



Allwin21 Corporation

Tegal 90Xe Upgrade



Installation Supplement to the Tegal90X Manual

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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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PREFACE

INTENDED AUDIENCE

This installation supplement has been written to assist Facility Engineers and Technicians in the installation of the Tegal 90Xe Through-The-Wall (TTW) system with the TTW Upgrade Kit. Building Planners may also use this document to plan facilities for the system. Please read this document carefully before installing the Tegal 90Xe TTW System with the TTW Upgrade Kit.

AW-901 TTW is used in this manual as a generic term meaning the plasma production etcher system which could be a Tegal 901e TTW or 903e TTW system. The AW-TGL software can control these machines. The machines may be refurbished or converted systems. The TTW upgrade kit contains all the modifications Allwin21 performed on the AW-901 TTW including the AW-TGL software.

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.

For example:

“Select **Recipe** from the *Main Menu* screen to enter the Recipe Programming mode.”

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1. INTRODUCTION

1.1 OVERVIEW

This installation supplement manual is aimed to explain the changes and present the additional requirements to the Tegal90Xe series with Allwin21 Corporation TTW Upgrade Kit. It is not a replacement for the Tegal90Xe TTW manuals or its OEM manuals.

The AW-TGL software is an advanced control software standard on all Allwin21 converted AW-901 TTW systems. It is also offered as an upgrade to the Tegal etching systems. Please refer to the Allwin21 Tegal90Xe TTW Operation Manual for controlling the AW-TGL control software.

1.2 ALLWIN21 MODIFICATIONS

Allwin21 made several modifications to the original Tegal90Xe TTW system. Modifications are made based on customer's needs and the need to upgrade the original hardware and software control.

1.2.1 CONTROL INTERFACE BOARD

The original Tegal90Xe TTW controls have been replaced by one control interface board (2100-0901-048) from Allwin21. The one control board interfaces with all of the devices and boards in the system and to the computer, which runs the AW-TGL control software.



Figure 2-1: *Control Interface Board*

1.2.2 EQUIPE ROBOT ARM

There are two types of Equipe robot arms, a straight robot arm with vacuum and a fork robot arm with vacuum. Based on customer's needs, one of the two Equipe robot arm types is included with the system.

Due to the difference in shape for the robot arm, the straight robot arm requires the chuck to be rotated 180° from the original manufacturing chuck position. The fork robot arm however does not require the chuck to be rotated.



Figure 2-2: *Equipe Robot Arm*

1.2.3 EQUIPE ROBOT

The Equipe robot replaced the shuttle system for wafer transportation. The wafer cassette to cassette system was removed, and replaced with just a single cassette as both the source and destination. The Equipe robot handles the loading, and unloading of wafers between the cassette, process chuck, and alignment station.

Equipe robot controller is included with the Equipe robot. It controls the robot movement location and speed. Refer to Section 6 Robot Setup for additional information on how to calibrate and teach the Equipe robot.

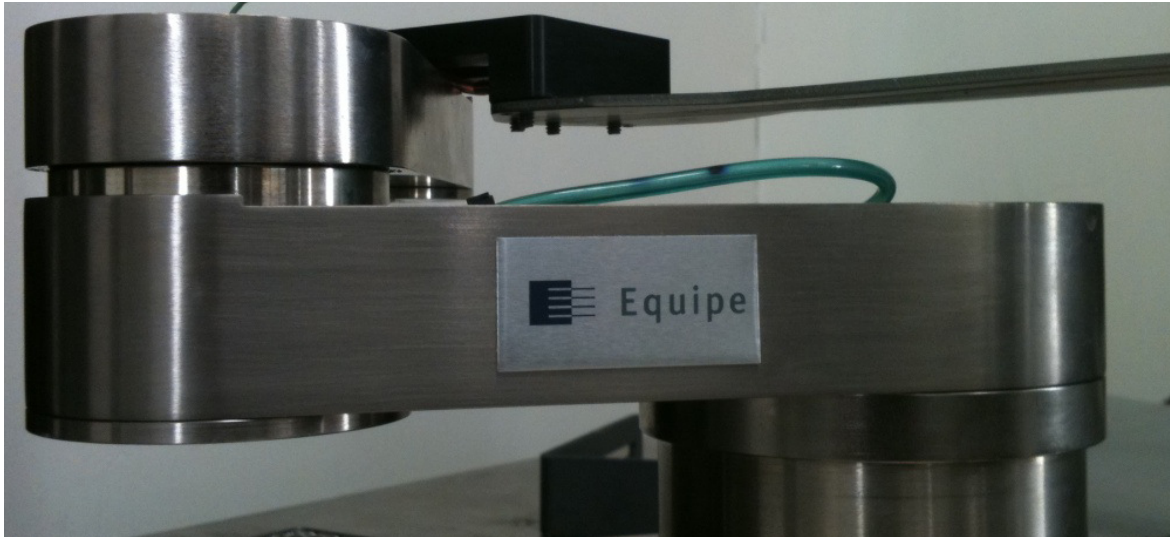


Figure 2-3: Equipe Robot

1.2.4 WAFER ALIGNMENT STATION

Allwin21 installed a wafer alignment station that allows the proper alignment of wafer size 3, 4, 5, and 6 inches. Its purpose is to ensure every wafer is centered and the flat is position in the same direction when processed to increase repeatability of results.

There are two types of alignment performed at the alignment station. The top level of the wafer alignment station center aligns the wafers. The bottom level ensures the wafer's flat is always aligned in the same position.



Figure 2-4: Wafer Alignment Station

1.2.5 RF GENERATOR

Based on customer's requirement, an appropriate wattage RF plasma generator is included with the Allwin21 machine. The RF generator generates microwave, which excites the gas molecules inside the chamber to produce plasma. The following RF generator is used:

MKS/ENI Elite 300

The unit is air cooled using a built in fan located at the rear of the unit. Make sure the generator receive proper venting and no obstruction blocks its air flow.

This unit is preinstalled and only needed to be powered on.



Figure 2-5: RF Generator Supply

1.2.6 CASSETTE HOLDER

Allwin21 has installed a new cassette holder. It replaced the two cassette elevators from the original shuttle cassette to cassette system. The cassette holder can be adjusted to fit wafer carriers between 3 to 6 inches.



Figure 2-6: Adjustable Cassette Holder

1.2.7 SOFTWARE CONTROLLER AND DISPLAY

The original Tegal90Xe controller has been completely removed and replaced with a modern computer with advanced AW-TGL control software. The front monochrome display is no longer used. However, a touch sensitive flat panel monitor is supplied with the AW-TGL system to interface with computer.



Figure 2-7: Software Computer Controller

The system is controlled by menu commands from the AW-TGL control software. This software allows a great deal of flexibility and control of the Allwin21 machine.

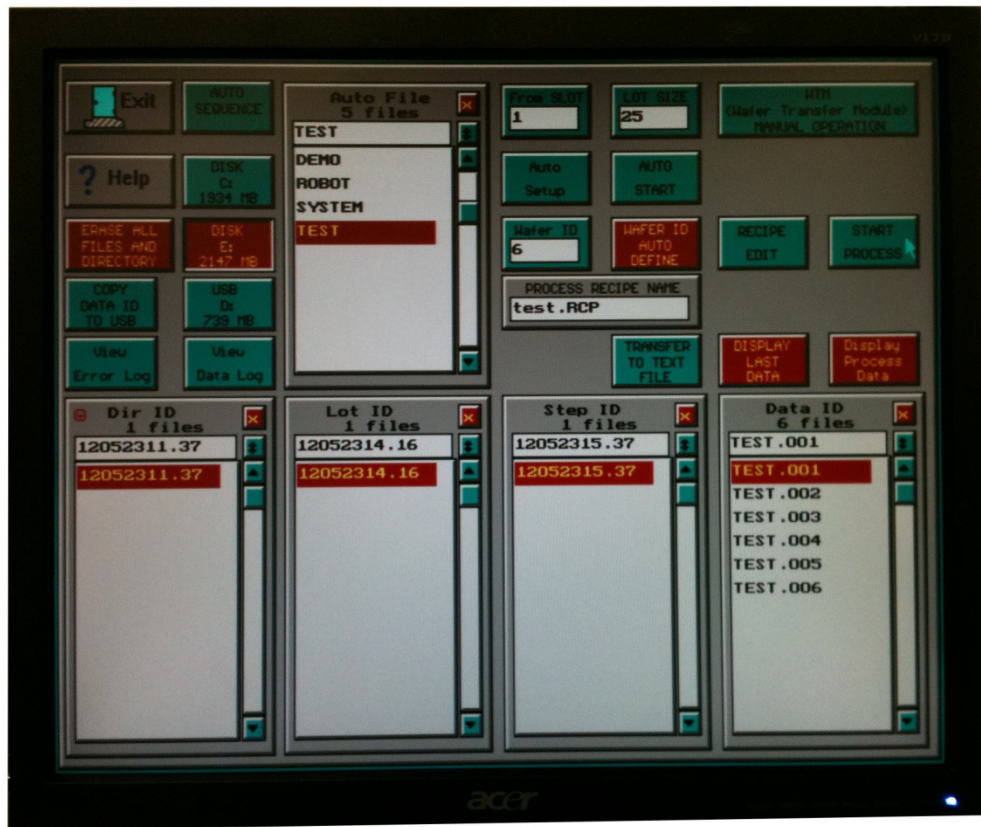


Figure 2-8: Display Panel with AW-TGL Software

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2. SAFETY PRECAUTIONS

2.1 OVERVIEW

This section provides information intended to prevent damage to the AW-901 TTW and injury to operation and maintenance personnel. All hazards are not covered, only those most prevalent and serious. Your full understanding of the capabilities and limitations of this equipment is necessary for safe and efficient operation.

WARNING

Only Allwin21 or qualified personnel should install, start up, operate and/or repair the AW-901 TTW. Damage to the system or injury to personnel could result if the preceding actions are carried out by unqualified personnel.

Prior to applying power to or starting up the AW-901 TTW, follow these safety precautions:

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

2.2 NOTES, CAUTIONS AND WARNINGS

When operating and maintaining the AW-901 TTW, 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 UTILITIES INSPECTION

Inspect the system utility connections and sources before switching on the AW-901 TTW.

Visually inspect the following utilities to make sure connections are secure:

- Electrical power.
- Gas-handling inlets.
- Cooling water inlet and outlet for chamber cooling
- Clean Dry Air inlet for system pneumatics
- Process exhaust to the Scrubber
- Cabinet exhaust to the Scrubber
- RF cables (if there is an external RF Generator)

Check the Utilities Specifications section in the appendix for proper settings.

 **CAUTION**

Make sure the purge outlet is not restricted. This will cause the process chamber to over pressurize and rupture the seals.

Check for possible water leaks at the cooling water inlet and water outlet connections.

If any of the utilities are disconnected or any connections appear to be leaking, correct the problem. Make sure the house scrubber is operating if processing with hazardous gases or processing wafer which outgas.

 NOTE

Before applying power to the system, the PC-controller computer must be connected; the purge gas and cooling water must be turned on.

2.4 SYSTEM OPERATION

During system operation, be aware of the following:

- The cooling subsystems must be used at all times and should be operational for at least 4 minutes following the last cycle.
- Experimental substrates contain unknown impurities which may outgas during processing.
- Emergency off (EMO) buttons are located at the front and rear of the system. In case of emergency, use the EMO button to shut down the system.

 WARNING

Allwin21 cannot anticipate the number and variety of materials a user may experiment with, and is not responsible for any potential hazards which may result from wafer outgassing.

2.5 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.

2.6 GAS HANDLING

Be aware of the following cautions when working with gasses in the AW-901 TTW:

- Only use gas that has been specified for use in the Tegal 90Xe TTW system. Refer to the original Tegal 90Xe TTW installation manual for a comprehensive list of acceptable complex process gases.

CAUTION

Allwin21 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 service 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.

2.7 **HAZARDS**

The AW-901 TTW presents certain hazards if operated or maintained improperly. These fall into the following categories:

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

2.7.1 **ELECTRICAL SHOCK HAZARDS**

The AW-901 TTW requires electrical power which is distributed through the machine. Safety interlocks are included in the original Tegal90Xe TTW design 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 AW-901 TTW. Allwin21 Corp. 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.

2.7.2 **PROCESS GAS HAZARDS**

AW-901 TTW may use complex process gasses. Serious injuries or death could be possible if process gases are inhaled. Proper servicing procedures must be followed for gas handling and should only be performed by trained persons. For a complete list of acceptable gasses, their usage and individual gas hazards please refer to the original Tegal 90Xe TTW installation manual for proper and safe gas handling.

2.7.3 **PROCESS BYPRODUCT HAZARDS**

The process byproducts found in the chamber surfaces of the AW-901 TTW 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 maintaining the chamber surfaces and its accessories.
- In the event of contact with by product deposits from the chamber, promptly flush the contact area with cold running water and contact first aid or safety personal.

Allwin21 Corp. claims no responsibility for the safety of the byproducts in the AW-901 TTW system.

2.7.4 OXYGEN HAZARDS

Oxygen (O₂) is often utilized as a process gas for an etching system, either alone or in conjunction with other gases. A possible EXPLOSIVE condition exists when O₂ is used.

Oxygen is an oxidizing agent which 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.

2.7.5 THERMAL HAZARDS

The 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 during physical contact with the system before the cooling time elapses.

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.

2.7.6 MECHANICAL HAZARDS

Mechanical hazards may include but not limited to moving parts, parts that block clearance, sharp edges and heavy objects. Use proper procedure during the setup and maintenance process to avoid possible injuries due to mechanical hazards.

2.7.7 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 1000 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 Allwin21 machine 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 AW-901 TTW removed. Lethal radiation hazards exist.

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3. INSTALLATION REQUIREMENTS

3.1 PURCHASER'S RESPONSIBILITY

The purchaser of a new AW-901 TTW 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).

3.2 INSTALLATION PROCESS OVERVIEW

3.2.1 INSTALLATION PROCEDURES

This manual describes how to install AW-901 TTW and perform an operational check of the system. These activities are outlined in the following sequence 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 AW-901 TTW and additional parts.
- Inspect the system for damage or missing parts.
- Connect the utilities to the AW-901 TTW.

3.3 **ALLWIN21 SERVICE**

3.3.1 **FIELD SERVICE INSTALLATION**

As an optional service Allwin21 Corp. provides is the installation of the AW-901 TTW. If it is desirable to have a Allwin21 Field Service Engineer to install the system, contact Allwin21 Corp.

The installation is provided after the Allwin21 machine 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.

- Conduct a thorough visual inspection of the system.
- Inspect all utility connections.
- Verify that supplied utilities meet system requirements
- Inspect processing chamber for damage and contamination, and install chamber chuck as needed.
- Power on and exercise the system software to ensure subsystems are responding properly to operator commands.
- Run system tests and calibration checks.
- Verify that all interlocks, flow switches are operating correctly.
- 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.

3.3.2 **TRAINING**

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

3.4 **SITE REQUIREMENTS**

Please refer to the installation requirements from the original Tegal 90Xe TTW system manual for full information about the utilities requirements. The following list contains but not limited to the utilities requirements that should be referenced from original manual.

- Utility connection locations.
- N₂ gas and pressurized clean dry air.
- Electrical specifications.
- Cooling water.
- Process gas.
- Exhaust.
- Vacuum.

3.4.1 FACILITY PREPARATION

CAUTION

Never place the unit in a location where excessive heat, moisture, or corrosive materials are present.

NOTE

All facilities required for the operation of the AW-901 TTW and its support equipment should be completed before any connections are made to any part of the equipment. For a list of facility requirements please refer to the Tegal 90Xe TTW original installation manual.

3.4.2 SPACE REQUIREMENTS

AW-901 TTW can be placed both through-the-wall or entirely in the cleanroom. Please plan the floor space or the wall and service chase for the equipment prior to positioning the system.

Please refer to the original Tegal 90Xe TTW installation manual under Section II for physical specification for system dimensions and space required for installation. Physical specification modifications are noted in this supplement manual.

3.4.3 FRONT COVER SPECIFICATION

The front cover dimension of the AW-901 TTW is listed below. Prior to installing the TTW system, please make sure the wall cutout size allows the following front cover dimension to be installed.

- Dimension : 60.75" H x 48" W x 0.34" D

3.5 **FACILITIES**

3.5.1 **UTILITY CONNECTIONS**

The notes in this section are designed to help the facility personnel connect the AW-901 TTW plumbing and other utilities in a practical and functional manner. This chapter 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 the original Tegal 90Xe TTW system installation manual for details on the locations and specifications of the system utilities.

3.5.2 **ELECTRICAL**

Power requirements vary between the United States, Europe and Japan, therefore special care must be taken in connecting the AC power from the facility main AC lines to the AW-901 TTW. AW-901 TTW utilizes the original Tegal 90Xe TTW system main power specifications. Please refer to the original Tegal 90Xe TTW installation manual for electrical specifications details.

The main power lines from the facilities AC source must be kept as short as possible to reduce distributed line inductance, preferably with a line length of less than 25 feet. As the AC power distribution lines become longer, there is a higher resistance or distributed inductance in the wire. This distributed line inductance can result in power line disturbances if measured close to the Aw-901 TTW AC power connections. These disturbances can result in the Aw-901 TTW and other equipment on the same distribution panel having operational problems.

VACUUM PUMP

Refer to the vacuum pump manufacturer's manual for further details.

3.5.3 **AIR CONDITIONING**

The moisture in the ambient air around the AW-901 TTW should not condense on any part of the system.

REQUIREMENTS

AIR CONDITION

Temperature: 20-30°C

Humidity: Non-condensing

3.5.4 ROBOT VACUUM

AW-901 TTW requires the use of a vacuum line to assist the wafer transfer process using the Equipe robotic arm.

<p>ROBOT VACUUM</p> <p>Purpose: Vacuum for the robot end-effector chuck</p> <p>Requirement: N/A</p> <p>Specification: -25 inHg</p> <p>Fitting: Swagelock ¼" tube</p>

3.5.5 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.

D is the inner diameter of the tube
 F is the flow rate
 P is the pressure gauge reading (in psig)

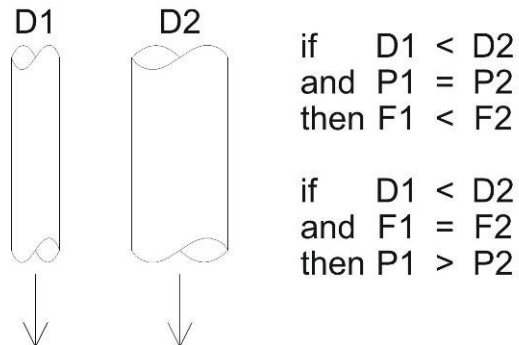


Figure 5-1: Gas Pressure and Flow Rate Relationship for Different Tube Diameters

TUBING IS TOO SMALL

As depicted in figure 3-1, 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.

If the diameter of the line is small, then the pressure of the air will have to be very high to get adequate air flow. Also, if another system opens their air valve, the pressure and volume of air will decrease. A high air pressure can cause other problems in the structural integrity of the chamber.

TUBING IS TOO LONG

Friction in tubing (gas line 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.

If the length of the line is very long, then the amount of air flow will be restricted, because of friction between the air and tubing wall.

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

3.5.6 CDA (PNEUMATIC)

REQUIREMENTS

Compressed Pneumatic Actuation Gas Valve (optional)	Type	Clean Dry Air (CDA) or Nitrogen (N2) oil-and-water-free
	Inlet Pressure	85 psig (550 kPa) \pm 5 psig (35 kPa)
	flow rate	10 lpm max
	Fitting	1/4" tube Swagelok

CONNECTION

AW-901 TTW can use one to five inert or non-toxic gases as inputs. Each of these gas inputs are connected to a separate MFC and (optionally) pneumatically operated shut off valve. The supply line for the compressed pneumatic air, figure 3-2, is connected to the 1/4" male Swagelok fitting on the rear of the chassis.

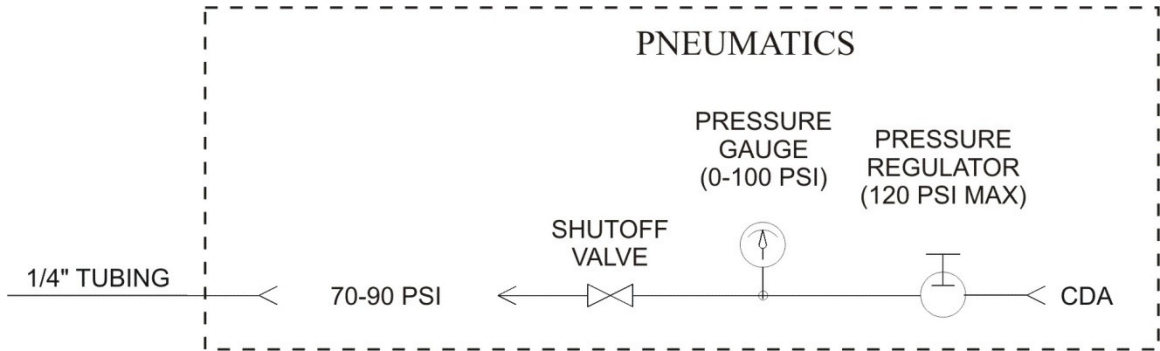


Figure 5-2: Recommended Pneumatic Configuration

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4. SETUP

4.1 UNPACKING AND INSPECTING

4.1.1 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.

Aw-901 TTW 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:

1. Remove the clamps that hold the front panel of the crate.
2. Remove the crate panels from around the AW-901 TTW.
3. Remove the packing material.
4. Remove the System.

 **WARNING**

Use proper handling precautions to avoid injuries.

5. Carefully unpack the accessories and spares, if applicable. Use care when unpacking accessories and spares and check that none of the parts are damaged.
6. 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 Corp. for repair.

4.1.2 INSPECTION

AW-901 TTW 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 compare 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.

4.1.3 UNPACKING

- Move the AW-901 TTW to a semi-clean area, and remove the protective cover.
- Remove all packing material from the Main Console.

 **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.

4.2 CONNECTING FACILITIES

Refer to the original Tegal 90Xe TTW system installation manual for instructions on how to properly connect the facilities to the equipment. Any modifications to the original installation and utility setup are noted in this Allwin21 supplement manual.

- Follow the checklist 1 included in the original Tegal 90Xe TTW installation manual to ensure all utility connections are properly installed.
- Connect the low vacuum to the port labeled “ROBOT VACUUM”.

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5. INITIAL START UP

5.1 OVERVIEW

This section describes how to power up the AW-901 TTW. 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. Refer to the Allwin21 operation manual for instructions on the operating the Aw-901 TTW with 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 Tegal 90Xe TTW system.

5.2 START-UP PROCEDURE

The procedure for properly powering-up the Aw-901 TTW is detailed in the following steps:

1. Visually inspect the utilities to make sure connections are secure and to the conditions are as specified.
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 AW-901 TTW is on.
 - The main power distribution box switch is on.
 - The main circuit breaker on the power distribution box is on.
 - The AC Supplies circuit breaker is on.
 - The Auxiliary circuit breaker is on.
 - The RF Generator is on.

- The computer power is on.
3. Press the **Main Power ON** button on the front control panel. This will turn on the AW-901 TTW. The **Power On Indicator** should illuminate.
 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. (Monitor located in the interior of the Aw-901 TTW requires the system to be powered down before inspection).
 5. The computer will ask to “initialize robot”. First move the robot arm to the Send Cassette position and the R to the Home position before you press YES to allow the robot to initialize.
 6. The system Main Menu should appear on the monitor screen after the robot has initialized.
 7. If the robot did not initialize, go to either the *WTM* screen or the *Robot Teach* screen and initialize the robot. Refer to Section 6 Robot Setup for setup and calibration instructions.
 8. Turn on the facilities as required for testing.
 9. The AW-901 TTW is now ready for testing.

Refer to the *Operation Manual* for complete instructions on Tegal 90Xe TTW system operation, recipe creation, and optimization.

Refer to the *Service Manual* for complete instructions and assistance on Tegal 90Xe TTW system tool maintenance and troubleshooting.

6. ROBOT SETUP

6.1 INITIAL INSPECTION OF EQUIP ROBOT

6.1.1 FACILITIES CHECK

Verify that all facilities connected to the system are within the required limits. The check should include a pressure check, flow check, or both.

6.1.2 ROBOT CHECK

Run five dummy wafers through a Null cycle. Observe wafer placement at each station and listen for scraping sounds.

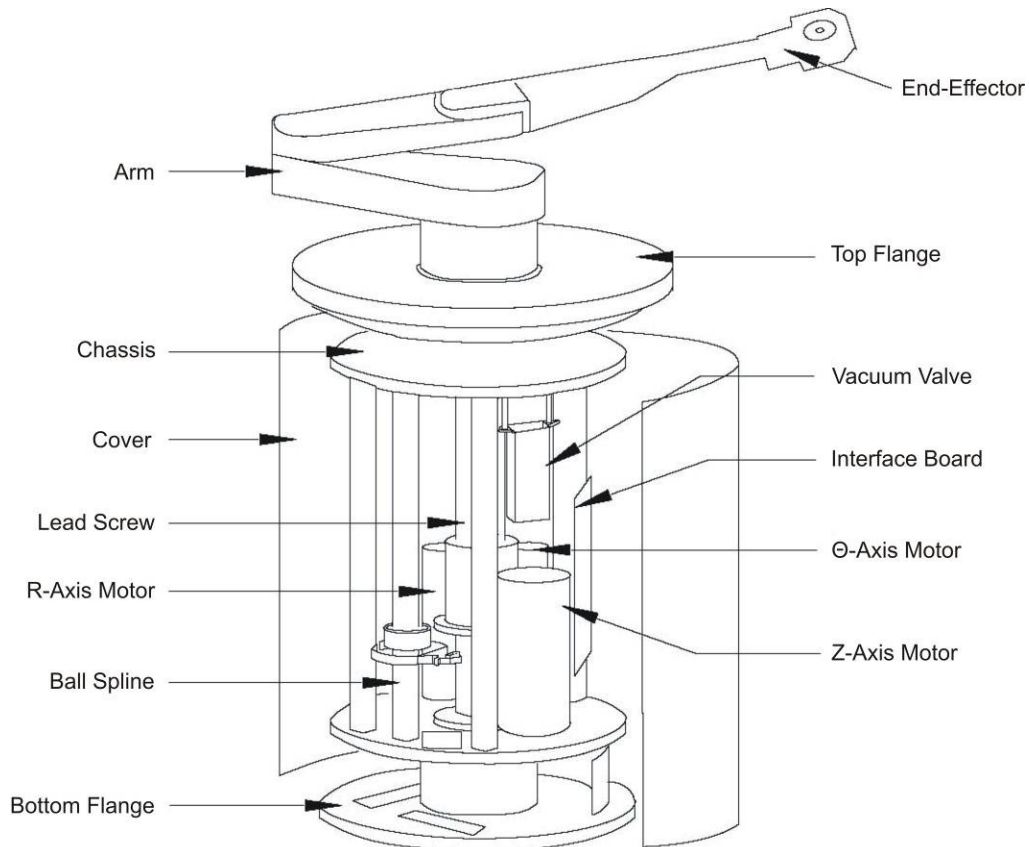


Figure 10-1: *Robot Mechanical Parts*

6.1.3 SYSTEM VISUAL CHECK

Visually inspect the system for the following:

	Pass	Fail	Repaired
Loose circuit boards	_____	_____	_____
Loose cables	_____	_____	_____
Loose connectors	_____	_____	_____

6.1.4 CLEAN SYSTEM CHECK

Check the wafer-handling area and the area underneath for dirt, dust, or pieces of silicon wafer. If necessary, vacuum up debris.

	Pass	Fail	Repaired
System clean	_____	_____	_____

6.1.5 ROBOT ALIGNMENT

Check placement of the robot on the AW-901 TTW.

	Pass	Fail	Repaired
Robot alignment	_____	_____	_____

6.1.6 ROBOT VACUUM

Turn on the vacuum pump and check the vacuum, using a vacuum gauge. The minimum level of vacuum should be 20 inches of H₂O. Record the level of vacuum.

_____ " of H₂O

Adjust the vacuum sense switch in the robot. Press the **Vacuum ON** in *Robot Teach* screen with a wafer on the chuck. Set the gain potentiometer so that the vacuum LED comes on when a wafer is on the chuck. "On" should be displayed in the **Vacuum Sensor** button. Remove the wafer: the button should display "Off."

6.1.7 ROBOT MAINTENANCE

Check alignment at all robot stations and perform adjustments to the alignment as required.

6.2 ADJUSTING THE VACUUM SENSOR (EQUIP ROBOT)

An SMC Series ZSE2-T1-15 vacuum sensor is installed in the lower arm link of the robot.

The functioning range of this sensor is from 0 to -30 in. Hg (0 to 101592 Pa). The robot vacuum sensor is set for detecting silicon wafers at -15 in. Hg (50796 Pa). If you use a stronger or weaker vacuum supply, you can adjust the sensor as follows:

- Remove the cover to the lower arm link by unscrewing the screws that attach the arm cover to the arm. The sensor has a yellow potentiometer with High (H) and Low (L) marked above it. You will need a small screwdriver to turn the potentiometer.
- 1) Open the vacuum valve from the **Robot Teach** screen.
 - 2) Without a wafer on the end effector, turn the potentiometer counterclockwise until the red LED lights. Consider this position A. (Refer to Figure 10-2:)
 - 3) With a wafer on the end effector, turn the potentiometer clockwise until the LED is turned off. Consider this position B.
 - 4) Turn the potentiometer to a position midway between position A and position B. Consider this position C.
 - 5) Turn off the vacuum to the end effector.

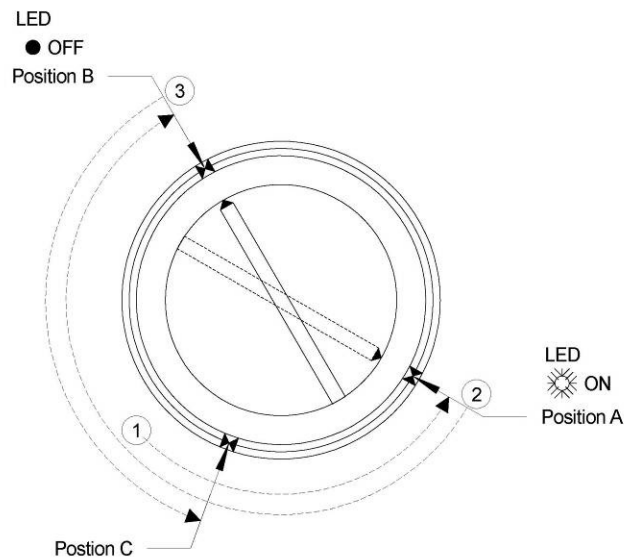


Figure 10-2: *Adjusting the Vacuum Sensor*

6.3 SAFETY VERIFICATION

Make a visual check of the robot and maximum envelope to ensure that conditions that might cause hazards do not exist.

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APPENDIX

A: PROBLEM REPORTING

Email the following problem report to: info@Allwin21.com

Give a brief description of the problem in the subject line in 8 words or less.

PROBLEM REPORT

Contact Name			
Company Name			
Address			
Telephone		Email	

Equipment Model		Equipment Serial #	
Equipment Designation Name (name you refer to machine)			

Date			
Software Version			
Problem	Electrical	Voltage	# of phases
		wire size	circuit breaker size
		line frequency	
	Chamber Cooling Water	flow rate	inlet temperature
		inlet pressure	diff. press.
	Cooling Air	flow rate Pressure	tubing diameter and length
	Pyrometer Cooling Water	Temperature	
	Process Gas	Pressure	tubing diameter and length
	Process Exhaust	negative pressure	
	Pneumatic Air	Pressure	
<p>Please give as much detail and information as possible to replicate the problem at our facility.</p> <p>When you comment on an issue that involves the software (example: error 0007), tell us:</p> <ul style="list-style-type: none"> ➤ How did the error occur? ➤ Is it repeatable? <p>Take a picture of the ENTIRE screen and send it to us. There are much more information on other areas of the screen that may help us determine the problem.</p>			

B: HOW TO ORDER / RETURN EQUIPMENT

The information contained in this appendix includes the following:

How to order equipment and parts

How to return parts

How to exchange parts

What to do when the system is down

Service Agreements

B.1 HOW TO ORDER EQUIPMENT AND PARTS

To order parts from Allwin21 Corporation, call:

Allwin21 Corporation
Customer Service
Phone: 1-408-778-7788

To obtain a quote and information concerning part availability, please have the following information ready:

System model number (example: Tegal 901e TTW)

Serial number of the system

Part number of the required part

Purpose of order (spares, failed part, etc.)

"Ship To:" address

"Bill To:" address

Purchase order number

B.2 HOW TO RETURN PARTS

 **NOTE**

An RMA (Return Material Authorization) number must be obtained from Allwin21 prior to shipping any parts back to Allwin21.

A Return Material Authorization (RMA) Number is required in order to return or exchange system parts. To obtain an RMA number, call:

**Allwin21 Corporation
Customer Service
Phone: 1-408-778-7788**

Return any failed parts to the following address:

**Allwin21 Corporation
220 Cochrane Circle
Morgan Hill, CA 95037
Attn: RMA # _____**

Ensure that the RMA (Return Material Authorization) number is included with any returned part(s). Include the following information with the part:

System model number (example: Tegal 903e TTW)

Part number of failed part

Detailed failure information

Serial number of system and of the failed parts (if applicable)

"Ship To:" address

"Bill To:" address

Purchase order number

RMA (Return Material Authorization) number

As the customer, it is your responsibility to return the part(s) in a proper packing container. Failure to return the part properly could result in further damage to the part.

 **NOTE**

The RMA (Return Material Authorization) number must be visible on the outside of the package when returning a failed part. Allwin21 Corporation will not accept returned parts without an RMA number. This could result in the sender being billed for the full purchase price.

B.3 HOW TO EXCHANGE PARTS

After troubleshooting to isolate a failed part, replace the part with a site spare if one is available. If the system is down due to an isolated failed part and no site spare is available, call:

**Allwin21 Corporation
Customer Service
Phone: 1-408-778-7788**

Contact Allwin21 Field Service to properly identify the failed part. Allwin21 will issue an RMA (Return Material Authorization) number to you which must be included when the failed part is returned. The failed part **MUST** be returned to Allwin21 within ten (10) days in the proper packing container or the full purchase price will be billed. Replacement parts under warranty are shipped out in the timeliest manner possible.

All returned parts must be shipped in the same packing material as the replacement part. Failure to return the part in the proper packing container could result in further damage to the part.

B.4 WHAT TO DO WHEN SYSTEM IS DOWN

If the system is down and you cannot isolate or fix the problem within a reasonable period of time, call Allwin21 Corporation Customer Service for telephone assistance or a service visit. Telephone numbers are staffed by trained Allwin21 Corporation technicians, who can provide on-the-spot help with difficult problems and advice on repairs.

Allwin21 Corporation
Customer Service
Phone: 1-408-778-7788

B.5 TIPS FOR TROUBLESHOOTING

Solve the real problem. Do not create one or more new problems to solve existing problem.

Face the problem. Do not escape from the problem.

Find the problem (if you find the problem, the problem is already 50% resolved)

Find the root causes and reasons the problem exists.

Follow the protocol and standards.

Follow the documents.

Double check, triple check.

Ask if you are not sure.

B.6 RULES FOR EQUIPMENT MAINTENANCE

Treat all the connectors like eggs. Never “drop” the connector on the ground or on any other hard surface.

Pull out a PCB board at least 30 seconds after turning off the machine.

$$dU=dI/dt,$$

Even at a very low leakage current, the voltage will be very high when the PCB is removed too soon. Many boards are damaged due to this phenomenon.

Turn on the machine at least 10 seconds after turning it off. This is because the inductance circuit is still at a high voltage after the machine was turned off. Many machines get problems after being shut down and then turned on too quickly.

Always check facility condition before turning on the machine.

B.7 EQUIPMENT TROUBLESHOOTING EXPERIENCES

>80% of equipment down time is caused by connectors. There are many kinds of reasons for bad connections:

- a. loose connectors
- b. corroded or oxidized pins of the connectors
- c. broken wires in the cable

>90% of RF problems are caused by the RF cable and connectors.

>75% of machine down time is caused by wafer transport.

>95% wafer breakage problems is caused by wafer transport.

Do not think there is a big issue in the problem first; always think and start from small issue first.

C: MAINTENANCE PLANS

C.1 EXTENDED MAINTENANCE PLANS

Allwin21 commitment to customer support carries on past the warranty period. By offering a choice of extended maintenance plans, we can satisfy most of your service requirements. Contact Allwin21 Field Service or Sales Administration for more details.

C.2 SERVICE TRAINING

Tegal 90Xe TTW system uptime may be increased dramatically by having trained in-house personnel and spare parts kits. Operator and Service training (a one day course) are available at Allwin21 for a fee. These courses cover the following types of information:

System overview

Operation

Software use

Control and optimization

Preventive maintenance

Electronics operation and troubleshooting

Students are usually Applications Specialists, Equipment Engineers, System Operators and Maintenance Technicians. Emphasis is on hands-on work, as the classes are small and allow personalized instruction.

D: MANUAL REVISION HISTORY

Date	rev.	Description
Dec. 2011	A	Initial Release
9/18/15	B	Update
8/28/17	C.1	Move Robot section to Operation manual.

