UNIT INFORMATION

ZGD SERIES
7.5 to 12.5 ton
26.3 to 42 kW

100187

Service Literature

ZGD092 through 150 with R454B

The ZGD 7.5, 8.5, 10 and 12.5 ton (092, 102, 120, 150) packaged gas units are available in standard cooling efficiency. Units are available in 130,000, 180,000 or 240,000Btuh (38.1, 52.7 or 70.3 kW) heating inputs. Gas heat sections are designed with aluminized steel tube heat exchangers.

All ZGD 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. 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
HEATING SYSTEM						
Combustion Air Intake Extensions		**19W51**	X	X	X	X
Gas Heat Input	130,000 Btuh	Factory	O	O	O	O
	180,000 Btuh	Factory	O	O	O	O
	240,000 Btuh	Factory	O	O	O	O
LPG/Propane Conversion Kits	Standard Heat	**14N22**	X	X	X	X
	Medium Heat	**14N27**	X	X	X	X
	High Heat	**14N25**	X	X	X	X
Stainless Steel Heat Exchanger		Factory	O	O	O	O
Vertical Vent Extension Kit		**31W62**	X	X	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 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
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
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
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

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
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 — UNIT

Model		ZGD092S5T	ZGD102S5T	ZGD120S5M	ZGD150S5M
Nominal Tonnage		7.5	8.5	10	12.5
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	14.6	15.0	15.0
	[1] EER (Btuh/Watt)	11.0	11.0	11.0	10.8
	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	5 lbs. 14 oz.	5 lbs. 10 oz.	5 lbs. 1 oz.	7 lbs. 0 oz.
	Circuit 2	3 lbs. 4 oz.	3 lbs. 6 oz.	5 lbs. 4 oz.	6 lbs. 1 oz.
Gas Heating Options Available - See page 16		Standard (2 stage), Medium (2 Stage), High (2 Stage)			
Compressor Type (number)		(1) Two-Stage Scroll, (1) Single-Stage Scroll			
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
	Rows	2	2	2	2
	Fins - in.	20	20	20	20
	Condensate drain size (NPT) - in.	(2) 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.

SPECIFICATIONS — GAS HEAT

Heat Input Type		Standard	Medium	High
Number of Gas Heat Stages		**2**	**2**	**2**
Input - Btuh	1st Stage	85,000	117,000	156,000
	2nd Stage	130,000	180,000	240,000
Output - Btuh	2nd Stage	105,000	146,000	194,000
Temperature Rise Range - °F		15-45	30-60	40-70
Minimum air volume - cfm		2150	2250	2600
[1] Thermal Efficiency		81%	81%	81%
Gas Supply Connections		3/4 in NPT	3/4 in NPT	3/4 in NPT
Recommended Gas Supply Pressure - Nat. / LPG		7 / 11 in. w.g.		
Gas Supply Pressure Range	Min. / Max. (Natural)	4.5 / 10.5 in. w.g.		
	Min. / Max. (LPG)	10.8 / 13.5 in. w.g.		

[1] Thermal Efficiency at full input.

HIGH ALTITUDE DERATE

NOTE - Units may be installed at altitudes up to 2000 feet above sea level without any modifications.
At altitudes above 2000 feet units must be derated to match gas manifold pressures shown in table below.
At altitudes above 4500 feet unit must be derated 4% for each 1000 feet above sea level.

NOTE - This is the only permissible derate for these units.

Refer to the Installation Instructions for more detailed information.

Heat Input Type	Altitude Feet	Gas Manifold Pressure in. w.g.		Input Rate (Btuh)
		Natural Gas	LPG/ Propane	
Standard (2 stage)	2001 - 4500	1.6 / 3.1	4.4 / 8.9	85,000 / 120,000
Medium (2 stage)	2001 - 4500	1.6 / 3.1	4.4 / 8.9	117,000 / 166,000
High (2 stage)	2001 - 4500	1.6 / 3.1	4.4 / 8.9	156,000 / 221,000

ZGD092S5T AND ZGD102S5T − 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 23 for blower motors and drives and air resistance for wet coil and options/accessories.

Maximum Static Pressure With Gas Heat - 2.0 in. w.g.
Minimum Air Volume Required For Different Gas Heat Sizes:
Standard - 2150 cfm; Medium - 2250 cfm; High - 2600 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

ZGD120S5M AND ZGD150S5M − 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 23 for blower motors and drives and air resistance for wet coil and options/accessories.

MAXIMUM STATIC PRESSURE WITH GAS HEAT - 2.0 in. w.g.

Maximum Static Pressure With Gas Heat - 2.0 in. w.g.
Minimum Air Volume Required For Different Gas Heat Sizes:
Standard - 2150 cfm; Medium - 2250 cfm; High - 2600 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		2.0		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		Gas Heat Exchanger			Economizer	Filters	
	090, 120	120, 150	Standard Heat	Medium Heat	High Heat		MERV 8	MERV 13
1750	0.03	0.04	0.06	0.02	0.02	0.03	0.01	0.03
2000	0.04	0.05	0.07	0.05	0.06	0.05	0.01	0.03
2250	0.05	0.06	0.07	0.07	0.08	0.06	0.01	0.04
2500	0.05	0.07	0.09	0.10	0.11	0.08	0.01	0.05
2750	0.06	0.08	0.09	0.11	0.12	0.09	0.02	0.05
3000	0.07	0.09	0.11	0.12	0.13	0.11	0.02	0.06
3250	0.08	0.10	0.12	0.15	0.16	0.13	0.02	0.06
3500	0.09	0.11	0.12	0.16	0.17	0.15	0.03	0.07
3750	0.10	0.13	0.14	0.19	0.20	0.17	0.03	0.08
4000	0.11	0.14	0.14	0.21	0.22	0.19	0.04	0.08
4250	0.13	0.15	0.14	0.24	0.28	0.21	0.04	0.09
4500	0.14	0.17	0.15	0.26	0.32	0.24	0.04	0.09
4750	0.15	0.18	0.16	0.29	0.37	0.26	0.05	0.10
5000	0.16	0.20	0.16	0.34	0.43	0.29	0.06	0.10
5250	0.17	0.22	0.16	0.37	0.47	0.32	0.06	0.11
5500	0.19	0.23	0.18	0.44	0.54	0.34	0.07	0.12
5750	0.20	0.25	0.19	0.49	0.59	0.37	0.07	0.12
6000	0.22	0.27	0.20	0.54	0.64	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 DATA — 7.5 TON

Model		ZGD092S5T		
[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

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 DATA — 8.5 TON

Model		ZGD102S5T		
[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

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 DATA — 10 TON

Model		ZGD120S5M		
[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

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 DATA — 12.5 TON

Model		ZGD150S5M		
[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

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.

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

Minimum R454B Space and CFM Requirements

Minimum Airflow[1]		
Unit	Q_{min}(CFM)	Q_{min}(m^3h)
ZGD 092	112	191
ZGD 102	104	177
ZGD 120	112	191
ZGD 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)
ZGD092	3.90	1.77	4.06	1.84
ZGD102	3.90	1.77	3.56	1.61
ZGD120	4.00	1.81	4.25	1.93
ZGD150	4.87	2.21	5.75	2.61

Minimum Room Area of Conditioned Space[2]		
Unit	TA_{min}(ft^2)	TA_{min}(m^2)
ZGD 092	63	5.8
ZGD 102	58	5.4
ZGD 120	63	5.8
ZGD 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 ZGD 092 at 1000 ft. above see level, multiply 112 by 1.05 to get 117.6 CFM as the new Q_{min}.*

PARTS ARRANGEMENT

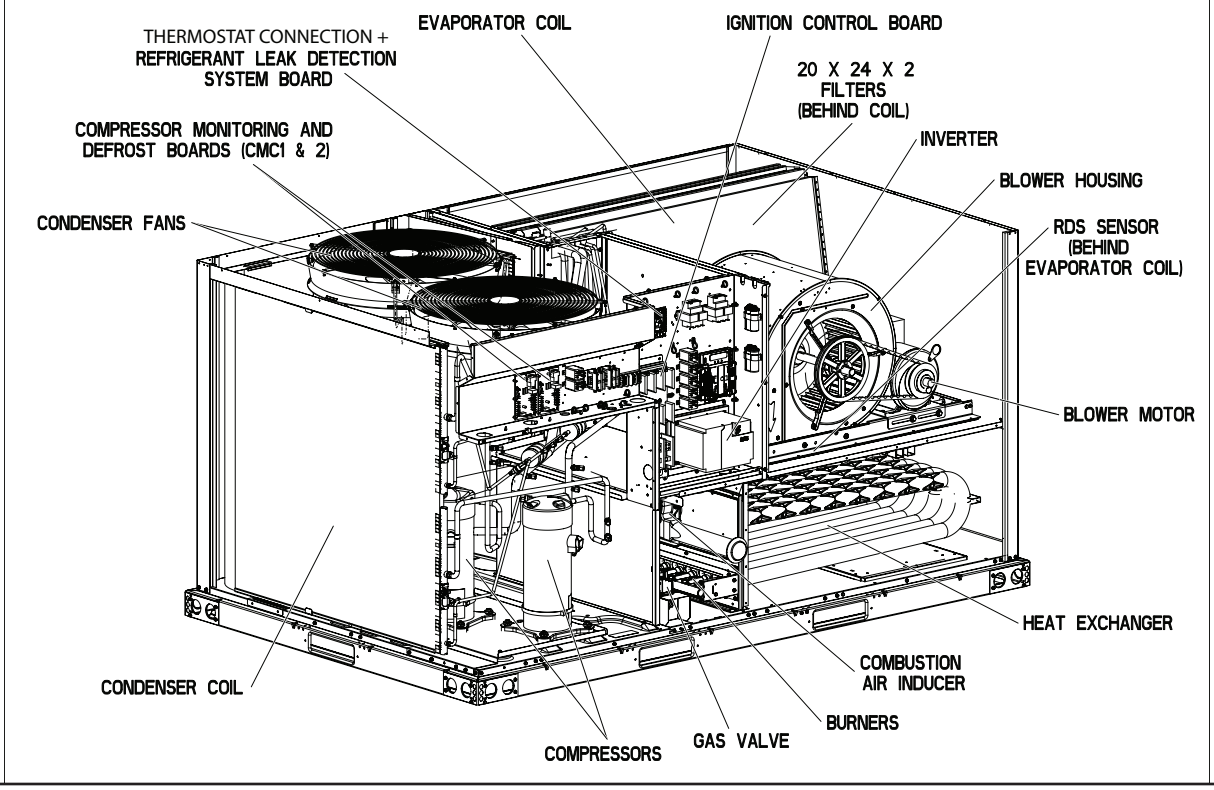


FIGURE 1

CONTROL BOX COMPONENTS

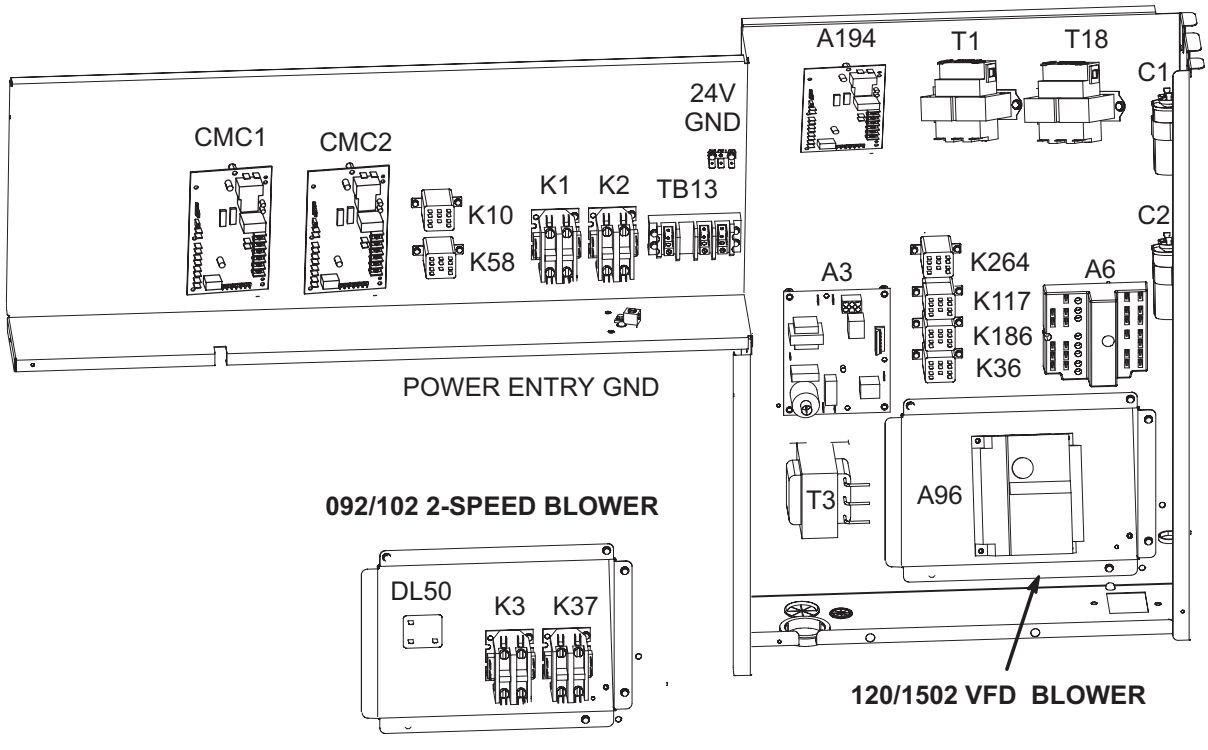


FIGURE 2

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 ZGD 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

ZGD 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.

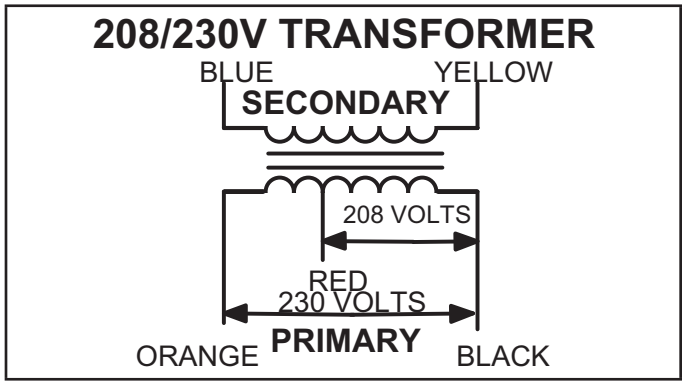


FIGURE 3

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-C. A. I. Transformers T3 575V units

All ZGD 575 (J) voltage units use transformer T3 mounted in the control box. The transformers have an output rating of 0.5A. T3 transformer supplies 230 VAC power to the combustion air inducer motor (B6).

4-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.

5-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.

6-Compressor Contactor K1 & K2

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

7-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.

8-Condenser Fan Relay K10

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

9-Power Exhaust Relay K65 (PED units)

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

10-Three Speed VFD Control Relays K264, K117, K186 and K36

K264, K117, K186, K36 relays are used to control the VFD during Blower (G) , Cool 1 (Y1) , Cool 2 (Y2) , Cool 3 (Y3) and Heating 1 (W1) demands from thermostat.

11-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.

12- 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).

13-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.

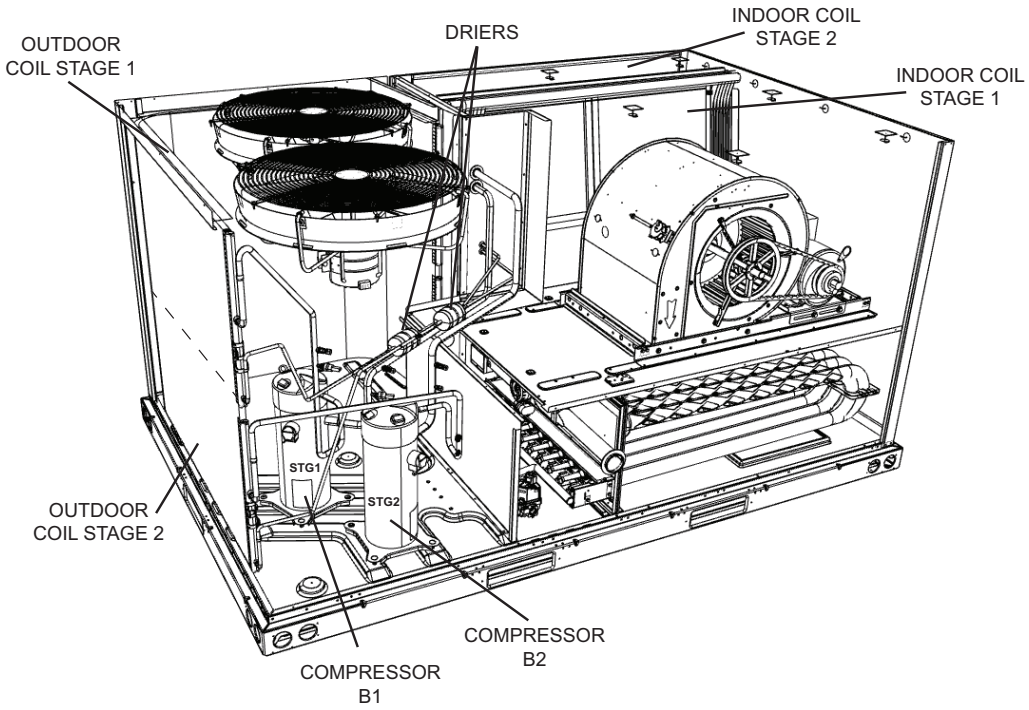
14-Blower Delay DL50 (-092/102 Units)

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

15-Terminal Block TB13

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

PLUMBING AND COMPRESSOR CIRCUITS DETAIL



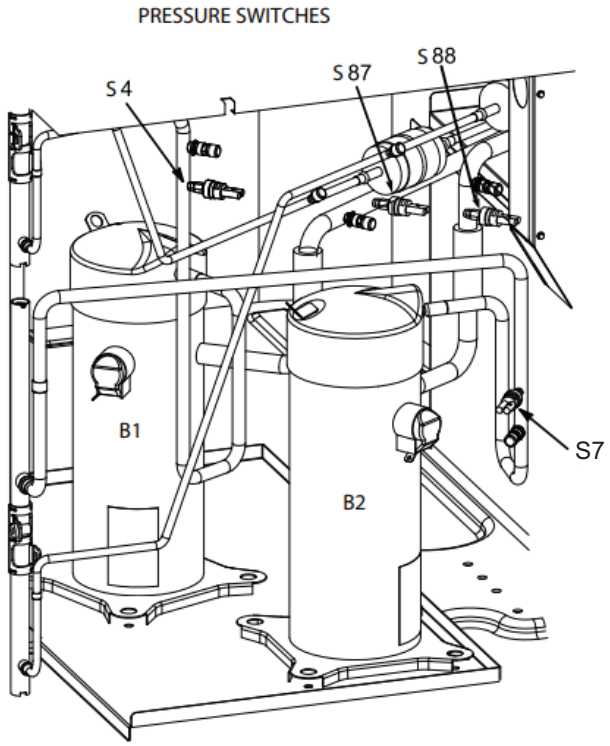


FIGURE 4

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 ZGD092/150 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 ZGD092/150 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 Ambient Switches S11 & S84 (optional)

The low ambient switch is an auto-reset SPST N.O. pressure switch which allows for mechanical cooling operation at low outdoor temperatures. In all models a switch is located in each liquid line prior to the indoor coil section.

In the ZGD092/150, S11 and S84 are wired in parallel with outdoor fan relay K10.

When liquid pressure rises to 450 ± 10 psig (3102 ± 69 kPa), the switch closes and the condenser fans are energized. When liquid pressure in both refrigerant circuits drops to 240 ± 10 psig (1655 ± 69 kPa), the switches open and the condenser fans are de-energized. This intermittent fan operation results in higher evaporating temperature allowing the system to operate without icing the evaporator coil and losing capacity.

4-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.

5-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).

6-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

8-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

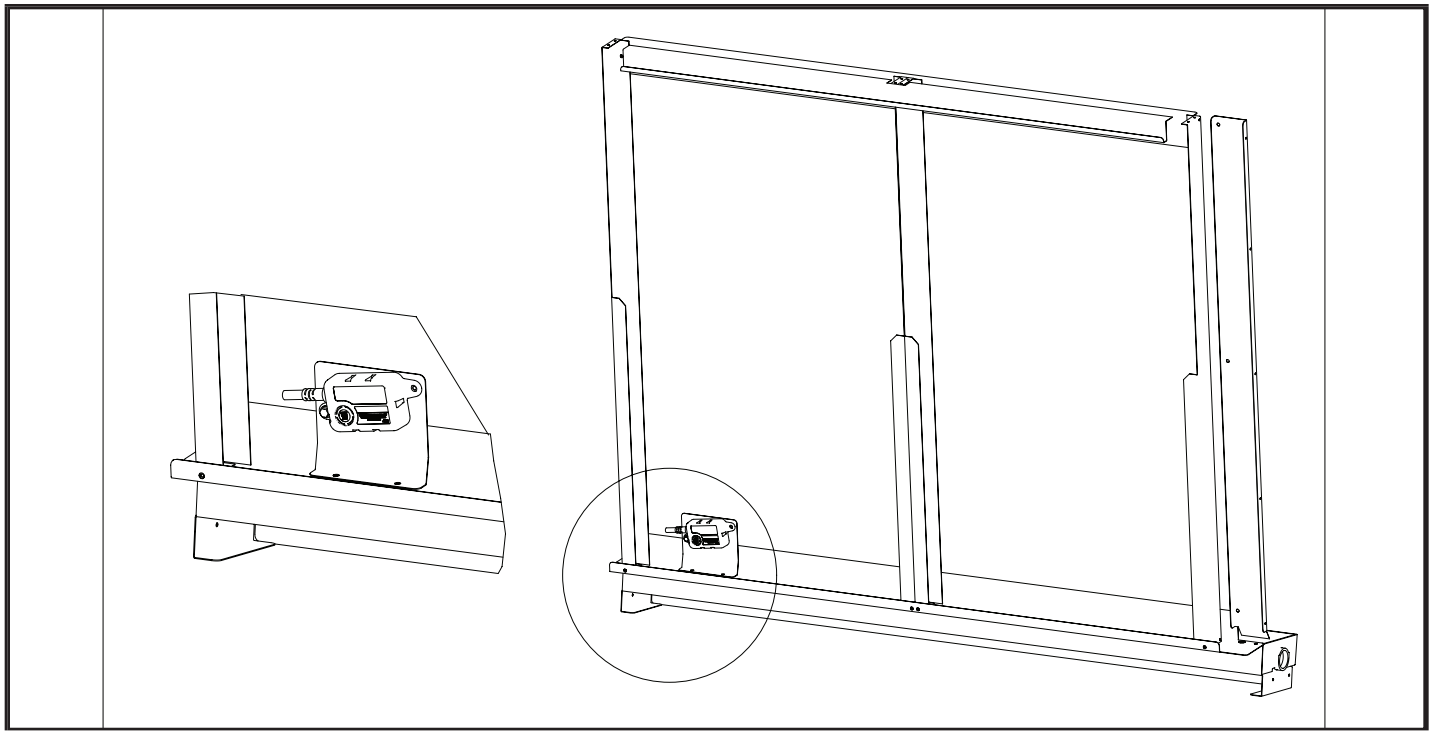


FIGURE 5

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.

FIGURE 6

C-Blower Compartment

All units are equipped with belt drive blowers.

1-Blower Wheels

All ZGD092/150 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. 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 - *ZGD092-102 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.

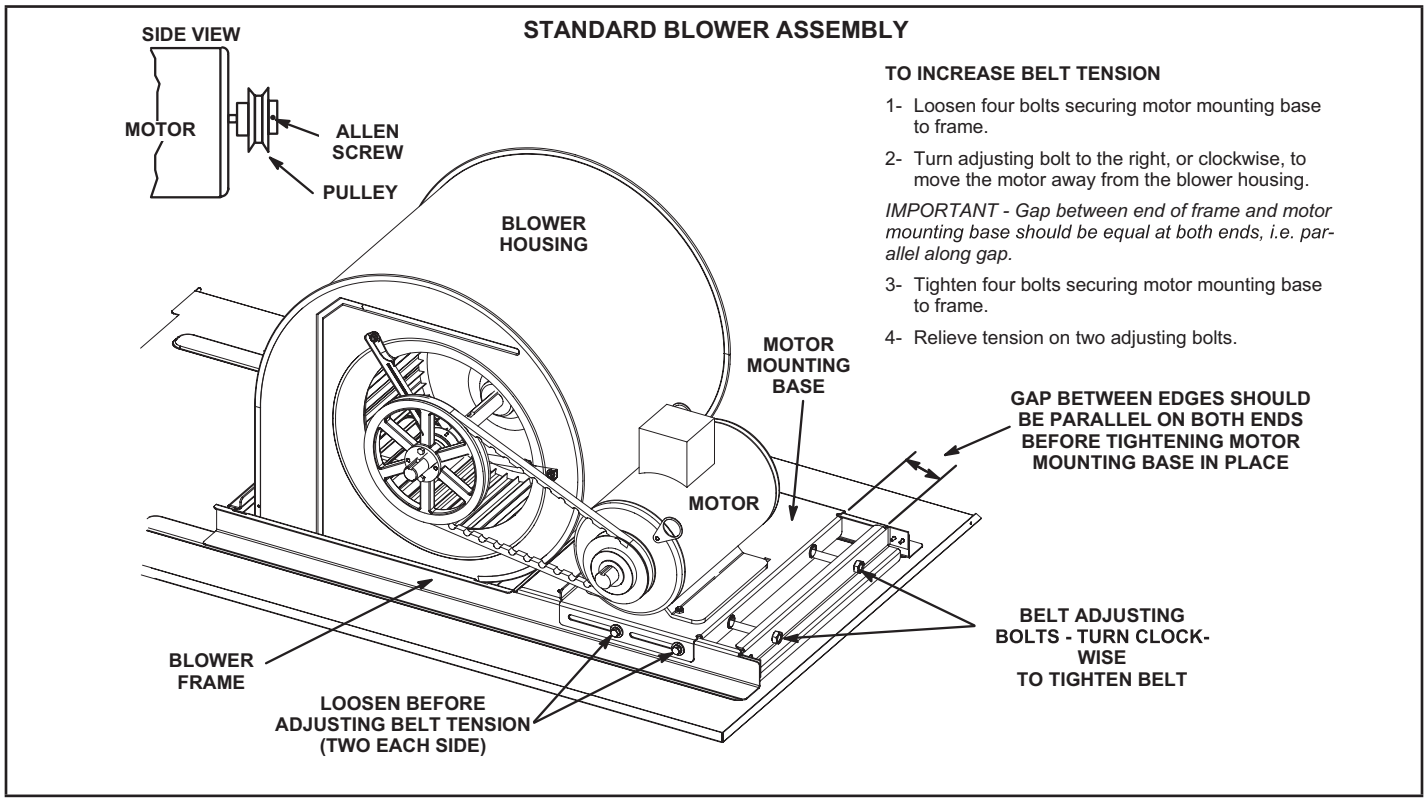


FIGURE 7

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 6.

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

4 - Referring to “BLOWER DATA” (table of contents) use static pressure and RPM readings to determine unit CFM.

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.

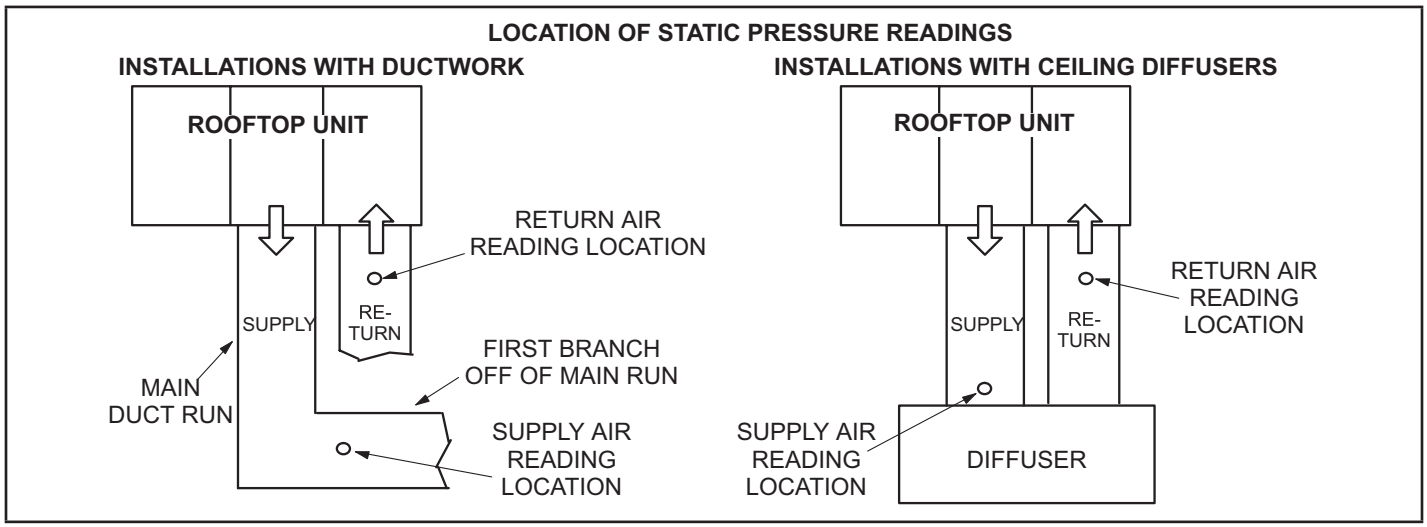


FIGURE 8

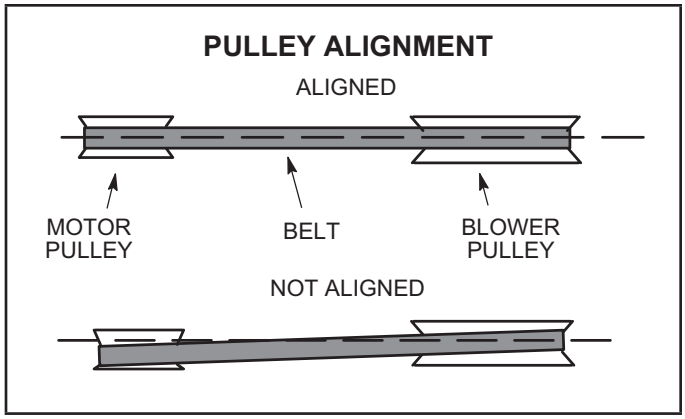


FIGURE 9

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.

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.

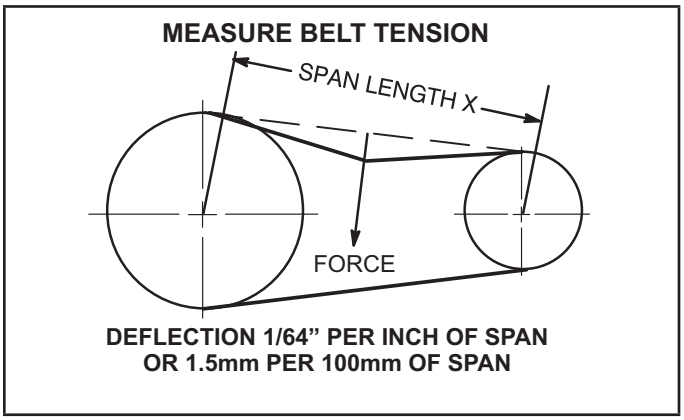


FIGURE 10

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-GAS HEAT COMPONENTS

ZGD092/150 units are available in 130,000 BTUH (38.1 kW), 180,000 BTUH (52.7 Kw) or 240,000 BTUH (70.3 kW) heat sizes.

1-Heat Exchanger FIGURE 11

Units are equipped with tubular aluminized steel heat exchangers and two-stage redundant gas valves. Units use one eleven tube/burner for high heat, one nine tube/burner for medium heat and one six tube/burner for standard heat. Burners in all units use a burner venturi to mix gas and air for proper combustion. Combustion takes place at each tube entrance. As hot combustion gases are drawn upward through each tube by the combustion air inducer, exhaust gases are drawn out the top and fresh air/gas mixture is drawn in at the bottom. Heat is transferred to the air stream from all surfaces of the heat exchanger tubes. The supply air blower forces air across the tubes to extract the heat of combustion. The shape of the tubes ensures maximum heat exchange.

The gas valves accomplish staging by allowing more or less gas to the burners as called for by heating demand.

2-Burner Box Assembly FIGURE 12

The burner assembly consists of a spark electrode, flame sensing electrode and gas valve. Ignition board A3 controls all functions of the assembly.

Burners

Units are equipped with either aluminized steel inshot burners or a one piece aluminized burner cluster. Burners are factory set and do not require adjustment. A peep hole with cover is furnished in the heating access panel for flame viewing. Always operate the unit with the access panel in place. Burners can be removed individually for service. Burner maintenance and service is detailed in the SERVICE CHECKS section of this manual.

Orifice

Each burner uses an orifice which is matched to the burner input. The orifice is threaded into the burner manifold. The burner is supported by the orifice and will easily slide off for service once the mounting screws are removed from the burners.

NOTE-*Do not use thread sealing compound on the orifices. Using thread sealing compound may plug the orifices.*

Each orifice and burner are sized specifically to the unit. Refer to Product Zone@www.davenet.com for correct sizing information.

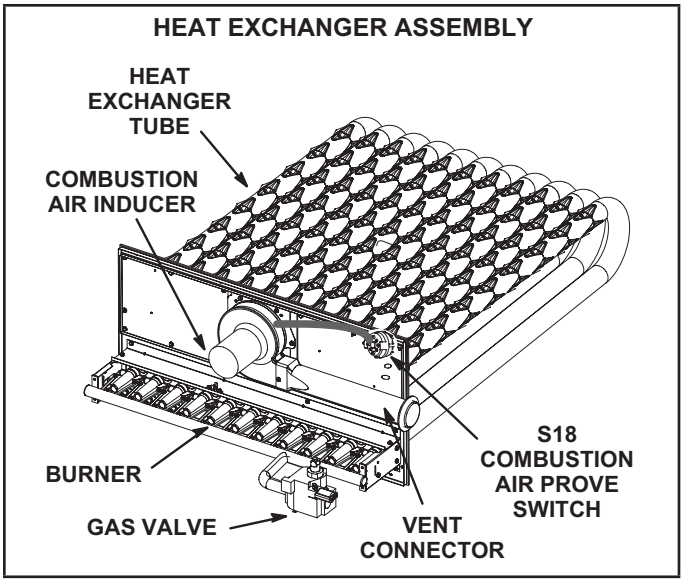


FIGURE 11

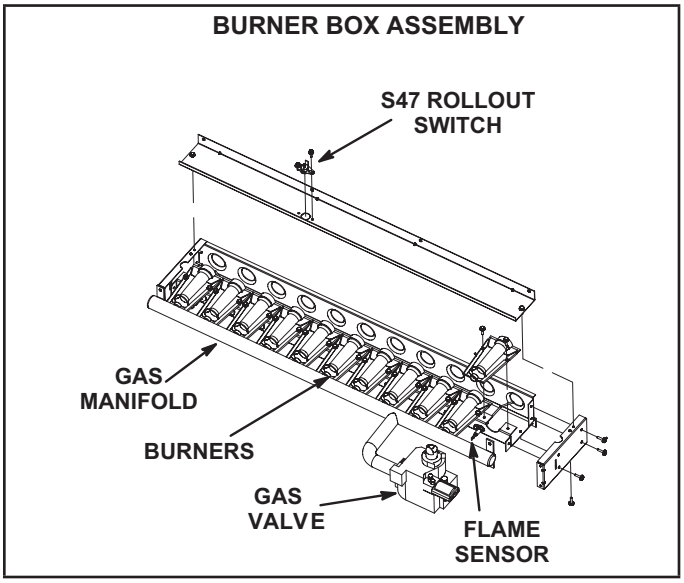


FIGURE 12

3-Primary High Temperature Limit S10

S10 is a SPST N.C. high temperature primary limit for gas heat in ZGD092/150 units. S10 is located behind the indoor- blower motor plate in the blower compartment. See FIGURE 13.

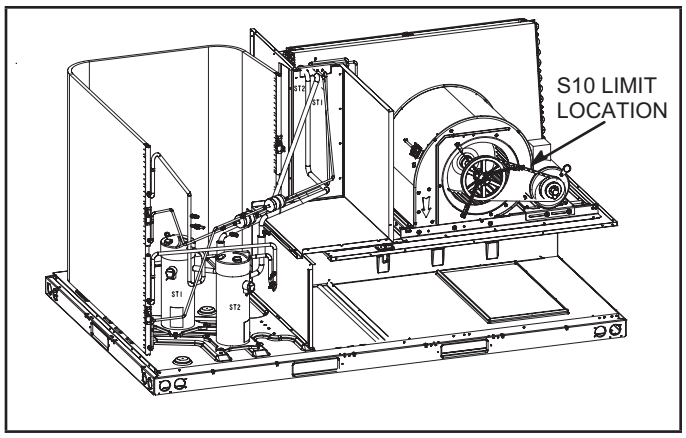


FIGURE 13

Primary limit S10 is wired to the ignition control A3. Its N.C. contacts open to de-energize the ignition control when excessive temperature is reached in the blower compartment. If the limit trips the blower relay coil K3 will be energized by ignition control A3. Three limits with different actuating temperatures are used. See Product Zone@ www.davenet.com for replacement.

4-Flame Rollout Limit Switch S47

Flame rollout limit switch S47 is a SPST N.C. high temperature limit located just above the burner air intake opening in the burner enclosures (see figure 10). S47 is wired to the ignition control A3. When S47 senses flame rollout (indicating a blockage in the combustion air passages), the flame rollout limit trips and the ignition control immediately closes the gas valve.

Limit S47 is factory preset to open at 290F $\pm$ 12ºF (143C $\pm$ 6.7ºC) on a temperature rise on all units. All flame rollout limits are manual reset.

5-Combustion Air Prove Switch S18

Prove switch S18 is a SPST N.O. switch located to the right of the induced draft assembly. S18 monitors combustion air inducer operation. Switch S18 is wired to the ignition control A3. The switch closes on a negative pressure fall. This negative pressure fall and switch actuation allows the ignition sequence to continue (proves, by closing, that the combustion air inducer is operating before allowing the gas valve to open.) The combustion air prove switch is factory set and not adjustable. The switch will automatically open on a pressure rise (less negative pressure). TABLE 8 shows prove switch settings.

TABLE 8

S18 Prove Switch Settings

Close“ w.c. (Pa)	Open “ w.c. (Pa)
0.25 $\pm$ 5 (62.3 $\pm$ 12.4)	0.10 $\pm$ 5 (24.8 $\pm$ 12.4)

6-Combustion Air Inducer B6

Combustion air inducers on ZGD092/150 units provide air to the corresponding burners while clearing the combustion chamber of exhaust gases. The inducer begins operating immediately upon receiving a thermostat demand and is de-energized when thermostat demand is satisfied.

The inducer uses a 208/230V single-phase PSC motor and a 4.81in. x 1.25in. (122mm x 32mm) blower wheel. All motors operate at 3200RPM and are equipped with auto-reset overload protection. Inducers are supplied by various manufacturers.

Ratings may vary by manufacturer. Specific inducer electrical ratings can be found on the unit rating plate. On a heating demand (W1), the ignition control A3 initiates the heating cycle. A3 then allows 30 to seconds for the combustion air inducer to vent exhaust gases from the burners.

When the combustion air inducer is purging the exhaust gases, the combustion air prove switch closes, proving that the combustion air inducer is operating before allowing the ignition sequence to continue. When the combustion air prove switch is closed and the delay is over, the ignition control activates the first stage operator of the gas valve (low fire), the spark and the flame sensing electrode. Sparking stops immediately after flame is sensed or at the end of the eight second trial for ignition.

All combustion air inducer motors are sealed and cannot be oiled. The inducer cannot be adjusted but can be disassembled for cleaning.

7-Combustion Air Motor Capacitor C3

The combustion air inducer motors in all ZGD units require run capacitors. Capacitor C3 is connected to combustion air inducer B6. Ratings will be on side of capacitor or combustion air motor nameplate.

8-Gas Valves GV1

Gas valve GV1 is a two-stage redundant valve. Units are equipped with valves manufactured by White-Rodgers or Honeywell. On a call for first stage heat (low fire), the valve is energized by the ignition control simultaneously with the spark electrode. On a call for second stage heat (high fire), the second stage operator is energized directly from A3. A manual shut-off knob is provided on the valve for shut-off. Manual shut-off knob immediately closes both stages without delay. On both valves first stage (low fire) is quick opening (on and off in less than 3 seconds).

On the White-Rodgers valve second stage is slow opening (on to high fire pressure in 40 seconds and off to low fire pressure in 30 seconds). The White-Rodgers valve is adjustable for high fire only. Low fire is not adjustable. On the Honeywell valve second stage is quick opening. The Honeywell valve is adjustable for both low fire and high fire. FIGURE 18 and FIGURE 19 show gas valve components. TABLE 9 shows factory gas valve regulation for ZGD series units.

TABLE 9

GAS VALVE REGULATION

Max. Inlet Pressure	Operating Manifold Pressure			
13.0" W.C.	Natural		L.P.	
	Low	High	Low	High
	1.6 ± 0.2" W.C.	3.7 ± 0.3" W.C.	5.5" + 0.3" W.C	10.5" ± 0.5" W.C.

9-Spark Electrode FIGURE 15

An electrode assembly is used for ignition spark. The electrode is mounted through holes under the left most burner location. The electrode tip protrudes into the flame envelope of the adjacent burner. The electrode assembly is fastened to burner supports and can be removed for service without removing any part of the burners. See FIGURE 14 for location of ignitor and sensor.

During ignition, spark travels through the spark electrode (FIGURE 15) and ignites the left burner. Flame travels from burner to burner until all are lit.

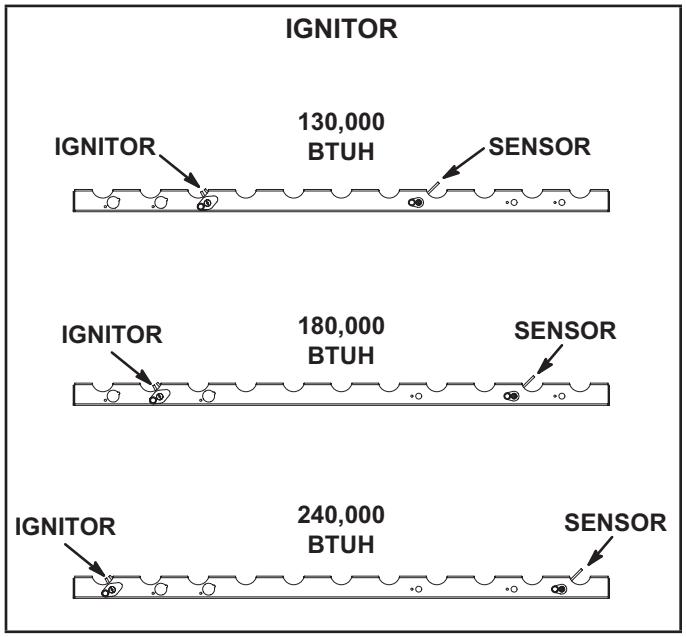


FIGURE 14

The spark electrode is connected to the ignition control by a 8 mm silicone-insulated stranded high voltage wire. The wire uses 1/4" (6.35 mm)female quick connect on both ends of the wire.

NOTE - *If electrode wire is replace, wire and suppression must be same type cable. See Product Zone@www.davenet.com for replacement.*

The spark electrode assembly can be removed for inspection by removing the screw securing the electrode assembly and sliding it out of unit.

For proper unit operation, electrodes must be positioned and gapped correctly.

Spark gap may be checked with appropriately sized twist drills or feeler gauges. Disconnect power to the unit and remove electrode assembly. The gap should be between 0.125" + 0.015" (3.2 mm + .4 mm). See FIGURE 15.

NOTE-*IN ORDER TO MAXIMIZE SPARK ENERGY TO ELECTRODE, HIGH VOLTAGE WIRE SHOULD TOUCH UNIT CABINET AS LITTLE AS POSSIBLE.*

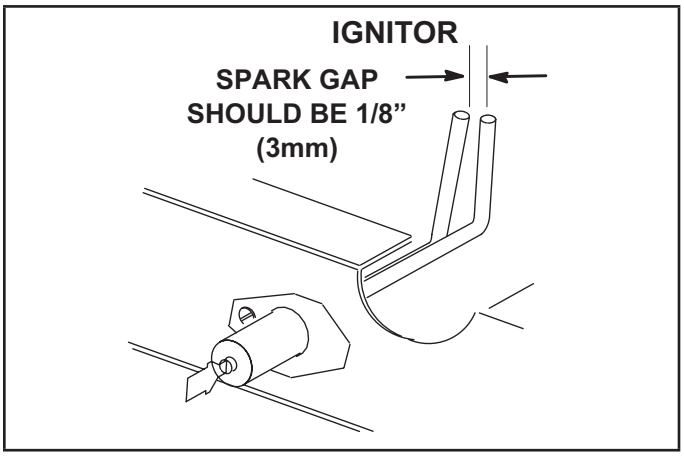


FIGURE 15

10-Flame Sensor FIGURE 16

A flame sensor is located under the right most side burner. The sensor is mounted through a hole in the burner support and the tip protrudes into the flame envelope of the right most burner. The sensor assembly is fastened to burner supports and can be removed for service without removing any part of the burners.

When flame is sensed by the flame sensor (indicated by microamp signal through the flame) sparking stops immediately or after the eight second trial for ignition. During operation, flame is sensed by current passed along the ground electrode (located on the spark electrode), through the flame and into the sensing electrode. The ignition control allows the gas valve to stay open as long as a flame signal (current passed through the flame) is sensed.

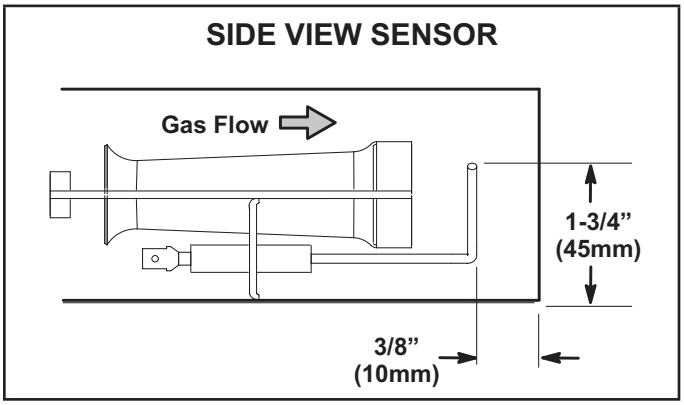


FIGURE 16

11-Burner Control A3

⚠ WARNING

Shock hazard. Spark related components contain high voltage which can cause personal injury or death. Disconnect power before servicing. Control is not field repairable. Unsafe operation will result. If control is inoperable, simply replace the entire control.

The burner control A3 is located in the gas heat section. See FIGURE 1 and FIGURE 17.

The ignition control provides four main functions: gas valve control, blower control, ignition and flame sensing. The control has a green LED to show control status (TABLE 10). The unit will usually ignite on the first trial and A3 allows three trials for ignition before locking out. The lockout time is 1 hour . After lockout, the ignition control automatically resets and provides three more attempts at ignition. Manual reset after lockout requires removing power from the control for more than 1 second or removing the thermostat call for heat for more than 1 second but no more than 20 seconds. 24 volt thermostat connections (P2) and heating component connections (J1) are made through separate jackplugs. See TABLE 11 for thermostat terminations and TABLE 12 for heating component terminations.

TABLE 10

LED Flashes	Indicates
Slow	Normal operation. No call for heat.
Fast	Normal operation. Call for heat.
Steady Off	Internal control fault OR no power to control OR Gas Valve Relay Fault.
Steady On	Control internal failure.
2	Lockout. Failed to detect or sustain flame.
3	Prove switch open or closed or rollout switch open.
4	Limit switch is open and/or limit has opened three times.
5	Flame sensed but gas valve solenoid not energized.

TABLE 11

P2 Terminal Designations	
PIN #	Function
1	**R** 24 Volts to thermostat
2	**W1** Heat Demand
3	**Y** Cool Demand
4	**C** Common
5	**G** Indoor Blower
6	**BL OUT** Indoor Blower Relay
7	**W2** Second Stage Heat

TABLE 12

P2 Terminal Designations	
PIN #	Function
1	Limit Switch Out
2	Rollout Switch / Prove Switch Out
3	Gas Valve Common
4	Gas Valve Out
5	Rollout Switch / Prove Switch In
6	Limit Switch In

IGNITION CONTROL A3

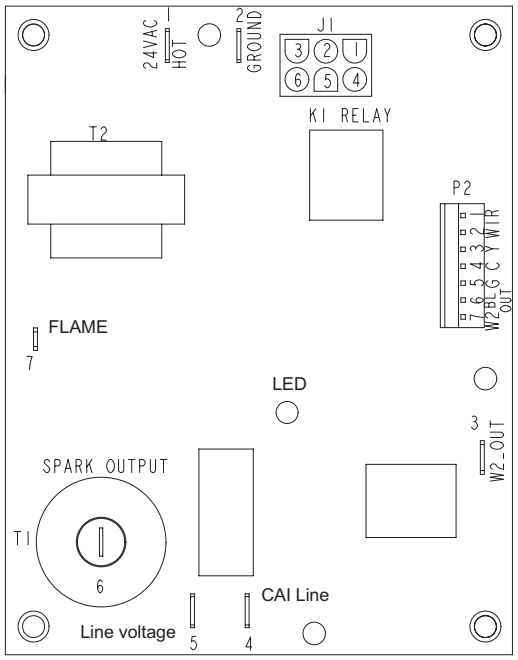


FIGURE 17

Flame rectification sensing is used on all ZGD units. Loss of flame during a heating cycle is indicated by an absence of flame signal (0 microamps). If this happens, the control will immediately restart the ignition sequence and then lock out if ignition is not gained after the third trial. See System Service Checks section for flame current measurement. The control shuts off gas flow immediately in the event of a power failure. Upon restoration of gas and power, the control will restart the ignition sequence and continue until flame is established or system locks out.

Operation

On a heating demand, the ignition control checks for a closed limit switch and open combustion air prove switch. Once this check is complete and conditions are correct, the ignition control then allows 30 seconds for the combustion air inducer to vent exhaust gases from the burners. When the combustion air inducer is purging the exhaust gases, the combustion air prove switch closes proving that the combustion air inducer is operating before allowing the ignition control to energize. When the combustion air prove switch is closed and the delay is over, the ignition control activates the gas valve, the spark electrode and the flame sensing electrode.

Once the gas valve is energized the non-adjustable 40 second indoor blower delay period begins. Sparking stops immediately after flame is sensed or at the end of the 8 second trial for ignition. The control then proceeds to “steady state” mode where all inputs are monitored to ensure the limit switch, rollout switch and prove switch are closed as well as flame is present. When the heat call is satisfied and the gas valve is de-energized, a combustion air inducer post purge period of 5 seconds begins along with a 120 second blower off delay.

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-Heating Startup

FOR YOUR SAFETY READ BEFORE LIGHTING

⚠ WARNING

Electric shock hazard. Can cause injury or death. Do not use this unit if any part has been under water. Immediately call a qualified service technician to inspect the unit and to replace any part of the control system and any gas control which has been under water.

⚠ WARNING

Danger of explosion. Can cause injury or product or property damage. If overheating occurs or if gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off electrical supply.

⚠ WARNING

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

⚠ CAUTION

SMOKE POTENTIAL

The heat exchanger in this unit could be a source of smoke on initial firing. Take precautions with respect to building occupants and property. Vent initial supply air outside when possible.

BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, do not try to repair it, call a qualified service technician.Force or attempted repair may result in a fire or explosion.

⚠ WARNING

Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.

This unit is equipped with an automatic spark ignition system. There is no pilot. In case of a safety shutdown, move thermostat switch to OFF and return the thermostat switch to HEAT to reset ignition control.

A-Placing Unit In Operation

⚠ WARNING

Danger of explosion and fire. Can cause injury or product or property damage.

You must follow these instructions exactly.

Gas Valve Operation for Honeywell VR8305Q or White Rodgers 36H54 FIGURE 18 or FIGURE 19

1 - Set thermostat to lowest setting.

2 - Turn off all electrical power to appliance.

3 - This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

4 - Open or remove the heat section access panel.

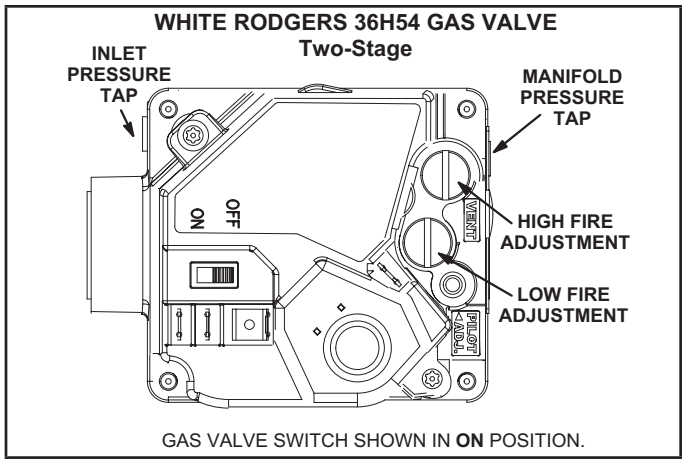


FIGURE 18

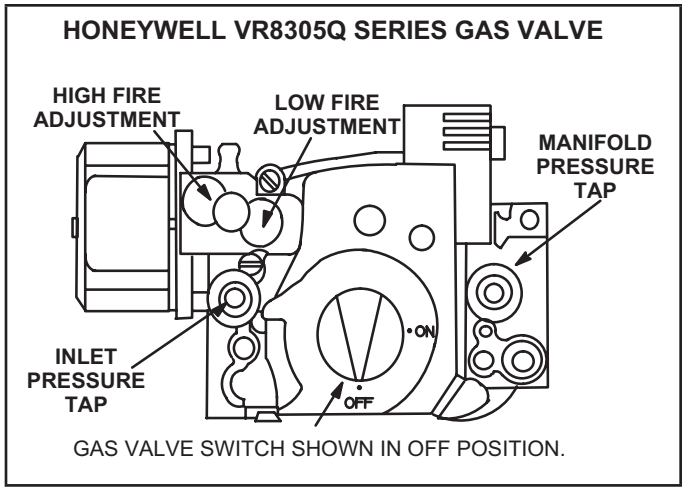


FIGURE 19

5 - Turn gas valve switch to OFF. See FIGURE 18. On Honeywell VR8305Q gas valves, turn the knob on the gas valve clockwise to “OFF”. Do not force. See FIGURE 19.

6 - Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Immediately call your gas supplier from a neighbor’s phone. Follow the gas supplier’s instructions. If you do not smell gas, go to the next step.

7 - Turn gas valve switch to ON. See FIGURE 18. On Honeywell VR8305Q gas valves, turn the knob on the gas valve counterclockwise to “ON”. Do not force. See FIGURE 19.

8 - Close or replace the heat section access panel.

9 - Turn on all electrical power to appliance.

10 - Set thermostat to desired setting.

11 - The ignition sequence will start.

12 - If the appliance does not light the first time (gas line not fully purged), it will attempt up to two more ignitions before locking out.

13 - If lockout occurs, repeat steps 1 through 10.

14 - If the appliance will not operate, follow the instructions

“Turning Off Gas to Appliance” and call your service technician or gas supplier.

Turning Off Gas to Unit

1 - If using an electromechanical thermostat, set to the lowest setting.

2 - Before performing any service, turn off all electrical power to the appliance.

3 - Open or remove the heat section access panel.

4 - Turn gas valve switch to OFF. On Honeywell VR8305Q gas valves, turn the knob on the gas valve clockwise to “OFF”. Do not force.

5 - Close or replace the heat section access panel.

⚠ WARNING

Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.

C-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 20.

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.

D-Safety or Emergency Shutdown

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

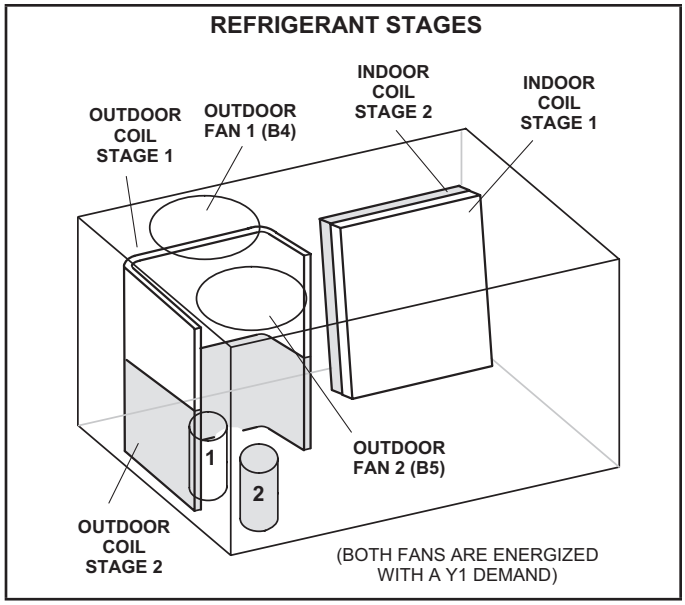


FIGURE 20

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		
Unit	M_c(lbs)	M_c(kg)
ZGD 092	4.25	1.93
ZGD 102	3.94	1.79
ZGD 120	4.25	1.93
ZGD 150	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 ZGD092, 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 agrees with the target liquid temperature.

TABLE 13
ZGD 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 092S Charging Curves

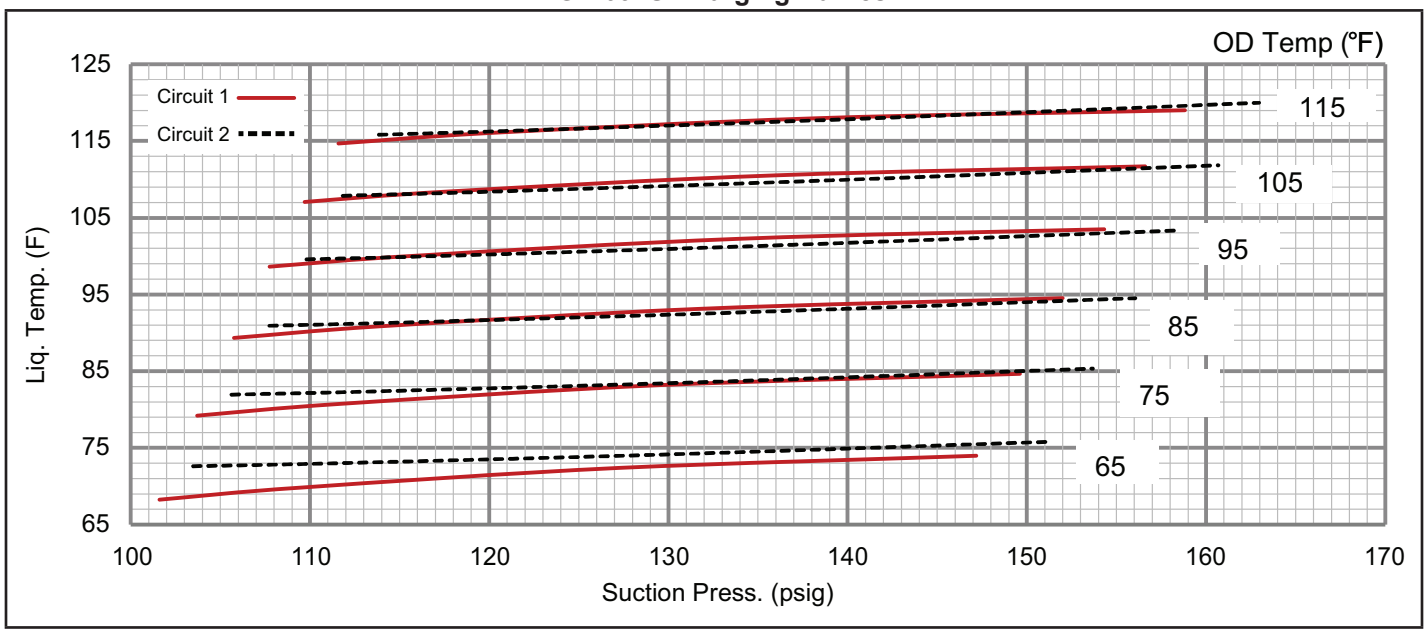


TABLE 14
ZGD 102S NORMAL OPERATING PRESSURES - 581372-01

	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 102S Charging Curves

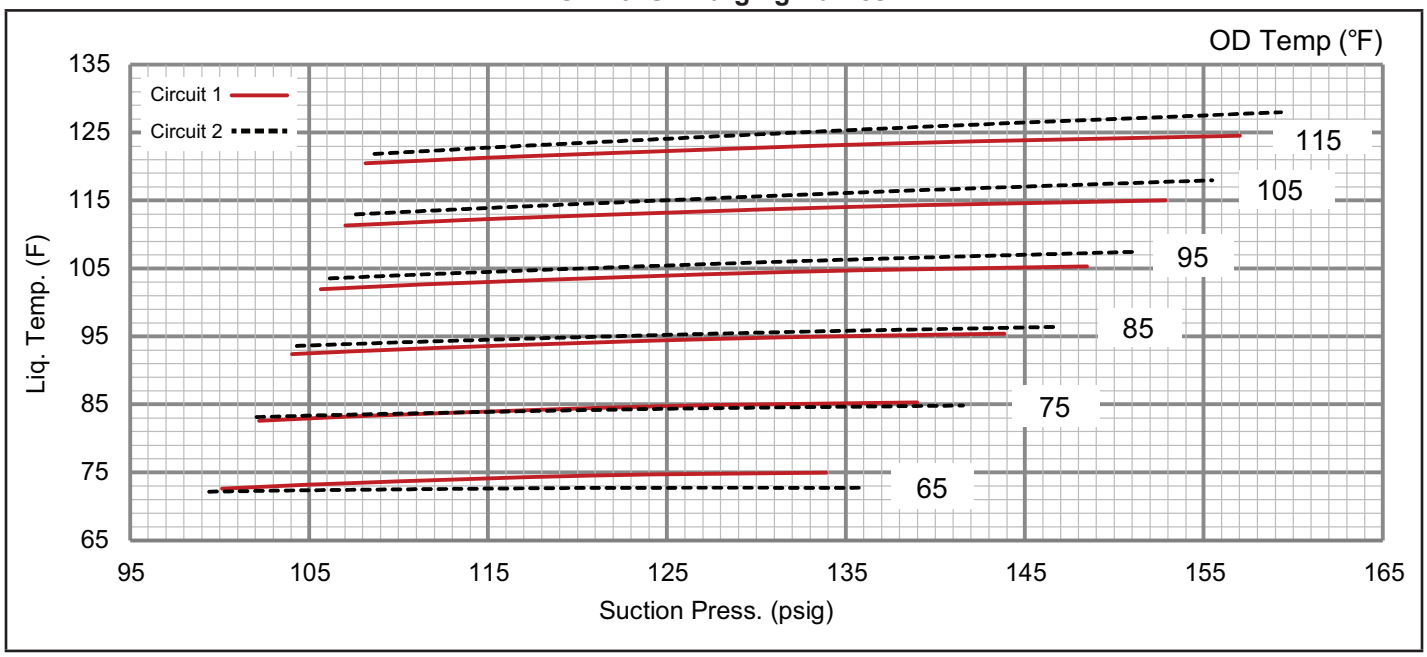


TABLE 15

ZGD 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 120S Charging Curves

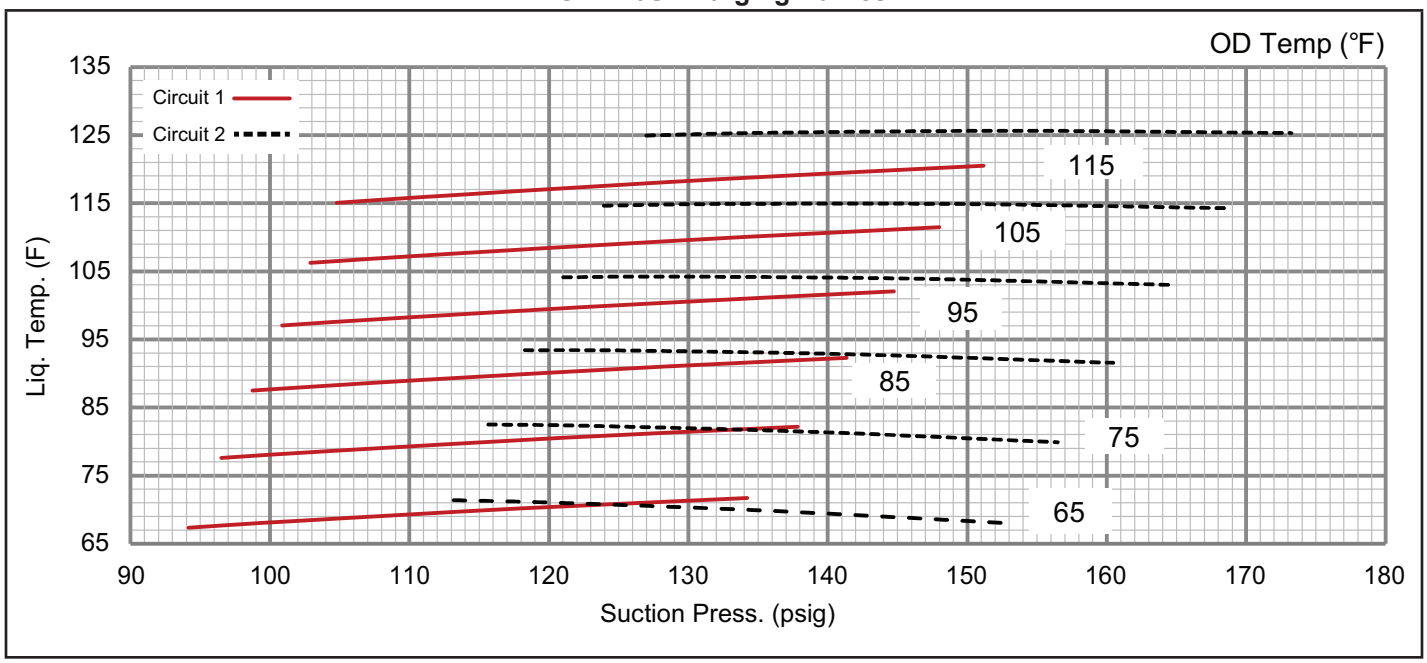
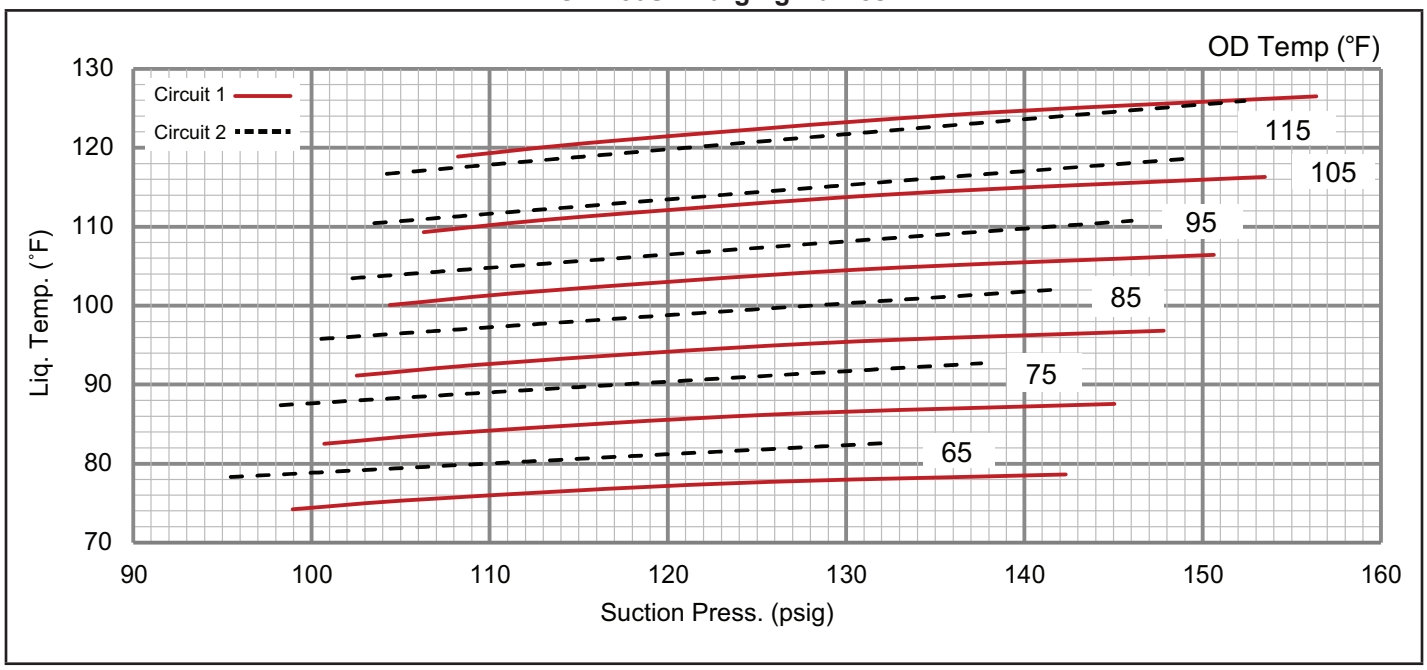


TABLE 16
ZGD 150S NORMAL OPERATING PRESSURES - 581374-01

	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 150S Charging Curves



V- SYSTEMS SERVICE CHECKS

A-Heating System Service Checks

All ZGD units are ETL/CSA design certified without modification.

Before checking piping, check with gas company or authorities having jurisdiction for local code requirements. Refer to the ZGD Installation instruction for more information.

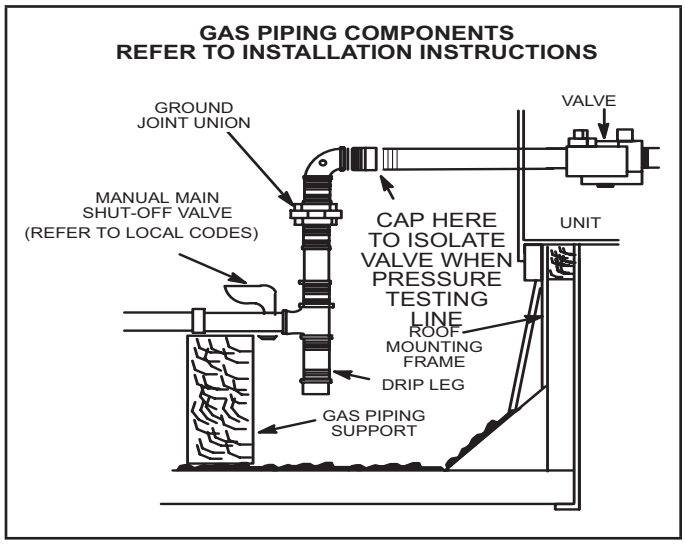


FIGURE 21

1-Gas Piping

Gas supply piping must not allow more than 0.5"W.C. (124.3 Pa) drop in pressure between the gas meter and the unit. Supply gas pipe must not be smaller than the unit gas connection. Refer to installation instructions for details.

2-Testing Gas Piping

NOTE-*In case emergency shutdown is required, turn off the main manual shut-off valve and disconnect the main power to the unit. These controls should be properly labeled by the installer.*

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig [14"W.C. (3481 Pa)]. See FIGURE 21.

When checking piping connection for gas leaks, use the preferred means. Common kitchen detergents can cause harmful corrosion on various metals used in gas piping. The use of specialty Gas Leak Detector is strongly recommended. It is available as part number 31B2001. See CORP 8411-L10, for further details.

Do not use matches, candles, flame or any other source of ignition to check for gas leaks.

3-Testing Gas Supply Pressure

When testing gas supply pressure, connect test gauge to the inlet pressure tap located on unit gas valve GV1. Test supply gas pressure with unit firing at maximum rate (both stages energized). Make sure the reading falls within the range of the following values.

Low pressure may result in erratic operation or "underfire." High pressure can result in permanent damage to the gas valve or "overfire." For natural gas units, operating pressure at the unit gas connection must be between 4.7"W.C. and 10.5"W.C. (1168 Pa and 2610 Pa). For L.P. gas units, operating pressure at the unit gas connection must be between 10.8"W.C. and 13.5"W.C. (2685.3 Pa and 3356.7 Pa).

On multiple unit installations, each unit should be checked separately while operating at maximum rate, beginning with the one closest to the supply gas main and progressing to the one furthest from the main. Multiple units should also be tested with and without the other units operating. Supply pressure must fall within the range listed in the previous paragraph.

4-Check and Adjust Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Move test gauge to the manifold pressure tap located on unit gas valve GV1. See FIGURE 18 and FIGURE 19 for location of manifold tap on the gas valve.

The manifold pressure is factory set and should not require adjustment. If manifold pressure is incorrect and no other source of improper manifold pressure can be found, the valve must be replaced. See FIGURE 18 and FIGURE 19 for location of gas valve (manifold pressure) adjustment screw.

All gas valves are factory regulated. The gas valve should completely and immediately cycle off in the event of gas or power failure. The manual shut-off knob can be used to immediately shut off gas supply.

⚠ CAUTION

For safety, connect a shut-off valve between the manometer and the gas tap to permit shut off of gas pressure to the manometer.

Manifold Adjustment Procedure

1 - Connect test gauge to the outlet pressure tap on the gas valve. Start the unit (call for second stage heat) and allow five minutes for the unit to reach steady state.

2 - While waiting for the unit to stabilize, notice the flame. The flame should be stable without flashback and should not lift from the burner heads. Natural gas should burn basically blue with some clear streaks. L.P. gas should burn mostly blue with some clear yellow streaks.

3 - After allowing the unit to stabilize for five minutes, record the manifold pressure and compare to the values given in TABLE 9. On two-stage units, check low fire, make adjustments, and recheck high fire before recording values.

⚠ IMPORTANT

Disconnect heating demand as soon as an accurate reading has been obtained.

5-High Altitude

See page 6 HIGH ALTITUDE DERATE.

6-Proper Gas Flow

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for two revolutions of gas through the meter. (Two revolutions assures a more accurate time.) Divide by two and compare to time in TABLE 17. Seconds in TABLE 17 are based on a 1 cu.ft. dial and gas value of 1000 btu's for natural and 2500 btu's for LP. Adjust manifold pressure on gas valve to match time needed.

NOTE - *To obtain accurate reading, shut off all other gas appliances connected to meter.*

TABLE 17

Unit Input Rate	Seconds for Natural	Seconds for Propane
130,000	28	69
180,000	20	50
240,000	15	37

7-Heat Exchanger

To Access or Remove Heat Exchanger From Unit:

1 - Turn off gas and electric power.
2 - Remove access panel(s) and unit center mullion.
3 - Remove gas valve, manifold assembly and burners.
4 - Remove combustion air inducer and flue box cover. Pay careful attention to the order in which gaskets and orifice are removed.
5 - Support heat exchanger (to prevent it from falling when final screws are removed.)
6 - Remove screws supporting heat exchanger.
7 - To install heat exchanger, reverse procedure. Be sure to secure all wires and check plumbing and burner plate for airtight seal. Screws must be torqued to 35 in.-lbs. to ensure proper operation.

8-Flame Sensing

Flame current is an electrical current which passes from the ignition control through the sensor electrode during unit operation.

The current passes from the sensor through the flame to the ground electrode (located on the flame electrode) to complete a safety circuit. The electrodes should be located so the tips are at least 1/2" (12.7 mm) inside the flame envelope. Do not bend electrodes. To measure flame current, follow the procedure below:

NOTE-*Electrodes are not field adjustable. Any alterations to the electrode may create a hazardous condition that can cause property or personal injury.*

1 - Disconnect power to unit.
2 - Remove lead from sensing electrode and install a 0-50DC microamp meter in series between the sensing electrode and the sensing lead.
3 - Reconnect power and adjust thermostat for heating demand.
4 - When flame is established, microamp reading should be 0.5 to 1.0. Do not bend electrodes. Drop out signal is .09 or less.
5 - Disconnect power to unit before disconnecting meter. Make sure sensor wire is securely reconnected before reconnecting power to unit.

NOTE-*If the meter scale reads 0, the leads are reversed. Disconnect power and reconnect leads for proper polarity.*

B-Cooling System Service Checks

ZGD 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 13 - TABLE 16.*

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 22. Lift filter stop to remove filters. See FIGURE 23.

⚠ 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 23.

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

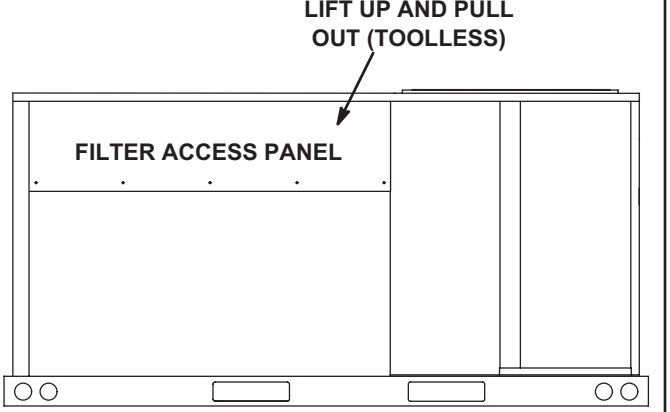


FIGURE 22

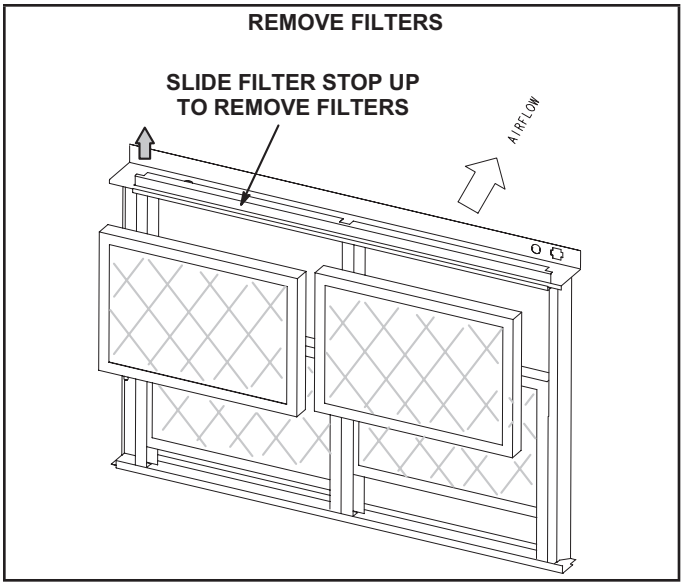


FIGURE 23

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-Burners

Periodically examine burner flames for proper appearance during the heating season. Before each heating season examine the burners for any deposits or blockage which may have occurred.

Clean burners as follows:

1 - Turn off both electrical power and gas supply to unit.

2 - Remove burner compartment access panel.

3 - Remove two screws securing burners to burner support and lift the burners from the orifices. See FIGURE 12. Clean as necessary.

Note - *Some units have inshot burners and can be removed individually. Some units have a one piece burner cluster and can removed as an assembly.*

4 - Locate the ignitor under the left burners. Check ignitor spark gap with appropriately sized twist drills or feeler gauges. See FIGURE 15.

5 - Replace burners and screws securing gas manifold.

⚠ WARNING

Danger of explosion. Can cause injury or death. Do not overtighten main burner mounting screws. Snug tighten only.

6 - Replace access panel.

7 - Restore electrical power and gas supply. Follow lighting instructions attached to unit and use inspection port in access panel to check flame.

E-Combustion Air Inducer

A combustion air proving switch checks combustion air inducer operation before allowing heating sequence to continue. The sequence will not be allowed to continue if inducer is obstructed.

The combustion air inducer wheel should be checked and cleaned prior to the heating season. It should be examined periodically during the heating season to establish an ideal cleaning schedule. With power supply disconnected, the condition of the inducer wheel can be determined by removing the vent pipe and inspecting the wheel through the outlet opening.

Clean combustion air inducer as follows:

1 - Shut off power supply and gas to unit.

2 - Disconnect pressure switch air tubing from combustion air inducer port.

3 - Remove and retain screws securing combustion air inducer to flue box. Remove and retain two screws from bracket supporting vent connector. See FIGURE 11.

4 - Clean inducer wheel blades with a small brush and wipe off any dust from housing. Clean accumulated dust from front of flue box cover.

5 - Return combustion air inducer motor and vent connector to original location and secure with retained screws. It is recommended that the combustion air inducer gasket be replaced during reassembly.

6 - Clean combustion air inlet louvers on heat access panel using a small brush.

F-Flue Passageway and Flue Box

1 - Remove combustion air inducer assembly as described in section D.

2 - Remove flue box cover. Clean with a wire brush as required.

3 - Clean tubes with a wire brush.

4 - Reassemble the unit. The flue box cover gasket and combustion air inducer gasket should also be replaced during reassembly.

G-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.

H-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 ZGD 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 ZGD 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 24. 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 25. 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 ZGD units. Refer to manufacturer’s instructions included with transition for detailed installation procedures.

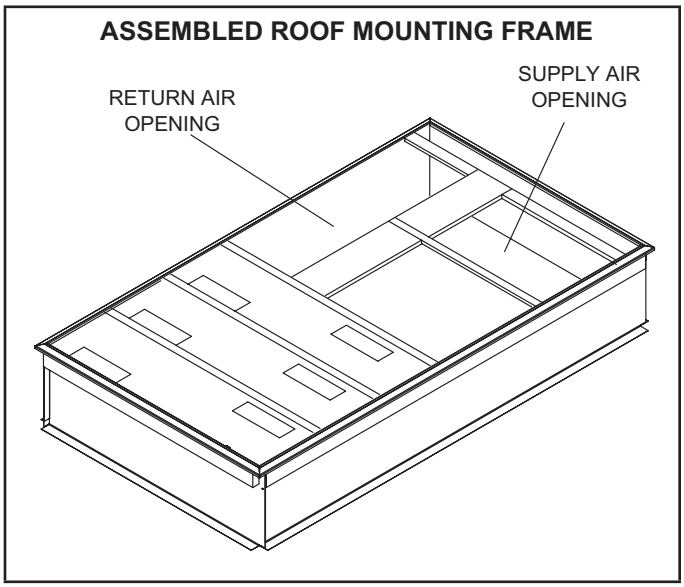


FIGURE 24

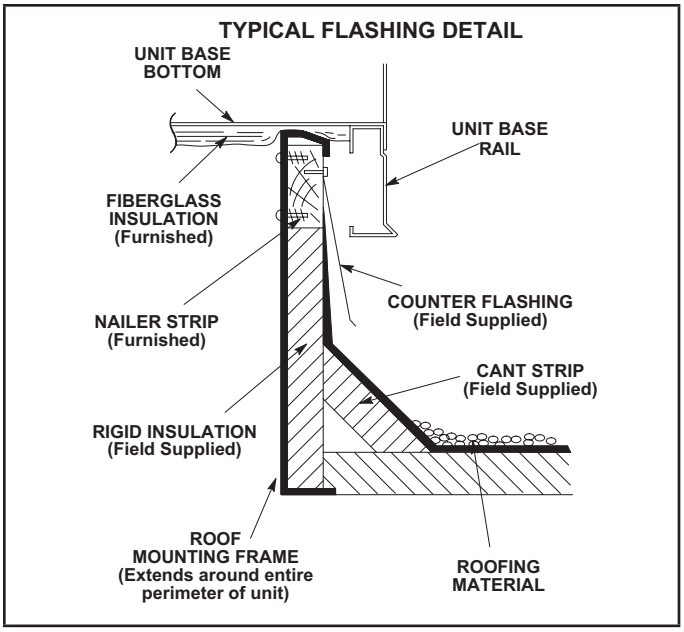


FIGURE 25

D-Horizontal Air Discharge

Units are shipped ready for downflow air discharge. An additional kit is not required to change the unit to horizontal air discharge. Remove the horizontal duct covers and place over the downflow air openings. See FIGURE 26 and FIGURE 27.

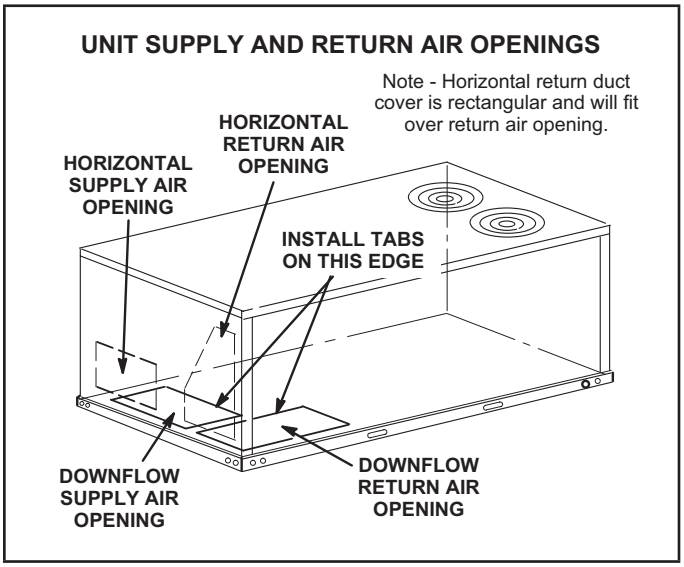


FIGURE 26

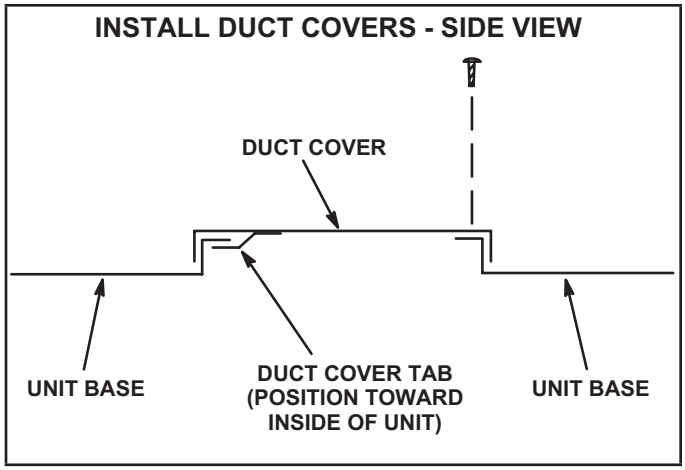


FIGURE 27

E- 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 29. The mixed air temperature sensor (R1) measures the supply air sensible temperature. See FIGURE 28. The outdoor air sensible control is the default economizer control. An outdoor air single sensible sensor, S175, is also provided. See TABLE 18 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.

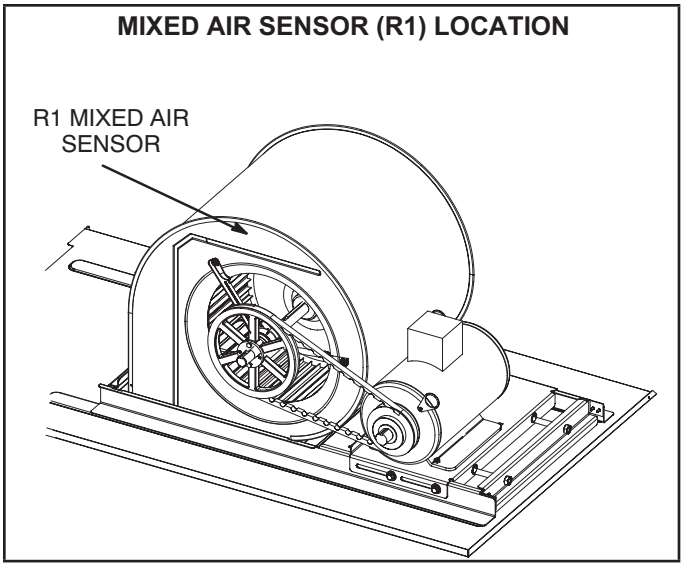


FIGURE 28

TABLE 18

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.

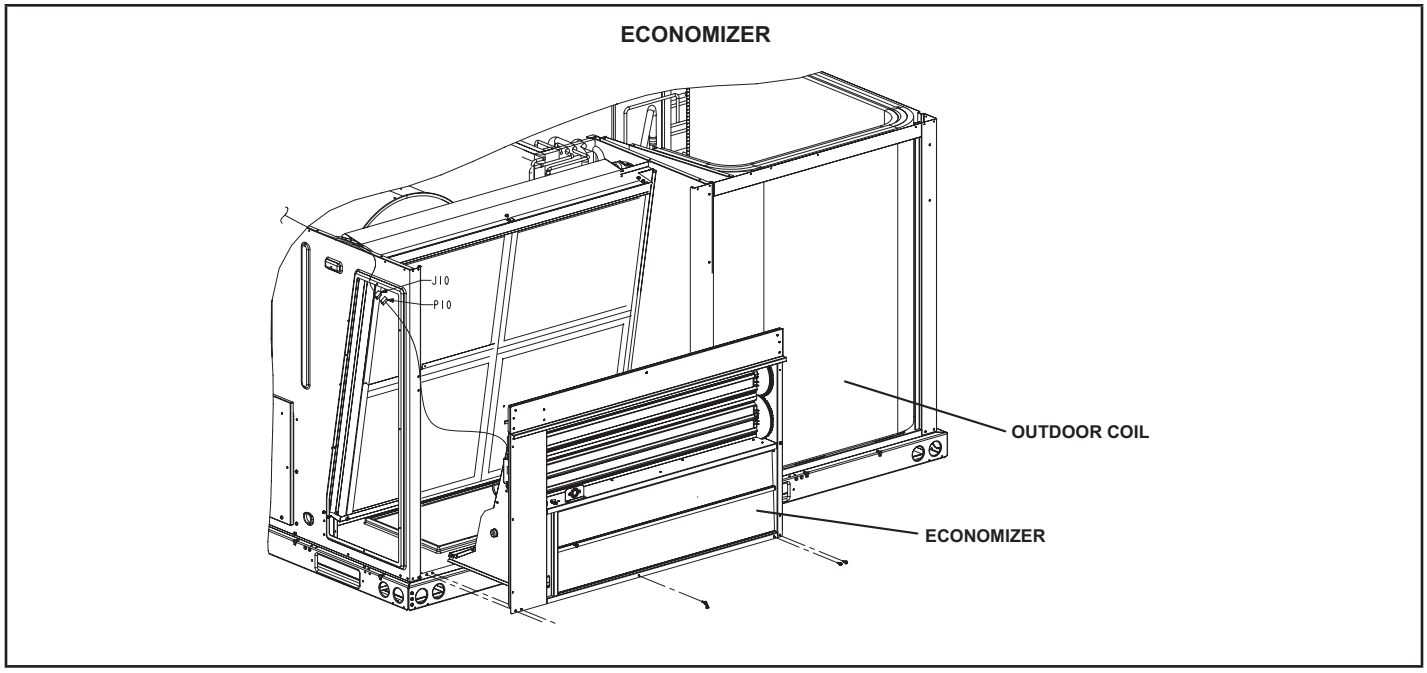


FIGURE 29

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 30.

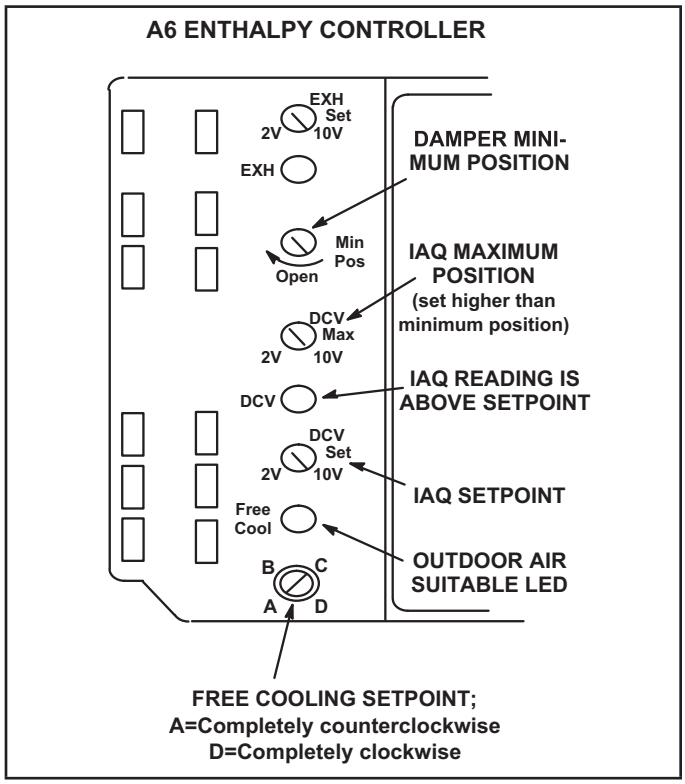


FIGURE 30

Free Cooling Setpoint

Outdoor air is considered suitable when temperature and humidity are less than the free cooling setpoints shown in TABLE 19. Setting A is recommended. See FIGURE 30. 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 19

ENTHALPY CONTROL SETPOINTS

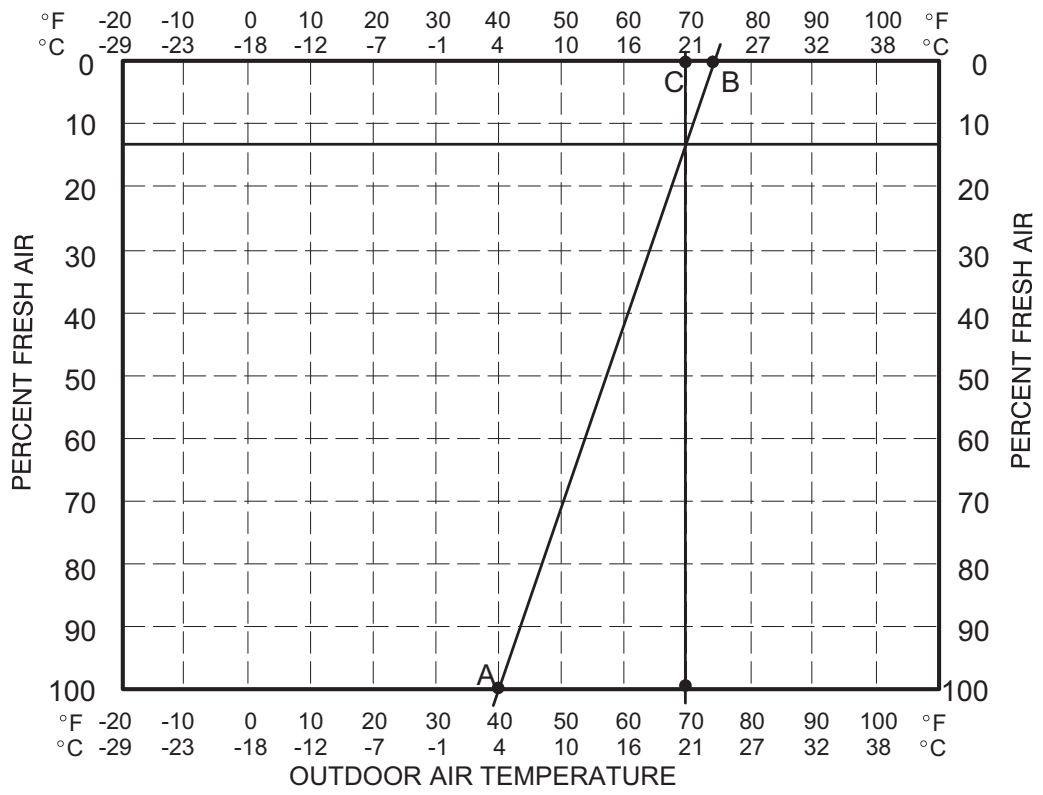
Control Setting	Free Cooling Setpoint At 50% RH
A	73° F (23° C)
B	70° F (21° C)
C	67° F (19° C)
D	63° F (17° C)

Damper Minimum Position

NOTE - *A jumper is factory-installed between TB1 R on the A194 board 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.

CHART 1
CALCULATE MINIMUM FRESH AIR PERCENTAGE



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.

Economizer Operation

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

Outdoor Air Not Suitable:

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

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

Outdoor Air Suitable:

See TABLE 20 for economizer operation with a standard twostage 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 20

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

Thermostat Demand	Damper Position		Mechanical Cooling
	Unoccupied	**Occupied**	
Off	Closed	Closed	No
G	Closed	Minimum	No
Y1	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 32.

2 - Route the control wires to the refrigerant detection board (A194) and connect these wires to TB1 on the A194 board as following (see FIGURE 32):

- Connect all female terminals to A2L 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 A2L board, Y1 and Y2. Connect these terminals to control male terminal Y1 and Y2

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

4 - At economizer/filter compartment, attach economizer plug(P10) to pre-wired harness jack (J10). See FIGURE 31.

5 - Connect any optional sensors as shown in FIGURE 31.

6 - If optional power exhaust is used, wire according to instructions provided with power exhaust. See FIGURE 31.

7 - Apply wiring diagram to the control panel.

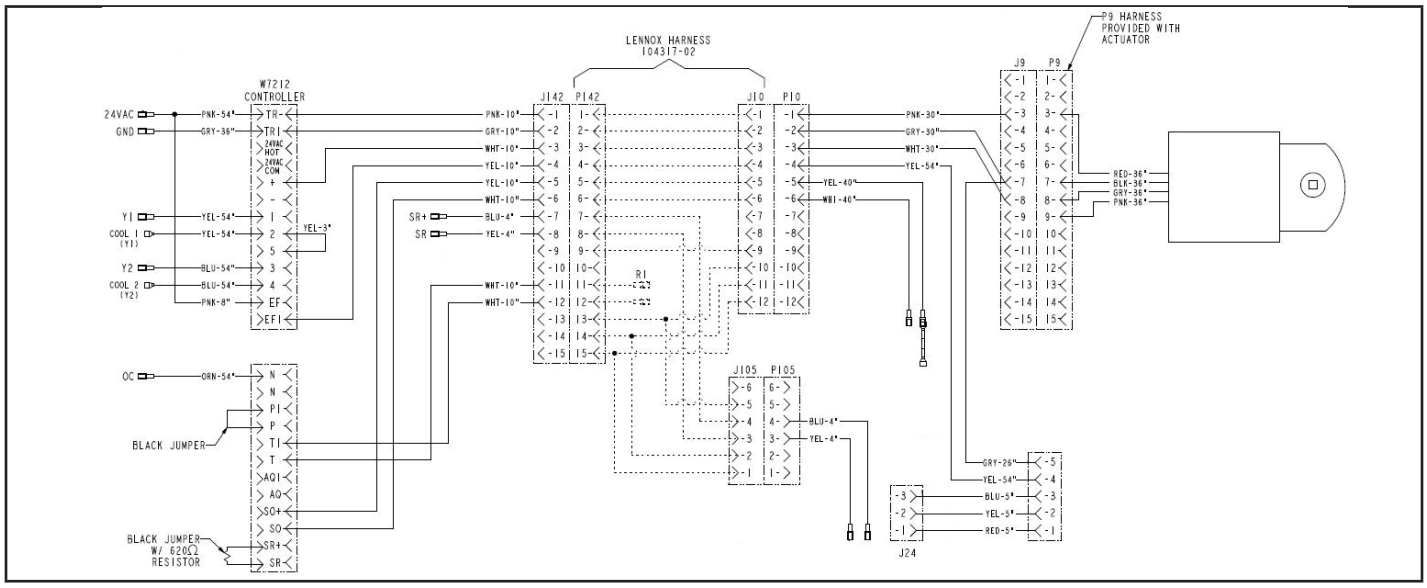


FIGURE 31

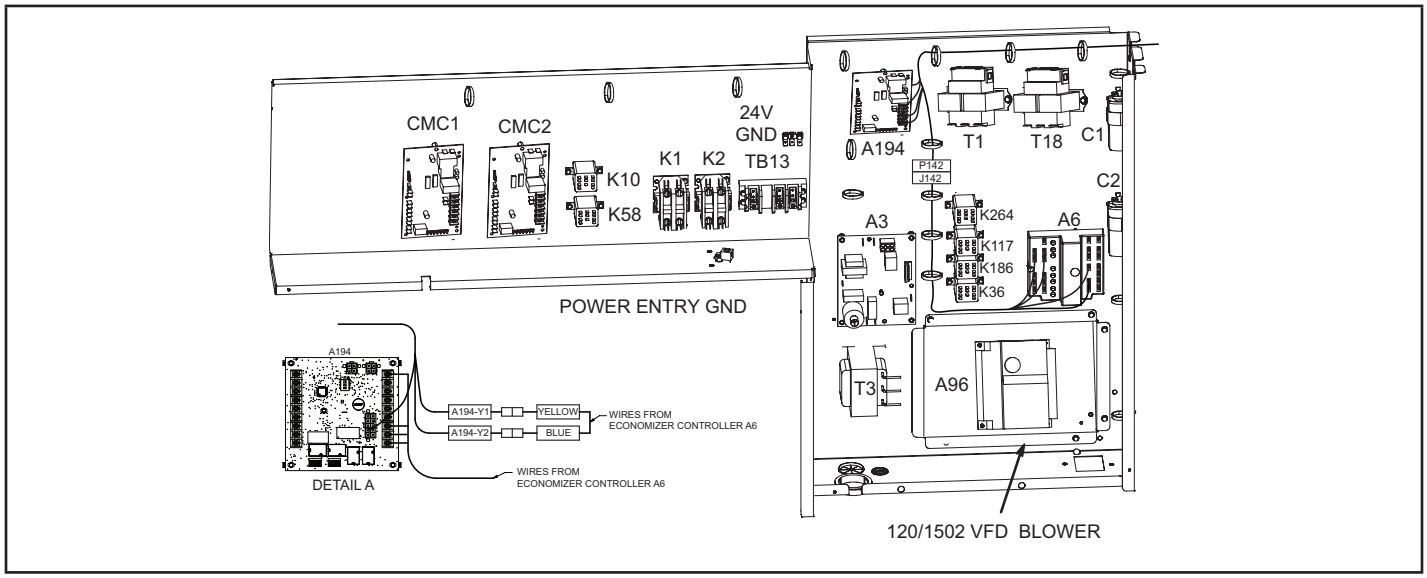


FIGURE 32

High Performance Economizer

USER INTERFACE

See FIGURE 33.

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.

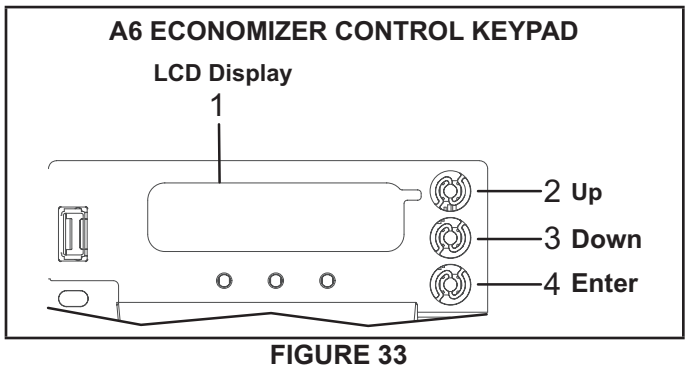


FIGURE 33

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 34.

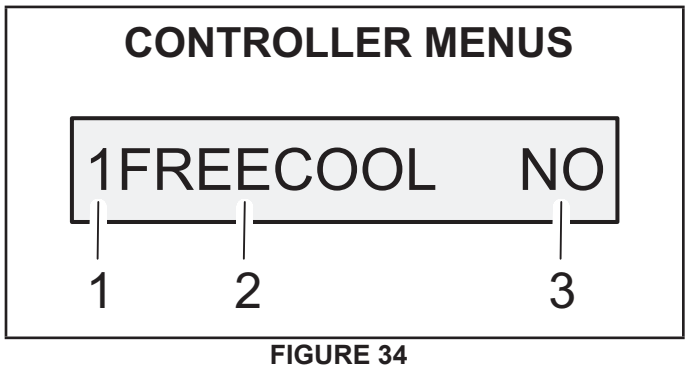


FIGURE 34

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 21.
- 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 21.*

TABLE 21

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 36. 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 35. 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.)

G-LP / Propane Kit

ZGD092/150 units require a natural to LP /propane kit. The kit includes one LP spring conversion kit, up to eleven burner orifices and three stickers. For more detail refer to the natural to LP gas changeover kit installation instructions.

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.

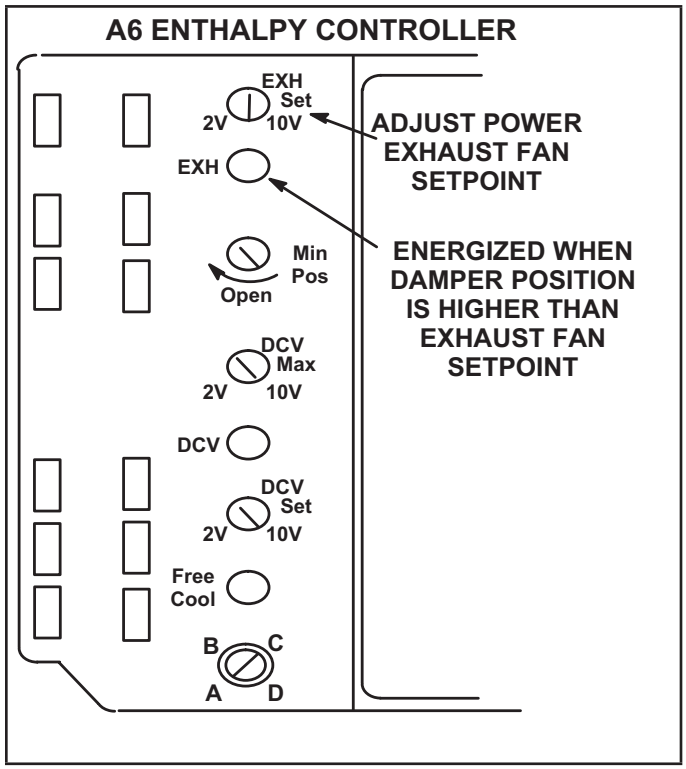


FIGURE 35

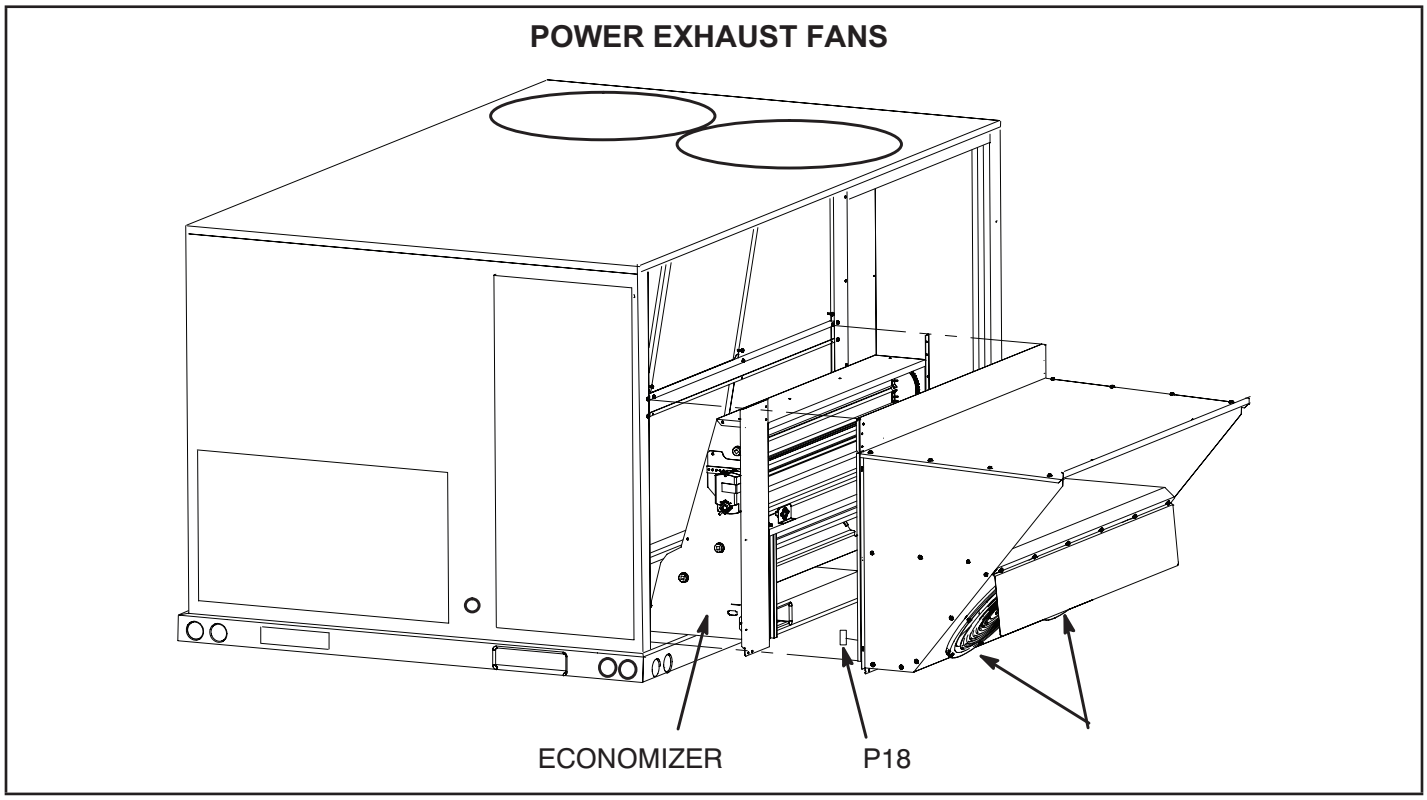
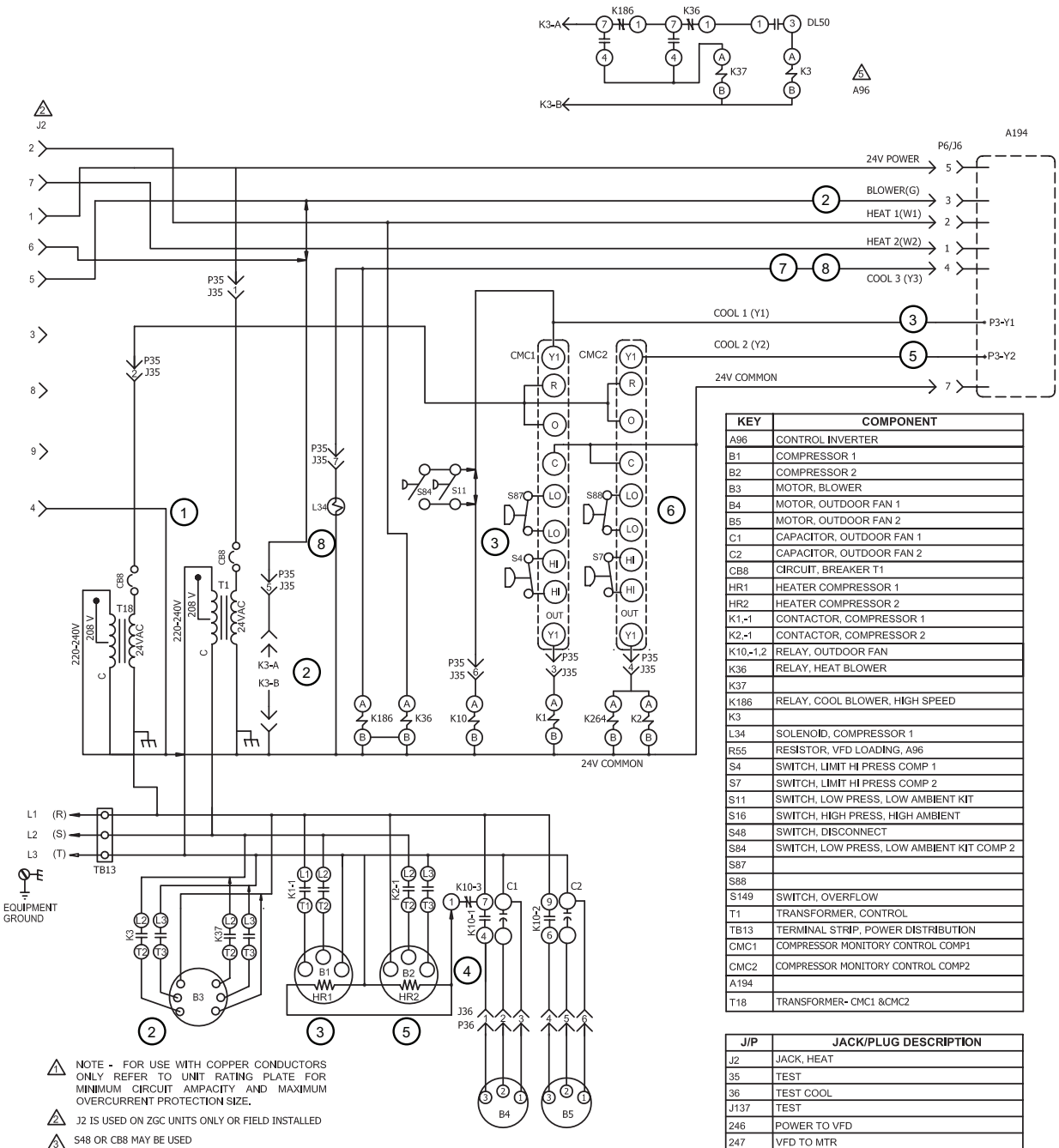


FIGURE 36

ZGD092-150 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

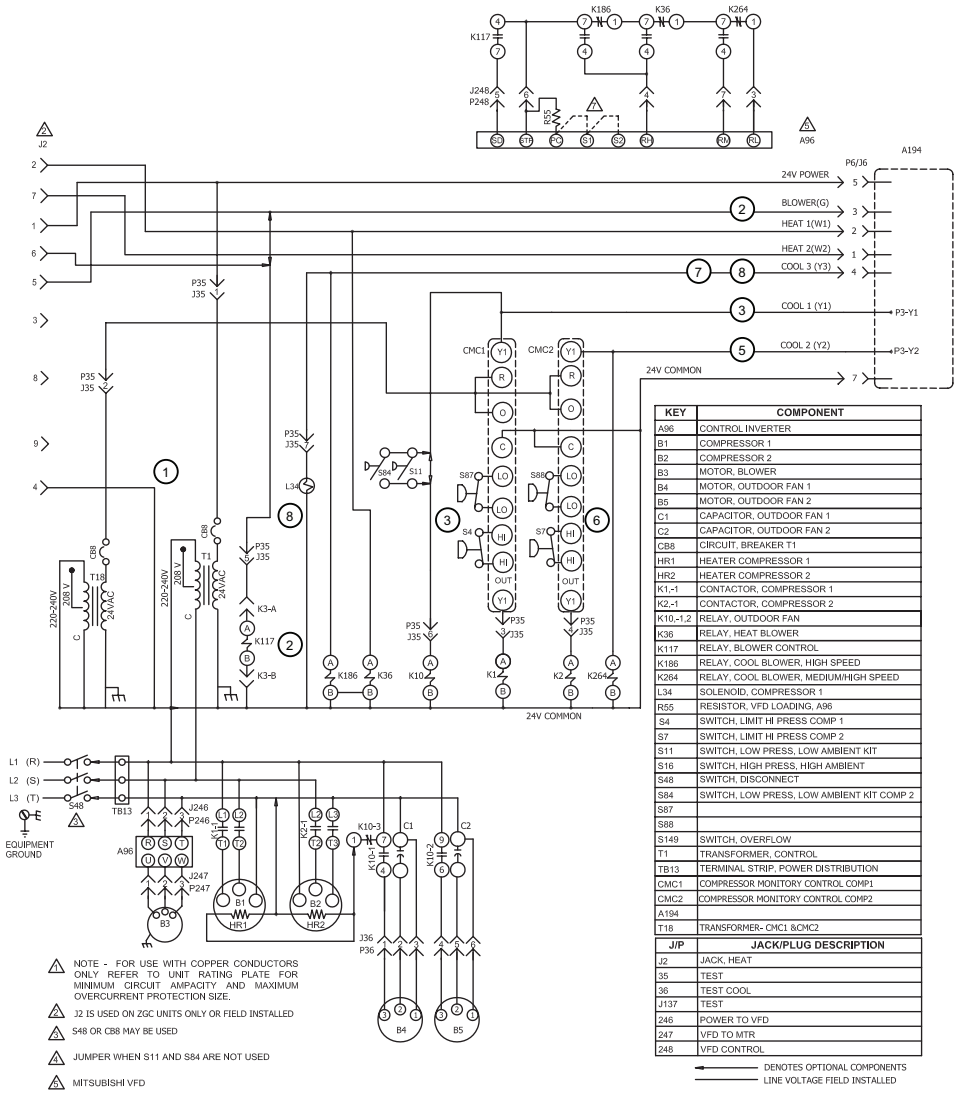
NOTE - IF ANY WIRE IN THIS APPLIANCE IS REPLACED IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING, TERMINATION AND INSULATION THICKNESS

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	

ZGD092-150 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

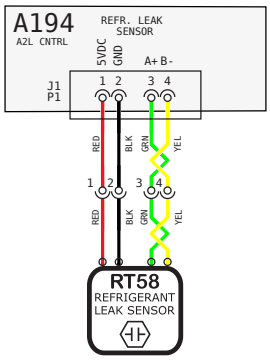
1. NOTE - FOR USE WITH COPPER CONDUCTORS ONLY REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
2. J2 IS USED ON ZGC UNITS ONLY OR FIELD INSTALLED
3. S48 OR CB8 MAY BE USED
4. JUMPER WHEN S11 AND S84 ARE NOT USED
5. MITSUBISHI VFD
6. USED ON 120 MODELS
7. 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 538305-01	New Form No. 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

ZGD092/150 Sequence of Operation

Power:

1 - Line voltage from unit disconnect energizes transformer T1. T1 provides 24VAC power to terminal strip TB1 on A194 baord. TB1 on 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 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 A194 board and energizes L34 2-Stage Solenoid for Compressor B1. Compressor B1 is now operating at high-capacity.

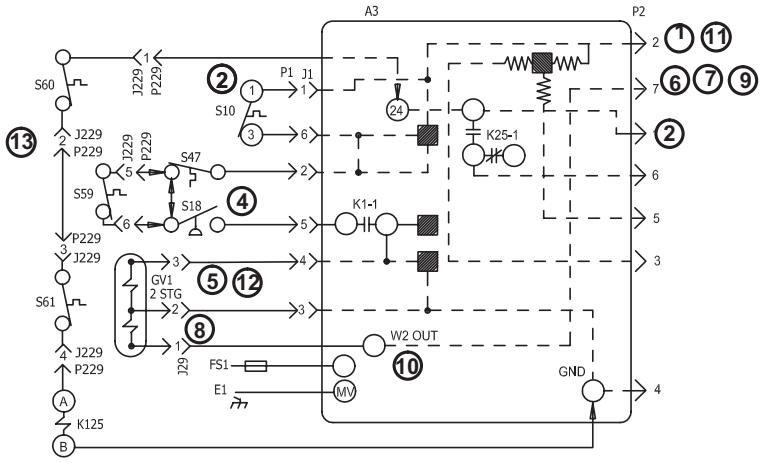
W1 Heating Demand

9 - First Stage Heating demand W1 is routed through A194-W1 and is routed to A3 Ignition control through the J2/P2 plugs. K186 relay is energized and K186 N.O. contacts close. The blower demand closes K117 N.O. Contacts. 24VAC is routed through K117 and K36 closed contacts to A96 inverter terminal STF and RH. Blower operates in high speed or 60Hz.

W2 Heating Demand

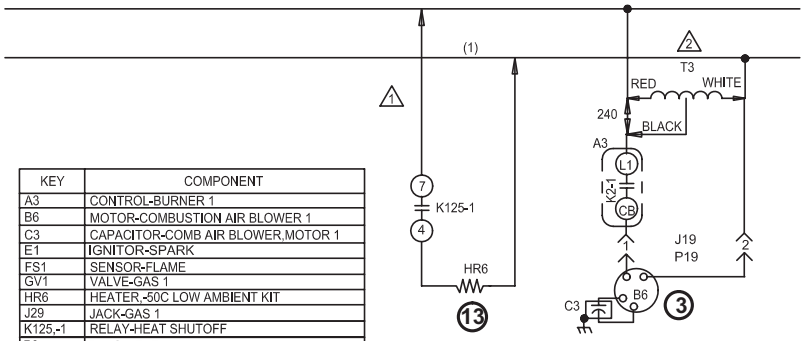
10 - Second Stage Heating demand Heat 2 is routed through A194-W2 Heating demand is routed to A3 Ignition control through the J2/P2 plugs.

GAS HEAT FOR ZGD092/150 UNITS



1 CSA(-50C)LOW AMBIENT KIT (OPTIONAL)

2 T3 USED ON 480V AND 600V UNITS



KEY	COMPONENT
A3	CONTROL-BURNER 1
B6	MOTOR-COMBUSTION AIR BLOWER 1
C3	CAPACITOR-COMB AIR BLOWER,MOTOR 1
E1	IGNITOR-SPARK
FS1	SENSOR-FLAME
GV1	VALVE-GAS 1
HR6	HEATER,-50C LOW AMBIENT KIT
J29	JACK-GAS 1
K125,-1	RELAY-HEAT SHUTOFF
P2	PLUG-HEAT
S10	SWITCH-LIMIT, PRIMARY GAS
S18	SWITCH-COMB AIR BLOWER, PROVE
S47	SWITCH-FLAME ROLLOUT, BURNER 1
S59	THERMOSTAT-OPEN -20F, CLOSE 10F
S60	THERMOSTAT-OPEN 20F, CLOSE -10F
S61	THERMOSTAT-OPEN 50F, CLOSE 20F
T3	TRANSFORMER-COMB AIR BLOWER 1

INDICATES MICRO PROCESSER

DENOTES OPTIONAL COMPONENTS

J/P	JACK/PLUG DESCRIPTION
1	GAS LIMIT
19	COMBUSTION AIR BLOWER
229	VESTIBULE HEATER,CONTROL 1

04/14	WIRING DIAGRAM 537063-02	04-14
HEATING - GAS		
ZGA/KGA UNITS - 130 THRU 240		
SECTION A		REV 1
Supersedes 537063-01	New Form No. 537063-02	

GAS HEAT SEQUENCE OF OPERATION

First Stage Heat:

1 - The thermostat initiates W1 heating demand.

2 - 24VAC is routed from TB1 on A194 board to ignition control A3 through P2. A3 proves N.C. primary limit S10 and N.C. rollout switch S47.

3 - Combustion air inducer blower B6 is energized.

4 - After the combustion air inducer B6 has reached full speed, the combustion air proving switch S18 contacts close.

5 - After a 30 second delay, A3 energizes the ignitor and LO terminal (low fire) of gas valve GV1.

Second Stage Heat:

6 - With first stage heat operating, an additional heating demand from the thermostat initiates W2.

7 - A second stage heating demand is received by TB1 on A194 board. The second stage heat signal passes from TB1 on A194 board to A3.

8 - A3 energizes HI terminal (high fire) of gas valve GV1.

End of Second Stage Heat:

9 - Heating demand is satisfied. Terminal W2 (high fire) is de-energized.

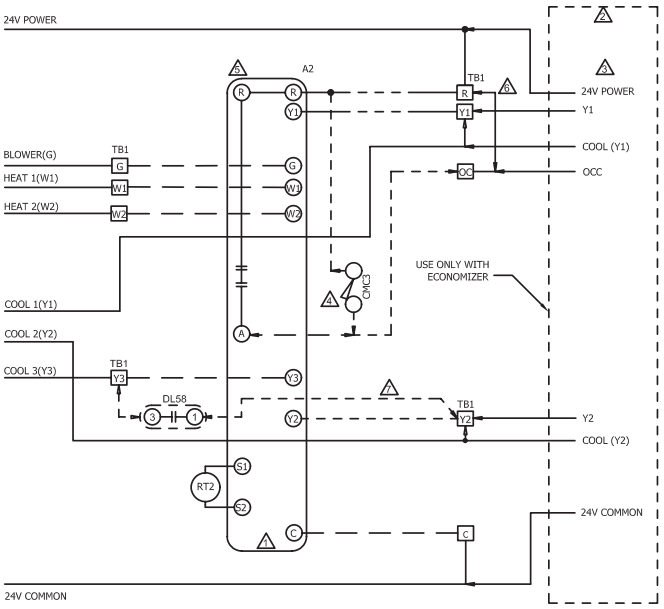
10 - Terminal HI of GV1 is de-energized by A3 control module.

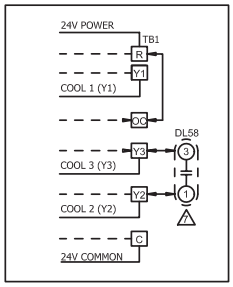
End of First Stage Heat:

11 - Heating demand is satisfied. Terminal W1 (low fire) is de-energized.

12 - Ignition A3 is de-energized in turn de-energizing terminal LO of GV1.

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	

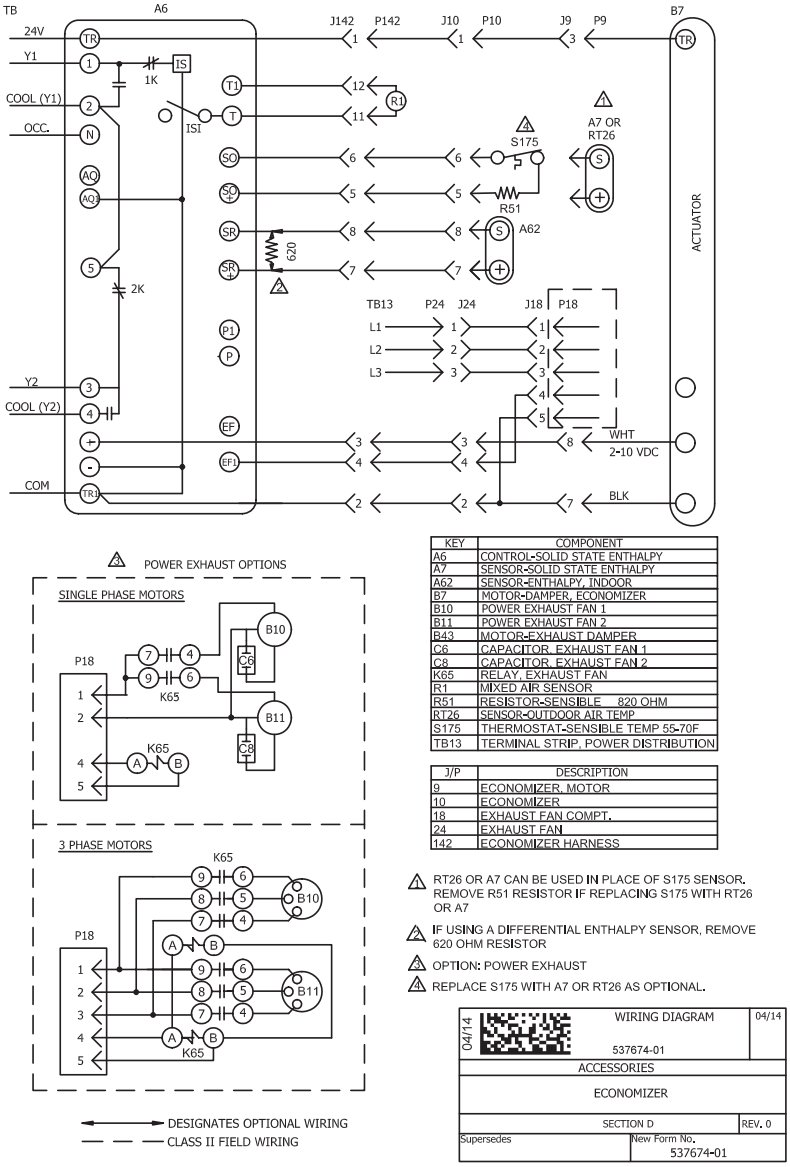
POWER:

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



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	04/14
	537674-01	
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.

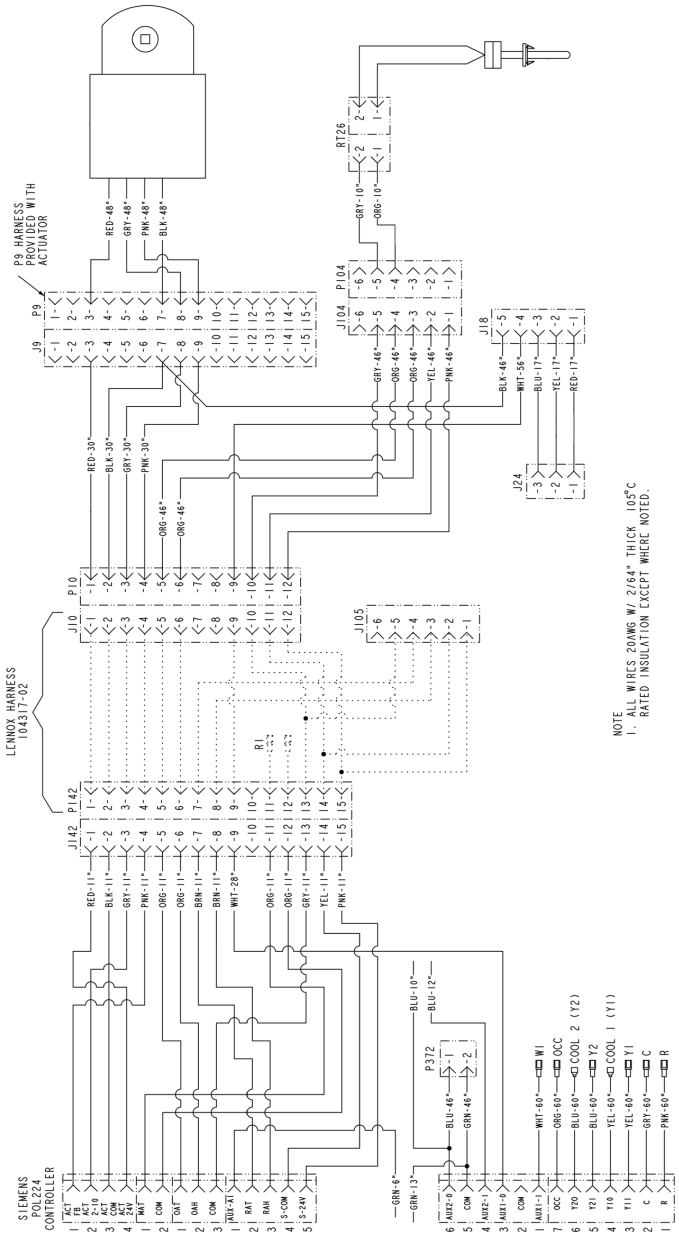
OPERATION:

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.

IX-DECOMISSIONING

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.