325	0.88	1362	0.93	1398	0.98	1434	1.03	1468	1.08
1800	1229	0.83	1270	0.87	1309	0.92	1347	0.97	1384	1.02	1420	1.07	1454	1.12	1488	1.17
1900	1256	0.91	1296	0.96	1334	1.01	1371	1.07	1407	1.12	1442	1.17	1476	1.23	1509	1.28
2000	1284	1.00	1322	1.06	1360	1.11	1396	1.17	1431	1.23	1465	1.28	1498	1.33	1531	1.38
2100	1312	1.10	1350	1.16	1386	1.22	1422	1.28	1456	1.34	1489	1.40	1521	1.45	1554	1.50
2200	1341	1.22	1378	1.28	1414	1.34	1448	1.41	1481	1.46	1513	1.52	1546	1.57	1578	1.62
2300	1371	1.34	1407	1.41	1442	1.47	1475	1.54	1507	1.59	1539	1.65	1571	1.70	1602	1.75
2400	1402	1.48	1436	1.55	1470	1.61	1503	1.67	1535	1.73	1566	1.79	1597	1.84	1628	1.89

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
1600	783	0.38	844	0.41	902	0.44	957	0.48	1008	0.52	1056	0.56	1100	0.60	1142	0.64
1700	825	0.44	882	0.47	938	0.50	989	0.54	1038	0.57	1083	0.62	1126	0.66	1166	0.71
1800	866	0.50	921	0.53	973	0.56	1021	0.60	1067	0.64	1111	0.68	1152	0.73	1191	0.78
1900	907	0.56	959	0.59	1008	0.63	1054	0.66	1098	0.71	1139	0.75	1179	0.80	1217	0.86
2000	948	0.63	996	0.66	1042	0.70	1086	0.74	1128	0.78	1168	0.83	1207	0.89	1244	0.94
2100	987	0.70	1033	0.74	1077	0.78	1119	0.82	1159	0.87	1198	0.93	1235	0.99	1272	1.05
2200	1026	0.78	1070	0.82	1112	0.87	1152	0.92	1191	0.98	1228	1.03	1265	1.10	1301	1.16
2300	1064	0.88	1106	0.92	1147	0.97	1186	1.03	1223	1.09	1260	1.15	1295	1.22	1331	1.28
2400	1102	0.98	1143	1.03	1182	1.08	1220	1.15	1256	1.21	1292	1.28	1327	1.35	1362	1.42

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
1600	1183	0.68	1223	0.72	1263	0.76	1302	0.81	1340	0.86	1377	0.91	1413	0.95	1448	1.00
1700	1205	0.75	1245	0.79	1284	0.84	1322	0.89	1360	0.94	1396	0.99	1431	1.04	1465	1.09
1800	1230	0.83	1268	0.87	1306	0.92	1344	0.98	1380	1.03	1416	1.08	1450	1.13	1483	1.19
1900	1255	0.91	1292	0.96	1330	1.02	1367	1.07	1402	1.13	1437	1.18	1470	1.24	1503	1.29
2000	1281	1.00	1318	1.06	1355	1.12	1391	1.18	1425	1.23	1459	1.29	1492	1.35	1524	1.40
2100	1308	1.11	1345	1.17	1381	1.23	1416	1.29	1450	1.35	1482	1.41	1514	1.46	1546	1.52
2200	1337	1.23	1372	1.29	1408	1.35	1442	1.42	1475	1.47	1507	1.53	1538	1.59	1569	1.64
2300	1366	1.35	1401	1.42	1435	1.49	1469	1.55	1501	1.61	1532	1.67	1563	1.72	1594	1.77
2400	1396	1.49	1431	1.56	1464	1.63	1496	1.69	1528	1.75	1559	1.81	1589	1.86	1619	1.91

BLOWER DATA - BELT DRIVE - ZHB036

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 13 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
900	562	0.11	621	0.13	685	0.16	752	0.18	818	0.21	883	0.24	944	0.27	1001	0.30
1000	584	0.13	644	0.16	707	0.18	773	0.21	838	0.24	901	0.27	960	0.3	1015	0.33
1100	609	0.16	669	0.18	732	0.21	796	0.24	860	0.27	921	0.30	978	0.34	1031	0.37
1200	635	0.19	696	0.21	758	0.24	821	0.27	883	0.31	942	0.34	997	0.38	1049	0.42
1300	664	0.22	725	0.25	786	0.28	848	0.31	908	0.35	965	0.39	1018	0.43	1068	0.47
1400	696	0.26	756	0.29	816	0.32	876	0.36	935	0.40	989	0.44	1041	0.48	1089	0.52
1500	729	0.30	788	0.33	848	0.37	906	0.41	962	0.45	1015	0.50	1065	0.54	1112	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
900	1053	0.32	1103	0.35	1149	0.38	1193	0.41	1234	0.43	1274	0.47	1312	0.50	1351	0.53
1000	1066	0.36	1114	0.39	1160	0.42	1204	0.45	1245	0.48	1284	0.51	1322	0.54	1361	0.58
1100	1081	0.40	1128	0.43	1173	0.46	1216	0.49	1257	0.53	1296	0.56	1334	0.60	1372	0.63
1200	1097	0.45	1144	0.48	1188	0.51	1231	0.54	1271	0.58	1310	0.62	1347	0.66	1385	0.69
1300	1115	0.50	1161	0.53	1204	0.56	1246	0.60	1286	0.64	1325	0.68	1362	0.72	1399	0.76
1400	1135	0.56	1179	0.59	1222	0.62	1264	0.66	1303	0.70	1341	0.75	1378	0.79	1415	0.83
1500	1157	0.62	1200	0.65	1242	0.69	1282	0.73	1321	0.77	1359	0.82	1396	0.86	1431	0.91

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
900	560	0.16	624	0.18	692	0.20	761	0.21	830	0.23	896	0.25	956	0.27	1012	0.29
1000	583	0.18	647	0.20	715	0.22	783	0.24	850	0.25	914	0.27	972	0.30	1025	0.33
1100	609	0.20	673	0.22	740	0.24	808	0.26	873	0.28	934	0.31	990	0.34	1041	0.37
1200	637	0.23	702	0.25	769	0.27	835	0.29	898	0.32	956	0.35	1009	0.38	1058	0.41
1300	669	0.26	734	0.28	800	0.30	863	0.33	924	0.36	979	0.39	1030	0.43	1077	0.46
1400	704	0.29	768	0.32	832	0.35	894	0.37	951	0.41	1004	0.44	1052	0.48	1097	0.52
1500	742	0.33	805	0.36	867	0.39	925	0.42	980	0.46	1030	0.50	1076	0.54	1119	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
900	1064	0.32	1114	0.35	1162	0.38	1208	0.41	1251	0.45	1293	0.49	1333	0.52	1373	0.56
1000	1076	0.36	1124	0.39	1170	0.42	1216	0.46	1259	0.49	1300	0.53	1340	0.57	1379	0.61
1100	1089	0.40	1136	0.43	1181	0.46	1225	0.50	1268	0.54	1308	0.58	1347	0.62	1386	0.66
1200	1104	0.45	1150	0.48	1194	0.51	1237	0.55	1279	0.59	1319	0.63	1357	0.67	1394	0.71
1300	1121	0.5	1165	0.53	1209	0.57	1251	0.61	1292	0.65	1331	0.69	1368	0.73	1405	0.78
1400	1140	0.56	1183	0.59	1225	0.63	1266	0.67	1306	0.71	1345	0.76	1382	0.8	1417	0.85
1500	1161	0.62	1202	0.65	1243	0.69	1284	0.73	1323	0.78	1360	0.83	1396	0.87	1432	0.92

BLOWER DATA - BELT DRIVE - ZHB048

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 13 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
1200	620	0.23	681	0.29	744	0.34	809	0.39	875	0.43	941	0.47	1004	0.51	1060	0.54
1300	652	0.28	713	0.34	775	0.39	839	0.44	903	0.48	967	0.51	1025	0.55	1078	0.59
1400	687	0.33	747	0.39	809	0.44	871	0.49	934	0.53	994	0.57	1048	0.61	1098	0.64
1500	724	0.40	784	0.45	844	0.50	905	0.54	965	0.59	1021	0.62	1071	0.66	1118	0.70
1600	764	0.46	823	0.51	882	0.56	940	0.60	997	0.65	1048	0.69	1094	0.72	1140	0.75
1700	806	0.53	863	0.58	919	0.62	975	0.67	1028	0.71	1075	0.75	1119	0.78	1164	0.81
1800	849	0.60	903	0.65	957	0.69	1010	0.74	1058	0.78	1102	0.82	1145	0.85	1189	0.88
1900	892	0.68	944	0.72	995	0.77	1045	0.82	1089	0.86	1131	0.89	1174	0.92	1217	0.95
2000	935	0.76	984	0.81	1033	0.86	1079	0.91	1122	0.95	1163	0.97	1204	1.00	1247	1.03

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
1200	1111	0.58	1156	0.60	1199	0.62	1241	0.63	1284	0.65	1326	0.67	1367	0.71	1408	0.74
1300	1127	0.62	1172	0.65	1214	0.66	1256	0.68	1299	0.70	1341	0.73	1381	0.77	1421	0.81
1400	1145	0.68	1189	0.70	1231	0.72	1274	0.74	1316	0.76	1357	0.79	1397	0.83	1436	0.88
1500	1164	0.73	1208	0.75	1251	0.78	1293	0.80	1334	0.83	1374	0.86	1413	0.91	1451	0.95
1600	1185	0.79	1229	0.81	1271	0.84	1313	0.86	1354	0.90	1393	0.94	1431	0.98	1468	1.03
1700	1208	0.84	1252	0.87	1294	0.90	1335	0.94	1375	0.98	1413	1.02	1449	1.07	1485	1.12
1800	1233	0.91	1276	0.94	1318	0.98	1358	1.02	1397	1.06	1434	1.11	1469	1.16	1504	1.21
1900	1261	0.98	1303	1.02	1343	1.06	1382	1.11	1420	1.16	1455	1.21	1490	1.26	1525	1.31
2000	1289	1.07	1330	1.11	1370	1.16	1407	1.21	1444	1.27	1478	1.32	1513	1.37	1547	1.42

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
1200	614	0.21	681	0.25	752	0.30	821	0.34	888	0.39	950	0.43	1006	0.46	1057	0.49
1300	644	0.24	712	0.29	782	0.34	850	0.39	915	0.43	974	0.47	1027	0.51	1076	0.53
1400	677	0.29	746	0.34	814	0.39	880	0.44	942	0.48	998	0.52	1049	0.55	1097	0.58
1500	714	0.34	781	0.40	848	0.45	911	0.49	970	0.53	1023	0.57	1072	0.60	1119	0.63
1600	752	0.40	818	0.45	882	0.50	943	0.55	999	0.59	1050	0.62	1097	0.66	1142	0.69
1700	792	0.46	855	0.52	917	0.56	975	0.61	1028	0.64	1077	0.68	1123	0.72	1166	0.75
1800	832	0.53	894	0.58	952	0.63	1007	0.67	1058	0.70	1105	0.74	1149	0.78	1192	0.82
1900	873	0.60	932	0.65	988	0.69	1040	0.73	1088	0.77	1134	0.81	1177	0.85	1219	0.90
2000	914	0.67	970	0.72	1023	0.76	1073	0.80	1120	0.85	1163	0.89	1205	0.94	1246	0.99

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
1200	1105	0.51	1152	0.53	1197	0.55	1240	0.58	1280	0.61	1320	0.64	1358	0.68	1395	0.72
1300	1123	0.55	1169	0.57	1213	0.60	1255	0.63	1295	0.67	1334	0.70	1372	0.74	1409	0.79
1400	1142	0.60	1187	0.63	1230	0.66	1272	0.69	1312	0.73	1350	0.77	1388	0.82	1424	0.86
1500	1163	0.66	1207	0.69	1249	0.72	1290	0.76	1330	0.80	1368	0.85	1405	0.90	1441	0.94
1600	1185	0.72	1228	0.75	1270	0.79	1310	0.83	1349	0.88	1387	0.93	1423	0.98	1459	1.03
1700	1209	0.78	1251	0.82	1292	0.87	1331	0.92	1370	0.97	1407	1.02	1443	1.07	1478	1.12
1800	1234	0.86	1275	0.91	1315	0.96	1354	1.01	1391	1.06	1428	1.11	1463	1.17	1498	1.22
1900	1260	0.95	1300	1.00	1340	1.05	1377	1.11	1414	1.16	1450	1.22	1485	1.27	1519	1.32
2000	1287	1.04	1326	1.10	1365	1.16	1402	1.21	1437	1.27	1472	1.33	1507	1.38	1541	1.43

BLOWER DATA - BELT DRIVE - ZHB060

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 13 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
1600	522	0.27	552	0.32	585	0.37	619	0.43	656	0.48	693	0.53	732	0.59	771	0.64
1700	539	0.32	570	0.37	603	0.43	638	0.48	674	0.53	711	0.59	749	0.64	787	0.69
1800	558	0.38	589	0.43	623	0.48	658	0.54	694	0.59	730	0.64	767	0.70	803	0.75
1900	578	0.44	610	0.49	643	0.54	678	0.60	714	0.65	749	0.70	785	0.76	819	0.82
2000	600	0.50	632	0.56	665	0.61	699	0.66	734	0.71	769	0.77	803	0.83	837	0.90
2100	623	0.57	655	0.62	688	0.68	721	0.73	755	0.79	789	0.84	822	0.91	854	0.98
2200	647	0.65	678	0.70	711	0.75	743	0.81	776	0.86	809	0.93	841	1.00	872	1.06
2300	671	0.73	702	0.78	734	0.83	766	0.89	798	0.95	829	1.02	860	1.09	890	1.16
2400	696	0.81	726	0.87	757	0.92	788	0.98	819	1.04	850	1.11	880	1.19	909	1.26

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
1600	809	0.69	844	0.74	877	0.80	908	0.85	936	0.91	963	0.97	989	1.02	1014	1.08
1700	823	0.75	857	0.80	889	0.86	919	0.92	947	0.97	973	1.03	999	1.09	1024	1.14
1800	838	0.81	870	0.87	901	0.92	931	0.98	958	1.04	984	1.10	1009	1.16	1034	1.22
1900	853	0.88	885	0.94	915	0.99	944	1.05	971	1.11	996	1.17	1021	1.23	1045	1.29
2000	869	0.96	899	1.01	929	1.07	957	1.13	984	1.19	1009	1.25	1033	1.31	1058	1.38
2100	885	1.04	915	1.10	944	1.15	971	1.22	997	1.28	1022	1.34	1046	1.40	1070	1.46
2200	902	1.13	931	1.19	959	1.24	986	1.31	1012	1.37	1036	1.43	1060	1.50	1084	1.56
2300	920	1.23	948	1.29	975	1.35	1001	1.41	1027	1.47	1051	1.53	1075	1.60	1098	1.66
2400	938	1.33	965	1.39	992	1.45	1017	1.52	1042	1.58	1066	1.64	1090	1.70	1113	1.77

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
1600	525	0.30	561	0.34	597	0.39	635	0.43	673	0.47	711	0.51	748	0.56	784	0.61
1700	543	0.34	578	0.39	615	0.43	653	0.48	691	0.52	728	0.57	765	0.62	800	0.67
1800	561	0.39	597	0.44	635	0.49	672	0.53	710	0.58	746	0.63	782	0.68	816	0.73
1900	581	0.44	618	0.49	655	0.54	692	0.59	729	0.64	765	0.69	800	0.75	833	0.80
2000	602	0.50	639	0.55	676	0.61	713	0.66	749	0.71	784	0.76	818	0.82	850	0.88
2100	625	0.57	661	0.62	698	0.67	735	0.73	770	0.78	804	0.84	837	0.90	868	0.96
2200	648	0.64	685	0.69	721	0.75	757	0.80	791	0.86	824	0.92	856	0.98	886	1.05
2300	673	0.71	709	0.77	745	0.83	780	0.88	813	0.94	845	1.01	876	1.08	905	1.15
2400	699	0.79	734	0.85	769	0.91	803	0.97	835	1.04	866	1.11	896	1.18	924	1.25

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
1600	819	0.66	851	0.72	883	0.77	913	0.83	943	0.89	971	0.95	998	1.01	1024	1.07
1700	833	0.72	865	0.78	896	0.84	926	0.90	954	0.96	982	1.02	1009	1.08	1034	1.14
1800	848	0.79	880	0.85	910	0.92	939	0.98	967	1.04	994	1.10	1020	1.16	1045	1.23
1900	864	0.87	895	0.93	924	0.99	953	1.06	980	1.12	1007	1.18	1032	1.25	1056	1.31
2000	881	0.95	911	1.01	940	1.08	967	1.14	994	1.21	1020	1.27	1044	1.34	1068	1.40
2100	898	1.03	927	1.10	955	1.17	982	1.23	1008	1.30	1033	1.37	1057	1.43	1080	1.50
2200	916	1.12	944	1.19	971	1.26	998	1.33	1023	1.40	1047	1.47	1071	1.54	1093	1.60
2300	934	1.22	961	1.29	988	1.36	1014	1.43	1038	1.50	1062	1.58	1085	1.65	1107	1.71
2400	952	1.32	979	1.40	1005	1.47	1030	1.54	1054	1.62	1077	1.69	1099	1.76	1121	1.83

BLOWER DATA - BELT DRIVE - ZHB072

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 13 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
1800	558	0.38	589	0.43	623	0.48	658	0.54	694	0.59	730	0.64	767	0.70	803	0.75
1900	578	0.44	610	0.49	643	0.54	678	0.60	714	0.65	749	0.70	785	0.76	819	0.82
2000	600	0.50	632	0.56	665	0.61	699	0.66	734	0.71	769	0.77	803	0.83	837	0.90
2100	623	0.57	655	0.62	688	0.68	721	0.73	755	0.79	789	0.84	822	0.91	854	0.98
2200	647	0.65	678	0.70	711	0.75	743	0.81	776	0.86	809	0.93	841	1.00	872	1.06
2300	671	0.73	702	0.78	734	0.83	766	0.89	798	0.95	829	1.02	860	1.09	890	1.16
2400	696	0.81	726	0.87	757	0.92	788	0.98	819	1.04	850	1.11	880	1.19	909	1.26
2500	720	0.90	750	0.95	780	1.01	811	1.07	841	1.14	871	1.22	900	1.30	929	1.37
2600	745	0.99	774	1.05	804	1.11	834	1.17	864	1.25	893	1.33	921	1.41	949	1.49
2700	770	1.09	799	1.15	828	1.21	858	1.28	887	1.36	916	1.44	943	1.53	969	1.61
2800	795	1.19	824	1.25	853	1.33	882	1.40	911	1.48	939	1.56	965	1.65	990	1.73
2900	820	1.30	849	1.37	878	1.45	907	1.53	935	1.61	962	1.70	988	1.78	1012	1.86

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
1800	838	0.81	870	0.87	901	0.92	931	0.98	958	1.04	984	1.10	1009	1.16	1034	1.22
1900	853	0.88	885	0.94	915	0.99	944	1.05	971	1.11	996	1.17	1021	1.23	1045	1.29
2000	869	0.96	899	1.01	929	1.07	957	1.13	984	1.19	1009	1.25	1033	1.31	1058	1.38
2100	885	1.04	915	1.10	944	1.15	971	1.22	997	1.28	1022	1.34	1046	1.40	1070	1.46
2200	902	1.13	931	1.19	959	1.24	986	1.31	1012	1.37	1036	1.43	1060	1.50	1084	1.56
2300	920	1.23	948	1.29	975	1.35	1001	1.41	1027	1.47	1051	1.53	1075	1.60	1098	1.66
2400	938	1.33	965	1.39	992	1.45	1017	1.52	1042	1.58	1066	1.64	1090	1.70	1113	1.77
2500	956	1.44	983	1.51	1009	1.57	1034	1.63	1059	1.69	1082	1.75	1105	1.82	1128	1.88
2600	975	1.56	1001	1.63	1026	1.69	1051	1.75	1075	1.81	1098	1.87	1121	1.93	1143	2.00
2700	995	1.68	1020	1.75	1044	1.81	1069	1.87	1092	1.93	1114	1.99	1136	2.06	1158	2.13
2800	1015	1.81	1039	1.87	1063	1.94	1086	2.00	1109	2.06	1131	2.12	1152	2.19	1174	2.26
2900	1035	1.94	1058	2.00	1081	2.07	1104	2.13	1126	2.19	1147	2.26	1168	2.33	1189	2.40

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
1800	561	0.39	597	0.44	635	0.49	672	0.53	710	0.58	746	0.63	782	0.68	816	0.73
1900	581	0.44	618	0.49	655	0.54	692	0.59	729	0.64	765	0.69	800	0.75	833	0.80
2000	602	0.50	639	0.55	676	0.61	713	0.66	749	0.71	784	0.76	818	0.82	850	0.88
2100	625	0.57	661	0.62	698	0.67	735	0.73	770	0.78	804	0.84	837	0.90	868	0.96
2200	648	0.64	685	0.69	721	0.75	757	0.80	791	0.86	824	0.92	856	0.98	886	1.05
2300	673	0.71	709	0.77	745	0.83	780	0.88	813	0.94	845	1.01	876	1.08	905	1.15
2400	699	0.79	734	0.85	769	0.91	803	0.97	835	1.04	866	1.11	896	1.18	924	1.25
2500	725	0.88	759	0.94	793	1.00	826	1.07	857	1.14	887	1.21	916	1.28	944	1.36
2600	752	0.97	785	1.04	818	1.10	850	1.17	880	1.25	909	1.32	937	1.40	964	1.48
2700	779	1.07	811	1.14	843	1.21	873	1.29	902	1.37	931	1.44	958	1.52	984	1.60
2800	805	1.18	837	1.26	868	1.33	897	1.41	925	1.49	952	1.57	979	1.66	1004	1.74
2900	832	1.30	863	1.38	892	1.46	921	1.54	948	1.63	974	1.71	1000	1.80	1024	1.88

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
1800	848	0.79	880	0.85	910	0.92	939	0.98	967	1.04	994	1.10	1020	1.16	1045	1.23
1900	864	0.87	895	0.93	924	0.99	953	1.06	980	1.12	1007	1.18	1032	1.25	1056	1.31
2000	881	0.95	911	1.01	940	1.08	967	1.14	994	1.21	1020	1.27	1044	1.34	1068	1.40
2100	898	1.03	927	1.10	955	1.17	982	1.23	1008	1.30	1033	1.37	1057	1.43	1080	1.50
2200	916	1.12	944	1.19	971	1.26	998	1.33	1023	1.40	1047	1.47	1071	1.54	1093	1.60
2300	934	1.22	961	1.29	988	1.36	1014	1.43	1038	1.50	1062	1.58	1085	1.65	1107	1.71
2400	952	1.32	979	1.40	1005	1.47	1030	1.54	1054	1.62	1077	1.69	1099	1.76	1121	1.83
2500	971	1.43	997	1.51	1022	1.59	1046	1.66	1069	1.74	1092	1.81	1114	1.88	1135	1.95
2600	990	1.55	1015	1.63	1039	1.71	1063	1.79	1086	1.86	1108	1.94	1129	2.01	1150	2.07
2700	1009	1.68	1034	1.76	1057	1.84	1080	1.92	1102	1.99	1124	2.07	1145	2.14	1166	2.21
2800	1028	1.82	1052	1.9	1075	1.98	1097	2.06	1119	2.13	1140	2.21	1161	2.28	1182	2.34
2900	1048	1.96	1071	2.04	1093	2.12	1115	2.20	1136	2.28	1157	2.35	1177	2.42	1198	2.48

BLOWER DATA

DRIVE KIT SPECIFICATIONS - ZHA036-060, ZHB036-048

Model No.	Motor HP		No. of Speeds	Drive Kits and RPM Range					
	Nominal	Maximum		ZA01	ZA02	ZA03	ZA04	³ ZA05	³ ZA06
ZHA/ZHB 036	¹ 0.75	0.86	1	678 - 1035	---	---	964 - 1471	---	---
	² 1	1.15	1	678 - 1035	---	---	964 - 1471	---	---
	¹ 1.5	1.7	1	678 - 1035	---	---	964 - 1471	---	---
ZHA/ZHB 048	¹ 0.75	0.86	1	---	803 - 1226	---	---	---	---
	² 1	1.15	1	---	803 - 1226	---	---	---	---
	¹ 1.5	1.7	1	---	803 - 1226	---	---	1098 - 1490	---
ZHA060	1	1.15	1	---	---	906 - 1383	---	---	---
	1.5	1.7	1	---	---	906 - 1383	---	---	1262 - 1634

DRIVE KIT SPECIFICATIONS - ZHB060-072

Model No.	Motor HP		No. of Speeds	Drive Kits and RPM Range			
	Nominal	Maximum		ZAA01	ZAA02	³ ZAA03	⁴ ZAA04
ZHB060	¹ 0.75	0.86	1	522 - 784	632 - 875	---	---
	² 1	1.15	1	522 - 784	632 - 875	---	---
	1.5	1.7	1	522 - 784	632 - 875	798 - 1105	---
ZHB072	1	1.15	1	---	632 - 875	---	---
	1.5	1.7	1	---	632 - 875	798 - 1105	---
	2	2.3	1	---	632 - 875	798 - 1105	921 - 1228

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.

¹ 0.75 and 1.5 hp motors are only available for ZHB036-060 208/230V-1ph applications.

² 1 hp blower motor is not available for ZHB060 208/230V-1ph applications.

³ 1.5 hp blower motor is the minimum required with the ZA05, ZA06, and ZAA03 drive kits.

⁴ 2 hp blower motor is required with the ZAA04 drive kit.

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

BLOWER DATA

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

Air Volume cfm	Wet Indoor Coil				Electric Heat	Economizer	
	ZHA036, ZHA048	ZHA060, ZHB036	ZHB048, ZHB060	ZHB072		Downflow	Horizontal
900	0.01	0.01	---	---	0.05	0.03	0.04
1000	0.02	0.01	---	---	0.06	0.03	0.05
1100	0.02	0.02	---	---	0.08	0.04	0.05
1200	0.02	0.02	0.01	---	0.09	0.05	0.06
1300	0.03	0.02	0.02	---	0.12	0.05	0.07
1400	0.03	0.03	0.02	---	0.17	0.06	0.08
1500	0.04	0.03	0.02	---	0.22	0.07	0.08
1600	0.04	0.03	0.03	0.03	0.26	0.08	0.09
1700	0.05	0.04	0.03	0.03	0.30	0.09	0.10
1800	0.05	0.04	0.03	0.03	0.33	0.10	0.11
1900	0.06	0.05	0.04	0.04	0.33	0.11	0.12
2000	0.06	0.05	0.04	0.04	0.31	0.12	0.13
2100	---	0.06	0.05	0.05	0.27	0.13	0.14
2200	---	0.06	0.05	0.05	0.29	0.14	0.15
2300	---	0.07	0.05	0.05	0.31	0.15	0.16
2400	---	0.07	0.06	0.06	0.32	0.16	0.18
2500	---	---	---	0.06	0.34	0.18	0.19
2600	---	---	---	0.07	0.38	0.19	0.20
2700	---	---	---	0.07	0.42	0.20	0.21
2800	---	---	---	0.07	0.45	0.22	0.23
2900	---	---	---	0.08	0.49	0.23	0.24

BLOWER DATA

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

Air Volume cfm	RTD9-65S Step-Down Diffuser			FD9-65S Flush Diffuser	RTD11-95S Step-Down Diffuser			FD11-95S Flush Diffuser
	2 Ends Open	1 Side & 2 Ends Open	All Ends & Sides Open		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	0.13	0.11	0.09	0.09
2000	0.73	0.50	0.36	0.36	0.15	0.13	0.11	0.10
2200	0.95	0.63	0.44	0.44	0.18	0.15	0.12	0.12
2400	---	----	---	---	0.21	0.18	0.15	0.14
2600	---	----	---	---	0.24	0.21	0.18	0.17
2800	---	----	---	---	0.27	0.24	0.21	0.20
3000	---	----	---	---	0.32	0.29	0.25	0.25
3200	---	----	---	---	0.41	0.37	0.32	0.31
3400	---	----	---	---	0.50	0.45	0.39	0.37
3600	---	----	---	---	0.61	0.54	0.48	0.44

CEILING DIFFUSER AIR THROW DATA

Air Volume - cfm	¹ Effective Throw - ft.	
Model No.	RTD9-65S	FD9-65S
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
Model No.	RTD11-95S	FD11-95S
2600	24 - 29	19 - 24
2800	25 - 30	20 - 28
3000	27 - 33	21 - 29
3200	28 - 35	22 - 29
3400	30 - 37	22 - 30
3600	25 - 33	22 - 24

¹ Effective throw based on terminal velocities of 75 ft. per minute.

ELECTRICAL/ELECTRIC HEAT DATA - ZHA

3 TON

ZHA036S4

¹ Voltage - 60hz		208/230V - 3 Ph		460V - 3 Ph		575V - 3 Ph	
Compressor	Rated Load Amps	8.7		4		3.6	
	Locked Rotor Amps	70		31		27	
Outdoor Fan Motor	Full Load Amps	1.7		0.9		0.7	
Power Exhaust (1) 0.5 HP	Full Load Amps	1.5		0.6		0.6	
Indoor Blower Motor	Horsepower	1	1.5	1	1.5	1	1.5
	Full Load Amps	4.6	6.6	2.1	3	1.7	2.4
² Maximum Overcurrent Protection	Unit Only	25	25	15	15	15	15
	With (1) 0.5 HP Power Exhaust	25	25	15	15	15	15
³ Minimum Circuit Ampacity	Unit Only	18	20	8	9	7	8
	With (1) 0.5 HP Power Exhaust	19	21	9	10	8	9

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	480V	480V	600V	600V
² Maximum Overcurrent Protection	Unit+ Electric Heat	5 kW	35	35	35	35	20	20	15	15
		7.5 kW	40	40	40	45	20	25	20	20
		10 kW	45	50	50	50	25	25	20	20
		15 kW	60	70	60	70	35	35	25	30
³ Minimum Circuit Ampacity	Unit+ Electric Heat	5 kW	31	33	33	35	16	17	13	14
		7.5 kW	37	40	39	42	20	21	16	17
		10 kW	44	48	46	50	24	24	19	20
		15 kW	57	63	59	65	31	32	25	26
² Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	35	35	35	40	20	20	15	15
		7.5 kW	40	45	45	45	20	25	20	20
		10 kW	45	50	50	60	25	25	20	25
		15 kW	60	70	60	70	35	35	30	30
³ Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	32	34	34	36	17	18	14	15
		7.5 kW	39	42	41	44	20	21	17	18
		10 kW	45	49	47	51	24	25	20	21
		15 kW	58	64	60	66	32	33	26	27

ELECTRIC HEAT ACCESSORIES

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

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

¹ Extremes of operating range are plus and minus 10% of line voltage.² HACR type breaker or fuse.³ Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

ELECTRICAL/ELECTRIC HEAT DATA - ZHA

4 TON

ZHA048S4

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

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	480V	480V	600V	600V
² Maximum Overcurrent Protection	Unit+ Electric Heat	5 kW	40	40	40	45	20	20	15	15
		7.5 kW	45	45	45	50	25	25	20	20
		10 kW	50	60	50	60	25	30	25	25
		15 kW	60	70	70	70	35	35	30	30
		22.5 kW	80	90	90	90	45	45	40	40
³ Minimum Circuit Ampacity	Unit+ Electric Heat	5 kW	34	36	36	38	18	19	15	15
		7.5 kW	40	43	42	45	22	23	18	18
		10 kW	47	51	49	53	25	26	21	22
		15 kW	60	66	62	68	33	34	27	28
		22.5 kW	79	88	81	90	44	45	36	37
² Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	40	40	40	45	20	20	15	20
		7.5 kW	45	50	50	50	25	25	20	20
		10 kW	50	60	50	60	30	30	25	25
		15 kW	70	70	70	70	35	35	30	30
			90	90	90	100	45	50	40	40
³ Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	35	37	37	39	18	19	15	16
		7.5 kW	42	45	44	47	22	23	18	19
		10 kW	48	52	50	54	26	27	21	22
		15 kW	61	67	63	69	34	34	27	28
		22.5 kW	81	90	83	92	45	46	36	37

ELECTRIC HEAT ACCESSORIES

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

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

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

² HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA - ZHA

5 TON

ZHA060S4

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

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	480V	480V	600V	600V
² Maximum Overcurrent Protection	Unit+ Electric Heat	5 kW	45	45	45	50	25	25	15	20
		7.5 kW	50	50	50	50	30	30	20	20
		10 kW	50	60	60	60	30	30	25	25
		15 kW	70	70	70	80	40	40	30	30
		22.5 kW	90	100	90	100	50	50	40	40
³ Minimum Circuit Ampacity	Unit+ Electric Heat	5 kW	37	39	39	41	21	22	15	16
		7.5 kW	43	46	45	48	25	26	18	19
		10 kW	50	54	52	56	29	30	21	22
		15 kW	63	69	65	71	36	37	27	28
		22.5 kW	82	91	84	93	47	48	36	37
² Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	45	50	50	50	25	25	20	20
		7.5 kW	50	50	50	50	30	30	20	20
		10 kW	60	60	60	60	30	30	25	25
		15 kW	70	70	70	80	40	40	30	30
		22.5 kW	90	100	90	100	50	50	40	40
³ Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	38	40	40	42	22	23	16	17
		7.5 kW	45	48	47	50	25	26	19	20
		10 kW	51	55	53	57	29	30	22	23
		15 kW	64	70	66	72	37	38	28	29
		22.5 kW	84	93	86	95	48	49	37	38

ELECTRIC HEAT ACCESSORIES

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

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

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

² HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA - ZHB

3 TON

ZHB036S4

¹ 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	0.75	1.5	1	1.5	1	1.5	1	1.5
	Full Load Amps	7.6	11	4.6	6.6	2.1	3	1.7	2.4
² Maximum Overcurrent Protection	Unit Only	40	45	25	25	15	15	15	15
	With (1) 0.5 HP Power Exhaust	40	45	25	25	15	15	15	15
³ Minimum Circuit Ampacity	Unit Only	28	32	17	19	8	9	7	8
	With (1) 0.5 HP Power Exhaust	30	33	18	20	9	10	8	8

ELECTRIC HEAT DATA

Electric Heat Voltage			208	240	208	240	240	240	480	480	600	600
² Maximum Overcurrent Protection	Unit+ Electric Heat	5 kW	60	60	60	60	35	35	15	20	15	15
		7.5 kW	70	70	70	80	40	45	20	20	20	20
		10 kW	80	80	80	90	50	50	25	25	20	20
		15 kW	100	110	100	110	70	70	30	35	25	30
³ Minimum Circuit Ampacity	Unit+ Electric Heat	5 kW	51	54	54	58	32	34	15	17	13	14
		7.5 kW	62	67	65	71	40	42	19	20	16	17
		10 kW	73	80	77	84	47	49	23	24	19	20
		15 kW	96	106	99	110	62	64	30	32	25	26
² Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	60	60	60	60	35	40	20	20	15	15
		7.5 kW	70	70	70	80	45	45	20	25	20	20
		10 kW	80	90	80	90	50	60	25	25	20	20
		15 kW	100	110	110	125	70	70	35	35	25	30
³ Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	52	56	56	59	34	36	16	17	13	14
		7.5 kW	64	69	67	72	41	43	20	21	16	17
		10 kW	75	82	78	85	49	51	23	25	19	20
		15 kW	97	108	101	111	64	66	31	32	25	26

ELECTRIC HEAT ACCESSORIES

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

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

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

² HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA - ZHB

4 TON

ZHB048S4

1 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	0.75	1.5	1	1.5	1	1.5	1	1.5
	Full Load Amps	7.6	11	4.6	6.6	2.1	3	1.7	2.4
2 Maximum Overcurrent Protection	Unit Only	50	50	30	30	15	15	15	15
	With (1) 0.5 HP Power Exhaust	50	50	30	30	15	15	15	15
3 Minimum Circuit Ampacity	Unit Only	35	38	21	23	10	11	9	9
	With (1) 0.5 HP Power Exhaust	36	40	22	24	11	12	9	10

ELECTRIC HEAT DATA

Electric Heat Voltage			208	240	208	240	208	240	208	240	480	480	600	600
2 Maximum Overcurrent Protection	Unit+ Electric Heat	5 kW	70	70	70	70	40	40	40	45	20	20	15	15
		7.5 kW	80	80	80	80	45	45	45	50	25	25	20	20
		10 kW	90	90	90	90	50	60	50	60	25	30	25	25
		15 kW	110	125	110	125	60	70	70	70	35	35	30	30
		22 kW	150	175	150	175	80	90	90	90	45	45	40	40
3 Minimum Circuit Ampacity	Unit+ Electric Heat	5 kW	57	61	61	64	34	36	36	38	18	19	15	15
		7.5 kW	69	74	72	77	40	43	42	45	22	23	18	18
		10 kW	80	87	83	90	47	51	49	53	25	26	21	22
		15 kW	103	113	106	116	60	66	62	68	33	34	27	28
		22 kW	136	152	140	155	79	88	81	90	44	45	36	37
2 Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	70	70	70	80	40	40	40	45	20	20	15	20
		7.5 kW	80	80	80	90	45	50	50	50	25	25	20	20
		10 kW	90	90	90	100	50	60	50	60	30	30	25	25
		15 kW	110	125	110	125	70	70	70	70	35	35	30	30
		22 kW	150	175	150	175	90	90	90	100	45	50	40	40
3 Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	59	62	62	66	35	37	37	39	18	19	15	16
		7.5 kW	70	75	74	79	42	45	44	47	22	23	18	19
		10 kW	81	88	85	92	48	52	50	54	26	27	21	22
		15 kW	104	114	107	118	61	67	63	69	34	34	27	28
		22 kW	138	153	141	157	81	90	83	92	45	46	36	37

ELECTRIC HEAT ACCESSORIES

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

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

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

2 HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA - ZHB

5 TON

ZHB060S4

¹ 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	0.75	1.5	1	1.5	1	1.5	1	1.5
	Full Load Amps	7.6	11	4.6	6.6	2.1	3	1.7	2.4
² Maximum Overcurrent Protection	Unit Only	50	60	35	35	20	20	15	15
	With (1) 0.5 HP Power Exhaust	60	60	35	40	20	20	15	15
³ Minimum Circuit Ampacity	Unit Only	37	41	24	26	14	14	9	10
	With (1) 0.5 HP Power Exhaust	39	42	25	27	14	15	10	11

ELECTRIC HEAT DATA

Electric Heat Voltage			208	240	208	240	208	240	208	240	480	480	600	600
² Maximum Overcurrent Protection	Unit+ Electric Heat	5 kW	70	70	80	80	45	45	45	50	25	25	15	20
		7.5 kW	80	90	80	90	50	50	50	50	25	30	20	20
		10 kW	90	100	90	100	50	60	60	60	30	30	25	25
		15 kW	110	125	110	125	70	70	70	80	40	40	30	30
		22 kW	150	175	150	175	90	90	90	100	50	50	40	40
³ Minimum Circuit Ampacity	Unit+ Electric Heat	5 kW	60	63	63	67	36	38	39	41	21	22	15	16
		7.5 kW	71	76	75	80	42	45	45	48	24	26	18	19
		10 kW	83	90	86	93	49	53	52	56	28	30	21	22
		15 kW	105	116	109	119	62	68	65	71	36	37	27	28
		22 kW	139	155	142	158	81	90	84	93	47	48	36	37
² Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	70	80	80	80	45	45	50	50	25	25	20	20
		7.5 kW	80	90	90	90	50	50	50	50	30	30	20	20
		10 kW	90	100	100	100	50	60	60	60	30	30	25	25
		15 kW	110	125	110	125	70	70	70	80	40	40	30	30
		22 kW	150	175	150	175	90	100	90	100	50	50	40	40
³ Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	5 kW	61	65	65	68	37	39	40	42	21	23	16	17
		7.5 kW	73	78	76	81	44	47	47	50	25	26	19	20
		10 kW	84	91	87	94	50	54	53	57	29	30	22	23
		15 kW	107	117	110	120	63	69	66	72	36	38	28	29
		22 kW	140	156	144	160	83	92	86	95	48	49	37	38

ELECTRIC HEAT ACCESSORIES

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

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

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

² HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA

6 TON

ZHB072S4

¹ Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor	Rated Load Amps	22.4			10.6			7.7		
	Locked Rotor Amps	149			75			54		
Outdoor Fan Motor	Full Load Amps	2.4			1.3			1		
Power Exhaust (1) 0.5 HP	Full Load Amps	1.5			0.6			0.6		
Indoor Blower Motor	Horsepower	1	1.5	2	1	1.5	2	1	1.5	2
	Full Load Amps	4.6	6.6	7.5	2.1	3	3.4	1.7	2.4	2.7
² Maximum Overcurrent Protection	Unit Only	50	50	60	25	25	25	20	20	20
	With (1) 0.5 HP Power Exhaust	50	60	60	25	25	25	20	20	20
³ Minimum Circuit Ampacity	Unit Only	35	37	38	17	18	18	13	14	14
	With (1) 0.5 HP Power Exhaust	37	39	40	18	19	19	13	14	14

ELECTRIC HEAT DATA

Electric Heat Voltage			208	240	208	240	208	240	480	480	480	600	600	600
² Maximum Overcurrent Protection	Unit+ Electric Heat	7.5 kW	70	70	70	70	70	70	35	35	35	25	25	25
		10 kW	70	80	80	80	80	80	35	40	40	25	30	30
		15 kW	80	90	90	90	90	90	45	45	45	35	35	35
		22 kW	100	110	100	110	100	110	60	60	60	40	45	45
		30 kW	125	150	125	150	125	150	70	70	70	50	50	50
³ Minimum Circuit Ampacity	Unit+ Electric Heat	7.5 kW	55	58	57	60	58	61	28	29	30	22	23	23
		10 kW	62	66	64	68	64	68	32	33	33	25	26	26
		15 kW	75	81	77	83	77	84	40	41	41	31	32	32
		22 kW	94	103	96	105	97	106	51	52	52	40	41	41
		30 kW	114	126	116	128	117	129	62	63	64	49	50	50
² Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	7.5 kW	70	70	70	70	70	70	35	35	35	25	25	25
		10 kW	70	80	80	80	80	80	35	40	40	30	30	30
		15 kW	90	90	90	90	90	90	45	45	45	35	35	35
		22 kW	100	110	100	110	100	110	60	60	60	40	45	45
		30 kW	125	150	125	150	125	150	70	70	70	50	50	60
³ Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.5 HP Power Exhaust	7.5 kW	57	60	59	62	59	62	29	30	30	22	23	23
		10 kW	63	67	65	69	66	70	33	34	34	25	26	26
		15 kW	76	82	78	84	79	85	40	41	42	31	32	32
		22 kW	96	105	98	107	99	108	52	52	53	40	41	41
		30 kW	115	127	117	129	118	130	63	64	64	50	50	51

ELECTRIC HEAT ACCESSORIES

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

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

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

² HACR type breaker or fuse.

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

ELECTRIC HEAT CAPACITIES

Input Voltage	5 kW			7.5 kW			10 kW		
	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
220	1	4.2	14,300	1	6.3	21,500	1	8.4	28,700
230	1	4.6	15,700	1	6.9	23,500	1	9.2	31,400
240	1	5.0	17,100	1	7.5	25,600	1	10.0	34,200
440	1	4.2	14,300	1	6.3	21,500	1	8.4	28,700
460	1	4.6	15,700	1	6.9	23,500	1	9.2	31,400
480	1	5.0	17,100	1	7.5	25,600	1	10.0	34,200
550	1	4.2	14,300	1	6.3	21,500	1	8.4	28,700
575	1	4.6	15,700	1	6.9	23,500	1	9.2	31,400
600	1	5.0	17,100	1	7.5	25,600	1	10.0	34,200
Input Voltage	15 kW			22.5 kW			30 kW		
	No of Stages	kW input	Btuh Output	No of Stages	kW input	Btuh Output	No of Stages	kW input	Btuh Output
208	1	11.2	38,400	1	16.9	57,700	1	22.5	76,800
220	1	12.6	43,000	1	18.9	64,500	1	25.2	86,000
230	1	13.8	47,000	1	20.7	70,700	1	27.5	93,900
240	1	15.0	51,200	1	22.5	76,800	1	30.0	102,400
440	1	12.6	43,000	1	18.9	64,500	1	25.2	86,000
460	1	13.8	47,000	1	20.7	70,700	1	27.5	93,900
480	1	15.0	51,200	1	22.5	76,800	1	30.0	102,400
550	1	12.6	43,000	1	18.9	64,500	1	25.2	86,000
575	1	13.8	47,000	1	20.7	70,700	1	27.5	93,900
600	1	15.0	51,200	1	22.5	76,800	1	30.0	102,400

ZHA/ZHB PARTS ARRANGEMENT

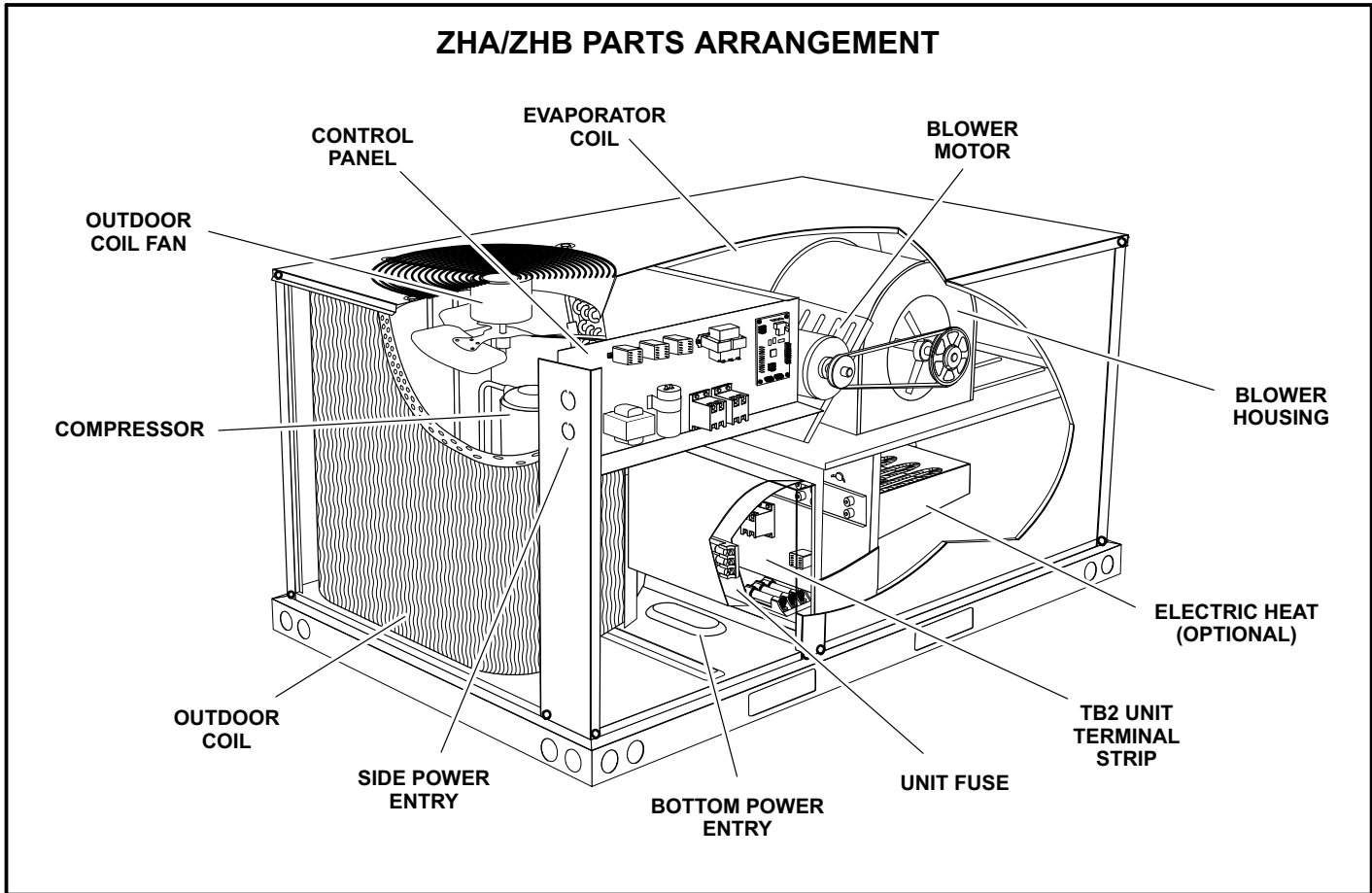


FIGURE 1

ZHA/ZHB CONTROL BOX

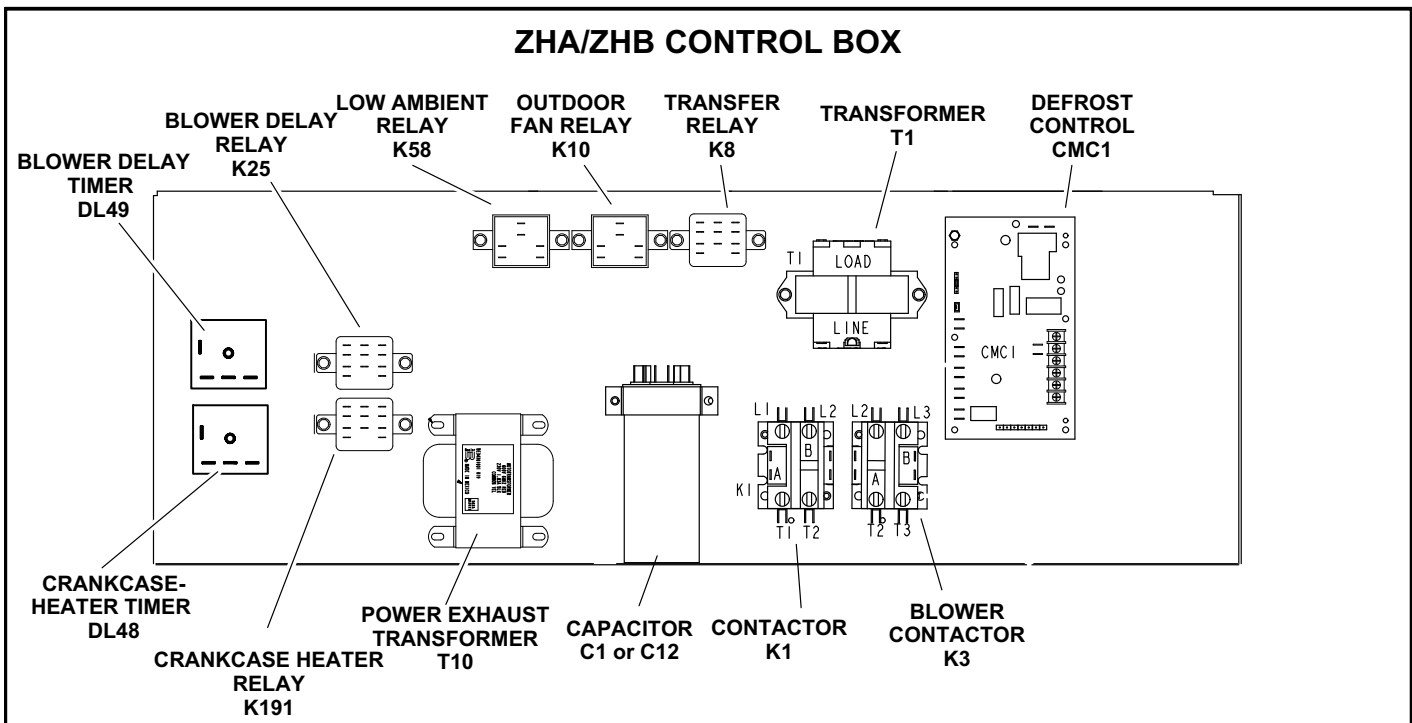


FIGURE 2

I-UNIT COMPONENTS

The ZHA/ZHB 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

ZHA/ZHB 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

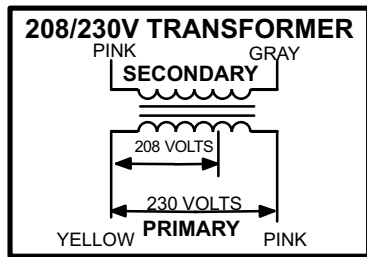


FIGURE 3

2-Fan Capacitor C1 (three phase)

Fan capacitor 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 ZHA/ZHB 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-Transfer Relay K8

K8 is a two-pole relay with a 24V coil used to de-energize the reversing valve and energize the blower during a heat call. On a first stage heat call, K8-1 N.O. terminals close to energize blower contactor K3. At the same time K8-1 N.C. terminals open to interrupt the signal at CMC1 terminal O. This enables CMC1 to de-energize the reversing valve for heating mode. Without K8 the reversing valve would remain energized at all times.

7-Condenser Fan Relay K10 (G, J voltage)

Outdoor fan relay K10 is a DPDT relay with a 24VAC coil. K10 relay coil is in series with CMC1 fan contacts and energizes B4 outdoor fan via K10-1 n.o. contacts.

8-Crankcase Heater Delay DL48 & Crankcase Heater Relay K191

Delay DL48 and relay K191 keep the crankcase heater de-energized during and immediately following compressor shut down. They ensure the crankcase heater is off while the compressor is energized. DL48 and K191 are used together on ZHB036,-048 and -060 units. K191 is used without DL48 on ZHB072.

9-Blower Delay DL49 & Blower Relay K25

Delay DL49 and relay K25 keep the blower energized for 30 seconds immediately following compressor shut down after heating or cooling demand.

10-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.

11-Defrost Control CMC1

The defrost thermostat and the defrost control work together to ensure that the heat pump outdoor coil does not ice excessively during the heating mode.

Compressor Accumulated Run-Time Interval

The defrost control will not energize a defrost cycle unless the unit has been operating in heating mode for an accumulated 90 minutes (default). The run time interval can be changed by moving the jumper on the CMC1 board timing pins. See figure 4.

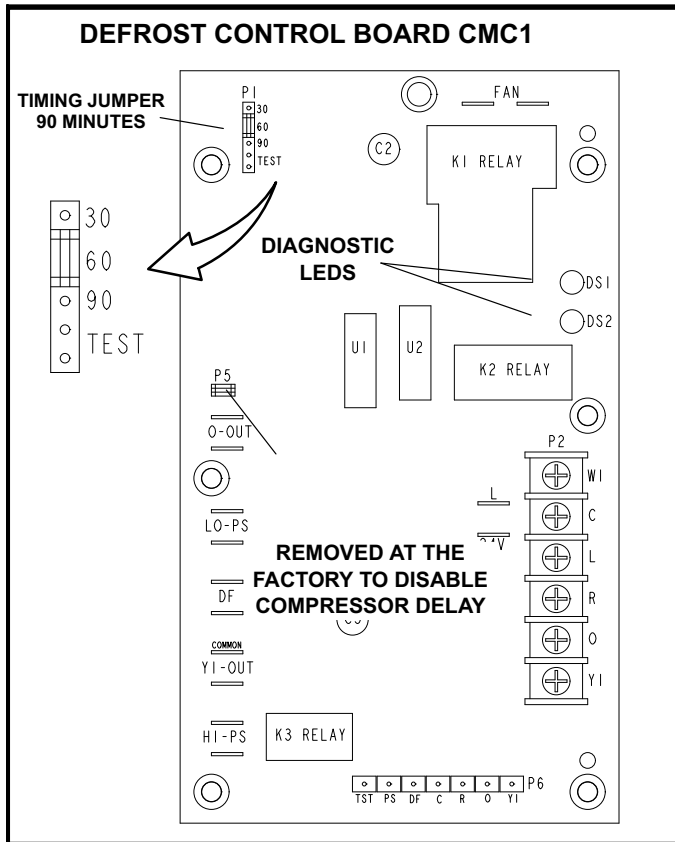


FIGURE 4

The defrost interval can be adjusted to 30, 60, or 90 minutes. The defrost timing jumper is factory-installed to provide a 90-minute defrost interval. If the timing selector jumper is not in place, the control defaults to a 90-minute defrost interval.

Defrost Test Option

A TEST option is provided for troubleshooting. The TEST mode may be started any time the unit is in the heating mode and the defrost thermostat is closed or jumpered. If the timing jumper is in the TEST position at power-up, the defrost control will ignore the test pins. When the jumper is placed across the TEST pins for two seconds, the control will enter the defrost mode. If the jumper is removed before an additional 5-second period has elapsed (7 seconds total), the unit will remain in defrost mode until the defrost switch opens

or 14 minutes have passed. If the jumper is not removed until after the additional 5-second period has elapsed, the defrost will terminate and the test option will not function again until the jumper is removed and re-applied.

Diagnostic LEDs

The defrost board uses two LEDs for diagnostics. The LEDs flash a sequence according to the condition.

TABLE 1

Defrost Control Board Diagnostic LED		
Mode	Green LED (DS2)	Red LED (DS1)
No power to control	OFF	OFF
Normal operation / power to control	Simultaneous Slow FLASH	
Anti-short cycle lockout	Alternating Slow FLASH	
High pressure switch fault	Slow FLASH	OFF
High pressure switch lockout	ON	OFF

12-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 reclaiming 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.

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 1-800-453-6669.

! 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.**

13-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 S5 high temperature limit and HI PS contacts on CMC1 defrost control board.

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

When discharge pressure drops to 475 ± 20 (3275 ± 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

14-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 B4 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 ± 10 psig (3102 ± 69 kPa), the switch closes and the condenser fan is energized. When liquid pressure drops to 240 ± 10 psig (1655 ± 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.

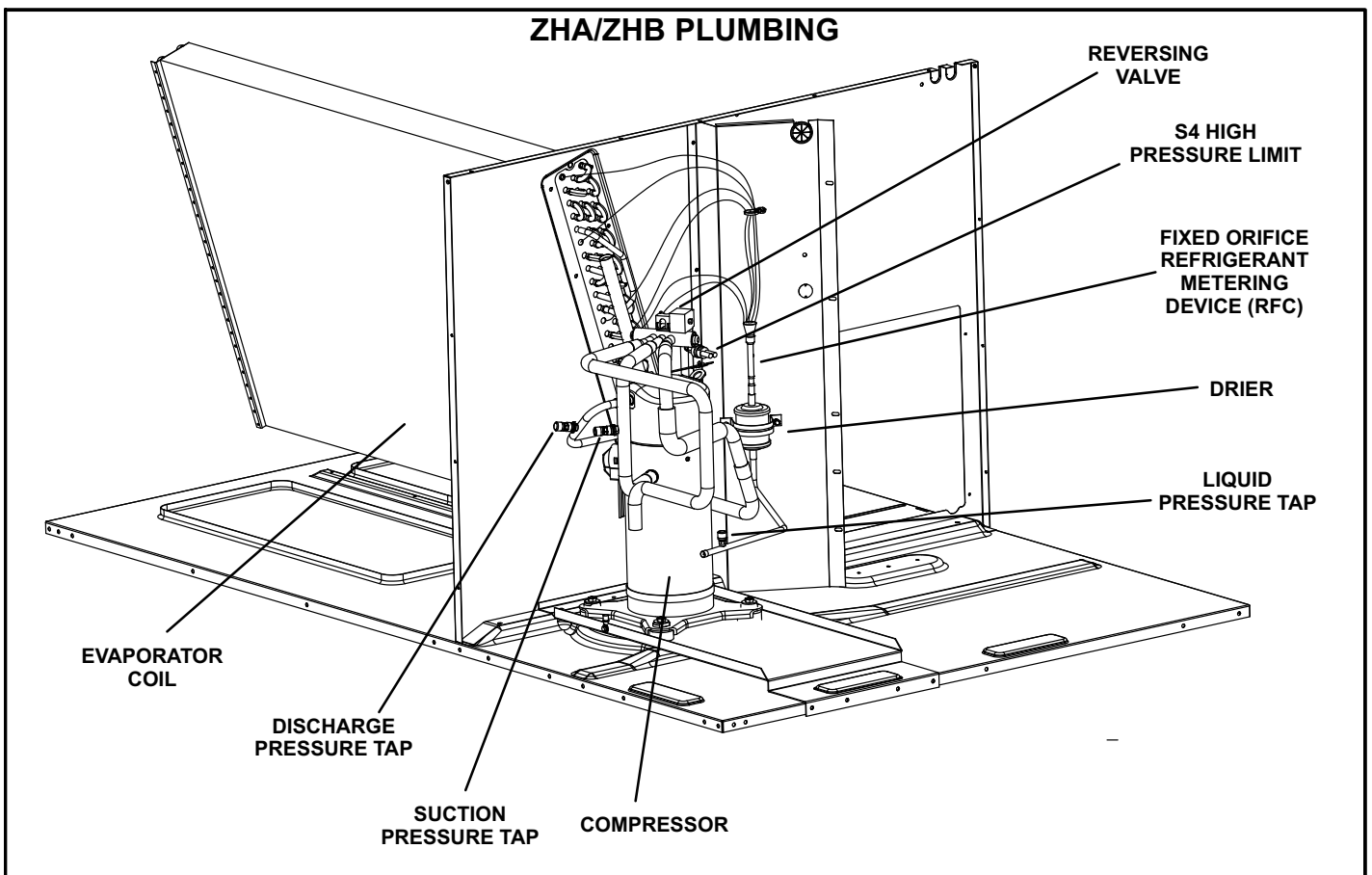


FIGURE 5

15-Low Ambient Kit Relay K58

(option used with S11 low ambient switch)

Low ambient relay K58 is a N.C. SPDT relay with a 24V coil wired in parallel with reversing valve L1. When L1 is energized in the cooling cycle, K58 is also energized opening K58-1. Therefore, K58-1 is always closed during heating demand bypassing S11. This allows the fan to operate during the heating demand and cycle during the cooling demand.

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

S3 is a thermostat which opens on temperature drop. It is wired in line with K8-2 N.C. contacts to CMC1 defrost control.

17-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 $169^{\circ}\text{F} \pm 18^{\circ}\text{F}$ ($76^{\circ}\text{C} \pm 10^{\circ}\text{C}$). Refer to 13-High Pressure Switch S4 for five strike lockout feature.

B-Blower Compartment

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

1-Blower Wheels

All ZHA units and ZHB 036 and 048 units use 10" x 10" (254 mm x 254 mm) blower wheels. The ZHB060 and 072 use a 15" x 9" blower wheel.(381 mm x 228 mm)

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 6.

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

- 2 Measure the indoor blower wheel RPM.
- 3- Referring to the blower tables starting on Page 6, 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 7. Do not exceed minimum and maximum number of pulley turns as shown in table 2.

**TABLE 2
MINIMUM AND MAXIMUM PULLEY ADJUSTMENT**

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

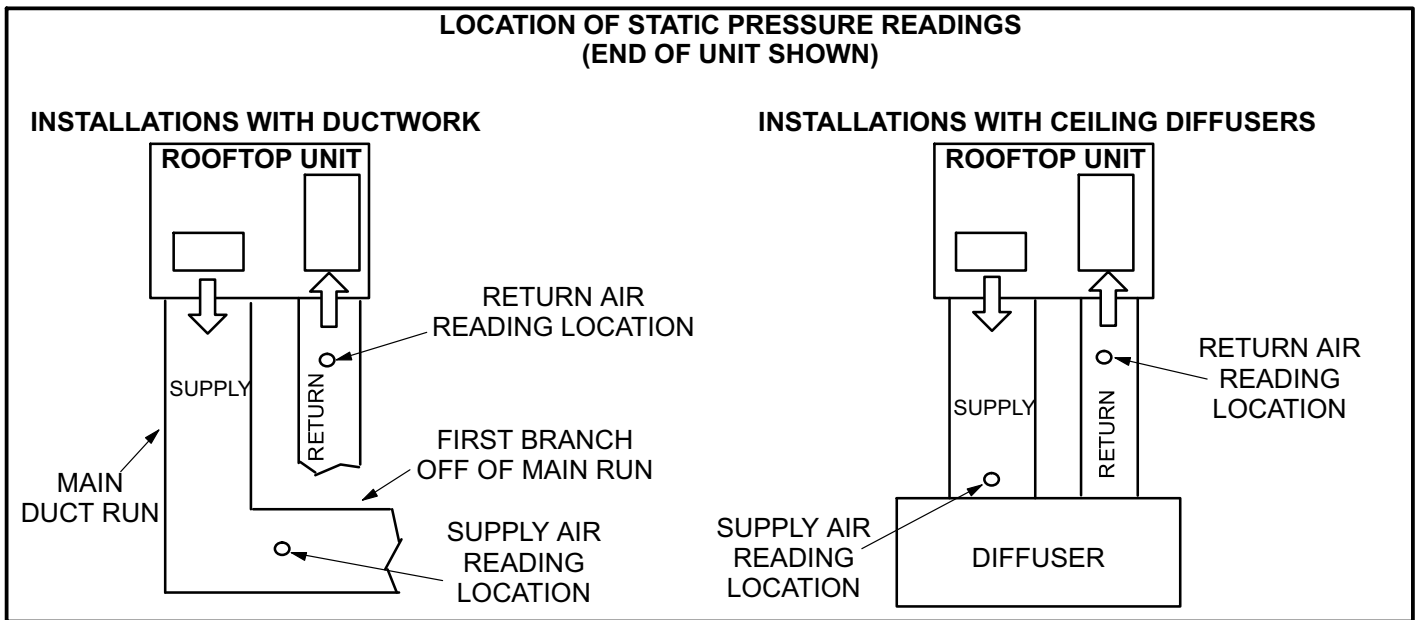


FIGURE 6

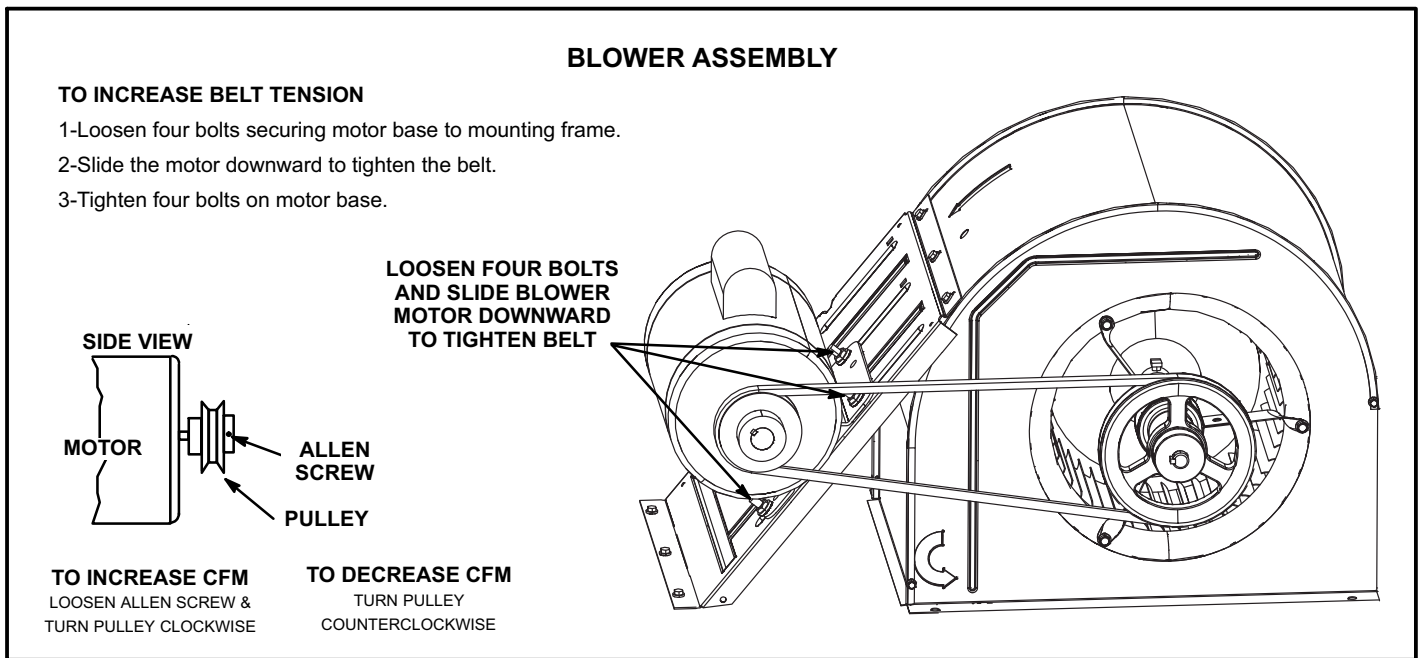


FIGURE 7

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 8.

- 1- Loosen four bolts securing motor base to mounting frame. See figure 7.
- 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 de-

creases the distance between the blower motor and the blower housing.

- 4- Tighten four bolts securing motor base to the mounting frame.

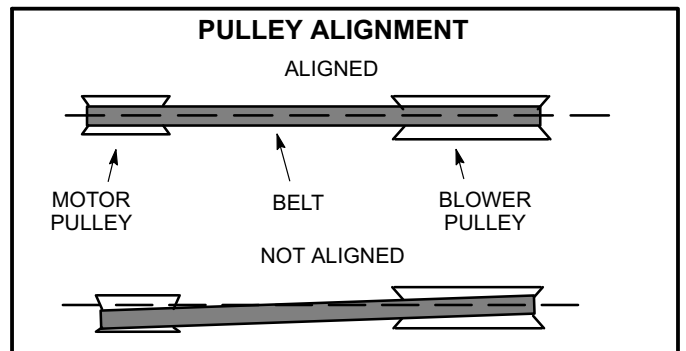


FIGURE 8

D-Check Belt Tension

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

- 1- Measure span length X. See figure 9.

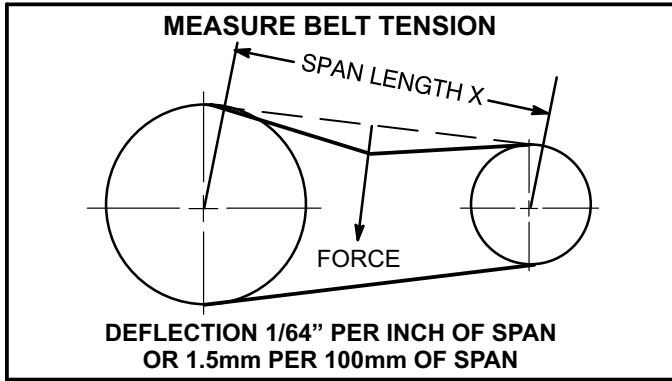


FIGURE 9

- 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.

F-Field-Furnished Blower Drives

See blower data tables for field-furnished blower drives to determine BHP and RPM required. See table 3 for drive component manufacturers numbers.

G-Units With Electric Heat

Units with electric heat (5-22.5kW) can operate up to 1.6" w.g. maximum static pressure. See table 4 for minimum air flow.

**TABLE 3
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
ZAA01	1VP34 X 7/8	31K69	AK69 X 1	37L47	AX51	13H01
ZAA02	1VP40 X 7/8	79J03	BK80H	100788-03	A53	100245-40
ZAA03	1VP40 X 7/8	79J03	AK59 X 1	31K68	A50	100245-29
ZAA04	1VP44 X 7/8	P-8-1488	AK59 X 1	31K68	AX51	13H01

**TABLE 4
MINIMUM AIRFLOW - UNITS WITH ELECTRIC HEAT**

kW	CFM - Downflow and Horizontal	
	ZHB036-048	ZHB060, 072
5	960	1750
7.5	960	1750
10	960	1750
15	960	1750
22.5	1280	1750

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 10. See figure 11 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 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 5 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 11.

TABLE 5
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

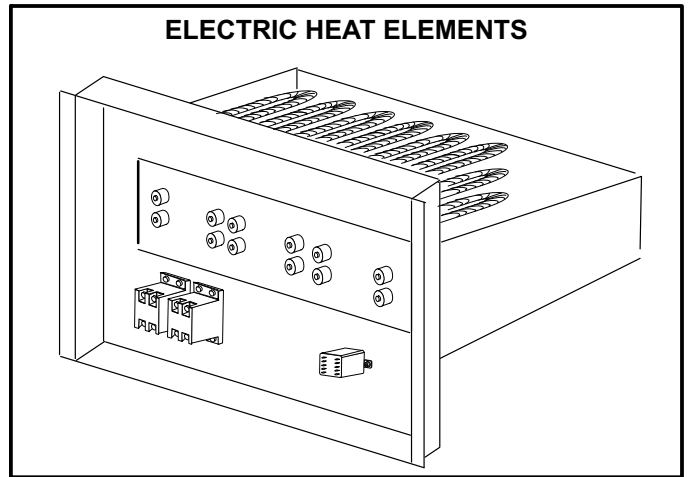


FIGURE 10

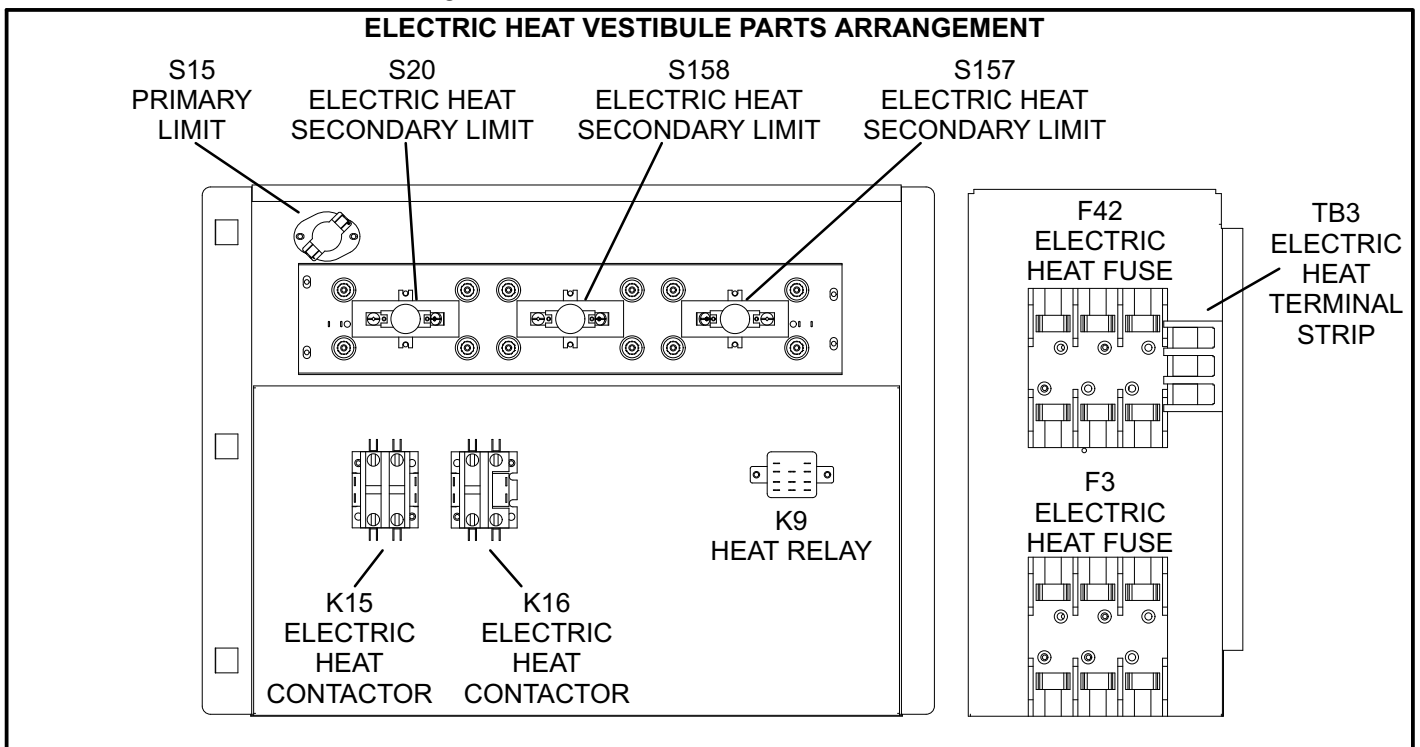


FIGURE 11

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°F ± 6°F (82°C ± 3.3°C) on a temperature rise and can be manually reset when temperature falls below 160°F (71.0°C). See figure 11 for location. On 22.5kW (P, G and J volt) units, S15 opens at 190°F ± 6°F (88°C ± 3.3°C).

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 11 and table 6 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 the ZHA/ZHB 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.

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 6

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-Heating Start-Up

- 1- Set thermostat or temperature control device to initiate a first-stage heating demand.
- 2- A first-stage heating demand (W1) will energize compressors 1 and the outdoor fan.

Note - L1 reversing valve is de-energized in the heating mode.

ZH Units With Optional Electric Heat -

An increased heating demand (W2) will energize electric heat. Electric heat is also energized during the defrost cycle (W1) to maintain discharge air temperature.

C-Cooling Start-Up

- 1- Set thermostat or temperature control device fan switch to **AUTO** or **ON**. Set thermostat or temperature control device to initiate a first-stage cooling demand. A first-stage Y1 cooling demand will energize L1 reversing valve solenoid and compressor 1.

Units With Optional Economizer -

The optional economizer will start on a first stage (Y1) cooling demand when outdoor air is suitable. An increased cooling demand (Y2) will energize compressor 1.

- 2 Refrigerant circuits are factory charged with R-410A refrigerant. See unit rating plate for correct amount of charge.

D-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.

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, reclaim the charge, evacuate the system, and add required nameplate charge.

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

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

IMPORTANT - Charge unit in standard cooling mode high stage only.

- 2 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 7 - 9) to the pressures obtained from the gauges. Check unit components if there are significant differences.
- 2 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.

- 6- 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.
- 7- Add or remove charge in increments. Allow the system to stabilize each time refrigerant is added or removed.
- 8- 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.
- 9- Example ZH 036: At 95°F outdoor ambient and a measured suction pressure of 130psig, the target liquid temperature is 105.5°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquid temperature agrees with the target liquid temperature.

**TABLE 7
ZHA 036 NORMAL OPERATING PRESSURES - FIN/TUBE 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)
119	235	122	272	124	314	126	359	129	409	132	461
128	241	130	279	132	319	136	364	146	421	140	470
139	245	146	285	151	331	155	377	155	428	159	482
145	248	154	290	163	335	170	384	174	438	179	498

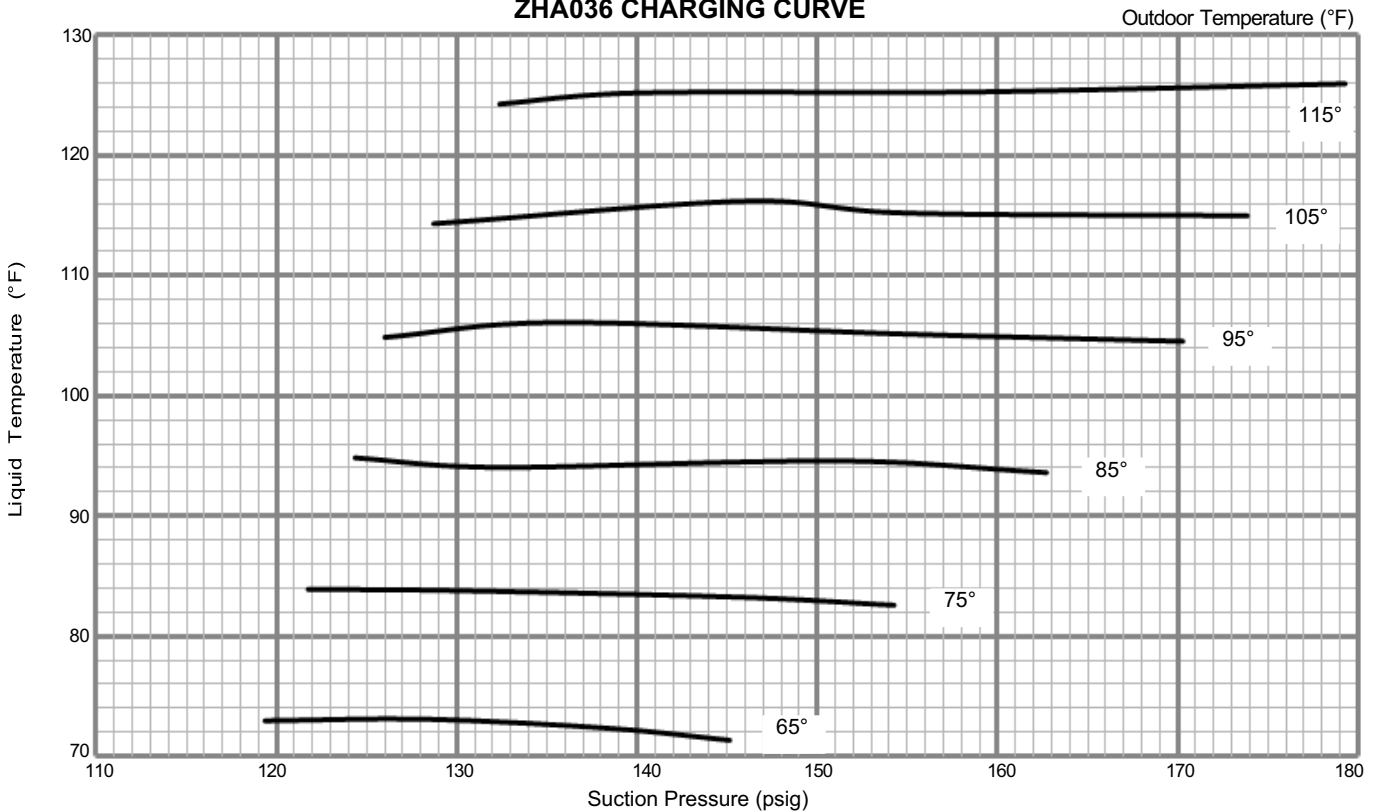
**TABLE 8
ZHA 048 NORMAL OPERATING PRESSURES - FIN/TUBE COIL**

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)
113	253	116	293	119	336	122	383	125	435	128	492
121	258	123	297	126	341	129	387	133	440	137	498
133	267	138	308	143	354	146	401	151	459	154	516
140	273	148	317	155	366	161	418	167	475	172	536

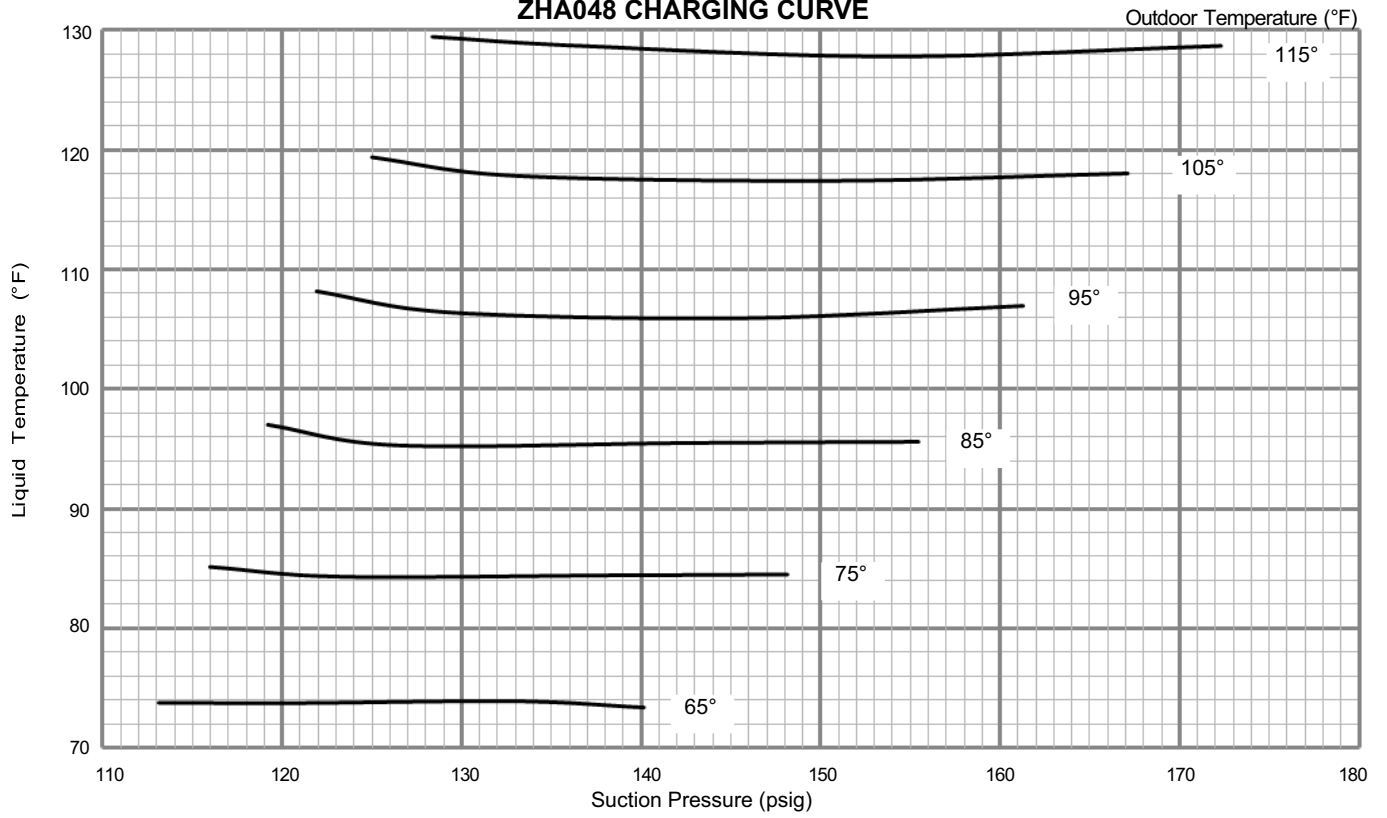
**TABLE 9
ZHA 060 NORMAL OPERATING PRESSURES - FIN/TUBE COIL**

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)
113	254	115	292	119	335	122	380	125	430	128	487
121	260	123	299	126	343	130	391	134	440	137	496
130	265	138	308	143	354	147	404	151	456	154	513
136	270	145	315	153	364	160	414	167	471	172	529

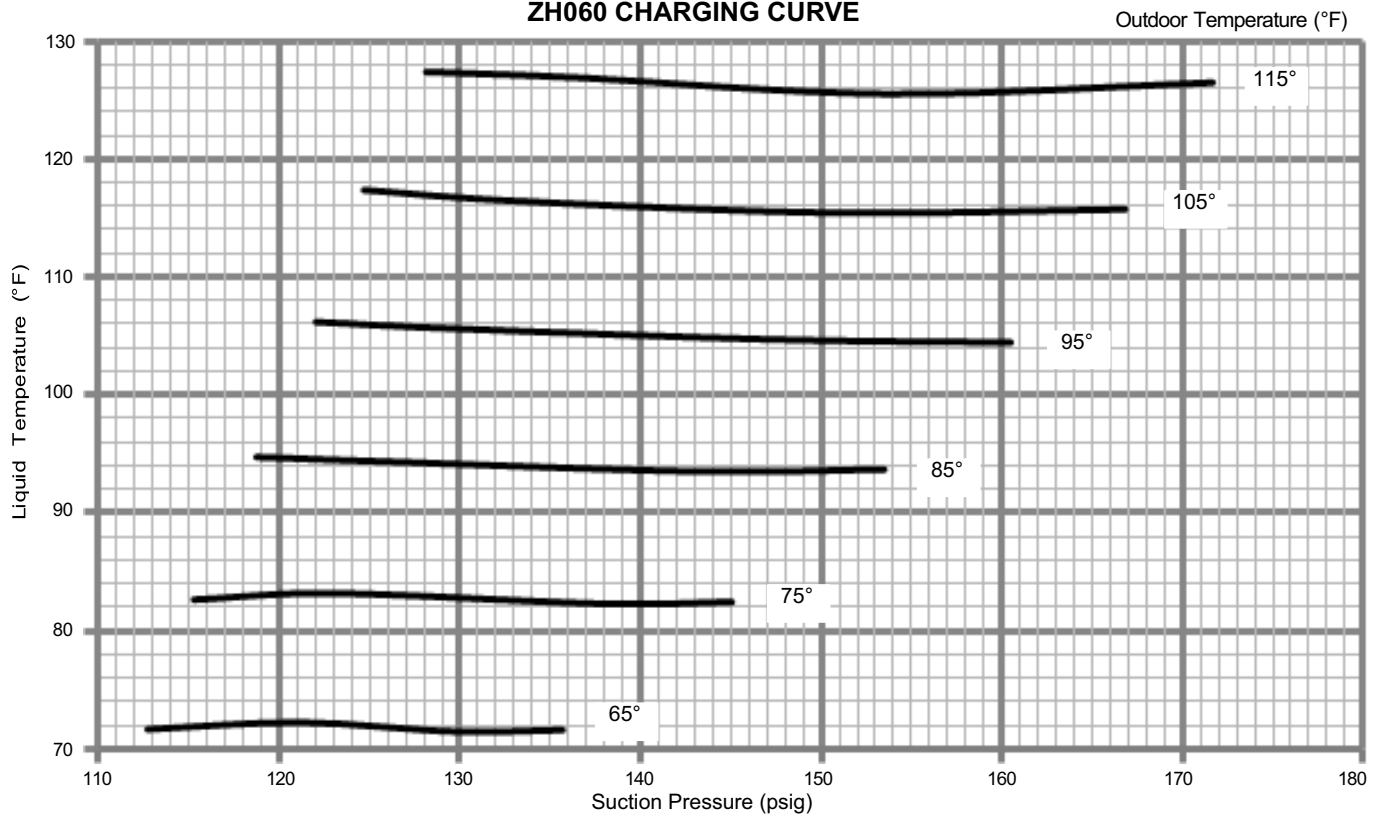
ZHA036 CHARGING CURVE



ZHA048 CHARGING CURVE



ZH060 CHARGING CURVE



**TABLE 10
ZHB036 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)
119	236	122	274	125	315	128	361	130	410	133	464
126	239	128	278	132	320	136	366	138	416	141	471
135	245	144	285	151	330	153	380	158	429	161	487
140	250	151	290	159	335	167	385	174	440	178	498

**TABLE 11
ZHB048 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)
116	248	119	287	121	328	123	374	126	423	128	477
123	252	127	292	129	336	132	382	135	433	137	487
133	260	140	302	145	347	148	395	152	451	156	505
137	264	146	308	154	357	162	409	168	464	173	523

**TABLE 12
ZHB060 NORMAL OPERATING PRESSURES**

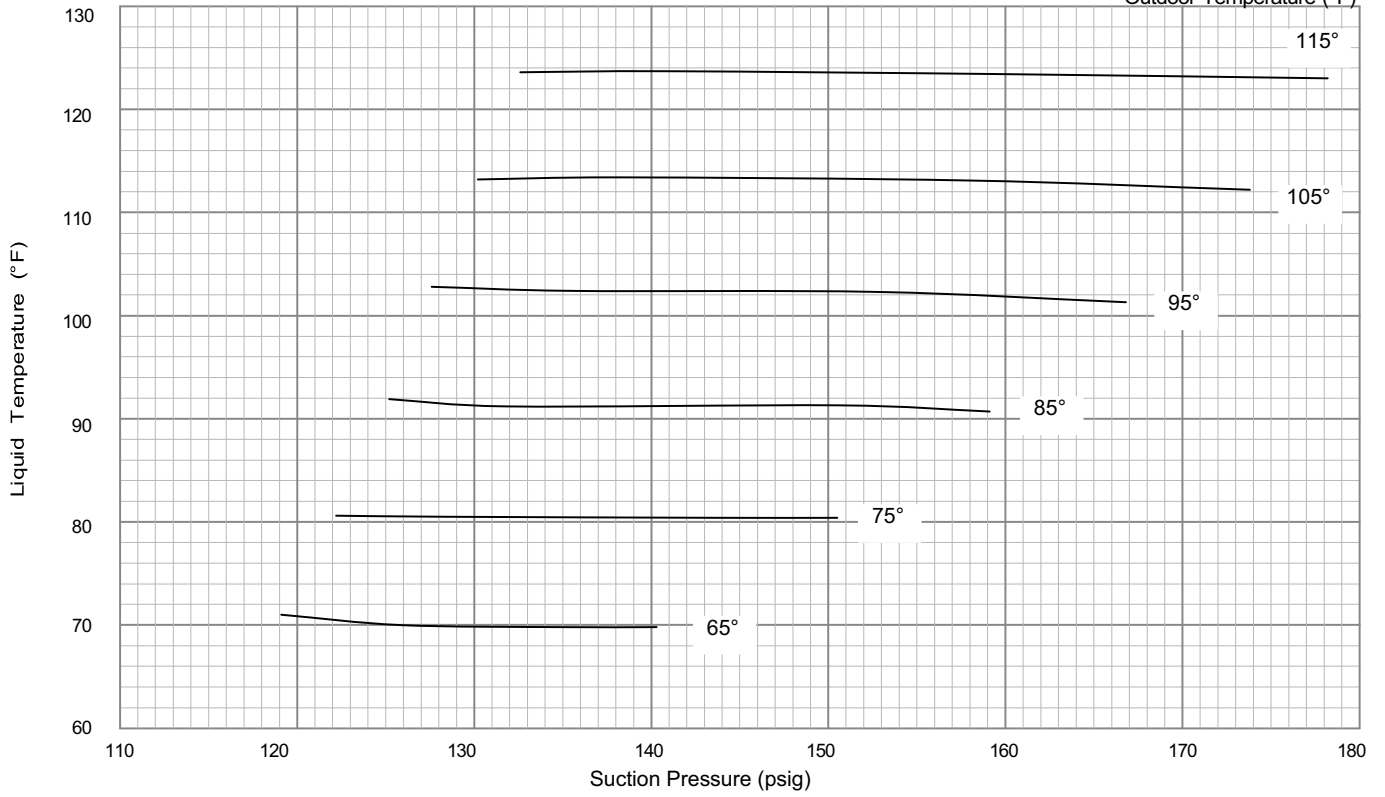
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
114	255	118	297	120	338	123	387	126	433	130	487
121	257	125	298	131	350	131	389	134	443	137	504
131	267	138	311	144	362	148	410	152	457	153	524
137	269	143	315	154	364	162	417	167	474	169	534

**TABLE 13
ZHB072S 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)
100	254	102	294	105	340	108	390	112	445	117	506
108	258	110	299	113	344	116	394	121	451	125	513
123	269	127	310	130	357	134	408	136	464	141	572
134	277	142	322	148	371	153	423	157	481	162	544

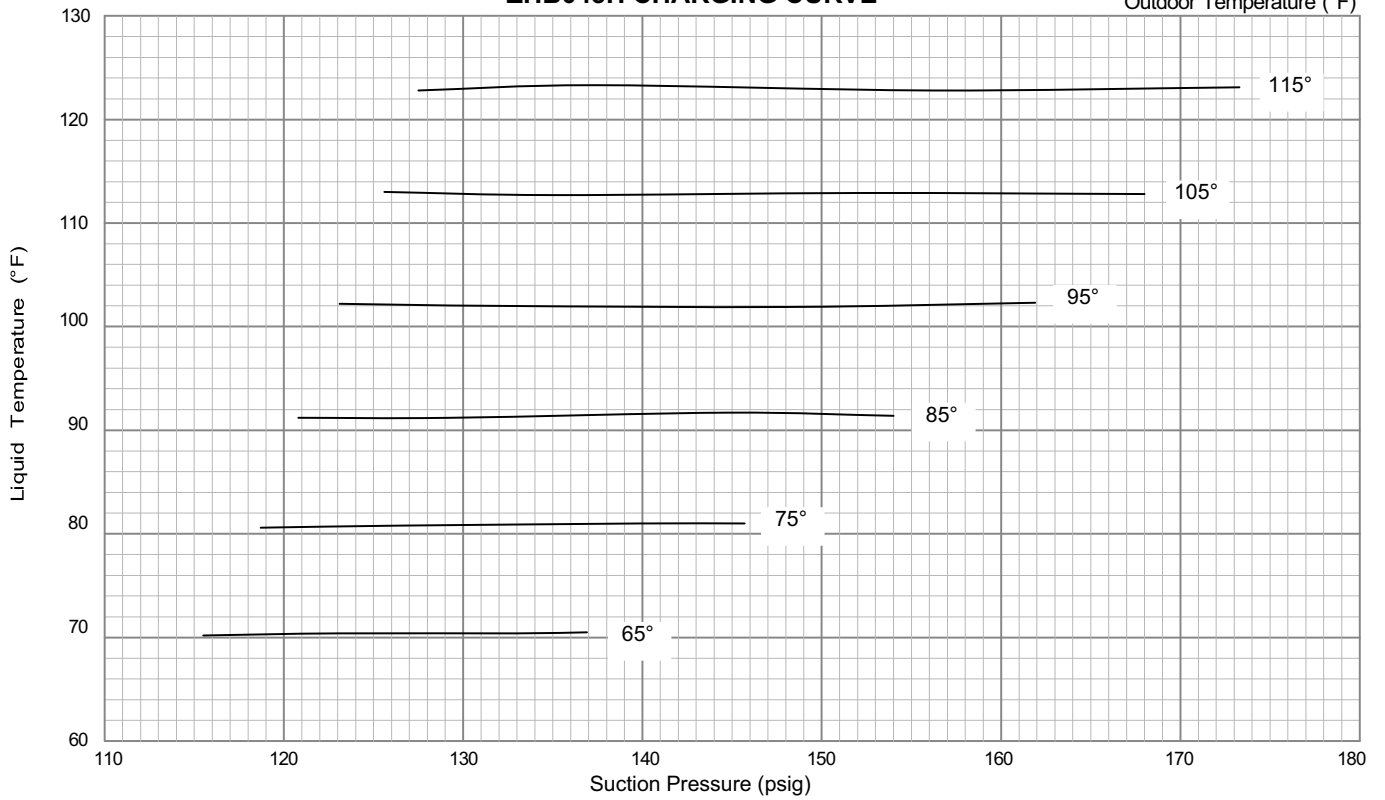
ZHB036H CHARGING CURVE

Outdoor Temperature (°F)



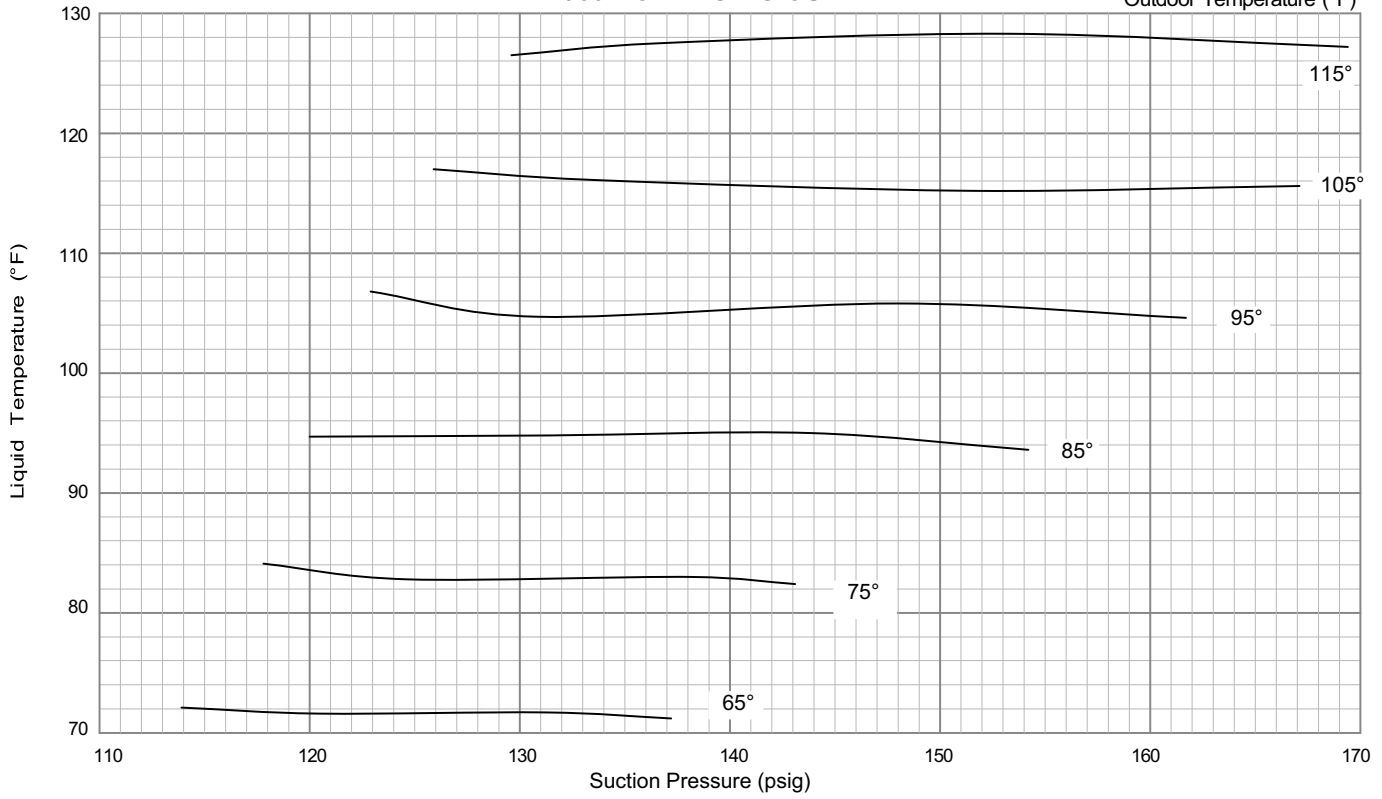
ZHB048H CHARGING CURVE

Outdoor Temperature (°F)



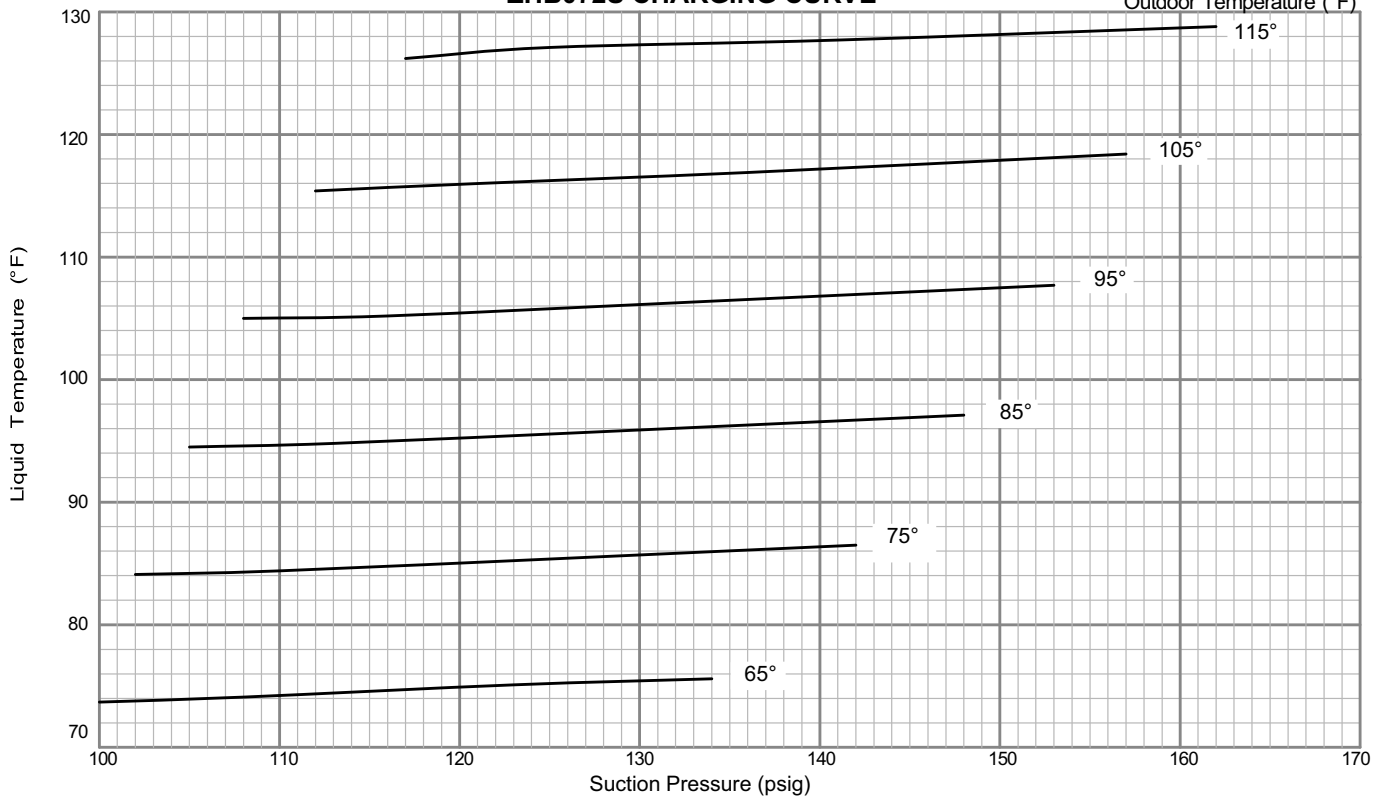
ZHB060H CHARGING CURVE

Outdoor Temperature (°F)



ZHB072S CHARGING CURVE

Outdoor Temperature (°F)



V- SYSTEM SERVICE CHECKS

A-Cooling System Service Checks

ZHA/ZHB 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 7 through 9.

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. See table 14 for correct filter size. Refer to local codes or appropriate jurisdiction for approved filters.

**TABLE 14
UNIT FILTERS**

Unit	Qty	Filter Size - inches (mm)
ZHA036, ZHA048	4	14 X 20 X 2 (352 X 508 X 51)
ZHA060, ZHB036	4	16 X 20 X 2 (406 X 508 X 51)
ZHB048, ZHB060, ZHB072	2 Each	16 X 20 X 2 (406 X 508 X 51) 20 X 20 X 2 (508 X 508 X 51)

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 12. Lift filter stop to remove filters. See figure 13.

⚠ 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.

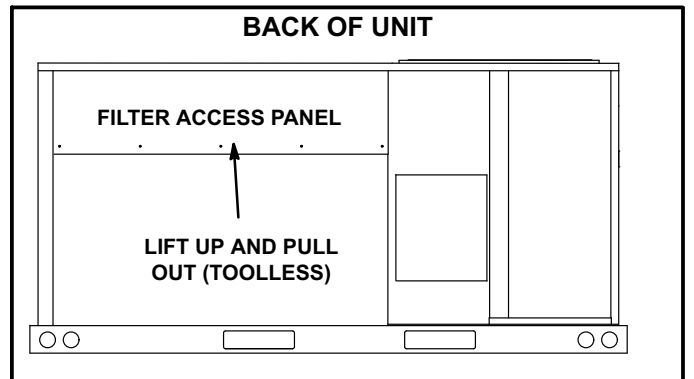


FIGURE 12

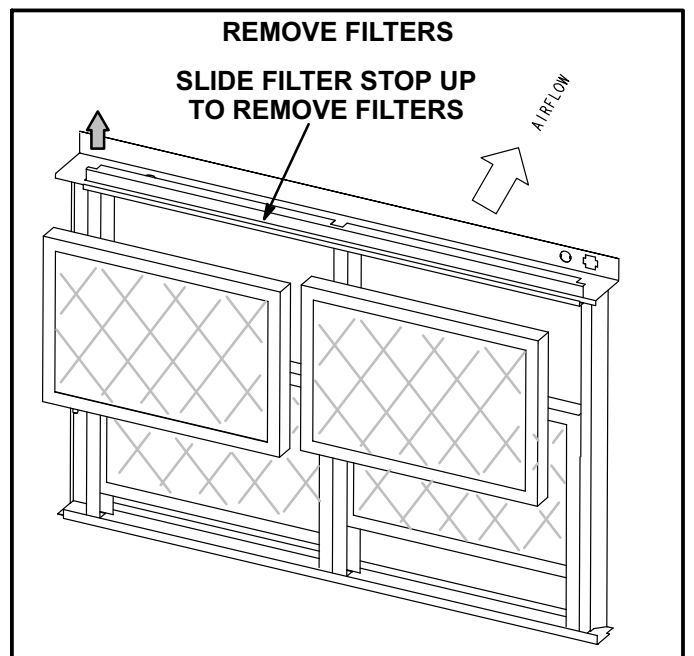


FIGURE 13

B-Lubrication

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

C-Indoor 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-Outdoor Coil

Clean condenser coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season. Outdoor coils are made of single and two formed slabs. On units with two slabs, dirt and debris may become trapped between the slabs. To clean between slabs, carefully separate coil slabs and wash them thoroughly. See figure 14. Flush coils with water following cleaning.

Note - Remove all screws and gaskets prior to cleaning procedure and replace upon completion.

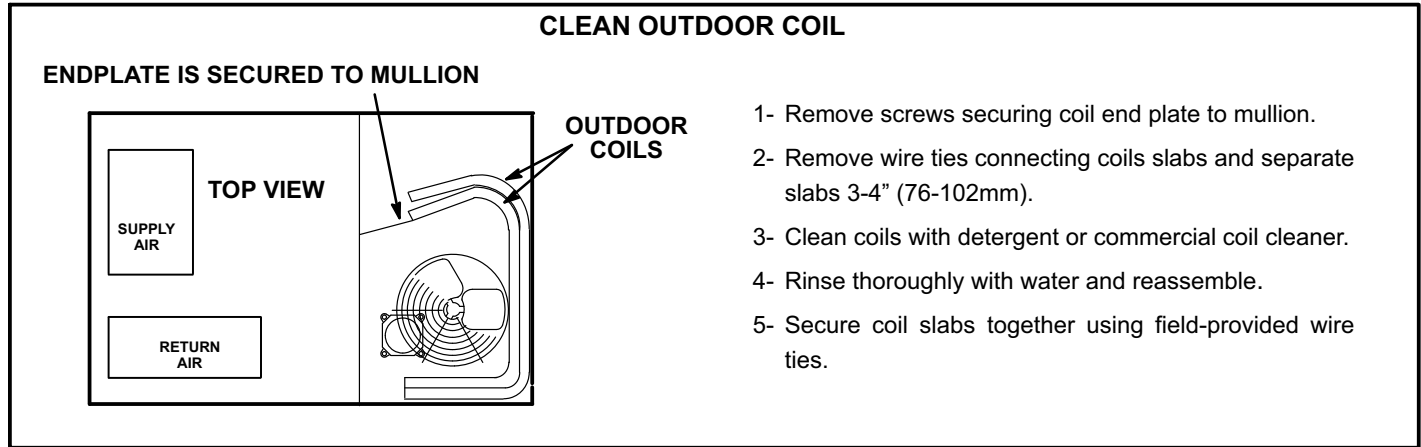


FIGURE 14

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 ZHA/ZHB units.

A-Z1CURB

When installing the ZHA/ZHB 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 ZHA/ZHB 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 15. 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 16. 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 ZHA/ZHB units. Refer to manufacturer's instructions included with transition for detailed installation procedures.

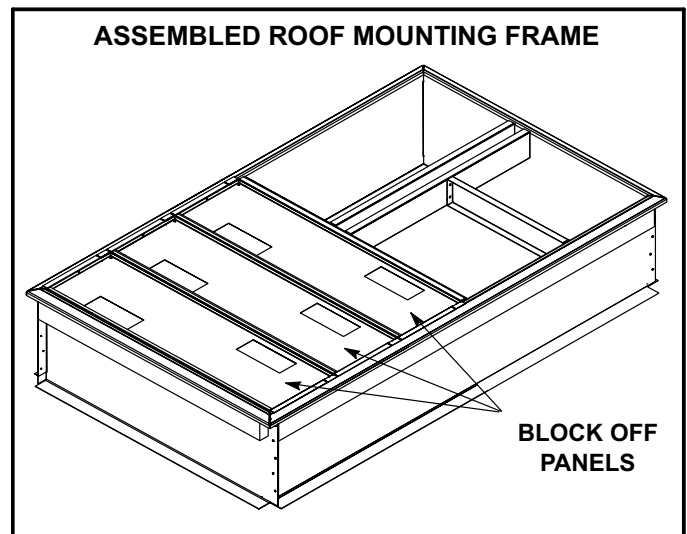


FIGURE 15

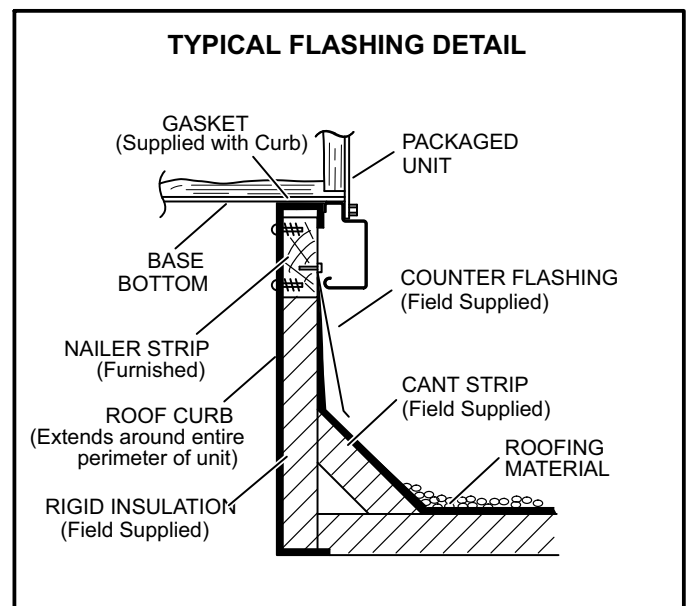


FIGURE 16

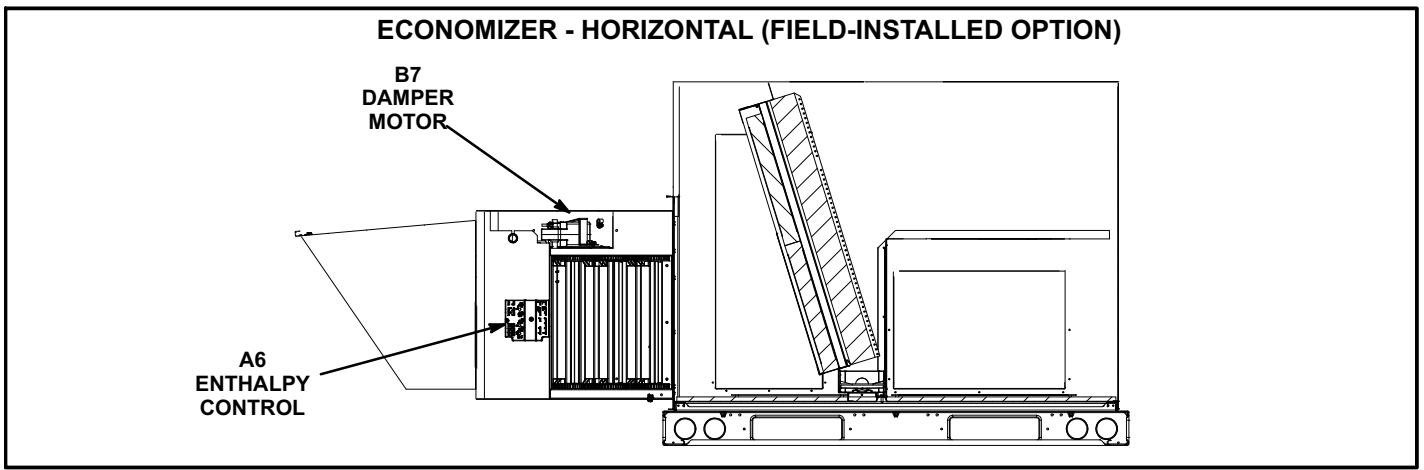


FIGURE 17

**D-Economizer
(Field or Factory Installed)**

Downflow economizers are a factory- or field-installed option. Horizontal air flow economizers are a field-installed option only. 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 17 for horizontal air discharge and figure 18 for downflow air discharge. The R1 mixed air sensor is shown in figure 19. An A7 outdoor enthalpy sensor is optional and replaces the S175 sensible sensor. See figure 20.

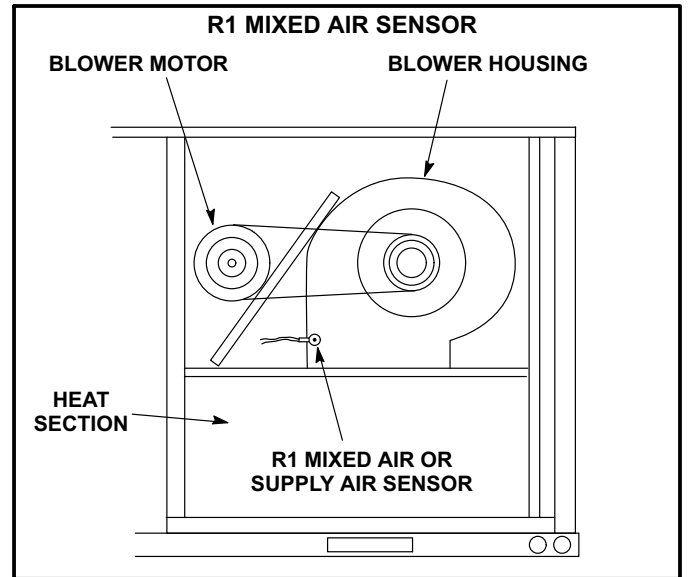


FIGURE 19

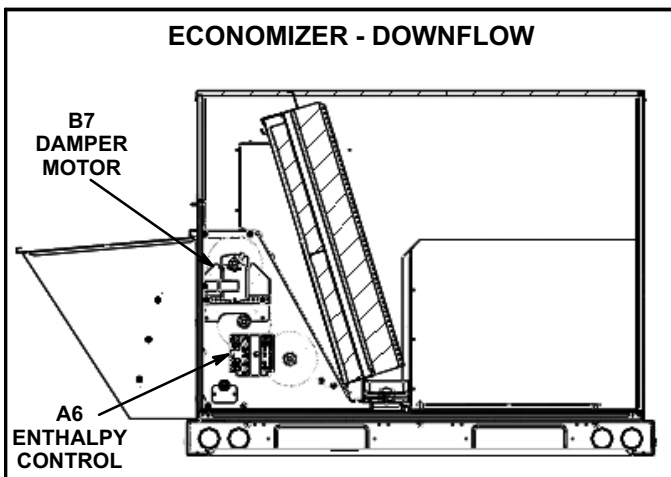


FIGURE 18

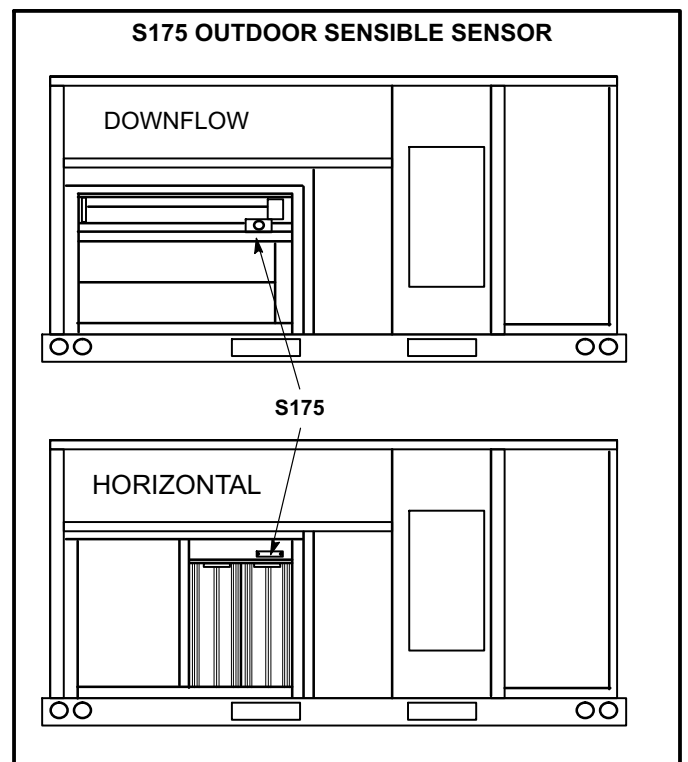


FIGURE 20

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

Refer to instructions provided with sensors for installation.

A6 Enthalpy Control LEDs

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

When an optional IAQ sensor is installed, a steady green DCV LED indicates that the IAQ reading is higher than setpoint requiring more fresh air. See figure 21.

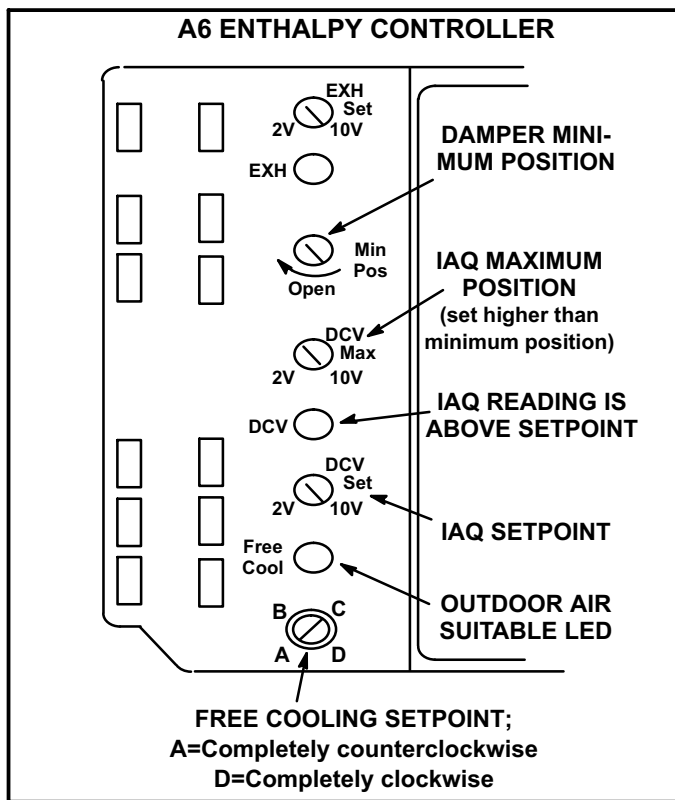


FIGURE 21

Free Cooling Setpoint

Outdoor air is considered suitable when temperature and humidity are less than the free cooling setpoints shown in table 15. Setting A is recommended. See figure 21. 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".

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.

**TABLE 15
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)

- 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.

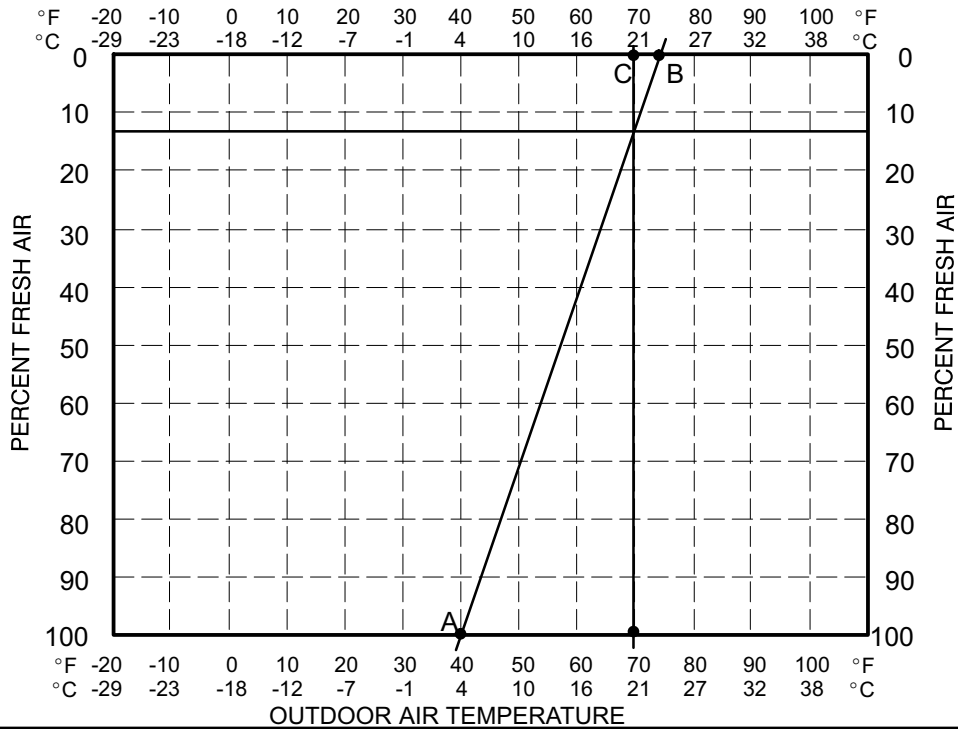
DCV Set and Max Settings

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 CO₂ sensor, dampers will start to open when the IAQ sensor reads approximately 1000ppm. Adjust the DCV SET potentiometer to the approximate setting specified by the controls contractor. Refer to figure 21.

The DCV MAX potentiometer is factory-set at approximately 50% of the potentiometer range or 6VDC. Dampers will open approximately half way when CO₂ rises above setpoint. Adjust the DCV MAX potentiometer to the approximate setting specified by the controls contractor. Refer to figure 21.

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 16 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 16
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

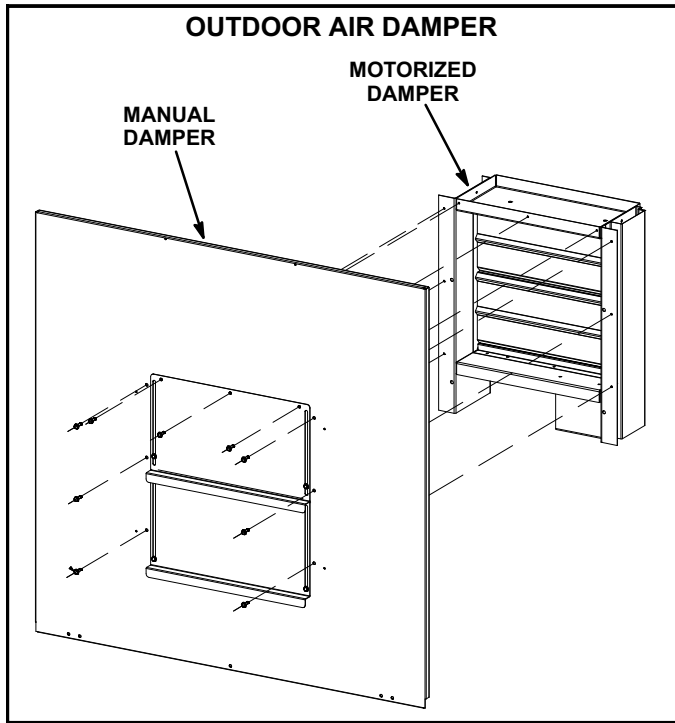


FIGURE 22

Z1DAMP21 is a motorized outdoor air damper and Z1DAMP11 is a manual outdoor air damper. See figure 22. 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 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 23. 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 ZHA/ZHB 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.

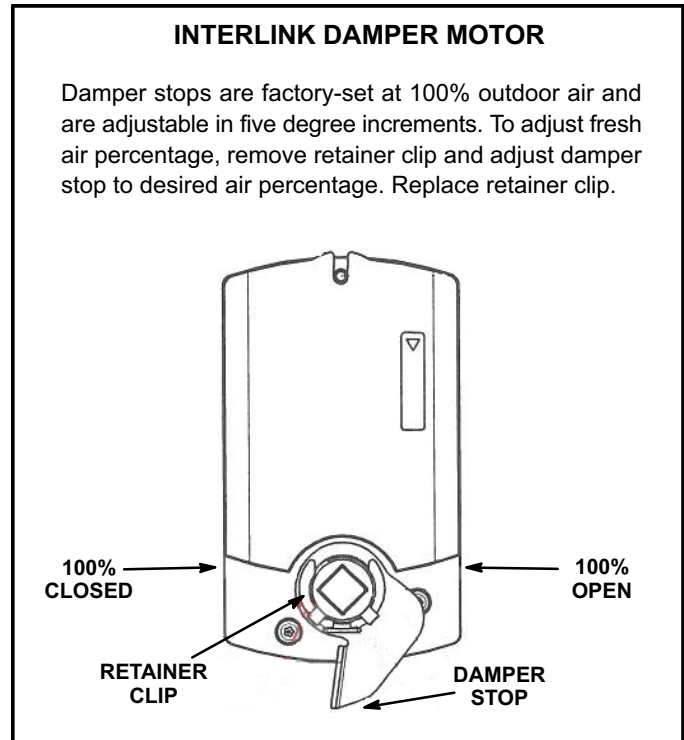


FIGURE 23

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 24, 25 and installation instructions for more detail.

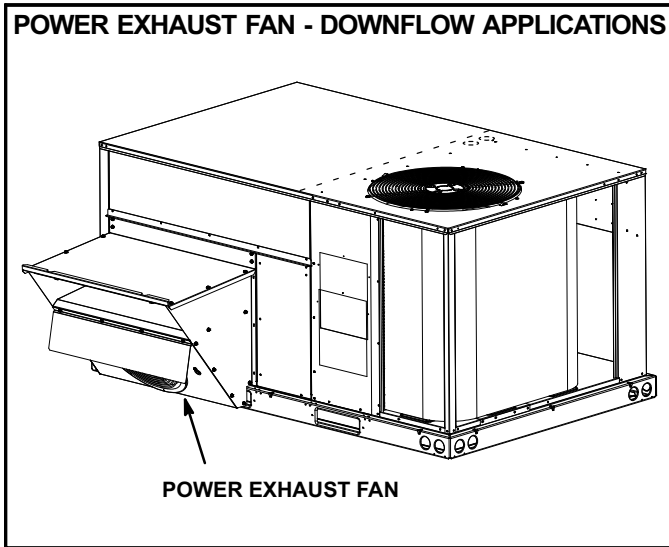


FIGURE 24

H-Control Systems

Different types of control systems may be used with the ZHA/ZHB 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 (CO₂) Sensor A63

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

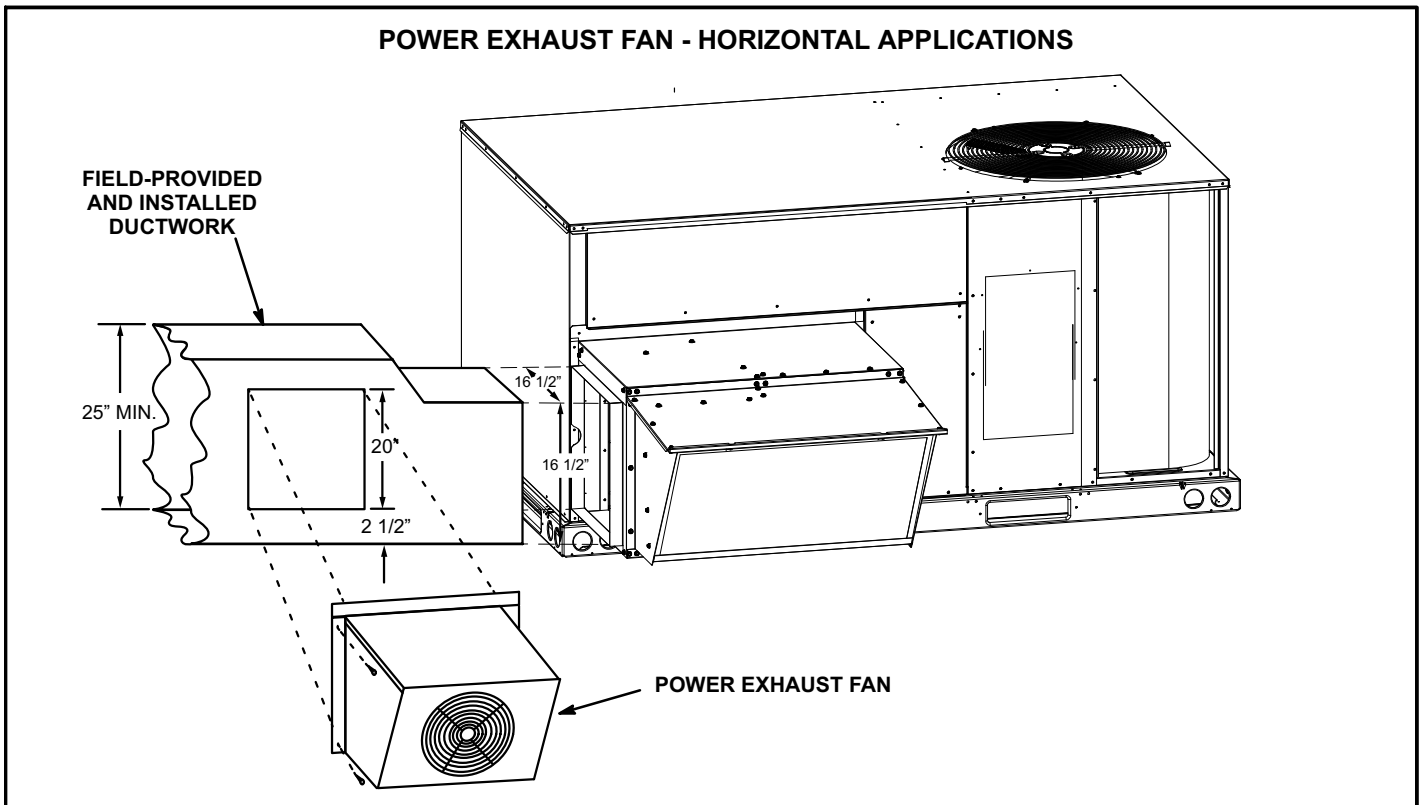
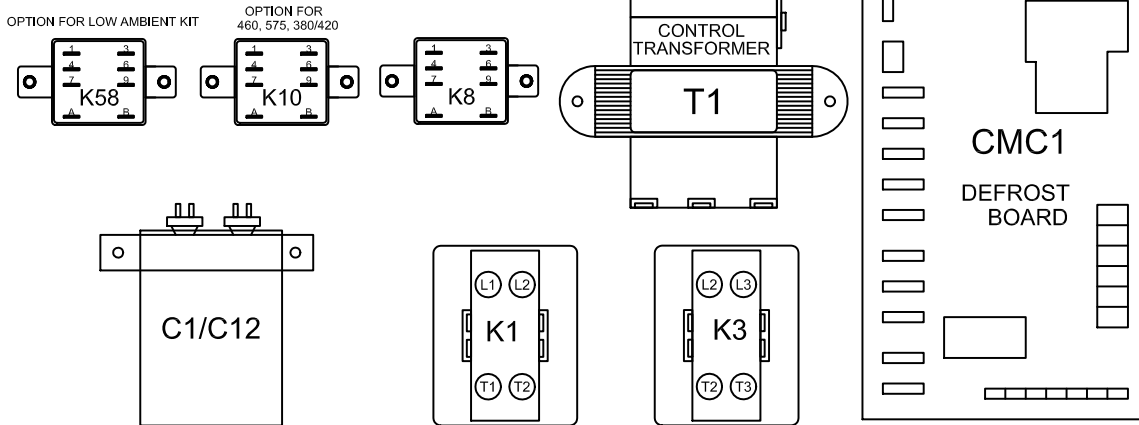


FIGURE 25

ZHA CONTROL BOX ARRANGEMENT

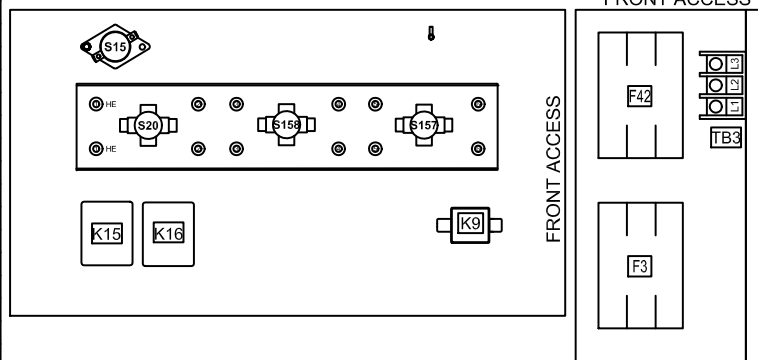


KEY LIST

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 HARD START CAPACITOR
C12	DUAL CAPACITOR
CMC1	DEFROST TIMER
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 CONTACTOR
K3	BLOWER CONTACTOR
K8	TRANSFER RELAY
K9	HEAT RELAY
K10	OUTDOOR FAN RELAY
K15	ELECTRIC HEAT 1 CONTACTOR
K16	ELECTRIC HEAT 2 CONTACTOR
K31	HARD START RELAY
K58	LOW AMBIENT RELAY
K65	EXHAUST FAN RELAY
L1	REVERSING VALVE
R1	MIXED AIR OR SUPPLY SENSOR
R2	MINIMUM POSITION POTENTIAMETER
RT2	REMOTE THERMOSTAT SENSOR
S3	LOW DISCHARGE TEMP LIMIT, COMPRESSOR 1
S4	HIGH PRESSURE LIMIT, COMPRESSOR 1
S5	HIGH TEMPERATURE LIMIT, COMPRESSOR 1
S6	DEFROST SWITCH
S11	LOW AMBIENT LOW PRESSURE SWITCH
S15	ELECTRIC HEAT 1 PRIMARY LIMIT
S20	ELECTRIC HEAT 1 SECONDARY LIMIT
S40	CRANKCASE THERMOSTAT
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

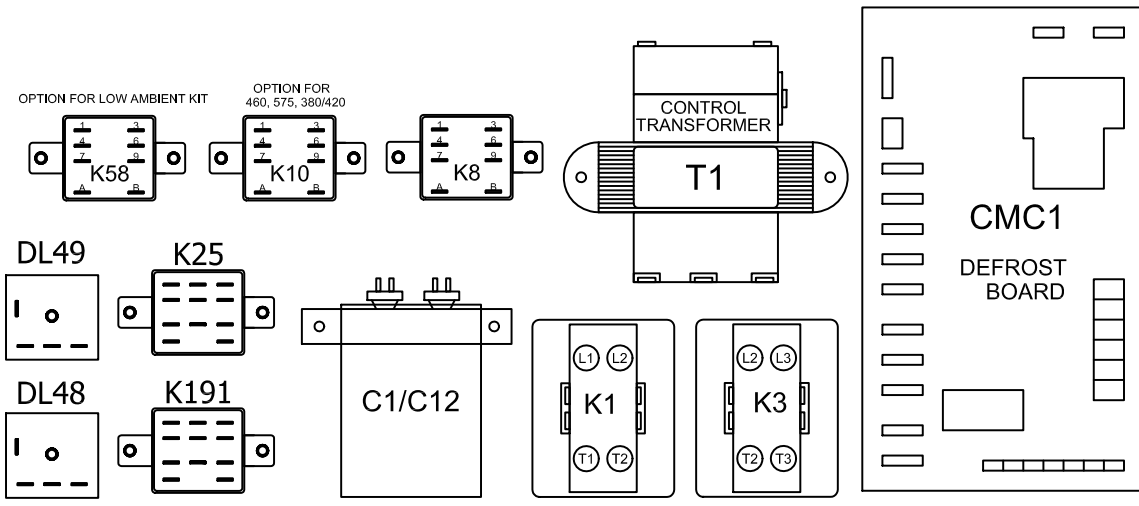
J/P #	JACK/PLUG DESCRIPTION
2	HEAT
3	ECONOMIZER
4	ECONOMIZER
9	ECONOMIZER
18	EXHAUST FAN
24	EXHAUST FAN
39	CONTROL INTERFACE

ELECTRIC HEAT SECTION



10/12		WIRING DIAGRAM	10/12
		537584-01	
KEY LIST			
ZH_ KEY LIST AND COMPONENT ARRANGEMENT			
			REV
Supersedes		Form No. 537584-01	

ZHB CONTROL BOX ARRANGEMENT



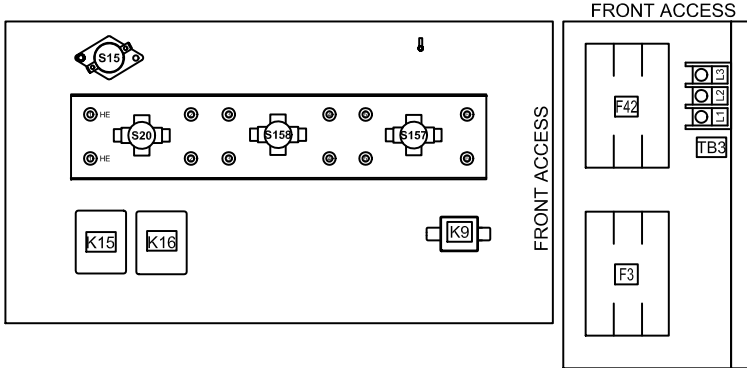
KEY	COMPONENT
A2	ELECTRONIC SENSOR
A6	SOLID STATE ENTHALPY CONTROL
A7	SOLID STATE ENTHALPY SENSOR
A63	CO2 SENSOR (IAQ)
B1	COMPRESSOR 1
B3	BLOWER MOTOR
B4	OUTDOOR FAN MOTOR
B7	ECONOMIZER OR DAMPER MOTOR
B10	EXHAUST FAN MOTOR
C1	OUTDOOR FAN CAPACITOR
C6	CAPACITOR, EXHAUST FAN 1
C7	COMPRESSOR HARD START CAPACITOR
C12	DUAL CAPACITOR
CMC1	DEFROST TIMER
CMC3	TIME CLOCK
DL48	DELAY, CRANKCASE HEATER
DL49	DELAY, BLOWER
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 CONTACTOR
K3	BLOWER CONTACTOR
K8	TRANSFER RELAY
K8E	TRANSFER RELAY, ECONOMIZER
K9	HEAT RELAY
K10	OUTDOOR FAN RELAY
K15	ELECTRIC HEAT 1 CONTACTOR
K16	ELECTRIC HEAT 2 CONTACTOR
K25	RELAY, BLOWER DELAY
K31	HARD START RELAY
K58	LOW AMBIENT RELAY
K65	EXHAUST FAN RELAY
K191	RELAY, CRANKCASE HEATER
L1	REVERSING VALVE
R1	MIXED AIR OR SUPPLY SENSOR
R2	MINIMUM POSITION POTENTIOMETER
R51	RESISTOR, MAT BYPASS
RT2	REMOTE THERMOSTAT SENSOR
RT26	SENSOR, OUTDOOR AIR TEMP
S3	LOW DISCHARGE TEMP LIMIT, COMPRESSOR 1
S4	HIGH PRESSURE LIMIT, COMPRESSOR 1
S5	HIGH TEMPERATURE LIMIT, COMPRESSOR 1
S6	DEFROST SWITCH
S11	LOW AMBIENT LOW PRESSURE SWITCH
S15	ELECTRIC HEAT 1 PRIMARY LIMIT
S20	ELECTRIC HEAT 1 SECONDARY LIMIT
S40	CRANKCASE THERMOSTAT


KEY LIST

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

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

ELECTRIC HEAT SECTION



01/15		WIRING DIAGRAM	01/15
		537714-02	
KEY LIST			
ZH_ KEY LIST AND COMPONENT ARRANGEMENT			
			REV. 0
Supersedes		Form No.	
537714-01		537714-02	

ZH036, 048, 060, 072 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 16 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 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.

End of Cooling Demand

- 10- Cooling demand is satisfied. Thermostat terminal Y1de-energizes
- 11- Compressor K1 is de-energized. N.O. K1 contactor opens de-energizing compressor B1 and outdoor fan B4. (*ZHB072 Only - K191 energizes the crankcase heater.*)

ZHB Models Only:

- 12- De-energizing K1 initiates delay timer DL49. DL49 energizes relay K25 which closes blower contactor B3. Blower is de-energized after 30 second delay.
- 13- De-energizing K1 initiates delay timer DL48. DL48 energizes relay K191, energizing the crankcase heater after a 30 minute delay.

First-Stage Heating Demand:

- 14- First stage heating demand W1 energizes K8. K8-1 N.C. terminals open interrupting 24V to CMC1 terminal O. K8-2 N.O. terminals close allowing 24V to CMC1 terminal Y1.
- 15- CMC1 energizes compressor contactor K1 and de-energizes L1 reversing valve into heating mode.
- 16- N.O. K1-1 contacts close energizing compressor B1 and outdoor fan B4.

Second-Stage Heating Demand (optional electric heat):

- 17- 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.
- 18- Heating demand is already initiated at W1 in the thermostat. An additional demand is initiated at W2 in the thermostat.
- 19- 24VAC is routed through N.C. primary limit S15. Electric heat contactors K15, K16 (on P volt 10 and 22.5kW heaters). 24VAC is also routed to CMC1 terminal W1.
- 20- N.O. contacts K15-1, K15-2, K16-1 and K16-2 close energizing HE1, HE2 and HE3.

ZH036, 048, 060, 072 P, Y, G, J & M Voltage Sequence of Operation (continued)

Defrost Cycle

21- When a defrost cycle is initiated, the control energizes the reversing valve solenoid and turns off the condenser fan. The control will also put 24VAC on the "W1" (auxiliary heat) line. The unit will stay in this mode until either the defrost thermostat (S6) temperature is above the termination temperature of 70°, the defrost time of 14 minutes has been completed, or the room thermostat demand cycle has been satisfied. If the room thermostat demand cycle terminates the cycle, the defrost cycle will be held until the next room thermostat demand cycle. If the defrost thermostat (S6) temperature is still below the termination temperature, the control will continue the defrost cycle until the cycle is terminated in one of the methods mentioned above.

End Heating Demand:

22- Second-stage heating demand is satisfied. Terminal W2 in the thermostat is de-energized.

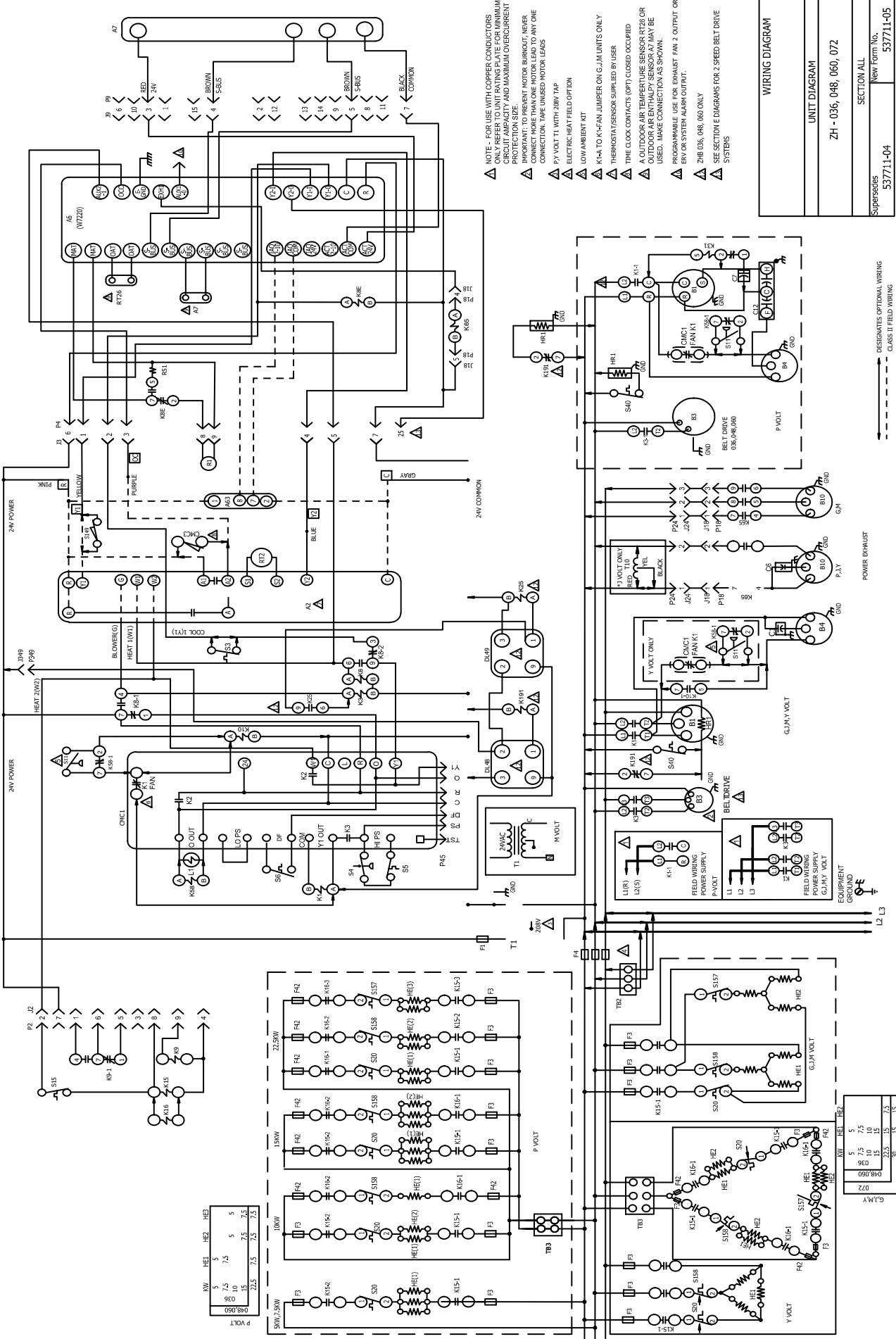
23- Electric heat contactors K15 and K16 are de-energized.

24- N.O. contacts K15-1, K15-2, K16-1 and K16-2 open de-energizing HE1, HE2 and HE3.

25- First-stage heating demand is satisfied. Terminal W1 in the thermostat is de-energized.

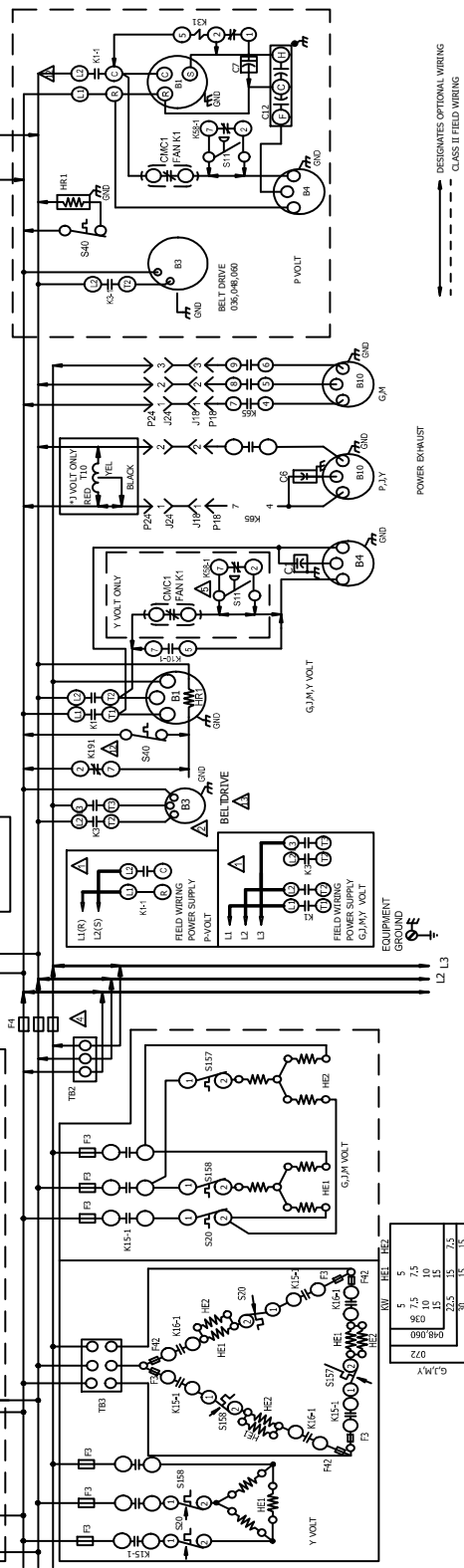
26- K8 relay coil is de-energized K8-1 terminals open interrupting 24VAC to CMC1 terminal Y1. CMC1 de-energizes compressor contactor K1.

ZHA/ZHB036, 048, 060, 072 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 OVERLOAD ANY MOTOR. NEVER CONNECT ANY ONE CONNECTION TAP UNLESS NOTED LEADS.
- ▲ P1 VOLT T1 WITH 208V TAP
- ▲ ELECTRIC HEAT FIELD OPTION
- ▲ LOW AMBIENT KIT
- ▲ KHA TO K-FAFAN JUMPER ON G.I. UNITS ONLY
- ▲ THERMISTAT (SENSOR SUPPLIED BY USER)
- ▲ TIME CLOCK CONTACTS (OPT) CLOSED OCCUPIED
- ▲ A OUTDOOR AIR TEMPERATURE SENSOR RT26 OR OUTDOOR AIR ENTHALPY SENSOR AT MAY BE USED. MAKE CONNECTION AS SHOWN.
- ▲ PROGRAMMABLE USE FOR EXHAUST FAN 2 OUTPUT OR ERV OR SYSTEM MAKEUP OUTPUT.
- ▲ ZHB 036, 048, 060 ONLY
- ▲ SEE SECTION E DIAGRAMS FOR 2 SPEED BELT DRIVE SYSTEMS

WIRING DIAGRAM	04/17
UNIT DIAGRAM	
ZH - 036, 048, 060, 072	
SECTION ALL	REV. 0
Supersedes	New Form No. 537711-04

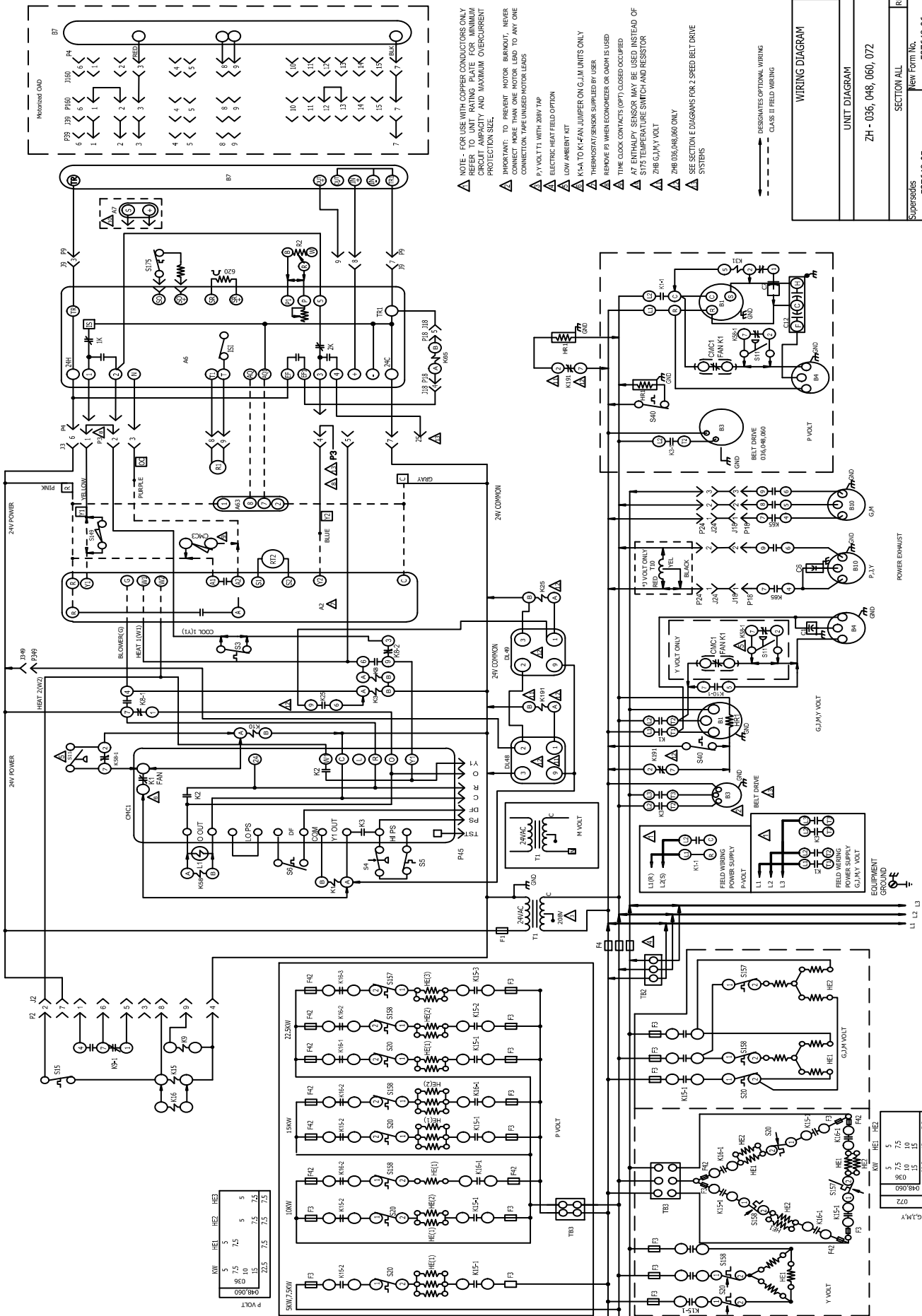


--- DESIGNATES OPTIONAL WIRING
 - - - CLASS II FIELD WIRING

1/00V	5	HE1	HE2	HE3
500/250V	5	5	5	5
90	7.5	7.5	7.5	7.5
100	10	10	10	10
150	15	15	15	15
225	22.5	22.5	22.5	22.5

0.3 MVA	5	HE1	HE2	HE3
5	5	5	5	5
90	7.5	7.5	7.5	7.5
100	10	10	10	10
150	15	15	15	15
225	22.5	22.5	22.5	22.5

ZHA/ZHB036, 048, 060, 072 UNIT DIAGRAM



- ▲ NOTE - FOR USE WITH COPPER CONDUCTORS ONLY REFER TO UNIT RATING PLATE FOR MINIMUM AWG SIZE AND MAXIMUM OVERCURRENT PROTECTION SIZE.
- ▲ IMPORTANT: TO PREVENT MOTOR BURNOUT, NEVER OVERLOAD. OVERLOADS MUST BE TO ANY ONE CONNECTION TIME UNLESS MOTOR LEADS.
- ▲ 24V VOLT T.T. WITH 208V TAP
- ▲ ELECTRIC HEAT FIELD OPTION
- ▲ LOW AMBIENT KIT
- ▲ K4-K1 TO K1-FAN JUMPER ON G.I.U. UNITS ONLY
- ▲ THERMOSHT/SENSOR SUPPLIED BY USER
- ▲ REMOVE F3 WHEN ECONOMIZER OR ODOM IS USED
- ▲ TIME CLOCK CONTACTS (OPT) OR ODOM IS USED AT ENTHALPY SENSOR MAY BE USED INSTEAD OF S175 TEMPERATURE SWITCH AND RESISTOR
- ▲ ZH6 G.M.Y. VOLT
- ▲ ZH6 036/048/060 ONLY
- ▲ SEE SECTION E DIAGRAMS FOR 1 SPEED BELT DRIVE SYSTEMS

DESIGNATES OPTIONAL WIRING
 CLASS II FIELD WIRING

WIRING DIAGRAM	04/17
UNIT DIAGRAM	
ZH - 036, 048, 060, 072	
SECTION ALL	REV. 0
Supersedes	New Form No. 537648-06