UNIT INFORMATION

100185

ZCD SERIES
7.5 to 12.5 ton
26.3 to 42 kW

Service Literature

ZCD092 through 150 with R454B

The ZCD 7.5, 8.5, 10 and 12.5 ton (092, 102, 120, 150) packaged electric units are available in standard cooling efficiency.

All ZCD units are designed to accept any of several different energy management thermostat control systems with minimum field wiring. Factory or field provided control options connect to the unit with jack plugs. When ”plugged in” the controls become an integral part of the unit wiring.

Optional electric heat is field-installed. Electric heat operates in single or multiple stages depending on the kW input size. 7.5kW to 60kW heat sections are available for ZCD units.

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.

False ceilings or drop ceiling may be used as a return air plenum only if the unit being installed has a Refrigerant Detection System installed.

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out with work in confined spaces being avoided.

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

⚠ WARNING

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

⚠ WARNING

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

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⚠ CAUTION

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

⚠ WARNING

Only manufacturer approved auxiliary devices are permitted to be installed in this unit.

⚠ CAUTION

The appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction

⚠ CAUTION

Children should be supervised not to play with the appliance.

⚠ CAUTION

Any personnel installing, decommissioning, or performaing maintenance on the unit must be properly trained with A2L refrigerants.

⚠ CAUTION

Servicing shall be performed only as recommended by the manufacturer.

⚠ WARNING

•This appliance must be installed in accordance with local and national wiring regulations.

•If the appliance is not fitted with an option for full disconnection from power, a means of disconnection must be incorporated in the fixed wiring in accordance with national and local wiring regulations.

⚠ CAUTION

Leak Detection System installed. Unit must be powered except for service.

⚠ WARNING

Ducts connected to an appliance shall not contain a potential ignition source.

⚠ IMPORTANT

Pipe work, including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.

⚠ IMPORTANT

Refrigerant sensors for refrigerant detection systems shall only be replaced with sensors specified by the appliance manufacture.

⚠ CAUTION

This unit is equipped with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.

⚠ WARNING

To prevent serious injury or death:

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

2- If system power is required (e.g., smoke detector maintenance), disable power to blower, remove fan belt where applicable, and ensure all controllers and thermostats are set to the “OFF” position before performing maintenance.

3- Always keep hands, hair, clothing, jewelry, tools, etc., away from moving parts.

OPTIONS / ACCESSORIES

Item Description		Order Number	Size 092	102	120	150
COOLING SYSTEM						
Condensate Drain Trap	PVC	**38R23**	X	X	X	X
	Copper	**38V21**	X	X	X	X
Corrosion Protection		Factory	O	O	O	O
Drain Pan Overflow Switch		**38A64**	X	X	X	X
Low Ambient Kit (Includes Compressor Crankcase Heater)	208/230V-3ph	**10Z35**	X	X		
	460V-3ph	**10Z36**	X	X		
	575V-3ph	**10Z37**	X	X		
	208/230V-3ph	**10Z50**			X	X
	460V-3ph	**10Z51**			X	X
	575V-3ph	**10Z52**			X	X
BLOWER - SUPPLY AIR						
Blower Motors	Two-Speed Belt Drive - 2 HP	Factory	O	O		
	MSAV® Belt Drive - 3 HP	Factory			O	
	MSAV® Belt Drive - 5 HP	Factory				O
Drive Kits See Blower Data Tables for selection	Kit #1 590-890 rpm	Factory	O	O		
	Kit #2 800-1105 rpm	Factory	O	O		
	Kit #3 795-1195 rpm	Factory	O	O		
	Kit #4 730-970 rpm	Factory			O	
	Kit #5 940-1200 rpm	Factory			O	
	Kit #6 1015-1300 rpm	Factory			O	
	Kit #10 900-1135 rpm	Factory				O
	Kit #11 1040-1315 rpm	Factory				O
CABINET						
Combination Coil/Hail Guards		**12X21**	X	X	X	X
CONTROLS						
NOTE - See Conventional Thermostat Control Systems on page 10 of the Engineering Handbook for Additional Options.						

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

OPTIONS / ACCESSORIES

Item Description		Order Number	Size 092	102	120	150
INDOOR AIR QUALITY						
Air Filters						
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)		**Y3063**	X	X	X	X
Indoor Air Quality (CO_2) Sensors						
Sensor - Wall-mount, off-white plastic cover with LCD display		**24C58**	X	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display		**23V86**	X	X	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting		**87N52**	X	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting		**23V87**	X	X	X	X
CO_2 Sensor Duct Mounting Kit - for downflow applications		**23Y47**	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO_2 sensors (**24C58**)		**90N43**	X	X	X	X
ELECTRICAL						
Voltage 60 Hz	208/230V - 3 phase	Factory	O	O	O	O
	460V - 3 phase	Factory	O	O	O	O
	575V - 3 phase	Factory	O	O	O	O
Bottom Power Entry Kit		**11H66**	X	X	X	X
ELECTRIC HEAT						
7.5 kW	208/240V-3ph	**30V24**	X	X		
	460V-3ph	**30V25**	X	X		
	575V-3ph	**30V26**	X	X		
15 kW	208/240V-3ph	**30V30**	X	X	X	X
	460V-3ph	**30V31**	X	X	X	X
	575V-3ph	**30V32**	X	X	X	X
22.5 kW	208/240V-3ph	**30V36**	X	X	X	X
	460V-3ph	**30V37**	X	X	X	X
	575V-3ph	**30V38**	X	X	X	X
30 kW	208/240V-3ph	**30V42**	X	X	X	X
	460V-3ph	**30V43**	X	X	X	X
	575V-3ph	**30V44**	X	X	X	X
45 kW	208/240V-3ph	**30V48**	X	X	X	X
	460V-3ph	**30V49**	X	X	X	X
	575V-3ph	**30V50**	X	X	X	X
60 kW	208/240V-3ph	**30V54**			X	X
	460V-3ph	**30V55**			X	X
	575V-3ph	**30V56**			X	X
ELECTRIC HEAT ACCESSORIES						
Unit Fuse Block (required) - See Electrical Accessories table for Selection on page 15			X	X	X	X

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

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

O = Configure To Order (Factory Installed)

X = Field Installed

OPTIONS / ACCESSORIES

Item Description		Order Number	Size 092	102	120	150
ECONOMIZER						
Standard Economizer (Not for Title 24)						
Standard Downflow Economizer with Single Temperature Control - With Barometric Relief Dampers and Air Hoods		**24K57**	X	X	X	X
Standard Horizontal Economizer with Single Temperature Control - With Barometric Relief Dampers and Air Hoods		**24K58**	X	X	X	X
Standard Economizer Controls (Not for Title 24)						
Single Enthalpy Control		**21Z09**	X	X	X	X
Differential Enthalpy Control (order 2)		**21Z09**	X	X	X	X
High Performance Economizer (Approved for California Title 24 Building Standards / AMCA Class 1A Certified)						
High Performance Downflow Economizer with Single Temperature Control - With Barometric Relief Dampers and Air Hoods		**24F99**	OX	OX	OX	OX
High Performance Horizontal Economizer with Single Temperature Control - With Barometric Relief Dampers and Air Hoods		**24G01**	X	X	X	X
High Performance Economizer Controls						
Single Enthalpy Control		**24G11**	X	X	X	X
Differential Enthalpy Control (order 2) (Not for Title 24)		**24G11**	X	X	X	X
Economizer Accessories						
WLAN Stick (For High Performance Economizer only)		**23K58**	X	X	X	X
OUTDOOR AIR						
Outdoor Air Dampers						
Motorized Dampers with outdoor air hood		**14G36**	X	X	X	X
Manual Dampers with outdoor air hood		**14G37**	X	X	X	X
POWER EXHAUST						
Standard Static (Downflow)	208/230V-3ph	**10Z70**	X	X	X	X
Standard Static (Horizontal)	208/230V-3ph	**24E01**	X	X	X	X
575V Transformer Kit	575V-3ph	**59E02**	X	X	X	X
NOTE - Order 575V Transformer Kit with 208/230V Power Exhaust Fan for 575V applications. Order two kits for downflow models, order one kit for horizontal models.						
ROOF CURBS						
Hybrid Roof Curbs, Downflow						
8 in. height		**10Z25**	X	X	X	X
14 in. height		**10Z26**	X	X	X	X
18 in. height		**10Z27**	X	X	X	X
24 in. height		**10Z28**	X	X	X	X
CEILING DIFFUSERS						
Step-Down - Order one	RTD11-95S	**13K61**	X			
	RTD11-135S	**13K62**		X	X	
	RTD11-185S	**13K63**				X
Flush - Order one	FD11-95S	**13K56**	X			
	FD11-135S	**13K57**		X	X	
	FD11-185S	**13K58**				X
NOTE - Ceiling Diffuser Transitions are not furnished and must be field fabricated.						

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

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

O = Configure To Order (Factory Installed)

X = Field Installed

SPECIFICATIONS

Model		ZCD092S5T	ZCD102S5T	ZCD120S5M	ZCD150S5M
Nominal Tonnage		7.5 Ton	8.5 Ton	10 Ton	12.5 Ton
Efficiency Type		Standard	Standard	Standard	Standard
Blower Type		Two Speed Belt Drive	Two Speed Belt Drive	MSAV® Multi-Stage Air Volume	MSAV® Multi-Stage Air Volume
Cooling Performance	Gross Cooling Capacity (Btuh)	89,700	100,200	118,200	140,200
	[1] Net Cooling Capacity (Btuh)	88,000	98,000	115,000	136,000
	[1] AHRI Rated Air Flow (cfm)	2700	2800	3300	4100
	[1] IEER (Btuh/Watt)	15.0	14.8	15.0	15.0
	[1] EER (Btuh/Watt)	11.2	11.2	11.2	11.0
	Total Unit Power - kW	7.9	8.8	9.7	12.8
Sound Rating Number	dBA	84	84	90	91
Refrigerant	Type	R-454B	R-454B	R-454B	R-454B
	Circuit 1	3 lbs. 14 oz.	3 lbs. 15 oz.	4 lbs. 0 oz.	4 lbs. 12 oz.
	Circuit 2	4 lbs. 4 oz.	3 lbs. 12 oz.	4 lbs. 4 oz.	5 lbs. 12 oz.
Electric Heat Available - See page 11		7.5,15,22.5,30 & 45 kW		15, 22.5, 30, 45 and 60 KW	
Compressor Type (number)		Two-Stage Scroll (1), Single-Stage Scroll (1)			
Outdoor Coils	Net face area - ft.^{2}	20.9	20.9	28.0	28.0
	Rows	1	1	1	1
	Fins - in.	23	23	23	20
Outdoor Coil Fans	Motor HP (number and type)	1/3 (2 PSC)	1/3 (2 PSC)	1/2 (2 PSC)	1/2 (2 PSC)
	Rpm	1075	1075	1075	1075
	Watts	740	740	930	950
	Diameter (Number) - in.	(2) 24	(2) 24	(2) 24	(2) 24
	Blades	3	3	3	3
	Total Air volume - cfm	8800	8800	9600	9600
Indoor Coils	Net face area - ft.^{2}	11.6	11.6	11.6	11.6
	Number of rows	2	2	2	2
	Fins - in.	20	20	20	20
	Condensate drain size (NPT) - in.	(1) 1			
	Expansion device type	Circuit 1 - Balanced Port Thermostatic Expansion Valve, removable element head Circuit 2 - Refrigerant Metering Orifice			Both Circuits - Balanced Port Thermostatic Expansion Valve, removable element head
[2] **Indoor Blower & Drive Selection**	Nominal motor HP	2		3	5
	Motor - Drive kit number	Kit #1 590-890 rpm Kit #2 800-1105 rpm Kit #3 795-1195 rpm		Kit #4 730-970 rpm Kit #5 940-1200 rpm Kit #6 1015-1300 rpm	Kit #10 900-1135 rpm Kit #11 1040-1315 rpm
	Wheel (Number) diameter x width - in.	(1) 15 X 15			
Filters	Type of filter	Disposable			
	Number and size - in.	(4) 20 x 24 x 2			
Line voltage data (Volts-Phase-Hz)		208/230-3-60 460-3-60 575-3-60			

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

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

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

NOTE – Motor service factor limit - 1.0.

ZCD092S5T - ZCD102S5T − BASE UNIT

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY (NO HEAT SECTION) WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE. FOR ALL UNITS ADD:

1 − Wet indoor coil air resistance of selected unit.

2 − Any factory installed options air resistance (heat section, economizer, etc.)

3 − Any field installed accessories air resistance (duct resistance, diffuser, etc.)

Then determine from blower table blower motor output required.

See page 9 for blower motors and drives and air resistance for wet coil and options/accessories.

Minimum Air Volume Required For Use With Optional Electric Heat:

15 kW, 22.5 kW- 2065 cfm; 30 kW - 2250 cfm; 45 kW - 2625 cfm

Total Air Volume cfm	Total Static Pressure − in. w.g.																									
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2		2.2		2.4		2.6	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2000	535	0.28	596	0.49	660	0.69	724	0.87	788	1.00	851	1.11	913	1.23	971	1.37	1025	1.52	1076	1.69	1124	1.86	- - -	- - -	- - -	- - -
2250	552	0.43	613	0.63	675	0.81	738	0.98	802	1.11	864	1.22	925	1.36	982	1.51	1036	1.68	1085	1.85	1133	2.04	1180	2.23	1228	2.44
2500	570	0.57	630	0.76	692	0.94	754	1.10	817	1.22	879	1.35	939	1.51	995	1.67	1047	1.85	1096	2.04	1143	2.23	1190	2.43	1239	2.65
2750	589	0.72	648	0.91	709	1.08	772	1.22	833	1.36	894	1.50	954	1.67	1009	1.85	1059	2.04	1108	2.24	1154	2.44	1202	2.65	1251	2.87
3000	608	0.87	668	1.05	729	1.22	791	1.37	852	1.51	912	1.67	970	1.85	1023	2.05	1073	2.25	1120	2.46	1167	2.67	1215	2.89	1265	3.11
3250	629	1.03	688	1.21	749	1.37	811	1.52	871	1.68	930	1.86	987	2.06	1039	2.27	1088	2.49	1134	2.70	1181	2.92	1229	3.14	1279	3.37
3500	651	1.20	710	1.38	772	1.54	833	1.70	892	1.88	950	2.07	1004	2.28	1055	2.51	1103	2.74	1150	2.96	1196	3.19	1245	3.42	1295	3.65
3750	674	1.36	734	1.56	796	1.73	856	1.90	914	2.10	970	2.30	1023	2.53	1072	2.78	1120	3.02	1166	3.25	1213	3.47	1262	3.71	1313	3.95
4000	699	1.55	761	1.76	822	1.94	880	2.12	936	2.33	991	2.56	1042	2.81	1090	3.07	1137	3.31	1183	3.55	1231	3.78	1281	4.03	1333	4.28
4250	726	1.77	789	1.98	849	2.16	904	2.37	959	2.59	1012	2.84	1062	3.11	1109	3.38	1156	3.63	1202	3.87	1251	4.11	1302	4.37	1354	4.63
4500	756	2.01	818	2.22	875	2.41	929	2.63	983	2.88	1034	3.15	1082	3.44	1129	3.71	1175	3.96	1222	4.21	1271	4.46	1323	4.72	1376	5.00
4750	788	2.27	848	2.47	902	2.68	955	2.92	1006	3.20	1056	3.50	1104	3.79	1150	4.06	1196	4.32	1243	4.57	1293	4.83	1345	5.09	1399	5.37
5000	822	2.54	878	2.75	929	2.98	980	3.25	1031	3.56	1079	3.87	1126	4.16	1172	4.44	1218	4.70	1266	4.95	1315	5.20	1367	5.47	1421	5.74

ZCD120S5M - ZCD150S5M − BASE UNIT

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY (NO HEAT SECTION) WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE. FOR ALL UNITS ADD:

1 − Wet indoor coil air resistance of selected unit.

2 − Any factory installed options air resistance (heat section, economizer, etc.)

3 − Any field installed accessories air resistance (duct resistance, diffuser, etc.)

Then determine from blower table blower motor output required.

See page 9 for blower motors and drives and air resistance for wet coil and options/accessories.

Minimum Air Volume Required For Use With Optional Electric Heat:

15 kW, 22.5 kW - 2065 cfm; 30 kW - 2250 cfm; 45 kW - 2625 cfm

Total Air Volume cfm	Total Static Pressure − in. w.g.																									
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2		2.2		2.4		2.6	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2000	542	0.43	602	0.60	664	0.75	732	0.89	802	1.02	869	1.15	927	1.27	979	1.41	1029	1.57	1079	1.75	1129	1.95	1179	2.15	1230	2.37
2250	560	0.55	619	0.71	681	0.86	748	1.00	817	1.14	882	1.27	939	1.41	991	1.57	1041	1.74	1090	1.93	1140	2.13	1190	2.35	1241	2.57
2500	579	0.68	637	0.83	699	0.98	766	1.12	834	1.26	897	1.41	953	1.57	1005	1.74	1054	1.92	1103	2.12	1152	2.33	1202	2.55	1254	2.79
2750	599	0.81	657	0.97	719	1.11	785	1.25	851	1.41	913	1.57	968	1.74	1020	1.93	1068	2.13	1116	2.34	1165	2.56	1215	2.78	1268	3.01
3000	620	0.95	678	1.11	741	1.25	806	1.40	870	1.58	930	1.75	985	1.94	1036	2.14	1084	2.36	1131	2.58	1180	2.80	1230	3.02	1283	3.26
3250	643	1.10	701	1.26	764	1.41	828	1.57	891	1.76	950	1.95	1003	2.16	1053	2.38	1100	2.61	1148	2.83	1196	3.06	1246	3.29	1299	3.52
3500	667	1.26	726	1.43	788	1.58	851	1.77	913	1.97	970	2.17	1023	2.41	1071	2.65	1118	2.88	1165	3.11	1213	3.33	1264	3.57	1317	3.81
3750	693	1.44	752	1.61	813	1.78	876	1.98	936	2.20	992	2.43	1043	2.68	1091	2.93	1137	3.17	1183	3.40	1232	3.64	1284	3.88	1338	4.13
4000	720	1.65	779	1.82	840	2.00	902	2.22	961	2.46	1015	2.71	1064	2.98	1111	3.24	1156	3.48	1203	3.72	1253	3.96	1305	4.22	1359	4.48
4250	748	1.86	807	2.04	868	2.24	929	2.48	986	2.75	1038	3.02	1086	3.30	1132	3.57	1177	3.81	1224	4.05	1274	4.31	1327	4.57	1382	4.85
4500	778	2.09	837	2.28	898	2.51	957	2.78	1012	3.07	1062	3.37	1108	3.65	1154	3.92	1199	4.17	1247	4.41	1297	4.67	1350	4.94	1405	5.22
4750	809	2.34	868	2.56	929	2.82	986	3.12	1038	3.43	1087	3.74	1132	4.03	1177	4.29	1223	4.54	1270	4.79	1321	5.04	1374	5.31	1428	5.58
5000	841	2.62	901	2.87	960	3.17	1015	3.50	1065	3.83	1112	4.14	1157	4.43	1201	4.69	1247	4.94	1295	5.18	1345	5.42	1398	5.68	---	---
5250	875	2.93	935	3.23	992	3.56	1044	3.91	1092	4.26	1138	4.57	1182	4.85	1226	5.10	1272	5.34	1320	5.57	---	---	---	---	---	---
5500	911	3.30	969	3.63	1024	4.00	1074	4.37	1120	4.71	1165	5.02	1208	5.29	1253	5.53	---	---	---	---	---	---	---	---	---	---
5750	948	3.71	1004	4.08	1056	4.48	1104	4.85	1148	5.19	1192	5.49	1235	5.74	---	---	---	---	---	---	---	---	---	---	---	---
6000	985	4.18	1039	4.59	1088	5.00	1134	5.37	1177	5.69	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6250	1022	4.70	1073	5.14	1120	5.54	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

BLOWER DATA

FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

Nominal HP	Drive Kit Number	RPM Range
2	1	590 - 890
2	2	800 - 1105
2	3	795 - 1195
3	4	730 - 970
3	5	940 - 1200
3	6	1015 - 1300
5	10	900 - 1135
5	11	1040 - 1315

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

NOTE – Motor service factor limit - 1.0.

POWER EXHAUST FAN PERFORMANCE

Return Air System Static Pressure	Air Volume Exhausted
in. w.g.	cfm
0	3575
0.05	3405
0.10	3550
0.15	3245
0.20	3115
0.25	3020
0.30	2900
0.35	2785

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

Air Volume cfm	Wet Indoor Coil		Electric Heat	Economizer	Filters	
	092, 102	120, 150			MERV 8	MERV 13
1750	0.03	0.04	0.03	0.03	0.01	0.03
2000	0.04	0.05	0.03	0.05	0.01	0.03
2250	0.05	0.06	0.04	0.06	0.01	0.04
2500	0.05	0.07	0.04	0.08	0.01	0.05
2750	0.06	0.08	0.05	0.09	0.02	0.05
3000	0.07	0.09	0.06	0.11	0.02	0.06
3250	0.08	0.10	0.06	0.13	0.02	0.06
3500	0.09	0.11	0.09	0.15	0.03	0.07
3750	0.10	0.13	0.09	0.17	0.03	0.08
4000	0.11	0.14	0.09	0.19	0.04	0.08
4250	0.13	0.15	0.13	0.21	0.04	0.09
4500	0.14	0.17	0.14	0.24	0.04	0.09
4750	0.15	0.18	0.17	0.26	0.05	0.10
5000	0.16	0.20	0.20	0.29	0.06	0.10
5250	0.17	0.22	0.22	0.32	0.06	0.11
5500	0.19	0.23	0.25	0.34	0.07	0.12
5750	0.20	0.25	0.31	0.37	0.07	0.12
6000	0.22	0.27	0.33	0.40	0.08	0.13

BLOWER DATA

CEILING DIFFUSERS AIR RESISTANCE - in. w.g.

Size	RTD11 Step-Down Diffuser				FD11 Flush Diffuser
	Air Volume cfm	2 Ends Open	1 Side, 2 Ends Open	All Ends & Sides Open	
092	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
	3800	0.73	0.63	0.57	0.51
102 & 120	3600	0.36	0.28	0.23	0.15
	3800	0.40	0.32	0.26	0.18
	4000	0.44	0.36	0.29	0.21
	4200	0.49	0.40	0.33	0.24
	4400	0.54	0.44	0.37	0.27
	4600	0.60	0.49	0.42	0.31
	4800	0.65	0.53	0.46	0.35
	5000	0.69	0.58	0.50	0.39
	5200	0.75	0.62	0.54	0.43
150	4200	0.22	0.19	0.16	0.10
	4400	0.28	0.24	0.20	0.12
	4600	0.34	0.29	0.24	0.15
	4800	0.40	0.34	0.29	0.19
	5000	0.46	0.39	0.34	0.23
	5200	0.52	0.44	0.39	0.27
	5400	0.58	0.49	0.43	0.31
	5600	0.64	0.54	0.47	0.35
	5800	0.70	0.59	0.51	0.39

CEILING DIFFUSER AIR THROW DATA

Size	Air Volume	[1] Effective Throw Range	
		RTD11 Step-Down	FD11 Flush
	cfm	ft.	ft.
092	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
102, 120	3600	25 - 33	22 - 29
	3800	27 - 35	22 - 30
	4000	29- 37	24 - 33
	4200	32 - 40	26 - 35
	4400	34 - 42	28 - 37
150	5600	39 - 49	28 - 37
	5800	42 - 51	29 - 38
	6000	44 - 54	40 - 50
	6200	45 - 55	42 - 51
	6400	46 - 55	43 - 52
	6600	47 - 56	45 - 56

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

ELECTRICAL/ELECTRIC HEAT DATA — 7.5 TON

Model			ZCD092S5T		
[1] Voltage - 60Hz			208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1 (Non-Inverter)	Rated Load Amps		12.4	6.5	4.8
	Locked Rotor Amps		93	60	41
Compressor 2 (Non-Inverter)	Rated Load Amps		12.8	5.1	4.5
	Locked Rotor Amps		97.5	44.3	27.1
Outdoor Fan Motors (2)	Full Load Amps (2 Non-ECM)		3	1.5	1.2
	Total		6	3	2.4
Power Exhaust (2) 0.33 HP	Full Load Amps		2.4	1.3	1
	Total		4.8	2.6	2
Indoor Blower Motor	Horsepower		2	2	2
	Full Load Amps		7.5	3.4	2.7
[2] Maximum Overcurrent Protection (MOCP)	Unit Only		50	25	20
	With (2) 0.33 HP Power Exhaust		50	25	20
[3] Minimum Circuit Ampacity (MCA)	Unit Only		42	20	16
	With (2) 0.33 HP Power Exhaust		47	23	18

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**7.5 kW**	50	50	25	20
		15 kW	50	60	30	25
		22.5 kW	70	80	40	35
		30 kW	90	100	50	40
		45 kW	150	150	80	60
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**7.5 kW**	42	42	20	16
		15 kW	49	55	27	22
		22.5 kW	69	78	39	31
		30 kW	88	100	50	40
		45 kW	127	145	72	58
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**7.5 kW**	50	50	25	20
		15 kW	60	70	35	25
		22.5 kW	80	90	45	35
		30 kW	100	110	60	45
		45 kW	150	175	80	70
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**7.5 kW**	47	47	23	18
		15 kW	55	61	31	24
		22.5 kW	75	84	42	33
		30 kW	94	106	53	42
		45 kW	133	151	76	61

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 — 8.5 TON

Model			ZCD102S5T		
[1] Voltage - 60Hz			208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1 (Non-Inverter)	Rated Load Amps		12.4	6.5	4.8
	Locked Rotor Amps		93	60	41
Compressor 2 (Non-Inverter)	Rated Load Amps		12.2	6.4	5.1
	Locked Rotor Amps		120	50	41
Outdoor Fan Motors (2)	Full Load Amps (2 Non-ECM)		3	1.5	1.2
	Total		6	3	2.4
Power Exhaust (2) 0.33 HP	Full Load Amps		2.4	1.3	1
	Total		4.8	2.6	2
Indoor Blower Motor	Horsepower		2	2	2
	Full Load Amps		7.5	3.4	2.7
[2] Maximum Overcurrent Protection (MOCP)	Unit Only		50	25	20
	With (2) 0.33 HP Power Exhaust		50	30	20
[3] Minimum Circuit Ampacity (MCA)	Unit Only		42	21	17
	With (2) 0.33 HP Power Exhaust		46	24	19

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**7.5 kW**	50	50	25	20
		15 kW	50	60	30	25
		22.5 kW	70	80	40	35
		30 kW	90	100	50	40
		45 kW	150	150	80	60
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**7.5 kW**	42	42	21	17
		15 kW	49	55	27	22
		22.5 kW	69	78	39	31
		30 kW	88	100	50	40
		45 kW	127	145	72	58
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (2) 0.5 HP Power Exhaust	**7.5 kW**	50	50	30	20
		15 kW	60	70	35	25
		22.5 kW	80	90	45	35
		30 kW	100	110	60	45
		45 kW	150	175	80	70
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (2) 0.5 HP Power Exhaust	**7.5 kW**	46	46	24	19
		15 kW	55	61	31	24
		22.5 kW	75	84	42	33
		30 kW	94	106	53	42
		45 kW	133	151	76	61

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 — 10 TON

Model			ZCD120S5M		
[1] Voltage - 60Hz			208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1 (Non-Inverter)	Rated Load Amps		12.4	6.5	4.8
	Locked Rotor Amps		93	60	41
Compressor 2 (Non-Inverter)	Rated Load Amps		16	7.1	6.4
	Locked Rotor Amps		156	69	47.8
Outdoor Fan Motors (2)	Full Load Amps (2 Non-ECM)		3	1.5	1.2
	Total		6	3	2.4
Power Exhaust (2) 0.33 HP	Full Load Amps		2.4	1.3	1
	Total		4.8	2.6	2
Indoor Blower Motor	Horsepower		3	3	3
	Full Load Amps		10.6	4.8	3.9
[2] Maximum Overcurrent Protection (MOCP)	Unit Only		60	30	25
	With (2) 0.33 HP Power Exhaust		60	30	25
[3] Minimum Circuit Ampacity (MCA)	Unit Only		49	24	20
	With (2) 0.33 HP Power Exhaust		54	26	22

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**15 kW**	60	60	30	25
		22.5 kW	80	90	40	35
		30 kW	100	110	60	45
		45 kW	150	150	80	60
		60 kW	150	175	80	70
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**15 kW**	53	59	29	23
		22.5 kW	72	81	40	32
		30 kW	92	104	52	41
		45 kW	131	149	74	60
		60 kW	139	158	79	63
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	60	70	35	30
		22.5 kW	80	90	45	35
		30 kW	100	110	60	45
		45 kW	150	175	80	70
		60 kW	150	175	90	70
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	59	65	32	26
		22.5 kW	78	87	44	35
		30 kW	98	110	55	44
		45 kW	137	155	77	62
		60 kW	145	164	82	66

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

Model			ZCD0150S5M		
[1] Voltage - 60Hz			208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1 (Non-Inverter)	Rated Load Amps		19.2	9.1	6.2
	Locked Rotor Amps		162	70.8	58.2
Compressor 2 (Non-Inverter)	Rated Load Amps		22.4	9.1	7.2
	Locked Rotor Amps		166	74.6	54
Outdoor Fan Motors (2)	Full Load Amps (2 Non-ECM)		3	1.5	1.2
	Total		6	3	2.4
Power Exhaust (2) 0.33 HP	Full Load Amps		2.4	1.3	1
	Total		4.8	2.6	2
Indoor Blower Motor	Horsepower		5	5	5
	Full Load Amps		16.7	7.6	6.1
[2] Maximum Overcurrent Protection (MOCP)	Unit Only		90	40	30
	With (2) 0.33 HP Power Exhaust		90	40	30
[3] Minimum Circuit Ampacity (MCA)	Unit Only		70	32	24
	With (2) 0.33 HP Power Exhaust		75	34	26

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat	**15 kW**	90	90	40	30
		22.5 kW	90	90	45	35
		30 kW	100	125	60	45
		45 kW	150	175	80	70
		60 kW	150	175	90	70
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat	**15 kW**	70	70	33	26
		22.5 kW	80	89	44	35
		30 kW	100	112	55	44
		45 kW	139	157	78	62
		60 kW	146	166	82	66
[2] Maximum Overcurrent Protection (MOCP)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	90	90	40	30
		22.5 kW	90	100	50	40
		30 kW	110	125	60	50
		45 kW	150	175	90	70
		60 kW	175	175	90	70
[3] Minimum Circuit Ampacity (MCA)	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	75	75	36	29
		22.5 kW	86	95	47	38
		30 kW	106	118	58	47
		45 kW	145	163	81	65
		60 kW	152	172	85	68

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.

[4] Factory installed circuit breaker not available.

ELECTRICAL ACCESSORIES - FUSE BLOCKS

7.5 TON | ZCD092S5T

Motor Horsepower	**2**			
Electric Heat Voltage	**208V**	**240V**	**480V**	**600V**
Unit Only	**10Z41**	**10Z41**	**10Z39**	**10Z38**
Unit + Power Exhaust	**10Z41**	**10Z41**	**10Z39**	**10Z38**

8.5 TON | ZCD102S5T

Motor Horsepower	**2**			
Electric Heat Voltage	**208V**	**240V**	**480V**	**600V**
Unit Only	**10Z41**	**10Z41**	**10Z39**	**10Z38**
Unit + Power Exhaust	**10Z41**	**10Z41**	**10Z39**	**10Z38**

10 TON | ZCD120S5M

Motor Horsepower	**3**			
Electric Heat Voltage	**208V**	**240V**	**480V**	**600V**
Unit Only	**10Z41**	**10Z41**	**10Z39**	**10Z38**
Unit + Power Exhaust	**10Z41**	**10Z41**	**10Z40**	**10Z39**

12.5 TON | ZCD0150S5M

Motor Horsepower	**5**				
Electric Heat Voltage	**208V**	**240V**	**480V**	**480V**	**600V**
Unit Only	**10Z42**	**10Z42**	**10Z40**	**10Z40**	**10Z39**
Unit + Power Exhaust	**10Z42**	**10Z42**	**10Z40**	**10Z40**	**10Z39**

FIELD WIRING NOTES

- For use with copper wiring only
- Field wiring not furnished
- All wiring must conform to NEC or CEC and local electrical codes
- For specific wiring information, please refer to the installation instructions

ELECTRIC HEAT CAPACITIES

Volts Input	7.5 kW			15 kW			22.5 kW			30 kW			45 kW			60 kW		
	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages	kW Input	Btuh Output	Stages
208	5.6	19,100	1	11.3	38,600	1	16.9	57,700	2	22.5	76,800	2	33.8	115,300	2	45.0	153,600	2
220	6.3	21,500	1	12.6	43,000	1	18.9	64,500	2	25.2	86,000	2	37.8	129,000	2	50.4	172,000	2
230	6.9	23,600	1	13.8	47,100	1	20.7	70,700	2	27.5	93,900	2	41.3	141,000	2	55.1	188,000	2
240	7.5	25,600	1	15.0	51,200	1	22.5	76,800	2	30.0	102,400	2	45.0	153,600	2	60.0	204,800	2
440	6.9	21,500	1	12.6	43,000	1	18.9	64,500	2	25.2	86,000	2	37.8	129,000	2	50.4	172,000	2
460	6.9	23,600	1	13.8	47,100	1	20.7	70,700	2	27.5	93,900	2	41.3	141,000	2	55.1	188,000	2
480	7.5	25,600	1	15.0	51,200	1	22.5	76,800	2	30.0	102,400	2	45.0	153,600	2	60.0	204,800	2
550	6.3	21,500	1	12.6	43,000	1	18.9	64,500	2	25.2	86,000	2	37.8	129,000	2	50.4	172,000	2
575	6.9	23,600	1	13.8	47,100	1	20.7	70,700	2	27.5	93,900	2	41.3	141,000	2	55.1	188,000	2
600	7.5	25,600	1	15.0	51,200	1	22.5	76,800	2	30.0	102,400	2	45.0	153,600	2	60.0	204,800	2

Minimum R454B Space and CFM Requirements

Minimum Airflow[1]		
Unit	Q_{min}(CFM)	Q_{min}(m^3h)
ZCD 092	112	191
ZCD 102	104	177
ZCD 120	112	191
ZCD 150	152	258

*[1] **NOTE -** The minimum airflow is the lowest CFM allowed during venting operation (leak mitigation).*

Refrigerant Charge R-454B				
	Circuit 1		Circuit 2	
Unit	M_c(lbs)	M_c(kg)	M_c(lbs)	M_c(kg)
ZCD092	3.90	1.77	4.06	1.84
ZCD102	3.90	1.77	3.56	1.61
ZCD120	4.00	1.81	4.25	1.93
ZCD150	4.87	2.21	5.75	2.61

Minimum Room Area of Conditioned Space[2]		
Unit	TA_{min}(ft^2)	TA_{min}(m^2)
ZCD 092	63	5.8
ZCD 102	58	5.4
ZCD 120	63	5.8
ZCD 150	85	7.8

[2] NOTE - The minimum room area of conditioned space is the smallest area the unit can service.

Altitude Adjustment Factor[3]									
Halt	0	200	400	600	800	1000	1200	1400	1600
AF	1	1	1	1	1.02	1.05	1.04	1.1	1.12
Halt	1600	1800	2000	2200	2400	2600	2800	3000	3200
AF	1.12	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.4

*[3] **NOTE -** Use the Altitude Adjustment Factor to adjust the values in the tables above to different altitudes. Find the relevant altitude above sea level in the two "Halt" rows and then multiply the value needed from the tables above by the altitude factor number. Example: For the minimum airflow in CFM for an ZCD 092 at 1000 ft. above see level, multiply 112 by 1.05 to get 117.6 CFM as the new Q_{min}.*

Parts Arrangement

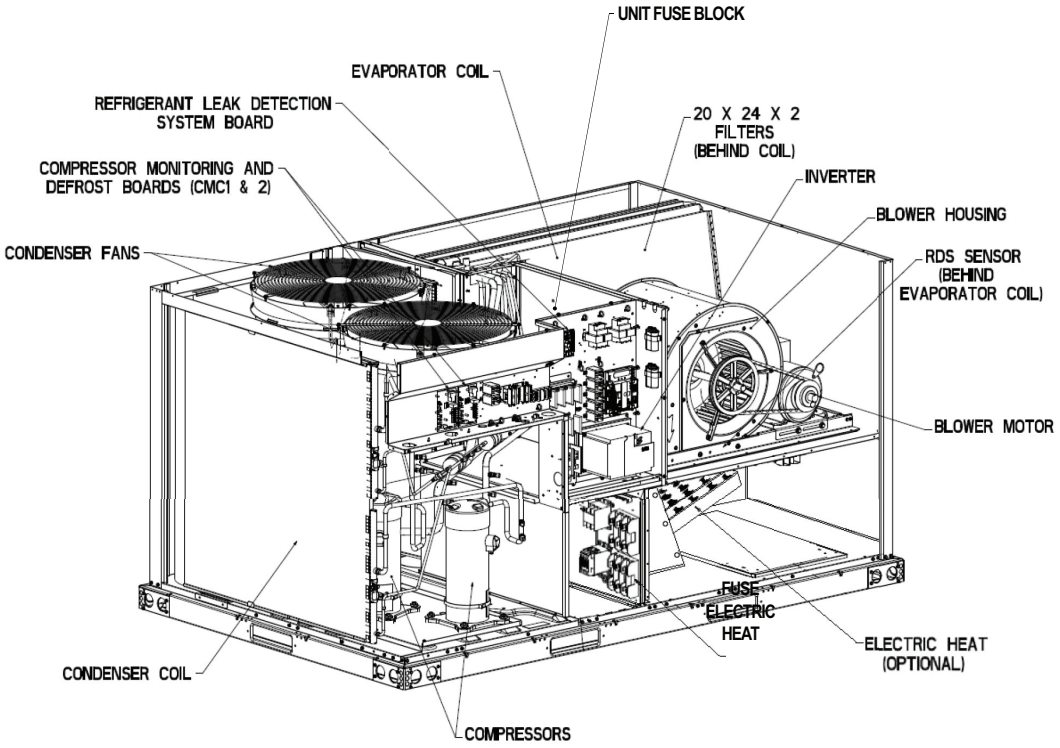


FIGURE 1

ZCD CONTROL BOX

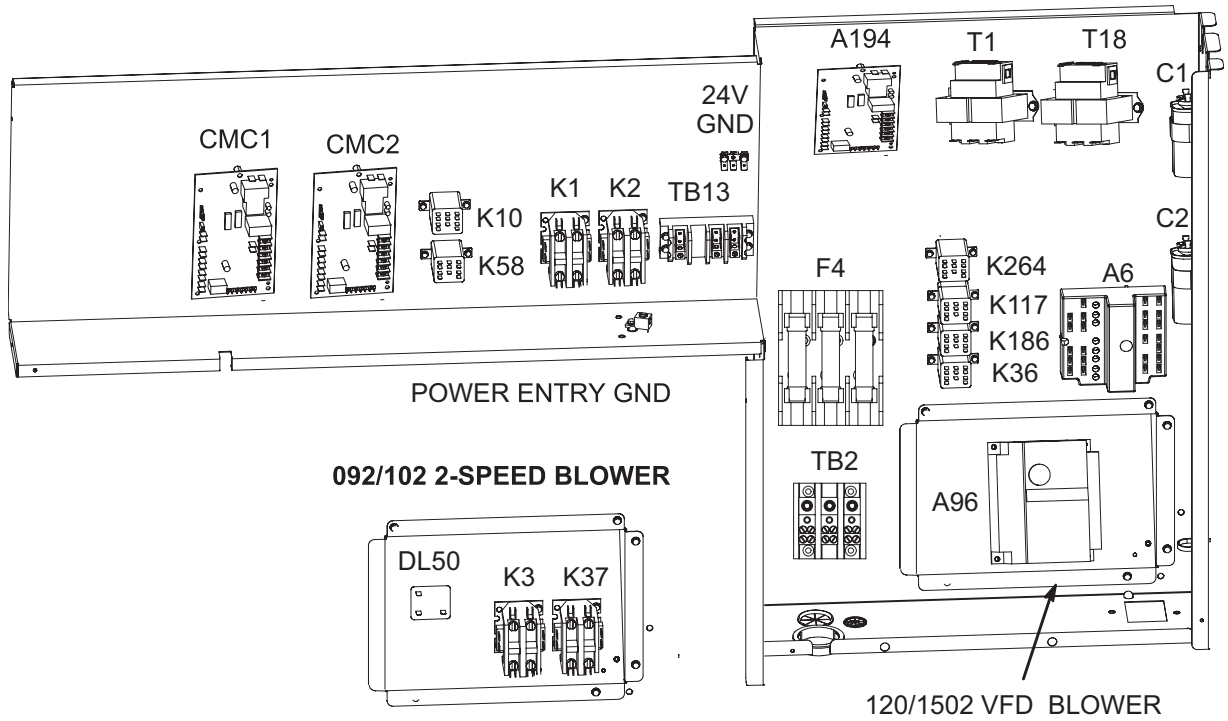


FIGURE 2

I-UNIT COMPONENTS

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.

All 7.5 through 12.5 ton (26.3 through 44 kW) units are configure to order units (CTO). The ZCD 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

ZCD control box components are shown in FIGURE 2.

1-Control Transformer T1 all units

All use a single line voltage to 24VAC transformer mounted in the control box. Transformer supplies power to control circuits in the unit. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB8). The 208/230 (Y) voltage transformers use two primary voltage taps as shown in FIGURE 3, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

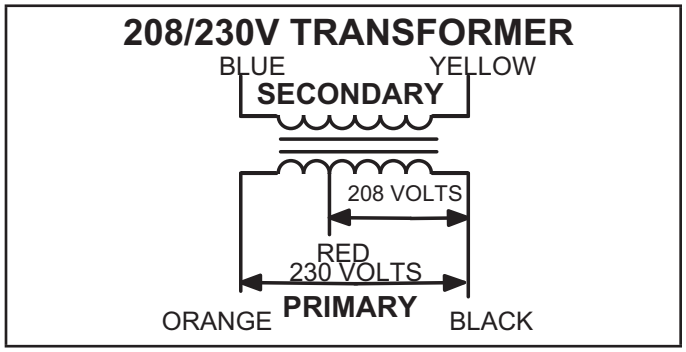


FIGURE 3

2-Contactor Transformer T18

T18 is a single line voltage to 24VAC transformer used in all LDT 13 to 20 ton units. Transformer T18 is protected by a 3.5 amp circuit breaker (CB18). T18 is identical to transformer T1. The transformer supplies 24VAC power to the contactors.

3-Terminal Block TB13

TB13 terminal block distributes line voltage power to the line voltage items in the unit.

4-Condenser Fan Capacitors C1 & C2

Fan capacitors C1 and C2 are used to assist in the start up of condenser fans B4 and B5. Ratings will be on side of capacitor or outdoor fan motor nameplate.

5-Compressor Contactor K1 & K2

All compressor contactors are two-pole, double-break contactors with 24VAC coils. In all ZCD units, K1 and K2 energize compressors B1 and B2 in response to thermostat demand.

6-Variable Speed Drive VFD A96

Units are equipped with a factory-installed supply air inverter (VFD). During cooling, the blower will operate at one of three speeds depending on the demand. When demand is low, the blower will operate at low speed. When demand is higher, the blower will operate at either medium or high speed depending on the cooling demand.

7-Condenser Fan Relay K10

Outdoor fan relay K10 is a DPDT relay with a 24VAC coil. K10 energizes condenser fans B4 and B5.

8-Relay K239 (-092/102 Units)

Relay K239 sends the Y1 demand “G” signal to K3 (through K250) to energize the blower on low speed and also sends the “W1” demand “G” signal to K37 (through K250) to energize the blower on high speed.

9-Relay K250 (-092/102 Units)

Relay K250 passes the “G” signal to contactor K3 energizing the blower on low speed. On a Y2 call K250 passes the signal to K37 (energizing the blower on high speed) and internal solenoid L34 (energizing the compressor on high speed).

10-Blower Contactor K3 &K37 (-92/102 Units)

On two-speed operation K37 acts as the high speed blower contactor and K3 acts as the low speed contactor in response to blower demand.

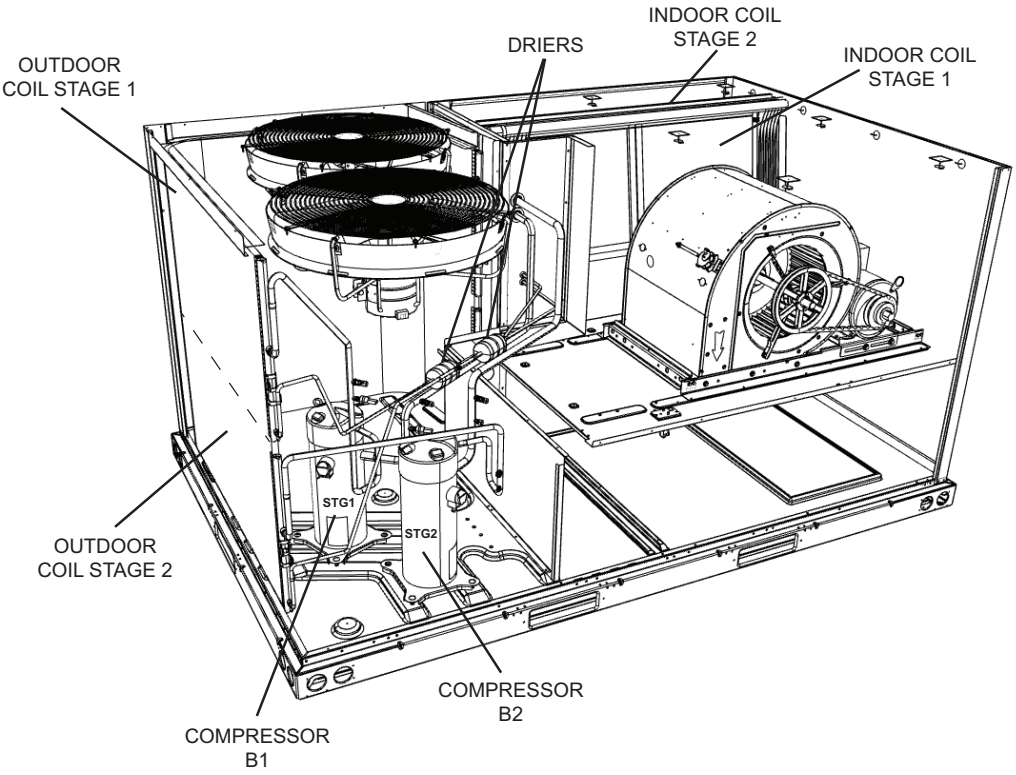
11-Blower Delay DL50 (-092/102 Units)

DL50 causes a 1.5 second delay switching from high speed to low speed.

12-Refrigerant Detection Board (A194) and Sensor (RT58)

All units are equipped with a Refrigerant Leak Detection System. The system consists of the RDS Non-Communicating Blower Control Board (A194) in the control compartment and a R454B Refrigerant Sensor (RT58) near the coil.

ZCD PLUMBING AND COMPRESSOR CIRCUITS DETAIL



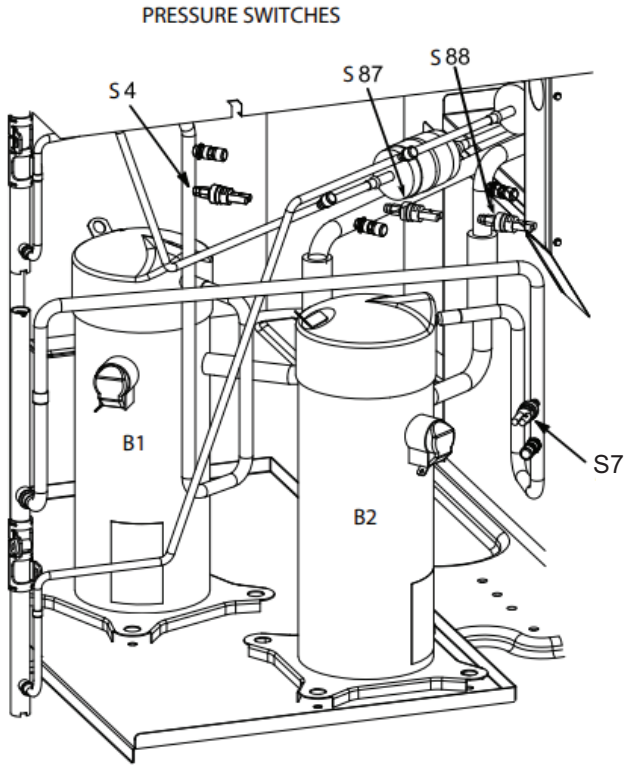


FIGURE 4

B-Cooling Components

All units use independent cooling circuits consisting of separate compressors, condenser coils and evaporator coils. See FIGURE 4. Two draw-through type condenser fans are used in ZCD092/150 units. All units are equipped with belt-drive blowers which draw air across the evaporator during unit operation.

Cooling may be supplemented by a factory- or field installed economizer. The evaporators are row-split. Circuit #2 is directly behind the filter rack and on 150 units is equipped with a TXV, 092,102,120 models use a fixed metering device. Circuit #1 is located after circuit #2 on the same evaporator slab. Circuit #1 always is equipped with a TXV. Each evaporator is also equipped with enhanced fins and rifled tubing.

In all units each compressor is protected by S4 and S7 high pressure switches (on each evaporator). Low ambient switches (S11, S84) are available as an option for additional compressor protection. Each compressor is protected by a crankcase heater.

1-Compressors B1 and B2

All ZCD092/150 units use two scroll compressors. however Circuit #1 B1 uses a 2-stage or 2-step compressor. Circuit #2 or B2 uses a fixed capacity compressor. Compressor capacity may vary from stage to stage. In all cases, the capacity of each compressor is added to reach the total capacity of the unit. See “SPECIFICATIONS” and “ELECTRICAL DATA” (table of contents) or compressor nameplate for compressor specifications.

⚠ WARNING

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

Each compressor is energized by a corresponding compressor contactor.

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

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.

2-High Pressure Switches S4 and S7

The high pressure switch is an auto-reset SPST N.C. switch which opens on a pressure rise. S4 (first circuit) and S7 (second circuit)are located in the compressor discharge line and wired in series with the respective compressor contactor coils.

When discharge pressure rises to 640 ± 10 psig (4413 ± 69 kPa) (indicating a problem in the system) the switch opens and the respective compressor is de-energized (the economizer can continue to operate). -120 Units have the S4 high pressure switch located in the liquid line before the filter drier.

3-Low Pressure Switch (S87, S88)

The compressor circuit is protected by a loss of charge switch. Switch opens at 40 psig $\pm$ 5 psig (276 $\pm$ 34 kPa) and automatically resets at 90 psig $\pm$ 5 psig (621 kPa $\pm$ 34 kPa).

4-Compressor Monitoring (CMC1 & CMC2)

The unit is equipped with two CMC control boards (CMC1 & CMC2 for compressors B1 and B2 respectively). Inputs will include cooling commands, and pressure controls.

Integral features include:

- Anti-short cycle timed-off control with compressor contactor driver.
- High- and low-pressure switch monitoring, with 5-strike lockout.

CMC1 & CMC2 will be engaged monitoring compressors B1 and B2.

See TABLE 1 for a listing of LED alerts.

TABLE 1

CMC1/CMC2 Control Board Diagnostic LED’s

DS2 Green	DS1 Red	Condition
OFF	OFF	Power Problem
Simultaneous Slow Flash		Normal Operation
Alternating Slow Flash		5-min. anti-short cycle delay
Fault and Lockout Codes		
OFF	Slow Flash	Loss of Charge Fault
OFF	ON	Loss of Charge Fault
Slow (Flash)	OFF	High Pressure Fault
ON	OFF	High Pressure Lockout

5-Crankcase Heaters HR1, HR2

092-150S units use belly band heaters. Heater HR1 is installed around compressor B1 and heater HR2 is installed around compressor B2. Crankcase heater wattage varies by compressor manufacturer. The power to crankcase heaters is routed through the N.C. Contacts on K10 Outdoor Fan Motor Relay.

6-Refrigerant Leak Detection System

This unit is equipped with a Refrigerant Leak Detection System. The system consists of the RDS Non-Communicating Blower Control Board (RDSC) in the control compartment and a R454B Refrigerant Sensor near the coil. The Modes of Operation for the RDS Non-Communicating Blower Control Board are Initializing, Normal, Leak Detected, and Fault.

MODES OF OPERATION

Initializing

The RDS Non-Communicating Blower Control Board is establishing connection with the refrigerant detection sensor and sensor is “warming up”.

Normal

The HVAC system is functioning normally, i.e., responding to thermostat demand signals. The RDS Non-Communicating Blower Control Board has not detected a refrigerant leak.

Leak Detected (Mitigation)

When the RDS Non-Communicating Blower Control Board detects a refrigerant leak:

1 - The RDS Non-Communicating Blower Control Board shuts off the (R) output (24VAC power) to the thermostat, which de-energizes the outdoor unit compressor and heat sources, such as gas and/or electric strip heat. No heating or cooling demands will be met.

2 - The RDS Non-Communicating Blower Control Board activates the blower ventilation speed (G). The blower purges refrigerant from the cabinet, plenum, and ductwork.

3 - After the RDS Non-Communicating Blower Control Board determines the refrigerant levels are below the safety threshold, the blower will continue to function for an additional seven (7) minutes.

4 - After the blower sequence is complete, the HVAC system resumes normal operation.

NOTE - *The HVAC system may not maintain a cooling or heating setpoint if a significant leak exists. Any refrigerant leaks that remain unaddressed for an extended time may cause the HVAC system to shut down on a low refrigerant pressure limit condition.*

Fault/Service

When a fault is detected within the RDS Non-Communicating Blower Control Board, the indoor blower engages and remains engaged at a constant output until the fault is cleared.

DIAGNOSTIC CODES / TROUBLESHOOTING

The RDS Non-Communicating Blower Control Board is equipped with a multicolor LED. The LED signals the operational state of the RDS Non-Communicating Blower Control Board. To review the operational states, refer to TABLE 2, LED Operational Modes / Troubleshooting, for details.

Red diagnostic codes indicate a specific RDS Non-Communicating Blower Control Board issue. To determine the issue and possible troubleshooting actions, refer to TABLE 3, Red LED Diagnostic Codes / Troubleshooting.

The RDS Non-Communicating Blower Control Board is equipped with a Test/Reset button. The Test button can be used to complete several functions, depending on the mode of operation of the RDS Non-Communicating Blower Control Board. TABLE 4 lists the functions of the Test button during each mode of operation.

TABLE 2

LED Operational Modes / Troubleshooting

Operating Mode	LED Status	Action
Initializing	Flashing green	None
Monitoring	Solid green*	None
Mitigation (Leak Detected)	Flashing blue	Check coil tubes for leak. Repair the issue and restart the equipment.
Fault / Service	Solid blue, interrupted by red flash code	Refer to table for troubleshooting guidance.

*Solid green interrupted by a blue flash indicates the mitigation process has previously occurred.

TABLE 3

Red LED Diagnostic Codes / Troubleshooting

Red Wink	Applies to Individual Sensor(s)	Issue	Action
1	Yes	RDS Sensor Fault	Replace sensor
2	No	VFD alarm / Drain pan overflow	Check VFD for alarms, remedy alarms present. If float switch is installed, verify proper switch mounting location, depth in pan, unobstructed condensate drain line; correct as needed.
3	Yes	Incompatible sensor installed	Replace sensor
4	Yes	Sensor communication issue	Check sensor connection. Ensure connection is clean and tight
5	No	R-input not available	Check for 24VAC power connected to thermostat R terminal on the RDSC. 24VAC power should only be provided at A194-R quick connection for the RDSC to function.
6	No	Invalid configuration of sensor count	Not applicable

TABLE 4

Test Button Functions

Operation Mode	Press the Test button to...	Press	Action
Monitoring	Trigger a leak detection response. Verify all equipment is wired correctly into the RDSC (after installation).	Short	Clear purge-counter if prior mitigation has occured; test mitigation.
		Long	Reset control.
Mitigating (Leak Detected)	Reset the RDSC to a normal mode of operation after a previous leak has been detected and purged from the HVAC system.	Short	If testing mitigation, end test.
Fault/Service	Reset the RDSC after troubleshooting and resolving a fault condition. If the fault is not resolved, the RDSC will enter the Fault mode again.	Short	Reevaluate fault condition - if cleared, return to monitoring, otherwise update indicator.
		Long	Reset control.

RDS SENSORS

Units are equipped with factory-installed RDS Sensors located on different points on the unit. The RDS sensors provide the Unit Controller with continuous readings for leaked refrigerant concentration levels and sensor health status (Good or Fault). These readings are used to modify unit operation to disperse the leaked refrigerant and to remove possible ignition sources. In addition, the Unit Controller uses these readings to initiate alarms to alert the operator of a refrigerant leak or faulty sensor(s).

Each sensor must be specifically placed for proper unit operation and to initiate valid alarms. To identify sensor locations see TABLE 5.

TABLE 5

RDS Sensor Figures

Model	Qty.	Type	Figure
ZCD092-150	1 sensor	INDOOR SENSOR	FIGURE 5

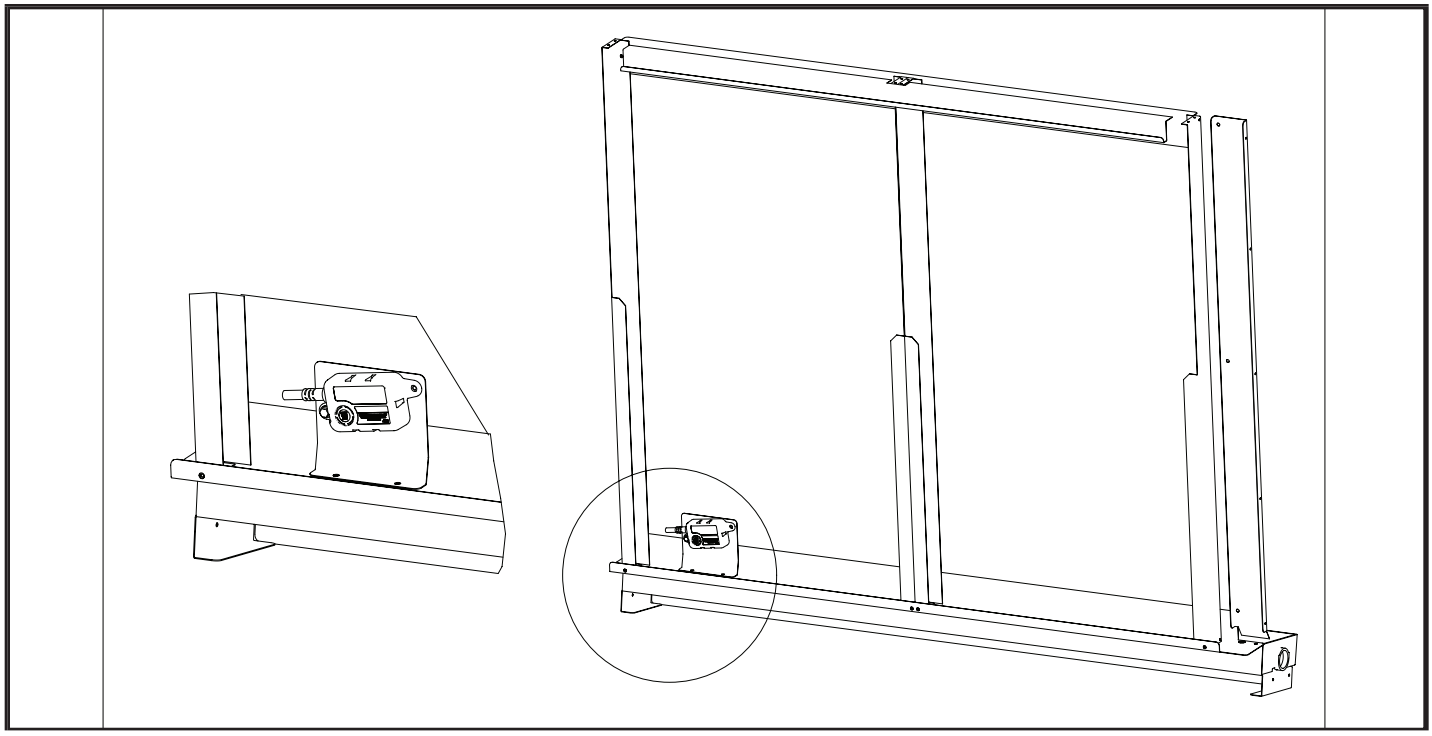


FIGURE 5

SENSOR MAINTENANCE

It is recommended to check the state of the sensor every 6 months, at the beginning of each cooling and heating season.

- Check that the sensor cable is in good condition.
- Ensure that the sensor opening is clear and free of debris.
  - DO NOT use abrasive cleaning solutions or detergents to clean sensor opening.
  - DO NOT use flammable compressed air solutions to clean the sensor opening.
  - DO NOT vacuum sensor inlet opening, as this could cause damage to the sensor internal components.
- Replace sensor if the opening is not clean or free of debris.

NOTE - *When cleaning the evaporator coil, remove the sensor from the coil. Recommended method is removal of bracket with sensor attached.*

See FIGURE 6 for an example of a clear, unobstructed sensor inlet. C-Blower Compartment

All units are equipped with belt drive blowers.

1-Blower Wheels

All ZCD092/150 units have one 15 in. x 15 in. (381 mm x 381 mm) blower wheel.

2-Indoor Blower Motor B3

All units use three-phase single-speed blower motors. CFM adjustments are made by adjusting the motor pulley (sheave). Motors are equipped with sealed ball bearings.

FIGURE 6

All motor specifications are listed in the SPECIFICATIONS (table of contents) in the front of this manual. Units may be equipped with motors manufactured by various manufacturers, therefore electrical FLA and LRA specifications will vary. See unit rating plate for information specific to your unit. Blower speed is controlled by the VFD for 10 and 12.5 tons and by relays K3 and K37 for 7.5 and 8.5 ton units. Units will operate the blower at various speeds depending on which thermostat signals are registered by the controller:

- G/Y1 = 40Hz
- Y2 = 55Hz
- Y3/W1/W2 = 60Hz.

OPERATION / ADJUSTMENT

A-Three Scroll Compressor Voltage Phasing

Three phase scroll compressors must be phased sequentially to ensure correct compressor and rotation and operation.

NOTE- *The VFD that drives the blower motor will automatically correct for incorrect phasing. Do not assume correct blower rotation with correct phasing.*

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.

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

2 - Suction pressure must drop, discharge pressure must rise.

3 - Disconnect all remote electrical power supplies.

4 - Reverse any two field-installed wires connected to the line side of K3, TB2 or F4. Do not reverse wires at blower contactor or compressors.

5 - Make sure the connections are tight. Discharge and suction pressures should operate at their normal start-up ranges.

NOTE - *ZCD092-102 units are equipped with two-stage blowers. The blower will operate at high speed with a Y3 thermostat demand and low speed with a Y2 or Y1 thermostat demand. Low speed operation delivers approximately ⅔ of the air volume of high speed. The blower will run on Low-Speed with a G thermostat demand. The blower will run on High-Speed with a W1 and/or W2 thermostat demand. Two-speed blower operation results in lower energy consumption.*

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

B-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.

C-Blower Access

The blower assembly is secured to a sliding frame which allows the blower motor to be pulled out of the unit. See FIGURE 7.

1 - Loosen the reusable wire tie which secures the blower wiring to the blower motor mounting plate.

2 - Remove and retain screws on either side of sliding frame. Pull frame toward outside of unit.

3 - Slide frame back into original position when finished servicing. Reattach the blower wiring in the previous location on the blower motor base using the wire tie.

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

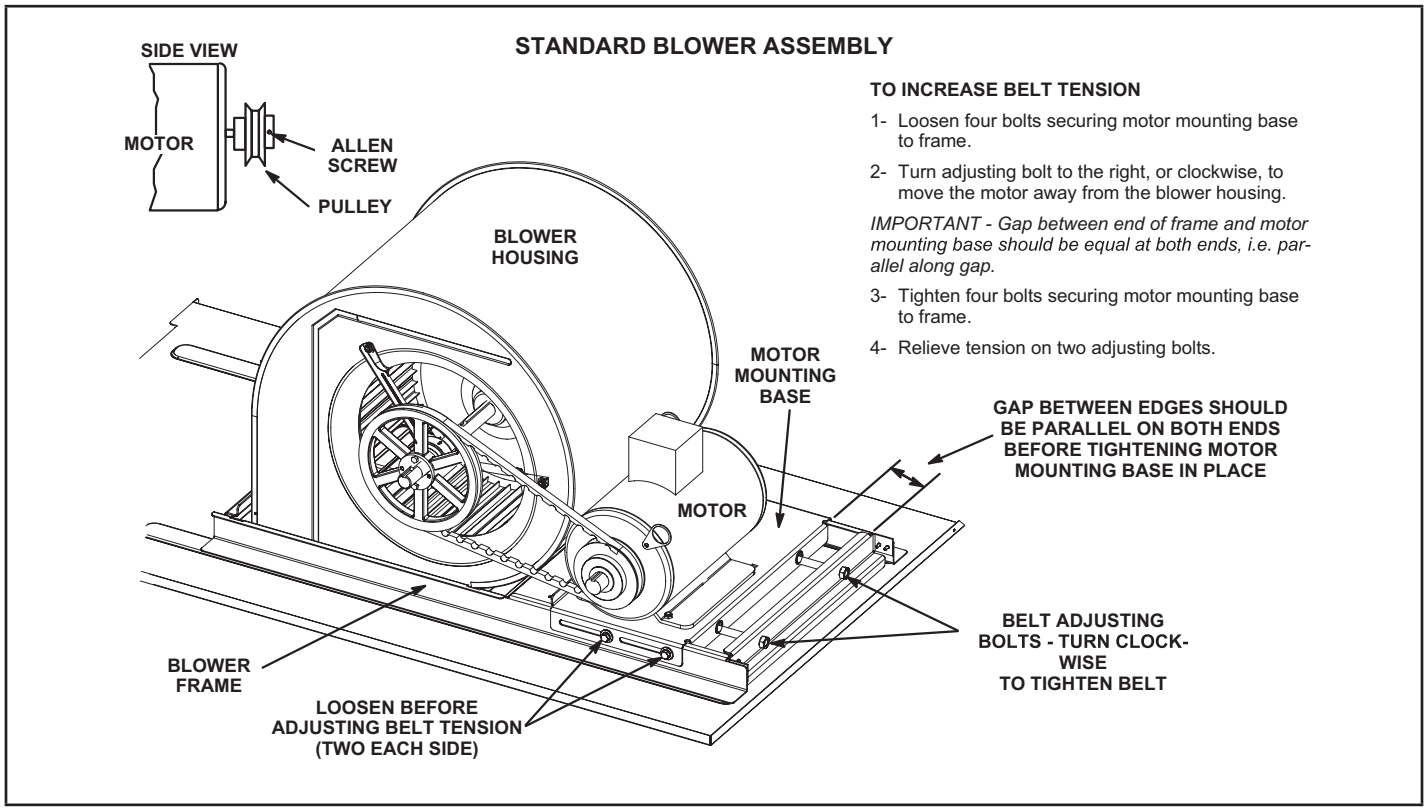


FIGURE 7

D-Determining Unit CFM

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

1 - The following measurements must be made with a dry indoor coil and air filters in place.

Units Equipped With An Inverter -

Initiate high speed blower without a cooling demand. Disconnect high pressure switches S4 and S7. Run the blower with Y1, Y2 and Y3 demands.

2 - Measure the indoor blower shaft RPM.

3 - 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 8.

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

4 - See "BLOWER DATA" to determine unit CFM and when installing units with any of the optional accessories listed.

5 - 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 6.

6 - *Units Equipped With An Inverter -* Reconnect high pressure switches S4 and S7.

TABLE 6

MINIMUM AND MAXIMUM PULLEY ADJUSTMENT

Belt	Min Turns Open	Max Turns Open
A Section	0	5
B Section	1*	6

*No minimum number of turns open when B belt is used on pulleys 6" O.D. or larger.

E-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 in the pulley grooves. Make sure blower and motor pulleys are aligned as shown in FIGURE 9.

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

2 - *To increase belt tension -*

Turn both adjusting bolts to the right, or clockwise, to move the motor outward and tighten the belt. This increases the distance between the blower motor and the blower housing.

To loosen belt tension -

Turn the adjusting bolts to the left, or counterclockwise to loosen belt tension.

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

3 - Tighten two bolts on each side of the motor mounting base. This secures the mounting base to the frame

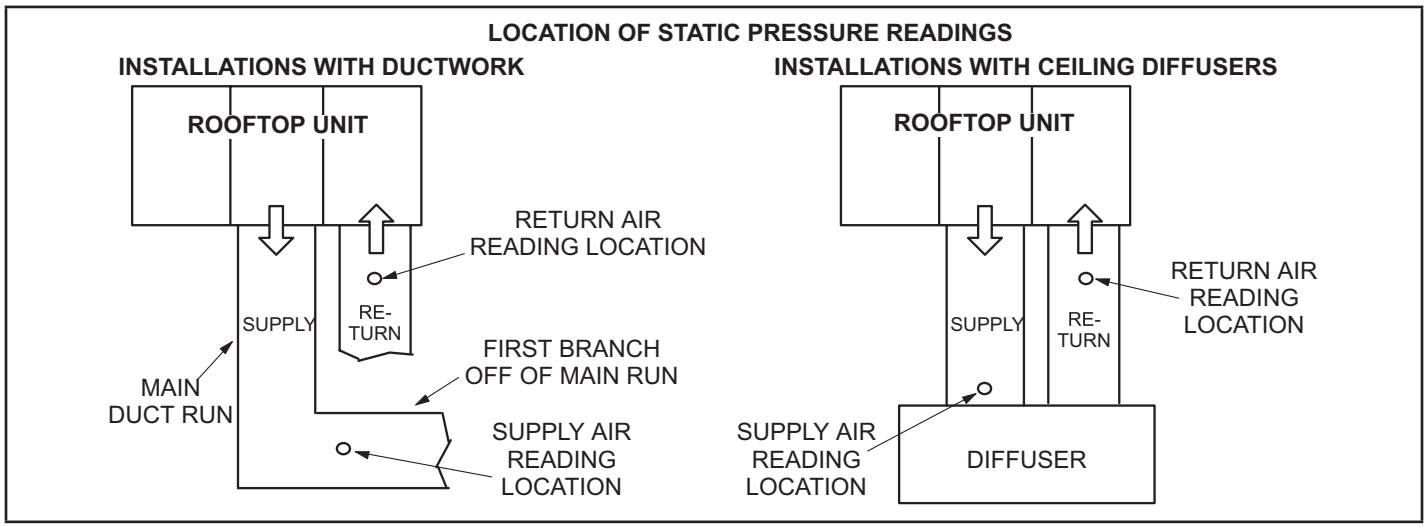


FIGURE 8

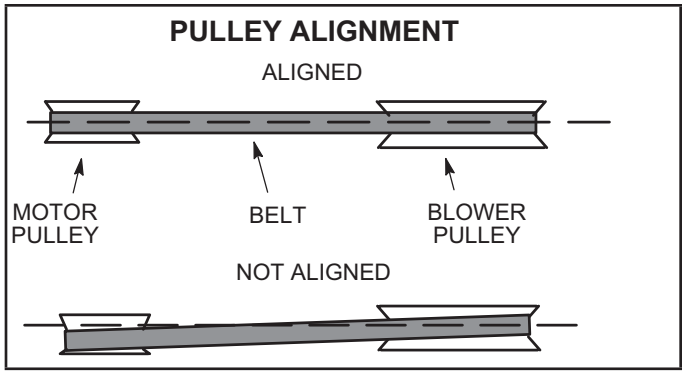


FIGURE 9

F-Check Belt Tension

Over-tensioning belts shortens belt and bearing life. Check belt tension as follows:

1 - Measure span length X. See FIGURE 10.

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

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

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

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

3 - Measure belt deflection force. For a new 2 and 3hp belt, the deflection force should be 5.0-7.0 lbs. (35-48kPa). For a new 5hp belt, the deflection force should be 7-10lbs. (48-69kPa).

A force below these values indicates an under-tensioned belt. A force above these values indicates an over-tensioned belt.

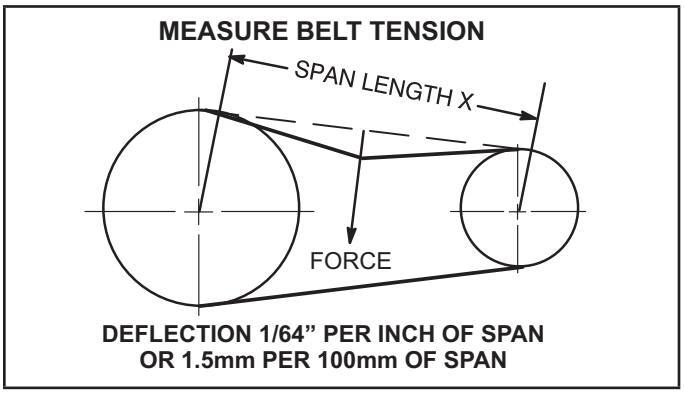


FIGURE 10

F-Field-Furnished Blower Drives

For field-furnished blower drives, use "BLOWER DATA" (table of contents) to determine BHP and RPM required. Reference TABLE 7 for drive component manufacturer's numbers.

TABLE 7
MANUFACTURER'S NUMBERS

DRIVE NO.	DRIVE COMPONENTS					
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELT	
	BROWNING NO.	OEM PART NO.	BROWNING NO.	OEM PART NO.	BROWNING NO.	OEM PART NO.
1	1VP34x7/8	31K6901	AK61x1	100244-20	A44	44L5501
2	1VP40x7/8	79J0301	AK59x1	31K6801	AX45	100245-23
3	1VP34x7/8	31K6901	AK46x1	100244-17	A41	100245-18
4	1VP44x7/8	P-8-1488	AK74x1	100244-21	AX48	100245-50
5	1VP50x7/8	P-8-2187	AK69x1	37L4701	AX48	100245-50
6	1VP50x7/8	P-8-2187	AK64x1	12L2501	AX46	31K7101
10	1VP50x1-1/8	P-8-1977	BK77x1	49K4001	BX50	100245-49
11	1VP50x1-1/8	P-8-1977	BK67x1	100244-24	BX46	100245-48

D-Optional Electric Heat Components

TABLE 8 shows electric heat fuse ratings. See Options/ Accessories section (see table of contents) for ZCD to EHA match-ups. See Electrical/Electric Heat Data section (see table of contents) of this manual for electrical ratings and capacities.

All electric heat sections consist of electric heating elements exposed directly to the air stream. See FIGURE 14.

EHA parts arrangement is shown in FIGURE 13 and FIGURE 14. Multiple-stage elements are sequenced on and off in response to thermostat demand.

1-Contactors K15, K16

Contactors K15 and K16 are three-pole double-break contactors located on the electric heat vestibule. All contactors are equipped with a 24VAC coil. The coils in the K15 and K16 contactors are energized by a W2 thermostat demand and K9. Contactor K15 energizes the first stage heating elements, while K16 energizes the second stage heating elements.

2-High Temperature Limits S15 (Primary)

S15 is a SPST normally closed auto-reset thermostat located on the back panel of the electric heat section below the heating elements. S15 is the high temperature limit for the electric heat section. When S15 opens, indicating a problem in the system, contactor K15 is de-energized.

When K15 is de-energized, first stage and all subsequent stages of heat are de-energized. For EHA102/150 units, the electric heat section thermostat is factory set to open at 170ºF ± 5ºF (76ºC ± 2.8ºC) on a temperature rise and automatically reset at 130ºF ± 6ºF (54.4ºC ± 3.3ºC) on a temperature fall. For EHA100 units, the electric heat section thermostat is factory set to open at 160ºF ± 5ºF (71.0ºC ± 2.8ºC) on a temperature rise and automatically reset at 120ºF ± 6F (49.0C ± 3.3ºC) on a temperature fall. The thermostat is not adjustable.

3-High Temperature Limit S20, S157, S158, S15, S160 & S161 (Secondary)

Limits are SPST normally closed manual-reset thermostat Like the primary temperature limit, S20 is wired in series with the first stage contactor coil (K15) and second stage contactor coil (K16). When S20 opens, contactors K15, K16) are de-energized. When the contactors are de-energized, first stage and all subsequent stages of heat are de-energized. The thermostat is factory set to open at 220ºF ± 6ºF (104ºC ± 3.3ºC) on a temperature rise and can be manually reset when temperature falls below 160ºF (71.0ºC).

4-Terminal Block TB2

Terminal block TB2 is used for single point power installations only. TB2 distributes L1, L2 and L3 power to TB3. Units with multi-point power connections will not use TB2.

5-Terminal Block TB3

Electric heat line voltage connections are made to terminal block TB3 located in the upper left corner of the electric heat vestibule. TB3 distributes power to the electric heat components.

6-Heating Elements HE1 through HE6

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

Fuse F3, is housed in a fuse block which holds three fuses. Each fuse is connected in series with each leg of electric heat. FIGURE 13 and table 3 show the fuses used with each electric heat section. For simplicity, the service manual labels the fuses F3 - 1, 2 and F4 - 1, 2.

8-Unit Fuse Block F4

Three line voltage fuses F4 provide short circuit and ground fault protection to all cooling components in the ZCD units with electric heat. The fuses are rated in accordance with the amperage of the cooling components.

ELECTRIC HEAT CONTROL ASSEMBLY

1-Electric Heat Relay K9

All ZCD series units with electric heat use an electric heat relay K9. K9 is a N.O. DPDT pilot relay intended to electrically isolate the unit's 24V circuit from the electric heat 24V circuit. K9 is energized by the thermostat A194-W1 AND A194-W2 signals on ZCD and by CMC1 Defrost control and TB1 on the A194 board on ZCD units. See FIGURE 11 and FIGURE 12 for location of the J2/P2 harness and FIGURE 13 for location of the K9 relay on the electric heat vest-panel.

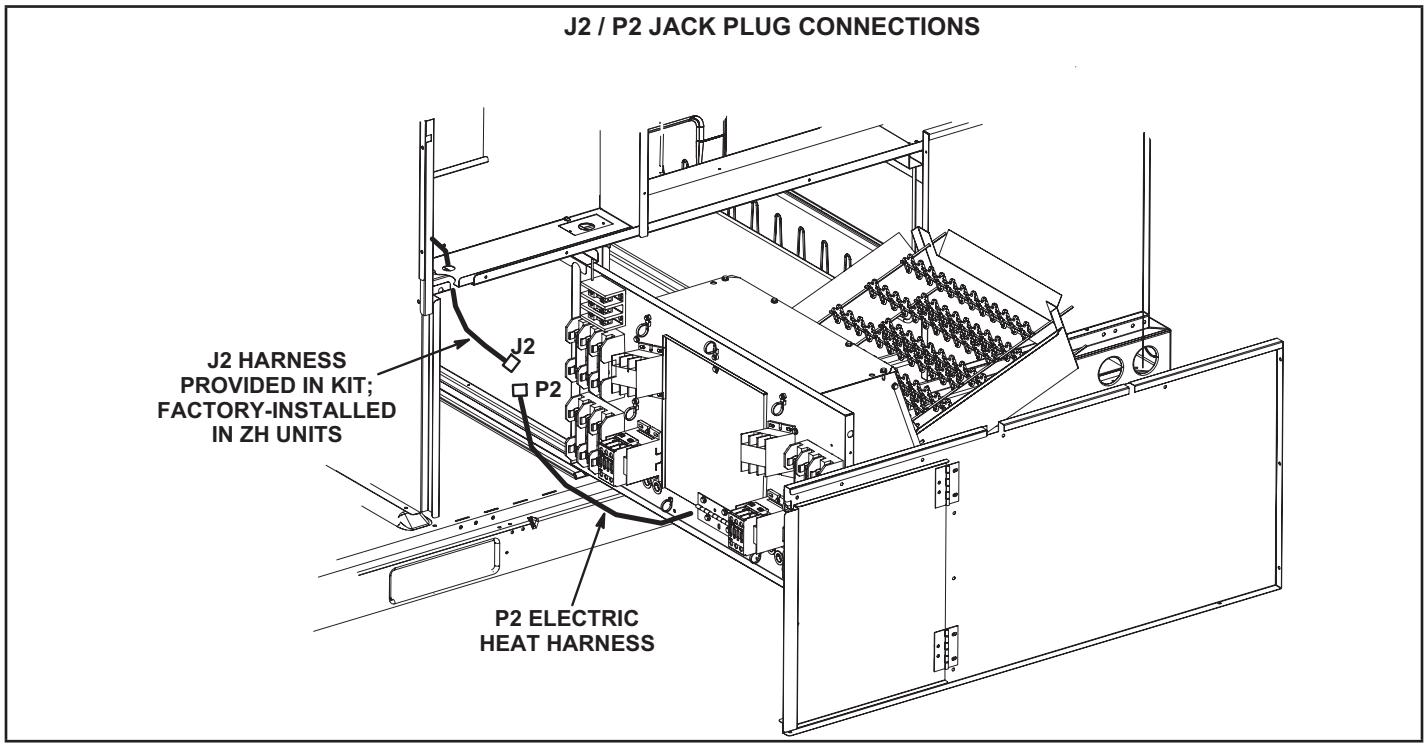


FIGURE 11

SINGLE DISCONNECT INSTALLATIONS

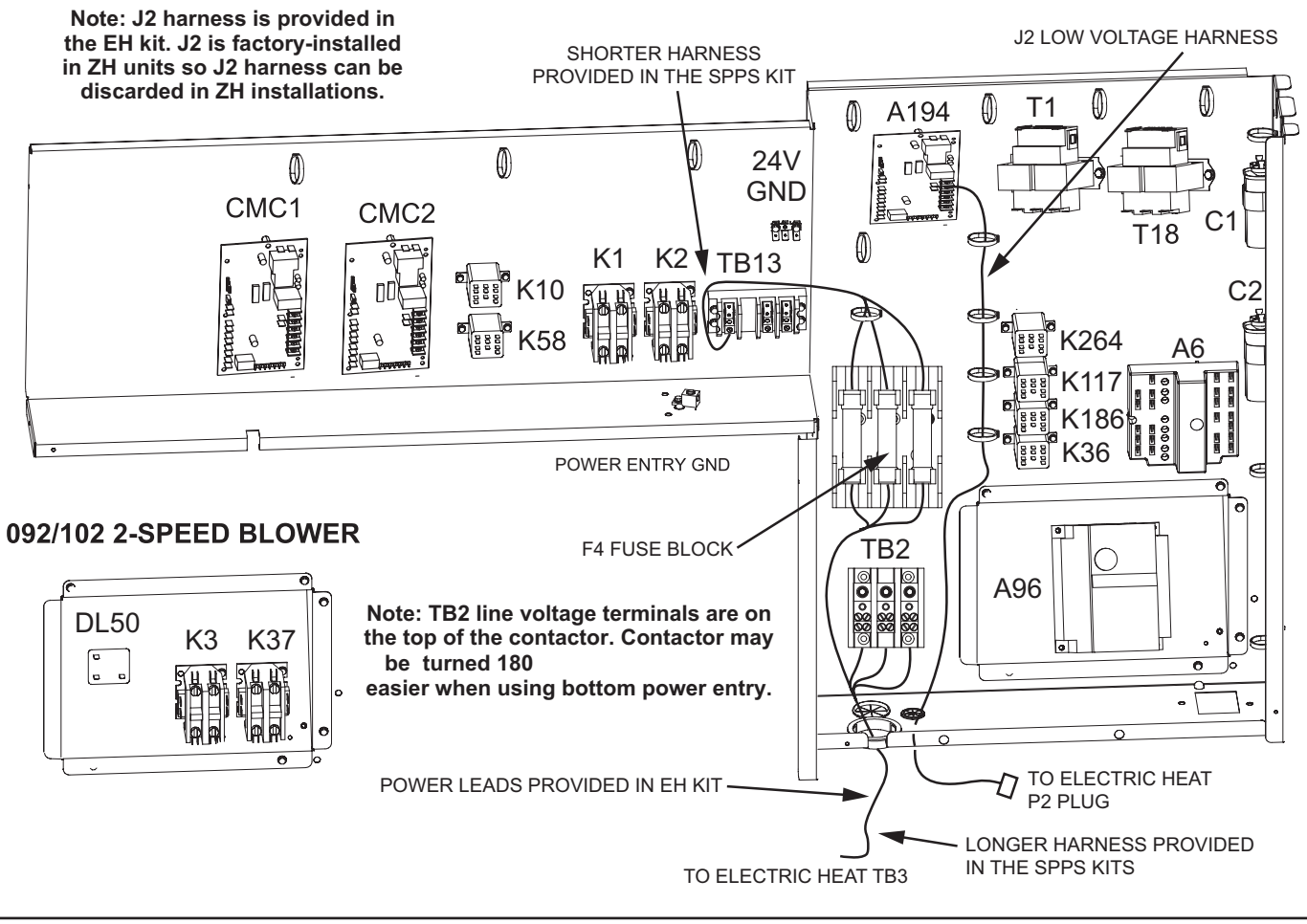


FIGURE 12

ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT

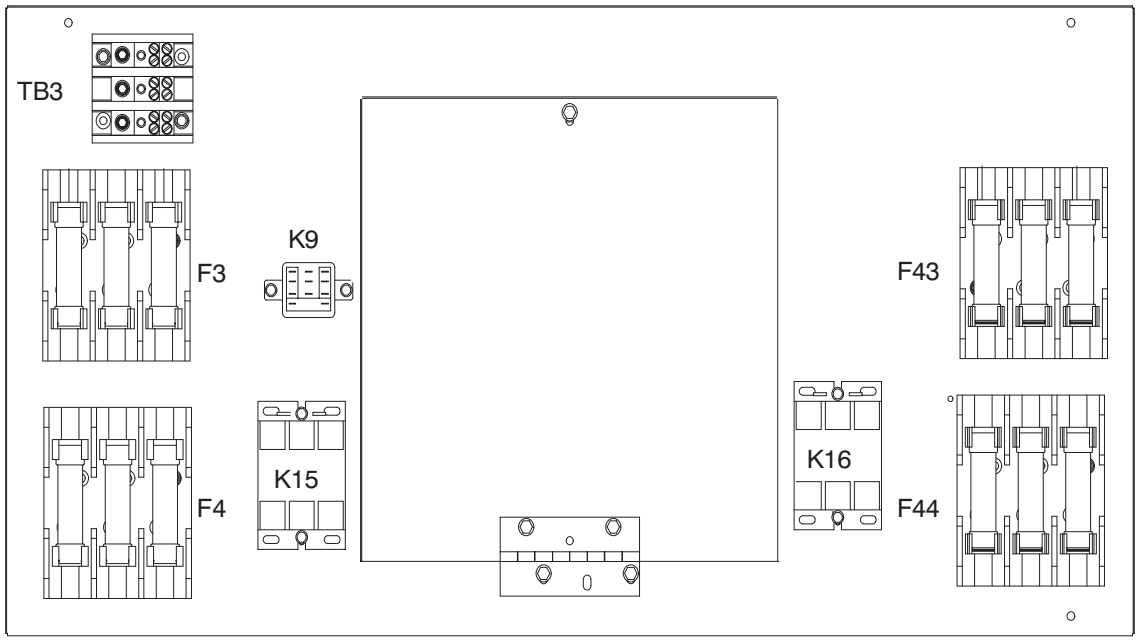


FIGURE 13

EHA 7.5, 15, 22.5, 30, 45, 60KW
ELECTRIC HEAT SECTION PARTS ARRANGEMENT

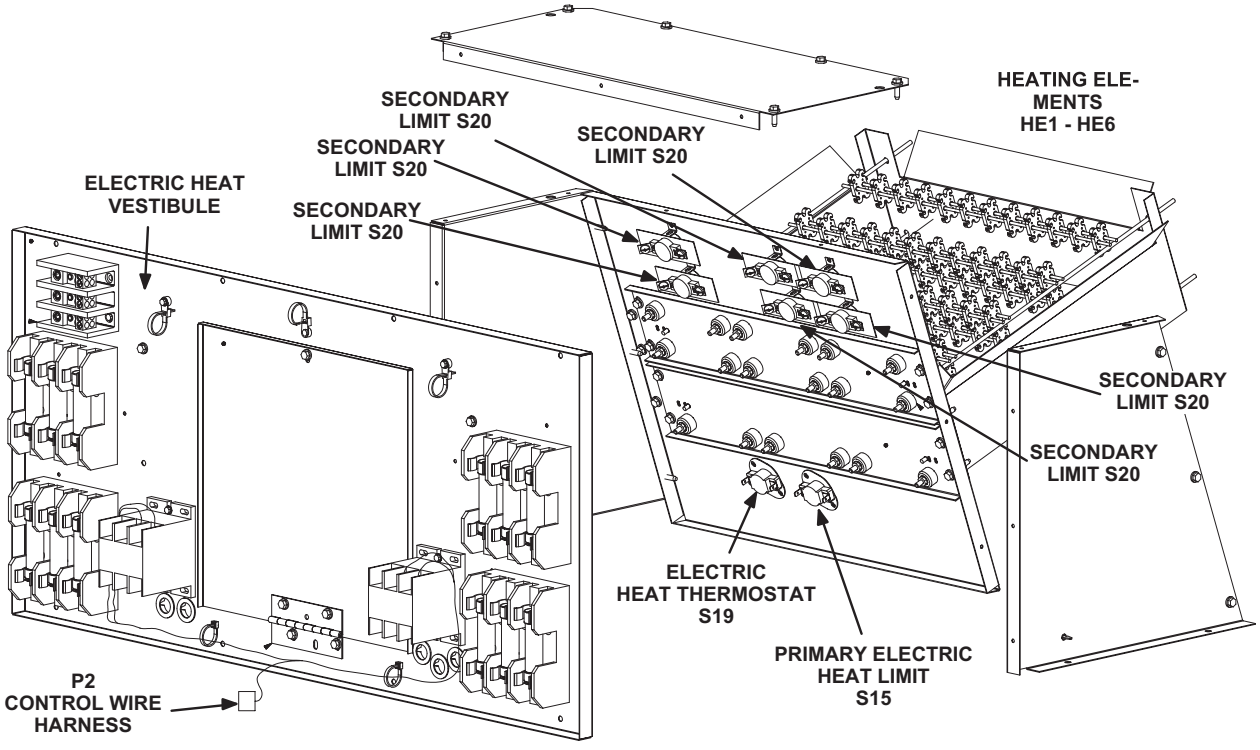


FIGURE 14

TABLE 8

ZCD/ZHD ELECTRIC HEAT SECTION FUSE RATING					
EHA QUANTITY & SIZE	VOLTAGES	FUSE (3 each)			
		F3 - 1	F3 - 2	F3 - 3	F3 - 4
EHO075-7.5	208/230V	25 Amp 250V	-----	-----	-----
	460V	15 Amp 600V	-----	-----	-----
	575V	10 Amp 600V	-----	-----	-----
EHO150-1	208/230V	50 Amp 250V	-----	-----	-----
	460V	25 Amp 600V	-----	-----	-----
	575V	20 Amp 600V	-----	-----	-----
EHO225-1	208/230V	50 Amp250V	-----	-----	25 Amp 250V
	460V	25 Amp 600V	-----	-----	15 Amp 600V
	575V	20 Amp 600V	-----	-----	10 Amp 600V
EHO300-1	208/230V	50 Amp 250V	-----	-----	50 Amp 250V
	460V	25 Amp 600V	-----	-----	25 Amp 600V
	575V	20 Amp 600V	-----	-----	20 Amp 600V
EHO450-1	208/230V	50 Amp 250V	-----	60 Amp 250V	60 Amp 250V
	460V	25 Amp 600V	-----	-----	50 Amp 600V
	575V	20 Amp 600V	-----	-----	40 Amp 600V
EHO600-1	208/230V	60 Amp 250V	60 Amp 250V	60 Amp 250V	60 Amp 250V
	460V	50 Amp 600V	-----	-----	50 Amp 600V
	575V	40 Amp 600V	-----	-----	40 Amp 600V

II-PLACEMENT AND INSTALLATION

Make sure the unit is installed in accordance with the installation instructions and all applicable codes. See accessories section for conditions requiring use of the optional roof mounting frame (Z1CURB40B-1, Z1CURB41B-1, Z1CURB42B-1, or Z1CURB43B-1).

III-STARTUP - 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 unit compressor access panel.

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

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

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

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

B-Cooling Startup

Operation

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

2 - *No Economizer Installed in Unit -*

A first-stage cooling demand (Y1) will energize compressor 1 and both condenser fans. An increased cooling demand (Y2) will energize compressor 2.

Units Equipped With Economizer -

When outdoor air is acceptable, a first-stage cooling demand (Y1) will energize the economizer. An increased cooling demand (Y2) will energize compressor 1 and both condenser fans. When outdoor air is not acceptable unit will operate as though no economizer is installed.

3 - Units contain two refrigerant circuits or stages. See FIGURE 15.

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

5 - Refer to section IV CHARGING for proper method to check refrigerant charge.

C-Safety or Emergency Shutdown

Turn off power to unit. Close manual and main gas valves.

Three Phase Scroll Compressor Voltage Phasing

Three phase power supplied to the unit disconnect switch must be phased sequentially to ensure the scroll compressor and indoor blower rotate in the correct direction. 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 K2 contactor or disconnect switch if installed. 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.

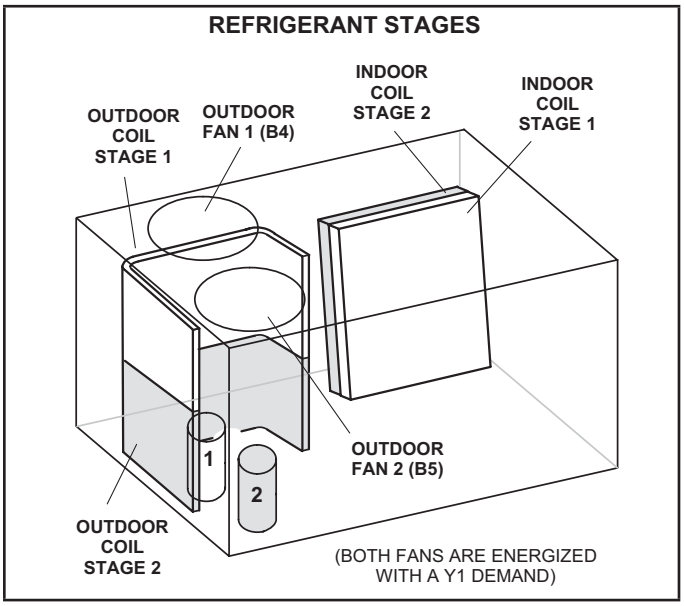


FIGURE 15

IV-CHARGING

⚠ WARNING

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

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

REFRIGERANT CHARGE AND CHECK

A-Refrigerant Charge and Check

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.

Refrigerant Charge R-454B				
	Circuit 1		Circuit 2	
Unit	M_c(lbs)	M_c(kg)	M_c(lbs)	M_c(kg)
ZCD092	3.90	1.77	4.06	1.84
ZCD102	3.90	1.77	3.56	1.61
ZCD120	4.00	1.81	4.25	1.93
ZCD150	4.87	2.21	5.75	2.61

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed and, since flammability is a consideration, the following procedure shall be adhered to:

- Safely remove refrigerant following local and national regulations,
- Evacuate the circuit,
- Purge the circuit with inert gas,
- Evacuate,
- Purge with inert gas,
- Open the circuit

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. Refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the refrigerating unit is earthed prior to charging the system with refrigerant.
    - Label the system when charging is complete (if not already).
    - Extreme care shall be taken not to overfill the refrigerating unit.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i. e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure- relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants includ-ing, when applicable, flammable refrigerants. In ad-dition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manu-facturer if in doubt.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do

not mix refrigerants in recovery units and especially not in cylinders.

- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

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

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

IMPORTANT - Charge unit in standard cooling mode.

1 - Make sure outdoor coil is clean. Attach gauge manifolds and operate unit at full CFM in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure all outdoor air dampers are closed. operate the unit in cooling mode at high speed using the following mobile service app menu path:

RTU MENU > COMPONENT TEST > COOLING > COOLING STAGE 3

2 - Compare the normal operating pressures to the pressures obtained from the gauges. Check unit components if there are significant differences.

3 - Measure the outdoor ambient temperature and the suction pressure. Refer to the charging curve to determine a target liquid temperature.

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

4 - Use the same thermometer to accurately measure the liquid temperature (in the outdoor section).

- If measured liquid temperature is higher than the target liquid temperature, add refrigerant to the system.
- If measured liquid temperature is lower than the target liquid temperature, recover some refrigerant from the system.

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

6 - Continue the process until measured liquid temperature agrees with the target liquid temperature. Do not go below the target liquid temperature when adjusting charge. Note that suction pressure can change as charge is adjusted.

7 - Example: For circuit 1 for the ZCD092, at 95°F outdoor ambient and a measured suction pressure of 130psig, the target liquid temperature is 102°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquidtemperature

TABLE 9
ZGD/ZCD 092S NORMAL OPERATING PRESSURES - 581371-01

	65°F		75°F		85°F		95°F		105°F		115°F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	102	238	104	273	106	314	108	362	110	417	112	478
	110	243	112	278	114	320	116	368	118	423	120	485
	127	252	130	288	132	331	134	380	136	436	138	499
	147	262	150	299	152	343	154	393	157	450	159	513
Circuit 2	103	229	106	264	108	305	110	353	112	406	114	465
	112	234	114	269	116	311	118	358	120	412	122	472
	130	244	132	279	135	321	137	369	139	423	141	483
	151	252	154	288	156	331	158	379	161	433	163	494

ZGD/ZCD 092S Charging Curves

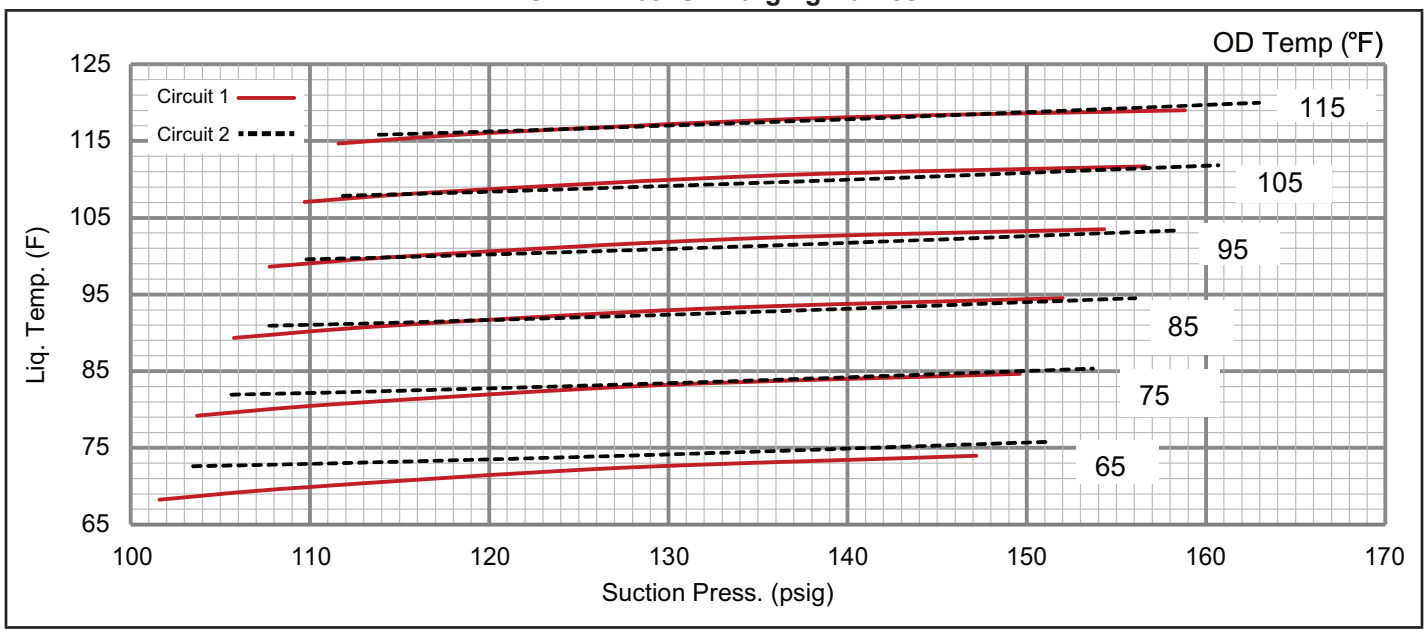


TABLE 10
ZGD/ZCD 102S NORMAL OPERATING PRESSURES - 581372-01

	65°F		75°F		85°F		95°F		105°F		115°F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	100	233	102	270	104	310	106	354	107	401	108	452
	107	237	110	274	112	315	114	360	116	408	118	459
	121	243	125	282	128	324	132	370	135	419	138	472
	134	247	139	287	144	331	148	378	153	428	157	482
Circuit 2	99	242	102	280	104	323	106	369	108	420	109	476
	106	246	109	285	112	328	115	375	117	427	118	482
	121	255	125	295	129	339	132	387	136	440	138	496
	136	265	142	306	147	351	151	400	155	453	159	511

ZGD/ZCD 102S Charging Curves

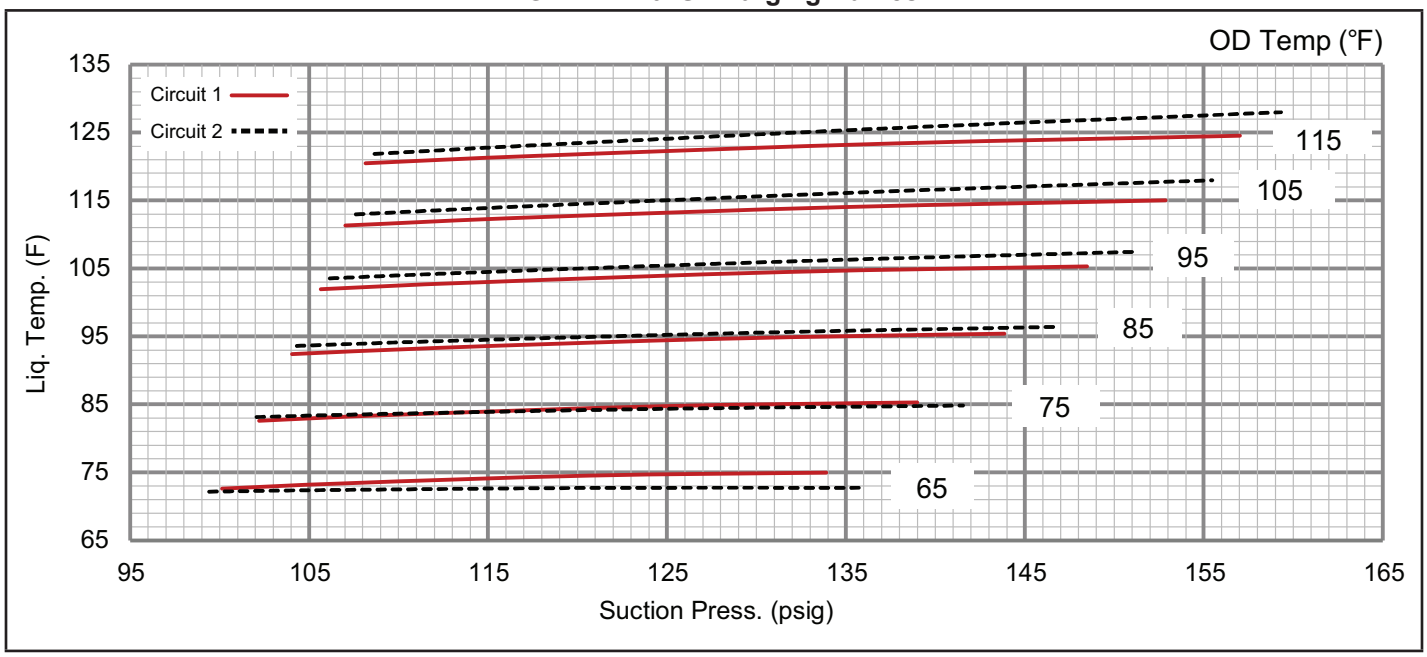


TABLE 11
ZGD/ZCD 120S NORMAL OPERATING PRESSURES - 581373-01

	65°F		75°F		85°F		95°F		105°F		115°F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	94	235	97	277	99	327	101	384	103	450	105	524
	102	231	105	270	107	318	109	373	112	436	114	507
	118	237	121	271	124	313	127	363	130	422	132	488
	134	261	138	290	141	327	145	372	148	426	151	487
Circuit 2	113	249	116	287	118	328	121	374	124	423	127	475
	120	255	123	293	126	334	129	379	132	428	135	480
	136	269	139	307	142	348	146	392	150	441	153	493
	153	287	156	324	160	365	165	409	169	457	173	509

ZGD/ZCD 120S Charging Curves

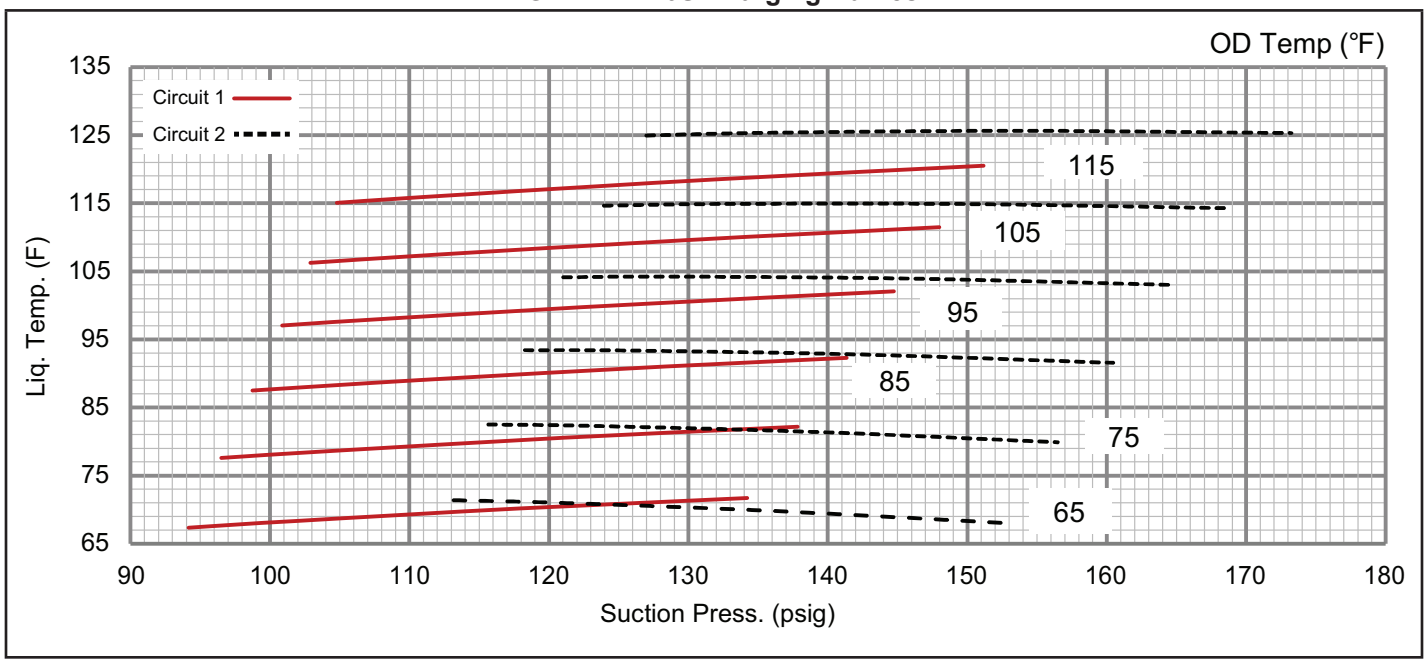
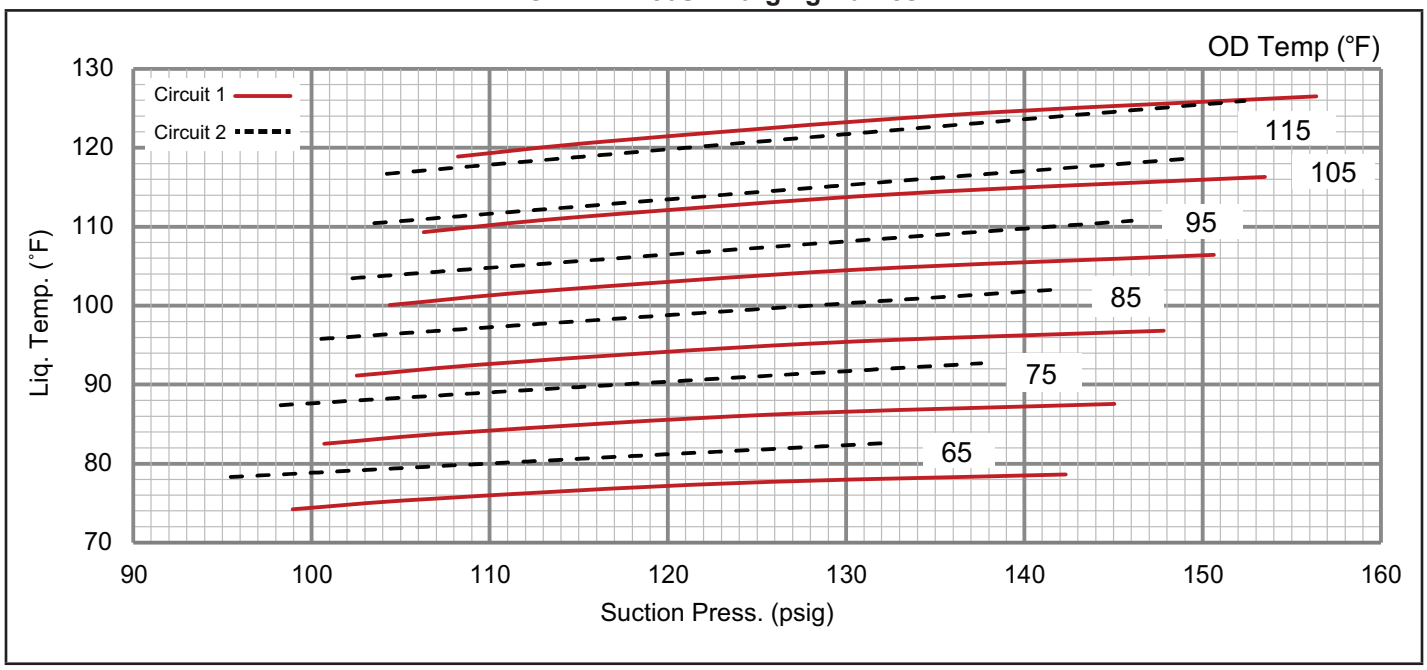


TABLE 12
ZGD/ZCD 150S NORMAL OPERATING PRESSURES - 581374-01

	65°F		75°F		85°F		95°F		105°F		115°F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	99	230	101	267	103	309	104	355	106	406	108	461
	107	234	109	271	111	313	113	360	115	411	117	467
	123	242	126	280	128	323	131	371	133	423	136	479
	142	251	145	290	148	334	151	382	153	435	156	492
Circuit 2	95	242	98	281	101	325	102	374	104	428	104	488
	102	247	106	286	108	330	111	380	112	434	113	494
	117	256	121	296	125	341	128	391	130	446	132	507
	133	267	138	307	142	353	146	404	149	459	152	520

ZGD/ZCD 150S Charging Curves



V- SYSTEMS SERVICE CHECKS

A-Cooling System Service Checks

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

NOTE-When unit is properly charged discharge line pressures should approximate those in TABLE 9 - TABLE 12.

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.

⚠ IMPORTANT

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

⚠ WARNING

Any service personnel installing, decommissioning, or performing maintenance on the unit must be properly trained with A2L refrigerants

Prior to beginning work on systems containing refigerant to ensure the risk of ignition is minimized:

- All work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i. e. non-sparking, adequately sealed or intrinsically safe.
- If any hot work is to be conducted on the refrigerating equipment or any associated parts, the appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
- No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.
- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.

A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

- Where electrical components are being changed, service technicians shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance. The following checks shall be applied to installations using flameable refrigerants as applicable:

1 - The actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed.

2 - The ventilation machinery and outlets are operating adequately and are not obstructed.

3 - If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.

4 - Markings on the equipment should be visible and legible. Markings and signs that are illegible shall be corrected.

5 - Refrigerating pipes or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.For systems containing refigerant all repair and maintenance to electrical components shall include initial safety checks and component inspection procedures such as that capacitors are discharged in a safe manner to avoid possibility of sparking, that no live electrical components and wiring are exposed while charging, recovering, or purging the system, and that there is continuity of earth bonding. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot

be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used that is reported to the owner of the equipment, so all parties are advised.

NOTE - *Sealed electrical components shall be replaced, not repaired.*

NOTE - *Intrinsically safe components must be replaced, not repaired.*

- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.
- When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

  a. Safely remove refrigerant following local and national regulations,

  b. Evacuate the circuit,

  c. Purge the circuit with inert gas,

  d. Evacuate,

  e. Purge with inert gas,

  f. Open the circuit.

- The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. Refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

A-Filters

Units are equipped with 20 X 24 X 2” temporary filters which must be replaced prior to building occupation. Refer to local codes or appropriate jurisdiction for approved filters.

To change filters, open filter access panel on back side of unit. See FIGURE 16. Lift filter stop to remove filters. See FIGURE 17.

⚠ 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.

Approved filters should be checked monthly and replaced when necessary. Take note of air flow direction marking on filter frame when reinstalling filters. See FIGURE 17.

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

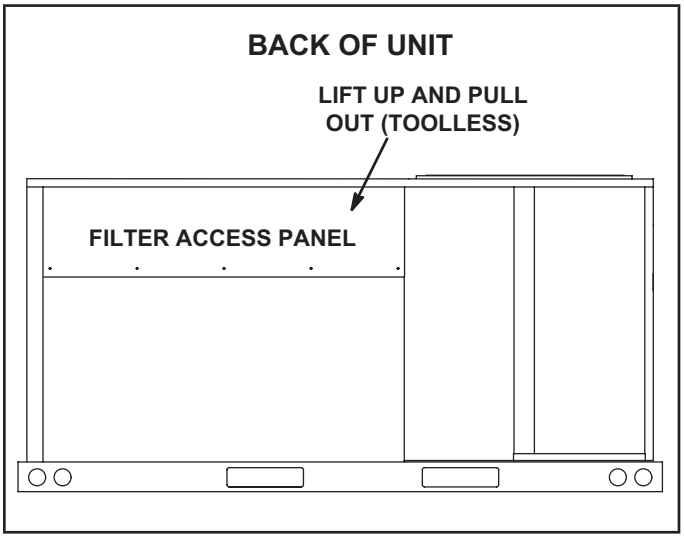


FIGURE 16

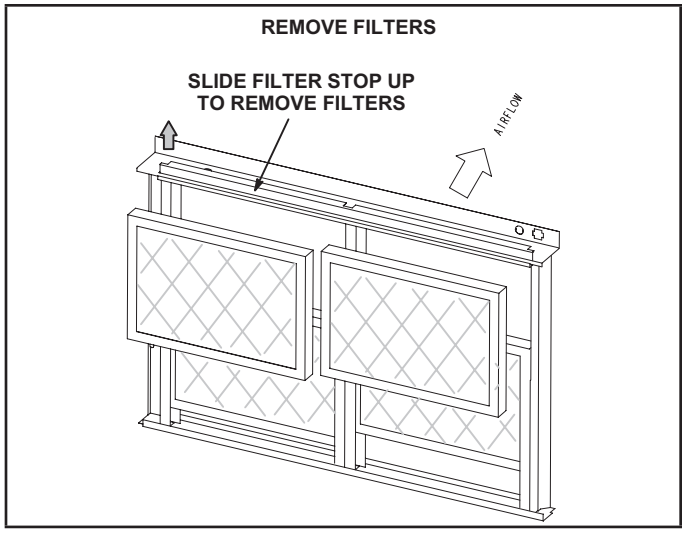


FIGURE 17

B-Lubrication

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

C-Evaporator Coil

Inspect and clean coil at beginning of each cooling season. Clean coil annually with water and inspect monthly during the cooling season. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet.

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

D-Condenser Coil

Clean condenser coil annually with water and inspect monthly during the cooling season.

Note - *Do not use commercial coil cleaner on the all aluminum coil. Using anything other than water could result in corrosion and/or leaks.Clean the all-aluminum coil by spraying the coil steadily and uniformly from top to bottom. Do not exceed 900 psi or a 45 angle; nozzle must be at least 12 inches from the coil face. Take care not to fracture the braze between the fins and refrigerant tubes. Reduce pressure and work cautiously to prevent damage.*

E-Supply Blower Wheel

Annually inspect supply air blower wheel for accumulated dirt or dust. Turn off power before attempting to remove access panel or to clean blower wheel.

VII-ACCESSORIES

The accessories section describes the application of most of the optional accessories which can be factory or field installed to the ZCD units. OPTIONAL ACCESSORIES section (see table of contents) show specific size per unit.

A-Mounting Frames

When installing units on a combustible surface for downflow discharge applications, the Z1CURB roof mounting frame is used. The roof mounting frames are recommended in all other applications but not required. If the ZCD 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 Z1CURB mounting frame is shown in FIGURE 18. Refer to the roof mounting frame installation instructions for details of proper assembly and mounting. The roof mounting frame MUST be squared to the roof and level before mounting. Plenum system MUST be installed before the unit is set on the mounting frame. Typical roof curbing and flashing is shown in FIGURE 19. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

B-Transitions

Transitions are field-provided.

C-Supply and Return Diffusers

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

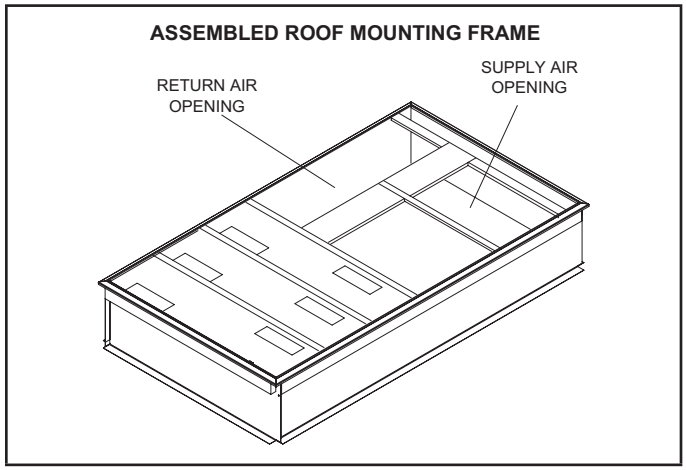


FIGURE 18

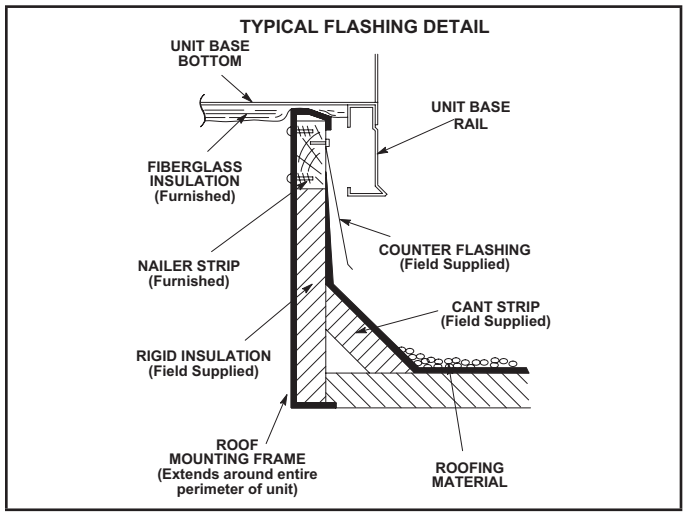


FIGURE 19

D-Economizer (Field or Factory Installed)

NOTE - *The following is an example of one economizer used. See Engineering Handbook for other economizers used and refer to the applicable economizer installation instruction for more detail.*

Economizers use outdoor air for free cooling when temperature and/or humidity is suitable. See FIGURE 20.

The mixed air temperature sensor (R1) measures the supply air sensible temperature. See FIGURE 21. The outdoor air sensible control is the default economizer control. An outdoor air single sensible sensor, S175, is also provided. See TABLE 13 for outdoor and return air (OA and RA) sensor options.

Refer to instructions provided with sensors for installation. An IAQ sensor is used when demand control ventilation (DCV) is specified. Damper minimum position can be set lower than traditional minimum air requirements resulting in cost savings. The IAQ sensor allows the A6 to open dampers to traditional ventilation requirements as room occupancy (CO2) increases.

TABLE 13

Sensors	**Dampers will modulate to 55°F discharge air (RT6) when:**
Single OA Sensible	OA temperature (S175) is lower than free cooling setpoint.
Single OA Sensible	OA temperature and humidity (A7) is lower than free cooling setpoint
Differential Enthalpy - 1 in OA and 1 in RA	OA temperature and humidity (A7) is lower than RA temperature and humidity (A62).
IAQ Sensor	CO_2 sensed (A63) is higher than CO_2 setpoint.

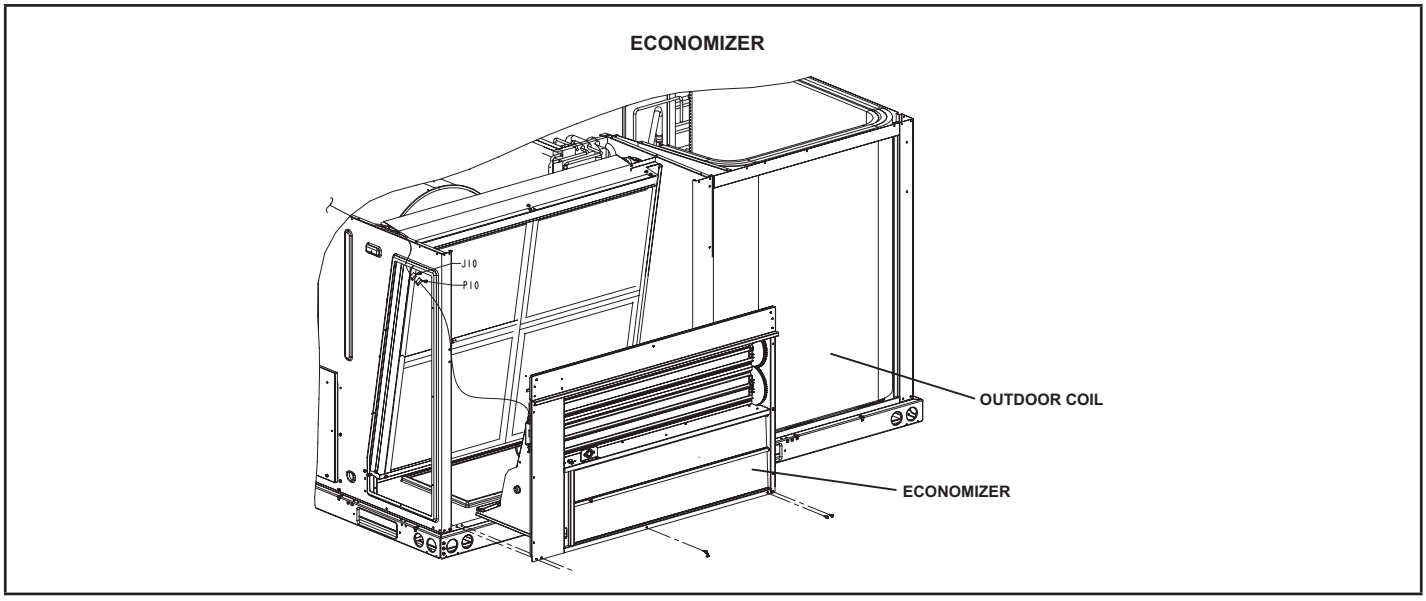


FIGURE 20

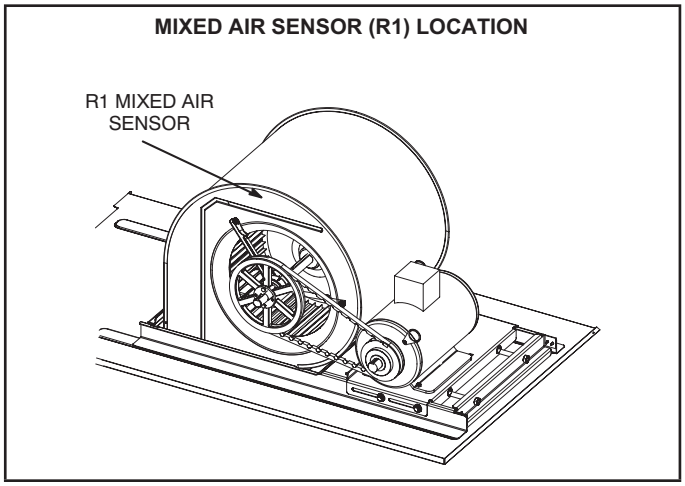


FIGURE 21

A6 Enthalpy Control LED'S

A steady green Free Cool LED indicates that outdoor air is suitable for free cooling. When an optional IAQ sensor is installed, a steady green DCV LED indicates that the IAQ reading is higher than setpoint requiring more fresh air. See FIGURE 22.

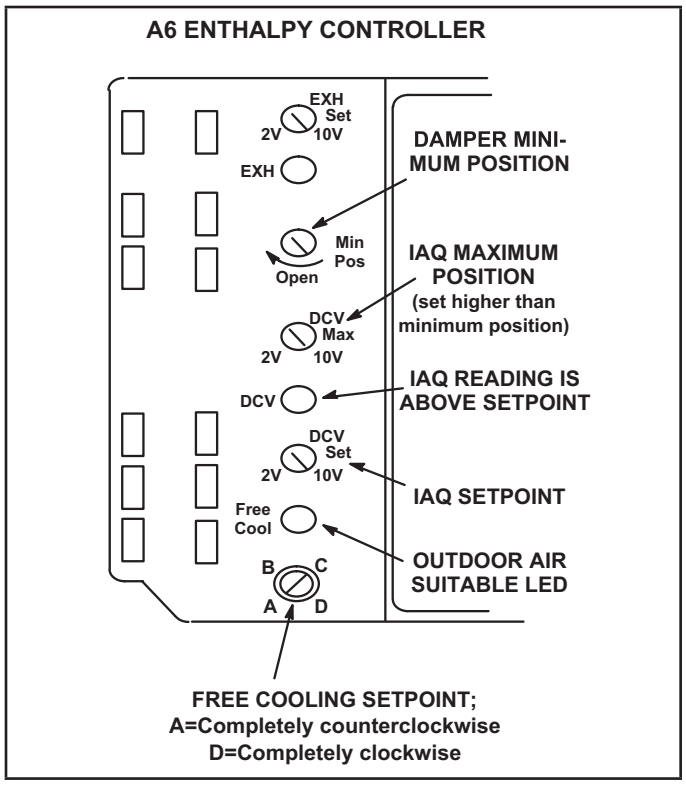


FIGURE 22

Free Cooling Setpoint

Outdoor air is considered suitable when temperature and humidity are less than the free cooling setpoints shown in TABLE 14. Setting A is recommended. At setting A, free cooling will be energized when outdoor air is approximately 73°F (23°C) and 50% relative humidity. If indoor air is too warm or humid, lower the setpoint to B. At setting B, free cooling will be energized at 70°F (21°C) and 50% relative humidity.

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

TABLE 14

ENTHALPY CONTROL SETPOINTS

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

Damper Minimum Position

NOTE - *A jumper is factory-installed between the A194 R and OC terminals to maintain occupied status (allowing minimum fresh air). When using an electronic thermostat or energy management system with an occupied/unoccupied feature, remove jumper.*

1 - Set thermostat to occupied mode if the feature is available. Make sure jumper is in place between the A194 board terminals R and OC if using a thermostat which does not have the feature.

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

Note - *Damper minimum position can be set lower than traditional minimum air requirements when an IAQ sensor is specified. 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" (40F, 4C shown).

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

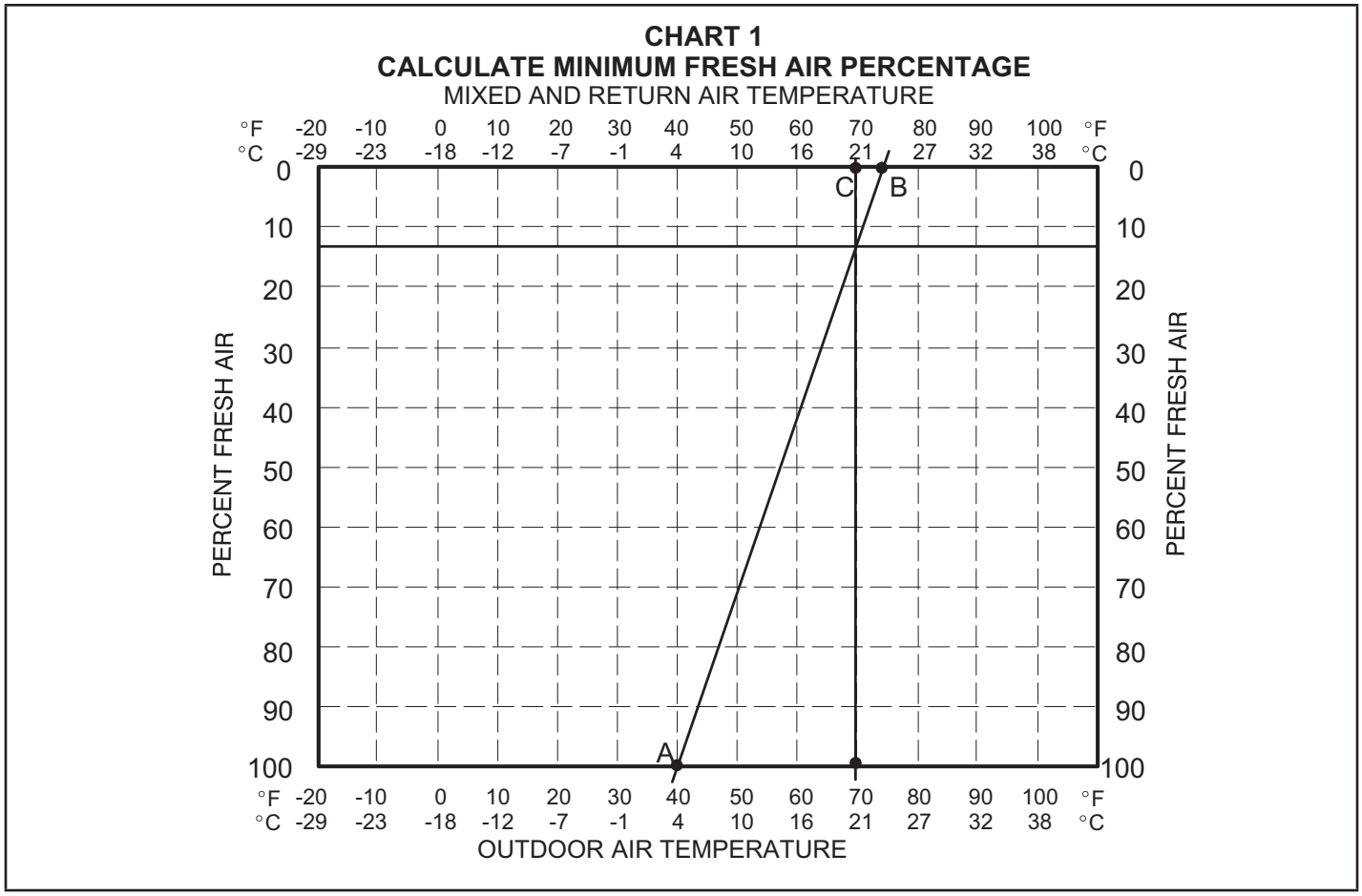
5 - Measure mixed air (outdoor and return air) temperature. Mark that point on the top line of chart 1 and label point "C" (70F, 21C shown).

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 22.

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 22.

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

Economizer Operation

The occupied time period is determined by the thermostator 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 15 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 45ºF (7ºC), dampers will move to minimum position until discharge air temperature rises to 48ºF (9ºC).

TABLE 15

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 open to maintain 55°F (13°C) supply air when an R1 mixed air sensor is installed.

Standard Economizer Down Flow and Horizontal

The standard economizer is used with ZC,ZG,ZH 092-150 units in downflow air discharge applications. Economizer dampers will modulate to maintain 55°F (13°C) supply air when outdoor air is suitable. The mixed air temperature sensor measures the supply air sensible temperature. An outdoor air sensor is used to determine whether outdoor air is suitable for free cooling. The outdoor air sensor is factory installed in all economizers. Other outdoor and return air (OA and RA) sensor options are available to determine whether outdoor air is suitable for free.

Wiring

1 - The economizer control module is located below the actuator for shipping. Relocate the control to the unit control box, see FIGURE 23.

1 - Route the control wires to refrigerant detection board (A194) and connect these wires to the A194 board as following (see FIGURE 23):

- Connect all female terminals to A194 board - Pink (24V) to R; Grey (GND) to ground; Yel (Cool 1) to Y1; and Blue (Cool 2) to Y2.
- Disconnect the factory installed terminals at A194 board, Y1 and Y2. Connect these terminals to control male terminal Y1 and Y2

2 - Attach the control harness jack (J142) to pre-wired harness plug (P142).

3 - At economizer/filter compartment, attach economizer plug(P10) to pre-wired harness jack (J10). See FIGURE 20.

4 - Connect any optional sensors as shown in FIGURE 24.

5 - If optional power exhaust is used, wire according to instructions provided with power exhaust. See FIGURE 24.

6 - Apply wiring diagram to the control panel.

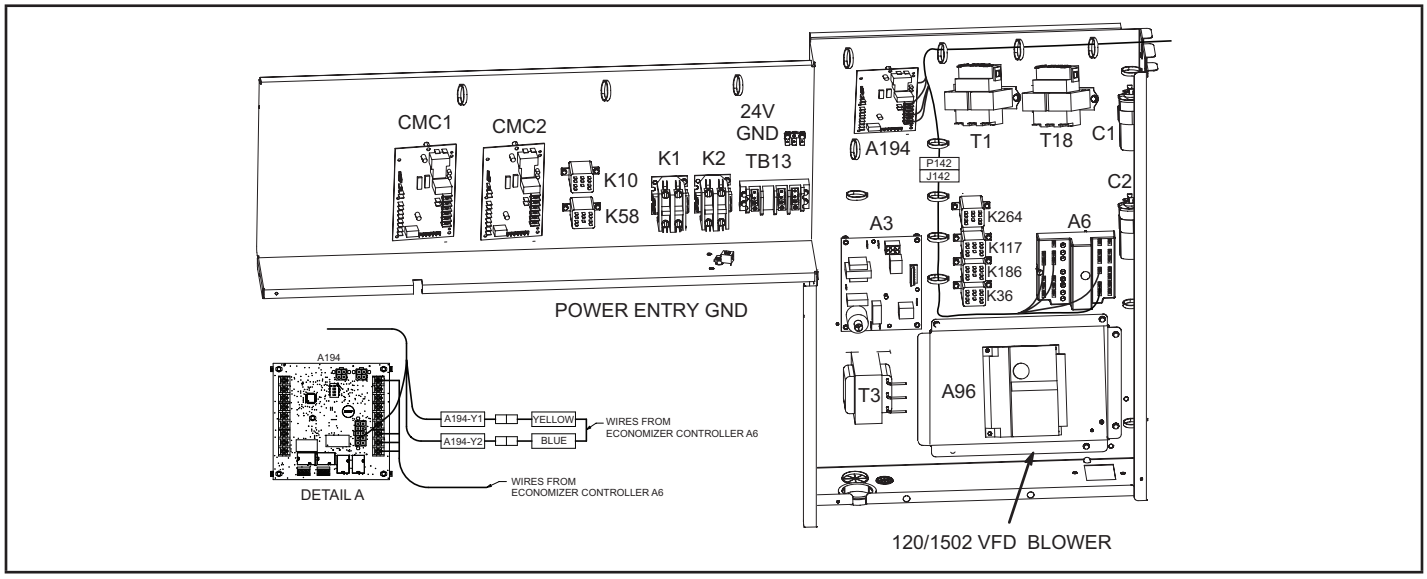


FIGURE 23

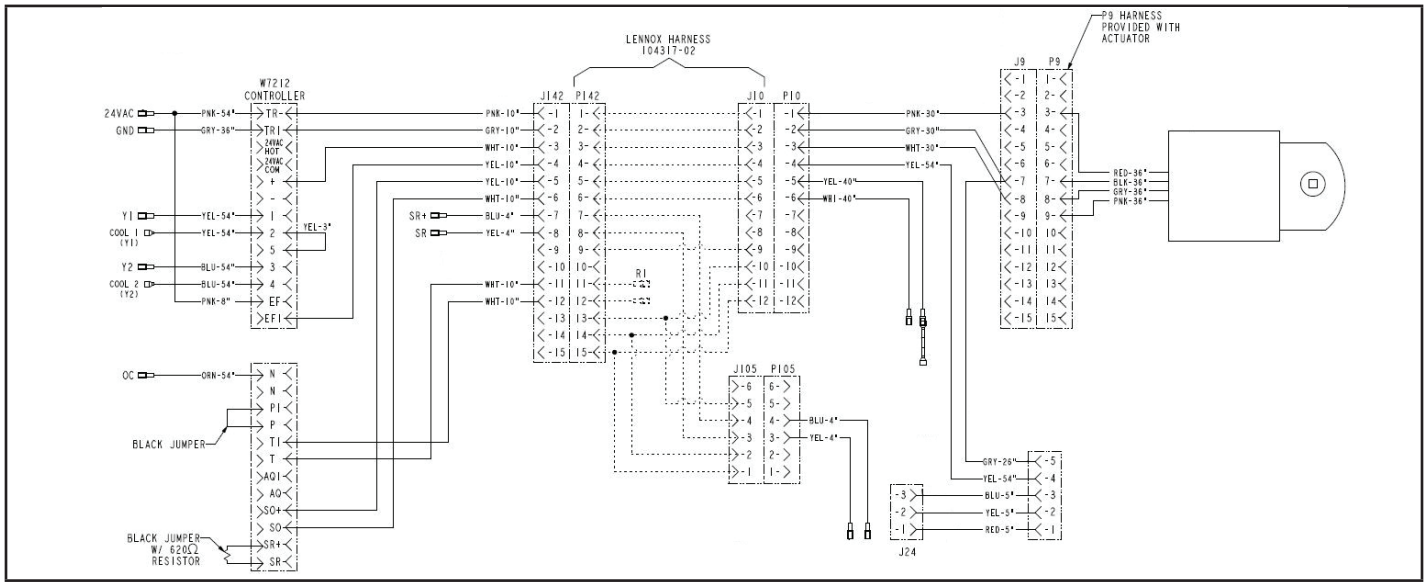


FIGURE 24

High Performance Economizer

USER INTERFACE

See FIGURE 25.

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

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

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

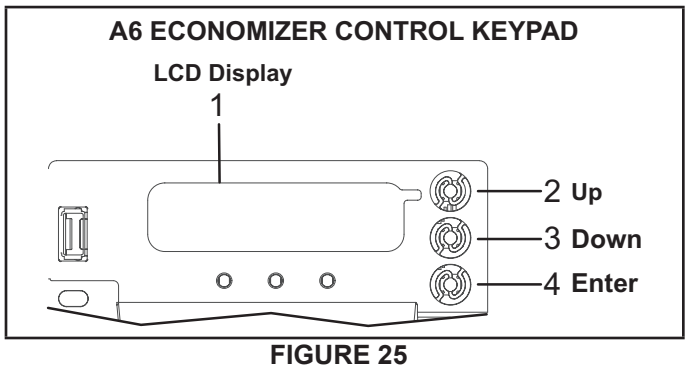


FIGURE 25

Operation button (Enter button):

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

MENU STRUCTURE

See FIGURE 26.

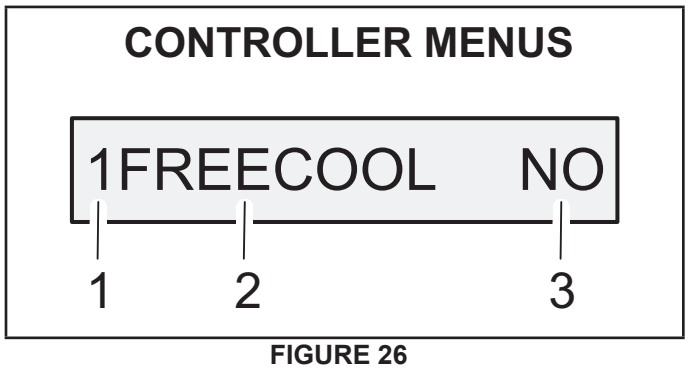


FIGURE 26

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

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

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

3 - At the end of the line, the LCD displays the value of the current sub-menu (if any). Enter the Edit mode by pressing Enter (if the value is editable). Press Up or Down to change the highlighted value. Press Enter to confirm the change and exit the Edit mode. For a complete list of parameters refer to the Siemens installation manual provided in this kit.

FREE COOLING SETPOINT

Single OA Sensible Sensing (Default)

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

For California Title 24 compliance, adjust the free cooling setpoint based on:

- The climate zone where the unit is installed. See TABLE 16.
- The setpoint requirement published by the California Energy Commission. See Section 140.4 - Prescriptive Requirements for Space Conditioning Systems of the 2013 Building Energy Efficiency Standards.

NOTE - *Values in the referenced standard will supersede values listed in TABLE 16.*

TABLE 16

FREE COOLING SETPOINT - SINGLE SENSIBLE

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

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

Single OA Enthalpy Sensing (Optional) -

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

Differential Sensing (Optional) -

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

SETUP AND CONFIGURATION - FACTORY-INSTALLED ECONOMIZER

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

1INS	(MM/DD/YY) enter installation date
2FAN L ACT	( ) adjust VDC value until desired fresh air set point is reached when fan runs at low speed (**Appears only if unit is configured as 2SPEED*)
2FAN H ACT	( ) adjust VCD value until desired fresh air set point is reached

SETUP AND CONFIGURATION - FIELD-INSTALLED ECONOMIZER

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

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

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

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

1INS	(MM/DD/YY) enter installation date
2FAN L ACT	( ) adjust VDC value until desired fresh air set point is reached when fan runs at low speed (**Appears only if unit is configured as 2SPEED*)
2FAN H ACT	( ) adjust VCD value until desired fresh air set point is reached
3DIF T LOC	(LAT)
3STG3 DLY	(120)
6Y2O	(NONE) For single-stage units (COOL 2) For 2-stage units
6FAN	(1 SPEED) For CAV units (2 SPEED) For MSAV units

ALARM MONITORING

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

NOTE - *Newer units are factory-wired to facilitate feedback wiring connections when a BACnetTM option is installed. Newer units can be identified by a P372 plug located near the A194 board in the control box. One white and one gray wire are connected to P372. On older units, call 1-800-453-6669 for wiring assistance.*

DEMAND CONTROL VENTILATION (DCV)

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

For proper operation, the IAQ sensor must provide a 0-10VDC signal. Connect sensor leads to the provided white wire marked “AUX-AI” located near the A6 economizer control located in the filter section.

CO2 Sensor Used With High Performance Economizers-

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

F-Power Exhaust Fan

The power exhaust fan (PEF) requires an optional gravity exhaust damper and economizer and is used in downflow applications only. See FIGURE 28. The PEF provides exhaust air pressure relief and also runs when return air dampers are closed and the supply air blower is operating. See installation instructions for more detail.

Power Exhaust Setpoint Adjustment

Locate the A6 enthalpy control in the control area. The EXH SET potentiometer is factory-set at approximately 50% of the dial range. See FIGURE 27. Power exhaust fans will be energized 30 seconds after dampers are 50% open. Adjust the EXH SET potentiometer higher (clockwise toward 10V) to energize fans when dampers are further open. Adjust the EXH SET potentiometer lower (counterclockwise toward 2V) to energize fans when dampers are further closed. (Thirty-second delay allows dampers to partially open before exhaust fan starts.)

H-Drain Pan Overflow Switch S149 (option)

The overflow switch is used to interrupt cooling operation when excessive condensate collects in the drain pan. The N.O. overflow switch is controlled by K220 and DL46 relays, located in the unit control panel.

When the overflow switch closes, 24VAC power is interrupted and after a five second delay unit compressors are de-energized. Once the condensate level drops below the set level, the switch will open. After a five-minute delay the compressor will be energized.

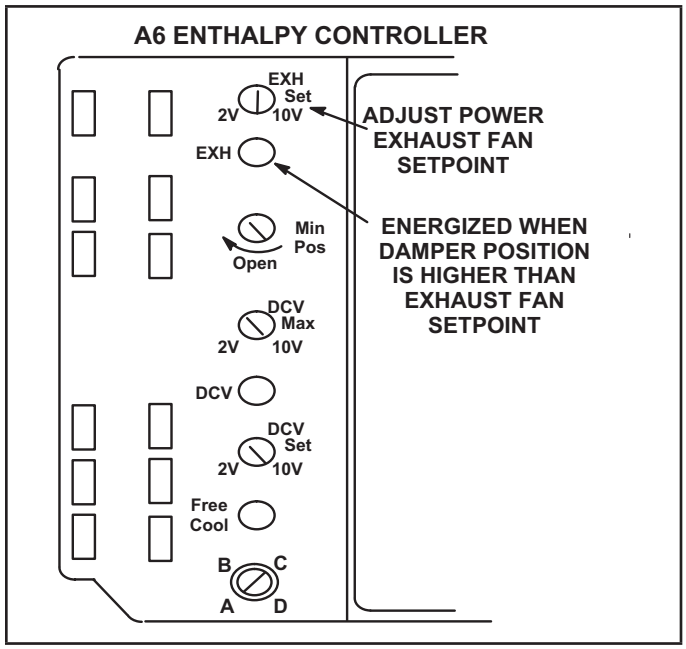


FIGURE 27

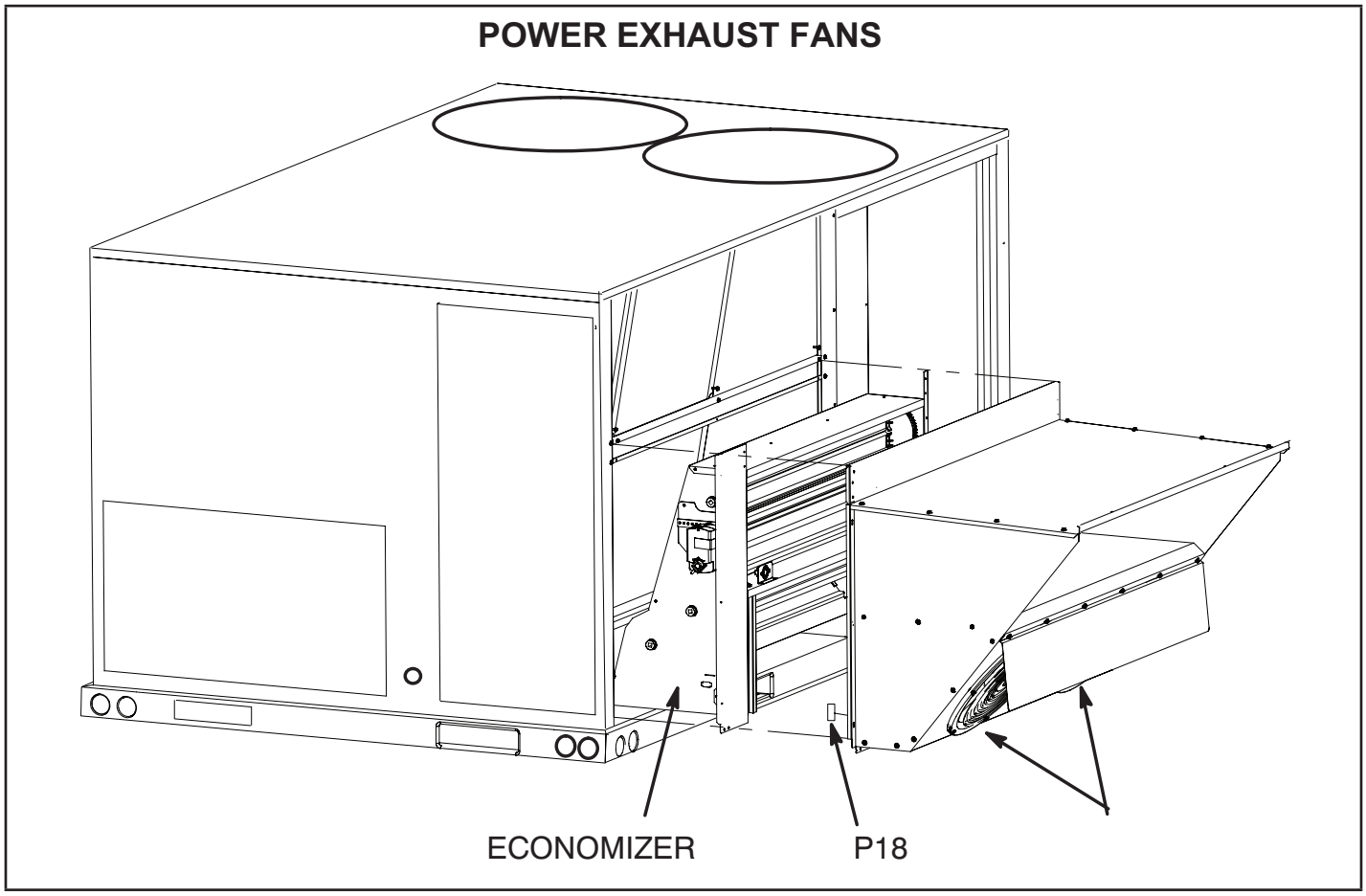
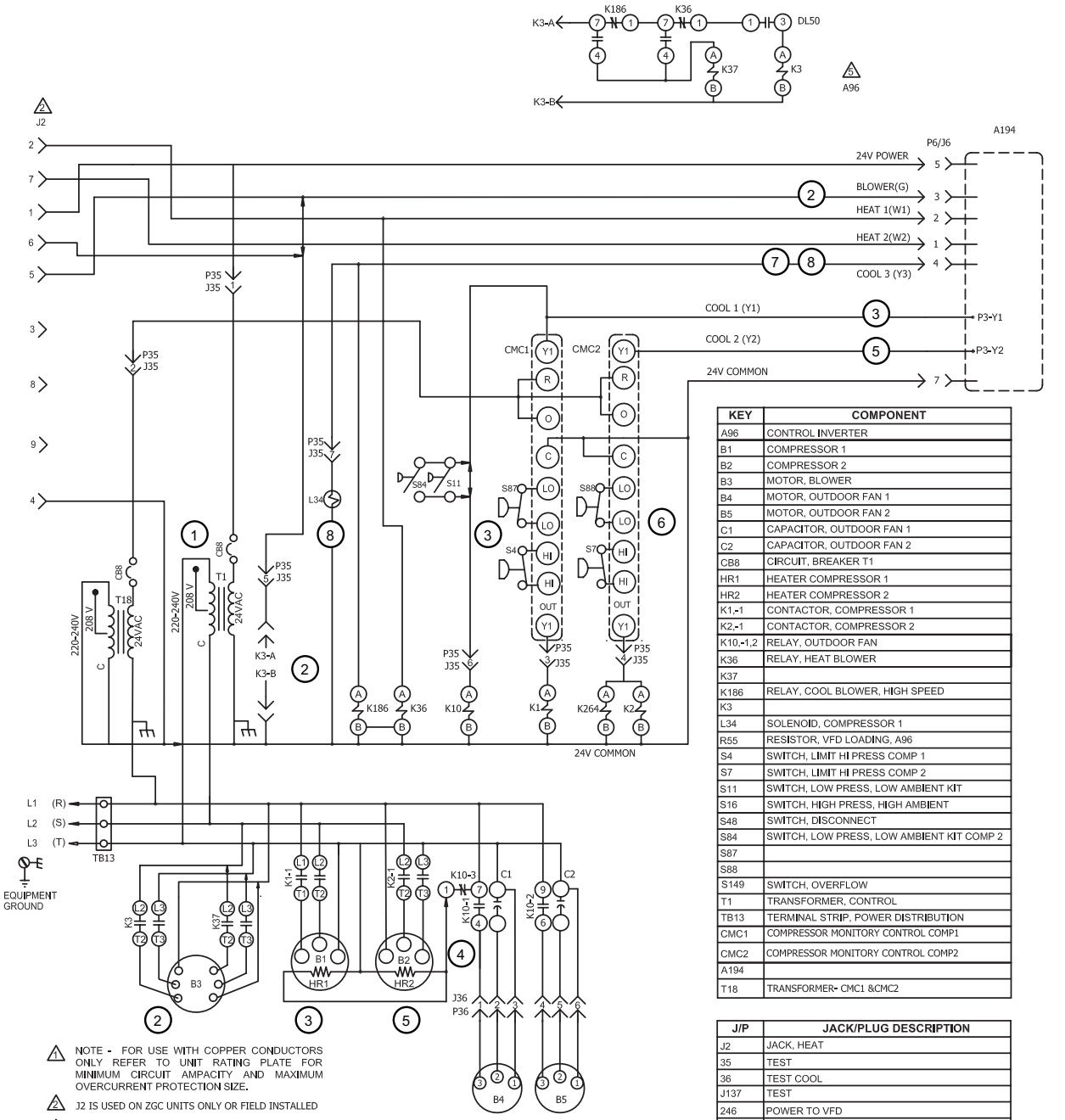


FIGURE 28

ZCD092-150 COOLING DIAGRAM
MSAV - 2-SPEED



KEY	COMPONENT
A96	CONTROL INVERTER
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
CB8	CIRCUIT, BREAKER T1
HR1	HEATER COMPRESSOR 1
HR2	HEATER COMPRESSOR 2
K1,-1	CONTACTOR, COMPRESSOR 1
K2,-1	CONTACTOR, COMPRESSOR 2
K10,-1,2	RELAY, OUTDOOR FAN
K36	RELAY, HEAT BLOWER
K37	
K186	RELAY, COOL BLOWER, HIGH SPEED
K3	
L34	SOLENOID, COMPRESSOR 1
R55	RESISTOR, VFD LOADING, A96
S4	SWITCH, LIMIT HI PRESS COMP 1
S7	SWITCH, LIMIT HI PRESS COMP 2
S11	SWITCH, LOW PRESS, LOW AMBIENT KIT
S16	SWITCH, HIGH PRESS, HIGH AMBIENT
S48	SWITCH, DISCONNECT
S84	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 2
S87	
S88	
S149	SWITCH, OVERFLOW
T1	TRANSFORMER, CONTROL
TB13	TERMINAL STRIP, POWER DISTRIBUTION
CMC1	COMPRESSOR MONITORY CONTROL COMP1
CMC2	COMPRESSOR MONITORY CONTROL COMP2
A194	
T18	TRANSFORMER- CMC1 &CMC2

J/P	JACK/PLUG DESCRIPTION
J2	JACK, HEAT
35	TEST
36	TEST COOL
J137	TEST
246	POWER TO VFD
247	VFD TO MTR
248	VFD CONTROL

DENOTES OPTIONAL COMPONENTS
LINE VOLTAGE FIELD INSTALLED

1. NOTE - FOR USE WITH COPPER CONDUCTORS ONLY REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
2. J2 IS USED ON ZGC UNITS ONLY OR FIELD INSTALLED
3. S48 OR CB8 MAY BE USED
4. JUMPER WHEN S11 AND S84 ARE NOT USED
5. MITSUBISHI VFD
6. USED ON 120 MODELS
7. RESTORE JUMPER WIRING IF PREVIOUSLY US

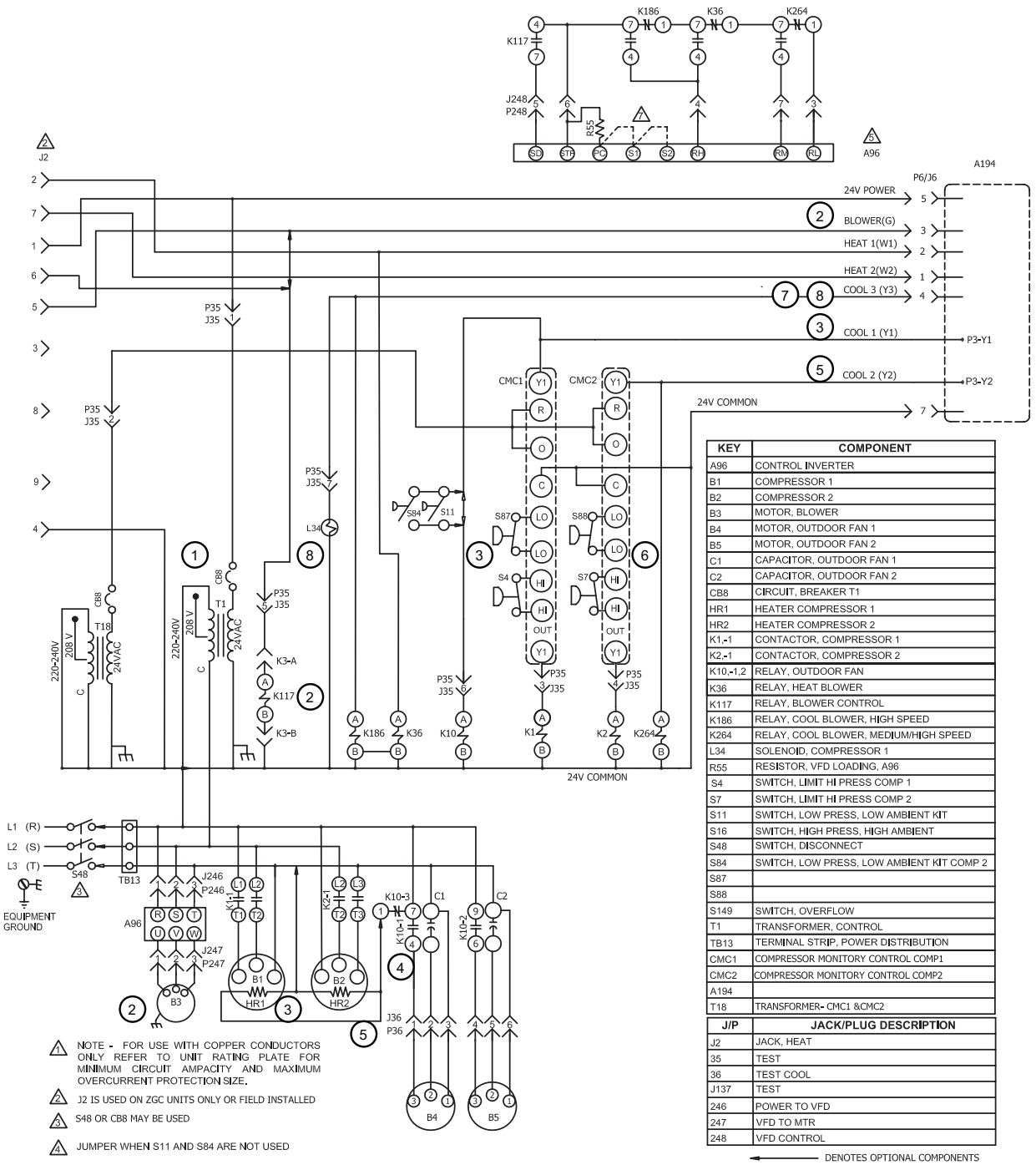
NOTE - IF ANY WIRE IN THIS APPLIANCE IS REPLACED IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING, TERMINATION AND INSULATION THICKNESS

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

DISCONNECT ALL POWER BEFORE SERVICING.

2024/11	WIRING DIAGRAM 538550-01	11/24
COOLING-MSAV-2 - SPEED		
ZCD,ZGD-092,102		
SECTION B		REV A
Supersedes 538305-01	New Form No. 538550-01	

ZCD092-150 COOLING DIAGRAM
MSAV - VFD



KEY	COMPONENT
A96	CONTROL INVERTER
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
CB8	CIRCUIT, BREAKER T1
HR1	HEATER COMPRESSOR 1
HR2	HEATER COMPRESSOR 2
K1,-1	CONTACTOR, COMPRESSOR 1
K2,-1	CONTACTOR, COMPRESSOR 2
K10,-1,2	RELAY, OUTDOOR FAN
K36	RELAY, HEAT BLOWER
K117	RELAY, BLOWER CONTROL
K186	RELAY, COOL BLOWER, HIGH SPEED
K264	RELAY, COOL BLOWER, MEDIUM/HIGH SPEED
L34	SOLENOID, COMPRESSOR 1
R55	RESISTOR, VFD LOADING, A96
S4	SWITCH, LIMIT HI PRESS COMP 1
S7	SWITCH, LIMIT HI PRESS COMP 2
S11	SWITCH, LOW PRESS, LOW AMBIENT KIT
S16	SWITCH, HIGH PRESS, HIGH AMBIENT
S48	SWITCH, DISCONNECT
S84	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 2
S87	
S88	
S149	SWITCH, OVERFLOW
T1	TRANSFORMER, CONTROL
TB13	TERMINAL STRIP, POWER DISTRIBUTION
CMC1	COMPRESSOR MONITORY CONTROL COMP1
CMC2	COMPRESSOR MONITORY CONTROL COMP2
A194	
T18	TRANSFORMER- CMC1 &CMC2

J/P	JACK/PLUG DESCRIPTION
J2	JACK, HEAT
35	TEST
36	TEST COOL
J137	TEST
246	POWER TO VFD
247	VFD TO MTR
248	VFD CONTROL

DENOTES OPTIONAL COMPONENTS
LINE VOLTAGE FIELD INSTALLED

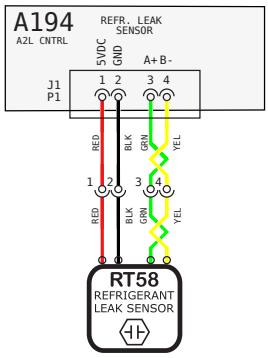
1. NOTE - FOR USE WITH COPPER CONDUCTORS ONLY REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
2. J2 IS USED ON ZGC UNITS ONLY OR FIELD INSTALLED
3. S48 OR CB8 MAY BE USED
4. JUMPER WHEN S11 AND S84 ARE NOT USED
5. MITSUBISHI VFD
6. USED ON 120 MODELS
7. RESTORE JUMPER WIRING IF PREVIOUSLY USED

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

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

DISCONNECT ALL POWER BEFORE SERVICING.

2024/11	WIRING DIAGRAM	11/24
	538551-01	
COOLING-MSAV-VFD		
ZCD,ZGD-120,150		
SECTION B		REV A
Supersedes	New Form No.	
538305-01	538551-01	



KEY LIST	
COMPONENT	**DESCRIPTION**
A194	CONTROL, REFR. LEAK DETECTION
RT58	SENSOR, REFR. LEAK DETECTION

WARNING

DISCONNECT ALL POWER BEFORE SERVICING.

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

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

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

MODEL: ZC/ZG/ZH
A2L SENSOR DIAGRAM
VOLT: All
SUPSDS: N/A NO: 538618-01 Rev 0

3 x 7
CUT SIZE

REV	EC NO.	DATE	BY	APVD	REVISION NOTE
---	CN-012849P	04-23-2025	ZN	STT	ORIGINATED AT PD&R CARROLLTON, TX

ZCD092-150 Sequence of Operation

Power:

1 - Line voltage from unit disconnect energizes transformer T1. T1 provides 24VAC power to terminal strip TB1 on A194 board. A194 board provides 24VAC to the unit cooling, heating and blower controls.

Blower Operation:

2 - Indoor thermostat terminal G energizes blower relay K117 with 24VAC. N.O. K117 closes, connecting SD to STF and RL on the A96 VFD Inverter Controller. RL sets inverter speed to Low or 40 Hz.

1st Stage Cooling (compressor B1 low capacity)

3 - First stage cooling demand Y1 and G are energized by the thermostat. G energizes blower. 24VAC is routed through A194 board passing N.C. high pressure switch S4. Compressor contactor K1 is energized. N.O. contacts K1 close energizing B1 two-step compressor into the lower capacity, or step-one.

4 - Optional N.O. low ambient switch S11 closes to energize condenser fan relay K10. N.O. contacts K10-1 and K10-2 close energizing condenser fans B4 and B5. N.C. contacts K10-3 open de-energizing crankcase heaters HR1 and HR2.

2nd Stage Cooling (compressor B2 is energized)

5 - Second stage cooling demand 24VAC is routed through TB1 on A194 board and proves N.C. high pressure switch S7. Compressor contactor K2 is energized. N.O. K2 contacts close energizing compressor B2. In addition to the Compressor Contactor K2, the K264 Medium Blower speed N.O. closes connecting RD to RM on the A96 VFD inverter controller. Changing the A96 VFD to operate at Medium Speed or 55 Hz.

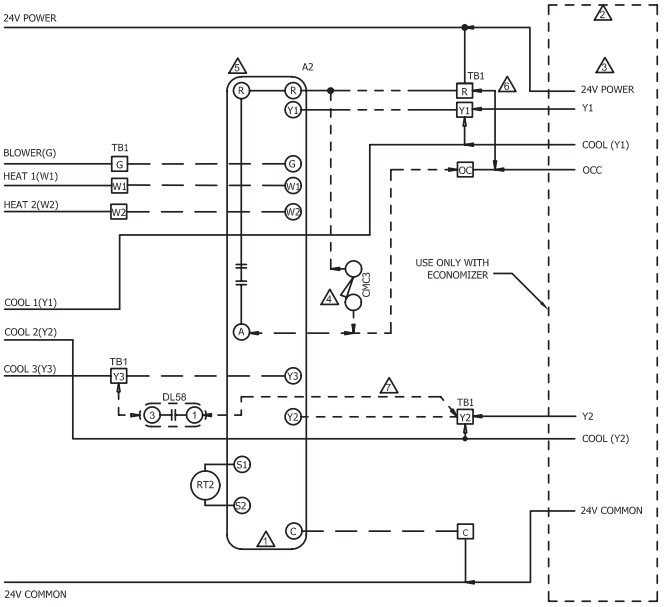
6 - Optional N.O. low ambient switch S84 closes to energizing condenser fan relay K10. N.O. contacts K10-1 and K10-2 close energizing condenser fans B4 and B5. N.C. contacts K10-3 open de-energizing crankcase heaters HR1 and HR2.

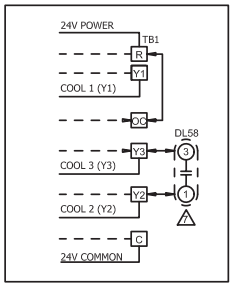
3rd Stage Cooling (compressor B1 High Capacity)

7 - Third Stage cooling demand Y3 24VAC is routed through TB1 on A194 board and energizes N.O. contacts on K36 relay connecting SD to RH on the A96 VFD inverter controller. Changing the A96 VFD to operate at High Speed or 60Hz.

8 - Third Stage cooling demand Y3 24VAC is routed through TB1 on A194 board and energizes L34 2-Stage Solenoid for Compressor B1. Compressor B1 is now operating at high-capacity.

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT





CONNECTION SCHEME FOR ZCC, ZGC AND ZHC 092 THROUGH 150 UNITS WITHOUT ECONOMIZER ONLY

KEY	COMPONENT
A2	SENSOR, ELECTRONIC THERMOSTAT
A63	SENSOR, CO2
CMC3	CLOCK, TIME
DL58	ADJUSTABLE TIMER, STAGE UP
K65	RELAY, EXHAUST FAN
R1	SENSOR, MIXED AIR OR SUPPLY AIR
RT2	SENSOR, REMOTE THERMOSTAT
TB1	TERMINAL STRIP, CLASS II VOLTAGE

1. THERMOSTAT SUPPLIED BY USER
2. OPTIONAL WIRING FOR UNITS WITH ECONOMIZER
3. J3 MAXIMUM LOAD 20VA 24VAC CLASS II
4. TIME CLOCK CONTACTS (OPT) CLOSED OCCUPIED
5. TOUCHSCREEN THERMOSTAT
6. REMOVE JUMPER BETWEEN TB1-R AND TB1-OCP WHEN USING A NITE SETBACK THERMOSTAT
7. INSTALL DL58 ADJUSTABLE STAGE UP TIMER AS SHOWN BETWEEN Y2 AND Y3 IF THERMOSTAT DOES NOT HAVE A COOL 3. TYPICAL TIME DELAY IS 15-30 MINUTES

DENOTES OPTIONAL COMPONENTS
CLASS II FIELD WIRING

2022/09	WIRING DIAGRAM 538308-01	09/22
CONTROL		
ELECTRONIC/ELECTROMECHANICAL THERMOSTAT (RAIDER B)		
SECTION C		REV 0
Supersedes 537673-01	New Form No. 538308-01	

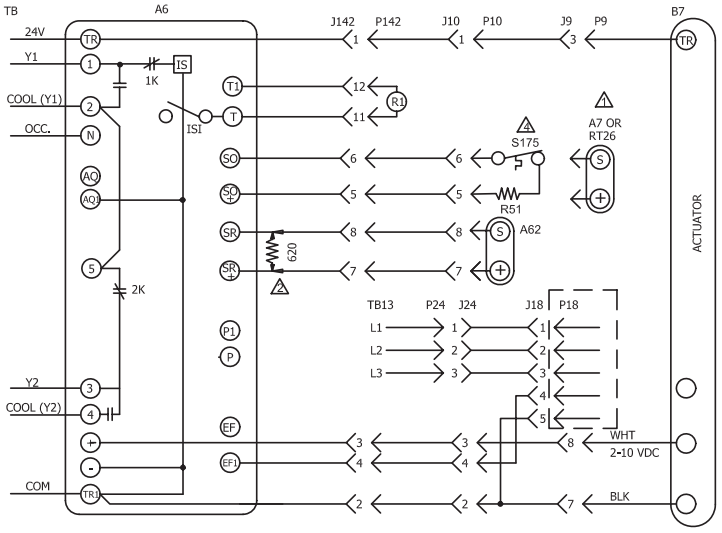
POWER:

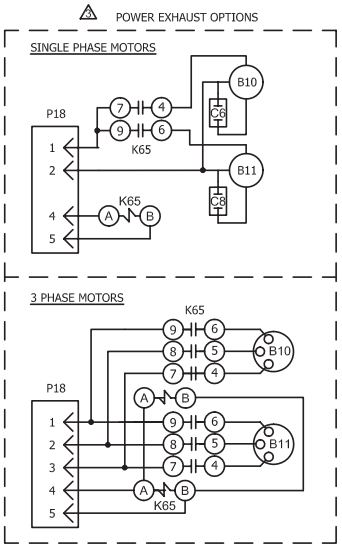
1- Terminal strip TB1 on A194 board energizes thermostat components with 24VAC.

OPERATION:

2- TB1 receives data from the electronic thermostat A2 (Y1, Y2, Y3, W1, W2, G, OCP). The 24VAC signal from TB1 energizes the appropriate components for heat or cool demand.

ECONOMIZER STANDARD EFFICIENCY





DESIGNATES OPTIONAL WIRING
CLASS II FIELD WIRING

KEY	COMPONENT
A6	CONTROL-SOLID STATE ENTHALPY
A7	SENSOR-SOLID STATE ENTHALPY
A62	SENSOR-ENTHALPY, INDOOR
B7	MOTOR-DAMPER, ECONOMIZER
B10	POWER EXHAUST FAN 1
B11	POWER EXHAUST FAN 2
B43	MOTOR-EXHAUST DAMPER
C6	CAPACITOR, EXHAUST FAN 1
C8	CAPACITOR, EXHAUST FAN 2
K65	RELAY, EXHAUST FAN
R1	MIXED AIR SENSOR
R51	RESISTOR-SENSIBLE 820 OHM
RT26	SENSOR-OUTDOOR AIR TEMP
S175	THERMOSTAT-SENSIBLE TEMP 55-70F
TB13	TERMINAL STRIP, POWER DISTRIBUTION

J/P	DESCRIPTION
9	ECONOMIZER, MOTOR
10	ECONOMIZER
18	EXHAUST FAN COMPT.
24	EXHAUST FAN
142	ECONOMIZER HARNESS

1. RT26 OR A7 CAN BE USED IN PLACE OF S175 SENSOR. REMOVE R51 RESISTOR IF REPLACING S175 WITH RT26 OR A7
2. IF USING A DIFFERENTIAL ENTHALPY SENSOR, REMOVE 620 OHM RESISTOR
3. OPTION: POWER EXHAUST
4. REPLACE S175 WITH A7 OR RT26 AS OPTIONAL.

04/14	WIRING DIAGRAM 537674-01	04/14
ACCESSORIES		
ECONOMIZER		
SECTION D		REV. 0
Supersedes	New Form No. 537674-01	

SEQUENCE OF OPERATION

POWER:

1- Terminal strip TB1 on A194 board energizes the economizer components with 24VAC.

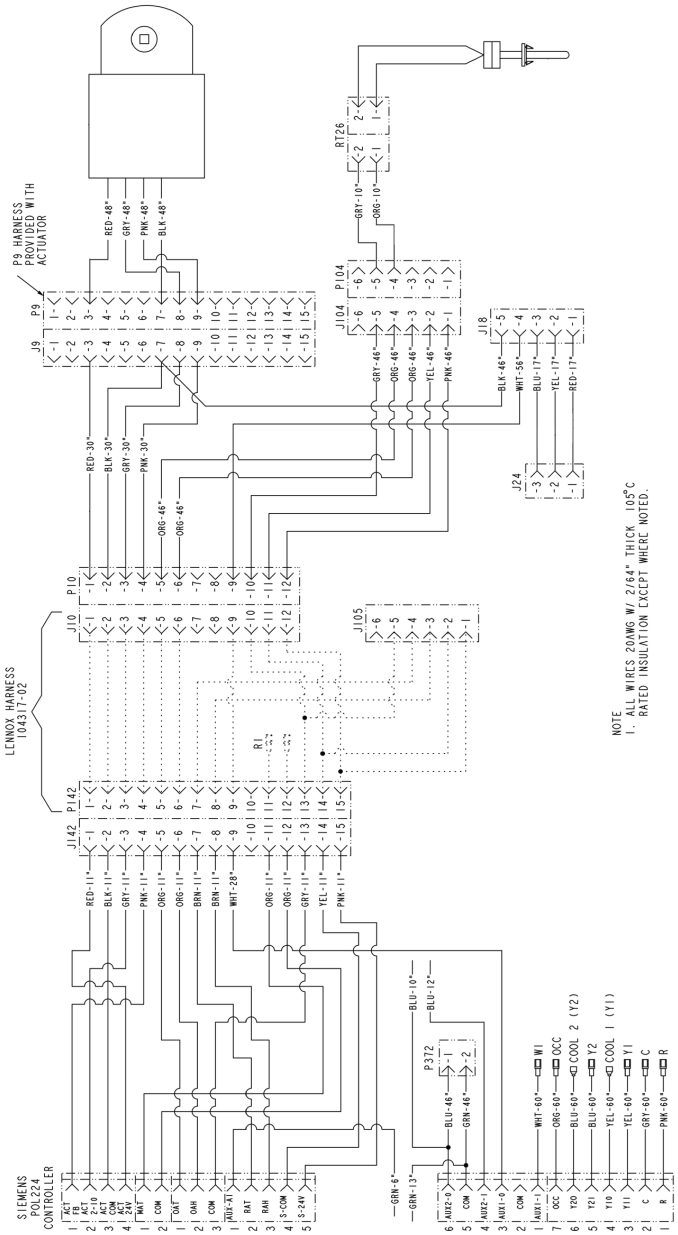
OPERATION:

2- Enthalpy sensor A7 and A62 (if differential enthalpy is used) communicates to the economizer control module A6 when to power the damper motor B7.

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

4- The damper actuator provides 2 to 10 VDC position feedback.

ECONOMIZER HIGH PERFORMANCE / LOW LEAK



SEQUENCE OF OPERATION

POWER:

1- Terminal strip TB1 on A194 board energizes the economizer components with 24VAC.

OPERATION:

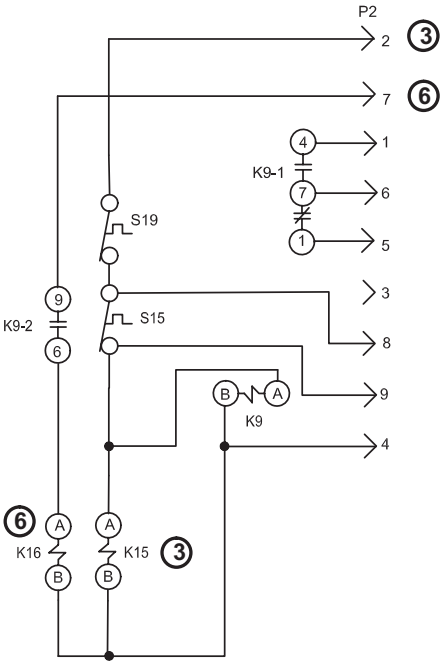
2- Enthalpy sensor A7 and A62 (if differential enthalpy is used) communicates to the economizer control module A6 when to power the damper motor B7.

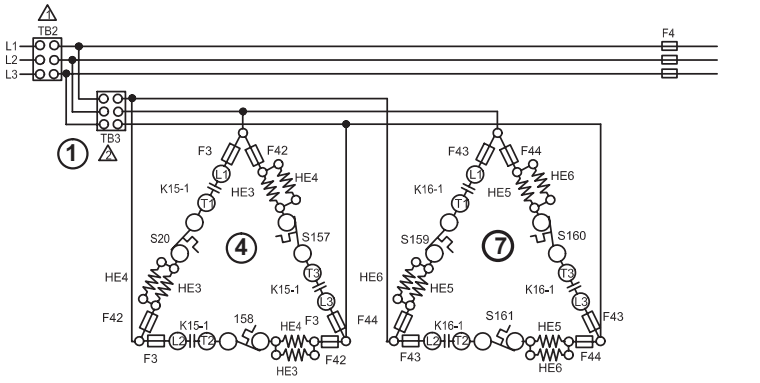
3- Economizer control module A6 supplies B7 with 0 - 10 VDC to control the positioning of economizer.

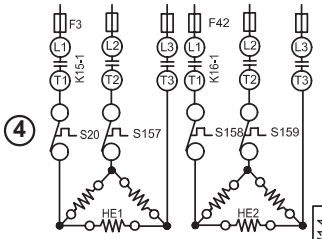
4- The damper actuator provides 2 to 10 VDC position feedback.

EHA-7.5, 15, 22.5, 30, 45 & 60kW Y VOLTAGE
ZCD SERIES UNITS

KEY	DESCRIPTION
F3	FUSE, ELECTRIC HEAT 1
F4	FUSE, UNIT
F42	FUSE, ELECTRIC HEAT 2
F43	FUSE, ELECTRIC HEAT 3
F44	FUSE, ELECTRIC HEAT 4
HE1	ELEMENT, ELECTRIC HEAT 1
HE2	ELEMENT, ELECTRIC HEAT 2
HE3	ELEMENT, ELECTRIC HEAT 3
HE4	ELEMENT, ELECTRIC HEAT 4
HE5	ELEMENT, ELECTRIC HEAT 5
HE6	ELEMENT, ELECTRIC HEAT 6
K9-1,2	RELAY, HEAT
K15-1	CONTACTOR, ELECTRIC HEAT 1
K16-1	CONTACTOR, ELECTRIC HEAT 2
P2	PLUG, UNIT HEAT
S15	SWITCH, LIMIT PRIMARY ELECTRIC HEAT
S19	THERMOSTAT, ELECTRIC HEAT LIMIT
S20	SWITCH, LIMIT SECONDARY ELEC. HEAT 1 (NO RESET)
S157	SWITCH, LIMIT SECONDARY ELEC. HEAT 2 (NO RESET)
S158	SWITCH, LIMIT SECONDARY ELEC. HEAT 3 (NO RESET)
S159	SWITCH, LIMIT SECONDARY ELEC. HEAT 4 (NO RESET)
S160	SWITCH, LIMIT SECONDARY ELEC. HEAT 5 (NO RESET)
S161	SWITCH, LIMIT SECONDARY ELEC. HEAT 6 (NO RESET)
TB2	TERMINAL STRIP, UNIT
TB3	TERMINAL STRIP, ELECTRC HEAT







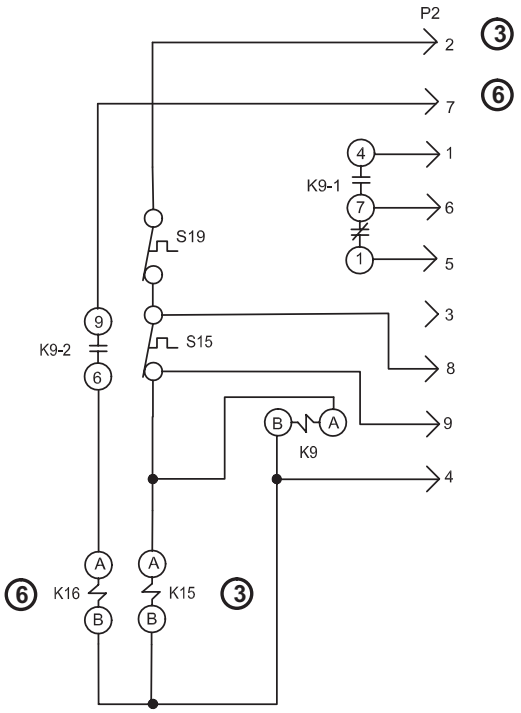
1. TB2,S48 OR CB10 MAY BE USED
2. TB3 IS USED ON SOME UNITS

KW	HE1	HE2	HE3	HE4	HE5	HE6
7.5	7.5					
15	15					
22.5	15	7.5				
30	15	15				
45	15				15	15
60			15	15	15	15

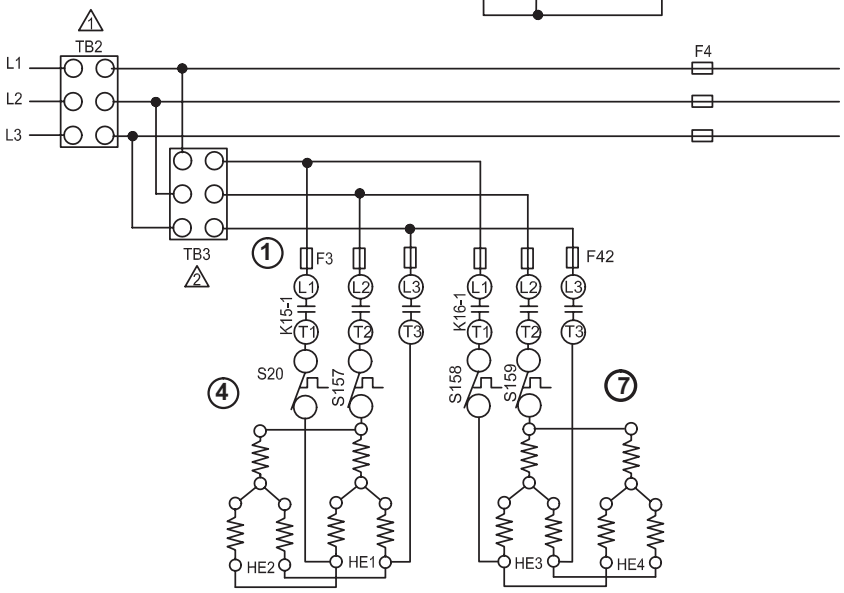
04/14	WIRING DIAGRAM 537690-01	04/14
	HEATING - ELECTRIC	
	7.5, 15, 22.5, 30, 45, 60 - Y	
	SECTION A	REV 0
Supersedes	New Form No. 537690-01	

EHA-7.5, 15, 22.5, 30, 45 & 60kW G, J VOLTAGE
ZCD SERIES UNITS

KEY	COMPONENT
F3	FUSE-ELECTRIC HEAT
F4	FUSE-UNIT
F42	FUSE-ELECTRIC HEAT 2
HE1	ELEMENT-ELECTRIC HEAT 1
HE2	ELEMENT-ELECTRIC HEAT 2
HE3	ELEMENT-ELECTRIC HEAT 3
HE4	ELEMENT-ELECTRIC HEAT 4
K9,-1, 2	RELAY-HEAT
K15,-1	CONTACTOR-ELECTRIC HT 1
K16,-1	CONTACTOR-ELECTRIC HT 2
P2	PLUG-HEAT
S15	SWITCH LIMIT, PRIMARY, ELECT HT
S19	THERMOSTAT-ELECTRIC HEAT LIMIT
S20	SWITCH-LIMIT, SECONDARY ELECT HT 1 (NO RESET)
S157	SWITCH LIMIT, SECONDARY ELECT HT 2 (NO RESET)
S158	SWITCH LIMIT, SECONDARY ELECT HT 3 (NO RESET)
S159	SWITCH LIMIT, SECONDARY ELECT HT 4 (NO RESET)
TB2	TERMINAL STRIP-UNIT
TB3	TERMINAL STRIP-ELECTRIC HEAT



1 TB2,S48 OR CB10 MAY BE USED
2 TB3 IS USED ON SOME UNITS



KW	HE1	HE2	HE3	HE4
7.5	7.5			
15	15			
22.5	15		7.5	
30	15		15	
45	15		15	15
60	15	15	15	15

04/14	WIRING DIAGRAM 537691-01	04/14
HEATING-ELECTRIC		
7.5, 15, 22.5, 30, 45, 60 - G, J		
SECTION A		REV. 0
Supersedes	New Form No. 537691-01	

Sequence of Operation - EHA 7.5, 15, 22.5, 30, 45, 60 kW - Y, G, and J,

NOTE: *This sequence of operation is for all Electric Heat kW ratings Y through J voltages. Each step of operation is numbered and can be followed in sequence on the diagrams. Operation for G and J voltages will be the same.*

HEATING ELEMENTS:

1 - Terminal Strip TB3 is energized when the unit disconnect closes. TB3 supplies line voltage to electric heat elements HE1 through HE6. Each element is protected by fuse F3, F42, F43, or F44.

FIRST STAGE HEAT:

2 - Heating demand initiates at W1 in thermostat.

3 - 24VAC W1 signal is routed from the thermostat through TB1 on the A194 board and P2-2. After S15 N.C. primary limit and S19 limit is proved, the electric heat 1 contactor K15 is energized.

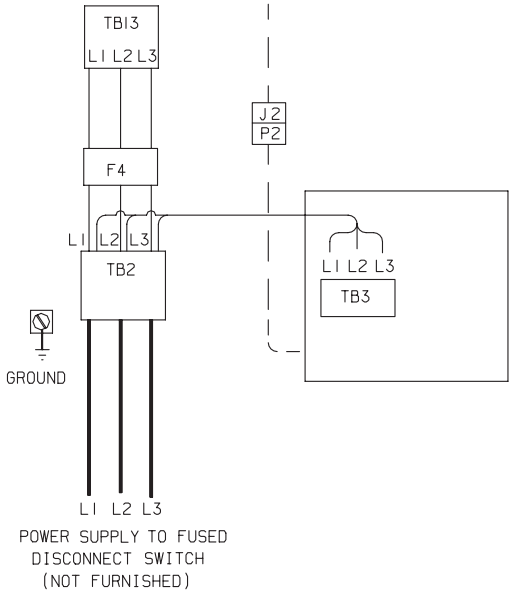
4 - If S20 and S157 (S158 on Y-volt units) secondary electric heat limits remain closed, HE1 and HE2 (HE3 and HE4 on Y-volt units) electric heat is energized.

SECOND STAGE HEAT:

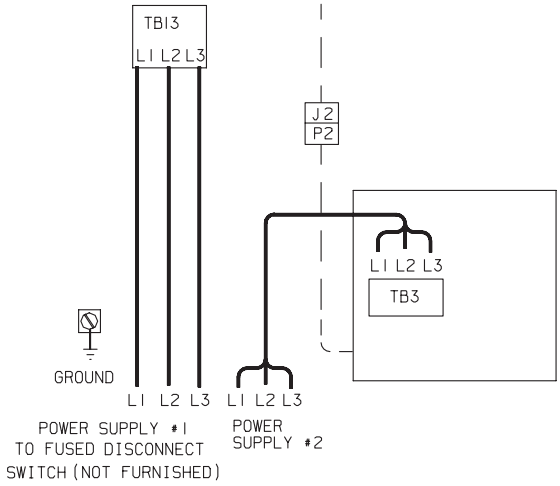
5 - Heating demand initiates at W2 in thermostat.

6 - 24VAC W2 signal is routed from the thermostat through TB1 on A194 board and P2-7. Electric heat contactor K16 is energized.

7 - If S158 and S159 (S159, S160 and S161 on Y-volt units) secondary electric heat limits remain closed, HE3 and HE4 electric heat is energized.

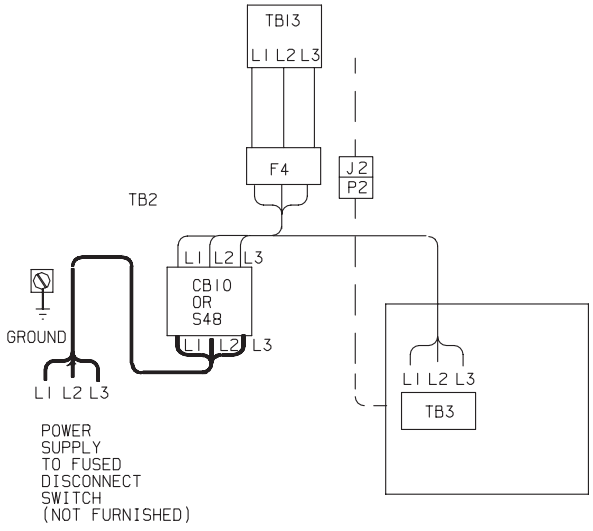


SINGLE POWER SUPPLY - NO CB10 OR S48

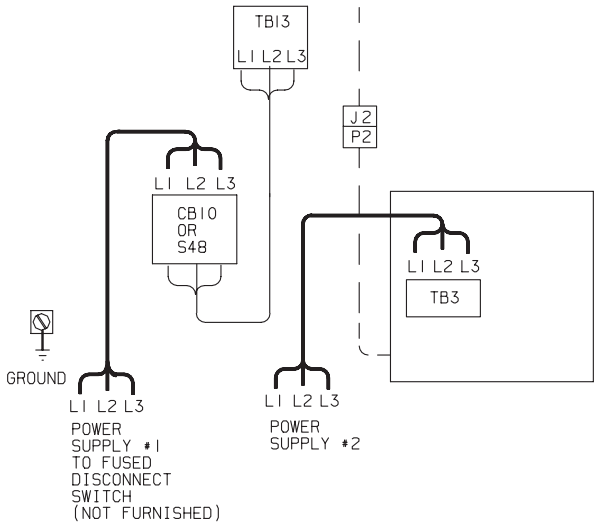


MULTIPLE POWER SUPPLY - NO CB10/S48

CB10-Circuit Breaker
F4- SPPS Terminal Block
J2- Low Voltage Control Harness
J3- Electric Heat Control Harness
S48- Disconnect
TB2- SPPS Terminal Block
TB3- Electric Heat Terminal Block
TB13- Unit Terminal Block



SINGLE POWER SUPPLY WITH CB10/S48



MULTIPLE POWER SUPPLY WITH CB10/S48

IX-Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely.

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before starting decommissioning.

a) Become familiar with the equipment and its operation.

b) Isolate system electrically.

c) Before attempting the procedure, ensure that:

- mechanical handling equipment is available, if required, for handling refrigerant cylinders;
- all personal protective equipment is available and being used correctly;
- the recovery process is supervised at all times by a competent person;
- recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.

e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

f) Make sure that cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate in accordance with instructions.

h) Do not overfill cylinders (no more than 80% volume liquid charge).

i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

k) Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

⚠ IMPORTANT

Equipment shall be labelled stating that it has been decommissioned and emptied of refrigerant. The label shall be signed and dated. Ensure that there are labels on the equipment that state the flammability of the refrigerant used.