

Operations Manual

INCU-SHAKER™ *Mini*

Item: H1001-M (-E)



Benchmark
Scientific



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1. General Information and Precautions

Safety Symbols:



1.1. Precautions related to the power cable

-  ■ Always allow at least 3cm between the power cable and the back wall to prevent the back wall from causing pressure on the power cable.
-  ■ Always use the electrical plug that was supplied with this instrument.
-  ■ Never touch the power cord with wet hands. (This can result in electric shock.)
-  ■ Never use a damaged power cord or power outlet.
-  ■ In the event of smoke or a burning smell, immediately remove the power cord from the outlet.

1.2. Precaution for use

-  ■ Do not attempt to disassemble this instrument. If service is required, please contact your local representative.
-  ■ Never operate a flammable spray near this instrument. (This can result in a fire hazard.)
-  ■ Always use caution when using flammable substances such as benzene, alcohol and LP gas. (Failure to do so can result in a fire hazard.)
-  ■ Prevent foreign substances from contacting the door seal. (The inflow of outside air can negatively impact the temperature in chamber.)
-  ■ Permissible ambient temperature range for transport: -10°C to 60°C.
-  ■ **ALWAYS ensure that the instrument is connected to an outlet with specifications that match those of the serial number label.**
(Over-voltage or under-voltage can damage the product and result in poor performance.)
-  ■ When installing the instrument, always allow a distance of at least 30cm from the back wall. Install the unit in the way that the power plug is easily accessible and can be easily pulled in case of danger.
-  ■ Install the instrument on a flat and stable surface, free from vibration and in a well-ventilated location. (If the surface is not level, it can cause an excessive vibration of the product.)

2. Feature & Specification

2.1 Features

- Magnetic induction drive & Brushless DC motor provides less vibration and maintenance.
- No interference with uniformity for cell culture by BLDC motor
- User friendly, intuitive LCD touch panel
- Moisture resistant structure by Epoxy – coated
- Automatic stop function. Once LID opens, shaker automatically stops for safety and convenience
- Once-piece construction with acrylic cover
- Transparent acrylic cover allows internal viewing without disturbance
- Stable and low noise shaking
 - ✧ Brushless DC motor and beltless drive system shaker minimizes noise and vibration
- Non-volatile memory for operation.
- Easy platform installation
 - ✧ Very simple installation of holder or spring rack platform.
 - ✧ Optional accessories available for most common laboratory vessels.

2.2 Specification

1) Dimension (Exterior): 28(W) X 47(D) X 33(H) cm

11.1(W) X 18.5(D) X 13(H) in.

(Internal): 27.5(W) X 32.5(D) X 22.2(H) cm /

10.8(W) X 12.8(D) X 8.75(H) in. /

(Platform): 23.5(W) x 29.2(D) cm / 9.5(W) X 11.5(D) in.

2) Temperature range: Ambient +5°C to 50°C

3) Temperature accuracy: $\pm 0.2^{\circ}\text{C}$ at 37°C

4) Temperature uniformity: $\pm 0.5^{\circ}\text{C}$ at 37°C

5) Speed range: 30~300 RPM

6) Shaking orbit: 19mm (3/4")

7) Circulation Fan: Convection Fan

8) Timer: Digital -1 min. to 99hr 59mm. (1 min. increments)

9) Motor: Beltless DC magnetic induction drive

10) Weight: 25lbs/11.5kg

11) Electrical: 120V or 230V, 50~60Hz / 200W

III. Operation

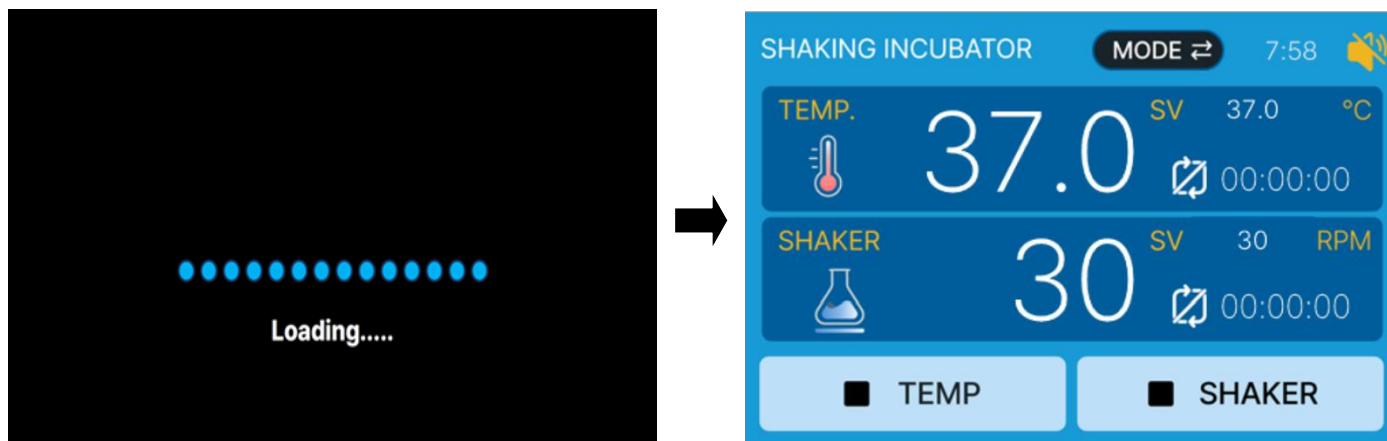
► Booting



Make sure the power cable is properly connected before turning on the power.

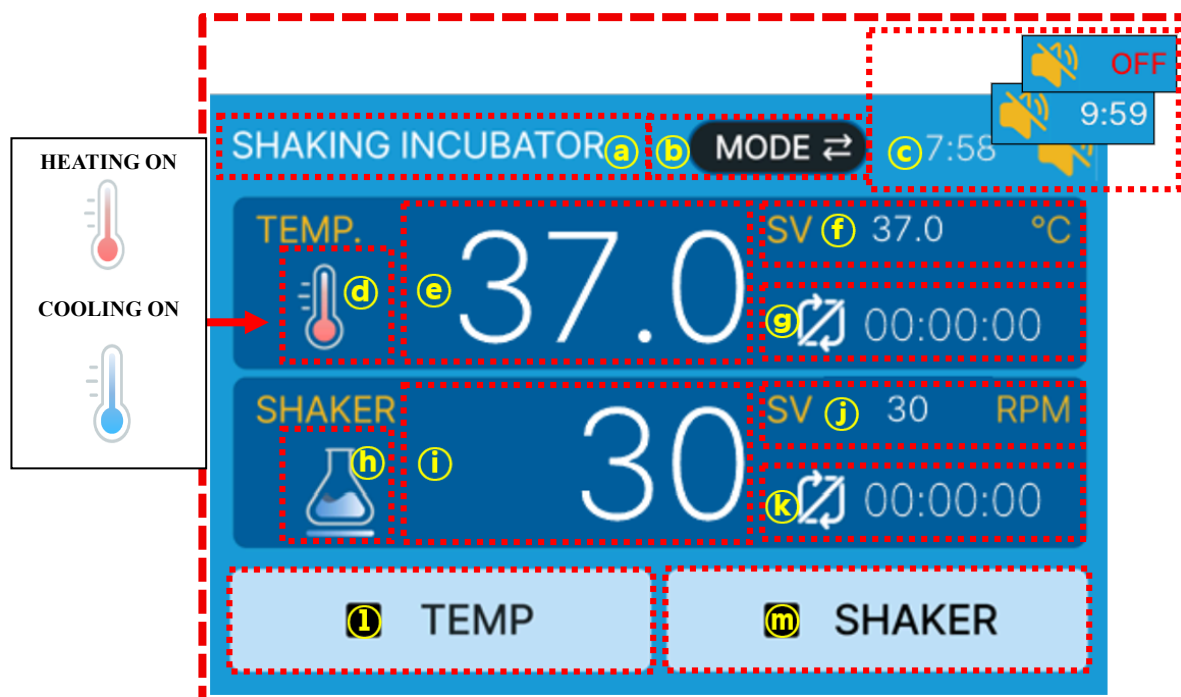
Do not disconnect the controller connection cable before turning off the power.

The touch panel operation is as follows:



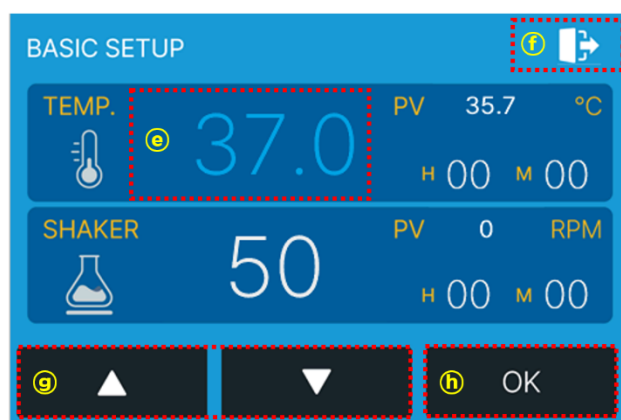
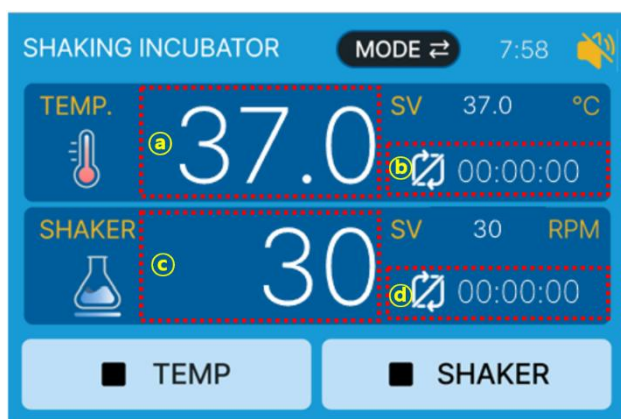
1. When Power switch is turned ON, the loading screen appears and then disappears, switching to the Shaker main screen.

■ Shaking Incubator View Screen (BASIC View)



(a) Error display	Area that displays an error code number when a problem occurs during operation.
(b) MODE view change button	Selecting the MODE button switches to MODE view.
(c) Alarm display	Allows changing the alarm mode to ON, MUTE (10 minutes), and OFF.
(d) Temperature operation Icon	Shows heating operation in Red / when heating is OFF, no color is displayed.
(e) Current Temp. display	The currently detected temperature is displayed. When selected, it switches to the Temperature Setup screen.
(f) User Temp. setting display	Indicates the set temperature value.
(g) Temp. timer display	Used when setting the temperature to operate in a limited time; When selecting, it switches to the temperature setup screen.
(h) Shaker operation icon	Indicates left–right shaking motion when the shaker is running.
(i) Current RPM display	Displays the current RPM value.
(j) User RPM setting display	Displays the RPM value set by the user.
(k) Shaker timer display	Used when setting the shaker to operate in a limited time; When selecting, it switches to the shaker setup screen.
(l) Temp. RUN/STOP button	Button used to start or stop temperature operation.
(m) Shaker RUN/STOP button	Button used to start or stop shaker operation.

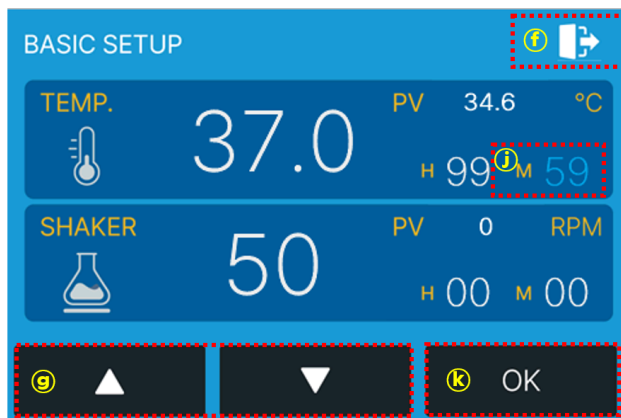
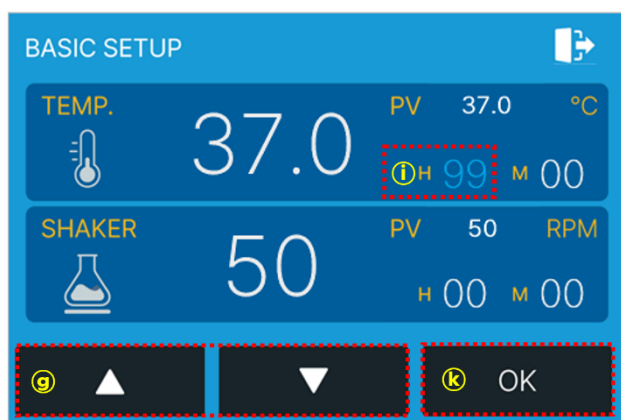
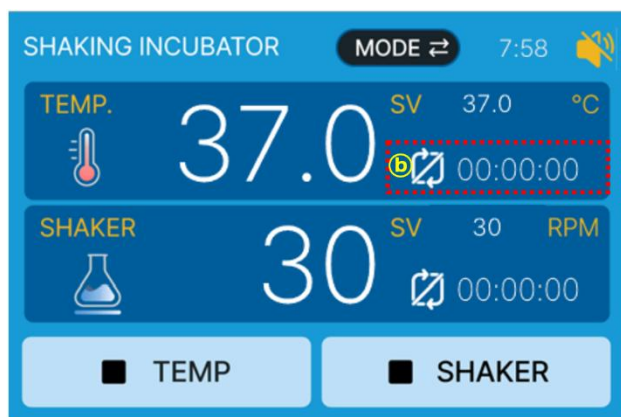
■ Temperature Set (BASIC View)



1. Select (a) to switch to BASIC SETUP screen.
2. When the value of (e) is blue, change it to the temperature value you want to use with (g) ▲(UP)/▼(DOWN) buttons.
3. Select the OK button(h) to save the settings and switch to BASIC view screen.
(If the OK button is not selected, the setting will not be applied.)
4. Select the Exit icon (f) to return to the previous screen without changing setting values.

- ※ When changing settings, you can quickly increase or decrease the value by continuously pressing the ▲(UP)/▼(DOWN) button.
- ※ Temperature settings can only be made within the changeable range, and it will not be exceeded even if the ▲(UP)/▼(DOWN) buttons are continuously pressed.

■ Temperature Timer Set (BASIC View)

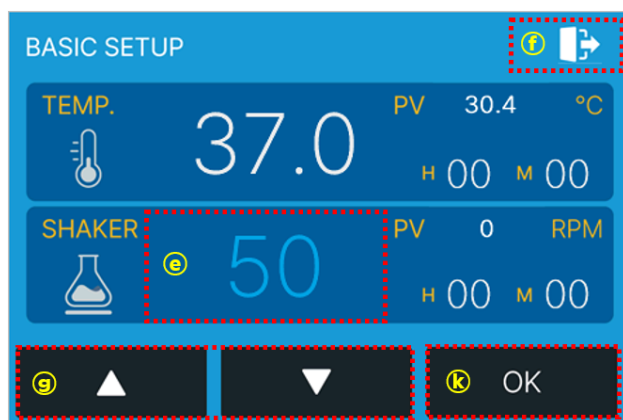
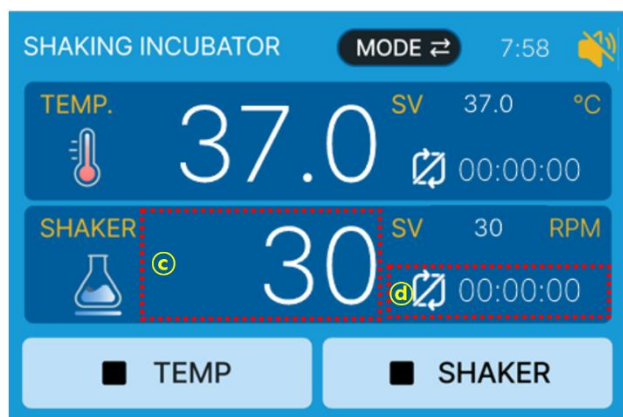


1. Select ⑥ to switch to BASIC SETUP screen.
2. When value of H(hours) setting (①) is in blue, use the ⑨▲(UP)/▼(DOWN) buttons to change the 'hour' you want to use.
(The maximum 'hour' that can be set is 99 hours.)
3. When value of M(min) setting (②) is in blue, use the ⑨▲(UP)/▼(DOWN) buttons to change the 'minute' you want to use.
(The maximum 'minute' that can be set is 59 minutes.)
4. Select the OK button (Ⓚ) to save the settings and switch to BASIC VIEW.
(If the OK button is not selected, the setting will not be applied.)
5. Select Exit icon ② to return to the previous screen without changing setting values.

※ When changing settings, you can quickly increase or decrease the value by continuously pressed the ▲(UP)/▼(DOWN) button.

※ To change the time while the temperature control is operating, change the time in BASIC SETUP, save it, then stop the operation in the BASIC view and restart it. The newly set time will then be applied.

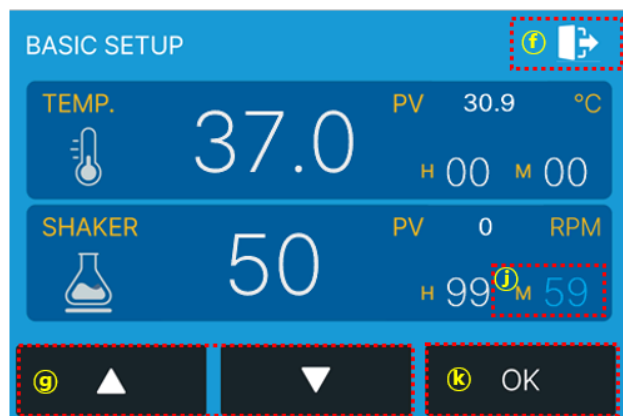
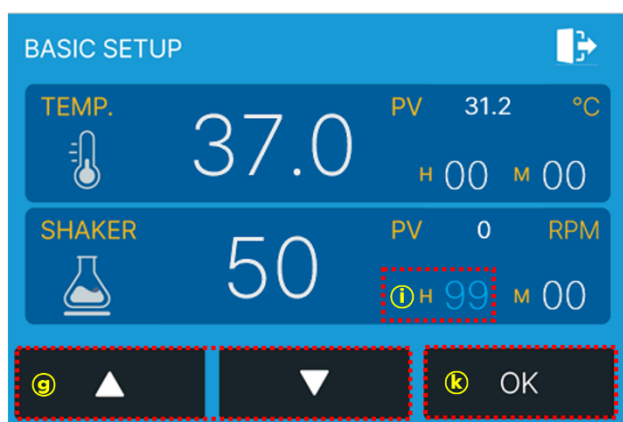
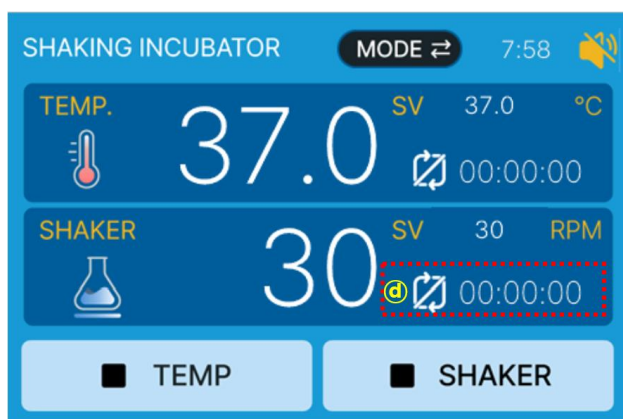
■ Shaker RPM Set (BASIC View)



1. Select ③ to switch to BASIC SETUP screen.
2. When the value of ③ is in blue, change it to the RPM value you want to use with ⑨▲(UP)/▼(DOWN) buttons. (RPM range: 30 ~ 300)
3. Select the OK button (Ⓚ) to save the settings and switch to BASIC view screen. (If the OK button is not selected, the setting will not be applied.)
5. Select the Exit icon ⑥ to return to the previous screen without changing setting values.

- ※ When changing settings, you can quickly increase or decrease the value by continuously pressing the ▲(UP)/▼(DOWN) button.
- ※ RPM settings can only be made within the changeable range, and it will not be exceeded even if the ▲(UP)/▼(DOWN) buttons are continuously pressed.

■ Shaker Timer Set (BASIC View)



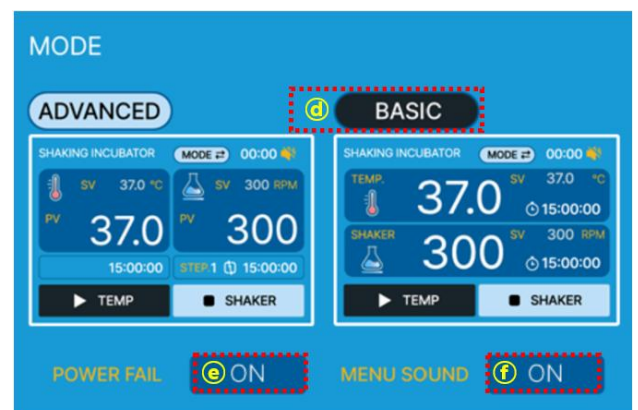
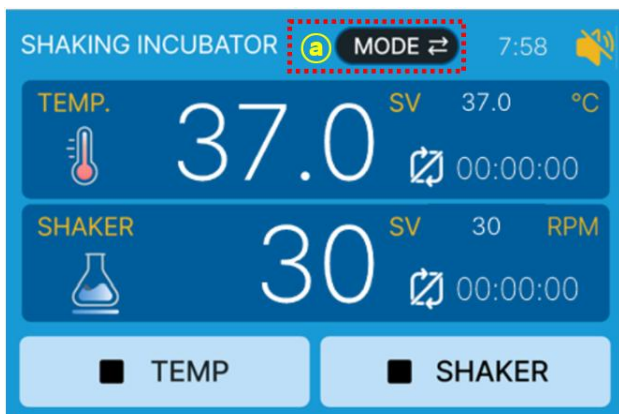
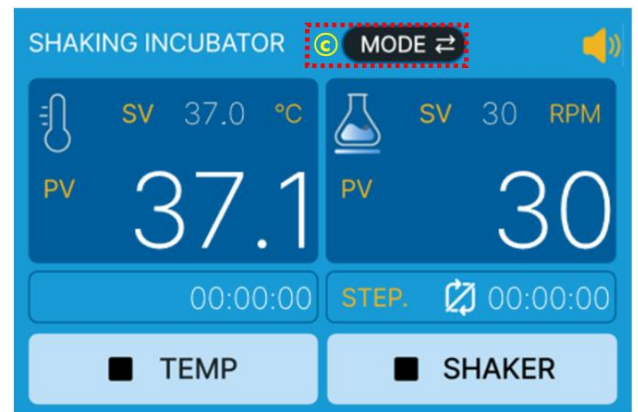
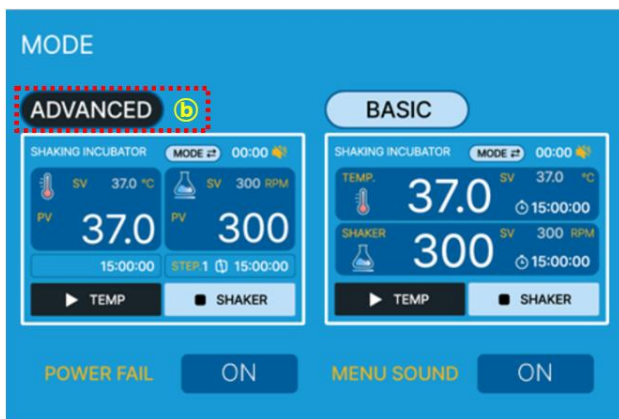
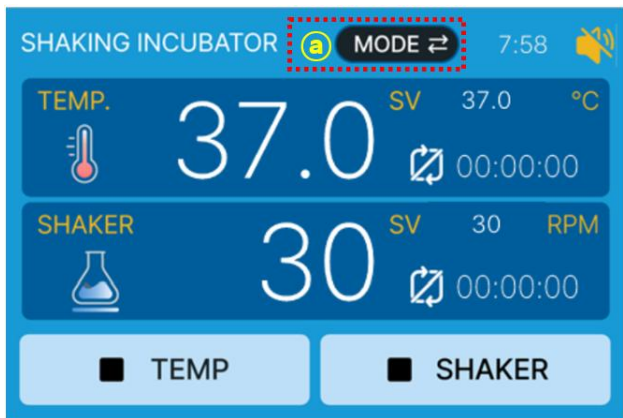
1. Select **d** to switch to BASIC SETUP screen.
2. When value of H(hours) setting (**i**) is in blue, use the **g**▲(UP)/▼(DOWN) buttons to change the 'hour' you want to use.
(The maximum 'hour' that can be set is 99 hours.)
3. When value of M(min) setting (**j**) is in blue, use the **g**▲(UP)/▼(DOWN) buttons to change the 'minute' you want to use.
(The maximum 'minute' that can be set is 59 minutes.)
4. Select the OK button (**k**) to save the settings and switch to BASIC VIEW.
(If the OK button is not selected, the setting will not be applied.)
5. Select Exit icon (**f**) to return to the previous screen without changing setting values

※ When changing settings, you can quickly increase or decrease the value by continuously touching the ▲(UP)/▼(DOWN) button.

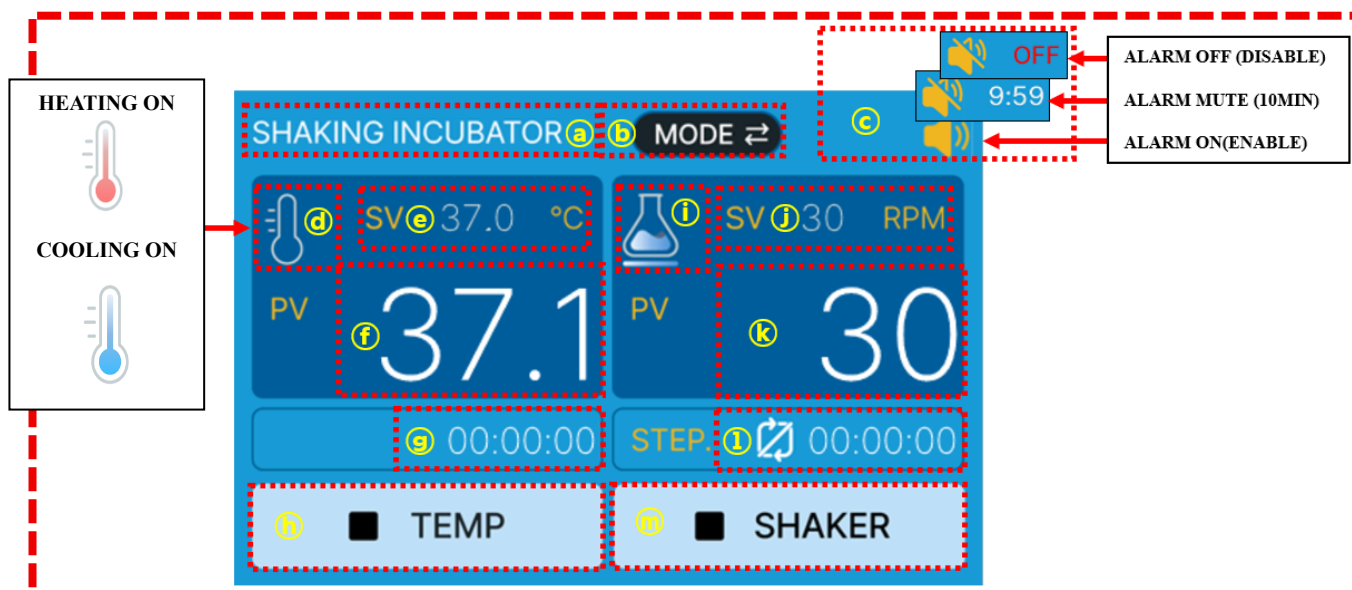
※ To change the time while the temperature control is operating, change the time in BASIC SETUP, save it, then stop the operation in the BASIC view and restart it. The newly set time will then be applied.

■ Mode View Change (BASIC ↔ ADVANCED)

1. Select ① MODE to switch to MODE VIEW.
The currently selected mode will be highlighted in white with black text.
 2. Select ② from MODE VIEW to switch to ADVANCED VIEW.
 3. From ADVANCED VIEW, selecting icon MODE (③) switches to MODE VIEW, and selecting icon BASIC (④) switches to BASIC VIEW.
 4. Select icon ⑤ to set POWER FAIL ON/OFF
 5. Select icon ⑥ to set MENU SOUND ON/OFF
(ON: Touch Sound On / OFF: Touch Sound Mute)
- ※ After turning on the power, the default screen is the BASIC VIEW

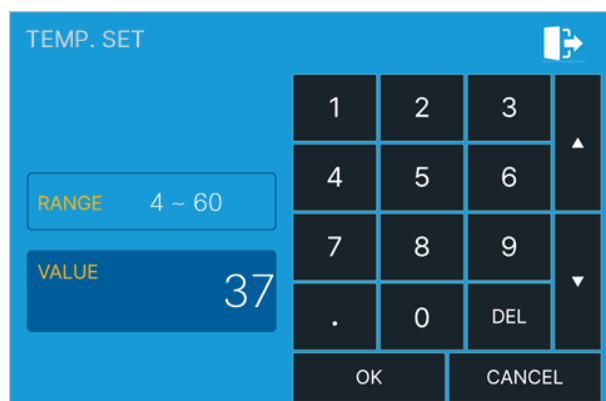
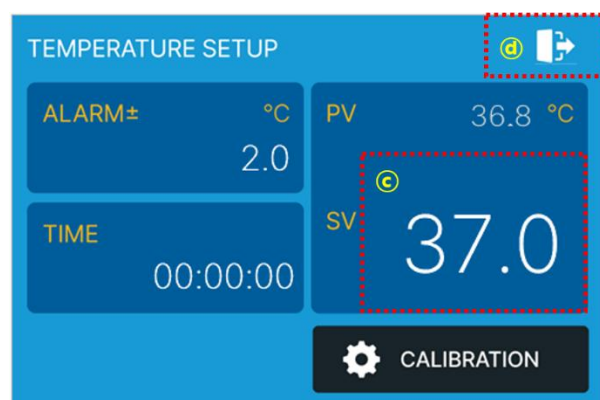
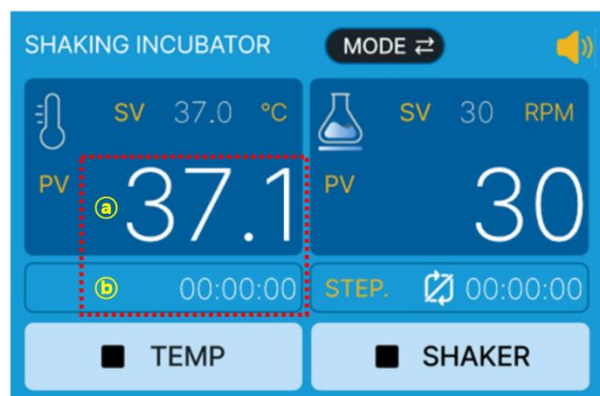


■ Shaking Incubator View Screen (ADVANCED View)



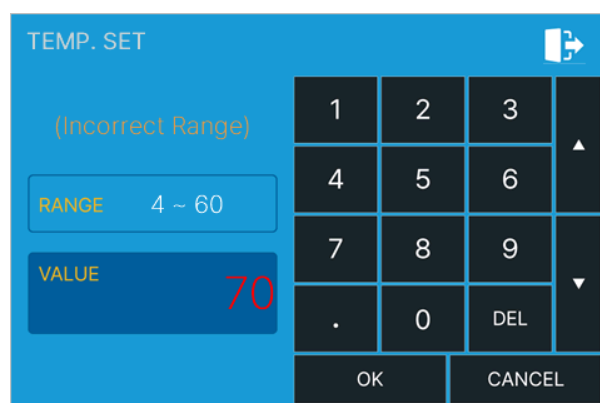
Ⓐ Error display	Area that displays an error code number when a problem occurs during operation.
Ⓑ MODE view change button	Selecting the MODE button switches to MODE view.
Ⓒ Alarm display	Allows changing the shaker alarm mode to ON, MUTE (10 minutes), and OFF.
Ⓓ Heating operation icon	Shows heating or cooling operation in Red or Blue / when heating is OFF, no color is displayed.
Ⓔ User Temp. setting display	Indicates the set temperature value.
Ⓕ Current Temp. display	The currently detected temperature is displayed. When selected, it switches to the Temperature Setup screen.
Ⓖ Temp. timer display	Used when setting the temperature to operate in a limited time; When selecting, it switches to the temperature setup screen.
Ⓗ Temp. RUN/STOP button	Button used to start or stop temperature operation.
Ⓘ Shaker operation icon	Indicates left–right shaking motion when the shaker is running.
⓫ User RPM setting display	Displays the RPM value set by the user.
⓬ Current RPM display	Displays the current RPM value.
⓯ Shaker timer display	Used when setting the shaker to operate in a limited time; When selecting, it switches to the shaker setup screen.
Ⓜ Shaker RUN/STOP button	Button used to start or stop shaker operation.

► Temperature Set (ADVANCED View)

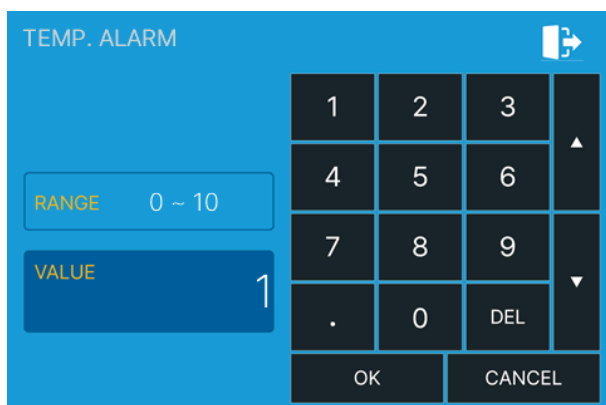
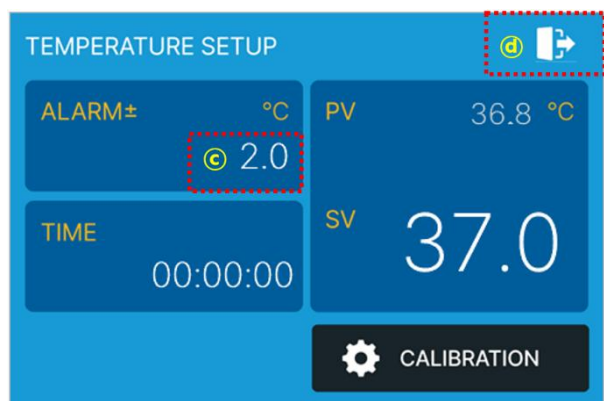
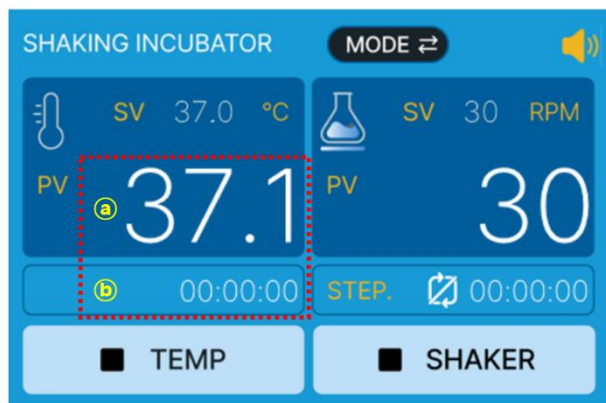


1. Select ① or ② to switch to the temperature setup screen.
2. Select ③ to switch to the **TEMP. SET** screen.
3. When the temperature is set or changed using the keypad, the entered value is displayed in **VALUE**.
4. Select the **OK** button to save the setting and return to the previous screen. (If the **OK** button is not selected, the setting will not be applied.)
5. Select the Exit icon ④ to return to the temperature /shaker screen.

※ If a temperature value outside the setting range is entered, “**Incorrect Range**” will appear, the value shown in **VALUE** will turn red and be cancelled. Settings can only be entered within the allowable range (see the figure below).

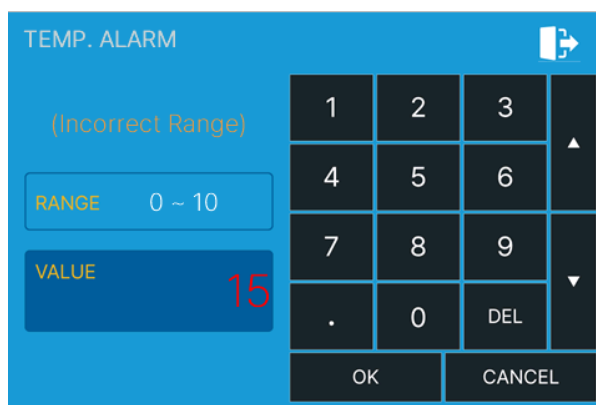


► Temperature Alarm Set (ADVANCED View)

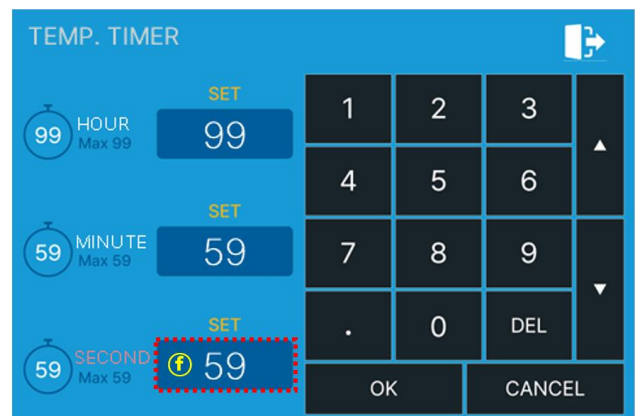
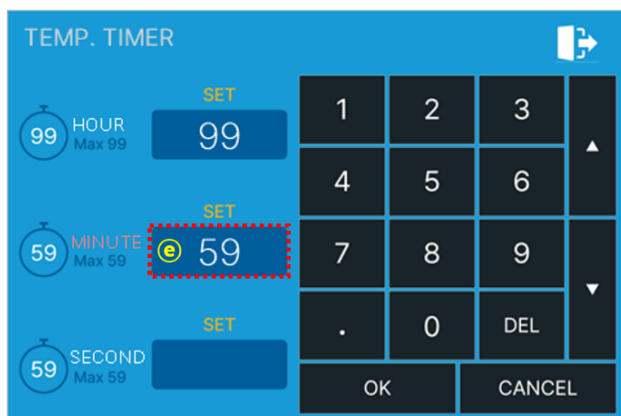
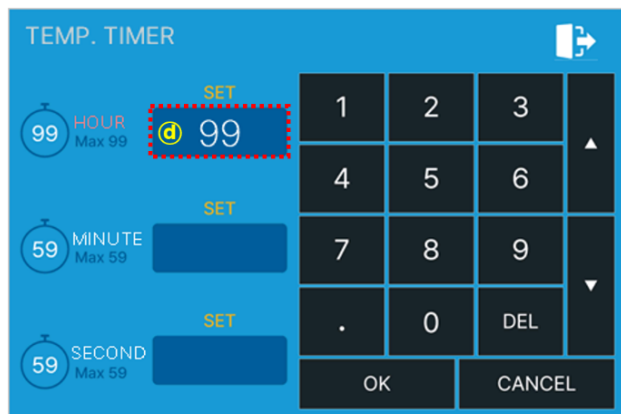
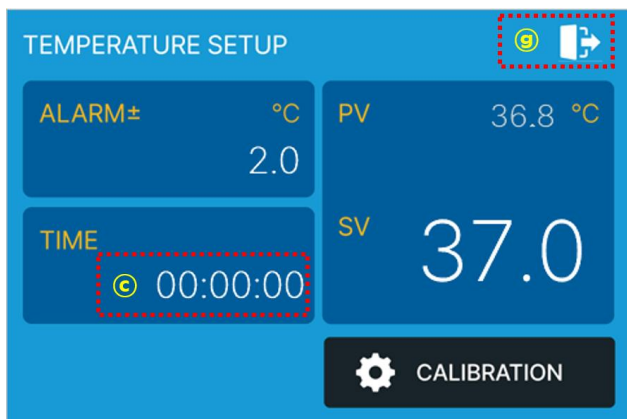
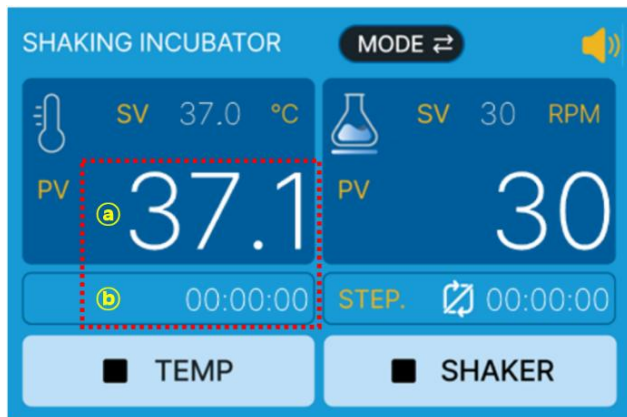


1. Select ① or ② to switch to the Temperature Setup screen.
2. Select ③ to switch to the **TEMP. ALARM** screen.
3. When you set or change the temperature alarm value using the keypad, it is displayed in VALUE.
4. Select the **OK** button to save the setting and return to the previous screen. (If the **OK** button is not selected, the setting will not be applied.)
5. Select the exit icon ④ to return to the temperature/shaker screen.

※ If a value outside the setting range is entered, “**Incorrect Range**” will appear, the value shown in **VALUE** will turn red and be cancelled. Settings can only be entered within the allowable range (see the figure below).



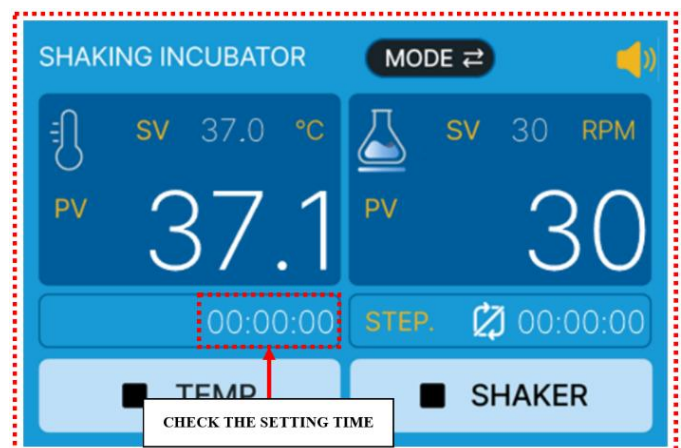
► Temperature Timer Set (ADVANCED View)



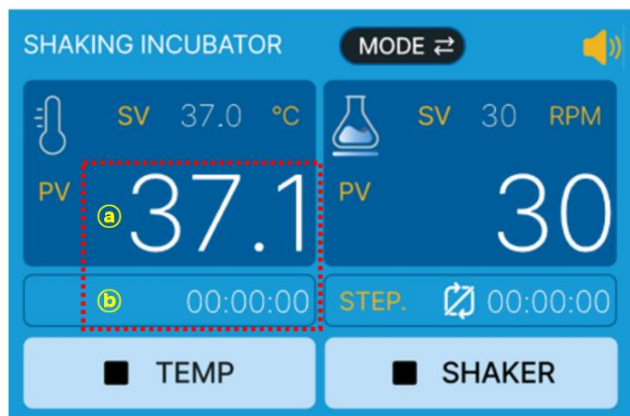
1. Select (a) or (b) to switch to the temperature setup screen.
2. Select (c) to switch to the **TEMP. TIMER** screen.
3. Select the **SET** box at (d) (the **HOUR** field turns pink), then use the keypad to set or change the hours.
4. Select the **SET** box at (e) (the **MINUTE** field turns pink). Use the keypad to set or change the minutes.
5. Select the **SET** box at (f) (the **SECOND** field turns pink). Use the keypad to set or change the seconds.
6. Select the **OK** button to save the setting and return to the previous screen. (If the **OK** button is not touched, the setting will not be applied.)
7. Select the exit icon (g) to return to the Temperature /RPM screen.

※ When setting the time, if a value exceeding the range is entered, only up to two digits will be displayed for the hour.

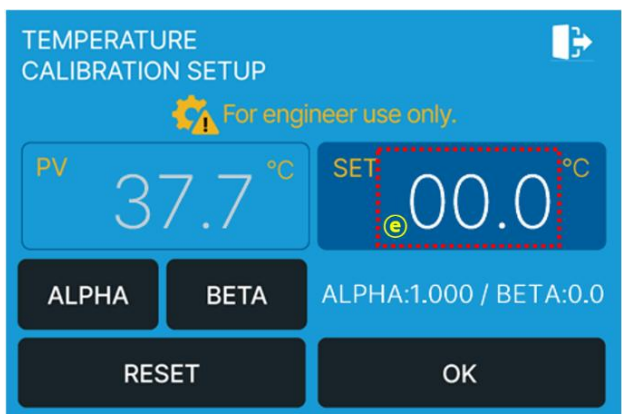
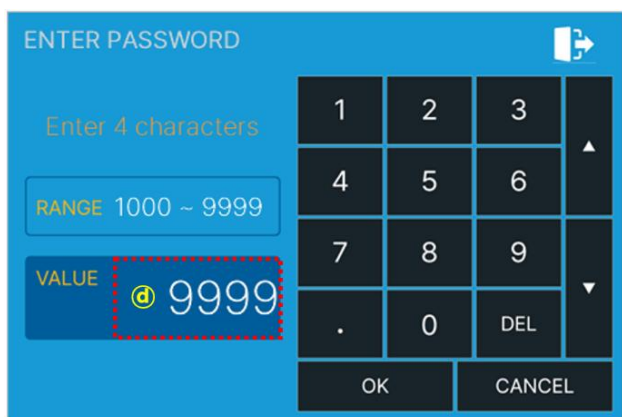
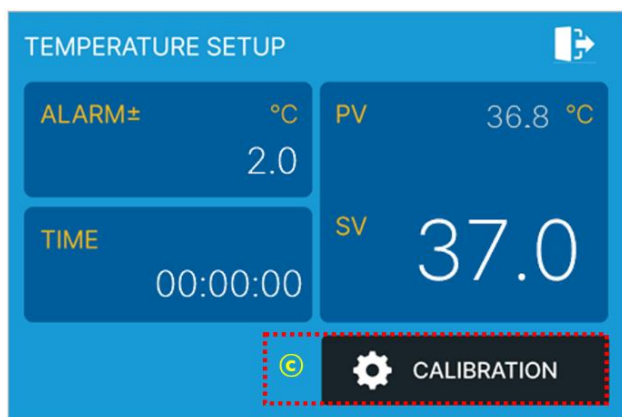
※ When setting minutes or seconds, if a value exceeding the range is entered, the maximum value (**Max 59**) will be displayed.

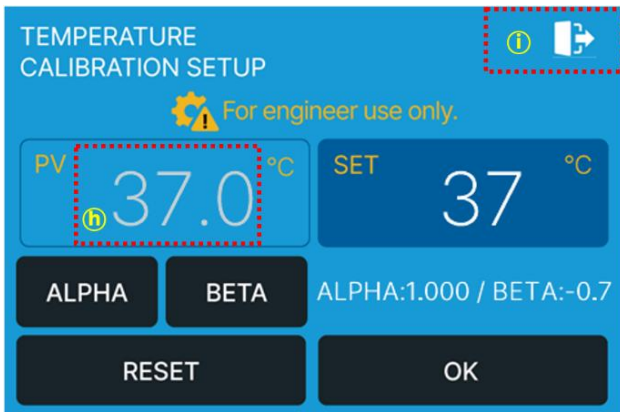
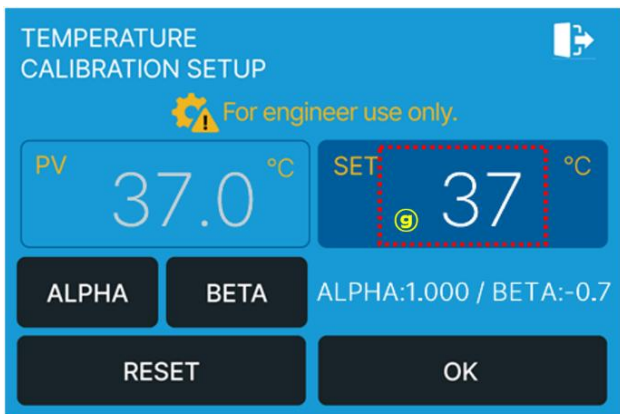
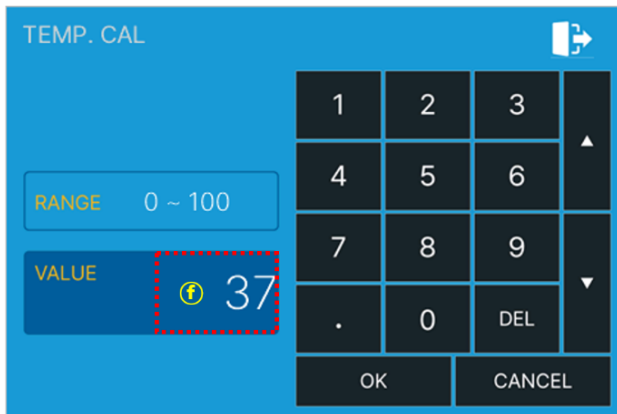


► Temperature Calibration Set (ADVANCED View)



1. Select (a) or (b) to switch to the temperature setup screen.
2. Select (c) to switch to **Enter Password** screen.
3. Using the keypad, enter “9999” (d). Select **OK** to switch to Temperature Calibration Setup screen.
4. Select the **SET** box (e) to switch to the **TEMP. CAL** screen.



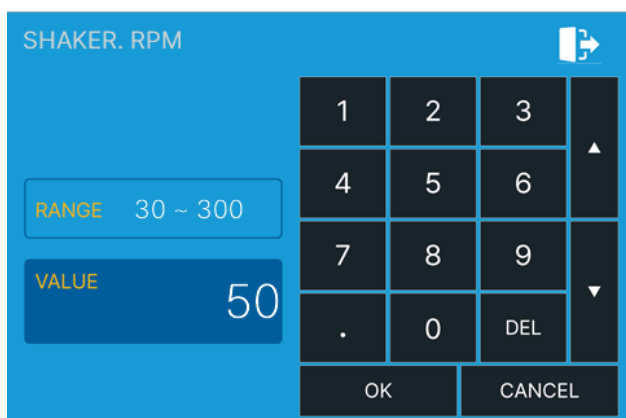
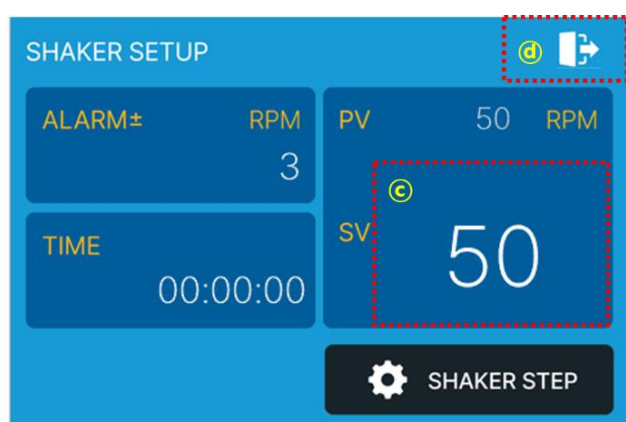
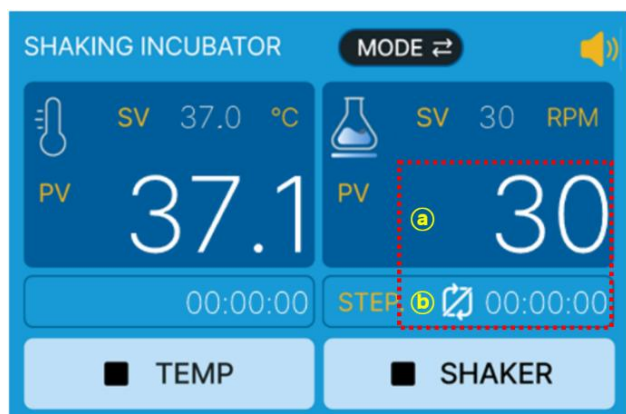


5. Using the keypad, enter the actual temperature value into the **VALUE** box (f), Select **OK**. The setting value will be applied and the screen will switch to Temperature Calibration Setting screen.
6. The entered calibration value will be displayed in the SET box of Temperature Calibration Setup(g). Select **OK**. If **OK** is not selected, the setting will not be applied. (BETA: difference between the currently detected temperature and the calibrated temperature)
7. After a short time, the left-side PV value (h) will adjust to an approximate value of the calibrated setting, and temperature control will operate accordingly.
8. Select the exit icon (i) to return to the previous screen.

※To cancel the calibration value shown in the **SET** box on the **Temperature Calibration Setup** screen, touch the **Reset** button. The **BETA** value will be displayed as **0.0**.

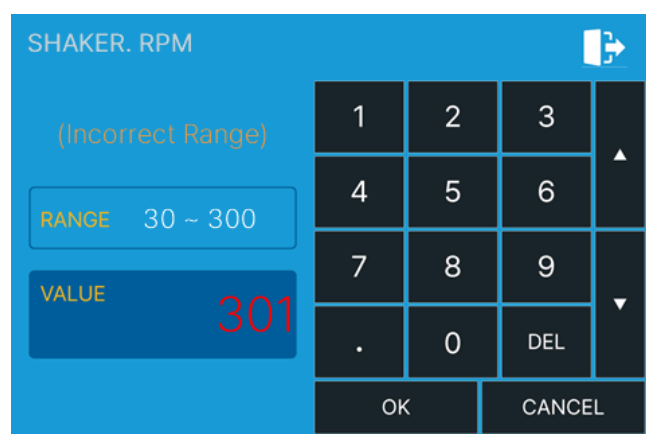
※If a value outside the allowable range is entered when inputting the password or calibration value, "**Incorrect Range**" will appear, and the value shown in **VALUE** will turn red and be cleared.

► Shaker RPM Set (ADVANCED View)

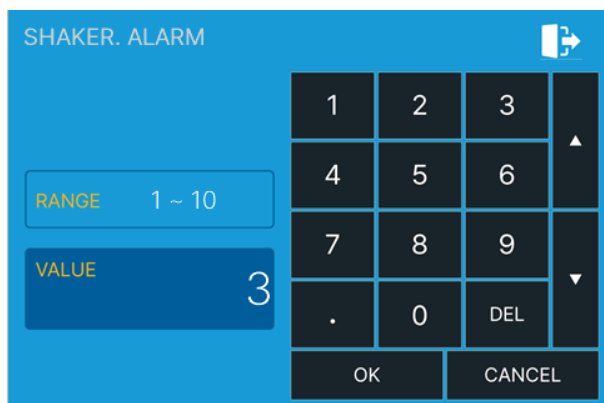
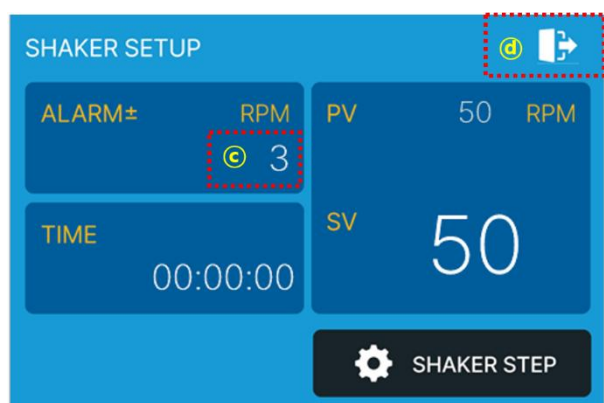
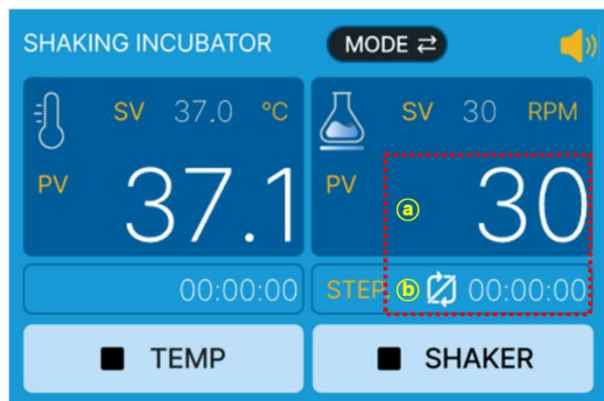


1. Select (a) or (b) to switch to the **SHAKER SETUP** screen.
2. Select (c) to switch to the **SHAKER. RPM** screen.
3. When set or change the RPM using the keypad, the entered value is displayed in **VALUE**.
4. Select the **OK** button to save the set value and return to the previous screen. (If the **OK** button is not selected, the set value will not be applied.)
5. Select the exit icon (d) to return to the temperature/shaker screen.

※ If a value outside the setting range is entered, **"Incorrect Range"** will appear, the value shown in **VALUE** will turn red and be cancelled. Settings can only be entered within the allowable range (see the figure below).

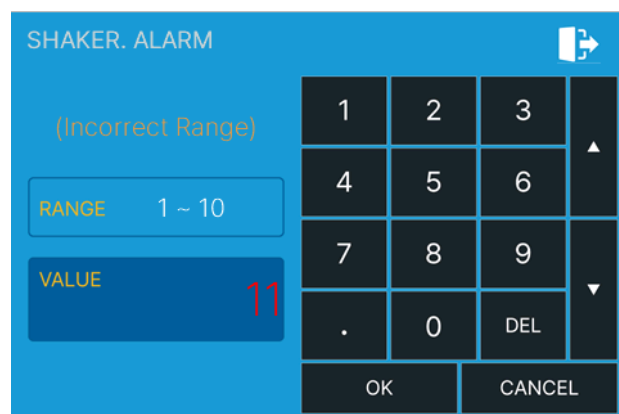


► Shaker Alarm Set (ADVANCED View)

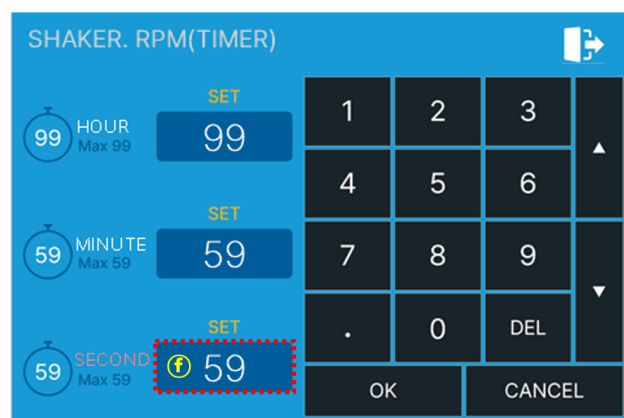
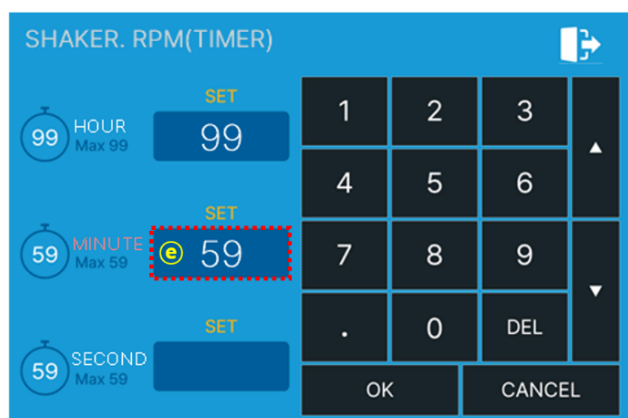
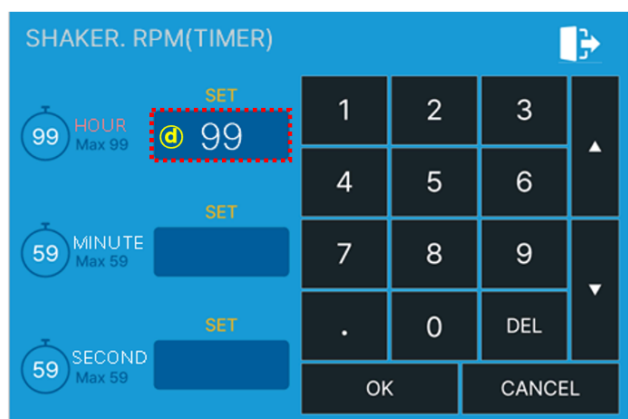
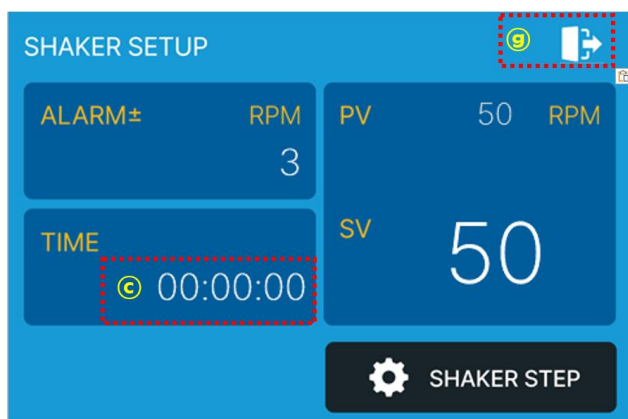
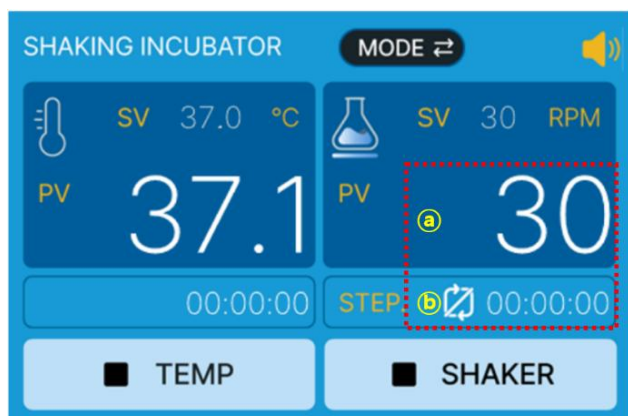


1. Select (a) or (b) to switch to the **SHAKER SETUP** screen.
2. Select (c) to switch to the **SHAKER. ALARM** screen.
3. When set or change the RPM alarm value using the keypad, it is displayed in **VALUE**.
4. Select the **OK** button to save the setting and return to the previous screen. (If the **OK** button is not selected, the setting will not be applied.)
5. Select the exit icon (d) to return to the temperature/shaker screen.

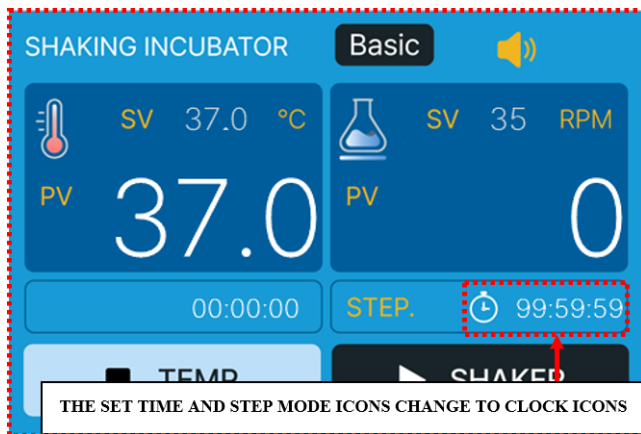
※ If a value outside the setting range is entered, “**Incorrect Range**” will appear, the value shown in **VALUE** will turn red and be cancelled. Settings can only be entered within the allowable range (see the figure below).



► Shaker Timer Set (ADVANCED View)

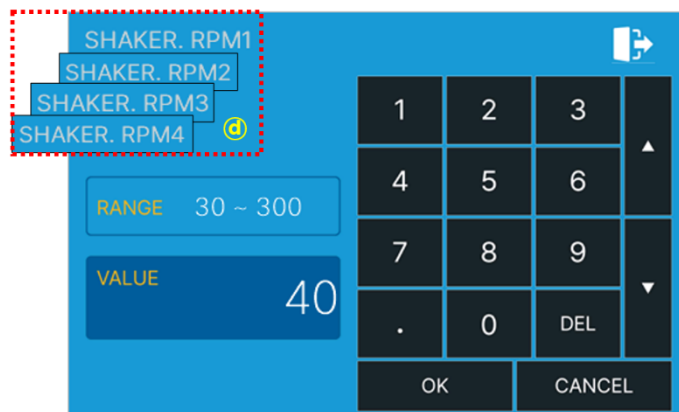
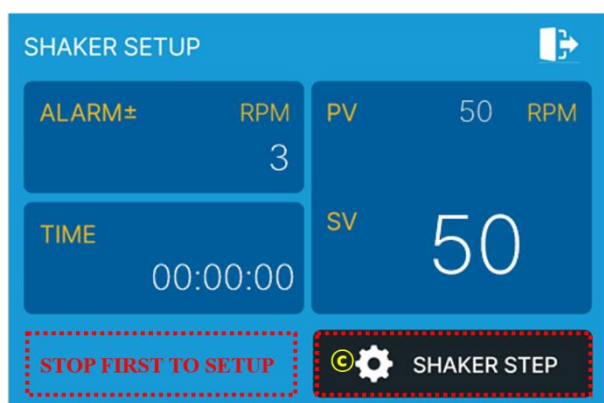
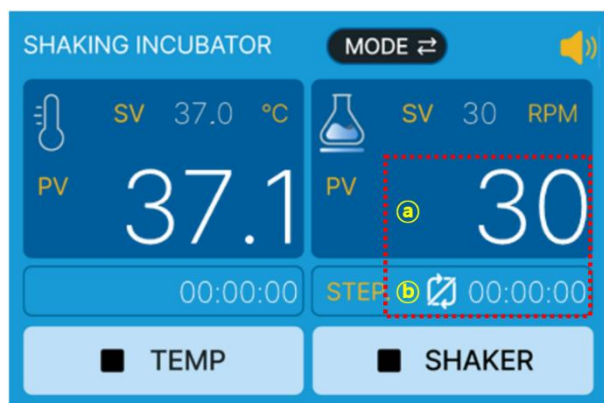


1. Select (a) or (b) to switch to the **SHAKER SETUP** screen.
2. Select (c) to switch to the **SHAKER. RPM (TIMER)** screen.
3. Select the **SET** box (d) (the **HOUR** field turns pink), then use the keypad to set or change the hours.
4. Select the **SET** box (e) (the **MINUTE** field turns pink), then use the keypad to set or change the minutes.
5. Select the **SET** box (f) (the **SECOND** field turns pink), then use the keypad to set or change the seconds.
6. Select the **OK** button to save the setting and return to the previous screen. (If the **OK** button is not selected, the setting will not be applied.)
7. Select the exit icon (g) to return to the temperature/shaker screen.



- ※ When setting the time, if a value exceeding the range is entered, only up to two digits will be displayed for the hour.
- ※ When setting minutes or seconds, if a value exceeding the range is entered, the maximum value (**Max 59**) will be displayed.
- ※ If the shaker is stopped before the countdown finishes and then start it again, the time will reset to the initially set time.

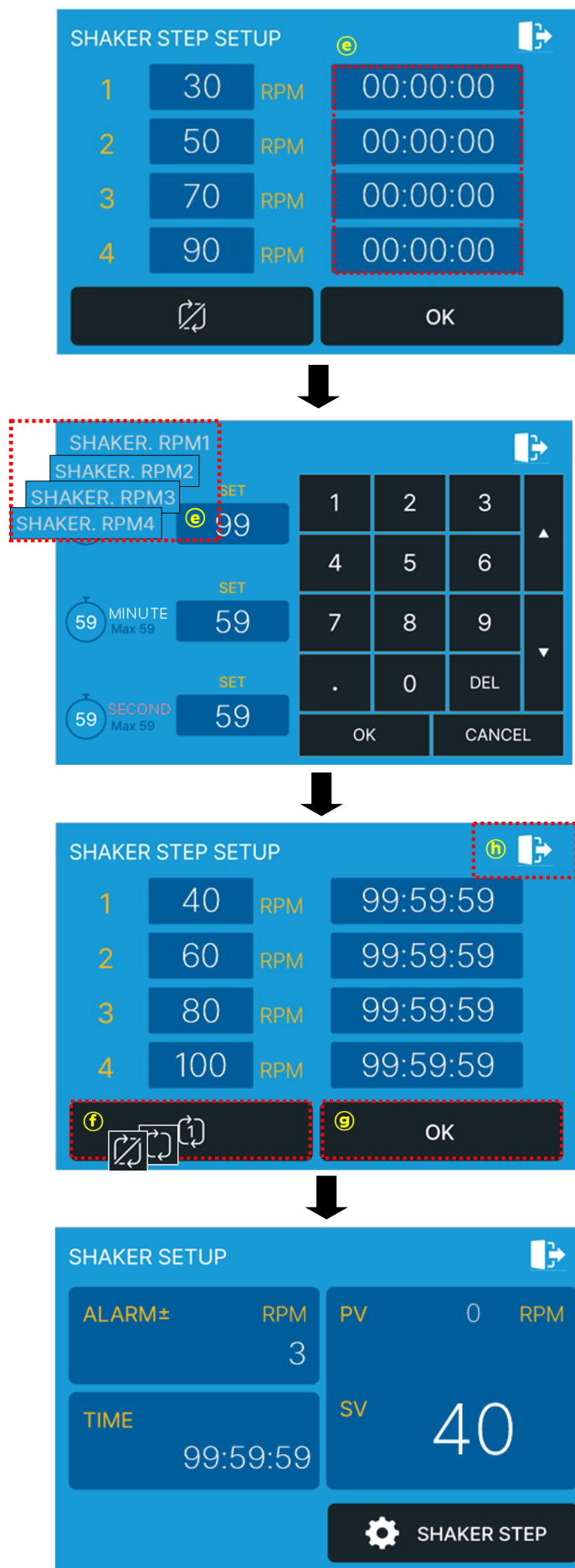
► Shaker Step RPM Set (ADVANCED View)



1. Select (a) or (b) to switch to the **SHAKER SETUP** screen.
2. Select (c) to switch to the **SHAKER STEP SETUP** screen.
(Note: The shaker must be stopped before touching SHAKER STEP to access the SHAKER STEP SETUP screen. If the shaker is operating, the message “STOP first to setup!” will be displayed, and the screen will not change to SHAKER STEP SETUP.)
3. Select the RPM display box (No. 1) (d), then use the keypad to change and set the RPM value.
(SHAKER.RPM2 ~ SHAKER.RPM4 can be set in the same manner.)
4. Select the **OK** button to save the settings and return to the previous screen.
(If the OK button is not selected, the settings will not be applied.)
5. Select the **OK button icon** (g) to save the settings and return to the **SHAKER SETUP** screen.
6. Select the **Exit icon** (h) to return to the previous Temperature/Shaker screen without saving.

※If a value outside the allowable RPM setting range is entered, the message “**Incorrect Range**” will be displayed. The value shown in the VALUE field will turn red and be cleared.

► Shaker Step Time & Mode Set (ADVANCED View)



1. Select the time display box ① and use the keypad to change and set the hours/minutes/seconds.

(The same settings can be applied to SHAKER.RPM2 ~ SHAKER.RPM4.)

2. Select the OK button to save the settings and return to the previous screen.

(If the OK button is not selected, the settings will not be applied.)

3. Once the RPM & TIME setting is completed, select the step setting(②) to select:

- Single repeat (③)
- Continuous repeat (④)
- Step Stop (⑤) - disable step operation

4. Select the OK button icon ⑥ to save the settings and return to the SHAKER SETUP screen.

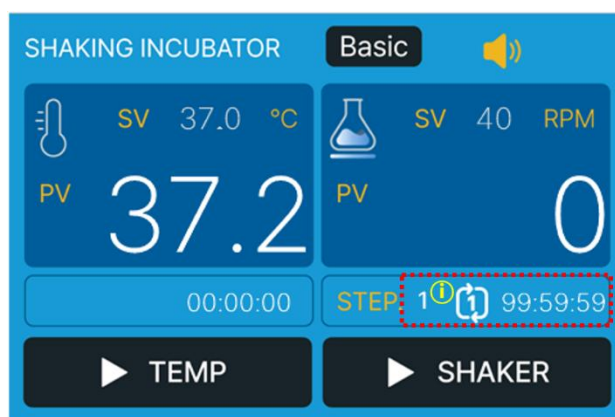
5. Select the Exit icon ⑦ to return to the previous Temperature/Shaker screen without saving.

6. Step activation displays in the red area(⑧) of the main view.

※ When entering a number that exceeds the range when setting the time, only two digits are displayed.

※ When entering a value exceeding the range when setting minutes and seconds, the maximum value (Max 59) is displayed.

※ If you set the step function and stop the shaker while it is running and then restart it, the step will return to step 1 and start again. If you restart it, the time will return to the initially set time.



■ Error Alarm Display

※ If a problem occurs during equipment operation, an error message as shown in the table below will appear in the display area. Refer to the table and take appropriate corrective action.

No.	Display	Description	No.	Display	Description
1	ER1 DOOR	The door is open.	11	ER11 POWER FAIL	Displayed when power is restored after a power failure. The message can be cleared by touching it.
2	ER2 E-STOP	The door is open while the shaker and temp is operating.	12	ER12 P1-FAN1	N/A
3	ER3 TEMP-1	The temperature did not stabilize within the set time during temperature control. (stability issue)	13	ER13 P1-FAN2	N/A
4	ER4 TEMP-2	N/A	14	ER14 P1-PELTIER	N/A
5	ER5 RPM-1	The RPM does not stabilize within the set time after the shaker starts operating.	15	ER15 PI-COMMUNICATION	N/A
6	ER5 RPM-2	N/A	16	ER16 P2-FAN1	N/A
7	ER7 SENSOR	A temperature sensor error has occurred.	17	ER17 P2-FAN2	N/A
8	ER8 SHAKER SIG	Cable issue in the shaker.	18	ER18 P2-PELTIER	N/A
9	ER9 TEMP-ALARM	The temperature exceeded the alarm range.	19	ER19 P2-COMMUNICATION	N/A
10	ER10 RPM-ALARM	The RPM exceeds the alarm range.			

4. Additional Operating Instructions

► Platform Installation:

▷ Microplate Platform and Spring Platform Installation:

The Mini Incu-Shaker includes a flat non-stick platform for low-speed operation with many common vessels, including trays and dishes. For installation of any of the optional platforms the user must:

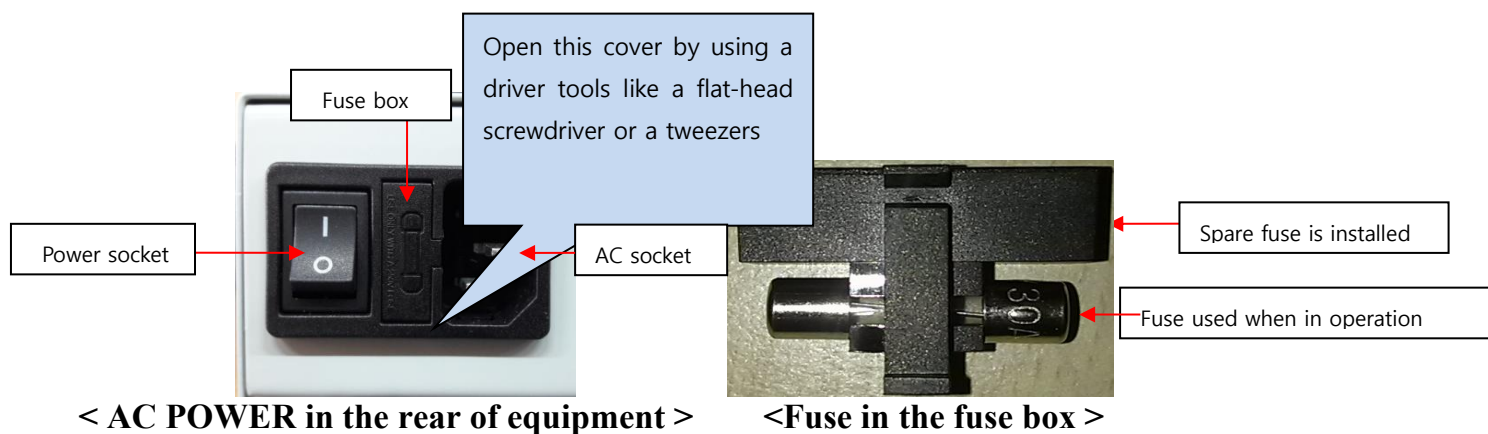
- 1) Unscrew the four plastic screws from the corners of the internal platform screws from the corners of the internal platform and remove the green rubber mat.
- 2) Clean any dirt or debris from the metal base-platform and apply the desired optional platform so that the four corner holes are aligned.
- 3) Screw in the four platform screws tightly by hand.

▷ Magic Clamp Platform Installation:

If you have ordered the H1001-M-MR MAGic clamp platform as an accessory with you Mini Incu-Shaker, the platform may arrive installed on the shaker. If not, please follow the steps below for installation instructions.

- 1) Unscrew the four corner thumb screws from the four corners of the internal platform and remove the green rubber mat.
- 2) Clean any dirt or debris from the metal base platform and apply the MAGic Clamp platform so that the four corner holes are aligned.
- 3) Screw in the four platform screws tightly by hand.

5. Fuse Replacement



- The fuse is stored in the fuse box of the integral power inlet on the backside of the instrument.
- In the case you need to use the spare fuse, put a “⌏”-shaped tool, a flat-head screwdriver or tweezers in the “U”-shaped hole on the bottom of fuse box to open the cover, remove the installed fuse and replace it with the included spare.

Maintenance:

The platform of the Mini Incu-Shaker should be cleaned regularly with a soft cloth dampened with water or alcohol. (Always ensure that the machine has been powered down prior to cleaning.)

In the event of a spillage:

Power down the unit, remove the platform and dry the internal chamber with a soft cloth.

DO NOT attempt to operate the unit until the spillage has been properly dried.

Service and Contact

Service on the Mini Incu-Shaker should only be performed by qualified service personnel. To request service or technical support, please contact Benchmark Scientific or your local benchmark Scientific representative.



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