

Shaking Device **MK201D**

Instruction Manual

First Edition

Yamato Scientific Co. LTD.

- Thank you for purchasing "Shaking Device, MK201D" 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.


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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.

 **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.

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.

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

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.



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.



NEVER disassemble or modify equipment.

Attempting to dismantle or modify unit in any way, may cause malfunction, fire or electric shock.

Caution



DO NOT operate equipment during thunderstorms.

In the event of a thunderstorm, terminate operation and turn off power switch immediately. A direct lightning strike may cause damage to equipment, or result in fire or electric shock.

Requirements for Installation

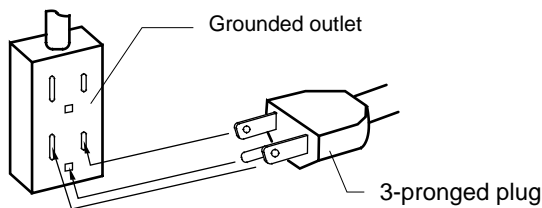
! WARNING!

1. Always ground this unit

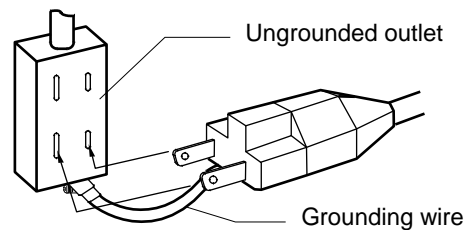


- Ground wire must be connected to a proper grounding line or terminal in order to avoid electrical shock.
- Never connect ground wire to gas lines or water pipes.
- Never connect ground wire to telephone grounding lines or lightening rods. Doing so may result in fire or electric shock.
- Never insert multiple plugs into a single outlet. Doing so may result in power cable overheating, fire or drop in voltage.

Connect to grounded outlet.



Use grounded adapter for ungrounded outlets.



When no grounding terminal is found:

Grounding to Electrical Equipment Technical Standards, Section 19, class D (Grounding Resistance Max. 100Ω) is required in Japan. Contact a local dealer, electrician, or Yamato Sales office for location-specific electrical requirements.

↑Insert grounded power plug into ground adapter. Connect grounding wire (green) from ground adapter to a ground terminal.

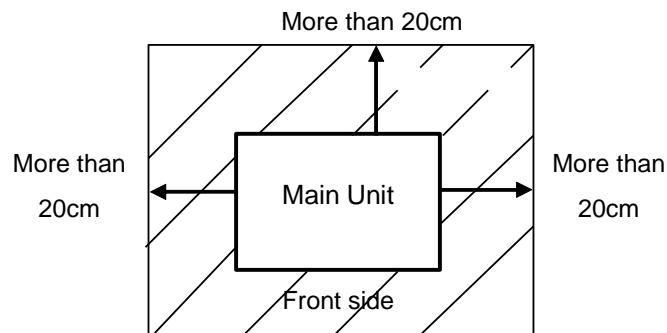
2. Choose a proper place for installation



- Do not install this unit in a place where.
 - ◆ Flammable gas or corrosive gas is generated.
 - ◆ Ambient temperature exceeds 35°C.
 - ◆ Ambient temperature fluctuates violently.
 - ◆ There is excessive humidity and dust.
 - ◆ There is direct sunlight.
 - ◆ There is a constant vibration.



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

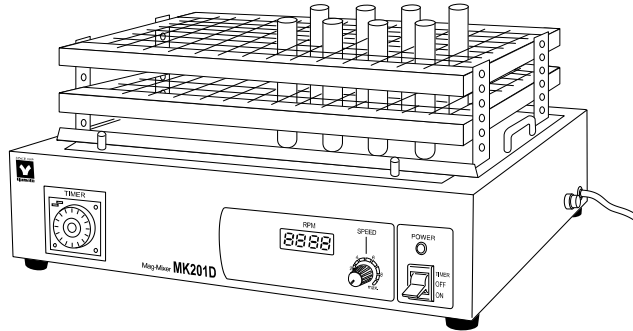
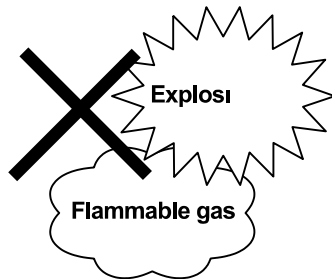


Requirements for Installation

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



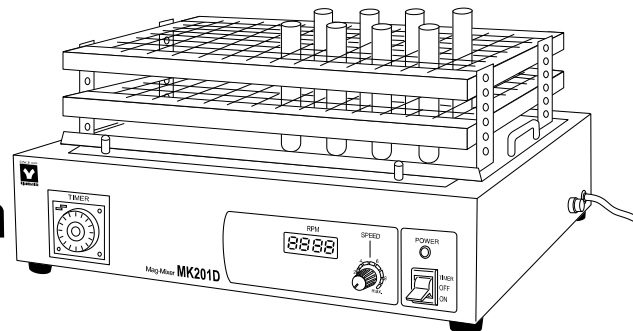
- Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the power switch is turned ON or OFF, and fire/explosion may result.



4. Do not modify



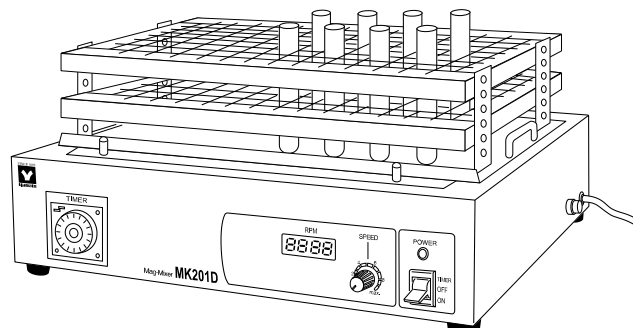
- Modification of this unit is strictly prohibited. This could cause a failure.



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 unexpectible trouble or malfunction.



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: AC115V 2A

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.

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..

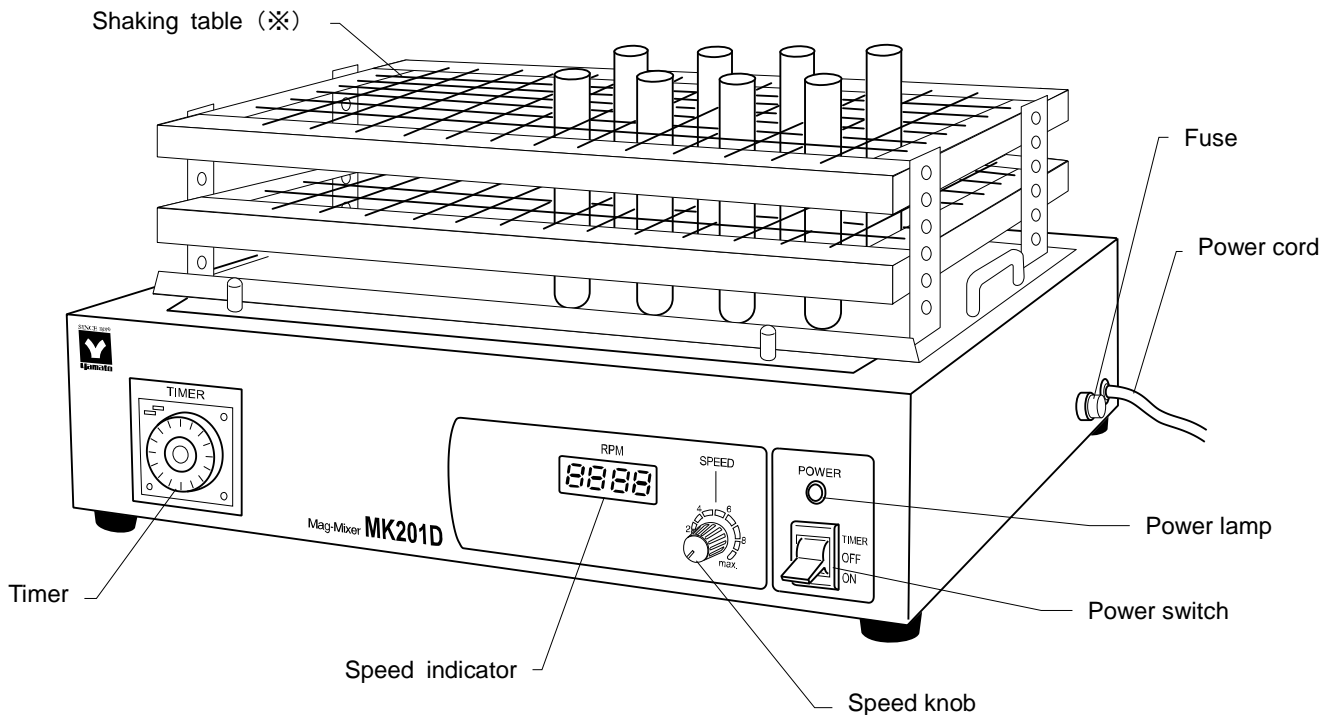
8. Handling of power code



- 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.



**The unit requires a shaking table (optional) dedicated for specific applications.
First purchase a special rack appropriate for your application.**

- Power switch..... When the power switch is ON, it become continuous operation. When the power switch is set to TIMER, it start timer operation. And, turn the power switch is OFF.
- Power lamp..... When power switch is ON or TIMER, indicator illuminates green.
- Speed knob..... Controls mixing speed. Turn clock-wise to increase speed.
- Speed indicator..... The screen displays the shaking speed (RPM).
- Timer..... Select of timer operating mode. (Refer to page 9. "Timer operation method")
- Fuse..... The fuse cut off the power supply in case of overcurrent occurrence. In that case, because exchange is necessary, I take off a cap and let a fuse of the inside, and, please replace it with an accessory.
- Power cord Connects to AC100V outlet to supply power to unit.

Preparation for Operation

1. Setting of shaking method

The unit is set to the rotary shaking method at the time of shipping. Perform the following procedures in order to set it to the reciprocating shaking method.

- ① Remove the shaking table when it is on the unit. Remove the two shaking table fixing screws by turning them counterclockwise, then hold the handle of shaking table and lift it to remove it.
- ② Change the attaching positions of the four flat countersunk head screws which are fixing the shaking table fixing table in referring to the drawing shown below. Move the flat countersunk head screws from the positions A to the positions B by using a Philips screwdriver. At this time, screw the flat countersunk head screws which are put into the holes B into the reciprocating motion axis of the main unit surely.

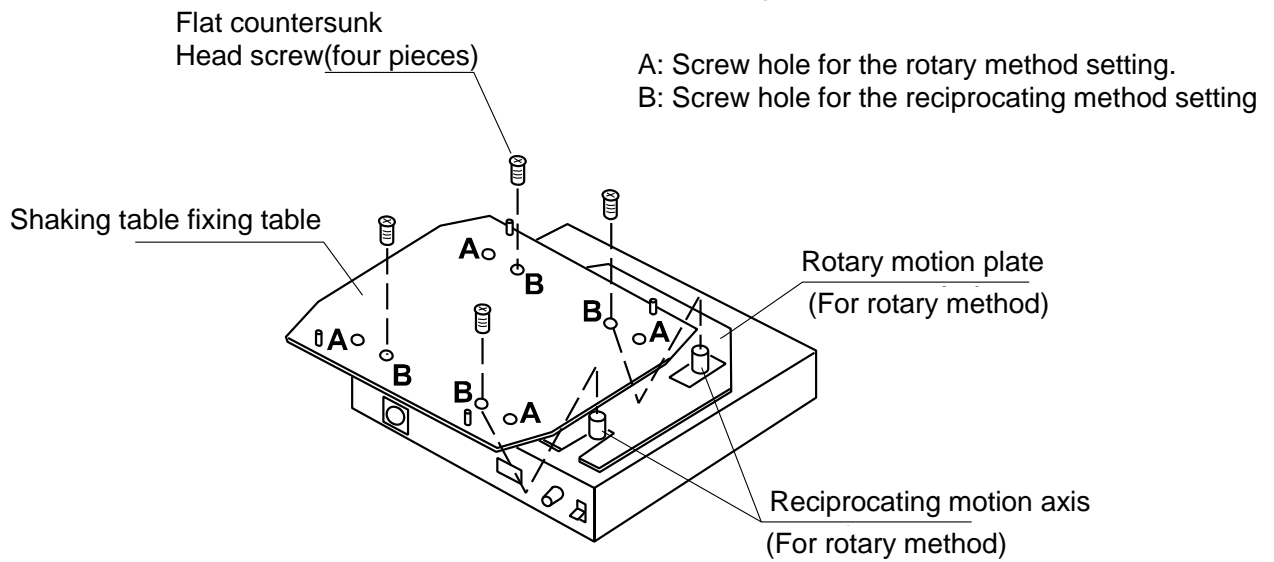


Fig.1 Setting of Reciprocating Shaking Method

2. Setting of shaking table

The shaking table is not the standard accessory. Prepare it separately.

At the time of setting of the shaking table, hold the handle of the shaking table, then set it between the front pins and the pusher pins (2 pieces) on the rear side of the shaking table fixing table by pushing the rear side pins. Finally, set the shaking table fixing screws (2 pieces) to the hole positions, then tighten them by your fingers.

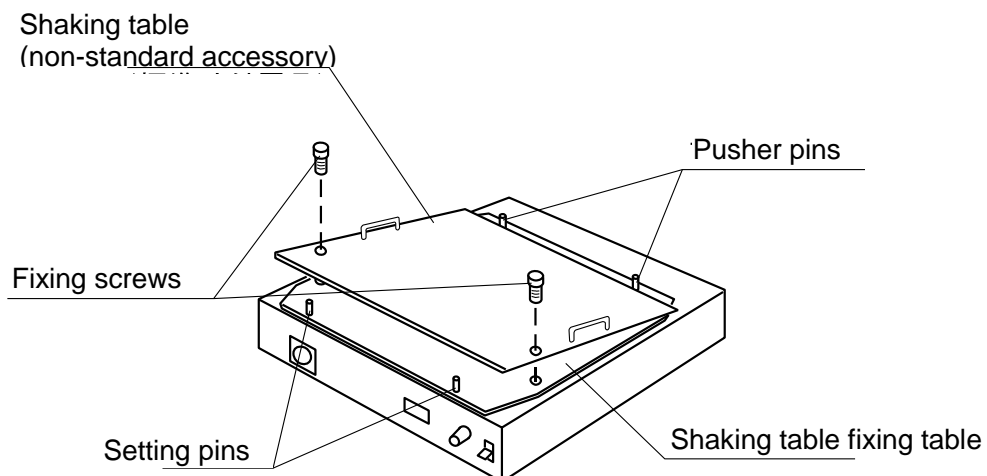


Fig.2 Setting of Shaking Table

Preparation for Operation

3. Setting of sample

Install the unit at a stable place. Put sample in the container which is suitable to the shaking table, then set it on the shaking table. At this time, confirm that the container is surely set on the shaking table. If sample is put up to the upper part of the container, sample may be overflowed during shaking.

4. Connection of power

Confirm that the Power switch is OFF and the Speed knob is at the position of MIN, then connect the power cord to the power of AC 100V. At this time, always ground the unit.

Unit Operation

- ① Turn On the Power switch and turn the Speed knob clockwise to start the shaking.
Turn the Speed knob clockwise to raise the shaking speed. It becomes the continuous operation when the Power switch is ON. When it is ON, the shaking speed is displayed in digital, so it can be used at time of setting of the shaking speed.
- ② When the power switch is set to TIMER, it start timer operation. When the unit is operating, the speed indicator show the concussion speed.
※About the setting method of the timer, refer to next page "Timer operation method".
- ③ When the shaking is completed, turn the Speed knob counterclockwise to MIN, then turn OFF the Power switch.

Timer Operation

Time unit and time range must be set.

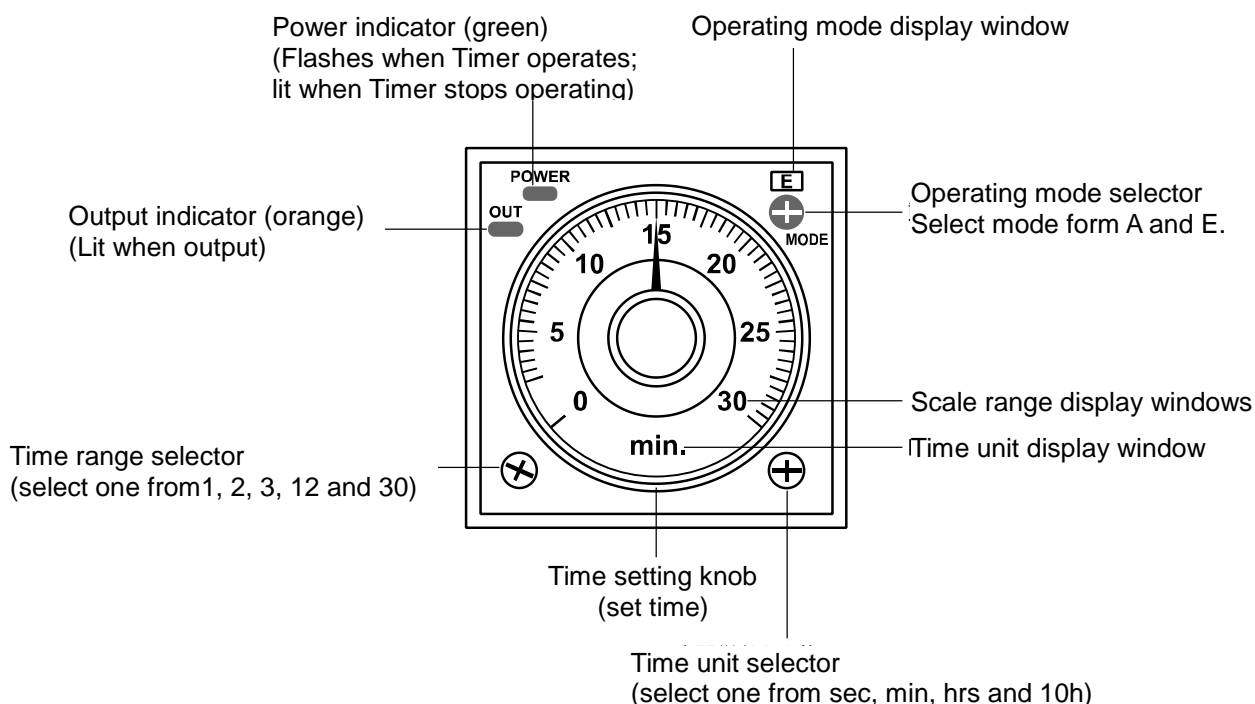
Factory default setting is E mode and 30min.

The operation mode have two ways.

E mode: Utilizes timer or clock to automatically stop an operation.

A mode: Utilizes timer or clock to automatically begin an operation. Operation must be stopped manually.

1. Component Name



Timer operation method

2. Setting Method

Selection of Timer Operating

The operation mode A and E can be selected. Use a Phillips head or flathead screwdriver to turn the selector switch. The window on the top shows E or A to indicate the selected mode.

Selection of Time Unit and Time Range

The desired time unit (sec, min, hrs, 10h) is displayed in the window below the time setting knob by turning the time unit selector located at the lower of the front panel.

A time range (1.2, 3, 12, 30) is selected with the time range selector at the lower left corner of the front panel, and the selected time range appears (in the window at the lower right part) within the plastic frame of the time setting knob.

3. Set Time

Set time with time setting knob.

Timer set range will be 0.5 seconds to 100 hour.

※ 3(three) Selectors

- The selectors can be turned clockwise and counterclockwise to select the desired time unit, time range, or operating mode.
- Each selector has a snap mechanism that secures the selector at a given position. Set the selector at a position at which it is secured. Do not set it midway between two securing positions or a malfunction could result from improper setting.

WARNING!

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.

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.

CAUTION

Putting specimen



Use the special rack to correctly put specimen. Put specimen evenly taking care not to be concentrated locally. The maximum total allowable weight is 12kg including racks and containers.

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.

Not to sandwich the hand.



Please be careful that a hand is not caught in the shaking table. It cause an unnecessary load in the motor, or may be injured.

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 place any object on the unit



Do not place any object other than the shaking table on the unit. The unit may malfunction or drop and cause a personal injury.

Close the screw surely



Please close screws surely, when exchange the shaking table or shaking method.

Do not allow the instrument to get wet



Be absolutely certain not to get electrical parts wet, as this can cause short circuits and electrical shock.

Start at low speed



Always start operation at low speed. Turning on the power with the dial set to high or maximum speed will cause the motor to spin abruptly, which may send the magnetic agitator flying, damaging or breaking glass container or causing fluid solution to splatter.

Increase mixing speed gradually.



Gradually increase mixing speed while watching solution mixture status closely. Increasing speed too quickly may send the agitator off center and into the sides of the container, possibly causing damage or breakage.

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.

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.

Daily Inspection and Maintenance

WARNING!

- Disconnect the power cable from the power source when doing an inspection or maintenance unless needed.
- 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.

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
Exterior Parts	
Frame	Steel plate baked with melamine resin coating
Production plates	Polyethylene (PET) resin film
Shaking parts	
Shaking table	Stainless steel plate baked with melamine resin coating
Electrical Parts	
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

Symptom	Causes	Countermeasures
Even if the switch is turned on <ul style="list-style-type: none"> • No display appears • Shaking does not start 	① Imperfect contact of a circuit ② Defect of the power switch ③ Fuse has blown ④ Defective substrate or imperfect contact	① Replace or repair ② Replace ③ Replace ④ Replace or repair
Although shaking is made <ul style="list-style-type: none"> • It is not smoothly. • Excessive noises or vibrations 	① Roller is worn ② Belt is loosened ③ Belt is worn or damaged ④ Anti-vibration rubber is defective ⑤ Floor is not flat	① Replace ② Adjust belt tension ③ Replace ④ Replace ⑤ Move to a different site
Speed is uncontrollable	① Speed controller is defective ② Motor is defective	① Replace ② Replace

In such cases

Symptom	Check
The unit will not operate even though power is turned on.	● If the power cord is connected to an outlet securely. ● If a power failure has occurred. ● If the fuse has blown.
Shaking speed fluctuates during operation.	● If the amount of specimen is too much. ● If specimen is concentrated to one side. ● If source voltage is too low.
Shaking stops.	● If the shaking table is not overloaded. ● If a foreign object is pinched in the shaking table.

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 >

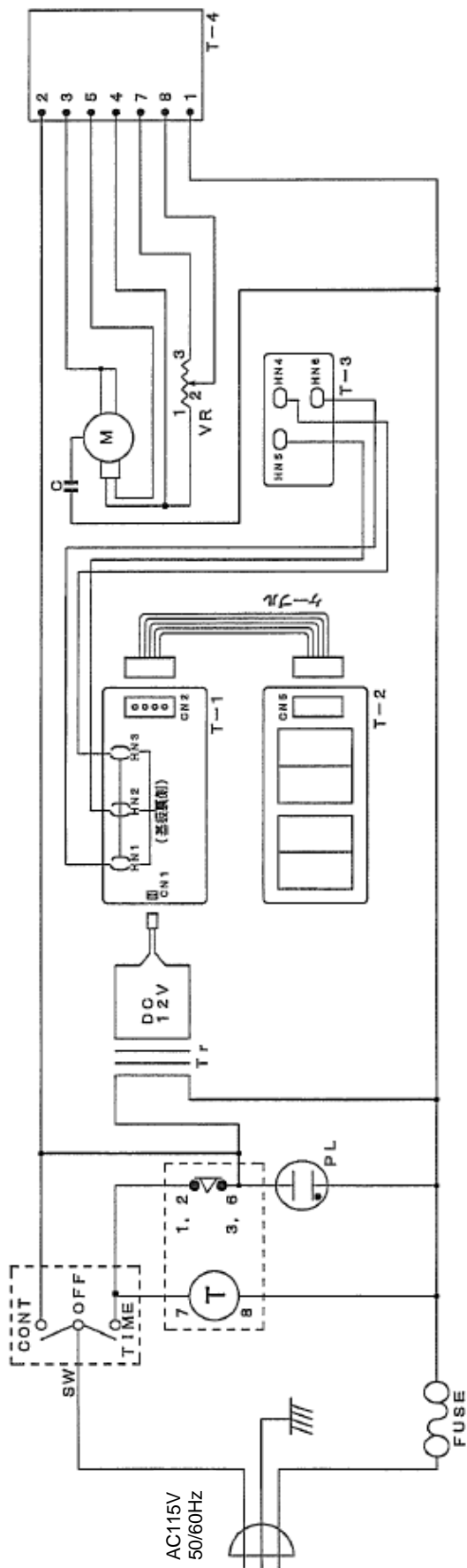
- ◆ Model Name of Product
 - ◆ Production Number
 - ◆ Purchase Date
 - ◆ About Trouble (in detail as possible)
- } See the production plate attached to this unit.

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.

Model	MK201D
Shaking Method	Reciprocating／Rotary (manual switch)
Shaking motion	Rotary motion : 30mm Reciprocating motion : 30mm
Shaking times	20～200rpm、Continuous adjustment
Shaking indicator	Digital display
Timer	0.5sec to 100hour (A unit and scale is switched.)
Power supply (50/60Hz)	AC115V 2A
External dimensions	W442xD415xH130mm (Dimensions do not include protruding components.)
Weight	Approx. 19kg
Accessories	Fuse 5A
Shaking table	Options : Refer to a catalog of the YAMATO



Symbol	Name	Specification	
SW	Power switch	M-2013J	NKK
T	Timer	H3CR-A8	OMRON
PL	Power Lamp	BN-9E-1-G	NKK
M	Motor & Gear	4IK25RGN-A + 4GN3RA	Yamato
C	Condenser	AC200VAC 6μF	Yamato
Tr	Transformer	TLNSRS-AS01	Yamato
T-1	Digital display control board	NSRS-AS01A	Yamato
T-2	Digital display board	NSRS-RS01A	Yamato
T-3	Interrupter board	NSRS-FS01A	Yamato
T-4	Motor control board	C-87A	Yamato
	Cable	NH04EH450EH	Yamato
FUSE	Fuse	5A (6φ)	

List of Dangerous Substances



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

EXPLOSIVE

EXPLOSIVE:	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

IGNITING:	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
OXIDIZING:	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
INFLAMMABLE LIQUID:	Calcium hypochlorite and other hypochlorites
	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
FLAMMABLE GAS:	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
	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.

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Shaking Device
MK201D
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