Lab Companion

OPERATION MAUNAL

Incubated shaker

-Chamber type

Model : SIF5000/5000R/SIF6000/SIF6000R

Manual No. : 27021L002 Version : 0.1

JEIO TECH

⚠WARNING

Before using this product, read this entire Operator's Manual carefully. Users should follow all of the Operational Guidelines contained in this Manual and take all necessary safety precautions while using this product. Failure to follow these guidelines could result in potentially irreparable bodily harm and/or property damage.

Thank you for purchasing Jeio Tech's products.

Jeio Tech Co., Ltd. is committed to customer service both during and after the sale. If you have questions concerning the operation of your unit or the information in this manual, contact our Sales Department. If your unit fails to operate properly, or if you have questions concerning spare parts or Service Contracts, contact our Service Department.

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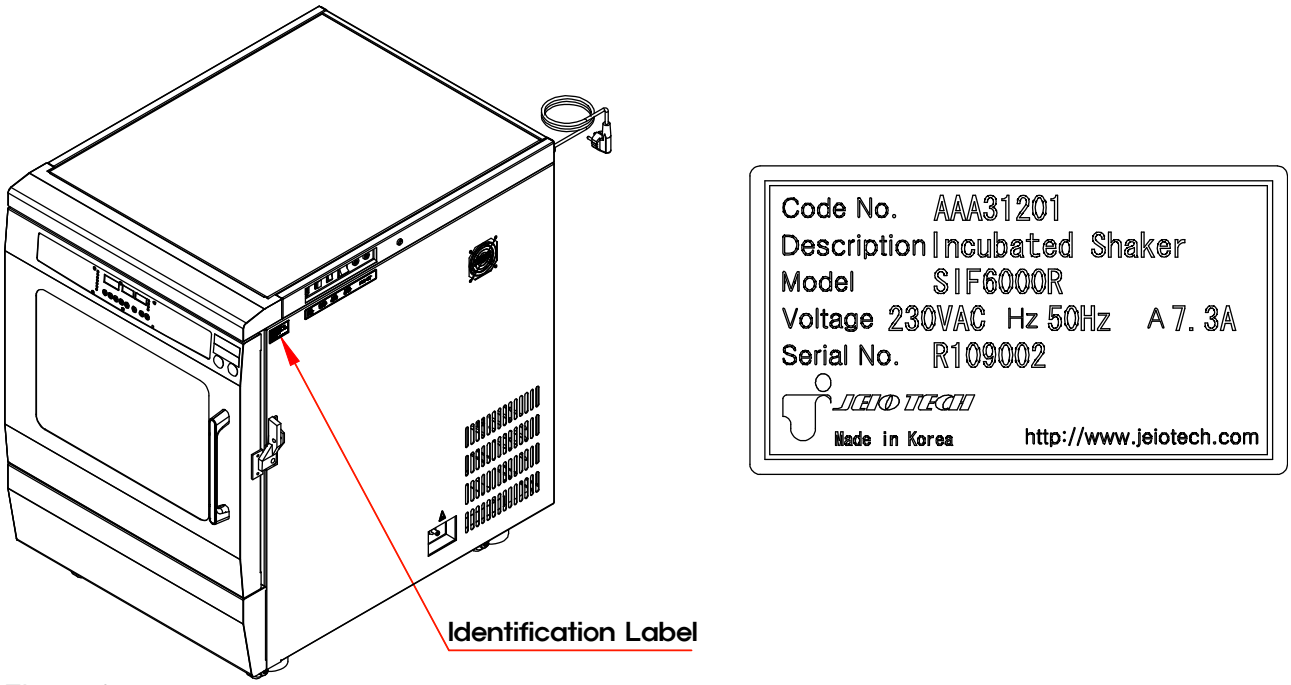

Figure 1

Please locate the identification label on the right side of the instrument. Fill in the information found on the identification label in the spaces provided above in Figure 1. Refer to this identification label information when calling, if your unit fails to operate properly, or if you have questions concerning spare parts or service contracts. Additionally, use this information at www.jeiotech.com when you register your Incubated shaker or you fill out the enclosed registration card.

Quality Management System

Jeio Tech Co, Ltd. is dedicated to providing world-best product quality and customer satisfaction. To ensure we maintain this commitment we have developed and implemented a total quality program, which conforms to the requirements according to ISO 9001:2000 for the design, development, production, sales and servicing of biotechnology, environmental chemical engineering related products, and reliable measuring equipment for electric and electronics.
(ovens, incubators, constant temperature humidity chambers, constant temperature baths, refrigerating bath circulators, heat exchangers and shakers).

Visit our Web site at http://www.jeiotech.com/ to view a copy of our certificate

Disclaimer

Jeio Tech Co., Ltd. is committed to a continuing program of product development and improvement, and reserves the right to change information, such as specifications, appearance, and dimensions, described in this document without notice.

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Table of contents

1.0 Safety

1.1 How to use the Manual

1.1.1 Introduction

This manual is intended for individuals requiring information about the use Incubated shaker. Use this manual as a guide and reference for installing, operating, and maintaining your Jeio Tech Incubated shaker. The purpose is to assist you in applying efficient, proven techniques that enhance equipment productivity

This manual covers only light corrective maintenance. No installation, service procedure or other maintenance should be undertaken without first contacting a service technician, nor should be carried out by someone other than a service technician with specific experience with laboratory equipment and electricity.

1.1.2 Chapter summary

The Functional Description chapter outlines models covered, standard features, and safety features. Additional sections within the manual provide instructions for installation, pre-operational procedures, operation, preventive maintenance, and corrective maintenance.
The Installation chapter includes required data for receiving, unpacking, inspecting, and setup of the unit. We can also provide the assistance of a factory-trained technician to help train your operator(s) for a nominal charge. This section includes instructions, checks, and adjustments that should be followed before commencing with operation of the Incubated shaker. These instructions are intended to supplement standard laboratory procedures performed at daily and weekly intervals.
The Operation chapter includes a description of controller features along with temperature and agitation parameter setting instructions, multi-segment program setting instructions and instructions for changing the type of agitation and agitation amplitude.
The Accessories and Option chapter is your source for information on available accessories and option with brief information.

The Appendix contains technical specifications, warranty and Jeio Tech technical support contact information.

1.1.3 Model number nomenclature

This manual covers all 4 models of the SIF series. The following describes the model number nomenclature used in throughout the manual.

SIF5000 includes incubation, and shaking, possible to connect external refrigeration

SIF5000R includes incubation, shaking and integrated refrigeration

SIF6000 includes incubation, and shaking, possible to connect external refrigeration

SIF6000R includes incubation, shaking and integrated refrigeration

1.2 Safety Notice

Be sure that you are completely familiar with the safe operation of this Incubated shaker. This unit may be connected to other machinery, such as a temperature control unit. Improper use can cause serious or fatal injury.
Installation and repair procedures require specialized skills with laboratory equipment and electricity. Any person that installs or repairs this unit must have these specialized skills to ensure that this unit is safe to operate. Contact Jeio Tech or their local authorized distributor for repairs or any questions you may have about the safe installation and operation of this unit.

The precaution statements are general guidelines for the safe use and operation of this instrument. It is not practical to list all unsafe conditions. Therefore, if you use a procedure that is not recommended in this manual you must determine if it is safe for the operator and all personnel in the proximity to the Temperature and Humidity chamber. If there is any question of the safety of a procedure please contact Jeio Tech before starting or stopping the Temperature and Humidity chamber.

This equipment contains high voltages. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the startup procedure or troubleshoot this unit.

Documentation must be available to anyone that operates this equipment at all times.
Keep non-qualified personnel at a safe distance from this unit.
Only qualified personnel familiar with the safe installation, operation and maintenance of this unit should attempt start-up or operating procedures.
Always stop the Incubated shaker before making or removing any connections.

1.3 Symbols used in this Manual

The following signal word panels, safety symbols and non safety symbols are used to alert you to potential personal injury hazards or information of importance. Obey all safety messages that follow these symbols to avoid possible personal injury or death.

1.3.1 Signal word panels

Signal word panels are a method for calling attention to a safety messages or property damage messages and designate a degree or level of hazard seriousness. It consists of three elements: a safety alert symbol, a signal word and a contrasting rectangular background. The following signal word panels are in accordance with ANSI Z535.4-2007 and ISO 3864 standards.

⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a property damage message.

1.3.2 Safety symbols

Safety symbols are graphic representations—of a hazard, a hazardous situation, a precaution to avoid a hazard, a result of not avoiding a hazard, or any combination of these messages—intended to convey a message without the use of words. The following safety symbols are used in this manual.

Mandatory


Read manual


Wear a face mask


Wear gloves


Wear goggles

Prohibition


No direct sunlight


No high frequency noise


No corrosive fluid or cleaners


No water

WARNING


Safety Alert Symbol. General caution.


Hand crush or pinch


Electrical shock


Foot crush


Flammable or fire could be caused.

Lifting hazard

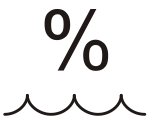

Sharp points

1.3.3 Miscellaneous none safety symbols used in manual

The following graphic representations are intended to convey a message without words or to bring your attention to important information about the use of the Incubated shaker or a feature.

European Union electrical directive compliance

Earth ground



Relative humidity

Note

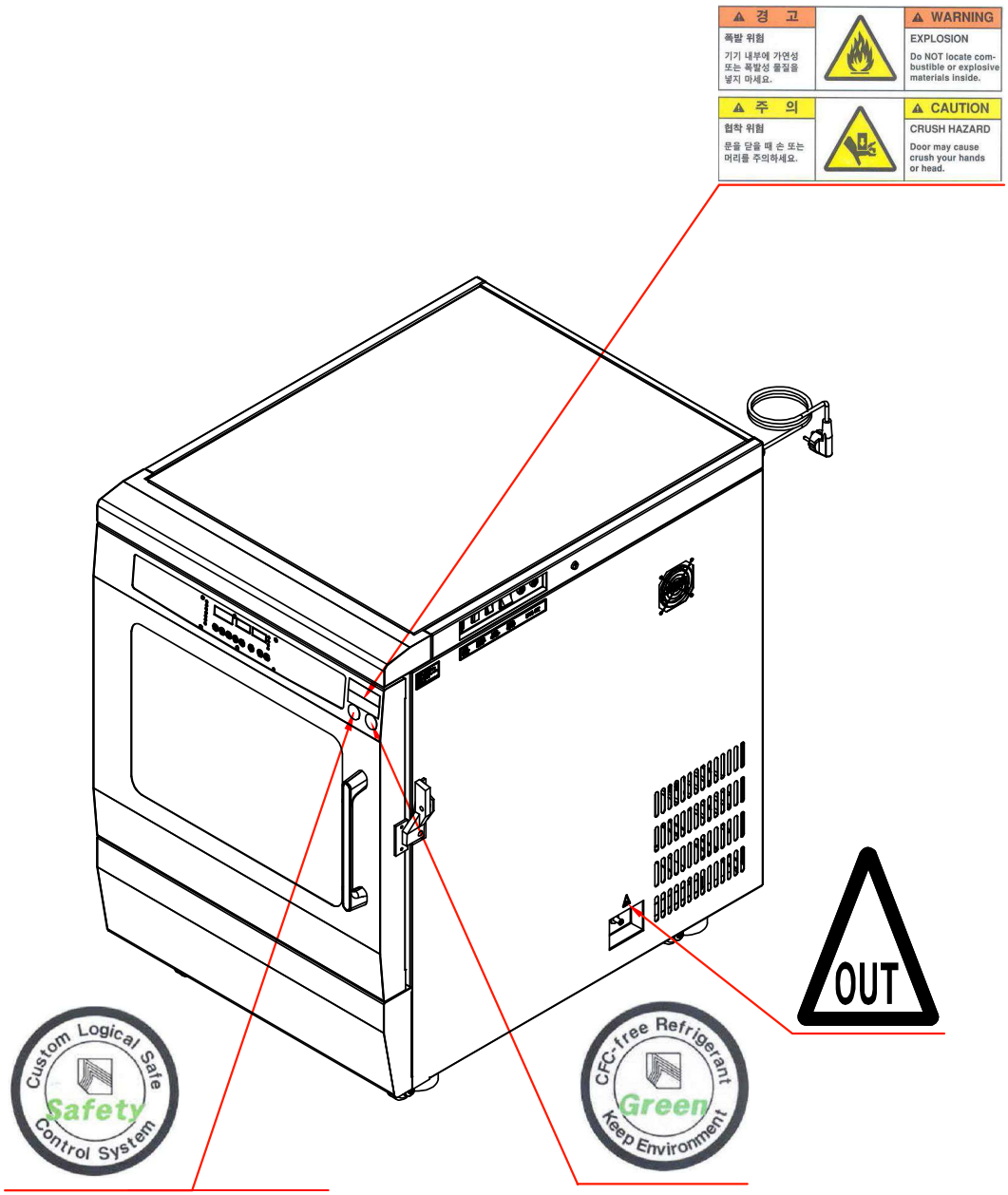
Altitude

1.4 Where to Locate Safety Labels

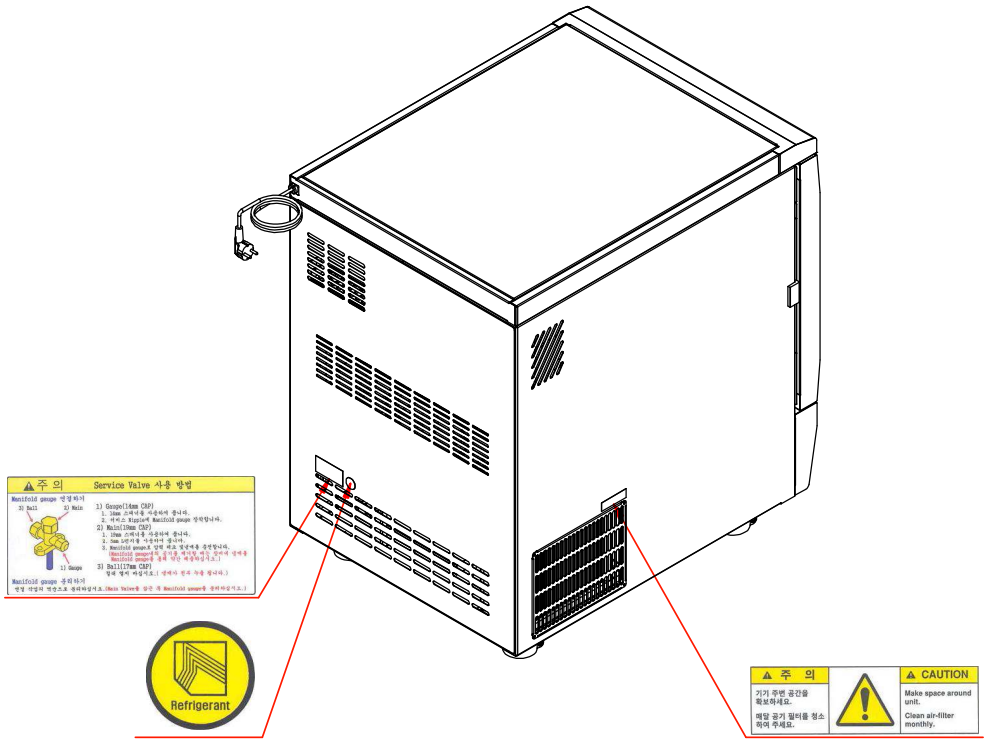
The safety labels are attached to the Incubated shaker important information about potential hazards and how to avoid them. All users must read this operating instruction carefully to operate the product properly.

The following illustrations show where the safety labels should be attached to the Incubated shaker until service of the product is discontinued. If the safety labels are damaged, please contact your local Jeio Tech office or distributor to request new labels.

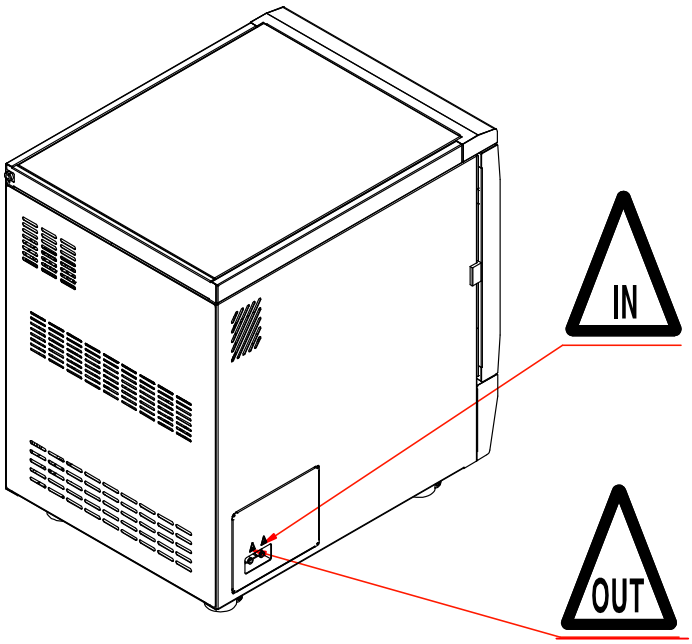
1.4.1 Front of SIF5000R/6000R



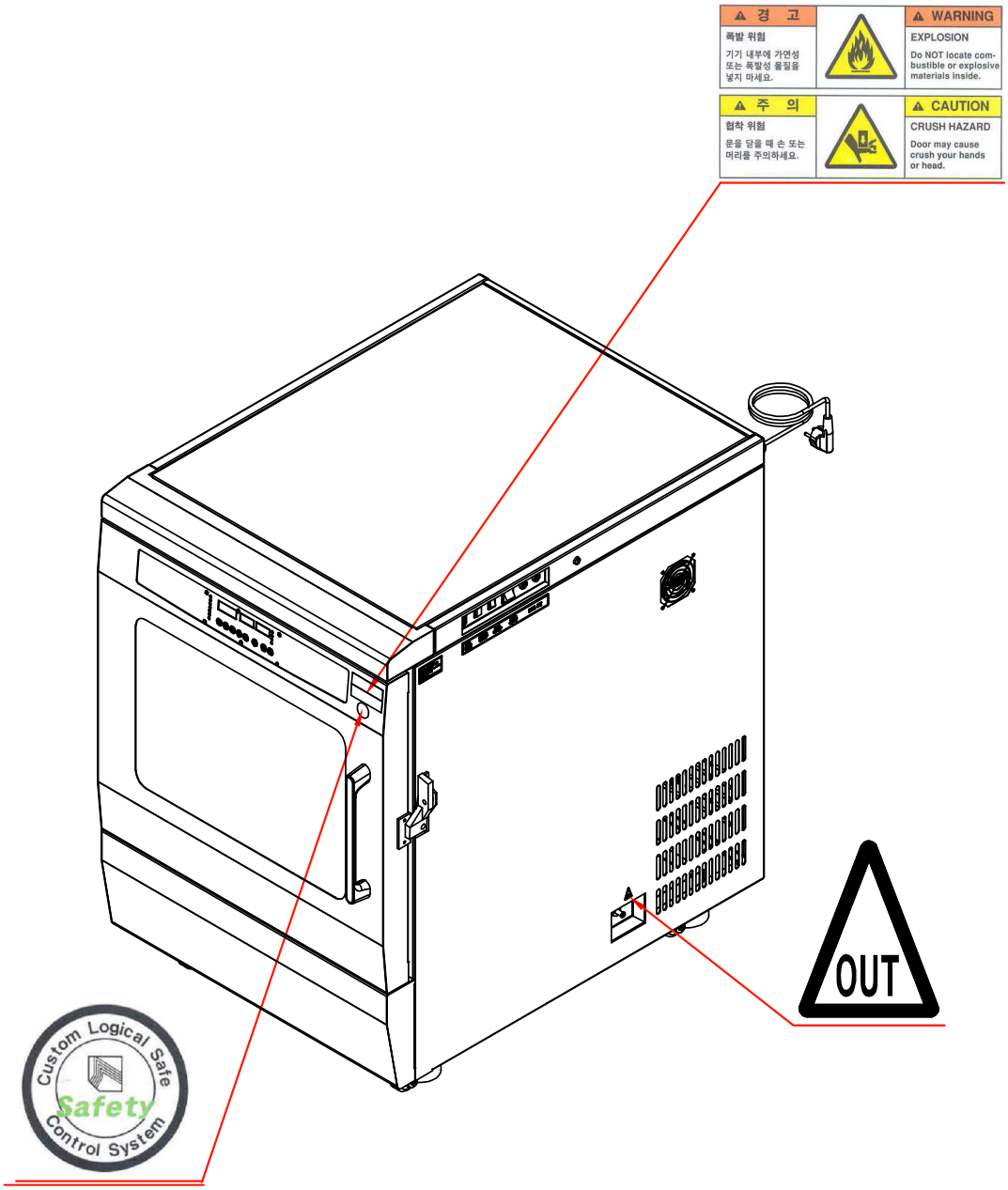
1.4.2 Back of SIF5000R/6000R



1.4.3 Back of SIF5000/6000



1.4.4 Front of SIF5000/6000



1.5 Precautions for Your Incubated shaker

Our Incubated shaker is designed to provide safe and reliable operation when installed and operated within design specifications. Make sure you read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions concerning the operation of your unit or the information in this manual, contact our Sales Department.

To avoid possible personal injury or equipment damage when installing, operating, or maintaining this Incubated shaker, use good judgment and follow these safe practices:

1.5.1 Warning statements

Observe all warning labels.

DO NOT remove warning labels.

Check the voltage, phase and capacity of the power supply and connect properly.

DO NOT ground the Incubated shaker to gas pipes or water pipes.

DO NOT insert multiple plugs into the outlet at the same time.

DO NOT operate equipment with damaged line cords.

DO NOT handle or touch electrical cord and electrical parts with wet hands.

DO NOT move the Incubated shaker while it is plugged into the power source.

DO NOT use or keep flammable gases near the Incubated shaker.

DO NOT install the Incubated shaker near environments where flammable gas may leak.

DO NOT use the machine near environments where explosion can occur due to organic evaporating gases.

DO NOT put explosive and flammable chemicals (Alcohol, Benzene, and etc) into the chamber.

DO NOT let moisture, organic solvents, dust, and corrosive gas enter the control panel.

DO NOT expose the Incubated shaker to direct sunlight.

DO NOT expose the Incubated shaker to direct heat sources.

DO NOT use the Incubated shaker in places where moisture is high and flooding can occur.

DO NOT install the Incubated shaker near machinery generating high frequency noise

DO NOT use Incubated shaker in environments that contain industrial oil smoke and metallic dust.

DO NOT operate damaged or leaking unit.

DO NOT operate the Incubated shaker when there is strange sound, smell and smoke coming from the unit.

DO NOT disassemble, fix or change the Incubated shaker other than for those items described in this operating manual

1.5.2 Caution statements

DO NOT use doors, handles or knobs to lift or stabilize the unit.

DO NOT place heavy objects on the power cord.

DO NOT put the Incubated shaker on the power cord.

DO NOT make the machine wet while cleaning.

DO NOT pour water or put liquid on the Incubated shaker when cleaning the unit.

DO NOT operate Incubated shaker and immediately disconnect the main power supply and request service when water may be in the unit.

DO NOT sprinkle insecticide or flammable spray on the Incubated shaker.

DO NOT clean the Incubated shaker with a strong cleanser (e.g., solvent type) and use a soft cloth.

In addition to the safety warnings listed above, safety messages are posted throughout the manual. These safety messages are designated by the use of a **signal word panel** followed by text and a **safety symbol** where applicable. Read and follow these important instructions. Failure to observe these instructions can result in permanent damage to the unit, significant property damage, personal injury or death.

1.6 Responsibility

Our Incubated shaker is constructed for maximum operator safety when used under standard operating conditions and when recommended instructions are followed in the maintenance and operation of the machine.
All personnel engaged in the use of the Incubated shaker should become familiar with its operation as described in this manual.
Proper operation of the unit promotes safety for the operator and all workers in its vicinity.

Each individual must take responsibility for observing the prescribed safety rules as outlined. All caution, warning and danger labels must be observed and obeyed. All actual or potential danger areas must be reported to your immediate supervisor.

1.6.1 General responsibility

No matter who you are safety is important. Owners, operators and maintenance personnel must realize that every day, safety is a vital part of their jobs.
If your main concern is loss of productivity, remember that production is always affected in a negative way following an accident. The following are some of the ways that accidents can affect your production:

- Loss of a skilled operator (temporarily or permanently)
- Breakdown of shop morale
- Costly damage to equipment and laboratory samples
- Downtime

Organize a safety committee or group, and hold regular meetings. Promote this group from the management level. Through this group, the safety program can be continually reviewed, maintained, and improved. Keep minutes or a record of the meetings.

Hold daily equipment inspections in addition to regular maintenance checks. You will keep your equipment safe for production and exhibit your commitment to safety.

Please read and use this manual as a guide to equipment safety. This manual contains safety warnings throughout, specific to each function and point of operation.

1.6.2 Operator responsibility

The operator's responsibility does not end with efficient experimentation and production. The operator usually has the most daily contact with the equipment and intimately knows its capabilities and limitations.

Plant and personnel safety is sometimes forgotten in the desire to meet incentive rates, or through a casual attitude toward laboratory equipment formed over a period of months or years. Your employer probably has established a set of safety rules in your workplace. Those rules, this manual, or any other safety information will not keep you from being injured while operating your equipment.

Learn and always use safe operation. Cooperate with co-workers to promote safe practices. Immediately report any potentially dangerous situation to your supervisor or appropriate person.

REMEMBER

- NEVER place your hands or any part of your body in any dangerous location.
- NEVER operate, service, or adjust the equipment without appropriate training and first reading and understanding this manual.
- Before you start the portable drying/conveying system check the following:

✓ Remove all tools from the Incubated shaker.
✓ Be sure no objects, samples or chemicals are lying on the Incubated shaker.

- If your Incubated shaker has been inoperative or unattended, check all settings before starting the unit.
- At the beginning of your shift and after breaks, verify that the Incubated shaker is functioning properly.

✓ Report the following occurrences IMMEDIATELY:
✓ Unsafe operation or condition
✓ Unusual Incubated shaker action
✓ Leakage
✓ Improper maintenance

- DO NOT wears loose clothing or jewelry, which can be caught while working on the equipment. In addition, cover or tie back long hair.
- Clean the equipment and surrounding area DAILY, and inspect the machine for loose, missing or broken parts.
- Shut off power to the Incubated shaker when it is not in use. Turn the power switch to the OFF position, or unplug it from the power source.

1.6.3 Maintenance responsibility

Proper maintenance is essential to safety. If you are a maintenance worker, you must make safety a priority to effectively repair and maintain equipment.

Before removing, adjusting, or replacing parts on this Incubated shaker, remember to turn off all electric supplies and all accessory equipment at the machine, and disconnect and lockout electrical power. Attach warning tags where possible.

Be sure that the Incubated shaker is correctly connected to earth grounded electrical outlet that complies with current codes.

When you have completed the repair or maintenance procedure, check your work and remove your tools.

DO NOT restore power to the Incubated shaker until all persons are clear of the area. BEFORE you turn the Incubated shaker over to the operator for production, verify the unit is functioning properly.

1.6.4 Reporting a safety defect

If you believe that your Incubated shaker has a defect that could cause injury, you should immediately discontinue its use and inform Jeio Tech or local authorized distributor.

The principle factors that can result in injury are failure to follow proper operating procedures (i.e. lockout/tag out), or failure to maintain a clean and safe working environment.

2.0 Functional Description

2.1 Introduction

SIF5000/5000R, SIF6000/6000R, 2-step stacking incubated shakers are space-efficiency and SI-300/300R, SI-600/600R can be loaded on SIF Series.

This product can be used in the field below.

- ✓ Plant and animal cell cultures
- ✓ Solubility studies
- ✓ Extraction procedures
- ✓ DNA & enzyme fermentation
- ✓ Plant growth
- ✓ General mixing
- ✓ Bacterial suspensions
- ✓ Cell staining & destaining
- ✓ Washing procedures
- ✓ Plasmid purification
- ✓ Protein expression

Orbital and reciprocal shaking is possible. Shaking system is designed to use a wide variety of laboratory glassware. 6,000 ml Flask clamp can be mounted on SIF6000/6000R. Orbital and reciprocal shaking, both can be selected by a user.

The 3-speed, forced convention heating and cooling system provides uniform temperature regulation with no overshoot—eliminating potential sample damage. External refrigeration capabilities are available in SIF5000R/SIF6000R and integrated cooling is available in SIF5000R/SIF6000R models.

Conveniently housed in a single panel, twin microprocessor-based controllers individually control temperature and agitation functionality. System risks, like voltage spikes, short circuit, over temperature, etc., are monitored by a safety system that runs independently of the performance controller. Audible and visual alarms are set off and the incubated shaker will go into a recoverable safety mode if a risk is identified.

A wide variety of platforms can be used with the incubated shaker. Dedicated platforms are available for a variety of flask sizes. A universal platform and flask and separatory funnel clamps, micro plate holders, test tube racks and stick pads are available along with spring wire racks, rubber mat and universal attachment platforms.

Additionally, incubated shakers have an R-232 communications port for data logging and remote control with our free Lab Tracer software.

2.2 Feature

2.2.1 Compliance

CE is an abbreviation for CONFORMITE EUROPEAN and it means that the products are qualified for European Standard related to safety, health, environment and protection of consumers. CE Mark doesn't mean that it guarantees the products quality but complied with basic safety requirements.

The products which do not acquire CE mark or do not follow the standards can not be sold or distributed in European market, and products test must be done by a manufacturer itself or a specified institute.

If you want to distribute the products in Europe manufactured by outside of Europe must attach CE mark. EU supply 76 ea guidelines and have 3 types (EN:EUROPEAN NORM, HD:HARMONIZED DOCUMENTS, ENV:EUROPEAN PRE-STANDARD) which including approx.3000 kinds of standards.

Jeiotech has supplied products met CE standards based on our strict quality policy.

2.2.2 Construction

2.2.2.1 General

2-step stacking unit
Vertically, 2-step stacking incubated shaker is space-efficiency.

Waterproof Structure
Even there is spillage by users accidentally the liquid doesn't go into the equipment

Available mass production
SIF6000/6000R can attach 2ea (maximum) 6,000ml large capacity flask.

Casters to prevent vibration
The casters make the unit easy to move and prevent vibration and be horizontal when moving.

Large viewing window
You can observe the internal state without changing the temperature.

Observation lamp
If the unit is in a dark place, a user can check the sample.

Door Lock
There is a hole on the latch. It can keep security and temperature.

Chemical Resistance
The basic surface finishes with a powder coating.

Door Alarm System
If the door suddenly opens, the heater, shaking system, air-circulating fan stop. Therefore, it can protect a user and minimize heat loss.

2.2.2.2 Shaking system

Dual Motion Agitation
Agitation motion can be converted from orbital to reciprocating motion.

A variety of turning radius
You can select 13mm, 19mm for the turning radius of SIF5000/5000R and 13mm, 19mm for SIF6000/6000R.

Right-position stop function
Universal platform stops at the very middle of the unit. Auto system can apply this.

Brushless DC motor
Jeio tech succeeds in controlling the motor accurately and it is the best motor for laboratory.

Balance weight system
It is excellent in terms of power consumption efficiency, and reduce the noise by spreading the load.

Accessory
Various accessories could be equipped flexibly.

2.2.2.3 Incubator

Cross Flow (Tangent) Fan
Cross Flow Fan is to generate laminar flow that keeps the temperature stably in the chamber. It also provides high restoration of temperature even if the door is opened and closed frequently.

High temperature refrigerant system
It supports to reduce a noise from a refrigerator. And also can minimize moisture evaporation in chamber.

Environmentally friendly refrigerants
Our refrigerants doesn't include Freon gas.

2.2.3 Communication

RS-232 Interface available
Lab Tracer is easy-to-use software supplied with the SIF series Incubated Shaker. It enables operators of all levels to use their PC to

- ✓ Collect, analyze, and archive unit data
- ✓ Produce required laboratory reports
- ✓ Control and monitor unit operation

2.2.4 Safety

2.2.4.1 CLS- Custom logic safety control system

The CLS-Control system (Patent No.0328729) is our enhanced safety controller developed by our engineers. Designed to allow our equipment to be operated in environments that require perfect thermal safety-including areas where flammable chemicals are used.
In most cases with other brands of lab equipment, the CPU comprises both control and safety features together. In the event of the CPU failing, the logic controlling the safety features will often be compromised.

CLS-Control system

Jeio Tech has separated these two important elements and now has an independent safety system running alongside the performance controller.

When any risk factors are sensed (ex: voltage peaks, short circuit, over temperature etc.) the machine will go into a recoverable safety mode as follows.

The power supply to individual components is isolated by a magnetic switch, leaving only the earth in circuit.

Details of the fault are displayed (indicator codes)

Audible and visual alarms alert the user and remain on until attended.
Independent IC logic detects and intercepts electronic interference before the main control board to give added safety to both user and product.

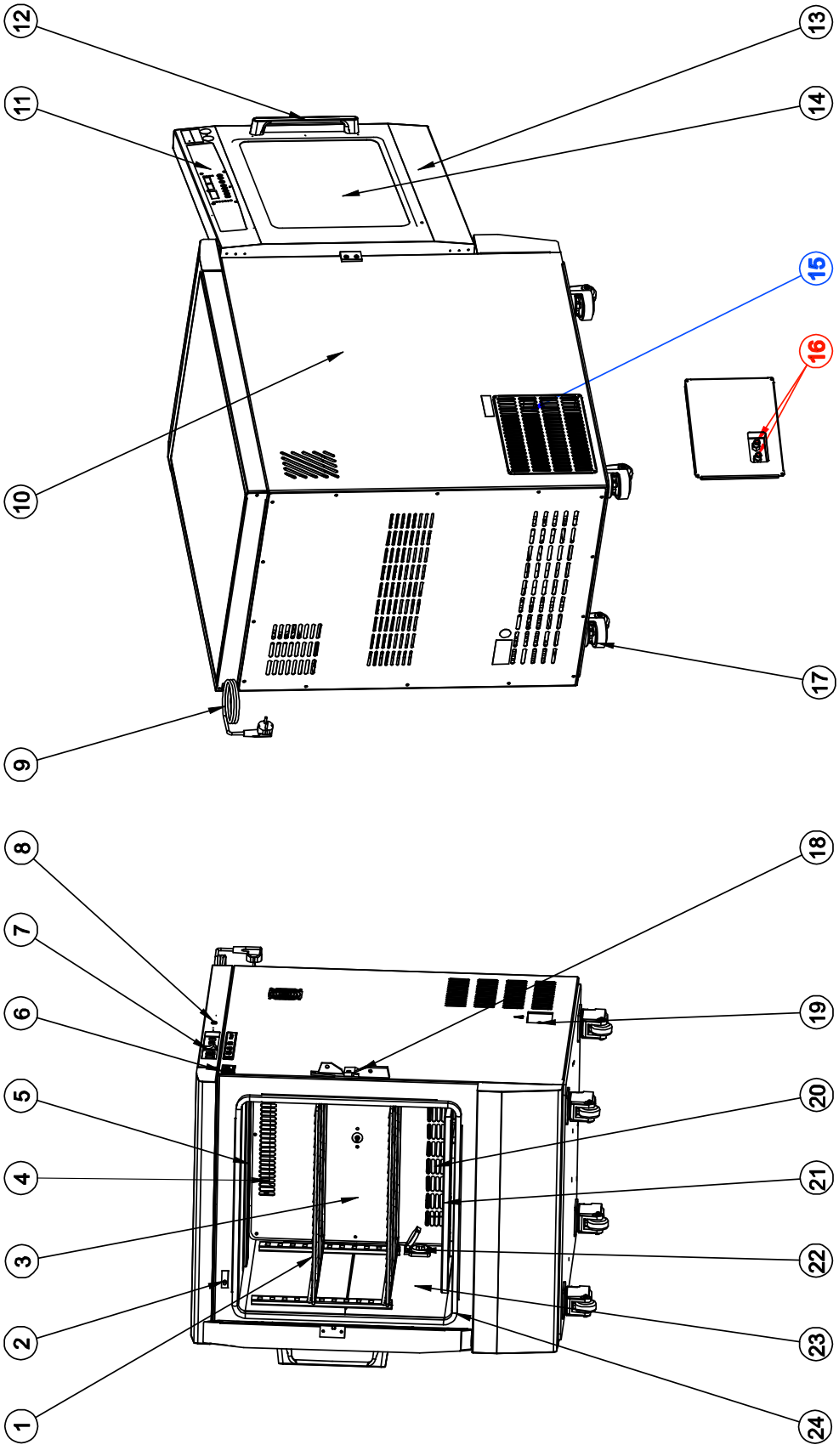
2.2.4.2 Over Temperature Limit

The built-in over temperature protector warns (audible alarm and LED lighted) and shuts off the heater in the event of overheating problems. Over temperature safety feature with independent thermostat provides additional backup by controlling heat if main temperature controller fails.

2.2.4.3 Thermal Protector

The power line of the heater is by thermal protector. It automatically cut off the power when the space's temperature where the heater is equipped is above 90℃. And if below 90℃, it connect the power again. Therefore, it protects overheating in advance.

2.3 Construction

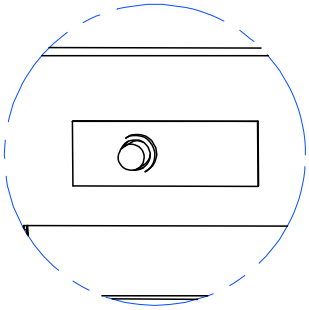


(1) Shelf

If you use low-height flasks, there are shelves(Standard 2ea). Shelves can be put on the shelf level adjuster.

(2) Door limit switch

There is door limit switch between door and the appliances mainframe upper parts, and discontinuance gets operation of Shaking unit, Blower and Heater done by the Logic IC which received an open signal if it opens Door. And Door LED is turned on. (Within five minutes)

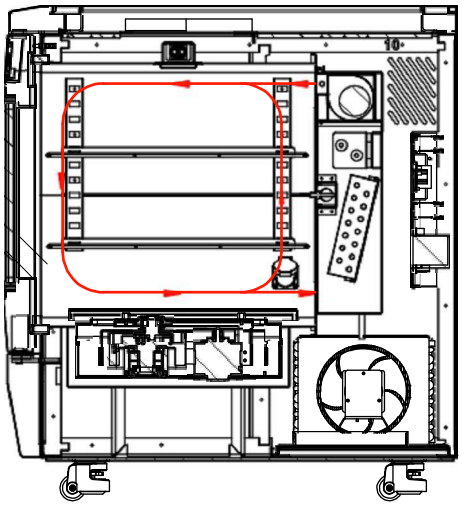


Door LED twinkles for warning ventilation of a user after a door opened if a user does not shut a door so that five minutes pass, and an alarm sound continuously rings.

And it blocks off the power to be authorized with a power switch, and Off gets a power switch done and all blocks off 2 phase of the power supplied with to an each part of appliances, and configuration does the safe state that only a Ground part is connected. At this time light is effective on Temp LED if closes a door again and presses a Button.

(3) Incubator heating & cooling system

Behind the stainless steel cover lies the heart of the forced convention heating/cooling system.



- ✓ **Evaporator**

Fin-type evaporator cools the chamber air down to Amb-20℃ (When ambient temperature is more than 20℃)

- ✓ **Heater**

Two (2) 550W, Incoloy fin-type heaters heat the chamber air to a maximum of 80℃

- ✓ **Circulation Fan**

Three-speed fan circulates air in the chamber and through the evaporator and heater.

(4) Air in vent

Air in-vent for air after it passes through (3)

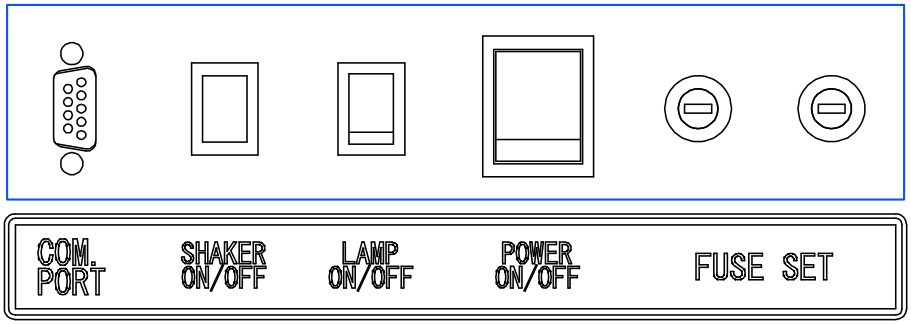
(5) Floursent Lamp

Floursent Lamp to observe inside the chamber.

(6) ID Label

Model name, Serial number, Voltage, Frequency, Power Consumption For Incubated Shaker (Two machine stackable)

(7) RS-232 Port, Switches, Fuse Set



- ✓ **RS-232 Port**

This equipment can monitoring and change setting to COM1 or COM2 port with state of appliances through PC and connection and a RS-232C program.
Also, can save control state of appliances, and output is possible through a printer, too.

- ✓ **Lamp Switch**

Turn On/Off Observation Lamp.

- ✓ **Shaker On/Off Switch**

Shaker On/Off separately.(When Sync sets at No.)

- ✓ **Main Switch**

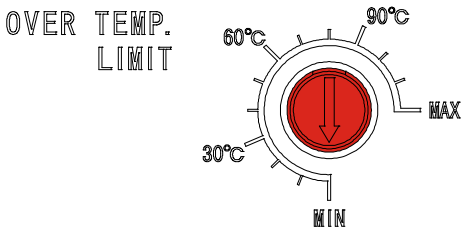
Main Switch On/Off. When Main Switch On, it lights.

- ✓ **Fuse**

The fuses protect the equipment from instantaneous electric currents.
Please check with correct electricity when fuse change.

(8) Over temp. limit

If heater more abnormally than setting temperature rises, blocks off power of Temp. controller, and Over temp. LED twinkles, and alarm rings. If the power is turned off, 15% upward tendency sets up Knob than setting temperature right and confirms whether certainly presses Start/Stop switch in one time, and dollar enters Run LED of Temp. controller.



(9) Main cord

It is cord to supply for main power.

(10) Body

The body is painted by a powder coating for chemical resistance

(11) Controller

- ✓ **Shaking controller**

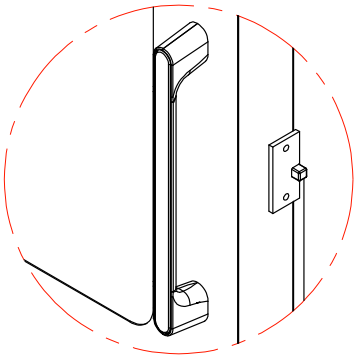
It can control for Left turn, right turn and stationary state by timer function

- ✓ **Temperature controller**

This equipment loaded the Micro processor (CPU) which had the verified S/W that Digital PID Auto tuning this is possible and is having a temperature revision function for a temperature sensor and a heating control function.

(12) Door handle

It is to open the door easily. Door handle is made from plastic, so the heat or cold of door doesn't deliver to a hand.



(13) Door

The door provides full and easy access to the incubator shaker chamber. An observation window is provided for viewing of samples during experiments.

(14) Observation window

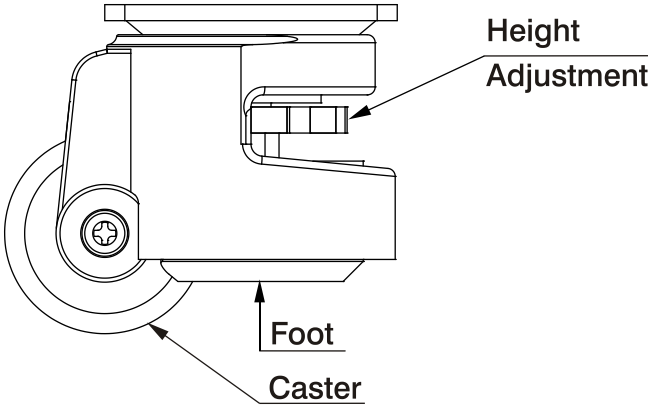
Large Low-E insulating glass provides excellent insulation and viewing of samples during experiments so the door stays closed. Heater is equipped to prevent humidity during long-time operation.

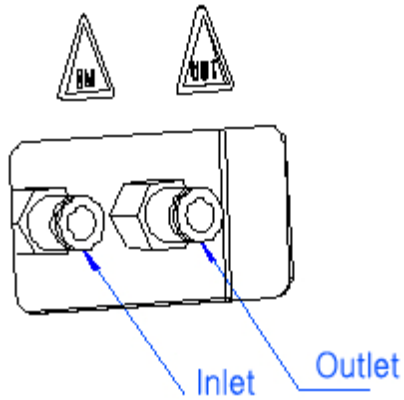
(15) Condenser cover & air filter

The condenser cover is a removable air vent providing air circulation through the condenser. The air filter protects the condenser from dust.

(16) External refrigeration port

These brass push-to-connect (by pushing plastic part) fittings accept Ø8mm OD hard-wall tubing and provide access points for external refrigeration on the SIF series.





(17) Caster assembly

A wheel and height adjustable, non-marking foot allow for easy movement, locking and leveling of the unit.

(18) Door latch

The door latch helps maintain a tight chamber seal and prevents accidental opening during operation. The lock hole is designed to accept a padlock for security purposes.

(19) Condensate drain barb

The barb provides a drain for condensate that forms as warm air is cooled by the evaporator. Constructed of chrome-plated brass it accepts Ø6mm ID soft-wall tubing.

(20) Air out vent

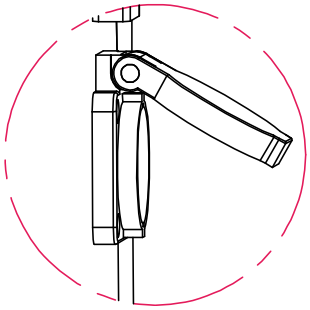
Outlet for cooled or heated air after it passes through the evaporator or heater.

(21) Shaking table

It's connected to gadget for shaking and install for accessories. (Universal Platform etc)

(22) Inner outlet

Chamber has a built-in outlet. When a user operates a small test equipment Inside the unit, it is used. Maximum allowable capacity is 2.0A.



(23) Chamber

Corrosion-resistant stainless steel was used. Agitation table, heater, evaporator, and temperature sensor are built in.

(24) Door seal

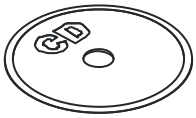
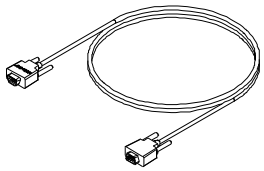
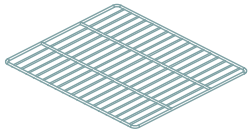
The door seal absorbs impact during door closing, and provides a tight chamber/door seal to prevent chamber air from escaping or ambient air from infiltrating the chamber.

3.0 Installation

3.1 Unit Components

After unpacking, please check the contents to ensure you have received all of the following incubated shaker components. Also, check the identification plate on the side of the incubated shaker to make sure you received the model number your ordered.

If you didn't receive one or more of the components or if the model is incorrect, contact your local Jeio Tech office, or the distributor from which the incubated shaker was purchased.

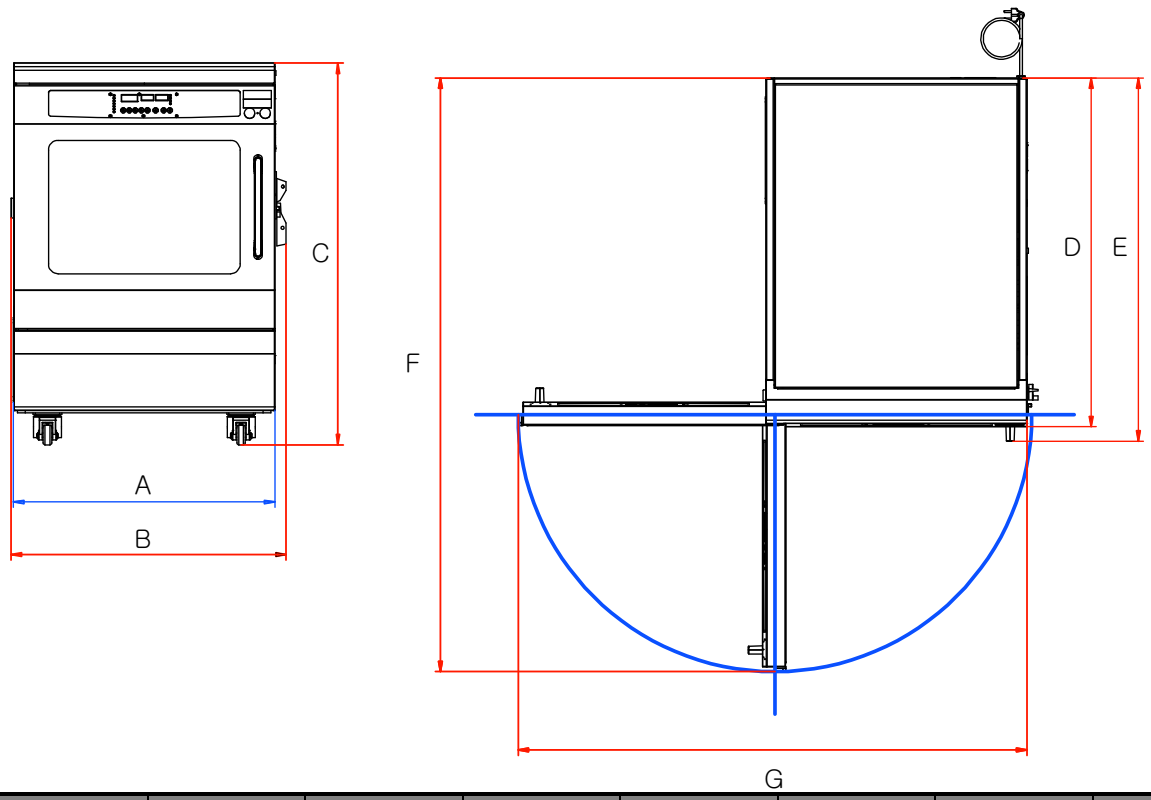
Component	Quantity	Received
Unit 	1	
Fuse (Spare) 	2 (2)	
Operating instruction 	1	
LabTracer communication software CD 	1	
Cable for communication 	1	
Wire Shelves 	2	
Spacer 	4	

3.2 Preparing the Location

3.2.1 Space requirements

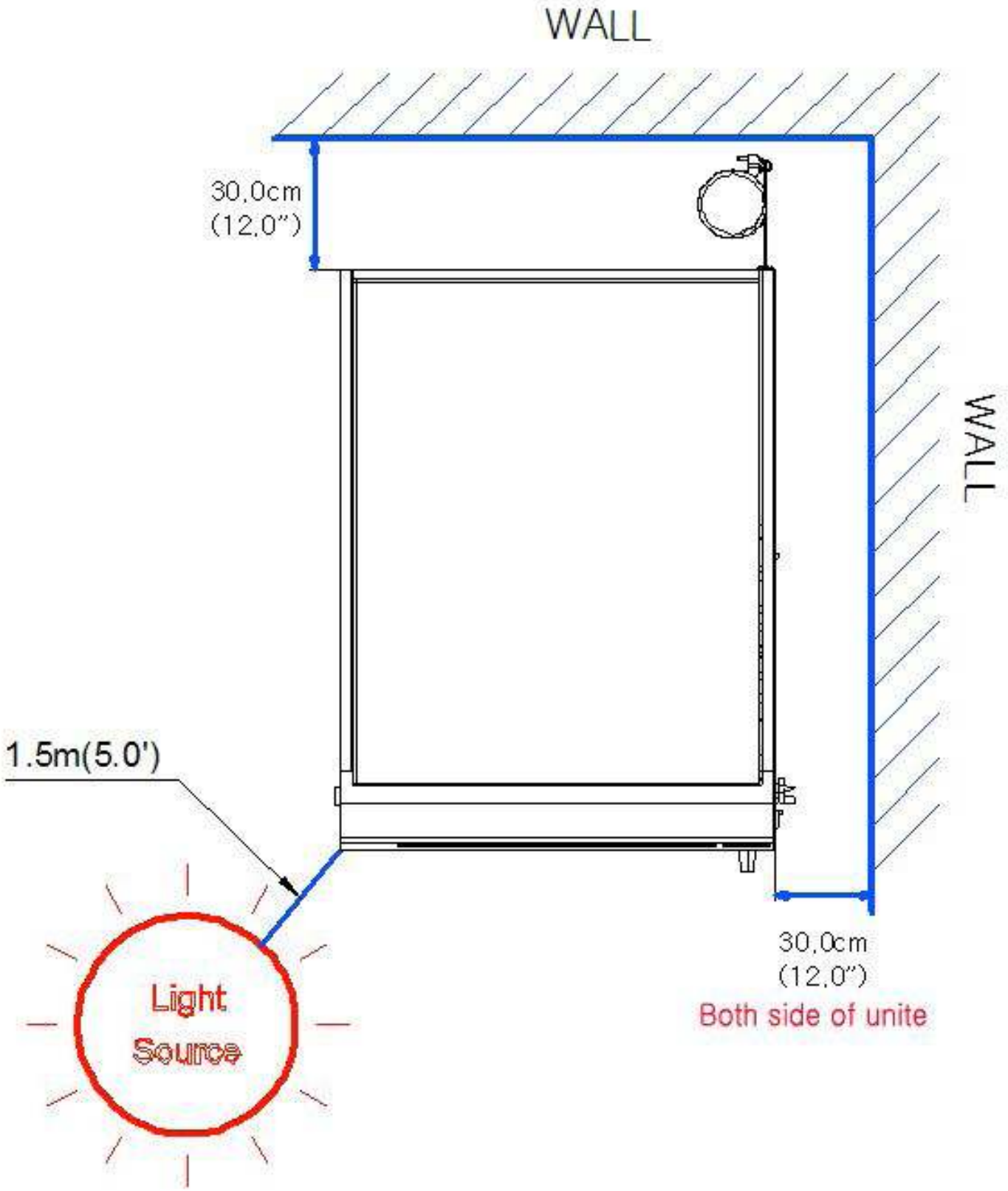
The surface where you place the Jeio Tech SIF series incubated shaker should be smooth, level and sturdy.

It is essential that the incubated shaker be situated in an area where there is sufficient space for the shaker and service lines. The minimum space requirements needed to properly operate and maintain the incubated shaker.



Dimension / Model	A	B	C	D	E	F	G
SIF5000/5000R	571 (22.5)	606 (23.9)	900 (35.4)	815 (32.1)	852 (33.5)	1,342 (52.8)	1,105 (43.5)
SIF6000/6000R	671 (26.4)	706 (27.8)	980 (38.6)	895 (35.2)	932 (37.7)	1,523 (60.0)	1,306 (51.4)

mm(inch)



3.2.2 Environmental setting

The Jeio Tech SIF series incubated shakers operate properly under the following environmental conditions.

No direct sunlight on incubated shaker

Ambient temperature: 5°C to 40°C (41°F to 104°F)

Relative humidity not to exceed 80%

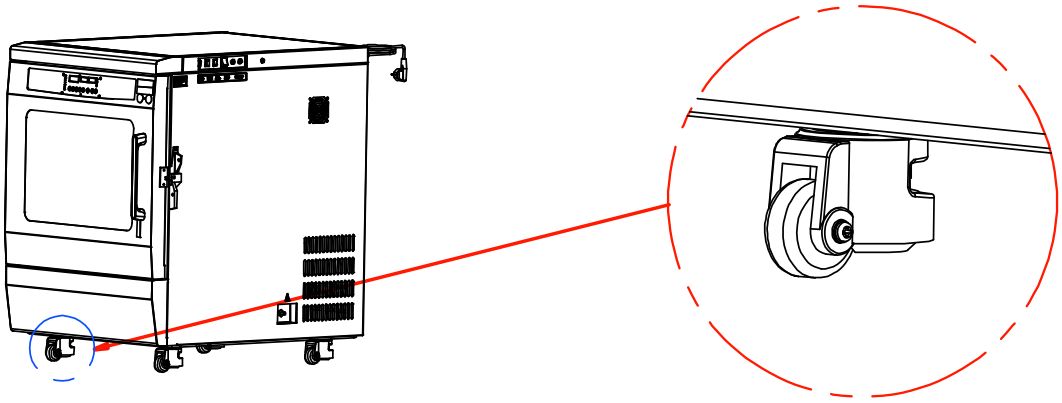
Altitude not to exceed 2000m (6,562 feet)

Keep incubated shaker away from high frequency noise produced by equipment and/or machinery, such as electrical distribution panels, welders, induction heating mechanism, and large amounts of SCR (Silicon-controlled rectifiers).

Check a ground wire of the unit.

3.3 Leveling the unit

When you set up the unit, balancing is very important. If the balance of the unit is not in a good condition, it causes vibration and noise and the user could be in danger.
Make it balanced well as following.

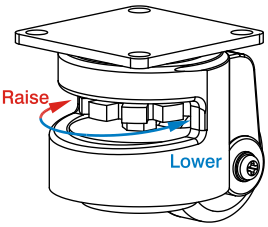


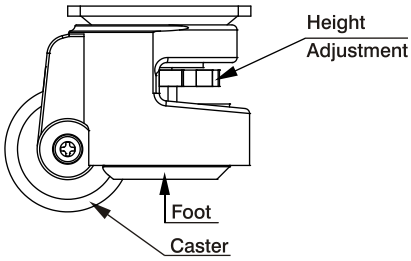
Step 1: Place the incubated shaker in its location.

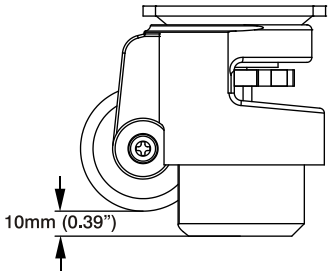
Step 2: Lower the foot of each caster by turning the red height adjustment counterclockwise until it hits the floor. Turn the height adjustment a quarter turn or more to ensure the unit's weight is taken off the caster. This will lock the unit in place.

Step 3: Place a level on the top of the door and check for level side-to-side and front-to-back.

Step 4: Turn the height adjustment to raise or lower the unit until the incubated shaker is level.





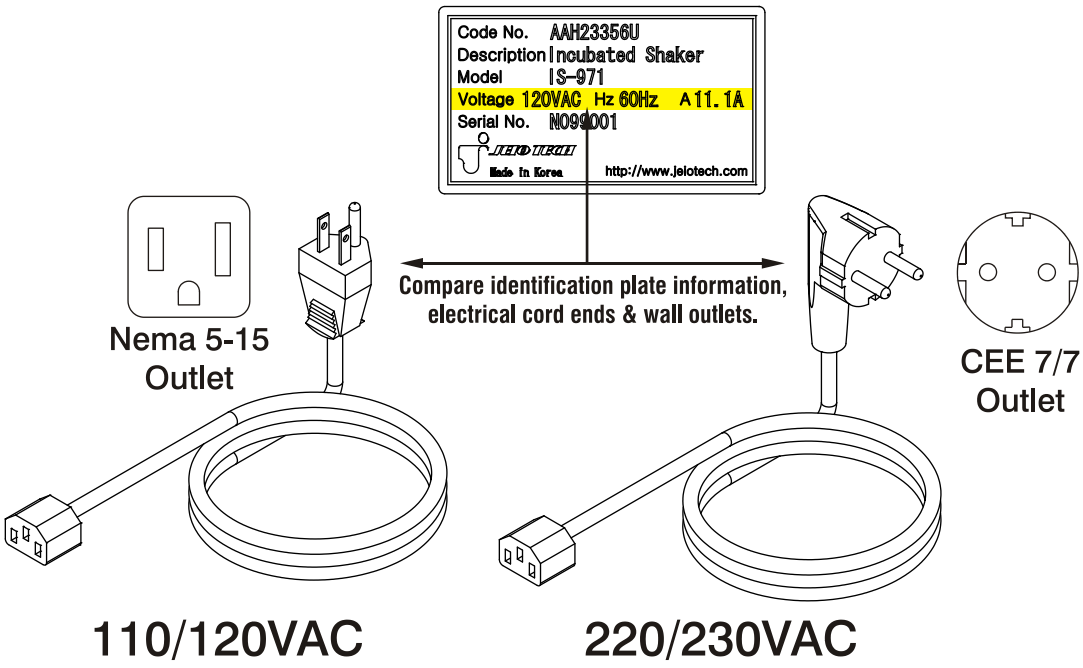


3.4 Attaching Electrical Connections

Jeio Tech SIF series incubated shakers are designed for single-phase, earth-grounded voltage operation. Refer to the unit's identification plate for proper voltage and amperage requirements. Make sure your electrical service conforms before making any electrical connections. Voltage must be within plus or minus ten percent (±10%) of the nameplate rating.

Compare voltage on unit's identification plate, wall outlet connection on electrical cord (see Figure 3.5 below) and the wall outlet to ensure proper connection before making any electrical connections. If you have the wrong electrical cord, please contact your local Jeio Tech office, or the distributor from which the incubated shaker was purchased to get the correct electrical cord.

If the supplied electrical cord is not long enough, it is recommended to use an IEC 60320 male to female extension cord with the proper amperage rating for the unit.

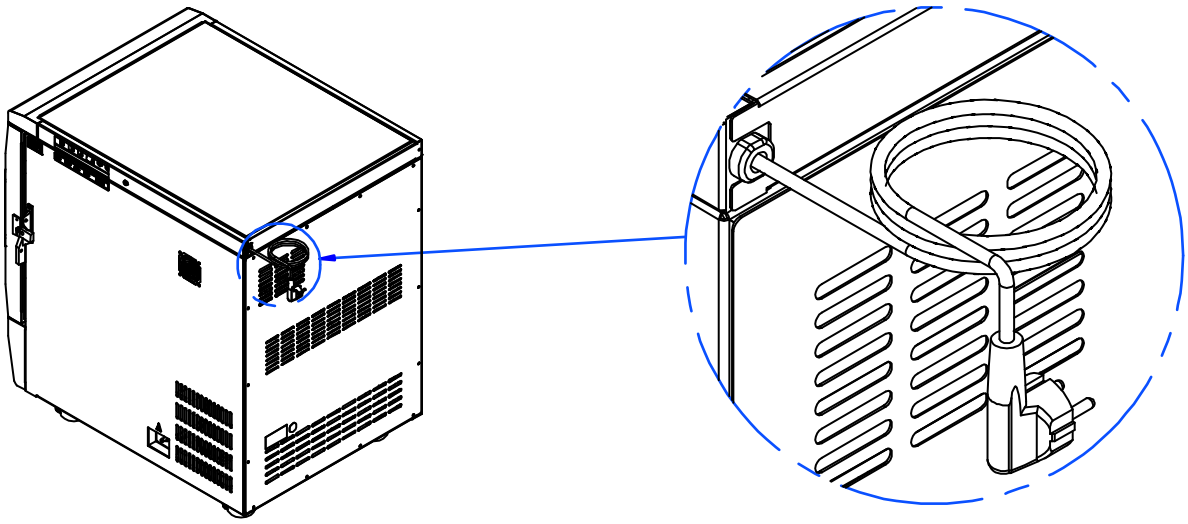


⚠ DANGER

ELECTRICAL shock hazard. Improper electrical connections can damage the unit and cause serious injury or death.

Use the following procedure to supply power to the incubated shaker.

Step 1: Find the power connection socket on the back of the unit.



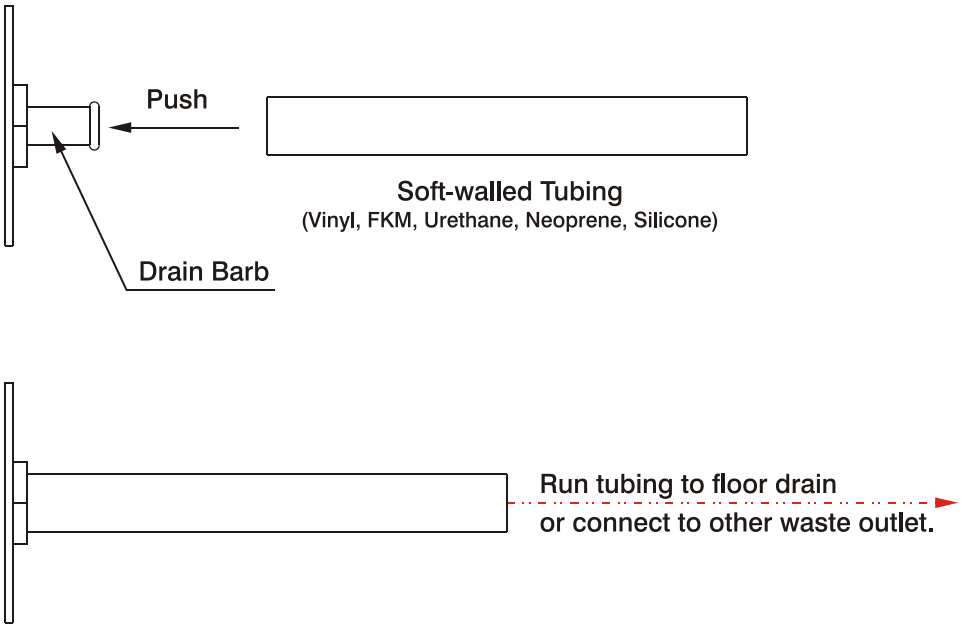
Step 2: Push the matching cord end into the socket.

Step 3 : Push the cord into the wall socket.

Make sure that all electrical connections are tight.

3.5 Attaching Condensate Drain

As the chamber heats and cools condensate will build up. The condensate drain is designed to eliminate any water build up. To connect the condensate drain to a floor drain or any other waste outlet push Ø6mm ID soft-walled tubing, such as: vinyl, FKM, urethane, neoprene or silicone, over the drain barb until is seated against the collar, as shown below.



3.6 Attaching/Detaching External Refrigeration
(SIF5000/SIF6000 only)

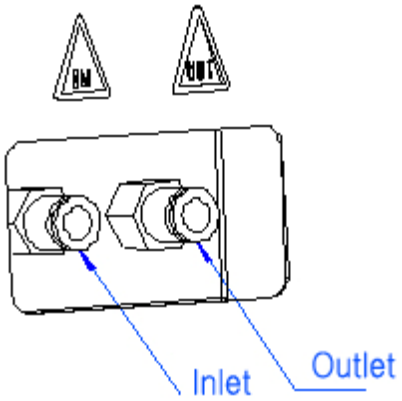
Many laboratories are built with central chilling systems. With this in mind Jeio Tech has developed the IS-971 incubated shaker so that it can be connected to external refrigeration systems. To connect the unit to external refrigeration source use Ø8mm OD hard-walled tubing, such as nylon or polyethylene.

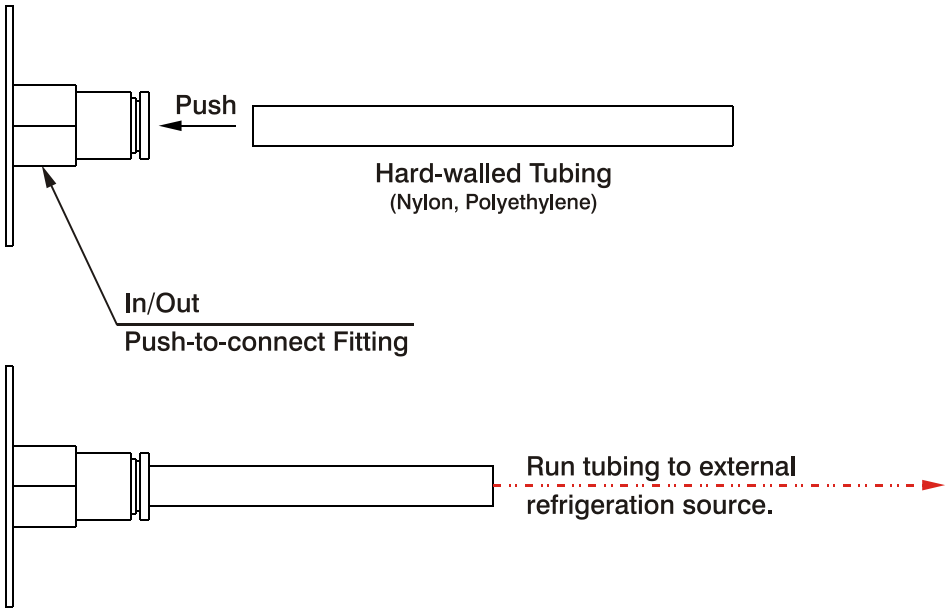
Note: The IS-971 controller does not have the ability to communicate with the external refrigeration source.

Use the following procedure to connect/disconnect the tubing to the unit.

3.6.1 Inserting tubing into fitting

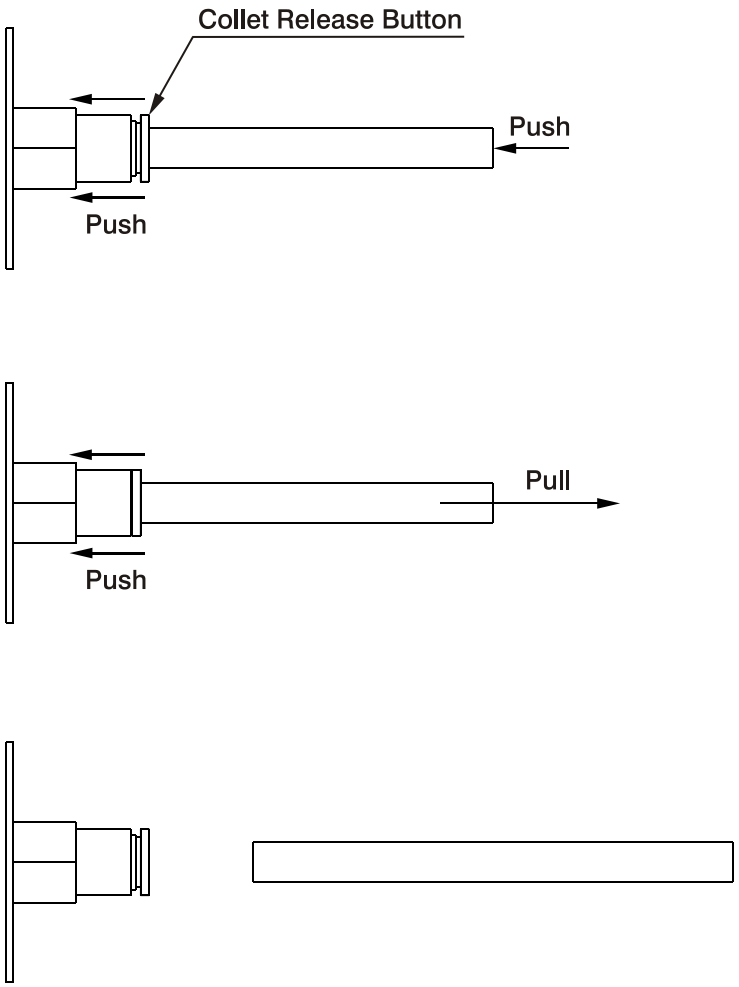
Hold the tubing firmly and push it tightly into the fitting. Run the tubing to the external refrigeration source.





3.6.2 Removing from fitting

Use the following procedure to remove the tubing from the external refrigeration ports.



Step 1: Grab the tubing tightly and push towards the incubated shaker as you firmly push the collect release button with two fingers.

Step 2: Continue to push the collect release button, and pull the tubing out of the fitting.

3.7 Initial Start-up

3.7.1 Pre start-up checks

- Make sure all unit and wall outlet electrical connections are tight.
- Make sure condense drain hose is tightly on hose barb and hose is run to a drain.
- Make sure external refrigeration hoses are tightly secured.
  (SIF5000/SIF6000 only and only if using external refrigeration feature.)
- Make sure caster feet are lowered and have locked the incubated shaker in place.
- Make sure unit is level side to side and front to back.
- Make sure the platform is locked onto the shaking table.
- Make sure the accessory(ies) are securely attached to the platform.
- Make sure all vessels are securely clamped.
- Make sure there are no flammable or explosive liquids in the incubation chamber.

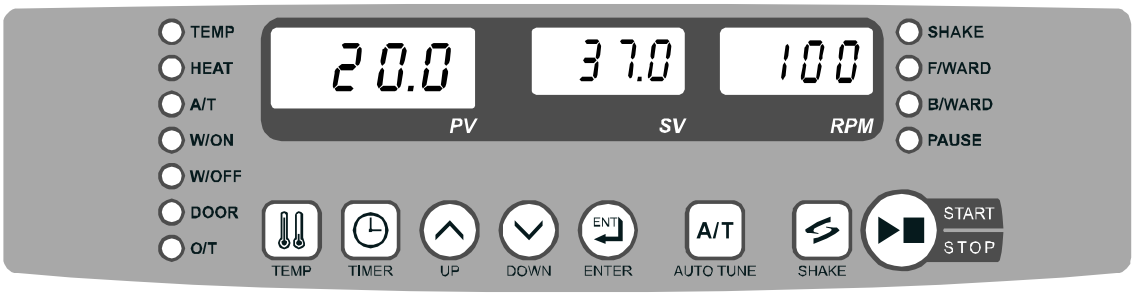
3.7.2 Starting the incubated shaker

Press the Power switch. The following will occur.

- The power switch will illuminate.
- Jeio Tech will appear in the PV and SV displays.

- After 3 seconds, a beep will emit and the following will appear.

✓ PV display: Current incubator temperature (numeral).
✓ SV display: Factory set point value of 37℃ (initial start-up) or last set point value.
✓ RPM display: Factory set point value of 100RPM (initial start-up) or last set point value.



Main Display

3.7.3 Calibrating temperature probe and controller (BIAS Function)

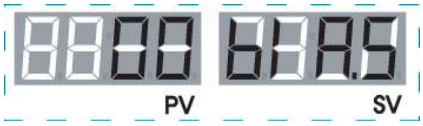
The BIAS function lets you calibrate the temperature probe and controller. While the temperature probes and microprocessor are calibrated at the factory during production, it is good practice to ensure the incubator chamber temperature and microprocessor are in sync for your operating environment. Use the following procedure to correct temperature variations:

Step 1: Press the power switch to turn the unit on, if it is not already on. Allow the controller to stabilize and the main display to appear, as shown in Figure 3.7.2.

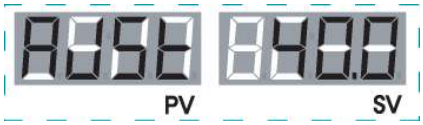
Step 2: Place a scientific digital thermometer into the chamber, close the door and allow the thermometer to stabilize. Make sure the thermometer display is readable through the incubated shaker's observation window if it does not have a remote display.

Step 3: Compare the thermometer reading to that shown on the PV display.

Step 4: If there is a difference, press the TEMP key six (6) times. The PV display will show the revised value and the SV display will read BIAS (as shown below).



Step 5: Press the UP key or DOWN key to reflect the difference between the present value and the thermometer reading the BIAS value display.



Step 6: Press the ENTER key to complete the calibration adjustment.

Step 7: Press the ENTER key to return to the main display.

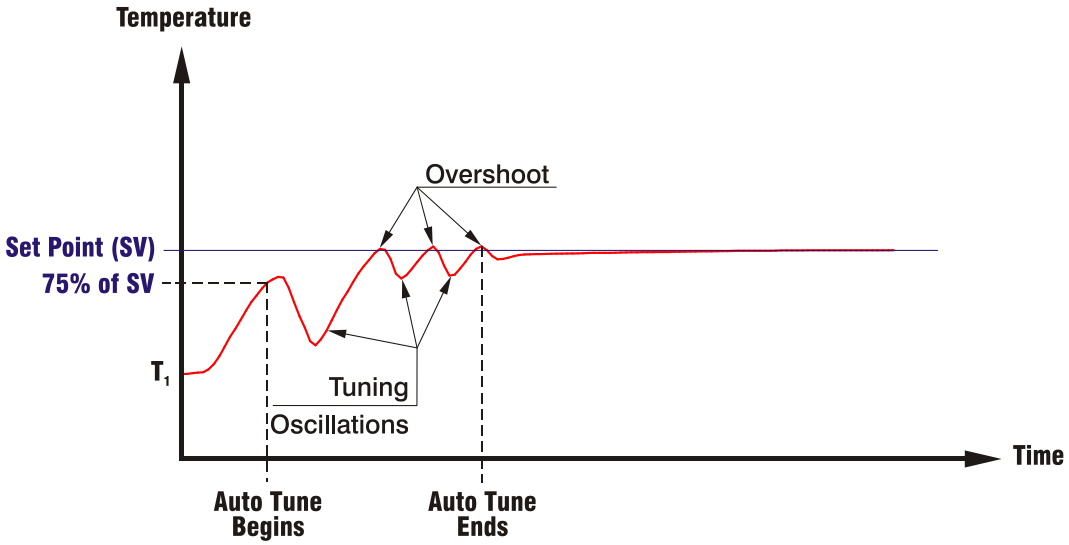
After long periods of time (especially, 2 weeks without stop) at one set point value incubator temperature and microprocessor should be checked for calibration. The chamber temperature and present value display should be checked and calibrated on a quarterly basis or a half yearly basis.

3.7.4 Auto-tuning the incubated shaker controller

The fuzzy-logic, auto-tune function lets you automatically fine-tune the PID control parameters of your IS-971, IS-971R and IS-971RF incubated shaker system based on its dynamic characteristics and your process requirements then stores them for future use. Auto-tuning is of importance for minimizing commissioning times for temperature regulation loops since they often have high system time constants, such as lag times and dead times.

The auto-tune function should be activated for the following:

- ✓ Initial start-up
- ✓ Change in ambient conditions
- ✓ Change of chamber air circulation fan speed.
- ✓ Change in thermal mass.
- ✓ Change in temperature set point after a long period of time at one set point.



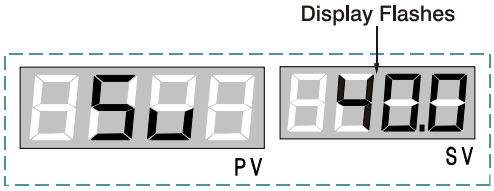
During auto-tuning the controller heats to 75% of the set point temperature, where it oscillates above and below the set point as many as three (3) times before loading the new tuning parameters. After the tuning parameters are loaded it heats to the set point temperature. See Figure 3.13 above.
Auto-tuning is dependent on the operating conditions and can take up to 45 minutes. It is best done before any experiment is run.

NOTICE

Temperature Overshoot May Damage Samples. Overshoot is a function of the set point temperature and the ambient temperature. If your samples can not handle overshoot of the set point temperature, wait until auto-tuning is complete before putting samples in the chamber.

Use the following procedure to auto-tune the controller:

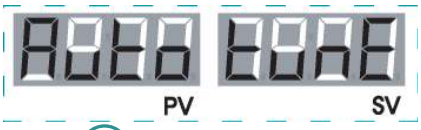
Step 1: Press the Temp key one (1) time. The setting in the SV display will flash.



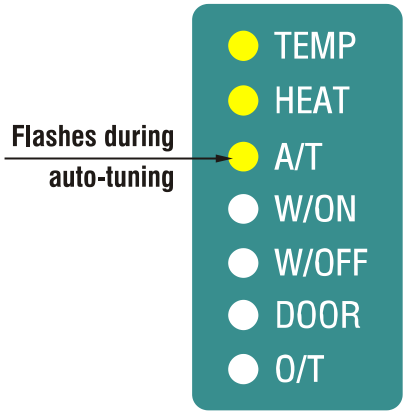
Step 2: Press the UP key or DOWN key to set the desired temperature.

Step 3: Press the ENTER key to finish setting the temperature.

Step 4: Press and hold down the A/T key for one (1) second or until the A/T LED illuminates and the PV and SV displays change to the following.



Step 5: Press START/STOP key. The TEMP and HEAT LEDs will illuminate and the A/T LED flashes to indicate that the controller is tuning itself. When the A/T LED light stops flashing, the controller is tuned and ready for operation.



Changing SV Temperature During Auto-Tuning
If the SV temperature is changed after starting the auto-tune function, the initial set point temperature will be maintained for the duration of the tuning process. After auto-tuning is complete, the controller will change to the new set point.

Wait On/Off (On/Off delay) Timers
These timers do not function during the auto-tuning process. However, shaking timers do function if synchronization is set to 'No.'

Multi-Segment Programs
The auto-tune function is locked out once program has been started.

3.3.5 Shutting down the incubated shaker

When the unit is not in use, it is recommended to shut down the incubated shaker. Use the following procedure to shut down the unit.

Step 1: Press START/STOP key to clear any programs.

Step 2: Press the Power switch to turn the unit off. Make sure the switch is not illuminated afterwards.

4.0 Operation

4.1 Controller

4.1.1 Feature

4.1.2.1 Temp. controller

PID Control
PID control is to control with calculation of the result with proportional, integral and differential values. Basically it comes the result out based on P(present), I(past) and D(future) info that can approach the practical required temperature quickly.

Wait On/Off Timers
The wait-on and wait off timers can be combined to give you a complete unattended start up and shut down.

Calibration

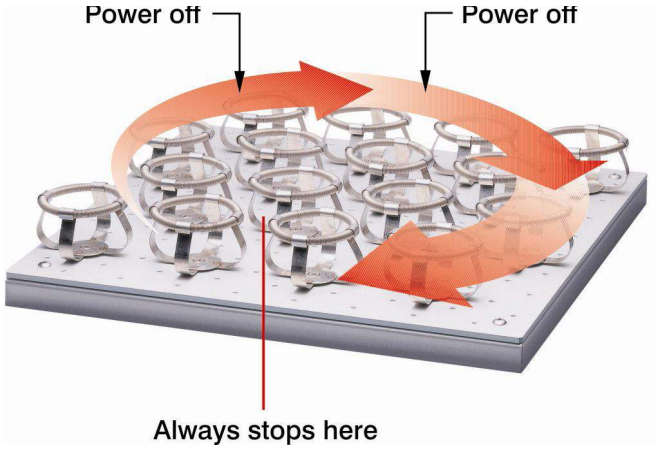
Dual Unit of Temperature Functionality
The incubated shaker's temperature can be measured in degrees Celsius or Fahrenheit.

Auto-Tuning
The fuzzy-logic, auto-tune function lets you automatically fine-tune the PID control parameters of your incubated shaker system based on its dynamic characteristics and your process requirements then stores them for future use.

Defrosting

4.1.2.2 Shaking (agitation) controller

Stop function at the exact position



When stopping the shaking system, the function operates on stopping at the exact position. This function contains the Brake Function for the automatic system in Shaker.

Timer function

Forward/ Backward Function
Shaking controller contains Auto Reserve Function which can operate Forward/Backward and Time set Function which can be programmable to set Forward/Backward Function

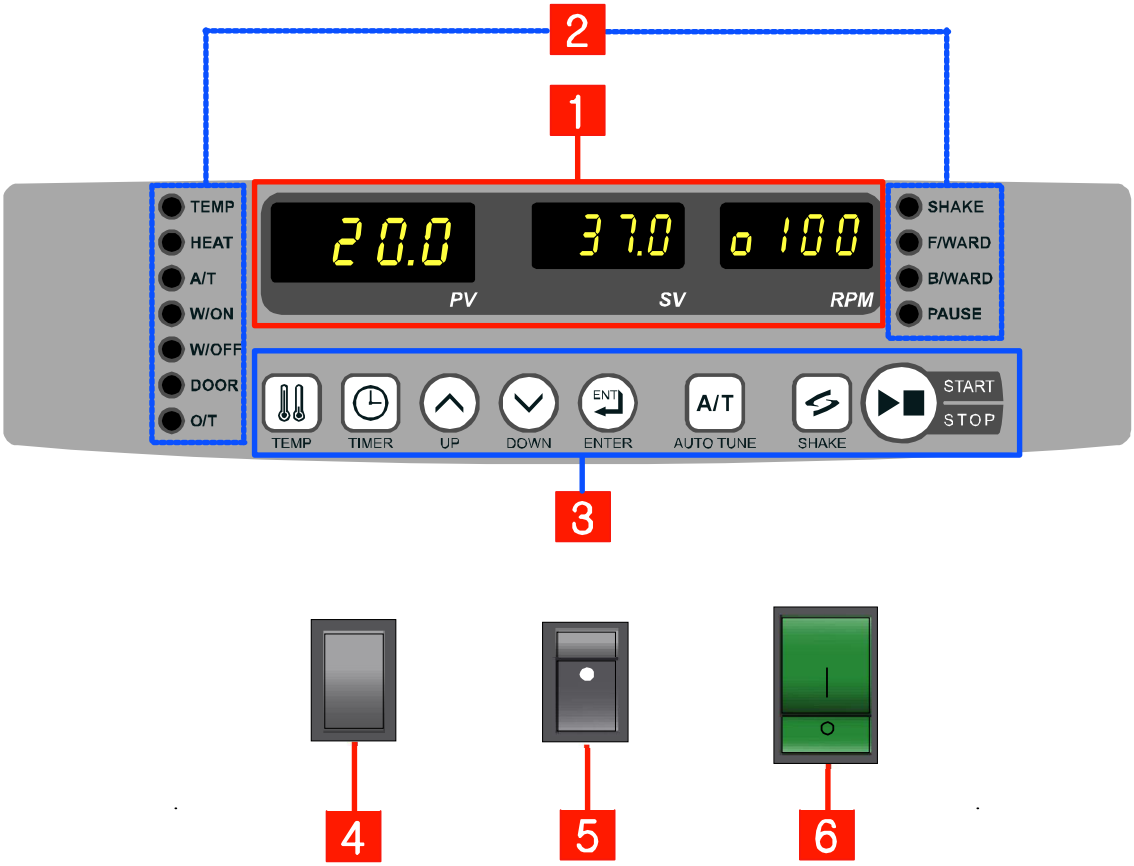
Automatic control function
For controlling exact speed & exact position, adjusted Parameter is memorized automatically.

Wide Range RPM
From 10 to 300 rpm

Speed Compensation
Motor recognizes set RPM frequently and should be adjusted to set value with memorized speed value of that time in case of external influences

Rapid Acceleration and Deceleration
Rapid Acceleration or Deceleration is achieved by using brake function and speed compensation additionally not to have Over Shoot and Under Shoot.

4.1.2 Keypad overview and description



The controller and its keyboard are divided into 6 sections:

.

1. Displays
2. Function and status indicators
3. User interface keys
4. Shaker I/O switch
5. Lamp switch
6. Power switch

The following describes what each section includes and their function

4.1.2.1 PV (Present Value) Display

Indicates the present (current) incubator temperature.

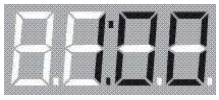
Or

Shows program function name

4.1.2.2 SV (Set Value) Display

Indicates the set (desired) incubator temperature value

Or



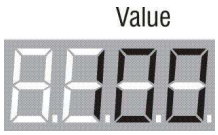
Shows the timer setting and remaining time on the timer

Or

Indicates the set (desired) shaker speed (RPM) value

Note: SV display flashes during the setting of temperature, time or speed.

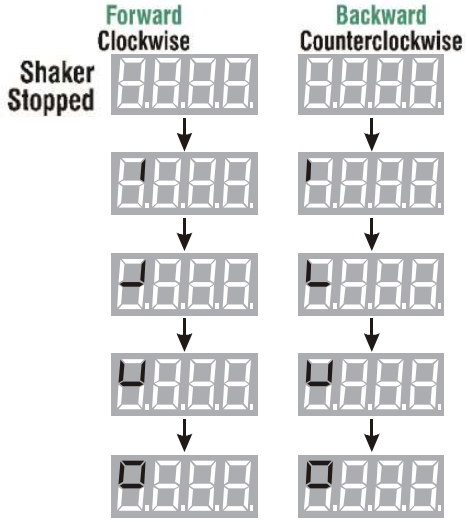
4.1.2.3 RPM display



Indicates the actual shaker speed from 10 to 300 RPM.

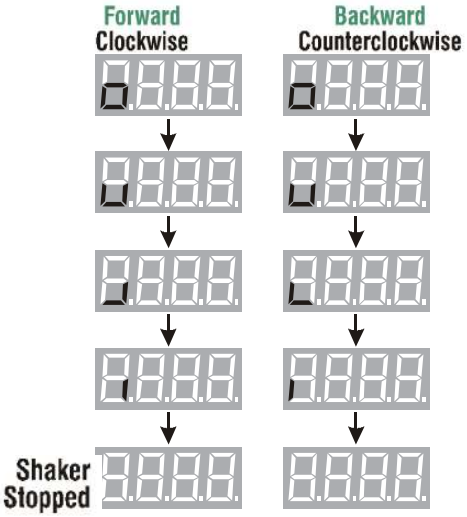
AND

Acceleration and rotation direction



Or

Acceleration and rotation direction



4.1.2.4 Shaker function and status indicators

Shake LED
Illuminates when shaking timer(s) is(are) set.
Flashes during the timer mode.

F/Ward LED
Illuminates when the clockwise timer is set.
Flashes during the timer mode or counterclockwise deceleration.

B/Ward LED
Illuminates when the counterclockwise timer is set.
Flashes during the timer mode or clockwise deceleration.

Pause LED
Illuminates when the pause timer is set.
Flashes during the timer mode or pause mode

4.1.2.5 Temperature function and status indicators

Temp. LED
Illuminates upon starting the temperature program.
Turns off when the temperature program expires.

Heater LED
Indicates the heater is on.
LED is on when heater is at 100% ouput.
LED flashes when PID cycles the heater.

Auto-tune LED
Flashes during Auto-tune function

Wait on (On delay) timer LED
Illuminates when wait on timer is set.
Flashes during timer countdown.
Turns off when timer expires.

Wait off (Off delay) timer LED
Illuminates when wait off timer is set.
Flashes during timer countdown.
Turns off when timer expires

4.1.2.6 Safety function and status indicators

Door LED
Illuminates when the door is open.

Notes:
When opening the door the shaking table, heater, and circulation fan stop operating.
After 5 minutes, the microprocessor stops all programs, the Door LED flashes, and a beep is emitted.

O/T (Over temperature) LED
O/T LED flashes, the microprocessor stops all programs and a beep is emitted when the incubator temperature exceeds the over temperature limit setting

4.1.2.7 Button

TEMP Button
Incubation Temperature setting button

PV Display	Push TEMP Button key	function
	1 time	Setting general temperature
	2 times	First saving temperature(SV1)
	3 times	Second saving temperature(SV2)
	4 times	Third saving temperature(SV3)
	5 times	Choose °F or °C
	6 times	Calibration

TIMER Button
Sets the program, timer, circulation fan, speed and auto-run function.

PV Display	Push timer key	function
	1 time	Wait on (delay on) timer
	2 times	Wait off (delay off) timer
	3 times	Setting auto-run
	4 times	Adjust fan speed
	5 times	Set program

UP Key
Increases the set value

DOWN Key
Decreases the set value

ENTER Key
Stores the selected set value.

Auto-Tune Key
Press the A/T button for one (1) second to begin autotuning the temperature.

SHAKE/SET Key
Rpm setting & shaking timer mode

PV Display	Push SHAKE/SET Key	function
	1 time	stop : rpm setting operation: setting rpm
	2 times	Timer total hours
	3 times	Timer total(minutes & seconds)
	4 times	Clockwise time
	5 times	Counterclockwise time
	6 times	pause
	7 times	Operation incubation/shaker at the same time

START/STOP Key
Start / Stop
Synchronized: Starts and stops the incubator and shaker.
Not Synchronized: Starts and stops the incubator only.
Press to clear flashing LED and beeping when the incubated shaker stops operating.

4.1.2.8 Shaker on/off switch

Shaker On/Off Switch

4.1.2.9 Lamp switch

Lamp Switch

4.1.2.10 Power switch

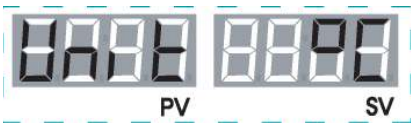
Power Switch

4.2 Temperature controller

4.2.1 Setting the temperature unit of measurement (°C/°F)

The incubated shaker's temperature can be measured in degrees Celsius or Fahrenheit. Unit of measurement is factory set to degrees Celsius (°C). Use the following procedure to change the temperature unit of measurement

Step 1: Press the TEMP key five (5) times. The PV and SV displays will change to the following.



Step 2: Press the UP key or DOWN key to change the unit of measurement.

If not selecting the temperature unit for ten (10) seconds, the controller will return to the main display and last set temperature unit value.

Step 3: Press the ENTER key to finish setting the unit of measurement

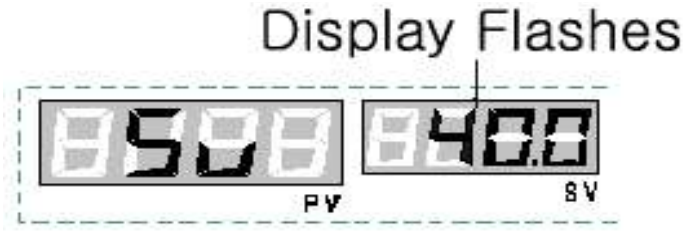
Step 4: Press the ENTER key to return to the main display.

4.2.2 Setting temperature

Use the following procedures to select individual temperature set point values, or to set and select from three (3) frequently used temperature settings (SV1, SV2 or SV3).

4.2.3.1 Single set point value (SV)—preparation

Step 1: Press the TEMP key one (1) time. The setting in the SV display will flash.



The initial factory temperature setting is 40°C. After changing this setting, the SV display will show the last set point used.

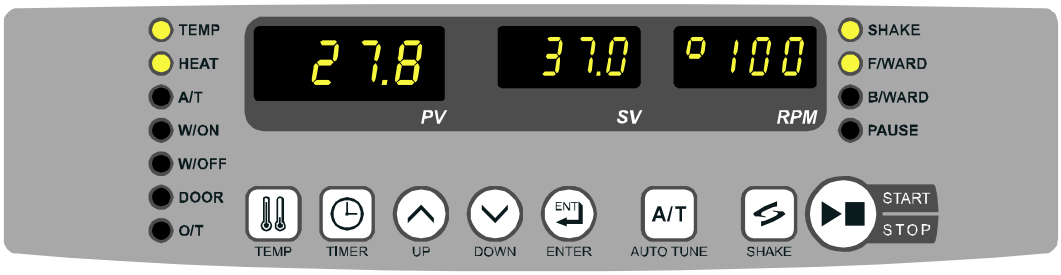
Step 2: Press the UP key or DOWN key to set the desired temperature
.

a. Temperature can be set between ambient +5℃~80℃ (SIF5000/SIF6000),
ambient -20℃~80℃(SIF5000R/SIF6000R) in one-tenth of a degree (0.1°C) increments.
b. Press and release UP or DOWN keys to slowly change timer setting. Press and hold UP or DOWN keys to rapidly change the timer setting.
c. If not selecting the temperature value for ten (10) seconds, the controller will return to the main display and last set temperature value.

Step 3: Press the ENTER key to finish setting the temperature.

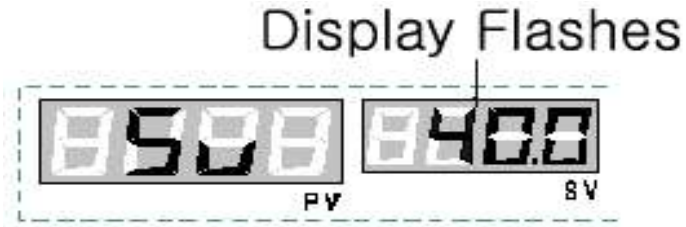
Step 4: Press the START/STOP key to begin incubator operation.
.

4.2.3.2 Single set point value (SV)—during operation



Main Display

Step 1: Press the TEMP key one (1) time. The setting in the SV display will flash.



The initial factory temperature setting is 37°C. After changing this setting, the SV display will show the last set point used.

Step 2: Press the UP key or DOWN key to set the desired temperature

a. Temperature can be set between amb +5℃~80℃(SIF5000/SIF6000), amb-20℃~80℃(SIF5000R/SIF6000R) in one-tenth of a degree (0.1℃) increments.

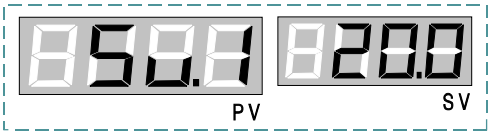
b. Press and release UP or DOWN keys to slowly change timer setting. Press and hold UP or DOWN keys to rapidly change the timer setting.

c. If not selecting the temperature value for ten (10) seconds, the controller will return to the main display and last set temperature value

Step 3: Press the ENTER key to finish setting the temperature.

4.2.3.3 Memorized set point values—SV1, SV2 and SV3

Step 1: Press the TEMP key two (2) times. The setting in the PV display will show SV1, and the SV display will flash.

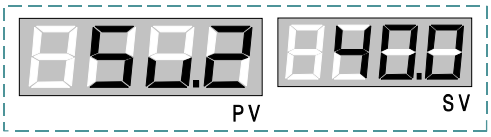


Step 2: Press the UP key or DOWN key to set the desired temperature

a. Temperature can be set between amb +5℃~80℃(SIF5000/SIF6000), amb-20℃~80℃(SIF5000R/SIF6000R) in one-tenth of a degree (0.1°C) increments.
b. Press and release UP or DOWN keys to slowly change timer setting. Press and hold UP or DOWN keys to rapidly change the timer setting.
c. If not selecting the temperature value for ten (10) seconds, the controller will return to the main display and last set temperature value.

Step 3: Press the ENTER key to finish setting the SV1 temperature value

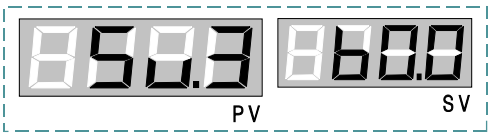
Step 4: Press the TEMP key one (1) time. The setting in the PV display will show SV2, and the SV display will flash..



Step 5: Press the UP key or DOWN key to set the desired temperature.

Step 6: Press the ENTER key to finish setting the SV2 temperature value

Step 7: Press the TEMP key one (1) time. The setting in the PV display will show SV3, and the SV display will flash.



Step 8: Press the UP key or DOWN key to set the desired temperature.

Step 9: Press the ENTER key to finish setting the SV3 temperature value

Step 10: Press the ENTER key to return to the main display

4.2.3.4 Selecting a memorized set point value to operate—preparation

Use the following procedure to select SV1, SV2 or SV3 as operating temperature once they have been set and memorized.

Step 1: Press the TEMP key

Times pushed	PV Display Shows Unselected	Previously Selected
2		
3		
4		

Step 2: Check the temperature setting in the SV display to ensure it is the one you want to select.
.

If not selecting the temperature unit for ten (10) seconds, the controller will return to the main display and last set temperature unit value.

Step 3: Press the ENTER key to finish selecting the rememorized temperature setting.

Step 4: Press the START/STOP key two (2) times operator the controller

4.2.3.5 Selecting a memorized set point value to operate—during operation

Use the following procedure to select SV1, SV2 or SV3 as operating temperature once they have been set and memorized.

Step 1: Press the TEMP key

Times pushed	PV Display Shows Unselected	Previously Selected
2		
3		
4		

Step 2: Check the temperature setting in the SV display to ensure it is the one you want to select.

If not selecting the temperature unit for ten (10) seconds, the controller will return to the main display and last set temperature unit value.

Step 3: Press the ENTER key to finish selecting the rememorized temperature setting. Upon pressing the ENTER key the controller will continue operating with the new set value.

Step 4: Press the ENTER key to return to the main display

4.2.4 Wait (Delay) Timer

4.2.4.1 Timer capabilities

The wait (delay) timer is a productivity tool and a safety device, which allows you to preset the start up and running times for unattended operation.
The wait-on (on-delay) timer delays the start of incubator temperature profile for a selected time. The wait-off (off-delay) timer shuts off the incubated shaker after the program runs for a chosen time.

When incubator and shaker are synchronized the wait off (off delay) timer shuts down all temperature and shaking programs.

The wait-on and wait-off timers can be combined to give you a complete unattended start up and shut down.

Example:

It is currently 5:00 PM and a completed culture is needed by 9:00 AM the next morning. It takes 4 hours for the culture to incubate at 35°C. The current chamber temperature is 25°C, and from a previous experiment you know the IS-971 will take approximately 15 minutes to raise the temperature to 35°C.

Place the culture in the incubator and set the Wait-On timer to 11 hours 45 minutes. Set the Wait-Off timer to 4 hours. Press the start key and return later to collect the culture.

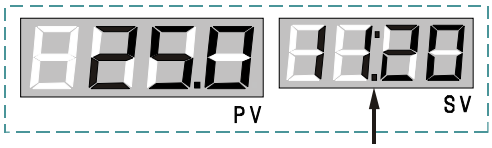
The timers count down and can be set from one (1) minute to ninety nine (99) hours and fifty nine (59) minutes (99:59) in one (1) minute increments. The factory timer setting is one (1) hour. Each occasion the timer is set the last setting will be displayed.

Minimum Timer Value

Maximum Timer Value

When the wait-on (on-delay) and wait-off (off-delay) timer starts, the following will occur:

- Timer setting will be shown in the SV display.

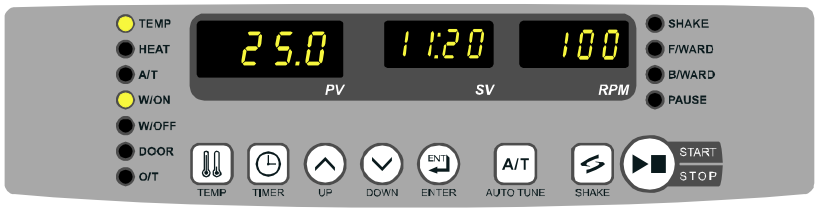


Blinks

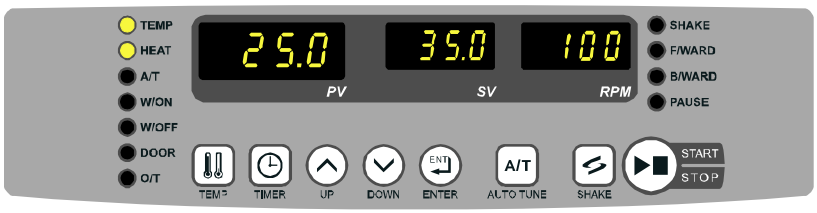
- Three (3) beeps will be emitted.
- And the colon (:) separating the hours and minutes will blink until timer expires.

When the wait-on (on-delay) timer expires the following will occur.

- A beep will be emitted.
- The set temperature will be shown in the SV display.
- And the W/ON LED will turn off.



During wait-on Timer



After wait-on Timer Expires

When the wait-off (off-delay) timer expires the following will occur:

- A beep will be emitted,
- The word stop will be shown in the PV display.

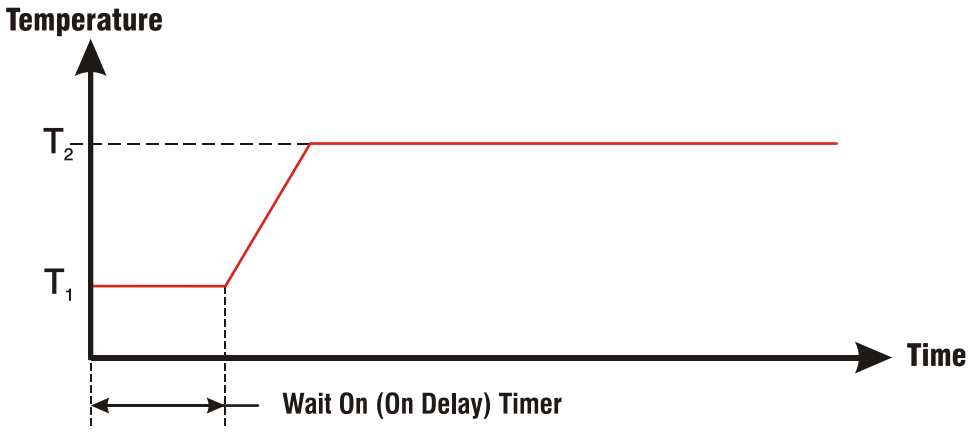
- And all LEDs will turn off.

The word ‘stop’ will remain in the PV display (as shown above) until the START/STOP key is pressed.

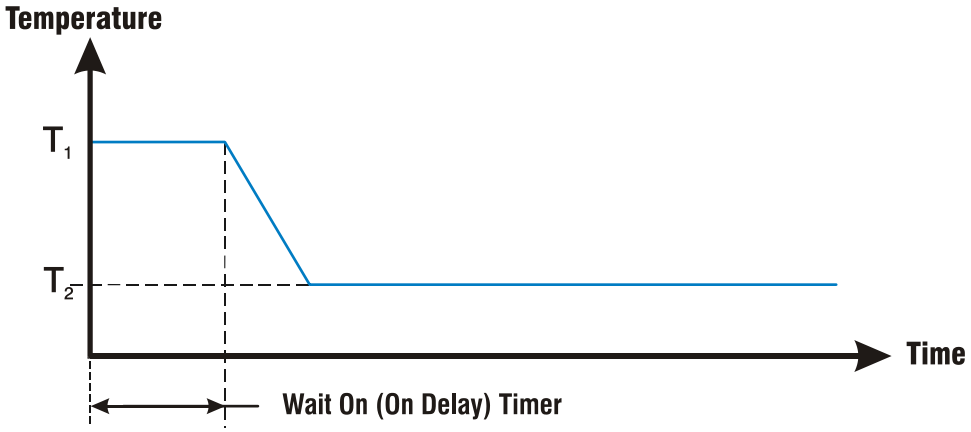
4.2.4.2 Setting wait-on (on-delay) timer

Use the following procedure to set and start the wait-on timer.

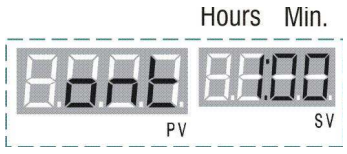
HEATING EXAMPLE



COOLING EXAMPLE



Step 1: Press the TIMER key one (1) time to display the Wait-On (On-Delay) Timer. The PV and SV screens will change to the following on the main display.



"ont" in the PV screen indicates the Wait-On (On-Delay) Timer is available to be set. The timer setting is shown in the SV display. The factory timer setting is one (1) hour. Each occasion the timer is set the last setting will be displayed.

Step 2: Press the UP key or DOWN key to change the timer to your desired setting.

a. Timer can be set from one (1) minute to ninety nine (99) hours and fifty nine (59) minutes (99:59) in one (1) minute increments.
b. Press and release UP or DOWN keys to slowly char hold UP or DOWN keys to rapidly change the timer set
c. If not selecting the timer value for ten (10) seconds, the controller will return to the main display and last set Wait-On Timer setting.

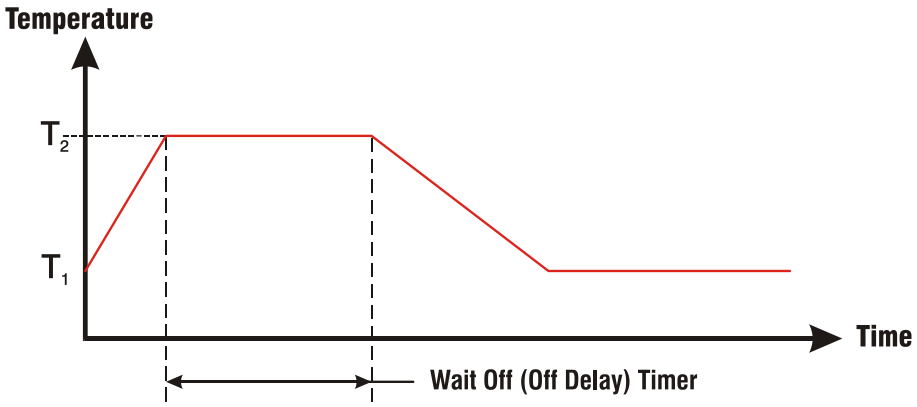
Step 3: Press the ENTER key to finish setting the timer. The W/ON LED will illuminate (as shown In Figure) and a beep will be emitted.

Step 4: Press the ENTER key to return to the main display. Press the START/STOP key to activate the timer and any other temperature and/or shaking parameters.

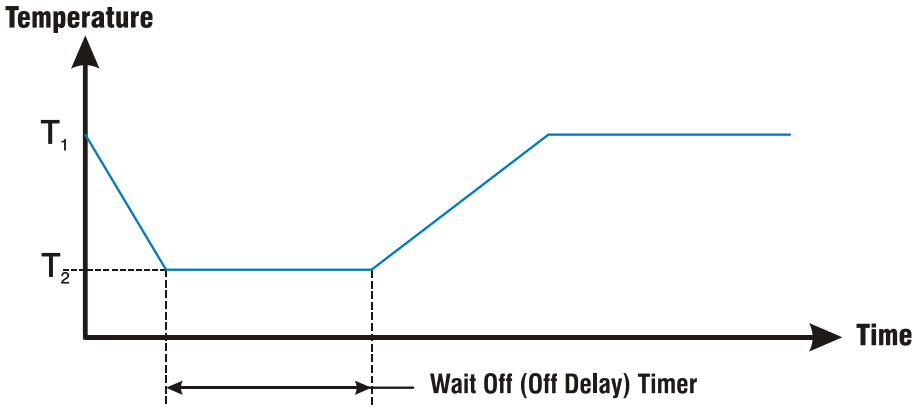
4.2.4.3 Setting wait-off (off-delay) timer

Use the following procedure to set and start the wait-off timer.

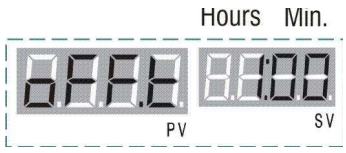
HEATING EXAMPLE



COOLING EXAMPLE



Step 1: Press the TIMER key two (2) times to display the Wait-Off (Off-Delay) Timer. The PV and SV screens will change to the following on the main display.



"oFF.t" in the PV screen indicates the Wait-Off (Off-Delay) Timer is available to be set. The timer setting is shown in the SV display. The factory timer setting is one (1) hour. Each occasion the timer is set the last setting will be displayed.

Step 2: Press the UP key or DOWN key to change the timer to your desired setting.

a. Timer can be set from one (1) minute to ninety nine (99) hours and fifty nine (59) minutes (99:59) in one (1) minute increments.
b. Press and release UP or DOWN keys to slowly change timer setting. Press and hold UP or DOWN keys to rapidly change the timer setting.
c. If not selecting the timer value for ten (10) seconds, the controller will return to the main display and last set Wait-Off Timer setting.

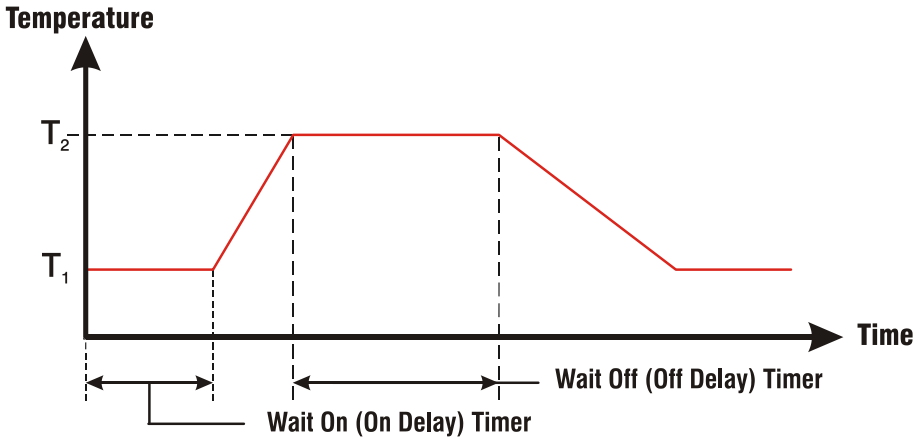
Step 3: Press the ENTER key to finish setting the timer. The W/OFF LED will illuminate (as shown in Figure) and a beep will be emitted.

Step 4: Press the ENTER key to return to the main display

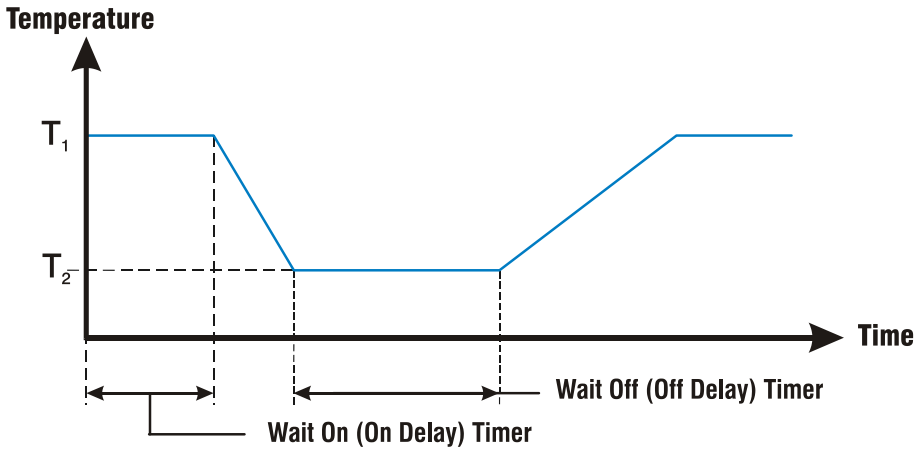
4.2.4.4 Setting the combined wait on and wait off (on and off delay) timer

Use the following procedure to set and start the combined timer

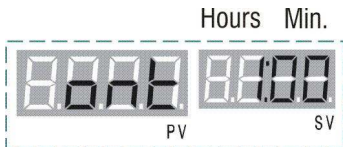
HEATING EXAMPLE



COOLING EXAMPLE



Step 1: Press the TIMER key one (1) time to display the Wait-On (On-Delay) Timer. The PV and SV screens will change to the following on the main display.



"ont" in the PV screen indicates the Wait-On (On-Delay) Timer is available to be set. The timer setting is shown in the SV display. The factory timer setting is one (1) hour. Each occasion the timer is set the last setting will be displayed.

Step 2: Press the UP key or DOWN key to change the timer to your desired setting.

a. Timer can be set from one (1) minute to ninety nine (99) hours and fifty nine (59) minutes (99:59) in one (1) minute increments.
b. Press and release UP or DOWN keys to slowly change timer setting. Press and hold UP or DOWN keys to rapidly change the timer setting.
If not selecting the timer value for ten (10) seconds, the controller will return to the main display and last set Wait-On and/or Wait-Off Timer setting.

Step 3: Press the ENTER key to finish setting the timer. The W/ON LED will illuminate (as shown in Figure on page 28) and a beep will be emitted.

Step 4: Press the TIMER key one (1) time display the Wait-Off (Off-Delay) Timer. The PV and SV screens will change to the following on the main display.

"oFF.t" in the PV screen indicates the Wait-Off (Off-Delay) Timer is available to be set. The timer setting is shown in the SV display. The factory timer setting is one (1) hour. Each occasion the timer is set the last setting will be displayed.

Step 5: Press the UP key or DOWN key to change the timer to your desired setting.

Step 6: Press the ENTER key to finish setting the timer. The W/OFF LED will illuminate (as shown in Figure) and a beep will be emitted.

At this time both W/ON and W/OFF LED lamps will be illuminated (as shown in Figure).

Step 7: Press the ENTER key to return to the main display

4.2.4.5 Cancelling wait on/off timer

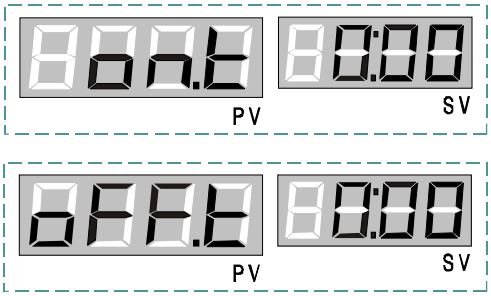
Use the following procedure to cancel the Wait-On Timer, Wait-Off Timer or both

Step 1: Press the TIMER key one (1) time to display the Wait-On (On-Delay) Timer.

Or

Press the TIMER key two (2) times to display the Wait-Off (Off-Delay) Timer.

Step 2: Press the UP key or DOWN key to until the timer reads 0:00 as shown below.



Press and release UP or DOWN keys to slowly change timer setting. Press and hold UP or DOWN keys to rapidly change the timer setting.
If not selecting the timer value for ten (10) seconds, the controller will return to the main display and last set Wait-On and/or Wait-Off Timer setting.

Step 3: Press the ENTER key to finish setting the timer

Step 4: Press the ENTER key to return to the main display

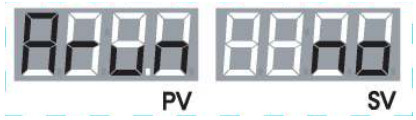
4.2.5 Setting Auto-run function

The incubated shaker's Auto-Run function is a productive and safety tool, which lets you:

- To automatically restart programs where they stopped when the power interruption occurred once power has been restored, or
- For safety purposes, require the operator to manually restart the programming once power interruption has been corrected.

Use the following procedure to change the auto-run status.

Step 1: Press the TIMER key three (3) times. The PV and SV displays will change to the following.



Step 2: Press the UP key or DOWN key to select 'YES' or 'NO'.

Selecting YES enables the unit to automatically restart operation upon restoration of power. Selecting NO makes the operator manually restart incubated shaker after restoration of power.

a. Auto-Run is factory set to NO.
b. If not selecting the fan speed for ten (10) seconds, the controller will return to the main display and last set fan speed value.

Step 3: Press the ENTER key to finish setting the auto-run function

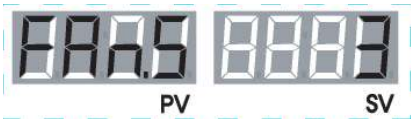
Step 4: Press the ENTER key to return to the main display

4.2.6 Setting chamber air circulation fan speed

The flow of air circulating throughout the incubator chamber can be controlled using this function. The fan speed is factory set at three (3)—the maximum velocity—for temperature uniformity. Decreasing the fan speed may cause unsuitable temperature uniformity.

Use the following procedure to change the air circulation fan speed.

Step 1: Press the TIMER key four (4) times. The PV and SV displays will change to the following.
.



Step 2: Press the UP key or DOWN key to change the air circulation fan speed

If not selecting the fan speed for ten (10) seconds, the controller will return to the main display and last set fan speed value.

Step 3: Press the ENTER key to finish setting the air circulation fan speed

Step 4: Press the ENTER key to return to the main display

4.2.7 Set Program

Multi Pattern program function is to make the unit can run the conditions what users want.
Not only users can set temperature, run time, numbers of segment but also total repeat numbers can be set.

Program pattern	
Max. input segment	9
Max. repeat numbers	200
Max. input time per segment	99:59 (99 hours:59 minutes)
Set temperature range per segment	SIF5000/6000 : Ambient plus 5℃ to 80℃ SIF5000R/6000R : Ambient minus 20℃ to 80℃

4.2.7.1 Understanding of the term for controller

The controller of this unit uses terms as below for setting programs.

Program
A Collection of each segment setting temperature and time.

Number of Repetitions (Loop)
Times to repeat the program

Segment, Prg.1~Prg.9
Program consists of each segment. Each segment can be set time and temperature, and they are displayed on the controller from Prg.1~Prg.9 in order.

Segment Run Time
Running time at setting temperature each segment.

When you set time at each segment, should consider time to reach the set temperature.
It moves to next segment after finishing setting time even it doesn't' reach the setting temperature. Therefore, please consider extra time to reach the set temperature.

Running time at each segment	
Temperature rising time	Running time after reaching set temperature

Running time at each segment	
Temperature decreasing time	Running time after reaching set temperature

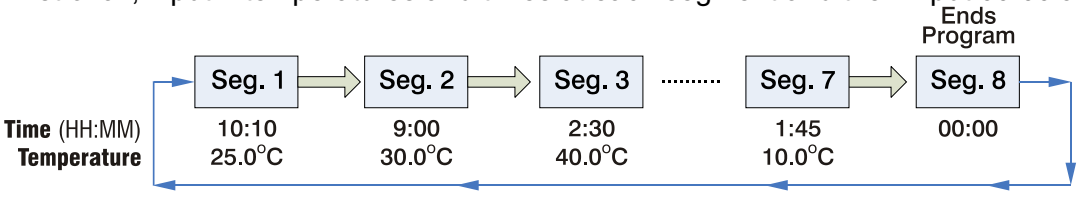
Phase (SEg.L)
If you input repeat numbers, it will operate from the specified segment after running all segments once.

4.2.7.2 Set program using Controller

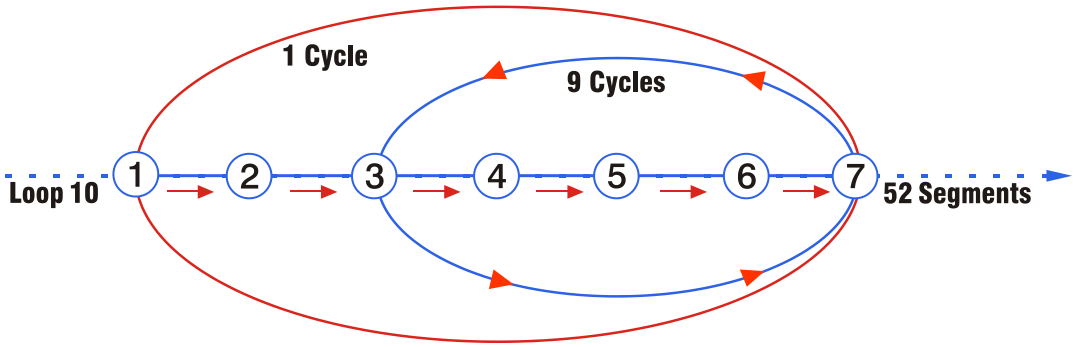
You can set a program as following

Example
One user wants to input 7 temperatures at each time and repeat it 10 times. For the first time, it will operate all from 1 segment to 7 segments, and then it will run from 3rd segment in seven segments during remaining 9 times.

First of all, input 7 temperatures and times at each segment and then input 00:00 at 8th segment.



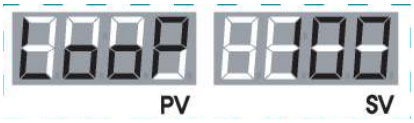
Input 3 at phase(Seg.L), and input 10 for total repeat numbers(Loop).



Program Run (10 Cycles)

Cycle 1: Segment 1 ~ Segment 7
Cycle 2-10: Segment 3 ~ Segment 7
Total: 52 Segments

Step 1: Press Timer button 5 times, PV and SV are displayed as below.



Step 2: Press Up/Down button to set total repeat numbers

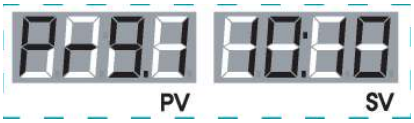
If you don't want to run program mode, input "O"

Step 3: Press Enter button to save. If you input 1 or more, PV and SV are displayed as below.

Step 4: Press Up/Down button to set SEg.L(phase) for assigning start segment for the second operating.

Step 5: Press Enter button to save.

SV and PV are displayed as below after pressing Enter button

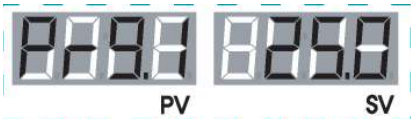


Step 6: Press Up/Down button to set time for the first segment.

Setting time range is from 1 min to 99hours 59 min. each time you press the button, 1min will increase or decrease.
When you keep pressing Up/Down button, setting time will be changed very rapidly.
If you don't change values for 10 sec, it will be initialized.

Step 7: Press Enter button to save the time.

After pressing Enter button, SV, PV will be displayed as below.

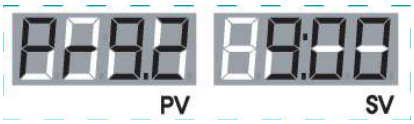


Step 8: Press Up/Down button to set temperature for the first segment.

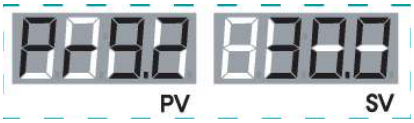
Temperature range is
amb+5℃~80℃(SIF5000/SIF6000),
amb-20℃~80℃(SIF5000R/SIF6000R),
each time you press the button, once the temp will increase or decrease by 0.1℃
When you keep pressing Up/Down button, setting time will be changed very rapidly.

Step 9: Press Enter button to save the temperature.

After pressing Enter button, SV, PV are displayed as below and then you can input time for second segment.



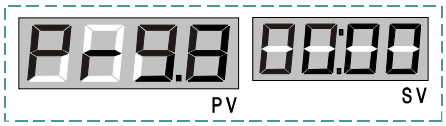
Repeat Step 6 and Step 7 to set the time for second segment.



Repeat Step 8 and Step 9 to set the temperature for the second segment.

Repeat Step 6 to Step 9 to set temperatures and times for all segments.
Max.9 segments can be set.

If you finish all steps as above, press “Enter” button. Then, PV and SV display 8th segment as below.



Step 10: Press Up/Down button to set time as 00:00

Step 11: Press Enter button to save the time 00:00

If time is entered 00:00, it will run until the previous segment. Even though you set time after 00:00, it will not be operated. As above example, it will run to 7th segment, and will not run 9th segment even if time is set.

Step 12: Press Enter button and then it returns to main screen

Or

Press Start/Stop button, it operates program mode.

4.3 Rotary and Rectilinear motion

This unit is designed to use both of rotary and rectilinear motion. It is fixed as Rotary motion from our factory, and you can exchange the mode easily as following process.

NOTICE

Do not force too much when you change or untighten bolts and spacer. It could be a cause of the system malfunction.

Necessary Tool

13mm Wrench

7mm Wrench

Step 1: Turn off the power of unit.

Step 2: Open the door to see the inside of chamber and remove all accessories including universal platform. And then you can see the shaking table.

Step 3: Remove wrench bolts and spring washer by 7mm wrench.

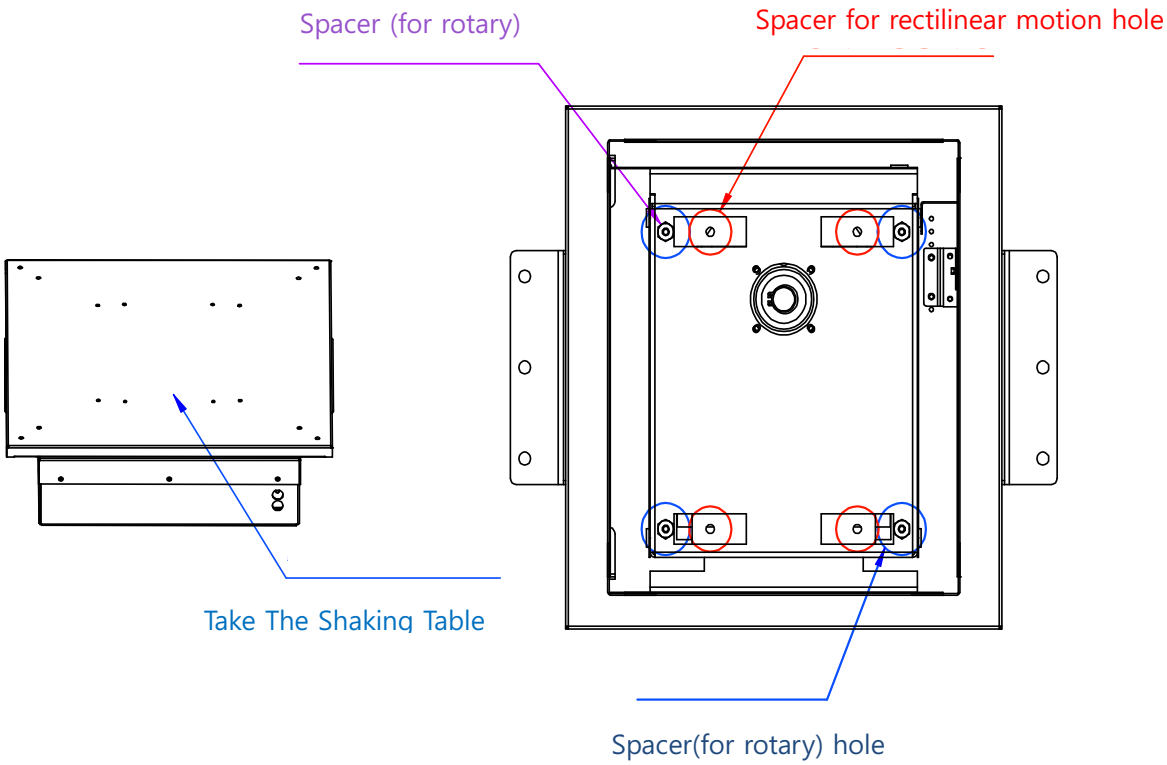
Step 4: Take the shaking table out from the system.

Step 5: Remove 4 ea spacer (for rotary) motion rotating counterclockwise by 13mm wrench.

Step 6: Fix the supplied spacer for rectilinear motion to lower side of the frame.

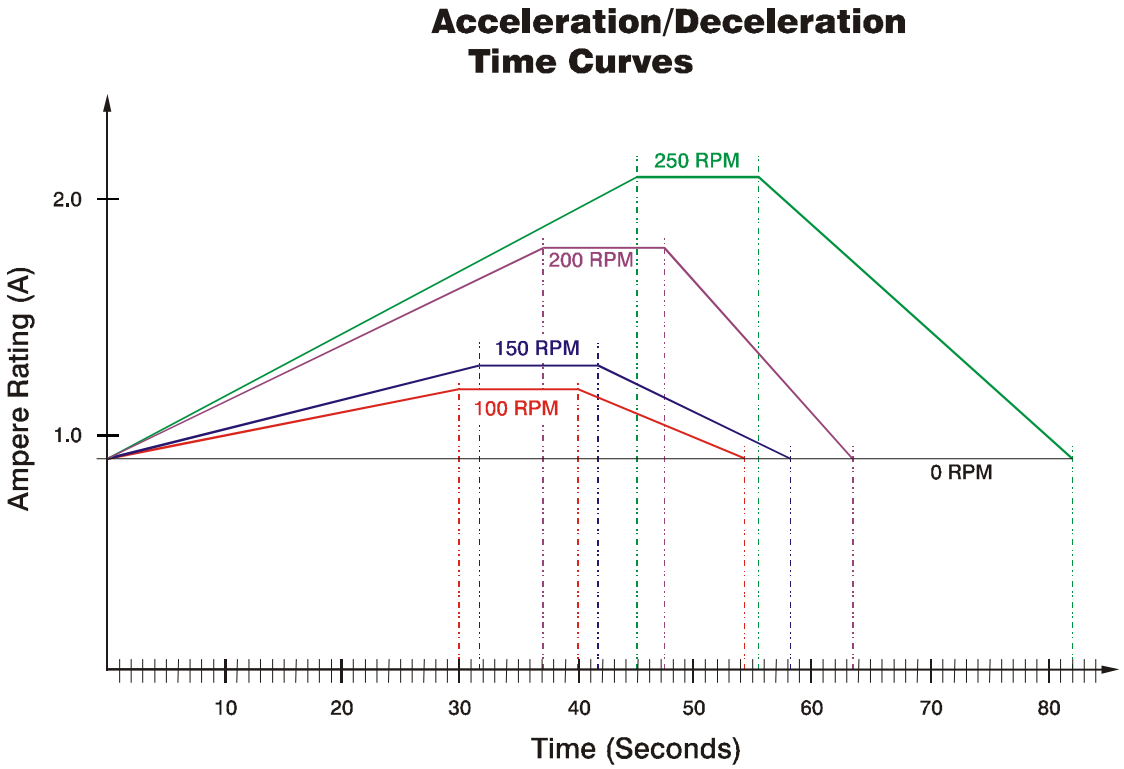
Step 7: Assemble the bolts and washer which were removed at step 3 to the outer hole of the shaking table.

Step 8: Changing the motion is done. Please power on and operate the unit.



4.4 Shaking Controller

4.4.1 Shaking accelerate/decelerate graph



The above drawing shows the times it will take to reach set RPM and to stop when you press Start/Stop button. This graph is only the result of testing 1 unit with 20kg loading, if you load more, if you stack up one unit more, the upper unit would be less 30~50rpm due to vibration.
However, this graph could have a difference depends on your environment like condition of floor, distribution of load so on.

This drawing is used as an important material when you set whole time using a shaking timer.
Because you can set timer by reaching rpm, when you set time, the time as above should be considered to use timer function correctly.

4.4.2 Set RPM

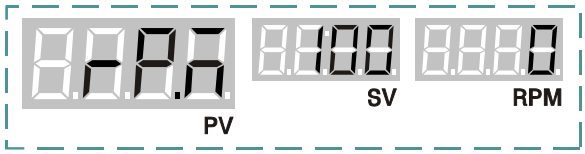
Rpm means revolution per minute of system. 1rpm means, shaking table rotates 1 time per 1 minute. Please check proper rotation numbers for the test condition before you attach sample in the chamber. Available Rpm is from 10 to 300 rpm.

You can set rpm not only when the unit stopped but also when it is working.

Please refer to the below for setting RPM

4.4.2.1 Set rpm (Unit stopped)

Step 1: Press Shake/set button to check RPM once. PV and SV show as below.



Step 2: Press Up/Down button to change rpm you want.

Step 3: Press Enter button to save the value

Step 4: Press Enter button to go back to main display. Press Start/Stop button, then, incubator and shaker start working at the same time. .

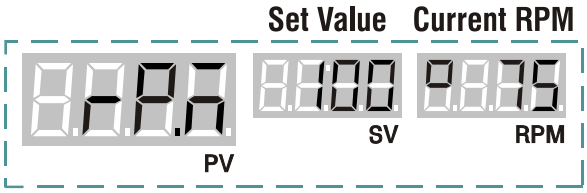
Or

When you press Shaker On/Off switch, only shaker start working.

If you don't input anything for 10 sec during changing RPM, the unit returns to start up screen and the previous value remains.

4.4.2.2 Set rpm (During operation)

Step 1: Press Shake/set button to check RPM once. PV and SV show as below



Step 2: Press Up/Down button to change rpm you want

Step 3: Press Enter button to save the value.

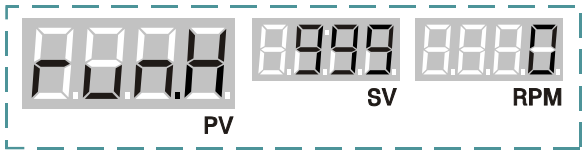
If you don't input anything for 10 sec during changing RPM, the unit returns to start up screen and the previous value remains.

4.3.3 Shaker “Delay Off” timer set

4.4.3.1 Set “Hour”

You can set timer for “Delay Off” function as following steps – “TIME” step of whole time.

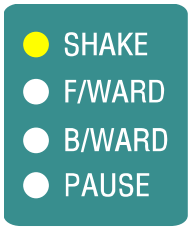
Step 1: Press Shake/Set button twice to set timer for “Delay off”
– (set “Hour” of whole time) PV and SV display as below.



Step 2: Press Up/Down button to input “time” of whole time.

Available set time range is 1 hour ~ 999 hours and each time you press Up/Down button, it will increase or decrease by 1 hour .
When you keep pressing Up/Down button, setting time will be changed very rapidly. If you don’t input anything for 10 sec, the unit returns to start up screen and the previous value remains.

Step 3: Press Enter button to save changed “time” of whole time.
It beeps and SHAKE LED light on as right figure.



Step 4: Press Enter button and return to main screen

4.4.3.2 Set “Minute”, “Second”

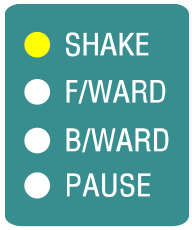
You can set timer for “Delay Off” function as following steps. – “Minute”, “Second” step of full time.

Step 1: Press Shake/Set button 3 times to set timer for “Delay off” – (“minute”, “second” of whole time) PV and SV display as below.

Step 2: Press Up/Down button to set “minute” and “second” of whole time you want

Available set time range is 10 sec ~ 59 minutes 59 seconds and each time you press Up/Down button, it will increase or decrease by 1 second .
When you keep pressing Up/Down button, setting time will be changed very rapidly. If you don’t input anything for 10 sec, the unit returns to start up screen and the previous value remains. .

Step 3: Press Enter button to save the value.
SHAKE LED light on as right figure with beep.



Step 4: Press Enter button and return to main screen.

The whole time of timer for “Delay off” is combined inputting hour step and minute/second step. If you input just one of steps, the SHAKE LED light on as above figure.

4.4.3.3 Set Time for Forward Rotation

The time of forward rotation during working of delay-off timer can be controlled by setting as following steps.

Step 1: Press Shake/set button 4 times to set time for forward rotation. PV and SV display as below.

Step 2: Press Up/Down button to input time you want.

Available set time range is 10 sec ~ 59 minutes 59 seconds and each time you press Up/Down button, it will increase or decrease by 1 second .
When you keep pressing Up/Down button, setting time will be changed very rapidly. If you don't input anything for 10 sec, the unit returns to start up screen and the previous value remains.

Step 3: Press Enter button to save the time. And then, F/WARD LED light on as right figure with beep.

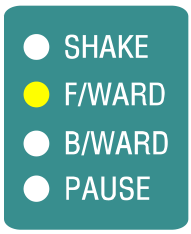
Step 4: Press Enter button to return to main display.
Press Start/Stop button, then shaker

And

incubator start run simultaneously with SHAKE, F/WARD LED light on.

Or,

if you press Shaker On/Off switch, only shaker runs with F/WARD LED light on.



4.4.3.4 Set Time for Backward rotation

The time of backward rotation during working of delay-off timer can be controlled by setting as following steps.

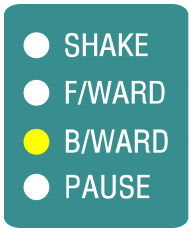
Step 1: Press Shake/set button 5 times to set time for backward rotation. PV and SV display as below

Step 2: Press Up/Down button to input time you want.

Available set time range is 10 sec ~ 59 minutes 59 seconds and each time you press Up/Down button, it will increase or decrease by 1 second .
When you keep pressing Up/Down button, setting time will be changed very rapidly. If you don't input anything for 10 sec, the unit returns to start up screen and the previous value remains.

Step 3: Press Enter button to save the time. And then, B/WARD LED light on as right figure with beep.

Step 4: Press Enter button to return to main display.
Press Start/Stop button, then shaker
And
incubator start run simultaneously with SHAKE, B/WARD LED light on.
Or,
if you press Shaker On/Off switch, only shaker runs with B/WARD LED light on.



4.4.3.5 Set Pause time

You can control the pause time during working delay-off timer by setting as following steps.

Step 1: Press Shake/set button 6 times to set pause time. PV and SV display as below

Step 2: Press Up/Down button to input time you want

Available set time range is 10 sec ~ 59 minutes 59 seconds and each time you press Up/Down button, it will increase or decrease by 1 second .
When you keep pressing Up/Down button, setting time will be changed very rapidly. If you don't input anything for 10 sec, the unit returns to start up screen and the previous value remains.

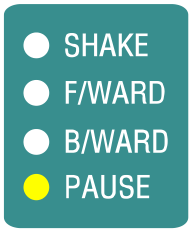
Step 3: Press Enter button to save the time. And then, PAUSE LED light on as right figure with beep.

Step 4: Press Enter button to return to main display.

Please press Start/Stop button if you want to stop setting up to now.
(but at least, one of F/WARD or B/WARD must be set)
Shaker and incubator start run simultaneously with SHAKE, B/WARD LED or F/WARD, and PAUSE LED lights on.

Or,

if you press Shaker On/Off switch, only shaker runs with F/WARD or B/WARD LED, PAUSE LED lights on.



PAUSE does not work if you only set time and pause during delay-off timer. F/WARD or B/WARD set is necessary.

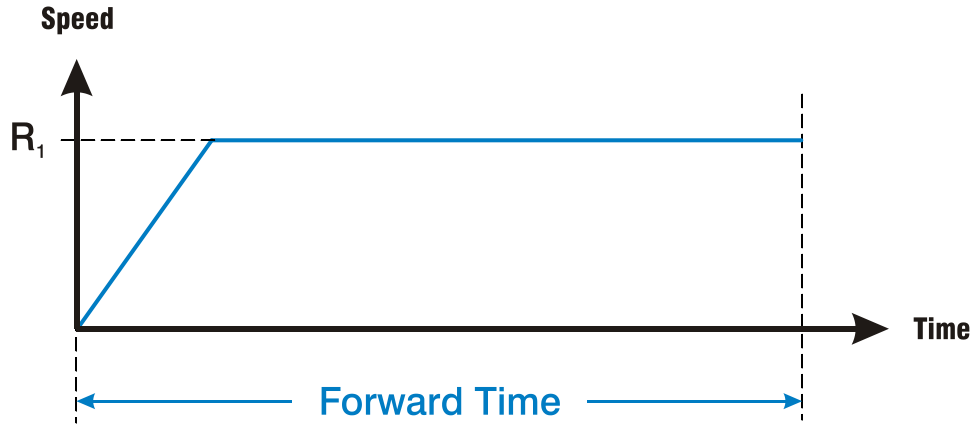
4.4.4 The kind of timers

This unit has 5 kinds of timers for delay off as below.

- General Operation
- Delay off timer including F/WARD or B/WARD.
- Delay off timer including F/WARD and B/WARD.
- Delay off timer including F/WARD or B/WARD and PAUSE.
- Delay off timer including F/WARD, B/WARD and PAUSE.

4.4.4.1 General Operation – F/WARD

It runs only forward rotation regardless the time. Start/Stop button or Shaker On/Off switch is used.



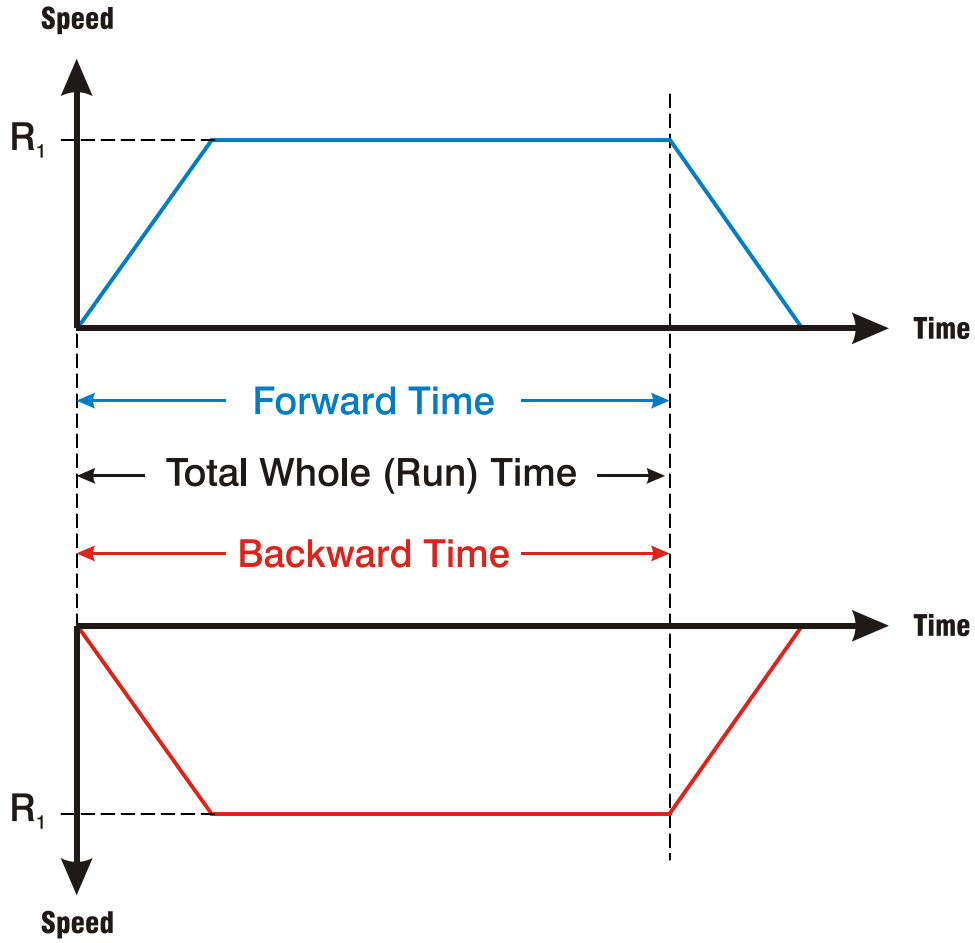
Step 1: Set rpm and then, press Enter button.

Step 2: The unit starts operating after pressing Start/Stop button.

SHAKER LED does not light on during general operation (regardless the time)

4.4.4.2 F/WARD or B/WARD Delay off timer

In this configuration, you can operate one of rotation forward or backward in a certain time. If you set whole time and forward(or backward) rotation time and press Start/Stop button or Shaker On/Off switch, the unit runs setting time and stop automatically even in your absence.



You can set whole time, F/WARD or B/WARD as following steps.

Step 1: Set rpm and press Enter button.

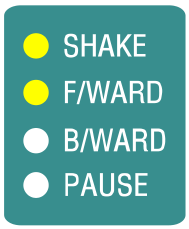
Step 2: Set 'Hour" or "Min/sec" of Shaker Delay off and press Enter button.

Step 3: Set F/WARD (or B/WARD) time and press Enter button.

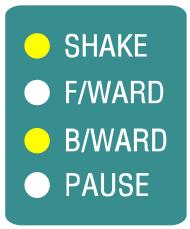
T To have an exact test result, the whole time and F/Ward (or B/Ward) rotation time should be the same at least. If the whole set time is less than F/Ward (or B/ward) rotation time, whole time set runs only, F/ward(or B/ward) set wouldn't be operated.

Step 4: Press Start/Stop button and the unit starts.

Setting the timer and press Start/Stop button,
Then, the LED is lit as shown at right.
SHAKE LED and F / WARD (or B/WARD) LED are blinking during timer working.



Timed
Forward
Agitation

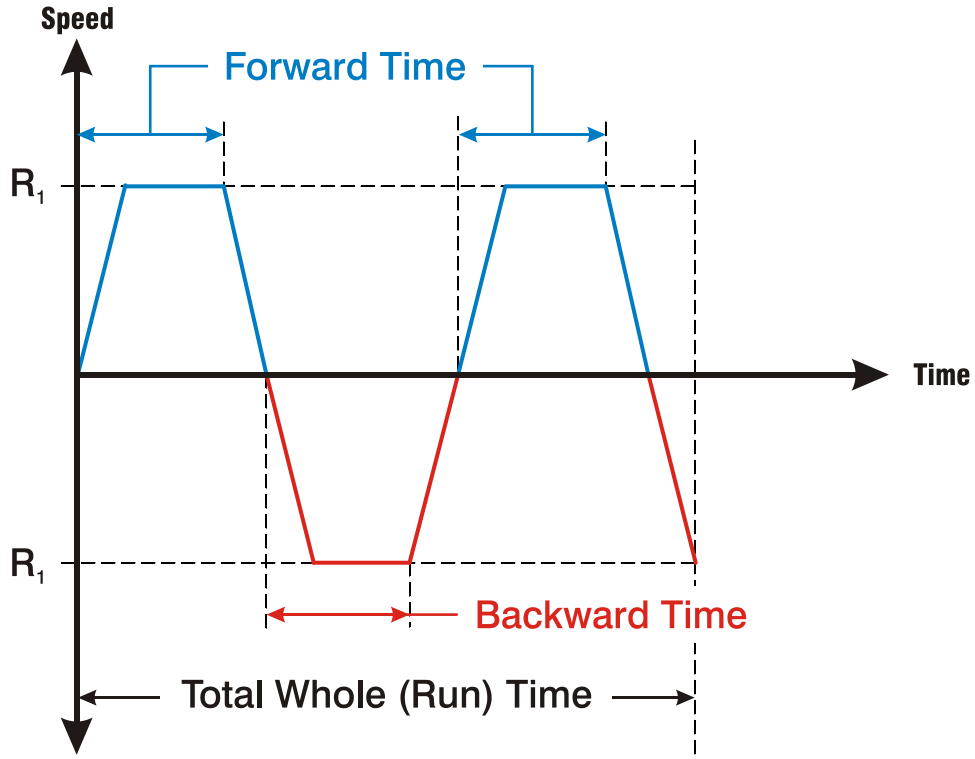


Timed
Backward
Agitation

4.4.4.3 Delay OFF Timer for F/WARD and B/WARD rotation

In this configuration, F/ward and B/ward rotation are operated step by step in a certain time. If you input whole time, F/ward, B/ward rotation time and press Start/Stop button or Shaker On/Off switch, the unit runs exactly what you saved and stop even in your absence.

The unit starts F/ward rotation first. The set time for F/ward rotation is finished then shaking table speed is decreased to stop. After stop, it starts accelerate for B/ward rotation. The set time for B/ward rotation is finished, then it decelerate and start F/ward rotation again. It will continue until the whole set time is finished.



You can set F/ward and B/Ward rotation program as following steps.

Step 1: Set rpm and press Enter button.

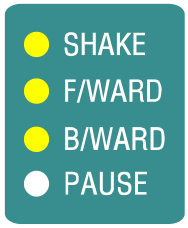
Step 2: Set “hour” or “min/sec” of Shaker delay off timer and then press Enter button.

Step 3: Set time for F/ward rotation and press Enter button.

Step 4: Set time for B/ward rotation and press Enter button.

Step 5: Press Start/Stop button and the unit operates.

After set the timer and press Start/Stop button, the LED lights on as shown. The SHAKE LED will be blinking until the timer working is finished and applicable working LED is blinking during timer working.

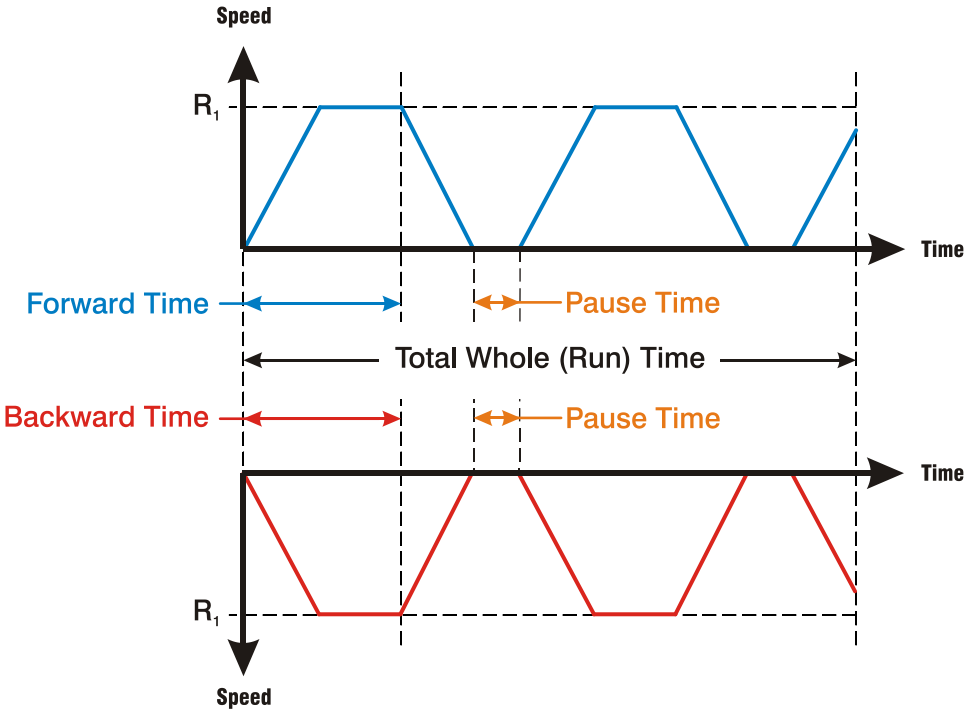


The opposite side LED is blinking while the shaking table speed is decelerated

4.4.4.4 Delay off timer including F/WARD or B/WARD and PAUSE

In this configuration, F/Ward rotation (or B/Ward rotation) and Pause can be operated step by step in a certain time. Set whole time, F/ward time (or B/ward time) and pause time and press Start/Stop button or Shaker On/Off switch, then, the unit will be operated what you saved and stop even in your absence.

The unit starts F/Ward (or B/Ward) rotation first. After finishing F/ward(or B/Ward) rotation time then, shaking table starts deceleration and pause after it stop. After finishing pause time, it starts operating F/ward rotation again. It continues until terminate whole time.



You can set program of whole time, F/ward rotation or B/ward rotation, pause time as following steps.

Step 1: Set rpm and press Enter button.

Step 2: Set “hour” or “min/sec” of Shaker delay off timer and then press Enter button.

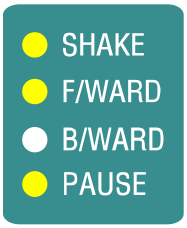
Step 3: Set F/ward time (or B/ward time) and press Enter button.

Step 4: Set pause time and press Enter button.

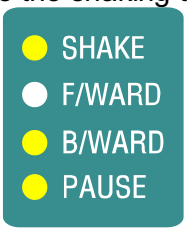
Step 5: Press Start/Stop button and the unit starts operation.

After set the timer and press Start/Stop button, the LED lights on as shown. The SHAKE LED will be blinking until the timer working is finished and applicable working LED is blinking during timer working.

The opposite side LED is blinking while the shaking table speed is decelerated



Timed
Forward + Pause
Agitation



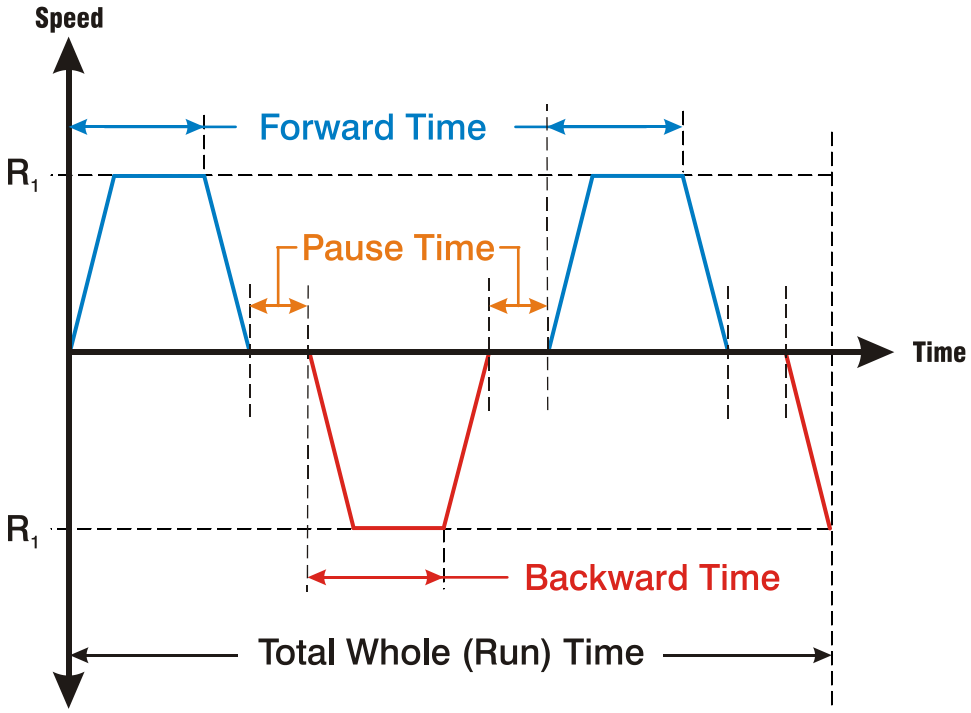
Timed
Backward + Pause
Agitation

4.4.4.5 Timed agitation with pause—forward and backward

This configuration provides the operator with timed oscillation between forward (clockwise) and backward (counterclockwise) agitation with pauses between agitation direction. Upon setting the whole, forward, and backward and pause timers and pressing the START/STOP key, the shaking timer controls the forward and backward agitation and stopping of the agitation for unattended operation.

Agitation begins in the forward (clockwise) direction. Upon timer expiration, the shaking table will decelerate. The pause timer begins when the shaking table stops. After the pause timer expires, the backward timer will begin and the shaking table will accelerate to the set speed. After the backward timer expires and the shaking table comes to a stop another pause cycle will begin. The agitation and pause cycling will continue until the whole (run) timer expires.

.



Use the following procedure to program this shaking (agitation) application.

Step 1: Set agitation speed. Press the ENTER key.

Step 2: Set Whole timer (Hours and/or Minutes:Seconds). Press the ENTER key.

Step 3: Set F/WARD timer. Press the ENTER key.

Step 4: Set B/WARD timer. Press the ENTER key.

Step 5: Set PAUSE timer. Press the ENTER key.

Step 6: Press the START/STOP key to begin agitation. Agitation continues until the whole timer expires.

Upon setting the timers and pressing the START/STOP key the following indicator LEDs will illuminate. During the timed agitation the SHAKE LED will flash during the total whole (run) time, and F/WARD (B/WARD) and PAUSE LEDs will flash during timing cycle.
As the shaking table decelerates the opposite rotation LED will flash.

4.4.4.6 Programming Precautions

When using the Timer function, set each set value, then must press Enter button to illuminate Display LED.

Even if illuminate SHAKE LED, the shaker doesn't operate when not illuminating the FORWARD LED or BACKWARD LED.

The shaker doesn't operate even if illuminating SHAKE LED and PAUSE LED.

If not setting the time, the shaker operates, the shaker repeats operation until pressing the START/STOP button.

Without insetting the set value by turns, illuminates the SHAKER LED. Press the button, the timer starts operating only the set value.

When pressing the button during the timer operation, able to re-input in the TIMER set time. Press Enter button, the shaker stops operating slowly and restarts following with the latest value.

If the shaker operates the whole time and FORWARD.
.

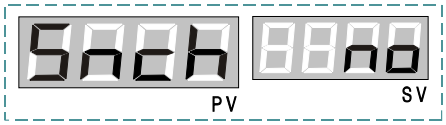
4.5 Incubator/Shaker Synchronization

4.5.1 Setting synchronization choice

Use the following procedures to change the incubator/shaker synchronization.

4.5.1.1 Preparation(Unit is stopped)

Step 1: Press the SHAKE/SET key seven (7) times. The following PV and SV displays will appear.



Incubator/shaker synchronization is factory set to no.

Step 2: Press the UP key or DOWN key to change the incubator/shaker synchronization.

Step 3: Press the ENTER key to finish setting your synchronization choice.

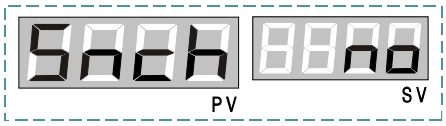
Step 4: Press the ENTER key to return to the main display

Or

Press the START/STOP key to activate any other shaking and/or temperature parameters.

4.5.1.2 During operation

Step 1: Press the SHAKE/SET key seven (7) times. The following PV and SV displays will appear.



Incubator/shaker synchronization is factory set to no.

Step 2: Press the UP key or DOWN key to change the incubator/shaker synchronization.

Step 3: Press the ENTER key to finish setting your synchronization choice.

4.5.2 Using shaker on/off switch

It is only for shaker to turn on and off (not related to incubator status)

4.5.2.1 Preparation (Unit is stopped)

Step 1: Input data follow step 1 to 3 based on Chapter 4.5.2.1

Step 2: Push the Shaker On/Off switch.

Step 3: Incubator is not activated and only shaker starts activating.

Step 4: Shaker would be stopped if Shaker On/Off switch is pushed again

4.5.2.2 During Incubator Operation

Step 1: Input data follow step 1 to 3 based on Chapter 4.5.2.1

Step 2: Push the Shaker On/Off switch.

Step 3: Shaker starts activating while incubator is working.

Step 4: Shaker would be stopped if Shaker On/Off switch is pushed again but Incubator is still working.

Example 1: If an user wants to check the status of process of cultivation, he can stop the machine shaking by pushing the shaker Off switch for a while. After checking the process, turn the shaker switch on to continue the cultivation process.

Example 2: If you don't want to use Incubator, turning the only Shaker on/off switch can be available

5.0 Preventive Maintenance

5.1 Inspection Cycle

CLASSIFICATION	INSPECTION TIME FRAME				
	DAILY	WEEKLY	MONTHLY	QUARTERLY	YEARLY
General					
Power cord					
Inspect power cord connection at unit and receptacle.	•				
Inspect power cord for wear, cracks or cuts.	•				
Surface cleaning		•			
Check condensate drain connections (SIF5000/6000)				•	
Check external refrigeration connections (SIF5000R/6000R)				•	
Incubator					
Air filter cleaning (SIF5000R/6000R)			•		
Auto-tune				•	
Calibration					
BIAS function					•
Thermocouple					•
Check temperature settings					
Current operating		•			
Memorized (SV1, SV2, SV3)					•
Programs					•
Check incubator/shaker synchronization settings	•				
Check wait timer settings and controller function				•	
Shaker					
Check accessory (ies) attachment screws to universal platform are tight.	•				
Check shaking table to platform screws are tight	•				
Check agitation RPM setting					•
Check shaking forward, backward, total timer setting and controller function				•	

5.2 Cleaning of Incubated Shaker

Regular cleaning of the incubated shaker is simply good practice. It preserves the surfaces, adds life to the incubated shaker and lets the incubated shaker run more efficiently. We recommend the unit be cleaned at least once a week. Please use the following instructions to clean your unit.

5.2.1 Interior surfaces

5.2.1.1 The normal condition

Step 1: Put anti-chemical gloves on and wipe out the inside of machine with a neutral detergent on soft patch.

Step 2: Wipe out the inside of machine with a neutral detergent on soft patch.

5.2.1.2 The condition of interior pollution

If the inside of machine is exposed and polluted by a toxic chemical and dangerous gas, wipe out carefully with following next steps

Step 1: Put anti chemical mask and gloves on.

Step 2: Wipe out the inside of machine slowly with dried patch.

5.2.2 Exterior surfaces

Step 1: Wet a patch into tepid water and wring it dry. Then clean the surface of machine by it.

Step 2: A neutral detergent would be relevant.

Step 3: Please clean up the controller panel with a dry patch like brushing away dust.

⚠WARNING

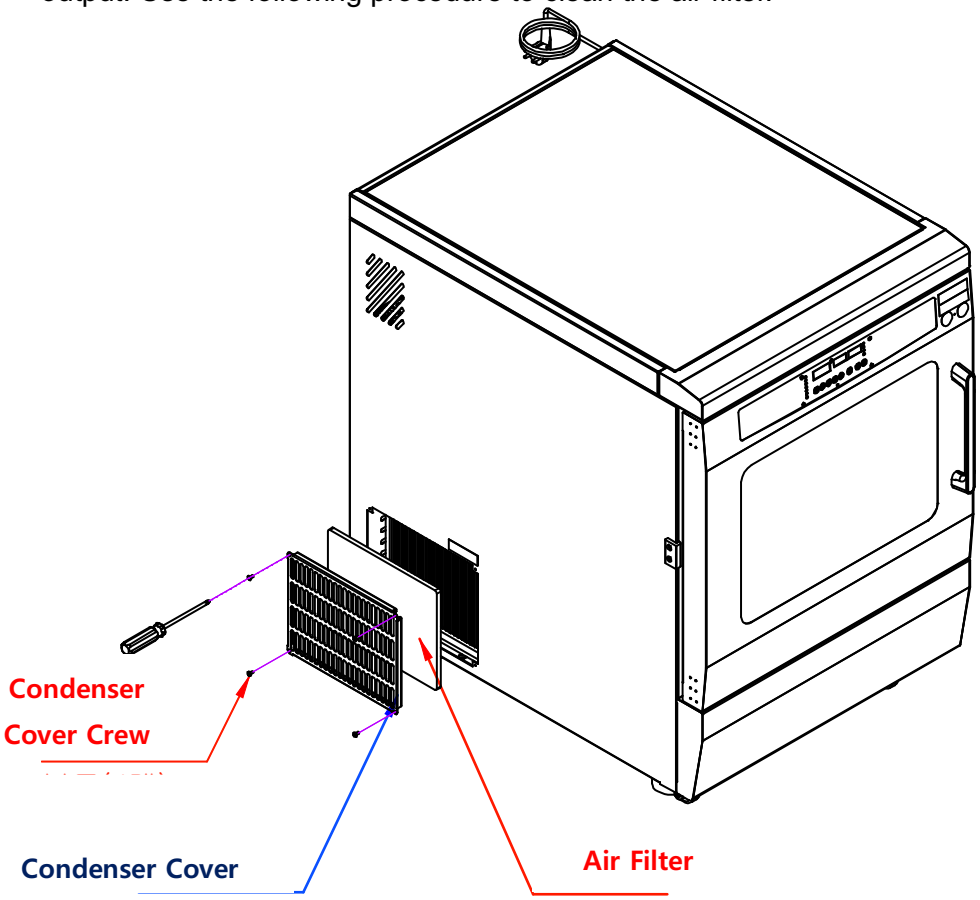
Sulfate, Hydrochloric acid or organic solvents can be
harmful on surface and reduce the life of machine.
Please do not use them for a clean

⚠WARNING

If you intend to clean the machine in other way, please
contact to the manufacturer for check before it begins.

5.2.3 Air filter (SIF5000R/SIF6000R)

A clean air filter is essential for the refrigeration system to run efficiently and maintain temperature output. Use the following procedure to clean the air filter.



Step 1: Press the POWER switch to turn the incubated shaker off.

Step 2: Remove the condenser cover screws with a Phillips screwdriver.

Step 3: Remove the condenser cover.

Step 4: Remove the air filter.

Step 5: Clean the air filter with a vacuum cleaner, compressed air or rinse with water.

Step 6: Check condenser and clean with a vacuum cleaner or compressed air as needed.

NOTICE

Take care NOT to bend condenser fins when removing and replacing air filter, and cleaning the condenser. Doing so will decrease the condenser's efficiency.

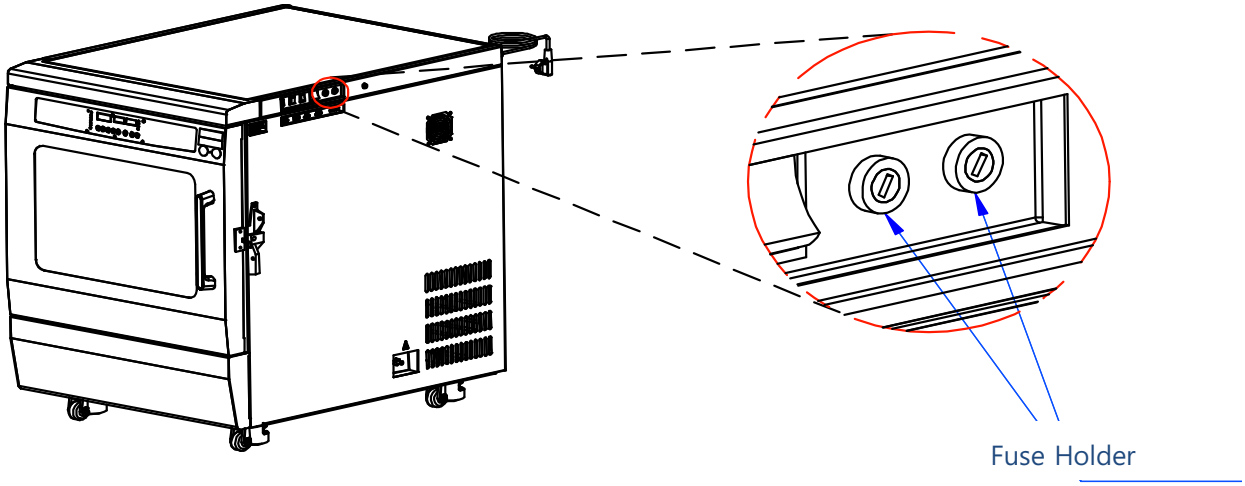
Step 7: Replace air filter using Steps 1 – 4 in reverse order.

5.3 Replacing Fuses

Each incubated shaker is supplied with two (2) spare fuses in case a fuse needs to be replaced.
Please store them in a location need the incubated shaker.
If you need additional fuses, use the following table to find the correct fuse part number and contact your local Jeio Tech office, or distributor to purchase.

MODEL	VOLTAGE	CURRENT DRAW (A)	FUSE(A)	NOISE FILTER (A)	FUSE PART NUMBER
SIF5000	100V~120V	9.6~ 11.1	12	15	00CDE0005542
	210V~250V	5.0 ~ 5.7	8	10	00CDE0005544
SIF5000R	100V~120V	11.4~ 12.9	15	15	00CDE0005541
	210V~250V	6.8 ~ 7.5	10	10	00CDE0005543
SIF6000	100V~110V	9.7~ 10.8	12	15	00CDE0005542
	120V	11.2	15	15	00CDE0005541
	210V~250V	5.0 ~ 5.8	8	10	00CDE0005544
SIF6000R	100V~120V	11.6~ 13.1	15	15	00CDE0005541
	210V~250V	6.9 ~ 7.7	10	10	00CDE0005543

Fuses are located at the right side of the incubated shaker near back of the switch. Use the following instructions to replace fuses.



⚠WARNING

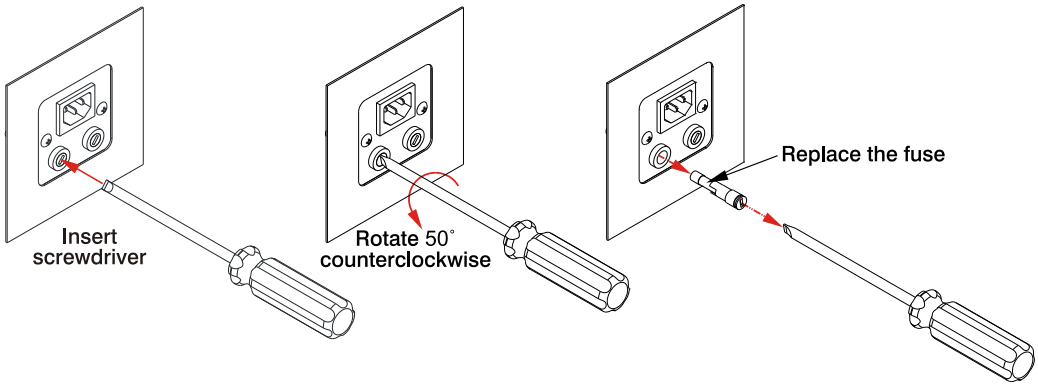
SEVERE SHOCK HAZARD.

Turn power OFF and disconnect electrical connections at the wall outlet and unit before servicing unit. Failure to do so could cause serious injury or death.

Step 1: Press the POWER switch to turn the incubated shaker off.

Step 2: Insert straight blade screwdriver into the fuse holder. Turn fuse holder 50 degree counterclockwise and pull the fuse holder out its socket.

Step 3: Replace blown fuse with new one. Compare fuse markings with the required fuse amp rating in the table 5.3 on page 113 before inserting new fuse in fuse holder.



Step 4: Complete steps 1 through 2 in reverse order. Make sure the unit is level when put back in its place.

5.5 Post Maintenance Checklist

Review the following checklist upon completing the tasks in Sections 5.2, 5.3 and 5.4 to ensure the unit runs properly.

- ✓ Make sure all unit and wall outlet electrical connections are tight.
- ✓ Make sure condense drain hose is tightly on hose barb and hose is run to a drain.
- ✓ Make sure external refrigeration hoses are tightly secured. (SIF5000, SIF6000 only and only if using external refrigeration feature.)
- ✓ Make sure caster feet are lowered and have locked the incubated shaker in place.
- ✓ Make sure unit is level side to side and front to back.
- ✓ Make sure the platform is locked onto the shaking table.
- ✓ Make sure the accessory(ies) are securely attached to the platform.
- ✓ Make sure all vessels are securely clamped.
- ✓ Make sure there are no flammable or explosive liquids in the incubation chamber.

6.0 Troubleshooting

6.1 Controller Fault Code

The controller's self-diagnostic function will identify any trouble. If the following error code appears in the PV display, please contact your local Jeio Tech office or the distributor from which the incubated shaker was purchased to request service.

6.2 Electrical

TROUBLE	CAUSES	SOLUTION
The unit stops running		Check the main power. Check the fuses by following the instruct ions in section 5.3. Check the RUN Led display is off. If the unit is off, press the START/STOP key to operate. Check the electrical circuit breaker.
The unit does not turn on	Incorrect electric power	Compare power source and voltage on the ID plate and make sure they are the same. ID plate is found on the right side of unit.
	Power failure or circuit breaker shuts down	Find out the causes of power failure and recovery.
	Main plug not seated properly.	Check the electrical cord connection at the unit to ensure it is fully seated.
	Socket / plug / main power line might be cut	If the socket / plug / main power line are cut, request service.
	Blown fuse(s)	Check the fuses and replace, if necessary, by following the instructions in section 5.4.
With the POWER switch ON, the main display does not illuminate.	The power plug is disconnected from the outlet.	Turn the POWER switch OFF, and insert the plug into an outlet.
	Blown fuse(s)	Blown fuse(s) Check the fuses and replace, if necessary, by following the instructions in section 5.4.
	Wiring harness, transformer, controller or display trouble	Request service.
With the POWER sw itch ON, the switch does not illuminate.	Power interruption	Check for power interruption.
	Main plug does not insert correctly	Make sure electrical cord connections at the outlet and the unit are firmly in place.
	Blown fuse(s)	Check the fuses and replace, if necessary.
	Faulty connection at the POWER switch	Request service.
	POWER switch malfunction	

TROUBLE	CAUSES	SOLUTION
If the unit stops operating because of Over Temperature	O/T LED is illuminated red.	If attributes red Knob of Over Temp. Limit to a (-) driver clockwise and presses one time of Start/Stop button after currently adjusting than temperature (PV) higher than 15%, red of O/T Led disappears, and a Beep sound disappears.
	Confirm whether a Beep sound rings continuously.	While Run LED and Heater LED are on if they press one time of Start/Stop button more, a machine operates again.
If the unit stops operating because of Door Limit Switch	Door LED is illuminated red.	Check whether Door LED is flickering due to opened door.
	Confirm whether a Beep sound rings	Confirm whether light reaches RUN LED after having pressed one time of START/STOP key.
Unit control stops, power instability, un stable or blinking display, or LED functioning improperly without cutting main power or pressing any buttons	Might be influenced by high frequency electrical noise.	Move the unit away appliances, SCR controller, induction heating systems, welders, or other equipment that may produce high frequency electrical noise. If the problem persists, request service.
Room circuit breaker trips often when the unit is turned on or running	Too many plugs connect at the same time	1. Check the circuit breaker size along with the voltage and current supplied to it. 2. Check that several similar units are inserted together, if so you should not use overly. 3. If the problems persists, request service.
Fuses burn out often	Fuses maybe wrong size (amperage)	Check the voltage and ampere rating of the fuses, contact Jeio Tech or reseller for correct fuses.
	Electrical cord maybe cut or frayed.	Check electrical cord for cuts or fraying, if found to be defective, contact Jeio Tech or reseller for new cord.
	Humidity might inflow into the main power inserting part	If there is humidity on the inserting part, clear it and reconnect.
With the POWER switch ON, the unit promptly shuts down.	Leak	Turn the POWER switch OFF immediately and request service.
The temperature doesn't decrease.	Confirm whether Temp LED is illuminated.	If Temp LED is not illuminated, press START/STOP key.

6.3 Refrigeration

TROUBLE	CAUSES	SOLUTION
The temperature doesn't decrease.	Check the TEMP LED is illuminated	Press the START/STOP key.
	Check the W/ON LED is illuminated	Release the Timer mode.
	Condenser maybe covers with dust.	Follow the instructions in section 4.2.5 to Check and clean the air filter.
	Chamber air circulation fan speed maybe set too low.	Follow the instructions in section 4.2.5 to check speed, and adjust to the highest setting.
The temp is unstable.	Check the PID value.	Auto-tune controller, refer to section 3.9.4.
Discrepancy between set temperature and present temperature.	Chamber air circulation fan speed maybe set too low.	Follow the instructions in section 4.2.5 to check speed, and adjust to the highest setting.
	Too many samples in chamber disrupting air circulation.	Reduce the number of samples in the chamber to improve air circulation.
	Check the revision value.	Follow the instructions in section 3.9.3 to calibrate the temperature probe and controller.

6.4 Shaker

TROUBLE	CAUSES	SOLUTION
Unit trembles during acceleration, deceleration and/or uniform velocity	The shaker is not level	Follow unit leveling instructions in section 3.4, if the problem persists request service.
	concentrated load	Evenly place samples inside the chamber, if samples are concentrated towards a corner of the chamber.
	Over load	Follow the instructions in section 8.3.2 to Adjust the amount of sample properly.
Makes bumping noise when operating	Interference, or loose RPM sensor or sensor mounting bracket	Request service.
	Interference of inner circuit lines	
	Drive system troubles.	
Discrepancy between set RPM and actual speed of the shaking table	Drive belt is loose.	Request service.
If the shaker stops operation by START /STOP	Check the incubated shaker synchronization setting, referto page.	Select “YES” as synchronization setting or press Shaker I/O switch to operate.
When the shaker speed is up or down, the display has any symptoms.	Check the unit location and Power.	Provide the main volt.

7.0 Accessories

7.1 Mountable maximum quantity

7.1.1 Universal Platform + Flask Clamp

Mode / Flask Clamp	SIF5000/5000R	SIF6000/6000R
50ml	36	55
100ml	28	44
125ml	28	44
250/300ml	13	24
500ml	10	16
1,000ml	5	8
2,000ml	4	5
2,800ml	2	4
4,000ml		2
6,000ml		2

7.1.2 Universal Platform + Funnel Clamp

Mode / Funnel Clamp	SIF5000/5000 R	SIF6000/6000R
250ml	4	6
500ml	2	3
1,000ml	-	2
2,000ml	-	-

7.1.3 Universal Platform + Microplate Holder

Model / Type	SIF5000/5000R	SIF6000/6000R
Single	8	15
Tower	6	10
Flat A(large)	-	2
Flat B(small)	2	3

7.1.4 Universal Platform + Test Tube Rack

Platform / Rack Angle	SIF5000/5000R	SIF6000/6000R
0˚~60˚	2	4

7.1.5 Test Tube Diameter and Mountable Test Tubes

Test tube diameter	Test tube quantity
8mm/10mm/11mm	86
12mm/14mm	58
15mm/16mm/17mm/18mm/19mm	32
20mm/22mm/25mm/28mm	19
30mm/35mm	10
50mm	4

7.1.6 Spring Wire Rack + Flask Clamp

Platform / Flask	SIF5000/5000R	SIF6000/6000R
50ml	16	25
100/125ml	9	16
250/300ml	4	9
500ml	4	5
1,000ml	2	4
2,000ml	1	2
2,800ml	1	2

※ About the right position for mounting maximum quantity of Accessories, please visit Jeio Tech website or contact our office and distributor.

8.0 Appendix

8.1 Technical Specifications

8.1.1 SIF5000/5000R

MODEL		SIF5000	SIF5000R	
Chamber volume		80L	80L	
Permissible environmental condition		Temperature 5℃ to 40℃, Maximum relative humidity 80%, Altitude up to 2,000m		
Controller		Digital PID Auto Tuning, 9step programmed control 200cycle		
Temperature	Range	Amb.+5℃~80℃	Amb.-20℃~80℃ [1]	
	Accuracy	±0.1℃ at 37℃ (at room temp. 25℃)		
	Uniformity	±1.0℃ at 37℃ (at room temp. 25℃)		
	Timer	Wait on time, Wait off time(Max. 99hr 59min, Min. 1min)		
	Sensor Type	Pt 100Ω		
Shaking	Motion	Orbital(forward, backward, pause):Standard, Reciprocating: Option		
	Frequency	10 to 300rpm / 10 to 250rpm(Stackable top)		
	Amplitude	19mm	25mm	
	Timer	Run time(999hr 59min 59sec) Pause, Forward, Backward(Max. 59min 59sec, Min. 10sec)		
	Driving System	Brushless DC motor with feedback control		
Material	Internal	Stainless Steel, 0.8t		
	External	Steel, 1.0t & 1.2t, powder coating		
	Platform	Anodized aluminum plate, 4.0t		
	Insulation	EPDM 25t		
	Lid	Viewing window in front opening		
	Heater	Incoloy, Fin Type (550W X 2EA = 1,100W)		
	Refrigerator	-	1/8 HBP	
Safety Device		CLS(Custom Logical Safe)-control system		
Over Temp. Limit		Hydraulic over temp. limit		
Print Interface		RS232		
Size (WXDXH)	Internal	440 X 440 X 418mm		
	External	570(600) X 815(850) X 900mm		
		570(600) X 815(850) X 1,735mm(Stackable)		
	Platform	350 X 350mm		
Electric requirements(230V)		50/60Hz 5.4A	60Hz, 7.2A	50HZ,7.2A
Electric requirements(120V)		60Hz, 11.1A	60Hz,12.9A	
Net Weight(kg)		120kg	130kg	

[1] At room temperature with 20℃ or more

8.1.2 SIF6000/6000R

MODEL		SIF6000	SIF6000R	
Chamber volume		150L	150L	
Permissible environmental condition		Temperature 5℃ to 40℃, Maximum relative humidity 80%, Altitude up to 2,000m		
Controller		Digital PID Auto Tuning, 9step programmed control 200cycle		
Temperature	Range	Amb.+5℃~80℃	Amb.-20℃~80℃[1)]	
	Accuracy	±0.1℃ at 37℃ (at room temp. 25℃)		
	Uniformity	±1.0℃ at 37℃ (at room temp. 25℃)		
	Timer	Wait on time, Wait off time(Max. 99hr 59min, Min. 1min)		
	Sensor Type	Pt 100Ω		
Shaking	Motion	Orbital(forward, backward, pause):Standard, Reciprocating: Option		
	Frequency	10 to 300rpm / 10 to 250rpm(Stackable top)		
	Amplitude	25mm	38mm	
	Timer	Run time(999hr 59min 59sec) Pause, Forward, Backward(Max. 59min 59sec, Min. 10sec)		
	Driving System	Brushless DC motor with feedback control		
Material	Internal	Stainless Steel, 0.8t		
	External	Steel, 1.0t & 1.2t, powder coating		
	Platform	Anodized aluminum plate, 4.0t		
	Insulation	EPDM 25t		
	Lid	Viewing window in front opening		
	Heater	Incoloy, Fin Type (550W X 2EA = 1,100W)		
	Refrigerator	-	1/6 HBP	
Safety Device		CLS(Custom Logical Safe)-control system		
Over Temp. Limit		Hydraulic over temp. limit		
Print Interface		RS232		
Size (WXDXH)	Internal	540 X 540 X 518mm		
	External	670(700) X 895(930) X 980mm		
		670(700) X 895(930) X 1,894mm(Stackable)		
	Platform	450 X 450mm		
Electric requirements(230V)		50/60Hz 5.4A	60Hz, 7.3A	60Hz, 7.3A
Electric requirements(120V)		60Hz, 11.2A	60Hz,13.1A	
Net Weight(kg)		140kg	150kg	

[1)]At room temperature with 20℃ or more

8. 2 Maximum rpm per model

8.2.1 Test condition

The following tables show the load and rotational speed for various loads the shaker can achieve at each of the agitation amplitudes. However, the greatest impact on this test results is the floor condition. The larger the coefficient of friction the floor gets the better results you get. Otherwise the result can be achieved much less.

The floor that the shaker is tested on for below results is a typical factory flooring materials (liquid hardener, powder hardener, epoxy paint, epoxy lining, etc.)

Weight condition is the sum of accessories (flask clamps, etc ...), flasks and the weight of the sample in a flask

8.2.2 Result

Model / Load	SIF5000/5000R (13mm)	SIF5000/5000R (19mm)	SIF6000/6000R (19mm)	SIF6000/6000R (25mm)
0kg	300	300	300	300
6.5kg	300	300	300	300
13.0kg	290	280	280	260
19.5kg	250	240	240	220
26.0kg	230	220	220	200

unit : rpm

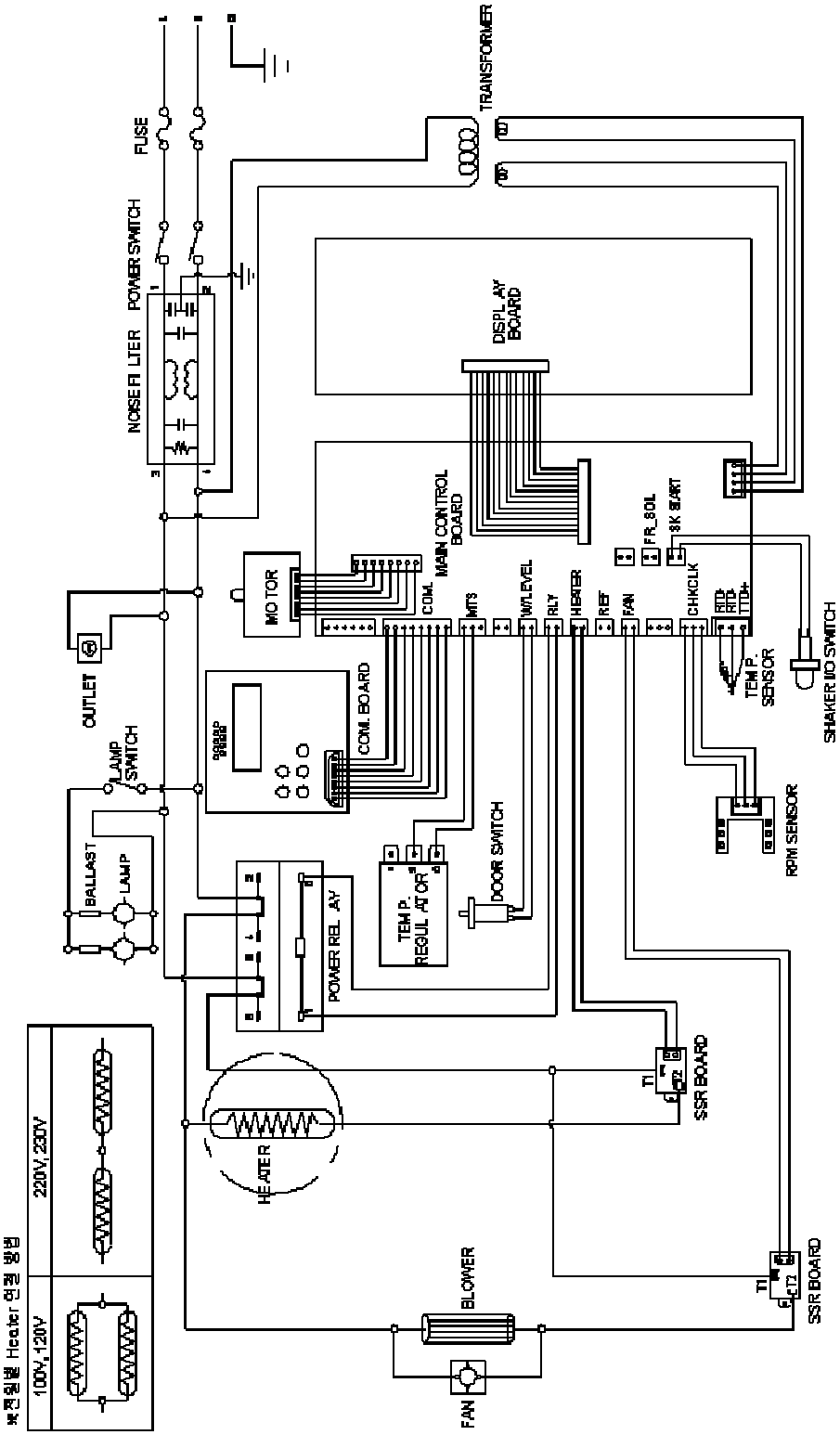
8.2.3 Attention

It may cause damage to floor paper when loading more than 21.5kg on the floor with normal floor paper.

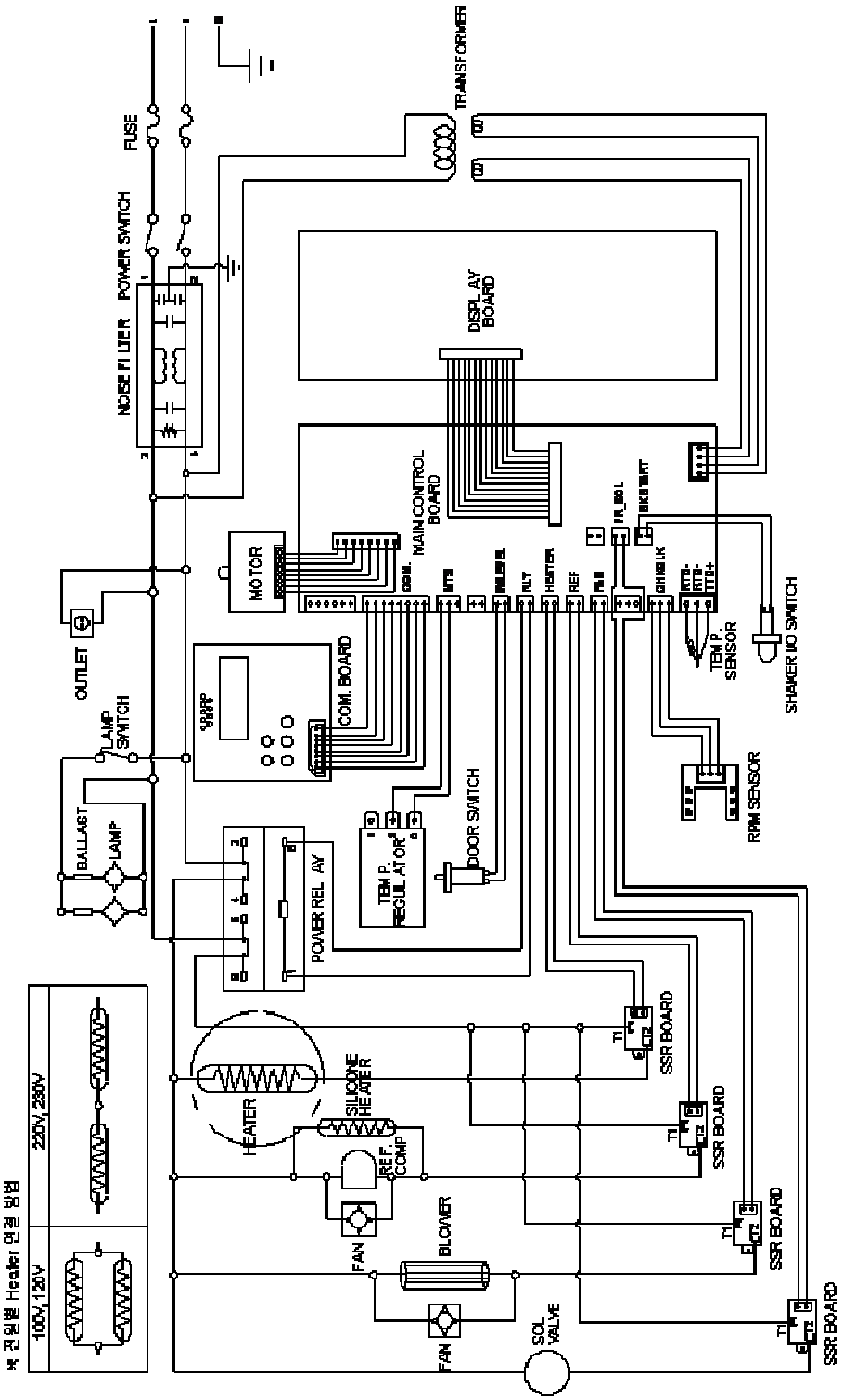
When two units are loaded, the above one will have the result which approximately 30~50rpm less than above results.

8.3 Circuit Diagrams

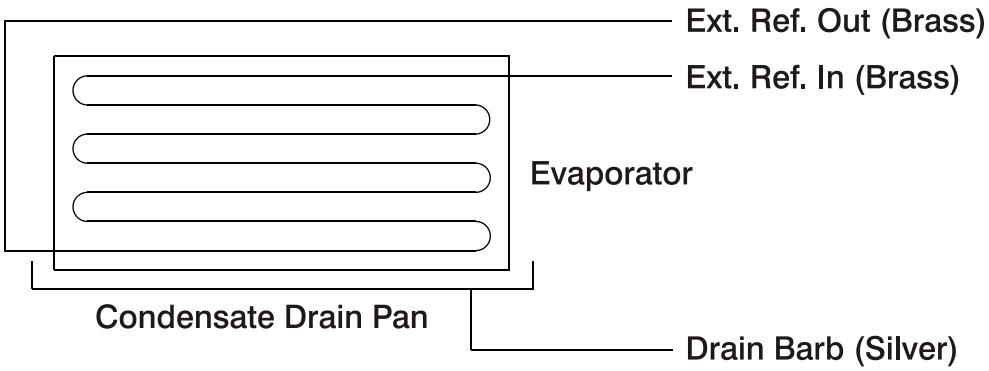
8.3.1 Electrical (SIF5000/SIF6000)



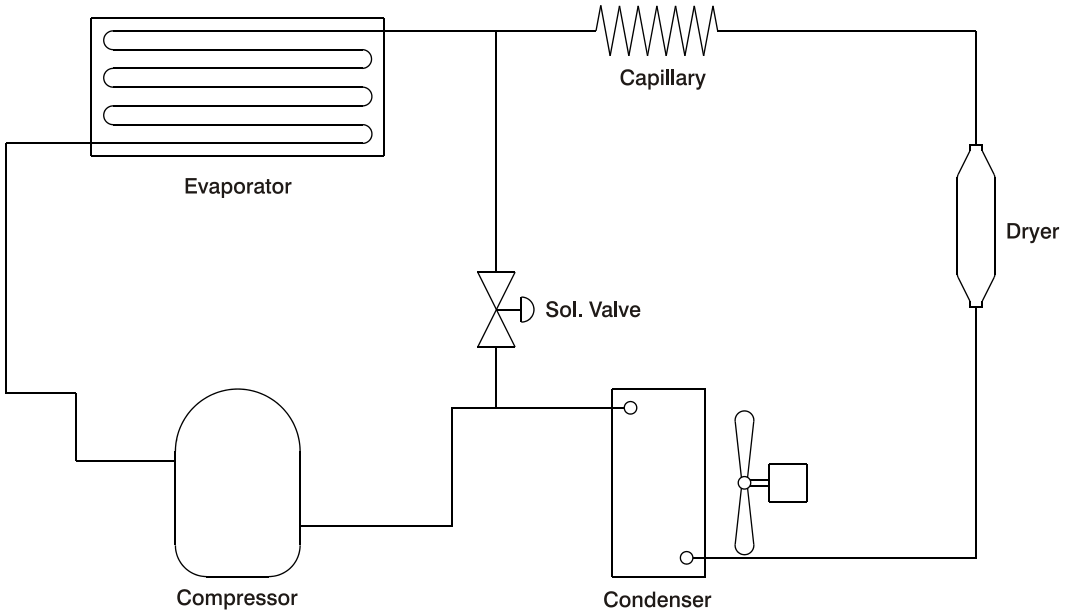
8.3.2 Electrical (SIF5000R/6000R)



8.3.3 External refrigeration (SIF5000/SIF6000)



8.3.4 Internal refrigeration (SIF5000R/SIF6000R)



8.4 Replacement Parts List

When ordering replacement parts or requesting service information, Please provide the Model Number and Serial Number of the unit.

PART NAME	DESCRIPTION	QUANTITY	CODE NUMBER
Lamp	13W, PL-S, Three-wavelength	1 EA	00CHE0004412
Filter	12t X 272 X 216	1 EA	00EDA0009128
Spacer	Reciprocation type	4 EA / Set	00EFA0005125
Fuse	65TL, 15A	1 EA	00CDE0005541
	65TL, 12A	1 EA	00CDE0005542
	65TL, 10A	1 EA	00CDE0005543
	65TL, 8A	1 EA	00CDE0005544

8.5 Disposing of Incubated Shaker

Before disposing of the incubated shaker or any of its components:

1. The equipment should be cleaned and decontaminated to protect workers servicing the equipment, the environment or the public purchasing surplus equipment because the incubated shaker can potentially be contaminated with biological material, chemicals or radioisotopes. Check with your institution or laboratory for individual policies and procedures for disposal of laboratory equipment.

2. Please contact your local governing body for regulations regarding disposal of electrical, electronic, metal (brass, aluminum, steel and stainless steel), refrigeration and rubber components. Jeio Tech recommends the user find a local scavenger or laboratory equipment recycler to properly dispose of the unit and its components.

8.5 Warranty

8.5.1 Terms of Warranty Service

Customer can get free warranty service for 2 years limited warranty from the date of purchase when the machine is broken while operating.

8.5.2 Warranty Exceptions

Customer can't get free warranty service in case of as below.

1. If the machine is broken due to the Act's of God.
2. If the machine is broken due to overuse of voltage.
3. If there is some shock to the machine.
4. If the outer part is damaged by solvent.
5. If the machine is broken without taking care of the "Notice" alerted on the manual.
6. If persons who are not under the authority of service of Jeio tech fixed or changed parts of the machine.
7. If the broken machine is due to customer's fault.

8.5.3 How to Request Services

If you face troubles during operating a product, please fill a service application as below and contact headquarters or authorized agents for the fast and accurate repair.

1. Purchase date
2. Customer name / Address / Telephone NO. / E-mail Address
3. Serial Number (Serial number on Identification plate)
4. Defect and trouble

8.5.4 Product Return Procedures

If you want to return the product due to transportation-related corruption and other reasons, please receive a return authorization number from the authorized agent which you purchased the product. When you return a product, please fill the return service application as below and send it to headquarters or authorized agents.

1. Purchase date
2. Customer name / Address / Telephone NO. / E-mail Address
3. Serial Number (Serial number on Identification plate.)
4. Forwarder's information
5. Return Authorization Number
6. Reason of Return

8.6 Technical Assistance

➢ **International Sales Head Office (Korea)**

#1005, Byucksan Digital Valley 6-Cha, 481-4 Gasan-Dong, Geumcheon-Gu, Seoul 153-704, Korea

Tel: +82 2 2627 3816 **E-mail:** overseas@jeiotech.com

FAX: +82 2 3143 1824

➢ **The Americas (U.S.A. Branch)**

1-A Gill St. Woburn, MA 01801, U.S.A.

Tel: +1 781 376 0700 **E-mail:** info@jeiotech.com

FAX: +1 781 376 0704

➢ **Europe (U.K. Branch)**

Unit 3, Tower Industrial Park, Chalgrove, Oxfordshire, OX44 7XZ, United Kingdom

Tel: +44 1865 400321 **E-mail:** labcompanion@medlinescientific.com

FAX: +44 1865 400736

➢ **China (Shanghai Branch)**

A-2113 Oriental International Plaza, 85 LouShanGuan Rd, Changning District, Shanghai, China 200336

Tel: +86-21-5108-9161 +86 21 3251 1086 **E-mail:** longjuncao@jeiotech.com

FAX:+86 21 3251 1083

➢ **South East Asia (Malaysia Branch)**

No 57-59, Jalan Adenium 2G/6, Pusat Perniagaan Adenium, 48300 Bandar Bukit Beruntung, Selangor Darul Ehsan , Malaysia

Tel: +60 3 6028 5833 +60 3 6028 5825 **E-mail:** labcomp@streamyx.com

FAX: +60 3 6028 5822

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