

LABORATORY WASHER

Model AW-62

Owner's Manual

Version 1

YAMATO SCIENTIFIC CO., LTD.

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1. Specifications

- | | |
|-----------------------------------|---|
| (1) Washing method | Two-directional (up and down) pressure water injection system

Fixed injection nozzle
(Replaceable with a jet rack)

Rack rotation system |
| (2) Supply-water temperature | Room temperature - 80°C |
| Washing-water temperature | 45 - 80°C |
| (3) Hot-water supply method | Heat with a heater (built-in: 6 kW)
or connect to hot-water piping system |
| (4) Water-supply pressure | 1 - 3 kg/cm ² |
| (5) Equipment which can be washed | Glass equipment such as test tubes, flasks, and beakers (excluding pipets)

Equipment height (upper limit) = 1000ml graduated cylinder (420 mm) |
| (6) Supply/Drain system | Water is supplied by opening/closing an electromagnetic valve, and the amount of water is prescribed by the water-surface level control switch.

Water drains by flowing from a higher location to a lower location. |
| (7) Washing cycle | Wash (selectable from 0 to 30 minutes)

Rinse (selectable from 0 to 30 minutes)

Final rinse (optional)
(Equipped with a water purifier)

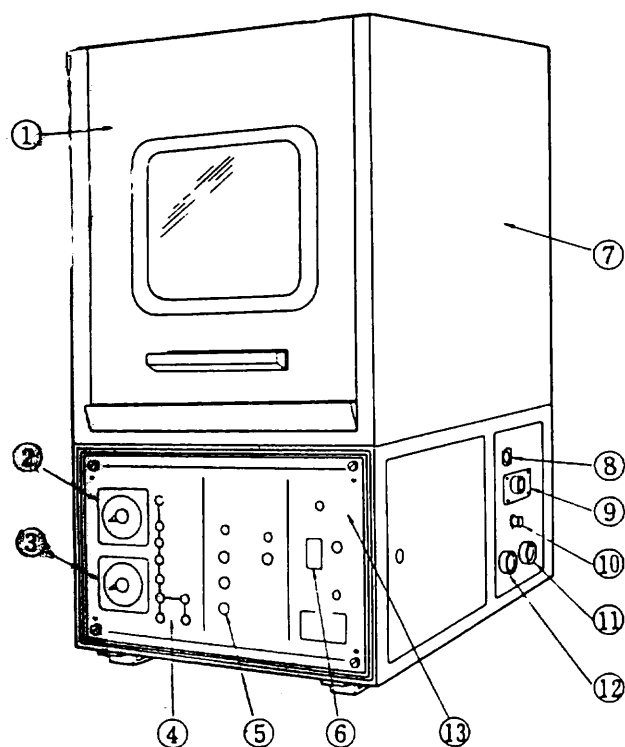
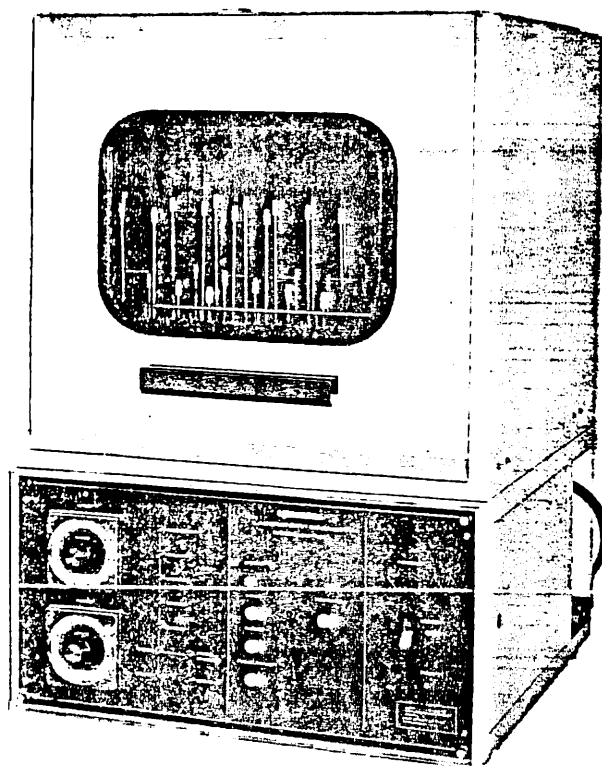
Washing is made with pure water (20 ℓ).

Washing cycle can be arbitrarily selected for each process above. |
| (8) Cleaning agents | Use a special non-phosphor luster (50 g) once for washing |

(9) Configuration	Materials: Stainless steel plate (SUS304)	
	External dimensions:	
	600 (W) x 620 (D) x 940 (H) mm	
	Internal tank dimensions:	
	600 (W) x 600 (D) x 600 (H) mm	
	Turntable: ϕ 550 (Maximum load 25 kg)	
	Pump: 3 ϕ , 200V, 250 W	
	Internal tank door: Opening/closing system (stops at any location)	
	Weight: Approximately 90 kg	
(10) Power supply	200 VAC, 3 ϕ , 50/60 Hz, 30A	
(11) Accessories (Main unit)	Vinyl cover	1
	Water-supply hose	1
	Internal diameter 9.5mm x 2m (with a one-touch coupler)	
	Draining hose	1
	External diameter 25.4mm x 1.5m (with a connecting fitting)	
	Exclusive cleaning agent	1 kg
	Non-phosphor luster	
	Measuring spoon (for 50 ml)	1
	Main injection nozzle washing arrow	1
	Water-supply port unit (with accessories)	1 set
	Fuse 2A	4
	Warranty	1
	Owner's manual	1
	Exclusive cleaning agent owner's manual	1
	Caution card	1
	Delivery date ID plate	1

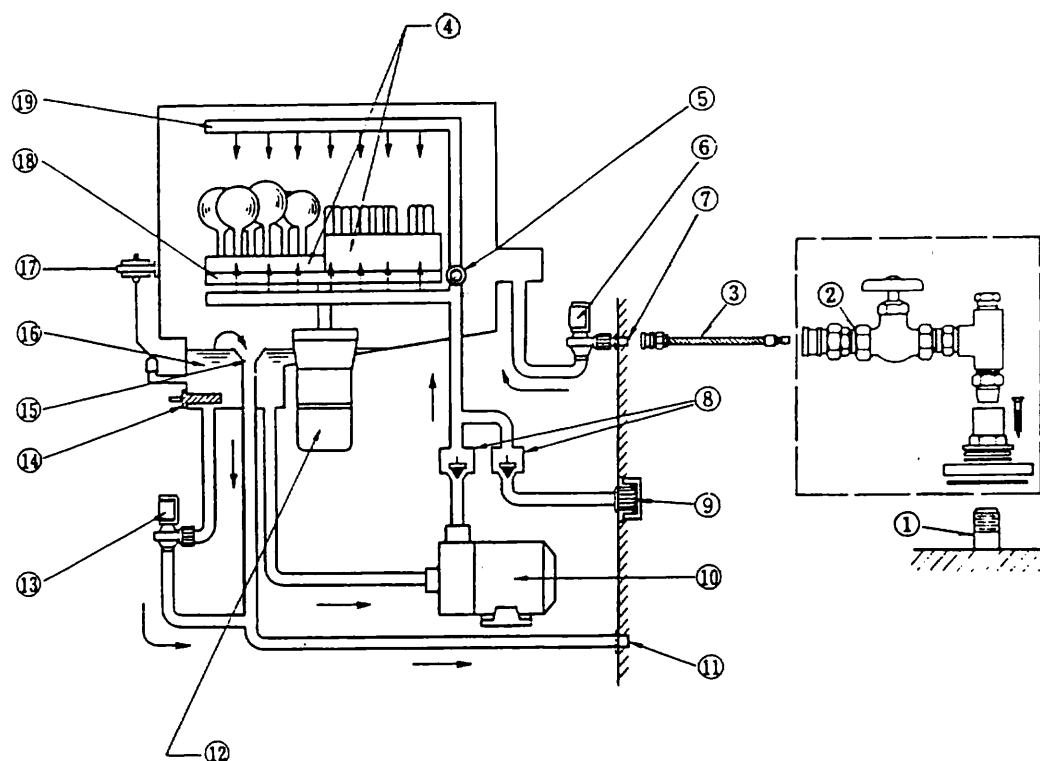
(12) Options	/ Jet rack	1 set
	Water purifier	1
	/ Test-tube rack	1
	(one set includes four racks)	
	/ Flask rack	1
	(one set includes 2 racks)	
	/ Beaker rack	1
	Exclusive cleaning agent non-phosphor luster	8 kg

2. Appearance



1. UP/DOWN opening/closing door
2. Wash timer
3. Rinse timer
4. Sequence display lamp
5. Selection switch (WASH, RINSE, FINAL RINSE, HEAT)
6. Power on/off switch (with excessive current and current leakage protection)
7. Washing room
8. Power cord clamp
9. Connection (option)
10. Water-supply port (SUPPLY)
11. Pure-water port (PURE)
12. Drain-water port (DRAIN)
13. Panel

3. Principle and Functions



Functions diagram

- | | |
|--|--|
| 1. Water pipe | 11. Drain-water port (DRAIN) |
| 2. Water-supply port unit | 12. Driving motor |
| 3. Water-supply hose | 13. Drain electromagnetic valve |
| 4. Rack (flask, test tube) | 14. Heater |
| 5. Jet rack connecting portion | 15. Overflow exit |
| 6. Water-supply electro-magnetic valve | 16. Water tank |
| 7. Water-supply port (SUPPLY) | 17. Water-surface level control switch |
| 8. Reverse-flow prevention valve | 18. Turntable |
| 9. Pure-water port (PURE) | 19. Injection nozzle |
| 10. Pump | |

(1) Wash (cleaning)

When equipment is to be washed (cleaned), the water-supply electromagnetic valve automatically opens, allowing water to flow into the water tank from external sources (the water-supply port unit cock or the hot-water piping system). When the water reaches a certain level (approximately 10 ℓ), the water-surface level control switch is activated and the water-supply electromagnetic valve closes. At the same time, the turntable rotates, the pump starts, and a powerful jet of water is injected from the upper and lower injection nozzles.

When the time set by the timer elapses, the turntable and the pump stop and the drain electromagnetic valve automatically opens. Draining continues for a fixed time.

(2) Rinse (rinsing)

Water is supplied to the water tank similar to the wash cycle above. When water reaches a certain level, the turntable and the pump start and a powerful jet of water is injected from the upper and lower injection nozzles, while the water-supply electromagnetic valve remains open the continue supplying water. Water is drained from the overflow exit and equipment is rinsed by continuously exchanging dirty

and clean water.

When a certain amount of time set by the timer elapses the turntable and the pump start, the water-supply electromagnetic valve closes, and the drain electromagnetic valve opens to drain water for a fixed time.

(3) Final Rinse (rinsing with pure water)

See 9.2 "Pure-water supply equipment (optional accessories)" for "Final Rinse" operation.

4. Washing Cycle

Washing process Time Operation (minutes)		Option /			
		Drain	Sup- ply		
		Drain	Sup- ply		
		(WASH) Wash	(RINSE) Rinse	(Rinsing with pure water) (FINAL RINSE)	Drain
		10	20	30	40
Option	Water-supply electromagnetic valve				
	Drain electromagnetic valve				
	Pump				
	Turntable				
	Water-surface level control switch				
	Heater				
	Pure-water pump				

Note: The table shows an example with the following conditions:

1. The amount of hot-water supply is 7 l/min.
2. The wash/rinse timer is set to 15 minutes.

5. Washing Method

The washing method must be modified to meet the various needs depending on the type of glass equipment, contaminants, and the degree of contamination (see the washing time in the table).

Use the test tube rack for washing test tubes, the flask rack or jet rack for flasks, and the beaker rack for beakers.

Example

Contamination, glass equipment, and cleaning time

Type of contamination		Glass equip- ment and size	Racks in use	Washing water temper- ature	Washing process			Time re- quired including supply/ drain (minutes)
					Timer setting (minutes)			
					Pre-pro- cessing	WASH	RINSE	
Water soluble material	Ink	Test tube (inter- nal diameter not less than 8mm ϕ).	Beaker	60 °C	—	10	15	33
		Conical flask (not less than 100 ml)	Flask	"	—	10	15	33
		Conical flask (not more than 100 ml)	Jet	"	—	8	12	29
		Graduated flask (not less than 10ml)	Flask	"	—	10	15	33
		Round flask (not less than 50 ml)	"	"	—	10	15	33
		Flat bottom flask (not less than 100 ml)	"	"	—	10	15	33
		Flat bottom flask (not more than 100 ml)	Jet	"	—	8	12	29
		Beaker (not less than 20 ml)	Beaker	"	—	8	12	29
Fats and oils group	Vegetable matter (vegetable oil) and mineral matter (machine oil)	Test tube (inter- nal dia. not less than 8 mm ϕ)	Test tube	80 °C	—	10	15	33
		Conical flask (not less than 500 ml)	Flask	"	—	10	15	33
		Conical flask (not more than 500 ml)	Jet	"	—	10	15	33
		Graduated flask (not less than 20ml)	"	"	—	13	15	36
		Round flask (not less than 100 ml)	Flask	"	—	15	15	38
		Round flask (not more than 100 ml)	Jet	"	—	13	15	36
		Flat bottom flask (not less than 100 ml)	Flask	"	—	15	15	38
		Flat bottom flask (not more than 100 ml)	Jet	"	—	13	15	36
		Beaker (not less than 20 ml)	Beaker	"	—	10	15	33
	Milk (dried at room temperature)	Test tube (inter- nal diameter not less than 8 mm ϕ)	Test tube	45 °C	—	15	15	38
		Conical flask (not less than 500 ml)	Flask	"	—	15	15	38
		Conical flask (not more than 500 ml)	Jet	"	—	13	15	36
		Graduated flask (not less than 20ml)	"	"	—	13	15	36

Materials including protein		Round flask (not less than 100 ml)	Flask	45 °C	—	15	15	36
		Round flask (not more than 100 ml)	Jet	"	—	13	15	36
		Flat bottom flask (not more than 100 ml)	Flask	"	—	15	15	36
		Flat bottom flask (not more than 100 ml)	Jet	"	—	13	15	36
		Beaker (not less than 20 ml)	Beaker	"	—	10	12	31
	Serum (dried at room temperature)	Test tube (internal diameter not less than 8 mm)	Test tube	45 °C	—	10	15	33
		Conical flask (not less than 500 ml)	Flask	"	Steep-ing	10	15	33
		Conical flask (not more than 500 ml)	Jet	"	—	15	15	38
		Graduated flask (not less than 20 ml)	"	"	—	15	15	38
		Round flask (not less than 100 ml)	Flask	"	Steep-ing	10	15	33
		Round flask (not more than 100 ml)	Jet	"	—	15	15	38
		Flat bottom flask (not less than 100 ml)	Flask	"	Steep-ing	10	15	33
		Flat bottom flask (not more than 100 ml)	Jet	"	—	15	15	38
		Beaker (not less than 20 ml)	Beaker	"	Steep-ing	8	12	29

Note 1. A jet rack should be used for flasks.

2. Excessive dirt and solid deposits must be removed with a brush before using the washer.

Gelatine deposits on the glass equipment may clog the electromagnetic valve. Use the hot-water riping system at a temperature of 80°C for removing gelatine deposits.

3. The amount of washing water is determined in reference to 7 l/min.

4. For dirt such as organic materials, wash glass equipment after steeping it in a proper solvent such as methanol.
5. For materials including protein, wash glass equipment with the washing water temperature at approximately 45°C to prevent modification of protein.

Please note that organic solvents cannot be used in the washer because of the mechanism and material quality.

6. Cleaning Agent

The "Non-Phosphor Luster" cleaning agent should be used exclusively for the LABORATORY WASHER. It has the following main constituents:

Silicate, Carbonate, Sulfate, Water quality regulator

Hydrogen ion concentration: pH 11.0 - 12.0

Note: Wash the cleaning agent off with water if it touches your body since it is an alkali and may be harmful.

Use this cleaning agent at a solution concentration of approximately 0.5% and set the washing water temperature to not less than 45°C. Since one process requires approximately 10 L of water, 50 g of cleaning agent is needed to produce the solution concentration of 0.5%.

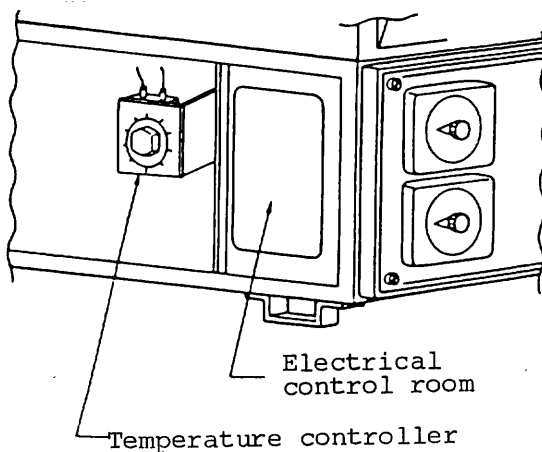
Do not use expandable cleaning agents. If bubbles are produced, they are injected by the pump, disabling injection and hence washing.

Also, never use cleaning agents containing insoluble materials such as cleanser which may damage the mechanical sealing of the pump.

7. Hot Water

Set the washing water temperature to 45 to 80°C according to type of dirt since the washing efficiency varies with the washing water temperature.

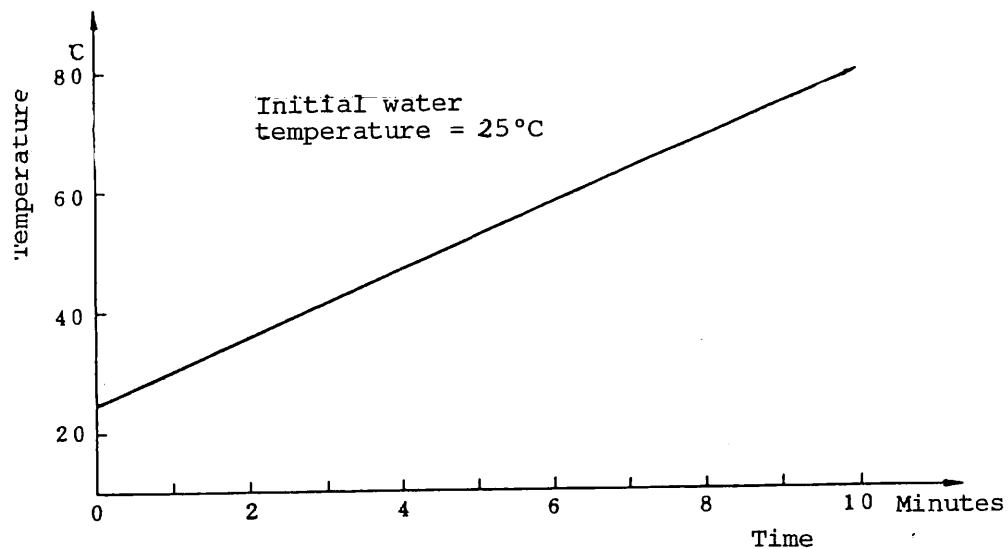
(1) Temperature setting using a built-in heater



As shown in the left figure, the control knob for the temperature controller is behind the left hand door. Turn it to control temperature.

Never set the temperature above 80°C to avoid danger.

The following graph shows the temperature versus time relationship when the washer is heated using a 6 kW heater. A built-in mechanism is provided to prevent the washer from operating without sufficient water in the tank.



(2) Steam piping

In this method, steam is mixed with service water to produce hot water. The supply and halt operations are performed by the electromagnetic valve of the washer. It is necessary to install a reverse-flow prevention valve and a relief valve and pipes so that a large amount of steam does not enter the internal tank since steam may flow in the opposite direction or pressure may rise excessively. Use of "High Coupler (socket)" results in a simple connection since the "High Coupler (20 PH plug)" of Nittho Kohki Ltd. is used on the piping side of the supply hose.

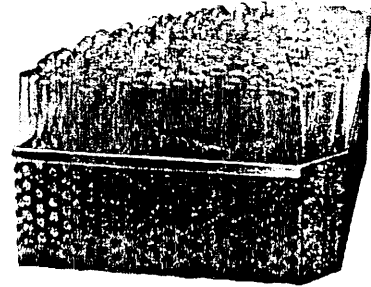
8. Rack (Optional accessories)

There are four types of racks: the test tube rack, flask rack, beaker rack, and jet rack. Select them according to the type or size of the glass equipment.

(1) Test tube rack (Material:

SUS304; four racks per set)

Set the test tube as vertically as possible with its port down for cleaning.



This rack is divided into four sections which are further divided into small sections to allow you to insert even a few test tubes easily.

This also allows you to wash both test tubes and flasks simultaneously when a flask rack is used. It is also possible to dry them in a small drying machine.

Number of test tubes per set: 16.5 ϕ test tube - approximately 600

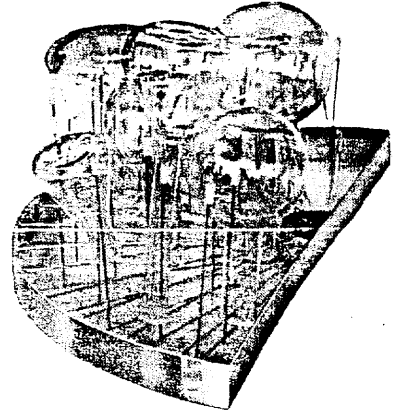
(2) Flask rack (Material: SUS304; 2 racks per set)

Load a flask for washing by inserting its port over the bar of the flask rack. It is also possible to load such glass equipment as graduated cylinders and funnel.

This flask rack is divided into two sections and can be washed in combination with the test tube rack as described above.

Number of flasks per set:

Round flask (50 ml)	- 68
Round flask (100 ml)	- 48
Round flask (200 ml)	- 28
Round flask (300 ml)	- 20
Round flask (500 ml)	- 14

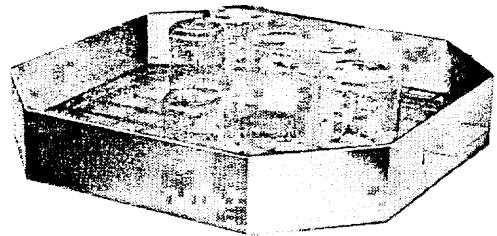


(3) Beaker rack (Material): SUS304; a rack per set

Load a breaker for cleaning with its port facing the ground.

Number of beakers per set:

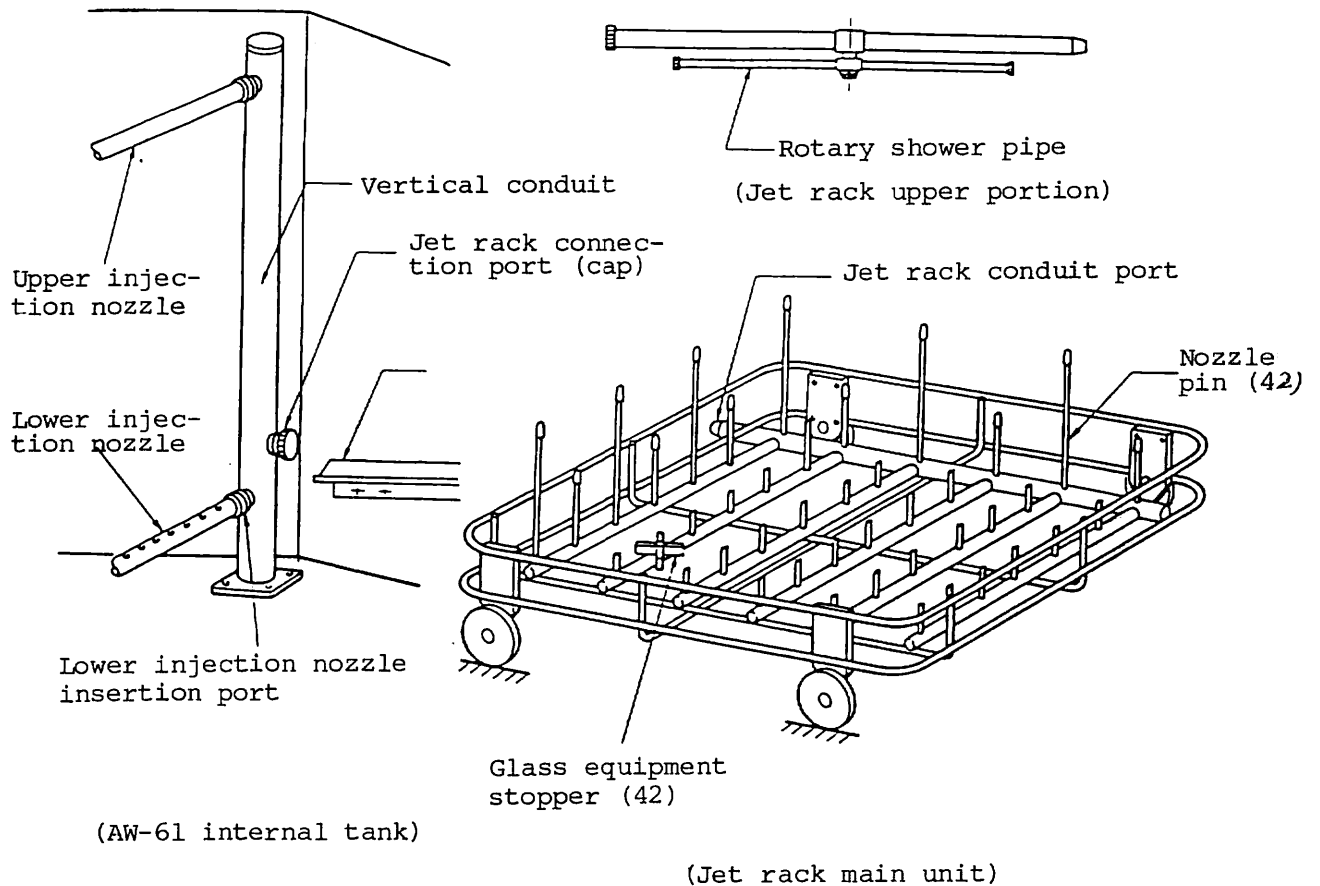
Beaker (50 ml)	- Approx. 85
Beaker (100 ml)	- 56
Beaker (200 ml)	- 37
Beaker (300 ml)	- 29
Beaker (500 ml)	- 21



(4) Jet rack

This jet rack should be used for graduated flasks with small port diameters and for conical flasks which tend to slant even if it is loaded into the flask rack as described above.

A Jet rack structure



The jet rack consists of the jet rack upper portion which injects water downward, rotating itself by water pressure; the jet rack main unit which holds the glass equipment; and the rail installing portion.

The metal and resin portion materials are SUS304 and Derlin products.

B Assembly/Installation

- 1) Remove the upper injection nozzle which is normally in use and insert the jet rack upper portion into the same position. Check to see if the rotary arm rotates horizontally by turning it lightly by hand.
- 2) Remove the turntable and the lower injection nozzle.
- 3) Firmly fasten the "Rail" to both side boards of the internal tank (see (C-1) for height adjustment).
- 4) Remove the jet rack connection port cap and remove the rubber plug in it. Insert the rubber plug into the lower injection nozzle insertion port and plug it firmly using the same cap.
- 5) Press the jet rack main unit along the rail.
Ensure that the jet rack main unit fits into the jet rack connection port of the vertical conduit and is firmly held by a stopper positioned on the rail (see (C-1) for stopper position adjustment).

C Adjustment

- 1) Rail height adjustment

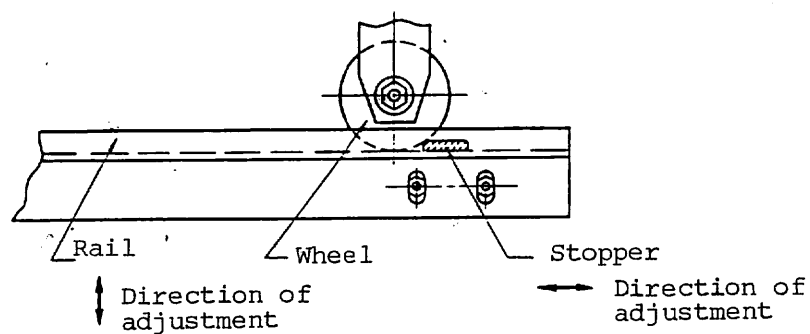
Temporarily set the rail to the highest position. Lower the rail by loosening the nut so that the height of the jet rack connecting port matches that of the jet rack conduit port when the "jet rack main unit" is placed on the rail adjustment ranges from 0 to 5 mm.

2) Stopper position adjustment

Insert the jet rack conduit port further into the jet rack connecting port and hold it. Move the stopper by loosening the countersunk screw then firmly fix the stopper when it reaches the desired position. Adjustment ranges from - 2.5 mm to +2.5 mm.

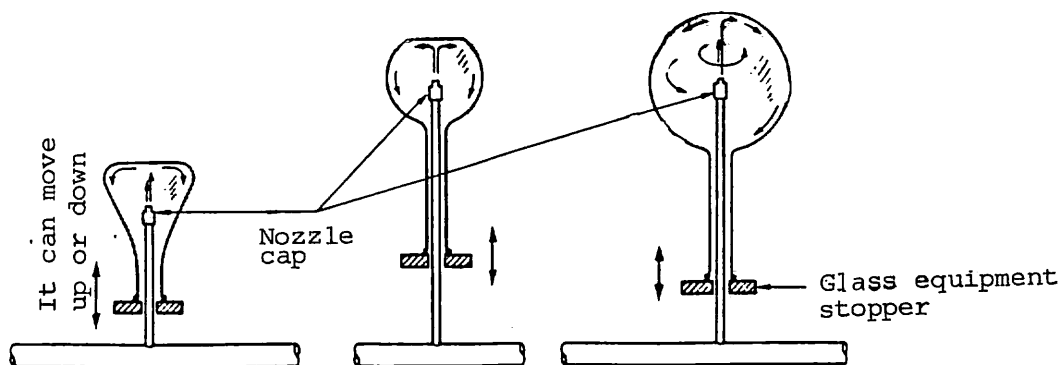
3) Jet rack main unit height adjustment

The height from the rail to the center of the jet rack conduit port is normally set to 59 mm but can be adjusted by loosening the wheel fastening bolt. Adjustment ranges from -3 mm to +3 mm.



D Number of graduated flasks per set:

Graduated flasks (Not more than 500 ml)	42
Graduated flasks (1000 ml)	20



An example of a
conical flask

An example of
a graduated
flask

An example of a round
(flat bottom) flask

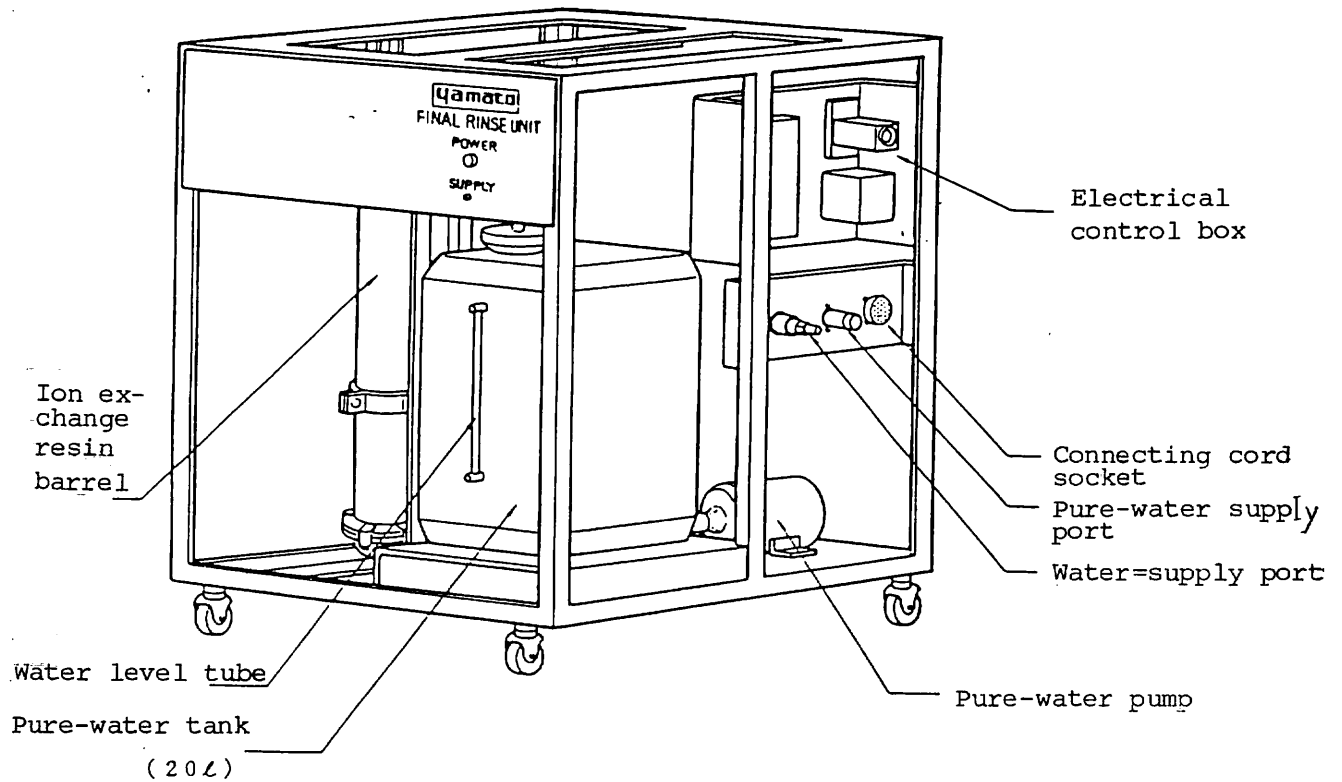
The glass equipment stopper attached to the nozzle pin can be moved up or down depending on the glass equipment to be used. Adjust the position of the nozzle cap so that the weight of the glass equipment is near the center of the cap.

E Configuration of jet rack

(a) Jet rack main unit	1
(b) Jet rack upper portion	1
(c) Rail (including 2 stoppers)	2
(d) Nut (M4)	10
(e) Flat washer (M4)	10
(f) Spring washer (M4)	10
(g) Countersunk screw (M4 x 12)	2

9. Water Purifier (optional accessory)

(1) Appearance



This equipment mainly consists of the ion exchange barrel, pure-water tank pump, and the electrical control box. Also, this equipment serves as the main unit support structure.

(2) Operation principles

If the conduit system and the electrical system are connected to the AW-62 main unit, the signal corresponding to the sequence of the main unit is

sent from the main unit. If the "FINAL RINSE" switch on the main unit panel is pressed then the "START" button of the AW-62 main unit is pressed, the electromagnetic valve of this equipment opens, and pure water flows into the storage tank through the ion exchange resin. When a certain water level is reached, the water-surface control switch is activated and the electromagnetic valve closes. When a specified time elapses, the pure-water pump of this equipment starts, and pure water is sent to the main unit through the pure-water supply hose. At this time, the turntable is rotating and the "FINAL RINSE" begins using the water jet from the injection nozzle. When a certain time (approximately 30 seconds) elapses, a timer stops the operation and the pure-water pump.

If the "FINAL RINSE" is initiated and the amount of pure water in the pure-water tank has not reached a certain level, the operation of the "FINAL RINSE" is delayed until the water reaches the specified level.

Since the pure-water flow rate is approximately 2 l/minute, it takes approximately 10 minutes to fill the pure-water tank.

(3) Connecting method with the main unit

(Note) Always turn the main unit power switch (6) off before starting the following operation.

- 1) Remove the dummy plug (with cap) attached to connector (10) of the main unit and insert the plug of the main unit electrical cable into this connector.
- 2) Remove the plug attached to the "PURE" (pure-water port) (12) of the main unit then firmly attach the nipple accessory (including packing) instead.
- 3) Insert the end of the pure-water supply hose (one side is fixed to the discharge port of the pure-water pump) into the above nipple and firmly clamp it using a wire clamp accessory.
- 4) Attach the water-supply port unit accessory to the service water port and connect the cock of the water-supply port unit to the main unit using a water-supply hose (see 10. Handling (1)-a).
- 5) Turn the main unit power switch on to allow the electromagnetic valve to open and pure water to be supplied to the pure-water tank. Adjust the cock of the ion exchange resin barrel so that 20 l of water is stored in the tank in approximately 10 minutes.

(4) Configuration of pure-water supply unit

- | | |
|---------------------------------|---|
| (a) Pure-water supply main unit | 1 |
| (b) Main unit connection nipple | 1 |
| (c) ϕ 34 packing | 1 |

- (d) Wire clamp (nominal diameter $\phi 30$) 1
- (e) Water-supply hose
Internal diameter 9.5 mm x 2 m
with one-touch connecting coupler 1
- (f) Water-supply port (with accessories) 1

10. Handling (see 2: Appearance, 3: Mechanical diagram)

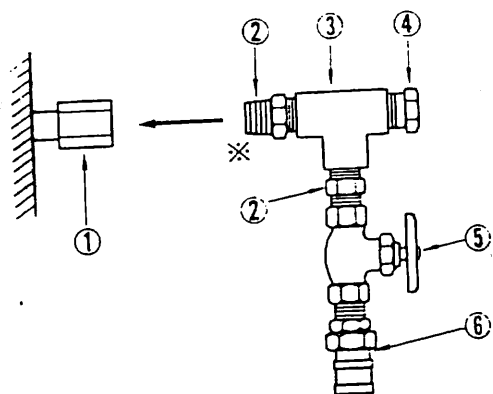
(1) Preparation before operation

- (a) Install this equipment at a stable location near the service water or drain.
- (b) Connect the water-supply port on the right of the main unit to a service water port having a water pressure of 3 kg/cm² according to the following procedures, using a water-supply hose accessory.

Always close the service water source valve before performing the above operation since the water cock normally attached to the service water system must be temporarily removed.

- 1) Remove the water cock near the washer and install the water-supply port unit accessory as shown in the figure on the right.

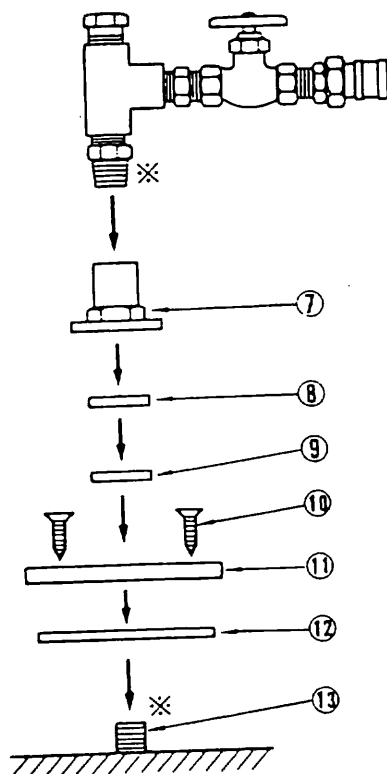
Always apply sealing tape (accessory) to the area marked * on connection.



1. Water service pipe
2. Connection nipple
3. T-shape pipe
4. Blind cock
5. Water cock
6. Socket

Water-supply
port unit

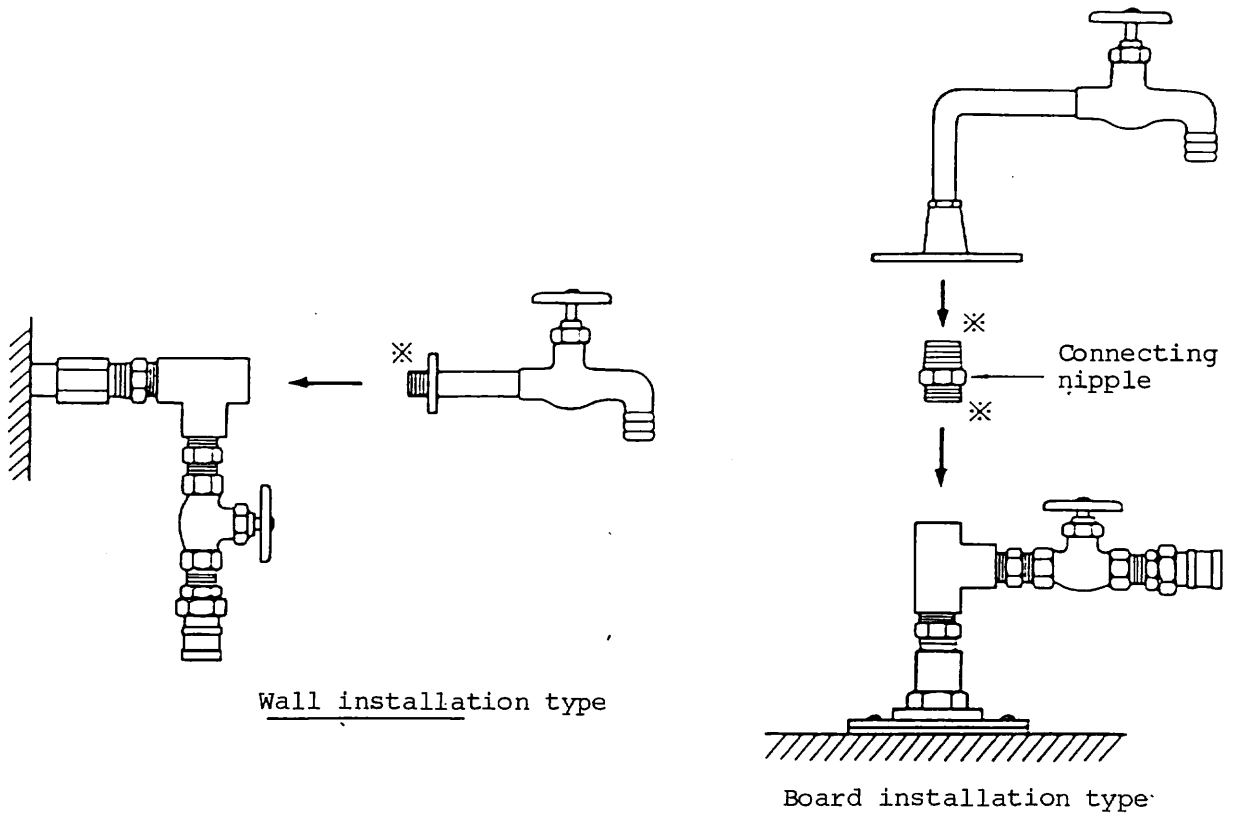
Wall installation type



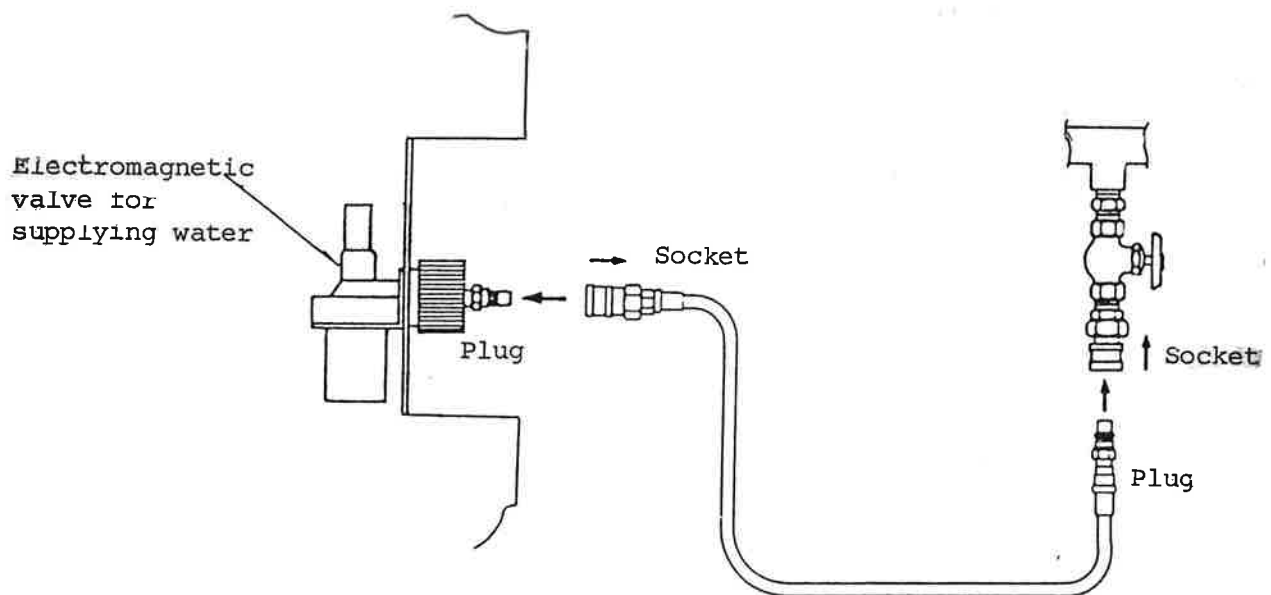
7. Adapter
8. Rubber packing (small)
9. Packing pressure foot
10. Wood screw
11. Pressure fitting
12. Rubber packing (large)
13. Water pipe

Board installation type

- 2) Remove the blind cock of the water-supply port unit and attach the cock to this port. Use a cock having either one port or two ports depending on the strength of the water-supply port unit. Always apply sealing tape (accessory) to the area marked * on attaching the cock.



- 3) Connect the water-supply port unit to the water-supply electromagnetic valve using a water-supply hose accessory. Firmly push the plug in with the socket pressed in the direction of the arrow since the connecting portion consists of a simple-to-use coupler.



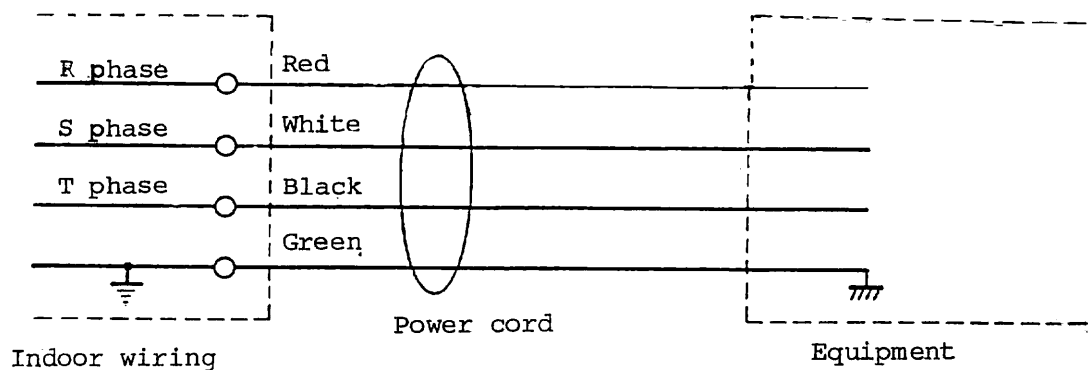
4) Open the service water source valve and check for water leaks from each connection.

(c) Securely insert the box nut of the drain hose accessory into the drain port of the right-side surface of the washer and place the other end of the drain hose in the drain.

Cut the drain hose to the required length so the hose doesn't break or loosen.

(d) Securely connect the power cord to the power supply (200 VAC, 3-phase, not less than 30 A) after confirming that the power switch is off.

Always connect the green wire to the ground since the power cord of this unit uses the "ground-type 4-core cable (VCT)" which has a built-in ground cord.



If the three wires of the power cord are connected in reverse, the output from the pump is weak and almost no water pressure is available from the injection nozzle on operation. Immediately turn off the power switch when this condition occurs. Change the connection of two of the three wires to achieve normal operation of the unit again.

(2) Operating procedures

- (a) Set the glass equipment on the rack (see 8. RACK above) and load the rack onto the turntable. Rotate the turntable until the rack can be easily loaded (see 8. -(4) Jet rack).
- (b) Select the washing method according to the shape, type of dirt, and dirtiness of the glass equipment (see 5. Washing method above).
Set (2) Wash Timer, (3) Rinse Timer, and the temperature (see 7. -(1) above)

- (c) Open the vertical opening/closing door (1) and place approximately 50 g of detergents on the strainer (approximately 2 spoonfuls of detergent using a measuring spoon (accessory)).

Close the door.

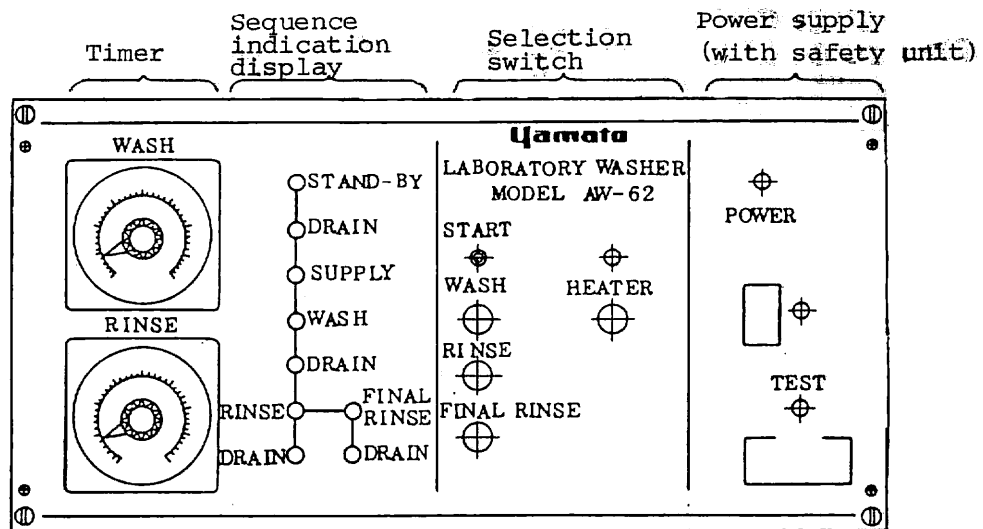
- (d) Turn power switch (6) on. The Power lamp (red) and the Stand-by lamp (red) of the sequence indication lamp light.

Make a selection with the Selection switch. The lamp (white) of each switch lights. If no selection is made, the unit will not start.

- (e) Press the Start button. The Drain lamp (red) of the sequence indication display lights and the Standby lamp goes out, indicating the start of draining (operation always starts from draining).

- (f) After that, the sequence proceeds automatically according to the process selected by the selection switch.

Open the vertical opening/closing door (1) during operation to stop the entire operation (excluding the heater). Inspection and additional operations are now possible.



(14) Panel

- (g) The turntable will not rotate during the supply/drain operation.
- (h) When the selected final process is completed, the Standby lamp of the sequence indication display lights.
- (i) Load the glass equipment, add detergent, then press the Start button to repeat washing for the same amount of time at the same temperature.

11. Cautions in Use

- (a) Connect the washer to a service water pipe or a hot-water piping system having a supply-water pressure of 1 to 3 kg/cm² (including night time) and a supply-water flow rate of approximately 7 ℓ/minute. When

the supply-water pressure is low, the electromagnetic valve will not open. Excessively high supply-water pressure may damage the piping system within the washer. If the water supply is low, the time required for supplying water in each process becomes longer, thus further degrading rinsing efficiency.

- (b) Set the washing-water temperature to 40 to 45°C for protein materials, to not more than 60°C for plastic equipment which may be softened by heat, and to 60 to 80°C for other cases. Increasing the washing-water temperature improves the washing efficiency and reduces the time required for drying.
- (c) Brush off solid deposits on the glass equipment before washing. Gelatine deposited on the glass equipment may block the electromagnetic valve. Clean such equipment at 80°C.
- (d) Do not use a foaming cleaning agent, a cleaning agent having insoluble materials such as cleanser, or organic catalysts. Only the non-phosphor luster cleaning agent should be used.
Wash off this cleaning agent if it accidentally splashes on you since it is an alkali and is harmful to your skin. Also, exercise caution with aluminum products since they are easily attacked by the cleaning agents.

- (e) If the injection nozzle port is blocked, satisfactory washing cannot be expected. Remove the injection nozzle and wash the injection port with a cleaning pin accessory if this situation occurs.
- (f) Replace the supply/drain hoses and the internal piping hose within two years after purchase. Replace them with new ones even sooner when defects such as crazing occur. Periodically inspect areas where the water pressure radically changes.
- (g) Do not load more than 25 kg onto the turntable. Place the load on the center.
- (h) The main unit uses 200 VAC (3 phase). An excessive current and leaking current protection unit is built into the main unit. Check to see if the excessive current/leaking current protection unit is functioning normally once a month according to the instructions on the panel (14).
- (i) Once the power is cut off due to power failure, the main unit will not start until the water is completely drained from the water tank.
- (j) Make the connection between the cock and the water-supply hose where the draining facility is provided.
- (k) Always close the cock when the unit is stopped at

night or on holidays.

- (l) Use the supply/drain hoses and other parts specified by YAMATO SCIENCE CO., Ltd.
- (m) Make the drain hose as short as possible to avoid any bending and make connections securely.
- (n) Always connect the unit to the ground to prevent any danger.
- (o) Exercise caution because the temperature in the tank is high.
- (p) Opening the door stops the entire operation. Open the door slowly, or water may burst out due to the remaining pump pressure.
- (q) Always attach the "Caution" card (accessory) to the cock side and the main unit side of the water-supply port.

12. Troubleshooting

Main Unit

Symptom	Causes	Diagnostics	Troubleshooting
a. Malfunctioning supply	(1) Faulty water-supply electromagnetic valve (2) Faulty electrical circuit (3) Water-supply electromagnetic valve filter is blocked. (4) Faulty water-supply system (service water, hot-water piping etc.)	(1) Measure the conduction of electromagnetic valve. (2) Apply current to the unit and measure voltages. (3) Disassemble the electromagnetic valve. (4) Check opening/closing of water-supply system cock. Check water-supply pressure.	(1) Replace it if conduction is not proper. (2) Repair relay and other electrical circuits. (3) Clean filters. (4) Open the cock. Set the pressure to the proper level
b. Malfunctioning draining	(1) Faulty draining electromagnetic valve (2) Faulty electrical circuit (3) External draining hose is misconnected. (4) Water-supply electromagnetic valve filter is blocked. (5) Improper setting of draining delay timer	(1) Measure the conduction of the electromagnetic valve. (2) Apply current to the unit and measure voltages. (3) Check to see if the position is too high. (4) Disassemble the two electromagnetic valves. (5) Check to see if the set time is correct.	(1) Replace it if conduction is not proper. (2) Repair the relay and other electrical circuits. (3) Lower it and eliminate hose bending. Cut it if it is too long. (4) Clean filters. (5) Modify the set time according to the situation.
c. Water leakage	(1) Faulty sealing or packing (2) Improper hoses connections (3) Faulty rubber piping	(1) Inspect sealing and packing. (2) Inspect connecting parts. (3) Inspect rubber pipes.	(1) Repair faulty parts. (2) Repair faulty parts. (3) Replace rubber pipes with new ones.
d. Malfunctioning sequence	(1) Water supply and draining cycles are repeated, and operation does not proceed due to improper water level control switch adjustment. (2) Faulty electrical circuit	(1) Check to see if control returns to "Drain" when pump operation starts. (2) Apply current, measure voltages, and check parts.	(1) Raise the tripping point of the water level control switch. Also, try to extend the time set by using the water-supply extension timer. (2) Repair and replace the relay and other electrical circuits.
e. Malfunctioning washing	(1) Faulty pump (2) Injection nozzle is blocked. (3) Turntable does not rotate properly or does not rotate at all. (4) Improper supply of cleaning agents. (5) Improper loading of glass equipment.	(1) Measure the motor current and inspect the inside of the pump (housing) (2) Inspect the injecting condition. (3) Measure conduction of drive motor and disassemble/inspect the driving portion. (4) Measure how much cleaning agent has been supplied using a measuring spoon. (5) Check to see if the glass equipment is vertical.	(1) Repair and replace the motor pump and other related parts if the motor pump is malfunctioning. (2) Clean injection nozzle. (3) Replace the motor if it is malfunctioning. Also, repair and replace the oil seal, drive shaft, and bearings if they are malfunctioning. (4) Place two spoonfuls of cleaning agent on the strainer. (5) Load the glass equipment again and use a jet rack for glass equipment which tend to slant.

Symptom	Causes	Diagnostics	Troubleshooting
f. Improper rinsing	(6) Improper water temperature. (1) The water supply quantity is in sufficient. (2) Rinsing time is too short or electrical circuits are malfunctioning.	(6) Measure water temperature. (1) See a. "Malfunctioning water supply" above. (2) Check to see if the time set by a timer is proper; also inspect conduction of electrical circuits.	(6) Adjust the temperature controller setting or the hot-water piping system. (1) Execute the procedures described in a. "Malfunctioning water supply" above. (2) Modify the time set by a timer, repair electrical circuits, and replace parts with new ones.
g. Improper insulation	(1) Failure due to aging or deterioration of electrical parts.	(1) Use measuring equipment	(1) Replace electrical parts with new ones.

Optional Accessories (Jet rack)

Symptom	Causes	Diagnostics	Troubleshooting
a. Malfunctioning rotation of rotary shower pipe	(1) Pressure shortage due to improper connection of jet rack. (2) Blocking of rotary shower pipe.	(1) Check to see if it is properly connected to vertical conduit or if there is leakage. (2) Disassemble rotary shower pipe.	(1) Change location of jet rack rail and stopper. (2) Replace them if they are malfunctioning.
b. Insufficient washing	(1) Malfunctioning pump. (2) Blocking of nozzle pin (3) Glass equipment stopper has been improperly placed.	(1) Inspect the conduction of motor and the inside of the pipe such as the housing. (2) Check to see if water is properly injected from the tip of the nozzle pin. (3) Check to see if the glass equipment is properly positioned.	(1) Replace or repair inside parts motor pump is malfunctioning. (2) Remove and clean pins. (3) Change the location of "Glass equipment stopper."

Optional accessories (water purifier)

Symptom	Causes	Diagnostics	Troubleshooting
a. Improper final rinsing	(1) Deterioration and malfunctioning of ion exchange resin. (2) Excessive amount of water passing through resin barrel. (3) Faulty pure-water pump (4) Reverse flow or leakage from reverse-flow stopper valve.	(1) Replace ion exchange resin. (2) Measure the amount of water supply. (3) Measure conduction of motor and inspect the inside of the pump such as the housing. (4) Remove the pure-water supply hose from the main unit and check to see if there is any leakage.	(1) Rejuvenate or replace ion exchange resin. (2) Control the amount of flow. (3) Replace or repair parts if there is any malfunctioning within the motor pump. (4) Clean the reverse flow stopper valve or replace parts.

13. Replacement Parts List

Submit requests for replacement parts to the dealers or
directly to YAMATO SCIENTIFIC CO., LTD

Part Name	Part No.	Specifications	Manufacturers
Conduit installing board gasket	291013-139	Chloroprene rubber	Yamato Scientific Co., Ltd.
ø 34 packing	140	"	"
Heater (2 kW, 200V)	150	Stainless	"
Conston spring	201	"	Sanko Hatsujo
Main conduit elbow (A)	202	Chloroprene rubber	Yamato Scientific Co., Ltd.
Main conduit elbow (B)	209	"	"
Housing gasket	214	"	"
Driving shaft printed-circuit board gasket	217	"	"
O ring (P15)	332	"	"
O ring (P12)	330	"	"
* Oil seal	304	TC254510	Nihon Oil Seal
Bearing	305, 306	6204DDU, 6203DDU	N S K
Electromagnetic packing	128	Chloroprene rubber	Yamato Scientific Co., Ltd.
Relay	361	AP3141	Matsushita Denko
Switch (START)	321	VAQ-4W	Omron Co., Ltd.
Selection switch	322	KLS-25	Kimden Co., Ltd.
Lamp (Sequence display)	323	BF-4S	Johshin Denki
Lamp (Power)	324	BN-107	Chuo Denshi
Timer (WASH. RINSE)	316	ATM5EPH	Fuji Denki
Cleaning agents	407	Non-Phosphor luster (1 kg pack)	Yamato Scientific Co., Ltd.

* Indicates consumable parts

