GCS16/GCS20 SERIES UNITS

GCS16/20 series units in the 2 to 5 ton (7.0 to 17.0 kW) cooling size are packaged combination gas heat / dx cool units designed for commercial applications. Gas heat sections are available with Lennox' new tubular heat exchanger in 50,000, 75,000, 90,000 and 120,000 (14.7, 22.0, 26.4, 35.2 kW) Btuh input sizes.

Three phase GCS20 units manufatured April 2002 and later have a 12.0 seer rating. Revised specifications, electrical data and blower data are included in this manual.

All GCS20 model units and GCS16-036 and -048 utilize a scroll compressor. The scroll compressor offers high volumetric efficiency, quiet operation and the ability to start under system load. Continuous flank contact, maintained by centrifugal force, minimizes gas leakage and maximizes efficiency. The motor is internally protected from excessive current and temperature. GCS16-024, -030 and-060 models will be equipped with a reciprocating compressor. The reciprocating compressor is hermetically sealed for trouble free operation and long service life. Like the scroll, the reciprocating compressor has a built-in protection device against excessive current and temperatures.

The GCS16/20 is designed to accept any of several different thermostat control systems with minimum field wiring. Control options such as economizer, warm up kit, Honeywell T7300 control or Honeywell T8600 control are applicable. When installed, the controls become an integral part of the unit wiring. Units are also equipped with a low voltage pig tails to facilitate thermostat field wiring.

Information in this manual is for use by a qualified service technician only. All specifications in this manual are subject to change. Procedures outlined in this manual are represented as a recommendation only and do not supersede or replace state or local codes.

⚠ 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.

GCS16 SHOWN

⚠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.

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠CAUTION

Electrostatic discharge can affect electronic components. Take precautions during furnace installation and service to protect the furnace'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.

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SPECIFICATIONS GCS16

Model No.			GCS16-024-50 GCS16X-024-50	GCS16-030-75 GCS16X-030-75	GCS16-036-90 GCS16X-036-90
Nominal Tonnage (kW)			2 (7.0)	2.5 (8.8)	3 (10.6)
Heating Capacity	Input - Btuh (kW)		50,000 (14.7)	75,000 (22.0)	90,000 (26.4)
	Output - Btuh (kW)		40,000 (11.7)	60,000 (17.6)	72,000 (21.1)
☆A.F.U.E.			80.0%		
★ARI Certified Cooling Ratings	Cooling capacity - Btuh (kW)		23,200 (6.8)	27,400 (8.0)	35,400 (10.4)
	Total unit watts		2670	3150	3850
	SEER (Btuh/Watts)		10.00		10.10
	EER (Btuh/Watts)		8.70		9.20
*Sound Rating Number (db)			80		
Refrigerant Charge (HCFC-22)			3 lbs. 3 oz. (1.45 kg)	4 lbs. 3 oz. (1.90 kg)	4 lbs. 6 oz. (1.94 kg)
Evaporator Blower	Blower wheel nominal diameter x width - in. (mm)		9 x 8 (229 x 203)	10 x 8 (254 x 203)	
	Motor horsepower (W)		1/3 (249)		1/2 (373)
Evaporator Coil	Net face area - sq. ft. (m^2)		3.2 (0.30)		4.10 (0.38)
	Tube diameter - in. (mm) & No. of rows		3/8 (9.5) - 2		
	Fins per inch (m)		15 (591)		
Condenser Coil	Net face area sq. ft. (m^2)	Outer coil	8.70 (0.81)		
		Inner coil	- - - -	8.40 (0.78)	
	Tube diameter - in. (mm) & No. of rows		3/8 (9.5) - 1	3/8 (9.5) - 2	
	Fins per inch (m)		20 (787)		
Condenser Fan	Diameter - in. (mm) & No. of blades		20 (508) - 4		
	Air volume - cfm (L/s)		2450 (1155)	2200 (1040)	
	Motor horsepower (W)		1/6 (124)		
	Motor watts		220	240	
Gas Supply Connections fpt - in. (mm)			1/2 (12.7)		
Recommended Gas Supply Pressure in. w.c. (kPa)		Natural Gas	7 (1.7)		
		LPG/Propane	11 (2.7)		
Condensate drain size mpt - in. (mm)			3/4 (19)		
No. & size of cleanable polyurethane filters - in. (mm)			(1) 16 x 25 x 1 (406 x 635 x 25)		
Net weight of basic unit - lbs. (kg)			350 (159)	373 (169)	370 (168)
Shipping weight of basic unit - lbs. (kg) 1 pkg			432 (196)	455 (206)	470 (213)
Electrical characteristics - (60hz)			208/230v - 1 phase		208/230v - 1 ph 208/230v, 460v or 575v - 3 ph

*Sound Rating Number in accordance with test conditions included in ARI Standard 270.
☆Annual Fuel Utilization Efficiency based on DOE test procedures and FTC labeling regulations.
★Certified in accordance with the USE certification program, which is based on ARI Standard 210/240: 95°F (35°F) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering evaporator coil air.

SPECIFICATIONS GCS16 CONT.

Model No.			GCS16-048-75 GCS16X-048-75	GCS16-048-120 GCS16X-048-120	GCS16-060-75 GCS16X-060-75	GCS16-060-120 GCS16X-060-120
Nominal Tonnage (kW)			4 (10.1)		5 (17.6)	
Heating Capacity	Input - Btuh (kW)		75,000 (22.0)	120,000 (35.2)	75,000 (22.0)	120,000 (35.2)
	Output - Btuh (kW)		60,000 (17.0)	96,000 (28.1)	60,000 (17.0)	96,000 (28.1)
☆A.F.U.E			80.0%			
★ARI Certified Cooling Ratings	Cooling capacity - Btuh (kW)		46,500 (13.6)		58,500 (17.1)	
	Total unit watts		4890		6570	
	SEER (Btuh/Watts)		10.35		10.00	
	EER (Btuh/Watts)		9.5		8.90	
*Sound Rating Number (db)			82			
Refrigerant Charge (HCFC-22)			5 lbs. 11 oz. (2.58 kg)		7 lbs. 0 oz. (3.18 kg)	
Evaporator Blower	Blower wheel nominal diameter x width - in. (mm)		11-1/2 x 9 (292 x 229)			
	Motor horsepower (W)		3/4 (560)			
Evaporator Coil	Net face area - sq. ft. (m^2)		5.30 (0.49)		6.20 (0.58)	
	Tube diameter - in. (mm) & No. of rows		3/8 (9.5) - 2			
	Fins per inch (m)		15 (591)			
Condenser Coil	Net face area sq. ft. (m^2)	Outer coil	14.30 (1.33)			
		Inner coil	5.90 (0.55)		13.70 (1.27)	
	Tube diameter - in. (mm) & No. of rows		3/8 (9.5) - 1.4		3/8 (9.5) - 2	
	Fins per inch (m)		20 (787)			
Condenser Fan	Diameter - in. (mm) & No. of blades		24 (610) - 4			
	Air volume - cfm (L/s)		3880 (1830)		3770 (1780)	
	Motor horsepower (W)		1/4 (187)			
	Motor watts		340		360	
Gas Supply Connections fpt - in. (mm)			1/2 (12.7)			
Recommended Gas Supply Pressure in. w.c. (kPa)		Natural Gas	7 (1.7)			
		LPG/Propane	11 (2.7)			
Condensate drain size mpt - in. (mm)			3/4 (19)			
No. & size of cleanable polyurethane filters - in. (mm)			(1) 20 x 25 x 1 (508 x 635 x 25)			
Net weight of basic unit - lbs. (kg)			496 (225)		526 (239)	
Shipping weight of basic unit - lbs. (kg) 1 package			605 (274)		635 (288)	
Electrical characteristics - (60hz)			208/230v - 1 ph, 208/230v or 460v - 3 ph	208/230v - 1 ph, 208/230v, 460v or 575v - 3 ph	208/230v - 1 ph, 208/230v or 460v - 3 ph	208/230v - 1 ph, 208/230v, 460v or 575v - 3 ph

*Sound Rating Number in accordance with test conditions included in ARI Standard 270.
☆Annual Fuel Utilization Efficiency based on DOE test procedures and FTC labeling regulations.
★Certified in accordance with the USE certification program, which is based on ARI Standard 210/240: 95°F (35°F) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering evaporator coil air.

SPECIFICATIONS GCS20

Model No.			GCS20 -024-50	GCS20 -030-75	GCS20 -036-90	GCS20 -042-75	GCS20 -042-120	GCS20 -048-75	GCS20 -048-120	GCS20 -060-75	GCS20 -060-120
Nominal Tonnage			2	2-1/2	3	3-1/2		4		5	
Heating Capacity	Input	Btuh	50,000	75,000	90,000	75,000	120,000	75,000	120,000	75,000	120,000
		kW	14.7	22.0	26.4	22.0	35.2	22.0	35.2	22.0	35.2
	Output	Btuh	40,000	60,000	72,000	60,000	96,000	60,000	96,000	60,000	96,000
		kW	11.7	17.6	20.5	17.6	28.1	17.6	28.1	17.6	28.1
☆A.F.U.E.			80.0%								
*Sound Rating Number (db)			80			78	82				
★ARI Standard 210/240 Ratings	Total Cooling Capacity	Btuh	24,600	30,400	33,600	41,000		48,000		58,000	
		kW	7.2	8.9	9.8	12.0		14.1		17.0	
	Total Unit Watts		2420	3140	3500	4165		4775		5985	
	SEER (Btuh/Watts)		11.00			11.3		11.30		11.00	
	EER (Btuh/Watts)		10.2	9.70	9.60	9.8		10.1		9.7	
Refrigerant Charge (HCFC-22)			4 lbs. 5 oz. (2.0 kg)	4 lbs. 10 oz. (2.10 kg)	4 lbs. 6 oz. (3.02 kg)	5 lbs. 2 oz. (2.32 kg)		7 lbs. 3 oz. (3.26 kg)		7 lbs. 5 oz. (3.32 kg)	
Evaporator Blower	Blower wheel nominal diameter x width	in.	9 x 8	10 x 8		11-1/2 x 9					
		mm	229 X 203	254 X 203		292 x 228					
	Motor output - hp (W)		1/3 (249)		1/2 (373)	3/4 (560)					
Evaporator Coil	Net face area - sq. ft. (m^2)		3.2 (0.30)	4.1 (0.38)	4.1 (0.38)	5.3 (0.49)				6.2 (0.58)	
	Tube diameter - in. (mm) & No. of rows		3/8 (9.5) - 2								
	Fins per inch (m)		15 (590)								
Condenser Coil	Net face area - sq. ft. (m^2)	Outer Coil	8.7 (0.81)			14.3 (1.33)					
		Inner Coil	8.4 (0.78)			5.9 (0.55)		13.7 (1.27)			
	Tube diameter - in. (mm) & No. of rows		3/8 (9.5) - 2			3/8 (9.5) - 1.4		3/8 (9.5) - 2			
	Fins per inch (m)		20 (787)								
Condenser Fan	Diameter - in. (mm) & No. of blades		20 (508) - 4			24 (610) - 4					
	Air volume - cfm (L/s)		2200 (1040)			3880 (1830)		3770 (1780)			
	Motor output - hp (W)		1/6 (124)			1/4 (187)					
	Motor watts		240			340		360			
Gas Supply Connections fpt - in. (mm)			1/2 (13)								
Recommended Gas Supply Pressure - wc. in. (kPa)		Natural	7 (1.7)								
		LPG/Propane	11 (2.7)								
Condensate drain size mpt - in. (mm)			3/4 (19)								
No. & size of cleanable polyurethane filters - in. (mm)			(1) 16 x 25 x 1 (406 x 635 x 25)			(1) 20 x 25 x 1 (508 x 635 x 25)					
Net weight of basic unit - lbs. (kg) (1 Pkg.)			406 (184)			494 (224)		527 (239)		541 (245)	
Ship weight of basic unit - lbs. (kg) (1 Pkg.)			472 (214)			603 (274)		636 (288)		650 (295)	
Electrical characteristics - 60 hertz			208/230v - 1 phase		208/230v 1ph 208/203v or 460v 3 ph	208/230v - 1 phase		208/230v - 1 phase 208/203v or 460v 3phase			

☆Annual Fuel Utilization Efficiency based on DOE test procedures and FTC labeling regulations.
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SPECIFICATIONS GCS20
(manufactured April 2002 and later)

SPECIFICATIONS - GCS20						
Heating Performance	**Model No.**	**GCS20-036-75**	**GCS20-048-75**	**GCS20-048-120**	**GCS20-060-75**	**GCS20-060-120**
	Input - Btuh (kW)	75,000 (22.0)	75,000 (22.0)	120,000 (35.2)	75,000 (22.0)	120,000 (35.2)
	Output - Btuh (kW)	60,000 (17.6)	60,000 (17.6)	96,000 (28.1)	60,000 (17.6)	96,000 (28.1)
	☆A.F.U.E.	80.0%	80.0%	80.0%	80.0%	80.0%
	Gas Supply Connections npt - in.	1/2	1/2	1/2	1/2	1/2
	Recommended Gas Supply Pressure - Natural Gas	7 in. w.c. (1.7 kPa)	7 in. w.c. (1.7 kPa)	7 in. w.c. (1.7 kPa)	7 in. w.c. (1.7 kPa)	7 in. w.c. (1.7 kPa)
	LPG/Propane	11 in. w.c. (2.7 kPa)	11 in. w.c. (2.7 kPa)	11 in. w.c. (2.7 kPa)	11 in. w.c. (2.7 kPa)	11 in. w.c. (2.7 kPa)
Cooling Performance	Nominal Tonnage (kW)	3 (10.6)	4 (14.1)	4 (14.1)	5 (17.6)	5 (17.6)
	★Cooling Capacity Btuh (kW)	35,200 (10.3)	50,000 (14.6)	50,000 (14.6)	59,000 (17.3)	59,000 (17.3)
	Total Unit Watts	3330	4545	4545	5765	5765
	★SEER (Btuh/Watts)	12.40	12.70	12.70	12.00	12.00
	EER (Btuh/Watts)	10.60	11.00	11.00	10.20	10.20
	*Sound Rating Number (dB)	82	82	82	82	82
	Refrigerant Charge (HCFC-22)	5 lbs. 2 oz. (2.34 kg)	7 lbs. 14 oz. (3.57 kg)	7 lbs. 14 oz. (3.57 kg)	8 lbs. 8 oz. (3.86 kg)	8 lbs. 8 oz. (3.86 kg)
Condenser Coil	Net face area - sq. ft. (m^2) Outer Coil	14.3 (1.33)	14.3 (1.33)	14.3 (1.33)	14.3 (1.33)	14.3 (1.33)
	Inner Coil	5.9 (0.55)	13.7 (1.27)	13.7 (1.27)	13.7 (1.27)	13.7 (1.27)
	Tube diameter - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Number of rows	1.4	2	2	2	2
	Fins per inch (m)	20 (787)	20 (787)	20 (787)	20 (787)	20 (787)
Condenser Fan	Motor horsepower (W)	1/4 (187)	1/4 (187)	1/4 (187)	1/4 (187)	1/4 (187)
	Motor watts	340	360	360	360	360
	Diameter - in. (mm)	24 (610)	24 (610)	24 (610)	24 (610)	24 (610)
	Number of blades	4	4	4	4	4
	Air volume - cfm (L/s)	3880 (1830)	3770 (1780)	3770 (1780)	3770 (1780)	3770 (1780)
Evaporator Coil	Net face area - sq. ft. (m^2)	5.3 (0.49)	6.2 (0.58)	6.2 (0.58)	6.2 (0.58)	6.2 (0.58)
	Tube diameter - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Number of rows	2	3	3	3	3
	Fins per inch (m)	15 (590)	14 (552)	14 (552)	14 (552)	14 (552)
	Condensate drain coupling size npt - in.	3/4	3/4	3/4	3/4	3/4
Evaporator Blower	Motor horsepower (W)	1/2 (373)	3/4 (560)	3/4 (560)	3/4 (560)	3/4 (560)
	Wheel nominal diameter x width - in. (mm)	10 x 8 (254 X 203)	11-1/2 x 9 (292 x 228)	11-1/2 x 9 (292 x 228)	11-1/2 x 9 (292 x 228)	11-1/2 x 9 (292 x 228)
Filters	Cleanable, polyurethane - No. & size - in.	(1) 20 x 25 x 1	(1) 20 x 25 x 1	(1) 20 x 25 x 1	(1) 20 x 25 x 1	(1) 20 x 25 x 1
	mm	508 x 635 x 25	508 x 635 x 25	508 x 635 x 25	508 x 635 x 25	508 x 635 x 25
Shipping Data	Net weight of basic unit - lbs. (kg)	496 (225)	541 (245)	541 (245)	541 (245)	541 (245)
	Ship. wt. of basic unit - lbs. (kg) 1 pkg.	603 (274)	650 (295)	650 (295)	650 (295)	650 (295)
Electrical characteristics (60 hz)		208/203v - 3 ph 460v - 3 ph	208/203v - 3 ph 460v - 3 ph	208/203v - 3 ph 460v - 3 ph	208/203v - 3 ph 460v - 3 ph	208/203v - 3 ph 460v - 3 ph

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OPTIONAL ACCESSORIES GCS16/20

Model No.			-024	-030	-036	-048	-060
Coil Guards — PVC coated steel wire guards to protect outdoor coil Standard equipment on GCS20 single phase units.			LB-82199CF (**47J23**) 2 guards per order			LB-82199CG (**47J24**) 3 guards per order	
Cold Weather Kit (GCS16 Units Canada Only) — Electric heater automatically controls minimum temperature in gas burner compartment when temperature is below 40°F (4°C). CGA certified to allow operation of unit down to -60°F (-50°C)			**65C03**				
Control Systems — See pages 4-5 for complete listing.			See pages 4-5				
Compressor Monitor (GCS16 Units Canada Only) — Non-adjustable switch (low ambient cut-out) prevents compressor operation when outdoor temperature is below 32°F (0°C).			T6-1469 **(45F08)**				
Diffusers — Aluminum grilles, large center grille, insulated diffuser box with flanges, hanging rings furnished, interior transition (even air flow), internally sealed (prevents recirculation), adapts to T-bar ceiling grids or plaster ceilings - Net Weight		**Step-Down** - double deflection louvers	RTD9-65 - 67 lbs. (30 kg)				
		Flush - fixed blade louvers	FD9-65 - 37 lbs.(17 kg)				
Economizer with Gravity Exhaust Dampers (Down-Flow) — Installs directly in cabinet, recirculated air dampers with pressure operated gravity exhaust damper, formed, gasketed damper blades, nylon bearings, 24v damper motor has adjustable minimum position switch, electronic discharge air sensor, adjustable outdoor air enthalpy control. Utilizes filter furnished with unit, filter rack will accept up to 2 in. (51 mm) filter. Removable exhaust air hood and outdoor air intake hood with cleanable aluminum mesh filter. Choice of economizer controls.	**US Only**	3 Position	REMD16-41 - 48 lbs. (22 kg)			REMD16-65 - 66 lbs. (30 kg)	
		Fully Modulating	REMD16M-41 - 48 lbs. (22 kg)			REMD16M-65 - 66 lbs. (30 kg)	
		[1] Indoor Filter	(1) 16 x 25 x 1 (406 x 635 x 25)			(1) 20 x 25 x 1 (508 x 635 x 25)	
		Outdoor Filter	(1) 14 x 25 x 1 (356 x 635 x 25)			(1) 18 x 25 x 1 (457 x 635 x 25)	
	GCS16 units Canada Only	Fully Modulating	REMD16M-41S - 85 lbs. (39 kg)			REMD16M-65S- 105 lbs. (48 kg)	
		[1] Indoor Filter	(1) 16 x 25 x 1 (406 x 635 x 25)			(1) 20 x 25 x 1 (508 x 635 x 25)	
		Outdoor Filter	(1) 19-3/8 x 15-3/4 x 1			(1) 19-7/8 x 22-3/4 x 1 (505 x 578 x 25)	
Economizer Dampers (Horizontal) — Installs directly in cabinet, combination outdoor air and recirculated air damper, formed, gasketed damper blades, nylon bearings, 24v damper motor has adjustable minimum position switch, electronic discharge air sensor, adjustable outdoor air enthalpy control. 1 in (25 mm) fiberglass filter furnished, filter rack will accept up to 2 in. (51 mm) filter, outdoor air intake hood with aluminum mesh filter. Choice of economizer controls.	**US Only**	3 Position	EMDH16-41 110 lbs. (50 kg)			EMDH16-65 - 130 lbs. (59 kg)	
		Fully Modulating	EMDH16M-41 - 110 lbs. (50 kg)			EMDH16M-65 - 130 lbs. (59 kg)	
		Indoor Filter	(1) 20 x 24 x 1 (508 x 610 x 25)			(1) 16 x 25 x 1 (406 x 635 x 25) (1) 14 x 25 x1 (356 x 635 x 1)	
		Outdoor Filter	(1) 8 x 24 x 1 (203 x 610 x 25)			(1) 8 x 28 x 1 (203 x 711 x 25)	
	GCS16 Units Canada Only	Fully Modulating	EMDH16M-41S - 70 lbs. (32 kg)			EMDH16M-65S - 86 lbs. (39 kg)	
		Indoor Filter	(1) 20 x 20 x 1 (508 x 508 x 25)			(1) 20 x 25 x 1 (508 x 635 x 25)	
		Outdoor Filter	(1) 16-1/2 x 21-3/4 x 1 (419 x 552 x 25)			(1) 22-1/2 x 25-1/4 x 1 (571 x 641 x 25)	
Enthalpy Control, Differential — Used in conjunction with outdoor air enthalpy control. Determines and selects which air has the lowest enthalpy. Return air enthalpy sensor field installs in economizer damper section			**54G44**				
Gravity Exhaust Dampers — For use with EMDH16. Pressure operated assembly field installs in the return air duct adjacent to the economizer assembly. Includes bird screen. - Net Weight			GEDH16-65 - 4 lbs. (2 kg)				
Horizontal Filter Kit (GCS16 Units Canada Only) — For horizontal applications, painted steel cabinet with filter access, disposable, pleated fiber filter furnished, see dimension drawing, No. and size of filter - Net Weight			HF16-46 - 18 lbs. (8 kg) (1) 20 x 20 x 2 in. (508 x 508 x 51 mm)			HF16-65 - 21 lbs. (10 kg) (1) 20 x 25 x 2 in. (508 x 635 x 51 mm)	
Low Ambient Control Kit — Units operate down to 30°F (-1°C) outdoor air temperature in cooling mode without any additional controls. Kit can be field installed, enables unit to operate properly down to 0°F (-18°C).			LB-57113BC **(24H77)**				
LPG/Propane Kits - Conversion from Natural Gas to LPG/Propane			**50L89 -** 50-75-90K input **50L88 -** 120K input				
Roof Curb Power Entry Kit — Allows power entry through roof mounting frame, knockouts provided in roof frame, kit contains 1/2 in. (13 mm) x 40 in. (1016 mm) armored conduit and installation hardware, two kits are required, one for low voltage and one for high voltage. See Dimension Drawing			**18H70**				
Roof Mounting Frame — Nailer strip furnished, mates to unit, U.S. National Roofing Contractors Approved, shipped knocked down. RMF16-41 may be used on all sizes, with a slight unit overhang on GCS20-042, GCS16/20-048 and GCS16/20-060 units - Net Weight NOTE (US Only) — Sound Reduction Plate must be ordered separately for field installation.			RMF16-41 - 75 lbs. (35 kg) Plate (ordered separately) (**73H80**)			RMF16-41 - 75 lbs. (35 kg) Plate (ordered separately) (**73H80**) RMF16-65 - 86 lbs. (39 kg) Plate (ordered separately) (**73H82**)	

[1] Indoor filter is not furnished with economizer. REMD16 utilizes existing filter furnished with CHA16 unit.

OPTIONAL ACCESSORIES GCS16/20 CONT.

Model No.		-024	-030	-036	-048	-060
Outdoor Air Damper Section — For down-flow applications, damper assembly replaces blower access panel, manually adjustable, 0 to 25% (fixed) outdoor air, outdoor air hood with cleanable filter included, number and size of filter - Net Weight Minimum mixed air temperature Heat mode - 45°F (7°C) Maximum mixed air temperature Cool mode - 90°F (32°C),	**US Only**	OAD16-41 - 12 lbs. (5 kg) (1) 5 x 17 x 1 in. (127 x 432 x 25 mm)			OAD16-65 - 12 lbs. (5 kg) (1) 8 x 17 x 1 in. (203 x 432 x 25 mm)	
	GCS16 Units Canada Only	OAD16-41S - 10 lbs. (5 kg) (1) 14 x 6 x 1 in. (356 x 152 x 25 mm)			OAD16-65S - 16 lbs. (7 kg) (1) 18 x 6 x 1 in. (457 x 152 x 25 mm)	
Outdoor Air Damper Section — For horizontal applications, installs in return air duct adjacent to unit, manually adjustable (fixed) outdoor air - Net Weight		OAD3-46/65 - 8 lbs. (4 kg)				
Timed Off Control — Prevents compressor short-cycling and allows time for suction and discharge pressure to equalize, permitting the compressor to start in an unloaded condition. Automatic reset control provides a time delay between compressor shutoff and start-up.		LB-50709BK **(47J27)**				
Thermostat — Not furnished with unit. See Thermostat bulletin in Thermostats and Controls section and Lennox Price book. For commercial control systems, see pages 4-5.		See Thermostat bulletin in Thermostats and Controls section, Lennox Price book and pages 4-5.				
Transitions (Supply and Return) — Used with diffusers, installs in roof mounting frame, galvanized steel construction, flanges furnished for round duct connection, fully insulated - Net Weight		SRT16-65 - 20 lbs. (9 kg)				
Unit Stand-Off mounting Kit — For horizontal applications, elevates units above mounting surface. Includes six high impact polystyrene stand-off mounts. See dimension drawings.		**38H18**				

ELECTRICAL DATA GCS16
Single Phase

Model No.		GCS16-024	GCS16-030	GCS16-036	GCS16-048	GCS16-060
Line voltage data - 60 hz		208/230v - 1 phase				
▶Recommended maximum fuse size (amps)		25	30	40	50	60
†Minimum Circuit Ampacity		16	20	25	34	42
Compressor	Rated load amps	10.1	12.4	16	21.8	27.6
	Locked rotor amps	60.0	69.4	100	131	135
Condenser Coil Fan Motor	Full load amps	1.1			2	
	Locked rotor amps	2.3			4.2	
Evaporator Blower Motor	Full load amps	2.2	3.0	3.9	4.6	
	Locked rotor amps	4.2	6.2	8.3	10.1	
[1]Induced Draft Blower Motor (1 phase)		0.7				

†Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
▶Where current does not exceed 100 amps, HACR type circuit breaker may be used in place of fuse (U.S. Only).
NOTE - Extremes of operating range are plus and minus 10% of line voltage.

ELECTRICAL DATA GCS16
Three Phase

Model No.		GCS16-036			GCS16-048			GCS16-060		
Line voltage data - 60 hz - 3 phase		208/230v	460v	575v	208/230v	460v	575v	208/230v	460v	575v
▶Recommended maximum fuse size (amps)		25	15		35	15		45	20	15
†Minimum Circuit Ampacity		18	10	8	23	12	10	29	16	12
Compressor	Rated load amps	10.3	5.1	4.2	12.8	6.4	5.1	17.6	9.5	6.3
	Locked rotor amps	77	39	31	91	46	37	105	55	45
Condenser Coil Fan Motor	Full load amps	1.1	.80	[2].80	2	1.1	[2]1.1	2	1.1	[2]1.1
	Locked rotor amps	2.3	1.9	[2]1.9	4.2	2.2	[2]2.2	4.2	2.2	[2]2.2
Evaporator Blower Motor	Full load amps	3.9	1.9	[2]1.9	4.6	2.4	[2]2.4	4.6	2.4	[2]2.4
	Locked rotor amps	8.3	4.2	[2]4.2	10.1	5.0	[2]5.0	10.1	5.0	[2]5.0
[1]Induced Draft Blower Motor (1 phase)		0.7								
Unit Power Factor		.86			.84	.87		.86	.88	

†Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
▶Where current does not exceed 100 amps, HACR type circuit breaker may be used in place of fuse (U.S. Only).
[1]Motor is rated at 230 volts. Full load amps shown are for step-down transformer output.
[2]Motors are rated at 460 volts. Full load amps shown are for step-down transformer output.
NOTE - Extremes of operating range are plus and minus 10% of line voltage.

ELECTRICAL DATA GCS20
Single Phase

Model No.		GCS20-024	GCS20-030	GCS20-036	GCS20-042	GCS20-048	GCS20-060
Line voltage data (60 Hz)		208/230v - 1 ph					
▶Recommended maximum fuse size (amps)		30	30	40	45	60	70
†Minimum Circuit Ampacity		19	21	26	30	37	43
Compressor	Rated load amps	12.2	13.5	16.1	17.9	23.7	28.8
	Locked rotor amps	61	73	88	104	129	169
Condenser Fan Motor	Full load amps	1.1			2.0		
	Locked rotor amps	2.3			4.2		
Evaporator Blower Motor (1 phase)	Full load amps	2.2	3.0	3.9	4.6		
	Locked rotor amps	4.6	6.2	8.3	10.1		
[1] Induced Draft Blower Motor (1 phase) - Full load amps (total)		0.7					

▶Where current does not exceed 100 amps, HACR circuit breaker may be used in place of fuse (U.S. only).
†Refer to National or Canadian Electric Code to determine wire, fuse and disconnect size requirements.
NOTE — Extremes of operating range are plus and minus 10 % of line voltage.

ELECTRICAL DATA GCS20
Three Phase

Model No.		GCS20-036		GCS20-048		GCS20-060	
Line voltage data (60 Hz)		208/230v	460v	208/230v	460v	208/230v	460v
		3 ph					
▶Recommended maximum fuse size (amps)		25	15	35	20	45	20
†Minimum Circuit Ampacity		18	10	24	13	29	15
Compressor	Rated load amps	10.3	5.1	13.5	7.4	17.3	9
	Locked rotor amps	77	39	120	49.5	123	62
Condenser Fan Motor	Full load amps	1.1	.8	2	1.1	2	1.1
	Locked rotor amps	2.3	1.9	4.2	2.2	4.2	2.2
Evaporator Blower Motor (1 phase)	Full load amps	3.9	1.9	4.6	2.4	4.6	2.4
	Locked rotor amps	8.3	4.2	10.1	5.0	10.1	5
[1] Induced Draft Blower Motor (1 phase) - Full load amps (total)		.7					

▶Where current does not exceed 100 amps, HACR circuit breaker may be used in place of fuse (U.S. only).
†Refer to National or Canadian Electric Code to determine wire, fuse and disconnect size requirements.
NOTE — Extremes of operating range are plus and minus 10 % of line voltage.

ELECTRICAL DATA GCS20
Three Phase (manufactured April 2002 and later)

ELECTRICAL DATA - GCS20							
General Data	Model No.	GCS20-036		GCS20-048		GCS20-060	
	Line voltage data - 60 hz	208/230v-3ph	460v-3ph	208/230v-3ph	460v-3ph	208/230v-3ph	460v-3ph
	Recommended maximum fuse size (amps)	25	15	40	20	45	20
	†Minimum Circuit Ampacity	19	10	24	13	29	14
Compressor	Rated load amps	10.3	5.1	14.7	7.1	17.3	8.2
	Locked rotor amps	77	39	91	50	123	62
Condenser Coil Fan Motor	Full load amps	2.0	1.1	2.0	1.1	2	1.1
	Locked rotor amps	4.2	2.2	4.2	2.2	4.2	2.2
Evaporator Blower Motor	Motor output - hp (W)	1/3 (249)	1/3 (249)	3/4 (560)	1/2 (373)	3/4 (560)	3/4 (560)
	Full load amps	3.9	1.9	5.0	2.4	5.0	2.4
	Locked rotor amps	8.3	4.2	10.1	5.0	10.1	5
Combustion Air Inducer Motor (1 phase) full load amps		0.7	0.7	0.7	0.7	0.7	0.7

†Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
NOTE - Extremes of operating range are plus and minus 10% of line voltage.

HIGH ALTITUDE GCS16/20

No gas pressure adjustment is needed when operating from 0 to 7500 ft. (0 to 2248 m). See below for correct manifold pressures for natural gas and LPG/propane.

FUEL	Manifold Pressure (outlet) 0 to 7500 ft. (0 to 2248 m) above sea level
Natural Gas	3.5 in. w.g. (0.87 kPa)
LPG/Propane	9.5 in. w.g. (2.36 kPa)

BLOWER DATA GCS16/20

GCS16/20-024-50 BLOWER PERFORMANCE @ 230v (Down-Flow Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1335	630	1000	470	905	425	665	315
.05	12	1330	630	1010	475	915	430	680	320
.10	25	1315	620	1015	480	920	435	685	325
.15	37	1300	615	1015	480	925	435	690	325
.20	50	1280	605	1010	475	920	435	695	330
.25	62	1255	590	1005	475	915	430	695	330
.30	75	1225	580	990	465	900	425	690	325
.40	100	1160	550	945	445	865	410	665	315
.50	125	1075	505	885	420	815	385	630	295
.60	150	975	460	805	380	745	350	585	275
.70	175	860	405	705	335	655	310	520	245
.80	200	730	345	590	280	545	255	- - -	- - -
.90	225	570	270	- - -	- - -	- - -	- - -	- - -	- - -
1.00	250	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16/20-024-50 BLOWER PERFORMANCE @ 230v (Horizontal Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1315	620	915	430	840	395	615	290
.05	12	1300	615	930	440	855	405	640	300
.10	25	1285	605	945	445	870	410	655	310
.15	37	1265	595	950	450	875	415	670	315
.20	50	1240	585	950	450	880	415	680	320
.25	62	1220	575	950	450	880	415	685	325
.30	75	1195	565	945	445	875	415	685	325
.40	100	1140	540	915	430	850	400	675	320
.50	125	1080	510	870	410	815	385	650	305
.60	150	1010	475	805	380	760	360	610	290
.70	175	935	440	725	340	690	325	550	260
.80	200	845	400	625	295	600	285	- - -	- - -
.90	225	735	345	515	245	- - -	- - -	- - -	- - -
1.00	250	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16-030-75 BLOWER PERFORMANCE @ 230v (Down-Flow Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1480	700	1360	640	1155	545	1015	480
.05	12	1465	690	1345	635	1145	540	1010	475
.10	25	1445	680	1335	630	1135	535	1000	470
.15	37	1425	675	1315	620	1120	530	985	465
.20	50	1400	660	1295	610	1105	520	970	460
.25	62	1375	650	1270	600	1085	510	955	450
.30	75	1345	635	1245	590	1060	500	930	440
.40	100	1275	600	1180	555	1005	475	875	415
.50	125	1195	565	1100	520	940	445	805	380
.60	150	1095	515	1010	475	865	410	720	340
.70	175	990	465	900	425	780	370	625	295
.80	200	880	415	790	375	675	320	515	245
.90	225	745	350	655	310	- - -	- - -	- - -	- - -
1.00	250	590	280	- - -	- - -	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16-030-75 BLOWER PERFORMANCE @ 230v (Horizontal Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1365	645	1235	585	1050	495	910	430
.05	12	1365	645	1225	580	1050	495	905	425
.10	25	1360	640	1215	575	1045	495	900	425
.15	37	1350	635	1205	570	1040	490	890	420
.20	50	1335	630	1190	560	1030	485	880	415
.25	62	1320	625	1170	550	1020	480	865	410
.30	75	1300	615	1155	545	1005	475	850	400
.40	100	1250	590	1110	525	965	455	815	385
.50	125	1185	560	1060	500	915	430	770	365
.60	150	1105	520	1000	470	855	405	715	335
.70	175	1010	475	930	440	780	370	655	310
.80	200	905	425	850	400	700	330	580	275
.90	225	780	370	730	345	- - -	- - -	- - -	- - -
1.00	250	630	295	- - -	- - -	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

BLOWER DATA GCS16/20 Cont.

GCS20-030-75 BLOWER PERFORMANCE @ 230v (Down-Flow Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1525	720	1350	635	1090	515	870	410
.05	12	1515	715	1345	635	1090	515	880	415
.10	25	1495	705	1335	630	1085	510	885	420
.15	37	1480	700	1325	625	1075	505	890	420
.20	50	1465	690	1310	620	1065	505	885	420
.25	62	1450	685	1285	605	1055	500	875	415
.30	75	1420	670	1270	600	1045	495	870	410
.40	100	1375	650	1230	580	1020	480	855	405
.50	125	1325	625	1190	560	990	465	835	395
.60	150	1280	605	1150	545	965	455	810	380
.70	175	1220	575	1110	525	930	440	790	375
.80	200	1130	535	1030	485	885	420	765	360
.90	225	1070	505	955	450	820	385	- - -	- - -
1.00	250	965	455	860	405	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS20-030-75 BLOWER PERFORMANCE @ 230v (Horizontal Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1435	675	1280	605	1010	475	860	405
.05	12	1425	675	1265	595	1005	475	860	405
.10	25	1410	665	1250	590	1005	475	865	410
.15	37	1380	650	1235	585	1000	470	860	405
.20	50	1365	645	1220	575	990	465	855	405
.25	62	1345	635	1205	570	975	460	845	400
.30	75	1315	620	1190	560	970	460	835	395
.40	100	1270	600	1160	550	945	445	810	380
.50	125	1220	575	1115	525	920	435	790	375
.60	150	1155	545	1070	505	900	425	765	360
.70	175	1095	515	1010	475	865	410	740	350
.80	200	1030	485	955	450	820	385	700	330
.90	225	950	450	865	410	745	350	- - -	- - -
1.00	250	850	400	760	360	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16/20-036-90 BLOWER PERFORMANCE @ 230v (Down-Flow Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1700	800	1580	745	1430	675	1315	620
.05	12	1665	785	1550	730	1420	670	1300	615
.10	25	1635	770	1520	715	1405	665	1285	605
.15	37	1600	755	1490	705	1390	655	1270	600
.20	50	1570	740	1460	690	1370	645	1250	590
.25	62	1540	725	1430	675	1345	635	1230	580
.30	75	1505	710	1400	660	1315	620	1215	575
.40	100	1430	675	1340	630	1260	595	1165	550
.50	125	1370	645	1280	605	1200	565	1110	525
.60	150	1300	615	1215	575	1130	535	1030	485
.70	175	1235	585	1150	545	1045	495	970	460
.80	200	1165	550	1075	505	955	450	870	410
.90	225	1090	515	990	465	825	390	- - -	- - -
1.00	250	980	465	885	420	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16/20-036-90 BLOWER PERFORMANCE @ 230v (Horizontal Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1740	820	1585	750	1500	710	1370	645
.05	12	1710	805	1565	740	1475	695	1350	635
.10	25	1675	790	1545	730	1450	685	1330	630
.15	37	1645	775	1525	720	1425	675	1310	620
.20	50	1615	760	1490	705	1400	660	1290	610
.25	62	1580	745	1465	690	1375	650	1265	595
.30	75	1550	730	1440	680	1345	635	1240	585
.40	100	1485	700	1380	650	1290	610	1190	560
.50	125	1420	670	1320	625	1230	580	1135	535
.60	150	1350	635	1260	595	1165	550	1075	505
.70	175	1255	590	1165	550	1105	520	1015	480
.80	200	1180	555	1085	510	1025	485	940	445
.90	225	1085	510	985	465	930	440	- - -	- - -
1.00	250	970	460	870	410	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

BLOWER DATA GCS16/20 Cont.

GCS16/20-036-90 BLOWER PERFORMANCE @ 460/575v (Down-Flow Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds					
		High		Medium		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1570	740	1480	700	1135	535
.05	12	1545	730	1455	685	1135	535
.10	25	1520	715	1430	675	1130	535
.15	37	1490	705	1405	665	1125	530
.20	50	1465	690	1375	650	1115	525
.25	62	1435	675	1350	635	1105	520
.30	75	1405	665	1320	625	1090	515
.40	100	1345	635	1265	595	1050	495
.50	125	1285	605	1200	565	1020	480
.60	150	1220	575	1140	540	975	460
.70	175	1155	545	1070	505	920	435
.80	200	1085	510	1000	470	850	400
.90	225	1000	470	910	430	- - -	- - -
1.00	250	905	425	810	380	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter.

GCS16/20-036-90 BLOWER PERFORMANCE @ 460/575v (Horizontal Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds					
		High		Medium		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1610	760	1515	715	1165	550
.05	12	1585	750	1490	705	1165	550
.10	25	1560	735	1465	690	1160	550
.15	37	1525	720	1440	680	1155	545
.20	50	1500	710	1410	665	1145	540
.25	62	1470	695	1385	655	1135	535
.30	75	1440	680	1355	640	1115	525
.40	100	1380	650	1295	610	1085	510
.50	125	1315	620	1230	580	1045	495
.60	150	1250	590	1170	550	1000	470
.70	175	1185	560	1095	515	945	445
.80	200	1110	525	1025	485	845	400
.90	225	1030	485	940	445	- - -	- - -
1.00	250	940	445	845	400	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter.

GCS16-048-75 GCS20-042/048-75 BLOWER PERFORMANCE @ 230v (Down-Flow Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2765	1305	2475	1170	2225	1050	1945	920	1670	790
.05	12	2735	1290	2450	1155	2205	1040	1930	910	1655	780
.10	25	2705	1275	2430	1145	2190	1035	1915	905	1640	775
.15	37	2670	1260	2405	1135	2170	1025	1900	895	1620	765
.20	50	2635	1245	2380	1125	2145	1010	1880	885	1605	760
.25	62	2600	1225	2355	1110	2125	1005	1860	880	1585	750
.30	75	2530	1195	2300	1085	2075	980	1820	860	1540	725
.40	100	2455	1160	2240	1055	2025	955	1775	840	1495	705
.50	125	2380	1125	2180	1030	1970	930	1725	815	1445	680
.60	150	2300	1085	2110	995	1910	900	1670	790	1385	655
.70	175	2260	1065	2075	980	1875	885	1640	775	1355	640
.80	200	2175	1025	2000	945	1805	850	1570	740	1290	610
.90	225	2100	990	1910	900	1730	815	1500	710	- - -	- - -
1.00	250	2010	950	1820	860	1645	775	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16-048-75 GCS20-042/048-75 BLOWER PERFORMANCE @ 230v (Horizontal Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2800	1320	2495	1180	2240	1055	1955	925	1680	795
.05	12	2765	1305	2475	1170	2225	1050	1945	920	1670	790
.10	25	2735	1290	2450	1155	2205	1040	1930	910	1655	780
.15	37	2705	1275	2430	1145	2190	1035	1915	905	1640	775
.20	50	2670	1260	2405	1135	2170	1025	1900	895	1620	765
.25	62	2635	1245	2380	1125	2145	1010	1880	885	1605	760
.30	75	2600	1225	2355	1110	2125	1005	1860	880	1585	750
.40	100	2530	1195	2300	1085	2075	980	1820	860	1540	725
.50	125	2455	1160	2240	1055	2025	955	1775	840	1495	705
.60	150	2380	1125	2180	1030	1970	930	1725	815	1445	680
.70	175	2300	1085	2110	995	1910	900	1670	790	1385	655
.80	200	2220	1050	2035	960	1835	865	1600	755	1310	620
.90	225	2130	1005	1950	920	1745	825	1510	715	- - -	- - -
1.00	250	2020	955	1845	870	1640	775	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16-048-120 GCS20-042/048-120 BLOWER PERFORMANCE @ 230v (Down-Flow Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2775	1310	2505	1180	2270	1070	1970	930	1710	805
.05	12	2725	1285	2465	1165	2240	1055	1950	920	1685	795
.10	25	2675	1265	2430	1145	2210	1045	1925	910	1665	785
.15	37	2630	1240	2395	1130	2180	1030	1905	900	1645	775
.20	50	2580	1220	2360	1115	2150	1015	1885	890	1620	765
.25	62	2540	1200	2320	1095	2120	1000	1860	880	1595	755
.30	75	2490	1175	2285	1080	2100	990	1840	870	1570	740
.40	100	2400	1135	2220	1050	2040	965	1795	845	1515	715
.50	125	2300	1085	2145	1010	1980	935	1740	820	1450	685
.60	150	2200	1040	2070	975	1910	900	1680	795	1365	645
.70	175	2130	1005	2000	945	1865	880	1620	765	1305	615
.80	200	2050	970	1925	910	1800	850	1550	730	1210	570
.90	225	1950	920	1840	870	1715	810	1465	690	- - -	- - -
1.00	250	1840	870	1740	820	1610	760	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16-048-120 GCS20-042/048-120 BLOWER PERFORMANCE @ 230v (Horizontal Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2700	1275	2470	1165	2235	1055	1900	895	1650	780
.05	12	2675	1265	2450	1155	2225	1050	1890	890	1640	775
.10	25	2650	1250	2425	1145	2210	1045	1880	885	1630	770
.15	37	2625	1240	2405	1135	2200	1040	1870	885	1620	765
.20	50	2595	1225	2380	1125	2185	1030	1855	875	1610	760
.25	62	2570	1215	2360	1115	2165	1020	1840	870	1600	755
.30	75	2535	1195	2335	1100	2150	1015	1830	865	1585	750
.40	100	2480	1170	2280	1075	2110	995	1795	845	1550	730
.50	125	2410	1140	2220	1050	2085	985	1750	825	1510	715
.60	150	2340	1105	2160	1020	2000	945	1680	795	1455	685
.70	175	2255	1065	2080	980	1965	925	1640	775	1410	665
.80	200	2165	1020	2000	945	1880	885	1565	740	1350	635
.90	225	2065	975	1900	895	1785	845	1470	695	- - -	- - -
1.00	250	1940	915	1780	840	1660	785	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16/20-060-75 BLOWER PERFORMANCE @ 230v (Down-Flow Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2785	1315	2530	1195	2270	1070	1980	935	1715	810
.05	12	2755	1300	2510	1185	2255	1065	1965	925	1700	800
.10	25	2725	1285	2488	1175	2240	1055	1950	920	1690	800
.15	37	2695	1270	2455	1160	2220	1050	1935	915	1680	795
.20	50	2670	1260	2430	1145	2200	1040	1920	905	1670	790
.25	62	2640	1245	2400	1135	2180	1030	1905	900	1655	780
.30	75	2610	1230	2375	1120	2160	1020	1895	895	1645	775
.40	100	2550	1205	2320	1095	2120	1000	1865	880	1615	760
.50	125	2485	1175	2265	1070	2075	980	1825	860	1580	745
.60	150	2415	1140	2200	1040	2025	955	1780	840	1540	725
.70	175	2345	1105	2165	1020	1965	925	1765	835	1450	685
.80	200	2270	1070	2105	995	1900	895	1720	810	1415	670
.90	225	2185	1030	2035	960	1830	865	1660	785	- - -	- - -
1.00	250	2085	985	1950	920	1750	825	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16/20-060-75 BLOWER PERFORMANCE @ 230v (Horizontal Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2760	1305	2515	1185	2220	1050	1945	920	1680	795
.05	12	2740	1295	2500	1180	2210	1045	1935	915	1670	790
.10	25	2720	1285	2485	1175	2200	1040	1930	910	1660	785
.15	37	2700	1275	2465	1165	2190	1035	1920	905	1650	780
.20	50	2680	1265	2450	1155	2175	1025	1910	900	1635	770
.25	62	2660	1255	2430	1145	2160	1020	1900	895	1620	765
.30	75	2630	1240	2410	1140	2150	1015	1885	890	1600	755
.40	100	2570	1215	2360	1115	2115	1000	1860	880	1570	740
.50	125	2490	1175	2300	1085	2075	980	1820	860	1525	720
.60	150	2375	1120	2225	1050	2020	955	1770	835	1470	695
.70	175	2310	1090	2170	1025	1970	930	1730	815	1435	675
.80	200	2200	1040	2070	975	1900	895	1670	790	1380	650
.90	225	2065	975	1960	925	1820	860	1590	750	- - -	- - -
1.00	250	1910	900	1820	860	1710	805	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

BLOWER DATA GCS16/20 Cont.

GCS16/20-060-120 BLOWER PERFORMANCE @ 230v (Down-Flow Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2740	1295	2520	1190	2270	1070	2025	955	1710	805
.05	12	2715	1280	2495	1180	2250	1060	2005	945	1690	800
.10	25	2685	1265	2470	1165	2230	1055	1980	935	1670	790
.15	37	2655	1255	2445	1155	2210	1045	1960	925	1650	780
.20	50	2630	1240	2420	1140	2190	1035	1935	915	1635	770
.25	62	2600	1225	2395	1130	2170	1025	1910	900	1615	760
.30	75	2570	1215	2370	1120	2150	1015	1885	890	1595	755
.40	100	2510	1185	2320	1095	2100	990	1835	865	1550	730
.50	125	2450	1155	2255	1065	2080	980	1780	840	1500	710
.60	150	2375	1120	2185	1030	1995	940	1755	830	1440	680
.70	175	2305	1090	2120	1000	1935	915	1695	800	1390	655
.80	200	2230	1055	2040	965	1860	880	1645	775	1315	620
.90	225	2140	1010	1945	920	1775	840	1585	750	- - -	- - -
1.00	250	2030	960	1835	865	1670	790	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16/20-060-120 BLOWER PERFORMANCE @ 230v (Horizontal Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2760	1305	2545	1200	2295	1085	2015	950	1680	795
.05	12	2745	1295	2530	1195	2280	1075	2005	945	1675	790
.10	25	2730	1290	2510	1185	2265	1070	1995	940	1670	790
.15	37	2710	1280	2495	1180	2250	1060	1985	935	1665	785
.20	50	2695	1270	2480	1170	2235	1055	1970	930	1665	785
.25	62	2675	1265	2460	1160	2220	1050	1955	925	1645	775
.30	75	2650	1250	2440	1150	2200	1040	1930	910	1635	770
.40	100	2600	1225	2395	1130	2160	1020	1875	885	1605	760
.50	125	2540	1200	2340	1105	2110	995	1805	850	1555	735
.60	150	2480	1170	2265	1070	2025	955	1725	815	1475	695
.70	175	2395	1130	2200	1040	1985	935	1630	770	1450	685
.80	200	2285	1080	2100	990	1900	895	1540	725	1370	645
.90	225	2155	1015	1985	935	1795	845	1410	665	- - -	- - -
1.00	250	2000	945	1845	870	1665	785	- - -	- - -	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter. For 208v unit operation, derate air volume by 7%.

GCS16/20-048/60-75-120 BLOWER PERFORMANCE @ 460/575v (Down-Flow Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds					
		High		Medium		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2630	1240	2330	1100	1905	900
.05	12	2605	1230	2310	1090	1890	890
.10	25	2580	1220	2285	1080	1870	885
.15	37	2555	1205	2260	1065	1850	875
.20	50	2525	1190	2235	1055	1830	865
.25	62	2495	1180	2210	1045	1810	855
.30	75	2445	1155	2180	1030	1790	845
.40	100	2400	1135	2125	1005	1745	825
.50	125	2325	1095	2065	975	1695	800
.60	150	2250	1060	2000	945	1640	775
.70	175	2165	1020	1930	910	1580	745
.80	200	2080	980	1850	875	1510	715
.90	225	1985	935	1760	830	- - -	- - -
1.00	250	1860	880	1655	780	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter.

GCS16/20-048/60-75-120 BLOWER PERFORMANCE @ 460/575v (Horizontal Air Openings)

External Static Pressure		Air Volume at Various Blower Speeds					
		High		Medium		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2655	1255	2350	1110	1920	905
.05	12	2630	1240	2330	1100	1905	900
.10	25	2605	1230	2310	1090	1890	890
.15	37	2580	1220	2285	1080	1870	885
.20	50	2555	1205	2260	1065	1850	875
.25	62	2525	1190	2235	1055	1830	865
.30	75	2495	1180	2210	1045	1810	855
.40	100	2465	1165	2155	1015	1765	835
.50	125	2365	1115	2095	990	1720	810
.60	150	2200	1040	2030	960	1665	785
.70	175	2205	1040	1965	925	1610	760
.80	200	2115	1000	1890	890	1545	730
.90	225	2010	950	1800	850	- - -	- - -
1.00	250	1885	890	1695	800	- - -	- - -

NOTE — All air data is measured external to the unit with dry coil and without air filter.

BLOWER DATA GCSC20
(manufactured April 2002 and later)

BLOWER DATA - GCS20 - All air data is measured external to the unit with dry coil and without air filter.

GCS20-036-75 BLOWER PERFORMANCE - 230 VOLTS (For 208V unit operation, derate air volume by 7%)

External Static Pressure		Down-Flow Air Openings								Horizontal Air Openings							
		Air Volume at Various Blower Speeds								Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
.00	0	1890	890	1530	720	1335	630	990	465	1935	910	1580	745	1320	620	1140	540
.05	10	1870	880	1530	720	1335	630	995	470	1910	900	1580	745	1325	625	1150	545
.10	25	1845	870	1525	720	1340	630	995	470	1890	890	1570	740	1330	625	1160	550
.15	35	1820	860	1520	715	1340	630	1000	470	1870	880	1565	740	1330	630	1165	550
.20	50	1795	845	1510	715	1335	630	1000	470	1845	870	1555	735	1330	630	1170	550
.25	60	1765	835	1500	710	1330	625	995	470	1820	860	1540	725	1330	625	1170	555
.30	75	1740	820	1485	700	1320	625	995	470	1795	845	1525	720	1325	625	1170	550
.40	100	1675	790	1450	685	1295	610	985	465	1740	820	1490	705	1305	615	1160	545
.50	125	1605	760	1405	665	1255	595	975	460	1680	795	1450	685	1280	605	1135	535
.60	150	1530	725	1350	635	1210	570	955	450	1620	765	1395	660	1240	585	1105	520
.70	175	1450	685	1285	605	1155	545	930	440	1550	730	1335	630	1195	565	1060	500
.80	200	1360	645	1205	570	1085	510	900	425	1480	700	1270	600	1140	535	1010	475
.90	225	1270	600	1120	530	1005	475	870	410	1405	665	1190	565	1070	505	945	445
1.00	250	1170	550	1020	480	915	430	830	390	1325	625	1105	520	995	470	870	410

GCS20-036-75 BLOWER PERFORMANCE - 460 VOLTS

External Static Pressure		Down-Flow Air Openings						Horizontal Air Openings					
		Air Volume at Various Blower Speeds						Air Volume at Various Blower Speeds					
		High		Medium		Low		High		Medium		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
.00	0	1840	870	1725	815	1070	505	1910	900	1720	810	1095	515
.05	10	1820	860	1705	805	1080	510	1890	890	1710	805	1110	525
.10	25	1805	850	1690	795	1090	515	1870	880	1700	800	1120	530
.15	35	1785	840	1670	790	1100	520	1850	870	1685	795	1125	530
.20	50	1760	830	1650	780	1100	520	1825	860	1670	790	1130	535
.25	60	1735	820	1625	770	1100	520	1800	850	1655	780	1135	535
.30	75	1710	805	1605	755	1100	520	1775	840	1635	770	1135	535
.40	100	1650	780	1550	730	1085	515	1720	815	1595	755	1125	530
.50	125	1580	745	1490	705	1065	500	1660	785	1545	730	1110	525
.60	150	1505	710	1425	675	1025	485	1595	755	1490	705	1085	510
.70	175	1425	670	1355	640	980	460	1525	720	1430	675	1045	495
.80	200	1335	630	1275	600	920	435	1445	680	1360	640	1000	470
.90	225	1235	580	1190	560	850	400	1365	645	1285	605	945	445
1.00	250	1130	530	1095	520	765	360	1275	600	1200	565	875	415

BLOWER DATA GCSC20
(manufactured April 2002 and later)

BLOWER DATA - GCS20 - All air data is measured external to the unit with dry coil and without air filter.

GCS20-048-75, GCS20-048-120 GCS20-060-75 and GCS20-060-120 BLOWER PERFORMANCE - 230 VOLTS
(For 208V unit operation, derate air volume by 7%)

External Static Pressure		Down-Flow Air Openings										Horizontal Air Openings									
		Air Volume at Various Blower Speeds										Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
.00	0	2480	1170	2315	1090	2060	975	1800	850	1555	735	2470	1165	2340	1105	2160	1020	1880	885	1620	765
.05	10	2460	1160	2295	1085	2055	970	1795	845	1555	735	2445	1155	2315	1095	2145	1010	1865	880	1615	765
.10	25	2435	1150	2275	1075	2050	965	1785	840	1550	730	2420	1140	2295	1085	2130	1005	1855	875	1610	760
.15	35	2410	1135	2255	1065	2040	965	1775	840	1545	730	2395	1130	2270	1070	2110	995	1840	870	1605	755
.20	50	2380	1125	2235	1055	2030	960	1765	835	1540	725	2365	1115	2245	1060	2090	985	1825	860	1595	755
.25	60	2355	1110	2210	1045	2015	950	1755	830	1535	725	2340	1105	2220	1050	2070	975	1810	855	1585	750
.30	75	2325	1100	2185	1030	2005	945	1745	825	1525	720	2310	1090	2195	1035	2050	965	1795	845	1575	740
.40	100	2265	1070	2135	1005	1970	930	1715	810	1505	710	2250	1060	2135	1010	2000	945	1760	830	1545	730
.50	125	2205	1040	2080	980	1930	910	1685	795	1475	695	2185	1030	2075	980	1950	920	1715	810	1510	710
.60	150	2135	1010	2015	950	1880	890	1650	780	1445	680	2115	1000	2010	950	1890	890	1670	790	1470	695
.70	175	2065	975	1950	920	1825	860	1610	760	1405	665	2045	965	1945	915	1825	860	1620	765	1420	670
.80	200	1990	940	1880	885	1765	835	1570	740	1365	645	1965	930	1870	885	1760	830	1565	740	1370	645
.90	225	1910	900	1800	850	1700	800	1520	720	1315	620	1885	890	1795	850	1685	795	1505	710	1310	620
1.00	250	1825	860	1720	810	1625	765	1470	695	1260	595	1800	850	1715	810	1605	755	1440	680	1245	585

GCS20-048-75, GCS20-048-120 GCS20-060-75 and GCS20-060-120 BLOWER PERFORMANCE - 460 VOLTS

External Static Pressure		Down-Flow Air Openings						Horizontal Air Openings					
		Air Volume at Various Blower Speeds						Air Volume at Various Blower Speeds					
		High		Medium		Low		High		Medium		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
.00	0	2395	1130	2205	1040	1960	925	2390	1125	2230	1050	2020	955
.05	10	2375	1120	2185	1030	1945	920	2365	1115	2205	1040	2005	945
.10	25	2350	1110	2165	1020	1935	910	2340	1105	2185	1030	1990	940
.15	35	2320	1095	2140	1010	1920	905	2310	1090	2160	1020	1970	930
.20	50	2295	1085	2120	1000	1905	900	2285	1080	2135	1010	1950	920
.25	60	2270	1070	2095	990	1885	890	2255	1065	2110	995	1930	910
.30	75	2240	1055	2070	975	1870	880	2230	1050	2085	985	1910	900
.40	100	2180	1030	2015	950	1825	860	2165	1025	2030	955	1860	880
.50	125	2115	1000	1960	925	1780	840	2105	990	1965	930	1810	855
.60	150	2050	965	1900	895	1730	815	2035	960	1900	895	1750	825
.70	175	1975	935	1835	865	1675	790	1960	925	1830	865	1690	795
.80	200	1900	895	1765	835	1615	760	1885	890	1755	830	1620	765
.90	225	1820	860	1695	800	1550	730	1805	850	1675	790	1550	730
1.00	250	1735	820	1620	765	1475	695	1720	810	1590	750	1470	695

ACCESSORY BLOWER DATA GCS16/20

FILTER AND ACCESSORY AIR RESISTANCE

Unit Model No.	Air Volume		Total Air Resistance — inches water gauge (Pa)					
			1 in. (25mm) Filter Furnished	REMD16 Down-Flow Economizer			EMDH16 Horizontal Economizer	
	cfm	L/s		Less Filter	With Optional Pleated Polyester 2 in. (51mm) Filter	With Optional Fiberglass Filter 2 in. (51mm)	With Furnished 1 in. (25mm) Filter	Less Filter
GCS16-024 GCS16-030 GCS16-036	800	380	.15 (37)	.05 (12)	.27 (67)	.13 (32)	.18 (45)	.10 (25)
	1000	470	.18 (45)	.06 (15)	.34 (85)	.18 (45)	.26 (65)	.15 (37)
	1200	565	.21 (52)	.09 (22)	.42 (104)	.24 (60)	.35 (87)	.21 (52)
	1400	660	.25 (62)	.15 (37)	.51 (127)	.31 (77)	.46 (114)	.29 (72)
GCS16-048 GCS16-060	1600	755	.15 (37)	.05 (12)	.40 (99)	.27 (67)	.30 (75)	.17 (42)
	1800	850	.17 (42)	.06 (15)	.48 (119)	.33 (82)	.35 (87)	.19 (47)
	2000	945	.20 (50)	.08 (20)	.56 (139)	.39 (97)	.40 (99)	.22 (55)
	2200	1040	.23 (57)	.13 (32)	.66 (164)	.46 (114)	.47 (117)	.26 (65)

DIFFUSER AIR RESISTANCE

Unit Model No.	Air Volume		Total Air Resistance — inches water gauge (Pa)			
			RTD9-65 Diffuser			FD9-65 Diffuser
	cfm	L/s	2 Ends Open	1 Side 2 Ends Open	All Ends & Sides Open	
GCS16-024 GCS16-030 GCS16-036	800	380	.15 (37)	.13 (32)	.11 (27)	.11 (27)
	1000	470	.19 (47)	.16 (40)	.14 (35)	.14 (35)
	1200	565	.25 (62)	.20 (50)	.17 (42)	.17 (42)
	1400	660	.33 (82)	.26 (65)	.20 (50)	.20 (50)
GCS16-048 GCS16-060	1600	755	.43 (107)	.32 (80)	.20 (50)	.24 (60)
	1800	850	.56 (139)	.40 (90)	.30 (75)	.30 (75)
	2000	945	.73 (182)	.50 (124)	.36 (90)	.36 (90)
	2200	1040	.95 (236)	.63 (157)	.44 (109)	.44 (109)

CEILING DIFFUSER AIR THROW DATA

Model No.		RTD9-65		FD9-65	
Air Volume		[1] Effective Throw		[1] Effective Throw	
cfm	L/s	ft.	m	ft. — ft. (m)	m
1000	470	10-17	3-5	15-20	5-6
1200	565	11-18	3-5	16-22	5-7
1400	660	12-19	4-6	17-24	5-7
1600	755	12-20	4-6	18-25	5-8
1800	850	13-21	4-6	20-28	6-9
2000	945	14-23	4-7	21-29	6-9
2200	1040	16-25	5-8	22-30	7-9

[1] Effective throw based on terminal velocities of 75 ft. (22.9 m) per minute.

WET INDOOR COIL AIR RESISTANCE

Model Number	Air Volume		Air Resistance	
	cfm	L/s	in. w.g.	Pa
GCS20-024 GCS20-030	800	380	0.08	20
	1000	470	0.09	22
	1200	565	0.10	25
GCS20-036	800	380	0.07	17
	1000	470	0.08	20
	1200	565	0.09	22
GCS20-042 GCS20-048	1400	660	0.12	30
	1600	755	0.13	32
	1800	850	0.14	35
	2000	945	0.15	37
	2200	1040	0.16	40
GCS20-060	1600	755	0.11	27
	1800	850	0.12	30
	2000	945	0.13	32
	2200	1040	0.14	35

WET INDOOR COIL AIR RESISTANCE

Model Number	Air Volume		Air Resistance	
	cfm	L/s	in. w.g.	Pa
GCS16-024	800	380	0.06	15
	1000	470	0.07	17
	1200	565	0.08	20
GCS16-030	800	380	0.09	22
	1000	470	0.10	25
	1200	565	0.11	27
GCS16-036	800	380	0.09	22
	1000	470	0.10	25
	1200	565	0.11	27
	1400	660	0.12	30
GCS16-048	1600	755	0.11	27
	1800	850	0.12	30
	2000	945	0.13	32
	2200	1040	0.14	35
GCS16-060	1600	755	0.08	20
	1800	850	0.09	22
	2000	945	0.10	25
	2200	1040	0.11	27

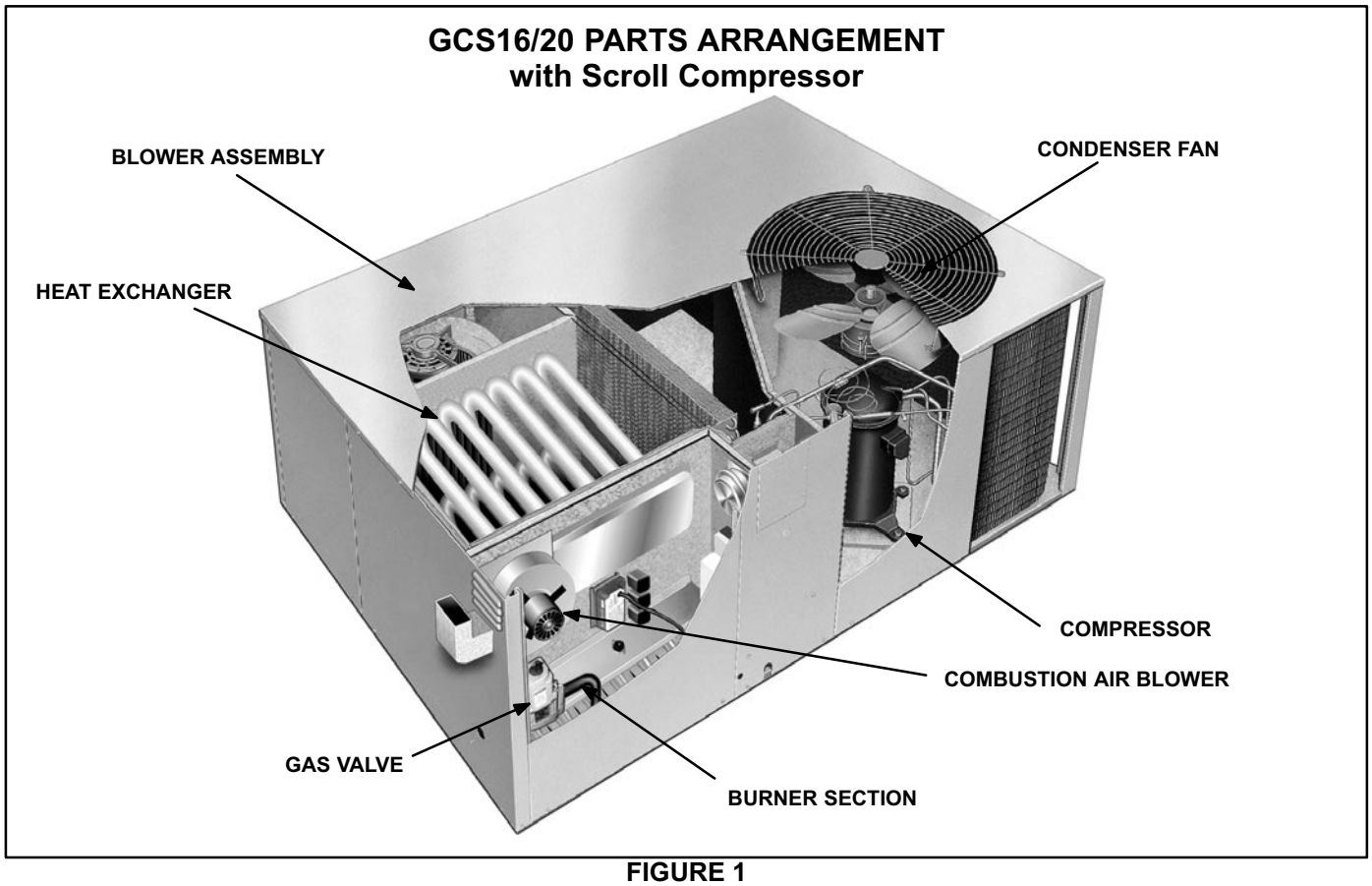


FIGURE 1

I-APPLICATION

GCS16/20 2-5 ton units are available in two cabinet sizes with GCS20 units built April 2002 and later, utilizing one (refer to the Engineering Handbook for more specific application data). GCS16/20 2 through 5 ton models are applicable for single phase installations and GCS16/20 3 through 5 ton models are applicable for three-phase installations.

II-UNIT COMPONENTS

GCS16/20 unit components are shown in figure 1.

A-Control Box Components

GCS16/20 control box is shown in figure 3. The control box is located in the heating compartment behind the heating compartment access panel. Note that the T1 transformer on the -024, -030 and -036 model units is located on the mullion adjacent to the compressor compartment access panel. The condenser fan can be accessed by removing the fan grill located on top of the unit.

The indoor blower access panel (all units) is located on the opposite side of the unit from the heating compartment access.

⚠ DANGER

All single phase units use single pole contactors. One leg of compressor, capacitor and condenser fan are connected to line voltage at all times.

Remove all power to disconnect before servicing.

Electrical shock resulting in death or injury may result if power is not disconnected.

1-Transformer T1

All GCS16/20 series units use a single line voltage to 24VAC transformer mounted in the control box. The transformer supplies power to control circuits in the unit. Transformers are rated at 70VA and use two primary voltage taps as shown in figure 2.

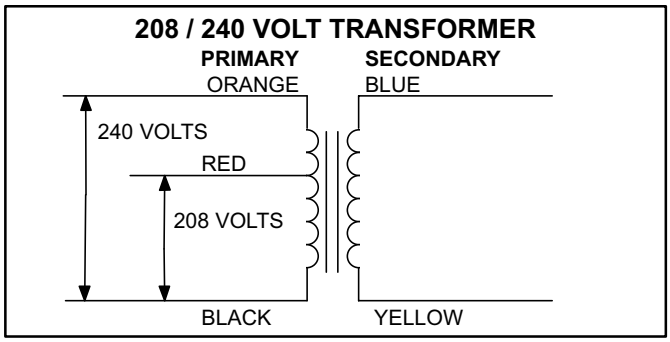


FIGURE 2

2-Cooling Contactor K1

K1 is a line voltage contactor with a 24V coil used to energize the compressor and condenser fan in response to thermostat demand. GCS16/20 single phase units use single-pole double break contactors. Three phase units use three pole double break contactors.

3-Indoor Blower Relay K3 (Cooling Speed)

All units use a DPDT relay to energize the indoor blower motor. The relay coil is energized by blower demand from indoor thermostat terminal “G” (cooling demand or fan switch in “ON” position). When the coil is energized, a set of N.O. contacts closes to energize the blower motor on high speed. When de-energized, a set of N.C. contacts allows the fan/limit control relay to energize the blower on heating speed (refer to unit wiring diagram).

4-Combustion Air Inducer Relay K13

Relay K13 is a DPDT relay located inside the control box. K13 is energized by heating demand from the thermostat and is energized throughout the heating demand. When energized, K13 normally open contacts close to energize the combustion air inducer and begin a heating sequence. A differential pressure “prove” switch connected to the combustion air inducer in turn energizes the ignition control and gas valve.

5- Indoor Blower Delay Relay K25

Relay K25 is a printed circuit board located in the control box wired in series with the gas valve. K25 is designed to provide an indoor blower delay of 45 seconds on time and 150 seconds off time during a heat demand. When there is a demand for heat, the gas valve will open and the on time delay will begin. When heat demand is satisfied the gas valve will close and the off time will begin. If K25 fails replace the entire control.

6- Indoor Blower Relay K20

Relay K20 is a DPDT relay also located in the control box. Relay K20 is energized after the 45 second on time delay by relay K25. K20 is de-energized after the 150 second off time delay by relay K25 after heat demand is satified or when limit S10 resets. When relay K20 is de-energized, contacts K20-1 open to de-energize the blower. A seperate set of contacts (K20-2) close energizing the optional economizer.

7- Transformer T3

460 (G) and 575 (J) voltage units use a line to 230V autotransformer to power the combustion air inducer. The autotransformer is connected directly to line voltage and is powered at all times. It has an output rating of 0.55A.

8- Transformer T4

575 (G) voltage units use a line to 460V autotransformer to power the indoor blower and outdoor motor.This autotransformer is also connected directly to line voltage and is powered at all times. It has a maximum VA rating of 3.4A.

9- Potential Relay K31 & Start Capacitor C7

Relay K31 and capacitor C7 are used on GCS16-024, -030 and -060 single phase units. K31 is a potential relay which controls operation of the starting circuit. The relay is normally closed when the compressor contactor K1 is de-energized. C7 is a compressor capacitor connected to a set of N.C. K31 contacts and is used to assist the compressor at start up. When K1 energizes, the compressor immediately begins start up. K31 remains de-energized during compressor start up and start capacitor C7 remains in the circuit. As the compressor gains speed K31 is energized by the electromotive forces generated by the compressor. When K31 energizes, its contacts open to take C7 out of the circuit.

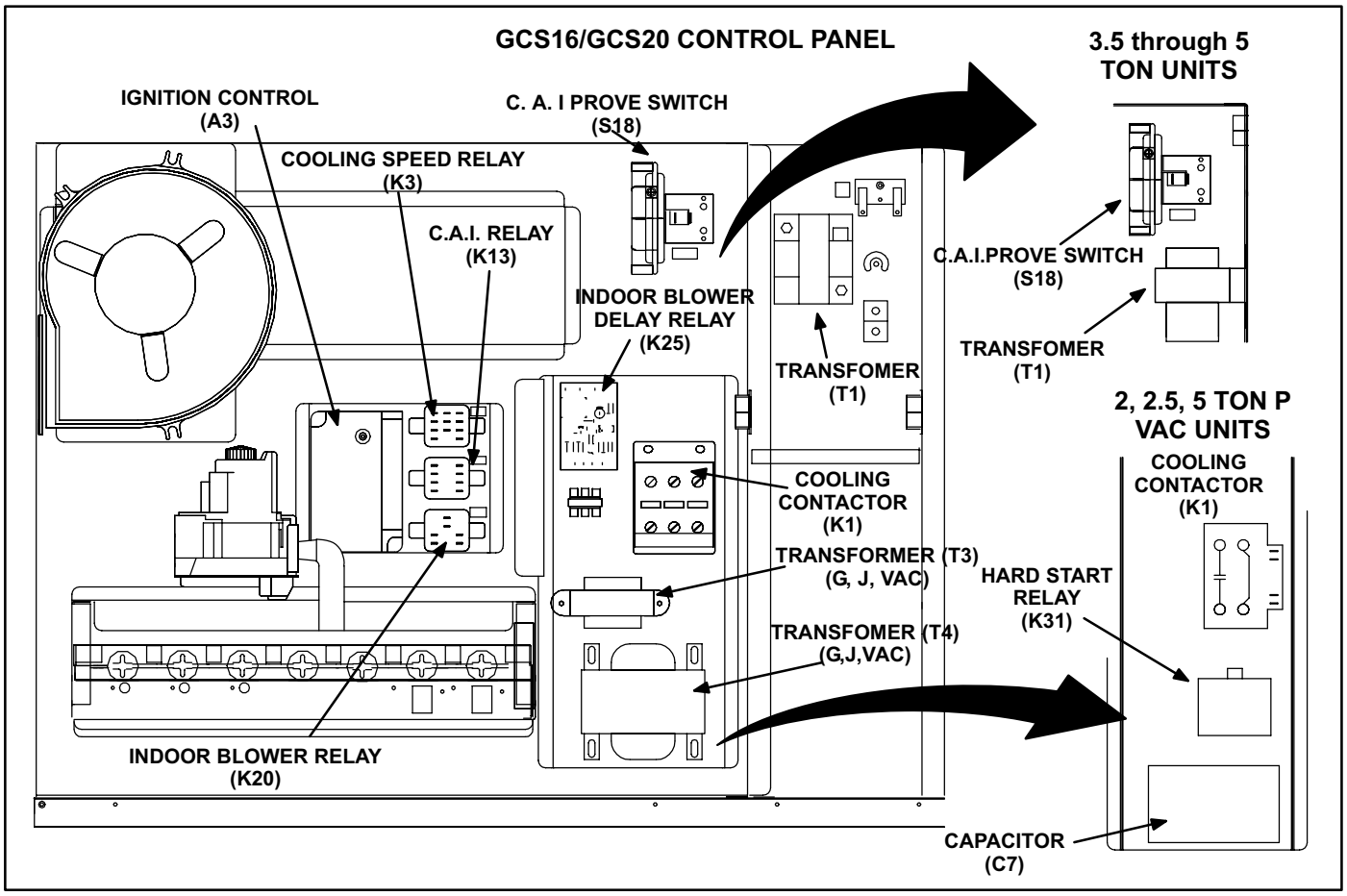


FIGURE 3

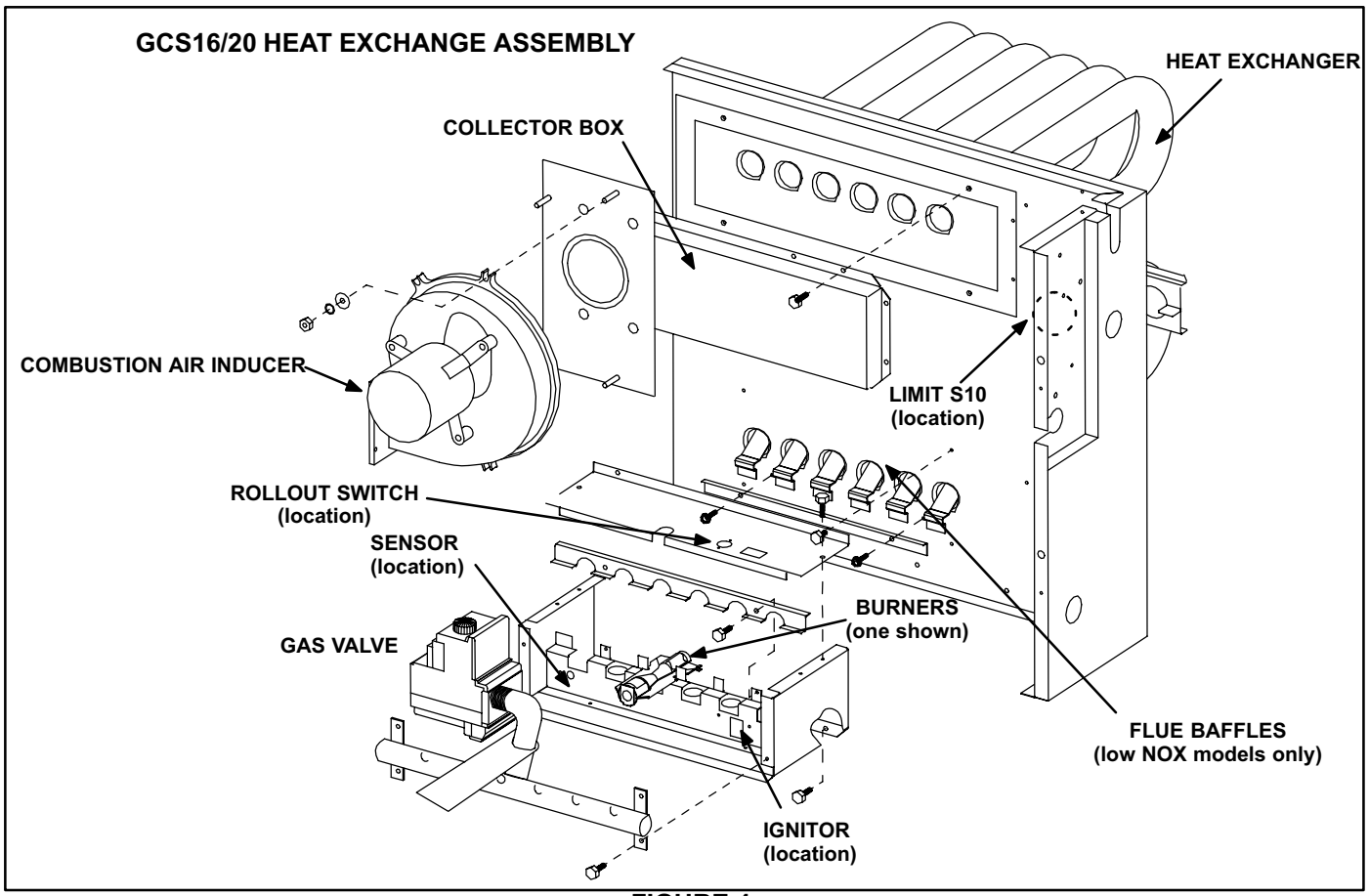


FIGURE 4

B-Heating Components

Heating components are illustrated in figures 3 and 4.

1-Heat Exchanger (Figure 4)

All units use an aluminized steel tubular heat exchanger. Each tube has a matching inshot burner. Combustion takes place at each tube entrance and is drawn upwards through each tube by the combustion air blower. Heat is transferred from all surfaces of the heat exchanger tubes. The supply air blower, controlled by the ignition control, forces air across all surfaces of the tubes to extract the heat of the combustion. The shape of the tubes ensure maximum heat exchange.

2-Burner Assembly (Figure 4)

The burners are controlled by the spark electrode, flame sensing electrode, gas valve GV1 and combustion air blower B6. The spark electrode, flame sensing electrode and gas valve GV1 are directly controlled by ignition control A3. Ignition control A3 is controlled by combustion air blower B6. Combustion air blower B6 is controlled by heating demand from the thermostat or control system.

a-Burners

All units use inshot burners. Burners are factory set and do not require adjustment. Burner shutters are designed to be fully open only. All units have a peep hole with cover in the access panel for flame viewing. Always operate unit with access panel in place. Burners can be individually removed for service. Burner maintenance and service is detailed in the MAINTENANCE section of this manual.

b-Orifice

Each burner uses an orifice which is matched to the burner input. The orifice is threaded into the manifold. The burner is supported by the orifice and will easily slide off for service.

Each orifice and burner are sized specifically to the unit. Refer to unit nameplate or Lennox Repair Parts for correct sizing.

3-Primary High Temperature Limit S10

S10 is the primary limit for gas heat. Units will have either a helical “stick” type limit , or disc type limit. Helical type limits are located on the vestbule. See figure 4. Disc type limits are located in the blower deck (figure 5) on all GCS16/20 model units. Primary limit S10 is wired to the ignition control A3. It’s N.C. contacts open to de-energize the ignition control when excessive heat is reached in the blower compartment. At the same time, the N.O. contacts close maintaining power to blower relay K20 and power to indoor blower B3. Set point is factory set and cannot be adjusted. See Lennox Repair Parts handbook for set point.

4-Flame Rollout Switch S47

Flame rollout switch S47 is a high temperature limit located just above the burner on all units. See figure 4. The limit is a N.C. SPST manual reset thermostat connected in series with ignition control A3. When S47 senses flame rollout, ignition control immediately stops ignition and closes the gas valve. The switch is factory set and cannot be adjusted.

5-Secondary Limit S21

GCS16/20-024, -030 and -036-090 (only size 3 ton) units are equipped with a secondary limit located on the blower scroll. See figure 5. The limit is an auto-reset thermostat which opens on a temperature rise. It is electronically connected in series with the ignition control. The limit is used to de-energize the ignition control and shut down the burners when temperature in the blower scroll becomes too high. The limit is factory preset to open at 170° F±5° F on a temperature rise and close at 135°F±10°F on a temperature fall. It is not adjustable. This is a safety shut-down function of the unit.

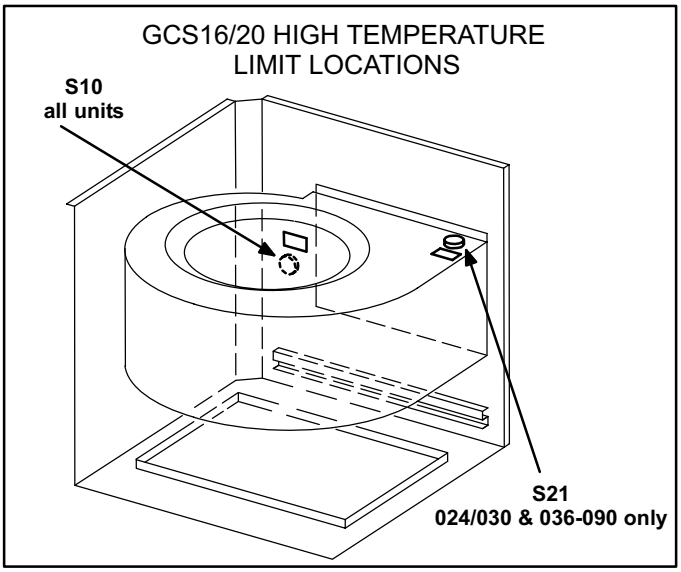


FIGURE 5

6-Combustion Air Prove Switch S18

The combustion air prove switch (S18) is a SPST N.O. differential pressure switch used to monitor combustion air inducer operation. A flexible hose connects one side of the switch to the blower housing. The other side of the switch is open to the atmosphere. The switch is wired in series with ignition control A3. Prove switch S18 closes when combustion air inducer reaches full speed to allow the ignition control to energize. This proves that the combustion air inducer is operating and allows the heating cycle to continue.

Combustion air prove switch S18 is factory set and non-adjustable. Set point will be on the side of switch.

7-Combustion Air Inducer B6

Combustion air inducer B6 provides fresh air to the burner while clearing the combustion chamber of exhaust gases. The inducer uses a shaded pole, 208/230VAC, single phase, 1/25 hp motor. The blower begins operating immediately upon receiving a thermostat demand and is de-energized immediately when thermostat demand is satisfied. All combustion air blower motors are sealed and cannot be oiled.

The tube connecting the switch to the blower flue box must be sloped in a manner that will prevent condensate from collecting in the tube. It is normal for a small amount of condensate to form in the tube during unit operation. The tube and switch must be allowed to drain accumulated condensate between thermostat demands. If the tube is positioned so that accumulated condensate is trapped in the tube, the unit may run improperly or may lock out.

8-Flue Vent and Rain Shield (Figure 6)

⚠ IMPORTANT

Vent cap assembly must be installed without modification. Any modification to the vent cap assembly or failure to install assembly can result in improper operation and will void the AGA/ CGA certification of the unit.

⚠ CAUTION

Do not start or operate unit unless vent cap is in place.

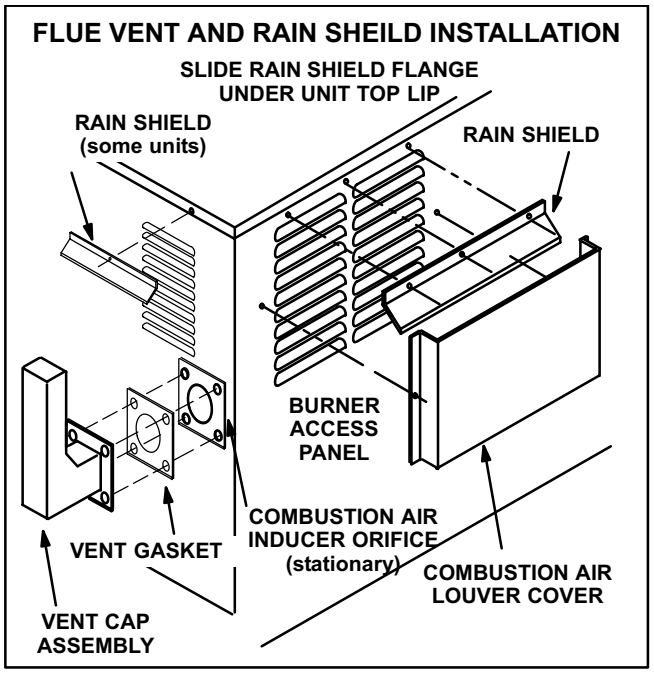


FIGURE 6

9-Gas Valve GV1

Gas valve GV1 (figure 7) is a single-stage redundant valve manufactured by Honeywell or White Rodgers. On a call for heat, the valve is energized by the ignition control simultaneously with the spark electrode. The valve opens 1/2 to 2 seconds. When the valve is de-energized, it closes in 1/2 to 3 seconds. A manual shut-off knob is provided on the valve for shut-off.

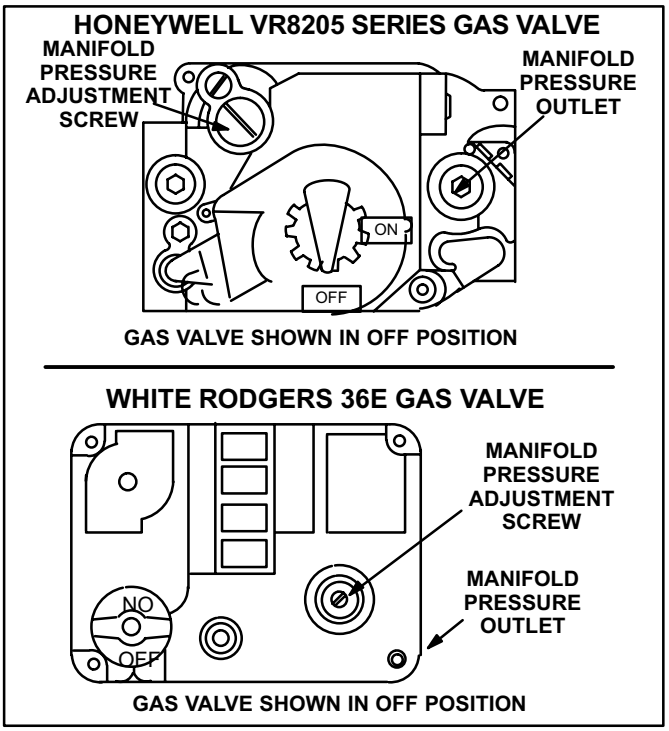


FIGURE 7

10-Ignitor

Ignitor tips are located in the path of the right most burner. The spark electrode is connected to the ignition control by a 8mm silicone insulated stranded high voltage wire. The wire uses 1/4" female quick connect on the electrode end and female spark plug-type terminal on the ignition control end. See figure 8 for gap dimension.

11-Sensor

The sensor tip is located in the left most burner path. Flame is sensed by rectification through the flame sensing electrode.

⚠ IMPORTANT

In order to maximize spark energy to the electrode, the high voltage wire should not rest on the bottom of unit vestibule panel and should touch unit cabinet as little as possible.

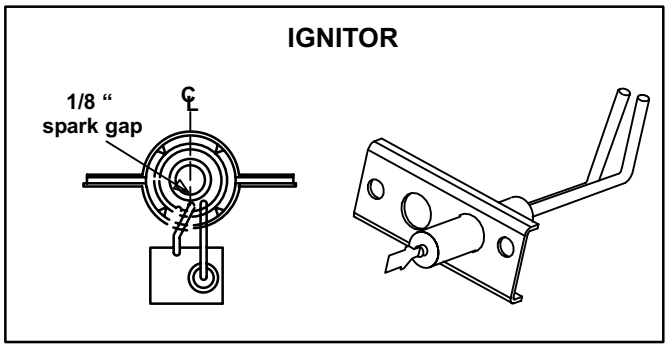


FIGURE 8

12-Ignition Control A3

⚠ DANGER

Shock Hazard.

Spark related components contain high voltage. Disconnect power before servicing unit. The ignition control is not field repairable.

Can cause unsafe operation, injury or death.

Electronic direct spark ignition with flame rectification sensing is used in GCS16/20 units. **Flame strength ranges from 0.5 to 1.0 micro-amps.** Ignition controls are manufactured by Johnson.

Johnson Control Figure 9

In GCS16/20 units, ignition control A3 is located in the heating compartment. On a heating demand, the ignition control is energized after proving combustion air blower operation. The control allows 30 to 40 seconds for the combustion air blower to vent exhaust gases from the burner. The ignition control then activates gas valve GV1, the spark electrode, the flame sensing electrode and blower relay K25. The ignition control is not adjustable.

The Johnson control is illustrated in figure 9. The unit wires plug directly into the side of the control. The spark electrode wire connects to the spark plug-type connector on top of the control.

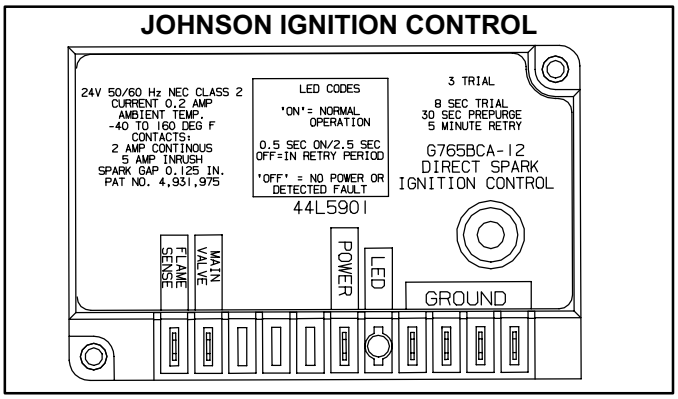


FIGURE 9

a- The ignition control provides three main functions: gas valve control, ignition and flame sensing. It is powered only after the combustion air prove switch has closed and as long as other safety switch circuits are closed. The ignition attempt sequence provides three trials for ignition before locking out. The blower control (K25) is energized simultaneously with the gas valve, so the blower will energize 45 seconds after flame has successfully been established. The unit will usually ignite on the first attempt. See figure 10 for a normal ignition sequence with nominal timings for simplicity.

b- Proper gas/air mixture is required for ignition on the first attempt. If there is any deviation, within tolerance of the unit, a second or third trial may be necessary for ignition. The control will lock out the heating system if ignition is not obtained within three trials and the (indoor) blower will not start. Reset after lockout requires only breaking and remaking thermostat demand. See figure 10 for the ignition attempt sequence with retrials (nominal timings given for simplicity). Loss of flame during a heating cycle is indicated by an absence of flame signal. If this happens, the control will immediately restart the ignition sequence and then lock out if ignition is not gained within three trials.

c- The specific timings for the Johnson ignition control are shown in figure 10.

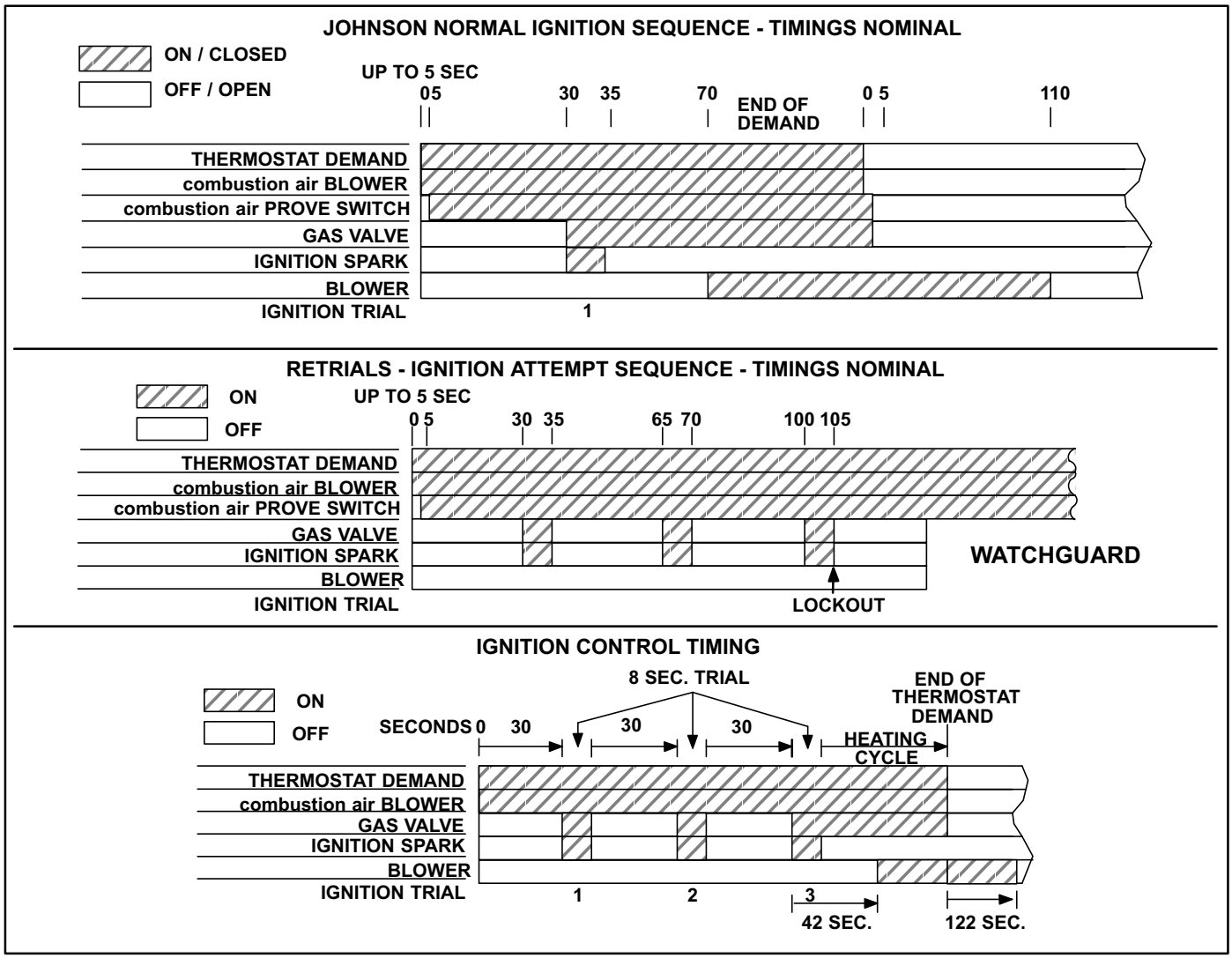


FIGURE 10

United Technologies Control Figure 11

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 control is designed to ignite on the first attempt; however, the ignition attempt sequence provides three trials for ignition before locking out. The lockout time for is 1 hour . A After lockout, the ignition control automatically resets and provides three more attempts at ignition. Manual reset after lockout requires breaking and remaking power to the ignition control. 24 volt thermostat connections (P2) and heating component connections (P1) 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.
2 Flashes	Lockout. Failed to detect or sustain flame.
3 Flashes	Prove switch or Rollout Switch open or closed.
4 Flashes	Limit switch open.
5 Flashes	Flame sensed but gas valve not open.
Steady	Internal failure in the control.

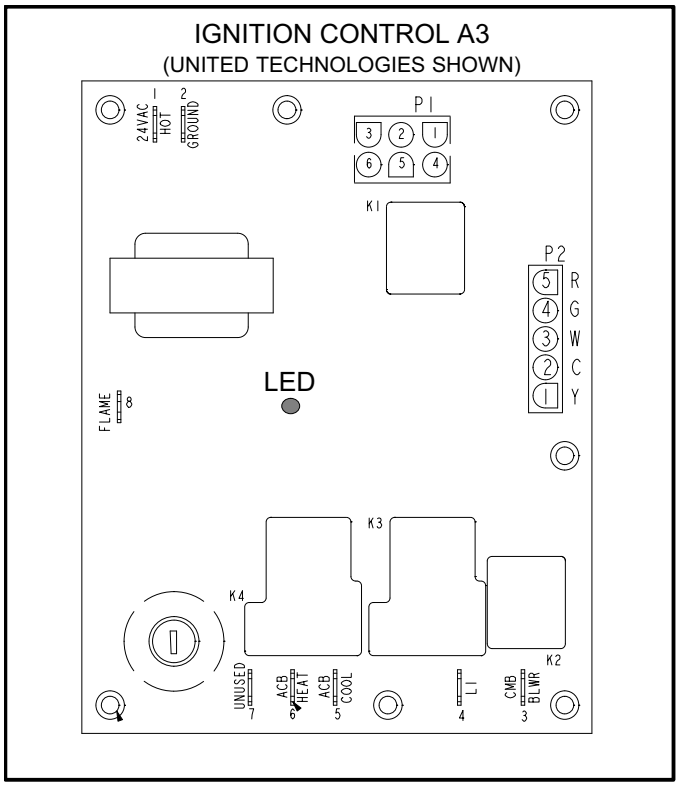


FIGURE 11

TABLE 2

P2 TERMINAL DESIGNATIONS	
Pin #	**Function**
1	**Y Cool Demand**
2	**C** Common
3	**W1** Heat Demand
4	**G** Indoor Blower
5	**R** 24 Volts to thermostat

TABLE 3

P1 TERMINAL DESIGNATIONS	
Pin #	Function
1	Limit Switch Out
2	Rollout Switch / Prove Switch Out
3	Ground
4	Gas Valve Out
5	Rollout Switch / Prove Switch In
6	Limit Switch In

Flame rectification sensing is used on all GCS16/20 units. Loss of flame during a heating cycle is indicated by an absence of flame signal (< 0.5 microamps). If this happens, the control will immediately restart the ignition sequence and then lock out if ignition is not gained after the third trial. See System Service Checks section for flame current measurement.

The control shuts off immediately in the event of a power failure. Upon restoration of power, the control will restart the ignition sequence and continue until flame is established or system locks out.

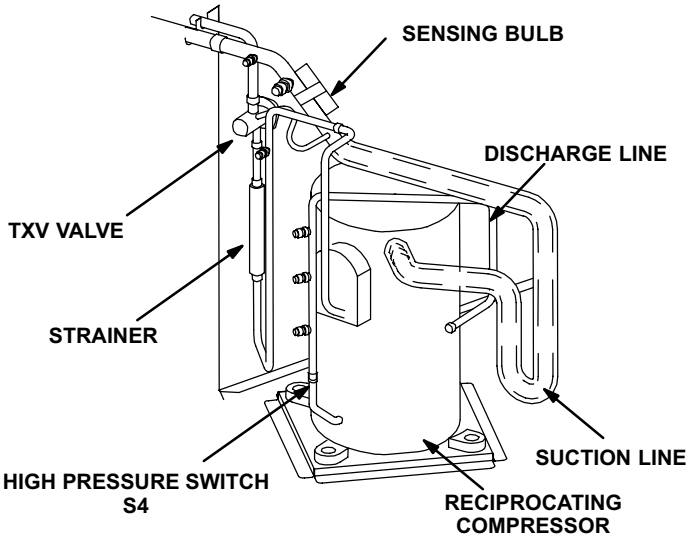
Operation

On a heating demand, the ignition control checks for a closed limit switch and open prove switch. Once this check is complete and conditions are correct, the ignition control then allows 30 seconds for the combustion air inducer (CAI) to vent exhaust gases from the burners. When the CAI is purging the exhaust gases, the CAI prove switch is closing proving that the CAI is operating before allowing the ignition control to energize. If the prove switch does not close within the 300 seconds, the control de-energizes the CAI for another 300 seconds and then re-energizes the CAI again. This cycle will continue as long as there is a call for heat and the CAI prove switch is open. Once the CAI switch is proven closed, the control begins a 30 second pre-purge period. After the pre-purge period the ignition control activates gas valve, the spark electrode and the flame sensing electrode. Once the gas valve is energized the non-adjustable 45 second indoor blower delay period begins. Sparking stops immediately after flame is sensed.

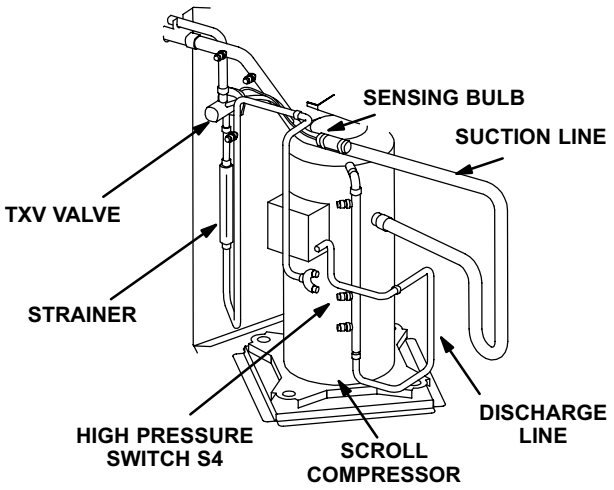
The control then proceeds to “steady state” mode where all inputs are monitored to ensure the limit switch, rollout switch and prove switch are closed as well as flame is present. When the heat call is satisfied the gas valve is de-energized and a 150 second blower off delay begins.

PLUMBING COMPONENTS GCS16/20

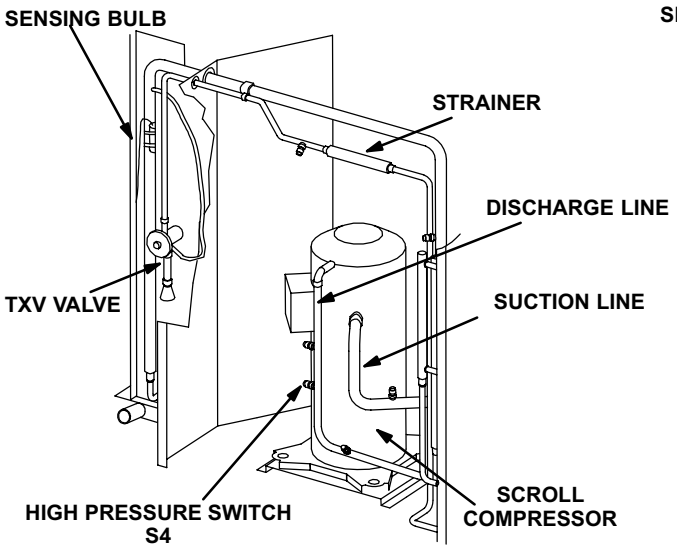
GCS16-024/030



GCS20-024/030/036, GCS16-036



GCS20-042, GCS16/20-048



GCS16-060

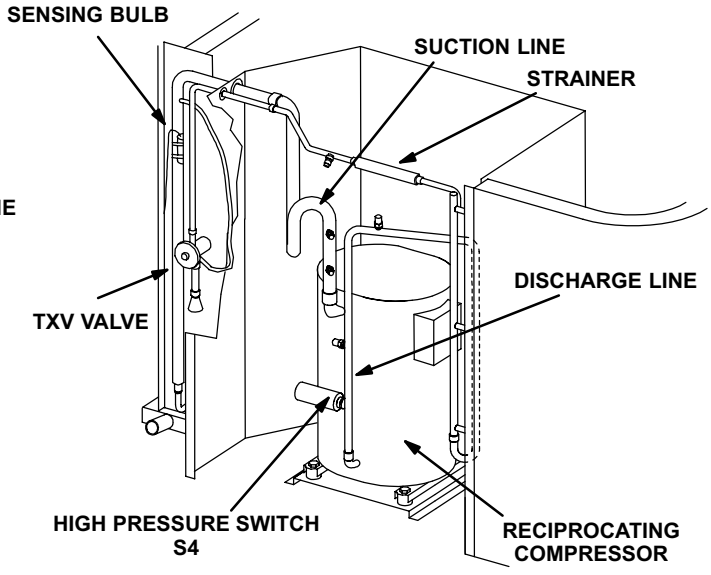


FIGURE 12

C-Cooling Components Figure 12

⚠ 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.

All units use DX cooling. All units use a single slab-type enhanced fin evaporator with rifled tubing and a thermal expansion valve "TXV" as the primary expansion device. All models use draw-through type condenser fans.

1-Reciprocating Compressor

All GCS16 model units (except the 036 and 048) are equipped with a reciprocating compressor. All compressors are protected by internal pressure releif valves for overload and internal crankcase heaters HR1 for proper lubrication. Compressor B1 operates during cooling demand and is energized by contactor K1 upon receiving thermosatat demand. For compressor specifications see compressor nameplate or ELECTRICAL DATA section in this manual.

2-Scroll Compressor

All GCS20 model units and GCS16-036/048 utilize a scroll compressor. The scroll compressor design is simple, efficient and requires few moving parts. A cutaway diagram of the scroll compressor is shown in figure 13. The scrolls are located in the top of the compressor can and the motor is located in the bottom of the compressor can. The oil level is immediately below the motor and oil is pressure fed to the moving parts of the compressor. The lower portion of the compressor shell is exposed to low side pressure while only the very top of the shell is exposed to high side pressure.

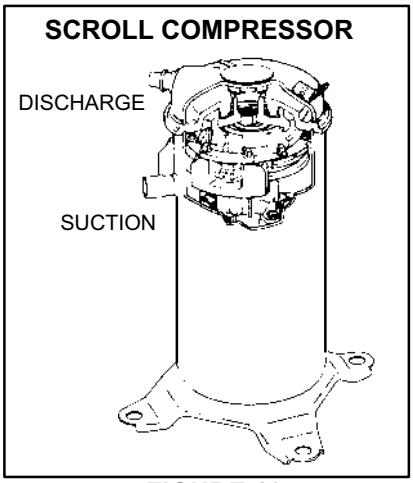


FIGURE 13

The scroll is a simple compression concept centered around the unique spiral shape of the scroll and its inherent properties. Figure 14 shows the basic scroll form. Two identical scrolls are mated together forming concentric spiral shapes (figure 15). One scroll remains stationary, while the other is allowed to orbit (figure 16-1). Note that the orbiting scroll does not rotate or turn but merely orbits the stationary scroll.

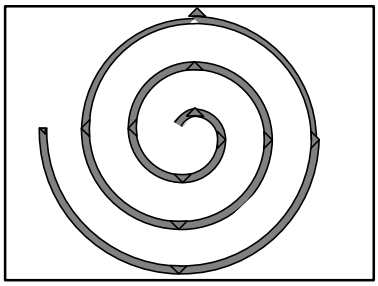


FIGURE 14

The counterclockwise orbiting scroll draws gas into the outer crescent shaped gas pocket created by the two scrolls (figure 16-2). The centrifugal action of the orbiting scroll seals off the flanks of the scrolls (figure 16-3). As the orbiting motion continues, the gas is forced toward the center of the scroll and the gas pocket becomes compressed (figure 16-4).

When compressed gas reaches the center, it is discharged vertically into a chamber and discharge port in the top of the compressor (figure13). The discharge pressure forcing down on the top scroll helps seal off the upper and lower edges (tips) of the scrolls (figure 15). During a single orbit, several pockets of gas are compressed simultaneously providing smooth continuous compression.

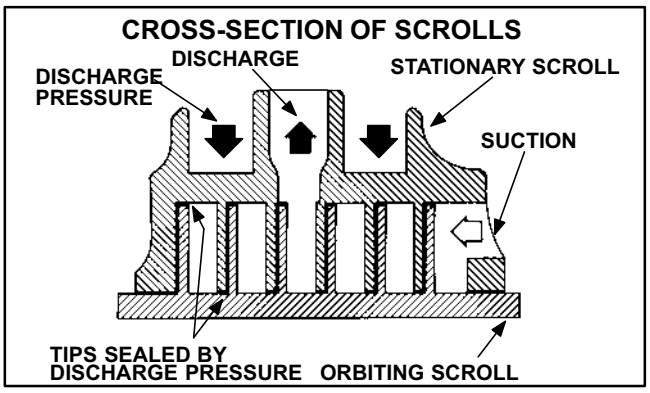


FIGURE 15

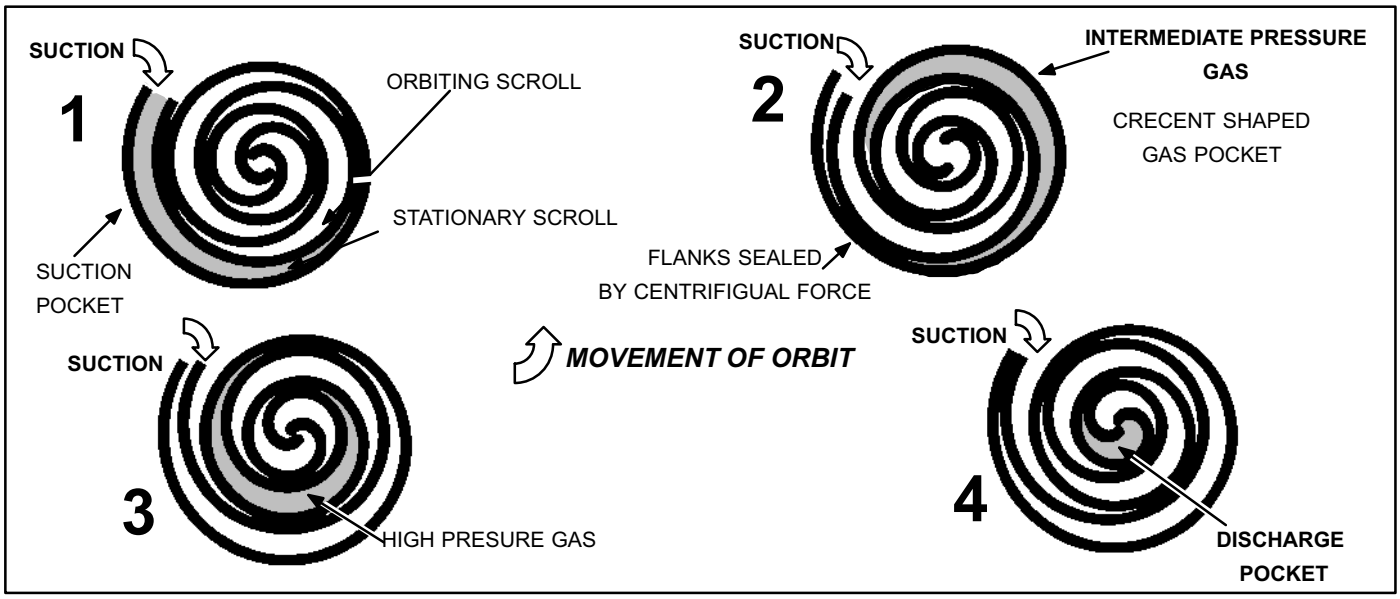


FIGURE 16

The scroll compressor is tolerant to the effects of liquid return. If liquid enters the scrolls, the orbiting scroll is allowed to separate from the stationary scroll. The liquid is worked toward the center of the scroll and is discharged. If the compressor is replaced, conventional Lennox cleanup practices must be used.

Due to its efficiency, the scroll compressor is capable of drawing a much deeper vacuum than reciprocating compressors. Deep vacuum operation can cause internal fusite arcing resulting in damaged internal parts and compressor failure. It is permissible to "pump-down" the system using the compressor but never use a scroll compressor for drawing a vacuum on the system. This type of damage can be detected and will result in denial of warranty claims.

⚠ CAUTION

The head of a scroll compressor may be hot since it is in constant contact with discharge gas.

Contact could result in serious burns.

For compressor specifications see compressor nameplate or ELECTRICAL DATA section in this manual. All compressors are protected by internal overload protection circuitry.

3-Run Capacitor C5 (single phase only)

GCS16-060 single phase units, use run capacitor C5 to maximize compressor efficiency. See side of capacitor for ratings. Three phase models will not use capacitor C5.

⚠ DANGER

Shock hazard.

Compressor must be grounded. Do not operate without protective cover over terminals. Capacitors contain high voltage. Disconnect power before removing cover. Discharge capacitors before servicing unit. Disconnect power before servicing unit.

Can cause unsafe operation, injury or death.

4-Dual Capacitor C12 (single phase only)

GCS16/20 single-phase units (except GCS16-060) use a single "dual" capacitor for both the fan motor and the compressor. The fan side of the capacitor and the compressor side of the capacitor have different mfd ratings. The capacitor is located inside the compressor compartment. Ratings will printed on capacitor side.

5-Condenser Fan and Motor B4

The specifications section in this manual shows the specifications of condenser fans used in GCS16/20s. The condenser fan in all units is controlled by cooling contactor K1.

6-Condenser Fan Motor Capacitor C1

All GCS16/20 units use single-phase PSC condenser fan motors. See condenser fan motor nameplate for capacitor ratings.

7-Blower Motor B3 and Run Capacitor C4

All GCS16/20 series units use single-phase PSC blower motors. A single run capacitor is mounted on the blower housing. Ratings for capacitor will be on motor nameplate. All motors use multiple speed taps. Typically, the high speed tap is energized during compressor operation and a lower speed tap is energized during heating operation. See motor nameplate or ELECTRICAL DATA section for motor specifications.

8-Evaporator Coil

All GCS16/20s have a single slab evaporator coil. The coil has two rows of rifled copper tubes fitted with ripple-edged aluminum fins. A Thermal Expansion Valve (TXV) feeds multiple parallel circuits through the coil. See figure 17.

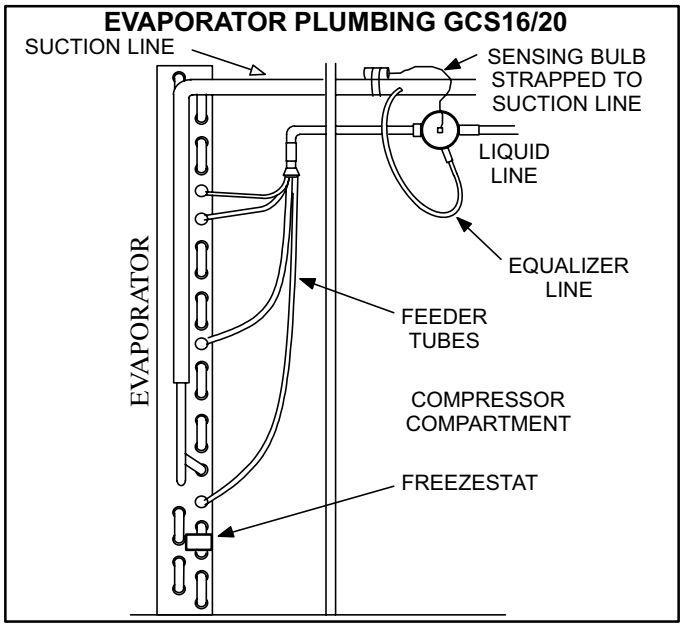


FIGURE 17

9-High Pressure Switch S4

S4 is a manually reset SPST N.C. high pressure switch which opens on pressure rise. The switch is located on the discharge line and wired in series with compressor contactor K1. The switches on GCS16/20-036, -042, -060 dash 6 units ONLY are set at 450±10 psig (3103 kPa± 69 kPa). For all other GCS16/20 dash number units, when discharge pressure rises above 410 ± 10 psig (2827 ± 69 kPa) the switch opens and the compressor is de-energized (the economizer can continue to operate). After the problem has been found and corrected, the switch can be reset by pushing-in the switch button.

10-Freezestat Switch S49

All GCS16/20 units are equipped with a low temperature freezestat switch S49 located on the evaporator coil. S49 is wired in series with high pressure switch S4 and compressor contactor K1. S49 is a SPST N.C. auto-reset switch which opens at 29°F ± 3 °F (-1.7°C ± 1.7 °C) on temperature drop and closes at 58°F ± 4 °F (14.4°C ± 2.2 °C) on a temperature rise. To prevent coil icing, S49 opens during compressor operation to temporarily disable the compressor until the coil warms sufficiently to melt any accumulate frost.

If S49 trips frequently due to coil icing, check the unit charge, air flow and filters before allowing unit back in operation. Make sure to eliminate conditions which might promote ice build up.

11-Condenser Coil

All GCS16/20s have a single condenser coil. All models (except the GCS16-024) have two rows of copper filled tubes with ripple-edged aluminum fins. The GCS16-024 units have one row.

III-PLACEMENT AND INSTALLATION

Make sure that 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 (RMF16).

IV-ELECTRICAL CONNECTIONS

A-Field Wiring

Unit and optional thermostat field wiring is shown in the unit diagram section of this manual.

B-Power Supply

Refer to start-up directions and refer closely to the unit wiring diagram when servicing. Refer to unit nameplate for minimum circuit ampacity and maximum fuse size. 230 volt units are factory wired with orange wire connected to control transformer primary. 208 volt units are field wired with red wire connected to control transformer primary.

⚠ DANGER

All SINGLE PHASE units use single pole contactors. One leg of compressor, capacitor and condenser fan are connected to line voltage at all times.

Remove all power to disconnect before servicing.

Electrical shock resulting in death or injury may result if power is not disconnected.

V-START-UP - OPERATION

A-Preliminary Checks

1 - Make sure unit is installed in accordance with the installation instructions and applicable codes. Make sure filter is in place,

2 - Inspect electrical wiring, both field and factory installed for loose connections. Tighten as required.

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

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

5 - Recheck voltage with unit running. If power is not within range listed on unit nameplate, stop unit and consult power company. Check amperage of unit. Refer to nameplate for correct running amps.

B-Cooling Start-Up

⚠ IMPORTANT

The following is a generalized procedure and does not apply to all thermostat systems. Electronic thermostats may operate differently. Refer to the operation sequence section of this manual for more information.

1 - Set fan switch to AUTO or ON and move the system selection switch to COOL. Adjust the thermostat to a setting far enough below room temperature to bring on the compressor.

2 - Close unit disconnect switch. Compressor will start and cycle with demand.

3 - The cooling circuit is charged with R-22 refrigerant. See rating plate for correct amount of charge.

4 - Refer to the Refrigeration System Service Checks section for the proper method of checking charge.

C-Heating Start-Up:

⚠ WARNING

Shock and burn hazard.

This unit is equipped with a direct spark ignition system. Do not attempt to light manually.

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.

Gas Valve Operation (Figure 18)

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

1- If using electro-mechanical thermostat, set to the lowest setting.

2- Turn off all electrical power to appliance.

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

4- Remove heat access panel.

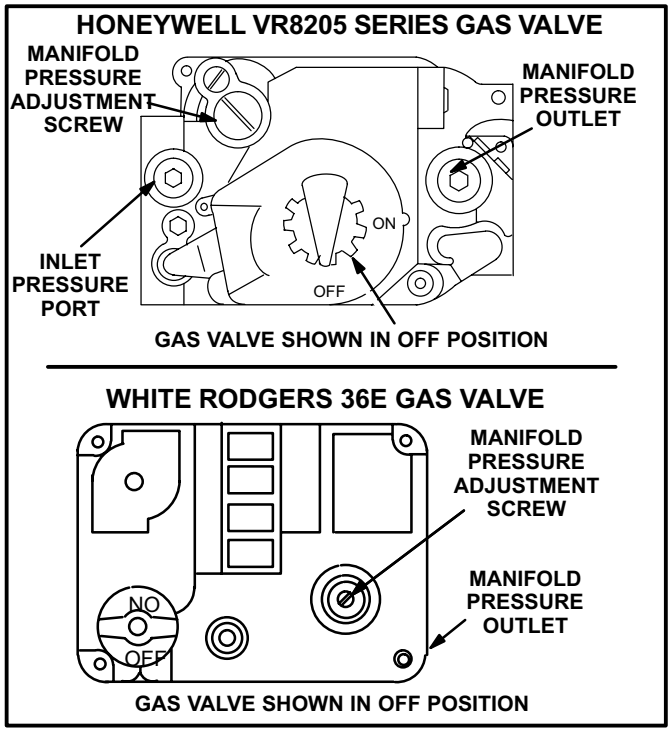


FIGURE 18

5- *Honeywell VR8205* - Turn knob on gas valve clockwise ↷ until it stops. Depress knob and turn clockwise ↷ to **OFF.**
White Rodgers 36E - Turn knob on gas valve 180° either way to **OFF**.

6- Wait five minutes to clear out any gas. If you then smell gas, STOP! Immediately call your gas supplier from your neighbor's phone. Follow the gas supplier's instructions. If you don't smell gas go to next step.

7- *Honeywell VR8205* - Turn knob on gas valve counterclockwise ↶ until it stops. Allow knob to pop up and continue counterclockwise to **ON** position.
White Rodgers 36E - Turn knob on valve 180° either way to **ON**.

8- Replace heat section access panel.

9- Turn on electrical power to unit. If using electro-mechanical thermostat, set to desired setting.

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

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

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

13-If the appliance will not operate, follow the instructions "To Turn Off Gas To Unit" and call your service technician or gas supplier.

B-To Turn Off Gas To Unit

1- Set thermostat to lowest setting.

2- Turn off all electric power to unit if service is to be performed.

3- Remove control access panel.

4- Turn knob on Honeywell gas valve clockwise ↷ until it stops. Depress knob and turn clockwise ↷ to **OFF**. Turn knob on White Rodgers 180_ either way to off. Do not force.

5- Replace burner access panel.

D-Safety or Emergency Shutdown:

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

E-Extended Period Shutdown:

Turn off the thermostat or set to "UNOCCUPIED" mode. Close all gas valves both internal and external to the unit to prevent gas leakage into the combustion chamber. Turn off power to the unit. All access panels, covers and vent caps must be in place and secured.

VI-REFRIGERATION SYSTEM SERVICE CHECKS

A-Cooling Start-Up

1 - Set thermostat system switch in “Cool” position, fan switch in “On” or “Auto” position and adjust room thermostat to a setting below room temperature.

2 - Close unit disconnect switch.

3 - Compressor will start and cycle on thermostat demand.

B-Three Phase Compressor Rotation

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

At compressor start-up, a rise in discharge and drop in suction pressures indicates proper compressor phasing and operation. If discharge and suction pressures do not function normally, follow these steps:

1 - Disconnect power to the compressor and the unit.

2 - Reverse any two field power leads to the unit.

3 - Reapply power to the compressor and unit.

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

NOTE - The compressor noise level will be significantly higher when phasing is incorrect and will not provide cooling when operating backwards.

C-Charging

It is not recommended that the system be charged below 60°F (15°C). If charging below 60°F (15°C) is required or if system is completely void of refrigerant, the recommended and most accurate method of charging is to weigh the refrigerant into the unit according to the amount shown on the unit rating plate.

Approach Method

If ambient temperature is above 60° F (15° C), read liquid line temperature. Approach temperature is the difference between liquid line temperature and ambient temperature.

CAUTION-*Use the same thermometer for both temperature readings.*

Approach temperature should be as shown in table 4, 5 or 6. Refrigerant must be added to lower approach temperature. Remove refrigerant from system to increase approach temperature.

TABLE 4
GCS16 APPROACH TEMPERATURES

UNIT	Liquid Line Temperature Minus Ambient Temperature
GCS16-024	5°F ± 1 (2.7°C ± 0.5)
GCS16-030	10°F ± 1 (5.5°C ± 0.5)
GCS16-036	11°F± 1 (6°C ± 0.5)
GCS16-048	9°F ± 1 (5°C ± 0.5)
GCS16-060	9°F ± 1 (5°C ± 0.5)

TABLE 5
GCS20 APPROACH TEMPERATURES

UNIT	Liquid Line Temperature Minus Ambient Temperature
GCS20-024	5°F ± 1 (2.7°C ± 0.5)
GCS20-030	10°F ± 1 (5.5°C ± 0.5)
GCS20-036	9°F ± 1 (5°C ± 0.5)
GCS20-042	7°F ± 1 (3.8°C ± 0.5)
GCS20-048	4°F± 1 (2.2°C ± 0.5)
GCS20-060	5°F ± 1 (2.7°C ± 0.5)

TABLE 6
GCS20 APPROACH TEMPERATURES
manufactured April 2002 and later

UNIT	Liquid Line Temperature Minus Ambient Temperature
GCS20-036	8°F ± 1 (4.4°C ± 0.5)
GCS20-048	7°F± 1 (3.9°C ± 0.5)
GCS20-060	8°F ± 1 (4.4°C ± 0.5)

VII-HEATING SYSTEM SERVICE CHECKS

A-C.S.A.
Applications and Requirements

All GCS16/20s are C.S.A. design certified without modification.

Refer to the GCS16/20 Operation and Installation Instruction Manual for more information.

B-Gas Piping

Gas supply piping must not allow more than 0.5”W.C. drop in pressure between gas meter and unit. Supply gas pipe must not be smaller than unit gas connection.

Compounds used on threaded joints of gas piping should be resistant to the action of L.P. gas.

C-Testing Gas Piping Pressure

⚠ IMPORTANT

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

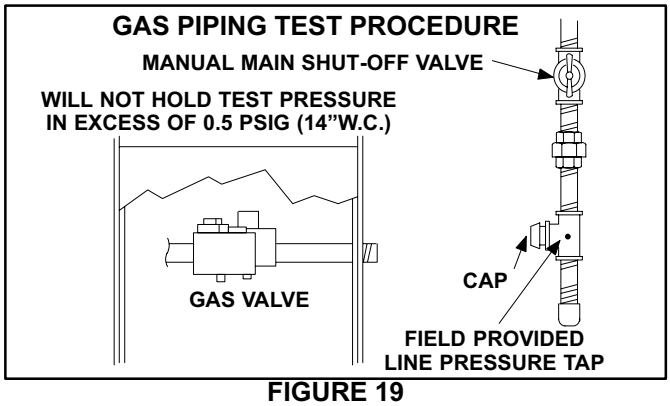


FIGURE 19

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.). See Figure 19.

If test pressure is equal to or less than 0.5 psig (14”W.C.), use the main manual shut-off valve before testing to isolate unit from gas supply system.

When checking piping connection for gas leaks, use a soap solution or other preferred means. Do not use matches, candles, flame, or other source of ignition to check for gas leaks.

D-Testing Gas Supply Pressure

When testing gas supply pressure, connect test gauge to the inlet pressure tap (field provided). Test supply gas pressure with unit firing at maximum rate. 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 4.5”W.C. and 10.5”W.C. For L.P. gas units, operating pressure at the unit gas connection must be between 11.0”W.C. and 13.0”W.C.

On multiple unit installations, each unit should be checked separately, with and without the other units operating. Supply pressure must fall within the range listed in the previous paragraph.

E-Check and Adjust Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Refer to figure 18 for location of manifold pressure adjustment screw and pressure tap outlet.

The gas valve is factory set and should not require adjustment. Manifold pressure for natual gas units is 3.5” ± 0.3 (.87 ± .074) and for propane units , 9.5 ± 0.5 (2.36 ± .12). 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.

⚠ IMPORTANT

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

1 - Connect a test gauge to the outlet pressure tap on the gas valve. Start the unit 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 head. Natural gas should burn blue. L.P. gas should burn mostly blue with some orange streaks.

3 - After allowing the unit to stabilize for five minutes, record the manifold pressure.

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

F-Proper Gas Flow (Approximate)

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for two revolutions of gas through the meter. (Two revolutions assures a more accurate time.) Divide by two and compare to time in table 7. Seconds in table 7 are based on a 1 cu.ft. dial and gas value of 1000 btu's for natural and 2500 btu's for LP. Adjust manifold pressure on gas valve to match time needed.

TABLE 7

Unit in Btu's	Seconds for Natural	Seconds for Propane
50,000	72	180
75,000	48	120
90,000	40	100
120,000	30	75

G-High Altitude Derate

Unit does not need gas pressure adjustment when operating from 0 to 7500 ft. (0 to 2248m.)

H-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 ground electrode to complete a safety circuit. The minimum flame current necessary to keep the ignitor from lockout is 0.1 microamps. The electrodes should be located so the tips are at least 1/2" inside the flame envelope. Do not bend electrodes. To measure flame current, follow the procedure below:

1 - Disconnect power to unit.

2 - Remove lead from sensing electrode and install a 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, meter reading should be .5 to 1.0 microamps. Do not bend electrodes.

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

6 - When finished, disconnect power to unit before disconnecting meter. Make sure sensor wire is securely reconnected before reconnecting power to unit.

VIII-INDOOR BLOWER OPERATION / ADJUSTMENT

A-Blower Operation

The following is a generalized procedure and does not apply to all thermostat control systems.

1 - Blower operation is dependent on the thermostat option that has been installed in the GCS16/20.

2 - Generally, blower operation is set at the thermostat subbase fan switch. With the fan switch in the "ON" position, the blower operates continuously. With the fan switch in the "AUTO" position, the blower cycles with demand (or, with some control systems, runs continuously while the heating or cooling circuits cycle).

3 - In most cases, the blower and entire unit will be off when the system switch is in the "OFF" position. The only exception is immediately after a heating demand until blower control switches off.

B-Determining Unit CFM

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

2 - Measure static pressure external to the unit (from supply to return).

To Measure Discharge Static Pressure:

a - Measure tap locations as shown in figure 20.

b - Punch a 1/4" diameter hole. Insert manometer hose flush with the inside edge of hole or insulation. Seal around hole with permagum. Connect zero end of manometer to the discharge (supply) side of system. Connect other end of manometer to return duct as above.

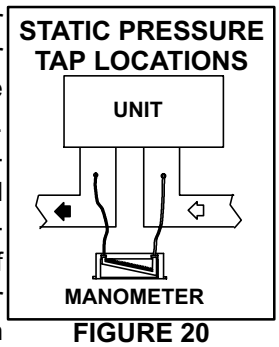


FIGURE 20

c - With only the blower motor running, observe the manometer reading.

d - Seal around the hole when check is complete.

3 - The CFM can be adjusted by changing the motor speed taps. Follow the blower speed change instructions below.

C-Blower Speed Adjustment

208-230V UNITS - Blower speed selection is accomplished by changing the taps in the harness connector at the blower motor (see figure 21). See wiring diagram for blower speeds.

Each motor port in a leadless motor (figure 21) is analogous to speed taps (pigtails) used in previous Lennox units. Each motor is capable of four or five different speeds depending on unit (refer to unit wiring diagram). Each unit is factory wired to provide a single cooling speed and a single heating speed. Speeds can be changed by moving the cooling wire or the heating wire to a different port at the harness connector.

460-575V UNITS—Blower speed selection is accomplished by changing the J38 blower speed jack in the return air section. See unit wiring diagram.

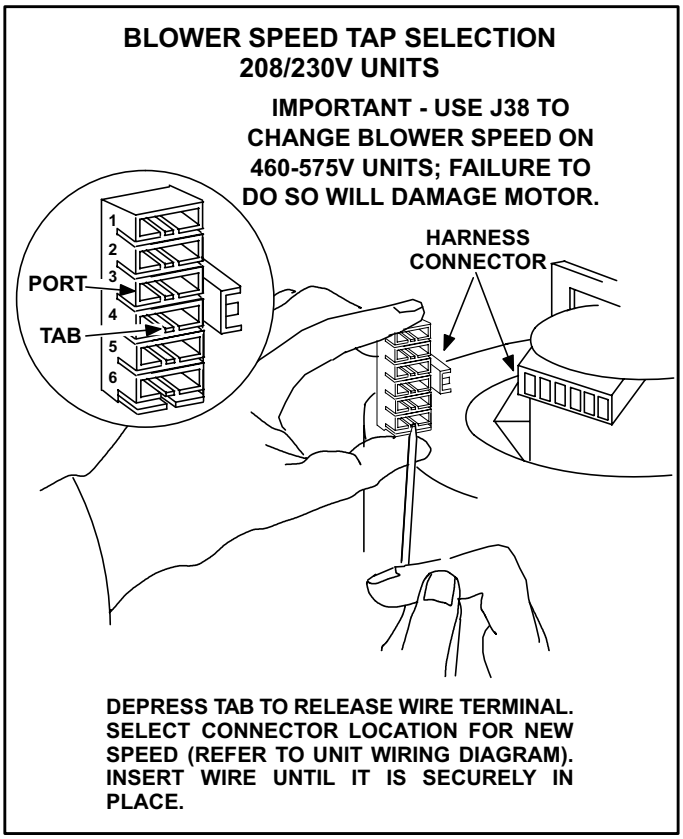


FIGURE 21

Heating Speed:

Factory blower speeds are listed in a table on the unit wiring diagram. Adjust the blower heating speed for proper air temperature rise (listed on unit rating plate). To measure temperature rise, place thermometers in the supply and return air plenums. Turn up thermostat to start the unit. After plenum thermometers have reached their highest and most steady readings, subtract thermometer readings. The difference should be in the range listed on unit rating plate. If this temperature is high, wire the blower to a higher speed; if resulting temperature is too low, wire the blower to a slower speed. Repeat this procedure until desired temperature rise is obtained.

Cooling Speed:

Factory blower speeds are listed in a table on the unit wiring diagram. Blower performance tables are listed in the first section of this manual. Section "VIII-B-Determining Unit CFM" shows how to measure discharge static pressure. Once discharge static pressure has been determined, compare the value to the blower performance tables listed in the first section of this manual. If CFM is low, wire the blower to a higher speed; if CFM is high, wire the blower to a lower speed. Repeat this procedure until desired CFM is reached.

IX-MAINTENANCE

⚠ CAUTION

Potential for personal injury.

Disconnect power to unit before performing any maintenance or service operation. Avoid contact with sharp metallic edges.

Can cause personal injury or death.

⚠ CAUTION

Potential for personal injury.

Remember to follow lighting instructions attached to the unit before putting unit back into operation.

Can cause property damage, unit damage and personal injury or death.

A-Lubrication

All motor bearings are prelubricated. No further lubrication is required.

B-Filters

Filters are provided with the GCS16/20 units and installed in the return air duct. See Installation Instructions. Filters should be checked monthly (or more frequently in severe use) and cleaned or replaced regularly. Take note of the ”AIR FLOW DIRECTION” marking on the filter frame when re-installing.

⚠ IMPORTANT

FIlters must be U.L.C certified or equivalent for use in Canada.

C-Burners

Clean burner as follows:

1 - Turn off both electrical power and gas supply to unit.
2 - Open access panel to burner compartment.
3 - Remove burner retaining bracket and gas manifold. Lift burners from orifices.
4 - Clean as necessary and replace burners. Refit retaining brackets and gas manifold. Make sure that burner heads line up correctly. Spark gap on ignition electrode must be properly set. Refer to Heating Adjustment section. Close access panel.
5 - Restore electrical power and gas supply. Follow lighting instructions attached to unit to restart unit.

D-Combustion Air Inducer

All GCS16/20s use combustion air inducers with pre-lubricated sealed stainless-steel ball bearings.

A differential pressure switch (combustion air prove switch) is used to prove combustion air inducer operation. If the inducer is obstructed, the switch will not close and the ignition control will be locked out.

Under normal operating conditions, the combustion air inducer wheel should be inspected prior to the heating season to determine if cleaning is necessary. With the power supply disconnected, the condition of the blower wheel can be determined by looking through the vent opening.

Maintenance consists of:

1 - Checking prove switch. Prove switch should close at the factory setting shown on side of switch.
2 - Check the combustion air pressure switch hose for blockage or deterioration. Replace if necessary.
3 - Position hose so accumulated condensate can drain from the switch into blower housing.
4 - Clean combustion air inducer assembly.

To clean combustion air blower:

1 - Shut off power supply and gas to the unit.
2 - Remove screws retaining the vent cap and combustion air inducer to the end panel. Clean vent cap as necessary. Check gaskets for deterioration. Replace if necessary. **Pay close attention to the order in which flue orifice and gaskets are installed.**
3 - Remove screws holding blower housing to the flue box cover plate and wires attached to motor.
4- Remove combustion air inducer assembly.
5- Clean with a wire brush as required.
6- Remove burner assembly from unit as described in burner section above.
7- Clean heat exchanger tubes with a wire brush as required.
8- Replace flue box cover and burner assembly. Replace combustion air inducer assembly including gaskets.

⚠ CAUTION

Use care when cleaning combustion air blower wheel. Wheel is made of aluminum and may distort if too much pressure is applied.

9- Reconnect tubing connecting blower to flue box. Arrange tubing so that it can drain accumulated condensate.
10 - Clean vestibule panel louvers using a small brush.

E-Flue

Make sure the flue is clean and free of debris.

F-Evaporator Coil

1 - Clean coil, if necessary.
2 - Check connecting lines and coil for oil leaks.
3 - Check condensate drain pan and line, if necessary.

G-Condenser Coil

1 - Clean and inspect condenser coil. (May be flushed with a water hose.)
2 - Visually inspect connecting lines and coils for evidence of oil leaks.

H-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.

X-ACCESSORIES

A-RMF16 Mounting Frame

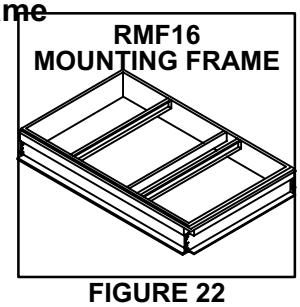


FIGURE 22

When installing a GCS16/20 unit on a combustible surface for downflow discharge applications, RMF16 roof mounting (figure 22) frame is required. Otherwise, the RMF16 is recommended but not required. The GCS16/20, if not mounted on a flat (roof) surface, MUST be supported under all edges and under the middle of the unit to prevent sagging. The GCS16/20 MUST be mounted level within 1/16" per linear foot in any direction.

The assembled RMF16 mounting frame is shown in figure 22. Refer to the RMF16 installation instructions for details of proper assembly and mounting. Roof mounting frame MUST be squared to roof before mounting. Plenum system MUST be installed before unit is set on mounting frame. Refer to RMF16 installation instructions for proper plenum construction.

Many types of roof framing or supports can be used to mount the GCS16/20 unit, depending upon different roof structures. A typical field fabricated roof mounting frame is shown in figure 23.

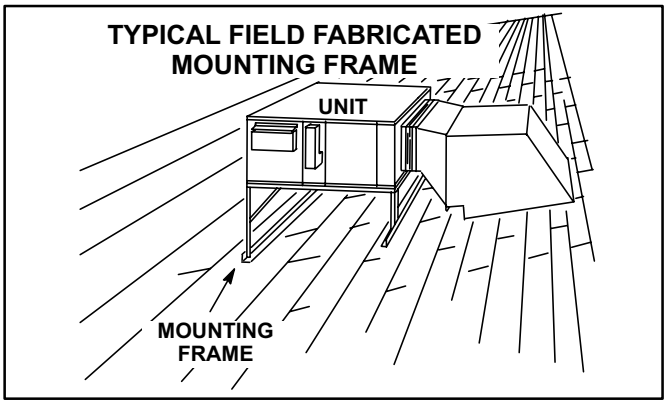


FIGURE 23

B-REMD16 Downflow Economizer
REMD16M Downflow Economizer

1-Application

The economizer opens a set of dampers to allow 0 to 100 percent outdoor air to be used for cooling when outdoor humidity and temperature are acceptable. Additional (2nd stage) cooling demand is directed to the compressor while the dampers remain open. If outdoor air becomes unacceptable, the outdoor air dampers close to a predetermined minimum position while the compressor cooling circuit cycles as needed.

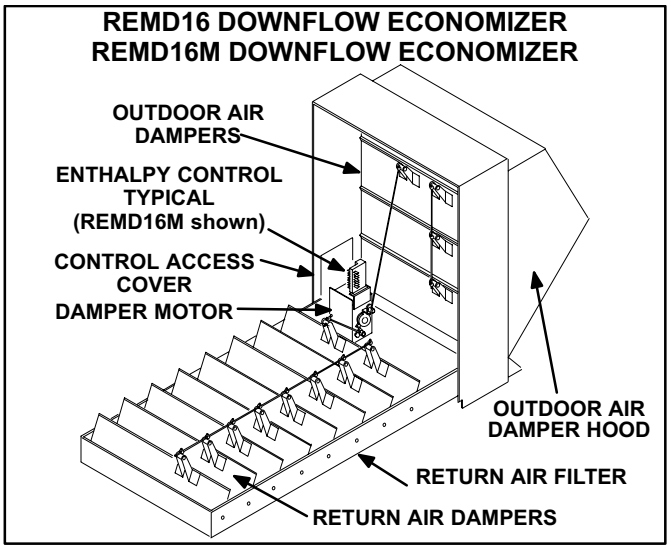


FIGURE 24

Refer to the REMD16-41/65 Installation Instruction Manual for specific details regarding installation.

The physical location of controls in the REMD16M and REMD16 economizers is shown in figures 25 and 26.

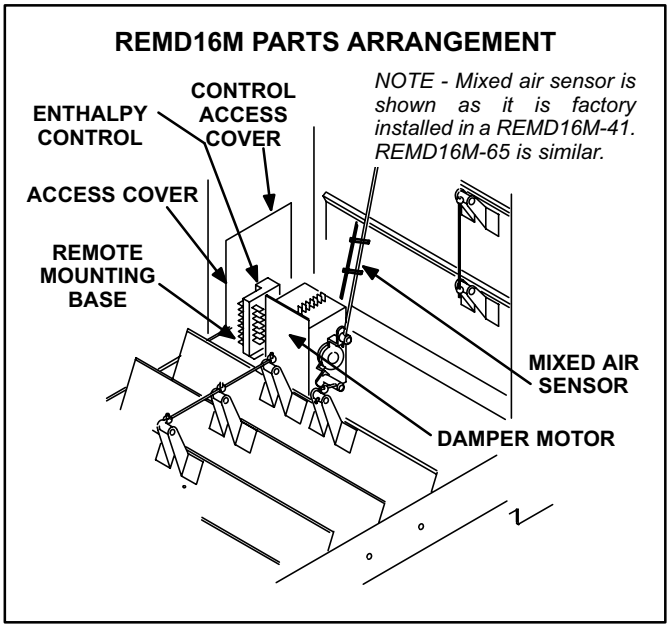


FIGURE 25

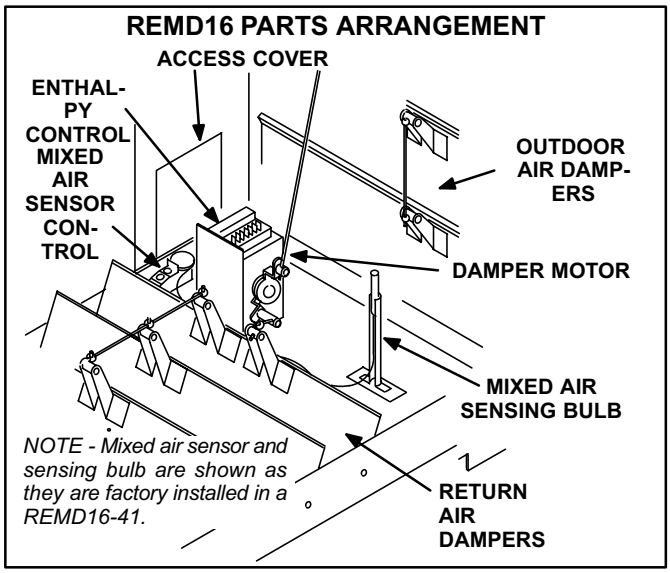


FIGURE 26

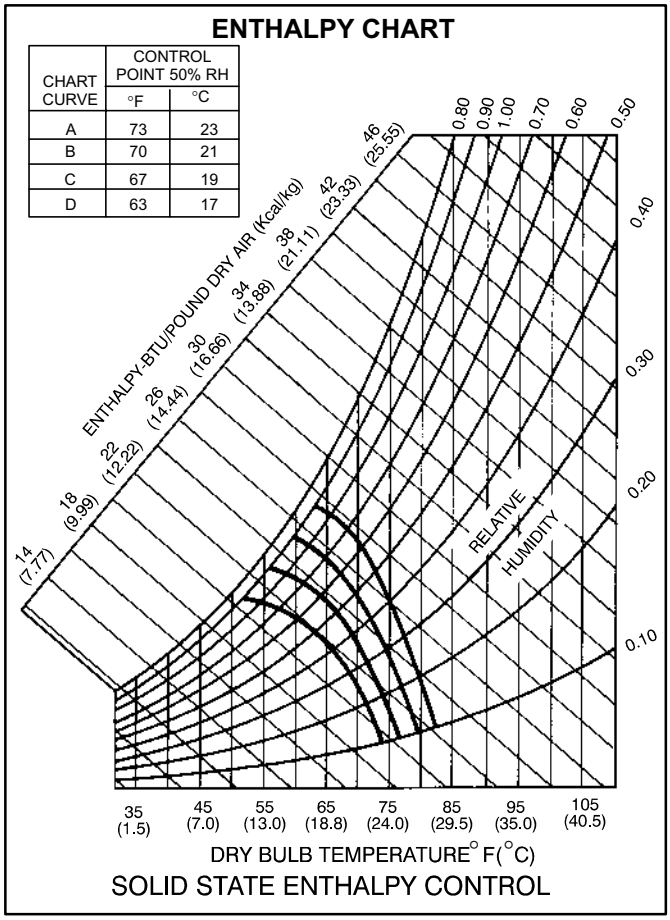


FIGURE 27

2-Economizer Operation

a-Enthalpy Control: Setpoint Control

The key to economizer operation is the enthalpy control. The enthalpy control senses the total heat content of the outside air (temperature plus humidity) and uses that information to control the amount of outside air brought into the system. When the enthalpy of outside air is below the control setpoint, the control actuates a motor which in turn adjusts the outdoor dampers to meet the cooling demands of the building.

When the heat content rises above the control setpoint, the control de-activates and the dampers close to the preset minimum position (not closed) position.

Two types of adjustment may be made at the control. The first is the control setpoint. The setpoint determines the temperature and humidity conditions at which the outdoor air dampers will open and close. The recommended setpoint is “A.” If the economizer is allowing air which is too warm or too humid into the system, the control may be changed to a lower setpoint (B,C or D). Refer to enthalpy chart figure 27.

Example:

If the enthalpy control is set at setpoint “A” as shown in figure 27, the following situation could occur. A cooling demand when the outside air is at 75° and 20 percent humidity would drive the economizer outdoor air dampers open to utilize outdoor air for cooling. The compressor cooling circuit would be disabled.

However, if the outdoor air should change to 70°F (a drop in temperature) and 70 percent humidity (a dramatic rise in humidity), the “total heat content” of the outdoor air would rise above the enthalpy control setpoint and de-activate the damper motor to the preset minimum position. If cooling demand is still present when the total heat of the outside air rises above the control setpoint, cooling demand is routed from the economizer to the compressor cooling circuit.

b-Minimum Positioner

The second type of adjustment which may be made at the control is the minimum position of the outdoor damper blades. Each economizer has a minimum positioner switch (potentiometer) which allows the outdoor dampers to be adjusted to a preset minimum position. This allows a preset amount of air exchange at all times during unit operation. When unit operation stops, the dampers drive fully closed. The potentiometer is located on the enthalpy control face (modulating economizer) or on the damper motor (three position economizer.)

c-Enthalpy Sensor

The enthalpy sensor is located on the outside portion of the outdoor damper blades (as shown in figure 28). The sensor monitors the total heat content of the outdoor air (temperature plus humidity) and sends the information to the enthalpy control. The enthalpy control uses the information to determine if outdoor air can be used for cooling.

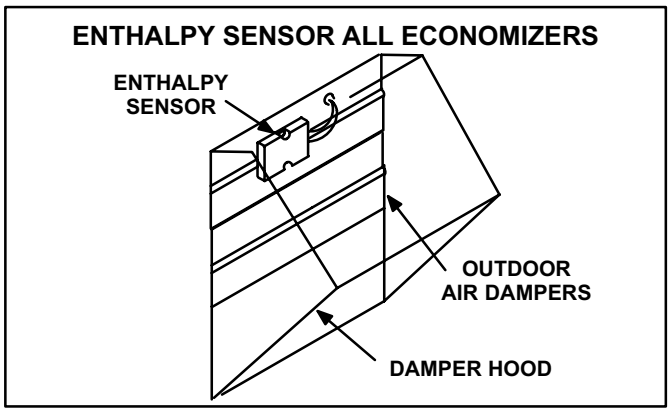


FIGURE 28

d-Mixed Air Sensor

The sensor measures the resultant temperature of the mixed air downstream of the evaporator coil. The mixed air temperature is used by the enthalpy control when outdoor dampers are open to help determine whether outdoor air dampers should close. There are two types of economizers: modulating and three-position. Modulating economizers are equipped with a single mixed air sensor. Three position economizers are equipped with a separate sensor (switch) and sensing bulb which are connected by a cap tube.

The mixed air sensor (bulb) is located in the supply air stream. The sensor (modulating economizer) or sensing bulb (three position economizer) fits through a factory supplied hole in the panel dividing the unit return and supply air. The three position economizer sensor (switch) mounts to pre-drilled holes in the unit panel dividing return and supply air.

e-Wiring, Installation, Maintenance

The economizer uses pigtail connectors to connect to the GCS16/20's harness connector located in the blower compartment. For specific details of economizer wiring and operation, refer to the sequence of operation section of this manual.

f-Modulating Damper Motor Check

Honeywell W7459A

1 - Disconnect main power to the unit.
2 - Turn thermostat control to OFF position (occupied mode).
3 - Install jumper across terminals 6-9 on blower relay K20 in unit control box.
4 - Install jumper across enthalpy control terminals T and T1. See figure 29 for location.
5 - Restore power to unit. Outdoor damper should drive to fully open position (60 to 90 sec. required for full travel). Observe travel for proper damper operation.
6 - Disconnect power to the unit. Outdoor damper should spring return to closed position.
7 - Remove T and T1 jumper then restore power to the unit. Outdoor damper should drive to minimum position. Adjust minimum damper position pot located on control. See figure 1.
8 - Disconnect power to unit and remove jumper on blower relay terminals 6-9. Replace all panels. Restore power to unit.

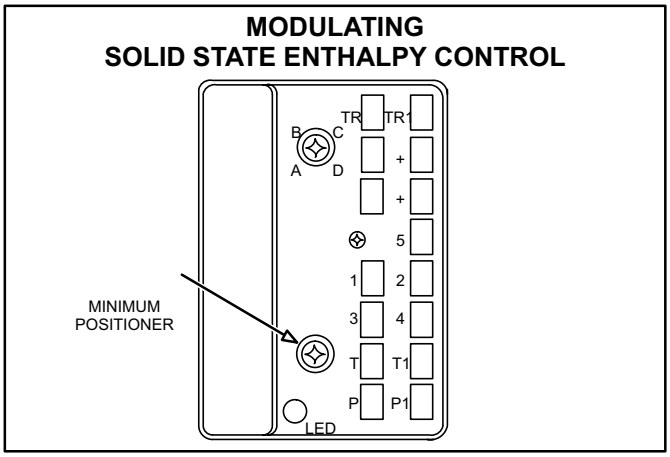


FIGURE 29

g-ThreePositionDamperMotorCheck

Honeywell W7459C

1 - Disconnect main power to the GCS16/20.
2 - Remove the control access cover (see figures 25 and 26).
3 - Install jumper across enthalpy control terminals D and TR1. See figure 30 for location.

THREE POSITION
SOLID STATE ENTHALPY CONTROL

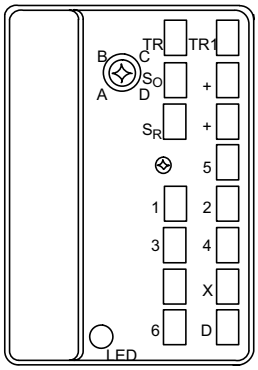


FIGURE 30

4 - Restore power to unit. Outdoor damper should drive to fully open position (requires approximately 90 seconds for full travel). Observe travel for proper damper operation.
5 - Disconnect power to unit. Damper should spring return to closed position.
6 - Remove jumper installed in step 3. Install jumper across enthalpy control terminals X and TR1. See figure 30 for terminal location.
7 - Restore power to unit. Outdoor damper should drive to mid (minimum) position (requires approximately 90 seconds for full travel). Adjust minimum position by turning thumb wheel on damper motor.
8 - Disconnect power to unit and remove jumper. Replace all panels. Restore power to unit.

h-Warm Up Kit

An optional warm up kit may be added to either REMD16 or EMDH16 economizer. The warm up kit holds the dampers closed during night setback and morning warm up. When the first thermostat demand of the day is satisfied, the warm up kit opens the outdoor dampers to minimum position. The warm up kit mounts to the GCS16/20 in the control mounting area of the blower compartment. The kit plugs into the unit wiring harness inline between the unit and the economizer. For detailed wiring and operation, refer to the sequence of operation section of this manual.

i-Night Relay

Optional night relay must be added to economizer when night setback functions are desired with electromechanical control systems. Kit includes a DPDT relay which is hard-wired to the economizer harness.

C-OAD16 Outdoor Air Damper

OAD16 damper section may be installed any place outside of the building in the return air duct. Refer to OAD16 installation instruction manual for specific details regarding installation. The washable filter supplied with the OAD16 can be cleaned with water and mild detergent. It should be sprayed with Filter Handicoater when dry prior to reinstallation. Filter Handicoater is R.P. Products coating no. 418 and is available as Lennox Part No. P-8-5069.

D-LPG Kit

All C.S.A rated GCS16/20s are factory set for use with natural gas. An optional L.P.G. conversion kit allows changeover from natural to L.P.G. supply. The kit includes a gas valve changeover kit and new gas orifices. See “OPTIONAL ACCESSORIES” section for kit number.

Refer to the L.P.G. conversion kit installation instruction for specific installation procedures.

E-Condenser Coil Guard Kit

Condenser coil guards are standard equipment for GCS20 single phase units only, but a kit for all other models is available. The kit includes PVC coated steel wire coil guard which is field installed.

F-Low Ambient Kit

The optional low ambient kit (figure 31) allows for mechanical cooling operation at low outdoor temperature.

Low ambient kit field wiring is shown in figure 32. The low ambient pressure switch is wired in series with the condenser fan L1 lead. Refer to the low ambient kit installation instruction manual for detailed installation instructions.

The low ambient pressure switch cycles the condenser fan while allowing normal compressor operation. This intermittent fan operation results in a high evaporating temperature which allows the system to operate without evaporator coil icing and losing capacity.

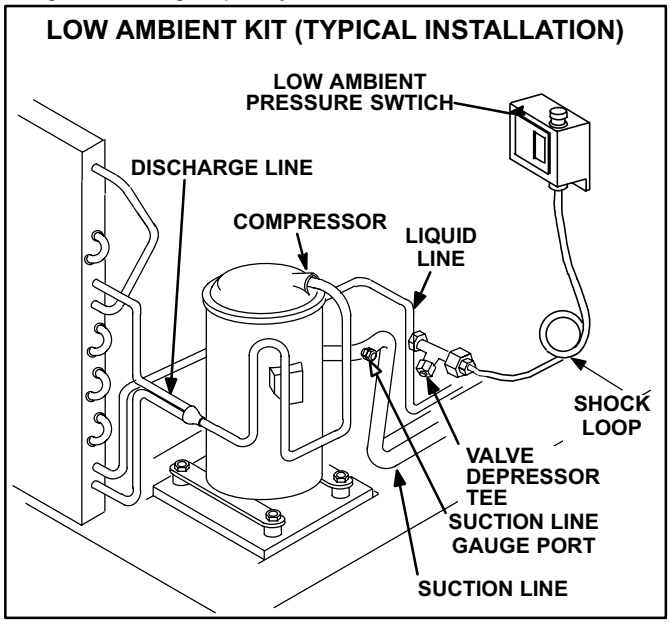


FIGURE 31

Adjustment:

The low ambient pressure switch is adjustable but the adjustment knob *does not* adjust CUT-IN or CUT-OUT points. CUT-IN point is fixed and cannot be adjusted. The scale on the switch measures the difference in pressure between preset CUT-IN and adjustable CUT-OUT points. Adjustment knob changes CUT-OUT point by adjusting the DIFFERENCE between CUT-IN and CUT-OUT.

The low ambient pressure switch is factory set to CUT-IN at 285psig with a difference of 145 psig (CUT-OUT at 140psig). Adjustment should not be needed. If adjustment is needed, adjust the switch as follows:

1 - Loosen knob securing screw to allow knob stop to pass over fixed stop on control (see figure 33).

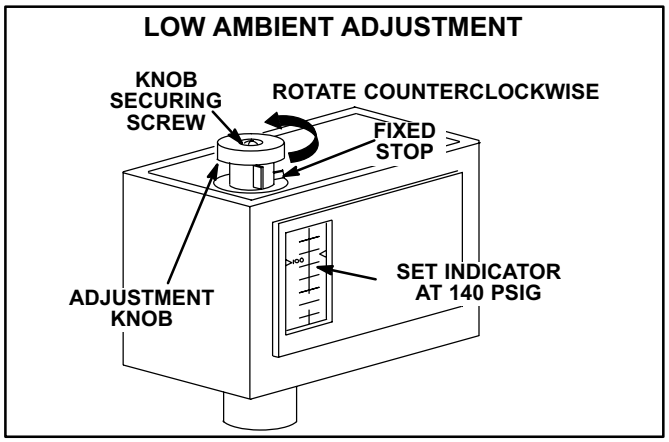


FIGURE 33

DIFFERENCE (set by knob) = CUT-IN POINT (fixed) minus CUT-OUT POINT

To find CUT-OUT point, this equation can be re-arranged:

CUT-OUT = CUT-IN minus the DIFFERENCE.

2 - Rotate the knob as needed to set the difference indicator at 145psig (1000kPa).

3 - Tighten the securing screw after adjusting.

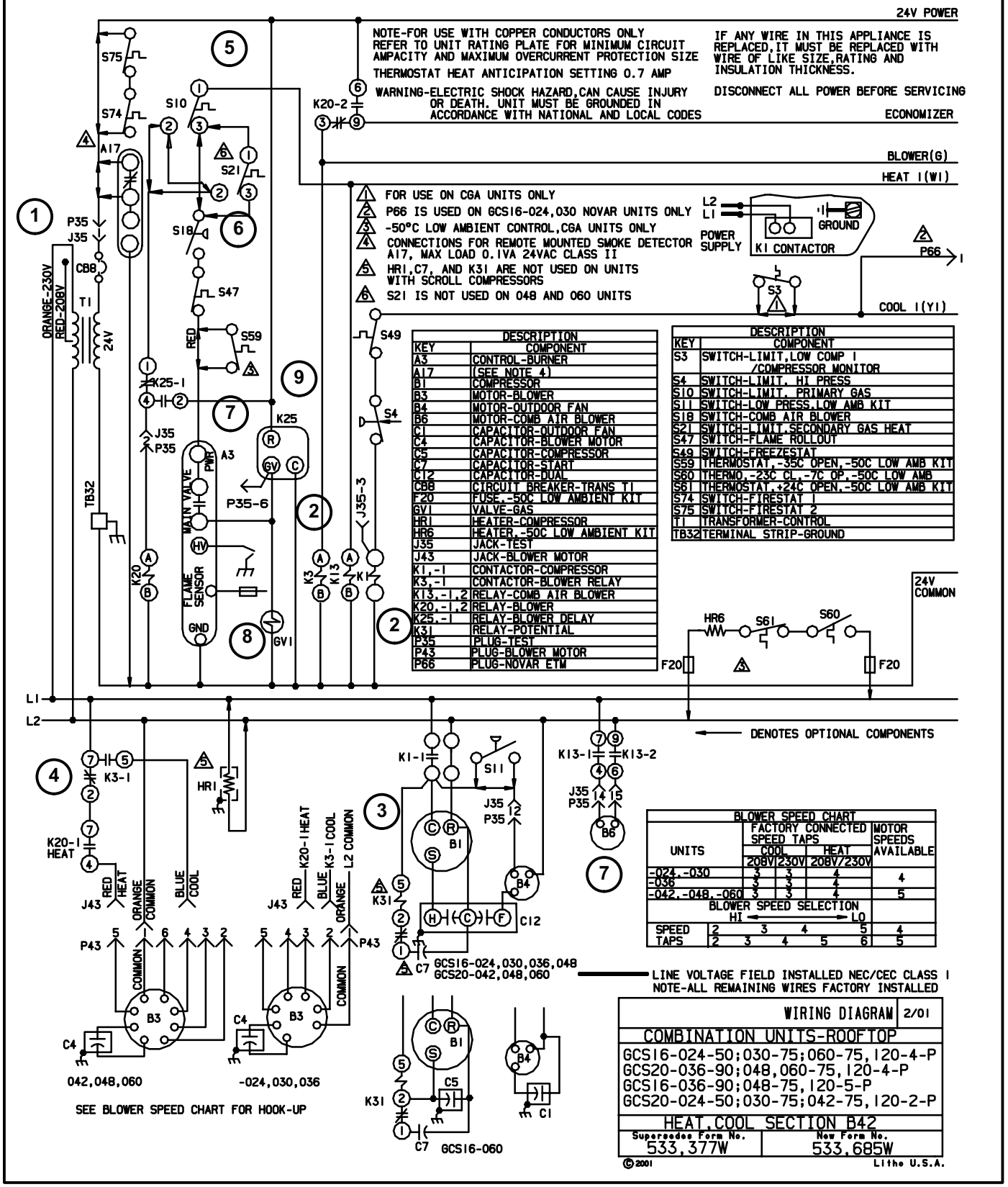
G-SRT-65 Transitions

Optional supply/return transitions are available for use with downflow GCS16/20s utilizing the optional RMF16 roof mounting frame. The transition must be installed in the RMF16 mounting frame before mounting the GCS unit to the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

H-RTD9-65 and FD9-65 Diffusers

Optional flush mount diffuser/return FD9-65 and extended mount diffuser/return RTD9-65 are available for use with the GCS16 unit. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

TYPICAL GCS16/GCS20 FIELD WIRING DIAGRAM
SINGLE PHASE



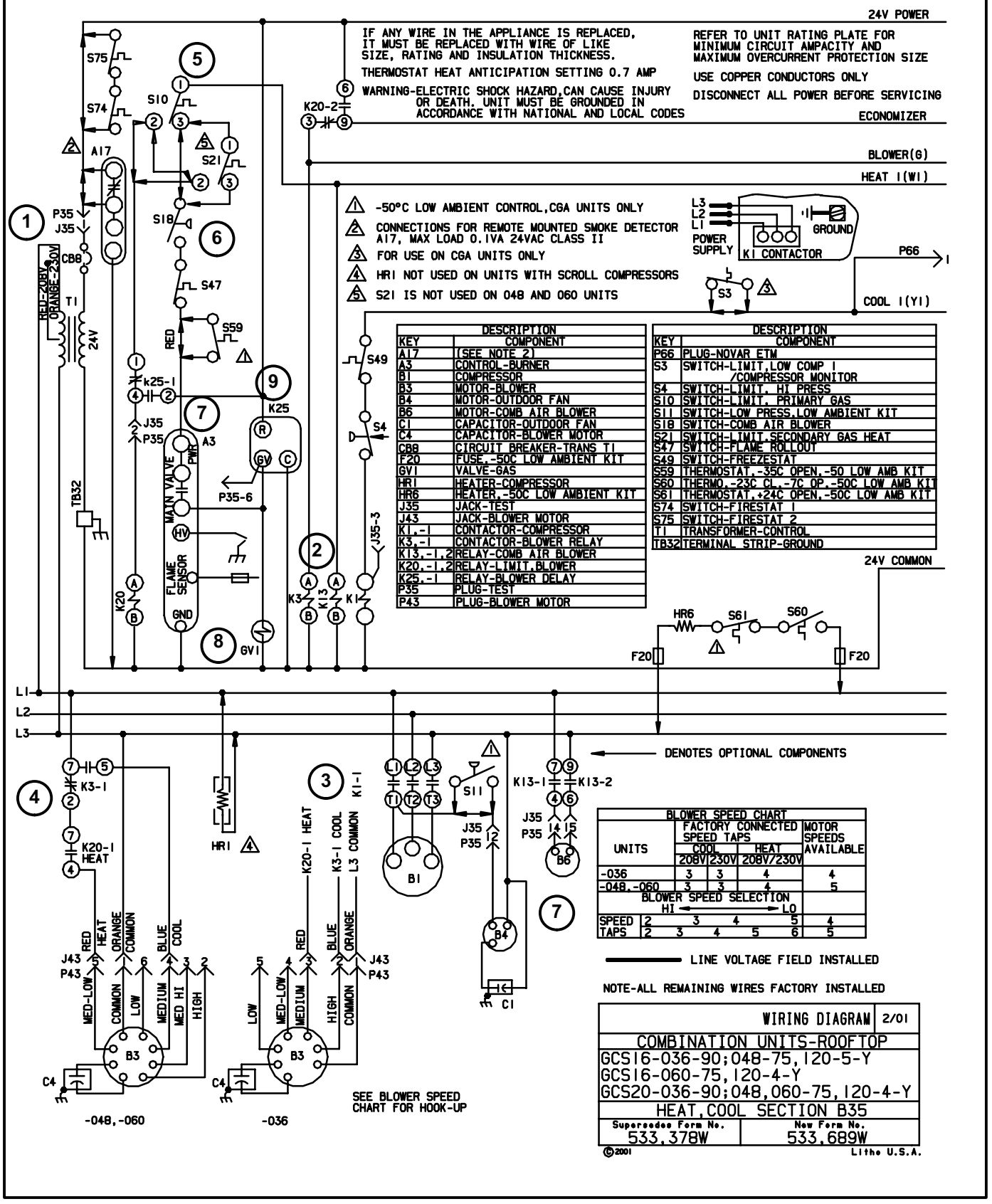
DESCRIPTION	
KEY	COMPONENT
A3	CONTROL-BURNER
A17	(SEE NOTE 4)
B1	COMPRESSOR
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN
B6	MOTOR-COMB AIR BLOWER
C1	CAPACITOR-OUTDOOR FAN
C4	CAPACITOR-BLOWER MOTOR
C5	CAPACITOR-COMPRESSOR
C7	CAPACITOR-START
C12	CAPACITOR-DUAL
CB8	CIRCUIT BREAKER-TRANS T1
F20	FUSE,-50C LOW AMBIENT KIT
GV1	VALVE-GAS
HR1	HEATER-COMPRESSOR
HR6	HEATER,-50C LOW AMBIENT KIT
J35	JACK-TEST
J43	JACK-BLOWER MOTOR
K1,-1	CONTACTOR-COMPRESSOR
K3,-1	CONTACTOR-BLOWER RELAY
K13,-1,2	RELAY-COMB AIR BLOWER
K20,-1,2	RELAY-BLOWER
K25,-1	RELAY-BLOWER DELAY
K31	RELAY-POTENTIAL
P35	PLUG-TEST
P43	PLUG-BLOWER MOTOR
P66	PLUG-NOVAR ETM

DESCRIPTION	
KEY	COMPONENT
S3	SWITCH-LIMIT,LOW COMP 1 /COMPRESSOR MONITOR
S4	SWITCH-LIMIT, HI PRESS
S10	SWITCH-LIMIT, PRIMARY GAS
S11	SWITCH-LOW PRESS,LOW AMB KIT
S18	SWITCH-COMB AIR BLOWER
S21	SWITCH-LIMIT,SECONDARY GAS HEAT
S47	SWITCH-FLAME ROLLOUT
S49	SWITCH-FREEZESTAT
S59	THERMOSTAT,-35C OPEN,-50C LOW AMB KIT
S60	THERMO,-23C CL,-7C OP,-50C LOW AMB
S61	THERMOSTAT,+24C OPEN,-50C LOW AMB KIT
S74	SWITCH-FIRESTAT 1
S75	SWITCH-FIRESTAT 2
T1	TRANSFORMER-CONTROL
TB32	TERMINAL STRIP-GROUND

BLOWER SPEED CHART				
UNITS	FACTORY CONNECTED SPEED TAPS			MOTOR SPEEDS AVAILABLE
	COOL		HEAT	
	208V	230V	208V/230V	
-024,-030	3	3	4	4
-036	3	3	4	
-042,-048,-060	3	3	4	5
BLOWER SPEED SELECTION HI → LO				
SPEED TAPS	2 3 4 5			4
	2 3 4 5 6			5

WIRING DIAGRAM	2/01
COMBINATION UNITS-ROOFTOP	
GCS16-024-50;030-75;060-75,120-4-P GCS20-036-90;048,060-75,120-4-P GCS16-036-90;048-75,120-5-P GCS20-024-50;030-75;042-75,120-2-P	
HEAT,COOL SECTION B42	
Supersedes Form No. 533,377W	New Form No. 533,685W

TYPICAL GCS16/GCS20 FIELD WIRING DIAGRAM
THREE PHASE



DESCRIPTION	
KEY	COMPONENT
A17	(SEE NOTE 2)
A3	CONTROL-BURNER
B1	COMPRESSOR
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN
B6	MOTOR-COMB AIR BLOWER
C1	CAPACITOR-OUTDOOR FAN
C4	CAPACITOR-BLOWER MOTOR
CB8	CIRCUIT BREAKER-TRANS T1
F20	FUSE,-50C LOW AMBIENT KIT
GV1	VALVE-GAS
HR1	HEATER-COMPRESSOR
HR6	HEATER,-50C LOW AMBIENT KIT
J35	JACK-TEST
J43	JACK-BLOWER MOTOR
K1,-1	CONTACTOR-COMPRESSOR
K3,-1	CONTACTOR-BLOWER RELAY
K13,-1,2	RELAY-COMB AIR BLOWER
K20,-1,2	RELAY-LIMIT,BLOWER
K25,-1	RELAY-BLOWER DELAY
P35	PLUG-TEST
P43	PLUG-BLOWER MOTOR

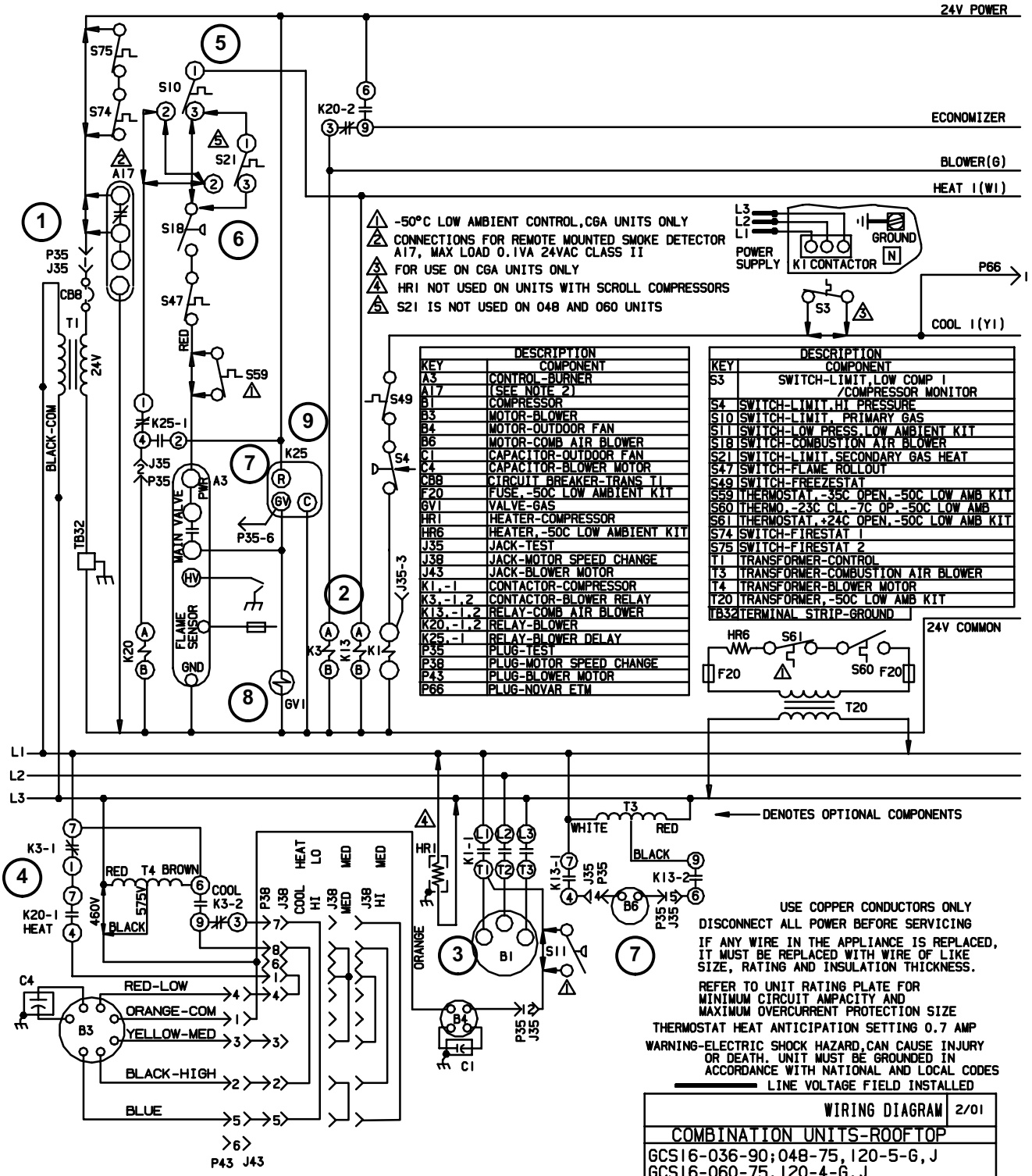
DESCRIPTION	
KEY	COMPONENT
P66	PLUG-NOVAR ETM
S3	SWITCH-LIMIT,LOW COMP 1 /COMPRESSOR MONITOR
S4	SWITCH-LIMIT, HI PRESS
S10	SWITCH-LIMIT, PRIMARY GAS
S11	SWITCH-LOW PRESS,LOW AMBIENT KIT
S18	SWITCH-COMB AIR BLOWER
S21	SWITCH-LIMIT,SECONDARY GAS HEAT
S47	SWITCH-FLAME ROLLOUT
S49	SWITCH-FREEZESTAT
S59	THERMOSTAT,-35C OPEN,-50 LOW AMB KIT
S60	THERMO.-23C CL.-7C OP.-50C LOW AMB KIT
S61	THERMOSTAT,+24C OPEN,-50C LOW AMB KIT
S74	SWITCH-FIRESTAT 1
S75	SWITCH-FIRESTAT 2
T1	TRANSFORMER-CONTROL
TB32	TERMINAL STRIP-GROUND

BLOWER SPEED CHART				
UNITS	FACTORY CONNECTED SPEED TAPS COOL 208V	COOL 230V	HEAT 208V/230V	MOTOR SPEEDS AVAILABLE
-036	3	3	4	4
-048,-060	3	3	4	5
BLOWER SPEED SELECTION HI ← → LO				
SPEED TAPS	2 3 4 5			4
	2 3 4 5 6			5

WIRING DIAGRAM	2/01
COMBINATION UNITS-ROOFTOP	
GCS16-036-90;048-75,120-5-Y GCS16-060-75,120-4-Y GCS20-036-90;048,060-75,120-4-Y	
HEAT,COOL SECTION B35	
Supersedes Form No. 533,378W	New Form No. 533,689W

Litho U.S.A.

TYPICAL GCS16/GCS20 FIELD WIRING DIAGRAM
THREE PHASE



DESCRIPTION	
KEY	COMPONENT
A3	CONTROL-BURNER
A17	(SEE NOTE 2)
B1	COMPRESSOR
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN
B6	MOTOR-COMB AIR BLOWER
C1	CAPACITOR-OUTDOOR FAN
C4	CAPACITOR-BLOWER MOTOR
CB8	CIRCUIT BREAKER-TRANS T1
F20	FUSE,-50C LOW AMBIENT KIT
GV1	VALVE-GAS
HR1	HEATER-COMPRESSOR
HR6	HEATER,-50C LOW AMBIENT KIT
J35	JACK-TEST
J38	JACK-MOTOR SPEED CHANGE
J43	JACK-BLOWER MOTOR
K1,-1	CONTACTOR-COMPRESSOR
K3,-1,2	CONTACTOR-BLOWER RELAY
K13,-1,2	RELAY-COMB AIR BLOWER
K20,-1,2	RELAY-BLOWER
K25,-1	RELAY-BLOWER DELAY
P35	PLUG-TEST
P38	PLUG-MOTOR SPEED CHANGE
P43	PLUG-BLOWER MOTOR
P66	PLUG-NOVAR ETM

DESCRIPTION	
KEY	COMPONENT
S3	SWITCH-LIMIT,LOW COMP 1 /COMPRESSOR MONITOR
S4	SWITCH-LIMIT,HI PRESSURE
S10	SWITCH-LIMIT, PRIMARY GAS
S11	SWITCH-LOW PRESS,LOW AMBIENT KIT
S18	SWITCH-COMBUSTION AIR BLOWER
S21	SWITCH-LIMIT,SECONDARY GAS HEAT
S47	SWITCH-FLAME ROLLOUT
S49	SWITCH-FREEZESTAT
S59	THERMOSTAT,-35C OPEN,-50C LOW AMB KIT
S60	THERMO,-23C CL,-7C OP,-50C LOW AMB
S61	THERMOSTAT,+24C OPEN,-50C LOW AMB KIT
S74	SWITCH-FIRESTAT 1
S75	SWITCH-FIRESTAT 2
T1	TRANSFORMER-CONTROL
T3	TRANSFORMER-COMBUSTION AIR BLOWER
T4	TRANSFORMER-BLOWER MOTOR
T20	TRANSFORMER,-50C LOW AMB KIT
TB32	TERMINAL STRIP-GROUND

WIRING DIAGRAM	2/01
COMBINATION UNITS-ROOFTOP	
GCS16-036-90;048-75,120-5-G,J GCS16-060-75,120-4-G,J GCS20-036-90;048,060-75,120-4-G,J	
HEAT,COOL SECTION B36	
Supersedes Form No. 533,379W	New Form No. 533,687W

GCS16/20 SEQUENCE OF OPERATION
Johnson Ignition Control P, Y, G, J Voltage

Operation Sequence
Cooling:

1-Line voltage energizes transformer T1. Transformer T1 provides 24VAC power to all unit controls and thermostat.

2-Cooling demand energizes Y1 and G in the thermostat. K1 compressor contactor and K3 blower relay energizes.

3-K1-1 closes to energize compressor terminal C and condenser fan. Compressor B1 and condenser fan B4 immediately begin operating. **Single Phase Reciprocating Compressor Only-** Potential Relay K31 remains closed during start up and capacitor C7 remains in circuit. As compressor gains speed, K31 is energized and N.C. contacts open taking C7 out of the circuit.

4-K3-1 contacts close to energize the indoor blower on cooling speed.

Heating:

5-Heating demand initiates at W1 in the thermostat and energizes relay K13. Heating demand also passes through high temperature limit S10 to combustion air prove switch S18.

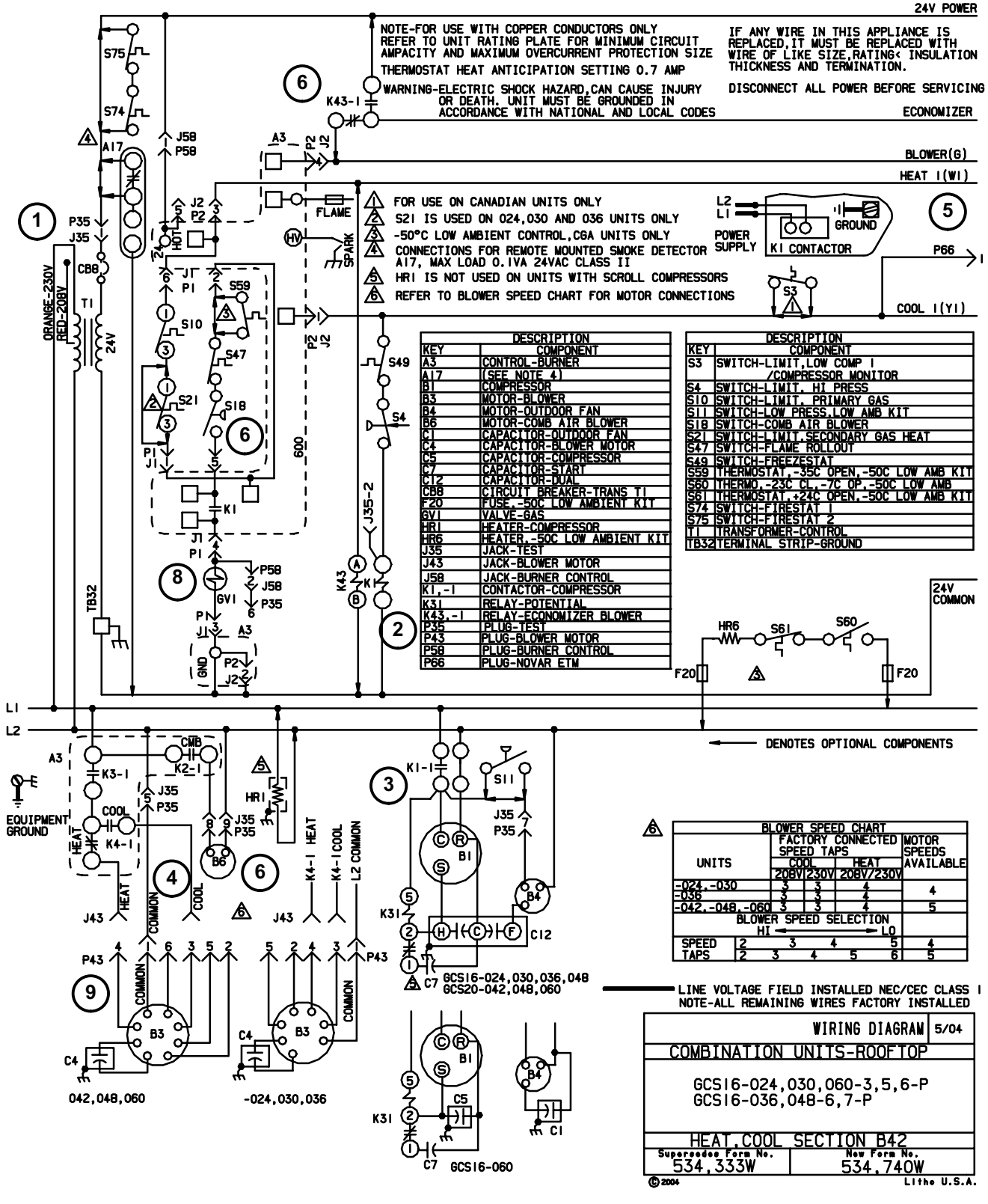
6-Relay K13 terminals close to energize combustion air blower B6. N.O. K20-2 terminals 6-9 close to energize the economizer. When the combustion air blower nears full speed, prove switch S18 closes. Heating demand continues through S18 and through flame rollout switch S47 to energize ignition control A3.

7-Ignition control A3 then waits 30 to 40 seconds to allow combustion air blower B6 time to draw exhaust gas from combustion chamber and to introduce fresh air. Combustion air blower B6 operates throughout the heating cycle.

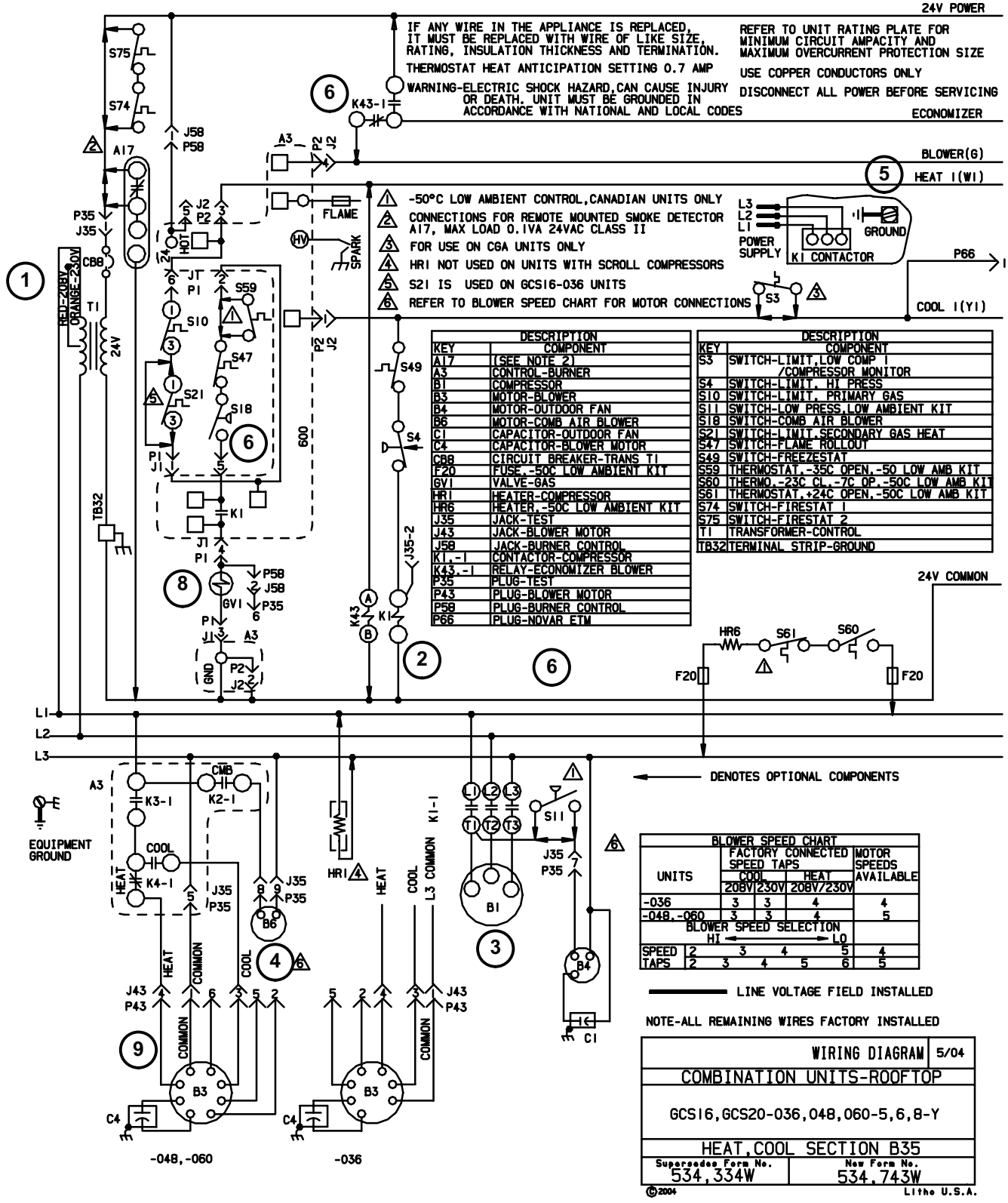
8-After the ignition control delay, A3 activates gas valve GV1 and the spark electrode. When flame is sensed by the flame sensor ,the spark electrode stops. If flame is not sensed after the first trial for ignition, controller A3 repeats steps 7 and 8 up to two more times (depending on controller make) before locking out. If the control locks out, it can be reset by breaking and remaking thermostat demand.

9- Once flame is established, blower delay relay K25 energizes indoor blower relay K20 after a 45 second delay. Indoor blower B3 is then energized.

TYPICAL GCS16/GCS20 FIELD WIRING DIAGRAM
SINGLE PHASE



TYPICAL GCS16/GCS20 FIELD WIRING DIAGRAM
THREE PHASE



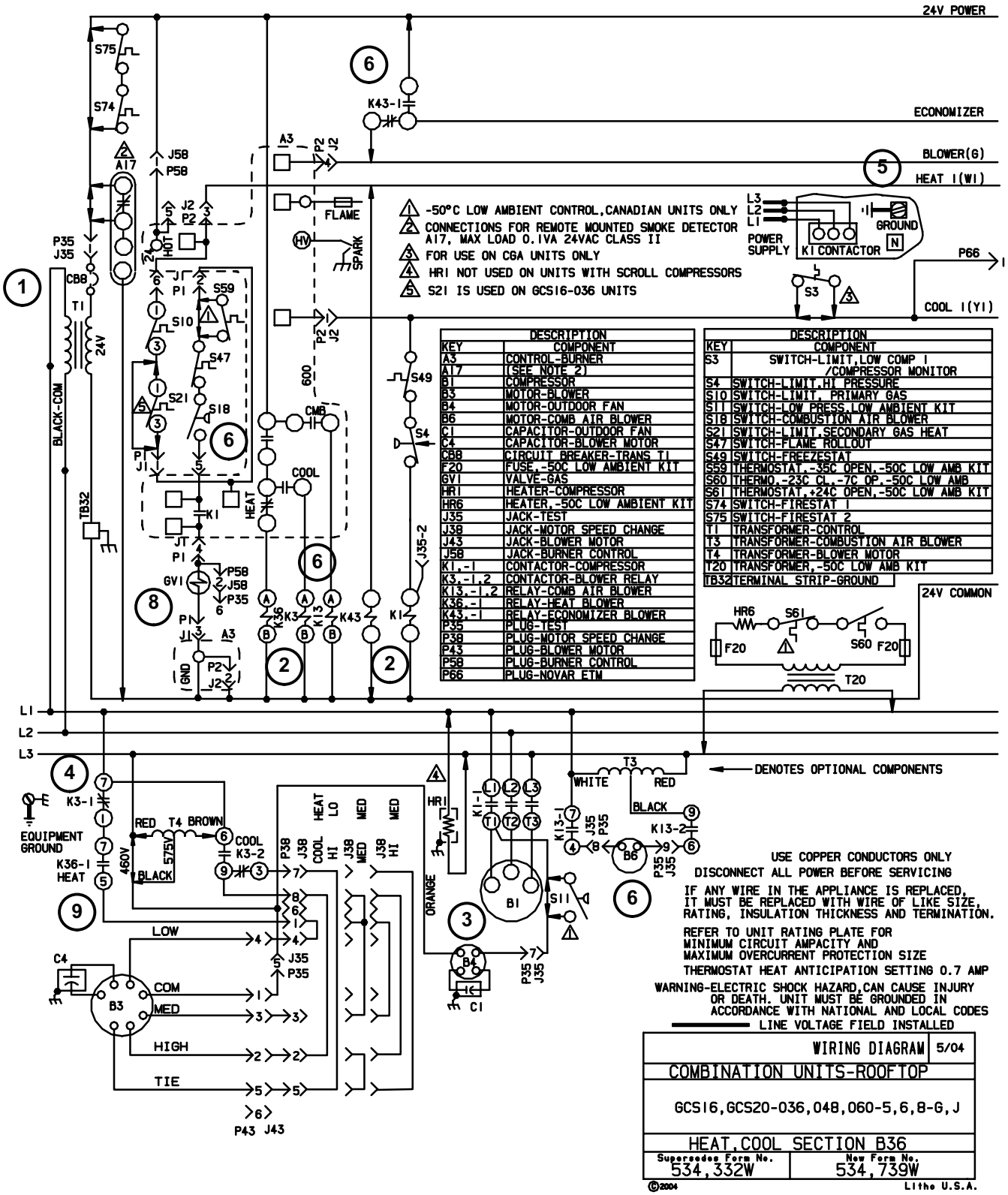
DESCRIPTION	
KEY	COMPONENT
A17	(SEE NOTE 2)
A3	CONTROL-BURNER
B1	COMPRESSOR
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN
B6	MOTOR-COMB AIR BLOWER
C1	CAPACITOR-OUTDOOR FAN
C4	CAPACITOR-BLOWER MOTOR
CB8	CIRCUIT BREAKER-TRANS T1
F20	FUSE,-50C LOW AMBIENT KIT
GV1	VALVE-GAS
HR1	HEATER-COMPRESSOR
HR6	HEATER,-50C LOW AMBIENT KIT
J35	JACK-TEST
J43	JACK-BLOWER MOTOR
J58	JACK-BURNER CONTROL
K1,-1	CONTACTOR-COMPRESSOR
K43,-1	RELAY-ECONOMIZER BLOWER
P35	PLUG-TEST
P43	PLUG-BLOWER MOTOR
P58	PLUG-BURNER CONTROL
P66	PLUG-NOVAR ETM

DESCRIPTION	
KEY	COMPONENT
S3	SWITCH-LIMIT,LOW COMP 1 /COMPRESSOR MONITOR
S4	SWITCH-LIMIT, HI PRESS
S10	SWITCH-LIMIT, PRIMARY GAS
S11	SWITCH-LOW PRESS,LOW AMBIENT KIT
S18	SWITCH-COMB AIR BLOWER
S21	SWITCH-LIMIT,SECONDARY GAS HEAT
S47	SWITCH-FLAME ROLLOUT
S49	SWITCH-FREEZESTAT
S59	THERMOSTAT,-35C OPEN,-5O LOW AMB KIT
S60	THERMO,-23C CL,-7C OP,-50C LOW AMB KIT
S61	THERMOSTAT,+24C OPEN,-50C LOW AMB KIT
S74	SWITCH-FIRESTAT 1
S75	SWITCH-FIRESTAT 2
T1	TRANSFORMER-CONTROL
TB32	TERMINAL STRIP-GROUND

BLOWER SPEED CHART				
UNITS	FACTORY CONNECTED SPEED TAPS			MOTOR SPEEDS AVAILABLE
	COOL		HEAT	
	208V	230V	208V/230V	
-036	3	3	4	4
-048,-060	3	3	4	5
BLOWER SPEED SELECTION HI ← → LO				
SPEED TAPS	2 3 4 5			4
	2 3 4 5 6			5

WIRING DIAGRAM	5/04
COMBINATION UNITS-ROOFTOP	
GCS16,GCS20-036,048,060-5,6,8-Y	
HEAT,COOL SECTION B35	
Supersedes Form No. 534,334W	New Form No. 534,743W

TYPICAL GCS16/GCS20 FIELD WIRING DIAGRAM
THREE PHASE



KEY	DESCRIPTION COMPONENT
A3	CONTROL-BURNER
A17	(SEE NOTE 2)
B1	COMPRESSOR
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN
B6	MOTOR-COMB AIR BLOWER
C1	CAPACITOR-OUTDOOR FAN
C4	CAPACITOR-BLOWER MOTOR
CB8	CIRCUIT BREAKER-TRANS T1
F20	FUSE,-50C LOW AMBIENT KIT
GV1	VALVE-GAS
HR1	HEATER-COMPRESSOR
HR6	HEATER,-50C LOW AMBIENT KIT
J35	JACK-TEST
J38	JACK-MOTOR SPEED CHANGE
J43	JACK-BLOWER MOTOR
J58	JACK-BURNER CONTROL
K1,-1	CONTACTOR-COMPRESSOR
K3,-1,2	CONTACTOR-BLOWER RELAY
K13,-1,2	RELAY-COMB AIR BLOWER
K36,-1	RELAY-HEAT BLOWER
K43,-1	RELAY-ECONOMIZER BLOWER
P35	PLUG-TEST
P38	PLUG-MOTOR SPEED CHANGE
P43	PLUG-BLOWER MOTOR
P58	PLUG-BURNER CONTROL
P66	PLUG-NOVAR ETM

KEY	DESCRIPTION COMPONENT
S3	SWITCH-LIMIT,LOW COMP 1 /COMPRESSOR MONITOR
S4	SWITCH-LIMIT,HI PRESSURE
S10	SWITCH-LIMIT, PRIMARY GAS
S11	SWITCH-LOW PRESS,LOW AMBIENT KIT
S18	SWITCH-COMBUSTION AIR BLOWER
S21	SWITCH-LIMIT,SECONDARY GAS HEAT
S47	SWITCH-FLAME ROLLOUT
S49	SWITCH-FREEZESTAT
S59	THERMOSTAT,-35C OPEN,-50C LOW AMB KIT
S60	THERMO,-23C CL,-7C OP,-50C LOW AMB
S61	THERMOSTAT,+24C OPEN,-50C LOW AMB KIT
S74	SWITCH-FIRESTAT 1
S75	SWITCH-FIRESTAT 2
T1	TRANSFORMER-CONTROL
T3	TRANSFORMER-COMBUSTION AIR BLOWER
T4	TRANSFORMER-BLOWER MOTOR
T20	TRANSFORMER,-50C LOW AMB KIT
TB32	TERMINAL STRIP-GROUND

WIRING DIAGRAM	5/04
COMBINATION UNITS-ROOFTOP	
GCS16,GCS20-036,048,060-5,6,8-G,J	
HEAT,COOL SECTION B36	
Supersedes Form No. 534,332W	New Form No. 534,739W

GCS16/20 SEQUENCE OF OPERATION
United Technologies Ignition Control P, Y, G, J Voltage

Operation Sequence
Cooling:

1-Line voltage energizes transformer T1. Transformer T1 provides 24VAC power to all unit controls and thermostat.

2-**P and Y voltage** - Cooling demand energizes Y1 and G in the thermostat. Compressor contactor K1 is energized.
G Voltage - Compressor contactor K1 and blower relay K3 are energized.

3-K1-1 closes to energize compressor terminal C and condenser fan. Compressor B1 and condenser fan B4 immediately begin operating. **Single Phase Reciprocating Compressor Only-** Potential Relay K31 remains closed during start up and capacitor C7 remains in circuit. As compressor gains speed, K31 is energized and N.C. contacts open taking C7 out of the circuit.

4-**P and Y voltage -** Indoor blower B3 is energized on cooling speed.
G voltage - K3-1 contacts close to energize indoor blower B3 on cooling speed.

Heating:

5-Heating demand initiates at W1 in the thermostat and A3 checks all safety switches for operation.

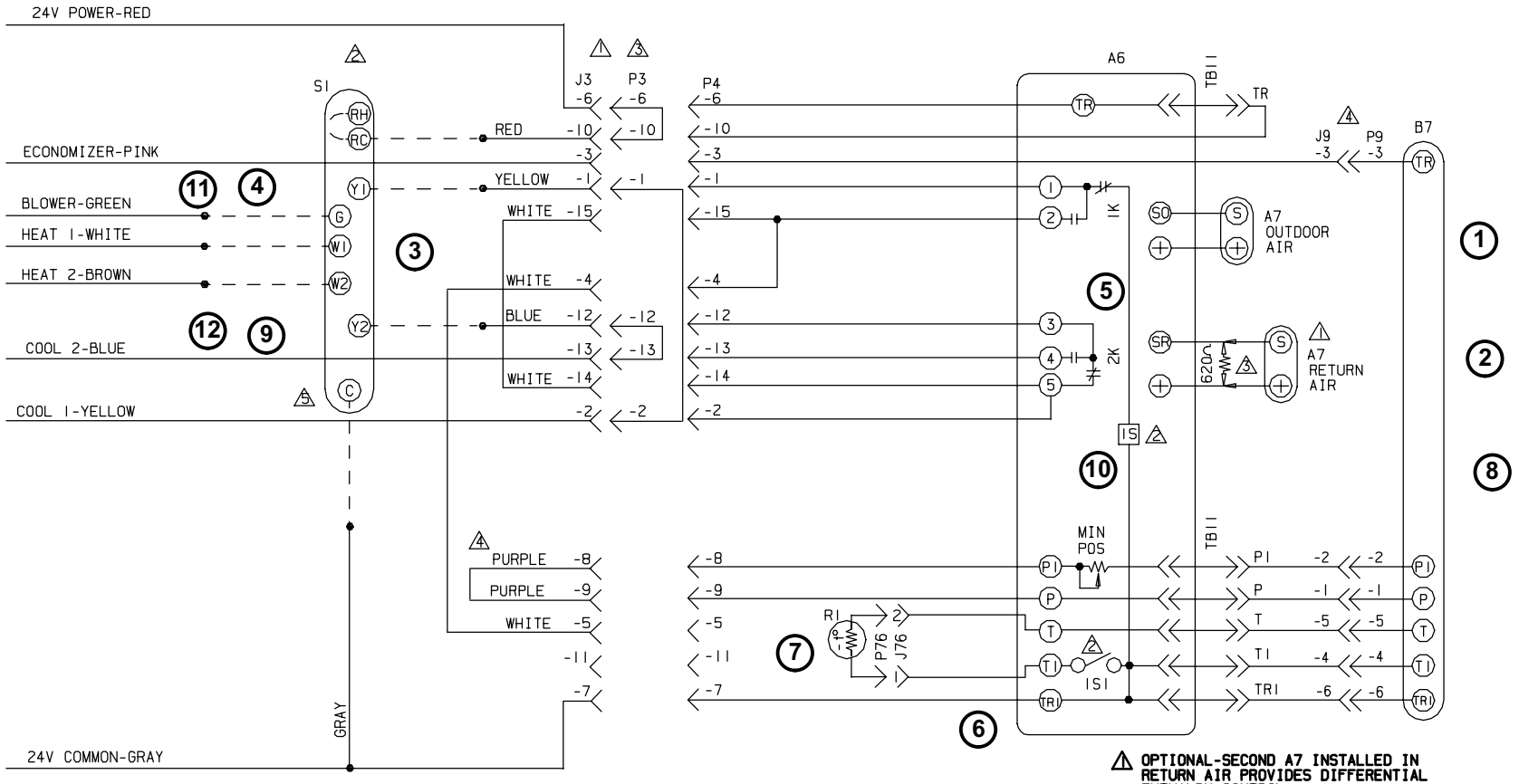
6-**P and Y voltage** - Combustion air inducer B6 begins operation. K43-1 closes energizing the economizer (if applicable). When the combustion air inducer nears full speed, prove switch S18 closes.
G voltage - Relay K13 terminals close to energize combustion air inducer B6. K43-1 closes energizing the economizer (if applicable). When the combustion air inducer nears full speed, prove switch S18 closes.

7-Ignition control A3 waits 30 seconds to allow the combustion air inducer to draw exhaust gas from the combustion chamber and to introduce fresh air.

8-After the ignition control delay, A3 activates gas valve GV1 and the spark electrode. When flame is sensed by the flame sensor ,the spark electrode stops. If flame is not sensed after the first trial for ignition, controller A3 repeats steps 7 and 8 up to two more times (depending on controller make) before locking out. If the control locks out, it can be reset by breaking and remaking thermostat demand.

9- **P and Y voltage -** After a 45 second delay, indoor blower B3 is energized on heating speed.
G voltage - After 45 second delay relay K36 closes energizing indoor blower B3 on heating speed.

ELECTROMECHANICAL THERMOSTAT WITH ECONOMIZER



DESCRIPTION	
KEY	COMPONENT
J3	JACK-UNIT.ECONOMIZER
P3	PLUG-LESS ECONOMIZER
S1	THERMOSTAT-ROOM

⚠1 OPTIONAL-SECOND A7 INSTALLED IN RETURN AIR PROVIDES DIFFERENTIAL ENTHALPY CONTROL

⚠2 WHEN IS RECEIVES POWER, ISI CLOSES.

⚠3 FACTORY INSTALLED 620 OHM, 1 WATT, 5% RESISTOR. REMOVE WHEN SECOND A7 SENSOR IS INSTALLED TO PROVIDE DIFFERENTIAL ENTHALPY CONTROL

⚠4 J9 AND P9 MAY OR MAY NOT BE USED

⚠5 DO NOT CONNECT GRAY COMMON WIRE UNLESS THE THERMOSTAT HAS TERMINAL "C" COMMON. MOST ELECTROMECHANICAL THERMOSTATS DO NOT HAVE THE "C" TERMINAL

⚠4 PURPLE JUMPER WIRE IS MADE LONG TO EXTEND INTO JUNCTION BOX

⚠3 REMOVE P3 WHEN ECONOMIZER IS USED

⚠2 THERMOSTAT SUPPLIED BY USER

⚠1 J3 MAXIMUM LOAD 20VA 24VAC CLASS II

WIRING DIAGRAM	11/99
ACCESSORIES	
ELECTROMECHANICAL THERMOSTAT FOR 16 & 20 SERIES VALUE LINE (2 HEAT, 2 COOL)	
THERMOSTAT-SECTION C1	
Supersedes Form No. 532,928W	New Form No. 533,392W

DESCRIPTION	
KEY	COMPONENT
A6	CONTROL-ENTHALPY W7459A
A7	SENSOR-ENTHALPY
B7	MOTOR-DAMPER
J9	JACK-ECONOMIZER.MOTOR
J76	JACK-SENSOR ECONOMIZER
P4	PLUG-ECONOMIZER
P9	PLUG-ECONOMIZER.MOTOR
P76	PLUG-SENSOR ECONOMIZER
RI	SENSOR-SUPPLY AIR
TB11	TERMINAL STRIP

WIRING DIAGRAM	11/99
ACCESSORIES	
REMD-16-M EMDH-16-M MODULATING ECONOMIZER FOR VALUE LINE UNITS	
ECONOMIZER-SECTION D5	
Supersedes Form No.	New Form No. 533,305W

ELECTROMECHANICAL THERMOSTAT WITH ECONOMIZER

Operation Sequence:

1- Economizer outdoor air dampers drive full closed anytime blower B3 is not operating (switched by K3-2 in the unit).

2- Damper motor terminal TR is powered by unit contactor K3 when there is a blower demand or a heating demand. When 24VAC is applied between terminals TR and TR1, the damper motor is energized and the outdoor air dampers open to minimum position.

3- Blower B3 is energized (indirectly) by thermostat terminal G. On a cooling demand, thermostat terminal G energizes contactor K3 which in turn energizes the blower (refer to operation sequence on previous page for exact sequence). When K3 energizes, K3-1 closes to energize the blower and K3-2 closes to energize the economizer (see step 2) and open the outdoor air dampers to minimum position.

Enthalpy Low, 1st Stage Cool:

4- Initial cooling demand Y1 is sent to enthalpy control A6 and terminal 1.

5- Enthalpy control A6 has determined that outside air can be used for cooling and has switched internal relays 1K and 2K.

6- Cooling demand is routed through enthalpy control to energize internal relay 1S. Internal contacts 1S1 close to complete a circuit through damper motor terminals T and T1.

7- When a voltage is applied across terminals T and T1 of damper motor, the damper motor energizes and outdoor air dampers open. Supply air sensor R1 varies the voltage across T and T1 and the outdoor air dampers open and adjust accordingly. 1st stage cooling is provided by outdoor air.

Enthalpy Low, 2nd Stage Cool:

8- Economizer outdoor air dampers remain open.

9- Additional cooling demand is routed from thermostat Y2 through enthalpy control terminals 3 and 5 to energize the 1st stage compressors. The 1st stage compressors provide all additional cooling.

Enthalpy High, 1st Stage Cool:

10-Enthalpy control internal relays 1K and 2K switch. Internal relay 1S is de-energized and 1S1 opens. Outdoor air dampers close to minimum position.

11-Cooling demand is sent from thermostat terminal Y1 through enthalpy control terminals 1 and 2 and through enthalpy control terminal 5 to energize the 1st stage compressors.