# Maintenance

Make sure all personnel are standing clear of the unit before proceeding. The system components will start when the power is applied.

## Fan Belt Adjustment—Belt Drive Units

**⚠WARNING**

**Rotating Components!**

**The following procedure involves working with rotating components. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in rotating components cutting and slashing technician which could result in death or serious injury.**

The fan belts must be inspected periodically to assure proper unit operation.

Replacement is necessary if the belts appear frayed or worn. Units with dual belts require a matched set of belts to ensure equal belt length.

When removing or installing the new belts, do not stretch them over the sheaves. Loosen the belts using the belt tension adjustment bolts on the motor mounting base.

Once the new belts are installed, using a Browning or Gates tension gauge (or equivalent) illustrated in Figure 21; adjust the belt tension as follows;

1. To determine the appropriate belt deflection;
   a. Measure the center-to-center shaft distance (in inches) between the fan and motor sheaves.
   b. Divide the distance measured in Step 1a by 64; the resulting value represents the amount of belt deflection that corresponds to the proper belt tension.
2. Set the large O-ring on the belt tension gauge at the deflection value determined in Step 1b.
3. Set the small O-ring at zero on the force scale of the gauge plunger.
4. Place the large end of the gauge at the center of the belt span; then depress the gauge plunger until the large O-ring is even with the top of the next belt or even with a straightedge placed across the fan and motor sheaves.

   Refer to Table 9, p. 28.
5. Remove the belt tension gauge. The small O-ring now indicates a number other than zero on the plunger's force scale. This number represents the force (in pounds) required to give the needed deflection.
6. Compare the "force" scale reading (Step 5) with the appropriate "force" value listed in Table 9, p. 28. If the "force" reading is outside the range, readjust the belt tension.

***Note:*** *Actual belt deflection "force" must not exceed the maximum "force" value shown in Table 9, p. 28.*

7. Recheck the belt tension at least twice during the first 2 to 3 days of operation. Belt tension may decrease until the new belts are "run in".

**Figure 21. Belt tension gauge**

$$\text{Deflection} = \frac{\text{Belt Span}}{64} \text{ (in)}$$

$$\text{Deflection} = \frac{\text{Belt Span}}{152} \text{ (mm)}$$

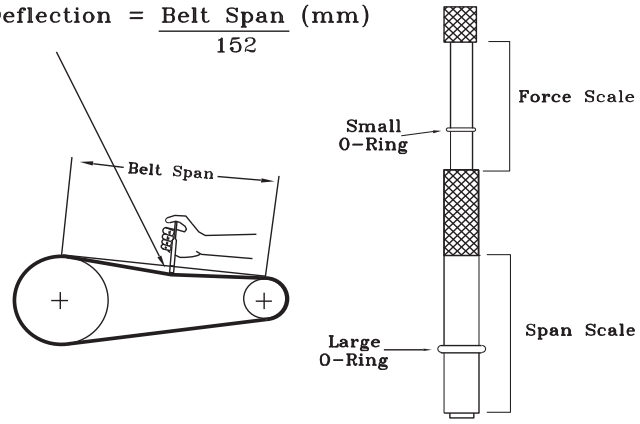


**Table 9. Belt tension measurement and deflection ranges**

| Belts Cross Section | Smallest Sheave Diameter Range (in.) | RPM Range | Deflection Force (lb) | | | |
|---|---|---|---|---|---|---|
| | | | Super Gripbelts and Unnotched Gripbands | | Gripnotch Belts and Notched Gripbands | |
| | | | Used Belt | New Belt | Used Belt | New Belt |
| A, AX | 3.0–3.6 | 1000-2500 | 3.7 | 5.5 | 4.1 | 6.1 |
| | | 2501-4000 | 2.8 | 4.2 | 3.4 | 5.0 |
| | 3.8–4.8 | 1000-2500 | 4.5 | 6.8 | 5.0 | 7.4 |
| | | 2501-4000 | 3.8 | 5.7 | 4.3 | 6.4 |
| | 5.0–7.0 | 1000-2500 | 5.4 | 8.0 | 5.7 | 8.4 |
| | | 2501-4000 | 4.7 | 7.0 | 5.1 | 7.6 |

## Monthly Maintenance

Before completing the following checks, turn the unit OFF and lock the main power disconnect switch open.

**⚠WARNING**

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

## Filters

Inspect the return air filters. Clean or replace them if necessary. Refer to the unit Service Facts for filter information.

## Condensate Overflow Switch

During maintenance, the switch float (black ring) must be checked to ensure free movement up and down.

## Cooling Season

- Check the unit's drain pans and condensate piping to ensure that there are no blockages.
- Inspect the evaporator and condenser coils for dirt, bent fins, etc. If the coils appear dirty, clean them according to the instructions described in "Condenser Coil Cleaning," p. 29.
- Manually rotate the condenser fan(s) to ensure free movement and check motor bearings for wear. Verify that all of the fan mounting hardware is tight.
- Inspect the F/A-R/A damper hinges and pins to ensure that all moving parts are securely mounted. Keep the blades clean as necessary.

***NOTICE:***

**Equipment Damage!**

**Never turn the motor shaft by hand or with a wrench. Forcibly turning the motor shaft can damage the gear train and motor beyond repair.**

- Verify that all damper linkages move freely; lubricate with white grease, if necessary.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- Check the fan shaft bearings for wear. Replace the bearings as necessary.
- Check the supply fan belt. If the belt is frayed or worn, replace it. Refer to "Fan Belt Adjustment—Belt Drive Units," p. 28 for belt replacement and adjustments.
- Verify that all wire terminal connections are tight.
- Remove any corrosion present on the exterior surfaces of the unit and repaint these areas.
- Generally inspect the unit for unusual conditions (e.g., loose access panels, leaking piping connections, etc.).
- Make sure that all retaining screws are reinstalled in the unit access panels once these checks are complete.
- With the unit running, check and record the: ambient temperature; compressor suction and discharge pressures (each circuit); superheat (each circuit); Record this data on an "operator's maintenance log" like the one shown in Table 10, p. 30. If the operating pressures indicate a refrigerant shortage, measure the system superheat. For guidelines, refer to "Compressor Start-Up," p. 26.

***Note:*** *Do NOT release refrigerant to the atmosphere! If adding or removing refrigerant is required, the service technician must comply with all federal, state and local laws.*

## Heating Season

- Inspect the unit's air filters. If necessary, clean or replace them.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- Inspect both the main unit control panel and heat section control box for loose electrical components and terminal connections, as well as damaged wire insulation. Make any necessary repairs.
- Verify that the electric heat system operates properly.

## Condenser Coil Cleaning

Regular coil maintenance, including annual cleaning, enhances the unit's operating efficiency by minimizing: compressor head pressure and amperage draw; evaporator water carryover; fan brake horsepower, due to increase static pressure losses; airflow reduction.

At least once each year, or more often if the unit is located in a "dirty" environment, clean the condenser coils using the instructions outlined below. Be sure to follow these instructions as closely as possible to avoid damaging the coils.

### Microchannel (MCHE) Coils

***NOTICE:***

**Coil Damage!**

**DO NOT use any detergents with microchannel condenser coils. Use pressurized water or air ONLY, with pressure no greater than 600psi. Failure to do so could result in coil damage.**

*For additional information regarding the proper microchannel coil cleaning procedure, refer to RT-SVB83*-EN.*

Due to the soft material and thin walls of the MCHE coils, the traditional field maintenance method recommended for Round Tube Plate Fin (RTPF) coils does not apply to microchannel coils.

Moreover, chemical cleaners are a risk factor to MCHE due to the material of the coil. The manufacturer does not recommend the use of chemical cleaners to clean microchannel coils. Using chemical cleaners could lead to warranty claims being further evaluated for validity and failure analysis.

The recommended cleaning method for microchannel condenser coils is pressurized water or air with a non-pinpoint nozzle and an ECU of at least 180 with pressure no greater than 600 psi. To minimize the risk of coil damage, approach the cleaning of the coil with the pressure washer aimed perpendicular to the face of the coil during cleaning. Optimum clearance between the sprayer nozzle and the microchannel coil is 1″–3″.

# Final Process

For future reference, you may find it helpful to record the unit data requested below in the blanks provided.

(1) Complete Unit Model Number:

_____

(2) Unit Serial Number:

_____

(3) Wiring Diagram Numbers (from unit control panel)

— schematic(s)

_____

_____

— connection(s)

_____

_____

**Table 10. Sample maintenance log**

| Date | Current Ambient Temp F/C | Refrigerant Circuit #1 | | | | | |
|---|---|---|---|---|---|---|---|
| | | Compr. Oil Level | Suct. Press. Psig / kPa | Disch. Press Psig / kPa | Liquid Press Psig / kPa | Super-heat F/C | Sub-cool F/C |
| | | - ok<br>- low | | | | | |
| | | - ok<br>- low | | | | | |
| | | - ok<br>- low | | | | | |
| | | - ok<br>- low | | | | | |
| | | - ok<br>- low | | | | | |
| | | - ok<br>- low | | | | | |
| | | - ok<br>- low | | | | | |
| | | - ok<br>- low | | | | | |
| | | - ok<br>- low | | | | | |
| | | - ok<br>- low | | | | | |
| | | - ok<br>- low | | | | | |

# Troubleshooting

**⚠WARNING**

**Hazardous Service Procedures!**

**The maintenance and troubleshooting procedures recommended in this section of the manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided throughout this manual concerning these procedures. Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks. Failure to follow all of the recommended safety warnings provided, could result in death or serious injury.**

## Standard Troubleshooting

The IGN has the ability to provide the service personnel with some unit diagnostics and system status information.

Before turning the main power disconnect switch "Off", follow the steps below to check the Ignition Module (IGN).

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

1. Verify LED on face of the phase monitor is green. If LED is red, correct supply power fault.
2. Verify that the LED on the IGN is burning continuously. If the LED is lit, go to Step 4.
3. If the LED is not lit, verify that 24 VAC is present between R and B. If the LED is not lit and 24 VAC is present replace the IGN. If 24VAC is not present, check transformer (TNS1). Proceed to Step 4 if necessary.
4. If no failures are indicated, use the TEST mode procedures described in the "Unit Start-Up" section or thermostat to start the unit.This procedure will allow you to check all of the external controls (relays, contactors, etc) and the IGN.
5. Test the system through all of the available modes, and verify operation of all outputs, controls, and modes.

   Refer to the sequence of operations for each mode, to assist in verifying proper operation. Make the necessary repairs and proceed to Step 6 and Step 7.
6. If no abnormal operating conditions appear in the test mode, exit the test mode by turning the power "Off" at the main power disconnect switch and removing the test mode connections.
7. Refer to the individual component test procedures if other components are suspect.

### Failures

#### Heating Failure - Low Heat Models

Verify heat failure by ignition module.

(IGN) LED indicator:

- Steady OFF: Check Power or Bad Board
- Flashing Slow (the LED flashes on for 3/4 second, then off for 1/4 second): Normal, No Call for Heat
- Flashing Fast (the LED flashes on for 1/4 second, and off for 1/4 second): Call for Heat
- Continuous On: Internal Error-Replace Control Board
- 2 Flashes: 1 Hour Lockout, No Flame
- 3 Flashes: Pressure Switch/Inducer Issue
- 4 Flashes: Open Temperature Limit Switch or Rollout Limit
- 5 Flashes: Flame without Gas Valve
- 7 Flashes: Gas Valve Circuit Error
- 8 Flashes: Low Flame Sense

#### Heating Failure - High Heat Models

Verify heat failure by ignition module.

(IGN) LED indicator:

- Steady OFF: Check Power or Bad Board
- Flashing Slow (the LED flashes on for 3/4 second, then off for 1/4 second): Normal, No Call for Heat
- Flashing Fast: Not Used
- Steady ON: Normal, No Call for Heat
- 2 Flashes: System Lockout: Failed to detect or sustain flame
- 3 Flashes: Pressure Switch Problem Detected
- 4 Flashes: High Limit Switch Protection Device Open
- 5 Flashes: Flame Sensed and Gas Valve not Energized or Flame Sensed and no "W" Signal
- 6 Flashes: Flame Rollout Switch Open
- 7 Flashes: Thermostat Miswired; W1 & W2

#### Cooling Failure

1. Cooling and heating set point (slide pot) on the thermostat has failed.
2. CC1 24 VAC control circuit has opened. Check CC1 coils, and any of the controls below that apply to the unit (HPC1, LPC1, DLT1, Frostat™ ).

#### Simultaneous Heat and Cool Failure

- Emergency Stop is activated.

# Low Leak Economizer (LLE) Troubleshooting

1. The economizer controller provides alarm messages that display on the 2-line LCD. If one or more alarms are present and there has been no keypad activity for at least 5 minutes, the Alarms menu displays and cycles through the active alarms.

***Note:*** *You can also navigate to the Alarms menu at any time.*

2. Once the alarm has been identified and the cause has been removed (e.g. replaced faulty sensor), the alarm can be cleared from the display.

***Note:*** *If an alarm still exists after you clear it, it re-displays within 5 seconds.*

## To Clear an Alarm

Once the alarm has been identified and the cause has been removed (e.g. replaced faulty sensor), the alarm can be cleared from the display.

1. Navigate to the desired alarm.
2. Press ⏎.
3. "ERASE?" is displayed.
4. Press ⏎.
5. "ALARM ERASED" is displayed.
6. Press ⓘ (Menu Up) to complete the action and return to the previous menu.

***Note:*** *If an alarm still exists after you clear it, it re-displays within 5 seconds.*

## Low Leak Economizer Fault Codes

Low Leak Economizer Alarms:

- CO2 Sensor Error
- SYS Alarm
- Actuator Undervoltage
- Actuator Overvoltage
- Actuator Stalled

The FDD system shall detect the following faults:

- Air temperature sensor failure/fault
- Not economizing when it should
- Economizing when it should not
- Damper not modulating
- Excess outdoor air

The JADE controller is a certified FDD product (HJW10) by California Title 24, Part 6. The FDD system is required for meeting California Energy Commission's Title 24 regulations. Table 11, p. 32 shows the various tests that can be performed (rows) and the five faults that are defined by FDD (columns). The 'x' means that the test has to be conducted to see if it is causing the fault to occur.

**Table 11. FDD troubleshooting**

| | FAULTS | | | | |
|---|---|---|---|---|---|
| TESTS | Air temp. sensor failure/ fault | Not econo-mizing when it should | Econo-mizing when it should not | Damper not modula-ting | Excess outdoor air |
| Damper Stuck Open | | | x | x | x |
| Damper Stuck at Minimum | | x | | x | |
| Bad or Unplugged Actuator | | x | x | x | |
| Sensor Hard Failure | x | x | x | | x |
| Actuator Mechanically Disconnected | | x | x | x | x |

# Resetting Cooling and Heating Lockouts

Cooling Failures and Heating Lockouts are reset in an identical manner.

"Method 1," p. 32 explains resetting the system from the space; "Method 2," p. 32 explains resetting the system at the unit.

***Note:*** *Before resetting Cooling Failures and Heating Lockouts check the Failure Status Diagnostics by the methods previously explained. Diagnostics will be lost when the power to the unit is disconnected.*

## Method 1

To reset the system from the space, turn the "Mode" selection switch at the thermostat to the "Off" position. After approximately 30 seconds, turn the "Mode" selection switch to the desired mode, i.e. Heat, Cool or Auto.

## Method 2

To reset the system at the unit, cycle the unit power by turning the disconnect switch "Off" and then "On".

## Condensate Overflow Switch

When the condensate overflow switch is closed, a drain pan overflow condition is indicated and it will shut unit operations down.

# Unit Economizer Control (ECA)

Verify Economizer Status by Economizer Actuator (ECA) LED indicator:

- OFF: No Power or Failure

- ON: Normal, OK to Economize
- Slow Flash: Normal, Not OK to Economize
- Fast Flash - 1/4 Second On / 2 Seconds Off:
  - Error Code: Communications Failure
- Pulse Flash: 1/30 Second On / 1/4 Second Off: (2 Seconds between pulse sequences)

### Error Code:

- 1 Flash: Actuator Fault
- 2 Flashes: $CO_2$ Sensor
- 3 Flashes: RA Humidity Sensor
- 4 Flashes: RA Temp Sensor
- 6 Flashes: OA Humidity Sensor
- 7 Flashes: OA Temp Sensor
- 8 Flashes: MA Temp Sensor
- 9 Flashes: On-board Setpoint Failure

# Wiring Diagrams

***Note:*** *Wiring diagrams can be accessed via e-Library by entering the diagram number in the literature order number search field or by contacting technical support.*

**Table 12. Wiring diagrams**

| Type of Airflow | Schematic Type | Voltage | Diagram Number | Description |
|---|---|---|---|---|
| Constant Volume | Power | 208-230 | 12132102 | GBC 036-060, 60Hz, 1 STAGE Gas Heat |
| | | | 12130803 | GBC 036-060, 60Hz, 2 STAGE Gas Heat |
| | | 460-575 | 12132103 | GBC 036-060, 60Hz, 1 STAGE Gas Heat |
| | | | 12130802 | GBC 036-060, 60Hz, 2 STAGE Gas Heat |
| | Control | 208-575 | 12132093 | GBC 036-060, 60Hz, 1 STAGE Gas Heat |
| | | | 12132094 | GBC 036-060, 60Hz, 2 STAGE Gas Heat |
| | Control box Connection | 208-230 | 12132221 | GBC 036-060, 60Hz, 1 STAGE Gas Heat |
| | | | 12131607 | GBC 036-060, 60Hz, 2 STAGE Gas Heat |
| | | 460-575 | 12131608 | GBC 036-060, 60Hz, 1 STAGE Gas Heat |
| | | | 12131610 | GBC 036-060, 60Hz, 2 STAGE Gas Heat |
| | Raceway Connection | 208-230 | 12132218 | GBC 036-060, 60Hz, 1 STAGE Gas Heat |
| | | | 12132219 | GBC 036-060, 60Hz, 2 STAGE Gas Heat |
| | | 460-575 | 12132267 | GBC 036-060, 60Hz, 1 STAGE Gas Heat |
| | | | 12132268 | GBC 036-060, 60Hz, 2 STAGE Gas Heat |