Save this manual for future reference.

Safety Labeling and Signal Words

DANGER, WARNING, CAUTION, and NOTE
The signal words DANGER, WARNING, CAUTION, and NOTE are used to identify levels of hazard seriousness. The signal word DANGER is only used on product labels to signify an immediate hazard. The signal words WARNING, CAUTION, and NOTE will be used on product labels and throughout this manual and other manual that may apply to the product.

DANGER – Immediate hazards which will result in severe personal injury or death.

WARNING – Hazards or unsafe practices which could result in severe personal injury or death.

CAUTION – Hazards or unsafe practices which may result in minor personal injury or product or property damage.

NOTE – Used to highlight suggestions which will result in enhanced installation, reliability, or operation.

Signal Words in Manuals
The signal word WARNING is used throughout this manual in the following manner:

⚠️ WARNING

The signal word CAUTION is used throughout this manual in the following manner:

⚠️ CAUTION

Signal Words on Product Labeling
Signal words are used in combination with colors and/or pictures or product labels.

⚠️ Safety–alert symbol
When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

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MODELS
(F/G)9MXE040141A
(F/G)9MXE060171A
(F/G)9MXE080171B
(F/G)9MXE100211A
(F/G)9MXE120242A

Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program. For verification of certification for individual products, go to www.ahridirectory.org.
SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes, the current editions of the National Fuel Gas Code (NFCG) NFPA 54/ANSI Z223.1, and the National Electrical Code (NEC) NFPA 70.

In Canada refer to the current editions of the National standards of Canada CAN/CSA–B149.1 and .2 Natural Gas and Propane Installation Codes, and Canadian Electrical Code CSA C22.1.

Recognize safety information. This is the safety–alert symbol ☢. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words; DANGER, WARNING, and CAUTION. These words are used with the safety–alert symbol. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies hazards which could result in personal injury or death. CAUTION is used to identify unsafe practices which may result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which will result in enhanced installation, reliability, or operation.

⚠️ WARNING

PERSONAL INJURY, AND/OR PROPERTY DAMAGE HAZARD
Failure to carefully read and follow this warning could result in equipment malfunction, property damage, personal injury and/or death. Installation or repairs made by unqualified persons could result in equipment malfunction, property damage, personal injury and/or death. The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with proper tools and test instruments. Installation must conform with local building codes and with the Natural Fuel Gas Code (NFCG) NFPA 54/ANSI Z223.1, and National standards of Canada CAN/CSA–B149.1 and .2 Natural Gas and Propane Installation Codes.

⚠️ WARNING

ELECTRICAL SHOCK HAZARD
Failure to follow this warning could cause personal injury or death. Before performing service or maintenance operations on unit, always turn off main power switch to unit and install lockout tag. Unit may have more than one power switch.

⚠️ WARNING

CARBON MONOXIDE POISONING AND FIRE HAZARD
Failure to follow safety warnings could result in personal injury, death, and/or property damage. This furnace is not designed for use in mobile homes, trailers or recreational vehicles.

⚠️ CAUTION

CUT HAZARD
Failure to follow this caution may result in damage personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing furnaces.
START-UP CHECK SHEET
For ECM Models (F/G)9MXE
(This sheet is optional. Keep for future reference.)

Date of Start-Up: ____________________________

Dealer Name: ________________________________

Address: ________________________________

City, State(Province), Zip or Postal Code: ________

Phone: ________________________________

Owner Name: ________________________________

Address: ________________________________

City, State(Province), Zip or Postal Code: ________

Model Number: ________________________________

Serial Number: ________________________________

Setup Checks

Check the box when task is complete.

All Electrical Connections Tight? □

Have hoses been relocated for furnace U/D/H application? □

Condensate Drain Connected? □

Condensate Drain Trapped? □

Manual Gas Shut-off Upstream of Furnace/Drip Leg □

Gas Valve turned ON? □

Type of Gas: Natural: □ Propane: □

Filter Type and Size: ____________________________

Check in box the Blower OFF Delay Jumper Heating Position for Fan "Time OFF" Setting:

<table>
<thead>
<tr>
<th>1 and 2</th>
<th>2 and 3</th>
<th>3 and 4</th>
<th>5 and 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>120</td>
<td>150</td>
<td>180</td>
</tr>
</tbody>
</table>

Calculated Input (BTU) Rate: (See Checks and Adjustments Section).

Heating Check

Measured Line Pressure During Heat: ________

Measured Manifold Pressure: Heat ________

Temperature of Supply Air: Heat ________

Temperature of Return Air: ________

Temperature Rise (Supply – Return): Heat ________

In Rise Range (see furnace rating plate)? □

Static Pressure (Ducts) High Heat: Supply ________

Return ________

The Blower Speed Tap used for: Heat ________

Optional Check: CO? ________

CO2? ________

Cooling Check

Temperature of Supply Air: ________

Temperature of Return Air: ________

Temperature Difference: ________

Static Pressure (Ducts) Cooling: Supply ________

Return ________

The Blower Speed Tap used for: Cooling ________

Dealer Comments: ________________________________

______________________________________________

Specifications subject to change without notice.
START-UP, ADJUSTMENT, AND SAFETY
CHECK

General
1. Furnace must have a 115-v power supply properly connected and grounded.

NOTE: Proper polarity must be maintained for 115-v wiring. Control status indicator light flashes code 10 and furnace does not operate if polarity is incorrect.

2. Thermostat wire connections at terminals R, W, G, and Y/Y2 must be made at 24-v terminal block on furnace control.

3. Natural gas service pressure must not exceed 0.5 psig (14-in. w.c.), but must be no less than 0.16 psig (4.5-in. w.c.).

4. Blower door must be in place to complete 115-v electrical circuit to furnace.

UNIT OPERATION HAZARD
Failure to follow this caution may result in intermittent unit operation or performance satisfaction.

These furnaces are equipped with a manual reset limit switch in burner assembly. This switch opens and shuts off power to the gas valve if an overheat condition (flame rollout) occurs in burner assembly. Correct inadequate combustion–air supply or improper venting condition before resetting switch. DO NOT jumper this switch.

CAUTION
Before operating furnace, check flame rollout manual reset switch for continuity. If necessary, press button to reset switch.

EAC-1 terminal is energized whenever blower operates. HUM terminal is only energized when blower the gas valve relay closes during a call for heat.

Prime Condensate Trap with Water

UNIT OPERATION HAZARD
Failure to follow this caution may result in intermittent unit operation or performance satisfaction.

Condensate trap must be PRIMED or proper draining may not occur. The condensate trap has two internal chambers which can ONLY be primed by pouring water into the inducer drain side of condensate trap.

1. Remove upper and middle collector box drain plugs opposite of the condensate trap. (See Figure 1).

2. Connect field-supplied 1/2-in. (13 mm) OD tube to upper collector box drain connection.

3. Insert field-supplied funnel into tube.

4. Pour one quart of water into funnel/tube. Water should run through collector box, overfill condensate trap, and flow into open field drain.

5. Remove funnel; replace collector box drain plug.

6. Connect field-supplied 1/2-in. (13 mm) OD tube to middle collector box drain port.

7. Pour one quart of water into funnel/tube. Water should run through collector box, overfill condensate trap, and flow into open field drain.

8. Remove funnel and tube from collector box and replace collector box drain plug.

PURGE GAS LINES

If not previously done, purge the lines after all connections have been made and check for leaks.

WARNING

FIRE OR EXPLOSION HAZARD
Failure to follow this warning could result in personal injury, death, and/or property damage.

Never purge a gas line into a combustion chamber. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

Adjustments

WARNING

FIRE HAZARD
Failure to follow this warning could result in personal injury, death and/or property damage.

DO NOT bottom out gas valve regulator adjusting screw. This can result in unregulated manifold pressure and result in excess overfire and heat exchanger failures.

CAUTION

FURNACE DAMAGE HAZARD
Failure to follow this caution may result in reduced furnace life.

DO NOT redrill orifices. Improper drilling (burrs, out-of-round holes, etc.) can cause excessive burner noise and misdirection of burner flames. This can result in flame impingement of heat exchangers, causing failures. (See Figure 2)
For proper operation and long term reliability the furnace input rate must be within +2 percent of input rate on furnace rating plate.

The gas input rate on rating plate is for installation at altitudes up to 2000 ft. (610 M)
In the U.S.A., the input rating for altitudes above 2000 ft. (610 M) must be reduced by 2 percent for each 1000 ft. (305 M) above sea level refer to Table 1.
In Canada, the input rating must be derated by 5 percent for altitudes of 2000 ft. (610 M) to 4500 ft. (1372 M) above sea level.

To adjust manifold pressure to obtain the proper input rate, first, determine if the furnace has the correct orifice installed. At higher altitudes or different gas heat contents, it may be necessary to change the factory orifice to a different orifice. Tables have been provided in the furnace Service and Technical Manual to match the required orifice to the manifold pressure to the heat content and specific gravity of the gas. To do this:

a. Obtain average yearly gas heat value (at installed altitude) from local gas supplier.
b. Obtain average yearly gas specific gravity from local gas supplier.
c. Find installation altitude range for your installation in the manifold pressure tables in Table 3.
d. Find closest natural gas heat value and specific gravity in Table 3.
e. Follow heat value and specific gravity lines to point of intersection to find orifice size and manifold pressure setting for proper operation.
f. Check and verify burner orifice size in furnace.
NEVER ASSUME ORIFICE SIZE. ALWAYS CHECK AND VERIFY.
g. Replace orifice with correct size, if required by Table 3. Use only factory–supplied orifices. See EXAMPLE.

EXAMPLE: 0 - 2000 ft. (0 - 609.6 M) altitude
Heating value = 1050 Btu/cu ft.
Specific gravity = 0.62
Therefore: Orifice No. 44
Manifold pressure: 3.4-in. w.c.
* Furnace is shipped with No. 44 orifices. In this example, all main burner orifices are the correct size and do not need to be changed to obtain proper input rate.

1. Adjust manifold pressure to obtain input rate. (See Figure 3)
   a. Turn gas valve ON/OFF switch to OFF.
   b. Remove manifold pressure tap plug from gas valve.
   c. Connect a water column manometer or similar device to manifold pressure tap.
   d. Turn gas valve ON/OFF switch to ON.
   e. Manually close blower door switch.
   f. Jumper R and W thermostat connections on control to start furnace. (See Figure 4)

<table>
<thead>
<tr>
<th>ALTITUDE FT. (M)</th>
<th>PERCENT OF DERATE</th>
<th>DERATE MULTIPLIER FACTOR*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–2000 (0–610)</td>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td>2001–3000 (610–914)</td>
<td>4–6</td>
<td>0.95</td>
</tr>
<tr>
<td>3001–4000 (914–1219)</td>
<td>6–8</td>
<td>0.93</td>
</tr>
<tr>
<td>4001–5000 (1219–1524)</td>
<td>8–10</td>
<td>0.91</td>
</tr>
<tr>
<td>5001–6000 (1524–1829)</td>
<td>10–12</td>
<td>0.89</td>
</tr>
<tr>
<td>6001–7000 (1829–2134)</td>
<td>12–14</td>
<td>0.87</td>
</tr>
<tr>
<td>7001–8000 (2134–2438)</td>
<td>14–16</td>
<td>0.85</td>
</tr>
<tr>
<td>8001–9000 (2438–2743)</td>
<td>16–18</td>
<td>0.83</td>
</tr>
<tr>
<td>9001–10,000 (2743–3048)</td>
<td>18–20</td>
<td>0.81</td>
</tr>
</tbody>
</table>

* Derate multiplier factors are based on midpoint altitude for altitude range.

NOTE: For Canadian altitudes of 2000 to 4500 ft. (610 to 1372 M), use USA altitudes of 2001 to 3000 ft. (610 to 914 M)

NOTE: If orifice hole appears damaged or it is suspected to have been redrilled, check orifice hole with a numbered drill bit of correct size. Never redrill an orifice. A burr–free and squarely aligned orifice hole is essential for proper flame characteristics.

   g. Remove regulator adjustment cap from gas valve pressure regulator (See Figure 3) and turn adjusting screw (3/16 or smaller flat–tipped screwdriver) counterclockwise (out) to decrease input rate or clockwise (in) to increase input rate.

NOTE: DO NOT set manifold pressure less than 3.2 in. w.c. or more than 3.8 in. w.c. for natural gas. If manifold pressure is outside this range, change main burner orifices to obtain manifold pressure in this range.
Figure 3  Redundant Automatic Gas Valve (Single Stage)

- 1/2" NPT Inlet
- 1/8" NPT Manifold Pressure Tap
- 1/2" NPT Outlet
- 1/8" NPT Inlet Pressure Tap

h. When correct input is obtained, replace cap that conceal gas valve regulator adjustment screw. Main burner flame should be clear blue, almost transparent (See Figure 13)

i. Remove jumper R to W.

2. Verify natural gas input rate by clocking meter.
   a. Turn off all other gas appliances and pilots served by the meter.
   b. Jumper R to W.
   c. Run furnace for 3 minutes.
   d. Measure time (in sec) for gas meter to complete 1 revolution and note reading. The 2 or 5 cubic feet dial provides a more accurate measurement of gas flow.
   e. Refer to Table 2 for cubic ft. of gas per hr.
   f. Multiply gas rate cu ft./hr by heating value (Btuh/cu ft.) to obtain input. If clocked rate does not match required input from Step 1, increase manifold pressure to increase input or decrease manifold pressure to decrease input. Repeat steps b through e until correct input is achieved. Re-install regulator seal cap on gas valve.

Figure 4  Single Stage Furnace Control for ECM Blower Motor

- 24-V THERMOSTAT TERMINALS
- 3-AMP FUSE
- LED OPERATION & DIAGNOSTIC LIGHT
- BLOWER SPEED SELECTION TERMINALS
- 115-VAC (L2) NEUTRAL CONNECTIONS

h. When correct input is obtained, replace cap that conceal gas valve regulator adjustment screw. Main burner flame should be clear blue, almost transparent (See Figure 13)

i. Remove jumper R to W.
<table>
<thead>
<tr>
<th>Table 2</th>
<th>SECONDS FOR 1 REvolution</th>
<th>Gas Rate (CU ft./hr)</th>
<th>SECONDS FOR 1 REvolution</th>
<th>SIZE OF TEST DIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Cu Ft.</td>
<td>2 Cu Ft.</td>
<td>5 Cu Ft.</td>
<td>1 Cu Ft.</td>
</tr>
<tr>
<td>10</td>
<td>360</td>
<td>720</td>
<td>1800</td>
<td>50</td>
</tr>
<tr>
<td>11</td>
<td>327</td>
<td>655</td>
<td>1636</td>
<td>51</td>
</tr>
<tr>
<td>12</td>
<td>300</td>
<td>600</td>
<td>1500</td>
<td>52</td>
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<tr>
<td>13</td>
<td>277</td>
<td>555</td>
<td>1385</td>
<td>53</td>
</tr>
<tr>
<td>14</td>
<td>257</td>
<td>514</td>
<td>1286</td>
<td>54</td>
</tr>
<tr>
<td>15</td>
<td>240</td>
<td>480</td>
<td>1200</td>
<td>55</td>
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<td>16</td>
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<td>17</td>
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<td>424</td>
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<tr>
<td>18</td>
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<td>21</td>
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<td>49</td>
<td>73</td>
<td>147</td>
<td>367</td>
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</tr>
</tbody>
</table>
Table 3  Orifice Size and Manifold Pressure (in. w.c.) for Gas Input Rate – Single Stage

<table>
<thead>
<tr>
<th>ALTITUDE RANGE</th>
<th>AVG. GAS HEAT VALUE (Btu/cu ft)</th>
<th>SPECIFIC GRAVITY OF NATURAL GAS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Orifice No.</td>
<td>Manifold Pressure</td>
</tr>
<tr>
<td>0 (0)</td>
<td>900</td>
<td>3.8</td>
</tr>
<tr>
<td>to 1000</td>
<td>950</td>
<td>3.4</td>
</tr>
<tr>
<td>2000 (610)</td>
<td>1000</td>
<td>3.7</td>
</tr>
<tr>
<td>1100</td>
<td>1025</td>
<td>3.3</td>
</tr>
<tr>
<td>U.S.A. 2001 (611) to 3000 (914)</td>
<td>1050</td>
<td>3.2</td>
</tr>
<tr>
<td>3000 (914)</td>
<td>1075</td>
<td>3.5</td>
</tr>
<tr>
<td>U.S.A. 4000 (1219) to 5000 (1524)</td>
<td>1100</td>
<td>3.7</td>
</tr>
<tr>
<td>5000 (1524)</td>
<td>1125</td>
<td>3.4</td>
</tr>
<tr>
<td>U.S.A. 6000 (1829) to 7000 (2133)</td>
<td>1150</td>
<td>3.7</td>
</tr>
<tr>
<td>7000 (2133)</td>
<td>1175</td>
<td>3.4</td>
</tr>
<tr>
<td>8000 (2460)</td>
<td>1200</td>
<td>3.6</td>
</tr>
</tbody>
</table>

SINGLE-STAGE FURNACE
(TABULATED DATA BASED ON 20,000 BTUH PER BURNER, DERATED 2%/1000 FT (305M) ABOVE SEA LEVEL)
### Table 3 (CONT.)

**Orifice Size and Manifold Pressure (in. w.c.) for Gas Input Rate – Single Stage**

<table>
<thead>
<tr>
<th>ALTITUDE RANGE</th>
<th>AVG. GAS HEAT VALUE AT ALTITUDE (Btu/cu ft)</th>
<th>SPECIFIC GRAVITY OF NATURAL GAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ft (m)</td>
<td>Orifice No.</td>
<td>Manifold Pressure</td>
</tr>
<tr>
<td>7001 (2134)</td>
<td>650</td>
<td>42</td>
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<tr>
<td></td>
<td>675</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>700</td>
<td>43</td>
</tr>
<tr>
<td>8000 (2438)</td>
<td>725</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>750</td>
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</tr>
<tr>
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<td>800</td>
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<tr>
<td></td>
<td>825</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>825</td>
<td>44</td>
</tr>
<tr>
<td>8001 (2439)</td>
<td>625</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>650</td>
<td>43</td>
</tr>
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<td>675</td>
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<td></td>
<td>700</td>
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<td>775</td>
<td>44</td>
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<tr>
<td></td>
<td>775</td>
<td>44</td>
</tr>
<tr>
<td>9000 (2743)</td>
<td>800</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>825</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>825</td>
<td>44</td>
</tr>
<tr>
<td>9001 (2744)</td>
<td>600</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>625</td>
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<td>44</td>
</tr>
<tr>
<td></td>
<td>725</td>
<td>44</td>
</tr>
</tbody>
</table>

*Orifice numbers shown in **BOLD** are factory-installed.

---

**Adjust Temperature Rise**

**NOTE:** Blower door must be installed when taking temperature rise reading. Leaving blower door off will result in incorrect temperature measurements.

---

**CAUTION**

**FURNACE OVERHEATING HAZARD**

Failure to follow this caution may result in shortened furnace life.

Set air temperature rise within limits specified on the rating plate to prevent reduced life of furnace components.

---

**CAUTION**

**FURNACE DAMAGE HAZARD**

Failure to follow this caution may result in overheating the heat exchangers or condensing flue gases in heat exchanger areas not designed for condensate.

Temperature rise must be within limits specified on unit rating plate.

---

**CAUTION**

**UNIT DAMAGE HAZARD**

Failure to follow this caution may result in component damage.

Temperature rise must be within limits specified on furnace rating plate. Recommended operation is at midpoint of rise range or slightly above.

---

**WARNING**

**ELECTRICAL OPERATION HAZARD**

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

Disconnect 115v electrical power before changing speed tap.
Table 4 Blower Speed Taps

<table>
<thead>
<tr>
<th>COLOR</th>
<th>SPEED</th>
<th>FACTORY ATTACHED TO:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray</td>
<td>5</td>
<td>Cool</td>
</tr>
<tr>
<td>Yellow</td>
<td>4</td>
<td>Spare</td>
</tr>
<tr>
<td>Blue</td>
<td>3</td>
<td>Heat</td>
</tr>
<tr>
<td>Orange</td>
<td>2</td>
<td>Spare</td>
</tr>
<tr>
<td>Red</td>
<td>1</td>
<td>LO HT/Cont. Fan</td>
</tr>
</tbody>
</table>

To change blower motor speed selections for heating mode, remove blower motor lead from control HEAT terminal. (See Figure 4) Select desired blower motor speed lead from one of the other motor leads and relocate it to HEAT terminal. (See Table 4 for lead color identification.) Reconnect original lead on SPARE terminal.

Adjust Blower Off Delay (Heat Mode)

The blower off delay has four adjustable settings from 90 sec to 180 sec. (See Table 5) The blower off delay jumpers are located on the furnace control (See Figure 4) To change the blower off delay setting, move the jumper from one set of pins on the control to the pins used for the desired blower off delay. Factory blower off delay setting is 120 sec.

Table 5 Blower Off Delay Jumper Positions

<table>
<thead>
<tr>
<th>PINS</th>
<th>1 AND 2</th>
<th>2 AND 3</th>
<th>3 AND 4</th>
<th>4 AND 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>90</td>
<td>120</td>
<td>150</td>
<td>180</td>
</tr>
</tbody>
</table>

Adjust Cooling Airflow

The cooling airflow can be set from the remaining blower speed taps. Refer to the Air Delivery Tables in these instructions.

Adjust Continuous Fan Airflow

The Continuous Fan airflow can be set from the remaining blower speed taps. Refer to the Air Delivery Tables in these instructions.

Adjust Thermostat Heat Anticipator

When using a non-electronic thermostat, the thermostat heat anticipator must be set to match the amp draw of the electrical components in R–W circuit. Accurate amp draw readings can be obtained at the thermostat subbase terminals R and W. Figure 5 illustrates the easy method of obtaining actual amp draw. The amp reading should be taken after blower motor has started and furnace is heating. Connect ammeter wires as shown in Figure 5. The thermostat anticipator should not be in the circuit while measuring current. If thermostat has no subbase, the thermostat must be disconnected from R and W wires during current measurement. See thermostat manufacturer’s instructions for adjusting heat anticipator and for varying heating cycle length. For an electronic thermostat, set cycle rate for 3 cycles per hour.

Check Safety Controls

The flame sensor, gas valve, and pressure switch were all checked in the Start–up procedure section as part of normal operation.

1. Check Main Limit Switch
   a. Run furnace for at least 5 minutes.
   b. Gradually block off return air with a piece of cardboard or sheet metal until the limit trips.
   c. Unblock return air to permit normal circulation.
   d. Burners will re-light when furnace cools down.

   2. Check Pressure Switch(es)
      a. Turn off 115–v power to furnace.

   a. Run furnace for at least 5 minutes.
   b. Gradually block off return air with a piece of cardboard or sheet metal until the limit trips.
   c. Unblock return air to permit normal circulation.
   d. Burners will re-light when furnace cools down.

   2. Check Pressure Switch(es)
      a. Turn off 115–v power to furnace.

    A96316
b. Disconnect inducer motor lead wires from wire harness.
c. Turn on 115–v power to furnace.
d. Set thermostat to “call for heat” and wait 1 minute. When low pressure switch is functioning properly, hot surface igniter should **NOT** glow and control diagnostic light flashes a status code 3. If hot surface igniter glows when inducer motor is disconnected, shut down furnace immediately.
e. Determine reason low pressure switch did not function properly and correct condition.
f. Turn off 115–v power to furnace.
g. Reconnect inducer motor wires, replace door, and turn on 115–v power.
h. Blower will run for 90 seconds before beginning the call for heat again.
i. Furnace should ignite normally.

**Checklist**

1. Put away tools and instruments. Clean up debris.
2. Verify that the jumper is removed from the TEST/TWIN terminal. Verify that there is nothing plugged into the PLT connector. **(See Figure 4)**
3. Verify that the Heat Off Delay jumpers are set as desired. **(See Figure 4)**
4. Verify that the blower and control (“Main”) doors are properly installed.
5. Verify that the Status LED glows. If not, check that the power supply is energized and that the blower door is secure. **(See Figure 14)** to interpret diagnostic codes.
6. Cycle test furnace with room thermostat to be sure that it operates properly with the room thermostat. Check all modes including Heat, Cool and Fan.
7. Check operation of accessories per manufacturer’s instructions.
8. Review Home Owner’s Information with owner.
9. Attach entire literature packet to furnace.

**Table 6**

<table>
<thead>
<tr>
<th>INPUT BTUH</th>
<th>RETURN-AIR SUPPLY</th>
<th>SPEED</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td>40,000</td>
<td>SIDE/BOTTOM</td>
<td>5(Gry)</td>
<td>1120</td>
<td>1080</td>
<td>1030</td>
<td>980</td>
<td>925</td>
<td>875</td>
<td>820</td>
<td>760</td>
<td>690</td>
<td>630</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4(Yel)</td>
<td>880</td>
<td>845</td>
<td>810</td>
<td>780</td>
<td>740</td>
<td>710</td>
<td>680</td>
<td>640</td>
<td>615</td>
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<td>640</td>
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<td>540</td>
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<td>385</td>
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<td>255</td>
<td>220</td>
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<td>1670</td>
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<td>1220</td>
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</tr>
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<td>785</td>
<td>745</td>
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<td>800</td>
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<td>1550</td>
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<td>2230</td>
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<td>2130</td>
<td>2055</td>
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<td>1770</td>
<td>1720</td>
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<td>1565</td>
<td>1505</td>
<td>1445</td>
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<td>1325</td>
<td>1275</td>
<td>1225</td>
<td>1170</td>
<td>1130</td>
</tr>
</tbody>
</table>
SERVICE AND MAINTENANCE PROCEDURES

**WARNING**

**FIRE, INJURY OR DEATH HAZARD**

Failure to follow this warning could result in personal injury, death and/or property damage.

The ability to properly perform maintenance on this equipment requires certain knowledge, mechanical skills, tools, and equipment. If you do not possess these, do not attempt to perform any service and maintenance on this equipment other than those procedures recommended in the Owner's Manual.

**CAUTION**

**ENVIRONMENTAL HAZARD**

Failure to follow this caution may result in environmental pollution.

Remove and recycle all components or materials (i.e. oil, refrigerant, control board, etc.) before unit final disposal.

**WARNING**

**ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD**

Failure to follow this warning could result in personal injury or death, or property damage.

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position and install a lockout tag. There may be more than one disconnect switch. Lock out and tag switch with a suitable warning label. Verify proper operation after servicing.

**CAUTION**

**ELECTRICAL OPERATION HAZARD**

Failure to follow this caution may result in improper furnace operation or failure of furnace.

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

General

These instructions are written as if the furnace is installed in an upflow application. An upflow furnace application is where the blower is located below the combustion and controls section of the furnace, and conditioned air is discharged upward. Since this furnace can be installed in any of the 4 positions shown in Figure 6, you must revise your orientation to component location accordingly.

The electrical ground and polarity for 115-V wiring must be properly maintained. Refer to Figure 7 for field wiring information and to Figure 15 for furnace wiring information.

**NOTE:** If the polarity is not correct, the STATUS LED on the control will flash code 10 and prevent the furnace from heating.

The control system also requires an earth ground for proper operation of the control and flame-sensing electrode.

The 24-V circuit contains an automotive-type, 3-amp. fuse located on the control. (See Figure 4) Any shorts of the 24-V wiring during installation, service, or maintenance will cause this fuse to blow. If fuse replacement is required, use ONLY a 3-amp. fuse. The control LED display will be off when fuse needs to be replaced.

**Troubleshooting**

Refer to the service label. (See Figure 14—Service Label)

The Troubleshooting Guide (See Figure 16) can be a useful tool in isolating furnace operation problems. Beginning with the word “Start,” answer each question and follow the appropriate arrow to the next item.

The Guide will help to identify the problem or failed component. After replacing any component, verify correct operation sequence.

Proper instrumentation is required to service electrical controls. The control in this furnace is equipped with a Status Code LED (Light-Emitting Diode) to aid in installation, servicing, and troubleshooting. Status codes can be viewed at the indicator in blower door. The green furnace control LED is either ON heartbeat, off or a code composed of 1 or 2 digits. The first digit is the number of short flashes, the second digit is the number of long flashes.
For an explanation of status codes, refer to service label located on blower door or Figure 14, and the troubleshooting guide which can be obtained from your distributor.

Retrieving Stored Fault Codes

**NOTE:** Fault codes cannot be retrieved if a thermostat signal (24-V on W, Y, G, etc.) is present, or if any delays such as blower off-delays are active.

The stored status codes will NOT be erased from the control memory when 115- or 24-V power is interrupted. See the Service Label (See Figure 14) for more information. The most recent fault code may be retrieved as follows:

1. Leave 115-V power connected to furnace.
2. Observe the status LED through the blower door (the lower door on upflow applications) indicator. Refer to the Service Label (See Figure 14) to interpret the LED.
3. Remove the Main/Control door (the upper door on upflow installations).
4. BRIEFLY disconnect and reconnect ONE of the main limit wires.
5. The LED will flash the last stored fault code. Refer to the Service Label (See Figure 14) to interpret the LED.
6. A component test sequence will follow.
7. Reinstall the Main/Control door.

Component Self-Test

**NOTE:** The furnace control component test allows all components to run for a short time; except the gas valve and humidifier terminal HUM 24 VAC are not energized. The EAC-1 terminal is energized when the blower is energized. This feature helps diagnose a system problem in case of a component failure. The component test feature will not operate if any thermostat signal is present at the control and not until all time delays are completed.

**To begin Component Self-Test:**

1. Remove blower access door.
2. Disconnect the thermostat R lead from furnace control.
3. Manually close blower door switch.

Caution must be taken when manually closing this switch for service purposes.

---

**WARNING**

**ELECTRICAL SHOCK HAZARD**

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

Blower access door switch opens 115-V power to control. No component operation can occur unless switch is closed. Caution must be taken when manually closing this switch for service purposes.

4. For approximately 2 sec, short (jumper) the C terminal on control to the TEST/TWIN 3/16-in. (5 mm) quick-connect terminal on control until the LED goes off. Remove jumper from terminals. (See Figure 4)

**NOTE:** If TEST/TWIN and C terminals are jumpered longer than 2 sec, LED will flash code 10 and ignore component test request.

Component test sequence is as follows:

- a. LED will display previous status code 4 times.
- b. Inducer motor starts and continues to run until Step g of component test sequence.
- c. After 7 seconds the hot surface igniter is energized for 15 sec., then off.
- d. Blower motor operates on Continuous-FAN speed for 10 sec.
- e. Blower motor operates on HEAT speed for 10 sec.
- f. Blower motor operates on COOL speed for 10 sec.
- g. Inducer motor stops.
5. Reconnect R lead to furnace control, remove tape from blower door switch, and re-install blower door.
6. Verify furnace shut down by lowering thermostat setting below room temperature.
7. Verify that furnace restarts by raising thermostat setting above room temperature.

**Care and Maintenance**

---

**WARNING**

**FIRE OR EXPLOSION HAZARD**

Failure to follow this warning could result in personal injury, death and/or property damage.

Never store flammable or combustible materials on, near, or in contact with the furnace, such as:

1. Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners, or other cleaning tools.
2. Soap powders, bleaches, waxes or other cleaning compounds, plastic or plastic containers, gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids, or other volatile fluids.
3. Paint thinners and other painting compounds, paper bags, or other paper products. Exposure to these materials could lead to corrosion of the heat exchangers.

---

**WARNING**

**ELECTRICAL SHOCK AND FIRE HAZARD**

Failure to follow this warning could result in personal injury, death, and/or property damage.

Turn off the gas and electrical supplies to the furnace and install lockout tag before performing any maintenance or service. Follow the operating instructions on the label attached to the furnace.

---

**WARNING**

**CARBON MONOXIDE POISONING AND FIRE HAZARD**

Failure to follow this warning could result in personal injury, death and/or property damage.

Never operate furnace without a filter or filtration device installed. Never operate a furnace with filter or filtration device access doors removed.

---

**WARNING**

**CUT HAZARD**

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts, and servicing furnaces.

---

The minimum maintenance on this furnace is as follows:

1. Check and clean air filter each month or more frequently if required. Replace if torn.
2. Check blower motor and wheel for cleanliness each heating and cooling season. Clean as necessary.
3. Check electrical connections for tightness and controls for proper operation each heating season. Service as necessary.
4. Inspect burner compartment before each heating season for rust, corrosion, soot or excessive dust. If necessary, have furnace and burner serviced by a qualified service agency.
5. Inspect the vent pipe/vent system before each heating season for water leakage, sagging pipes or broken fittings. Have vent pipes/vent system serviced by a qualified service agency.
6. Inspect any accessories attached to the furnace such as a humidifier or electronic air cleaner. Perform any service or maintenance to the accessories as recommended in the accessory instructions.

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**Cleaning and/or Replacing Air Filter**

The air filter type may vary depending on the application or orientation. The filter is external to the furnace casing. There are no provisions for an internal filter with this furnace. See “Filter Arrangement” under the “Installation” section of this manual.

**NOTE:** If the filter has an airflow direction arrow, the arrow must point toward the blower.

To clean or replace filters, proceed as follows:

---

1. Turn off electrical supply to furnace.
2. Remove filter cabinet door.
3. Slide filter out of cabinet.
4. If equipped with permanent, washable filter, clean filter by spraying cold tap water through filter in opposite direction of airflow. Rinse filter and let dry. Oiling or coating of the filter is not recommended.
5. If equipped with factory specified disposable media filter, replace only with a factory specified media filter of the same size.
6. Slide filter into cabinet.
7. Replace filter cabinet door.
8. Turn on electrical supply to furnace.

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**Blower Motor and Wheel Maintenance**

To ensure long life, economy, and high efficiency, clean accumulated dirt and grease from blower wheel and motor annually.

The inducer and blower motors are pre-lubricated and require no additional lubrication. These motors can be identified by the absence of oil ports on each end of the motor.

The following items should be performed by a qualified service technician. Clean blower motor and wheel as follows:

1. Turn off electrical supply to furnace.
2. Remove blower door.
3. All factory wires can be left connected, but field thermostat and accessory wiring may need to be disconnected depending on their length and routing.

4. If the vent and combustion air pipe passes through the blower compartment, it will be necessary to remove the pipes from the blower compartment.

Disconnect the vent and combustion air pipe by:
   a. Loosen the clamps on the vent couplings and combustion air pipe external to the furnace.
   b. Separate the pipes from the couplings and move them aside.
   c. Loosen the clamps on the vent couplings and combustion air pipe located on the blower shelf.
   d. Separate the pipes from the blower compartment and set aside.
   e. Remove the couplings from the pipe adapters and set aside.
   f. After servicing the blower, reverse steps a through e.
   g. Tighten all clamps 15 lb-in.

See Figure 8 for steps 5 through 14.

5. Remove screws securing blower assembly to blower shelf and slide blower assembly out of furnace. Detach ground wire and disconnect blower motor harness plugs from blower motor.

NOTE: Blower wheel is fragile. Use care.

6. Clean blower wheel and motor by using a vacuum with soft brush attachment. Be careful not to disturb balance weights (clips) on blower wheel vanes. Do not bend wheel or blades as balance will be affected.

7. If greasy residue is present on blower wheel, remove wheel from the blower housing and wash it with an appropriate degreaser. To remove wheel:
   a. Mark blower wheel location on shaft before disassembly to ensure proper reassembly.
   b. Loosen setscrew holding blower wheel on motor shaft.

NOTE: Mark blower mounting arms and blower housing so each arm is positioned at the same hole location during reassembly.
   c. Mark blower wheel orientation and cutoff plate location to ensure proper reassembly.
   d. Remove screws securing cutoff plate and remove cutoff plate from housing.
   e. Remove bolts holding motor mounts to blower housing and slide motor and mounts out of housing.
   f. Remove blower wheel from housing.
   g. Clean wheel per instructions on degreaser cleaner. Do not get degreaser in motor.

8. Reassemble motor and blower wheel by reversing items 7b through 7f. Ensure wheel is positioned for proper rotation.
9. Torque motor mounting bolts to 40 ± 10 lb-in. when reassembling.
10. Torque blower wheel set screw to 160 ± 20 lb-in. when reassembling.
11. Verify that blower wheel is centered in blower housing and set screw contacts the flat portion of the motor shaft. Loosen set screw on blower wheel and reposition if necessary.
12. Spin the blower wheel by hand to verify that the wheel does not rub on the housing.
13. Reinstall blower assembly in furnace.
14. Reinstall 2 screws securing blower assembly to blower deck.
15. Reconnect blower leads to furnace control. Refer to furnace wiring diagram, and connect thermostat leads if previously disconnected.

**NOTE:** Be sure to attach ground wire and reconnect blower harness plugs to blower motor.

### WARNING

**ELECTRICAL OPERATION HAZARD**
Failure to follow this warning could result in personal injury or death.
Blower door switch opens 115-V power to control. No component operation can occur unless switch is closed. Caution must be taken when manually closing this switch for service purposes.

16. Downflow or horizontal furnaces with vent pipe through furnace only:
   a. Install and connect short piece of vent pipe inside furnace to existing vent.
   b. Connect vent connector to vent elbow.
17. Turn on electrical supply. Manually close blower door switch. Use a piece of tape to hold switch closed. Check proper rotation and speed changes between heating and cooling by jumpering R to G and R to Y/Y2 on furnace control thermostat terminals. If outdoor temperature is below 70°F, turn off circuit breaker to outdoor unit before running furnace in the cooling cycle. Turn outdoor circuit breaker on after completing cooling cycle. (See Figure 4)

**NOTE:** If R–W/W1 thermostat terminals are jumpered at the time blower door switch is closed, blower will run for 90 sec before beginning a heating cycle.
   a. Perform component self-test as shown at the bottom of the SERVICE label, located on the blower door.
   b. Verify blower is rotating in the correct direction

18. If furnace is operating properly, RELEASE BLOWER DOOR SWITCH. Remove any jumpers or reconnect any disconnected thermostat leads. Replace blower door.
19. Turn on gas supply and cycle furnace through one complete heating cycle. Verify the furnace temperature rise as shown in Adjustments Section. Adjust temperature rise as shown in Adjustments Section.

### Cleaning Burners and Flame Sensor

The following items must be performed by a qualified service technician. If the burners develop an accumulation of light dirt or dust, they may be cleaned by using the following procedure:

**NOTE:** Use a back-up wrench on the gas valve to prevent the valve from rotating on the manifold or damaging the mounting to the burner assembly.

Refer to Figure 9.

1. Disconnect power at external disconnect, fuse or circuit breaker.
2. Turn off gas at external shut-off or gas meter.
3. Remove control door and set aside.
4. Turn electric switch on gas valve to OFF.
5. Disconnect the gas pipe from gas valve and remove pipe from the furnace casing.
6. Remove individual wires from terminals on gas valve.
7. Disconnect Hot Surface Igniter (HSI) wires from HSI.
9. Support the manifold and remove the 4 screws that secure the manifold assembly to the burner assembly and set aside. Note the location of the green/yellow wire and ground terminal.
10. Inspect the orifices in the manifold assembly for blockages or obstructions. Remove orifice and clean or replace orifice.
11. Remove the four screws that attach the top plate of the casing to the furnace.
12. Raise top plate up slightly and prop it up with a small piece of wood or folded cardboard.
13. Support the burner assembly and remove the screws that attach the burner assembly to the heat exchanger cell panel.
14. Remove wires from both rollout switches.
15. Slide one–piece burner out of slots on sides of burner assembly.
16. Remove the flame sensor from the burner assembly.
17. (Optional) Remove the Hot Surface Igniter (HSI) and bracket from the burner assembly.
18. Check igniter resistance. Nominal resistance is 40 to 70 ohms at room temperature and is stable over the life of the igniter.
19. Clean burner with a brush and a vacuum.
20. Clean the flame sensor with fine steel wool (0000 grade). Do not use sand paper or emery cloth.
To reinstall burner assembly:
1. Install the Hot Surface Igniter (HSI) and bracket in burner assembly.
2. Install flame sensor on burner.
3. Align the edges of the one-piece burner with the slots in the burner assembly and slide the burners forward until they are fully seated in the burner assembly.
4. Align the orifices in the manifold assembly with the support rings on the end of the burner.
5. Insert the orifices in the support rings of the burners.

**NOTE:** If manifold does not fit flush against the burner, do not force the manifold on the burner assembly. The burners are not fully seated forward in the burner assembly. Remove the manifold and check burner positioning in the burner assembly before re-installing the manifold.

6. Attach the green/yellow wire and ground terminal to one of the manifold mounting screws.
7. Install the remaining manifold mounting screws.
8. Check the igniter alignment. See Figure 9, Figure 10 and Figure 11.

9. Attach the wires to the roll-out switches.
10. Align the burner assembly with the openings in the primary cell inlet panel and attach the burner assembly to the cell panel.
11. Connect the wire for the flame sensor.
12. Connect the wire for the Hot Surface Igniter.

**NOTE:** Use propane-resistant pipe dope to prevent leaks. Do not use Teflon tape.
13. Install the gas pipe to the gas valve.
b. Carefully withdraw the igniter and bracket assembly through the front of the burner assembly without striking the igniter on surrounding parts.

c. Inspect igniter for signs of damage or failure.

d. If replacement is required, remove the screw that secures the igniter on igniter bracket and remove the igniter.

6. To replace igniter and bracket assembly, reverse items 5a through 5d.

7. Reconnect igniter harness to the igniter, dressing the igniter wires to ensure there is no tension on the igniter itself. (See Figure 9)

8. Turn on gas and electrical supplies to furnace.

9. Verify igniter operation by initiating control board self-test feature or by cycling thermostat.

10. Replace control door.

Flushing Collector Box and Drainage System

**WARNING**

**ELECTRICAL SHOCK AND FIRE HAZARD**

Failure to follow this warning could result in personal injury, death, and/or property damage.

**NOTE:** Ensure the pressure switch tube disconnected from the pressure switch is higher than the collector box opening or water will flow out of tube.

1. Turn off gas and electrical supplies to furnace.

2. Remove control door.

3. Disconnect pressure switch tube from pressure switch port.

**NOTE:** Do NOT blow into tube with tube connected to the pressure switch.

4. Remove the collector box plug from the top port on the upper corner of the collector box. (See Figure 1)

5. Attach a funnel with a flexible tube to port on the collector box.

6. Flush inside of collector box with water until discharge water from condensate trap is clean and runs freely.

7. Repeat steps 4 through 6 with middle plug on upper corner of collector box.

8. Remove the pressure switch tube from the collector box.

**NOTE:** Ensure the pressure switch tube disconnected from the pressure switch is higher than the collector box opening or water will flow out of tube.

9. Clean pressure switch port on collect box with a small wire. Shake any water out of pressure switch tube.

10. Reconnect tube to pressure switch and pressure switch port.

11. Run the furnace through two complete heating cycles to check for proper operation.

12. Install control door when complete.

**Checking Heat Pad Operation (If Applicable)**

In applications where the ambient temperature around the furnace is 32°F or lower, freeze protection measures are required. If this application is where heat tape has been applied, check to ensure it will operate when low temperatures are present.

**NOTE:** The Heat Pad, when used, should be wrapped around the condensate drain trap. There is no need to use heat tape within the furnace casing. Most heat tapes are temperature activated, and it is not practical to verify the actual heating of the tape. Check the following:

1. Check for signs of physical damage to heat tape such as nicks, cuts, abrasions, gnawing by animals, etc.

2. Check for discolored heat tape insulation. If any damage or discolored insulation is evident, replace heat tape.

3. Check that heat tape power supply circuit is on.

**Cleaning Condensate Drain and Trap**

**NOTE:** If the condensate trap is removed, a new gasket between the trap and collector box is required. Verify a condensate trap gasket is included in the service kit or obtain one from your local distributor.

1. Disconnect power at external disconnect, fuse or circuit breaker.

2. Turn off gas at external shut-off or gas meter.

3. Remove control door and set aside.

4. Turn electric switch on gas valve to OFF.

5. Disconnect external drain from condensate drain elbow or drain extension pipe inside the furnace and set aside.

6. Disconnect the condensate trap relief hose from collector box port and condensate trap.

**NOTE:** If condensate has a heat pad attached to the trap, trace the wires for the pad back to the connection point and disconnect the wires for the heat pad.

7. Remove the screw that secures the condensate trap to the collector box, remove the trap and set aside.

8. Remove the trap gasket from the collector box if it did not come off when the trap was removed.

9. Discard the old trap gasket.

10. Rinse condensate trap in warm water until trap is clean.

11. Flush condensate drain lines with warm water. Remember to check and clean the relief port on the collector box.

12. Shake trap dry.

13. Clean port on collector box with a small wire.

To re-install Condensate Drain and Trap:

1. Remove adhesive backing from condensate trap gasket.

2. Install gasket on collector box.

3. Align the condensate trap with the drain opening on the collector box and secure the trap with the screw.

4. Attach the relief hose to the relief port on the condensate trap and collector box.

5. Secure tubing to prevent any sags or traps in the tubing.

6. Connect condensate drain elbow or drain extension elbow to the condensate trap.

7. Connect the leads of the condensate heat pad (if used).

8. Connect external drain piping to the condensate drain elbow or drain extension pipe.

9. Turn gas on at electric switch on gas valve and at external shut-off or meter.

10. Turn power on at external disconnect, fuse or circuit breaker.

11. Run the furnace through two complete heating cycles to check for proper operation.

12. Install control door when complete.

**Primary Heat Exchangers**

The following items must be performed by a qualified service technician.

**Cleaning Heat Exchangers**

The following items must be performed by a qualified service technician.

**Conditions of Use**

The following items must be performed by a qualified service technician.
NOTE: If the heat exchangers get a heavy accumulation of soot and carbon, both the primary and secondary heat exchangers should be replaced rather than trying to clean them thoroughly due to their intricate design. A build-up of soot and carbon indicates that a problem exists which needs to be corrected, such as improper adjustment of manifold pressure, insufficient or poor quality combustion air, improper vent termination, incorrect size or damaged manifold orifice(s), improper gas, or a restricted heat exchanger (primary or secondary). Action must be taken to correct the problem.

1. Turn off gas and electrical supplies to furnace.
2. Remove control door.
3. Disconnect wires or connectors to flame rollout switch, gas valve, igniter, and flame sensor.
4. Using backup wrench, disconnect gas supply pipe from furnace gas control valve.
5. Remove two screws attaching top filler plate and rotate upwards to gain access to screws attaching burner assembly to cell panel.
6. Remove screws attaching burner assembly to cell panel.
(See Figure 9)
NOTE: Burner cover, manifold, gas valve, and burner assembly should be removed as one assembly.

7. Clean heat exchanger openings with a vacuum and a soft brush. (See Figure 12)

Figure 12 | Cleaning Heat Exchanger Cell

NOTE: After cleaning, inspect the heat exchangers to ensure they are free of all foreign objects that may restrict flow of combustion products.

8. Reverse items 6 through 1 for reassembly.
9. Refer to furnace wiring diagram and reconnect wires to flame rollout switch, gas valve, igniter, and flame sensor.
10. Turn on gas and electrical supplies to furnace.
11. Check furnace operation through two complete heat operating cycles. Look at burners. Burner flames should be clear blue, almost transparent. (See Figure 13)

Figure 13 | Burner Flame

12. Check for gas leaks.

WARNING
FIRE OR EXPLOSION HAZARD
Failure to follow this warning could result in personal injury, death, and/or property damage.
Never purge a gas line into a combustion chamber.
Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

13. Replace main furnace door.

Secondary Heat Exchangers
The condensing side (inside) of the secondary heat exchanger CANNOT be serviced or inspected without complete removal of the heat exchanger assembly. Detailed information on heat exchanger removal can be obtained from your Distributor.

Winterization

CAUTION
UNIT AND PROPERTY DAMAGE HAZARD
Failure to follow this caution may result in unit component or property damage.
If the furnace is installed in an unconditioned space where the ambient temperatures may be 32°F (0°C) or lower, freeze protection measures must be taken to prevent property or product damage.

Since the furnace uses a condensing heat exchanger, some water will accumulate in the unit as a result of the heat transfer process. Therefore, once it has been operated, it cannot be turned off and left off for an extended period of time when temperatures will reach 32°F (0°C) or lower unless winterized. Follow these procedures to winterize your furnace:
UNIT COMPONENT DAMAGE HAZARD

Failure to follow this caution may result in damage to the furnace and other property damage.
Do not use ethylene glycol (automotive antifreeze coolant or equivalent). Failure of plastic components may occur.

1. Obtain propylene glycol (RV/swimming pool antifreeze or equivalent).
2. Turn off gas and electrical supplies to your furnace.
3. Remove furnace control door.
4. Remove the top unused rubber plug from the port on the collector box opposite the condensate trap. (See Figure 1)
5. Connect a field supplied 3/8-in. (9.5-mm) ID tube to the open port on the collector box.
6. Insert a field supplied funnel into the tube.
7. Pour 1 quart of anti-freeze solution into the funnel/tube. Antifreeze should run through the collector box, overfill condensate trap and flow to an open drain.
8. Replace the rubber plug in the port on the collector box.
9. Remove the middle unused rubber plug from the port on the collector box opposite the condensate trap. See Figure 1
10. Repeat Steps 5 through 8.
11. If a condensate pump is used, check with pump manufacturer to verify pump is safe for use with antifreeze used. Allow pump to start and pump anti-freeze to open drain.
12. Replace main door.
13. When furnace is re-started, flush condensate pump with clear water to check for proper operation before re-starting furnace.
14. Propylene glycol need not be removed before re-starting furnace.
SERVICE

To perform status code recall/component test, the control must be in idle mode
(no calls for heat, cool, or fan with the blower off) displaying a “Heartbeat”. Status
code recall/component test can be performed in one of two ways:

1. Briefly (2-3 seconds) connect the TEST/TWIN terminal to the “C” thermostat terminal with a jumper wire.
   (NOTE: If connected for more than 4-5 seconds status code 10 will flash but it will not overwrite the previous status code),
   OR
2. Briefly remove then reconnect one wire (main or rollout switch).
   (NOTE: If wire is disconnected for more than 4-5 seconds status code 4 will flash and the previous status code will be lost).
   After the status code is flashed 4 times the component test will begin (see “Component Test Sequence” below). If no
   previous status code is available the control will not flash a status code and will immediately start the component test.
   Stored status codes are erased automatically after 72 hours.

EACH OF THE FOLLOWING STATUS CODES IS A SINGLE OR TWO DIGIT NUMBER WITH THE
FIRST NUMBER DETERMINED BY THE NUMBER OF SHORT FLASHES AND THE SECOND NUMBER
AFTER THE PLUS (+) SIGN IS THE NUMBER OF LONG FLASHES.

LED STATUS CODES

HEARTBEAT (bright-dim) - Control has 24VAC power
2 PRESSURE SWITCH DID NOT OPEN - Check for: - Obstructed pressure tubing.
   - Pressure switch stuck closed.
3 PRESSURE SWITCH DID NOT CLOSE OR REOPENED - If LPS open longer than five
   minutes, inducer shuts off for 15 minutes before retry. If HPS remains open for one minute after
   gas valves close (after three successive trials), then furnace control will lockout for 3 hours
   before retry. Check for: - Excessive wind - Proper vent sizing
   - Defective inducer motor - Low inducer voltage (115VAC) - Defective pressure switch
   - Inadequate combustion air supply - Disconnected or obstructed pressure tubing
   - Low inlet gas pressure (if LGPS used) - Restriction in vent
   - Condensate drainage restricted or blocked
   If it opens during blower on-delay period, blower will come on for the selected blower off-delay.
4 LIMIT CIRCUIT FAULT - Indicates a limit or flame rollout is open.
   Blower will run for 4 minutes or until open switch remains whichever is longer. If open longer
   than 3 minutes, code changes to lockout #7. If open less than 3 minutes status code #4
   continues to flash until blower shuts off. Flame rollout switch requires manual reset.
   Check for: - Proper vent sizing - Restricted vent
   - Loose blower wheel - Excessive wind - Dirty filter or restricted duct system
   - Defective blower motor - Defective switch or connections
   - Inadequate combustion air supply (Flame Roll-out Switch open)
5 ABNORMAL FLAME-PROVING SIGNAL - Flame is proved while gas valve is de-energized.
   Inducer will run until fault is cleared. Check for: - Leaky gas valve - Stuck-open gas valve
6 IGNITION PROVING FAILURE - Control will try three more times before lockout #6+1
   occurs. If flame signal lost during blower on-delay period, blower will come on for the selected
   blower off-delay.
   Check for: - Flame sensor must not be grounded - Low inlet gas pressure
   - Oxide buildup on flame sensor (clean with fine steel wool) - Manual valve shut-off
   - Proper flame sense microamps (.5 microamps D.C. min. , 4.0 - 6.0 nominal)
   - Gas valve defective or gas valve turned off - Defective Hot Surface Ignitor
   - Control ground continuity - Inadequate flame carryover or rough ignition
   - Green/Yellow wire MUST be connected to furnace sheet metal
7 LIMIT CIRCUIT LOCKOUT - Lockout occurs if the limit or flame rollout is open longer than
   3 minutes. - Control will auto reset after three hours. - Refer to #4.
8 GAS HEATING LOCKOUT - Control will NOT auto reset. Check for: - Mis-wired gas valve
   - Defective control (valve relay)
10 POLARITY - Line voltage (115VAC) polarity reversed.
   - If bimetal, refer to twinning kit instructions.
1+2 BLOWER ON AFTER POWER UP (115 VAC or 24 VAC)
   - Blower runs for 90 seconds, if unit is powered up during a call for heat (R-W closed) or
   (R-W) opens during blower on-delay.
6+1 IGNITION LOCKOUT - Control will auto-reset after three hours. Refer to #6.
OFF SECONDARY VOLTAGE FUSE IS OPEN Check for: - Door switch not closed
   -115VAC at L1 and Neutral, 24VAC at 24VAC RED and COM BLUE, 24V Fuse 3A
   - Short circuit in secondary voltage (24VAC) wiring.
ON CONTROL CIRCUITRY LOCKOUT - Auto-reset after one hour. Lockout due to:
   SOLID State valve relay stuck open - Flame sensor circuit failure - Software check error
   Reset power to clear lockout. Replace control if status code repeats.

COMPONENT TEST

Gas valve and humidifier will not be turned on. Components will be tested in
sequence as follows:
   Inducer motor will run for entire component test, and the following
   components are ON for 10 - 15 seconds each individually: hot surface
   ignitor, FAN (if equipped), HEAT speed, COOL speed.
NOTES:
1. If any of the original equipment wire is replaced use wire rated for 105°C.
2. Use only copper wire between the disconnect switch and the furnace junction box (JB).
3. This wire must be connected to furnace sheet metal for control to prove flame.
4. Symbols are electrical representation only.
5. Solid lines inside PCB are printed circuit board conductors and are not included in legend.
6. Replace only with a 3 amp fuse.
7. Inducer (IDM) motor contains internal auto-reset thermal overload switches (OL).
8. L2 connections are interchangeable within the L2 connector block.
9. Blower motor speed selections are for average conditions, see installation instructions for details on optimum speed selection.
10. Factory connected when LGPS is not used.
11. Ignition-lockout will occur after four consecutive unsuccessful trials-for-ignition. Control will auto-reset after three hours.
12. Blower-on delay: gas heating 25 seconds, cooling or heat pump 2 seconds.
13. Blower-off delay: gas heating selections are 90, 120, 150 or 190 seconds, cooling or heat pump 90 seconds or 5 seconds when DHUM is active.
14. BLWM is locked-rotor overload protected by redundant electronic control circuits.
15. Inductor (When Used).
Troubleshooting Guide

START

Is LED status light ON solid, alternately flashing bright-dim-bright-dim like a heartbeat, or flashing ON and OFF?

YES

NO

Is there 115V at L1 and NEUTRAL?

YES

NO

Is there 24V at 24VAC and COM?

YES

NO

Is there 115V going to switch?

YES

NO

Is there 115V at L1 and NEUTRAL?

YES

NO

Close the door switch.

Check for continuity in wire from circuit breaker to furnace.

Replace door switch.

Replace transformer.

Close circuit breaker and go back to START.

Inspect secondary voltage (24V) wiring, including thermostat leads for short circuit.

Replace fuse.

Replace furnace control.

The control is locked out and will auto-reset after 1 hour. Lockout could be due to any of the following:

- Flame sensor circuit failure.
- Gas valve relay stuck open.
- Software check error.

Reset power to clear lockout. Replace control if code repeats.

To recall a status code: Briefly (2–3 seconds) connect the TEST/TWIN terminal to the "C" thermostat terminal with a jumper wire to begin status code recovery and component test. If a previous status code is present, the code will repeat 4 times then go on to component test. If no previous code is present, a component test will begin without flashing any status codes.

Component Test Sequence: Gas valve and humidifier will not be turned on. Inducer motor will start and remain on until the end of the blower test, then off. The following components are on for 10–15 seconds each individually: hot surface igniter, blower speeds: FAN (if present), HEAT, COOL.

Was there a previous status code?

YES

NO

Does the control respond to W, Y1, Y/Y2, and G (24V) thermostat signals?

YES

NO

Run system through a heat, or cooling cycle to check operation. Status codes are erased after 72 hours.

Disconnect all the thermostat wires from the furnace control.

Replace furnace control.

Does the problem repeat when using a jumper wire?

YES

NO

The thermostat is not compatible with the furnace control. Either install a ballast resistor, connect the C furnace control thermostat terminal to the thermostat, or replace the thermostat.

Check room thermostat or interconnecting cable.

YES

NO

Is 24V present at W, Y1, Y/Y2 or G thermostat terminals on the furnace control?

YES

NO

Does the control respond to W, Y1, Y/Y2, and G (24V) thermostat signals?

YES

NO

Run system through a heat, or cooling cycle to check operation. Status codes are erased after 72 hours.

Disconnect all the thermostat wires from the furnace control.

Replace furnace control.

Does the problem repeat when using a jumper wire?

YES

NO

The thermostat is not compatible with the furnace control. Either install a ballast resistor, connect the C furnace control thermostat terminal to the thermostat, or replace the thermostat.

NO

Was there a previous status code?

YES

NO

Does the control respond to W, Y1, Y/Y2, and G (24V) thermostat signals?

YES

NO

Run system through a heat, or cooling cycle to check operation. Status codes are erased after 72 hours.

Disconnect all the thermostat wires from the furnace control.

Replace furnace control.

Does the problem repeat when using a jumper wire?

YES

NO

The thermostat is not compatible with the furnace control. Either install a ballast resistor, connect the C furnace control thermostat terminal to the thermostat, or replace the thermostat.

NO

Was there a previous status code?

YES

NO

Does the control respond to W, Y1, Y/Y2, and G (24V) thermostat signals?

YES

NO

Run system through a heat, or cooling cycle to check operation. Status codes are erased after 72 hours.

Disconnect all the thermostat wires from the furnace control.

Replace furnace control.

Does the problem repeat when using a jumper wire?

YES

NO

The thermostat is not compatible with the furnace control. Either install a ballast resistor, connect the C furnace control thermostat terminal to the thermostat, or replace the thermostat.

NO
Figure 16 (CONT.) Troubleshooting Guide

6. IGNITION PROBING FAILRE – If flame is not seen during the test for ignition
   connections, check the low Z signal on the control to assure that the for the
   selected blower off-delay. Check for the probe state is 1.0 Ohm.
   - Manual shutoff valve open or connected

7. LIMIT CIRCUIT LOCKOUT – Control will
   - Low inlet gas pressure (15 psi), Low inlet gas pressure
   - Loose or broken connection to the probe.

8. GAS HEATING LOCKOUT – Control will
   - Low inlet gas pressure (15 psi), Low inlet gas pressure
   - Loose or broken connection to the probe.

9. PROBING SIGNAL – Check for connecting wire
   - Remote control.
   - Remote control.

10. ABNORMAL ELECTRODE – Check the electrode connections.
   - Improper electrode connections.
   - Improper electrode connections.
   - Improper electrode connections.
   - Improper electrode connections.

11. PROGRAM PROBING SIGNAL – Check the electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.

12. ABNORMAL PROGRAM PROBING SIGNAL – Check the electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.

13. PROGRAM PROBING SIGNAL – Check the electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.

14. ABNORMAL PROGRAM PROBING SIGNAL – Check the electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.
    - Improper electrode connections.

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**SEQUENCE OF OPERATION**

**NOTE:** Furnace control must be grounded for proper operation or control will lock out. Control is grounded through green/yellow wire routed to gas valve and manifold bracket screw. Using the schematic diagram in Figure 15, follow the sequence of operation through the different modes. Read and follow the wiring diagram very carefully.

**NOTE:** If a power interruption occurs during a call for heat (W), the control will start a 90–second blower-only ON period two seconds after power is restored, if the thermostat is still calling for gas heating. The GREEN LED light will flash code 1+2 during the 90–second period, after which the LED will be flashing a heartbeat, as long as no faults are detected. After the 90–second period, the furnace will respond to the thermostat normally.

The blower door must be installed for power to be conducted through the blower door interlock switch ILK to the furnace control CPU, transformer TRAN, inducer motor IDM, blower motor BLWM, hot–surface igniter HSI, and gas valve GV.

1. **Heating**
   
   (See Figure 17 – Figure 23 for thermostat connections.)
   
   The wall thermostat “calls for heat,” closing the R–to–W circuit. The furnace control performs a self–check, verifies the pressure switch contacts LPS and HPS are open, and starts the inducer motor IDM.
   
   a. **Inducer Prepurge Period**– As the inducer motor IDM comes up to speed the low pressure switch contacts LPS close to begin a 15 second prepurge period. The high pressure switch contacts HPS are ignored until one minute after the gas valve closes.

   b. **Igniter Warm-Up**– At the end of the prepurge period, the Hot–Surface igniter HSI is energized for a 17–second igniter warm–up period.

   c. **Trial–for–Ignition Sequence**– When the igniter warm–up period is completed, the main gas valve relay contacts GVR close to energize the gas valve GV, the gas valve opens, and 24 vac power is supplied for a field–installed humidifier at the HUM 24VAC terminal. The gas valve GV permits gas flow to the burners where it is ignited by the HSI. Five seconds after the GVR closes, a 2–second flame proving period begins. The HSI igniter will remain energized until the flame is sensed or until the 2–second flame proving period begins.

   d. **Flame–Proving**– When the burner flame is proved at the flame–proving sensor electrode FSE, the furnace control CPU begins the blower–ON delay period and continues to hold the gas valve GV open. If the burner flame is not proved within two seconds, the control CPU will close the gas valve GV, and the control CPU will repeat the ignition sequence for up to three more Trials–For–Ignition before going to Ignition–Lockout. Lockout will be reset automatically after three hours or by momentarily interrupting 115 vac power to the furnace, or by interrupting 24 vac power at 24VAC or COM to the furnace control CPU (not at W, G, R, etc.).

   If flame is proved when flame should not be present, the furnace control CPU will lock out of Gas–Heating mode and operate the inducer motor IDM until flame is no longer proved.

   e. **Blower–On Delay**– If the burner flame is proven, the blower motor is energized on HEAT speed 25 seconds after the gas valve GV is energized. Simultaneously, the electronic air cleaner terminal EAC 1 AMP is energized and remains energized as long as the blower motor BLWM is energized.

   f. **Heat–Off Delay**– When the thermostat is satisfied, the R–to–W circuit is opened, de–energizing the gas valve GV, stopping gas flow to the burners, and de–energizing the humidification terminal HUM 24 VAC. The inducer motor IDM will remain energized for a 15–second post–purge period. The blower motor BLWM and air cleaner terminal EAC 1 AMP will remain energized for 90, 120, 150, or 180 seconds (depending on the heat–OFF delay selection). The furnace control CPU is factory–set for a 120–second heat–OFF delay.

2. **Cooling Mode**
   
   The thermostat “calls for cooling.”

   a. **Single–Speed Cooling**
      
      (See Figure 17 – Figure 23 for thermostat connections.)
      
      
      The electronic air cleaner terminal EAC 1 AMP is energized with 115 vac when the blower motor BLWM is operating. When the thermostat is satisfied, R–to–G–and–Y circuits are opened. The outdoor unit will stop, and the furnace blower motor BLWM will continue operating on the COOL speed for an additional 90 seconds. Jumper Y/Y2 to DHUM to reduce the cooling off–delay to 5 seconds. (See Figure 4)

   b. **Two–Speed Cooling**
      
      (See Figure 17 – Figure 23 for thermostat connections.)
      
      
      The electronic air cleaner terminal EAC 1 AMP is energized with 115 vac whenever the blower motor BLWM is operating. When the thermostat is satisfied, the R–to–G–and–Y1 or R–to–G–and–Y1 and Y2 circuits are opened. The outdoor unit stops, and the furnace blower BLWM and electronic air cleaner terminal EAC 1 AMP will remain energized for an additional 90 seconds. Jumper Y1 to DHUM to reduce the cooling off–delay to 5 seconds. (See Figure 4)

3. **Dehumidify Mode**
   
   (See Figure 17 – Figure 23 for humidity sensing thermostat connections.)
   
   The dehumidification output, H on the humidity sensing thermostat should be connected to the furnace control thermostat terminal DHUM. When there is a dehumidify demand, the H input is activated, which means 24 vac signal is removed from the DHUM input terminal. In other words, the DHUM input logic is reversed. The DHUM input is turned ON when no dehumidify demand exists.

   **Activation/Deactivation**
   
   Once 24 vac is detected by the furnace control on the DHUM input, the furnace control operates in dehumidify mode. If the DHUM input is low for more than 48 hours, the furnace control reverts back to non–humidity sensing thermostat mode.
   
   The cooling operation described in item 2. above also applies to operation with a humidity sensing thermostat. The exceptions are listed below:
a. When the R–G–Y1 circuit is closed and there is a demand for dehumidification, the furnace blower motor BLWM will continue running at low–cool speed (same speed as FAN).

b. When the R–G–Y/Y2 circuit is closed and there is a demand for dehumidification, the furnace blower motor BLWM will drop the blower speed from COOL to HEAT for a maximum of 10 minutes before reverting back to COOL speed. If there is still a demand for dehumidification after 20 minutes, the furnace control CPU will drop the blower speed back to HEAT speed. This alternating 10–minute cycle will continue as long as there is a call for cooling.

c. When the “call for cooling” is satisfied and there is a demand for dehumidification, the cooling blower-OFF delay is decreased from 90 seconds to 5 seconds.

4. Continuous Blower Mode
When the R–G circuit is closed by the thermostat, the blower motor BLWM will operate on continuous–blower speed (same speed as FAN). Terminal EAC 1 AMP is energized as long as the blower motor BLWM is energized. During a call for heat, the blower BLWM will stop during igniter warm-up (17 seconds), ignition (7 seconds), and blower–on delay (25 seconds), allowing the furnace heat exchangers to heat up more quickly, then restarts at the end of the blower–on delay period at HEAT speed.

In heating, the furnace control CPU will hold the blower motor BLWM at HEAT speed during the selected heat–off delay period before reverting to continuous–blower speed. When the thermostat “calls for low–cooling,” the blower motor BLWM will remain operating at continuous blower speed.

When the thermostat “calls for high–cooling”, the blower motor BLWM will operate at COOL speed. When the thermostat is satisfied, the blower motor BLWM will operate an additional 90 seconds on COOL speed before reverting back to continuous–blower speed. When the R–G circuit is opened, the blower motor BLWM will continue operating for an additional 5 seconds, if no other function requires blower motor BLWM operation.

5. Heat pump
(See Figure 17 – Figure 23 for thermostat connections.)
NOTES FOR Figure 17 – Figure 23

1. Refer to outdoor equipment Installation Instructions for additional information and setup procedure.
2. Outdoor Air Temperature Sensor must be attached in all dual fuel application.
3. Refer to ICP thermostat Installation Instructions for additional information and setup procedure.
4. When using a Humidity Sensing Thermostat, set DEHUMIDIFY OPTIONS to H DE-ENRGZD FOR DEHUM
5. HUM 24VAC terminal is 24 VAC and is energized when the low pressure switch closes during a call for heat.
6. When connecting 115 VAC to humidifier use a separate 115 VAC supply.
7. When using a humidifier on a HP installation, connect humidifier to hot water.
PARTS REPLACEMENT INFORMATION GUIDE

Casing GROUP
Control door
Blower door
Top filler plate
Bottom filler plate
Door Knob Assembly

Electrical group
Control box
Junction box
Limit switch(es)
Circuit board
Door switch
Transformer
3-Amp fuse
Flame Rollout Switch
Main Wiring Harness
Blower Motor Harness (when used)

Filter Group
Filter(s)

Blower group
Cut–off Plate
Blower housing
Blower motor
Blower wheel
Capacitor (when used)
Capacitor strap (when used)
Power choke (where used)

Gas Control Group
Manifold
Burner
Orifice
Flame sensor
Hot surface igniter
Gas valve

Heat exchanger group
Primary Heat Exchanger assembly
Primary Heat Exchanger cell panel
Secondary Heat Exchanger assembly
Coupling box
Containment Plate
Tubing Gaskets

Inducer group
Pressure switch(es)
Inducer assembly
Inducer
Inducer motor
Motor Module (when used)
Inducer motor capacitor (when used)
Collector box
Condensate trap
Condensate trap elbow
Gaskets

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! WARNING

FIRE, EXPLOSION, ELECTRICAL SHOCK AND CARBON MONOXIDE POISONING HAZARD
Failure to follow this warning could result in dangerous operation, personal injury, death or property damage. Improper installation, adjustment, alteration, service, maintenance, or use can cause carbon monoxide poisoning, explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, local gas supplier, or your distributor or branch for information or assistance. The qualified installer or agency must use only factory-authorized and listed kits or accessories when modifying this product.

Have available the product/model number and the serial number located on the unit rating plate to ensure correct replacement parts. TO OBTAIN INFORMATION ON PARTS: Consult your installing dealer or the classified section of your local telephone directory under the “Heating Equipment” or “Air Conditioning Contractors and Systems” headings for dealer listing by brand name, or contact:
### PRODUCT NOMENCLATURE

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<td>17 = 17–1/2&quot;</td>
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<td>21 = 21&quot;</td>
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<td>24 = 24–1/2&quot;</td>
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<td>10 = 1000 CFM (max)</td>
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<td>14 = 1400 CFM (max)</td>
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<td>16 = 1600 CFM (max)</td>
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<td>20 = 2000 CFM (max)</td>
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<td>22 = 2200 CFM (max)</td>
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931-270-4100

Specifications subject to change without notice.