Original Instructions (Original Language)

Service Information

The Applied Materials Global Help Center is open 24 hours/day, 7 days/week. Please have your model number, serial number, and phone number ready when you call any of the numbers listed on this page.

Contact the Applied Materials Global Help Center:
Phone: +1 (888) 432-6797 — This USA number is toll-free within the USA; Internationally, a toll may apply.

NOTE

For International Dialing (Calling) Codes, including Country Codes and IDD (International Direct Dialing) Prefixes, you may consult the Internet. Recommended: http://kropla.com/dialcode.htm.

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About this System User Manual

Contact Technical Publications for additions or corrections to this manual. Suggestions and corrections may be submitted by email to: tech_pubs@amat.com. Please include your contact information, manual part number and revision and the information to be corrected or added to the manual.

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1 Introduction

This document describes facilities design and equipment installation requirements for the Silicon Etch DPS DTM chamber on a Centura II mainframe. This document must be used in conjunction with the *Etch Centura II Mainframe SSPS* (Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263). These two manuals together provide the necessary information required to prepare the fab facilities for Centura installation.

This document contains configurable equipment not necessarily found on every customer system. For questions regarding installation or startup, call the Applied Materials regional customer engineering office.

It is the customer's responsibility to ensure that the system is installed and facilitized in accordance with the instructions in this document and the Mainframe SSPS. Failure to do so may result in inadequate system performance. Applied Materials will not guarantee process results of the recommendations contained in this document are not correctly followed.

Refer to the *Etch Centura II Mainframe SSPS* for additional information on:

- The purpose and scope of the SSPS
- How to use the manual
- Referenced documents
- An acronym list
- A list of abbreviations used for facilities connections.

1.1 Purpose and Scope of the SSPS

The SSPS provides only information for tool facilitization (Tier 0). For all other startup information (Tiers 1 through 3), refer to the appropriate System Startup Procedure.

The facilities interconnect diagrams are provided for reference only and are not intended to represent a fab layout or specify all the fittings that may be required at an actual installation site. You are responsible for ensuring that facilities meet all applicable local/national codes and ordinances.

After reading this specification, complete and return the Confirmation Summary (Chapter 10) to the Applied Materials regional office responsible for startup and service of the system. You must sign these statements before startup may proceed. Read and understand all information in each section before signing the confirmation. Return the Confirmation Summary within 10 working days prior to the scheduled startup date. After Applied Materials receives the Confirmation Summary, the startup date will be reconfirmed.

1.2 How to Use this Manual

The SSPS is organized by facilities environment (Chapter 7), component type (Chapter 8), and contractor type (Chapter 9). These three chapters work together to provide the necessary facilities requirements for the system configuration purchased.

The facilities interconnect diagrams give an overview of typical system connections for a standard system. Representative external connections for every piece of equipment are

diagrammed. The table that accompanies each diagram provides summary information on the lines represented. The equipment datasheets and component drawings provide detailed information on each component.

All lines are identified by reference numbers or callouts. Callout numbers are consistent throughout the diagrams, datasheets, and drawings. Some callouts are repeated on more than one datasheet. This numbering system is used to reflect the system configuration.

For ease of use, pertinent sections of the document may be removed and copied.

The clearances noted in the tables and figures are nominal values. Conformance to local, state, or federal codes or requirements may take precedence when they exceed the clearances noted in this SSPS. Pay particular attention to the actual construction and the anticipated maintenance of the system (i.e., location and configuration of chambers, control panels, adjacent systems, etc.) which, in some cases, may increase the clearance values.

1.3 Referenced Documents

Refer to the following documents as needed:

- *Etch Centura II Mainframe SSPS*, Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263
- *Etch Centura II Mainframe SSPS for Systems with 84" Single AC and Generator Rack*, Cleanroom Part No. 0230-01265, Standard Part No. 0230-01264
- *Occupational Safety and Health Administration,* OSHA 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout)
- *Occupational Safety and Health Administration,* OSHA 29 CFR 1910.331-335, Safety Related Work Practices
- *National Fire Protection Association standard,* NFPA 70E-1995 (or most recently adopted edition), Electrical Safety Requirements for Employee Workplaces, Part11, Safely Related work practices
- *System Safety Manual*

1.4 Acronym List

This list contains most of the acronyms used in this SSPS document:

Table 1-1. Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
Ar	Argon
AWG	American Wire Gauge
bar	105 Pascals, a high range SI pressure unit
Btu	British thermal unit
CAD	Computer-aided design
CDA	Clean, dry air
CES	Customer engineering special
DI	Deionized water

Table 1-1. Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
f.o.b.	Free on board (i.e., any costs incurred after the shipment is loaded on the transport are the responsibility of the recipient)
HP	High purity
I.D.	Inside dimension
kPa	kiloPascal, a low range SI pressure unit
mbar	millibar (0.001 bar)
MFC	Mass flow controller
N_2	Nitrogen
NPT	National pipe thread
O.D.	Outside dimension
OEM	Original equipment manufacturer
PCW	Process cooling water
ppb	Parts per billion
ppm	Parts per million
psi	Pounds per square inch
QKD	Quick-disconnect
SP	Standard purity
SST	Stainless steel
SSPS	Site and System Preparation Specification
VAC	Volts AC
VDC	Volts DC

1.5 Facilities Abbreviation List

The same reference indicators for lines, hoses, and cables are used on all datasheets and drawings in all SSPS documents, as follows:

Table 1-2. Facilities Abbreviations

Abbreviation	Definition
C:	Communication and control
D:	Drain (wastewater)
E:	Electrical power
G:	General and service gases (e.g., CDA, plant nitrogen, etc.)
L:	Liquid service (e.g., chilled water, DI water, etc.)
P:	Process and specialty gases
S:	Slurry
V:	Vacuum (e.g., foreline, house)
X:	Exhaust (e.g., effluent, heat)

For example, "**P31**" indicates Process Gas Line No. 31.

1.6 Revision History

The Silicon Etch DPS-DTM SSPS Manual revision history is shown in Table 1-3.

Table 1-3. Revision History

Release Date	Revision	Description
July 2011		Initial Draft
November 2012	01	Preliminary Release
July 2013	02	Added Revision History. Added “Applied Materials Confidential” to footer on all pages. Changed all references to “Centura II Mainframe SSPS” to “Etch Centura II Mainframe SSPS”, including changes in part numbers. Added Equipment Datasheets and Diagrams for the Edwards QDP80/ QMB250 Dry Pumps. Added reference to mainframe SSPS for Liquid Facilities Interface Diagrams.
March 2018	03	Updated Chapter 8 Equipment Data sheets: Section 8.5 Remote Component — SMC H2000 Heat Exchanger for Walls. Changed "SMC 496 Galden" to "SMC H2000".
June 2018	04	Added H_2 (Hydrogen) to Table 9-3 Process and Specialty Gases Interconnect Datasheet and Table 9-4 System Gas Purity Requirements.

2 Administrative Information

See **Chapter 2** in the *Etch Centura II Mainframe SSPS* (Cleanroom Part Number 0230-00264; Standard Part Number 0230-00263) for administrative information.

Table 2-1 includes the contacts for commercial questions and technical questions for both Applied Materials and the customer. This table must be filled in and returned or faxed to Applied Materials prior to the Customer Engineer arriving onsite to begin facilitizing the tool.

Table 2-1. FAX Transmittal Sheet - Administrative Interface Information

Administrative Interface FAX Transmittal		Date:
Tool Type: (Edit Tool Type Variable)	Serial No.:	Sales Order No.:
Project No.:	Quotation No.:	PO No.:
Company Information	**Supplier**	**Purchaser**
Company Name/Division	Applied Materials, Inc.	
Local Mailing Address		
City, State/Province		
ZIP/Country		
Administrative Contacts	**Supplier**	**Purchaser**
Name/Title		
Phone/FAX		
Sales/Purchasing Contacts	**Supplier (Sales)**	**Purchaser (Purchasing)**
Name/Title		
Phone/FAX		
Shipping Contacts	**Shipped From:**	**Ship To:**
Name/Title		
Phone/FAX		
Shipping Address		
City, State/Province		
ZIP/Country		
Installation Contacts	**Supplier**	**Purchaser**
Name/Title		
Phone/FAX		
Company Name/Division	Applied Materials, Inc.	
Local Mailing Address		
City, State/Province		
ZIP/Country		

Administrative Information Completed by:

Signature: _____

Printed Name: _____

Title/Department: _____

Telephone: _____ Date: _____

3 Safety and Environmental Requirements

3.1 Safety Overview

This chapter summarizes the key safety precautions that must be taken when installing the system facilities. For more detailed information on system safety, refer to the *Safety manual*.

High-voltage AC and DC current is present on the Silicon Etch DPS™ DTM Centura® II. Any high-voltage AC cables that run between the mainframe and remote components must be fully enclosed in approved metallic conduit or wire ducting.

In addition to toxic process gases, nontoxic process gases are used in the Silicon Etch DPS™ DTM Centura® II. Although they are nontoxic, these gases may displace oxygen in the workplace, potentially causing suffocation or breathing difficulties. Rapid suffocation can occur when the concentration of a nontoxic gas is sufficient to reduce the oxygen level below 19.5%. Therefore, be sure to follow safe work practices when installing the system. These safe work practices include the following:

1. Complying with all applicable codes, laws, and regulations.
2. Turn off, lock out, and tag out all hazardous energy sources before performing any installation tasks.
3. Install the proper materials exactly as the installation procedures are written.
4. Perform all testing procedures exactly as specified.
5. Ensure that all components are secured to meet local seismic codes as required.

See **Chapter 3 i**n the *Etch Centura II Mainframe SSPS* (Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263) that contains important Safety and Environmental information for system installation. Consult the following publications for critical safety information that describes potential hazards and safe procedures to be used during start-up and operation.

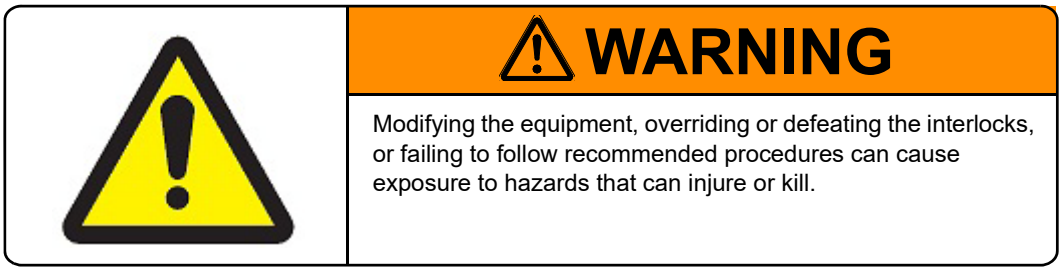
- *Centura II Silicon Etch DPS-DTM Tier I Startup Manual:* Cleanroom Part Number 0230-05172; Standard Part Number 0230-05171
- *Centura Operations and Programming:* Cleanroom Part Number 0230-35192; Standard Part Number 0230-35191
- *Centura II Functional Description:* Cleanroom Part Number 0230-00270; Standard Part Number 0230-00269
- *Centura Maintenance and Calibration:* Cleanroom Part Number 0230-35214; Standard Part Number 0230-35213
- *Centura II Safety Manual:* Cleanroom Part Number 0230-01529; Standard Part Number 0230-01528

3.2 Safety Hazard Alerts

Symbols (icons) identify potentially hazardous situations and consequences of not avoiding the hazard. They appear on the equipment where exposure to a hazard is possible. See Figure 3-1.

The hazard alerts use the signal words "**DANGER**," "**WARNING**," or "**CAUTION**." These signal words are defined as follows:

1. **DANGER** indicates an imminently hazardous situation which, if not avoided, **WILL** result in severe injury or death.
2. **WARNING** indicates a potentially hazardous situation which, if not avoided, **COULD** result in severe injury or death.
3. **CAUTION** indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor injury or moderate injury, or product or property damage.



The manual set for the Silicon Etch DPS™ DTM Centura® II provides hazard alerts (warnings) before each step that may involve hazards to personnel. When working on a subsystem, refer to the equipment data sheet or the appropriate section of the manual for the subsystem. Be sure to read and understand the warnings and cautions found in that section before performing any maintenance.

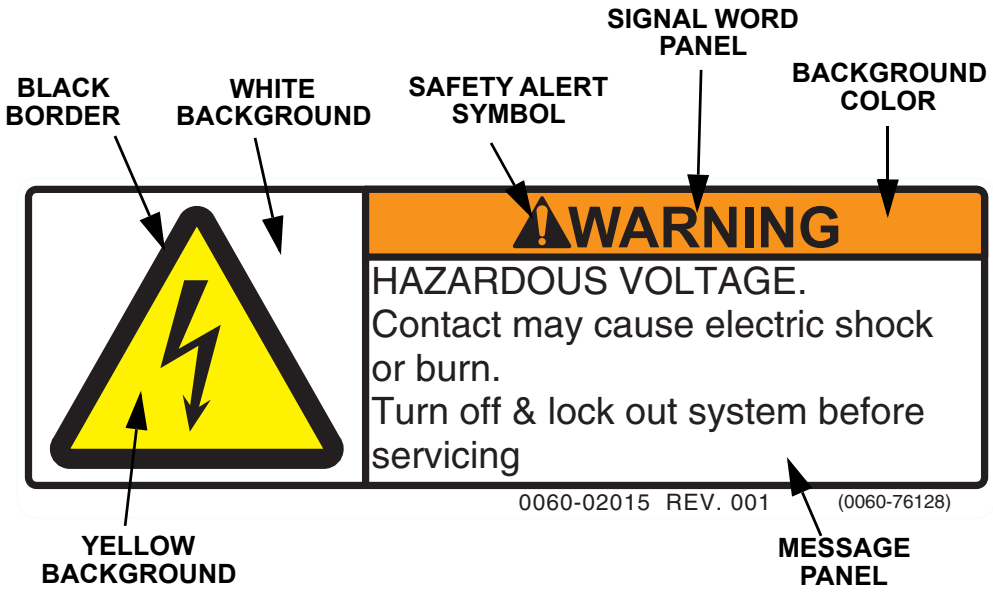


Figure 3-1. Hazard Alert Label Format

3.3 Customer Obligations

It is the customer's responsibility to inform Applied Materials of all ordinances or regulations that would affect the installation. The customer is responsible for meeting all governmental codes and regulations concerning the facilities. In addition, the customer is responsible for compliance with the following requirements:

1. Complete the following Customer Safety Contact Information Form and return it at least 10 (ten) days before startup.
2. Meet all local, national, and international codes for all subjects covered in this specification. The subjects covered include fire and life safety, building, electrical, exhaust, gas, air, and water plumbing codes.
3. Document and inform Applied Materials of all deviations from this specification.
4. Reconfirm the startup date with the Applied Materials Regional/Local Field Office after completing this specification.
5. Read and comply with all applicable "Safety Notices" issued on the [change the User Manual Title variable]. To obtain safety notices through the Applied Materials Regional Offices or the Global Product Safety Office, complete, detach and fax the form shown in Section 3.3.1 to fax number (408) 986-2858. Applicable Safety Notices will be faxed to you. You may contact the Applied Materials Global Product Safety Offices directly by calling (408) 563-7810.
6. Provide Materials Safety Data Sheets (MSDS) for all chemicals used in this equipment to all operator and maintenance personnel (including Applied Materials personnel).
7. Provide "approved" air, water, and gas pressure limiting devices.
8. Label all gas lines during the installation process.

3.3.1 Customer Safety Contact Information Form

The Customer should complete and FAX the form, see Figure 3-2, to Applied Materials Global Product Safety Office at the FAX number shown below. Future Safety Notices will be sent to the names listed on the form.

Safety Contact FAX Transmittal	Date:
To: Global Product Safety	From:
Company: Applied Materials, Inc.	Company:
Location: Santa Clara, Calif. USA	Location:
FAX number: (408) 986-2858	Fab:
Telephone number: (408) 563-7810	FAX number:
Toll-Free Telephone: (888) 800-6901	Telephone number:
Tool Type:	Project Number:
Applied Materials Regional Field Office:	
Customer's Equipment Safety Officer	
Name: Fax number: Telephone number: E-mail address:	
Complete and return this form to Applied Materials to receive Safety Notices.	

Figure 3-2. Fax Transmittal Sheet — Customer Safety Contact information Form

3.4 Facilities Safety

The system should be installed in accordance with the local safety codes and regulations at the facility site. This section describes some of the facilities safety requirements for the system.

3.4.1 General Gas Safety Requirements

Installation and service personnel should be trained in hazardous gas handling and the use of appropriate safety equipment, such as self contained breathing apparatus and personal

protective equipment. This equipment must be available if hazardous gases are being used. Emergency medical treatment information and resources must also be available.

NEVER USE HOUSE NITROGEN (N_2) supplies to purge process gas lines. This may allow hazardous gases to enter the house N_2 lines and endanger personnel and equipment. Instead, use cylinders or a completely separate source of dry nitrogen (electronic grade) to purge reactant gas supply lines or to vent the chambers and loadlocks. **NEVER** allow process gases to mix through a common nitrogen manifold.

Simply flowing the purge gases through the system does not purge toxic gases from the lines. Instead, use cycle purging (pulse-dilution or vacuum cycle) to ensure that all gases and gas products are out of the lines. Cycle purge by purging the lines with N_2 and then pressurizing and depressurizing (or applying vacuum to) the system at least 10 times before opening any gas lines. The number of cycle purges needed depends on the pressure used and the plumbing arrangement, as well as the properties of the gas.

Process by-products and residual gases may be hazardous. Evacuate the system exhaust plumbing before performing any service on it and wear required personal protective equipment.

DO NOT store gases where high temperatures can occur. Shut off gas cylinders at the tank when hot being used (overnight, over a weekend). Routine handling and emergency procedures should be posted and practiced.

3.4.2 (System Specific) Gas Safety Requirements

Gas panel and auxiliary gas cabinet exhaust must have at least the flow and differential pressure which has been shown by the tracer gas test to be sufficient.

Install flow limiting devices on all toxic or flammable gas supply systems.

The system gas exhaust must comply with applicable codes. Absence of system exhaust must sound an alarm. Applied Materials provides an interlock that shuts down HPM gases at the gas panel if there is an exhaust failure. Applied Materials also recommends interlocking the exhaust to shut off all gas supplies if there is an exhaust failure. This prevents noxious, corrosive, or poisonous gases from being delivered to the work area if the exhaust is not working. Backup power must be installed to ensure adequate ventilation if there is a power failure.

Mixing ammonia (NH_3) with chloride-bearing gases, such as hydrogen chloride (HCL), fluorine (F_2), hydrofluoric acid (HF) and silicon tetrachloride ($SiCL_4$), leads to powder in the plumbing lines. This causes failure of associated components.

Unreacted Silane (SiH_4) in the exhaust system with O_2 or H_2 present can lead to exhaust fires. SiH_4 ignites spontaneously with air in concentrations of two percent or greater. Extinguish SiH_4 fires by turning off the SiH_4 at its source. **FIRE EXTINGUISHERS WILL NOT WORK**.

Return-air systems must comply with applicable codes. The return-air system of one fab area must not connect to the return-air system of another fab area.

A manual ventilation switch that controls the air supply or the air recirculation system must be installed in accordance with building codes. The switch must be located outside of the

work area. Additional manual control switches must be provided to comply with all governmental and industrial safety requirements.

Trenches, ducts, and crawl spaces must be well ventilated. **DO NOT** use fittings in these areas. Dead-end plumbing lines must be avoided in construction or remodeling. **DO NOT** carry hazardous gases through piping in exit corridors or above exit ceilings.

Never use silicone (neoprene) materials with chlorine-based gases.

3.4.3 Gas Line Safety Requirements

Pressure regulators for hazardous gases should be the vented-bonnet type and should only be used with a purge assembly. All bonnet vents should be connected to the exhaust system. A pressure relief and automatic shutoff system must be installed in case of a pressure regulator failure. The pressure relief system should vent to a safe, N_2 purged space or shut off the gas source which is evacuated by a corrosive or flammable capable (depending on process) exhaust system.

Use pressure regulators with captured ("tied-seat") diaphragms for gases supplied as condensed liquids, such as hydrogen chloride (HCl). Be sure that regulators are used in accordance with manufacturer's recommendations.

Install gas detectors in gas boxes, gas panels, and throughout the work area. Install automatic shutoff devices at the source of hazardous gases. Gas leaks and inadequate ventilation alarms should trigger those shutoff devices. In addition, Applied Materials recommends that these shutoff devices be triggered by earthquakes. Contact Applied Materials Product Safety Engineering for recommendations regarding gas detector location.

All process gas supply lines must be clearly labeled (including the gas and flow direction) at least every 20 feet (6.1 meters). Applied Materials recommends that they should be labeled every 4 feet (1.2 meters) and at the entrance and exit from walls.

The process gas supply lines should be static pressure-tested, using both of the following methods:

- First, use a pressure-decay test. At 1.5 times operating pressure, there should be no pressure drop during a 24-hour period.
- Second, test seal integrity at each joint, using a helium mass spectrometer (sensitive to 10^{-9} millibar-cm^3 per second). The leak rate should be less than 1×10^{-9} millibar-cm^3 per second.

3.4.4 Electrical Safety Requirements

All AC supply conductors to the system and to supporting stand-alone peripheral subassemblies (RF generator rack, pumps, heat exchangers, etc.) shall be enclosed within a metal conduit or raceway as specified by local, national, and/or other applicable codes and regulations. All interconnecting input/output and control lines are to be enclosed within a metallic jacket (or equivalent metal enclosure). The jacket (or equivalent metal enclosure) is to be grounded to the equipment at both ends. The input/output and control lines are to exit the metallic jacket (or equivalent metal enclosure) from within the metal enclosures of the system.

All cables, wiring, and plumbing should be arranged in a way that prevents people from stepping or tripping on the electrical lines.

Protect the system from accidental facilities water discharge.

The following should be routed from the remote components to the system in separate trays:

- RF and power cables — High voltage conductors may not be run in the same raceway as low voltage conductors unless the insulation is rated for the highest voltage potential in the raceway.
- Control cables
- Coolant hoses — This reduces the risk of water leaks or condensation reaching electrical wiring and prevents interference between the high power of RF cables and control signals.

INFORMATION: Do not override or defeat interlocks unless the written maintenance procedure explicitly directs you to. If an interlock is defeated for any reason, it must be identified as being open and dangerous. Applied Materials recommends placing a sign or poster on the system and near the location of the interlock during the time the interlock is defeated. Always ensure the interlock has been restored to normal operation once the need for defeating the interlock as been completed.

Lockout/Tagout Required: Take care whenever any internal components or wiring are exposed. To prevent exposure to energized electrical parts, lock out all electrical energy sources supplying energy to the area being serviced, whenever possible, before performing maintenance.

3.4.5 Other Safety Requirements

As Applicable

3.5 Lockout/Tagout Requirement

During installation, the Customer must provide the capability to completely lock out and tagout power at the main disconnect or electrical panel just prior to the tool. It may be necessary for Applied Materials' personnel to place their own lockout at these locations during startup or during other service activities. Applied Materials reserves the right to not perform installation or other service activities if this capability is not provided.

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4 Installation Responsibilities

4.1 Applied Materials Responsibilities

- Verify that the tilt and shock shipping indicators have not been triggered.
- Supervise the unloading and uncrating of the system.
- Inventory of all the crate contents.
- Inventory of all the boxes and totes.
- Leveling of the system.
- Entering of all non-conformances in FRACAS.

Refer to **Chapter 4** in the *Etch Centura II Mainframe SSPS* (Cleanroom Part Number 0230-00264; Standard Part Number 0230-00263) for additional information.

4.1.1 Applied Materials-Supplied Parts

The following parts are supplied by Applied Materials:

- Control and signal cabling
- Hoses and fittings for closed-loop coolants from heat exchangers and chillers.

Optional longer cables may be available. Contact your Applied Materials representative for details.

4.1.2 Check and Assemble Components

It is important that you check the components carefully as the shipping containers are opened. Notify an Applied Materials representative immediately regarding any missing, damaged or incorrect components. Assemble the components of the system using this documentation and other documentation included in the shipment.

4.1.3 Applied Materials Installation Personnel

Applied Materials Installation and service personnel are trained in hazardous gas handling and the use of appropriate safety equipment, such as a self-contained breathing apparatus and personal protective equipment. This equipment must be available. Emergency medical treatment information must also be available.

4.2 Customer Responsibilities

To help simplify the site preparation, this specification is divided into sections, as shown in the Table of Contents. The accompanying illustrations show the typical connections and locations.

- Complete the SSPS documentation with Facility Management initials and date entered in each blank provided for at the completion of each facility task. Return this to your local Applied Materials regional Field Engineering office no later than ten (10) working days prior to the startup.

- Ensure that all local/state safety codes have been met and signed off by the appropriate local inspector as well as your company's safety department.
- Document and inform Applied Materials Field Service Representative on any known deviations from the specifications.
- Reconfirm or reschedule the start-up date, based on the completion status of the SSPS requirements.

⚠ CAUTION

It is the customer's responsibility to inform Applied Materials of any and all ordinances or regulations which would affect installation. The customer is responsible for meeting all governmental codes and regulations concerning the facilities.

- Although it is the customer responsibility to move and position the system, arrange for an Applied Materials Customer Engineer to assist in positioning the mainframe in its permanent location.

4.3 Customer Installation Personnel

The following personnel are expected to be made available during installation and facilitization.

1. Maintenance personnel and the facility engineer must be available at start-up for reactor maintenance instructions.
2. The customer safety engineer must complete an audit of the installation before the Applied Materials Customer Engineer can perform the start-up. Review any safety concerns and requirements with the local Applied Materials Customer Engineer or contact the Applied Materials Safety Department in Santa Clara, California at (408) 563-7810.
3. An engineer capable of handling the heating, ventilation, and air conditioning must be available to measure and balance the facilities air and exhaust systems to the required specifications listed in this document.

5 Shipping and Handling Requirements

5.1 Handling and Storing the Containers

Store all containers under cover. When it is not possible to bring the equipment into the facility immediately, store the containers in a warehouse or on a covered dock. Direct rain or moisture may compromise the integrity of the moisture vapor barrier.

See **Chapter 5** in the *Etch Centura II Mainframe SSPS* (Cleanroom Part Number 0230-00264; Standard Part Number 0230-00263) for any other Shipping and Handling requirements not shown here.

Observe the following requirements when handling the containers. If any problems occur, contact the appropriate Applied Materials regional office immediately.

1. Verify the forklift forks extend the full length or width of the crate or component.
2. Carefully unpack the crate or container. Be careful not to damage the components contained inside.
3. Remove the systems (as appropriate).
4. Install leveling pads on the bottom of the mainframe before lowering the mainframe to the ground.

5.1.1 Crate Dimensions and Weights

The packing list for each specific system describes the dimensions and weights of each container in the shipment. Refer to Table 5-1 for a general description of what equipment may arrive with a typical Silicon Etch DPS™ DTM Centura® II.

Table 5-1. Container Dimensions and Weights

Container	Length in (cm)	Width in (cm)	Height in (cm)	Weight lbs (kg)
Mainframe (without process chambers)	114.5 (290.8)	95 (241.3)	113 (287)	6639 (3011) ± 10%
AC rack, system controller, etc.	100 (254)	50 (127)	100 (254)	7500 (3402)
Process chamber 1	50 (127)	50 (127)	100 (254)	750 (340
Edwards dry pump	50 (127)	50 (127)	100 (254)	750 (340)
SMC H2000	22 (55.9)	33 (83.8)	33 (83.8)	409 (186)
SMC 496 Galden	45 (114.3)	25 (63.5)	37 (94)	475 (216)
SMC 496 50/50	33 (83.8)	25 (63.5)	37 (94)	519 (235)
Notes:				

5.2 Unpacking and Inspecting the Containers

Observe the following requirements when opening and unpacking the containers. If any problems occur, contact the appropriate Applied Materials representative or regional office immediately.

1. Do not accept a shipment or sign a carrier's delivery receipt until verifying that the correct number of crates, cartons or pieces have been received and that no damage has occurred. If any items are missing, immediately notify Applied Materials. Failure to do this can result in replacement charges.
2. Carefully open each box and remove the contents.
3. Compare the contents of each box or container with the packing list. If any items are missing, check the back order list. If missing items are not on the back order list, document which parts are missing and immediately notify Applied Materials. Failure to do this can result in replacement charges.
4. Check each item for damage. If an item is damaged, notify the CARRIER immediately. The carrier is responsible for any damage caused during shipment and should provide Applied Materials with information needed to file a damage report. Once the claim has been filed, the item or items will then be repaired or replaced.
5. Some elements of the system may require special tools that will ship with the component. Ensure that the these tools are retained for later use during the installation.
6. Each container will have impact, tilt, and shock monitors installed. Inspect them carefully upon receipt. If any of these monitors have been triggered, notify Applied Materials immediately.

5.3 Chamber Handling Precautions

When transporting a chamber separately from the mainframe, use appropriate support frames or bracing to prevent damage to bottom features and covers. If using a fork lift, load-spreading members such as wooden beams may also be required to prevent damage.

6 Placing and Leveling Requirements

6.1 2-D Templates

The 2-D templates supplied by Applied Materials can be used to pre-facilitize a tool installation. The template is a dimensionally accurate representation of the tool footprint, printed on matte-finish plastic film, 4-mils thick.

6.1.1 Why Use Templates?

The template allows the facilities to be put in place before the tool is delivered. This has several benefits. It allows the tool to be started up more quickly thus enabling the customer to use the tool earlier. Also, it makes facilities installation less costly if it can be done without having to work around the system. If prefacilitization is not used, the template is still a useful tool, but a big opportunity for saving cost and time is missed.

6.1.2 Reference Points Used in Templates

For a template to be useful, the features shown must be close to the same position on the system as they are on the template. Clearly there are tolerances associated with the positioning of all features during system assembly. However the crucial feature is the datum point from which tolerances are measured. If the datum point used in positioning the system is different from the datum point used in drawing the template, **THE TOLERANCE ON THE SYSTEM WILL APPEAR TO BE GREATER THAN EXPECTED**. For this reason it is crucial to use the template correctly.

6.1.3 How to Use the Template

Each template shows two datum points. These MUST be the origin of all measurements used in installing the template. Do this as follows:

1. Cut template sheet no. 1 along cut lines shown.
2. Lay the template on the fab floor, making sure to keep it square with the fab wall.
3. On the template, find the distance between the cleanroom side of the wall and the frame of the tool.
4. Tape the template to the floor.
5. Tape additional template sheets one at a time to the first template sheet.
6. Determine heights:
    - Heights of connection points are shown on the template.
    - Use a builder’s square or equivalent to determine the connection point in space.
    - Allow for adjustment of the feet. Note that the vertical dimensions shown on the template are referenced to the bottom of the frame.

6.1.4 Tolerances

The tolerances associated with the drawing of the template are negligible, as is any thermal expansion of the plastic film used. However, the plotter can introduce dimensional errors. Check these by using the reference dimension provided on the template to verify scaling.

The tolerances quoted below represent the tolerance between positions shown on the template and the position on the actual system.

Table 6-1. Template/System Tolerances

Facility Connection	Tolerance
High purity gases	± 0.2" (0.5 cm)
Vacuum forelines	± 0.2" (0.5 cm)
Process cooling water (PCW)	± 2.0" (5.0 cm)
Deionized water (DI)	± 1.0" (2.5 cm)
Purge nitrogen (PN2)	± 0.5" (1.3 cm)
Air (CDA)/pneumatic	± 0.5" (1.3 cm)
Electrical power	± 0.5" (1.3 cm)
Communication lines	± 0.5" (1.3 cm)
Seismic tie-downs	± 1.0" (2.5 cm)
Common electrical ground	± 1.0" (2.5 cm)
Heat exhaust	± 2.0" (5.0 cm)
Process exhaust	± 2.0" (5.0 cm)
Frame supports	± 1.0" (2.5 cm)

In order to realize this positional accuracy it is necessary to reference all measurements to a common fixed point. Therefore it is important to follow all alignment procedures.

6.2 Assembly and Connection Tools and Equipment

The following tools and equipment are required for assembly and installation of the Centura system.

- A forklift, portable hand truck, or portable palette jack, capable of lifting two tons
- A dolly
- A level

The lifting device is required to lift and place the main system. Use the level to ensure the mainframe is level before making any facilities connections.

6.3 Transporting, Locating, Moving and Leveling the Centura Mainframe

To move and locate the mainframe, Applied Materials recommends the following instructions. If the mainframe will be mounted “through-the-wall,” see *Etch Centura II Mainframe SSPS*, Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263, for instructions on cutting and preparing for mainframe positioning.

⚠ CAUTION

When lifting the Centura frame, System Controller, AC racks, and the RF Generator Racks, be careful not to damage the leveling pads. Move the components by their frames only. DO NOT push or pull the Mainframe by the front through-the-wall skirt.

1. Lift the mainframe from the bottom of the “floater pallet” or from the bottom of the subframe (when moving it into the cleanroom). Use a forklift or a portable Roll-a-Lift hand truck. The forks must extend the full length of the frame through the pallet or beneath the supporting struts of the frame. If this procedure is not followed, damage to internal parts of the system may occur.
2. Remove system covers, if applicable. Make sure all leveling pads are present in the bottom of the mainframe before lowering it to the ground.
3. When using a forklift or portable hand truck to lift the mainframe, make sure the forks support both the front and the rear half of the unit. Insert the forks from the front of the system only. Lift slowly and check the balance of the unit.
4. Place the mainframe in its permanent location. Maintenance clearance of 36" (91cm) is required from the maximum extent of the mainframe, including the gas panel and chambers. Remove the forklift or truck.
5. To adjust the placement of the mainframe, lift one end of the mainframe with the pallet jack and place a dolly (capable of supporting at least 50% of the configured mainframe’s weight) under each raised corner. Lower the system onto the dollies. Place the pallet jack under the opposite end to make it easier to steer. Pull or push the unit by hand to move it. Use at least four people to ensure clearance in close quarters.
6. Check for loose wires and connections before beginning hookup. Immediately notify an Applied Materials customer service engineer of any broken wires or connections.
7. Check the entire system for foreign objects or remaining packing materials.
8. The mainframe subframe is equipped with 11 leveling pads. See Chapter 6 of *Etch Centura II Mainframe SSPS*, Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263. Level the main system by adjusting the leveling pads. Use the top of the transfer chamber as the leveling surface.

6.4 Moving, Locating, and Leveling the Remote Racks

See *Etch Centura II Mainframe SSPS*, Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263.

6.5 Through-the-Wall Mounting

See *Etch Centura II Mainframe SSPS*, Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263.

6.6 Seismic Mounting

See *Etch Centura II Mainframe SSPS*, Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263.

7 Facilities Environment

7.1 Ambient Temperature

Applied Materials recommends installing the Mainframe and any of the support equipment components in an environment having a temperature not greater than 72°F (22°C).

7.2 Relative Humidity

Applied Materials recommends installing the Mainframe and any of the support equipment components in an environment having a relative humidity lower than 40%.

7.3 Special Lighting Requirements

Applied Materials recommends installing the Mainframe and any of the support equipment components in an environment where the lighting is sufficient to provide a safe working environment for operation and maintenance of the system. Lighting levels similar to office environments are normally sufficient.

7.4 Vibration Requirements

Due to the effect that vibration may have on wafer handling, Applied Materials recommends isolating any nearby vibration sources away from the Mainframe in order to ensure consistent system operation.

The primary source of vibration in the Centura II system is the vacuum pumps. Vibration imparted to the mainframe by the vacuum pumps can be minimized by incorporating at least one metal bellows on all plumbing leading to the pumps.

Applied Materials recommends that the mainframe be installed on a concrete slab or vibration isolating floor.

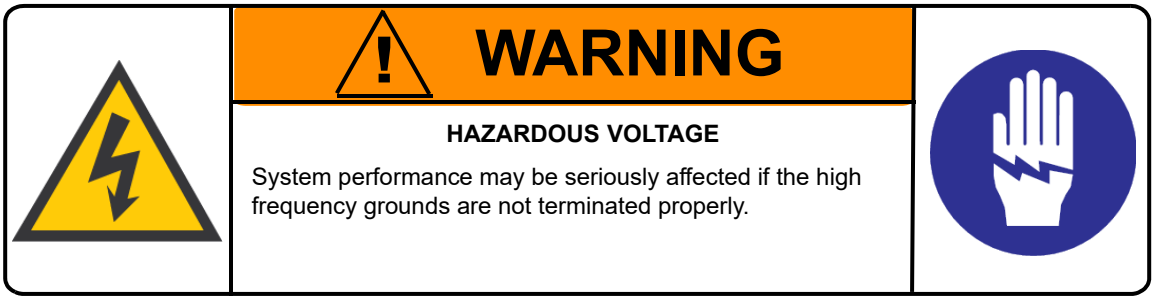
7.5 Noise Requirements

The following two sections describe the audible and electrical noise that the system may either be susceptable to or may itself generate.

7.5.1 Audible Noise

The system mainframe and its sub-components are producers of audible noise. At this time the levels and frequency spectrum of the emitted noise have not been specified. Use normal and customary hearing protection methods when working around the heater/chiller units and electronics racks which contains fans and pumps, as well as nearby the dry pumps.

7.5.2 Electromagnetic Compatibility



The following is recommended for all installations. However, the EMC directive *requires* the following for ***CE Mark Certification*** **only**:

- All AC mains and conductors to the system and to the supporting stand-alone peripheral subassemblies (RF generator rack, pumps, heat exchangers, etc.) shall be enclosed within a metal conduit or raceway as specified by local, national or other governmental codes and regulations.
- All interconnecting signal input/output and control lines are to be enclosed within a separate metallic jacket (or equivalent metal enclosure, i.e., metal conduit).
  - The jacket (or equivalent metal enclosure) is to be grounded to the equipment on both ends.
  - The input/output and control lines are to exit the metallic jacket (or equivalent metal enclosure) within the enclosure of the system.
- The cross sectional area of the signal interconnect input/output control lines is twelve square inches.
  - The metallic jacket (or equivalent metal enclosure) for the signal interconnect input/output control lines must be adequately sized to contain them.
- This system is very complex and requires voltage with minimal fluctuation.
  - The facilities voltage supplied by the end-user must maintain a voltage fluctuation of not more than ± 5%.
  - Failure to maintain this voltage tolerance may result in system shutdown.
- The end-user facilities shall provide suitable surge protection for their specific installation.
- The customer **SHOULD NOT** subject the Centura II system to excessive, unregulated electromagnetic (EM) radiation.

7.6 Seismic Requirements

Applied Materials recommends that shutoff devices, triggered by earthquakes, be installed at all dangerous gas sources. Leveling pads should be used in lieu of wheels on mainframe and applicable support equipment.

Mainframe and remote equipment should be positively secured to the floor (including controller, pump frames, and heat exchanger).

INFORMATION: Mounting holes are provided on the mainframe for the installation of earthquake tie-down brackets (see Section 6.6). Customers should provide brackets as required.

INFORMATION: Applied Materials recommends that the foreline from the mainframe to backing pump be heated up to 85 ºC by heating jackets.

7.7 Water Requirements

Process Cooling Water (PCW) MUST meet the specification listed in Table 7-1.

Table 7-1. Water Specifications

Item	Value
Temperature	63 °F to 72 °F (17 °C to 22 °C)
pH	8.0 to 9.0
Conductivity (Resistivity)	as low as possible; not to exceed 2000 µmho/cm (minimum 500 Ω-cm)
Dissolved solids/Total hardness	< 75 ppm when reported as CaCO3; Soft water recommended
Corrosion inhibitors	300 ppm to 600 ppm nitride borate or 450 ppm to 900 ppm sodium nitride or organic inhibitors (such as CorrShield® OR404) following the supplier's usage guidelines
Microbiological control (closed-loop systems)	< 100 colonies / ml using standard plate count techniques
Filtration	5 µm

7.8 Gas Handling Requirements

7.8.1 Handling Precautions

A local scrubbed exhaust hood MUST be used to remove the fumes released when a process chamber is opened. The exhaust duct should be at least 6" (152.4 mm) in diameter with a minimum flow rate of 300 cfm (8495 slm).

7.8.2 System Gas Purity Requirements

Table 7-2. System Gas Purity Requirements

Gas	Name	Purity	Grade	Where Used	Source
He	Helium	99.99%	Ultra high	Process gas	UC bottle
N_2	Nitrogen	99.9999%	Ultra high	Purge gas	Liquid N_2 or UC source
N_2	Nitrogen	99.999%	High	Vent gas	Facilities

7.8.3 Regulator Requirements

Regulators as well as other gas carrying components (gas lines) used in the Centura II Mainframe must meet or exceed the following requirements. Your regulator or gas supplier can help you with the final selection.

Standard Purity (SP) is used with Freon and O_2 gases. High Purity (HP) is used with most gases.

7.8.3.1 Leak Rate (Standard Purity)

- Inboard: 2×10^{-9} sccs He
- Across seat: 1×10^{-6} sccs He
- Outboard: 1×10^{-6} sccs He
- (Pressurized to 2000 psig or the full rated system pressure, whichever is lower)

7.8.3.2 Leak Rate (High Purity)

- Inboard: 2×10^{-9} sccs He
- Across seat: 1×10^{-6} sccs He
- Outboard: 1×10^{-8} sccs He
- (Pressurized to 2000 psig or the full rated system pressure, whichever is lower)

7.8.3.3 Presence of Moisture

- Measure moisture at the process outlet of the regulator.
- For SP regulators, the maximum allowable rise is 1 ppm H_2O.
- For HP regulators, the maximum allowable rise is 100 ppb H_2O.

7.8.3.4 Presence of Particles Measured at the Process Outlet

- Measure the particles produced by the regulator at the pressure outlet of the regulator.
- For all types, the maximum allowable limit per cfm is 10 particles greater than 0.1 mm.

- For SP regulators, the maximum allowable limit per cfm is 1000 particles between 0.02 mm and 0.1 mm.
- For HP regulators, the maximum allowable limit per cfm is 100 particles between 0.02 mm and 0.1 mm.

7.8.4 Connections

Also see Section 9.4, General and Service Gases. Before facilitizing the gas delivery system, read this section carefully and follow all of the instructions.

1. To best achieve a 100 ppb moisture level, purge the lines and components as they are installed and welded.
   - Continue this purge at a flow rate of not less than 2 slm for a minimum of five days after completing all welding.
   - The maximum moisture contamination level for the Ar welding gas should be 30 ppb H_2O.
   - Generally, N_2 will be used for purging after the welding of the line is complete.
   - Provision should be made to switch over from the Ar without allowing ambient air into the lines.
   - The purity requirement of the N_2 is the same as that of the welding Ar gas.
   - To establish the 0.07 scfm (2 slm) flow rate, use a metering valve orifice and a 14.5' (4.5 m) section of 1/8" O.D. “poly” tubing as an exit path to prevent back streaming. Mount this at the end of the line, just after the shutoff valve.
   - Determine the metering valve setting with a flowmeter or MFC.
   - Connect a metering -valve to all lines that “tee” into a main line. All lines that “tee” into a main line must be dried with a bleed purge set to the 0.07 scfm (2 slm) flow rate.
   - Purge all dead legs (but avoid creating them while plumbing if at all possible).
2. If the lines are left at atmosphere after welding, use the following purge procedure before any system is placed back online:
   a. Use N_2, with a minimum purity level of 30 ppb H_2O, to do a 20-cycle pulse purge of the line. One cycle requires raising the line pressure to a minimum of 50.0 psig (345 kPa), or a pressure that is reasonable with respect to other components in the line, and gradually bleeding it down to 5.0 psig (34.5 kPa). The higher the delta pressure the better. The MFC should not be subjected to pressures greater than 45.0 psig (310 kPa).
   b. For at least seven days, flow a minimum of 0.07 scfm (2 slm) N_2 down the main line and each dead leg using a metering valve orifice as described above.

INFORMATION: The times specified above will vary with the cleanliness of the tubing components and bagging, the purity of the purge gases, and the care used in assembly. Poor quality in any of these areas will required increased pumping time.

3. To ensure the lines are ready for connection to production equipment, use a moisture analyzer. The target moisture level is <50 ppb H_2O at the lowest flow rate that a process line will use.

8 Equipment Data Sheets and Diagrams

This section contains data sheets and diagrams for all of the standard components that can be selected with the system, and are specific to the DPS Deep Trench chamber. The data sheets and diagrams for standard components that are not chamber-specific are located in the *Etch Centura II Mainframe SSPS*, Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263. To provide complete installation information this chapter must be used in conjunction with Chapter 8 of the Mainframe SSPS.

Please see the introductory paragraphs of Chapter 8 in the Mainframe SSPS for general information on using the data in this chapter.

8.1 System Drawings

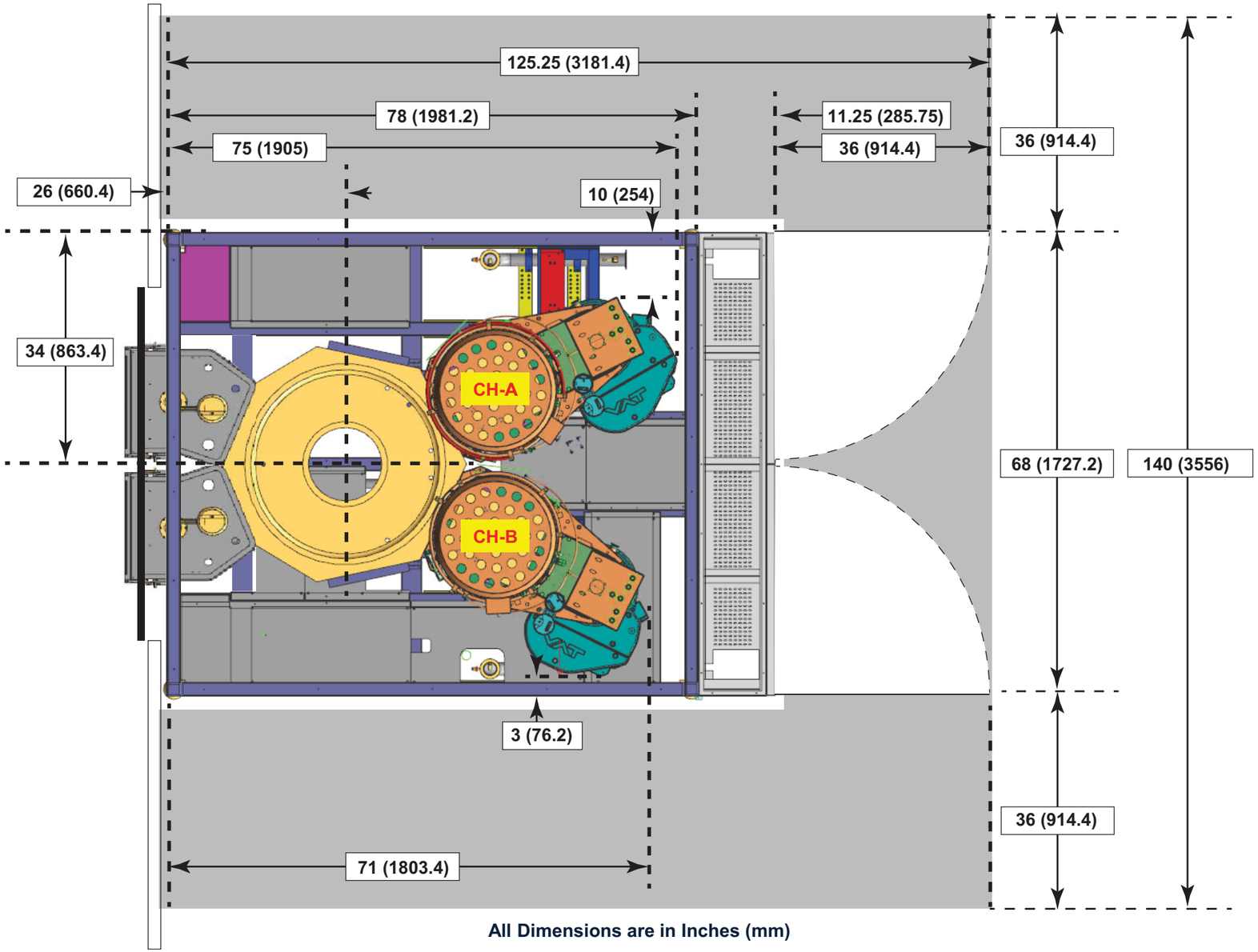


Figure 8-1. Service Area for Mainframe with DPS-DTM Chambers in Positions A & B

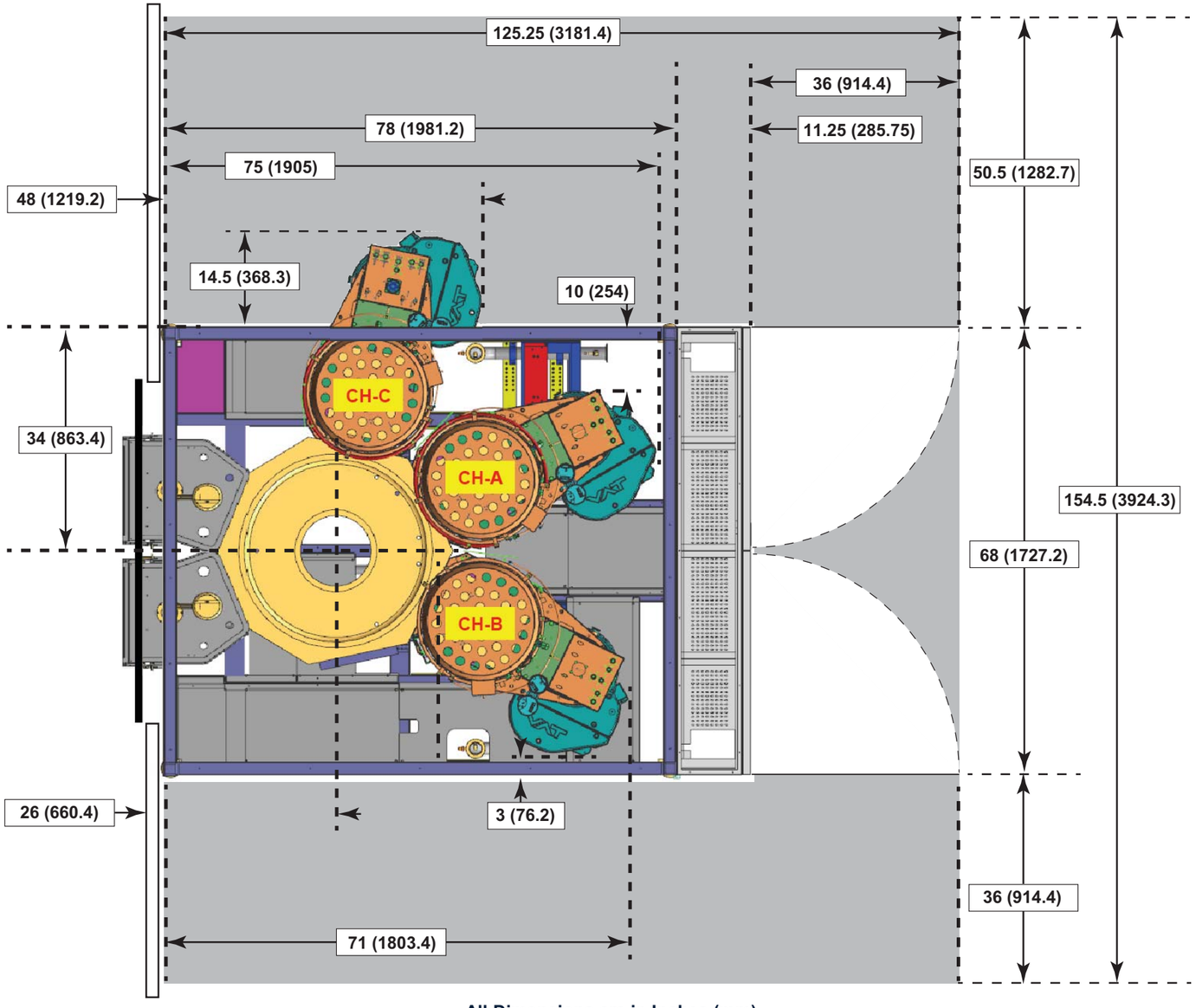


Figure 8-2. Service Area for Mainframe with DPS-DTM Chambers in Positions A, B & C

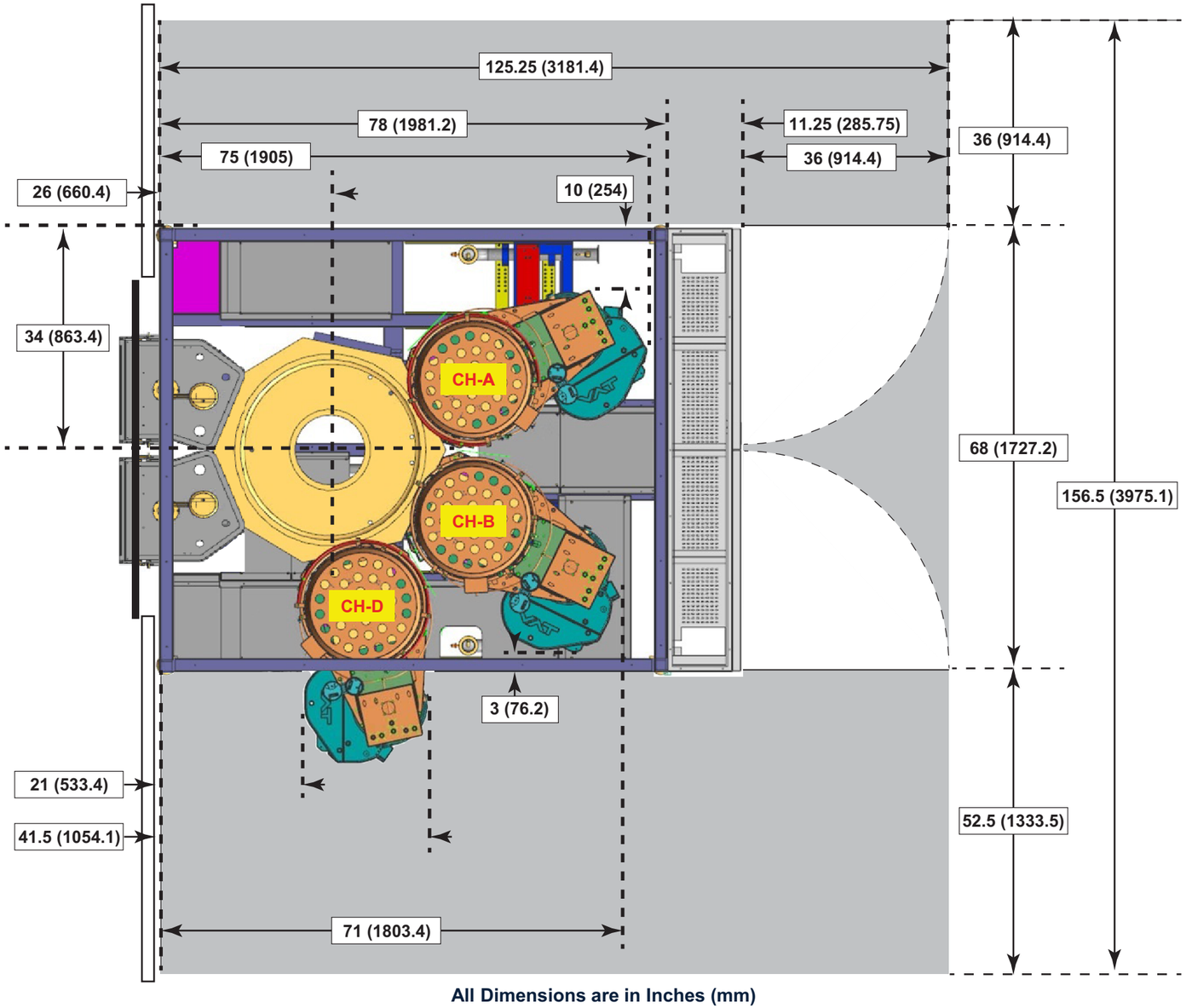
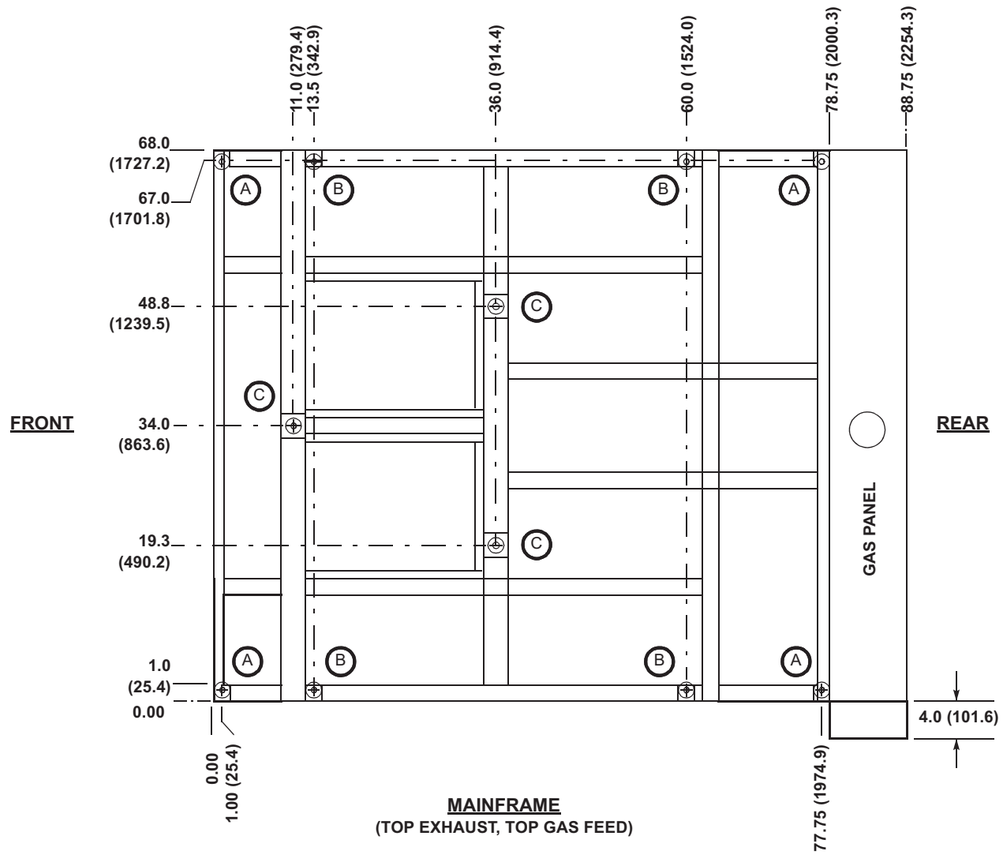
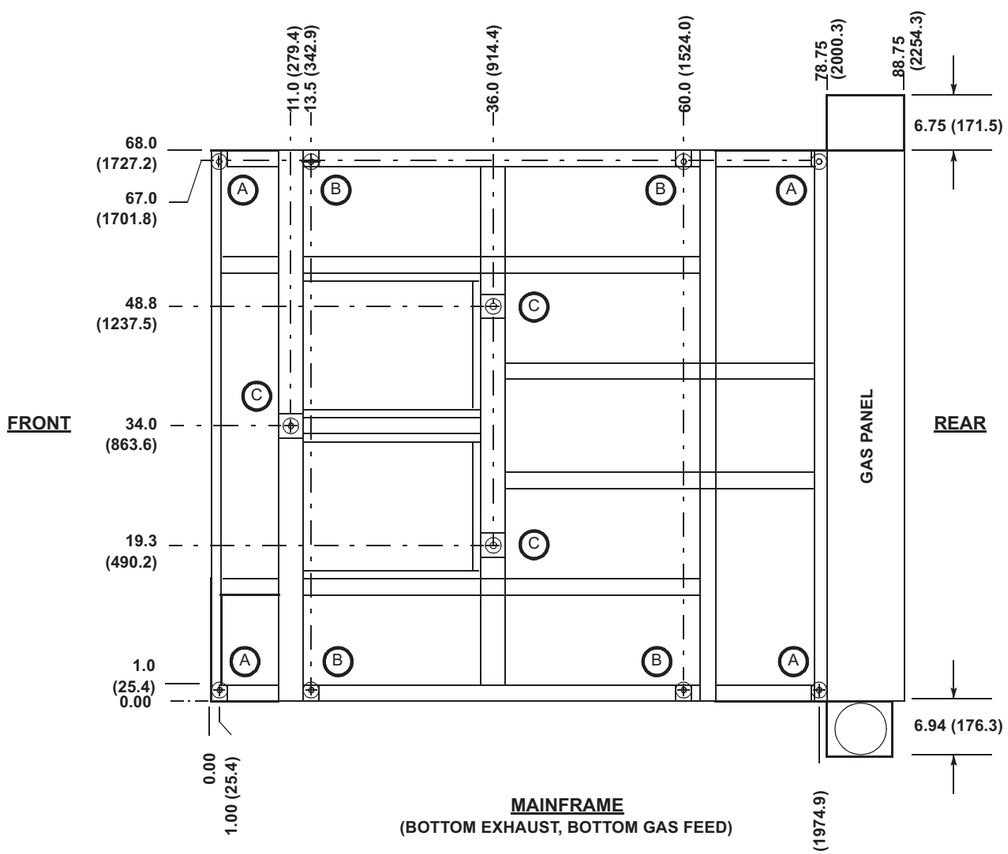


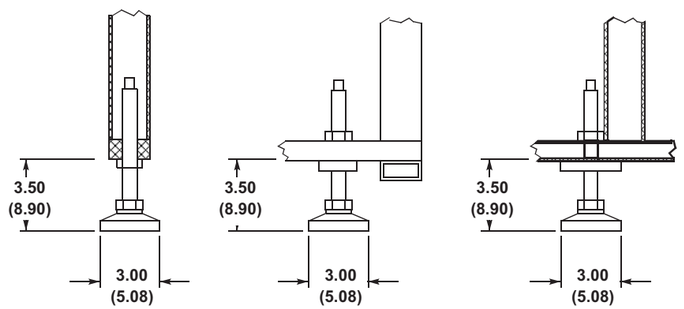
Figure 8-3. Service Area for Mainframe with DPS-DTM Chambers in Positions A, B & D



MAINFRAME
(TOP EXHAUST, TOP GAS FEED)



MAINFRAME
(BOTTOM EXHAUST, BOTTOM GAS FEED)

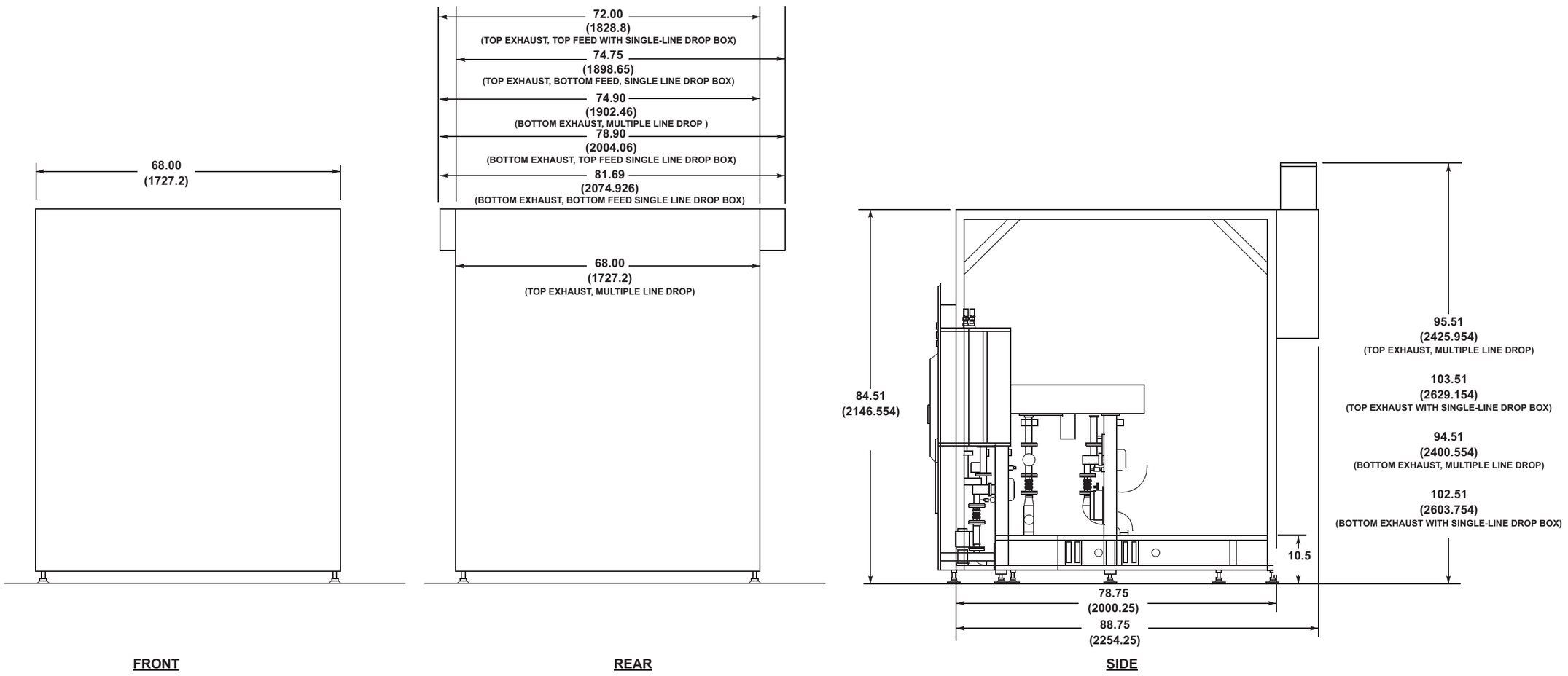


LEVELING PAD A **LEVELING PAD B** **LEVELING PAD C**

ALL DIMENSIONS ARE IN INCHES (MILLIMETERS).
ALL FEET ARE ADJUSTABLE IN HEIGHT FOR LEVELING AND ARE 3 (76.2 mm).

009978

Figure 8-4. Mainframe Leveling Pads



ALL DIMENSIONS ARE IN INCHES (MILLIMETERS).
ALL FEET ARE ADJUSTABLE IN HEIGHT FOR LEVELING AND ARE 3 (76.2 mm).

009979

Figure 8-5. Mainframe with Dimensions

8.2 Remote Component — DPS DTM Source RF Generator (Apex 5513)

Ensure the following items are completed in conjunction with this Equipment Sheet.

1. Ensure that the RF generator AC cable is connected to the appropriate circuit breaker in the AC Rack. The AC cable must maintain a 3.0" (7.6 cm) minimum radius on bends.
2. Route the RF coaxial cable from the RF generator through the access hole on the back of the RF rack to the RF matching unit on the mainframe. The RF coaxial cable must *NOT* be spliced or shortened, and must maintain a 2.0" (5 cm) minimum radius on bends. The RF power coaxial cables should not be run in the same cable raceway or conduit as any signal cables. The coaxial cables are long enough to run from the generator to the main system if the recommended distances from the main system to the support frame are maintained.
3. If necessary, connect the RF generator control cable from each RF generator to the proper D-connector in the back of the RF Rack PCB. Each control cable is labeled and connects to a specific process chamber.
4. If necessary, connect the RF generator communication cable from each RF generator to the proper D-connector on the System Controller Serial/Video Distribution PCB. Each communication cable is labeled and connects to a specific receptacle; see
5. Communication and Control Interconnect Datasheet.
6. If one is not already in place, connect an RF ground wire (1" braid) from the generator to the generator rack grounding bus. National Electric Code (NEC) Grounding, 1990 Article 250, Section 250-95. Each generator must have its own earth ground.

Table 8-1. Equipment Datasheet — Source RF Generator (Apex 5513)

Equipment Name: Source RF Generator (Apex 5513)				**Description:**				**No. of Pieces: 1**					
Vendor: Advanced Energy				**Installation Location: Generator Rack**						**Revision Level:**			
Physical Properties			**Clearance**	**in**	**cm**	**Environmental Requirements**		**Oper.**		**Stdby.**			
Height:	5.25 in.	13.3 cm	Front:			Ambient temperature:		41 °F ± 104 °F (5 °C ± 40 °C)					
Depth:	19.2 in.	48.5 cm	Back:	-		Ambient humidity:		15~85%					
Width:	8.5 in.	21.6 cm	Left:	-		Heat release to air (Btu/Hr):							
Weight:	45 lb.	20.4 kg	Right:	-		Heat release to water (Btu/Hr):		12500 Btu/Hr					
			Top:	-		Heat release to exhaust (Btu/Hr):		-		-			

Ref.	Communication and Control Requirements
	Supplied by Applied Materials. See .
Ref.	**Drain Requirement**
	Does Not Apply

Ref.	Electrical Power Requirement	Supply Point	Voltage	Phases	Full Load Amps	Breaker Amps	Peak kVA	Operate kVA	Standby kVA	Wire	Ground	Supplied By	Remarks
	50/60 (±3)Hz	Local AC	208 VAC ±10%	3Ø	26	40	-	-	-	3x #8 AWG	#8 AWG	-	
	RF power	Chamber	-	-	-	-	-	-	-	coax	-	-	

Ref.	General and Service Gas Requirement
	Does Not Apply

Ref.	Liquid Service Requirement	Supply Point	Input Pressure psig ($kg/cm^{2)}$	Outlet Pressure psig ($kg/cm^{2)}$)	Pressure Differential psig ($kg/cm^{2)}$)	Flow Min.gpm (lpm)	Flow Max. gpm (lpm)	Flow Avg. gpm (lpm)	Inlet Temp.	Fitting Size/Type	Fitting Material	Supplied By	Remarks
	Process Cooling Water Supply	Facilities	100 (6.9) max.	-	-			3 (11.4)	41 °F–95 °F (5 °C–35 °C)	3/8" Female NPT	Brass		
	Process Cooling Water Return	Facilities	-	82 (4.24) max.	18 (1.24) min.								

Ref.	Process and Specialty Gas Requirement
	Does Not Apply
Ref.	**Slurry Requirement**
	Does Not Apply
Ref.	**Vacuum Requirement**
	Does Not Apply
Ref.	**Exhaust Requirement**
	Does Not Apply

8.3 Remote Component — DPS DTM Bias RF Generator (Apex II)

Ensure the following items are completed in conjunction with this Equipment Sheet.

1. Ensure that the RF generator AC cable is connected to the appropriate circuit breaker in the AC Rack. The AC cable must maintain a 6.75" (17.1 cm) minimum radius on bends.
2. Route the RF coaxial cable from the RF generator through the access hole on the back of the RF rack to the RF matching unit on the mainframe. The RF coaxial cable must *NOT* be spliced or shortened, and must maintain a 2.8" (7.0 cm) minimum radius on bends. The RF power coaxial cables should not be run in the same cable raceway or conduit as any signal cables. The coaxial cables are long enough to run from the generator to the main system if the recommended distances from the main system to the support frame are maintained.
3. If necessary, connect the RF generator control cable from each RF generator to the proper D-connector in the back of the RF Rack PCB. Each control cable is labeled and connects to a specific process chamber.
4. If necessary, connect the RF generator communication cable from each RF generator to the proper D-connector on the System Controller Serial/Video Distribution PCB. Each communication cable is labeled and connects to a specific receptacle; see Table 9-1 Communication and Control Interconnect Datasheet.
5. If one is not already in place, connect an RF ground wire (1" (25.4 mm) braid) from the generator to the generator rack grounding bus. National Electric Code (NEC) Grounding, 1990 Article 250, Section 250-95. Each generator must have its own earth ground.

Table 8-2. Equipment Datasheet — Bias RF Generator (Apex II)

Equipment Name: Bias RF Generator (Apex II)				**Description:**			**No. of Pieces: 1**		
Vendor: Advanced Energy				**Installation Location: Generator Rack**			**Revision Level:**		
Physical Properties			**Clearance**	**in**	**cm**	**Environmental Requirements**	**Oper.**	**Stdby.**	
Height:	7 in.	17.8 cm	Front:	-	-	Ambient temperature:	41 °F ± 104 °F (5 °C ± 40 °C)		
Depth:	19.7 in.	43.4 cm	Back:	4.0	10.2	Ambient humidity:	15~85%		
Width:	17.1 in.	50.1 cm	Left:	-	-	Heat release to air (Btu/Hr):			
Weight:	78 lb.	35.4 kg	Right:	1.0	2.54	Heat release to water (Btu/Hr):	-	-	
			Top:	-	-	Heat release to exhaust (Btu/Hr):	-	-	

Ref.	**Communication and Control Requirements**
	Supplied by Applied Materials. See Table 9-1.
Ref.	**Drain Requirement**
	Does Not Apply

Ref.	**Electrical Power Requirement**	**Supply Point**	**Voltage**	**Phases**	**Full Load Amps**	**Breaker Amps**	**Peak kVA**	**Operate kVA**	**Standby kVA**	**Wire**	**Ground**	**Supplied By**	**Remarks**
	50/60 (±3) Hz	Local AC	208 VAC ±10%	3Ø	18	50	-	-	-	3x #6 AWG	#6 AWG	-	
	RF power	Chamber	-	-	-	-	-	-	-	coax	-	-	

Ref.	**General and Service Gas Requirement**
	Does Not Apply

Ref.	**Liquid Service Requirement**	**Supply Point**	**Input Pressure psig (kg/cm^{2})**	**Outlet Pressure psig (kg/cm^{2})**	**Pressure Differential psig (kg/cm^{2})**	**Flow Min.gpm (lpm)**	**Flow Max. gpm (lpm)**	**Flow Avg. gpm (lpm)**	**Inlet Temp.**	**Fitting Size/Type**	**Fitting Material**	**Supplied By**	**Remarks**
	Process Cooling Water Supply	Facilities	100 (6.9) max.	-	-	2 (7.6)			41 °F–95 °F (5 °C–35 °C)	3/8" Female NPT	SST		
	Process Cooling Water Return		-	94 (4.86) max.	6 (0.41) min.								

Ref.	**Process and Specialty Gas Requirement**
	Does Not Apply
Ref.	**Slurry Requirement**
	Does Not Apply
Ref.	**Vacuum Requirement**
	Does Not Apply
Ref.	**Exhaust Requirement**
	Does Not Apply

8.4 Remote Component — SMC 496 Galden Heat Exchanger for Cathode

Ensure that the following items are completed in conjunction with this Equipment Sheet.

1. Place the chiller no more than 50′ (15 m) from the mainframe. (The customer must supply additional hose if this length is exceeded.)
2. Connect the coolant supply and return hoses to the 3/4″ compression fittings on the SMC 496 Galden.
3. The PCW connects to 3/4″ barb fittings labeled TAP WATER and DRAIN on the side of the chiller. Ensure that the following items are completed before connecting the PCW supply and return lines.
   - Install a 10.0 gpm (38.02 lpm) flowmeter on the PCW return line. Use a minimum 10.0" (25.4 cm) straight line into the flowmeter to reduce oscillation.
   - Install a 120 µm filter on the water supply line.
   - Install a temperature gauge on the PCW supply line with a mid-scale reading of 60 ºF (20 ºC).
   - Install pressure gauges on the PCW to measure delta pressures across the filter and the chiller. Use three pressure gauges to measure 0 psi to 120 psi (0 kg/cm^2 to 8.4 kg/cm^2) graduated in 5.0 psi (0.35 kg/cm^2) or smaller increments.
   - Install shutoff valves on both sides of the filter, each end of the filter bypass, and on the return line.
   - Set the PCW flow rate to the SMC 496 Galden according to Table 8-3.

Table 8-3. Equipment Datasheet — SMC 496 Galden Heat Exchanger

Equipment Name: SMC 496 Galden				**Description: Cathode Chiller**			**No. of Pieces: 1**		**See Figure 8-6**
Vendor: SMC Corporation				**Installation Location:**					**Revision Level:**
Physical Properties			**Clearance**	**in**	**cm**	**Environmental Requirements**	**Oper.**	**Stdby.**	
Height:	31.0 in	78.74 cm	Front:	24	60	Ambient temperature:	50-95 °F (10-35 °C)	50-95 °F (10-35 °C)	
Depth:	39.0 in	99.06 cm	Back:	24	60	Ambient humidity:	30-70%	30-70%	
Width:	19.0 in	48.26 cm	Left:	24	60	Heat release to air (Btu/Hr):	-	-	
Weight:	375.0 lb	170.0 kg	Right:	24	60	Heat release to water (Btu/Hr):	-	-	
			Top:	24	60	Heat release to exhaust (Btu/Hr):	-	-	
						DTCU Heat release to air (Btu/Hr):	-	-	

Ref.	**Communication and Control Requirements**
	Supplied by Applied Materials. See Table 9-1.
Ref.	**Drain Requirement**
	Does Not Apply

Ref.	**Electrical Power Requirement**	**Supply Point**	**Voltage**	**Phases**	**Full Load Amps**	**Breaker Amps**	**Peak kVA**	**Operate kVA**	**Standby kVA**	**Wire**	**Ground**	**Supplied By**	**Remarks**
	50/60 (±3) Hz	Local AC	208 VAC ±10%	3Ø	16	30	5.2	5.2	-	3x #10 AWG	#10 AWG	-	Mating connector provided.

Ref.	**General and Service Gas Requirement**
	Does Not Apply

Ref.	**Liquid Service Requirement**	**Supply Point**	**Input Pressure psig (kg/cm^2)**	**Outlet Pressure psig (kg/cm^2))**	**Pressure Differential psig (kg/cm^2))**	**Flow Min.gpm (lpm)**	**Flow Max. gpm (lpm)**	**Flow Avg. gpm (lpm)**	**Inlet Temp.**	**Fitting Size/Type**	**Fitting Material**	**Supplied By**	**Remarks**
L17	Coolant supply	HX Manifold	80 (5.6)	-	-	-	-	8.0 (30.4)	-	3/4" Compression	Stainless Steel	-	
L18	Coolant return	HX Manifold		-	-	-	-	-	-	3/4" Compression	Stainless Steel	-	
L5	PCW supply	Facilities	100 (7.0)	-	-	-	-	8.0 (30.4)	50–95°F (10-35° C)	3/4″ Barb	Stainless Steel	-	
L6	PCW return	PCWR	-	-	Δ=30 (2.11)	-	-	-	-	3/4″ Barb	Stainless Steel		

Ref.	**Process and Specialty Gas Requirement**
	Does Not Apply
Ref.	**Slurry Requirement**
	Does Not Apply
Ref.	**Vacuum Requirement**
	Does Not Apply
Ref.	**Exhaust Requirement**
	Does Not Apply

Figure 8-6. SMC 496 Galden Heat Exchanger

8.5 Remote Component — SMC H2000 Heat Exchanger for Walls

Ensure that the following items are completed in conjunction with this Equipment Sheet.

1. Place the chiller no more than 50′ (15 m) from the mainframe. (The customer must supply additional hose if this length is exceeded.)
2. Connect the coolant supply and return hoses to the 3/4″ compression fittings on the SMC H2000.
3. The PCW connects to 3/4″ barb fittings labeled TAP WATER and DRAIN on the side of the chiller. Ensure that the following items are completed before connecting the PCW supply and return lines.
   - Install a 10.0 gpm (38.02 lpm) flowmeter on the PCW return line. Use a minimum 10.0" (25.4 cm) straight line into the flowmeter to reduce oscillation.
   - Install a 120 µm filter on the water supply line.
   - Install a temperature gauge on the PCW supply line with a mid-scale reading of 60 ºF (20 ºC).
   - Install pressure gauges on the PCW to measure delta pressures across the filter and the chiller. Use three pressure gauges to measure 0 psi to 120 psi (0 kg/cm^2 to 8.4 kg/cm^2) graduated in 5.0 psi (0.35 kg/cm^2) or smaller increments.
   - Install shutoff valves on both sides of the filter, each end of the filter bypass, and on the return line.
   - Set the PCW flow rate to the SMC H2000 according to Table 8-4.

Table 8-4. Equipment Datasheet — SMC H2000 Heat Exchanger

Equipment Name: SMC H2000					**Description: Heat Exchanger**			**No. of Pieces: 1**		See Figure 8-7	
Vendor: SMC Corporation					**Installation Location: Gray Area**						
Physical Properties				**Clearance**	**in**	**cm**	**Environmental Requirements**	**Oper.**	**Stdby.**		
Height:		27.0 in	78.0 cm	Front:	24	60	Ambient temperature:	50~95 °F (10~35 °C)			
Depth:		26.78 in	68.0 cm	Back:	24	60	Ambient humidity:	30~70% max. no condensation			
Width:		15.75 in	40.0 cm	Left:	24	60	Heat release to air (Btu/Hr):	-	-		
Weight:		309 lb	140.0 kg	Right:	24	60	Heat release to water (Btu/Hr):	-	-		
				Top:	24	60	Heat release to exhaust (Btu/Hr):	-	-		

Ref.	**Communication and Control Requirements**
	Supplied by Applied Materials. See Table 9-1.
Ref.	**Drain Requirement**
	Does Not Apply

Ref.	**Electrical Power Requirement**	**Supply Point**	**Voltage**	**Phases**	**Full Load Amps**	**Breaker Amps**	**Peak kVA**	**Operate kVA**	**Standby kVA**	**Wire**	**Ground**	**Supplied By**	**Remarks**
	50/60 (±1) Hz	System controller	208 VAC ±10%	3Ø	24	30	8.1	5.5	*	3x #10 AWG	#10 AWG	-	Mating connector provided.

Ref.	**General and Service Gas Requirement**
	Does Not Apply

Ref.	**Liquid Service Requirement**	**Supply Point**	**Input Pressure psig (kg/cm^2)**	**Outlet Pressure psig (kg/cm^2)**	**Pressure Differential psig (kg/cm^2)**	**Flow Min.gpm (lpm)**	**Flow Max. gpm (lpm)**	**Flow Avg. gpm @ psig**	**Inlet Temp.**	**Fitting Size/Type**	**Fitting Material**	**Supplied By**	**Remarks**
L13	Coolant supply	Mainframe	44~130	-	-	-	-	8 gpm @ 80 psi	-	3/4" Compression	Stainless Steel	-	
L14	Coolant return	Mainframe	-	-	-	-	-	-	-	3/4" Compression	Stainless Steel	-	
L1	PCW supply	Facility	100 psig (7.3 kg/cm^2)	-	-	-	-	5 gpm @ 19 psi min.	62 °F–72 °F (17 °C–22 °C)	3/4" Barbed	Stainless Steel	-	
L2	PCW return	Facility	-	-	-	-	-	-	-	3/4" Barbed	Stainless Steel	-	

Ref.	**Process and Specialty Gas Requirement**
	Does Not Apply
Ref.	**Slurry Requirement**
	Does Not Apply
Ref.	**Vacuum Requirement**
	Does Not Apply
Ref.	**Exhaust Requirement**
	Does Not Apply

Figure 8-7. SMC H2000 Heat Exchanger

8.6 Remote Component — SCM 496 50/50 Heat Exchanger for SD-DTCU

Ensure that the following items are completed in conjunction with this Equipment Sheet.

1. Place the chiller no more than 50′ (15 m) from the mainframe. (The customer must supply additional hose if this length is exceeded.)
2. Connect the coolant supply and return hoses to the 3/4″ compression fittings on the SMC 496 Galden.
3. The PCW connects to 3/4″ barb fittings labeled TAP WATER and DRAIN on the side of the chiller. Ensure that the following items are completed before connecting the PCW supply and return lines.
   - Install a 10.0 gpm (38.02 lpm) flowmeter on the PCW return line. Use a minimum 10.0" (25.4 cm) straight line into the flowmeter to reduce oscillation.
   - Install a 120 µm filter on the water supply line.
   - Install a temperature gauge on the PCW supply line with a mid-scale reading of 60 ºF (20 ºC).
   - Install pressure gauges on the PCW to measure delta pressures across the filter and the chiller. Use three pressure gauges to measure 0 psi to 120 psi (0 kg/cm^2 to 8.4 kg/cm^2) graduated in 5.0 psi (0.35 kg/cm^2) or smaller increments.
   - Install shutoff valves on both sides of the filter, each end of the filter bypass, and on the return line.
   - Set the PCW flow rate to the SMC 496 Galden according to Table 8-5.

Table 8-5. Equipment Datasheet — SCM 496 50/50 Heat Exchanger

Equipment Name: SMC 496 50/50					**Description: Heat Exchanger**					**No. of Pieces: 1**		**See Figure 8-7**	
Vendor: SMC Corporation					**Installation Location: Gray Area**								
Physical Properties				**Clearance**	**in**	**cm**	**Environmental Requirements**			**Oper.**	**Stdby.**		
Height:		31 in	79.5 cm	Front:	24	60	Ambient temperature:			50~95 °F (10~35 °C)			
Depth:		27 in	69.0 cm	Back:	24	60	Ambient humidity:			30~70% max. no condensation			
Width:		19 in	48.0 cm	Left:	24	60	Heat release to air (Btu/Hr):			-	-		
Weight:		419 lb	190.0 kg	Right:	24	60	Heat release to water (Btu/Hr):			-	-		
				Top:	24	60	Heat release to exhaust (Btu/Hr):			-	-		

Ref.	**Communication and Control Requirements**
	Supplied by Applied Materials. See Table 9-1.
Ref.	**Drain Requirement**
	Does Not Apply

Ref.	**Electrical Power Requirement**	**Supply Point**	**Voltage**	**Phases**	**Full Load Amps**	**Breaker Amps**	**Peak kVA**	**Operate kVA**	**Standby kVA**	**Wire**	**Ground**	**Supplied By**	**Remarks**
	50/60 (±1) Hz	System controller	208 VAC ±10%	3Ø	16	30	5.2	5.2	-	3 #10 AWG	#10 AWG	-	Mating connector provided.

Ref.	**General and Service Gas Requirement**
	Does Not Apply

Ref.	**Liquid Service Requirement**	**Supply Point**	**Input Pressure psig (kg/cm$^{2)}$**	**Outlet Pressure psig (kg/cm$^{2)}$)**	**Pressure Differential psig (kg/cm$^{2)}$)**	**Flow Min.gpm (lpm)**	**Flow Max. gpm (lpm)**	**Flow Avg. gpm @ psig**	**Inlet Temp.**	**Fitting Size/Type**	**Fitting Material**	**Supplied By**	**Remarks**
L13	Coolant supply	Mainframe	80 psig (5.6)	-	-	-	-	8 gpm @ 80 psi	-	3/4" Compression	Stainless Steel	-	
L14	Coolant return	Mainframe	-	-	-	-	-	-	-	3/4" Compression	Stainless Steel	-	
L1	PCW supply	Facility	100 psig (7.3 kg/cm^2)	-	30 psig	-	-	5 gpm @ 19 psi min.	62 °F–72 °F (17 °C–22 °C)	3/4" Barbed	Stainless Steel	-	
L2	PCW return	Facility	-	-	-	-	-	-	-	3/4" Barbed	Stainless Steel	-	

Ref.	**Process and Specialty Gas Requirement**
	Does Not Apply
Ref.	**Slurry Requirement**
	Does Not Apply
Ref.	**Vacuum Requirement**
	Does Not Apply
Ref.	**Exhaust Requirement**
	Does Not Apply

FRONT

REAR

Figure 8-8. SCM 496 50/50 Heat Exchange

8.7 Remote Component — QDP80 Dry Rotary Vane Pump with QMB250 Dry Roots Blower

The minimum requirement for pump capacity is a QDP80 Dry Pump with a QMB250 Blower. If necessary, another dry pump may be substituted.

Ensure that the following items are completed in conjunction with this Equipment Sheet.

1. Install a bellows at each end of the roughing line leading from the mainframe to the pump to isolate any pump vibration. The bellows should not be tool long – Applied Materials recommends 10.16 cm (4.0"). Clean all vacuum tubing.
2. Before installation, perform a helium leakcheck to $1x10^{-5}$ mbar.liters per second to test vacuum line integrity.
3. Applied Materials recommends installing a leakcheck port on the roughing line leading to the pump. The vacuum line should be checked annually.
4. An external scrubber must be connected to pump exhaust systems. The scrubber must be capable of 119 slm per pump or a maximum of 1133 slm for a multiple pump package.
   Install a shutoff valve on each vacuum roughing pump exhaust to a scrubber line to prevent backflow from the scrubber during servicing. Verification will be required at startup. Waste gas disposal equipment must handle the effluent at maximum capacity flow.
   Discuss the proper type for each application with the manufacturer.
5. Exhaust gases containing silane, diborane, or ammonia must pass through a treatment system before mixing with other gases in the scrubber.
6. Install a magnahelic gauge at the pump exhaust to measure negative draw.
7. To determine maximum allowable tubing lengths, select your tubing size in column A below. For each 90° bend, subtract the number in column B from the standard allowable length in column C. Use stainless steel tubing.

Col A	Col B		Col C	
Tubing O.D.	Equivalent length for each 90° bend		Maximum allowable length	
2 "	76.2 cm	2.5 ft	6.1 m	20 ft
3 "	91.4 cm	3.0 ft	12.2 m	40 ft
4 "	106.7 cm	3.5 ft	18.3 m	60 ft
5 "	121.9 cm	4.0 ft	18.3 m	60 ft
6 "	137.2 cm	4.5 ft	18.3 m	60 ft

8. Control Cable Note: Connect the 16-pin pump control cable to the system controller interconnect PCB.
9. Control Cable Note: Connect the 17-pin signal connector from the interface box to the pump face.
10. Control Cable Note: Connect the 19-pin connector cable from the interface box to the pump face (system with optional gas module only).
11. Install a 20 gph full scale flowmeter, 0 psi–120 psi H_2O pressure gauge, 20 °C (68 °F) midrange thermometer, and a 120 micron filter on the inlet side of the QDP facilities water line.
12. Install shutoff valves on both sides of the filter and on the inlet side of the QDP facilities water line. See the Liquid Service Facilities Interface Diagram in the Mainframe SSPS.
13. Install a shutoff valve on the outlet side of the QDP facilities water line.
14. Cooling lines should be stainless steel, copper, PVC, or rubber hosing, 1/2" (12.7mm) or larger. Hosing must have sufficient temperature, pressure, and burst rating — poly is not acceptable.
15. High purity, diffusion-resistant, 2-stage N_2 regulator with 0.0 psi to 3000.0 psi (0.0 kg/cm^2 to 210.0 kg/cm^2) inlet gauge and -30.0 psi to 30.0 psi (-2.1 kg/cm^2 to 2.1 kg/cm^2) outlet gauge, 1/4" (6.35mm).

16. Recommended N_2 supply pressures and flow rates:

	Shaft-Seal Purge (all modules)	3/4 Interstage Purge (medium and harsh module)	2/3 Interstage Purge (medium and harsh module)	Inlet Purge (harsh module only)	Exhaust Purge (harsh module only)
Flow rate (typ)	7 slm	25 slm	10 slm	N/A	5 slm

17. Connect the electrical power cables from the pump to the system controller circuit breaker through 3/4" conduit. Conduit is provided.
18. Connect a 1/4" Swagelok N_2 supply line from the facilities gas source to the N_2 inlet connection on the pump. Use poly, copper, or stainless tubing. On silane system, purge flow must be monitored by the interlock located on the remote support frame.
19. Install an ISO63 to KF50 transition adapter at the outlet of the vacuum pump. Use stainless steel tubing.
20. (Metal Etch systems only) Install a small prescrubber as close as possible to the outlet port of the backing pump for each Metal Etch chamber. This is required to prevent clogging of the outlet line from the Metal Etch backing pump. The PRS/P chamber exhaust does not need to be prescrubbed nor can it be combined with the Metal Etch chamber(s) exhaust before the prescrubber.
21. Dimensions are approximate. Height = To the highest point, Depth = center of standard exhaust to end of pump or blower, Width = frame to frame.

Table 8-6. Equipment Datasheet — QDP80 Dry Rotary Vane Pump with QMB250 Dry Roots Blower

Equipment Name: Edwards QDP80 Dry Rotary Vane Pump, QMB250 Dry Roots Blower			Description: Process Chamber Pump			No. of Pieces: 1		See Figure 8-9
Vendor: Edwards			**Installation Location:**					
Physical Properties	**inches/lb**	**cm/kg**	**Clearance**	**in**	**cm**	**Environmental Requirements**	**Oper.**	**Stdby.**
Height:	46.75 in	119.00 cm	Front:	12	30	Ambient temperature:	5 °C–40 °C (41 °F–104 °F)	5 °C–40 °C (41 °F–104 °F)
Depth:	37.77 in	95.95 cm	Back:	6	15	Ambient humidity:	90% max	90% max
Width:	15.35 in	39.00 cm	Left:	6	15	Heat release to air (Btu/Hr):	13000 max	4560 max
Weight:	580.00 lb	264.00 kg	Right:	6	15	Heat release to water (Btu/Hr):	12500 max	8900 max
See Note 21			Top:	1	3	Heat release to exhaust (Btu/Hr):	Negligible	Negligible

Ref	**Communication and Control Req.**
(Supplied by Applied Materials. See Table 9-1.)	

Ref	**Drain Requirement**	**Supply Point**	**Pressure psig (kg/cm^2)**	**P-Trap**	**Discharge Temp.**	**Flow Min. gpm (lpm)**	**Flow Max gpm (lpm)**	**Flow Avg. gpm (lpm)**	**Fitting Size**	**Fitting Type**	**Fitting Material**	**Supplied By**	**Remarks**
(Does not apply.)													

Ref.	**Electrical Power Requirement**	**Supply Point**	**Voltage**	**Phases**	**Full Load Amps**	**Breaker Amps**	**Peak kVA**	**Operate kVA**	**Standby kVA**	**Wire**	**Ground**	**Supplied By**	**Remarks**
E9	4 kW 50 Hz	System controller	208 VAC ±6%–10%	3	24.8	30	8.9	5.4	4.3	3 #10 AWG	#10 AWG	Customer	See Notes
E9	4 kW 60 Hz	System controller	208 VAC ±10%	3	24.8	30	8.9	5.4	4.3	3 #10 AWG	#10 AWG	Customer	See Notes

Ref.	**General and Service Gas Requirement**	**Supply Point**	**Pressure psig (kg/cm^2)**	**Regulator**	**Minimum Filtration**	**Flow Min. sccm**	**Flow Max. sccm**	**Flow Avg. sccm**	**Fitting Size**	**Fitting Type**	**Fitting Material**	**Supplied By**	**Remarks**
G7	N_2 Gas Module	HPN_2	22.5 psig-100.0 psig (1.58–7.03 kg/cm^2)	See Notes	0.5 µm	7000	60000	See Notes	1/4"	Compression	SST	Customer	See Notes

Ref.	**Liquid Service Requirement**	**Supply Point**	**Input Pressure psig (kg/cm^2)**	**Regulator psig (kg/cm^2)**		**Flow Min. gpm (lpm)**	**Flow Max. gpm (lpm)**	**Flow Avg. gpm (lpm)**	**Inlet Temp**	**Fitting Size/ Type**	**Fitting Material**	**Supplied By**	**Remarks**
L4	Cooling water return	Facilities	Δ30.0 psig (2.11 kg/cm^2)			0.9 (3.4)	2.1 (7.9)	1.4 (5.3)	–	3/8" F QkD	Brass	Customer	See Notes
L8	Cooling water supply	Facilities	60.0 psig–100 psig (4.22–7.03 kg/cm^2)	100 psig (7.03 kg/cm^2)		0.9 (3.4)	2.1 (7.9)	1.4 (5.3)	20 °C–25 °C (68 °F–77 °F)	3/8" M QkD	Brass	Customer	See Notes

Ref.	**Process and Specialty Gas Requirement**	**Supply Point**	**Pressure psig (kg/cm^2)**	**Regulator**	**Minimum Filtration**	**Flow Min. sccm**	**Flow Max. sccm**	**Flow Avg. sccm**	**Fitting Size**	**Fitting Type**	**Fitting Material**	**Supplied By**	**Remarks**
(Does not apply.)													

Ref.	**Slurry Requirement**	**Supply Point**	**Pressure psig (kg/cm^2)**	**Regulator**	**Minimum Filtration**	**Flow Min. gpm (lpm)**	**Flow Max. gpm (lpm)**	**Flow Avg. gpm (lpm)**	**Inlet Temp.**	**Fitting Size/ Type**	**Fitting Material**	**Supplied By**	**Remarks**
(Does not apply.)													

Table 8-6. Equipment Datasheet — QDP80 Dry Rotary Vane Pump with QMB250 Dry Roots Blower

Ref.	Vacuum Requirement	Supply Point	Pressure psig (kg/cm^2)	Size (O.D.)	Leak Rate	Flow Min. cfm	Flow Max. cfm	Flow Avg. cfm	Fitting Size	Fitting Type	Fitting Material	Supplied By	Remarks
V3	Roughing Line	Foreline	0.5 mTorr/760 Torr	See Notes		1.4	180	1.5	ISO63	ISO (bolted)	Stainless	Customer	See Notes
Ref	**Exhaust Requirement**	**Supply Point**	**Pressure psig (cm/H_2O)**	**Size (O.D.)**	**Exhaust Type**	**Flow Min. cfm**	**Flow Max. cfm**	**Flow Avg. cfm**	**Fitting Size**	**Fitting Type**	**Fitting Material**	**Supplied By**	**Remarks**
X8	Toxic	Effluents	2 psig (140 cm/H_2O)	1-1/2"		1.7	181.5	2	NW40	NW	Stainless	Customer	See Notes

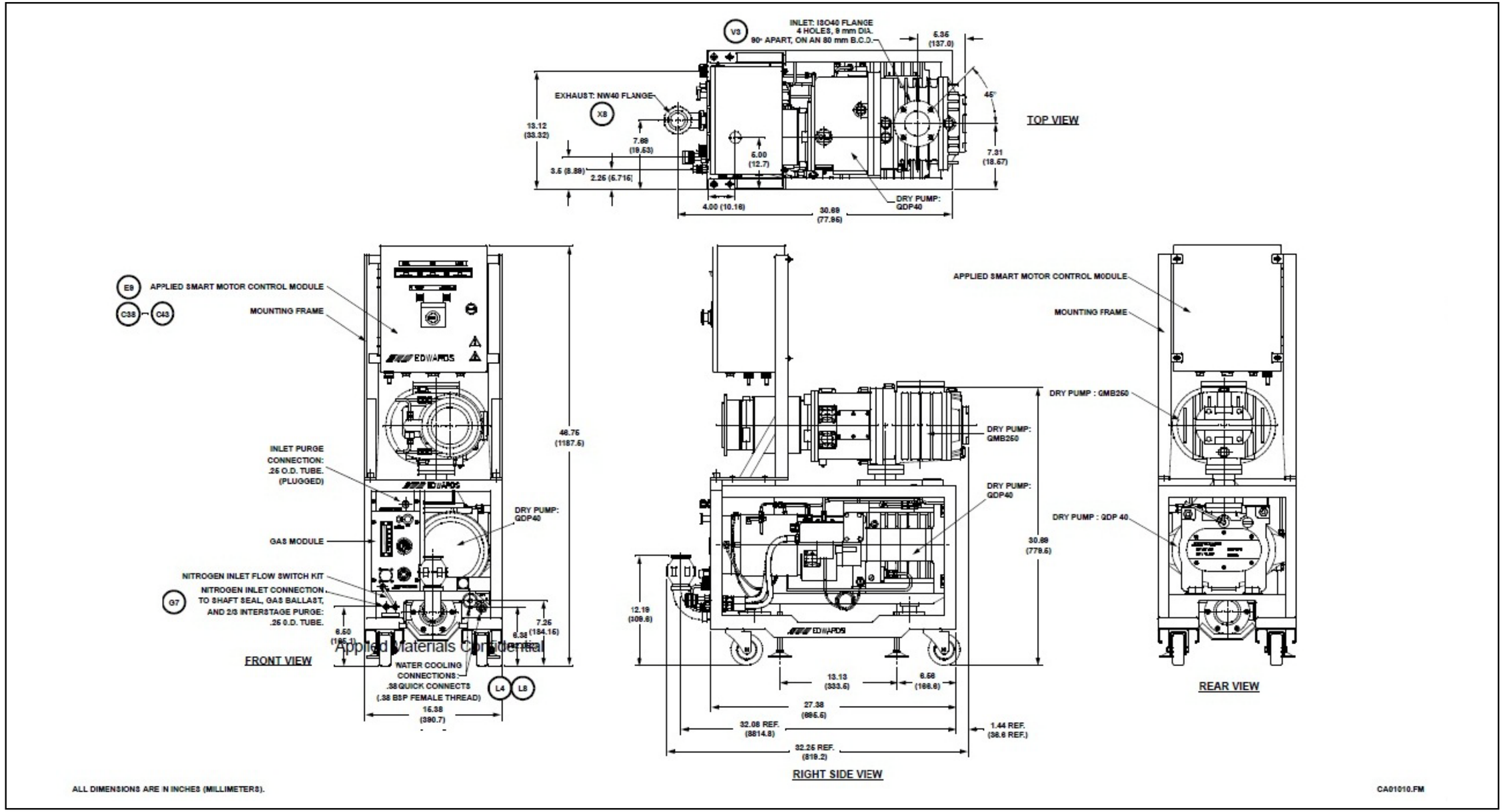


Figure 8-9. QDP80 Dry Rotary Vane Pump with QMB250 Dry Roots Blower

9 Facilities Interconnect Data Sheets and Diagrams

This chapter contains Facilities Interconnect Diagrams that are coupled with Interconnect Datasheets. The information in this manual covers all connections that are specific to the Deep Trench DPS chamber. All connection information for components that are independent of the chambers that are installed on the system can be found in the *Etch Centura II Mainframe SSPS* (Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263). Both manuals are required to fully facilitize the Centura II system.

Where it is practical, the services to primary components have been assigned Reference Designators that correlate the service between diagrams and datasheets. The Reference Designators are:

C – Communications and Control
E – Electrical (AC) Power Service
G – General Service Gases
L – Liquid Service
P – Process and Specialty Gases
V – Vacuum Service
X – Exhaust

These Diagrams and Datasheets *DO NOT* represent a specific fab layout. Some of the equipment shown may not be included with your configuration. Check the “Sales Order Project Packet” for your specific configuration. The Diagrams and Datasheets are provided as references only. The customer is responsible to assure that the facilities meet all applicable local/national codes and ordinances.

This chapter has the following sections:

Please refer to the introductory paragraphs of Chapter 9 in the Mainframe SSPS for further information about using the data in this chapter.

9.1 Communication and Control

Table 9-1. Communication and Control Interconnect Data Sheet

Interconnect Type: Communication and Control

Ref.	Description	From	Code	To	Code	Applied Part Number (Standard)	Actual Length	Effective Length[a]	Remarks
C1	CHX Heat exchanger control	System Controller CHX	TB1	Heat exchanger #1	J1	0620-02383	75’ (22.9 m)		
C3	Chiller Control	Heat exchanger #1	J1A	Note 1		0620-02763	10’ (3 m)		Note 1
C5	Seriplex Comm cable	Serial/Video Dist Brd	VJ13	Seriplex I/O Dist Brd	SRPLX1	0620-10505	55’ (16.8 m)		
C6	Seiko Seiki Control A	Seiko Seiki Turbo Controller A		Chamber A Turbo		0620-00617	66’ (20 m)		
C8	Seiko Seiki Control B	Seiko Seiki Turbo Controller B		Chamber B Turbo		0620-00617	66’ (20 m)		
C10	Seiko Seiki Control C	Seiko Seiki Turbo Controller C		Chamber C Turbo		0620-00617	66’ (20 m)		
C12	Seiko Seiki Control D	Seiko Seiki Turbo Controller D		Chamber D turbo		0620-00617	66’ (20 m)		
C14	RF power coaxial cable chamber A bias	Chamber A Bias Generator		Chamber A bias match		0150-25541	79’ (24.1 m)		
C15	RF power coaxial cable chamber A source	Chamber A Source Generator		Chamber A source match		0190-05949	79’ (24.1 m)		
C16	RF power coaxial cable chamber B bias	Chamber B Bias Generator		Chamber B bias match		0150-25541	79’ (24.1 m)		
C17	RF power coaxial cable chamber B source	Chamber B Source Generator		Chamber B source match		0190-05949	79’ (24.1 m)		
C18	RF power coaxial cable chamber C bias	Chamber C Bias Generator		Chamber C bias match		0150-25541	79’ (24.1 m)		
C19	RF power coaxial cable chamber C source	Chamber C Source Generator		Chamber C source match		0190-05949	79’ (24.1 m)		
C20	RF power coaxial cable chamber D bias	Chamber D Bias Generator		Chamber D bias match		0150-25541	79’ (24.1 m)		
C21	RF power coaxial cable chamber D source	Chamber D Source Generator		Chamber D source match		0190-05949	79’ (24.1 m)		
C22	RS 232 cable	Serial/Video Dist	VP4	RS 232 - RS-485 Converter		0620-00466	3’ (0.91 m)		
C23	RS 232 cable	Serial/Video Dist	VJ14	Chamber A Bias Generator		0150-25539	79’ (24.1 m)		
C24	RS 232 cable	Serial/Video Dist	VJ17	Chamber A Source Generator		0150-25539	79’ (24.1 m)		
C25	RS 232 cable	Serial/Video Dist	VJ15	Chamber A Source Match		0150-28055	79’ (24.1 m)		
C26	RS 232 cable	Serial/Video Dist	VJ19	Chamber B Bias Generator		0150-25539	79’ (24.1 m)		
C27	RS 232 cable	Serial/Video Dist	VJ21	Chamber B Source Generator		0150-25539	79’ (24.1 m)		
C28	RS 232 cable	Serial/Video Dist	VJ25	Chamber B Source Match		0150-28055	79’ (24.1 m)		
C29	RS 232 cable	Serial/Video Dist	VJ12	Chamber C Bias Generator		0150-25539	79’ (24.1 m)		
C30	RS 232 cable	Serial/Video Dist	VJ13	Chamber C Source Generator		0150-25539	79’ (24.1 m)		
C31	RS 232 cable	Serial/Video Dist	VJ43	Chamber C Source Match		0150-28055	79’ (24.1 m)		
C32	RS 232 cable	Serial/Video Dist	VJ12	Chamber D Bias Generator		0150-25539	79’ (24.1 m)		
C33	RS 232 cable	Serial/Video Dist	VJ13	Chamber D Source Generator		0150-25539	79’ (24.1 m)		
C34	RS 232 cable	Serial/Video Dist	VJ43	Chamber D Source Match		0150-28055	79’ (24.1 m)		

a. The effective lengths are based on the standard controller located on the same floor as, and to the rear of, the mainframe. The effective length takes into account the amount of cabling running inside the mainframe and controller. If your floor plan varies from the standard floor plan, the effective cable lengths will vary.

Note 1: See Figure 9-1 for CHX Communication Diagram

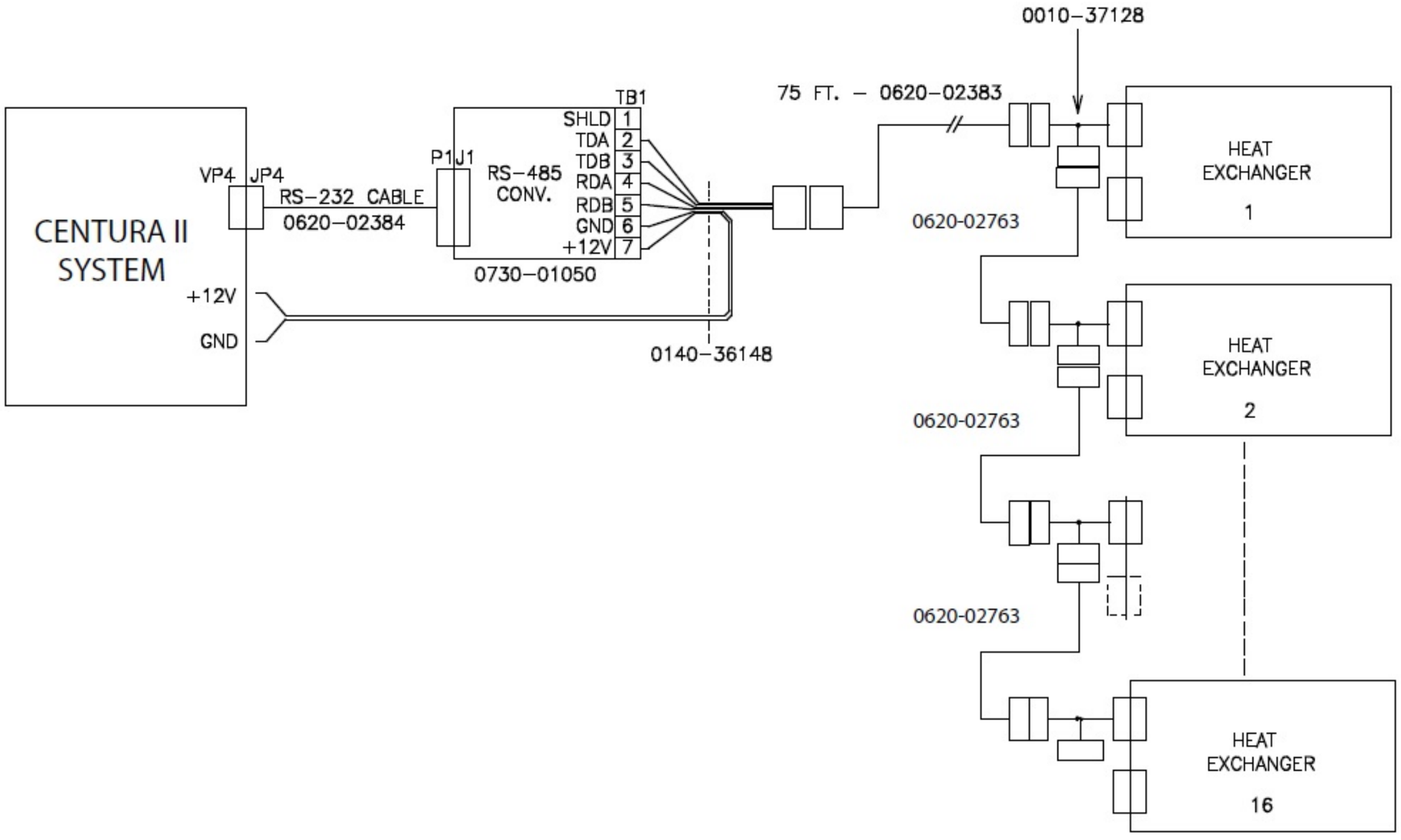


Figure 9-1. CHX Communication Diagram

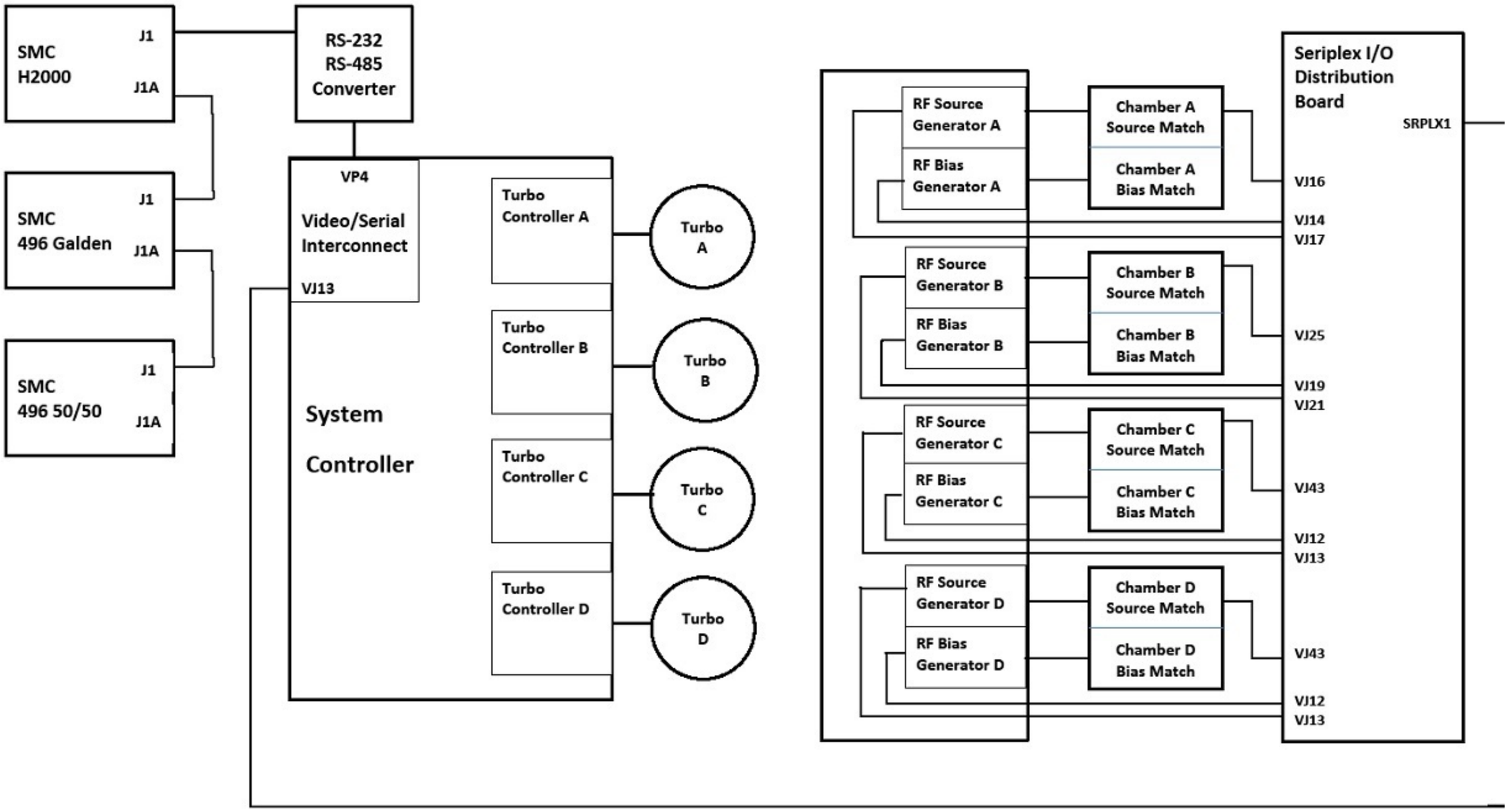


Figure 9-2. System Communication Scheme

9.2 Drain (Wastewater)

Does not apply.

9.3 Electrical Power

See the *Etch Centura II Mainframe SSPS* (Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263) for information on electrical power connections.

Table 9-2. 84-Inch AC Rack Interconnections

From		To	CB Rating (A)	Power Connection	Minimum Wire Size (AWG)
Facility		AC Rack CB 100	400	208VAC, 3P	750MCM
Customer Supplied UPS		AC Rack CB115AB	20	208VAC, 3P	12
AC Rack	CB 157B	Load Lock Pump (QDP 40)	30	208VAC, 3P	10
	CB 156A	Transfer Pump (QDP 40)	30	208VAC, 3P	10
	CB 154A	Chamber A - Pump (QDP 80)	30	208VAC, 3P	10
	CB 155B	Chamber B - Pump (QDP 80)	30	208VAC, 3P	10
	CB 254C	Chamber C - Pump (QDP 80)	30	208VAC, 3P	10
	CB 146A	AC Sub-Panel 1	100	208VAC, 3P	1
	CB 147B	AC Sub-Panel 2	100	208VAC, 3P	1
	CB 164A	Chamber A - Bias Generator	50	208VAC, 3P	6
	CB 162A	Chamber A - Source Generator	40	208VAC, 3P	8
	CB 165B	Chamber B - Bias Generator	50	208VAC, 3P	6
	CB 163B	Chamber B - Source Generator	40	208VAC, 3P	8
	CB 264C	Chamber C - Bias Generator	50	208VAC, 3P	6
	CB 262C	Chamber C - Source Generator	40	208VAC, 3P	8
	CB 142A	Chamber A - AC Box	15	208VAC, 3P	14
	CB 150A	Chamber A - AC Box (Lamp and Magnet Drivers)	30	208VAC, 3P	10
	CB 143B	Chamber B - AC Box	15	208VAC, 3P	14
	CB 151B	Chamber B - AC Box (Lamp and Magnet Drivers)	30	208VAC, 3P	10
	CB 242C	Chamber C - AC Box	15	208VAC, 3P	14
	CB 250C	Chamber C - AC Box (Lamp and Magnet Drivers)	30	208VAC, 3P	10
	CB 160A	Mainframe - AC Box (MF AUX Power Box)	30	208VAC, 3P	10
AC Sub-Panel 1	CB 1	Chamber A - Cathode Chiller	30	208VAC, 3P	10
	CB 2	Chamber B - Cathode Chiller	30	208VAC, 3P	10
	CB 3	Dome Chiller #1	30	208VAC, 3P	10
	CB 4	Wall Heat Exchanger #1	30	208VAC, 3P	10
AC Sub-Panel 2	CB 5	Chamber C - Cathode Chiller	30	208VAC, 3P	10
	CB 6	Dome Chiller #2	30	208VAC, 3P	10
	CB 7	Wall Heat Exchanger #2	30	208VAC, 3P	10

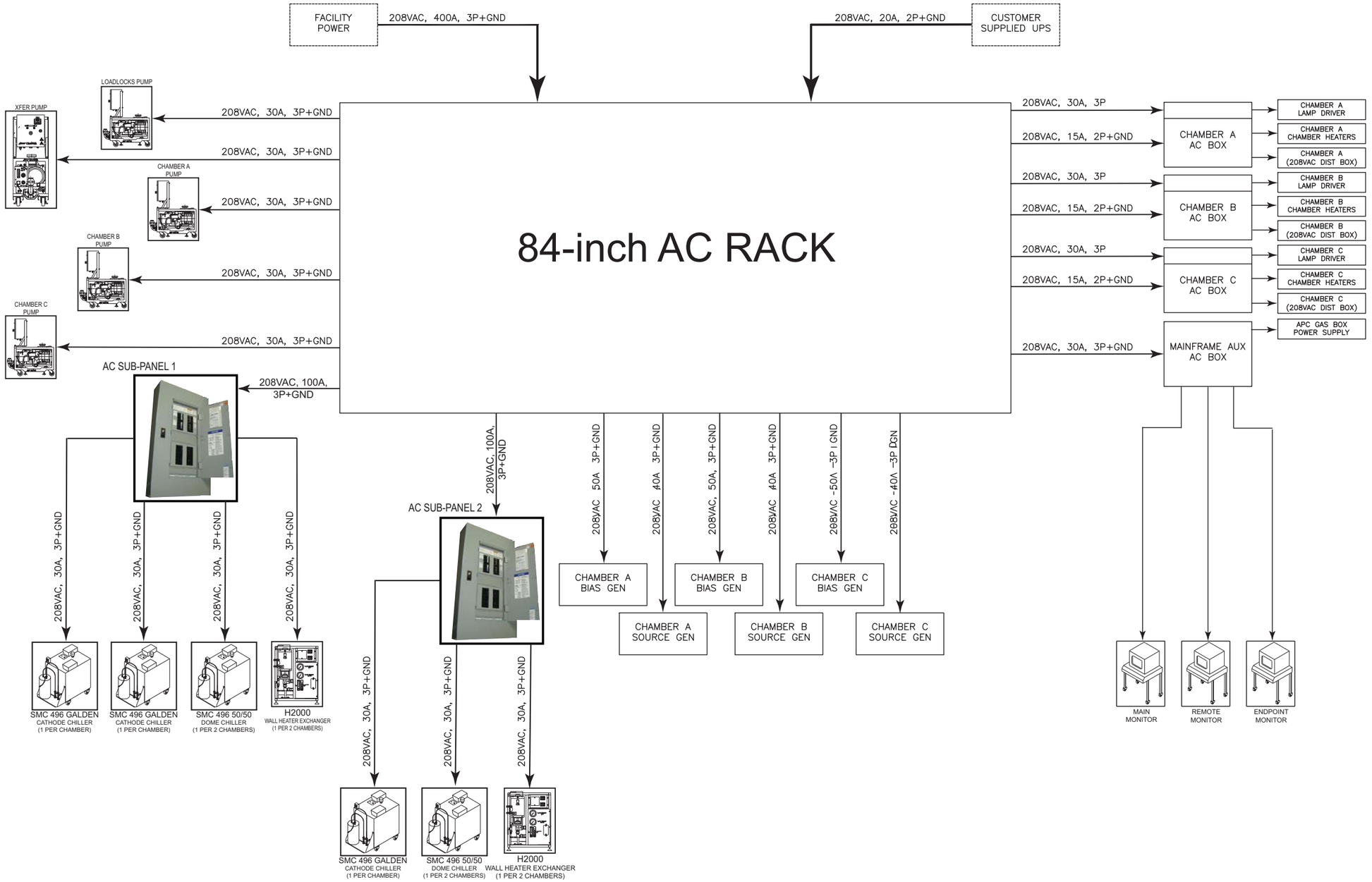


Figure 9-3. AC Power Interconnections

9.4 General and Service Gases

See the *Etch Centura II Mainframe SSPS* (Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263) for information on general and service gas connections.

9.5 Liquid Service Facilities Interconnections

Refer to Chapter 8, Equipment Data Sheets and Diagrams, and the Mainframe SSPS, for PCW and Coolant Interconnect specifications.

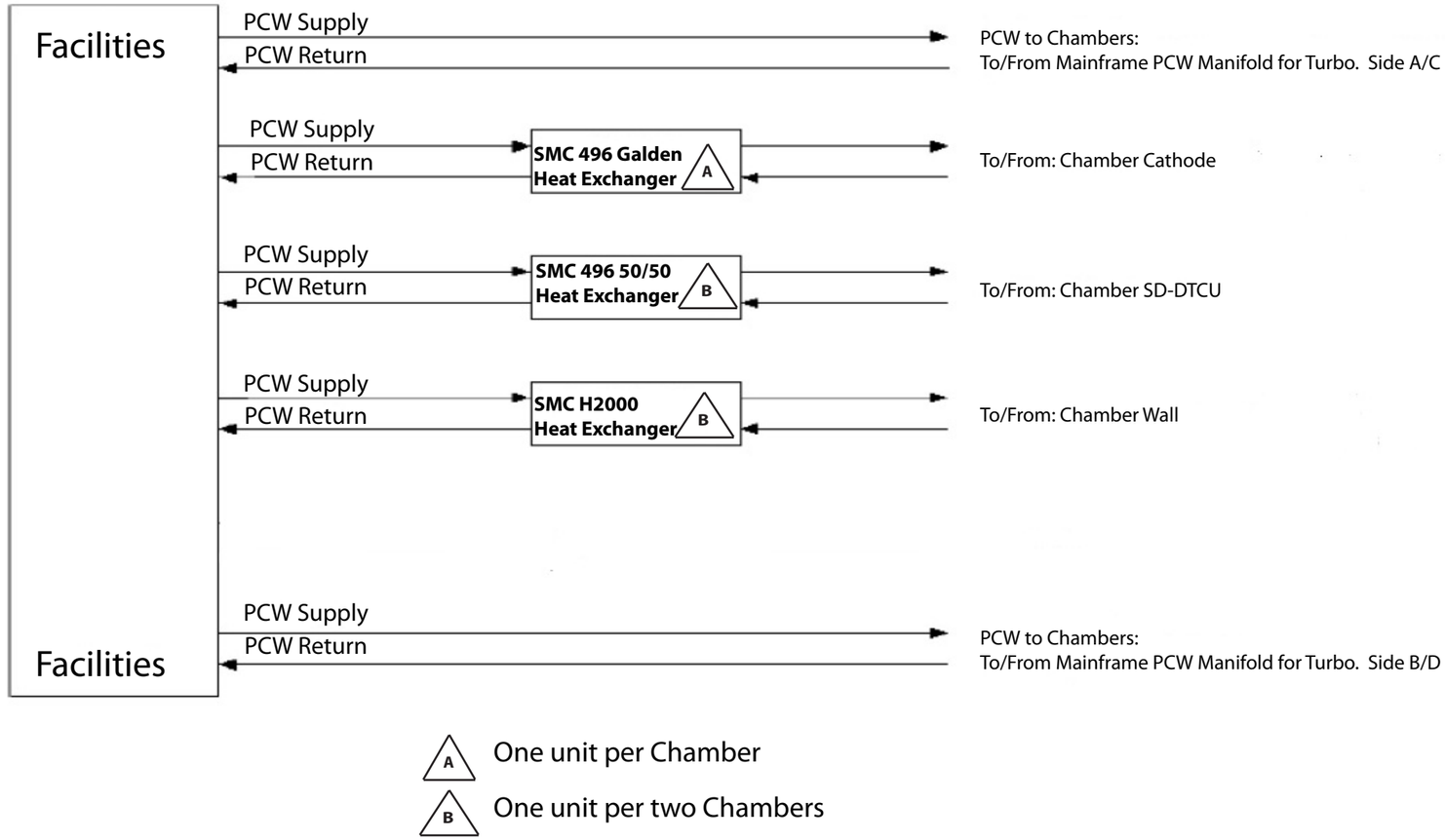


Figure 9-4. Liquid Service, Heat-Exchanger, Chiller and Mainframe Interconnections

9.6 Process and Specialty Gas

Table 9-3. Process and Specialty Gases Interconnect Datasheet

Interconnect Type: Process and Specialty Gases								
Ref.	**System Component**	**From**	**To**	**Pressure (Nominal) psia (kg/cm^2)**	**Pressure (Maximum) psia (kg/cm^2)**	**Connection Type**	**Remarks**	**Max Flow in slm**
	HBr Line In	Bottle	Gas panel	15 psia–25 psia (1.055–1.758)	30 (2.11)	1/4" VCR female SST	5 RA	5
	Cl_2 Line In	Bottle	Gas panel	15 psia–25 psia (1.055–1.758)	30 (2.11)	1/4" VCR female SST	5 RA	5
	O_2 Line In	Bottle	Gas panel	15 psia–25 psia (1.055–1.758)	30 (2.11)	1/4" VCR female SST	5 RA	NA
	HeO_2 Line In	Bottle	Gas panel	15 psia–25 psia (1.055–1.758)	30 (2.11)	1/4" VCR female SST	5 RA	NA
	CF_4 Line In	Bottle	Gas panel	15 psia–25 psia (1.055–1.758)	30 (2.11)	1/4" VCR female SST	5 RA	5
	NF_3	Bottle	Gas panel	15 psia–25 psia (1.055–1.758)	30 (2.11)	1/4" VCR female SST	5 RA	5
	SF_6	Bottle	Gas panel	15 psia–25 psia (1.055–1.758)	30 (2.11)	1/4" VCR female SST	5 RA	5
	N_2 Line In	Facilities	Gas panel	15 psia–25 psia (1.055–1.758)	30 (2.11)	1/4" VCR female SST	5 RA	NA
	C_4F_8	Bottle	Gas panel	10 psia–12 psia (0.7033–0.844)	10 (0.7033)	1/4" VCR female SST	Gas line temp 68 °F ±41 °F (20 °C ±5 °C)	NA
	H_2	Bottle	Gas Panel	15 psia–25 psia (1.055-1.758)	30 (2.11)	Gas panel	5 RA	2

Table 9-4. System Gas Purity Requirements

Symbol	Gas	Purity	Where Used	Maximum Contaminants (ppm)																
				Tetrafluoro-Methane	Total Fluorides	Air	Krypton	Nitrous Oxide	Argon+ Nitrogen	Methane	Hydrogen	Nitrogen	Oxygen	Water	Carbon-Dioxide	Total Hydro-carbons	Carbon-Monoxide	Nitrogen + Oxygen	Acidity (as HCl)	Total Fluoro-carbons
He	Helium	99.999%	Gas Panel; Wafer Backside cooling	-	-	-	-	-	-	1	1	6	2	1	-	-	-	-	-	-
N_2 (HP)	Nitrogen (High Purity)	99.9999%	Gas panel, Liquid-Source Delivery, Loadlock Vent,Process-Chamber Vent, Gas-Line Purge, Buffer Purge	-	-	-	-	-	-	0.1	0.5	-	0.2	0.2	1	-	0.1	-	-	-
N_2 (SP)	Nitrogen (Standard Purity)	99.999%	Ballasts, Turbo Purge, Pump Purge	-	-	-	-	-	-	-	1	-	1	3	1	1	2	-	-	-
Cl_2	Chlorine			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HBr	Hydrogen Bromide			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
He/O_2	Helium/ Oxygen mixture	99.999%	Gas Panel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SF_6	Sulphur Hexafluoride	99.99%	Gas Panel	25	0.1	75	-	-	-	-	-	-	-	5	-	-	-	-	-	-
CF_4	Carbon Tetrafluoride			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NH_3	Ammonia	99.999%	Gas Panel	-	-	-	-	-	-	1	-	5	2	2	-	-	1	-	-	-
O_2	Oxygen	99.994%	Gas Panel	-	-	-	10	2	40	1	-	-	-	1	-	-	2	-	-	-
C_4F_8	Octafluoro-cyclobutane		Gas Panel	-	-	-	-	-	-	-	-	-	-	1	-	-		4	0.1	4
H_2	Hydrogen	99.999%	Gas Panel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

9.7 Slurry
Does not apply.

9.8 Vacuum
See the *Etch Centura II Mainframe SSPS* (Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263) for information on vacuum connections.

9.9 Exhaust
See the *Etch Centura II Mainframe SSPS* (Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263) for information on exhaust connections.

10 Final Confirmation Sign-off

See **Chapter 10** in the *Etch Centura II Mainframe SSPS*, Cleanroom Part No. 0230-00264; Standard Part No. 0230-00263, for the required Confirmation sign off.

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A Unit Conversion Tables

This section is not intended to be exhaustive. It shows only units that are likely to be relevant to an installation. Information such as wiring current capacity may vary per local standards.

A.1 Unit Conversion Table (Quick Reference)

Length	
1 in = 2.54 cm	1 cm = 0.3937 in
1 in = 25.4 mm	1 mm = 0.03937 in
1 ft = 30.5 cm	1 cm = 0.0328 ft
1 ft = 0.3048 meter	1 meter = 3.281 ft
Mass/Weight	
1 ounce = 28.3 grams	1 gram = 0.0353 ounce
1 pound = 454 grams	1 gram = 0.002203 pound
1 pound = 0.454 kg	1 kg = 2.203 pounds
1 ton (US) = 909 kg	1 kg = 0.0011 tons (US)
Area	
1 in^2 = 6.45 cm^2	1 cm^2= 0.1550 in^2
1 ft^2 = 0.0929 m^2	1 m^2 = 10.76 ft^2
Volume	
1 in^3 = 16.387 cm^3	1 cm^3 = 0.0610 in^3
1 ft^3 = 0.02832 m^3	1 m^3 = 33.32 ft^3
1 US quart = 0.946 liter	1 liter = 1.057 US quart
1 US gallon = 3.785 liter	1 liter = 0.2642 US gallon
1 US gallon = 0.833 Imp. gallon	1 Imp. gallon = 1.201 US gallon
Temperature	
[(°Fahrenheit-32) x 5/9] = °Celsius	[(°Celsius x 9/5)+32] = °Fahrenheit
Pressure	
1 Torr = 133.33 Pascal	1 Pascal = 0.0075 Torr
1 Torr = 0.0193 psi	1 psi = 51.71 Torr
1 Atmosphere = 760 Torr	1 mTorr = 0.001315 Atmosphere
1 Atmosphere = 14.70 psi	1 psi = 0.0680 Atmosphere
1 bar = 10^5 Pascal	1 Pascal = 10^{-5} bar
1 bar = 14.50 psi	1 psi = 0.0689 bar
1 psi = 0.07031 kg/cm^2	1 kg/cm^2 = 14.223 psi
1 psig = 1 psia - 14.7	1 psia = 1 psig + 14.7
1 in H_2O = 1.868 mm Hg	1 mm Hg = 0.535 inch H_2O
1 in Hg = 13.6 in H_2O	1 mm Hg = 13.6 mm H_2O
1 in Hg = 345 mm H_2O	1 mm H_2O = 0.0339 in H_2O

A.2 Conversion Chart of American Wire Gauge to Metric

Amperes Capacity (Single Wire)			Area		Approximate Diameter	
Size AWG or MCM	Copper (NFPA)[1]	Circular Mils	Square Inches	Square mm	Inches[2]	mm[2]
20	7	1020	0.0008	0.52	0.038	0.97
18	10	1620	0.0013	0.82	0.046	1.22
16	15	2580	0.0020	1.31	0.060	1.52
14	20	4110	0.0032	2.08	0.078	1.98
12	25	6530	0.0051	3.31	0.101	2.57
10	40	10380	0.0082	5.26	0.126	3.20
8	65	16510	0.0130	8.37	0.162	4.11
6	95	26240	0.2060	13.30	0.215	5.46
4	125	41740	0.0328	21.15	0.269	6.83
2	170	66360	0.0521	33.62	0.337	8.56
1	195	83690	0.0657	42.41	0.376	9.55
1/0	230	105600	0.0829	53.50	0.423	10.74
2/0	265	133100	0.1045	67.43	0.508	12.90
3/0	310	167800	0.1318	85.01	0.576	14.63
4/0	360	211600	0.1662	107.20	0.645	16.38
250 MCM	405	250000	0.1964	126.70	0.713	18.11
300 MCM	445	300000	0.2356	152.00	0.768	19.51
500 MCM	620	500000	0.3927	253.40	0.997	25.32
750 MCM	785	750000	0.5891	380.00	1.207	30.66
1000 MCM	935	1000000	0.7854	506.70	1.404	35.66

1. Rated for 167°F (75°C) maximum temperature rise above ambient.

2. Class M NEMA wire type.

A.3 Calculating System Heat Load

BTU: Defined as the heat required to raise the temperature of 1 lb. of water by 1 °F.

BTU = weight of water in lb. × ΔTemp

[8.34 lb. = 1 gal] 8.34 lb. × (H_2O Return Temp — H_2O Supply Temp)

1 Kilocalorie = 3.968 BTU

1 BTU = 0.252 Kilocalorie

A.4 Specific Heat Load in BTU

Specific heat × weight in lb. × ΔTemp (Note- temperature is in degrees F)

GPH × 8.34 × (H_2O Return Temp — H_2O Supply Temp)

A.5 Conversion Factors for Gases

The "s" prefixes on the following units denote "standard". This is defined as volumes measured at 1 atmosphere pressure (at average sea level) and at 60°F (20°C).

- scfh × .472 = slpm
- scfh × 472 = sccm
- slpm × .001 = sccm

A.6 Specific Gravity

To convert air flow from chart to another gas flow.

$Flow_{(gas)} = Flow_{(air)} / \sqrt{S.G._{(gas)}}$

Example:

To obtain flow rate for helium when air flow is 5 scfh

$Flow_{(Helium)} = Flow_{(air)} / \sqrt{0.138} = 5/0.371 = 13.48$ scfh

S.G. = specific gravity of gas relative to air

S.G. = 0.138 for Helium

A.6.1 Liquid Flow - C_V Method

The C_V method of rating flow capacity of various devices employs empirical data based on water flow.

The basic formula for water flow is

$Q = C_V \sqrt{\Delta P}$

Q = water flow in gallons per minute (gpm)

ΔP = pressure differential in psig

C_V = flow factor

For a flow of 1 gpm at ΔP = 1, the $C_V = 1$

A.7 Quantification of Gas Purity

Minimum Purity%	# of Nines	Total Impurities
99.9999	6.0	1 ppm
99.9995	5.5	5 ppm
99.999	5.0	10 ppm
99.995	4.5	50 ppm
99.99	4.0	100 ppm
99.95	3.5	500 ppm
99.9	3.0	1000 ppm

B Legal Notices

B.1 Applied Materials Trademarks

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Centura	DPS	DPS Centura
Durasource	DxZ	Endura
Giga Cap	Giga-Fill	Lo K CVD
MasterFAB	Micro Clean	Mirra
MxP	MxP+	Optima
P.E.T.	P Y E	Producer
SACVD	SACVDBPSG	SEMVISION
SiNergy Centura	Twin Chamber	TxZ
Ultima HDP CVD	Ultralife	Unichamber
uRPS	VSPI	VHP
Viafill	WxP	WxZ

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X-Acto®	Registered trademark of Hunt Manufacturing Co.

C Computer Interface

Does Not Apply!

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D PCW Flows/Temperature/Pressures

Table D-1. PCW Flows/Temperatures/Pressure

PCW Source	Facilities Flow Minimum	Facilities Flow Maximum	Coolant Temp Minimum	Coolant Temp Maximum	Coolant Supply	Specifications From	Notes
Mainframe Feed							These values represent the PCW requirements for proper operation of these devices.
MAINFRAME (PCW Manifold)	4.0 gpm (15.1 lpm)	6.0 gpm (22.7 lpm)	63 °F(17 °C)	77 °F (25 °C)	PCW	Applied Materials	
HRDTCU	1.4 gpm per chamber @ 40psi (5.3 lpm @ 2.8 kg/cm^2)	1.6 gpm @ 40 psi (6.1 lpm @ 2.8 kg/cm^2)	63 °F (17 °C	77 °F (25 °C)	PCW	Applied Materials	
Alcatel ATH 1300		0.264 gpm (1.0 lpm)	59 °F (15 °C)	77 °F (25 °C)	PCW	Manufacturer	
PCW; Direct Feed RF Generator & Pumps							These values represent the PCW requirements for proper operation of these devices.
Source RF Generator Apex 5513	3.0 gpm per chamber (11.4 lpm)		41 °F (5 °C)	95 °F (35 °C)	PCW	Manufacturer	
Bias RF Generator Paramount MF	2.0 gpm per chamber (7.6 lpm)		41 °F (5 °C)	95 °F (35 °C)	PCW	Manufacturer	
Service-Chamber Pump Edwards QDP40	0.8 gpm @ 60-10 psi (3.0 lpm @ 4.2–7.0 kg/cm^2)	1.3 gpm @ 60-100 psi (4.9 lpm @ 4.2–7.0 kg/cm^2)	68 °F (20 °C)	77 °F (25 °C)	PCW	Manufacturer	
Process Chamber Pump; Edwards QDP80;	1.0 gpm @ 60-100 psi (3.8 lpm @ 4.2–7.0 kg/cm^2)	1.8 gpm @ 60-100 psi (6.8 lpm @ 4.2–7.0 kg/cm^2)	68 °F (20 °C)	77 °F (25 °C)	PCW	Manufacturer	
Service-Chamber Pump Ebara 30W		0.9 gpm @ 40-60 psi (3.4 lpm @ 2.8–4.2 kg/cm^2) Recommended	59 °F (15 °C)	86 °F (30 °C)	PCW	Manufacturer	
Process Chamber Pump; Ebara 70W		0.9 gpm @ 40 - 60 psi (3.4 lpm @ 2.8–4.2kg/cm^2) Recommended	59 °F (15 °C)	86 °F (30 °C)	PCW	Manufacturer	
HX's & Chillers							These values represent the PCW requirements for proper operation of these devices.
AMAT 2000 (Default)	16.0 gpm @ 60 psi max (60.56 lpm @ 4.22 kg/cm^2)	16.0 gpm @ 60 psi max (60.56 lpm @ 4.22 kg/cm^2)	63 °F (17 °C)	71.6 °F (22 °C)	PCW	Applied Materials See Notes	
Neslab HX-150 (Default)	1.0 gpm @ 60 psi (3.785 lpm @ 4.22 kg/cm^2)	5.0 gpm @ 60 psi (18.9 lpm @ 4.22 kg/cm^2)	55.4 °F (13 °C)	84.2 °F (29 °C)	PCW	Manufacturer	
Note: This table was developed from manufacturer's specifications. It contains the manufacturer's measured RANGES of flows, temperatures, and pressures over which their equipment is operable. Applied Materials offers this data to facilitate calculations such as PCW flow rates. Temperature and Pressure are typically controlled in the Customer's Facilities, and are regulated to fixed values.							

E Miscellaneous—Power Requirements for Centura II DPS Systems

Table E-1. Power Requirements for 1 Chamber Centura II DPS

	Single Phase		Three Phase		1 Chamber Single Phase		1 Chamber Three Phase	
	Full Load Watts	**Operating Watts**	**Full Load Watts**	**Operating Watts**	**Full Load Watts**	**Operating Watts**	**Full Load Watts**	**Operating Watts**
System Controller								
Exhaust Fan	60	60			60	60		
EMO Transformer	200	100			200	100		
1 KVA Transformer	1,000	1,000			1,000	1,000		
3 KVA Transformer	3,000	3,000			3,000	3,000		
5 KVA Transformer								
Generator Rack								
Exhaust Fan	60	60			60	60		
DC Power Supply	50	50			50	50		
Mainframe								
Loadlock Pump (QDP 40)			2,200	1,300			2,200	1,300
Transfer Chamber Pump (QDP 40)			2,200	1,300			2,200	1,300
DPS Chamber								
Source Match (24 VDC PS)	150	108			150	108		
Bias Match (24 VDC PS)	150	18			150	18		
TGV Controller (24 VDC PS)	150	150			150	150		
TGV Heater	400	361			400	361		
Foreline Heating								
Roughing Pump (QDP 80)			4,000	3,100			4,000	3,100
Source Generator (Apex 5513)			2,912	2,912			2,912	2,912
Bias Generator (Paramount MF)			3,328	2,556			3,328	2,556
Turbo Controller	650	300			650	300		
DTCU Lamp			4,160	4,160			4,160	4,160
DTCU Fan	210	210			210	210		
Cathode Chiller (SMC 496 Galden)			3,328	3,328			3,328	3,328
Wall HX (H2000)			6,000	4,000			6,000	4,000
Dome Chiller			3,328	3,328			3,328	3,328
Chamber Heaters			700	700			700	700
Sum					**4,200**	**4,100**	**32,156**	**26,684**

Total Full Load Power = Single Phase / sq root of 3 + Three Phase = 34,581 Watts (166 amps)
Total Operating Power = Single Phase / sq root of 3 + Three Phase = 29,051 Watts (140 amps)

Note: All power rating on this page are in Watts.

Table E-2. Power Requirements for 3 Chamber Centura II DPS

	Single Phase		Three Phase		3 DTM Chambers Single Phase		3 DTM Chambers Three Phase	
	Full Load Watts	**Operating Watts**	**Full Load Watts**	**Operating Watts**	**Full Load Watts**	**Operating Watts**	**Full Load Watts**	**Operating Watts**
System Controller								
Exhaust Fan	60	60			60	60		
EMO Transformer	200	100			200	100		
1 KVA Transformer	1,000	1,000			1,000	1,000		
3 KVA Transformer	3,000	3,000			3,000	3,000		
5 KVA Transformer								
Generator Rack								
Exhaust Fan	60	60			60	60		
DC Power Supply	50	50			50	50		
Mainframe								
Loadlock Pump (QDP 40)			2,200	1,300			2,200	1,300
Transfer Chamber Pump (QDP 40)			2,200	1,300			2,200	1,300
DPS Chamber								
Source Match (24VDC PS)	150	108			450	324		
Bias Match (24VDC PS)	150	18			450	54		
TGV Controller (24VDC PS)	150	150			450	450		
TGV Heater	400	361			1,200	1,083		
Foreline Heating								
Roughing Pump (QDP 80)			4,000	3,100			12,000	9,300
Source Generator (Apex 5513)			2,912	2,912			8,736	8,736
Bias Generator (Paramount MF)			3,328	2,556			9,984	7,668
Turbo Controller	650	300			1,950	900		
DTCU Lamp			4,160	4,160			12,480	12,480
DTCU Fan	210	210			630	630		
Cathode Chiller (SMC 496 Galden)			3,328	3,328			9,984	9,984
Wall HX (H2000)			6,000	4,000			12,000	8,000
Dome Chiller (SMC 496 50/50)			3,328	3,328			6,656	6,656
Chamber Heaters			700	700			2,100	2,100
Sum					**4,200**	**4,100**	**78,340**	**67,524**

Total Full Load Power = Single Phase / sq root of 3 + Three Phase = 80,765 Watts (388 amps)
Total Operating Power = Single Phase / sq root of 3 + Three Phase = 69,891 Watts (336 amps)

Note: All power ratings on this page are in Watts

F User Feedback

Applied Materials takes pride in the accuracy and completeness of the information presented in this document. Should you discover errors, wish to suggest improvements or changes, or wish to offer comments regarding this document, we encourage you to contact Applied Materials.

This may be done by using the Applied Materials FRACAS system (Failure Reporting Analysis and Corrective Action System) or by completing the top portion and description section of the form provided within this appendix and faxing it to **Etch Centura II**, **Silicon Etch DPS-DTM SSPS, Total Product Support. P**lease be certain to provide us with your own phone number and/or fax number in the event we need to contact you.

When using FRACAS, choose DOCUMENTATION under the Problem Type field.

Please provide a detailed description of the problem, comment, or desired change and its location within the manual. If more space is required, attach additional sheets and/or markups. Please submit only one problem or change request per form. Also, to speed processing, please indicate in the triangle boxes at the top of the form whether your communication represents an *error*, a *desired improvement* or *change*, or a *comment*.

Thank you for your time and feedback.

-notes-

FAX to (408) 748-9943 Attention: **Etch Centura II, Silicon Etch DPS DT SSPS**, **Total Product Support.**

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