

# Instruction Manual for

**Incubator Shaker**    model    **IK 400**  
**IK 400W**  
**IM 400**  
**IM 400W**

2nd Edition


- Thank you for purchasing the Yamato Scientific IK/IM incubator shaker.
- For correct use of the incubator shaker, read this manual and the guarantee thoroughly before use. After reading, keep the manual and the guarantee in a safe place for quick reference whenever required.


**WARNING:** Before using this product, carefully read and fully understand the instructions on safety (WARNINGS and CAUTIONS) that appear elsewhere in this manual.




## ■ Safety Symbols


The following safety symbols are used on the product and in this manual. Be sure to follow the instructions and requirements on safety described in this manual when handling the product. Yamato Scientific Co., Ltd. assumes no liability for failure to comply with these instructions and requirements.


 **WARNING** A WARNING denotes a potential safety hazard. It calls attention to a procedure, practice, or condition, which, if not correctly performed, adhered to, or manipulated, could result in injury or loss of life. Resulting injuries include wounds, electrical shock, broken bones, and poisoning, which may lead to other diseases and require long-term hospitalization.

 **CAUTION** A CAUTION denotes a potential safety and equipment hazard. It calls attention to a procedure, practice, or condition, which, if not correctly performed, adhered to, or manipulated, could result in injury or loss of property. Resulting injuries include wounds and electrical shock which may not require hospitalization. Resulting property losses include facilities, equipment, and buildings.

## ■ Symbol Conventions

 This symbol indicates a WARNING or CAUTION (or note). An instruction that must be followed is associated with this symbol.

 This symbol calls attention to an action that must not be done. The instruction for the prohibited act is associated with this symbol.

 This symbol calls attention to an action that must be done. The instruction for this action is associated with this symbol.



## WARNING

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### 1. Do NOT Use Where Flammable or Explosive Gases or Vapors Are Present.



Do **NOT** operate this product where there are flammable or explosive gases or vapors since this product is not explosion-proof. Operation of the product in such an environment constitutes a safety hazard and may cause a fire or electrical shock.

### 2. Use Protective Grounding.



Always connect the protective grounding to the ground, to prevent electrical shock or fire due to stray current.

### 3. Stop Operation Immediately upon an Abnormal Condition.



If you notice smoke or unusual odors coming from the product, immediately stop using it. It may cause a fire or electrical shock.

### 4. Do Not Entangle the Power Cord.



Entangling the power cord will result in overheating and may cause a fire.

### 5. Handle the Power Cord Carefully.



Do not bend or twist the power cord, or apply excessive tension to it. This may cause a fire or electrical shock.

### 6. Do Not Use Flammable or Explosive Gases or Vapors.



Do **NOT** use flammable or explosive substances, or materials containing such substances. This may cause an explosion and/or fire.

### 7. Do Not Disassemble or Make Modifications.



Do **NOT** disassemble or modify this product. This may constitute a safety hazard, resulting in an accident including fire or electrical shock.



## CAUTION

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### Approaching Thunderstorms

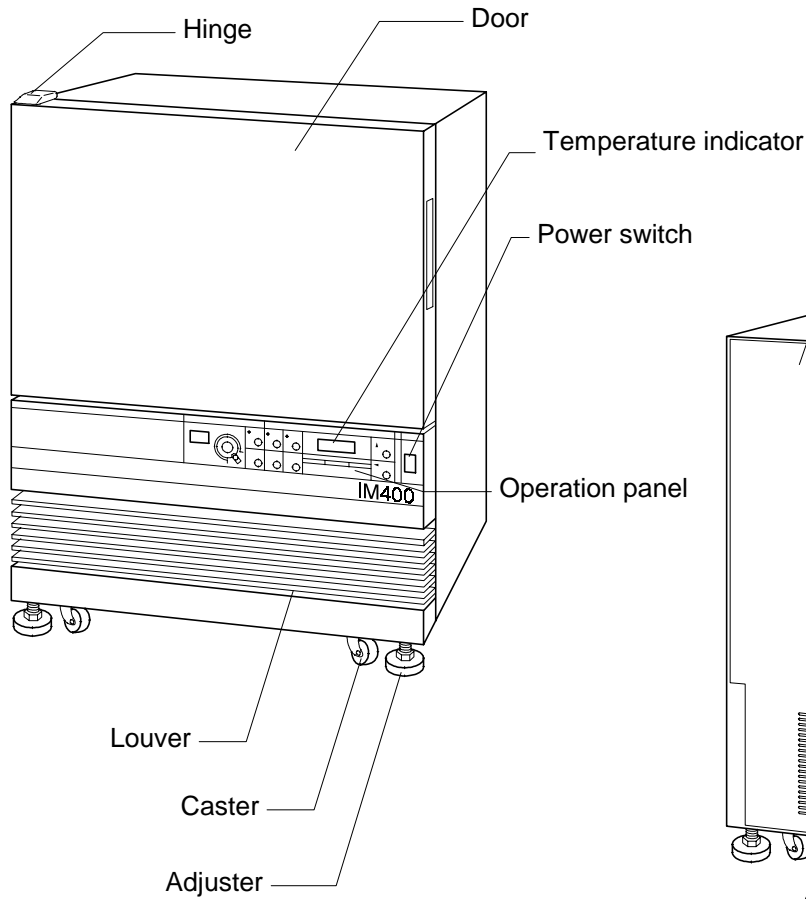


If a thunderstorm approaches in the distance, immediately turn off the power. Lightning from the storm may cause a fire or electrical shock.

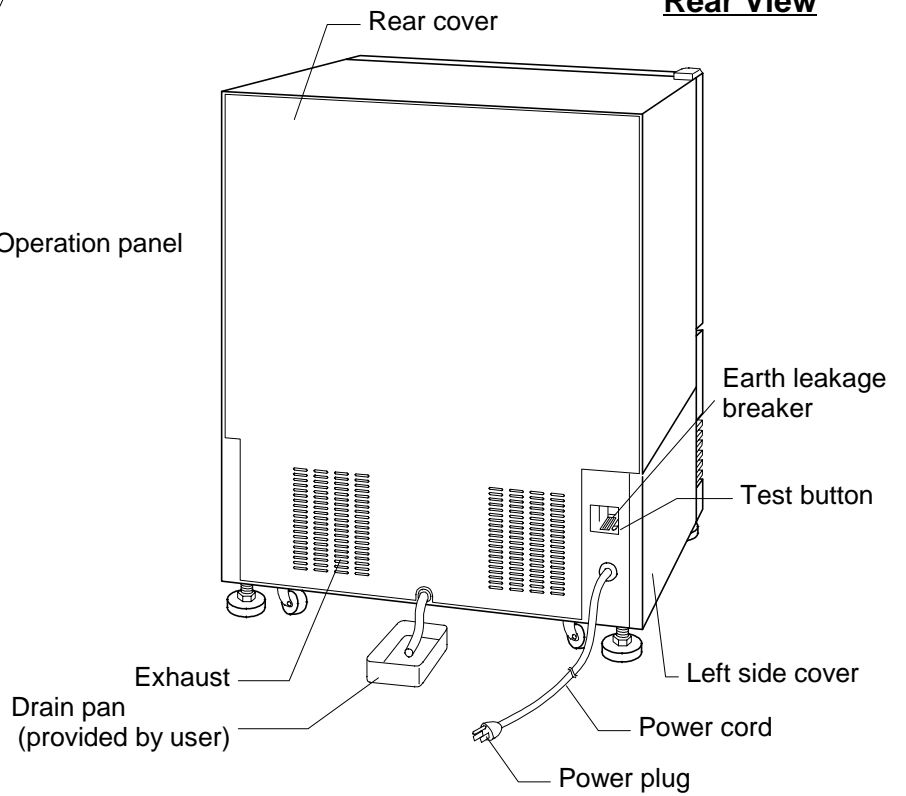
**Parts and Their Functions: Exterior**

Note: Models IK400W and IM400W are furnished with a glass door.

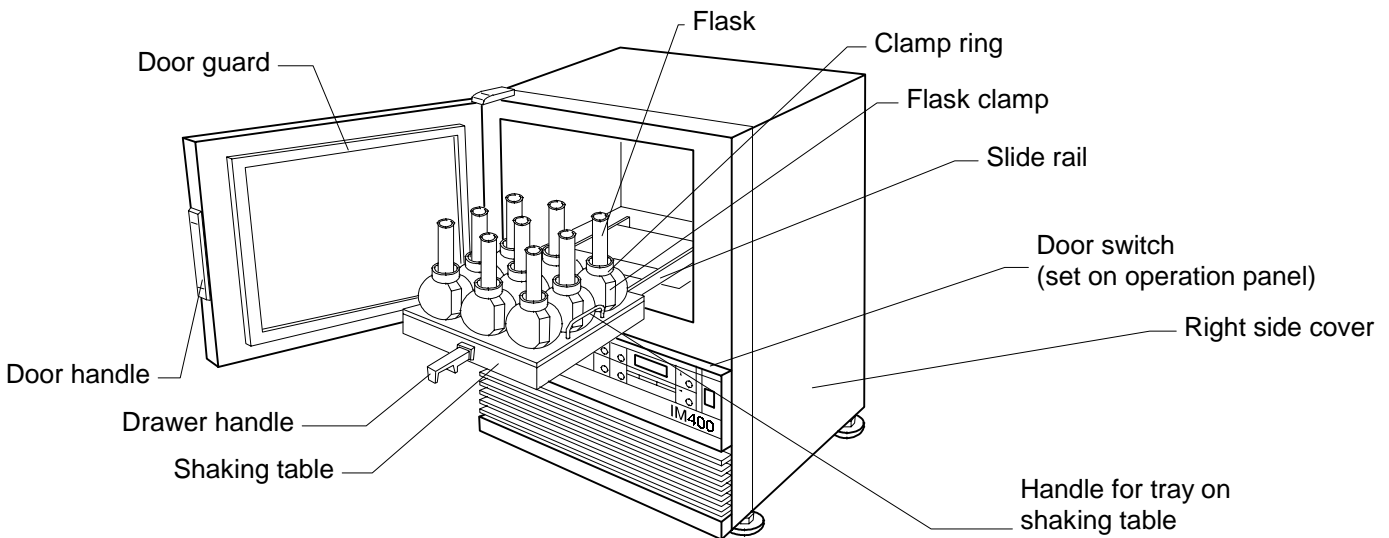
**Front View**



**Rear View**

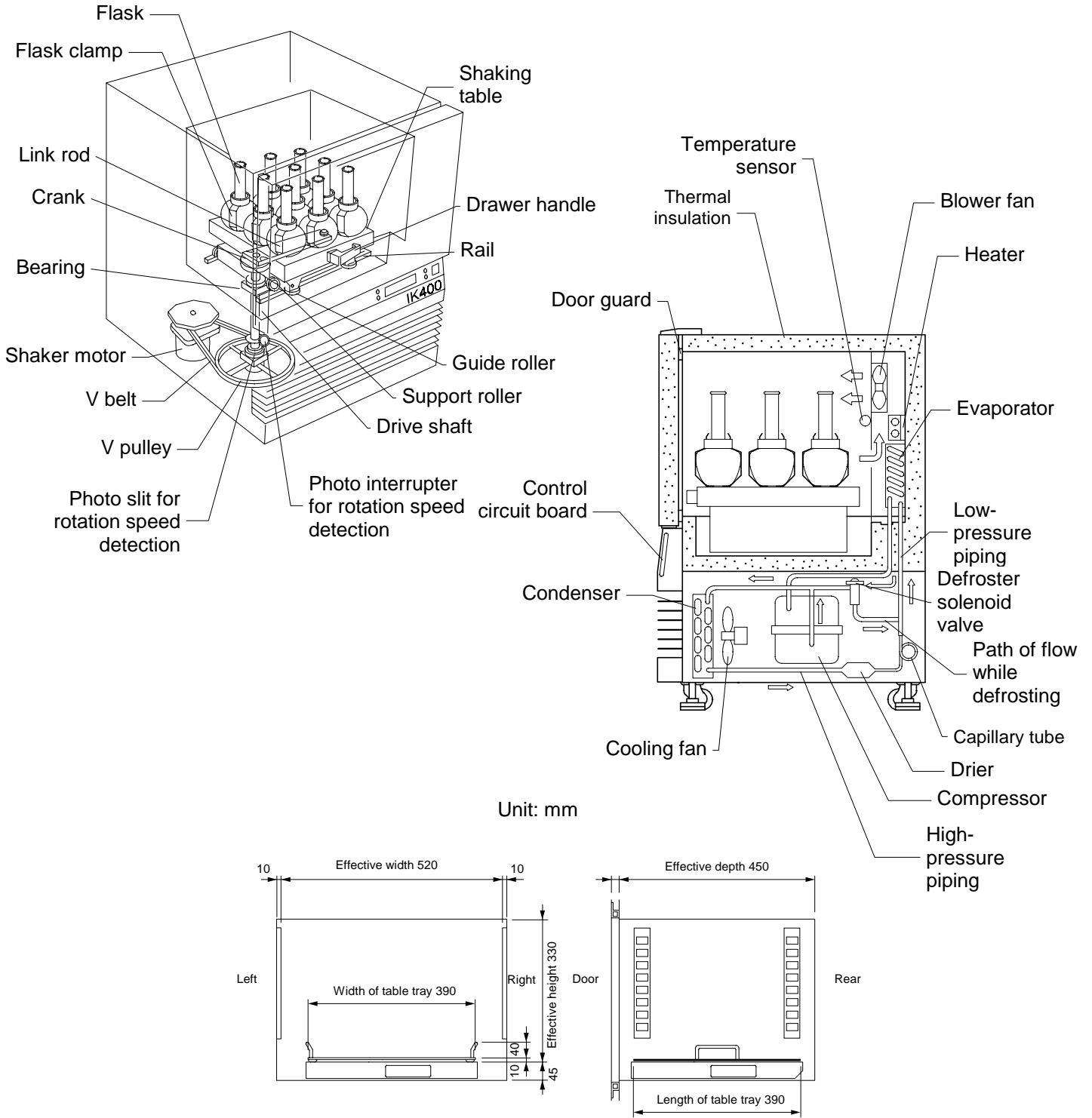


**Inside Door**



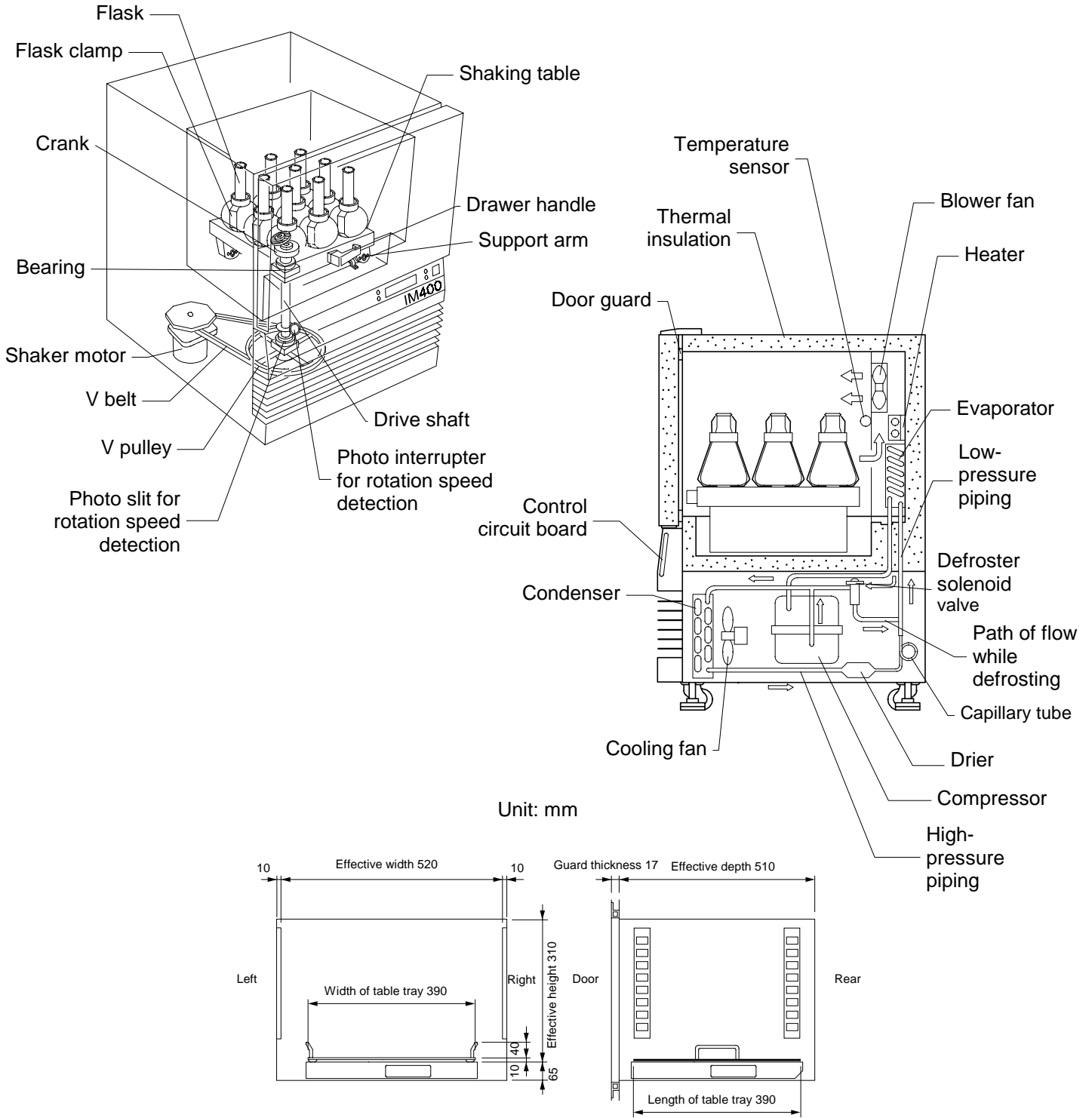
**Parts and Their Functions: Structural Drawings**

**IK Series**

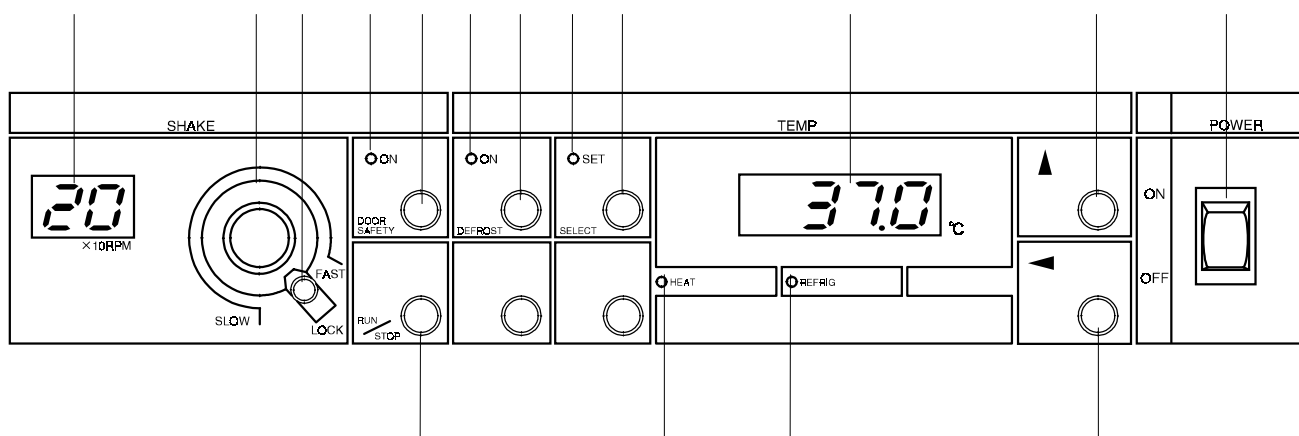


**Parts and Their Functions: Structural Drawings**

**IM Series**



Parts and Their Functions: Operation Panel




Speed indicator	Displays the shaking speed in tenths of the revolutions per minute.
Speed control knob	Used to increase and decrease the speed.
Lock knob	Used to lock the speed control knob to prevent operation error.
Door safety lamp	Lit when the door safety function--to stop shaking if the door is opened--is switched on.
Door safety key	Used to switch on/off the door safety function--to stop shaking if the door is opened.
Run/stop key	Used to start and stop shaking.
Defrost lamp	Lit while defrosting.
Defrost key	Used to start/stop defrosting if the temperature cannot be regulated during low-temperature operation.
Temperature set lamp	Lit while the indicator displays the temperature setpoint.
Temperature set key	Used when setting the temperature setpoint.
Heater lamp	Lit while the heater is on.
Freezer lamp	Lit while the freezer is operating.
Temperature indicator	Displays the setpoint or current internal temperature.
Increment key	Used to increment the set value.
Shift up key	Used to move the entry cursor (blinking) and set the entered value in the microcomputer when setting the temperature setpoint.
Power switch	Used to turn the power on/off.

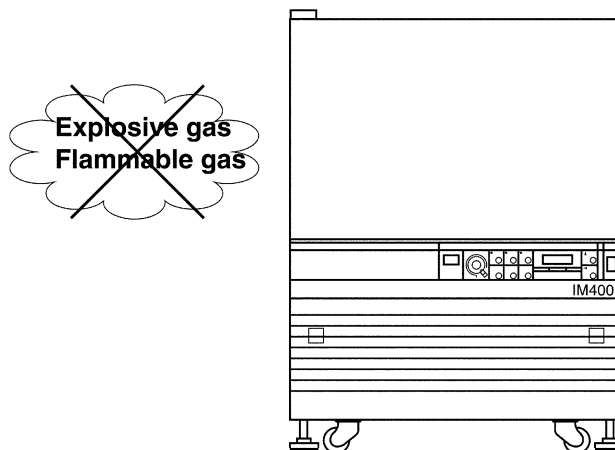


Installation and Preparation Before Use


 **WARNING**


**Do NOT Use Where Flammable or Explosive Gases or Vapors Are Present.**

 Do **NOT** operate this product where there are flammable or explosive gases or vapors since this product is an arcing device--it produces an arc at power-on--and not explosion-proof. Operation of the product in such an environment may cause a fire or explosion.

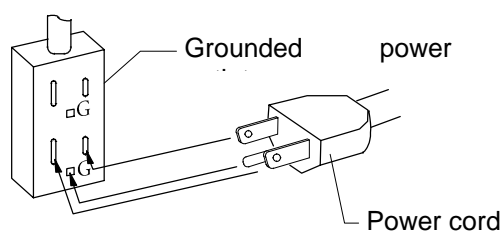


**Use Protective Grounding.**

 Always connect the protective grounding to the ground, to prevent electrical shock or fire due to stray current. Do **NOT** connect the grounding wire to gas supply piping. This may cause a fire.

 Do **NOT** connect the grounding wire to the grounding for telephone lines or lightning rods. This may cause a fire or electrical shock.

■ **A grounded 3-prong power outlet is recommended.**



■ **If there is no grounding terminal**

If a grounding terminal is not provided by the electric facility, a grounding pole (grounding resistance  $\leq 100 \Omega$ , Japanese Industrial Standard Class 3) must be provided. Since this requires personnel qualified to do electrical work, consult the dealer from whom you purchased this product or the nearest Yamato Scientific sales representative office.

## Installation and Preparation Before Use



# WARNING

### Observe the Power Rating.



Use a power outlet whose rating meets the electric capacity.

**Electric capacity:** 100 V AC, 9 A for all IK/IM series products

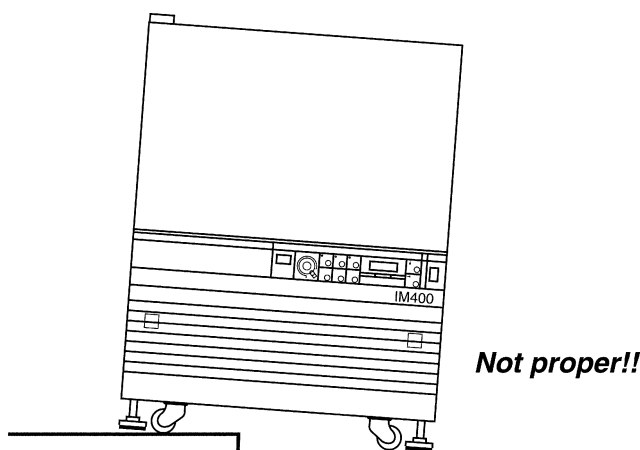


Do not use a multiple-outlet adapter. It may cause overheating.

### Avoid Uneven Surfaces.



Install the product on a level surface. Installing on an uneven surface may cause unanticipated accidents or failures.

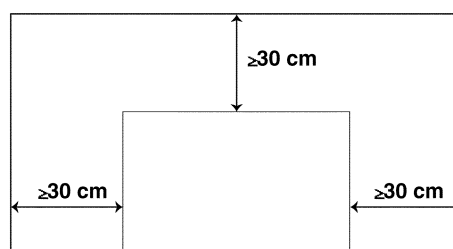


### Installation Location



Avoid the following locations:

- Outdoors
- Where flammable, corrosive, or hazardous gases are present
- Where the ambient temperature is 35°C or higher or 5°C or lower
- Where rapid changes in temperature occur
- Humid or dusty place
- In direct sunlight
- Where flooring is not strong enough to support this product, or on a rack or the like
- Where there is vibration
- Nearby equipment which should be kept away from vibrations



Front



A clearance of at least 30 cm is needed on both sides and at the rear (see the figure on the right)

**Installation and Preparation Before Use**



**WARNING**

**Make fine adjustments for precise level installation.**



After determining where to install the product, use the four adjusters to support this product securely. At that point, also use a level or the like to insure that the product is precisely level. A forward inclination is especially dangerous since the front door may come open and the shelf inside may slide out from the vibration. After adjusting the adjusters, tighten all the adjusters in place with the lock nuts.



Do not allow the weight of the product to rest on any caster.

**After Installation**



To avoid injury, take adequate measures to insure that this product will not fall in the event of an earthquake or from mechanical shock.

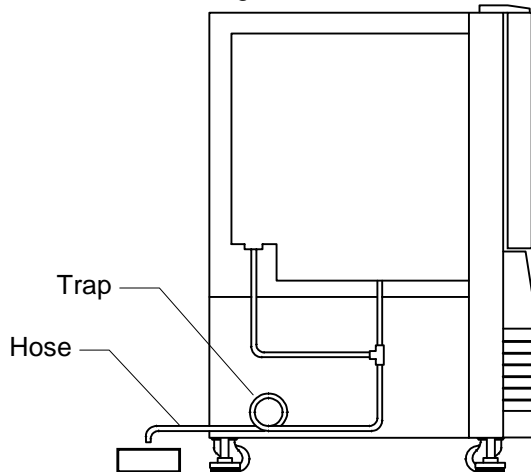
**Drainage of Water**



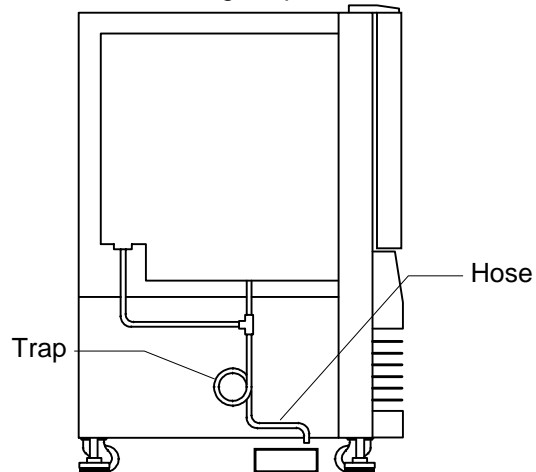
- Water that has condensed inside the incubator is drained through the hose in the rear. Include an adequate-size drain pan
- The hose is as shown in Figure 1 when it is delivered to you; however, the layout can be changed as shown in Figure 2 if it is more suitable for your location.

**To change the hose layout**

1. First make sure that the power cord is unplugged. Detach the rear cover and louver. To detach the louver, refer to page 23, "Daily Maintenance and Inspection."
2. Let the end of the hose stick out from the bottom hole as shown in Figure 2.
3. If the hose seems to be too long, you can make it shorter by cutting it with scissors or the like
4. When laying the hose, be careful not to allow it to be in contact with the V pulley or cooling fan.
5. Be careful not to allow the hose to become twisted.
6. To diminish the intrusion of outside air, make a loop in the hose to make a trap.
7. After the change, reattach the rear cover and louver in their original positions.



**Figure 1**



**Figure 2**



## Installation and Preparation Before Use



### WARNING

#### Do Not Use Flammable or Explosive Gases or Vapors.



Do **NOT** use flammable or explosive substances, or materials containing such substances. This may cause an explosion and/or fire. The substances that must not be used are listed on Page 32 for reference.

#### Abnormal Condition



If you notice smoke or unusual odors coming from the product, immediately stop using it and contact the dealer or your nearest Yamato Scientific representative office to ask for an inspection. Leaving it as is may cause a fire or electrical shock. Do **NOT** repair the product yourself--this is highly dangerous.

#### Do Not Place Hands, Tools or the Like Inside Incubator While It Is Shaking.



Do not place your hand, a tool, or the like inside the incubator while it is shaking. This is very dangerous. Since the shaking table has a great inertia, if your hand or any part of your body is pinched immediately after stopping the operation or while it is shaking at a slower speed, you will be injured.



Even if the door safety function is on, it takes nearly ten seconds for the shaking to stop after the door is opened. Do not touch the table or anything on the table until after the shaking stops completely.

#### Intrusion of Foreign Matter



Foreign matter which intrudes or is accidentally introduced inside the incubator may affect the internal mechanism such as hindering the action of the shaking table or V pulley, and lead to a failure. If foreign matter gets inside the incubator, immediately turn off both the power switch on the front panel and the earth leakage breaker at the rear and shut off the supply power, and then remove the matter. Leaving it as is may cause an equipment failure, fire, or electrical shock.



### CAUTION

#### Approaching Thunderstorms



If a thunderstorm approaches in the distance, immediately turn off the power on the front panel (and earth leakage breaker at the rear) and shut off the supply power. Leaving the power turned on may cause a fire or electrical shock.

#### During Power Failure



While the earth leakage breaker or the power switch is turned off, or during a power failure, the temperature setpoint is backed up by a built-in battery. The shaking speed is retained since it is set with a knob. These features allow an automatic restart with the previous set values after a power recovery.



## CAUTION

### Defrosting



During operation at low temperatures, the evaporator becomes heavily frosted. This large amount of frost degrades the freezing power, and the temperature then may not be regulated at the setpoint. The use of samples having a large water content especially accelerates frost on the evaporator--be careful. If you observe that the temperature cannot be regulated at the setpoint, press the defrost key to start defrosting.



After being started, defrosting automatically stops after about ten minutes. While defrosting, the internal temperature rises--be careful.

### Drainage



Condensation inside the incubator or defrost drain drains through the hose at the rear. Provide an adequate-size drain pan. Check the amount of drainage in the pan frequently to avoid overflow.



Depending on the installation environment and internal temperature, if a glass door is furnished, it may become fogged.

### Placement of Samples



- If the optional shelves are used, allow at least a 30% clearance above the samples on each shelf to insure accurate temperature control. Too many samples may disable proper temperature control. The maximum allowable weight is 5 kg(f) per shelf.
- Since the internal temperature is controlled by air circulation, frequent checks should be made that the samples have not dried up. It is especially true if the sample containers are not covered while the freezer is operating that the samples may dry up. When placing samples on an optional shelf, avoid placing them near the fan outlet. This may degrade the temperature control accuracy and the circulating air may affect the samples themselves.



## CAUTION

### Do Not Use Corrosive Samples.



- A major part of the internal structure is stainless steel (JIS SUS304 – JIS stands for Japanese Industrial Standards); however, strong acids may corrode it--be careful.
- The guard is made of vinyl-chloride rubber, which may be corroded by acids, alkalines, oils, or halide solvents--be careful.

### Be Careful Not to Get Burned.



- Be careful not to get burned. The interior and the inside of the door may become extremely hot during and immediately after operation.
- The upper operating temperature limit is 60°C. Do not set the temperature higher than this.

### When Opening/Closing Door



When opening/closing the door, do not get in the way of the door. It may hit you and cause an injury.



Close the door tightly when operating.

### Powering-on after Shutdown



After turning off the earth leakage breaker or power switch, do not turn the power on again for at least 15 minutes to protect the freezer.

### Do Not Step On the Product.



Do not step on the product. It may fall over or break and cause an injury.

### Do Not Place Anything on Top.



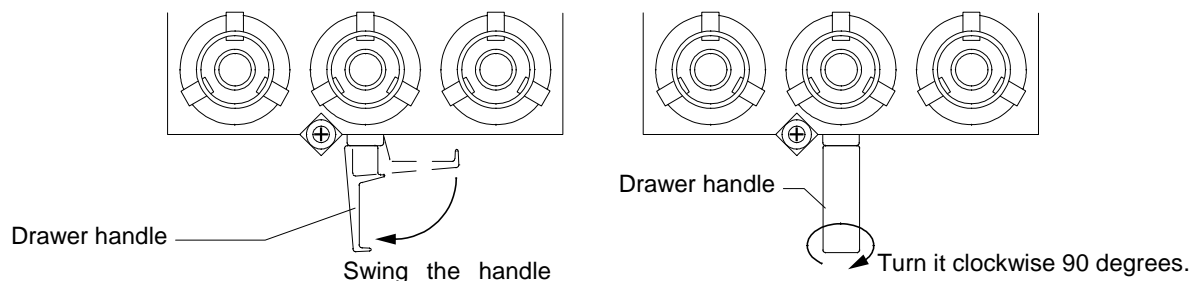
Do not place anything on top of the product. It may fall off and cause an injury.

## Placing Flasks

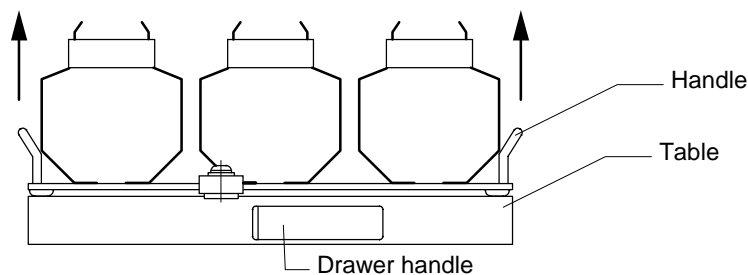
### ■ Placing Flasks

Open the door and confirm that shaking has stopped.

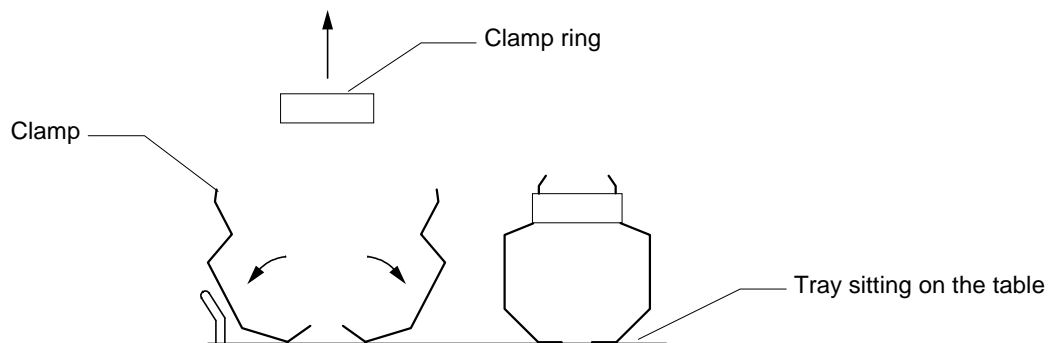
Swing the handle out and turn it clockwise 90 degrees, and then draw out the table.



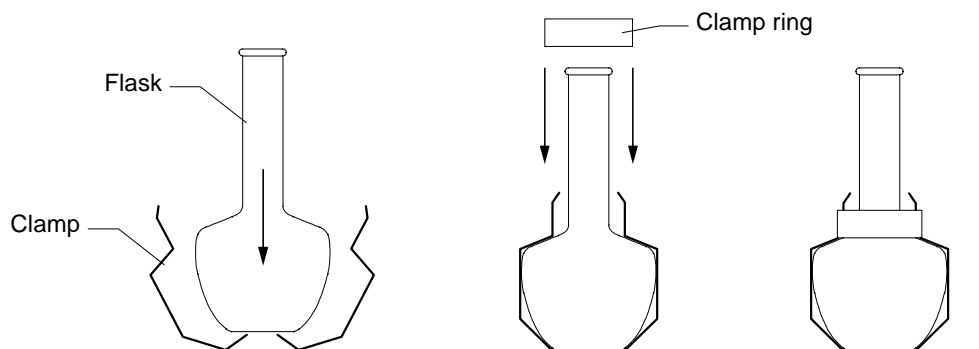
Hold the tray on the table with both hands and lift it off of the table. Note that the tray does not always have to be removed when placing or taking out flasks.



Remove the clamp ring from the clamp



Place a flask in the middle of the clamp so it will sit properly. The clamp closes naturally.



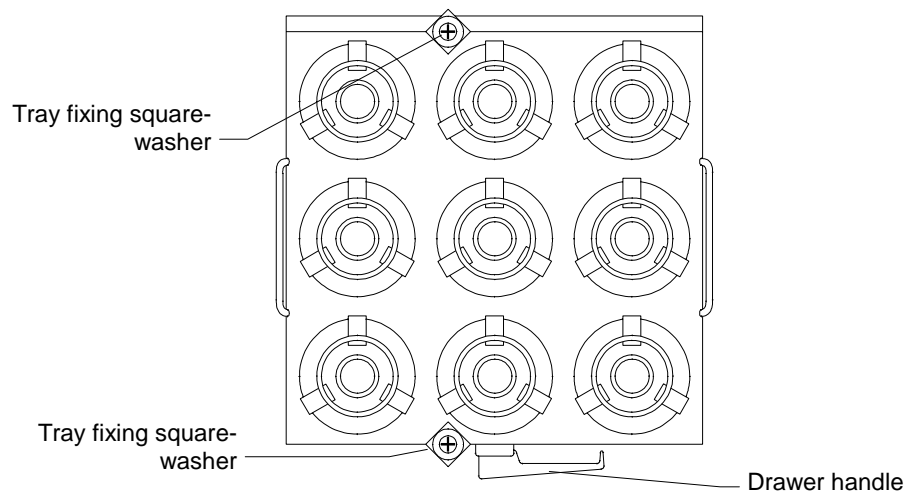


## Placing Flasks

Attach the clamp ring in its correct position as shown in the figure below.

Attach rings to all the clamps including those with no flasks.

Place the tray on the table. Confirm that the tray fixing square-washers at the front and back properly fit the grooves of the tray.



If improperly attached, the tray may slide off while shaking.

Hold the drawer handle and push the table in slowly. After completely pushing the table in, turn the handle counterclockwise 90 degrees and swing it in.

The maximum allowable weight on the tray is 6 kg(f).

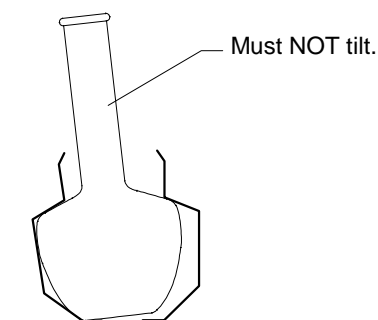
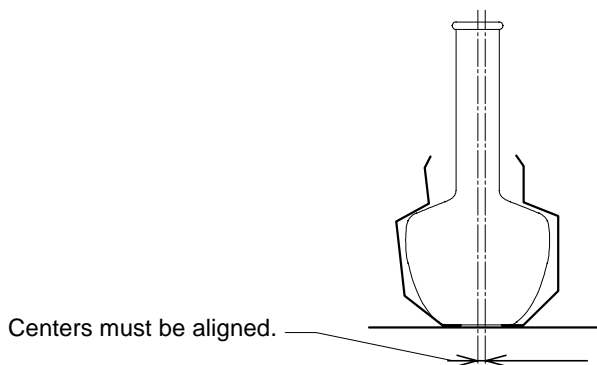
## Placing Flasks



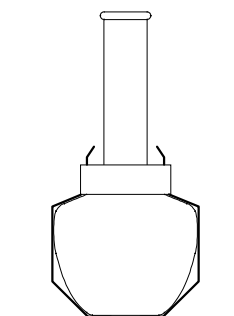
Place flasks properly.



Place each flask so its center is aligned with the middle of the clamp and so it sits straight up.



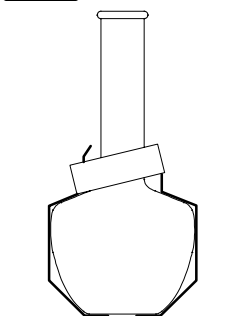
Do not use a flask that does not fit the clamp. Attach the clamp properly by inserting it to the neck of the clamp.



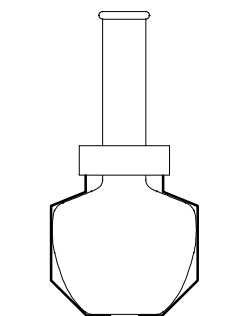
**PROPER placement**



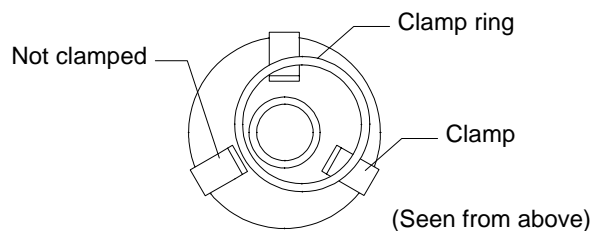
If a clamp ring is not attached properly or if a flask that does not fit the clamp is used, the flask may come loose from the clamp while shaking, thus breaking the flask.



**IMPROPER:** tilted clamp ring




**IMPROPER:** Clamp ring is not fit down to its base position.




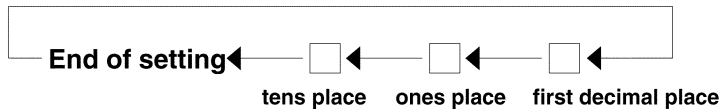
**IMPROPER:** Ring is not catching all the clamp wires.


## Setting the Temperature


Press the temperature set key () . The indicator then displays the previous temperature setpoint.

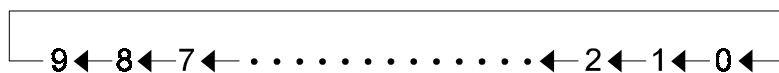
The temperature set lamp () is lit, indicating that the setting mode is on.


Press the left cursor key () to move the entry cursor (blinking digit) to the digit you wish to change. Pressing this key moves the cursor in the following sequence.





After moving the entry cursor to the desired digit, use the increment key () to change the number.

Pressing the increment key () changes the displayed number in the following sequence.




Pressing the left cursor key () once when the cursor is in the tens place (blinking) ends the setting and overwrites the temperature setpoint.


















After ending the setting, press the temperature set key () once. The mode then changes to measurement. Even if the temperature set key () is not pressed, the mode automatically returns to measurement after ten seconds with no key operation.

(If the mode returns from setting to measurement before you have made the setting, i.e., if the mode returns while a digit is blinking, the temperature setpoint is not changed and the temperature is controlled with the previous setpoint.)

In the measurement mode, the temperature indicator displays the internal temperature and the temperature set lamp **SET** is off.

(It is recommended to verify the new setpoint by pressing the temperature set key ().)

The following shows an example of the temperature setting procedures, to change the setpoint to 27.5°C (from the previous setpoint of 31.7°C).

	Step	Key	Display and Indication Lamp
(a)			Lit.
(b)		The temperature display changes as shown below (with the first decimal place blinking).	
		<span style="border: 1px solid black; padding: 2px;">3 1.7</span>	
(c)			Change the number.
		<span style="border: 1px solid black; padding: 2px;">3 1.5</span>	
(d)			Move the cursor to the ones place.
		<span style="border: 1px solid black; padding: 2px;">3 1.5</span>	
(e)			Change the number.
		<span style="border: 1px solid black; padding: 2px;">3 7.5</span>	
(f)			Move the cursor to the tens place.
		<span style="border: 1px solid black; padding: 2px;">3 7.5</span>	
(g)			Change the number.
		<span style="border: 1px solid black; padding: 2px;">2 7.5</span>	
(h)			End the setting.
		<span style="border: 1px solid black; padding: 2px;">2 7.5</span>	
(i)			Off. The indicator then displays the internal temperature.

Pressing the




key in this mode does not affect the temperature setpoint at all.

The occurrence of a problem in temperature control is indicated by an error display.


(See Page 21, "Safety Systems and Error Codes.")

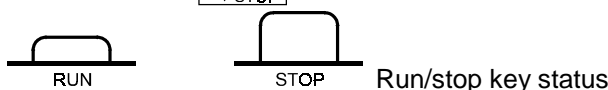
## Operating the Shaker

For safe operation, keep the “door safety” key () switched on.

Turn the speed control knob to its leftmost position (SLOW side).

(Turn the knob after loosening the lock knob.)

Close the door and press the run/stop key (). Shaking then starts.




After the shaking starts, slowly turn the speed control knob clockwise to set the speed to the desired level.

The speed indicator shows the current speed in tenths of the revolutions per minute

(e.g., 130 rpm is displayed as **13**.)

The shaking speed increases and decreases slowly, so it does not follow a quick turning of the knob.




To stop the shaking, press the run/stop key () again.

Do not open the door until the table stops moving completely (about ten seconds).



Since the shaking table has a great inertia, if your hand or any part of your body is pinched immediately after stopping the operation or while it is shaking at a slower speed, you will be injured.

### ■ Regarding “Door Safety” Key


The “door safety” function is a safety mechanism that stops the table when the door is opened. Usually, keep the “door safety” key () switched on.

Behavior when the “door safety” key () is on (the “door safety” lamp is lit):

- Shaking stops if the door is opened (but doesn't stop quickly).
- Shaking restarts when the door is closed.

Behavior when the “door safety” key () is off (the “door safety” lamp is off):

- Shaking continues regardless of whether the door is opened or closed.
- This may be useful for controlling the speed while observing the shaking status of the samples with the door opened.

If the run/stop key () is in ‘STOP’ state, shaking stops regardless of whether the “door safety” key is on or off and whether the door is opened or closed.






# Safety Systems and Error Codes

This incubator features safety systems independent of the controller, in addition to the self-diagnostics function of the controller. The table below shows the causes when the safety systems go into effect and the countermeasures to be taken.

If an abnormality such as an operational error or equipment failure occurs, the corresponding error code "ErrX" (where X is a number) appears on the operation panel display and a buzzer sounds. In this case, check the error code and immediately stop operation.

Safety System	Display	Causes and Countermeasures
Earth leakage breaker	None	Leakage or over-current Contact your nearest service representative office to check for the cause of shutdown of the breaker.
Automatic overheating protector	None	Heating of sample Decrease the sample.

## ■ Error Codes and Corresponding Countermeasures


Error Code Display	Description	Countermeasure
	Disconnection of temperature sensor	Replace the sensor.
	Short-circuiting of TRIAC	Replace the TRIAC.
	Disconnection of heater	Replace the heater.

If a problem is detected, the error code appears on the temperature indicator, a buzzer sounds, and then the freezer and heater circuits are shut off.

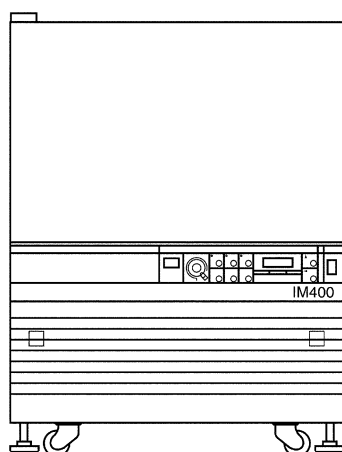
## Daily Maintenance and Inspection

### **WARNING**

#### Do NOT Make Modifications to This Product.

 Disassembly of the product is strictly prohibited. This may cause an electrical shock since there are high-voltage circuits inside the product. Inspection, maintenance, or repair of the internal circuits and mechanisms should be inquired of the dealer or your nearest sales representative office.


Modification is strictly prohibited. This may cause a fire or electrical shock.



Do **NOT** make any modification

### **CAUTION**

#### Before Maintenance ...

 Make sure that you turn off the power on the front panel and the earth leakage breaker at the rear, and shut off the supply power, before maintenance. Do not do any maintenance work until the internal temperature returns to near room temperature.

Use a soft, damp cloth to wipe off dirt from the resin moldings and operation panel. Do not clean the product with a volatile solvent such as a thinner or benzene or cleanser, and do not rub it with a pot cleaner or brush. This may cause a deformity, alteration, or discoloration.

#### Every Month ...

 Follow the procedure below to check the operation of the earth leakage breaker once a month.

- Plug in the power cord. Do the check with the power turned on.
- Set the earth leakage breaker to on.
- Use the tip of a ball-point pen or the like to press the red test button of the breaker. If the breaker turns off, then it is operating normally.



## Daily Maintenance and Inspection

### Cleaning the Condenser Slats

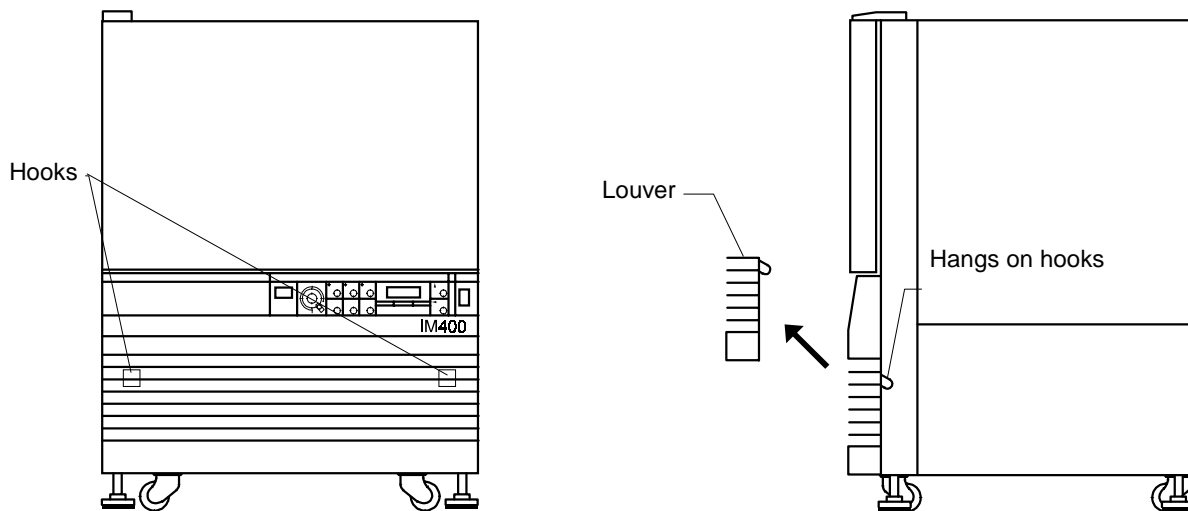


Dust adhering to the condenser slats degrades freezing ability and may prevent the temperature from being controlled at the setpoint. To avoid this, clean the condenser approximately once a month.

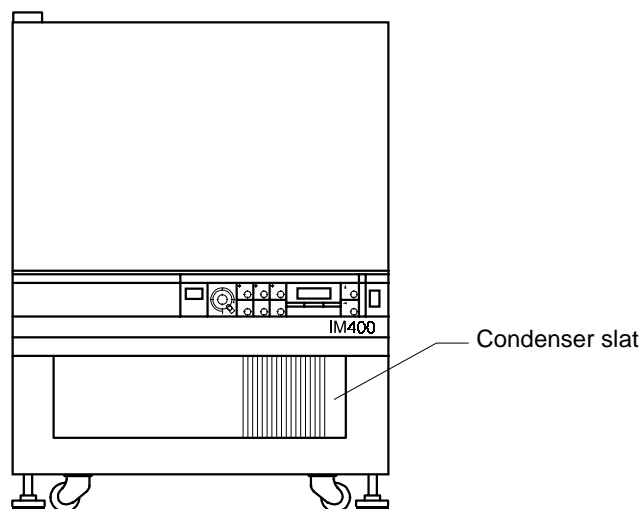
### Cleaning Procedure

(1) Detach the louver on the front as follows.

Unscrew the round-head M4 screws and detach the louver from the front. The louver hangs on the incubator casing with two hooks. Lift it up and pull it off.



(2) Clean the condenser slats with a vacuum cleaner or the like.



Be careful not to bend the aluminum slats when cleaning them.

(3) Reattach the louver in its original position.

## Daily Maintenance and Inspection

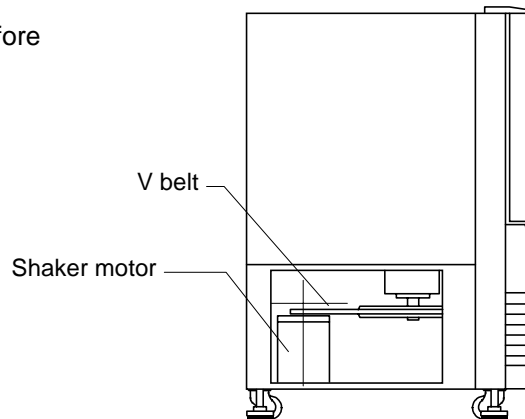
### ■ Adjustment of Tension of V Belt



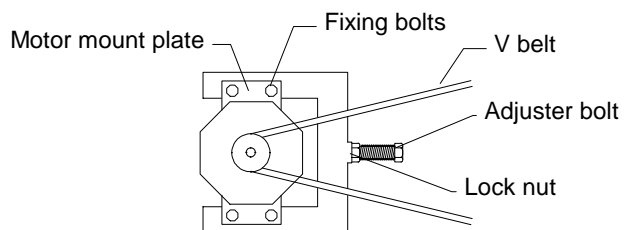
Various problems may result from improper tension of the V belt. To avoid these, check and adjust the tension approximately once every six months.

#### Adjustment Procedure

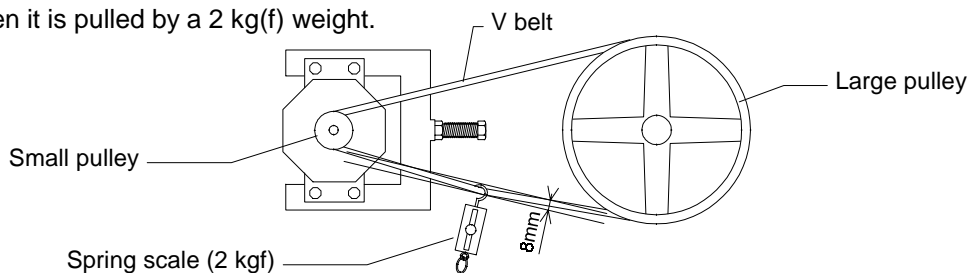
- ( 1 ) Make sure that you unplug the power cord before adjustment.
- ( 2 ) Detach the left and rear covers.



- ( 3 ) Loosen the four bolts that fix the motor mount plate. (Loosen them only--you do not have to remove them.)



- ( 4 ) Loosen the lock nut and turn the adjuster bolt to adjust the tension of the belt so that the belt deflects by 8 mm when it is pulled by a 2 kg(f) weight.



- ( 5 ) After adjustment, tighten the lock nut and then tighten the four fixing bolts.
- ( 6 ) The following conditions may be observed if the belt is improperly tightened.
  - If the belt is too loose:
    1. Slip (speed does not increase) or heating of the pulley
    2. Wearing or cracking of the V belt
    3. Unusual noises
  - If the belt is too tight:
    1. Abnormal heating ( $\geq 110^{\circ}\text{C}$ ) of the motor (normally  $\leq 80^{\circ}\text{C}$ )
    2. Damage to the motor shaft
- ( 7 ) If the V belt wears severely, replace it with a new one. The model number of the V belt is M-40.

## Daily Maintenance and Inspection

### ■ Inspection and Maintenance of Drawer Handle

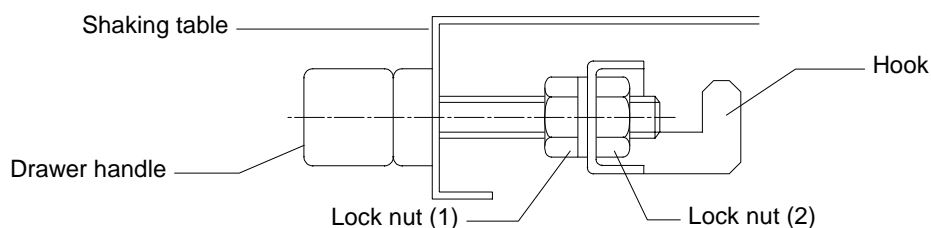


If the shaking table plays back and forth even when the table is pushed in completely and locked, adjustment of the handle hook is needed.

If it continues to operate with the play left as is, the life of handle and slide rails are shortened.

### Adjustment Procedure

(1) Loosen the lock nut (1) and slightly tighten (turn clockwise) the lock nut (2).



(2) Tighten the lock nut (1)

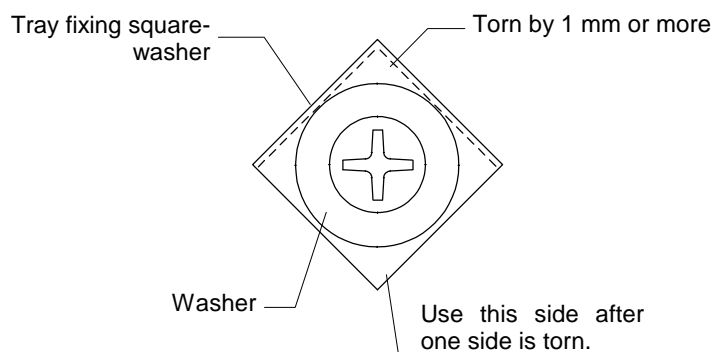
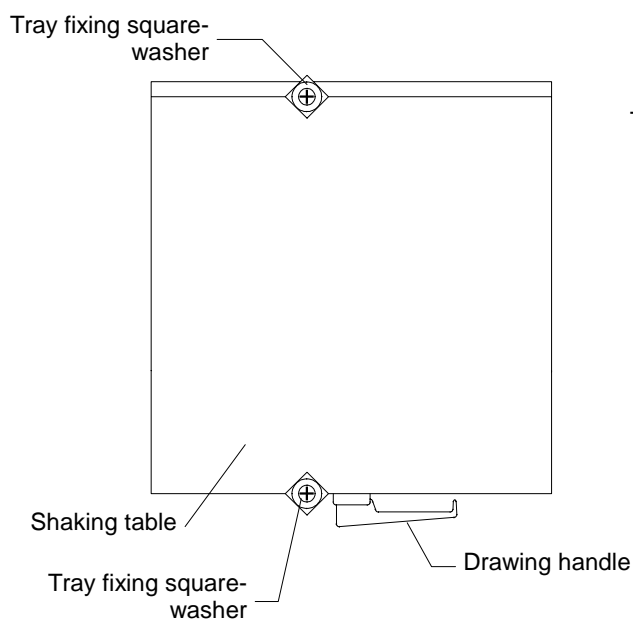
(3) Check the locking condition. If there is still play, repeat steps (1) and (2).

### ■ Inspection of Tray Fixing Square-washers



(1) The tray fixing square-washers will wear out after long-term use. If the working face is torn by 1 mm, loosen the screw and rotate the square-washer to change the working face.

(2) If both sides are torn, replace it with a new one. The guidelines are, although depending on the operating conditions, to rotate the working face after 5,000 hours and to replace it with a new one after 10,000 hours.



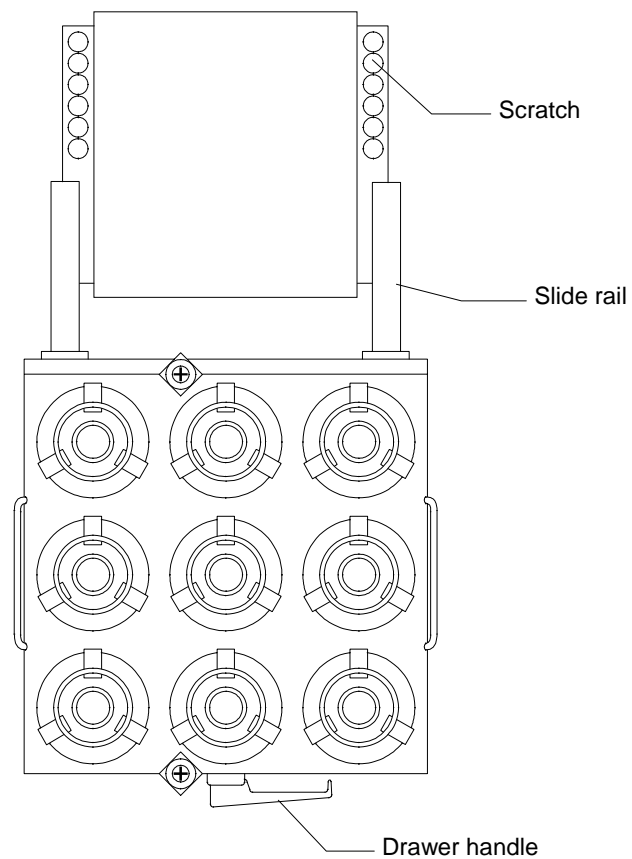
## Daily Maintenance and Inspection

### ■ Inspection of Slide Rails



The working surfaces of the steel ball bearings, which are used for the slide rails, become scratched after use. This is normal.

When the scratches get to be 5 mm long, replace the slide rails with new ones. The slide rails are Model 301-381 from Nihon ACCURIDE.



## If Not Using the Product for a Long Period or If Disposing of It

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# **WARNING**

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### **If Not Using for a Long Period**



If you will not be using the product for a long period, always turn off the power switch on the front and the earth leakage breaker at the rear and shut off the supply power.

### **If disposing**



If you will be disposing the product, keep it out of the reach of children.

**For any questions, contact the dealer from whom you purchased the product or the nearest sales representative's office.**

## Requests for Repairs

### Requests for Repairs

If an abnormality occurs, immediately stop the operation, turn off the power switch, and unplug the power cord. Then, contact the dealer from whom you purchased the product or the nearest sales representative's office.

Have the following information on hand:

- Model number of the product
- Serial number of the product
- Date of purchase (Refer to the guarantee or the name plate on the product.)
- Description of failure (in as much detail as possible)

Show the guarantee to the service personnel who visits your site.

### Guarantee (given with product)

- A certificate of guarantee is given by the dealer or sales representative's office from whom you purchased the product. Check that the name of the dealer and the date of purchase are filled in, read the guarantee thoroughly, and keep it in a secure place.
- The guarantee is good for one year after the date of purchase. According to the guarantee, repairs during this period will be free of charge.
- For repairs after the expiration of the guarantee period, consult the dealer from whom you purchased the product or the nearest sales representative's office. If the product can be repaired, it will be done for a fee per a request from the customer.

### Minimum Period for Maintenance Repair Parts Support

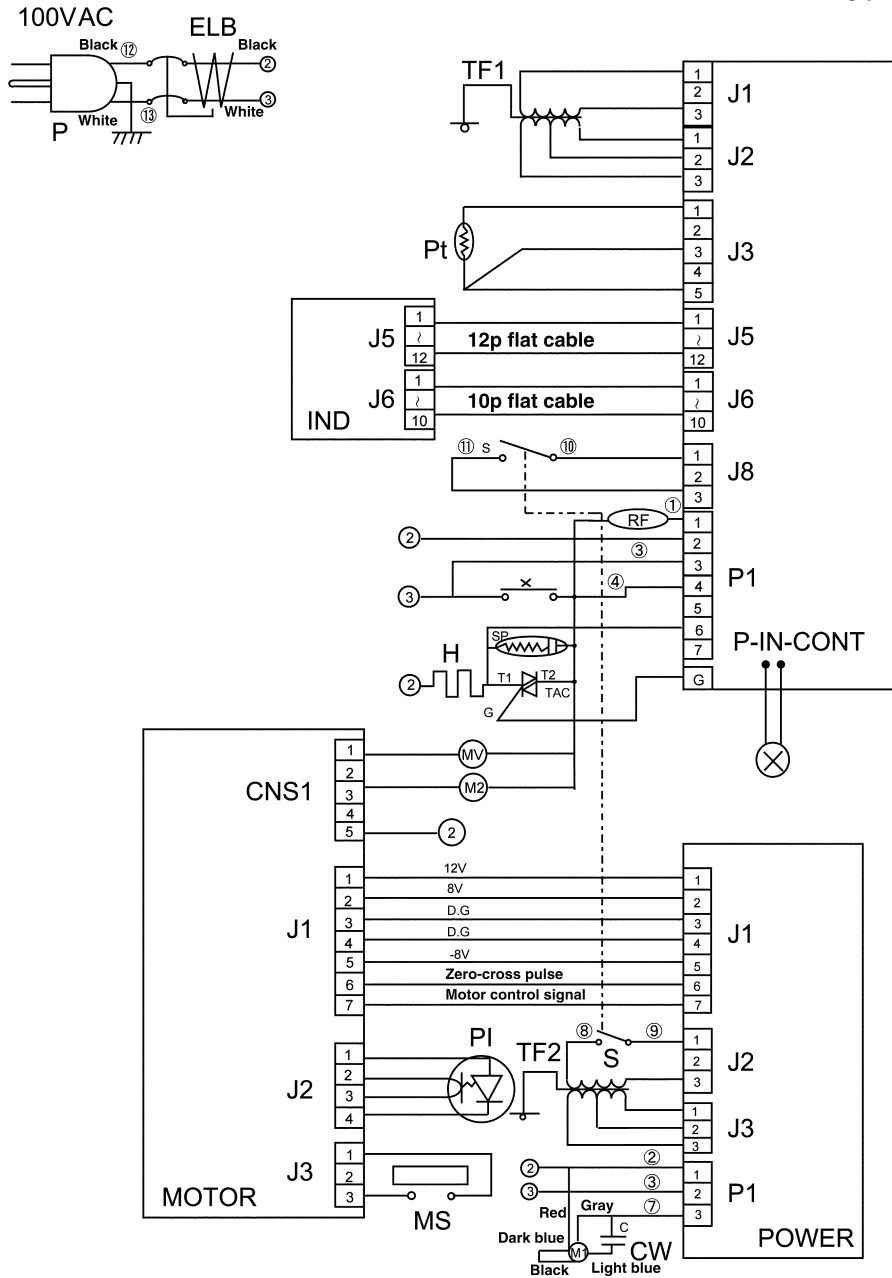
The supply of maintenance repair parts is guaranteed for at least seven years after a discontinuation of the product. These parts include those needed to maintain the performance of the product.

## After-Sales Service and Guarantee

### Troubleshooting

Problem	Causes	Countermeasures
(1) Unusual noise is heard during shaking	<ol style="list-style-type: none"> <li>1. The tray is not sitting on the table properly, or a flask clamp is not set properly.</li> <li>2. Failure of drawer handle</li> <li>3. Improper tension of the V belt</li> </ol>	<p>Set them properly.</p> <p>Adjust the hook or replace the handle.</p> <p>Adjust the tension.</p>
(2) The incubator itself shakes during shaking.	<ol style="list-style-type: none"> <li>1. An adjuster is not touching the floor.</li> <li>2. The floor or rack is not strong enough to support the incubator.</li> <li>3. The floor or rack is not level.</li> <li>4. The incubator is not installed on a level surface.</li> <li>5. Samples are too heavy.</li> </ol>	<p>Adjust the adjuster height.</p> <p>Change the installation location.</p> <p>Change the installation location.</p> <p>Adjust the adjuster heights.</p> <p>Reduce the weight to under 6 kg(f).</p>
(3) The table does not shake.	<ol style="list-style-type: none"> <li>1. The power is not turned on.</li> <li>2. The run/stop key is not pressed.</li> <li>3. The door is not shut(if the “door safety” key is switched on).</li> <li>4. Loosen V belt</li> <li>5. Foreign matter has gotten jammed in the table.</li> <li>6. Foreign matter has gotten jammed in the V pulley.</li> </ol>	<p>Turn on the power.</p> <p>Press the key to start the shaking.</p> <p>Close the door.</p> <p>Adjust the tension.</p> <p>Remove the foreign matter.</p> <p>Remove the foreign matter.</p>
(4) The internal temperature does not drop.	<ol style="list-style-type: none"> <li>1. There is too much frost.</li> <li>2. The room temperature is too high.</li> </ol>	<p>Defrost.</p> <p>Lower the room temperature to no more than 35°C.</p>

**Note:** Common to all models



Symbol	Part	Symbol	Part
C	Condenser	P-IN-CONT	Temperature control board
ELB	Earth leakage breaker	POWER	Motor power supply board
H	Heater	Pt	Temperature sensor
IND	Temperature indicator board	RF	Freezer
M1	Shaker motor	S	Power switch
M2	Fan	SP	Spark killer
MOTOR	Motor control board	TAC	TRIAC
MS	Door switch	TF1	Transformer
MV	Defroster solenoid valve	TF2	Transformer
P	Power plug	X	Main relay
PL	Speed detector		



# Specifications

Model		IK400	IK400W	IM400	IM400W
Temperature control method		Draft circulation			
Shaking method		Horizontal back-and-forth		Horizontal rotating	
Performance *1	Operating temperature range	5° to 60°C			
	Temperature control accuracy	±0.5°C (at 37°C)			
	Temperature distribution accuracy	±1.0°C (at 37°C)			
	Shaking speed	Approximately 30 to 200 rpm			
	Shaking amplitude	70 mm			
Construction	Heater	500-W iron-chrome wire heater			
	Fan	Axial fan with a 14/13-W (50/60 Hz) motor			
	Shaker motor	Fully enclosed 60-W motor			
	Interior	JIS SUS304 stainless steel			
	Heat insulator	Expanded polystyrene (styrene foam)			
	Window	Not furnished	Furnished	Not furnished	Furnished
	Freezer	130-W, air-cooled sealed freezer (R130a coolant)			
	Shaking table	JIS SUS304 stainless steel. The tray must be used.			
Control unit	Temperature control	PID control using a microcomputer			
	Temperature setting and display	Digital setting using the increment and cursor keys. 7-segment green LEDs; display of 3 digits.			
	Speed setting and display	Analog setting using a turning knob. 7-segment green LEDs; display of 2 digits.			
	Temperature sensor	Platinum resistance temperature detector			
	Auxiliary function	Defrost function (continuous 10-minute defrosting after switch-on)			
Safety systems	Featured in controller	Self-diagnostics (sensor, heater, TRIAC, main relay)			
	Security	Door switch ("door safety" function), earth leakage breaker			
Other specifications	Dimensions*2	710 (W) X 650 (D) X 920 (H) mm			
	Maximum load	Nine 500-ml Erlenmeyer flasks (up to 6 kg(f))			
	Maximum load on optional shelf	Approximately 5 kg/shelf			
	Power supply	100 V AC, 50/60 Hz, 9 A			
	Weight	Approximately 125 kg(f)			
Accessories		Instruction manual			

\*1: Reference conditions: temperature 23°±5°C, humidity 65±20%, and with the rated power supply

\*2: Excluding protruding portions

## ■ Parts Common to the IK and IM Series

Part	Code Number.	Specification	Manufacturer
Temperature control board	1-01-180-0003	P-IN-CONT (for IK-41)	Yamato Scientific, Japan
Temperature indicator board	1-01-180-0004	IND	Yamato Scientific, Japan
Motor control board	1-01-180-0002	MOTOR	Yamato Scientific, Japan
Motor power supply board	1-01-180-0001	POWER	Yamato Scientific, Japan
Heater	IK41S-40420	500-W iron-chrome wire, 100 V AC	Yamato Scientific, Japan
Temperature sensor	1-16-003-0007	Pt 100 Ω (common for IS-42)	Yamato Scientific, Japan
Evaporator		IN61-20081	Yamato Scientific, Japan
TRIAC	1-20-001-0001	400V-30A (with SP)	Yamato Scientific, Japan
Slit	4-36-001-0002	56-180-t0.2	Yamato Scientific, Japan
Door guard		IK41S-30260	Yamato Scientific, Japan
Earth leakage breaker	2-06-005-0010	BJS153	Matsushita Electric Works, Japan
Main relay	2-05-010-0002	JH 1a-24V (AR5211)	Matsushita Electric Works, Japan
Power switch	2-01-008-0001	HLS208K black	FUJISOKU ELECTRIC, Japan
Photo interrupter for speed detection	1-21-002-0001	GP1S51	Sharp Electric, Japan
Door switch	2-02-008-0002	B42A05S	OKI, Japan
Freezer	3-01-003-0002	CAM16YE-A	Toshiba Electric, Japan
Defroster solenoid valve	3-02-006-0002		SAGINOMIYA, Japan
Fan	2-15-004-0005	4715PS-10T-B30-100 (with guard)	NMB, Japan
Shaker motor	2-14-006-0003	6 IK60A-AUL (100 V AC)	ORIENTAL MOTOR, Japan
V belt	4-19-001-0002	M-40	MITSUBOSHI, Japan
Bearings for shaker shaft	4-18-001-0004	UCF204	NTN, Japan
Slide rail	4-30-001-0007	301-381	ACCURIDE, Japan
Drawer handle	IM41S-30440	A-201	Yamato Scientific, Japan
Nylon leg for tray	7-02-003-0001	C-30-CS-6	TAKIGEN, Japan
Handle for tray	7-11-001-0002	A-1075-4	TAKIGEN, Japan

■ **Parts Common to IK Series**

<b>Part</b>	<b>Code Number.</b>	<b>Specification</b>	<b>Manufacturer</b>
Bearings for linkage shaft	4-18-003-0001	UFL000	KOYO, Japan
Support roller	4-18-004-0002	E-0835	EASTERN SEIKO, Japan
Guide roller	4-18-004-0002	E-0835	EASTERN SEIKO, Japan
Auxiliary roller	4-18-004-0001	E-0620	EASTERN SEIKO, Japan

■ **Parts Common to IM Series**

<b>Part</b>	<b>Code Number.</b>	<b>Specification</b>	<b>Manufacturer</b>
Tray fixing square-washer		IM41S-30210	Yamato Scientific, Japan
Washer for tray fixing square-washer		IM41S-30220	Yamato Scientific, Japan
Bearings for supporting arm		IM41S-30060	Yamato Scientific, Japan
Bearings for drive pin	4-18-007-0001	ASPF201	NTN, Japan
Bearings for support shaft	4-18-006-0001	UFL001	FYH, Japan
Bearings for support shaft	4-18-006-0002	UP001	FYH, Japan

## Dangerous Substances

<b>Explosive</b>	<b>Explosive</b>	Ethylene glycol dinitrate (nitroglycol), glycerine trinitrate (nitroglycerine), cellulose nitrate (nitrocellulose), and other explosive nitrate esters
		Trinitrobenzene, trinitrotoluene, trinitrophenol (picric acid), and other explosive nitro compounds
		Acetyl hydroperoxide (peracetic acid), methyl ethyl ketone peroxide, benzoyl peroxide, and other organic peroxides
<b>Flammable</b>	<b>Igniting</b>	Lithium (metal), potassium (metal), sodium (metal), yellow phosphorus, phosphorus sulfide, red phosphorus, celluloid compounds, calcium carbide, lime phosphide, magnesium (powder), aluminum (powder), powder of metals other than magnesium and aluminum, sodium hydrosulfite
	<b>Oxidizing</b>	Potassium chlorate, sodium chlorate, ammonium chlorate, and other chlorates
		Potassium perchlorate, sodium perchlorate, ammonium perchlorate, and other perchlorates
		Potassium peroxide, sodium peroxide, barium peroxide, and other inorganic peroxides
		Potassium nitrate, sodium nitrate, ammonium nitrate, and other nitrates
		Sodium chlorite and other chlorites
		Calcium hypochlorite and other hypochlorites
	<b>Inflammable liquid</b>	Ethyl ether, gasoline, acetaldehyde, propylene chloride, carbon disulfide, and other flammable substances having a flash point of $-30^{\circ}\text{C}$ or higher but lower than $0^{\circ}\text{C}$
		Normal hexane, ethylene oxide, acetone, benzene, methyl ethyl ketone, and other flammable substances having a flash point of $-30^{\circ}\text{C}$ or higher but lower than $65^{\circ}\text{C}$
		Methanol, ethanol, xylene, pentyl acetate (amyl acetate), and other flammable substances having a flash point of $0^{\circ}\text{C}$ or higher but lower than $30^{\circ}\text{C}$
		Kerosene, light oil (gas oil), oil of turpentine, isopentyl alcohol (isoamyl alcohol), acetic acid, and other flammable substances having a flash point of $30^{\circ}\text{C}$ or higher but lower than $65^{\circ}\text{C}$
	<b>Flammable gas</b>	Hydrogen, acetylene, ethylene, methane, ethane, propane, butane, and other flammable substances which assume a gaseous state at $15^{\circ}\text{C}$ and 1 atm

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