Lab Companion

OPERATION MANUAL
Open-air Shaker

Model : OS-2000, OS-3000, OS-4000, OS-7100, OS-7200

Manual no. : 3D1115L002 Version :1.5

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.

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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

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.

1.2 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

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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 place this unit near other product that makes high frequency noise.
Install machine to avoid High frequency welding machine, High frequency Sewing machine, SCR controller.

Do not clean the machine with strong solvent detergent and use smooth fabric.
Strong detergent is cause of discoloration and shape change so use smooth fabric or sponge with neutral detergent.

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

This device is to shake the sample at a constant speed, constant motion. It consists of a platform table and various accessories for fixing the culture vessel. It has a motor and other related system to shake the culture vessel.
This device can constantly supply oxygen to the culture medium in the process of animals and plants cell culture or microbial growth by shaking performance at a constant speed, constant motion. Also when dyeing and washing of cell / DNA, it can improve the effectiveness of the process by providing constant shaking performance.

- Cell culture
- Extractions
- Solubility studies
- Hybridization
- Staining and destaining
- General mixing

2.1.1 High Performance

(1) Precise and fast 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 rpm is under ± 1% (standard: set rpm) which is regarded as very precise value. If the deviation goes above a certain level, alarm will be activated to the user

(2) Control range is very wide. Shaking speed range is from minimum 10rpm to maximum 500rpm depending on the model. It is beneficial for wider experimental conditions. (OS-7100/7200 : min 30 rpm, OS-7200 : max 300 rpm)

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

2.1.2 Advanced Convenience

(1) Easy-to-read VFD and easy-to use control knob enables user-friendly interface. Intuitive operation status check and easy operation are available.

(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) Built-in RS-232 port and USB port for external control and data collection.

(4) 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

(5) 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.

2.1.3 Advanced Safety

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

(2) Shaking speed is automatically adjusted in case of excessive workload such as unbalanced load placement, unusual vibrations caused from unstable floor or external shock. It prevents turbulence of the device.

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

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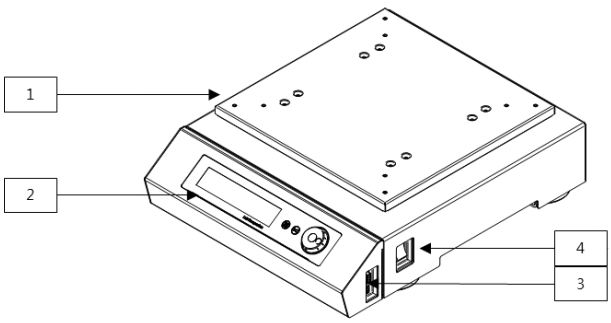
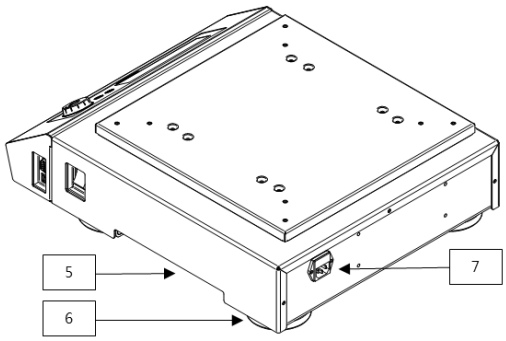
2.3 Structure

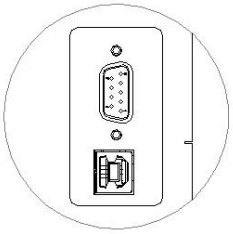




(1) Driving Plate
It fixes the shaking table such as universal Platform.

(2) Control Panel
It is main control part. The use of FND and membrane touch switch improves visibility and convenience.
There are start/stop buttons and speed and timer setting buttons.

(3) Computer Interface
This unit can be connected to PC by USB & RS232.
And user can monitor and operation unit by PC.
If the USB and RS232 is connected at the same time, the unit read USB first.



(4) Power Switch
It turns the main power on/off of the device.

(5) Side Handle
When moving the device, lift the device by holding each handle.

(6) Foot
Four feet fix the device for stable operation.

(7) Power Socket
It is the part that receives the power from the electronic cord and there are fuses built in..

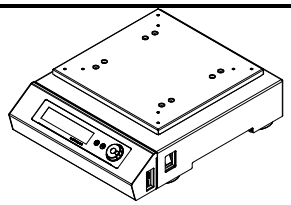
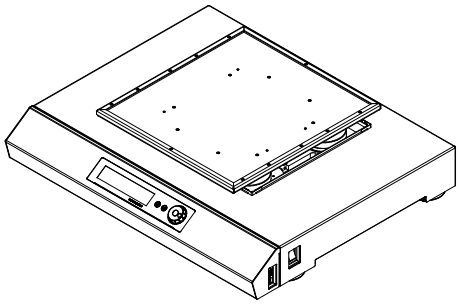
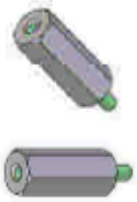
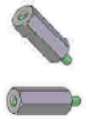
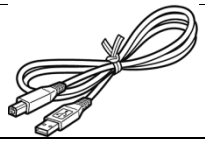
3 Installation

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	 or 	1	
Orbital Movement spacer		4	OS-2000, OS-3000, OS-4000 Only
Reciprocating Movement Spacer		4	OS-2000, OS-3000, OS-4000 Only
JEIOTECH SOFTWARE CD		1	
Cable for Communication (USB)		1	

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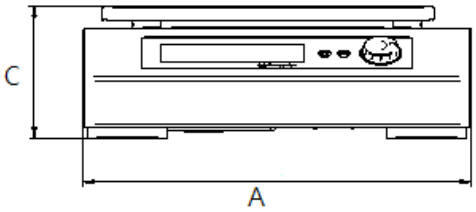
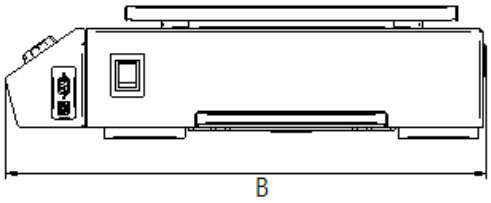
Power Cord		1	
Fuse 250V, 3.15A		2	inside Power Socket
Operation Manual		1	

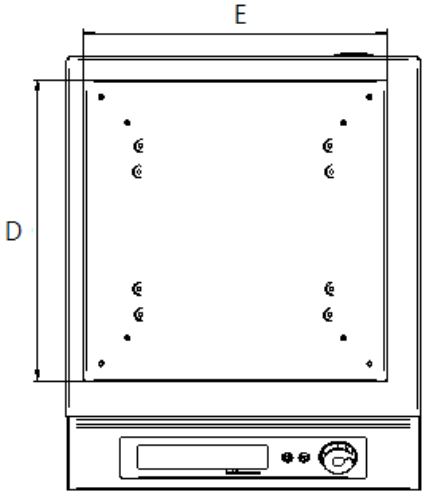
3.3 Preparation before installment

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.







Dimension (mm) / Model	A	B	C	D	E
OS-2000	354	388	146	260	320
OS-3000	409	508	141	350	350
OS-4000	510	632	156	450	450
OS-7100	755	627	151	450	418
OS-7200	755	627	151	450	418

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.

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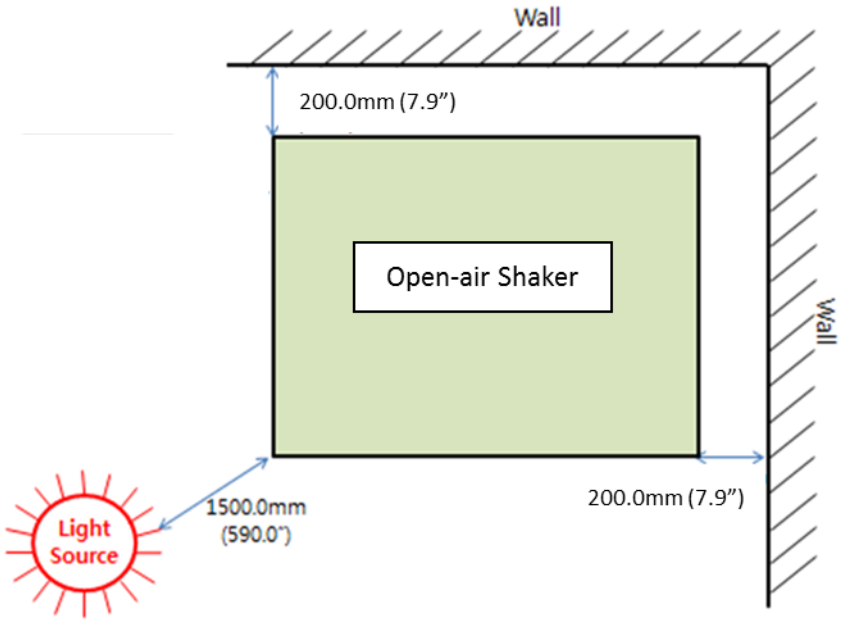
3.4 Installation

3.4.1 Precautions for use

(1) The device is recommended to use under the room temperature and do not install it near the Heat devices like a Heater. Please install it on the sturdy surface laboratory and do not throw down or gives a big shock

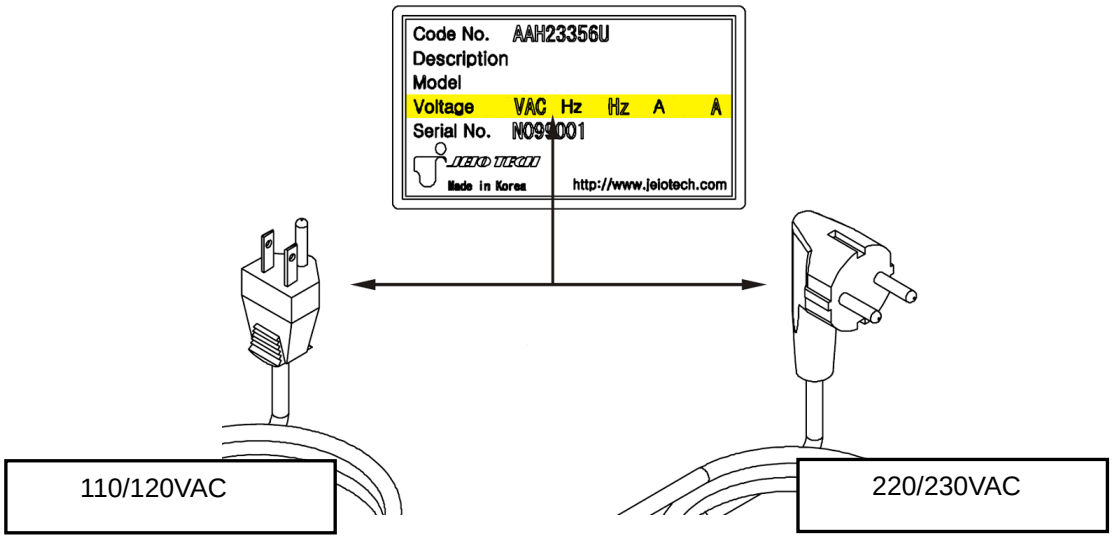
(3) Locate it 1.5m away from any light devices and 20 CM away from the wall.

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



3.5 Connection power

JEIOTECH's Shaker 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.

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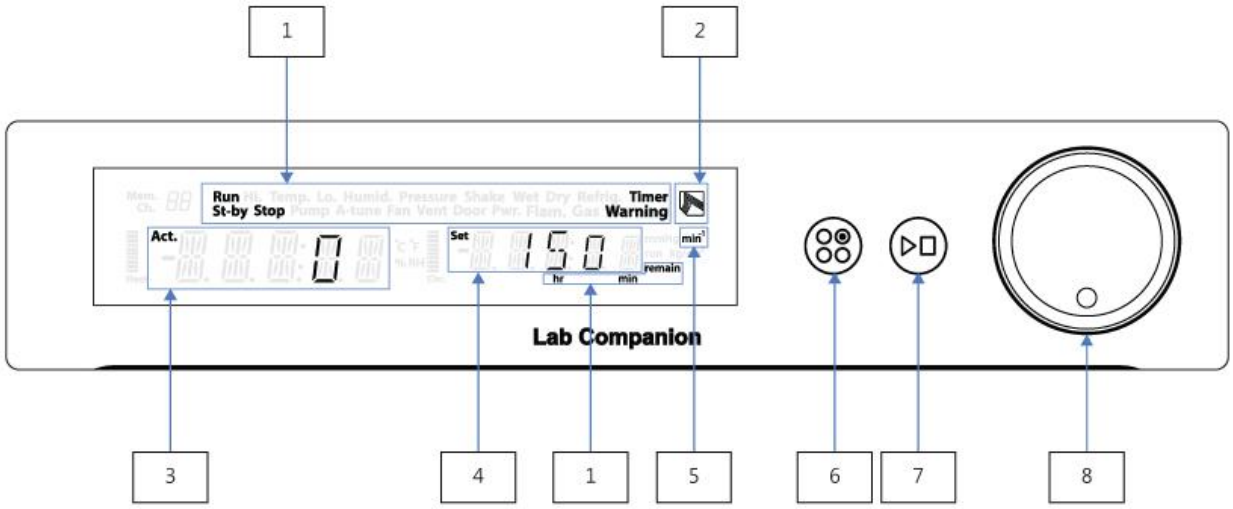
4. Operation

4.1 Controller name and function

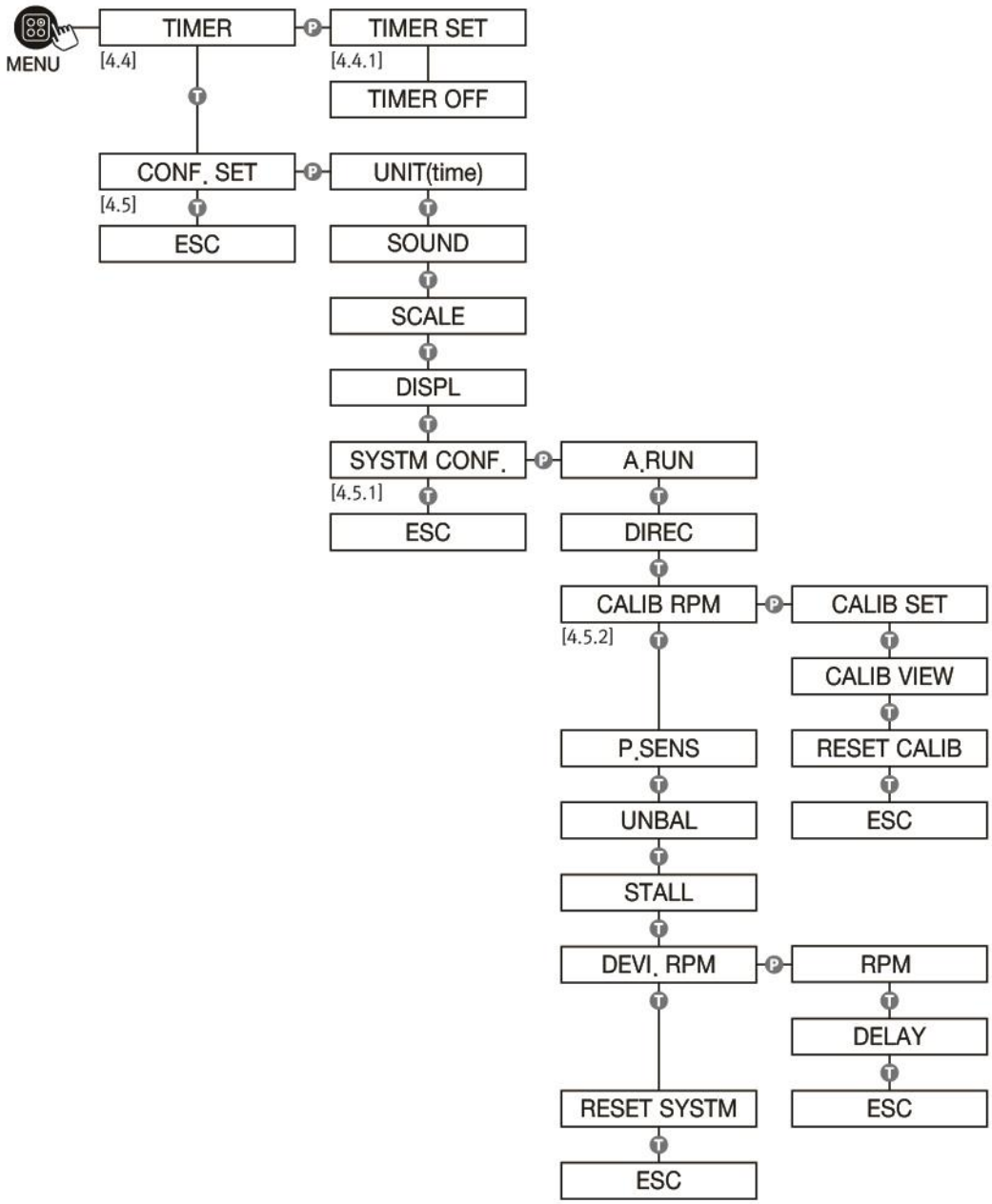
The control panel has VFD as basic display and dial knob for operation and membrane button After power supply to unit, the below home display shows.



1	Status Display	Operation status • Run : Under operation • St-by : Stand-by mode • Stop : Operation stops • hr /min: Hour/Minute • remain : Remain time in case of Timer operation
2	Logo(Lab Companion)	Lab companion logo, blinking in case of PC communication
3	Actual Display	• Shaking speed • Menu item
4	Set Display	Shaking value or Menu set value
5	min	revolutions per minute (= rpm)
6	Menu Button	Timer and unit set up Set up cancel
7	Start/Stop Button	Operation starts and stop
8	Dial Knob	Knob TURN • During operation: Select set value of Set Display (Set RPM or operation time). • Value increase or decrease • Menu searching Knob PUSH • Select the menu and set-up save and check the status

4.2 Menu structure

The menu has the structure as below.



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4.3 Basic operation

4.3.1 Power Supply

Once turn switch on, whole LED of VFD is ON and “JEIOTECH” logo displayed for 3 seconds and Main Display will shows.

4.3.2 Shaking start and stop

(1) When the unit is stopped, Please check the shaking speed on Set Display.

(2) Once the user presses Start/Stop button, shaking speed will increase gradually and it will be reached at set-up shaking speed.

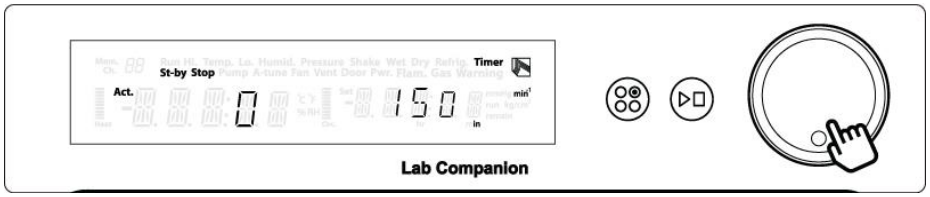
(3) During the machine operation, if the user presses Start/Stop botton, the speed will decrease gradually and will be stopped. .

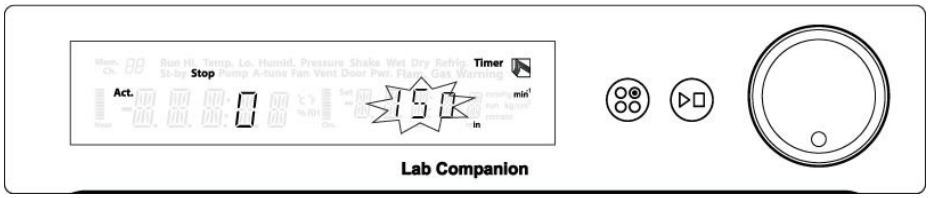
⚠ CAUTION

- Please arrange the samples on the platform to distributed weight evenly..
- When try to change sample, please approach the machine when it is stopped. .
- Do not leave the unit until the speed is reached to set-up value

4.3.3 Shaking speed set-up

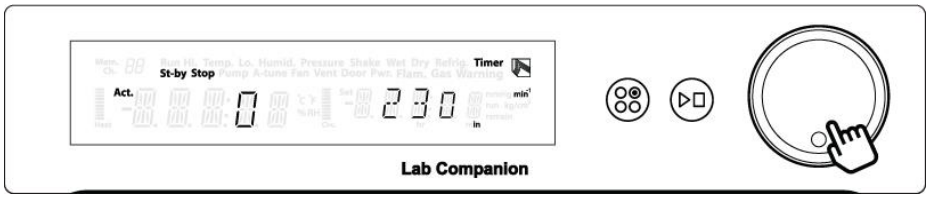
(1) Press Dial Knob(Knob) one time, display is blinking .





(2) Turn Knob to change the set-up value.

(3) Press Knob to save the set-value.



NOTICE

- If you want to cancel while shaking speed-set up, please press MENU button.
- In case of Shaking speed change during operation, Shaking speed can be changed according to set-up value. Press Knob to save the shaking speed change.
- Before Save Shaking speed change, if the machine is stopped or power is OFF, Shaking speed changed is not saved.
- While shaking speed set-up change, if there is no change for 50sec, current values will be saved automatically.

4.3.4 Check set-up shaking speed and operation time

(1) In case of basking shaking operation, Set Display shows set-up shaking speed.

At this time, if you turn Know to right, it shows operation time.

(2) The period of operation time can be changed according to DISPL item selection of [4.5 Unit Configuration]

Return	Return to set up shaking speed after 3sec
Fix	Return to set up shaking speed if user turn knot to left
Auto	At **intervals** of 3sec, Set up shaking speed displayed and operation time by turns regardless of user's knob change

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4.4 Timer operation

Timer is the function that shaking operation make stopped after set-up time.

It is controlled by MENU button.

If timer is operation, “Timer” is displayed on VFD (Right up side).

4.4.1 Timer set-up

(1) Press Menu button 1time. Displayed current timer status “TIMER”

(2) Press Knob to start timer set-up.

(3) Select “TIMER SET” item and press Knob. ‘Hour’ value is blinking.

(4) Change ‘Hour’ value and press Knob. ‘Minute’ value is blinking.

(5) Change ‘Minute’ value and press Knob. Timer set-up is completed and user can check the set-up value.

(6) Press Menu button or Turn Knob to right to select “ESC” to escape from Timer menu

(7) To operate the unit, press Start/Stop button.

NOTICE

- While ‘Minute’ set-up, if it is cancelled, ‘Hour” is also cancelled together. 시간만 따로 ‘Hour’ cannot be saved separately.
- (2) & (3) is from time unit set-up as “HHH:MM” of Unit configuration. If Time unit set-up as “MMM:SS”, it means Minutes and Second value.
- If time is set-up during operation, Set Display shows remain time as default value not shaking speed during operation. Turn Knob to check shaking speed.
- During operation, user can set-up timer. Same as above (1)~(6). After timer set-up and escape to menu, user can check if the timer is applied or not.
- If user change the set-up time during timer operation, it means change of previous set-up time. The remain time is total time of the past time from now and new set-up time. If the new timer from the change timer point that doesn’t include previous time, Turn OFF timer (“TIMER OFF”) and set-up timer again.

4.4.2 Timer Cancel

(1) Press Menu button 1time. Displayed current timer status “TIMER”

(2) Press Knob to start timer set-up..

(3) Select “TIMER OFF” and Press Knob.

(4) Press Menu button or Turn Knob to right to select “ESC” to escape from Timer menu.

NOTICE

- During operation if Timer is OFF, basic shaking mode is operated.

4.4.3 Timer Stop

(1) After set-up time, the unit operation is stopped with alarm sound with “TIMER END” display.

(2) Press Knob and check status and return to Main display.

4.5 Unit set-up

Unit operation configuration set-up. Press MENU button and, set-up in “CONF. SET” item.

1	“UNIT” (Time Unit)	Timer set-up and time unit display (“HHH:MM” or “MMM:SS”)
2	“SOUND”	System electric sound control
3	“SCALE”	In case of RPM set-up, Increased or decreased on set-up unit basis • Unit : 1, 5, 10
4	“DISPL” (Run Display)	During operation, Information on Set Display (Set-up shaking speed, Operation time) display method [Refer 4.3.4] • **Return**: Return to Default display after 3sec from Knob turn • **Fix**: Fix the display that user displayed by Turn • **Auto**: Display set-up speed and operation time every 3sec by turns
5	“SYSTM CONF.” (System Configuration)	System operation set-up without above item

NOTICE

- If user presses MENU button while change of set-up value, screen is returned to the previous step. It will be returned main display during menu searching.

4.5.1 System Set-up

Set-up about main factors that can effect unit operation.

Before change of system set-up, please read this manual carefully.

Set-up SYSTM CONF of [4.5 Unit set-up]

1	“A.RUN” (Auto Run)	Auto Run • During unit operation, if the power is forced OFF and ON, the previous set-up is returned. (Time information is not returned) * Default :ON
2	“DIREC” (Direction)	Direction of circulation • CW(Clocklwise), CCW(Counter clockwise) * Default : CW
3	“CALIB” (RPM Calibration)	Reconcile unit shaking speed value with user’s reference measurement value. Refer [4.5.2 Shaking speed calibration]

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4	“P.SENS” (Position Sensor)	In case of shaking stop, Check the position or not If this item OFF, unit doesn’t check the proper position stop * Default : ON
5	“UNBAL” (Load Unbalance)	Automatic shaking speed control function according to unit vibration If this item OFF, RPM doesn’t controlled automatically even though unit vibration. * Default : ON
6	“STALL” (Stall Check)	Belt type product, platform faulty check (For OS-2000, 3000, 4000) * Default : ON
7	“DEVI” (RPM Deviation)	An allowance error set-up between set-up shaking speed and actual shaking speed. • RPM: allowance error set-up • DELAY : Alarm ON/OFF period set-up about an allowance error If the shaking speed is over/under allowance error in Delay item, alarm is ON/OFF * Default •RPM : 5 •DELAY : 30sec
8	“RESET” (System Reset)	Factory Reset

4.5.2 Shaking speed calibration

By “CALIB RPM” of [4.5.1 System set-up], specific shaking speed can be matched with user’s calibration reference.

Before data input, complete to install calibration reference.

(1) In “CALIB RPM”, Press Knob. User can check the latest calibration shaking speed.

(2) In put shaking point (POINT) that user wants to Set Display.

(3) In put shaking speed by pressing Knob, unit start to control shaking speed.

(4) Wait a moment until set-up shaking speed matches with actual shaking speed.

(5) Measure the current shaking speed by reference. In put shaking speed (“VALUE”) of reference by pressing Knob.

(6) This calibration process means that user’s exact in put “(VALUE”) is applied to shaking speed (“POINT”) that calculated by unit. After calibration, unit control the shaking speed that input value is reflected in .

⚠ CAUTION

- In case of shaking speed input to (2) section, unit starts to operate without Start/ Stop button press.

NOTICE

- When the shaking is operated in shaking speed calibration, it can be stopped by Start/ Stop button.
- It is possible to cancel calibration by MENU button.
- Previous calibration value can be checked from item in “CALIB RPM”.
- If user selects “CALIB VIEW” in “CALIB RPM”, user can check previous calibration (“POINT”) and input calibration value (“VALUE”).
- It is possible to initialize of the past calibration value. It is possible to initialize of calibration value by “RESET CALIB” in “CALIB RPM”.

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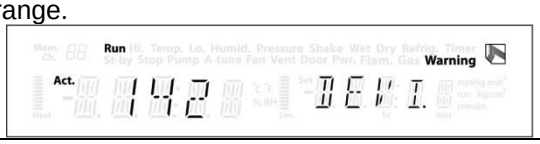
4.6 Warning and Fault Messages

The unit has several functions that making the user to acknowledge the error on the unit. This machine can call attention by visual – audible alarm. This functions are divided into Warning and Fault based on seriousness of problem

4.6.1 Warning

In case of Warning, visual and audible alarm operated but unit keeps operating.

If user presses Knob, alarm sound is stopped but the visual alarm is remained until problem is solved.

1	RPM Deviation	This message is displayed if the difference between set-up shaking speed and actual shaking speed is over than an allowance error which is beyond alarm delay (Refer to 4.5.1) Warning is stopped if the actual shaking speed reaches the set-up shaking speed after sometime to approach a permissible range. 
2	Unbalance	If the shaking system keeps shaking precariously, this system control the shaking speed by itself. This message shows this function operation to user. (Refer to 4.5.1) 
3	Home Position	Generally, platform is always stopped at the same position if the shaking system is stopped normally This message is displayed if the shaking is stopped at not proper position. (Refer to 4.5.1) 

NOTICE

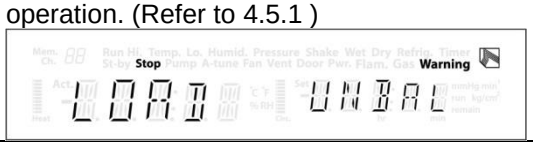
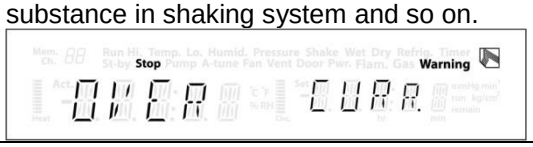
- In case of sound OFF in Configuration part, the sound alarm about WARNING is not operated.

4.6.2 Fault

Fault is the very serious problem level to stop the machine forcibly.

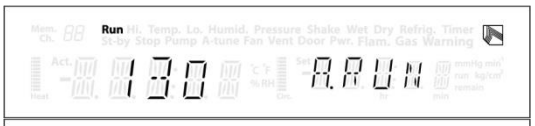
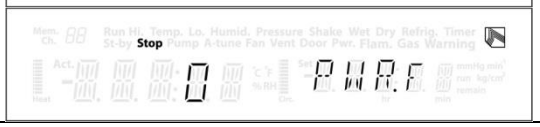
If user presses Knob, audible alarm is canceled but visual alarm is not canceled until the problem is solved. If the problem is not fixed after some time, the audible alarm is operated again and the shaking operation is stopped to protect shaking system.

1	Platform Stall	For belt type product, This message can be occurred because platform doesn't shaking operation freely. The main cause are substance in shaking system or broken belt. (Refer to 4.5.1) 

2	Load Unbalance	This message can be occurred because shaking system vibration to avoid shaking operation. The main cause are imbalance arrangement of sample on platform, overload sample, uneven place that unit placed and re-operation. (Refer to 4.5.1) 
3	Over Current	In case of over current than the allowed current consumption, the operation is stopped to protect the unit. The main cause are overload shaking operation and foreign substance in shaking system and so on. 

IF user presses Knob, Display is return to Main screen.

4.6.3 Other message

1	Auto Start	During operation, Forced power OFF or ON In configuration, if A.RUN Set-up value is ON ″A.RUN″ displayed. If OFF, ″PWR.F″displayed  

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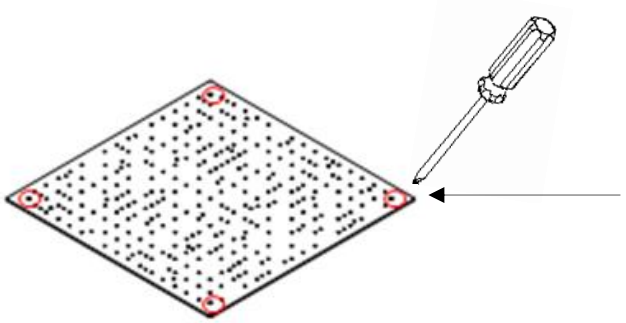
4.7 Orbital / Reciprocating Movement change

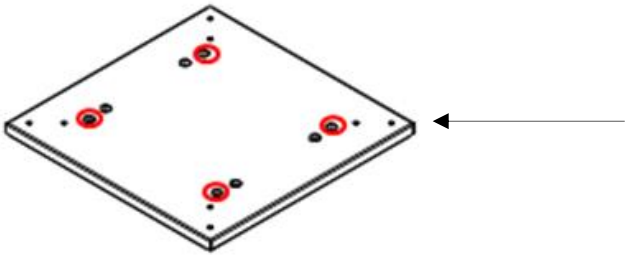
(For OS-2000/3000/4000)

Orbital / Reciprocating Movement for OS-2000/3000/4000 can be changed. It defaults to Orbital movement. Please prepare the enough space for shaking system disassembly and follow the instruction to change amplitude.

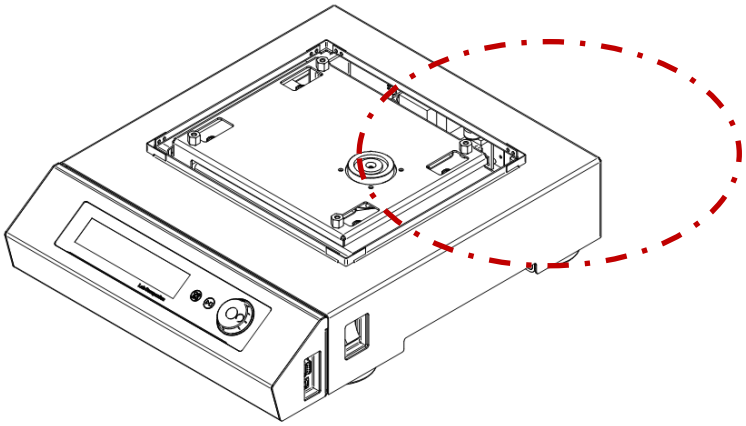
(1) Disassemble the 4 bolts for platform fix with (+) Screw driver according to below photo steps.
(2) Disassemble the 4ea bolts that fix shaking table from the location of below photo.



Platform
(For example, universal platform)

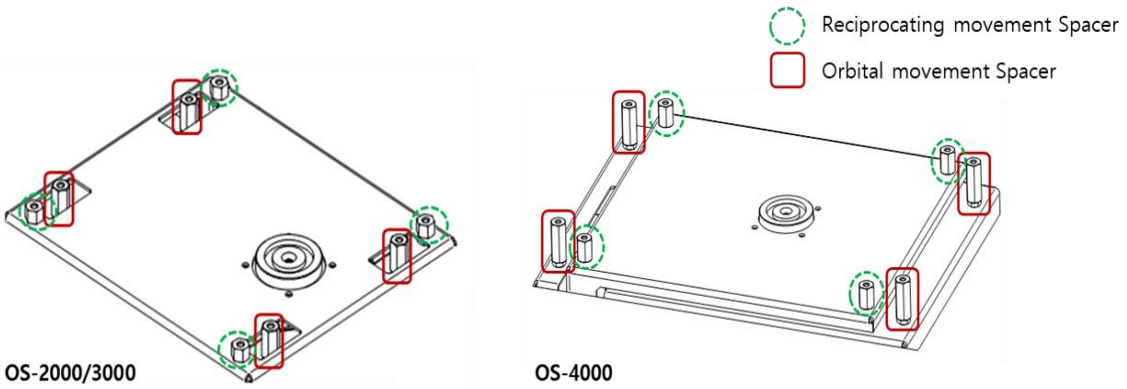


Shaking table

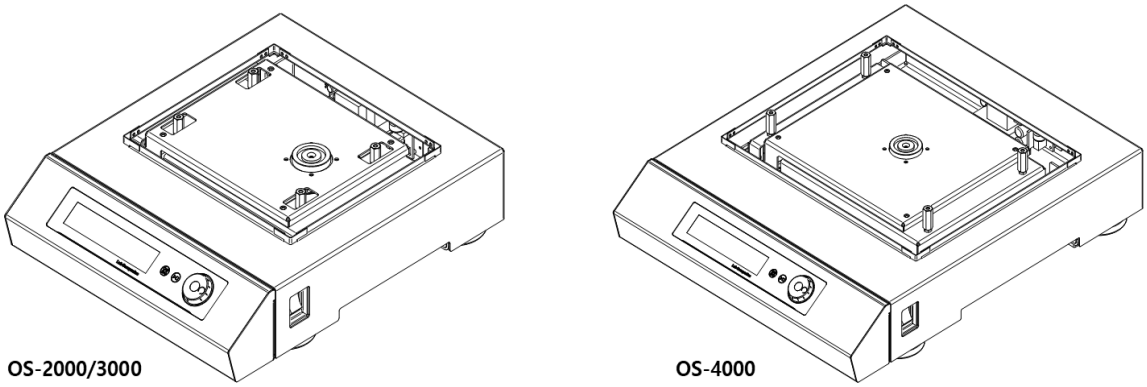


OS 2000/3000 with spacer for orbital movement

(3) Disassemble Spacer that is located in dotted line circle for orbital movement with spanner (12mm) or monkey spanner and install spacer for reciprocating to red-cubic.



Position of Spacer Reciprocating/Orbital movement of OS-2000/3000 and OS-4000



OS-2000/3000 and OS-4000 with spacer for orbital movement

(4) Assemble shaking table in reverse order.

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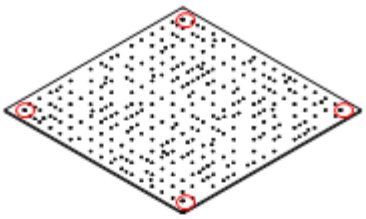
4.8 Amplitude change (For OS-2000/3000/4000)

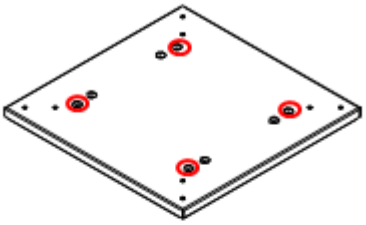
Amplitude for OS-2000/3000/4000 only can be changed.

Please prepare the enough space for shaking system disassembly and follow the instruction to change amplitude.

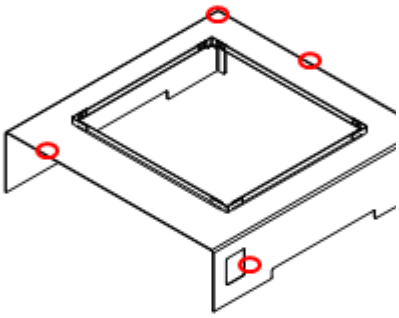
4.8.1 Disassemble of shaking system



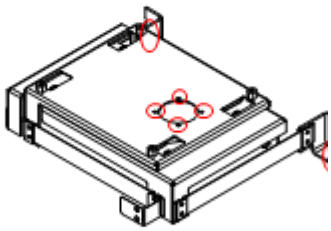
Disassemble platform (The picture is example of universal platform) as 4.7(1).



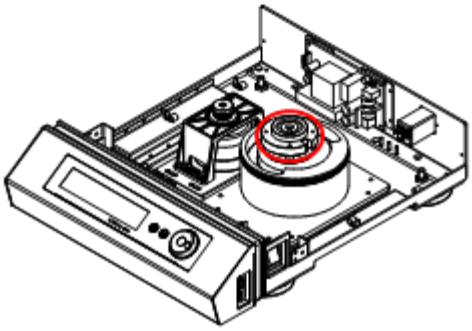
Disassemble shaking table as 4.7(2).



Separate the shaking cover and bolt with (+) Screw driver.

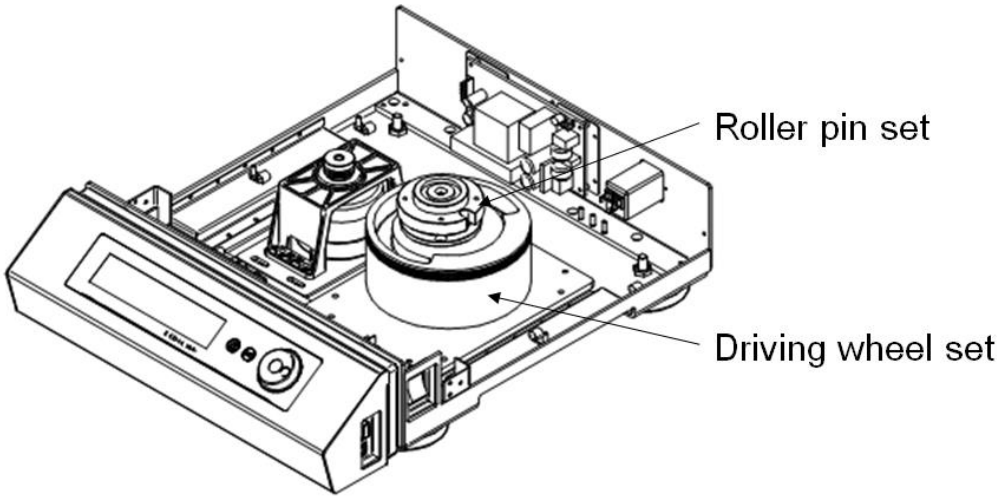


Disassemble shaking frame module and wrench bolt with 4mm wrench (OS-2000/3000: 8ea, OS-4000 12ea of wrench bolt)

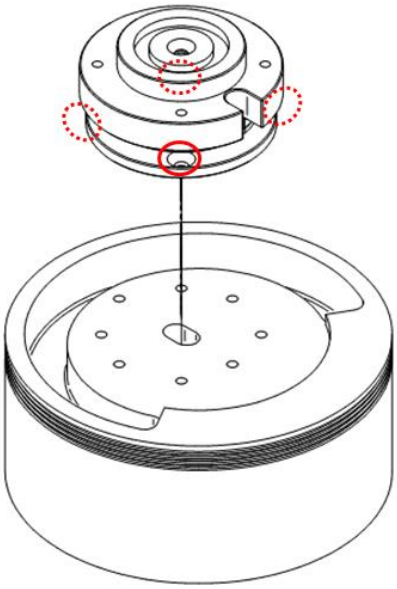


4.8.2 Amplitude change

(1) If you disassemble the shaking system you can find roller pin set and driving wheel set as 4.8.1..



(2) Refer to the below and Disassemble 4ea bolts with (+) Screw driver from Roller pin set of Driving wheel set



(3) Check the model name and refer to the below table (Bolt location per Amplitude size) and asseble 4ea bolts to (2).

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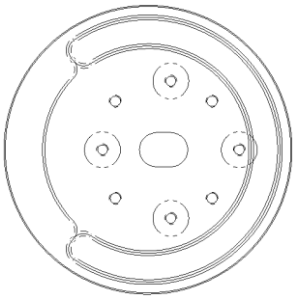
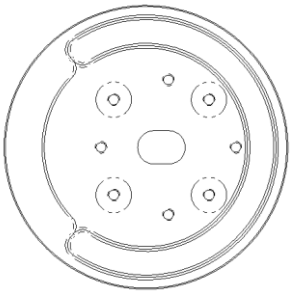
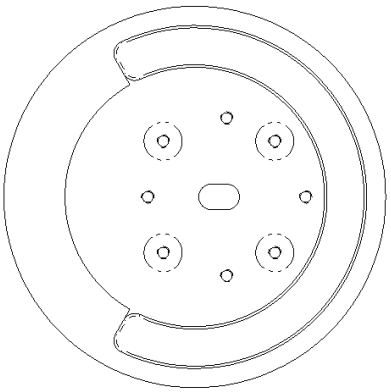
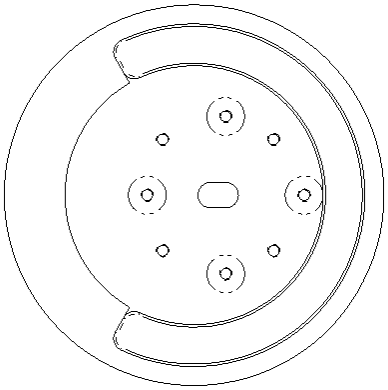
Models	Bolt location per Amplitude size	
OS-2000	19.1mm (0.75 inch)	12.7mm (0.5inch)
		
OS-3000/4000	19.1mm (0.75 inch)	25.4mm (1inch)
		

Assemble it in reverse order.

5 Maintenance

5.1 Inspection period

Section	Inspection period				
	Daily	Weekly	Monthly	Quarterly	Yearly
General					
Power					
Connection between machine and power	●				
Power code	●				
Exterior cleanliness		●			
System					
Connection between platform and accessories	●				
Connection between platform and shaking table	●				
Actual rpm/ Display rpm correction					●
Malfunction of shaking system			●		
In case of connection with PC, check Sync operation.	●				
Check controller function and timer operation				●	

5.2 Clean

(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.

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⚠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 Fuse Replacement.

Replace the fuse which is located in power socket (Refer to 2.3.(7)) if no operation of short circuit breaker and No power.

To replace fuse, disconnect the power cord first and take the extra fuse out.

There is extra fuse 2pcs in power socket.

If you need additional fuse, ask it to sales team or seller.

Model	Voltage	Current consumption(A)	Fuse (A)	Fust Cat. No.
OS-2000	230VAC, 50/60Hz	0.3	3.15	00CDE0005567
	120VAC, 60Hz	0.6	3.15	
OS-3000	230VAC, 50/60Hz	0.3	3.15	
	120VAC, 60Hz	0.6	3.15	
OS-4000	230VAC, 50/60Hz	0.3	3.15	
	120VAC, 50Hz	0.6	3.15	
OS-7000	230VAC, 50/60Hz	0.4	3.15	
	120VAC, 60Hz	0.8	3.15	

⚠WARNING

- 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.

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6 Troubleshooting

6.1 Machine stop during operation

Display Message	Description	Solution
“LOAD UNBAL” (Load Unbalance)	During operation, if there is big vibration to avoid general shaking, machine stops to protect the machine.	Check imbalance arrangement of sample on platform, overload sample, uneven place that unit placed and re-operation. Refer to 4. 6.2
“OVER CURRT” (Over Current)	In case of over current than permitted current, machine stops to protect the machine.	Re-operation after solve problem about overload and disturbance of shaking system. Refer to 4. 6.2
“PLAT STALL” (Platform Stall)	If there is any foreign substance between platform and shaking table, the shaking system cannot be operated normally.	If there is any foreign substance of shaking system, please remove it. After remove it, if the problem is continued, request A/S. Refer to 4.6.2.

6.2 Another trouble and solution

Trouble	Probable Cause & Solution
The equipment is not on	Check the power plug connection to the socket Check if the circuit breaker is operated When the fuse is short circuited, replace new one as enclosed. Check the power failure If the problem is not fixed with the above method, please request A/S
Power on but controller does not operated	Check the power plug connection to the socket Check the panel board circuit breaker and reset it then turn the machine on Request A/S if Display board or Main PCB has problem Request A/S if Power switch has problem.
Shaking trouble	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 If there is extremely intense vibration of the machine and shaking speed is slow down, check the sample location and relocate the samples harmoniously In case of overloading, control the sample weight according to 9.1(Max load per speed).

	Check Timer close status if shaking is not operated after shaking start button press, cancel timer set-up. If the problem is not fixed with the above method, please request A/S. When Warning message is displayed, check the cause according to 6.1, change the related item if needed
Noise	Check fixed condition of platform or sample. Check the weight of sample is shifted to one side, relocate the samples evenly. If the problem is not fixed with the above method, please request A/S.

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7 Accessories

7.1 Maximum install quantity

7.1.1 Universal Platform + Flask Clamp

Model / Flask Clamp	OS-2000	OS-3000	OS-4000	OS-7000 series	Cat.No.
50ml	20	36	49	88	AAA23550
100ml	16	28	39	68	AAA23551
250/300ml	8	14	24	39	AAA23552/AAA23556
500ml	6	10	16	28	AAA23553
1,000ml	3	6	9	18	AAA23554
2,000ml	-	4	6	11	AAA23555
2,800ml	-	3	5	8	AAA23557
4,000ml	-	1	4	6	AAA23558
6,000ml	-	1	3	5	AAA23559

7.1.2 Universal Platform + Plastic Flask Clamp

Model / Flask Clamp	OS-2000	OS-3000	OS-4000	OS-7000 series	Cat.No.
50ml	20	36	49	88	AAA30570
100/125ml	12	19	29	48	-/AAA30571
200ml	8	13	21	35	AAA30572
250ml	8	13	19	35	AAA30573
300ml	6	12	19	35	AAA30574
500ml	6	9	12	24	AAA30575
1,000ml	3	5	9	12	AAA30576
2,000ml	-	4	5	8	AAA30577

7.1.3 Universal Platform + Funnel Clamp

Model / Funnel Clamp	OS-2000	OS-3000	OS-4000	OS-7000 series	Cat.No.
250ml	4	4	6	15	AAA23562

500ml	3	3	4	10	AAA23563
1,000ml	3	3	3	7	AAA23564
2,000ml	-	2	2	5	AAA23565

7.1.4 Universal Platform + Microplate Holder

Model / Type	OS-2000	OS-3000	OS-4000	OS-7000 series	Cat.No.
Single	6	8	15	25	AAA23654
Tower	4	6	10	21	AAA23651
Flat A(large)	-	-	2	4	AAA23562
Flat B(small)	1	2	3	6	AAA23563

7.1.5 Universal Platform + Test Tube Rack

Model	OS-2000	OS-3000	OS-4000	OS-7000 series	Cat.No.
Ø8mm(86ea)	2	2	4	7	AAA23581
Ø10mm(86ea)	2	2	4	7	AAA23582
Ø12mm(58ea)	2	2	4	7	AAA23583
Ø14mm(58ea)	2	2	4	7	AAA23584
Ø17mm(32ea)	2	2	4	7	AAA23585
Ø25mm(19ea)	2	2	4	7	AAA23586
Ø35mm(10ea)	2	2	4	7	AAA23594

7.1.6 Spring Wire Rack + Flask

Model / Flask	OS-2000	OS-3000	OS-4000	OS-7000 series
Cat.No	AAA3A521	AAA31521-V1	AAA31522-V1	AAA23514
50ml	15	16	25	45
100/125ml	9	9	16	28
250/300ml	4	4	9	18
500ml	4	4	5	15
1,000ml	2	2	4	10

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2,000ml	-	1	2	6
2,800ml	-	1	2	4

7.1.7 Dedicated Platforms

Description	Cat.No.
An universal platform for OS-3000 series with 250mL flask clamps 13ea	AAA31551
An universal platform for OS-3000 series with 500mL flask clamps 10ea	AAA31552
An universal platform for OS-4000 with 250mL flask clamps 24ea	AAA31561
An universal platform for OS-4000 with 500mL flask clamps 16ea	AAA31562
An universal platform for OS-7100/OS-7200 with 250mL flask clamps 35ea	AAA23634
An universal platform for OS-7100/OS-7200 with 500mL flask clamps 24ea	AAA23635

7.1.8 Rubber Mats

Model	OS-2000	OS-3000	OS-4000	OS-7000
Cat.No.	AAA3A531	AAA31531	AAA31532	AAA23534

7.1.9 Universal Attachment

Models	OS-2000	OS-3000	OS-4000	OS-7000
Cat. No.	AAA3A511	AAA31511	AAA31512	AAA23505

7.1.10 Dual stacking tray for Microplate

Model	Cat.No.
OS-2000	AAA3A541

7.1.11 Large tray for Microplate

Model	Cat.No.
OS-2000	AAA3A542

7.1.12 Dimpled Mat

Model	Cat.No.
OS-2000	AAA3A532

7.1.13 Lab Sticker

Description	Size	Cat.No.
Size (mm / inch, W×D×H)	200×200×5 / 7.9×7.9×0.2	AAA30551

※ Please visit Jeiotech homepage or ask service to install maximum quantity.

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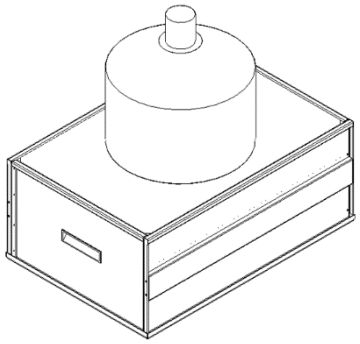
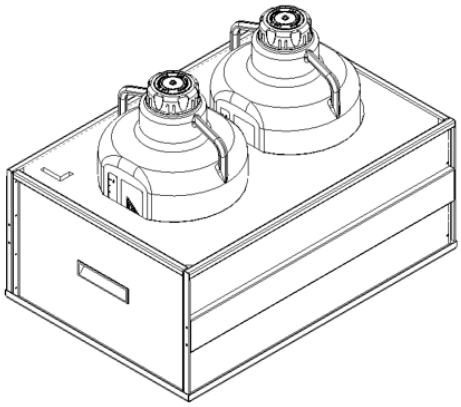
7.2 duty holder

7.2.1 Heavy duty holder for OS-7000 series



Heavy duty holder with 50L carboy



Heavy duty holder with 20L carboy

Description	Cat.No.
Heavy duty holder for OS-7000 series	AAA3D501
Heavy duty holder sponge (Φ376mm x 1hole) for 50L Carboy	AAA3D502
Heavy duty holder sponge (Φ290mm x 2hole) for 20L Carboy	AAA3D503

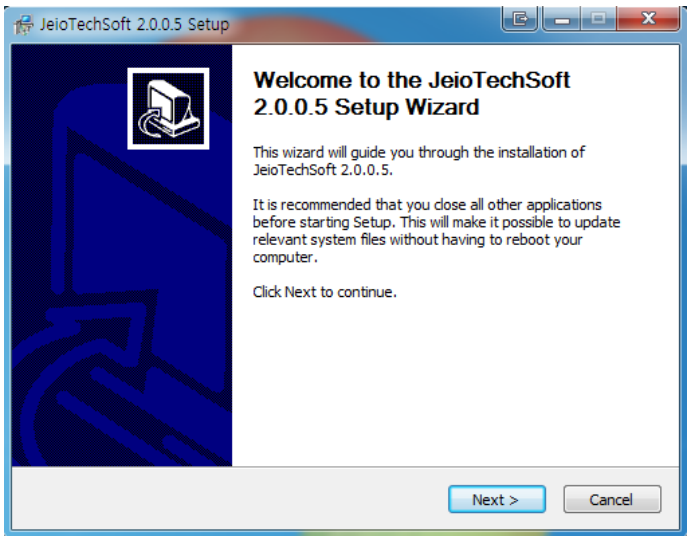
7.2.2 Allowable Maximum agitating RPM of OS-7000 series

Model	Holder Sponge	Water weight(kg)					
		0	10	20	30	40	50
OS-7100	20ℓX2	300	280	180	160	160	-
	50ℓX1	300	190	150	130	130	130
OS-7200	20ℓX2	210	180	160	150	150	-
	50ℓX1	210	140	120	110	100	100

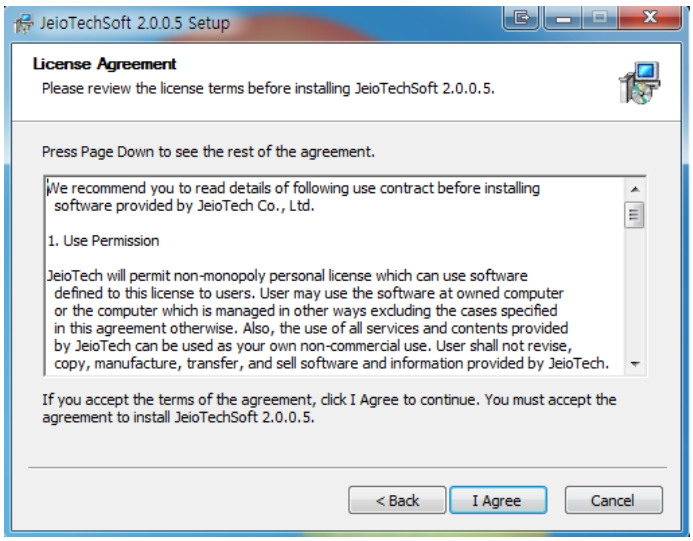
8 S/W

8.1 Monitoring Program install

Put install CD to CD-ROM Drive and installation program is started automatically.
Touch ″Next″ button to change License Agreement page.



Before JeioTech Soft install, please review License and touch ″I agree″ button



Select the save way and touch ″Install″ button to install program.

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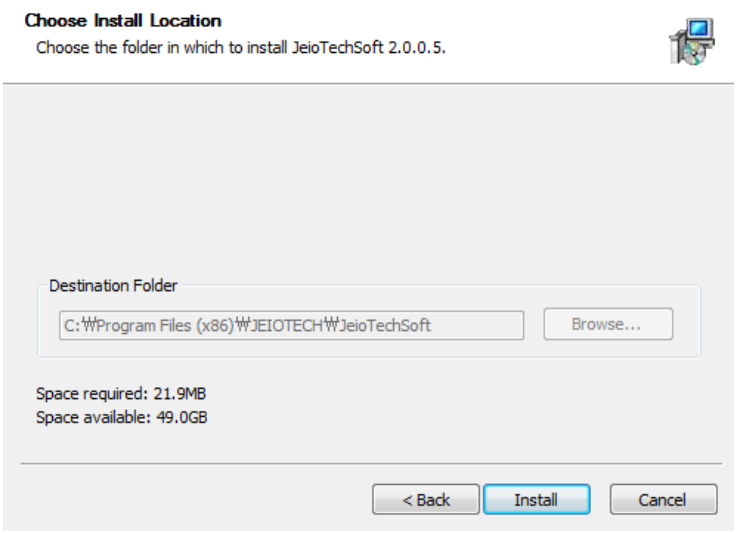
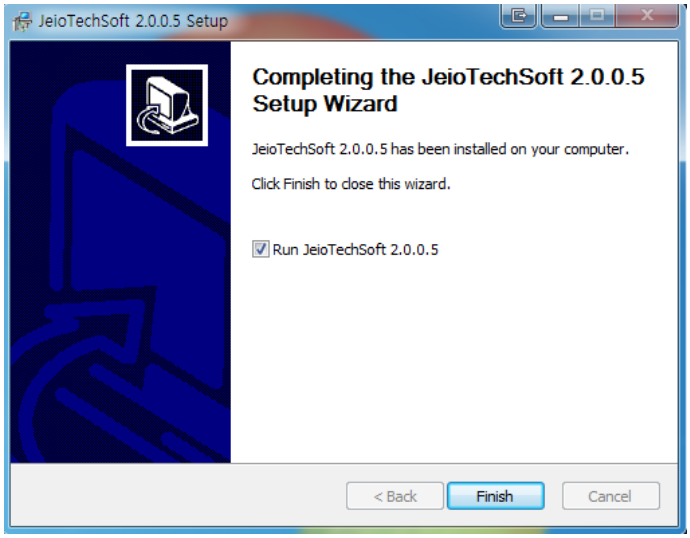


After program installation completed, Jeiotechsoft icon will be made on wallpaper.
Check Run JeioTechSoft 2.0.0.5 or Icon on wallpaper to run program.



8.2 Communication protocol

This unit can be communicated with other product by RS-232C port.
The S/W that Jeiotech supplies, can double-way communication, operation check, data record and save.
If you want to change S/W, please refer to the below communication reference.
Communication 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 System number

ITEM	System Number	System	Model Number
Open-air Shaker	2701H	shaker	OS-2000
	2702H	shaker	OS-3000
	2703H	shaker	OS-4000
	2704H	shaker	OS-7100
	2705H	shaker	OS-7200

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(For communication test)	1	2
			0x0002	BEEP_KEY(For communication test)	1	2
R/I	2	MOD_SYS_NAME	x	Unit name	1	2
R/I	3	MOD_SYS_VER	x	Firmware version	1	2
R/I	4	MOD_SYS_PARAM	x	system parameter(required items when set-up)	20	40
W/S, R/I	28	MOD_AUTO_RESTART	0/1	system auto restart	1	2
W/S, R/I	41	MOD_SET_RPM	rpm min ~ rpm max	shaker set rpm	1	2

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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	67	MOD_AUTO_ACK	1	auto run ack	1	2

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- You must enter -1 value from the specified address value when entering a register address because It is a Modbus Poll based design.

8.2.4 Modbus Protocol Description

Command	Description					
Beep	Buzzer sound	Modbus function code	0	Write data	1	System boot beep
		W.S	Data		2	System key beep

MOD_SYS_NAME	Return unit name. Refer to System number	Modbus function code	0	Return data	0	
		R.I	address		Upper	Lower
					Model num	

MOD_SYS_VER	Return firmware version	Modbus function code	0	Return data	0	
		R.I	address		Upper	Lower
					version	

MOD_SYS_VER	Return System parameter	Modbus function code	0	Return data	0	1
		R.I	address		Max rpm	Min rpm

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 (1초단위)	
		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	addre		dumm	dum	set	act

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				ss			y	my	rpm	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	sk_stall_err	sk_pos_chk	usb_mode	temp delay	auto tune	sk over cur
					1:ERROR	unused	unused	unused	unused	1:ERROR
			23	22	21	20	19	18	17	16
			rpm hold	temp hold	silent	ext otp	sk load warn	sk load	rpm devi	temp devi
			unused	unused	unused	unused	1:WARNING	1:ERROR	WARNING:1	unused
			15	14	13	12	11	10	9	8
			auto run	mute	refrig	sensor	opt warn	door warn	otp	door open
			1:A.RUN	unused	unused	unused	unused	unused	unused	unused
			7	6	5	4	3	2	1	LSB
			usb connect	silent disp	sk pos er	lamp	timer	shaker	incubator	operation
			unused	unused	1:ERROR	unused	ON:1	0:STOP, 1:RUN	unused	unused

MOD_WARN_ACK	warn message clear	modbus function code	0		data	1: message clear
		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 Appendix

9.1 Technical Specifications

MODEL		OS-2000	OS-3000	OS-4000	OS-7100	OS-7200
Shaking Motion (Factory Setting : Orbital)		Orbital / Reciprocal	Orbital / Reciprocal	Orbital / Reciprocal	Orbital	Orbital
Amplitude Size (mm/inch, dia.)		19.1/0.8 (Standard) 12.7/0.5 (Adjustable)	19.1/0.8 (Standard) 25.4/1 (Adjustable)	19.1/0.8 (Standard) 25.4/1 (Adjustable)	25.4/1 (Standard)	50.8/2 (Standard)
Speed range (rpm)		20 to 500	20 to 500	20 to 500 (Orbital) 20 to 450 (Reciprocal)	30 to 500	30 to 300
Max. Load(kg) at permissible speed (rpm)	Orbital	10 at 500 16 at 300	10 at 500 18 at 300	14 at 500 21 at 400	10 at 500 30 at 400	23 at 300 35 at 250
	Reciprocal	8.5 at 500	8.5 at 500	10 at 450 21 at 300	-	-
Accuracy		±1% of set speed (>100rpm) / ±1 (<100rpm)				
Timer		1 min. to 999 hr 59 min.				
Dimension	Platform (W×D) (mm/inch)	320*260/ 12.6*10.2	350*350/ 13.8*13.8	450*450/ 320*260	755*520/ 320*260	755*520/ 320*260
	Overall (W×D×H) (mm/inch)	354*388*146/ 13.9x15.3x5.7	409*508*141/ 16.1x20x5.6	510*632*156/ 16.1x20x5.6	755*627*151/ 16.1x20x5.6	755*627*151/ 16.1x20x5.6
	Net Weight (Kg/lbs)	22/48.5	28/61.7	43/94.8	117/257.9	117/257.9
Materials	External	Epoxy powder coated steel				
	Platform	Anodized aluminum plate				
Safety Device		Over Current Stop, Platform Stalled Check				
		RPM Deviation Check, , Load Unbalance Check				
Communication Interface		USB, RS232				
Electric requirements (230V, 50/60Hz,A)		0.3	0.3	0.3	0.4	0.4

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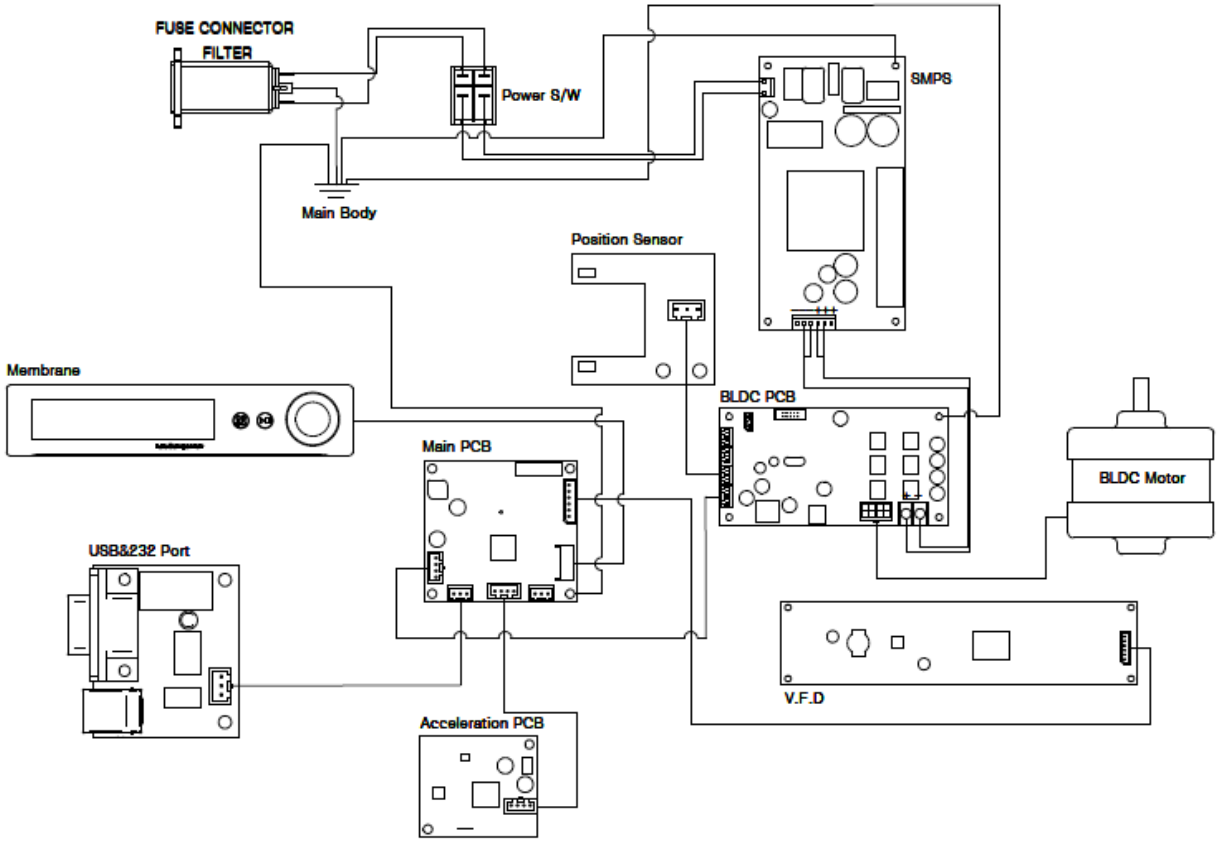
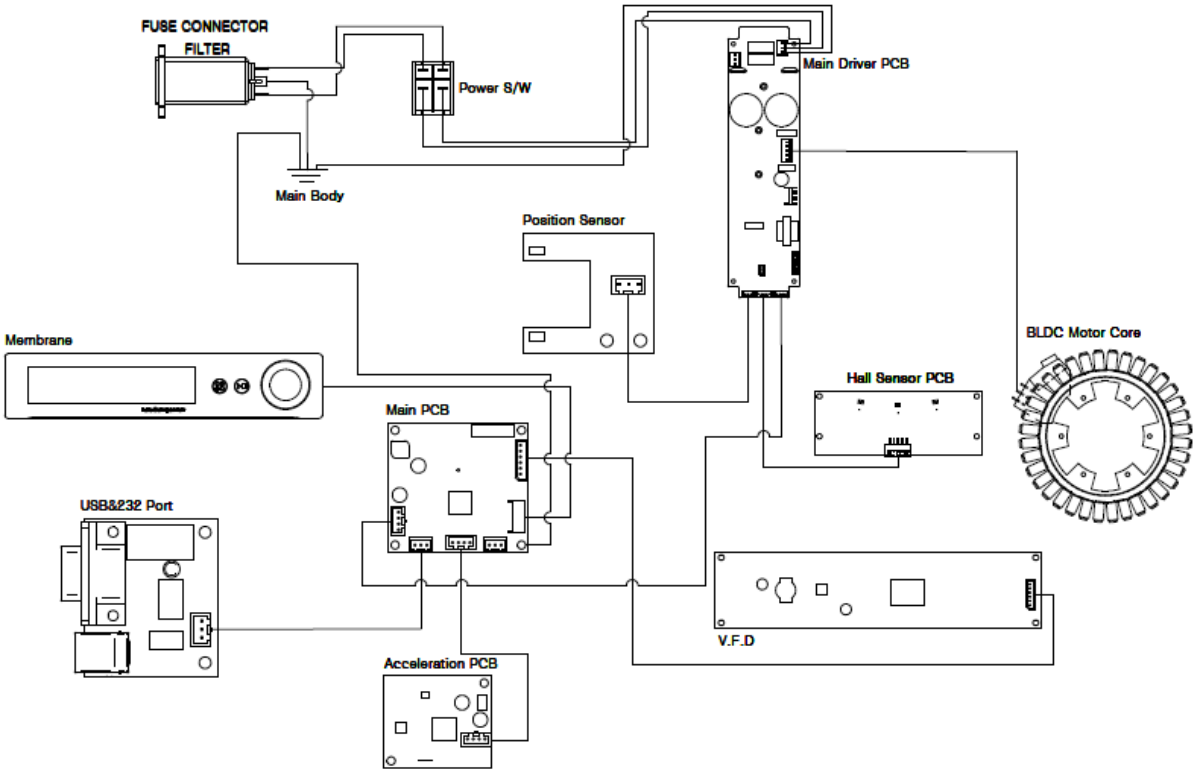
9.2 Circuit Diagrams

9.2.1 OS-2000/3000/4000



9.2.2 OS-7100/7200



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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

Customer can get free warranty service for 2 years limited warranty from the date of shipping date when the machine is broken while operating.
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 earths hock.
- 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, 219, Gasan digital 1-ro, Geumcheon-gu, Seoul, Korea
153-704

Tel: +82 2 2627 3816 **E-mail:** overseas@jeiotech.com
FAX: +82 2 3143 1824

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