

# Yamato

## Shaker

Model

**SA300 (2-way Shaking Method)**

**SA320 (Rotary Shaking Method)**

## Instruction Manual

- Third Edition -

- Thank you for purchasing "Shaker, SA Series" of Yamato Scientific Co., Ltd.
- To use this unit properly, read this "Instruction Manual" thoroughly before using this unit.  
Keep this instruction manual around this unit for referring at anytime.



**WARNING!**

Carefully read and thoroughly understand the important warning items described in this manual before using this unit.

**Yamato Scientific Co. LTD.**

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## Explanation


### MEANING OF ILLUSTRATED SYMBOLS


#### Illustrated Symbols

Various symbols are used in this safety manual in order to use the unit without danger of injury and damage of the unit. A list of problems caused by ignoring the warnings and improper handling is divided as shown below. Be sure that you understand the warnings and cautions in this manual before operating the unit.

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 **WARNING!** If the warning is ignored, there is the danger of a problem that may cause a serious accident or even fatality.


 **CAUTION!** If the caution is ignored, there is the danger of a problem that may cause injury/damage to property or the unit itself.


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#### Meaning of Symbols

 This symbol indicates items that urge the warning (including the caution). A detailed warning message is shown adjacent to the symbol.

 This symbol indicates items that are strictly prohibited. A detailed message is shown adjacent to the symbol with specific actions not to perform.

 This symbol indicates items that should be always performed. A detailed message with instructions is shown adjacent to the symbol.

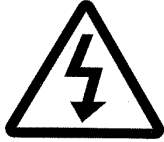
# Cautions in Using with Safety

## Table of Illustrated Symbols

### Warning



Warning,  
generally



Warning,  
high voltage



Warning,  
high temperature



Warning,  
drive train



Warning,  
explosive

### Caution



Caution,  
generally



Caution,  
electrical shock



Caution,  
scald



Caution,  
no road heating



Caution,  
not to drench



Caution,  
water only



Caution,  
deadly poison

### Prohibit



Prohibit,  
generally



Prohibit,  
inflammable



Prohibit,  
to disassemble



Prohibit,  
to touch

### Compulsion



Compulsion,  
generally



Compulsion,  
connect to the  
grounding  
terminal



Compulsion,  
install on a flat  
surface



Compulsion,  
disconnect the  
power plug



Compulsion,  
periodical  
inspection

## Cautions in Using with Safety

### Fundamental Matters of “WARNING!” and “CAUTION!”

#### **WARNING!**

##### **Do not use this unit in an area where there is flammable or explosive gas**

Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the power switch is turned on or off, and fire/explosion may result. (Refer to page20 “List of Dangerous Substances”.)

##### **Always ground this unit**

Always ground this unit on the power equipment side in order to avoid electrical shock due to a power surge.

##### **If a problem occurs**

If smoke or strange odor should come out of this unit for some reason, turn off the power key right away, and then turn off the circuit breaker and the main power. Immediately contact a service technician for inspection. If this procedure is not followed, fire or electrical shock may result. Never perform repair work yourself, since it is dangerous and not recommended.

##### **Do not use the power cord if it is bundled or tangled**

Do not use the power cord if it is bundled or tangled. If it is used in this manner, it can overheat and fire may be caused.

##### **Do not process, bend, wring, or stretch the power cord forcibly**

Do not process, bend, wring, or stretch the power cord forcibly. Fire or electrical shock may result.

##### **Substances that can not be used**

Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit. Explosion or fire may occur.

##### **Do not disassemble or modify this unit**

Do not disassemble or modify this unit. Fire or electrical shock or failure may be caused.

#### **CAUTION!**

##### **During a thunder storm**

During a thunderstorm, turn off the power key immediately, then turn off the circuit breaker and the main power. If this procedure is not followed, fire or electrical shock may be caused.

## Requirements for Installation

### **WARNING!**

#### 1. Always ground this unit



- Connect the power plug to a receptacle with grounding connectors.



- Do not forget to ground this unit, to protect you and the unit from electrical shock in case of power surge. Choose a receptacle with grounding connectors as often as possible.
- Do not connect the grounding wire to a gas pipe, or by means of a lightning rod or telephone line. A fire or electrical shock will occur.

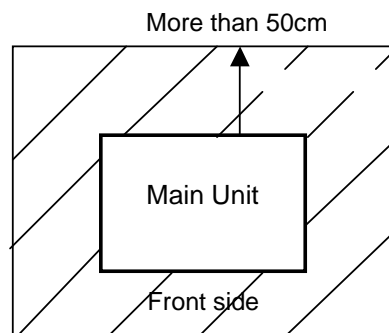
#### 2. Choose a proper place for installation



- Do not install this unit in a place where:
  - ◆ Rough or dirty surface.
  - ◆ Flammable gas or corrosive gas is generated.
  - ◆ Ambient temperature exceeds 35°C.
  - ◆ Ambient temperature fluctuates violently.
  - ◆ There is direct sunlight.
  - ◆ There is excessive humidity and dust.
  - ◆ There is a constant vibration.
- Driving parts are exposed. Do not install this unit to busy place.



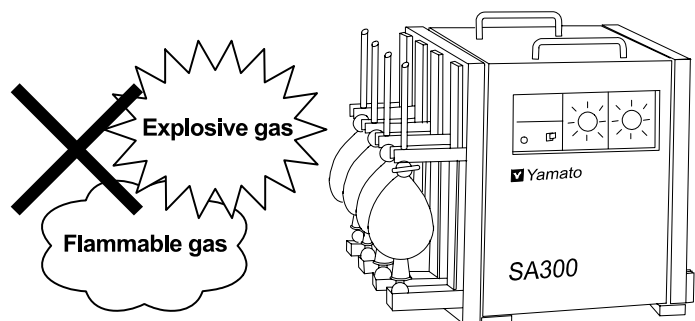
- Install this unit on a stable place with the space as shown below.



#### 3. Do not use this unit in an area where there is flammable or explosive gas



- Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the power switch is turned ON or OFF, and fire/explosion may result.



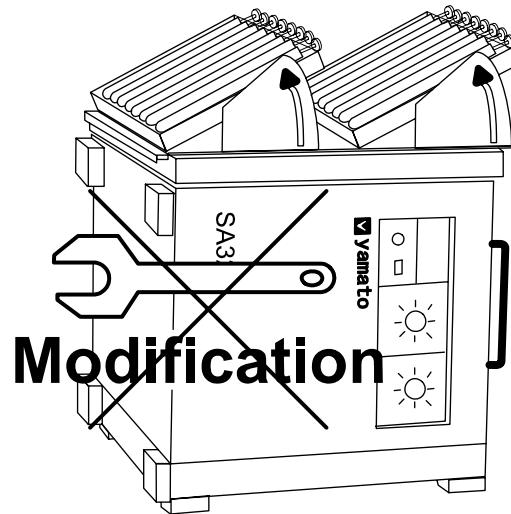
- ❖ Illustration shows a case of vertical shaking
- NOTE) Glass tools and holders are optional accessories.

## Requirements for Installation

### 4. Do not modify



- Modification of this unit is strictly prohibited. This could cause a failure.

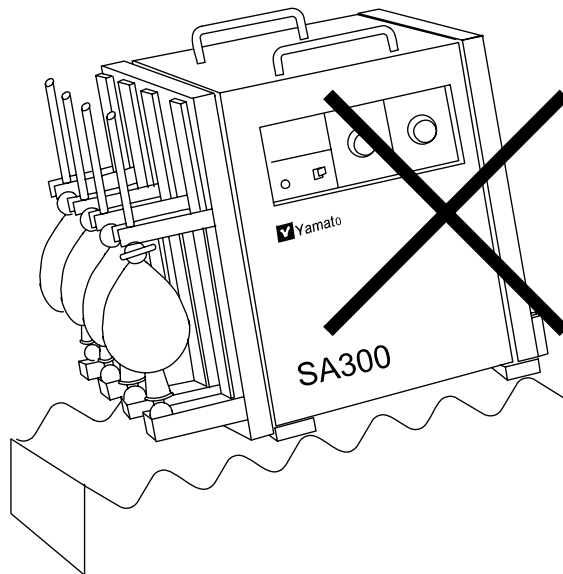


❖ Illustration shows a case of horizontal shaking  
NOTE) Glass tools and holders are optional accessories.

### 5. Installation on horizontal surface



- Set this unit to the flattest place. Not setting this unit with its 4 legs covered with rubber contacted to the setting place surface evenly could cause the vibration or noise, or cause the unexpected trouble or malfunction.



❖ Illustration shows a case of vertical shaking  
NOTE) Glass tools and holders are optional accessories.



## Requirements for Installation

### **CAUTION!**

#### 6. Choose a correct power distribution board or receptacle



- Choose a correct power distribution board or receptacle that meets the unit's rated electric capacity.

**Electric capacity:** SA300: AC100V, 2.2A  
SA320: AC100V, 2.2A

#### NOTE)

There could be the case that the unit does not run even after turning ON the power. Inspect whether the voltage of the main power is lowered than the specified value, or whether other device(s) uses the same power line of this unit. If the phenomena might be found, change the power line of this unit to the other power line.

#### 7. Before/after installing



- It may cause injure to a person if this unit falls down or moves by the earthquake and the impact. etc..To prevent, take measures that the unit cannot fall down, and not install to busy place.
- Touching the shaking parts may cause injure to a person during the operation. To prevent, take measures that putting up a notice of operating, making an enclosure etc..

#### 8. Handling of power code



- Do not entangle the power cord. This will cause overheating and possibly a fire.
- Do not bend or twist the power cord, or apply excessive tension to it. This may cause a fire and electrical shock.
- Do not lay the power cord under a desk or chair, and do not allow it to be pinched in order to prevent it from being damaged and to avoid a fire or electrical shock.
- Keep the power cord away from any heating equipment such as a room heater. The cord's insulation may melt and cause a fire or electrical shock.

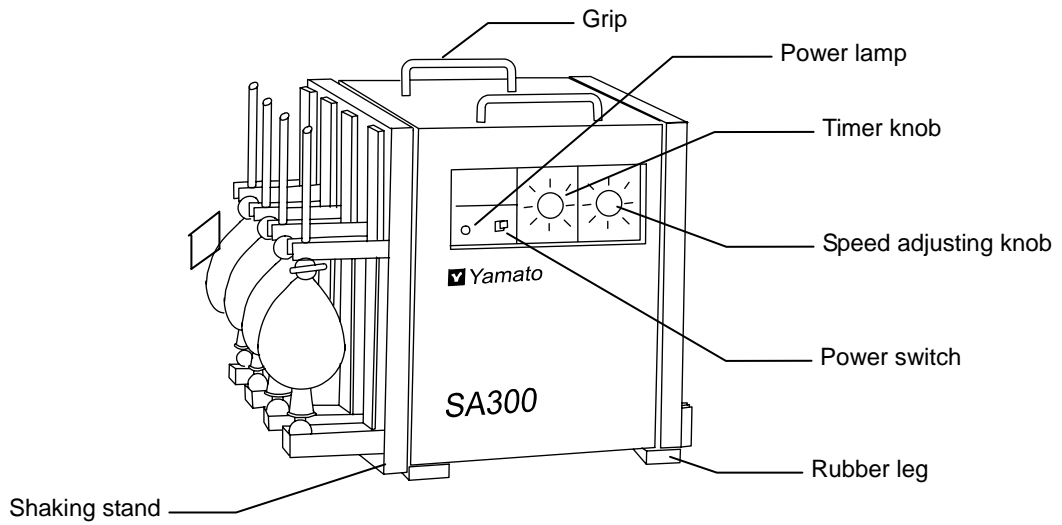


- If the power cord becomes damaged (wiring exposed, breakage, etc.), immediately turn off the power at the rear of this unit and shut off the main supply power. Then contact your nearest dealer for replacement of the power cord. Leaving it may cause a fire or electrical shock.
- Connect the power plug to the outlet which is supplied appropriate power and voltage.

# Description and Function of Each Part

## Main Unit

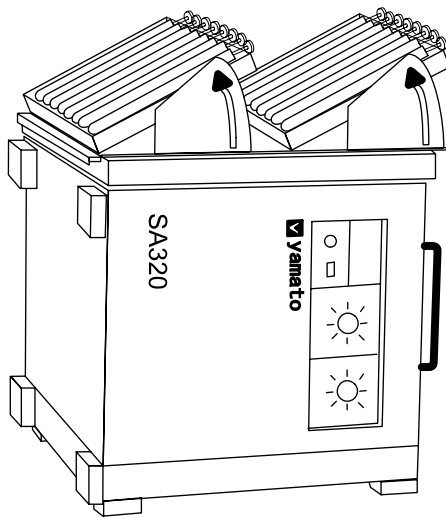
### Installation Example of Vertical Shaking



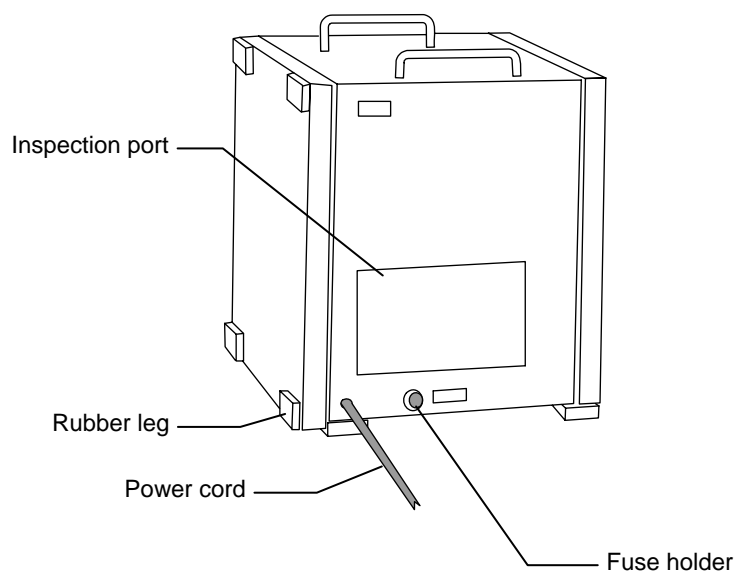
NOTE)

- Glass tools and holders are nonstandard options.
- Illustration shows SA300.

### Installation Example of Horizontal Shaking



### Rear view

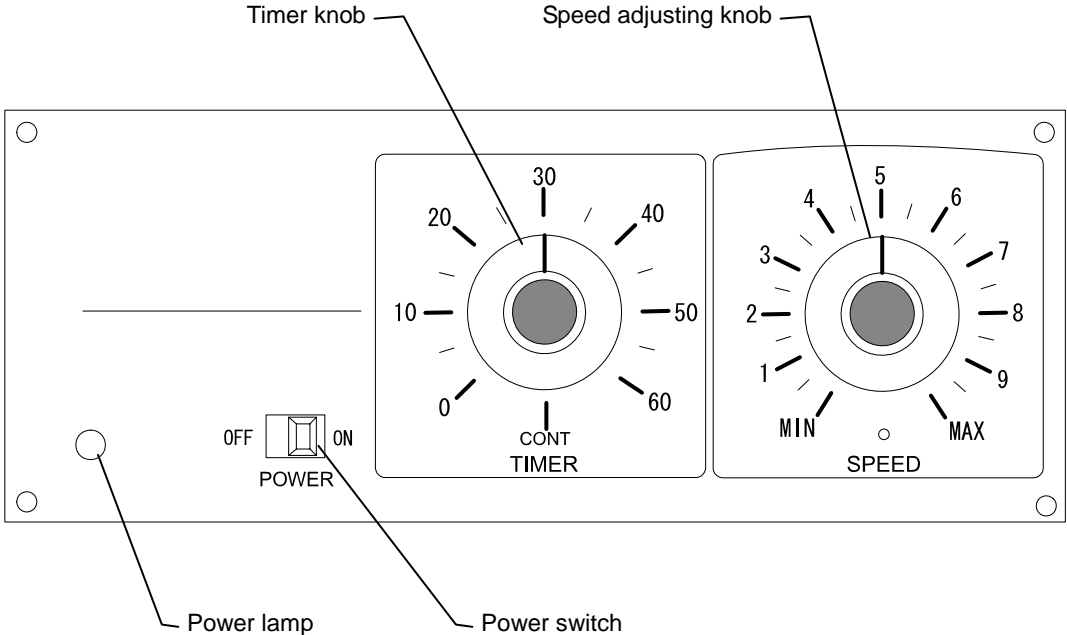


NOTE)

- Glass tools and holders are nonstandard options.
- Illustration shows SA320.

# Description and Function of Each Part

## Control Panel



## Sequence of Operation

### 1. Fix the sample containers.

- Before turning on the power switch, fix the sample containers firmly.
- The quantity of sample containers to be installed is as shown in the following table.

Holder \ Capacity (mL)	100	200	300	500	1000
Separating Funnel Holder	5	4	4	4	3
Erlenmeyer Flask Holder	25	16	16	9	4

### 2. Turn on the power.

- Before turning on the power switch, check if the timer knob is OFF and if the speed adjusting knob is at the lowest speed.
- When the power switch is turned on, the power lamp is ON.

### 3. Set the shaking time.

- When the sample container is installed, turn the timer dial, and set it to the required time (min).
- In continuous operation, adjust the dial position to "CONT".

### 4. Adjust the shaking times.

- Shaking times shall be set by the speed adjusting knob.  
Since the scale has its variable range divided evenly, use this for reference.

#### **⚠ CAUTION!**

If used at the max shaking times, such shaking times could exceed the standard value in the area of commercial power frequency 60 Hz. If shaking is performed in the too wide range, or if the main unit vibrates widely, reduce the speed-regulating dial.

Shaking times could also rise according to the condition of the load. In such cases, slightly reduce the speed-regulating dial similarly.

Shaking times for each scale (reference) are as shown below approximately:

Model \ Scale	2	4	6	8	Max.
SA300	Start	115	185	250	300
SA320	Start	95	140	180	210

## Sequence of Operation

### **⚠CAUTION!**

It is possible to make vibrate the main unit, when the setting sample is heavy or the shaking time is large. Please refer to the table of vibration-proof and operate not to move by sample or shaking time.

#### **The case of horizontal shaking type**

The sample weight that can be shaken in each option is as follows.

Erlenmeyer Flask Holder (Item Code:232097)

Shaking time (Scale)	1	2	3	4	5	6	7	8	9	10
Permissible sample weight (kg)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.5	1.5

Test Tube Holder (Item Code:232086)

Shaking time (Scale)	1	2	3	4	5	6	7	8	9	10
Permissible sample weight (kg)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	×

Test Tube Rack Holder (Item Code:232088)

Shaking time (Scale)	1	2	3	4	5	6	7	8	9	10
Permissible sample weight (kg)	5.6	5.6	5.6	5.6	5.6	5.6	5.6	3.5	1.0	×

Centrifugal Tube Holder (Item Code:232087)

Shaking time (Scale)	1	2	3	4	5	6	7	8	9	10
Permissible sample weight (kg)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	×	×

Two Layers Spring Shaking Rack (Item Code:232079)

Shaking time (Scale)	1	2	3	4	5	6	7	8	9	10
Permissible sample weight (kg)	15	15	15	15	15	15	15	×	×	×

x...No Shaking

### **⚠CAUTION!**


- The holder or the flask are not attached.
- It might be possible to shift the permissible sample weight by the condition of setting floor.
- Permissible sample weight is the value with maximum load weight.

### **⚠CAUTION!**


In the early stage after supplying power, the shaking times may be 10-15% lower than the set value. Perform the running operation for about 15 min. Then, the shaking times will stabilize.

## **WARNING!**

### **If a problem occurs**


-  If smoke or strange odor should come out of this unit for some reason, turn off the power key right away, and then turn off the circuit breaker and the main power. Immediately contact a service technician for inspection. If this procedure is not followed, fire or electrical shock may result. Never perform repair work yourself, since it is dangerous and not recommended.

### **Substances that cannot be used**


-  Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit. Explosion or fire may occur. (Refer to page20 “List of Dangerous Substances”.)

## **CAUTION!**


### **Take care not to load too much sample**

-  If too much sample is loaded, the shaking speed will be reduced, or the main unit will vibrate. Do not start operation with any overload.


### **Do not step on this unit**

-  Do not step on this unit. It will cause injury if this unit fall down or break.


### **Do not put anything on this unit**

-  Do not put anything on this unit. It will cause injury if fall.


### **During a thunder storm**

-  During a thunderstorm, turn off the power key immediately, then turn off the circuit breaker and the main power. If this procedure is not followed, fire or electrical shock may be caused.

### **Speed adjustment**


-  The shaking speed of this unit is adjusted appropriately at the shipment from factory. If the power voltage fluctuates widely, or if the motor temperature rises abnormally, the speed could be changed more or less. If any abnormality including abnormal vibration and shaking main unit is detected, reduce the speed by means of the speed adjusting knob. If max. specified revolution is exceeded, the abnormal vibration or noises could be caused, and thus be caused failure.

### **Operation method**


-  Operate this unit with the method specified by this operation manual. If operated in ways other than specified in this operation manual, any failure or accident could be caused. If operated in ways other than specified in this operation manual, the product is not guaranteed.

## **CAUTION!**


### **Sample installation method**

-  The sample container mounting holders for separating funnel, Erlenmeyer flask, centrifugation tube and test tube are provided respectively as nonstandard options. Select them according to the purpose, and mount them on the shaking table of the main unit.
- To shake the separating funnel, set the shaking table at vertical position (vertical shaking type), and enter the positioning pins of the holder into the two pipe holes provided in the table (see the sketch drawing), and then fix them firmly.
- When using Erlenmeyer flask, set the vinyl chloride box type holder firmly on the table of the main unit placed at level (horizontal shaking type) (See the illustration on Page 7).
- Also, when using centrifugation tube and test tube, place the main unit horizontal.

### **Preparing timer**

-  This unit incorporates a 60-min meter for timer. If it is necessary to operate this unit for a longer time, set the timer to CONT. Continuous operation is available.

### **Return after power failure**

-  When power is supplied after a power failure, the device automatically starts operation again with the same state as just before the power failure. It is danger that the device starts unattached operation after a power failure. We recommend for you to turn off the switch of this unit if a power failure occurs during operation.

### **When the main unit vibrate using it**

- Please use it as follows when the main unit vibrate or begin.
- It is considered becoming unbalance of the unit to use for a long time.
- ① Decrease the shaking time not to vibrate it.
  - ② Decrease the weight and not to vibrate position.
  - ③ If not to decrease the shaking time or the weight, please fix the unit with anchor.

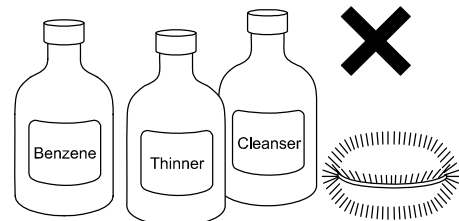
## Daily Inspection and Maintenance

### **WARNING!**

- Disconnect the power cable from the power source when doing an inspection or maintenance unless needed.
- Perform the daily inspection and maintenance after returning the temperature of this unit to the normal one.
- Do not disassemble this unit.

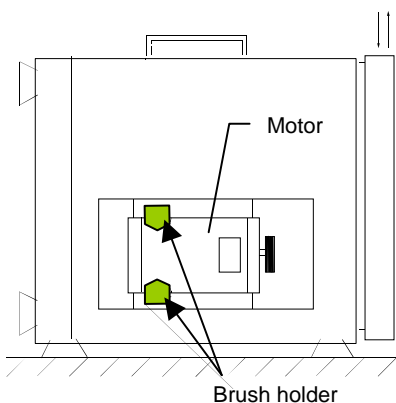
### **CAUTION!**

- Use a well-drained soft cloth to wipe dirt on this unit. Do not use benzene, thinner or cleanser for wiping. Do not scrub this unit. Deformation, deterioration or color change may result in.



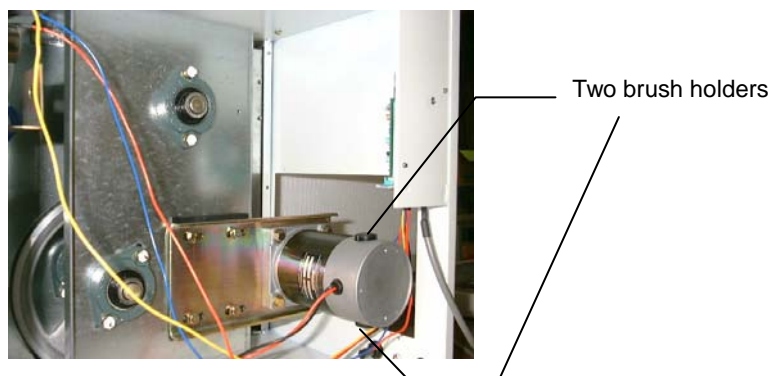
## Replacement method of Motor Brush

### Replacement of Motor Brush



- Since the carbon brush of the motor is worn out as the motor is operated for a long time, replace the carbon brush periodically. Though the timing of the replacement is dependent on the frequency of operation, check such a brush every 6 months.
- When the inspection port cover is removed, the motor can be seen. Two resin holders for fixing the carbon brush are provided in the lower part of the motor. Use a coin, etc. to loosen the groove on top of the holder. Change it with the attached carbon brush, and replace it at the original place.

(Photo shows the inspection port as seen from the opposite side.)



For any questions, contact the dealer who you purchased this unit from, or the nearest sales division in our company.



### When not using this unit for long term / When disposing

#### **CAUTION!**

##### When not using this unit for long term...

- Turn off the power and disconnect the power cord.

#### **WARNING!**

##### When disposing...

- Keep out of reach of children.
- Remove the driving parts.
- Treat as large trash.

#### ***Environmental protection should be considered***

We request you to disassemble this unit as possible and recycle the reusable parts considering to the environmental protection. The feature components of this unit and materials used are listed below.

Component Name	Material
<b>Exterior Parts</b>	
Casing	Iron bonderizing steel plate baked with melamine resin coating
Frame	Iron bonderizing steel plate baked with melamine resin coating and cement
Pipe	Stainless steel SUS304
Production plates	Polyethylene (PET) resin film
<b>Shaking parts</b>	
Shaking table	Iron bonderizing steel plate baked with melamine resin coating
Mounting plate for shaking table	Iron bonderizing steel plate
Table for mounting motor	Iron bonderizing steel plate
Pulley shaft	Polishing round rod SS41B
Pulley	Aluminum
V belt	Synthetic rubber
<b>Electrical Parts</b>	
Motor	Motor case, rotor, shaft: made of iron Bracket: aluminum Coil: copper wire (epoxy resin insulation coating)
Power cord & wiring materials and others	Wiring materials and circuit boards coated with synthetic rubber and resins

## Trouble Shooting

### Instances

Condition	Possible Causes	Solution
When turning ON the switch; <ul style="list-style-type: none"> <li>Lamp does not light ON.</li> <li>The device does not start shaking.</li> </ul>	Bad connecting in lamp or lamp circuit	Replacement or repair
	Defective power switch	Replacement or repair
	Failure in timer	Replacement or repair
	Fuse is blown	Replacement or repair
	Failure in speed control	Replacement
	Timer is set to "0"	Resetting timer
Shaking but; <ul style="list-style-type: none"> <li>Smooth shaking is not available.</li> <li>Loud noises and violent vibration.</li> </ul>	Too loosened or tensed belt	Repair
	Loose pulley or its wrong position	Repair
	Worn carbon brush of the motor	Replacement
	Worn roller	Replacement
	Defective vibration-proof rubber leg	Replacement
Speed cannot be controlled.	Failure in speed control	Replacement
	Defective speed-adjusting volume	Replacement
	Defective motor	Replacement

### Before call us...

Condition	Possible Causes
The device does not start when turning on the power switch.	<ul style="list-style-type: none"> <li>Power plug is not connected to the receptacle correctly.</li> <li>Power failure.</li> <li>Fuse is blown.</li> <li>Timer is set to "0".</li> </ul>
The shaking speed fluctuates in operation.	<ul style="list-style-type: none"> <li>Too much samples</li> <li>The carbon brush of the motor is worn out.</li> </ul>
Required shaking times cannot be reached.	<ul style="list-style-type: none"> <li>Too much samples</li> <li>The carbon brush of the motor is worn out.</li> </ul>

In the case if the error other than listed above occurred, turn off the power switch and primary power source immediately. Contact the shop of your purchase or nearest Yamato Scientific Service Office.

### In Case of Request for Repair

If the failure occurs, stop the operation, turn OFF the power switch, and unplug the power plug. Please contact the sales agency that this unit was purchased, or the Yamato Scientific's sales office.

#### < Check following items before contact >

- ◆ Model Name of Product
  - ◆ Production Number
  - ◆ Purchase Date
  - ◆ About Trouble (in detail as possible)
- } See the production plate attached to this unit.

### Minimum Retention Period of Performance Parts for Repair

The minimum retention period of performance parts for repair of this unit is 7 years after discontinuance of this unit.

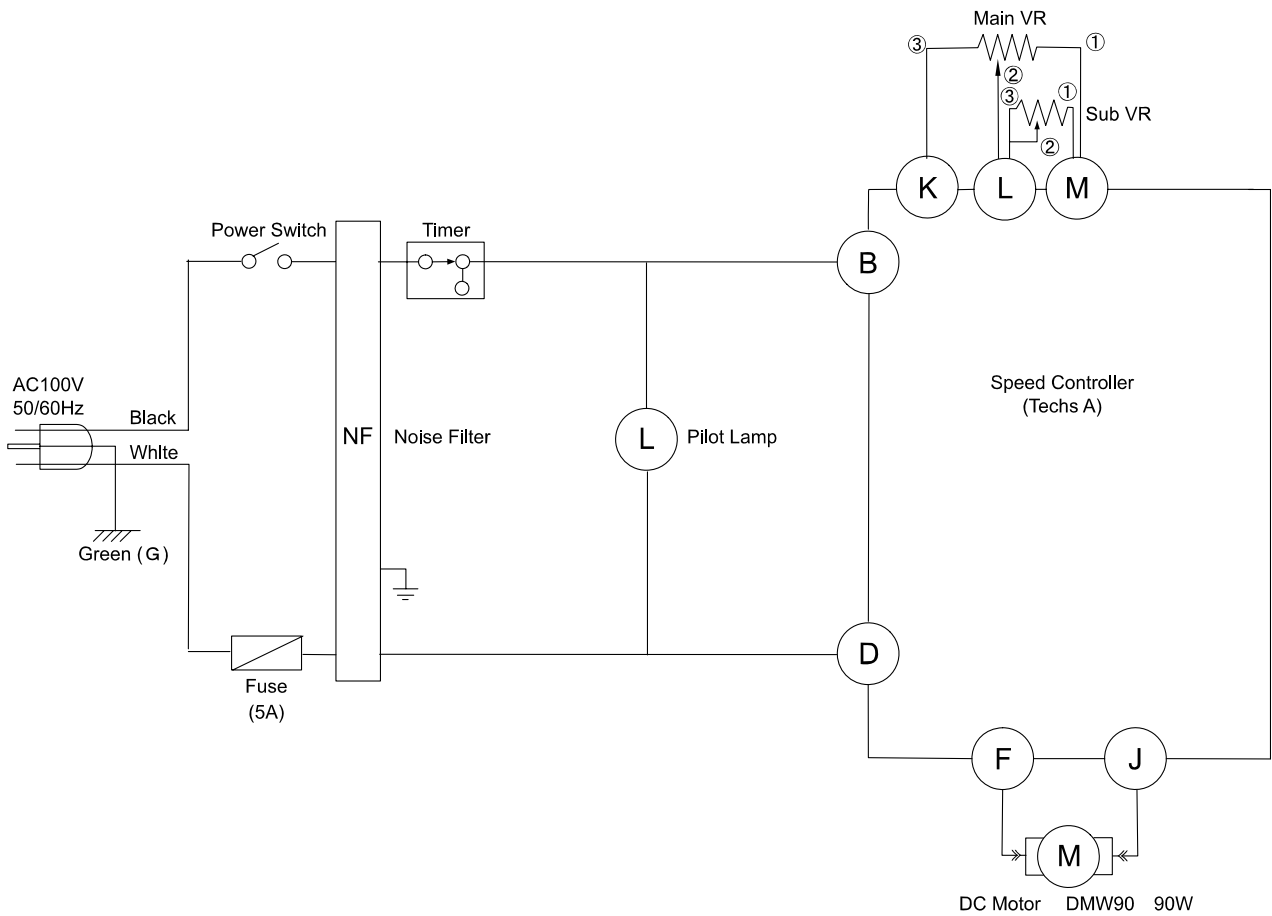
The "performance part for repair" is the part that is required to maintain this unit.

		SA300	SA320
Method/performance	Shaking Method	Horizontal/vertical shaking methods	Horizontal turn/vertical turn shaking methods
	Max No. of Racks	Separating funnel 1000 mL x 3 pcs.	
	Shaking times	Horizontal shaking: approx. 20 to 300 times/min. Vertical shaking: approx. 20 to 300 times/min.	Horizontal turn shaking: approx. 20 to 210 times/min. Vertical turn shaking: approx. 20 to 210 times/min.
	Shaking Width	40mm	
Configuration/standards	Variable Shaking Speed	Using the speed adjusting knob	
	Variable Speed Method	Leonard system by thyristor Non-stage transmission	
	Timer	0 to 60 min. (min. scale: 5 min.)	
	Motor	DC motor 90W	
	External dimensions	W460 × D460 × H425 mm	
	Weight	Approx. 40Kg	
	Power supply	100V AC, 50/60Hz (common), Max.2.2A	
	Accessories	Fuse, Carbon brush, Instruction manual	

## Optional Accessories

Product code	Name (specification)
232096	Separating funnel holder (1 pc for 100 to 1000 ml)
232097	Erlenmeyer flask holder (1 pc for 100 to 1000 ml)
232085	Centrifugation tube holder (dia 16 to 35 × length 110 to 130 mm) with 18 racks
232086	Test tube holder (dia 16.5 to 18 × length 160 to 190 mm) with 18 racks

\* Optional accessories are common to the SA300/SA320 and the old SA31 type.



## Electrical Parts List

Name	Code No.	Specification	Manufacturer
Power cord kit	DN005	0.75sq 2M 3cores	Yamato Scientific
Timer	232004-202	SC-2-1H-1a AC125V 3A	Zenkousya Tokei
Switch	LT00002483	M-2022J	Nihon Kaiheiki
Pilot lamp	232004-204	BN-5701 AC110V translucent	Sato Parts
Fuse	232004-206	F7161 5A	Sato Parts
Noise filter	2300010002	ZAG2220-11S	TDK
Motor	2140000029	DMW90	Yamato Scientific
Speed controller	1080060001	Techs A	Yamato Scientific
Variable resistor	2120020009	RV16YN10S B303 30K $\Omega$	Tokyo Cosmos
Variable resistor	2120020010	RV24YN20S B50 25K $\Omega$	Tokyo Cosmos

## Replacement Parts Table

Refer to Page 18 for electrical replacement parts.

### Common Use Parts

Part Name	Code No.	Specification	Manufacturer
Roller	LT00026600	TOK IN-19-B3	Yamato Scientific
Rubber leg	232004-141	Neoprene rubber	Yamato Scientific
Speed/Time adjusting knob	7140000028	K100set	Yamato Scientific
V belt (*)	232004-209	JIS-6323 M-29	Sansei Belt
V belt (*)	232004-211	JIS-6323 M-31	Sansei Belt

(\*) : Expendables

### Only for SA320

Part Name	Code No.	Specification	Manufacturer
Rotation unit		For SA320	Yamato Scientific

## List of Dangerous Substances



Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit.

### EXPLOSIVE

<b>EXPLOSIVE:</b>	Ethylene glycol dinitrate (nitro glycol), Glycerin trinitrate (nitroglycerine), Cellulose nitrate (nitrocellulose), and other explosive nitrate esters
	Trinitrobenzene, Trinitrotoluene, Trinitrophenol (picric acid), and other explosive nitro compounds
	Acetyl hidroperoxide (peracetic acid), Methyl ethyl ketone peroxide, Benzyl peroxide, and other organic peroxides

### FLAMMABLE

<b>IGNITING:</b>	Lithium (metal), Potassium (metal), Sodium (metal), Yellow phosphorus, Phosphorus sulfide, Red phosphorus, Celluloid compounds, Calcium carbide, Lime phosphate, Magnesium (powder), Aluminum (powder), Powder of metals other than magnesium and aluminum, Sodium hydrosulfite
<b>OXIDIZING:</b>	Potassium chlorate, Sodium chlorate, Ammonium chlorate, and other chlorate
	Potassium perchlorate, Sodium perchlorate, Ammonium perchlorate, and other perchlorate
	Potassium peroxide, Sodium peroxide, Barium peroxide, and other inorganic peroxide
	Potassium nitrate, Sodium nitrate, Ammonium nitrate, and other nitrate
	Sodium chlorite and other chlorites
	Calcium hypochlorite and other hypochlorites
<b>INFLAMMABLE LIQUID:</b>	Ethyl ether, Gasoline, Acetaldehyde, Propylene chloride, Carbon disulfide, and other flammable substances having a flash point of lower than -30°C
	Normal hexane, ethylene oxide, acetone, benzene, methyl ethyl ketone, and other flammable substances having a flash point of -30°C or higher but lower than 0°C
	Methanol, Ethanol, Xylene, Pentyl acetate (amyl acetate), and other flammable substances having a flash point of 0°C or higher but lower than 30°C
	Kerosene, Light oil (gas oil), Oil of turpentine, Isopentyl alcohol (isoamyl alcohol), Acetic acid, and other flammable substances having a flash point of 30°C or higher but lower than 65°C
<b>FLAMMABLE GAS:</b>	Hydrogen, Acetylene, Ethylene, Methane, Propane, Butane, and other flammable substances which assume a gaseous state at 15°C and 1 atm

(Source: Appendix Table 1 of Article 6 of the Industrial Safety and Health Order in Japan)

## Responsibility

Please follow the instructions in this document when using this unit. Yamato Scientific has no responsibility for the accidents or breakdown of device if it is used with a failure to comply. Never conduct what this document forbids. Unexpected accidents or breakdown may result in.

## Note

- ◆ The contents of this document may be changed in future without notice.
- ◆ Any books with missing pages or disorderly binding may be replaced.

Instruction Manual for

**Shaker**

**Model SA300/320**

Third Edition Feb. 10, 2010

Revised Feb. 8, 2012

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