HACH

LOW TEMPERATURE INCUBATORS

MODEL: 205/207

INSTALLATION AND OPERATIONAL MANUAL

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These units are Biochemical Oxygen Demand incubators 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. These units are 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 necessary, 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, first contact your customer representative for authorization. Supply nameplate data, including model number and serial number.

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. These units are equipped with 2 shelves.

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.

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 of these limits.

This unit should remain upright for 24 hours prior to powering up. This will allow the oil to settle in the refrigeration compressor.

2.1 Power Source: The electrical supply circuit to the incubator must conform to all national and local electrical codes. Consult the incubator's serial data plate for the voltage, cycle wattage and ampere requirements before making connection. VOLTAGE SHOULD NOT VARY MORE THAN 10% FROM THE SERIAL PLATE RATING. This unit is intended for 50/60 Hz application. A separate circuit is recommended to prevent possible loss of product due to overloading or failure of other equipment on the same circuit.

2.2 Location: When selecting a site for the incubator, consider all conditions which may affect performance, such as extreme heat from steam radiators, stoves, ovens autoclaves, etc. Avoid direct sun, fast-moving air currents, heating/cooling ducts and high traffic areas. To ensure air circulation around the unit allow a minimum of 20cm between incubator rear and sides and any walls, partitions or obstructions to free airflow.

2.3 Lifting / Handling: These units are 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. Turn the leveling feet counterclockwise to raise level. If the unit must be moved, turn the leveling screws in all the way to prevent bending of the feet.

2.5 Cleaning: The incubator interior was cleaned at the factory, but not sterilized. Remove all interior parts, including shelves and trays and clean with a disinfectant that is appropriate to your application. DO NOT USE spray cleaners that might leak through openings and cracks and get on electrical components, or that may contain solvents that will harm coatings. DO NOT USE chlorine-based bleaches or abrasives as this will damage the stainless steel interior. A thorough periodic cleaning is strongly recommended.

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.

Section 3

CONTROL PANEL OVERVIEW

(SEE FIGURE 1)

3.1 Power Switch: The main power I/O (on/off) switch controls all power to the unit and must be in the I/ON position before any systems are operational.

3.2 Main Temperature Control: The Main Temperature Control consists of the digital display and UP and DOWN arrow pads for inputting set point temperatures and calibration.

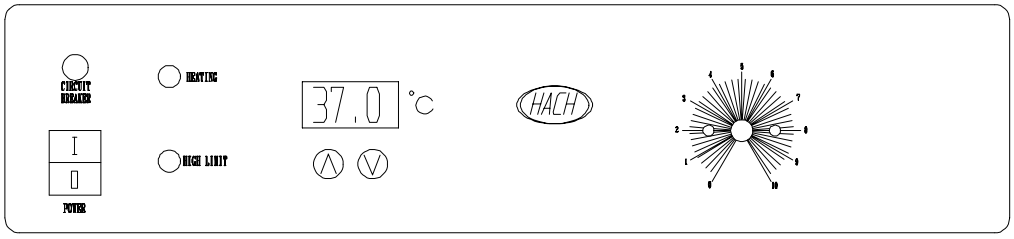
3.3 HEATING Lamp: This pilot lamp is ON when the unit is heating up to set point and is blinking when controlling temperature at set point.

3.4 High Limit Safety Thermostat: The manual dial marked from 0 to 10, the High Limit Safety is a completely independent control that acts as an override in the event that the Main control fails in the ON position. The High Limit Safety will regulate chamber temperature at approximately 1°C above the set point of the Main controller.

3.5 HIGH LIMIT Light: This pilot lamp comes ON when the High Limit Thermostat is activated. Under normal operating conditions this light should never be lit.

3.6 Circuit Breaker: The breaker can be manually reset by pushing in the extended button when tripped. It offers protection against power source variations. Protection is an addition to the automatic high-temperature limit designed into the heating element and low limit control wired into the cooling compressor.

Figure 1



(2 circuit breakers on 220V units)

Section 4

OPERATION

4.1 Check power supply against unit serial plate. They must match.

4.2 Plug service cord into the grounded electrical outlet. The power switch must be in the I/On position before the unit will operate (this includes both chambers on the 207).

4.3 Turn the High Limit thermostat to its maximum position (clockwise).

4.4 **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. Note that the High Limit Thermostat should be turned to its maximum position, (clockwise) until the unit has stabilized at desired set point temperature. Allow the incubator at least 24 hours to stabilize.

4.5 **Calibrating the Main Temperature Controller:** It is recommended that calibration is done once the unit is installed in its working environment and has been stabile at set point for several hours. Place a certified reference thermometer in the chamber and 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. If the arrow pads are not pressed for five (5) seconds, the display will stop blinking and will return to read the temperature of the chamber. Allow the incubator temperature to stabilize again, and recalibrate if necessary.

4.6 **Set High Limit Thermostat:** As mentioned in step 4.4, the High Limit Thermostat should be initially set to its maximum position, to allow the unit to stabilize. Once the incubator is stabile at the desired set point, turn the High Limit Thermostat counterclockwise until the HIGH LIMIT light turns on. Next, turn the Thermostat clockwise just until the light turns off. This will set the High Limit Thermostat at approximately 1°C above main Temperature set point.

4.7 On model 207, set the lower storage chamber control (located at the top right back of the chamber) to a position that maintains your desired temperature.

Section 5

MAINTENANCE

ATTENTION: Your refrigerator is equipped with a special Thermostat Control Device (PTC). If the unit is turned off or unplugged, YOU MUST ALLOW THREE (3) MINUTES BEFORE RESTARTING OR REPLUGGING THE UNIT. The unit will not start if you attempt it in less than three (3) minutes.

Note: Prior to performing maintenance and or service on this incubator, disconnect the unit from the power supply.

5.1 **Cleaning:** Turn off the power to the unit and remove items, shelves, trays, etc. Wash the interior and shelving with a disinfectant that is appropriate to your application. DO NOT use abrasives of any kind as this will damage the chamber interior. Rinse clean with water and wipe dry. NEVER use acids, chemical thinner, gasoline, benzine or the like for cleaning any part of the unit. Boiling water and benzine may deform or damage plastic parts. DO NOT USE spray cleaners that might leak through openings and cracks and get on electrical components, or that may contain solvents that will harm coatings. DO NOT USE chlorine-based bleaches or abrasives as this will damage the stainless steel interior. A thorough periodic cleaning is strongly recommended.

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 of the incubator chamber or 207 refrigeration compartment always handle the gasket with care so that the positive seal is not impaired. Use only mild soapy water to clean the gasket.

5.3 **Compressor Compartment**: Located at the back and bottom of the unit, the compressor compartment can collect dust that will inhibit proper airflow. This compartment should be vacuumed out at least once every six (6) months to ensure maximum efficiency.

5.4 **Defrosting:** For the most efficient operation of the lower refrigeration unit of the 207 using the minimum electrical energy consumption, defrost

freezing compartment whenever the layer of ice/frost on the wall of the freezing compartment reaches a quarter inch thick.

For defrosting, remove everything from the freezing compartment and put drip tray in place. To start defrosting, set the cold control knob at the “OFF” position. Defrosting usually takes a few hours. In order to defrost faster, remove all items from refrigerator and keep door open.

Never use any sharp or metallic instruments to remove ice/frost from the freezing compartment. This could puncture the evaporator causing serious problems, and will void your warranty. DO not use boiling water or defrost heater as it may cause damage to plastic parts such as cabinet liner, voiding your warranty.

When defrosting is completed, remove drip tray and dispose of water. Set the cold control knob at any desired position between “MAX” and “MIN” to restart refrigeration.

5.5 **Storage:** If the incubator is to be shut down for storage or transport, remove all items, drip tray, and shelves and screw in leveling feet. Review Section 2.3 Lifting/Handling for transporting instructions.

5.6 There is no maintenance required for electrical components. If the unit fails to operate as specified, please review Section 6.0 Troubleshooting, prior to calling for service.

Section 6

TROUBLESHOOTING

FOR PERSONAL SAFETY, ALWAYS DISCONNECT THE POWER BEFORE SERVICING. Always make a visual inspection of the incubator and control console when troubleshooting to find loose or disconnected wires which may be the source of the trouble.

TEMPERATURE

Temperature too high	
	1/ controller set too high-see section 4.4 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 4.5
Temperature too low	
	1/ high limit set too low – see section 4.6 2/ controller set too low – see section 4.4 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 Safety is operating correctly. 8/ wiring problem – check all functions and compare wiring to schematic - especially around any areas recently worked on. 9/ loose connection – check shadow box for loose connections.
Display reads "LO"	

	1/ sensor is plugged in backwards – reverse sensor wires to controller 2/ if ambient temperature is lower than range of unit – compare set points and ambient temperature to rated specifications in section 7, Unit Specifications.
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 motion, feel for air movement in chamber 2/ confirm that set point is set high enough –turn safety all the way clockwise and see if heating light or safety light comes on 3/ check connections to sensor 4/ check calibration – using independent certified thermometer, follow instructions in section 4.5
Unit will not heat up at all	
	1/ verify that controller is asking for heat by looking for controller 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 Safety 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? – feel for air movement at the top of the chamber. 3/ is ambient room temperature 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 Safety 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 Safety is more than 5 degrees over desired set point; check if High Limit pilot is on continuously; turn controller knob completely clockwise to see if problem solved then follow instructions in owner's manual for correct setting – see section 4.6 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 or faulty relay – 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
Display and reference thermometer don't match	
	1/ calibration error – see section 4.5 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 two hours to stabilize. 5/ see if 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 as close to the set point temperature.

REFRIGERATION

Temperature can't get up to set point	
	1/ assure that power is going to heating coils. 2/ if the displacement is erratic, see if air is being circulated. 3/ confirm that controller is calling for heat (check front panel light). 4/ if light not coming on, check control set point and Safety set point . 5/ confirm that fan is operating and airflow is not blocked. 6/ reset by turning unit off and on.
Unit will not cool	
	If the compressor is running: 1/ see if condenser is cold but free of ice. 2/ be sure that fans are circulating air: in the chamber, and over the compressor.

	3/ confirm proper sensor location and operation. 4/ look for leaks in the chamber or around the door gasket. 5/ assure there is ample room around the unit as described in Installation section 2.2 6/ adjust calibration on controller, see section 4.5 7/ compare ambient specifications to Unit specifications in section 7. 8/ If 1 through 7 has been tried and still not functioning correctly, call customer service. If compressor isn't running: 9/ confirm that compressor cooling fan motor is operable. 10 / check if motor has voltage to it. 11/ see if refrigeration is running too hot , factory set high-limit may have shut down the compressor: a- dirty coil or poor circulation b- coil next to heat source c- ambient temperature too high
Ice build up in chamber	
	1/ Search for leak in door gasket. 2/ door being opened too often. 3/ open container/loose seal on bottles 4/ see section 5.4 for defrost instruction
Making noise	
	1/ assure that fan is not miss-aligned. 2/ Steady internal clicking may be broken spring or valve – call Customer Service.
MECHANICAL	
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/ If noise is from the motor, tap the top of motor shaft with ball peen hammer. 2/ If the sound gets worse, tap the other end of the shaft - avoiding touching the fan blade. 3/ If there is no change, call Customer Service.
Door not sealing	
	1/ Confirm that unit has not been damaged and body is square. 2/ Check to see that door gasket is in place and not damaged.
Water leaking	
	1/ If leaking inside: dry chamber, run at temperature with door open. Check all seams with flashlight including front face.

	2/ If leaking outside: dry out and see if leak repeats and find source of leak. Sources may include: fittings that need tightening, condensation due to missing insulation or drip tray needs to be emptied.
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 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.
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
Circuit Breaker	1100505	1100505
Circulating Fan, Incubator	X1000071	X1000071
Convenience Outlet	100020	X1000779
Cooling Fan, Compressor	210002	210002
Element Limit Control	1750506	1750506
EMI Filter		2800502
Heating Element Coil	2350503	120071
High Limit Thermostat	10000J	10000J
I/O (On/Off) Power Switch	103351	103351
Low Limit Control, Compressor	1750557	1750577
Microprocessor Temperature Control	1750573	1750574
Pilot Light Green	200021	200021
Pilot Light Red	200020	200020
Power Cord	1800516	X1000778
Step Down Transformer		100055

UNIT SPECIFICATIONS

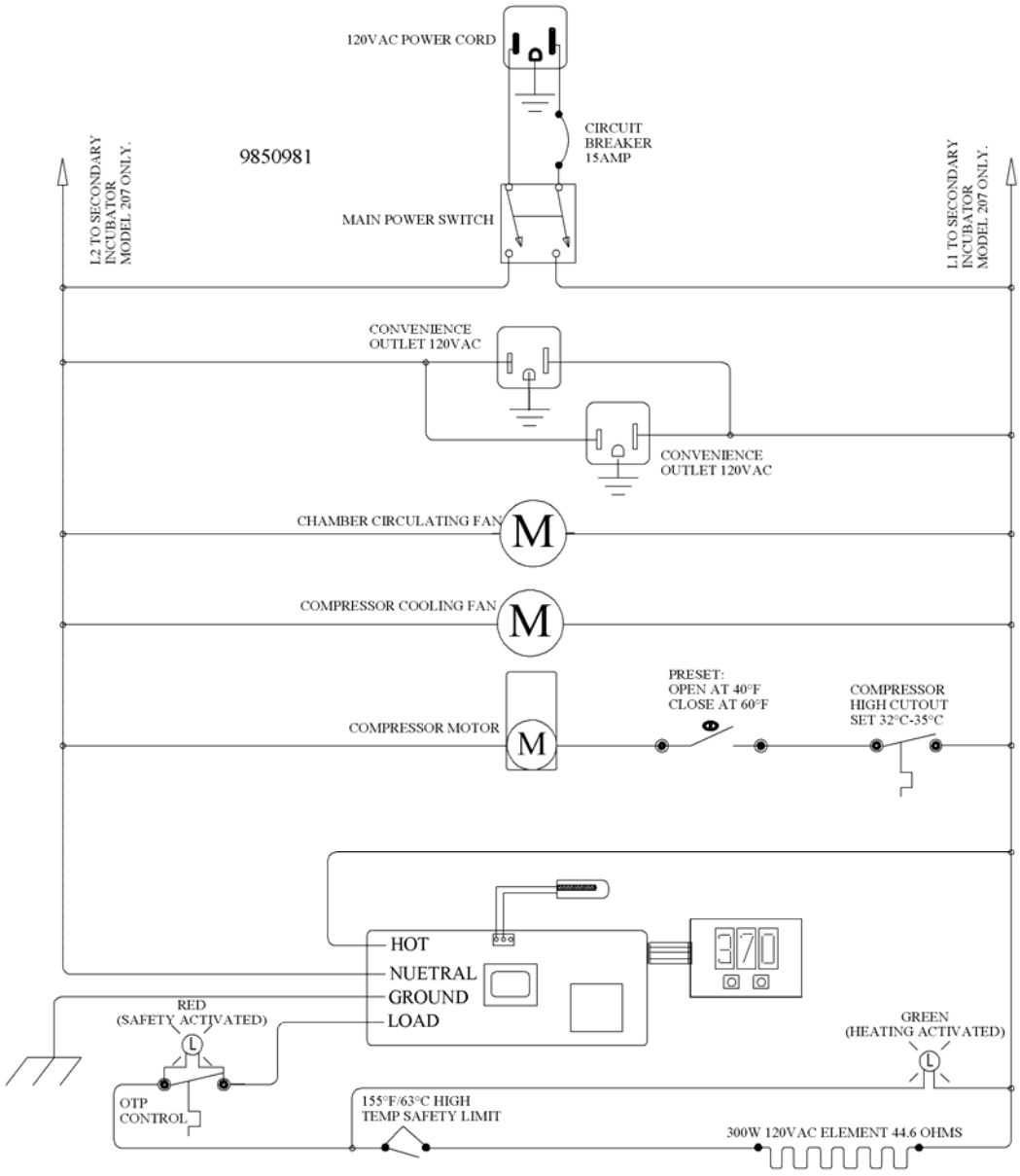
Weight	Shipping	Net
205	190 lbs.	61 lbs.
207	300 lbs.	121 lbs.

Dimensions	Exterior WxDxH	Interior WxDxH
205	18.5x19x38	16.5x14.5x22.5
207	18.5x19x70	16x15.5x29.5 each

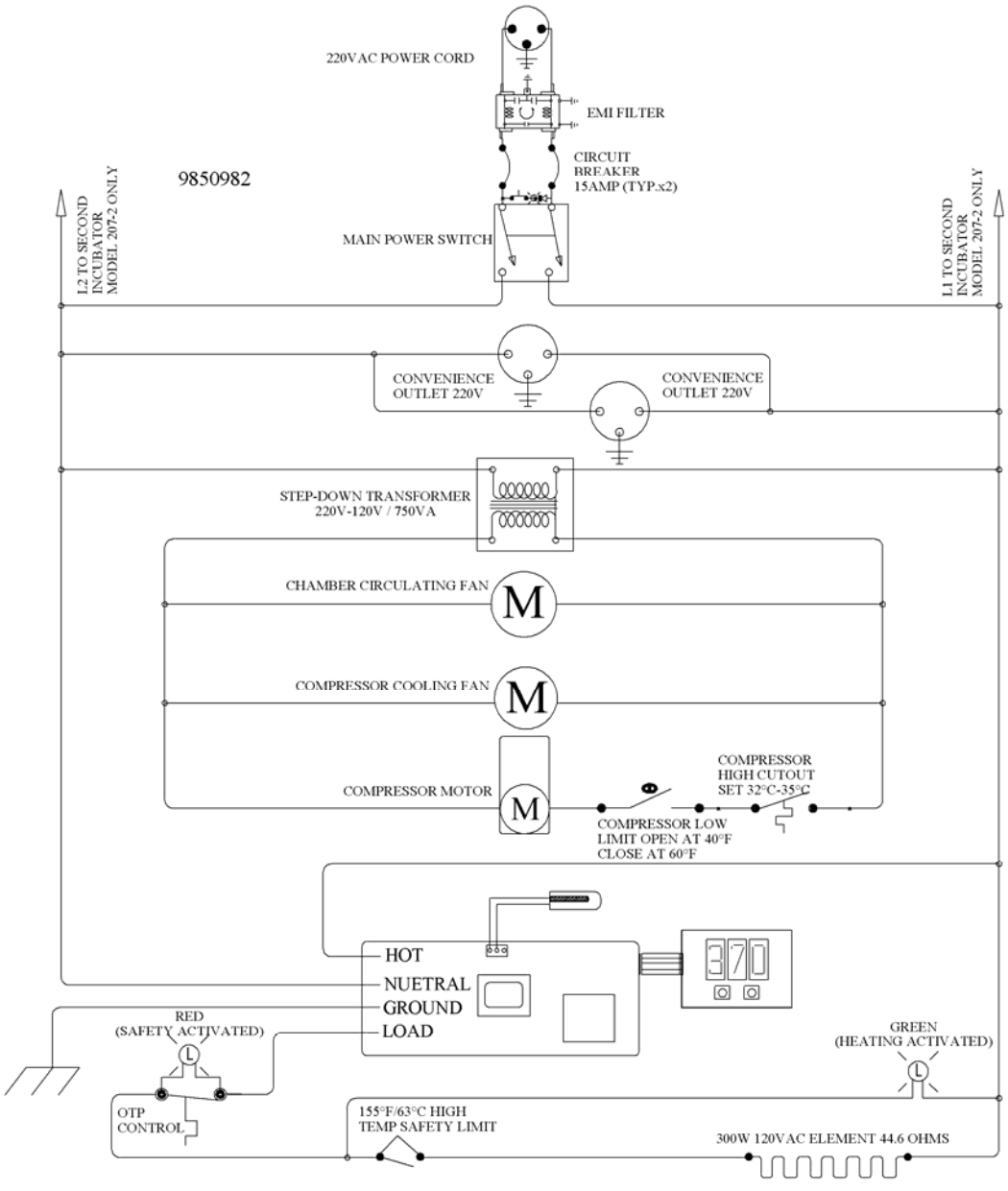
Capacity	B.O.D. Bottles
205	59
207	59 per chamber

Temperature	Range	Uniformity
205	-10 to 45°C	±.5 @ 20°C
207	-10 to 45°C	±.5 @ 20°C

Wire Diagram
115 Volts



Wire Diagram
220 Volts



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. _____