

**INSTRUCTIONAL MANUAL
CAT. 63155-10, 63155-20, 63155-30
Isotemp Standard Lab Incubators**



Electron Microscopy Sciences
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Introduction

Isotemp 600 Series incubators are available in three sizes: small (Model 6250), medium (Model 6370) and large (Model 6500). All models provide P10 microprocessor control at operating temperatures ranging from 30 (86°F) to 75°C (167°F).

NOTE: Ambient temperature must be at least 5°C below operating temperatures.

In these models, fresh air enters through an air intake on the bottom of the incubator, then is heated in a plenum below the chamber, finally flowing into the oven chamber itself in uniform flow patterns. Exhaust air is vented through a port at the top of the incubator.

Temperature readouts and control parameters are shown on red LEDs. Three additional LEDs indicate when the heater power is being applied, an error condition is encountered, or the temperature is being set.

Isotemp incubators incorporate a variety of safety features. A safety backup is built into the controller software. If the primary heater control fails, the backup will maintain control at 3°C above the set point. An alarm LED then indicates that the backup controller is operating the incubator. A circuit breaker protects the incubator from power surges.

Installation

Selecting a Location

Choose a location for the incubator that will provide an area of approximately 30 inches by 30 inches. Allow at least 2" of open space on both sides and back of unit (six inches if combustible materials). Appropriate electrical power must be available.

Locate the incubator within three feet of the power outlet so that no extension cord is required.

Unpacking

Isotemp incubators are shipped in a single carton. After unpacking, locate each item shown in the list below. Report any missing items, by name and part number, to Electron Microscopy Sciences. In the event of shipping damage, retain the carton and packing material and file a claim with the final carrier.

Preparing the Incubator

To prepare the incubator for operation, perform the following procedures:

1. Install the shelf(s).
2. Make certain all packing material has been removed from incubator chamber.
3. Connect the line cord to an appropriate electrical outlet.
4. The incubator is now ready for operation. No preliminary adjustments or calibrations are required. Depending on the customer application and customer laboratory procedures an initial calibration may be done at this point.

NOTE: Refer to data plate on incubator for voltage, current and line frequency specifications. Ensure that the power requirements of the incubator will not overload the circuit.

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Power Switch

The 600 Series incubators feature a front panel mounted power switch which is a combination power switch and circuit breaker, eliminating the need for separate internal fusing. The circuit breaker will interrupt power in the event of an incubator heater malfunction.

Press the upper half (I) of the rocker-type power switch to the ON position to turn on the incubator. Press the lower half (O) to the OFF position to turn off the incubator power. To reset the breaker, place the switch to the OFF position, and then return it to the ON position.

Convenience Outlet

The 600 Series incubators feature a convenience electrical outlet located inside the incubator, at the lower right of the back panel. This outlet is rated at the same voltage as the incubator itself and is limited to a maximum current of 5A for all models. If the current limit is exceeded, the circuit breaker will trip. For safety, the integrity of the electrical ground should always be maintained.

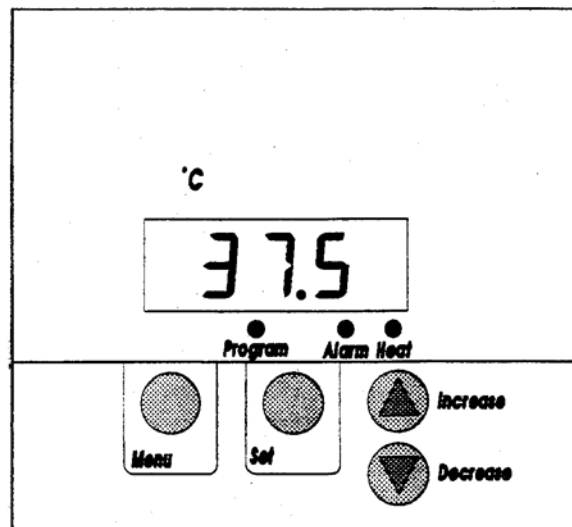
Controls

The following sections briefly describe the locations and functions of various display fields and keypad controls. More detailed descriptions are provided, when required, in the operating sections of the manual.

Display

The 600 Series controller features two bright, one-half inch, 7-segment LEO displays used in setting up the incubator program or reading incubator temperature. Two smaller LEOs indicate, respectively, an alarm condition or when power is being applied to the incubator heaters. Each display field is discussed separately below.

Figure 1. The Display Field



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The Temperature Display In the normal operating mode, shows the current incubator temperature. During programming, however, it indicates the incubator set temperature target.

The heat Indicator lights when power is being supplied to the incubator heater.

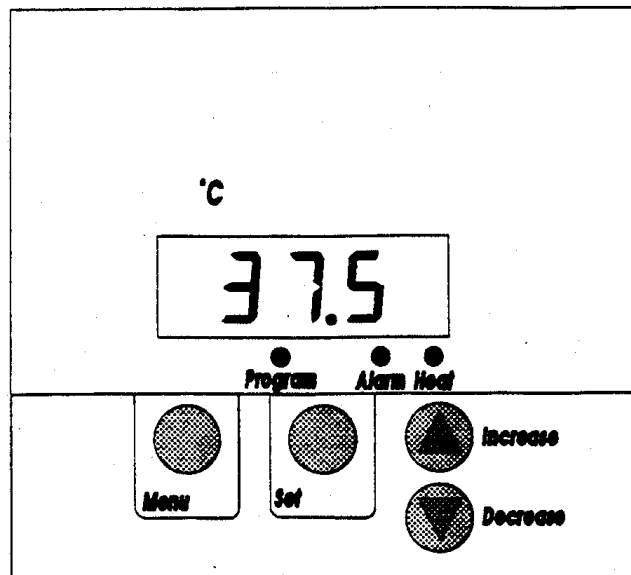
The alarm indicator lights if the actual incubator temperature exceeds the alarm temperature. The alarm temperature is automatically-adjusted to be 5°C above the set temperature.

Program Indicator lights when the control temperature is being set.

Keypad

The 600 Series incorporates a four-key, tactile keypad. See Figure 2 below for its functions.

Figure 2. The Keypad



Pressing the **MENU** Key will cause display to show CAL. Then pressing **SET** Key will display calibration.

Pressing **INCREASE** Key while holding down the **SET** Key increases the incubator set temperature, as indicated on the temperature display.

Pressing the **DECREASE** Key while holding down the **SET** Key decreases the incubator set temperature, as indicated on the temperature display.

Pressing the **SET** Key causes the display to show the set temperature. Used with **INCREASE** Key and **DECREASE** Key to change the set temperature. With **MENU** Key to access entry of a temperature display offset (calibration feature).

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Operation

In control mode, the incubator maintains a set temperature until that set temperature is changed. The Actual and Set Displays will indicate current chamber temperature and the temperature set point, respectively. To set a temperature and initiate control mode operation, following the steps below:

1. Place the power switch in the ON position. All 8's will flash as a test of the display.
2. Press and hold the SET Key.
3. Observe the set temperature in the Set Display window.
4. To decrease the set temperature, press the DECREASE Key while holding the SET Key.
5. To increase the set temperature, press the INCREASE Key while holding the SET Key.
6. When the desired set temperature is shown, release the INCREASE OR DECREASE Key.
7. Finally, release the SET Key. The incubator automatically begins to control at the set temperature.

NOTE: To rapidly increase or decrease the set temperature, press and hold the appropriate key. To slowly increase or decrease the set temperature one degree at a time, press and immediately release the key,

NOTE: Once the initial heat temperature has been set, the over range alarm indicator light may illuminate for several minutes until it is stabilized (temperature). We recommend that the incubator temperature be stabilized before loading samples.

Safety precautions

NOTE: Before operating the incubator, please consider the following safety precautions:

- This unit is not explosion proof.
- Do not use anywhere near flammable or combustible materials; fire or explosion may result. Unit contains components that may ignite such materials.
- Fumes and spillage from acidic solutions cause corrosion of the stainless steel chamber and other components. Care should be taken to maintain a neutral pH at all times.
- The heater is in the bottom of the unit. Surface temperatures at the bottom cover may be higher than set point temperature.
- Do not place items on the heater cover.
- Wear insulated gloves.
- Use tongs.
- Never stand in front of an open incubator.
- Use safety goggles.

Alarm limits

The 600 Series controller features a deviation alarm, which alerts the operator and interrupts heater power whenever the actual incubator temperature differs from the set temperature by more than 3 °C.

NOTE: This set limit cannot be adjusted by the user..

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If the actual temperature exceeds the alarm limit, the alarm indicator LED will light and the Display will flash "EEE".

The reference point for the alarm is the set temperature. Should any change in the set temperature be made, a shift in the alarm temperature will ensue.

Example:

If the set temperature is 40 °C, the alarm will trip at 43 °C. If the set temperature is changed to 50 °C, the alarm will follow the set temperature and trip at 53 °C.


Changing the set temperature to a value more than 3 °C. Below the present incubator temperature will trip the alarm. Power is removed from the heaters when an alarm condition occurs. As an example:

An experiment was being run at 50°C. The experiment finished and another researcher needed to run an experiment at 40°C. The researcher reset the set point to 40 and the unit went into alarm. The researcher knowing this was a normal operation allowed the unit to cool and stabilize at 40°C. Just below 43 degrees the unit alarm LE0 went off and the display resumed normal operation.

Display offsets

The 600 Series controllers allow for the operator to select a display offset temperature. With a display offset entered, the temperature displayed will be the actual incubator temperature (measured at the control thermocouple) *plus or minus* the display offset selected. Functionally, the offset feature permits the operator to measure and calibrate such that the display will indicate the temperature *at a specific point or zone* within the incubator.

To enter a display offset, please do the following:

1. Press the **MENU** key – the following will be displayed: 
2. To view the present offset value, press and hold the **SET** key
3. If changing the display offset is desired, press and hold the **SET** key. Press **INCREASE** or **DECREASE** key until the display indicates the desired offset.
4. Release the **SET** key.
5. Press **MENU** key once to return to normal temperature control.

Example:

The displayed temperature is the result of algebraically adding the actual temperature to the offset value. Thus, if an offset value of -3 degrees is being used, a measured temperature of 50 degrees will be displayed as 47 degrees.

Cleaning

1. Prior to cleaning, make sure the unit is unplugged and not in use.
2. During the cleaning process, avoid any cleaning agents from getting in contact with electrical components.
3. We recommend using a mild, non-abrasive cleaner to clean all surfaces.
4. Please do not reconnect the unit to a power source while it is still wet.

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Service

The following sections describe procedures for servicing the 600 Series incubators. The procedures, replacing the Door Gasket, Replacing the door handle, and adjusting the door handle may be performed by most users. However, all other service procedures involve possible exposure to line voltage. Only qualified service personnel should take on such tasks. The second section, *accessing the Electronics Compartment*, describes procedures required for subsequent service.

CAUTION: Service procedures involve exposure to line voltage and should only be conducted by qualified personnel. Before attempting repairs of any kind, disconnect the incubator.

Replacing the door gasket

The Isotemp 600 Series incubators incorporate a durable, silicone door gasket in order to prevent heat loss as much as possible. In the case that the gasket becomes damaged, it may be replaced by following the steps below:

1. Set the power switch to the OFF position and open the chamber door

NOTE: Allow the incubator to cool to room temperature before attempting to repair.

2. Open the door completely and lift it off of the hinge pins. Lay the door on a flat surface with the handle over the edge.
3. Note the joint position of the old gasket. This is where the new gasket installation will start.
4. Bend back the old door gasket and remove the Philips head screws attaching the gasket.
5. Remove the old door gasket.
6. Loosely install two screws through the stainless steel liner and into the door wrap to align these pieces during the installation of the new gasket. Once one side of the new gasket is installed, these screws will need to be removed to install the new gasket.
7. Begin installing the replacement gasket at the joint position of the old gasket. Stretch the replacement gasket around the corners of the liner to avoid bunching up of the gasket material.
8. Install a Philips head screw as the gasket rounds each corner to keep the gasket properly stretched. (The screw goes through the liner. Pierces the gasket and threads into the door wrap.
9. After all four corners are secured, install the remainder of the Philips head screws. Make sure there is no gap at the gasket joint; stretch the gasket slightly, if necessary.
10. Reinstall the door onto the hinge pins.

Accessing the electronics

In order to access the electronics compartment, follow the steps below:

1. Disconnect power cord from the electrical outlet

CAUTION: Allow the unit to cool to room temperature before attempting any repair.

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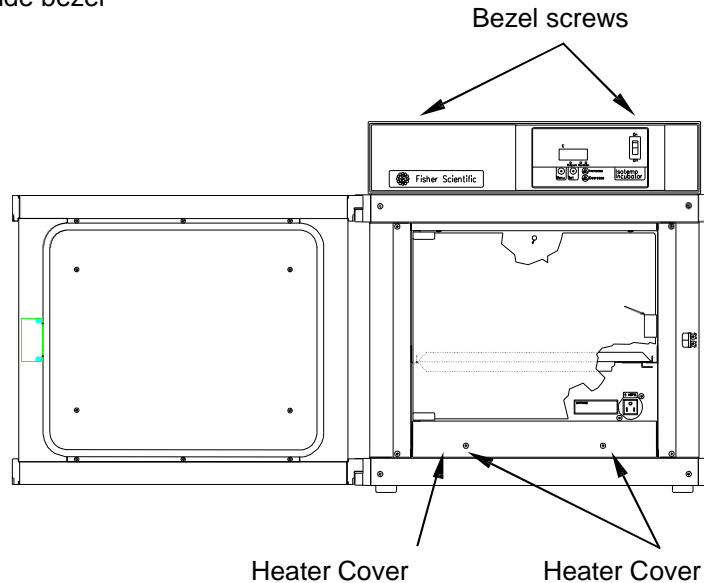
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2. Open the chamber door, carefully lifting it upward and off of its two hinges. Set the door aside.

CAUTION:

3. Remove the screws securing the bezel from the top of the incubator.
4. Grasp the bezel and pull the top outward – the bezel will disengage from the front. Lay the bezel on the top of the unit.
5. Assembly is in the reverse order.

Controller and relays inside bezel*



Replacing the heater

CAUTION: Service procedures that require access to the electronics compartment involve exposure to line voltage. It is because of this that only authorized and qualified personnel handle this matter. Be sure to disconnect the unit for attempting repairs.

CAUTION: Allow the incubator enough time to cool to room temperature before attempting repairs of any kind.

In order to replace a defective heater, following the steps below:

1. Disconnect power cord from the electrical outlet.
2. Remove the outer chamber door and glass door.
3. Remove the two screws that secure the heater cover. Remove the cover by lifting and sliding it forward. It may be necessary to use a flat- blade screwdriver to assist in lifting the cover upward. Set heater cover aside.

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4. Remove the two nuts and shake proof washers securing the heater leads, then pull the lead terminals off the heater studs.
5. Remove the two screws securing heater to cabinet. Slide heater forward to disengage back heater clips, lift back of heater up, then slide heater back and lift out.
6. Install replacement heater and reassemble unit by generally reversing the steps above.

Replacing the controller

CAUTION: Service procedures that require access to the electronics compartment involve exposure to line voltage. It is because of this that only authorized and qualified personnel handle this matter. Be sure to disconnect the unit for attempting repairs.

To replace a defective controller, following the steps below:

1. Complete the procedures discussed in *Accessing the Electronics Compartment*.
2. Locate terminal blocks on controller, remove all wires connected to controller. Note color and location of wires.
3. Remove four screws that hold controller to bezel, then remove old controller.
4. Install new replacement controller and reattach wires previously removed.
5. Check wiring connections against schematic, making sure that the line power wiring is attached to the proper terminal, i.e. 120V or 230V.
6. Check switch 0S 1 setting: Switches A and B should be OFF.

Replacing the solid state relay

To replace a defective solid state relay, follow the steps below:

1. Complete the procedures discussed in *Accessing the Electronics Compartment*.
2. Consult the schematic and locate the solid state relay (mounted on bezel).
3. Remove four lead wires from their screw-down terminals.
4. Remove two Phillips screws which mount the solid state relay to the bezel.
5. Lift out the solid state relay. Put new solid state relay in place, making certain that the thin, conductive pad remains between the solid state relay and the bezel.
6. Generally reverse the steps above to reassemble incubator.

Replacing the safety relay

CAUTION: Service procedures that require access to the electronics compartment involve exposure to line voltage. It is because of this that only authorized and qualified personnel handle this matter. Be sure to disconnect the unit for attempting repairs.

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To replace a defective safety relay, follow the steps below:

1. Complete the procedures discussed in Accessing the Electronics Compartment.
2. Consult the schematic and locate the safety relay (mounted on Bezel).
3. Remove four lead wires from their push-on terminals.
4. Remote two Phillips screws which mount the safety relay to the bezel.
5. Lift out the safety relay.
6. Reverse the steps above to install the replacement safety relay and reassemble incubator.

Replacing the thermopcouple

CAUTION: Service procedures that require access to the electronics compartment involve exposure to line voltage. It is because of this that only authorized and qualified personnel handle this matter. Be sure to disconnect the unit for attempting repairs.

To replace a defective control thermocouple, proceed as follows:

1. Complete the procedures discussed in Accessing the Electronics Department.
2. Locate the thermocouple connections on the controller.
3. Remove the thermocouple wires by loosening two securing screws.

NOTE: Observe the position in terminal for each lead. When reconnecting, be sure to observe for polarity. Compare with polarity indication on the controller housing. For thermocouples, please note that the red wire is negative and the yellow is positive.

4. The thermocouple can be found on the roof of the chamber. Locate the clip which holds the thermocouple in place – remove it from the clip.
5. Pull the thermocouple forward into the chamber, exposing about 6 inches of thermocouple wire.
6. Cut the thermocouple wire to remove the thermocouple sheath.
7. Securely loop together the cut end of the defective thermocouple with the two leads of the replacement thermocouple. Wrap masking tape over the length of the loops to secure them.
8. Gently pull the defective thermocouple out through the electronics compartment while guiding the replacement thermocouple into place.
9. Reverse steps 1 through 3 to complete installation of the new thermocouple and reassemble incubator.

CAUTION: Allow the incubator sufficient time to cool to room temperature before attempting to repair.

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Replacing the door hinges

To replace a defective door hinge, follow the steps below:

1. Remove door by lifting it straight up.
2. Remove the two mounting screws securing the defective hinge.
3. Remove defective hinge and mount new hinge by replacing the mounting screws.
4. Put door back onto hinges.

Replacing the glass door

The Isotemp incubator features an inner glass door to allow the chamber to be observed without much heat loss. In the case that the glass door needs to be replaced, follow the steps below:

1. Hold the glass door and loosen the set screws on the inside of the upper and lower hinges.
2. Remove the old glass door and set aside.

CAUTION: While loosening hinge set screws, continue to grasp the glass door. When the set screws are loosened, the door is freed and will fall out if not held.

3. Reverse steps above to install replacement glass door. Adjust hinge position until gap between door and frame is roughly equal on both sides.

Replacing the handle

To replace a defective door handle, follow the steps below:

CAUTION: Allow door to cool first!

1. Remove the two mounting screws holding latch cover in place.
2. Remove the two mounting screws holding defective handle in place.
3. Mount the replacement handle using two screws.
4. Adjust bottom nut (13/16) from end of shaft.
5. Secure latch cover in place with two screws.

Adjusting the door cam

To adjust the door cam, follow the steps below:

1. Open door and remove screws holding latch cover in place.
2. Locate nuts securing tongue on cam shaft.
3. Loosen but do not remove outside nut.
4. Adjust inside nut, one full turn clockwise draws door 1/16" closer to cabinet when door is closed.

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5. Secure cam tongue in place by tightening outside nut.
6. Repeat 1 thru 5 as necessary to get desired door seal.
7. Secure latch cover in place with two screws.

Troubleshooting

| Symptom | Probable Cause | Action |
|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| No power | Unit not plugged in or turned on. | Plug in or turn on. |
| | Defective circuit breaker. | Replace circuit breaker. |
| Oven temperature extremely high | Defective control thermocouple. | Replace control thermocouple. |
| Failure to heat | Set temperature less than actual temperature. | Refer to <i>Operation</i> . |
| | Defective control thermocouple. | Replace control thermocouple. |
| | Poor heater connections. | Tighten connections at terminal strip and/or heater. |
| | Defective heater element. | Check heater resistance on Schematic at back of manual. Replace heater unless approx. the same as schematic. |
| Alarm LED stays on and control is higher than set temperature | Defective controller. | Replace controller. |
| | Set temperature has been changed to a value less than the actual temperature minus the alarm limit. | Wait for actual temperature to cool to the set temperature. |
| | Defective controller. | Replace controller. |

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