The TGA180S, 180H, 210S, 210H, 240S, 240H and 300S units are available in 260,000, 360,000 or 480,00 Btuh (76.2, 105.5 or 140.6 kW) heating inputs. Gas heat sections are designed with aluminized steel tube heat exchangers.

The TGA 15, 17.5, 20 and 25 ton packaged gas units are available in standard cooling efficiency (180S, 210S, 240S, 300S) and high cooling efficiency (180H, 210H, 240H).

Cooling capacities range from 15 to 25 tons (53 to 88 kW). TGA180S, 180H, 210S and 240S utilizes three compressors and TGA210H, 240H and 300S utilizes four compressors.

All TGA units are designed to accept any of several different energy management thermostat control systems with minimum field wiring.

Information contained in this manual is intended for use by licensed professional 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.

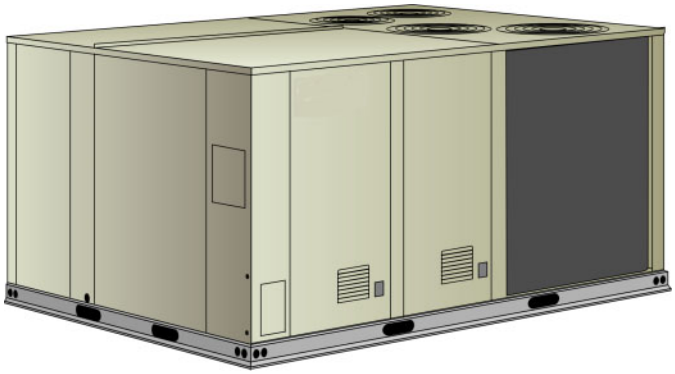
ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ 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.

⚠ 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.



⚠ 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.

Table of Contents

Phone: (803) 738-4000

OPTIONS / ACCESSORIES

Item		180	210	240	300S
COOLING SYSTEM					
Compressor Crankcase Heater	208/230V - T1CCHT01CD1Y	x	x	x	x
	460V - T1CCHT01CD1G	x	x	x	x
	575V - T1CCHT01CD1J	x	x	x	x
Condensate Drain Trap	PVC - LTACDKP09/36	x	x	x	x
	Copper - LTACDKC09/36	x	x	x	x
Corrosion Protection		○	○	○	○
Efficiency	Standard	○	○	○	○
	High	○	○	○	
High Pressure Switch	T1SNSR11C-1	x	x	x	x
Low Ambient Kit	T1SNSR12C-1	x	x	x	x
HEATING SYSTEM					
Cold Weather Kit	208/230V - LTACWK10/15-Y	x	x	x	x
	575V - LTACWK10/15-J	x	x	x	x
Combustion Air Intake Extensions	LTACAIK10/15	[1]x	[1]x	[1]x	[1]x
Gas Heat Input	Standard - 169/260 kBtuh input	○	○	○	○
	Medium - 234/360 kBtuh input	○	○	○	○
	High - 312/480 kBtuh input	○	○	○	○
Gas Piping Kit	Thru unit base - C1GPKT01C-1-	x	x	x	x
LPG/Propane Conversion Kits	Standard - LTALPGK-130	[1]x	[1]x	[1]x	[1]x
	Medium - LTALPGK-180	[1]x	[1]x	[1]x	[1]x
	High - LTALPGK-240	[1]x	[1]x	[1]x	[1]x
Stainless Steel Heat Exchanger		○	○	○	○
Vertical Vent Extension	LTAWEK10/15	[1]x	[1]x	[1]x	[1]x
AIR FILTERS					
MERV 11 High Efficiency	24 x 24 x 2 order 6 per unit - C1FLTR10C-1	x	x	x	x
Replaceable Media Filter Kit with Frame	24 x 24 x 2 order 6 per unit - C1FLTR30C-1	x	x	x	x
BLOWER – SUPPLY AIR – See Blower Data Tables for Specifications					
	Low Static Motor/Drive Combination	○	○	○	○
	Standard Static Motor/Drive Combination (stock unit)	○	○	○	○
	High Static Motor/Drive Combination	○	○	○	○
	[2] Standard to Low Static Conversion Kit - Drive Kit #A - C1DRKT044-1	x			
	[2] Standard to Low Static Conversion Kit - Drive Kit #2 - C1DRKT004-1		x		
	[2] Standard to Low Static Conversion Kit - Drive Kit #9 - C1DRKT045-1			x	
	[2] Standard to Low Static Conversion Kit - Drive Kit #7 - C1DRKT042-1				x
	[3] High to Standard Static Conversion Kit - Drive Kit #3 - C1DRKT038-1	x			
	[3] High to Standard Static Conversion Kit - Drive Kit #7 - C1DRKT042-1		x		
CABINET					
Coil Guards	C1GARD20C-1	x	x	x	x
Hail Guards	C1GARD10C-1	x	x	x	x
Horizontal Return Air Panel Kit	C1HRAP10C-1	x	x	x	x
CONTROLS					
Control Systems	See Pages 19-22	x	x	x	x
Blower Proving Switch	LTABPSK	x	x	x	x
Dirty Filter Switch	LTADFSK	x	x	x	x
Smoke Detector - Supply	LTASASDK10/36	x	x	x	x
Smoke Detector - Return	LTARASDK10/30	x	x	x	x
Indoor Air Quality (Co_2) Sensors					
CO_2 Sensor Duct Mounting Kit	LTIAQSDMK03/36	x	x	x	x
Sensor - white case CO_2 display	LTAIAQSWDK03/36	x	x	x	x
Sensor - white case no display	LTAIAQSWN03/36	x	x	x	x
Sensor - black case CO_2 display	LTAIAQSND03/36	x	x	x	x
Sensor - black case, no display	LTAIAQSDMBN03/36	x	x	x	x
Aspiration Box for duct mounting	LTIAQABD03/36	x	x	x	x
Handheld CO_2 Monitor	LTAIAQSHM03/36	x	x	x	x

NOTE - The catalog and part numbers that appear here are for ordering field installed accessories only.
○ - Configure to Order (Factory Installed). Factory installed items are special order with extended lead times and must be ordered with the unit.
X - Field Installed
[1] Order two each
[2] Standard static drive can be converted to low static drive with field installed kit.
[3] High static drive can be converted to standard static drive with field installed kit.

OPTIONS / ACCESSORIES

Item		180	210	240	300S
ELECTRICAL					
Voltage 60 hz	208/230V - 3 phase	○	○	○	○
	460V - 3 phase	○	○	○	○
	575V - 3 phase	○	○	○	○
HACR Circuit Breakers	T1HACR***-1 (indicate size)	x	x	x	x
Disconnect Switch	80 Amp - T1DISC080-1 - For 460/575V models	x	x	x	x
	150 Amp - T1DISC150-1 - For 208/230V-3ph models	x	x	x	x
GFI Service Outlets	LTAGFIK10/15	x	x	x	x
ECONOMIZER / OUTDOOR AIR					
Economizer - Order Hood Separately	T1ECON10C-1	⊗	⊗	⊗	⊗
Economizer Controls					
Differential Enthalpy	C1SNSR07AE1-	x	x	x	x
Single Enthalpy	C1SNSR06AE1-	⊗	⊗	⊗	⊗
Sensible	TASEK03/36	x	x	x	x
Differential Sensible	TASEK03/36	[1]x	[1]x	[1]x	[1]x
Barometric Relief					
Down-Flow Barometric Relief Dampers - Order Hood Separately	LAGED18/24	⊗	⊗	⊗	⊗
Hood for Down-Flow LAGED	C1HOOD20C-1	x	x	x	x
Horizontal Barometric Relief Dampers - Hood Furnished	LAGEDH18/24	x	x	x	x
Outdoor Air Dampers					
Damper Section (down-flow) - Automatic - Order Hood Separately	T1DAMP20C-1	⊗	⊗	⊗	⊗
Damper Section (down-flow) - Manual - Order Hood Separately	LAOAD18/24	⊗	⊗	⊗	⊗
Outdoor Air Hoods					
Outdoor Air Hood (down-flow) includes 3 - 16 x 25 x 1 in. filters	C1HOOD10C-1	⊗	⊗	⊗	⊗
Power Exhaust					
Standard Static	208/230V - C1PWRE20C-1Y	x	x	x	x
	460V - C1PWRE20C-1G	x	x	x	x
	575V - C1PWRE20C-1J	x	x	x	x
ROOF CURBS – CLIPLOCK 1000					
Down-Flow					
14 in. (356 mm) height	LARMF18/30S-14	x	x	x	x
18 in. (457 mm) height	LARMF18/30S-18	x	x	x	x
24 in. (610 mm) height	LARMF18/30S-24	x	x	x	x
Horizontal					
26 in. (660 mm) height	LARMFH18/24S-26	x	x	x	x
37 in. (940 mm) height	LARMFH18/24S-37	x	x	x	x
ROOF CURBS – STANDARD					
Down-Flow					
14 in. (356 mm) height	LARMF18/36-14	x	x	x	x
24 in. (610 m) height	LARMF18/36-24	x	x	x	x
Horizontal					
26 in. (660 mm) height	LARMFH18/24-26	x	x	x	x
37 in. (940 mm) height	LARMFH18/24-37	x	x	x	x
Insulation Kits for Standard Horizontal Roof Curbs					
for LARMFH18/24-26	C1INSU11C-1	x	x	x	x
for LARMFH18/24-37	C1INSU13C-1	x	x	x	x
CEILING DIFFUSERS					
Step-Down	RTD11-185(S)	x			
Order one	RTD11-275(S)		x	x	x
Flush	FD11-150/180S or FD11-185	x			
Order one	FD11-275(S)		x	x	x
Transitions - (Supply and Return)	LASRT18(S)	x			
Order one	LASRT21/24(S)		x	x	x

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

⊗ - Field Installed or Configure to Order (factory installed). Factory installed items are special order with extended lead times and must be ordered with the unit.

X - Field Installed.

[1] - Order two each

SPECIFICATIONS — 15 - 17.5 TON

General Data	Nominal Tonnage / Model No. / Efficiency Type		15 Ton TGA180S2B Standard	15 Ton TGA180H2B High	17.5 Ton TGA210S2B Standard	17.5 Ton TGA210H2B High
Cooling Performance	Gross Cooling Capacity - Btuh (kW)		186,000 (54.5)	186,000 (54.5)	218,000 (63.8)	219,000 (64.1)
	[1] Net Cooling Capacity - Btuh (kW)		180,000 (52.7)	180,000 (52.7)	210,000 (61.5)	210,000 (61.5)
	ARI Rated Air Flow - cfm (L/s)		6000 (2830)	6000 (2830)	6700 (3160)	7000 (3305)
	Total Unit Power - kW		18.6	16.7	22.1	19.4
	[1] EER (Btuh/Watt)		9.7	10.8	9.5	10.8
	[2] Integrated Part Load Value (Btuh/Watt)		10.1	11.2	9.9	11.2
	Refrigerant Type		R-22	R-22	R-22	R-22
	Refrigerant Charge Furnished	Circuit 1	9 lbs. 0 oz. (4.08 kg)	11 lbs. 8 oz. (5.22 kg)	8 lbs. 0 oz. (3.63 kg)	11 lbs. 0 oz. (4.99 kg)
		Circuit 2	9 lbs. 0 oz. (4.08 kg)	11 lbs. 8 oz. (5.22 kg)	8 lbs. 0 oz. (3.63 kg)	11 lbs. 0 oz. (4.99 kg)
		Circuit 3	9 lbs. 0 oz. (4.08 kg)	11 lbs. 8 oz. (5.22 kg)	8 lbs. 0 oz. (3.63 kg)	11 lbs. 0 oz. (4.99 kg)
		Circuit 4	- - -	- - -	- - -	11 lbs. 0 oz. (4.99 kg)
Gas Heating Options - See Table Below			**Standard (2 Stage) - Medium (2 Stage) - High (2 Stage)**			
Compressor Type (no.)			Scroll (3)	Scroll (3)	Scroll (3)	Scroll (4)
Outdoor Coils	Net face area - sq. ft. (m^2) total		56.0 (5.2)	56.0 (5.2)	56.0 (5.2)	56.0 (5.2)
	Tube diameter - in. (mm)		3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Number of rows		1	2	1	2
	Fins per inch (m)		20 (787)	20 (787)	20 (787)	20 (787)
Outdoor Coil Fans	Motor horsepower (W)		(4) 1/3 (249)	(4) 1/3 (249)	(4) 1/2 (373)	(4) 1/3 (249)
	Motor rpm		1075	1075	1075	1075
	Total Motor watts		1370	1395	1800	1395
	Diameter - in. (mm) - No. of blades		(4) 24 (610) - 3	(4) 24 (610) - 3	(4) 24 (610) - 3	(4) 24 (610) - 3
	Total Air volume - cfm (L/s)		15,850 (7480)	15,450 (7290)	16,000 (7550)	15,450 (7290)
Indoor Coils	Net face area - sq. ft. (m^2) total		22.3 (2.07)	22.3 (2.07)	22.3 (2.07)	22.3 (2.07)
	Tube diameter - in. (mm)		3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	No. of rows		3	3	3	4
	Fins per inch (m)		14 (551)	14 (551)	14 (551)	14 (551)
	Drain connection - number and size		(1) 1 in. NPT coupling		(1) 1 in. NPT coupling	
	Expansion device type		Balanced Port Thermostatic Expansion Valve, removeable power head			
[3, 4] **Indoor Blower and Drive Selection**	Nominal motor HP	Low Static	3 hp (2.2 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)	5 hp (3.7 kW)
		Standard Static	3 hp (2.2 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)	5 hp (3.7 kW)
		High Static	5 hp (3.7 kW)	5 hp (3.7 kW)	7.5 hp (5.6 kW)	7.5 hp (5.6 kW)
	Max. usable motor output (US Only)	Low Static	3.45 hp (2.6 kW)	3.45 hp (2.6 kW)	5.75 hp (4.3 kW)	5.75 hp (4.3 kW)
		Standard Static	3.45 hp (2.6 kW)	3.45 hp (2.6 kW)	5.75 hp (4.3 kW)	5.75 hp (4.3 kW)
		High Static	5.75 hp (4.3 kW)	5.75 hp (4.3 kW)	8.63 hp (6.4 kW)	8.63 hp (6.4 kW)
	Drive Kit	Low Static	#A - 535-725 rpm	#A - 535-725 rpm	#2 - 685-865 rpm	#2 - 685-865 rpm
		Standard Static	#1 - 710-965 rpm	#1 - 710-965 rpm	#3 - 850-1045 rpm	#3 - 850-1045 rpm
		High Static	#4 - 945-1185 rpm	#4 - 945-1185 rpm	#6 - 1045-1285 rpm	#6 - 1045-1285 rpm
	Field Installed Drive Kits	Standard to Low Static	#A - 535-725 rpm	#A - 535-725 rpm	#2 - 685-865 rpm	#2 - 685-865 rpm
		High to Standard Static	#3 - 850-1045 rpm	#3 - 850-1045 rpm	#7 - 850-1045 rpm	#7 - 850-1045 rpm
Blower wheel nominal diameter x width			(2) 15 x 15 in. (381 x 381 mm)			
Filters	Type of filter		Disposable, pleated MERV 7			
	No. and size - in. (mm)		(6) 24 x 24 x 2 (610 x 610 x 51)			
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 ARI Standard 340/360; 95°F (35°C) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering evaporator air; minimum external duct static pressure.

[2] Integrated Part Load Value tested at 80°F (27°C) outdoor air temperature.

[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] Stocked models are available with standard static drives. High static drives are factory installed (configure to order). Low static drive can be factory installed (configure to order) or standard static drives can be converted to low static with field installed kit. High static models can be converted to standard static with field installed kit.

SPECIFICATIONS — 20 - 25 TON

General Data			20 Ton TGA240S2B Standard	20 Ton TGA240H2B High	25 Ton TGA300S2B Standard
	Nominal Tonnage				
	Model No.				
	Efficiency Type				
Cooling Performance	Gross Cooling Capacity - Btuh (kW)		243,000 (71.2)	251,000 (73.5)	302,000 (88.4)
	Net Cooling Capacity - Btuh (kW)		2342,000 (68.5)	240,000 (70.3)	286,000 (83.7)
	ARI Rated Air Flow - cfm (L/s)		8000 (3775)	7500 (3540)	9000 (4245)
	Total Unit Power - kW		24.1	22.2	30.1
	[1] EER (Btuh/Watt)		9.5	10.8	9.5
	[3] Integrated Part Load Value (Btuh/Watt)		10.1	11.2	9.7
	Refrigerant Type		R-22	R-22	R-22
	Refrigerant Charge Furnished	Circuit 1	11 lbs. 8 oz. (5.22 kg)	11 lbs. 8 oz. (5.22 kg)	11 lbs. 0 oz. (4.99 kg)
		Circuit 2	11 lbs. 8 oz. (5.22 kg)	11 lbs. 8 oz. (5.22 kg)	11 lbs. 0 oz. (4.99 kg)
		Circuit 3	11 lbs. 8 oz. (5.22 kg)	11 lbs. 8 oz. (5.22 kg)	11 lbs. 0 oz. (4.99 kg)
		Circuit 4	- - -	11 lbs. 8 oz. (5.22 kg)	11 lbs. 0 oz. (4.99 kg)
Gas Heating Options - See Table below			**Standard (2 Stage) - Medium (2 Stage) - High (2 Stage)**		
Compressor Type (no.)			Scroll (3)	Scroll (4)	Scroll (4)
Outdoor Coils	Net face area - sq. ft. (m^2) total		56.0 (5.2)	56.0 (5.2)	56.0 (5.2)
	Tube diameter - in. (mm)		3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Number of rows		2	2	2
	Fins per inch (m)		20 (787)	20 (787)	20 (787)
Outdoor Coil Fans	Motor horsepower (W)		(4) 1/3 (249)	(4) 1/3 (249)	(4) 1/2 (373)
	Motor rpm		1075	1075	1075
	Total Motor watts		1395	1395	1800
	Diameter - in. (mm) - No. of blades		(4) 24 (610) - 3	(4) 24 (610) - 3	(4) 24 (610) - 3
	Total Air volume - cfm (L/s)		15,450 (7290)	15,450 (7290)	16,000 (7550)
Indoor Coils	Net face area - sq. ft. (m^2) total		22.3 (2.07)	22.3 (2.07)	22.3 (2.07)
	Tube diameter - in. (mm)		3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	No. of rows		3	4	4
	Fins per inch (m)		14 (551)	14 (551)	14 (551)
	Drain connection - no. and size		(1) 1 in. NPT coupling	(1) 1 in. NPT coupling	(1) 1 in. NPT coupling
	Expansion device type		Balanced Port Thermostatic Expansion Valve, removeable power head		
[4, 5] Indoor Blower and Drive Selection	Nominal motor HP	Low Static	5 hp (3.7 kW)	5 hp (3.7 kW)	7.5 hp (5.6 kW)
		Standard Static	7.5 hp (5.6 kW)	7.5 hp (5.6 kW)	10 hp (7.5 kW)
		High Static	10 hp (7.5 kW)	10 hp (7.5 kW)	N/A
	Max. usable motor output (US Only)	Low Static	5.75 hp (4.3 kW)	5.75 hp (4.3 kW)	8.63 hp (6.4 kW)
		Standard Static	8.63 hp (6.4 kW)	8.63 hp (6.4 kW)	11.5 hp (8.6 kW)
		High Static	11.5 hp (8.6 kW)	11.5 hp (8.6 kW)	N/A
	Drive Kit	Low Static	#2 - 685- 865 rpm	#2 - 685-865 rpm	#7 - 850-1045 rpm
		Standard Static	#7 - 850-1045 rpm	#7 - 850-1045 rpm	#6 - 1045-1285 rpm
		High Static	#6 - 1045-1285 rpm	#6 - 1045-1285 rpm	N/A
	Field Installed Low Static Drive Kit		#9 - 685-865 rpm	#9 - 685-865 rpm	#7 - 850-1045 rpm
Blower wheel nominal diameter x width			(2) 15 x 15 in. (381 x 381 mm)		
Filters	Type of filter		Disposable, pleated MERV 7		
	No. and size - in. (mm)		(6) 24 x 24 x 2 (610 x 610 x 51)		
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 ARI Standard 340/360; 95°F (35°C) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering evaporator air; minimum external duct static pressure.

[2] Tested at conditions included in with ARI Standard 340/360; 95°F (35°C) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering evaporator air; minimum external duct static pressure.

[3] Integrated Part Load Value tested at 80°F (27°C) outdoor air temperature.

[4] 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.

[5] Stocked models are available with standard static drives. High static drives are factory installed (configure to order). Low static drive can be factory installed (configure to order) or standard static drives can be converted to low static with field installed kit.

SPECIFICATIONS - GAS HEAT — 15 - 17.5 ton

Usage Data	Model No.		TGA180S2B, TGA180H2B, TGA210S2B, or TGA210H2B		
Gas Heating Performance		Heat Input Type	**Standard (2 Stage)**	**Medium (2 Stage)**	**High (2 Stage)**
	Input - Btuh (KW)	First Stage	169,000 (49.5)	234,000 (68.6)	312,000 (91.4)
		Second Stage	260,000 (76.2)	360,000 (105.5)	480,000 (140.6)
	Output - Btuh (kW)	Second Stage	208,000 (60.9)	288,000 (84.4)	384,000 (112.5)
		CSA Thermal Efficiency	80.0%		
		Gas Supply Connections	1 in. NPT		
Recommended Gas Supply Pressure - Natural / LPG/Propane			7 in. w.g. (1.7 kPa) / 10.8 in. w.g. (2.7 kPa)		

SPECIFICATIONS - GAS HEAT — 20 - 25 ton

Usage Data	Model No.		TGA240S2B, TGA240H2B, or TGA300S2B		
Gas Heating Performance		Heat Input Type	**Standard (2 Stage)**	**Medium (2 Stage)**	**High (2 Stage)**
	Input - Btuh (KW)	First Stage	169,000 (49.5)	234,000 (68.6)	312,000 (91.4)
		Second Stage	260,000 (76.2)	360,000 (105.5)	480,000 (140.6)
	Output - Btuh (kW)	Second Stage	208,000 (60.9)	288,000 (84.4)	384,000 (112.5)
		CSA Thermal Efficiency	80.0%		
		Gas Supply Connections	1 in. NPT		
Recommended Gas Supply Pressure - Natural / LPG/Propane			7 in. w.g. (1.7 kPa) / 11 in. w.g. (2.7 kPa)		

HIGH ALTITUDE DERATE

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 gas manifold pressures shown in table below. NOTE - This is the only permissible derate for these units.

Altitude - ft. (m)	Natural Gas		LPG/Propane	
	in. w.g.	**kPa**	**in. w.g.**	**kPa**
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
8001 - 10,000 (2440 - 3048)	Contact Technical Support			

BLOWER DATA — 15 TON

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT WITH STANDARD GAS HEAT, WET INDOOR COIL & AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:

1 - Any factory installed options air resistance (high gas heat, economizer, etc.). See table below

2 - Any field installed accessories air resistance (duct resistance, diffuser, etc.). See page 18

Then determine from table the blower motor output and drive required.

0.30 to 1.40 in. w.g. — **TGA180**

Air Volume cfm	External Static (in. w.g.)																							
	0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00		1.10		1.20		1.30		1.40	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Low Static – 3 HP, Drive Kit A								Standard Static – 3 HP, Drive Kit 1															
4800	577	1.13	620	1.31	662	1.48	702	1.66	742	1.83	777	2.01	811	2.18	842	2.36	872	2.54	902	2.72	932	2.89	960	3.07
5000	585	1.25	628	1.43	670	1.60	710	1.78	750	1.95	783	2.13	815	2.30	848	2.50	880	2.70	910	2.88	940	3.05	968	3.23
5500	605	1.45	648	1.65	690	1.85	728	2.05	765	2.25	800	2.45	835	2.65	865	2.85	895	3.05	925	3.25	955	3.45	983	3.65
6000	630	1.75	670	1.95	710	2.15	748	2.38	785	2.60	818	2.83	850	3.05	880	3.25	910	3.45	**940**	**3.68**	970	3.90	998	4.13
6500	650	2.05	690	2.28	730	2.50	768	2.75	805	3.00	838	3.23	870	3.45	**900**	**3.70**	**930**	**3.95**	**958**	**4.18**	985	4.40	1013	4.63
7000	675	2.35	715	2.63	755	2.90	790	3.15	825	3.40	**858**	**3.68**	**890**	**3.95**	**920**	**4.20**	**950**	**4.45**	978	4.70	1005	4.95	1030	5.18
7200	687	2.55	725	2.81	763	3.06	798	3.33	**833**	**3.60**	**866**	**3.86**	**898**	**4.11**	**926**	**4.36**	**954**	**4.61**	984	4.90	1013	5.19	1038	5.44

NOTE - **Bold** - To operate in this range, unit must be ordered with High Static Drive and drive kit #3 must be ordered separately for field installation.

1.50 to 2.50 in. w.g. — **TGA180**

Air Volume cfm	External Static (in. w.g.)																					
	1.50		1.60		1.70		1.80		1.90		2.00		2.10		2.20		2.30		2.40		2.50	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	High Static – 5 HP, Drive Kit 4																		Field Furnished Drive			
4800	987	3.24	1014	3.42	1041	3.60	1064	3.78	1087	3.95	1112	4.13	1136	4.30	1159	4.50	1181	4.70	1204	4.88	1226	5.06
5000	995	3.40	1020	3.60	1045	3.80	1070	3.98	1095	4.15	1118	4.33	1140	4.50	1163	4.70	1185	4.90	1208	5.10	1230	5.30
5500	1010	3.85	1035	4.05	1060	4.25	1085	4.48	1110	4.70	1133	4.90	1155	5.10	1178	5.30	1200	5.50	1220	5.70	1240	5.90
6000	1025	4.35	1050	4.58	1075	4.80	1098	5.00	1120	5.20	1145	5.43	1170	5.65	1193	5.88	1215	6.10	1235	6.33	1255	6.55
6500	1040	4.85	1065	5.10	1090	5.35	1115	5.60	***1140***	***5.85***	***1163***	***6.08***	***1185***	***6.30***	1205	6.53	1225	6.75	1248	7.00	1270	7.25
7000	1055	5.40	1080	5.68	***1105***	***5.95***	***1130***	***6.20***	***1155***	***6.45***	***1178***	***6.70***	1200	6.95	1220	7.20	1240	7.45	1263	7.73	1285	8.00
7200	1063	5.68	***1088***	***5.94***	***1113***	***6.19***	***1136***	***6.44***	***1159***	***6.69***	***1182***	***6.96***	1204	7.23	1226	7.50	1248	7.77	1269	8.03	1289	8.28

NOTE - ***Bold, italics*** - drive is capable of the values noted but will exceed motor horsepower.

AIR RESISTANCE (in. w.g.) - Factory Installed Options

Air Volume - cfm	Gas Heat Exchanger		Economizer	Horizontal Roof Curb	MERV 11 Filter
	Med. Heat	High Heat			
4800	.08	.10	- - -	.08	.01
5000	.09	.11	- - -	.08	.01
5500	.10	.13	- - -	.10	.02
6000	.12	.15	- - -	.11	.02
6500	.13	.17	.02	.13	.02
7000	.15	.19	.04	.15	.03
7200	.16	.20	.05	.16	.03

BLOWER DATA 17.5 TON

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT WITH STANDARD GAS HEAT, WET INDOOR COIL & AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:

1 - Any factory installed options air resistance (high gas heat, economizer, etc.). See table below

2 - Any field installed accessories air resistance (duct resistance, diffuser, etc.). See page 18

Then determine from table the blower motor output and drive required.

0.20 to 1.20 in. w.g. **TGA210**

Air Volume cfm	External Static (in. w.g.)																					
	0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00		1.10		1.20	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Furnished				Low Static – 5 HP, Drive Kit 2										Standard Static – 5 HP, Drive Kit 3							
5600	609	1.51	652	1.71	694	1.91	732	2.12	769	2.33	803	2.53	837	2.73	868	2.93	899	3.13	928	3.33	957	3.53
6000	630	1.75	670	1.95	710	2.15	748	2.38	785	2.60	818	2.83	850	3.05	880	3.25	910	3.45	940	3.68	970	3.90
6500	650	2.05	690	2.28	730	2.50	768	2.75	805	3.00	838	3.23	870	3.45	900	3.70	930	3.95	958	4.18	985	4.40
7000	675	2.35	715	2.63	755	2.90	790	3.15	825	3.40	858	3.68	890	3.95	920	4.20	950	4.45	978	4.70	1005	4.95
7500	700	2.75	738	3.03	775	3.30	810	3.58	845	3.85	878	4.15	910	4.45	938	4.70	965	4.95	993	5.23	1020	5.50
8000	725	3.20	763	3.50	800	3.80	833	4.08	865	4.35	898	4.65	930	4.95	958	5.23	985	5.50	**1013**	**5.80**	**1040**	**6.10**
8400	746	3.55	783	3.87	819	4.18	853	4.49	886	4.80	916	5.12	946	5.43	974	5.73	**1001**	**6.03**	**1029**	**6.35**	1056	6.66

NOTE - **Bold** - To operate in this range, unit must be ordered with High Static Drive and drive kit #7 must be ordered separately for field installation.

1.30 to 2.40 in. w.g. **TGA210**

Air Volume cfm	External Static (in. w.g.)																					
	1.30		1.40		1.50		1.60		1.70		1.80		1.90		2.00		2.10		2.20		2.30		2.40	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Standard Static – 5 HP, Drive Kit 3								High Static – 7.5 HP, Drive Kit 6															
5600	985	3.74	1012	3.95	1037	4.15	1062	4.35	1087	4.58	1112	4.80	1135	5.00	1157	5.20	1180	5.41	1202	5.62	1223	5.83	1244	6.04
6000	998	4.13	1025	4.35	1050	4.58	1075	4.80	1098	5.00	1120	5.20	1145	5.43	1170	5.65	1193	5.88	1215	6.10	1235	6.33	1255	6.55
6500	1013	4.63	1040	4.85	1065	5.10	1090	5.35	1115	5.60	1140	5.85	1163	6.08	1185	6.30	1205	6.53	1225	6.75	1248	7.00	1270	7.25
7000	1030	5.18	1055	5.40	1080	5.68	1105	5.95	1130	6.20	1155	6.45	1178	6.70	1200	6.95	1220	7.20	1240	7.45	1263	7.73	1285	8.00
7500	1048	5.78	1075	6.05	1100	6.33	1125	6.60	1148	6.88	1170	7.15	1193	7.40	1215	7.65	1238	7.95	1260	8.25	1280	8.50	*1300*	*8.75*
8000	1065	6.40	1090	6.70	1115	6.98	1140	7.25	1163	7.55	1185	7.85	1208	8.13	1230	8.40	***1253***	***8.70***	***1275***	***9.00***	*1295*	*9.30*	*1315*	*9.60*
8400	1081	6.96	1106	7.26	1131	7.58	1156	7.89	1179	8.19	1201	8.49	***1224***	***8.79***	***1246***	***9.09***	***1266***	***9.38***	*1286*	*9.67*	*1307*	*9.98*	*1328*	*10.29*

NOTE - ***Bold, italics*** - drive is capable of the values noted but will exceed motor horsepower.

Italics - field furnished drive

AIR RESISTANCE (in. w.g.) - Factory Installed Options

Air Volume - cfm	Gas Heat Exchanger		Economizer	Horizontal Roof Curb	MERV 11 Filter
	Med. Heat	High Heat			
5600	.10	.13	- - -	.10	.02
6000	.12	.15	- - -	.11	.02
6500	.13	.17	.02	.13	.02
7000	.15	.19	.04	.15	.03
7500	.17	.21	.06	.17	.03
8000	.19	.24	.09	.19	.04
8400	.20	.26	.11	.21	.04

BLOWER DATA 20 TON

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT WITH STANDARD GAS HEAT, WET INDOOR COIL & AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:

1 - Any factory installed options air resistance (high gas heat, economizer, etc.). See table below

2 - Any field installed accessories air resistance (duct resistance, diffuser, etc.). See page 18

Then determine from table the blower motor output and drive required.

0.20 to 1.10 in. w.g. **TGA240**

Air Volume cfm	External Static (in. w.g.)																					
	.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00		1.10		1.20	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			Low Static – 5 HP, Drive Kit 2										Standard Static – 7.5 HP, Drive Kit 7									
6400	648	1.99	688	2.22	727	2.46	764	2.69	801	2.92	834	3.15	866	3.39	896	3.62	926	3.85	954	4.08	981	4.30
7000	675	2.35	715	2.63	755	2.90	790	3.15	825	3.40	858	3.68	890	3.95	920	4.20	950	4.45	978	4.70	1005	4.95
7500	700	2.75	738	3.03	775	3.30	810	3.58	845	3.85	878	4.15	910	4.45	938	4.70	965	4.95	993	5.23	1020	5.50
8000	725	3.20	763	3.50	800	3.80	833	4.08	865	4.35	898	4.65	930	4.95	958	5.23	985	5.50	1013	5.80	1040	6.10
8500	750	3.65	788	3.98	825	4.30	858	4.60	890	4.90	920	5.23	950	5.55	978	5.85	1005	6.15	1033	6.48	1060	6.80
9000	780	4.20	815	4.53	850	4.85	880	5.18	910	5.50	940	5.83	970	6.15	998	6.48	1025	6.80	1053	7.15	1080	7.50
9600	811	4.87	845	5.22	879	5.57	910	5.94	941	6.31	970	6.67	999	7.02	1027	7.38	1054	7.74	1079	8.08	1104	8.41

1.30 to 2.40 in. w.g. **TGA240**

Air Volume cfm	External Static (in. w.g.)																					
	1.30		1.40		1.50		1.60		1.70		1.80		1.90		2.00		2.10		2.20		2.30		2.40	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Standard Static				High Static – 10 HP, Drive Kit 6																			
6400	1008	4.53	1035	4.75	1060	4.98	1085	5.22	1110	5.45	1135	5.68	1157	5.91	1180	6.15	1202	6.40	1225	6.65	1246	6.88	1268	7.11
7000	1030	5.18	1055	5.40	1080	5.68	1105	5.95	1130	6.20	1155	6.45	1178	6.70	1200	6.95	1220	7.20	1240	7.45	1263	7.73	1285	8.00
7500	1048	5.78	1075	6.05	1100	6.33	1125	6.60	1148	6.88	1170	7.15	1193	7.40	1215	7.65	1238	7.95	1260	8.25	1280	8.50	*1300*	*8.75*
8000	1065	6.40	1090	6.70	1115	6.98	1140	7.25	1163	7.55	1185	7.85	1208	8.13	1230	8.40	1253	8.70	1275	9.00	*1295*	*9.30*	*1315*	*9.60*
8500	1085	7.10	1110	7.40	1135	7.73	1160	8.05	1183	8.35	1205	8.65	1228	8.95	1250	9.25	1270	9.55	*1290*	*9.85*	*1310*	*10.15*	*1330*	*10.45*
9000	1105	7.83	1130	8.15	1153	8.45	1175	8.75	1198	9.08	1220	9.40	1243	9.75	1265	10.10	*1288*	*10.45*	*1310*	*10.80*	*1330*	*11.10*	*1350*	*11.40*
9600	1129	8.77	1154	9.13	1177	9.46	1199	9.78	1222	10.14	1244	10.50	1267	10.87	*1289*	*11.23*	- - -		- - -		- - -		- - -	

NOTE - *italics* - field furnished drive.

AIR RESISTANCE (in. w.g.) - Factory Installed Options

Air Volume - cfm	Gas Heat Exchanger		Economizer	Horizontal Roof Curb	MERV 11 Filter
	Med. Heat	High Heat			
6400	.13	.17	.02	.13	.02
7000	.15	.19	.04	.15	.03
7500	.17	.21	.06	.17	.03
8000	.19	.24	.09	.19	.04
8500	.20	.26	.11	.21	.04
9000	.23	.29	.14	.24	.04
9600	.25	.32	.16	.26	.05

BLOWER DATA — STANDARD 25 TON

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT WITH STANDARD GAS HEAT, WET INDOOR COIL & AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:

1 - Any factory installed options air resistance (high gas heat, economizer, etc.). See table below

2 - Any field installed accessories air resistance (duct resistance, diffuser, etc.). See page 18

Then determine from table the blower motor output and drive required.

0.00 to 1.00 in. w.g. — **TGA300S**

Air Volume cfm	External Static (in. w.g.)																			
	0.00		0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
									Low Static – 7.5 HP, Drive Kit 7													
8000	725	3.20	763	3.50	800	3.80	833	4.08	865	4.35	898	4.65	930	4.95	958	5.23	985	5.50	1013	5.80	1040	6.10
8500	750	3.65	788	3.98	825	4.30	858	4.60	890	4.90	920	5.23	950	5.55	978	5.85	1005	6.15	1033	6.48	1060	6.80
9250	790	4.45	825	4.80	860	5.15	893	5.50	925	5.85	955	6.20	985	6.55	1013	6.88	1040	7.20	1065	7.53	1090	7.85
10000	835	5.40	868	5.78	900	6.15	930	6.50	960	6.85	988	7.23	1015	7.60	1043	7.98	1070	8.35	1095	8.70	1120	9.05
10750	875	6.40	908	6.83	940	7.25	970	7.65	1000	8.05	1028	8.45	1055	8.85	1080	9.25	1105	9.65	1130	10.05	1155	10.45
11500	915	7.40	948	7.88	980	8.35	***1010***	***8.80***	***1040***	***9.25***	1068	9.68	1095	10.10	1118	10.53	1140	10.95	1165	11.40	***1190***	***11.85***

NOTE - ***Bold, italics*** - drive is capable of the values noted but will exceed motor horsepower.

1.10 to 2.20 in. w.g. — **TGA300S**

Air Volume cfm	External Static (in. w.g.)																			
	1.10		1.20		1.30		1.40		1.50		1.60		1.70		1.80		1.90		2.00		2.10		2.20	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Standard Static – 10 HP, Drive Kit 6																				Field Furnished Drive			
8000	1065	6.40	1090	6.70	1115	6.98	1140	7.25	1163	7.55	1185	7.85	1208	8.13	1230	8.40	1253	8.70	1275	9.00	1295	9.30	1315	9.60
8500	1085	7.10	1110	7.40	1135	7.73	1160	8.05	1183	8.35	1205	8.65	1228	8.95	1250	9.25	1270	9.55	1290	9.85	1310	10.15	1330	10.45
9250	1115	8.20	1140	8.55	1163	8.88	1185	9.20	1208	9.53	1230	9.85	1253	10.20	1275	10.55	1295	10.88	1315	11.20	---	---	---	---
10000	1145	9.43	1170	9.80	1193	10.15	1215	10.50	1238	10.88	1260	11.25	1283	11.62	---	---	---	---	---	---	---	---	---	---
10750	1178	10.83	1200	11.20	1222	11.57	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11500	***1210***	***12.23***	***1230***	***12.60***	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

NOTE - ***Bold, italics*** - drive is capable of the values noted but will exceed motor horsepower.

AIR RESISTANCE (in. w.g.) - Factory Installed Options

Air Volume - cfm	Gas Heat Exchanger		Economizer	Horizontal Roof Curb	MERV 11 Filter
	Med. Heat	High Heat			
8000	.19	.24	.09	.13	.04
8500	.20	.26	.11	.15	.04
9250	.24	.30	.15	.18	.05
10,000	.27	.35	.19	.21	.06

BLOWER DATA

CEILING DIFFUSER AIR RESISTANCE

Air Volume		Step-Down Diffuser												Flush Diffuser			
		RTD11-185						RTD11-275						FD11-185		FD11-275	
		2 Ends Open		1 Side/2 Ends Open		All Ends & Sides Open		2 Ends Open		1 Side/2 Ends Open		All Ends & Sides Open					
cfm	L/s	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa
5000	2360	.51	127	.44	109	.39	97	- - -	- - -	- - -	- - -	- - -	- - -	.27	67	- - -	- - -
5200	2455	.56	139	.48	119	.42	104	- - -	- - -	- - -	- - -	- - -	- - -	.30	75	- - -	- - -
5400	2550	.61	152	.52	129	.45	112	- - -	- - -	- - -	- - -	- - -	- - -	.33	82	- - -	- - -
5600	2645	.66	164	.56	139	.48	119	- - -	- - -	- - -	- - -	- - -	- - -	.36	90	- - -	- - -
5800	2735	.71	177	.59	147	.51	127	- - -	- - -	- - -	- - -	- - -	- - -	.39	97	- - -	- - -
6000	2830	.76	189	.63	157	.55	137	.36	90	.31	77	.27	67	.42	104	.29	72
6200	2925	.80	199	.68	169	.59	147	- - -	- - -	- - -	- - -	- - -	- - -	.46	114	- - -	- - -
6400	3020	.86	214	.72	179	.63	157	- - -	- - -	- - -	- - -	- - -	- - -	.50	124	- - -	- - -
6500	3065	- - -	- - -	- - -	- - -	- - -	- - -	.42	104	.36	90	.31	77	- - -	- - -	.34	85
6600	3115	.92	229	.77	191	.67	167	- - -	- - -	- - -	- - -	- - -	- - -	.54	134	- - -	- - -
6800	3210	.99	246	.83	206	.72	174	- - -	- - -	- - -	- - -	- - -	- - -	.58	144	- - -	- - -
7000	3305	1.03	256	.87	216	.76	189	.49	122	.41	102	.36	90	.62	154	.40	99
7200	3400	1.09	271	.92	229	.80	199	- - -	- - -	- - -	- - -	- - -	- - -	.66	164	- - -	- - -
7400	3490	1.15	286	.97	241	.84	209	- - -	- - -	- - -	- - -	- - -	- - -	.70	174	- - -	- - -
7500	3540	- - -	- - -	- - -	- - -	- - -	- - -	.51	127	.46	114	.41	102	- - -	- - -	.45	112
7600	3585	1.20	301	1.02	254	.88	219	- - -	- - -	- - -	- - -	- - -	- - -	.74	184	- - -	- - -
8000	3775	- - -	- - -	- - -	- - -	- - -	- - -	.59	147	.49	122	.43	107	- - -	- - -	.50	124
8500	4010	- - -	- - -	- - -	- - -	- - -	- - -	.69	172	.58	144	.50	124	- - -	- - -	.57	142
9000	4245	- - -	- - -	- - -	- - -	- - -	- - -	.79	196	.67	167	.58	144	- - -	- - -	.66	164
9500	4485	- - -	- - -	- - -	- - -	- - -	- - -	.89	221	.75	186	.65	162	- - -	- - -	.74	184
10,000	4720	- - -	- - -	- - -	- - -	- - -	- - -	1.00	249	.84	209	.73	182	- - -	- - -	.81	201
10,500	4955	- - -	- - -	- - -	- - -	- - -	- - -	1.10	273	.92	229	.80	199	- - -	- - -	.89	221
11,000	5190	- - -	- - -	- - -	- - -	- - -	- - -	1.21	301	1.01	251	.88	219	- - -	- - -	.96	239

BLOWER DATA

CEILING DIFFUSER AIR THROW DATA

Model No.	Air Volume		[1] Effective Throw Range			
			Step-Down		Flush	
	cfm	L/s	ft.	m	ft.	m
	Diffuser Model		RTD11-185		FD11-185	
180 Models	5600	2645	39 - 49	12 - 15	28 - 37	9 - 11
	5800	2740	42 - 51	13 - 16	29 - 38	9 - 12
	6000	2830	44 - 54	13 - 17	40 - 50	12 - 15
	6200	2925	45 - 55	14 - 17	42 - 51	13 - 16
	6400	3020	46 - 55	14 - 17	53 - 52	13 - 16
	6600	3115	57 - 56	14 - 17	45 - 56	14 - 17

Model No.	Air Volume		[1] Effective Throw Range			
			Step-Down		Flush	
	cfm	L/s	ft.	m	ft.	m
	Diffuser Model		RTD11-275		FD11-275	
210, 240, 300S Models	7200	3400	33 - 38	10 - 12	26 - 35	8 - 11
	7400	3490	35 - 40	11 - 12	28 - 37	9 - 11
	7600	3585	36 - 41	11 - 13	29 - 38	9 - 12
	7800	3680	38 - 43	11 - 13	40 - 50	12 - 15
	8000	3775	39 - 44	12 - 13	42 - 51	13 - 16
	8200	3870	41 - 46	12 - 14	43 - 52	13 - 16
	8400	3965	43 - 49	13 - 15	44 - 54	13 - 17
	8600	4060	44 - 50	13 - 15	46 - 57	14 - 17
	8800	4155	47 - 55	14 - 17	48 - 59	15 - 18

DRIVE KIT SPECIFICATIONS

Blower Motor Outputs				RPM Range							
Nominal hp	Maxi-mum hp	Nominal kW	Maxi-mum kW	Drive A	Drive 1	Drive 2	Drive 3	Drive 4	Drive 6	Drive 7	Drive 9
3	3.45	2.2	2.6	535-725	710-965	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
5	5.75	3.7	4.3	- - - -	- - - -	685-865	850-1045	945-1185	- - - -	- - - -	- - - -
7.5	8.63	5.6	6.4	- - - -	- - - -	- - - -	- - - -	- - - -	1045-1285	850-1045	685-865
10	11.5	7.5	8.6	- - - -	- - - -	- - - -	- - - -	- - - -	1045-1285	- - - -	- - - -

*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 by manufacturer 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.

MANUFACTURER'S NUMBERS

		DRIVE COMPONENTS									
		RPM		ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS		SPLIT BUSHING	
Drive No.	**H.P.**	Min	Max	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
A	2 & 3	535	725	1VP40x7/8	79J0301	BK95 x 1-7/16	80K1601	BX59	59A5001	N/A	N/A
1	3	710	965	1VP40x7/8	79J0301	BK72 x 1-7/16	100244-13	BX56	100245-11	N/A	N/A
2	3 & 5 High	685	865	1VP50x1-1/8	P-8-1977	BK100 x 1-7/16	39L1301	BX62	57A7701	N/A	N/A
3	5	850	1045	1VP65x1-1/8	100239-03	BK110H	100788-06	BX66	97J5901	H-1-7/16	49M6201
4	5	945	1185	1VP60x1-1/8	41C1301	BK90H x 1-7/16	100788-04	BX62	57A7701	H-1-7/16	49M6201
5	7.5	945	1185	1VP60x1-3/8	78L5501	BK90H x 1-7/16	100788-04	BX63	97J5501	H-1-7/16	49M6201
6	7.5	1045	1285	1VP65x1-3/8	78M7101	BK90H x 1-7/16	100788-04	BX64	97J5801	H-1-7/16	49M6201
6	10	1045	1285	1VP65x1-3/8	78M7101	1B5V86	78M8301	5VX760	100245-21	B-1-7/16	100246-01
7	7.5	850	1045	1VP65x1-3/8	78M7101	BK110H	100788-06	BX66	97J5901	H-1-7/16	49M6201
8	10	1135	1365	1VP65x1-3/8	78M7101	1B5V80	100240-05	5VX660	100245-20	B-1-7/16	100246-01

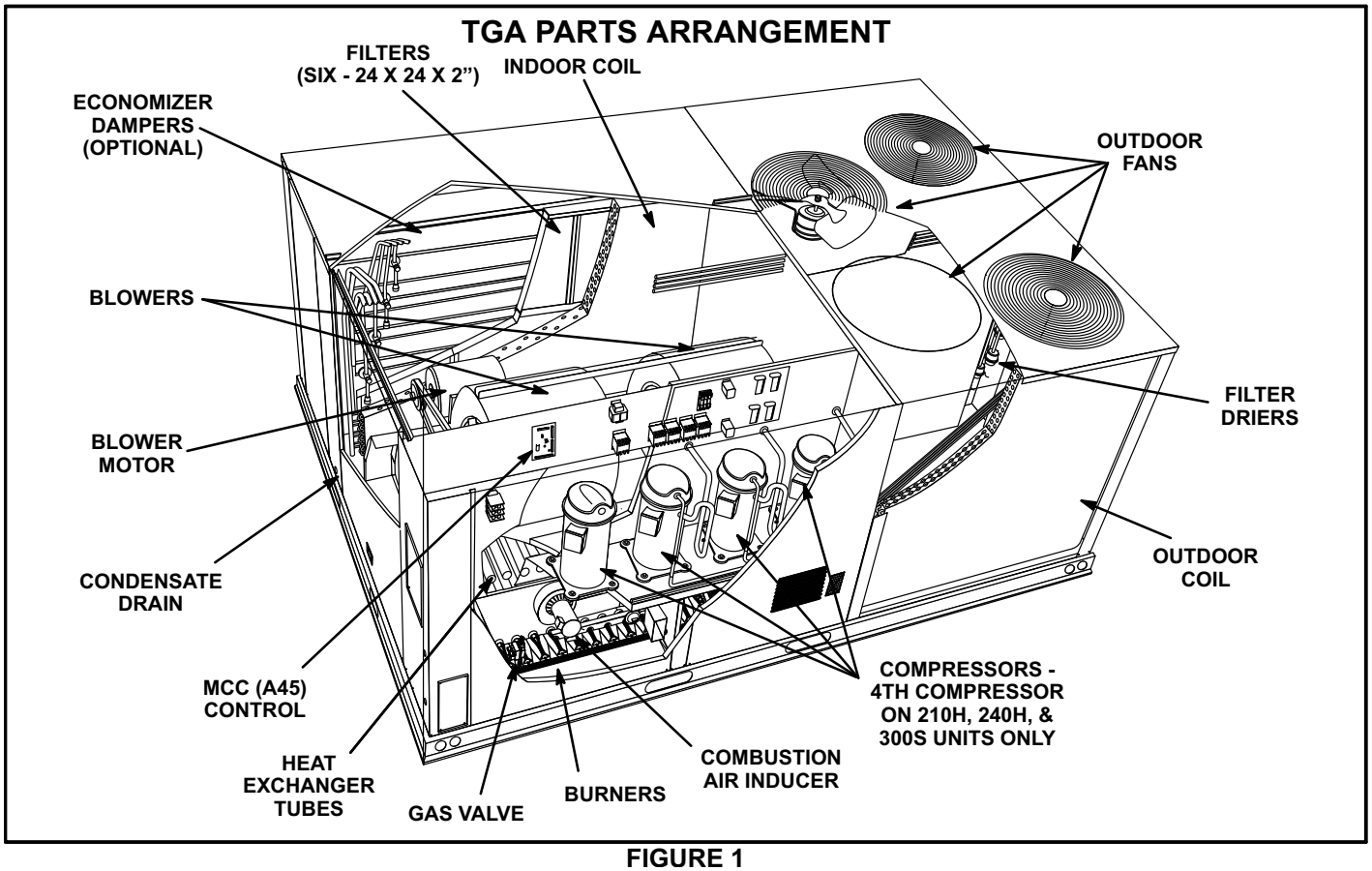


FIGURE 1

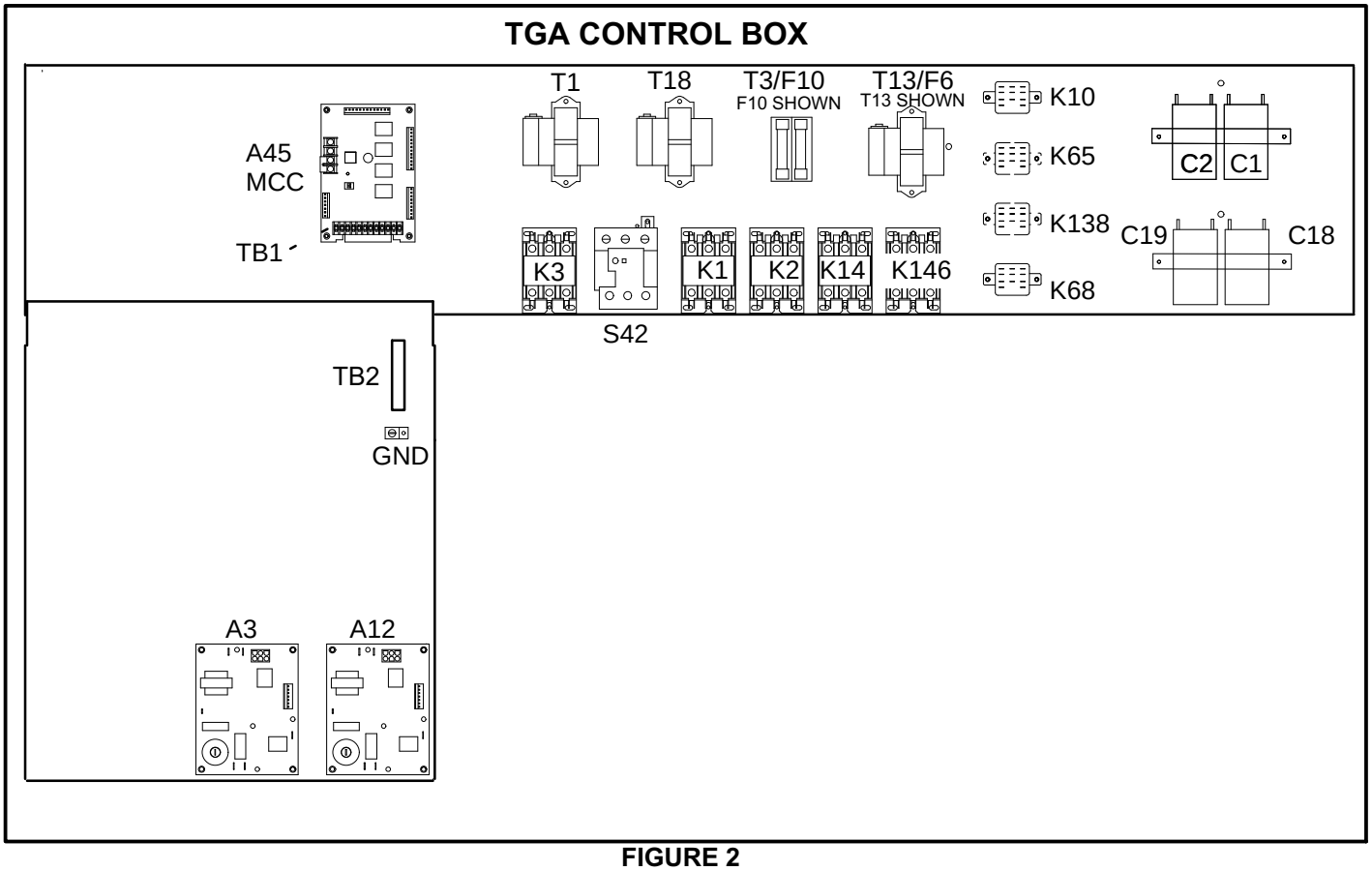


FIGURE 2

I-UNIT COMPONENTS

TGA unit components are shown in figure1. All units come standard with removeable 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

TGA control box components are shown in figure 2. The control box is located in the compressor compartment.

1-Disconnect Switch S48 (field installed)

All units may be equipped with an optional disconnect switch S48, or circuit breaker, CB10. S48 and CB10 can be a toggle switch or a twist style switch. Both types can be used by the service technician to disconnect power to the unit. CB10 when use, will be in the same location as S48 on the wiring diagram.

2-Terminal Strip TB2

All units are equipped with TB2. Units without S48 or CB10 will have incoming power connected to TB2.

3-Control Transformer T1 (all units)

All use a single line voltage to 24VAC transformer mounted in the control box. Transformer supplies power to control circuits in the unit. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB8) which is located on the transformer itself. The 208/230 (Y) voltage transformers have two primary voltage taps, but only one may be used depending on supply voltage. See figure 3. 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

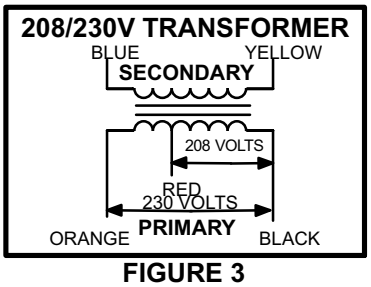


FIGURE 3

4-C. A. I. Transformers T3 & T13 575V Only

All TGA 575 (J) voltage units use transformers T3 and T13 mounted in the control box. The transformers have an output rating of 0.5A. T3 transformer supplies 230 VAC power to combustion air inducer motor B6 and T13 supplies 230 VAC to combustion air inducer motor B15.

5-Contactor Transformer T18

T18 is a single line voltage to 24VAC transformer used in 4 compressor units only. Transformer T18 is protected by a 3.5 amp circuit breaker (CB18) located on the transformer itself. T18 is identical to transformer T1. The transformer supplies 24VAC power to the contactors.

6-Terminal Strip TB1

All indoor thermostat connections will be to TB1 located on MCC board A45. For thermostats with “occupied “ and “unoccupied” modes, a factory installed jumper across terminals A1 and A2 should be removed. Unit wiring is designed for a three-stage thermostat. For two-stage applications jumper between Y2 and Y3 on TB1.

7-Terminal Strip TB14

Terminal strip TB14 located on the MCC board A45 distributes 24V power from transformer T1 to the control box components. Units not equipped with smoke detectors A17 or A64, will have a factory installed jumper across terminals 24VAC and R.

8-Outdoor Fan Capacitors C1, C2, C18 & C19

Fan capacitors C1, C2, C18, C19 are 10 MFD / 370V capacitors used to assist in the start up of condenser fans B4, B5, B21, B22 respectively.

9-Outdoor Fan Relay K10 & K68

Outdoor fan relays K10 and K68 used in all units, are DPDT relays with a 24VAC coil. In all TGA units K10 energizes condenser fans B4 and B5 and K68 energizes condenser fans B21 and B22.

10-Fuses F10 and F6

Two line voltage fuses F10 provide overcurrent protection to all condenser fans in all Y voltage TGA units and rated at 30A. Fuses F6 provide overcurrent protection for optional field installed power exhaust fans and rated at 15A.

11-Compressor Contactor K1, K2 & K14 (all units) K146 (TGA 210H, 240H, 300S units only)

All compressor contactors are three-pole-double-break contactors with 24VAC coils. In all TGA180, 210S and 240S units, K1, K2 and K14 energize compressors B1, B2 and B13 in response to thermostat demand. In the TGA210H, 240H and 300S units, K1, K2, K14 and K146 energize compressors B1, B2, B13 and B20 in response to thermostat demand.

12-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 relay KD on the A45 MCC board.

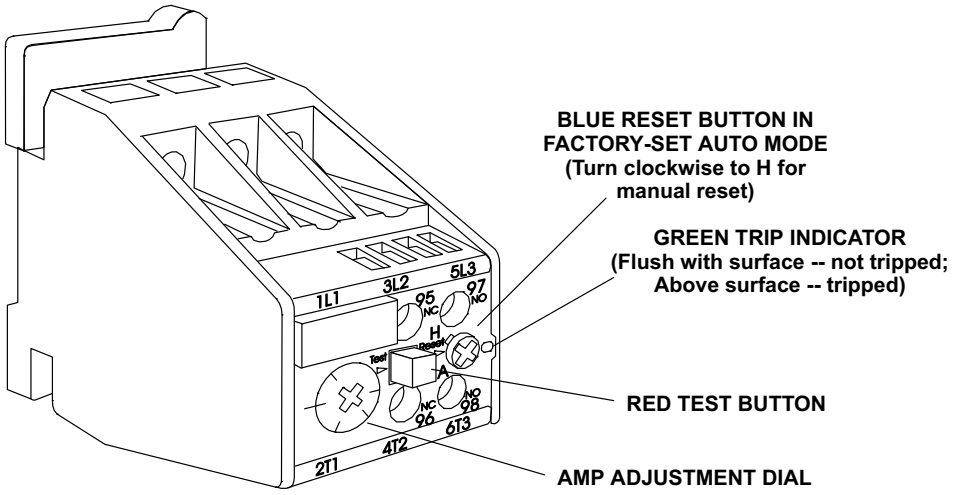
13-Blower Motor Overload Relay S42

S42 is a manual reset overload relay, used in all TGA units equipped with 10 or more HP standard efficiency motors. The relay is connected in line with the blower motor to monitor the current flow to the motor. When the relay senses an overload condition, a set of normally closed contacts opens de-energizing the 24 volt output of T1. See figure figure 4.

14-Power Exhaust Relay K65 (PED units)

Power exhaust relay K65 is a DPDT relay with a 24VAC coil. K65 is used in Y voltage units equipped with the field installed 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 fans B10 and B11 are energized.

SIEMENS OVERLOAD RELAY



Adjust relay amp setting according to value given on the blower motor nameplate. Proper relay amp setting equals motor nameplate FLA X service factor of 1.15 X .95.
Use small slotted screwdriver to adjust control mode from automatic reset (A) to manual reset (H). Control must be in the manual reset mode (H) to perform a test. Press the red test button. Green trip indicator should pop out. Press the blue reset screw to reset the relay.

FIGURE 4

CONTROL BOARDS A3, A12 & A45

15-Ignition Control A3 & A12

⚠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 main control box (see figure 2) houses the ignition control (A3), (A12) and control module (A45).

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 1). The unit will usually ignite on the first attempt and allows three attempts for ignition before locking out. The lockout time is 1 hour. After lockout time expires the ignition control automatically resets and begins the ignition sequence again. 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 2 for thermostat terminations and table 3 for heating component terminations.

TABLE 1

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

IGNITION CONTROL A3 & A12

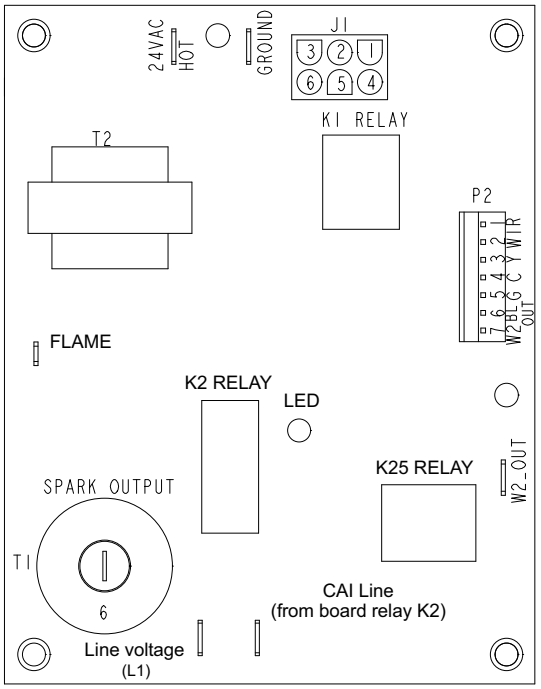


FIGURE 5

TABLE 2

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 3

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

Flame sensing is used on all TGA 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 for one hour 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 lockout (one hour) after which time the control resets and the process begins again.

Operation

On a heating demand, the ignition control checks the limit switch (closed) and combustion air prove switch (open). Once this check is complete and conditions are correct, the ignition control energizes the CAI allowing 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. 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.

16-MCC Control A45

The main control module A45 (figure 6) controls all cooling operation and serves as a staging point for all internal inputs to the appropriate components of the TGA unit. The MCC control receives and sends out 24 volts to the components located in the TGA control box, economizer and supply/return compartments. The control communicates to compressor contactors K1, K2 and K14/K146 (if applicable) and indoor blower contactor K3. Thermostat hook ups (TB1) and accessory low voltage hook ups (TB14) are located on the board. See tables 5 and 6 for terminal designations. Tables 7, 8, 9 and 10 show pin terminal designations.

Features

The MCC is equipped with a green LED for board status. See table 4 for LED flash codes. While in the cooling mode the board will incorporate AUTO-STAGING. If the board receives a Y3 demand (if applicable) the board will energize Y1, Y2 and Y3 in successive order. In the same manner a Y2, will be interpreted as a Y1/Y2. The MCC control also incorporates a minimum run time of 4 minutes for up to 3 independent cooling stages. This 4 minute run time can be interrupted by pushing SW1 located on the board. If pressed for 3 seconds or more, the control does a soft reset. The MCC control board is used for all T Class units. A dip switch, factory set, is provided to configure to unit type (TGA gas, TCA cooling/electric heat, THA heat pump) See figure 6.

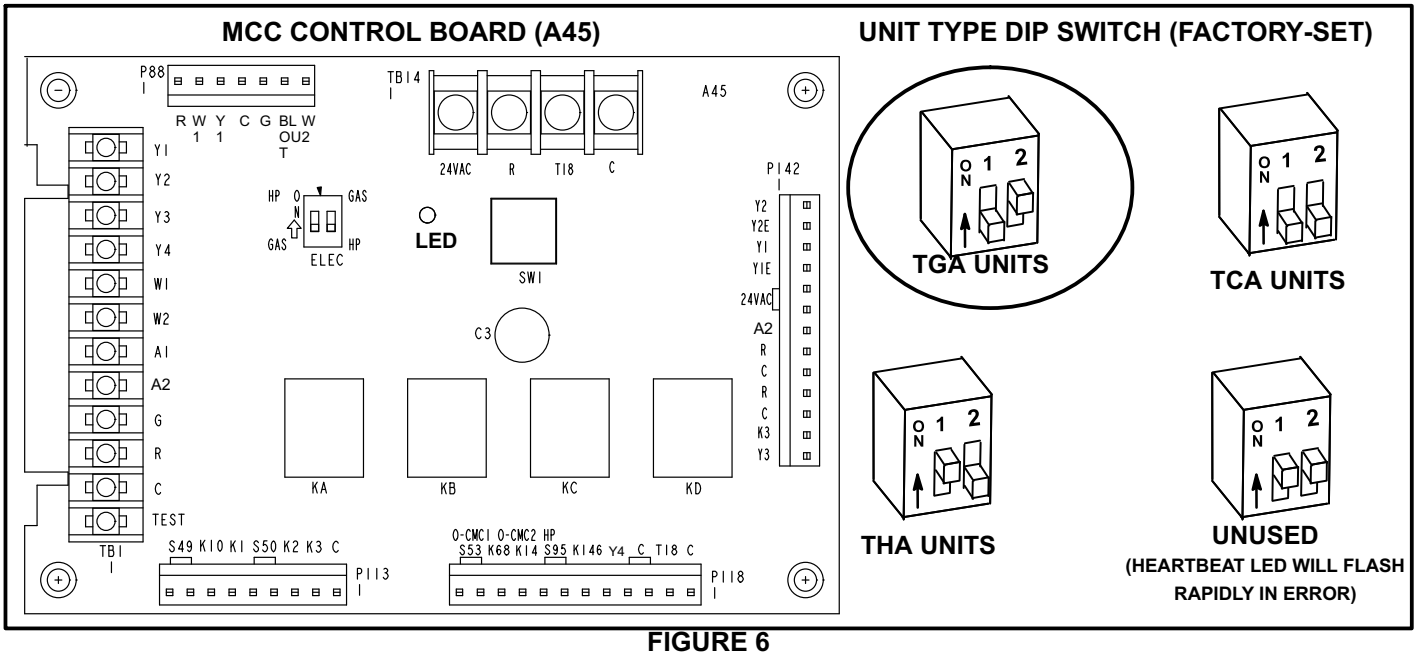


FIGURE 6

TABLE 4

LED Status	Indicates	Action
Off	No power to board.	Check field wiring.
On	Processor error.	Press MCC pushbutton and hold for three seconds to reset processor.*
Flashes Slowly	Normal.	None.
Flashes Rapidly	Invalid unit DIP switch selected.	Make sure switches are set correctly. Refer to figure NO TAG.
Flashes Rapidly	Simultaneous heat and cool demands.	Check thermostat and wiring.

*Press pushbutton and immediately release to override the 4-minute compressor-minimum run time.

TABLE 5

TB1 TERMINAL DESIGNATIONS	
Y1	Cool Stage 1
Y2	Cool Stage 2
Y3	Cool Stage 3
Y4	Cool Stage 4
W1	Heat Stage 1
W2	Heat Stage 2
A1	Occupied Loop
A2	Occupied Loop
G	Indoor Blower
R	24V To Thermostat
C	Ground
TEST	Test Terminal (Disable Min Run Time)

TABLE 6

TB14 24VAC TERMINAL DESIGNATIONS	
24VAC	Uninterrupted 24 Volt Power
R	24 Volt Accessories (from T1 transformer)
T18	24 Volts (from T18 transformer)
C	Ground

TABLE 7

P142 TERMINAL DESIGNATIONS	
Terminal	**Function**
Y2	To Economizer (cool 2)
Y2E	To Processor (micro chip)
Y1	To Economizer (cool 1)
Y1E	To Processor (micro chip)
24V	To Smoke Detector
24V	From T1 Transformer
A2	Occupied Loop from Thermostat
R	To Economizer
C	Ground to Economizer
R	From Transformer T1
C	Ground
K3	From Transformer T18
Y3	To Processor (micro chip)

TABLE 8

P113 TERMINAL DESIGNATIONS	
Terminal	**Function**
S49	Relay KC To Freezestat
S49	From Freezestat
K10	Relay KA To Outdoor Fan Relay
K1	Freeze Stat to Compressor Contactor
S50	Relay KB To Freeze Stat
S50	From Freeze Stat
K2	Freeze Stat To Compressor Contactor
K3	KD To Fan Relay
C	Ground To Cooling Components

TABLE 9

P88 TERMINAL DESIGNATIONS	
Terminal	**Function**
R	24V To A3
W1	Heat Stage 1 to A3
Y1	Cooling Stage to A3
C	Ground to A3
G	Blower Demand to A3
BL Out	Blower Out from A3
W2	Heat Stage 2 to A3

TABLE 10

P118 TERMINAL DESIGNATIONS	
Terminal	**Function**
S53	Relay KC to Freezestat
S53	From Freezestat
K68	Relay KD to Outdoor Fan Relay
K14	Freezestat to Compressor Contactor
S95	Relay KC to Freezestat
S95	From Freezestat
K146	Freezestat to Compressor Contactor
Y4	Cool Stage 4 from TB1
C	Ground
C	Ground
T18	24V from T18
C	Ground

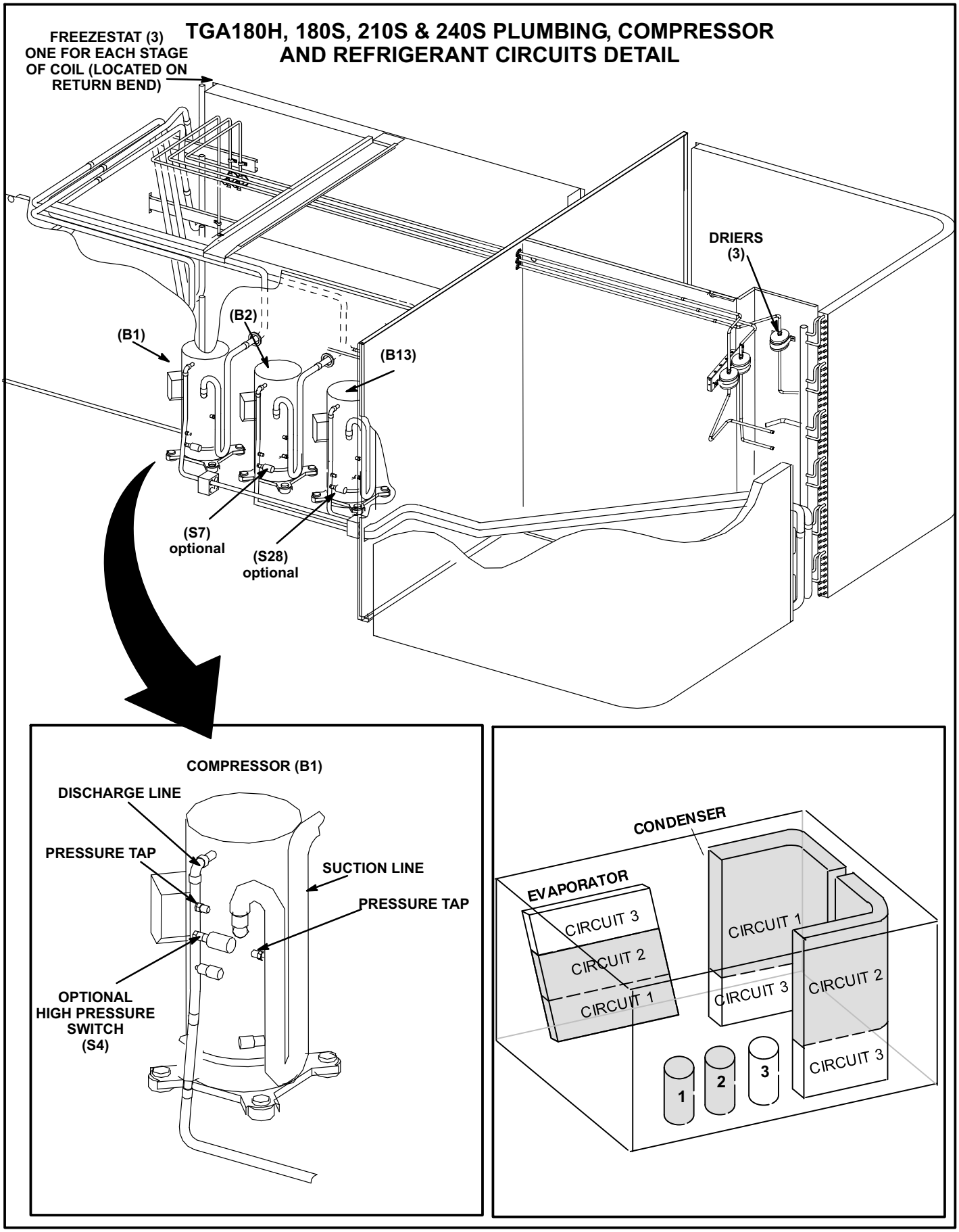

TGA180H, 180S, 210S & 240S PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL
FREEZESTAT (3) ONE FOR EACH STAGE OF COIL (LOCATED ON RETURN BEND)
DRIERS (3)
(B1)
(B2)
(B13)
(S7) optional
(S28) optional
COMPRESSOR (B1)
DISCHARGE LINE
PRESSURE TAP
SUCTION LINE
PRESSURE TAP
OPTIONAL HIGH PRESSURE SWITCH (S4)
CONDENSER
EVAPORATOR
CIRCUIT 3
CIRCUIT 2
CIRCUIT 1
CIRCUIT 1
CIRCUIT 3
CIRCUIT 2
CIRCUIT 3
1
2
3

FIGURE 7

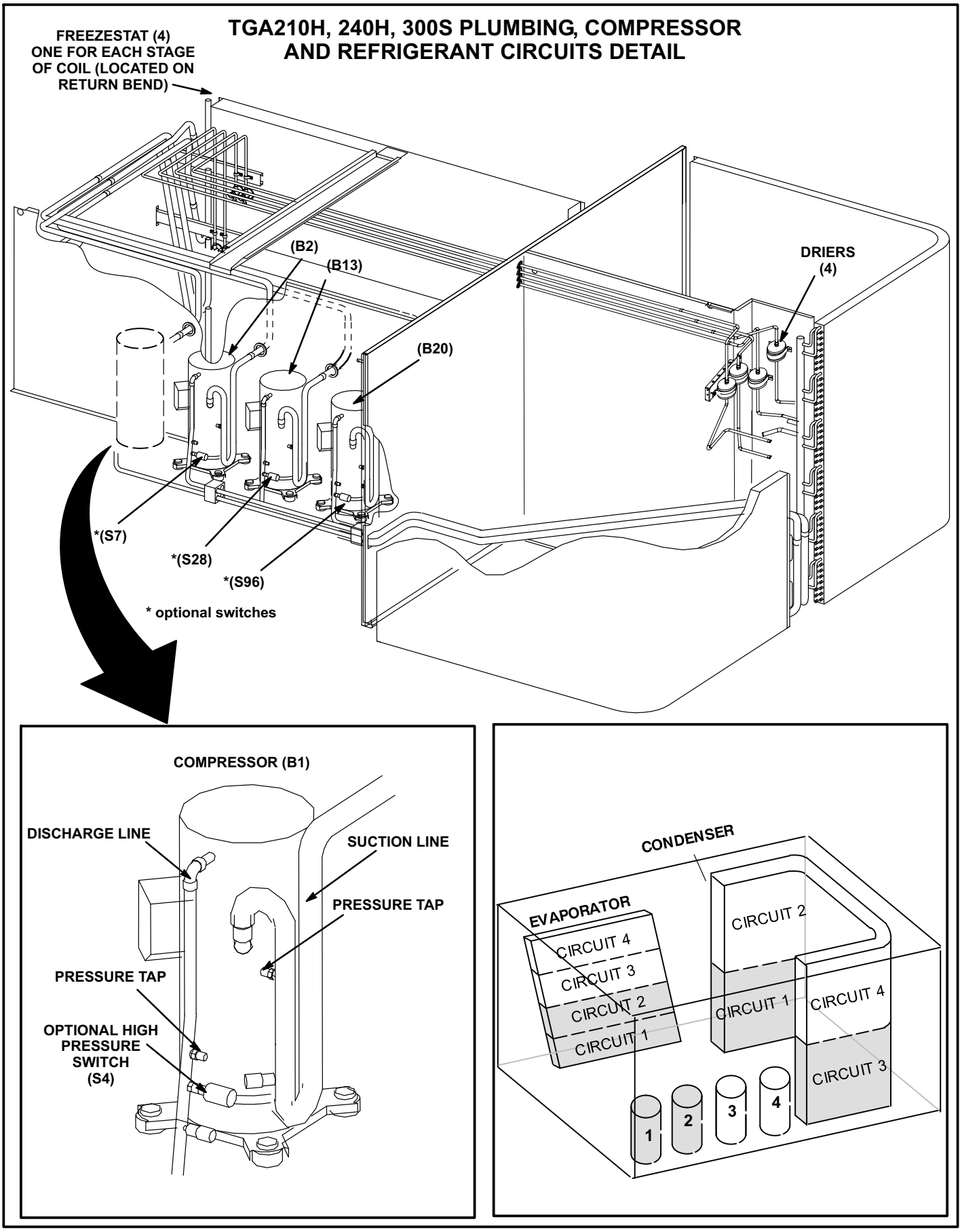

TGA210H, 240H, 300S PLUMBING, COMPRESSOR AND REFRIGERANT CIRCUITS DETAIL
FREEZESTAT (4) ONE FOR EACH STAGE OF COIL (LOCATED ON RETURN BEND)
(B2)
(B13)
(B20)
DRIERS (4)
*(S7)
*(S28)
*(S96)
* optional switches
COMPRESSOR (B1)
DISCHARGE LINE
SUCTION LINE
PRESSURE TAP
PRESSURE TAP
OPTIONAL HIGH PRESSURE SWITCH (S4)
CONDENSER
EVAPORATOR
CIRCUIT 4
CIRCUIT 3
CIRCUIT 2
CIRCUIT 1
CIRCUIT 2
CIRCUIT 1
CIRCUIT 4
CIRCUIT 3
1
2
3
4

FIGURE 8

B-Cooling Components

All units use independent cooling circuits consisting of separate compressors, condenser coils and evaporator coils. See figures 7 and 8. Four draw-through type condenser fans are used in TGA180/300 units. All units are equipped with belt-drive blowers which draw air across the evaporator during unit operation.

Cooling may be supplemented by an optional field-installed economizer. The evaporators are slab type and are stacked. Each evaporator uses a thermostatic expansion valve as the primary expansion device. Each evaporator is also equipped with enhanced fins and rifled tubing. In all units each compressor is protected by a freezestat (on each evaporator). Optional field installed low ambient switches and optional field installed high pressure switches are available for additional compressor protection.

1-Compressors B1, B2 & B13 (all units) B20 (TGA210H/240H/300S only)

All TGA180/300 units use scroll compressors. TGA180, 210S and 240S units use 3 compressors and TGA210H, 240H and 300S use four compressors. All compressors are equipped with independent cooling circuits. 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.

2-High Pressure Switches (optional) S4, S7 & S28 (all units) S96 (TGA210H, 240H, 300S only)

The high pressure switch is a manual reset N.C switch which opens on a pressure rise.

S4 (first circuit), S7 (second circuit), S28 (third circuit), and S96 (fourth circuit) are wired in series with the respective compressor contactor coils.

When discharge pressure rises to 450 ± 10 psig (3103 ± 69 kPa) (indicating a problem in the system) the switch opens and the respective compressor is DE-energized (the economizer can continue to operate).

3-Low Ambient Switches (optional) S11, S84 & S85 (all units) S94 (210H, 240H, 300S only)

The low ambient switch is an optional field installed auto-reset N.O. pressure switch which allows for mechanical cooling operation at low outdoor temperatures. The switch is located in each liquid line prior to the indoor coil in the blower compartment.

In three compressor units, S11 (compressor 1)is wired in parallel with outdoor fan relay K10 coil. S84 (compressor 2) and S85 (compressor 3) are wired in parallel with the outdoor fan relay K68 coil.

In four compressor units, S11 (compressor 1) and S84 (compressor 2) are wired in parallel with outdoor fan relay K10. S85 (compressor 3) and S94 (compressor 4) are wired parallel with outdoor fan relay K68.

When liquid pressure rises to 275 ± 10 psig (1896 ± 69 kPa), that switch closes. When discharge pressure in one refrigerant circuit drops to 150 ± 10 psig (1034 ± 69 kPa), that switch opens. The pair of condenser fans are energized when one switch in parallel with the outdoor fan relay closes. To de-energize the outdoor fan relay, both switches in parallel must open before the fans are de-energized. This intermittent fan operation results in higher evaporating temperature allowing the system to operate without icing the evaporator coil and losing capacity.

4-Filter Drier (all units)

TGA units have a filter drier located in the liquid line of each refrigerant circuit at the exit of each condenser coil. The drier removes contaminants and moisture from the system.

5-Freezestats S49, S50 & S53 (all units) S95 (TAG210H/240H/300S only)

Each unit is equipped with a low temperature switch located on a return bend of each evaporator coil. S49 (first circuit), S50 (second circuit) and S53 (third circuit) are located on the corresponding evaporator coils. On the 210H, 240H and 300S models, S95 is located on the fourth circuit.

Each freezestat is wired in series with the corresponding compressor contactor. Each freezestat is an 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.

6-Condenser Fans B4, B5, B21 & B22

See SPECIFICATIONS tables at the front of this manual for specifications of condenser fans used in all units. All condenser fans used have single-phase motors. The fan assembly may be removed for servicing and cleaning.

C-Blower Compartment

The blower compartment in TGA180/300 units is located between the evaporator coil and the compressor / control section on the opposite side of the condenser coil. The blower assembly is accessed by removing the screws on either side of the sliding base. The base pulls out as shown in figure 11.

1-Blower Wheels

All TGA180/300 units have two 15 in. x 15 in. (381 mm x 381 mm) blower wheels. Both wheels are driven by one motor mounted on a single shaft. Shaft bearings are equipped with grease ports for service.

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 elector-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.

Blower Access

The blower assembly is secured to a sliding base which allows the entire assembly to be pulled out of the unit. See figure 11.

1- Remove the clamp which secures the blower wiring to the blower motor base.

2- Remove and retain screws on either side of sliding base. Pull base toward outside of unit. When pulling the base out further than 12" (305mm), disconnect wiring to K3 blower contactor T1, T2, and T3. Pull wiring toward blower to allow enough slack to slide the base out further.

3- Slide base back into original position when finished servicing. Replace the clamp and blower wiring in the previous location on the blower motor base. Reconnect wiring to K3 if it was disconnected.

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

Determining Unit Air Volume

1- The following measurements must be made with a dry indoor coil. Run blower without cooling demand. 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).

3- Measure the indoor blower wheel RPM.

4- 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.

5- The RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase RPM. Turn counterclockwise to decrease RPM. See figure 11 for TGA180/300 units.

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 9.

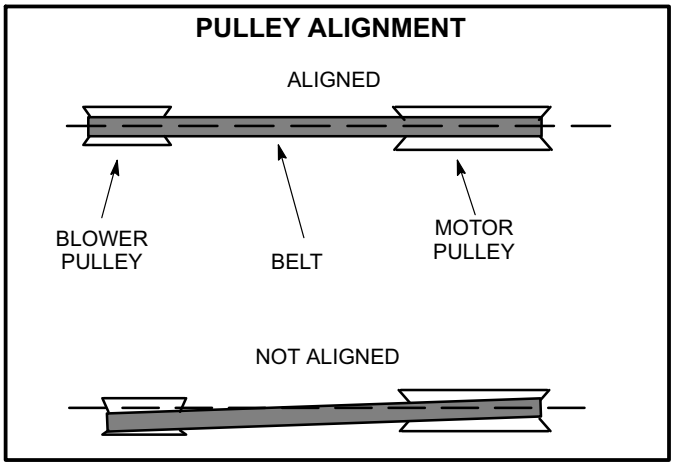


FIGURE 9

1- Loosen four bolts securing motor base to mounting frame. See figure 11.

2- *To relieve belt tension -*
Turn adjusting bolt to the right, or clockwise, to move the motor upward and loosen the belt. This decreases the distance between the blower motor pulley and the blower housing pulley.

To increase belt tension -
Turn the adjusting bolt to the left, or counterclockwise to increase belt tension. This increases the distance between motor pulley and blower housing pulley (motor moves downward and tightens belt).

3- Tighten four bolts securing motor base to mounting frame.

IMPORTANT - Align top edges of blower motor base and mounting frame base parallel before tightening bolts on the both sides of base. Motor shaft and blower shaft must be parallel.

Check Belt Tension

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

1- Measure span length X. See figure 10.

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

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

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

3- Measure belt deflection force. For a 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.

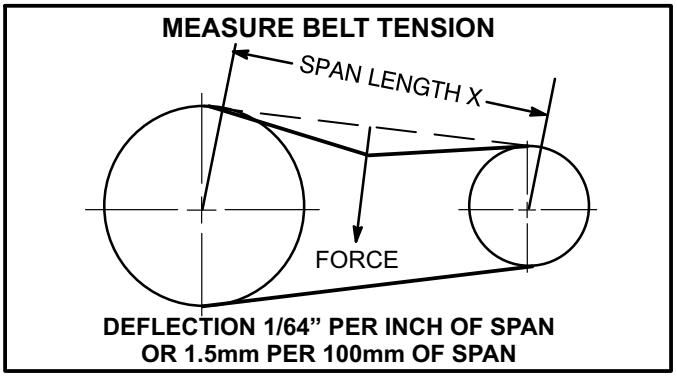


FIGURE 10

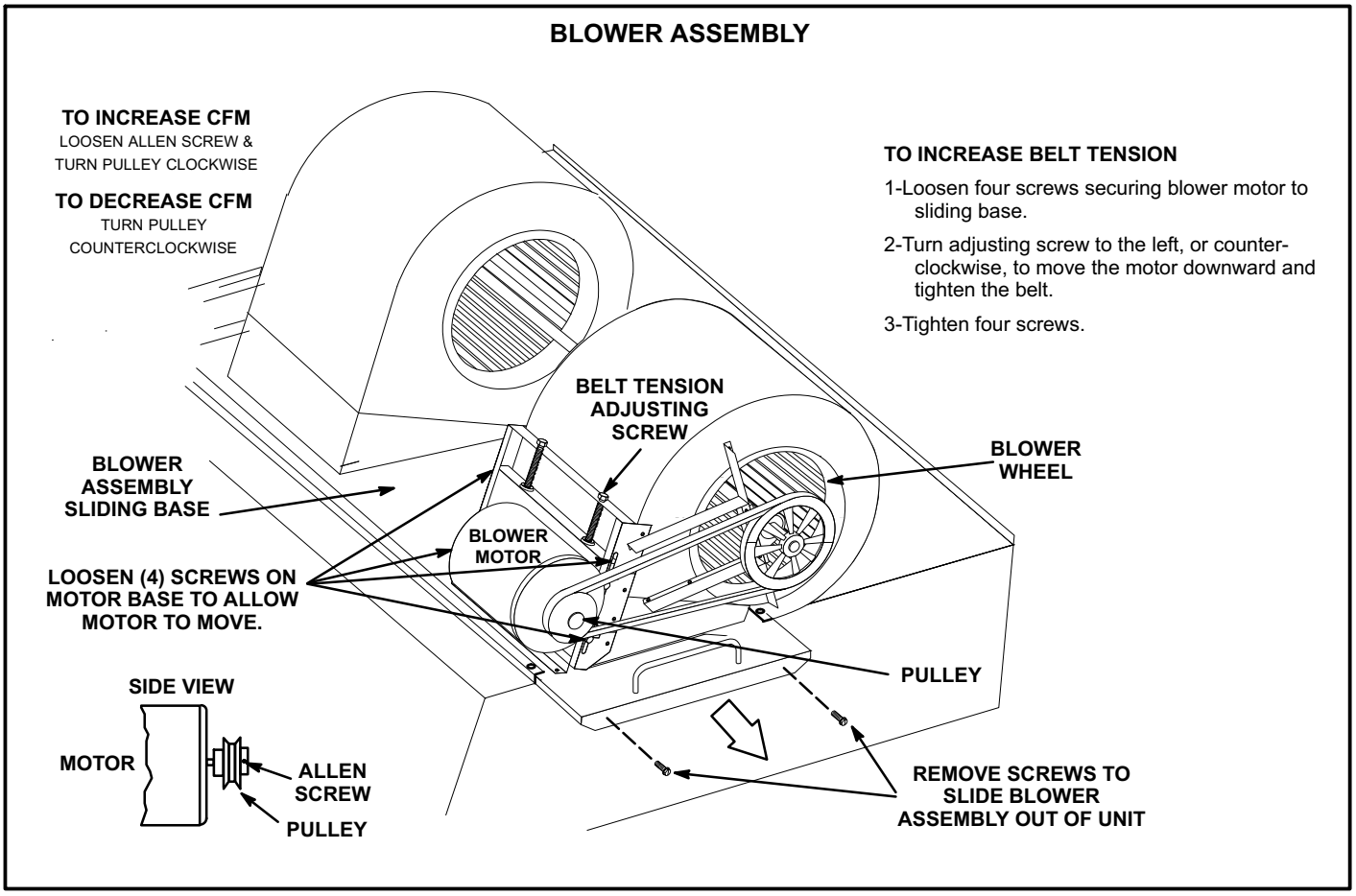


FIGURE 11

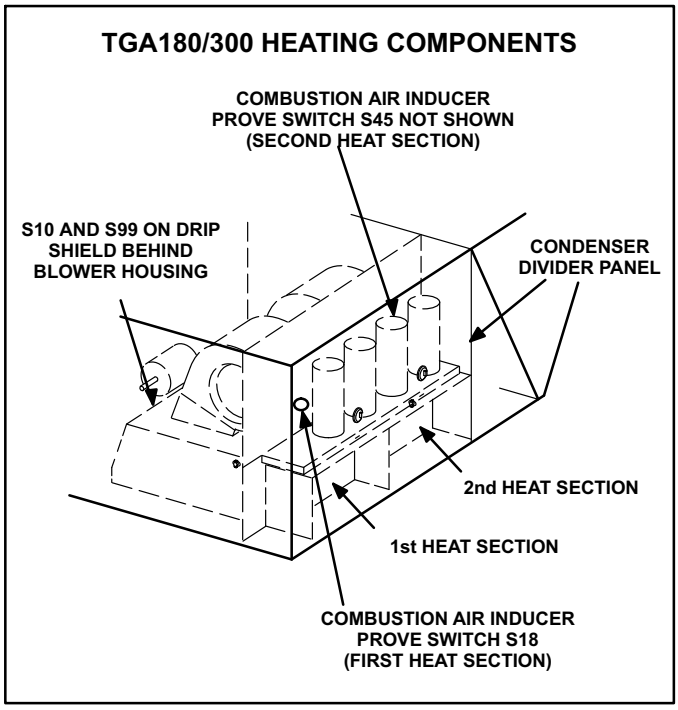


FIGURE 12

D-GAS HEAT COMPONENTS

See SPECIFICATIONS tables or unit nameplate for Btuh capacities. TGA180/300 units are equipped with two identical gas heat sections (gas heat section one and gas heat section two).

Heat sections consists of heat exchanger and buner box assembly. See figures 13 and 14. Flexible pipe will feed supply gas to both sections. If for service the flexible connection must broken, hand tighten then turn additional 1/4" with a wrench for metal to metal seal (do not overtighten).

NOTE - Do not use thread sealing compound on flex pipe flare connections.

1-Heat Exchanger (Figure 13)

The TGA units use aluminized steel inshot burners with matching tubular aluminized steel heat exchangers and two-stage redundant gas valves. TGA180/300 units use two six tube/burners for standard heat, two nine tube/burners for medium heat and two eleven tube/burner for high 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 blowers force air across all surfaces of 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.

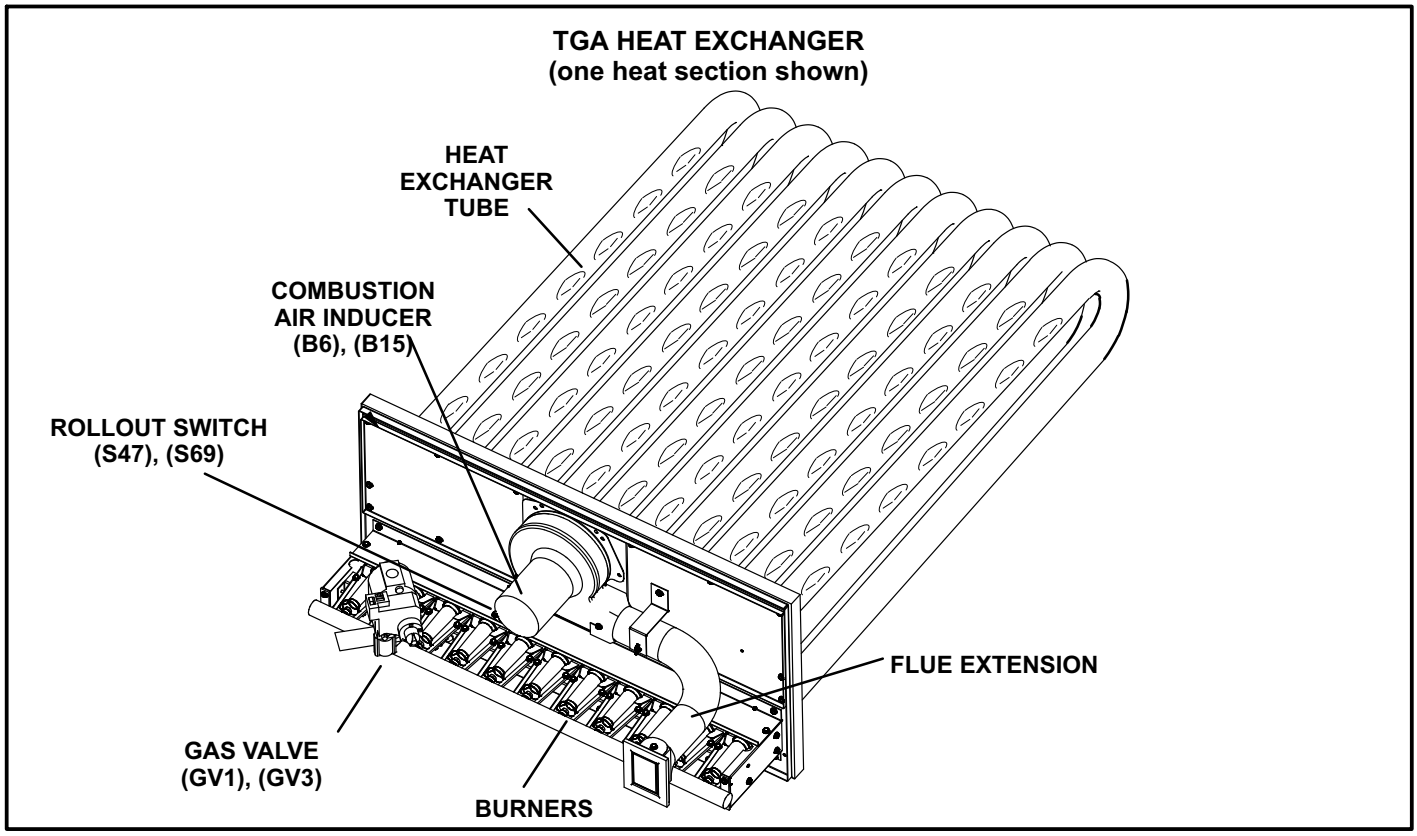


FIGURE 13

2-Burner Box Assembly (Figure 14)

Each heat section is equipped with a burner box assembly. The burner assembly consists of a spark electrode, flame sensing electrode and gas valve. Each assembly is controlled by the heat sections ignition control board (A3 section one and A12 section two)

Burners

All units use inshot burners (see figure 14). Burners are factory set and do not require adjustment. A peep hole with cover is furnished in the heating access panel for flame viewing. Always operate the unit with the access panel in place.

Burners can be removed individually for service. Burner maintenance and service is detailed in the SERVICE CHECKS section of this manual.

Orifice

Each burner uses an orifice which is precisely 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.

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 Repair Parts Listing for correct sizing information.

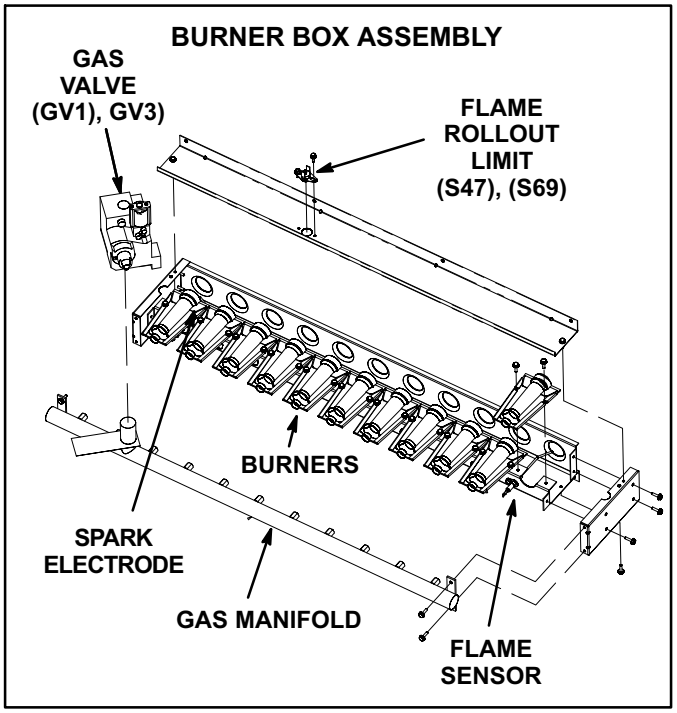


FIGURE 14

3-Flame Rollout Limits S47 & S69

Flame rollout limit S47 (first heat section) and S69 (second heat section), are SPST N.C. high temperature limits located just above the burner air intake opening in the burner enclosures (see figure 14). S47 is wired to the ignition control A3 while S69 is wired to ignition control A12. When S47 or S69 senses flame rollout (indicating a blockage in the combustion air passages), the ignition control immediately closes the gas valve.

Limit S47 and S69 are factory preset to open at 290°F ± 12°F (143°C ± 6.7°C) on a temperature rise in all units. All flame rollout limits are manual reset.

4-Primary High Temperature Limits S10 & S99

S10 is the primary high temperature limit for heat section one in TGA180/300 units, while S99 is the primary high temperature limit for heat section two.

S10 and S99 are located on the drip shield behind the blower housing. In this location S10 and S99 also serve as secondary limits. See figure 12.

Primary limit S10 is wired to the ignition control A3. while primary limit S99 is wired to ignition control A12. Its N.C. contacts open to de-energize the ignition control when excessive temperature is reached in the blower compartment. If either limit trips the blower relay K3 and combustion air inducer will energized. Limit settings are factory set and cannot be adjusted. If limit must be replaced same type and set point must be used.

5-Combustion Air Prove Switches S18 & S45

On TGA180/300 units S18 (first heat section) and S45 (second heat section) switches are located in the compressor compartment . Both are SPST N.O. switches and are identical and monitor combustion air inducer operation. Switch S18 is wired to ignition control A3 while S45 is wired to ignition control A12.

The switch closes at *negative* 0.46"W.C. ± 0.05" (114 Pa ± 12.4 Pa) on pressure fall. This negative pressure fall and switch actuation allows the ignition sequence to continue (proves, by closing, that the combustion air inducer is operating before allowing the gas valve to open.) The combustion air prove switch is factory set and not adjustable. The switch will automatically open on a pressure rise (less negative pressure) at 0.31" W.C. ± 0.05" W.C. (77.2 Pa ± 12.4 Pa).

6-Combustion Air Inducers B6 & B15

Combustion air inducers B6 (first heat section) and B15 (second heat section), are identical inducers which provide fresh air to the corresponding burners while clearing the combustion chamber of exhaust gases. The inducers begin operating once the safety switch check (closed limits and open CAI prove switches) is complete upon receiving a thermostat demand, and are de-energized immediately following a 5 second post-purge when thermostat demand is satisfied.

Both combustion air inducers use either a 208/230V or 460V single-phase PSC motor and a 4.81in. x 1.25in. (122mm x 32mm) inducer wheel. All motors operate from 3200 RPM to 3450 RPM 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 controls initiates the heating cycle. The control then allow 30 seconds for the combustion air inducers to vent exhaust gases from the burners. When the combustion air inducers are purging the exhaust gases, the combustion air prove switches close, proving that the combustion air inducers are operating before allowing the ignition sequence to continue. When the combustion air prove switches are closed and the delay is over, the ignition controls activate the first stage operator of the gas valves (low fire), the spark and the flame sensing electrode. Sparking stops immediately after flame is sensed or at the end of the eight second trial for ignition.

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

7-Combustion Air Motor Capacitors C3 & C11

The combustion air inducer motors in all TGA units require run capacitors. Capacitor C3 is connected to combustion air inducer B6 and C11 is connected to combustion air inducer B15. Ratings will be on capacitor side or combustion air motor nameplate.

8-Gas Valves GV1 & GV3

GV1 and GV3 are identical two-stage redundant gas valves. Units are equipped with valves manufactured by Honeywell or White-Rodgers. See figure 15. On a call for first-stage heat, the valve (Honeywell or White-Rodgers) is energized by the ignition control simultaneously with the spark electrode. On a call for second stage-heat, the second-stage operator is energized directly from A3 (GV1) and A12 (GV3). A manual shut-off knob is provided on the valve for shut-off.

Manual shut-off knob immediately closes both stages without delay. Figure 15 shows White-Rodgers and Honeywell gas valve components. Table 11 shows factory gas valve regulation for TGA series units. Both valves are quick opening (on-off in less than 30 seconds) for first-stage heat.

On the White-Rodgers valve second-stage is slow opening (on to second-stage in 40 seconds and off to first-stage in 30 seconds). The White-Rodgers valve is adjustable for second-stage only. First stage is not adjustable. On the Honeywell valve second-stage is quick opening.

TABLE 11

GAS VALVE REGULATION FOR TGA UNITS				
Maximum Inlet Pressure	Operating Pressure (outlet) Factory Setting			
	Natural		L.P	
	Low	High	Low	High
13.0"W.C. 3232Pa	1.6±0.2"W.C. 398±50Pa	3.7±0.3"W.C. 920±75Pa	5.5±0.3"W.C. 1368±75Pa	10.5±0.5"W.C. 2611±7124Pa

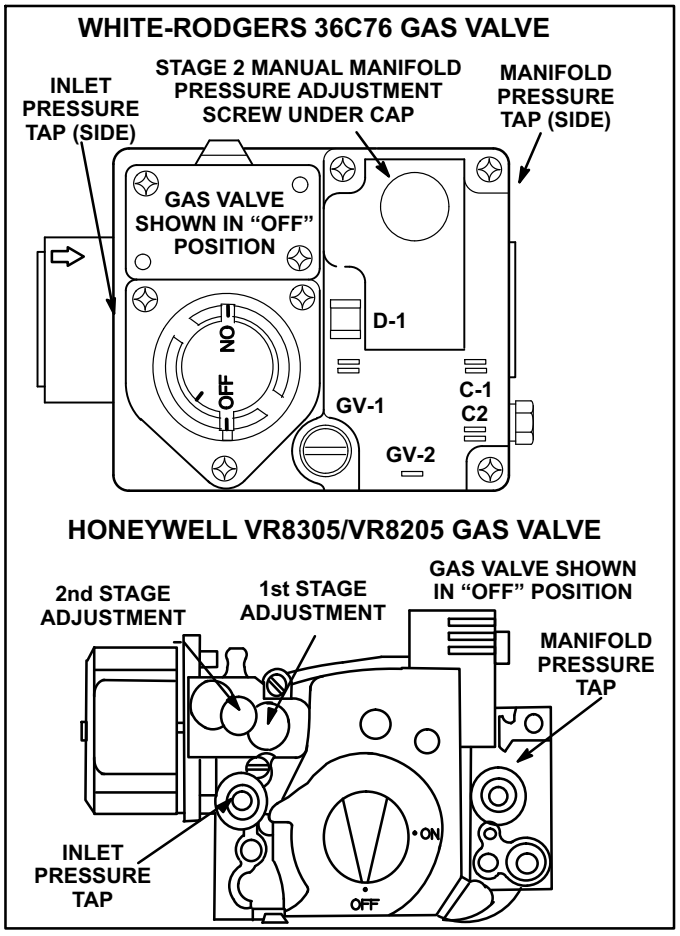


FIGURE 15

9-Spark Electrodes

An electrode assembly is used for ignition spark. Two identical electrodes are used (one for each gas heat section). The electrode is mounted through holes on the leftmost end of the burner support. 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 16) 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 a 8 mm silicone-insulated stranded high voltage wire. The wire uses 1/4" (6.35 mm)female quick connect.

⚠ IMPORTANT

In order to maximize spark energy to electrode, high voltage wire should touch unit cabinet as little as possible

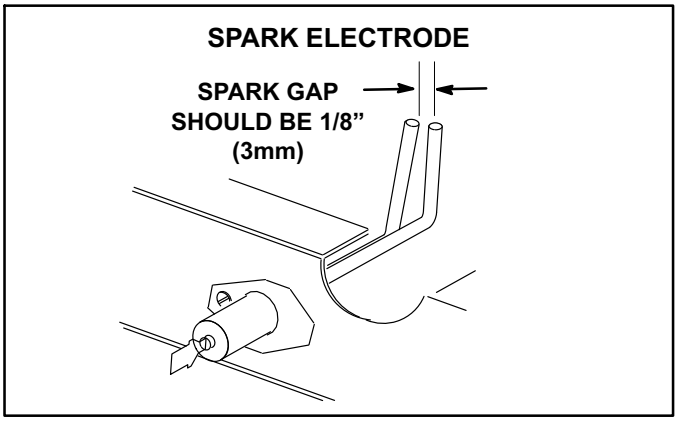


FIGURE 16

10-Flame Sensors (Figure 17)

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

When flame is sensed by the flame sensor (indicated by microamp signal through the flame) sparking stops immediately. 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.

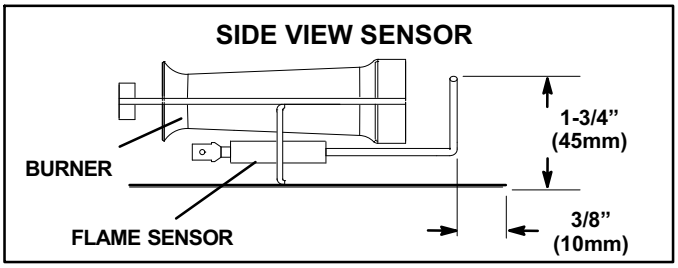


FIGURE 17

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

Refer to startup directions and to the unit wiring diagram when servicing. See unit nameplate for minimum circuit ampacity and maximum fuse size.

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 control box cover.

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 (if applicable) or TB2. 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

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.

⚠ IMPORTANT

This unit is equipped with an automatic spark ignition system. Do not attempt to light manually.

In case of a safety shutdown, move thermostat switch to **OFF** and return the thermostat switch to **HEAT** to reset ignition control.

-Placing Furnace In Operation

Gas Valve Operation for White Rodgers 36C and Honeywell VR8205Q/VR8305Q (figure 15)

1- Set thermostat to lowest setting.

2- Turn off all electrical power to appliance.

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

4- Open or remove the heat section access panel.

5- Turn the knob on the gas valve clockwise ↷ to **"OFF"**. Depress 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 Appliance

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"**. Depress 36C knob slightly. Do not force.

C-Safety or Emergency Shutdown

Turn off power and main manual shut off valve to unit.

D-Cooling Start Up

The thermostat specified for use on this unit has three cooling outputs.

1- Remove coil covers before starting unit.

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

3- First-stage thermostat demand will energize compressor 1. Second-stage thermostat demand will energize compressor 2. Third-stage thermostat demand will energize compressor 3 (and 4 on 4-compressor units only). 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.

4- *180S & H, 210S, 240S,-*

Units contain three refrigerant circuits or systems. Evaporator and condenser coil refrigerant circuit 1 makes up stage 1 cooling. Evaporator and condenser coil refrigerant circuit 2 makes up stage 2 cooling. Evaporator and condenser coil refrigerant circuit 3 makes up stage 3 cooling. See figure 18.

210H, 240H, 300S -

Units contain four refrigerant circuits or systems. Evaporator and condenser coil refrigerant circuit 1 makes up stage 1 cooling. Evaporator and condenser refrigerant circuit 2 makes up stage 2 cooling. Evaporator and condenser refrigerant circuit 3 and 4 makes up stage 3 cooling. See figure 19.

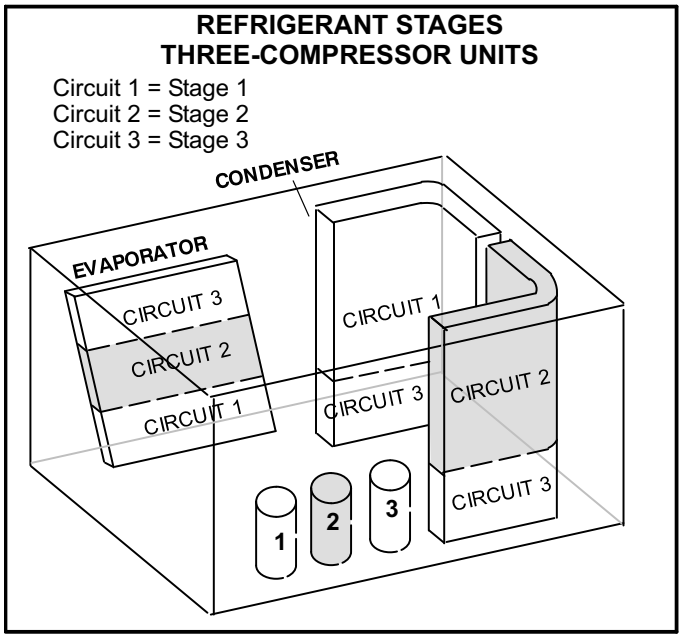


FIGURE 18

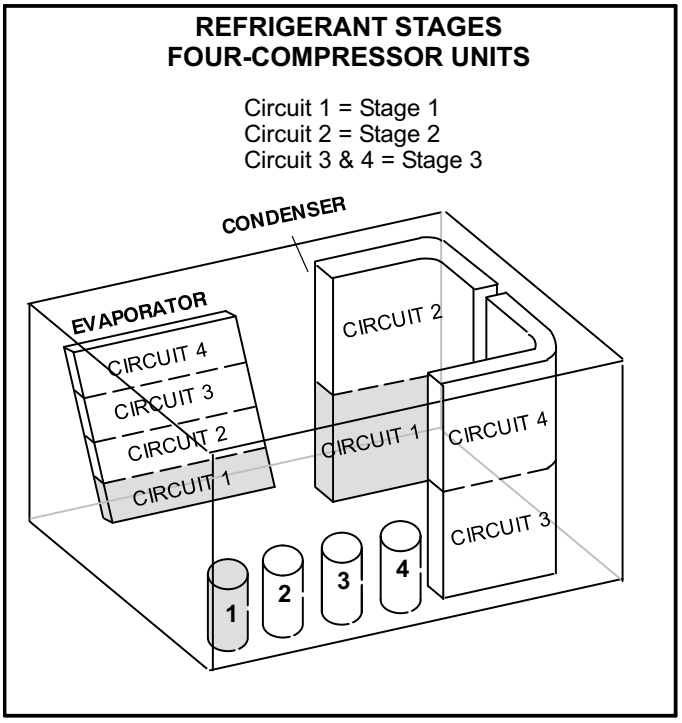


FIGURE 19

5- *180S & H, 210S, 240S,-*

First-stage thermostat demand will energize condenser fans 1 and 2. See figure 20. Second-stage thermostat demand will energize condenser fans 3 and 4. Fans will continue to operate with additional thermostat demands.

210H, 240H, 300S -

First-stage thermostat demand will energize condenser fans 1 and 2. See figure 20. Third-stage thermostat demand will energize condenser fans 3 and 4.

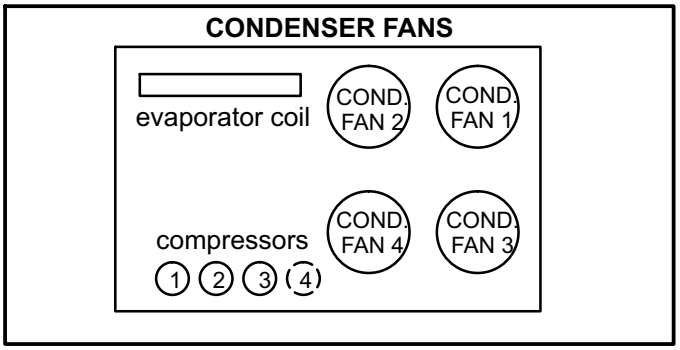


FIGURE 20

6- Each refrigerant circuit is separately charged with R-22 refrigerant. See unit rating plate for correct amount of charge.

7- Refer to Cooling Operation and Adjustment section for proper method to check refrigerant charge.

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 charge, *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 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 12 through 18 to determine normal operating pressures.

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 12
TGA180S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	172	75	178	78	181	78
75°F	199	77	205	80	210	80
85°F	228	79	237	82	242	81
95°F	258	80	271	83	274	82
105°F	293	82	309	84	312	84
115°F	331	83	348	85	350	85

TABLE 13
TGA180H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	158	72	159	74	158	74
75°F	183	76	186	79	184	78
85°F	210	78	214	81	211	79
95°F	239	79	245	83	241	81
105°F	270	81	278	84	273	82
115°F	304	82	313	86	306	84

TABLE 14
TGA210S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suc .±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	188	66	191	67	194	71
75°F	213	69	217	70	220	73
85°F	242	71	247	74	252	74
95°F	275	73	281	76	286	76
105°F	308	75	315	77	321	77
115°F	347	77	355	79	361	79

TABLE 15
TGA210H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	170	77	173	80	172	80	168	80
75°F	197	78	198	81	197	81	193	81
85°F	223	79	225	82	225	82	221	82
95°F	255	81	255	83	257	83	252	83
105°F	289	83	287	84	293	85	287	85
115°F	329	85	323	86	333	87	327	87

TABLE 16
TGA240S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	185	69	182	73	183	72
75°F	212	71	209	75	210	74
85°F	236	72	233	75	234	75
95°F	267	73	265	76	264	75
105°F	297	74	301	77	300	76
115°F	335	76	340	78	338	78

TABLE 17
TGA240H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	179	75	181	79	174	79	176	79
75°F	207	76	208	81	203	79	204	80
85°F	239	78	238	82	233	80	234	81
95°F	272	80	270	83	266	83	266	83
105°F	307	83	303	84	301	84	300	85
115°F	351	85	342	85	343	86	342	86

TABLE 18
TGA300S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	185	69	183	70	186	72	179	71
75°F	213	72	210	74	215	76	207	75
85°F	247	75	241	77	249	78	240	78
95°F	280	77	271	78	281	80	271	79
105°F	320	79	309	79	317	81	307	80
115°F	361	81	346	80	358	82	345	82

C-Charge Verification - Approach Method

1- Using the same thermometer, compare liquid temperature to outdoor ambient temperature.

Approach Temperature = Liquid temperature minus ambient temperature.

2- Approach temperatures should match values in table 19. An approach temperature greater than this value indicates an undercharge. An approach temperature less than this value indicates an overcharge.

3- Do not use the approach method if system pressures do not match pressures in tables 12 through 18. The approach method is not valid for grossly over or undercharged systems.

TABLE 19
APPROACH TEMPERATURES

Unit	Liquid Temp. Minus Ambient Temp.			
	1st Stage	2nd Stage	3rd Stage	4th Stage
180S 210S 240S 180H	7°F ± 1 (3.9°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)	NA
210H	9°F ± 1 (5°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)
240H	10°F ± 1 (5.6°C ± 0.5)	9°F ± 1 (5°C ± 0.5)	9°F ± 1 (5°C ± 0.5)	10°F ± 1 (5.6°C ± 0.5)
300S	14°F ± 1 (7.8°C ± 0.5)	12°F ± 1 (6.7°C ± 0.5)	12°F ± 1 (6.7°C ± 0.5)	12°F ± 1 (6.7°C ± 0.5)

V- SYSTEMS SERVICE CHECKS

A-Heating System Service Checks

All TGA units are C.S.A. design certified without modification.

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

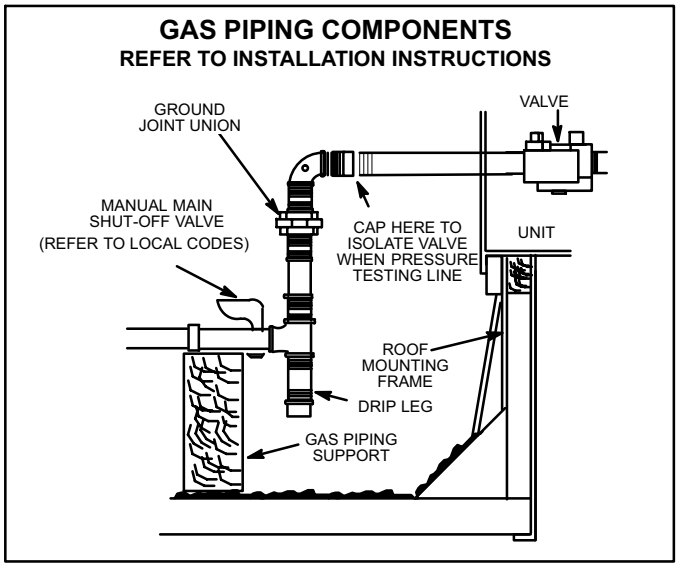


FIGURE 21

1-Gas Piping

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

2-Testing Gas Piping

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

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

When checking piping connection for gas leaks, use the preferred means. Common kitchen detergents can cause harmful corrosion on various metals used in gas piping. The use of specialty Gas Leak Detector is strongly recommended.

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 and or GV3. 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 11.0"W.C. (1168 Pa and 2735 Pa). For L.P. gas units, operating pressure at the unit gas connection must be between 11.0"W.C. and 13.0"W.C. (2735 Pa and 3232 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 and or GV3. See figure 15 for location of pressure tap on the gas valve.

The manifold pressure is factory set and should not require adjustment. If manifold pressure is incorrect and no other source of improper manifold pressure can be found, the valve must be replaced. See figure 15 for location of gas valve (manifold pressure) adjustment screw.

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 11.

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 20.

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

TABLE 20

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).

⚠ CAUTION

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

6-Proper Gas Flow

To check for proper gas flow to burners, determine Btuh input from unit rating plate or the gas heating capacity in the SPECIFICATIONS tables. Divide this input rating by the Btuh per cubic foot of available gas. Result is the number of cubic feet per hour required. Determine the flow of gas through gas meter for two minutes and multiply by 30 to get hourly flow of gas to the burners.

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

TABLE 21

Unit in Btu's	Seconds for Natural	Seconds for Propane
260,000	14	35
360,000	10	30
480,000	8	19

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. Loosen or remove corner mullion if necessary.
3- Remove gas valve, manifold assembly and burners.
4- Disconnect all wiring (label wiring) from heat section components and remove combustion air inducer and flue box. 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:

⚠ CAUTION

Electrodes are not field adjustable. Any alterations to the electrode may create a hazardous condition that can cause property damage 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, compare reading to table 22. Do not bend electrodes.

5- Disconnect power to unit before disconnecting meter. Make sure sensor wire is securely reconnected before reconnecting power to unit.

TABLE 22

Manufacturer	Nominal Signal Microamps	Drop Out
JOHNSON	0.5 - 1.0	.09

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

B-Cooling System Service Checks

TGA 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 12 through 18.

VI-MAINTENANCE

⚠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.

A-Filters

Units are equipped with six 24 X 24 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 22. *Filters must be U.L.C. certified or equivalent for use in Canada.*

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

B-Lubrication

All motors used in TGA units are factory lubricated, no further lubrication is required.

Blower shaft bearings are prelubricated. For extended bearing life, relubricate at least once every two years with a lithium base grease such as Alvania 3 (Shell Oil), Chevron BRB2 (Standard OIl) or Regal AFB2 (Texas Oil). Use a hand grease gun for lubrication. Add only enough grease to purge through the bearings so that a bead of grease appears at the seal lip contacts.

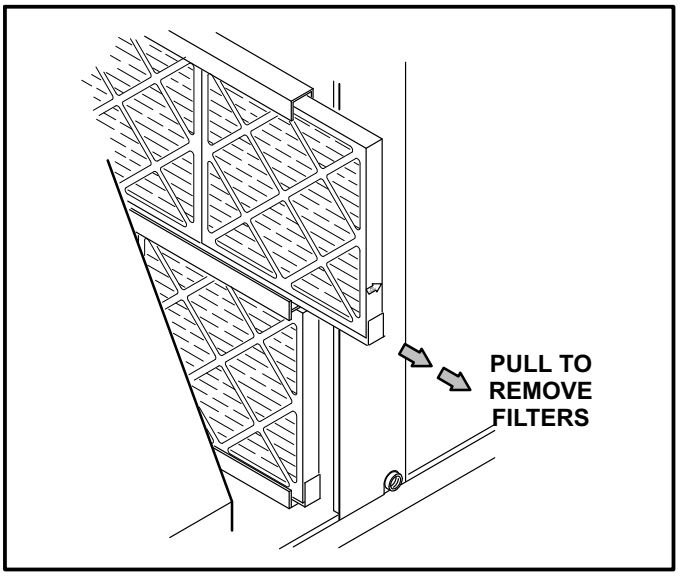


FIGURE 22

C-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 14. 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 16.

5- Reinstall burners and screws securing burners to burner support.

⚠WARNING

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

6- Replace access panel.

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

D-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.
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.

E-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.

F-Supply Air 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.

G-Evaporator Coil

Inspect and clean coil at beginning of each season. Clean using mild detergent or commercial coil cleanser. Check condensate drain pan and line, if necessary. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet. Check connecting lines and coil for evidence of oil and refrigerant leaks.

H-Condenser Coil

Clean condenser coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season.

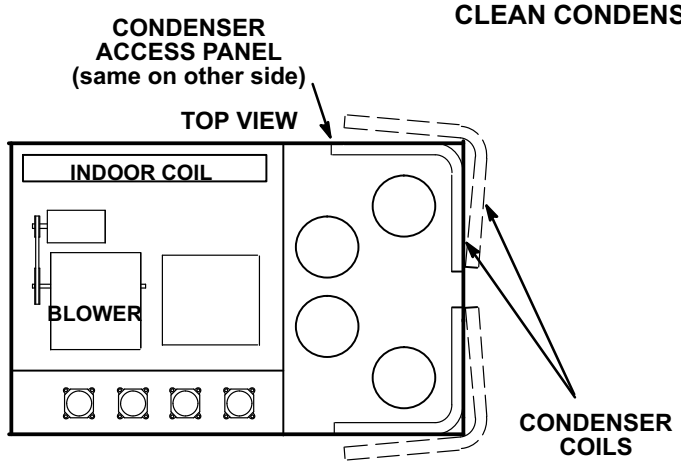
Condenser coils are made of two formed slabs. Dirt and debris may become trapped between the slabs. To clean between slabs, carefully separate coil slabs and wash them thoroughly. See figure 23. Flush coils with water following cleaning.

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

I-Electrical

1- Check all wiring for loose connections.
2- Check for correct voltage at unit (unit operating).
3- Check amp-draw on both condenser fan motor and blower motor.
Fan Motor Rating Plate ____ Actual _____
Indoor Blower Motor Rating Plate____ Actual____

CLEAN CONDENSER COIL



1- Remove unit top panel and both condenser access panels.
2- Remove screws securing coil end plates to mullions.
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 23

VII-OPTIONAL ACCESSORIES

The accessories section describes the application of most of the optional accessories which can be installed to the TGA units.

A-LARMF and LARMFH Mounting Frames

When installing either the TGA units on a combustible surface for downflow discharge applications, the LARMF18/36 14-inch or 24-inch (356 mm or 610mm) height roof mounting frame is used. For horizontal discharge applications, use LARMFH18/24 26-inch or 37-inch (660mm or 940mm) height roof mounting frame. This frame converts unit from down-flow to horizontal air flow. The 37 inch (940mm) horizontal frame meets National Roofing Code requirements. The roof mounting frames are recommended in all other applications but not required. If the TGA units are not mounted on a flat (roof) surface, they MUST be supported under all edges and under the middle of the unit to prevent sagging. The units MUST be mounted level within 1/16" per linear foot or 5mm per meter in any direction.

The assembled LARMF18/36 mounting frame is shown in figure 24. Refer to the roof mounting frame installation instructions for details of proper assembly and mounting. The roof mounting frame MUST be squared to the roof and level before mounting. Plenum system MUST be installed before the unit is set on the mounting frame. Typical roof curbing and flashing is shown in figure 25. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

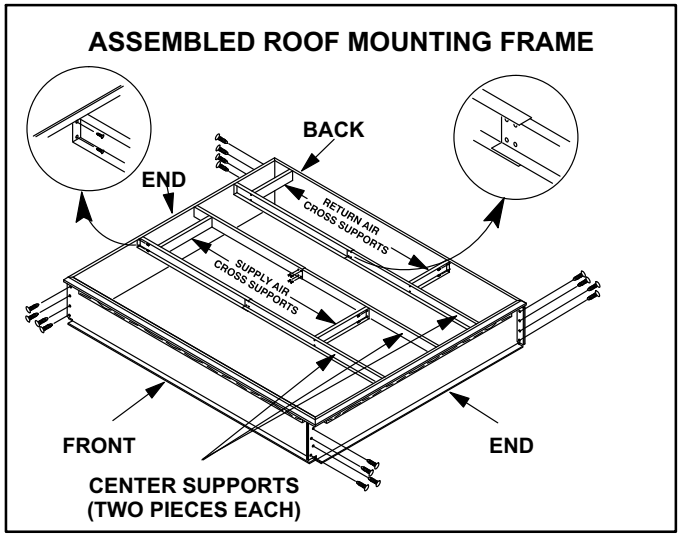


FIGURE 24

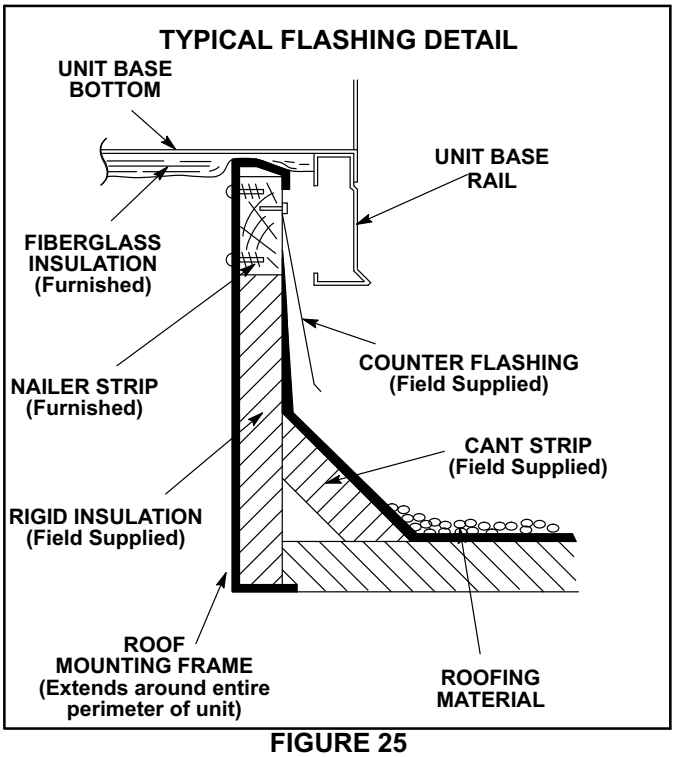


FIGURE 25

B-Transitions

Optional supply/return transitions LASRT18/24 are available for use with TGA series units utilizing optional LARMF18/36 roof mounting frame. Transition must be installed in the LARMF18/36 mounting frame before mounting the unit to the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

C-Supply and Return Diffusers (all units)

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

D-T1ECON

Unit may contain an optional modulating economizer equipped with an A6 enthalpy control and an A7 outdoor enthalpy sensor. The economizer modulates to use outdoor air for free cooling when temperature is suitable.

The A6 enthalpy control is located in the economizer access area. See figure 26. The A7 enthalpy sensor is located on the division panel between horizontal supply and return air sections.

Optional Sensors

An optional differential sensor (A62) may be used with the A7 outdoor sensor to compare outdoor air enthalpy to return air enthalpy. When the outdoor air enthalpy is below the return air enthalpy, outdoor air is used for free cooling.

A mixed air sensor (R1) is used in modulating the dampers to 55°F (13°C) blower compartment air temperature.

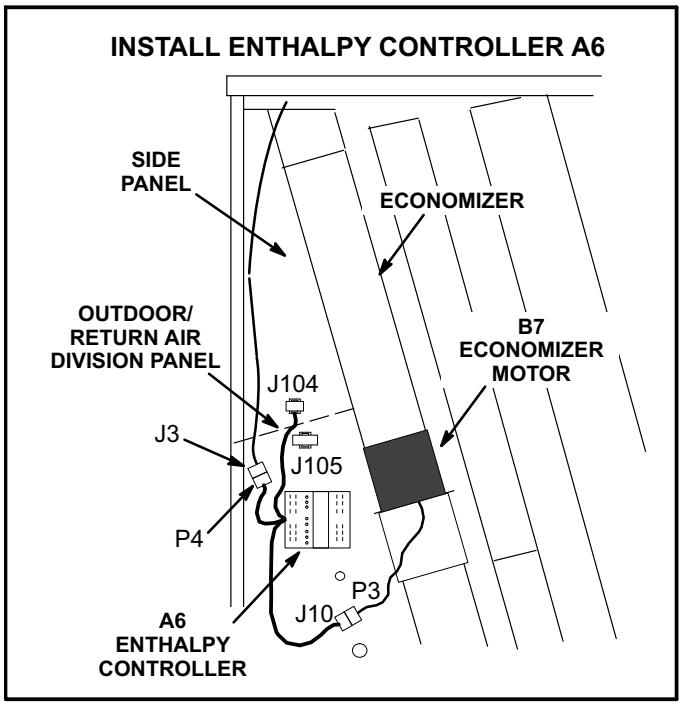


FIGURE 26

An optional IAQ sensor (A63) may be used to lower operating costs by controlling outdoor air based on CO_2 level or room occupancy (also called demand control ventilation or DCV). Damper minimum position can be set lower than traditional minimum air requirements; dampers open to traditional ventilation requirements when CO_2 level reaches DCV (IAQ) setpoint.

Refer to instructions provided with sensors for installation.

A6 Enthalpy Control LED's

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

When an optional IAQ sensor is installed, a steady green DCV LED indicates that the IAQ reading is higher than setpoint requiring more fresh air. See figure 27.

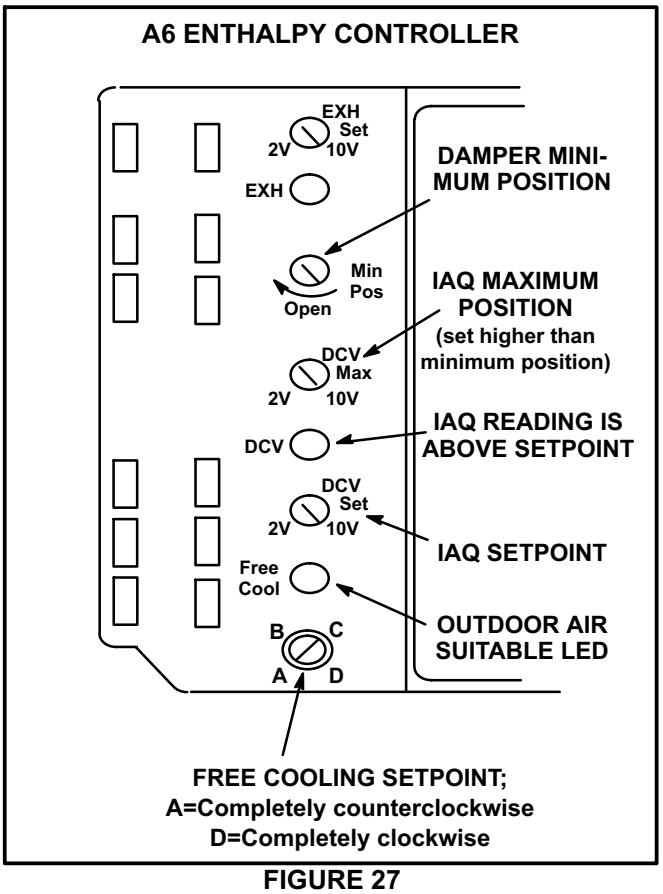


FIGURE 27

Free Cooling Setpoint

Outdoor air is considered suitable when temperature and humidity are less than the free cooling setpoints shown in table 23. Setting A is recommended. See figure 27. 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 23
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 A1 and A2 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 A45 control board TB1 terminals A1 and A2 if using a thermostat which does not have the feature.

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

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

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

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

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

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

7- Draw a vertical line through point C.

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

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

DCV Set and Max Settings

Adjust settings when an optional IAQ sensor is installed.

The DCV SET potentiometer is factory-set at approximately 50% of the potentiometer range. Using a standard 1-2000ppm CO_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 27.

The DCV MAX potentiometer is factory-set at approximately 50% of the potentiometer range or 6VDC. Dampers will open approximately half way when CO_2 rises above setpoint. Adjust the DCV MAX potentiometer to the approximate setting specified by the controls contractor. Refer to figure 27.

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. See table 25.

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 24 for economizer operation with a standard three-stage thermostat.

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

B-Outdoor Air Dampers

T1DAMP20C-1 used on TGA units consists of a set of dampers which may be manually or motor (M) operated to allow outside air into the system (see figure 30). Either air damper can be installed in TGA units.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. See figure 28. Washable filter supplied with the outdoor air dampers can be cleaned with water and a mild detergent. It should be sprayed with Filter Handicoater when dry prior to reinstallation. Filter Handicoater is R.P. Products coating no. 418.

Optional manual and motorized outdoor air dampers provide fresh outdoor air.

Follow the steps to determine fresh air percentage

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

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

3- 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).

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

5- Draw a vertical line through point C.

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

7- If fresh air percentage is less than desired, adjust thumbwheel higher. If fresh air percentage is more than desired, adjust thumbwheel lower. Repeat steps until calculation reads desired fresh air percentage. See figure 29.

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.

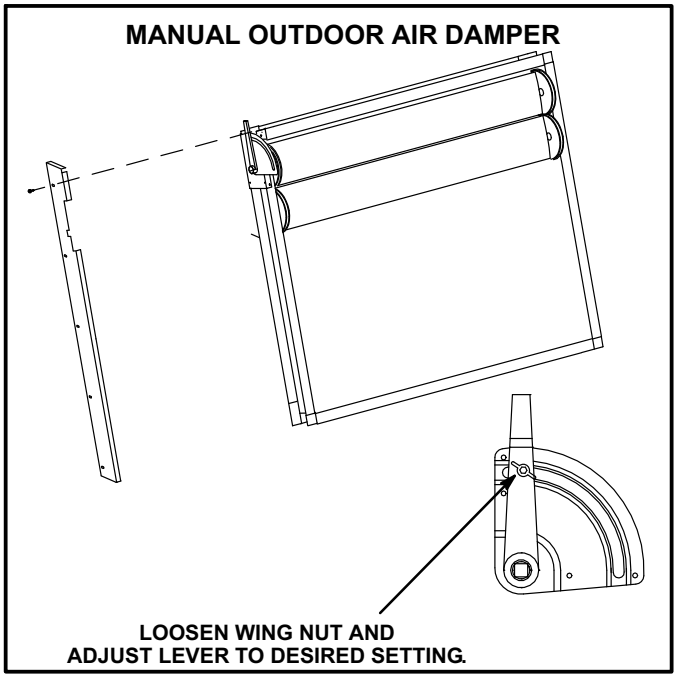


FIGURE 28

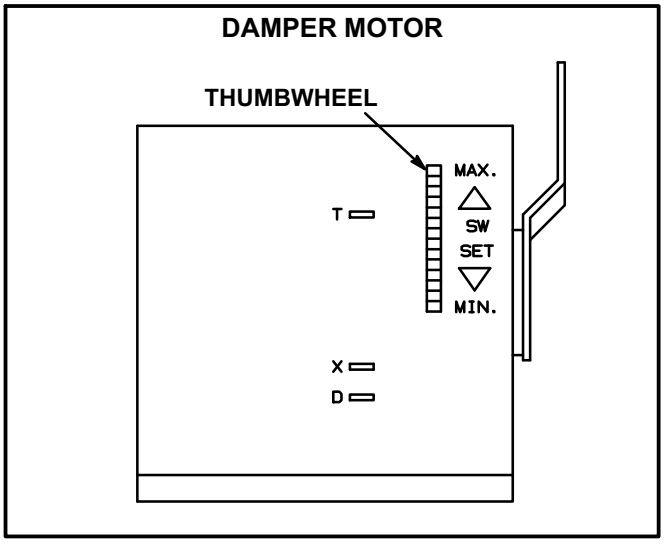


FIGURE 29

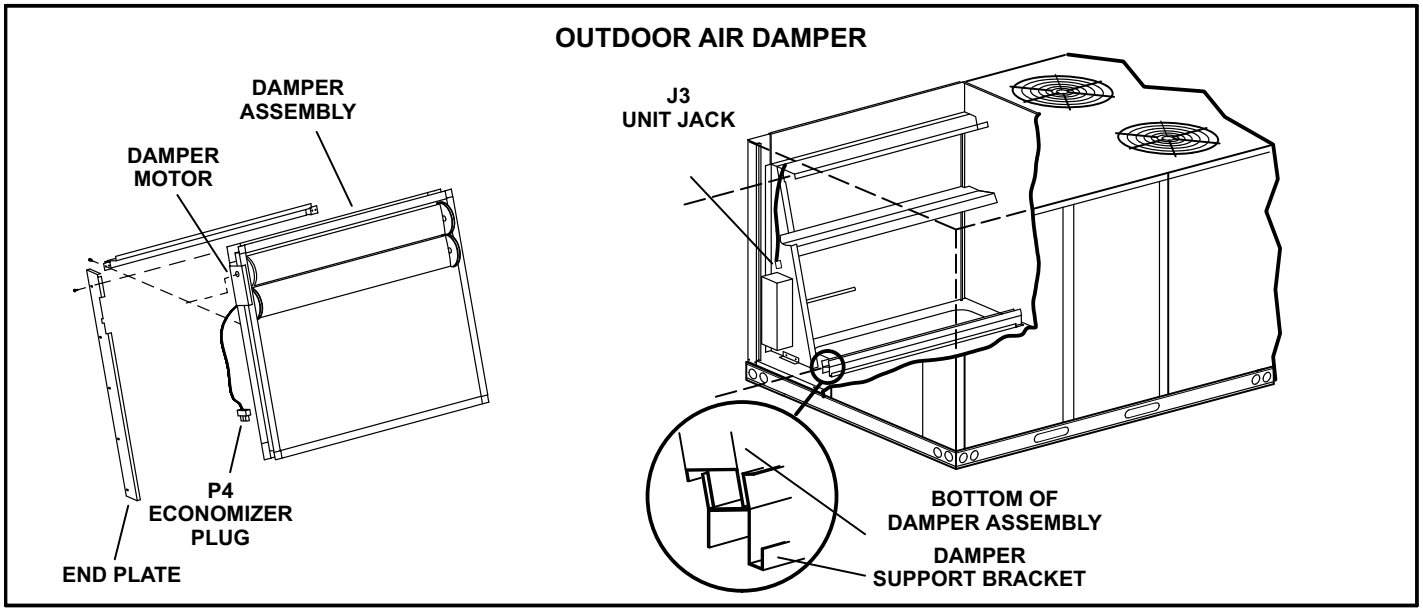


FIGURE 30

CHART 1
CALCULATE MINIMUM FRESH AIR PERCENTAGE

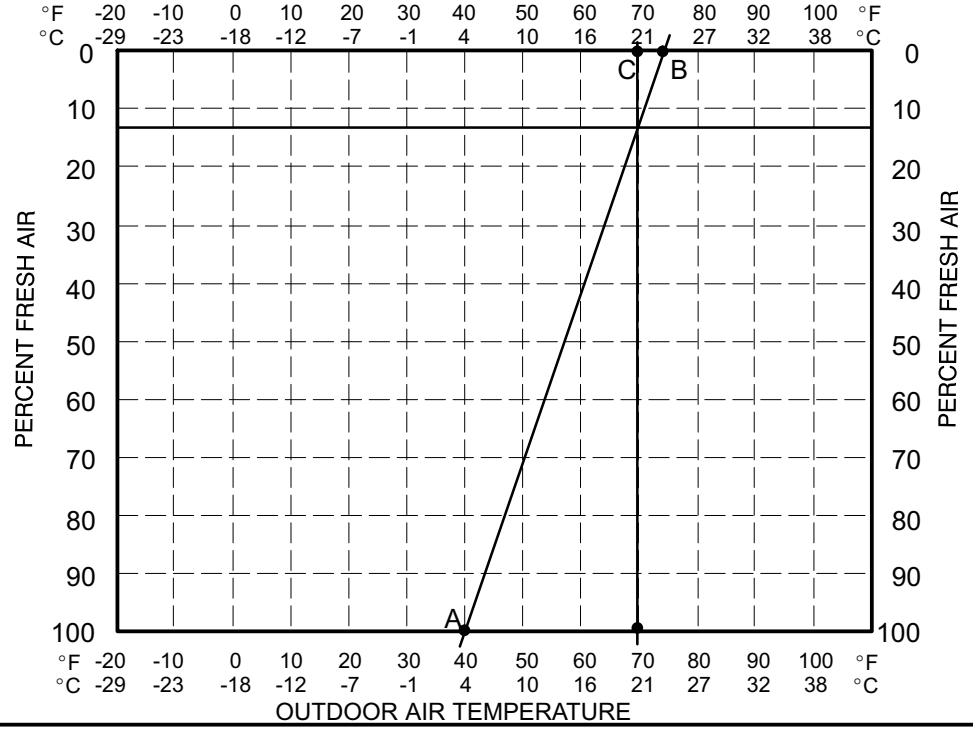


TABLE 24

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	Modulating	Modulating	No
Y2	Modulating	Modulating	Stage 1
Y3	Modulating	Modulating	Stage 2

TABLE 25

ECONOMIZER OPERATION-OUTDOOR AIR IS **NOT SUITABLE** FOR FREE COOLING -- FREE COOL LED "OFF"

THERMOSTAT DEMAND	DAMPER POSITION		MECHANICAL COOLING
	UNOCCUPIED	**OCCUPIED**	
Off	Closed	Closed	No
G	Closed	Minimum*	No
Y1	Closed	Minimum*	Stage 1
Y2	Closed	Minimum*	Stage 2
Y3	Closed	Minimum*	Stage 3

*IAQ sensor can open damper to DCV max.

E-LAGED(H) Gravity Exhaust Dampers

LAGED18/24 dampers (figure 31) available for TGA180/300 units, are used in downflow and LAGED(H)18/24 are used in horizontal air discharge applications. LAGED(H) gravity exhaust dampers are installed in the return air plenum . The dampers must be used any time an economizer or power exhaust fans are applied to TGA 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.

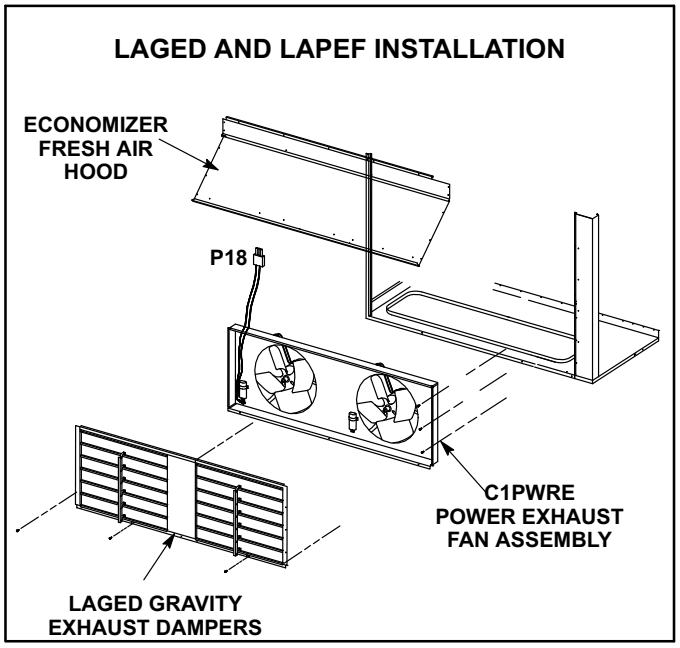


FIGURE 31

F-C1PWRE20C Power Exhaust Fans

C1PWRE20C available for TGA180/300 units are power exhaust fans used in downflow applications only. The fans require optional down-flow gravity exhaust dampers and T1ECON economizers. Power exhaust fans provide exhaust air pressure relief and also run when return air dampers are closed and supply air blowers are operating. Figure 31 shows the location of the C1PWRE. See installation instructions for more detail.

G- Cold Weather Kit (Canada only)

Electric heater is available to automatically control the minimum temperature in the gas burner compartment. Heater is C.G.A. 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 stepdown 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:

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 inducer 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).

H-Control Systems

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

1- Electro-mechanical thermostat (13F06)
   The electro-mechanical thermostat is a two-stage heat / two-stage cool thermostat with dual temperature levers. A non-switching or manual system switch subbase may be used.
2- Electronic thermostat (see price book)
   Any two-stage heat / two-stage cool electronic thermostat may be used.
3- Honeywell T7300 thermostat (81G59)
   The Honeywell T7300 thermostat is a programmable, internal or optional remote temperature sensing thermostat. The T7300 provides occupied and unoccupied changeover control.

I-Smoke Detectors A17 and A64

Photoelectric smoke detectors are a field installed option. The smoke detectors can be installed in the supply air section (A64), return air section (A17), or in both the supply and return air section.

J-Blower Proving Switch S52

The blower proving switch monitors blower operation and locks out the unit in case of blower failure. The switch is N.O. and closes at 0.14" W.C. (34.9 Pa) The switch is mounted on the upper left hand corner of the blower deck.

K-Dirty Filter Switch S27

The dirty filter switch senses static pressure increase indicating a dirty filter condition. The switch is N.O. and closes at 1" W.C. (248.6 Pa) The switch is mounted on the top filter channel corner.

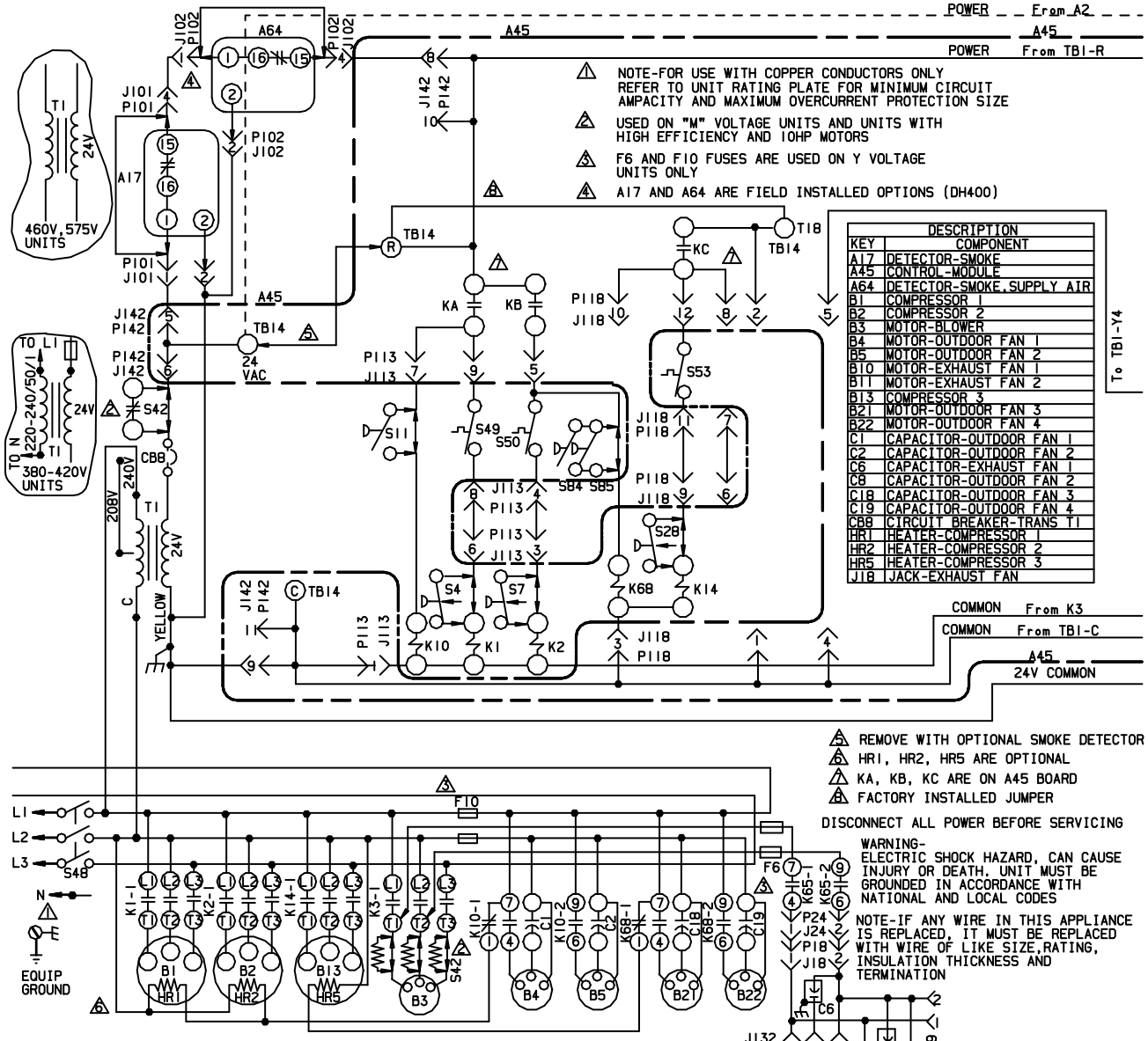
L-Indoor Air Quality (CO_2) Sensor A63

The indoor air quality sensor monitors CO_2 levels and reports the levels to the economizer control module A6. The board adjusts the economizer dampers according to the CO_2 levels. The sensor is mounted next to the indoor thermostat or in the return air duct. Refer to the indoor air quality sensor installation instructions for proper adjustment.

M-LP / Propane Kit

TGA180/300 units require two (one for each gas heat section) LP kits. The kit includes one gas valve, eleven burner orifices, and three stickers. For more detail refer to the natural to LP gas changeover kit installation instructions.

TGA180S, 180H, 210S & 240S UNIT DIAGRAM



DESCRIPTION	
KEY	COMPONENT
A17	DETECTOR-SMOKE
A45	CONTROL-MODULE
A64	DETECTOR-SMOKE,SUPPLY AIR
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN 1
B5	MOTOR-OUTDOOR FAN 2
B10	MOTOR-EXHAUST FAN 1
B11	MOTOR-EXHAUST FAN 2
B13	COMPRESSOR 3
B21	MOTOR-OUTDOOR FAN 3
B22	MOTOR-OUTDOOR FAN 4
C1	CAPACITOR-OUTDOOR FAN 1
C2	CAPACITOR-OUTDOOR FAN 2
C6	CAPACITOR-EXHAUST FAN 1
C8	CAPACITOR-OUTDOOR FAN 2
C18	CAPACITOR-OUTDOOR FAN 3
C19	CAPACITOR-OUTDOOR FAN 4
CB8	CIRCUIT BREAKER-TRANS T1
HR1	HEATER-COMPRESSOR 1
HR2	HEATER-COMPRESSOR 2
HR5	HEATER-COMPRESSOR 3
J18	JACK-EXHAUST FAN

DESCRIPTION	
KEY	COMPONENT
F6	FUSE-EXHAUST FAN
F10	FUSE-OUTDOOR FAN MOTOR
J24	JACK-EXHAUST FAN
J101	JACK-SMOKE DETECT,RETURN AIR
J102	JACK-SMOKE DETECT,SUPPLY AIR
J113	JACK-BLOWER & COOL 1 CONT
J118	JACK-COMP 3 & 4 CONTROL
J132	JACK-BLOWER,EXHAUST FAN MTR
J133	JACK-B11 EXHAUST FAN MOTOR
J139	JACK-EXHAUST FAN 3
J142	JACK-ECONOMIZER HARNESS
K1,-1	CONTACTOR-COMPRESSOR 1
K2,-1	CONTACTOR-COMPRESSOR 2
K3,-1	RELAY/CONTACTOR-BLOWER
K10,-1	RELAY-OUTDOOR FAN 1
K14,-1	CONTACTOR-COMPRESSOR 3
K65-1,2	RELAY-EXHAUST FAN
K68,-1	RELAY-OUTDOOR FAN 2
P18	PLUG-EXHAUST FAN
P24	PLUG-EXHAUST FAN

DESCRIPTION	
KEY	COMPONENT
P101	PLUG-SMOKE DETECT,RETURN AIR
P102	PLUG-SMOKE DETECT,SUPPLY AIR
P113	PLUG-BLOWER,COOL 1 CONTROL
P118	PLUG-COMPRESSOR 3&4 CONTROL
P132	PLUG-B10 EXHAUST FAN MOTOR
P133	PLUG-B11 EXHAUST FAN MOTOR
P142	PLUG-ECONOMIZER HARNESS
S4	SWITCH-LIMIT,HI PRESS COMP 1
S7	SWITCH-LIMIT,HI PRESS COMP 2
S11	SWITCH-LOW PRESS,LOW AMBIENT
S28	SWITCH-LIMIT,HI PRESS COMP 3
S42	OVERLOAD-RELAY,BLOWER MOTOR
S48	SWITCH-DISCONNECT
S49	SWITCH-FREEZESTAT COMP 1
S50	SWITCH-FREEZESTAT COMP 2
S53	SWITCH-FREEZESTAT COMP 3
S84	SWITCH-LOW PRESS,AMB COMP 2
S85	SWITCH-LOW PRESS,AMB COMP 3
T1	TRANSFORMER-CONTROL
TB14	TERMINAL STRIP-CLASS II VOLT

WIRING DIAGRAM	4/05
COMBINATION PACKAGED/ROOFTOP	
TCA,TGA-180,210S,240S-G,J,M,Y	
HEAT/COOL SECTION B2	
Supersedes Form No.	New Form No. 534,477W

TGA180S, 180H, 210S, 240S SEQUENCE OF OPERATION

Power:

1. Line voltage from unit disconnect S48 or TB2 if equipped, energizes transformer T1. T1 provides 24VAC to the unit cooling, heating and blower controls and TB1 and TB14.

Blower Operation:

2. The main control module receives a demand from thermostat terminal G. A45 energizes blower contactor K3 with 24VAC.
3. N.O. K3 closes, energizing blower B3.

Optional Power Exhaust Operation:

4. The economizer control module receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% outside air damper open (adjustable).
5. N.O. K65-1 and N.O. K65-2 both close, energizing exhaust fan motors B10 and B11.

1st Stage Cooling (compressor B1)

6. First stage cooling demand Y1 and G is energized by the thermostat. G energizes blower.
7. 24VAC is routed from P113 on module A45 through N.C. freezestat S49, optional N.C. high pressure switch S4 to energize compressor contactor K1.
8. N.O. contacts K1 close energizing compressor B1.
9. Optional N.O. low ambient switch S11 closes to energize condenser fan relay K10.
10. N.O. contacts K10-1 and K10-2 close energizing condenser fan B4 and B5.

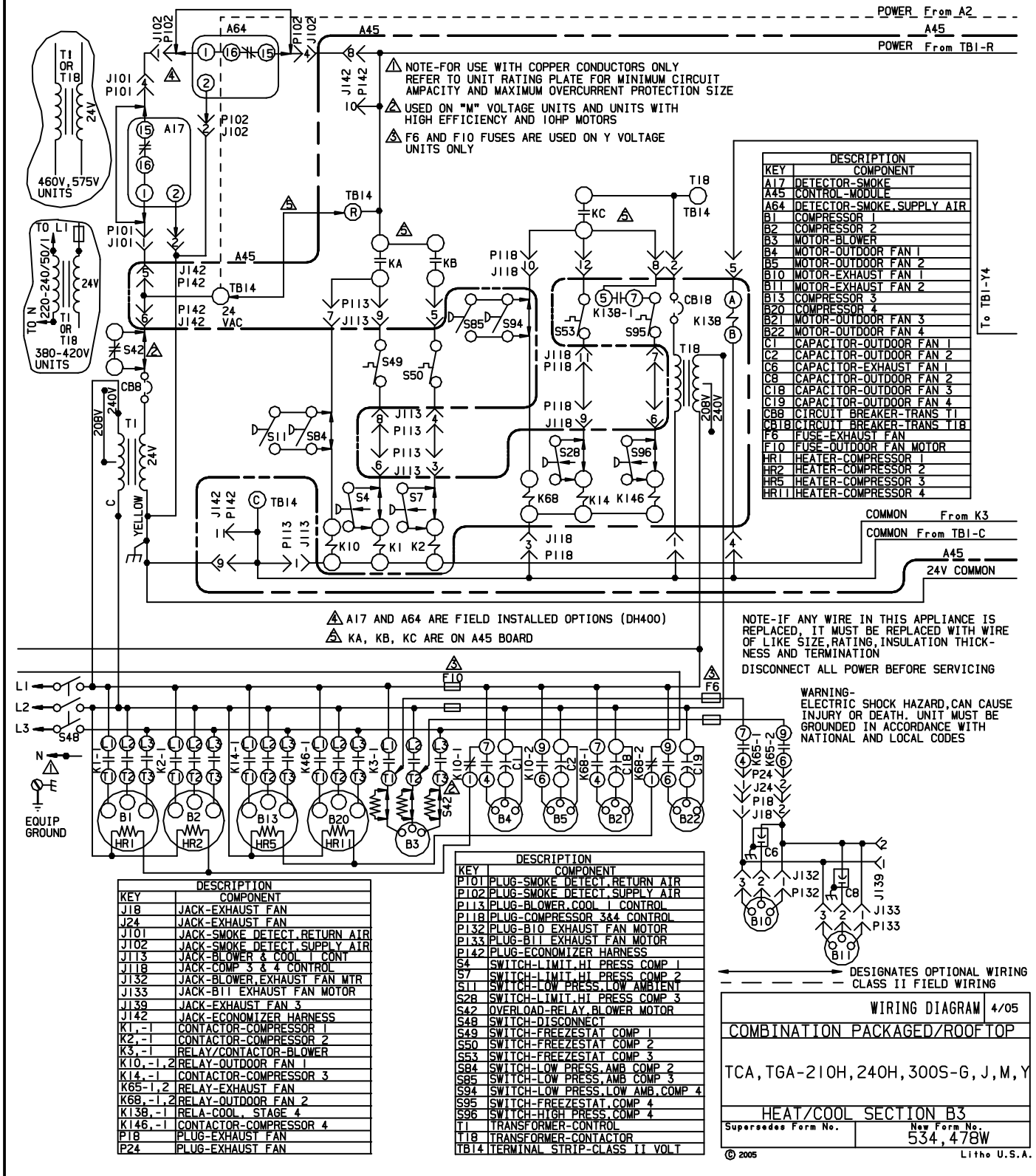
2nd Stage Cooling (compressor B2 is energized)

11. Second stage cooling demand energizes Y2.
12. 24VAC is routed from P113 on module A45 through N.C. freezestat S50, optional N.C. high pressure switch S7 to energize compressor contactor K2.
13. N.O. K2 closes energizing compressor B2.
14. Optional N.O. low ambient switch S84 closes to energize condenser fan relay K68.
15. .N.O. contacts K68-1 and K68-2 close energizing condenser fans B21 and B22.

3rd Stage Cooling (compressor B13 is energized)

16. Third stage cooling demand energizes Y3.
17. 24VAC is routed from P118 on module A45 through N.C. freezestat S53, optional N.C. high pressure switch S28 to energize compressor contactor K14.
18. N.O. K14 closes energizing compressor B13.

TGA210H, 240H & 300S UNIT DIAGRAM



DESCRIPTION	
KEY	COMPONENT
A17	DETECTOR-SMOKE
A45	CONTROL-MODULE
A64	DETECTOR-SMOKE,SUPPLY AIR
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN 1
B5	MOTOR-OUTDOOR FAN 2
B10	MOTOR-EXHAUST FAN 1
B11	MOTOR-EXHAUST FAN 2
B13	COMPRESSOR 3
B20	COMPRESSOR 4
B21	MOTOR-OUTDOOR FAN 3
B22	MOTOR-OUTDOOR FAN 4
C1	CAPACITOR-OUTDOOR FAN 1
C2	CAPACITOR-OUTDOOR FAN 2
C6	CAPACITOR-EXHAUST FAN 1
C8	CAPACITOR-OUTDOOR FAN 2
C18	CAPACITOR-OUTDOOR FAN 3
C19	CAPACITOR-OUTDOOR FAN 4
CB8	CIRCUIT BREAKER-TRANS T1
CB18	CIRCUIT BREAKER-TRANS T18
F6	FUSE-EXHAUST FAN
F10	FUSE-OUTDOOR FAN MOTOR
HR1	HEATER-COMPRESSOR 1
HR2	HEATER-COMPRESSOR 2
HR5	HEATER-COMPRESSOR 3
HR11	HEATER-COMPRESSOR 4

DESCRIPTION	
KEY	COMPONENT
J18	JACK-EXHAUST FAN
J24	JACK-EXHAUST FAN
J101	JACK-SMOKE DETECT.RETURN AIR
J102	JACK-SMOKE DETECT.SUPPLY AIR
J113	JACK-BLOWER & COOL 1 CONT
J118	JACK-COMP 3 & 4 CONTROL
J132	JACK-BLOWER,EXHAUST FAN MTR
J133	JACK-B11 EXHAUST FAN MOTOR
J139	JACK-EXHAUST FAN 3
J142	JACK-ECONOMIZER HARNESS
K1,-1	CONTACTOR-COMPRESSOR 1
K2,-1	CONTACTOR-COMPRESSOR 2
K3,-1	RELAY/CONTACTOR-BLOWER
K10,-1,2	RELAY-OUTDOOR FAN 1
K14,-1	CONTACTOR-COMPRESSOR 3
K65-1,2	RELAY-EXHAUST FAN
K68,-1,2	RELAY-OUTDOOR FAN 2
K138,-1	RELA-COOL, STAGE 4
K146,-1	CONTACTOR-COMPRESSOR 4
P18	PLUG-EXHAUST FAN
P24	PLUG-EXHAUST FAN

DESCRIPTION	
KEY	COMPONENT
P101	PLUG-SMOKE DETECT.RETURN AIR
P102	PLUG-SMOKE DETECT.SUPPLY AIR
P113	PLUG-BLOWER,COOL 1 CONTROL
P118	PLUG-COMPRESSOR 3&4 CONTROL
P132	PLUG-B10 EXHAUST FAN MOTOR
P133	PLUG-B11 EXHAUST FAN MOTOR
P142	PLUG-ECONOMIZER HARNESS
S4	SWITCH-LIMIT,HI PRESS COMP 1
S7	SWITCH-LIMIT,HI PRESS COMP 2
S11	SWITCH-LOW PRESS,LOW AMBIENT
S28	SWITCH-LIMIT,HI PRESS COMP 3
S42	OVERLOAD-RELAY,BLOWER MOTOR
S48	SWITCH-DISCONNECT
S49	SWITCH-FREEZESTAT COMP 1
S50	SWITCH-FREEZESTAT COMP 2
S53	SWITCH-FREEZESTAT COMP 3
S84	SWITCH-LOW PRESS,AMB COMP 2
S85	SWITCH-LOW PRESS,AMB COMP 3
S94	SWITCH-LOW PRESS,LOW AMB,COMP 4
S95	SWITCH-FREEZESTAT,COMP 4
S96	SWITCH-HIGH PRESS,COMP 4
T1	TRANSFORMER-CONTROL
T18	TRANSFORMER-CONTACTOR
TB14	TERMINAL STRIP-CLASS II VOLT

WIRING DIAGRAM	4/05
COMBINATION PACKAGED/ROOFTOP	
TCA,TGA-210H,240H,300S-G,J,M,Y	
HEAT/COOL SECTION B3	
Supersedes Form No.	New Form No. 534,478W

TGA210H, 240H, 300S SEQUENCE OF OPERATION

Power:

1. Line voltage from unit disconnect S48 or TB2 if equipped, energizes transformer T1. T1 provides 24VAC to the unit cooling, heating and blower controls and TB1 and TB14.

Blower Operation:

2. The main control module receives a demand from thermostat terminal G. A45 energizes blower contactor K3 with 24VAC.
3. N.O. K3 closes, energizing blower B3.

Optional Power Exhaust Operation:

4. The economizer control module receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% outside air damper open (adjustable).
5. N.O. K65-1 and N.O. K65-2 both close, energizing exhaust fan motors B10 and B11.

1st Stage Cooling (compressor B1)

6. First stage cooling demand Y1 and G is energized by the thermostat. G energizes blower.
7. 24VAC is routed from main control module A45, P113 to N.C. freezestats S49, optional N.C. high pressure switch S4. Compressor contactor K1 is energized.
8. N.O. contacts K1 closes energizing compressor B1.
9. Optional N.O. low ambient switch S11 closes to energize condenser fan relay K10.
10. N.O. contacts K10-1 and K10-2 close energizing condenser fan B4 and B5.

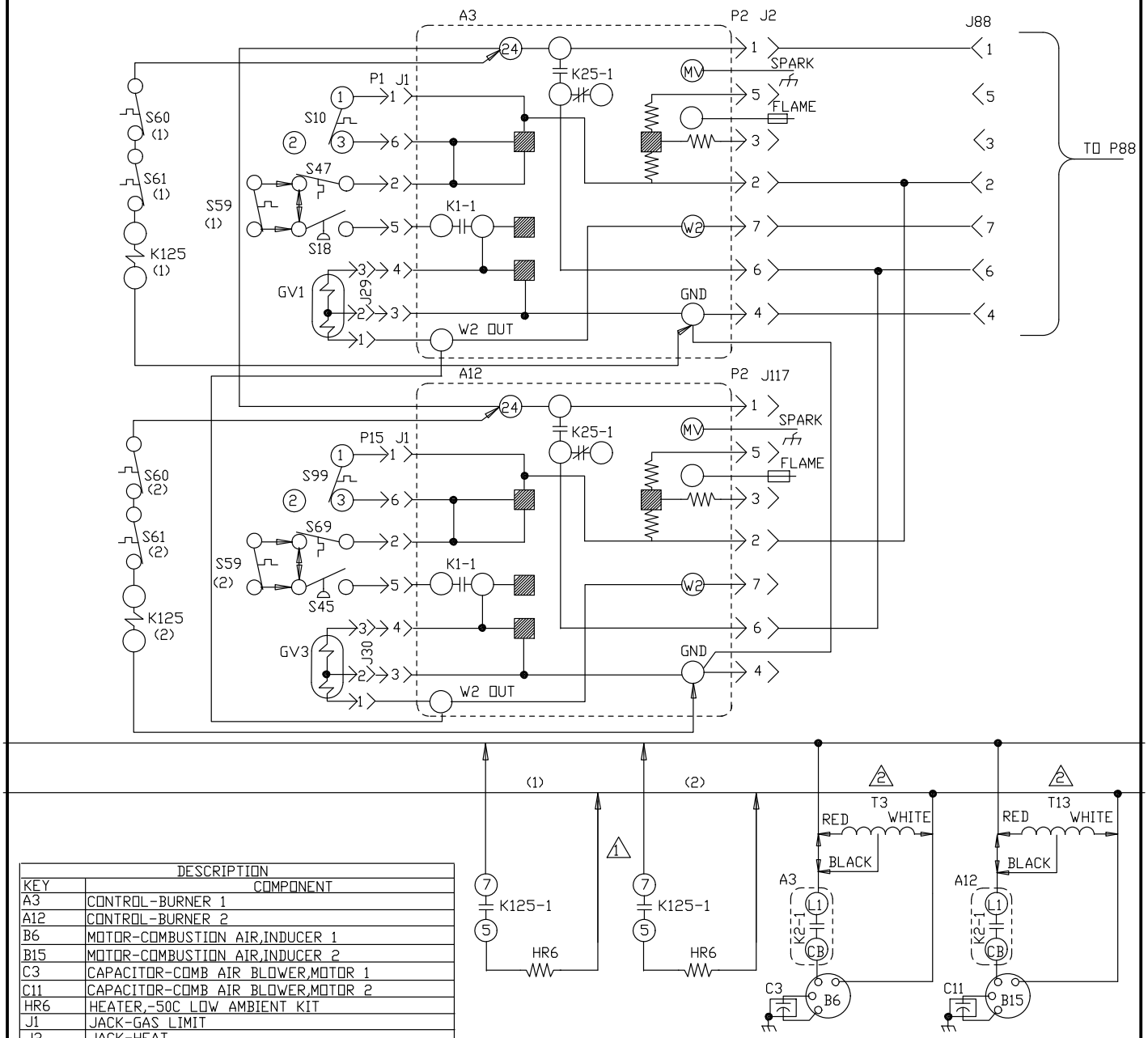
2nd Stage Cooling (compressor B2 is energized)

11. Second stage cooling demand energizes Y2.
12. 24VAC is routed from module A45 P113 to N.C. freezestat S50, optional N.C. high pressure switch S7. Compressor contactor K2 is energized.
13. N.O. K2 closes energizing compressor B2.
14. Optional N.O. low ambient switch S84 closes. (S84 and S11 are wired in parallel)

3rd Stage Cooling (compressor B13 and B20 are energized)

15. Third stage cooling demand energizes Y3.
16. 24VAC is routed from main control module A45 , P118 to N.C. freezestats S53 and S95 then continues through optional N.C. high pressure switches S28 and S96. Compressor contactors K14 and K146 are energized.
17. N.O. K14 and K146 close energizing compressors B13 and B20.
18. Optional N.O. low ambient switches S28 and S96 (wired in parallel) close to energize condenser fan relay K68
19. N.O. contacts K68-1 and K68-2 close energizing fans B21 and B22.

GAS HEAT FOR TGA180/300



DESCRIPTION	
KEY	COMPONENT
A3	CONTROL-BURNER 1
A12	CONTROL-BURNER 2
B6	MOTOR-COMBUSTION AIR,INDUCER 1
B15	MOTOR-COMBUSTION AIR,INDUCER 2
C3	CAPACITOR-COMB AIR BLOWER,MOTOR 1
C11	CAPACITOR-COMB AIR BLOWER,MOTOR 2
HR6	HEATER,-50C LOW AMBIENT KIT
J1	JACK-GAS LIMIT
J2	JACK-HEAT
J29	JACK-GAS 1
J30	JACK-GAS 2
J88	JACK-CONTROL MODULE
J117	JACK-GAS 2 CONTROL
J130	JACK-GAS BURNER
K125,-1	RELAY-HEAT SHUTOFF
P1	PLUG-GAS LIMIT
P2	PLUG-HEAT
P15	PLUG-F.A.T. SHIFT
P130	PLUG-GAS BURNER
S10	SWITCH-LIMIT, PRIMARY GAS
S18	SWITCH-COMB AIR BLOWER, PROVE
S45	SWITCH-LIMIT,COMB AIR PROVE 2
S47	SWITCH-FLAME ROLLOUT, BURNER 1
S59	THERMOSTAT,-35 C OPEN,-50 C
S60	THERMOSTAT,-23C CL,-7C OP,-50C LOW AMB KIT
S61	THERMOSTAT,+24C OPEN,-50C LOW AMB KIT
S69	SWITCH-FLAME ROLLOUT BURNER 2
S99	SWITCH-LIMIT,PRIMARY BURNER 2
T3	TRANSFORMER-COMB AIR BLOWER 1
T13	TRANSFORMER-COMB AIR BLOWER 2

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

2 T3 & T13 USED ON 575V UNITS ONLY

INDICATES MICRO PROCESSER

DENOTES OPTIONAL COMPONENTS

	WIRING DIAGRAM	2/08
COMBINATION UNIT-ROOFTOP		
GAS HEAT FOR TGA 260,360 AND 480 UNITS C BOX		
HEATING SECTION-A2		
Supersedes Form No.	New Form No. 537054-01	

GAS HEAT FOR TGA180/300 UNITS

First-Stage Heat:

1. The thermostat initiates W1 heating demand.
2. 24VAC is routed from TB1 on control module A45 to ignition control A3 (first heat section) and A12 (second heat section) through P88. A3 proves N.C. primary limit S10 and N.C. rollout switch S47. A12 proves N.C primary limit S99 and rollout switch S69.
3. Combustion air inducer B6 and B15 are energized.
4. After the combustion air inducers B6 and B15 have reached full speed, the combustion air proving switches S18 and S45 close.
5. After a 30 second delay A3 energizes the ignitor and LO terminal (low fire) of gas valve GV1. A12 energizes the ignitor and LO terminal (low fire) of GV3.

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 A45 control module. The second stage heat signal passes from A45 to A3 and A12.
8. A3 energizes HI terminal (high fire) of gas valve GV1 and A12 energizes HI terminal (high fire) of gas valve GV3.

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 and terminal HI of GV3 is de-energized by A12..

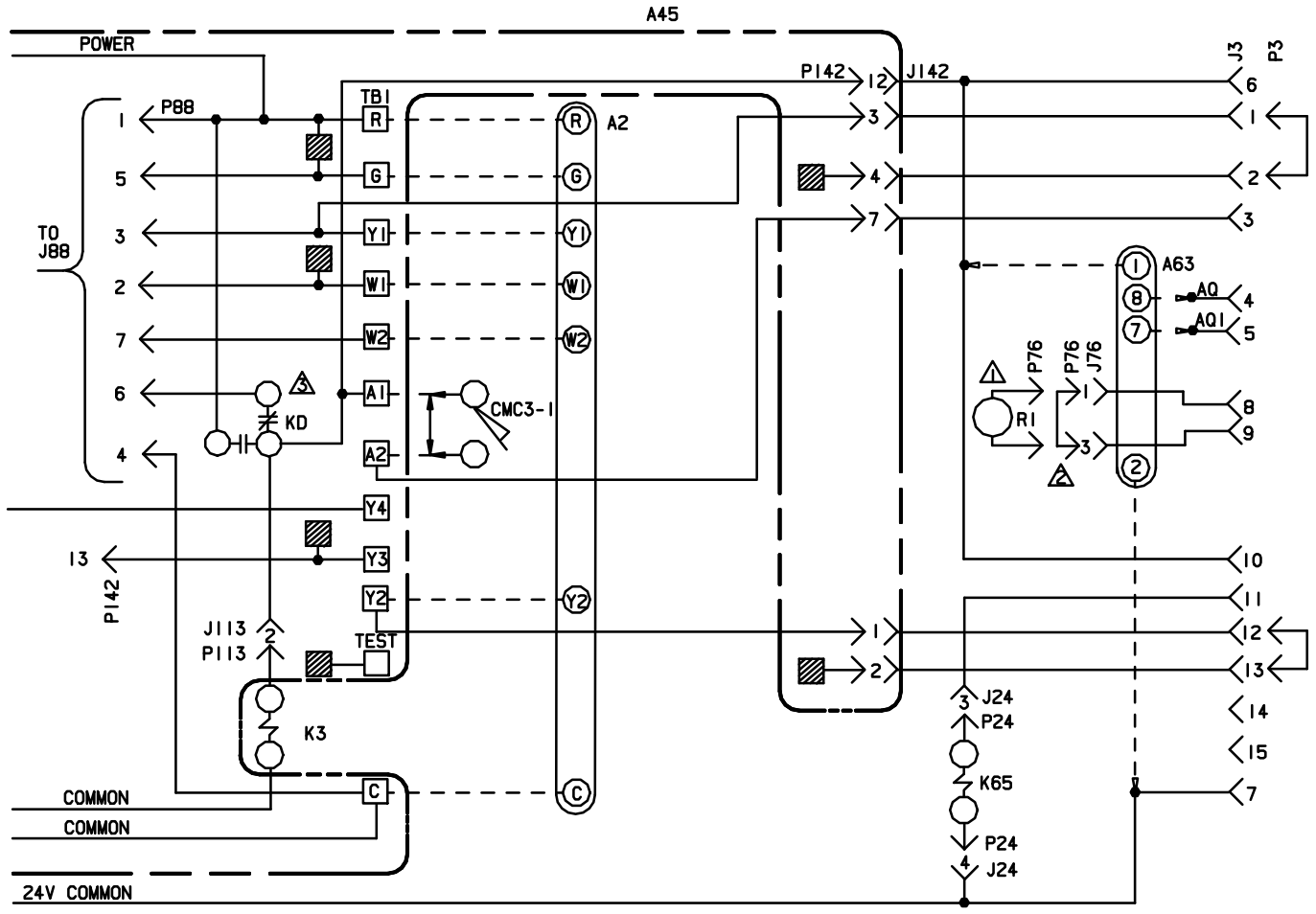
End of First-Stage Heat:

11. Heating demand is satisfied. Terminal W1 (low fire) is de-energized.
12. Ignition A3 is de-energized by control module A45 in turn de-energizing terminal LO of GV1. A12 is de-energized as well, de-energizing LO terminal on GV3.

Optional Low Ambient Kit:
(C.G.A. -50°C Low Ambient Kit)

13. Line voltage (or transformer T20 in 460V and 575V only) is routed through the low ambient kit fuses F20 and N.C. low ambient kit thermostats S60 and S61,to energize low ambient kit heater HR6.

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT



1. R1 IS USED WITH OPTIONAL MODULATING ECONOMIZER FIELD KIT
2. REMOVE JUMPER WHEN R1 IS USED
3. KD IS ON A45 BOARD

DESCRIPTION	
KEY	COMPONENT
A2	SENSOR-ELECTRONIC
A45	CONTROL-MODULE
A63	SENSOR-CO2
CMC3-1	CLOCK-TIME
J3	JACK-UNIT, ECONOMIZER
J24	JACK-EXHAUST FAN
J76	JACK-SENSOR, ECONOMIZER
J113	JACK-BLOWER & COOL 1 CONTROL
J142	JACK-ECONOMIZER HARNESS
K3	RELAY/CONTACTOR-BLOWER
K65	RELAY-EXHAUST FAN
P3	PLUG-LESS ECONOMIZER
P24	PLUG-EXHAUST FAN
P76	PLUG-SENSOR, ECONOMIZER
P88	PLUG-HEAT CONTROL
P113	PLUG-BLOWER & COOL 1 CONTROL
P142	PLUG-ECONOMIZER HARNESS
R1	SENSOR-MIXED OR SUPPLY AIR
TB1	TERMINAL STRIP-24V CLASS II

THERMOSTAT HEAT ANTICIPATION SETTING 0.1 AMP

INDICATES MICRO PROCESSER

DESIGNATES OPTIONAL WIRING

CLASS II FIELD WIRING

WIRING DIAGRAM	2/05
ACCESSORIES	
ELECTROMECHANICAL OR ELECTRONIC THERMOSTAT FOR TCA/TGA UNITS	
TEMPERATURE CONTROL SECTION CI	
Supersedes Form No.	New Form No. 534,484W

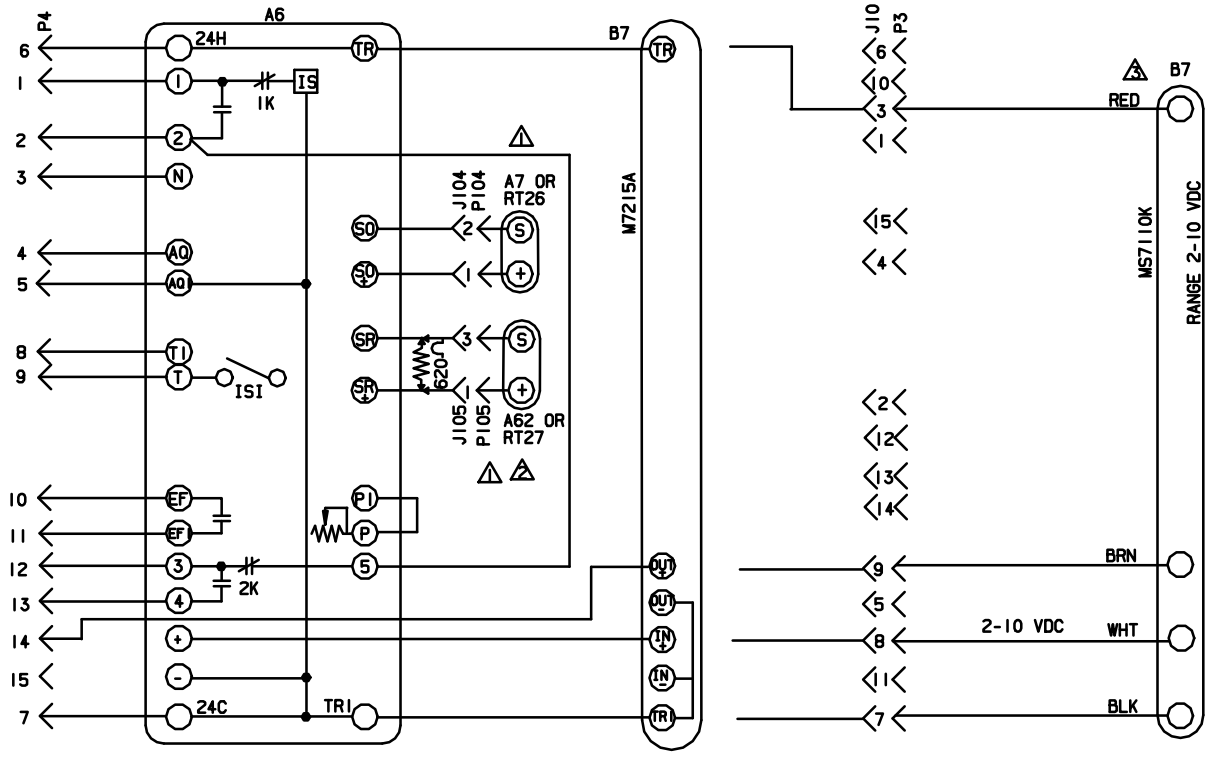
POWER:

1. Terminal strip TB1 found on the main control module A45 energize thermostat components with 24VAC.

OPERATION:

2. The main control module A45 receives data from the electronic thermostat A2 (Y1, Y2, Y3, W1, W2, G, OCP) A45 energizes the appropriate components for heat or cool demand.

"T" SERIES ECONOMIZER



KEY	DESCRIPTION COMPONENT
A6	CONTROL-SOLID STATE ENTHALPY
A7	SENSOR-SOLID STATE ENTHALPY
A62	SENSOR-ENTHALPY, INDOOR
B7	MOTOR-DAMPER, ECONOMIZER
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
RT26	SENSOR-OUTDOOR AIR TEMP
RT27	SENSOR-INDOOR AIR TEMP

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	12/04
ACCESSORIES	
ECONOMIZER FOR TCA/TGA UNITS	
ECONOMIZER SECTION DI	
Supersedes Form No.	New Form No. 534,965W

 Litho U.S.A.

SEQUENCE OF OPERATION

POWER:

1. Economizer control module A6 is energized through main module A45, P142 when contactor K3 is energized.

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.