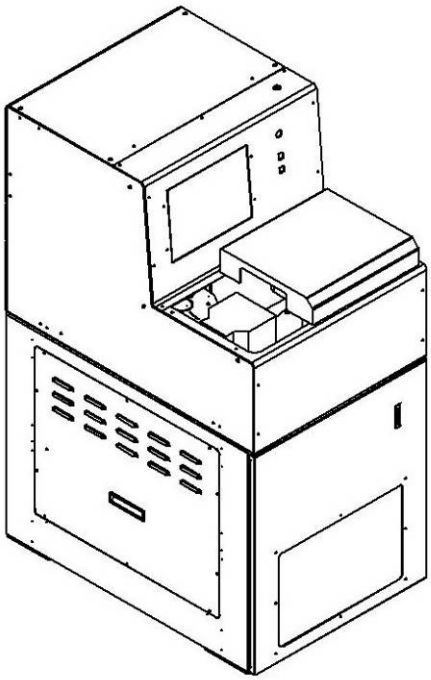
Allwin21 Corporation

AW105R

Matrix 105
with
Allwin21
Robot Upgrade Kit



Installation Manual

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SERVICE INFORMATION

Customer technical support is available from Allwin21 Corporation to provide information not included in this manual. The Customer Support Department is open Monday through Friday, 9:00 a.m. to 6:00 p.m., Pacific Time.

Field service support and parts are available from Allwin21 Corporation. The office is open Monday through Friday, 9:00 a.m. to 6:00 p.m., Pacific Time.

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To receive field service or parts replacement during a system warranty period, the customer shall promptly provide to Allwin21 Corporation details of any product or component thought to be defective and request a Return Material Authorization (RMA). Within fourteen (14) days after receipt of the RMA number from Allwin21 Corporation, the customer shall return the defective product or component to Allwin21 Corporation freight paid. As soon as is practicable after issue of the RMA, Allwin21 Corporation shall repair/replace and return any product/component found to be defective.

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- Quartzware
- Consumable parts
- O-rings and gaskets
- Fuses
- Thermocouples
- Mass Flow Meter

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PREFACE

MACHINES COVERED IN THIS MANUAL

AW-105R & AW105R

This manual is focused on explaining the use of the AW-105R control software for plasma etching systems. When this manual mentions AW105R, it pertains to the following plasma etching systems that are supported: Matrix 105 Etcher System with the Allwin21 Robot Upgrade Kit.

AW-105R is the control software running on the computer. It controls the AW105R system to process the wafer according to the specification of the user.

AW105R is used in this manual as a term meaning the Plasma Etching System that consists of a Matrix 105 Etcher System with the Allwin21 Robot Upgrade Kit using the AW-105R control software. The different types of Allwin21 Etching systems this manual covers are mentioned above. The AW105R systems are Matrix systems that have been converted to use the AW-105R control software.

INTENDED AUDIENCE

This installation manual has been written to assist facilities engineers and technicians in the installation of the Allwin21 AW105R system, a Matrix 105 Etcher System with the Allwin21 Robot Upgrade Kit. Building planners may also use this document to plan facilities for the system.

Please read this manual carefully before installing the Allwin21 AW105R.

DOCUMENT CONVENTIONS

FONT CONVENTIONS
The following font conventions are used in this manual.

Bold	Software screen selections are represented in **bold** type.
Italic	Screen names are shown in *italic* type.
First Letter Capitalized	Operating modes are shown in normal type with the first letter capitalized.
Italic and Bold	References to other sections, chapters, and manuals are shown in both ***italic and bold*** type.
For example:	"Select **Recipe** from the *Main Menu* screen to enter the Recipe Programming mode."

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TABLE OF FIGURES

1. INTRODUCTION

1.1 SYSTEM

The AW105R, figure 1-1, is a Matrix 105 Etcher System with the Allwin21 Robot Upgrade Kit. It is controlled by the Allwin21 AW-105R control software. It is used to etch the photo resist off of the wafer using high frequency RF to create plasma.

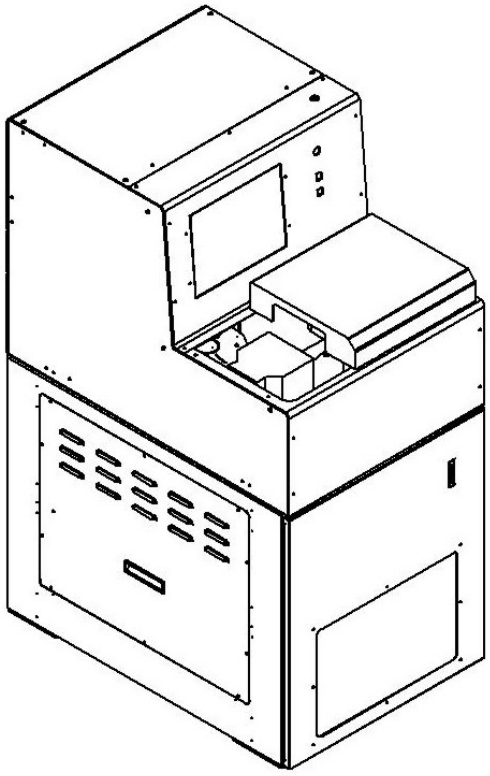

Figure 1-1: *AW105R*

1.2 PURCHASER'S RESPONSIBILITY

The purchaser of a new Allwin21 AW105R System is primarily responsible for preparing for the system's installation. This responsibility includes preparing the physical site to accept the sub-systems and providing the prescribed power, gas, vacuum, and exhaust supplies and lines. Electrical connections must be arranged for by the purchaser (user).

1.3 ALLWIN21 SERVICE

1.3.1 INSTALLATION

An optional service Allwin21 provides is the installation of the AW105R system. If it is desirable to have a Allwin21 Field Service Engineer to install the system, contact Allwin21.

The installation is provided after the Allwin21 AW105R system is in place and all of the support utilities have been connected as described in this manual. The Allwin21 Field Service Engineer will verify correct installation and system operation.

The following is an overview of the activities the Allwin21 Field Service Engineer will carry out.

1) Conduct a thorough visual inspection of the system.
2) Inspect all utility connections.
3) Verify that supplied utilities meet system requirements
4) Inspect quartzware for damage and contamination, and install quartzware as needed.
5) Power on and exercise the system software to ensure subsystems are responding properly to operator commands.
6) Run system tests and calibration checks.
7) Verify that all interlocks, flow switches are operating correctly.
8) Verify that the gas subsystem is operating properly.

Allwin21 Field Service Engineers use a standard checklist and worksheet to ensure that the above activities are carried out and that test results are documented.

1.3.2 TRAINING

Allwin21 offers optional training courses for Process and Equipment Engineers. If you wish to be factory trained for in-depth service and maintenance, contact Allwin21.

2. SAFETY

2.1 OVERVIEW

This section provides information intended to prevent damage to the Allwin21 system and injury to personnel. All hazards are not covered, only those most prevalent and serious. Your full understanding of the capabilities and limitations of this equipment and your fab is necessary for safe and efficient operation.

Please read and refer to the AW105R System manuals for all safety precautions. What is mentioned here is only some of what should be known.

☠ WARNING

Only ALLWIN21 or qualified personnel should install, start up, operate and/or repair the Allwin21 system. Damage to the system or injury to personnel could result if the preceding actions are carried out by unqualified personnel.

Prior to applying power or starting the system, follow these safety precautions:

- Check all utilities for proper connections. Connect only those gases specified for use in the system.
- Make sure the cabinet covers are on and the doors are closed.
- Check the scrubber exhaust to make sure it is properly connected to the facility scrubber. Ensure the facility scrubber is operating properly. Check the vacuum outlet for any restrictions.

2.2 NOTES, CAUTIONS AND WARNINGS

When operating and maintaining the Allwin21 system, the following safety procedures and precautions must be followed to avoid certain hazards. Observe all warnings and cautions. Their purpose is to protect personnel from injury and long term health hazards and to protect the machine from damage.

Pay special attention to notes, cautions and warnings located in appropriate areas in this manual.

NOTE

Notes provide additional important information which requires special attention.

CAUTION

Cautions alert you to avoid system damage.

WARNING

Warnings are given for personnel safety to prevent bodily harm.

2.3 MAINTENANCE

During the maintenance operation, observe the following precautions:

- Do not use replacement parts not provided or recommended by Allwin21.

☠ WARNING

Allwin21 is not liable for any damage or injury which may occur when unauthorized parts are used.

- Disconnect power to the system before performing any maintenance activity requiring the removal of access covers.
- Whenever the quartz chamber is changed, perform a vacuum leak test on the process chamber. Replace the O-rings on the process chamber.

2.4 GAS HANDLING

Be aware of the following cautions when working with gases in the Allwin21 system:

- Only use gases that have been specified for use in the Allwin21 system.

CAUTION

Allwin21 Corp. is not liable for the use of gases not recommended by the factory.

- Make sure the specified gases are connected to the proper inlets on the rear panel.

WARNING

Failure to properly connect the gas lines may result in dangerous gas mixture that could cause harm to personnel and/or the system.

WARNING

There will be no chemical exposures during normal routine maintenance. However, if the need arises that a gas valve has to be changed, then it is the maintenance person's responsibility to follow all safety procedures for gas exposure.

2.5 HAZARDS

The Allwin21 system presents certain hazards during installation. These fall into the following categories:

- Electrical shock hazards
- Process gas hazards
- Process byproduct hazards
- Oxygen hazards
- Thermal hazards
- Vacuum hazards
- RF radiation hazards

2.5.1 ELECTRICAL SHOCK HAZARDS

The Allwin21 system requires electrical power which is distributed through the machine. Safety interlocks are installed to shut off electrical power to the system when the cover is removed. Only qualified troubleshooting maintenance technicians should be permitted to work on an uncovered Allwin21 system. Allwin21 assumes no liability for injuries or deaths caused by operation with interlocking devices defeated. Caution and safety measures characteristically taken with AC and DC circuitry are imperative.

2.5.2 PROCESS GAS HAZARDS

An Allwin21 system process may use these complex process gases: 0_2, H_2N_2 depending on user application. 0_2 is an oxidant and it supports combustion. It must be handled with care.

2.5.3 PROCESS BYPRODUCT HAZARDS

The process byproducts found in the chamber surfaces of the Allwin21 system should be treated as potentially hazardous.

☠ WARNING

Avoid skin, eye, and respiratory contact with process byproducts. Some byproduct chemistries have hazardous characteristics. Failure to avoid skin, eye, and respiratory contact with process byproducts may result in injury or death of personnel.

Due to the variations in chemistry employed to meet application requirements, the exact constituents of effluents from the process family cannot be defined. However, the following general precautions should be observed:

- Solvent-proof neoprene or viton gloves should be worn while handling the chamber surfaces and its accessories.

Allwin21 Corp. claims no responsibility for the safety of the byproducts of the Allwin21 system.

2.5.4 OXYGEN HAZARDS

In stripping systems, oxygen (O_2) may be utilized as a process gas, either alone or in conjunction with other gases. A possible EXPLOSIVE condition exists.

Oxygen is an oxidizing agent which vigorously accelerates combustion. Contact with flammable materials may cause fire or explosion. Any time there is heat, and if the concentration of oxygen is greater the 21% of the volume, the condition for an explosion exists. It should be noted this potential condition exists anytime oxygen is connected to the system.

Use appropriate procedures when processing with oxygen.

2.5.5 THERMAL HAZARDS

The quartz chamber and chuck must be allowed to cool down before they are serviced. Allow 20 to 30 minutes for the system to cool before servicing. Burns may result if the system is touched before it has been allowed to cool sufficiently.

In addition, use of solvents, such as IPA (isopropyl alcohol) or acetone to clean the chamber, may pose a hazard if used while the chamber is still hot.

NOTE

The control system contains two safety shutoffs. The first is a watchdog timer that turns OFF the heating system and RF if the control software has been interrupted for more than approximately 2 seconds.

The second shutoff shuts down the heating system, RF and the MFC's if the measured temperature is above 350°C. These high readings indicate that the RTD is broken or disconnected from the Controller board, in which case the interface reads something greater than 350°C.

2.5.6 VACUUM HAZARDS

The part of the reactor chamber made of quartz is very fragile. When the unshielded reactor chamber is under vacuum, this poses a hazard.

It is strongly recommended that the reactor chamber only be serviced with the shield in place whenever the chamber is evacuated. Otherwise, one should shield one's self, others and the surrounding area to avoid injury and damage from the potential implosion of the chamber.

2.5.7 RF RADIATION HAZARDS

The RF energy used to operate a glow discharge is provided by a solid state RF generator which can operate, at up to 650 Watts in continuous Wave (CW) mode. Its frequency is 13.56 MHz. At these powers and frequency, unless shielded, the RF radiation is sufficient to cause surface radiation burns.

Depending on proximity, these burns can be serious enough to cause significant injury to personnel. Under normal operating conditions the AW105R is properly shielded. RF power supplies and their associated circuitry are extremely dangerous and should be handled only by trained, competent maintenance technicians.

☠ WARNING

Do not operate the RF generator with any of its covers removed, or any covers on the AW105R removed. Lethal radiation hazards exist.

3. INSTALLATION

3.1 INSTALLATION PROCESS OVERVIEW

3.1.1 INSTALLATION PROCEDURES

This manual describes how to install the Allwin21 AW105R system. These activities are outlined in the following sequence of steps.

The following steps are an overview of the activities which should be completed by the customer prior to the arrival of the support engineer, if requested. More details on each of these activities are provided in subsequent sections in this manual.

- ☐ Prepare the site floor space.
- ☐ Prepare the site utility connections.
- ☐ Unpack the AW105R system and any additional parts.
- ☐ Inspect the system for damage or missing parts.
- ☐ Connect the utilities to the AW105R system.

If it is desired to have a Allwin21 Field Service help in the installation of the AW105R, then they will do the following steps. Otherwise, the purchaser must do them.

- ☐ Electrical Checks
- ☐ Testing & Adjustments
- ☐ Power-up the system (refer to the Service Manual).
- ☐ Confirm proper operation. Do a confidence check of the system (refer to the Service Manual).
- ☐ For system troubleshooting refer to the Service Manual.

3.2 SITE REQUIREMENTS

3.2.1 FACILITY PREPARATION

NOTE

All facilities required for the operation of the Allwin21 AW105R system and its support equipment should be completed by the customer before any connections are made to any part of the equipment.

3.2.2 SPACE REQUIREMENTS

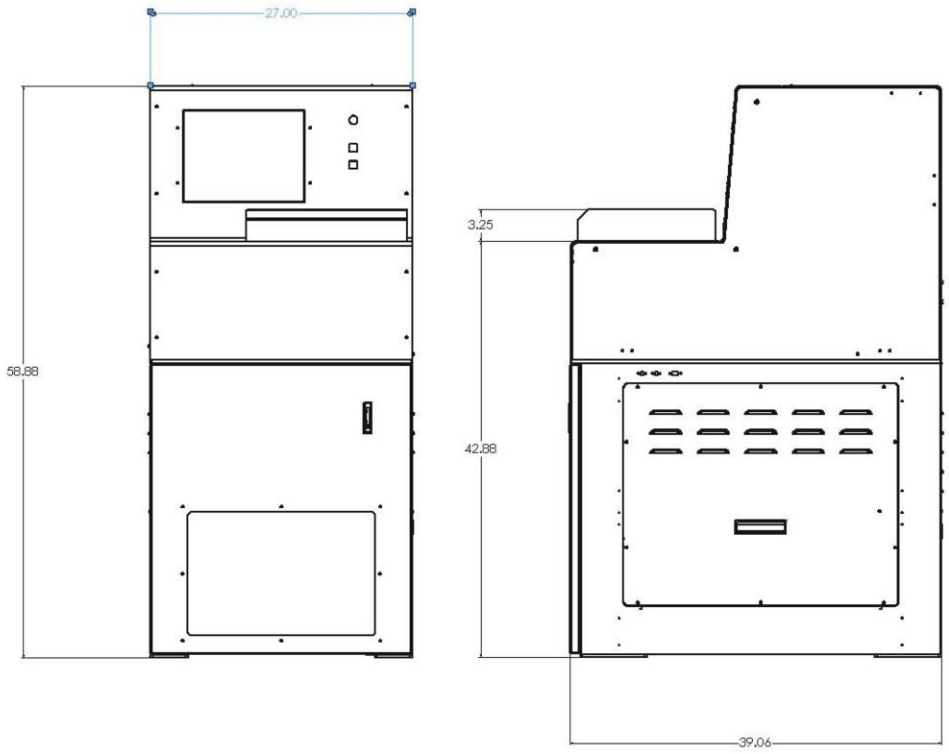

Figure 3-1: *Footprint of the AW105R*

The AW105R has a footprint (figure 3-1) of 27” (68.5 cm) wide by 39” (99 cm) deep. A floor clearance of 15 inches beyond the hardware dimensions is needed for service access on all sides

of the machine (see figure 3-2). It is required that no facilities hardware be within this service access, especially that which may limit machine accessibility. The side service access need not be replicated for machines that are placed side by side (see figure 3-3). A top clearance of 24 inches (61 cm) is necessary as well for the light tower.

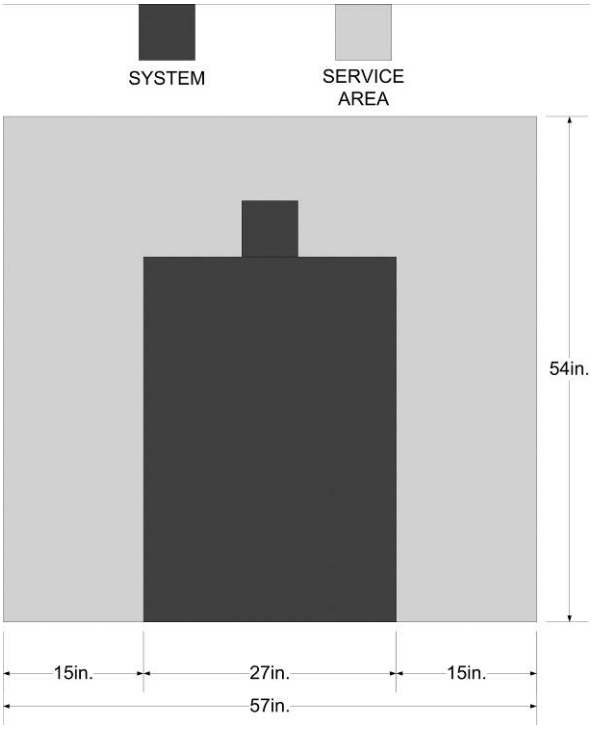

Figure 3-2: *Floor Clearance for one AW105R*

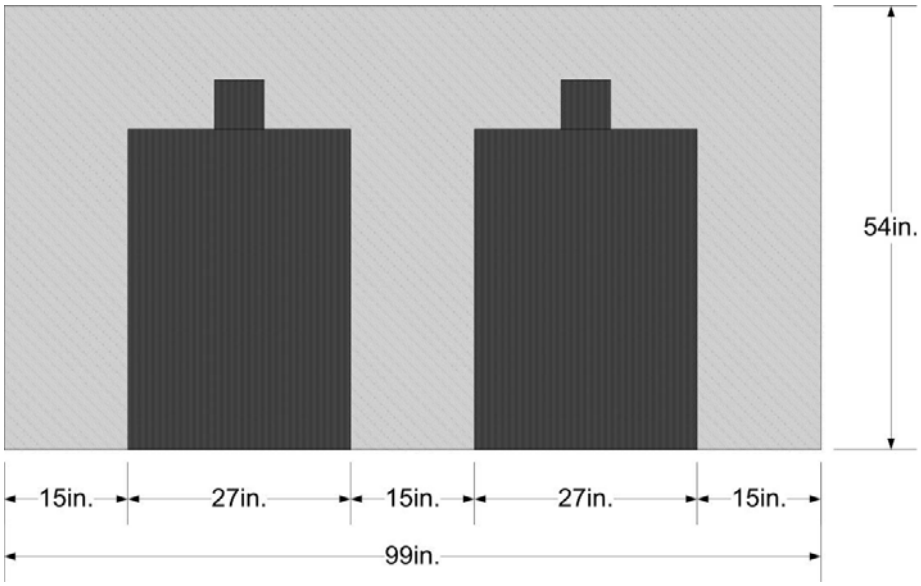

Figure 3-3: *Floor Clearance for two AW105Rs side-by-side*

3.3 FACILITIES

3.3.1 UTILITY CONNECTIONS

The notes in this chapter are designed to help the facility engineer connect the Allwin21 AW105R system plumbing and other utilities in a practical and functional manner. This section also emphasizes certain practices and requirements that are considered particularly important for system operation and serviceability.

All utilities are connected at the rear utility panel of the system. Refer to figure 3-4 and figure 3-5, below.

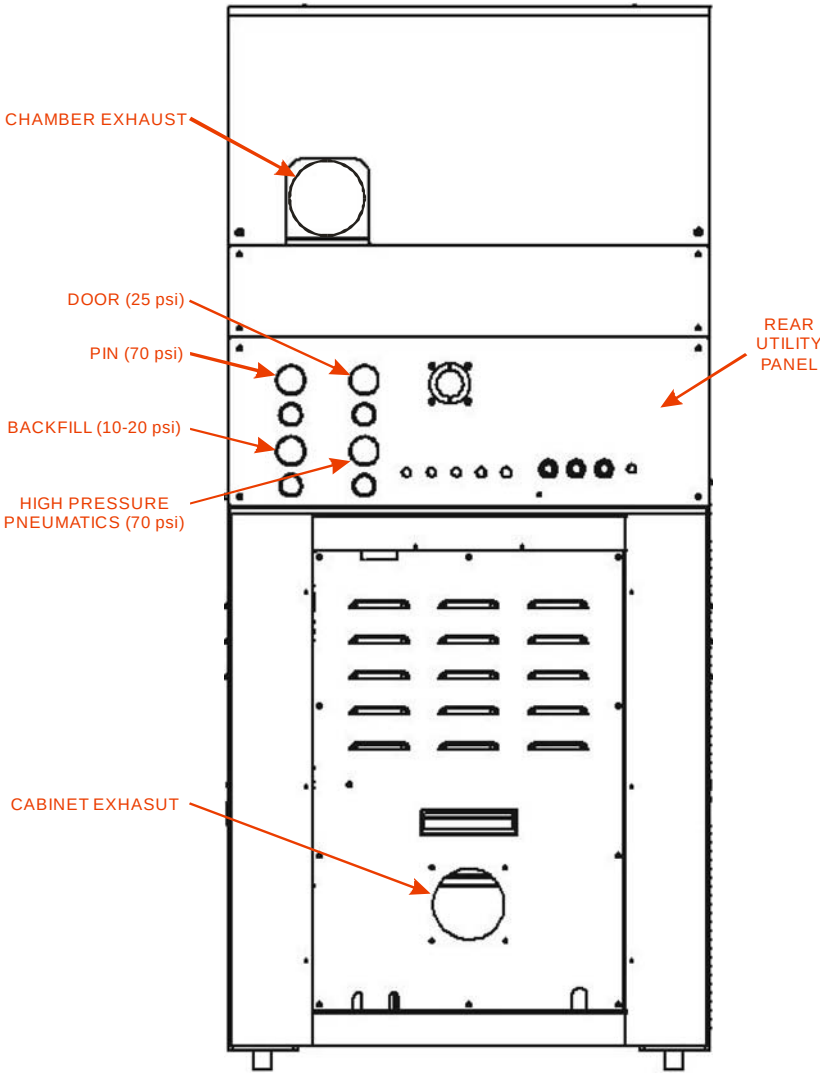

Figure 3-4: *AW105R Rear View*

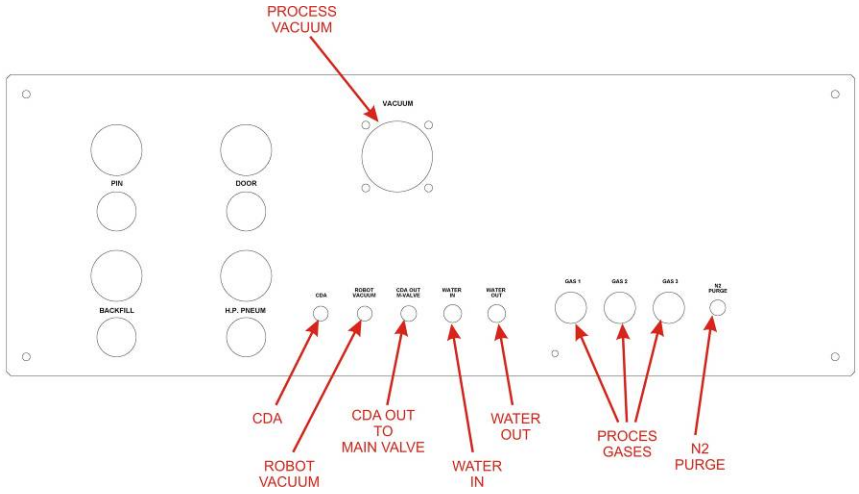

Figure 3-5: *AW105R Rear Utility Panel*

3.3.2 ADEQUATE TUBING SIZE

Adequate gas and air flow is essential to the proper operation of the system. If the tubing inner diameter is too small, the gas flow rate can be reduced. If the tubing is too long, the gas flow rate can also be reduced.

Tubing is Too Small

As depicted in figure 3-6, the smaller diameter tubing (D1) needs to have a higher pressure so it can have the same amount of gas flow rate as the larger diameter tubing (D2). For D1 to have the same flow rate as D2, the pressure in D1 must be greater than in D2. However, it may be impractical to increase the pressure due to equipment constraints. Therefore, using larger diameter tubing is the answer.

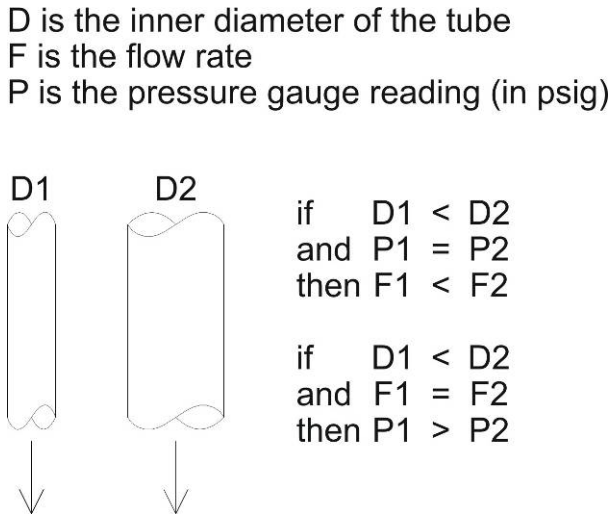

Figure 3-6: *Gas Pressure and Flow Rate Relationship for Different Tube Diameters*

Tubing is Too Long

Friction in tubing (gas or air line) that has a very long length can be a major factor to reduce the flow rate of gas through the line. The result is the volume cannot be maintained once the valve is opened to allow flow and the pressure will drop significantly from a static state.

It is advisable to have adequate size diameter for the required length of tubing.

3.3.3 AIR CONDITIONING

The moisture in the ambient air around the AW105R should not condense on any part of the system (i.e. RF Generator).

AIR CONDITION	
Temperature:	20-30°C
Humidity:	Non-condensing

3.3.4 ELECTRICAL

ELECTRICAL	
Voltage:	200 – 240 VAC
Current:	30 Amps
Frequency:	50/60 Hz
Phases:	Single (1)
Number of Wires:	3 (2 main, 1 ground)

Grounding

An isolated computer grade building ground must be provided. This ground must be a continuous wire from the service entrance to the building and must be isolated from making contact with other conduits or with the safety ground connections of other equipment. A minimum requirement is #10 AWG copper wire with THHN or equivalent insulation. The impedance of the conductor should be < 1 Ohm at 60 Hz from end to end.

If such a building ground cannot be provided, an Isolation Filter that attenuates both common and normal mode noise and spikes on the power line can be used.

Even if the Isolation Filter is used, a basic safety ground must be provided. The filter serves to make the AW105R safer from voltage spikes and noise from an existing ground line, but will not compensate for a very poor or nonexistent ground.

Another possible method for providing an adequate ground is by utilizing a grounding rod.

NOTE

Conduit IS NOT an adequate ground.

Vacuum Pump

A receptacle of the correct specification should be provided at the pump location. Refer to the vacuum pump manufacturer's manual for further details.

Heat Exchanger

Refer to the heat exchanger manufacturer's manual for further details.

3.3.5 COOLING WATER

WATER IN / WATER OUT	
Purpose:	Cooling water for the baseplate and RF Generator
Requirement:	100% Distilled Water
Specification:	< 10 MOhm-cm
Filter:	5 microns (nominal)
Temperature:	23°C ± 4°C
Pressure:	< 60 psi

If **only** the baseplate needs cooling water:

Flow Rate:	> 1.0 gpm (3.8 lpm)
Fitting:	Swagelok 1/4" tube
Hose Line:	1/4” OD Tubing

If **both** the baseplate and RF Generator need cooling water:

Flow Rate:	> 1.5 gpm (5.7 lpm)
Fitting:	Swagelok 3/8" tube
Hose Line:	3/8” OD Tubing

The following instruments are recommended to be installed and supplied by the user.

Pressure Gauge Inlet	range of 0 – 100 psi (11 kg/cm).
Flowmeter	range of 0 – 4 gpm (15 liters/min.) (installed on the return line).

It is recommended that a closed loop water temperature controller be used.

It is recommended that distilled water be used for cooling the baseplate and RF Generator (if water cooled). The distilled water needs to be ISO 3696 Grade 1 (resistivity at < 10 MOhm-cm corrected to 25°C). 40% ethylene glycol and 60% distilled water may be used. Refer to the heat exchanger specification for the proper type and condition of the cooling water.

The customer must supply a water filter. The water filter is connected to the water source line of the AW105R. It is recommended to be 5 micron (nominal). It is used to filter out sediment, dirt and sand.

The water temperature should be set to 23°C ± 4°C. The water pressure should not be more than 60 psi. It should have a flow rate of a minimum of 1.5 gallons (5.7 liters) per minute at 23°C. This will provide all of the cooling needs of the AW105R system. The cooling water should not exceed 27°C and it should not get below 19°C.

The use of municipal water or any other type or water/coolant source is not recommended. These sources can lead to chemical deposits, scaling, occlusions or electrolytically-induced loss of the conducting metal. Also, deionized (DI) water and tap water are not suitable since they will react in the RF field to form deposits or loss of metal in the coolant line.

NOTE

The length of the water temperature controller's lines should not exceed 15 feet for optimum performance.

Coolant should be routed from the supply with 3/8" polyethylene tubing.

Connect the supplied water flow sensor to the "Water Out" connector on the AW105R Utility Panel (refer to figure 3-5).

If the RF Generator needs water cooling, connect the supplied "T" fittings (3/8" tube) to the "Water In" port and to the "OUTPUT" port of the water flow switch.

3.3.6 GAS 1, 2, AND 3 (PROCESS GASES)

PROCESS GAS	
Purpose:	Process Gases
Requirement:	High Purity Process Gas
Specification:	9 psig ± 1 psig
Fitting:	1/4" VCR-F

The process gases must be of high purity, at least 99.95%. Facility filters and dryers should be used at the supply point before the AW105R.

The process gas pressure should be set to 9 psig, the actual setting will be determined at the time of process development. It is recommended to use a regulator that has a maximum pressure of 30 psig.

NOTE

The pressure regulators should be located within 10 feet of the AW105R. A location as close as possible to the system's mass flow controllers and purge valve will ensure proper operation.

3.3.7 N_2 PURGE

N2 PURGE	
Purpose:	Backfill the Chamber
Requirement:	High Purity Process Nitrogen
Specification:	20 psig
Fitting:	Swagelok 1/4" tube

The N_2 Purge is used to backfill the process chamber to atmospheric pressure. Therefore, it needs to be of high purity, the same as process gases.

3.3.8 EXHAUST

CHAMBER EXHAUST	
Purpose:	Maintain chamber temperature
Requirement:	N/A
Specification:	< 200 CFM
Fitting:	4-inch (10 cm) diameter duct

The chamber exhaust port (located in the upper section, see figure 3-4) has an internal fan which draws air from the clean room over the chamber and the matching network for cooling. It maintains chamber temperature to a predetermined ambient temperature. If this exhaust is attached to the house exhaust system, the port should have a maximum flow rate of 200 CFM for proper operation. The exhaust port is 4-inches (10 cm) in diameter.

CABINET EXHAUST	
Purpose:	Exhaust equipment heat
Requirement:	N/A
Specification:	< 100 CFM
Fitting:	4-inch (10 cm) diameter duct

The cabinet exhaust port (located in the lower section, see figure 3-4) removes heat that is generated by the equipment in the lower section. It should have a maximum flow rate of 100 CFM. The exhaust port is 4-inches (10 cm) in diameter.

3.3.9 VACUUM

Process Vacuum

PROCESS VACUUM	
Purpose:	Vacuum for the Process Chamber
Requirement:	25 SCFM (42.5 m^3/h)
Specification:	Average Flow Rate: 0.2 to 4 SCFM (based on one hour's operation)
Fitting:	KF40

The vacuum port (figure 3-5) is the process vacuum and it is required to be connected to the vacuum pump. The size and type of vacuum pump used with the AW105R depends on the process requirements.

The pump hose is connected to the main poppet valve with a KF40 flange.

Vacuum Pump

As process requirements vary from one plant to another, many different vacuum pumps and pumping configurations are used. Review the operation and maintenance manual of the vacuum pump (optional) delivered with your system for proper installation and operation.

The vacuum pump that is provided with the AW105R has the following current requirements:

Pump (optional)	**208 VAC, 3-phase**
Edwards E2M40	7.4 Amps

Vacuum Pump Fluid Requirements

The standard system configuration may not include a charge of perfluorpolyether fluid in the pump. If one was not ordered with the pump as an option then it is the user's responsibility to have it available for installation.

☠ WARNING

Operating the pump without any ferfluoropolyether fluid OR with the improper fluid will void the pump warranty.

If your AW105R was shipped with an Edwards E2M40 vacuum pump, the following amounts of perfluoropolyether fluid are required:

- 9 kg, 4.5 liters OR 20 lbs. of Fomblin Y06/6 or Krytox 1506 pump fluid

Vacuum Pump Exhaust
Edwards vacuum pumps supplied by Allwin21 have a NW25 flange for the exhaust port.

Fluid mist will be contained in the exhaust media. It is strongly recommended that an oil mist recovery system be installed on any pumping system.

Oil Filtration System

(optional)
The Edwards EOF2500 and EOF4000 Oil Filtration Systems are wired for 115 Volt, single phase, 50/60 Hz operation. The Oil Filtration System uses a standard 115 V, 20 Amp wall outlet. The distance from the vacuum pump to the EOF2500 and EOF4000 filtration systems should not exceed 40 inches.

For 230 Volt operation, see the manual that accompanied your oil filtration system.

3.3.10 ROBOT VACUUM

ROBOT VACUUM	
Purpose:	Vacuum for the robot end-effector chuck
Requirement:	N/A
Specification:	-25 inHg
Fitting:	Swagelok 1/4" tube

The robot vacuum (figure 3-5) is a separate line from the main process vacuum. It should have a vacuum of 25 inHg at all times to hold the wafer on the robot chuck.

3.3.11 CDA

CDA	
Purpose:	Pneumatics
Requirement:	Clean Dry Air or Nitrogen
Specification:	80 psig
Fitting:	Swagelok 1/4" tube

The CDA (figure 3-5) is used for the pneumatics within the AW105R, such as the wafer lift pins, and the chamber door.

The source for the CDA can either be the house nitrogen of clean dry air. It should have a pressure of 80 psig.

CDA-OUT M-VALVE	
Purpose:	Goes to the main vacuum isolation valve.
Requirement:	N/A
Specification:	N/A
Fitting:	Swagelok 1/4" tube

The port labeled “CDA OUT M-VALVE” (figure 3-5) goes to the main vacuum isolation valve that is attached externally to the vacuum port. The pneumatic pressure is regulated by the regulator labeled “H.P. PNEUM”.

REGULATED PRESSURE

H.P. PNEUM	70 psi
PIN	70 psi
DOOR	25 psi
BACKFILL	10-20 psi, Set so the process chamber vents in 20-30 seconds.

3.4 SETUP

3.4.1 UNPACKING & INSPECTING

Uncrating

Detailed unpacking instructions are contained in the system manual shipped with your system. Unpacking should not take place until the manual is removed and the unpacking instructions are thoroughly understood.

If the container shows visible signs of damage upon delivery, notify the carrier **immediately,** and do not proceed with unpacking until a carrier's agent is present.

The AW105R should be removed from its sealed plastic shroud only in an appropriate particulate free environment to avoid contamination prior to its installation.

To open this package, follow the steps below:

Step 1. Remove the clamps that hold the front panel of the crate.

Step 2. Remove the crate panels from around the AW105R..

Step 3. Lift out the AW105R.

☠ WARNING

The AW105R weighs over 220 lbs. (100 kg).

Use proper handling precautions.

Step 4. Carefully unpack the accessories and spares, if applicable. Use care when unpacking accessories and spares and check that none of the parts are damaged.

Step 5. Do an inventory of all items, using the packing list that was enclosed.

🏷 NOTE

Do not discard shipping crate. You may wish to use them later if the system must be returned to Allwin21 for repair.

Inspecting

The Allwin21 AW105R system has been thoroughly inspected and tested at the factory prior to shipment, and should be operational when received.

The system has been shipped in a specially designed container to prevent any equipment damage. However, if the container shows visible signs of damage upon delivery, notify the carrier **immediately,** and do not proceed with unpacking until a carrier's agent is present. Do not notify Allwin21, as the initial claim for damages must be filed with the carrier. Retain all shipping containers and packing material for damage inspection and possible return of the damaged unit.

Visually inspect the unit for dents, scratches or other visible signs of shipping damage. If you notice any shipping damage, notify the carrier **immediately**.

Inventory and inspect the contents of the containers with the Allwin21 packing list to make sure all items have been shipped. If any parts are missing or broken, notify Allwin21 immediately. The appendix in the Service manual lists procedures and phone numbers to obtain replacement parts.

Unpacking

Step 1. Move the AW105R system to a semi-clean area, and remove the protective cover. Wipe any dirt accumulation from the system.

Step 2. Remove all packing material from the Main Console.

- Cut the tie wrap at the chamber door.

CAUTION

DO NOT PUT ANY PRESSURE ON THE ROBOT ARM.

- Remove plastic bagging from the end effector and each of the gas and vacuum fittings at the back of the system.
- Remove the "Tip and Tell" packing indicator.

3.4.2 CONNECTING FACILITIES

Position System

Step 1. Position the AW105R System in its final place. Ensure the unit is level by using the leveling feet.

CAUTION

If the wafer chuck heater has been disconnected during any installation or maintenance procedure, the heater must be checked after the device has been reconnected. This is to ensure the device is operating properly.

Turn on the heater for one (1) minute.

If the temperature fails to rise after that time, it could indicate that the thermocouple is not properly seated. In this event the heater should be shut off immediately. Failure to do so could result in damage to the hardware, as the thermostat will not respond quickly enough when the chamber assembly is heating up.

Recheck the heater connection and repeat this procedure as necessary. This procedure should be followed when the system is installed or after the heater has been off for more than one (1) hour.

Vacuum Valve

Step 2. Install the Vacuum Isolation Valve on the vacuum port (figure 3-5) with a KF-40 O-ring and clamp.

Step 3. Install the 1/4" plastic tubing from the “CDA OUT M-VALVE” port (figure 3-5) to the Vacuum Isolation Valve.

Power Cord Removal

Step 4. Remove the back panel of the Cabinet. Remove the power cord from this area.

Cooling Water

Step 5. The water coolant connections should be made in the following manner:

- Install the flow switch first. Attach the 0.10 gpm flow switch to the baseplate coolant outlet, labeled “WATER OUT”. The flow switch should be attached in the following manner: The "IN” port of the flow switch is attached to the "WATER OUT" port of the baseplate. Swagelok fittings should be used.
- Attach the 3/8" drain line to the "OUT" port of the flow switch.
- Attach the coolant lines as indicated in figure 3-7.
- Connect the Flow Switch Harness to the 3-pin connector on the flow switch appropriately tagged.

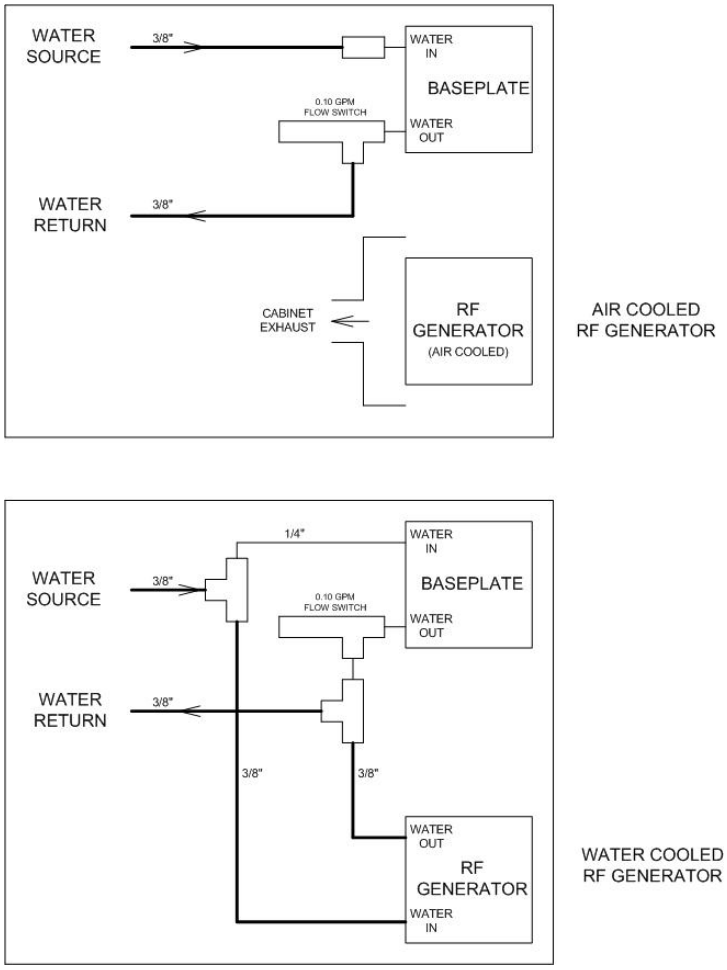

Figure 3-7: *Water Cooling Connections*

Robot Vacuum

Step 6. Connect the low vacuum to the port labeled “ROBOT VACUUM” (figure 3-5).

CDA (Pneumatics)

Step 7. Connect the 80 psig Nitrogen to the port marked “CDA” (see figure 3-5). Set the pressure for the “H.P. PNEUM”, “PIN”, and “DOOR” as specified for CDA.

Process Gases

Step 8. Connect gas lines to the gas input ports. See your system utility description for determining the gas arrangement. Typically oxygen is connected to Gas 1 and Gas 2, and forming gas is connected to Gas 3.

N_2 Purge

Step 9. Connect the process nitrogen to the N2 Purge port (figure 3-5). Set the pressure for the “BACKFILL” regulator to 20 psig.

NOTE

There is an interrelationship between the nitrogen pressure for the chamber backfill and venting the chamber. Venting controls the amount of time the system will backfill before attempting to open the door. The higher the nitrogen backfill pressure, the sooner the chamber will rise to atmospheric pressure.

As a starting point, it is suggested that the backfill regulator be set to 20 psig. Set the regulator so that the door cylinder attempts to open the door only after the system is at atmosphere (i.e., the door does not strain nor "pop" when it opens).

Process Vacuum

Step 10. Connect the Vacuum Pump to the Vacuum Isolation Valve using tubing with KF-40 flanges. Attach pump exhaust line to a facility provided exhaust line.

NOTE

The vacuum pump used with your system can vary depending on application and fab area. Please refer to the manufacturer's manual which accompanied the specific vacuum pump you use with your system for information on its proper installation.

WARNING

Operating the pump without any ferfluoropolyether fluid OR with the improper fluid will void the pump warranty.

Exhaust

Step 11. Connect House Exhaust to the two 4" fittings at the rear of the AW105R for the "Cabinet Exhaust" and the "Chamber Exhaust" (figure 3-4).

Power Cord

Step 12. Attach the power cord into the proper receptacle.

System is now ready for startup. Stop here if a Allwin21 Service Engineer has been requested to do the startup procedure. Otherwise, an equipment engineer should continue and do the startup procedure.

3.4.3 ELECTRICAL CHECKS

NOTE

Unless specified otherwise on the system order, all units are shipped from the plant set for 208 volts 50/60 Hz.

AC Line Voltage

Step 1. Measure the AC line voltage with a voltmeter. The reading must be between 190 Volts and 240 Volts.

RF Generator

This procedure verifies, and if necessary sets, the proper selection of the voltage for the RF generator. Consult the RF Generator Manufacturer's manual for selecting the proper voltage.

Step 1. If the RF Generator is OEM-6, then verify the supply voltage tap is selected properly. Else, skip to step #7.

Step 2. Remove the RF generator, and its top cover. Locate the terminal strip at the left rear.

Step 3. Secure the black wire to the proper terminal as follows:

Terminal #	Line Voltage
1	190 to 200
2	200 to 210
3	210 to 225
4	225 to 240

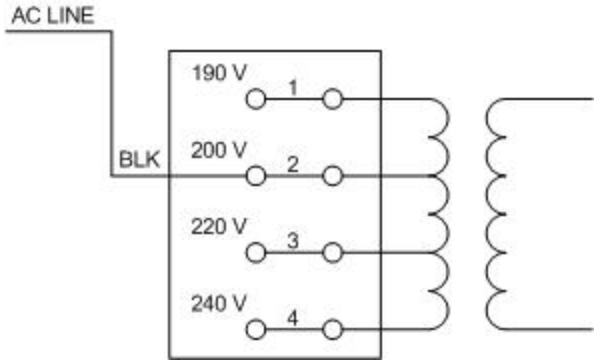

Figure 3-8: *OEM-6 RF Supply Voltage Tap Selection*

NOTE

Be sure the generator uses the proper power relay coils – DPST 240V for 208 to 240 VAC operation and DPST 200V for 190 VAC operation.

Step 4. Plug in the RF generator and flip the AC switch to ON.

WARNING

Only qualified, trained maintenance technicians should be allowed to work on an uncovered RF generator. Caution and safety measures must be taken that are characteristic with all high energy RF generators and AC and DC circuitry is imperative.

Press the line voltage test switch on the rear panel and observe the voltage reading on the generator panel meter (450 = 45.0 Volts). The reading should be between 44 and 48 Volts. If the reading is below 44 Volts, unplug the unit and select the next lower tap. If higher than 48 Volts, select the next higher tap.

Step 5. Replace cover.

Step 6. Reinstall RF generator.

3.4.4 INITIAL TESTS AND ADJUSTMENTS

Heater Chuck Test

CAUTION

If the wafer chuck heater has been disconnected during any installation or maintenance procedure, the heater must be checked after the device has been reconnected. This is to ensure the device is operating properly.

This procedure should be followed when the system is installed or after the heater has been off for more than one (1) hour.

Step 1. Turn on the heater for one (1) minute.

Step 2. If the temperature fails to rise after that time, it could indicate that the thermocouple is not properly seated. In this event the heater should be shut off immediately. Failure to do so could result in damage to the hardware, as the thermostat will not respond quickly enough when the chamber assembly is heating up.

Step 3. Recheck the heater connection and repeat this procedure as necessary.

RF Generator Test

An initial RF generator test should be completed before the system is put into operation. Refer to the RF Generator manufacturer's manual for proper operation.

Step 1. Ensure the generator is properly connected to a suitable 190 to 240 Volt, 50 to 60 Hz line voltage and the proper transformer tap has been selected. The internal line voltage test circuit should read 440 to 480 Watts on the front panel meter. (See "***Electrical Checks***" above.)

Step 2. Ensure coolant flow is properly connected. (See "***Water Coolant***" above.)

Step 3. Connect the output of the RF generator to a suitable 1000 Watt, 50 ohm load.

Step 4. After checking that the RF power switch is in the OFF/REMOTE position and the LOCAL/REMOTE switch on the rear panel is in the LOCAL position, rotate the POWER ADJUST control fully CCW.

Step 5. Turn on the AC line switch. The AC ON light should be on; all other lights should be off. The internal cooling fan should be operating.

Step 6. Turn on the RF POWER switch. The RF ON light should be on; the MAXIMUM POWER and OVERHEAT lights should be off. There should be no meter reading.

Step 7. With the METER SELECT switch in the FORWARD POWER position, rotate the POWER ADJUST control CW to obtain at least 650 Watts. The MAXIUM POWER light may be on at 650 Watts if the line voltage is near its low limit. This is normal.

Step 8. Set the METER SELECT switch to the REVERSE POWER position. The meter reading should be zero.

Step 9. Return the METER SELECT switch to the FORWARD POWER position and turn off the RF POWER switch. Do not change the POWER ADJUST control.

Step 10. Disconnect the generator output connector from the 50 ohm load, place the connector where it does not touch any equipment and turn on the RF POWER switch.

CAUTION

Extreme care and appropriate precautions taken while working with any RF power equipment should be observed during this step of the initial test.

Observe that the Forward and Reverse Power meter readings are 150 Watts. The Maximum Power light should be ON to indicate the generator is being limited by internal protection circuits and is no longer controlled by the front panel POWER ADJUST.

Step 11. Rotate the POWER ADJUST CCW to reduce output power. As the power is reduced to below 150 Watts, the MAXIMUM POWER lamp will turn OFF as power control and leveling are restored.

Step 12. The test is complete.

Heater Chuck Level

After the system has been facilitized, it is necessary to ensure the chuck surface is level. Since wafers will rest on the chuck surface during processing, they may slide around on the chuck if the surface is not level.

Step 1. Turn OFF power to the AW105R. Remove the top and right side covers. Remove the RF shield.

Step 2. Place a bull's eye level on the center of the chuck. Determine if the chuck surface is level.

Step 3. Turn the system on and allow the system to initialize.

Step 4. Loosen the bolts that hold the chamber clamps in place.

Step 5. Swing the clamps clear of the chamber bottom and completely remove the clamp in the left rear corner. Raise the chamber on its hinge and secure it opened.

NOTE

When using the bull's eye level, there may be an inherent tendency for the bubble to be off center when truly level. This can be corrected by leveling with respect to the arrow on the level. As the level is rotated, the bubble should remain stationary with respect to the arrow. Check the chuck surface at 90° rotations.

Step 6. If the chuck surface is not level, adjust the leveling feet. Repeat steps #3 - #6 until it is optimal.

Step 7. Two sets of pin locator holes can be found on the chuck surface. Each set contains four holes 1ocated on 4.25 " and 5.25 " diameters. If 4" (100 mm) wafers will be processed in the system place the four ceramic locator pins in the 4.25" diameter holes. For 5" (125 mm) wafers, use the 5.25” diameter holes and for 6” (150 mm) wafers, no pin locator pins should be used.

Step 8. Install the quartz baffle ring onto the anodized chamber base. Carefully place the top of the quartz baffle into the center opening. Place the anodized retainer ring on the lower lip of the quartz baffle and fasten into the anodized chamber using four shoulder screws. Tighten the screws hand tight, then tighten slightly (about 1/16 of a turn) with a wrench.

Step 9. When the adjustment is complete, let down the chamber assembly and place the clamps over the lower chamber body. HAND TIGHTEN ONLY!

Step 10. Pump down the chamber.

Step 11. Once the system is evacuated, hand tighten the bolts that hold the chamber clamps in place.

Step 12. Vent the chamber.

Step 13. Once the system has reached atmospheric pressure, turn the system power OFF.

Step 14. Replace the RF Shield as well as the top and right side covers.

Pin Motion Adjustment

Step 1. Turn OFF power to the AW105R. Remove the top and right side covers. Remove the RF shield.

Step 2. Turn the system on and allow the system to initialize.

Step 3. Loosen the bolts that hold the chamber clamps in place.

Step 4. Swing the clamps clear of the chamber bottom and completely remove the clamp in the left rear corner. Raise the chamber on its hinge and secure it opened.

Step 5. If the Pin Drive Assembly is new or has never been adjusted, screw the control valves of this assembly to 1 turn out (counter clockwise) from its seated position.

Step 6. The pneumatic pressure for the pins should be set as specified in the CDA Facilities section. Adjust the pressure until the pins are raised 0.200 inches (+0.00, -0.02 inches) above the flat surface of the chuck.

Step 7. Go to the WTM screen.

Step 8. Press the **PIN UP** and **PIN DOWN** buttons. The pins should be traveling up and down. Adjust the regulator for the Pin Drive Assembly so that they raise and lower in 1 to 2 seconds.

Step 9. Repeat the above step with a wafer on the pins.

Step 10. When the adjustment is complete, remove the wafer, let down the chamber assembly and place the clamps over the lower chamber body. HAND TIGHTEN ONLY!

Step 11. Pump down the chamber.

Step 12. Once the system is evacuated, hand tighten the bolts that hold the chamber clamps in place.

Step 13. Vent the chamber.

Step 14. Once the system has reached atmospheric pressure, turn the system power OFF.

Step 15. Replace the RF Shield as well as the top and right side covers.

4. START-UP

4.1 OVERVIEW

This section describes how to power up the Allwin21 AW105R system. Prior to applying power to the system, a visual inspection of the facilities is required. It is also recommended that you read the safety precautions given in the *Safety Precautions* section of this manual.

To complete the following procedures, you must first be familiar with the use of the control software.

If any irregularities occur during power-up, power down the system and immediately notify the service engineer in charge.

☠ WARNING

Check the system utility connections and sources before switching on the AW105R.

4.2 OPERATOR CONTROLS

The operator controls are located on the front panel of the Allwin21 AW105R, figure 4-1.

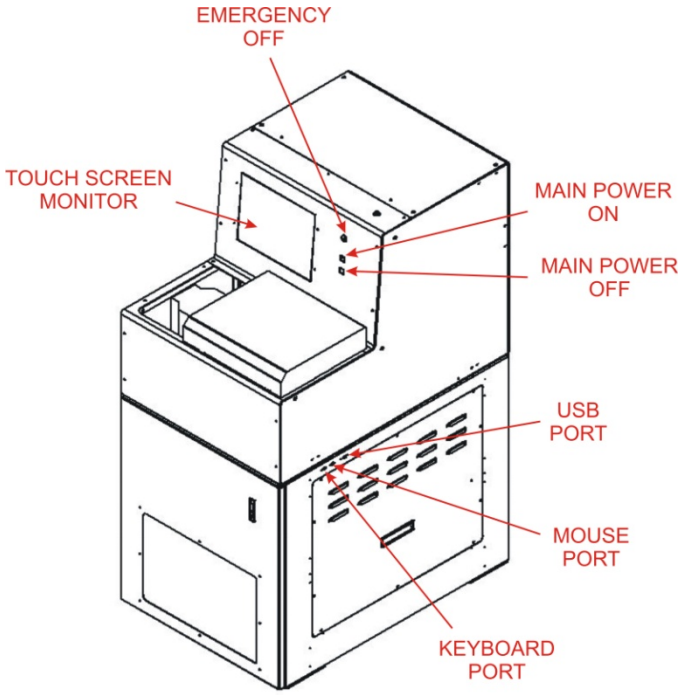

Figure 4-1: *Operator Controls*

Main Power “ON”	This push button switch turns on the entire system.
Main Power “OFF”	This push button switch turns off the entire system.
Touch Screen Monitor	Displays the graphics user interface for the AW105R control software. It is also touch sensitive so the operator can simply touch the buttons that are displayed on the screen to activate the button function.
Emergency Off (EMO)	This push button switch turns off the entire system if there is an emergency situation.
Keyboard Port	Allows the operator to attach a keyboard to the system to edit parameter fields, instead of using the pop-up keyboard on the monitor. There is a PS/2 port on the right side of the AW105R chassis to plug in a keyboard.
Mouse Port	Allows the operator to attach a mouse to the system to select buttons and fields to activate the function, instead of touching the monitor. There is a PS/2 port on the right side of the AW105R chassis to plug in a mouse.

Once the power has been turned on by pressing the **Main Power "ON"** push button on the front control panel, the system will start to initialize and the control software will load. Also, the **Power On Indicator** on the front of the power distribution box will illuminate, figure 4-2.

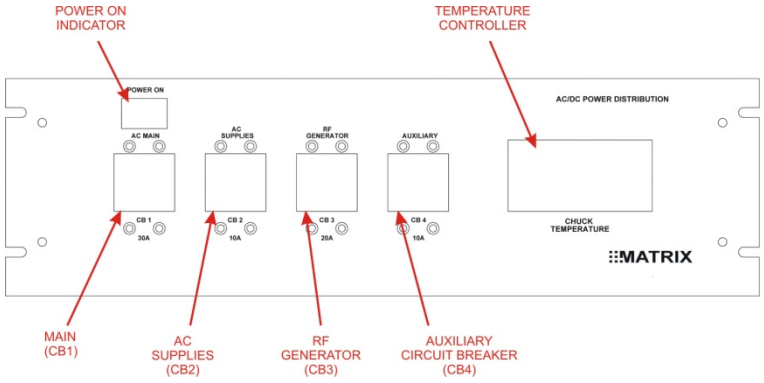

Figure 4-2: *Power Distribution Box*

As the AW105R control software loads, the robot should initialize. If the robot does not initialize, the robot cannot be commanded until it is initialized. The robot can be initialized from either the *WTM* screen or the *Robot Teach* screen.

4.3 POWER-UP PROCEDURE

The procedure for properly powering-up the AW105R is detailed in the following steps:

Step 1. Visually inspect the utilities to make sure connections are secure and to the conditions are as specified.

Step 2. Ensure that the system power input circuit breakers and power switches are set as indicated below:

- The wall circuit breaker(s) for the controller computer and AW105R is on.
- The main power distribution box switch is on.
- The main circuit breaker (CB1) on the power distribution box (figure 4-2) is on.
- The AC Supplies (CB2) circuit breaker is on.
- The RF Generator (CB3) circuit breaker is on.
- The Auxiliary (CB4) circuit breaker is on.
- The computer power is on.

Step 3. Press the **Main Power ON** button on the front control panel (figure 4-1). This will turn on the AW105R. The **Power On Indicator** should illuminate (figure 4-2).

Step 4. Wait for the computer to boot. If the monitor does not show any initialization messages after 30 seconds, check that the power to the monitor is on.

Step 5. The robot should start to initialize.

Step 6. The system Main Menu should appear on the monitor screen after the robot has initialized.

Step 7. If the robot did not initialize, go to either the *WTM* screen or the *Robot Teach* screen and initialize the robot.

Step 8. Turn on the facilities as required for testing.

Step 9. The AW105R system is now ready for testing.

4.4 POWER-DOWN PROCEDURE

The procedure for properly powering-down the AW105R is detailed in the following steps:

Step 1. Make sure the robot is retracted and away from the stations.

Step 2. Press the Main Power OFF push button on the operator control panel (figure 4-1).

Step 3. Turn off the machine main power breaker/switch.

Step 4. If any accessories are being used with the system, turn them off as necessary.

APPENDIX

A. MANUAL REVISION HISTORY

Date	Description
September 2011	Initial Release, A9-0745-02 Rev. A
February 2012	Removed QuickSemi and the index