Laboratory Washer
AWD510

Instruction Manual

First Edition

- **Thank you for purchasing "Laboratory Washer, AWD510" of Yamato Scientific Co., Ltd.**
- **In order to use this Equipment properly, please read this Instruction Manual thoroughly before use. Keep them in safe place close to this Equipment so that you can refer to them any time.**

⚠ **Warning**: **Please read the important warning notes in this Manual carefully and thoroughly, and get the good understanding of their contents before using this Equipment.**

Yamato Scientific America Inc.
Santa Clara, CA

Printed on recycled paper

Contents

1. Safety Precautions

Explanation of symbols

About symbols

Various symbols are provided in this Instruction Manual and on the product to ensure safe operation. Improper handling of this Equipment without understanding their contents will lead to the results classified below. Be sure to fully understand the description of symbols below before proceeding to the text of this Manual.

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

Caution Indicates a situation which may result in minor injury (Note 2) and property damages (Note 3.)

（Note 1）Serious injury means a wound, an electrical shock, a bone fracture or intoxication that may leave after effects or require hospitalization or outpatient visits for a long time

（Note 2）Minor injury means a wound or an electrical shock that does not require hospitalization or outpatient visits for a long time.

（Note 3）Property damage means damage to facilities, devices and buildings or other properties.

Meanings of symbols

This symbol indicates a matter urging user to follow the warning (“caution” included).
Specific description of warning is indicated near this symbol.

This symbol indicates prohibitions.
Specific prohibition is indicated near this symbol.

This symbol indicates matters that the user must perform.
Specific instruction is indicated near this symbol.

1. Safety Precautions

List of symbols

Warning

General Warnings

Danger!: High Voltage

Danger!: High Temperature

Danger!: Moving Part

Danger!: Explosion Hazard

Caution

General Cautions

Caution: Electrical Shock!

Caution: Burns!

Caution: Heating Container without water!

Caution: Water Leak!

Caution: For water only

Caution: Toxic Chemicals

Prohibitions

General Prohibited Actions

No open flame

Do not disassemble

Do not touch

Compulsions

General Mandatory Actions

Connect grounding wire

Leveled Installation

Disconnect Power

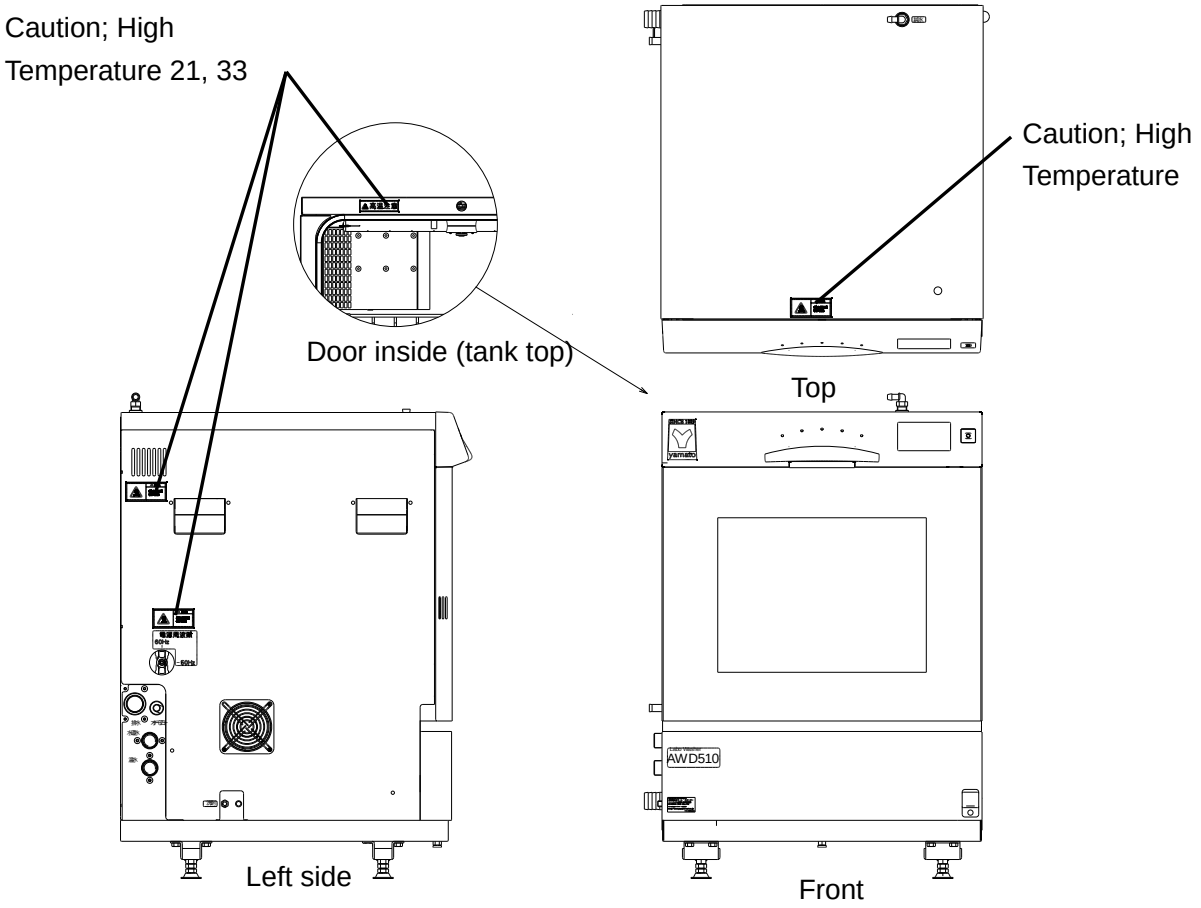
Regular Inspection

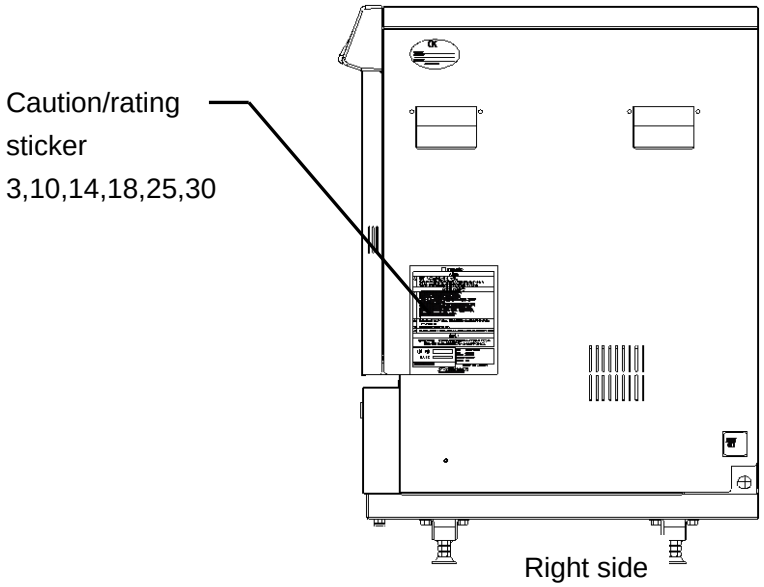
1. Safety Precautions

Residual risk map

These figures indicate positions of caution stickers.

The numbers shown in the text refer to those of the residual risk for portions included in the resididual risk list of the product. For details of each residual risk, refer to the residual risk list.





* Contact us if the caution signs are no more visible because nameplate is peeled off or texts are eliminated. We will send you a new nameplate. (for charge)

List of residual risks (Instructions for avoiding risks)

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

Be sure to fully understand or receive instructions on how to use, maintain and inspection of the product before starting operation.

	During or on carrying-in or installation			
№	Degree of risks	Details of risks	Protective measures to be implemented by the machine users	Relevant sections
1	Warning	Explosion or fire	Do not use in inflammable or explosive gas atmosphere.	Chapter 1
2	Warning	Fire or electrical shock	Ground always the Equipment.	Chapter 1
3	Warning	Fire	Never operate this Equipment at bundled Power Cord/Power Cable.	Chapter 1
4	Caution	Fire or electrical shock	Do not damage Power Cord/Power Cable	Chapter 1
5	Warning	Fire or electrical shock	Never disassembly nor modify the Equipment.	Chapter 1
6	Warning	Fire, electrical shock or leakage	Choose proper place for installation。	Section 2.1
7	Warning	Fire,explosion	Never operate in an atmosphere where flammable or explosive gas is present.	Section 2.2
8	Warning	Injury	Install the Equipment on leveled location.	Section 2.3
9	Warning	Injury	Set the Equipment adjusters.	Section 2.4
10	Warning	Fire or electrical shock	Connect the power supply to dedicated switch board of facilities.	Section 2.5
11	Warning	Fire or electrical shock	Must connect grounding wire properly.	Section 2.6
12	Warning	Fire or electrical shock	Confim to turn off main breaker of switch board of facilities before connecting 3 round terminals of its power cable.	Section 2.7
13	Warning	Fire, electrical shock or injury	Handle Power Cord/Power Cable carefully.	Section 2.8
14	Warning	Leakage	Be sure to keep the tap (raw) water pressure within the specified pressure range.	Section 2.9
15	Caution	Leakage	Water feed and Drainage. Reference	Section 2.10
16	Caution	Faulty	Raw Water. Reference	Section 2.11
17	Caution	Leakage	Be sure to connect the water feed hose firmly.	Section 5.1
18	Caution	Leakage	Carry out routing of the drain and overflow hoses with care.	Section 5.6
19	Caution	Leakage, burn	Check the drain temperature.	Section 5.7
20	Caution	Imcomplete washing	Set the 50/60Hz area selector valve.	Section 5.8
21	Caution	Injury	Provide any adequate measure to prevent overturn to ensure safety.	Section 5.9

Residual risk list

	During use			
№	Degree of risks	Details of risks	Protective measures to be implemented by the machine users	Relevant sections
21	Warning	Burn	Never touch high temperature sections.	Chapter 1
22	Warning	Fire or electrical shock	Never operate and take steps at the abnormal state.	Chapter 1
23	Warning	Injury	Do not put any objects on the unit.	Chapter 1
24	Warning	Injury	Do not climb on the Equipment.	Chapter 1
25	Warning	Leakage	Always close the faucet when the washer is not operated.	Chapter 1
26	Caution	Fire or electrical shock	Turn immediately off the Breaker of the Equipment at thundering.	Chapter 1
27	Caution	Imcomplete washing	In case of power outage, turn OFF(O) the breaker in the front of the main body to ensure safety.	Chapter 1
28	Warning	Imcomplete washing	Set the object to be washed in the washing tank while ensuring the specified weight.	Section 2.12
29	Warning	Product failure · overturn	Do not keep the door open carelessly.	Section 2.13
30	Caution	Injury	Cautions for preparation of washing	Section 2.14,15
31	Caution	Faulty washing, product failure, injuiry, burn	Refer to the cautions for preparation of washing and drying processes.	Section 2.16～19
32	Warning	Imcomplete washing · product faulty	Always use our designated genuine parts, accessories, and options.	Section 2.20
33	Caution	Burn	The main body, area around steam outlet, and in particular the area around door may become extremely hot during operation, Take care not to touch them accidentally.	Section 2.21

	During inspection and maintenance			
№	Degree of risks	Details of risks	Protective measures to be implemented by the machine users	Relevant sections
34	Caution	Fire or electrical shock	Unless otherwise specified in this manual, be sure to turn OFF power supply before starting maintenance.	Chapter 7
35	Caution	Burn	When performing maintenance, be sure to allow the temperature within the washing tank to lower to the level of room temperature.	Chapter 7

	When you are not going to use the unit for a long time or when discarding the unit			
№	Degree of risks	Details of risks	Protective measures to be implemented by the machine users	Relevant sections
36	Warning	Fire or electrical shock	Turn OFF (O) the breaker	Chapter 8
37	Warning	Leakage	Be sure to close the faucet.	Chapter 8
38	Warning	Injury, confined	Do not leave the unit where children may play around.	Chapter 8
39	Warning	Injury, confined	Remove the handle to prevent the door from locking	Chapter 8

1. Safety Precautions

⚠ Warning

Do not use in inflammable or explosive gas atmosphere.

Never use the product in the inflammable or explosive atmosphere.
This product is not of an explosion proof type and may cause fire or explosion.
See Chapter 14. “List of Dangerous Substances” on page 74

Ground always the Equipment.

Ground always this Equipment properly in order to avoid electric shok due to electrical leakage.

Never touch high temperature sections.

The washing tank inside is extremelyu hot during and immediately after operation.Take care to avoid burn. Washing and servicing of the tank inside should be performed after confirmation of that the washing tank inside is cool.

Never operate and take steps at the abnormal state.

Turn immediately off Earth Leakage Breaker(ELB) of this Equipment and disconnect Power Cord/Power Cable from receptacle or switch board of facilities, if smoke or strange smell is generated from it by any chance It may cause fire and/or electrical shock.

Never operate this Equipment at bundled Power Cord/Power Cable.

Never operate this Equipment at bundled Power Cord/Power Cable. May heat its Cord/Cable and then cause fire, if operate at bundled it.

Do not damage Power Cord/Power Cable

Do not damage Power Cord/Power Cable by bending, pulling, or twisting with force. It may cause fire or electric shock.

Do not disassemble or modify the unit.

Never disassemble or modify the unit. A fire or an electrical shock may result.

Do not put any objects on the unit.

Do not put any objects on the unit. They may fall off and cause a personal injury. Note also that putting the solvent on the unit may cause failure.

Do not climb on the Equipment.

Do not climb on this Equipment. May cause personal injury and/or its failure by tipping it over and being damaged.

1. Safety Precautions

Warning・caution

⚠ Warning

Always close the faucet when the washer is not operated.

Be sure to close the faucet because accidental water leakage may occur when the washer is not to be operated (nighttime and holiday).

⚠ Caution

Turn immediately off the Breaker of the Equipment at thundering.

Turn immediately off the power supply of the unit, when thundering and lightning start. If do not so, it may cause fire or electric shock by the thunderbolt.

About recovery from power outage

In case of power outage, the product stops operation. In such an event, turn OFF the breaker in the front of the main body to ensure safety.When power outage occurs during washing and drying, restart operation by setting the breaker to “ON（｜）”. The power outage screen appears and draining is started.

2. Before operating the Equipment

Cautions for Installation

⚠ Warning

1.Be careful with selection of the location.

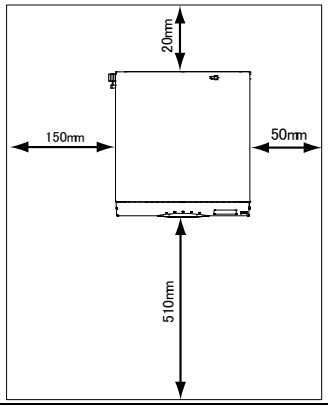
Avoid in particular the following locations for installation.

- the location is rough, dirty or un-leveled.
- flammable gas or corrosive gas will be generated.
- ambient temperature will be more than 40℃ or less than 5℃.
- humidity is outside the range of 65±20%RH
- altitude exceeding 1500m abpve sea ;eve;
- ambient temperature will fluctuate.
- there is excessive humidity.
- there is direct sunlight.
- unstable power supply
- location not level and stable
- outside the building.
- location where the raw water pressure is 0.10MPa or less, 0.50MPa or more (for connection of tap water and hot water)
- location where the raw water pressure is 0.02MPa or less, 0.10MPa or more (for connection of pure water）
- for connection of hot water at 60℃ or more
- location without drainage
- location where the product using weak signals are operated in the neighborhood
- dust-laden location
- location with lots of small animals and insects

It is recommended to secure the space around the product, which is larger than the range shown in the right figure.

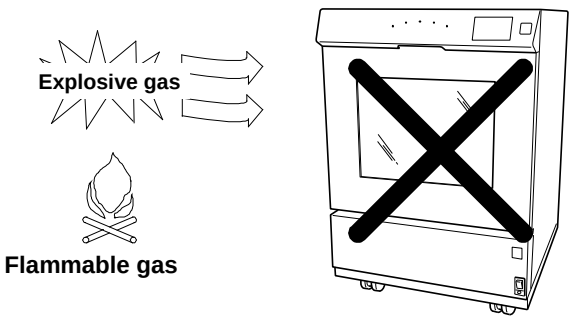
Backside of the main body 20mm or more
Right side of the main body 50mm or more
Left side of the main body 150mm or more
Front side of the main body 510mm or more

(As viewed from above)



2. Never operate in an atmosphere where flammable or explosive gas is present.

- Never operate this Equipment in an atmosphere where flammable or explosive gas is present. This Equipment is not explosion-proof. Spark may be discharged by switching Earth Leakage Breaker(ELB) “ON” and “OFF” and and also relay during operation, and then it may cause fire or explosion
- See Chapter 14. “List of Dangerous Substances” on page 74 for flammable and explosive gases.

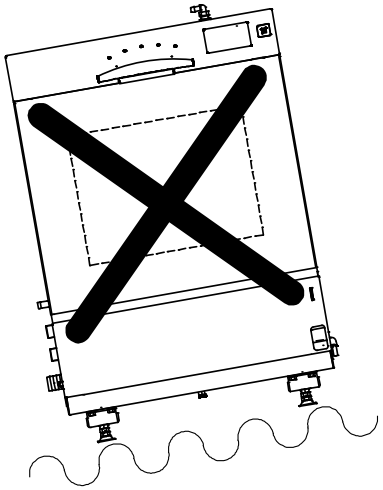


2. Before operating the Equipment

Cautions for Installation

3. Install the Equipment on leveled location.

- Install this Equipment on leveled floor. If it is installed on rough and/or slope floor, vibration or noise will be occurred, and unexpected trouble and malfunction may be happened.
- Weight of this Equipment: approx.87kg(dry weight) Handle this Equipment carefully at least at the transpottaion and the installation.



4. Set the Equipment adjusters.

The product has an adjuster at four points.

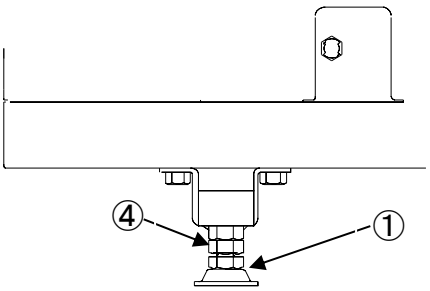
Set those adjusters by the following procedure after this Equipment installation.

① Turn each adjuster until securely stand on the floor wiuth sppaner.

② Carry out leveling using a level gauge.

③ Check any gap between floor and 4(four) standing points.

④ Tighten each nut of its adjuster against to the nut above to prevent loosening.



5. Connect the power supply to dedicated switch board of facilities.

- Connect Power Cord/Power Cable to suitable receptacle/switch board of facilities according to electrical requirements as follows.。
- If the power capacity is insufficient, the supply voltage may drop, making correct control impossible. Always connect to the power supply system with sufficient supply voltage.

  Electrical requirements : single phase AC220V ELB capacity 15A

* Check line voltage of its receptacle/switch board of facilities and/or whether utilize the same line with other equipments or not, if this Equipment does not start up/operate even to turn the power supply On . Take correct action for the solution, such as changing its power source away from other equipment.

2. Before operating the Equipment

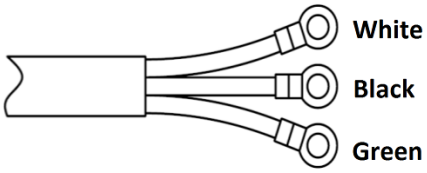
Cautions for Installation

6. Ground wire MUST be connected properly (with external transformer for 220V)

If no ground terminals found, contact original dealer of purchase for location-specific electrical requirements.

Securely connect to a distribution board.

No power plugs or connectors of any kind are included. When using a power plug, use a plug that meets the voltage and electrical capacity.



Core color	Wiring on distribution board
White	Neutral
Black	Live
Green	**Ground**

Never connect ground wire to gas lines, water pipes, telephone grounding lines or lightning rods. Doing so may result in fire, electric shock or equipment malfunction.

7. Power cord connection

Confim to turn off main breaker of switch board of facilities before connecting 3 round terminals of its power cable. Not include any kinds of power plug for this unit as an accessory. Select appropriate power plug and connect those 3 round terminals to it as requied of electric capacity.（see the right table）

Core color	Wiring on the distribution board
White	Ground side
Black	Voltage side
Yellow/Green	Earth

8. Handle Power Cord/Power Cable carefully.

- Never operate this Equipment at bundled Power Cord/Power Cable. May heat its Cord/Cable and then cause fire, if operate at bundled it.
- Do not modifiy, bend forcibly, twist or pull Power Cord/Power Cable. Otherwise, may cause fire and/or electrical shock.
- Do not lay the power cord in way of the person or other materials. Otherwise overturn or fire may be caused.
- Do not damage Power Cord/Power Cable by setting under any desk and/or chairs, or by pinching it between objects. Otherwise, may cause fire and/or electrical shock.
- Do not place Power Cord/Power Cable close to kerosene heater, electric heater, or other heat-generating devices.
  Insulation of Power Cord/Power Cable may burn and cause fire or electrical shock.
- Turn immediately off Earth Leakage Breaker(ELB) and also disconnect Power Plug/breake of switch board of facilites, if it is damaged such as exposure of core wire or disconnection. May cause fire or electrical shock, if this Equipment is operated with damaged Power Cord/Power Cable.
  Ask local dealer to replace Power Cord/Power Cable.
- Connect Power Cord/Power Cable to appropriate receptacle or switch board of facilities.

9.Be sure to keep the tap (raw) water pressure within the specified pressure range.

- Operate the product with the tap water pressure within a range of 0.10～0.50MP at all times including nighttime.
- The same raw water pressure range applies even when the optional “feed-water inlet connection unit (OAW44)” (see page 20 is used.

2. Before operating the Equipment

Cautions for Installation

⚠ Caution

10. Water feed and Drainage

- Request the water feed/drainage equipment work to the specialty contractor.
- Do not use any water feed/drainage hoses other than those attached or any damaged or deteriorated supply/drainage hoses.
- Be sure to connect the water feed/drainage hoses firmly and confirm that there is no water leakage.
- Arrange the water feed/drainage hoses in such a manner that they are not crushed by a person or object.

11.Raw Water

- Use tap water for raw water.
- Check if raw water is contaminated with red rust, etc, Contaminated raw water may result in failure of achieving the specified washing effect and may cause malfunction, etc.

Cautions for preparation of washing

⚠ Warning

12. Faulty Washing and Abnormal Operation

- The specified maximum total weight including the optional rack is 10 kg for the upper stage and 15 kg for the lower stage. The weight of objects to be loaded is 6 kg for the upper stage and 10 kg for the lower stage. Put the object into the washing tank while keeping the specified weight. Otherwise, faulty washing or abnormal operation may occur.
- Always use our designated genuine parts and accessories.

13. Product failure and overturn

- Do not keep the door open carelessly.
- Do not put any material of 15 kg or more on the door.
- Do not climb and sit on or lean against the open door.

⚠ Caution

14. Skin and Eye Irrigation and Skin Inflammation

- Be sure to put on protective tools, such as gloves, protective goggles, when handling detergent, interior washing agent, and other chemicals.
- Before use, read through the instructions for detergent and interior washing agent so that you understand fully the contents.

15. Injury

- When washing an appliance with sharp end, handle it with care to prevent injury.

2. Before operating the Equipment

Cautions for preparation of washing and drying

⚠ Warning

16. Insufficient washing

- When changing the detergent, check the type (general-purpose alkaline liquid detergent, alkaline liquid detergent for oil stains, general-purpose weakly-alkaline liquid detergent, alkaline liquid detergent for high hardness water, general-purpose powder detergent). For liquid detergents, take care not to install a bottle in the wrong manner.
- Arrange objects to be washed in an adequate manner.
- Before starting washing, turn the spray arm manually in the washing tank to confirm that it does not contact the object to be washed.
- Be sure to use our specified detergent.
- While the product is in use, do not close the shut-off valve on the feed water line to the product.
- A container-like object to be washed may allow large amount of water to stagnate in it during operation, causing decrease in the amount of circulation water and possibly resulting in abnormal operation end. Be sure to set such object upside down to prevent water stagnation.

17. High-temperture burn

- Never operate the product with the door packing in the abnormal state (damage, deformation, dislodgement, etc.)
- Never operate the product while the door packing holds the object to be washed.

18.Damage and deformation of the object to be washed, and damage to the product

- De not wash any disposable appliances.
- The product cannot be used for washing of non-heat resistant appliances.
- Carry out washing and drying while confirming the characteristics of objects to be washed.
- The object to be washed is exposed to the following atmosphere in this washer:
  Temperature in the washing bath: Pre-washing・washing：～80℃,Rinse・final rinse：～93℃
  Temperature in the drying tank：Approx. 60℃

19. Corrosion of objects to be washed

- Before washing, confirm that the object to be washed can withstand the detergent and temperature while referring to the instructions for the object.
- Do not attempt washing of any nickel-plated appliances, aluminum appliances with color enameling.

2. Before operating the Equipment

Precaustions when washing and drying

⚠ Warning

20. Faulty washing and product abnormal operation

- Always use our designated genuine parts, accessories, and options.

⚠ Caution

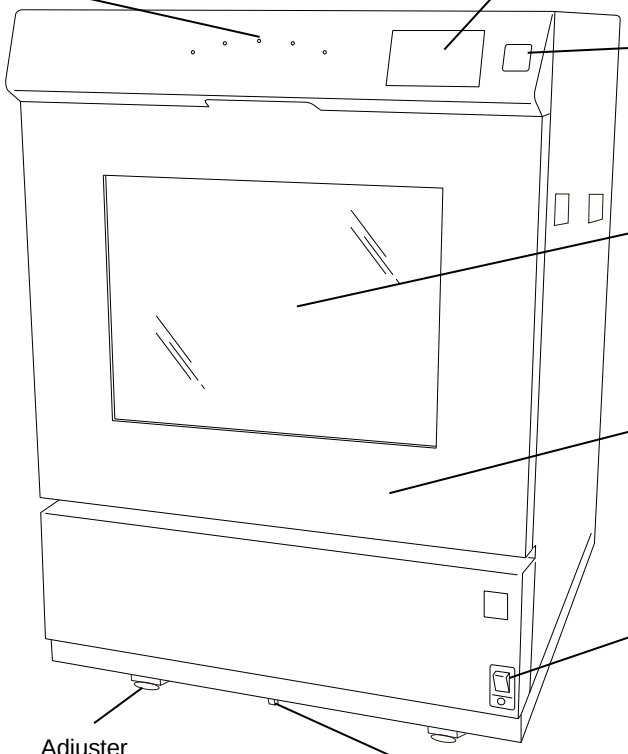
21. High-temperature burn

- The main body, area around steam outlet, and in particular the area around door may become extremely hot during operation, Take care not to touch them accidentally.
- When opening the door during operation or pause, be sure to put on cloth gloves, etc, because the object to be washed, racks, jet rack (option), and the washer may be extremely hot. (The door cannot be opened during paus when the tank internal temperature exceeds 60℃.)
- Keep hands off from the washing solution (hot) from the drain hose.
- The object to be washed, various racks, jack rack (option), and the washer may become extremely hot after operation. Always put on cloth gloves when taking out the objects.

3. Names and functions of each part

Appearance

1.Front side



RUNlamp
Indicates the state with lamp.
① ON according to the progress of process during operation
From left:
・Pre-washing
・Washing
・Rinsing
・Final rinsing
・Predrying
② When power supply is turned OFF with the power switch,only the lamp in the middle goes ON.

Touch panel
Pressing the display on the screen enables operation.

POWER switch
Operated when the product is naot used temporarily.

Observation window
Enables observation of the state inside the tank

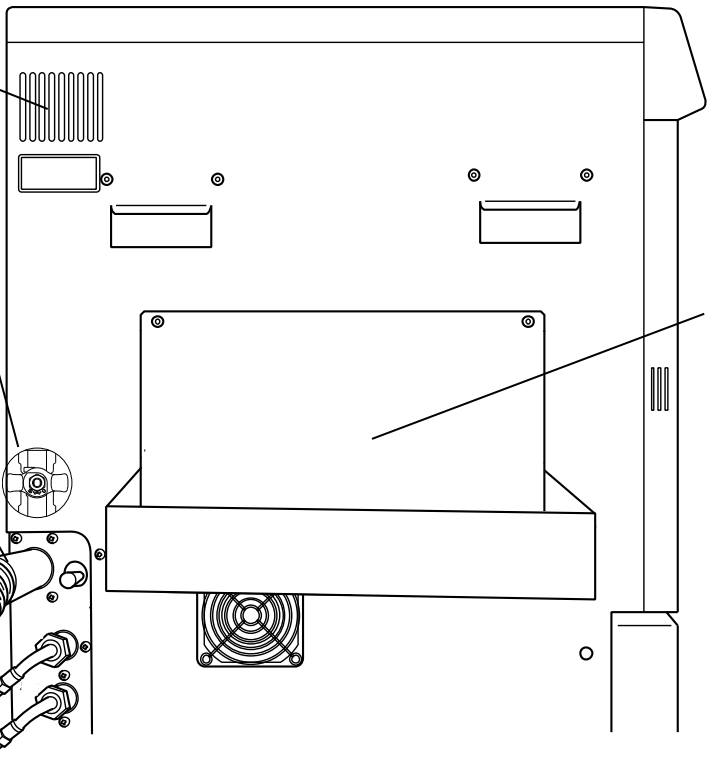
Door
Opened to load/unload the object to be washed (Door operated from the touch panel)

Main power switch (earth leakage circuit breaker)
ON：「｜」 OFF：「○」
Detects any occurring earth leakage and shuts off operation

Adjuster
Used to adjust the washer to a horizontal state during operation

Drain
Used to drain water stagnated on the bottom plate。

2.Left side



Steam outlet
Used to blow out steam

50/60Hz area selector valve
Select according to the frequency of the area

Drain port
Used to dischcage drain after washing

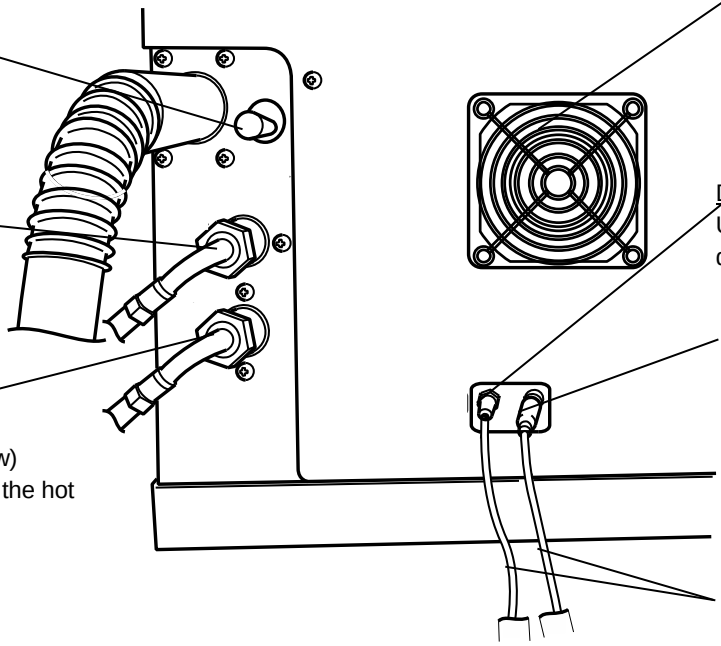
Drain hose
Accessory
2m

Detergent storage rack
Used to store the detergent bottle.

3. Names and functions of each part

Appearance

3.Detailed view of the left side



Overflow
Allows any extra washing water in the tank to be discharged Outside dia.φ18mm
Attached hose：1.5m

Tap water inlet
G3/4 connection (male screw)
Used to feed water from tap water pipintg
Attached hose :1.5m

Hot water inlet
G3/4 connection (male screw)
Used to feed hot water from the hot water piping
Attached hose 1.5m

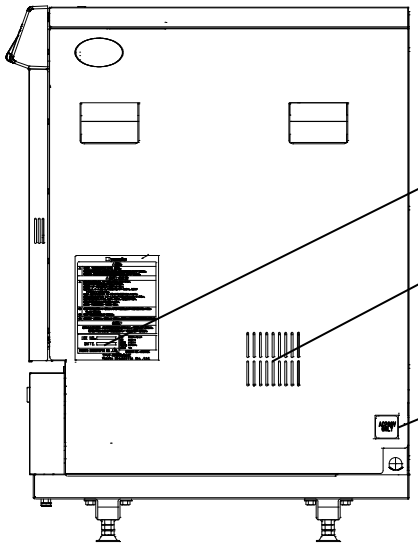
Exhaust cooling fan
Used to cool the washer inside

Detergent connection port
Used to connect to the detergent tube

Detergent residual sensor terminal connection port
Used to connect to the detergent residual sensor (white terminal),

Detergent tube
Accessory
Attached to the dedicated bottle.

4.Right side

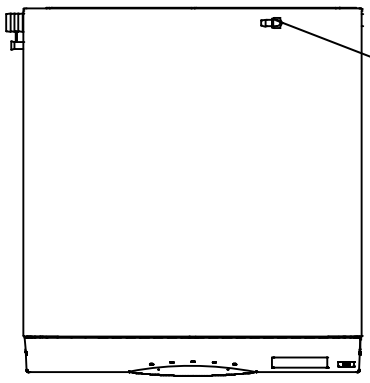


Serial No. seal

Air intake for cooling of the washer inside
Used to cool the washer inside

Power cord
3m long outside the washer; Round terminal M5 for termination

5.Top surface

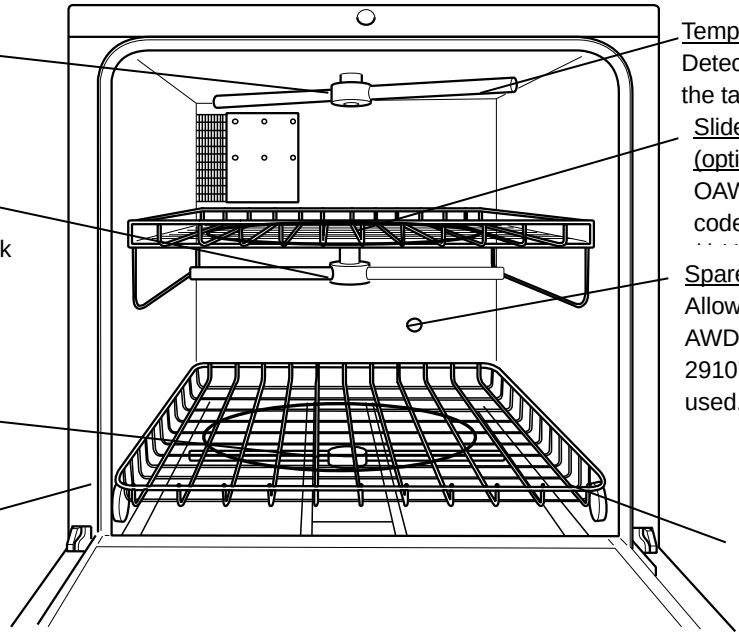


Pure water inlet
φ10.5mm for connection,water feed through gravity drop
- Final rinsing can be made by connecting the water purification apparatus, PureLine WL220T (product code:253629).
- When supplying water from the water purification apparatus, reduce the pressure to 0.02～0.10MPa.

3. Names and functions of each part

Inside the tank

1. Inside the washing tank (front)



Upper spray arm
Sprays water while turning

Intermediate spray arm
Sprays water while turning when the slide type upper rack base (option) is used.

Lower spray arm
Sprays water while turning

Door packing

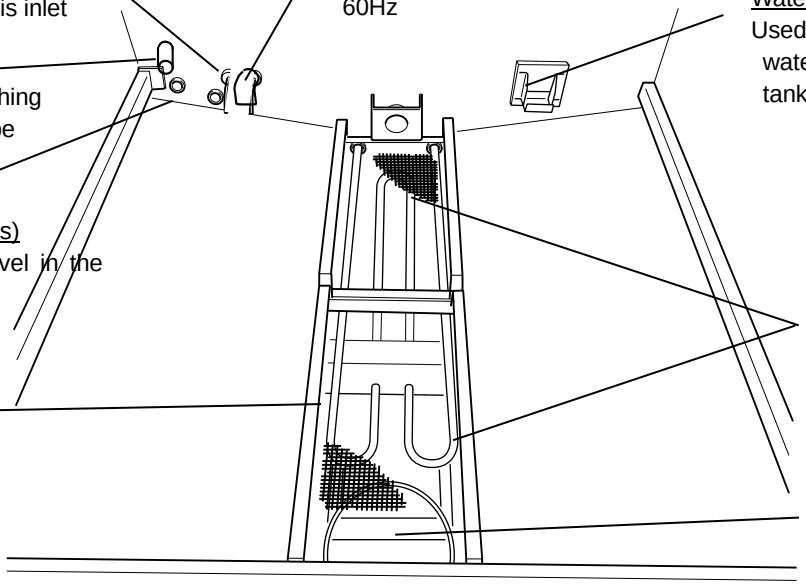
Temperature sensor
Detects the temperature inside the tank.

Slide type upper rack base (option)
OAW34 (Product code:291061)

Spare dry air outlet
Allows dry air to blow out when AWD510DRY (product code : 291070) with spare dry air unit is used.

Slide type lower rack base (option)
OAW36 (product code : 291062)
Objects to be washed are placed on this rack base.

2.Inside the washing tank (lower)



Detergent inlet
Detergent supplied through this inlet

Relief outlet
Used to drain the washing solution during operation at 60Hz

Water inlet
Used to supply tap water, hot water, and pure water into the tank.

Overflow
Alllows any extra washing water in the tank to be discharged

Level sensor (2 pieces)
Detects the water level in the tank

Tank internal filter
Used to collect wastes from washing #10

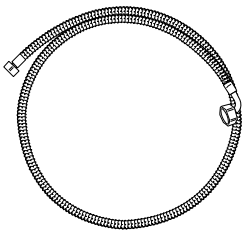
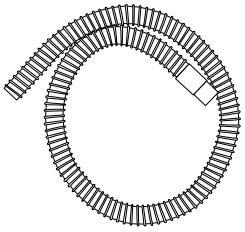
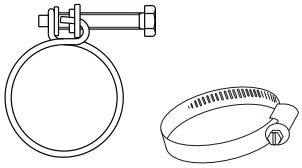
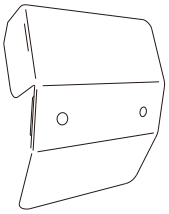
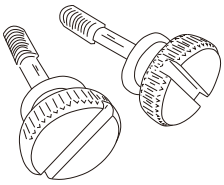
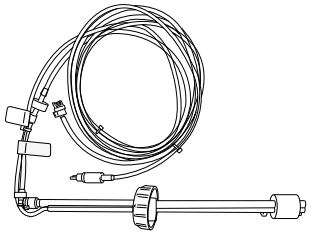
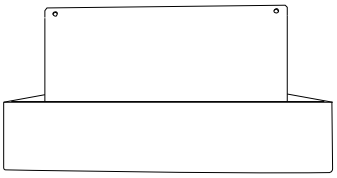
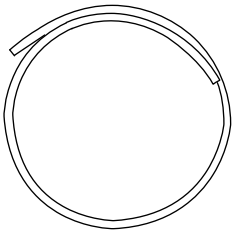
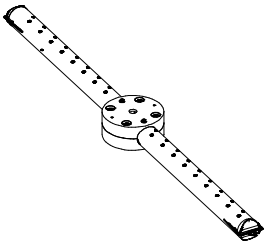
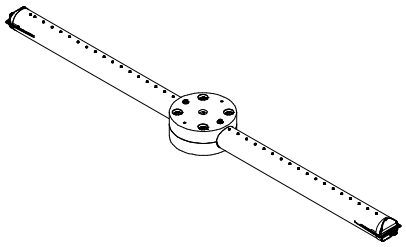
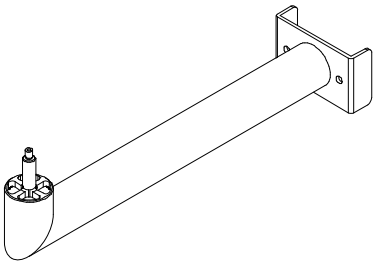
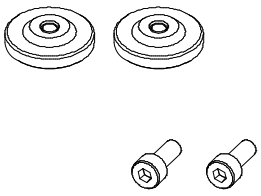
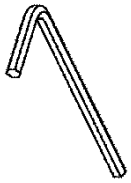
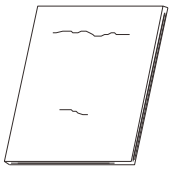
Heater
Activated to heat the washing water

Drain filter
Used to collect wastes from washing #40

3. Names and functions of each part

Accessories/consumables

Before use, confirm that all of accessories shown below are provided. If any one of them is missing, contact the shop from which you have purchased the product.

① Water feed hose 1.5m×2 pieces  Connection to this washer：G3/4,Connection to water feed：G1/2	② Drain hose 2m  Outside diameter φ36.5mm× inside diameter φ31.5mm.with cuff attached to one end	③ Hose band  Used to secure the drain hose and overflow hose
④ Lid to be provided after removal of the upper-rack  Used when the upper rack is not used	⑤ Knurled screws, 2  ④ For installation	⑥ Detergent tube  Used to charge the liquid detergent (LaboWash)
⑦ Detergent bottle rack  Installed on the left side of main body to house the detergent bottle.	⑧ Overflow hose, 1.5m  Outside dia. φ18mm×inner dia. φ12mm	⑨ Upper spray arm 
⑩ Lower spray arm 	⑪ Lower nozzle spindle 	⑫ Fixing nuts 2 Hexagon socket head bolts 2 
⑬ Hexagonal wrench 	⑭ Operation manual 	

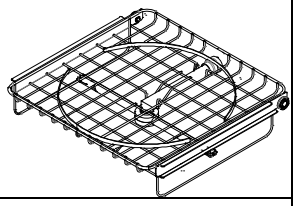
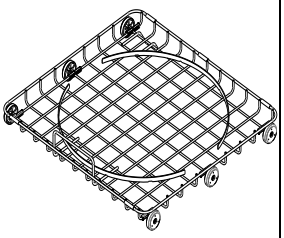
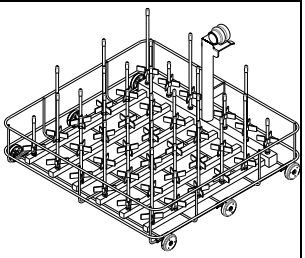
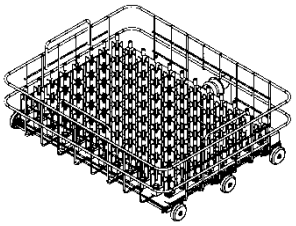
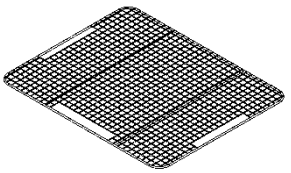
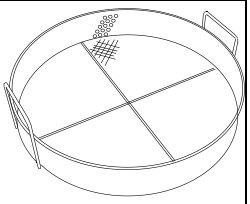
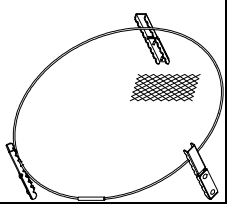
3. Names and functions of each part

List of consumables

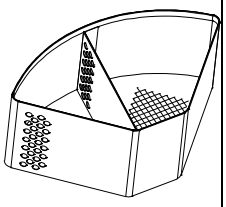
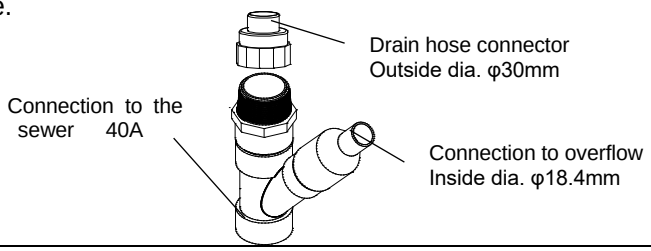
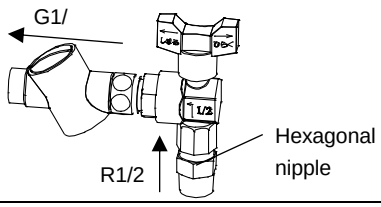
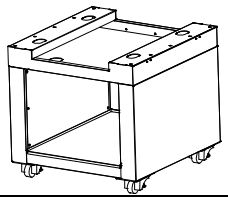
Name (type)	Product code	Remarks
Murinluster	9190026001	General-purpose/alkaline powder detergent, 8kg contained (with a measuring cup)
LABO WASH (AWL100)	291077	General-purpose/alkaline liquid detergent (foamless) 2L×4 pieces Applicable to various contaminations, This is also designed to prevent clouding of glassware.
LABO WASH (AWL200)	291078	For oil contamination/alkaline liquid detergent (foamless), 2L×4 pieces Demonstrates superior washing power for contamination with mineral oil.
LABO WASH (AWL300)	291079	General-purpose/weak alkaline liquid detergent (foamless) 2L×4 piece Can be discharged as it is into the ordinary sewerage
LABO WASH (AWL400)	LT00038937	For high hardness water/alkaline liquid detergent (foamless), 2L×4 pieces It corresponds to washing with hard water up to 400 ppm.
Washing-tank cleaner (AWP500)	291080	Used for cleaning of the washing tank inside. Acid powder detergent 500g×4 pieces

4. Useful Functions

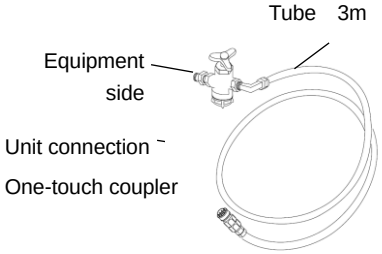
List of options

Name (type)	Product code	Remarks
Slide type upper rack base (OAW34)	291061	Upper rack in the tank Installed on the lower stage in the washing tank and can carry various racks. ・ Effective height of loaded appliances：155mm 
Slide type lower rack base (OAW36)	291062	Lower rack in the tank Installed on the lower stage in the washing tank and can carry various racks. ・ Effective height of loaded appliances ：300mm (for operation with one stage) ：175mm(for operation with two stages) 
Slide type jet rack A5(OAW38)	291063	Enables washing of the inside of measuring flasks. This type of rack cannot be used together with lower and upper racks. No. of jet nozzles：Total of 36 (Nozzles with the height of 100mm :18 pieces) (Nozzles with the height of 200mm :18 pieces) 
Rack for vials (OAW56)	291073	Enables washing of the inside of vials. This type of rack cannot be used together with lower and upper racks. No. of jet nozzles：Total of 96 pieces Accessories：Tube connecting to the lower rack Socket screws 2 
Holder for the rack for vial (OAW58)	291074	For washing using the rack for vial. This is to prevent overturn of vials. 
Beaker rack A5 (OAW40)	291064	Used for washing of beakers. ・Applicable beaker：50～3000mL ・No. of set beakers：1L beaker, about 8 pieces * When washing 50～200mL beakers, use the beaker rack net because they may be overturned. 
Beaker rack net (OAW50)	291069	Used for washing 50～200mL beakers with the beaker rack A5. This is to prevent overturn of beakers. ・Can be used for 50ml～1000ml glass beakers, resin containers, and measuring cups. 

List of options

Test tube rack (OAW48)	291068	Used for washing of test tubes.(Set of four 90°-divided pieces) The rack may be directly loaded and dried in a small dryer. ・Test tube inside dia. φ9mm or more ・Number of test tubes that can be set, φ10.0：about 212 pieces×4 racks φ16.5：about 84 pieces ×4 racks φ18.0： about 71 pieces×4 racks ・Effective height of installed appliances Upper：150mm Lower：165mm For operation with the lower rack only：200mm 
Band to hold a few test tubes (OAW52)	291071	When setting the test tubes to the rack, use this band when the number of test tubes is small and may overturn during washing. (Set of four pieces) 
Mesh tray (OAW54)	291072	Size：W220×D140×D50（with lid） Used for washing of small objects （2 objects installable on one rack base）
Junction pipe for draining (OAW42)	291065	Combines the drain hose (standard attachment) and overflow hose for draining. Used when two or more drain hoses are difficult to secure. 
Unit to connect to water inlet (OAW44)	291066	Used for connection to the water inlet of the product. Connection IN：R1/2,OUT：G1/2 valve ＋ strainer（60 meshes） * This may be used as Rc1/2 when the hexagonal nipple on the IN side is removed. 
Frame (OAW46)	291067	W580×D600×H535,with casters/adjuster Washing bottles and test tube racks may be stored in the frame. 
Water purification unit Pure-line WL220T	253629	Supplies pure water according to JIS K0557A3 (for final washing)
WL220T Pad for installation on the top surface (OWL50)	253271	Used to place WL220T on top of the product.
Power cord 4 m for WL220T (OWL52)	253273	Used when the standard power cord of 2 m is short

List of options

Water inlet unit for WL220T (OWH10)	253686	Used when there is no sink for the raw water inlet. The faucet is installed to the tap water line and a metallic coupler is used for connection to the water feed hose. The safety against water leakage is enhanced. * This can be used as Rc1/2 when a connection hexagonal nipple is removed. 
Ion-exchange cartridge set for WL220T	253262	Consumables for WL220T（Ion-exchange resin CPC-P+CPC-E）

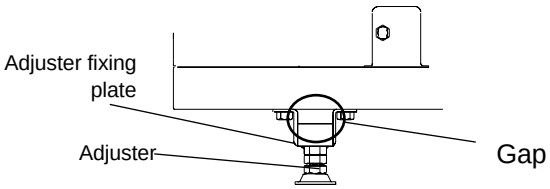
Description of options

1. Frame OAW46

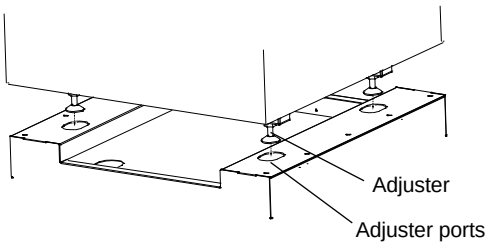
Dedicated frame of the washer. This is provided with casters/adjusters and can be moved. The lower space can be used to store the washing bottles and test tube racks.

● How to install

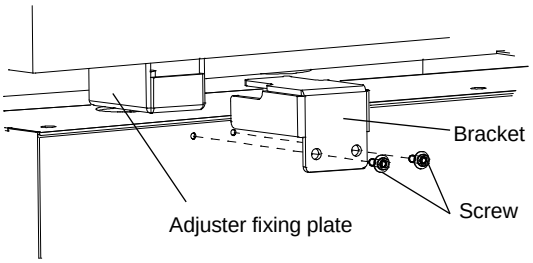
(1) Allow the adjuster screw of the washer to a point where the screw is not visible through a gap of adjuster fixing plates.



(2) Insert adjusters of AWD510 into four adjuster ports in the frame and place AWD510 on the frame.

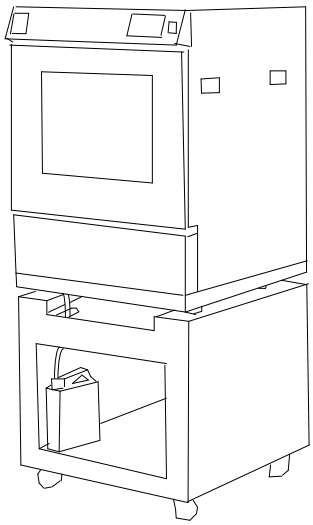


(3) Using four attached brackets and eight screws, secure AWD510 firmly to the frame at four points.



● The dedicated liquid detergent may be stored in the housing space under the frame.
(With openings provided for wiring and piping.)

● The bottom plate of the housing space is removable. As the panel used is washable, any spilled dedicated liquid detergent may be cleaned with ease.



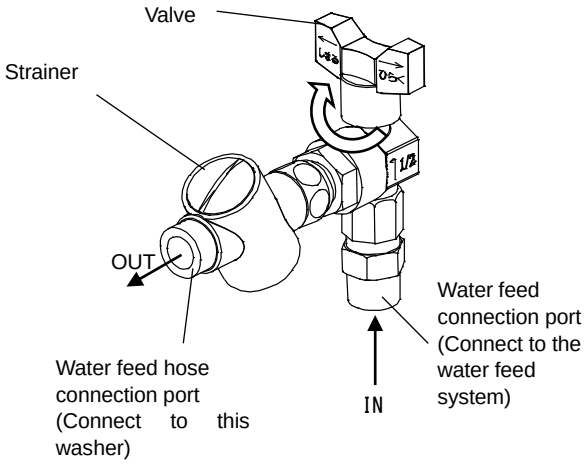
As installed on the frame

2. Water inlet connection unit OAW44

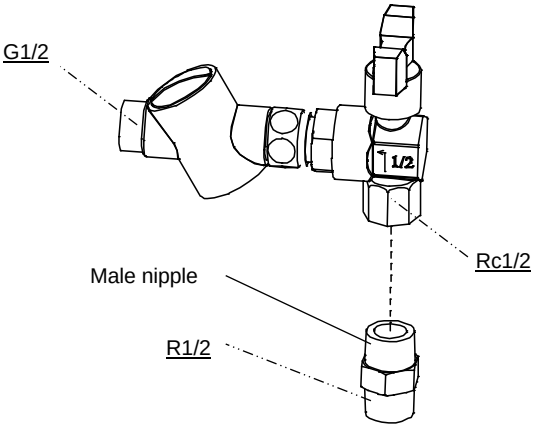
The water inlet connection unit enables opening/closing of the water feed line. The strainer (#60) is also provided and prevents mixing of dust and dirt into the water feed line of the washer.

● How to install

(1) Turn the valve of water inlet connection unit to the “CLOSE” direction.



(2) Connect the water inlet connection port to your water feed system.
The product is shipped in a state with the male nipple (R1/2) provided to the water feed unit.
With the male nipple removed, the connection port may be used as Rc1/2. Use this water inlet connection unit either with the nipple provided or without nipple according to the customer’s system layout.



(3) Connect the water feed hose to the water feed hose connection port (G1/2).

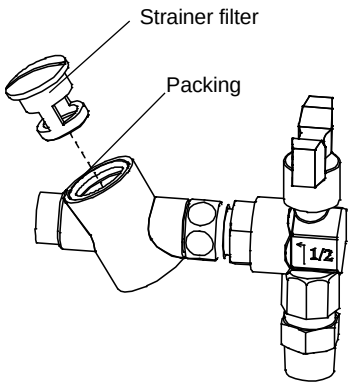
● Periodical maintenance

Clean the strainer filter according to the procedure described below:

(1) Turn the valve of water inlet connection unit in the “CLOSE” directly fully.

(2) Remove the strainer filter with a standard screwdriver and remove dust. (Take care not to lose the packing.)

(3) Install the strainer filter.



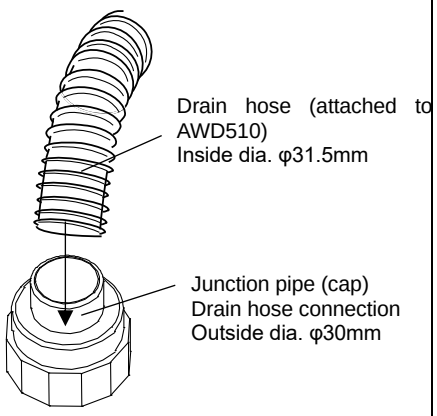
3. Junction pipe for draining OAW42

This pipe enables connection of drain and overflow hoses together to the sewer pipe when the location where this washer has been installed has no sink facilities.（The customer is requested to provide the PVC adhesives to be used for connection of junction pipe.）

● Connection of drain hose

(1) Connect the drain hose to the junction pipe.

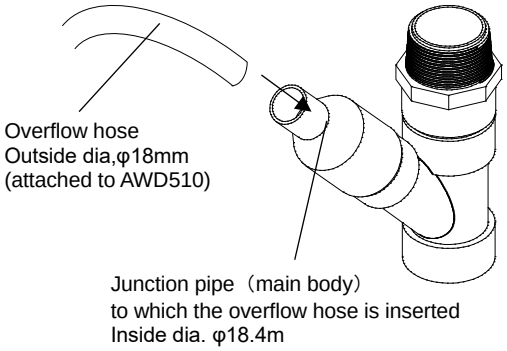
(2) Secure the connection firmly with PVC adhesives.



●Connection of overflow hose

(1) Apply PVC adhesives to the outside of overflow hose and the inside of overflow hose connection.

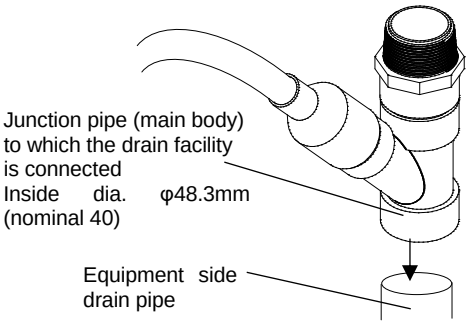
(2) Insert the overflow hose into the overflow hose connection. (Insert the hose till it cannot be inserted anymore.)



● Connection of the junction pipe to the water feed line of equipment

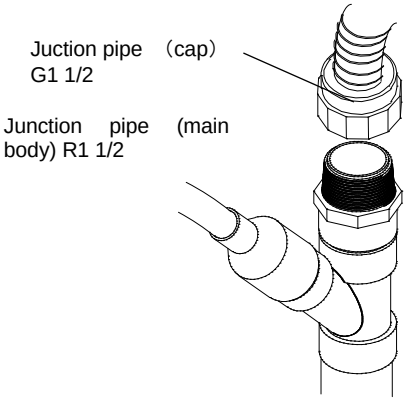
(1) Apply PVC adhesives to the inside of drain facility connection and the inside of the drain pipe of equipment.

(2) Connect the drain facility connection to the drain pipe of the equipment.



● Connection of the junction pipe main body and the cap

Fasten the cap fully onto the junction box main body.



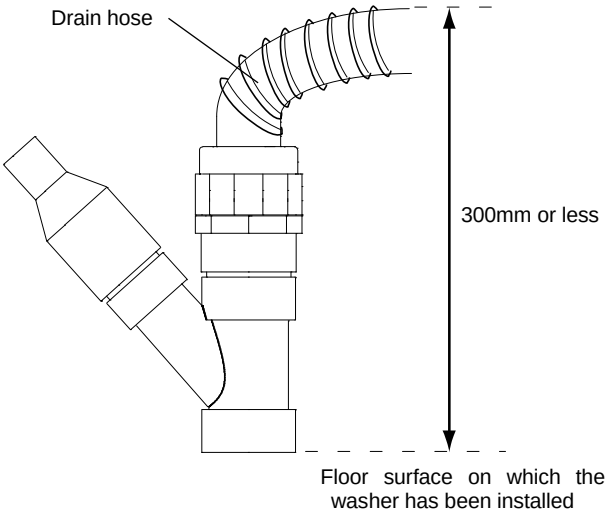
* Allow PVC adhesives to dry completely before operation of the washer.

Junction pipe OAW42 Route the drain hose with care.

Take the followings into account when the junction pipe is to be used.

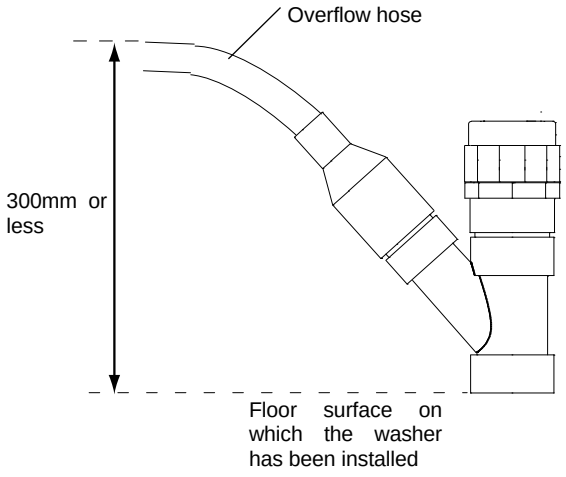
● Drain hose

* Carry out piping so that the drain hose as a whole is 300 mm or less above the floor surface where the washer has been installed. Any portion exceeding 300mm above floor may cause faulty draining or backflow into the washing tank.
* The attached drain hose is 2 m in length. For the drain hose exceeding 2 m in length, contact the store from which you have purchased the product.
* When the drain length is too long, cut it into the appropriate length. (Since the hose contains metallic wires, use a pliers, etc. to cut the hose.)



● Overflow hose

* Carry out piping so that the drain hose as a whole is 300 mm or less above the floor surface where the washer has been installed. Be careful not to provide a trap (sag) in the hose from the overflow port to the drain pipe. Any portion exceeding 300mm above floor or trap may cause failure of achieving the overflow function.
* When the overflow hose is too long, cut it to the appropriate length.



● When the hose cannot reach the specified height or when the drain hose and overflow hose do not reach the specified height above floor, use the optional “frame (OAW46)” (see Page 20) to add the height to reach the specified level

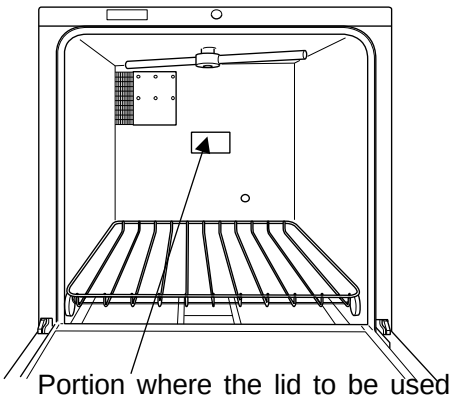
Main body connection port height above floor

	Standard	When the frame is used
Drain port	300mm	800mm
Overflow port	300mm	800mm

4. Example of the use of optional racks

This section describes the example of combining optional racks.

1 ,One stage used



Portion where the lid to be used when the upper rack has been removed

● Combination examples

①One stage used ＋ test tube rack

Applicable test tube ：Inside dia. φ9mm or more,length 200mm or less

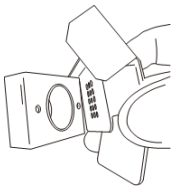
②One stage used ＋ beaker rack

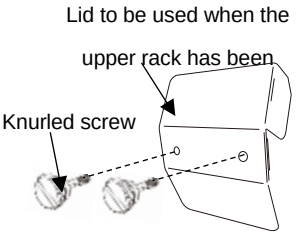
Applicable beaker 50～3000mL

● Installing the lid to be used when the upper rack has been removed

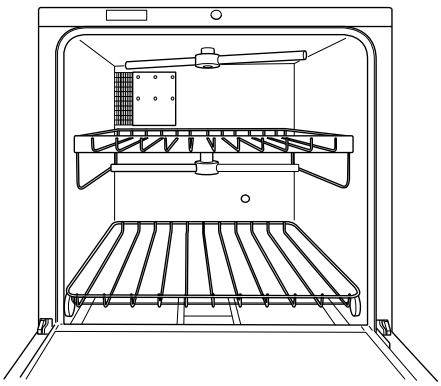
(1) On the cleaning solution blow port for upper rack in the tank, place the attached lid to be used when the upper rack has been removed.
In this case, hook the bend of lid to the upper portion of the blow port.

(2) Secure the lid plate with attached knurled screws.





2 ,Two (upper and lower) stages used



● Combination examples

① Lower： Test tube rack×4 pieces
Applicable test tube：Inside dia. φ9mm or more,Length 165mm or less
Upper： Test tube rack×3 pieces
Applicable test tube：Inside dia.φ9mm or more,Length 150mm or less

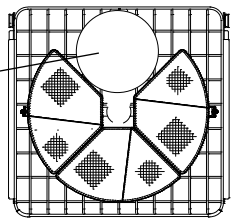
②Lower： Test tube rack×4 pieces
Applicable test tube：Inside dia.φ9mm or more,Length 165mm or less
Upper： Beaker rack
Applicable beaker：1000mL or less

③Lower： Beaker rack
Applicable beaker：1000mL or less
Upper： Test tube rack×3 pieces
Applicable test tube：Inside dia.φ9mm or more,Length 150mm or less

④Upper： Beaker rack
Applicable beaker：1000mL or less
Lower： Beaker rack
Applicable beaker：1000mL or less

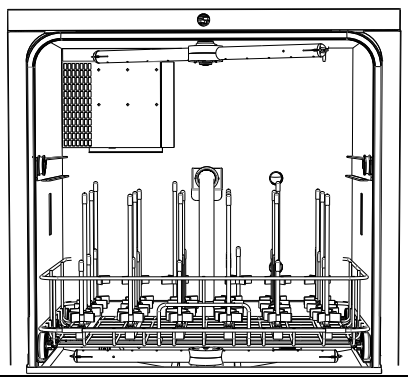
* In case of operation with two stages, maximum three test tube racks are placed.

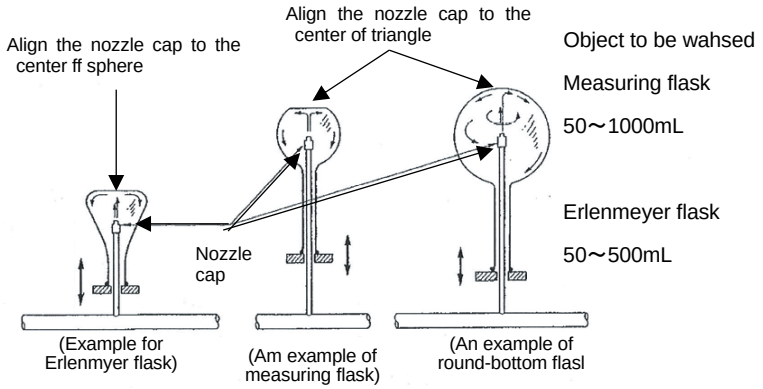
Satisfactory washing effect cannot be achieved because the jet solution hits the circulation solution piping.
Do not arrange the rack in this area.



Front

3 ,Jet rack





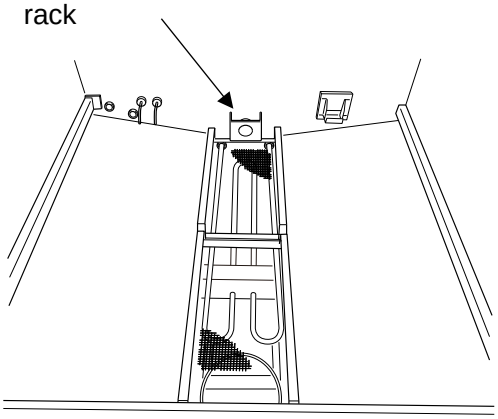
4. Example of the use of optional racks

4 ,Rack for vials

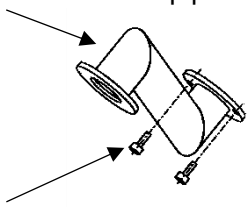
(1) To the washing solution blow port for upper rack in the washing tank, install the attached lid to be used when the upper rack has been removed.
（Refer to “1. One stage used”）

(2) Install the attached lower connection pipe to the washing solution blow hole.

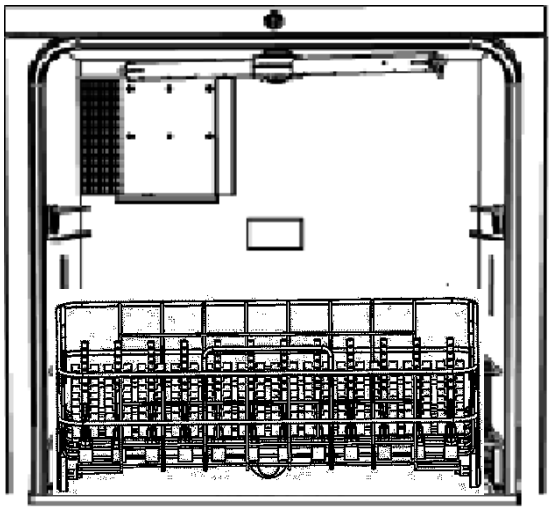
Washing solution blow hole for lower rack



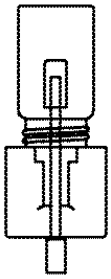
Lower connection pipe



Socket screw



Install so that the nozzle center is aligned to the center of bottle.



5. How to Install

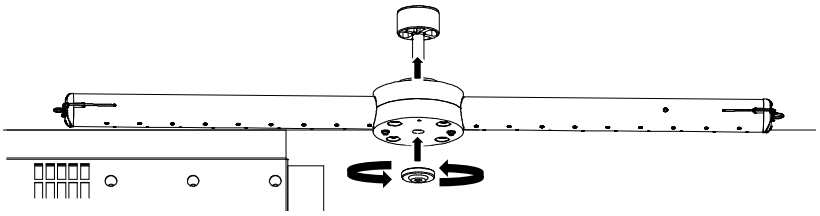
Installation method

1. Connect the upper and lower spray arms

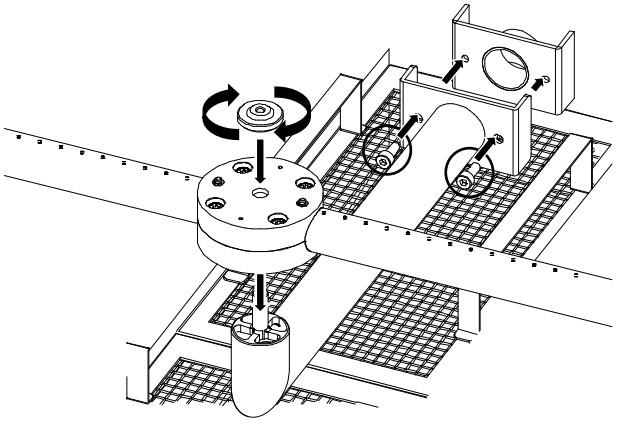
(1) Take out the upper spray arm, lower spray arm, lower nozzle spindle, fixing nuts (2 pieces) and hexagon socket head bolts (2 pieces) from the accessories of product.

* Since the shape of the spray arm is different between the upper and the lower, be careful when connecting.

(2) After fitting the upper spray arm to the bearing on the ceiling of the washing tank, turn the attached fixing nut clockwise to fix the arm.(Because there is a danger of the nut breaking, do not use the tool, and tighten by hand. Be careful not to over tighten.) Push the arm lightly with a finger to confirm smooth rotation.



(3) After fitting the lower spray arm to the lower nozzle spindle, turn the fixing nut clockwise to fix the arm. (Because there is a danger of the nut breaking, do not use the tool, and tighten by hand. Be careful not to over tighten.) As shown in the figure below, Connect the nozzle with the arm to the mouth at the back of the bottom of the washing tank with two hexagon socket head bolts using the supplied hexagonal wrench. After connection, push the arm lightly with a finger to confirm smooth rotation.



2. Be sure to connect the water feed hose firmly.

- Take out the water feed hose set from the accessories of this product, Install the product in a horizontal and stable location close to the faucet and sink.
- If not firmly connected, the feed hose or connection port may be disconnected, allowing water to jet out and resulting in water leakage.
- Take care not to overtighten the connection because the feed hose connection port may be broken.

3. Connect the water feed hose.

(1) Connect the feed hose to the tap water inlet of the product (G3/4 connection).When the hot water is also used, connect the water feed hose to the hot water inlet.

* For connection, confirm that a black packing is provided to the feed hose.

* Be sure to connect tap water supply also when the hot water is to be used.

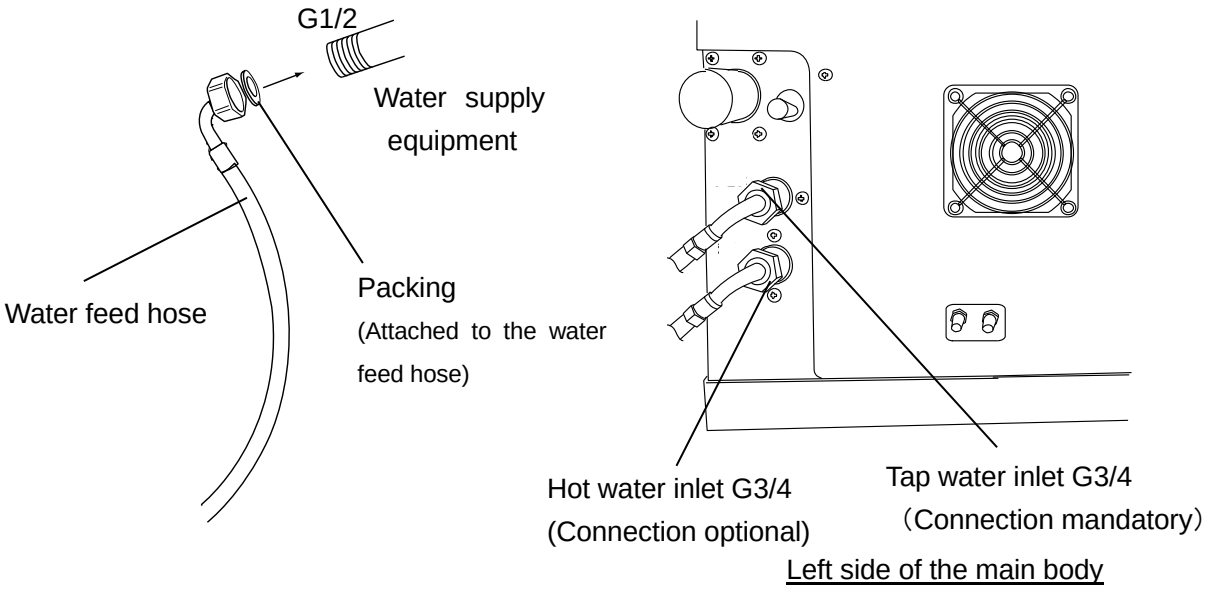
(2) Connect the feed hose to the water supply equipment. (G1/2 connection)

Connect the feed hose to the water supply (water temperature; 5～25℃,water feed pressure:0.1～0.5MPa).

In case of connection to the hot water inlet, connect it to the hot water piping (water temperature; 5～60℃,water feed pressure ; 0.1～0.5MPa).

* For connection, confirm that a black packing is provided to the feed hose.

* Take care not to overtighten the connection nut because it may damage the packing, resulting in water leakage.



* When the tap water contains dust, use the optional “water inlet connection unit (OAW44)(see Page 20).

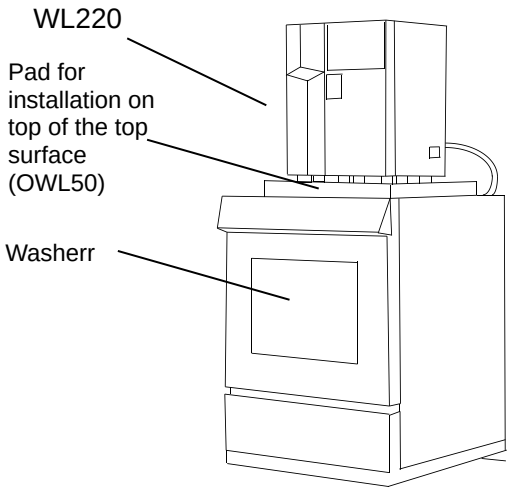
4. Connection of pure water

Final rinsing is available when the optional water purification unit WL220T or the customers' water purification unit is used.

- Installing the water purification unit WL220T

  Install WL220T on top of the product.

* When installing, the use of a "pad for installation on the top surface", which is an option of WL220T, helps installation of WL220T in a stable manner.

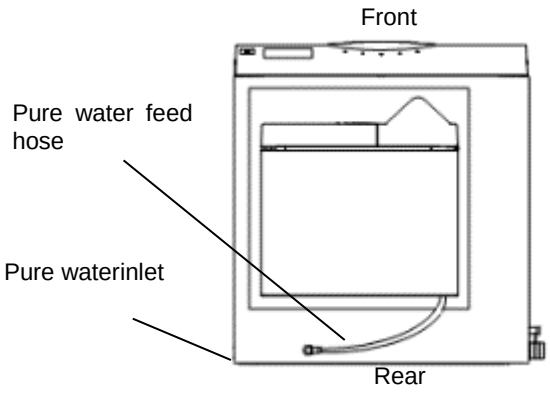


As-installed water purification equipment WL220T

- Connecting the pure water feed hose

  Cut the pure water feed hose of WL220T to the adequate length without any bend and sag and insert the length firmly to the pure water inlet in the top surface of washer.

* For the pure water feed hose connection method on the WL220T side, refer to the attached operation manual.



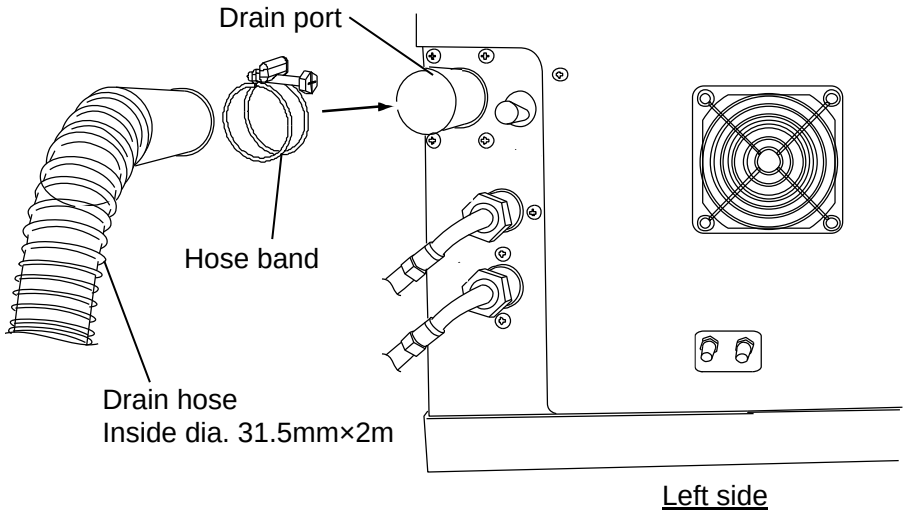
As-installed water purification equipment WL220T (top)

- Connection using the pure water equipment

  When connecting the customer's water purification unit, be sure to reduce the pressure to a range of 0.02～0.1MPa with a regulator.

5. Connect the drain hose to the washer.

● Connecting the drain hose.
Connect the drain hose according to the procedure described below,
Be sure to connect firmly. Otherwise, water may leak from the connection.



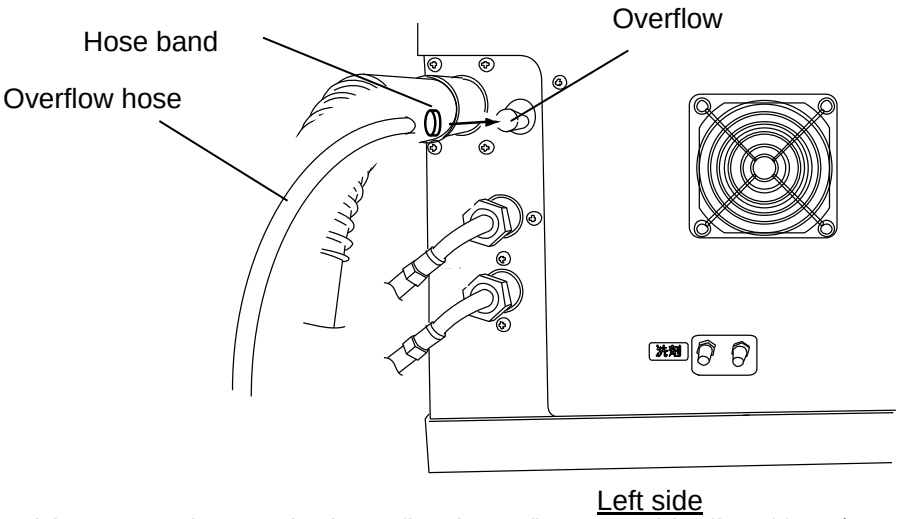
(1) Take out the drain hose and hose band from accessories of the product.
(2) Put the hose band on the drain hose and connect the hose to the drain port. After connection, tighten firmly the hose band with a Phillips screwdriver.
(3) Place the opposite side of drain hose to the sink.

* Carry out piping so that the drain hose as a whole is 300 mm or less above the floor. Any portion exceeding 300 mm above floor may cause faulty draining or backwash into the washing tank.

* The attached drain hose is 2 m. For the drain hose exceeding 2 m, contact the store from which you have purchased the product.

6. Connect the overflow hose to the washer.

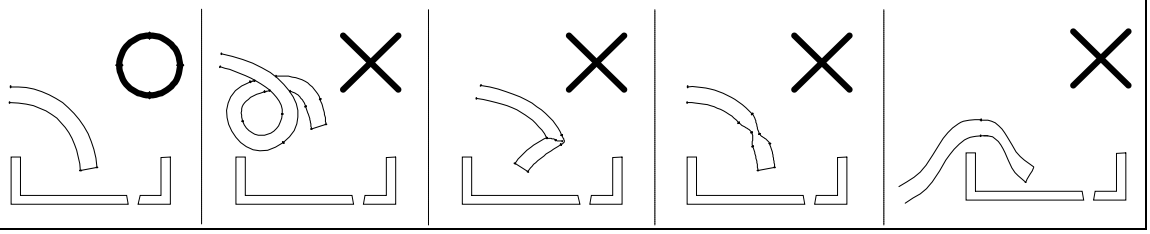
● Connecting the overflow hose.



(1) Prepare the attached overflow hose (hose outside dia.φ18mm).
(2) Put the hose band on the overflow hose and connect the hose to the overflow port.
(3) Place the opposite side of drain hose to the sink.

7. Carry out routing of the drain and overflow hoses with care.

- Never allow the drain and overflow hoses to form any bend or convexed portion.
- Failure of draining due to the bent drain or overflow hose may cause backflow or hose damage inside the washer.
- Connect the drain and overflow hoses **to the drain equipment located lower than the drain/overflow port of this product.** Avoid piping in such a manner as to allow water stagnation inside the hose or at its outlet.
- When the drain hose is long, cut off any extra length. (Since the hose contains metallic wires, use a pliers, etc. to cut the hose.



* When there is no sink or the drain and overflow hoses cannot b be connected, use the optional junction pipe (OAW42) (see Page 20)

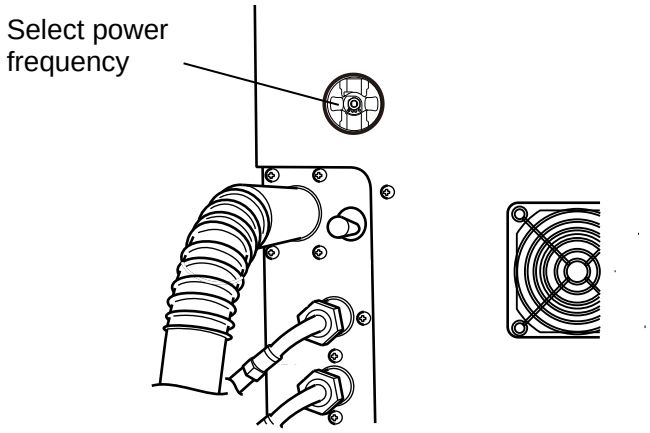
8. Check the drain temperature.

- For draining of washing solution, the cooling water flows simultaneously with draining of the tank at the set solution temperature of 61℃ or more. Draining must be done at a location away from the work environment to prevent touching the drain carelessly.
- High-temperature cooling water may flow out. PVC tubes if used in the drainage of sink may be deteriorated. Therefore, draining must be done at a location away from the drain pipes of sink.
- The draining rate from this washer is maximum about 25L/min.Confirm that water will not overflow from the drain equipment.

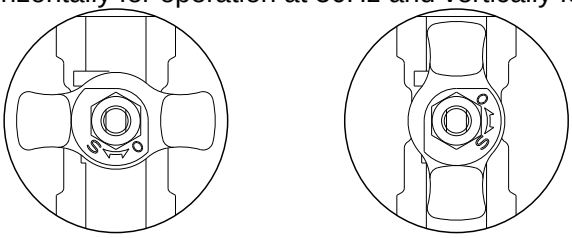
9. Set the 50/60Hz area selector valve.

● Setting the 50/60Hz area selector valve

To correct difference in the pump performance depending on the power frequency, select the area appropriate to the frequency to be used.



Set the selector horizontally for operation at 50Hz and vertically for operation at 60Hz.



50Hz 60Hz

The selector may be hot after operation. Be careful when selecting the area.

10. After installation

The product may overturn to cause injury in case of unexpected earthquake or impact. Provide any adequate measure to prevent overturn to ensure safety.

11. Carry out firm connection for dedicated liquid detergent.

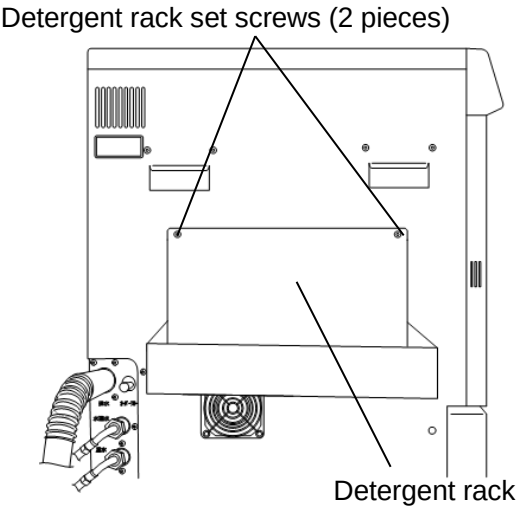
● For dedicated liquid detergent, carry out connection as follows;

● How to install the detergent rack

(1) Prepare the attached detergent rack.

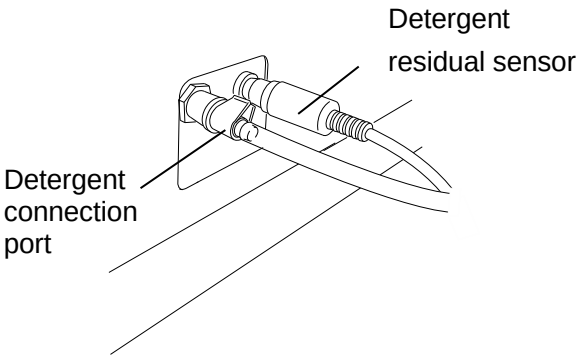
(2) Remove the detergent rack set screw from the left side of the product.

(3) Secure the detergent rack with the screw removed in (2) above.



● Connecting the detergent tube with the washer

Connect the detergent tube to the detergent connection port on the left side of washer and to the detergent residual sensor connection port. Turn the tube lightly till it clicks.

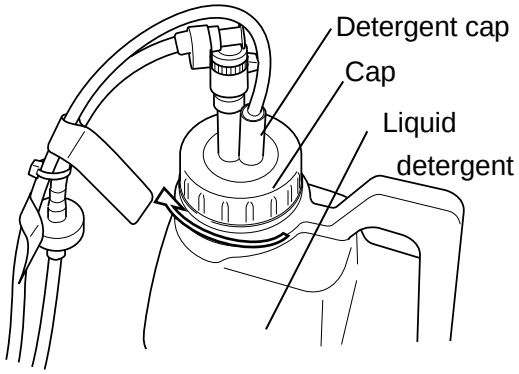


● Connecting the liquid detergent and the detergent tube

(1) Remove a detergent cap, insert the detergent tube, and screw the cap onto the detergent bottle.

(2) Store the detergent in the detergent rack.

(3) Bleed air from the tube according to the "Detergent feed setting" (see Page 51).



* Be sure to put on rubber gloves and protective goggles when handling the detergent tube, and liquid detergent.

* Do not use the detergent tube other than attached ones or any deteriorated detergent tube.

* Confirm that the detergent tube is not twisted, pulled, or crushed.

* Always use the liquid detergent designated by us. The use of detergent other than designated may cause failure of the washer.

* Carry out maintenance of the float switch of detergent tube regularly. If it is clogged with dust, normal operation cannot be made.

12. Handling of the objects to be washed and various detergents

Carry out checking before operation according to the procedure described below:

● Handling the objects to be washed

- Set the washing water temperature while referring to the guideline below:
  Protein containing materials:40～45℃,thermo-softening plastic appliances：60℃ or less,Others：60～80℃
- When the objects to be washed is heavily contaminated or any contaminant solids adhere, brush them off and the proceed to washing. In particular, adhering agar may cause clogging of the filter and nozzle.
- When the objects to be washed has been pretreated with detergent, rinse them well before setting.
- For organic contaminants, immerse the object to be washed in an adequate solvent (methanol) before washing.
- Note that washing with any organic solvent put in this unit is not possible because of mechanism and materials.
- Do not stack objects to be washed. Also take care not to load excessive amount of objects in the washer. Otherwise, not only the washing effect cannot be achieved, but also the objects may be damaged or the unit may develop failure.

● Handling of various detergents

- When using various dedicated detergents, be sure to understand the contents of label on the detergent bottle beforehand.
- Be sure to put onprotective tools (gloves and goggles) when using various dedicated detergent.
- No detergents other han dedicated one can be used, Never use any foaming detergents or any one containing insoluble substances (cleanser, etc.) because the pump may be damaged.
- When using the dedicated liquid detergent, keep its operating temperature range within 0.2～2.0% (0.5% recommended).
  The use quantity of dedicated powder detergent (Murinluster) should be 0.5% (equivalent to one dedicated cup).
- The dedicated detergent varies in foaming depending on the harness of tap water. Adjust the detergent concentration according to the hardness of tap water used for washing. In case of excessive foaming, the satisfactory washing effect cannot be secured and may cause failure.
- Be sure to cleaning the filter inside the tank. With the filter clogged, foaming may occur readily. (P.57, “2. Cleaning the tank internal/drain filters”)
- Hydrogen ion concentration (pH) of dedicated detergent
  The table below shows the reference value for hydrogen ion concentration (pH) of dedicated detergent.

Detergent	Hydrogen ion concentration (concentrate solution)	Hydrogen ion concentration (diluted)
LABO WASH (AWL100)	About 13.0～14.0	About 11.2～12.2(1.0%)
LABO WASH (AWL200)	About 13.0～14.0	About 11.7～12.7(1.0%)
LABO WASH (AWL300)	About 7.5～8.5	About 6.5～7.5(1.0%)
LABO WASH (AWL400)	About 13.3～14.3	About 11.2～12.2(1.0%)
Murinluster	---	About 11.0～12.0(0.1%)
Washing tank cleaner (AWP500)	---	About 1.5～2.5(1.0%)

* The allowable limit is specified for the hydrogen ion concentration (pH) of drain according to the national minimum effluent standards of the Water Pollusiton Control Act (PH 5.8 or more, 8.6 or less for area other than sea areas; PH 5.0 or more, 9.0 or less for sea areas)。If drain from the product exceeds the allowable limit of the hydrogen ion concentration (pH), carry out neutralization of pH before draining.
LABO WASH (AWL300) is a weak alkaline detergent and can be discharged into general sewage.
However, where there is a regulatory standard with specific application to the operation environment, carry out drainage in accordance with the standard.

13. Reconfirm before use.

Carry out confirmation before use according to the steps shown below:

- Checking water feed (daily)
  - Confirm that the water feed hose is firmly connected.
  - Open the faucet.
  - Check the feed hose connection for any water leakage.
- Checking water drain
  - Confirm that the drain hose is firmly connected.
  - Confirm that the drain hose is free from bend and is installed at the location lower than the drain port of the washer.
  - With the bent drain hose, the washer may not operate correctly and water leakage may occur. Check the hose from time to time to confirm that water is drained correctly.
- Checking the power supply
  - Confirm that the power cord is connected to the adequate distribution panel and power socket outlet.
- Visual check （daily）

  Check the washer, door, and door packing for any damage, dislodgement, and dust adhesion.
- Check with main power ON（daily）

  Turn ON main power supply, and check if the touch panel is turned ON.

  With main power ON, the start screen appears for about five seconds and is shifted to the main screen.
- Others

  Check for any abnormal sound or vibration during startup.

* If any defect is identified during confirmation before operation, contact the shop from which you have purchased the product. Never attempt operation while leaving the failure and faulty point not corrected.

14. Cautions for use

When using, carry out checks as follows;

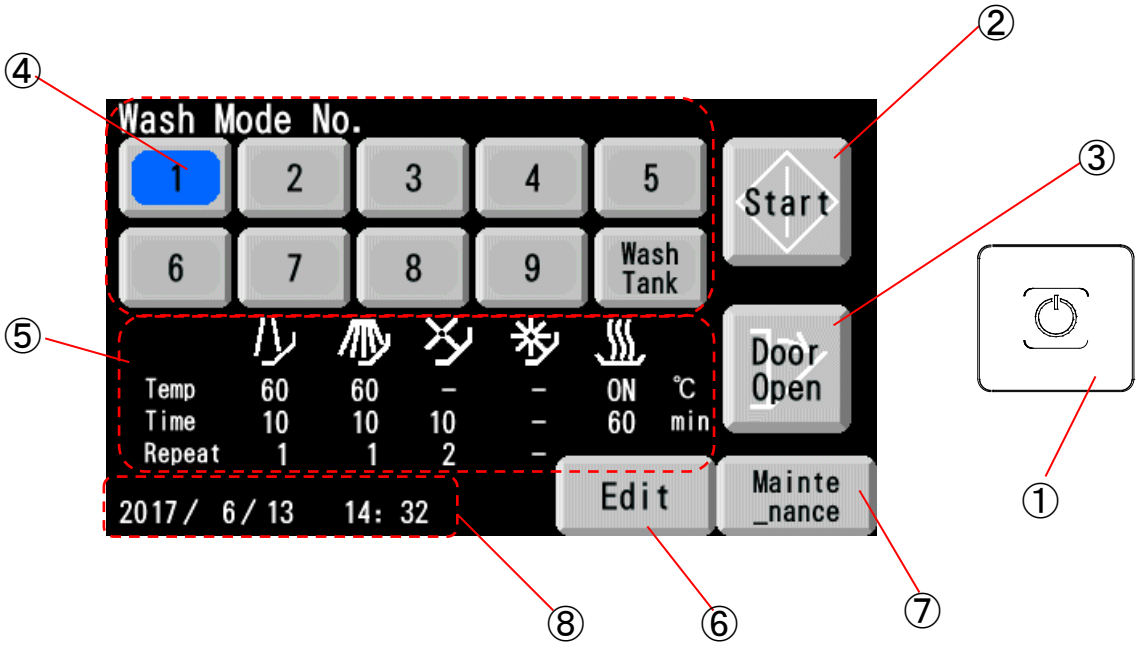
- When setting the cup, tray, or other containers, either set them upside down or allow them to stand on the side.
- Take care not to allow the objects to be washed to touch the water level sensor. Otherwise, malfunction may occur.
- When operating the washer with the upper rack removed, be sure to install the attached closing plate.
- When loading or unloading the rack, take care not to cause damage to the door packing.
- When the door packing is damaged, water leakage may occur. Replace the damaged door packing.

6. Operating procedure

Touch panel (startup screen)

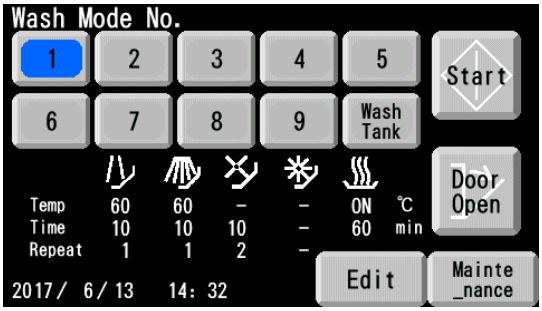
When power supply is turned ON, the startup screen appears for about five seconds and changes to the main screen.

Touch panel (main screen)



No.	Name	Operation/function
①	POWER switch	Turns ON/OFF the touch panel display.
②	START	Starts the selected Wash Mode program
③	OPEN	Opens the door
④	Wash Mode (1～9)/tank wash	Selects Wash modes 【1】～【9】 and 【TANK WASH】
⑤	Mode information screen	Shows the information of selected mode. Icon shows the process. : Pre-wash, : Wash, : Rinse, : Final-rinse, : Predrying
⑥	EDIT	Edits the program of selected mode
⑦	MAINTENANCE	Shows the submenu
⑧	Date display	Shows the current date and time

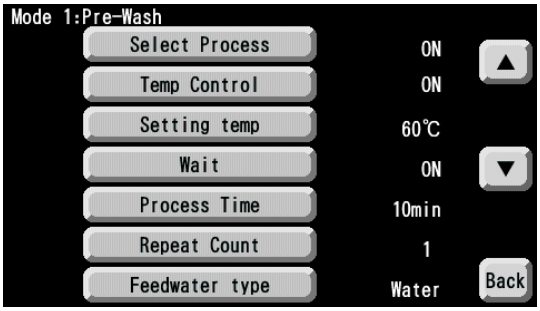
1. Select the Wash Mode whose program is to be edited.



Select the Wash Mode to be edited from【1】～【9】. The selected wash mode turns blue.

Press the EDIT button. The screen changes to the EDIT screen.

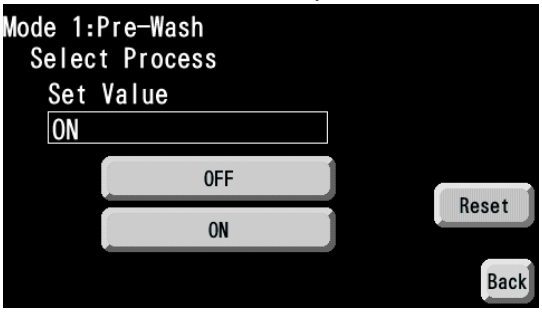
2. EDIT SELECT screen



The Pre-wash process edit screen appears.
With the process selection OFF, each item is not shown and the adjustment value and operation cannot be changed.

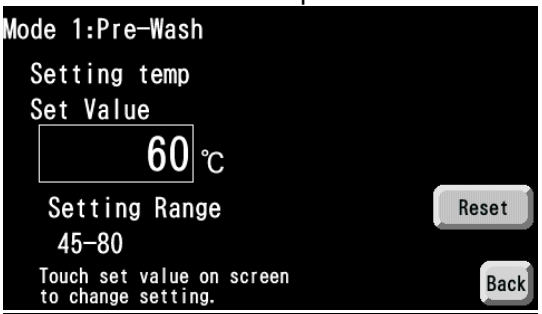
Touch the name of item to be changed. The Edit screen appears and change of the adjustment value and operation becomes possible.

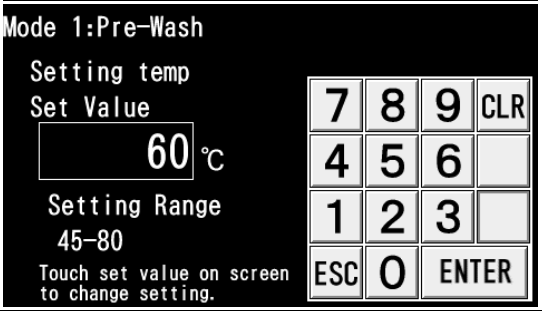
3. Edit screen Example 1



This shows an example of item to select the set value.
The current set value is shown in a square frame.
Touch the set value. The set value can be changed.
Touch [Reset]. The shown value returns to the initial value.
Touch [Back]. The EDIT SELECT screen appears.

4. Edit screen Example 2





An example of perform numerical setting is shown below:
The current set value is shown in a square. frame.Touching this frame causes the ten-key to appear.
Touch [Reset] to return to the initial value.
Touch [Back], and the edit select screen appears.
Any numerical value can be set within the setting range.

Touch [CLR] to show “0.”
Touch [ESC] to turn OFF the ten-key without changing the set value.
Touch [ENTER] to change the setting to the displayed value.

5. Set items of each mode

The set items for each mode are shown in the table below.

Item		Adjusted value/operation	Item		Adjusted value/operation
Pre-wash	Process selection	Turns ON/OFF pre-washing. ＯＮ／ＯＦＦ	Rinse	Process selection	Turns ON/OFF rinsing ＯＮ／ＯＦＦ
	Temperature control	Sets whether or not temperature control is made ＯＮ／ＯＦＦ		Temperature control	Sets whether or not temperature control is made ＯＮ／ＯＦＦ
	Set temperature	Sets washing temperature ４５℃～８０℃ ・ Setting possible when temperature control is set to ON.		Set temperature	Sets washing temperature ４５℃～９３℃ ・ Setting possible when temperature control is set to ON.
	Wait*	Sets the wait function. ＯＮ／ＯＦＦ ・ Setting possible when temperature control is set to ON		Wait*	Sets the wait function. ＯＮ／ＯＦＦ ・ Setting possible when temperature control is set to ON
	Process time	Sets the process time １～６０ minutes		Process time	Sets the process time １～６０ minutes
	Repeat count	Sets the repeat count. １～１０ times		Repeat count	Sets the repeat count. １～１０ times
	Water supply type	Sets the Water supply type Water/hot water		Water supply type	Sets the Water supply type Water/hot water
Wash	Process selection	Turns ON/OFF Final-Rincing ＯＮ／ＯＦＦ	Final-wash	Process selection	Turns ON/OFF Final-Rincing ＯＮ／ＯＦＦ
	Temperature control	Sets whether or not temperature control is made ＯＮ／ＯＦＦ		Temperature control	Sets whether or not temperature control is made ＯＮ／ＯＦＦ
	Set temperature	Sets the washing temperature ４５℃～８０℃ ・ Setting possible when temperature control is set to ON		Set temperature	Sets the washing temperature ４５℃～９３℃ ・ Setting possible when temperature control is set to ON
	Wait*	Sets the wait function ＯＮ／ＯＦＦ ・ Setting possible when temperature control is set to ON		Wait*	Sets the wait function ＯＮ／ＯＦＦ ・ Setting possible when temperature control is set to ON
	Process time	Sets the process time １～６０ minutes		Process time	Sets the process time １～６０ minutes
	Repeat count	Sets the repeat count １～１０ times		Repeat count	Sets the repeat count １～１０ times
	Water supply type	Sets the Water supply type Water/hot water	Predrying	Process selection	Turns ON/OFF predrying。 ＯＮ／ＯＦＦ
	Type of detergent	Sets the type of detergent Liquid/Powder		Heater	Turns ON/OFF the heater ＯＮ／ＯＦＦ
	Detergent temperature	Sets the concentration of liquid detergent. ０．２～２．０% ・ Setting possible when the detergent is liquid		Process time	Sets the process time １～３６０ minutes

* Wait function

After arrival at the set temperature, the process time is counted.

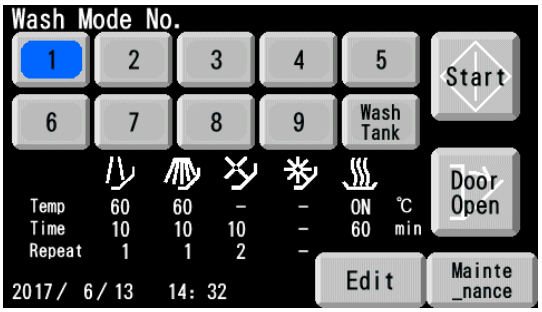
When this function is turned OFF, the process time is counted simultaneously with start while heating.

In the rinse and final rinse processes, the temperature may be set to maximum 93℃. However, when the set temperature exceeds 90℃, the process time is limited to 10 minutes.

6. Operating procedure

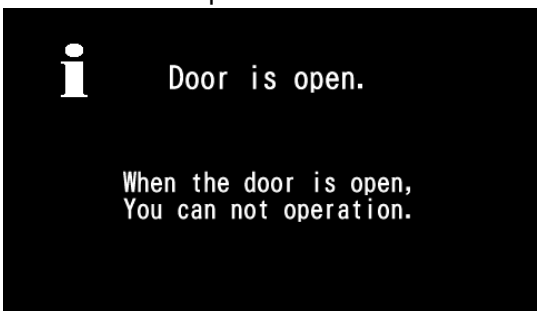
Door opening/closing

1. How to open the door



Touch 【Door Open】. The door opens.

2. The door is open



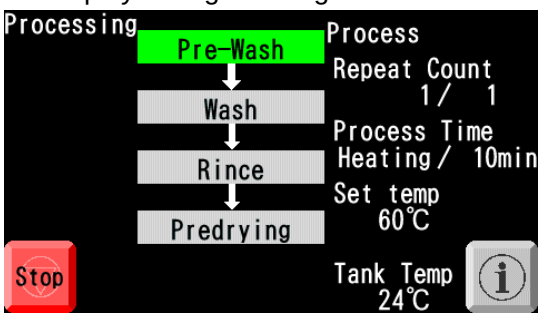
When the door is open, the touch panel shows the message as shown in the left. You cannot operate.

To close the door, push it to close till the door upper portion is locked.

1. How to start washing

Touch the washing mode of 【1】～【9】 to be started or 【WASH TANK】.The selected button lights up in blue.
Touch [START] to start washing.

2. Display during washing

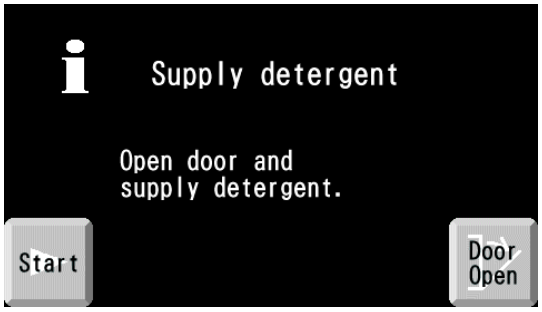


At start of washing, the touch panel display becomes as shown in the left.

*** Screen showing the "insufficient detergent" message**

When the detergent is insufficient when [Start] is touched, the screen showing the "insufficient detergent" message appears as shown in the left.
Either add or change the liquid detergent.
Liquid detergent is supplied automatically.

*** Powder detergent supply screen**



The touch panel display at start of the washing process is as shown in the left.

Touch [OPEN] to supply powder detergent into the tank, and close the door.

Touch [Start] to start the washing process.

6. Operating procedure

End of washing

1. Wash end screen

At end of process, the left screen appears.
Touch [Door Open] to open the door.

* The washing tank inside may be extremely hot depending on the set temperature of the final process, Allow the internal temperature to lower sufficiently before taking out appliances.

Washing mode

The processes shown below have been registered before shipment. Edit the process data for adjustment according to the condition of contamination of the objects to be washed. (For modes【1】～【8】, the water supply type is water.)

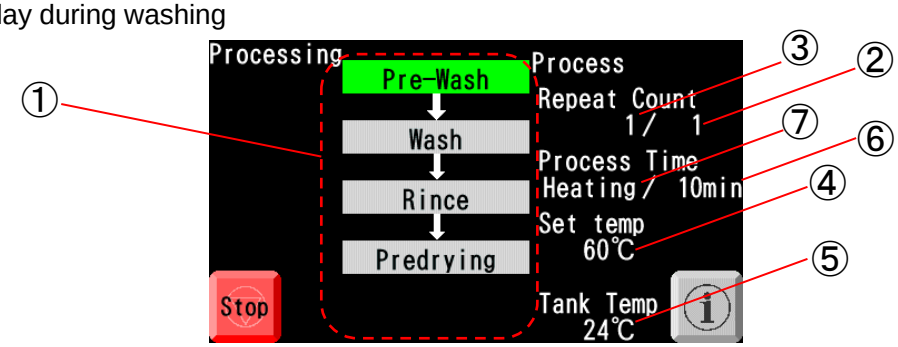
Mode	Process	Temperature (℃)	Wait	Time (min)	Repeat count (times)	Type of detergent	Detergent concentration (%)	Target contamination
【1】	Pre-wash	60	ON	10	1	---	---	General contamination
	Wash	60	ON	10	1	Liquid	0.5	
	Rinse	OFF	---	10	2	---	---	
【2】	Pre-wash	45	ON	10	1	---	---	Protein contamination
	Wash	45	ON	10	1	Liquid	0.5	
	Rinse	OFF	---	10	2	---	---	
【3】	Pre-wash	80	ON	10	1	---	---	Oil contamination
	Wash	80	ON	10	1	Liquid	0.5	
	Rinse	OFF	---	10	2	---	---	
【4】	Pre-wash	60	ON	10	1	---	---	General contamination (with final wash)
	Wash	60	ON	10	1	Liquid	0.5	
	Rinse	OFF	---	10	2	---	---	
	Final-Rince	OFF	---	2	3	---	---	
【5】	Pre-wash	45	ON	10	1	---	---	Protein contamination (with final wash)
	Wash	45	ON	10	1	Liquid	0.5	
	Rinse	OFF	---	10	2	---	---	
	Final-Rince	OFF	---	2	3	---	---	
【6】	Pre-wash	80	ON	10	1	---	---	Oil contamination (with final wash)
	Wash	80	ON	10	1	Liquid	0.5	
	Rinse	OFF	---	10	2	---	---	
	Final-Rince	OFF	---	2	3	---	---	
【7】	Pre-wash	60	ON	10	1	---	---	General contamination (powder detergent)
	Wash	60	ON	10	1	Powder	---	
	Rinse	OFF	---	10	2	---	---	
【8】	Pre-wash	45	ON	10	1	---	---	Protein contamination (powder detergent)
	Wash	45	ON	10	1	Powder	---	
	Rinse	OFF	---	10	2	---	---	
【9】	Pre-wash	60	ON	5	1			---
	Wash	80	ON	5	1	Liquid	0.5	
	Rinse	93	OFF	5	1			
	Final-Rince	OFF	---	2	2			
【Wash Tank】	Wash	90	ON	10	1	Powder	---	For weekly tank washing (See P.50)
	Rinse	OFF	---	2	4	---	---	

* When foam in the washing tank occurs for 5 mm or more above the water surface, the washer cannot operate correctly, resulting in failure of achieving the washing effects. Adjust foaming by changing the detergent concentration and washing solution temperature.

6. Operating procedure

Operation during washing

1. Display during washing

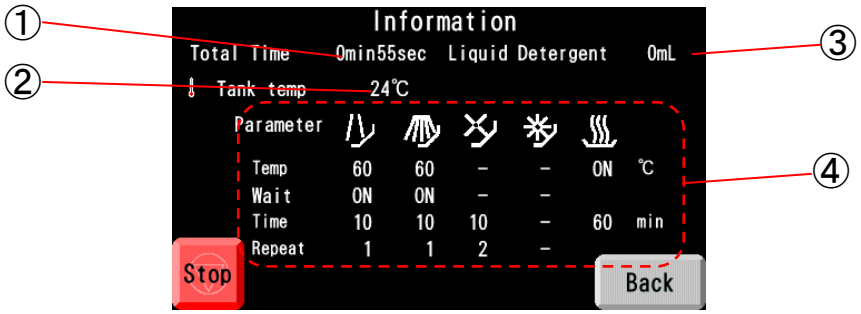


The washing process state is displayed during washing:

① : Progress of process. For the current process, the background color changes.
② : Set repeat count of the process currently under way
③ : Repeat count of the process currently under way
④ : Temperature setting of the process currently under way
⑤ : Temperature in the washing tank
⑥ : Set process time of the process currently under way
⑦ : Process time of the process currently under way
With WAIT ON, “Heating” is shown during heating.

Touch [i], and the information screen appears.

2. Information screen



The information screen shows information on the mode currently under way.

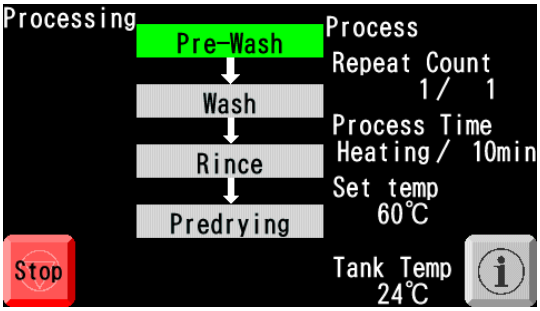
① : Indicates the time elapsed from start of process.
② : Indicates the temperature in the washing tank.
③ : Indicates the amount of liquid detergent supplied in the WASH process.
0 mL when the powder detergent has been set.
④ : Indicates information on the mode currently under way.

Touch [Back]. The washing screen appears.

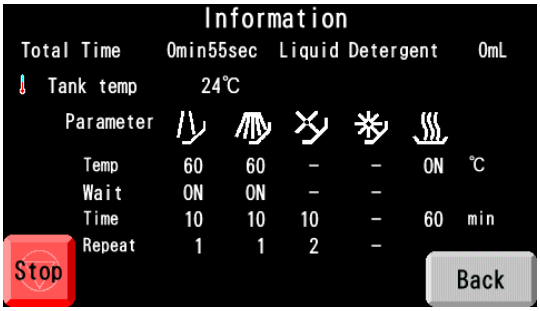
Stopping washing

1. How to stop during washing

Screen during washing

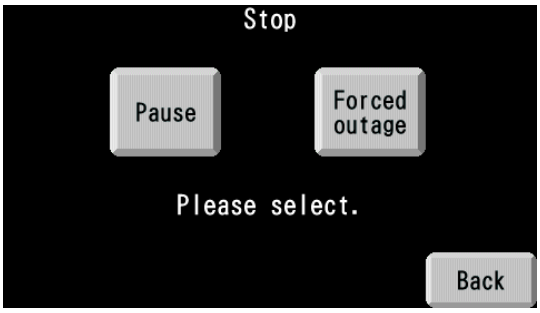


Information screen



Touch [Stop] in the washing or information screen causes change of the screen to the stop select screen.

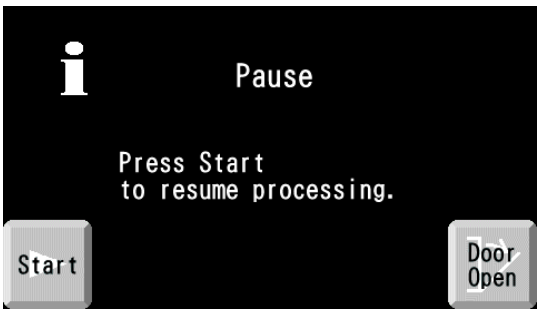
2. Stop select screen



Select [Pause] or [Forced Outage].
Touch [Pause]. Processing is stopped and the pause screen appears.
Touch [Forced Outage]. The forced outage confirmation screen appears.

Touch [Back] to return to the washing screen.

3. Pause screen



Processing is paused.
Touch [Door Open to open the door.

Close the door and touch [STart]. Processing begins.

* While the tank temperature exceeds 60℃, the door cannot be opened to ensure the safety
* Processing cannot be stopped during water supply and draining and is stopped after completion of water supply and draining.
* With temperature control ON and Wait ON, pausing after arrival at the set temperature causes counting of the process time beginning with 0 again.

4. Forced outage confirmation screen

Touch [Stop]. Processing is interrupted and the forced outage confirmation screen appears.
Once interrupted, the operation cannot be resumed. Restart processing.

5. Forced outage screen

Touch [OK].
If washing solution remains in the tank, draining begins and the draining screen appears.
The main screen appears when there is no washing solution remaining in the tank.

6. Draining screen

The draining screen appears, and washing solution is drained.

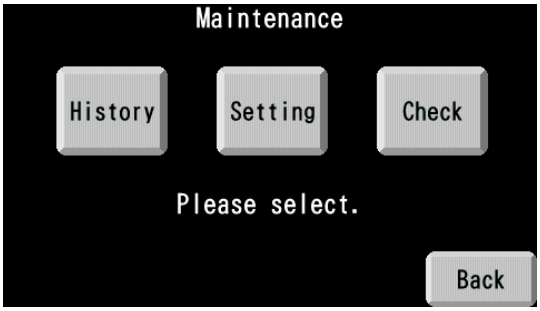
After completion of draining, the main screen appears.

Maintenance screen

1. How to open the maintenance screen

Touch [Maintenance] of the main screen.

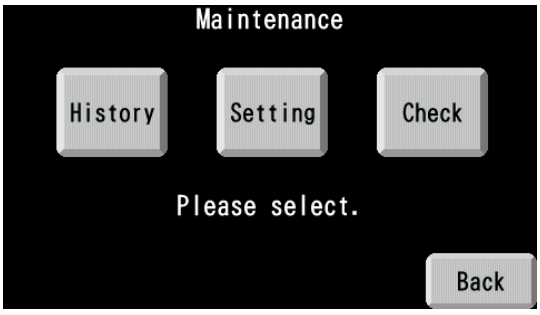
2. Maintenance screen



The maintenance screen appears.

Maintenance screen (history check)

1. How to check the history

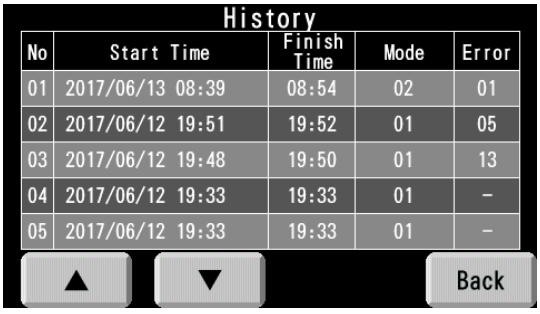


Touch [History] of the maintenance screen.

The screen changes to the history check screen.

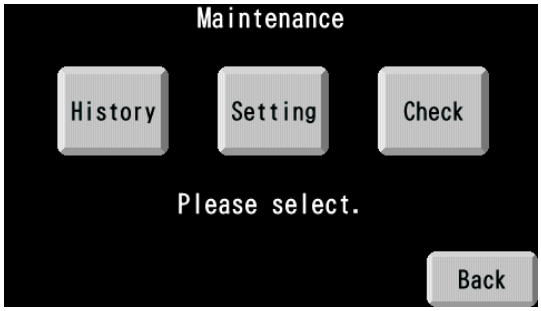
The past processing history can be checked.

2. History check screen



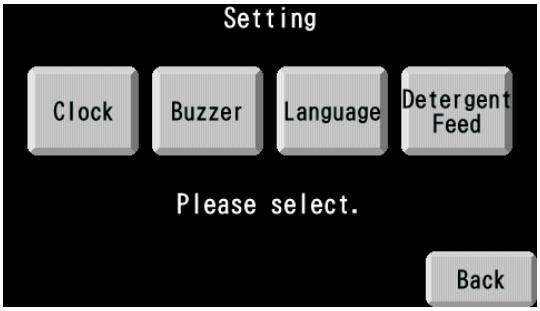
The processing history can be checked. Maximum 20 cases can be stored for history.
Larger numbers show older information.
Then the number of cases registered under History exceeds 20, the information is deleted beginning with the oldest one.
Touch △ and ▽ to change the page.
The history screen dhows the date and time of start, date and time of end, process mode, and error No.
Touch [Back]. The maintenance screen appears.

1. How to open the setting screen



Touch [Setting] in the maintenance screen.

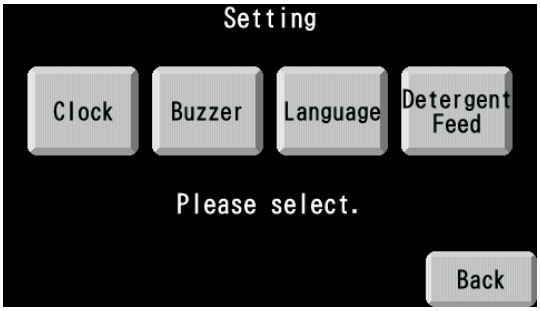
2. Setting screen



The setting screen opened.

Setting screen (clock: setting the time)

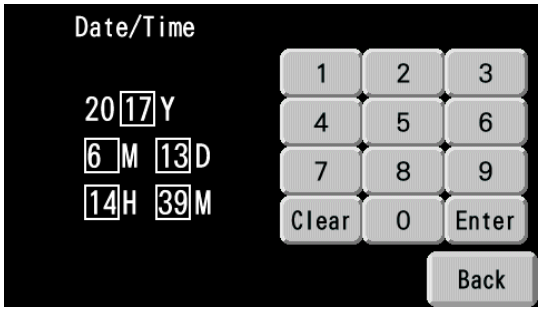
1. How to set the time



Touch [Clock] in the setting screen.
The time setting screen appears.

The time for indication of the date and time in the main screen and the time used for storage of the day and time of history can be set.

2. Time setting screen



Touch ☐ to be changed in the day/time display.
Touched ☐ turns gray in color, enabling change of the numerical value.
Enter the value from the ten-key and touch ENTER.
Set the year, month, day, and time to the current time.

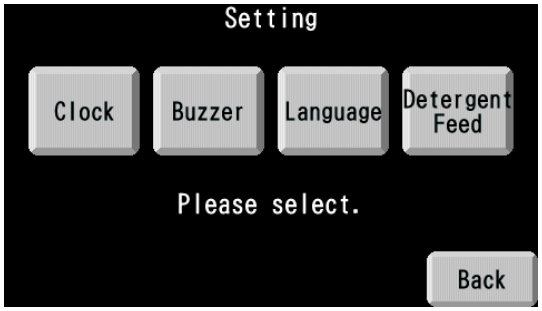
Procedure: To change the year 2015 to 2017.

① Touch 15 . The background turns gray.
② Using a keyboard in the screen, enter 17 and [Enter].

Touch [Back]. The setting screen appears.

Setting screen (buzzer setting)

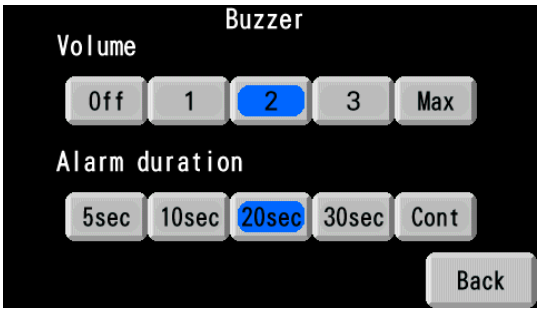
1. How to open the buzzer setting screen



Touch [Buzzer].
The buzzer setting screen appears.

This is to set activation of buzzer at end of processing and at a time error.

2. Buzzer setting screen



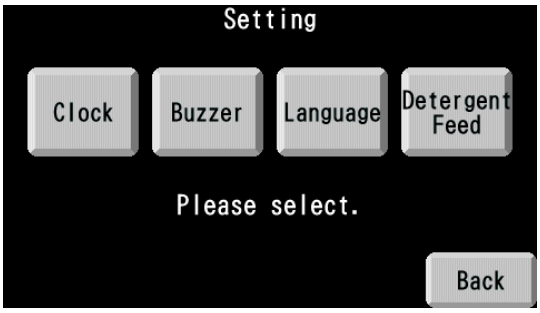
The volume of buzzer can be set for the end of processing and at a time error.
Chose the designed volume.
The selected set value changes in color.

The buzzer duration in case of error can be set.
The desired alarm duration.
The selected set value changes in color.

Touch [Back]. The setting screen appears.

Setting screen (language setting)

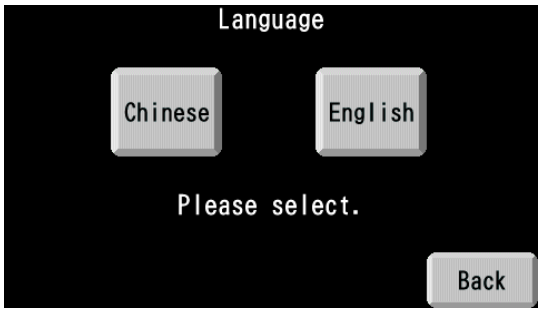
1. How to open the language setting screen



Touch [Language] in the setting screen.
The language setting screen appears.

The language shown in the screen can be changed to Chinese or English.

2. Language setting screen

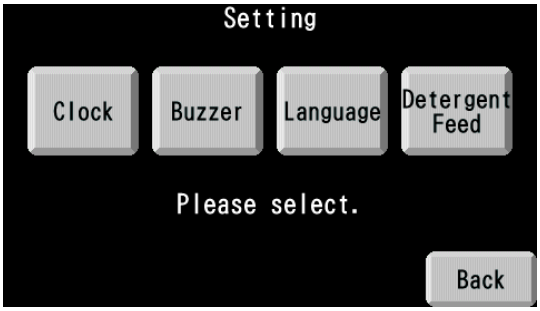


Touch [Chinese] to change the language to Chinese.
Touch [English] to change the language to English.

After completion of setting, touch [Back]. The screen changes to the setting screen.

Setting screen (detergent feed setting)

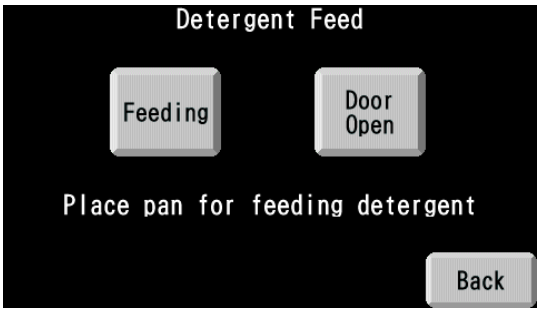
1．How to open the detergent feed screen



Touch [Detergent Feed] in the setting screen.
The detergent feed screen appears.

Forced detergent feed is possible when it is to be changed.

2．Detergent feed screen

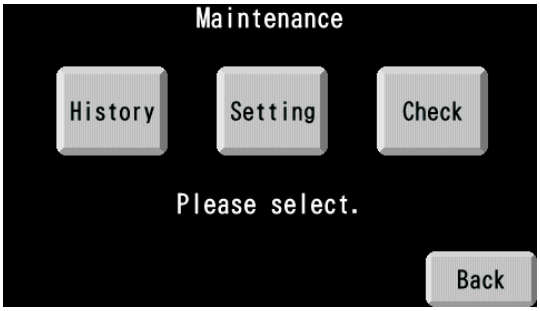


Touch [Feeding]. Detergent is fed from the detergent tube into the washing tank.（During feeding, the button character is displayed in red.）
To stop feeding, touch [Feeding] again.

For feeding, place pan at the detergent feeding port (see the name and functions of P.16), preventing detergent from entering the washing tank.
Touch [Door Open]. The door opens.

Touch [Back] to move to the setting screen.

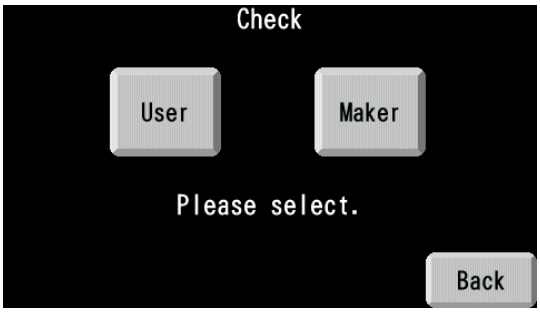
1. How to check the maintenance timing



Touch [Check] in the maintenance screen. The check screen appears.

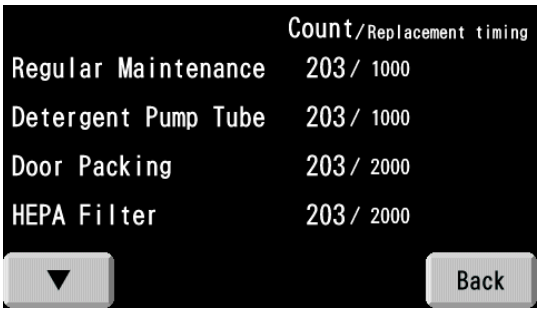
The unit condition can be checked.

2. Check screen



Touch [User]. The user check screen 1 appears.

3. User check screen 1



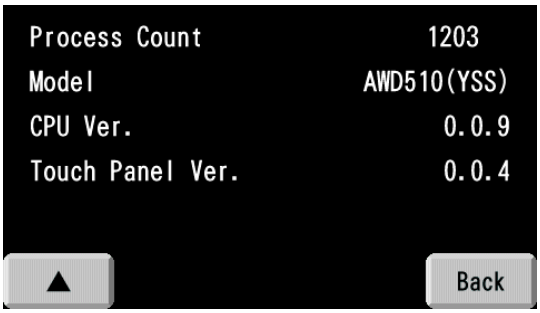
In the user check screen 1, you can check the number of processing since the previous regular maintenance and the timing to replace the regular replacement parts.

Example For the detergent pump tube 128/1000, the tube replacement timing is 1000 times (washing cycles).
This shows 128 processing have been completed as of present.

Press ▼. The user check screen 2 appears.

Touch [Back]. The check screen appears.

4. User check screen 2



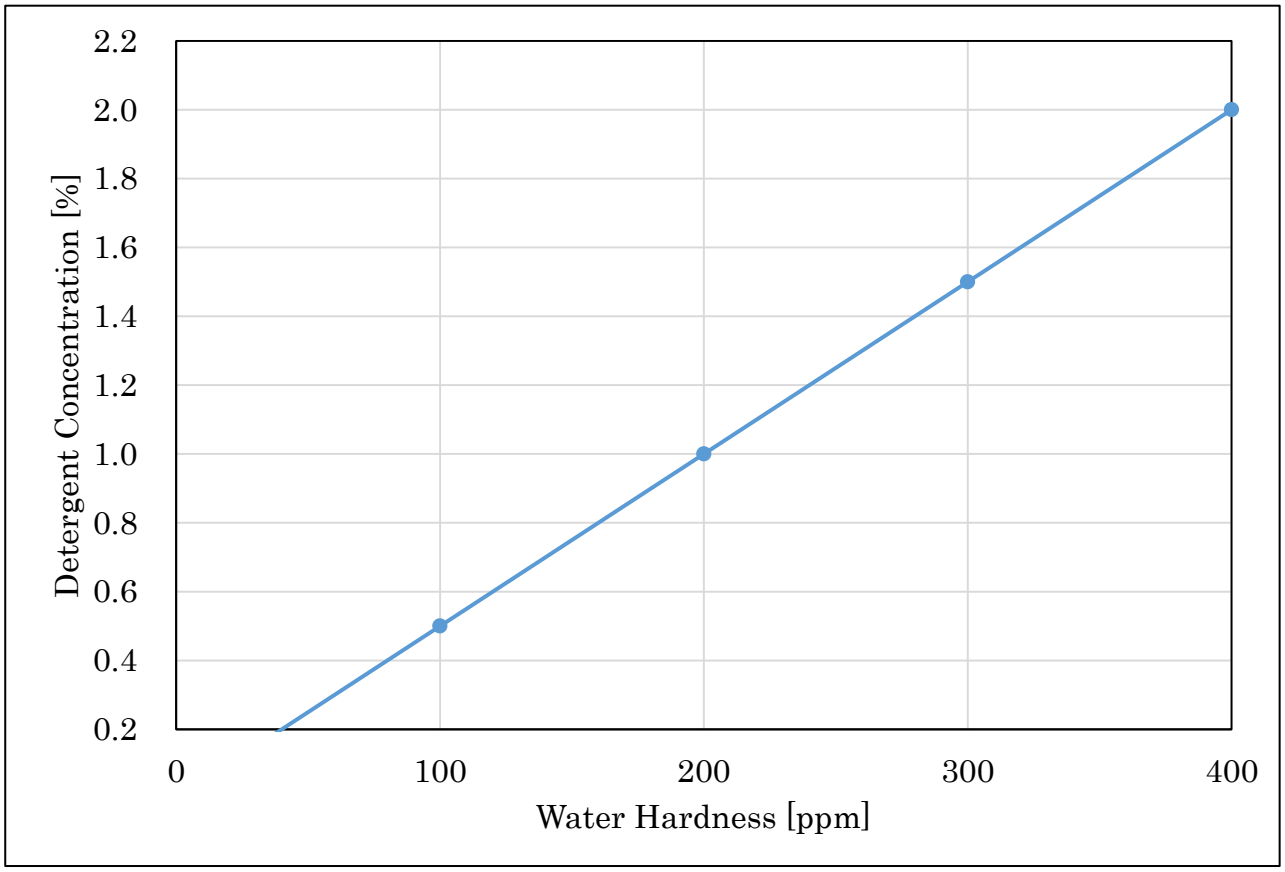
In the user check screen 2, the product serial number for the customer and the version of the control program.

Touch ▲. TH user check screen 1 appears.

Touch [Back]. The check screen appears.

●Estimation of detergent concentration by water hardness（when using AWL400）

Water hardness [ppm]	100	200	300	400
Detergent Concentration [%]	0.5	1.0	1.5	2.0

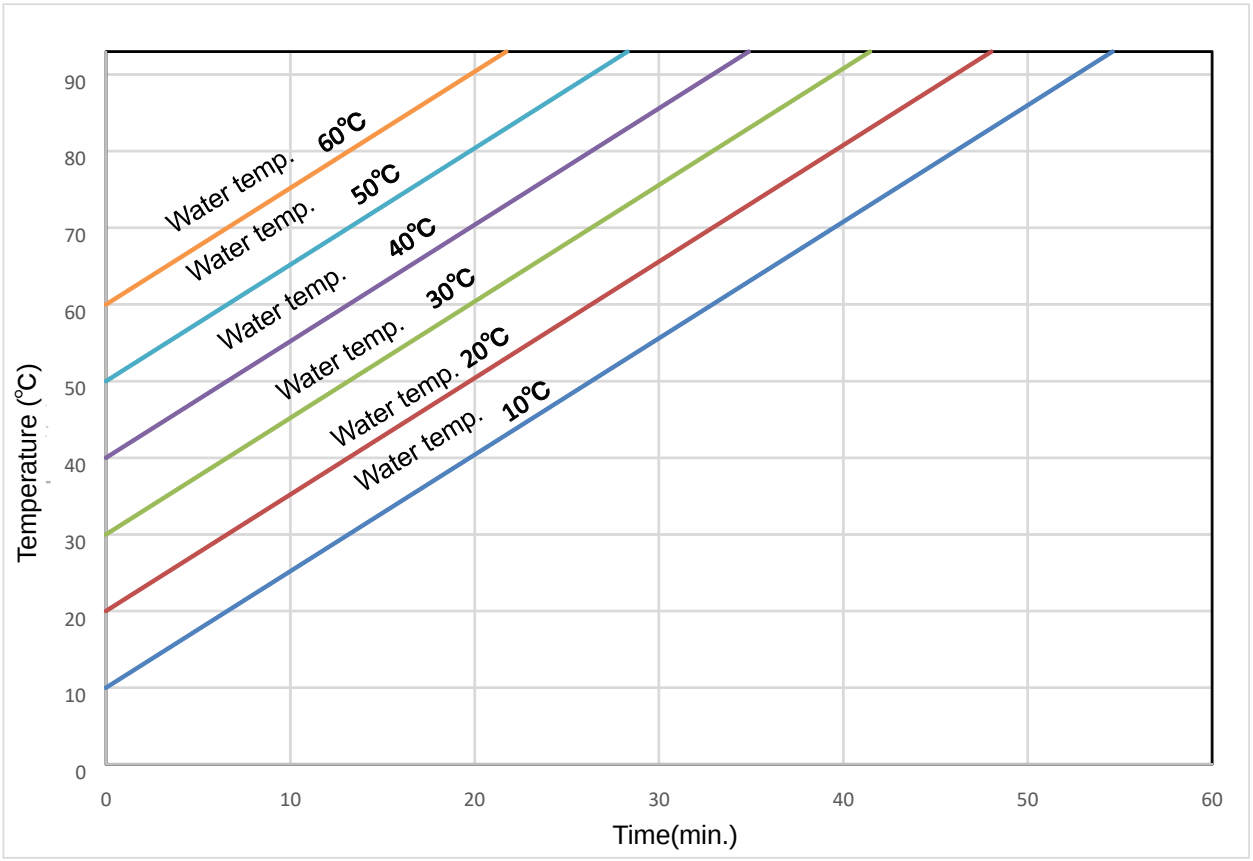


Adjust the detergent concentration according to the hardness of the water used for washing. (Washing capability will increase or decrease depending on water quality)

6. Operating procedure

Reference data

● **Water heating time (no load)**



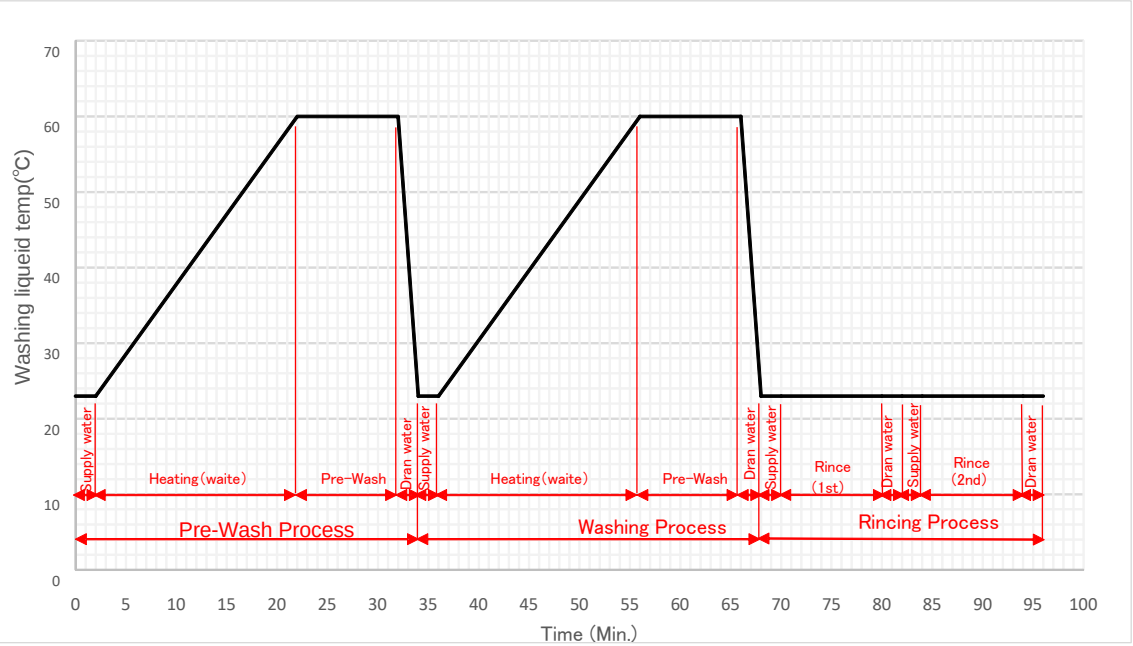
Room temperature：23±5℃,power supply：220V

6. Operating procedure

Reference data

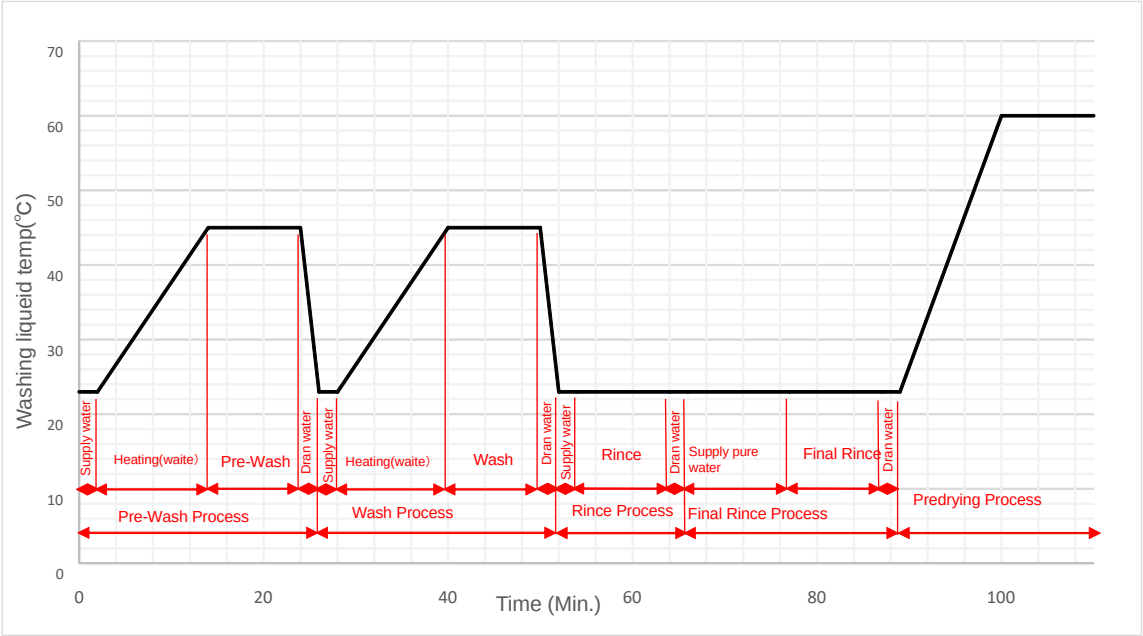
- **Guideline for washing time: Operating conditions : room temperature:23±5℃ / water temperature:23℃ / raw water pressure:0.10MPa/ power supply 220V±5%**
  - **Mode 1 (Setting before shipment) Reference time**

Process	Temperature (℃)	Wait	Time (min)	Frequency (times)
Pre-wash	60	ON	10	1
Wash	60	ON	10	1
Rinse	OFF	---	10	2



- **Mode 5（the frequency of rinse and final wash changed to once＋predrying added) Reference time**

Process	Temperature (℃)	Wait	Time (min)	Frequency (times)
Pre-wash	45	ON	10	1
Wash	45	ON	10	1
Rinse	OFF	---	10	1
Final wash	OFF	---	10	1
Predrying	About 60 min.	---	1 minute～	1



7. Maintenance Method

Check and inspection timing

（To ensure stable operation of the product, be sure to carry out daily inspection.）

Check・inspection items	Interval	Remarks
Cleaning the washing tank inside	Weekly	See 7.1 (P.56)
Cleaning the internal/drain filters	Each operation	See 7.2(P.57)
Cleaning the product outside	Weekly	See 7.3 (P.57)
Cleaning the spray arm	Monthly	See 7.4 (P.58)
Check and inspection by a specialized service personnel	Yearly	See 7.5 (P.59)

Cautions for maintenance

- Unless otherwise specified in this document, be sure to turn OFF power supply.
- Before maintenance, be sure to wait till the tank internal temperature lowers approximately to the room temperature. Otherwise, you may suffer burn.

1. Cleaning the washing tank inside (every week)

Be sure to carry out washing of the tank inside while observing the cautions listed below:

- Be sure to use the dedicated tank internal washing detergent for washing the tank inside.
- The tank internal washing detergent is acid. Never use it together with chlorine chemicals and detergent.
- Be sure to put on rubber gloves and protective goggles.
- Be sure to observe the dose specified on the detergent label.
- For other details, refer to cautions on the bottle label and ensure correct understanding of the contents.

- Washing tank inside cleaning method

(1) Remove objects to be washed (glassware, etc.) from inside the washing tank.
(2) Select the mode 【Tank Wash】and touch START.
(3) When the touch panel shows the detergent supply screen after completion of water feed, open the door, supply about 100 g of dedicated detergent (AWP500), and close the door.
(4) Touch START, Washing of the tank inside begins.
(5) The tank internal washing is over in about 70 minutes.
(6) Clean by wiping the surface of temperature and water level sensors in the tank with wet gauze.

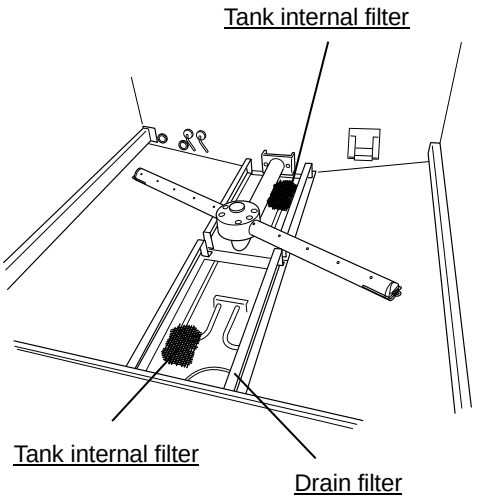
2. Cleaning the tank internal/drain filters (each operation)

Clean the filters while observing the cautions listed below:

- Be sure to install filters to specified positions correctly.
- When removing filters, be sure not to allow trapped wastes, etc. to drop from these filter. Entry of washing dust and wastes into the circulation system may cause pump failure, deterioration of the product (faulty washing),etc. In particular, when installing the drain filter, confirm that the dust or objects to be washed are not in the receiving side (in the cylinder) of the tank. Remove if any.

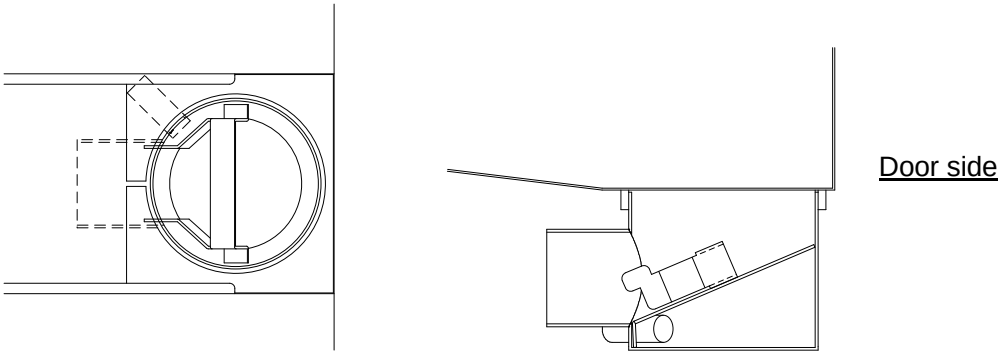
- Filter cleaning method

(1) Pull out tank internal filters (front and rear) in the tank bottom toward yourself and take them out from the tank.
(2) Take out the drain filter.
(3) Remove dust and wastes from the filter and wash it well with running water.
(4) Reinstall drain filter and internal (front and rear) filters to the original positions.



- Installed state of drain filter

Install the drain filter correctly while referring to the installed state shown in the figures below.



Top view　　Side view

3. Cleaning the product outside (weekly)

Clean the filter while observing the cautions listed below:

- Never attempt cleaning using the cleaners containing oxidizer remover and those containing abrasives and solvents, dishwashing cleaner, glass cleaner, abrasive-containing sponge as well as cleaning with brush and steam cleaner. Otherwise, the product surface may be damaged.

- Product outside cleaning method

・Wipe the outside clean with soft cloth soaked with neutral detergent. Then, wipe off any remaining detergent with wet gauze.

4. Cleaning the spray arm (monthly)

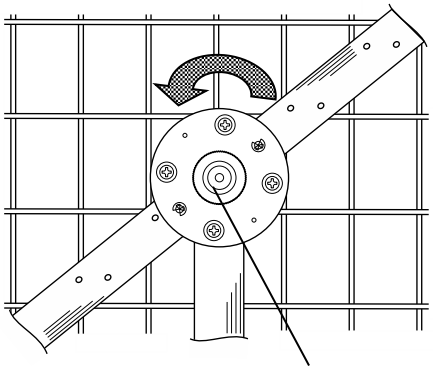
Clean the spray arm while observing the cautions listed below:

- Be sure to install the spray arm to the specified position correctly. If not, faulty rotation occurs, resulting in failure of the product or deterioration of performance and washing.
- The intermediate nozzle has a shape different from upper and lower nozzles. Take care not to correct in the wrong position.

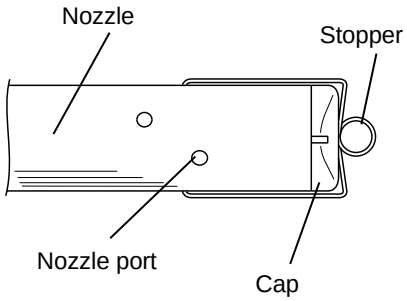
The nozzle and bearing of spray arm may be clogged with dust and wastes from washing. Clogged nozzle leads to product failures, including faulty washing. Inspect and clean the spray arm regularly.

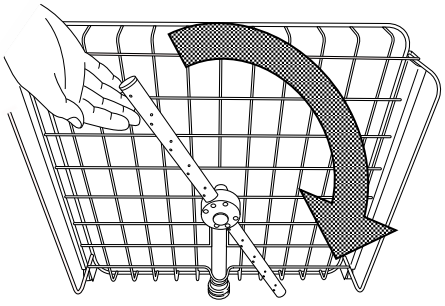
- Spray arm cleaning method

(1) Turn the fixing nut of lower spray arm shaft in the bottom of tank counterclockwise and remove the spray arm shaft.
(2) Turn the fixing nut of intermediate spray arm shaft in the middle rack counterclockwise and remove the spray arm shaft.
(3) Turn the fixing nut of upper spray arm shaft on the top of tank counterclockwise and remove the nozzle only.
(4) Press the stopper at both ends of each nozzle with a finger for removal.
(5) Pull out the cap from the front end and remove the dust and wastes from the inside.
(6) Remove dust and wastes from the nozzle port with a tool having a sharp end.
(7) Allow water to flow from both ends of nozzle to clean the inside.
(8) Provide a cap to the spray arm, reset to the original position, and push the arm lightly with a finger to confirm smooth rotation.



Spray arm fixing nut





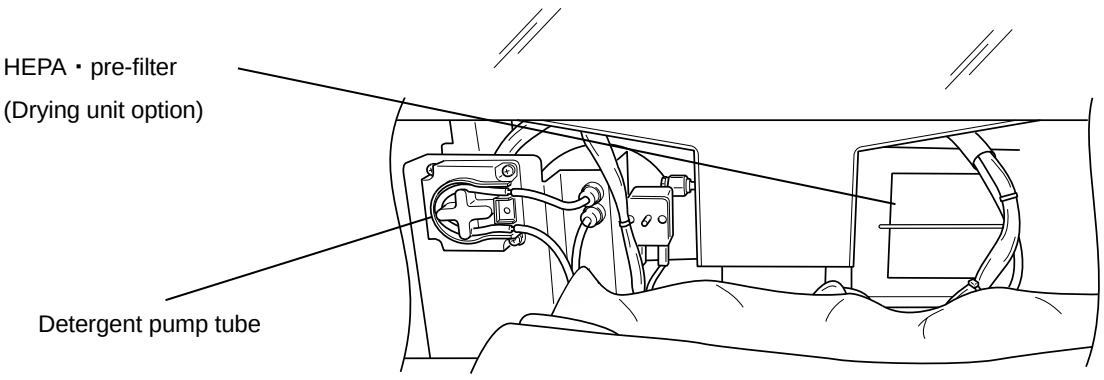
5．Check and inspection by a dedicated service personnel

At a time of periodical maintenance, the following message is shown in the touch panel. Be sure to call for service.

This product requires periodical check and inspection in terms of items shown below.

	Interval		
	Periodical		Non-periodical replacement
	Every year (every 1000 times)	Every two years (every 2000 times)	
Replacing the detergent pump tube	○		
Inspecting detergent tube (in the product)	○		○
Replacing the door packing		○	
Inspecting/cleaning washing filters	○		
Inspecting/cleaning spray arms		○	
Inspecting the spray arm shaft resin cover		○	○
Check the electric circuit		○	
Checking the door lock mechanism		○	
Checking the safety system		○	
Replacing the HEPA・ pre-filter (when the drying unit option is provided)		○	

* The detergent pump tube is the one side the detergent pump. Note that this tube is different from the detergent tube.



8. When the unit is not to be used for a long time or when disposing

⚠ Warning

1. When the unit is not to be used in the nighttime and holidays

- ●Turn OFF (○) the breaker on the right side of the product.
- ●Be sure to close the faucet.
- ●When the product is used in areas where it is extremely cold in winter, be sure to avoid freezing of water inside the washing tank and water feed hose.

2. When disposing the unit

- ●In general, dispose the unit as a bulky waste.
- ●Do not leave the unit where children may play around.
- ●Remove the handle to prevent the door from locking before discarding the unit.

Notes about disposition

Always pay attention to the preservation of the global environment.

- We highly recommend taking the unit apart as far as possible for separation or recycling to contribute to the preservation of the global environment. Major components and materials for the unit are as follows:

Major components	Material
Major components of external section	
Exterior	Stainless steel plate
Door	Stainless steel plate, heat resistant glass, polycarbonate, ABS resin
Installation plates(coated)	Cold-rolled steel plate (SPCC),coated
Installation plates (not coated)	Stainless steel plates
Adjuster	Stainless steel plates
Nameplate	Polyethylene terephthalate
Major components of water circuit system	
Washing tank	Stainless steel plates
Various tanks	Polypropylene

8. When the unit is not to be used for a long time or when disposing

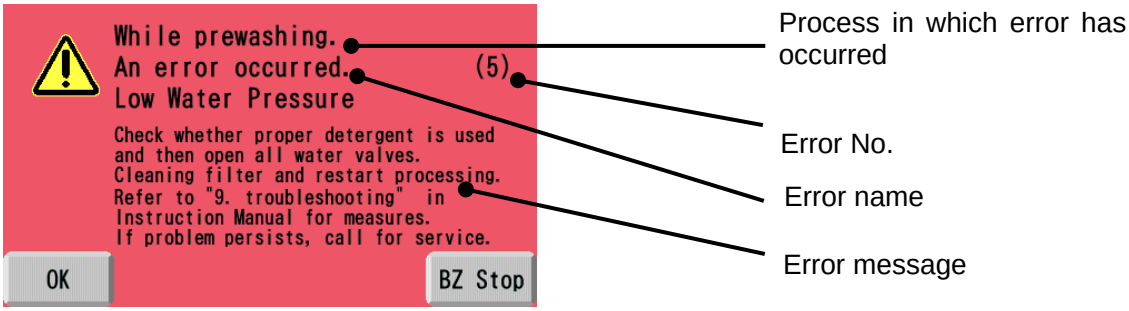
Cautions for disposal

Major components	Materials
Major components of piping system	
Feed hose	Polyethylene
Drain hose	PVC, ferrous
Hose (transparent)	PVC vinyl
Hose (white transparent)	Silicon rubber
Tube (black)	Ethylene propylene rubber
Hose clamp	Polyacetal
Hose nipple (resin white)	Polypropylene
Hose nipple (metal)	Brass, stainless steel
Major components of electric system	
Pump	Casing：Modified Polyhenylene ether Impeller：Modified Polyhenylene ether Motor case：Ferrous Rotor：Ferrous
Electromagnetic valve	Metal made：Body made from brass Resin made:：Body made from nylon
Float switch	Polypropylene
Power cord and wiring materials, others	Synthetic rubber sheathed and resin sheathed wiring materials and substrates

How to handle

Error messages

- This product is provided with the safety devices, each corresponding to each error mode.
- When the safety device is activated, the following error message is displayed on the product touch panel.
- In case of error, be sure to observe the error message on the touch panel and the instruction on countermeasure described in this page.
- If the error is not corrected even after execution of countermeasure, inform the error state and error No.to the shop from which you have purchased the product.



Take the necessary steps according to the procedure described below when any error is displayed on the touch panel during product operation.

1. Stop the buzzer by touching [BZ Stop]. ⇒ Check the error contents and countermeasures.
2. Keep pressing [OK] to start canceling the error.
3. The error canceling screen appears. Cancel error and wait till the operation to return to the initial state is completed. (Tank internal draining)
4. The main screen appears again when the tank internal draining is completed.
5. After having taken the countermeasure, carry out the same operation. If no error occurs, resume the use of this product.
6. If the error occurs again, either the part must be replaced or the product must be inspected. Contact the store from which you have purchased the product. In such an event, be sure to inform the error display contents and the product serial number.

9. Troubleshooting

Display and description

Error No.	Contents	State	Message	Countermeasure
1	Power outage	① Power outage or voltage drop during washing	Operation has been suspended. Please restart processing. If breaker operated, please call for service	① Check for Power outage or voltage drop during washing. ② Washing may be insufficient. Carry out washing again, ③ When the leakage breaker with overcurrent has been activated before display of this screen, turn OFF the breaker and disconnect the power cord. ⇒Call for service.
2	Water leak Detected in case of leakage in equipment Leak detected (LE7) detected	① Water leaking from the washing tank, door packing, water piping, spare drying piping, etc. inside the product ② Failure in leakage detection ③ Failure in CPU board	Close all water valves and call for service.	① Close all water valves. ② Call for service.
3	Drop in Temp of Predrying Feed air temperature drop during predrying Detection made by feed air detection bimetal (TE3)	① Failure in the predrying heater ② Failure in the hot air detection bimetal ③ Failure in CPU board	Predrying error. Please call for service.	Error in the predrying unit or its connection. Call for service.
4	Overtime Water Feed Specified amount of water not supplied to the washing tank within the specified time period Tank water level detection (LE5)	① Valve closed ② Water supply pressure lowering ③ Abnormality in water supply hose ④ Failure in the water supply electromagnetic valve (within the washer)	Check whether all the valves are open, Make sure that water supply hose is not bent, and main pressure has not fallen. Refer to "9. troubleshooting" in Instruction Manual for measures. If problem persists, call for service	① Open the water supply valve fully. ② Check the water supply hose for any kink or bend. ③ Repeat washing after steps ① and ② are taken. ④ Confirm that the water pressure at the water supply port is 0.1MPa. Consult the installer. If no improvement is observed, call for service.

9. Troubleshooting

Display and description

Error No.	Contents	State	Message	Countermeasure
5	Low Water Pressure Washing water pressure drop, causing error detection Pressure switch for circulation water pressure drop detection (PE1(	① Clogged filter in the tank	Check whether proper detergent is used and then open all water valves. Clean filter and restart processing. Refer to "9. troubleshooting" in Instruction Manual for measures. If problem persists, call for service	① Clean the filter inside the tank.
		② Excessive foaming of washing solution		② Check the type of detergent used. The product may not operate correct with detergent other than specified one.
		③ Water supply insufficient		(3) Open the water supply valve fully.
		④ Failure or performance deterioration of the circulation pump		(4) Check the water supply hose for any kink or bend.
		⑤ Failure in CPU board		⑤ Repeat washing after steps ①～④are taken.
				⑥ Check if the product is installed on a horizontal floor.
		⑥ Failure of the pressure switch to detect drop of circulation water pressure		⑦Confirm that the water pressure at the watger supply port is 0.1MPa. Consult the installer. If no improvement is observed, call for service.
6	Detergent supply error The specified amount of liquid detergent not supplied into the tank. Detergent flow meter (FE1)	① Small amount of detergent remaining in the bottle	Check whether detergent is sufficient. Check whether detergent bottle tubing and pump tubing are not damaged. Refer to "9. troubleshooting" in Instruction Manual for measures. If problem persists, call for service.	① Check the detergent amount in the detergent bottle. If detergent is in shortage, replace with the new detergent bottle.
		② Bent detergent supply tube from the detergent bottle		② Check the detergent supply tube from the detergent bottle for any bend and the tube piping for any leakage of detergent.
		③ Detergent leaking from the detergent pump tube and piping		
		④ Clogged filter of detergent supply tube		
		⑤Failure or performance deterioration in the detergent pump and detergent flow meter		
		⑧ Liquid blockage or deposition in the pump tube		③ Repeat washing after steps after steps ① and ② are taken. If no improvement is observed, call for service.
		⑦ Failure in CPU board		
7	Condensation tank full Detected when the condensation tank is full Condenser full detection（LE8) detection	① Error in the drain hose	Check whether drain hose is bent or tangled. Check whether drain system error has occurred. Refer to "9. troubleshooting" in Instruction Manual for measures. If problem persists, call for service.	① Check whether drain hose is bent or tangled. Repeat washing after operation.
		② Error in the drain system。		② Checking the drain system is necessary. Contact the installer. If no improvement is observed, call for service.
		③ Error in the condenser full detection		
		④ Failure in CPU board		
		⑤ Failure in the condensation drain pump。		
8	Door error Door open detected during washing Door open detection limit switch（ZE1)	① Failure in the door lock solenoid	Confirm that the door is firmly closed, and restart. Refer to "9. troubleshooting" in Instruction Manual for measures. If problem persists, call for service	Confirm that the door is firmly closed, and repeat washing. If no improvement is observed, call for service.
		② Error in the door lock mechanism		
		③ Error in the door open detection limit switch		

9. Troubleshooting

Display and description

Error No.	Contents	State	Message	Countermeasure
9	Temp sensor error Failure of temperature sensor detected PT100ΩW sensor (TE1)	① Failure in temperature sensor	Clean the temperature sensor and restart processing Refer to "9. troubleshooting" in Instruction Manual for measures. If problem persists, call for service	Clean the temperature sensor and restart If no improvement is observed, call for service.
		② Wire breakage in the sensor cable		
10	Low temp 1 Low temperature error detected in the tank during heating of washing watger PT100ΩW sensor（TE1）detection	① Failure in washing water heater	Clean the temperature sensor and restart processing Refer to "9. troubleshooting" in Instruction Manual for measures. If problem persists, call for service	① Clean the temperature sensor and restart processing
		② Water and hot water not contacting the temperature sensor. Spray arm in the bath not turning		② Check arrangement of objects to be washed. If the spray arm cannot turn due to contact with the objects to be washed, the temperature sensor cannot detect the liquid temperature.
		③ Objects to be washed in contact with the temperature sensor		③ Clean the nozzle of spray arm according to the maintenance procedure in P.55.
		④ Failure in temperature sensor		④ Repeat washing after steps ①,②,③ are taken. If no improvement is observed, call for service.
		⑤ Washing water heater contaminated		
		⑥ Supply voltage drop during processing。		
11	High Temp Abnormal temperature rise detected in the bath PT100ΩW sensor（TE1）detection	① Failure in washing water heater	Clean the temperature sensor and restart processing Refer to "9. troubleshooting" in Instruction Manual for measures. If problem persists, call for service	Clean the temperature sensor and restart processing If no improvement is observed, call for service.
		② Failure in temperature sensor		
12	Low Temp 2 Low temperature error detected in the tank during maintaining f washing watgertemperature PT100ΩW sensor（TE1）detection	① Failure in washing water heater	Clean the temperature sensor and restart processing Refer to "9. troubleshooting" in Instruction Manual for measures. If problem persists, call for service	①Clean the temperature sensor and restart processing
		② Water and hot water not contacting the temperature sensor. Spray arm in the bath not turning		② Check arrangement of objects to be washed. If the spray arm cannot turn due to contact with the objects to be washed, the temperature sensor cannot detect the liquid temperature.
		③ Objects to be washed preventing contact, insufficient water amount, nozzle clogged		③ Clean the nozzle of spray arm according to the maintenance procedure in P.55.
		④ Failure in temperature sensor		④ Repeat washing after steps ①,②,③ are taken. If no improvement is observed, call for service.
		⑤ Contaminated heater for washing water		

9. Troubleshooting

Display and description

Error No.	Contents	State	Message	Countermeasure
13	Washing tank full Water level rising to the overflow level during outage and water supply。 Tank full detection（LE1）	① Something is in contact with the tank full sensor	Close all water valves and call for service.	① Remove anything that is in contact with the tank full sensor
		② Failure in the water supply electromagnetic valve (in the washer)		
		③ Draining not performed → See Error No. 14		② Repeat washing. If no improvement is observed, call for service.
		④ Failure in CPU board		
14	Drainage pending Drainage not detected during draining Drainage completed（ LE2) detection	① Failure or performance deterioration in the drain pump	Clean out the filters on the bottom of chamber and restart processing. Refer to "9. troubleshooting" in Instruction Manual for measures. If problem persists, call for service	① Check whether drain hose is bent or tangled. Repeat washing after operation
		② Failure in the sensor for drainage completion		② Clean tank internal filter and drain filter and repeat washing.
		③ Failure in CPU board		③ Checking the drain system is necessary. Contact the installer If no improvement is observed, call for service.
		④ Drain port blocked. Drain port rising too high		
30 ～	System error	① Nonvolatile memory erased	Memory error Call for service.	Call for service.
		② Battery backup memory erased		
		③ Failure in the logic circuit		
		④ Other error on CPU board		

9. Troubleshooting

Troubleshooting

Symptom	Check	Countermeasure
No operation No display	Check if the leakage breaker with overcurrent is OFF	Press the “IN (	)” side of the leakage breaker with overcurrent,
	Check if the power cord is disconnected	Connect the power cord to the power supply.
	Check if power is supplied	Check the breaker, etc. on the equipment side.
	Check if the touch panel is faulty.	Call for service.
Door cannot be opened	Check if the leakage breaker with overcurrent is OFF	Turn ON the leakage breaker with overcurrent and touch [OPEN] on the touch panel.
Door cannot be closed	Check if the objects to be washed are in contact with the door.	Store the objects to be washed in such a manner that they do not contact the door.
	Check if the door packing is protruding.	Reset the door packing to the correct position.
Water is leaking	Check if the piping is sufficiently tightened.	Call for service.
Chattering inside the washing tank	Check if the spray arm is in contact with the objects to be washed.	Stop operation and change arrangement of the objects to be washed that block the spray arm,
Bustling inside the washing bath	Check if objects to be washed are moving inside the tank.	Stop operation and set the objects to be washed firmly in the standing position.
Spray arm not turning	Check if large amount of foaming has occurred within the washing tank.	Clean the filter inside the washing tank.
Stain in the objects to be washed	Check if the quality of water used in final wash is poor.	Check the pure water equipment when it is used
Insufficient washing results	Check if too many objects to be washed are loaded.	Rearrange objects to be washed correctly,
	Check if contamination has adhered to the objects to be washed for a long time and is dried.	Minimize the time period from contamination to washing.
	Check if the spray arm is blocked.	Rearrange the objects to be washed, so as to prevent blocking the spray arm.
	Check if the nozzle of spray arm is clogged.	Check the spray arm nozzle and clean it if necessary.
Rusting of appliances	Check if rust has flown from other locations into the tank or if washing is made together with rusted appliances.	Remove any rusted appliances. If the problem persists, call for service.

10. After sales service and warranty

When requesting a repair

If any trouble occurs, immediately stop operation, turn the power switch off, pull out the power plug and contact your dealer or our sales office.

Information necessary for requesting a repair

- Model name of the product
- Serial number
- Date (y/m/d) of purchase

} See the nameplate on the unit.
See the section “3. Names and Functions of Parts” on page 115.

- Description of trouble (as in detail as possible)

Minimum holding period of repair parts

The minimum holding period of repair parts for this product is seven years after end of production. Repair parts here refer to parts necessary for maintaining performance of the product.

11. Specifications

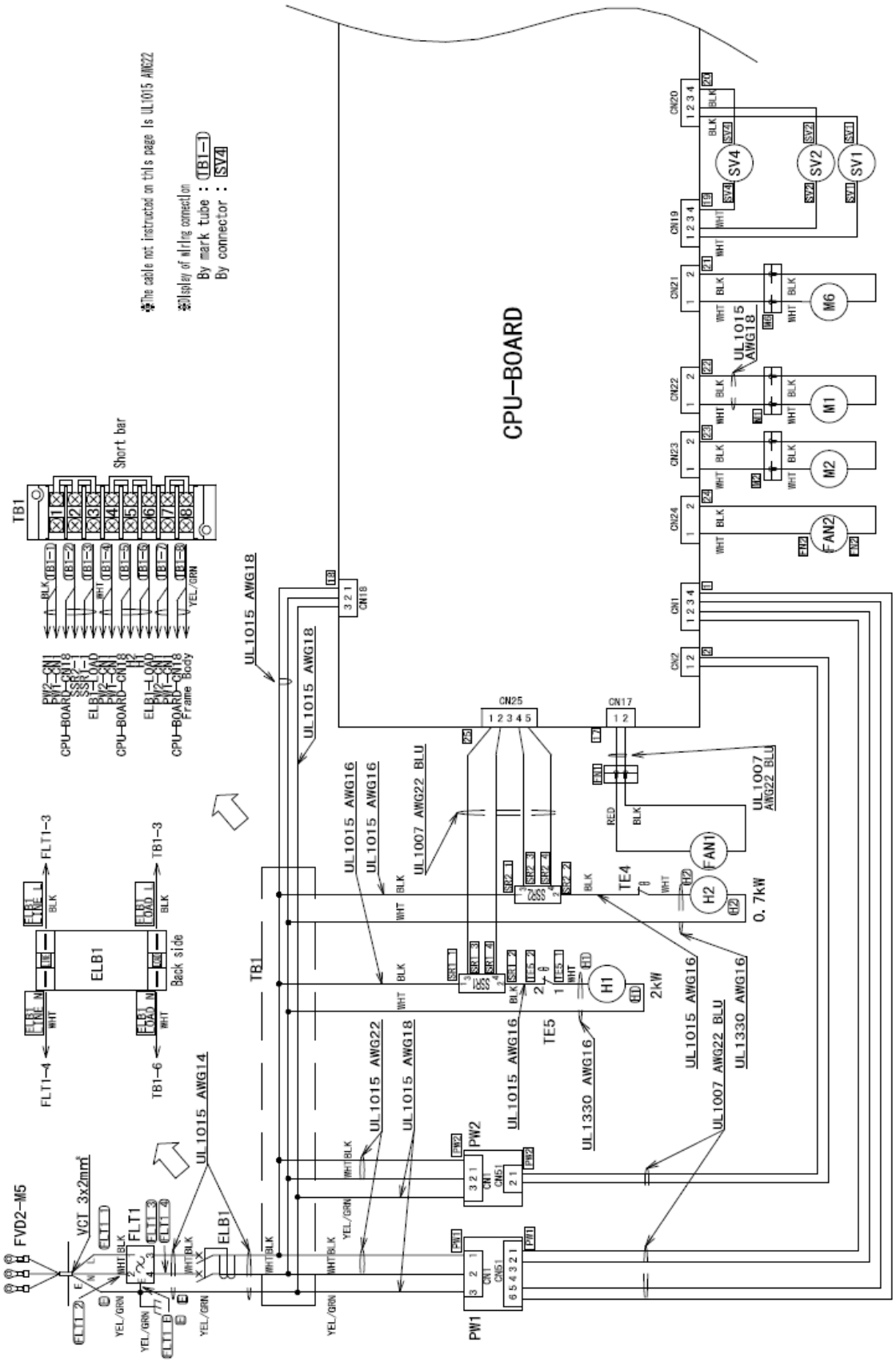
Model		AWD510	AWD510DRY (with predrying unit)
Product code		291020	291070
Type		Upper/middle/lower stage pressure jet type rotary jet nozzle	
Objects to be washed		Glass ware as a whole including test tubes, flasks. beakers（excluding pipet）	
Detergent		Liquid detergent/supplied by automatic supply unit	
		Powder detergent/manually supplied during operation	
Performance	Operation	Operation panel；Touch panel 4.3 inch LCD	
		Washing program；Pre-wash⇒wash⇒rinse⇒final wash	
			⇒ Predrying
		Arbitrary selection of the process Washing temperature setting：OFF,pre-wash and wash：45～80℃,rinse and final wash：45～93℃	
			Predrying：fixed at about 60℃
		Washing time：1～60 minutes（～10 minutes for 90℃ or more）,Wait, Repeat count：1～10	
			Predrying process Time setting: 1～360 min,Wait OFF, Repeat Count: 1
		Program；Nine patters of above program can be stored.	
	Process display	Operation panel LED ON for each process（pre-wash, wash, rinse, final wash, predrying）green	
		Lighting color inside the bath: Pre-wash [green],wash [yellow],rinse [blue],final wash [light blue],predrying [purple]	
	Maximum washing volume	With two stages: Upper stage 10kg（effective height 150mm）,Lower stage 15kg（effective height 165mm）	
		With one stage: Lower stage 15kg（effective height 300mm） * With optional low-stage rack used	
Installation	Ambient environment	Operating ambient temperature：5～40℃,Humidity 65±20%RH（no dewing）,Elevation：1500m or less above sea level	
	Water supply conditions	Tap water (mandatory)：G3/4 connections（G1/2 on the equipment side）, flow 10L/min or more, temperature ：5～25℃ Feedwater pressure：0.1～0.5MPa	
		Hot water (optional)： G3/4 connection port （G1/2 on the equipment side）, flow 10L/min or more, temperature ：5～60℃ Feedwater pressure：0.1～0.5MPa	
		Pure water (optional) ： φ10.5mm connection port, gravity water supply, temperature ：5～60℃,Feedwater pressure：0.02～0.1MPa	
		Feedwater rate：11L	
	Draining	Temperature：60℃ or less,φ31.5mm connection port,on the equipment side； nominal 40（40A） piping	
		Forced drain with pump	
	Overflow	Connection port 13mm	
Composition	Legs	Level adjuster（M10 screw）	
	Exterior	Overall dimensions：W580×D600×H845mm（not including projection）	
		Side/top surfaces：SUS304 hairline,bottom plate/backside：SUS304 2B	
		Front panel (front below)：SPCC	
	Door	Front loading type（damper mechanism）	
		Double glass inside structure（heat-resistant reinforced）,Outside：Polycarbonate	
		Operation panel (door upper portion)；ABS resin	
	Inner tank	Washing tank dimensions：W500×D480×H480mm（not including projection）, material：SUS316 Rotary nozzle shower type,internal filter 10 mesh,water tank filter 40 mesh, heater 2kW Bath internal temperature sensor（Pt100）	
	Predrying unit	---	Heater 700W, hot air drying with external air introduced via HEPA
	Heat insulation material	Material：Melamine resin	
	Main power switch	Leakage breaker function with overcurrent (provided in the front panel (lower front)	
	Standby power switch	Tact switch（provided on the right side of panel）	
	Steam cooling function	Reduction of the steam amount due to steam cooling	
	Controller	Calendar function（battery backup）, set memory function	
Safety device		Interlock, overcurrent/sensitivity current, door lock, overtemperature prevention, water full detection, circulation water pressure drop detection, leakage detection, prevention of water overtemperature	
Standard	No. of rack stages	2 or 1（option）	
	Power supply（50/60Hz）	Single phase AC220V 13A（breaker capacity 15A）, Power cord：3m,3 wires Round terminal for M5	
	Weight	Dry weight 87kg（not including racks and circulation water）	
Accessories		Water supply hose [20A(G3/4) female - 15A(G1/2) female 1.5m] (2 pieces), Drain hose (inside dia. 31×2m), Detergent bottle housing rack, detergent tube, operation manual,Guarantee card,cover to be used after removal of upper rack, overflow hose (inside dia. φ12×1.5m), upper and lower rotation nozzles	

* The performance is under conditions of power supply of AC220V, room temperature of 23℃±5℃, the humidity of 65%RH±20%.

* The performance range is for the raw water pressure at 0.1～0.5MPa and water temperature at 20℃. The water sampling rate differs depending on fluctuation of the water temperature.

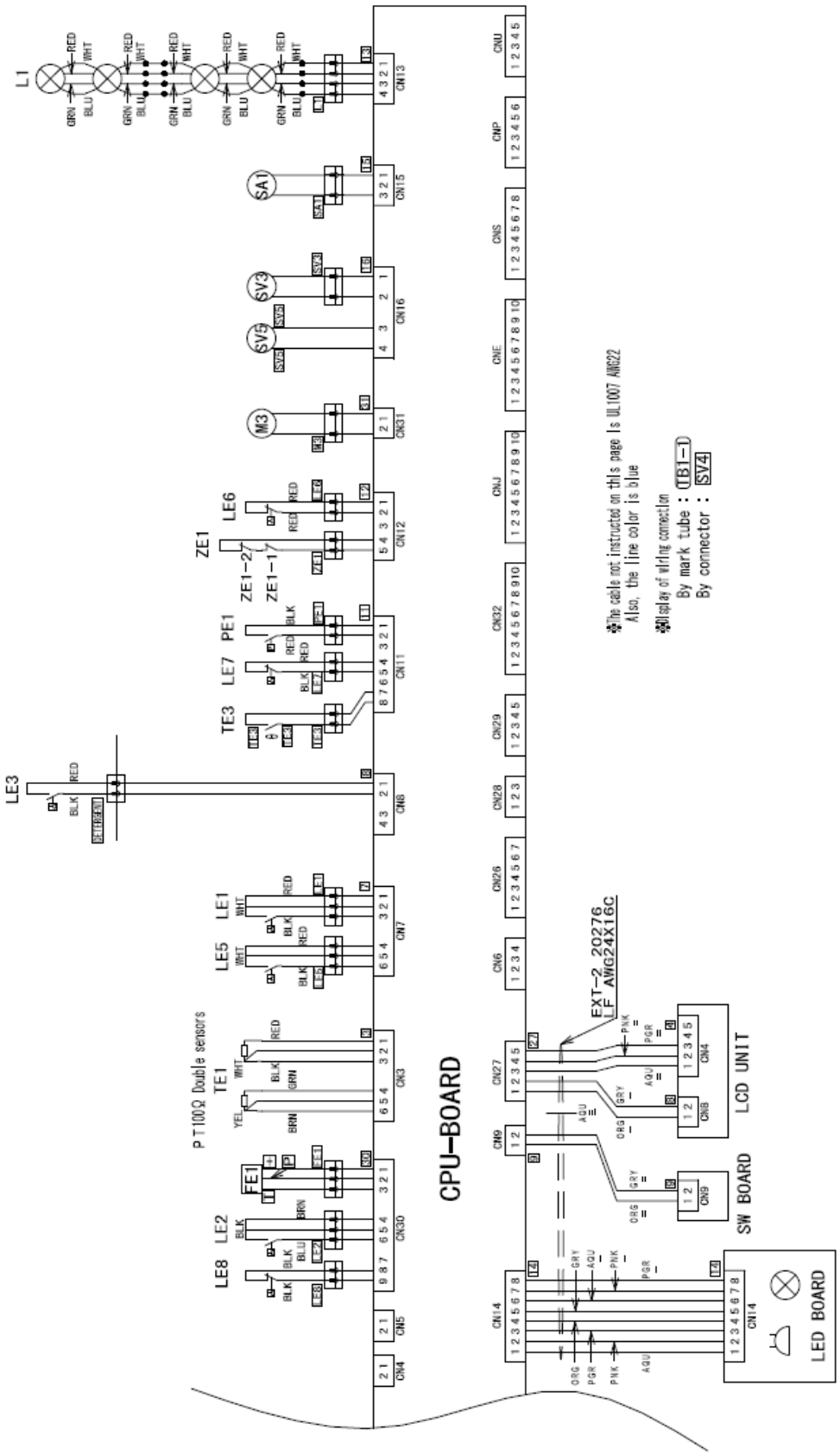
12. Wiring Diagram

Wiring diagram 1



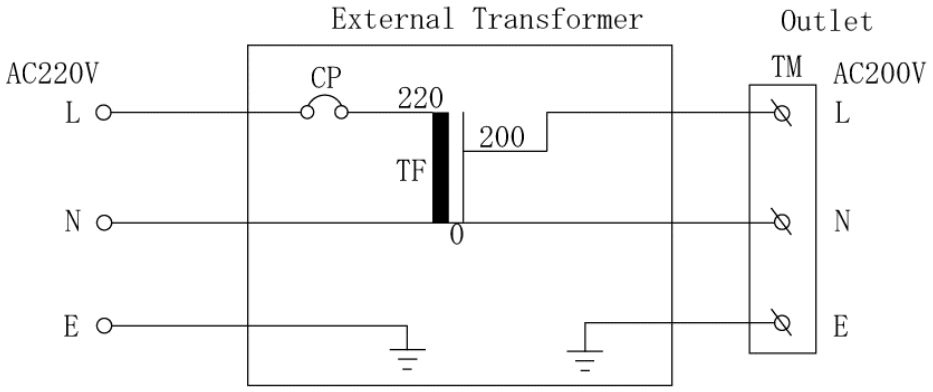
12. Wiring Diagram

Wiring diagram 2



12. Wiring Diagram

Wiring diagram 3



Connect to the Outlet of the External Transformer.

12. Wiring Diagram

Parts list

Symbol	Name	Symbol	Name
SV1	Tap water supply electromagnetic valve	TE3	Hot air detecting bimetal (predrying unit option)
SV2	Hot water supply electromagnetic valve	TE4	Overtemperature preventive bimetal (predrying unit option)
SV3	Pure water supply electromagnetic valve	TE5	Overtemperature preventive hydraulic sensor
SV4	Cooling water electromagnetic valve	LE1	Tank full detection/electrical capacitance
SV5	Drain cooling electromagnetic valve	LE2	Drain completion detection/proximity switch
FE1	Detergent flow meter	LE3	Residual detergent detection/float type
PE1	Pressure switch to detect drop of circulation water pressure	LE5	Pure water level detection/electrical capacitance
M1	Circulation pump	LE6	Water supply tank full detection/float type
M2	Drain pump	LE7	Leakage detection/float type
M3	Detergent pump	LE8	Condenser full detection/float type
M6	Condensation drain pump	FAN1	Predrying blower (predrying unit option)
TE1	PT100ΩW sensor (tank inside temperature, compensation temperature)	FAN2	System inside cooling fan
ELB1	Leakage breaker with overcurrent	FLT1	Noise filter
PW1	Switching power supply	TB1	Terminal board
SSR1	Solid state relay	PW2	Switching power supply
SSR2	Solid state relay (Predrying unit option)	SA1	Door lock solenoid
H1	Washing water heater	ZE1	Limit switch to detect door open
H2	Predrying heater (predrying unit option)	L1	Tank inside LED illumination
CPU-BOARD	CPU board	LCD-ユニット	Operation panel LCD substrate (touch panel)
LED-BOARD	Operation panel LED substrate	SW-BOARD	Operation panel switch substrate

13. Replacement Parts

Name of part	Code №	Specifications
Water supply hose	LT00038086	Braided flexible tube 1.5m
Water supply hose packing	LT00038087	
Drain hose	LT00038088	With cuff on one side, 2m
Drain hose band	LT00038108	For drain hose
Overflow hose	LT00038113	1.5m
Hose band	LT00038114	For overflow hose
Detergent tube	LT00038089	
Tank internal filter	LT00038090	
Drain filter	LT00038091	
Detergent housing rack	LT00038092	
Cover after removal of upper rack	LT00038093	with knurled screw (two pieces)
Lower nozzle set	LT00038094	Lower nozzles (one set of left and right nozzles Nozzle cover (2 pieces),stop (2 pieces) Spray arm shaft
Middle nozzle set	LT00038099	Lower nozzles (one set of left and right nozzles Nozzle cover (2 pieces),stop (2 pieces) Spray arm shaft
Upper nozzle set	LT00038102	Lower nozzles (one set of left and right nozzles Nozzle cover (2 pieces),stop (2 pieces) Spray arm shaft
HEPA filter	LT00038106	
Pre-filter	LT00038107	

14. List of dangerous substances

Never process any explosive, flammable samples and also samples contained with those substances.

Explosive Substance	①Nitroglycol, Glycerine trinitrate, Cellulose Nitrate and other explosive nitrate esters
	②Trinitrobenzen, Trinitrotoluene, Picric Acid and other explosive nitro compounds
	③Acetyl Hydroperoxide, Methyl Ethyl Ketone Peroxide, Benzoyl Peroxide and other organic peroxides
	④Metallic Azide, including Sodium Azide, etc.
ExplosiveSsubstances	①Metal “Lithium” ②Metal “Potassium” ③Metal “Natrium” ④Yellow Phosphorus ⑤Phosphorus Sulfide ⑥Red Phosphorus⑦Phosphorus Sulfide ⑧Celluloids, Calcium Carbide (a.k.a, Carbide)⑨Lime Phosphide⑩Magnesium Powder ⑪Aluminum Powder ⑫Metal Powder other than Magnesium and Aluminum Powder ⑬Sodium Dithionous Acid (a.k.a., Hydrosulphite)
Oxidizing Substances	①Potassium Chlorate, Sodium Chlorate, Ammonium Chlorate, and other chlorates
	②Potassium Perchlorate, Sodium Perchlorate, Ammonium Perchlorate, and other perchlorates
	③Potassium Peroxide, Sodium Peroxide, Barium Peroxide, and other inorganic peroxides
	④Potassium Nitrate, Sodium Nitrate, Ammonium Nitrate, and other nitrates
	⑤Sodium Chlorite and other chlorites
	⑥Calcium Hypochlorite and other hypochlorites
Flammable Substances	①Ethyl Ether, Gasoline, Acetaldehyde, Propylene Chloride, Carbon Disulfide, and other substances with ignition point at a degree 30 or more degrees below zero.
	②n-hexane, Ethylene Oxide, Acetone, Benzene, Methyl Ethyl Ketone and other substances with ignition point between 30 degrees below zero and less than zero.
	③Methanol, Ethanol, Xylene, Pentyl n-acetate, (a.k.a.amyl n-acetate) and other substances with ignition point between zero and less than 30 degrees.
	④Kerosene, Light Oil, Terebinth Oil, Isopenthyl Alcohol(a.k.a. Isoamyl Alcohol), Acetic Acid and other substances with ignition point between 30 degrees and less than 65 degrees.
Combustible Gas	Hydrogen, Acetylene, Ethylene, Methane, Ethane, Propane, Butane and other gases combustible at 15℃ at one air pressure.

15. Standard setup manual

* Install this Equipment according to following format (Check the format for options or customized specifications)

Model	Serial number	InstallationDate	Charged Personnel or Company Name for Installation	Installation proved by	Judgment

№	Item	Implementation method	TOC No. Reference page of the operating instruction manual	Judgment
Specifications				
1	Accessories	Check for number of accessories on the basis of the column for accessories.	11. Specifications P.69	
2	Installation	・Visual check of environmental conditions Caution:Take care for environment	2.Before operating the Equipment ・Be careful with… P.8	
		・Securing a space		
Operation-related matters				
1	Source voltage	・Measure the user side voltage (outlet, distribution board, etc.) with a tester ・Measure line voltage during operation. (Must meet required voltage.) Caution: Check breaker on power switch board rating to meet this Equipment requirement.	2. Before operating the Equipment ・Must connect grounding wire… P.10 ・Connect the power supply to…. P.9 11. Specifications ・Specification - power supply P.69	
2	Raw Water	Check Raw Water	2. Before operating the Equipment P.11 ・Raw Water	
Description				
1	Operational descriptions	Explain the customer about each assembly as per the operation manual.	6.Operating procedure P.37～	
2	Error Codes Maintenance and inspection	Explain about error codes and procedures for reset according to Instruction Manual. Explain operations of each component according to Instruction Manual.	9. . Troubleshooting ～10. After sales service and warranty P.68	
3	Error Codes	Explain about error codes and procedures for reset according to Instruction Manual.	6.Maintenance Method ・Check and inspection timing P.62	
4	Completion of installation Entries	・Fill in the installation date and the installation mgr. on the nameplate of the main unit ・Fill in necessary information to the warranty card and hand it over to the customer ・Explanation of the route for after-sales service	10. After sales service and warranty P.68	

Limited liability

Be sure to use the unit strictly following the handling and operating instructions in this operating instruction.
Yamato Scientific Co., Ltd. assumes no responsibility for an accident or a malfunction caused by use of this product in any way not specified in this operating instruction.
Never attempt to perform matters prohibited in this operation instruction.
Otherwise, an unexpected accident may result.

Notice

- **Descriptions in this operating instruction are subject to change without notice.**
- **We will replace a manual with a missing page or paging disorder.**

Instruction Manual for

Laboratory Washer

AWD510

First Edition March 9, 2020

Revision

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