The 15GCSX packaged heat/cool units, are available in sizes ranging from 2 through 5 tons (7.0 through 17.6 kW). 15GCSX series units are designed 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.

All 15GCSX models are two-stage heat and equipped with a variable speed indoor motor. The motor maintains a specific air volume throughout the entire external static range. The 15GCSX is also designed for HFC-410A refrigerant and utilize 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 15.00

This unit is not approved for installation as part of a zoning system.

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.

**WARNING**

Improper installation, adjustment, alteration, service or maintenance can cause personal injury, loss of life, or damage to property.

Installation and service must be performed by a licensed HVAC professional installer (or equivalent), service agency or the gas supplier.

**IMPORTANT**

The 15GCSX unit is charged with HFC-410A refrigerant. Operating pressures are higher than R-22 charged units. All service equipment MUST be rated for HFC-410A refrigerant.

**CAUTION**

In order to avoid injury, take proper precaution when lifting heavy objects.

**CAUTION**

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working nearby these areas during installation or while servicing this equipment.

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## SPECIFICATIONS

### General Data

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Nominal Tonnage</th>
<th>Gas Heat Available - See Next Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>15GCSXAV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-24</td>
<td>2</td>
<td>-68X</td>
</tr>
<tr>
<td>-30</td>
<td>2.5</td>
<td>-83X or -90X</td>
</tr>
<tr>
<td>-36</td>
<td>3</td>
<td>-83X or -110X</td>
</tr>
<tr>
<td>-42</td>
<td>3.5</td>
<td>-83X or -90X</td>
</tr>
<tr>
<td>-48</td>
<td>4</td>
<td>-83X or -110X or -138X</td>
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<tr>
<td>-60</td>
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### Nominal Tonnage

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<tr>
<td>15GCSXAV</td>
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</tr>
</tbody>
</table>

### Gas Heat Available - See Next Page

- 68X
- 83X or -90X
- 83X or -110X
- 83X or -90X or -138X

### Cooling Performance

**Total cooling capacity - Btuh (kW)**

<table>
<thead>
<tr>
<th></th>
<th>23,000 (6.7)</th>
<th>28,200 (8.3)</th>
<th>35,000 (10.2)</th>
<th>41,500 (12.2)</th>
<th>47,500 (13.9)</th>
<th>59,000 (17.3)</th>
</tr>
</thead>
</table>

**Total unit watts**

<table>
<thead>
<tr>
<th></th>
<th>1850</th>
<th>2275</th>
<th>2820</th>
<th>3350</th>
<th>4030</th>
<th>5040</th>
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</table>

**2 SEER (Btu/Watt)**

<table>
<thead>
<tr>
<th></th>
<th>14.50</th>
<th>14.00</th>
<th>15.00</th>
<th>14.50</th>
<th>14.00</th>
<th>14.00</th>
</tr>
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</table>

**EER (Btu/Watt)**

<table>
<thead>
<tr>
<th></th>
<th>12.40</th>
<th>12.40</th>
<th>12.40</th>
<th>12.40</th>
<th>11.80</th>
<th>11.70</th>
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**Sound Rating Number (dB)**

<table>
<thead>
<tr>
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<th>77</th>
<th>77</th>
<th>82</th>
<th>82</th>
<th>82</th>
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</table>

**Refrigerant Type**

- HFC-410A

**Refrigerant Charge**

<table>
<thead>
<tr>
<th></th>
<th>7 lbs. 8 oz. (3.40 kg)</th>
<th>6 lbs. 10 oz. (3.00 kg)</th>
<th>8 lbs. 12 oz. (3.97 kg)</th>
<th>11 lbs. 5 oz. (5.13 kg)</th>
<th>6 lbs. 6 oz. (2.89 kg)</th>
<th>9 lbs. 4 oz. (4.20 kg)</th>
</tr>
</thead>
</table>

**Condensate drain size (fpt) - in. (mm)**

|----------|----------|----------|----------|----------|----------|----------|

**Outdoor Coil Fan**

- Motor horsepower (W)
  - 1/6 (248)
  - 1/6 (248)
  - 1/4 (373)
  - 1/4 (373)
  - 1/4 (373)
  - 1/4 (373)

**Indoor Blower**

- Motor
  - Full load amps (A)
    - 1.5 (400)
    - 1.5 (400)
    - 2.7 (560)
    - 2.7 (560)
    - 2.7 (560)
    - 2.7 (560)

**NOTE:** Extremes of operating range are plus and minus 10% of line voltage.

### ELECTRICAL DATA

**Line voltage data - 60hz 1 phase**

<table>
<thead>
<tr>
<th></th>
<th>208/230V</th>
<th>208/230V</th>
<th>208/230V</th>
<th>208/230V</th>
<th>208/230V</th>
<th>208/230v</th>
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<tr>
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<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

**Maximum overcurrent protection (amps)**

<table>
<thead>
<tr>
<th></th>
<th>21</th>
<th>22</th>
<th>22</th>
<th>29</th>
<th>34</th>
<th>39</th>
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</thead>
</table>

**Minimum Circuit Ampacity**

<table>
<thead>
<tr>
<th></th>
<th>13.5</th>
<th>14.1</th>
<th>14.1</th>
<th>17.9</th>
<th>21.8</th>
<th>26.4</th>
</tr>
</thead>
</table>

**Compressor**

- Rated load amps (A)
  - 1.1 (400)
  - 1.1 (400)
  - 1.7 (560)
  - 1.7 (560)
  - 1.7 (560)
  - 1.7 (560)

- Locked rotor amps (A)
  - 2.3 (400)
  - 2.3 (400)
  - 4.0 (560)
  - 4.0 (560)
  - 4.0 (560)
  - 4.0 (560)

**Condenser Fan Motor**

- Full load amps (A)
  - 1.5 (400)
  - 1.5 (400)
  - 2.7 (560)
  - 2.7 (560)
  - 2.7 (560)
  - 2.7 (560)

- Locked rotor amps (A)
  - 3.0 (400)
  - 3.0 (400)
  - 5.0 (560)
  - 5.0 (560)
  - 5.0 (560)
  - 5.0 (560)

**Indoor Blower Motor**

- Full load amps (A)
  - 1/2 (13)
  - 1/2 (13)
  - 1/2 (13)
  - 1/2 (13)
  - 1/2 (13)
  - 1/2 (13)

### SPECIFICATIONS - GAS HEAT

**Heat Option**

- 68X
- 83X
- 90X
- 110X
- 138X

**Heating Capacity**

- Btuh (kW)
  - First Stage Input: 50,600 (14.8)
  - Second Stage Input: 67,500 (19.8)
  - Second Stage Output: 54,000 (15.8)

**Temperature Rise - °F (°C)**

- First Stage: 25 - 55 (15 - 33)
  - Second Stage: 35 - 65 (20 - 36)

**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

---

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.

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.
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 de-rated as shown in table.

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

**FIGURE 1**

**TABLE 1**

**MANIFOLD PRESSURE VERSUS ALTITUDE**

<table>
<thead>
<tr>
<th>Altitude (ft.)</th>
<th>Natural Gas Heating value* (BTU/ft³)</th>
<th>Manifold Pressure (in. w. c.)</th>
<th>Propane (LP) Heating value* (BTU/ft³)</th>
<th>Manifold Pressure (in. w. c.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>2000</td>
<td>948</td>
<td>3.50</td>
<td>2.00</td>
<td>2278</td>
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<td>3000</td>
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<td>4000</td>
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</tr>
<tr>
<td>5000</td>
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<tr>
<td>5500</td>
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<td>6000</td>
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<td>1964</td>
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<tr>
<td>6500</td>
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<td>3.23</td>
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<td>7000</td>
<td>787</td>
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<td>1891</td>
</tr>
<tr>
<td>7500</td>
<td>771</td>
<td>3.19</td>
<td>1.82</td>
<td>1853</td>
</tr>
</tbody>
</table>

* Consult local utility for actual heating value.
Furnace input = Input Factor X Nameplate Input
Above 7500 feet, call Lennox Technical Services for additional assistance.
**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.

**I-APPLICATION**

15GCSX 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. 15GCSX units are single-phase and residential only. Refer to the Engineering Handbook for more specific application data.

**II-UNIT COMPONENTS**

15GCSX components are shown in figure 1.

**A-Control Box Components**

15GCSX 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 two-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 15GCX 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.
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)
The 15GCSX unit includes an ignition control board which controls the combustion air inducer, gas valve and spark electrode. It receives signals from the main and secondary limit switches (if applicable), the rollout switch, the prove switch and the flame sensor. The board is protected by a 5 amp fuse. The ignition control board is shown in figure 4. LED codes are in table 2.

Electronic Ignition
On a W1 call the ignition control checks high temperature limit, secondary 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 15-second pre-purge.

The ignition control energizes the combustion air inducer on high speed, 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 15-second pre-purge period. When the pre-purge time has expired, the control begins the ignition trial.

The ignition control energizes the gas valve and spark. The control ignores the flame sense signal for the first two seconds of the ignition trial. 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 and the ignition control initiates a 30-second inter-purge sequence.

Approximately 30 seconds after the flame has been established, the circulating air blower starts and the combustion air inducer is switched to low speed. 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. First-stage gas valve, low-speed combustion air inducer and circulating blower remain energized. If the thermostat signals a requirement for second-stage heat (W2), the ignition control initiates high heat operation.

When a signal for second-stage heat is received by the ignition control, the control energizes the gas valves second stage and high-speed combustion air inducer until the demand is satisfied.

If a first-stage heat demand continues after the second-stage heat demand has been satisfied, the ignition control immediately de-energizes the second-stage gas valve. The combustion air inducer is held in high speed operation for an additional 1 second after the gas valves second stage is de-energized. First-stage heat operation (first-stage gas valve and low-speed combustion air inducer) continues until heating demand is satisfied.

When the heating demand is satisfied, the control immediately de-energizes the gas valve. The combustion air inducer remains energized for a 30-second post-purge period. The circulating air blower operates for 90 seconds after the gas valve is de-energized.

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

| CODE 2 - 2 flashes in 1 sec with 1 sec pause | Lockout, failed to detect or sustain flame, gas valve knob or switch off. |
| CODE 3 - 3 flashes in 1 1/2 sec with 1 sec pause | Prove switch open with inducer on or closed with inducer OFF. |
| CODE 4 - 4 flashes in 2 sec with 1 sec pause | High temp limit |
| CODE 5 - 5 flashes in 2 1/2 sec with 1 sec pause | Flame sensed with gas valve de-energized |
| CODE 6 - 6 flashes in 3 sec with 1 sec pause | Rollout switch open |
IGNITION CONTROL BOARD (A3)

FIGURE 4

CONNECTOR P1
- PIN 1 - LIMIT SWITCH (OUTPUT, COMMON WITH "R" TERMINAL)
- PIN 2 - GAS VALVE 24 VAC COMMON (CHASSIS GROUND)
- PIN 3 - LOW GAS VALVE OUTPUT
- PIN 4 - LIMIT SWITCH INPUT
- PIN 5 - PRESSURE SWITCH OUTPUT
- PIN 6 - LOW PRESSURE SWITCH INPUT
- PIN 7 - HIGH GAS VALVE OUTPUT
- PIN 8 - HIGH PRESSURE SWITCH INPUT (OPTIONAL)
- PIN 9 - FLAME SENSE INPUT

CONNECTOR P2
- "N" - 24VAC TO THERMOSTAT
- "W" - THERMOSTAT CALL FOR HEAT
- "W2" - THERMOSTAT 2ND STAGE CALL FOR HEAT
- "G" - THERMOSTAT CALL FOR CONTINUOUS FAN
- "Y" - THERMOSTAT CALL FOR COOLING

QUICK CONNECT TERMINALS
- "INDUCER LOW" - DRAFT INDUCER MOTOR OUTPUT
- "INDUCER HIGH" - 2ND STAGE DRAFT INDUCER MOTOR OUTPUT
- "LI" (2) - 230 VAC LINE INPUT
- "L2" (2) - 230 VAC LINE INPUT
- "C" (2) - 24 VAC SYSTEM COMMON (GROUND)
- "24VAC" - CONTINUOUS 24VAC FROM TRANSFORMER
- "CIR" - CIRCULATING AIR BLOWER MOTOR

TIMINGS:
- PRE-PURGE: 15 SECONDS
- IGNITION TRIAL: 10 SECONDS
- INTER-PURGE: 30 SECONDS
- HEAT BLOWER ON DELAY: 90 SECONDS
- HEAT BLOWER OFF DELAY: 90 SECONDS
- POST PURGE: 50 SECONDS
- COOL FAN OFF DELAY: 90 SECONDS

BLOWER CONTROL BOARD (A54)

FIGURE 5

ADJUST SELECTOR PINS (Setting affects both heating and cooling modes)
HEATING SPEED SELECTOR PINS
COOLING SPEED SELECTOR PINS

DIAGNOSTIC LED
 CFM LED = 100 CFM/BLINK

16-PIN PLUG (BOARD TO MOTOR)

FAILSAFE MODES
TEST MODE
DENHUMIDIFY CUTOFF TO ENABLE
6-Blower Control Board (A54)

15GCSX units are equipped with a variable speed motor which is controlled by a blower control board. See figure 5.

![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 variable speed motor that is capable of maintaining a specified CFM throughout the external static range. A particular CFM can be obtained by positioning jumpers (COOL, HEAT, and ADJUST) on the blower control board. The HEAT and COOL jumpers are labeled A, B, C and D. Each of the letters corresponds with an air volume (CFM) setting. The ADJUST jumper is labeled NORM, +, - and Test. The + and - pin settings are used to add or subtract a percentage of the CFM selected. The Test jumper is used to operate the motor in the test mode. See figure 5.

Factory settings for the blower speed jumpers are given in the wiring diagram in figure 5. Figure 5 shows the blower control board. Use tables 1, 2 and 3 to determine the correct air volume for operation in heat and cool mode.

The CFM LED located on the blower control board flashes one time per 100 cfm to indicate selected blower speed. For example, if the unit is operating at 1000 CFM, CFM LED will flash 10 times. If the CFM is 1150, CFM LED will flash 11 full times plus one fast or half flash.

At times the light may appear to flicker or glow. This takes place when the control is communicating with the motor between cycles. This is normal operation.

Read through the jumper settings section before adjusting the jumper to obtain the appropriate blower speed.

To change jumper positions, gently pull the jumper off the pins and place it on the desired set of pins. The following section outlines the different jumper selections available and conditions associated with each one. Refer to figure 5.

After the CFM for each application has been determined, the jumper settings must be adjusted to reflect those given in the blower tables on the next page. From the tables, determine which row most closely matches the desired CFM. Once a specific row has been chosen (+, NORM, or -), CFM volumes from other rows cannot be used. Below are descriptions of the jumper selections.

The variable speed motor slowly ramps up to and down from the selected air flow during both cooling and heating demand. This minimizes noise and eliminates the initial blast of air when the blower is initially energized.

ADJUST

The ADJUST pins allow the motor to run at normal speed, approximately 15 percent higher, or approximately 15 percent lower than normal speed. Tables 1, 2 and 3 give three rows (+, NORM, and -) with their respective CFM volumes. Notice that the normal adjustment setting for heat speed position C in table 1 is 900 CFM. The + adjustment setting for that position is 1035 CFM and for the - adjustment setting is 765 CFM. After the adjustment setting has been determined, choose the remaining speed settings from those offered in the table in that row.

The TEST pin is available to bypass the blower control and run the motor at approximately 70 percent to make sure that the motor is operational. This is used mainly in troubleshooting. The G terminal must be energized for the motor to run.

COOL

The COOL jumper is used to determine the CFM during cooling operation. This jumper selection is activated for cooling when Y1 is energized.

The blower motor runs at 80 percent of the selected air flow for the first 7-1/2 minutes of each cooling demand. This feature allows for greater humidity removal and saves energy.

In the cooling mode, the blower control board delays blower operation for 5 seconds after the compressor starts. The blower continues to operate for 90 seconds after the compressor is de-energized.

HEAT

The HEAT jumper is used to determine CFM during gas heat operation only. These jumper selections are activated only when W1 is energized.

In the heating mode, the blower control board delays blower operation for 30 seconds after the flame is established. The blower continues to operate for 90 seconds after the gas valve is de-energized.

CONTINUOUS FAN

When the thermostat is set for “Continuous Fan” operation and there is no demand for heating or cooling, the blower control will provide 50 percent of the COOL CFM selected.

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.

DEHUMIDIFICATION

The blower control board includes an HUM terminal which provides for connection of a humidistat. The JW1 resistor on the blower control board must be cut to activate the HUM terminal. The humidistat must be wired to open on humidity rise. When the dehumidification circuit is used, the variable speed motor will reduce the selected air flow rate by 25 percent when humidity levels are high. An LED (D1) lights when the blower is operating in the dehumidification mode.

NOTE - This unit is not approved for installation as part of a zoning system.
TABLE 1
15GCSXAV-24, 15GCSXAV-30 Blower Performance
0 through 0.80 in. w.g. (0 through 200 Pa) External Static Pressure Range

<table>
<thead>
<tr>
<th>“ADJUST” Jumper Setting</th>
<th>“COOL” Speed</th>
<th>“HEAT” Speed</th>
<th>“CONTINUOUS FAN” Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>+</td>
<td>1150</td>
<td>545</td>
<td>920</td>
</tr>
<tr>
<td>NORM</td>
<td>1000</td>
<td>470</td>
<td>800</td>
</tr>
<tr>
<td>-</td>
<td>850</td>
<td>400</td>
<td>680</td>
</tr>
</tbody>
</table>

TABLE 2
15GCSXAV-36 Blower Performance
0 through 0.80 in. w.g. (0 through 200 Pa) External Static Pressure Range

<table>
<thead>
<tr>
<th>“ADJUST” Jumper Setting</th>
<th>“COOL” Speed</th>
<th>“HEAT” Speed</th>
<th>“CONTINUOUS FAN” Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>+</td>
<td>1380</td>
<td>650</td>
<td>1150</td>
</tr>
<tr>
<td>NORM</td>
<td>1200</td>
<td>565</td>
<td>1000</td>
</tr>
<tr>
<td>-</td>
<td>1020</td>
<td>480</td>
<td>850</td>
</tr>
</tbody>
</table>

TABLE 3
15GCSXAV-42, 15GCSXAV-48, 15GCSXAV-60 Blower Performance
0 through 0.80 in. w.g. (0 through 200 Pa) External Static Pressure Range

<table>
<thead>
<tr>
<th>“ADJUST” Jumper Setting</th>
<th>“COOL” Speed</th>
<th>“HEAT” Speed</th>
<th>“CONTINUOUS FAN” Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>+</td>
<td>2070</td>
<td>975</td>
<td>1840</td>
</tr>
<tr>
<td>NORM</td>
<td>1800</td>
<td>850</td>
<td>1600</td>
</tr>
<tr>
<td>-</td>
<td>1530</td>
<td>720</td>
<td>1360</td>
</tr>
</tbody>
</table>
7- Lennox System Operation Monitor (A132)  
(Not present in units built after June 2012)

The Lennox system operation monitor (LSOM) detects the most common fault conditions in the air conditioning system. When an abnormal condition is detected, the module communicates the specific condition through its ALERT and TRIP lights. The module is capable of detecting both mechanical and electrical system problems. See figure 6 for the system operation monitor.

![Lennox System Operation Monitor (A132)](image)

**FIGURE 6**

--- IMPORTANT

This monitor does not provide safety protection. The monitor is a monitoring device only and cannot control or shut down other devices.

**LSOM LED Functions**

- **Power LED (green)** -- Voltage within the range of 19-28VAC is present at the system monitor power connection.

- **Alert LED (yellow)** -- Communicates an abnormal system condition through a unique flash code. The alert LED flashes a number of times consecutively; then pauses; then repeats the process. This consecutive flashing corresponds with a particular abnormal condition.

- **Trip LED (red)** -- Indicates a demand signal from the thermostat; but detects no current to the compressor.

- **Flash code number** -- Corresponds to a number of LED flashes, followed by a pause, and then repeated.

- **Trip & Alert LEDs flashing simultaneously** -- Indicates that the control circuit voltage is too low for operation.

- **Reset ALERT flash code by removing 24VAC power from monitor. Last ALERT flash code will display for 1 minute after monitor is powered on.**

**LSOM codes are given in table 4.**

8- 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) Figure 7

The 15GCSX uses a gas valve manufactured by Honeywell or White-Rodgers. The valve is two-stage 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) and is adjustable on both high and low fire. 24VAC and gas control knob / switch 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.

![Gas Valve (GV1) Figure 7](image)

**Figure 7**

2- Burners/Orifices

All 15GCSX units use inshot burners. A flame retention ring located in the burner end keeps flame from lifting off the burner. All 15GCSX 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 8.
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.
### TABLE 4

<table>
<thead>
<tr>
<th>Status LED Condition</th>
<th>Status LED Description</th>
<th>Status LED Troubleshooting Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green “Power” LED ON</td>
<td>Module has power</td>
<td>24VAC control power is present at the module terminal.</td>
</tr>
<tr>
<td>Green “Power” LED OFF</td>
<td>Module not powering up</td>
<td>Determine/verify that both R and C module terminals are connected and voltage is present across terminals.</td>
</tr>
</tbody>
</table>
| Red “Trip” LED ON    | System and compressor check out OK | 1. Verify Y terminal is connected to 24VAC at contactor coil.  
                        | Thermostat demand signal Y1 is present, but compressor not running | 2. Verify voltage at contactor coil falls below 0.5VAC when off.  
                        |                                                                      | 3. Verify 24VAC is present across Y and C when thermostat demand signal is present; if not present, R and C wires are reversed. |
|                      | Simultaneous flashing   | Indicates that the control circuit voltage is too low for operation. |
| Yellow “Alert” Flash Code 1* | Long Run Time - Compressor is running extremely long run cycles | 1. Low refrigerant charge.  
                               |                                                                      | 2. Evaporator blower is not running.  
                               |                                                                      | 3. Evaporator coil is frozen.  
                               |                                                                      | 4. Faulty metering device.  
                               |                                                                      | 5. Condenser coil is dirty.  
                               |                                                                      | 6. Liquid line restriction (filter drier blocked if present).  
                               |                                                                      | 7. Thermostat is malfunctioning. |
| Yellow “Alert” Flash Code 2* | System Pressure Trip - Discharge or suction pressure out of limits or compressor overloaded | 1. High head pressure.  
                               |                                                                      | 2. Condenser coil poor air circulation (dirty, blocked, damaged).  
                               |                                                                      | 3. Condenser fan is not running.  
                               |                                                                      | 4. Return air duct has substantial leakage.  
                               |                                                                      | 5. If low pressure switch is present, see Flash Code 1 info. |
| Yellow “Alert” Flash Code 3* | Short Cycling - Compressor is running only briefly | 1. Thermostat demand signal is intermittent.  
                               |                                                                      | 2. Time delay relay or control board is defective.  
                               |                                                                      | 3. If high pressure switch is present, see Flash Code 2 info.  
                               |                                                                      | 4. If low pressure switch is present, see Flash Code 1 info. |
| Yellow “Alert” Flash Code 4* | Locked Rotor | 1. Run capacitor has failed.  
                               |                                                                      | 2. Low line voltage (contact utility).  
                               |                                                                      | 3. Excessive liquid refrigerant in the compressor.  
                               |                                                                      | 4. Compressor bearings are seized. |
| Yellow “Alert” Flash Code 5* | Open Circuit | 1. Outdoor unit power disconnect is open.  
                               |                                                                      | 2. Unit circuit breaker or fuse(s) is open.  
                               |                                                                      | 3. Unit contactor has failed to close.  
                               |                                                                      | 4. High pressure switch is open and requires manual reset.  
                               |                                                                      | 5. Unusually long compressor protector reset time due to extreme ambient temperature.  
                               |                                                                      | 6. Compressor windings are damaged. |
| Yellow “Alert” Flash Code 6* | Open Start Circuit - Current only in run circuit | 1. Run capacitor has failed.  
                               |                                                                      | 2. Open circuit in compressor start wiring or connections.  
                               |                                                                      | 3. Compressor start winding is damaged. |
| Yellow “Alert” Flash Code 7* | Open Run Circuit - Current only in start circuit | 1. Open circuit in compressor start wiring or connections.  
                               |                                                                      | 2. Compressor start winding is damaged. |
| Yellow “Alert” Flash Code 8* | Welded Contactor - Compressor always runs | 1. Compressor contactor failed to open.  
                               |                                                                      | 2. Thermostat demand signal not connected to module. |
| Yellow “Alert” Flash Code 9* | Low Voltage - Control circuit <17VAC | 1. Control circuit transformer is overloaded.  
                               |                                                                      | 2. Low line voltage (contact utility).  

*Flash code number corresponds to a number of LED flashes, followed by a pause, and then repeated. Reset ALERT flash code by removing 24VAC power from monitor; last code will display for 1 minute after monitor is powered on.
3-Tubular Heat Exchanger

The 15GCSX 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 8). 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 15GCSX 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 down the unit except for the main blower. 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)

Two-speed 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 bypassed) and is de-energized following a 30 second post purge once thermostat demand is satisfied. All CAI motors are sealed and cannot be oiled.

On a call for heat the CAI energizes on high speed until prove switch S18 closes. Once S18 closes a 15 second pre-purge begins and the ignition trial follows. Once flame is established the inducer continues on high speed for 30 seconds. After 30 seconds the inducer switches to low speed for first stage heat. If a second stage heat is called the inducer will switch to high speed until W2 demand is satisfied. See Ignition Control (A3) in the control box section for more detail.
C-Cooling Components

1-High Pressure Switch (S4)

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-Low Pressure Switch (S79)

The low pressure switch is an auto-reset N.C. switch that opens on pressure drop. The switch is wired in series with the high pressure switch S4 and compressor contactor K1 and is located on the suction line. When suction pressure drops to 10 psig (68.95 kPa) the switch opens and the compressor is de-energized. When suction pressure rises to 30 psig (206.85 kPa) the pressure switch will close.

3-Condenser Fan (B4)

15GCSX units use single phase condenser fan motors. See SPECIFICATIONS and ELECTRICAL DATA for more detail.

The top of the condenser fan should be 1-1/2 inches from the bottom of the top grille. This dimension should be checked and the fan should be adjusted accordingly any time servicing of the outdoor fan system is required.

4-Compressor B1 (all models)

All 15GCSX/ 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.

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.

The counterclockwise orbiting scroll draws gas into the outer crescent shaped gas pocket created by the two scrolls (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.
D-Blower Compartment
Access panels can easily be removed for service.

1-Blower Wheel
Blower wheel size varies between models. See SPECIFICATIONS.

2-Variable Speed Motor (B3)
15GCSX units use a three-phase, electronically controlled D.C. brush-less motor (controller converts single phase a.c. to three phase D.C.), with a permanent-magnet-type rotor (figure 12). Because this motor has a permanent magnet rotor it does not need brushes like conventional D.C. motors. Internal components are shown in figure 13. The stator windings are split into three poles which are electrically connected to the controller. This arrangement allows motor windings to turn on and off in sequence by the controller.

A solid-state controller is permanently attached to the motor. The controller is primarily an A.C. to D.C. converter. Converted D.C. power is used to drive the motor. The controller contains a microprocessor which monitors varying conditions inside the motor (such as motor workload).

The controller uses sensing devices to sense what position the rotor is in at any given time. By sensing the position of the rotor and then switching the motor windings on and off in sequence, the rotor shaft turns the blower.

All blower motors use single phase power. An external run capacitor is not used. The motor uses permanently lubricated ball-type bearings.

Internal Operation
Each time the controller switches a stator winding (figure 13) on and off, it is called a “pulse.” The length of time each pulse stays on is called the “pulse width.” By varying the pulse width, the controller varies motor speed (called “pulse-width modulation”). This allows for precise control of motor speed and allows the motor to compensate for varying load conditions as sensed by the controller. In this case, the controller monitors the static workload on the motor and varies motor rpm in order to maintain constant airflow (cfm).

The motor controller is driven by the blower control board (figure 5). The board receives its demand (PWM signal or fixed 24 VAC or VDC signal) from optional controls such as the Lennox SignatureStat™ or a conventional thermostat.

Motor rpm is continually adjusted internally to maintain constant static pressure against the blower wheel. The controller monitors the static work load on the motor and motor amp-draw to determine the amount of rpm adjustment. Blower rpm may be adjusted any amount in order to maintain a constant cfm as shown in Blower Ratings Tables (1, 2 and 3). The cfm remains relatively stable over a broad range of static pressure. Since the blower constantly adjusts rpm to maintain a specified cfm, motor rpm is not rated. Hence, the terms “cool speed”, “heat speed” or “speed tap” if used in this manual, on the unit wiring diagram and on blower B3, refer to blower cfm regardless of motor rpm.

Initial Power Up
When line voltage is applied to B3, there will be a large inrush of power lasting less than 1/4 second. This inrush charges a bank of DC filter capacitors inside the controller. If the disconnect switch is bounced when the disconnect is closed, the disconnect contacts may become welded. Try not to bounce the disconnect switch when applying power to the unit.

![FIGURE 11](image1)

![FIGURE 12](image2)

![FIGURE 13](image3)
Motor Start-Up

When B3 begins start-up, the motor gently vibrates back and forth for a moment. This is normal. During this time the electronic controller is determining the exact position of the rotor. Once the motor begins turning, the controller slowly eases the motor up to speed (this is called “soft-start”). The motor may take as long as 10-15 seconds to reach full speed. If the motor does not reach 200rpm within 13 seconds, the motor shuts down. Then the motor will immediately attempt a restart. The shutdown feature provides protection in case of a frozen bearing or blocked blower wheel. The motor may attempt to start eight times. If the motor does not start after the eighth try, the controller locks out. Reset controller by momentarily turning off power to unit.

The DC filter capacitors inside the controller are connected electrically to the speed tap wires. The capacitors take approximately 5 minutes to discharge when the disconnect is opened. For this reason it is necessary to wait at least 5 minutes after turning off power to the unit before attempting to change speed taps.

⚠️ DANGER

Disconnect power from unit and wait at least five minutes to allow capacitors to discharge before attempting to adjust motor speed tap settings. Failure to wait may cause personal injury or death.

External Operation (Speed Tap Priority)

Figure 14 shows the two quick-connect jacks (J48 and J49) which connect the motor to the 15GCSX. Jack J48 is the power plug and jack J49 connects the unit controls to the motor.

Line voltage must be applied to J48 pin 5 in order for the motor to operate. When using 120VAC pins 1 and 2 must be jumpered. When control voltage is applied to J49 pin 3 and 15, the motor is energized on the continuous fan mode.

When voltage is applied to J49 pin 2 in addition to pin 3 and 15 (first stage heating), the blower is energized on the low speed heating tap. When voltage is applied to J49 pin 13 in addition to pin 3 and 15 (second stage heating), the blower is energized on the high speed heating tap. The motor assigns priority to J49 pin 2 so that if a call for cooling and a call for heating are concurrent, heating call overrides and the blower operates on high speed heating tap.

![FIGURE 14]

Precautions

If the 15GCSX or its electronically controlled blower motor is improperly or inadequately grounded, it may cause television interference (commonly known as RFI or radio frequency interference).

This interference is caused by internal switching frequencies of the motor controller. TV interference may show up as small specks or lines which randomly appear on the TV screen accompanied by pops or clicks in the sound. Before attempting any service, make sure the indoor unit is causing the interference. To check, disconnect power to indoor unit then check TV for continued signs of interference.

TV interference may be stopped by making sure the motor is solidly grounded to the cabinet (metal to metal) and by making sure the cabinet is solidly grounded. If TV interference persists, make sure the television (and all affected RF appliances) are moved away from the 15GCSX. Also make sure affected appliances are connected to a separate electrical circuit.
VARIABLE SPEED CHECKOUT

Using the transformer in the unit, test motor operation by jumping 24 volts into the terminals illustrated below for the desired speed.

**LOW (continuous blower) SPEED**

1. Disconnect power to unit.
2. Disconnect plug J46 from P46 located on the blower control board.
3. Disconnect C and R from ignition control board.
4. Disconnect “Y” from ignition control and connect a separate wire between “R” on the transformer and “Y” on the ignition control.
5. Connect voltage source as shown above.
6. Turn on power to unit. Blower should operate at LOW speed.

**COOLING SPEED**

7. Disconnect power to unit.
8. Connect voltage source as shown above.
9. Disconnect “Y” on ignition control and connect a separate wire between “R” on transformer and “Y” on ignition control.
10. Turn on power to unit. Blower should operate at COOLING speed.

**HEATING SPEED**

11. Disconnect power to unit.
12. Connect voltage source as shown above.
13. Disconnect “W” from ignition control and connect a separate wire between “R” on transformer and “W” on the ignition control.
14. Turn on power to unit. Blower should operate at HEATING speed.

**HIGH HEATING SPEED**

15. Disconnect power to unit.
16. Connect voltage source as shown above.
17. Disconnect “W2” from ignition control and connect a separate wire between “R” on transformer and “W2” on ignition control.
18. Turn on power to unit. Blower should operate at HIGH HEATING speed.

---

### J49 CONTROL CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>VOLTAGE</th>
<th>WHEN VOLTAGE IS PRESENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C1</td>
<td>Common</td>
</tr>
<tr>
<td>2</td>
<td>W / W1</td>
<td>24VAC</td>
</tr>
<tr>
<td>3</td>
<td>C2</td>
<td>Common</td>
</tr>
<tr>
<td>4</td>
<td>Delay</td>
<td>see note 1</td>
</tr>
<tr>
<td>5</td>
<td>Cool</td>
<td>see note 1</td>
</tr>
<tr>
<td>6</td>
<td>Y1</td>
<td>24VAC</td>
</tr>
<tr>
<td>7</td>
<td>Adjust</td>
<td>see note 1</td>
</tr>
<tr>
<td>8</td>
<td>Out</td>
<td>Motor sends pulse signals between pin 8 and 16 to signal CFM</td>
</tr>
<tr>
<td>9</td>
<td>O</td>
<td>24VAC</td>
</tr>
<tr>
<td>10</td>
<td>DS / PWM</td>
<td>0 / 24 VAC</td>
</tr>
<tr>
<td>11</td>
<td>Heat</td>
<td>see note 1</td>
</tr>
<tr>
<td>12</td>
<td>R</td>
<td>24VAC</td>
</tr>
<tr>
<td>13</td>
<td>EM / W2</td>
<td>24VAC</td>
</tr>
<tr>
<td>14</td>
<td>Y / Y2</td>
<td>Not used on single stage cooling</td>
</tr>
<tr>
<td>15</td>
<td>G</td>
<td>24VAC</td>
</tr>
<tr>
<td>16</td>
<td>Out</td>
<td>Motor sends pulse signals between pin 8 and 16 to signal CFM</td>
</tr>
</tbody>
</table>

1 signal from selection taps - A tap = 0 volts, B and C taps = half wave, D tap = 24VAC
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 - 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

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 table 5, refrigerant charge should be adjusted accordingly for maximum performance.

**TABLE 5** Suction Superheat Values

<table>
<thead>
<tr>
<th>Unit Model No.</th>
<th>Suction Superheat 82°F OD minus 80°F IDDB / 67°F IDWB</th>
</tr>
</thead>
<tbody>
<tr>
<td>15GCSX-24</td>
<td>15°</td>
</tr>
<tr>
<td>15GCSX-30</td>
<td>12°</td>
</tr>
<tr>
<td>15GCSX-36</td>
<td>12°</td>
</tr>
<tr>
<td>15GCSX-42</td>
<td>10°</td>
</tr>
<tr>
<td>15GCSX-48</td>
<td>10°</td>
</tr>
<tr>
<td>15GCSX-60</td>
<td>10°</td>
</tr>
</tbody>
</table>

Verify system performance using table 6 as a general guide. Table 6 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, this table 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 6** Normal Operating Pressures

<table>
<thead>
<tr>
<th>80°F db / 67°F wb RETURN AIR</th>
<th>Air Temperature Entering Outdoor Coil (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIT</td>
<td>PRESSURE</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>15GCSX-24</td>
<td>Suction</td>
</tr>
<tr>
<td>15GCSX-30</td>
<td></td>
</tr>
<tr>
<td>15GCSX-36</td>
<td></td>
</tr>
<tr>
<td>15GCSX-42</td>
<td></td>
</tr>
<tr>
<td>15GCSX-48</td>
<td></td>
</tr>
<tr>
<td>15GCSX-60</td>
<td></td>
</tr>
<tr>
<td>15GCSX-24</td>
<td>Liquid</td>
</tr>
<tr>
<td>15GCSX-30</td>
<td></td>
</tr>
<tr>
<td>15GCSX-36</td>
<td></td>
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<tr>
<td>15GCSX-42</td>
<td></td>
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<tr>
<td>15GCSX-48</td>
<td></td>
</tr>
<tr>
<td>15GCSX-60</td>
<td></td>
</tr>
</tbody>
</table>
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.

![GAS PIPING TEST PROCEDURE](figure15.png)

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 15.

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.

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

This furnace 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 - Turn the gas valve knob or move the switch to the ON position. Refer to figure 16.
4 - Turn on electrical power to unit.
5 - Set room thermostat to desired temperature. (If thermostate setpoint temperature is above room temperature after the pre-purge time expires, main burners will light).

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 16 for location of manifold pressure adjustment screw and pressure tap outlet.

The gas valve is factory set and should not require adjustment. See table 7. The gas valve should completely and immediately cycle off in the event of gas or power failure. The manual shut-off knob or switch can be used to immediately shut off gas supply.

<table>
<thead>
<tr>
<th>TABLE 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manifold Pressure &quot; w.c.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1st Stage Heat</td>
</tr>
<tr>
<td>Natural</td>
</tr>
<tr>
<td>2.0 ± 0.3</td>
</tr>
<tr>
<td>LP</td>
</tr>
<tr>
<td>5.6 ± 0.3</td>
</tr>
<tr>
<td>2nd Stage Heat</td>
</tr>
<tr>
<td>Natural</td>
</tr>
<tr>
<td>3.5 ± 0.3</td>
</tr>
<tr>
<td>LP</td>
</tr>
<tr>
<td>10.0 ± 0.5</td>
</tr>
</tbody>
</table>

**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)

Final first-stage and second-stage manifold pressures 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.

\[
\text{BTU/HR} = \text{Cubic Feet Per Revolution} \times 3600 \times \text{Heating Value}
\]

**INPUT** No. Seconds Per Revolution

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

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.

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

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 17 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.

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.

First Stage Heating

1- Heating demand initiates at "W1" in 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 on high speed. When the N.O. combustion air inducer prove switch S18 closes, a pre-purge period of 15 seconds follows.
3- Ignition control A3 begins spark and energizes gas valve GV1.
4- Gas valve GV1 opens on low heat. When flame is sensed, spark stops.
5- After 30 seconds indoor blower control A54 energizes indoor blower B3. Combustion air inducer B6 switches to low speed.
6- When first stage heat demand is satisfied, "W1" in 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 90 seconds.

Second Stage Heating

Unit is operating in first stage heat

1- Heating demand initiates at "W2" in the indoor thermostat.
2- Ignition control A3 energizes gas valve GV1 on second stage heat and combustion air inducer B6 switches to high speed. The unit remains in this state until second stage demand is satisfied. Once second stage heat is satisfied, and if a firsts stage heat demand continues, control A3 de-energizes the second stage on gas valve and the combustion air inducer B6 switches to low speed.
15GCSX Series Gas Packaged Units

Typical Wiring Diagram

**FIGURE 18**

**DIAGNOSTICS**
- **IGNITION CONTROL**

The following ignition control board LED codes will indicate normal or abnormal operations:
- **SLOW FLASH** Normal operation, no call for heat.
- **FAST FLASH** Normal operation, call for heat.
- **2 FLASH** System lockout, failed to detect or sustain flame.
- **3 FLASH** Pressure switch senses incorrect pressure.
- **4 FLASH** Main limit open.
- **5 FLASH** Flame sensor and gas valve not energized.
- **6 FLASH** Rollout switch open.
- **STEADY** Internal failure (micro-controller failure; self check)

**HEAT ANTICIPATION SETTING**
- 1ST STAGE: 0.85 AMP
- BOTH STAGES: 0.85 AMP

**NOTE:**
- If any of the original wire is replaced, the same size and type wire must be used.
- Use copper conductor only, min. 18 gauge wire.
- Line voltage field installed.

**WARNING:**
- Electric shock hazard. Unit must be grounded in accordance with national and local codes.
15GCSX Series Gas Packaged Units

Typical Wiring Diagram

Figure 19 (Units built after June 2012)