



Compact Incubator (Natural Convection)

INC018



Contents

1. Safety and Precautions	2
2. Product Overview	3
3. Product Specifications	6
4. Operating Environment Conditions	6
5. Operation Instructions	7
A. Installation	7
B. Temperature Controller Labels	7
C. Temperature Controller Operation	9
6. Cleaning and Maintenance	15
7. Warranty	17

User Manual Introduction

This user manual provides information on the features and functions of the instrument and how to operate the instrument safely, including detailed safety guidelines. We strongly recommend that all users carefully review this manual before using the instrument for the first time.

1. Safety and Precautions



Caution

Do not store volatile, inflammable, or explosive materials in this instrument for risk of explosion or fires. Do not allow the instrument to come into contact with volatile chemicals such as gasoline, paint thinner, etc.



Caution

If the door is open for an extended amount of time (>5 minutes) while heating operation is ongoing, the instrument may overheat and pose a fire hazard. Thus, do not leave the door open during operation.



Caution

Surfaces can become hot during operation.



Depending on operating temperatures, surfaces may be too hot to touch.

Wear heat-resistant protective gloves or wait until the instrument cools.

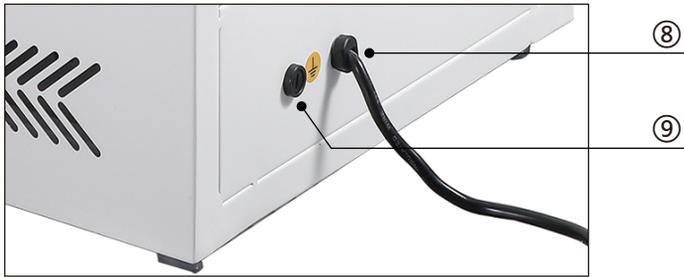
- A. Wear gloves when conducting instrument maintenance, to prevent injury due to sharp edges.
- B. Do not place the instrument in a wet area or area with frequent splashing, for risk of short circuits and electric shocks.
- C. Connect only to a power supply with the correct, corresponding voltage as specified on the instrument nameplate (110V).
- D. Do not use the instrument if the power cable or power outlet is damaged.
- E. Uncertified personnel shall not attempt to disassemble, repair, or modify the instrument.
- F. The instrument shall be placed on a level surface.
- G. If the instrument is operating in an abnormal manner, immediately remove the plug from the power outlet for risk of shock or fire.
- H. Temperature parameter settings should only be managed by authorized management personnel, in order to prevent dysfunction of the temperature controller.
- I. Keep the instrument interior and exterior clean and dry before use.
- J. In case of spillage, disconnect the unit from the power supply, and follow the cleaning procedures.

2. Product Overview

Electric heating is controlled by a PID temperature controller to achieve a uniform and constant temperature in this Compact Incubator (Natural Convection). This provides an ideal and stable temperature environment for contrast media before use in clinical settings.

What's in the Box

1. The Compact Incubator (Natural Convection) Unit
2. User Manual
3. 2x spare fuses



- ① Vent
- ② Door
- ③ Handle
- ④ Observation window
- ⑤ Foot
- ⑥ Temperature controller
- ⑦ Power switch
- ⑧ Power Cord
- ⑨ Fuse

Product General Features

1. The casing of the instrument is made from high quality cold-rolled steel plates, with the steel surface sprayed with anti-corrosion coating.
2. The interior is also made from high quality cold-rolled steel plates, sprayed with anti-corrosion coating.
3. An insulated, double-pane window is located at the center of the door, which allows for convenient viewing into the interior.
4. The door has a magnetic rubber seal to ensure a tight seal.
5. The instrument has an intelligent temperature control that includes a PID control program, digital display, push buttons, and timer functions.
6. There is an airflow vent located on the top side of the instrument.

3. Product Specifications

Temperature Range	Room Temperature (RT) + 5°C ~ 65°C
Temperature Resolution	0.1°C
Temperature Fluctuation	±0.5°C
Temperature distribution accuracy	±2.0°C
Heating Element	Nickel Alloy heating wire
Rated Power	0.18kW
Timer	0~9999 minutes (0 indicates an indefinite amount of time)
Sensor	Pt100
Inner Chamber Size (W*D*H mm)	260*260*260
Volume	18L
Shelf Load	15kg
Shelf Layers	6 (2 shelves included)
Spacing between Shelf Layers	35mm
Voltage	110V
Additional Features	Power Failure Memory

4. Operating Environment

Power Supply Voltage: 110V

Ambient Temperature 5~40° C

Relative Humidity: <90%

Air Pressure: 86-106Kpa

- There shall not be strong vibrations nor corrosive gases in the vicinity of the instrument.
- Avoid direct sunlight or the influence of other sources of heat or cooling.

5. Operation Instructions

A. Installation

1. Place the instrument on a flat ground or table.
2. Plug in the power cable to an appropriate outlet corresponding to the voltage specified by the instrument nameplate.
3. Turn on the power switch, the power indicator light will turn on.
4. Ensure that the top vent is in the open position.
5. Set the temperature and the timer functions accordingly (see below for detailed instructions).
6. Once the incubator has reached the desired temperature and the temperature is stable, place your contrast media inside the incubator.
7. When finished with instrument operation, flip the power switch to the “Off” position to power off the instrument.

B. Temperature Controller Labels

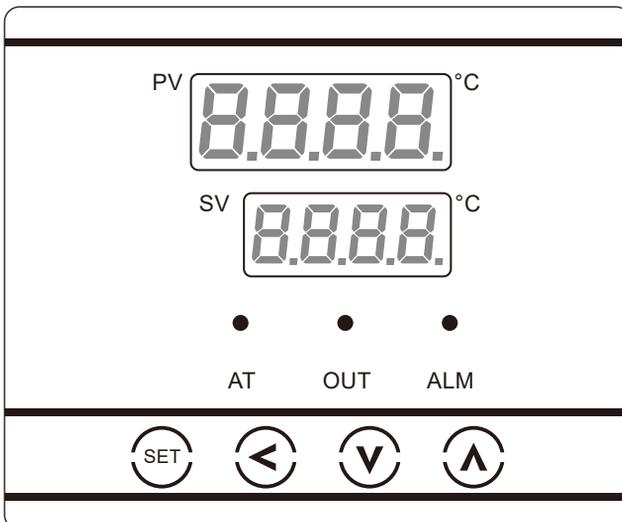
Display Labels

PV – Upper Screen;

- PV stands for Process Value

SV – Lower Screen;

- SV stands for Set Value or Setpoint Value



Indicator Labels

AT – Auto-Tuning

OUT – Output

ALM – *N/A*

The AT indicator flashes if the Auto-Tuning process is ongoing.

The OUT indicator flashes if heating is ongoing.

The ALM indicator is not applicable for this model.

Use   to set the values.

Use  to move between the digit places.

Key/Button Labels

 the “Set” key a.k.a. the Function Key, for setting program variables

 the “Left Arrow” key, for navigating the digits when inputting values

 the “Down Arrow” key, for decrementing values

 the “Up Arrow” key, for incrementing values

What the displays show during heating operations:

The Upper Screen (PV) displays the measured value from the temperature sensor.

The Lower Screen (SV) displays either:

- The setpoint temperature value set by the user, if the timer is set as indefinite (set to 0).

OR

- The time elapsed in minutes counting up from 0, if the timer has been set to a time other than 0.

What the displays show during setting operations:

- The Upper Screen (PV) displays the associated symbol for the current parameter being set.
- The Lower Screen (SV) displays the numerical value of the parameter being set.

C. Operating the Temperature Controller

Setting Temperature (without Timer)	
Operation	Display/Explanation
	<div style="text-align: center;"> PV  °C SV  °C </div> <p>This shows that the current target temperature is set to 37.0°C.</p>
  	<p>Use the  and  keys to set the temperature on the lower display.</p> <p>Use the  arrow key to move between the digit places.</p>
	<div style="text-align: center;"> PV  °C SV  °C </div> <p>This shows that the timer is currently set to 0 minutes (indefinite duration).</p>
  	<p>Use the  and  keys to set the timer to 0 on the lower display, if it is not already set to 0.</p> <p>Use the  arrow key to move between the digit places.</p>
	<div style="text-align: center;">  °C PV  °C SV  °C SV  °C </div> <p>The upper display will update in 0.1°C increments as the incubator heats up to the target temperature.</p>

Setting Temperature with Timer

Operation	Display/Explanation
	<div style="text-align: center;"> <p>PV  °C</p> <p>SV  °C</p> </div> <p>In this image, the current target temperature is set to 37.0°C.</p>
  	<p>Use the  and  keys to set the temperature on the lower display.</p> <p>Use the  arrow key to move between the digit places.</p>
	<div style="text-align: center;"> <p>PV  °C</p> <p>SV  °C</p> </div> <p>In this image, the timer is currently set to 60 minutes.</p>
  	<p>Use the  and  keys to set the timer on the lower display.</p> <p>Use the  arrow key to move between the digit places.</p>

Setting Temperature with Timer (continued)

Operation	Display/Explanation
	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center;"> PV  °C </div> <div style="margin: 10px 0;"> → </div> <div style="display: flex; align-items: center;"> SV  °C </div> </div> <p style="text-align: center; margin-top: 10px;">The display shows the temperature rising in 0.1 increments. The timer on the lower display stays at 0 until the target temperature has been reached.</p>

<div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center;"> PV  °C </div> <div style="margin: 10px 0;"> → </div> <div style="display: flex; align-items: center;"> SV  °C </div> </div>		<div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center;"> PV  °C </div> <div style="margin: 10px 0;"> → </div> <div style="display: flex; align-items: center;"> SV  °C </div> </div>
<p>Once the target temperature has been reached, the lower display shows the number of minutes elapsed.</p>		

<div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center;"> PV  °C </div> <div style="margin: 10px 0;"> → </div> <div style="display: flex; align-items: center;"> SV  °C </div> </div>	<p>Upon finishing the timer duration, the lower display shows “<i>End</i>”.</p> <p>Long-press the  key for 3 seconds to exit the <i>End</i> phase.</p>	
---	---	--

The instructions in these diagrams have been written below for more detail.

Setting the Temperature

- Press  to enter into the temperature setting menu.
- The upper screen displays the **SP** symbol (stands for setpoint), and the lower screen displays the temperature to be set.
- Now the temperature can be set using the  and  keys.
- Press  once more to confirm the desired temperature (the setpoint).
 - Upon pressing , the program will continue directly to the timer function setting.

Temperature Setting notes:

- Note that the temperature units are in Celsius.
- The valid temperature setting range is your Room Temperature + 5°C ~ 65°C.

Setting the Timer

- Upon confirming the desired temperature, you will enter into the timer setting menu.
- The upper screen displays the **ST** symbol, and the lower screen displays the timer duration to be set.
- Now the timer can be set using the  and  keys.
- Press  once more to confirm the desired timer duration setting.

Timer Setting notes:

- The units for the timer is in minutes.
- The valid time range is 0 ~ 9999 minutes.
 - 0 minutes indicates an indefinite amount of time (no time limit), i.e., upon reaching the desired temperature, the instrument will stay at that temperature as long as the instrument is powered on.

After Setting the Temperature and Timer

Now the instrument is in operation (heating is ongoing). At any point during operation, you may set a new desired temperature and/or a new desired timer duration. Simply press  to begin again.

Important Note: If the timer function was set at a timer duration value other than 0 .

Upon finishing the set duration of time, the instrument enters the *End* phase.

- It will sound out a small alarm and display *End* on the lower screen to indicate completion of the heating cycle.
- **Note:** The instrument is unresponsive to parameter changes in the *End* phase. Therefore, when the instrument has reached the *End* phase (the timer duration has finished), you must hold the  arrow key for 3 seconds in order to escape the *End* phase. Then instrument parameters can be set again (the previous settings will be automatically used if you decide to not adjust the settings).

Auto-tuning feature

From factory settings, the instrument has already been auto-tuned at the setpoint value of 37°C, from an ambient temperature of 25°C. Thus, the instrument is ready to use out of the box. However, in certain cases you may be advisable to use the auto-tuning feature.

Such cases include:

- 1) You will operate the instrument at an ambient temperature far off from 25°C, e.g., near the operating limits of 5°C and 40°C.
- 2) You notice the heating rate is slow (takes more than 40 minutes to reach 37 degrees C from ambient temperature).
- 3) You notice the temperature excessively oscillates around the setpoint with a delta greater than $\pm 1^{\circ}\text{C}$.
- 4) You notice the heating function is slow to respond to changes, e.g., a new user temperature setpoint, or a minor cooldown from opening

the door for <2 minutes.

5) The temperature overshoot is excessive (>1 degrees Celsius).

Auto-Tuning (AT) Function	
Operation	Display
 Long press the LEFT button for 7 seconds.	<div style="text-align: center;"> PV  °C SV  °C </div> <p>In this image, 0000 indicates Auto-Tuning has yet to be confirmed</p>
	<div style="text-align: center;"> PV  °C SV  °C </div> <p>To confirm and allow Auto-Tuning, update 0000 to 000 1.</p>
	<p>Auto-Tuning begins if 000 1 has been set. Otherwise if the value was left at 0000, Auto-Tuning will not be performed. The incubator will heat during Auto-Tuning, and the AT indicator flashes until the process has finished.</p>

Our PID temperature controller features an intelligent auto-tune feature. PID tuning is a type of calibration specific to PID systems. The controller needs to be tuned in order to know the best parameters to reach the desired temperature in a timely fashion without overshoot, and to minimize oscillation once the target temperature has been reached.

Setpoint (SP): The desired output of the system. For our device it is the temperature at which we want the warmer to reach and stay constant at, in order to warm up contrast media. Note: Also known as the Set

Value (SV); we use SV on our device.

Process Variable (PV): The parameter measured by the sensor. For our device, it is the temperature for which the device currently is at.

Overshoot & Undershoot: Overshoot refers to when the temperature exceeds the setpoint by a significant amount, and undershoot is the reverse. PID minimizes these cases by varying the output percentage instead of fully shutting on or off the heating apparatus.

6. Cleaning and Maintenance

Pre-requisites for Cleaning

- Remove all items, including the removable shelves, from the incubator.
- Inspect incubator chamber for damage and corrosion and repair if necessary.
- Inspect the incubator door seal for damage and repair if necessary.

Cleaning

- If the incubator is soiled it will first need to be cleaned with an alkaline liquid detergent.

Only use alkaline liquid detergents.

The following cleaners are not recommended:

- a. Hypochlorite Solutions
- b. Corrosive Detergents
- c. Acidic Solutions
- d. Salt Solutions

Cleaning using a detergent solution

- The incubator: Use a lint free cloth to clean the interior of the incubator and the door. Remove all visible dirt from surfaces.
- Shelves and associated items: Use a lint free cloth to clean shelves

and items associated with the incubator. Remove all visible dirt from surfaces.

Removing detergent from the instrument

- The incubator: Use a lint free cloth and sterile deionized water to wipe the interior of the incubator, the door, and the incubator door gasket. Perform this action twice to remove all cleaner. The cloth need not be extremely damp.
- Shelves and associated items: Use a lint free cloth and sterile deionized water to wipe shelves or equipment associated with the incubator. Perform this action twice to remove all cleaner. Do not submerge any equipment or shelves with deionized water.

Disinfection

- The incubator: Use a lint free cloth and a 70% isopropyl alcohol solution to clean the interior of the incubator, the door, and the incubator door gasket.
- Shelves and associated items: Use a lint free cloth and a 70% isopropyl alcohol solution to disinfect shelves or equipment associated with the incubator.
- Return removeable equipment and / or shelves to the incubator
- Allow the unit to completely dry before operating the incubator.

Troubleshooting

1. The unit does not power on.

Potential Cause 1: Power supply failure.

Solution: If other appliances on the same circuit are still operable, then this indicates the unit will need the power supply replaced by a professional.

Potential Cause 2: There is a blown fuse.

Solution: Replace the fuse

2. The incubator temperature does not rise as expected.

Potential Cause 1: Actual temperature of the incubator is already higher than the set temperature (desired temperature).

Solution: Check the temperature setting.

Potential Cause 2: Temperature control circuit fault

Solution: Have a professional check the unit.

3. Temperature continues to rise unexpectedly.

Potential Cause 1: Actual temperature of the incubator is lower than set temperature.

Solution: Check the temperature setting.

Potential Cause 2: Temperature control circuit fault

Solution: Have a professional check the unit.

4. The incubator does not function as expected after END displays.

Potential Cause: The incubator is still in the END phase.

Solution: Exit the END phase. Consult the detailed instructions in the
“After Setting the Temperature and Timer” Section.

5. The incubator warms slowly and/or does not reach the setpoint precisely.

Potential Cause: The instrument needs to be auto-tuned.

Solution: Consult the “Auto-tuning feature” section.

7. Warranty

You have purchased an original laboratory machine which meets the highest engineering and quality standards. In accordance with our warranty conditions, the warranty period is 12 months from our shipment. For claims under the warranty, please contact your local dealer.

The warranty does not cover worn out parts, accidental damage, incorrect storage, nor does it apply to faults resulting from improper use, insufficient care or maintenance not carried out in accordance with the instructions in this operating manual.



Date: 2025.04.03
Version: V1.1