



**DROSOPHILA SPECIFIC
INCUBATORS**
MODEL: LIFLY & LIFLY-VIEW
Installation and operations manual

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	UNIT SPECIFICATIONS
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These units are Drosophila Specific 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.

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 Service representative for authorization. Supply data plate information including model number and serial number. For information on where to contact Customer Service, please see the manual cover.
- 1.4 **Accessories:** Verify that all of the equipment indicated on the packing slip is included with the unit. Carefully inspect all packaging before discarding. The incubator is supplied with eight (8) shelves.

INSTALLATION

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

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.



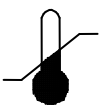





Operating Conditions: For optimum performance use your incubator at room temperatures between 18 and 25°C, at no greater than 80% relative humidity. If you intend to operate the unit in conditions outside of these limits contact customer service.

- 2.1 Power Source:** Before connecting the unit to the power source, the electrical supply circuit must conform to all national and local electrical codes. The power source must match the cycle and ampere requirements as noted on the data plate located on the side of the incubator. This unit is intended for 50/60 HZ application. **VOLTAGE SHOULD NOT VARY BY MORE THAN 10% FROM THE DATA PLATE RATING.** A separate circuit is recommended to prevent possible loss of product due to the overloading or failure of other equipment on the same circuit.
- 2.2 Location:** When selecting a site for the incubator, consider all conditions that may affect performance, such as extreme heat from radiators, stoves, ovens, autoclaves, etc. Avoid direct sun, fast moving air currents, heating and cooling ducts, and high traffic areas. To ensure air circulation around the unit, allow a minimum of 20cm (8") between incubator and any walls or partitions that may obstruct free airflow.
- 2.3 Lifting and 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 the level. If the unit must be moved, turn the leveling feet in all the way to prevent bending and damage.
- 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. **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 they will damage the stainless steel interior. Regular periodic cleaning is required. Special care should be taken when cleaning around sensing heads to prevent damage.

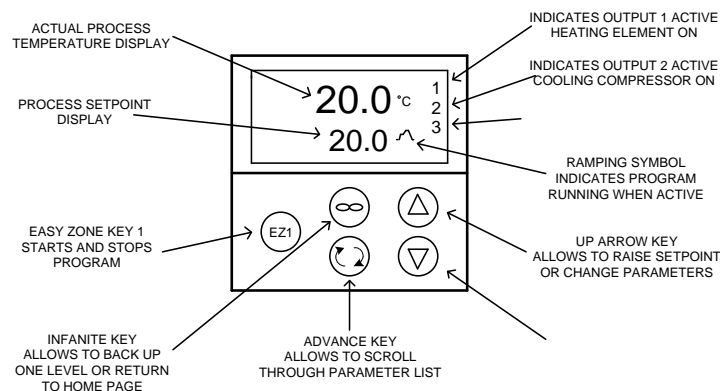
WARNING: *Never clean the unit with alcohol or flammable cleaners with the unit connected to the electrical supply. Always disconnect the unit from the electrical service when cleaning and assure all volatile or flammable cleaners are evaporated and dry before reattaching the unit to the power supply.*

GRAPHIC SYMBOLS

Your incubator is provided with a display of graphic symbols on the control panel which are designed to help identify the use and function of the adjustable components.

1.  Indicates that you should consult your manual for further description and discussion of a control or user item.
2.  Indicates **“Temperature”**
3.  Indicates **“Overtemperature”**
4. $^{\circ}\text{C}$ Indicates **“Degrees Centigrade”**
5.  Indicates **“AC Power”**
6.  Indicates **“Manual Adjustment”**
7.  Indicates **“Potential Shock Hazard”** behind partition
8.  Indicates **“Earth Ground”**
9.  Indicates **“Unit should be recycled”** (Not disposed of in land-fill)

CONTROLS OVERVIEW



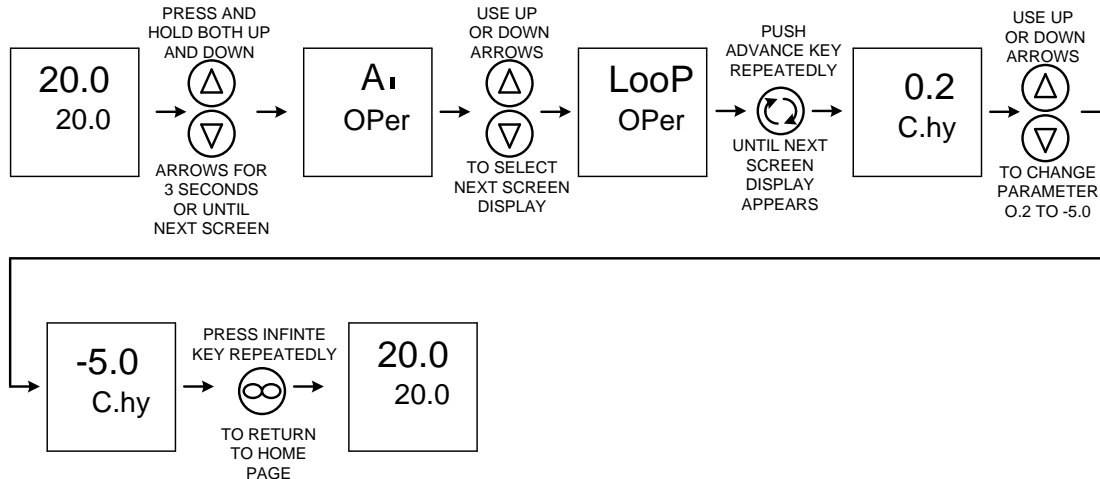
- 4.1 Power Switch:** The main power I/O (on/off) switch controls all power to the unit and must be in the I/ON position before any systems are operational.
- 4.2 Main Temperature Control:** The Main Temperature Control is a Watlow P.I.D. (Proportional Integral Derivative) dual output control. We strongly recommend that all operators read the included Watlow manual to become familiar with the control. This unit is specifically designed for drosophila applications and the actual chamber temperature will fluctuate above and below set point. This is normal.
- 4.3 HEATING Light:** This pilot lamp is ON when the unit is heating up to set point and is blinking when controlling temperature at set point.
- 4.4 Overtemperature Thermostat:** This controller is marked SET OVERTEMPERATURE and is equipped with an adjustment knob and a graduated dial from 0 to 10. Completely independent of the Main Temperature Controller, the Overtemperature Thermostat guards against any failure of the Main Temperature Controller which would allow temperature to rise past set point. If temperature rises to the Overtemperature set point, the Overtemperature 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 for an extended period of time using only the Thermostat as temperature uniformity will suffer.
- 4.5 OVER TEMP Light:** This pilot light comes on when the Overtemperature Thermostat has been activated. Under normal operating conditions this light should never come on.
- 4.6 Low Limit Thermostat:** Located on the lower right rear of the unit, the Low Limit Thermostat keeps the unit from freezing. It is factory set to activate at 1° and disengage at 3°C and should not be adjusted.
- 4.7 Defrost Switch:** Used to defrost the unit if frost should form. It is an ON/OFF switch located on the top right, rear of the unit.
- 4.8 Fuse:** Located on the back, bottom near the cord inlet. adjacent to the defrost switch in place of the circuit breaker, the fuse offers protection against power source variations. Protection is in addition to the automatic high temperature limit designed into the heating element. If the fuse is blown, the unit will shut down and the cause should be determined and corrected before replacing the fuse.

OPERATION

The refrigeration system, heater, and air circulating fan are used in conjunction with the temperature control circuit to achieve sensitive temperature control. The thermostat sensor located in the air stream senses any temperature deviation from the control point, and heat is provided to maintain desired temperature. The circulating fan provides even air distribution throughout the chamber and assures temperature uniformity.

The factory PID settings of the control will cycle the compressor on and off at regular, temperature controlled intervals. This cycling will cause the temperature to fluctuate above and below setpoint and is perfectly normal. This setting is highly recommended for *Drosophila* applications; however it can be changed for other applications. Note that a factory set Low-Limit Thermostat will shut off the compressor when temperatures reach 1°C.

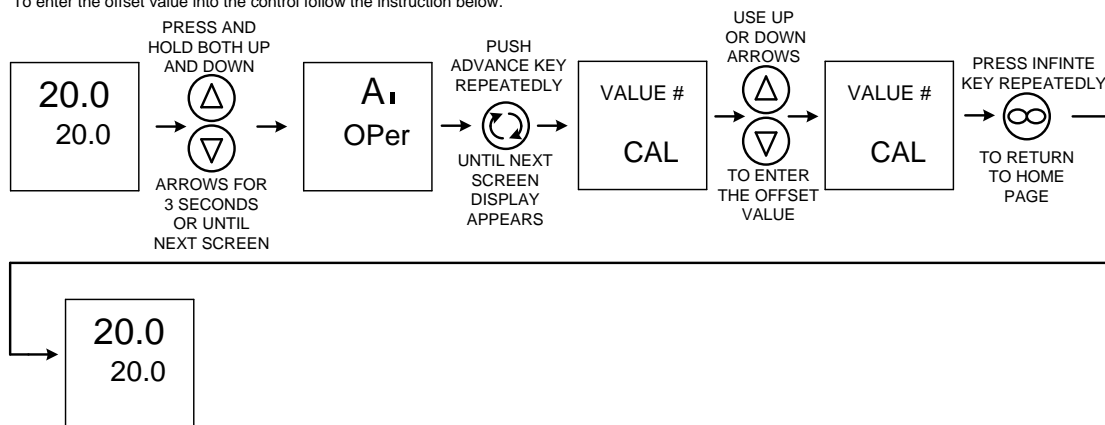
- 5.1 The power supply must match the unit's requirements listed on the data plate located on the side of the incubator.
- 5.2 Plug the service cord into the power supply and turn the Power Switch to the ON position. Turn the Overtemperature Thermostat to its maximum position, clockwise using a coin or flat edged tool.
- 5.3 Place a certified reference thermometer (not supplied) in the center of the chamber. Be certain the thermostat is not touching any shelving or chamber walls. Taping the thermometer to a petri dish raises it off the shelf and keeps the scale in view. Placing the reference thermometer in the chamber at this stage of operation will allow for calibrating the control with out the loss of processing time.
- 5.4 **Loading Procedure:** Adequate spacing should be allowed between items whenever possible. Proper spacing will allow maximum air circulation, which is necessary for temperature uniformity.
- 5.5 **Set Main Temperature:** The main temperature control has two displays. The upper displays the actual temperature of the unit and the lower is the set point. To change the set point, push the up or down arrow until the desired value is reached. Allow at least 24 hours for temperature to stabilize. It is highly recommended that operators read the included Watlow manual and refer to it for advanced programming applications. As mentioned earlier, the PID settings from the factory will cycle the compressor on and off at regular intervals. This is done to prevent damage to the incubator during *Drosophila* applications.
- 5.6 **Calibrating Main Temperature Control:** As mentioned previous the main control is set up to cycle the compressor on and off causing the temperature to fluctuate. To calibrate temperature the incubator must run at a stable temperature. To make the incubator to run at a stable temperature the PID values must be changed in the Watlow control. Follow the instructions below to change the PID values to make the incubator to stabilize and calibrate the temperature. Before starting place a reference thermometer on the middle shelf like it was explained previously.



Changing the parameter from 0.2 to -5.0 allows the compressor to stop cycling on and off and run continuously so the incubator will run stable at set point. Allow several hours for the incubator to stabilize before calibrating. After incubator has stabilized take a reading from the reference thermometer and subtract it from the process display. This value can be negative or positive depending on the reading of the reference thermometer. This value is also called the offset value. See examples on determining offset value below.

REFERENCE THERMOMETER READING	-	PROCESS DISPLAY READING	=	OFFSET VALUE
18	-	20	=	- 2
22	-	20	=	2

To enter the offset value into the control follow the instruction below.



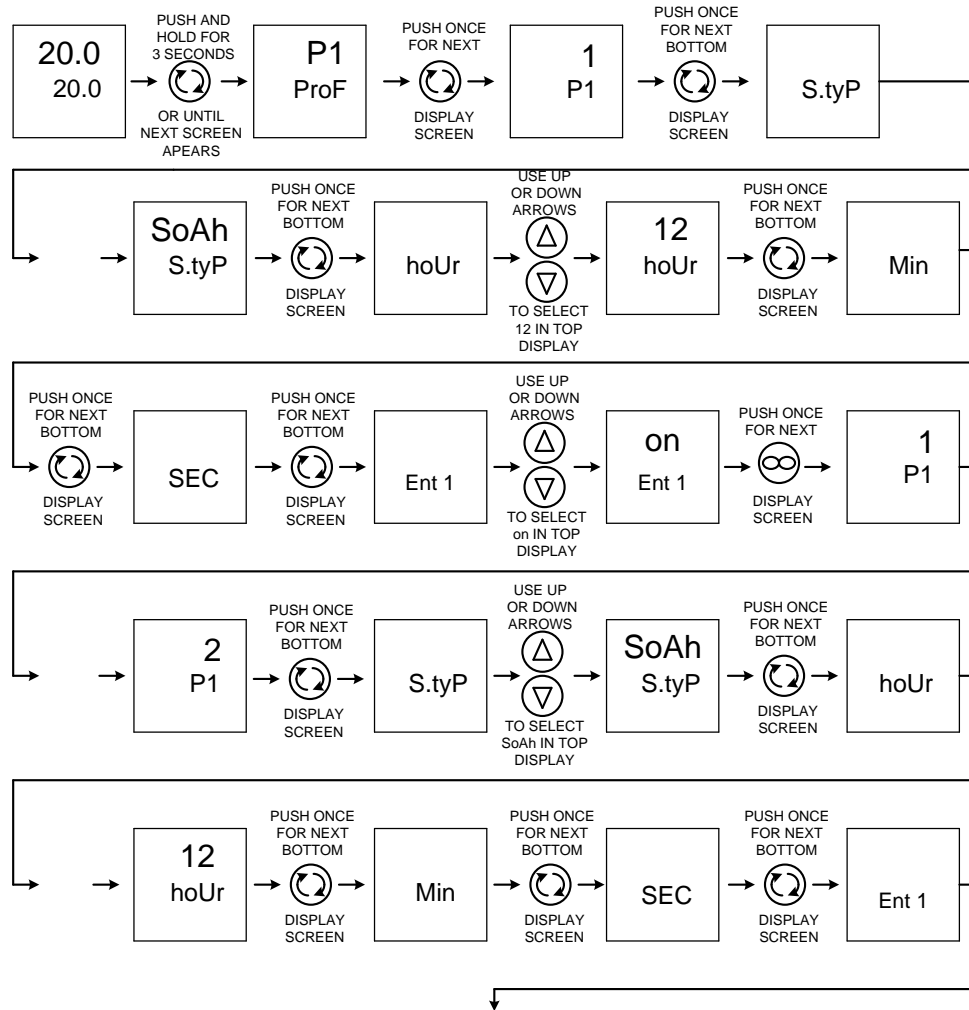
After the offset value has been entered allow sufficient time for incubator to stabilize and recheck reference thermometer and process display to make sure they match. If there is a unacceptable difference between the two reenter the new offset value again using the same procedure above. After calibration has been achieved reset the C.hy parameter back to 0.2 using the same procedure above.

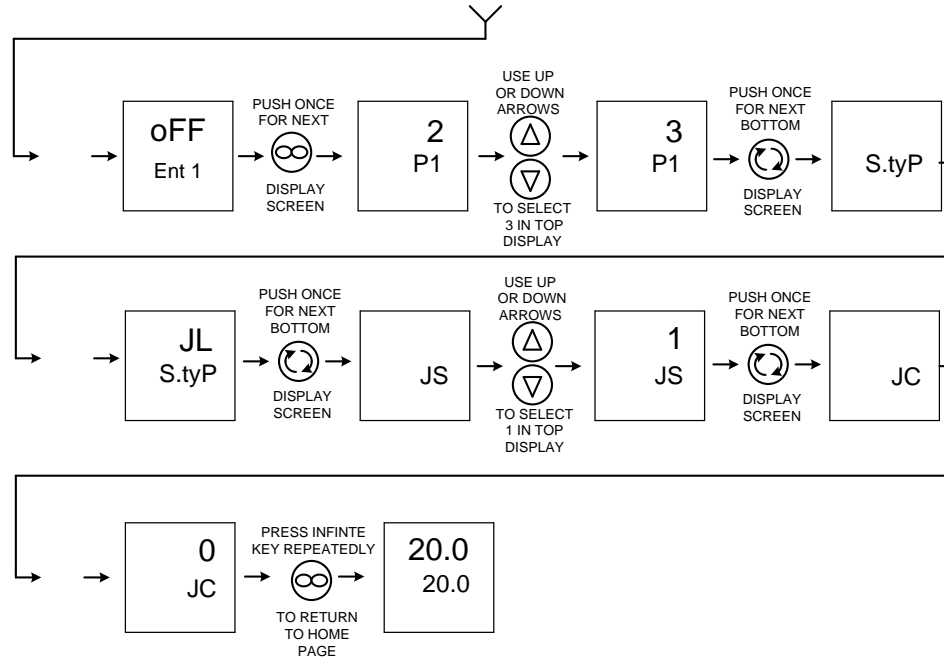
- 5.7 **Set Overtemperature Thermostat:** As mentioned in Step 5.2, the Overtemperature Thermostat should be turned up to the maximum. Also, it is mentioned previously, the Main Control will cycle the compression on and off causing the temperature to fluctuate up and down across setpoint. To set Overtemperature Thermostat, turn the Key Knob counter-clockwise when the Main Temperature is at its high point swing just until the Overtemperature Light activates. Then, turn it clockwise about 1/16 of an inch or until light goes off.
- 5.8 **Low Temperature Control:** This control is factory set and should NOT be adjusted. It is pre-set at 1°C and is an added feature that keeps samples from freezing.
- 5.9 **High Temperature Control:** Not to be confused with the Overtemperature Thermostat, this control is factory set and should NOT be adjusted. It is pre-set at 50°C and is an added feature that will shut down the compressor so that it will not burn up in the event of a temperature run away.
- 5.10 **Accessory Outlet:** There is an electrical outlet inside the chamber for use with equipment not exceeding one (1) amp. 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.

CAUTION: When operating at normal conditions, this incubator is capable of damaging certain accessory equipment. Make certain that accessory equipment is capable of operating under the conditions you intend to run your incubator.

5.11 Exterior Heat: Under normal operating conditions the unit will generate enough heat to be felt by the hand when touching the sides of the unit. This is normal and does not indicate improper performance.

5.12 Programming Controller for Light Operation: The Watlow controller is a ramp and soak programmable controller that is capable of running 4 different files with 10 different steps for each file or one file with 40 steps. For more information on how to program the control for more detailed operations refer to the Watlow user disk or call for customer service for help. To activate the light operation on a timed cycle the control has to be programmed. Below is a example on how to program the control for a simple 12 hour light on and 12 hour light off cycle. This programming will only use three steps.



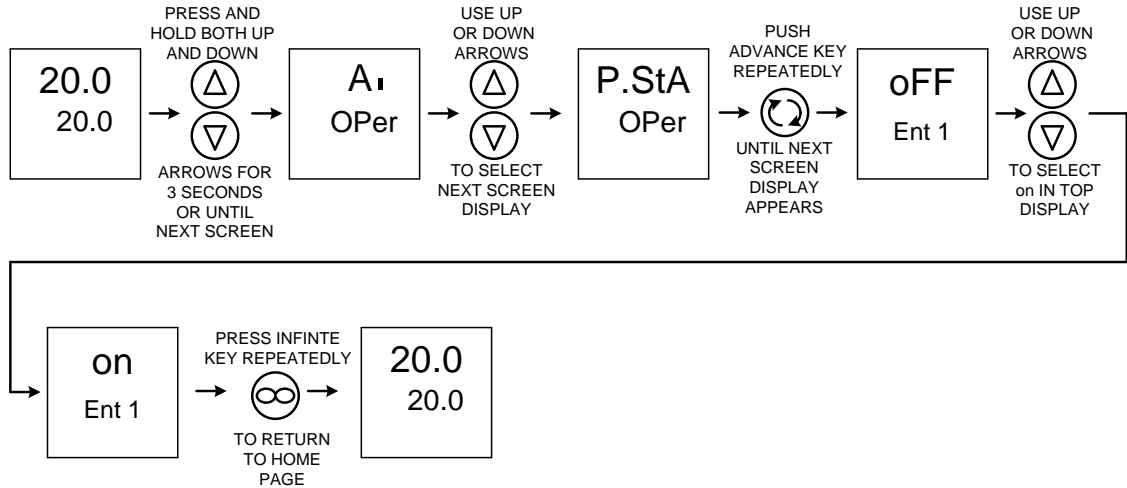


Before starting the program, set the desired set point in the control. The control is programmed to start the light cycle first. With the program entered above it will run lights on for 12 hours and lights off for 12 hours repeatedly until the program is stopped or power is removed from control. Pick a time of day when the program needs to start. To start the program, push the EZ key once. A ramp symbol should illuminate on the right hand side of the display and the LED lights should illuminate also. Below is a table of the program from above.

	SYTP	HOUR	MIN	SEC	JS	JC	ENT1	ENT2
P1-1	SoAk	12	0	0	N/A	N/A	ON	OFF
P1-2	SoAk	12	0	0	N/A	N/A	OFF	OFF
P1-3	JL	N/A	N/A	N/A	1	0	OFF	OFF

To start the light cycle off first, change ENT1 in P1-1 to off and ENT1 in P1-2 to on. ENT is the event output command that turns the light on or off. To change the cycle times enter the desired times under hours, minutes, and seconds. JL stands for jump loop and JS stands for jump step and JC stands for jump count. When P1-1 and P1-2 time out P1-3 tells the program to jump back to step 1 and start over again. When JC is set for zero the program runs repeatedly until the program is stopped or the control loses power. To stop the program push EZ button once and the ramp symbol will disappear ending the program.

5.13 Operating Lights Manually Without Running Program: To turn lights on without running a program ENT1 (event output 1) must be turned on. Follow instruction below on how to turn the output on.



To turn the lights off follow the same procedure but, turn ENT1 to off.

PID SETTINGS (from factory)

P.I.D.
h.Pb = 12.0
c.hy = 0.2
ti = 180
td = 50
db = 0.2

The PID values are stored in the loop menu under operation page. These parameters control how the unit will control at set point. The incubator is setup from the factory to cycle the compressor on and off to keep the evaporator from freezing up to eliminate damage to the coil from off gassing from Fruit Fly growth. Due to the cycling of the compressor the temperature will fluctuate up and down above and below set point. To run the incubator at a stable temperature, change the parameter c.hy to -5.0. This will make the compressor to run continuously and should make the incubator run stable at set point. All other parameters are control sensitive and should not be changed. To enter the loop menu follow the instruction under calibration procedure.

5.14 Set Up Parameters: The setup parameters are parameters that configure the control on how it functions and should not be changed. Below is the list of parameters that is sent from the factory for reference. They should never be changed unless there is a complete understanding of what they do and how they will affect control functions. For better understanding on what these functions do refer to the Watlow manual on the Watlow disk.

A1 SET
Sen = rO.HI
rt.L = 2
FiL = 0.5
i.Er = oFF
dEC = 0.0

OTPT SET		
OTPT 1	OTPT 2	OTPT 3
Fn = hEAt	Fn = CoOL	Fn = EntA
O.Ct = utb	O.tb = 40.0	
O.Lo = 0%	O.Lo = 0%	
O.hi = 100%	O.hi = 100%	

LOOP SET
H.ag = Pid
C.Ag = On.oF
t.tUn = No
P.dL = 0.0
t.Agr = Crit
UFA = USEr
Fail = USEr
L.dE = No
rP = oFF
L.SP = 00.0
H.SP = 45.0
SP.Lo = 00.0%
SP.hi = 100%

GLBL SET
C.F = C
ACLF = 60
R.tyP = ti
P.tyP = STPT
gSE = oFF
C.Led = both
ZonE = on
ChAn = on
d.PrS = 1
d.ti = 0
Usr.S = nonE
Usr.r = nonE

FUN SET
LEu = HigH
Fn = P.StS
Fi = 1

COM SET
Ad.S = 1
MAP = 1
nU.S = yES

ALM SET			
ALM 1	ALM 2	ALM 3	ALM 4
A.ty = oFF	A.ty = oFF	A.ty = oFF	A.ty = oFF
<small>Turning A.ty to off turns all other alarm parameter functions off.</small>			

MAINTENANCE

The design of the chamber is such that periodic maintenance is kept to a minimum. NO lubrication or adjustments of components is needed. If the incubator is used frequently at temperatures below ambient room temperature or in any manner that increases moisture build-up within the chamber, a frequent defrosting schedule is recommended.

- 6.1 Defrosting:** Frost can appear inside the unit due to moisture accumulating and condensing on the coldest surface. The unit should be defrosted and cleaned on a regular basis. The unit can be defrosted either manually or automatically. The water drains from the chamber into an evaporate pan. Make sure to completely dry out the interior and evaporate tray in the bottom of the body when defrosting is complete.
- A. Manual Defrost:** Turn the unit off, open the door and allow the frost to melt. Then clean the chamber following the directions in 6.2.
- B. Automatic Defrost:** The automatic defrost switch is located on the back of the unit in the top right corner. It is an ON/OFF switch. In the ON position, the frost sensor is activated once every twelve (12) hours. If the sensor detects frost, the compressor is shut down until the frost has melted, and the compressor is reactivated. The amount of time the compressor is shut down is roughly one-half hour. During this time, the temperature in the chamber will spike and the Main temperature Controller will cycle off, shutting down the heating element. When the compressor is reactivated, the temperature will stabilize at set point.
- 6.2 Cleaning:** Clean the incubator with a mild soap and water solution, rinse clean with water and wipe dry with a soft cloth.
- 6.3 Disinfecting:** Disinfect the incubator on a regular basis. Remove all of the interior parts and clean thoroughly, including all corners using a suitable disinfectant that is appropriate for 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 the coatings. DO NOT use abrasives of any kind as they will damage the interior. Special care should be taken when cleaning around sensing heads to prevent damage and around the door gasket so as not to impair the positive seal.
- 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.
- 6.4 Compressor Compartment:** Located at the back and bottom of the unit, the compressor compartment can collect dust which will inhibit proper airflow. This compartment should be vacuumed out at least once every six (6) months to ensure maximum efficiency. Note that the unit must be disconnected from the power supply during this procedure, and removal of the wire safety screen is required if it is equipped with one.
- 6.5 Electrical Components:** There is NO maintenance to electrical components such as Temperature Controllers and Probes. If the incubator fails to operate properly, read the Troubleshooting guide prior to contacting Customer Service. If service is required, access to all electrical components is available by removing the panel cover at the top rear of the unit. Temperature Controllers are accessible from behind the control panel. Main Temperature Probe is located on the interior chamber back. Thermostat Probe is located in the element chamber. If the Low Limit Temperature Thermostat needs adjustment, contact the factory for assistance.

TROUBLESHOOTING and SERVICE

When troubleshooting, always make a visual inspection of the incubator and its control console to find loose or disconnected wires which may be source of the trouble. In the event the incubator does not operate properly, check the following before calling for service.

TEMPERATURE

Temperature too high

- 1/ controller set too high-see section 5.5
- 2/ controller failed on – call Customer Service

Temperature too low

- 1/ Overtemperature set too low
- 2/ controller set too low
- 3/ unit not recovered from power failure or being turned off – incubators will need to warm up and stabilize.
- 4/ element failure – see if heating light is on; compare current draw to data plate.
- 5/ controller failure – confirm with front panel lights that controller is calling for heat.
- 6/ Overtemperature Thermostat failure – confirm with front panel lights that thermostat is operating correctly.

Unit will not heat

- 1/ verify that controller is asking for heat by looking for heating light is activated.
- 2/ do all controller functions work?
- 3/ is the Thermostat set high enough? – for diagnostics, should be fully clockwise with the pilot light never on.

Display and reference thermometer don't match

- 1/ calibration error – see chapter 4 of Watlow Manual- calibration offset 1
- 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.

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/ if light not coming on, check control set point and Overtemperature set point .
- 2/ confirm that fan is operating and airflow is not blocked.

Unit won't cool

- 1/ be sure that fan is circulating air in the chamber and over the compressor.
- 2/ confirm proper sensor location and operation.
- 3/ look for leaks in the chamber or around the door gasket.
- 4/ assure ample room around the unit as described in Installation section 2.2.
- 5/ compare ambient specifications to Unit specifications in section 8.0.

Ice build up in chamber

- 1/ Search for leak in door gasket.
- 2/ door being opened too often.
- 3/ open container inside the chamber.
- 4/ check tightness of seal around all chamber wire and plumbing access to outside.
- 5/ turn defrost switch on, Note: defrost switch must be turned off for best temperature uniformity; If no defrost option available, call Customer Service.

MECHANICAL

Door not sealing

- 1/ Confirm that unit has not been damaged and body is not square.

OTHER

Front panel displays are all off

- Check for wire damage.

Unit or wall fuse/circuit breaker is blown

- 1/ check wall power source.
- 2/ 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.

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.

Service

If none of the suggestions listed above in the Troubleshooting guide have solved the problem Customer Service should be contacted for assistance.

Call 1-800-322-4897, and have the model number, serial number and voltage (listed on the date plate on the side of the incubator) as your service representative will require it.

PARTS LIST

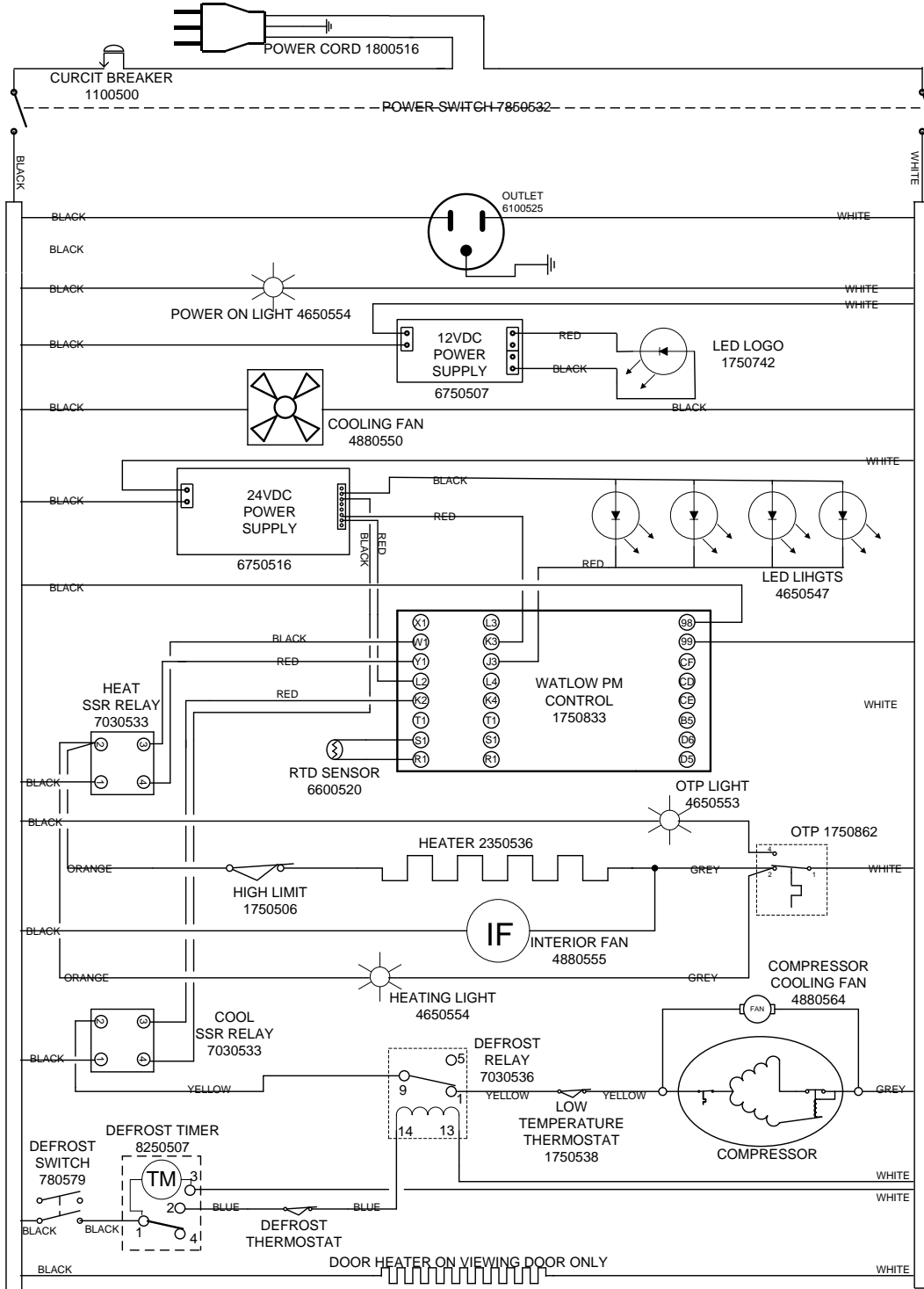
Description	115V	220V
Blower Motor	4880564	4880564
Circuit Breaker	1100500	1100500
Convenience Outlet	6100525	6100531
Defrost Switch	7850579	7850579
High Limit Control	1750538	1750538
I/O (on/off) Switch	7850553	7850553
Low Limit Control	1750538	1750538
Temperature Controller Watlow PM	1750833	1750833
Overtemperature Thermostat	1750862	1750862
Pilot Light, Green	4650554	4650554
Pilot Light, Red	4650553	4650553
Relay Mechanical	7030520	7030520
Relay Solid State	7030533	7030533
RTD Temperature Probe	6600520	6600520
Fan Guard	2600518	2600518

UNIT SPECIFICATIONS

	LIFLY & LIFLY-VIEW	LIFLY-2 & LIFLY-2VIEW
Shipping Weight	340 lbs.	340 lbs.
Net Weight	246 lbs.	246 lbs.
Exterior WxDxH (in.) Dimensions	32 x 32 x 77	32 x 32 x 77
Interior WxDxH (in.) Dimensions	27 x 23.5 x 57	27 x 23.5 x 57
Capacity	20.3 cubic feet	20.3 cubic feet
Capacity	305 bottles	305 bottles
Temperature Range	18° TO 29°C	18° TO 29°C
Electrical	110-120V 9.5	220-240 4.0

The equipment is rated for ingress protection IPX0.

WIRING DIAGRAM LIFLY LIFLY-VIEW 110V 9851210



WIRING DIAGRAM

LIFLY-2 LIFLY-2VIEW 220V

9851211

