

# EYELA

# Instruction Manual

Shaking  
Apparatus

**Multi-shaker**

- Model MMS-120**
- Model MMS-220**
- Model MMS-320**
- Model MMS-3020**



This instruction manual is designed to use the product efficiently and safely with keeping its best performance.

**Be sure to read “Safety precautions” before use.**

**IMPORTANT**

Please keep this manual in a place easily accessible to every user.

# IMPORTANT SAFETY INFORMATION



## 1. Warning signal word

Because of the function and characteristics, this product may cause accidental injury when touched carelessly during operation.

Most of such troubles, however, can be prevented if you are well informed about them beforehand.

To ensure the safety, this manual defines the information on such matters as requiring particular care in the safety as follows in terms of the importance and risk and attaches the alert mark and signal word.

It is recommended to follow the instruction to ensure the safe use of the product.

Alert mark Signal word	Definition
 Warning	Wrong handling is assumed to cause the possibility of the death or heavy injury of the user.
 Caution	Wrong handling is assumed to cause the risk of injury of the operator or physical damages.

We have undertaken thorough verification concerning the possible occurrence of risk in the course of use of the product, but prediction of all and every kind of risk is extremely difficult. Namely, cautions contained in this manual are not necessarily all of possible risks.

However, if the product is operated according to the procedure described in this manual, the safe operation and work is ensured. Be sure to pay utmost care during handling of the product to prevent accident or failure of the product.

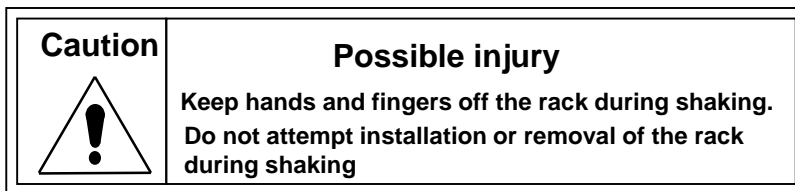
## 2. Warning Display on the Product

For particularly important warning instructions, the warning label is provided to the product main body.

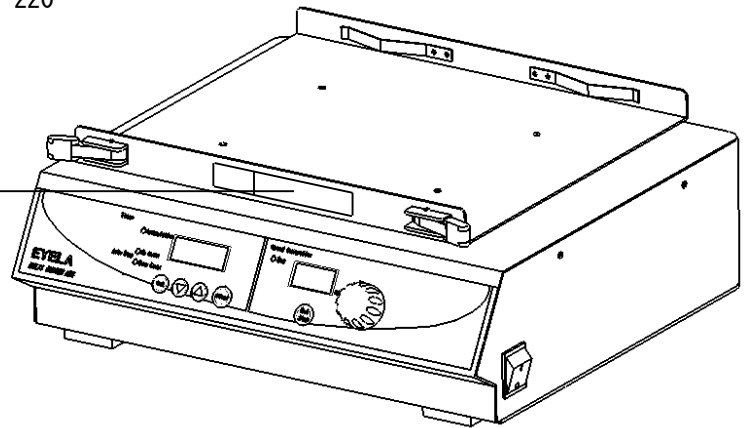
The labelling position is shown below.

When using the product, be sure to pay due attention to the description of the warning.

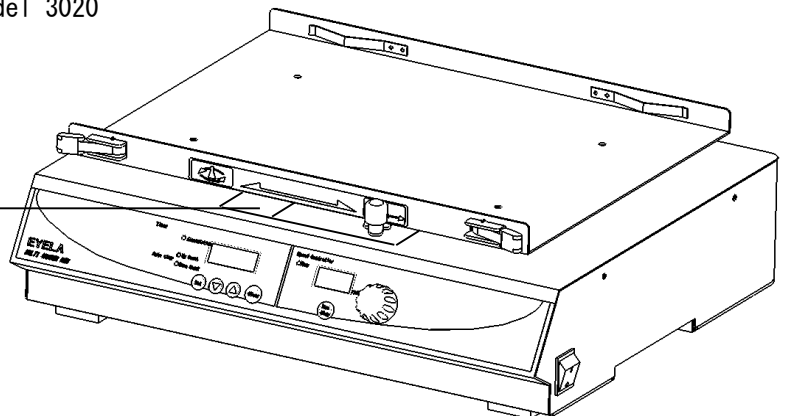
- \* If damaged and illegible, be sure to change the warning label to the new one.  
Send the request for the new label to us.



Model 120  
Model 220



Model 320  
Model 3020



Thank you for purchasing our  
**EYELA** product.

## Introduction

This instruction manual explains installation, operation, troubleshooting, maintenance and inspection, and discarding procedures for the products below:

### Multi-shaker

Models: MMS-120  
 MMS-220  
 MMS-320  
 MMS-3020

Always read this manual before use to ensure familiarization of the product.

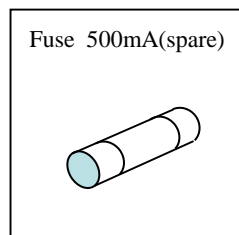
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## Items contained in your packing

Be sure to confirm the type and quantity of parts before setting.




No.	Packaged items	All models
1	Shaking apparatus, main body	1
2	Fuse 500mA	1
3	Instruction manual	1
4	Warranty card	1



# 1 For safe operation

The shaking table of the product is shaken forward and backward as well as right and left.

Be careful to ensure the safety during use.

 <b>Caution</b>	<p><b>Always operate within the specified shaking speed range.</b></p> <p>The product adjust the balance according to the shaking load and has the shaking table specified according to the shaking speed. Shaking beyond the specified range may cause the unbalanced state, resulting in instability or removal of the container and finally in unexpected accident and injury. Be sure to operate the device within the specified shaking speed range.</p>
 <b>Caution</b>	<p><b>Always use our designated shaking table.</b></p> <p>Always use our designated shaking table. The use of any shaking table other than designed may cause removal of the shaking table and container during shaking, resulting in unexpected injury.</p>
 <b>Caution</b>	<p><b>Be sure to select the appropriate shaking position, (Models 320 and 3020)</b></p> <p>For models 320 and 3020, either turning shaking or reciprocal shaking can be selected. Each type of shaking has the designated position, to which the selected shaking must be set. Shaking with the setting in the wrong position may cause unexpected shaking, abnormal sound, or failure.</p>

## 2 Product overview

### 2-1 Application



#### WARNING

**Never attempt to modify the product.  
Operate the unit for the specified purpose only.**

An electric shock or a malfunction may result if the product is modified or used for any purposes other than that specified.

This product performs turning or reciprocal shaking for the purpose of cultivating the plant tissue and microorganisms as well as effectuation of reaction, dissolution, and mixing.

### 2-2 Specifications

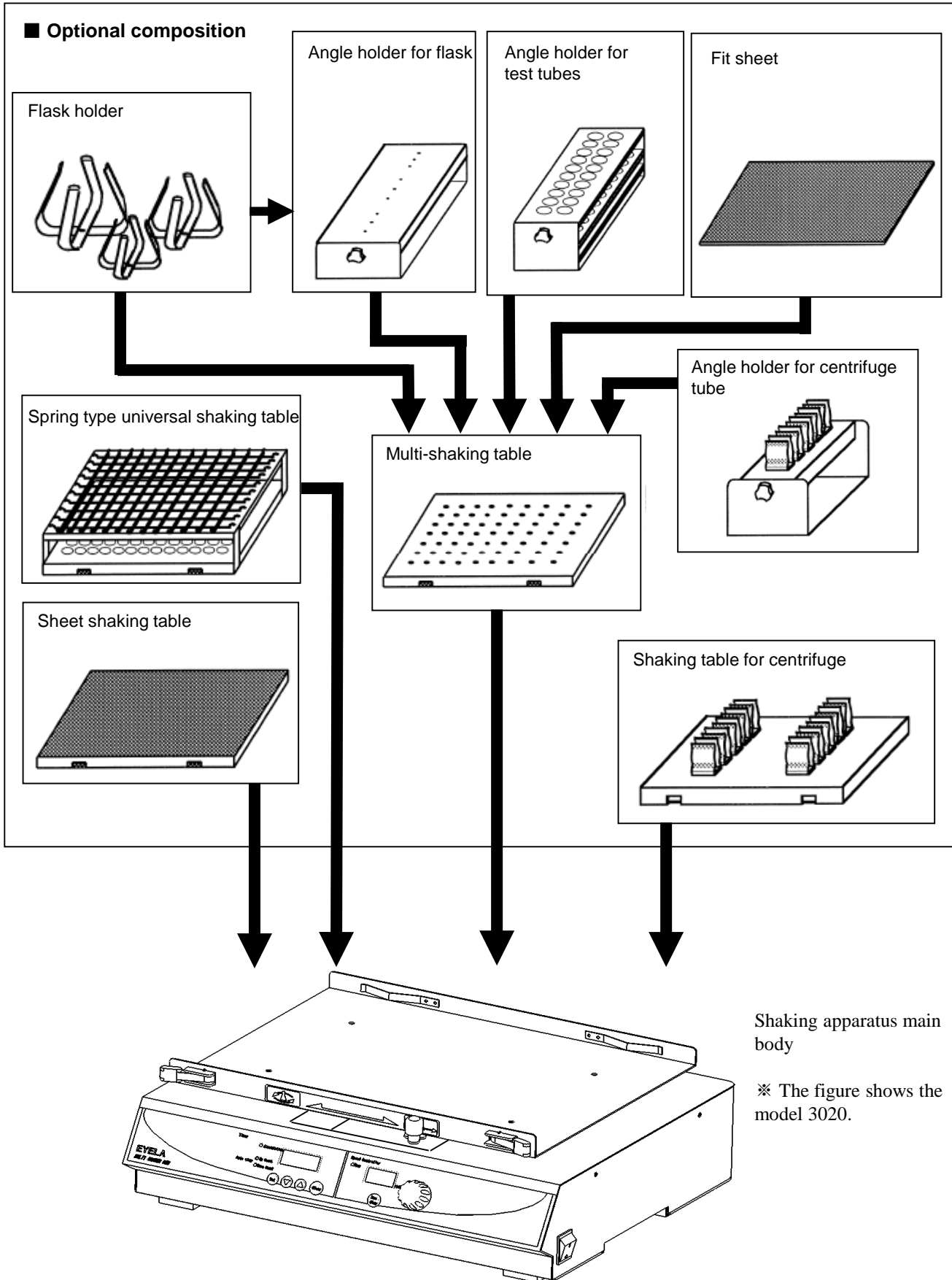
Name of product		Shaking apparatus	Multi-shaker
Model		MMS-120	MMS-220
Shaking method		Reciprocal	Turning
Shaking speed range ※1		20~250rpm ※2	
Amplitude		25mm ※2	
Functions	Shaking speed setting/display	Dial setting and digital display	
	Time setting/display	Setting with sheet key and digital display	
	Safety function	Fuse (500mA) , motor overload protective circuit, etc.	
	Auxiliary functions	Auto stop function (up-count and down-count) or cumulative time selection type (1min~999 h) , power fail recovery	
Motor		DC brushless motor (15W)	
No. of container racks, shaking table		Optional (See 2-3 Option)	
Shaking table allowable load		Approx. 5kg (including the shaking table)	
Operating ambient temperature range		4~50℃	
External size (mm) ※3		356 W×329 D×150 H	
Mass		Approx. 14kg	Approx. 15kg
Power input		0.2A,30VA	
Rated power supply		AC220V,50/60Hz	

- ※1. The shaking speed range is for a case of using the attached shaking table at the room temperature of 20℃, the rated supply voltage, and 50Hz under no load.
- ※2. The amplitude of 25 mm is the factory amplitude, which can be changed within a range of 10~40mm. The shaking speed range is 20 – 250 rpm for the amplitude of 10~30mm and 20 – 200 rpm for the amplitude of up to 40 mm. For change of the amplitude, contact the nearest sales office.
- ※3. The depth of external size does not include any projections (power cord, etc.) while the height does not include the shaking table.

Name of product		Shaking apparatus	Multi-shaker
Model		MMS-320	MMS-3020
Shaking method		Reciprocal/turning	
Shaking speed range ※ 1		20~250rpm ※2	
Amplitude		25mm ※2	
Function	Shaking speed setting/display	Dial setting and digital display	
	Time setting/display	Setting with sheet key and digital display	
	Safety function	Fuse (500mA) , motor overload protective circuit, etc	
	Auxiliary functions	Auto stop function (up-count and down-count) or cumulative time selection type (1min~999 h ) , power fail recovery	
Motor		DC brushless motor (15W)	
No. of container racks, shaking table		Optional (See2-3 Option)	
Shaking table allowable load		Approx. 5kg (including the shaking table)	Approx. 8kg ( including the shaking table )
Operating ambient temperature range		4~50℃	
External size (mm) ※3		356 W×329 D×155 H	456 W×379 D×155 H
Mass		Approx. 15kg	Approx. 19kg
Power input		0.2A,30VA	
Rated power supply		AC220V,50/60Hz	

- ※1. The shaking speed range is for a case of using the attached shaking table at the room temperature of 20℃, the rated supply voltage, and 50Hz under no load.
- ※2. The amplitude of 25 mm is the factory amplitude, which can be changed within a range of 10~40mm. The shaking speed range is 20 – 250 rpm for the amplitude of 10~30mm and 20 – 200 rpm for the amplitude of up to 40 mm. For change of the amplitude, contact the nearest sales office.
- ※3. The depth of external size does not include any projections (power cord, etc.) while the height does not include the shaking table.

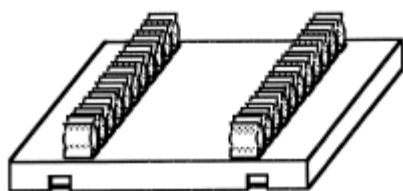
## 2-3 Optional Parts





### ● Shaking table for 15mL centrifuge tubes

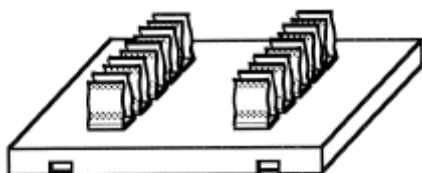
This is the shaking table that holds 15mL centrifuge tubes horizontally.



Model	MMS BASE-S15	MMS BASE-L15
Code No.	194490	194550
Applicable model	MMS-120,220,320	MMS-3020
No. of container racks	22 pieces	36 pieces
External size Width × Depth × Height (mm)	290 × 250 × 44	390 × 290 × 44
Mass	Approx. 1.9kg	Approx. 3.4kg

### ● Shaking table for 50mL centrifuge tubes

This is the shaking table that holds 50mL centrifuge tubes horizontally.

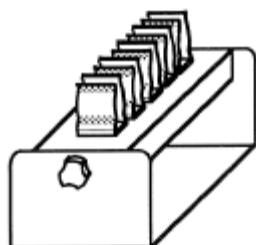


Model	MMS BASE-S50	MMS BASE-L50
Code No.	194540	194560
Applicable model	MMS-120,220,320	MMS-3020
No. of container racks	12 pieces	21 pieces
External size Width × Depth × Height (mm)	290 × 250 × 58	390 × 290 × 58
Mass	Approx.1.9kg	Approx.3.4kg

### ● Angle holder for centrifuge tubes

Installed to the multi-shaking table for used.

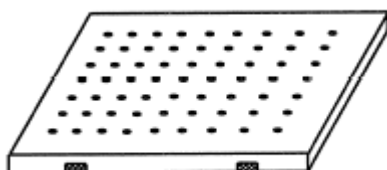
This holder can shake 15mL and 50mL centrifuge tubes in the inclined state.



Model	MMS FKH15	MMS FKH50
Code No.	194500	194570
Applicable container	15mLcentrifuge tube × 8pieces	50mLcentrifuge tube × 5pieces
External size Width × Depth × Height (mm)	290 × 250 × 85	390 × 290 × 100
Mass	Approx.360g	Approx.360g

### ● Multi-shaking table

This shaking table allows the use of the fit sheet and various holders in the combined state.

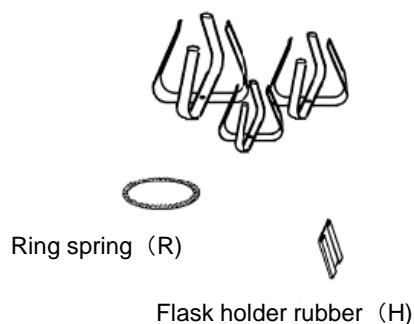


Model		MMS BASE-S	MMS BASE-L	
Code No.		140110	140120	
Applicable model		MMS-120 MMS-220 MMS-320	MMS-3020	
No. of racks	Angle holder for centrifuge tubes	FKH-15	3(2)	4(3)
		FKH-50	3(2)	4(3)
	Angle holder for test tubes	TST-A	2	3
		TST-B	3	4
		TST-C	2	3
		TST-D	3	4
	Angle holder for flasks	FKH-S	2	3
FKH-L		2	3	
External size Width × Depth × Height (mm)		290 × 250 × 20	390 × 290 × 20	
Mass		Approx.1.7kg	Approx.2.7kg	

※ The quantity shown in parentheses is for a case in which the centrifuge tubes are set in the horizontal state.

### ● Flask holder rubber

This is attached to the multi-shaking table or the angle holder for flasks for use.



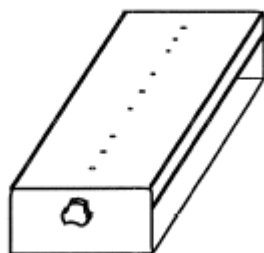
Model	Flask capacity		Code No.	Mass	No. of rubbers to be installed to the shaking table	
					MMS-120 MMS-220 MMS-320	MMS-3020
MMS CRAMP	50mL		140170	Approx.10g	20	35
	100mL		140180	Approx.20g	10	18
	200mL		140190	Approx.40g	9	12
	300mL	R	140200	Approx.50g	5	10
	500mL	R	140210	Approx.60g	4	6
	1L	R	140220	Approx.70g	2	4
	2L	RH	140230	Approx.80g	1	2
	3L	RH	140240	Approx.90g	1	2

※ R is a type with ring spring while RH is a type with ring spring and flask holder rubber.

### ● Angle holder for flask

This is installed to the multi-shaking table for use.

The Erlenmeyer flask can be shaken in the inclined state.

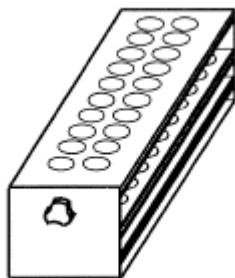


Model			MMS FKH-S	MMS FKH-L
Code No.			140290	140300
Applicable model			MMS-120 MMS-220 MMS-320	MMS-3020
No. of container racks	Angle holder for test tubes	50mL	4 pieces	5pieces
		100mL	3pieces	4pieces
		200mL	2pieces	3pieces
		300mL	2pieces	2pieces
		500mL	1 piece	1piece
External size Width x Depth x Height (mm)			250 × 110 × 50	300 × 110 × 50
Size of holder rack Width × Depth (mm)			220 × 110	270 × 110
Mass			Approx.600g	Approx.700g

### ● Angle holder for test tubes

This is installed to the multi-shaker for use.

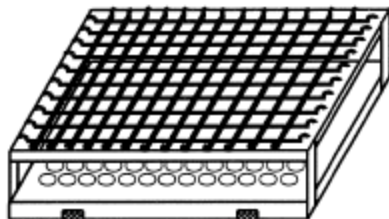
The test tubes can be shaken in the inclined state.



Model	MMS TST-A	MMS TST-B	MMS TST-C	MMS TST-D
Code No.	140250	140260	140270	140280
Applicable container	Φ12mm × 50 pieces	Φ16.5mm × 20 pieces	Φ16.5mm × 50 pieces	Φ18mm × 20 pieces
External size Width × Depth × Height (mm)	255 × 100 × 95	285 × 70 × 80	285 × 110 × 100	320 × 70 × 80
Mass	Approx. 900g	Approx. 750g	Approx. 900g	Approx. 750g

### ● Spring type universal shaking table

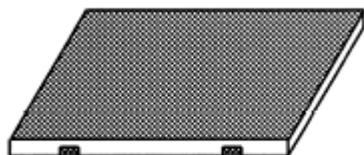
This table can hold the test tubes, Erlenmeyer flask, and various containers.



Model		MMS TRAY-S	MMS TRAY-L	
Code No.		140090	140100	
Applicable model		MMS-120 MMS-220 MMS-320	MMS-3020	
Number of container racks	Φ16 test tube	120 pieces	204 pieces	
	Angle holder for test tubes	50mL	20 pieces	24 pieces
		100mL	10 pieces	20 pieces
		200mL	9 pieces	12 pieces
		300mL	5 pieces	9 pieces
		500mL	4 pieces	6 pieces
		1L	2 pieces	3 pieces
		2L	1 piece	2pieces
Spring installation interval		20mm	20mm	
Width × Depth × Height (mm)		300 × 250 × 70	400 × 290 × 100	
Mass		Approx. 1.5kg	Approx. 3kg	

### ● Sheet shaking table

This shaking table is provided with the fit sheet.



Model	MMS FIT-S	MMS FIT-L
Code No.	140130	140140
Applicable model	MMS-120,220,320	MMS-3020
External size Width × Depth × Height (mm)	290 × 250 × 20	390 × 290 × 20
Mass	Approx.1.8kg	Approx.2.8kg

### ● Fit sheet

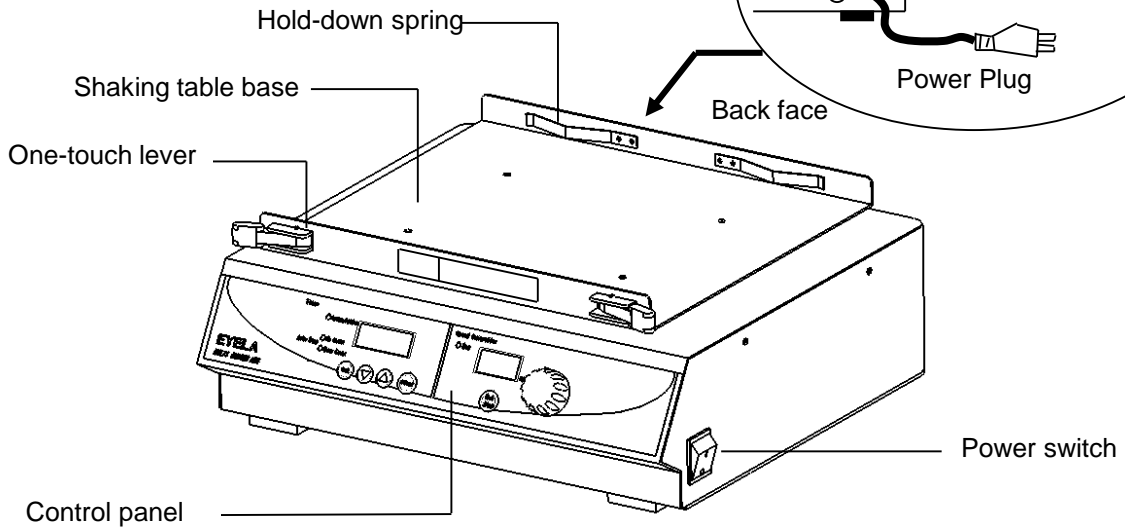
This is installed to the multi-shaking table for use.



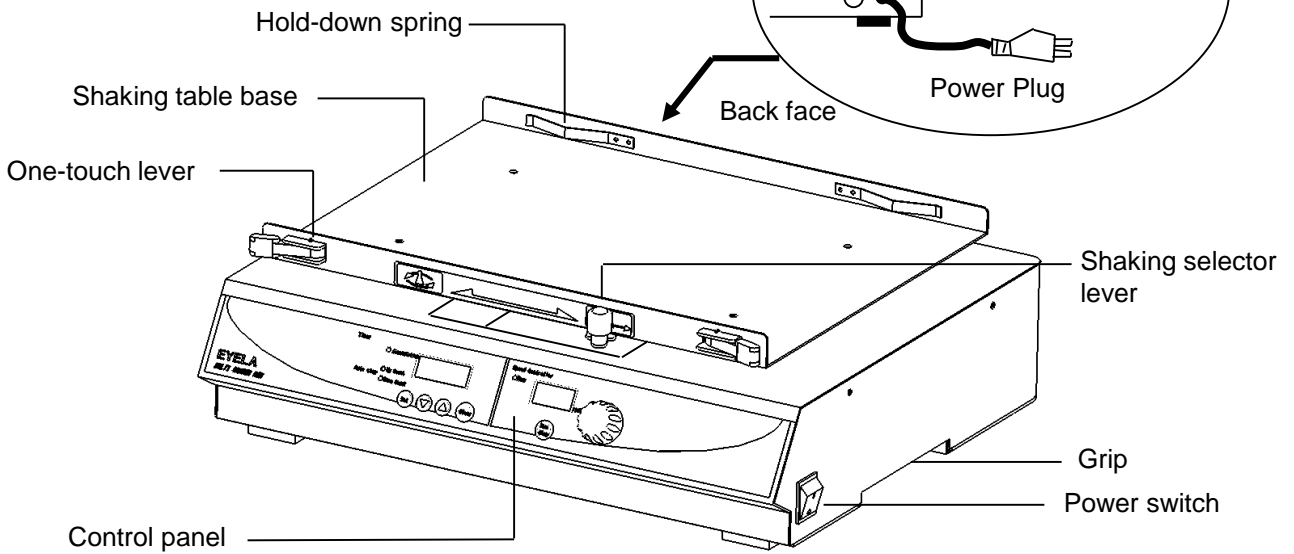
Model	MMS SHEET-S	MMS SHEET-L
Code No.	140150	140160
Applicable model	MMS-120,220,320	MMS-3020
External size Width × Depth × Height (mm)	290 × 250	390 × 290

## 2-4 Names of parts

Model MMS-120  
Model MMS-220



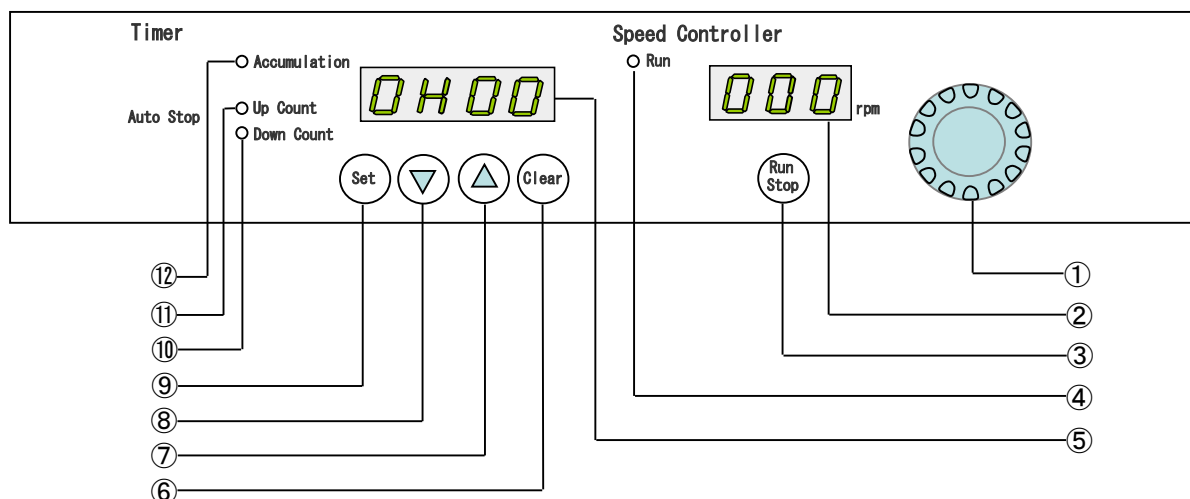
Model MMS-320  
Model MMS-3020



※ The grip of the main body is provided in the case of Models 3020.

### 3 Names and functions of control assembly

#### 3-1 Control panel



No.	Name	Function
①	Shaking speed setting dial	Used to set the shaking speed. Press the dial to set the speed and turn it to increase/decrease the setting. Press it again to confirm the setting.
②	Shaking speed display	Displays the shaking speed.
③	Run/Stop key switch	Press the switch to start/stop shaking.
④	Run lamp	Lamp ON during running
⑤	Time display	Displays the shaking time. A lower right dot blinks while the time is counted. This displays the parameters concerned when the timer or power failure recovery is selected.
⑥	Clear key switch	The elapse time shown on the display is cleared when this switch is pressed for two seconds or more.
⑦	△(Up) key switch	Pressing this switch in the setting state causes the time setting to increase. The switch causes change of the parameter display in the screen where the timer or power failure recovery is selected.
⑧	▽(Down) key switch	Pressing the switch in the setting state causes the time setting to decrease. The switch causes change of the parameter display in the screen where the timer or power failure recovery is selected
⑨	Set key switch	Pressing the key for three seconds or more while the operation is stopped enables selection of the timer mode and power failure recovery. The switch can confirm each setting and cancel the power failure return alarm.
⑩	Auto Stop • Down Count lamp	This lamp goes ON when the timer mode is set to down-count.
⑪	Auto Stop • Up Count lamp	This lamp goes ON when the timer mode is set to up-count.
⑫	Accumulation lamp	This lamp goes ON when the timer mode is set to “Accumulation.” This lamp is ON in the factory default state.

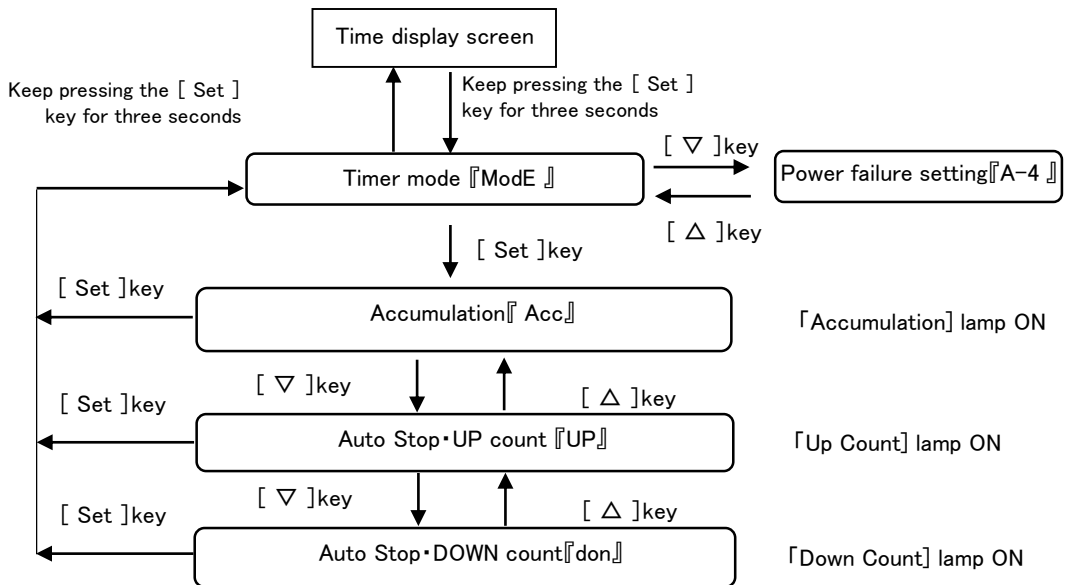
### 3-2 Timer Mode

Three timer modes shown below can be selected according to the purpose:

- Accumulation
- Auto Stop • UP count
- Auto Stop • DOWN count

※ For the detailed setting method, refer to “2. Timer Mode Display and Setting” of p.19 “5-2 Operation Method.”

※ The default is “Accumulation.”



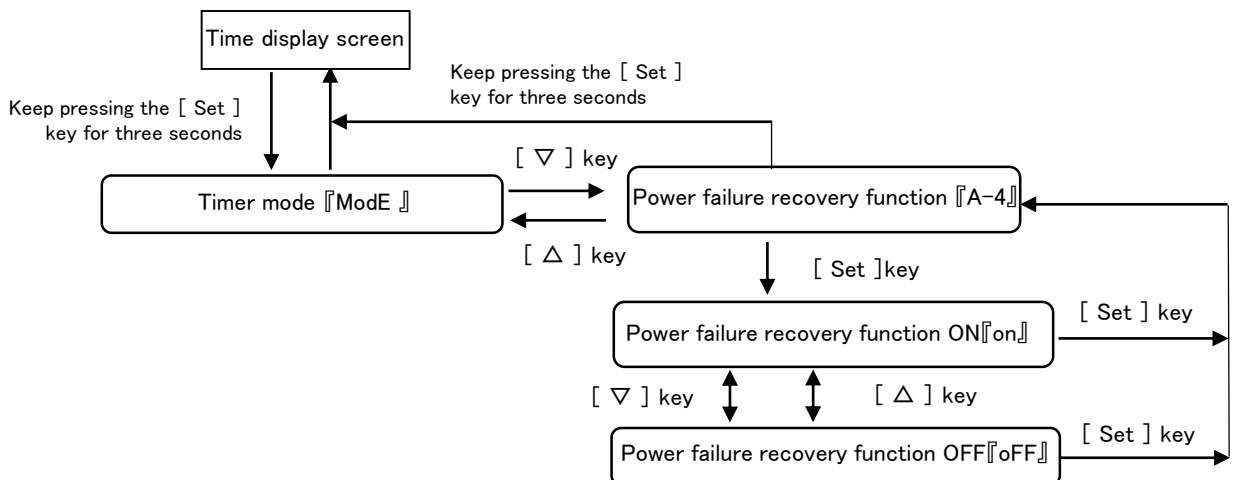
### 3-3 Power failure recovery function

Two types of power failure recovery operation can be selected according to the purpose:

※ For the detailed setting method, refer to “3. Setting the power failure recovery function” of p.19 “5-2 Operation Method.”

- Power failure recovery function ON..... Operation resumed beginning with the state immediately before power failure
- Power failure recovery function OFF..... Operation stopped regardless of the state of operation immediately before power failure.

※ The default is “Power failure recovery function ON.2




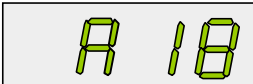

## 3-4 Safety Functions

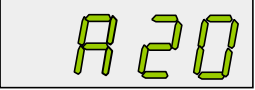
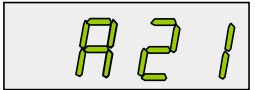
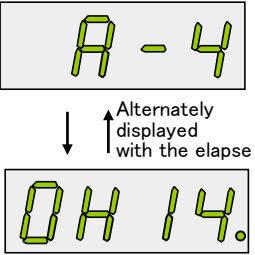
This product is provided with the following safety functions.  
In case of abnormality, refer to “Causes of troubles and solutions.”

### Safety functions

Safety functions	Description	Cause and reset method
Fuse	Abnormal current blows the fuse, shutting off power supply.	Short-circuited power circuit or flow of overcurrent  For reset, refer to p.29, “7-1 Replacing the fuse.”

### Alarm function

Name and operation	Alarm display	Cause and reset method
Overload alarm (Motor overload protection)  • Shaking stop • RUN/STOP key and dial operation made ineffective		<ul style="list-style-type: none"> <li>Overload exceeding the rating has been applied to the motor shaft.</li> </ul> When the load is heavy, reduce it. Turn OFF power supply to the product once, then turn power supply ON again. The alarm display is canceled. If the alarm occurs repeatedly though the load has been decreased, stop operation and contact the shop from which the user has purchased the product or the closest service center.
Over-temperature alarm  • Shaking stop • RUN/STOP key and dial operation made ineffective		<ul style="list-style-type: none"> <li>The ambient temperature has exceeded the specified one.</li> <li>The ambient temperature was high, and the product was operated in the overload state.</li> </ul> Always operate the product at the ambient temperature within the specified level. Turn OFF power supply to the product once, then turn power supply ON again. The alarm display is canceled. If the alarm occurs repeatedly though the load has been decreased or after resetting the ambient temperature to fall within the specified range, stop operation and contact the shop from which the user has purchased the product or the closest service center.
Over-current alarm  • Shaking stop • RUN/STOP key and dial operation made ineffective		<ul style="list-style-type: none"> <li>The product was operated in the overload state and, as a result, the over-current flew temporarily.</li> </ul> When the load is heavy, reduce it. Turn OFF power supply to the product once, then turn power supply ON again. The alarm display is canceled. If the alarm occurs repeatedly though the load has been decreased, stop operation and contact the shop from which the user has purchased the product or the closest service center.

Safety function	Alarm display	Cause and reset method
<p>Over-voltage alarm</p> <ul style="list-style-type: none"> <li>• Shaking stop</li> <li>• RUN/STOP key and dial operation made ineffective</li> </ul>		<ul style="list-style-type: none"> <li>• The product was operated with the supply voltage exceeding the rated voltage.</li> </ul> <p>Confirm that the supply voltage is the rated one, and turn ON power supply again.</p> <p>If the alarm is displayed again, any internal parts of the product may have developed abnormality. In such an event, stop operation and contact the shop from which the user has purchased the product or the closest service center.</p>
<p>Under-voltage alarm</p> <ul style="list-style-type: none"> <li>• Shaking stop</li> <li>• RUN/STOP key and dial operation made ineffective</li> </ul>		<ul style="list-style-type: none"> <li>• The product was operated with the supply voltage too low than the rated one.</li> </ul> <p>Confirm that the supply voltage is the rated one, and turn ON power supply again.</p> <p>If the alarm is displayed again, any internal parts of the product may have developed abnormality. In such an event, stop operation and contact the shop from which the user has purchased the product or the closest service center.</p>
<p>Power failure recovery alarm</p> <ul style="list-style-type: none"> <li>• [A-4] and the elapse time displayed alternately on the time display screen</li> </ul>		<ul style="list-style-type: none"> <li>• Power failure occurred during running, and then recovered</li> </ul> <p>Press the Set key or keep pressing the Clear key. The display can be canceled.</p> <p>Setting the power failure recovery function ON/OFF enables setting of whether the operation is stopped or resumed while the alarm is displayed.</p> <p>For details, refer to p.23 “3. Setting the power failure recovery function.”</p>



### 4-1 Installation environment



#### Caution

#### Always install the product on a level and stable firm site.

This product is designed to shake the samples. If shaking is done with the product installed on an inclined site with surface irregularities or on a site wet with water or oil, the sample in the container may splash or displaced to drop, resulting in the failure or consequential accident.

Select the installation site that meets the following conditions.

- Level, stable, and firm place
- Place free of flammable gas, liquid, or solid materials in the vicinity of the product.
- Place where the ambient temperature can be kept within a range of 4~50℃.
- Place free from condensation
- Place with less humidity (85%Rh or less) and free from splashing water
- Place with minimum dust
- Place free from direct sunshine
- Place where airy or well-ventilated

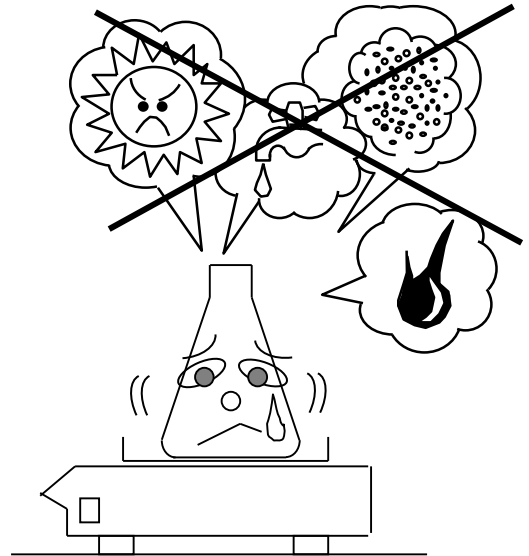
#### The related products shown below can be installed:

- MMS-120,220,320,3020 (one unit)
  - Low- and constant-temperature chamber for shaking apparatus      Models FMC-100 and 1000
  - Constant-temperature chamber for shaking apparatus                Models FMS-100 and 1000

※ When the FMS model is stacked in two stages for use, the maximum shaking speed is 200rpm.

※ For the conditions, etc. for installation to SLI, LTI, MTI, FLI, and LTE series, refer to our latest catalog.

※ For handling of related products, refer to their respective operation manual.



## 4-2 Connecting utilities



### Warning

**Confirm the voltage, phase, capacity, and the type of receptacle of power supply.**

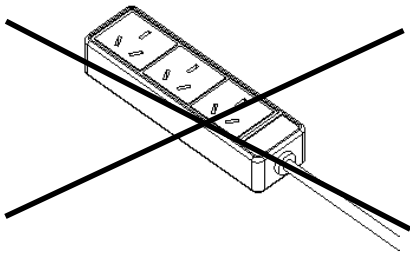
Wrong connection of power supply may cause fire or electric shock



### Warning

**Do not use the branching socket or table tap.**

Burn-out of the cable or a fire may result from over current.



- (1) Check the product type as well as the voltage, phase, and capacity of power supply to be connected.  
Power supply to be connected to the product is as shown in the right.
- (2) Check the receptacle of installation place.  
(Do not connect the power plug yet.)



### Warning

**Always connect to the outlet with earth terminal.**

When connection to the “outlet without earth terminal” is inevitable, be sure to connect the earth wire of the earth adaptor to the ground, Otherwise, leakage cannot be detected correctly, resulting in leakage or electric shock.

Pay attention to the connection state of the earth adaptor and power plug. Inclined or insufficient insertion may cause overheat or fire.

### Power cord specification

Cable		Section area of electric wire(AWG)
Length	Thickness (O.D)	
Approx.2m	Approx.7.4mm	0.75mm <sup>2</sup> (AWG18)

Power supply to connect	
Voltage	Capacity
AC220V	8A

# 5 Operation

## 5-1 Preparation for operation



### Caution

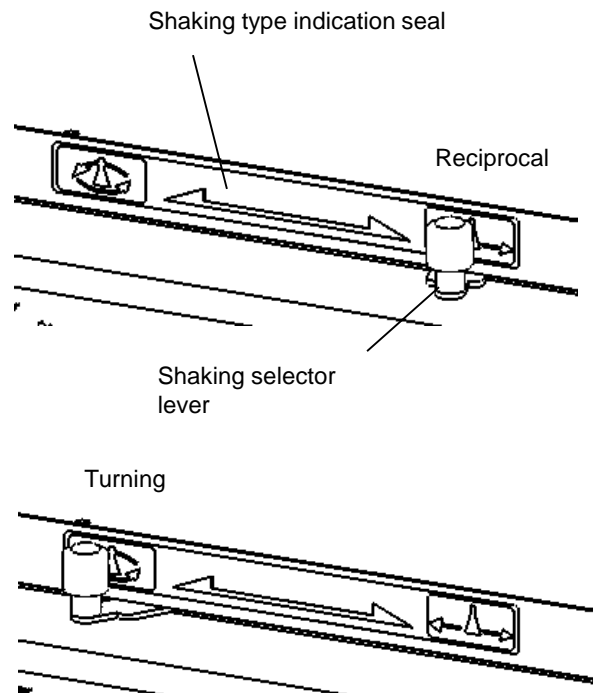
**Be sure to set the lever dial to the designated position correctly.**

When changing the shaking method in Models 320 and 3020, always set the dial of shaking type selector lever to a middle point of indication on the shaking type indication seal. If this is set in the wrong position outside the specified range, abnormal sound or failure may occur.

### 1. Setting the shaking type (Models MMS-320 and 3020)

- (1) Turn OFF the power switch.
- (2) Slide the dial of shaking type selector lever under the shaking table base and set it to the middle point of the shaking indication of the seal. Set the dial to the left end for turning and right end for reciprocal.

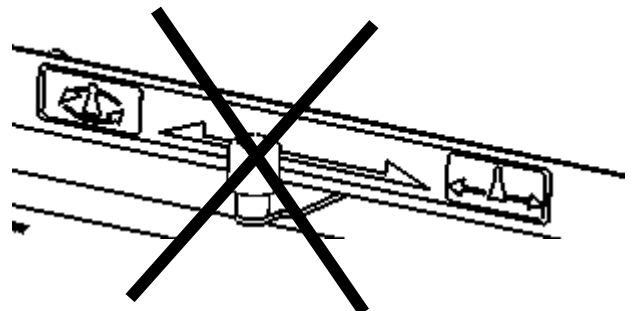
※ The default setting is “Turning shaking position.”



※ When shaking is done with the dial in a halfway position, abnormal sound may occur or the motor overload protection function is activated to stop shaking.

Be sure to set the dial to the designated position at the full right end or the full left end.

When the motor overload function is activated, turn OFF the power switch once. Set the selector lever dial to the designated position and turn ON the power switch.



## 2. Setting the shaking table

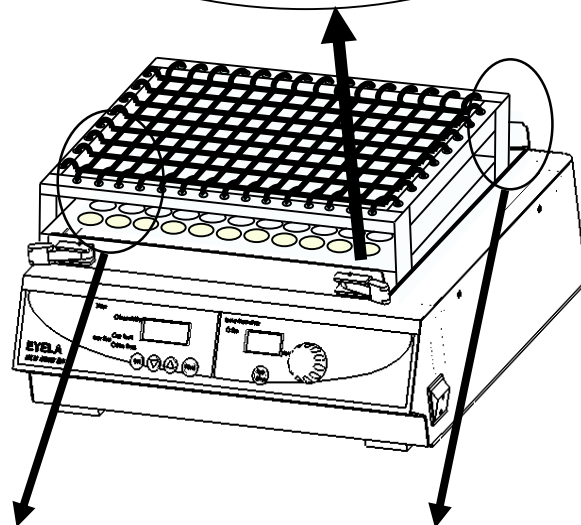
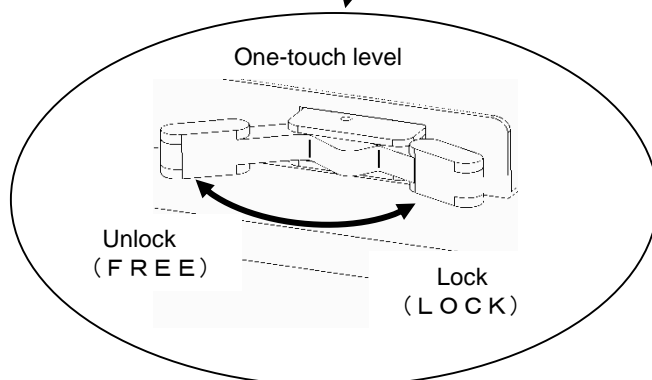
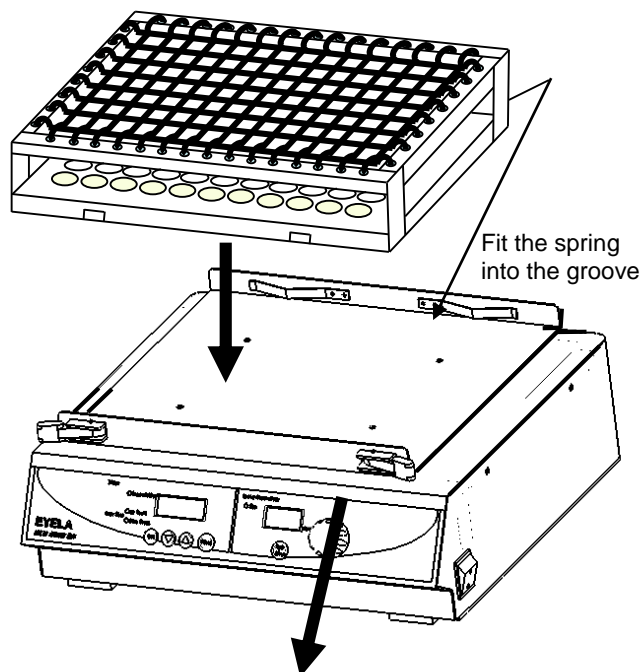
Various shaking tables and holders are available separately. Prepare the appropriate one while referring to p.4 “2-3 Options.”

### Caution

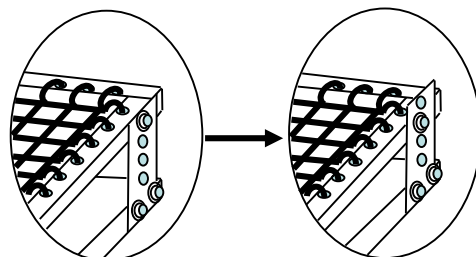
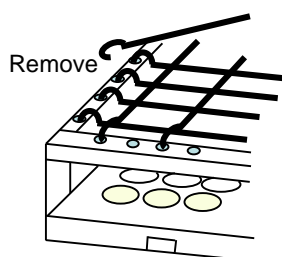
#### Arrange containers in the well-balanced state.

When the load on the shaking table is displaced or when the center of gravity of the load is high, excess weight is applied to the product main body even though the weight is less than the allowable load weight (load bearing). Failure may occur. Be careful particularly during high-speed shaking.

- (1) Turn OFF the power switch.  
Shift the one-touch lever to the FREE side.
- (2) Set the shaking table while allowing two grooves in the back of the table to fit onto hold-down springs in the table base. (One groove is in the front and the other in the rear,
- (3) Tilt two one-touch levers in the shaking table base to the LOCK side and secure the shaking table.
- (4) To remove the shaking table, shift the one-touch lever to the FREE side for unlocking. Then, remove the table carefully.



※ For the spring type universal shaking table, adjust the spring net plate height and its interval before use according to the containers to be used.

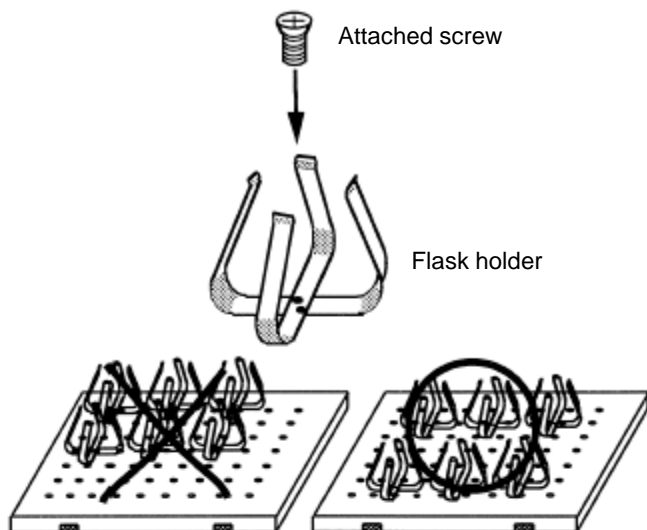


### 3. Setting various holders

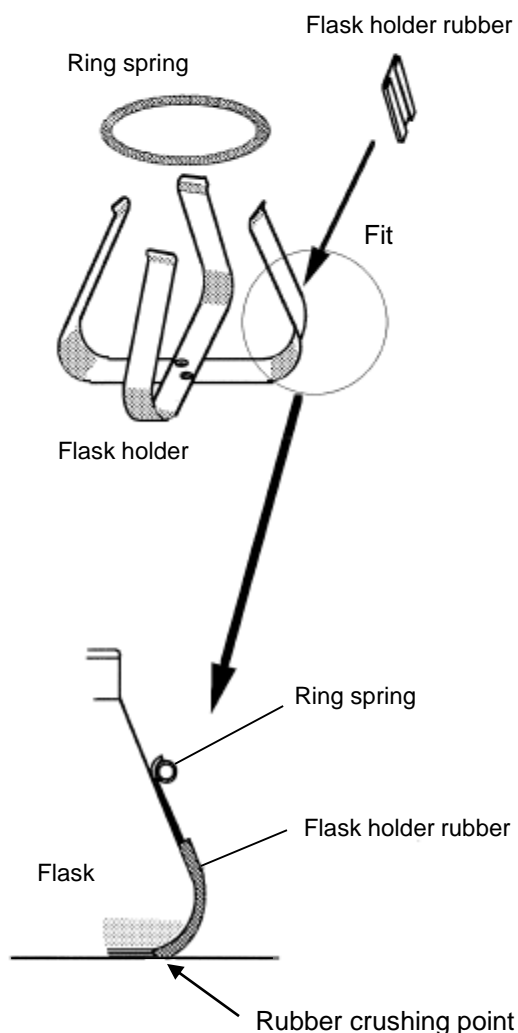
The holders are available separately. All of these holders can be installed to the multi-shaking table for use.

#### ● Setting the flask holder

The flask holders are available in various sized according to the flask capacity. Note that the number of flasks that can be set to the multi-shaking table and angle holder is determined according to the size. (See p.4 "2-3 Options.") Use attached screws for installation. Offset holder position may result in failure of stable shaking. Arrange holders evenly on the shaking table.



For 2 L and 3 L flask holders, there are four flask holder rubbers in addition to the ring springs. The shaking stability is affected by the flask holding state. Be sure to install so that the R portion of flask is firmly held.



#### Flask holder rubber installation position

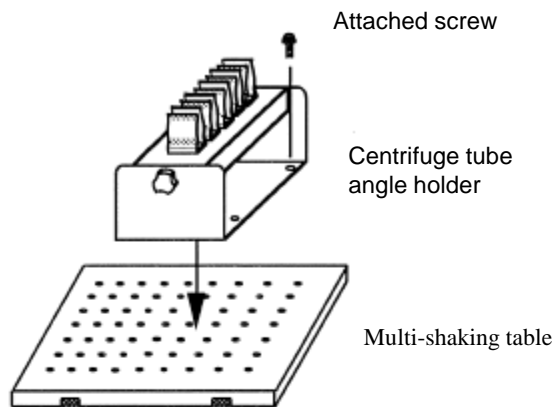
Install the rubber at a point where the rubber lower side is crushed when the flask holder is to be secured. If the rubber upper portion is too high, the flask becomes difficult to remove. In such an event, either readjust by lowering the rubber position or expand the holder when removing.

## ● Setting the centrifuge tube angle holder and installing the centrifuge tubes

※ Setting the angle holders and adjusting the rotation angle are common procedures for II models.

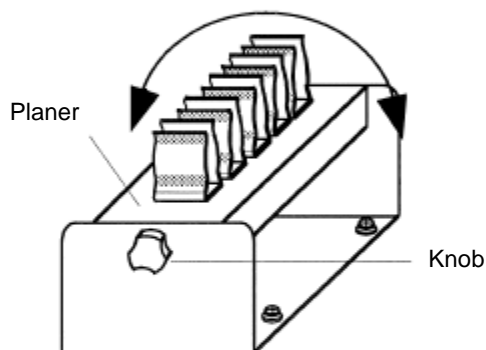
(1) Install the angle holder rack to the multi-shaker with attached four screws. There are four installation holes.

※ Confirm the shaking direction of the MMS main body and install it in a direction appropriate for the use condition.



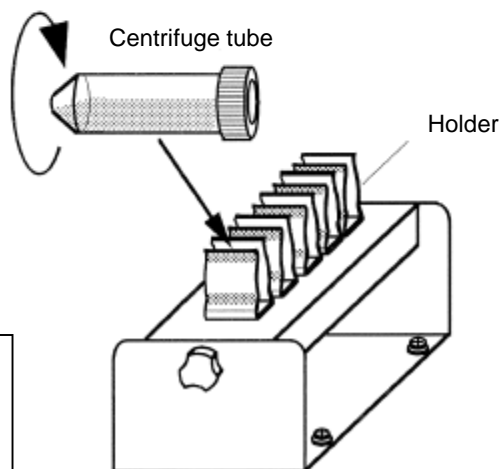
(2) Turn the knob counterclockwise to loosen and turn the planer to tilt to the required angle. When the position is determined, secure the planer with hand and turn the knob clockwise to tighten.

※ When the knob is difficult to loosen, turn the planer itself slightly during loosening. The knob can be loosened with ease.



(3) Install the centrifuge tubes

To fit the centrifuge tubes, press the container against one side of holder to open the holder slightly. Then insert the tube while rotating it.



### Holder resin coating

The holders on the centrifuge angle holder and centrifuge tube shaking table are provided with the PVC resin coating. This coating is a consumable. Being the resin coating, its wearing period differs depending on the removal method and use frequency. In any case, deterioration of the coating does not affect the shaking performance.

## 5-2 Operation Method

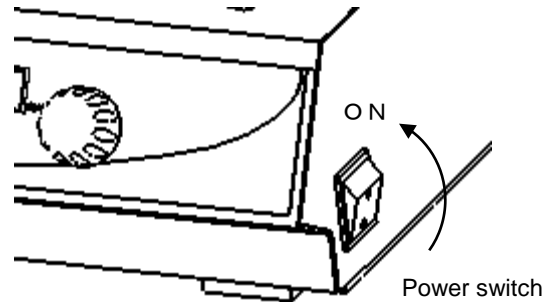


### Caution

#### Stop operation in case of any abnormality.

In case of abnormality, turn OFF the power switch and refer to p.28 "Causes of troubles and solutions."

- (1) Confirm that the power switch is OFF, and then insert the power plug into the outlet.
- (2) With the power switch ON, the indicator goes ON and the power is supplied.



### 1. Setting the shaking speed

- (1) Press the shaking speed setting dial.  
The shaking speed of the indicator blinks and the set value can be entered.

※ The default setting is 50rpm.

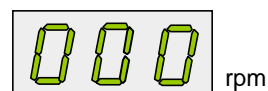
- (2) Turn the shaking speed setting dial.  
While the indicated value is blinking, turn the dial clockwise to increase the value or turn it counterclockwise to decrease the value.

※ The shaking speed range falls within the specified range.

- (3) Press the shaking speed setting dial.  
The set value is finalized.

※ When the setting is changed during running, the indicated speed is applied to shaking. If not finalized by pressing the dial, the shaking speed returns to the original one in 30 seconds.

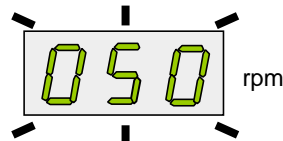
Shaking speed indicator



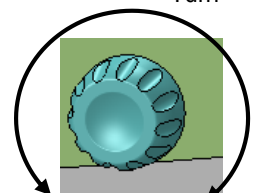
Shaking speed setting dial



Press

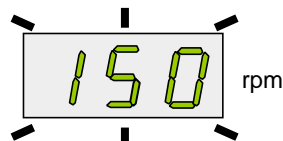


Turn



Decrease

Increase



Press



## 2. Timer mode display and setting

Three timer modes as follows can be selected according to the purpose:

- **Accumulation**  
Accumulated run time displayed
- **Auto Stop • UP count**  
The operation stops when the set time is reached.  
The indicated elapse time increases.
- **Auto Stop • DOWN count**  
The operation stops when the set time is reached.  
The indicated elapse time decreases.

### ① Time indication

The default setting is indication of “Accumulation.”  
After operation start, the indicated operation time begins to be accumulated. The lower right dot blinks.

The indicated elapse time of Auto Stop UP-count keeps increasing up to the set time point.

In the case of Auto Stop DOWN-count, the indicated time decreases from the set time,

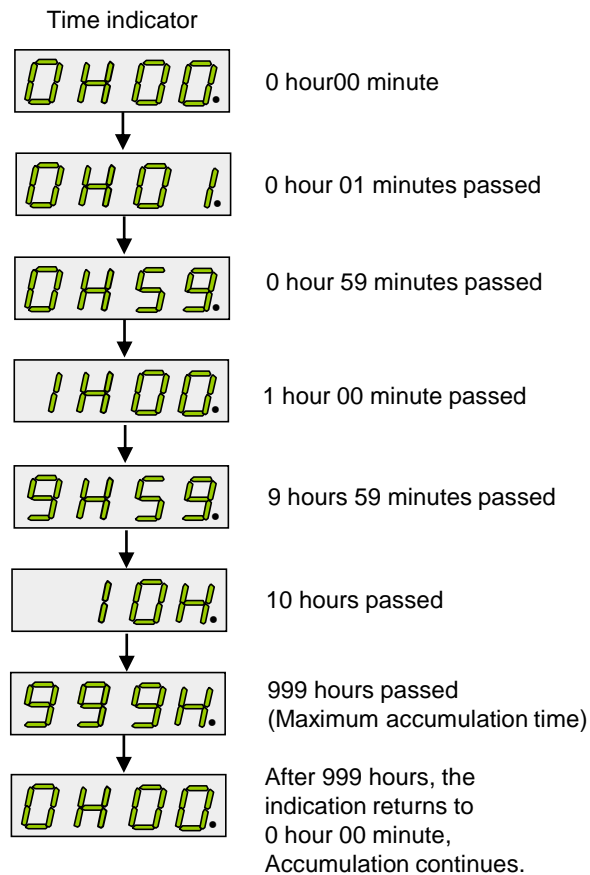
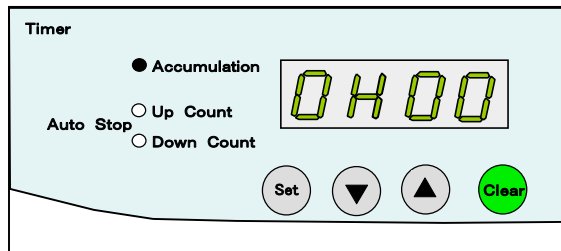
To reset the accumulated time, keep pressing the CLEAR key for two seconds or more. Reset can be made even during running.

※ In case of resetting with the [Clear] key, the time indication becomes as follows:

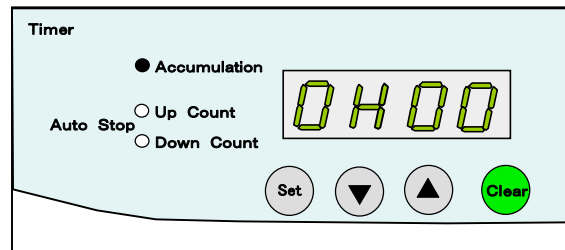
- Accumulation                    ..... [0H00]
- Auto Stop UP-count            ..... [0H00]
- Auto Stop DOWN-count        ..... [set time indication]

※ When the screen changes to another timer mode screen, the accumulation time is reset even when not reset with the [Clear] key.

[Time display screen]

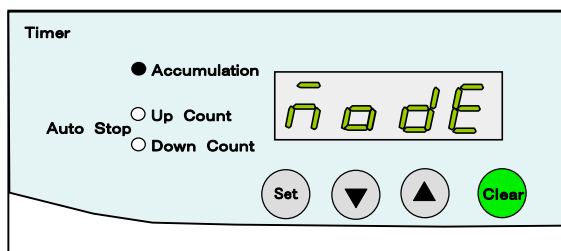


[Time display screen]



↓      (Set) Keep pressing for three seconds

[Timer mode screen]



↓      (Set)

### ② Setting the timer modes

(1) Keep pressing the SET key for three seconds or more in the time display screen.

(2) Press the Set key.

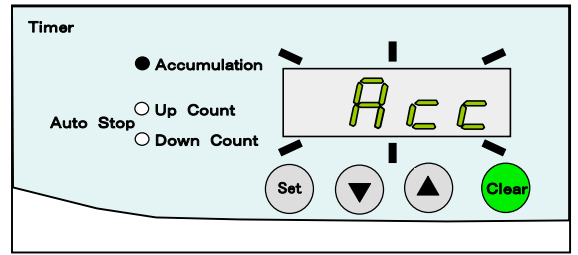


(3) The Accumulation setting screen appears. And the Accumulation lamp goes ON.

※ To acknowledge the setting her, proceed to (6).

Press the ▽ key to proceed to the next step.

[Accumulation setting screen]



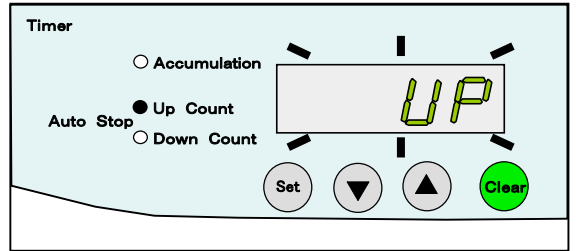
(4) The Auto Stop UP-count setting screen appears. And the “UP count” lamp goes ON.

※ To acknowledge the setting her, proceed to (6).

Press the ▽ key to proceed to the next step.

[Auto Stop

• UP-count setting screen]

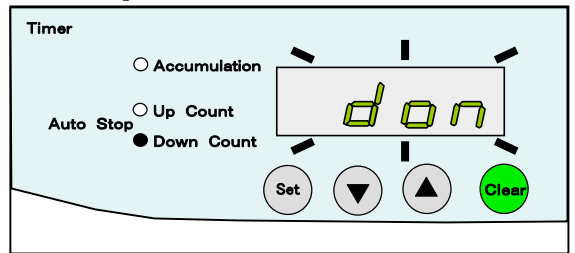


(5) The Auto Stop DOWN-count setting screen appears. And the “DOWN count” lamp goes ON.

※ To acknowledge the setting her, proceed to (6).

Press the ▽ key to proceed to the next step.

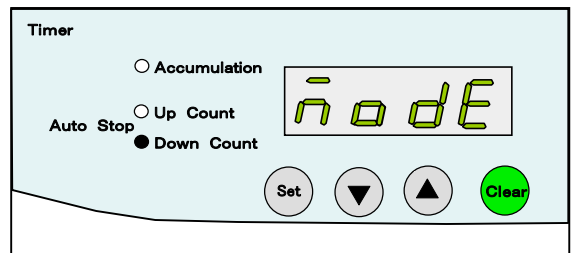
[Auto Stop  
• DOWN-count setting screen]



(6) Press the Set key.

The timer mode shown blinking on the screen is acknowledged, and the timer mode screen appears. The acknowledged timer mode lamp goes ON. The screen shown in the right indicates the state in which Auto Stop DOWN-count has been acknowledge.

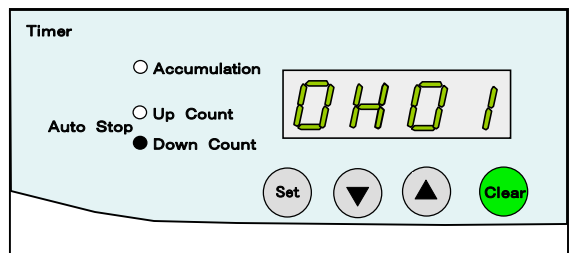
[Timer mode screen]



(7) Keep pressing the Set key for three seconds or more. The screen returns to the time display screen.

The screen shown in the right indicates the state in which Auto Stop DOWN-count has been acknowledge.

[Time display screen]



※ If no operation is done in 10 seconds or more, the operation stops in the state with original setting, and the normal time display screen appears.

### ③ Auto Stop timer setting

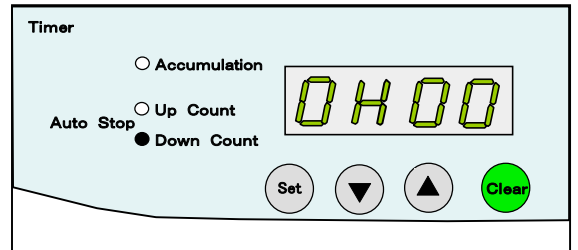
The setting method is common for UP-count and DOWN-count.

※ When Accumulation has been selected, timer setting cannot be made.

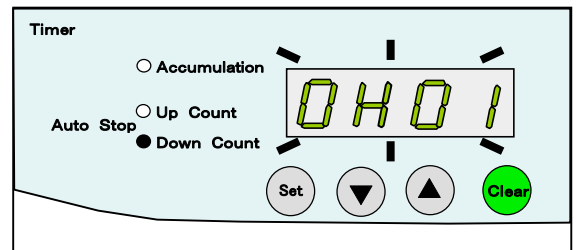
(1) Press the Set key in the normal time display screen.

The screen shown below indicates that the “DOWN-count” lamp is ON. Therefore, this screen is the screen to select the DOWN-count.

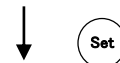
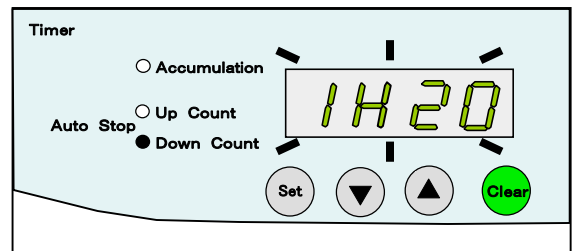
※ When the “UP-count” lamp is ON, the screen is for selection of UP-count.



(2) The time display screen blinks and is ready for setting. The minimum setting time is “0H01” (1 minute).

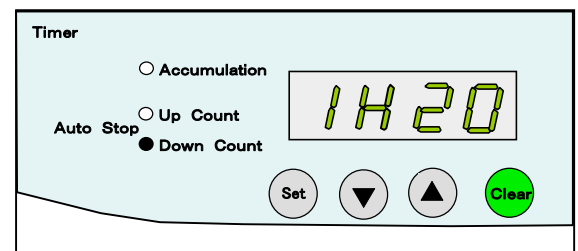


(3) Press the  $\nabla$  or  $\triangle$  key to increase/decrease the time. Press the Set key.



(4) The time display screen changes from blinking to the light-up state, and the time setting is acknowledged.

※ When the set time has been changed, the accumulation time is reset even when not reset with the Clear key.



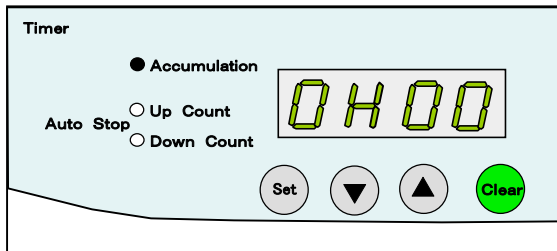
### 3. Setting the Power Failure Recovery Function

By setting the power failure recovery function On or OFF, the operation shown below can be selected.

- Power failure recovery function ON.....  
Operation resumed beginning with the state immediately before power failure
- Power failure recovery function OFF.....  
Operation stop regardless of the state immediately before power failure

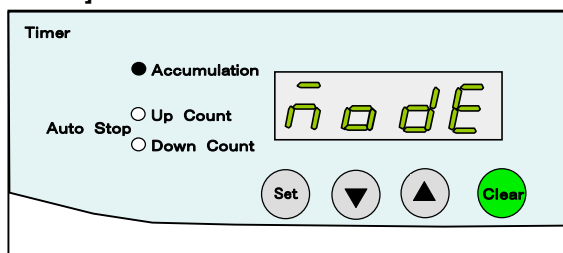
※ The default is the power failure recovery function ON.  
Accumulation continues after power failure recovery when the Accumulation mode has been used.  
When the Auto Stop timer is used, the operation is resumed at a time point of power failure.

[Time display screen]



(1) Keep pressing the Set key for three seconds or more in the time display screen.

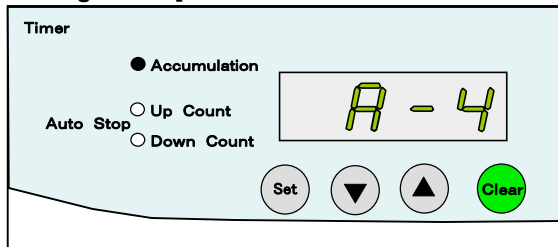
[Timer mode setting screen]



(2) Initially, the timer mode setting screen appears.

Press the ▽ or △ key.

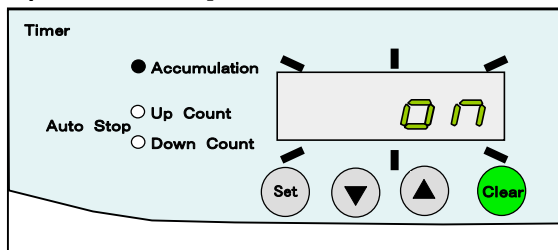
[Power failure recovery setting screen]



(3) The power failure recovery setting screen appears.

Press the Set key in this screen.

[Continuous operation screen]



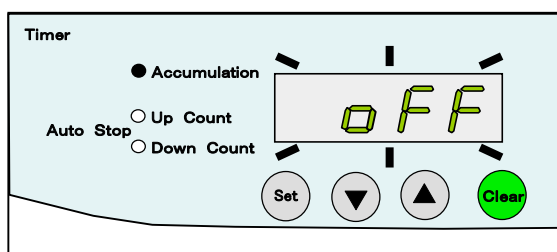
(4) “ON” in the screen blinks.

※ If “OFF” has been set in the previous setting, “OFF” blinks.

To acknowledge this screen, proceed to (6).

To stop operation, press the △ or ▽ key.

[Operation stop screen]



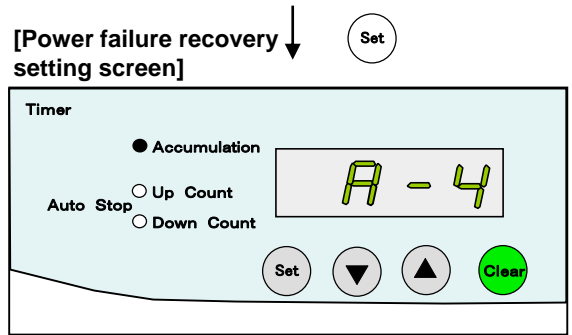
(5) The screen shows “OFF” is blinking.

To acknowledge this screen, proceed to (6).

To allow “ON” to be shown again, press the △ or ▽ key to return to (4),

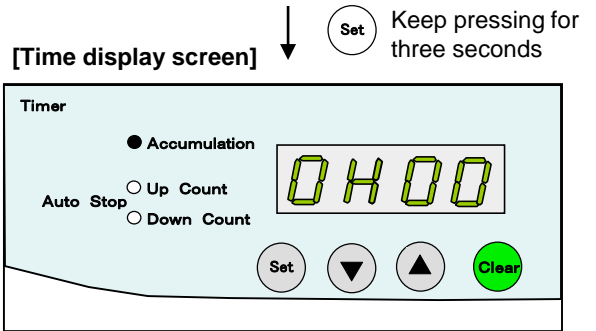
- (6) Press the Set key.  
The screen with a blinking indication is acknowledged.  
The power failure recovery setting screen “-4” appears.

※ To confirm acknowledgement, press the Set key. The set function blinks. Press the Set key again to indicate “A-4” again.



- (7) Keep pressing the Set key for three seconds or more.  
The screen returns to the normal time display screen.

※ If no operation is done for 30 seconds or more in the blinking state, the operation stops in the state with original setting, and the normal time display screen appears.



※ In case of power failure recovery during running the time display screen shows A-4 and the elapse time alternately.



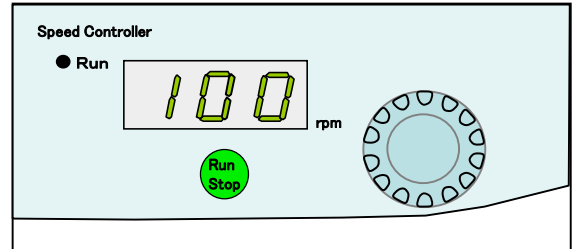
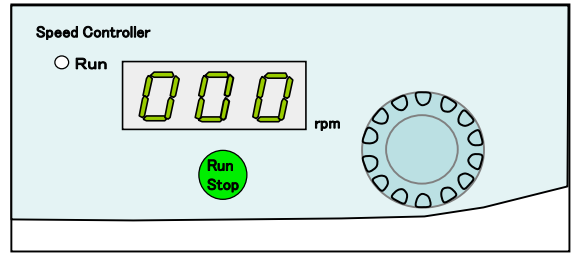
To cancel “A-4”, either press the Set key or keep pressing the Clear key for two seconds.  
The operation elapse time is displayed again.

## 5-3 Operation and Stop

- (1) Press the Run/Stop key.

The “RUN” lamp goes ON and the operation begins with the set conditions.

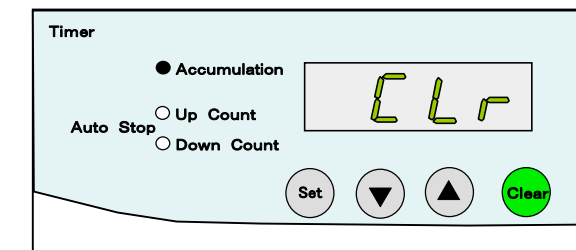
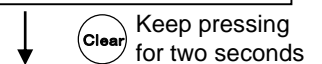
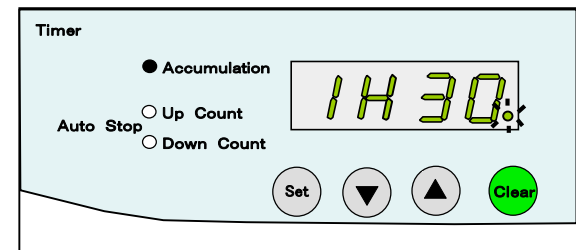
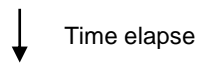
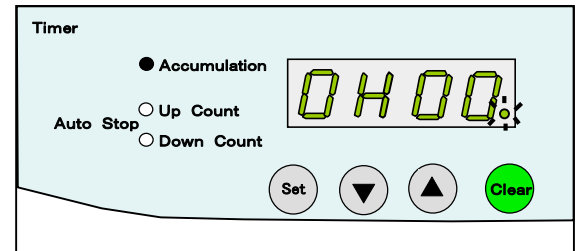
[Shaking speed display screen]



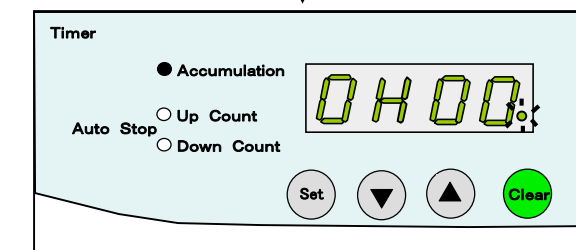
### ① Accumulation mode

- (1) The “Accumulation” lamp goes ON, and accumulation of time begins with 0 minute. The lower right dot blinks.

[Time display screen]



- (3) The time display changes to display of the initial time.



## ② Auto Stop UP-count operation

- (1) When UP-count has been selected, the “UP-Count” lamp goes ON.  
The time count begins with 0 minute, and the lower right dot blinks.

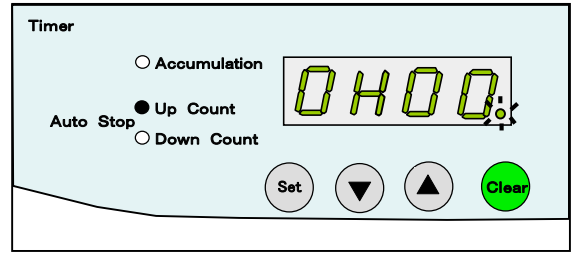
- (2) UP-count of operation time is made up to the set time point.  
In case of setting to 30 minutes, the operation stops at the time displayed in the right screen. The lower right dot goes OFF.

- (3) To clear the time, keep pressing the Clear key for two seconds or more.

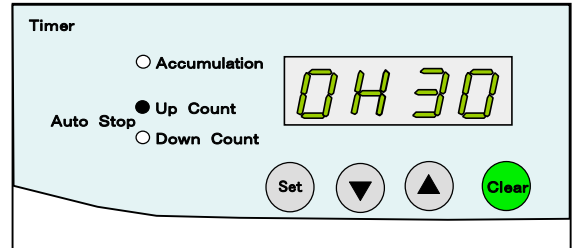
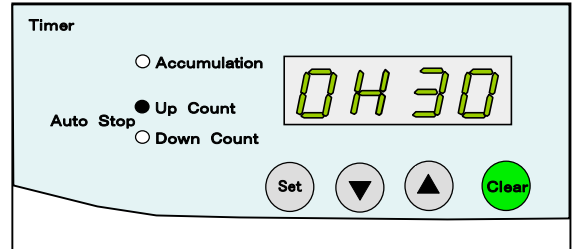
In two seconds, “Clr” is displayed for one second, indicating that the accumulation time is cleared.


- (4) The time display changes to the one before operation.

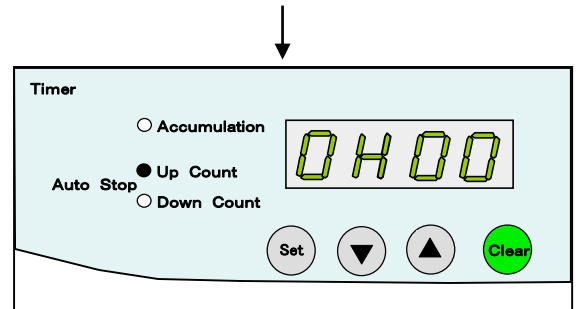
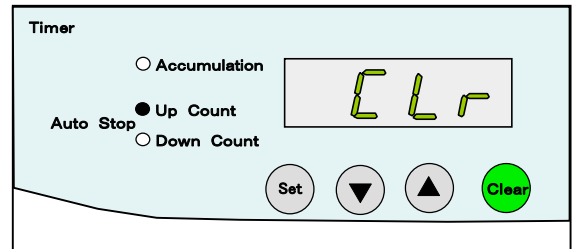
[Time display screen]



↓ Time elapse



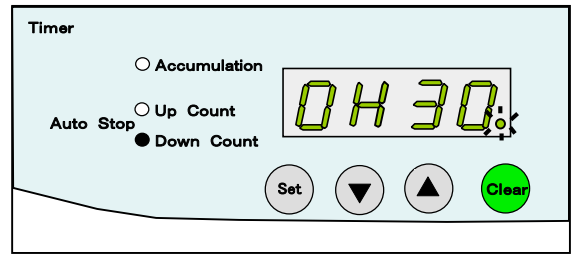
↓  Keep pressing for two seconds



### ③ Auto Stop DOWN-count operation

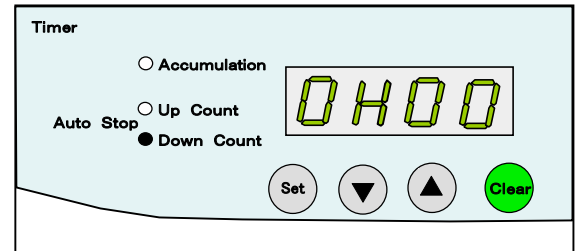
- (1) When DOWN-count has been selected, the “DOWN-Count” lamp goes ON.  
When the set time is 30 minutes, DOWN-count begins with this set time. The lower right dot blinks.

[Time display screen]



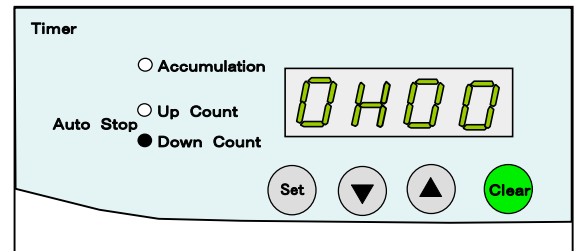
↓ Time elapse


- (2) DOWN-count of operation time is made up to the set time point.  
The operation stops when the time shown in the right screen is reached. and the lower right dot goes OFF.

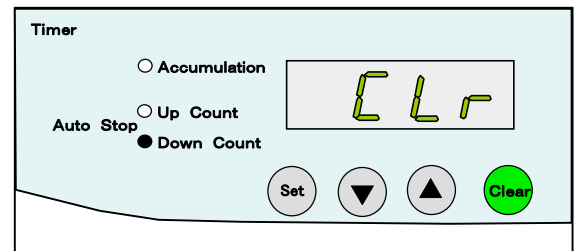


- (3) To clear the time, keep pressing the Clear key for two seconds or more.

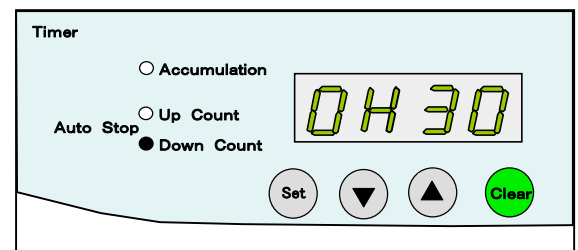
In two seconds, “Clr” is displayed for one second, indicating that the accumulation time is cleared.



↓  Keep pressing for two seconds



- (4) The time display changes to the set time display.



### ④ End of operation

To interrupt or stop operation halfway, press the Run/Stop key.

#### Step to be taken after operation

When the product is not to be used, turn OFF the power switch and disconnect the power plug from the outlet.

# 6

## Causes of troubles and solutions

For any trouble not described in the table below, contact the nearest service center.

Symptom	Causes	Solutions
The time indicator and shaking speed indicator do not go ON even when the power switch is turned ON.	Power plug disconnected from the outlet or not firmly inserted.	Turn OFF the power switch and insert the power plug firmly into the outlet.
	Fuse blown	Replace the fuse with the new one. if it is blown immediately, stop operation and contact the shop from which the user has purchased the product or the closest service center.
	Faulty electronic parts	Stop operation and contact the shop from which the user has purchased the product or the closest service center.
No shaking even when the Run/Stop key is turned ON	Power switch not ON	Turn ON the power switch.
	The shaking selector lever is not set to the appropriate position in models 320 and 3020, and the motor overload protection circuit is activated.	Turn OFF the power switch and set the shaking selector lever to the specified position. Turn ON the power switch and the Run/Stop key.
	Faulty electronic parts	Stop operation and contact the shop from which the user has purchased the product or the closest service center.
Driving belt is either removed or cut.		
Turn ON the Run/Stop key and turn the shaking speed setting dial. No shaking occurs. (No motor running sound)	Faulty electronic parts	Stop operation and contact the shop from which the user has purchased the product or the closest service center.
	Faulty electronic parts	
Speed control cannot be made	Faulty electronic parts	Install the product on the level and stable site.
Loud shaking sound	Driving parts or bearing is worn.	
	Installation site not level Installation site not stable	
The screen displayed alarm and shaking stopped.	Safety function is active.	Take appropriate measure while referring to p.11 “3-4 Safety functions.”



# 7 Maintenance and inspection

## Warning

Never attempt to disassembly the product.

The unit contains parts with high voltage applied or may become hot, and disassembly may cause an electrical shock or an injury.

## Warning

**Always use the designated fuse.**

Use of any fuse other than designated may result in failure of blowing in case of over-current, resulting in fire and other accidents.

## Caution

Use a correct method and items for cleaning or caring the product.

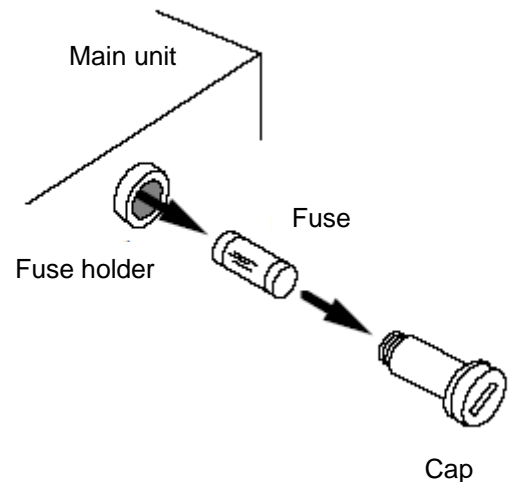
When cleaning or maintaining the main unit and shaking table, never splash water to the exterior or the inside directly, do not put any foreign materials and never use the cleanser, thinner, oil, kerosene, acid, and equivalent. Otherwise, the user may suffer electric shock or damage to the product.

### 7-1 Replacing the fuse

To ensure the safety, replace the fuse only with the power switch OFF and with the power plug disconnected.

- (1) Press and turn counterclockwise by 90° the <cap> of the fuse holder with the standard screwdriver. Remove the blown fuse.
- (2) Insert the attached or equivalent capacity fuse into the <cap> of fuse holder and turn it clockwise to secure. The fuse standard is stamped on the fuse metal portion. Use the service parts as shown in the right.

- ※ Use of any fuse other than designated may result in failure of blowing in case of over-current, resulting in fire and other accidents.
- ※ If the fuse is blown immediately after replacement, stop operation immediately and contact the shop from which the user has purchased the product or the closest service center.



Product name	Code No.
Fuse 500mA	147680

### 7-2 Cleaning and Servicing of product

- (1) Set the shaking speed to the minimum and turn OFF the Run/Stop key. Turn OFF the power switch and disconnect the power plug from the outlet.
- (2) Wipe the main body with the soft cloth from which water is squeezed off. For any difficult-to-remove contamination, use neutral detergent, and then wipe it with the cloth.

## 8 Disposal of Products

Disposal of product or part must be done according to the specified disposal method.

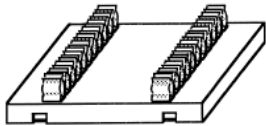
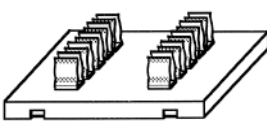
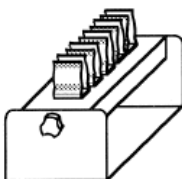
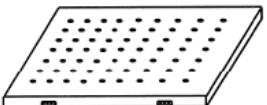
Principal components parts and disposal method



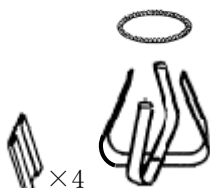

Components	Model	Weight	External dimensions (mm)	How to discard
Main body	MMS-120	Approx. 14kg	356 (W) × 329 (D) × 150 (H)	Request the disposal operator for disposal.
	MMS-220	Approx. 15kg	356 (W) × 329 (D) × 150 (H)	
	MMS-320	Approx. 15kg	356 (W) × 329 (D) × 155 (H)	
	MMS-3020	Approx. 19kg	456 (W) × 379 (D) × 155 (H)	


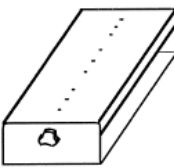
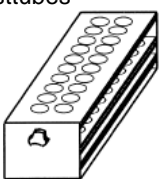
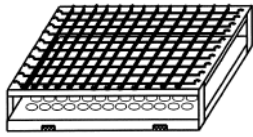
\* We ask you to discard packing materials after classifying them by material types.

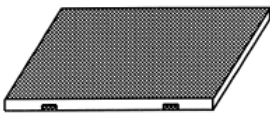
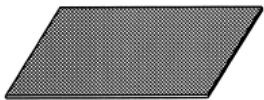
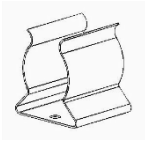
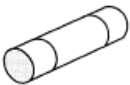
## **9 After-sale Services**

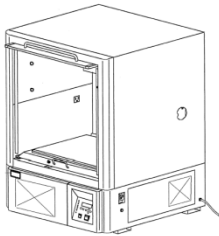
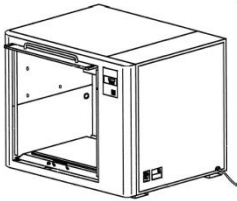
1. In case the product does not function satisfactorily, check first by referring to the page on troubleshooting to see if this is actually a trouble.
2. If the product remains unsatisfactory even after checking, contact the shop from which the user has purchased the product or the service center described in the manual and request repair.
3. Repair during the guarantee period will be made according to the guarantee stipulations.
4. After expiration of the guarantee period, the charged repair will be made at the customer's request.

① Shaking table for 15mL centrifuge tubes			② Shaking table for 50mL centrifuge tubes			③ Angle holder for centrifuge tubes			④ Multi-shaking table		
											
Code No.	Q' ty	Std.	Code No.	Q' ty	Std.	Code No.	Q' ty	Std.	Code No.	Q' ty	Std.
194490	1	For 120 For 220 For 320	194540	1	For 120 For 220 For 3020	194500	1	For 15mL centrifuge tubes	140110	1	For 120 220 320
194550	1	For 3020	194560	1	For 3020	194570	1	50mL centrifuge tubes	140120	1	For 3020

⑤ Flask holder			⑥ Flask holder			⑦ Flask holder			⑧ Ring spring		
											
Code No.	Q' ty	Std.	Code No.	Q' ty	Std.	Code No.	Q' ty	Std.	Code No.	Q' ty	Std.
140170	1	For 50mL	140200	1	For 300mL	140230	1	For 2L	193450	1	For 300mL
140180	1	For 100mL	140210	1	For 500mL	140240	1	For 3L	193460	1	For 500mL
140190	1	For 200mL	140220	1	For 1L				193470	1	For 1 L
									193480	1	For 2L, 3L

⑨ Flask holder rubber			⑩ Angle holder for flask			⑪ Angle holder for test tubes			⑫ Spring type universal shaking table		
											
Code No.	Q' ty	Std.	Code No.	Q' ty	Std.	Code No.	Q' ty	Std.	Code No.	Q' ty	Std.
193440	1	For 2L, 3L	140290	1	For 120 For 220 For 320	140250	1	Φ12mm × 50	140090	1	For 120 For 220 For 320
			140300	1	For 1020 For 3020	140260	1	Φ16.5 mm × 20	140100	1	For 1020 For 3020
						140270	1	Φ16.5 mm × 50			
						140280	1	Φ18mm × 20			

⑬ Sheet shaking table			⑭ Fit sheet			⑮ Holder for centrifuge tubes			⑯ Fuse 500mA		
											
Code No.	Q' ty	Std.	Code No.	Q' ty	Std.	Code No.	Q' ty	Std.	Code No.	Q' ty	Std.
140130	1	For 120 For 220 For 320	140150	1	For 120 For 220 For 320	188630	1	For 15mL	147680	2	500mA
140140	1	For 3020	140160	1	For 3020	188640	1	For 50mL			

⑰ Low-temperature constant-temperature chamber FMC-100, FMC-1000			⑱ Constant-temperature chamber FMS-100, FMS-1000		
					
Code No.	Q' ty	Std.	Code No.	Q' ty	Std.
195240	1	For 120 For 220 For 320	191060	1	For 120 For 220 For 320
195250	1	For 3020	191070	1	For 3020