

SINCE 1889



Low Temperature Incubator

Model

IJ 100

Instruction Manual

- First Edition -

- Thank you for purchasing " Low Temperature Incubator, IJ100 " of Yamato Scientific Co., Ltd.
- To use this unit properly, read this "Instruction Manual" thoroughly before using this unit. Keep this instruction manual around this unit for referring at anytime.



WARNING!:

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

Yamato Scientific Co. LTD.

Contents


◆ Cautions in Using with Safety	1
• Explanation	1
• Table of Illustrated Symbols	2
• Fundamental Matters of “WARNING!” and “CAUTION!”	3
◆ Before Using this unit	4
• Requirements for Installation.....	4
• Change the Direction of Opening/Closing Door.....	7
◆ Description and Function of Each Part	8
• Main Unit.....	8
• Control Panel	9
◆ Operation Method	10
• Sequence of Operation	10
• Independent overheating prevention device.....	12
◆ Handling Precautions	13
◆ Maintenance Method	16
• Daily Inspection and Maintenance	16
◆ Setting Air Jacket (Optional accessory)	17
◆ Long storage and disposal	18
• When not using this unit for long term / When disposing	18
◆ In the Event of Failure	19
• Safety Device and Error Code.....	19
• Trouble Shooting.....	19
◆ After Service and Warranty	20
◆ Specification	21
◆ Wiring Diagram	22
◆ Replacement Parts Table	23
◆ Reference	24
• List of Dangerous Substances	24


Explanation

MEANING OF ILLUSTRATED SYMBOLS

Illustrated Symbols

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

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

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

Meaning of Symbols



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



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



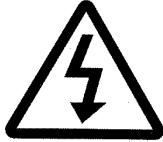
This symbol indicates items that should be always performed. A detailed message with instructions is shown adjacent to the symbol.

Table of Illustrated Symbols

Warning



Warning,
generally



Warning,
high voltage



Warning,
high temperature



Warning,
drive train



Warning,
explosive

Caution



Caution,
generally



Caution,
electrical shock



Caution,
scald



Caution,
no road heating



Caution,
not to drench



Caution,
water only



Caution,
deadly poison

Prohibit



Prohibit,
generally



Prohibit,
inflammable



Prohibit,
to disassemble



Prohibit,
to touch

Compulsion



Compulsion,
generally



Compulsion,
connect to the
grounding
terminal



Compulsion,
install on a flat
surface



Compulsion,
disconnect the
power plug



Compulsion,
periodical
inspection

Cautions in Using with Safety

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

WARNING!

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

Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the power switch is turned on or off, and fire/explosion may result. (Refer to page24 “List of Dangerous Substances”.)

Always ground this unit

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

If a problem occurs

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

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

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

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

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

Substances that can not be used

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

Do not disassemble or modify this unit

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

CAUTION!

During a thunder storm

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

Requirements for Installation

WARNING!

1. Always ground this unit



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



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

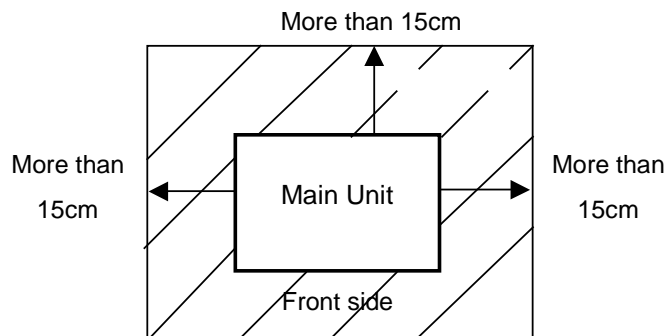
2. Choose a proper place for installation



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



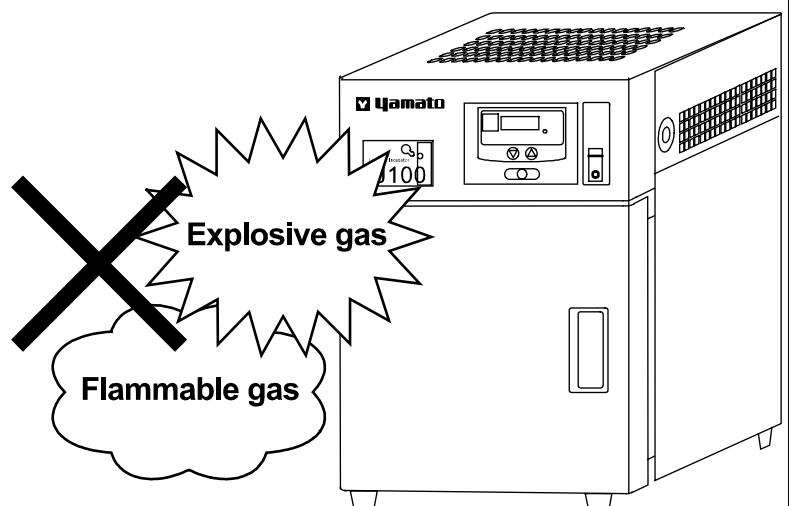
- Install this unit on a stable place with the space as shown below. Furthermore, make a space 30cm or more above this unit.



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



- Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the power switch is turned ON or OFF, and fire/explosion may result. (To know about flammable or explosive gas, refer to page24 "List of Dangerous Substances".)

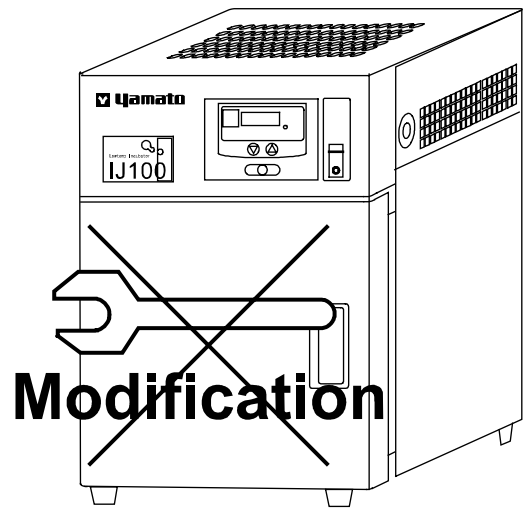


Requirements for Installation

4. Do not modify



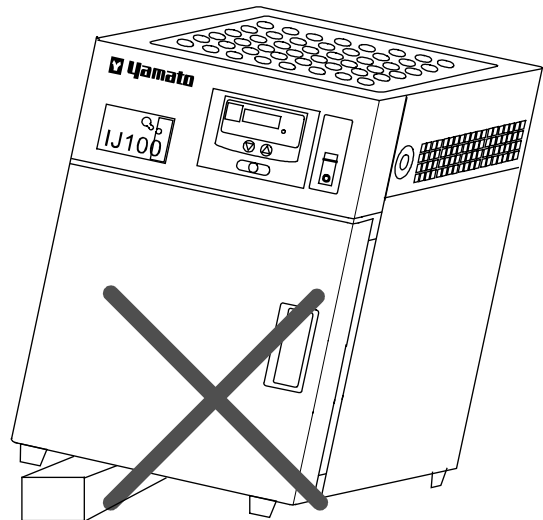
- Modification of this unit is strictly prohibited. This could cause a failure.



5. Installation on horizontal surface



- Set this unit to the flattest place. Setting this unit on rough or slope place could cause the vibration or noise, or cause the unexpected trouble or malfunction.



CAUTION!

6. Choose a correct power distribution board or receptacle



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

Electric capacity: 100V AC 3.5A

NOTE)

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

Requirements for Installation

CAUTION!

7. Before/after installing



- It may cause injury to a person if this unit falls down or moves by the earthquake and the impact. etc..To prevent, take measures that the unit cannot fall down, and not install to busy place.

8. Handling of power code



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



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

9. Draining of condensation



- When the cooling device is operated, condensation may occur on the cooling surface. The condensation is led out via the drain provided at the bottom on the rear the unit. Therefore, be sure to set the attached drain-receiving pan.

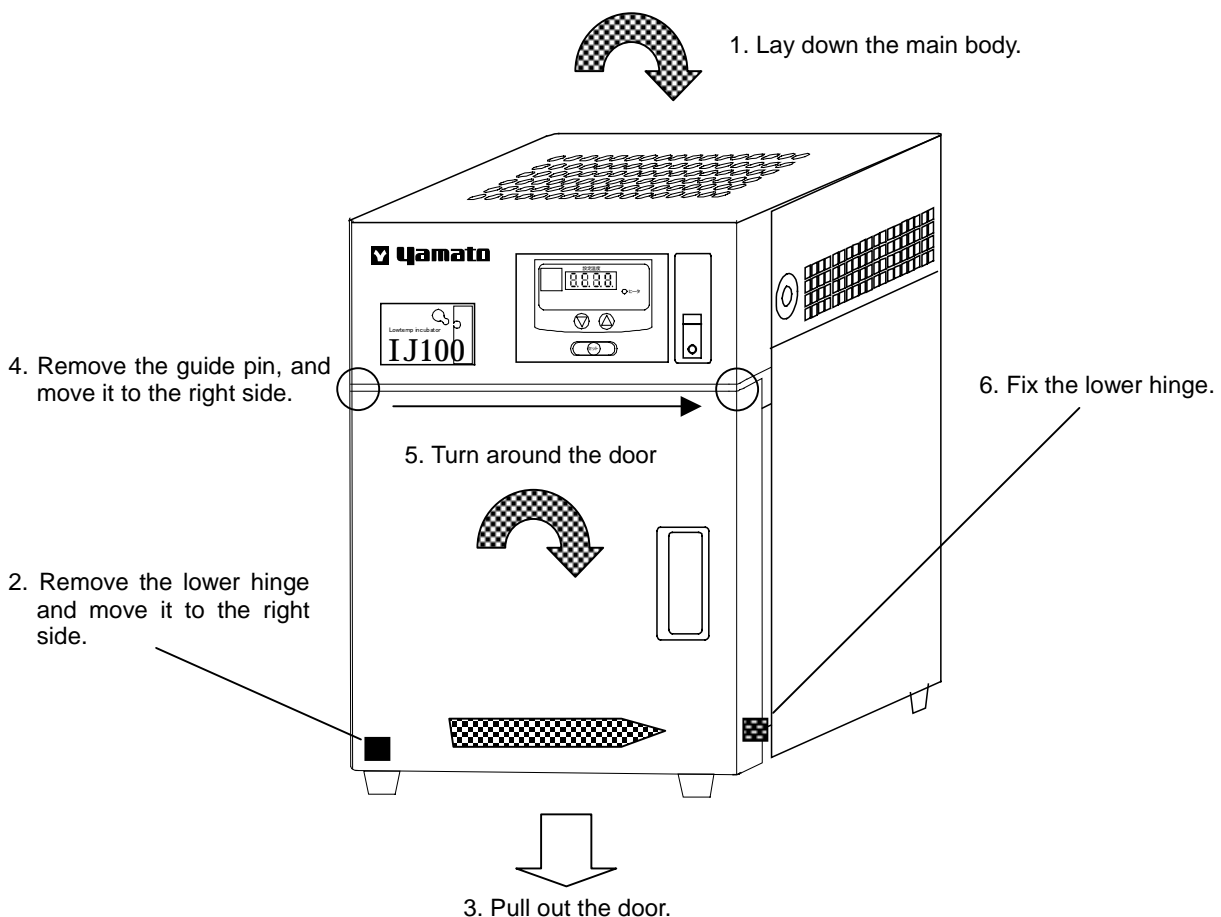
10. Setting shelf



- Fix the two shelves (attached accessory) on the appropriate position.

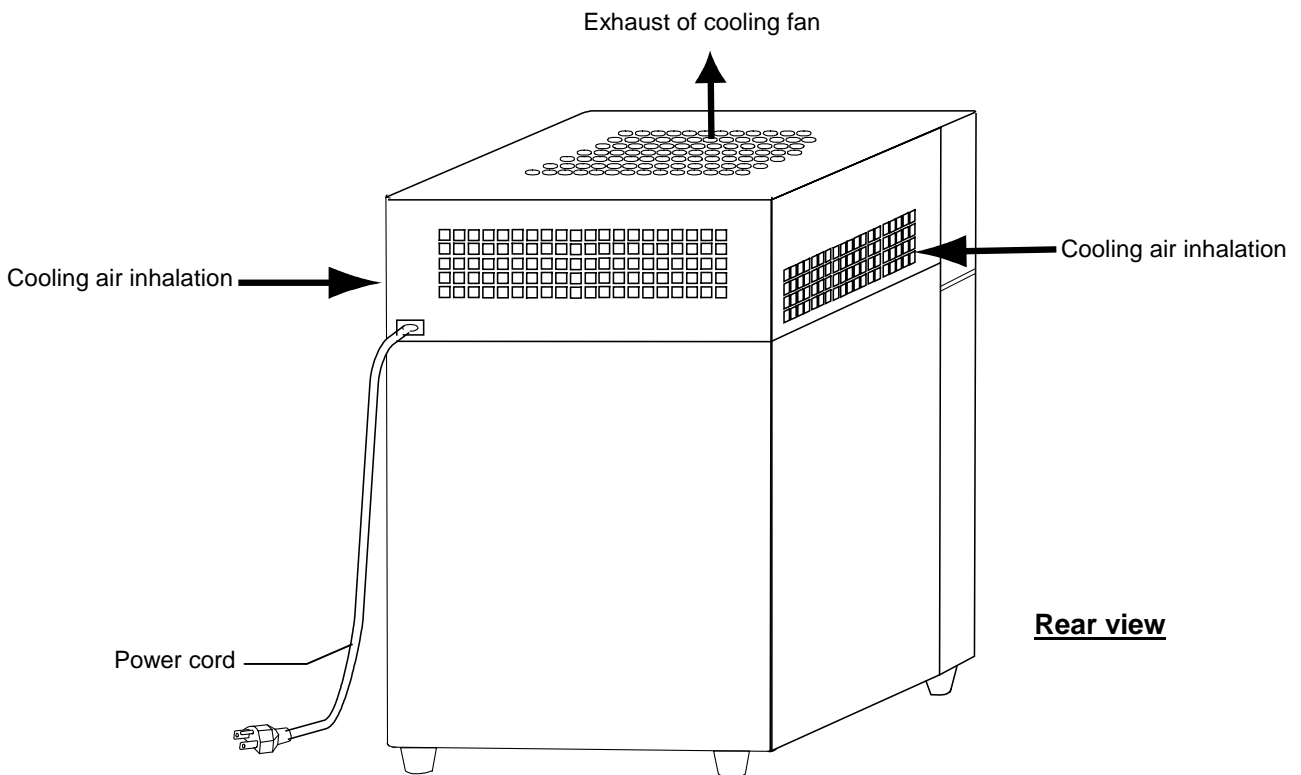
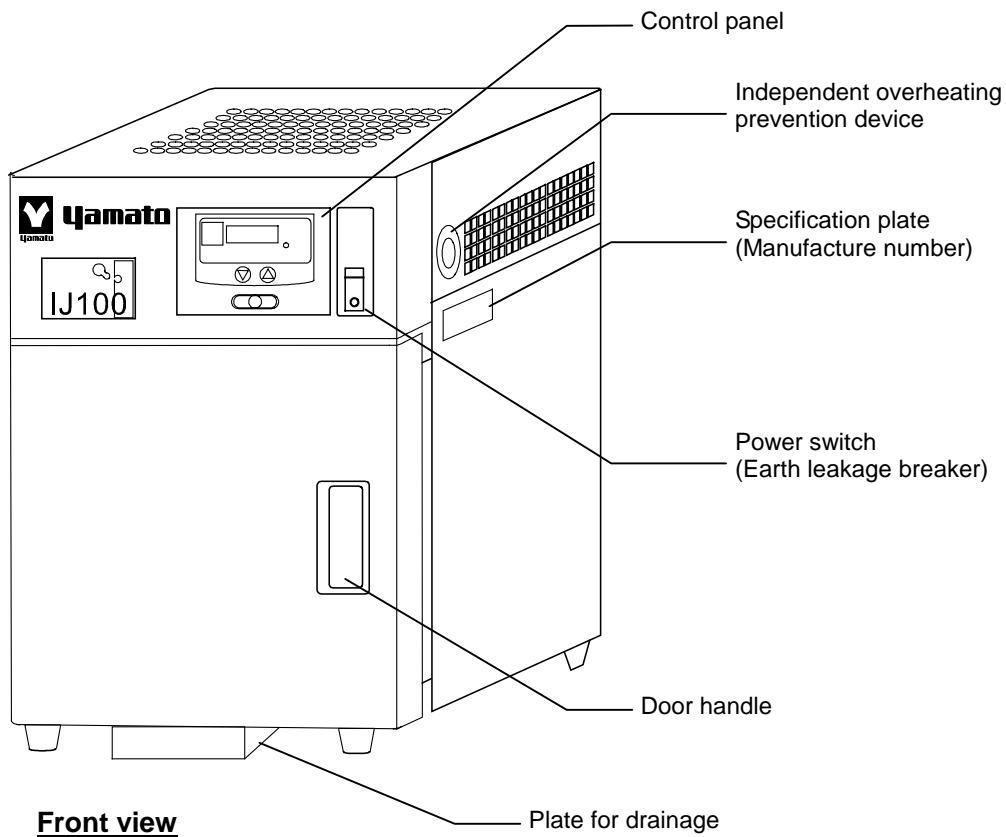
Change the Direction of Opening/Closing Door

- This unit can be changed the direction of opening/closing the door easily.
- The door opened/closed to the right or left can be selected according to the place where it is installed and the convenience of operation.
- The direction of opening/closing the door is set to left at the shipping from factory. If the door should be opened/closed to the right, the direction of opening/closing the door can be changed by the following procedure:
 1. Lay down the main body backward in a way that the door unit may come above.
 2. By using phillips screwdriver, remove the hinge mounting screws fixing the door in the lower part of the main body.
 3. Pull off the door downward carefully.
 4. Pull off the guide pin fixing the upper part of the door, and insert it into the screw hole on the opposite side (right side).
 5. Turn the door 180 degrees, and insert it into the upper guide pin.
 6. After adjusting the door position, fix the hinge in the lower part of the door.
 7. Replace the main body to complete the procedure.



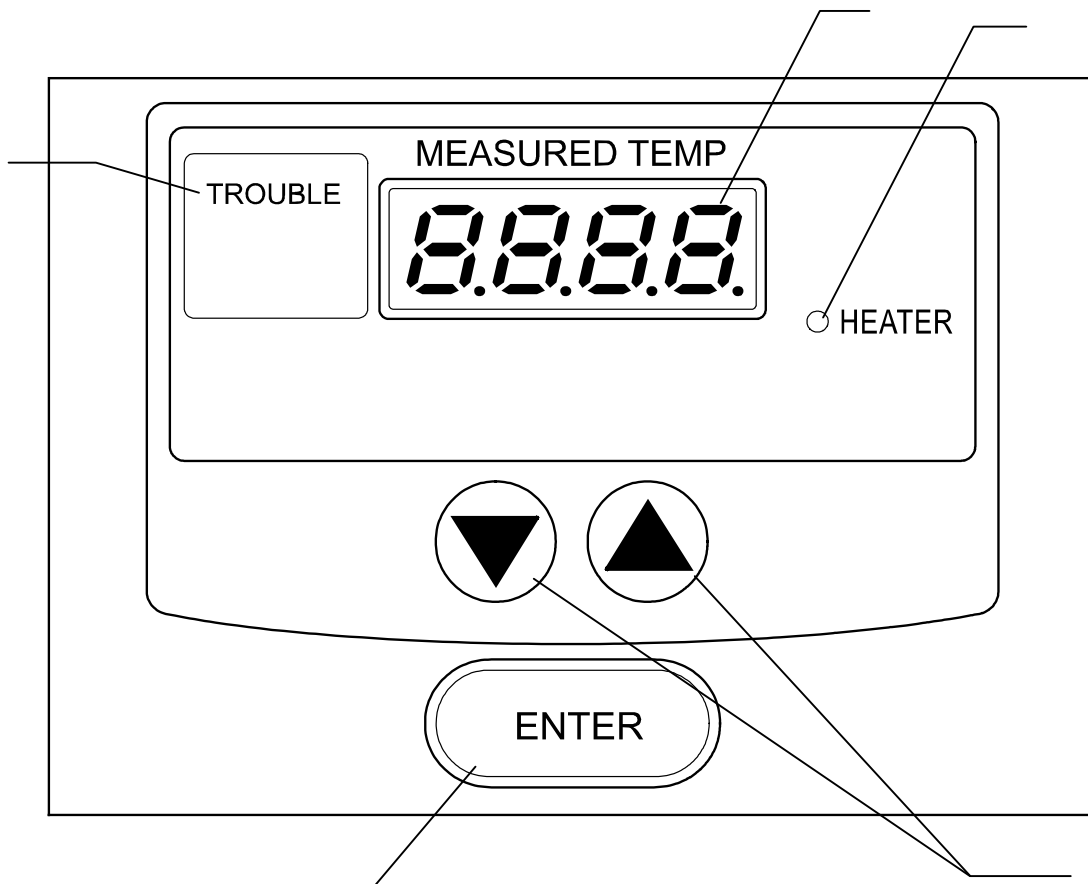
Description and Function of Each Part

Main Unit



Description and Function of Each Part


Control Panel



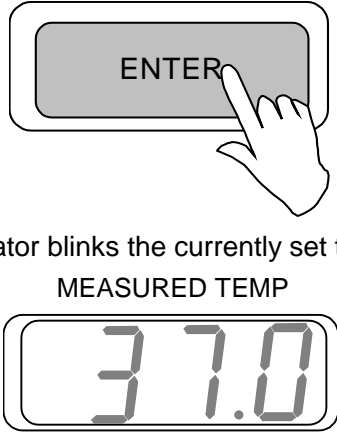




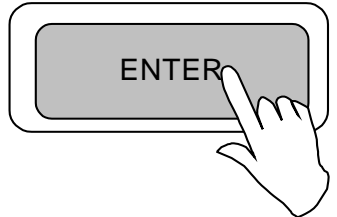
Main Indicator:	Mainly displays measured temperature.
Heater Lamp:	Lights up when electric power is supplied to the heater.
Trouble Indicator:	Blank in normal operation. Lights up when the device has a trouble.
(Up/Down) Key	Use these keys when you change the parameters.
Enter Key	Use this key when you decide a modified parameter.

Sequence of Operation

Fixed Temperature Operation

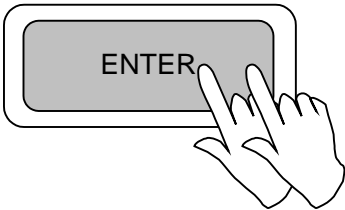
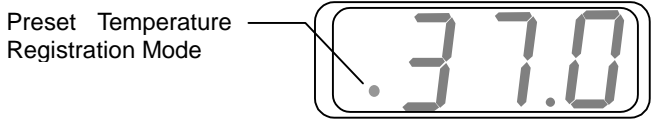

<p>1. Turn on the power.</p>	<ul style="list-style-type: none"> The main indicator shows the current internal temperature. <div style="text-align: center;"> <p>MEASURED TEMP</p>  </div> <ul style="list-style-type: none"> Fixed temperature operation is started with the target of the previously set temperature. ❖ When the power is turned on, the controller resets automatically to the condition immediately before the previous power-off.
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Changing Temperature Setting

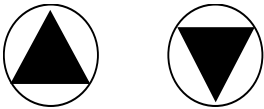
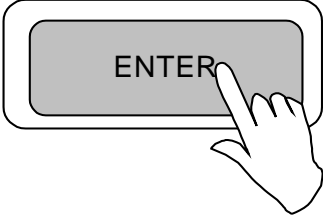
<p>1. Press the Enter key.</p>	<ul style="list-style-type: none"> The main indicator blinks the currently set temperature. <div style="text-align: center;"> <p>MEASURED TEMP</p>  </div>
<p>2. Press the  key or  key until the required value is given in the blinking number</p>	<div style="text-align: center;">   </div>
<p>3. When the temperature reaches to the required value, press the Enter key.</p>	<ul style="list-style-type: none"> The blinking indicator of the temperature setting is turned on, and the fixed temperature operation is started toward the newly set temperature. <div style="text-align: center;">  </div>

Sequence of Operation

Temperature Preset Function Using Method

<ul style="list-style-type: none"> • Temperature. Preset is the function to memorize a specified temperature. It is useful to register any temperature used frequently during operation. • The preset temperature can be registered any time if the power switch is ON in normal operation. To register this, follow the procedure shown below. • Operation continues even when the temperature preset is being registered. 	
<p>1. Press the Enter key twice.</p>	<div style="text-align: center;">  </div> <ul style="list-style-type: none"> • The main indicator shows the temperature registered currently. • Then, the dot point to the left of the main indicator blinks and indicates that the operation is in the preset temperature registration mode. <div style="text-align: center;"> <p>MEASURED TEMP</p>  </div> <p>NOTE) If not registered, the main indicator blinks .</p>

Temperature Setting Method

<p>1. Press the key or key until the required value is given in the main indicator.</p>	
<p>2. When the required value is given, press the Enter key.</p>	<div style="text-align: center;">  </div> <ul style="list-style-type: none"> • The previous temperature is deleted. • Blinking of the previously set temperature is changed to the display for the current measurement.

Independent overheating prevention device

For the safety device to prevent any over-temperature, an independent overheating prevention device consisted of the circuits and sensors other than those for the controller is provided in addition to the controller's automatic function (auto reset) to prevent over-temperature, thus configuring a double safety measure.

Range of Set Temperature & Functions

- This unit has two functions for preventing over-temperature; one is in the controller, and set to automatically operate at the temperature set in the temperature regulator plus 6 °C when delivered from the factory; the other is the temperature regulating dial provided in the upper right part of this unit, which is used to set the activating temperature for over-temperature prevention. Such a temperature setting completes a duplex function to prevent over-temperature.
- The independent overheating prevention device provided in the upper right part of this unit sets temperatures in the range 0 °C -120 °C .
- If the independent overheating prevention device is activated, the heater circuit is cut off, and Er03 starts to blink.
- If the independent overheating prevention device trips, the status is maintained until the power is reset, while Er03 is not disabled.
- If any wrong value is set for the activating temperature for over-temperature prevention, units could fail to start, or the independent overheating prevention device could trip even while the internal temperature is rising, or unexpected accidents including fire could be occurred.

Using Method


- Normally set this to a temperature about 10 °C (about 2 units in dial) higher than the temperature set for the controller.
- For the independent overheating prevention device to start at the required temperature, first establish a stable operation at such a required temperature, and lower gradually the setting dial of the independent overheating prevention device, and then check if the operation is maintained with stable at the required temperature. Also set the bath temperature. To a level higher than the temperature activating the independent overheating prevention device, and check if the independent overheating prevention device trips at the required temperature.

Caution


- When cleaning the independent overheating prevention device or area around it, any touch on the over-temperature prevention setting dial could change the set temperature. Therefore, be sure to check if appropriate value is set for the temperature before starting operation.

WARNING!


If a problem occurs

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


Substances that cannot be used

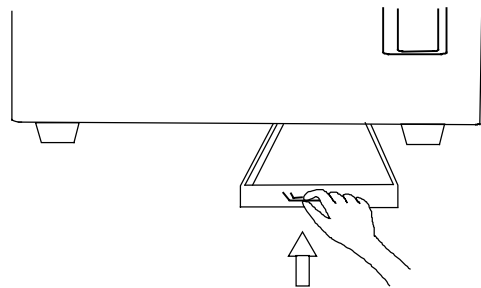
-  Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit. Explosion or fire may occur. (Refer to page24 “List of Dangerous Substances”.)

When the setting temperature is 35°C or less

-  When the setting temperature is 35°C or less, pay attention to dryness of sample. The cooling device of this unit is operated by peltier element. It is set to operate when the setting temperature is 35°C or less. If container for sample is open, sample may dry.


Condensation drainage

-  The cooling device may have condensation during operation. It is drained through the port on the base to the plate. Check the plate sometime to avoid overflow.




CAUTION!


Do not step on this unit

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


Do not put anything on this unit

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

During a thunder storm


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

When you open and close the door



-  When you open and close the door, be careful not to be hit your hands or face. It may cause injury.

CAUTION!


Do not use corrosive sample

-  Stainless steel SUS304 is used for the main hot-air path. However, it may be corroded by strong acid etc.. Care must be taken, vinyl chloride rubber may be corroded by some kind of solvent, ex alkaline, oil, halogen etc.


Setting sample

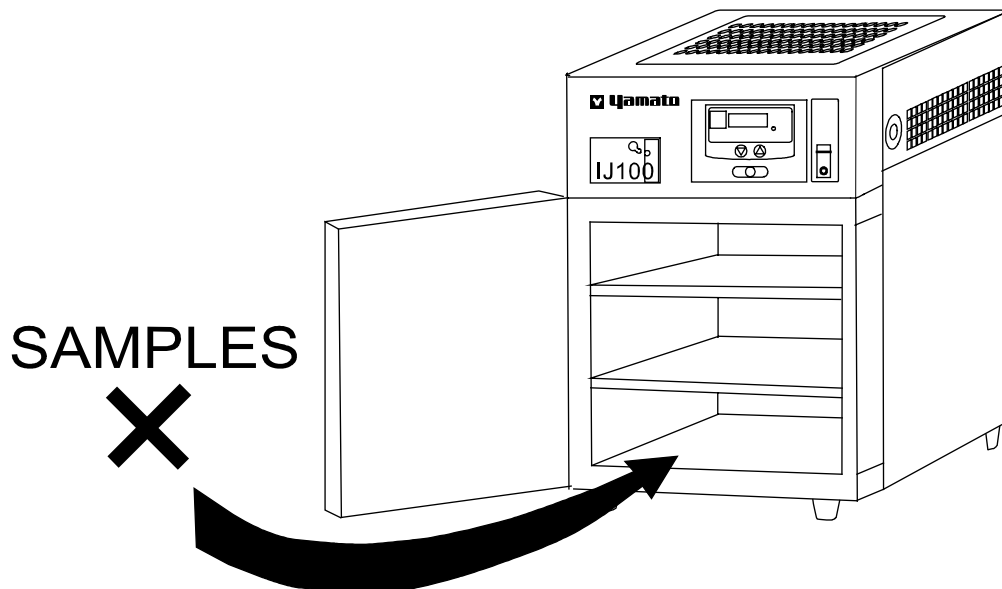
-  Do not put sample more than 5kg on the shelf provided. When you use some samples, keep space between each of them.
-  Temperature control may lose accuracy if many samples are set. Set sample making room more than 30% of the shelf in order to keep accuracy of temperature. It can be cooled to 0°C(minimum)by the product when the room temperature is 20°C and there is no load. The lowest temperature may change by quantity of sample.

Use under proper temperature range

-  Operational temperature range of this unit is 0 to 60 . Never set the temperature out of that.

Do not put sample on the internal base

-  If sample is put directly on the base, device performance will be disturbed. Furthermore, internal temperature will abnormally rise and it will cause trouble. Never put sample on the base. Fix the shelf on the metal fittings then set sample on it.



CAUTION!

Recovery of power failure

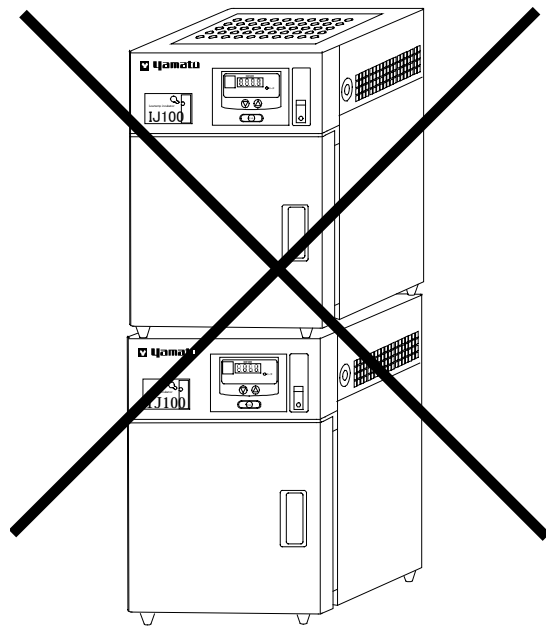


When power is supplied after a power failure, the device automatically starts operation again with the same state as just before the power failure. It is danger that the device starts unattached operation after a power failure. We recommend for you to turn off the switch of this unit if a power failure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

Do not pile up the units



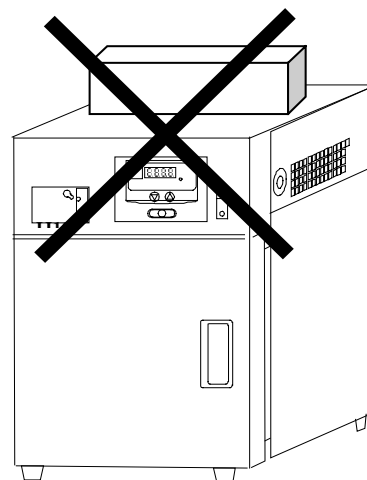
Do not pile up the units like the figure. This unit is not designed for that using.



Do not put things on the top.



Don't put things on the top like a figure. Cooling ability declines, and proper control can't be done any more.



After installing



It may cause injure to a person if this unit falls down or moves by the earthquake and the impact. etc.. To prevent, take measures that the unit cannot fall down.

Daily Inspection and Maintenance

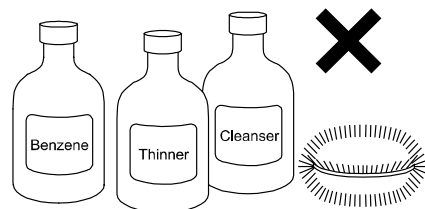
WARNING!

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

CAUTION!

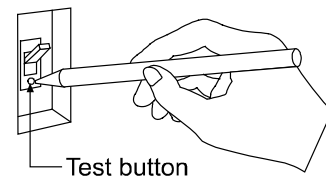
Main unit maintenance

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



Monthly maintenance

- Check the earth leakage breaker function.
 1. Connect the power cord.
 2. Turn the breaker on.
 3. Push the red test switch by a ballpoint pen etc.
 4. If there is no problem, the earth leakage breaker will be turned off.



Cleaning of Heat radiate fin

- Clogging radiate fin causes its performance decreased and also breakdown.
- Keep periodical cleaning depends on how the operating environment or time is.
 1. Lose 4 of upper shelf board screws and take the shelf off.
 2. Take off the fan lead wire and 4 of fan screws.
 3. Clean the surface of radiate fin with vacuum cleaner after take off the fin.

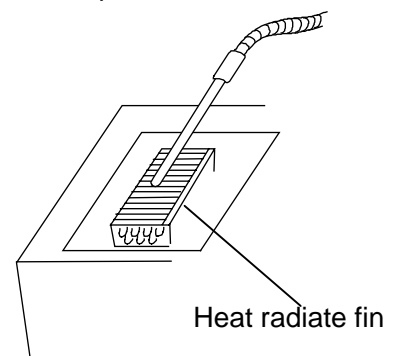


Fin stop screw

Fix them as it was following 3 to 1 order.



PRECAUTIONS: Pay attention not to crush the fin during cleaning.



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

Setting Air Jacket (Optional accessory)

1. Set the shelf at the lowest stage in a way that the side with margin may come innermost.



Set the shelf on the lowest stage.

2. Set this on the shelf of the air jacket, and push it in.



3. Pus the air jacket inward until it hits the depth.



Enter this while adjusting it closely to the edge of the inner bath.

When not using this unit for long term / When disposing

CAUTION!

When not using this unit for long term...

- Turn off the power and disconnect the power cord.

WARNING!

When disposing...

- Keep out of reach of children.
- Treat as large trash.

Environmental protection should be considered

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

Component Name	Material
Main Components of Exterior	
Casing	Steel plate, melamine resin baking finish
Interior	Stainless steel plate SUS 304
Air jacket (optional accessory)	Aluminum, Neoprene rubber packing
Production plates	PET resin film
Main Components of Cooling System	
Heat absorb fin	Aluminum
Heat radiate fin	Copper, Lead solder
Heat radiate cover	Steel plate, melamine resin baking finish
Parts attaching plate	Steel plate, melamine resin baking finish
Main Components of Electric System	
Heater	Mica heater, Aluminum, Grass coating wire
Fan	Aluminum, Copper wire and other composites
Circuit boards	Composites of board, condenser, resistor, transformer, etc.
Power cord, Wiring material, etc.	Wiring material of synthetic rubber coating and resin coating

Safety Device and Error Code

This unit has an automatic diagnosis function built in the controller and safety devices independent of the controller. The table below shows the cause and the solution method when the safety device operates.

Error Code:

When an abnormal condition occurs, an error code and the trouble indicator blinks in the controller, the buzzer sounds simultaneously. Record the error code and turn off the power of device immediately.

Safety Device	Notify	Cause/Solution
Sensor trouble detection	"TROUBLE" lamp blinks, "Er.01" blinks	<ul style="list-style-type: none"> Temperature sensor is broken or disconnected. Make a call for service.
Triac short-circuit detection	"TROUBLE" lamp blinks, "Er.02" blinks	<ul style="list-style-type: none"> Triac is in short-circuit Make a call for service.
Heater disconnecting detection (or independent overheating prevention device is operates)	"TROUBLE" lamp blinks, "Er.03" blinks	<ul style="list-style-type: none"> Heater is disconnected. Independent overheating prevention device is operates Make a call for service.
Main relay trouble detection	"TROUBLE" lamp blinks, "Er.10" blinks	<ul style="list-style-type: none"> Main relay is broken. Make a call for service.
Electric circuit trouble detection	"TROUBLE" lamp blinks, "Er.15" blinks	<ul style="list-style-type: none"> Failure in electric circuit. Make a call for service.

Trouble Shooting

Before call us...

Condition	Check the following.
The device does not start operation when turning on the power switch.	<ul style="list-style-type: none"> Power plug is not connected to the receptacle correctly. Power failure.
Temperature fluctuates during the operation.	<ul style="list-style-type: none"> Too much samples. The change of ambient temperature is remarkable. Samples are too moist. The power supply voltage is lower than the proper value.

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

In Case of Request for Repair

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

< Check following items before contact >

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

Minimum Retention Period of Performance Parts for Repair

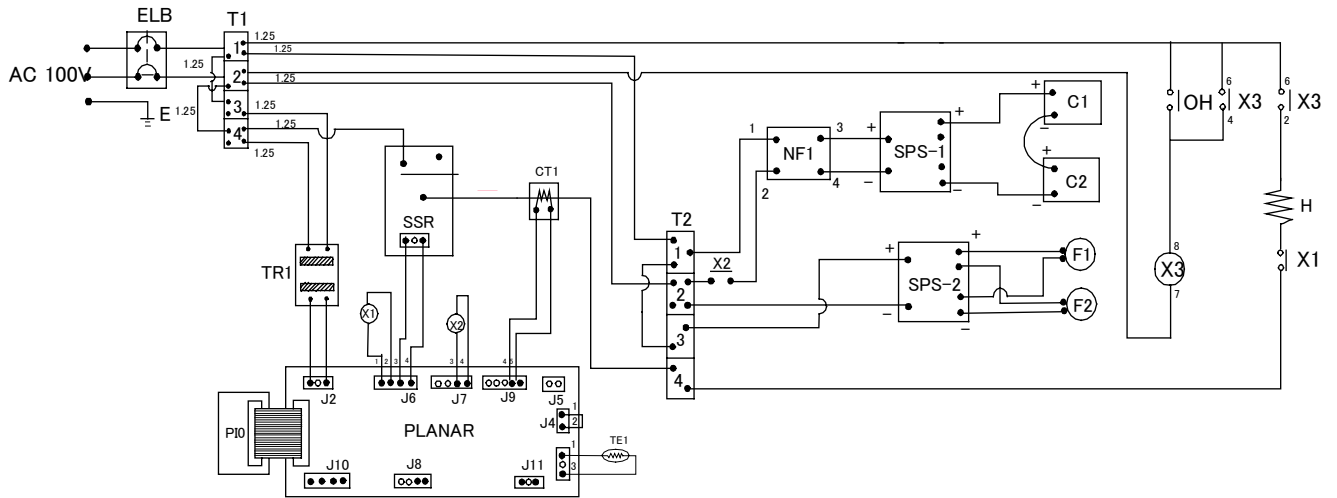
The minimum retention period of performance parts for repair of this unit is 7 years after discontinuance of this unit.

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

Model		IJ100
Performance	Operating temperature range	0 to 60 (room temp: 20 , no load)*
	Temperature adjustment accuracy	± 0.3 (the center of inner bath, set temp.:37)
	Temperature distribution accuracy	± 1.0 (the center of inner bath, set temp.:37)
	Temperature rising time	Approx. 40min. (20 to 60°C)
	Temperature falling time	Approx. 100min. (20 to 0°C)
Configuration	Heating device	Mica heater 120W
	Cooling device	Two peltier cells, forced radiating method: It works continuous at the setting temperature below 35 . (It is turned off at the setting temperature 35 and over.)
	Internal fan	Axial fan (DC)
Control Section	Controller	Hitec IV _{FR} type1
	Temperature control system	PID control of heater output by microcomputer
	Temperature setting system	Digital Setting by (up/down) Keys
	Operational mode	Fixed temperature operation
	Sensor	Thermistor
	Additional function	Temperature preset function (1 for desired temperature is able to set/load)
Safety Device	Self-diagnostic function	Sensor error, Heater error, Triac error, Main relay error, Auto overheating prevention
	Preservation device	Earth leakage breaker, Independent overheating prevention device
Standard	External dimensions	350(W) × 396(D) × 535(H) mm
	Internal dimensions	250(W) × 250(D) × 250(H) mm (Air jacket installed: 200 × 200 × 200 mm)
	Internal capacity	15.6L
	Door	Single door with magnet packing (the direction of opening/closing is changeable)
	Weight	Approx. 20kg
	Power supply	100V AC 50/60Hz 3.5A
Accessories		Shelf × 2 (Load: 5kg for each), Plate for drainage, Instruction manual
Optional accessories		Extra shelf (with metal fittings), Air jacket made of aluminum (with shelf)

- ❖ The values shown on “Performance” are in power supply 100V AC.
- ❖ Usable ambient temperature for this unit is 5 to 30 .

Wiring Diagram



Symbol	Part name	Symbol	Part name
ELB	Earth leakage breaker	F1, F2	Fan
T1, T2	Terminal block	H	Heater
TR1	Power transformer	C1, C2	Peltier cell
X1, X2, X3	Relay	PLANAR	Control board
SSR	SSR	PIO	Display board
CT1	Current detector	TE1	Thermistor sensor
NF1	Noise filter	SPS-1	Switching power supply
OH	Independent overheating prevention device	SPS-2	Switching power supply for fan

Replacement Parts Table

Part Name	Code No.	Specification	Manufacturer
Earth leakage breaker	2060000018	FG32R-10-30mA 10A	Fuji Denki
Terminal block	2070230001	TS046-1049 4P	Yamato Scientific
Relay	2050000013	AJR6010	Matsushita
Relay	2050000040	AP5524K (HL2-HTM-AC100)	Matsushita
SSR	2160000026	YLT-SSR-01	Yamato Scientific
Noise filter	2300010009	ZAG2206-11S 6A	TDK
Fan 1 (for circulation)	2150000011	109R0812H4021 (DC12V 13W)	Sanyo Denki
Fan 2 (for radiation)	2150000012	109R1212H1021 (DC12V 52W)	Sanyo Denki
Heater	2260020014	Mica heater 120W	Sakaguchi Dennetsu
Switching power supply board	2550000005	DC24V 144W	Tenseiramda
Fan power supply board	2550000006	DC12V 15W	Tenseiramda
Independent overheating prevention device	1270010010	TO-1124-B	Matsushita
Peltier cell	2600000001	17.5V 40W(950-127-085)	Fellow Tech
Power transformer	1013200033	IV FR AC100	Yamato Scientific
PLANAR board	1240000057	IV FR	Yamato Scientific
PIO board	1240000030	IV FR	Yamato Scientific
CPU	1180010011	H8/3256 IJ200	Yamato Scientific
Thermistor	1160050010	Thermistor	Yamato Scientific
Current detector	2170010005	CTL-6-S-4-H	URD

List of Dangerous Substances



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

EXPLOSIVE

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

FLAMMABLE

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

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

Responsibility

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

Note

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

Instruction Manual for
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