



LOW TEMPERATURE INCUBATOR

MODEL: LI5

INSTALLATION AND OPERATIONAL MANUAL

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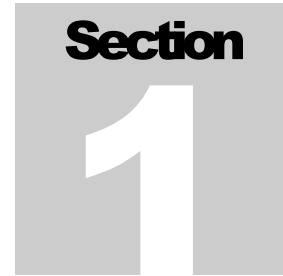


TABLE OF CONTENTS

SECTION 1.0	RECEIVING AND INSPECTION
SECTION 2.0	INSTALLATION
SECTION 3.0	CONTROL OVERVIEW
SECTION 4.0	OPERATION
SECTION 5.0	MAINTENANCE
SECTION 6.0	TROUBLESHOOTING
SECTION 7.0	PARTS LIST
	UNIT SPECIFICATIONS
	SCHEMATICS

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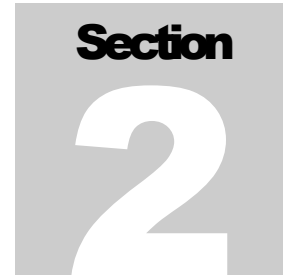
This unit is a general purpose Biochemical Oxygen Demand (BOD) incubator for professional, industrial or educational use where the preparation or testing of materials is done at approximately atmospheric pressure and no flammable, volatile or combustible materials are being heated. This unit is not intended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



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. Please see the manual cover for information on where to contact Customer service.
- 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 2 shelves and a humidity pan.



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 turning on. This will allow the oil settle to 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 5cm between incubator rear and sides and any walls, partitions or obstructions to free airflow.
- 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. Turn the leveling feet counterclockwise to raise level. If the unit must be moved, turn the leveling feet in all the way to prevent bending and damage.

2.5 Cleaning: The incubator interior was cleaned at the factory, but not sterilized. Remove all interior parts and clean with a disinfectant that is appropriate for your application. DO NOT USE abrasives as this will damage the incubators interior. DO NOT USE spray cleaners that might leak through opening and cracks and get on electrical parts or that may contain solvents that will harm the coatings. A thorough periodic cleaning is strongly recommended.

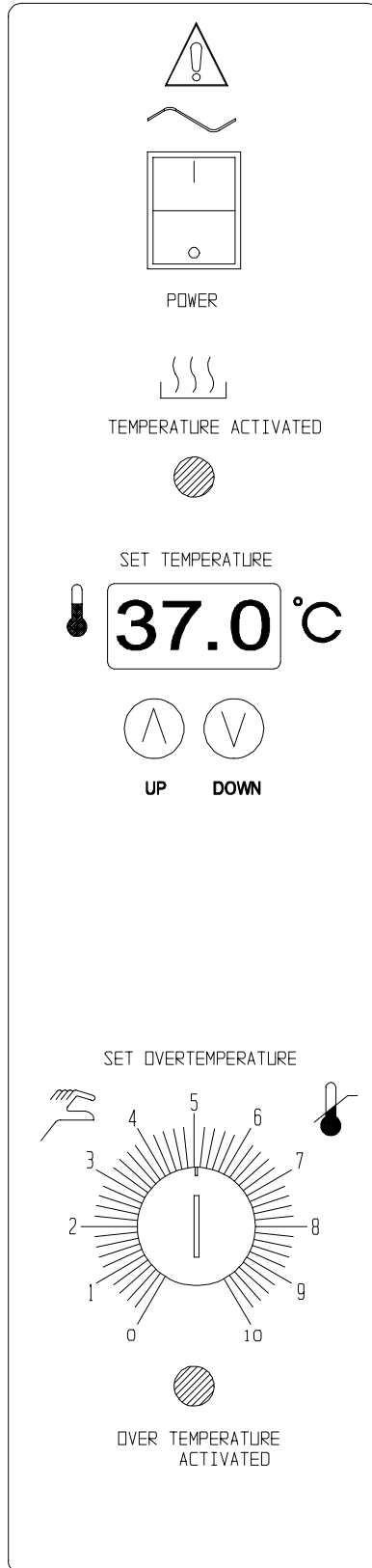
WARNING: Never clean the unit with alcohol or flammable cleaners with the unit connected to the electrical supply. Always disconnect the unit from the electrical service when cleaning and assure all volatile or flammable cleaners are evaporated and dry before reattaching the unit to the power supply.

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:** This control is marked SET TEMPERATURE and consists of the digital display and UP/DOWN arrow pads for inputting set point temperatures and calibration.
- 3.3 Heating Lamp:** This pilot lamp is marked TEMPERATURE ACTIVATED and is ON when the unit is heating up to set point and is blinking when controlling temperature at set point.
- 3.4 Overtemperature Thermostat:** This control is marked SET OVERTEMPERATURE and is completely independent of the Main controller. It acts as an override in the event that the Main control fails in the ON position. The Thermostat will regulate chamber temperature at approximately 1°C above the set point of the Main controller.
- 3.5 Overtemperature Light:** This pilot lamp is marked OVERTEMPERATURE ACTIVATED and is on when the thermostat has been activated. Under normal operating conditions, this pilot light should never be on.
- 3.6 Circuit Breaker:** (Non-CE units) Adjacent to the power cord the circuit breaker is an added measure of protection against power source variations that if tripped, must be reset by pushing in the button once the reason for interruption has been cleared. This protection in addition to the automatic high temperature limit designed into the element assembly.
- 3.7 Fuse:** (CE units only) Located at the back of the unit within the power inlet, the fuse is an added measure of protection against power source variations that, if blown, must be replaced once the reason for the interruption has been cleared. This protection is in addition to the automatic High-Temperature limit designed into the heating element. Note that the unit will not power up unless the fuse is in place.

Figure 1



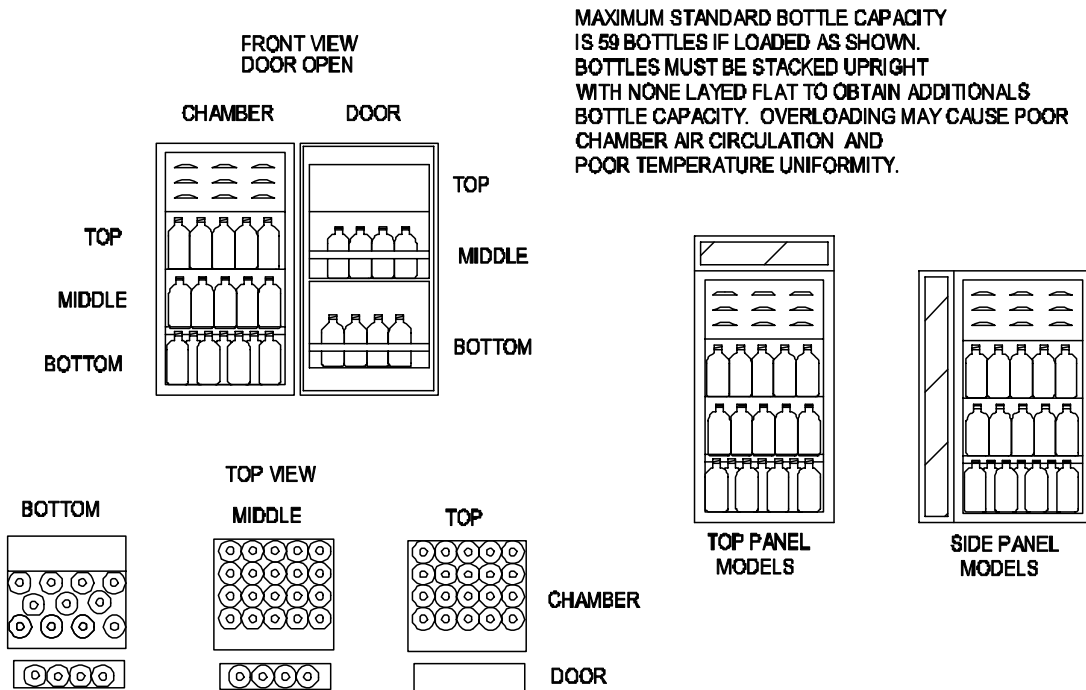
OPERATION

- 4.1 Check power supply against unit serial plate. They must match.
- 4.2 Plug service cord into the grounded electrical outlet.
- 4.3 Push the power switch to the I/On position, and turn the Overtemperature Thermostat to its maximum position, clockwise using a coin or flat edged tool.
- 4.4 Load the chamber with sample bottles. See **Figure 2** for bottle placement.
- 4.5 **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 Overtemperature 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.
- 4.6 **Calibration:** It is recommended that calibration is done once the unit is installed in its working environment and has been stable at set point for several hours. Place a certified reference thermometer in the chamber. 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.
- 4.7 **Set Overtemperature Thermostat:** As mentioned in step 4.5, the Overtemperature Thermostat should be initially set to its maximum position, (clockwise), to allow the unit to stabilize. Once the incubator is stable at the desired set point, turn the Overtemperature Thermostat counterclockwise until the OVERTEMPERATURE ACTIVATED light turns on. Next, turn the Thermostat clockwise just until the light turns off. Then turn the Thermostat

clockwise two (2) minor increments on its scale past the point where the light went out. This will set the Overtemperature Thermostat at approximately 1°C above main Temperature set point.

- 4.8 Accessory Outlet:** This unit has been supplied with a 1 amp accessory outlet inside the chamber to provide power for equipment such as magnetic stirrers, rockers, etc. Be certain the apparatus draws 1 amp or less. The power switch on the front panel controls power to the outlet. Note that the apparatus may provide additional heat that could affect the temperature range of this incubator. It is recommended that testing be done with the incubator and any accessory equipment to insure that the desired operating conditions can be met.

Figure 2



MAINTENANCE

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

- 5.1 Cleaning:** Cleaning and decontamination are recommended on a regular basis. To prepare the unit for cleaning, disconnect the power cord and remove all interior parts, such as shelves, trays, etc.

First clean the chamber with soap and water, rinse and let dry. To decontaminate use a solution that is appropriate for your application. **DO NOT USE** abrasives as this can damage the chamber 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. **NEVER USE** acids, chemical thinner, gasoline, benzine or the like for cleaning the unit. Boiling water and benzine can deform and damage plastic parts.

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 evaporates and dry before reattaching the unit to the power supply.

- 5.2 Compressor Compartments:** Located at the back and bottom of the unit, the compressor compartment can collect dust that will inhibit proper air flow. This compartment should be vacuumed out at least once every six (6) months to ensure maximum efficiency.
- 5.3 Defrosting:** Generally defrosting should not be necessary. If ice build-up occurs it is usually attributed to open containers, loose closures or frequent door openings causing excessive moisture to build up in the chamber. Try to eliminate these as possibilities. To defrost, remove all items from the chamber and let the unit stand with the door open and the POWER OFF. Once frost is gone, empty drip tray, wipe the chamber dry and power up the unit.
- 5.4 Storage:** If the incubator is to be shut down for storage or transport, remove all items, drip tray and shelves and be certain the chamber is dry. Screw in the leveling feet. Review section 2.3, Lifting / Handling for transport instructions.
- 5.5** There is no maintenance required on electrical components. If the unit fails to operate as specified, please review Section 6 Troubleshooting, prior to calling for technical service.

TROUBLESHOOTING

FOR PERSONAL SAFETY, ALWAYS DISCONNECT THE POWER BEFORE SERVICING.

In the event the incubator does not operate properly, check the following before calling for service. 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 trouble.

TEMPERATURE

Temperature too high

- 1/ controller set too high-see section 4.5
- 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 4.6

Temperature too low

- 1/ Overtemperature thermostat set too low – see section 4.7
- 2/ controller set too low – see section 4.5
- 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/ Overtemperature failure – confirm with front panel lights that Thermostat 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 Thermostat all the way clockwise and see if Overtemperature light or heating light comes on
3/ check connections to sensor
4/ check calibration – using independent certified thermometer, follow instructions in section 4.6

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 Overtemperature 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 sensors, then trace wires or tubing between sensors and controls.
5/ calibration sensitivity – call Customer Service
6/ Overtemperature set too low – be sure that Thermostat is more than 5 degrees over desired set point; check if Overtemperature 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 4.7
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 4.6
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
 Overtemperature 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 4.6
 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 5.3 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 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

PARTS LIST

Description	115V	220V
Circuit Breaker	1100505	1100505
Circulating Fan, chamber	X1000071	X1000071
Convenience Outlet	100020	101483
Cooling Fan, compressor	210002	210002
Factory Set Overtemp.	1750506	1750506
Fuse (CE units only)	NA	103555
Heating Element	2350503	2350503
I/O (On/Off) Power Switch	103351	103351
Main Temperature Controller	1750573	1750574
Overtemperature Thermostat	100001	100001
Pilot Light, Green	20021	20021
Pilot Light, Red	200020	200020
Power Cord, European	NA	1800500
Power Cord, USA	100014	101990
Step Down Transformer	NA	100055

UNIT SPECIFICATIONS

Weight	Shipping	Net
LI5	130 lbs.	108 lbs.

Dimensions	Exterior LxDxH (in.)	Interior LxDxH (in.)
LI5	23.5 x 20.25 x 32	16 x 14.5 x 22.5

Capacity	3 cubic feet
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Temperature	Range	Uniformity
LI5	-10 to +45°C	$\pm 0.5^{\circ}\text{C}$ @ 20°C

WIRE DIAGRAM

