Issued Date Sep. 20, 2022

Specifications for Approval

Device Name	WS-620C
Specification Sheet No.	
PJ No.	
Client name	

Specifications may changed due to product improvement.

SCREEN SPE Tech Co., Ltd.
SCREEN Semiconductor Solutions Co., Ltd.

History of Changes

Project No: _____

Client: _____

Date	Page	Chapter / Section	Documentation
Sep. 20, 2022	2-2	2-1-2 Summary of Module Specifications	Modified
	Drawing		Rev00 → Rev01

GENERAL NOTES

1. Confirmation of the contents of the Specifications for Approval

After confirming the contents of the Specifications for Approval (“the Specifications”), you are kindly requested to give your signature and return the Confirmation of Receiving Specifications by the specified date. The Specifications sets forth the additional understanding by both parties as to the matters covered herein, and supersedes and replaces any prior written or oral understanding by both parties.

2. Alteration of the Specifications

(1) The Specifications were mutually agreed upon between your company (“COMPANY”) and SCREEN Semiconductor Solutions Co., Ltd. (“SCREEN”), based on technical meetings held to reconcile any differences between COMPANY’s required specifications and SCREEN’s recommended and provisional specifications. Accordingly, the Specifications shall be considered final, and there will be, in principle, no further alterations.

(2) Should COMPANY desire any further alterations of or amendments to the Specifications, please advise SCREEN’s sales office accordingly as quickly as possible..

(3) Since certain modifications may change the previously agreed upon delivery date and price of the equipment, SCREEN reserves the right to finalize the delivery date and price after consultation with COMPANY.

3. Equipment acceptance tests for final approval

(1) After the equipment designated in this document (“the equipment”) is installed, acceptance tests on various items and under various operating conditions for COMPANY’s final approval shall be carried out in accordance with SCREEN’s standard acceptance criteria. Any extra costs incurred for performing acceptance tests on specially designated items other than SCREEN’s satndard acceptance criteria and/or operating conditions shall be charged to COMPANY, as a separate expense.

(2) SCREEN defines the “sign-over date” to be the date when SCREEN’s acceptance tests confirm that the equipment satisfies all of SCREEN’s designated acceptance test criteria and operating conditions. Should the equipment not satisfy all of the designated acceptance test criteria or operating conditions, necessary measures shall be taken upon consultation with COMPANY.

4. Warranty

4-1 Warranty period

The warranty periods are set as follows, unless otherwise agreed between COMPANY and SCREEN.

· New equipment delivered: 12 months after the completion of delivery of the equipment
(Software product delivered: 6 months after the completion of delivery of the software)
· Modification of the already delivered equipment: 3 months after the completion of modification

If a failure or damage occurs under the normal usage conditions within the warranty period, SCREEN will provide repair services without cost to COMPANY, except the consumables specified in the Recommend Parts List or the Maintenance Manual which are provided separately.

4-2 Exemptions

SCREEN's warranty does not cover any cases or situations deemed by SCREEN to fall under any of the following:

(1) Operational problems, equipment damage or loss resulting from fires, earthquakes, lightning, floods, or other natural disasters; or wars, insurgencies, sabotage, or other circumstances beyond SCREEN's control.

(2) Operational problems or equipment damage resulting from modification of the equipment without SCREEN's knowledge or consent.

(3) Operational problems or equipment damage resulting from:

1) Inappropriate operations and/or handling procedures which are inconsistent with those stipulated in the Specifications, the Operator's Manual, the Maintenance Manual, and other manuals;

2) The use of chemical and gas substances whose specifications differ from those stipulated in the Specifications and manuals;

3) The use of utilities with inadequate capacities and/or inappropriate specifications;

4) Movement or relocation made without the presence of SCREEN's personnel.

5) Inadequate storage or setup location or environment.

6) Negligence in replacing consumable parts.

(4) Operational problems or equipment damage due to parts specified or provided by COMPANY.

(5) Operational problems or equipment damage resulting from COMPANY-specified processes not consistent with SCREEN's design standards.

(6) Operational problems or equipment damage resulting from use of non-standard materials.

(7) Operational problems or equipment damage resulting from use of the chemical which COMPANY uses it without providing its material such as Safety Data Sheet ("SDS") to SCREEN prior to the production of the Equipment.

(8) Operational problems or equipment damage due to inappropriate maintenance, repair, or adjustment work performed by a person other than SCREEN's personnel.

(9) Operational problems or equipment damage caused by products that were not manufactured by SCREEN.

(10) Operational problems or equipment damage due to the wafer itself or the previous process.

(11) In addtion to (1) to (10) above, operational problems, equipment damage or loss due to some other cause not attributable to SCREEN

4-3 Limitation of Liabilities

SCREEN is not responsible for operational problems, equipment damage or loss in the period from installation until final aproval of the equipment due to some other cause not attributable to SCREEN. The warranties set forth above in this section 4 in respect of the equipment are exclusive and in lieu of all other warranties, express or implied, including but not limited to the implied warranties of merchantability, fitness for a particular purpose. In no event shall SCREEN be liable for loss of profits or indirect, special or consequential damages arising from the manufacture, sale, license, shipment, delivery, resale, repair, replacement or use of the equipment.

5. Parts, materials, or other items Provided for Testing

Before delivery, if there are any parts, materials, or other items that SCREEN must borrow from COMPANY to accommodate SCREEN's internal inspection and trial operations, those items must be specified in a separately presented list. SCREEN requests that COMPANY deliver those items to SCREEN before the mutually agreed upon date to prevent delays in delivery of the equipment.

6. Installation site and environmental conditions

6-1 Installation site and environmental conditions

SCREEN requests that the equipment be installed on a floor strong enough to bear the weight of the equipment, and in an ample amount of space. The operating environment must always be kept at an appropriate temperature and humidity, and be free of potentially corrosive substances.

6-2 Passage to the installation site

SCREEN requests that a suitable passageway be prepared to the installation site so that the equipment can be safely and conveniently transported to this site.

6-3 Utilities

Preparing the site with the appropriate utilities and connecting them to the equipment are the sole responsibility of the client.

7. Maintenance of the equipment

7-1 Space for maintenance

SCREEN requests that a sufficient amount of space be secured around the equipment for all necessary maintenance services, by referring to the recommendations in the appended schematic drawing(s).

7-2 Maintenance parts

SCREEN asks that the consumables and the maintenance parts are prepared by referring to the Recommend Parts List or the Maintenance Manual which are provided separately.

7-3 Periodic Inspection

To keep COMPANY's equipment in the best possible working condition, SCREEN asks that COMPANY inspect the equipment on a daily basis.

8. Automatic fire extinguishing system

Depending on the equipment's specifications, it may be necessary to attach an automatic fire extinguishing system to the equipment to ensure its safety. SCREEN request that COMPANY consult a specialist regarding installation and subsequent management, including regular maintenanse, as SCREEN cannnot take responsibility for those systems.

9. Third-party safety devices

If decide to provide the equipment with gas detectors or other safety devices produced by third-party suppliers/manufacturers, SCREEN request that COMPANY entrust their inspection and maintenance to these suppliers/manufacturers. SCREEN assume no responsibility for the maintenance or aftercare of such devices or systems.

10. Equipment software

Subject to the following conditions, SCREEN hereby grant to COMPANY a non-transferable, non-exclusive, limited license to use the software included with the equipment.

(1) The software may only be used for the equipment with which it is provided.

(2) Reverse engineering of the software, such as de-compiling or disassembling, is strictly prohibited.

(3) The software may not be copied, altered, or modified.

(4) The software, and any license or rights for its use, may not be assigned, sold, leased, sub-licensed, encumbered, or otherwise supplied or transferred, in whole or in part, to a third party.

(5) Any copyright notices, trademarks, or other notices included on or in the software may not be deleted or modified.

Please note that COMPANY may be required to sign a license agreement specified by SCREEN.

The copyright for this entire document belongs to SCREEN. The Specifications contain proprietary engineering information of SCREEN. This publication, in whole or in part, shall not be reproduced in any media or disclosed to any third party, without our express consent.

International transfer of the equipment, any of its parts, components and/or software must be carried out in compliance with the relevant laws and ordinance of the country of export and the country of equipment end-use. SCREEN does not assume any responsibility or liability for equipment transferred without regard to proper export/import regulations or procedures.

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Ⅰ. Customized Specifications

1 Specifications agreed upon by the customer

These specifications are created based on the agreement with the customer, and given priority over the items described after Chapter II.

1-1 Processing specifications

1-1-1 Overall specifications

1.Meter

Meter with SI unit system are used.

2.Exhaust

A manometer and manoster switch are used for the main processing equipment.

Manometer
Name : Manoster gauge
Model : FR51AHV300D(0-300PA) (Yamamoto Electric Works)
Measured Pressure : 0 to 300Pa
Manoster switch
Name : Manoster switch
Model : KU-604(CE)-20-300PA-B (CRONE Copration)
Measured Pressure : 20 to 300Pa

3. Leakage sensor

The Leakage sensor are used a ribbon sensor.

Model: F03-15, F03-16P（OMRON）

Note : If Ribbon sensor contact chemical, please make sure exhange a new ribbon because it may corrode.

4. Door interlock sensor

Interlock sensors are used for the doors of the transport unit and drive unit.

Model: HS7A-DMC7905（IDEC）

5. Carrier

6 inch Process carrier: A194-60MB-0215(Entegris)
Process carrier should be prepared by the customer.

Note : The tab on the carrier is raised by using the chuck hunger during carrier transfer.
Therefore, cut off the rib on the back side of the tab.
Should be cut off by the customer.

6. Piping step

Piping step should be prepared by the customer.

7. Piping/Wiring support

Support for Piping and Wiring to be prepared by the customer.
Equipment inside is prepared by SCREEN.
Equipment outside should be prepared by the customer.

8. Ionizer

An ionizer is installed in the loader and Unloader Module.

9. Monitoring（Pos.3：HF、Pos.5：HF、Pos.9：SC-1、Pos.11：SC-2）

The circulation line is designed so that Wet Process Analyzer units (ABB) can be installed on the line.
The concentration meter should be prepared by the customer.
The power to the Wet Process Analyzer units (ABB) and WAGO I/O system are provided directly from the facility.
WS connects to WAGO I/O system for parallel and analog signals for each chemical.
The signal cable length 15m.

Note: The concentration meter should be installed, set, and adjusted by the customer.
The rack or the wagon for the concentration meter device should be prepared by the customer.

10. Processing Bath and Rinsing Bath

The bath is designed to reduce the amount of modification when remodeling to 8 inch.
(Pos.3：HF、Pos.5：HF、Pos.9：SC-1、Pos.10：QDR、Pos.11：SC-2、Pos.12：H/C QDR、Pos.13：FR)
The bath is installed with an 8inch size.
The carrier guide in the bath is designed for 6 inch carriers.
(Pos.4：EDR、Pos.6：EDR、Pos.7：H3PO4、Pos.8：H/C QDR)
The bath is a design that can be changed from a 6 inch bath to 8 inch bath by modification.

11. 4%HF supply(Pos.3：HF、Pos.5：HF)

The 4%HF supplied from the factory is supplied directly to the processing bath.
The measuring tank be removed.

12. Heater(Pos.7:H3PO4、Pos.9:SC-1、Pos.11:SC-2)

The immersion type quartz glass heater in the measuring tank is installed with overheat sensor and sensor.

13. H3PO4 processing temperature (Pos.7:H3PO4)

The H3PO4 module is designed to control the temperature up to 165° C.

14. Hot DIW temperature measurement (Pos.8:H/C QDR、Pos.12:H/C QDR)

The sensor that measures the temperature of Hot DIW is installed in the rinsing bath.

15. Auto fire extinguisher system

The fire extinguisher system from Ansul is installed to the dryer Module.
The power to the fire extinguisher is provided directly from the facility.
The equipment power is turned OFF after 60 seconds when the fire alarm signal turns OFF.

Note: Auto fire extinguisher system
Installing the fire extinguisher system and concentration monitor
Please install the extinguisher system or concentration monitor in the area you are responsible for after consulting with a local fire station.
Further, if an extinguisher/monitor supplier is specified by the customer, we would be pleased to procure the extinguishers/monitors from the supplier on behalf of the customer, but we will not be held responsible for accidents or other trouble caused by such extinguishers/monitors. The customer should directly contract with the extinguisher or concentration monitor manufacturer for maintenance of the extinguisher or monitor.

16. Operation Box

The operation box is installed on the loader side.
The cable length 5m from LD.BOX.

17. Chemical EMO(EMS) and Leak sensor Ignore key switch

Chemical EMO(EMS) switch and Leak sensor Ignore key switch are installed in the Operation Box.
Chemical EMO(EMS) switch and Leak sensor Ignore key switch should be prepared by the customer.
The signal connection is taerminal block(M3) in the UL.BOX.

18. Tower lamp

The tower lamp is specified by the customer.
The colors of the lamps are red, green, blue and white from the top.

19. Lufran Hot DIW Unit (Pos.8:H/C QDR、Pos.12:H/C QDR)

The piping of the Equipment is designed to connect to the Hot DIW Unit.
The Hot DIW Unit should be prepared by the customer.
The piping between the Hot DIW Unit and the Equipment should be prepared by the customer.
The cable length 15m from UL.BOX.
The hot DIW temperature setting is set on the Hot DIW unit side.
It cannot be set with an analog signal from WS.

20. Down Transformer

Down Transformer is prepared by SCREEN
A transformer box is prepared for conversion from 3φ 400 V, 160 A to 3φ 200 V, 200 A / 1φ 100 V. 80 A.
The power supply cable from the transformer box to the WS should be prepared by SCREEN

21. Barcode reader

The barcode reader should be prepared by the customer.
The barcode reader connect to USB port on the PC.
The USB extention cable length is 2m.

22. RFID reader

The RFID reader should be prepared by the customer.
The terminal block(M3) for supply 24V DC power to RFID reader prepare in the LD and UL.

23. Chemical bath (HF bath, H3PO4 bath, SC-1 bath, SC-2 bath) over-processing alarms

a. Description
If over-processing occurs in the chemical bath (HF bath, H3PO4 bath, SC-1 bath, SC-2 bath), an alarm occurs.
b. Details
For each of the chemical baths (HF bath, H3PO4 bath, SC-1 bath, SC-2 bath), an alarm occurs when the actual processing time is equal to or longer than the “processing time + processing time allowable time (specified in the parameter)”.

24. DI water replacement in the event of over-processing in the chemical bath (DHF bath, SC-1 bath)

When over-processing occurs in the chemical bath (DHF bath, SC-1 bath), an over-processing alarm occurs and DI water replacement is performed in the bath.

1-1-2 Chemical delivery specifications

SCREEN standard specifications.

1-1-3 Equipment module specifications

《POS.1》 Loader specification

The following item is customized to meet your request specification.

(1) Ionizer

a. Ionizer :SJ-H060CSO(50217)(Keyence)

《POS.2》 CHCL specification

SCREEN standard specification

《POS.3》 HF specification

The following item is customized to meet your request specification.

Processing Bath Module

(1) Chemical solution

a. Bath capacity :36.0 L

b. Circulating capacity :Approx. 3 L

Circulation System

(1) Filtering section

a. Filtering method :Cartridge filter

b. Filter :Intercept HPX IHAZ01P01K, 0.05μm(Entegris)

- Material : Polyethylene
- Temperature rating : 70°C
- Effective filtering area : 11,000 cm2

c. Filter housing :Chemlock 11" YY56 112 03J(11 INCH)

- Material : PFA

《POS.4》 EDR specification

SCREEN standard specification

《POS.5》 HF specification

The same specification as POS.3

《POS.6》 EDR specification

SCREEN standard specification

《POS.7》 H3PO4 specification

The following item is customized to meet your request specification.

Measuring Tank

(1) Pre-heating section (for H3PO4)

a. Heating device :Immersion type quartz glass heater

- 1.2 kW x 4 sets
- With leak sensor and overheat sensor

Processing Bath Module

(1) Thermo-controller section

a. Control range :100°C to 165°C (with circulation system)

b. Heater :Immersion type quartz glass heater

- 1.8 kW (x2)
- With leak sensor and overheat sensor

Circulation System

(1) Temperature control section

a. Control range : 100°C to 165°C

(2) Circulation section

a. Circulation method : By pneumatic pump

b. Pump : Bellows type (Teflon bellows) FF-20HT-T3

•Temperature rating : RT to 180°C

(3) Filtering section

a. Filter method : Disposable filter

b. Filter : QuickChangeNXX NXDGX10L02HP, 0.2μm (Entegris)

•Material : PTFE, PFA

•Temperature rating : 200° C

•Effective filtering area : 13,000 cm2

《POS.8》 H/C QDR specification

The following item is customized to meet your request specification.

(1) Hot DIW temperature measurement

a. Sensor : K-type thermocouple shielded with PFA

: FT-100-K-42-A-2000-1000-W-AW

(RKC Instrument)

《POS.9》 SC-1 specification

The following item is customized to meet your request specification.

Measuring Tank

(1) Pre-heating section (for DI water)

a. Heating device : Immersion type quartz glass heater

•1.2 kW x 4 sets

• With leak sensor and overheat sensor

Processing Bath Module

(1) Chemical solution

a. Bath capacity : 34.5 L

b. Circulating capacity : Approx. 3 L

Circulation System

(1) Filtering section

a. Filter method : Disposable filter

b. Filter : QuickChange NXM NXDZM10L02HP, 0.05μm (Entegris)

•Material : PTFE, PFA

•Temperature rating : 200° C

•Effective filtering area : 18,000 cm2

《POS.10》 QDR specification

The following item is customized to meet your request specification.

(1) Rinsing solution

a. Bath Capacity : 26.6 L

《POS.11》 SC-2 specification

The following item is customized to meet your request specification.

Measuring Tank

(1) Pre-heating section (for DI water)

a. Heating device : Immersion type quartz glass heater
- 1.2 kW x 4 sets
- With leak sensor and overheat sensor

Processing Bath Module

(1) Chemical solution

a. Bath capacity : 34.5 L

b. Circulating capacity : Approx. 3 L

Circulation System

(1) Filtering section

a. Filter method : Disposable filter

b. Filter : QuickChange NXM NXDZM10L02HP, 0.05μm (Entegris)
- Material : PTFE, PFA
- Temperature rating : 200° C
- Effective filtering area : 18,000 cm2

《POS.12》 H/C QDR specification

The following item is customized to meet your request specification.

(1) Rinsing solution

a. Bath Capacity : 26.6 L

(2) Hot DIW temperature measurement

a. Sensor : K-type thermocouple shielded with PFA
: FT-100-K-42-A-2000-1000-W-AW
(RKC Instrument)

《POS.13》 FR specification

The following item is customized to meet your request specification.

(1) Rinsing solution

a. Bath Capacity : 28.8 L

《POS.14》 IPA VD specification

SCREEN standard specification

《POS.15》 Unloader specification

The following item is customized to meet your request specification.

(1) Ionizer

a. Ionizer : SJ-H060CSO(50217)(Keyence)

1-2 WS-620C Acceptance Criteria

Any additional requests for the acceptance conditions may not able to be satisfied.
They will be consulted separately. Moreover, additional fees may be charged depending on the requests.

1-2-1 Contents

Acceptance criteria consist of 5items ((1) ~ (5)).

(1) Particle increment
(2) Particle removal efficiency
(3) Etching uniformity
(4) Metal contamination
(5) Transfer reliability

1-2-2 Items

1-2-2-1 Particle increment

① Conditions

(a) Particles on the wafer surface are measured with customer's measurement equipment (KLA-Tencor SP1). The size is equal to or larger than 0.16μm and the edge cut is 3 mm.

(b) Clean bare silicon wafers and oxide wafers are used.

(c) The initial level of 0.16 μm particles should be 50 or less and edge cut is 3 mm.

(d) The wafers to be measured and the dummy wafers have to be cleaned by SC-1 cleaning or equivalent method to get rid of their initial contaminants.

② The recipes and value of particle increments are as follows :

Recipe	Process sequence	Conditions	Specifications
1	DHF / Dry	2 runs with 6 wafers slot no. 1, 10, 20, 30, 40, 50 Including dummy wafer --- 1 run with 25 wafers Including dummy wafer	≦40 Particles @0.16μm
2	SC1 / SC2 / Dry	3 runs with 6 wafers slot no. 1, 10, 20, 30, 40, 50 Including dummy wafer	≦30 Particles @0.16μm
3	H3PO4 / Dry	1 run with 25 wafers Including dummy wafer *Oxide wafers	≦60 Particles @0.16μm
4	Drying (Rinse / Dry)	3 runs with 6 wafers slot no. 1, 10, 20, 30, 40, 50 Including dummy wafer	≦20 Particles @0.16μm

③ Calculation

Particle increment is calculated as follows: Adder particle

(Post particle counts) – (Pre particle counts)

1-2-2-2 Particle removal efficiency

① Conditions

(a) Particles on the wafer surface are measured with customer's measurement equipment (KLA-Tencor SP1). The size is equal to or larger than 0.16μm and the edge cut is 3 mm.

(b) Clean bare silicon wafers are used.

(c) The initial level of 0.16 μm particles should be 50 or less and edge cut is 3 mm.

(d) Particle counts after contamination by S3N4 on hydrophilic bare silicon wafers: 3000-4000

② The recipe and the specification value are as follows :

Process sequence	Conditions	Specifications
SC1 / SC2 / Dry *SC1 with Megasonic	1 run with 50 wafers 2 runs with 6 wafers slot no. 1, 10, 20, 30, 40, 50 Including dummy wafer	> 90% @0.16μm

③ Calculation

Particle removal efficiency is calculated as follows:

(After contamination-After cleaning) / (After contamination-Before contamination) x 100

1-2-2-3 Etching uniformity

① Conditions

(a) The etching amounts are measured with customer's measurement equipment (Rudolph Ellipsometer). The measured points are 49 points (the edge cut is 3 mm).

(b) The initial thickness uniformity should be better than 1%.

(c) The wafers are used only one time.

② The recipes and value of etching uniformity are as follows :

Process sequence	Conditions	Specifications
DHF (4.0%, 25C) Etching time; 5min	2 runs with 6 Th-Oxide wafers slot no. 1, 10, 20, 30, 40, 50 Including dummy wafer	Within wafer ≦ 4.5% Wafer to wafer ≦ 4.5% Run to run ≦ 4.5%
	1 run with 16 Th-Oxide wafers slot no. 1-5, 10, 20, 21, 22, 30, 40, 45, 50 Including dummy wafer	
H3PO4 (165C) Etching time; 30min	3 runs with 6 Nitride wafers slot no. 1, 10, 20, 30, 40, 50 Including dummy wafer	Etch rate: 6 ± 0.5 nm/min Within wafer ≦ 7% Wafer to wafer ≦ 7% Run to run ≦ 7%
	1 run with 4 Th-Oxide wafers slot no. 5, 20, 35, 45	Selectivity (Oxide / Nitride) > 1:30

③ Calculation

- Within wafer: 3σ / (2 × Ave) × 100 (%)
- Wafer to wafer: 3σ / (2 × Wafer Ave) × 100 (%)
- Run to Run: 3σ / (2 × Run Ave) × 100 (%)

1-2-2-4 Metal contamination

① Conditions

(a) Metal contamination is measured with customer's measurement equipment (VPD-ICPMS).

(b) 1 wafer (slot no. 25) is measured. The other slots are empty.

(c) Clean bare silicon wafer is used.

(d) Wafer is run immediately after chemical exchange.

*As a precondition, each metal contamination in IPA supplied from the facility has to pass <0.1 ppb.

② The recipes and values of metals are as follows:

Process sequence	Elements	Specifications
SC2 last	Ag, Ca, Co, Cu, Cr, Fe, K, Mo, Mn, Na, Ni, Pt and W	< 5E9 at/cm2 on Si wafer
	Al, Ba, Ti and Zn	<5E10 at/cm2 on Si wafer
	All metals	<5E10 at/cm2 on Si wafer

1-2-2-5 Transfer reliability

After supplying chemicals to the equipment, confirm that no alarms or errors occur while continuously processing 50 lots with customer's specified recipes.

Note: However, that alarms or errors caused by out-of-spec input must be excluded. Also you are free to reduce the normal processing time, and might providently include the lots for other testing lots.

1-2-3 Test condition requirements

We request that you confirm or arrange that the following conditions are all met before testing.

1-2-3-1 Utilities

Utilities must match or perform in accord with the levels designated in the specification book. If they do not, we cannot guarantee the acceptance test results. Designated levels shall include the following 3 items.

(1) DI water

The DI water supplied for connection to the equipment must match or surpass the following purity standards.

① Resistivity ≧ 17.8 MΩ
② Number of particles ≦ 5/mL (Size: >= 0.1 μm)
③ Number of bacteria ≦ 10/mL
④ TOC ≦ 10 μg/L
⑤ Silica ≦ 3 μg/L
⑥ Dissolved oxygen ≦ 40ppb
⑦ Dissolved nitrogen = 9±3mg/L (or there should be no bubbles.)

(2) Chemicals

The purity of chemicals supplied to the equipment must match the following values.

Item Specification Number of particles Sum of metal

① Number of particles ≦ 10/mL (Size: >= 0.1 μm)
② All metal contaminations ≦ 0.01 μg/L)

(3) Clean room

The environment of the area where the equipment is installed (the clean room) must be rated at least Class 10 (≧ 0.1 μm particles).

1-2-3-2 Wafer specification

The specifications for test wafers shall meet the following tolerances.

Diameter: 150 mm

Thickness: 305 to 800 μm

Wafers that are out of specification, distorted or contaminated must not be used.

1-2-3-3 Supporting tools

Distorted and/or contaminated transfer and process carriers must not be used.

1-2-3-4 Measurement instruments

Instruments to measure particles, film thickness and metal contaminations must be calibrated periodically as well as just before test measurements.

2 Specification list and utility list

2-1 WS-620C module

2-1-1 General Specifications Summary

Name of equipment: WS-620C

Carrier : A194-60MB-0215(Entegris)

Wafer size: ϕ150 mm (Si、SiC)
Thickness: 305 ~ 800 μm

Processing flow direction: Left→Right
（The direction indicates the processing flow from the loader to the unloader.）

Dimensions: 7150 mm(W)×1735 mm(D)×2839.2 mm(H)

Weight: Approx. 4709 Kg

Clean unit

Main filter:	ULPA
Particle removal ratio:	0.1μm 99.999%
Airflow velocity:	0～0.2m／sec ±20%.
Illumination:	White

External units

Operation Box
540 mm(W) × 630 mm(D) × 1753 mm(H)
※Tower lamp (included)： 2273 mm(H)

Step-Down Transformer
＊＊＊ mm(W) × ＊＊＊ mm(D) × ＊＊＊ mm(H)

Hot DIW Unit

POSITION .NO			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Name			Loader	CHCL	HF(DHF)	EDR	HF(DHF)	EDR	H3PO4	H/C QDR	SC-1 (APM)	QDR	SC-2 (HPM)	H/C QDR	FR	IPA-VD	Unloader	–
ROBOT (transfer unit)			|←R1			R1→|←R2		R2→|←R3		R3→|←R4		R4→|←R5				R5→|←R6	R6→|	
Shutter position			▲								▲				▲			
Chemical in use		#1		DIW	HF	DIW	HF	DIW	H3PO4	HOT-DIW	NH4OH	DIW	HCL	HOT-DIW	DIW	IPA		
		#2		–	–	–	–	–	(DIW)	DIW	H2O2	–	H2O2	DIW	–	–		
		#3		–	–	–	–	–	–	–	DIW	–	DIW	–	–	–		
Mixing ratio				–	4%(Direct)	–	4%(Direct)	–	1 : 0	–	1:2:50	–	1:2:50	–	–	–		
Processing temperature (℃)				RT	25±0.5	RT	25±0.5	RT	Max.165±3	～70,RT	50±3	RT	50±3	～70,RT	RT	83		
Bath material				–	PTFE	Quartz	PTFE	Quartz	Quartz	Quartz	Quartz	Quartz	Quartz	Quartz	Quartz	Quartz		
Bath shape (Type)				–	Circuration Overflow	Overflow	Circuration Overflow	Overflow	Circuration Overflow	Overflow	Circuration Overflow	Overflow	Circuration Overflow	Overflow	Overflow	–		
Bath capacity (L)				–	39 (8inchi Bath)	18 (6inchi Bath)	39 (8inchi Bath)	18 (6inchi Bath)	31.5 (6inchi Bath)	18 (6inchi Bath)	37.5 (8inchi Bath)	26.6 (8inchi Bath)	37.5 (8inchi Bath)	26.6 (8inchi Bath)	28.8 (8inchi Bath)	13		
Wafer guide material					–	–	–	–	–	–	–	–	–	–	–	–		
Material	Bath lower section			FMT3331	FMT3331	FMT3331	FMT3331	FMT3331	FMH5300	FMH5300	FMH5300	FMH5300	FMH5300	FMH5300	FMH5300	SUS304		
	Chemical supply piping			PVDF	PFA	PVDF	PFA	PVDF	PFA	PVDF	PFA	PVDF	PFA	PVDF	PVDF	SUS316		
	Drain piping			HT-PVC	PVC	HT-PVC	PVC	HT-PVC	HT-PVC	HT-PVC	HT-PVC	HT-PVC	HT-PVC	HT-PVC	HT-PVC	SUS		
Bath/processing function	Shower			STD	–	STD	–	STD	–	STD	–	STD	–	STD	–	–		
	N2 bubbling			–	–	–	–	–	–	STD	–	STD	–	STD	–	–		
	Resistivity meter			–	–	–	–	–	–	–	–	–	–	–	STD	–		
	Auto-cover			–	STD	–	STD	–	STD	–	STD	–	STD	–	–	STD		
	DSM			–	–	–	–	–	–	–	–	–	–	–	–	–		
	Bath cleaning			–	STD	–	STD	–	STD	–	STD	–	STD	–	–	–		
	Chemical/H2O supply function			–	HF	–	HF	–	–	–	–	–	–	–	–	IPA		
Temperature	Electronic thermocontroller			–	STD	–	STD	–	–	–	–	–	–	–	–	–		
	Heater			–	–	–	–	–	Inline +IMS.H	–	Inline	–	Inline	–	–	Al Heater		
Drain	Processing bath → Gravity			STD	STD	–	STD	–	–	–	–	–	–	–	STD	STD		
	Processing bath → Pump			–	–	–	–	–	–	–	○	–	○	–	–	–		
	Processing bath → Quick drain			–	–	STD	–	STD	–	STD	–	STD	–	STD	–	–		
	Processing bath → Aspirator			–	–	–	–	–	–	–	–	–	–	–	–	–		
	Processing bath → Cooling tank → Gravity drain			–	–	–	–	–	○	–	–	–	–	–	–	–		
	Drain switching			–	–	○	–	○	STD	○	–	○	–	○	–	–		
	Drain chemical name #1			1. Rinse	Ablauf HF	1. Rinse	Ablauf HF	1. Rinse	Ablauf H3PO4	1. Rinse	WAL	1. Rinse	WAS	1. Rinse	2. Rinse	WAL		
	Drain chemical name #2			–	–	2. Rinse	–	2. Rinse	WAS	2. Rinse	–	2. Rinse	–	2. Rinse	–	–		
Circulation pump				–	FF-20BT	–	FF-20BT	–	FF-20HT	–	FF-20BT	–	FF-20BT	–	–	–		
				–	IWAKI	–	IWAKI	–	IWAKI	–	IWAKI	–	IWAKI	–	–	–		
Circulation filter				–	Intercept	–	Intercept	–	Qickchange	–	Qickchange	–	Qickchange	–	–	–		
				–	HPX 0.05um	–	HPX 0.05um	–	NXX 0.2um	–	NXM 0.05um	–	NXM 0.05um	–	–	–		
	(Housing)			–	Chemlock	–	Chemlock	–	Dispo	–	Dispo	–	Dispo	–	–	–		
				–	PFA 11″	–	PFA 11″	–	–	–	–	–	–	–	–	–		
Measuring tank	Material/ temperature (℃)	#1		–	–	–	–	–	PTFE/Max.80	–	PTFE/RT	–	PTFE/RT	–	–	–		
		#2		–	–	–	–	–	PTFE/RT	–	PFA/RT	–	PFA/RT	–	–	–		
		#3		–	–	–	–	–	–	–	PTFE/Max.80	–	PTFE/Max.80	–	–	–		
	Replenishment (Pump,Level,etc)	#1		–	Level	–	Level	–	Level	–	Pump	–	Pump	–	–	–		
		#2		–	–	–	–	–	Pump	–	Pump	–	Pump	–	–	–		
		#3		–	–	–	–	–	–	–	Pump	–	Pump	–	–	–		
	Preliminary temperature control (Heater)			–	–	–	–	–	H3PO4	–	DIW	–	DIW	–	–	–		
				–	–	–	–	–	IMS.H	–	IMS.H	–	IMS.H	–	–	–		
	Chemical/H2O supply function			–	–	–	–	–	H3PO4	–	NH4OH	–	HCL	–	–	–		
				–	–	–	–	–	DIW	–	H2O2	–	H2O2	–	–	–		
				–	–	–	–	–	–	–	DIW	–	DIW	–	–	–		
Remarks	WS-620C CT:3L			N2 knife														
	Operator OP-box				ABB Conc Monitor prepared by customer		ABB Conc Monitor prepared by customer			HotDIW Unit prepared by customer	ABB Conc Monitor prepared by customer		ABB Conc Monitor prepared by customer	HotDIW Unit prepared by customer				
	Ionizer LOT ID recognition															Fire extinguisher (ANSUL)		

2-1-3 Utility calculation table

Utility Unit		DI water L/min			Hot DI Water L/min	Cooling water L/min	General water L/min		N2 NL/min			AIR NL/min		Exhaust m3/min	
Function		UP	SH	Others	UP		AS	Others	NB	AN	NP	TR	AP		
POS.1	Loader														
POS.2	CHCL		15							700				2	
POS.3	HF(DHF)			0.2(*2)		5(*5)							150	5	
POS.4	EDR	20	15											2	9
POS.5	HF(DHF)			0.2(*2)		5(*5)							150	5	
POS.6	EDR	20	15											2	7
POS.7	H3PO4			3(*3)		20(*6)							150	8	
POS.8	H/C QDR	20	15		20				15					4	12
POS.9	SC-1 (APM)			0.2(*2)									150	5	
POS.10	QDR	20	15						15					2	7
POS.11	SC-2 (HPM)			0.2(*2)									150	5	
POS.12	H/C QDR	20	15		20				15					2	
POS.13	FR	20												2	9
POS.14	IPA VD			1		20(*7)					150	10		5	5
POS.15	Unloader														
POS.16	-														
External unit 1															
External unit 2															
External unit 3															
External unit 4															
External unit 5															
Others										For sensors	10	WS	30		
Total		214.8			40	50	0		905			790		49	

Remarks

* 1: For (DSM) water filling and processing baths cooling
* 2: Water sealing
* 3: Upper Vat Cooling.
* 4: For SD bath cleaning and dryer
* 5: For electronic thermocontroller
* 6: For drainage cooling
* 7: For IPA vapor cooling

(The numbers noted above are not applicable for some bath configuration.)

2-1-4 Utility List

No.	UTILITY/ ELECTRIC UTILITY	CONNECTOR DIAMETER/ TERMINAL SIZE	MATERIAL/ TERMINAL TYPE/ BREAKER TYPE/ EARTH BAR	PRESSURE/ PHASE,VOLTAGE/EARTH	VOLUME/ BREAKER CAPACITY	QTY	REMARKS/ ELECTRIC CAPACITY
①	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.+GF+	0.2~0.3 MPa	15 L/min	1	Pos.2 CHCL
②	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.+GF+	0.2~0.3 MPa	35.2 L/min	1	Pos.4 EDR
③	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.+GF+	0.2~0.3 MPa	35.2 L/min	1	Pos.6 EDR
④	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.+GF+	0.2~0.3 MPa	38 L/min	1	Pos.8 H/C QDR
⑤	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.+GF+	0.2~0.3 MPa	35.2 L/min	1	Pos.10 QDR
⑥	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.+GF+	0.2~0.3 MPa	35.2 L/min	1	Pos.12 H/C QDR
⑦	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.+GF+	0.2~0.3 MPa	20 L/min	1	Pos.13 FR
⑧	DIW	15A (OD.20×ID.16.2)	PVDF SOCKETWELD UNION GEORGE FIS.+GF+	0.2~0.3 MPa	1 L/min	1	Pos.14 IPA VD
9	–	–	–	–	–	–	
10	HOT DIW	φ1″	PFA SP300 TYPE FITTING NIPPON PILLAR	0.2~0.3 MPa	20 L/min	1	Pos.8 H/C QDR From HOT DIW UNIT
11	HOT DIW	φ1″	PFA SP300 TYPE FITTING NIPPON PILLAR	0.2~0.3 MPa	20 L/min	1	Pos.12 H/C QDR From HOT DIW UNIT
⑫	COOLING WATER IN	16A (OD.22×ID.16)	PVC UNION SEKISUI	0.1~0.2 MPa	5 L/min	1	Pos.3 HF
⑬	COOLING WATER OUT	16A (OD.22×ID.16)	PVC UNION SEKISUI	Atmosphere	–	1	Pos.3 HF
⑭	COOLING WATER IN	16A (OD.22×ID.16)	PVC UNION SEKISUI	0.1~0.2 MPa	5 L/min	1	Pos.5 HF
⑮	COOLING WATER OUT	16A (OD.22×ID.16)	PVC UNION SEKISUI	Atmosphere	–	1	Pos.5 HF
⑯	COOLING WATER IN	16A (OD.22×ID.16)	PVC UNION SEKISUI	0.1~0.2 MPa	20 L/min	1	Pos.7 H3PO4
⑰	COOLING WATER OUT	16A (OD.22×ID.16)	PVC UNION SEKISUI	Atmosphere	–	1	Pos.7 H3PO4
⑱	COOLING WATER IN	20A (OD.25×ID.20)	U-PVC SOCKETWELD UNION GEORGE FIS.+GF+	0.1~0.2 MPa	20 L/min	1	Pos.14 IPA VD
⑲	COOLING WATER OUT	20A (OD.25×ID.20)	U-PVC SOCKETWELD UNION GEORGE FIS.+GF+	Atmosphere	–	1	Pos.14 IPA VD
⑳	N2	φ3/8″	SUS316 UNION (SWAGELOK)	0.4~0.7 MPa	10 L/min	1	FOR SENSOR
Note	·Working capacity indicates the capacity per single port.,and is the minimum capacity required by the unit. ·For use in utilities, it is necessary to prepare a maximum capacity for the supply pressure port diameter. ·The symbol "○" stands for connection to user's utility.						

No.	UTILITY/ ELECTRIC UTILITY	CONNECTOR DIAMETER/ TERMINAL SIZE	MATERIAL/ TERMINAL TYPE/ BREAKER TYPE/ EARTH BAR	PRESSURE/ PHASE,VOLTAGE/EARTH	VOLUME/ BREAKER CAPACITY	QTY	REMARKS/ ELECTRIC CAPACITY
㉑	N2	ϕ 1/2″	SUS316 UNION (SWAGELOK)	0.4～0.7 MPa	895 L/min	1	FOR PROCESS
㉒	AIR IN	ϕ 1/2″	SUS316 UNION (SWAGELOK)	0.4～0.7 Mpa	790 L/min	1	
㉓	HF(4%)	ϕ 1/2″	PFA SP300 TYPE FITTING NIPPON PILLAR	0.1～0.2 Mpa	-	1	OUTER TUBE ϕ 3/4″ PFA
㉔	H3PO4	ϕ 1/2″	PFA SP300 TYPE FITTING NIPPON PILLAR	0.1～0.2 Mpa	-	1	OUTER TUBE ϕ 3/4″ PFA
㉕	NH4OH	ϕ 1/2″	PFA SP300 TYPE FITTING NIPPON PILLAR	0.1～0.2 Mpa	-	1	OUTER TUBE ϕ 3/4″ PFA
㉖	H2O2	ϕ 1/2″	PFA SP300 TYPE FITTING NIPPON PILLAR	0.1～0.2 Mpa	-	1	OUTER TUBE ϕ 3/4″ PFA
㉗	HCL	ϕ 1/2″	PFA SP300 TYPE FITTING NIPPON PILLAR	0.1～0.2 Mpa	-	1	OUTER TUBE ϕ 3/4″ PFA
㉘	IPA	ϕ 3/8″	SUS316 UNION (SWAGELOK)	0.1～0.2 Mpa	-	1	Pos.14 IPA VD
㉙	1.Rinse	30A (OD.38×ID.30)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.2 CHCL
㉚	Ablauf HF	20A (OD.26×ID.20)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.3 HF
㉛	Ablauf HF	20A (OD.26×ID.20)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.3 HF
㉜	1.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.4 EDR
㉝	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.4 EDR
㉞	Ablauf HF	20A (OD.26×ID.20)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.5 HF
㉟	Ablauf HF	20A (OD.26×ID.20)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.5 HF
㊱	1.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.6 EDR
㊲	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.6 EDR
㊳	WAS	25A (OD.32×ID.25)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.7 H3PO4
㊴	Ablauf H3PO4	ϕ 3/4″	PFA SP300 TYPE FITTING NIPPON PILLAR	Atmosphere	-	1	Pos.7 H3PO4 OUTER TUBE ϕ 1″ PFA
㊵	1.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.8 H/C QDR
Note	·Working capacity indicates the capacity per single port, and is the minimum capacity required by the unit. ·For use in utilities, it is necessary to prepare a maximum capacity for the supply pressure port diameter. ·The symbol ″○″ stands for connection to user's utility.						

No.	UTILITY/ ELECTRIC UTILITY	CONNECTOR DIAMETER/ TERMINAL SIZE	MATERIAL/ TERMINAL TYPE/ BREAKER TYPE/ EARTH BAR	PRESSURE/ PHASE,VOLTAGE/EARTH	VOLUME/ BREAKER CAPACITY	QTY	REMARKS/ ELECTRIC CAPACITY
41	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.8 H/C QDR
42	WAL	30A (OD.38×ID.30)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.9 SC-1
43	WAL	φ3/4″	PFA SP300 TYPE FITTING NIPPON PILLAR	Atmosphere	-	1	Pos.9 SC-1 OUTER TUBE φ1″ PFA
44	1.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.10 H/C QDR
45	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.10 H/C QDR
46	WAS	30A (OD.38×ID.30)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.11 SC-2
47	WAS	φ3/4″	PFA SP300 TYPE FITTING NIPPON PILLAR	Atmosphere	-	1	Pos.11 SC-2 OUTER TUBE φ1″ PFA
48	1.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.12 H/C QDR
49	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.12 H/C QDR
50	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.13 FR
51	VAT DRAIN	PT1/2″	SUS FEMAIL	Atmosphere	-	1	Pos.12 IPA VD
52	WAL	φ1/2″	SUS316 UNION (SWAGELOK)	Atmosphere	-	1	Pos.12 IPA VD
53	WAL	20A (OD.26×ID.20)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.12 IPA VD
54	VAT DRAIN	PT1/2″	SUS FEMAIL	Atmosphere	-	1	Pos.12
55	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.2～4
56	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.5,6
57	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.7,8
58	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.9,10
59	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.11,12
60	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.13
Note	・Working capacity indicates the capacity per single port.,and is the minimum capacity required by the unit. ・For use in utilities, it is necessary to prepare a maximum capacity for the supply pressure port diameter. ・The symbol "○" stands for connection to user's utility.						

No.	UTILITY/ ELECTRIC UTILITY	CONNECTOR DIAMETER/ TERMINAL SIZE	MATERIAL/ TERMINAL TYPE/ BREAKER TYPE/ EARTH BAR	PRESSURE/ PHASE,VOLTAGE/EARTH	VOLUME/ BREAKER CAPACITY	QTY	REMARKS/ ELECTRIC CAPACITY
(61)	ACID EXHAUST	150A	PVC PIPE	-200～-300Pa	9 m^3/min	1	Pos.2～4
(62)	ACID EXHAUST	150A	PVC PIPE	-200～-300Pa	7 m^3/min	1	Pos.5,6
(63)	ACID EXHAUST	200A	PVC PIPE	-200～-300Pa	12 m^3/min	1	Pos.7,8
(64)	ALKALI EXHAUST	150A	PVC PIPE	-200～-300Pa	7 m^3/min	1	Pos.9,10
(65)	ACID EXHAUST	150A	PVC PIPE	-200～-300Pa	9 m^3/min	1	Pos.11～13
(66)	SOLVENT EXHAUST	100A	PVC JIS 5K Flange	-200～-300Pa	5 m^3/min	1	Pos.14
(67)	POWER	M8	Terminal Block	3 φ ,400V	*** A	1	Step-Down Trasformer
68	POWER	M8	Lockable Breaker NF250-SVU	3 φ ,200V	175 A	1	Main body Full load:132A
69	POWER	M8	Lockable Breaker NF125-SVU	1 φ ,100V	80 A	1	Main body Full load:67A
70	POWER	M8	EARTH BAR: F-K4-08524	EARTH	-	1	Main body
(71)	POWER	-	Terminal Block	1 φ ,240V	5A	1	Fire extinguisher
Note	·Working capacity indicates the capacity per single port.,and is the minimum capacity required by the unit. ·For use in utilities, it is necessary to prepare a maximum capacity for the supply pressure port diameter. ·The symbol "○" stands for connection to user's utility.						

Ⅱ. Equipment Basic Specifications

1 Safety Specifications

1-1 Pressure resistance

The equipment has been designed and manufactured to withstand the following pressures.
Please note, however, that the equipment is supposed to be used at pressures within the range shown in the utility list.
Therefore, the following pressure ratings are not guaranteed values.

Utility Name	Pressure rating
DIW	0.3 MPa
Cooling water	0.2 MPa
City water	0.2 MPa
Chemical	0.2 MPa
N_2	0.7 MPa
Air	0.7 MPa

2 Safety Interlocks

To safeguard workers against accidents and dangerous situations inherent to such operations, this equipment incorporates a variety of safety interlocks designed according to fail safe principles.
When these interlocks are activated, the equipment is put into a safe state and the operators are alerted with a buzzer and a tower lamp (See Note). The following table lists all the equipment's interlocks with simple explanations. For further details, please refer to Operation manual and Maintenance manual.
Note: Tower lamp is option.

2-1 Transfer units

1. Front cover (upper/lower) interlock

Interlocked safety countermeasures	1) Equipment enters transfer pause state. 2) Power supply to the transfer units shuts off (Hardware interlock) 3) Spinning chamber instantly stops rotating. 4) Covers and other moving parts halt their movementsinstantly.
Sensor type	Magnetic proximity switch
Recovery procedure	1) Close covers. 2) Turn on the ROBOT POWER switch on the remote control panel 3) Reset the alarm from the main operation panel. 4) Press the ROBOT PAUSE key on the main operation panel.

2-2 Processing bath

1. Exhaust low pressure

Interlocked safety countermeasures	1) Power supply to processing bath in-line heater shuts off. Power supply to processing bath immersion heater shuts off Power supply to Measuring tank immersion heater shuts off. Power supply to electric thermo-controller shuts off. 2) Equipment enters cycle pause state
Sensor type	Manostar switch
Recovery procedure	1) Find and correct the cause of the low exhaust pressure error and adjust the pressure to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

2. Source N_2 low pressure for level sensor

Interlocked safety countermeasures	1) Power supply to processing bath in-line heater shuts off. Power supply to processing bath immersion heater shuts off. Power supply to measuring tank immersion heater shuts off Power supply to electric thermo-controller shuts off. 2) Chemical demand (supply from facility line to measuring tank/processing bath), supply, replenish and drainage stop. 3) Circulation pump stops. 4) Equipment enters cycle pause state
Sensor type	Pressure gauge with lower limit setting
Recovery procedure	1) Find and correct the cause of the low N_2 pressure error and adjust the pressure to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

3. Source air low pressure

Interlocked safety countermeasures	1) Power supply to processing bath in-line heater shuts off. Power supply to processing bath immersion heater shuts off. Power supply to electric thermo-controller shuts off.
Sensor type	Pressure gauge with lower limit setting
Recovery procedure	1) Find and correct the cause of the low air pressure error and adjust the pressure to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

4. Leakage from measuring tank

Interlocked safety countermeasures	1) Power supply to measuring tank immersion heater shuts off. 2) Chemical demand (supply from facility line to measuring tank) stops. 3) Equipment enters cycle pause state.
Sensor type	Leakage sensor
Recovery procedure	1) Find and correct the cause of the leakage and dry the sensor. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

5. Leakage in lower vat

Interlocked safety countermeasures	1) Power supply to processing bath in-line heater shuts off. Power supply to processing bath immersion heater shuts off. Power supply electric thermo-controller shuts off. 2) Chemical demand (supply from facility line to processing bath),supply, replenish and drainage stop. 3) Circulation pump stops. 4) Equipment enters cycle pause state.
Sensor type	Leakage sensor
Recovery procedure	1) Find and correct the cause of the leakage error and dry the sensor. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

6. Leakage at in-line heater

Interlocked safety countermeasures	1) Power supply to processing bath in-line heater shuts off. Power supply to processing bath immersion heater shuts off 2) Circulation pump stops. 3) Equipment enters cycle pause state.
Sensor type	Leakage sensor
Recovery procedure	1) Find and correct the cause of the leak. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

7. Leakage at circulation pump

Interlocked safety countermeasures	1) Power supply to processing bath in-line heater shuts off. Power supply to processing bath immersion heater shuts off. Power supply to electric thermo-controller shuts off. 2) Circulation pump stops. 3) Equipment enters cycle pause state.
Sensor type	Leakage sensor
Recovery procedure	1) Find and correct the cause of the leak. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

8. Bath chemical level upper limit

Interlocked safety countermeasures	1) Chemical demand (supply from facility line to processing bath), supply and replenish stop. 2) Equipment enters cycle pause state.
Sensor type	Level sensor
Recovery procedure	1) Find and correct the cause of the abnormal chemical level and manually adjust to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

9. Bath chemical level lower limit (for heater protection)

Interlocked safety countermeasures	1) Power supply to processing bath in-line heater shuts off. (Hardware interlock) Power supply to processing bath immersion heater shuts off. (Hardware interlock) 2) Equipment enters cycle pause state.
Sensor type	Level sensor (Double-interlock)
Recovery procedure	1) Find and correct the cause of the abnormal chemical level and manually adjust to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.
Note:	Ensuring protection of heater, two dedicated sensor/circuit sets are provided for detecting lower limit level.

10. Bath chemical level lower limit (for circulation pump protection)

Interlocked safety countermeasures	1) Power supply to processing bath in-line heater shuts off. Power supply to processing bath immersion heater shuts off. 2) Circulation pump stops. 3) Equipment enters cycle pause state.
Sensor type	Level sensor
Recovery procedure	1) Find and correct the cause of the abnormal chemical level and manually adjust to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.
Note:	The safety interlock for heater protection is always activated earlier than that for the circulation pump because the limit level for heater protection is located higher in the bath.

11. Measuring tank, chemical level upper limit

Interlocked safety countermeasures	1) Chemical demand (supply from facility line to measuring tank) stops. 2) Equipment enters cycle pause state.
Sensor type	Level sensor
Recovery procedure	1) Find and correct the cause of the abnormal level in the measuring tank and manually adjust to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

12. Measuring tank, chemical level lower limit

Interlocked safety countermeasures	1) Power supply to the measuring tank immersion heater shuts off. (Hardware interlock) 2) Replenishment pump stops. 3) Equipment enters cycle pause state.
Sensor type	Level sensor
Recovery procedure	1) Find and correct the cause of the abnormal level in the measuring tank and manually adjust to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

13. Drain cooling tank, drainage level upper limit *(for Drainage cooling tank system)

Interlocked safety countermeasures	1) Chemical drain stops. (from processing bath to cooling tank) 2) Equipment enters cycle pause state.
Sensor type	Level sensor
Recovery procedure	1) Find and correct the cause of the abnormal drainage level and adjust to the normal level in the cooling tank. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

14. Bath overheat

Interlocked safety countermeasures	1) Power supply to processing bath in-line heater shuts off. (Hardware interlock) Measuring tank immersion heater shuts off. 2) Circulation pump stops. (See Note 1.) 3) Equipment enters cycle pause state.
Sensor type	Thermocouple (See Note 2.)
Recovery procedure	1) Find and correct the cause of the overheating error and wait until the temperature drops to the proper setting value. 2) Turn the TC/OH switch off and turn it on again. 3) Reset the alarm from the main operation panel. 4) Press the CYCLE PAUSE key on the main operation panel.
Note:	1.During temperature control, circulation pump stops one minute after power to the heater shuts off. 2.The equipment includes a dedicated sensor and circuit for overheat detection.

15. In-line heater overheat (Heater surface temperature)

Interlocked safety countermeasures	1) Power supply to the processing bath in-line heater shuts off.(Hardware interlock) Power supply to measuring tank immersion heater shuts off. (Hardware interlock) 2) Circulation pump stops. (See Note 1.) 3) Equipment enters cycle pause state.
Sensor type	Thermocouple (See Note 2.)
Recovery procedure	1) Find and correct the cause of the abnormal temperature and wait until the temperature drops to the proper setting value. 2) Press the TC/OH switch off and press it on again. 3) Reset the alarm from the main operation panel. 4) Press the CYCLE PAUSE key on the main operation panel.
Note:	1.During temperature control, circulation pump stops one minute after power to heater shuts off. 2.The equipment includes a dedicated sensor and circuit to monitor heater surface temperature.

16. Bath chemical temperature high limit

Interlocked safety countermeasures	1) Power supply to processing bath in-line heater shuts off. Power supply to processing bath immersion heater shuts off. 2) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the abnormal temperature and wait until the temperature drops to the proper setting value. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

17. Overheat at measuring tank

Interlocked safety countermeasures	1) Power supply to measuring tank immersion heater shuts off. (Hardware interlock) 2) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the overheating and wait until the temperature drops to the proper setting value. 2) Turn the TC/OH switch off and turn it on again. 3) Reset the alarm from the main operation panel. 4) Press the CYCLE PAUSE key on the operation panel after the cycle pause.
Note:	The equipment includes a dedicated sensor and circuit for overheat detection.

18. Measuring tank, chemical temperature high limit

Interlocked safety countermeasures	1) Power supply to measuring tank immersion heater shuts off. 2) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the abnormal temperature and wait until the temperature drops to proper setting value. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

19. Aspirator drain temperature high limit *(for Aspirator drain system)

Interlocked safety countermeasures	1) Drainage stops. 2) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the abnormal drain temperature and wait until the temperature drops to the proper setting value 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

20. Process bath drain overtime

Interlocked safety countermeasures	1) Drainage stops. 2) Equipment enters cycle pause state.
Recovery procedure	1) Find and correct the cause of the error. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

21. Measuring tank, chemical supply overtime

Interlocked safety countermeasures	1) Chemical demand (supply from facility line to measuring tank) stops. 2) Equipment enters cycle pause state.
Sensor type	Software timer
Recovery procedure	1) Find and correct the cause of the error 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel

22. Process bath auto cover open/close overtime

Interlocked safety countermeasures	1) Auto cover halt their movement instantly. 2) Equipment enters cycle pause state.
Sensor type	Magnetic proximity switch
Recovery procedure	1) Find and correct the cause of the error and open/close the cover 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

23. Safety cover open (rear side cover)

Interlocked safety countermeasures	1) Circulation pump stops. 2) Power supply to processing bath in-line heater shuts off. 3) Equipment enters cycle pause state.
Sensor type	Magnetic proximity switch
Recovery procedure	1) Find and correct the cause of the error and close the cover. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

2-3 Spin dryer

1. Abnormal vibration during rotation

Interlocked safety countermeasures	1) Spinning chamber instantly stops rotating. 2) Equipment enters cycle pause state.
Sensor type	Touch sensor
Recovery procedure	1) Find and correct the cause of the abnormal vibration error. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

2. Top cover lock overtime

Interlocked safety countermeasures	1) Cover lock movement halts. 2) Spinning chamber instantly stops rotating.
Sensor type	Proximity magnet switch
Recovery procedure	1) Find and correct the cause of the error 2) Reset the alarm from the main operation panel.

2-4 IPA vapor dryer

1. Exhaust low pressure

Interlocked safety countermeasures	1) Power supply to IPA heater shuts off. 2) Equipment enters cycle pause state.
Sensor type	Manostar switch
Recovery procedure	1) Find and correct the cause of the low exhaust pressure error and adjust the pressure to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

2. IPA cooling water low flow rate

Interlocked safety countermeasures	1) Power supply to IPA heater shuts off. 2) IPA demand (supply from facility line to IPA bath) stops. 3) DI water starts showering into bath. (See Note.) 4) Equipment enters cycle pause state.
Sensor type	Flow meter with lower limit setting
Recovery procedure	1) Find and correct the cause of the low flow rate error and adjust the flow rate to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.
Note:	DI water starts showering only when the exhaust pressure and the cooling water flow rate drop off at the same time. If the DI water shower is ever activated, be sure to clean and rinse the inside of the bath in manual mode.

3. N_2 purge low pressure for IPA heater

Interlocked safety countermeasures	1) Power supply to IPA heater shuts off. 2) IPA demand (supply from facility line to IPA bath) stops. 3) Equipment enters cycle pause state.
Sensor type	Pressure gauge with lower limit setting
Recovery procedure	1) Find and correct the cause of the low pressure error and adjust the pressure to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

4. N_2 purge low flow rate for IPA heater

Interlocked safety countermeasures	1) Power supply to IPA heater shuts off. 2) IPA demand (supply from facility line to IPA bath) stops. 3) Equipment enters cycle pause state.
Sensor type	Flow meter with lower limit setting
Recovery procedure	1) Find and correct the cause of the low flow rate error and adjust the flow rate to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

5. Leakage into lower vat

Interlocked safety countermeasures	1) Power supply to IPA heater shuts off. 2) IPA demand (supply from facility line to IPA bath) and drainage stop. 3) Equipment enters cycle pause state.
Sensor type	Float switch
Recovery procedure	1) Find and correct the cause of the leakage. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

6. IPA bath, IPA level upper limit

Interlocked safety countermeasures	1) Power supply to IPA heater shuts off. 2) IPA demand (supply from facility line to IPA bath) stops. 3) Equipment enters cycle pause state.
Sensor type	Quartz fiber sensor
Recovery procedure	1) Find and correct the cause of the error and manually adjust to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

7. IPA bath, IPA level lower limit

Interlocked safety countermeasures	1) Power supply to the IPA heater shuts off. (Hardware interlock) 2) Equipment enters cycle pause state.
Sensor type	Quartz fiber sensor & Capacitance sensor (Double-interlock)
Recovery procedure	1) Find and correct the cause of the error and manually adjust to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

8. IPA heater temperature high limit

Interlocked safety countermeasures	1) Power supply to IPA heater shuts off. 2) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the overheating error, and wait until the temperature drops to the proper setting value. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

9. IPA heater overheat

Interlocked safety countermeasures	1) Power supply to the IPA heater shuts off. (Hardware interlock) 2) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the overheating error, and wait until the temperature drops to the proper setting value. 2) Turn the TC/OH switch off and turn it on again. 3) Reset the alarm from the main operation panel. 4) Press the CYCLE PAUSE key on the main operation panel.
Note:	The equipment includes a dedicated sensor and circuit for overheat detection.

10. Module shutter open/close overtime

Interlocked safety countermeasures	1) Equipment enters cycle pause state.
Sensor type	Magnetic proximity switch
Recovery procedure	1) Find and correct the cause of the error. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

11. Abnormal IPA density (Two steps: LEL 30% and 60%)

Interlocked safety countermeasures	1) Power supply to IPA heater shuts off. 2) DI water starts showering. (See Note.) 3) Equipment enters cycle pause state.
Sensor type	Gas detector
Recovery procedure	1) Find and correct the cause of the abnormal density error. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.
Note:	The DI water shower begins when the density reaches 60% of LEL or higher. Whenever the DI water shower is ever activated, be sure to clean and rinse the inside of the bath in the manual mode.

12. Malfunction of IPA density sensor

Interlocked safety countermeasures	1) Power supply to IPA heater shuts off. 2) Equipment enters cycle pause state.
Recovery procedure	1) Replace the sensor. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

13. Occurrence of fire

Interlocked safety countermeasures	1) Fire extinguisher is activated. (hardware interlock) 2) Power supply to IPA heater shuts off. 3) IPA demand (supply from facility line to IPA bath) and drainage stop. 4) DI water starts showering. 5) Lifter descends and auto-cover closes. 6) Shutter closes between modules. 7) Equipment enters cycle pause state.
Sensor type	Fire signal codes input from the extinguisher system
Recovery procedure	1) After fire is extinguished, investigate the cause and extent of the damage so your and our engineers can make appropriate repairs.
Note:	This interlock is provided only for equipment incorporating a fire extinguisher system.

2-5 Low pressure dryer

1. Exhaust low pressure

Interlocked safety countermeasures	1) Vacuum pump stops. 2) Power supplies to heaters (temperature control bath, vapor line, N_2) shut off. 3) Purge stops. 4) Equipment enters cycle pause state.
Sensor type	Manostar switch
Recovery procedure	1) Find and correct the cause of the low exhaust pressure error and adjust the pressure to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

2. N_2 low pressure

Interlocked safety countermeasures	1) Power supplies to heaters (vapor line, N_2) shut off. 2) Equipment enters cycle pause state.
Sensor type	Pressure gauge with lower lirmt setting
Recovery procedure	1) Find and correct the cause of the low N_2 pressure error and adjust the pressure to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

3. N_2 purge low flow rate

Interlocked safety countermeasures	1) Power supplies to heaters (vapor line, N_2) shut off. 2) Equipment enters cycle pause state.
Sensor type	Flow meter With lower lirmt setting
Recovery procedure	1) Find and correct the cause of the low flow rate error and adjust the pressure to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

4. Leakage in temperature control bath

Interlocked safety countermeasures	1) Circulation pump stops. 2) Power supply to temperature control bath heater shuts off. 3) IPA demand and drainage stop. 4) Purge stops. 5) Air-vent valve on temperature control bath valve opens. 6) Equipment enters cycle pause state.
Sensor type	Leakage sensor
Recovery procedure	1) Find and correct the cause of the leakage error. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

5. Leakage-in lower vat

Interlocked safety countermeasures	1) Vacuum pump stops. 2) Upflow and drainage stop. 3) IPA purge stops. 4) Air-vent valve on temperature control bath valve opens. 5) Equipment enters cycle pause state.
Sensor type	Leakage sensor
Recovery procedure	1) Find and correct the cause of the leakage error. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

6. Temperature control bath, Chemical level upper limit

Interlocked safety ountermeasures	1) IPA demand stops. 2) Equipment enters cycle pause state.
Sensor type	Fiber sensor
Recovery procedure	1) Find and correct the cause of the error and manually adjust to the proper level. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

7. Temperature control bath, Chemical level lower limit

Interlocked safety countermeasures	1) Power supply to temperature control bath heater shuts off. (Hardware interlock) 2) Equipment enters cycle pause state.
Sensor type	Fiber sensor 2 sets
Recovery procedure	1) Find and correct the cause of the error and manually adjust to the proper level.

8. Temperature control bath overheat

Interlocked safety countermeasures	1) Power supply to temperature control bath heater shuts off. (Hardware interlock) 2) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the overhearing error, and wait until the temperature drops to the proper setting value. 2) Turn the TC/OH switch off and turn it on again. 3) Reset the alarm from the main operation panel. 4) Press the CYCLE PAUSE key on the main operation panel.

9. Temperature control bath temperature high limit

Interlocked safety countermeasures	1) Power supply to temperature control bath heater shuts off. 2) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the error, and wait until the temperature drops to the proper setting value. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

10. Vapor line overheat

Interlocked safety countermeasures	1) Power supply to vapor line heater shuts off. (Hardware interlock) 2) IPA purge stops. 3) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the overheating error, and wait until the temperature drops to the proper setting value. 2) Turn the TC/OH switch off and turn it on again. 3) Reset the alarm from the main operation panel. 4) Press the CYCLE PAUSE key on the main operation panel.

11. Vapor line temperature high limit

Interlocked safety countermeasures	1) Power supply to temperature control bath heater shuts off. 2) IPA purge stops. 3) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the error, and wait until the temperature drops to the proper setting value. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

12. N_2 overheat

Interlocked safety countermeasures	1) Power supply to N_2 heater shuts off. (Hardware interlock) 2) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the overhearing error, and wait until the temperature drops to the proper setting value. 2) Turn the TC/OH switch off and turn it on again. 3) Reset the alarm from the main operation panel. 4) Press the CYCLE PAUSE key on the main operation panel.

13. N_2 temperature high limit

Interlocked safety countermeasures	1) N_2 heater shuts off. 2) Equipment enters cycle pause state.
Sensor type	Thermocouple
Recovery procedure	1) Find and correct the cause of the error, and wait until the temperature drops to the proper setting value. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

14. Process-bath auto cover open/close overtime

Interlocked safety countermeasures	1) Auto covers halt their movement instantly. 2) IPA purge stops. 3) Equipment enters cycle pause state.
Sensor type	Magnetic proximity switch
Recovery procedure	1) Find and correct the cause of the error and open/close the cover. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

15. Safety cover open (rear side upper cover)

Interlocked safety countermeasures	1) Circulation pump stops. 2) Power supplies to heaters (temperature control bath, vapor line, N_2) shut off. 3) IPA demand and drainage stops. 4) Air-vent valve on temperature control bath valve opens. 5) Purge stops. 6) Equipment enters cycle pause state.
Sensor type	Magnetic proximity switch
Recovery procedure	1) Find and correct the cause of the error and close the cover. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

16. Safety, cover open (rear side lower cover)

Interlocked safety countermeasures	1) Vacuum pump stops. 2) Purge stops. 3) Air-vent valve on temperature control bath valve opens. 4) Lifter stops. 5) Equipment enters cycle pause state.
Sensor type	Magnetic proximity switch
Recovery procedure	1) Find and correct the cause of the error and close the cover. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

17. Abnormal IPA density (Temperature control bath/lower vat)

Interlocked safety countermeasures	1) Power supplies to heaters (temperature control bath, vapor line, N_2) shut off. 2) IPA demand stops. 3) Purge stops. 4) Air-vent valve on temperature control bath valve opens. 5) Equipment enters cycle pause state.
Sensor type	Gas detector
Recovery procedure	1) Find and correct the cause of the abnormal density error. 2) Reset the alarm from the main operation panel. 3) Press the CYCLE PAUSE key on the main operation panel.

18. Mallunction of IPA density sensor (Temperature control bath/lower vat)

Interlocked safety countermeasures	1) Power supplies to heaters (temperature control bath, vapor line, N_2) shut off. 2) IPA demand stops. 3) Purge stops. 4) Air-vent valve on temperature control bath valve opens. 5) Equipment enters cycle pause state.
Recovery procedure	1) Reset the alarm from the main operation panel. 2) Press the CYCLE PAUSE key on the main operation panel.

19. IPA remained, dry processing request

Interlocked safety countermeasures	1) Cover opening is prohibited.
Recovery procedure	2) Manually execute dry processing.

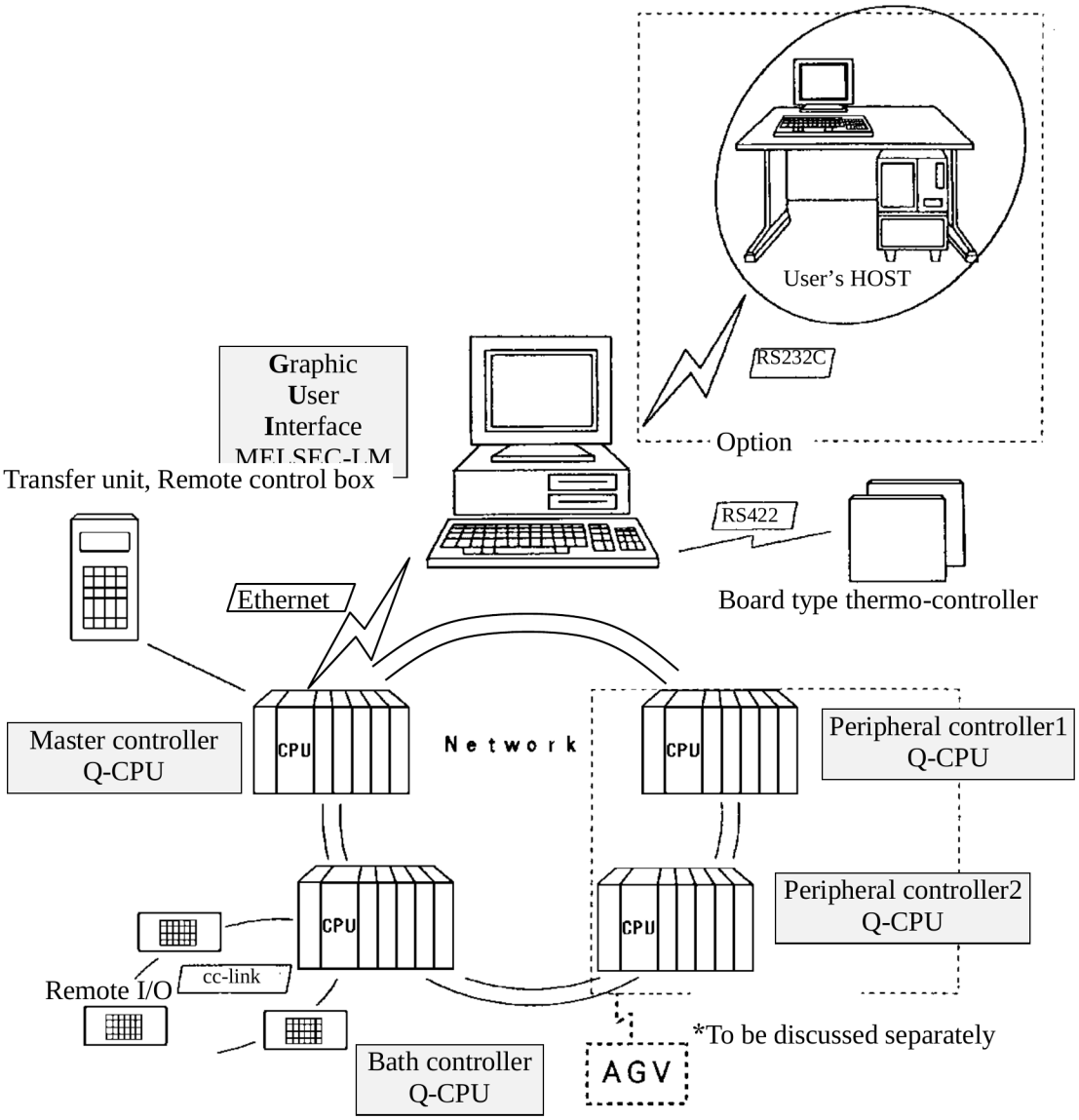
20. Occurrence of fire

Interlocked safety countermeasures	1) Fire extinguisher is activated. 2) Power supplies to heaters (temperature control bath, vapor line, N_2) shut off. 3) IPA demand stops. 4) Purge stops. 5) Air-vent valve on temperature control bath valve opens. 6) Circulation pump stops. 7) Vacuum pump stops. 8) Equipment enters cycle pause state.
Sensor type	Fire signal codes input from the extinguisher system
Recovery procedure	1) After fire is extinguished, investigate the cause and extent of' the damage so your and our engineers can make appropriate repairs.
Note:	This interlock is provided only for equipment incorporating a fire extinguisher system.

3 Control System Outline

3-1 Control system block diagram

The entire equipment system is managed by four major controllers as illustrated in the following block diagram.
Note: The peripheral controller is an optional item.



Controllers and Functions

a. GUI (Man-Machine Interface):
Mainly functions as an interface between the operator and the equipment. It controls the input from the keyboard and displays, the communications with the board-type temperature controller, and the on-line communication with the host computer.

b. Master Controller:
Works as the master controller of the network, handling initial data management, alarm management, and remote operation of the transfer sections.

c. Bath Controller:

Controls the operations of the individual processing baths such as the input/output functions of the bath's overhead operation panels; the operation of solenoid valves, pumps and temperature controllers; the quantity/level of the chemicals in each bath; and alarm generation.

d. Peripheral Controller (Optional item):

Controls the transfer section for peripheral modules such as stocker, shuttle, AGV interface and other transfer units as well as their alarm generation.

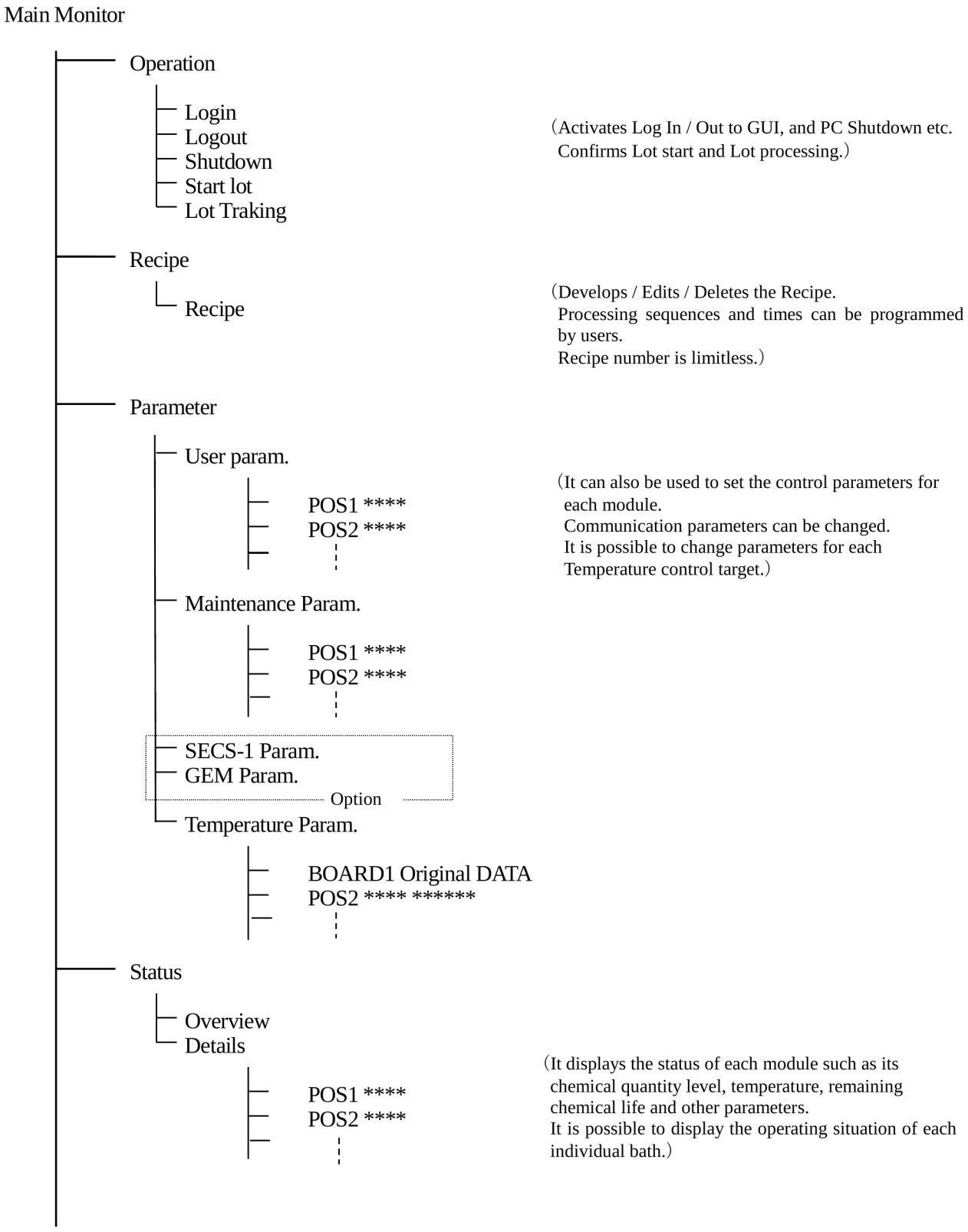
3-2 Outline of Functions

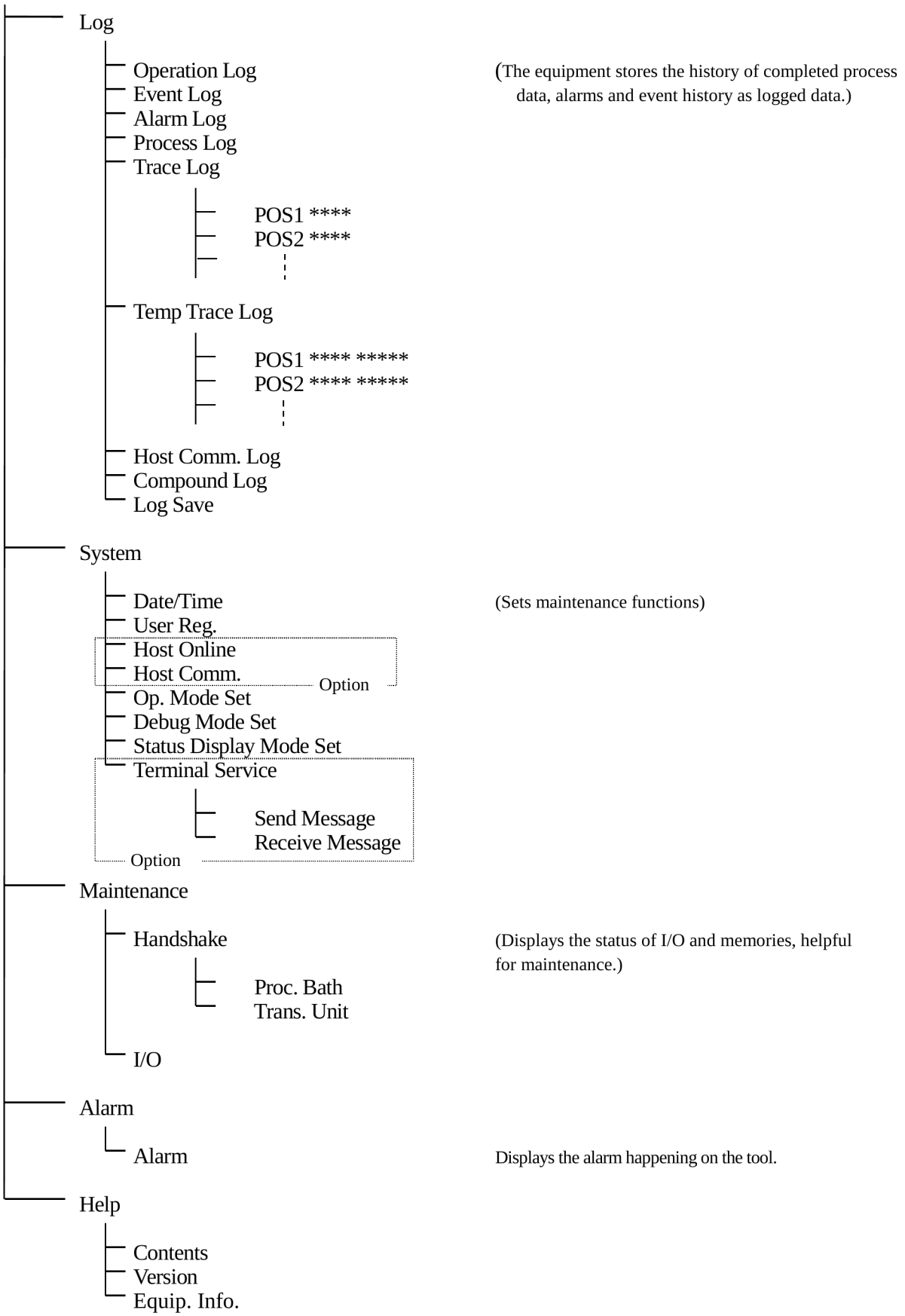
There are two ways to select each function ;

1. Click the target item from the Tool Bar in the Upper part of screen.
2. Click the target object on the screen.

In order to return to the initial display, press [ESC]

3-2-1 Operation Menu Configuration





(The equipment stores the history of completed process data, alarms and event history as logged data.)

(Sets maintenance functions)

(Displays the status of I/O and memories, helpful for maintenance.)

Displays the alarm happening on the tool.

4 Definitions of Operation Modes

4-1 Control Modes

4-1-1 Automatic mode

Automatic lot processing is performed with fully automatic control of lot recipes and each module's operation.

4-1-2 Manual mode

Manually controls the equipment, managing each individual module with the relevant operation panels.

4-1-3 Change-over from automatic to manual mode

When the equipment is in transfer pause, cycle pause or step pause status, the automatic mode can be switched to manual mode by pressing the auto/manual switch on the operation panel.

4-1-4 Change-over from manual to automatic mode

When the equipment contains no lots, is in the step pause status, or after the home return operation is completed, the manual mode can be switched to the automatic mode by pressing the auto/manual switch on the operation panel.

4-1-5 Control conditions in manual mode

In manual mode the equipment's operation is totally dependent on the operators' judgment regarding lot transfer and the conditions of each individual processing bath; that is, whether or not the equipment is ready for processing. In other words, the equipment no longer controls the lot data or determines the status of each processing bath.
If for some reason the equipment was put into manual mode during automatic processing, it can resume automatic processing once it is put back into the automatic mode.
However, automatic processing cannot be resumed if the lot has been manually moved by the transfer unit (with remote control box commands) while in the manual mode or, more specifically, while in the step pause status.

4-1-6 Control conditions during lot transfer

Switching the equipment into manual mode affects all of its subsystems. No component of the equipment will operate with the same degree of automation as it would in the automatic mode. In the manual mode, for instance, the transfer unit can only be operated with the remote control box. It will not move as programmed by the recipe data. However, even in the manual mode the movements of the transfer unit and the processing bath auto-covers are interlocked to prevent collisions between the two. For example, the transfer unit will not lower its chuck unless the auto-cover is opened.

4-2 Definitions of Stop Modes

4-2-1 Emergency stop

The equipment's entire power supply is shut down. The equipment can be manually put into this state by pressing the emergency stop switch on the equipment; or it can automatically enter this state when certain errors occur. When the power supply is turned on again, the equipment reverts to the same state it was operating in when the power was turned off. However, if the equipment was operating in the automatic mode, it will revert to the transfer pause status when power is resumed.

4-2-2 Transfer pause

All of the equipment's moving sections such as the transfer unit, loader module, auto-covers on the processing baths, and other moving parts are temporarily halted. When the equipment is in automatic mode, you can manually put the equipment into this state by pressing the transfer pause switch on the operation panel; or the equipment will automatically enter this state when certain errors occur. This status can be canceled by pressing the same switch again or by switching the equipment into the manual mode. The moving sections will then resume their operations.

4-2-3 Step pause

Transfer sections related to carrier transfer such as the transfer unit, loader modules and other peripheral transfer units halt their movements temporarily. When the equipment is in automatic mode, you can manually put the equipment into this state by pressing the step pause switch; or the equipment will enter this state automatically when certain errors occur. This status can be canceled by pressing the same switch again, allowing carrier transfer to resume. In this status, lots can be deleted with commands from the operation panel or the CM-1000 interface. Unlike the cycle pause, the step pause cannot be canceled by putting the equipment into manual mode.

4-2-4 Cycle pause

The loader module halts the supply of new lots to the processing line. Note, however, that the equipment continues processing those lots already in the processing line, and delivering them to the unloader module. The equipment can be manually put into this state by pressing the cycle pause switch on the operation panel; or it will automatically enter this state when certain errors occur. Even while in this status, the peripheral transfer units continue their operation. This status can be canceled by pressing the same switch again, which allows the loader module to resume the supply of new lots to the processing line.

4-2-5 Stand-by status

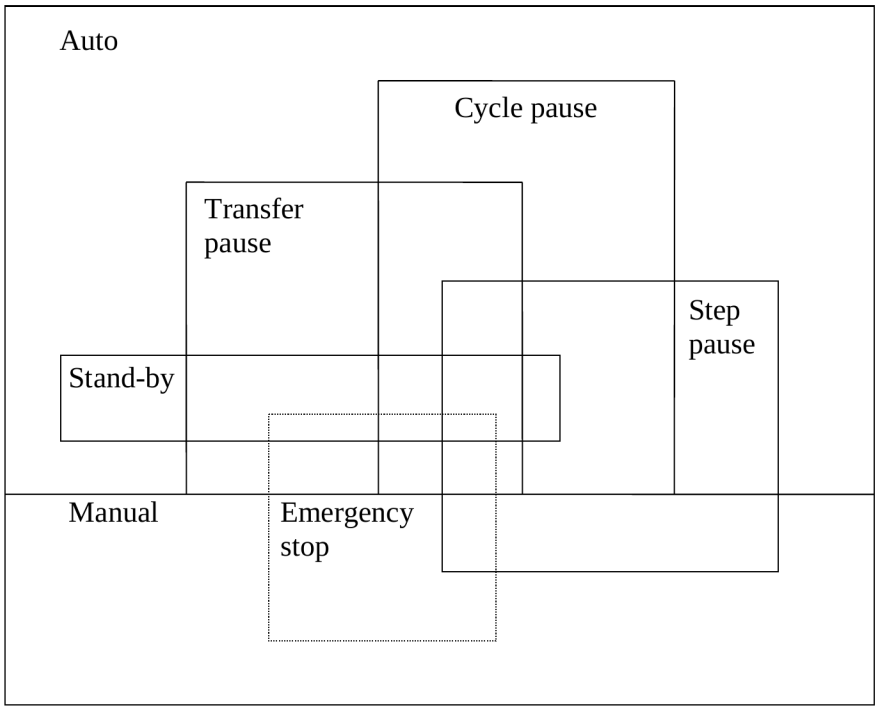
During automatic processing, the main transfer unit suspends the transport of lot to the next process and stand by until certain conditions are met. Stand-by status is further classified into abnormal stand-by and normal stand-by status.
A. Abnormal standby:
The transfer unit suspends transport due to an error which the equipment has detected or which it anticipates will occur at the next processing bath.
B. Normal standby:
The transfer unit withholds transport temporarily until the next processing bath is cleared of the current lot or until the next processing bath has completed the change of its chemical solution.

4-2-6 Relation with interlock

None of these stop states are mutually interlocked. Each can be directly and independently reset to return the equipment to its previous operational status.

4-2-7 Relation between stop mode and auto/manual mode

The figure below shows the relationships between each stop status and the manual and automatic operation modes.



4-3 Definitions of Operational Status

When the equipment is in use, it will always be in one of the following operational states.
Note: Definitions of “operational status” do not cover the status of the temperature controller.

4-3-1 IDLE

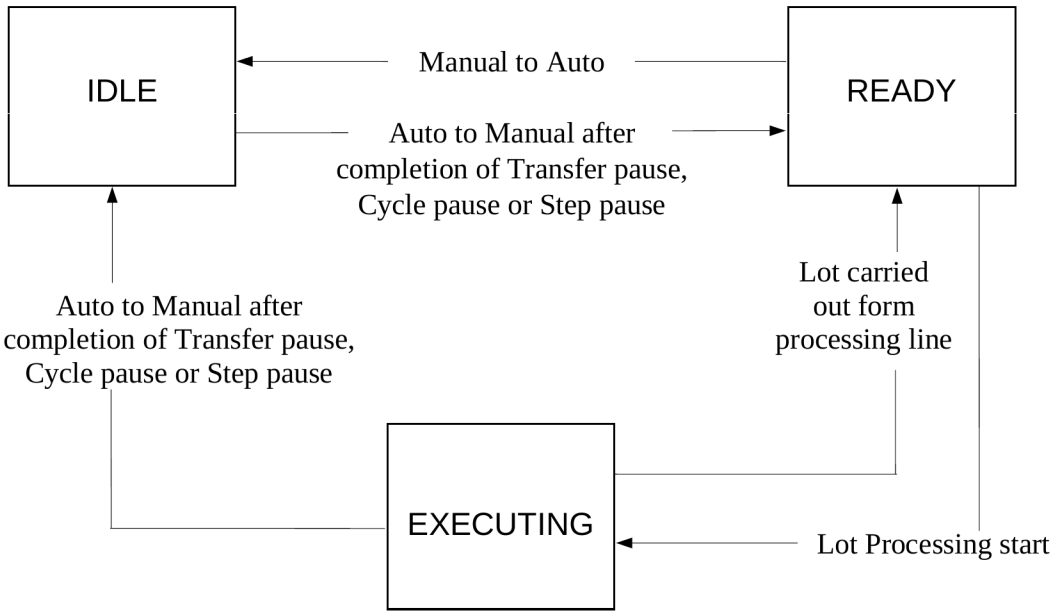
The equipment is in manual mode (can only be controlled or operated manually). Automatic processing is not possible.

4-3-2 READY

The equipment is in automatic mode and ready for automatic processing, but no lots have been sent to the equipment/loader yet.

4-3-3 EXECUTING

The equipment is processing lots in the automatic mode.



4-4 Lot Delete

If the processing of certain lots has to be terminated during automatic operation, their lot data can be canceled. This procedure is called “lot delete”. Please note that although their lot data has been “deleted,” the transfer unit will continue its operations, and the equipment will still signal when the terminated lots would normally have reached the unloader position even if they have already been physically removed from the processing line. Aborted lots which do arrive at the unloader position, however, will not be delivered from the unloader module to the AGV (Automatic Guided Vehicle).

4-5 Lot Control in Manual Mode

Lot data for the lots being processed will be retained even after the operation mode is changed from automatic to manual.

4-6 Definitions of Host Computer Modes

4-6-1 OFF-LINE

The equipment and the host computer are electronically linked, but no communication channel between the two has been activated. Therefore, the equipment will not respond even when the host attempts to send it commands. In this communication mode, processing can only be started from the equipment's operation panels.

4-6-2 ON-LINE

The communication channel between the two is active. Processing can be started from the host computer.

4-6-3 Change-over from OFF-LINE mode to ON-LINE mode

It is possible to switch the communication mode at any time from the OFF-LINE to the ON-LINE mode.

4-6-4 Change-over from ON-LINE mode to OFF-LINE mode

It is possible to switch the communication mode at any time from the ON-LINE to the OFF-LINE mode. Current lot processing will continue even after the communication mode changes to OFF-LINE.

4-6-5 Mode switch

The communication mode can be switched with appropriate commands in the operation window of the CM-1000 interface.

4-7 Definitions of AGV Modes

4-7-1 AGV_ON

The interface between the equipment and a third party manufacturer's AGV is active. Lots can be automatically transferred between the equipment and the AGV.

4-7-2 AGV_OFF

The interface between the equipment and a third party manufacturer's AGV is not active. Automatic transfer is not possible. Lots have to be manually transferred by the operator.

4-7-3 Change-over from AGV_ON to AGV_OFF

It is possible to change from AGV_ON to AGV_OFF at any time, except while the AGV is communicating with the equipment.

4-7-4 Change-over from AGV_OFF to AGV_ON

It is possible to change from AGV_OFF to AGV_ON at any time.

4-7-5 Mode switch

The AGV mode can be switched with appropriate commands in the operation window of the CM-1000 interface.

5 Equipment Abnormalities

5-1 Outline of Equipment Errors

If the equipment detects any of the abnormal states described below, it will terminate its operations either entirely or in part.

1. Power failure or equipment states where lot transfer or processing has to be immediately halted.
2. Equipment states which if left unattended could lead to highly detrimental situations.
3. Equipment states caused by malfunctions during lot transfer.
4. Equipment states with a low probability of damage to the equipment and/or the lots being processed, but which are nonetheless abnormal.

5-2 Outline of countermeasure for errors and resetting method

When the equipment detects an abnormal state, it alerts the operators with buzzer sounds, and shows the description(s) and location(s) of the error(s) on its displays. At the same time, the equipment puts itself into one of its four stop states corresponding with the level of urgency. Once the equipment is put into a stop status, it will not reset itself even if the error is automatically corrected. To reset the equipment, it is necessary to first correct the error(s) and then follow the designated procedure for the stop status involved.

Alarm level

Level	Operation Status	Buzzer	Alarm Display	Description
1	Power supply shut off	Yes (after recovery)	Yes (after recovery)	Main power shuts down and alarm is activated.
2	Transfer pause	Yes	Yes	The equipment enters the transfer pause status and alarm is activated.
3	Step pause	Yes	Yes	The equipment enters the step pause status and alarm is activated.
4	Cycle pause	Yes	Yes	The equipment enters the cycle pause status and alarm is activated.
5	Display only	Yes	Yes	Display and buzzer
6	Transfer pause	Yes	Yes	Relevant transfer unit stops
7	Display only	-	Yes	Display only

5-3 Operation after resumption of power

When the power supply is turned on again after a power failure, the equipment reverts to the same status it was in just before the power failed. For example, if the power failed when the lot transfer sections were operating, the equipment will revert to the transfer pause status when the power supply is turned on again. The timers and counters resume their timing and counting from the values reached just before the power failure. If the power fails when the lot transfer sections are in operation, the LED lamps for Transfer Pause will light up when the power supply is turned on again. The same reset procedures must be followed as when a transfer error occurs.
Note: A power failure is defined as a continuous loss of power that lasts for 20 m seconds or more.

5-4 For safety

To ensure safe operation, the equipment incorporates the following specifications:

5-4-1 Emergency stop

Shuts off the power supply to the entire system including the peripheral transfer systems. The procedure to restart the equipment is the same as that for restarting after a power failure.

5-4-2 Transfer module

The equipment employs servo motors and stepping motors to drive the transfer systems.
The power circuit for the transfer section is separate and independent from the other circuits, and the following electrical interlocks are provided to ensure safety. The interlocks can be deactivated for maintenance purposes.

An emergency stop switch is provided on the transfer section’s remote control box to shut off the power supply for this section.

a. Safety protection covers

The safety protection covers are interlocked with the operation of the transfer section.
When a safety protection cover is opened:
(a) the power supply for the transfer section is turned off, stopping the servo motors and stepping motors that drive the transfer systems;
(b) the buzzer sounds and an alarm message appears on the display to alert operators that the cover is open;
(c) the equipment puts itself into the transfer pause status.
Recovery procedure
(a) Close the protection cover;
(b) Resume the power supply to the transfer section with the transfer power switch;
(c) Press the TRANSFER PAUSE switch to reset the equipment from the transfer pause status;
(d) Refer to the alarm messages on the display and reset the alarm concerning the opened protection covers; and, if necessary, the alarm concerning positioning errors of the transfer unit.

b. Overrun switches for the transfer unit

Limiter switches are installed at the ends of the transfer units' normal travel ranges to stop them from overrunning, and thereby prevent excessive stress or damage to the equipment.
When a limiter switch is activated:

(a) The power supply to the relevant drive system is turned off, stopping the servo motor and stepping motor;

(b) The buzzer sounds and an alarm message appears on the display to alert the operator.

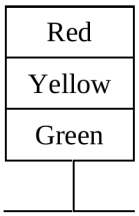
Recovery procedure

(a) Resume power supply to the drive system by turning the transfer power switch to ON/ RETRY.

(b) After performing the necessary adjustments/repairs, reset the alarm message(s) on the display concerning the positioning error(s) of the relevant unit(s).

6 Tower lamp(Option)

6-1 Lamp configuration



6-2 Manufacturer and type of tower lamp

Manufacturer: Sasaki Electrics Co. Ltd.
Type: ST-302

6-3 Tower lamp signal codes

The different possible equipment states are signaled by the following lamp states.

Priority	Status of Equipment	Red	Yellow	Green	Buzzer
1	Error/Alarm occur (Operator call: Immediate attention is required.)	Blink	-	-	ON
2	Error/Alarm occur	Lighted-	-	-	ON
3	In automatic mode	-	-	Lighted	-
4	In manual mode	-	-	Lighted	-
5	Unloading request	-	Lighted	-	-
6	Power supply shut off	OFF	OFF	OFF	OFF

Note: The tower lamp can only indicate one of the above states at a time. If two or more different states occur at the same time, the tower lamp will only signal the higher priority status.

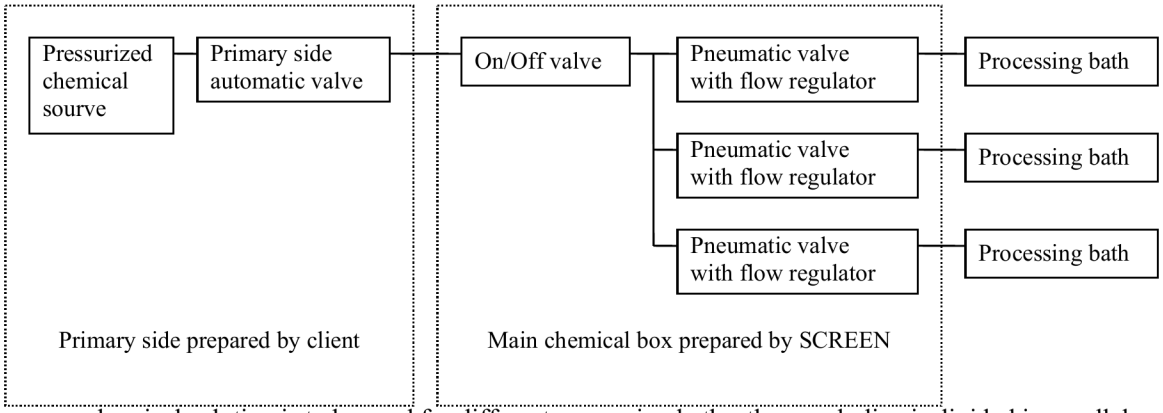
7 Module Specifications

7-1 Connections between Chemical Sources and the Equipment

The following offers only standard examples. Actual connection specifications will vary depending upon clients' requirements.

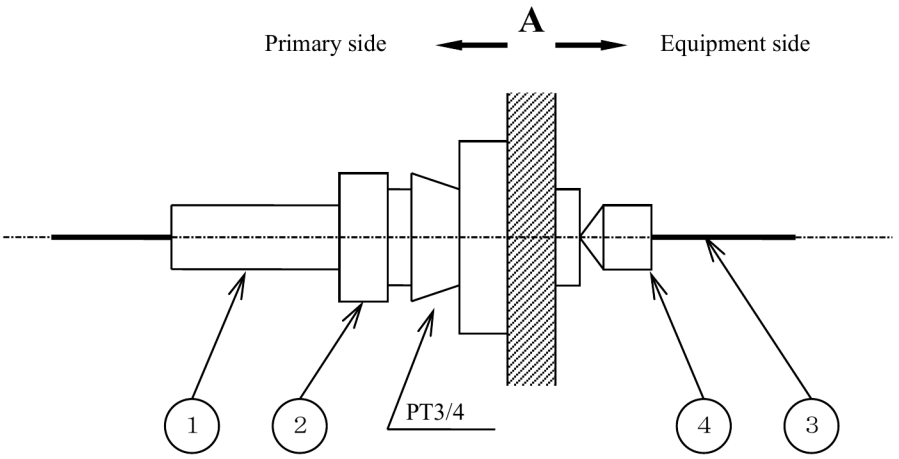
7-1-1 Outline

(1) Schematic diagram of typical connections between chemical source lines and the equipment.



If the same chemical solution is to be used for different processing baths, the supply line is divided in parallel.

(2) Detailed connection specifications



(3) Connections and pipes

No	Part Name	Purpose	Remarks
1	3/4" PFA tube Wall thickness : 1.50mm ± 0.15mm Outer diameter : 19.00mm ± 0.18mm Inner diameter : 16.00mm ± Ref.	For protective tube	Parts selected and prepared by the client
2	Male connector (through type) for 3/4" PFA tube	Sealed from the primary side	Parts selected and prepared by the client
3	1/2" PFA tube Wall thickness : 1.59mm ± 0.15mm Outer diameter : 12.70mm ± 0.15mm Inner diameter : 9.53mm ± Ref.	For chemical supply tube	Parts selected and prepared by the client
4	Male connector (through type) for 1/2" PFA tube	Sealed from the equipment side	Parts selected and prepared by SCREEN

(4) Notes

- The 1/2” PFA tube (Part No. 3) must be laid by clients or their subcontractors and extend approximately 2 m beneath the main chemical box. Connection of the tube in the equipment will be done by SCREEN.
- The 3/4” PFA tube (Part No. 1) and its male connector (through-type) (Part No. 2) must be selected and prepared by clients or their subcontractors.
- The chemical pipeline from its source to the primary side of the joint (point A in the diagram) must be laid by clients or their subcontractors, who shall be held responsible for any leakage occurring in this section. SCREEN shall be held responsible for any leakage occurring between the pipeline’s equipment side (Point A in the diagram) and the equipment itself including its internal piping.
- The equipment is designed to transmit an electrical signal to the primary side automatic valve when it detects chemical leakage in the equipment. The automatic valve (or its control circuit) must be designed to close itself in response to this signal.
- The fitting and sealing screws of the male connector (through-type) (Part No. 2) to the box must be of PT 3/4”. (Box side: Female screw PT 3/4”, Male connector side: Male screw PT 3/4”)

7-1-2 Specifications

(1) Chemical solution

a. Alkaline chemical

(a) Ammonia NH_4OH : 30.0% or less

b. Acidic chemicals

(a) Sulfuric acid H_2SO_4 : 98.0% or less

(b) Hydrochloric acid HCL : 37.0% or less

(c) Phosphoric acid H_3PO_4 : 87.0% or less

(d) Hydrogen peroxide H_2O_2 : 35.0% or less

(e) Hydrogen fluoride HF : 49.0% or less

(f) Buffered hydrogen fluoride BHF : Client’s specifications

(2) Supply pipeline

a. Supply pressure : 0.1 to 0.2 MPa

b. Pipes : Alkaline/acidic chemical PFA tube 1/2”

c. Connection requirements : One line per chemical

(3) Components

a. Main chemical box : FMH5300(HT-PVC)

b. ON/OFF control valve

(a) Manual valve : Anti-corrosive manual valve
- Fluid contact surface : PTFE
- Pressure rating : 0.3 MPa
- Orifice : 10 mm dia.

(Possible visual confirmation of open/closed status)

(b) Automatic valve : Anti-corrosive pneumatic valve with flow regulator
- Fluid contact surface : PTFE
- Pressure rating : 0.3 MPa
- Orifice : 10 mm dia.

c. Sealing : Male connector (through-type) for 1/2” PFA tube

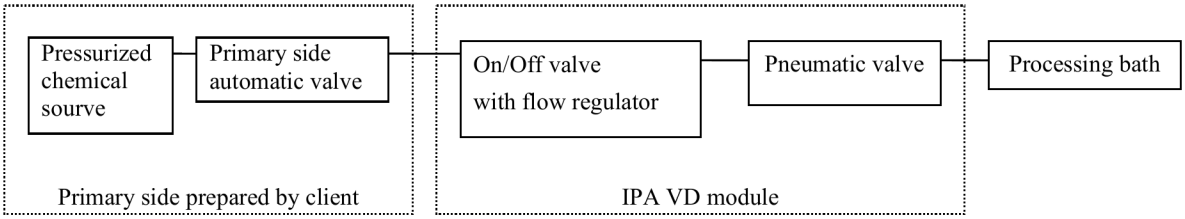
d. Leakage detection : Leak sensor

7-2 Connections between Chemical Sources and the Equipment (IPA VD)

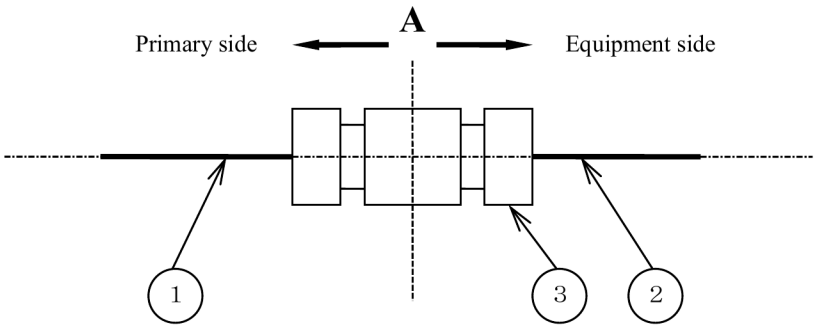
The following offers only standard examples. Actual connection specifications will vary depending upon clients' requirements.

7-2-1 Outline

(1) Schematic diagram of typical connections between chemical source lines and the equipment.



(2) Detailed connection specifications



(3) Connections and pipes

No	Part Name	Purpose	Remarks
1	3/8" SUS 316 tube pipe	For chemical supply tube	Parts selected and prepared by the client
2	1/4" SUS 316 tube pipe	For chemical supply tube	Parts selected and prepared by SCREEN
3	Panel mount union for 3/8" to 1/4" SUS 316 tube	Sealed from the equipment side	Parts selected and prepared by SCREEN

(4) Notes

- The 3/8" SUS tube (Part No. 1) must be laid by clients or their subcontractors and extend approximately 1.5 m beneath the IPA vapor module. Connection of the tube in the equipment will be done by clients or their subcontractors.
- The chemical pipeline from its source to the primary side of the joint (point A in thediagram) must be laid by clients or their subcontractors, who shall be held responsible for any leakage occurring in this section. SCREEN shall be held responsible for any leakage occurring between the pipeline's equipment side (Point A in the diagram) and the equipment itself including its internal piping.
- The equipment is designed to transmit an electrical signal to the primary side automatic valve when it detects chemical leakage in the equipment. The automatic valve (or its control circuit) must be designed to close itself in response to this signal.

7-2-2 Specifications

(1) Chemical solution
  a. Organic solvent
    (a) Isopropyl alcohol IPA : 100.0% or less
(2) Supply pipeline
  a. Supply pressure : 0.1 to 0.2 MPa
  b. Pipes : Organic solvent SUS 316 tube 3/8”
  c. Connection requirements : One line per chemical
(3) Components
  a. Main chemical box : SUS 316
  b. ON/OFF control valve with flow regulator
    (a) Manual valve : Stainless steel manual valve
      •Fluid contact surface : SUS 316
      •Pressure rating : 7.0 MPa
      •Orifice : 4 mm dia.
      : Anti-corrosive pneumatic valve with flow regulator
      •Fluid contact surface : SUS 316
      •Pressure rating : 1.0 MPa
      •Orifice : 4.5 mm dia.
  c. Sealing : Panel mount union for 3/8”to1/4” SUS 316 tube
  d. Leakage detection : Float switch

7-3 Transfer Unit

7-3-1 Outline

The transfer unit holds the wafers directly in its chuck and transports them into and out of the processing line as well as the individual baths. Travel time between two baths takes a maximum of 7 seconds. Both travel time and up/down speed of the chuck are adjustable.

7-3-2 Specifications

(1) Main section

a. Materials	: Cast aluminum
b. Surface treatment	: Anti-corrosive fluorinated resin coating
c. Guide rail (Vertical movement)	: Linear motion guide

(2) Transfer section

a. Frame	: Steel framing
b. Surface treatment	: Anti-corrosive coating
c. Guide rail (Horizontal movement)	: Linear motion guide
d. Electrical wiring	: Cable bearer guide

(3) Chuck section

a. Arm	: PVC coated stainless steel (SUS304)
b. Chuck	: PFA tube & Teflon coated SUS core

7-3-3 Functions

(1) Horizontal movement

a. Power source	: Stepping motor installed on the main frame
b. Transmission system	: Timing belt
c. Positioning	: Photosensor
d. Velocity	: Max. 400 mm/sec.
e. Positioning accuracy	: Within ±0.15 mm

(2) Vertical movement

a. Power source	: Stepping motor installed on the transfer unit
b. Transmission system	: Ball screw
c. Positioning	: Photosensor
d. Velocity	: Max. 300 mm/sec.
e. Positioning accuracy	: Within ±0.1 mm

(3) Chuck operation

a. Power source	: Rotary actuator installed in chuck section
b. Transmission system	: Cam system (Holds wafers securely even during power failures.)
c. Open/close checking	: Photosensor

7-4 Loader Module (3-lot type)

7-4-1 Outline

This module moves carrier-loaded unprocessed wafers into the wet station.

7-4-2 Specifications

a. Carrier storage capacity : 3 lots (6 carriers)
b. Material : FMT3331(PVC)

7-4-3 Functions

(1) Carrier detection (See Fig. 1 below.)

a. Method : Presence of a carrier at each position is detected by transmission type photosensors.

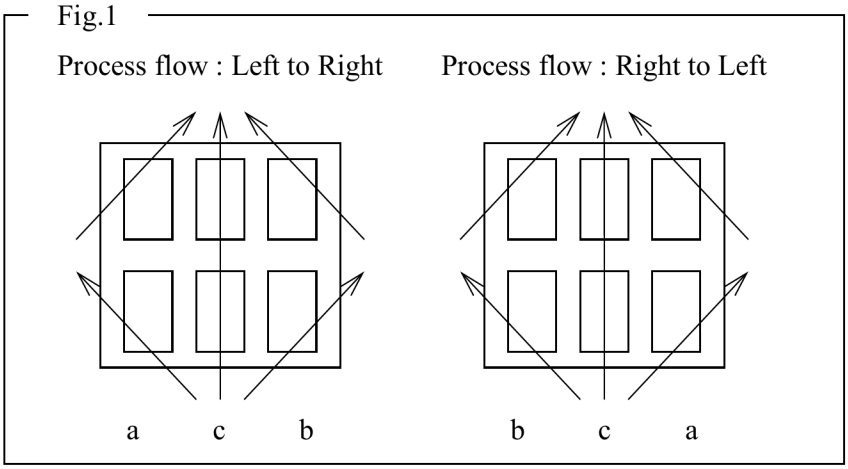
b. Detection

(a) Carry-in position : Necessary presence of two carriers at the carry-in position is confirmed by two sensors operating independently.

(b) Transfer unit delivery position : Necessary presence of two carriers to the transfer unit is confirmed by two sensors operating independently.

(c) Other positions : Subsequent lot position is confirmed by a sensor.

Fig.1



(2) Transfer

a.Horizontal movement : Linear guide mechanism, driven by pneumatic cylinder
b. Vertical movement : Independent movement at each position, driven by pneumatic cylinder

7-5 Unloader Module (3-lot type)

7-5-1 Outline

This module moves carrier-loaded processed wafers from the wet station.

7-5-2 Specifications

a. Carrier storage capacity : 3 lots (6 carriers)
b. Material : FMT3331(PVC)

7-5-3 Functions

(1) Carrier detection (See Fig. 1 below.)

a. Method : Presence of a carrier at each position is detected by transmission type photosensors.

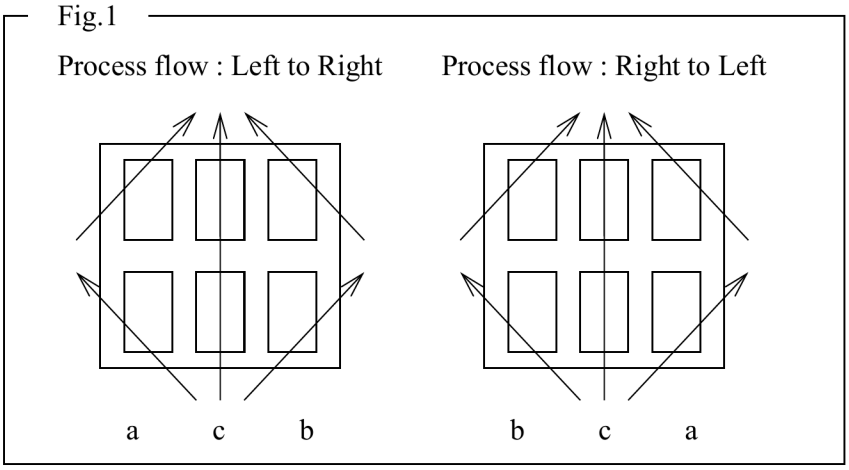
b. Detection

(a) Transfer unit delivery position : Necessary presence of two carriers from the processing module is confirmed by two sensors operating independently.

(b) Carry-out position : Necessary presence of two carriers at thecarry-out position is confirmed by two sensors operating independently.

(c) Other positions : Subsequent lot position is confirmed by a sensor.

Fig.1



(2) Transfer

a. Horizontal movement : Linear guide mechanism, driven by pneumatic cylinder
b. Vertical movement : Independent movement at each position, driven by pneumatic cylinder

7-6 Chuck Rinsing Module

7-6-1 Outline

The chuck rinsing module rinses chemical solutions and DI water from the transfer unit's chuck before the transfer unit collects new wafers at the loader as well as before and after the transfer unit delivers wafers to a rinsing or chemical processing bath. The chuck rinsing module prevents wafers from being contaminated with residual chemical solutions or DI water, and also prevents chemical solutions in different processing baths from contaminating each other with solution residues adhering to the chuck.The rinsing module sprays DI water over the chuck's wafer guides and vertical support arms simultaneously and dries them with pressurized N_2 gas.

7-6-2 Specifications

(1) Main body
- a. Material : FMT3331(PVC)

(2) Piping
- a. Material
  - (a) For DI water : PVDF, PFA
  - (b) For N_2 gas : PFA

7-6-3 Functions

(1) DI water spraying section
- a. Spray nozzle : Full cone pattern type
  - •Material : PVDF
  - •Nozzle pipe : PVDF
- b. Spray control : Anti-corrosive pneumatic valve (water-saving type) with flow regulator
  - •Fluid contact surface : PTFE, PVDF
  - •Orifice : 18 mm dia.

(2) N_2 blower section
- a. N_2 blow nozzle : Spray type (linear nozzle array)
  - •Material : PP
- b. N_2 blow control : Two-port pilot valve made of stainless steel
  - •Pressure rating : 1.5MPa
  - •Orifice : 15 mm dia.
- c. Filter : Millipack filter unit, 3 sets, MPGL10CBJ 0.01 μm
  - •Material : PVDF

7-7 HF Measuring Tank

7-7-1 Outline

The HF measuring tank receives HF from the plant supply line, and measures out accurate quantities in accord with the required density in the processing bath. The tank employs the overflow measuring method to ensure precise measurement and repeatability.

7-7-2 Specifications

(1) Chemical solution

a. HF : 49% or less

b. Mixing ratio : 1:2 to 1:628 ($HF:H_2O$)

c. Tank capacity

(a) 10.0 to 1.2 L (1:2 to 1:24)

(b)2.0 to 0.36 L (1:14 to 1:83)

(c)0.61 to 0.09 L (1:48 to 1:333)

(d)0.22 to 0.05 L (1:135 to 1:628)

*The client must preselect a single mixing ratio within the range of permissible ratios noted above. Tank capacity should be determined according to the selected mixing ratio.

(2) Materials

a. Measuring tank : PTFE, PFA

b. Measuring box : FMT3331(PVC) (Main body)

c. Piping : PFA

7-7-3 Functions

(1) Chemical supply to measuring tank

a. Method : The measuring tank is connected directly to the main chemical box.

b. Control : Refer to the “Connections between Chemical Sources and the Equipment.”

(2) Chemical supply to the processing bath(HF)

a. Method : Gravity feed

b. Control : Anti-corrosive pneumatic valve

- Fluid contact surface : PTFE
- Orifice : 10 mm dia.

(3) Chemical supply to the processing bath(H_2O)

a. Method : The processing bath is connected directly to the chemical delivery section. (No measuring tank is provided.)

b. Control : Refer to the “Connections between Chemical Sources and the Equipment.”

(4) Control of chemical level in measuring tank

a. Chemical surface level monitoring method : N_2 bubbling pressure

b. Sensor : Semiconductor pressure transducer

c. Monitoring levels and control

(a) HF Sensor

i) Upper limit level : To prevent tank overflow

ii) Designated level : Overflow measurement level

iii) Empty level : To confirm completion of supply to processing bath

7-8 HF Processing Bath Module

7-8-1 Outline

The HF processing bath is made of PTFE which is highly resistant to corrosion, and materials for other parts have also been carefully selected to minimize particle generation during processing. All parts and functions of this bath have been designed to maximize etching uniformity.

7-8-2 Specifications

(1) Chemical solution

a. HF	: 49% or less
b. DI water	: 18 MΩ or higher
c. Mixing ratio	: 1:2 to 1:628 ($HF:H_2O$) *The client must preselect a single mixing ratio within the range of permissible ratios noted above.
d. Bath capacity	: 27.0 L
e. Circulating capacity	: Approx. 3 L

(2) Materials

a. Processing bath	: PTFE
b. Baffle plate	: PEEK
c. Upper vat	: FMT3331(PVC) (Main body section)
d. Piping	: PFA

(3) Bath design

a. Chemical solutions overflow to the outer bath all across the serrated upper edges of the inner bath walls.

7-8-3 Functions

(1) Auto-covers

a. Open/close direction	: Twin covers opening right/left
b. Drive source	: Pneumatic cylinder
c. Material	: PTFE

(2) Bath cleaning

a. Cleaning method	: Each time chemicals are replaced, the bath is first drained of old solution, then filled with DI water and drained again to thoroughly flush the inside clean.
b. DI water supply control	: Anti-corrosive pneumatic valve (water saving type) with flow regulator •Fluid contact surface : PTFE •Orifice : 10 mm dia.

(3) Control of chemical level in processing bath (See Fig. 1 below.)

a. Chemical surface level monitoring method : N_2 bubbling pressure

b. Sensor : Semiconductor pressure transducer

c. Monitoring levels and control

(a) Inner bath sensor

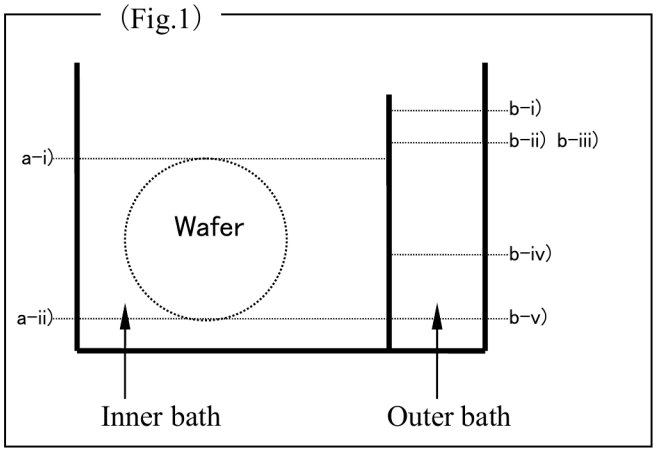
i) Lower limit level : To ensure sufficient chemical to cover wafer tops

ii) Empty level : To confirm complete drainage from the inner bath

(b) Outer bath sensor

i) Upper limit level : To prevent chemical overflow
ii) Designated DI water level : To confirm sufficient DI water for bath cleaning
iii) Designated chemical level : To optimize processing and start the chemical circulation pump
iv) Lower limit level for circulation pump protection : To turn off circulation pump
v) Empty level : To confirm complete drainage from the outer bath

(Fig.1)



7-9 HF Circulation System (Etchgard HPX)

7-9-1 Outline

The circulation system incorporates an electric thermo-controller and filter to maintain the chemical solution at its optimum temperature and to continuously remove particles from the chemical solution.

7-9-2 Specifications

(1) Temperature control section
- a. Control range : 22°C to 30°C
- b. Accuracy : ±0.3°C
- c. Electric thermo-controller : Direct temperature control by electric thermo-controller (Peltier elements)
  - •Heat exchanger : ETC232-G-N-CE
  - •Power supply : ETC232-DNF-CE
  - •Fluid contact surface : PTFE, PFA
- d. Temperature controller : PID control system
- e. Sensor : Platinum resistor Pt 100Ω shielded with PFA
- f. Measuring point : Inside processing bath for control of solution temperature

(2) Circulation section
- a. Circulation method : By pneumatic pump
- b. Pump : Bellows type (Teflon bellows) FF-20BT-T3
  - •Temperature rating : RT to 100°C
  - •Maximum drive pressure : 0.3 MPa
  - •Maximum pump pressure : 0.3 MPa
  - •Maximum air consumption : 150 L(Normal)/min.

(3) Filtering section
- a. Filtering method : Cartridge filter
- b. Filter : Etchgard HPX CPUV01P01, 0.1µm
  - •Material : Polyethylene
  - •Temperature rating : 60°C
  - •Effective filtering area : 11,000 cm^2
  - •Operating pressure differential : 0.34 MPa
- c. Filter housing : ChemiGuard 12” YY461230A
  - •Material : PFA
- d. Air vent
  - (a) Filter IN : PFA 1/2” dia. Tube
    - •Orifice : 1.0 mm dia.
  - (b) Filter OUT : PFA 6 mm dia. x 4 mm dia.tube

(4) Drainage section
- a. Method : Gravity drain
- b. Drain valve : Anti-corrosive pneumatic valve
  - •Fluid contact surface : PTFE

7-10 H_3PO_4 Measuring Tank (PW-5MA-SC)

7-10-1 Outline

This measuring tank receives chemical solutions from the plant supply lines, measures out accurate quantities and stores them in separate tanks. The measuring tank for H3PO4 also contains a pre-heating device which reduces solution heating time in the processing bath. The tank's replenishment function stabilizes chemical solutions, extending their life span and enhancing their processing power.

7-10-2 Specifications

(1) Chemical solutions
- a. Phosphoric acid : 87% or less
- b. DI water : 18 MΩ or higher
- c. Tank capacity
  - (a) Phosphoric acid : 19.4 to 44.0 L

(2) Materials
- a. Measuring tank
  - (a) Phosphoric acid : PTFE
  - (b) DI water : PTFE
- b. Measuring box : FMH5300 (main body)
- c. Piping : PFA

7-10-3 Functions

(1) Chemical supply to the measuring tank
- a. Method : Source line and measuring tank directly connected (source line to be provided by client)
- b. Control : Refer to the "Connections between Chemical Sources and the Equipment."

(2) Chemical supply to the processing bath
- a. Method : Gravity feed
- b. Control
  - (a)Phosphoric acid : Anti-corrosive pneumatic valve
    - •Fluid contact surface: PTFE
    - •Orifice: 18 mm dia.

(3) Replenishment function
- a. Level replenishment (phosphoric acid)
  To be replenished by opening the supply valve whenever the actual quantity of chemical solution in the processing bath drops below the designated level for a certain time period. This does not apply if wafers are being processed in the bath.
- b. Designated amount replenishment (DI water)
  To be replenished to the inner bath with a metered spiking pump.
  - (a)Replenishment pump : Metered spiking pump PW-5MA-SC
    - •Fluid contact surface : PTFE
    - •Flow rate : 20 to 200 ml/min.

(4) Control of chemical level in measuring tank

a. Chemical surface level monitoring method : N_2 bubbling pressure

b. Sensor : Semiconductor pressure transducer

c. Monitoring levels and control

(a) Phosphoric acid sensor 1

i) Upper limit level : To prevent overflow

ii) Designated level : To maintain a designated chemical level

iii) Tank replenishment stop level : To stop refilling of tank

iv) Tank replenishment start level : To start refilling of tank

v) Lower limit level : To turn off heater

vi) Empty level : To confirm completion of supply to processing bath

(b) Phosphoric acid sensor 2

i) Lower limit level : To turn off heater

(*A back-up safety device in case sensor 1 fails.)

(c) DI water sensor

i) Upper limit level : To prevent overflow

ii) Tank replenishment stop level : To stop refilling of tank

iii) Tank replenishment start level : To start refilling of tank

iv) Lower limit level : To protect metered spiking pump

v) Empty level : To confirm complete drainage

(5) Pre-heating section (for H_3PO_4)

a. Control range : RT to 80°C

b. Accuracy : ±3°C

c. Max. temp : 80°C

d. Heating device : Immersion type quartz glass double coil heater
1.2 kW x 4 sets

e. Temperature controller : PID control system

f. Overheat prevention : Set with variable resistor (separate circuit)

g. Sensor : K-type thermocouple shielded with PFA tube

h. Measuring point : Inside measuring tank for control of solution temperature and overheat protection

7-11 H_3PO_4 Processing Bath Module

7-11-1 Outline

This processing bath etches out nitric film with heated phosphoric acid stabilized by steady DI water replenishment and circulation. The module is specially designed and engineered to prevent sudden temperature drops from DI water replenishment. To ensure safe operation, the process bath is protected by an external proetction bath for a heat insulation and an upper vat.

7-11-2 Specifications

(1) Chemical solution

a. Phosphoric acid	: 87% or less
b. DI water	: 18 MΩ or higher
c. Bath capacity	: 28.5 L
d. Circulating capacity	: Approx. 3 L
e. Temperature	: Max. 160°C

(2) Materials

a. Processing bath	: Quartz glass
b. Protection bath	: PFA
c. Upper vat	: FMH5300(HT-PVC) (Main body section)
d. Piping	: PFA

(3) Bath design

a. Chemical solutions overflow to the outer bath all across the V-notched upper edges of the inner bath walls.

7-11-3 Functions

(1) Auto-covers

a. Open/close direction	: Twin covers opening right/left
b. Drive source	: Pneumatic cylinder
c. Material	: PTFE

(2) Bath cleaning

a. Cleaning method : Each time chemicals are replaced, the bath is first drained of old solution, then filled with DI water and drained again to thoroughly flush the inside clean.

b. DI water supply control : Anti-corrosive pneumatic valve (water saving type) with flow regulator

- Fluid contact surface : PTFE
- Orifice : 10 mm dia.

(3) Control of chemical level in processing bath (See Fig. 1 below.)

a. Chemical surface level monitoring method : N_2 bubbling pressure

b. Sensor : Semiconductor pressure transducer

c. Monitoring levels and control :

(a) Inner bath sensor 1

i) Lower limit level : To ensure sufficient chemical to cover wafer tops
ii) Lower limit level for heater protection : To turn off heater
iii) Empty level : To confirm complete drainage from the inner bath

(b) Inner bath sensor 2

i) Lower limit level for heater protection : To turn off heater
(*A back-up safety device in case sensor 1 fails.)

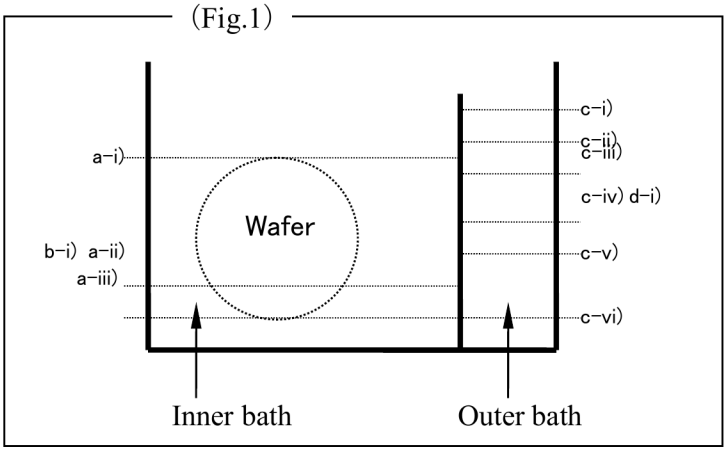
(c) Outer bath sensor 1

i) Upper limit level : To prevent chemical overflow
ii) Designated chemical level : To optimize processing and start the chemical circulation pump and heater
iii) Designated DI water level : To confirm sufficient DI water for bath cleaning
iv) Lower limit level for heater protection : To turn off heater
v) Lower limit level for circulation pump protection : To turn off circulation pump
vi) Empty level : To confirm complete drainage from the outer bath

(d) Outer bath sensor 2

i)Lower limit level for heater protection : To turn off heater
(*A back-up safety device in case sensor 1 fails.)

(Fig.1)



(4) Thermo-controller section

a. Control range	: 100°C to 160°C (with circulation system)
b. Accuracy	: ±5°C
c. Heater	: Immersion type quartz glass heater 1.5 kW (x2)
	•Fluid contact surface : Quartz glass
d. Temperature controller	: PID Control system
e. Overheat prevention	: Set with variable resistor (separate circuit)
f. Sensor	: K-type thermocouple shielded with PFA
g. Measuring point	: Inside processing bath for control of solution temperature and overheat protection

7-12 H_3PO_4 Circulation System (Quick Change ATX)

7-12-1 Outline

The circulation system incorporates an in-line heater and filter which maintain the circulating chemical solution at optimum temperature and cleanness. The circulation piping is designed to minimize dead solution and thus enhance processing efficiency.

7-12-2 Specifications

(1) Temperature control section

a. Control range	: 100°C to 160°C
b. Accuracy	: ± 5°C
c. Heating device	: Ceramic heater (in-line type) •4.0 kW •Fluid contact surface : Quartz glass •With leak sensor
d. Temperature controller	: PID control system
e. Overheat prevention	: Set with variable resistor (separate circuit)
f. Sensor	: K-type thermocouple shielded with PFA tube
g. Measuring points	: Inside processing bath for control of solution temperature Chemical outlet side of in-line heater to prevent overheating Surface of in-line heater to prevent overheating

(2) Circulation section

a. Circulation method	: By pneumatic pump
b. Pump	: Bellows type (Teflon bellows) FF-20HT-T3 •Temperature rating : RT to 160°C •Maximum drive pressure : 0.2 MPa •Maximum pump pressure : 0.2 MPa •Maximum air consumption : 150 L(Normal)/min.

(3) Filtering section

a. Filter method	: Disposable filter
b. Filter	: QuickChange ATX QCDGATXLH, 0.2µm •Material : PTFE, PFA •Temperature rating : 160° C •Effective filtering area : 13,000 cm^2
c. Air vent	
(a) Filter IN	: PFA 1/2” dia. Tube •Orifice : 1.0 mm dia.
(b) Filter OUT	: PFA 6 mm dia. x 4 mm dia. Tube

7-13 H_3PO_4 Cooling Tank Type Drain System

7-13-1 Outline

High-temperature chemical solution is pumped from the processing bath and circulation system to the cooling tank where the solution is cooled to a specified temperature and then emptied into the plant drainage line.

7-13-2 Specifications

(1) Drainage section

a. Drain method : The circulation pump forces solution out from the internal and external baths to cooling tank, and after cooling, soluton in the cooling tank is drained by gravity.

b. Drain temperature : 60°C or lower

(2) Cooling tank

a. Materials : Stainless steel (SUS 316) with Teflon coated

b. Capacity : Max. 54 L

c. Cooling method : Heat exchange system with PFA cooling coil tube
- PFA tube 1/2" dia. × 25 m

d. Coolant : Water of 20°C or lower

e. Drain valve : Anti-corrosive pneumatic valve
- Fluid contact surface : PTFE
- Orifice : 16 mm dia.

(3) Quantity level control in the cooling tank

a. Monitoring method : N_2 bubbling pressure

b. Sensor : Semiconductor pressure transducer

c. Control

(a) Sensor 1

i) Upper limit level : To prevent overflow

ii) Designated level : To stop the supply of solution to the tank from processing bath

iii) Designated level : To start the supply of solution to the tank from processing bath

iv) Empty level : To confirm complete drainage from the tank

(b) Sensor 2

i) Upper limit level : To prevent overflow
(*A back-up safety device in case Sensor 1 fails.)

(4) Drainage temperature setting

a. Drainage temperature setting : Variable resistor for setting upper temperature limit

b. Sensor : K-type thermocouple shielded with PFA tube

c. Control : Auto-drainage at specified temperature

7-14 SC-1 Measuring Tank (PW-5MA-SC)

7-14-1 Outline

The SC-1 measuring tank receives chemical solutions from the plant's supply lines, measures out accurate quantities in accord with designated densities and mixing ratios, and stores them in separate tanks. The measuring tank for DI water also contains a pre-heating device which reduces solution heating time in the processing bath. The tank's replenishment function stabilizes chemical solutions, extending their life span and enhancing their processing power.

7-14-2 Specifications

(1) Chemical solutions

a. Ammonia	: 30% or less	
b. Hydrogen peroxide	: 35% or less	
c. DI water	: 18 MΩ or higher	
d. Mixing ratio	: 1:1:4 to 1:1:269 ($NH_4OH:H_2O_2:H_20$)	
e. Tank capacity		
(a) Ammonia	: 0.7 to 5.0 L	
(b) Hydrogen peroxide	: 0.7 to 5.0 L	1:1:4 to 1:1:40
(c) DI water	: 19.9 to 28.5 L	
(d) Ammonia	: 0.11 to 0.8 L	
(e) Hydrogen peroxide	: 0.11 to 0.8 L	1:1:36 to 1:1:269
(f) DI water	: 28.3 to 29.7 L	

*The client must preselect a single mixing ratio within the range of permissible ratios noted above. Tank capacity should be determined according to the selected mixing ratio.

(2) Materials

a. Measuring tank	
(a) Ammonia	: PFA, PTFE
(b) Hydrogen peroxide	: PFA, PTFE
(c) DI water	: PTFE
b. Measuring box	: FMH5300(HT-PVC) (main body)
c. Piping	: PFA

7-14-3 Functions

(1) Chemical supply to the measuring tank

a. Method	: Source line and measuring tank directly connected (Source line to be provided by client)
b. Control	: Refer to the "Connections between Chemical Sources and the Equipment."

(2) Chemical supply to the processing bath

a. Method	: Gravity feed
b. Control	
(a) Ammonia	: Anti-corrosive pneumatic valve •Fluid contact surface : PTFE •Orifice : 10 mm dia.
(b) Hydrogen peroxide	: Anti-corrosive pneumatic valve •Fluid contact surface : PTFE •Orifice : 10 mm dia.
(c) DI water	: Anti-corrosive pneumatic valve •Fluid contact surface : PTFE •Orifice : 18 mm dia.

(3) Replenishment function

a. Level replenishment : To be replenished by opening the supply valve whenever the actual quantity of chemical solution in the processing bath drops below the designated level for a certain time period. This does not apply if wafers are being processed in the bath.

b. Designated amount : To be replenished to the outer bath with a metered replenishment spiking pump. Spiking frequency and duration are programmable using any or both of the following methods.
- Spiking a certain amount per a specified time interval
- Spiking a certain amount per a specified number of processed lots

(a) Replenishment Pump : Metered spiking pump
PW-5MA-SC
- Fluid contact surface : PTFE
- Flow rate : 20 to 200 ml/min.

(4) Control of chemical level in measuring tank

a. Chemical surface level monitoring method : N_2 bubbling pressure

b. Sensor : Semiconductor pressure transducer

c. Monitoring levels and control

(a) Ammonia Sensor
i) Upper limit level : To prevent overflow
ii) Designated level : To maintain a designated chemical level
iii) Tank replenishment stop level : To stop refilling of tank
iv) Tank replenishment start level : To start refilling of tank
v) Lower limit level : To protect metered spiking pump
vi) Empty level : To confirm completion of supply to processing bath

(b) Hydrogen peroxide Sensor
i) Upper limit level : To prevent overflow
ii) Designated level : To maintain a designated chemical level
iii) Tank replenishment stop level : To stop refilling of tank
iv) Tank replenishment start level : To start refilling of tank
v) Lower limit level : To protect metered spiking pump
vi) Empty level : To confirm completion of supply to processing bath

(c) DI water Sensor 1
i) Upper limit level : To prevent overflow
ii) Designated level : To maintain a designated chemical level
iii) Tank replenishment stop level : To stop refilling of tank
iv) Tank replenishment start level : To start refilling of tank
v) Lover limit level : To turn off heater and protect metered spiking pump
vi) Empty level : To confirm completion of supply to processing bath

(d) DI water Sensor 2
i) Lower limit level for heater protection : To turn off heater
(*A back-up safety device in case sensor 1 fails.)

(5) Pre-heating section (for DI water)

a. Control range : RT to 80°C

b. Accuracy : ±3°C

c. Max. temp : 80°C

d. Heating device : Immersion type quartz glass double coil heater
- 1.2 kW × 4 sets

e. Temperature controller : PID control system

f. Overheat prevention : Set with variable resistor (separate circuit)

g. Sensor : K-type thermocouple shielded with PFA tube

h. Measuring point : Inside measuring tank for control of solution temperature and overheat protection

7-15 SC-1 Processing Bath Module

7-15-1 Outline

The SC-1 processing bath cleans wafers with a mixed solution of ammonia, hydrogen peroxide and DI water. The processing bath employs our uniquely efficient nozzle array system which maximizes processing power with the minimum amount of chemical solution. To ensure safe operation, the process bath is protected by an upper vat.

7-15-2 Specifications

(1) Chemical solutions

a. Ammonia	: 30% or less
b. Hydrogen peroxide	: 35% or less
c. DI water	: 18 MΩ or higher
d. Mixing ratio	: 1:1:4 to 1:1:269 ($NH_4OH:H_2O_2:H_2O$) *The client must preselect a single mixing ratio within the range of permissible ratios noted above.
e. Bath capacity	: 26.9 L
f. Circulating capacity	: Approx. 3 L

(2) Materials

a. Processing bath	: Quartz glass
b. Upper vat	: FMH5300(HT-PVC) (main body)
c. Piping	: PFA

(3) Bath design

a. Chemical solutions overflow to the outer bath all across the V-notched upper edges of the inner bath walls.

7-15-3 Functions

(1) Auto-cover

a. Open/close direction	: Twin covers opening right/left
b. Drive source	: Pneumatic cylinder
c. Materials	: PTFE

(2) Bath cleaning

a. Cleaning method	: Each time chemicals are replaced, the bath is first drained of old solution, then filled with DI water and drained again to thoroughly flush the inside clean.
b. DI water supply control	: Anti-corrosive pneumatic valve (water saving type) with flow regulator •Fluid contact surface : PTFE •Orifice : 10 mm dia.

(3) Control of chemical level in processing bath (See Fig. 1 below.)

a. Chemical surface level monitoring method : N_2 bubbling pressure

b. Sensor : Semiconductor pressure transducer

c. Monitoring levels and control

(a) Inner bath sensor

i) Lower limit level : To ensure sufficient chemical to cover wafer tops

ii) Empty level : To confirm complete drainage from the inner bath

(b) Outer bath sensor 1

i) Upper limit level : To prevent chemical overflow

ii) Designated chemical level : To optimize processing and start the chemical circulation pump and heater

iii) Designated DI water level : To confirm sufficient DI water for bath cleaning

iv) Lower limit level for heater protection : To turn off heater

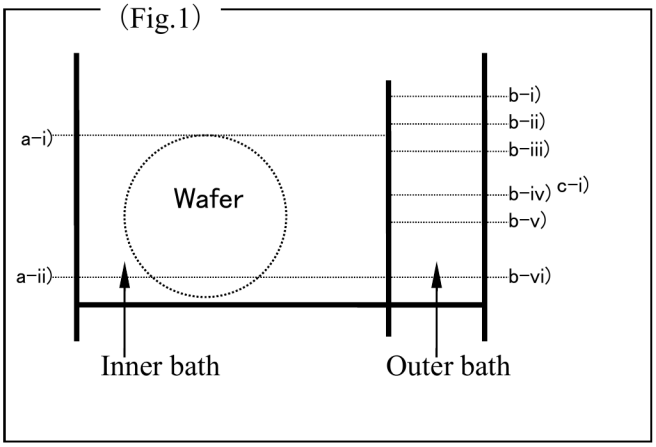
v) Lower limit level for circulation pump protection : To turn off circulation pump

vi) Empty level : To confirm complete drainage from the outer bath

(c) Outer bath sensor 2

i) Lower limit level for heater protection : To turn off heater
(*A back-up safety device in case sensor 1 fails.)

(Fig.1)



7-16 SC-2 Measuring Tank (PW-5MA-SC)

7-16-1 Outline

The SC-2 measuring tank receives chemical solutions from the plant's supply lines, measures out accurate quantities in accord with designated densities and mixing ratios, and stores them in separate tanks. The measuring tank for DI water also contains a pre-heating device which reduces solution heating time in the processing bath. The tank's replenishment function stabilizes chemical solutions, extending their life span and enhancing their processing power.

7-16-2 Specifications

(1) Chemical solutions

a. Hydrochloric acid	: 37% or less	
b. Hydrogen peroxide	: 35% or less	
c. DI water	: 18 MΩ or higher	
d. Mixing ratio	: 1:1:4 to 1:1:269 ($HCL:H_2O_2:H_20$)	
e. Tank capacity		
(a) Hydrochloric acid	: 0.7 to 5.0 L	1:1:4 to 1:1:40
(b) Hydrogen peroxide	: 0.7 to 5.0 L	
(c) DI water	: 19.9 to 28.5 L	
(d) Hydrochloric acid	: 0.11 to 0.8 L	1:1:36 to 1:1:269
(e) Hydrogen peroxide	: 0.11 to 0.8 L	
(f) DI water	: 28.3 to 29.7 L	

*The client must preselect a single mixing ratio within the range of permissible ratios noted above. Tank capacity should be determined according to the selected mixing ratio.

(2) Materials

a. Measuring tank	
(a) Hydrochloric acid	: PFA, PTFE
(b) Hydrogen peroxide	: PFA, PTFE
(c) DI water	: PTFE
b. Measuring box	: FMH5300(HT-PVC) (main body)
c. Piping	: PFA

7-16-3 Functions

(1) Chemical supply to the measuring tank

a. Method	: Source line and measuring tank directly connected (Source line to be provided by client)
b. Control	: Refer to the "Connections between Chemical Sources and the Equipment."

(2) Chemical supply to the processing bath

a. Method	: Gravity feed
b. Control	
(a) Hydrochloric acid	: Anti-corrosive pneumatic valve •Fluid contact surface : PTFE •Orifice : 10 mm dia.
(b) Hydrogen peroxide	: Anti-corrosive pneumatic valve •Fluid contact surface : PTFE •Orifice : 10 mm dia.
(c) DI water	: Anti-corrosive pneumatic valve •Fluid contact surface : PTFE •Orifice : 18 mm dia.

(3) Replenishment function

a. Level replenishment : To be replenished by opening the supply valve whenever the actual quantity of chemical solution in the processing bath drops below the designated level for a certain time period. This does not apply if wafers are being processed in the bath.

b. Designated amount : To be replenished to the outer bath with a metered replenishment spiking pump. Spiking frequency and duration are programmable using any or both of the following methods.

- Spiking a certain amount per a specified time interval
- Spiking a certain amount per a specified number of processed lots

(a) Replenishment Pump : Metered spiking pump
PW-5MA-SC
- Fluid contact surface : PTFE
- Flow rate : 20 to 200 ml/min.

(4) Control of chemical level in measuring tank

a. Chemical surface level monitoring method : N_2 bubbling pressure

b. Sensor : Semiconductor pressure transducer

c. Monitoring levels and control

(a) Hydrochloric acid Sensor

i) Upper limit level : To prevent overflow
ii) Designated level : To maintain a designated chemical level
iii) Tank replenishment stop level : To stop refilling of tank
iv) Tank replenishment start level : To start refilling of tank
v) Lower limit level : To protect metered spiking pump
vi) Empty level : To confirm completion of supply to processing bath

(b) Hydrogen peroxide Sensor

i) Upper limit level : To prevent overflow
ii) Designated level : To maintain a designated chemical level
iii) Tank replenishment stop level : To stop refilling of tank
iv) Tank replenishment start level : To start refilling of tank
v) Lower limit level : To protect metered spiking pump
vi) Empty level : To confirm completion of supply to processing bath

(c) DI water Sensor 1

i) Upper limit level : To prevent overflow
ii) Designated level : To maintain a designated chemical level
iii) Tank replenishment stop level : To stop refilling of tank
iv) Tank replenishment start level : To start refilling of tank
v) Lover limit level : To turn off heater and protect metered spiking pump
vi) Empty level : To confirm completion of supply to processing bath

(d) DI water Sensor 2

i) Lower limit level for heater protection : To turn off heater
(*A back-up safety device in case sensor 1 fails.)

(5) Pre-heating section (for DI water)

a. Control range : RT to 80°C
b. Accuracy : ±3°C
c. Max. temp : 80°C
d. Heating device : Immersion type quartz glass double coil heater
- 1.2 kW × 4 sets

e. Temperature controller : PID control system
f. Overheat prevention : Set with variable resistor (separate circuit)
g. Sensor : K-type thermocouple shielded with PFA tube
h. Measuring point : Inside measuring tank for control of solution temperature and overheat protection

7-17 SC-2 Processing Bath Module

7-17-1 Outline

The SC-2 processing bath cleans wafers with a mixed solution of hydrochloric acid, hydrogen peroxide and DI water. The processing bath employs our uniquely efficient nozzle array system which maximizes processing power with the minimum amount of chemical solution. To ensure safe operation, the process bath is protected by an upper vat.

7-17-2 Specifications

(1) Chemical solutions

a. Hydrochloric acid	: 37% or less
b. Hydrogen peroxide	: 35% or less
c. DI water	: 18 MΩ or higher
d. Mixing ratio	: 1:1:4 to 1:1:269 ($HCL:H_2O_2:H_2O$)
	*The client must preselect a single mixing ratio within the range of permissible ratios noted above.
e. Bath capacity	: 26.9 L
f. Circulating capacity	: Approx. 3 L

(2) Materials

a. Processing bath	: Quartz glass
b. Upper vat	: FMH5300(HT-PVC) (main body)
c. Piping	: PFA

(3) Bath design

a. Chemical solutions overflow to the outer bath all across the V-notched upper edges of the inner bath walls.

7-17-3 Functions

(1) Auto-cover

a. Open/close direction	: Twin covers opening right/left
b. Drive source	: Pneumatic cylinder
c. Materials	: PTFE

(2) Bath cleaning

a. Cleaning method	: Each time chemicals are replaced, the bath is first drained of old solution, then filled with DI water and drained again to thoroughly flush the inside clean.
b. DI water supply control	: Anti-corrosive pneumatic valve (water saving type) with flow regulator •Fluid contact surface : PTFE •Orifice : 10 mm dia.

(3) Control of chemical level in processing bath (See Fig. 1 below.)

a. Chemical surface level monitoring method : N_2 bubbling pressure

b. Sensor : Semiconductor pressure transducer

c. Monitoring levels and control

(a) Inner bath sensor

i) Lower limit level : To ensure sufficient chemical to cover wafer tops

ii) Empty level : To confirm complete drainage from the inner bath

(b) Outer bath sensor 1

i) Upper limit level : To prevent chemical overflow

ii) Designated chemical level : To optimize processing and start the chemical circulation pump and heater

iii) Designated DI water level : To confirm sufficient DI water for bath cleaning

iv) Lower limit level for heater protection : To turn off heater

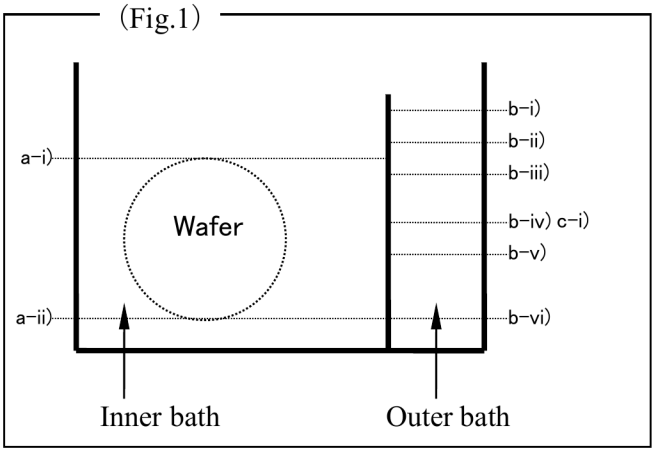
v) Lower limit level for circulation pump protection : To turn off circulation pump

vi)Empty level ：To confirm complete drainage from the outer bath

(c) Outer bath sensor 2

i) Lower limit level for heater protection ：To turn off heater
(*A back-up safety device in case sensor 1 fails.)

（Fig.1）



7-18 SC Circulation System (Quick Change ATX)

7-18-1 Outline

The circulation system incorporates an in-line heater and filter which maintain the circulating chemical solution at optimum temperature and cleanness. The circulation piping is designed to minimize dead solution and thus enhance processing efficiency.

7-18-2 Specifications

(1) Temperature control section

a. Control range	: 35°C to 80°C
b. Accuracy	: ± 3°C
c. Max. temperature	: 80°C
d. Heating device	: Ceramic heater (in-line type) •4.0 kW •Fluid contact surface : Quartz glass •With leak sensor
e. Temperature controller	: PID control system
f. Overheat prevention	: Set with variable resistor (separate circuit)
g. Sensor	: K-type thermocouple shielded with PFA tube
h. Measuring points	: Inside processing bath for control of solution temperature Chemical outlet side of in-line heater to prevent overheating Surface of in-line heater to prevent overheating

(2) Circulation section

a. Circulation method	: By pneumatic pump
b. Pump	: Bellows type (Teflon bellows) FF-20BT-T3 •Temperature rating : RT to 100°C •Maximum drive pressure : 0.3 MPa •Maximum pump pressure : 0.3 MPa •Maximum air consumption : 150 L(Normal)/min.

(3) Filtering section

a. Filter method	: Disposable filter
b. Filter	: QuickChange ATX QCDVATXLH, 0.1μm •Material : PTFE, PFA •Temperature rating : 150° C •Effective filtering area : 13,000 cm^2
c. Air vent	
(a) Filter IN	: PFA 1/2” dia. Tube •Orifice : 1.0 mm dia.
(b) Filter OUT	: PFA 6 mm dia. x 4 mm dia. Tube

7-19 SC Pump Type Drain System

7-19-1 Outline

Chemical can be forcibly drained from the processing bath using a circulation pump.

7-19-2 Specifications

(1) Drainage section

a. Method : The circulation pump forces solution out from the internal and external baths, and solution in the circulation system is drained by gravity.

b. Drain valve (pump) : Anti-corrosive pneumatic valve
- Fluid contact surface : PTFE
- Orifice : 15 mm dia.

c. Drain valve (gravity) : Anti-corrosive pneumatic valve
- Fluid contact surface : PTFE
- Orifice : 10 mm dia.

7-20 EDR Processing Bath Module

7-20-1 Outline

The EDR processing bath is provided with DI water showering, upflow and quick dumping function for efficient rinsing chemical solution away from processed wafers. After completion of rinsing, the bath is automatically drained and cleaned with DI shower.

7-20-2 Specifications

(1) Rinsing solution
- a. DI water : 18 MΩ or higher
- b. Bath Capacity : 18.0 L

(2) Materials
- a. Rinsing bath : Quartz glass
- b. Upper vat : FMT3331(PVC) (Main body)
- c. Piping : PVDF, PFA

(3) Bath Design
- a. DI water overflows to the upper vat all across the V-notched upper edges of the bath walls.

7-20-3 Functions

(1) Control of DI water levels in rinsing bath
- a. DI water surface level monitoring : N_2 bubbling pressure
- b. Sensor : Semiconductor pressure transducer
- c. Monitoring levels and control
  - i) Lower limit level : To ensure sufficient DI water to cover wafer tops
  - ii) Empty level : To confirm complete drainage from the bath

(2) Upflow function
- a. Flow meter : Float type, 4 to 45 L/min.
  - •Float : PTFE
  - •Body : PTFE
  - •Gauge tube : Pyrex glass
- b. Control valve : Anti-corrosive pneumatic valve with flow regulator (water-saving type)
  - •Orifice : 18 mm dia.
  - •Fluid contact surface : PFA, PTFE
  - •Pressure rating : 0.3 MPa

(3) Showering function
- a. Spray nozzle : 45 degree type (full cone pattern)
  - •Fluid contact surface : PVDF
- b. Control valve : Anti-corrosive pneumatic valve with flow regulator (water-saving type)
  - •Orifice : 18 mm dia.
  - •Fluid contact surface : PFA, PTFE
  - •Pressure rating : 0.3 MPa

(4) Quick drain function
- a. Drainage valve : Directly incorporated in bath wall
  - •Diameter : 100 mm
  - •Fluid contact surface : PTFE

(5) Drain Line Switching *Optional
- a. Method : Three way at the rear connection section
- b. Control : Pneumatic valve
  - •Three way
  - •Fluid contact surface : HT-PVC
  - •Diameter : 40 mm.

7-21 Hot & Cold DI Water Quick Dump Rinsing (QDR) Bath Module

7-21-1 Outline

The Quick Dump Rinsing module can provide either hot or cold DI water showering, upflow and quick drain as well as N_2 bubbling functions to assure thorough and efficient removal of residual chemical solutions from processed wafers.

7-21-2 Specifications

(1) Rinsing solution
- a. DI water : 18 MΩ or higher
- b. Bath Capacity : 18.0 L
- c. Temperature : Max. 75°C

(2) Materials
- a. Rinsing bath : Quartz glass
- b. Upper vat : FMH5300(HT-PVC) (Main body)
- c. Piping : PVDF, PFA

(3) Bath Design
- a. DI water overflows to the upper vat all across the V-notched upper edges of the bath walls.

7-21-3 Functions

(1) Control of DI water level in rinsing bath
- a. DI water surface level monitoring method : N_2 bubbling pressure
- b. Sensor : Semiconductor pressure transducer
- c. Monitoring levels and control
  - i) Lower limit level : To ensure sufficient DI water to cover wafer tops
  - ii) Empty level : To confirm complete drainage from bath.

(2) Upflow function
- a.Flow meter : Float type, 4 to 45 L/min.
  - •Float : PTFE
  - •Body : PTFE
  - •Gauge tube : Pyrex glass
- b. Control valve : Anti-corrosive pneumatic valve with flow regulator (water saving type)
  - •Orifice : 18 mm dia.
  - •Fluid contact surface : PFA, PTFE
  - •Pressure rating : 0.3 MPa

(3) Showering function
- a. Spray nozzle : 45 degree type (full cone pattern)
  - •Fluid contact surface : PVDF
- b. Control valve : Anti-corrosive pneumatic valve with flow regulator (water saving type)
  - •Orifice : 18 mm dia.
  - •Fluid contact surface : PFA, PTFE
  - •Pressure rating : 0.3 MPa

(4) Bubbling function
- a. Bubbler : Teflon tube
- b. Control valve : Anti-corrosive solenoid valve
  - •Fluid contact surface : PTFE
- c. Flow meter : Float type with flow regulator
  - •Fluid contact surface : SUS, Pyrex glass

d. Filter : Waferguard GT Cartridge
- Filtration size : 0.01μm
- Material : PTFE
- Effective filtering area : 25 cm^2

(5) Switch over between hot and cold DI water

a. Method : Pneumatic valve operation

b. Control

(a) Hot DI water : Pneumatic valve (Normal close type)
- Orifice : 20 mm dia.
- Fluid contact surface : PFA
- Pressure rating : 0.3 MPa

(b) Cold DI water : Pneumatic valve (Normal open type)
- Orifice : 20 mm dia.
- Fluid contact surface : PFA
- Pressure rating : 0.3 MPa

(6) DI water heating coil protective function

a. Method : To protect the heating coil in the client's DI water heater from sudden residual heat buildup when the flow of hot DI water is stopped, cold DI water continues to be fed through the unit for a certain period of time.

b. Control : Pneumatic valve
- Orifice : 10 mm dia.
- Fluid contact surface : PTFE
- Pressure rating : 0.3 MPa

(7) Quick drain function

a. Drainage valve : Directly incorporated in bath wall
- Diameter : 100 mm
- Fluid contact surface : PTFE

(8) Drain Line Switching *Optional

a. Method : Three way at the rear connection section

b. Control : Pneumatic valve
- Three way
- Fluid contact surface : HT-PVC
- Diameter : 40 mm.

7-22 Quick Dump Rinsing (QDR) Bath Module

7-22-1 Outline

The Quick Dump Rinsing module is equipped with showering, upflow, quick drain and N_2 bubbling functions to assure thorough and efficient removal of residual chemical solutions from processed wafers.

7-22-2 Specifications

(1) Rinsing solution
- a. DI water : 18 MΩ or higher
- b. Bath Capacity : 18.0 L

(2) Materials
- a. Rinsing bath : Quartz glass
- b. Upper vat : FMH5300(Main body)
- c. Piping : PVDF, PFA

(3) Bath Design
- a. DI water overflows to the upper vat all across the V-notched upper edges of the bath walls.

7-22-3 Functions

(1) Control of DI water level in rinsing bath
- a. DI water surface level monitoring method : N_2 bubbling pressure
- b. Sensor : Semiconductor pressure transducer
- c. Measured levels and control
  - i) Lower limit level : To ensure sufficient DI water to cover wafer tops
  - ii) Empty level : To confirm complete drainage from bath.

(2) Upflow function
- a. Flow meter : Float type, 4 to 45 L/min.
  - •Float : PTFE
  - •Body : PTFE
  - •Gauge tube : Pyrex glass
- b. Control valve : Anti-corrosive pneumatic valve with flow regulator (water-saving type)
  - •Orifice : 18 mm dia.
  - •Fluid contact surface : PFA, PTFE
  - •Pressure rating : 0.3 MPa

(3) Showering function
- a. Spray nozzle : 45 degree type (full cone pattern)
  - •Fluid contact surface : PVDF
- b. Control valve : Anti-corrosive pneumatic valve with flow regulator (water-saving type)
  - •Orifice : 18 mm dia.
  - •Fluid contact surface : PFA, PTFE
  - •Pressure rating : 0.3 MPa

(4) Bubbling function
- a. Bubbler : Teflon tube
- b. Control valve : Anti-corrosive solenoid valve
  - •Fluid contact surface : PTFE
- c. Flow meter : Float type with flow regulator
  - •Fluid contact surface : SUS, Pyrex glass

d. Filter : Waferguard GT Cartridge
- •Filtration size : 0.01μm
- •Material : PTFE
- •Effective filtering area : 25 cm^2

(5) Quick drain function

a. Drainage valve : Directly incorporated in bath wall
- •Diameter : 100 mm
- •Fluid contact surface : PTFE

(6) Drain Line Switching *Optional

a. Method : Three way at the rear connection section

b. Control : Pneumatic valve
- •Three way
- •Fluid contact surface : HT-PVC
- •Diameter : 40 mm.

7-23 Final Rinsing (FR) Bath Module

7-23-1 Outline

The Final Rinsing Bath Module is used for final rinsing as well as for monitoring cleanliness of processed wafers with its resistivity meter. The bath is designed to assure high rinsing efficiency and rapid recovery of resistivity.

7-23-2 Specifications

(1) Rinsing solution
- a. DI water : 18 MΩ or higher
- b. Bath Capacity : 16.7 L

(2) Materials
- a. Rinsing bath : Quartz glass
- b. Upper vat : FMH5300(HT-PVC) (Main body)
- c. Piping : PVDF, PFA

(3) Bath Design
- a. DI water overflows to the upper vat all across the V-notched upper edges of the bath walls.

7-23-3 Functions

(1) Control of DI water levels in rinsing bath
- a. DI water surface level monitoring method : N_2 bubbling pressure
- b. Sensor : Semiconductor pressure transducer
- c. Monitoring levels and control
  - i) Lower limit level : To ensure sufficient DI water to cover wafer tops

(2) Resistivity measurement
- a. Measuring method : DI water is sampled at 30 mm below the bath edge and measured.
- b. Resistivity meter : AQM-110
  - •Detection part : SUS
  - •Body : PVDF

(3) Upflow function
- a. Flow meter : Float type, 4 to 45 L/min.
  - •Float : PTFE
  - •Body : PTFE
  - •Gauge tube : Pyrex glass
- b. Control valve : Anti-corossive pneumatic valve with flow regulator (water saving type)
  - •Orifice : 18 mm dia.
  - •Fluid contact surface : PFA, PTFE
  - •Pressure rating : 0.3 MPa

(4) Drainage section
- a. Method : Gravity drain
- b. Drain valve : Pneumatic valve
  - •Orifice : 10 mm dia.
  - •Fluid contact surface : PTFE

(5) Drain Line Switching *Optional
- a. Method : Three way at the rear connection section
- b. Control : Pneumatic valve
  - •Three way
  - •Fluid contact surface : HT-PVC
  - •Diameter : 40 mm.

7-24 IPA Vapor Dryer

7-24-1 Outline

The IPA vapor dryer dries wet wafers by condensing vaporized IPA (isopropyl alcohol) on wafer surfaces. The heating section (which raises the IPA temperature to 83°C) and the vaporizing section employ highly efficient thermal conduction materials to generate large volumes of IPA vapor. Wet wafers are brought to the IPA vapor dryer directly from processing baths and are loaded onto the lifter which lowers them into the proper drying position. The vapor bath's rapid replenishment of vapor levels to effective concentrations (30 seconds from the entry of new wafers) significantly improves the system's drying efficiency. Since the IPA dryer uses a flammable solvent as a displacement agent, we have strongly emphasized safety concerns in the system's design and manufacture as noted below. Nevertheless, we also urge our clients to fully familiarize themselves with all the techniques and procedures necessary to operate the dryer with absolute safety.

7-24-2 Specifications

(1) Chemical solution

a. Displacement agent : Isopropyl alcohol, EL-SS grade or higher,
•Water content : 40 ppm or less

b. Capacity : 13 L

c. Temperature : 83°C (used at boiling point)

(2) Materials

a. Vapor drying bath : Quartz glass

b. Cooling coil : Quartz glass

c. Lifter : Stainless steel (SUS 316), Teflon coated

d. IPA supply piping : Stainless steel (SUS 316)

e. Fire protection cover : Stainless steel (SUS 304)

f. Other parts : PTFE/PFA

g. Shutter : Stainless steel (SUS 304)

7-24-3 Functions

(1) Temperature control section

a. Heating section : Explosion-proof aluminum cast heater
3ø 200 V 12 kW, K-type thermocouple

b. Control : ON/OFF control system
Input and read-out through control panel display

c. Measuring points : Heater area
(for temperature control and overheat prevention)
Vapor bath (for monitoring only)

d. Overheat prevention : Set with variable resistor (separate circuit)

(2) Control of IPA level in vapor bath

a. Monitoring system

(a) Sensor 1 : Optical fiber sensor made of quartz glass (×4)

(b) Sensor 2 : Electrical capacitance sensor
(Back-up protective circuit in case sensor 1 fails.)

b. Monitoring levels and control

(a) Sensor 1

i) Upper limit level : To prevent overflow

ii) Designated level : To maintain specified amount of IPA and halt replenishment

iii) Lower limit level : To turn off heater

iv) Empty level : To confirm complete drainage from bath

(b) Sensor 2

i) Lower limit level : To turn off heater

(3) Lifter

a. Drive source	: AC servo motor
b. Stroke	: 460 mm
c. Ascent speed	: 3 to 100 mm/sec.

(4) Shutter

a. Drive source	: Pneumatic cylinder
b. Open/close	: Open only when wafers are carried in and out.

(5) Fire prevention cover

a. Drive source	: Pneumatic cylinder
b. Open/close	: Close only when fire occurs

(6) Vapor condensation zone

a. Coolant	: DI water or cooling water (supplied from plant utilities)
b. Temperature	: 20°C or below
c. Condensation device	: Quartz glass cooling coil , 12 mm dia. × 15 mm dia.7 steps

(7) Drainage

a. Method	: Gravity drain
b. Drain valve	: Anti-corrosive pneumatic valves •Fluid contact surface : PTFE/SUS •Pipe diameter at connecting section : 12 mm dia.

(8) DI water supply section

a. Function	: Showers DI water into vapor drying bath to cool and dilute IPA to help extinguish fires in emergencies.
b. Valve	: Anti-corrosive pneumatic valve (Dead water bypass line provided) •Fluid contact surface : PTFE •Pipe diameter at connecting section : 1/2”dia. •Provided with a piping for slow trickling to prevent water stagnation.

(9) Leakage detection

a. Fluid leak detection	: Float-type sensor
b. IPA gas detection	: IPA gas monitor (Lifetime: 6 months)

7-24-4 Automatic fire extinguisher system and IPA gas monitor

(1) Installation and maintenance of an automatic fire extinguisher system and maintenance of IPA gas monitor

We request all our clients to take responsibility for installing and maintaining an automatic fire extinguisher system for the equipment. If the manufacturer, name and other particulars for a desired extinguisher system are known, we can procure and install it on behalf of the client. However, in such cases the client must offer written agreement in advance that we will not be held liable or responsible for any subsequent problems or accidents. Clients must also agree to arrange their own maintenance contracts for IPA gas monitors and extinguisher systems with the original supplier(s) by themselves.

(2) Items to be confirmed when an automatic fire extinguisher system installed on a client behalf

a. Choosing a fire extinguisher system

As soon as you decide upon a particular fire extinguisher system, please advise us of its manufacturer, name and model number.

b. Calculating the required capacity of extinguisher gas

Please calculate the required capacity of extinguisher gas and advise us accordingly.

c. Handling of output signals from fire detection system

As soon as you decide upon a particular fire extinguisher system, please inform us of the signal codes from its fire detection sensors so that we can set the rest of the equipment to recognize them.

d. Installation of the fire extinguisher system

Placement of the fire detection sensors, the extinguisher nozzles and the main extinguisher unit will be decided through consultations among the client, the extinguisher manufacturer and ourselves. We manufacture all the necessary brackets and fittings for extinguisher installation, but in principle, the actual installation of the extinguisher system should be conducted by its manufacturer. If we are requested by the client to install it on behalf of the manufacturer, the equipment will be delivered to the client only after the extinguisher manufacturer has checked the system and confirmed its proper functioning.

e. Confirmation of the extinguisher system's proper functioning

After the equipment is installed at the client's premises, the extinguisher system will again be checked for proper functioning in the presence of the client, the extinguisher manufacturer and our representatives.

f. Fire detection signals

The extinguisher system must provide a 125V 3A dry contact to feed fire detection signals to our equipment.

7-24-5 Safety measures

(1) To ensure safe operation, the IPA vapor dryer continuously monitors the following aspect of its operation status.

a. IPA upper limit level
The IPA level in the vapor drying bath is constantly monitored to prevent oversupply.

b. IPA lower limit level
The IPA level in the vapor drying bath is constantly monitored to prevent heating when the bath solution is low or the tank is empty.

c. Chemical leaks
The pipelines and bath are monitored for chemical leakage.

d. IPA supply overtime
The IPA supply time is monitored to avoid oversupply.

e. Overheating of heater
The heater is monitored to prevent it from overheating.

f. Low exhaust pressure
The exhaust pressure is monitored to detect drop-offs or unacceptably low pressure levels.

g. Low flow rate of cooling water
The cooling water flow rate is monitored to ensure that the specified height of the IPA vapor line is maintained.

h. IPA vapor density
The IPA vapor density is monitored in the exhaust duct to alert operators whenever it reaches 30% and 60% of LEL.

i. Low N_2 purge pressure
The N_2 supply pressure to the vapor drying module is monitored.

j. Low N_2 purge flow rate
The N_2 purge flow rate is monitored to determine whether enough N_2 is flowing to sufficiently suppress the O_2 density in the heating section.

(2) Actions to be taken when abnormal operation states are detected
When an abnormal operation state is detected, the IPA dryer alerts operators with an alarm.
Wafers in rinsing baths at the time will stand by in their respective baths, and wafers in chemical processing baths will be carried down to an available rinsing bath and stand by.

(3) Safety devices

a. Preventative measures against static electricity
Insulated parts such as the lifter are earthen and other parts around the bath are made of stainless steel. No FMT3331(PVC) is used.

b. N_2 purge
N_2 purging is provided to reduce O_2 density around heat and spark sources, such as electrical control boxes, motors, heaters, etc.

c. IPA heater safety devices
The IPA is heated with a cast aluminum heater (explosion-proof type).
The system includes a temperature control sensor to constantly monitor the IPA heating temperature.
Another separate sensor is provided to detect overheating of the IPA heater itself.
The IPA heater is earthen. All terminals are completely sealed.

d. Safety precautions in the electrical system
The equipment employs only brush-less motors and barrier relays.

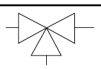
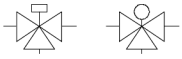
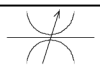
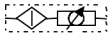
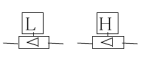
e. DI water showering
If a fire should break out in the IPA vapor dryer, DI water immediately showers down into the vapor bath to cool and dilute the IPA and help extinguish the fire.

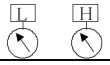
8 List of Device Symbols

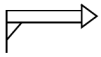
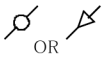
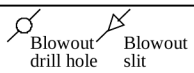
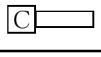
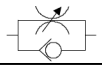
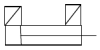
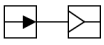
8-1 Explanation of Functions

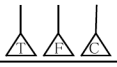
—	Symbol	Function	—	Symbol	Function
1	AH	Air Heater	16	PT	Pressure Feed
2	AI	Air In	17	RA	Rotary actuator
3	AN	Air Knife	18	RE	Regulator
4	AO	Air Out	19	RT	Recovery
5	AP	Air Pump	20	SD	Supply Water
6	AS	Aspirator	21	SF	Side Flow
7	BY	Bypass	22	SG	N_2 Gun
8	CD	Conductivity Meter	23	SH	Shower
9	CH	Change	24	SL	DI Gun
10	CI	Circulation	25	SP	Sampling
11	CO	Cooling	26	SU	Supply
12	CY	Cylinder	27	TC	Bath Washing
13	DR	Drain	28	TH	Load In
14	NB	Bubbling	29	UP	Upflow
15	NP	Nitrogen Purge			

8-2 Equipment Symbol List

Symbol		Name	Note
	MV	Open/close valve	Ball valve, etc.
	RV	Flow control valve	Diaphragm valve. Needle valve, etc.
	AV	Air valve	Single operation valve
	AV	Air valve	Double-operation air valve
	AV	Air valve	Relief air valve
	AV	Air valve	Air valve for quick water drain
	SV	Solenoid valve	
	SV (or AV)	Solenoid valve (or air valve)	N.O(Normal open) solenoid valve Air valve ( Air valve)
	TV	Three-way valve	
	KV	Control valve	
	FV	Constant-flow valve	
	CV	Check valve	
	RF	Relief valve	
	BV	Butterfly valve	For exhaust control
	RE	Regulator	
	As shown in the following exam ples. This symbol is used in the fllustrated part of the unit	 Dead water type (Air valve)  Attached Needle (Flow mate r)  Filter (Regulator)	
	SV	3 port solenoid valve	Single solenoid
	SV	4 port solenoid valve	Single solenoid
	SV	4 port solenoid valve	Double solenoids
	SV	4 port solenoid valve	Double solenoids 3 of 4 ports are open. (Center one is closed.)
	SV	5 port solenoid valve	Single solenoid
	SV	5 port solenoid valve	Double solenoids
	SV	5 port solenoid valve	Double solenoids 3 of 4 ports are open. (Center one is closed.)
	FL	Flow meter	For liquid
	FL	Flow meter	For gases
	FL	Flow meter	Digital type ( For liquid  For gases)
	FS	Flow meter w/contact	H: Upper limit level M: Designated chemical level L: Lower limit level (A digital flow meter is also included.)

Symbol		Name	Note
	FS	Flow switch	
	PG	Pressure gauge	
	PS	Pressure gauge w/contact	H: Upper limit level L: Lower limit level
	PS	Pressure transducer	
	MG	Manoster gauge	
	MM	Manoster switch	
	FI	Filter	
	EP	Electric pump	
	AP	Air pump	
	HE	Heater	
	CI	Thermo-electric cooling	
	CI	Cooling Unit	
	TP	Thermo-sensor	Platinum resistor (Pt100Ω)
	TP	Thermo-sensor	Platinum resistor (2 pair set) (Pt100Ω)
	TP	Thermo-protector	Platinum resistor (Pt100Ω)
	TC	Thermo-sensor	K Thermo-couple
	TC	Thermo-protector	K Thermo-couple
	TR	Thermo-sensor	Thermostat
	TR	Thermo-protector	Thermostat
	TT	Thermo-sensor	Thermistor
	TT	Thermo- protector	Thermistor
	TF	Temperature fuse	
	AS	Aspirator	
	PD	Pulse damper	
	MW	D-sonic	
	US	Ultrasonic generator	
	LV	Level-sensor	Pressure detection type

Symbol		Name	Note
	LV	Level-sensor	Electrode type
	LV	Level-sensor	Electrostatic type
	LV	Level-sensor	Float type
	LV	Level-sensor	Air type
	SL	DI gun	
	SG	N_2 gun	
		Air knife	
	PC	PH meter cell	
	CM	Conductivity meter	
	CC	Conductivity meter	
	CO	Concentration meter	For liquid
	DE	Gas detector	For gasses (i.e., IPA and O_3)
	SC	Speed controller	
	CY	Cylinder	
	CY	Cylinder with sensor	
	CY	Pneumatic cylinder	
	RA	Rotary actuator	
	EM	Electric motor	
	AM	Air motor	
	FM	Fan motor	
	MB	Magnetic brake	
	MC	Magnetic clutch	
	AC	Rotary encoder	
	SO	Solenoid lock	
		Movement (vertical or swinging)	
	PH	Photo-sensor	Transmission type
	PH	Photo-sensor	Reflection type

Symbol		Name	Note
	PH	Photo-sensor	Integrated type
	PH	Wafer counter	
	MS	Proximity switch	
	LS	Limit switch	
	VS	Vibration sensor	
	ES	Sensor for extinguisher	T. Thermo-sensor F. Flame sensor C. Concentration sensor
	EN	Nozzle for extinguisher	
	HP	Fan filter unit	
	LF	Light fixture	
	AE	Ionizer	
	IR	IR heater	
	UV	UV heater	
	EC	Exhaust cleaner	
	OI	Oiler	
	ST	Steam trap	
	PBEM	Emergency stop switch	

9 Precautions

(1) Precautions for drainage

When different types of chemical are mixed, there may be some risks caused by the mixture. Therefore, make sure to deliver chemicals using the lines dedicated for each type of chemical. The following list shows the possibilities of risks when different types of undiluted chemical are mixed.

×: High-risk mixture =: Low-risk mixture

		Acid							Alkali	Organic chemical	
		HCL Hydrochloric acid	H_2O_2 Hydrogen peroxide	CH_3COOH Acetic acid	HNO_3 Nitric acid	HF/BHF Hydrofluoric acid	H_2SO_4 Sulfuric acid	H_3PO_4 Phosphoric acid	NH_4OH Ammonia	IPA	Organic stripper
Acid	HCL		×	=	=	=	×	=	×	×	×
	H_2O_2	×		×	×	×	×	=	×	×	×
	CH_3COOH	=	×		×	=	×	=	=	=	=
	HNO_3	=	×	×		×	=	=	×	×	×
	BF/BHF	=	×	=	×		×	=	×	=	=
	H_2SO_4	×	×	×	=	×		=	×	×	×
	H_3PO_4	=	=	=	=	=	=		=	×	×
Alkali	NH_4OH	×	×	=	×	×	×	=		×	×
Organic chemical	IPA	×	×	=	×	=	×	×	×		=
	Organic stripper	×	×	=	×	=	×	×	×	=	

Caution: 1) Organic stripper includes stripper 106, EKC, and N-303.

SCREEN

MOOV

NO.	UTILITY	CONNECTOR DIAMETER	MATERIAL	PRESSURE	RECOMMENDED CAPACITY	QTY	REMARKS

POS 1 Loader
POS 2 CHCL
POS 3 HF (DHF)
POS 4 EDR
POS 5 HF (DHF)
POS 6 EDR
POS 7 H3P04
POS 8 H/C QDR
POS 9 SC-1 (APM)
POS 10 QDR
POS 11 SC-2 (HPM)
POS 12 H/C QDR
POS 13 FR
POS 14 IPA-VD
POS 15 Unloader

ACID EXHAUST 61
ACID EXHAUST 62
ACID EXHAUST 63
ALKALI EXHAUST 64
ACID EXHAUST 65
SOLVENT EXHAUST 66

HCL
H2O2
NH4OH
H3P04
HF (4%)
N2 (SENSOR)
N2 (PROCESS)
DIW
COOLING WATER IN
COOLING WATER OUT
1.Rinse
2.Rinse
Ablauf HF
Ablauf H3P04
WAS
WAL
VAT DRAIN
AIR
IPA

HOT DIW UNIT
HOT DIW UNIT

P Sensor

Loader | CHCL | HF (DHF) | EDR | HF (DHF) | EDR | H3P04 | H/C QDR | SHUTTER | SC-1 | QDR | SC-2 | H/C QDR | SHUTTER

FR | IPA VD | Unloader

DATE (MM/DD/YY)	REVISED	APPROVED	SYM	REVISION	
			1		
			2		
			3		

STANDARD

MODEL: WS-620C

TITLE: FLOW SHEET

DESIGNED | CHECKED

DRAWN | APPROVED

SCALE: – : –

DATE (MM/DD/YY): 03/18/22

REV: 00

SCREEN Semiconductor Solutions Co., Ltd.

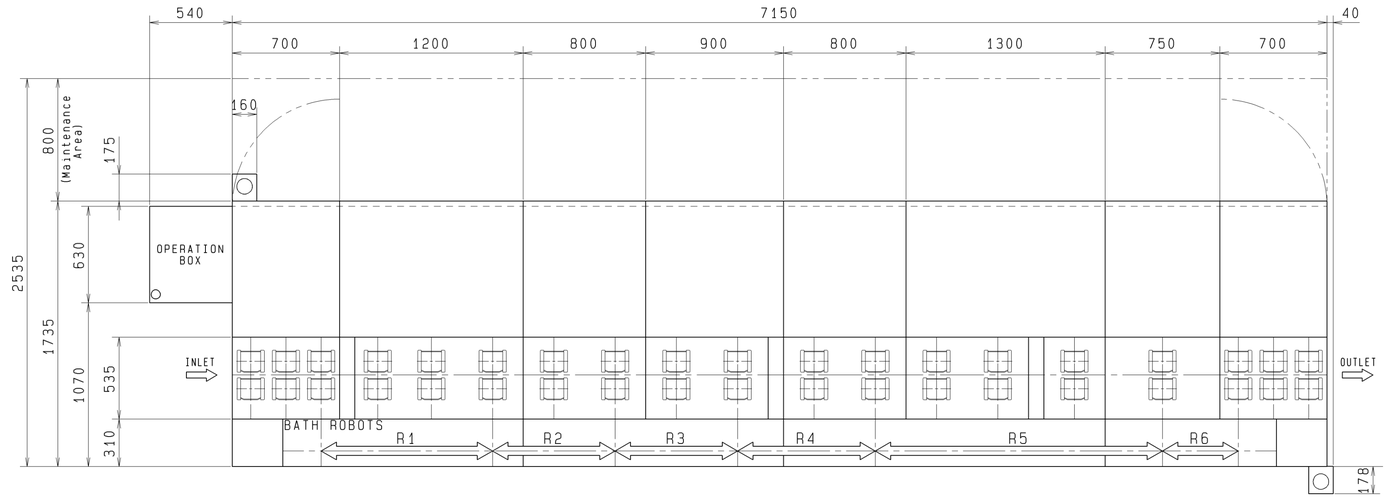
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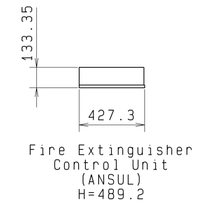
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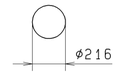
NO.	UTILITY	CONNECTION DIAMETER	MATERIAL	PRESSURE	RECOMMENDED CAPACITY	QTY	REMARKS



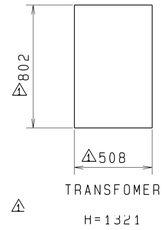
POS 1 LD | M/S | POS 2 CHCL | POS 3 HF(DHF) | POS 4 EDR | POS 5 HF(DHF) | POS 6 EDR | POS 7 H3PO4 | POS 8 H/C QDR | M/S | POS 9 SC-1(APM) | POS 10 QDR | POS 11 SC-2(HPM) | POS 12 H/C QDR | M/S | POS 13 FR | POS 14 IPA-VD | POS 15 UL



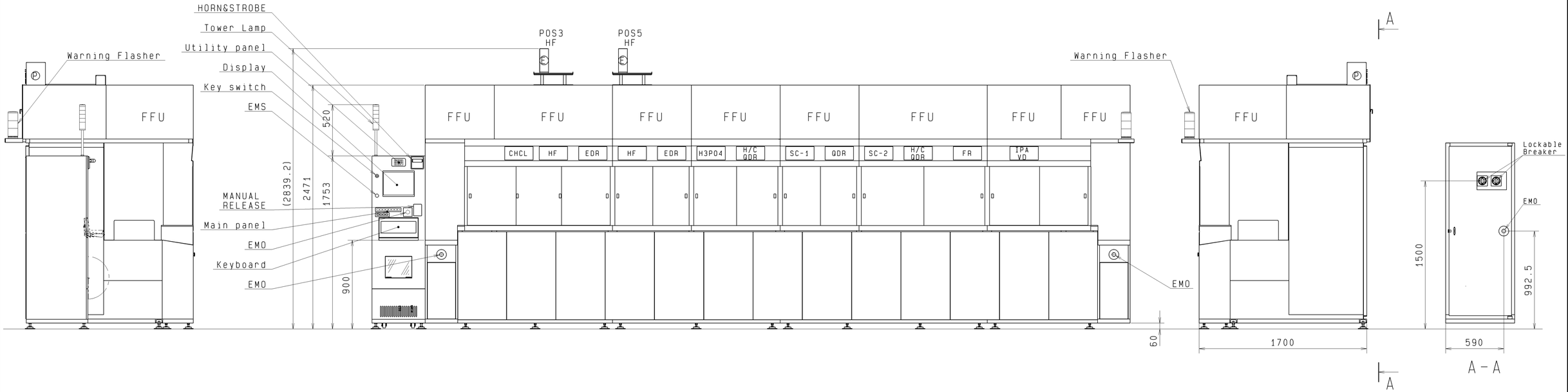
Fire Extinguisher Control Unit (ANSUL) H=489.2



Fire Extinguisher CO2 Cylinder X2 (ANSUL) H=908



⚠ TRANSFOMER H=1321



Ⓜ: Megasonic Ocillator

Ⓔ: Electronic thermocontroller

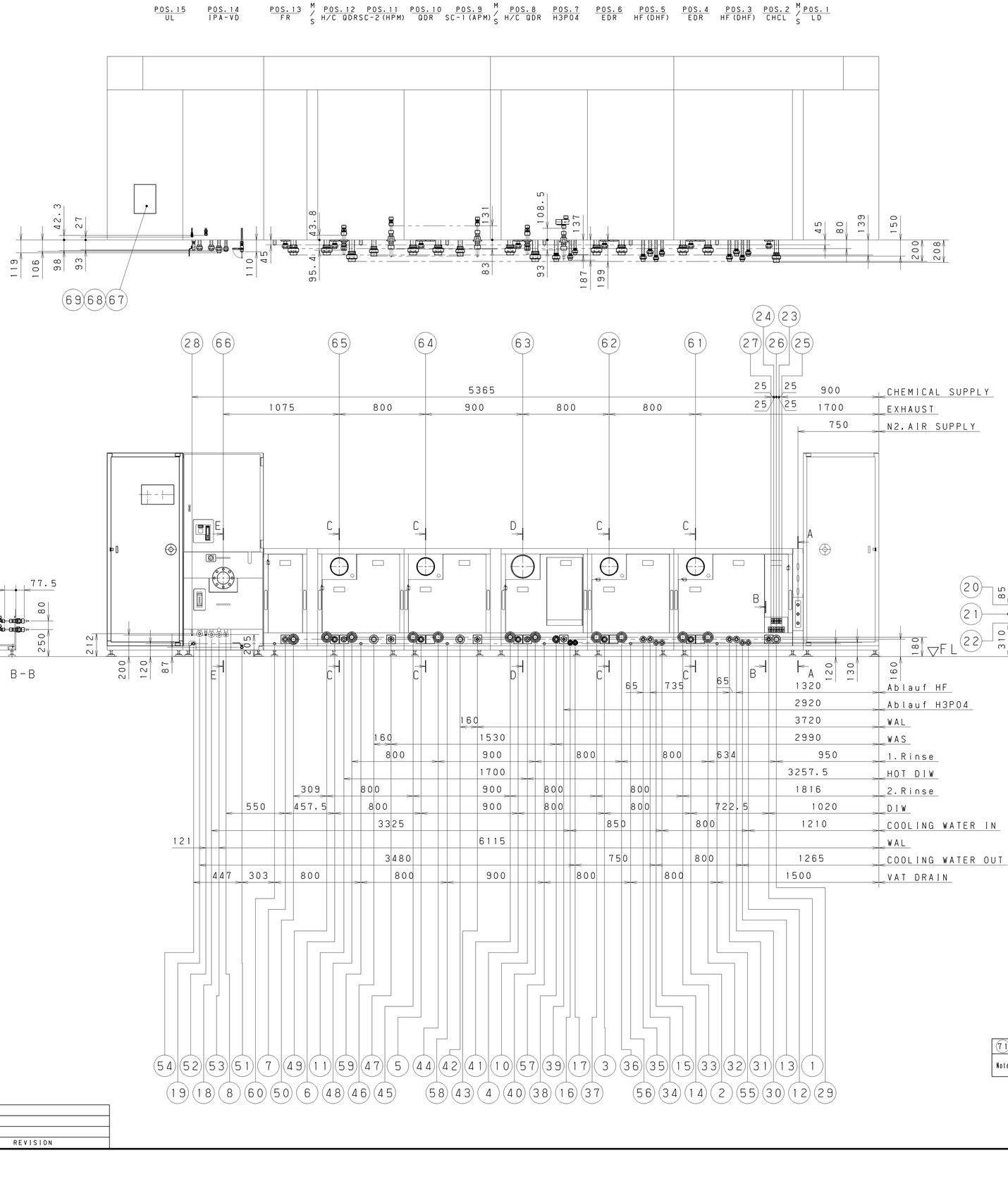
Ⓟ: Pressure Sensor

			⚠3	
			⚠2	
08/12/22	Y.N	S.I	⚠1	Add dimensions.
DATE (MM/DD/YY)	REVISED	APPROVED	SYM	REVISION

■CONFIDENTIAL■

STANDARD			
MODEL WS-620C		TITLE SCHEMATIC DRAWING	
DESIGNED	CHECKED		
DRAWN	APPROVED	SCALE 1:20	DATE (MM/DD/YY) 03/23/22
SCREEN Semiconductor Solutions Co., Ltd.		DRAWING NO	REV 01

SCREEN



NO.	UTILITY	CONNECTOR DIAMETER	MATERIAL	PRESSURE	RECOMMENDED CAPACITY	QTY	REMARKS
1	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.×GF×	0.2~0.3 MPa	15 L/min	1	Pos.2 CHCL
2	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.×GF×	0.2~0.3 MPa	35.2 L/min	1	Pos.4 EDR
3	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.×GF×	0.2~0.3 MPa	35.2 L/min	1	Pos.6 EDR
4	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.×GF×	0.2~0.3 MPa	38 L/min	1	Pos.8 H/C QDR
5	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.×GF×	0.2~0.3 MPa	35.2 L/min	1	Pos.10 QDR
6	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.×GF×	0.2~0.3 MPa	35.2 L/min	1	Pos.12 H/C QDR
7	DIW	20A (OD.25×ID.21.2)	PVDF SOCKETWELD UNION GEORGE FIS.×GF×	0.2~0.3 MPa	20 L/min	1	Pos.13 FR
8	DIW	15A (OD.20×ID.16.2)	PVDF SOCKETWELD UNION GEORGE FIS.×GF×	0.2~0.3 MPa	1 L/min	1	Pos.14 IPA VD
9	-						
10	HOT DIW	φ1"	PFA SP300 TYPE FITTING NIPPON PILLAR	0.2~0.3 MPa	20 L/min	1	Pos.8 H/C QDR From HOT DIW UNIT
11	HOT DIW	φ1"	PFA SP300 TYPE FITTING NIPPON PILLAR	0.2~0.3 MPa	20 L/min	1	Pos.12 H/C QDR From HOT DIW UNIT
12	COOLING WATER IN	16A (OD.22×ID.16)	PVC UNION SEKISUI	0.1~0.2 MPa	5 L/min	1	Pos.3 HF
13	COOLING WATER OUT	16A (OD.22×ID.16)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.3 HF
14	COOLING WATER IN	16A (OD.22×ID.16)	PVC UNION SEKISUI	0.1~0.2 MPa	5 L/min	1	Pos.5 HF
15	COOLING WATER OUT	16A (OD.22×ID.16)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.5 HF
16	COOLING WATER IN	16A (OD.22×ID.16)	PVC UNION SEKISUI	0.1~0.2 MPa	20 L/min	1	Pos.7 H3P04
17	COOLING WATER OUT	16A (OD.22×ID.16)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.7 H3P04
18	COOLING WATER IN	20A (OD.25×ID.20)	U-PVC SOCKETWELD UNION GEORGE FIS.×GF×	0.1~0.2 MPa	20 L/min	1	Pos.14 IPA VD
19	COOLING WATER OUT	20A (OD.25×ID.20)	U-PVC SOCKETWELD UNION GEORGE FIS.×GF×	Atmosphere	-	1	Pos.14 IPA VD
20	N2 (SENSOR)	φ3/8"	SUS316 UNION (SWAGELOK)	0.4~0.7 MPa	10 L/min	1	FOR SENSOR
21	N2 (PROCESS)	φ1/2"	SUS316 UNION (SWAGELOK)	0.4~0.7 MPa	895 L/min	1	FOR PROCESS
22	AIR	φ1/2"	SUS316 UNION (SWAGELOK)	0.4~0.7 MPa	790 L/min	1	
23	HF(4%)	φ1/2"	PFA SP300 TYPE FITTING NIPPON PILLAR	0.1~0.2 Mpa	-	1	OUTER TUBE φ3/4" PFA
24	H3P04	φ1/2"	PFA SP300 TYPE FITTING NIPPON PILLAR	0.1~0.2 Mpa	-	1	OUTER TUBE φ3/4" PFA
25	NH4OH	φ1/2"	PFA SP300 TYPE FITTING NIPPON PILLAR	0.1~0.2 Mpa	-	1	OUTER TUBE φ3/4" PFA
26	H2O2	φ1/2"	PFA SP300 TYPE FITTING NIPPON PILLAR	0.1~0.2 Mpa	-	1	OUTER TUBE φ3/4" PFA
27	HCL	φ1/2"	PFA SP300 TYPE FITTING NIPPON PILLAR	0.1~0.2 Mpa	-	1	OUTER TUBE φ3/4" PFA
28	IPA	φ3/8"	SUS316 UNION (SWAGELOK)	0.1~0.2 Mpa	-	1	Pos.14 IPA VD
29	1.Rinse	30A (OD.38×ID.30)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.2 CHCL
30	Ablauf HF	20A (OD.26×ID.20)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.3 HF
31	Ablauf HF	20A (OD.26×ID.20)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.3 HF
32	1.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.4 EDR
33	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.4 EDR
34	Ablauf HF	20A (OD.26×ID.20)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.5 HF
35	Ablauf HF	20A (OD.26×ID.20)	PVC UNION SEKISUI	Atmosphere	-	1	Pos.5 HF
36	1.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.6 EDR
37	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.6 EDR
38	WAS	25A (OD.32×ID.25)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.7 H3P04
39	Ablauf H3P04	φ3/4"	PFA SP300 TYPE FITTING NIPPON PILLAR	Atmosphere	-	1	Pos.7 H3P04 OUTER TUBE φ25×22 PFA
40	1.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.8 H/C QDR
41	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.8 H/C QDR
42	WAL	30A (OD.38×ID.30)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.9 SC-1
43	WAL	φ3/4"	PFA SP300 TYPE FITTING NIPPON PILLAR	Atmosphere	-	1	Pos.9 SC-1 OUTER TUBE φ25×22 PFA
44	1.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.10 QDR
45	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.10 QDR
46	WAS	30A (OD.38×ID.30)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.11 SC-2
47	WAS	φ3/4"	PFA SP300 TYPE FITTING NIPPON PILLAR	Atmosphere	-	1	Pos.11 SC-2 OUTER TUBE φ25×22 PFA
48	1.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.12 H/C QDR
49	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.12 H/C QDR
50	2.Rinse	40A (OD.48×ID.40)	HT-PVC UNION SEKISUI	Atmosphere	-	1	Pos.13 FR
51	VAT DRAIN	Rc1/2	SUS FEMAIL	Atmosphere	-	1	Pos.14 IPA VD
52	WAL	φ1/2"	SUS316 UNION (SWAGELOK)	Atmosphere	-	1	Pos.14 IPA VD
53	WAL	20A (OD.26×ID.20)	HT-PVC UNION	Atmosphere	-	1	Pos.14 IPA VD
54	VAT DRAIN	Rc1/2	SUS FEMAIL	Atmosphere	-	1	Pos.14
55	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.2~4
56	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.5,6
57	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.7,8
58	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.9,10
59	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.11,12
60	VAT DRAIN	20A (OD.26×ID.20)	HT-PVC PIPE SEKISUI	Atmosphere	-	1	Pos.13
61	ACID EXHAUST	150A	PVC PIPE	-200~-300Pa	9 m3/min	1	Pos.2~4
62	ACID EXHAUST	150A	PVC PIPE	-200~-300Pa	7 m3/min	1	Pos.5,6
63	ACID EXHAUST	200A	PVC PIPE	-200~-300Pa	12 m3/min	1	Pos.7,8
64	ALKALI EXHAUST	150A	PVC PIPE	-200~-300Pa	7 m3/min	1	Pos.9,10
65	ACID EXHAUST	150A	PVC PIPE	-200~-300Pa	9 m3/min	1	Pos.11~13
66	SOLVENT EXHAUST	100A	SUS JIS 5K Flange	-200~-300Pa	5 m3/min	1	Pos.14
67	POWER	M8	Teminal Block	3φ,400V	*** A	1	Step-down trasformer
68	POWER	M8	Lockable Breaker NF250-SHV	3φ,200V	175 A	1	Main body Full load:132A
69	POWER	M8	Lockable Breaker NF125-SHV	1φ,100V	80 A	1	Main body Full load:67A
70	POWER	M8	EARTH BAR: F-K4-08524	EARTH	-	1	Main body
71	POWER	-	Teminal Block	1φ,240V	5A	1	Fire extinguisher

Note
-Working capacity indicates the capacity per single port.,and is the minimum capacity required by the unit.
-For use in utilities, it is necessary to prepare a maximum capacity for the supply pressure port diameter.
-The srabol 'O' stands for connection to

DATE (MM/DD/YY)	REVISED	APPROVED	SYM	REVISION
			3	
			2	
			1	

STANDARD -

MODEL WS-620C

TITLE UTILITY (1/2)

DESIGNED | CHECKED

DRAWN | APPROVED

SCALE 1:20

DATE (MM/DD/YY) 03/23/22

REV 00

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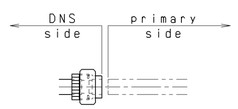
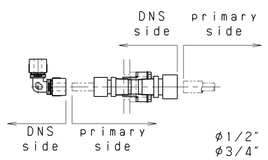
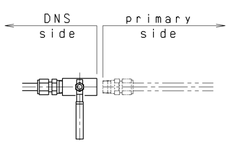
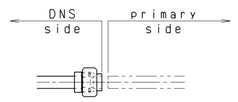
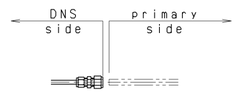
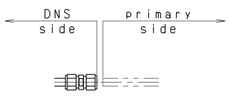
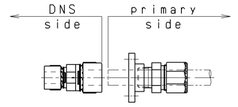
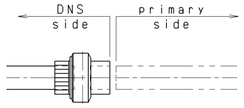
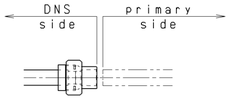
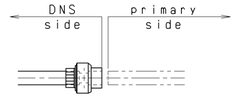
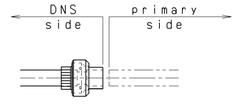
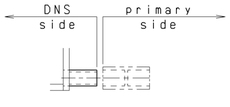
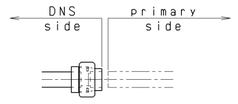
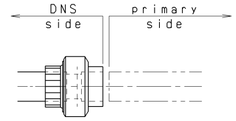
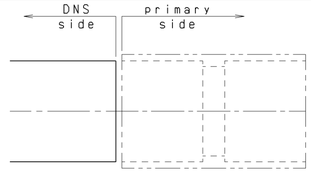
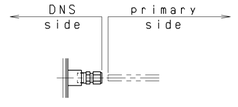
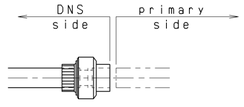
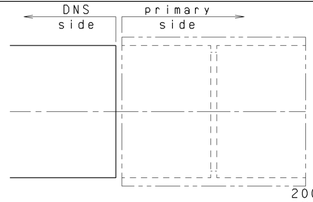
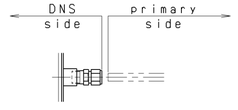
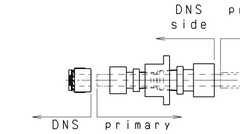
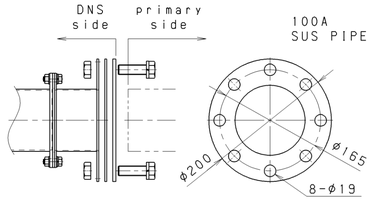
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NO.	UTILITY	CONNECTOR DIAMETER	MATERIAL	PRESSURE	RECOMMENDED CAPACITY	QTY	REMARKS

1 2 3 4 5 6 7	 20A(OD.25×ID.21.2) PVDF PIPE	23 24 25 26 27	 φ1/2" TUBE φ3/4" TUBE PFA	51 54	 R1/2 SUS MALE
8	 15A(OD.20×ID.16.2) PVDF PIPE	28	 φ3/8" SUS TUBE	52	 φ1/2" SUS TUBE
10 11	 φ1" PFA TUBE	29 42 46	 30A(OD.38×ID.30) HT-PVC PIPE	53	 20A(OD.26×ID.20) HT-PVC PIPE
12 13 14 15 16 17	 16A(OD.22×ID.16) PVC PIPE	30 31 34 35	 20A(OD.26×ID.20) PVC PIPE	55 56 57 58 59 60	 20A(OD.26×ID.20) HT-PVC SOCKET
18 19	 20A(OD.25×ID.20) U-PVC PIPE	32 33 36 37 40 41 44 45 48 49 50	 40A(OD.48×ID.40) HT-PVC PIPE	61 62 64 65	 150A PVC SOCKET
20	 φ3/8" SUS TUBE	38	 25A(OD.32×ID.25) HT-PVC PIPE	63	 200A PVC SOCKET
21 22	 φ1/2" SUS TUBE	39 43 47	 φ3/4" TUBE φ25XφΦ22 TUBE PFA	66	

SYM	REVISION	REVISED	APPROVED	DATE(MM/DD/YY)
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2				
3				

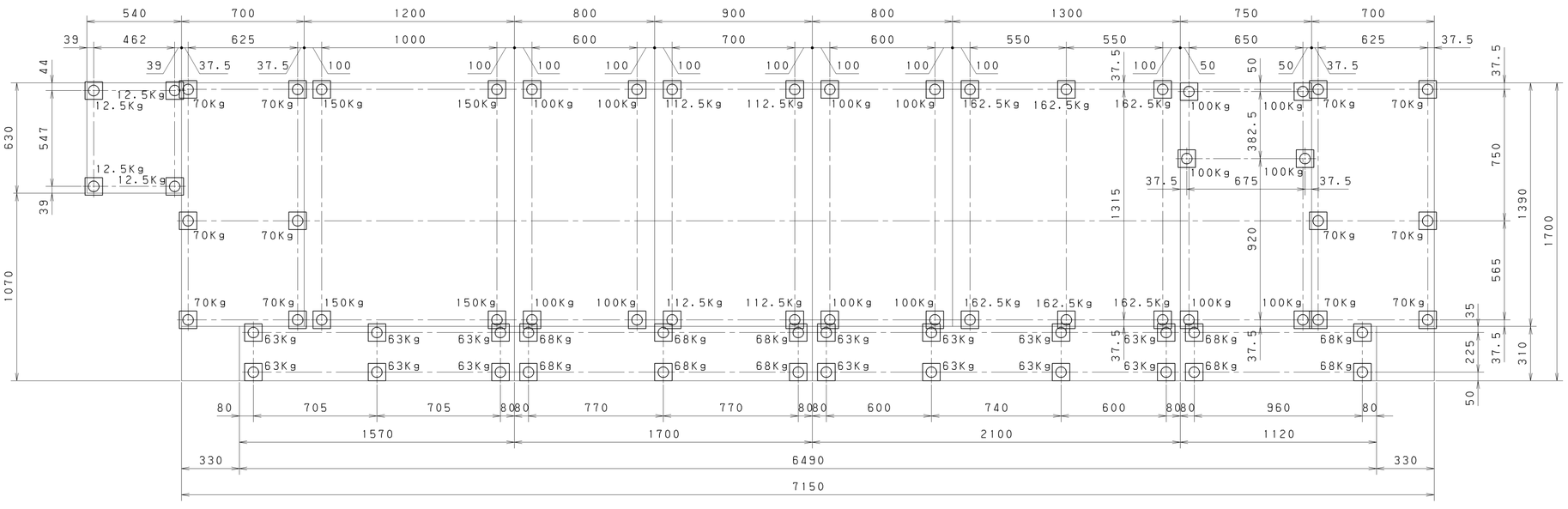
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MODEL WS-620C	TITLE UTILITY(2/2)		
DESIGNED	CHECKED		
DRAWN	APPROVED	SCALE 1:5	DATE(MM/DD/YY) 03/23/22
SCREEN Semiconductor Solutions Co., Ltd.	DRAWING NO.		REV 00

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NO.	UTILITY	CONNECTOR DIAMETER	MATERIAL	PRESSURE	RECOMMENDED CAPACITY	QTY	REMARKS



Note
1) This diagram indicates the position of the equipment's adjustment foot.
◎ ⊕ : Position of adjustment foot.
2) Maximum load on any single stabilizing foot : Approx 250 kg

DATE (MM/DD/YY)	REVISED	APPROVED	SYM	REVISION
			3	
			2	
			1	

STANDARD			
MODEL: WS-620C	TITLE: FOOT LAYOUT		
DESIGNED	CHECKED		
DRAWN	APPROVED	SCALE: 1:15	DATE (MM/DD/YY): 03/23/22
SCREEN Semiconductor Solutions Co., Ltd.	DRAWING NO.		REV: 00

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MOOV

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株式会社 SCREEN SPE テック

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SCREEN SPE Tech Co., Ltd.

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October 2020

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