



## Magnetic Stirrer

MFD/MFH800 Series

# Instruction Manual

Second Edition

Thank you for choosing MFD/MFH series Magnetic Stirrer from Yamato Scientific Co., Ltd.

In order to use the product properly, please read this "Instruction Manual" and "Warranty" carefully and familiarize yourself with them before use. Always keep equipment documentation safe and close at hand for convenient future reference.



The warnings in the instruction manual are important for the safe use of the product. Please read carefully and familiarize yourself with the product before use.

**Yamato Scientific Co. ,Ltd.**

Printed on recycled paper



# Introduction.

- Note that this product has a model for each destination, and product specifications and available options may differ. Items that vary by model are noted separately by model.
- Contact information differs for each destination. See " 16. Contact information (p. 48).

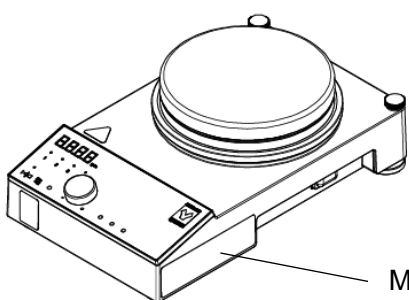
MFD series	Power Specifications	Power supply cable	Service Outlet	destination	instruction language	Warranty card
MFD800	100V±5% 0.25A 50/60Hz	Type A plug (PSE)	Yes	Japan	Japanese	Attached
MFD800-Y	115V±5% 0.25A 50/60Hz	Type A plug (UL)		America Asia Others	English	— (Note 1)
MFD810-Y	230V±5% 0.15A 50/60Hz	Type SE plug (VDE)	No			
MFD810-B	220V±5% 0.15A 50Hz	Type O plug (CCC)		China	Chinese	Attached

MFH series	Power Specifications	Power supply cable	Service Outlet	destination	instruction language	Warranty card
MFH800	100V±5% 6A 50/60Hz	Type A plug (PSE)	Yes	Japan	Japanese	Attached
MFH800-Y	115V±5% 6A 50/60Hz	Type A plug (UL)		America Asia	English	— (Note 1)
MFH810-Y	230V±5% 3A 50/60Hz	Type SE plug (VDE)	No			
MFH810-B	220V±5% 3A 50Hz	Type O plug (CCC)		China	Chinese	Attached

Note 1: Warranty is included in some regions.

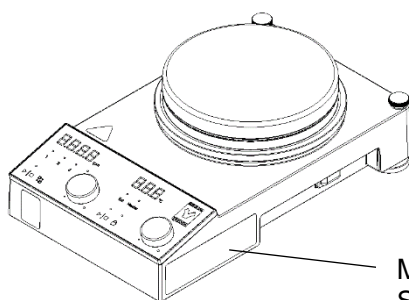
If you do not know the model number, refer to the model number on the model rating sticker on the side of the product.

Type rating sticker affixed  
location  
MFD Series



Model Rating  
Seals

MFH Series



Model Rating  
Seals

Power supply cable

\*Cord specifications and plug shape differ  
depending on the model.

Power supply cable plug  
shape list



Type A



Type O



Type SE

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# 1. SAFETY PRECAUTIONS

## 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.



Signifies restriction.  
Specific restrictions will follow symbol.



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

# 1. SAFETY PRECAUTIONS

## Symbol Glossary

---

### WARNING / CAUTION



General



Danger!: High  
Temperature



Caution: Burn  
Hazard!



Caution: Shock  
Hazard!

### RESTRICTION



General  
Restriction



Do Not  
Disassemble



Do Not Touch

### ACTION



General Action  
Required



Connect Ground  
Wire



Level Installation



Disconnect Power  
supply cable plug



Inspect  
Regularly

# 1. SAFETY PRECAUTIONS

## Warnings and Cautions

### WARNING



#### **Install in a location free of flammables and explosives.**

NEVER install or operate unit in a flammable or explosive gas atmosphere. This unit is not explosion-proof and may cause explosion or ignition. See "LIST OF HAZARDOUS SUBSTANCES" (P. ) for information on flammable and explosive gases.



#### **Ground wire MUST be connected properly**

Connect power supply cable to a grounded outlet in order to avoid electric shock. Never insert multiple plugs into a single outlet. Doing so may result in power cable overheating, fire or drop in voltage.



#### **Turn OFF (○) the power switch immediately when an abnormality occurs.**

If unit begins emitting smoke or abnormal odors for reasons unknown, turn OFF (○) switch immediately, disconnect power cable from power supply cable, and contact original dealer or service center. (P.46) Failure to do so may result in fire or electric shock. Never attempt to disassemble or repair unit. Repairs should always be performed by a certified technician.



#### **Handle power supply cable with care.**

Observe the following precautions in order to prevent fire, electric shock, or other accidents.

- Do not operate unit with power supply cable bundled or tangled.
- Do not modify, bend, forcibly twist or pull on power supply cable.
- Do not risk damage to power supply cable by positioning it under desks or chairs, or by allowing it to be pinched in between objects.
- Do not place power supply cable near kerosene/electric heaters or other heat-generating devices.
- Regularly check and clean the connection part, and avoid using an old outlet.

Turn off (○) power switch immediately and disconnect from facility power supply cable, if power supply cable becomes partially severed or damaged in any way. Contact original dealer or service center about replacing power supply cable. (P.46)



#### **DO NOT disassemble or modify equipment.**

Never attempt to disassemble or modify unit. Doing so may cause malfunction, fire, electric shock, or personal injury. Note that any malfunction resulting from unauthorized modifications or customizations to unit will void the warranty.



#### **DO NOT touch hot surfaces.**

Do not touch the agitator stand or peripheral parts during or immediately after operation. Burn injury may result.



# 1. SAFETY PRECAUTIONS

## Warnings and Cautions



### **Be aware of the effects of magnetic fields.**

This product uses a strong magnetic force magnet. Please be careful when using data storage media or cardiac pacemakers, etc., as they may malfunction.



### **Do not subject the top plate to strong shocks.**

If a strong impact is applied, the top plate may be deformed or the coating may peel off, making the container unstable or heating unstable. When placing containers, aluminum blocks, etc. on the stirring table, please handle them with care.



## **CAUTION**



### **DO NOT operate equipment during thunderstorms.**

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



### **Pay attention to the cleanup of the stirring table.**

If the top plate is contaminated by spilled solvent, etc., clean the top plate after the temperature of the top plate has cooled sufficiently. After cleaning, wipe off any detergent, etc. with a cloth lightly moistened with water. (Be careful not to pour water directly on it.)

# 1. SAFETY PRECAUTIONS

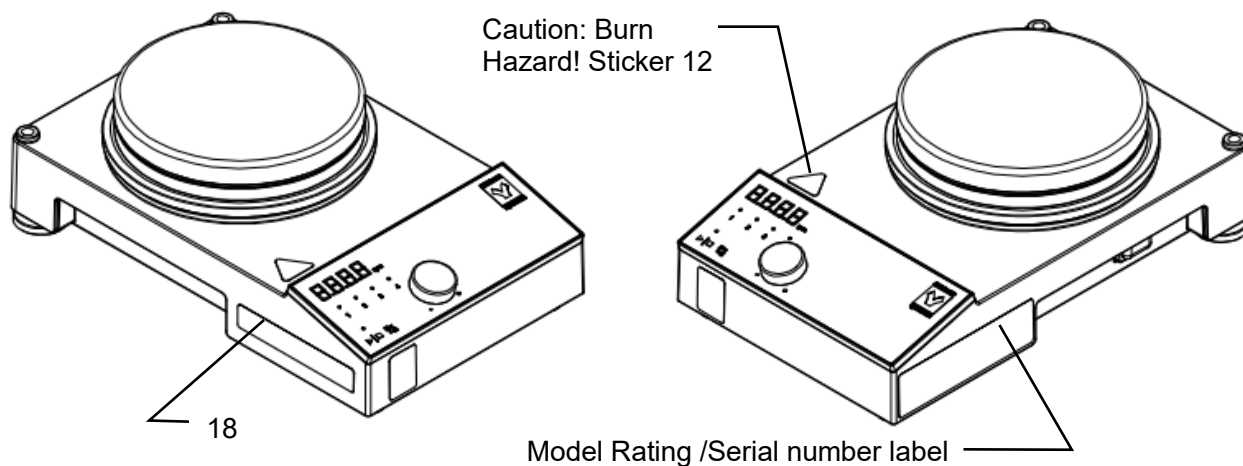
## Residual Risk Map

These figures indicate positions of caution labels.

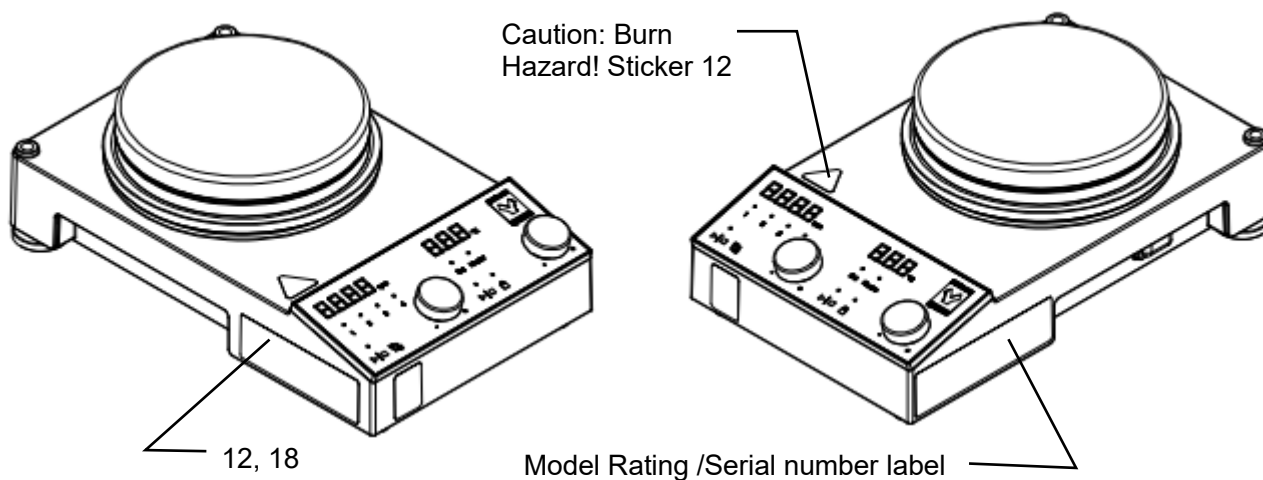
The numbers shown in the figure indicate the numbers listed in the "List of Residual Risks" in this manual.

For details of individual residual risks, see the List of Residual Risks.

### MFD800 Series



### MFH800 Series



※Contact original dealer or service center if the nameplates and caution labels have come off, or become illegible. (P.46) New nameplates are available at cost. **We will send you a new nameplate (for a fee).**

# 1. SAFETY PRECAUTIONS

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

The following is a list of residual risks to prevent harm to the human body in the use of our products.

**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.
2	WARNING	Fire/Electric shock	Ground wire MUST be connected properly
3	WARNING	Fire/Electric shock	Always connect power supply cable to appropriate facility outlet or terminal.
4	WARNING	Fire/Electric shock	Turn off the power switch and disconnect the power supply cable immediately in the event of an abnormality.
5	WARNING	Fire/Electric shock	Handle power supply cable with care.
6	WARNING	Fire/Electric shock	DO NOT disassemble or modify.
7	WARNING	Fire	Install unit in a well-ventilated place
8	WARNING	Fire/Electric shock	Choose an appropriate installation site.
9	CAUTION	Injury	Install unit on a level surface.

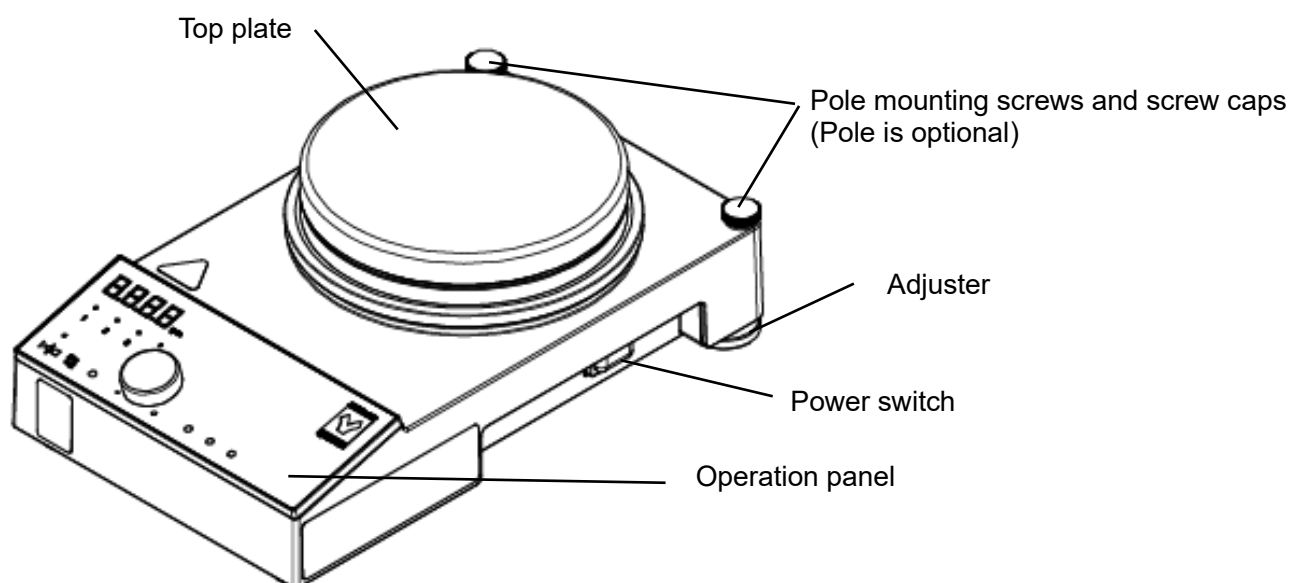
Use			
No.	Degree of risks	Risk description	Protective measures taken by the user
10	WARNING	Explosion/Fire	DO NOT process explosive or flammable substances
11	WARNING	Fire/Electric shock	Turn OFF the power switch immediately when an abnormality occurs.
12	WARNING	Burn	DO NOT touch hot surfaces
13	WARNING	Injury	DO NOT climb or place any objects on top of equipment.
14	WARNING	Fire	DO NOT operate equipment during thunderstorms
15	CAUTION	Burns, injuries, fires	Use within the temperature control range.
16	WARNING	Burn	Pay attention to the temperature of the top plate and the surrounding area after the operation is finished.
17	WARNING	Burns, injuries, fires	Do not place samples weighing more than 30 kg on the stirring table.
18	WARNING	Injury	Be aware of the effects of magnetic fields.

Daily inspection/maintenance			
No.	Degree of risks	Risk description	Protective measures taken by the user
19	WARNING	Fire/Electric shock	Be sure to disconnect power supply cable before daily inspection and maintenance.
20	WARNING	Burn	Perform inspections and maintenance when unit is at room temperature.
21	WARNING	Fire/Electric shock	NEVER disassemble or modify unit

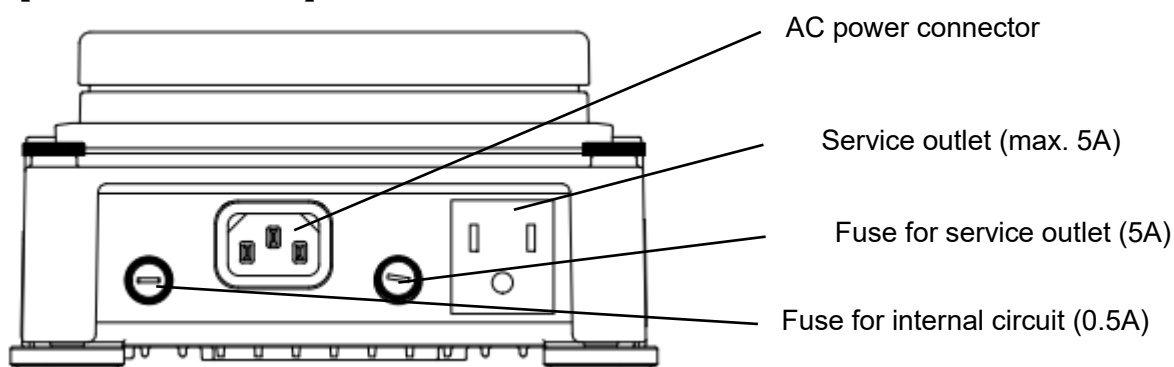
Extended storage/disposal			
No.	Degree of risks	Risk description	Protective measures taken by the user
22	WARNING	Fire/Electric shock	Turn off power switch and disconnect power supply cable from facility outlet or terminal.
22	CAUTION	Injury	DO NOT leave unit in a location where children may have access

## 2. names and functions of each part

### Product appearance (MFD series)

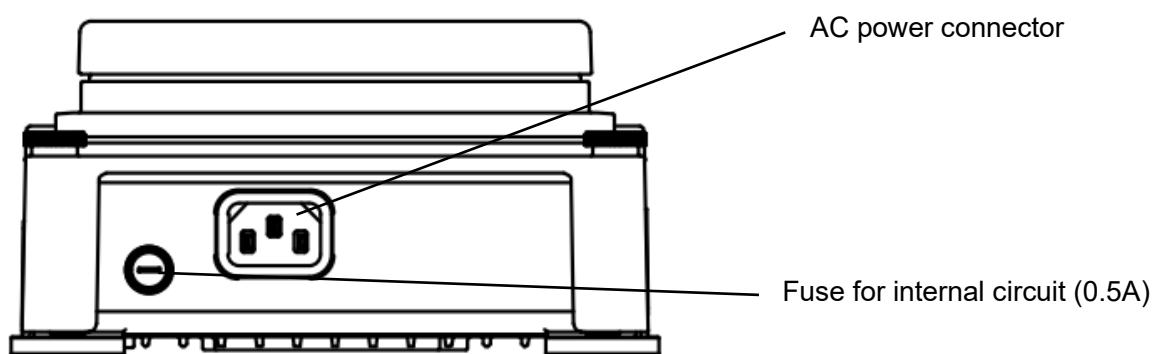


#### 【MFD800/MFD800-Y】



\*To replace the fuse (see p. 33), remove the fuse by turning it counterclockwise while pressing the cap.

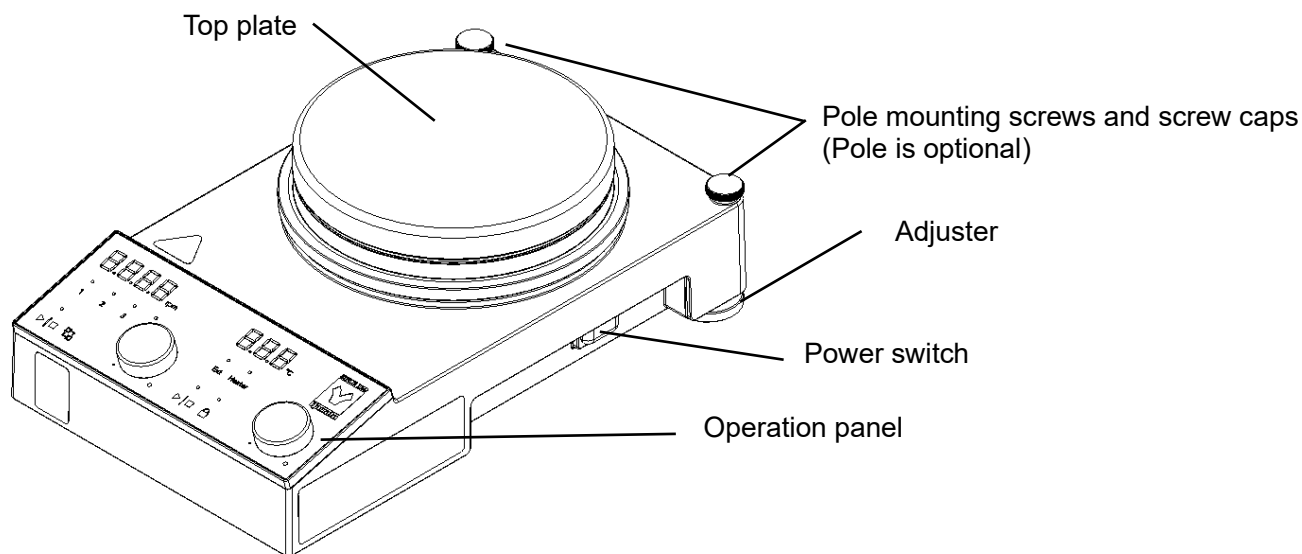
#### 【MFD810-B/MFD810-Y】



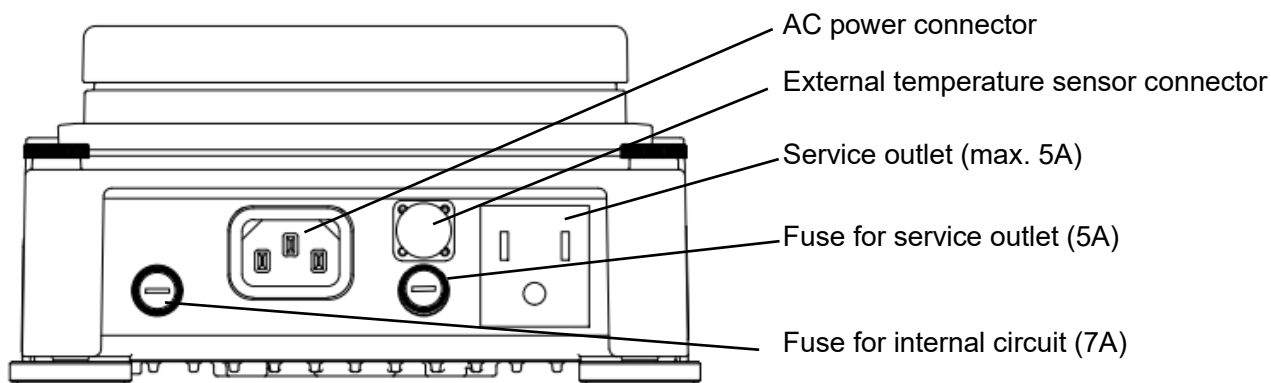
\*To replace the fuse (see p. 33), remove the fuse by turning it counterclockwise while pressing the cap.

## 2. COMPONENT NAMES AND FUNCTIONS

### Product appearance (MFH series)

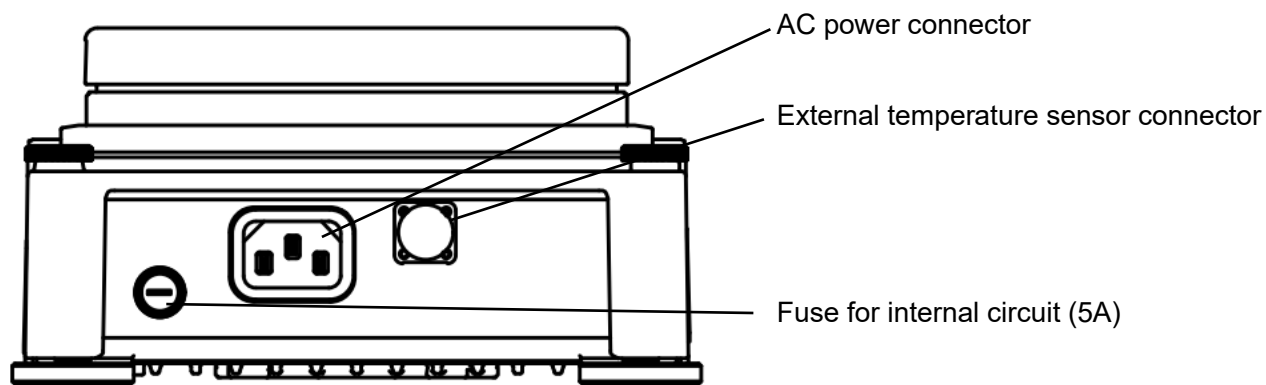


#### 【MFH800/MFH800-Y】



\*To replace the fuse (see p. 33), remove the fuse by turning it counterclockwise while pressing the cap.

#### 【MFH810-B/MFH810-Y】

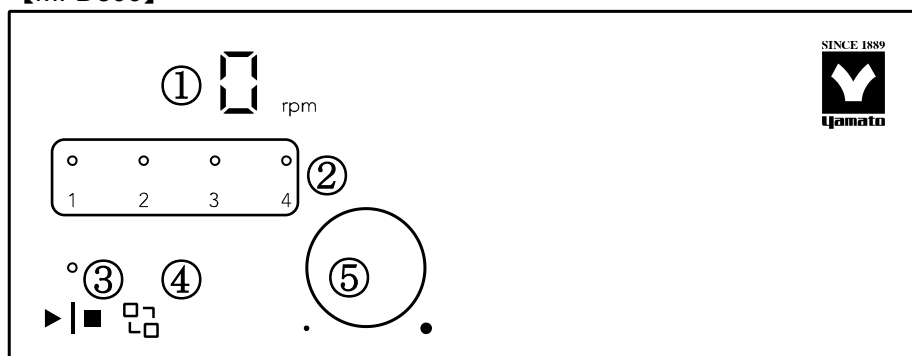


\*To replace the fuse (see p. 33), remove the fuse by turning it counterclockwise while pressing the cap.

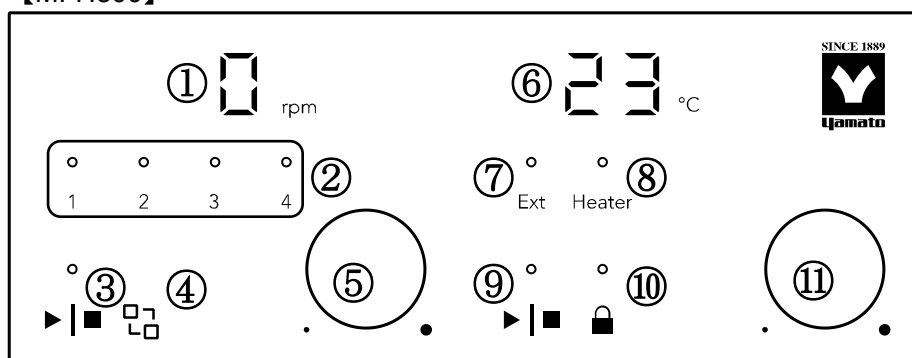
## 2. COMPONENT NAMES AND FUNCTIONS

### Operation panel

【MFD800】



【MFH800】



Number	Name	Function
①	Motor rotation speed display	While the display is lit, the current speed of the agitation motor is shown. While blinking, the set Motor rotation speed is displayed.
②	Rotation mode No. display	Displays the No. when the rotation mode is set. When all lights are turned off, the unit is in constant speed rotation mode.
③	Rotation start button	Each press of the button starts and stops the rotation of the agitation motor. To start rotation, press and hold for 1 second. The LED on the button lights up while the motor is rotating.
④	Rotation mode button	Press the button to switch the rotation mode No. The mode No. changes each time the button is pressed, and when the mode No. LED is off, the machine rotates at a constant speed. This button is valid only when the rotation is stopped.
⑤	Rotation setting knob	Turning the knob causes the motor rotation speed display to blink, allowing the motor rotation speed to be changed. The changed value is automatically determined by pressing the knob or leaving it alone for 4 seconds. To check the setting value, press the knob or turn the knob just one click. Used to move items and switch settings during user settings.
⑥	Temperature display	When the ⑦ indicator is lit, the temperature of the external temperature sensor is displayed, and when the indicator is unlit, the temperature of the top plate is displayed. When the display is lit, it means the current value; when it is blinking, it means the set value. If the top plate temperature exceeds 50 °C while temperature control is stopped, the HOT indicator appears alternately with the temperature.
⑦	External temperature sensor	Lights up when an external temperature sensor is connected.
⑧	Heater operation indication	Lights up when the heater in the top table is operating.
⑨	Temperature control start button	Each press of the button starts and stops temperature control by the heater. The start of temperature control is a 1-second long-press operation. The LED on the button lights up during temperature control.
⑩	Temperature lock button	Each press of the button enables or disables the temperature change operation. The LED on the button lights up when the lock is enabled. While this LED is lit, the temperature cannot be changed by turning knob ⑪.
⑪	Temperature setting knob	When the knob is pressed, the temperature display will blink and the temperature setting can be changed. Pressing the knob again confirms the set value and the display returns to the current temperature. If the knob is left for 4 seconds without pressing the knob again, the set value is automatically canceled. While the LED on the ⑩ button is lit, the value cannot be changed.

The operating specifications for the rotation setting knob ⑤ and the temperature setting knob ⑪ are different.

### 3. PRE-OPERATION PROCEDURES

#### Precautions for installation



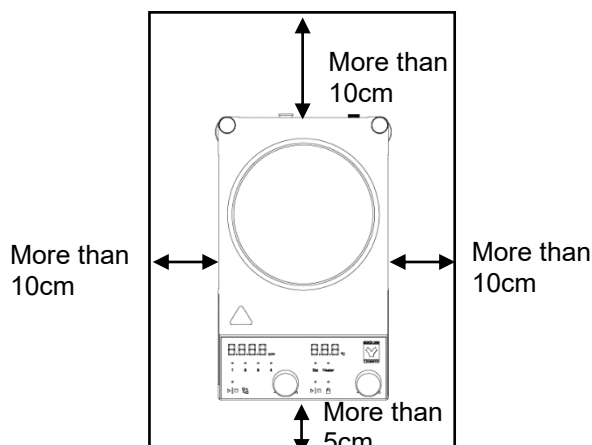
##### Choose an appropriate installation site.

DO NOT install unit:

- where installation surface is not completely level, not even or not clean.
- where flammable or corrosive gases/fumes may be present.
- where external temperature will exceed 41°C, will fall below 3°C or will fluctuate largely.
- where liquid is assumed to splash on unit.
- A place with a large temperature difference.
- In excessively humid or dusty locations.
- In direct sunlight or outdoors.
- Where there is constant vibration.
- In direct contact with the outside air
- Where power supply is erratic.
- Where there is combustible material nearby.
- In the proximity of, particularly right below a fire alarm.
- Where there is a risk of freezing or condensation.



##### Install unit in a location with sufficient space, as specified below.



##### Install unit on a level surface.

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



##### Use under stable temperature environment.

Use under stable temperature environment. If condensation forms inside the enclosure due to temperature changes, there is a risk of electric shock or malfunction.

### 3. PRE-OPERATION PROCEDURES

#### Precautions for installation



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 MFH800 AC 100 V single-phase 50/60 Hz 11 A (breaker capacity; 15 A)

requirements: MFD800 AC 100 V single-phase 50/60 Hz 6 A (breaker capacity; 10 A)

Standard test conditions with no load should be as follows. Operational voltage range:  $\pm 10\%$ , Voltage range at which specified performance is guaranteed:  $\pm 5\%$ , Frequency rating:  $\pm 1\%$ .

Check the line voltage on distribution board and properly evaluate whether to utilize a line being shared by other equipment. If unit is not activated by turning on ELB, take an appropriate course of action, such as connecting 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.



### 3. PRE-OPERATION PROCEDURES

#### Installation Precautions



##### Initial operation

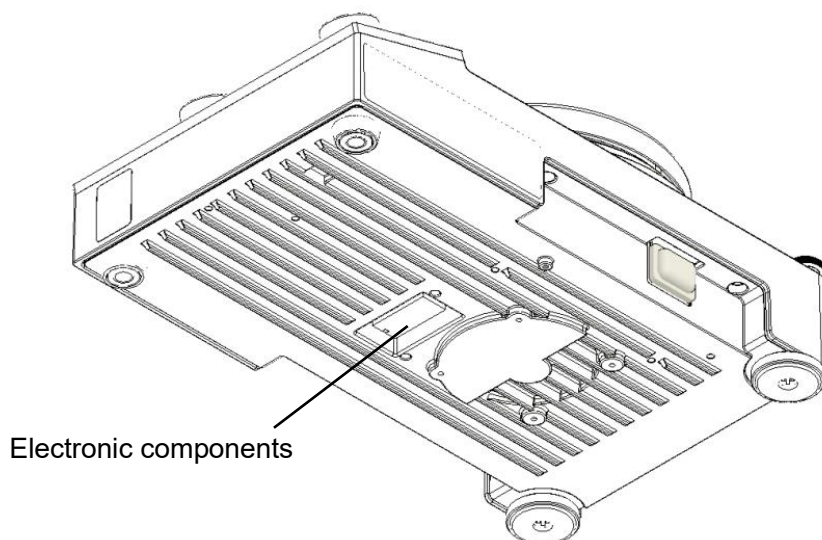
When using the product for the first time, an unusual odor may occur if the product is heated to a high temperature. This is due to the decomposition of the binding material in the heat insulator and is not a product failure. Operation at maximum temperature is recommended once before use in an open area or in a fume hood.



##### When lifting the product.

When lifting the product, make sure the top plate is cool, and if there are containers or aluminum blocks on the top plate, be careful to balance the product. For the MFH800, be careful not to apply excessive force to the bottom of the product by inserting fingers or other objects, since there are electronic components in the bottom of the product.

【Bottom of MFH800】



## 4.PRE-OPERATIVE PREPARATIONS

### Various Functions

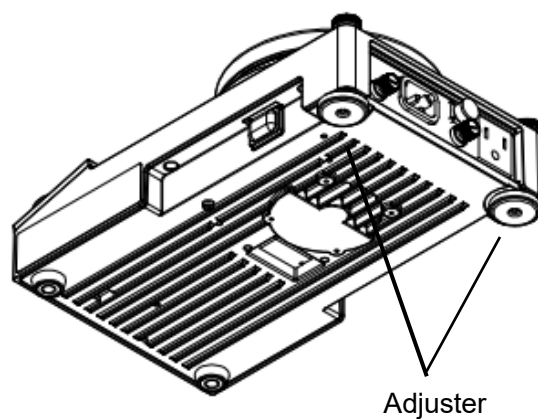
The various functions of the product are as follows. The following features are available only in MFH800 and not in MFD800.

Name	Description	Page
Overheat prevention	This function is intended to prevent abnormal overheating of the product. If the temperature of the top plate rises above 400 °C, the control stops. Temperature (400 °C) is fixed and cannot be changed.	P.26
Temperature lock function	This function disables the operation to change the temperature setting. It can be set and released with the temperature lock button on the panel.	P.27
External temperature sensor function	When the supplied external temperature sensor is inserted into the connector on the rear panel, temperature control is performed based on the external temperature sensor temperature.	P.26
Temperature high limit function	If the top plate temperature exceeds the set temperature, all controls are stopped and an error is displayed.	P.28
Calibration offset function	This function corrects the difference between the displayed temperature and the actual temperature. Correction values can be set for each external internal sensor.	P.29
Auto-resume mode	This function automatically resumes operation after the power is restored, even in the event of a power failure during operation.	P.30
LED brightness switching function	Changes the brightness of the operation panel.	P.31

## 4. PRE-OPERATIVE PREPARATIONS

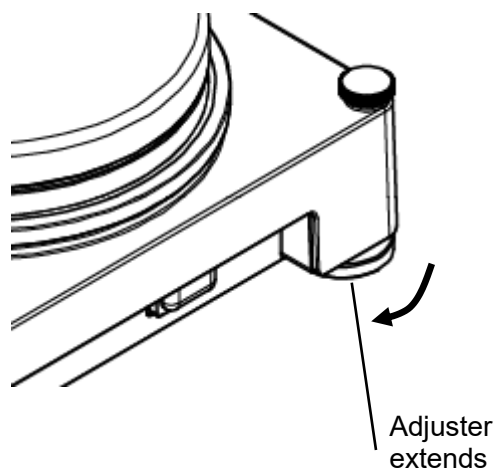
### Adjuster adjustment

Adjust the adjusters on the two rear legs so that the main body is level.



#### <Procedure>

When the adjuster is turned clockwise when the main unit is viewed from above, the adjuster will extend.



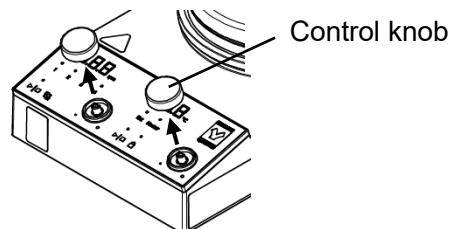
## 4. PRE-OPERATIVE PREPARATIONS

### Protective cover installation

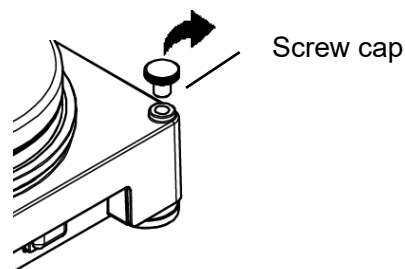
A protective cover is provided to reduce corrosion of the main unit due to chemicals, etc. (Included, optional)

#### <Procedure>

- ① Pull the control knob upward to remove it.



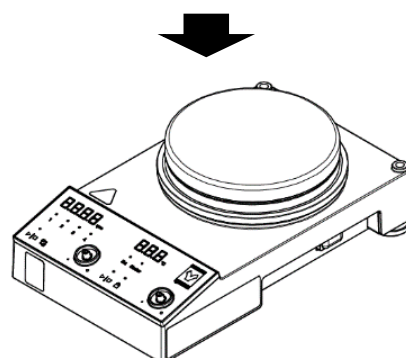
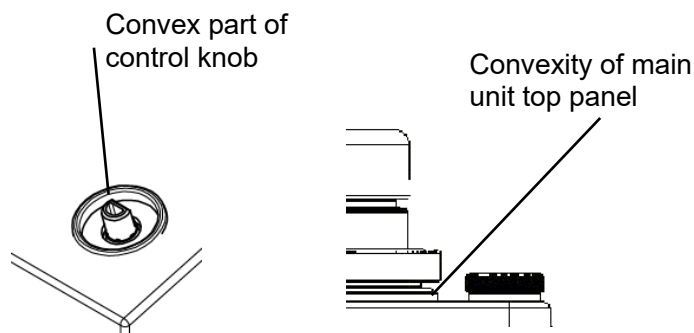
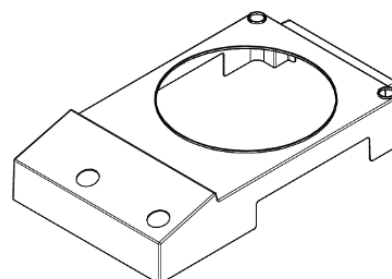
- ② Remove the two screw caps on the back of the main unit



- ③ Place a protective cover over the main unit.

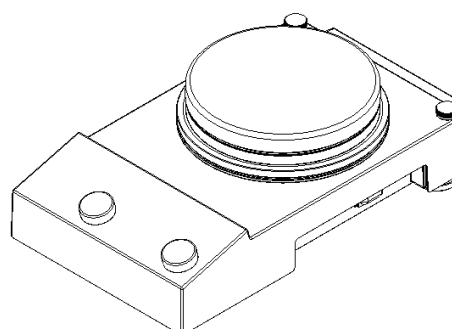
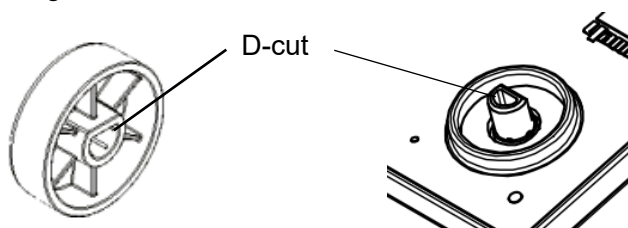
\*Make sure that the hole in the protective cover is nicely inserted into the convex part of the control knob on the operation panel.

\*Make sure that the hole through which the top plate passes on the protective cover is neatly dropped into the convex part on the top plate of the main unit.



- ④ Finally, put back the control knob and screw cap.

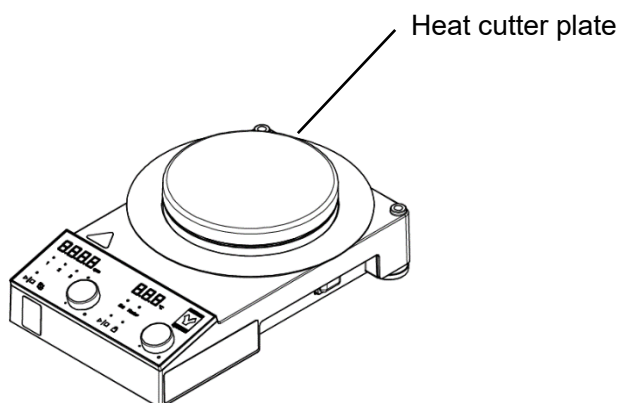
\*The hole for the control knob is a D-cut shape. Align and install.



## 4. PRE-OPERATIVE PREPARATIONS

### Attachment of heat cutter

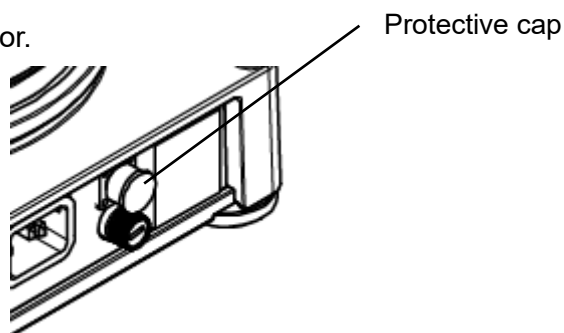
Heating without using the heat cutter plate will cause the internal temperature of the main unit to rise, which may result in a malfunction.



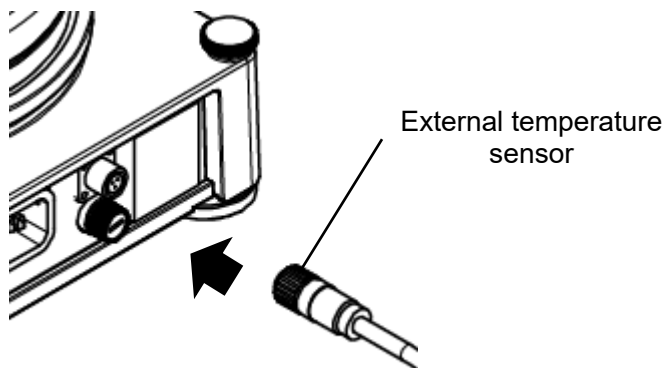
### Installation of external temperature sensor 【MFH800 series】

<Procedure>

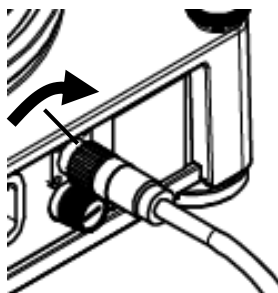
- ① Remove the protective cap attached to the connector.



- ② Connect the connector of the external temperature sensor to the connector of the main unit.  
The connectors are oriented so that the one with the slit should be inserted with the slit facing up.



- ③ Tighten and secure the knurled portion of the connector by turning it clockwise.

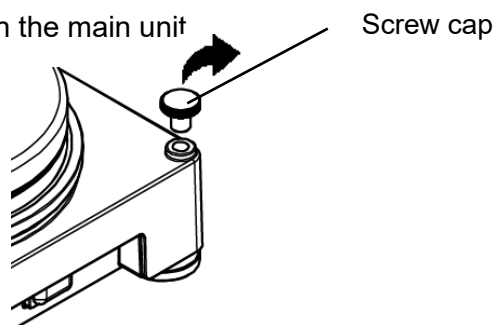


## 4. PRE-OPERATIVE PREPARATIONS

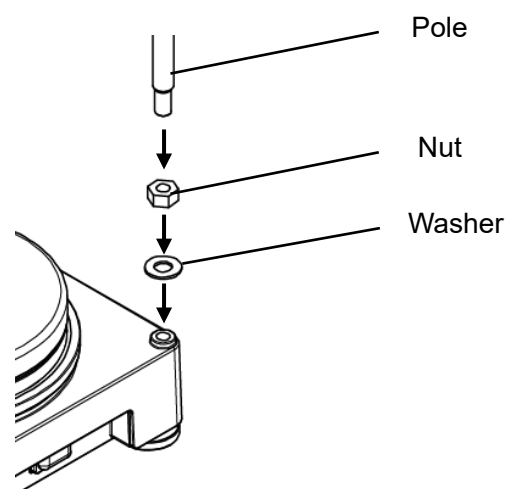
### Pole (optional) installation

<Procedure>

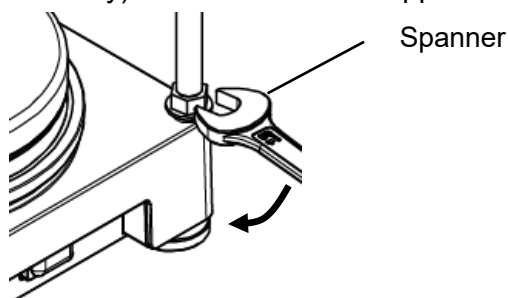
- ① Remove the screw caps from the mounting screws on the main unit



- ② Tighten the nuts and washers on the pole in this order to the mounting screws on the body.

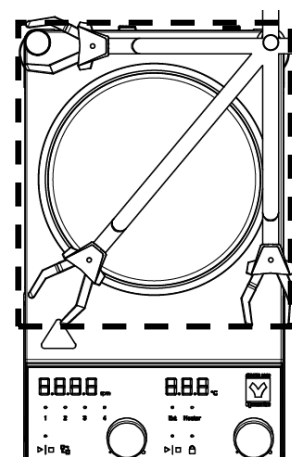


- ③ Finally, tighten the nuts on the pole using a wrench (accessory) with 13 mm on the opposite side to secure the pole to the main body.



#### Watch out for falls!

To avoid the risk of tipping over, be sure to set the pole so that the center of gravity of the equipment attached to the pole is within the dotted line area.



## 4. PRE-OPERATIVE PREPARATIONS

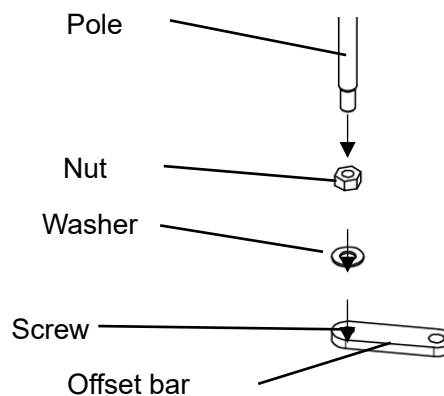
### Offset bar (optional) installation

When using a large container such as an oil bath on the stirring table, an offset bar can be used without interfering with the pole.

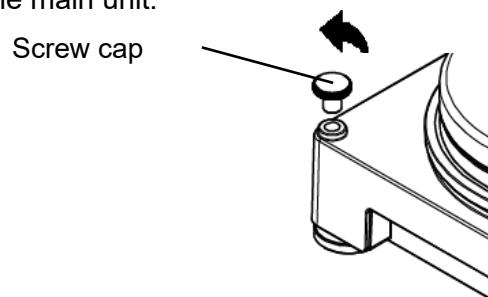
#### <Procedure>

- ① Install the nuts and washers on the pole in this order and tighten them onto the offset bar screws.

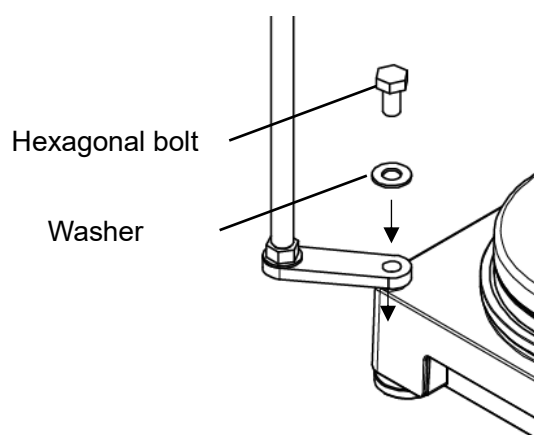
※Tighten firmly using the supplied wrench (17 mm on the opposite side).



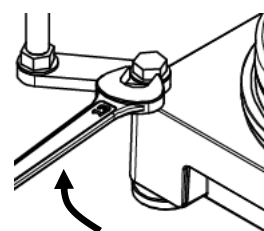
- ② Remove the screw caps from the mounting screws on the main unit.



- ③ Fix the offset bar to the mounting screws on the main unit using the supplied hexagonal bolts and washers.



- ④ Finally, fix the hexagonal bolt to the main body using a wrench with a 17 mm diagonal.



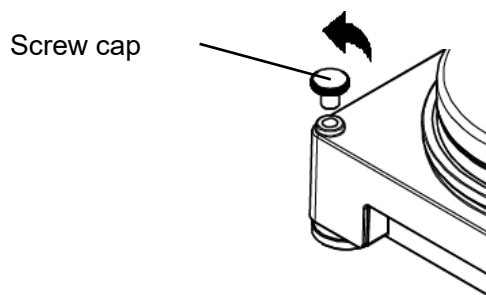
## 4. PRE-OPERATIVE PREPARATIONS

### How to use the container fall prevention frame (optional)

When using a vessel on the top plate, the risk of the vessel tipping over or falling can be reduced by using a frame to prevent the vessel from tipping over.

#### <Procedure>

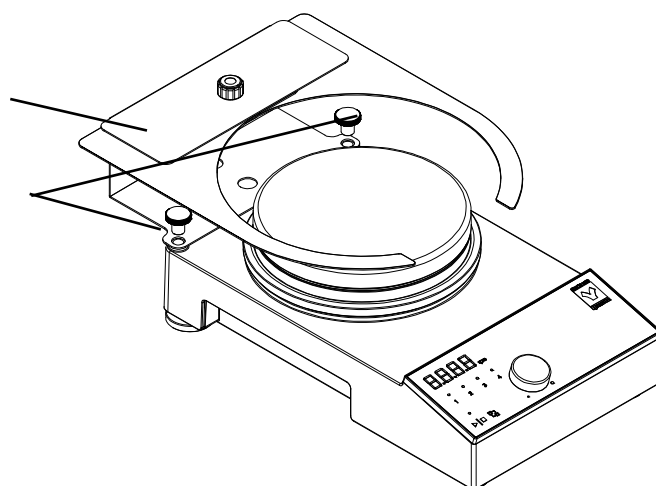
- ① Remove the screw caps from the mounting screws on the main unit.



- ② Fasten with screw caps on the body.

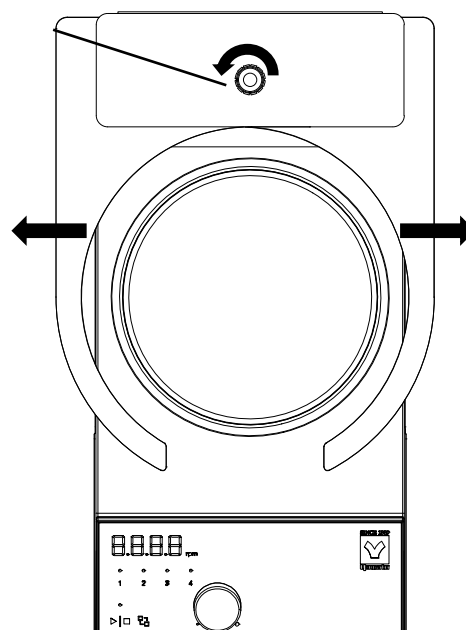
Container fall prevention frame

Screw cap



- ③ Containers Turn the knob on the fall prevention frame to loosen the fitting, and adjust the position of the fitting so that it is the right width for the container to be installed. Turn the knob in the opposite direction to secure the metal fitting again.

Knob





## 4. PRE-OPERATIVE PREPARATIONS

### How to use aluminum blocks (optional)



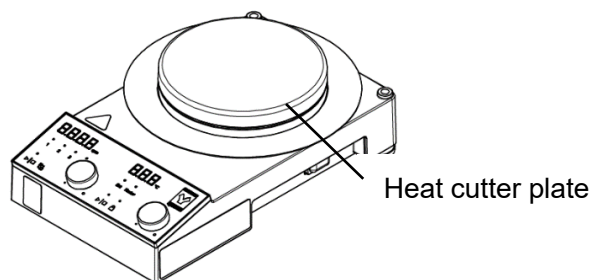
#### DO NOT touch hot surfaces

Do not touch the aluminum block and surrounding parts during or after operation. Burn injury may result.

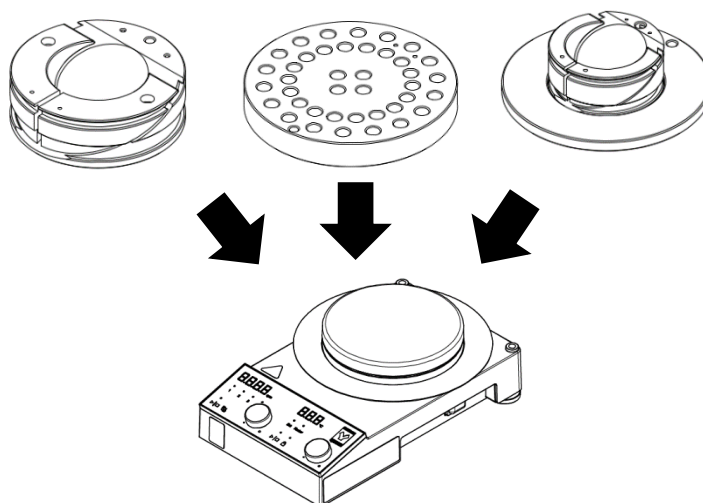
By placing an aluminum block on the top plate, heating can be mediated by the aluminum block.

#### <Procedure>

- ① Before placing the aluminum block on the top plate, attach the supplied heat cutting plate.  
Heating without using the heat cutter plate will cause the internal temperature of the main unit to rise, which may result in a malfunction.



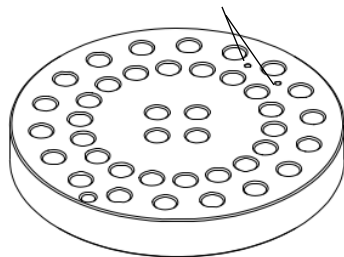
- ② Place various aluminum blocks on the stirring table.  
Be careful not to allow the bumps on the bottom of the aluminum block to ride up on the top plate.



- ③ When controlling aluminum block temperature with an external temperature sensor, use the sensor insertion hole in each block.

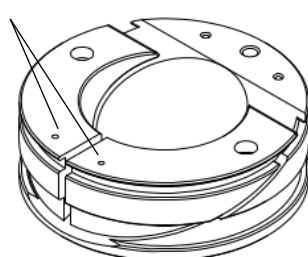
**\*The aluminum block has two sensor insertion holes. Use for control and recording purposes. The outer diameter of the temperature sensor for recording should be  $\Phi 3.00$  mm or larger and  $\Phi 3.20$  mm or smaller.**

Sensor insertion hole



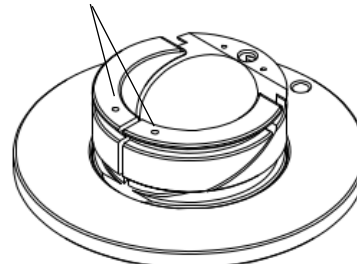
Integrated type  
(for small containers)

Sensor insertion hole



Integrated type  
(for flasks)

Sensor insertion hole



Holder + Adapter

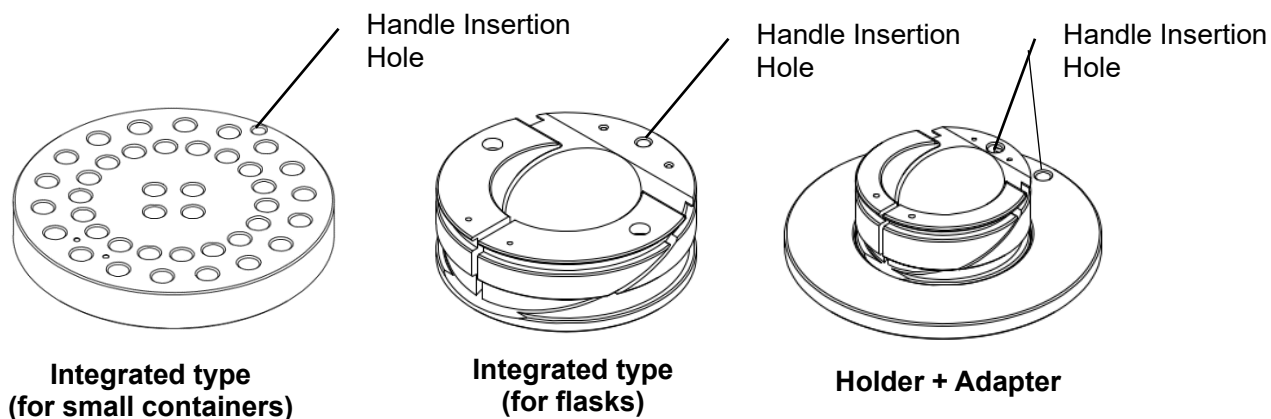
## 4. PRE-OPERATIVE PREPARATIONS

### How to use the aluminum block handle (optional)

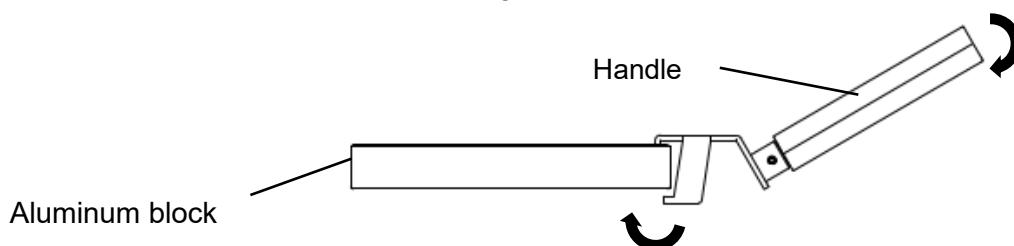
The aluminum block handle allows easy carrying of the aluminum block on the top table.

#### <Procedure>

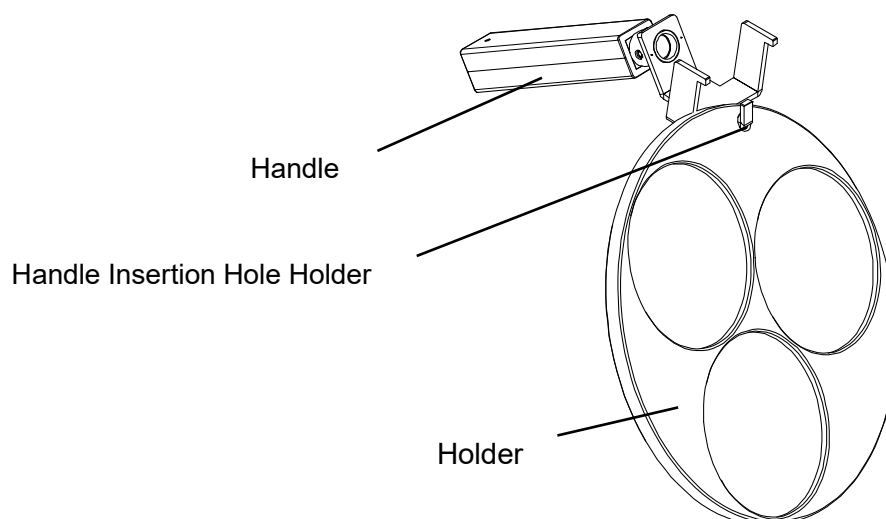
- ① Insert the end of the handle into the handle insertion hole in each aluminum block.  
All aluminum blocks have insertion holes.



- ② Apply force to press the lower part of the handle against the aluminum block.



- ③ When lifting the holder, use the handle insertion hole as shown at right.



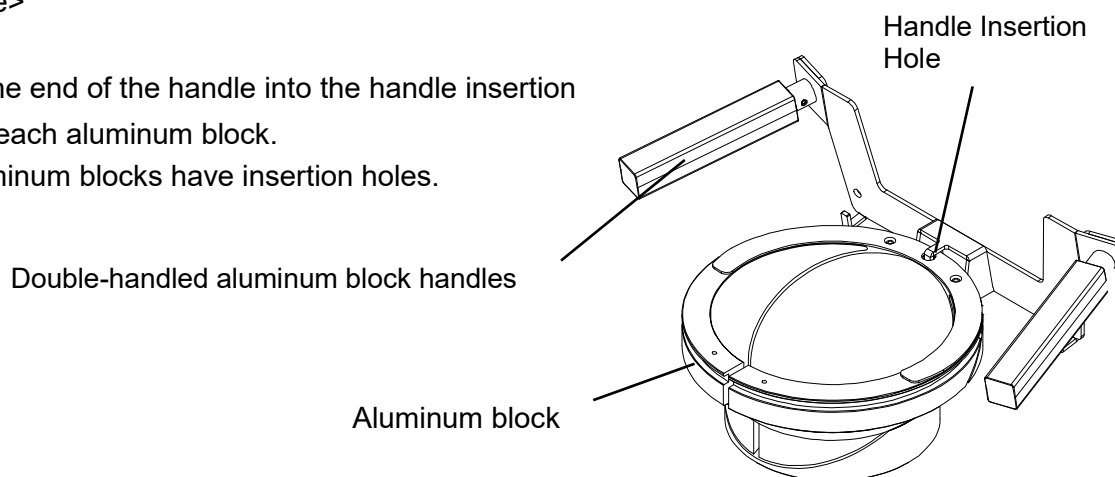
## 4. PRE-OPERATIVE PREPARATIONS

### How to use the double-handled aluminum block handle (optional)

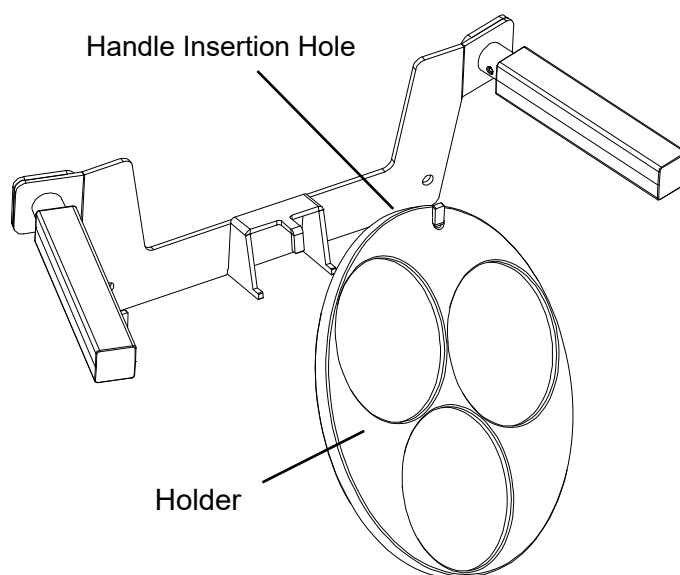
When using 1000mL or 2000mL size aluminum blocks, they can be easily carried by using the double-handled aluminum block handles.

<Procedure>

- ① Insert the end of the handle into the handle insertion hole in each aluminum block.  
All aluminum blocks have insertion holes.



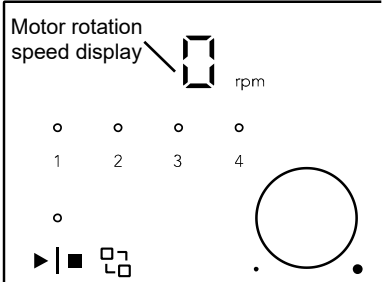
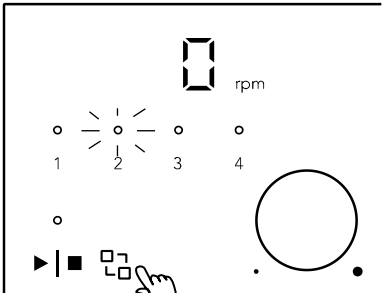
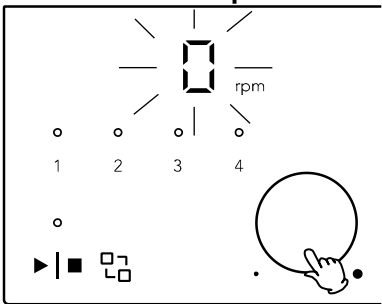
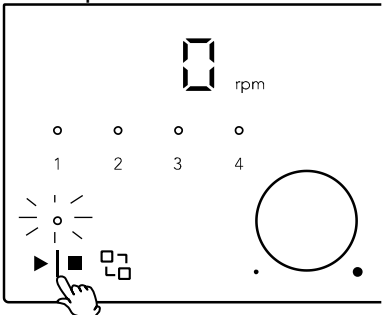
- ② When lifting the holder, use the handle insertion hole as shown at right.



## 5. OPERATION PROCEDURES

**Operation method: Stirring function (operated on the left side of the operation panel)**

This section explains how to operate the stirring function on the left side of the operation panel. It operates completely independent of the previous stirring function. **Be careful not to press the wrong switch.**

<p>1. Turn power ON</p>	 <ul style="list-style-type: none"> <li>Turn the power switch on the side of the main unit to "ON (I)". After the software version "V * * *" is displayed on the motor rotation speed display (left side 7 seg), the current motor rotation speed of the agitation motor is displayed.</li> </ul>
<p>2. Set rotation mode</p>	 <ul style="list-style-type: none"> <li>Each time the rotation mode key is pressed, the rotation mode No. changes. When the rotation mode No. indicator is unlit, the unit is in the constant speed rotation mode. See p.24 for rotation modes.</li> </ul>
<p>3. Set the rotation speed</p>	 <ul style="list-style-type: none"> <li>When the rotation setting knob is pressed or turned one click, the motor rotation speed display blinks and the display changes to the set rotation speed</li> <li>Turning the rotation setting knob further changes the rotation speed setting.</li> <li>Press the rotation setting knob again or do not operate the knob for 4 seconds to confirm the set value. After the change, the display returns to the current motor rotation speed display.</li> </ul>
<p>4. Start operation</p>	 <ul style="list-style-type: none"> <li>Press the Start Rotation button ( ▶ ■ ) for 1 second to light the LED on the button and start the agitation motor rotating. The current motor rotation speed is displayed until the set RPM is reached.</li> <li>To stop, press the start button ( ▶ ■ ) again, the LED on the button will turn off and the agitation motor will stop.</li> </ul> <p><b>*The rotation speed can be changed during rotation, but the rotation mode cannot be changed.</b></p>

## 5. OPERATION PROCEDURES

### About Rotation Mode

The rotation mode allows the rotation speed of the agitation motor to be varied repeatedly. The rotation modes are as follows.

No	Name	Description
No setting	Fixed speed operation mode  Continuous operation at set motor rotation speed.	
1	Step out detection mode  The mode detects step-out. If a stall is detected after 10 seconds of reaching the set rpm, the machine restarts at 100 rpm lower rpm. ※If stalling is detected again, restart at 100 rpm lower rotation.	
2	Intermittent operation mode  Repeat restart after 60 seconds of constant speed operation.	
3	Auto inversion mode  Repeat reversal after 60 seconds of constant speed operation.	
4	Slowup mode  Continuous operation at a set rpm, but accelerates several times slower than in other modes.	

※The rotation mode cannot be changed during rotation. To change the mode, stop the rotation once and then do so.

※About stall detection

Small changes in load due to step-out cannot be detected.

It may not be detected depending on the type of agitator and conditions.

《Reference》

It is effective to use different rotation modes depending on the characteristics of the sample.

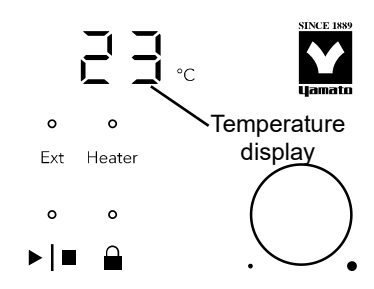
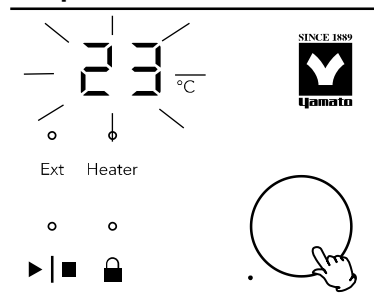
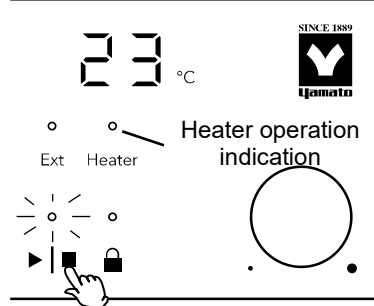
- Stall detection mode : When the viscosity after the reaction is not known and there is concern that the agitator may be stalling.
- Intermittent mode : Sedimentable samples and large-grained samples.
- Inversion mode : Sedimentable or deliquescent samples, paste-like materials.
- Throw-up : High viscosity sample (about 2000 cP or more)

## 5. OPERATION PROCEDURES

**Operation method: Temperature control function (operated on the right side of the panel, only available on MFH800 series)**

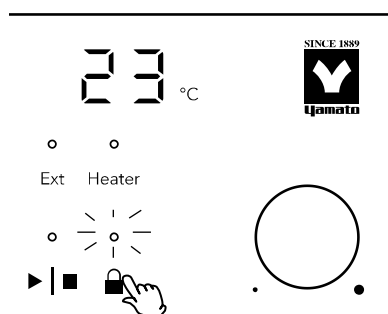
This section explains how to operate the temperature control function on the right side of the operation panel, which is available only for the MFH800 series.

It operates completely independent of the previous stirring function.

<p><b>1. Turn power ON</b></p>		<ul style="list-style-type: none"> <li>Turn the power switch on the side of the main unit to "ON (I)". After the software version "V * * *" is displayed on the motor rotation speed display (left side 7 seg), the temperature display (right side 7 seg) shows the current top plate temperature. When an external temperature sensor is connected, the temperature changes to the external temperature sensor temperature. (For details, see "Temperature control by external temperature sensor" on the next page.)</li> </ul>
<p><b>2. Set the temperature control temperature</b></p>		<ul style="list-style-type: none"> <li>When the temperature setting knob is pressed, the temperature display blinks and the display changes to the set temperature.</li> <li>Turning the temperature setting knob further changes the temperature setting.</li> <li>Press the temperature setting knob again to confirm the setting and the display changes to the current temperature. If the knob is not operated for 4 seconds, the set value is canceled and the display returns to the current temperature.</li> </ul>
<p><b>3. Start temperature control</b></p>		<ul style="list-style-type: none"> <li>Press the temperature control start button (▶ ■) for 1 second to turn on the LED on the button and start the temperature control of the top plate.</li> <li>The heater operation indicator lights while the heater mounted on the top plate is operating.</li> <li>To stop the temperature control, press the start button (▶ ■) again, the LED on the button will turn off and the temperature control will stop.</li> </ul> <p><b>*Temperature can be changed even during temperature control operation.</b></p>

\*If the temperature of the top plate is above 50°C while the machine is stopped, HOT appears alternately on the temperature display with the current temperature. (See "High Temperature Warning Function" on the next page for details.)

### When you want to fix the temperature setting



- When the temperature lock button is pressed, the LED on the button lights up and the temperature setting will not change even if the temperature setting knob is turned.
- Press the button again to turn off the LED and disable the function.

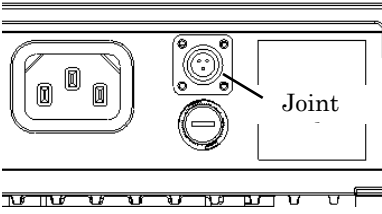
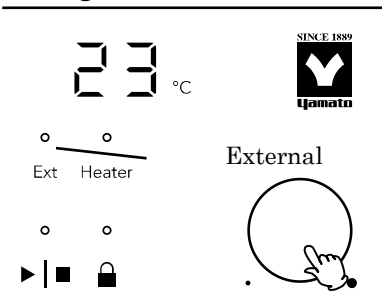
**\*Setting values can be checked even during temperature lock.**

## 5. OPERATION PROCEDURES

### Temperature control by external temperature sensor (only available for MFH800 series)

Temperature control operation is possible with the attached external temperature sensor. We will explain how to set this up.

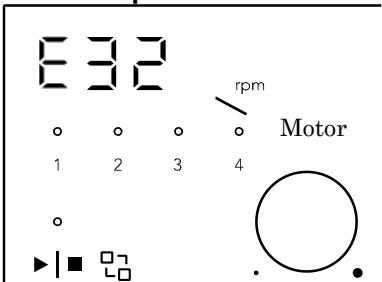
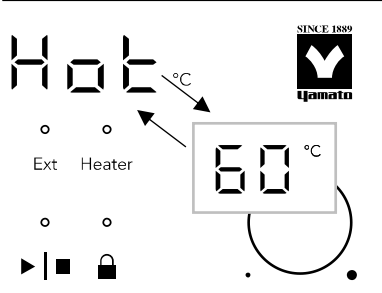
The operation method is the same as the previous temperature control using an internal sensor.

1.	<b>Connect external temperature sensor</b> 	<ul style="list-style-type: none"> <li>Insert the external temperature sensor into the connector on the rear panel.</li> <li>Fix the connector ring firmly so that the sensor does not make poor contact.</li> </ul>
2.	<b>Automatically change settings</b> 	<ul style="list-style-type: none"> <li>The external temperature sensor indicator lights up and the temperature display changes to the temperature of the external temperature sensor.</li> <li>The setting automatically changes to temperature control by the external temperature sensor when the external temperature sensor is connected to the connector.</li> <li>To return to temperature control by the internal sensor, disconnect the sensor from the connector.</li> </ul> <p><b>*Changes can be made even during temperature control operation.</b></p>

(Note) If the temperature inside the enclosure rises too high, the heater is automatically shut off.

### Safety features for temperature control

MFH800 series is equipped with the following safety features regarding temperature control

1.	<b>Overheat prevention</b> 	<ul style="list-style-type: none"> <li>If the top table temperature exceeds 400°C, the heater is turned off regardless of microcomputer operation.</li> <li>At the same time, the microcomputer control stops and E32 is displayed on the motor rotation speed display. Even if the temperature drops, the error display will not disappear until the power is turned on again.</li> </ul> <p><b>※The temperature setting cannot be changed.</b></p>
2.	<b>High temperature warning function</b> 	<ul style="list-style-type: none"> <li>When the temperature control operation is not in progress, the temperature display alternately shows the word HOT and the current temperature while the top plate temperature is above 50°C.</li> </ul> <p><b>※Note that if an external temperature sensor is plugged in, the current temperature is the temperature of the external temperature sensor.</b></p>

## 5. OPERATION PROCEDURES

### User setting (only available for MFH800 series)

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The following features can be configured in the user settings. Settings are made in the user settings menu, and both agitation and temperature control can be entered into the menu while operation is stopped.

Name	Description	Page
Temperature high limit function	If the top plate temperature exceeds the set temperature, all controls are stopped and an error is displayed.	P.28
Calibration offset function	This function corrects the difference between the displayed temperature and the actual temperature. Correction values can be set for each external internal sensor.	P.Calibration offset29
Auto-resume mode	This function automatically resumes operation after the power is restored, even in the event of a power failure during operation.	P.30
LED brightness switching function	Changes the brightness of the operation panel.	P.31

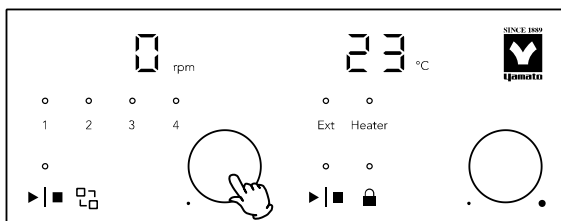


## 5. OPERATION PROCEDURES

### Temperature high limit function

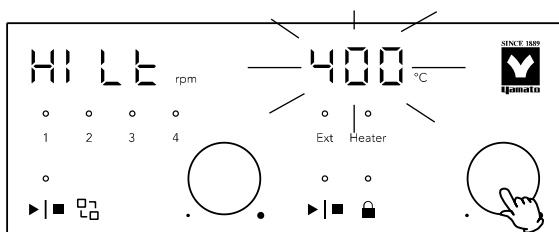
If the top plate temperature exceeds the set temperature, all controls are stopped and an error(E32) is displayed. This section describes how to operate the system.

#### 1. Enter the user settings menu



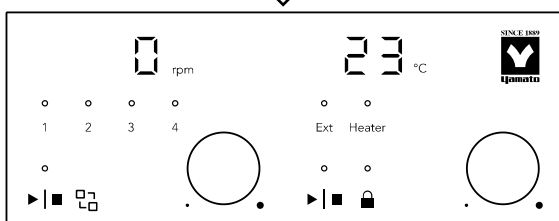
- Confirm that both agitation and temperature control are stopped.
- Press the rotation setting knob for 3 seconds to change the display and enter the setting menu, and "HiLt" will appear on the rotation indicator.

#### 2. Set the upper temperature limit of the top plate



- Turn the temperature setting knob and the temperature display will blink to set the upper temperature limit of the top plate. (Setting range: 50 to 400°C)
- Press the temperature setting knob to save the value.
- If you want to cancel during setting, turn the rotation setting knob and the setting will not be saved.

#### 3. Exit the user settings menu



- Press the rotation setting knob for 1 second to return to normal display.

# 5. OPERATION PROCEDURES

## Calibration offset

If there is a difference between the actual temperature and the controller's displayed temperature, this function compensates (offsets) this difference. It is possible to make a uniform correction to the positive or negative side for all temperature zones.

Set value: -5.0 to +5.0 (factory default: "0.0")

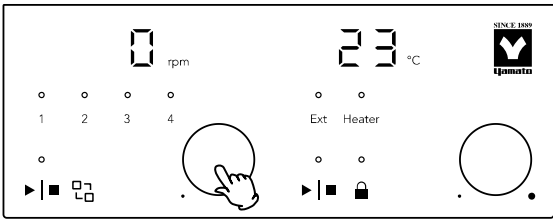
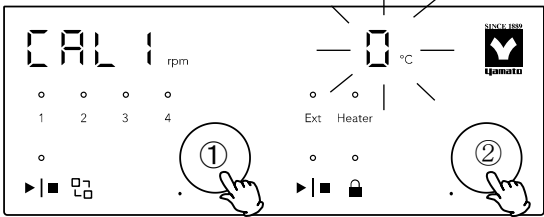
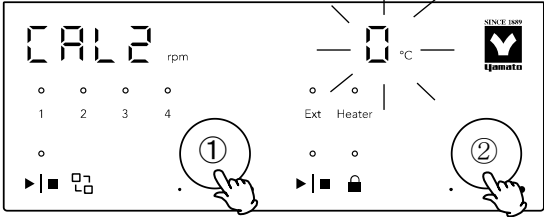
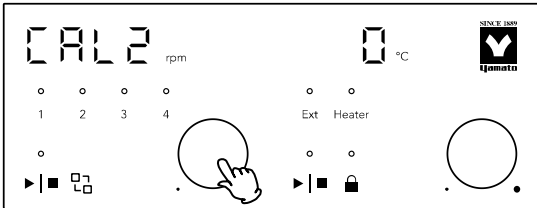
- Start operation at the desired temperature setting, and after the temperature stabilizes, check the actual temperature with a temperature recorder.
- Check the difference between the set temperature and the actual temperature.

### Setting illustration

If the actual temperature is 2 °C lower than the displayed temperature

Temperature reading can be calibrated by entering a calibration offset value of -2.0 to compensate against the actual temperature deficiency of 2 °C.

If the initial temperature reading was 60 °C, it will read 58°C after offset calibration, and be brought into agreement with actual chamber temperature.

<p><b>1. Enter the user settings menu</b></p>	 <ul style="list-style-type: none"> <li>• Confirm that both agitation and temperature control are stopped.</li> <li>• Press the rotation setting knob for 3 seconds to change the display and enter the setting menu, and "HiLt" will appear on the rotation indicator.</li> </ul>
<p><b>2. Set compensation values for internal sensors</b></p>	 <ol style="list-style-type: none"> <li>① Turn the rotation setting knob to change the motor rotation speed display to CAL 1. Turn the temperature setting knob and the temperature display will blink to set the compensation value of the internal sensor. The temperature display after setting becomes "conventional temperature display" + "compensation value". Press the temperature setting knob to save the value.</li> <li>• If you want to cancel during setting, turn the rotation setting knob and the setting will not be saved.</li> </ol>
<p><b>3. Set compensation values for internal sensors</b></p>	 <ol style="list-style-type: none"> <li>① Turn the rotation setting knob to change the motor rotation speed display to CAL2.</li> <li>② Turn the temperature setting knob and the temperature display will blink, then set the compensation value for the external sensor. The temperature display after setting becomes "conventional temperature display" + "compensation value". Press the temperature setting knob to save the value.</li> <li>• If you want to cancel during setting, turn the rotation setting knob and the setting will not be saved.</li> </ol>
<p><b>4. Exit the user settings menu</b></p>	 <ul style="list-style-type: none"> <li>• Press the rotation setting knob to return to the normal display.</li> </ul>

## 5. OPERATION PROCEDURES

### User setting: Power failure recovery mode selection (only available for MFH800 series)

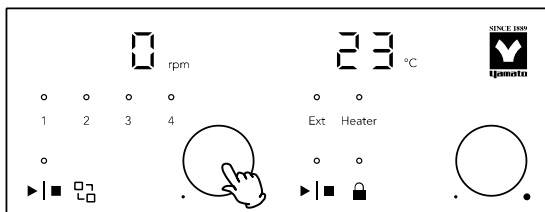
Select recovery mode for the event of a power failure.

Setting OFF: Operation is stopped when power is restored.

Setting ON : When power failure is restored, operation continues in the state immediately before power failure.

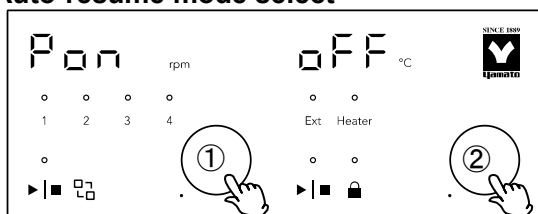
(Default setting: "OFF")

#### 1. Enter the user settings menu



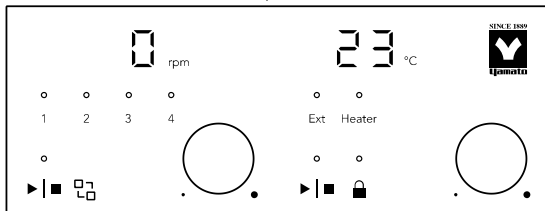
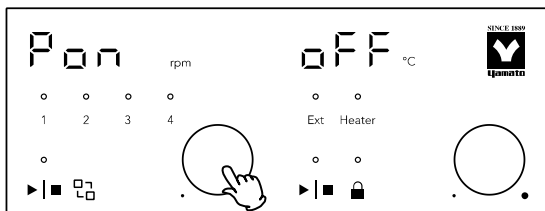
- Confirm that both agitation and temperature control are stopped.
- Press the rotation setting knob for 3 seconds to change the display and enter the setting menu, and "HiLt" will appear on the rotation indicator.

#### 2. Auto-resume mode select



- Turn the rotation setting knob to change the motor rotation speed display to PON.
  - Turn the temperature setting knob to set ON/OFF for the power failure recovery mode selection as the temperature display blinks. Press the temperature setting knob to save the value.
- If you want to cancel during setting, turn the rotation setting knob and the setting will not be saved.

#### 3. Exit the user settings menu



- Press the rotation setting knob for 1 second to return to normal display.

## 5. OPERATION PROCEDURES

### User setting: LED brightness switching function (only available for MFH800 series)

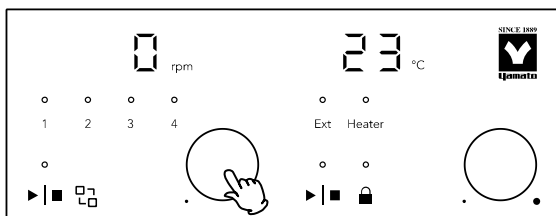
#### Sets the LED brightness of the operation panel.

The brightness can be changed in 9 steps from "0 to 8".

(Default setting: "4")

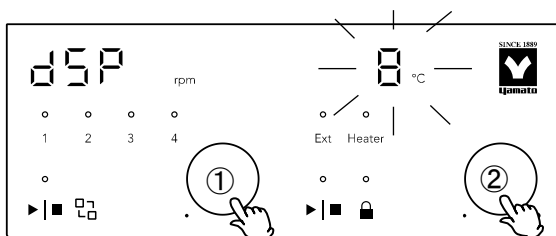
Changes the brightness of the operation panel. This section describes how to operate the system.

#### 1. Enter the user settings menu



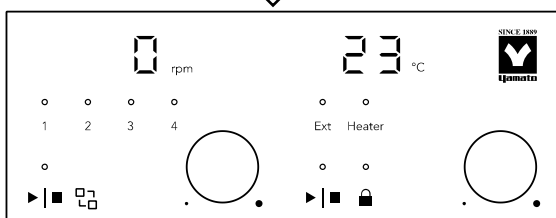
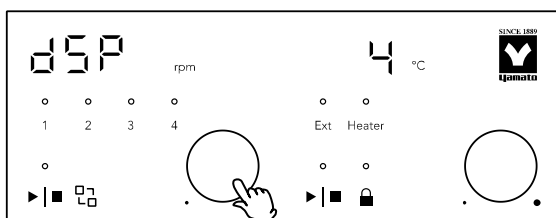
- Confirm that both agitation and temperature control are stopped.
- Press the rotation setting knob for 3 seconds to change the display and enter the setting menu, and "HiLt" will appear on the rotation indicator.

#### 3. Set compensation values for internal sensors



- Turn the rotation setting knob to change the motor rotation speed display to DSP.
- Turning the temperature setting knob causes the temperature display to blink, and changing the brightness (number) changes the brightness of the panel. Press the temperature setting knob to save the value. If you want to cancel during setting, turn the rotation setting knob and the setting will not be saved.

#### 3. Exit the user settings menu



- Press the rotation setting knob for 1 second to return to normal display.

## 6. HANDLING PRECAUTIONS

### Warnings and Cautions



### CAUTION



#### **NEVER process explosive or flammable substances**

Never attempt to process explosives, flammables or any items which contain explosives or flammables. Fire or Explosion may result. See " 13. LIST OF HAZARDOUS SUBSTANCES" (P.41)



#### **Resin container advisory.**

When using resin containers for processing, confirm that they conform to the heating specifications of this unit. Heating resin beyond capacity to withstand temperature will cause resin to melt and may result in fire or explosion.



#### **DO NOT insert foreign objects into unit openings.**

In the event that a foreign object accidentally falls inside, turn OFF(○) ELB immediately, disconnect power cable and contact original dealer or service center. (P.46) Failure to do so may result in fire or electric shock.



#### **Use extreme caution in handling samples following high temperature operation.**

If operation is performed at high temperatures, the enclosure and sample will remain hot for some time after the end of operation, which may result in burns.  
Wear protective equipment when loading and unloading samples, and take care not to touch them directly.



#### **ALWAYS run equipment within specified temperature range.**

Use within the temperature control range specified in the specification column.  
Never attempt to operate unit outside of specification range. Use of the product outside the temperature control range may result in product failure or an accident.



#### **Power loss recovery**

When the power failure recovery mode is enabled, the product will resume operation in the state immediately before the power failure if it is stopped during operation due to a power failure, etc. and the power is supplied again.  
If the power failure recovery mode is disabled, operation will remain stopped.  
For details, see Power Failure Return Mode Selection (P. 30).



#### **Be careful with exothermic samples.**

Further note that temperature reading may not be consistent when processing heat-generating specimens.



#### **Make sure the container is centered on the top plate before use.**

Be careful that the container is not centered on the top plate, otherwise it may become unstable and fall from the top plate, which may result in injury.

## 7. INSPECTION AND MAINTENANCE

### Precautions before Inspection



### Warning

- Be sure to disconnect power supply cable before daily inspection and maintenance.
- Perform inspections and maintenance when unit is at room temperature.
- Never attempt to disassemble unit.

### Precautions in Daily Maintenance



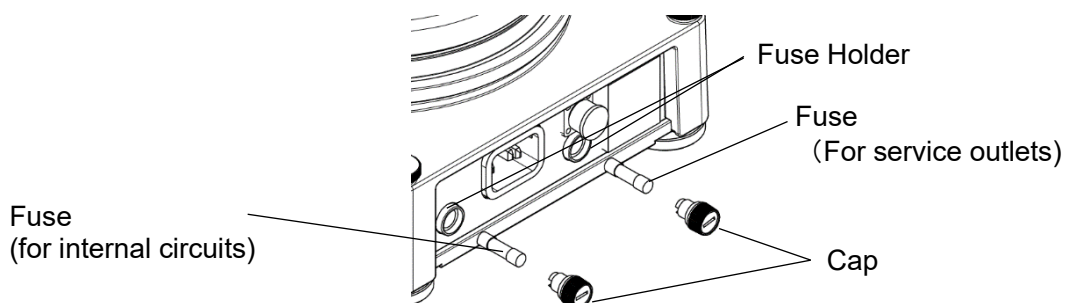
### CAUTION

- Clean unit 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

#### fuse replacement

If a fuse should blow, eliminate the cause and replace it with a spare fuse according to the following procedure.





- ① Turn the power switch to "OFF (○)" and unplug the power supply cable from the outlet.
- ② With the cap pushed in, turn it to the left to remove it.
- ③ Replace the fuse and install the cap on the fuse holder.  
The fuse is secured by turning the cap to the right with the cap pushed in.
- ④ Plug the power supply cable into a wall outlet and turn the product's power switch to "ON (|)" to make sure the power is on.

Model	For internal circuits	For service outlet
MFH800/MFH800-Y	7A	5A
MFH810-B/MFH810-Y	5A	—
MFD800/MFD800-Y	0.5A	5A
MFD810-B / MFD810-Y	0.5A	—

◆Contact original dealer or service center, if further questions arise concerning maintenance procedures. (P.46)

## 8. EXTENDED STORAGE AND DISPOSAL

### Extended storage/disposal

 <b>Warning</b>	 <b>CAUTION</b>
To store or to place unit out of service <ul style="list-style-type: none"> <li>● Turn off the power switch and unplug the power supply cable from the outlet.</li> </ul>	Disposal <ul style="list-style-type: none"> <li>● Do not leave unit unattended, or in reach of children.</li> <li>● Since the magnets are highly magnetic, please be careful not to pinch your fingers when disposing of the product.</li> </ul>

### Disposal Considerations

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. The main components and materials used in this product are as follows.

Component Name	Material
<b>Main components of this product section</b>	
Exterior parts	Aluminum, stainless steel plate Glass-filled polyphenylene sulfide resin
Heat insulator	Chemically bonded structures of glass fibers and nano-sized particles
protective cover	Silicon rubber
Magnet, Yoke	Neodymium magnet, iron
Legs, Adjuster	Ethylene vinyl acetate, polypropylene resin, and Polyamide resin, ethylene vinyl acetate, steel
<b>Electrical Parts</b>	
Switches and relays	Composite of resin, copper and other materials
Operation panel, knob	Polycarbonate resin, polyacetal resin
Printed circuit boards	Composite of fiber glass and other materials
Anti-vibration rubber, spacer	Nitrile rubber and steel, brass
Heater	Mica heater
Power supply cable	Composite of synthesized rubber coating, copper, nickel and other compounds
Wires	Composites of fiberglass, fire-retardant vinyl, copper, nickel and other compounds
Stickers	Resin material
Sensor	Stainless steel etc.

# 9. TROUBLESHOOTING

## Reading Error Codes

The product is equipped with a self-diagnostic function.

The table shows the error code, cause, and treatment method when an abnormality occurs.

### [Error Codes]

If an error occurs in the product, the following error code is displayed in the rotation or temperature display (right side 7 segments) on the display panel, and operation stops in the state shown in the table corresponding to the error code. After confirming the error code, immediately turn the power switch "OFF (○)" and discontinue use.

Error Code Name	Operation and Display	Possible causes and solutions
<b>E01</b> Internal temperature sensor abnormal (E01)	<ul style="list-style-type: none"> <li>● Stopping temperature control</li> <li>● OVR for temperature display</li> <li>● Rotation Continuation</li> </ul>	<ul style="list-style-type: none"> <li>● Defective internal temperature sensor (disconnection or short circuit failure) or abnormal internal circuit</li> <li>● Temperature out of specification range.</li> </ul> Contact original dealer or service center. (P.46)
<b>E03</b> Heater interruption or disconnection (E03)	<ul style="list-style-type: none"> <li>● Stopping temperature control</li> <li>● Temperature display Alternate display of E03 and measured values</li> <li>● ※Hot is also displayed at high temperature.</li> <li>● Rotation Continuation</li> </ul>	<ul style="list-style-type: none"> <li>● Internal heater disconnection</li> <li>● internal circuitry error</li> </ul> Contact original dealer or service center. (P.46)
<b>E15</b> EEPROM error (E15)	<ul style="list-style-type: none"> <li>● Stopping temperature control</li> <li>● Stopped Rotation</li> <li>● E15 on rotating display</li> </ul>	<ul style="list-style-type: none"> <li>● Memory Data Error               <ul style="list-style-type: none"> <li>● Turn the power switch "OFF (○)" and start up again. If problem persists, contact original dealer or service center. (P.46)</li> </ul> </li> </ul>
<b>E30</b> External temperature sensor abnormal (E30)	<ul style="list-style-type: none"> <li>● Stopping temperature control</li> <li>● Temperature display Alternate display of E30 and measured values</li> <li>● ※Hot is also displayed at high temperature.</li> <li>● Rotation Continuation</li> </ul>	<ul style="list-style-type: none"> <li>● External temperature sensor is far from the temperature control object.</li> <li>● Not in the sensor insertion hole in the aluminum block</li> <li>● Difficult to raise temperature of temperature-controlled object</li> <li>● internal circuitry error</li> <li>● Install an external temperature sensor in a location where the temperature of the temperature control target can be measured, such as the sensor insertion hole in the aluminum block.</li> </ul>
<b>E32</b> Heater Overheating (E32)	<ul style="list-style-type: none"> <li>● Stopping temperature control</li> <li>● Stopped Rotation</li> <li>● E32 on rotating display</li> </ul>	<ul style="list-style-type: none"> <li>● internal circuitry error</li> <li>● When the temperature of the top plate exceeds 400°C due to a heating device on the stirring table, etc.</li> <li>● If the temperature high limit function setting is exceeded (see p. 28)</li> <li>● Turn the power switch "OFF (○)" and leave it for a while to allow the temperature to cool down before starting up again. If problem persists, contact original dealer or service center. (P.46) .</li> </ul>
<b>E72</b> Motor error (E72)	<ul style="list-style-type: none"> <li>● Stopping temperature control</li> <li>● Stopped Rotation</li> <li>● E72 on rotating display</li> </ul>	<ul style="list-style-type: none"> <li>● Turn the power switch "OFF" (○) and start the motor again when the motor is defective (broken wire or short circuit failure), the internal circuit is abnormal, or an overload is applied to the motor.</li> </ul>





- If problem persists, call for service.

## 9. TROUBLESHOOTING

### Reading Error Codes

Other warning signs

Warning Sign	Warning Name	Possible causes and solutions
 (Displayed on temperature display side)	High Temperature Warning (HOT indication)	<ul style="list-style-type: none"> <li>● The warning is displayed when the temperature of the top plate exceeds 50°C while the temperature control is stopped.</li> </ul>
 (Displayed on temperature display side)	Out of temperature measurement range warning (OVR display)	<ul style="list-style-type: none"> <li>● A warning is displayed when the displayed temperature is above the upper measuring limit of 440°C.</li> </ul>

### Troubleshooting Guide

Troubles

Symptom	Possible causes
Unit does not turn on when main power switch is turned "ON(I)"	<ul style="list-style-type: none"> <li>● Power supply cable is not securely connected to the power outlet.</li> </ul>
Agitation motor does not rotate	<ul style="list-style-type: none"> <li>● The set motor rotation speed is set to 0.</li> </ul>
Temperature in chamber does not rise.	<ul style="list-style-type: none"> <li>● The set temperature is lower than the displayed temperature.</li> </ul>
Temperature does not rise smoothly	<ul style="list-style-type: none"> <li>● Power supply voltage has dropped.</li> <li>● The ambient temperature is out of operable temperature range</li> <li>● Heat load of the sample on the top plate is high.</li> </ul>
Display temperature fluctuates during use.	<ul style="list-style-type: none"> <li>● Large voltage fluctuations in the power supply.</li> <li>● Large fluctuations in ambient temperature.</li> <li>● Heat load of the sample on the top plate is high.</li> </ul>
The displayed temperature is different from the actual temperature.	<ul style="list-style-type: none"> <li>● Temperature offset value is not appropriate. P. 28 Please check the setting values in "Calibration Offset Function".</li> </ul>
External temperature sensor indicator lamp on operation panel does not light up even if external temperature sensor is installed.	<ul style="list-style-type: none"> <li>● External temperature sensor connector is not connected. P. 16 Refer to "External Temperature Sensor Installation" for installation.</li> <li>● External temperature sensor has failed.</li> </ul>

◆If problem persists, turn "OFF (O)" the power switch immediately, disconnect power supply cable from outlet, and contact original dealer or service center as there may be a fault with the product. (P.46)

## 10. 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>

<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 controller and ELB, and disconnect power supply cable. contact original dealer or service center. (P.46)

The following information is required for all repairs.

- Product Name
  - Model
  - Serial Number
  - Date (year/month/day) of Delivery
  - Description of problem in as much detail as possible
- } Refer to warranty card.
- 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 or Yamato sales office 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.

# 11. SPECIFICATIONS

## Specifications (MFD)

form (something takes)		MFD800	MFD800-Y	MFD810-B	MFD810-Y
Product name		Magnetic Stirrer			
Motor rotation speed range		50 to 1600 rpm (set in 10 rpm increments)			
Configuration	Motor	DC brushless motor (31 W)			
	Magnets	Neodymium magnet			
	Error message	White LED digital display			
	Exterior parts	Aluminum Die Casting			
	Top plate	Die-cast aluminum (ceramic coating)			
Agitation motor function (rotation mode)		Constant speed, Step out detection mode, Intermittent, Reversing, Slowup			
Safety functions		Overcurrent fuse			
Other Functions		Service outlet		—	
Standard	External Dimensions*1	W165 mm x D275 mm x H90 mm			
	Top plate diameter	φ135 mm			
	Load capacity	30 kg or less			
	Power supply	AC100 V 0.25 A 50/60 Hz *2	AC115 V 0.25 A 50/60 Hz *2	AC220 V 0.15A 50 Hz	AC230 V 0.15 A 50/60 Hz
	Overcurrent fuse capacity	For internal circuit: 0.5A For service outlet: 5 A		For internal circuits: 0.5 A —	
	Power supply cable	2 m with inlet type FG plug			
	Weight	Approx. 2.8 Kg			
	Operational external temperature range	4 °C~40 °C			
Accessories		1 Protective cover, 2 Screw caps, 1 Power supply cable 1 Spare fuse (internal circuit), 1 Copy of instruction manual 1 Heat cutter plate			
		1 Warranty card	*3	1 Warranty card	*3
		1 Spare fuse For service outlet		—	Conversion Plug

\*1 Protrusions excluded.

\*2 Service outlets are not included.

\*3 In some regions, a warranty card is included.

(set in 1 °C increments)

# 11. SPECIFICATIONS

## Specifications (MFH)

form (something takes)		MFH800	MFH800-Y	MFH810-B	MFH810-Y
Product name		Magnetic Stirrer with Hot Plate			
Motor rotation speed range		50 to 1600 rpm (set in 10 rpm increments)			
Temperature control range		(Room temperature + approx.25*2) °C to 310°C			
Temperature control accuracy*1		±1.5 °C at 100 °C (internal temperature sensor)			
		±1.0 °C at 50 °C (external temperature sensor)			
Configuration	Motor	DC brushless motor (31 W)			
	Magnets	Neodymium magnet			
	Error message	White LED digital display			
	Temperature control system	PID control			
	Temperature sensor	PT100			
	Heater	600 W mica heater			
	Exterior parts	Aluminum Die Casting			
	Top plate	Die-cast aluminum (ceramic coating)			
Agitation motor function (rotation mode)		Constant speed, Step out detection mode, Intermittent, Reversing, Slowup			
Safety functions		Over-temperature protection (fixed temperature), high temperature warning Abnormal temperature limit, Overcurrent fuse			
Other Functions		Service outlet			
		Temperature high limit function			
		Auto-resume mode			
		Calibration offset			
Standard	External Dimensions*3	W165 mm × D275 mm × H90 mm			
	Top plate diameter	φ135 mm			
	Load capacity	30 Kg or less			
	Power supply	AC100 V 6 A 50/60 Hz *4	AC115 V 6 A 50/60 Hz *4	AC220 V 3 A 50Hz	AC230 V 3 A 50/60 Hz
	Overcurrent fuse capacity	For internal circuits: 7 A		For internal circuits: 5 A	
		For service outlet: 5 A		—	
	Power supply cable	2 m with inlet type FG plug			
	Weight	Approx. 3.0 kg			
	Operational external temperature range	4 °C~40 °C			
Accessories		1 Protective cover, 2 Screw caps, 1 Power supply cable 1 Spare fuse (internal circuit), 1 Copy of instruction manual 1 Heat cutter plate			
		1 External temperature sensor			
		1 Warranty card	*5	1 Warranty card	*5
		1 Spare fuse For service outlet		—	Conversion Plug

\*1 Performance is based on a power supply of 95 to 105 V AC, room temperature of 23 °C ± 5 °C, humidity of 65 %RH ± 20 %, no load when an internal sensor is used, and when an external temperature sensor is used, with the attached PT sensor inserted into an aluminum block (for φ12) sold separately. The operating ambient temperature range is 4 °C to 40 °C. Note that the maximum operating temperature may not be reached if the power supply voltage is below 95 V or under 4°C. Temperature control accuracy is measured by JTM K05. (MFH series only)

\*2 Self-heating at room temperature of 23°C and 1600 rpm conditions. The added value varies depending on operating conditions and operating environment.

\*3 Protrusions excluded.

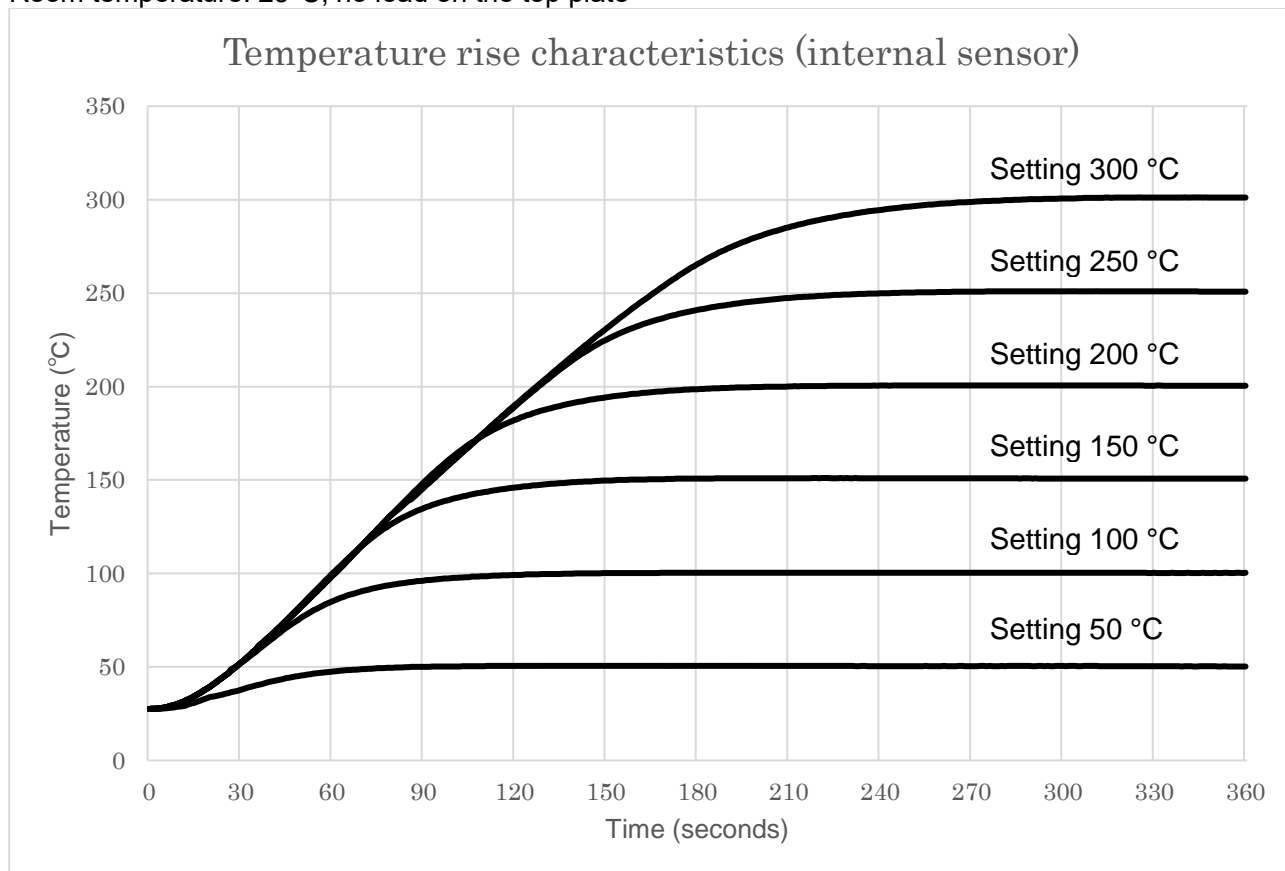
\*4 Service outlets are not included.

\*5 In some regions, a warranty card is included.

## 12. Reference Data

### Temperature rise characteristics

Room temperature: 23°C, no load on the top plate



# 13. LIST OF HAZARDOUS SUBSTANCES



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

Table 13.1 List of hazardous substances

Explosive substances	① Nitroglycol, nitroglycerin, nitrocelluloses and other explosive nitrate esters
	② Trinitrobenzen, Trinitrotoluene, Picric Acid and other explosive nitro compounds
	③ Acetyl Hydroperoxide, Methyl Ethyl Ketone Peroxide, Benzoyl Peroxide and other organic peroxides
	④ Metallic Azide, including Sodium Azide, etc.
Combustible substances	① Metal "lithium" ② metal "potassium" ③ metal "sodium" ④ yellow phosphorus ⑤ phosphorus sulfide ⑥ red phosphorus ⑦ celluloids ⑧ calcium carbide (aka Carbide) ⑨ phosphorized lime ⑩ magnesium powder ⑪ aluminum powder ⑫ metal powder other than magnesium powder and aluminum powder ⑬ Sodium subthionate (also known as hydrosulfite)
Oxidizing Substances	① Potassium Chlorate, Sodium Chlorate, Ammonium Chlorate, and other chlorates
	② Potassium Perchlorate, Sodium Perchlorate, Ammonium Perchlorate, and other perchlorates
	③ Potassium Peroxide, Sodium Peroxide, Barium Peroxide, and other inorganic peroxides
	④ Potassium Nitrate, Sodium Nitrate, Ammonium Nitrate, and other nitrates
	⑤ Sodium Chlorite and other chlorites
	⑥ Calcium Hypochlorite and other hypochlorites
Flammable Substances	① Ethyl Ether, Gasoline, Acetaldehyde, Propylene Chloride, Carbon Disulfide, and other substances with ignition point at 30 or more degrees below zero.
	② n-hexane, Ethylene Oxide, Acetone, Benzene, Methyl Ethyl Ketone and other substances with ignition point between 30 degrees below zero and less than zero.
	③ Methanol, Ethanol, Xylene, Pentyl n-acetate, (a.k.a.amyl n-acetate) and other substances with ignition point between zero and less than 30 degrees.
	④ Kerosene, Light Oil, Terebinth Oil, Isopenthyll Alcohol(as known as Isoamyl Alcohol), Acetic Acid and other substances with ignition point between 30 degrees and less than 65 degrees.
Combustible gas	hydrogen, acetylene, ethylene, methane, ethane, propane, butane and other flammable objects that are gases at 1 atm and 1 atm

Excerpt from Table 1, Hazardous Substances, of Cabinet Order of the Occupational Safety and Health Law (substances related to Articles 1, 6, and 9)

# STANDARD INSTALLATION MANUAL

Please install the equipment in accordance with the following items. (Please confirm separately in the case of optional or special specifications.)

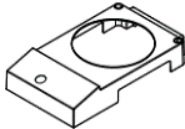
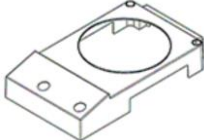

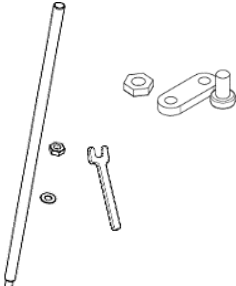
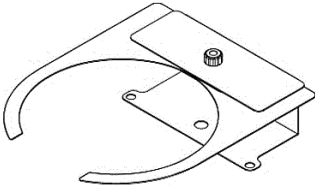
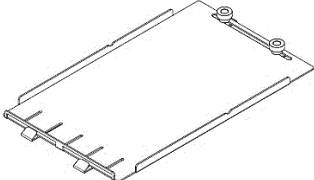
Model	Serial Number	Installation Date	Installation proved by (Company name)	Installation proved by	Judgment

No	Item	Implementation method	Chapter No. & Reference page of instruction manual	Judgment
<b>Specifications</b>				
1	Accessories	Quantity check according to the accessories column	11. Specifications P.38	
2	Installation	<ul style="list-style-type: none"> <li>Visual check of surrounding conditions</li> <li>Caution: Take care for environment</li> <li>Securing a space</li> </ul>	3. PRE-OPERATION PROCEDURES <ul style="list-style-type: none"> <li>Precautions for installation...</li> </ul> P.10	
<b>Operation-related matters</b>				
1	Supply voltage	Customer's voltage with tester (e.g., electrical outlets). Voltage measurement during operation (within specification)	1. SAFETY PRECAUTIONS <ul style="list-style-type: none"> <li>ground wire must be...</li> <li>Power supply cable...</li> </ul> 11. Specifications <ul style="list-style-type: none"> <li>Power supply...</li> </ul> P.3 P.3 P.38	
2	Operation check	<ul style="list-style-type: none"> <li>Explanation of the name and function of each part</li> <li>Operation</li> <li>Set temperature: 50°C</li> </ul>	2. COMPONENT NAMES AND FUNCTIONS Main unit 5. OPERATION PROCEDURES P.7~9 P.23~31	
<b>Description</b>				
1	Operational descriptions	Explain operation of each part and handling precautions to customers according to the instruction manual	5. OPERATION PROCEDURES P.23~31 6. HANDLING PRECAUTIONS P.32 <ul style="list-style-type: none"> <li>Warnings and Cautions</li> </ul> 13. LIST OF HAZARDOUS SUBSTANCES P.41 <ul style="list-style-type: none"> <li>Table 13.1 Hazardous materials...</li> </ul>	
2	Error Codes	Explanation of error codes and cancellation methods to customers according to the instruction manual	9. TROUBLESHOOTING <ul style="list-style-type: none"> <li>Reading Error</li> </ul> Codes... P.36 <ul style="list-style-type: none"> <li>Troubleshooting Guide.</li> </ul> P.36	
3	Maintenance and Inspection	Explain about maintenance of equipment and each component according to instruction manual.	7. MAINTENANCE PROCEDURES <ul style="list-style-type: none"> <li>INSPECTION AND MAINTENANCE</li> </ul> P.33	
4	Installation complete Items mentioned	<ul style="list-style-type: none"> <li>The date of installation and the person in charge shall be indicated on the nameplate of the product.</li> <li>Fill in necessary information to warranty card and hand it over to customer</li> <li>Explain how to contact with service personnel</li> </ul>	10. SERVICE & REPAIR <ul style="list-style-type: none"> <li>Requests for...</li> </ul> P.37	

## 15. List of Options

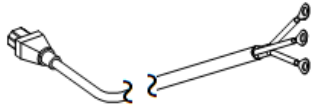
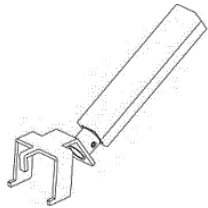
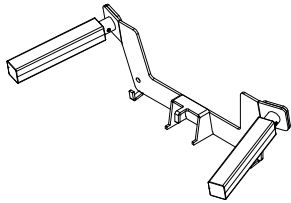
A variety of options are available to suit your application.

Please contact your distributor or " 16. Contact information(p.48)" to purchase the product.

Product name	Model/Product Code	Description	Product Contents
Protective cover (for MFD) 	OA154/281395	Protective cover to protect the MFD main unit from dirt and sample scattering. Refer to Protective Cover Installation for installation instructions.	Silicon protective cover x1
Protective cover (for MFH) 	OA155/281396	Protective cover to protect the MFH main unit from dirt and sample scattering. Refer to Protective Cover Installation for installation instructions.	Silicon protective coverx1
External temperature sensor 	OA153/281394	When external temperature control is used, it is attached to the main body of the MFH. Use by inserting it into the external temperature sensor connection connector described in the product appearance [MFH series].	External temperature sensorx1
pole set 	OA143/281381	This is a set of poles that can be attached to the main body of MFD and MFH to attach muff, etc. Offset bar allows for use with large containers. Refer to pole (optional) installation for mounting method.	Pole (Φ10xL480) x 1 Pole offset plate x 1 Bolt x 1 Washer x 2 Nut x 1 Spanner x 1
Container fall prevention frame 	OA146/281384	A variable frame to prevent containers such as beakers from slipping off the top plate when they are placed on the stirring table. Refer to Installation and Usage of Container Tipping Over Prevention Frame (optional) for the installation method.	Container fall prevention frame x1
Stage for lab jacks 	OA147/281385	This stage allows the main body of the Mag-Mixer to be placed on various lab jacks. Refer to Installation of the stage for lab jacks (optional) for installation method.	Stage for lab jack x1



## 15. List of Options

Product name	Model/Product Code	Description	Product Contents
Power supply cable (round terminal 2m) 	OA183/281587	Power cable with round terminals.	Power supply cable (round terminal 2m)×1
Aluminum block handle 	OA144/281382	Handles for carrying various types of aluminum blocks. Refer to Installation and usage of aluminum block handles (optional) for installation instructions.	Aluminum block handle×1
Dual-handed aluminum block Handle 	OA145/281383	A double-handed handle for carrying various types of aluminum blocks. Refer to Installation and Usage of Double-Handed Aluminum Block Handles (Optional) for installation instructions.	Dual-handed aluminum block Handle×1
Glass bath for BOG100	OBO14/222193	Glass bath for BOG100 can be used as an oil bath if placed on top.	Glass bath (φ150) ×1
Glass bath for BOG200	OBO16/222194	Glass bath for BOG200 can be used as an oil bath if placed on top.	Glass bath(φ180) ×1

## 15. List of Options

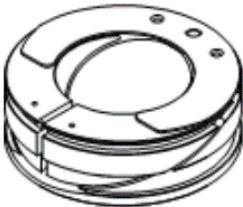


Product name	Model/Product Code	Description	Product Contents
Muff	OLM44/231632	For $\phi 5 \sim \phi 13$	Muffx1
	OLM46/231633	For $\phi 6 \sim \phi 17$	Muffx1
	OLM48/231634	For $\phi 9.5 \sim \phi 29$	Muffx1
Double Opening Clamp	OLM50/231635	Tightness adjustment range: 3~55mm Shaft diameter: 10mm compatible flask: 50mL~3000mL	Clampx1
	OLM52/231636	Tightness adjustment range: 3~80mm Shaft diameter: 12mm compatible flask: 50mL~5000mL	Clampx1

Product name	Model/Product Code	Description	Product Contents
High Magnetic Agitator	OA148/281386	Oval $\Phi 6 \times 15$	High Magnetic Agitatorx1
	OA149/281390	Octagon $\Phi 3 \times 13$	High Magnetic Agitatorx1
	OA150/281391	Octagon $\Phi 8 \times 13$	High Magnetic Agitatorx1
	OA151/281392	Octagon $\Phi 8 \times 38$	High Magnetic Agitatorx1
Magnetic Agitator	OA152/281393	Micro $\Phi 2 \times 5$	Magnetic Agitatorx5
	TB-20/F-4028-02	20mm	Magnetic Agitatorx12
	TB-30/F-4028-03	30mm	Magnetic Agitatorx12
	TB-40/F-4028-04	40mm	Magnetic Agitatorx12
	A-43/F-4025-04	43mm	Magnetic Agitatorx6

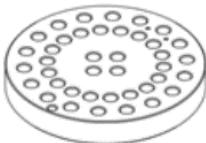
## 15. List of Options

### List of Aluminum Blocks by Container Used

Integrated model

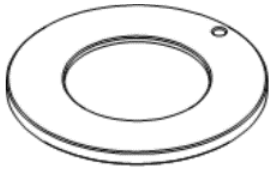
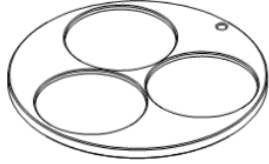
Shape	target flask		Model/Product Code	Identification number	
	Eggplant flask (sold separately)		200ml	OA167/281432	200JE
			300ml	OA171/281436	300JE
			500ml	OA172/281566	500JE
			1000ml	OA173/281567	1000JE
			2000ml	OA174/281568	2000JE
	Round flask (Sold separately)		200ml	OA175/281572	200JR
			300ml	OA176/281573	300JR
			500ml	OA177/281574	500JR
			1000ml	OA178/281575	1000JR
			2000ml	OA179/281576	2000JR

Integrated model



Shape	Container size and number of usable holes	Model/Product Code	Identification number
	Container outer diameter $\Phi 12\text{mm}$ / Plate depth 20mm, 40 pcs.	OA158/281423	$\Phi 12$
	Container outer diameter $\Phi 15\text{mm}$ / Plate depth 20mm, 38 pcs.	OA159/281424	$\Phi 15$
	Container outer diameter $\Phi 17\text{mm}$ / Plate depth 20mm, 38 pcs.	OA160/281425	$\Phi 17$
	Container outer diameter $\Phi 18\text{mm}$ / Plate depth 20mm, 34 pcs.	OA161/281426	$\Phi 18$
	Container outer diameter $\Phi 21\text{mm}$ / Plate depth 20mm, 30 pcs.	OA162/281427	$\Phi 21$
	Container outer diameter $\Phi 30\text{mm}$ / Plate depth 26mm, 12 pcs.	OA163/281428	$\Phi 30$
	Container outer diameter $\Phi 35\text{mm}$ / Plate depth 26mm, 12 pcs.	OA164/281429	$\Phi 35$

## 15. List of Options

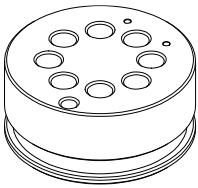
### Holder

Name	Body shape	Model/Product Code
Single Holder		OA156/281421
Triple Holder		OA157/281422

### For small containers

Shape	target flask		Model/Product Code	Identification number	Description
	Eggplant flask (sold separately) 	10ml	OA169/281434	10JE	
		20ml	OA168/281433	20JE	
		30ml	OA165/281430	30JE	ISO Round 25ml available
		50ml	OA166/281431	50JE	ISO Round 50ml available
		100ml	OA170/281435	100JE	ISO Round 100ml available

### Adapter type for small containers

Shape	Container size and number of usable holes	Model/Product Code	Identification number
	Container outer diameter $\Phi 12\text{mm}$ / Plate depth 40mm, 8 pcs.	OA180/281577	$\Phi 12$
	Container outer diameter $\Phi 16\text{mm}$ / Plate depth 40mm, 6 pcs.	OA181/281578	$\Phi 16$
	Container outer diameter $\Phi 24\text{mm}$ / Plate depth 40mm, 4 pcs.	OA182/281579	$\Phi 24$

## 16. Contact information

(1) 日本
<p>お客様総合サービスセンター フリーコール 0120-405-525 携帯電話からのお問い合わせは：0570-064-525 FAX：055-284-5210 受付時間：9:00～17:30 ※土・日・祝日・振替休日を除く（12:00～13:00の間も受け付けております）</p>  <p><a href="http://www.yamato-net.co.jp">http://www.yamato-net.co.jp</a></p>
2) USA・Canada・Latin America
<p>Yamato Scientific America Inc. 925 Walsh Avenue, Santa Clara, CA 95050, U.S.A <a href="http://www.yamato-usa.com">http://www.yamato-usa.com</a> Toll Free: 1-800-2-YAMATO (1-800-292-6286)</p>
3) Other Country
<p>For repair service, maintenance service and consumables purchase support, please contact to our distributors from whom you purchased. Or please visit to our customer support website at <a href="https://www.yamato-scientific.com/support/inquiry/">https://www.yamato-scientific.com/support/inquiry/</a></p>
4) China
<p>雅马拓科技贸易（上海）有限公司 上海市徐汇区桂箐路 65 号新研大厦 B 座 1001-1002 室 Tel: 021-6443-5319 Fax: 021-5452-0268 URL: <a href="http://www.yamato-china.cn">http://www.yamato-china.cn</a></p>

## Limited Liability

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

**If you use the product in a manner other than that described in the instruction manual, accidents or malfunctions may occur.**

**In the event of any occurrence, Yamato Scientific Co.**

**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.**

Instruction Manual

Product Name Mag -Mixer

Model type MFD800/MFH800

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