User's Manual

**Premium Stackable
Shaking Incubator
(LED Lighting Option)**

This Manual applies to:

Modes: FL8-2/FL16-2/FL24-2

FL16-2

Thanks!

Thank you very much for purchasing one of our Premium Stackable Shaking Incubators, specially designed for you-the lab professional. Your choice indicates that you have very high requirements on style and performance of this type of incubators.

SCIQUIP shaking incubators have achieved a good reputation and trust among various clients for its advanced temperature controlling technology, sound framework design, excellent molded exterior and outstanding professional workmanship. These products have been exported through most leading companies into European, American and East Asian markets.

The premium stackable shaking incubators have a number of advanced specifications such as, TFT touch screen control panel, intelligent precise control of temperature and shaking speed with "ramp and soak" programs and solid operating safety features. This stackable model can be stacked up to three units high, providing laboratory professionals tripled culture capacity with each units running at highest speed simultaneously, while still only occupying the same "footprint" of a single shaker.

This equipment with lighting controlling system is specially designed for the research experiment that involves plant cells, and agriculture applications. It is widely used for cell culturing, hybridization, cell aeration, and solubility studies, etc.

Since the date of your purchase of this product, after-sale service will always be close to you through your local dealer and/ or the importing company of your region.

Anyhow, no matter what questions you have using our equipment; please do not hesitate to contact us.

SCIQUIP thanks you for your trust in this product!

Reminder:

Prior to operation, this manual should be read thoroughly and completely understood-as it might be helpful to master the operation techniques of this unit.

⚠	**Danger!** **Warnings against injuries and damages.**

1. The electrical supply circuit to the incubator must confirm to all national and local electric codes. Check the serial-data plate for voltage, cycle, phase and amperage requirements before you connect the unit.

2. Only use grounded power source (outlet) to avoid an electric shock or fire, and it is recommended that the equipment has an unobstructed access to a dedicated power source.

3. In case of a problem, do not attempt to repair the product yourself. Do not open the power box to avoid electric shocks.

4. Do not pull out the plug when the unit is in use. Never drag on the wire to unplug the unit.

5. This equipment can sustain a maximum of $\pm$10% nominal voltage fluctuation; Otherwise a power stabilizer is needed.

6. A surge protector is recommended to avoid power-related faults.

7. In case of malfunction or burning smell, the unit must be unplugged immediately .Use a circuit breaker to cut off the power supply. Continuance of abnormal state will result in fire caused by overheating.

8. The electric power supply must be cut off in following situations:

8.1.-When opening the door of electrical power box without cutting off power supply might result in electric shock.

8.2.-When replacing the fuse. Replacing the fuse without cutting off the power supply will probably result in electric shock.

8.3.-When a malfunction occurs, mishandling will result in further damage of the equipment or accidental injury to the user(s).

8.4.-If you do not use the unit for a long period of time.

9. Never touch the glass door and/or inner chamber when the incubator is hot

10. Please make sure the platform has been securely locked before starting shaking motions. (Refer to Chapter 4 for more information)

1. Before starting your equipment, the unit must be placed horizontally on a solid, flat floor, and elevated and leveled with four foot blocks.

2. The incubator needs even heat lost on all surfaces in order to maintain small internal temperature variations .As a result, a minimum of 20 cm must be allowed between the rear and sides of the incubator to any obstructions.

3. Do not locate the unit exposed to direct sunlight or near heating /cooling ducts.

4. The unit must be kept away from electromagnetic interference sources.

5. Flasks placed inside the shaking incubator should be placed to avoid (as much as possible) imbalance on the shaking platform. Check flasks regularly, and make sure the nuts are fixed securely at all times.

6. Slam the door(s) will probably leads to damage of the equipment.

7. When in operation, do not leave the lid/door open for too long, as this will affect the temperature inside.

8. The incubator must be kept away from volatile, flammable, explosive liquids or gases

9. Please keep the chamber clean. Regular cleaning is required.

10. Please do not touch the screen with sharp objects.

Extra for refrigerated units:

12. After transport or moving –DO **NOT** USE this unit for at least **24 Hours, if you are not 100% sure that the unit has been moved in an upright position**.

13. If the incubator is continuously used at low temperatures, condensate can occur inside of the incubator. It is recommended that you wipe condensations out, or-if possible-heat up the incubator to evaporate this small amount of condensation once every 10 days of operations.

14. To extend the compressors life and to maintain an excellent performance of your refrigeration system, the condenser of the unit should be cleaned every month.

Clean the shaking incubator before you put it into use and on a regular base. The interior should be wiped down with an appropriate disinfectant, such as 70 % ISOPROPYL ALCOHOL or equivalent.

⚠️   ⚠️

**DO NOT USE ANY CHLORINATED OR HALOGEN MATERIAL-
AS THIS IS HARMFUL TO THE POLISHED STAINLESS STEEL!!!**

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1. Performance Parameters

✶ As one of the unique features, the sophisticated PID controller provides our new units with great flexible choice of not only constant controlling one fixed temperature and speed, but also programmed controlling with a series (up to 9 segments, 99 cycles) of "ramps and soaks", on just one unit.

✶ 5.6" LCD 640x480 touch screen panel clearly indicates all parameters in one page display, which also simplifies all fuzzy settings with just quick finger touches.

✶ Both the interior and exterior are made of robust materials for lifetime operations. The inner chamber is made of high quality #304 stainless steel sheets, with 4 round coved corners. All exposed edges are de-burred to insure no sharp edges. The exterior is cold rolled steel finished with powder coated polyurethane finish, which is resistant to most chemicals and easily cleaned with mild household detergents.

✶ The control electronics are protected trough a circuit breaker that may trip at 110% of loading rate, but will trip within 1 second at 150% of load rating.

✶ Cooling system is controlled by solenoid valves, non-frosting, with independent compressor overload protection.

✶ Door switch stops the main heater and motor if lid is opened, and switches them back on once it's closed in 10 seconds. Otherwise the motor will remain stopped, while the main heater resumes working.

✶ Heater shuts off when high-temperature limit is exceeded. Shaker stops when excess vibration is detected.

✶ Large double fold tempered glass window and fluorescent light provide complete visibility of chamber interior.

✶ Fold-down door with door handle, and dedicated sliding shaking platform provide convenient access to your experiment products. Moreover, the top of the casing can be further used as a work area for locating small items of lab equipment etc.

✶ Electronic timer, from 0 – 9999 minutes, automatic stop, audio/ visual alarm.

✶ Audible and visual alarms for motor temperature and set point deviations

✶ Non-volatile memory for set point retention after a power interruption.

✶ "Long-Life" brushless AC motor creates a smooth and quiet shaking motion.

✶ Auto defrosting function ensures continuous low temperature operation.

✶ Versatile LED lighting upgrade makes a variety of applications with lighting involvements come true.

✶ Different color light combination with independent controlling system provides great flexibility of day/night simulations, and best light spectrums for your precious cells.

2.   Technical Specifications

Control	P.I.D Microprocessor
Control Mode	Fix Value or Programmable (up to 9 Segments)
Control Panel	LCD Touch Screen
Air Convection	Forced
Shaking Mode	Orbit
Volume/ Compartment (L)	190x2
Working Temperature(℃)	10-35
Shaking speed (rpm)	30-300
Stroke (mm)	1-50 Stepless Adjustable
Temperature Range (℃)	4-60
Temperature Accuracy (℃)	0.1
Temperature Uniformity (℃)	±1ºC@37℃
Light Type	LED White
Light Intensity	15,000 Lux
Control	Yes, separately, from 0-100% output
Control mode	Fixed and programmable (Day/night simulation)
Timer	1 to 9999 mins
Tray (mm) (WxD)	800x430
Power (W)	1350
Electricity	220/240Volt 50/60 Hz
Approval	CE, ISO
Security	Over-temperature Protection, Compressor Overload Protection, Electrical Leakage Protection
Additional	RS-485 COM Kit

| *Glass dimensions may reduce max. capacity									
Capacity	**50ml**	**100ml**	**250ml**	**500ml**	**750ml**	**1000ml**	**2000ml**	**Tube Rack S/S**	**96 Well Plate**
FL8-2	91	50	38	26	15	15	8	8	19
FL16-2	182	100	76	52	30	30	16	16	38
FL24-2	273	150	114	78	45	45	24	24	57

3.   Preparation and Start-up

3.1 Before starting your equipment, the unit must be placed horizontally on a solid, flat floor, and elevated and leveled with three foot blocks and one flexible block (with adjustable bolt). The foot blocks are provided to level as well as "fix" the unit firmly on the floor. To allocate the blocks in position, please do strictly follow the procedures:


Safety instruction!

Please be sure to follow the instructions, which are really important for your safety.
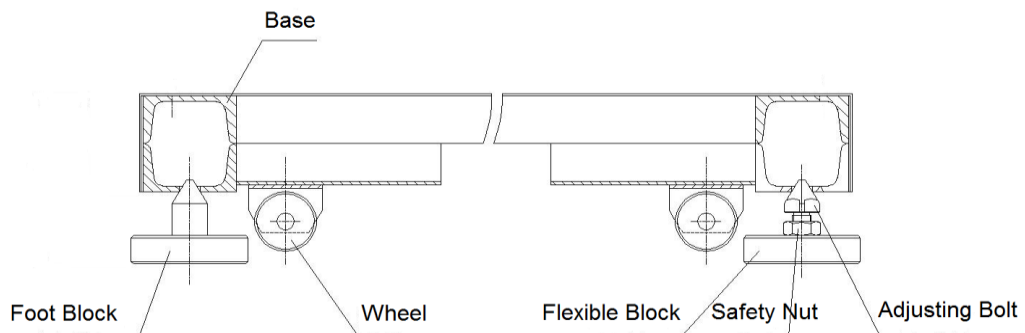
3.1.1   Unscrew the safety nut on the flexible block first, screw down the adjusting bolt of the flexible block, so that it will leave some gap when it fits underneath the hole on the base.

3.1.2   There is one hole on each corner of base of the unit, locate each of them.

3.1.3   Use lifting tools to elevate the unit, and place the four foot blocks right underneath the holes on each corner.

3.1.4   Lay down the unit and check and adjust the potions of the foot blocks and make sure the tips of the blocks sits firmly in the holes. Make sure hands be off the unit before the unit is laid down! Do be careful of your hand!

3.1.5   Use a spanner to unscrew the adjusting bolt, raising the height of the flexible block, until feeling some strength, and the tip of the bolt sits firmly in the hole.

3.1.6   Make sure the unit is elevated leveled and sits firmly on the four blocks. Try setting the unit at its top speed, and adjust the adjusting bolt until no vibration is encountered.

3.1.7   Finally screw the safety nut of the flexible block, lock up the adjusting bolt.

3.2 Use grounded power source (outlet) to avoid an electric shock or fire, and it is recommended that the equipment has an unobstructed access to a dedicated power source

3.3 Place dripping water tray underneath the tube outlet near the back of the unit.

3.4 Turn the main switch which is located on the right side of the unit, power is applied to the unit. Turn on the fluorescent light switch next to the main power switch on the side of the unit.

3.3 The screen will display the welcome picture, then the home page. In the meantime, the system starts controlling temperature, while leaving the shaking motor standby.

4.   Instruction of Platform Tray Operation.
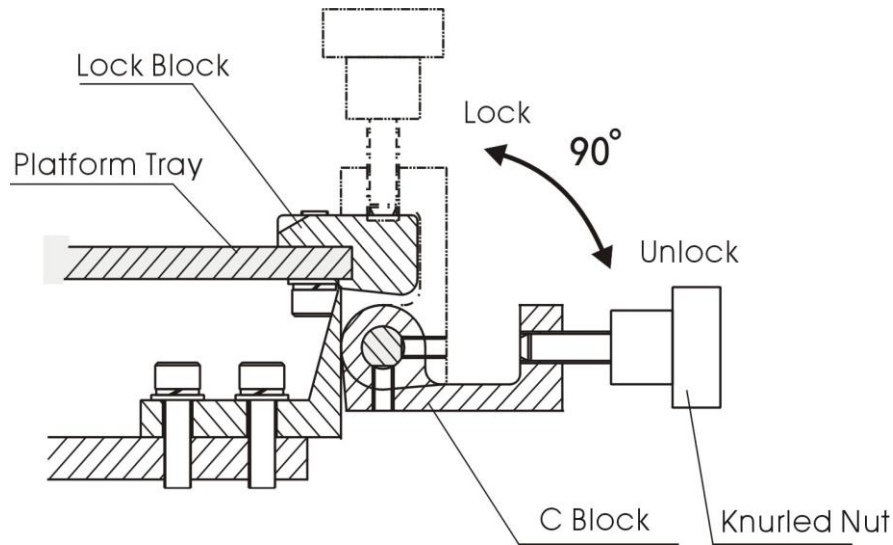
4.1. Unlock the sliding platform: Spin and the safety knob, turn the "C" block and knurled nut by 90° to horizontal position, the platform tray is unlocked, and free to be pulled out.

4.2. To lock it, lift the "C" block and knurled nut by 90° to upright position, then screw the knurled nut into the threaded hole to tightened up and lock the platform tray.

Safety instruction!
Make sure platform is securely locked before starting operation; failing to do so may cause serious damage to the unit and its applications.

5.   Home Page Operation

Control Mode Status

"STOP" button:
Press this to stop the running shaking motion.

"RUN" button:
Press this button to start shaking motion.

"Shaking" Status (Animated Flask):
The illustration of "flask" indicates the status of the unit; the flask remains still when unit is stopped; or keeps swinging when it's running.

"Control Mode" Status:
This box indicates the status of the current control mode, fixed value mode or programmable mode.
When the unit is controlled under Programmable mode, it displays the current segment number (P) and remaining cycle times (L). No display If it is controlled under Fixed Value mode,

⚠	**Special Remind!** Under programmable mode, the control mode status shows as follow-ings, **P"m"/L''n",** **m**: Current segment No. **n**: Remaining cycle times.

"SET" Button: (See Chapter 6)
Press it to enter the Set Page Settings.

"Alarm" Status:
Once the conditions of alarms are fulfilled, the alarm is declared, and indicator will be lighted. Press the "alarm" icon to mute the alarm for Please see Chapter "?" for more information of alarms and conditions.

"Speed" Display:
It displays the actual speed.

"Temperature" Display:
It displays the actual temperature.

"Time" Display:
It displays the actual running time.

"Clock Time" Display:
It displays the actual clock time.

"LIGHT" Switch
It controls the switch of the lighting panel and displays the actual output of each color light in percentage. To change the output percentage of the lights, see Chapter 15 for details.

6.   Set Page Settings

FUNC-- Functional Settings (See Chapter 7)
Press it to enter the page and set temperature control mode, and other functions, such as, temperature holding, printer control, light control mode, red and white light switch.

FIXED—Fixed Value Mode Settings (See Chapter 8)
Press it to enter the page of setting parameters (temperature, speed and timer) for fixed value mode. (Not for lighting control)

PROG—Programmable Mode Settings (See Chapter 9)
Press it to enter the page of settings parameters (ramp timer, end temperature, hold timer, cycle times and hold deviation) for programmable mode. (Not for lighting control)

DEFROST-- Defrosting Settings (See Chapter 10)
Press it to enter the page of settings of automatic defrosting, such as defrosting timer and defrosting period, and manual defrost operation.

ALARM—Alarm Settings (See Chapter 11)
Press it to enter the page of setting temperature and speed deviation alarms.

CALIB—Temperature Calibration (Factory Default) (See Chapter 12)
Press it to enter the page of temperature calibrations and corrections. Restricted and authorized access only.

CLOCK—Clock Settings (See Chapter 13)
Press it to enter the page of clock time settings.

PRT/COM—Print and Communication Settings (See Chapter 14)
Press it to enter the page of setting print timer (interval), and channel of RS-485 communication.

LIGHTS— Lighting Settings (See Chapter 15)
Press it to enter the page of setting lighting control modes and lighting outputs under both fixed and programmable mode, etc.

BACK
Press it to exit the current page after all settings are finished.

7. FUNC—Functional Settings

TEMP MODE—Temperature Control Mode Set

Stop the operation first, then press the buttons to select preferred control mode between fixed value and programmable modes.

"FIXED"—Fixed value mode; Once fixed value mode is set, the temperature and shaking speed will be controlled according to the setpoint under "FIXED" menu in the "Set" page. (See Chapter 8 for more details)

"PROG"—Programmable mode. Once programmable mode is set, the temperature will be controlled according to the program under "PROG" menu in the "Set" page. (See Chapter 9 for more details)

	Special Remind! Make sure the unit is stopped (by pressing "STOP") before changing the state of "MODE".

KEEP—Temperature Holding Switch

This function will enable or disable the system to keep controlling temperature at the setting temperature when the unit is stopped.

Under programmable mode, when it is switched on, if all programmed operation finishes, the temperature will be controlled according to the set temperature of the last segment. While if it is switched off, temperature is no longer under control as shaking motion stops.

PRINT-Printer Switch

This function will enable or disable the printing function. Once it is switched on, the print will run according to the setting under PRT/COM menu.

LIGHT MODE—Lighting Control Mode Set

Press this button to change the current control mode of lighting between fixed value and programmable, and start to run the lighting function simultaneously under selected control mode.

LIGHT-RED-Red Light Switch

This function will enable or disable the red lights.

LIGHT-WHITE-White Light Switch
This function will enable or disable the white lights.

BACK—"Return" Button
Press it to exit the current page after all settings are finished.

8.   FIXED—Fixed Value Mode Settings

All necessary setpoints, except lighting, of fixed value mode are set under this menu. Once the unit is selected for fixed value control mode, it will run according to the parameters set under this menu.
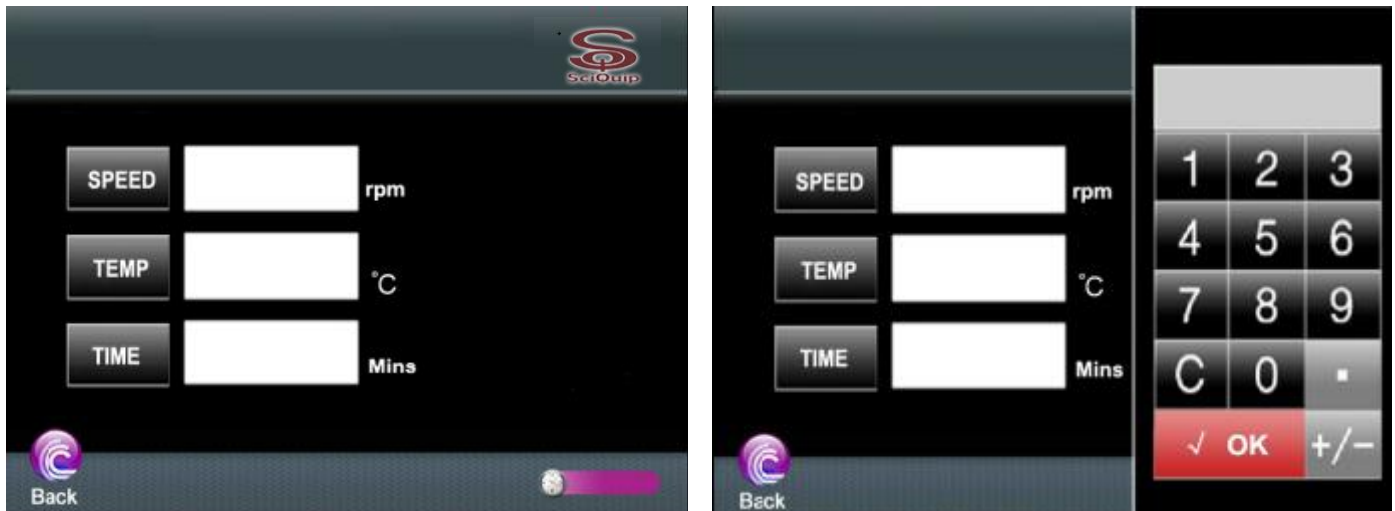
SPEED—Speed Set button
Press it and use the keyboard to enter the speed set value and press "OK" to confirm and save. Set range from 30-300rpm.

TEMP—Temperature Set button
Press it and use the keyboard to enter the temperature set value between 4 and 60℃, and press "OK" to confirm and save. Set range 4.0-60.0℃

TIME—Timer Set button
Press it and use the keyboard to enter the timer set value between 0 and 9999 mins, and press "OK" to confirm and save. Set range:0-9999mins

BACK—Return Button
Press it to exit the current page after all settings are finished.

⚠	**Special Remind!** ◆ If the entered value exceeds the limit of the setting range, then the max value will be set at its upper or lower value. ◆ Press the "C" on the key board to clear the entry. ◆ Setting of each parameter must be confirmed and saved by pressing "OK" button.

9. PROG—Programmable Control Settings

This new particular shaking incubator can operate according to stored program to meet various requirements of professional experiments. Under programmable control mode, it is possible to program up to 10 different segments. Each segment consists of two steps, which is "Ramp Step" and "Hold Step". Each segment need to have proper settings of "Ramp Time", "Ramp End Temperature", "Hold Time" and "Speed". At the end of the settings, you are also required to set the "Hold Deviation" and "Cycle Times".
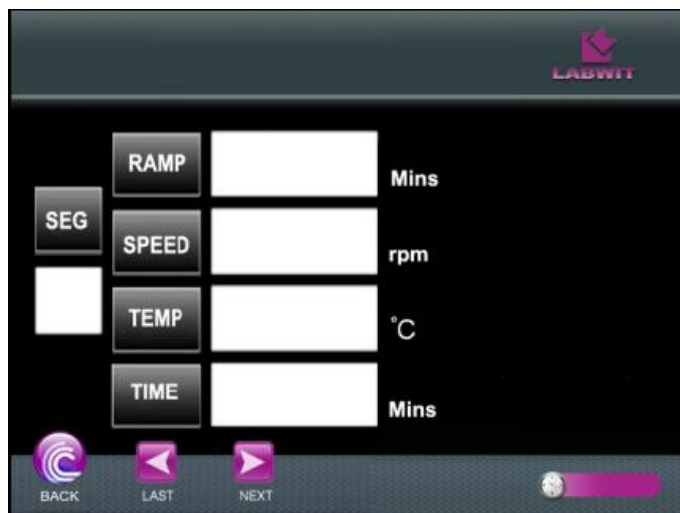
SEG—Segment No.
The function indicates the number of current segment. No setting required.

RAMP—Ramp Time
This function indicates the time duration of the "Ramp Step", the time required for temperature to reach from current actual value to the ramp end (temperature) value. Use the keyboard to enter the ramp time. Range from 0-9999mins.

SPEED—Segment Speed
This function indicates the speed set for the segment. Use the keyboard to enter the segment speed. Range from 30-300rpm.

TEMP-Ramp End Temperature
This function indicates the ideal temperature value for the unit to reach for the segment. Use the keyboard to enter the ramp end temperature. Range from 4-60℃.

HOLD—Hold Time
This function indicates the time of "Hold Step", which is the length of time that the unit has to maintain the (Ramp End) Temperature for the segment. Use the keyboard to enter the hold time. Range from 0-9999mins.

LAST—"Last" Button
Press it to return to the set page of previous segment.

NEXT—"Next" Button
Press it to forward to the set page of next segment.

BACK— "Return" Button
Press it to exit the current page after all settings are finished.

Setting a Termination Point for Your Program!

The program can run with up to 10 segments. However, if the total number of segments are less than 10, it is necessary to set a termination point for the program.

To do so, please set the "Ramp" time of the next unused segment as "-1" or "-2".
"-1": Ending point of program, no repeats.
"-2": Repeating point of program, program repeats.

For example, for a program with only two segments, after finishing setting the Segment NO.2, user should press "Next" to enter the page of "Segment NO.3"; then press "Ramp Time" box and set it as "-1", if only once operation is needed, alternatively, set as "-2" if multiple repeat operation is needed.

By setting as "End", the program will finish in here.
By Setting as "Cycle", the program will keep running according to the "Cycle times" setting (See below)

Once the termination point is set, keep pressing "NEXT", until the following page appears.

HOLD—Hold Deviation

This function indicates the temperature deviation that the incubator must have at the end of each" Ramp Step" before starting the "Hold Step", in another word, the difference between actual temperature and desired "Ramp End Temperature", which activates the "Hold Time".

If "Hold Deviation" is set as "0", the program enters the "Hold Step" on time priority, which means no matter if the actual temperature reaches at "Ramp End Temperature", the "Hold Step" will be triggered as soon as the "Ramp Time" dues.

If "Hold Deviation" is set as "N", (N>0), then the program enters the "Hold Step" on temperature priority, which means the "Hold Step" will only be triggered when the actual temperature reaches at Ramp End Temperature ± "N"℃, no matter if the "Ramp Time" runs out.
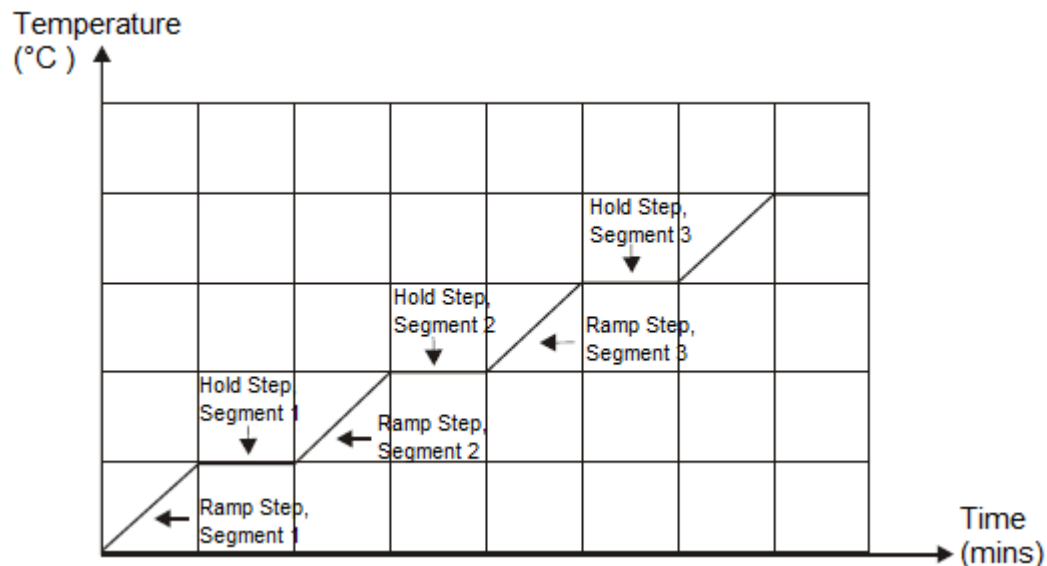
CYCL—Cycle Times

This function indicates the number of times for the whole program to run repeatedly if the whole

program has a termination point as "Cycle", if it's set as "1" cycle, the program will run for 1 repeat, so a total of 2 times! Use the keyboard to enter between 0-99 times.

BACK—"Return" Button
Press it to exit the current page after all settings are finished.

10. DEFROST — Defrosting Settings

This unit is equipped with automatic defrosting functions. For automatic defrost, there are two parameters to be set,

DEF. TIMER—Auto Defrost Cycle
This function indicates the time interval between two defrosting cycles. Use the keyboard to enter the set value between "0-50" hours and press "OK" to confirm and save. Set it as "0" to disable the auto defrosting function. Once the "Defrost Timer" is set, the unit will automatically perform the defrosting cycle accordingly.

To find out the suitable "Defrost Timer" setting, the frosting time duration should be counted from start of the low-temperature operation to the point that the actual temperature start bouncing up due to the frosting inside the evaporation chamber. Then set the "Defrost Timer"

as somewhere between 1/10-1/5 of the frosting time duration. For example, if the frosting time duration is 20 hours, the "defrost timer" can be set from 2-4 hours. High relative humidity will require more frequent defrosting cycle.

DEF. PERIOD—Defrost Time
This function indicates the time duration for each single defrost cycle both under auto and manual operations. Use the keyboard to enter the set value between "1-20"mins and press "OK" to confirm and save. Set it as "0" to disable the defrosting function.

When the ambient temperature is higher than 25℃, like in summer, the recommended setting is 30 seconds, otherwise, 1 min is considered as adequate. As ambient conditions may vary, therefore, always try to find the most appropriate settings for your own particular ambient condition.

BACK—"Return" Button
Press it to exit the current page after all settings are finished.

⚠	**Attention:** 1. Auto defrosting cycle is only activated when the set temperature is below 10℃ 2. It is considered as normal, that the actual temperature slightly deviates during defrosting, and will be stabilized shortly after defrosting cycle.

11. ALARM—Alarm Settings

A sophisticated alarm system monitors all system parameters for any fault condition. A list of alarm descriptions, the conditions they look for, and how they are delayed and displayed are in the table below:

Alarm Description	Condition Detected	Other Notes
Door Ajar	Front Door Open	Text Display "Alarm: Door Ajar! "; Heating and motor will be disabled
Temperature Deviation	Temperature reading deviates by ±n °C against setpoint "n"= TEMP DEV value	Display shows "Alarm: Temperature!"; Display continues to show Temperature reading
Speed Deviation	Speed reading deviates by ±n rpm against setpoint "n"= SPEED DEV value	Display shows "Alarm: Speed!"; Display continues to show speed reading
Temperature Sensor Failure	Faulty Temp Sensor Detected	Text Display "Alarm: Temperature Sensor Failure!"; Heating will be disabled

TEMP DEV—Alarm Deviation Temperature
This value determines the maximum deviation, measured in temperature (℃), which the chamber is permitted above/below once the incubator reaches the specified set point before an

alarm condition is declared. Use the keyboard to enter and press "OK" to confirm and save. Set range: 0.5-5.0℃

SPEED DEV—Alarm Deviation Speed
This value determines the maximum deviation, measured in speed (rpm), which the shaking is permitted above/below once the incubator reaches the specified set point before an alarm condition is declared. Use the keyboard to enter and press "OK" to confirm and save. Set range: 1-50rpm.

BACK—"Return" Button
Press it to exit the current page after all settings are finished.
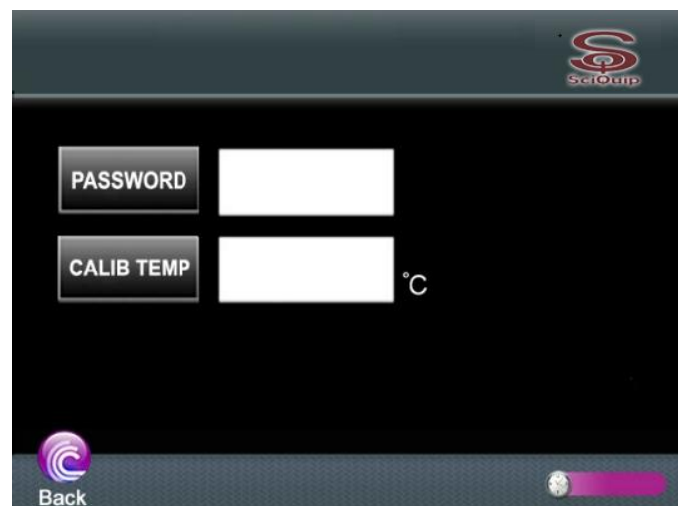
⚠	**Special Remind!**
	In case the alarms are activated, the alarm will start beeping with the "Alarm" status be lighted in the home page. Pressing the "alarm" indicator in the home page can mute the audio alarm.
	The alarm will be deactivated if the alarm value is set as "0".

12. CALIB—Temperature Corrections (Factory Default)

<u>Detailed Setting Instructions:</u>

12.1   Take a certified calibrated thermometer in a small bottle with glycerin and place that in the middle of the incubator.
12.2   Change the set point to the designated value, for example, 37°C , let the incubator run for at least one hour– until the temperature is constant.
12.3   Read the temperature on the external thermometer, for example, 36.8°C
12.4   Press the SET button in the Home Page; enter the page of "CALIB".
12.5   Key in the password "7724", and use the keyboard to enter 36.8°C in the "CALIB TEMP" box and press "OK" to confirm.
12.6   Press "Back" to the homepage and observe the actual displayed temperature in the homepage, wait until it stabilizes again at 37°C.
12.7   Keep repeating step 11.3-11.5, until the actual displayed temperature matches with the reading of external thermometer.
12.8   Temperature calibration is finished and press "BACK" to exit.

⚠️	**Attention:** 1. The unit is delivered with calibration done in the factory, so please perform the corrections only if necessary. 2. This menu is encrypted to prevent unauthorized access, and may only be performed by an authorized engineer with certified equipment.

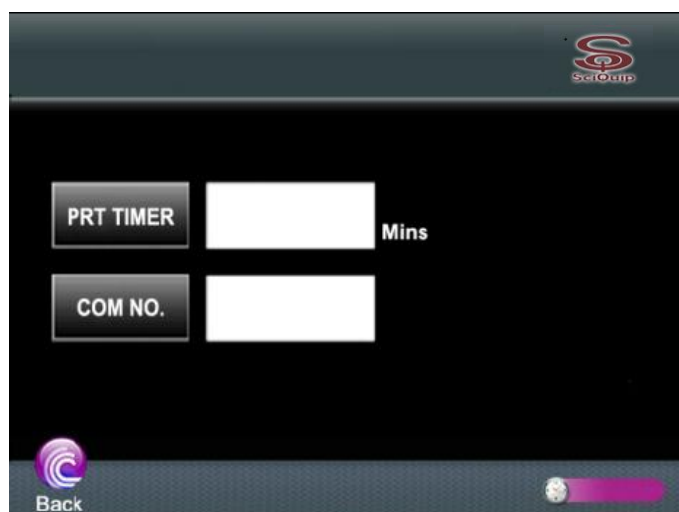# 13.   CLOCK—Clock Settings
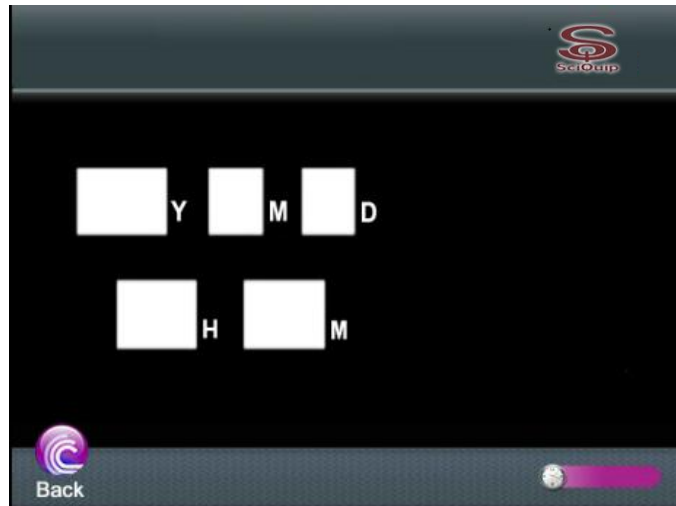
Clock Settings
Press the display box and use the keyboard to set date and clock, and then press "OK" to confirm and save.

Back—"Return" Button
Press it to exit the current page after all settings are finished.

14. PRT/COM—Print and Communication Settings

PRT TIMER—Print Timer
This function indicates the time interval between two printing records. Use the keyboard to enter set value between 0-250 and press "OK" to confirm and save.

COM NO.—Communication Channel Setting for RS-485 (Optional)
This function indicates the communication channel ID for RS-485 connections. Use the keyboard to enter and press "OK" to confirm and save.

BACK—"Return" Button
Press it to exit the current page after all settings are finished.

15. LIGHT—Lighting Settings
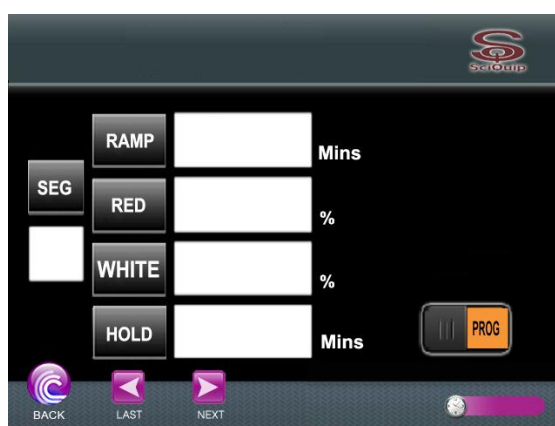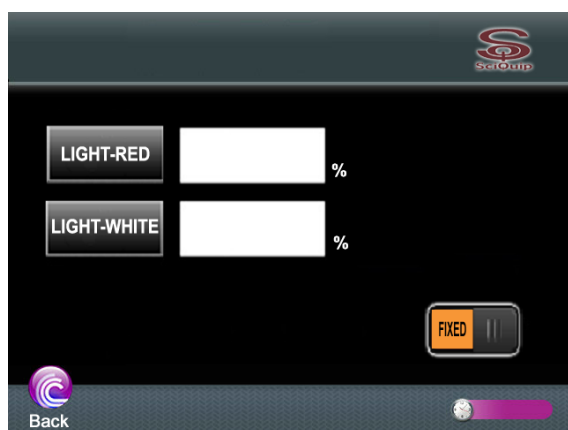
This shaking incubator is equipped with LED lighting panels, which can be used for the applications with algae and plant cells. Different color light combination with independent controlling system provides great flexibility of day/night simulations, and best light spectrums for your precious cells.

Light Type	White LED
Light Intensity	0-15000Lux
Control Mode	Fixed and Programmable Control
Control	0-100% adjustable

FIXED/GROG—Setting Switch
Press the button to switching setting pages between fixed value and programmable mode of the lighting function.

- **Fixed Mode:**
  When the lighting function of the unit is running under fixed mode, each color proportion of the lighting panel will be controlled at the set output percentages respectively. Lightings can be turned on/off manually via the "Light" switch in the homepage.

  LIGHT-RED/ LIGHT-WHITE
  Use the keyboard to enter the light output percentages of each color and press "OK" to confirm and save. Set range from 0-100%. Set it as "0%" to disable the designated color light.

- **Programmable mode**
  This shaking incubator can operate according to stored lighting program to meet various requirements of professional experiments. When the lighting function of the unit is running under programmable mode, each color proportion of the lighting panel will be controlled according to the program set in this page.

  It is possible to program up to 10 different segments. Each segment consists of two steps, which is "Ramp Step" and "Hold Step". Each segment need to have proper settings of "Ramp Time", "Ramp End Lighting Outputs", and "Hold Time".

  SEG—Segment No.
  The function indicates the number of current segment. No setting required.

  RAMP—Ramp Time
  This function indicates the time duration of the "Ramp Step", the time required for lighting output to reach to the "Ramp End Lighting Output" value . Use the keyboard to enter the ramp time. Range from 0-9999mins.

  RED-Ramp End Lighting Output-Red
  This function indicates the ideal lighting output value for the red lights to reach for the segment. Use the keyboard to enter the ramp end output. Range from 0-100%.

  WHITE-Ramp End Lighting Output-White
  This function indicates the ideal lighting output value for the white lights to reach for the segment. Use the keyboard to enter the ramp end output. Range from 0-100%.

  HOLD—Hold Time
  This function indicates the time of "Hold Step", which is the length of time that the unit has to maintain the (Ramp End) lighting outputs for the segment. Use the keyboard to enter the hold time. Range from 0-9999mins.

LAST—"Last" Button
Press it to return to the set page of previous segment.

NEXT—"Next" Button
Press it to forward to the set page of next segment.

BACK— "Return" Button
Press it to exit the current page after all settings are finished.

- **Run the lighting functions**

    Lighting function is independently controlled apart from the general function, such as shaking speed, temperature and timer.

    To run the lighting control under fixed value mode or programmable model, enter the "Set" menu in the homepage, then press "FUNC" to enter the functioning setting, press "Light mode" switch. At the time of pressing the switch icon, it starts running at the either control mode. Press it again to exit the current control mode, change and start the new run under the other control mode.

	Attention: 1. In order to run the unit with all functions under programmable mode, all parameters of both general function and lighting function will need to set separately. 2. Pressing the "Start" or "Stop" button in the homepage only controls the general functions. Lighting function must be switched on/off via the "Light mode" switch under "FUNC" menu.

    Different from the speed & temperature programmable mode setting, there is no need to set termination point for the lighting program. The whole program is repeated automatically from the first segment to the last set segment and skipping any unused segments. Simply leaving the "Ramp Time" and "Hold Time" as "0" mins to make the segment as unused segment.

16. Air Vent Adjustment

To ensure enough fresh air exchange rate inside the chamber, the unit is equipped with air vent on the left side of the chamber. Turn the knob to adjust the air vent of the unit, clockwise to increase, and anti-clockwise to decrease. The actual temperature will deviate slightly when the air vent is adjusted, and will be stabilized shortly.

17. Instructions of Sticky Mat Operation

17.1   Introduction
The Sticky Mat is supplied as a 20 x 20 cm mat that can be used to attach flasks, bottles, dishes, and other similar equipment to shaking tray. It can be used to cover the entire tray surface, or mixed with screwed-on flask clamps and tube racks. The Sticky Mat can be easily removed and re-positioned simply by peeling it from the surface. The Sticky Mat is re-usable and will last several years.

17.2   Installation
● It is important to remove all traces of oil, grease or other foreign residues from the surface of the shaking tray before using the Sticky Mat. Please use any one of a number of commercially available cleaners.
● Remove either side of the plastic sheet.
● Install the Sticky Mat with the surface in contact with the clean shaking tray.
● Install flasks onto the upper face of the Sticky Mat by pressing them firmly into place.

17.3   Operation
● Test the Sticky Mat with the container to be used, under the same conditions of the applications (speed, temperature and the same amount of material in the container). If the container moves or dislodges under such conditions, do not use it for that application.

|	**Attention:** Recommended temperature range for the Sticky Pad is 15°C – 45 °C. At high speeds, the Sticky Mat is not as safe as flask clamps. The maximum speed to use with the Sticky Mat is 250 rpm for shaking diameters up to 25mm and 200 rpm for diameters up to 50mm.

● Clean up spills as fast as possible. If small amounts of water come in contact with the Sticky Mat, allow to dry completely before use.
● To remove flasks from the Sticky Mat, use a small amount of water around the bottom of the flask, then pat dry with a paper towel after the flask is removed.
● The Sticky Mat can be simply cleaned by peeling it off of the tray and washing it with a sponge and water or a detergent solution. The full adhesion strength will return after the Sticky Mat is completely dry.

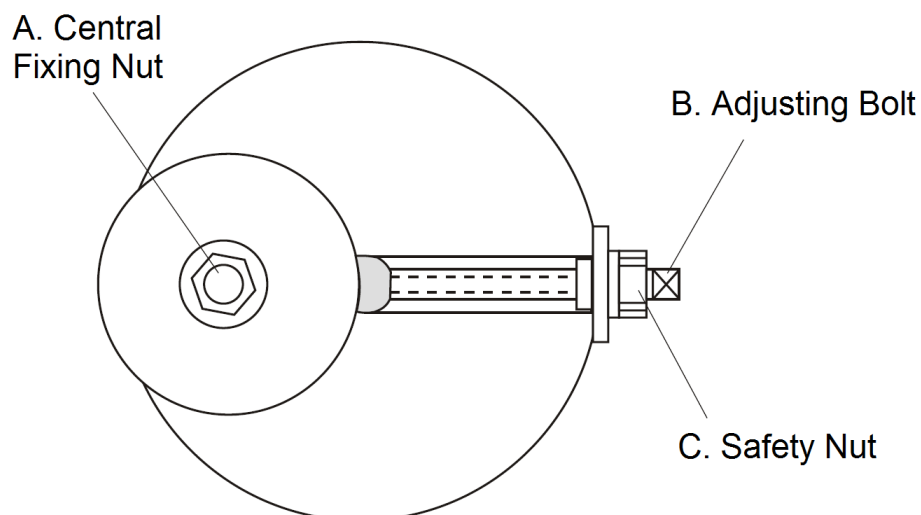|	**Attention:** Excessive force should not be used when removing flasks from the Sticky Mat. This may result in material damage. If the Sticky Mat is used for extended periods of time, it may become difficult to remove flasks from the Sticky Mat. To avoid possible breakage, use the procedure described above to safely remove flasks.

18. Electronic Control System
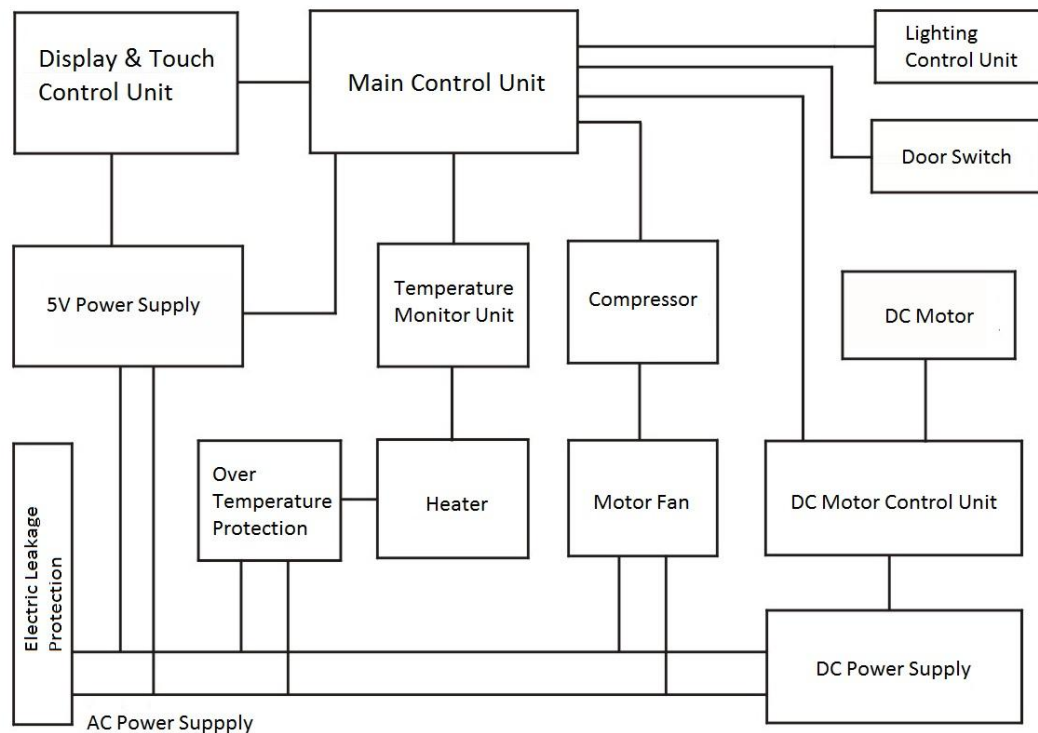
19. Operation of Shaking Diameter Adjustment

These models have an adjustable shaking diameter of Ø3-50mm. To adjust it, please follow the instructions below,

⚠	**Attention:** Power supply must be disconnected before performing the following operations!

A. Central Fixing Nut

B. Adjusting Bolt

C. Safety Nut

18.1   Tools needed: 17*19 spanner, 8*10 spanner, allen key (Included in accessory pack)
18.2   Turn off the unit, open the glass door, unlock the platform tray and pull it out unitl seeing the center of the shaking mechanism (as illustrated)
18.3   Turn the main shaking mechanism until you see adjusting bolt (B) and safety nut (C) through the opening.
18.4   Use the allen key to loosen the (A) central fixing nut.
18.5   Use the 8*10 spanner to hold the (B) adjusting bolt as still, in the meantime, loosen the (C) safety nut with 17*19 spanner
18.6   Use the 8*10 spanner to rotate the (B) adjusting bolt clockwise to decrease the diameter, but anti-clockwise to increase.
18.7   When adjustment is done, tighten the (B) adjusting bolt and (A) central fixing nut.
18.8   Push platform tray back in place and lock it properly with handle and safety knobs.

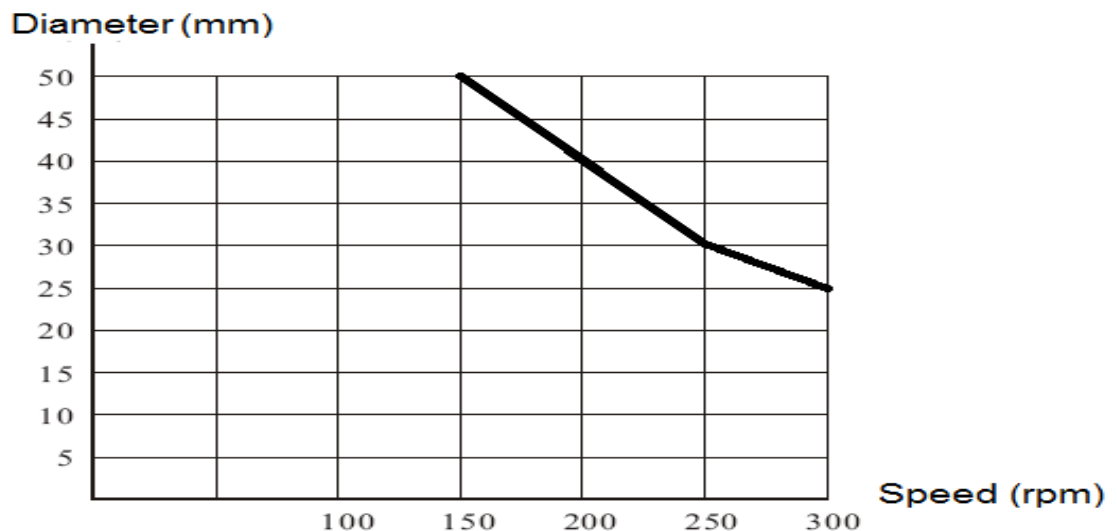| ⚠	**Attention:** The maximum shaking speed should decrease when the shaking diameter is increased. Please see the chart below for the chart of ratio between speed and shaking diameter.

Chart of Ratio Between Speed and Shaking Diameter

20. Trouble Shooting.

Error Indicator	Possible cause	Corrections
Power on , No display	Power supply is not connected	Check the power supply system to see if there is voltage on the line
	Plug has no access to socket	Plug in firmly
	The power switch has not been turned on.	Turn on the power switch on the right side of the unit
	The fuse is broken	Replace fuse with new one of same specification
	Circuit occurs mall function of power box	Notify distributor for repair service
Actual temperature is higher than the set point, high temperature alarm is activated	Unit has not yet reached the required (constant) temperature.	Wait a moment and observe
	Temperature setting is at the blind area of temperature control	Open the ventilation hole
	Improper setting of refrigeration coefficient	Set the refrigeration coefficient to be "0.5"and close the ventilation opening.
	The ventilation fan is broken	Notify the distributor to replace the fan
	Malfunction occurs with refrigeration system	Notify the distributor to repair the refrigeration system
Actual temperature is lower than the set point. low temperature alarm is activated	Unit has not yet reached the required (constant) temperature	Wait a moment and observe
	The circulation of cold air is excessive	Close(a part of) the ventilation opening
	The ventilation fan is broken	Notify the distributor to replace the fan
	The heater does not work	Notify the distributor to repair the heater
Actual temperature is fluctuating and will not be stable	Improper setting of refrigeration coefficient	Refer to Users Guide and reset the refrigeration coefficient
	The door (lid) is not closed firmly	Close the door (lid) firmly
	Malfunction occurs with the control circuit	Notify distributor for repair service
Temperature is constant out of control	Malfunction occurs with the control circuit	Notify distributor for repair service
The oscillation of platform is unstable	The platform is in imbalance due to a spoiled object	Remove the object , clear and clean the chamber
	The equipment is not placed horizontally	Adjust the left-back foot leveler install the equipment in a proper way.
	Malfunction occurs with	Notify distributor for repair /service

	control circuit	
The shaking platform does not work	The door switch has not yet made contact	Check the door to see if it is closed firmly
	The platform is blocked with an object at the bottom	Remove the platform and clear the object and clean the inside
	The belt is broken	Notify the distributor to replace the belt
	Malfunction occurs with control circuit	Notify distributor for repair service
The oscillation of platform is out of control	Malfunction occurs with control circuit	Notify distributor for repair service
The platform keeps shaking after the door is opened	The door switch has short circuit ,could be caused by humidity	Use a blower drier to dry the chamber Press the Start/Stop button before opening the door
As the door is closed ,the platform starts shaking but the speed runs high suddenly	Improper operating method	Refer to Users Guide and press the Start/Stop button to operate again
Screen has no response when button on the control keyboard is pressed	Equipment is disturbed by high frequency.	Press the Change/Control button and try other operation mode.
		Restart the equipment-if it does not work:
		Notify the distributor.
The equipment causes a strange loud noise	The equipment is not placed horizontally	Adjust the left back foot to make the equipment stable
	The fixed screw of clamp is loose	Remove the platform and tighten the screw
	The platform is loose	Remove the platform an tighten the screws on the four corners
	There is strange object, like a piece of a bottle, under the platform	Remove the platform ,clear the object and clean the inside
	Mechanical malfunction occurs	Notify the distributor for repair service
The accumulation of frost is fast after refrigeration is started, resulting in the rise of temperature	The refrigerating time is too long and the evapo-rating chamber is too humid	Refer to Users Guide and conduct a drying maintenance on the evaporation chamber
No LED lighting	Switched off in Homepage	Press "Light" switch in the homepage to turn on the lightings.
	Switched off in the "FUNC" page	Press "Set", then "FUNC", turn on the "LIGHT RED" and "LIGHT WHITE" switches
	Set as 0% output	Press "Set", then "LIGHTS", check the current light output settings, set them as designed values.