KGA092 through 150

The KGA 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 KGA 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.

⚠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 qualified installer or service agency.

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the furnace, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface, such as the gas valve or blower deck, before performing any service procedure.

⚠CAUTION

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

⚠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.

OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No 092	102	120	150
COOLING SYSTEM						
Compressor Crankcase Heater	208/230V-3ph - K1CCHT02B-1Y	**54W17**	X	X	X	
	460V-3ph - K1CCHT02B-1G	**54W18**	X	X	X	
	575V-3ph - K1CCHT02B-1J	**54W19**	X	X	X	
Condensate Drain Trap	PVC - LTACDKP09/36	**76M18**	X	X	X	X
	Copper - LTACDKC09/36	**76M19**	X	X	X	X
Corrosion Protection		Factory	O	O	O	O
Drain Pan Overflow Switch	K1SNSR71AB1-	**74W42**	X	X	X	X
Efficiency		Standard	O	O	O	O
Low Ambient Kit	K1SNSR33B-1	**54W16**	X	X	X	X
Refrigerant Type		R-410A	O	O	O	O
HEATING SYSTEM						
Bottom Gas Piping Kit	C1GPKT01B-01	**54W95**	X	X	X	X
Combustion Air Intake Extensions	T1EXTN10AN1	**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
Low Temperature Vestibule Heater	208/230V-3ph - C1LTVH10B-1Y	**55W91**	X	X	X	X
	460V - C1LTVH10B-1G	**55W92**	X	X	X	X
	575V - C1LTVH10B-1J	**55W93**	X	X	X	X
LPG/Propane Conversion Kits	Standard Heat - E1LPCO10B-1	**53W07**	X	X	X	X
	Medium Heat - E1LPCO20B-1	**53W08**	X	X	X	X
	High Heat - E1LPCO30B-1	**53W09**	X	X	X	X
Stainless Steel Heat Exchanger		Factory	O	O	O	O
Vertical Vent Extension	C1EXTN20FF1	**42W16**	X	X	X	X
BLOWER - SUPPLY AIR						
Motors	Belt Drive - 2 hp	Factory	O	O	O	O
	Belt Drive - 3 hp	Factory	O	O	O	O
	Belt Drive - 5 hp	Factory	O	O	O	O
Drive Kits	Kit #1 590-890 rpm	Factory	O	O	O	O
See Blower Data Tables for selection	Kit #2 800-1105 rpm	Factory	O	O	O	O
	Kit #3 795-1195 rpm	Factory	O	O	O	O
	Kit #4 730-970 rpm	Factory	O	O	O	O
	Kit #5 940-1200 rpm	Factory	O	O	O	O
	Kit #6 1015-1300 rpm	Factory	O	O	O	O
	Kit #10 900-1135 rpm	Factory	O	O	O	O
	Kit #11 1040-1315 rpm	Factory	O	O	O	O
	Kit #12 1125-1425 rpm	Factory	O	O	O	O

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

OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No 092	102	120	150
CABINET						
Coil Guards	K1GARD20B-1	**55W08**	X	X	X	X
Hail Guards	K1GARD10B1	**55W11**	X	X	X	X
Hinged Access Panels		Factory	O	O	O	O
Horizontal Discharge Kit	K1HECK00B-1	**51W25**	X	X	X	X
Return Air Adaptor Plate (for L Series® and T-Class™ replacement)	C1CONV10B-1	**54W96**	X	X	X	X
CONTROLS						
Commercial Controls — L Connection® Building Automation System		- - -	X	X	X	X
Smoke Detector - Supply or Return (Power board and one sensor)	C1SNSR44B-1	**53W80**	X	X	X	X
Smoke Detector - Supply and Return (Power board and two sensors)	C1SNSR43B-1	**53W81**	X	X	X	X
INDOOR AIR QUALITY						
Air Filters						
Healthy Climate® High Efficiency Air Filters	MERV 8 - C1FLTR15B-1	**50W61**	X	X	X	X
20 x 25 x 2 (Order 4 per unit)	MERV 13 - C1FLTR40B-1	**52W41**	X	X	X	X
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)	C1FLTR30B-1-	**Y3063**	X	X	X	X
Indoor Air Quality (CO_2) Sensors						
Sensor - Wall-mount, off-white plastic cover with LCD display	C0SNSR50AE1L	**77N39**	X	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display	C0SNSR52AE1L	**87N53**	X	X	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting	C0SNSR51AE1L	**87N52**	X	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting	C0MISC19AE1	**87N54**	X	X	X	X
CO_2 Sensor Duct Mounting Kit - for downflow applications	C0MISC19AE1-	**85L43**	X	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO_2 sensors (**87N53** or **77N39**)	C0MISC16AE1-	**90N43**	X	X	X	X
UVC Germicidal Lamps						
[1] Healthy Climate® UVC Light Kit (208/230v-1ph)	C1UVCL10B-1	**54W62**	X	X	X	X
ELECTRICAL						
Voltage 60 hz	208/230V - 3 phase	Factory	O	O	O	O
	460V - 3 phase	Factory	O	O	O	O
	575V - 3 phase	Factory	O	O	O	O
Disconnect Switch	80 amp - C1DISC080B-1	**54W56**	OX	OX	OX	OX
GFI Service Outlets	LTAGFIK10/15	**74M70**	OX	OX	OX	OX

[1] Lamps operate on 110-230V single-phase power supply. Step-down transformer may be ordered separately for 460V and 575V units. Alternately, 110V power supply may be used to directly power the UVC ballast(s)

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

OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No 092	102	120	150
ECONOMIZER						
Economizer						
Economizer with Single Temperature Control - Downflow or Horizontal With Barometric Relief Dampers (downflow) and Air Hoods	K1ECON20B-1	**54W55**	OX	OX	OX	OX
Economizer Controls						
Single Enthalpy Control	C1SNSR64FF1	**53W64**	OX	OX	OX	OX
Differential Enthalpy Control (order 2)	C1SNSR64FF1	**53W64**	X	X	X	X
Horizontal Barometric Relief Dampers With Exhaust Hood						
Horizontal Barometric Relief Dampers - Exhaust Hood Furnished	LAGEDH03/15	**53K04**	X	X	X	X
OUTDOOR AIR						
Outdoor Air Dampers						
Motorized Dampers with outdoor air hood	C1DAMP20B-1	**53W49**	OX	OX	OX	OX
Manual Dampers with outdoor air hood	C1DAMP10B-1	**53W48**	OX	OX	OX	OX
POWER EXHAUST						
Standard Static	208/230V-3ph - K1PWRE10B-1Y	**53W44**	X	X	X	X
	460V-3ph - K1PWRE10B-1G	**53W45**	X	X	X	X
	575V-3ph - K1PWRE10B-1J	**53W46**	X	X	X	X
ROOF CURBS - DOWNFLOW						
Clip Curb						
8 in. height	C1CURB23B-1	**54W46**	X	X	X	X
14 in. height	C1CURB20B-1	**54W47**	X	X	X	X
18 in. height	C1CURB21B-1	**54W48**	X	X	X	X
24 in. height	C1CURB22B-1	**54W49**	X	X	X	X
Standard						
8 in. height	C1CURB12B-1	**54W44**	X	X	X	X
14 in. height	C1CURB10B-1	**54W43**	X	X	X	X
24 in. height	C1CURB11B-1	**54W45**	X	X	X	X
Adjustable Pitched Curb						
14 in. height	C1CURB55B-1	**54W50**	X	X	X	X
CEILING DIFFUSERS						
Step-Down - Order one	RTD11-95	**29G04**	X			
	RTD11-135	**29G05**		X	X	
	RTD11-185	**29G06**				X
Flush - Order one	FD11-95	**29G08**	X			
	FD11-135	**29G09**		X	X	
	FD11-185	**29G10**				X
Transitions (Supply and Return) - Order one	LASRT08/10	**24L14**	X			
	LASRT10/12	**49K55**		X	X	
	LASRT15	**49K56**				X

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

SPECIFICATIONS

General Data		Nominal Tonnage	7.5 Ton	8.5 Ton	10 Ton	12.5 Ton
		Model Number	KGA092S4B	KGA102S4B	KGA120S4B	KGA150S4B
		Efficiency Type	Standard	Standard	Standard	Standard
		Blower Type	Constant Air Volume CAV	Constant Air Volume CAV	Constant Air Volume CAV	Constant Air Volume CAV
Cooling Performance	Gross Cooling Capacity - Btuh		88,900	100,500	119,600	144,800
	[1] Net Cooling Capacity - Btuh		86,000	97,000	115,000	138,000
	AHRI Rated Air Flow - cfm		3,000	3,400	3,800	4,300
	Total Unit Power - kW		7.8	8.8	10.4	12.8
	[1] EER (Btuh/Watt)		11	11	11	10.8
	[2] IEER (Btuh/Watt)		11.2	11.2	11.2	11
	Refrigerant Type		R-410A	R-410A	R-410A	R-410A
	Refrigerant Charge Furnished	Circuit 1	7 lbs. 8 oz.	8 lbs. 8 oz.	10 lbs. 0 oz.	14 lbs. 0 oz.
		Circuit 2	7 lbs. 0 oz.	8 lbs. 8 oz.	10 lbs. 0 oz.	12 lbs. 0 oz.
Gas Heating Options Available - See page 6			Standard (2 stage), Medium (2 Stage), High (2 Stage)			
Compressor Type (number)			Scroll (2)	Scroll (2)	Scroll (2)	Scroll (2)
Outdoor Coils	Net face area (total) - sq. ft.		20.42	24.5	28.0	28.0
	Tube diameter - in.		3/8	3/8	3/8	3/8
	Number of rows		2	2	2	3
	Fins per inch		20	20	20	20
Outdoor Coil Fans	Motor - (No.) hp		(2) 1/3	(2) 1/3	(2) 1/3	(2) 1/2
	Motor rpm		1075	1075	1075	1075
	Total Motor watts		670	670	670	830
	Diameter - (No.) in.		(2) 24	(2) 24	(2) 24	(2) 24
	Number of blades		3	3	3	3
	Total Air volume - cfm		7200	7400	7800	8,800
Indoor Coils	Net face area (total) - sq. ft.		12.78	12.78	12.78	13.54
	Tube diameter - in.		3/8	3/8	3/8	3/8
	Number of rows		2	2	3	4
	Fins per inch		14	14	14	14
	Drain connection - Number and size		(1) 1 in. NPT coupling			
	Expansion device type		Balance port TXV, removable head			
[3] Indoor Blower and Drive Selection	Nominal motor output		2 hp, 3 hp, 5 hp			
	Maximum usable motor output (US Only)		2.3 hp, 3.45 hp, 5.75 hp			
	Motor - Drive kit number		2 hp [4] **Kit 1** 590-890 rpm **Kit 2** 800-1105 rpm **Kit 3** 795-1195 rpm 3 hp **Kit 4** 730-970 rpm **Kit 5** 940-1200 rpm **Kit 6** 1015-1300 rpm 5 hp **Kit 10** 900-1135 rpm **Kit 11** 1040-1315 rpm **Kit 12** 1125-1425 rpm			
	Blower wheel nominal diameter x width - in.		(1) 15 X 15	(1) 15 X 15	(1) 15 X 15	(1) 15 X 15
Filters	Type of filter		Disposable			
	Number and size - in.		(4) 20 x 25 x 2			
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase			

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

[1] Certified in accordance with the ULE certification program, which is based on 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] Integrated Energy Efficiency Ratio certified and tested according to AHRI Standard 340/360..

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

[4] Standard motor and drive kit furnished with unit.

SPECIFICATIONS - GAS HEAT

			Heat Input Type	Standard	Medium	High
			Number of Gas Heat Stages	**2**	**2**	**2**
Gas Heating Performance	Input - Btuh	First Stage		84,500	117,000	156,000
		Second Stage		130,000	180,000	240,000
	Output - Btuh	Second Stage		104,000	144,000	192000
			Temperature Rise Range - °F	15-45	30-60	40-70
			Thermal Efficiency	80%	80%	80%
			Gas Supply Connections	3/4 in NPT	3/4 in NPT	3/4 in NPT
Recommended Gas Supply Pressure - in. w.g.			Natural	7	7	7
			LPG/Propane	11	11	11

HIGH ALTITUDE DERATE

Units may be installed at altitudes up to 2000 feet above sea level without any modification.

At altitudes above 2000 feet, units must be derated to match gas manifold pressures shown in table below.

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

Gas Heat Type	Altitude	Gas Manifold Pressure		Input Rate Natural Gas or LPG/Propane	
		Natural Gas	LPG/Propane Gas	First Stage	Second Stage
	ft.	In. w.g.	In. w.g.	Btuh	Btuh
Standard	2001-4500	3.4	9.6	84,500	124,000
Medium	2001-4500	3.4	9.6	117,000	172,000
High	2001-4500	3.4	9.6	156,000	230,000

BLOWER DATA

092 AND 102 BELT DRIVE BLOWER − 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 10 for blower motors and drives.

See page 10 for wet coil and option/accessory air resistance data.

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

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
2250	- - -	- - -	- - -	- - -	707	0.14	753	0.50	800	0.84	847	1.15	892	1.38	934	1.53	979	1.65	1051	1.86	1126	2.12	1183	2.36	1238	2.62
2500	- - -	- - -	- - -	- - -	714	0.29	758	0.64	803	0.97	849	1.26	893	1.48	936	1.63	983	1.75	1052	1.96	1124	2.22	1184	2.49	1241	2.77
2750	- - -	- - -	680	0.11	721	0.45	763	0.78	807	1.09	852	1.37	896	1.58	940	1.74	989	1.88	1053	2.08	1121	2.34	1185	2.63	1244	2.93
3000	- - -	- - -	689	0.29	728	0.61	770	0.93	812	1.23	856	1.49	901	1.70	947	1.87	996	2.02	1055	2.21	1120	2.47	1186	2.78	1248	3.10
3250	661	0.17	698	0.46	737	0.78	777	1.09	819	1.38	862	1.63	908	1.84	955	2.01	1004	2.17	1059	2.36	1122	2.62	1189	2.94	1252	3.28
3500	672	0.36	708	0.65	746	0.95	786	1.25	827	1.53	870	1.78	916	1.99	965	2.17	1013	2.33	1065	2.52	1126	2.79	1193	3.12	1257	3.47
3750	684	0.56	719	0.85	756	1.14	795	1.43	836	1.70	880	1.95	927	2.16	976	2.34	1023	2.51	1073	2.71	1133	2.98	1198	3.32	1263	3.67
4000	697	0.78	731	1.05	768	1.34	807	1.62	848	1.89	892	2.13	940	2.34	988	2.53	1034	2.71	1083	2.91	1141	3.19	1205	3.53	1270	3.89
4250	710	1.00	745	1.27	781	1.55	819	1.83	861	2.09	906	2.33	954	2.55	1001	2.74	1046	2.93	1094	3.14	1151	3.42	1214	3.76	1278	4.12

BLOWER DATA

120 BELT DRIVE BLOWER − 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 10 for blower motors and drives.

See page 10 for wet coil and option/accessory air resistance data.

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

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
3000	- - -	- - -	677	0.24	719	0.55	764	0.87	813	1.18	866	1.45	920	1.67	975	1.82	1026	1.96	1076	2.13	1126	2.35	1176	2.63	1225	2.92
3250	650	0.14	688	0.43	730	0.73	775	1.04	823	1.34	875	1.60	930	1.81	985	1.97	1036	2.12	1086	2.31	1136	2.54	1186	2.83	1235	3.13
3500	663	0.35	700	0.63	741	0.92	786	1.22	834	1.5	886	1.76	942	1.96	997	2.14	1048	2.31	1097	2.51	1147	2.75	1196	3.04	1245	3.35
3750	676	0.57	714	0.84	754	1.12	798	1.41	846	1.68	899	1.93	956	2.14	1010	2.32	1060	2.51	1109	2.72	1158	2.98	1207	3.27	1255	3.58
4000	691	0.79	728	1.05	768	1.33	812	1.61	860	1.88	914	2.12	971	2.34	1023	2.53	1072	2.73	1121	2.95	1169	3.22	1218	3.51	1266	3.83
4250	706	1.03	743	1.28	783	1.55	827	1.82	876	2.09	931	2.33	987	2.55	1037	2.76	1085	2.97	1133	3.20	1181	3.47	1229	3.76	1277	4.08
4500	722	1.27	759	1.52	799	1.78	844	2.05	894	2.31	949	2.56	1003	2.79	1052	3.00	1098	3.22	1145	3.46	1193	3.73	1241	4.03	1289	4.34
4750	739	1.53	776	1.77	817	2.03	862	2.30	913	2.56	968	2.81	1020	3.04	1066	3.27	1112	3.49	1158	3.74	1205	4.01	1253	4.30	1301	4.61
5000	757	1.79	794	2.04	835	2.30	882	2.56	934	2.83	988	3.08	1036	3.32	1081	3.55	1125	3.78	1171	4.02	1218	4.29	1265	4.59	1312	4.89

BLOWER DATA

150 BELT DRIVE BLOWER − 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 10 for blower motors and drives.

See page 10 for wet coil and option/accessory air resistance data.

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

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
3750	689	0.68	731	0.97	775	1.27	820	1.56	865	1.81	911	2.02	957	2.19	1004	2.35	1051	2.53	1100	2.74	1151	2.99	1204	3.29	1258	3.61
4000	706	0.92	748	1.22	792	1.51	836	1.78	881	2.02	926	2.22	972	2.39	1018	2.57	1065	2.76	1113	2.98	1163	3.25	1217	3.55	1271	3.87
4250	725	1.18	766	1.47	810	1.75	854	2.02	899	2.25	943	2.44	988	2.61	1033	2.81	1079	3.01	1127	3.25	1178	3.52	1230	3.82	1284	4.14
4500	744	1.45	786	1.73	829	2.01	873	2.27	917	2.49	961	2.67	1005	2.87	1050	3.07	1096	3.29	1143	3.53	1193	3.81	1245	4.11	1298	4.43
4750	764	1.73	806	2.01	849	2.28	893	2.53	936	2.74	980	2.94	1023	3.15	1068	3.37	1113	3.60	1160	3.84	1210	4.12	1261	4.42	1314	4.74
5000	785	2.02	827	2.30	870	2.57	914	2.81	957	3.02	1000	3.23	1043	3.46	1087	3.69	1131	3.92	1178	4.17	1227	4.44	1278	4.74	1330	5.05
5250	807	2.33	850	2.61	893	2.87	937	3.11	979	3.33	1021	3.55	1064	3.80	1107	4.03	1151	4.27	1197	4.51	1245	4.78	1295	5.08	1347	5.38
5500	831	2.66	874	2.94	917	3.2	960	3.43	1002	3.67	1043	3.91	1085	4.16	1127	4.39	1171	4.63	1216	4.87	1264	5.14	1313	5.42	1364	5.72
5750	856	3.00	899	3.29	943	3.55	985	3.79	1026	4.04	1066	4.30	1107	4.55	1149	4.78	1192	5.00	1237	5.24	1284	5.50	- - -	- - -	- - -	- - -
6000	883	3.38	927	3.66	970	3.93	1010	4.19	1050	4.46	1089	4.72	1129	4.95	1171	5.17	1213	5.40	1257	5.63	- - -	- - -	- - -	- - -	- - -	- - -
6250	912	3.78	956	4.07	997	4.35	1036	4.63	1074	4.90	1113	5.15	1152	5.37	1193	5.58	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

BLOWER DATA

FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

Nominal hp	Maximum hp	Drive Kit Number	RPM Range
2	2.3	1	590 - 890
2	2.3	2	800 - 1105
2	2.3	3	795 - 1195
3	3.45	4	730 - 970
3	3.45	5	940 - 1200
3	3.45	6	1015 - 1300
5	5.75	10	900 - 1135
5	5.75	11	1040 - 1315
5	5.75	12	1125 - 1425

POWER EXHAUST FAN PERFORMANCE

Return Air System Static Pressure	Air Volume Exhausted
in. w.g.	cfm
0	3175
0.05	2955
0.10	2685
0.15	2410
0.20	2165
0.25	1920
0.30	1420
0.35	1200

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

Air Volume cfm	Wet Indoor Coil			Gas Heat Exchanger			Economizer	Filters		Return Air Adaptor Plate
	092, 102	120	150	Standard Heat	Medium heat	High Heat		MERV 8	MERV 13	
2250	0.07	0.10	0.13	0.07	0.07	0.08	0.08	0.01	0.04	0.00
2500	0.09	0.12	0.15	0.09	0.10	0.11	0.11	0.01	0.05	0.00
2750	0.09	0.12	0.17	0.09	0.11	0.12	0.12	0.02	0.05	0.00
3000	0.11	0.15	0.19	0.11	0.12	0.13	0.13	0.02	0.06	0.02
3250	0.13	0.18	0.23	0.12	0.15	0.16	0.15	0.02	0.06	0.02
3500	0.14	0.21	0.26	0.12	0.16	0.17	0.15	0.03	0.07	0.04
3750	0.16	0.23	0.29	0.14	0.19	0.20	0.15	0.03	0.08	0.07
4000	0.17	0.25	0.31	0.14	0.21	0.22	0.19	0.04	0.08	0.09
4250	0.20	0.27	0.34	0.14	0.24	0.28	0.19	0.04	0.09	0.11
4500	0.21	0.30	0.37	0.15	0.26	0.32	0.22	0.04	0.09	0.12
4750	0.23	0.32	0.40	0.16	0.29	0.37	0.25	0.05	0.10	0.16
5000	0.26	0.35	0.43	0.16	0.34	0.43	0.29	0.06	0.10	0.18
5250	0.27	0.36	0.46	0.16	0.37	0.47	0.32	0.06	0.11	0.19
5500	0.29	0.40	0.50	0.18	0.44	0.54	0.34	0.07	0.12	0.22
5750	0.32	0.43	0.56	0.19	0.49	0.59	0.45	0.07	0.12	0.25
6000	0.33	0.46	0.59	0.20	0.54	0.64	0.52	0.08	0.13	0.27

BLOWER DATA

CEILING DIFFUSERS AIR RESISTANCE - in. w.g.

	RTD11 Step-Down Diffuser				FD11 Flush Diffuser
Unit Size	Air Volume cfm	2 Ends Open	1 Side, 2 Ends Open	All Ends & Sides Open	
092 Models	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 Models	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 Models	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

Model No.	Air Volume	[1] Effective Throw Range	
		RTD11 Step-Down	FD11 Flush
	cfm	ft.	ft.
092 Models	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 Models	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 Models	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

7.5 TON STANDARD EFFICIENCY (R-410A) — KGA092S4

[1] Voltage - 60hz		208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1	Rated Load Amps	13.1	6.1	4.4
	Locked Rotor Amps	83.1	41	33
Compressor 2	Rated Load Amps	13.1	6.1	4.4
	Locked Rotor Amps	83.1	41	33
Outdoor Fan Motors (2)	Full Load Amps (total)	2.4 (4.8)	1.3 (2.6)	1 (2)
Power Exhaust (1) 0.33 HP	Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)		15	15	15
Indoor Blower Motor	Horsepower	2	2	2
	Full Load Amps	7.5	3.4	2.7
[2] Maximum Overcurrent Protection	Unit Only	50	25	15
	With (1) 0.33 HP Power Exhaust	50	25	20
[3] Minimum Circuit Ampacity	Unit Only	42	20	15
	With (1) 0.33 HP Power Exhaust	45	22	16

[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.

8.5 TON STANDARD EFFICIENCY (R-410A) — KGA102S4

[1] Voltage - 60hz		208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1	Rated Load Amps	14.5	6.3	6
	Locked Rotor Amps	98	55	41
Compressor 2	Rated Load Amps	14.5	6.3	6
	Locked Rotor Amps	98	55	41
Outdoor Fan Motors (2)	Full Load Amps (total)	2.4 (4.8)	1.3 (2.6)	1 (2)
Power Exhaust (1) 0.33 HP	Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)		15	15	15
Indoor Blower Motor	Horsepower	2	2	2
	Full Load Amps	7.5	3.4	2.7
[2] Maximum Overcurrent Protection	Unit Only	50	25	20
	With (1) 0.33 HP Power Exhaust	60	25	25
[3] Minimum Circuit Ampacity	Unit Only	45	21	19
	With (1) 0.33 HP Power Exhaust	48	22	20

[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

10 TON STANDARD EFFICIENCY (R-410A) — KGA120S4

[1] Voltage - 60hz		208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1	Rated Load Amps	16	7.8	5.7
	Locked Rotor Amps	110	52	38.9
Compressor 2	Rated Load Amps	16	7.8	5.7
	Locked Rotor Amps	110	52	38.9
Outdoor Fan Motors (2)	Full Load Amps (total)	2.4 (4.8)	1.3 (2.6)	1 (2)
Power Exhaust (1) 0.33 HP	Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)		15	15	15
Indoor Blower Motor	Horsepower	3	3	3
	Full Load Amps	10.6	4.8	3.9
[2] Maximum Overcurrent Protection	Unit Only	60	30	20
	With (1) 0.33 HP Power Exhaust	60	30	25
[3] Minimum Circuit Ampacity	Unit Only	52	25	19
	With (1) 0.33 HP Power Exhaust	54	27	20

[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.

12.5 TON STANDARD EFFICIENCY (R-410A) — KGA150S4

[1] Voltage - 60hz		208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1	Rated Load Amps	19	9.7	7.4
	Locked Rotor Amps	123	62	50
Compressor 2	Rated Load Amps	19	9.7	7.4
	Locked Rotor Amps	123	62	50
Outdoor Fan Motors (2)	Full Load Amps (total)	3 (6)	1.5 (3)	1.2 (2.4)
Power Exhaust (1) 0.33 HP	Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)		15	15	15
Indoor Blower Motor	Horsepower	5	5	5
	Full Load Amps	16.7	7.6	6.1
[2] Maximum Overcurrent Protection	Unit Only	70	35	25
	With (1) 0.33 HP Power Exhaust	70	35	25
[3] Minimum Circuit Ampacity	Unit Only	53	27	22
	With (1) 0.33 HP Power Exhaust	56	29	23

[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.

KGA PARTS ARRANGEMENT

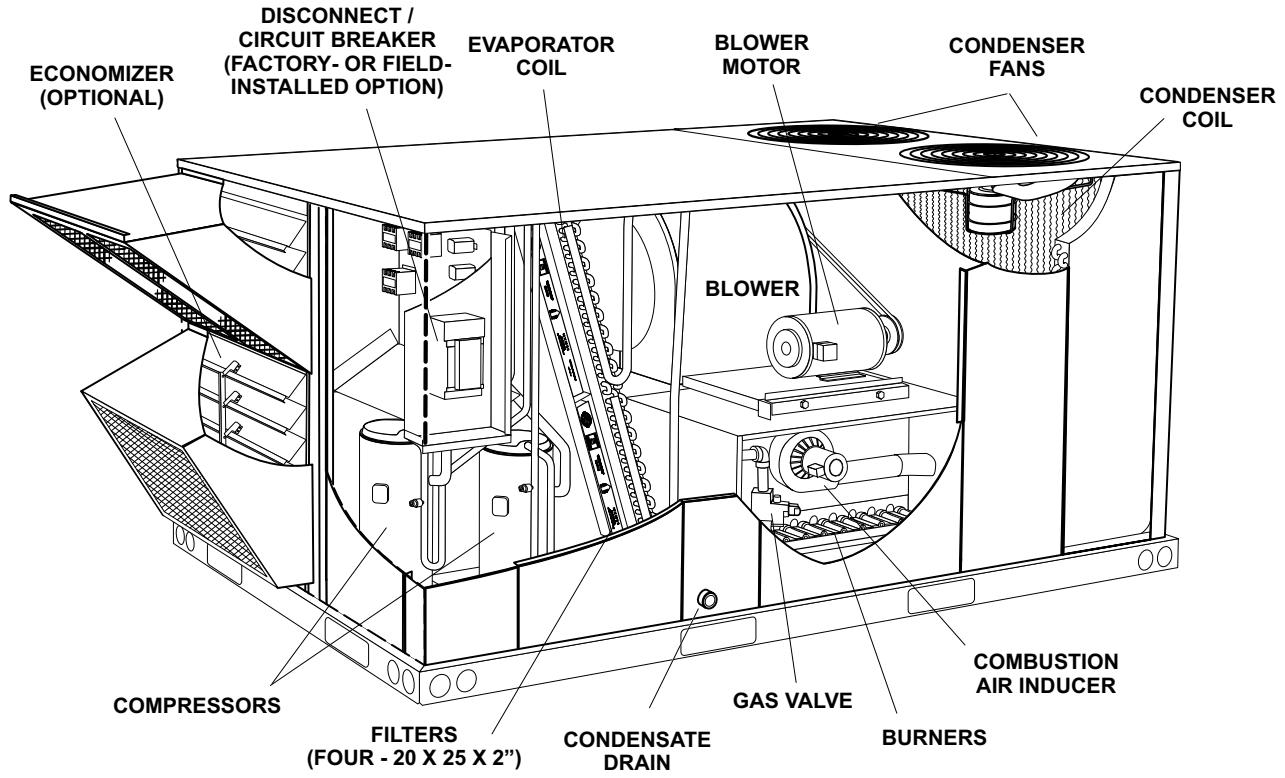


FIGURE 1

KGA CONTROL BOX - Y, G, J-VOLT UNITS

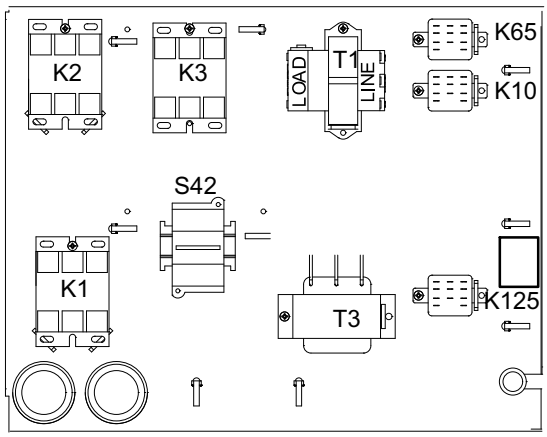


FIGURE 2

KGA CONTROL BOX - M VOLT CE UNITS

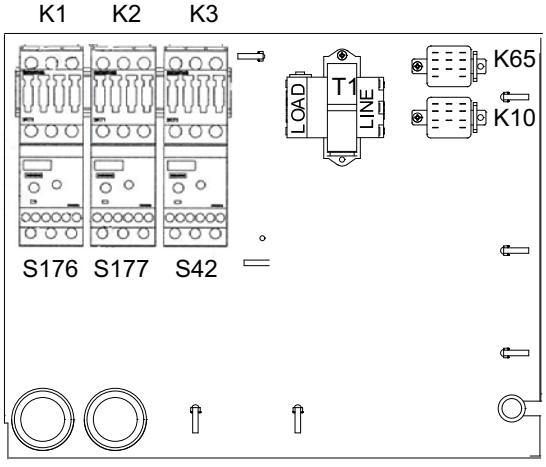


FIGURE 3

I-UNIT COMPONENTS

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

KGA control box components are shown in figures 2 and 3. The control box is located in the upper portion of the compressor compartment.

1-Disconnect Switch S48 (Field-Installed for all units)

All units may be equipped with an optional disconnect switch S48 or circuit breaker CB10. S48 and CB10 are toggle switches, which can be used by the service technician to disconnect power to the unit.

2-Control Transformer T1 all units

All use a single line voltage to 24VAC transformer installed in the control box. The 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 4, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

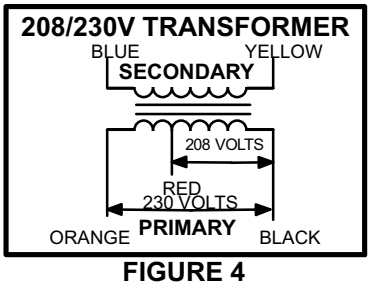


FIGURE 4

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

All KGA 575 (J) voltage units use transformer T3 located 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-Terminal Strip TB1

All indoor thermostat connections are made at terminal block TB1 located in the control area. For thermostats without “occupied “ and “unoccupied” modes, a factory-installed jumper across terminals R and OC should be in place.

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 three-pole-double-break contactors with 24VAC coils. In all KGA units, K1 and K2 energize compressors B1 and B2 in response to thermostat demand. On CE M-voltage units, contactor is CE approved by manufacturer (Siemens). See figure 5.

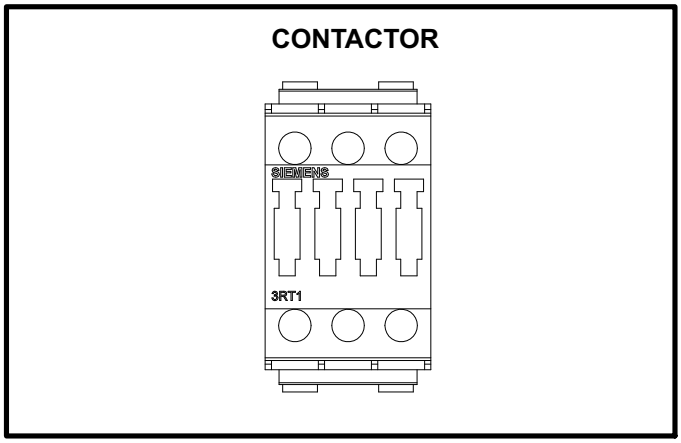


FIGURE 5

7-Blower Contactor K3

Blower contactor K3, used in all units, is a three-pole-double-break contactor with a 24VAC coil used to energize the indoor blower motor B3 in response to blower demand. K3 is energized by a thermostat cooling demand. On M-volt CE units, the contactor is CE approved by manufacturer (Siemens). See figure 5.

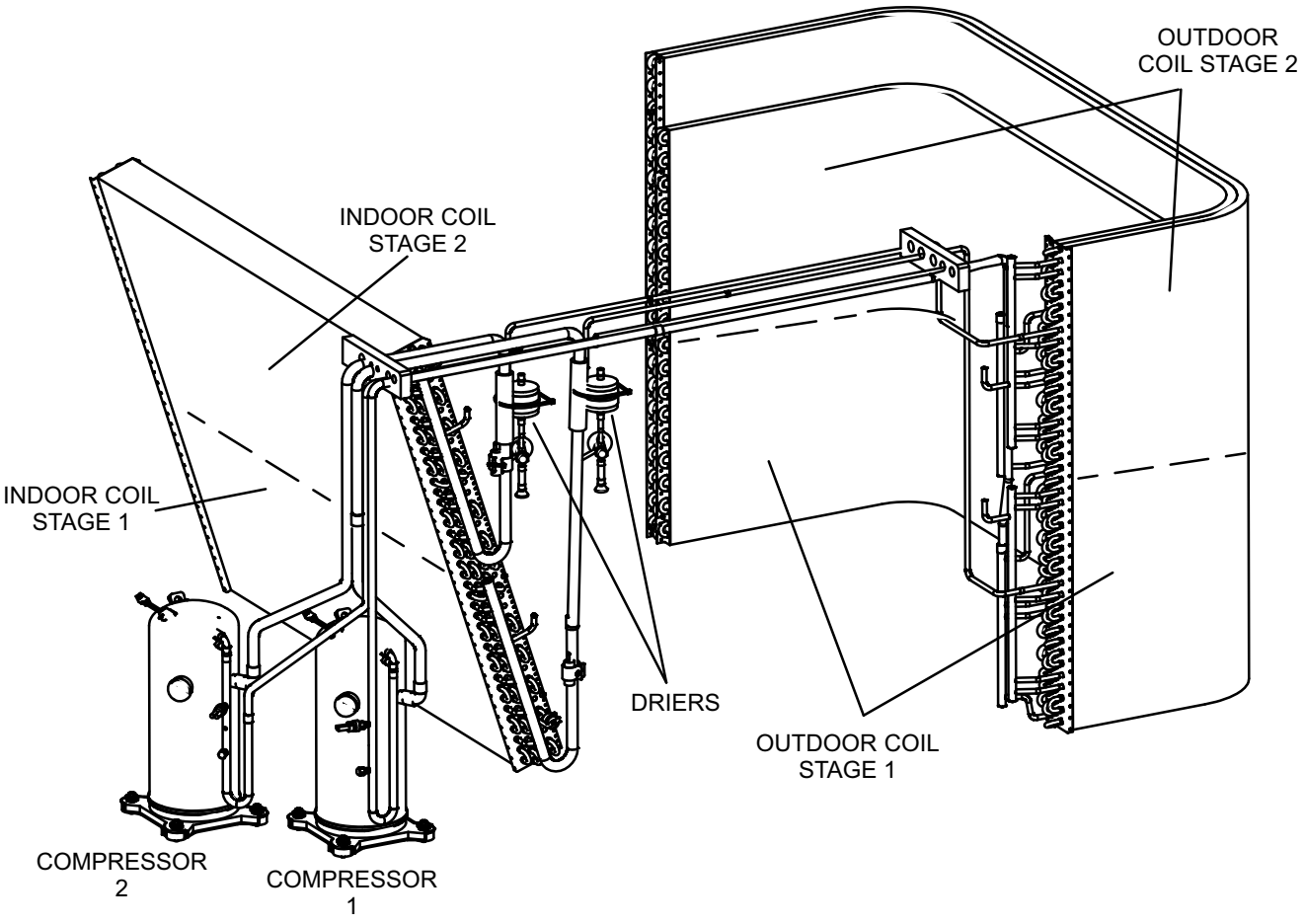
8-Condenser Fan Relay K10

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 KGA 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.

KGA092,102, 120, 150 PLUMBING AND COMPRESSOR CIRCUITS DETAIL



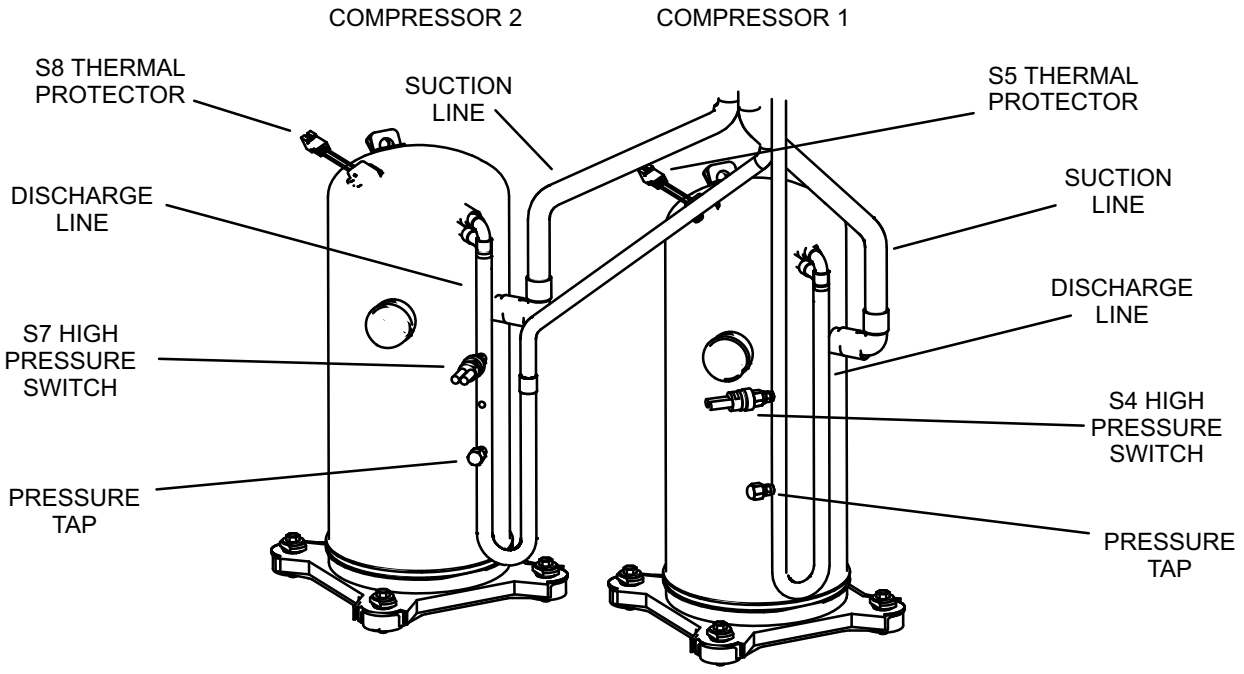


FIGURE 6

B-Cooling Components

All units use independent cooling circuits consisting of separate compressors, condenser coils and evaporator coils. See figure 6. Two draw-through-type condenser fans are used in KGA092/150 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 slab-type and are stacked. Each evaporator uses a thermostatic expansion valve as the primary refrigerant metering device. Each evaporator is also equipped with enhanced fins and rifled tubing.

In all units each compressor is protected by S49 and S50 freezestats and S4 and S7 high pressure switches (on each evaporator). Low ambient switches (S11 and S84) are available as an option for additional compressor protection. On 150 units, each compressor is protected by a crankcase heater.

1-Compressors B1 and B2

All KGA092/150 units use two scroll compressors. 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 1-800-4-LENNOX (1-800-453-6669).

⚠IMPORTANT

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

2-Thermal Protectors S5, S8

Some compressors have thermal protectors located on top of the compressor. The protectors open at 248°F ± 9°F (120°C ± 5°C) and close at 169°F ± 18°F (76°C ± 10°C).

3-Freezestats S49 and S50

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

Freezestats are wired in series with compressor contactors. Each freezestat is a SPST N.C. auto-reset switch which opens at 29°F ± 3°F (-1.7°C ± 1.7°C) on a temperature drop and closes at 58°F ± 4°F (14.4°C ± 2.2°C) on a temperature rise. To prevent coil icing, freezestats open during compressor operation to temporarily disable the respective compressor until the coil temperature rises.

If the freezestats are tripping frequently due to coil icing, check the airflow/filters, economizer position and unit charge before allowing unit back in operation. Make sure to eliminate conditions which might promote evaporator ice buildup.

4-High Pressure Switches S4 and S7

The high pressure switch is a manual 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 are 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).

5-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 KGA092/150, 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.

6-Crankcase Heaters HR1, HR2

150S units use insertion-type heaters. Heater HR1 is installed around compressor B1 and heater HR2 is installed around compressor B2. Crankcase heater wattage varies by compressor manufacturer.

C-Blower Compartment

The blower compartment in all KGA092/150S units is located between the evaporator coil and the condenser coil section. The blower assembly is accessed by disconnecting the blower motor .See *Blower Access* in the Operation/ Adjustment section. The blower pulls out as shown in figure 7.

1-Blower Wheels

All KGA092/150 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.

OPERATION / ADJUSTMENT

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 subbase 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.

Determining Unit CFM

1- The following measurements must be made with a dry indoor coil. Run blower without a cooling demand. Measure the indoor blower shaft RPM. Air filters must be in place when measurements are taken.

2- With all access panels in place, measure static pressure external to unit (from supply to return). *Measure static below roof curb if roof curb is used.*

3- Refer to blower tables in BLOWER DATA (table of contents) in the front of this manual. Use static pressure and RPM readings to determine unit air volume.

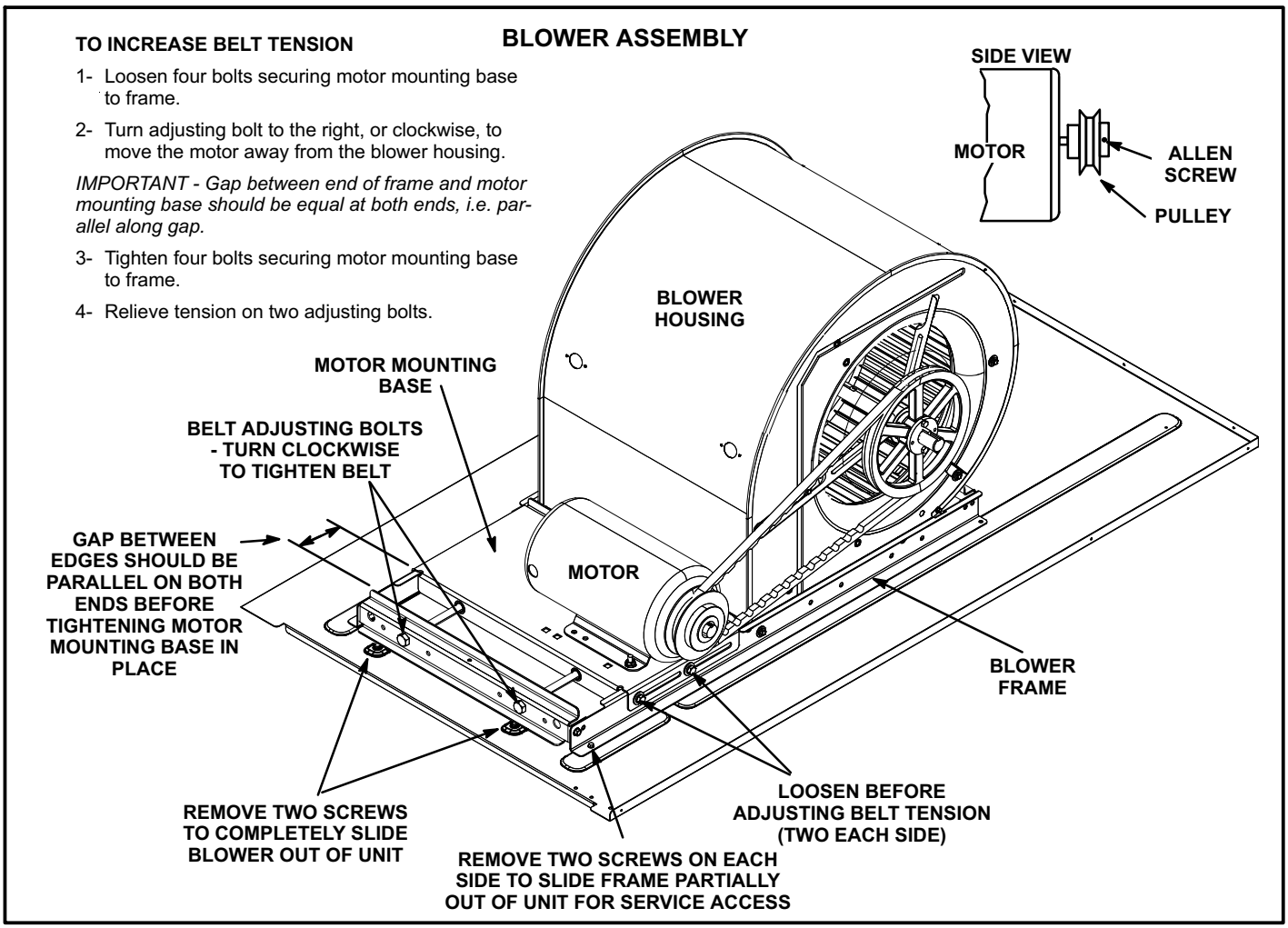


FIGURE 7

4- The blower RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase CFM. Turn counterclockwise to decrease CFM. See figure 7. Do not exceed minimum and maximum number of pulley turns as shown in table 1.

TABLE 1
MINIMUM AND MAXIMUM PULLEY ADJUSTMENT

Belt	Minimum Turns Open	Maximum Turns Open
A Section	No minimum	5
B Section	1*	6

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

Blower Belt Adjustment

Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Tension new belts after a 24-48 hour period of operation. This will allow belt to stretch and seat grooves. Make sure blower and motor pulley are aligned as shown in figure 8.

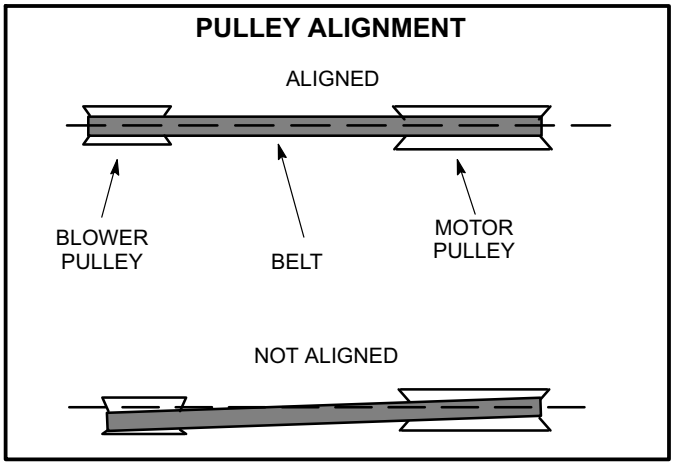


FIGURE 8

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

2- *To increase belt tension -*
Turn adjusting bolt 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 bolt 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 bolts on side of base.

Check Belt Tension

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

1- Measure span length X. See figure 9.

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

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

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

3- Measure belt deflection force. For a used belt, the deflection force should be 5 lbs. (35kPa). A new belt deflection force should be 7 lbs. (48kPa).

A force below these values indicates an undertensioned belt. A force above these values indicates an overtensioned belt.

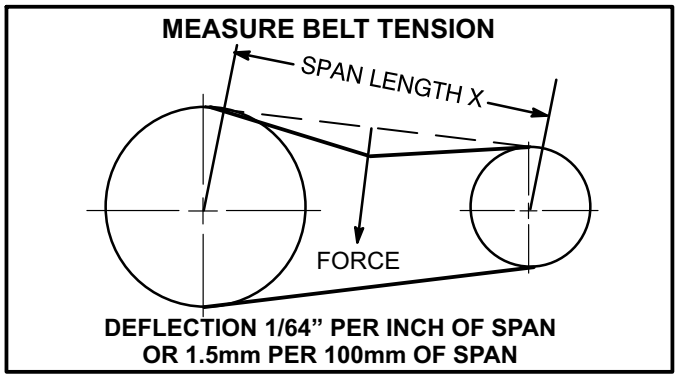


FIGURE 9

D-GAS HEAT COMPONENTS

KGA092/150 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 10

The KGA units use aluminized steel inshot burners with tubular aluminized steel heat exchangers and two-stage redundant gas valves. KGA092/150 units use one eleven-tube/burner for high heat, one eight-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.

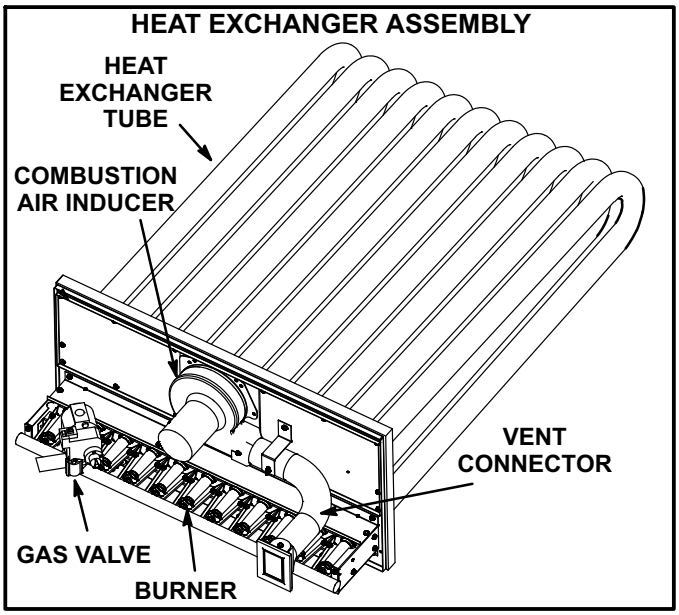


FIGURE 10

2-Burner Box Assembly (Figure 11)

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

Burners

All units use inshot burners. Burners are factory-set and do not require adjustment. A peep hole with a cover is furnished in the heating access panel for viewing the burner flame. 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 Lennox Repair Parts Listing for correct sizing information.

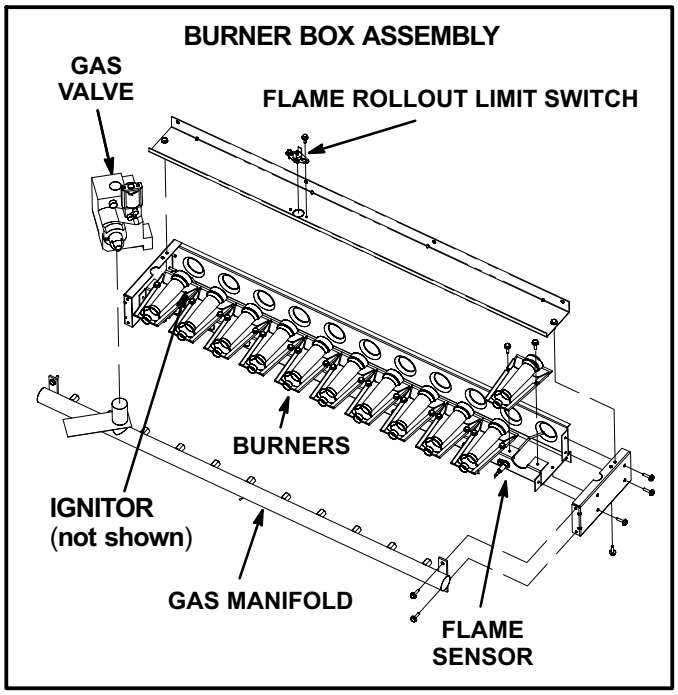


FIGURE 11

3-Primary High Temperature Limit S10

S10 is a SPST N.C. high-temperature primary limit for gas heat in KGA092/150 units. On KGA092/150 units, S10 is located next to the blower. See figure 12.

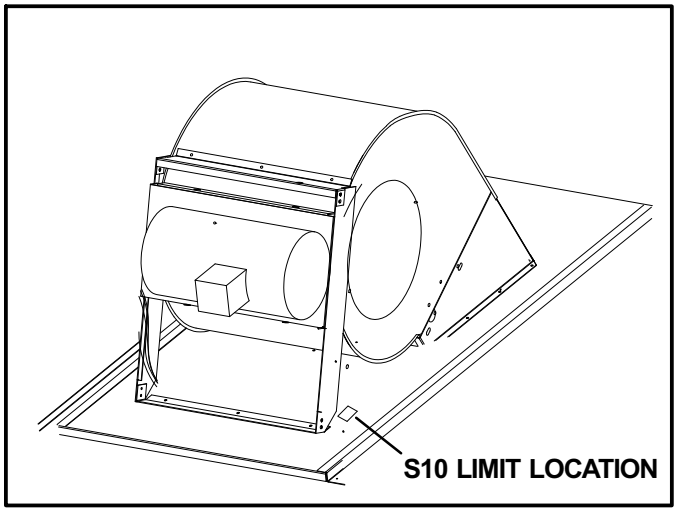


FIGURE 12

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 for limits S10. Use appropriate limit when replacement is required.

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 11). 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-set to open at 290°F ± 12°F (143°C ± 6.7°C) 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 is not adjustable. The switch will automatically open on a pressure rise (less negative pressure). Table 2 shows prove switch settings.

TABLE 2
S18 Prove Switch Settings

Close“ w.c. (Pa)	Open “ w.c. (Pa)
0.25 ± 5 (62.3 ± 12.4)	0.10 ± 5 (24.8 ± 12.4)

6-Combustion Air Inducer B6

Combustion air inducers on KGA092/150 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 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 is not adjustable; but, it can be disassembled for cleaning.

7-Combustion Air Motor Capacitor C3

The combustion air inducer motors in all KGA units require run capacitors. Capacitor C3 is connected to combustion air inducer B6. Ratings will be on the 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 shutoff. The manual shut-off knob immediately closes both stages without delay. On both valves, the first stage (low fire) is quick-opening (on and off in less than 3 seconds).

On the White-Rodgers valve, the 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, the second stage is quick-opening. The Honeywell valve is adjustable for both low fire and high fire. Figures 17 and 18 show gas valve components. Table 3 shows factory gas valve regulation for KGA series units.

TABLE 3

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.	6.5” ± 0.3” W.C	10.5” ± 0.5” W.C.

9-Spark Electrode Figure 13

An electrode assembly is used for ignition spark. The electrode is inserted through holes under the left-most burner. 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.

During ignition, spark travels through the spark electrode (figure 13) and ignites the left burner. Flame travels from burner to burner until all are lit.

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

NOTE - If the electrode wire is replaced, wire and suppression must be same type of cable. See repair parts listing for correct 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 13.

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

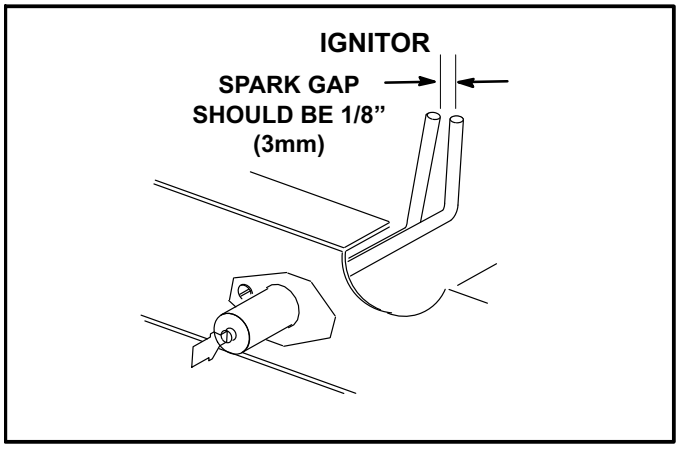


FIGURE 13

10-Flame Sensor Figure 14

A flame sensor is located under the right-most burner. The sensor is inserted 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.

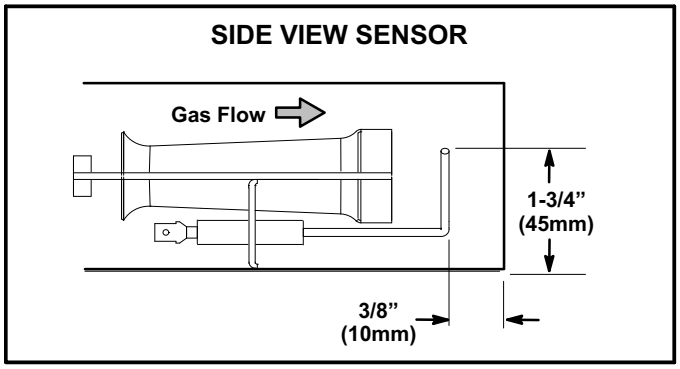


FIGURE 14

INTEGRATED CONTROL BOARD A3

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 figures 16 and 15.

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 4). 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 5 for thermostat terminations and table 6 for heating component terminations.

TABLE 4

LED	STATUS
Slow Flash	Normal operation. No call for heat.
Fast Flash	Normal operation. Call for heat.
Steady Off	Internal Control Fault, No Power To Board or Gas Valve Relay Fault
Steady On	Control Internal Failure.
2 Flashes	Lockout. Failed to detect or sustain flame.

3 Flashes	Rollout switch open / Prove switch open or closed.
4 Flashes	Primary High Limit switch open.
5 Flashes	Flame sensed but gas valve not open.
6 Flashes	On Board Microprocessors Disagree

TABLE 5

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 6

J1 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

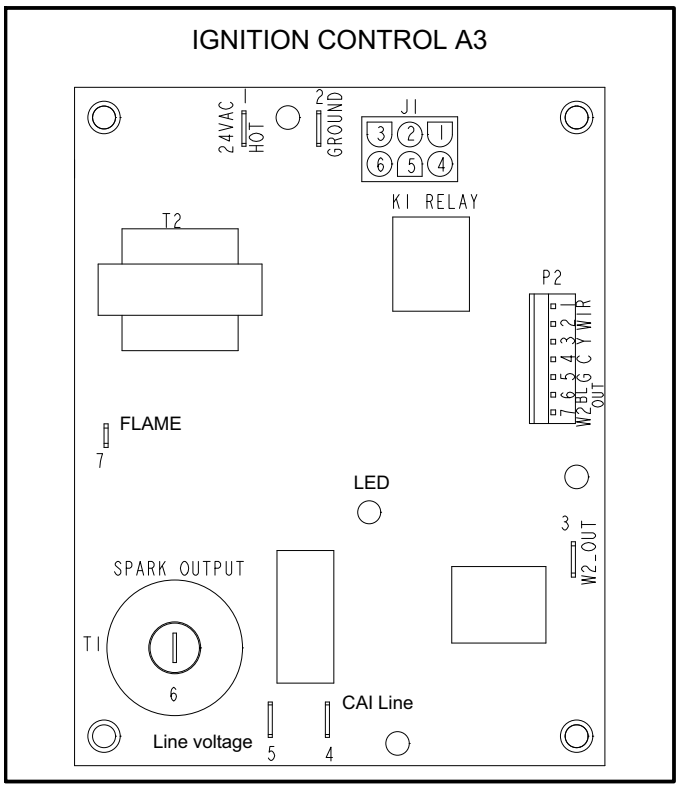


FIGURE 15

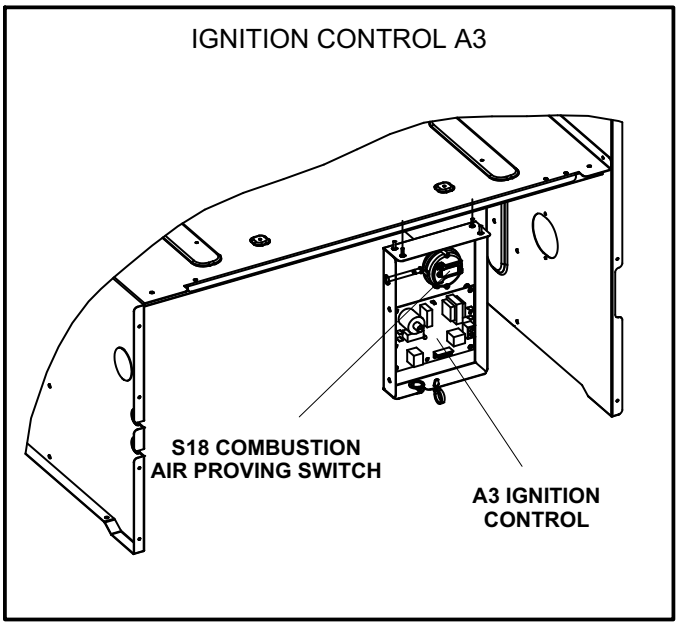


FIGURE 16

Flame rectification sensing is used on all KGA 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 (LARMF18/36 or LARMFH18/24).

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.

⚠WARNING

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.

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 White Rodgers 36C (figure 17) and Honeywell VR8205Q/VR8305Q (figure 18)

1- Set thermostat to lowest setting.

2- Turn off all electrical power to appliance.

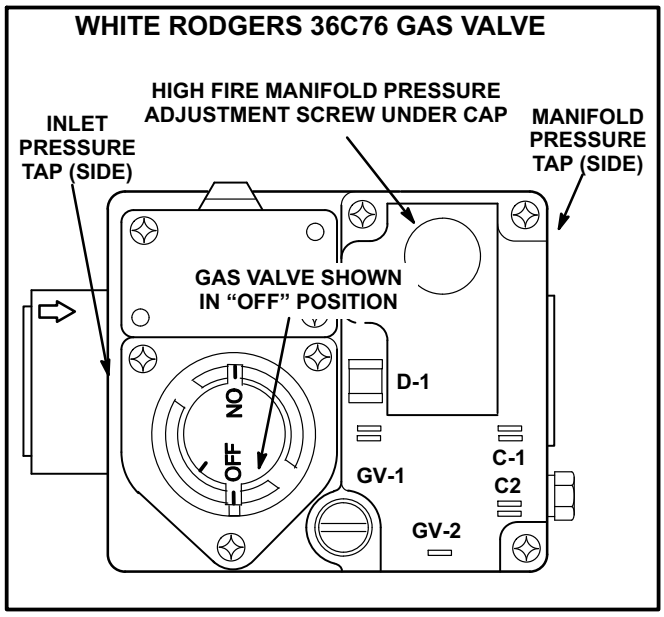


FIGURE 17

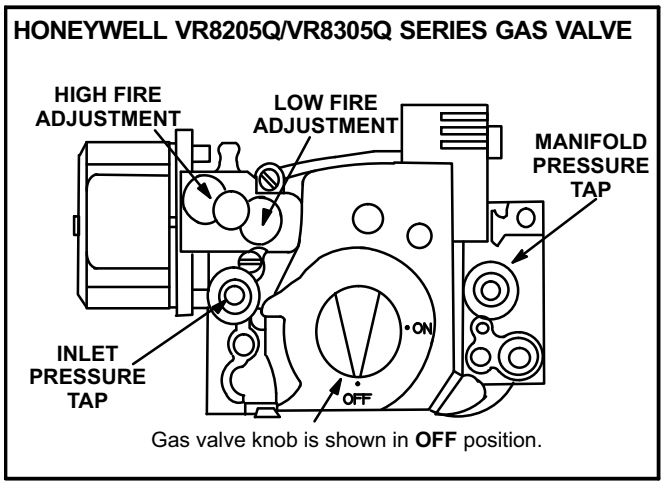


FIGURE 18

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.

5- Turn the knob on the gas valve clockwise ↷ to **"OFF"**. Push in 36C knob slightly. Do not force.

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 the knob on the gas valve counterclockwise ↶ to **"ON"**. Do not force.

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 combustion air inducer will start. The burners will light within 40 seconds.

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 the knob on the gas valve clockwise ↷ to **"OFF"**. Push in 36C knob slightly. Do not force.

5- Close or replace the heat section access panel.

C-Cooling Startup

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

2- First-stage thermostat demand will energize compressor 1. Second-stage thermostat demand will energize compressor 2. On units with an economizer, when outdoor air is acceptable, a first-stage demand will energize the economizer; a second-stage demand will energize compressor 1.

3- Units contain two refrigerant circuits or stages. See figure 19.

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

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

Three-Phase Scroll Compressor Voltage Phasing

Three-phase power supplied to the unit disconnect switch must be phased sequentially to ensure the scroll compressor and indoor blower rotate in the correct direction. Compressor and blower are wired in phase at the factory. Power wires are color-coded as follows: line 1-red, line 2-yellow, line 3-blue.

1- Observe suction and discharge pressures and blower rotation on unit start-up.

2- Suction pressure must drop, discharge pressure must rise and blower rotation must match rotation marking.

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

3- Disconnect all remote electrical power supplies.

4- Reverse any two field-installed wires connected to the line side of K2 contactor or disconnect switch if installed. Do not reverse wires at blower contactor.

5- Make sure the connections are tight.

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

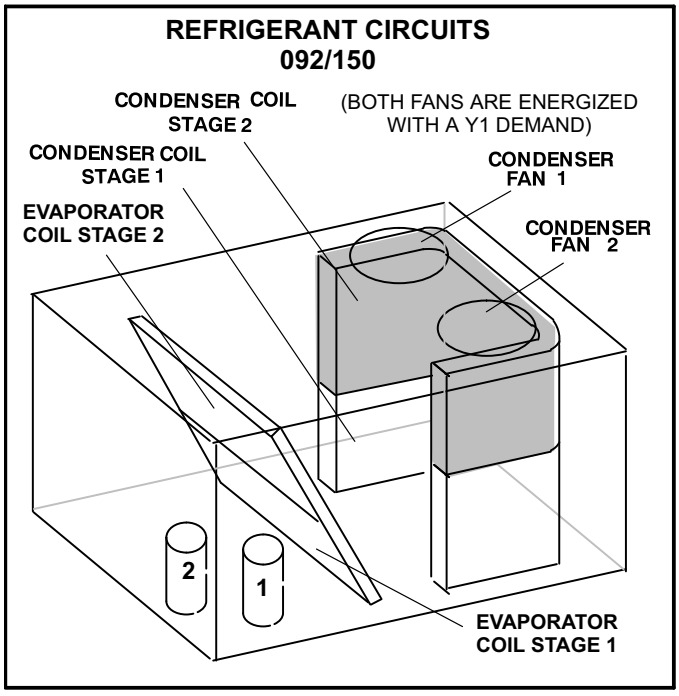


FIGURE 19

D-Safety or Emergency Shutdown

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

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.

WARNING-Do not exceed nameplate charge under any condition.

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

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

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

1- Attach gauge manifolds and operate unit in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure outdoor air dampers are closed.

2- Check each system separately with all stages operating.

3- Use a thermometer to accurately measure the outdoor ambient temperature.

4- Apply the outdoor temperature to tables 7 through 10 to determine normal operating pressures. Pressures are listed for sea level applications at 80°F dry bulb and 67°F wet bulb return air.

5- Compare the normal operating pressures to the pressures obtained from the gauges. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. **Correct any system problems before proceeding.**

6- If discharge pressure is high, remove refrigerant from the system. If discharge pressure is low, add refrigerant to the system.

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

7- Use the following approach method along with the normal operating pressures to confirm readings.

TABLE 7
KGA092 NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Discharge ±10 psig	Suction ±5 psig	Discharge ±10 psig	Suction ±5 psig
65° F	260	130	269	132
75° F	301	133	311	133
85° F	343	135	354	136
95° F	388	138	401	139
105° F	435	140	449	141
115° F	481	142	497	144

TABLE 8
KGA102 NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Discharge ±10 psig	Suction ±5 psig	Discharge ±10 psig	Suction ±5 psig
65° F	262	128	270	129
75° F	299	131	310	131
85° F	342	134	353	134
95° F	386	137	399	136
105° F	434	140	448	139
115° F	487	143	501	142

TABLE 9
KGA120 NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Discharge ±10 psig	Suction ±5 psig	Discharge ±10 psig	Suction ±5 psig
65° F	275	135	282	136
75° F	313	137	323	138
85° F	355	140	366	141
95° F	400	142	414	143
105° F	447	145	464	145
115° F	499	148	517	148

TABLE 10
KGA150 NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Discharge ±10 psig	Suction ±5 psig	Discharge ±10 psig	Suction ±5 psig
65° F	279	132	283	136
75° F	318	134	323	138
85° F	360	136	364	139
95° F	406	138	411	140
105° F	456	141	462	142
115° F	508	145	515	145

Charge Verification - Approach Method - AHRI Testing

1- Using the same thermometer, compare liquid temperature (at condenser outlet) to outdoor ambient temperature.

Approach Temperature = Liquid temperature minus ambient temperature.

2- Approach temperature should match values shown in table 11. An approach temperature greater than this value indicates an undercharge. An approach temperature less than this value indicates an overcharge.

3- The approach method is not valid for grossly overcharged or undercharged systems. Use tables 7 through 10 as a guide for typical operating pressures.

TABLE 11
APPROACH TEMPERATURE

Unit	Liquid Temp. Minus Ambient Temp.	
	1st Stage	2nd Stage
092	9°F ± 1 (5.0°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)
102	7°F ± 1 (3.9°C ± 0.5)	6°F ± 1 (3.3°C ± 0.5)
120	8°F ± 1 (4.4°C ± 0.5)	6°F ± 1 (3.3°C ± 0.5)
150	6°F ± 1 (3.3°C ± 0.5)	6°F ± 1 (3.3°C ± 0.5)

V- SYSTEMS SERVICE CHECKS

A-Heating System Service Checks

All KGA 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 KGA Installation instruction for more information.

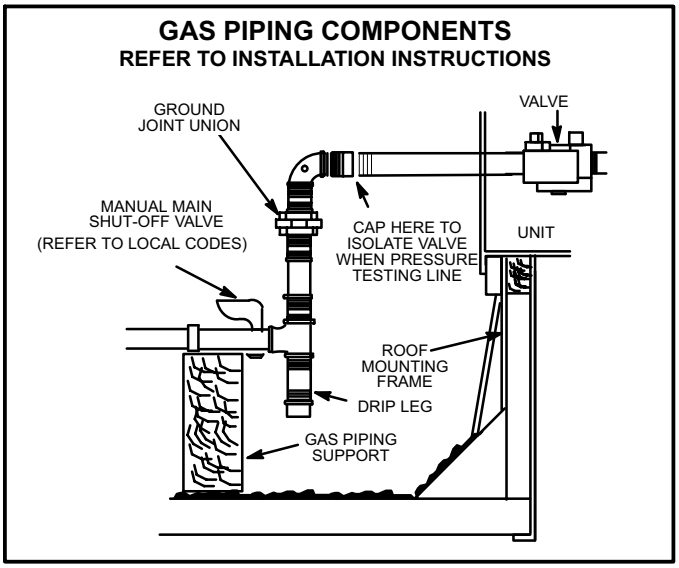


FIGURE 20

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 20.

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 outlet pressure tap located on unit gas valve GV1. See figure 17 for location of pressure tap on the gas valve.

The manifold pressure is factory set and should not require adjustment. See table 12. If manifold pressure is incorrect and no other source of improper manifold pressure can be found, the valve must be replaced. See figure 17 or 18 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 3.

5-High Altitude

Units may be installed at altitudes up to 2000 feet (610 m) above sea level without any modification. At altitudes above 2000 feet (610 m), units must be derated to match the gas manifold pressures shown in table 12.

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

TABLE 12

Altitude - ft. (m)	Gas Manifold Pressure in. w.g. (kPa)	
	Natural	LP (Propane)
0 - 2000 (610)	3.7 (0.92)	10.5 (2.61)
2001 - 3000 (610 - 915)	3.6 (0.90)	10.2 (2.54)
3001 - 4000 (915 - 1220)	3.5 (0.87)	9.9 (2.46)
4001 - 5000 (1220 - 1525)	3.4 (0.85)	9.6 (2.39)
5001 - 6000 (1525 - 1830)	3.3 (0.82)	9.4 (2.34)
6001 - 7000 (1830 - 2135)	3.2 (0.80)	9.1 (2.26)
7001 - 8000 (2135 - 2440)	3.1 (0.77)	8.8 (2.19)

*Contact Technical Support for altitudes higher than 8000 ft. (2400m).

⚠ IMPORTANT

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

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 13. Seconds in table 13 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 13

Unit in Btu's	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 on the following page:

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. *Dropout 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

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

NOTE - When unit is properly charged, discharge line pressures should approximate those in tables 7 through 10.

VI-MAINTENANCE

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

⚠WARNING

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

⚠CAUTION

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

⚠WARNING

Product contains fiberglass wool.
Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)
Fiberglass wool may also cause respiratory, skin and eye irritation.
To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown on unit nameplate or contact your supervisor.

⚠IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HCFC's) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

A-Filters

Units are equipped with four 20 X 25 X 2" filters. Filters should be checked and replaced when necessary with filters of like kind and size. Take note of air flow direction marking on filter frame when reinstalling filters. See figure 21. *Filters must be U.L.C. certified or equivalent for use in Canada.*

B-Lubrication

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

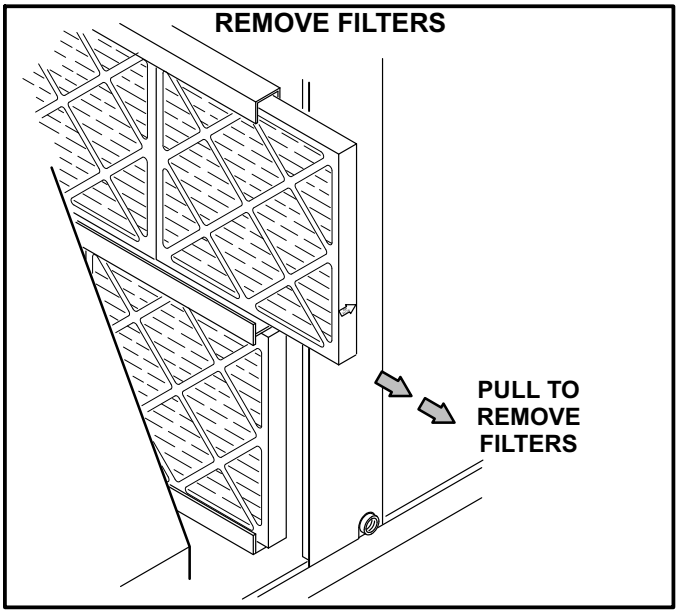


FIGURE 21

C-Evaporator Coil

Inspect and clean coil at beginning of each cooling season. Clean using mild detergent or commercial coil cleanser. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet.

D-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 11. Clean as necessary.

4- Locate the ignitor under the left burners. Check ignitor spark gap with appropriately sized twist drills or feeler gauges. See figure 13.

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.

7- Replace access panel.

8- 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 10.

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 detergent or commercial coil cleaner and inspect monthly during the cooling season.

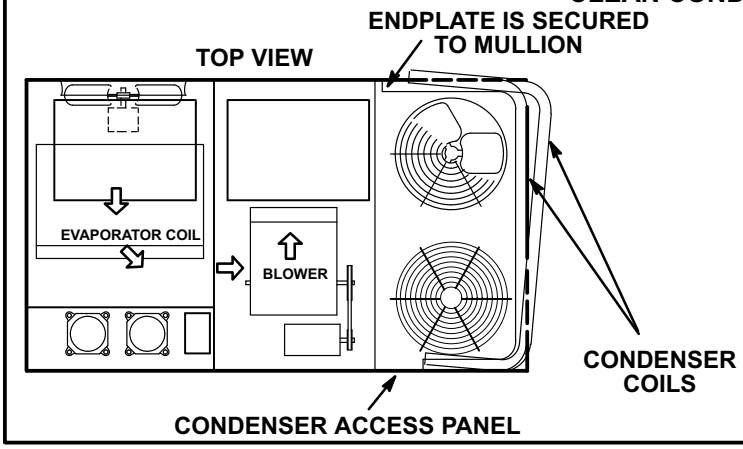
Condenser coils are made of one, two and three formed slabs. Dirt and debris may become trapped between the slabs. To clean between slabs, carefully separate coil slabs and wash them thoroughly. See figure 22. Flush coils with water following cleaning.

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

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.

CLEAN CONDENSER COIL



1- Remove unit top panel and condenser section access panel.

2- Remove screws securing coil end plate to mullion.

3- Remove clips connecting coils slabs and separate slabs 3-4” (76-102mm).

4- Clean coils with detergent or commercial coil cleaner.

5- Rinse thoroughly with water and reassemble.

FIGURE 22

VII-ACCESSORIES

The accessories section describes the application of most of the optional accessories which can be factory- or field-installed in or on the KGA units. OPTIONAL ACCESSORIES section (see table of contents) shows specific sizes per unit.

A-LARMF Mounting Frames

When installing units on a combustible surface for downflow discharge applications, the Lennox C1CURB roof mounting frame is used. The roof mounting frames are recommended in all other applications but not required. If the KGA units are not installed 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 installed level within 1/16" per linear foot or 5mm per meter in any direction.

The assembled C1CURB mounting frame is shown in figure 23. Refer to the roof mounting frame installation instructions for details of proper assembly and installation. The roof mounting frame MUST be squared to the roof and level before installation. Plenum system MUST be installed before the unit is set on the mounting frame. Typical roof curbing and flashing is shown in figure 24. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

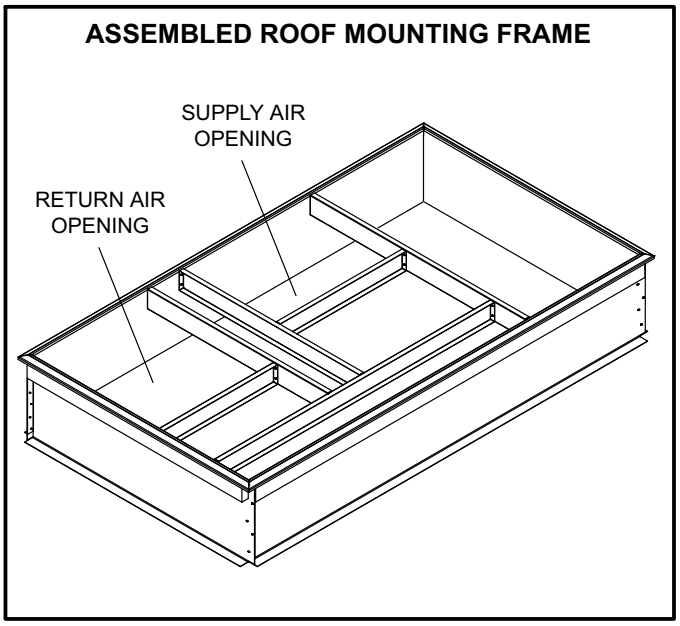


FIGURE 23

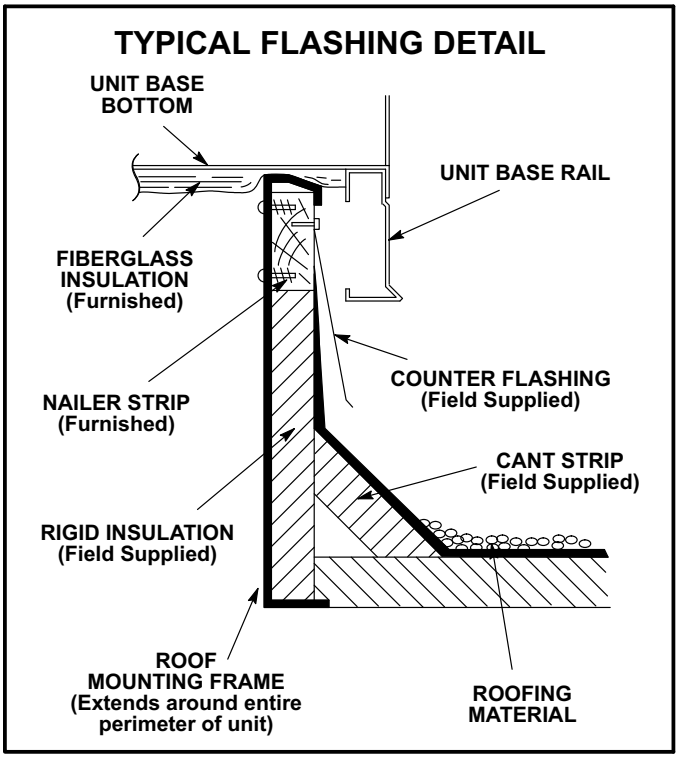


FIGURE 24

B-Transitions

Optional supply/return transition LASRT08/10 is available for use with the KGA 7.5 ton units and LASRT10/12 is available for the 8.5 and 10 ton units, utilizing optional C1CURB roof mounting frames. KGA 12.5 ton units will use LASRT15 with C1CURB roof mounting frame. Transition must be installed in the C1CURB mounting frame before setting the unit on the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

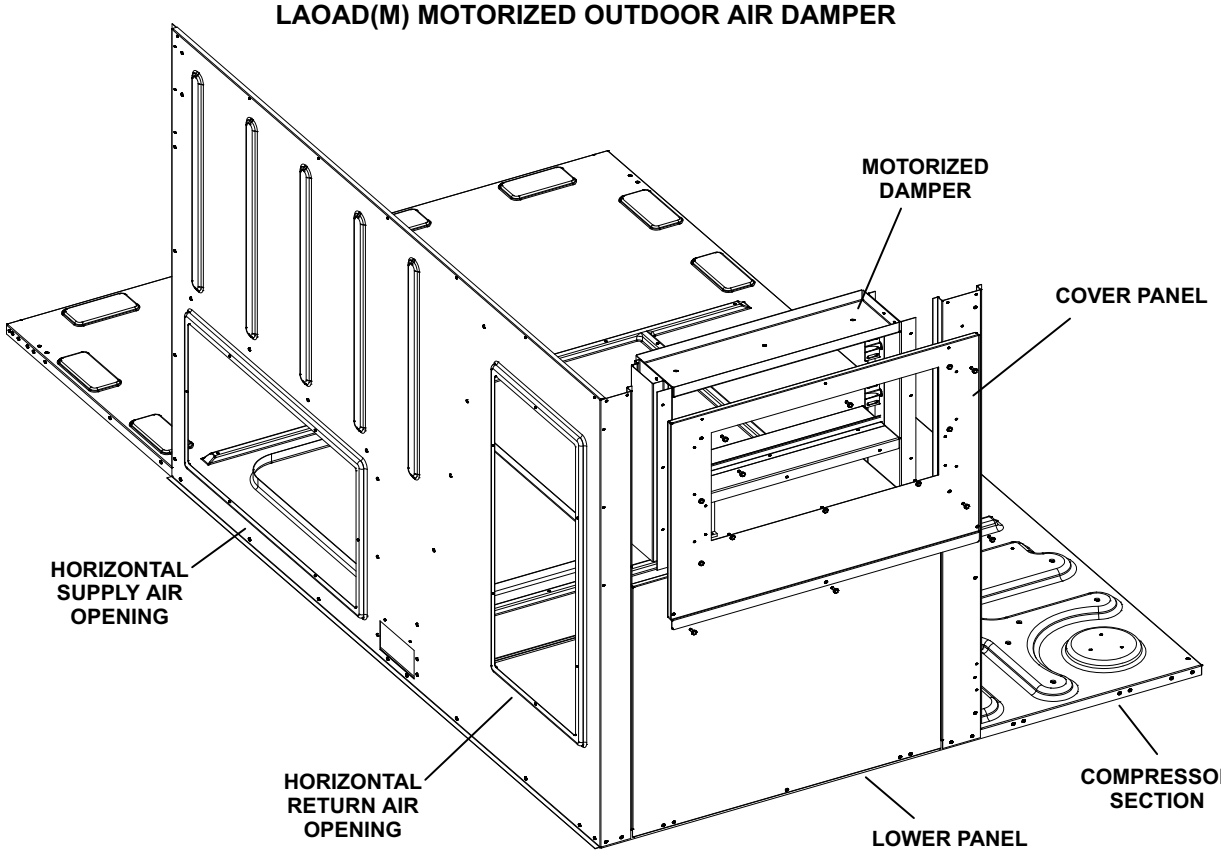
C-Supply and Return Diffusers

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

D-LAOAD(M) Outdoor Air Dampers Field- or Factory-Installed

Optional manual and motorized outdoor air dampers provide up to 25 percent fresh air for return. Motorized damper opens to minimum position simultaneously with the blower during the occupied period and remains closed during the unoccupied period. Manual damper assembly is manually operated; damper position is manually set at installation and remains in that position.

LAOAD(M) MOTORIZED OUTDOOR AIR DAMPER



MANUAL OUTDOOR AIR DAMPER

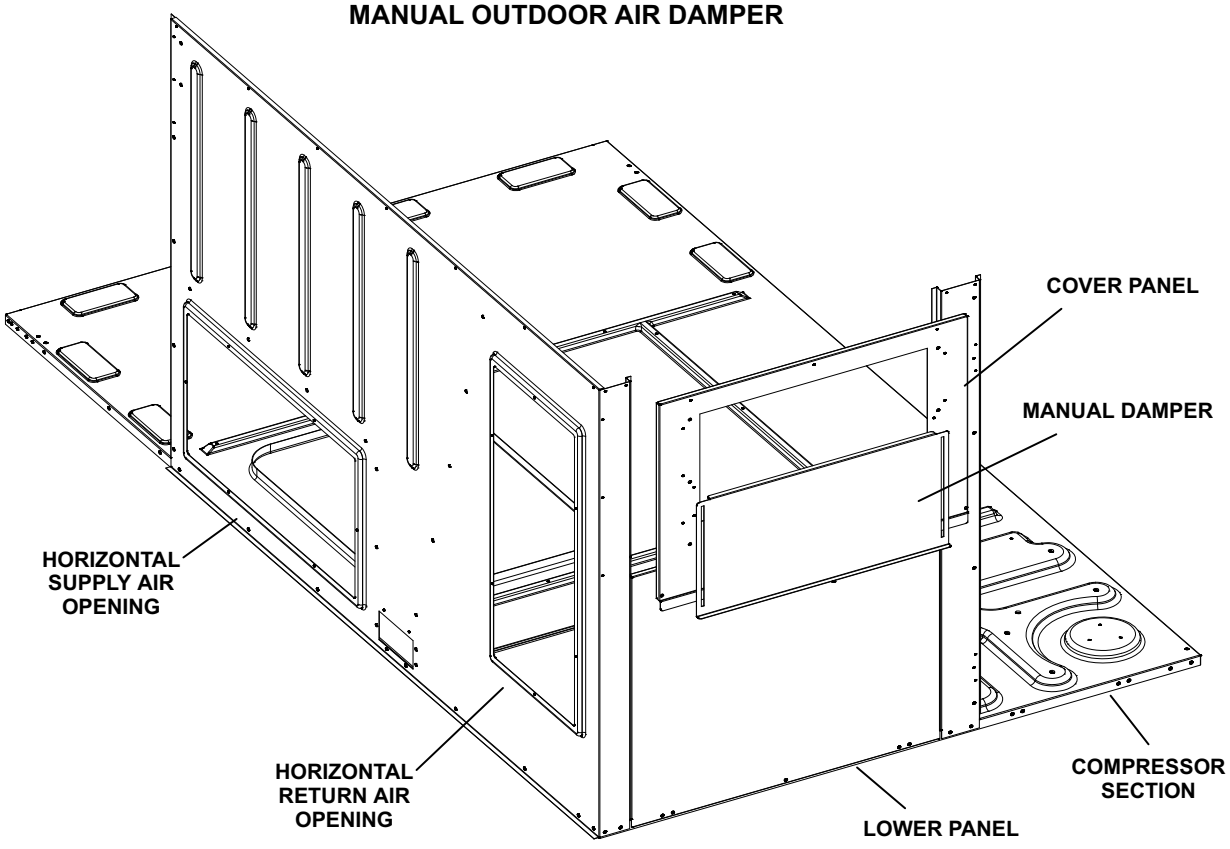


FIGURE 25

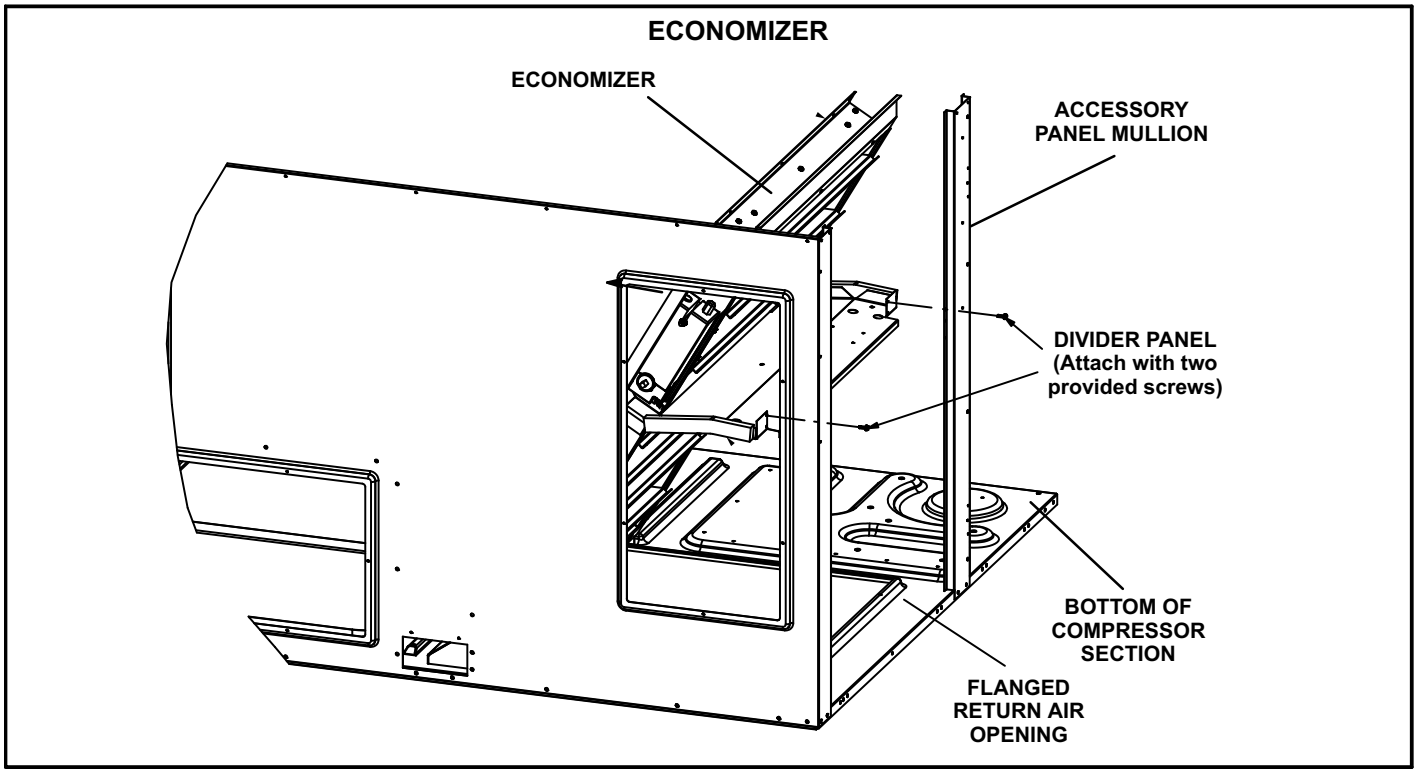


FIGURE 26

E-K1ECON20B Economizer

(Field- or Factory-Installed)

Economizers use outdoor air for free cooling when temperature and/or humidity is suitable. See figure 26.

The mixed air temperature sensor (R1) measures the supply air sensible temperature. See figure 27. The outdoor air sensible control is the default economizer control. An outdoor air single sensible sensor, S175, is also provided. See table 14 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 (CO_2) increases.

TABLE 14

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.

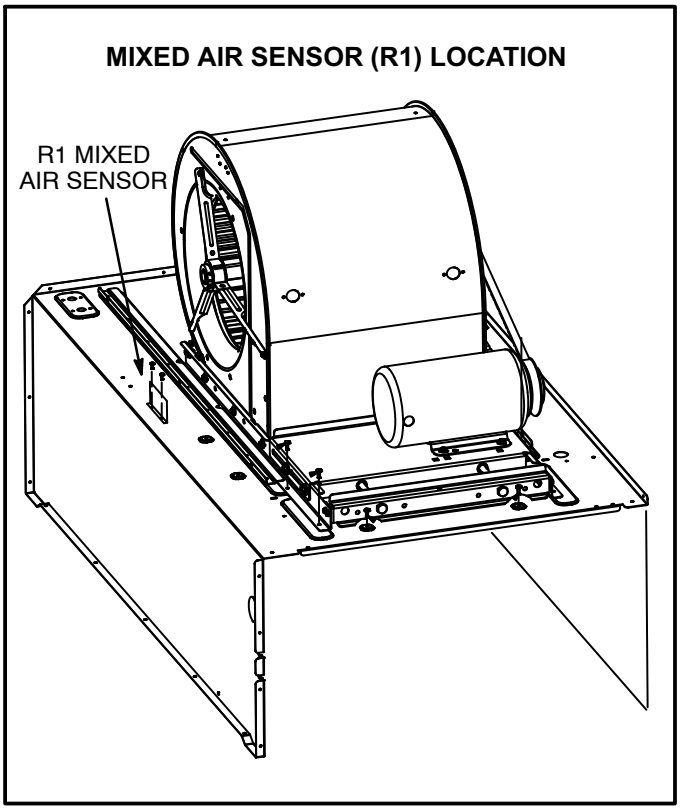


FIGURE 27

A6 Enthalpy Control LEDs

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

When an optional IAQ sensor is installed, a steady green DCV LED indicates that the IAQ reading is higher than setpoint requiring more fresh air. See figure 28.

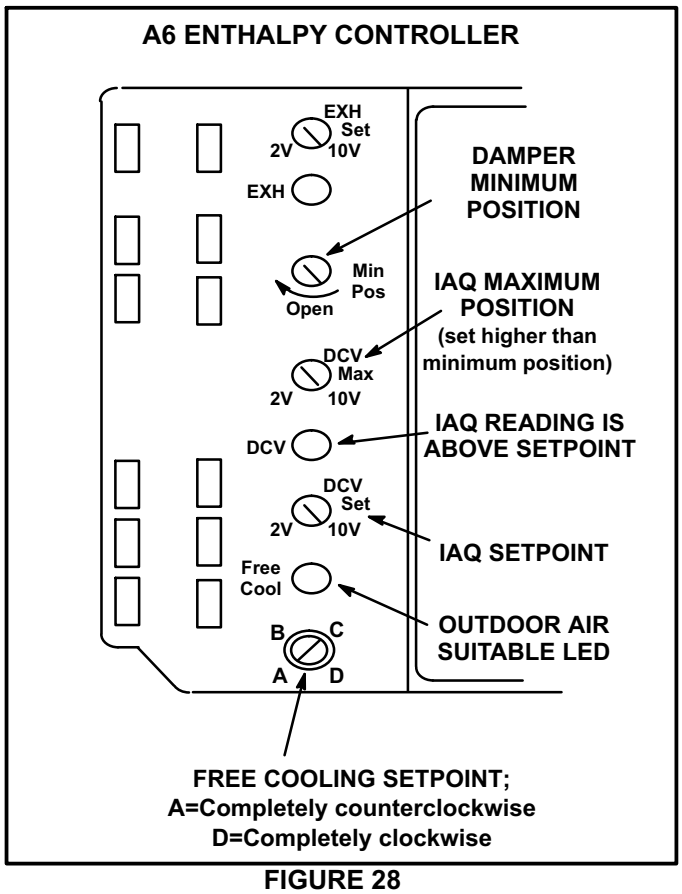


FIGURE 28

Free Cooling Setpoint

Outdoor air is considered suitable when temperature and humidity are less than the free cooling setpoints shown in table 15. Setting A is recommended. See figure 28. 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 15
ENTHALPY CONTROL SETPOINTS

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

Damper Minimum Position

NOTE - A jumper is factory-installed between TB1 R and OC terminals to maintain occupied status (allowing minimum fresh air). When using an electronic thermostat or energy management system with an occupied/unoccupied feature, remove jumper.

1- Set thermostat to occupied mode if the feature is available. Make sure jumper is in place between TB1 terminals R and OC if using a thermostat which does not have the feature.

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

NOTE - Damper minimum position can be set lower than traditional minimum air requirements when an IAQ sensor is specified. Dampers will open to DCV MAX setting (if CO2 is above setpoint) to meet traditional ventilation requirements.

3- Measure outdoor air temperature. Mark the point on the bottom line of chart 1 and label the point “A” (40°F, 4°C shown).

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

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

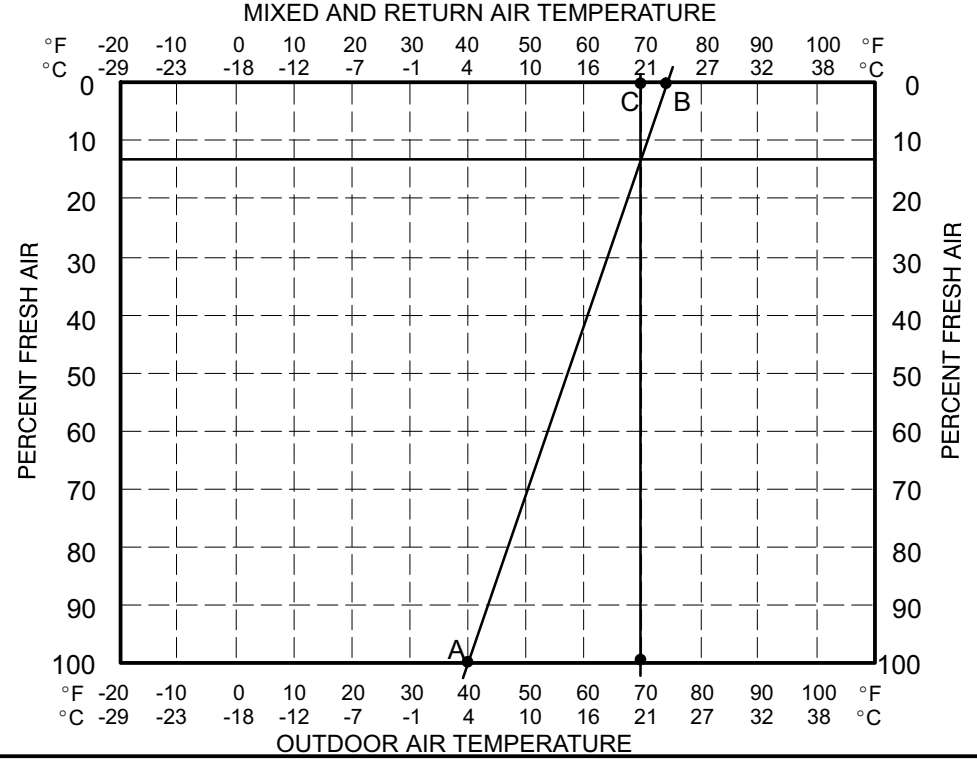
6- Draw a straight line between points A and B.

7- Draw a vertical line through point C.

8- Draw a horizontal line where the two lines meet. Read the percent of fresh air intake on the side.

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

CHART 1
CALCULATE MINIMUM FRESH AIR PERCENTAGE



DCV Set and Max Settings

Adjust settings when an optional IAQ sensor is installed.

The DCV SET potentiometer is factory-set at approximately 50% of the potentiometer range. Using a standard 1-2000ppm CO_2 sensor, dampers will start to open when the IAQ sensor reads approximately 1000ppm. Adjust the DCV SET potentiometer to the approximate setting specified by the controls contractor. Refer to figure 28.

The DCV MAX potentiometer is factory-set at approximately 50% of the potentiometer range or 6VDC. Dampers will open approximately halfway when CO_2 rises above setpoint. Adjust the DCV MAX potentiometer to the approximate setting specified by the controls contractor. Refer to figure 28.

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

Economizer Operation

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

Outdoor Air Not Suitable:

During the unoccupied time period dampers are closed.

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

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

Outdoor Air Suitable:

See table 16 for economizer operation with a standard two-stage thermostat.

During the occupied period, dampers will open to DCV MAX when IAQ reading is above setpoint (regardless of thermostat demand or outdoor air suitability). DCV MAX will NOT override damper fully open position. When an R1 mixed air sensor for modulating dampers is installed, DCV MAX may override damper free cooling position when occupancy is high and outdoor air temperatures are low. If R1 senses discharge air temperature below 45°F (7°C), dampers will move to minimum position until discharge air temperature rises to 48°F (9°C).

TABLE 16

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

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

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

B-Outdoor Air Dampers

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

Set damper minimum position in the same manner as economizer minimum position. Adjust motorized damper position using the thumbwheel on the damper motor. See figure 29. Manual damper fresh air intake percentage can be determined in the same manner.

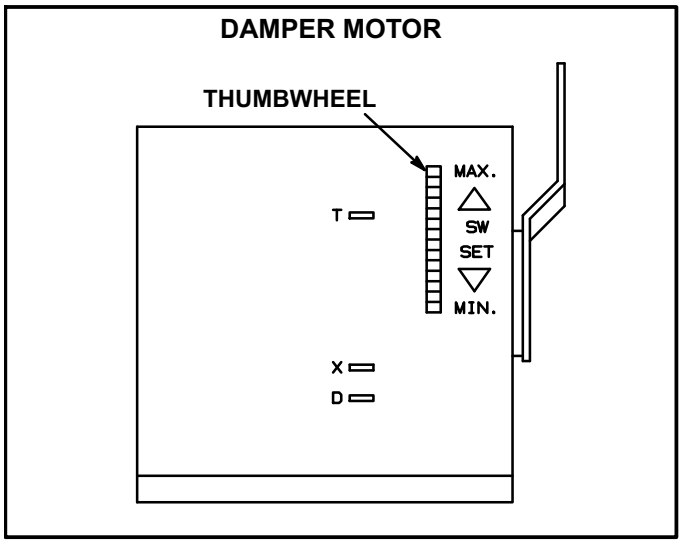


FIGURE 29

F-Gravity Exhaust Dampers

Dampers are used in downflow (see figure 30) and horizontal (see figure 31) air discharge applications. Horizontal gravity exhaust dampers are installed in the return air duct. The dampers must be used any time an economizer and a power exhaust fan is applied to KGA series units.

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

NOTE - GED is optional except when used with power exhaust dampers, where it is required..

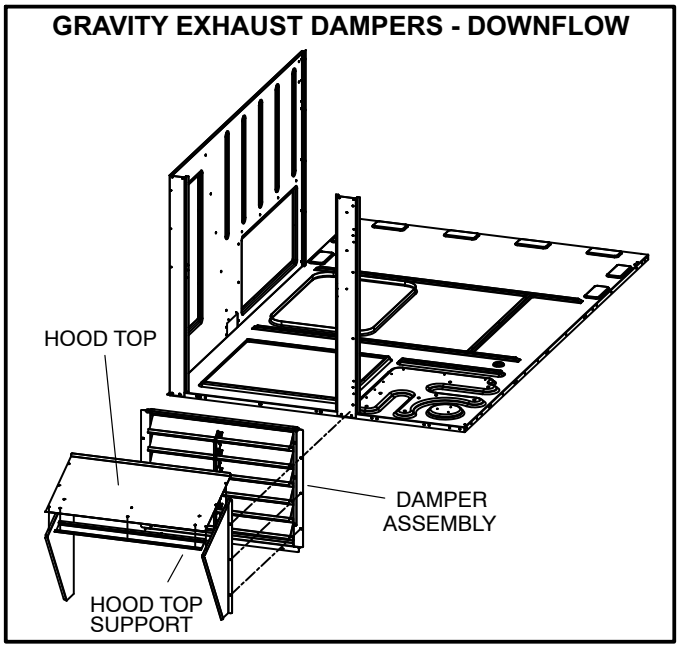


FIGURE 30

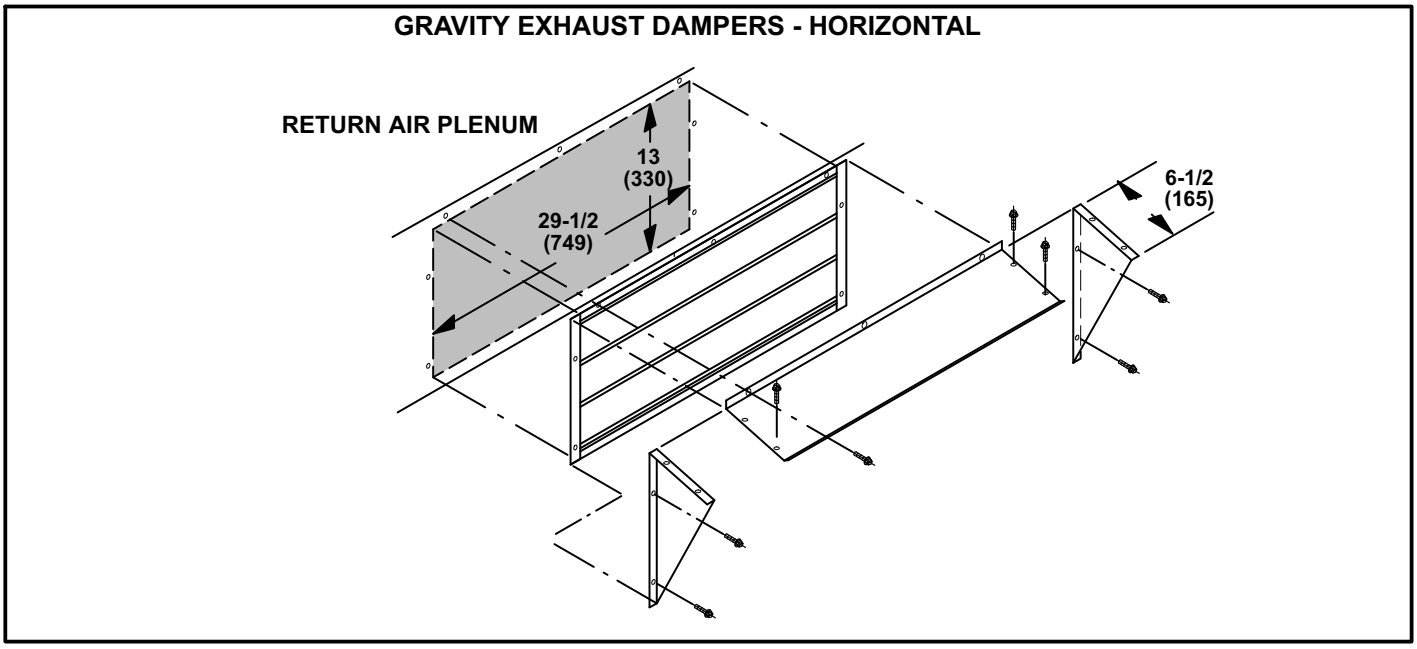


FIGURE 31

G-Power Exhaust Fan

The power exhaust fan (PEF) requires the use of a gravity exhaust damper and economizer and is used in downflow applications only. See figure 32. 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.

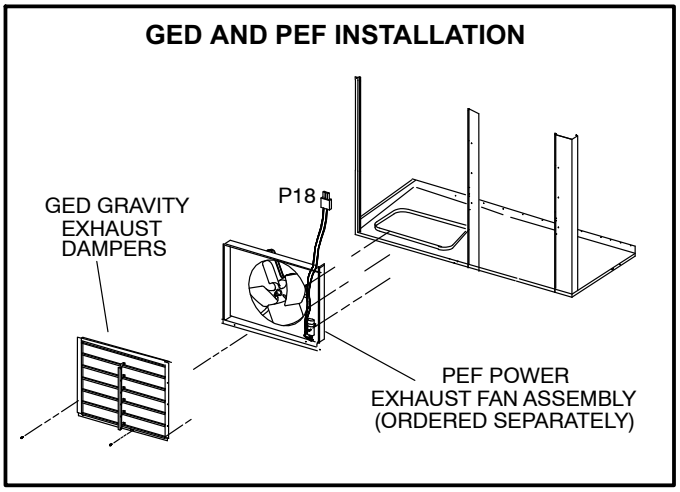


FIGURE 32

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 33. Power exhaust fans will be energized 30 seconds after dampers are 50% open. Adjust the EXH SET potentiometer higher (clockwise toward 10V) to energize fans when dampers are further open. Adjust the EXH SET potentiometer lower (counterclockwise toward 2V) to energize fans when dampers are further closed. (Thirty-second delay allows dampers to partially open before exhaust fan starts.)

H-Optional Cold Weather Kit (Canada only)

Electric heater is available to automatically control the minimum temperature in the gas burner compartment. Heater is ETL/CSA certified to allow cold weather operation of unit down to -60° F (-50° C).

The kit includes the following parts:

1- Transformer (T20) is a 600V to 120/240V step-down transformer mounted in the blower compartment.

2- T20 has two in line fuses (F20), one on each leg of the transformer. Both are rated at 15 amps.

3- The strip heater (HR6) is located as close as possible to the gas valve. It is wired in series with T20. The strip heater is rated at 500 Watts

4- A thermostat mounting box is installed on the vestibule of the heating compartment. Included in the box are the following thermostat switches:

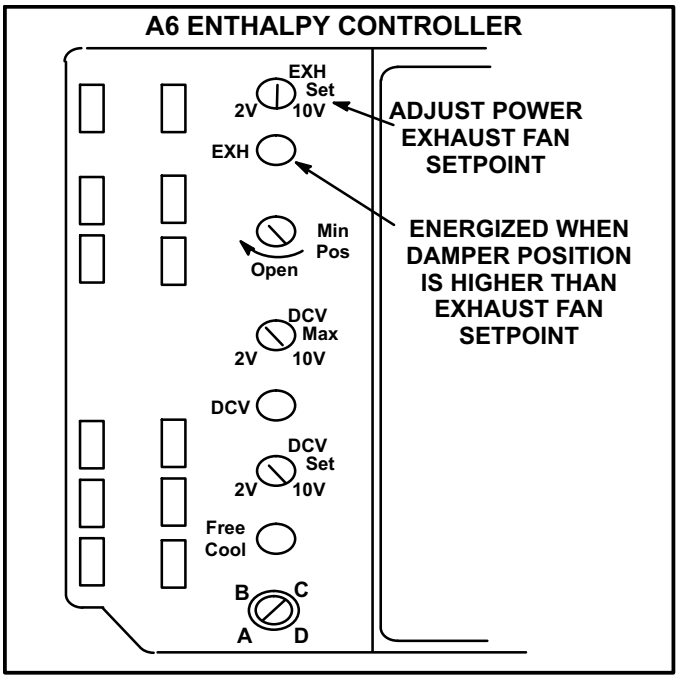


FIGURE 33

a - Thermostat switch (S59) is an auto-reset SPST N.C. switch which opens on a temperature drop. The switch is wired in series with 24V power and the combustion air blower switch. When the temperature drops below -30° F (-35° C) the switch opens and the gas heat section is de-energized. The switch automatically resets when the heating compartment temperature reaches -10° F (-12° C).

b - Thermostat switch (S60) is an auto-reset SPST N.C. switch which opens on a temperature rise. The switch is wired in series with HR6 and T20. When the temperature rises above 20° F (-7° C) the switch opens and the electric heater is de-energized. The switch automatically resets when the heating compartment temperature reaches -10° F (23.3° C).

c -Thermostat switch (S61) is an auto-reset SPST N.O. switch which closes on a temperature drop. The switch is wired in series with HR6 and T20. When temperature drops below 20° F (-7° C) the switch closes and electric heater is energized. The switch automatically opens when heating compartment temperature reaches 76° F (24° C).

I-Control Systems

Three different types of control systems may be used with the KGA series units. All thermostat wiring is connected to TB1 located in the control area. Each thermostat has additional control options available. See thermostat installation instructions for more detail.

1- Electro-mechanical thermostat (13F06)

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

2- Electronic thermostat

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

3- Honeywell T7300 thermostat (60L59)

The Honeywell T7300 thermostat is a programmable, internal or optional remote temperature sensing thermostat. The T7300 provides occupied and unoccupied changeover control.

J-Smoke Detectors A171 and A172

Photoelectric smoke detectors are a field-installed option. The smoke detectors can be installed in the supply air section (A172), return air section (A171), or in both the supply and return air sections.

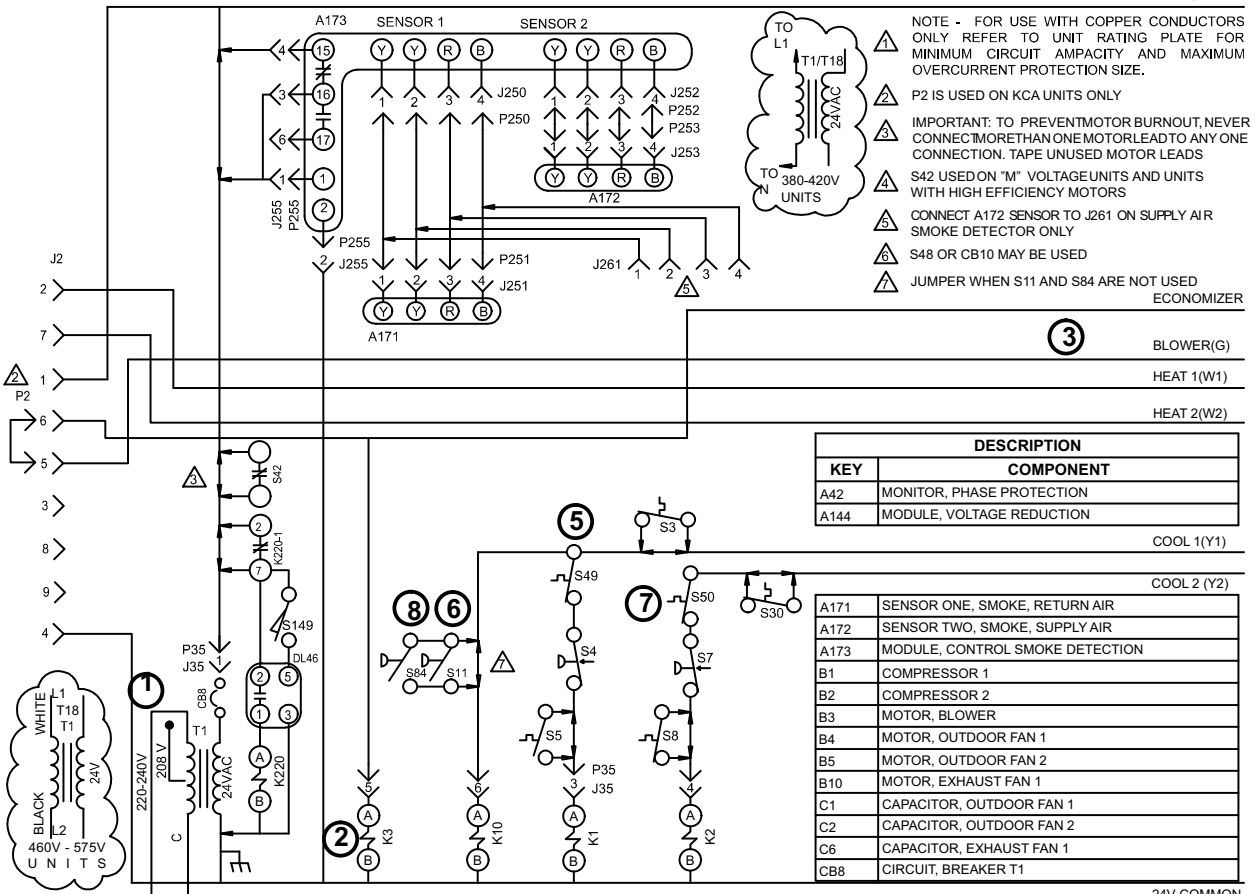
K-LP / Propane Kit

KGA092/150 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.

L-Drain Pan Overflow Switch S149 (optional)

The overflow switch is used to interrupt cooling operation when excessive condensate collects in the drain pan. The N.O. overflow switch is controlled by K220 and DL46 relays, located in the unit control panel. When the overflow switch closes, 24VAC power is interrupted and after a five-second delay unit compressors are de-energized. Once the condensate level drops below the set level, the switch will open. After a five-minute delay the compressor will be energized.

KGA092/150 UNIT DIAGRAM



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

P2 IS USED ON KCA UNITS ONLY

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

S42 USED ON "M" VOLTAGE UNITS AND UNITS WITH HIGH EFFICIENCY MOTORS

CONNECT A172 SENSOR TO J261 ON SUPPLY AIR SMOKE DETECTOR ONLY

S48 OR CB10 MAY BE USED

JUMPER WHEN S11 AND S84 ARE NOT USED

DESCRIPTION	
KEY	COMPONENT
A42	MONITOR, PHASE PROTECTION
A144	MODULE, VOLTAGE REDUCTION

A171	SENSOR ONE, SMOKE, RETURN AIR
A172	SENSOR TWO, SMOKE, SUPPLY AIR
A173	MODULE, CONTROL SMOKE DETECTION
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR, BLOWER
B4	MOTOR, OUTDOOR FAN 1
B5	MOTOR, OUTDOOR FAN 2
B10	MOTOR, EXHAUST FAN 1
C1	CAPACITOR, OUTDOOR FAN 1
C2	CAPACITOR, OUTDOOR FAN 2
C6	CAPACITOR, EXHAUST FAN 1
CB8	CIRCUIT, BREAKER T1

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.

DL46	DELAY, OVERFLOW SWITCH
HR1	HEATER COMPRESSOR 1
HR2	HEATER COMPRESSOR 2
J2	JACK, HEAT
J11	JACK, GFI, RECEPTICLE
J18	JACK, EXHAUST FAN COMPT
J24	JACK, EXHAUST FAN
J35	JACK, TEST
J36	JACK, TEST COOL
J86	JACK, OUTDOOR FANS 1
J132	JACK, BLOWER , EXHAUST FAN MOTOR 1
J250	JACK, SMOKE DETECTOR ONE
J251	JACK, SMOKE DETECTOR ONE
J252	JACK, SMOKE DETECTOR TWO
J253	JACK, SMOKE DETECTOR TWO
J255	JACK, MODULE, CONTROL SMOKE DETECTION
J261	JACK, SMOKE DETECTOR JUMPER
K1,-1	CONTACTOR, COMPRESSOR 1
K2,-1	CONTACTOR, COMPRESSOR 2
K3, -1	CONTACTOR, BLOWER
K10,-1,2	RELAY, OUTDOOR FAN
K65-1,2	RELAY, EXHAUST FAN
K220, -1	RELAY, OVERFLOW DELAY
P2	JACK, HEAT
P18	PLUG, EXHAUST FAN COMPT
P24	PLUG, EXHAUST FAN
P35	JACK, TEST
P36	PLUG, TEST COOL

P86	PLUG, OUTDOOR FANS 1
P132	PLUG, EXHAUST FAN MOTOR 1
P250	JACK, SMOKE DETECTOR ONE
P251	JACK, SMOKE DETECTOR ONE
P252	JACK, SMOKE DETECTOR TWO
P253	JACK, SMOKE DETECTOR TWO
P255	PLUG, MODULE, CONTROL SMOKE DETECTION
S3	SWITCH, LIMIT LOW COMPRESSOR 1
S4	SWITCH, LIMIT HI PRESS COMP 1
S5	SWITCH, LIMIT HI TEMP COMPRESSOR 1
S7	SWITCH, LIMIT HI PRESS COMP 2
S8	SWITCH, LIMIT HI TEMP COMPRESSOR 2
S11	SWITCH, LOW PRESS, LOW AMBIENT KIT
S30	SWITCH, LIMIT LOW COMPRESSOR 2
S42	SWITCH, OVERLOAD RELAY BLOWER MOTOR
S48	SWITCH, DISCONNECT
S49	SWITCH, FREEZESTAT COMP 1
S50	SWITCH, FREEZESTAT COMP 2
S84	SWITCH, LOW PRESS, LOW AMBIENT KIT COMP 2
S149	SWITCH, OVERFLOW
T1	TRANSFORMER, CONTROL

DENOTES OPTIONAL COMPONENTS

LINE VOLTAGE FIELD INSTALLED

WIRING DIAGRAM	03/10
COOLING	
KCA, KGA - 092, 102, 120,150 - G, J, M, Y	
SECTION B	REV. 0.0
Supersedes	New Form No. 537075-02

KGA092/150 Sequence of Operation

Power:

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

Blower Operation:

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

Economizer Operation:

3- The economizer control module receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% outside air damper open (adjustable).

4- N.O. K65-1 and N.O. K65-2 both close, energizing exhaust fan motor B10.

1st Stage Cooling (compressor B1)

5- First stage cooling demand Y1 and G are energized by the thermostat. G energizes blower. 24VAC is routed through TB1 passing N.C. freezestat S49 and optional N.C. high pressure switch S4. Compressor contactor K1 is energized. N.O. contacts K1 close energizing compressor B1.

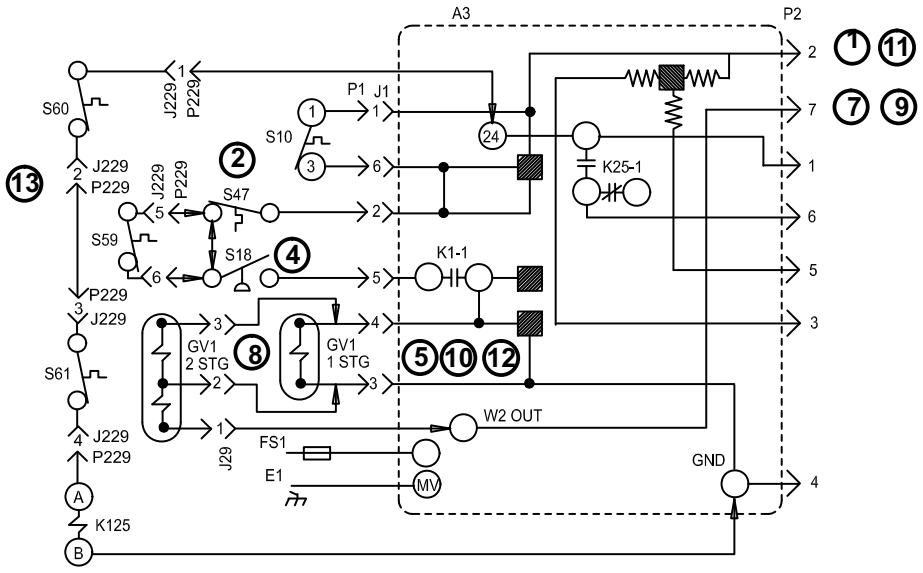
6- Optional N.O. low ambient switch S11 closes to energize condenser fan relay K10. N.O. contacts K10-1 and K10-2 close energizing condenser fans B4 and B5. N.C. contacts K10-1 open de-energizing crankcase heaters HR1 and HR2.

2nd Stage Cooling (compressor B2 is energized)

7- 24VAC is routed through TB1 and proves N.C. freezestat S50 and optional N.C. high pressure switch S7. Compressor contactor K2 is energized. N.O. K2 contacts close energizing compressor B2.

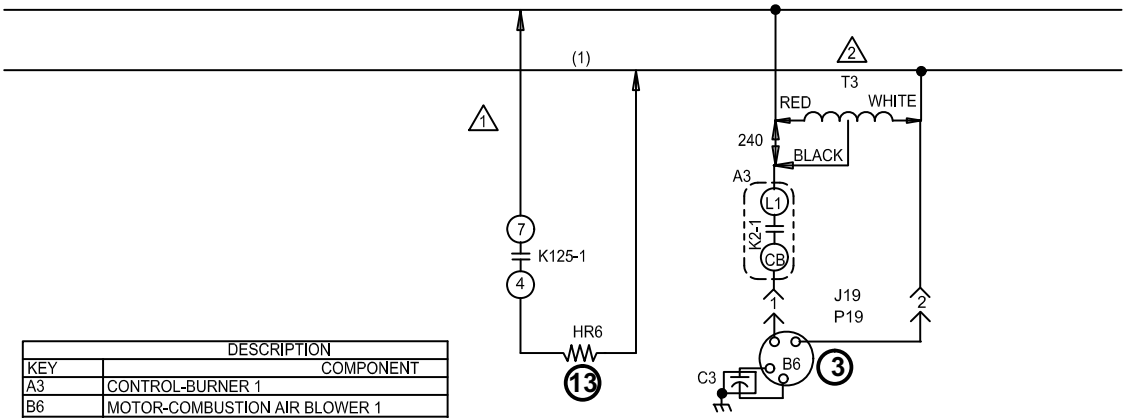
8- Optional N.O. low ambient switch S84 closes to energizing condenser fan relay K10. N.O. contacts K10-1 and K10-2 close energizing condenser fans B4 and B5. N.C. contacts K10-1 open de-energizing crankcase heaters HR1 and HR2.

GAS HEAT FOR KGA092/150 UNITS



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

2 T3 USED ON 480V AND 600V UNITS



DESCRIPTION	
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
J1	JACK-GAS LIMIT
J19	JACK-COMBUSTION AIR BLOWER
J29	JACK-GAS 1
J229	JACK-VESTIBULE HEATER,CONTROL 1
K125,-1	RELAY-HEAT SHUTOFF
P1	PLUG-GAS LIMIT
P2	PLUG-HEAT
P19	PLUG-COMBUSTION AIR BLOWER
P229	PLUG-VESTIBULE HEATER,CONTROL 1
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

WIRING DIAGRAM	8/09
COMBINATION UNIT-ROOFTOP	
GAS HEAT FOR TGA UNITS, 130 THRU 240 UNITS B BOX	
HEATING SECTION-A1	
Supersedes Form No. 535334w	New Form No. 537063-01

GAS HEAT SEQUENCE OF OPERATION

First Stage Heat:

1- The thermostat initiates W1 heating demand.

2- 24VAC is routed from TB1 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. The second stage heat signal passes from TB1 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:

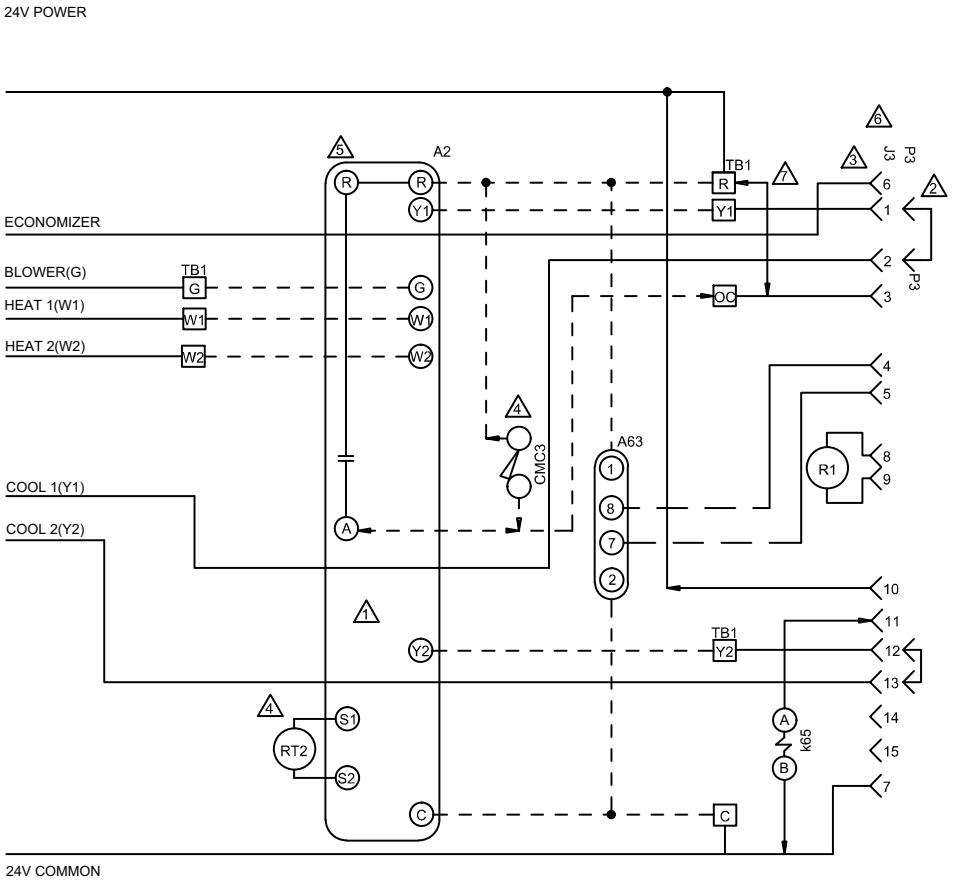
11- Heating demand is satisfied. Terminal W1 (low fire) is de-energized.

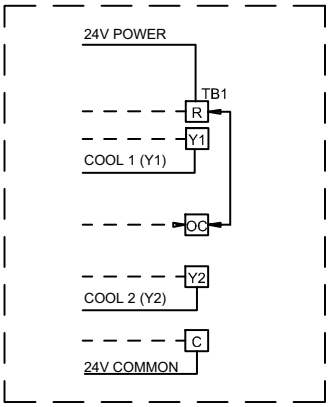
12- Ignition A3 is de-energized in turn de-energizing terminal LO of GV1.

Optional Low Ambient Kit:
(ETL/CSA -50° C Low Ambient Kit)

13- Line voltage is routed through the N.C. low ambient kit thermostats S60 and S61. K125 relay is energized closing N.O. K125-1 contacts and energizing the low ambient kit heater HR6.

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT





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

DESCRIPTION	
KEY	**COMPONENT**
A2	SENSOR, ELECTRONIC THERMOSTAT
A63	SENSOR, CO2
CMC3	CLOCK, TIME
J3	JACK, UNIT ECONOMIZER
K65	RELAY, EXHAUST FAN
P3	PLUG, ECONOMIZER BYPASS
R1	SENSOR, MIXED AIR OR SUPPLY AIR
RT2	SENSOR, REMOTE THERMOSTAT
TB1	TERMINAL STRIP, CLASS II VOLTAGE

1. THERMOSTAT SUPPLIED BY USER
2. REMOVEP3 WHEN ECONOMIZERS USED, ONLY ON KCA, KGA AND KHA 180 THROUGH 300 UNITS.
3. J3 MAXIMUM LOAD 20VA 24VAC CLASS II
4. TIME CLOCK CONTACTS (OPT) CLOSED OCCUPIED
5. TOUCHSCREEN THERMOSTAT
6. J3 AND P3 ARE NOT USED ON KCA, KGA AND KHA 092 THROUGH 150 UNITS WITHOUT ECONOMIZER
7. REMOVE JUMPER BETWEEN TB1-R AND TB1-OCP WHEN USING A NITE SETBACK THERMOSTAT

DENOTES OPTIONAL COMPONENTS
CLASS II FIELD WIRING

WIRING DIAGRAM	12/09
ACCESSORIES	
ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT	
SECTION C	REV. 2.0
Supersedes	New Form No. 537077-01

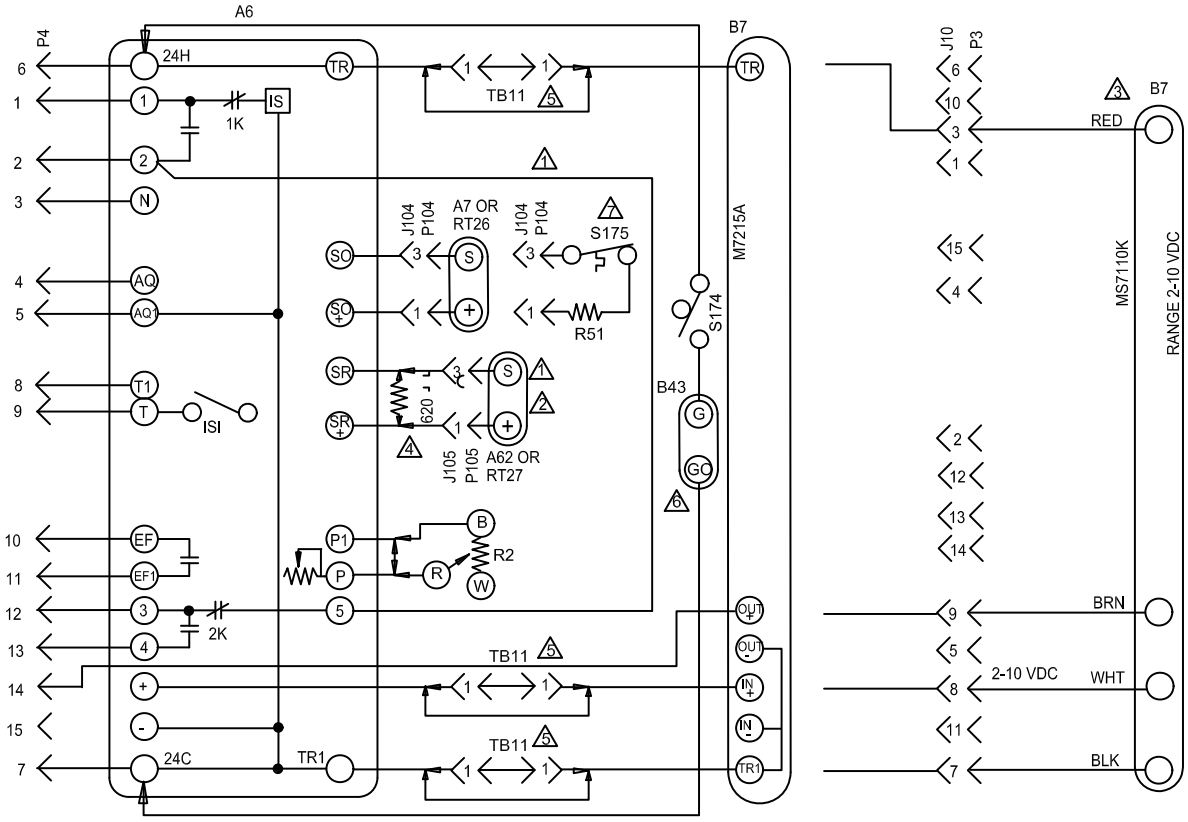
POWER:

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

OPERATION:

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

ECONOMIZER



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

⚠1 OPTIONAL OUTDOOR THERMOSTAT TO REPLACE RT26 SENSIBLE SENSOR

⚠6 OPTIONAL EXHAUST DAMPER TO HOLD EXHAUST DAMPER CLOSED WHEN OUTSIDE AIR DAMPER IS CLOSED

⚠5 TB11 USED ON "C" BOX ONLY WITH MOTOR M7215A

⚠4 REPLACE A7 OR RT26 WITH 620 OHM RESISTOR FOR CONTROLS WITH GLOBAL ECON

⚠3 USED ON C BOX UNITS

⚠2 A62 ENTHALPY SENSOR OR RT27 USED FOR DIFFERENTIAL SENSING

⚠1 RT26 AND RT27, TEMPERATURE SENSORS MAY BE USED INSTEAD OF A7 AND A62 ENTHALPY SENSORS

DESIGNATES OPTIONAL WIRING

CLASS II FIELD WIRING

WIRING DIAGRAM	5/09
ACCESSORIES	
ECONOMIZER	
ECONOMIZER SECTION D1	
Supersedes Form No.	New Form No. 537080-01

SEQUENCE OF OPERATION

POWER:

1- Terminal strip TB1 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.