



Quincy Lab, Inc.

Bench Series Ovens ER Models 21 / 31 / 51 Operating Manual

With Digital Microprocessor Control
and Ramp & Soak Programming



Standard Contents

- (1) Bench Series ER Oven
- (2) Adjustable chrome wire shelf
- (4) Shelf brackets

**⚠ Not For Use With Flammable
Solvents or Gases.**

SPECIFICATIONS	MODEL 21-250ER	MODEL 21-350ER	MODEL 31-350ER	MODEL 51-550ER
INTERIOR DIMENSIONS INCHES W x H x D (CM) W x H x D	25.5x19.7x24 64x49.5x60	25.5x19.7x24 64x49.5x60	25.5x29.7x24 64x75.5x60	25.5x19.7x22.5 64x49.5x57
EXTERIOR DIMENSIONS INCHES W x H x D (CM) W x H x D	33x24x35.5 83x60x90	33x24x35.5 83x60x90	33x34x35.5 83x86x90	33x24x35.5 83x60x90
TEMPERATURE RANGE Ambient + 25F to:	300°F/150°C	450°F/232°C	450°F/232°C	550°F/287°C
CONTROL STABILITY @ 100C @ 200C	+/- 0.2° C NA	+/- 0.3° C +/- 0.5° C	+/- 0.5° C +/- 0.5° C	+/- 0.5° C +/- 0.5° C
STANDARD ELECTRICAL VOLTS/AMPS WATTS PLUG/NEMA	120/8.75* 1050 5-15P*	120/16* 1920 5-20P*	120/16* 1920 5-20P*	230/12.5 2850 6-20P
* Standard models voltage only, optional 230 voltage available. Check label on back of unit.				
WEIGHT(lbs) SHIPPING STAND ALONE	185 165	185 165	225 200	195 170

Common Unit Construction

Exterior: Powder Coated Steel
Insulation: Fiberglass
Thermo-control: PID Microprocessor

Interior: Aluminized Steel (stainless optional)
Motor: Sealed Ball Bearing
Heater: Resistive-Tubular Incoloy

Safety Precautions ⚠️ **Read Operating Instructions Thoroughly Prior to Operation**

⚠️ The Bench Series ovens are not designed for use with any flammable solvents or gases or for materials that may contain flammable solvents or gases. Use only a grounded outlet that is rated for your model's electrical requirement - do not use with an extension cord. Oven exterior walls and doors may become hot to the touch when operating at higher set temperatures. Do not operate the oven in close proximity to any flammable solvents, gases or materials. Do not leave the oven unattended during operation, especially when processing materials that have flash point temperatures lower than the model oven's maximum operating range. Do not operate or modify the oven to operate without the motor or fan/blower. Conduct periodic maintenance as required.

Set-Up & Installation

Locate the oven on a suitable, clean, solid surface and maintain a minimum of 6 inches of air space between the rear electrical cover and any building or vertical surface (**FIG. 1**). This is important as ambient air must circulate freely through the rear air intake ports for proper cooling of the blower motor. ⚠️ Do not cover or restrict air flow at the rear air intake ports, this will cause the motor to overheat, shortening the motor's life and increase risk of fire. Heated exhaust air is expelled through the two small ports located just above rear electrical cover. (**FIG. 2**) Keep materials or building surfaces that may be susceptible to this heated exhaust air clear from rear area. Maintain a minimum 5 feet of unobstructed space above the oven to allow exhaust air to naturally convect up and away from the air intake ports. Keep 3" of air space at the oven sides (3" from control panel cover). For units with optional Exhaust Chamber Adapter, see page 3.

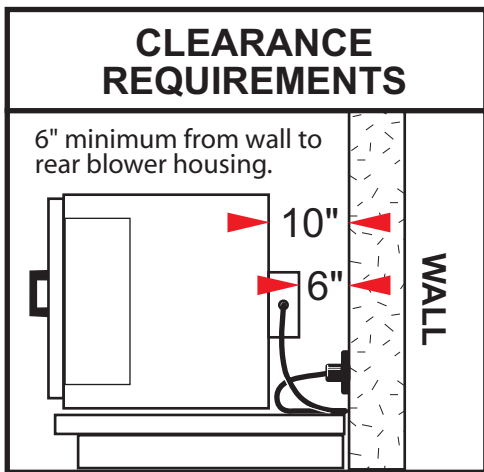


FIG. 1

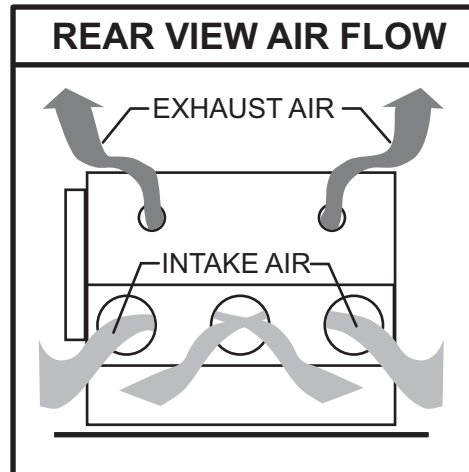


FIG. 2

Electrical

Plug the unit into a grounded outlet for your unit's rated voltage. **IMPORTANT** See electrical label at right side rear electrical cover to verify your units power requirements. Isolate each model to a separate, appropriately rated circuit or breaker. Below are the NEMA plug configurations that are supplied with the various Bench Series ovens. These configurations will also help to identify the ovens electrical rating or power requirements.



Connecting to the Exhaust Chamber Adapter (Optional)

Connect the exhaust chamber adapter with standard 3" or 4" diameter single or double-wall steel or galvanized pipe. A minimum of 4 inches of clearance should be maintained between the connected pipe and any building surface or material. **(FIG.3)**

For best performance, run a short pipe horizontally (3 feet max.) directly through an exterior wall. For vertical runs the exhaust pipe should not have more than one (1) 90 degree elbow, a maximum horizontal run of 3', and a maximum of 15' vertically. Exceeding these recommendations may cause improper ventilation.

Poor exhaust quality would be indicated by an excess of fumes and/or vapor from around the door gasket versus what would normally be present if no exhaust venting was used.

Piping run lengths can be extended beyond recommended maximums where a connection to an existing ventilation or exhaust system provide a larger pipe diameter and/or a mechanically powered draft that provides a negative pressure at the point of connection.

Mechanically powered vent systems work best to eliminate fumes and moisture vapors, but depending on vacuum strength at the point of connection, it may slightly reduce the oven's time-to-temperature and recovery performance.

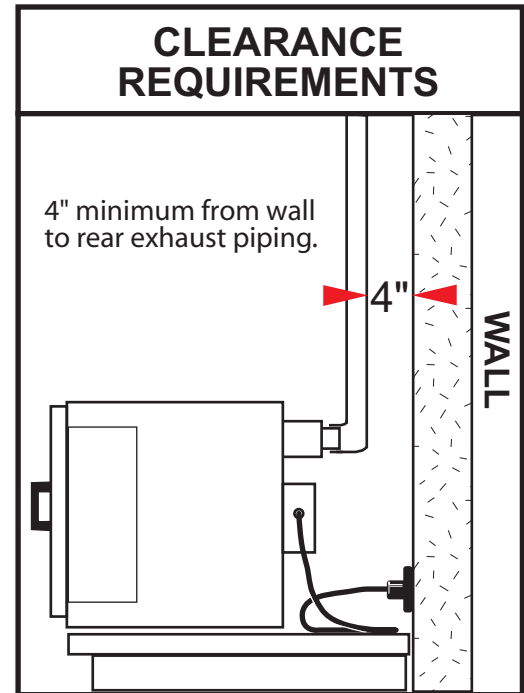


FIG. 3

⚠ Important Note about the Exhaust Chamber and Connection

The optional exhaust chamber adapter is used to vent oven chamber fumes and heated moisture-laden air to a building's exterior for the purposes of minimizing excess heat, humidity or unpleasant but otherwise harmless fumes within an interior working environment.

The exhaust chamber system as a whole is not designed for use to remove harmful or flammable gases or vapors since the oven itself is not rated for use with such materials. Also, the oven, being electric as opposed to gas, does not produce any harmful bi-products in the process of producing heat. It is recommended that the attached exhaust chamber and piping be checked once a year for any obstruction from dust, dirt, or material process "plaque" build-up from processing certain materials. Check with the manufacturer of the materials used in your process if heating the material may produce a bi-product or out-gassing that may build up on the interior surface of the oven, exhaust chamber or piping and present a fire hazard over time.

Contact an HVAC engineer for assistance with installation or questions regarding proper venting requirements in your specific building or location, and if any local or national fire or safety codes may apply for your application or process.

⚠ Annually check exhaust piping for possible obstruction or material process build up.

Shelf Installation and Use

Install adjustable shelf by first placing the shelf bracket rivets into the corresponding keyhole supports located on each inner side of the oven. Orientate the bracket in the "down" or "L" position. This position guides the shelf in and out and protects the side wall from being scratched. The bracket may also be placed in the "up" or "┐" position if slightly more interior clearance is needed. Place the shelf on the brackets as shown. **(FIG. 4)**

Each shelf will support a distributed load of 100 lbs. maximum. Do not exceed a combined total of 300 lbs. within the oven at one time. Avoid placing articles on the oven floor. Instead, use a shelf at the lowest adjustable position.

⚠ Care should be taken when removing articles from the oven. Don't pull the shelf out when removing heavy loads. The shelf is not secured and loads can tip and fall forward.



FIG. 4

General Operation

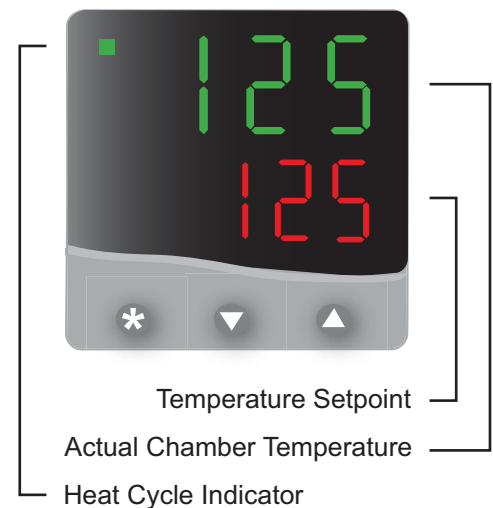
All control parameters and other control variables have already been factory set for your model's temperature range and capacity to provide heating and performance characteristics for a broad range of applications. Your Bench Series ER oven is ready for operation.

To power the oven, turn on the power fan switch. The blower will begin to circulate chamber air and the temperature control will display the current chamber temperature (green LEDs) and a factory set temperature (orange LED's) of 125 degrees F. Turn heater switch to heat. The heat cycle indicator will illuminate and the oven will immediately begin heating towards the set temperature. Once the set temperature is reached, the heat cycle indicator will cycle on and off with the heaters, maintaining the set temperature. Typically, the oven will need to cycle at set temperature for a minimum of 20 minutes before it will achieve equilibrium and become temperature stable (see stability specs. on page 1).

To change the set temp, press and hold the star key ***** then press the up or down arrow keys to change to the desired set temperature. Pressing the star key ***** alone verifies the control's temperature display units in degrees F or C (factory set at "F" for Fahrenheit). To change the display units to read in Centigrade, see the control's Menu Level Functions page 6.

The temperature setting is maintained in the control whenever the power is turned off. When the oven is turned back on it will begin heating toward the temperature setting.

DIGITAL MICROPROCESSOR Temperature controller

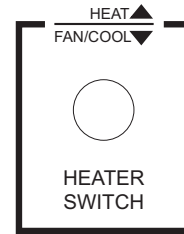


To adjust temperature set point press and hold the star key ***** then press:

- ▲ To Increase Setpoint
- ▼ To Decrease Setpoint

General Operation (continued)

The heater switch in the off or cool position allows for convenient ambient air drying of articles or to more slowly & evenly cool heated articles without having to lower or change the temperature setting. Also, use this switch to allow the oven to cool before turning the fan off when using the oven at higher temperature settings. This helps to both cool the motor (prolonging its life) and remove any moisture-laden air before it condenses in the chamber, which will help prevent premature corrosion over time.



Chamber Loading and Oven Performance

Load the oven so that air circulation within the oven is not impaired. Note the air flow from the top section view (**FIG. 5**). Heated air flows from back to front along the side walls, then moves horizontally toward the chamber center and back toward the recirculating blower. Placing an article against the side walls or rear blower return vent opening will greatly affect unit performance i.e. chamber uniformity, run-up & recovery, maximum operating temperature, and energy use efficiency.

Here are some guidelines that are critical to optimum oven performance and better/faster work-load processing.

- Leave a space between articles on a shelf.
- For best processing performance for a single item, adjust one shelf so that the article is centered in the oven.
- Avoid placing articles on the oven floor. Instead use a shelf at the lowest adjustable position.
- Do not place articles against the inner side walls or the slotted vents in rear air plenum. This will obstruct air flow and degrade uniformity.
- Do not overload the unit with large or high-density loads. This will show by non-uniform processing and/or long heat-through or processing times.

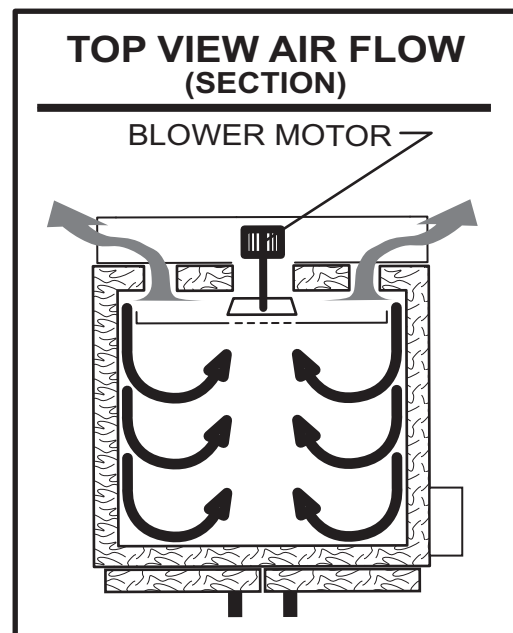


FIG. 5

Menu Level Functions

Access the menu levels for the following Relay functions: (all user-applicable functions and their menu locations are outlined in red in Menu Guide below).

- ~ Change control to read in C or F temperature units (**UNIT** in level 2).
- ~ Change to whole degree or 1/10th degree display resolution (**d.SP** in level 2).
- ~ Run or Read temperature tracking /data (**CHEB** or **REAR** in level 3).
- ~ Lock Temperature setting against inadvertent adjustment (**SP.LV** in level 1).
- ~ Calibrate control temperature to an external standard (**ZERD** in level 3).
- ~ Auto Tune PID performance parameters (**TUNE** in level 1).

FUNCTION PROMPT



FIG. 6

To access the menu levels:

Press and hold both arrow keys until the "tune" / "off" function prompt is displayed from within LEVEL 1. When in the function menu the LED display will alternate the function prompt with the current function setting when keys are released. See "menu entry point" in Menu Guide below.

To navigate within the menu:

Press the down arrow to move "Left" into menu LEVEL SELECTION (**LEVEL** level 1) (FIG 6). Use up and down arrow keys individually to move "right" or "left" within a level. Hold star key and up or down arrow keys to move "up" or "down" through levels 1, 2 and 3. (Note: you must be at **LEVEL** prompt to move up/down thru levels)

To change the function setting (or to read function data - if a read only function):

Once at the desired level function prompt, press and hold the star key and press the up or down arrow key to change a function setting or to read alternate function data. Release star key to set the function. Press and hold the up and down keys together to return to temperature display, or control will auto-return in 60 seconds.

Functions Menu Guide

LEVEL 3 (PRESS) * (PRESS) ↓

LEVEL 2 (PRESS) * (PRESS) ↓

LEVEL 1 (PRESS) * (PRESS) ↓

LEVEL P (PRESS) * (PRESS) ↓

Press star key & up or down arrow key to scroll through functions levels

Press up & down arrow keys to scroll back-and-forth through level functions

MENU ENTRY POINT

IMPORTANT NOTE: The non-high-lighted control functions within the menu levels are factory set for the basic and **safe operation** of your model oven. Care should be taken when navigating or changing **user-applicable settings**, outlined in red, so as not to alter these factory settings. Factory settings for each function are listed within the parentheses "()" in each function tab above - use only as a trouble-shooting reference.

LEVEL 3 FUNCTIONS:

- RELAY OUTPUT TYPE: Primary Relay Output (heater) none, rly, (ssd), AnLG
- SAFETY SETTINGS: Secondary Relay Output (signal) none, rly, (ssd), AnLG; Sensor burn-out (1P, SC), dn.sc, lU2d, 1d,2u; Reverse outputs (1,12d), 1d,2d, 1,12r, 1d,2r
- CONTROL CALIBRATION: Reverse outputs (1,12r), 1,12r, 1,12i; Sensor Span Adjustment (0.0) to 25% of sensor's full scale
- TEMPERATURE TRACKING: Control Calibration Adjust varies: (-3.0 to 3.0); Temperature Tracking Monitor on, (Off); Read Tracking Monitor VAr, hi, Lo (read only); Advanced Auto Tune Data (read only); Software Version (read only); Control Reset (Do Not Reset)

LEVEL 2 FUNCTIONS:

- MANUAL ADJUSTMENTS: Read heater output % varies: 100% to 0% read only; Set SP1 manual output "heater" (off), 100% to 0%; Limit heater output % (100%) to 0%; Set SP2 output % (100%) to 0%
- AUDIBLE/ALARM MODES: Configure main mode (EOP) none, dv,hi...FS,hi...
- RESOLUTION, RANGING, INPUT AND UNIT SELECTION: Configure Second mode (none), L,LC,1, hold, L,1,ho; Display Resolution (1) or 0.1 degree; Set T temperature max scale (325,450,550) F per model; Set Temperature min scale (50) F; Thermocouple Type none, (J), K, I, s, i, rd; Select C / F NONE, C, (F), Bar, PSI, Ph

LEVEL 1 FUNCTIONS:

- PID AND PERFORMANCE SETTINGS: Auto Tune Function (off), on, P,AK, A1,SP; Proportional Band 0.1 to 100% of sensor max (17) or auto-tune variation; Integral Time (resg) off, or 0.1 to 60 minutes (5.0) or auto-tune variation; Derivative Time (rate) off, or 0.1 to 200 seconds (25) or auto-tune variation; Derivative Approach Control (5.0), 0.5 to 5.0; Cycle Time or on/off on,off, or 0, 1 to 81 seconds (20); Offset (manual reset) (0), 0 to 500% x band Int.1 = off; Setpoint Lock Function (off), on; Adjust alarm set point if SP2 configured as alarm (0), 1 to full scale; SP2 Band / Gain / Hyst. of sensor full scale; SP2 Cycle on/off (on,off), or 0.1 to 81
- SP2 AUDIBLE / ALARM SETTINGS: **TUNE**, bARnd, ntb, dEr.b, dRC, CYCb, OFSt, **SP.LV**, SEEt, bnd,2, CYC,2

LEVEL P FUNCTIONS:

- RAMP & SOAK PROGRAM SETTINGS: Program number 1 to 31; Run program hold, dEL off; on, h,old, r,sc; Power failure recovery mode; FST, Cont, hold; Program start value PV, sp; Setpoint ramp time units hour, 60s; Segment number 1 to 120 max; Define segment type SP, SoAK, StP, Loop; Call EOP, dEL, ms; Setpoint ramp rate 1 to 9990 (100) units/time; Adjust target setpoint +b sensor full scale or full scale; Holdback value off, 0.1 to 150; Evert output (SP2A or SP3A) none, 2d,2E, 3d,3E, 2d,3d, 2E,3E, 2d,3E, 2E,3E
- Programs: **Prg**, run, FR, L, St, u, SP, ru, SE, Q, tY, PE, SP, r, t, SP, h, b, u, E, o, P

Temperature Tracking Feature

This feature monitors the stability of the control during any given length process. It will record and display: 1. The total variation or spread between high and low, 2. The absolute or maximum high and 3. The absolute or minimum low.

To start the tracking feature navigate to "CheK" prompt in menu level 3. Hold star key then up arrow key to select ON. Return to temp display or control will auto-return in 60 seconds. The control will track the temperature variation until "CheK" is turned off. Recorded readings are retained until next "CheK" ON.

You can view readings at any time during or after tracking feature has been turned off. But de-powering the unit will reset "CheK" to OFF and "rEAd" to zero. To view total temperature variation navigate to "rEAd" prompt in menu level 3.

EXAMPLE:



Displays total variance (0.9°)



Press & Hold * Then Press ▲ Once Displays High Variation



Press & Hold * Then Press ▲ Again Displays Low Variation



TIP: To avoid erroneous tracking data from run-up temperatures or door openings, start the Tracking feature after articles have been placed and temperature steadies at set point.

Advance Control Operation

AUTO-TUNING performance parameters PID:

The control's PID performance parameters as well as other control variables are factory tuned for your model's temperature range and capacity to provide heating and performance characteristics for a broad range of applications. For certain applications, such as extra large or high density loads, it may be necessary to generate new PID parameters to improve oven performance.

To customize performance for a specific application, activate the auto-tune function. At the "tunE" prompt in the functions menu, change the function setting from "off" to "on". NOTE: To tune parameters more accurately for set temperatures below 250 degrees F, change the function setting to "At.SP" (at set point), instead of the "on" setting. Auto-tune will take between 5 and 45 minutes to complete. When completed it will return to normal operation automatically.

Start the tune function at the point in your application for which you desire better performance. For example; If you want better run-up performance once a load is placed, start the auto-tune function just after you've place the load. If you want the best stability after the load achieves temperature, start the auto-tune function after the load achieves temperature, etc.


PID vs "On - Off" Operation:

The temperature control has two primary modes, PID mode and On-Off mode. The control is factory set in PID mode. This mode is best for applications requiring excellent temperature stability, +/- 1 degree. On-Off mode can be used where faster run-up and recovery times for batch-style processing are desired and where a greater cyclical deviation from set point is not critical.

To place the control in On-Off mode, navigate level 1 in the functions menu. Change the "int.t" and "der.t" function settings to "oFF" and the "CyC.t" to "on.of". Return to the temperature display by pressing the up & down keys together for 3 seconds. The control will now operate in On-Off mode.

Periodic Oven Maintenance

The Bench Series Ovens are designed to be virtually maintenance free. But operational safety requires periodic cleaning and chamber temperature accuracy verification. Periodically check the rear air intake vents for dirt or dust build-up. Keep the intake & exit ports clear of obstruction and clean of dust and dirt. This will keep the motor from overheating and reduce risk of fire. It may be necessary to remove the rear electrical cover to clean or vacuum dirt and dust from in & around the motor.

 Unplug the oven before removing the rear cover. The sealed ball bearing motor requires no lubrication. Twice a year, check the actual oven chamber temperature against a known accurate temperature measurement device. Maintain temperature accuracy to within 10 degrees F of the control setting - calibrate the control as necessary (see control calibration). Contact factory upon observation of temperature instability. Periodically check fan for continuous operation. Maintain records of all periodic maintenance and repairs. To clean exterior and interior surfaces, use a damp cloth or an all-purpose cleaner. Avoid commercially available oven cleaners.

Replacement Components

All replacement components are readily available and are easily replaced in the field.

COMPONENT	MODEL	PART #	COMPONENT	MODEL	VOLTAGE	PART #
Power / Heat Switch	All Models	301-2251-1	Blower Motor	All Models	120 Volt 230 Volt	301-2235 301-2230
Door Ball Catch	All Models	301-2221	Temperature Controller	All Models	120 or 230 Volt	701-6412
Door Handle	All Models	301-2206	Power Light (red)	All Models	120 Volt 230 Volt	101-2202 101-2202-1
Door Gasket (Per Foot)	All Models	301-2253	Relay	All Models	120 or 230 Volt	701-6252
Thermocouple	All Models	701-6253	Heater	21 & 31-250	120 Volt 230 Volt	301-1210 301-1210-1
Blower/Fan Blade	All Models	301-2218	Heater	21 & 31-350	120 Volt 230 Volt	301-1212 301-1212-1
Shelf	All Models	301-5000	Heater	51-550	230 Volt	301-1213-1
Shelf Rail (Galvanize) (Stainless)	All Models	301-5001 301-5001S	Cord and Plug	21 & 31-250	120 Volt 230 Volt	101-1403 101-1403-1
Exhaust Chamber Adapter	All Models	301-2065	Cord and Plug	21 & 31-350	120 Volt 230 Volt	101-1203 101-1403-1
Floor stand or Cabinet	Stand w/shelf Cabinet stand	301-2060 301-2055	Cord and Plug	51-550	230 Volt	101-1203-1

 Disconnect Power Before Repairing or Replacing any Component

Technical Support

If you have any questions or need technical assistance, please contact Quincy Lab Tech Support at

Email: information@quincylab.com
Voice: 800-482-HEAT (4328)
Fax: 773-622-2282

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Limited Warranty

Quincy Lab, Inc. warrants to the original purchaser that this product will be free from defects in material and workmanship under normal use throughout the warranty period. The standard warranty period for this instrument is eighteen months from date of shipment. The instrument warranty is supplemented with a three-year warranty on the heating element. Please refer to your invoice or shipping documents to determine the active warranty period. This warranty covers parts & labor (labor at factory only) and shipping cost for replacement parts.

