

# **Magnetic Stirrer**

Mag-Mixer MC801

Instruction manual

First Edition

 Thank you for choosing Magnetic Stirrer Mag-Mixer MC801 from Yamato Scientific Co., Ltd.

For proper equipment operation, please read and become thoroughly familiar with this instruction manual before use. Always keep equipment documentation safe and close at hand for convenient future reference.

WARNING: Read instruction manual warnings and cautions carefully and completely before proceeding.

Yamato Scientific Co., Ltd.

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### **Explanation of Symbols**

#### A Word Regarding Symbols

Various symbols are provided throughout this text and on equipment to ensure safe operation. Failure to comprehend the operational hazards and risks associated with these symbols may lead to adverse results as explained below. Become thoroughly familiar with all symbols and their meanings by carefully reading the following text regarding symbols before proceeding

Warning Signifies a situation which may result in serious injury or death (Note 1.)

**Caution** Signifies a situation which may result in minor injury (Note 2) and/or property damage (Note 3.)

- (Note 1) Serious injury is defined as bodily wounds, electrocution, bone breaks/fractures or poisoning, which may cause debilitation requiring extended hospitalization and/or outpatient treatment.
- (Note 2) Minor injury is defined as bodily wounds or electrocution, which will not require extended hospitalization or outpatient treatment.
- (Note 3) Property damage is defined as damage to facilities, equipment, buildings or other property.

#### Symbol Meanings



Signifies warning or caution.

Specific explanation will follow symbol.



Signifiles restriction. Specific restrictions will follow symbol.



Signifies an action or actions which operator must undertake. Specific instructions will follow symbol.

### Symbol Glossary

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General Warning/Caution



Caution:

Water Only



Caution:

Shock Hazard!

Danger! High Voltage





Danger! Extremely Hot



Caution: Burn Hazard!



Danger! Moving Parts



Caution: Do Not Heat Without Water!



Danger! Blast Hazard



Caution: May Leak Water!



Caution: Toxic Chemicals





**General Restriction** 



No Open Flame

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Do Not Disassemble



Do Not Touch





General Action Required



Connect Ground Wire



Level Installation



Disconnect Power

Inspect Regularly

### Warnings and Cautions



**Turn OFF (** $\circ$ **) the power switch immediately when an abnormality occurs.** If unit begins emitting smoke or abnormal odors for reasons unknown, turn OFF ( $\circ$ ) The power

switch immediately, disconnect power cable from power supply, and contact original dealer of purchase for assistance.

Continuing to operate without addressing abnormalities may cause fire or electric shock, resulting in serious injury or death. Never attempt to disassemble or repair unit. Repairs should always be performed by a certified technician.



#### Handle power cable with care.

- Do not operate unit with power cable bundled or tangled. Operating unit with power cable bundled or otherwise tangled, may cause power cable to overheat and catch fire.
- Do not modify, bend, forcibly twist or pull on power cable. Doing so may cause fire and/or electric shock.
- Do not risk damage to power cable by positioning it under desks or chairs, or by allowing it to be pinched in between objects. Doing so may cause fire and/or electric shock.
- Do not place power cable near kerosene/electric heaters or other heat-generating devices. Doing so may cause power cable insulation to overheat, melt and/or catch fire, which may result in electric shock.
- Turn off the power switch immediately and disconnect from facility outlet, if power cable becomes partially severed or damaged in any way. Failure to do so may result in fire or electric shock.
- Always connect power cable to appropriate facility outlet or terminal.



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### DO NOT operate equipment during thunderstorms

In the event of a thunderstorm, turn OFF ( $\circ$ ) the power switch and disconnect power cable immediately. A direct lightning strike may cause equipment damage, fire or electric shock, resulting in serious injury or death.

### List of Residual Risks

#### List of residual risks (instructions for risk avoidance)

This list summarizes residual risks to avoid personal injuries during or related to the use of equipment.

Be sure to fully understand or receive instructions on how to use, maintain and inspect equipment before starting operation.

	Loading/Installation		
No.	Degree of risks	Risk description	Protective measures taken by the user
1	WARNING	Explosion/fire	Install in a location free of flammables and explosives (P.4)
2	WARNING	Fire/Electric shock	Ground wire MUST be connected properly (P.4)
3	WARNING	Fire/Electric shock	Handle power cable with care. (P.5)
4	WARNING	Fire/Electric shock	Choose an appropriate installation site. (P.9)
5	CAUTION	Injury	Install unit on a level surface. (P.9)
6	WARNING	Fire/Electric shock	Always connect power cable to appropriate facility outlet or terminal. (P.9)

	Use		
No.	Degree of risks	Risk description	Protective measures taken by the user
7	WARNING	Fire/Electric shock	Turn OFF ( $\circ$ ) the power switch immediately when an abnormality occurs. (P.4)
8	WARNING	Fire	DO NOT operate equipment during thunderstorms (P.5)
9	WARNING	Explosion/fire	NEVER process explosive or flammable substances (P.11)

Daily inspection/maintenance			
No.	Degree of risks	Risk description	Protective measures taken by the user
10	WARNING	Fire/Electric shock	Never attempt to disassemble unit (P.13)
11	WARNING	Fire/Electric shock	Be sure to disconnect power cable before daily inspection and maintenance (P.13)

	Extended storage/disposal			
No.	Degree of risks	Risk description	Protective measures taken by the user	
12	WARNING	Fire/Electric shock	Disconnect power cable when putting unit in storage (P.14)	
13	CAUTION	Injury	Remove all the moving parts when disposing of this unit (P.14)	
14	CAUTION	Injury	Do not leave unit in a location where children may have access (P.14)	

# 2. COMPONENT NAMES AND FUNCTIONS

#### Main Unit

Mag-Mixer MC801 employs magnetic stirrer bar to agitate solutions.

#### ■Beaker Placement



\* Beaker not included

# 2. COMPONENT NAMES AND FUNCTIONS

■Main unit



Component	Description	
Power switch	Flip up to turn ON unit and start operation. Flip down to stop operation and turn OFF power.	
Power indicator lamp	Illuminates green when main power is ON.	
Speed control dial	Controls rpm of the motor. Turn clockwise to increase the speed.	
Changeover switch (3 positions)	Switches the rotation modes of the stirring. Rotation mode can be selected from CW (clockwise), CCW (counterclockwise), and TURNOVER (operates CW-CCW alternately).	
Time setting dial	Sets the time to switch between CW-CCW in TURNOVER mode. It does not work with the changeover switch in CW or CCW position. With the dial in "0" position, it switches CW and CCW in a very short time.	
Top plate	A beaker or other container filled with sample should be placed at the center of this plate. The position of the + mark is the center of the stirring.	
Fuse	Shuts off power in the event of an electrical surge or current overload. In that case, remove the cap and take out the fuse (125 V, 2 A) and replace it with new one.	
Power cable	Connect to 100 V AC power supply.	

# **3. PRE-OPERATION PROCEDURES**

### **Installation Precautions**



### Install unit on a level surface.

Flat

Install unit on level and even surface. Failure to do so may cause abnormal vibrations or noise, possibly resulting in complications and/or malfunction.



0	Always connect power cable to appropriate facility outlet or terminal		
·	Connect power cable to a suitable facility outlet or terminal, according to the electrical requirements.		
	Electrical requirements: MC801 100 V AC single phase 50/60 Hz 1 A		
	Check the line voltage on outlet or terminal to be used and properly evaluate whether to utilize a line being shared by other equipment. If unit is not activated by turning on power switch, take an appropriate course of action, such as connecting the unit to a dedicated power source. Inserting multiple cords into a single outlet, using branch outlets or extension cords, may cause a drop in voltage, which may affect performance, resulting in failure to control or maintain		
	proper temperature.		

### 4. OPERATION PROCEDURES

#### **Operation Procedures**

(1) Install unit on a level and stable surface, check that unit is turned "OFF" and the speed control dial is in the "0" position, and then connect power cable to 100 V AC power supply. At this time, be sure to connect the ground as well.

(2) Put the stirrer bar in the container and place it in the center of the top plate.

#### \* Stirrer bar has strong magnetic force, so use caution not to let it damage the container.

(3) Flip the power switch up to "ON" and turn the speed control dial to the right to begin stirring. The stirring speed increases as the speed control dial is turned further to the right.

(4) Select rotation mode from CW (clockwise), CCW (counterclockwise), and TURNOVER (operate CW-CCW alternately) by using the changeover switch. Set timer as desired with the time setting dial when operating in TURNOVER mode.

(5) When stirring is completed, turn the speed control dial back to the "0" position and flip the power switch down to "OFF".

# **5. HANDLING PRECAUTIONS**

### Warnings and Cautions



### NEVER process explosive or flammable substances

Never attempt to process explosives, flammables or any items which contain explosives or flammables. See 13. LIST OF HAZARDOUS SUBSTANCES (P.20).

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### DO NOT place items on top of equipment

Do not place any objects on top of unit. Personal injury or equipment malfunction may result.



#### Be aware of effects of magnetic force.

This unit employs a strong magnet. Keep measuring instruments and other equipment subject to magnetic force away from unit. Exercise caution when putting the stirrer bar into containers. Strong magnetic force vigorously attracts the stirrer bar, possibly causing damage to the containers.



### DO NOT allow unit to be exposed to chemicals.

Although top plate is made of stainless steel plate, it is not corrosion resistant, so be careful not to get chemicals on the top plate. If chemicals get on it, wipe it off immediately.



### Pay attention to the temperature of sample solution.

The upper limit temperature of the sample to be placed on the top plate is 35 °C. If the temperature of the sample exceeds the limit, use a heat insulating mat, etc.<sup>\*</sup>to make sure that the temperature of the top plate is 35 °C or less. \* Heat insulating mat is not included.



### Pay attention to the viscosity of liquid

The stirring capacity of MC801 unit is 100 to 10,000 mL and the rotation speed is 80 to 1,800 rpm. However, for a highly viscous solution, it may not be possible to agitate within these specification ranges.



### Start at low speed.

Always start operation at low speed. Turning on power with the dial set to high or maximum speed will cause a heavy load on the motor or sample to scatter.

# **5. HANDLING PRECAUTIONS**



### Turn OFF ( $\circ$ ) the power switch in case of power failure.

When a power failure occurs, suspending unit operation, and then power is restored, unit will automatically resume operation. If the operation is restarted at a high rotation speed, the sample may scatter. Be sure to turn "OFF" the power switch in the event of a power loss.



#### Use as directed.

Operate this unit according to the procedure described in this Instruction manual. Failure to follow the operation procedure described herein may result in a problem. Read instruction manual thoroughly before use. Likewise, using non-Yamato components to modify, customize or in attempt to otherwise improve unit design is not recommended and may void warranty.

# 6. INSPECTION AND MAINTENANCE

### **Precautions before Inspection**



- Be sure to disconnect power cable before daily inspection and maintenance.
- Never attempt to disassemble unit.

#### **Precautions in Daily Maintenance**



 Clean the top plate and the control panel surface using soft damp cloth. Never use benzene, paint thinner, scouring powder, scrubbing brush or other abrasives and solvents to clean unit. Superficial damage and/or discoloration, as well as deformity to some components may result.

#### **Maintenance and Inspection**

Check power plug for damage

- Check power plug for dust or dirt on its prongs, and clear off if any accretions found.
- Confirm that the prongs of power plug are not bent or damaged. Replace if bent or damaged.
- Check the power plug for discoloration or abnormal heat generation. If there is discoloration or abnormal heating, the internal contact of the outlet may be faulty.

♦ Contact original dealer of purchase, if further questions arise concerning maintenance procedures.

# 7. EXTENDED STORAGE AND DISPOSAL

### Extended Storage/Disposal



If unit will be out of service for an extended period of time, turn off the power switch and disconnect power cable from outlet.

#### **Disposal Considerations**

Remove all the moving parts when disposing of this unit. Do not leave unit in a location where children may have access.

Dispose of this unit in accordance with local laws and regulations. Dispose of or recycle this unit in a responsible and environmentally friendly manner.

Yamato Scientific Co., Ltd. strongly recommends disassembling unit, as far as is possible, in order to separate parts and recycle them in contribution to preserving the global environment. Major components and materials, comprising this unit are listed in the table below

Component Name	Material
Exterior Parts	
Casing	Steel plate, baked-on melamine resin coating
Labels	PET resin film
Top Plate	
Top plate	Stainless steel sheet
Stirrer bar	Alnico (magnet) with tetrafluoride resin coating
Electrical Parts	
Motor	Motor case, rotor, shaft: Iron Bracket: Aluminum Coils: Copper wire (resin insulation coating)
Power cable, wiring and other components	Resin coated wiring materials, boards

## 8. TROUBLESHOOTING

### **Troubleshooting Guide**

Troubles	
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Toubles	
Symptom	Possible causes
Unit does not turn on when main power switch is turned "ON"	<ul> <li>Power cable is not properly connected to power outlet.</li> <li>Power failure in progress</li> <li>Fuse (125 V, 2 A) is blown.</li> </ul>
Stirring operation is not stable	<ul> <li>Installation site is not sturdy.</li> <li>Installation site is not even, or level.</li> <li>Container is off center on the top table.</li> </ul>

◆ If problem persists, turn "OFF (○)" the power switch immediately, disconnect power cable from outlet, and contact original dealer of purchase for assistance.

# 9. SERVICE & REPAIR

#### **Requests for Repair**

#### Warranty card (attached separately)

Warranty card will be handed by dealer or Yamato personnel upon delivery and installation, or will be attached to equipment if no one from dealer or Yamato is to be present at delivery and installation.

Register warranty card at https://www.yamato-net.co.jp/support/warranty.htm

• Keep warranty card safe

#### Requests for Repair

If abnormalities remain after confirming "Troubleshooting Guide", terminate operation, turn OFF (O) controller and the power switch, and disconnect power cable. Contact original dealer of purchase for assistance.

The following information is required for all repairs.

Product Name

Serial Number

Model

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Refer to warranty card.

- Date (year/month/day) of Delivery
- Description of problem in as much detail as possible
- Repair this equipment for free of charge according to the contents on warranty card. Warranty period is 1 (one) year from date of purchase.
- Consult with original dealer of purchase for any repair after warranty ended. Charged repair service of this equipment will be available on customer's request when it can be maintained functional by its repair.

\* Be sure to present warranty card to the service representative.

#### **Guaranteed Supply Period for Repair Parts**

Guaranteed maximum supply period for repair parts is 7 (seven) years from date of discontinuation for this equipment.

"Repair parts" is defined as components which, when installed, allow for continued equipment operation.

# **10. SPECIFICATIONS**

### Specifications

Model	MC801
Top plate material	Stainless steel sheet
Casing	Steel plate, baked-on melamine resin coating
Top plate dimensions	W272 x D 270 mm
Stirring capacity	100-10,000 mL
Load capacity	12 kg
	Approx. 80-1,800 rpm
Motor rotation speed	(when stirring water in a beaker, using supplied stirrer bar)
Motor	DC brushless motor 30 W
	Precision feedback control
Motor rotation direction	Three patterns of Counterclockwise (CCW), Inversion (TURNOVER), Clockwise (CW)
Rotation changeover switch	Equipped
Inversion timer	Approx. 10-120 seconds
Rated current (50/60)	100 V AC 1 A
	W278 x D286 x H81 mm
External dimensions	(protrusions excluded)
Weight	Approx. 3.6 kg
Accessories	Magnetic stirrer bar 30 mm (1), 40 mm (1)

# **11. OPTIONAL ACCESSORIES**

### List of Options

Optional stand for fixing pH gauge or other instruments is available for MC801. This stand is a common option with MD200.

able 1 List of options (ca	n be installed after delivery)
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Product name	Product code	Model	Compatible models	Description
Attachment kit for 8 φ support rod (Attachment bracket, 8 φ support rod)	231589	OMD10	MC801/MD200	This kit is to fix support rod on the rear of main unit

\* Prepare muff separately to hold electrode, etc. on the rod





\* pH meter and muff are not included.

Fig 2 Operation example

# **12. WIRING DIAGRAM**

### Wiring Diagram



#### Replacement parts list

Symbol	Component	Symbol	Component
SW	Power switch	PL	Power indicator lamp
FUSE	Tubular fuse 125 V 2 A	SMPC	Switched-mode power supply
SPEED	VR for speed adjustment	TIMER	VR for time setting for TURNOVER mode
CW CCW	Forward/Reverse changeover switch	T-1	Rotation control board with inversion function
T-2	Motor driver	М	Motor

\* Repair parts are subject to change without notice.

# **13. LIST OF HAZARDOUS SUBSTANCES**

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Never attempt to process explosives, flammables or any items which contain explosives or flammables.

lces	Nitroglycol, Glycerine trinitrate, Cellulose Nitrate and other explosive nitrate esters
ubstar	②Trinitrobenzen, Trinitrotoluene, Picric Acid and other explosive nitro compounds
osive s	③Acetyl Hydroperoxide, Methyl Ethyl Ketone Peroxide, Benzoyl Peroxide and other organic peroxides
Explo	(4)Metallic Azide, including Sodium Azide, etc.
ible ces	①Metal "Lithium" ②Metal "Potassium" ③Metal "Natrium" ④Yellow Phosphorus ⑤Phosphorus Sulfide ⑥Red Phosphorus ⑦Phosphorus Sulfide
bust	(a) Celluloids, Calcium Carbide (a.k.a, Carbide) (a) Lime Phosphide (a) Magnesium Powder
ymc sdr	In Aluminum Powder     In Metal Powder other than Magnesium and Aluminum Powder
ũ v	<sup>13</sup> Sodium Dithionous Acid (a.k.a., Hydrosulphite)
	①Potassium Chlorate, Sodium Chlorate, Ammonium Chlorate, and other chlorates
lces	2 Potassium Perchlorate, Sodium Perchlorate, Ammonium Perchlorate, and other perchlorates
izing substan	③Potassium Peroxide, Sodium Peroxide, Barium Peroxide, and other inorganic peroxides
	④Potassium Nitrate, Sodium Nitrate, Ammonium Nitrate, and other nitrates
Oxid	5 Sodium Chlorite and other chlorites
	6 Calcium Hypochlorite and other hypochlorites
ces	①Ethyl Ether, Gasoline, Acetaldehyde, Propylene Chloride, Carbon Disulfide, and other substances having ignition point of 30 or more degrees below zero.
substar	②n-hexane, Ethylene Oxide, Acetone, Benzene, Methyl Ethyl Ketone and other substances with ignition point between 30 degrees below zero and less than zero.
Imable	③Methanol, Ethanol, Xylene, Pentyl n-acetate, (a.k.a. amyl n-acetate) and other substances having ignition point of between zero and less than 30 degrees.
Flam	④Kerosene, Light Oil, Terebinth Oil, Isopenthyl Alcohol (a.k.a. Isoamyl Alcohol), Acetic Acid and other substances having ignition point of between 30 degrees and less than 65 degrees.
Combustible gas	Hydrogen, Acetylene, Ethylene, Methane, Ethane, Propane, Butane and other gases combustible at 15°C, ambient air pressure.

#### Limited Liability

Always operate equipment in strict compliance to the handling and operation procedures set forth by this instruction manual.

Yamato Scientific Co., Ltd. assumes no responsibility for malfunction, damage, injury or death, resulting from negligent equipment use.

Never attempt to disassemble, repair or perform any procedure which are not expressly mandated by this manual. Doing so may result in equipment malfunction, serious personal injury or death.

#### Notice

- Instruction manual descriptions and specifications are subject to change without notice.
- Yamato Scientific Co., Ltd. will replace flawed instruction manuals (pages missing, pages out of order, etc.) upon request.

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