LENNOX Service Literature®

UNIT INFORMATION

Corp. 0519-L8
Revised September 2011

13GCS/13GCSX

2 to 5 Ton (7.0 to 17.6 kW)

13GCS/13GCSX SERIES UNITS

The 13GCS(X) packaged heat/cool units, are available in sizes ranging from 2 through 5 tons (7.0 through 17.6 kW). 13GCSX series units are designed for R-410A refrigerant and 13GCS series units are designed for R-22 refrigerant. Both models are for outdoor residential use only. Units can be installed at ground level or roof top applications. Gas heat sections are available with aluminized tubular steel heat exchangers in 67,500, 82,500, 90,000, 110,000 and 137,500 Btuh input sizes.

Four NO_x models: the13GCS-68(X), 13GCS-83(X), 13GCSX-68(X) and 13GCSX-83(X) meet California nitrogen oxide standards.

The 13GCS(X) utilizes a scroll compressor. The scroll compressor operates much like a standard compressor, but the scroll compressor is unique in the way that it compresses refrigerant. The compressor has overload protection and its own cover for reducing operating sound levels. Cooling capacities range from 23,000 to 59,000 Btuh and a SEER rating up to 13.00

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

⚠ IMPORTANT

The 13GCSX unit is charged with R-410A refrigerant. Operating pressures are higher than R-22 charged units. All service equipment MUST be rated for R-410A refrigerant.

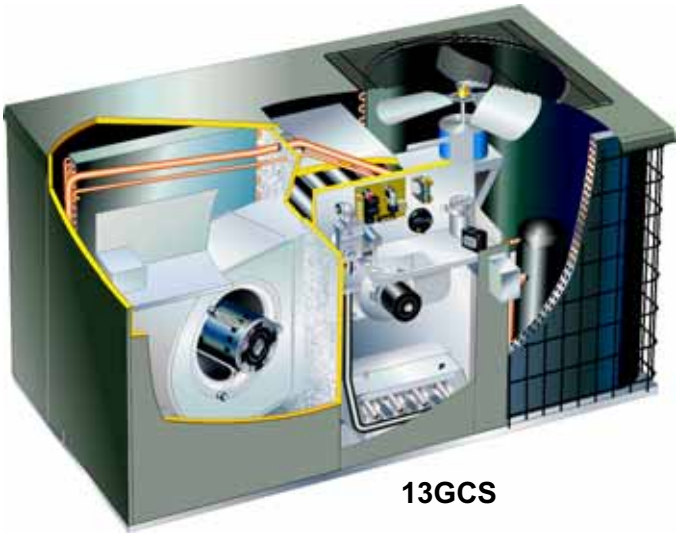
⚠ WARNING

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

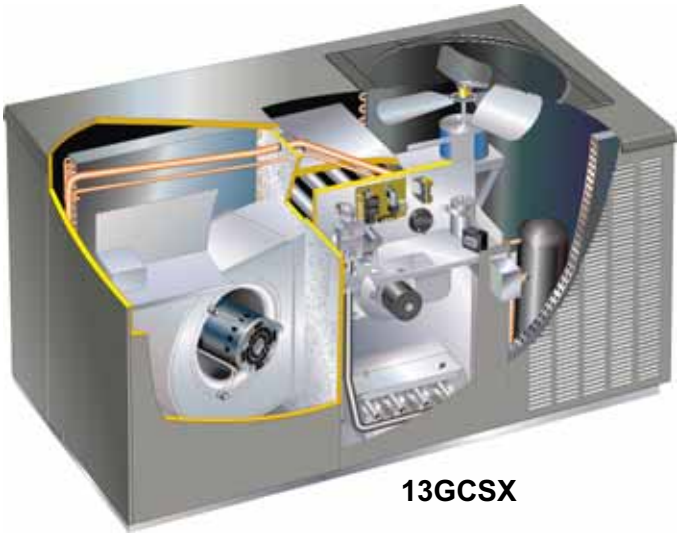
Failure to follow this warning may result in personal injury or death.

⚠WARNING

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



13GCS



13GCSX

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SPECIFICATIONS R-22							2-5 TON
General Data	**Model No.**	**13GCSA-24**	**13GCSA-30**	**13GCSA-36**	**13GCSA-42**	**13GCSA-48**	**13GCSA-60**
	Nominal Tonnage	2	2.5	3	3.5	4	5
Gas Heat Available - See Next Page		**-68(X)**	**-68(X)**	**-68(X) or -90**	**-83(X) or -110**	**-83(X), -110 or -138**	**-83(X), -110 or -138**
Cooling Performance	Total cooling capacity - Btuh (kW)	23,000 (6.7)	28,800 (8.4)	36,000 (10.5)	41,000 (12.0)	47,000 (13.8)	55,500 (16.3)
	Total unit watts	2000	2500	3130	3570	4090	5020
	[2] SEER (Btuh/Watt)	13.00	13.00	13.00	13.00	13.00	13.00
	EER (Btuh/Watt)	11.50	11.50	11.50	11.50	11.50	11.05
	Sound Rating Number (dB)	81	81	81	79	79	79
	Refrigerant Type	R-22	R-22	R-22	R-22	R-22	R-22
	Refrigerant Charge	6 lbs. 8 oz. (2.95 kg)	6 lbs. 2 oz. (2.78 kg)	6 lbs. 5 oz. (2.86 kg)	7 lbs. 10 oz. (3.46 kg)	9 lbs. 2 oz. (4.14 kg)	10 lbs. 5 oz. (4.68 kg)
Condensate drain size (fpt) - in. (mm)		3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)
Outdoor Coil Fan	Motor horsepower (W)	1/5 (149)	1/5 (149)	1/5 (149)	1/4 (187)	1/4 (187)	1/4 (187)
	Diameter - in. (mm) & No. of blades	22 (559) - 2	22 (559) - 2	22 (559) - 2	26 (660) - 3	26 (660) - 3	26 (660) - 3
Indoor Blower	Blower wheel size dia. x width - in. (mm)	10 x 6 (254 x 152)	10 x 6 (254 x 152)	10 x 8 (254 x 203)	10 x 10 (254 x 254)	10 x 10 (254 x 254)	10 x 10 (254 x 254)
	Motor horsepower (W)	1/2 (373)	1/2 (373)	1/2 (373)	3/4 (560)	3/4 (560)	3/4 (560)
Net weight of basic unit		390 (177)	390 (177)	415 (188)	560 (254)	570 (259)	595 (270)
Shipping weight of basic unit (1 Pkg.)		435 (197)	435 (197)	460 (209)	615 (279)	625 (283)	650 (295)
Electrical characteristics (60 hz)		208/230V-1ph-60hz					
ELECTRICAL DATA							
	Line voltage data - 60hz 1 phase	208/230V	208/230V	208/230V	208/230V	208/230v	208/230v
	[4] Maximum overcurrent protection (amps)	25	30	35	45	45	45
	[5] Minimum Circuit Ampacity	19	23	23	31	31	32
Compressor	Rated load amps	10.4	14.1	14.4	19.2	19.2	19.9
	Locked rotor amps	45	68	77	104	97	137
Condenser Fan Motor	Full load amps	1.1	1.1	1.1	1.7	1.7	1.7
	Locked rotor amps	2.2	2.2	2.2	4.0	4.0	4.0
Indoor Blower Motor	Full load amps	2.2	2.2	2.2	3.6	3.6	3.6
	Locked rotor amps	3.8	3.8	3.8	11	11	11
OPTIONAL ACCESSORIES – MUST BE ORDERED EXTRA							
Compressor Crankcase Heater		**93M04**	**93M04**	**93M04**	**93M04**	**93M04**	**93M04**
Compressor Hard Start Kit		**10J42**	**10J42**	**10J42**	**10J42**	**10J42**	**81J69**
Compressor Timed-Off Control		**47J27**	**47J27**	**47J27**	**47J27**	**47J27**	**47J27**
Internal Filter Kit		**92M54**	**92M54**	**92M54**	**92M55**	**92M55**	**92M55**
	[3] Number and size of filters in.	(1) 20 x 25	(1) 20 x 25	(1) 20 x 25	(2) 16 x 25	(2) 16 x 25	(2) 16 x 25
	mm	508 x 635	508 x 635	508 x 635	406 x 635	406 x 635	406 x 635
Lifting Brackets		**92M51**	**92M51**	**92M51**	**92M51**	**92M51**	**92M51**
Low Ambient Kit		**34M72**	**34M72**	**34M72**	**34M72**	**34M72**	**34M72**
Roof Curbs	8 inch (203 mm) height	**92M99**	**92M99**	**92M99**	**93M01**	**93M01**	**93M01**
	14 inch (356 mm) height	**93M00**	**93M00**	**93M00**	**93M02**	**93M02**	**93M02**

NOTE - Extremes of operating range are plus and minus 10% of line voltage.
[1] Annual Fuel Utilization Efficiency based on U.S. DOE test procedures and FTC labeling regulations.
[2] Rated in accordance with ARI Standard 210/240; 95°F (35°C) outdoor air temperature, 80°F (27°C) db / 67°F (19°C) wb entering evaporator air.
[3] Filters are not furnished and must be field provided. 1, 2 or 4 inch (25, 51 or 102 mm) width filters can be used.
[4] HACR type circuit breaker or fuse.
[5] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

SPECIFICATIONS R-410A							2-5 TON
General Data	**Model No.**	**13GCSXA -24-01**	**13GCSXA -30-01**	**13GCSXA -36-01**	**13GCSXA -42-01**	**13GCSXAV -48-01**	**13GCSXA -60-01**
	Nominal Tonnage	2	2.5	3	3.5	4	5
Gas Heat Available - See Next Page		**-68(X)**	**-68(X)**	**-68(X) or -90**	**-83(X) or -110**	**-83(X), -110 or -138**	**-83(X), -110 or -138**
Cooling Performance	Total cooling capacity - Btuh (kW)	22,800	28,600	34,000	41,500	47,500	57,500
	Total unit watts	1940	2440	3040	3710	4200	5200
	[2] SEER (Btuh/Watt)	13.00	13.00	13.00	13.00	13.00	13.00
	EER (Btuh/Watt)	11.75	11.70	11.20	11.20	11.30	11.05
	Sound Rating Number (dB)	81	81	81	79	79	79
	Refrigerant Type	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A
	Refrigerant Charge	7 lbs. 8 oz. (3.40 kg)	6 lbs. 10 oz. (3.00 kg)	7 lbs. 13 oz. (3.54 kg)	11 lbs. 5 oz. 5.13 kg)	11 lbs. 13 oz. (5.36 kg)	11 lbs. 12 oz. (5.33 kg)
Condensate drain size (fpt) - in. (mm)		3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)
Outdoor Coil Fan	Motor horsepower (W)	1/5 (149)	1/5 (149)	1/5 (149)	1/4 (187)	1/4 (187)	1/4 (187)
	Diameter - in. (mm) & No. of blades	22 (559) - 2	22 (559) - 2	22 (559) - 2	26 (660) - 3	26 (660) - 3	26 (660) - 3
Indoor Blower	Blower wheel size dia. x width - in. (mm)	10 x 6 (254 x 152)	10 x 6 (254 x 152)	10 x 8 (254 x 203)	10 x 10 (254 x 254)	10 x 10 (254 x 254)	10 x 10 (254 x 254)
	Motor horsepower (W)	1/2 (373)	1/2 (373)	1/2 (373)	3/4 (560)	3/4 (560)	3/4 (560)
Net weight of basic unit		390 (177)	390 (177)	415 (188)	560 (254)	570 (259)	595 (270)
Shipping weight of basic unit (1 Pkg.)		435 (197)	435 (197)	460 (209)	615 (279)	625 (283)	650 (295)
Electrical characteristics (60 hz)		208/230V-1ph-60hz					
ELECTRICAL DATA							
	Line voltage data - 60hz 1 phase	208/230V	208/230V	208/230V	208/230V	208/230v	208/230v
	[4] Maximum overcurrent protection (amps)	30	30	30	40	50	60
	[5] Minimum Circuit Ampacity	22	23	23	30	35	40
Compressor	Rated load amps	13.5	14.1	14.1	17.9	21.8	26.4
	Locked rotor amps	58	73	77	112	117	134
Condenser Fan Motor	Full load amps	1.1	1.1	1.1	1.7	1.7	1.7
	Locked rotor amps	2.2	2.2	2.2	4.0	4.0	4.0
Indoor Blower Motor	Full load amps	2.2	2.2	2.2	3.6	3.6	3.6
	Locked rotor amps	3.8	3.8	3.8	11	11	11

NOTE - Extremes of operating range are plus and minus 10% of line voltage.
[1] Annual Fuel Utilization Efficiency based on U.S. DOE test procedures and FTC labeling regulations.
[2] Rated in accordance with ARI Standard 210/240; 95°F (35°C) outdoor air temperature, 80°F (27°C) db / 67°F (19°C) wb entering evaporator air.
[4] HACR type circuit breaker or fuse.
[5] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

SPECIFICATIONS R-410A							2-5 TON
General Data	**Model No.**	**13GCSXA -24-02**	**13GCSXA -30-02**	**13GCSXA -36-02**	**13GCSXA -42-02**	**13GCSXAV -48-02**	**13GCSXA -60-02**
	Nominal Tonnage	2	2.5	3	3.5	4	5
Gas Heat Available - See Next Page		**-68(X)**	**-68(X)**	**-68(X) or -90**	**-83(X) or -110**	**-83(X), -110 or -138**	
Cooling Performance	Total cooling capacity - Btuh (kW)	22,000	28,600	34,800	41,500	47,500	57,500
	Total unit watts	2000	2600	3160	3770	4320	5230
	[2] SEER (Btuh/Watt)	13.00	13.00	13.00	13.00	13.00	13.00
	EER (Btuh/Watt)	11.00	11.00	11.00	11.00	11.00	11.00
	Sound Rating Number (dB)	81	81	81	79	79	79
	Refrigerant Type	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A
	Refrigerant Charge	4 lbs. 10 oz. (2.10 kg)	4 lbs. 12 oz. (2.10 kg)	4 lbs. 14 oz. (2..21kg)	6 lbs. 2 oz. 2.78kg)	6 lbs. 4 oz. (2.83kg)	6 lbs. 6 oz. (2.89 kg)
Condensate drain size (fpt) - in. (mm)		3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)
Outdoor Coil Fan	Motor horsepower (W)	1/5 (149)	1/5 (149)	1/5 (149)	1/4 (187)	1/4 (187)	1/4 (187)
	Diameter - in. (mm) & No. of blades	22 (559) - 2	22 (559) - 2	22 (559) - 2	26 (660) - 3	26 (660) - 3	26 (660) - 3
Indoor Blower	Blower wheel size dia. x width - in. (mm)	10 x 6 (254 x 152)	10 x 6 (254 x 152)	10 x 8 (254 x 203)	10 x 10 (254 x 254)	10 x 10 (254 x 254)	10 x 10 (254 x 254)
	Motor horsepower (W)	1/4 (186.5)	1/4 (186.5)	1/2 (373)	1/2 (373)	3/4 (560)	3/4 (560)
Net weight of basic unit - lbs. (kg)		390 (177)	390 (177)	405 (184)	520 (236)	540 (245)	555 (252)
Shipping weight of basic unit (1 Pkg.)		440 (200)	440 (200)	455 (206)	575 (261)	595 (270)	610 (277)
Electrical characteristics (60 hz)		208/230V-1ph-60hz					
ELECTRICAL DATA							
	Line voltage data - 60hz 1 phase	208/230V	208/230V	208/230V	208/230V	208/230v	208/230v
	[4] Maximum overcurrent protection (amps)	25	25	35	45	50	60
	[5] Minimum Circuit Ampacity	15.9	17	22.5	30.5	35.5	38.3
Compressor	Rated load amps	10.7	11.6	15.2	21.1	24.1	26.4
	Locked rotor amps	53	59	70	90	100	134
Condenser Fan Motor	Full load amps	1.1	1.1	1.1	1.7	1.7	1.7
	Locked rotor amps	2.2	2.2	2.2	4.0	4.0	4.0
Indoor Blower Motor	Full load amps	1.4	1.4	2.4	2.4	3.6	3.6
	Locked rotor amps	2.4	2.4	4.9	4.9	9.5	9.5

NOTE - Extremes of operating range are plus and minus 10% of line voltage.
[1] Annual Fuel Utilization Efficiency based on U.S. DOE test procedures and FTC labeling regulations.
[2] Rated in accordance with ARI Standard 210/240; 95°F (35°C) outdoor air temperature, 80°F (27°C) db / 67°F (19°C) wb entering evaporator air.
[4] HACR type circuit breaker or fuse.
[5] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

SPECIFICATIONS - GAS HEAT

Heat Option		-68X	-83X	-90X	-110X	-138X
Heating Capacity Btuh (kW)	Input	67,500 (19.8)	82,500 (24.2)	90,000 (26.4)	110,000 (32.2)	137,500 (40.3)
	Output	54,000 (15.8)	66,000 (19.3)	72,000 (21.1)	88,000 (25.8)	110,000 (32.2)
[1] A.F.U.E.		80	80	80	80	80
Temperature Rise - °F (°C)		35 - 65 (21 - 39)	30 - 60 (18 - 36)	35 - 65 (21 - 39)	45 - 75 (27 - 45)	45 - 75 (27 - 45)
Gas Supply Connection (fpt) - in. (mm)		1/2 (13)	1/2 (13)	1/2 (13)	1/2 (13)	1/2 (13)
Min. Recommended Gas Supply Pressure		5 in. w.g. (1.2 kPa) Natural Gas, 11 in. w.g. (2.7 kPa) LPG/Propane				

OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA

LPG/Propane Conversion Kit		**92M57**	**92M58**	**92M57**	**92M58**	**92M58**

[1] Annual Fuel Utilization Efficiency based on U.S. DOE test procedures and FTC labeling regulations.

HIGH ALTITUDE DERATE

Units may be installed at altitudes up to 4500 feet (1372 m) above sea level without any modification. At altitudes above 4500 feet (1372 m), units must be derated 4% for every 1000 feet (470 m) above sea level. (Example - At an altitude of 6000 feet (2830 m) the unit would require a derate of 24%.)

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

13GCS(X) PARTS ARRANGEMENT

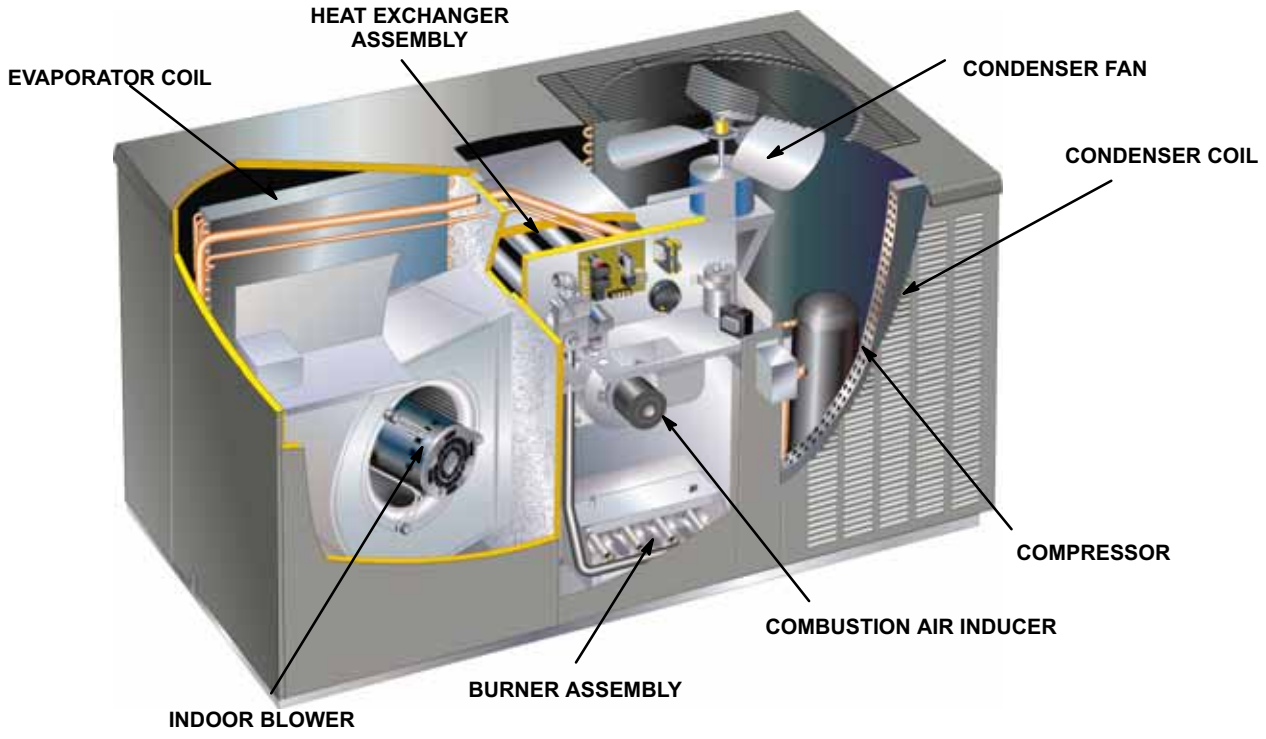


FIGURE 1

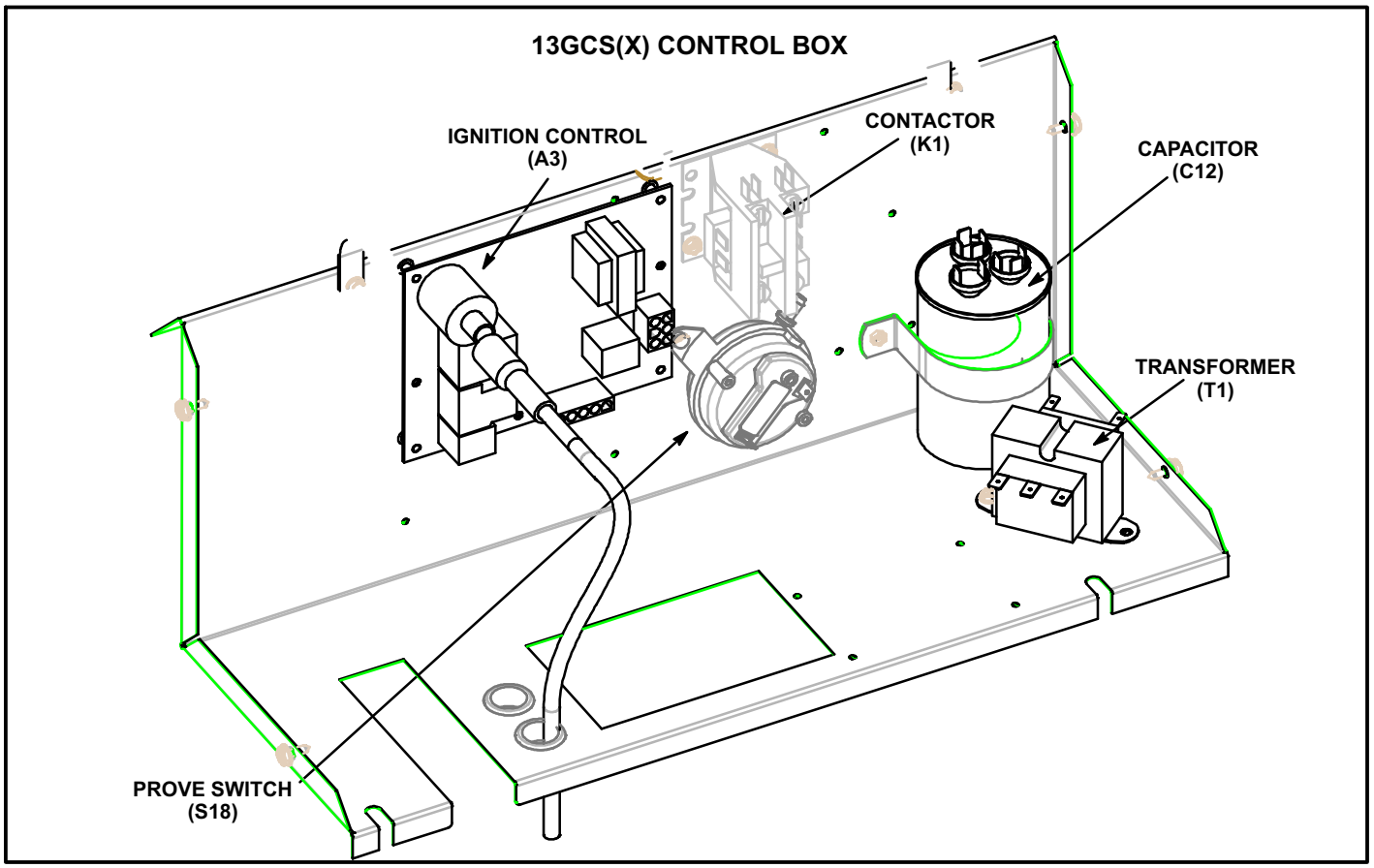


FIGURE 2

I-APPLICATION

13GCS(X) 2 through 5 ton (7.0 through 17.6kW) model units are single packaged heat/cool units designed for outdoor installation on a slab or rooftop. The units are available in two cabinet sizes. 13GCS(X) units are single-phase and residential only. Refer to the Engineering Handbook for more specific application data.

II-UNIT COMPONENTS

13GCS(X) components are shown in figure 1.

A-Control Box Components

13GCS(X) control box components are shown in figure 2.

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

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

1-Compressor Contactor (K1)

K1 is a line voltage single-pole double break contactor with a 24 volt coil. K1 energizes the compressor and condenser fan in response to thermostat demand.

2-Control Transformer (T1)

All 13GCS(X) series units use line voltage to 24VAC transformer mounted in the control box. The transformer supplies power to control circuits in the unit. Transformers use two primary voltage taps as shown in figure 3.

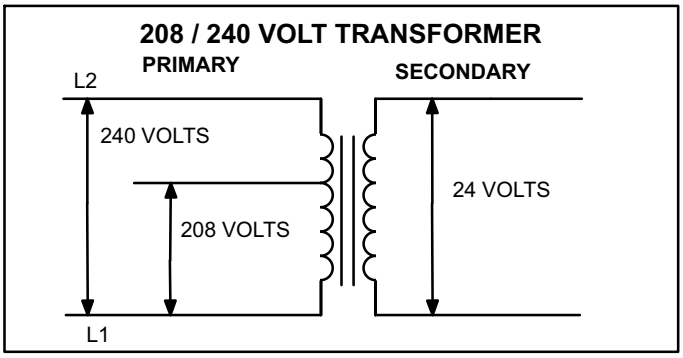


FIGURE 3

3-Potential Relay (K31) option

Potential relay K31 is used in the start up of compressor B1. K31 is a normally closed relay and is energized after K1 energizes the compressor. Once the compressor reaches a target speed (approximately 75%), K31 is energized, the contacts open and the field installed start capacitor is taken out of the circuit.

4-Capacitor (C12)

The compressor uses a permanent split capacitor motor and is connected to dual capacitor C12. Capacitor C12 also supplies the condenser fan motor. See side of capacitor for ratings.

5-Ignition Control (A3)

⚠ WARNING

Shock hazard.
Disconnect power before servicing. Control is not field repairable. If control is inoperable, simply replace entire control.
Can cause injury or death. Unsafe operation will result if repair is attempted.

The 13GCS(X) unit includes an integrated ignition control board which controls the combustion air inducer, gas valve, spark electrode and indoor blower. The control board receives signals from the main and auxiliary limit switches, the rollout switch, the prove switch and the flame sensor. LED codes and flash rates are given in table 1. The ignition control board is shown in figure 4.

Operation

When the thermostat calls for heating, W1 is energized.

The ignition control checks high temperature limit and rollout switches to make sure they are closed. The control then verifies that the prove switch is open. If the prove switch is closed, the control will flash code 3 on the LED and will wait indefinitely for the prove switch to open. If the prove switch is open, the control proceeds to the 30-second pre-purge.

The ignition control energizes the combustion air inducer, flashes a code 3 on the LED, and waits for the prove switch to close.

When the prove switch has closed, the LED code 3 flash stops and the control begins the 30-second pre-purge period. When the pre-purge time has expired, the control begins the ignition trial.

The ignition control energizes the gas valve, spark electrode and flame sensor. If the flame is established within 10 seconds, the control de-energizes the spark. If flame is not established within 10 seconds, the gas valve and spark are de-energized. The ignition control will initiate three ignition trials. If the flame sensor does not sense an established flame at the end of the third ignition trial, the ignition control will allow a 1-hour Watchguard period to pass before allowing additional ignition trials.

Approximately 30 seconds after the flame has been established, the circulating air blower starts. The ignition control inputs are continuously monitored to ensure that limit switch(es), rollout switch and prove switch are all closed, and that the flame remains established and heating demand is present.

When the heating demand is satisfied, the control immediately de-energizes the gas valve and combustion air inducer. The circulating air blower operates for 120 seconds after the gas valve is de-energized.

Blower Delay - Heating

In the heating mode, the circulating air blower operation is delayed for 30 seconds after the flame is established. The blower continues to operate for 120 seconds after the gas valve is de-energized.

Blower Delay - Cooling

In the cooling mode, the circulating air blower operation is delayed for 5 seconds after the compressor starts. The blower continues to operate for 90 seconds after the compressor is de-energized.

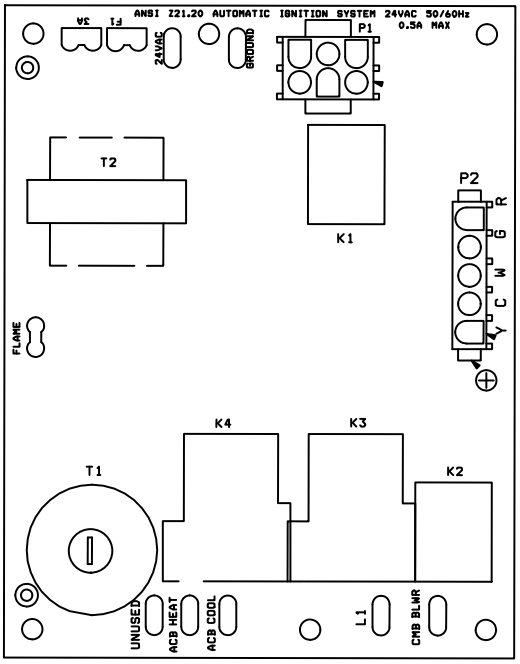
NOTE - With the proper thermostat and subbase, continuous blower operation is possible by closing the R to G circuit. Cooling blower delay is also functional in this mode.

The ignition control board LED flashes codes which indicate normal or abnormal operations:

TABLE 1

Slow Flash - 1 per second	Normal operation, no call for heat
Fast Flash - 2 per second	Normal operation, call for heat
Steady On	Internal control failure
Code 2 - 2 flashes in 1 sec with 1 sec pause	Lockout, failed to detect or sustain flame
Code 3 - 3 flashes in 1 1/2 sec with 1 sec pause	Prove switch senses incorrect pressure or is stuck in closed position
Code 4 - 4 flashes in 2 sec with 1 sec pause	High temp limit or Rollout switch open
Code 5 - 5 flashes in 2 1/2 sec with 1 sec pause	Flame sensed with gas valve de-energized

IGNITION CONTROL BOARD (A3)



.25 MALE QUICK CONNECTS:

T1 - SPARK TRANSFORMER
24 VAC HOT
GROUND = 24 VAC RETURN
CMB BLOWER = COMBUSTION BLOWER (LINE VOLTAGE)
LI = LINE VOLTAGE
ACB COOL = AIR CIRCULATING BLOWER COOL SPEED (LINE VOLTAGE)
ACB HEAT = AIR CIRCULATING BLOWER HEAT SPEED (LINE VOLTAGE)
UNUSED

.19 MALE QUICK CONNECT:

FLAME = FLAME PROBE

MOLEX/AMP PLUG-IN DESCRIPTION:

1. MAIN LIMIT AND ROLLOUT SWITCH RETURN
2. PRESSURE SWITCH OUT
3. GAS VALVE COMMON
4. GAS VALVE OUT
5. PRESSURE SWITCH RETURN
6. MAIN LIMIT AND ROLLOUT SWITCH OUT

THERMOSTAT INPUT:

R = 24 VAC TO THERMOSTAT (RED)
G = MANUAL FAN INPUT FROM THERMOSTAT (GREEN)
W = HEAT DEMAND INPUT FROM THERMOSTAT (WHITE)
C = COMMON GROUND TO THERMOSTAT
Y = COOL DEMAND INPUT FROM THERMOSTAT (YELLOW)

FIGURE 4

6-Combustion Air Prove Switch (S18)

The combustion air prove switch S18 is a SPST N.O. differential prove switch, used to monitor combustion air inducer blower operation. The switch is wired in series with limit S21 and ignition board A3. When the combustion air inducer begins operation and pressure drop reaches 0.25" w.c. across the switch, the contacts close and ignition can be initiated. The switch is factory set to open at 0.10" w.c. and cannot be adjusted.

B-Heating Components

1-Gas Valve (GV1) Figures 5 & 6

The 13GCS(X) uses a gas valve manufactured by Honeywell. Two type valves are used, one with a control knob and one with a control switch. The valves operate the same and are internally redundant to assure safety shut off. If the valve must be replaced the same type valve must be used. The valve can be converted to LP (see options gas specifications for LP kit) .

24VAC and gas control on/off are located on top of the valve. Terminals on the gas valve are connected to wires from the ignition control (A3). Inlet and outlet taps are located on the valve.

Honeywell VR8205 Series Gas Valve

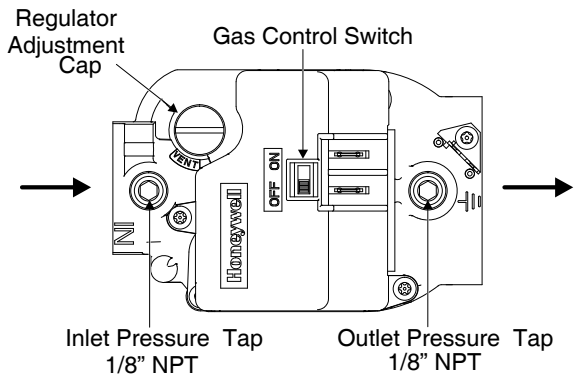
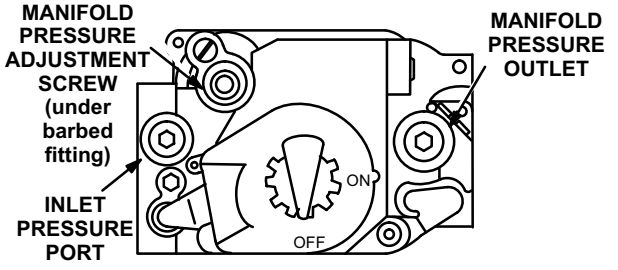


FIGURE 5

Honeywell VR8205 Gas Valve with Control Knob



GAS VALVE SHOWN IN OFF POSITION

FIGURE 6

2-Burners/Orifices

All 13GCS(X) units use inshot burners. A flame retention ring located in the burner end keeps flame from lifting off the burner. All 13GCSX units use orifices that are precisely matched to the burner's input. Each burner is supported by the orifice but can easily be removed for service. If service is necessary, the following instructions apply.

1. Close main manual shut-off valve and shut off all power to the unit.
2. Disconnect wiring to the gas valve, electrode/flame sensor and rollout switch. Remove top of burner box (4 screws). See figure 7.
3. Remove screws holding burners in burner rack. Burners can now be serviced.
4. Reverse the above procedure to replace the assembly. Make sure that burners are level and centered into each burner's corresponding heat exchanger tube.

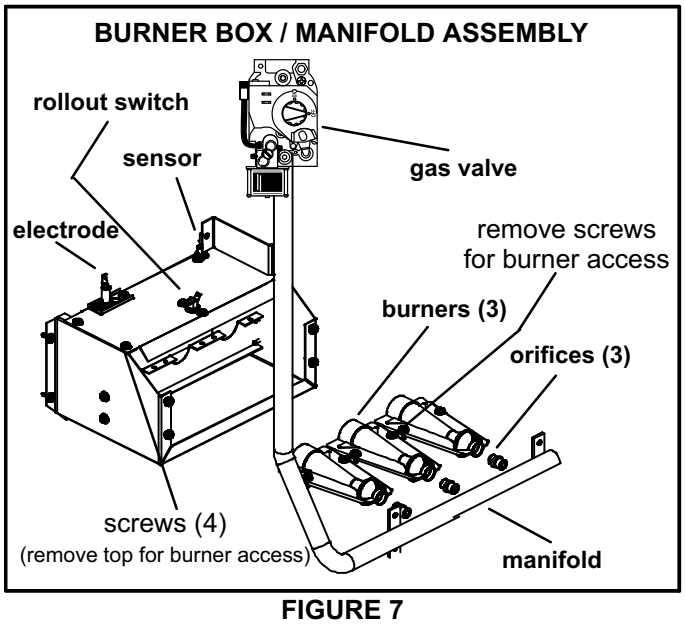


FIGURE 7

3-Tubular Heat Exchanger

The 13GCS(X) units use an aluminized tubular steel heat exchanger. Heat is transferred to the air stream from all surfaces of the heat exchanger. The combustion air inducer pulls fresh air through the burner box. This air is mixed with gas in the burner Venturi. The gas/air mixture is then burned at the lower portion of each tube. Combustion gases are then pulled through the heat exchanger and exhausted out the vent.

4-Rollout Switch (S47)

Rollout switch S47 is a high temperature limit located on the burner box (figure 7). The switch is N.C and in series with ignition control A3. When S47 senses flame rollout (opens), the gas valve is de-energized. The switch is factory set at 350°F and cannot be adjusted. S47 can be manually reset when temperatures allow.

5-Electrode and Flame Sensor

The electrode and sensor are used for ignition and controlled by ignition control (A3). The electrode is located on the far left burner with a 1/8" spark gap. The sensor rod is located on the right burner side and protrudes into the flame envelope once flame is established. If the ignition control (A3) does not receive signal from the sensor indicating that the burners have established flame, the main gas valve (GV1) will close after the 10-second sensing interval built into the ignition control (A3). To measure flame current follow the procedure below:

1- Disconnect power to unit.

2- Remove sensor lead from the sensor and install a microamp meter in series between the sensor and the ignition control.

3- Reconnect power and adjust thermostat for heating demand.

4- When flame is established, meter should read a signal of 1.0 microamps or more. Drop out signal is 0.5 microamps or less.

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

6-Primary Limit (S10)

All 13GCS(X) units are equipped with a closed face, auto reset, high temperature limit. S10 protects the unit from high temperature operation. S10 is located on the heating vest panel. The N.C. contacts are actuated by a bimetal shim when temperature in the heating compartment is high enough. When the N.C. contacts open, the gas valve (GV1) is de-energized shutting off the burners. The limit will automatically reset when unit temperature returns to normal. Limit set points are printed on switch.

7- Secondary Limit (S21) -42, -48, and -60 only

S21 is a high temperature limit located on the blower housing. The switch is an automatic reset disc with a bimetal shim that actuates on temperature rise. S21 is wired in series with rollout switch S47 and prove switch S18. When the N.C. contacts open the gas valve (GV1) is de-energized. The switch is a safety feature should the circulating blower B3 fail. The switch will automatically reset when temperatures in the blower housing return to normal. Limit set points will be printed on side of switch.

8-Combustion Air Inducer (B6)

Combustion air inducer B6 provides fresh air to the burners while clearing the heat exchanger of exhaust gases. The combustion air inducer (CAI) begins operating immediately upon receiving a thermostat demand (provided prove switch S18 is open and not by-passed) and is de-energized following a 30 second post purge once thermostat demand is satisfied. All CAI motors are sealed and cannot be oiled.

C-Cooling Components

1-High Pressure Switch (S4) 13GCSX only

The high pressure switch is an auto-reset N.C. switch that opens on pressure rise. The switch is wired in series with the low pressure switch S79 and compressor contactor K1 and is located on the discharge line. When discharge pressure rises to 590 psig (4068 kPa) the switch opens and the compressor is de-energized. When discharge pressure drops to 418 psig (**2882** kPa) the pressure switch will close.

2-Condenser Fan (B4)

All 13GCS (X) units use single phase condenser fans. Specifications for the condenser fans are at the front of this manual. See figure 8 for fan and motor replacement dimensions.

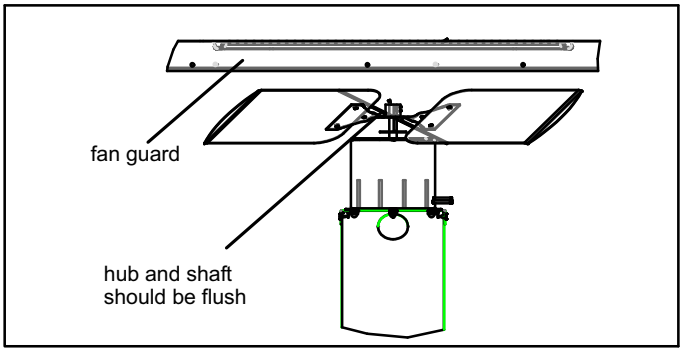


FIGURE 8

3-Compressor B1

All 13GCS(X) units utilize a scroll compressor. Compressors are energized by contactors found in unit control box. Compressor specifications are found in the "ELECTRICAL DATA" section in this manual.

⚠ WARNING

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

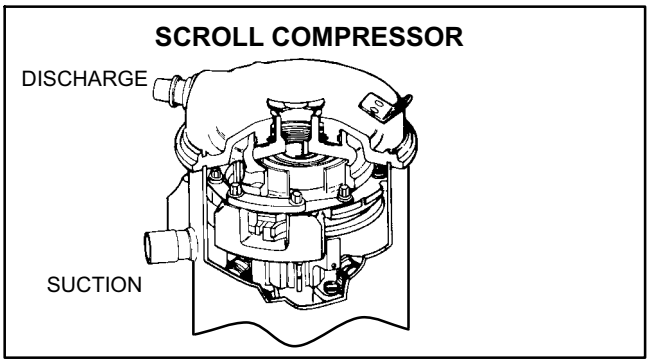


FIGURE 9

The scroll compressor design is simple, efficient and requires few moving parts. A cutaway diagram of the scroll compressor is shown in figure 9. 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.

The scroll is a simple compression concept centered around the unique spiral shape of the scroll and its inherent properties. Two identical scrolls are mated together forming concentric spiral shapes (figure 10). One scroll remains stationary, while the other is allowed to "orbit" (figure 11). Note that the orbiting scroll does not rotate or turn but merely orbits the stationary scroll.

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

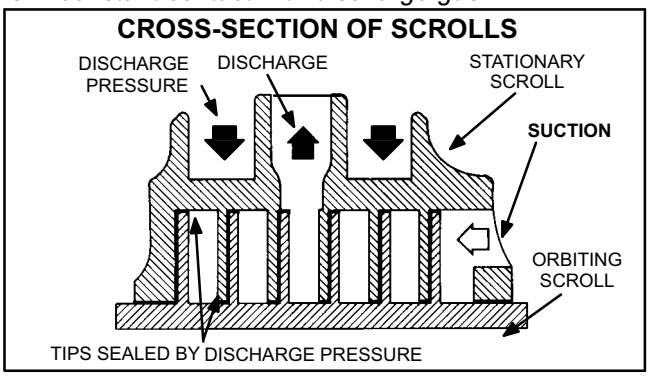


FIGURE 10

The counterclockwise orbiting scroll draws gas into the outer crescent shaped gas pocket created by the two scrolls (figure (figure 11 - 1). The centrifugal action of the orbiting scroll seals off the flanks of the scrolls (figure 11 - 2). As the orbiting motion continues, the gas is forced toward the center of the scroll and the gas pocket becomes compressed (figure 11 - 3). When the compressed gas reaches the center, it is discharged vertically into a chamber and discharge port in the top of the compressor (figure 9). The discharge pressure forcing down on the top scroll helps seal off the upper and lower edges (tips) of the scrolls (figure 10). During a single orbit, several pockets of gas are compressed simultaneously providing smooth continuous compression.

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. Continued slugging of liquid will cause damage to the scroll and replacement will be necessary. 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.

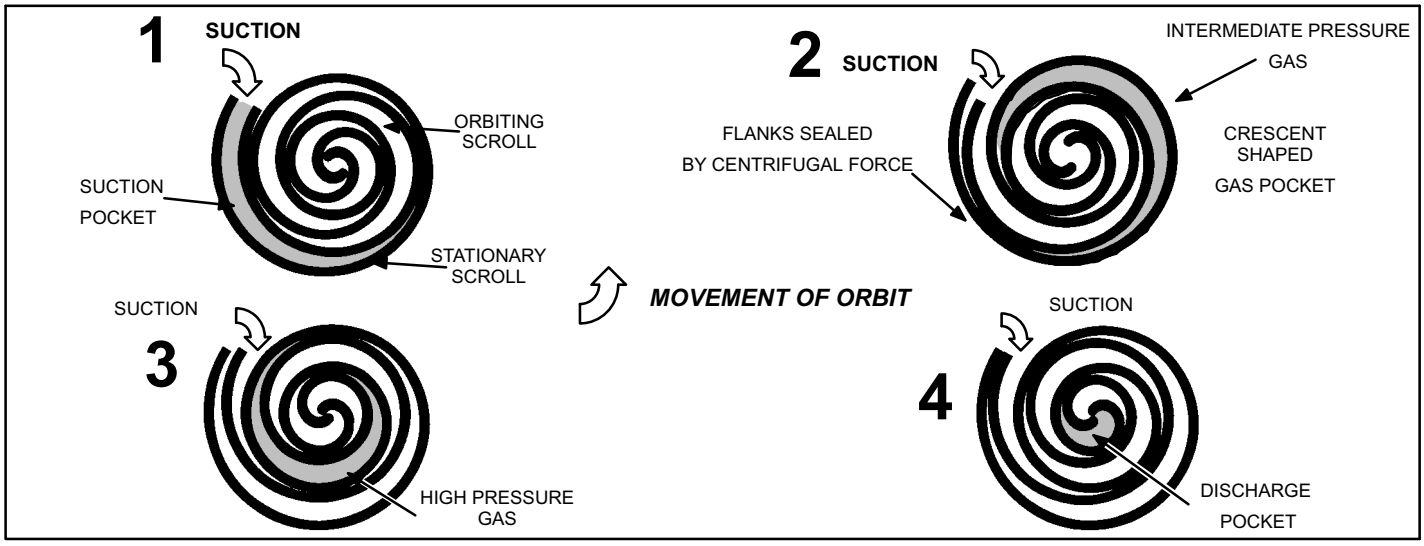


FIGURE 11

D-Blower Compartment

Access panels can easily be removed for service.

1-Blower Motor

13GCS(X) units are equipped with an indoor blower that is controlled by the integrated ignition control board.

Factory settings for the blower speed jumpers are given in the wiring diagram. Use tables 2, 3 and 4 to determine the correct air volume for operation in heat and cool mode.

To change blower speeds, move blower speed tap wire on the blower motor. Refer to figure 4. To replace blower motor remove blower access panel. Motor is easily accessible from there. See figure 1.

2-Blower Wheel

Blower wheel size varies between models.
See SPECIFICATIONS.

TABLE 2
13GCS(X)-24-01, 13GCSXA-30-01 Blower Performance

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
.20	50	1470	695	1070	505	880	415
.30	75	1420	670	1060	500	870	410
.40	100	1360	640	1020	480	850	400
.50	125	1290	610	1000	470	820	385
.60	150	1220	575	950	450	790	375
.70	175	1140	540	900	425	740	350
.80	200	1050	495	830	390	690	325

NOTE - All air data is measured external to unit without air filters.
[1] For down-flow air volume, add 0.05 in. w.g. (12 Pa) to duct static.

TABLE 3
13GCS(X)-36-01 Blower Performance

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
.20	50	1510	715	1060	500	870	410
.30	75	1460	690	1050	495	860	405
.40	100	1400	660	1030	485	840	395
.50	125	1330	630	990	465	820	385
.60	150	1250	590	950	450	790	375
.70	175	1180	555	900	425	750	355
.80	200	1100	520	850	400	680	320

NOTE - All air data is measured external to unit without air filters.
[1] For down-flow air volume, add 0.05 in. w.g. (12 Pa) to duct static.

Table 4
13GCS(X)-42-02, 13GCSXA-48-01, 13GCSXA-60-02
Blower Performance

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
.20	50	2090	985	1820	860	1520	715
.30	75	2000	945	1780	840	1480	700
.40	100	1930	910	1730	815	1450	685
.50	125	1820	860	1650	780	1440	680
.60	150	1710	805	1570	740	1410	665
.70	175	1590	750	1480	700	1360	640
.80	200	1480	700	1370	645	1260	595

NOTE - All air data is measured external to unit without air filters.
[1] For down-flow air volume, add 0.05 in. w.g. (12 Pa) to duct static.

Blower Performance - [1] Horizontal Air Flow

External Static Pressure - in. w.g.	Air Volume at Various Blower Speeds - cfm														
	13GCSX-24-02 13GCSX-30-02			13GCSX-36-02				13GCSX-42-02				13GCSX-48-02 13GCSX-60-02			
	High	Med	Low	High	Med	Med Low	Low	High	Med-High	Med-Low	Low	High	Med-High	Med-Low	Low
0.20	1160	1010	800	1560	1270	1230	1090	1550	1400	1300	1140	2200	1880	1660	1570
0.30	1100	950	750	1480	1240	1190	1060	1520	1370	1280	1120	2120	1830	1630	1550
0.40	1030	890	690	1400	1180	1140	1020	1490	1340	1250	1100	2010	1780	1590	1520
0.50	960	830	630	1290	1110	1070	980	1460	1300	1210	1080	1900	1690	1530	1480
0.60	890	760	570	1210	1030	1000	920	1410	1250	1170	1040	1800	1600	1470	1420
0.70	810	680	440	1100	950	930	840	1340	1190	1110	990	1690	1500	1390	1350
0.80	680	590	300	990	810	790	640	1240	1120	1050	830	1560	1390	1300	1250

NOTE – All air data is measured external to unit without air filters.

[1] For downflow air volume, add 0.05 in. w.g. to duct static.

III-PLACEMENT AND INSTALLATION

Make sure that the unit is installed in accordance with the installation instructions and all applicable codes.

IV-START-UP - OPERATION

A-Preliminary Checks

1 - Make sure refrigerant lines do not rub against the cabinet or each other.

2 - Inspect all electrical wiring, both factory- and field-installed, for loose connections.

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

4 - Check the type of gas being supplied. Be sure it is the same as listed on the unit nameplate.

5 - Make sure the vent hood has been properly installed.

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

7 - Make sure filter is in place before unit start-up.

8 - **(Applicable to -01 version only):** Before placing the unit into full operation, energize the unit for three false starts. Energize the compressor just long enough for it to make a few revolutions, wait five to seven minutes before repeating a second and third time.

B-Refrigerant System Service Checks

⚠ 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-Start Up

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 R410A refrigerant. See rating plate for correct amount of charge.

2-System Performance - 13GCS(X)-XX-01

For maximum performance of this cooling system, the operating temperatures and pressure should be checked and superheat determined at Standard ARI test conditions of 82° F outdoor temperature with 80° F indoor dry bulb / 67° F indoor wet bulb. If superheat measured deviates from values in tables 5 and 6, refrigerant charge should be adjusted accordingly for maximum performance.

TABLE 5

13GCS Suction Superheat Values (13GCS(X)-XX-01)

Unit Model No.	Suction Superheat 82°F OD / 80°F IDDB / 67°F IDWB
13GCS-24	22°F
13GCS-30	20°F
13GCS-36	20°F
13GCS-42	20°F
13GCS-48	20°F
13GCS-60	20°F

TABLE 6

13GCSX Suction Superheat Values (13GCS(X)-XX-01)

Unit Model No.	Suction Superheat 82°F OD minus 80°F IDDB / 67°F IDWB
13GCSX-24 13GCSX-30	16°
13GCSX-36	12°
13GCSX-42 13GCSX-48 13GCSX-60	16°

2 - System Performance - 13GCS(X)-XX-02

This self-contained system has been factory-charged for optimal performance. If performance is questionable, use the following procedure to check the system.

Ensure that unit has been installed per these instructions and that line voltage and air flow are both correct. Check superheat values by measuring pressure at the suction line service port. Measure suction line temperature within 2 inches of the service port connection to its main tube. If superheat measured deviates from values in table 7, check internal seals, service panels and duct system for air leaks, as well as restrictions. Also check blower speed settings. Make all necessary adjustments. If unit performance remains questionable, recover unit refrigerant charge, evacuate to 500 Microns, and weigh in refrigerant to match value given on unit nameplate. It is critical that exact required charge is used. Failure to follow this instruction will compromise system performance. If unit performance is still questionable, check for blocked coil or circuits, malfunctioning metering devices or other system component problems.

Table 7

Suction Superheat Values - 13GCS(X)-XX-02

Unit Model No.	Suction Superheat +/-3°F @ ARI Conditions 82°F OD minus 80°F IDDB / 67°F IDWB
13GCSX-24	17°
13GCSX-30	15°
13GCSX-36	19°
13GCSX-42	13°
13GCSX-48	15°
13GCSX-60	18°

Verify system performance using tables 8 and 9 and as a general guide. Tables 8 and 9 should not be used for charging unit. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system.

Used carefully, these tables could serve as a useful service guide. Data is based on 80°F dry bulb / 67°F wet bulb return air. Allow unit operation to stabilize before taking pressure readings.

TABLE 8
13GCS Normal Operating Pressures

80°F db / 67°F wb RETURN AIR		Air Temperature Entering Outdoor Coil (°F)												
UNIT	PRESSURE	65	70	75	80	82	85	90	95	100	104	105	110	115
13GCS-24	Suction	78	80	82	84	85	86	88	90	91	92	92	93	94
13GCS-30		78	79	81	82	83	84	85	87	87	88	88	89	90
13GCS-36		79	80	81	83	83	84	85	86	87	88	88	89	90
13GCS-42		75	76	78	79	80	81	83	84	87	89	89	90	91
13GCS-48		76	77	79	80	81	82	83	85	85	86	86	88	91
13GCS-60		78	79	81	82	83	84	85	87	88	89	89	91	92
13GCS-24	Liquid	131	146	161	176	182	191	207	221	238	250	250	268	286
13GCS-30		132	148	164	181	187	197	213	229	246	259	259	277	295
13GCS-36		146	161	176	191	197	206	221	236	250	262	262	280	298
13GCS-42		129	144	159	175	181	190	205	221	236	248	248	267	286
13GCS-48		131	146	161	177	183	193	208	223	240	253	253	272	291
13GCS-60		143	159	175	191	197	206	221	238	252	264	264	283	302

TABLE 9
13GCSX Normal Operating Pressures - 13GCS(X)-XX-01

80°F db / 87°F wb RETURN AIR		Air Temperature Entering Outdoor Coil (°F)											
UNIT	PRESSURE	65	70	75	80	82	85	90	95	100	105	110	115
13GCSX-24	Suction	133	136	138	141	142	143	146	149	150	152	155	157
13GCSX-30		133	135	138	140	141	142	144	147	148	149	151	153
13GCSX-36		140	142	144	146	147	148	150	152	154	155	157	159
13GCSX-42		124	127	130	133	134	135	138	142	142	144	147	149
13GCSX-48		139	140	142	143	144	145	146	148	148	149	150	152
13GCSX-60		142	143	144	146	146	147	148	149	151	152	154	156
13GCSX-24	Liquid	222	245	267	290	299	312	335	358	379	397	429	456
13GCSX-30		232	255	277	300	309	323	345	368	390	408	440	467
13GCSX-36		241	265	288	312	321	336	360	382	409	429	461	488
13GCSX-42		223	247	270	294	303	317	339	364	384	402	434	461
13GCSX-48		239	261	284	306	315	328	349	373	391	408	440	467
13GCSX-60		258	281	303	326	335	349	373	394	420	439	471	498

Table 1
Normal Operating Pressures - 13GCS(X)-XX-02

80°F db / 67°F wb RETURN AIR		Air Temperature Entering Outdoor Coil (°F)											
UNIT	PRESSURE	65	70	75	80	82	85	90	95	100	105	110	115
13GCSX-24	Suction	129	132	134	137	138	139	141	143	145	147	151	155
13GCSX-30		130	133	135	138	139	140	142	143	146	148	149	150
13GCSX-36		134	137	140	143	144	145	147	149	151	153	154	155
13GCSX-42		123	125	128	130	131	133	135	136	139	142	143	144
13GCSX-48		125	128	130	133	134	135	137	139	141	142	144	146
13GCSX-60		128	131	133	136	137	138	140	141	143	144	145	146
13GCSX-24	Liquid	229	248	268	287	295	309	332	352	377	397	429	455
13GCSX-30		253	274	294	315	323	337	361	384	408	427	461	490
13GCSX-36		241	262	284	305	314	329	353	376	402	422	453	479
13GCSX-42		237	256	275	294	302	316	339	359	383	403	433	458
13GCSX-48		237	256	276	295	303	317	339	360	383	402	433	459
13GCSX-60		244	263	283	302	310	324	349	370	396	416	447	472

C-Heating System Service Checks

1-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.

2-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.

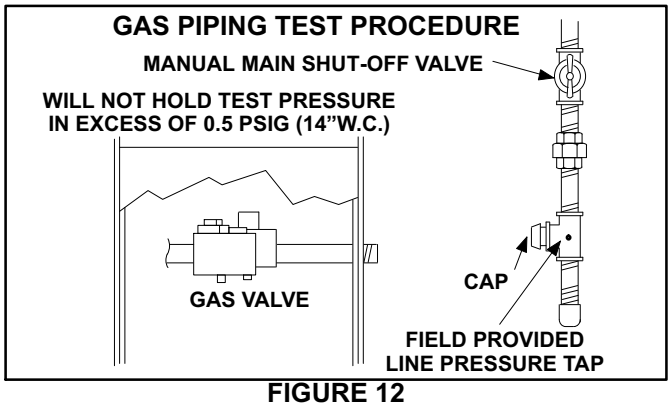


FIGURE 12

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 12.

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.

3-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 “under fire.” High pressure can result in permanent damage to the gas valve or “over fire.” For natural gas units, operating pressure at the unit gas connection must be between 5.0”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.

4-Start Up

FOR YOUR SAFETY READ BEFORE LIGHTING

BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell around the base of the unit because some gas is heavier than air and will settle down low.

⚠ WARNING

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

⚠ WARNING

Danger of explosion and fire. Can cause injury or product or property damage. You must follow these instructions exactly.

⚠ WARNING

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

⚠ WARNING

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

The gas valve on may be equipped with either a gas control switch or gas control knob. Use only your hand to push the switch or turn the gas control knob. Never use tools. If the the switch will not move or 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.

This unit is equipped with a direct ignition control. Do not attempt to manually light the burners.

1 - Turn off electrical power to unit.

2 - Set thermostat to lowest setting.

3 - *HoneywellVR8205 Gas Valve with ON/OFF Switch* - Set gas valve switch to **ON**. See figure 13.
Honeywell VR8205 Gas Valve with Knob - Turn knob on gas valve counterclockwise ↶ to **ON**. Do not force. See figure 14.

4 - Turn on electrical power to unit.

5 - Set room thermostat to desired temperature. (If thermostat setpoint temperature is above room temperature after the pre-purge time expires, main burners will light).

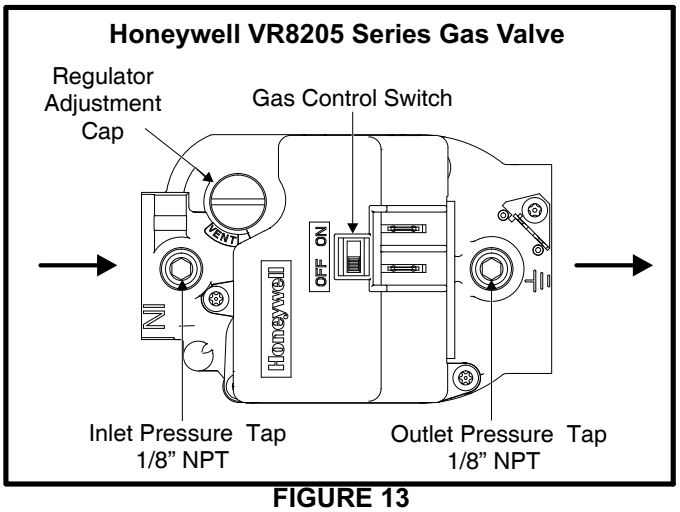


FIGURE 13

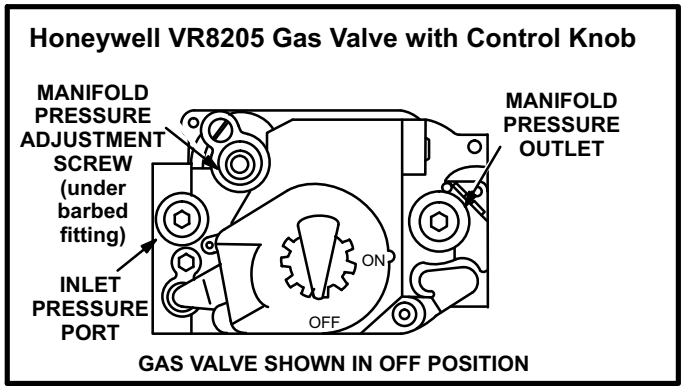


FIGURE 14

To Shut Down:

1 - Turn off electric power to unit.

2 - *HoneywellVR8205 Gas Valve with ON/OFF Switch* - Set gas valve switch to **OFF**.
Honeywell VR8205 Gas Valve with Knob - Turn gas valve knob clockwise to **OFF**. Do not force.

Post Start-up Check List (Gas)

After the control circuit has been energized and the heating section is operating, make the following checks:

1 - Use soap solution to check for gas leaks in the unit piping as well as the supply piping.

2 - Check the supply gas pressure. It must be within the limits shown on rating nameplate. Supply pressure should be checked with all gas appliances in the building at full fire. At no time should the supply gas pressure exceed 10.5 inches w.c., nor drop below 5.0 inches w.c. for natural gas units. For propane gas, supply gas pressure should not drop below 11 inches w.c. If gas pressure is outside these limits, contact your gas supplier for corrective action.

3 - Check for correct manifold gas pressures. See "Check and Adjust Manifold Pressure".

4 - Adjust temperature rise to the range specified on the rating plate.

5-Check and Adjust Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Refer to figure 13 for location of manifold pressure adjustment screw and pressure tap outlet.

The gas valve is factory set and should not require adjustment. Manifold pressure should be 3.5" W.C. ± 0.3" for natural gas and 10.0" W.C. ± 0.5 for L.P. 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.

6-Proper Gas Flow (Approximate)

Manifold pressure must be within the allowable ranges for the gas being used.

For Natural Gas: Check the furnace rate by observing gas meter, making sure all other gas appliances are turned off. The test hand on the meter should be timed for at least one revolution. Note the number of seconds for one revolution.

$$\text{BTU/HR INPUT} = \frac{\text{Cubic Feet Per Revolution}}{\text{No. Seconds Per Revolution}} \times 3600 \times \text{Heating Value}$$

The heating value of your gas can be obtained from your local utility.

For LP/Propane Gas: The only check for the output rate is to properly adjust the manifold pressure using a manometer. Typical manifold setpoint for installations at altitudes from 0 to 4500 feet above sea level is 10.0 inches W.C.

V-Maintenance

Periodic inspection and maintenance normally consists of changing or cleaning filters and (under some conditions) cleaning the coils.

⚠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.

FILTERS

Inspect once a month. Replace disposable or clean permanent type as necessary. DO NOT replace permanent type with disposable.

MOTORS

Indoor and outdoor fan motors are permanently lubricated and require no maintenance.

OUTDOOR COIL 13GCSX

Dirt should not be allowed to accumulate on the outdoor coil surface or other parts in the air circuit. Cleaning should be as often as necessary to keep coil clean. Use a brush, vacuum cleaner attachment, or other suitable means. If water is used to clean coil, be sure power to the unit is shut off prior to cleaning.

OUTDOOR COIL 13GCS

Clean and inspect outdoor coil. The coil may be flush with a water hose. Make sure power is off before cleaning. The outdoor coil is protected by an inner mesh screen and a wire cage. If debris has collected between the mesh screen and the coil and cannot be dislodged by spraying un-pressurized water from inside coil surface to the outside, the mesh may be removed (see figure 15) by first removing the the wire cage. **The top of the unit does not have to be removed.**

Then, using pliers to grip the head of the push pins, pull straight out to extract the push pins along one side of the coil. If necessary, remove the push pins along the back of the unit; it is usually unnecessary to fully remove the inner mesh screen.

Drape the mesh screen back and wash the coil. When all the debris has been removed from the coil, reinstall the mesh screen by positioning it in its original position and re-inserting the push pin. No tool is required to push the pin back into the same slot in the fins. If the push pin is loose and tends not to stay in place, brush the fins with a fin brush. Line up the push pin a couple fins to the right or left of the original hole and re-insert the pin.

NOTE - Care should be used when cleaning the coil so that the coil fins are not damaged.

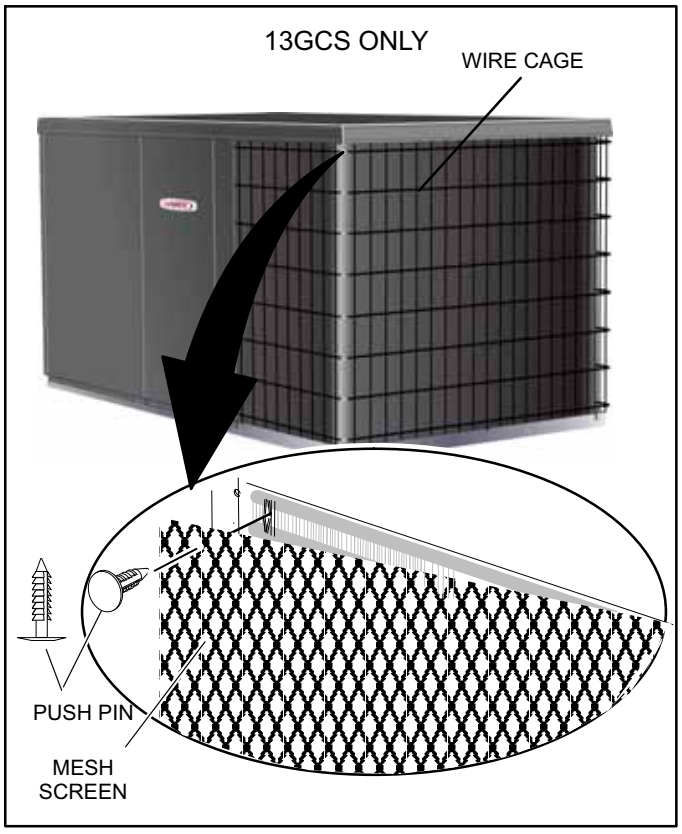


FIGURE 15

VENT OUTLET

Visually inspect vent outlet periodically to make sure that the buildup of soot and dirt is not excessive. If necessary, clean to maintain adequate opening to discharge flue products.

TO CLEAN BURNERS

Light the burners and allow unit to operate for a few minutes to establish normal burning conditions. Observe the burner flames. Compare this observation to figure 16 to determine if flame is properly adjusted. Flame should be predominantly blue in color and strong in appearance. Verify that all burners are lit and that the flame does not impinge on the sides of the heat exchanger.

Distorted flame or yellow tipping of the natural gas flame (or long yellow tips on LP/propane flame) may be caused by one or more of the following: lint or dirt inside the burner or burner ports; lint or dirt at the air inlet between the burner and manifold pipe; or an obstruction over the burner orifice.

Remove from the unit as explained in burner description in GAS COMPONENTS section. Vacuum and/or brush as required.

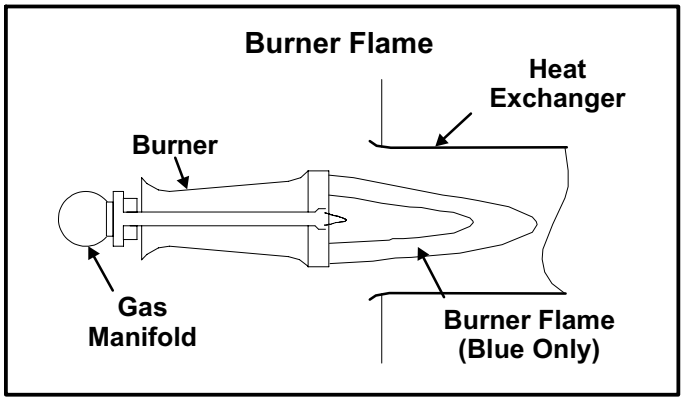


FIGURE 16

VI-Wiring Diagram and Sequence of Operation

Cooling

1- Cooling demand initiates at Y in the indoor thermostat.
2- 24VAC passes through N.C high pressure switch (S4) and N.C low pressure switch (S79) and energizes compressor contactor K1.
3- K1-1 closes energizing compressor B1 and outdoor fan motor B4.
4- Compressor B1 and outdoor fan B4 begin immediate operation. Indoor blower B3 begins after 5 second delay.
5- When cool demand is satisfied, Y in the indoor thermostat de-energizes K1 contactor. K1-1 opens de-energizing compressor B1 and outdoor fan B4. Indoor blower B3 de-energizes after 90 second delay.

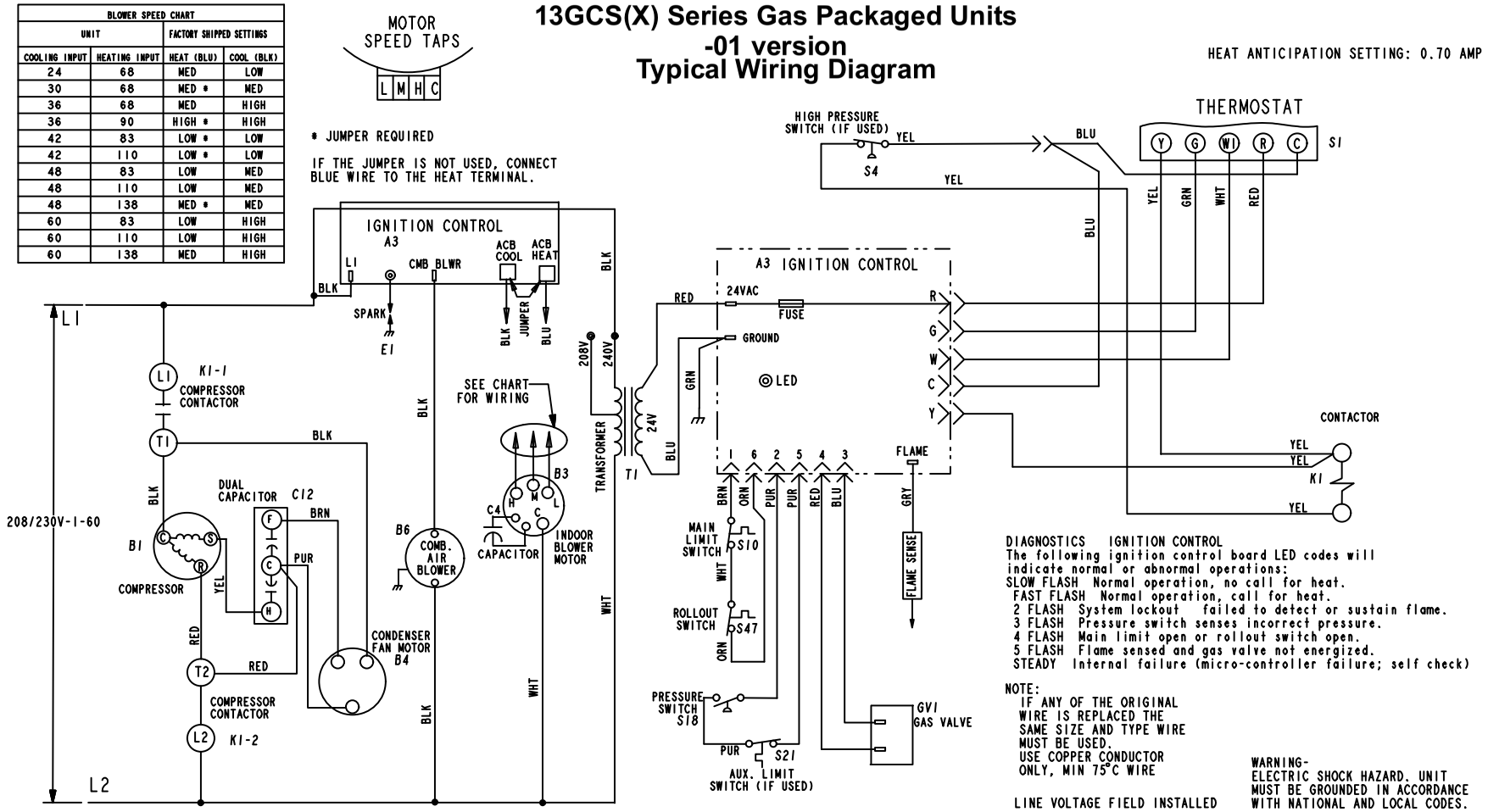
Heating

1- Heating demand initiates at the indoor thermostat.
2- Assuming all safety circuits are closed (with the exception of the prove switch open), A3 energizes the combustion air inducer blower B6. When the N.O. combustion air inducer prove switch S18 closes, a pre-purge period of 30 seconds follows.
3- Ignition control A3 begins spark and energizes gas valve GV1.
4- Gas valve GV1 opens. When flame is sensed, spark stops.
5- After 30 seconds ignition control A3 energizes indoor blower B3.
6- When heat demand is satisfied the indoor thermostat de-energizes control A3 which de-energizes gas valve GV1 and combustion air inducer blower B6. Indoor blower B3 runs for a designated period of 120 seconds.

Figure 17

13GCS(X) Series Gas Packaged Units
-01 version
Typical Wiring Diagram

BLOWER SPEED CHART			
UNIT		FACTORY SHIPPED SETTINGS	
COOLING INPUT	HEATING INPUT	HEAT (BLU)	COOL (BLK)
24	68	MED	LOW
30	68	MED *	MED
36	68	MED	HIGH
36	90	HIGH *	HIGH
42	83	LOW *	LOW
42	110	LOW *	LOW
48	83	LOW	MED
48	110	LOW	MED
48	138	MED *	MED
60	83	LOW	HIGH
60	110	LOW	HIGH
60	138	MED	HIGH



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3- K1-1 closes energizing compressor B1 and outdoor fan motor B4.
4- Compressor B1 and outdoor fan B4 begin immediate operation. Indoor blower B3 begins after 5 second delay.
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Heating

1- Heating demand initiates at the indoor thermostat.
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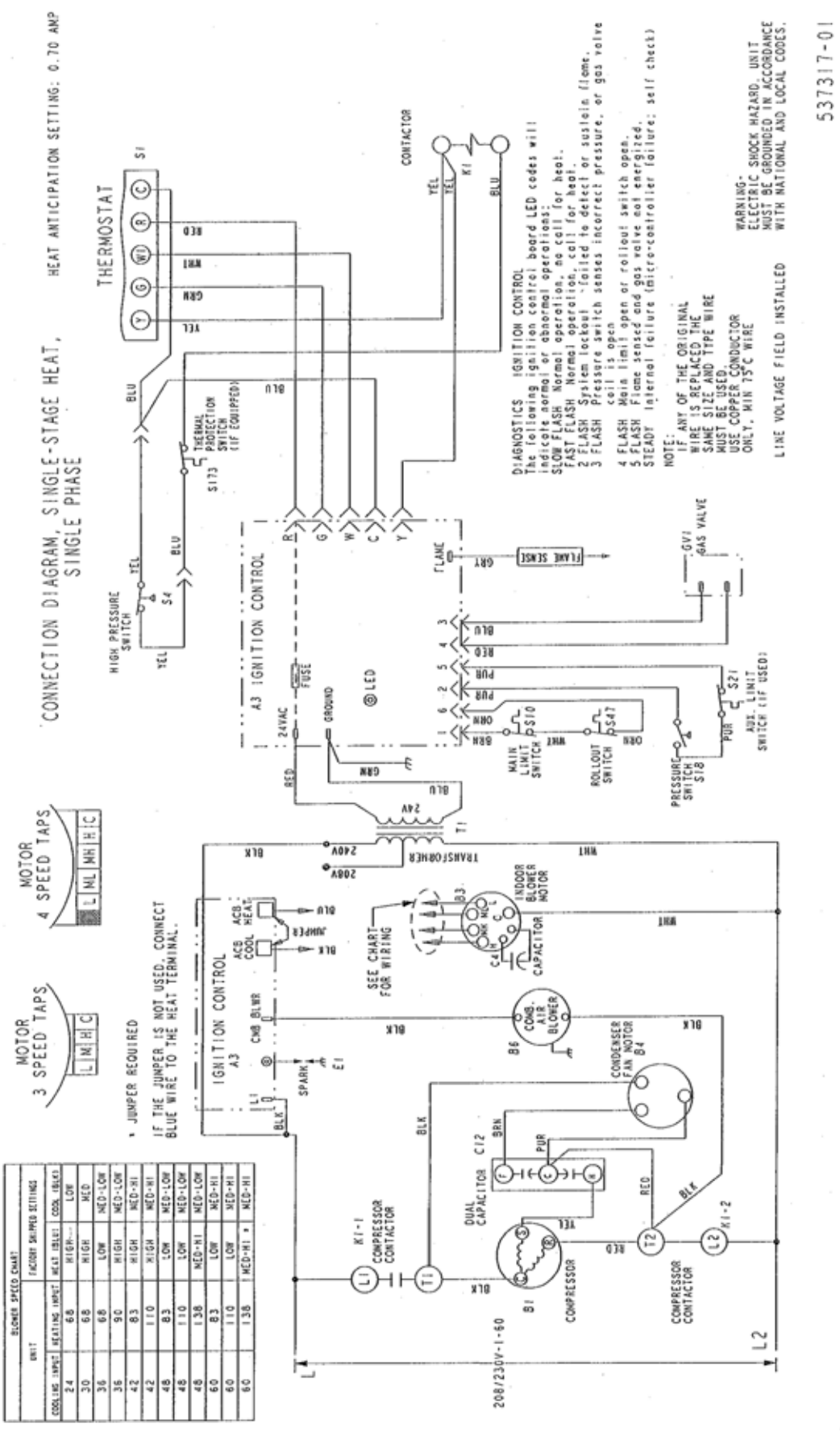
3- Ignition control A3 begins spark and energizes gas valve GV1.
4- Gas valve GV1 opens. When flame is sensed, spark stops.
5- After 30 seconds ignition control A3 energizes indoor blower B3.
6- When heat demand is satisfied the indoor thermostat de-energizes control A3 which de-energizes gas valve GV1 and combustion air inducer blower B6. Indoor blower B3 runs for a designated period of 120 seconds.

13GCSX Series Gas Packaged Units
(-02 version)
Typical Wiring Diagram



BLOWER SPEED CHART			
UNIT		FACTORY SHIPPED SETTINGS	
COOLING INPUT	HEATING INPUT	HEAT (BLUE)	COOL (BLACK)
24	68	HIGH	LOW
30	68	HIGH	MED
36	68	LOW	MED-LOW
36	90	HIGH	MED-LOW
42	83	HIGH	MED-HI
42	110	HIGH	MED-HI
48	83	LOW	MED-LOW
48	110	LOW	MED-LOW
48	138	MED-HI	MED-LOW
60	83	LOW	MED-HI
60	110	LOW	MED-HI
60	138	MED-HI *	MED-HI

Figure 18