



**Vacuum Drying Oven
Model
ADP200/300**

Instruction Manual

– First Edition –

- Thank you for purchasing "Vacuum Drying Oven, ADP Series" 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.,

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Explanation

MEANING OF ILLUSTRATED SYMBOLS

Illustrated Symbols

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

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

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

Meaning of Symbols



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



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



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

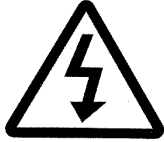
Cautions in Using with Safety

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 page32 “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.

Do not touch high-temperature parts

The inside of the body or the door may become hot during and just after operation. It may cause burns.

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.

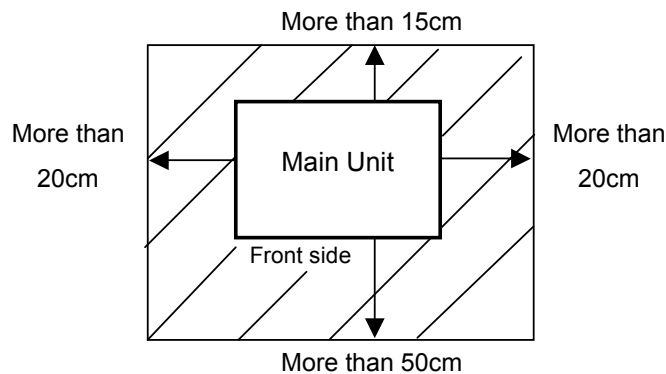
2. Choose a proper place for installation



- 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.



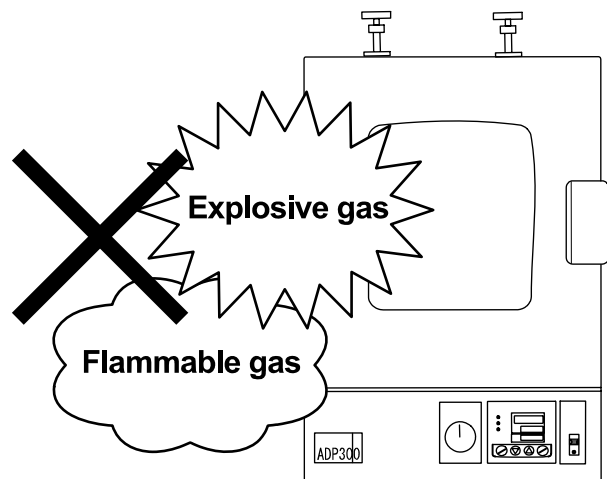
- Install this unit on a stable place with the space as shown below.



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.

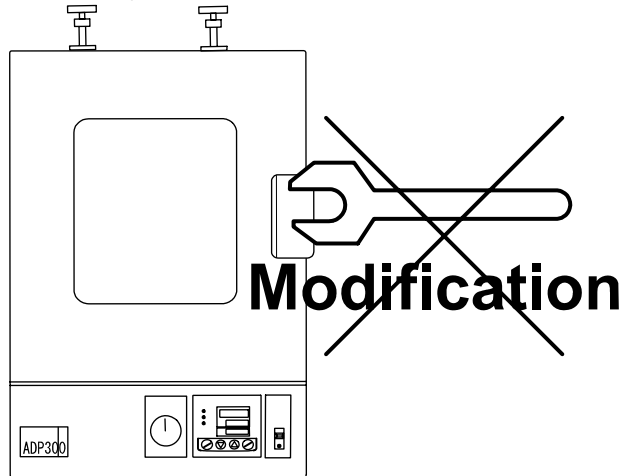


Requirements for Installation

4. Do not modify



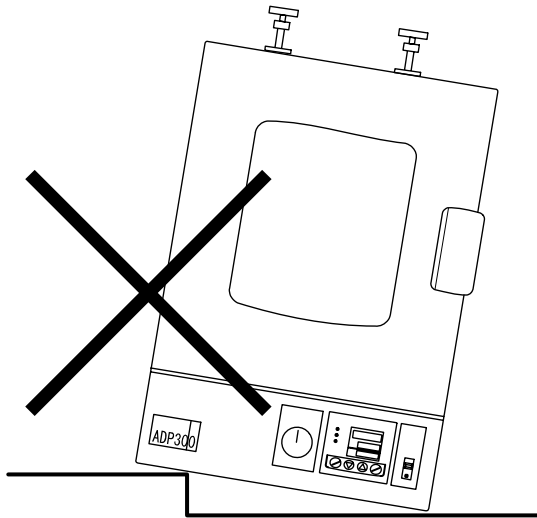
- Modification of this unit is strictly prohibited. This could cause a failure.



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 unexpectible trouble or malfunction.



Requirements for Installation

CAUTION!

6. Choose a correct power distribution board or receptacle



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

Electric capacity: ADP200: 100V AC, 8A
ADP300: 100V AC, 12A

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.

7. 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 receptacle which is supplied appropriate power and voltage.

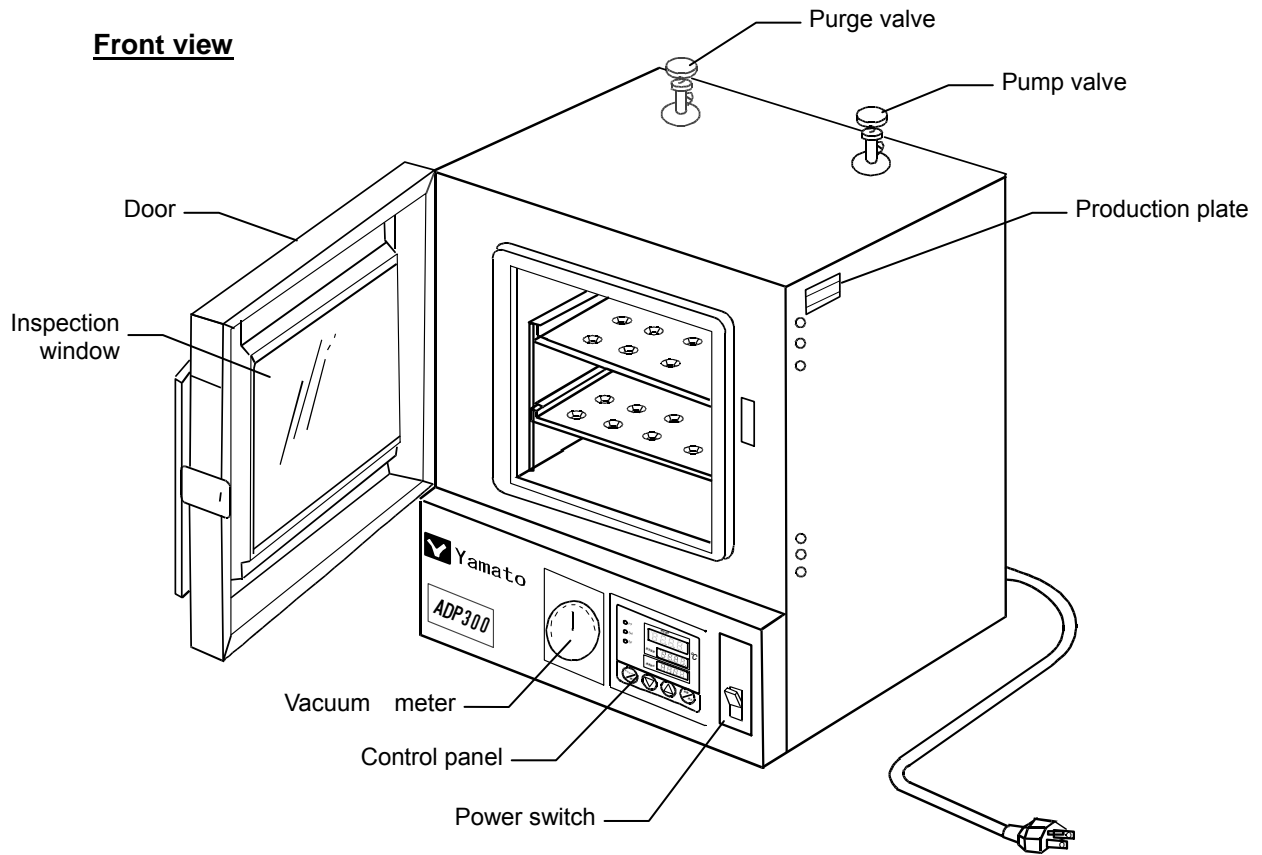
8. Before/after installing



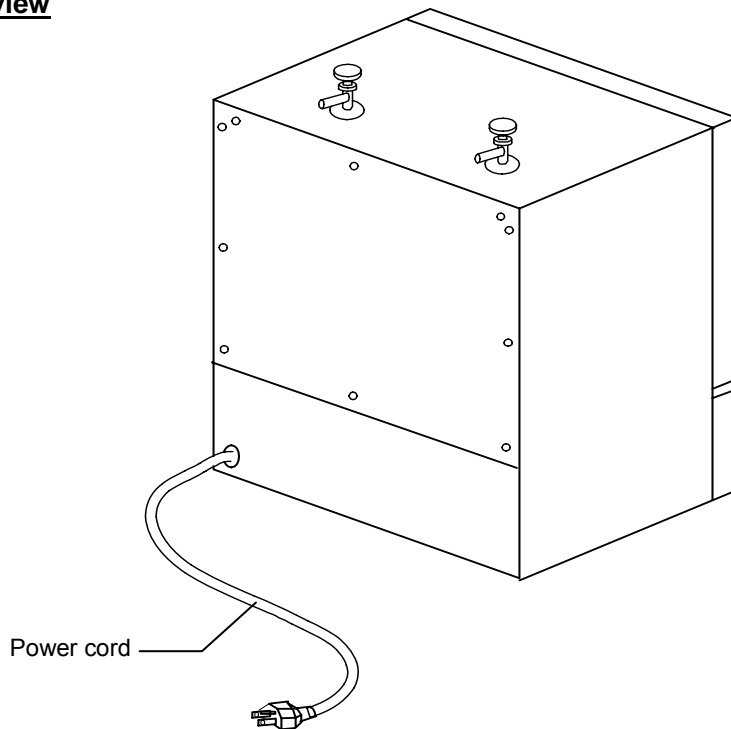
- It may cause injure to a person if this unit falls down or moves by the earthquake and the impact. etc..To prevent, take measures that the unit cannot fall down, and not install to busy place.
- Touching the unit may cause a burn during and just after the operation. To prevent, take measures that putting up a notice of operating etc..

Description and Function of Each Part

Main Unit

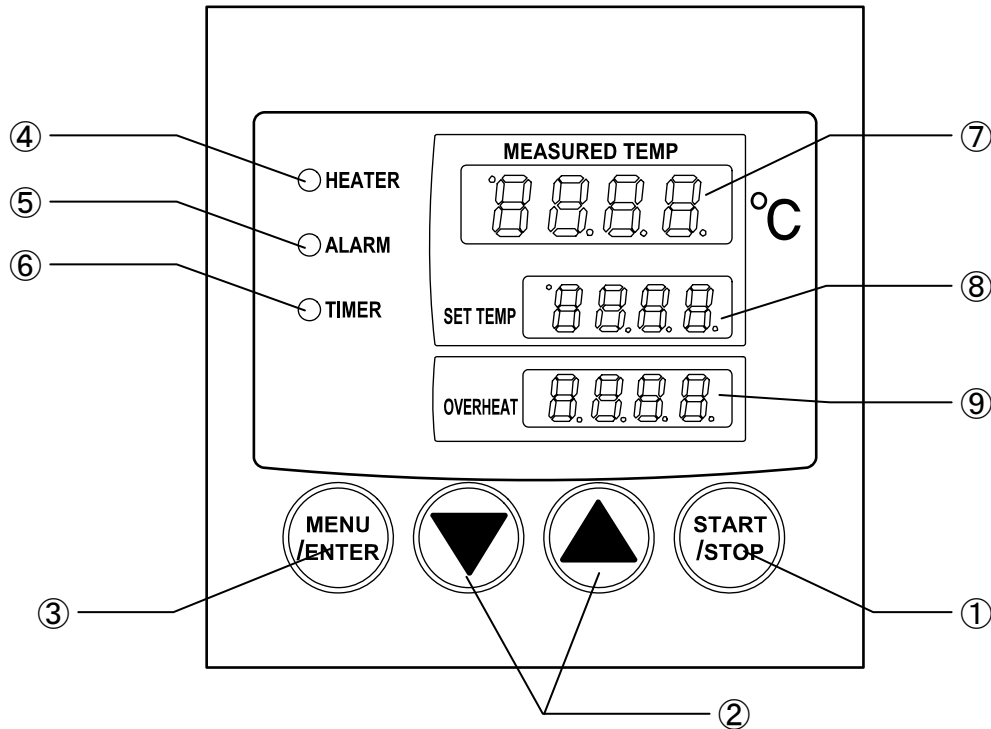


Rear view



Description and Function of Each Part






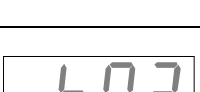
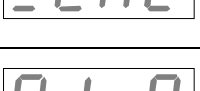
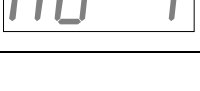

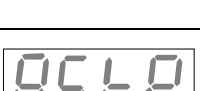
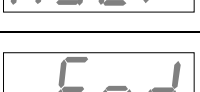

Control Panel



①	Start/Stop Key :	Starts/stops the operation.
②	▲▼ Key :	Uses for rising UP/lowering DOWN the setting value.
③	Menu/Enter Key :	Changes the setting item, or settles the inputted value.
④	Heater Lamp :	Displays the heater status. The heater is not at work: Lights off The heater is at work: Lights up
⑤	Alarm Lamp :	Displays the alarm occurred status. Not occurred the alarm: Lights off Occurred the alarm: Lights up (and the buzzer sounds)
⑥	Timer Lamp :	Displays the timer status. Stop the operation: Lights off Not set the timer: Lights off Timer under running status during operation: Blinks Timer ended running during operation: Lights up
⑦	Measurement Temperature Display Unit :	Displays the measured temperature, setting character, alarm information.
⑧	Setting Temperature Display Unit :	Displays the setting temperature, setting value for timer mode, remaining time.
⑨	Overheating Prevention Setting Temperature Display Unit :	Displays the setting temperature for overheating prevention device.

Description and Function of Each Part

Characters of Thermo Controller

Character	Identifier	Name	Purpose
	Sv1	Temperature Setting	Used for setting the temperature.
	tiM	Time Setting	Used for setting the time.
	Md-0	Overheating Prevention Setting Mode	Used for setting temperature for overheating prevention device.
	Sv2	Overheating Prevention Temperature Setting	Used for setting temperature for overheating prevention device.
	Md-6	Operation Setting Mode	Selects either the operation starting function or operation condition function.
	_tM2	Timer Condition Select	Used for selecting the timer condition for the operation. (Refer to Page11 "Operation Method".)
	Md-7	Calibration Offset Setting Mode	Used for calibrating the temperature (inputting the offset value).
	_PvS	Offset Calibration	Used for inputting the offset value for calibrating the in-bath sensor and overheating prevention sensor. (Refer to Page22 "Calibration Offset Function".)
	ASTP	Timer Setting Mode Display	Represents that the unit is under the quick auto stop operation mode.
	End	Time Up	Displays when the quick auto stop operation is completed.
	Pv2	Overheating Prevention Measurement Temperature	Monitors the measurement value (current temperature).
	NG	Parameter input unavailable	It shows up when trying to change the parameter setting while controller is starting.

Preparation for Operation

Set the shelf: Use the shelf of attached accessory. Permissible load of the shelf is approximately 15kg. Do not put too much sample.

Set sample: Set samples with space between each of them. Make room more than 30% of the shelf in order to keep accuracy of temperature.

Connect the power code: Connect the power code to a proper receptacle securely.

Read the following without fail before using the vacuum pump



Use a vacuum pump with air volume displacement of approximately 50 liters/min. Connect the pump valve (outer diameter: ϕ 18 mm), and inlet of vacuum pump with a vacuum hose (inner diameter: ϕ 15 mm) so that no air leakage exist on them.

If the sizes of diameter are different between the nipple and inlet, use the nipple with different diameter size to connect them securely. (recommended pump: Yamato Science PD-53 air volume displacement: 50/60 liters /min., outer diameter of inlet pipe: ϕ 18 mm)



The vacuum pump shall be connected to the main unit before starting operation. Check no vacuum air leakage exists before turning on the power of this unit.

Make bath to vacuum state: Close the purging valve to vacuum the bath. Turn on the power switch of vacuum pump after opening the pump valve.
After the power switch of vacuum pump is turned on, the scale at the front of the unit gradually slants to the left until it reaches to approximately 100 Pa.
Vacuuming time is around seven minutes for ADP200 and around ten minutes for ADP300 under an ambient temperature.

Return bath to atmospheric pressure: Close the pump valve and open the purge valve.



Turn off the power switch of the vacuum pump after returning the inlet side of pump to atmospheric pressure. If not, oil inside the pump may flow back to the bath.



When using powder-type sample, open the purging valve gradually to avoid powder flying.

Operation Mode and Function List

All the operation mode of this unit is as follows;

No.	Name	Description	Page
1.	Fixed Temperature Operation	Pressing the start key activates the operation, and pressing the stop key stops the operation.	13
2.	Quick Auto Stop Operation	Pressing the start key activates the operation, activates the timer during the operation, and stops the operation automatically after passing the specified time. This function is used for "Stop the operation automatically after passing the specified time", and "Stop the operation even during the operation after several hours"	15
3.	Auto Start Operation	Uses for starting the operation automatically after passing the specified time. (Not stops automatically.)	19

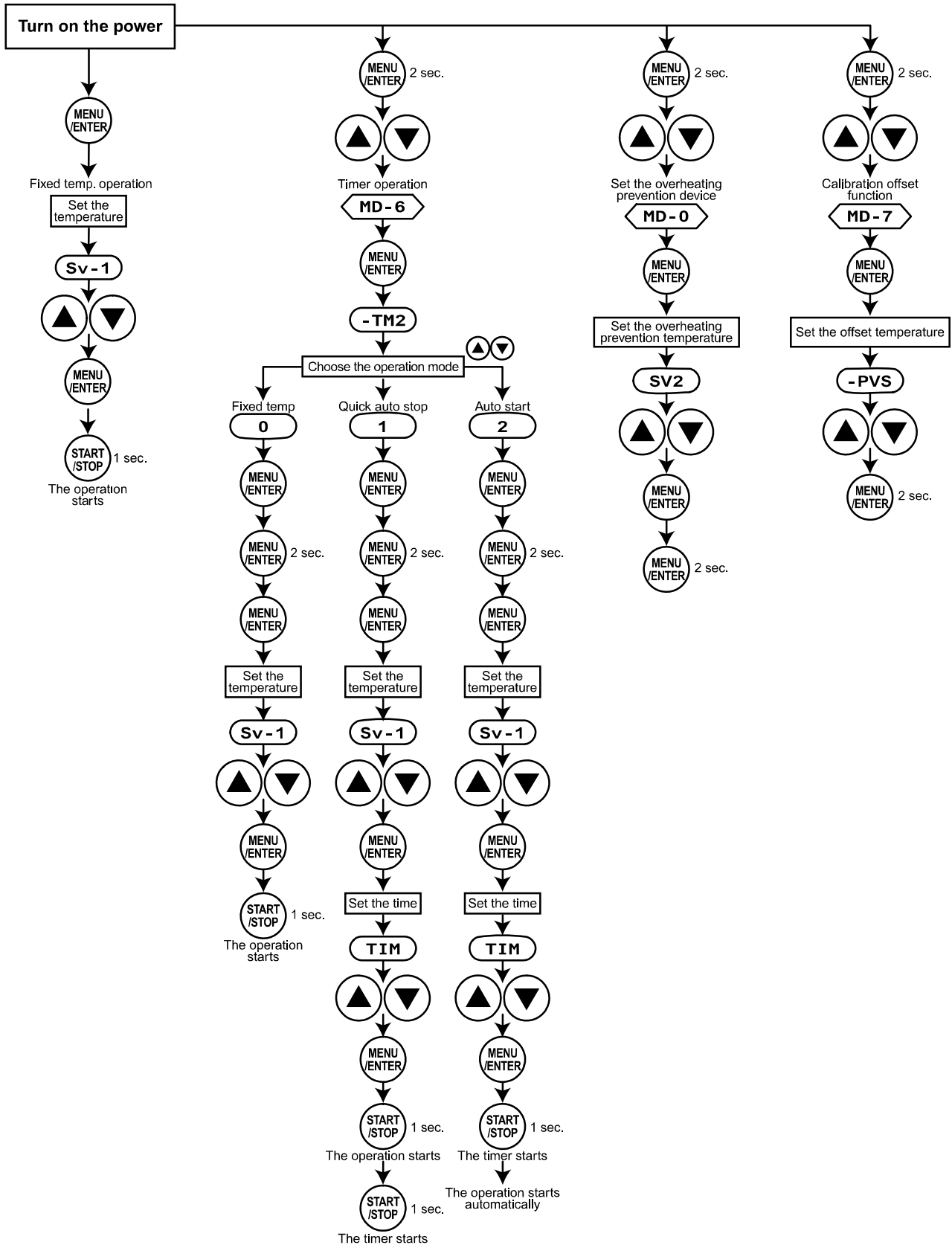
NOTE) This unit is impossible to be changed the mode during the operation. "NG" shows up when trying to change the mode. If the mode requires to be changed, stop the operation.

The operation function of this unit is as follows;

No.	Name		Description	Page
1.	Overheating prevention function	Auto overheating prevention function	Linked to the setting temperature of the device. If the temperature of in-bath is raised, the temperature of the device is set for resetting automatically with that raised temperature plus 12 Celsius degrees.	21
		Overheating prevention device	Though the controller, power source, display unit, and key in unit are shared, this unit is composed with the individual temperature measurement circuit, CPU, sensor, and output circuit, and also is possible to be set at the desired temperature from the control panel. If the overheating prevention device should activate, this unit stops running, and does not reset unless re	
2.	Calibration offset function		This calibration offset function is for calibrating the difference occurred between the required in-bath temperature and control temperature (sensor temperature) of the controller. This unit can be calibrated toward either plus side or minus side of the whole temperature range.	22
3.	Overheating prevention temperature calibration function		When the Item 2 above activates, the temperature calibration of the overheating prevention device also activates automatically.	

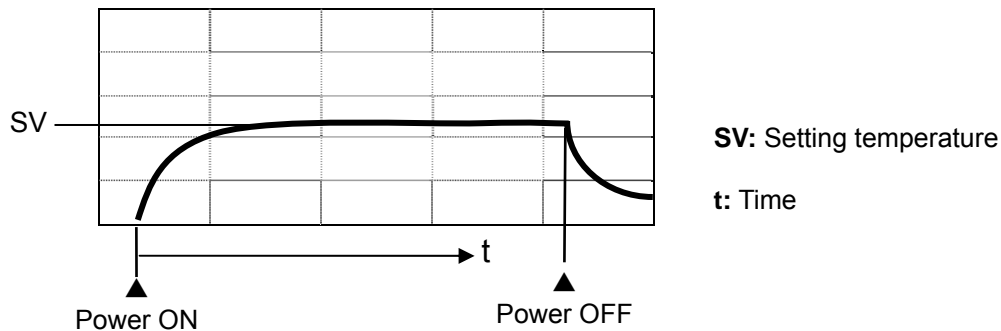
Operation Mode, Function Setting Key, and Characters

The operation mode setting and function setting use the key operation and characters show in the following figure.



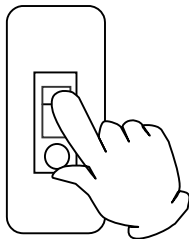
Fixed Temperature Operation

Start the operation from turning on the power shown in the figure, and continue the operation under the setting temperature unless turning off the power.



Setting of the Fixed Temperature Operation

- 1** Turn on the power.

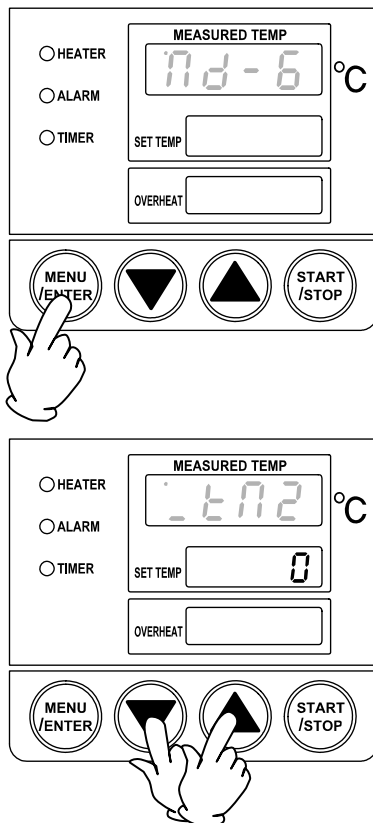


Toggle the power switch (earth leakage breaker) of this unit to "ON". The temperature controller display is lit.

The initial display is appeared about for 4 seconds, and then the display goes into the measurement temperature display (in-bath temperature).

❖ The following information, version of the software, kind of the sensor to be applied, and setting temperature of the overheating prevention device, are displayed in the initial window.

- 2** Set to the fixed temperature mode.



1. Press the **Menu/Enter** key for 2 seconds, and display the operation setting mode **nd-6** (md-6) (blinking) in the measurement temperature display unit using the **▲▼** keys.

2. Pressing the **Menu/Enter** key displays the timer activating function **-tm2** (-tm2).

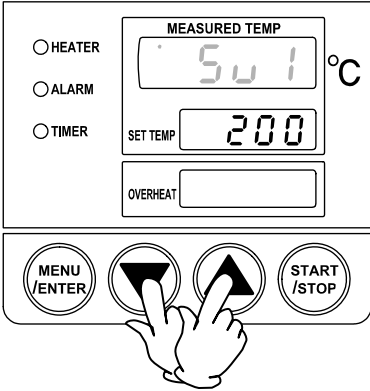
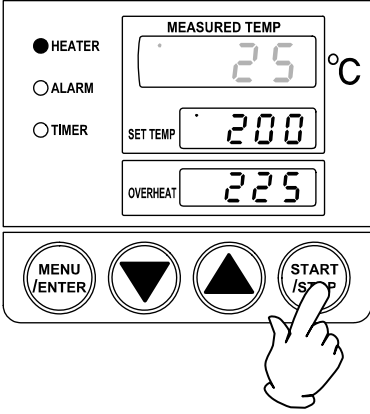
3. The setting temperature display unit blinks. Select "0" as the fixed temperature mode for the operation using the **▲▼** keys.

4. Pressing the **Menu/Enter** key again displays **nd-6** (md-6) (blinking) in the measurement temperature display unit. This completes the setting.

- After complete the setting, pressing the **Menu/Enter** key for 2 seconds makes going back to the measurement temperature display.

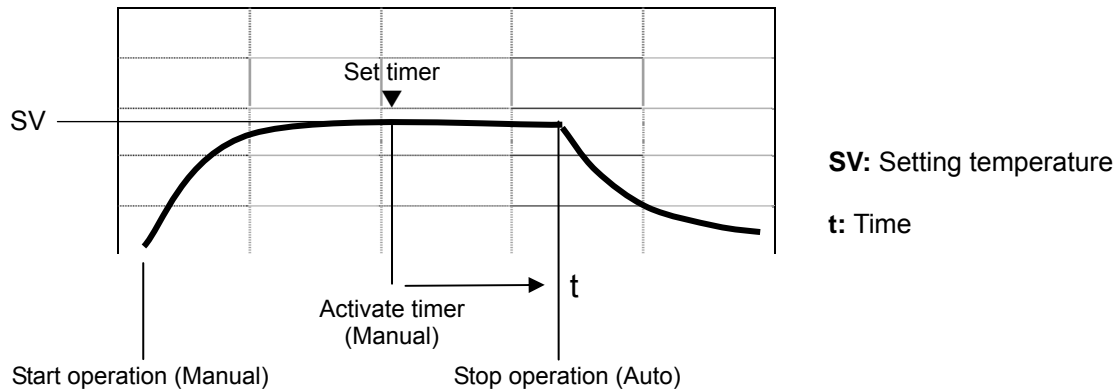
❖ The device is set to "0" mode when shipping from the factory.

Fixed Temperature Operation

<p>3</p>	<p>Set the temperature.</p> 	<ol style="list-style-type: none"> 1. Pressing the Menu/Enter key displays the temperature setting 50.1 (Sv1) in the measurement temperature display unit. 2. Set the desired temperature using the ▲▼ keys. 3. Pressing the Menu/Enter key completes the temperature setting. <p>⚠ CAUTION! Set the temperature between 5°C and 240°C.</p>
<p>4</p>	<p>Start the operation.</p> 	<p>After completing the temperature setting, start the operation.</p> <ul style="list-style-type: none"> • Press the Start/Stop key about for 1 second. • Then the operation starts, and the in-bath temperature starts going up. • The heater lamp is lit, and the setting temperature is displayed in the setting temperature display unit. • For stopping operation, press the Start/Stop key again about for 1 second.

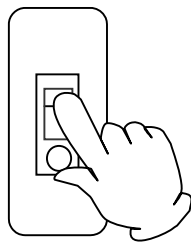
Quick Auto Stop Operation

As shown in the following figure, the device stops operating automatically by setting the timer.



Setting of the Quick Auto Stop Operation

- 1** Turn on the power.

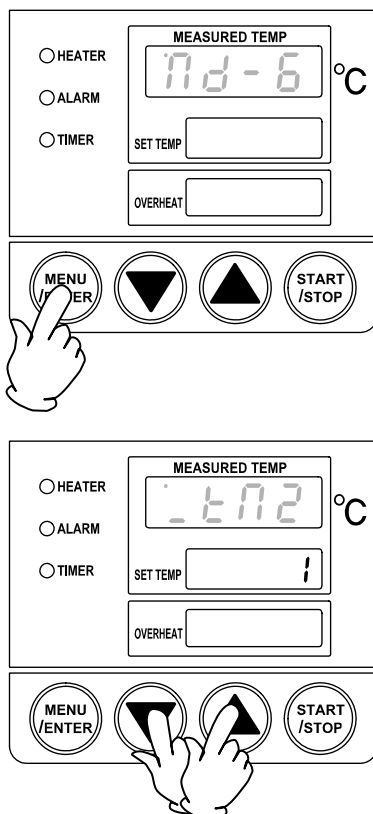


Toggle the power switch (earth leakage breaker) of this unit to "ON". The temperature controller display is lit.

The initial display is appeared about for 4 seconds, and then the display goes into the measurement temperature display (in-bath temperature).

❖ The following information, version of the software, kind of the sensor to be applied, and setting temperature of the overheating prevention device, are displayed in the initial window.

- 2** Set into the quick auto stop mode.



1. Press the **Menu/Enter** key for 2 seconds, and display the operation setting mode **nd-6** (md-6) (blinking) in the measurement temperature display unit using the **▲▼** keys.

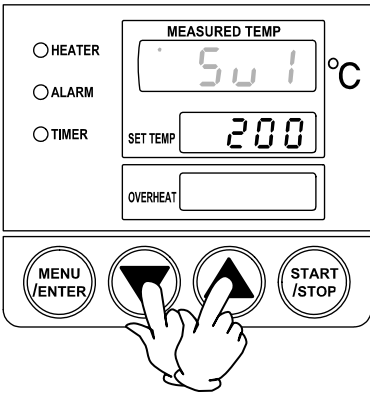
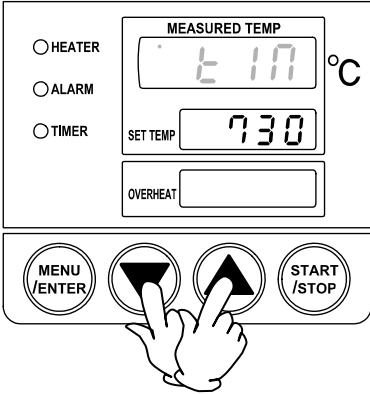
2. Pressing the **Menu/Enter** key displays the timer activating function **tm2** (-tm2).

3. The setting temperature display unit blinks. Select "1" as the quick auto stop operation using the **▲▼** keys.

4. Pressing the **Menu/Enter** key again displays **nd-6** (md-6) (blinking) in the measurement temperature display unit. This completes the setting.

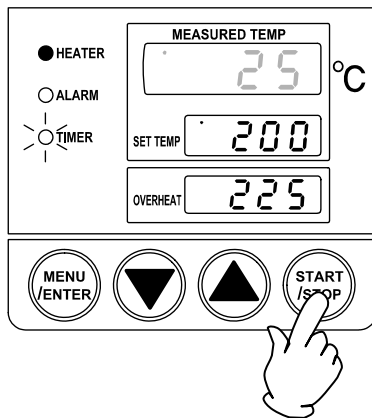
- After complete the setting, pressing the **Menu/Enter** key for 2 seconds makes going back to the measurement temperature display.

Quick Auto Stop Operation

<p>3</p>	<p>Set the temperature.</p> 	<ol style="list-style-type: none"> 1. Pressing the Menu/Enter key displays the temperature setting 50.1 (Sv1) in the measurement temperature display unit. 2. Set the desired temperature using the ▲▼ keys. The setting temperature is displayed in the setting temperature display unit. 3. Pressing the Menu/Enter key completes the temperature setting. Then, the time setting 6.17 (tim) is displayed in the measurement temperature display unit, and the setting temperature display unit blinks.
<p>4</p>	<p>When starting the quick auto stop operation from the beginning</p> 	<p>NOTE) When changing the operation mode into quick auto stop one during the operation, go to Procedure 6.</p> <ol style="list-style-type: none"> 1. The setting temperature display unit blinks. Set the desired temperature using the ▲▼ keys. The value is input as the requiring time from the current time to the operation ending time. e.g. : 7.30 (after 7 hours and half) 2. Pressing the Menu/Enter key again completes the setting.

Quick Auto Stop Operation

5 Start the operation.



When completing the temperature and time settings, start the operation.

- Press the **Start/Stop** key about for 1 second. The operation starts, and the in-bath temperature starts going up.
- The heater lamp is lit, and the setting temperature is displayed in the setting temperature display unit.
- Pressing the Start/Stop key again for 1 second blinks the timer lamp, and the timer starts.

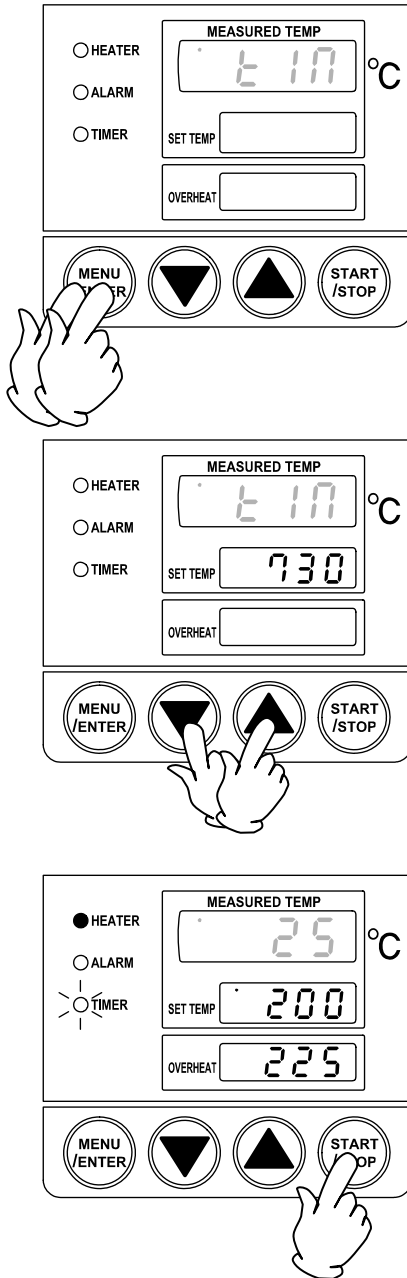
CAUTION!

Be sure to check the timer lamp blinks.

- The setting temperature display unit is available to change the display into "Timer setting Mode Display" **ASTP** (AstP) and "Remaining Timer Display Until Stopping Operation" in the order using the ▼ key.
- When the timer stops, the heater lamp is lit off, and the operation stops. The timer lamp is changed from blinking status to lit one, and the time up **End** (End) is displayed in the setting temperature display unit.
- Pressing the **Start/Stop** key goes back to the measurement temperature display.

Quick Auto Stop Operation

6 When activating quick auto stop operation during the operation.



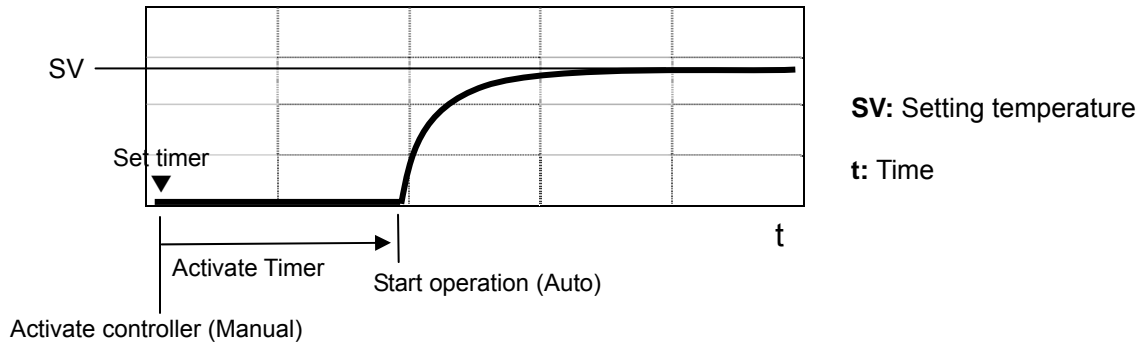
This procedure describes the setting of the quick auto stop operation from the operation status already running under the fixed temperature mode.

Though this procedure can be performed any time of the operation, it is impossible to set the quick auto stop mode described in the Procedure 2 in advance.

1. Press the **Menu/Enter** key in the measurement temperature display twice, and display the time setting **6:10** (tim).
 2. The setting temperature display unit blinks. Set the desired temperature using the **▲▼** keys. The value is input as the requiring time from the current time to the operation ending time.
e.g. : **7.30** (after 7 hours and half)
 3. Pressing the **Menu/Enter** key again completes the setting.
 4. When the setting is completed, press the **Start/Stop** key for 1 second. The timer lamp blinks and the time starts.
- When the timer stops, the heater lamp is lit off, and the operation stops. The timer lamp is changed from blinking status to lit one, and the time up **End** (End) is displayed in the setting temperature display unit.
 - Pressing the **Start/Stop** key goes back to the measurement temperature display.

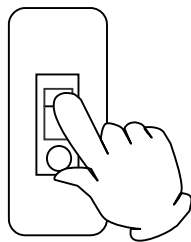
Auto Start Operation

As shown in the following figure, this mode is applied to the device for starting the operation after the specified time (hours) automatically.
 Note that the device does not stop the operation automatically. Stop the operation by manual without fail.



Setting of the Auto Start Operation

1 Turn on the power.

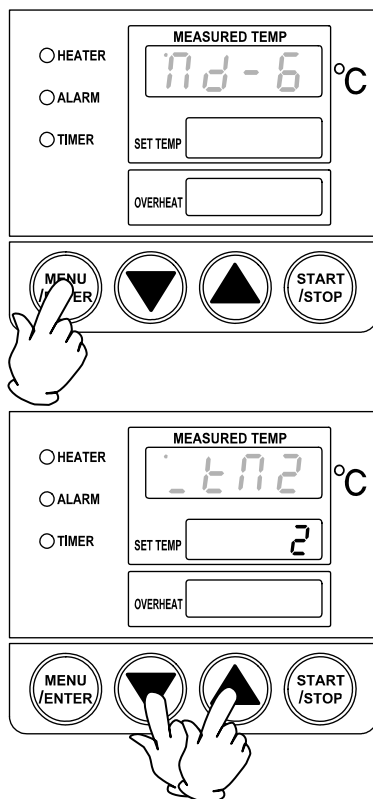


Toggle the power switch (earth leakage breaker) of this unit to "ON". The temperature controller display is lit.

The initial display is appeared about for 4 seconds, and then the display goes into the measurement temperature display (in-bath temperature).

❖ The following information, version of the software, kind of the sensor to be applied, and setting temperature of the overheating prevention device, are displayed in the initial window.

2 Set into the auto start mode.



1. Press the **Menu/Enter** key for 2 seconds, and display the operation setting mode **nd-6** (md-6) (blinking) in the measurement temperature display unit using the **▲▼** keys.

2. Pressing the **Menu/Enter** key displays the timer activating function **t72** (-tm2).

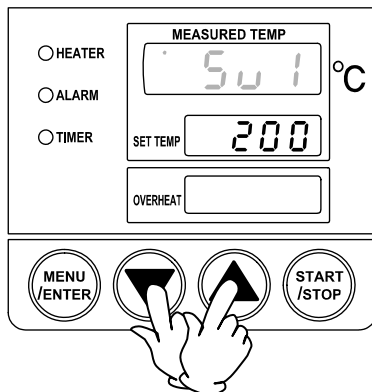
3. The setting temperature display unit blinks. Select "2" as the auto start mode using the **▲▼** keys.

4. Pressing the **Menu/Enter** key again displays **nd-6** (md-6) (blinking) in the measurement temperature display unit. This completes the setting.

• After complete the setting, pressing the **Menu/Enter** key for 2 seconds makes going back to the measurement temperature display.

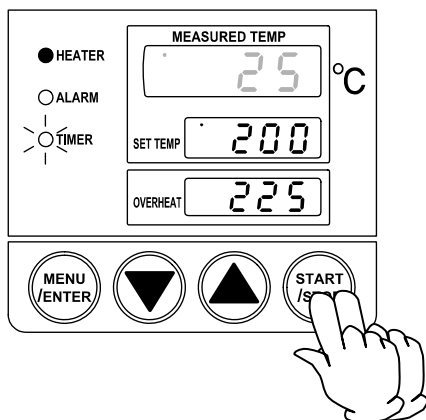
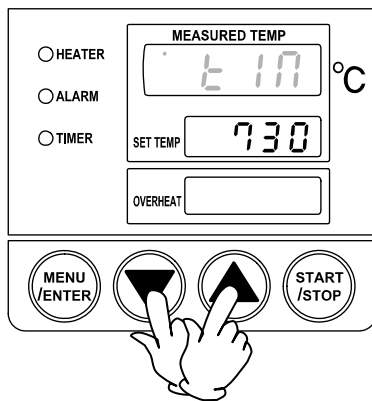
Auto Start Operation

3 Set the temperature.



1. Pressing the **Menu/Enter** key displays the temperature setting **50.1** (Sv1) in the measurement temperature display unit.
2. Set the desired temperature using the **▲▼** keys. The setting temperature is displayed in the setting temperature display unit.
3. Pressing the **Menu/Enter** key completes the temperature setting.

4 Set the time, and start the operation.



After completing the temperature setting, the time setting **6.17** (tim) is displayed in the measurement temperature display unit

1. The setting temperature display unit blinks. Set the desired temperature using the **▲▼** keys. The value is input as the requiring time from the current time to the operation starting time.
e.g. : **7.30** (after 7 hours and half)
2. Pressing the **Menu/Enter** key again completes the setting.

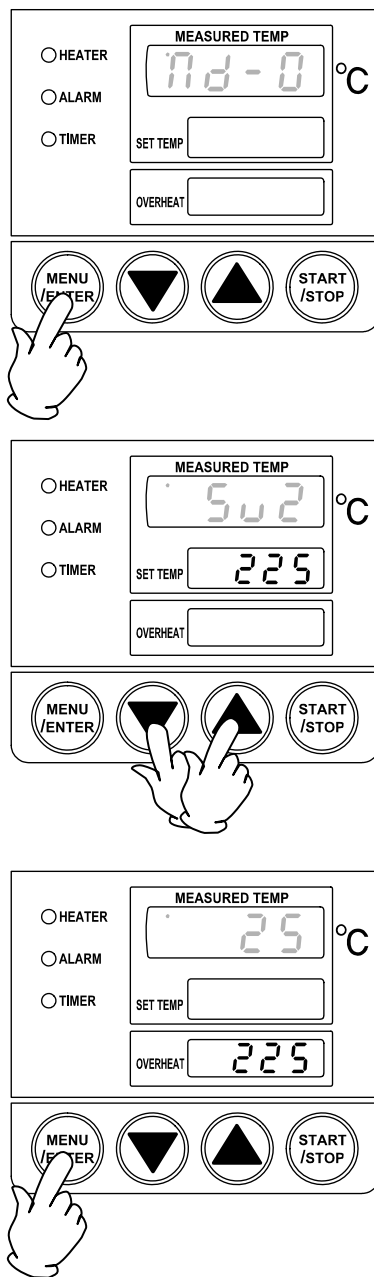
⚠ CAUTION!

Be sure to check the timer lamp blinks.

- When the timer reaches to the setting time, the timer lamp changes from blinking status to lit one. Then the heater lamp is lit, and the device starts the operation.

Overheating Prevention Device

Set temperature of overheating prevention device.



1. Press the **Menu/Enter** key for two seconds, then press the **▲▼** keys to select the setting mode for overheating prevention device **nd-0** (md-0) (blink).
2. Press the **Menu/Enter** key again to indicate the temperature setting of overheating prevention device **Sv2** (Sv2) on the temperature display window.
3. Press the **▲▼** keys to select the desired temperature while the indication is blinking.
4. Press the **Menu/Enter** key again to determine the temperature set in 3. above. The temperature set above is indicated on the display.
 - The overheating prevention setting temperature is displayed in the display unit.
 - After complete the setting, pressing the **Menu/Enter** key for 2 seconds makes going back to the measurement temperature display.

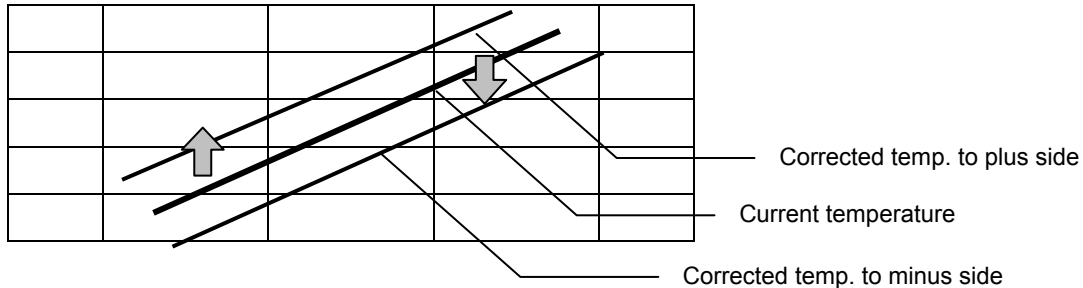
Notes for overheating prevention device



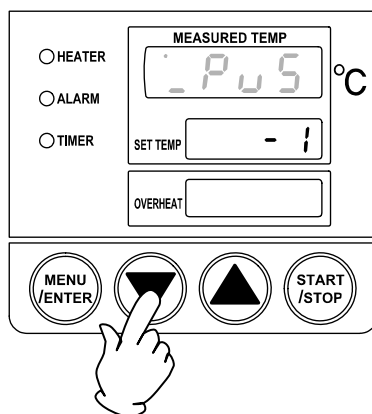
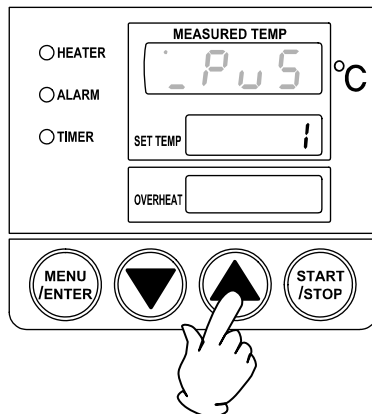
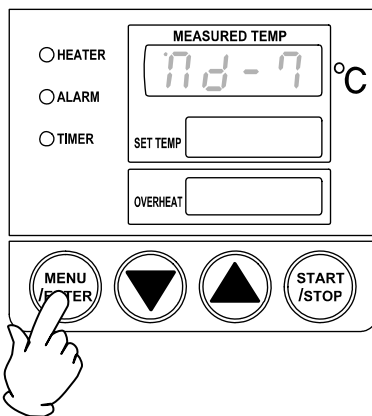
- In case there is a small difference between the set values of temperature for overheating prevention device and that of controller, the overheating prevention device may be activated when the temperature reaches to the set value of controller. Set the temperature of overheating prevention device so it be at least 10°C or more higher than that of controller.
- For activating the overheating prevention device at the desired temperature without fail, check previously that it activates at that temperature with its preset value gradually lowered while keeping the desired in-bath temperature. An alarm lamp lights on and buzzer sounds when the overheating prevention device activates. This unit indicates Er07 and stops the operation.
- The default value of the overheating prevention device at factory shipment is 250°C.

Calibration Offset Function

Calibration offset is a function that corrects the difference between the desired in-bath temperature and that of controller (sensor temperature). It corrects the difference either to plus or minus side in the whole temperature zone of device in parallel.



Temperature Correction




1. Press the **Menu/Enter** key for two seconds, then press the **▲▼** keys to select the calibration offset setting mode **nd-7** (md-7) (blink) on the temperature display window.
2. The three indications on the window, calibration offset setting mode **nd-7** (md-7), offset correction **-Pv5** (-Pvs), and overheating prevention device temperature **Pv2** (Pv2) can be switched every time the **Menu/Enter** key is pressed.
3. The indication blinks when offset correction **-Pv5** (-Pvs) is selected. Input the value of temperature to be corrected with the **▲▼** key. Press the **▲** key for plus setting and the **▼** key for minus.
4. After complete the setting, pressing the **Menu/Enter** key for 2 seconds makes going back to the measurement temperature display.
 - When the temperature of overheating prevention device **Pv2** (Pv2) is selected in 2. above, the measured temperature of overheating prevention device sensor is indicated on the temperature indication window.
 - Calibration offset is adjustable within the temperature range of 99°C to -99°C.

Temperature correction for overheating prevention device:


Temperature correction on the controller can automatically correct that on overheating prevention device with the same value.

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 page32 “List of Dangerous Substances”.)

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.


Do not touch high-temperature parts

 Some parts of this unit may become hot during and just after operation. It may cause burns.

Sample loading

 Overload of samples may cause the malfunction of the temperature control. Do not use this unit with too much samples. Leave a certain space between samples.

Return after 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.

Daily Inspection and Maintenance

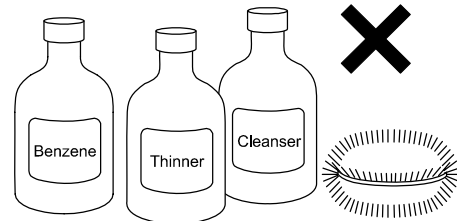
For the safety use of this unit, please perform the daily inspection and maintenance without fail. Using the city water to this unit might attach dirt. Do inspect and maintain this point while performing daily inspection and maintenance.

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.

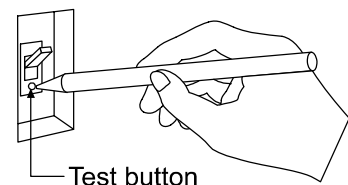
CAUTION!

- 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.



- Check the movement of overheating prevention device.

Perform the fixed temperature operation of device with certain preset temperature. Then set the operation temperature of overheating prevention device to the value approximately 5°C lower than the preset temperature of device.

In normal condition, the overheating prevention device shuts off the heating circuit in a few seconds, at the same time the alarm lamp lights on and the Er07 is indicated accompanied with a warning buzzer.

❖ Be sure to check the movement of earth leakage breaker malfunction and overheating prevention device mentioned above before a long-term continuous operation or unmanned night operation.

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

Long storage and disposal

When not using this unit for long term / When disposing

CAUTION!

When not using this unit for long term...

- Turn off the power and disconnect the power cord.

WARNING!

When disposing...

- Keep out of reach of children.
- Remove the door and driving parts.
- Treat as large trash.

Environmental protection should be considered

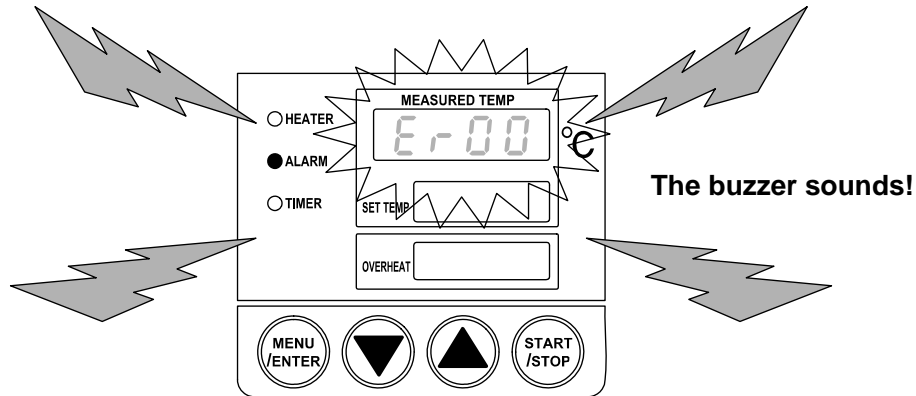
We request you to disassemble this unit as possible and recycle the reusable parts considering to the environmental protection. The feature components of this unit and materials used are listed below.

Component Name	Material
Exterior Parts	
Outer covering	Steel plate, Melamine and epoxy composite resin coating
Bath	Stainless steel SUS304
Inspection window	Reinforced glass and polycarbonate resin
Heat insulation material	Composites with glass fiber and others
Piping	Copper pipe
Intake/exhaust valve	Brass
Vacuum meter	Composites with glass, brass and others
Electrical Parts	
Switches, Relays	Composites with resin, copper and others
Control panel frame	ABS resin
Board	Composites with glass fiber and others
Heater	Steel and mica heater
Power cord	Composites with synthetic rubber, copper, nickel and others
Wiring Material	Composites with glass fiber, flame resistance vinyl, copper, nickel and others
Labels	Resin material
Leg with rubber	Synthetic rubber, Steel

Error Display

The followings are the error indications displayed on the controller.

The device stops the heater and notifies it with an error code display, alarm lamp and buzzer sound when an error occurred. Record the error code and turn off the power of device. Call us if any trouble arises.



Error Code		Failure	
Er00	Er00	Memory Error	Error in setting value of memory. Replace the board.
Er01	Er01	Temperature Sensor Error	Temperature sensor is broken or disconnected. Check and, if required, replace the sensor. Release the error by resetting the power supply.
Er02	Er02	SSR Short-circuit	Failure in SSR. Replace SSR. Release the error by resetting the power supply.
Er03	Er03	Heater Disconnection	Heater is disconnected or heater circuit is broken. Release the error by resetting the power supply.
Er07	Er07	Overheating Prevention Error	Overheating protection device is operated. Check the cause of failure. Release the error by resetting the power supply.
Er14	Er14	Inter-Communication Error	Replace the substrate.
Er70	Er70	Temperature Input Error	Failure in temperature input circuit. Check the circuit.

In the Event of Failure...

Trouble Shooting

Condition	Possible Causes
The device does not start when turning on the power switch.	<ul style="list-style-type: none">• Power plug is not connected to the receptacle correctly.• Power failure.
Alarm lamp lights on.	<ul style="list-style-type: none">• Setting value of overheating prevention is lower than that of in-bath temperature.
Vacuumping is not conducted.	<ul style="list-style-type: none">• Power for vacuum pump is turned off.• Door or valve is open.• Wear on packing.• Air leakage on the vacuum hose

When power failure occurs...

- 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 device if a power failure occurs during operation.

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

In Case of Request for Repair

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

< Check following items before contact >

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

Minimum Retention Period of Performance Parts for Repair

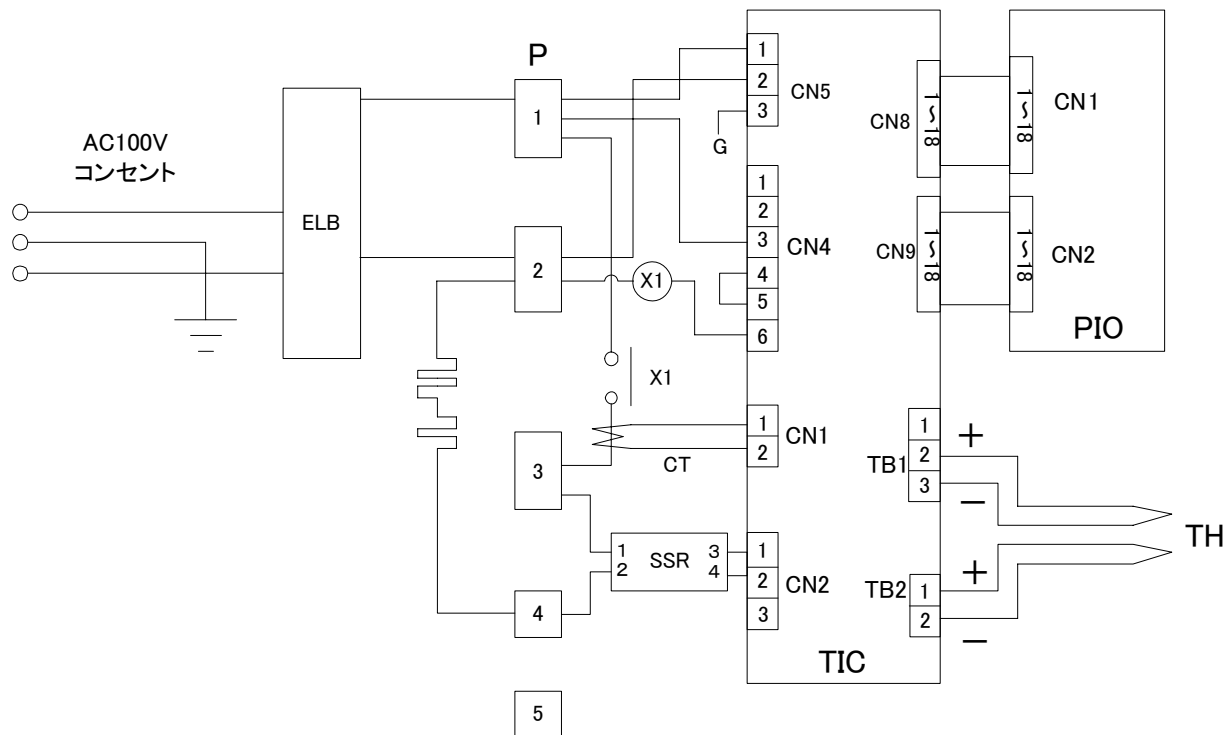
The minimum retention period of performance parts for repair of this unit is 7 years after discontinuance of this unit.

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

Specification

Model		ADP200	ADP300
Standards	Internal dimensions	W200 × D250 × H200 mm	W300 × D300 × H300 mm
	External dimensions	W400 × D411 × H565 mm	W500 × D463 × H669 mm
	Interior	Stainless steel SUS304	
	Internal capacity	10L	27L
	Permissible load of shelf	Approx. 15kg/one shelf	
	Shelf material	Aluminum	
	Number of shelf step	2	3
	Pitch of shelf	63mm	71mm
	Intake	Outer diameter: 18mm	
Performance	Method	Decompression, radiation heating	
	Operating temperature range	40 to 240°C	
	Operating vacuum degree range	101 to 0.1KPa	
	Temperature adjustment accuracy	±1.5°C (at 240°C, no load)	
	Temperature distribution accuracy	Within ±10°C (at 240°C, no load)	
	Time required to reach highest temperature	Approx. 70min.	Approx. 100min.
Function	Thermo regulator	PID control by microcomputer (VS1 controller)	
	Overheating prevention device	ON/OFF control by microcomputer (VS1 controller)	
		Temperature control circuit shares the power source with overheating prevention circuit. Temperature measurement circuit, CPU, sensors, and output circuit are independent respectively.	
	Sensor for temperature control	K-thermocouple (W-sensor for temperature control and overheating prevention)	
	Sensor for overheating prevention		
	Temperature setting system	Digital setting (also for overheating prevention device)	
	Temperature display system	Digital display	
	Heater	Mica heater	
		680W	1.05KW
	Heat insulation material	Rock wool 100 mm	
	Inspection window	Reinforced glass, 12mm thickness with polycarbonate resin protection plate	
Vacuum meter	Bourdon tube type, scale range 0 to 0.1 mPa		
Safety device	Over current earth leakage breaker, Dual overheating prevention function		
Operation	Key input	Display : 4digits 7segments 10mm LED (green) Setting : 4digits 7segments 8mm LED (red) Setting of overheating prevention : 4digits 7segments 8mm LED (red)	
	Monitor lamp	Heater lamp, Alarm lamp, Timer lamp	
	Timer function	Select from Auto stop/Auto start/Not use	
	Vacuum control	Bourdon tube display, manually control by pump valve and purge valve	
	Safety function	Earth leakage breaker (with OC), Dual overheating prevention function, Error display (refer to page 26)	
Power supply	100V AC, 50/60Hz, 8A	100V AC, 50/60Hz, 12A	
Weight	Approx. 30Kg	Approx. 55Kg	
Accessory	Shelf (aluminum punching metal)		
	2 pcs.	3pcs.	

Wiring Diagram



Symbol	Part name	Symbol	Part name
H	Heater	X1	Main relay
TIC	Control board	SSR	Breakerless relay
PIO	Display circuit board	TH	W-sensor (K-thermocouple)
ELB	Earth leakage breaker	CT	Current transformer

Replacement Parts Table

Part Name	Code No.	Specification	Manufacturer
ADP200 Heater A	ADP2140100	100V 80W	Yamato Scientific
ADP200 Heater B	ADP2140110	100V 200W	Yamato Scientific
ADP300 Heater A	ADP3140070	100V 150W	Yamato Scientific
ADP300 Heater B	ADP3140080	100V 300W	Yamato Scientific
Control board	1020000042	VS-1 fixed value type (control board and display circuit board are replaced together.)	Yamato Scientific
Display circuit board			Yamato Scientific
Earth leakage breaker	2060000019	15A 30mA (with OC)	Yamato Scientific
Tough card	1130000008	Length: 300mm	Yamato Scientific
Main relay	2050000019	AHE1254 100V	Matsushita
Breakerless relay	2160000035	TRS5225	Toho Denshi
W-sensor	1160030047	K-thermocouple	Yamato Scientific
Pump/Purge valve	3150000009	DC-42B BS	Fujikin
Vacuum meter	5070010004	GK25-A40	Nagano Keiki
Door packing (ADP200)*	ADP2140080	Silicon rubber	Yamato Scientific
Door packing (ADP300)*	ADP2140060	Silicon rubber	Yamato Scientific
Inspection window glass (ADP200)	ADP2140260	Hard glass	Yamato Scientific
Inspection window glass (ADP300)	ADP3140200	Hard glass	Yamato Scientific

*: Door packing is expendable

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°C
	Normal hexane, ethylene oxide, acetone, benzene, methyl ethyl ketone, and other flammable substances having a flash point of -30°C or higher but lower than 0°C
	Methanol, Ethanol, Xylene, Pentyl acetate (amyl acetate), and other flammable substances having a flash point of 0°C or higher but lower than 30°C
	Kerosene, Light oil (gas oil), Oil of turpentine, Isopentyl alcohol (isoamyl alcohol), Acetic acid, and other flammable substances having a flash point of 30°C or higher but lower than 65°C
FLAMMABLE GAS:	Hydrogen, Acetylene, Ethylene, Methane, Propane, Butane, and other flammable substances which assume a gaseous state at 15°C and 1 atm

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

Responsibility

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

Note

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

Instruction Manual for
Vacuum Drying Oven
Model ADP200/300

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Yamato Scientific Co., Ltd.

2-1-6 Nihonbashi Honcho, Chuo-ku,
Tokyo, 103-8432, Japan

<http://www.yamato-net.co.jp>