

QuikSILVER

Maintenance and Trouble Shooting

	Pages
Maintenance	2-7
Troubleshooting	8-14

Maintenance

DriQuik™ has designed the QuikSILVER oven as well as all other equipment to operate with very low preventive and heavy maintenance.

Scheduled preventive maintenance is necessary to prolong the life of major components. In terms of costs, scheduled preventive maintenance provides for reduced down time for emergency repairs, and longer, more reliable equipment life.

The best way to schedule preventive maintenance is through an ongoing program, utilizing a scheduling chart or a computerized tracking system.

Not all purchased parts are described here, for many require no preventive maintenance. If there is a question regarding maintenance instructions on a purchased component, please contact DriQuik™ or the maintenance manuals of the component manufacturer.

Safety

Maintenance and repair require close contact with the oven, therefore safety precautions must be observed.

1. Remove any loose objects such as trash and rags from the work area. If you always remember to keep the work area clean, this should take little time.
2. Do not work on any equipment until it has finished cycling, and is shut down.
3. Turn the oven power off before beginning any maintenance procedure. "Always lock it out".
4. Wear eye protection. Eye protection is critical when preventive maintenance is performed in many areas of the system.
5. Neither engage nor tolerate horseplay in the work area. Many avoidable accidents occur due to operator negligence.



Warning: Always turn off and lock out the power before performing any type of maintenance.



Note: Only qualified and trained personnel must perform maintenance procedures.

Preventive Maintenance

Bulb Cleaning

Due to dirt and other residue build up on bulbs, it may be necessary to clean them. Frequency of cleaning is dependent on the oven application, efficiency of the exhaust system, cleanliness of the work area, etc. Typically, cleaning bulbs every four months is sufficient. The following steps should be followed to clean the bulb. **When replacing bulbs, make sure the platinum coating is facing away from the product, toward the stainless steel reflective back plate. When performing routine maintenance, these bulbs should be checked to insure that they are kept in the proper position.**

1. Be sure oven Power has been Turned Off and Locked Out.
2. Apply a small amount of denatured alcohol to a lint free cloth.
3. Use one hand to support the reflectant side of the bulb.
4. With the cloth in the other hand, wipe the emitter side of the bulb.
5. When all residue has been loosened, use a clean lint free cloth to wipe away excess.



Warning: QuikSILVER bulbs are very hot. The operator or maintenance person must never touch a bulb while it is on or cooling down. Doing so may result in severe skin burns.

Bulb Replacement

Do to failure or filament breakage, it may be necessary to replace a bulb. Proceed to change the bulb in the following manner.

1. Be sure the **Power** has been **Turned Off** and **Locked Out**.
2. Remove nuts holding the mesh guard.
3. Remove mesh guard.
4. Remove nuts holding the end guards.
5. Remove end guards.
6. Remove the bulbs by holding firmly at both ends and pulling uniformly, freeing them from the clips.
7. Reverse these steps to install the new bulb, ensuring the platinum coating is toward the reflector.



Warning: Handle the bulbs only by the ends; applying pressure at the center of the tube while installing or replacing may break the bulb and cause injury.



Warning: When handling the Quartz Tubes, always use clean cotton gloves or non-abrasive paper towels. Do not touch the bulb with you fingers.



Warning: DriQuik™ infrared bulbs are very HOT. The operator or maintenance person must never touch a bulb while it is on or cooling down. Doing so may result in severe skin burns.



Warning: The bulbs are quartz glass. Please use care in handling them or breakage may occur.

Ovens

Keep all reflectors clean.

- Remove dust and dirt from the reflectors by using an air hose blow-off and/or a non-abrasive mild cleaner with a soft cloth.
- Remove paint with paint thinner, using a soft non-abrasive cloth, as specified in the coating safety data sheet.
- Check the terminal block connections and replace brittle or cracked terminal blocks as needed.
- Replace infrared bulbs as required.

Control Panel Cabinets

The control panel should be kept free of dust. Blow out dust from the panel using compressed air monthly. Check the wires to ensure they are securely attached to the components. Look for any frayed or otherwise damaged wires and replace them if needed. Check the vent filters on the cabinet and clean them if necessary.



Warning: Always Lock Out power when performing any maintenance on the control panel.

Blowers and Exhausters

The blower and exhausters should be inspected regularly. Follow these guidelines:

- The blowers are factory checked and serviced before installation.
- After the first 8 hours of running time add 3 shots of high temperature Lithium grease to the grease fittings on the blowers and exhausters. Periodically check the blowers and exhausters and add grease as needed. Since the blowers and exhausters run at very high temperatures, they should be monitored closely.
- Repeat these maintenance procedures every 30 days (rated for 6 days a week, 2 shifts).
- Semiannually check the blowers and exhausters for loose bolts, loose squirrel cage, etc.
- Periodically, blow out the squirrel cage and check for tightness.

Heavy Maintenance

This section contains references to the manufacturer of this oven. Please contact DriQuik™ before performing any heavy maintenance on the major components.

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Guidelines

In order to ensure a long oven life, the following guidelines should be followed.

- No infrared bulb is designed for continuous operation at 100 percent capacity for longer than the recommended 30 minute initial warm-up period.
- If you choose to run at 100 percent capacity beyond warm-up time, it is especially important to establish a routine maintenance program.
- If your production makes it necessary to run at 100 percent capacity, you may need to consider expanding your oven system. To explore this option, contact you DriQuik™ representative, or contact the DriQuik™ factory directly at (812) 663-4141.

To help get the best performance from your oven, keep these points in mind.

- **Only** use the oven while parts are ready to go through the oven cycle.
- **Only** use the portion of the oven specific parts require.
- **Never** run the oven at higher power settings than absolutely necessary.

Summary

As previously stated, not all purchased parts are described here, for many require no preventive maintenance. If there is a question regarding maintenance instructions on a purchased component, please contact DriQuik™ or the maintenances manuals of the component manufacturer.

Maintenance Checklist Semiannual Schedule

Initiation Date ___/___/___

Action	Date Performed		Performed By		Notes
Inspect the control panel monthly	_____ _____	_____ _____	_____ _____	_____ _____	
Clean the control panel monthly	_____ _____	_____ _____	_____ _____	_____ _____	
Inspect heaters and blowers monthly	_____ _____	_____ _____	_____ _____	_____ _____	
Clean the bulbs & reflectors Semi-annually					
Check the oven frame for loose bolts, struts, etc. semi-annually					



Note: This is a recommended maintenance schedule. You may need to alter this schedule depending upon the conditions of your plant. It is important that you design the schedule that best suites plant conditions.

Troubleshooting

Silicon Controlled Rectifiers (SCR's)

The QuikSILVER oven has a variable temperature control, meaning the temperature may be altered to produce the desired heat. Once the target body is near the desired temperature, the infrared bulbs do not need to operate at full power to maintain that temperature. The power delivered to the bulbs during the curing process must be varied (from 0 to 100 percent) depending on the current temperature of the target.

This control is accomplished with the use of Silicon Controlled Rectifiers (SCR's). Basically, an SCR is a switch that can be turned on or off electronically to either stop or allow the flow of current in a circuit. An SCR is composed of diodes which allow current flow in only one direction. Since SCR's are used to control AC power, they contain two diodes back to back, with one diode allowing the current to flow during each half of the AC cycle. To achieve a controlled percentage of the available power, SCR's are simply turned off for a number of cycles. This in turn reduces the effective delivered power. For example, if a bulb should be operating at 50 percent of its maximum power, the SCR might be on for five cycles, and off for the next five. The bulb is really on only half of the time, so it only delivers half the power.

Zone Temperature Controller

Your DriQuik™ QuikSILVER oven **may** come equipped with West Temperature Controllers. They are used with SCR's to help control the temperature of the oven. The West temperature controller operates in the manual mode for open loop control with no feed back. If your oven is controlled by SCR's, the temperature controllers output a DC linear (4-20mA or 0-10V) signal to an SCR witch controls the corresponding zone temperature. A positive value of 0 to 100 percent controls the heating output percentage. Press the UP (↑) or Down (↓) key to adjust the output percentage. Zero output percentage disables the heating output. The temperature controllers are located on the control panel door, and are not to be mistaken with the High Limit Temperature Controller. This controller will be described later on in this chapter.

Variable Frequency Drive (VFD)

A VFD is used as an option to control the speed of exhaust(s), blower(s), and conveyors. This can be controlled in various ways.

- It can be controlled with 2 relays where as one relay controls the start signal, and one relay controls the speed. When this option is used, usually one speed is preset into the VFD. If for some reason, the operator needs the speed changed, the control panel must be shut down and locked out in order for the operator to change the speed on the VFD itself. The VFD is din rail mounted inside the control panel.
- It can be controlled with a relay and a potentiometer. The relay gives the start signal, and the potentiometer located on the control panel door controls the speed. This method

requires the operator to physically go to the control panel location and dial the speed he desires. (clockwise for faster), (counterclockwise for slower).

- It can be controlled with a mod bus, in which a direct line is run from the VFD to the PLC. The operator then has control of the speed through the touch screen.
- The most preferred way is with an analog output card in the PLC itself. The analog card sends a 4-20mA signal to the VFD. The operator has precise speed control with this option.

Oven Control Scheme

The QuikSILVER oven functions in manual mode. The manual mode uses an open loop system. In this mode, the operator controls which zones are functional and which are turned off. The curing time and heater power output are also controlled by the operator. The heater power output is set to a certain percentage of the maximum output power. The heater power output then remains constant throughout the curing cycle.

Note: In Auto Mode, the oven will come on at 100 percent trying to achieve set point.



output, unexpected

results may occur. This may cause serious consequences to the product and oven.

Warning: If temperature controllers are not placed into the manual mode and set to a desired

Getting Started

Main Disconnect/Circuit Breaker

The main disconnect source of your system is located at the control panel. It supplies power to the system when the switch is closed. It also provides a point of protection for lockout when oven maintenance is required.

High Limit Temperature Controller

The high limit temperature controller, located on the control panel door is a safety device built into your system to let the operator know that a high temperature limit has been reached in your exhaust system or oven. The controller is designed to override all other devices built into the system and completely shuts the whole system down. The oven cannot be restarted until the temperature fall below the preset limit. Once the temperature falls below the preset limit, the temperature controller will have to be manually reset. This is done by press the “Reset” button on the temperature controller. The high limit is preprogrammed into the controller by DriQuik™, and should never be changes without written consent by DriQuik™. This is an NFPA requirement.

(PLC) Operator Interface

The operator interface located on the door of the main control panel, allows the operator to choose a recipe and change its respective settings. A recipe is a customized output percent level setting for each of the heating zones. The higher the output percent level for a specific zone, the hotter the zone will operate. The range is 0 percent to 100 percent output. It also functions as a message display and troubleshooting guide to inform the operator about various oven conditions. The PLC monitors the real world inputs and process the information within an internal, custom designed software program. Using ladder logic, real world outputs are turned “on” or “off” to control the oven as designed.

Main Screen: On the main screen, the PLC sends various messages to the text box displays to communicate the system status. Some examples are:

1. “OVEN OFF”
2. “OVEN RAMPING”
3. “OVEN READY”
4. “OVEN IN STANDBY”
5. “OVEN FAULTED”
6. “BLOWER ON”

Recipe Selection: Within each recipe on the operator interface, you can change the respective zone output percent settings from 0 percent to 100 percent. Touch view on the main screen to go to the output screen. From here you need to touch edit/view recipe settings. This will bring you to the recipe global screen. Select which recipe you need to alter. Touch the zone or temperature setpoint and a numeric entry box will pop up. Enter the new value and touch enter. The recipe has now been changed.

Edit/View Recipe Settings Screen: To view or edit the specific One settings for a recipe, press the “Edit/View Recipe Settings” button. You will advance to a screen that allows you to select any one of the 10 recipes. Press the specific recipe that you want to view or change and you will advance to that specific screen. At the recipe settings screen selected, press on the percent output number to change the percent output level of the respective zone. When the number is pressed, a numeric keypad will pop up on the screen. Enter the new percent output value and press the enter key. The range of selectable percent output values from 0 to 100.

Heating Zone Status Screen: The temperature of each heating zone is displayed here. The reading is located under the indicator light which tells you if the heating zone is on or off. The indicator lights here will pulse at a rate depending on what the percent heating of each zone is set at.

Off-Delay setting Screen: The off-delay setting can be viewed and changed from this screen.

View Input Status Screen: From this screen you can view the input states listed. This is a maintenance view screen only, and inputs cannot be altered from here.

View Output Status Screen #1: From this screen you can view outputs listed from screen #1. This is a maintenance view screen only, and the outputs cannot be altered from here.

View Output Status Screen #2: From this screen you can view outputs listed for screen #2. This is a maintenance view screen only, and the outputs cannot be altered from here.

General note

All screens allow you to go to other screens. Just touch the button and it will send you there.



Warning: Prior to start-up, check all wire terminations inside the control panel. Retighten if necessary. This ensures that your oven will operate properly. Repeat this periodically to help keep your oven in a good operating condition.

Faults Descriptions

Entrance Exhaust Fault

Entrance exhaust motor overload or airflow switch (optional) has indicated a problem with entrance exhaust. Oven shuts down automatically when loss of air flow in the entrance exhaust is detected for more than 15 seconds. Fault is reset by pressing the fault reset button on the touch screen.

Exit Exhaust Fault

Exit exhaust motor overload or airflow switch (optional) has indicated a problem with exit exhaust. Oven shuts down automatically when loss

High Limit Temperature Fault

High limit temperature controller has indicated an exhaust or oven over temperature condition. Oven shuts down automatically when an over temperature condition is detected for more than 15 seconds. Press the manual "RESET" button located on the Temperature controller on the control panel door. (This fault cannot be reset until the oven temperature falls below the preset limit).

Fault Reset

To reset any oven fault follow the instructions below:

1. Silence alarm horn. (If any)
2. View the touch screen for fault condition, location, and prognosis. Physically locate the faulty device, assess the situation, and fix the fault as described in section 3.4.

3. If fault requires you to come into contact with an electrical component, such as a blower, exhaust, or any electrical component inside the control panel, press the Master E-Stop button on the control panel door and follow the lock out procedures provided in this manual. The oven will then have to go through the sequence of operation again to restart oven. The sequence of operation is provided on the following page.
4. On the touch screen, press the “Fault Reset” button after the fault has been evaluated and fixed.

Typical Start Sequence

Oven Start

1. Verify the main disconnect is in the “ON” position
2. Push the “Master Start” push button located on the door of the main panel.
3. The operator interface display should read “Oven Off”
4. Pick the correct recipe to use.
5. Set correct Off-Delay/On Delay time.
6. Turn on the conveyor (if one is installed in system).
7. Press “Oven Start”
8. If a Photo Eye is installed in the system, the heaters will turn on once a part is detected.

Oven Stop

1. Press the Master E-Stop or press Oven Stop on touch screen.
2. Oven turns off.

Troubleshooting

What's Wrong?

What to do

<p>A single section stops operating, or is not operation properly.</p>	<ul style="list-style-type: none">• Check for a burned out bulb by performing a standard continuity check on each individual element in the section.• Check for loose connections at the terminal block.
<p>A complete circuit or zone is not operating.</p>	<ul style="list-style-type: none">• Check for blown fuses or a bad contactor.• If the contactor is activated (pulled in), check for voltage from top to bottom.• If voltage is not present on the bottom, replace the contactor.• If contactor is not activated, check for voltage at the contactor coil.• If voltage is not present at the coil, proceed to the next step.• Double check low voltage fuses, if they are good, and replace any bad fuses.• Check for loose connections in the control cabinet.
<p>The entire oven is not operating.</p>	<ul style="list-style-type: none">• Check the conveyor interlock• Check the exhaust (interlock) for a bad relay.• Check the master switch for proper voltage continuity in on position.• Check the main disconnect for proper voltage on "bottom side" in on position.• If all else fails, call the DriQuik™ factory for assistance. (812) 663-4141.