HACH
GENERAL PURPOSE INCUBATORS

MODELS: 153

INSTALLATION AND OPERATION MANUAL

09/11
4861378

Hach Company, PO Box 389, Loveland, Co. 80539 • 1-800-227-4224 • Fax (303) 669-2932

TABLE OF CONTENTS

This unit is general purpose air incubator for professional, industrial or educational use where the preparation or testing of materials is done at approximately atmospheric pressure and no flammable, volatile or combustible materials are being heated. This unit is not intended for hazardous or household locations or use.

Section 1

RECEIVING AND INSPECTION

Your satisfaction and safety require a complete understanding of this unit. Read the instructions thoroughly and be sure all operators are given adequate training before attempting to put the unit in service. NOTE: This equipment must be used only for its intended application; any alterations or modifications will void your warranty.

1.1 **Inspection:** The carrier, when accepting shipment, also accepts responsibility for safe delivery and is liable for loss or damage. On delivery, inspect for visible exterior damage, note and describe on the freight bill any damage found, and enter your claim on the form supplied by the carrier.

1.2 Inspect for concealed loss or damage on the unit itself, both interior and exterior. If any, the carrier will arrange for official inspection to substantiate your claim.

1.3 **Return Shipment:** Save the shipping crate until you are sure all is well. If for any reason you must return the unit, contact your local Hach representative for authorization and supply the data plate information. Please see the manual cover for information on where to contact Hach.

1.4 **Accessories:** Verify that all of the equipment indicated on the packing slip is included with the unit. Carefully check all packaging before discarding. This unit is equipped with four (4) leveling feet, two (2) shelves; eight (8) shelving clips and a moisture proof plug kit for use in the equipment inside the chamber.

Section 2

INSTALLATION

Local city, county, or other ordinances may govern the use of this equipment. If you have any questions about local requirements, please contact the appropriate local agency. Installation may be performed by the end user. It is unnecessary for this unit to be installed by a technician.

Under normal circumstances this unit is intended for use indoors, at room temperatures between 5° and 40°C, at no greater than 80% Relative Humidity (at 25°C) and with a supply voltage that does not vary by more than 10%. Customer service should be contacted for operating conditions outside these limits.

2.1 **Power Source:** Check the data plate for voltage, cycle, phase and ampere requirements. If matched to your power source, plug the power cord into a grounded outlet. VOLTAGE SHOULD NOT VARY MORE THAN 10% FROM THE DATA PLATE RATING. These units are intended for a 50/60 Hz application. A separate circuit is recommended to preclude loss of product due to overloading or circuit failure. NOTE: Electrical supply to the unit must conform to all national and local electrical codes.

2.2 **Location:** In selecting a location, consider all conditions which might affect performance, such as heat from radiators, ovens, autoclaves, etc. Avoid direct sun, fast moving air currents, heating/cooling ducts and high-traffic areas. Allow a minimum of 10cm between the unit and any walls or partitions which might obstruct free air flow.

2.3 **Lifting / Handling:** This unit is heavy and care should be taken to use appropriate lifting devices that are sufficiently rated for these loads. Units should only be lifted from their bottom surfaces. Doors, handles and knobs are not adequate for lifting or stabilization. The unit should be completely restrained from tipping during lifting or transport. All moving parts, such as shelves and trays should be removed and doors need to be positively locked in the closed position during transfer to prevent shifting and damage.

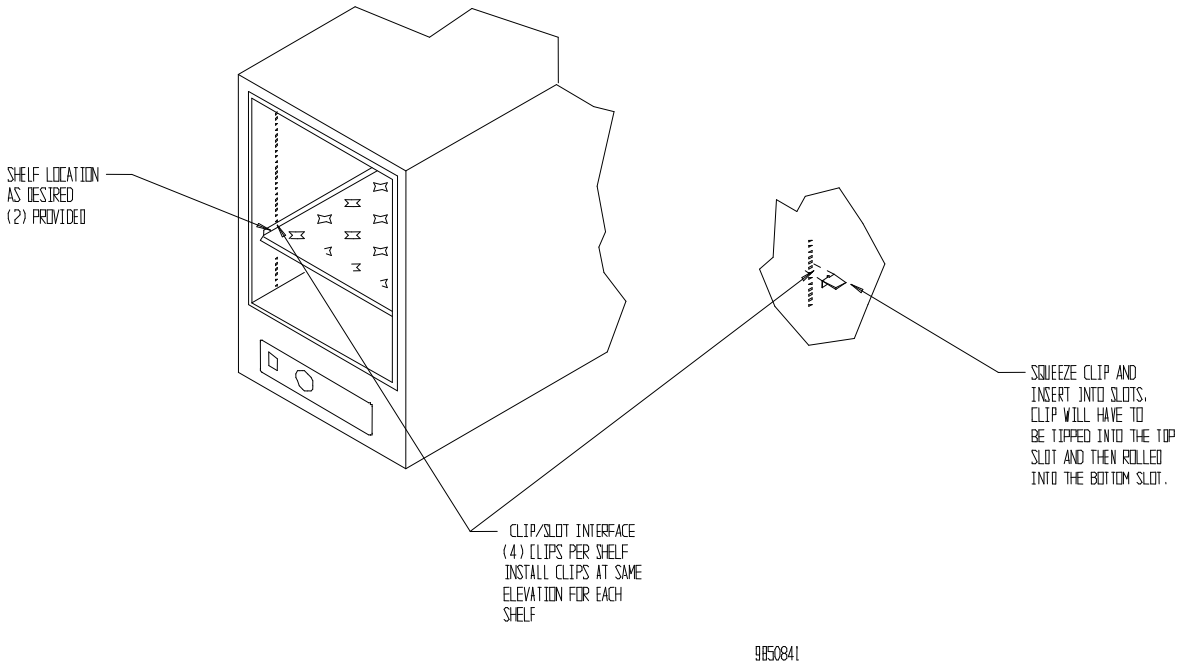
2.4 **Leveling:** The unit must sit level and solidly. Leveling feet are supplied and must be installed in the four holes in the bottom corners of the unit. With the feet installed and the unit standing upright, each foot can be raised by turning it in a counterclockwise direction. Adjust the foot at each corner until the unit stands level and solid without rocking. If the unit must be moved, turn the leveling feet all the way clockwise to prevent damage while moving.

2.5 **Cleaning:** The unit chamber should be cleaned and disinfected prior to use. Remove all of the interior parts, if assembled, and clean thoroughly, including all corners using a suitable disinfectant that is appropriate to your application. Regular periodic cleaning is required. Special care should be taken when cleaning around sensing heads to prevent damage. DO NOT USE chlorine-based bleaches or abrasive cleaners as they will damage the coated tank. DO NOT USE spray cleaners that might leak through openings and cracks and get on electrical parts or that may contain solvents that will harm the coatings.

WARNING: Never clean the unit with alcohol or flammable cleaners with the unit connected to the electrical supply. Always disconnect the unit from the electrical service when cleaning and assure all volatile or flammable cleaners are evaporated and dry before reattaching the unit to the power supply.

2.6 Place shelves in chamber as desired. **See Figure One.**

Figure One



Section 3

CONTROL PANEL OVERVIEW (See Figure 2)

3.1 **Power Switch:** The main power I/O (On/Off) switch controls all power to the unit. It must be in the I/On position before any systems are operational.

3.2 **Main Temperature Control:** This control is marked °C and consists of the Up/Down arrow pads and the digital display and UP/DOWN arrow pads for inputting set point temperatures and calibration.

3.3 **High Limit Thermostat:** This controller is marked SET HIGH LIMIT and is equipped with an adjustment knob and a graduated dial from "0 to 10". Completely independent of the Main Temperature Controller, the High Limit Thermostat guards against any failure of the Main Temperature Controller which would allow temperature to rise past set point. If temperature rises to the safety set point, the High Limit Thermostat takes control of the heating element and allows continued use of the incubator until the problem can be resolved or service can be arranged. It is not recommended that the unit be allowed to operate using only the High Limit as temperature uniformity will suffer.

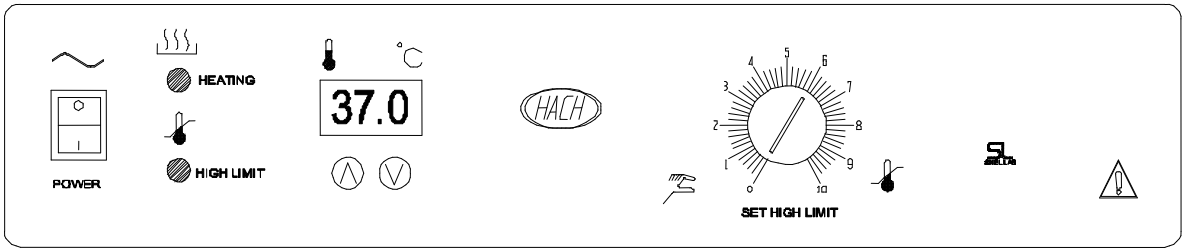
3.4 **Heating Light:** This pilot light is on when the unit is heating up to set point and is blinking when controlling temperature at set point.

3.5 **High Limit Light:** This pilot light comes on when the High Limit Thermostat is activated. Under normal operating conditions this light should never come on.

3.6 **Circuit Breaker: (Non CE units)** Adjacent to the power cord, the breaker is manually re-settable and offers protection against power source variations. When tripped the unit will be shut down and the extended button must be pushed in to reset the circuit breaker, once the source of the interruption has been cleared.

3.7 **Fuse: (CE units)** Located in the power inlet, the fuse offers protection against power source variations. When blown the unit will shut down and the fuse must be replaced, once the source of the interruption has been cleared.

FIGURE 2



4500788M

Section 4

OPERATION

4.1 Check power supply against unit serial plate. They must match. Plug service cord into the grounded electrical outlet.

4.2 Push the power switch to the I/On position, and turn the High Limit Thermostat to its maximum position, clockwise.

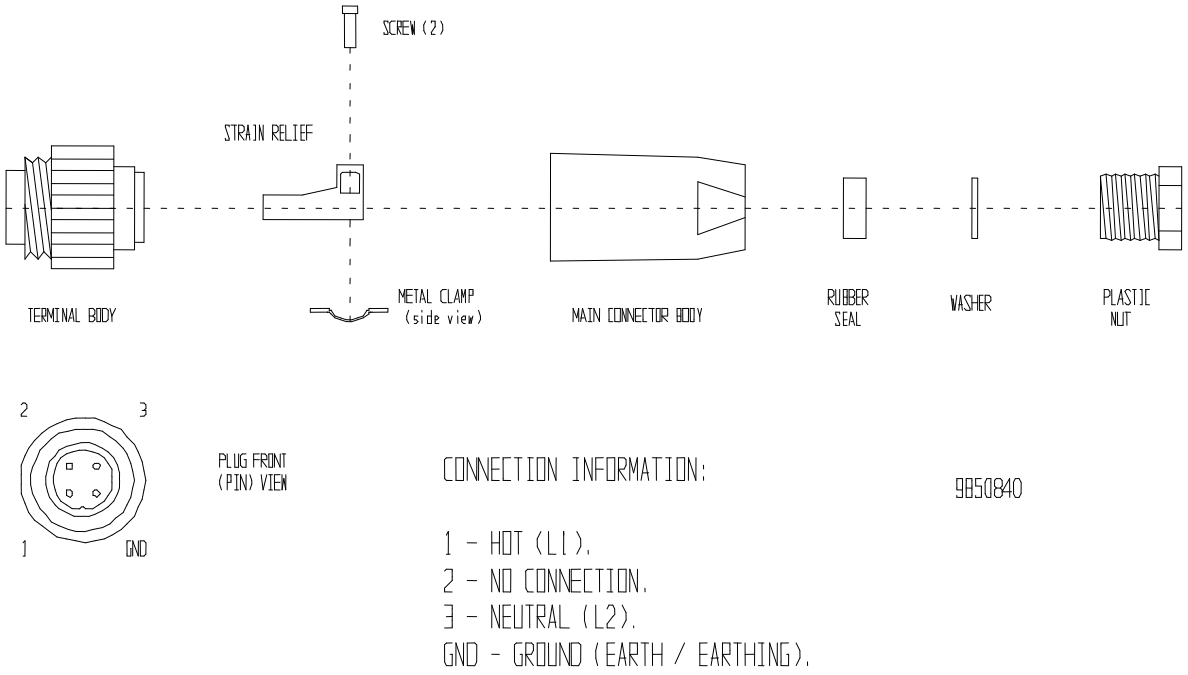
4.3 **Set Main Temperature Controller:** Enter desired set point temperature. To enter set point mode on the controller, press either the Up or Down arrow pad one time. The digital display will start to blink, going from bright to dim. While blinking, the digital display is showing the set point. To change the set point, use the Up and Down arrow pads. If the arrow pads are not pressed for five (5) seconds, the display will stop blinking and will read the temperature of the unit. Allow the incubator at least 24 hours to stabilize.

4.4 **Calibration:** It is highly recommended that calibration is done once the unit is installed in its working environment and chamber temperature has been stabile at set point for several hours. Place a certified reference thermometer in the chamber by either placing it directly inside, or through the access tube at the top left of the unit. Be certain the thermometer is not touching any shelving. Allow the temperature to stabilize again until the thermometer reads a constant value for one hour. Compare the digital display with the reference thermometer. If there is an unacceptable difference, put the display into calibration mode by pressing both the Up and Down arrow pads at the same time until the two outside decimal points begin to flash. While the decimal points are flashing the display can be calibrated by pressing the Up or Down arrow pads until the display reads the correct value. Allow the incubator temperature to stabilize again, and recalibrate if necessary.

4.5 **Set High Limit Thermostat:** As mentioned in step 4.2, the High Limit Thermostat should be initially set to its maximum position to allow the temperature to stabilize. Once the incubator is stabile at the desired set point, turn the High Limit Thermostat counterclockwise with a coin or a flat-headed screwdriver until the High Limit light turns on. Next, turn the High Limit Thermostat clockwise just until the High Limit light turns off. Then turn the control clockwise two minor increments on the dial past the point where the light went out. This will set the High Limit Thermostat at approximately 1°C above Main Temperature set point.

4.6 **Accessory Outlet and Plug:** There is an outlet inside the chamber for use with equipment not exceeding 1 amp and a corresponding plug provided with your accessories. See **Figure 3** for assembly instructions. The weight of this equipment should not exceed 25 pounds per shelf. Note that equipment in the chamber may provide additional heat that could affect the temperature range of the incubator. It is recommended that testing be done with the incubator and any additional equipment to insure that the desired operating conditions can be met.

Figure 3



Assembly, Moisture Proof Plug:

1. Slide the accessory equipment's power cord through the plastic nut, washer, rubber seal and the main connector body.
2. Connect the hot wire to Terminal 1.
3. Connect the neutral wire to Terminal 2.
4. Connect the ground wire to the Ground Terminal.
5. Attach the strain relief to the terminal body.
6. Using the metal clamp and two screws (supplied), clamp the accessory equipment power cord to the strain relief.
7. Screw the main connector body onto the terminal body.
8. Push the rubber seal and the washer into the end of the main connector body.
9. Screw the plastic nut into the main connector body and tighten.
10. Disconnect the unit from its power source, and remove the cover from the accessory outlet.
11. Slowly rotate the plug until the plug and outlet is aligned, and then press in.
12. Secure by tightening the nut on the accessory plug.

Section 5

MAINTENANCE

NOTE: Prior to any maintenance or service on this unit, disconnect power cord from supply.

5.1 **Cleaning:** Clean interior of the incubator on a regular basis. Remove shelving and shelf clips and sterilize the incubator with a disinfectant that is appropriate for your application. The shelves and clips are autoclavable, or can be cleaned with the same solution as the incubator. DO NOT USE chlorine-based bleaches or abrasive cleaners as they will damage the stainless steel interior. DO NOT USE spray cleaners that might leak through openings and cracks and get on electrical parts or that may contain solvents that will harm the coatings.

WARNING: Never clean the unit with alcohol or flammable cleaners with the unit connected to the electrical supply. Always disconnect the unit from the electrical service when cleaning and assure all volatile or flammable cleaners are evaporated and dry before reattaching the unit to the power supply.

5.2 When washing the interior, handle the door gasket carefully so as not to impair the positive seal.

5.3 No maintenance is required for the electrical components. If the incubator fails to operate as specified, please review the Troubleshooting section prior to calling for service.

Section 6

SERVICE AND TROUBLESHOOTING

WARNING: Troubleshooting procedures involve working with high voltages which can cause injury or death. Troubleshooting should only be performed by trained personnel.

Always make a visual inspection of the incubator and control panel when troubleshooting. Look for loose or disconnected wires that may be the source of trouble. If following these troubleshooting suggestions does not solve the problem call your local Hach representative for assistance.

TEMPERATURE	
Temperature too high-display and reference thermometer don't match	
	1/ Controller set too high-see section 4.3. 2/ Controller failed on – call Customer Service. 3/ Wiring error – call Customer Service.
Display reads "HI" or "400"+	
	Probe is unplugged, is broken or wire to sensor is broken – trace wire from display to probe; move wire and watch display to see intermittent problems.
Chamber temperature spikes over set point and then settles to set point	
	Recalibrate – see section 4.4.
Temperature too low-display and reference thermometer don't match	
	1/ High limit set too low – see section 4.6. 2/ Controller set too low – see section 4.3. 3/ Unit not recovered from door opening – wait for display to stop changing. 4/ Unit not recovered from power failure or being turned off – incubators will need 24 hours to warm up and stabilize. 5/ Element failure – see if heating light is on; compare current draw to data plate. 6/ Controller failure – confirm with front panel lights that controller is calling for heat. 7/ High limit failure – confirm with front panel lights that High Limit is operating correctly. 8/ Wiring problem – check all functions and compare wiring in section 7.0 – especially around any areas recently worked on. 9/ Loose connection – call Customer Service.
Display reads "LO"	
	1/ If ambient temperature is lower than range of unit – compare set points and ambient temperature to rated specifications in section 7.0. 2/ Sensor is plugged in backwards – call Customer Service.
Unit will not heat over a temperature that is below set point	

	1/ Confirm that fan is moving and that amperage and voltage match data plate – check fan motor motion by removing back body panel of the unit. 2/ Confirm that set point is set high enough –turn High Limit all the way clockwise and see if heating light or safety light comes on. 3/ Check connections to sensor. 4/ Check calibration – using independent thermometer, follow instructions in section 4.4.
Unit will not heat up at all	
	1/ Verify that controller is asking for heat by looking for Heating light – if pilot light is not on continuously during initial start up, there is a problem with the controller. 2/ Check amperage – amperage should be virtually at maximum rated (data plate) amperage. 3/ Do all controller functions work? 4/ Is the High Limit set high enough? – for diagnostics, should be fully clockwise with the pilot light never on. 5/ Has the fuse/circuit breaker blown?
Indicated chamber temperature unstable	
	1/ ±0.1 may be normal. 2/ Is fan working? – remove back panel and verify movement of cooling fan. 3/ Is ambient radically changing – either door opening or room airflow from heaters or air conditioning ? – stabilize ambient conditions. 4/ Sensor miss-located, damaged or wires may be damaged - check mounts for control and High Limit sensors, then trace wires or tubing between sensors and controls. 5/ Calibration sensitivity – call Customer Service. 6/ High limit set too low – be sure that its setting is more than 5 degrees over desired set point; check if pilot light is on continuously; turn controller knob completely clockwise to see if problem solved then follow instructions in section 4.6 for correct setting. 7/ Electrical noise – remove nearby sources of RFI including motors, arcing relays or radio transmitters. 8/ Bad connection on temperature sensor or faulty sensor – check connectors for continuity and mechanical soundness while watching display for erratic behavior; check sensor and wiring for mechanical damage. 9/ Bad connections– check connectors for mechanical soundness and look for corrosion around terminals or signs of arcing or other visible deterioration.
Will not maintain set point	
	1/ Assure that set point is at least 5 degrees over ambient. 2/ See if ambient is fluctuating – check for adjacent open doors or HVAC duct openings, stabilize ambient conditions.
Display and reference thermometer don't match	
	1/ Calibration error – see section 4.4. 2/ Temperature sensor failure – evaluate if pilot light is operating correctly. 3/ Controller failure – evaluate if pilot light is operating correctly. 4/ Allow at least 24 hours to stabilize at set point temperature. 5/ Verify that reference thermometer is certified.
Can't adjust set points or calibration	
	1/ Turn entire unit off and on to reset. 2/ If repeatedly happens, call Customer Service.
Calibrated at one temperature, but not at another	
	This can be a normal condition when operating temperature varies widely. For maximum accuracy, calibration should be done at or as close to the set point temperature as possible.

MECHANICAL	
Glass door not sealing	
	1/ Stretch and tuck gasket. 2/ Align clamps till they hold gasket tight. 3/ Check physical condition of gasket. 4/ Tighten door latch till it pulls glass in. 5/ Assure that gasket clamps are in original location.
Motor doesn't move	
	1/ If shaft spins freely: check connections to motor and check voltage to motor. 2/ If shaft rubs or is frozen, relieve binding and retest.
Motor makes noise	
	1) Make sure that the fan or blower wheel is not contacting its housing. Adjust the motor mounting bracket position to re-center the fan or blower wheel, if necessary. 2) Check the fan or blower wheel for damage or out of balance condition. Replace the fan or blower wheel if it is damaged or out of balance. 3) Turn the motor shaft to make sure that it spins freely. If it binds or the bearings make a rubbing or scrapping sound then replace the motor.
Outer door not sealing	
	1/ Adjust hinge blocks or twist the door. 2/ Confirm that unit has not been damaged and body is square.
OTHER	
Controller on at all times - "locked-up"	
	1/ Turn unit off and on to reset. 2/ If cannot change any condition on the front panel, call Customer Service.
Front panel displays are all off	
	Check for wire damage.
Unit or wall fuse/circuit breaker is blown	
	1/ Check wall power source. 2/ Compare current draw and compare to specs on data plate. 3/ See what other loads are on the wall circuit.
Unit will not turn on	
	1/ Check wall power source. 2/ Check fuse/circuit breaker on unit or in wall. 3/ See if unit is on, e.g., fan or heater, and just controller is off. 4/ Check all wiring connections, especially around the on/off switch.
Unit is smoking – Out of box	
	This is not an uncommon occurrence when first operating new units. Put unit under vent and run at full power for one hour. – smoking is normal during first cycle to temperature.
Contamination in chamber	
	1/ See cleaning procedure in operator's manual. 2/ Develop and follow standard operating procedure for specific application; include definition of cleaning technique and maintenance schedule.

Section 7

PARTS LIST

DESCRIPTION	115V	220V
Blower Motor	4880564	4880563
Circuit Breaker	1100505	1100505
Door Element	2350544	2350544
Element	2350564	2350566
EMI Filter 10amp, CE units only	NA	2800502
Heat On Pilot Light	4650554	4650554
High Limit Thermostat	1750862	1750862
Interior Convenience Outlet	1650531	1650531
Leveling Feet	2700512	2700512
Main Temperature Control w/ Probe	1750549	1750549
Moisture Proof Plug	1650530	1650530
On / Off Switch	7850570	7850570
Power Cord - USA	1800516	1800537
Power Cord, European - detachable	NA	1800500
Safety On Pilot	4650553	4650553
Shelf	5130518	5130518

UNIT SPECIFICATIONS

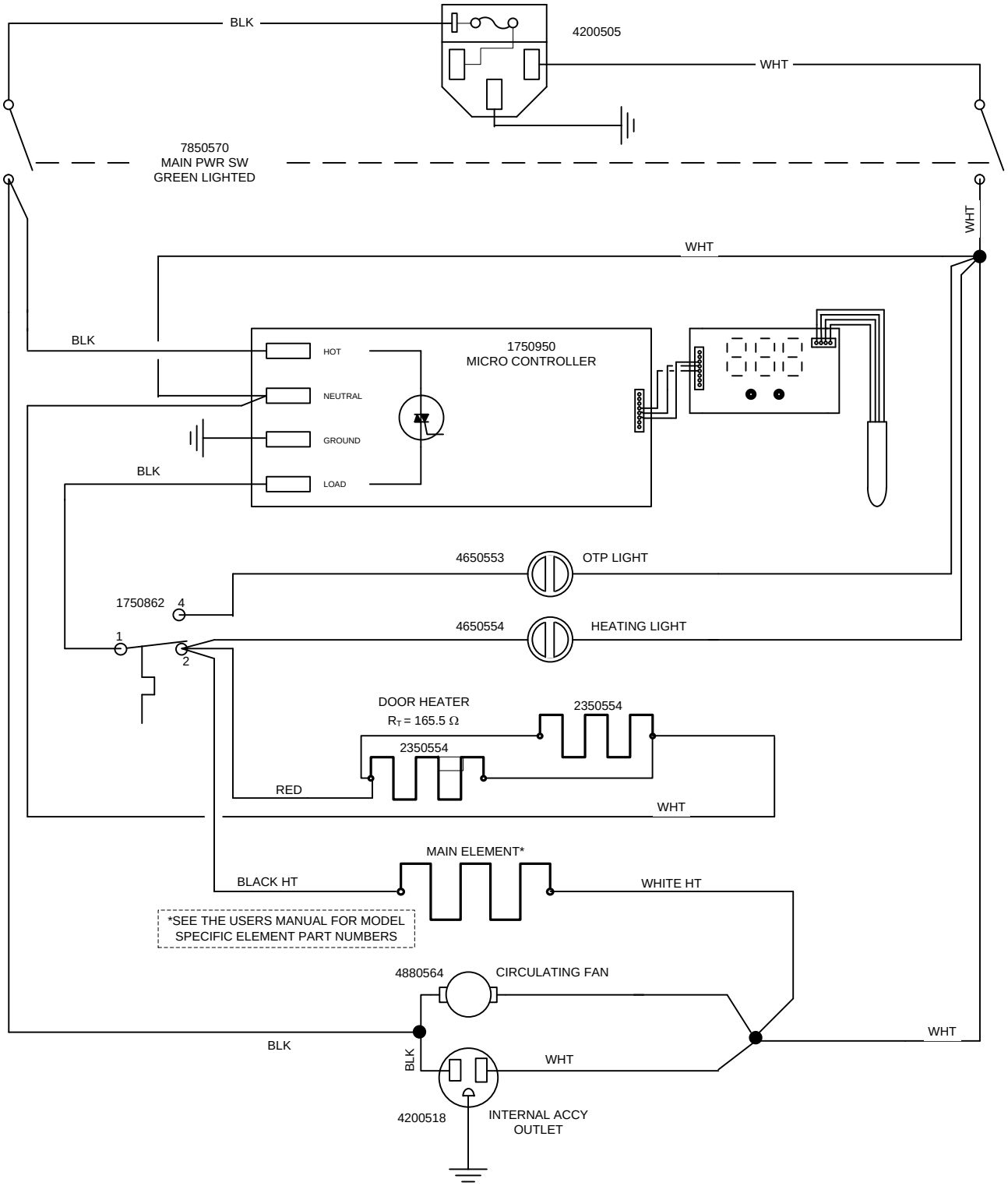
Weight	Shipping	Net
	260 lbs.	132 lbs.

Dimensions	Exterior WxDxH (in.)	Interior WxDxH (in.)
	30x30x32	24x24x20

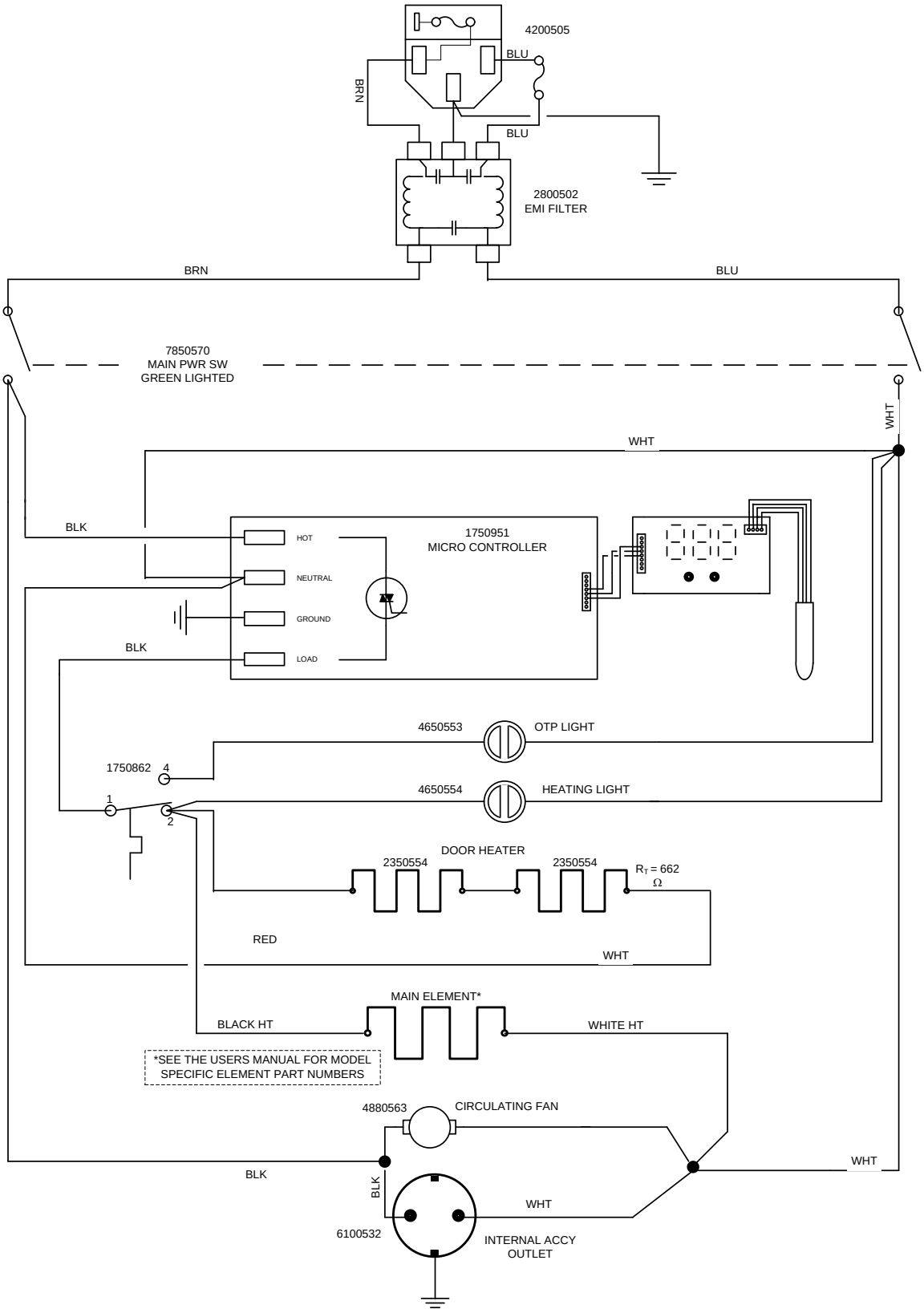
Capacity	6.67 Cubic Ft

Temperature	Range	Uniformity	Stability
	Amb. +5° to 70°C	±.25° @ 37°C	±.1°C

WIRE DIAGRAM
153 110V (9851321)



153-2
220V (9851322)


4200505
BLU
BRN
BLU
2800502
EMI FILTER
BRN
BLU
7850570
MAIN PWR SW
GREEN LIGHTED
WHT
WHT
BLK
HOT
NEUTRAL
GROUND
LOAD
1750951
MICRO CONTROLLER
BLK
4650553
OTP LIGHT
1750862
4
1
2
4650554
HEATING LIGHT
DOOR HEATER
2350554
2350554
R_T = 662 Ω
RED
WHT
MAIN ELEMENT*
BLACK HT
WHITE HT
*SEE THE USERS MANUAL FOR MODEL
SPECIFIC ELEMENT PART NUMBERS
4880563
CIRCULATING FAN
WHT
BLK
BLK
WHT
6100532
INTERNAL ACCY
OUTLET

SHELDON MANUFACTURING, INC.
LIMITED WARRANTY
(Parts only, exclusive of labor)

Sheldon Manufacturing, Inc., ("Manufacturer") warrants for the original user of this product that all parts, not including finished goods products, it manufactures or resells will be free from defects in material and workmanship for a period of one year from the date of delivery of this product to the original user (the "Warranty Period"). During the Warranty Period, Manufacturer, at its election and expense, will repair or replace parts that are proven to Manufacturer's satisfaction to be defective, or, at Manufacturer's option, refund the price or credit the price of any parts that are proven to Manufacturer's satisfaction to be defective. This warranty does not cover any labor or damage due to accident, misuse, negligence, or abnormal use. Use of parts in a system that includes components not manufactured by Manufacturer is not covered by this warranty. Any alteration or removal of the serial number on Manufacturer's parts will void this warranty. **Under no circumstances will Manufacturer be liable for indirect, incidental, consequential, or special damages.** The terms of this warranty are governed by the laws of the state of Oregon without regards to the principles of conflicts of laws thereof. If any provision of this limited warranty is held to be unenforceable by any court of competent jurisdiction, the remainder of this limited warranty will remain in full force and effect.

This warranty is in lieu of and excludes all other warranties or obligations, either express or implied. Manufacturer expressly disclaims all implied warranties, including without limitation, the warranties of merchantability and fitness for a particular purpose.

For fast and efficient support, please have the following information available anytime you request service:

Model _____

Serial No. _____

Part No. _____