Lab Companion

Operating Manual

Shaking Incubator

Model : IST-3075, IST-4075, IST-3075R, IST-4075R

Menual no. : XXXXXXXXXXX

JEIO TECH

Lab Companion

⚠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.

We are doing best for customer's satisfaction.

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CONTENTS

1 Safety

1.1 How to use the manual

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

1.2 Symbols used in this Manual

(1) The alert marks are for safety operation and protect user and instrument from Damage.
(2) 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.
(3) Pay attention enough to the contents of alert marks.

Signal word panels	Uses
⚠ 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 Exemption for responsibility

(1) The claim which is out of the quality guaranteed by the manufacturer is out of manufacturer's responsibility.
(2) The damage which is from unexpected fault or damage of user by Acts of God is out of Manufacturer's responsibility

1.4 Warning statement

⚠WARNING
Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Please use the product in safety facility installing laboratory in case of accident.

Installed the product on durable and flat surface.

Please, make sure safety equipment with relevant provision before handling the sample

which may cause flammable or toxic gases.

Do not use the machine near to places where explosion can be happened due to organic evaporating gases.

Explosive materials: Acid, Esther, Nitro compound

Inflammable materials: salt peroxides, inorganic peroxide, salt acids.

Do not use the machine at places where moisture is high and flooding can be happened.

Please check and connect properly -the voltage, phase and capacity of power supply on the ID plate before installation.

Be sure to install a separate power wiring and use a dedicated power supply.

Power supply must be properly grounded.

Abnormal grounded connection causes serious damage. Grounded connection must not be on the water pipe and gas pipe.

Put off the power plug if some sounds and burning smell, smokes are happened. And request the service

Stop the product operation and request service.

Do not assemble, repair, modify on your own.

The product may not work well and electric shock in the efficiency of the product. Also you cannot get after service by warranty regulation

1.5 Caution statement

⚠ CAUTION
Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

Be sure to disconnect the power after turning off the power switch.

This is the safety regulation for next user.

Do not put heavy things on the power line. Do not put the machine on the line.

It may take off the wire coating and causes the electric shock or fire.

Do not touch it with wet hands and put the main plug correctly.

It may cause the electric shock or injuries.

Do not inject any liquid and inflammable things inside of product.

Do not let the product take any strong shock or vibration.

It causes abnormal operation or trouble. It may deteriorate the ability of the product and not obtain correct results.

Do not install the stirrer neat machinery generating high frequency noise.

Please avoid installed from high frequency- welding machine, sewing machine, and mass SCR controller

Do not sprinkle insecticide or flammable spray on the product. Use smooth cloths.

Cleaning with solvent can cause fire and deformity.

Please power off while product cleaning.

It may cause the electric shock or fire.

Wear protective gloves.

Wear eye protection.

No water

No corrosive

Electrical shock.

Flammable

Foot crush.

Hand crush or pinch.

Lifting hazard.

Do not take the device apart deliberately.

2 Functional Description

2.1 Introductions

The cultivation environment such as temperature, pH, oxygen concentration, nutrition supply have a significant impact on cell cultures of animals and plants or proliferation of microorganisms.

This incubated shaker is to provide a suitable environment for the cultivation through controlling constant temperature and shaking speed.

The main uses of this device are as below:

- Cell culture
- Extractions
- Solubility studies
- Hybridization
- Plasmid purification
- Protein expression

2.2 Features

2.2.1 High Performance

(1) Precise and fast temperature / shaking speed control is available by microprocessor PID feedback control. PID feedback control ensures the same experimental environment conditions for the user. The device's deviation of set temperature and set rpm are each under ± 0.1 ℃ (standard: 37 ℃), ± 1% (standard: set rpm) which are regarded as very

precise value. If the deviations go above a certain level, alarm will be activated to the user.

(2) Control range of temperature and stirring speed is wide. Temperature control up to 80 ℃ and stirring speed control up to 500rpm are available to provide users wider experimental conditions.

(3) Optimizing the structural design of the product enables stable shaking even with heavy load. Low center of gravity minimizes noise and vibration.

(4) The accurate temperature control is available on the three temperature points. At the three points, the user adjust the temperature as same as the external calibration sensor.

2.2.2 Advanced Convenience

(1) Touch LCD built user-friendly interface. LCD provides intuitive operation status check and easy operation.

(2) Timer and operation time check of shaking performance is available. Setting and checking the value is available up to 999 hours and 59 minutes.

(3) Convenient sample monitoring without affecting inside environment thanks to the three side transparent acryl lid with bright LED lamps.

(4) Sturdy and light-weight acryl lid for effortless opening and closing the door.

(5) Not only the conventional RS-232 port but also USB port is provided so it is easy to control the unit with PC.

(6) By providing an automatic power failure recovery, even if the product gets power back after a momentary power failure, the auto run function automatically runs the product.

(7) This equipment is more convenient when mounting / desorption of the sample. When

shaking performance, operation always starts and stops at a specified location, the platform is fixed to easily replace the sample.

2.2.3 Advanced Safety

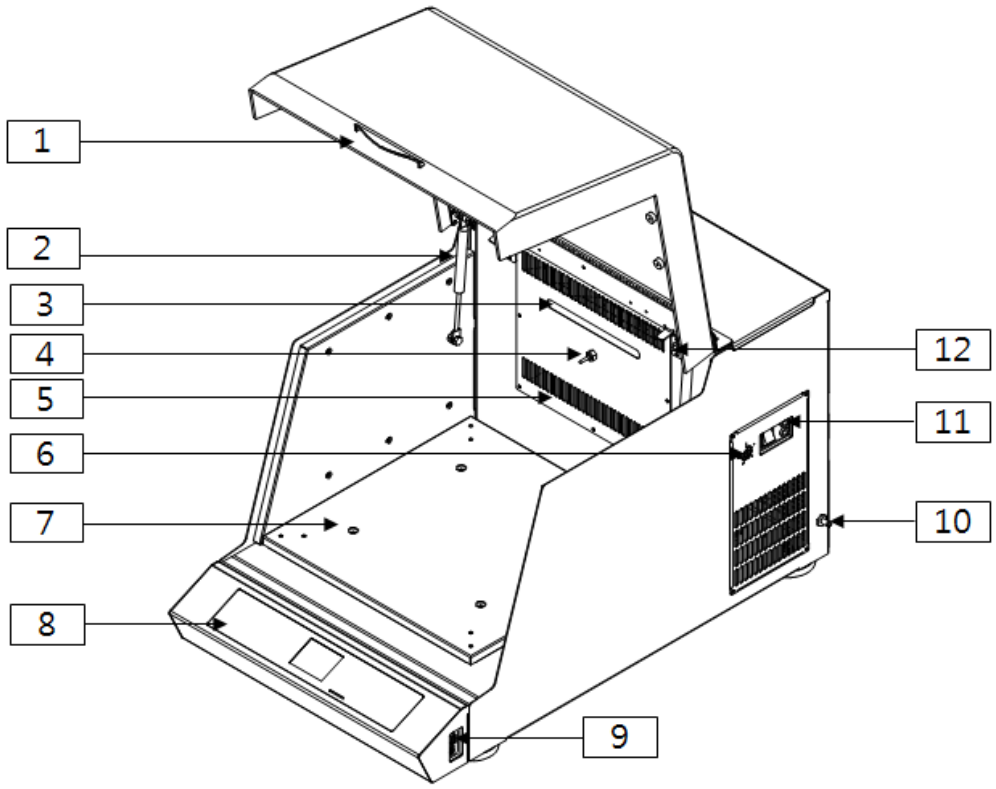
(1) Smooth shaking start and stop mechanism minimizes the opportunity of reagent leakage.

(2) In the case of the over load, the unit adjust itself with controllable rpm. There is no move cased from the vibration of the unit.

(3) There is an independent adjustable temperature limit device in addition to the main controller in this device. If temperature rises more than the specified value due to equipment error, the independent device protects the internal sample and equipment by blocking the power supply of the temperature-related equipment.

(4) When shaking operation is not possible due to the obstacle interfering the system, over current protection device stops the operation.

2.3 Structure



(1) Door cover and Handle

You can monitor the inner samples without opening the door during operation.

(2) Gas Spring

Door can stay opened for the user' convenience when sample replacement.

(3) LED Lamp

Long lasting less electricity consumption LED is installed to check the inside of the chamber.

(4) Temperature Sensor

It is Pt 100Ω sensor that temperature and resistance values are shown as the linear format and response speed is fast.

(5) Heater

Temperature control is up to 80℃ by two 400W pin heaters.

(6) Over Temperature Limiter

Over temperature limiter is independently configured from the main controller. The inner temperature of the chamber exceeds more than the set temperature, the device cut off the power to the power switch for the secure condition. (Refer to '4.5 Safety Device')

(7) Shaking Table

Shaking table is connected to a shaking system and Accessory such as Universal Platform can be equipped on shaking table.

(8) Control Panel

There are independent displays for each Temperature, RPM, Timer and there are and start/stop buttons and LED on/off buttons.

(9) Computer Interface

The unit can be controlled by PC through USB port and RS-232 port. In the case of connecting both of the port, the USB port will be priority.

(10) Condensate Drain Barb

In case of the liquid leakage caused by spilled reagent or cracked flask inside of the chamber, the liquid is designed to be drained out through the drain of the unit. The drain barb is made of chromium plated copper and it is easy to connect 6mm ID soft-walled tubing to the condensate drain. (Refer to '3.5 Attaching Condensate Drain')

(11) Power Switch and Fuse

Power switch provide the main power to the device. Fuse protects the device from instantaneous overcurrent. In case of fuse replacement, check the rated power. (Refer to 5.4

Fuse Replacement)

(12) Door Switch

There is a door limit switch between the door and the appliances mainframe's upper parts. If the door is opened, Shaking, Blower and Heater operation automatically stops. After 3 minutes at this status, warning sound alarms users to close the door. If a user does not shut a door so that five minutes passes, 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.

(13) External Refrigeration Port (IST-3075/IST-4075only)

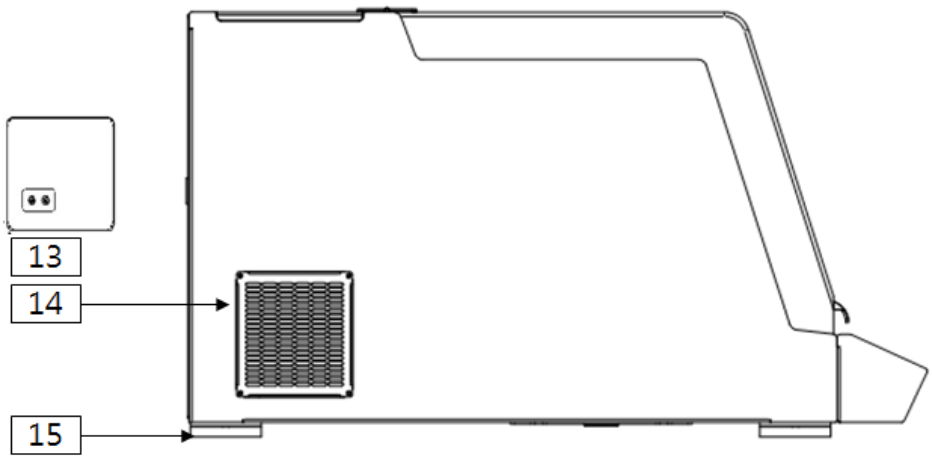
Even if the model such as IST-3075/4075 which has no refrigerator, It can lower the temperature in the chamber by receiving refrigerant from the external refrigerant device such as chiller. The In/out ports are located on the back and bottom side of the device. These brass push-to-connect fittings accept Ø8mm OD hard-wall tubing and provide access ports for external refrigeration. (Refer to '3.6 Connection to External Refrigeration System')

(14) Condenser Cover and Filter (IST-3075R/IST-4075R only)

Attachable condenser cover and filter prevent dust to the inside system.

(15) Foot

Foot fix the device for stable operation.


13
14
15

3 Installation

3.1 Unpacking and Checking

(1) Inspect the shipping container carefully for any damage.

(2) Remove the outer container.

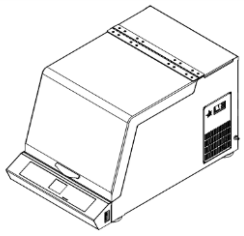
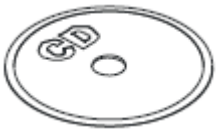
(3) Before use, inspect the product carefully for any damage that may have occurred during shipping.

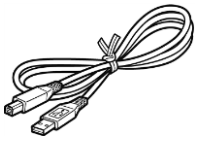
(4) Report any damage to your local Jeio Tech office or the distributor.

3.2 Component

(1) After unpacking, check the components.

(2) In the case of omission of components, contact to Jeiotech.

Item	Figure	Quantity	Description
Main Body		1	
Fuse		2	
JEIOTECH SOFTWARE CD		1	

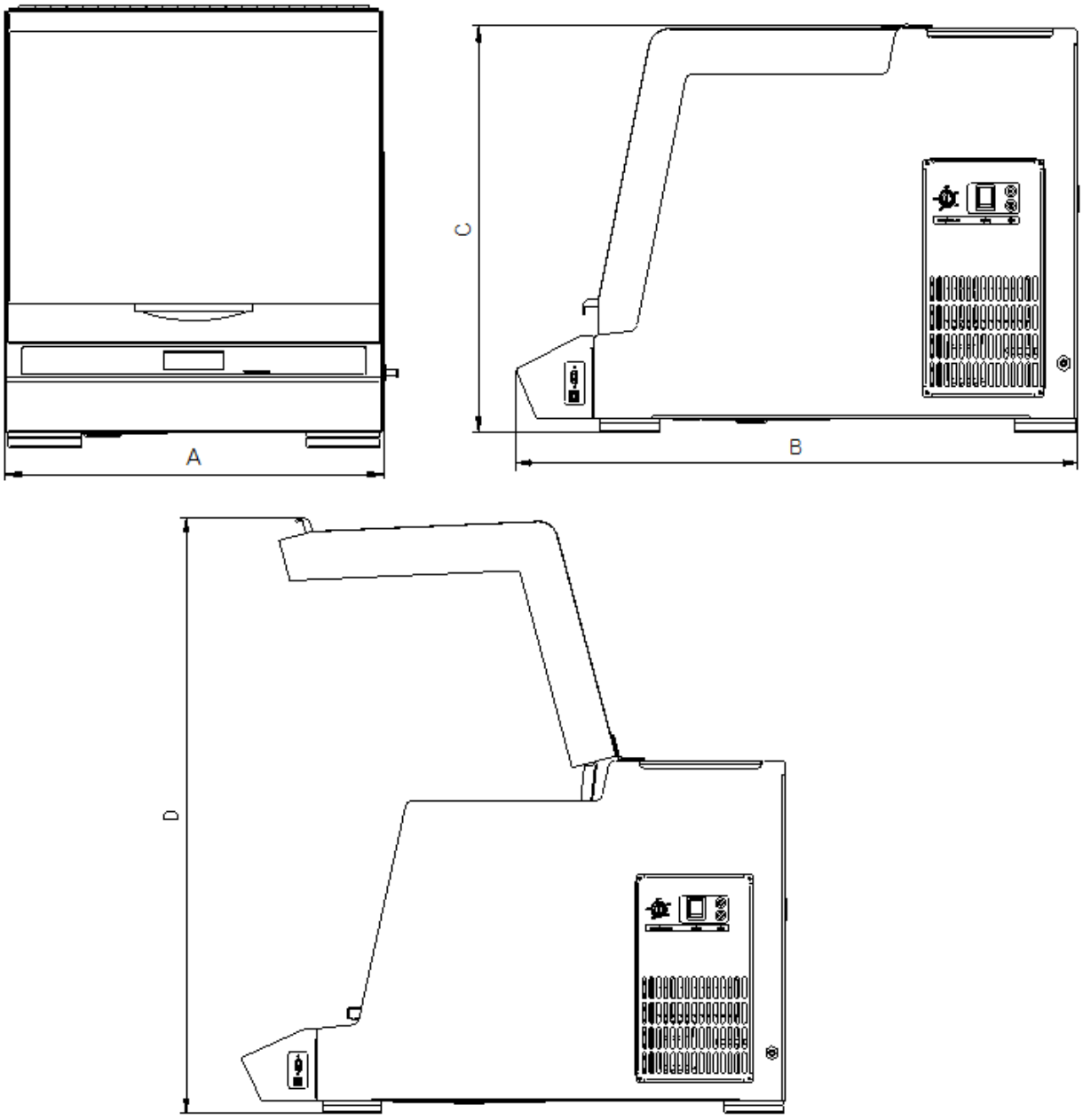
Cable for Communication (USB)		1	-
Power Cord		1	-
Operating Manual		1	

3.3 Preparation before installation

3.3.1 Space requirements

It is essential that the product to be situated in an area where there is sufficient space for the product. Below figures show the minimum space requirements needed to properly operate and maintain the product.

Dimensions (mm) / Models	A	B	C	D
IST-3075(R)	440	785	510	860
IST-4075(R)	540	890	510	915


A
C
B
D

3.3.2 Environmental setting

The unit can be operated properly under the following environmental conditions for a long time running without any problem.

No direct sunlight on the product

Ambient temperature: 5℃ ~ 40℃ (41℉~104℉)

Relative humidity not to exceed 80%

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

Connect the product to earth grounded terminals only.

⚠WARNING

- Please install on the sturdy surface laboratory which is set safety facility and make sure horizontal align correctly.
- Do not use the Product near environments where flammable gas may leak.
- Moving casters must be changed height adjustable foots so that the unit is not moving.

3.4 Installation

3.4.1 Caution for Installation

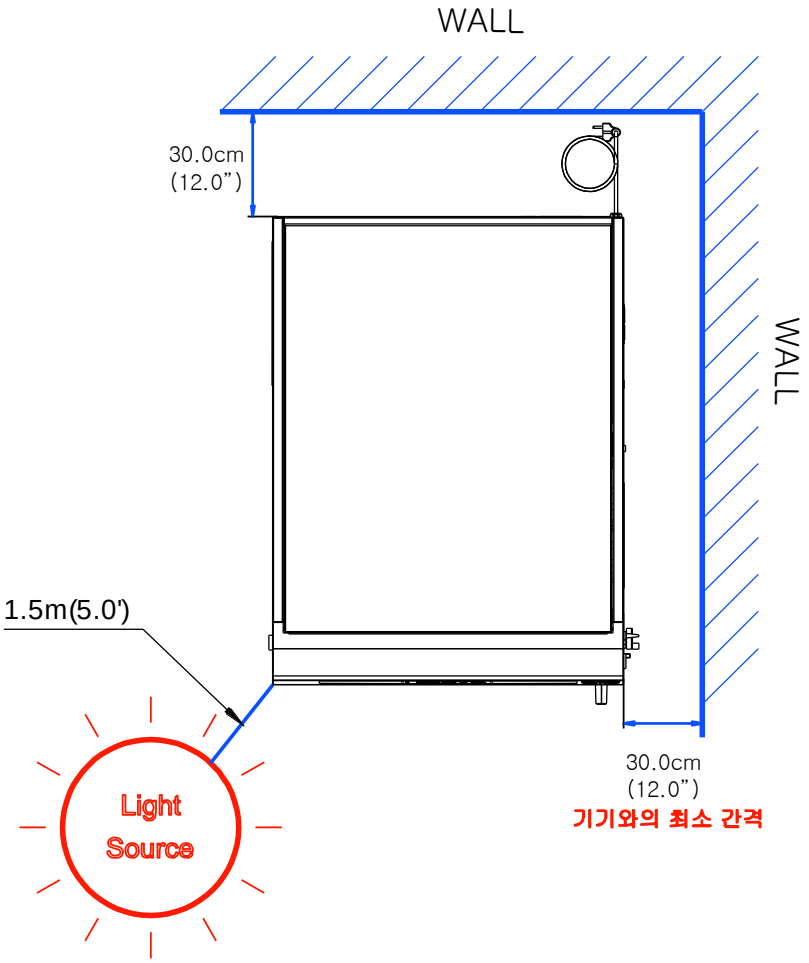
(1) The device is recommended to use under the room temperature and humidity (30°C, 80%RH) do not install it near the Heat devices like a Heater.

(2) Have enough space for door opening. (refer to 3.3.1)

(3) Please install it on the sturdy surface laboratory and do not throw down or gives a big shock.

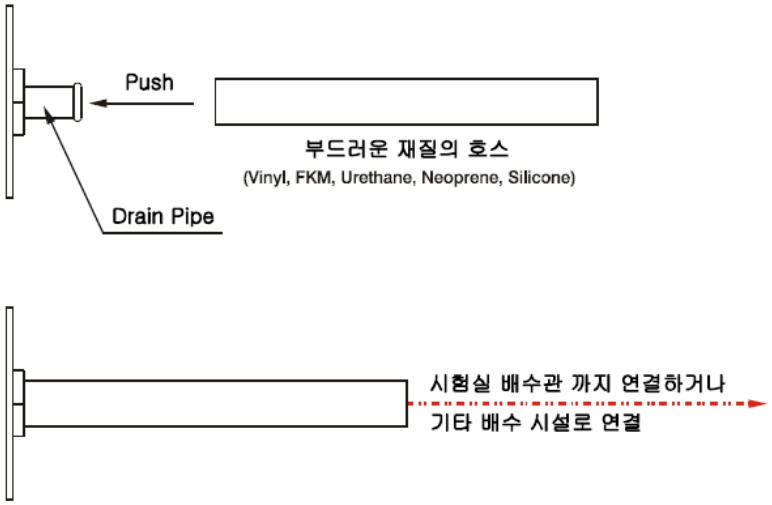
(4) Locate it 1.5m away from any light devices and 30 CM away from the wall.

(5) Install it on the sturdy leveled surface to prevent abnormal turbulence and noise.



3.5 Attaching Condensate Drain

In case of the liquid leakage caused by spilled reagent or cracked flask inside of the chamber, the liquid is designed to be drained out through the drain of the unit. The drain barb is made of chromium plated copper and it is easy to connect 6mm ID soft-walled tubing to the condensate drain.



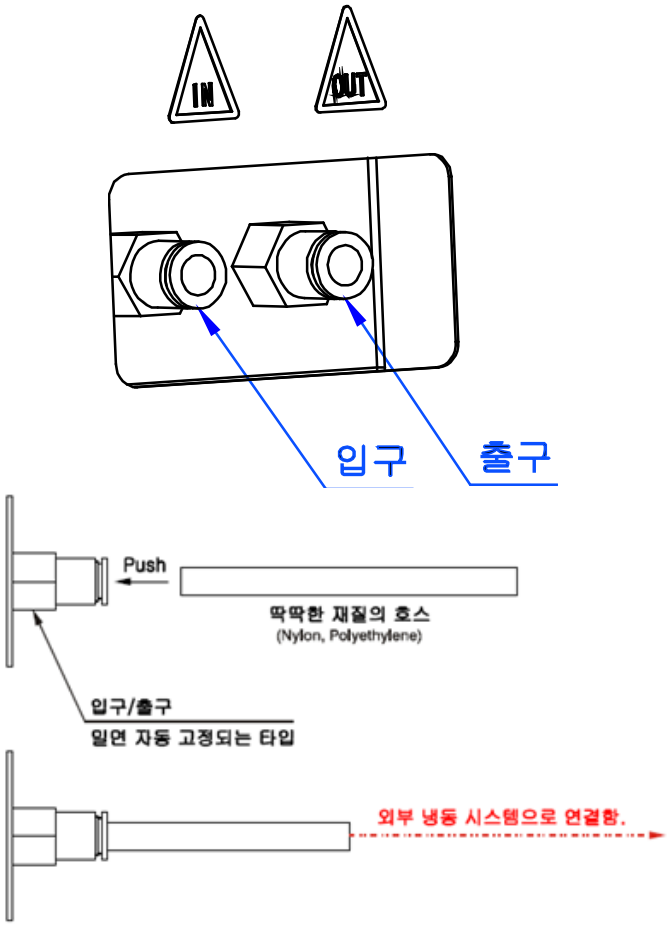
3.6 Attaching/Detaching External Refrigeration (IST-3075, IST-4075 Only)

Many laboratories are built with central chilling systems. With this in mind Jeio Tech has developed the IST-3075/4075 so that it can be connected to external refrigeration systems. To connect the unit to an external refrigeration source use Ø8mm OD hard-walled tubing, such as nylon or polyethylene.

Note: The ISS-3075/4075 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. Use the following procedure to connect/disconnect the tubing to the unit.

(1) Inserting tubing into fitting

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



(2) Removing from fitting

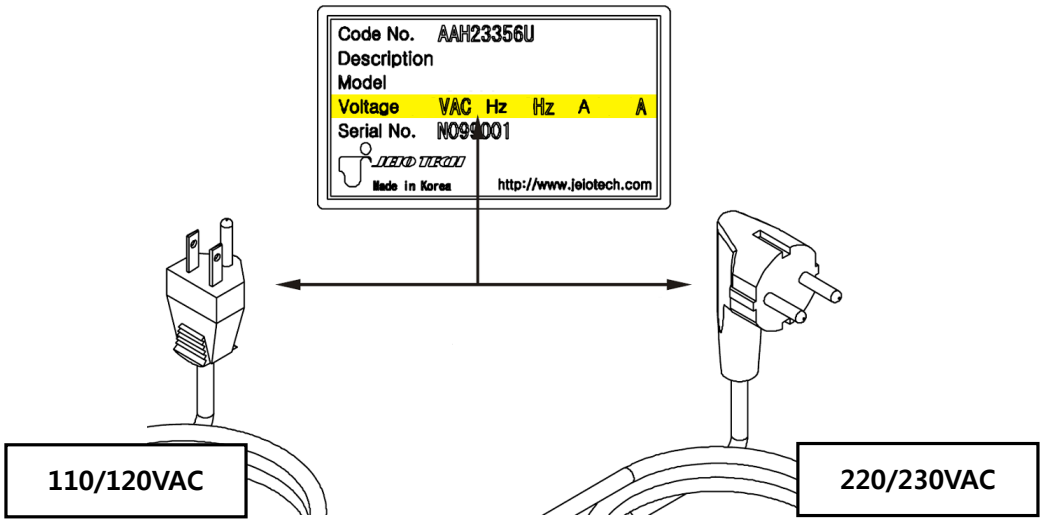
Grab the tubing tightly and push towards the incubated shaker as you firmly push the collet release button with two fingers. Continue to push the collect release button, and pull the tubing out of the fitting.

3.7 Connection power

JEIOTECH's Shaking Incubators use a single-phase current.

Use a suitable plug as the picture bellow by Identification label.

Voltage is the 10% of applied voltage.



⚠WARNING

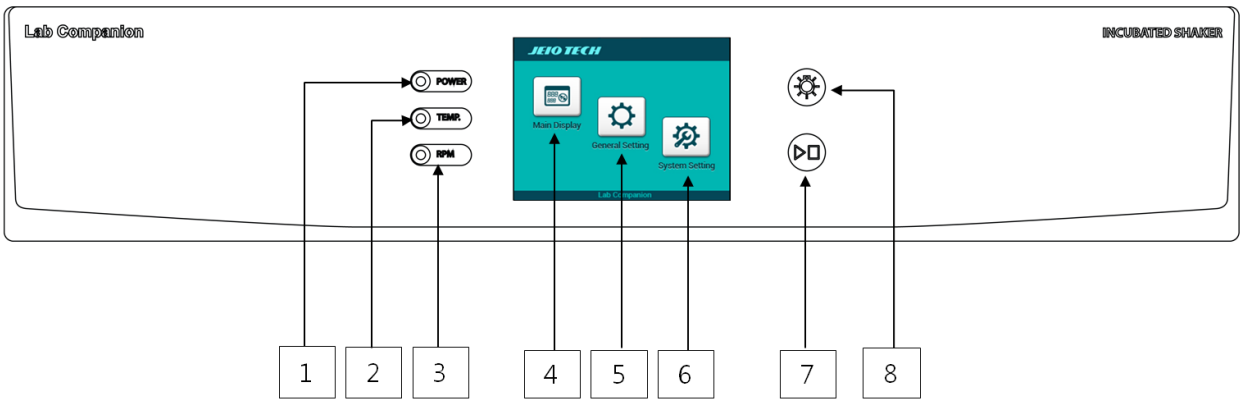
- Connect the power with checking the voltage, Phase, Capacity.
- Use the ground power for the connection.

  Do no use the double cap or a current tap socket causing a damage on the cable and fire due to an overcurrent.

4 Operation

4.1 Controller

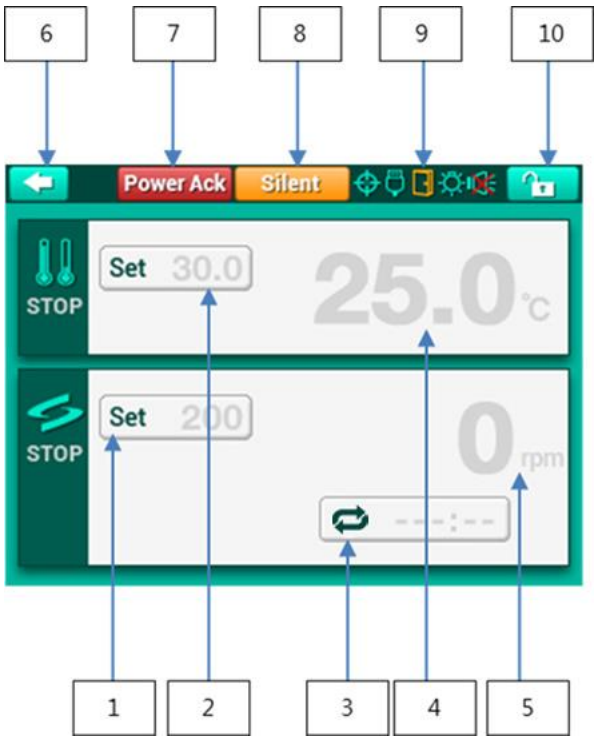
The controller is consist of the touch screen, LED, membrane. Once the power is supplied, below display is appeared.



1	Power ON indicator	Power is supplied.
2	Temperature Control ON indicator	Under the temperature controlling.
3	Shaking Control ON indicator	Under the shaking controlling. In the case of the timer is set, it is off.
4	Main Display	Main Display for the operationg
5	General Setting	General setting.
6	System Setting	Parameter setting is available. For change the parameter, acknowledge the manual.
7	Quick Start/Stop	Touch button is the base. Start/Stop external button is installed on the controller for the user's convenience. Function setting is available on the system setting. (Default: shaking start/stop)
8	LED Lamp	On/Off the LED lamp.

4.2 How to use the controller

Setting is available on the main display.



1	Set RPM	Display the setting RPM. Touch the screen, set the RPM.
2	Set Temperature	Display the setting temperature. Touch the screen, set the temperature.
3	Set Timer	Display the shaking time. Touch the screen, set the timer. In the case of no timer is set, the operating time is displayed. (999hours 59minutes)
4	Actual Temperature	Display the temperature of inside of chamber.
5	Actual RPM	Display the present shaking speed.
6	Back	From main display to home display. It is available when the unit is stop the operating.

7	Power Ack	In the case of the power is off for the supply faulty reason and the supply is back, the previous operating is back. It is auto restart function. At the time Power-Ack button is appeared on the display. In the case of the shaking was operating, the operating time is appeared on the display with red words. Once touch the Power-Ack or change the setting value, The Power Ack display is disappeared.	
8	Silent	In the case of attention on the unit is required, the unit generates the alarm. Touch the silent, the unit stops the alarm. Once the problem is not eliminated, the unit generates alarm again.	
9	Status Bar		The unit stops the platform on the same position. This display indicates that the platform is on the right position. If the platform is not on the right position, the color will be changed as yellow.
			The unit provide USB port and RS-232 port. The display is on when the computer is connected. Report Only :  / Slave Mode : 
			Door is opened.
			LED lamp is on.
			Mute function. The setting is available by the General Setting.
10	Lock	The lock function is to prevent the not proper setting change. Once touch the button, the display is changed same as  . To unlock it, touch twice of the button.  -> 	

4.2.1 Temperature control

(1) Start temperature control

Touch the set temperature button on the main display. Setting display is appeared. Set the temperature with touch pad and touch the start button. The temperature control starts. SV and PV is displayed on the main display with green color.

(2) Stop the temperature control

Touch the set temperature button. Setting display is appeared. Touch the stop button. The temperature control stops. The temperature control starts. SV and PV is displayed on the main display with gray color.

(3) Change the set temperature

Touch the set temperature button. Setting display is appeared. Put the setting value on the touch pad and touch the enter button. SV is changed.

NOTICE

- Temperature setting is one digit and one decimal point available. Touch the panel and put the numbers.
- Move out from the setting mode with ESC button.
- In the case of no touch for 10 seconds, the display changed to the main automatically.
- Check the PV, RPM on the setting display is available. (right upper side)
- The operating is maintained as previous during the setting.
- Once the door is opened during the shaking operating, the heater and fan is stopped. Close the door before door error generating, the previous operating is back.

4.2.2 Shaking Control

(1) Start shaking control

Touch the Set RPM Button under the shaking stop status. Setting mode is appeared. Set the value on the display and touch the Start button. Shaking control starts. SV/PV rpm is changed to green color.

(2) Stop the shaking control.

Touch the Set RPM button under the shaking operating status. Setting mode is appeared. Touch the Stop button. Shaking stops. SV/PV rpm is changed to gray color.

(3) Change the shaking speed

Touch Set RPM button. Setting mode is appeared.

Set the value on the display and touch the Enter button. The rpm is changed.

NOTICE

- Move out from the setting mode with ESC button.
- In the case of no touch for 10 seconds, the display changed to the main automatically.
- Check the PV, RPM on the setting display is available. (right upper side)
- The operating is maintained as previous during the setting.
- Once the door is opened during the shaking operating, the heater and fan is stopped. Close the door before door error generating, the previous operating is back.

⚠ CAUTION

- In the case of change the sample, stop the shaking and check whether the platform is completely stopped.

4.2.3 Shaking Timer

Timer is only available for shaking. Once the timer is set, the shaking stops after operating the set time and beep is generated. Setting time is on the display once the timer is set and '---:--' is on the display once the timer is not set. Remaining time is on the display once the timer is set and accumulated time is on the display once the timer is not set.

(1) Timer ON

Touch the Set timer on the main display. Timer OFF is on the display once the timer is set and Timer on is on the display once the timer is not set. Touch the Timer ON button and set the time on the display. Touch the Enter button. Check the set time on the main display.

(2) Timer OFF

Touch the Set timer on the main display. Timer OFF is on the display once the timer is set and Timer on is on the display once the timer is not set. Touch the Timer OFF button and touch the Enter. Time display on the main display is changed to "---:--".

(3) Change the setting time

Touch the Set timer on the main display. On the Timer ON status, put the time on the display. Touch the Enter. Check the changed time on the main display.

NOTICE

- Once the setting time is changed during the timer operating, original set time is changed. The accumulated time is applied to the new time setting and the remaining time is calculated and displayed. If you want whole new time setting, off the timer and set the timer again.

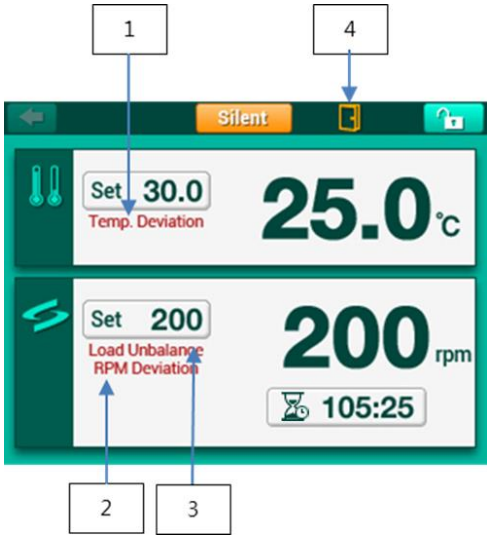
- Timer setting is available for hour:minute. Touch the part you want to change and put the numbers on it.
- Move out from the setting mode with ESC button.
- In the case of no touch for 10 seconds, the display changed to the main automatically.
- On the timer set display, you can check the present chamber temperature and rpm. (right upper side of the display)
- Below 1 minutes is displayed as"mmm:ss".
- Timer is not counted during the door open.

4.2.4 Alarm and Stop by force

The unit senses the problem on the unit and warn to the user. The warning is visual-audial effect. The alarm is divided into warning and fault.

4.2.4.1 Warnings

Warning generates visual-audial alarm but the unit is operating. Once the warning is generated, Silent button is appeared on the main display. Once the silent button is touched, next 15 minutes there is no alarm. If the problem is on-going after 15 minutes, the alarm is generated again.



1	Temp. Deviation	The temperature difference between setting temperature and present temperature is more than the range of the permission. The unit check it once the present value reached to setting value. Once the gap is over the permission range, the alarm is generated.
2	RPM Deviation	The rpm difference between setting rpm and present rpm is more than the range of the permission. The unit check it once the present value reached to setting value. Once the gap is over the permission range, the alarm is generated.
3	Load Unbalance	Once the shaking system is vibrated by the present operating, the system adjusts the shaking speed to the controllable stage. This is on the display.
4	Door Open	Once the door is opened, the temperature and rpm are not operated. Once the door is opened, visual-audial alarm is generated. After 3 minutes of door opening, the alarm is effective. Once the door is closed, alarm is eliminated and the operating is back.

NOTICE

- Alarm is not effective if Sound Off is set on the General Setting.
- Deviation Alarm is not effective once the present value reaches to the setting value. (set time, in permission range)
- Deviation alarm is initialized under the below situation.
  - Set the setting value
  - Get back to the work after stopping the control. (Door open, Stop operating)
- Once the Deviation initialized, the unit check the present value. If the temperature not reaches to the SV for 4 hours and the rpm not reaches to the SV for 10 minutes, Deviation check is started.
- The range of permission and the period of Deviation is changeable on the System Setting.
- Once Load Unbalance is generated and the setting rpm is changed, the changed rpm is on the display with red color.

1	Temperature Limit	Digital temperature regulator is active. The temperature of inside of chamber is out of range. Stop the unit for unit and user's safety. Check the range of the temperature regulator.
2	Load Unbalance	Shaking system has severe vibrating so that the unit must be stopped. Unbalanced sample attaching, heavy sample attaching, un-flat ground are the causes. Shaking system is stopped.
3	Door Open	Once the door is opened for 5 minutes, the unit is stopped and generates the alarm.
4	Sensor Fault	Temperature sensor is faulty so that the operating is stopped.
5	Over Current	Over current is generated so stop the unit. Main causes are over-load and obstacle inside of the system.

4.2.4.2 Faults

Fault Alarm stops the unit and inform it to the user when the unit need forced stop for the protection. Fault alarm are over-temp protection, Load Unbalance, Door Open, Sensor Fault, Over Current.

4.3 General Settings

Set the general operating. Touch General Setting button and below setting menu is appeared. Touch the '<' or '>' and explore the menu.

1	Shaking Direction	Set the shaking direction • CW(clock wise), CCW(counter clock wise)
2	Temperature Unit	C°/F°
3	Lock	Use the Lock or not
4	System Sound	Mute for sound or not
5	LCD Brightness	Adjust the brightness of LCD
6	LCD Auto Dim	LCD Dim function (No input, LCD dim)
7	Dim Brightness	LCD Dim, and the brightness of the dim
8	Dim Time Out	Waiting time for LCD Dim mode operating
9	Light Brightness	Select the brightness of LED
10	Light Auto	Door opened, auto LED light on
11	Auto Restart	Auto restart function. The unit is back to the operating, before the power out.(Time information is not back)
12	USB (RS232)	USB and RS-232 port is available for the PC. Select the mode when PC is connected. Report Only : PC received the information from the unit. Slave Mode : PC control the unit.

4.4 System Settings

Set the main variable that affects on the unit. Please read the manual carefully before setting the system. Touch the System setting button on the home display, below clauses are arranged.

1	Control Deviation Limit	Set the deviation limit range. Temperature setting and rpm setting are available.
2	External Start/Stop Key	Start/Stop membrane button is located on the control panel. Set about this key
3	Calibration	Calibration on the temperature sensor and rpm to the user's reference. Calibration on the LCD touch coordinate is available.
4	Auto Tuning	Temperature PID parameter update. Optimum control on the main operating temperature is available.
5	Operating Parameters	Set the operating and error check
6	Reset	Set the parameter as initial factory value.

4.4.1 Control Deviation Limit

Set the deviation limit between setting value and actual value of the temperature and rpm. The time of out of deviation limit range can be set either.

1	Temperature Deviation Limit	Set the deviation limit between setting value and actual value. Set on the key pad.
2	Temperature Deviation Alarm Delay	Once the deviation is out of range for alarm delay period, the alarm is generated. Once the actual temp reached to the set temp, the alarm is disappeared after alarm delay period check.
3	RPM Deviation Limit	Set the deviation limit between setting value and actual value. Set on the key pad.
4	RPM Deviation Alarm Delay	Once the deviation is out of range for alarm delay period, the alarm is generated. Once the actual rpm reached to the set rpm, the alarm is disappeared after alarm delay period check.

4.4.2 External Start/Stop Key

START/STOP

External Start/Stop button is on the control penal as membrane button. It generates start and stop. Set the applying range of it.

1	Only Shaker	The button only works for shaker's start/stop.
2	Only Incubator	The button only works for incubator's start/stop.
3	Shaker Incubator	The button only works for shaker and incubator's start/stop.

NOTICE

- Shaker and incubator are both available for the external membrane button. Once one of the shaker/incubator is on the generating and touch the button, the stopped part is operated. Touch the button again, both of mode are stopped.

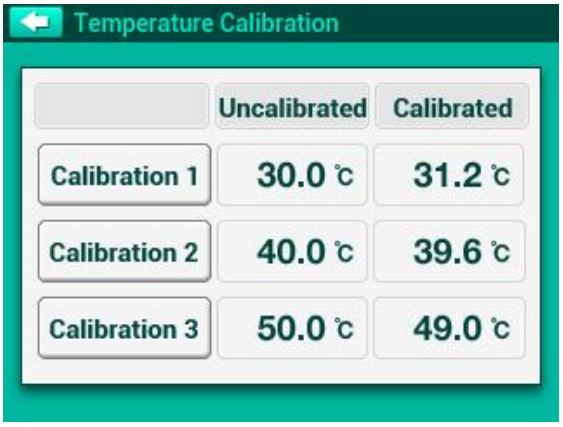
4.4.3 Calibration

The temperature sensor and rpm reached to the user's reference measure value, accurate experiment circumstance can be made. Calibration for coordinate is available.

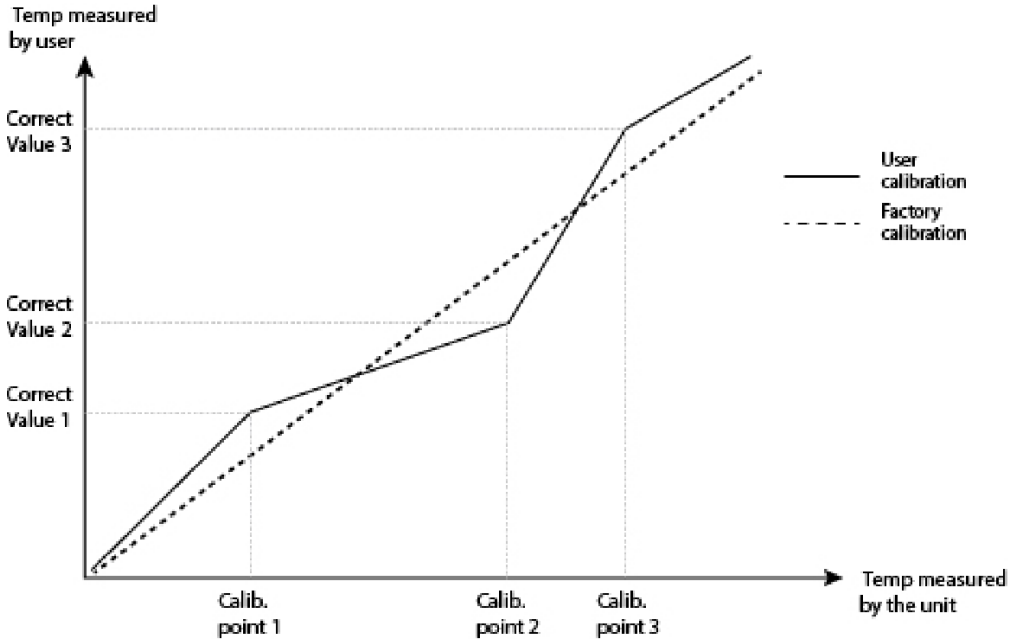
4.4.3.1 Temperature Calibration

Calibration for temperature sensor of main controller. The unit provides three points calibration.

Each point of three shows the uncalibrated and calibrated status. Touch the point you want to change. Touch the one point of Calibration 1,2,3. Put the external sensor on the chamber and close the door.



Touch the temperature on Set Temp. and put the desired temperature on it and operate the unit. Wait until the actual temp reaches to the setting temp. Once the actual temp reaches to the setting temp, touch the calibrated temp and put the temperature from the external sensor. Touch the confirm for the saving. The unit stops the operating. The unit read the temp as the external sensor's value.



NOTICE

- Once the door is opened or the temperature is out of range, the temperature control is stopped.
- The calibration is operating on various points so it limits the calibrating that is our of the logic.
- The result of the calibration is on the uncalibrated and calibrated. Uncalibrated means the value from the unit and the calibrated means the temp that calibrated. The calibrated value is from the external sensor.
- The calibration setting is available to be initialized on the System Setting Reset.

4.4.3.2 Shaking Speed Calibration

The user calibrates the unit's rpm with external sensor. The unit is available for one point rpm calibration. The procedure is similar with temperature calibration. The difference is that the shaking is not stopped during the door opening because the door need to be opened to check the shaking with external sensor. Touch the set rpm. Put the desired rpm and start the nut. Wait unit the actual rpm reached to the set rpm. Touch the calibrated rpm and put the value from the external sensor. Touch the confirm button to save it. The unit read the calibrated value from the next operating.

NOTICE

- Be careful that the external sensor never touch the platform. Once the external sensor is removed from the platform during the operating, it will be dangerous.
- The calibration setting is available to be initialized on the System Setting Reset.

4.4.3.3 Touch Screen Calibration

Touch penal coordinate could be in the problem for the reason of the older unit and the problem in the unit. The unit has a touch screen coordinate function. Touch the "+" on the screen three time s. And repeat it two times.

4.4.4 Auto Tuning

Update the parameter of PID temperature control. Optimum temperature for the main using temperature is available. The unit is set to use the temperature on proper range. Once the temperature is not actual on the main points during the actual use on the field, operating auto tuning will tune the temperature parameter and make the unit operates the temperature on the actual temperature.

Touch the Set Temp. and put the desired value. Touch the START button and start the parameter tuning. Touch the stop button during the tuning and stop the tuning. Once the tuning is complicated, touch the ok button and save it.

4.4.5 Operating Parameters

Set the parameters for the other operating.

1	Position Sensor	Check the platform stop on the right position.
2	Stall Check	Check the belt when the platform is not working properly.
3	Defrost Use	Defrost is not for the IST model. Off the defrost use.
4	Load Unbalance	Once the vibration is generated, the shaking speed is adjustable.
5	Threshold	Load Unbalance check the vibration on the unit and adjust the rpm automatically. The vibration is on the range of not controlling, the automatic adjusting is operated.

4.4.6 Reset

Initialize the changed value to the factory value.

1	Temperature Calibration	Initialize the calibration value.
2	RPM Calibration	Initialize the calibration value.
3	Auto Tuning	Initialize the calibration value.
4	Touch Screen	Initialize the calibration value.
5	Operating Parameters	Initialize the calibration value.
6	Factory Default	Initialize the calibration value of all parts.

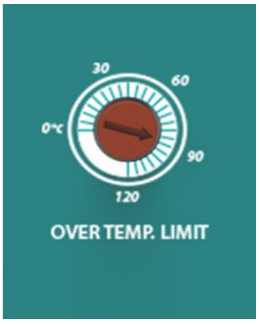
NOTICE

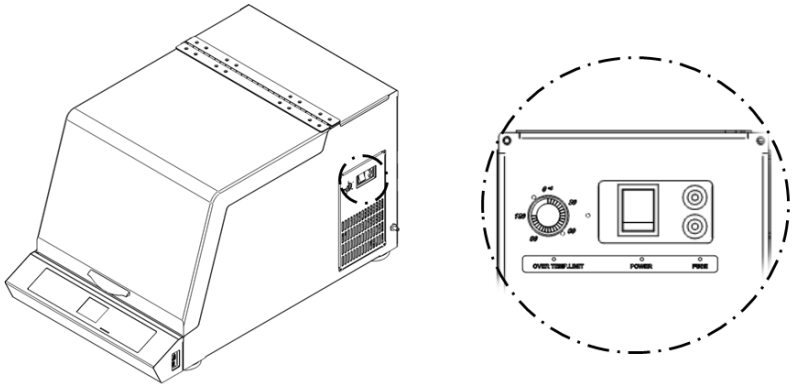
- Auto tuning parameter can be initialized to the factory value.

4.5 Safety Tool

4.5.1 Over Temp. Limiter

This model has the over temp limit and temp sensor in the main controller. Over temp limit is located on the right down side of the unit. Set the over temp limit over 15% than normal use temperature by a flat head screwdriver. In case of that the temperature in the chamber over set temp, the operation discontinues.





4.5.2 Glass Fuse

In the case of the over current generating, the fuse is cut and the power is down.

5 Maintenance

5.1 Inspection Period

Classification	Inspection period				
	Daily	Weekly	Monthly	Quarterly	Yearly
General					
Power					
Connection between machine and power	●				
Power code	●				
Exterior cleanliness		●			
Drain connection				●	
Outside refrigeration system connection (IST-3075/IST-4075)				●	
Incubator					
Set temperature and actual temperature difference	●				
Auto Tuning				●	
Temperature setting					
Temperature correction					●
Actual temp. / Display temp. correction					●
Air filter clean (IST-3075R/IST-4075R)			●		
PC Sync operation	●				
Controller and timer operation				●	
System					
Connection between platform and accessories	●				
Connection between platform and shaking table	●				
Actual rpm/ Display rpm correction					●
Malfunction of shaking system			●		

5.2 Cleaning

(1) After disconnect the power cord, clean the machine with soft and dried towel.

Regarding the un-removable point, clean the polluted area only by towel with alcohol solvent (methanol, ethanol) which has low boiling point.

(2) Do not use Acid solution, sharp one, soapy water, detergent and hot water.

It makes the machine discolored. Rubber and plastic part can be change of shape and color.

Especially, do not use volatile matter.

In case of neutral detergent, clean it with the soft fabric and dry well.

(3) Do not put the water to exterior of the machine when you clean the surrounding (Especially, socket and controller part, it can make short circuit problem.)

(4) After discussion the proper cleaning method to avoid any damage for the machine with Jeiotech, if you want to clean the machine or remove the polluted area with not mentioned cleaning method before the clean.

(5) The inside electric part of the machine should be handled by Jeiotech or person who is delegated by Jeiotech.

(6) If the parts is required to replace, please use genuine parts only.

(7) Technical maintenance is not offered in case of abnormal trouble beyond the normal limit.

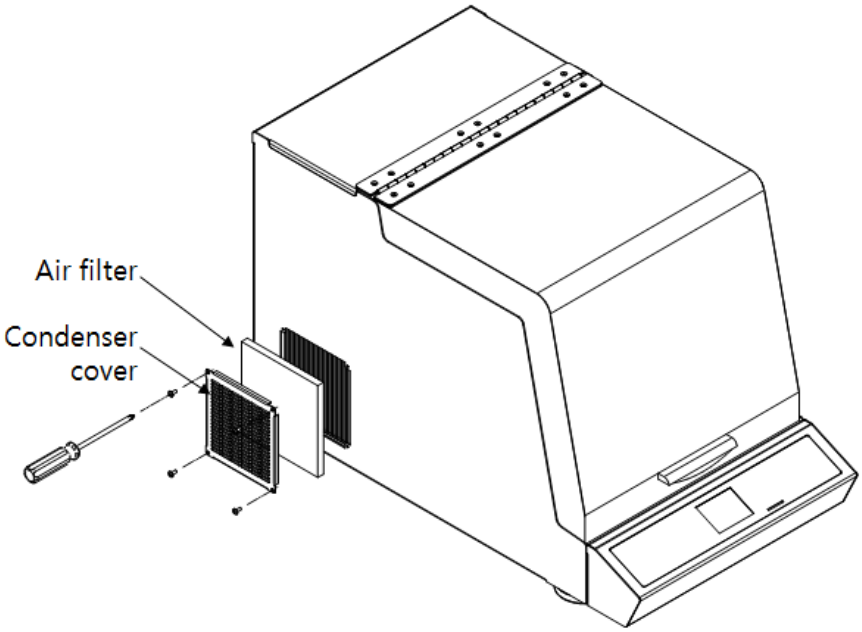
⚠WARNING

- Do not soak the machine into water and spray the water

⚠CAUTION

- Do not clean whole body with chlorine bleaching, detergent with chlorine, an abrasive, ammonia, steel sponge and alcohol solvent (methanol, ethanol) which has low boiling point.

5.3 Air filter cleaning **(IST-3075R/IST-4075R)**



Step 1: Put power switch and turn the machine off.

Step 2: Loosen the bolt that located in edge of condenser cover

Step 3: Disassemble condenser cover

Step 4: Disassemble air filter which is combined with condenser cover.

Step 5: Vacuum or clean the air filter with the water.

Step 6: Vacuum or high pressure air clean to the condenser in the machine.
It makes better refrigeration effect.

Step 7: Assemble air filter in reverse order of Step 1~Step4

NOTICE

- When air filter clean, please be careful to avoid fold the condenser pin
- It is possible to decrease refrigeration effect.

5.4 Fuse Replacement

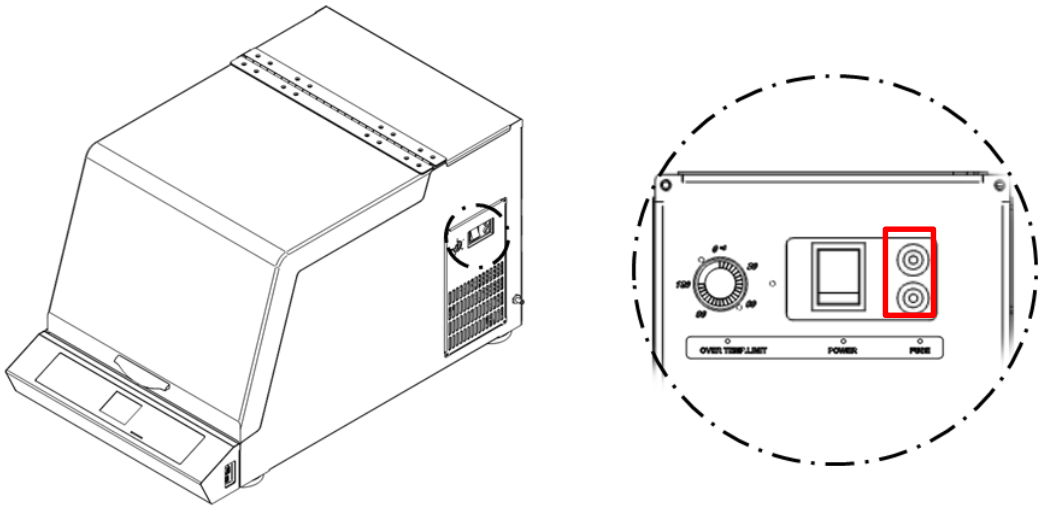
Replace the fuse which is located in next to power button (Refer to 2.3.(11)) if no operation of short circuit breaker and No power.

There is extra fuse 2pcs in socket case inside. If you need additional fuse, ask it to sales team or seller.

Model	Voltage	Current consumption(A)	Fuse (A)	Fust Cat. No.
IST-3075	120VAC, 60Hz	7.5	10	00CDE0005543
	230VAC, 50/60Hz	4	8	00CDE0005544
IST-4075	120VAC, 60Hz	10.1	12	00CDE0005542
	230VAC, 50/60Hz	5.5	8	00CDE0005544
IST-3075R	120VAC, 60Hz	7.5	10	00CDE0005543
	230VAC, 50/60Hz	4	8	00CDE0005544
IST-4075R	120VAC, 60Hz	10.1	12	00CDE0005542
	230VAC, 50/60Hz	5.5	8	00CDE0005544

Fuse is located in next to power switch. (Side of machine.)

Please replace the fuse according the below picture.



⚠WARNING

Caution to Electrical shock.

Before replace the fuse, turn the machine off and check the power connection again.

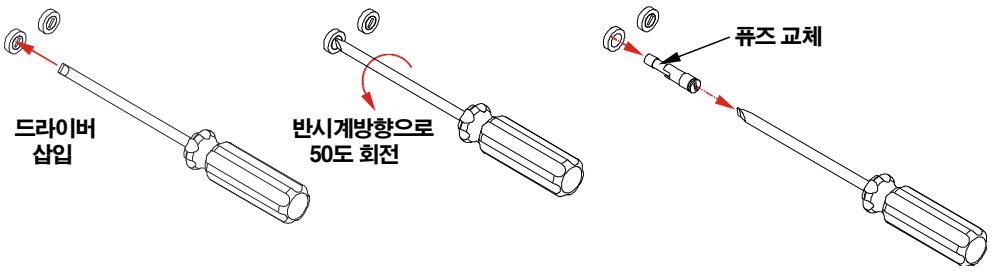
If the power is connected, serious injury or death can be occurred.

Step 1: Press power switch and Power off

Step 2: Connect (-) screw driver to fuse holder

Spin the fuse holder counterclock wise 50 ° then fuse holder is disassembled.

Step 3: Compare the fuse specification with the above table and replace it if there is no problem.



Step 4: Complete the replacement in reverse order of Step 2

6 Troubleshooting

6.1 Stop during the operating

Display Message	Description	Solution
Temperature Limit	Analog over temperature regulator is active.	Check the set on the analog over temperature regulator and the operating. Restart after temperature is inside of the range.
Load Unbalance	Vibration is generating and the normal shaking is not available. To prevent the shaking system, stop the shaking.	Check the unbalanced sample setting, overload, un-flat ground.
Door Open	Door is opened over 5 minutes during the operating.	Close the door and touch the start button and restart the unit.
Sensor Fault	Temperature sensor is faulty so the operating is stopped.	Contact the manufacturer or sales point.
Over Current	Over current is generated so the operating is stopped.	Check the overload, obstacle in the shaking system.

6.2 Another problem and solution

Trouble	Probable Cause & Solution
The equipment is not on	① Check the power plug connection to the socket ② Check if the circuit breaker is operated ③ When the fuse is short circuited, replace new one as enclosed. ④ Check the power failure ⑤ If the problem is not fixed with the above method, please request A/S
Power on but controller does not operated	① Check the power plug connection to the socket ② Check the panel board circuit breaker and reset it then turn the machine on ③ Request A/S if Display board or Main PCB has problem ① Request A/S if Power switch has problem.
NO The temperature of incubator rise to setting value	① Check the Temperature Control ON indicator is ON ② Check outdoor temperature is too high or low and maintain the right room temperature. ③ Request A/S after check the difference between actual temperature and display temperature. ④ Check the door switch irregularity ⑤ Request A/S if the heater is out of order ⑥ Request A/S if the freezer is out of order. ⑦ Check air filter condition and clean it according to 5.3 ⑧ Auto Tuning if the temperature is unstable according to 4.4.4. ⑨ If the problem is not fixed with the above method, please request A/S.

Shaking trouble	① If there is extremely intense vibration of the machine than usual during operation, check the horizontality. If you need, please adjust horizontality according 3.4.2 ② If there is extremely intense vibration of the machine and shaking speed is slow down, check the sample location and relocate the samples harmoniously ③ In case of overloading, control the sample weight according to 9.1(Max load per speed). ④ Check door switch if shaking is not operated after shaking start button press. ⑤ Check Timer close status if shaking is not operated after shaking start button press, cancel timer set-up. ⑥ If the problem is not fixed with the above method, please request A/S.
Noise	① Check fixed condition of platform or sample. ② Check the weight of sample is shifted to one side, relocate the samples evenly. ③ If the problem is not fixed with the above method, please request A/S.

7 Accessories

7.1 Mountable maximum quantity

7.1.1 Universal Platform + Flask Clamp

Model / Flask Clamp	IST-3075 series	IST-4075 series
50ml	25	49
100ml	20	39
250/300ml	9	18
500ml	9	13
1,000ml	5	9
2,000ml	3	5
2,800ml	1	2

7.1.2 Universal Platform + Plastic Flask Clamp

Model / Flask Clamp	IST-3075 series	IST-4075 series
50ml	25	49
100/125ml	14	25
200ml	9	16
250ml	9	16
300ml	9	16
500ml	6	9
1,000ml	4	7
2,000ml	2	4

7.1.3 Universal Platform + Funnel Clamp

Model / Funnel Clamp	IST-3075 series	IST-4075 series
250ml	4	6
500ml	2	4
1,000ml	-	3
2,000ml	-	-

7.1.4 Universal Platform + Microplate Holder

Model / Type	IST-3075 series	IST-4075 series
Single	7	13
Tower	5	8
Flat A(large)	-	2
Flat B(small)	2	2

7.1.5 Universal Platform + Test Tube Rack

Model / Type	IST-3075 series	IST-4075 series
0°	2	4
15°	2	4
30°	1	3
45°	1	2
60°	1	1

7.1.6 Spring Wire Rack + Flask

Platform / Flask	IST-3075 series	IST-4075 series
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

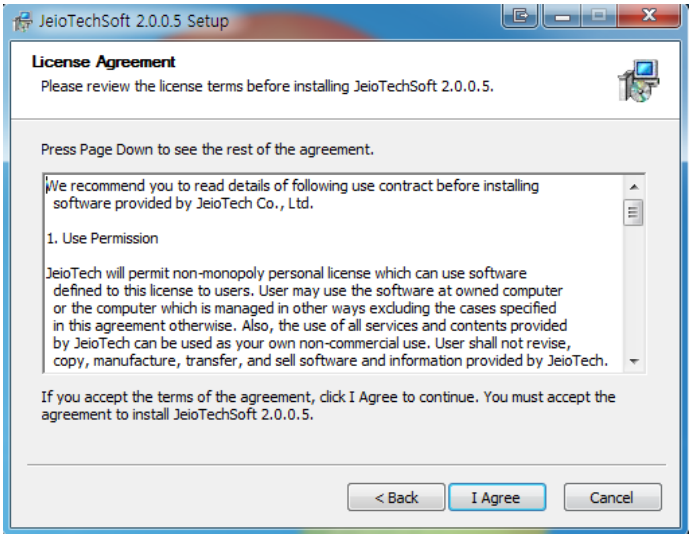
※ About the right position for mounting maximum quantity of Accessories, please visit Jeio Tech website or contact our office and distributor.

8.0 S/W

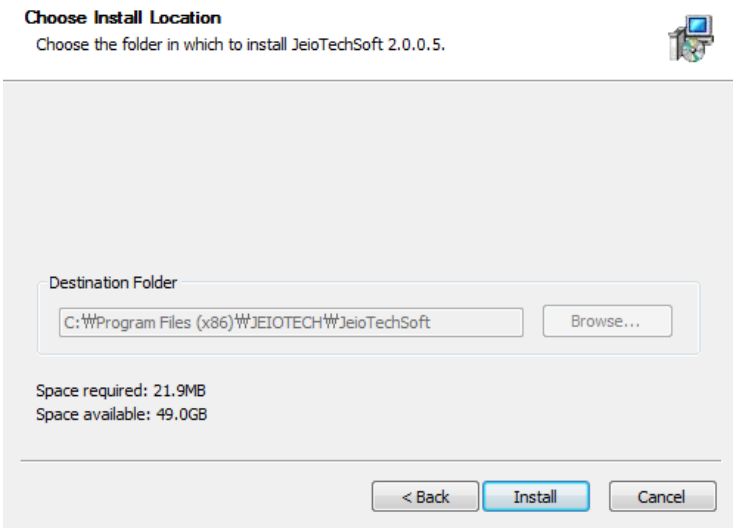
8.1 Monitoring Program installation

(1) Put the installation CD on the CD-ROM drive then the program is operated automatically. Click the "Next" button go to the License Agreement.

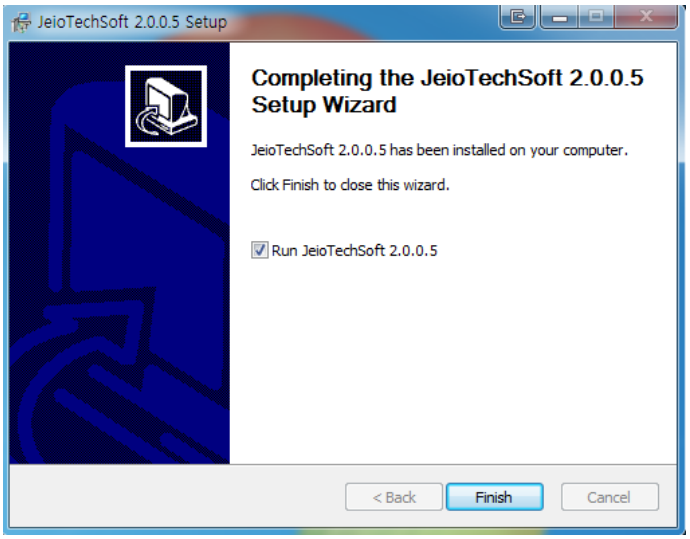
(2) Check the details and click the "I agree".



(3) Click the "Install" and install the program.



(4) Once the program is installed, below window is up and JeioTechSoft icon is generated on the background.
Check the Run JeioTechSoft 2.0.0.5 or double click the icon then the program starts.



8.2 Communication Protocol

The unit communicates with PC through RS-232C port. Software save the duplex communication, operating status, date. If you want to change on software, refer to below reference.

Communicatioin Reference :

http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf

8.2.1 Physical Layer

- Communication port : RS-232C /USB

8.2.2 Model System number

ITEM	System Number	System	Model Number
Incubated Shaker	1611H	Shaking incubator	IST-3075
	1612H	Shaking incubator	IST-3075R
	1613H	Shaking incubator	IST-4075
	1614H	Shaking incubator	IST-4075R

8.2.3 Modbus Protocol Address Definition

modbus function code	address	command	data	description	data length	
					word	byte
W/S	1	Beep	0x0001	BEEP_SYS_BOOT (Communication Test)	1	2
			0x0002	BEEP_KEY (Communication Test)	1	2
R/I	2	MOD_SYS_NAME	x	Model name	1	2
R/I	3	MOD_SYS_VER	x	Firmware Version	1	2
R/I	4	MOD_SYS_PARAM	x	system parameter	20	40
W/S, R/I	25	MOD_SYS_SOUND	0/1	system sound	1	2
W/S, R/I	26	MOD_SYS_LAMP	1 ~ 3	lamp bright	1	2

W/S, R/I	27	MOD_SYS_LAMP_AUTO	0/1	lamp auto onoff	1	2
W/S, R/I	28	MOD_AUTO_RESTART	0/1	system auto restart	1	2
W/M, R/I	29	MOD_TEMP_DEVI	temp devi min ~ temp devi max	temperature deviation	4	8
W/S, R/I	33	MOD_TEMP_DEVI_ALARM	0 ~ 3599	temp devi alarm time	1	2
W/S, R/I	34	MOD_RPM_DEVI	rpm devi min ~ rpm devi max	rpm deviation	1	2
W/S, R/I	35	MOD_RPM_DEVI_ALARM	0 ~ 3599	rpm devi alarm time	1	2
W/S, R/I	36	MOD_EXT_KEY	0 ~ 2	external key operation	1	2
W/M, R/I	37	MOD_SET_TEMP	low temp lmt ~ high temp lmt	incubator set temp	4	8
W/S, R/I	41	MOD_SET_RPM	rpm min ~ rpm max	shaker set rpm	1	2
W/M, R/I	42	MOD_SHAKER_TIME	60L ~ 3599940L	shaker set time	2	4
W/S	44	MOD_SHAKER_TIME_ONOFF	0 ~ 1	shaker timer set	1	2
W/S	45	MOD_INCUBATOR_RUN_STOP	0 ~ 1	incubator operation set	1	2
W/S	46	MOD_SHAKER_RUN_STOP	0 ~ 1	shaker operation set	1	2
R/I	47	MOD_SYS_REPORT	X	system report	18	36
W/S	65	MOD_WARN_ACK	1	system warning ack	1	2
W/S	66	MOD_SILENT_ACK	1	system silent ack	1	2
W/S	67	MOD_AUTO_ACK	1	auto run ack	1	2

8.2.4 Modbus Protocol Description

Command	Description		
Beep	Beep generating	Modbus function code	0
		W.S	Data

Write data	1	System boot beep
	2	System key beep

MOD_SYS_NAME	Return the unit name Refer to System number	Modbus function code	0
		R.I	address

Return data	0	
	Upper	Lower
	Model num	

MOD_SYS_VER	Return the firmware version	Modbus function code	0
		R.I	address

Return data	0	
	Upper	Lower
	version	

MOD_SYS_VER	Return the system parameter	Modbus function code	0
		R.I	address

Return data	0 ~ 3	4 ~ 7	8 ~ 11	12 ~ 15
	high temp lmt	low temp lmt	temp_devi_max	temp_devi_min
	16	17	18	19
	max rpm	min rpm	rpm_devi_max	rpm_devi_min

MOD_SYS_SOUND	Set the system sound	modbus function code	0
		R.I	address
		modbus function code	0
		W.S	data

return data	0		
	upper	lower	
	sound flag		
r/w data	0	sound off	
	1	sound on	

MOD_SYS_LAMP	Set the lamp brightness	modbus function code	0
		R.I	address
		modbus function code	0
		W.S	data

return data	0	
	upper	lower
	lamp bright	
r/w data	1 ~ 3	
	1 : Min, 3 : Max	

MOD_SYS_LAMP_AUTO	Automatic lamp on setting	modbus function code	0	return data	0	
		R.I	address		upper	lower
					lamp auto flag	
		modbus function code	0	r/w data	0	lamp auto off
		W.S	data		1	lamp auto on

MOD_AUTO_RESTART	Auto run setting	modbus function code	0	return data	0	
		R.I	address		upper	lower
					auto run flag	
		modbus function code	0	r/w data	0	auto run off
		W.S	data		1	auto run on

MOD_TEMP_DEVI	temperature deviation	modbus function code	0	return data	0 ~ 3
		R.I	address		temp devi
		modbus function code	0~3	value	temp devi min ~ max
		W.M	value		

MOD_TEMP_DEVI_ALARM	temp devi alarm time	modbus function code	0	return data	0
		R.I	address		temp devi alarm
		modbus function code	0	value	0 ~ 3599(sec)
		W.S	value		

MOD_RPM_DEVI	rpm deviation	modbus function	0	return	0

		code			data	
		R.I	address			rpm devi
		modbus function code	0		value	rpm devi min ~ max
		W.S	value			

MOD_RPM_DEVI_ALARM	rpm devi alarm time	modbus function code	0		return data	0
		R.I	address			rpm devi alarm
		modbus function code	0		value	0 ~ 3599(sec)
		W.S	value			

MOD_EXT_KEY	external key operation	modbus function code	0		return data	0		
		R.I	address			ext key value		
		modbus function code	0		value	0	1	2
		W.S	value			shaker	incubator	both

MOD_SET_TEMP	incubator set temp	modbus function code	0		return data	0 ~ 3
		R.I	address			set temp
		modbus function code	0 ~ 3		value	high temp ~ low temp
		W.M	value			

MOD_SET_RPM	shaker set rpm	modbus function code	0		return data	0
		R.I	address			set rpm
		modbus function code	0		value	rpm min ~ max
		W.S	value			

MOD_SHAKER_TIME	shaker set time	modbus function code	0	return data	0 ~ 1	
		R.I	address		set time	
		modbus function code	0 ~ 1	value	0 ~ 3599940L(min)	
		W.M	value			

MOD_SHAKER_TIME_ONOFF	shaker timer on/off set	modbus function code	0	data	0 : shaker timer off
		W.S	data		1 : shaker timer on

MOD_INCUBATOR_RUN_STOP	incubator operation set	modbus function code	0	data	0 : incubator stop
		W.S	data		1 : incubator start

MOD_SHAKER_RUN_STOP	incubator operation set	modbus function code	0	data	0 : shaker stop
		W.S	data		1 : shaker start

MOD_SYS_REPORT	system report	modbus function code	0		return data	0 ~ 3	4 ~ 7	8	9
		R.I	address			set temp	act temp	set rpm	act rpm
						10 ~11	12 ~ 13	14 ~ 15	16 ~ 17
						set time	remain time	system indicate	dummy
	system indicate	4byte	MSB	30	29	28	27	26	25	24
			dummy	dummy	dummy	dummy	usb_mode	temp delay	auto tune	sk over cur
							0 : report	Igonore		

							1: slave				
			23	22	21	20	19	18	17	16	
			rpm hold	temp hold	silent	ext otp	sk load warn	sk load	rpm devi	temp devi	
			15	14	13	12	11	10	9	8	
			auto run	mute	refrig	sens or	opt warn	door warn	otp	door open	
						error					
			7	6	5	4	3	2	1	LSB	
			usb connec t	silent disp	sk pos er	lamp	timer	shaker	incubat or	operation	
						on/o ff	on/off	op_flag	op_flag	sys op	

MOD_WARN_ACK	warn message clear	modbus function code	0		data	1: message clear
		W.S	data			0: operation none

MOD_SILENT_ACK	Mute	modbus function code	0		data	1: beep stop
		W.S	data			0: operation none

MOD_AUTO_ACK	auto run ack	modbus function code	0		data	1: auto run clear
		W.S	data			0: operation none

9.0 Appendix

9.1 Technical Specifications

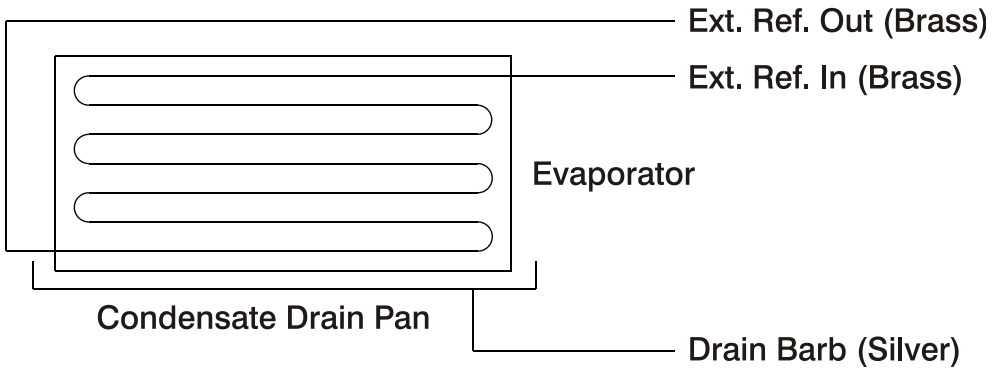
MODEL		IST-3075	IST-3075R	IST-4075	IST-4075R
Temperature	Range	Amb.+5~80℃	Amb.-15 (Min. +15)~80℃	Amb.+5~80℃	Amb.-15(Min. +15)~80℃
	Accuracy	±0.1℃ in flask at 37℃			
	Uniformity	±0.5℃ in flask at 37℃			
	Refrigerator (Hp)	-	1/6Hp	-	1/6Hp
	Sensor Type	Pt 100Ω			
Shaking	Motion	Orbital			
	Amplitude Size (mm, dia.)	19.1			
	Speed Range (RPM)	10 to 500			
	Accuracy	±1% of set speed (>100rpm) / ±1 (<100rpm)			
	Timer	1 min. to 999 hr 59 min.			
	Max. Load (kg)	10 at 500 rpm 15 at 400 rpm		14 at 500 rpm 21 at 400 rpm	
Material	Internal	Stainless Steel			
	External	Epoxy powder coated steel			
	Platform	Anodized aluminum plate			
	Insulation	Polyethylene			
	Lid	PET			
	Heater	Incoloy, Fin Type (400W X 2EA)			
Safety Device		CLS(Custom Logical Safe)-control system			
		Electronic temperature limiter, Hydraulic over-temperature limiter			
		Temperature deviation alarm (High/Low)			
Communication Interface		USB, RS232			
Dimension	Volume (L)	53		83	
	Platform (W×D)	350×350		450×450	

	(mm)				
	Internal (W×D×H) (mm)	410×410×320		510×510×320	
	Overall (W×D×H) (mm)	440 x 785×510		540 x 890×510	
	Net Weight (Kg)	65	73	81	90
Electric requirements(230V)		50/60Hz, 4A	50/60Hz, 5.5A	50/60Hz, 4A	50/60Hz, 5.5A
Cat. No.					
Electric requirements(110V)		60Hz , 7.5A	60Hz ,10.1A	60Hz , 7.5A	60Hz ,10.1A
Cat. No.					

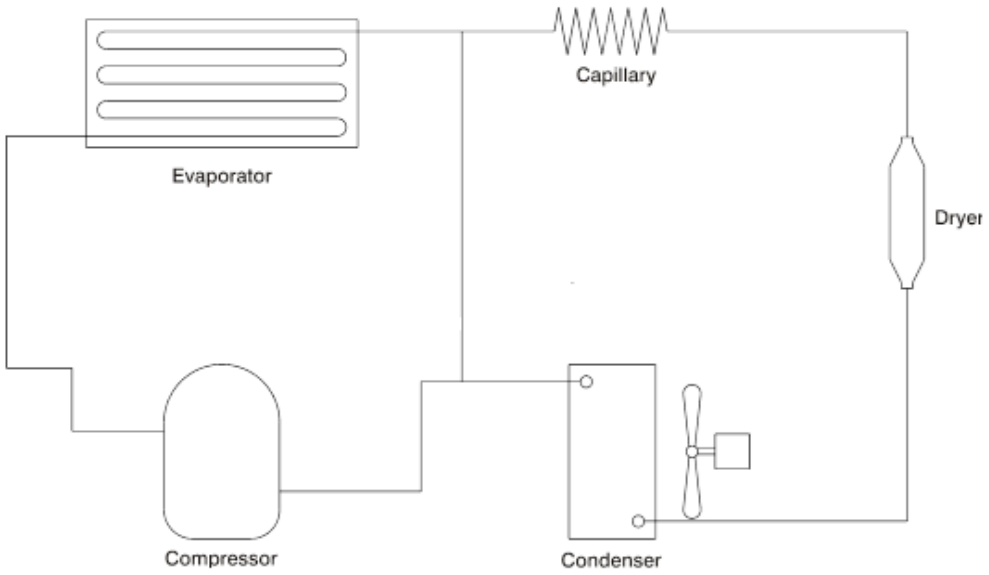
9.2 Circuit Diagrams

9.2.1 IST circuit diagram

9.2.2 External refrigeration system (IST-3075/IST-4075)



9.2.3 Internal refrigeration (IST-3075R/IST-4075R)



9.3 Disposing of products

Before you dispose product or the 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.

9.4 Warranty

9.4.1 Terms of Warranty Service

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

(2) When you ask for repairing, please check the below details first.

- Date of purchase
- Customer name / address / Phone number / E-mail
- Fault status

9.4.2 Warranty exception

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

- If the product is broken due to the user's fault.
- If the product is broken due to improper operation or storage.
- If the product is broken due to improper modify or repairing.
- If the product is broken due to overuse of voltage or earthshock.
- If the product is broken without taking care of the "Notice" alerted on the manual.

9.4.3 Service and technical advice

We, Jeiotech Co., Ltd. are doing best to give best support based on customer service system.

When we get the symptoms, fault states, contact number by customer, we offer after sales service.

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

The Americas (U.S.A. Branch)
19 Alexander Road, Unit #7. Billerica, MA 01821-5094, 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)
B-705, Jingting Bldg. No.1000 Hongquan Rd, Minhang district,
Shanghai, P.R.CHINA 201103
Tel: +86-21-5108-9161, 5414-8389
Fax: +86-21-5168-5414
E-mail: longjuncao@jeiotech.com

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 6021 6880
E-mail: lcomp99@po.jaring.my
FAX: +60 3 6021 7880

- Product is subject to change for improving quality and performance without an advance notice.
- The copyright of this manual belongs to Jeiotech.