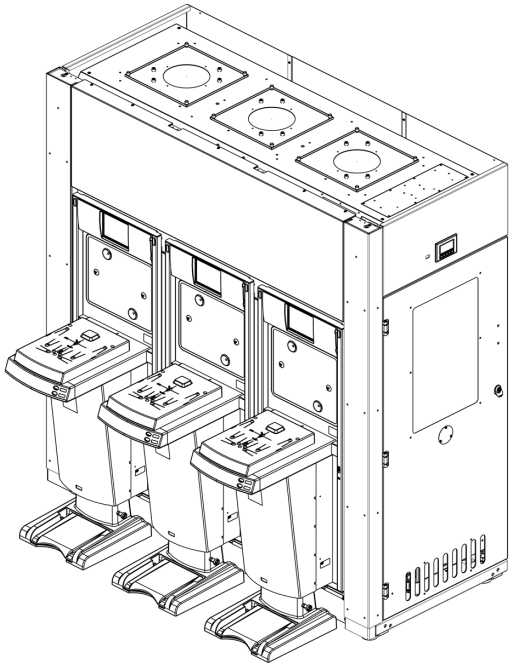


(JCP) JET Common Platform

User Manual

Part Number 606707 Rev. A

Brooks Automation, Inc.

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Revision	ECO	Date	Action	Author
A	EC146185	7/19/2023	Initial release.	K. Forscher

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1. Introduction

The JCP system is intended for use by industrial customers and should be serviced only by Brooks or Brooks trained representatives. The service manuals and related materials are provided in English at no charge and are intended for use by experienced technicians. It is the responsibility of the user to obtain and assure the accuracy of any needed translations of manuals. If you require assistance please contact Brooks service department. Contact information can be found at www.brooks.com.

JCP System Overview

The Brooks Automation JCP system is an Equipment Front End Module or EFEM. It is the link between the factory's Material Transport System and the Process Tool. The JCP system, shown in

The "JCP Common Platform System" is a SEMI-standard compatible interface system designed for manual, AGV, PGV, or OHV automated loading of carriers that contain wafers or other material waiting for horizontal transfer. It is a self contained and fully integrated atmospheric transfer system with robot, aligner, load ports, and controls mounted on an integral frame.

The mini-environment supports the robot, track, aligner, load ports, electronics, and Fan/Filter Unit, provides a single connection point for all facilities, and provides interface locations for the users process equipment. Quick and easy kinematic installation and replacement of all Brooks material handling modules keep service and reteaching time to a minimum. It uses a unique integrated control system that provides a single wire interface to factory controls, adequate delivery clearance for factory interface, and easy access by service personnel.

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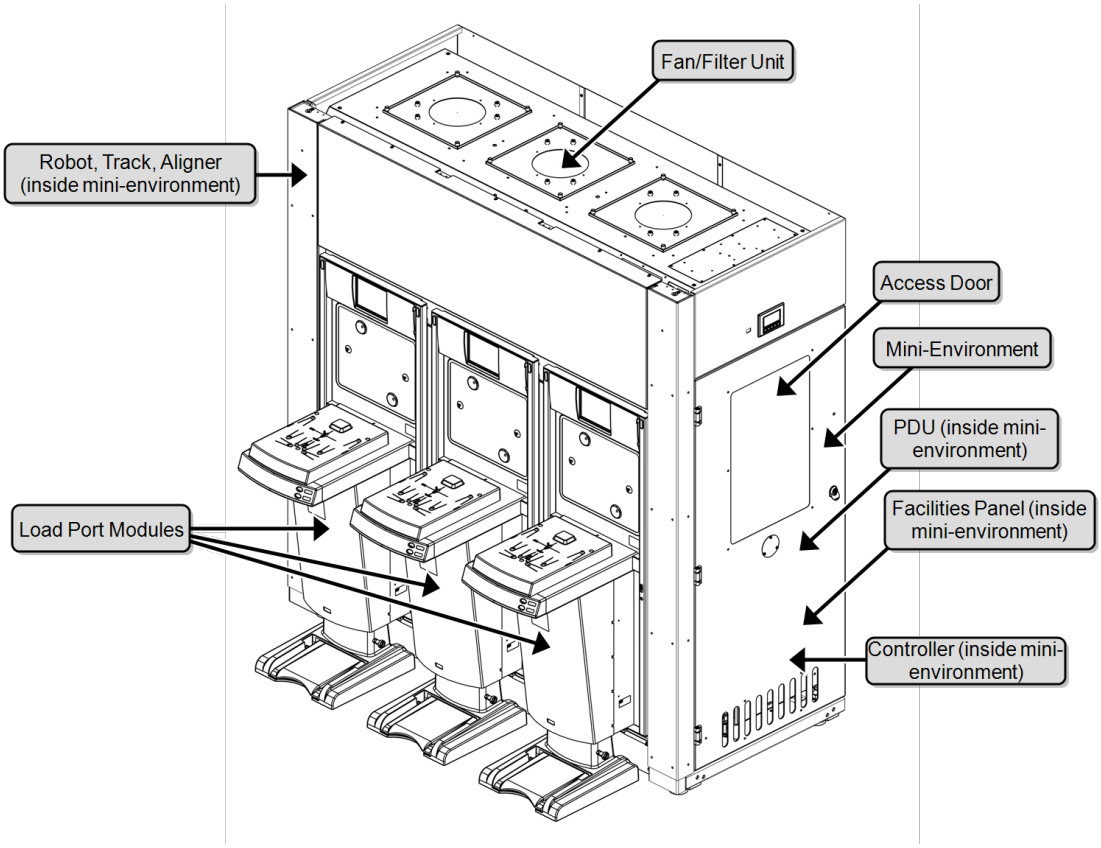


Figure 1-1: JCP Common Platform System

Features

- Mini-environment with side doors and view ports for easy access and observation
- Fan/Filter Unit with covers integrated with the mini-environment
- Atmospheric Transfer Robot - (ATR)
- Atmospheric Track (ATK)
- Atmospheric Wafer Aligner - (AWA)
- Semi Standard BOLTS Interface, 2,3, and 4 position
- Internal Lighting (White is standard, Amber is optional)
- Internal Power Distribution Unit
- Quick facilities disconnect
- Two air test ports per I300I

Options

- EMO button for user defined and supplied Emergency Off circuit
- Teach Pendant
- Light Tower
- Operator Interface (swing-out arm or wing panel)
- Ionizer
- OCR (Optical Character Reader)
- Operator/Carrier Protection (Light curtain or protection bar)

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- SEMI E84 interface for Load Ports
- Front air intake
- Wafer Mapping on Load Ports or Robot
- 18U 19” rack storage (9U 19” rack storage on 2 bay JCP)
- Kinematic Coupling Pins

Subsystems

The JCP system is made up of several functional subsystems designed for ease of use, maintenance, and repair. These subsystems are modular in design to allow ease of maintenance and to minimize Mean Time To Repair (MTTR). The individual modules that make up the Atmospheric Transfer System are described briefly below and in detail in the "Operation" chapter.

The JCP system may use either the Razor, Reliance or Wafer Engine families of Automation components. For illustration purposes, the components shown in this manual are the Razor Robot, Razor Track, Razor Wafer Aligner, and Fusion controller. When using this manual, always refer to the appropriate documentation for the specific components used on your system.

Atmospheric Transfer Robot - ATR

The ATR provides all material transport functions within the JCP system, which includes moving material from the Load Port Modules mounted on the front of the mini-environment to the aligner and the process stations. The ATR is a direct drive, continuous rotation material handler. This robot provides up to five axes of motion, allowing off-center pick and place and fast swap. For more information, refer to the robot manual.

Atmospheric Track - ATK

Within certain configurations of the JCP system, the robot is mounted on an ATK which moves the robot horizontally within the mini-environment, providing the robot access to all LPMs or process stations. The ATK is an atmospheric horizontal track that permits the robot mounted on it to access material carriers, process modules, and cluster tool load locks within its range of motion. For more information, refer to the track manual.

Atmospheric Wafer Aligner - AWA

The AWA provides centering and positioning of material passing through the JCP system before being transferred to the process stations. The AWA is an atmospheric pre-aligner used to align material in conjunction with the robot. Both the FlexAlign and other AWA offers utilize the same operation manuals and command sets. Different configurations of the aligner provide aligning of 300 mm wafers, 200 mm wafers, and rotating of reticles. The aligner provides edge contact or backside vacuum grip support of the material during alignment and is capable of aligning wafers with a notch type fiducial. For more information, refer to the aligner manual.

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Load Port Module - LPM

The standard Load Port is Vision, but other 300mm BOLTS compatible load ports can be installed. The system may be configured with up to four Semi Standard BOLTS LPM interfaces designed for manual or automated loading of substrate carriers. Once the carriers are loaded and opened, the wafers (or other material) within the carriers are available for horizontal transfer. For more information, refer to the load port manual.

Fan/Filter Unit - FFU

FFU provides airflow and filtering to maintain an ISO Class 1 or better material handling environment. The FFU is optimized to work with the Brooks Automation JCP system.

Facilities Panel

The facilities panel provides a central location for all facilities, communications, and control connections to the JCP system. The facilities panel is mounted inside the EFEM on the rear of the system next to the power distribution unit.

Power Distribution Unit - PDU

The PDU provides a central location for connection of power coming into the JCP system and for distribution of power within the JCP. The PDU is mounted inside the EFEM at the rear of the system.

Internal Lighting

LED light tubes provide internal lighting of the EFEM for system observation. Optional Amber lighting is available for lithography applications.

E-Stop Button - ESTOP

An Emergency Stop button may be supplied to provide category 1 stop of the automation systems through the Safety Hub. Location of the button is determined by the location of user selected options.

EFEM Safety Relay

In systems with Level 1.5 Controls, the ESR (EFEM Safety Relay) monitors the EFEM access doors and will interlock the robot and load ports. Further information can be found in the "Safety" chapter.

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Options

Options are available for the JCP system that increase its functionality. All options are available at the time of purchase for installation and configuration by Brooks Automation. Note that some of these options are only available as factory installed options.

Emergency Off Button - EMO

An optional SEMI compliant button marked with "EMO" is supplied to provide user-configured Emergency Off capability for the JCP system and the equipment to which it is connected. Location of this button is determined by the customer requirements as well as other selected options. Brooks does not supply EMO functionality for the JCP. Brooks supplies only the button and associated cable to the facilities panel.

EFEM Safety Hub

In Level 2.5 Controls systems, the ESH (EFEM Safety Hub) replaces the Safety Relay as a central interface where multiple components may be interlocked together for the purpose of human and machine safety. The ESH utilizes proprietary safety logic to monitor the status of multiple automation components and interlock them together in such a way that is seamless to the end user. Further information can be found in the "Safety" chapter of this manual.

Mini-environment Options

Ionizer

An ionization system is available to help eliminate electrostatic discharge (ESD) and particle contamination caused by electrostatic attraction within the EFEM. The ionization system provides compliance to SEMI E-78.

OCR

Mechanical and Electrical Support for Cognex 1700 series optical character recognition cameras is available. The cameras can be positioned to read wafer ID on either the top or bottom side of wafers being transported through a Brooks wafer aligner. Check with Brooks Automation sales for availability of OCR for the particular wafer aligner, wafer size, or other camera support.

Light Curtain

A Light Curtain is available to provide additional operator and product safety when using an Over Head Transport (OHT) system to transfer material carriers to and from the Load Port Modules.

Protection Bar

A mechanical protection bar is available to provide additional operator and product safety when using an Over Head Transport (OHT) system.

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SEMI E84 Interface

A SEMI E84 IR transponder Interface is available to provide SEMI E84 communications between the Load Port Modules on the JCP system and AGV, RGV, or OHT systems for the automated handoff of material carriers.

Front Air Intake

A Front Air Intake is available for the FFU mounted on the JCP system. This allows the system to draw air from the cleanroom side when it is mounted in a wall.

Wafer Mapping

Mapping of the wafers in the carriers on the Load Port Modules is available as either an option for the LPM or an option for the robot.

Equipment Racks

Two 9U 19-inch equipment racks can be located above the FFU. These racks may be used for any user electronics. Note that only one rack is available on 2 Bay systems due to space restrictions. An IEC320 power strip is supplied for convenience. The maximum load on the power strip is 2A.

User Interface Options

Teach Pendant

A robot Teach Pendant is available to provide a general maintenance interface for the robot. It is used for position teaching and other functions, including component testing and calibration. For certain robots, a hand held enabling device is available.

Light Tower

A light tower is available to provide instant visual and audio status of the JCP system or any user defined events. Location of the light tower is determined by the location of user selected options. The light tower may be controlled through the robot interface or directly by the host via Ethernet.

Operator Interface

An Operator Interface with LCD display and keyboard is available to provide local control of the connected host computer. The Operator Interface is available as a swing-out arm or a wing panel.

Basic Configuration

The Basic Configuration of the JCP system is determined by the number of Load Port Modules (LPM) accommodated.

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Table 1-1: Basic Configuration Matrix

	2-Bay	3-Bay	4-Bay
Load Port	2	3	4
Robot, 3/4/5 axis	1	1	1
Aligner	0-2	0-2	0-2
Robot Controller	1	1	1

NOTE: A track may be included with the robot depending on the number of bays, the robot type, and throughput requirements.

Using this Manual

This manual provides documentation for operation and general maintenance of the Brooks Automation JCP system. Although this document covers specific information and adjustments for the JCP system, there may be information in sub-system manuals which affects the settings or operating mode of the system and the attached components. The JCP system is set to system specifications and acceptance tested at Brooks Automation. Before adjusting or changing settings on a JCP system, consult the following documentation:

- Load Port Module User Manual
- Atmospheric Transfer Robot User Manual
- Traverser User Manual
- Atmospheric Aligner User Manual
- Safety Hub User Manual
- Brooks Automation JCP system Block Diagrams
- OEM Component Manuals (supplied with this manual)
- Process Tool User Manual
- Process Tool Controller User Manual
- Process Tool Wiring Diagrams
- Manual Addendums
- Programmer's Guides
- System Interface Drawing

NOTE: All documents must be the latest revision.

This manual is intended to provide information about a wide variety of JCP system configurations and options. It may contain references to items not installed on a specific system.

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The commands for controlling the robot and other components used in the JCP system are defined in the robot and load port User Manuals. The JCP system User Manual may refer the reader to this or other manuals for additional information.

This manual contains, as addendums and attachments, customized documents for a specific build of the JCP system. These documents are provided to allow service personnel to identify specific parts within the system and aid in maintenance and troubleshooting.

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2. Safety

When using this manual, always refer to the appropriate documentation for the specific components used on your system.

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.



If safety-related upgrades or newly identified hazards associated with the JCP system are identified, the Brooks Automation Technical Support group will notify the owner of record with a Technical Support Bulletin (TSB).

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Regulatory Compliance and Declaration of Incorporation

The Product meets the requirements of the European Union's Machinery Directive 2006/42/EC as a partially completed machine. In accordance with the Directive, Brooks Automation has issued a Declaration of Incorporation and the Product does not have a CE mark affixed.

The Product meets the applicable requirements of SEMI Guidelines. In addition to this section, other sections may include regulatory information.

Brooks	Declaration of Incorporation of Partly Completed Machinery For the European Union	Document #: 220853 Rev.: C

Description: Jet EFEM with Level 1.5 Controls, Razor
Function: Wafer Handling System - Atmospheric
Part Number: 241100-XXX and 241101-XXX Series
Serial Number:

Business name and full address of the manufacturer of the partly completed machinery:
Brooks Automation Inc., 15 Elizabeth Drive, Chelmsford, MA, USA 01824

Name and address of the person, established in the Community, authorized to compile the relevant technical documentation:
Brooks Automation (Germany) GmbH, Im Wiesengrund 14, 78315 Radolfzell am Bodensee, Germany

The manufacturer declares:

- That the following essential requirements of Machinery Directive 2006/42/EC are applied and fulfilled and that the relevant technical documentation is compiled in accordance with part B of Annex VII:
  - Annex I sections: 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.2.2, 1.2.3, 1.2.6, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8, 1.3.9, 1.4.1, 1.4.2, 1.4.3, 1.5.1, 1.5.2, 1.5.6, 1.5.7, 1.5.8, 1.5.9, 1.5.11, 1.5.12, 1.5.14, 1.6.1, 1.6.2, 1.6.3, 1.6.4, 1.6.5, 1.7.1, 1.7.2, 1.7.3
- That this partly completed machinery conforms to the provisions of Electromagnetic Compatibility Directive 2014/30/EU.
  - EN61000-6-4
  - EN61000-6-2
- We will transmit, in response to a reasoned request by a national authority, relevant information on the partly completed machinery, on paper or in electronic form, without prejudice to our intellectual property rights.

The partly completed machinery must not be put into service until the final machinery into which it is incorporated has been declared in conformity with the provisions of Directive 2006/42/EC

David Jarzynka
Vice President and General Manager - Automation

10-March-2017
Chelmsford, Massachusetts

Figure 2-1: Product Declaration of Incorporation

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Explanation of Hazards and Alerts

This manual and this product use industry standard hazard alerts to notify the user of personal or equipment safety hazards. Hazard alerts contain safety text, safety icons, signal words, and color.

Safety Text

Hazard alert text follows a standard, fixed-order, three-part format.

- Identify the hazard,
- State the consequences if the hazard is not avoided,
- State how to avoid the hazard.

Safety Icons

- Hazard alerts contain safety icons that graphically identify the hazard.
- The safety icons in this manual conform to ISO 3864 and ANSI Z535 standards.

Signal Words and Color

Signal words inform of the level of hazard.

	Danger indicates a hazardous situation which, if not avoided, **will result in death or serious injury**. Danger signal word is white on a red background with an iconic exclamation point inside a yellow triangle with black border.
	Warning indicates a hazardous situation which, if not avoided, **could result in death or serious injury**. Warning signal word is black on an orange background with an iconic exclamation point inside a yellow triangle with black border.
	Caution indicates a hazardous situation or unsafe practice which, if not avoided, **may result in minor or moderate personal injury**. Caution signal word is black on a yellow background with an iconic exclamation point inside a yellow triangle with black border.
	Indicates a situation or unsafe practice which, if not avoided, **may result in equipment damage**. Notice signal word is white on blue background with no icon.

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Alert Example

The following is an example of a *Warning* hazard alert.

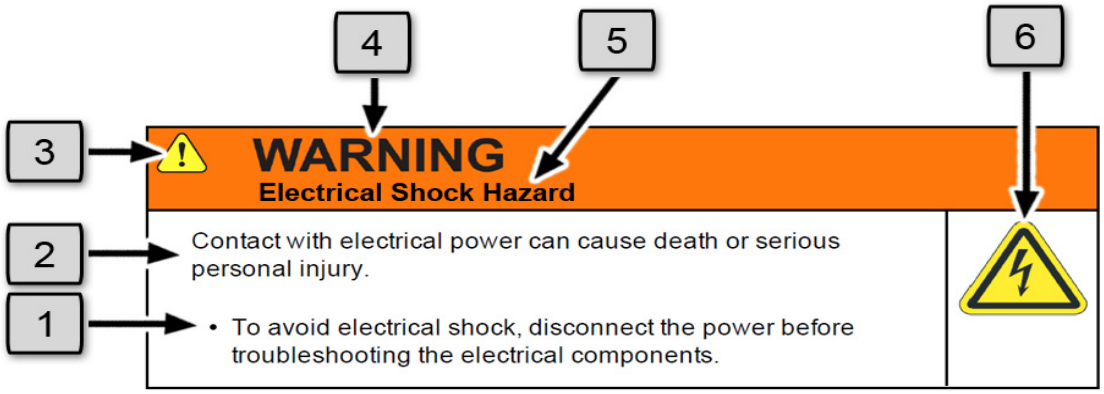


Figure 2-2: Components of a Safety Alert

Number	Description
1.	How to Avoid the Hazard
2.	Source of Hazard and Severity
3.	General Alert Icon
4.	Signal Word
5.	Type of Hazard
6.	Hazard Symbol(s)

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General Safety Considerations

CAUTION

Training and Unauthorized Service

Personal injury or damage to equipment may result if this product is operated or serviced by untrained or unauthorized personnel.

- Only qualified personnel who have received certified training and have the proper qualifications for their jobs are allowed to transport, assemble, operate, or maintain the product.



CAUTION

Personal Protective Equipment

This product contains heavy objects that may cause personal injury.

- Use safety shoes and head protection when installing or maintaining the product.
- Wear protective eyewear when setting up or testing the system.



CAUTION

Seismic Restraint

The use of this product in an earthquake prone environment may cause equipment damage or personal injury.

The user is responsible for determining whether the product is used in an earthquake prone environment and installing the appropriate seismic restraints in accordance with local regulations.



CAUTION

Inappropriate Use

Use of this product in a manner or for purposes other than for what it is intended may cause equipment damage or personal injury.

- Only use the product for its intended application.
- Do not modify this product beyond its original design.
- Always operate this product with the covers in place.



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CAUTION

Damaged Components

The use of this product when components or cables appear to be damaged may cause equipment malfunction or personal injury.

- Do not use this product if components or cables appear to be damaged.
- Place the product in a location where it will not get damaged.
- Route cables and tubing so that they do not become damaged and do not present a personal safety hazard.



NOTICE

Emergency Off Required

This product is not provided with an Emergency Off (EMO) device. The user is accountable for the EMO circuit.

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Location of Hazardous Points

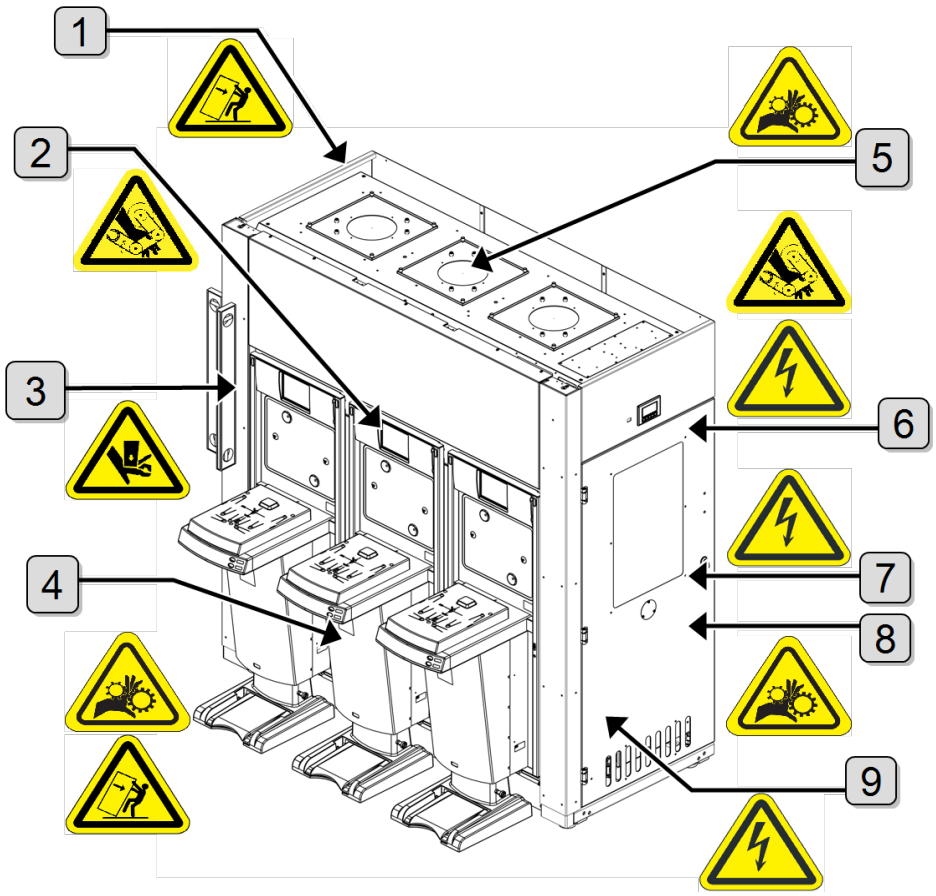


Figure 2-3: Locations of Hazardous Points on a Typical JCP System

Item	Name	Explanation
1.	Mini-Environment	Tip hazard when transporting Jet system or when the EFEM is not attached to user's tool.
2.	Robot	(Inside Mini-Environment) Mechanical, moving parts and pinch points, and automatic movement hazards.
3.	Track	(Optional; Inside Mini-Environment) Mechanical, moving parts and pinch points, and automatic movement hazards.
4.	Load Port Modules	Mechanical, moving parts and pinch points, and automatic movement hazards. Tip hazard when not attached to the Jet system.
5.	Fan Filter Unit (FFU)	(Above Mini-Environment) Mechanical, and moving parts and pinch point hazards
6.	Door	Opening and removing door panel exposes moving parts, pinch points, and electrical hazards.

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Item	Name	Explanation
7.	Power Distribution Unit (PDU)	(Inside Mini-Environment) Electrical hazard
8.	Aligner	(Inside Mini-Environment) Mechanical, moving parts and pinch points, and automatic movement hazards.
9.	Controller	(Inside Mini-Environment) Electrical hazard

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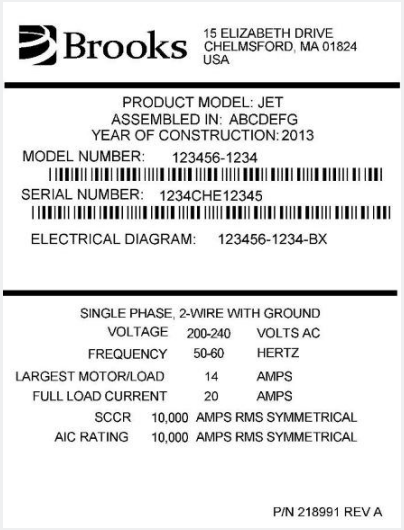
Safety Labels

Labels are used to alert personnel to hazards on or within the JCP system and to provide information about the JCP system.

The following tables list the labels that are placed on each JCP EFEM module. The figure following each table shows the label locations. To replace a lost or damaged label, order from Brooks Automation using the label part number.

For Robot and load port automation labels, please refer to the appropriate component manual supplied.

Table 2-1: Labels Used on the JCP System

Label	Description
	Product Information Label Part Number 218991 Quantity: 2 Location: One located on the rear of the EFEM above the facilities panel. One located above the facilities panel inside the EFEM.

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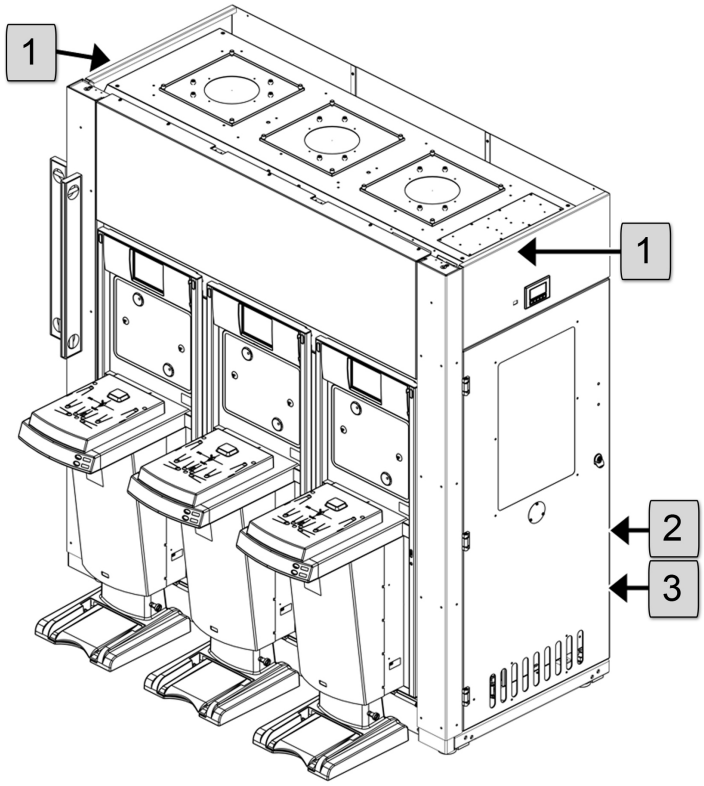


Figure 2-4: Label Locations on a Typical JCP System

1.	Heavy Object Label (FFU)
2.	Product Information Label (On Rear)
3.	Product Information Label (Above Facilities Panel)

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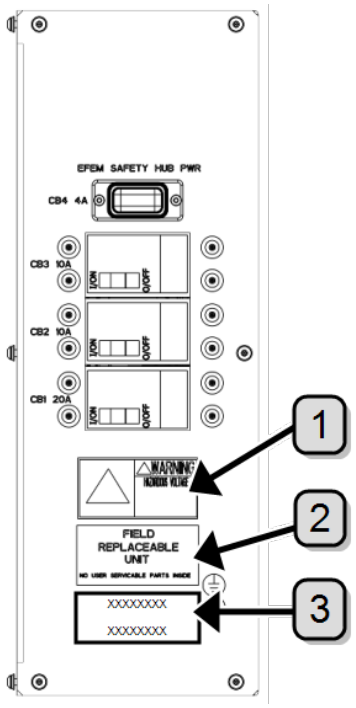


Figure 2-5: Label Locations on a Typical Power Distribution Unit (PDU)

1.	High Voltage Label (106957)
2.	Field Replaceable Unit Label (130165)
3.	Product Information Label

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Safety Interlocks

Safety interlocking is available for operator safety. Operational interlocks are available to protect the JCP system and the material in transport from damage.

NOTICE

The JCP system provides only the personal safety and obstruction interlocks described below. Additional interlocks may be implemented by the user at their discretion.

Overriding interlocks can result in personal injury or equipment damage.

The following safety interlocks exist on the JCP system:

Table 2-2: System Safety Interlocks

Name	Type	Function
EFEM Door Interlock	Safety Rated Coded Magnetic interlock switch 2 position switch Requires Service Key to override	Inhibits robot motion if either EFEM door is open. See Figure 2-6.
Operational Interlocks	Parallel IO Interface between automation components	These interlocks are commonly referred to as handshaking signals provide hardware level safety interlocking between the robot and stations.

WARNING





Automatic Motion Hazard

If the Door Interlock on the mini-environment is disabled, the possibility of automatic movement of components within the JCP system exists which may cause death or serious injury.

- The Robot, Track, Aligner, Load Port Modules, and FFU Fans may move automatically: stay out of their range of motion.
- Use of the JCP system when the Door Interlock is bypassed is at the user's own risk.

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Location of Interlocks

All user safety interlocks are located as shown in Figure 2-6.

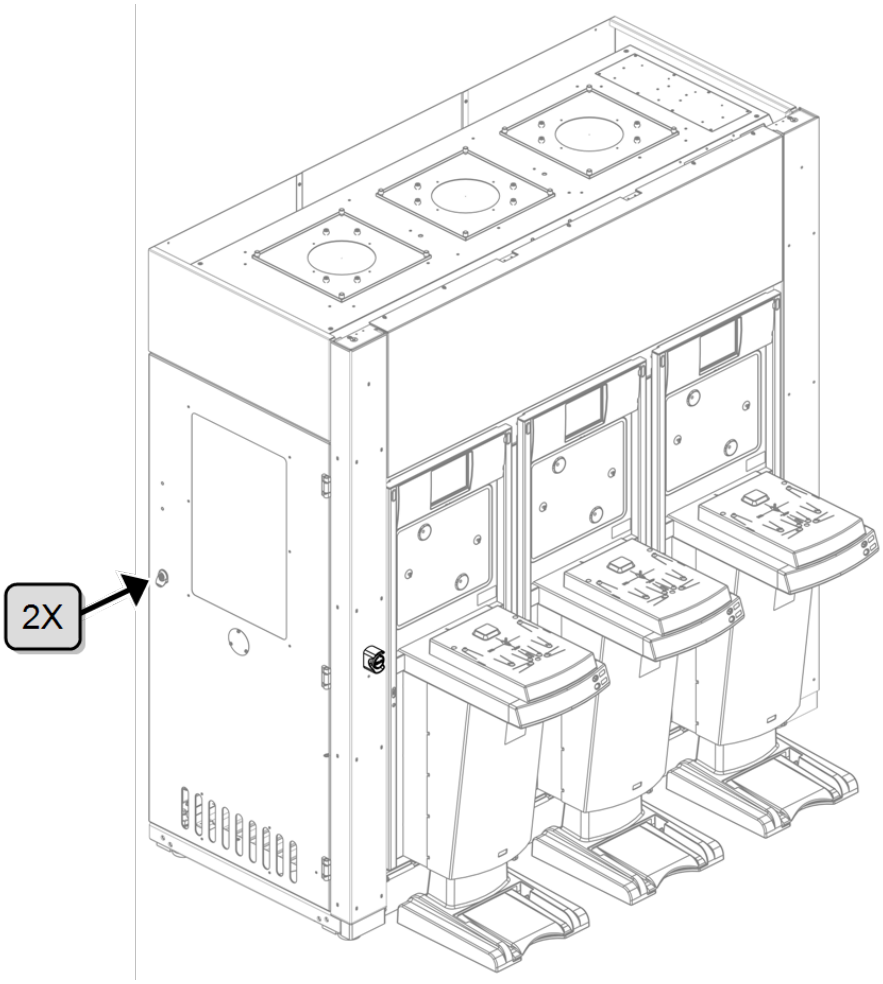


Figure 2-6: Typical Door Interlocks

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Functional Safety

All JCP Systems with Level 2.5 controls use an EFEM Safety Hub (ESH) to protect tool operators and maintenance personnel from potential hazards. Table 2-3 lists the human safety hazards and the relevant data for each hazard.

ESH features:

- Redundant and monitored safety controls.
- Any single point of failure in the safety system will put the JCP into a Halt mode.
- The action to Halt tool operation will be executed in less than 500ms.
- Any fault of the safety system is detectable.
- No periodic proof testing or preventative maintenance of the ESH is required.
- The ESH fault tolerance has been proven through rigorous fault insertion testing. The ESH has demonstrated fault tolerance with DC input levels of up to 40VDC.
- The ESH is not liable to a systematic failure.

Table 2-3: Functional Safety

Functions	Constraints	Safety System Failure Detectable?	Estimated failure rate (FITs)	EN 61508-2 Classification
Upon opening of JCP Access Doors the ESH will go into HALT mode, activate outputs to HALT the robot, activate outputs to HALT loadports, activate outputs to HALT equipment interfaced to the JCP, activate outputs to remove stored pneumatic energy	None	Yes	0.35	Type A
Upon activation of the ESH E-Stop input, the ESH will go into HALT mode, activate E-stop outputs, activate outputs to HALT the robot, activate outputs to HALT loadports, and activate outputs to HALT equipment interfaced to the JCP	None	Yes	0.35	Type A
When the ESH detects the JCP mode select switch is set to Auto mode, the ESH will validate door and e-stop interlocks are satisfied and set outputs to allow normal operation of the JCP	None	Yes	0.3	Type A

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Functions	Constraints	Safety System Failure Detectable?	Estimated failure rate (FITs)	EN 61508-2 Classification
When the ESH detects the JCP mode select switch is set to HALT mode, the ESH will go into HALT mode, activate outputs to HALT the robot, activate outputs to HALT loadports, and activate outputs to HALT equipment interfaced to the JCP.	None	Yes	0.3	Type A
When the ESH detects the JCP mode select switch is set to Service mode the ESH will validate door and e-stop interlocks are satisfied and set outputs to allow service operation of the JCP. In service operation, the ESH will activate outputs to put the robot into a slow speed service mode.	None	Yes	0.3	Type A

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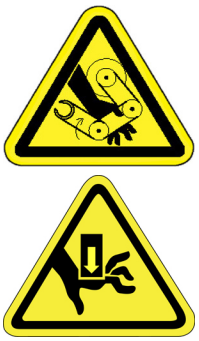
Mechanical Hazards

WARNING

Moving Mechanisms

Moving mechanisms do not have obstruction sensors and can cause death or serious injury.

- Be aware of and avoid working in the potential movement area of the product whenever power is applied.
- Use physical barriers to prevent injury when working in the movement path.

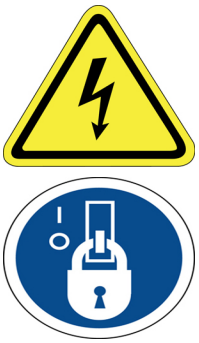


WARNING

Lockout / Tagout

Working with energized equipment may cause sudden movement or electrical shock and may result in death or serious injury.

- All energy must be removed from the equipment per the facility's Lockout/Tagout procedure before servicing.
- If local procedures are not available, follow the procedure for Lockout/Tagout in **OSHA Standard 29CFR 1910.147**.



CAUTION

Pinch Point

Moving parts of the product may cause squeezing or compression of fingers or hands resulting in personal injury.

- Do not operate the product without protective covers in place.
- If a pinch occurs, perform one of the following:
  - Press EMO button (user responsible circuit)
  - Issue a HALT command.
  - Turn off power from source.
  - Press Emergency Stop button on Teach Pendant



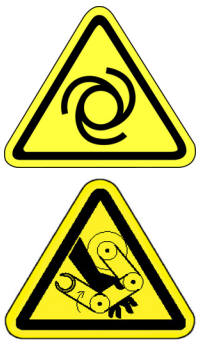
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WARNING

Automatic Movement

Moving parts of the JCP system may cause automatic or sudden movement which may result in personal injury.

- Ensure that all panels, doors, access, ports, and load ports are installed prior to operation of the robot and load ports. Process module must be installed within 1/8" (3mm) of the wafer pass through opening in the rear of the JCP system.



Electrical Hazards

WARNING

High Voltage Hazard

Improper electrical connection or a connection to an improper electrical supply can result in electrical shock or burns resulting in death or serious injury, and cause equipment fire and damage to the equipment.

- Always provide the JCP system with the proper electrical code compliant connections and disconnect.
- Maximum power consumption for the JCP system during normal operation is 200 - 240 VAC at 20 Amps.
- Turn off power before servicing.
- Ensure all circuit breakers are off before disconnecting main power.

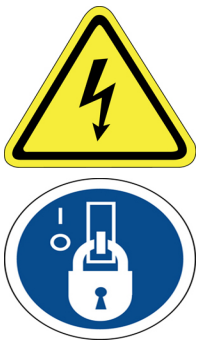


WARNING

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Working with energized equipment may cause sudden movement or electrical shock and may result in death or serious injury.

- All energy must be removed from the equipment per the facility's Lockout/Tagout procedure before servicing.
- If local procedures are not available, follow the procedure for Lockout/Tagout in **OSHA Standard 29CFR 1910.147**.



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Laser Hazard

A laser may be used in the JCP EFEM for wafer sensing. Lasers used with Brooks products are classified as CDRH Class I. National and international safety standards classify very low power laser CDRH Class I laser systems as follows:

Class I: Very low power (<CW: 0.4µWatts at visible wavelengths) -- does not emit laser radiation at known hazard levels (eye damage occurs at 1µW).

CAUTION

Laser Radiation

Laser radiation may cause serious eye injury.

- Know the power and hazard level of all lasers.
- Avoid exposure to laser hazards.
- Do not look directly at or into the laser beam (no matter what Class of laser).
- Follow any posted laser warnings or labels.
- Do not attempt to service, repair, or remove the protective housing of the laser device.



Ergonomic Hazards

WARNING

Tip Hazard

Moving this product without proper precautions could cause a tip hazard which may cause death or serious injury.

- Roll on smooth floors only.
- Use cautions when moving the System or the Load Port Modules.



CAUTION

Lift Aid Required

The JCP System weighs between 540 kg (1200 lb) to 975 kg (2150 lb). The Load Port modules weigh 59 kg (130 lb). Improper lifting may result in personal injury.

- Do not attempt to move or lift this product without a lift aid such as a forklift or a hoist.



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CAUTION

Trip Hazard

Cables for power and communication and facilities create trip hazards which may cause serious injury.

- Always route the cables where they are not in the way of traffic.



Environmental Considerations

Noise

The JCP system provides no direct noise hazard. Any sounds produced are minimal and cause no hazardous conditions. The JCP system produces less than 70dB noise during normal operation.

Vibration

The JCP system provides no direct vibration hazard. Any vibrations produced are minimal and cause no hazardous conditions.

Venting

Follow the facility's environmental procedures for vacuum pump exhaust.

Hazardous Material Disposal

The JCP system automation components may contain the following items that may require special handling for disposal or recycling:

Lithium Batteries

A Lithium battery may be located in the controller to maintain data when power is removed. If a Lithium battery is removed or replaced, it must be handled in accordance with all Federal, State, Local, and Facility procedures for the disposal of hazardous materials.

NiMH Battery

A NiMH battery may be located in an optional Uninterruptable Power Supply (UPS) located in the controller. If a NiMH battery is removed or replaced, itmust be handled in accordance with all Federal, State, Local, and Facility procedures for the disposal of hazardous materials.

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Safety Data Sheets (SDS)

Hazardous materials may be present in the product as shipped by Brooks. These materials may vary, depending on the configuration of the JCP system. Refer to the manual for each component to identify hazardous substances that may be in the system.

NOTE: Formerly known as Material Safety Data Sheets or MSDSs, the official name is now Safety Data Sheets or SDS.

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3. Specifications and Site Requirements

Overview

This chapter details the specifications of the 300mm JCP systems and the requirements for their installation.

Dimensions are shown for a typical system. When using this manual, always refer to the appropriate documentation for the specific components used on your system.

300mm JCP System Specifications

NOTICE

All drawings within this manual are generic and may not fully represent all builds of the JCP system.

Refer to the documents provided with your system.

To obtain drawings and documents for your system, contact Brooks Technical Support.

Table 3-1: 300mm System Mechanical Specifications

Specifications	
Dimensions	Refer to Figure 3-1: "300mm JCP System Installation, Typical - Side View" on page 40, Figure 3-3: "300mm JCP System Installation, Typical - Top View" on page 42, and Table 3-2: "300mm JCP System Space Requirements, Typical" on page 42 for typical physical dimensions. For the actual dimensions of the specific system, including foot and seismic tie-down locations, refer to the Mechanical Layout Drawing supplied with the system.

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Specifications	
Weight	Refer to Table 3-2 for typical weights. For the actual weight of the system, including floor loading and center of gravity, refer to the Mechanical layout Drawing supplied with this manual.
Exposed Materials	Aluminum Stable-Cast® 3, Aluminum 6061-T6, Stainless Steel, Nickel Plate, Epoxy Powder Coat, Aegis SC1071, PEEK
Vacuum Port	8 mm Quick Connect
Ground Clearance	50.8 mm (2.00 in) under frame 38.1 mm (1.50 in) under foot supports
LPM Interface	BOLTS per SEMI E154 300mm Load Port
Leveling Provisions	Adjustable feet to meet WTP -0.5/+2.5 inch range
Rolling Provisions	4 casters on removable outriggers
Lifting Provisions	4 removable forking brackets provided under the frame
Seismic Brackets	User provided
Audible Noise Level	<70dB

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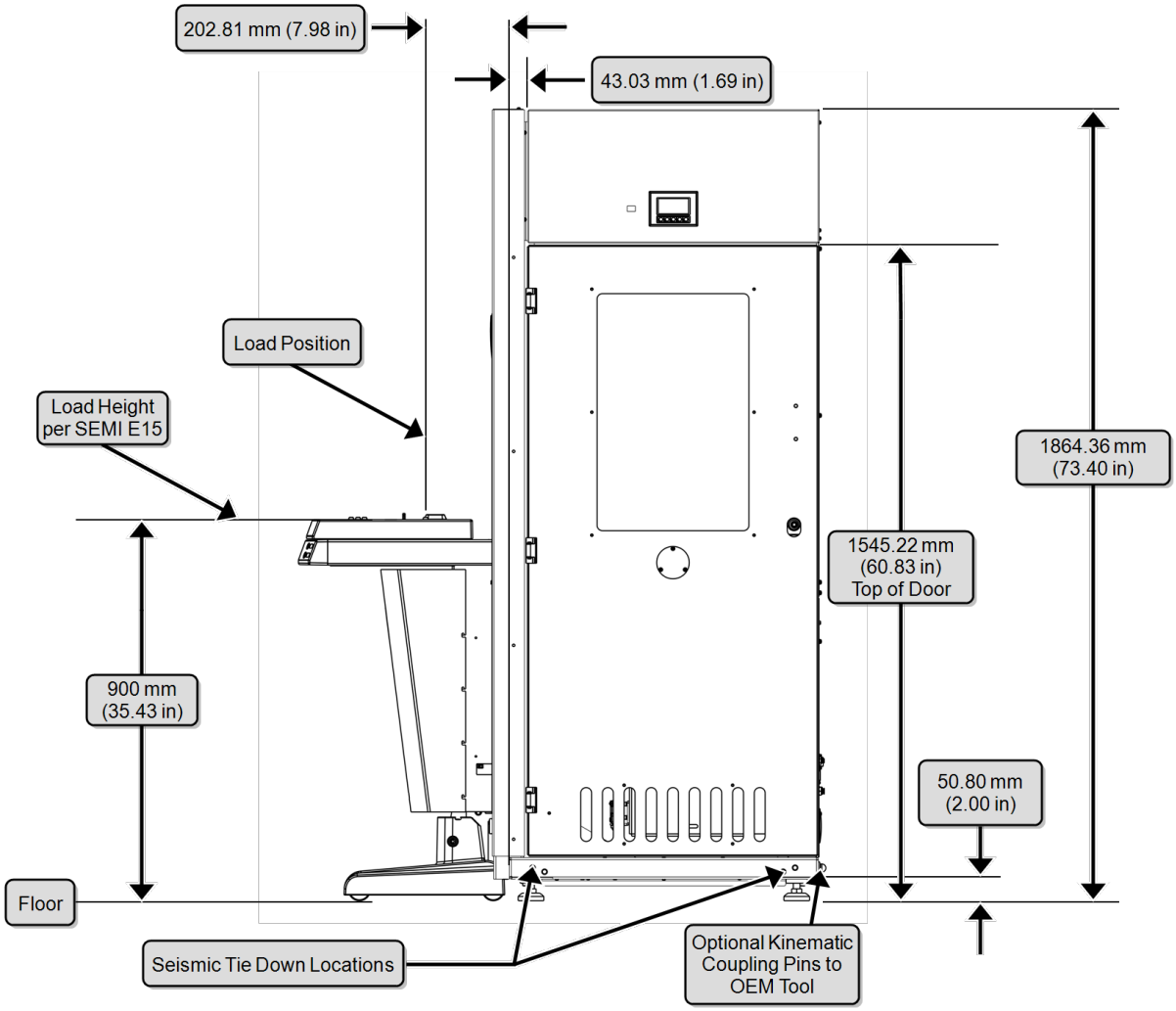


Figure 3-1: 300mm JCP System Installation, Typical - Side View

NOTE: Dimensions shown are typical dimensions. For the actual dimensions of a specific system, refer to the Mechanical Layout Drawing supplied with the system.

NOTE: The overall height for JCP systems configured with overhead storage is 2435.8 mm (95.90 in).

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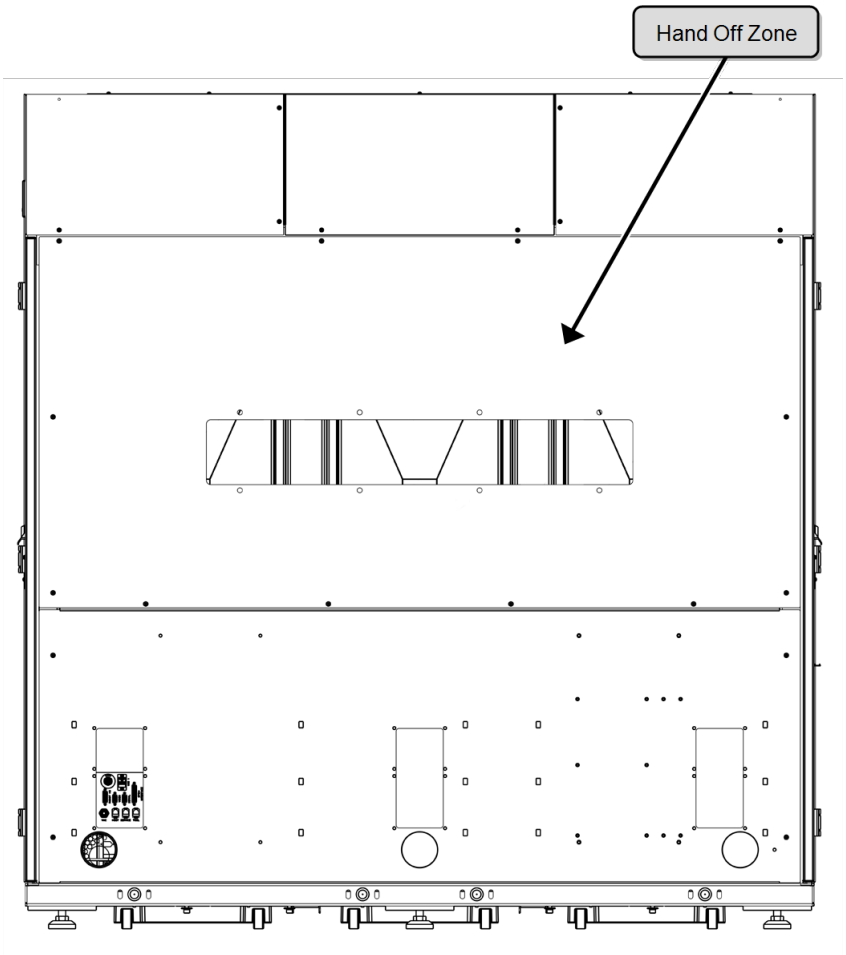


Figure 3-2: 300mm JCP System Installation, Typical - Rear View

NOTE: For the actual dimensions of the specific system refer to the Machanical Layout Drawing.

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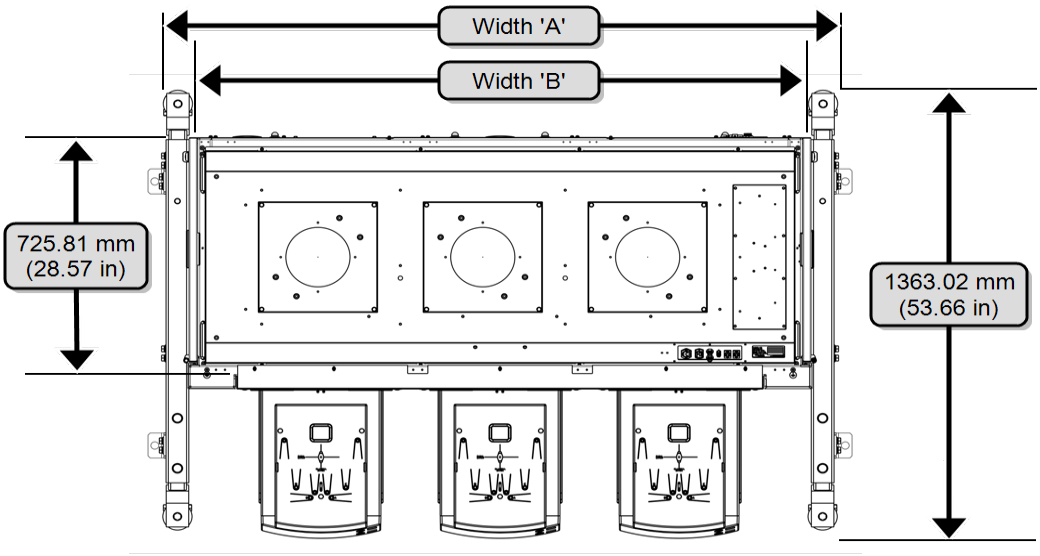


Figure 3-3: 300mm JCP System Installation, Typical - Top View

Table 3-2: 300mm JCP System Space Requirements, Typical

Model	Width 'A'	Width 'B'	Estimated Weight	Weight with Optional Storage
2 Bay	1402.98 mm (55.23 in)	1250.62 mm (49.23 in)	544 kg (1200 lb)	612 kg (1350 lb)
3 Bay	1907.90 mm (75.11 in)	1755.62 mm (69.12 in)	680 kg (1500 lb)	748 kg (1650 lb)
4 Bay	2418.8 mm (95.23 in)	2266.5 mm (89.23 in)	907 kg (2000 lb)	975 kg (2150 lb)

NOTE: Dimensions shown are typical dimensions. For the actual dimensions of the specific system refer to the Mechanical Layout Drawing.

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Center of Gravity and Floor Loading

Center of gravity and floor loading information for the JCP system varies based on the configuration. For specific information, refer to Mechanical Layout Drawings.

Contact your Brooks account manager for Center of Gravity drawings.

Power Specifications

Electrical, System:

200-240VAC, 50/60Hz, single phase, (L1,L2,PE)
System full load current 20A
Constant load range 5 - 14A depending on configuration
Overvoltage Category II
The JCP PDU is supplied with 10,000 AIC circuit breakers.
SCCR 10,000A

NOTE: The facility is responsible for the main disconnect device between the JCP system and the facility's power source and for ensuring that it complies with the correct electric codes. Service to the JCP system must have the appropriate fuse or circuit breaker rating.

NOTICE

Before connecting or disconnecting main power to the JCP system, ensure all JCP system and related equipment circuit breakers are in the OFF position.

Damage to internal components may result if circuit breakers are left in the ON position.

See the system block diagram for more information.

Power Cable

The PDU carries power to the modules of the JCP system (controller, robot, aligner, etc.) via the supplied power cables. The user must provide the power cable carrying facilities power to the JCP system's PDU. The pin-out for the PDU's 200 - 240 VAC cable is provided in Table 3-3.

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Table 3-3: AC Power Cable

Pin ID	1 Phase
X	N/L2
Y	L/L1
G	GND

The power cable plugs into the JCP system at the power distribution unit located next to the facilities panel. Refer to Table 3-4 for connector descriptions and part numbers. Brooks Automation recommends construction of the power cable using 10 AWG wire for each pin on the connector that is wired. Brooks supplies a mating power connector Hubbel 2323 with each system.

Table 3-4: AC Power Connectors

Connector on PDU	Connector required for power cable
Hubbell 2325 (NEMA L6-20P) or Flanged Inlet connector 250 VAC, 20A, single Phase, male	Hubbell 2323 (NEMA L6-20R) or Connector body 250 VAC, 20A, single Phase, female

Facilities Specifications

Vacuum:

80 kPa @ ≥ 6 l/m (100 cc/sec)

Network Interface Connections

Network:

Ethernet, 10/100 Mbit/sec

Ethernet Communications

The JCP system uses the Ethernet communications protocol to connect a number of different devices to a factory controller, using a single communications cable. Each device connected to the cable has a unique network device address. Only communications addressed to a specific device through the network will be received by that device. For configurations of various devices that use Ethernet, see the "Ethernet Switch" section.

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Network communications allows the host controller to communicate with the JCP system using the commands listed in the component user manuals. When the teach pendant and the host controller are unavailable, a personal computer running a network communications application may be connected to the JCP system's network port, using the same cable to communicate with the system as the host controller.

The configuration of the atmospheric robot external network communications protocol is described in the "Installation Procedure" section. If more than one JCP system is connected to the same network, the IP Address of each system must be unique to avoid IP conflicts.

The Ethernet IP address of the components can be changed using system commands found in the component user manuals.

Standard Ethernet IP Address

Table 3-5 lists the default IP addresses of host controlled components in the JCP EFEM. For systems where the robot controller is in control of the device, those addresses cannot be externally controlled by the host. See the system selection guide for guidance.

Table 3-5: Host Controlled Ethernet Address

System Ethernet Module	IP Address	Subnet Mask
Atmospheric Robot Controller / Razor	20.20.249.20	255.255.255.0
Atmospheric Robot Controller / Reliance	20.20.249.2	255.255.255.0
Atmospheric Robot Controller / Wafer Engine EC4	20.20.249.20	255.255.255.0
Vision Load Port 1 (Port 4449)	20.20.249.22	255.255.255.0
Vision Load Port 2 (Port 4449)	20.20.249.23	255.255.255.0
Vision Load Port 3 (Port 4449)	20.20.249.24	255.255.255.0
Vision Load Port 4 (Port 4449)	20.20.249.25	255.255.255.0
Ionizer Controller	20.20.249.28	255.255.255.0
JCP Fan Filter Unit (Automatic Pressure Controlled) (Port 502)	20.20.249.26	255.255.255.0
EFEM Ethernet Light Tower Controller	20.20.249.35	255.255.255.0
Ethernet to Multi-Port Serial Gateway (if present)[1]	20.20.249.5	255.255.255.0

[1]See serial gateway Port Addressing

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Serial Gateway Port Addresses

The Serial Gateway Port Addresses in Table 3-6 do not apply to the single serial port gateway Advantech 4571L. These settings reflect default load port and load port carrier ID setup. Port numbers are reserved. Alternate uses of ports should be given other port numbers.

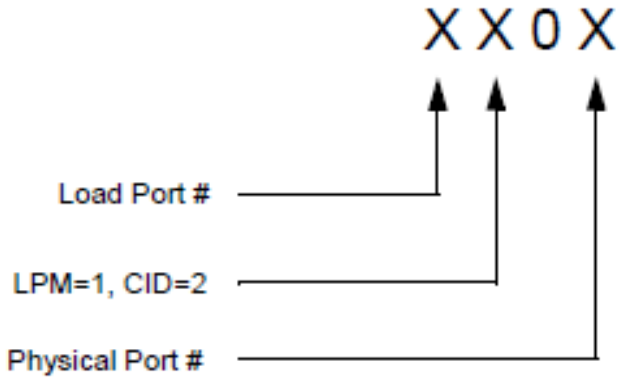


Figure 3-4: TCP Port Format

Table 3-6: Serial Gateway Port Addresses

Device	Comtrol Physical Port #	Port ID
Load port 1	1	1101
Load Port 1 Carrier ID	2	1202
Load Port 2	3	2103
Load Port 2 Carrier ID	4	2204
Load Port 3	5	3105
Load Port 3 Carrier ID	6	3206
Load Port 4	7	4207
Load Port 4 Carrier ID	8	4208

The Ethernet cables are standard network cable (UTP-CAT5e) with an 8-pin RJ-45 connector that connect to the JCP system facilities panel.

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Site Requirements

Environment

ISO 14644-1 Class ISO 6 or better cleanroom ambient.

Table 3-7: Environmental Specifications

Specification	
Temperature- Operating: Shipping: Storage:	10° C to 30° C (50° F to 86° F) -25° C to 55° C (-13° F to 131° F), up to 65° C (149° F) for 24 hrs. max -25° C to 55° C (-13° F to 131° F), up to 65° C (149° F) for 24 hrs. max
Humidity	5% to 80% (Relative, non-condensing)
Lighting	Standard lighting provided in the cleanroom environment where the JCP system is installed is sufficient for proper operation. Maintenance may require additional light.

Service Access

The JCP system requires service access as specified in SEMI E72. Refer to the Mechanical Layout Drawing supplied with the system for system dimensions.

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Moving the JCP System

Various locations within the site where the JCP system will be installed must meet the following minimum requirements to ensure proper handling of the JCP system:

Location	Requirements
Door Openings:	See system mechanical specifications and system layout for exact dimensions.
People:	A minimum of four people are required to move the JCP system within the facility.
Floor:	The JCP system is designed to roll easily across smooth interior floors only. The floor where the JCP system is installed must be capable of supporting the weight of the JCP system as described in Table 1-2. The weight information provided is maximum weight, specific JCP systems may weigh less

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4. Installation

Overview

This chapter provides installation instructions for the Brooks Automation JCP system.

When using this manual, always refer to the appropriate documentation for the specific components used on your system.

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.



NOTICE

Untrained or Improperly Equipped Personnel

Untrained or improperly equipped personnel performing this procedure may cause damage to the equipment.

- Only Brooks Automation trained personnel should perform this procedure.
- Personnel performing this procedure must read and understand this procedure and have the proper tools and supplies ready before starting.
- Personnel performing this procedure must know the applicable safety codes, facility safety procedures, safety equipment, and emergency contact information.

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Unpacking and Inspection

The JCP system is typically shipped in one package which is sealed to maintain cleanroom conformance. Additional crates may be used for options and documentation.

One set of shipping documents is attached to the outside of the main shipping crate for easy access. An additional set of the same documents is attached to the equipment inside the shipping crate.

The number of shipping crates and their contents will depend on the items purchased. Refer to the shipping documents for the exact contents. Table 4-1, below, is provided for reference only.

Certain options may be shipped in the JCP crate, strapped tot he platform of the crate. Remove these boxes from the crate before removing the JCP from the platform. Keep all boxes with the JCP system for installation. All documentation and small parts shipped loose will be located in a small plastic box.

Table 4-1: Packing Checklist Reference

Package	Contents
JCP system	a. System (mini-environment with FFU) on casters with installed options that may include robot, track, aligner, load port modules, EMO Button, etc.
Installation and Options Kit	a. Copy of ATP (Certificate of Performance Testing) b. User Manuals c. Teach Pendant (if ordered) d. Light Tower (if ordered) e. Operator Interface (OI) Module (if ordered) f. Wing Panel OI g. Light Curtain (if ordered) or Protection Bar

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CAUTION

Tipover Hazard

Tip hazard exists when moving the JCP system or the Load Port Modules.

Failure to take the proper precautions before moving the system, especially while rolling it out of the shipping crate, could result in personal injury.

- Inspect the travel route of the JCP system to be sure the travel path is level and clear of debris and obstacles.
- Cover dips, thresholds, or any uneven floor transitions with plates.
- Ensure that all force exerted on the JCP system or its components when moving is below the center of gravity.
- Personal Protection Equipment such as safety glasses and steel toe shoes should be worn at all times when installing the JCP system.



CAUTION

Lift Aid Required

The JCP System weighs between 540 kg (1200 lb) to 975 kg (2150 lb). The Load Port modules weigh 59 kg (130 lb). Improper lifting may result in personal injury.

- Do not attempt to move or lift this product without a lift aid such as a forklift or a hoist.



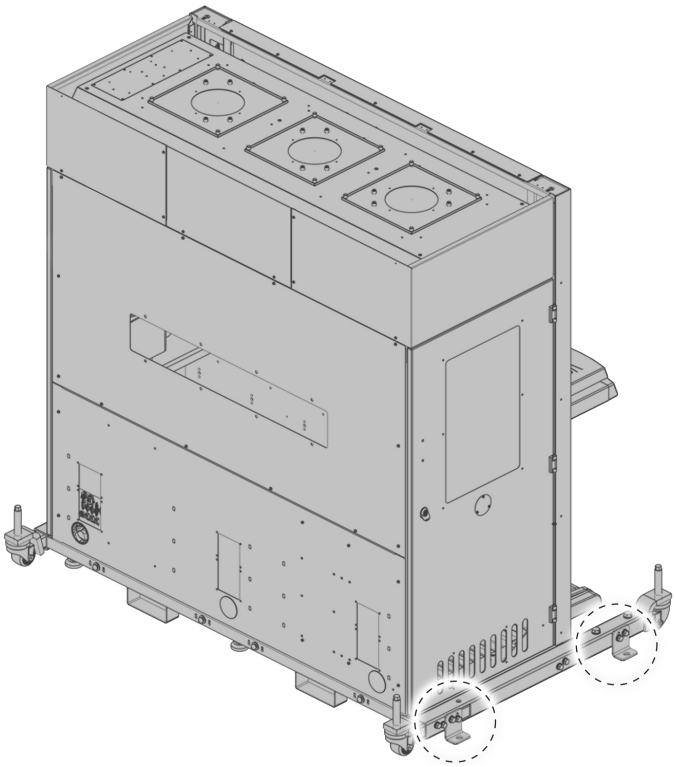
Tools and Materials

The following tools and materials are required for unpacking the JCP system.

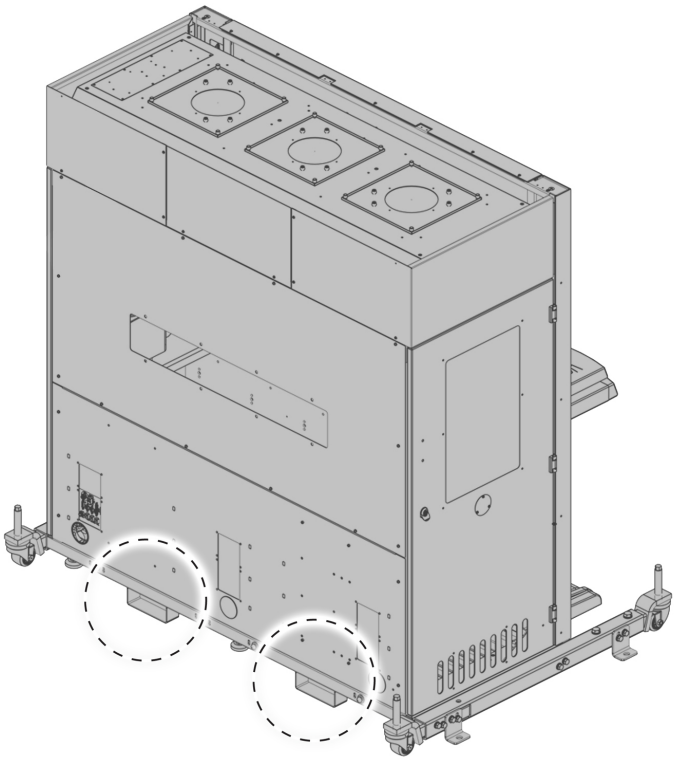
- Metric hex wrenches
- Inch hex wrenches
- Open end wrenches or adjustable wrenches.
- Utility knife
- Fork truck or appropriate lift.

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Unpacking and Moving Instructions

Step	Action
1.	Upon receiving the crate(s), inspect the attached shipping indicators for disturbance. Also, visually verify that each crate is not damaged. Report any damage to the containers to the shipper and to Brooks Automation.
2.	Remove the cover of each shipping crate. Unpack, inspect, and verify the contents against the shipping documents. Do not remove any protective wrapping.
3.	Cut open the bag the JCP system is shipped in and unbolt the four tie-down brackets from the base of the shipping container.  ***NOTE:*** *Save all shipping materials for possible future use. If the JCP system is shipped, the original shipping crate must be used. If the original crates have become lost or damaged, contact Brooks Automation for replacements. Refer to the* *Appendix C: "Packing and Shipping Instructions" on page 145**.*

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Step	Action
4.	Using a fork lift with 6 inch wide forks (maximum), lift the JCP system from the back using the Fork Brackets.  ***NOTE:*** *The system may slightly tip forward on the forks.*
5.	Slide the base of the shipping container out from under the JCP system.
6.	Move the JCP system into the facility as far as the fork lift is allowed to travel.
7.	Ensure the casters wheels are low enough such that they will touch the ground before the system's fork tubes or leveling feet. Lower the caster wheels by loosening the jam nuts and turning the stem of each caster clockwise: • Raise the feet if necessary by loosening the jam nut (against the frame) and turning the stem of each caster clockwise.
8.	Lower the JCP system to the floor and move the fork lift away from the system.
9.	Remove the four Fork Brackets and save for future use. If the JCP system is shipped, the Fork Brackets must be replaced before shipping.
10.	Confirm that the system is high enough off the ground to provide rolling clearance. Adjust as required.

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Step	Action
11.	Roll or use a hoist to move the JCP system into the unpacking area. ***NOTE:*** *When rolling the JCP system on its casters, push on the mini environment only. Do not push on any externally mounted components (Load Port Modules, Light Tower, and so forth) as damage to those components could result.*
12.	Unpack, inspect, and verify the contents of all crates against the shipping documents. Do not remove any protective wrapping. ***NOTE:*** *Report any damage or missing material immediately to the shipper and to Brooks Automation.*
13.	Move the contents of all crates into the unpacking area.
14.	Vacuum and wipe down all of the bags for all items.
15.	Remove the outer bags. Do not remove the inner bags. Vacuum and wipe down all inner bags.
16.	Move the JCP system and any additional material to its final location in the Cleanroom.
17.	Remove all inner bags and any additional wrapping.
18.	Carefully inspect the JCP system and all additional items for signs of damage. Report damage to the shipper and to Brooks. Do not install damaged equipment.

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Installation Procedure

Tools and Materials

The following tools and materials are required during final unpacking and installation of the JCP system.

- Metric hex wrenches
- Inch hex wrenches
- Open end wrenches or adjustable wrenches
- 10 mm and 24 mm open end wrench for leveling feet
- 19 mm and 26 mm open end wrench for casters
- Metric hex wrench with ratchet, 8 mm x 100 mm
- Utility knife
- Scale (ruler)
- MicroTool wafer level or bubble level
- Two 1 m bubble level with magnetic base or equivalent
- Fork Truck or other appropriate lifting device

Dock the Load Port Modules (LPM) to the EFEM

The LPMs attach to the JCP system using the kinematic mounts attached to the system. If the LPMs must be attached, refer to the Load Port User Manual.

Position the JCP System

CAUTION

Tipover Hazard

Tip hazard exists when moving the JCP system or the Load Port Modules.

Failure to take the proper precautions before moving the system, especially while rolling it out of the shipping crate, could result in personal injury.

- Inspect the travel route of the JCP system to be sure the travel path is level and clear of debris and obstacles.
- Cover dips, thresholds, or any uneven floor transitions with plates.
- Ensure that all force exerted on the JCP system or its components when moving is below the center of gravity.
- Personal Protection Equipment such as safety glasses and steel toe shoes should be worn at all times when installing the JCP system.







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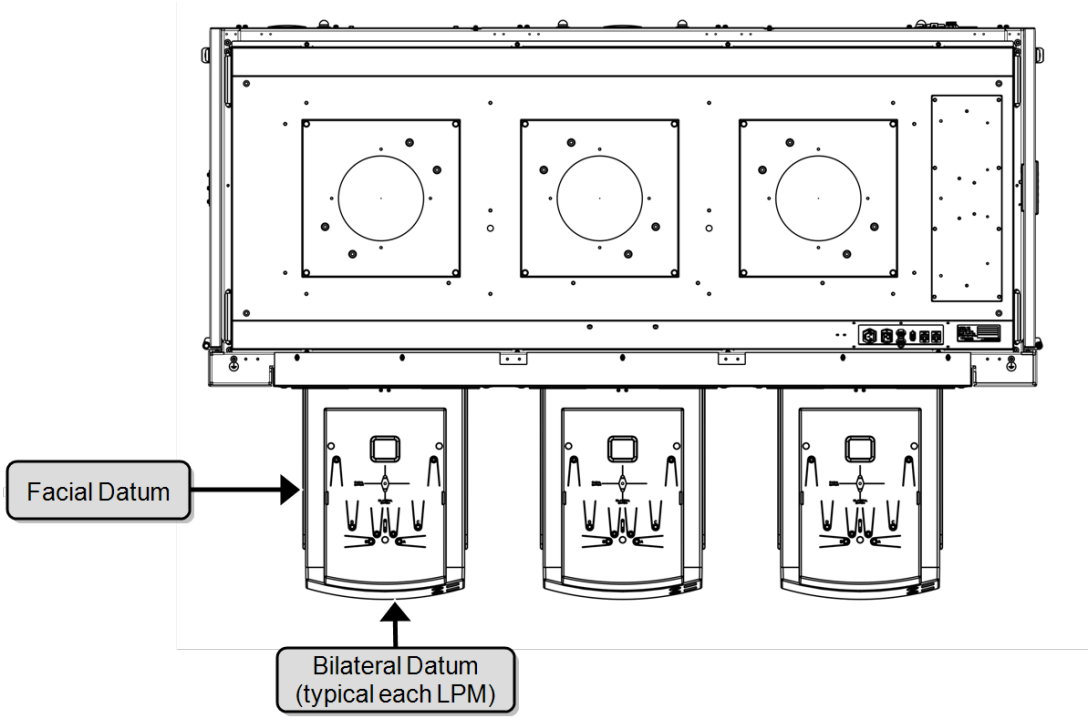
CAUTION

Lift Aid Required

The JCP System weighs between 540 kg (1200 lb) to 975 kg (2150 lb). The Load Port modules weigh 59 kg (130 lb). Improper lifting may result in personal injury.

- Do not attempt to move or lift this product without a lift aid such as a forklift or a hoist.



1.	Position the JCP system as required. Verify the height of the JCP system to ensure the Material Transfer Plane for the Load Port Modules is set correctly.
2.	If an automated handling system (AGV or OHV) is being used, ensure the JCP system is properly aligned for transfers. ***NOTE:*** *The outriggers can be rotated so that the rear of the EFEM can be placed close to the wafer transfer system. See the "Outrigger Configuration Procedure" for outrigger operation.*
3.	Install the Load Port Modules, if required. Refer to their manuals.
4.	Position the JCP system with the Load Port Modules in the proper position for carrier hand-off, starting with the left-most LPM. Refer to the datum marks on the Load Port Module's shuttle cover as shown. 

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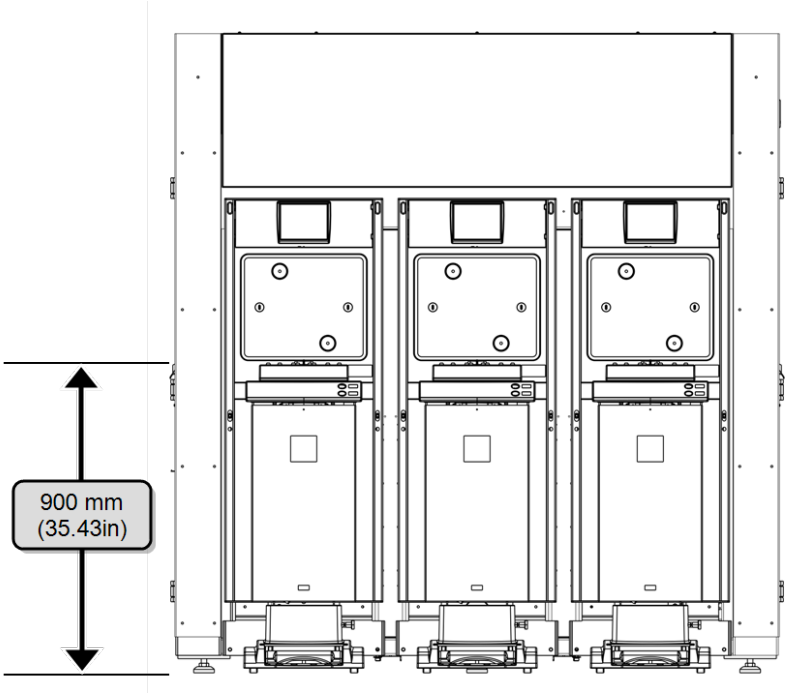
Set the Material Transport Plane

The Jet system frame has adjustable feet to support the system, to set the Material Transfer Plane, and to compensate for an uneven floor.

NOTE: The material handling components of the Jet system are kinematically mounted and adjusted at the factory. No additional adjustments to the components should be required when the system is properly installed.

1.	Loosen and completely back-off the locking nut for each leveling pad.
2.	Using the two leveling pads at each of the front corners and one leveling pad at the rear center, adjust the foot height by turning the stem of each foot clockwise using an 8mm hex wrench in the socket on the end of the foot shaft until the outrigger wheels or casters are just off the floor.
3.	Remove each outrigger, if provided, by removing the four bolts securing them. Store the outriggers and hardware for possible reuse.
4.	Adjust the other remaining leveling pads so that they are positioned in the full up location. Only the leveling pads in the front corners and the leveling pad in the rear center will be used for leveling-positioning.
5.	Lower the front two leveling pads to approximately 50.8mm (2.0”) below the frame. Use a ruler or height block as a guide. Do not use the reinforcing plates for the feet as the reference.
6.	Place height block under the rear center of the frame behind the rear center leveling pad. Adjust the rear center leveling pad to 50.8 mm (2.0 in). If rear center of JCP is not accessible, you may use the four corners to set up 50.8mm / 2” nominal height.
7.	Secure the locking nut on the rear center leveling pad. All remaining leveling of the JCP will be performed using only the front corner leveling pads.
8.	Check the two front corners and center rear of the EFEM to verify that distance between bottom of frame and ground is approximately 2”.

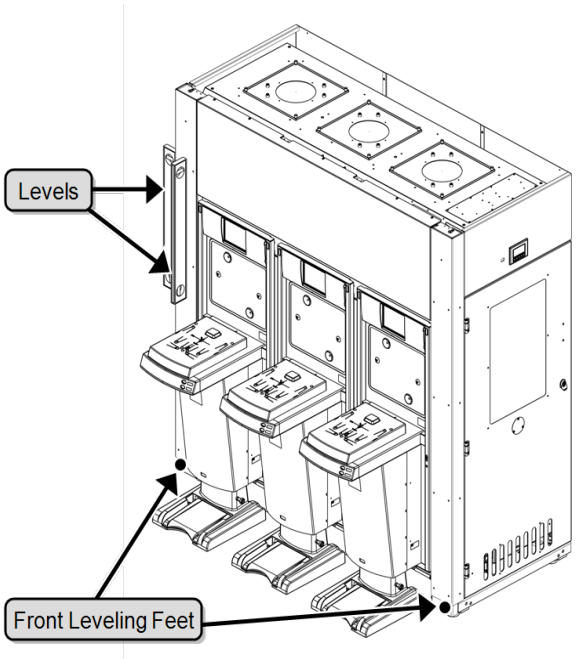
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9.	Verify the other remaining leveling pads are positioned in the full up location. At this point, only three leveling feet should be contacting the ground. Only the leveling pads in the front corners will be used to level. The leveling pad in the rear center should be locked in position with locking nut. The height adjustment sets the Jet system so the load/unload height for the Load Port Modules is nominally 900mm (35.95 inches) per SEMI E15.1, as shown in figure below.  ***NOTE:*** *The 900 mm height specification is related to the bottom of the FOUP. The easiest way to attain this height is to set the top of the kinematic pins that the FOUP sits on to* ***913 mm*** *from the floor.*
10.	Final height and leveling will be performed in the JET System leveling portion of this document.

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JCP Leveling Stage 1

The Jet System will be leveled in 2 Stages. The first stage will be to rough-proximate level using two (2) 24” I-Beam Magnetic Levels on the frame structure (corner skins) of the Jet System. The second stage will be to fine adjust level using an electronic level, on the robot (“Umbrella Test”), detailed in the "Alignment and Teaching" chapter.

1.	Place 2 magnetic levels on the left front corner post approximately 48 inches off the ground as shown below. 
2.	Adjust the 2 front leveling feet until the bubble is centered in each level. Do not adjust the rear center leveling feet. Take care not to change the control height of the system. This is the 2” height from section “Set Material Transfer Plane” of this document.
3.	Leveling complete.

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Remove Protective Packaging

Internal components or cabling may be covered or wrapped in protective wrapping or film. These materials must be removed before system start-up.

1.	Mini-environment Module: • Remove protective wrapping from any loose cable ends or connectors. • Remove the protective film from all windows.
2.	Load Port Module(s): Remove protective film from all displays.

Remove Shipping Brackets

The JCP system is shipped with shipping brackets and foam blocks that must be removed before the removed before the system is installed or used. Refer to component manuals for detailed instructions.

NOTICE

Save all shipping brackets and foam pads for future use.

If the JCP system is shipped to another location, the original shipping brackets and foam must be used.

Step	Action
1.	Shipping brackets secure the robot arm to the robot flange. The type of brackets vary based on the type of arm installed. Remove the brackets and save in a convenient place.
2.	On systems with a 5-axis robot, a foam pad may be placed between the end effectors. Remove the pad and the plastic ties holding the end effectors together and save the pads for future use.
3.	On systems with a track, shipping brackets are used to secure the track carriage to the frame. Remove the brackets and save for future use.
4.	On systems with an aligner, foam pads are placed between the Lift Chuck and the Rotate Chuck. Remove the pads and the plastic ties holding the chucks together and save the pads for future use.

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Step	Action
5.	On the Load Port Modules, the pod door opening paddle is secured in place for protection during shipment. Remove the foam pads securing the paddle within the JCP system and save for future use.

Install User Interface Options Removed for Shipping

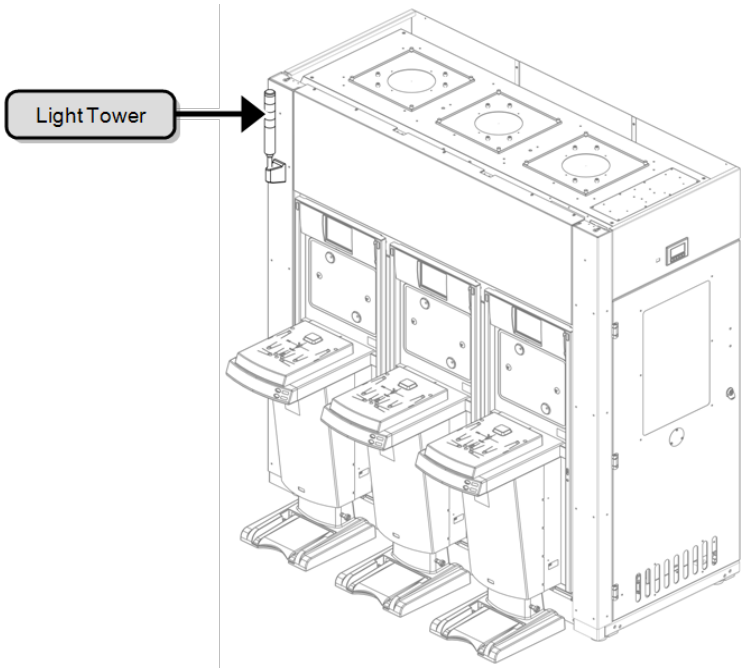
Some items are removed so they do not get damaged during shipment. After the JCP system is installed, these items must be re-attached to the system prior to operation.

Install the Light Tower

The Light Tower is mounted to the front of the JCP system, as shown in the "Installation Procedure", on either the left or right side depending upon system configuration.

Step	Action
1.	Remove the Light Tower from the shipping container.
2.	Remove the protective film over the Light Tower mount on the front of the JCP.
3.	Unwrap the Light Tower and remove the protective wrapping from the cable.

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Step	Action
4.	Insert the plug in the Light Tower base into the jack inside the mounting bracket on the JCP. 
5.	Slide the Light Tower base over the mounting bracket and slide the base down to seat it onto the bracket.
6.	Insert the mounting screw through the hole in the bottom of the base and tighten.
7.	Adjust the Light Tower as required to ensure it is vertical.

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Connecting the Process Tool to the JCP System

After the JCP system is installed, the OEM's Process Tool must be mated to the JCP, adjusted to the Material Transfer Plane, and leveled. Once mated, the Process Tool should be bolted to the floor as specified by the facility.

When mating the JCP system to the OEM's Process Tool, kinematic alignment pins may be used to position the JCP system to the tool. If the kinematic alignment pins are being used, confirm that the mating features for the pins have been machined into the frame of the Process Tool. Contact Brooks Automation for detailed drawings showing the location of these pins.

Step	Action
1.	Roll the process tool up to the JCP system.
2.	If the kinematic alignment pins are used, align the 0.75-inch pins on the lower mating edge of the JCP system to the alignment features on the process tool. Refer to the detailed drawings for the position of the pins.
3.	When the pins are in place, perform any final adjustments to the Process Tool, such as leveling and bolting to the floor.

WARNING

Moving Mechanisms

Moving mechanisms do not have obstruction sensors and can cause death or serious injury.

- Be aware of the potential movement area of the product whenever power is applied.
- Never place any part of your body between the robot arms and fixed surfaces.
- Do not operate the robot without the guards and protective covers in place and all safety interlocks enabled.
- There should be no more than 3.18 mm (.125 in) gap between the pass through window of the JCP system and the mating process tool station.



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Facilities Connections

The standard configuration of the JCP system requires electrical power, vacuum, and communication connections. These facilities connections are typically made to the JCP system at the facilities panel and to the power distribution unit inside the EFEM. Reference Figure 4-1.

Additional facilities may be required depending on the actual configuration. See system interface drawing and block diagram for details of any additional facilities connections made available per system configuration requirements.

Refer to "Specifications and Site Requirements" on page 38 for descriptions and specifications of all required facilities connections.

NOTICE



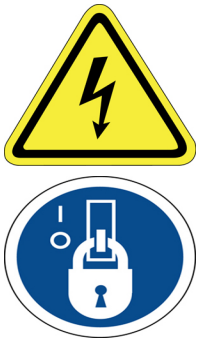
Safety glasses should be worn at all times when connecting any facilities to the JCP system.

WARNING

Lockout / Tagout

Working with energized equipment may cause sudden movement or electrical shock and may result in death or serious injury.

- All energy must be removed from the equipment per the facility's Lockout/Tagout procedure before servicing.
- If local procedures are not available, follow the procedure for Lockout/Tagout in **OSHA Standard 29CFR 1910.147**.



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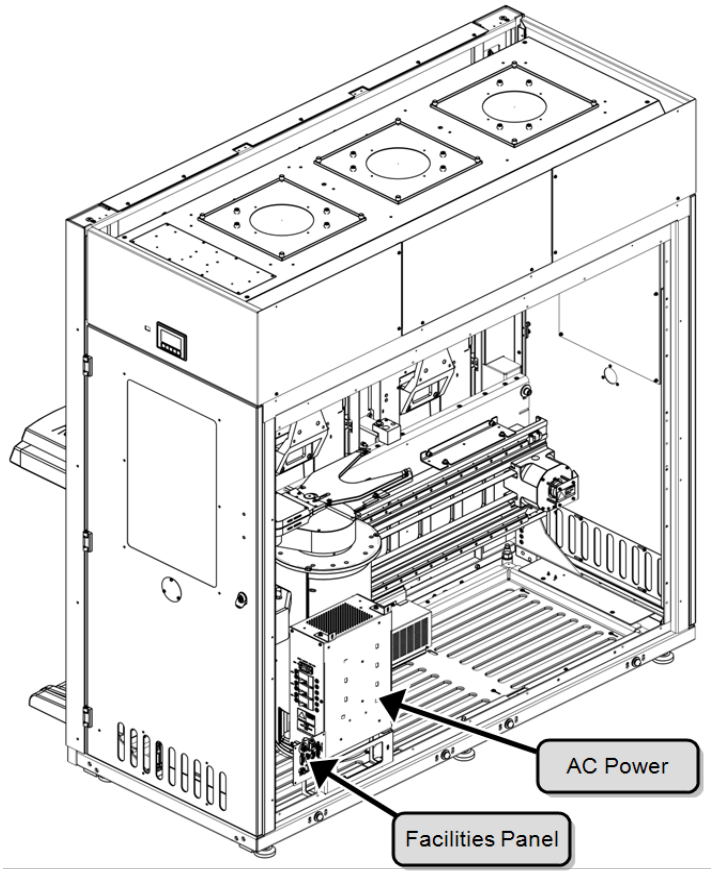


Figure 4-1: Typical Facilities Connections (Rear covers removed for clarity)

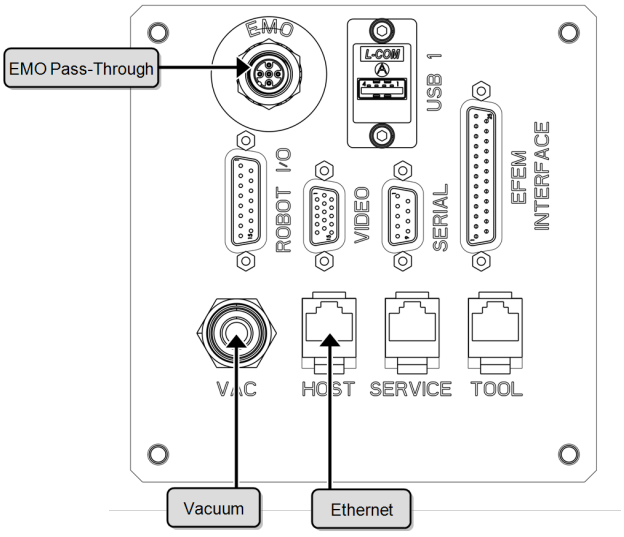
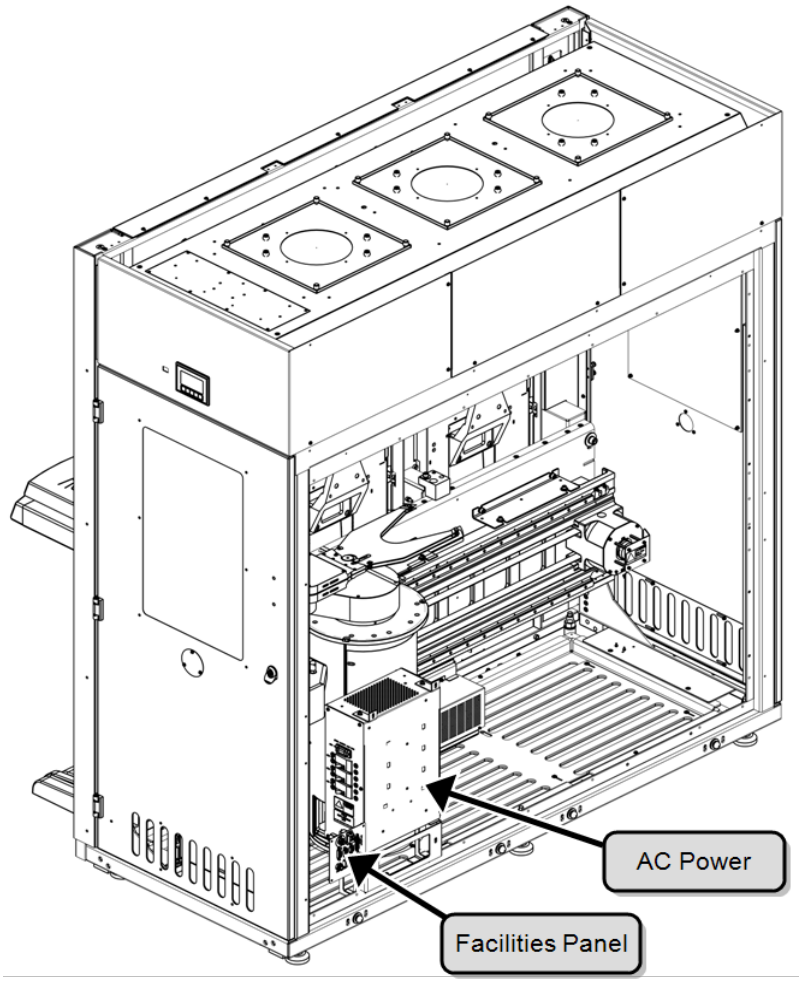


Figure 4-2: Typical Facilities Panel

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Electrical

Electrical power is connected to the JCP system for operation of the robot, load ports, sensors, and other subsystems. An AC electrical connection is provided on the JCP system's Power Distribution Unit, located in the rear of the system as shown in Figure 4-1.

1.	Obtain an appropriate electrical cable suitable for the electrical power requirements specified in the "Power Specifications" section.
2.	Connect the power cable from the main power disconnect of the facility to the power connector on the PDU as shown. 

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NOTICE

Do not connect the JCP system power supply to facility power until all installation procedures have been completed.

EMO Circuit

An EMO button can be supplied with the JCP system for the user's convenience. The EMO circuit and all EMO wiring is the responsibility of the user. Refer to Figure 4-1: "Typical Facilities Connections (Rear covers removed for clarity)" on page 65.

A pass-through connection from the EMO button for the user's EMO circuit is provided at the facilities panel through a 5-Pin M12 Plug connector as shown in Figure 4-2 on page 65. This connection may be used for wiring convenience to bring the signal from the EMO button the host system's EMO circuits.

Once the EMO circuit is wired and tested, remove the Warning label from the EMO button.

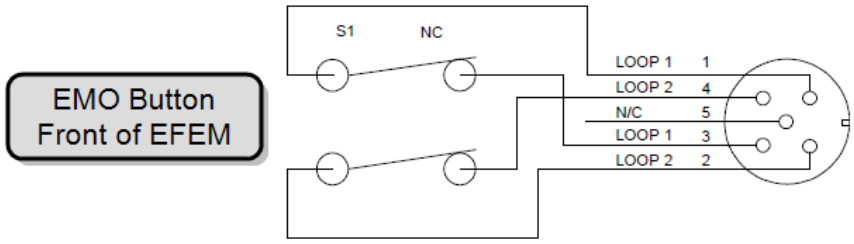


Figure 4-3: EMO Wiring Circuit

Vacuum

Vacuum must be supplied to the JCP system at the facilities panel for operation of the Load Port Modules and may be required for operation of the robot's end effector. Refer to the "Facilities Specifications" section for vacuum requirements.

Connect the vacuum line from the facility to the 8 mm Quick Connect on the facilities panel as shown in Figure 4-3.

Clean Dry Air - (CDA)

CDA is not required on standard JCP systems but may be required by certain load ports or other options. CDA connection is made using 8 mm (0.31 inch) O.D. tubing. Refer to the Interface drawing and component manuals for pressure and flow specifications.

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Use of CDA requires that a Lockout/Tagout valve be located upstream of the JCP system. A Lockout/Tagout valve is typically not supplied with an EFEM.

Communication Connections

The standard configuration of the JCP system is designed to use 10/100 Mbps Ethernet communications with a Host Controller. The following procedures provide the information required to make all communications connections to the JCP system as shown in Figure 4-1: "Typical Facilities Connections (Rear covers removed for clarity)" on page 65.

Power-up Sequence

The following procedure describes the steps to safely apply power to the JCP system and verify that it is ready for operation.

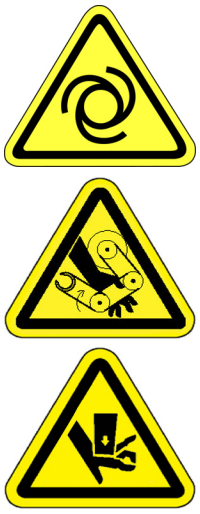
WARNING

Automatic Movement

Moving mechanisms have no obstruction sensors and can cause death or serious personal injury.

The Robot, Aligner, Track, Load Port Modules, and FFU Fans have the possibility of automatic movement:

- Do not operate the JCP system without the protective covers in place.
- If interlocks are disabled, the possibility of automatic movement of the systems within the JCP system exists.



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WARNING

High Voltage Hazard

Improper electrical connection or a connection to an improper electrical supply can result in electrical shock or burns resulting in death or serious injury, and cause equipment fire and damage to the equipment.

- Always provide the JCP system with the proper electrical code compliant connections and disconnect.
- Maximum power consumption for the JCP system during normal operation is 200 - 240 VAC at 20 Amps.
- Turn off power before servicing.
- Ensure all circuit breakers are off before disconnecting main power.



Step	Action
1.	Confirm that all of the installation procedures previously described in this chapter have been completed.
2.	Operational Safety and Interlock Check: • Ensure that the mini-environment doors are closed and secured.
3.	Mechanical Check: • Verify all shipping brackets and packaging have been removed. • Ensure that the JCP system is properly and securely installed. • Ensure that the Load Port modules are properly and securely mounted to the JCP system. • Ensure that any equipment the JCP system is connected to is properly secured within the facility. • Ensure that all panels and fasteners are secure. • Ensure that the EMO button is functional. Remove the shipping warning label from the EMO button.
4.	Facility Check: • Ensure that all facilities are capable of meeting, or exceeding, the requirements as described in the "Center of Gravity and Floor Loading" section. • Ensure that the power, communications, and vacuum connections have been completed. • Check all cables. Verify the connectors are fully seated and screws and locks are secured to ensure good continuity. • Verify all internal cables are routed in a safe place and away from any internal movement. • Verify all external cables are routed in a safe place and away from any travel areas. • Inspect all cables for restricting bend radii or excessive tension.
5.	Pre-operation Check: • Ensure that no packing material or other objects have been left in the mini environment. • Ensure that there are no obstructions in the travel path of the robot and its end effector(s). ***NOTE:*** *Some of the internal components of the JCP system may present travel obstructions to the robot end effector. It is the user's responsibility to control the robot to ensure that the robot and any material in transport do not come into contact with these components.*

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Step	Action
6.	Turn on the AC power connection to the JCP system from the facility's electrical services.
7.	Turn on vacuum and air supply if used.
8.	Perform a Ground Continuity check from the surfaces of the JCP frame to a known good ground.

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5. Alignment and Teaching

Overview

This chapter provides basic adjustment and calibration instructions for the Brooks Automation JCP system. When using this manual, always refer to the appropriate documentation for the specific components used on your system.

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.



JCP System Alignment and Teaching

The components of the system were aligned at the factory prior to shipment. However, even a small misalignment can interfere with proper system operation. Thus, prior to use, the components within the Brooks Automation JCP system must be aligned to each other to prevent misplacement of material or collision of the robot with other parts of the system. Also, the JCP system must be aligned with the system that it will be operating in to prevent misplacement of material or collision of any material handling components.

Brooks Automation recommends performing the alignment procedures under the following circumstances:

- A complete alignment when the JCP system is first set up at the user's site.
- A complete check when performing routine maintenance.

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- A complete check when the controller or any of the material handling modules (aligner, load port, robot, etc.) are replaced.
- A complete check if the JCP system was involved in a material transfer error or a collision.
- A complete check if the JCP system was involved when an Emergency Off (EMO) occurred.
- A partial check at the appropriate station(s) whenever any component, such as a Load Lock Module, is replaced.

Required Tools and Test Equipment

Performing the alignment procedure requires the following tools and materials:

- The parameter sheet for all robot stations from the System Acceptance Test (ATP) shipped with the system
- A portable computer running control software, or a keyboard, mouse, and monitor, or the teach pendant, connected to the controller
- MicroTool Dummy Wafers or test material of the type and size for which the system is being set up
- The User Manual for the controller
- The User Manual(s) for each device that interfaces with the JCP system

Alignment Process

Alignment consists of adjusting the mechanical components of the system using a teach pendant or a computer to operate the JCP components. The JCP system must be installed and attached to the process tool or the customer's system.

Proper alignment ensures that the robot or material being transferred does not contact the surfaces of the JCP system and no sliding motions occur between material and support surfaces.

WARNING

Tip Hazard

Tip hazard exists when the JCP system is not attached to the process tool which may cause death or serious injury.

- Be away of tip hazards and take appropriate precautions when aligning the components of the JCP system.
- Wear Personal Protection Equipment such as steel toe shoes and eye protection.



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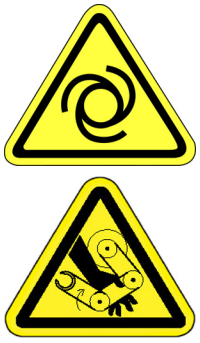
WARNING

Automatic Movement

The possibility of automatic movement exists with JCP system components. These components do not have obstruction sensors and may cause death or personal injury.

The Robot, Track, Aligner, Load Port Modules, and FFU Fans all have the possibility of automatic movement:

- Safety interlocks may require being overridden while using the JCP system's Teach Pendant.
- The user is responsible for any damage to the JCP system or their system as a result of using the teach pendant incorrectly.



NOTICE

DO NOT perform a “Home” operation of any of the material handling modules within the JCP system during the alignment procedure unless specifically directed to do so.

NOTICE

It is important to perform the alignment in the sequence shown in this section for maximum operating performance of the JCP system.

Step	Action
1.	Read and understand the "Safety" chapter.
2.	Read each of the Alignment Procedures and be familiar with the safety warnings to ensure safety while performing the procedures.
3.	Become familiar with the robot and all attached subsystems.
4.	Understand the use of the teach pendant and remote service computer.
5.	Ensure the JCP system, the process tool, and all associated components are at room temperature.
6.	Power up and initialize the JCP system and all devices that interface with the JCP system. The system must be in the following state: • All process tool Load Lock vacuum chambers must be at atmosphere • All process tool Load Lock atmospheric doors must be open

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Step	Action
7.	Follow the alignment procedures in this section in the order presented. Refer to the user manual for the affected component as required.
8.	Record the Station coordinates for the robot in the appropriate worksheet.

Level the JCP System, Stage 2

This section is applicable to systems with SCARA-based automation.

For more detail regarding operation of the robot, refer to the applicable user manual(s).

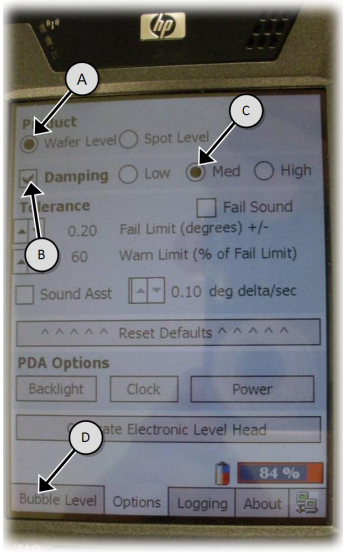
It is important that the MicroTool level is always placed in the same orientation to the robot for all measurements. If the cable is away from the center of the robot, it should always be away from the robot even when leveling LPM, Aligner and PM modules.

Step	Action
1.	Place the appropriate MicroTool Electronic Level on End Effector 1 in the orientation seen in Step 2.

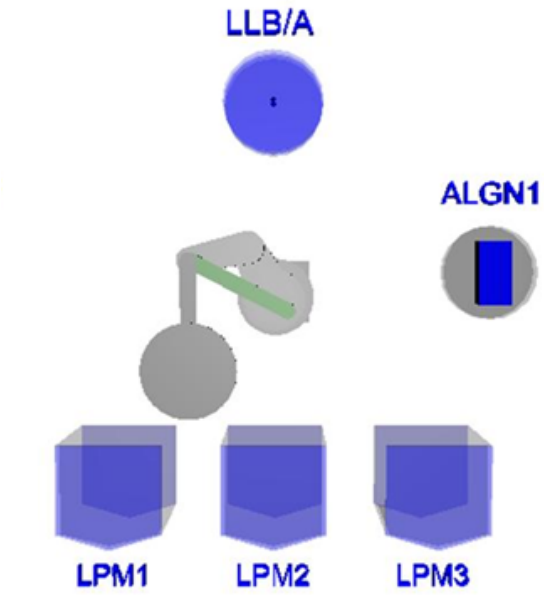
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Step	Action
2.	If the end effector is an active grip style, command the robot to grip the Electronic Level. If the end effector is passive grip style, center the Wafer Level on the pads using a ruler. 
3.	Use the cable clip to strain relief the wire to opening in the back panel so that it does not affect measurement.
4.	Connect the 300mm (or applicable) electronic level wafer to the HP IPAQ Pocket PC or a suitable laptop with MicroTool Software.
5.	Turn on the power.

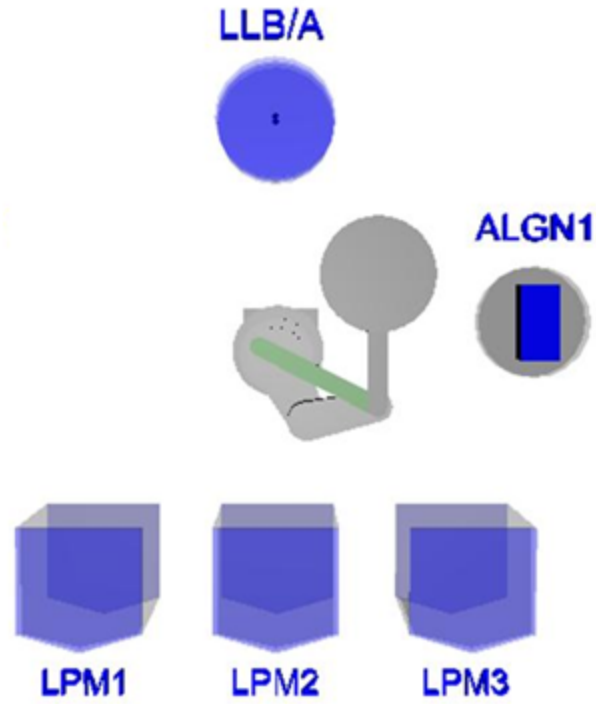
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Step	Action
6.	Select the “Options” tab at the bottom of the MicroTool display. • Select “Wafer Level”. • Select “Dampening” • Select the “Medium” setting. • Select the “Bubble Level” tab. 
7.	Z-axis height of robot should be 300mm or higher by using the Jog function.
8.	If system is equipped with a Track, command the robot near the center of the EFEM.
9.	Servo Off the robot so the arm can be moved by hand.
10.	Readjust the MicroTool cable as necessary.

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Step	Action
11.	Position the arm and end effector in orientation shown below. This is “Position 1”. 
12.	On a piece of paper create three columns and label them “Position, Pitch, and Roll”. Note this location as “Position 1” and write down the “Pitch” and “Roll” readings seen on the MicroTool level. 

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Step	Action
13.	Carefully rotate the turret 180 degrees counter clockwise making sure not to change the position of the forearm and/or the end effector. This new position is known as “Position 2”.  .
14.	On the same piece of paper note this new location as “Position 2” and again write down the “Pitch” and “Roll” readings seen on the MicroTool level.

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<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>15.</td><td>Calculate the pitch and roll "Umbrella Test Target" values:

NOTE: These values will be used for adjusting the leveling of the robot at Position 1.

Table 5-1: Example Chart
<table><tr><th>Position</th><th>Pitch</th><th>Roll</th></tr><tr><td>1</td><td>.012</td><td>.018</td></tr><tr><td>2</td><td>-.008</td><td>-.008</td></tr></table>
Calculating the Umbrella Test Target Pitch:
Calculate the “Maximum Pitch”: Subtract the Position 2 Pitch value from the Position 1 pitch value.
Calculate the “Average Pitch”: Take the “Maximum Pitch” and divide it by 2.
The “Umbrella Test Target Pitch” value for position 1 is the “Average Pitch:

Calculating the Umbrella Test Target Roll:
Calculate the “Maximum Roll”: Subtract the “Position 2” roll value from the “Position 1” roll value.
Calculate the “Average Roll”: Take the “Maximum Roll” value and divide it by 2.
The Umbrella Test Target Roll” value for “Position 1” is the “Average Roll”.

Sample Calculations (Example Chart Data)
Maximum Pitch: .012 - (-.008) = .020
Average Pitch: .020 / 2 = .010
Umbrella Test Target Pitch: = .010
Maximum Roll: .018 - (-.008) = .026
Average Roll: .026 / 2 = .013
Umbrella Test Target Roll: =.013

NOTE: Using the target values calculated above the robot turret will be rotated back to Position 1 and the system will be adjusted to a Pitch of .010 and a Roll of .013.</td></tr>
<tr><td>16.</td><td>Rotate the turret assembly 180 degrees clockwise back to Position 1.</td></tr>
<tr><td>17.</td><td>Adjust the front leveling pads of the EFEM to the umbrella test target Roll value (Tolerance .06°).</td></tr>
<tr><td>18.</td><td>Evenly raise or lower the front leveling pads of the EFEM to the umbrella test target Pitch value (Tolerance .06°).</td></tr>
<tr><td>19.</td><td>Recheck Position 1 and Position 2 (perform steps 9-12). Readjust if necessary.</td></tr>
<tr><td>20.</td><td>Lower the remaining feet on the rear of the EFEM (one at each rear corner) taking care not to change the level of hte JCP system.</td></tr>
<tr><td>21.</td><td>Secure all feet by tightening the jam nut against the frame for eatch foot.</td></tr>
<tr><td>22.</td><td>Stage 2 level complete.</td></tr>
</table>

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Step	Action
23.	Adjustable feet are provided on the JCP system. These feet are used to support the JCP system, to compensate for an uneven floor, and to relieve the casters. The JCP system must be located such that there is user access for service as shown in "Service Access" on page 47. Refer to the "Installation Procedure" on page 55 for instructions on leveling the system. Leveling or adjusting the position is usually only necessary on new installations.
24.	Once the JCP system has been leveled, all of the modules mounted to it through kinematic mounts should be level and properly aligned within the system, eliminating the need for any additional leveling.

DO NOT Adjust the Robot and Track

The ATR robot and ATK track are kinematically mounted within the JCP system. This mounting ensures proper alignment once the system is properly installed. Adjusting the position is only necessary on new Robot installations.

Adjust the Load Port Modules

The Load Port Modules are kinematically mounted to the JCP system. This mounting ensures proper alignment once the system is properly installed. Adjusting the position is usually only necessary on new installations.

Verify Level of the Loadlocks/Process Tool Handoff and Custom Modules

Step	Action
1.	Place a MicroTool Electronic Level on the station bottom surface to record pitch and roll. Make sure the wafer level orientation relative to the robot remains consistentas it was with the system enclosure leveling.
2.	If the surface level is greater than ± 0.10°, recofirm levelness of the entire station.
3.	Place a MicroTool Electronic Wafer Level on the handoff shelf to record pitch and roll. Make sure the wafer level orientation relative to the robot remains consistent as it was with the system enclosure leveling.
4.	If the surface is level within ± 0.10° but the shelf is greater than ± 0.10°, relevel the handoff shelf. ***NOTE:*** *In some cases the station(s) cannot be adjusted, if so make a note and continue leveling the End Effectors.*

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Adjust the End Effector(s)

For Wafer Engine systems, refer to the Wafer Engine in the Jet manual (232460).

Do not adjust the End Effectors until the system enclosure has been fully leveled as well as the critical handoff station(s).

Perform leveling of the End Effector(s) at the most critical station such as Loadlocks or Custom Modules. It is recommended to level at the tightest station if possible. In many cases, the critical station may be very space limited and Load Port stations can then be used.

For more information on leveling end effectors, refer to the applicable robot user manual.

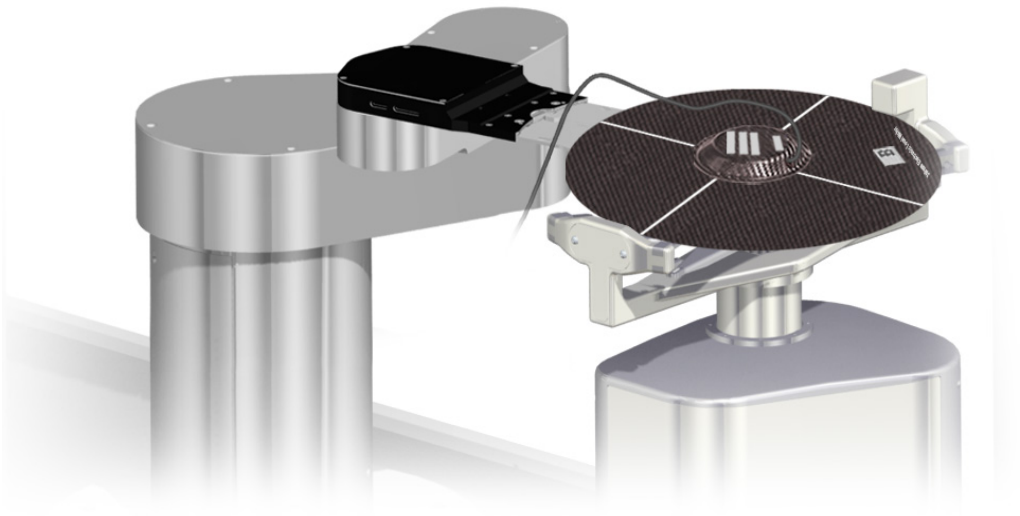
Check level of End Effector(s) at all stations. If necessary, adjust pitch and roll to within 0.06 degrees difference relative to all stations.

NOTE: If the pitch and roll of the critical station(s) differs more than 0.1 degrees from the Load Port stations, it is recommended to adjust the Load Port station leveling to reduce the difference (while, if applicable, keeping the Load Port pitch and Roll within the specifications for OHT handoff).

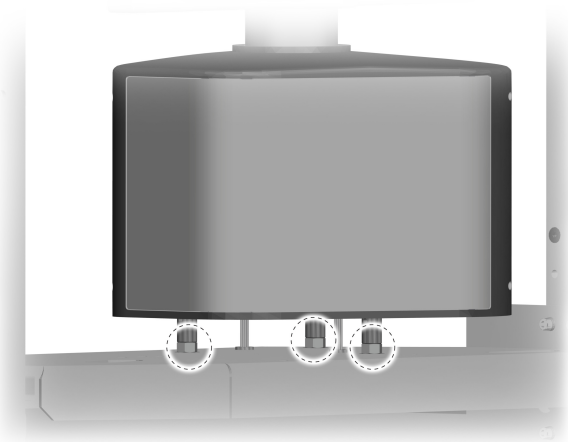
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Adjust the Aligner

The Aligner is leveled relative to the End Effector(s). Do not adjust the Aligner until final adjustment to the End Effector(s) has been made.

Step	Action
1.	Extend the robot arm to the hand-off position of the aligner above the chuck.
2.	Place a MicroTool Electronic Wafer Level on the robot EE and record the pitch and roll values. Make sure the wafer level orientation towards the robot ist he same as thin the previous steps.
3.	Place the electronic wafer level onto the chuck of the aligner and center wafer level, aligning the wafer with the alignment marks on the chuck. Make sure the wafer level orientation relative to the robot remains consistent as it was with the system enclosure leveling. 
4.	Attach the Electronic Level's strain relief clip nearby so there is no interference with the electronic wafer level.
5.	Verify that levelness is within 0 ±04° of the pitch and roll of the EE extended at the aligner position.

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Step	Action
6.	If it is not within specifications, adjust the kinematic mounts using the following steps: a. Loosen the mounting screws. b. Adjust the kinematic mounts to obtain 0 ±04° of pitch and roll relative to the EE. c. Secure the mounting screws. d. Verify that Pitch and Roll have not changed. e. Remove the electronic wafer level.  

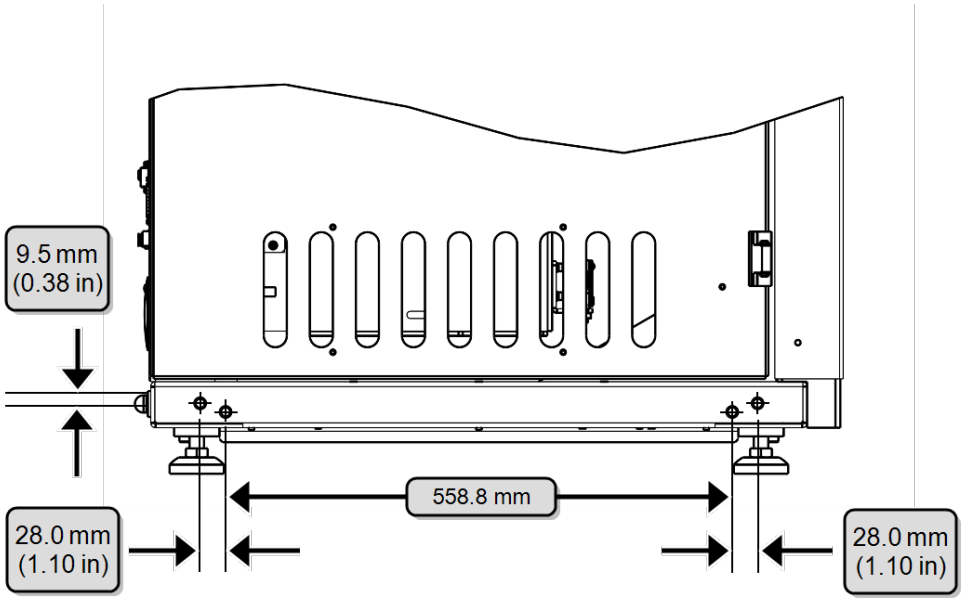
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Mount Tie-Down Brackets

The JCP system has 4 tie-down points that provide anchoring to eliminate movement and provide seismic anchoring for earthquake protection per SEMI S2. Two tie-down points are located on each end.

NOTE: Seismic hold-down brackets for facilities requiring earthquake protection are the responsibility of the user.

The shipping brackets supplied with the JCP system are for shipping only. The user must supply their own brackets and hardware for facility tie-down or seismic tie-down.

Step	Action
1.	Install Grade 5 or better M12 mounting hardware (not supplied) at each of the four tie-down points to secure the user supplied brackets. 
2.	Secure the user supplied bracket to the facility's floor using Grade 5 or better mounting hardware (including flat washers and split washers) and tighten to a torque of 11 newton meters (100 inch pounds).

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Final Checkout

Once all material handling devices in the JCP system have been set up for all transfers, verify proper transfer of material to and from all stations within the system.

NOTE: This procedure must be performed during initial setup and at any time that any material handling device is damaged, removed and replaced, or changed.

CAUTION

Personal Protective Equipment

Breaking material may produce flying shards which may cause personal injury.

- Wear protective eye equipment at all times when using wafers or any other fragile material.



Procedure Category

Type 2 Procedure: Equipment is energized and all energized circuits are covered or insulated. Work is performed remotely using the teach pendant or service computer.

Required Tools and Test Equipment

- MicroTool Dummy Wafer(s) or test wafer(s) of the appropriate size
- FOUP(s) of the appropriate size

Checkout Procedure

Step	Action
1.	Starting at a slow speed, PICK the material from one station and PLACE it into another station while observing the system to verify proper operation.
2.	Repeat step 1 to transfer the material back to its original location.
3.	Repeat steps 1 and 2 for each end effector for each station.

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6. Operation

Overview

This chapter provides a review of the JCP system and general operation instructions for the JCP and the major subsystems. The operation of the JCP system is covered for both normal and emergency conditions.

This chapter is not a complete reference for developing the software and hardware for JCP system operation. The user is required to configure the details of operation for their specific application, such as material transfer routing and option configuration.

When using this manual, always refer to the appropriate documentation for the specific components used on your system.

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.



Station Naming System

Control software uses a station naming system for identifying specific locations within the JCP system and the system it is interfacing with, as shown in Figure 6-1. The JCP systems use a true Cartesian coordinate system where each station is given a name and identified by its X, Y, and Z position. By identifying the stations in this manner, it is only necessary to provide the controller with

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the station name instead of the complete coordinate set each time a station related command is issued. Multiple station names may be given to a single physical location.

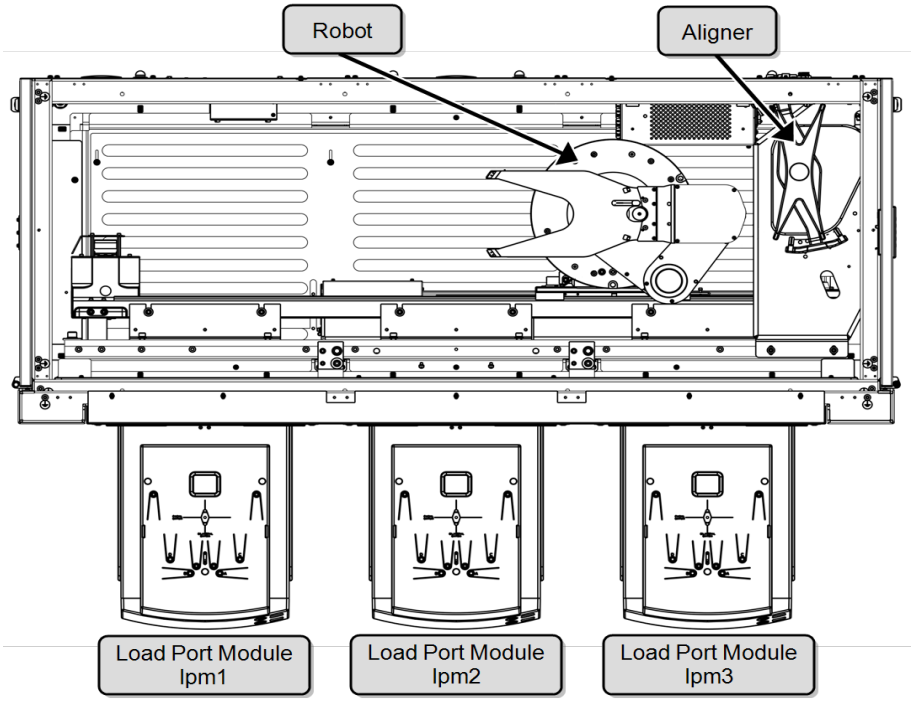


Figure 6-1: Typical Station Assignments - JCP System 2

Brooks Automation configures the stations on the JCP systems as shown unless different station assignments are specifically requested. All references to setting stations in this manual will reflect the standard Brooks EFEM station assignments.

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Frame of Reference

Before setting stations or using the JCP system, it is important to understand the Frame of Reference used within the system.

Material is transferred to specific locations, or stations, within the system by the robot. Each location is defined by its X, Y, and Z position within the system's Frame of Reference. Station definition is the process of defining each of these locations, which are then stored in the controller's memory for future reference. It is important to note that the system's frame of reference is defined by the controller, as described below, and that each station is defined by the X, Y, and Z coordinates, and by other station values.

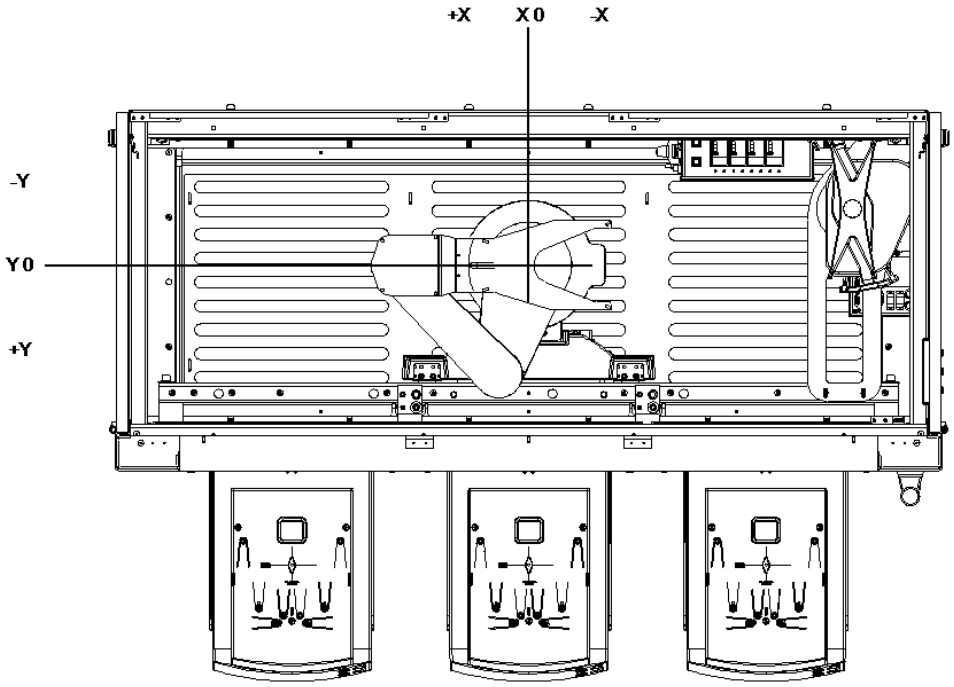


Figure 6-2: Typical Global Cartesian Frame of Reference - Fixed Robot

System Frame of Reference

The typical frame of reference for the JCP system is defined by the global Cartesian coordinate system. The top view shown in Figure 6-2 is a horizontal x-y plane, and each position within this plane is defined using a Cartesian coordinate notation. The third axis in the JCP system's Frame of Reference is the vertical, or Z, axis.

When the robot is mounted in a fixed location, as shown in Figure 6-2, the system's origin is centered on the robot as shown. When the robot is mounted on a track, the system's origin is centered on the robot's position when the track is at its Home location, as shown in Figure 6-3.

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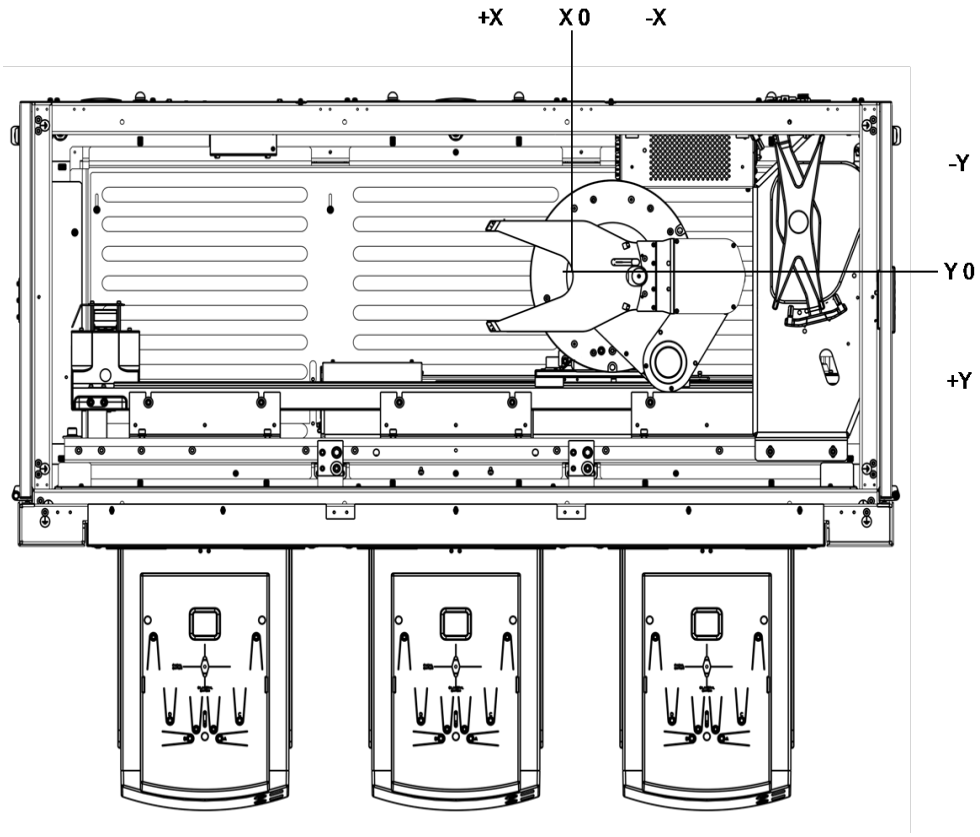


Figure 6-3: Typical Global Cartesian Frame of Reference - Robot on Track

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Safety Interlocks

The JCP system is provided with safety interlocks to ensure the safety of the operators and service personnel.

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
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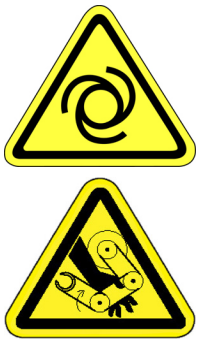
WARNING

Automatic Movement

The possibility of automatic movement exists with JCP system components. These components do not have obstruction sensors and may cause death or personal injury.

The Robot, Track, Aligner, Load Port Modules, and FFU Fans all have the possibility of automatic movement:

- Safety interlocks may require being overridden while using the JCP system's Teach Pendant.
- The user is responsible for any damage to the JCP system or their system as a result of using the teach pendant incorrectly.



Door Interlock Circuit

Access to the JCP system mini-environment is through the tool secured side doors. These doors contain an interlock switch that when opened will stop all automation within the JCP system and if connected may also stop the process system.

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Emergency Off (EMO) Circuit

The optional EMO button(s) supplied with the JCP system is provided to allow the user to conveniently expand the tool EMO system to the front of the EFEM. A pass thrrough connection for the user's EMO circuit is provided at the facilities panel through a male M12 connector. The action caused by pressing the EMO button is determined by the user. Correct implementation should be made according to SEMI-S2.

NOTICE

The robot controller may contain an Uninterruptable Power Supply (UPS) that is used to provide a controlled shut-down of the robot and of the controller in the event of power loss.

Start-Up

The JCP system is started by applying power and plant facilities as previously specified. Once this is done, the JCP system is ready to operate and will accept commands over the Ethernet communications line.

NOTE: All switch settings, communications connections, power connections, and facilities connections should be made before power is applied.

This section describes the recommended procedure for powering up the Brooks Automation JCP system under normal circumstances.

Step	Action
1.	Verify that all of the installation procedures previously outlined have been completed.
2.	Ensure that all switch settings are set according to the instructions.
3.	Turn on the PDU starting with CB1, then CB2, CB3, and finally CB4. • FFU Display turns on • Interior service lights turn on
4.	Turn on all load ports.
5.	Turn on the robot automation controller. • Refer to the robot user manual for correct initialization sequence. • For Wafer Engine systems, refer to the Wafer Engine in Jet Manual (PN 232460).

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Step	Action
6.	If the initialization sequence executes without error, then all the components are communicating successfully.
7.	Ensure all components are properly referenced (home the robot, home the aligner, initialize the load ports, set FFU to auto mode, etc.).

Normal operation of the Brooks Automation JCP system is controlled by the user's host controller. Normal operation would typically proceed as follows:

Step	Action
1.	Power up the JCP system as previously described.
2.	Power up the user's host controller as directed.
3.	Once all systems are up and running properly, proceed as directed by the user's host controller.

Normal Running

The exact usage of the JCP system must be determined by the user. Each component has been described in this manual with the intention of providing the user with the knowledge to use this tool in the most appropriate manner for their application.

Safe Shutdown

The following shutdown procedure is used to remove power from the JCP system in an orderly manner and place the components within the JCP system in safe conditions. This procedure is used to prepare the system for repair, removal, or maintenance.

NOTE: When the host controller is to be shut down, the JCP system should be shut down first.

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NOTICE

The shutdown procedure is used in the normal shutdown of the JCP system.

This procedure completely removes the power source and all other facilities to the JCP system and provides guidelines for lockout/tagout.

This procedure is NOT the same as an EMO circuit or other safety interlock.

Step	Action
1.	All material transfers should be completed (move all material to the appropriate LPMs).
2.	Command all modules (robot, aligner, LPM, etc.) to a known safe position (e.g., Home). Ensure that the appropriate software is shutdown properly.
3.	Turn off and relieve all pressure from process supply lines to the JCP system (e.g., vacuum) compressed air if applicable.
4.	Shut down the robot controller. a. See the Automation User manual for correct procedure for shutdown. b. Shut down the controller by turning off the power switch.
5.	Turn off Power at the PDU in sequence starting with CB4, CB3, CB2, and then the main power CB1.
6.	Remove the power cable from the source and disconnect it from the JCP system.
7.	If moving the JCP system, disconnect the communication cables and pneumatic tubes to the JCP system and to the facility panel. Note that the vacuum line may or may not go through the facility panel.
8.	Secure the JCP system using Tagout procedures defined by the facility. The JCP's main power circuit breaker CB1 includes a padlock bar to be used as a lockout/tagout device for the JCP system. Follow local lockout/tagout procedures. If no such procedures exist, follow the procedure for Lockout/Tagout in OSHA Standard 29CFR 1910.147.
9.	If applicable, secure the compressed air supply line using tagout procedures defined by the facility. These procedures may include an isolating device to prevent the supply lines from being connected into the facilities supply, along with information about the purpose of the tagout and the person responsible. If no such procedures exist, follow the procedure for Lockout/Tagout in OSHA Standard 29CFR 1910.147. ***NOTE:*** *This procedure only shuts down facilities to the JCP system and its subsystems. Any user equipmTent will remain powered up.*
10.	Verify that Power has been successfully shut down by testing the AC outlets on the PDU using a volt meter.

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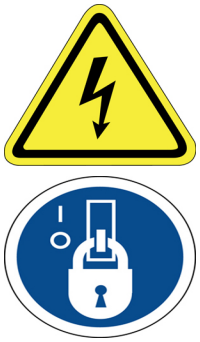
Lockout/Tagout Procedure

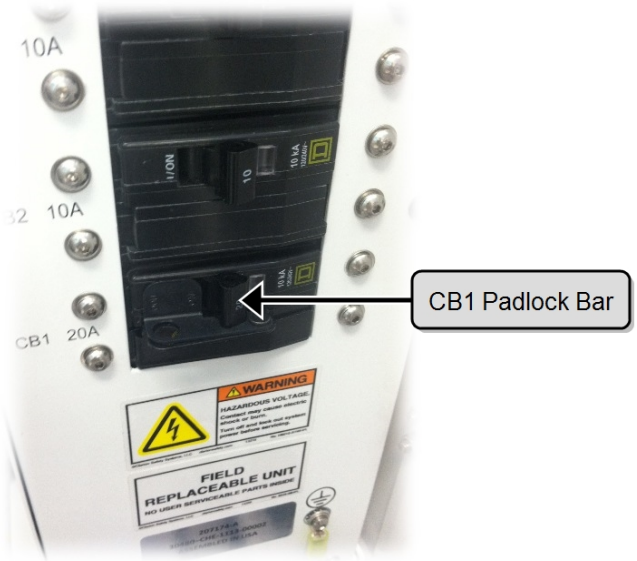
WARNING

Lockout / Tagout

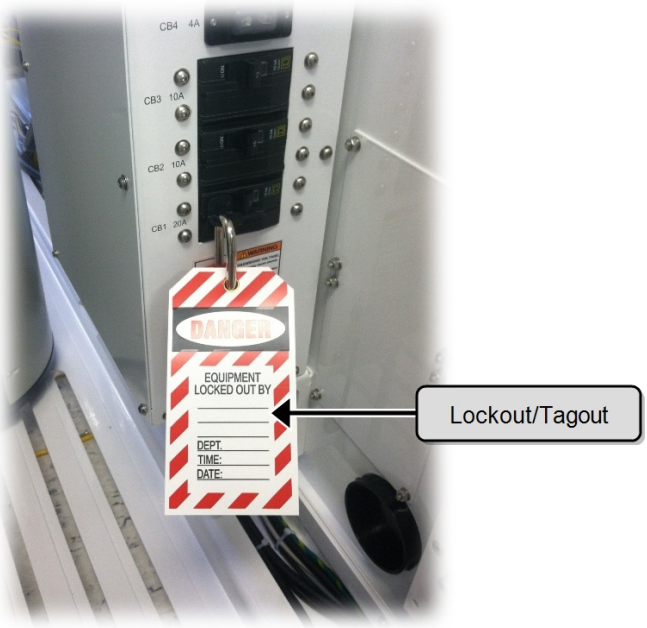
Working with energized equipment may cause sudden movement or electrical shock and may result in death or serious injury.

- All energy must be removed from the equipment per the facility's Lockout/Tagout procedure before servicing.
- If local procedures are not available, follow the procedure for Lockout/Tagout in **OSHA Standard 29CFR 1910.147**.



Step	Action
1.	Notify affected personnel that a lockout/tagout is required.
2.	Complete safe shutdown of the JCP EFEM per process in "Safe Shutdown" on page 92.
3.	Turn off PDU circuit breakers in sequence: CB4, CB3, CB2, CB1.
4.	Rotate CB1 padlock bar to the locking position as shown. 

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Step	Action
5.	Attach a lock and warning tag onto the locking bar as shown. 
6.	Use a volt meter to electrically verify that the JCP EFEM is de-energized.
7.	Complete the necessary maintenance or work to the tool.
8.	Inspect the work area to ensure that non-essential items have been removed and that components are intact and capable of operating properly.
9.	Check the area around the equipment to ensure that all employees have been safety positioned or removed.
10.	Remove only the locks and tags you have attached.
11.	Notify affected employees that locks and tags have been removed immediately after removing locks and tags and before starting equipment.

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Outrigger Configuration Procedure

This procedure describes rotating the rear outrigger wheel position for flush JCP installation. The JCP should be in front of its final location before performing these steps.

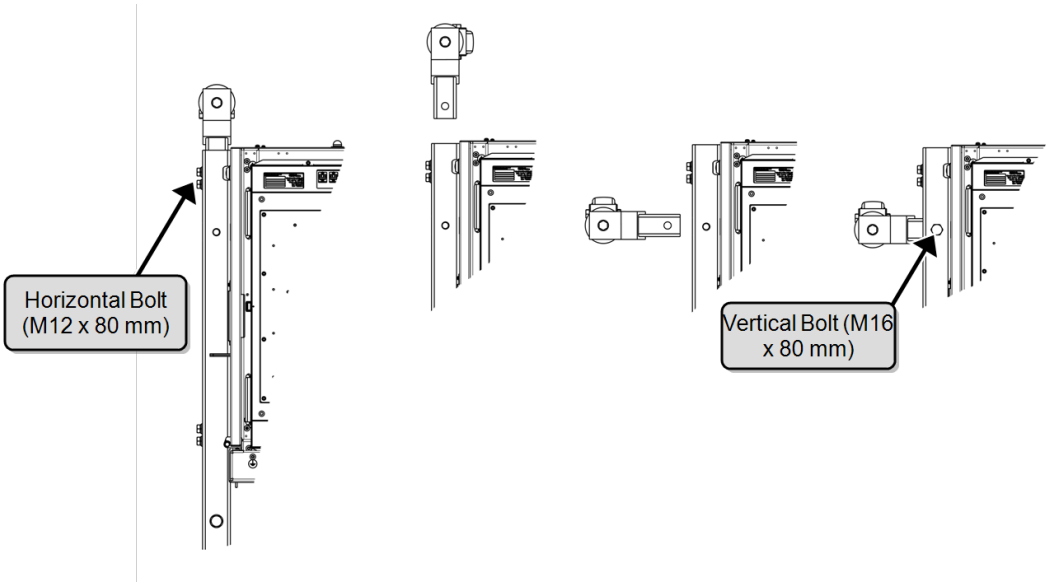
CAUTION

Tipover Hazard

This product has a high center of gravity which may cause the product to tip over causing serious injury.

- JCP EFEM must not be transported with outriggers in alternate position. Use only for final positioning.



Step	Action
1.	Remove the 4 fork tubes from the bottom of the system if they have not already been removed.
2.	Adjust the casters until the wheels are no longer in contact with the floor and the EFEM is sitting on the leveling pads.
3.	Remove the horizontal bolt retaining the caster. Remove the spare vertical bolt from the top of the outrigger assembly and set it aside. 
4.	Remove the caster and replace the horizontal bolt in the outrigger assembly.

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Step	Action
5.	Align the caster with the cutout on the outrigger assembly and insert the caster into the cutout.
6.	Secure the caster using the vertical bolt retained from Step 2.
7.	Lower the wheels to lift the JCP slightly off the ground.
8.	Move the JCP into position.

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Fan Filter Unit with Active Pressure Control (FFU)

The Fan Filter Unit (FFU) provides airflow and filtering to maintain an ISO Class 1 or better material handling environment within the JCP system while maintaining positive internal pressure.

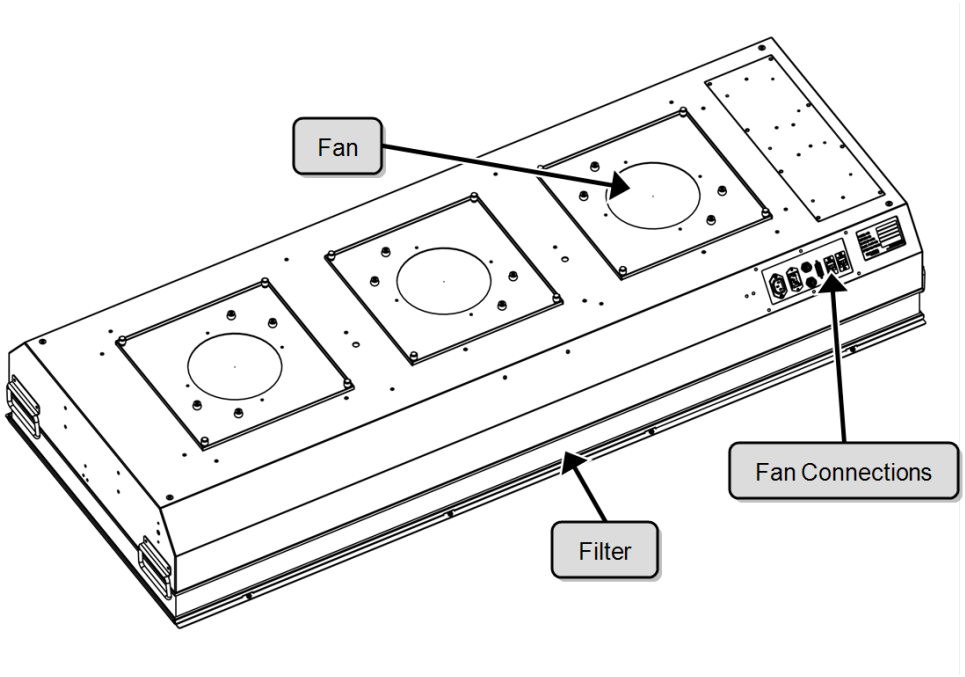


Figure 6-4: Typical Fan/Filter Unit

Description

The Fan/Filter Unit is equipped with an active differential air pressure that provides set-point monitoring.

The FFU operates between 200-240VAC. Communications is through Ethernet Modbus TCP protocol. A touchscreen display is provided for monitoring FFU status and changing the set points. All features may be set and monitored via Ethernet. Additional discrete IO is available through a DB9 connector. Fan and pressure status only are available through discrete IO.

The pressure set point and alarms are factory set to meet SEMATECH best practices and ISO Class 1 specifications. Changing the pressure set point and EFEM vent louvers may cause the EFEM to be out of spec with ISO Class 1 specifications.

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Theory of Operation

The FFU provides a clean, laminar air flow through the mini-environment. User adjustable and monitored fan speed provide air control with the doors closed. All controls are accessed and controlled through software, eliminating moving parts.

Operational Interlocks

- If a fan fails or operates erratically, an indicator light is activated, and a signal is sent to the host.
- If the pressure in the mini-environment deviates from the set point, an indicator light is activated, and a signal is sent to the host.

Start-Up

To start the Fan/Filter Unit, ensure it is in a safe state and connected to the power distribution unit. Once the controller is running, the FFU is controlled through the Ethernet connection. The FFU will automatically ramp up to its set-point without manual intervention in the mode it was previously set to.

Basic Fan/Filter Unit Functions

All FFU functions, including fan speed, are controlled and monitored through an Ethernet connection. Fan motor and pressure alarms are also available on discrete IO.

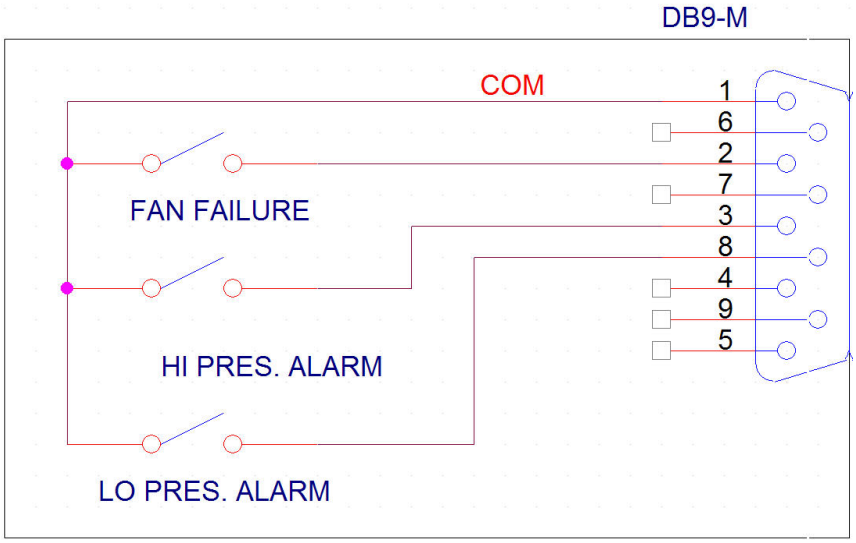


Figure 6-5: Typical FFU IO Connector Pinout

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Shutdown

To shutdown the Fan/Filter Unit, remove power from the power distribution unit.

Automatic Pressure Control Display Operating Procedure

Main Screen Operation (Function F1)

Pressing Function key F1 will display the main screen.

1. Differential Pressure Reading - The pressure transducer will display real time pressure readings in both units of Pascal and inches of water column ("Wg).



Figure 6-6: Main Screen (F1)

a. **Auto Speed Mode Button** - Enabling this mode will automatically adjust the fan motor speed to maintain the differential pressure set point value.
b. **Manual Speed Mode Button** - Enabling this mode will set the fan speed to the manual speed set point.
c. **PID Speed Output** will display the output of the PID controller. The value is shown in percentage of maximum fan speed. This display value is only valid during Auto Speed mode.
d. **Differential Pressure Set Point**
   - The differential pressure set point is displayed in units of Pascal. When pressed, a keypad will appear allowing the set point to be changed. Set point must be set in units of Pascal.
   - The differential pressure set point is also displayed in units of inches of water column ("Wg).

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e. **Manual Speed Set Point** - will display the manual speed set point in percentage of maximum fan speed. When pressed, a keypad will appear allowing the set point to be changed. Acceptable values are 0 - 99.99%.

Alarm Screen Operation (Function F2)



Figure 6-7: Alarms (F2)

Pressing the function key F2 will display the Alarms screen. Pressing F2 again or F1 will return to the main screen.

a. **Low Differential Pressure Alarm** - This indicator will flash when the M-E differential pressure falls below the set point. The alarm will activate after the delay time set point. When pressure returns above the set point, the alarm will deactivate.
b. **Low Pressure Alarm Set Point** - This button will display the low differential pressure alarm set point. When pressed, a keypad will appear allowing the set point to be changed.
c. **High differential Pressure Alarm** - This indicator will flash when the M-E differential pressure rises above the set point. The alarm will activate after the delay time set point. When pressure returns below the set point, the alarm will deactivate.
d. **High Pressure Alarm Set Point** - This button will display the high pressure alarm set point. When pressed, a keypad will appear allowing the set point to be changed.
e. **Delay** - This button will display the time delay set point for both alarms to activate. When pressed, a keypad will appear allowing the set point to be changed.The delay can be set to 0 or in increments of 1 minute. Non-zero values will prevent unintended alarm signals during the delay time.

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Fan Speed Status Screen

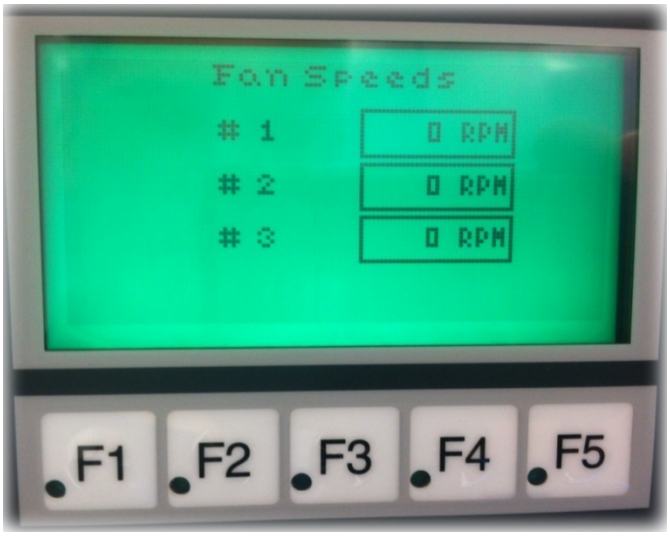


Figure 6-8: Fan Motor Speeds (F3)

Pressing function key F3 will display the Fan motor status screen. Each fan motor is displayed in units or RPM. There are no function buttons in this screen. Pressing F3 again or F1 will return to the main screen.

Internal Setup

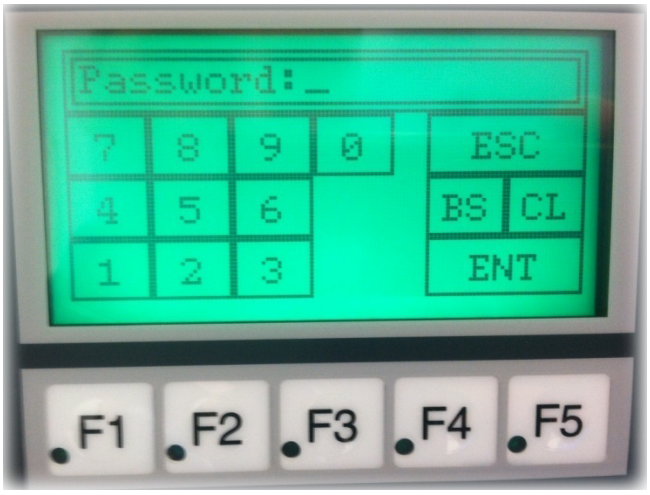


Figure 6-9: FFU Settings (F5)

This screen provides access to factory PID control settings. Contact Brooks Automation support. Pressing ESC will return to the main screen.

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NOTE: PID control settings are factory calibrated for optimal performance for the JCP EFEM. Changing these settings without proper procedure and test equipment may reduce the mini-environment cleanliness performance and the life expectancy of the fan motors and filter media.

Facilities Panel

The facilities panel, shown in Figure 6-10, is the user interface to the Brooks Automation JCP system. It provides a central location for all facilities, communications, and control connections.

The facilities panel is mounted inside the mini-environment on the Service Side on the rear of the system next to the power distribution unit. For some specialized installations, the facilities panel may be mounted in other locations or orientations.

Access to an internally mounted Facilities Panel for user connections can be granted through the cable port below the facilities panel.

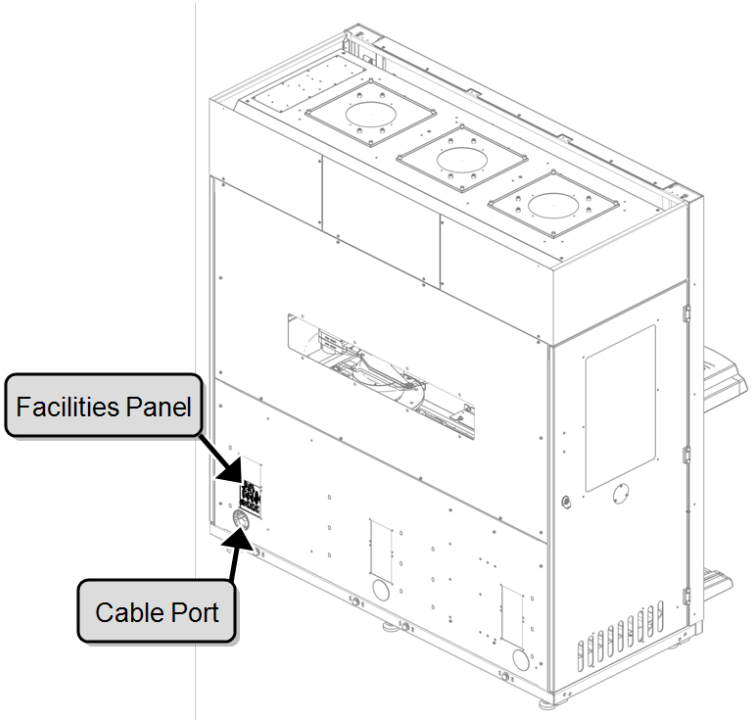


Figure 6-10: Typical Facilities Panel

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Facilities Panel Functions

The facilities panel provides the following functions:

- Creates a central connection point for all JCP system facilities connections
- Enables complete access to the controller through an RJ-45 connector for use with IEEE 802.3 style communication (Ethernet)
- Provides a central location for all user connections (EMO and User Interface)

The JCP system is controlled by a single cable from the host controller using an Ethernet LAN. Different configurations of the JCP system provide different external interfaces.

Connections, Controls, and Indicators

Table 6-1 shows the location of all connections found on the facilities panel. Table 6-1 lists the connections found on the Facilities panel, and shows which type of connectors are used.

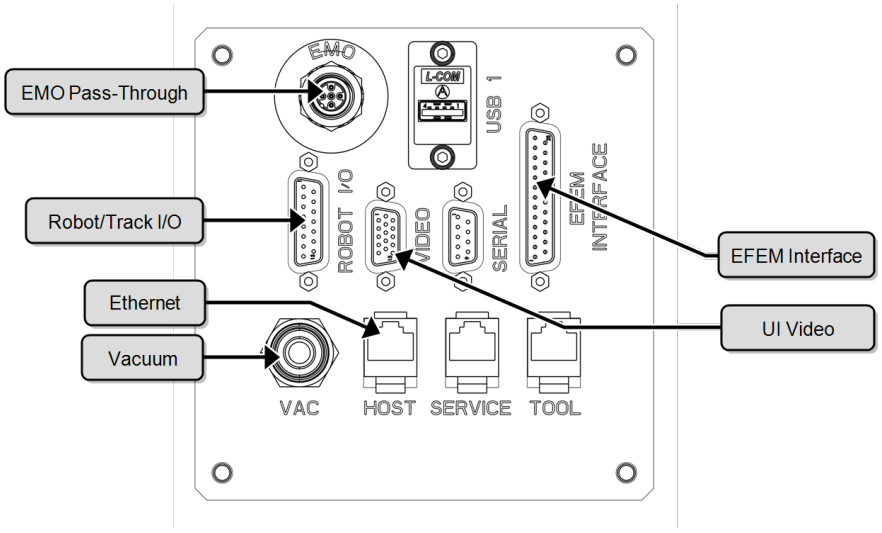


Figure 6-11: Typical Facilities Panel Connections

Table 6-1: Typical Facilities Panel Connections

Label	Description	Connector Type
EMO	Pass through connection to EMO button for user EMO circuit	Male M12 Pin
Robot I/O	Robot Parallel I/O	DB15
Host	Ethernet from Host Controller to controller	RJ-45
Service	Ethernet to controller and other JCP system devices	RJ-45
Tool	Spare Ethernet pass-through for additional devices	RJ-45
Video	User Interface video connection	Female HD-15

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Label	Description	Connector Type
VAC	Vacuum	8 mm Quick Connect
USB	User Interface Keyboard/Mouse	USB A

Power Distribution Unit - PDU

The power distribution unit (PDU), shown in Figure 6-12, provides a single point for connection to the plant's facilities for AC power. The PDU distributes AC and DC power to all installed devices in the JCP system which provide their own conversion from AC power or are connected to the DC power source within the PDU.

PDU is located in the rear of the JCP EFEM on the Service Side. It is easily accessible for service. User connection access is through the cable port below the facilities panel.

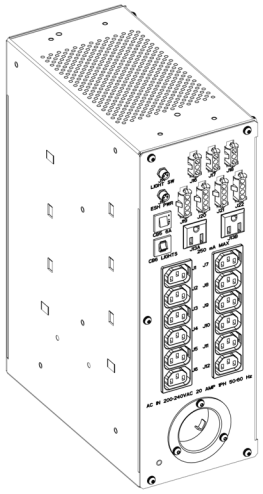


Figure 6-12: Typical Power Distribution Unit

PDU Functions

See the associated block diagram for more information.

Connections, Controls, and Indicators

The location of the user accessible controls on the PDU are shown in Figure 6-13. The descriptions of the controls are shown in Table 6-3.

The locations of the connections on the PDU are shown in Figure 6-13. The descriptions and types of connectors that are used are shown in Table 6-3.

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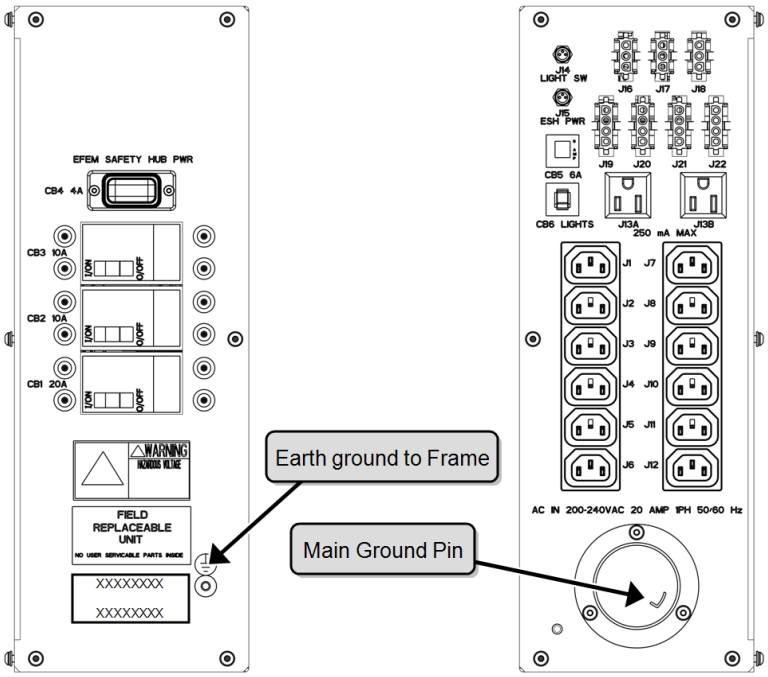


Figure 6-13: Typical Power Distribution Unit Connections and Controls

Table 6-2: Typical Power Distribution Unit Controls

Name	Type	Function
CB1	Circuit Breaker, 20 A	Main AC Power
CB2	Circuit Breaker, 10 A	AC to J1-J6 and internal 24VDC Power Supply
CB3	Circuit Breaker, 10 A	AC to J7-J12 and AC transformer to interior lights
CB4	Circuit Breaker, 4 A	24VDC and power switch to EFEM Safety Hub

Table 6-3: Typical Power Distribution Unit Connections

Label	Description	Connector Type
AC IN	200-240 AC power inlet, 20A	NEMA L6-20
J1-J6	100-240 AC power outlets, 10A, CB2	IEC320
J7-J12	100-240 AC power outlets, 10A, CB3	IEC320
J13A-J13B	Interior Lights Power, 120V, 0.25A max	NEMA 5-15
J14	Interior Light Switch connection, 0.5A max	M8 3-pin receptacle

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Label	Description	Connector Type
J15	EFEM Safety Hub Power, 4A max	M8 3-pin receptacle
J16-J19	General purpose 24VDC, 0.5A max each	Mate-n-Lock 3-pin receptacle
J20-J22	General purpose 24VDC, 6A max total	Mate-n-Lock 4-pin receptacle

Internal Lighting

Internal lighting to monitor operation within the JCP system EFEM is provided by a white or amber LED lamp system.

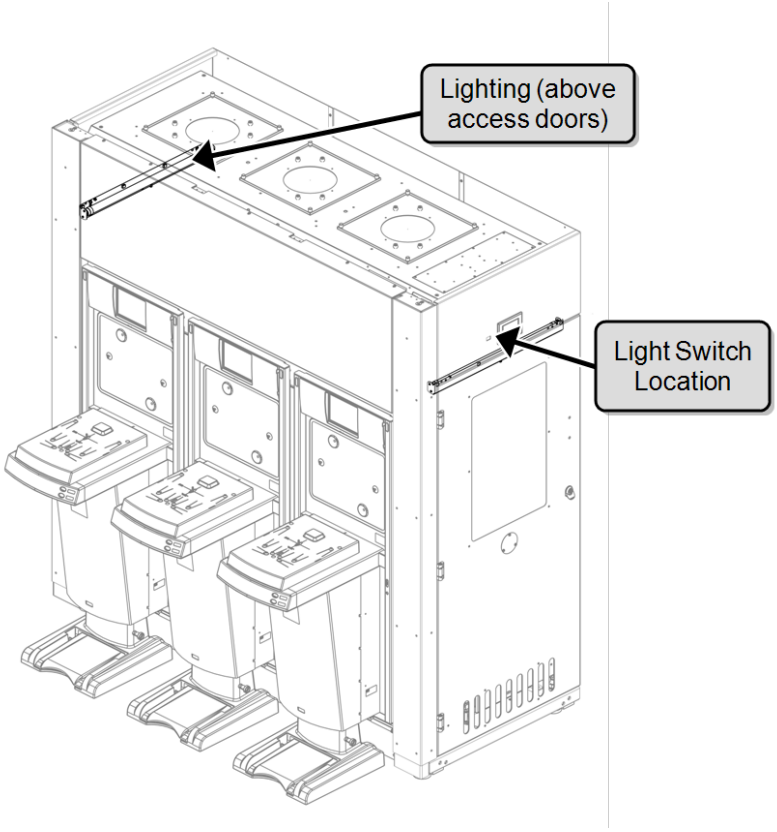


Figure 6-14: Optional LED Lighting, Typical

Description

The internal lighting fixtures provide lighting within the material handling zone of the JCP mini-environment with LED light tubes installed above the EFEM access doors.

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The LED tubes are powered by a 120V isolation transformer with .25A overload protection. The lights can be switched on and off from a switch mounted externally on the upper door or panel on the service side. Optional Amber lights are available.

JCP Level 1.5 Controls Using JCP Safety Relay

JCP Safety Relay

The JCP Safety Relay achieves a SIL2 safety rating according to EN 62061 and PL d/Category 3 according to EN 13849-1. In reference to the risk assessment, this relay mitigates most personnel safety risks during normal operation only. Teaching and maintenance tasks that require the automation to be enabled require an interlock bypass key to be installed. Use of this key disables all safety protections of the access doors without secondary risk mitigations. Training and risk mitigation in the use of an interlock bypass key is the responsibility of the OEM and end user.

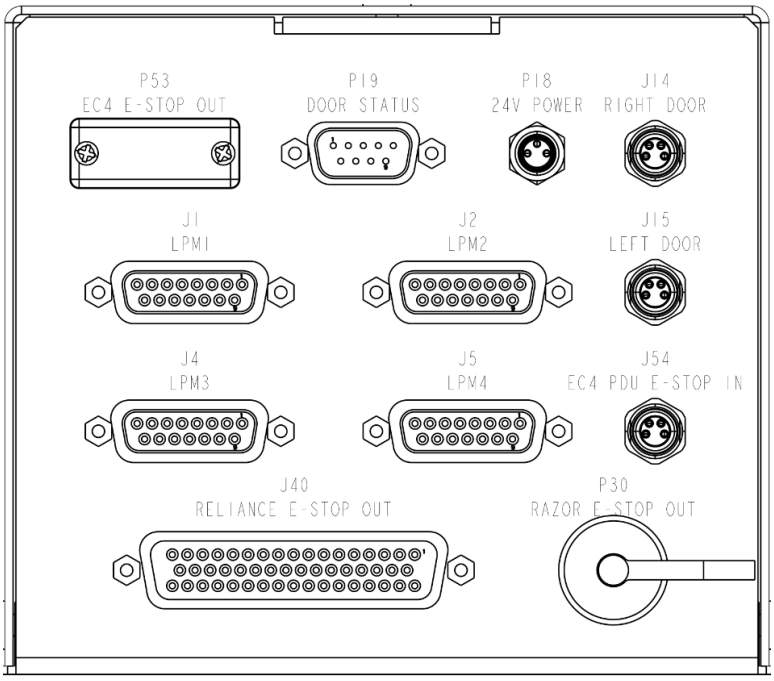


Figure 6-15: Typical Safety Relay

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Interlock Bypass Key

The Interlock Bypass Key is used only on systems that do not include a Brooks Safety Hub. The key is tethered to the JCP frame below the interlock switch. Bypassing the EFEM access door interlocks will allow the robot to be enabled and allow Vision load port door motion.

The Service Key is only to be used by trained personnel and is only meant to be used while performing service on the JCP system. The JCP system should never be run with the Service Key inserted or the doors open. The Service Key overrides the EFEM Access Door Interlock.

WARNING

Automatic Movement

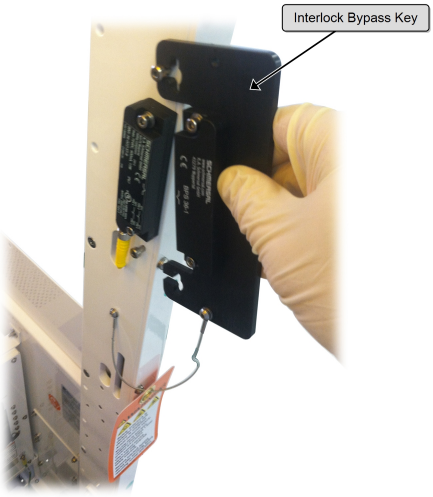
If the Door Interlock on the mini-environment is disabled, the possibility exists of automatic movement of components within the JCP system. JCP components do not have the obstruction sensors and may cause death or serious injury.

- Use of the JCP system when the Door Interlock is bypassed is at the user's own risk.
- The Robot, Track, Aligner, Load Port Modules, and FFU Fans may move automatically.

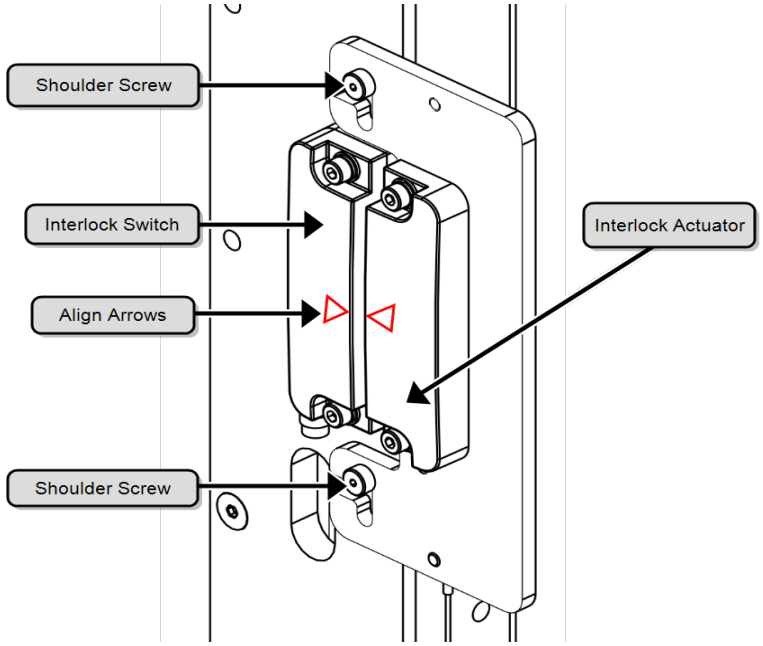


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Interlock Bypass Key Usage

Step	Action
1.	Hook the top slot over the upper shoulder screw. 
2.	Rotate the key to capture the lower shoulder screw. 

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Step	Action
3.	Push the key down to lock it in place so that the arrows of the interlock switch and actuator are aligned. The Actuator and Switch should be nearly touching. 

EFEM Safety Hub, Level 2.5

The ESH comes with Level 2.5 Controls systems and does not apply to Level 1.5 Controls systems with the standard EFEM Safety Relay.

Detailed information for the EFEM Safety Hub including interfacing schematics, troubleshooting and diagnostic information can be found in the EFEM Safety Hub manual specific to the robot automation configured in the JCP manual.

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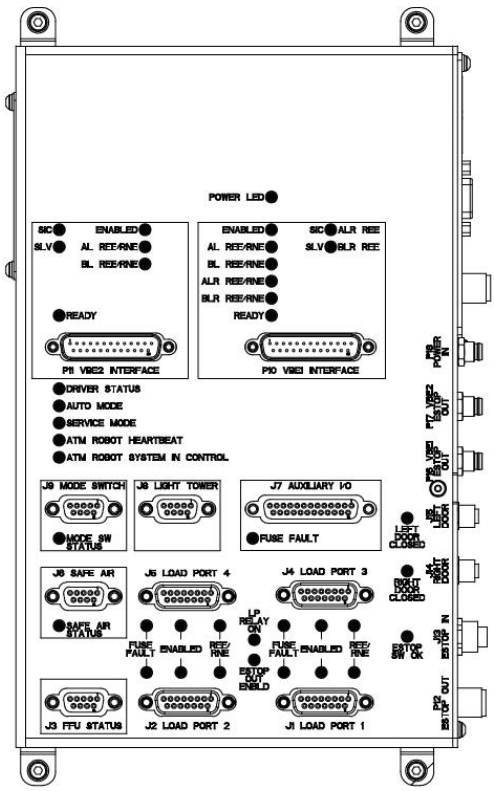


Figure 6-16: Typical EFEM Safety Hub

See the Safety Hub manual for more information.

ESH Connections

See the Safety Hub manual for more information.

Safety Interlocking

The ESH is designed to mitigate or remove all human and machine safety related hazards within the JET EFEM identified by a thorough risk assessment. The ESH provides operator and service personnel protection using appropriate methods of safety control of automation such as reduced robot speed and torque during service, preventing automated door movement. The ESH also protects equipment and product by preventing robot collisions with automated doors and valve. The ESH also has provisions to be used as a global emergency stop system.

Operation Mode Selection Key Switch

The mode selection key switch has three states. AUTO - HALT - SERVICE. All state changes must pass through HALT. The key can be removed in all but the service position. The switch also

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includes a status indicator light and a buzzer alarm.

> ***NOTE:*** Switch may be marked with AUTO - RESET - MAN (manual).

See the Safety Hub manual for more information on the following topics:

- Load Port Interlocking/Handshaking
- Atmospheric Robot Interface
- Process Module Interface
- EFEM Access Door Interlocks
- Operation Modes
- Light Tower Connection
- Safe Air Valve
- FFU Status
- Auxiliary I/O
- Emergency Stop IN/OUT
-

Teach Pendant

A teach pendant is a hand held device that is connected directly to the robot controller for the purpose of teaching and diagnostics of the robot. The device includes an emergency stop switch and a 3-position enabling switch that must be held in the center position to allow the robot motors to be powered.

Robot Enabling Device

A robot enabling device is a hand held control that is directly connected to the robot controller. This device may be used in lieu of a teach pendant on certain robot models, in conjunction with an alternative teaching device such as a laptop computer. The device is equipped with both an emergency stop switch and a 3-position enabling switch that must be held in the center position to allow the robot motors to be powered.

EMO Button

An optional Emergency Off (EMO) Button is provided on the JCP for the user to configure to provide emergency off signal to the equipment to which the JCP is attached.

The EMO is typically mounted on the front of the mini-environment on either side of the LPMs. It is wired to the facilities panel which provides a pass-through connection for wiring convenience.

The action caused by pressing the EMO button is determined by the user. The user is responsible for the EMO circuitry. Typically, the button is configured so that pressing it removes all power from the JCP system. Once the emergency is resolved power can be restored to the EFEM as described in "Power-up Sequence" on page 68, and processing can be restarted.

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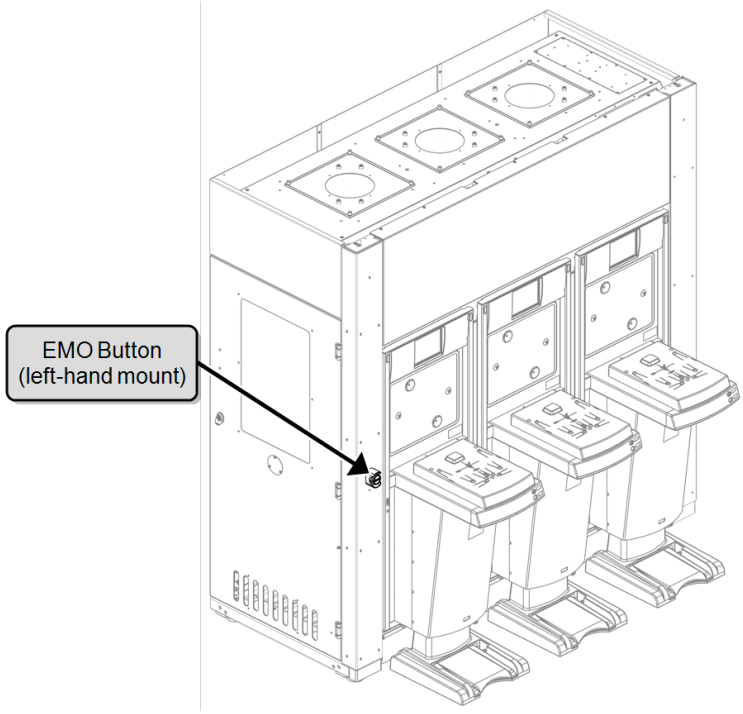


Figure 6-17: Typical EMO Button

Emergency Stop Button

An Emergency Stop button can be provided on the JCP for the purpose of stopping the JCP system automation. An E-Stop button is required by the EU Machinery Directive. Additional modules attached to the JCP system may be connected to the JCP Emergency stop system should the user require it. The E-Stop button will typically be located in the same area as the EMO as shown in Figure 1-1.

Ethernet Switch

The 10/100 Mbps Ethernet Switch provides a single point of connection for internal Ethernet communication within the JCP system. It provides distribution for up to fifteen Ethernet devices. The switch is located inside the mini-environment on the lower rear electronics panel.

Switch Operation

The devices connected to the Ethernet Switch are accessed through standard Ethernet communications to the specified IP Address for each device connected to the switch. LEDs on the switch indicate the status of each Ethernet channel. Refer to the System Block Diagram and OEM manuals supplied with this manual for additional information.

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Optional Ionizers

An optional ionization system is available to help eliminate electrostatic discharge (ESD) and particle contamination caused by electrostatic attraction within the JCP system. The system guarantees intrinsically balanced ionization without the need for complicated feedback circuits, and no adjustment is required.

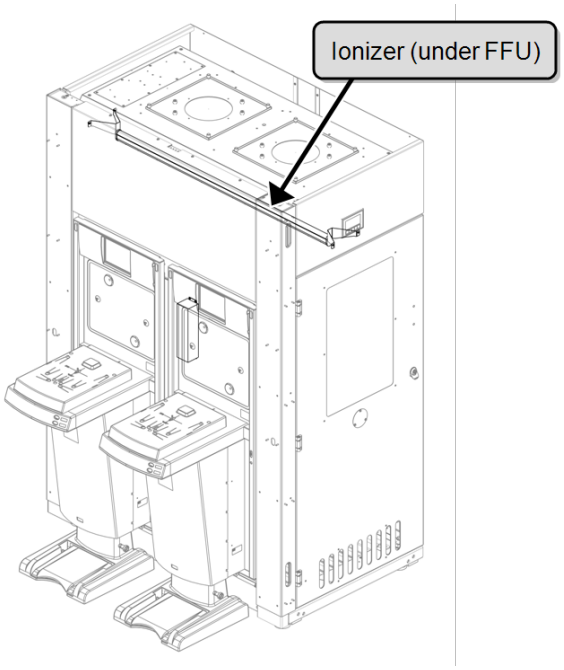


Figure 6-18: Typical Optional Ionizers

Description

The Ionizer is mounted in the top of the mini-environment below the air filter. The ionizer features a unique aerodynamic design that ionizes a local area with minimal disruption to the laminar air flow and an intelligent controller. The output and balance of the ionization unit can be adjusted, providing reduced maintenance cost and better alarm handling. Ionizer status and alarms are displayed through its controller software.

The ionizer can be controlled and monitored over Ethernet. It may also be configured as a resource within the Jet system's workspace, allowing the robot controller software to monitor status.

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Optional Optical Character Reading Mounting

Mounting for user installed Optical Character Reader (OCR) systems is available as an option. These mounts support cameras at the aligner for top surface scanning, bottom surface scanning, or both top and bottom scanning.

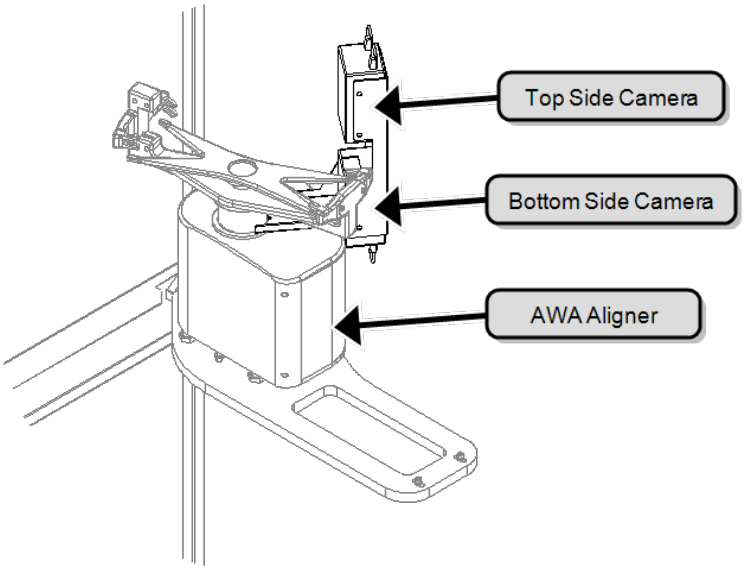


Figure 6-19: Typical Optional OCR

Description

The optional OCR mounting system is designed to hold an OCR camera at the correct distance from a wafer on the AWA aligner to read the Wafer ID (WID) information etched into the wafer. The aligner provides precise positioning of the wafer at the camera to locate the WID for scanning. All camera control and OCR conversion are performed by the user's controller.

Mounts are available to hold cameras for top, bottom, and top and bottom scanning as shown in Figure 6-19. The cameras currently supported by the optional OCR mounting system are:

- Cognex OCR

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Optional Light Curtain

An optional Light Curtain can be installed on the front of the JCP system. While this option is typically installed on JCP systems used with OHT systems, it can be installed on any JCP.

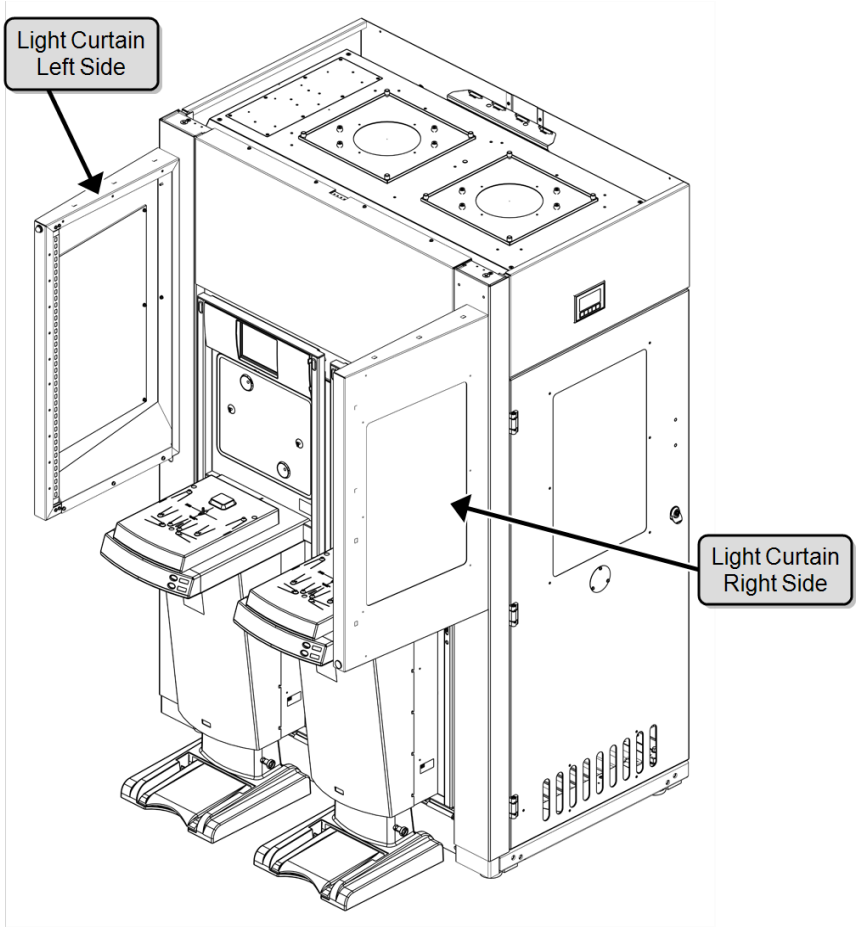


Figure 6-20: Typical Optional Light Curtain

Description

The Light Curtain provides product and operator safety when an operator manually accesses the Load Port Modules attached to the JCP system. The user accessible areas of the LPMs are separated from the general facility area by the light curtain. The top of the light curtain is open allowing access by an OHT system.

Safety Interlocks

The Light Curtain provides a hardware interlock with the Load Port Modules. When any beam of light within the Light Curtain is broken, the interlock disables (turns off or prevents turning on) the

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HO_AVBL signal.

Optional Light Tower

An optional light tower is available to provide instant visual and audio status of the system or any user defined events.

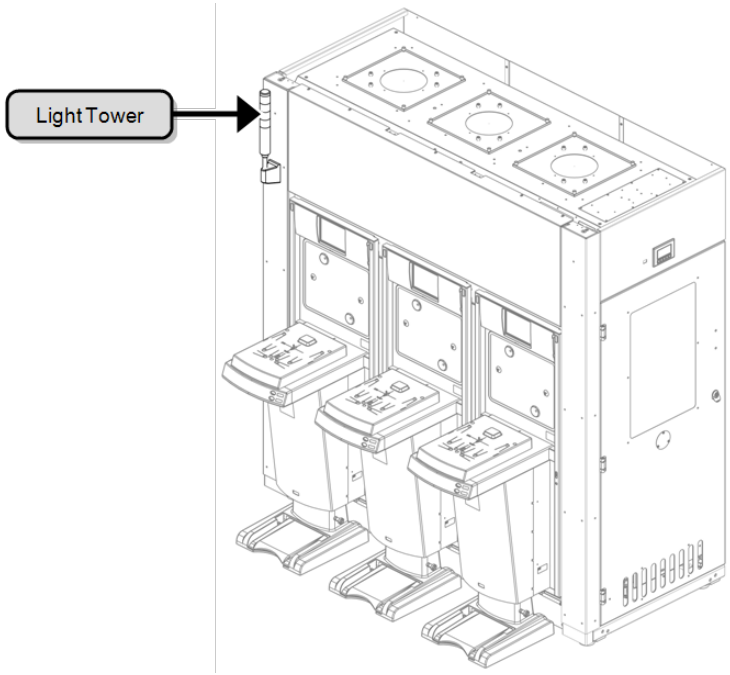


Figure 6-21: Optional Light Tower (Right-Hand Mount), Typical

Description

The Light Tower provides four user-controllable lamp modules and an audible alarm. The lamp modules are comprised of LED arrays in four colors: RED, AMBER, GREEN, and BLUE. The light tower also has a separate audible alarm. Power for the light tower is provided by the 24 VDC power supply in the PDU, with control of the light tower provided through a connection to the System controller or Ethernet to Discrete I/O Gateway. The Light Tower is mounted directly to the forward support column of the JCP mini-environment, and may be mounted on either the left or right side.

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Optional Operating Interface (IO) Module

An optional Operator Interface (OI) Module is available to provide the user with a convenient, and easy to use, method of local control and monitoring of the JCP system. OI Modules are configured with a monitor and keyboard.

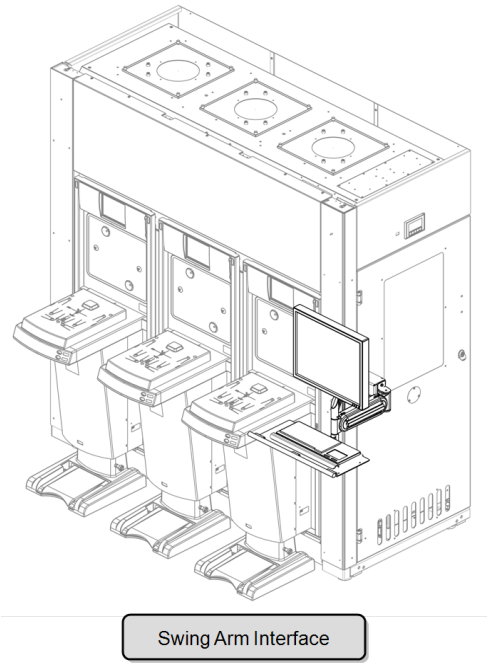


Figure 6-22: Optional Operator Interface Module, Typical

Description

The OI Module provides the user with an interface for local control of the JCP system and, if desired, the tool to which the EFEM is connected. The Wing Panel version of the OI Module is supplied with a 17-inch LCD monitor and a keyboard with trackball. The OI Module is mounted directly to the forward support column of the JCP mini-environment, and may be mounted on either the left or right side.

> ***NOTE:*** When the OI is mounted on the Service Side of the JCP system the EMO button and Light Tower will be mounted on the other side of the JCP to eliminate the possibility of having the OI obstruct them.

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Optional SEMI E84 Interface

An optional SEMI E84 Interface is provided through the LPM to support AGV, PGV, RGV, or OHT systems. The SEMI E84 electronics module mounts inside the LPM it is associated with, and the optical transmitter/receiver modules are mounted in the appropriate relation to the Load Port Module, as shown in Figure 6-23.

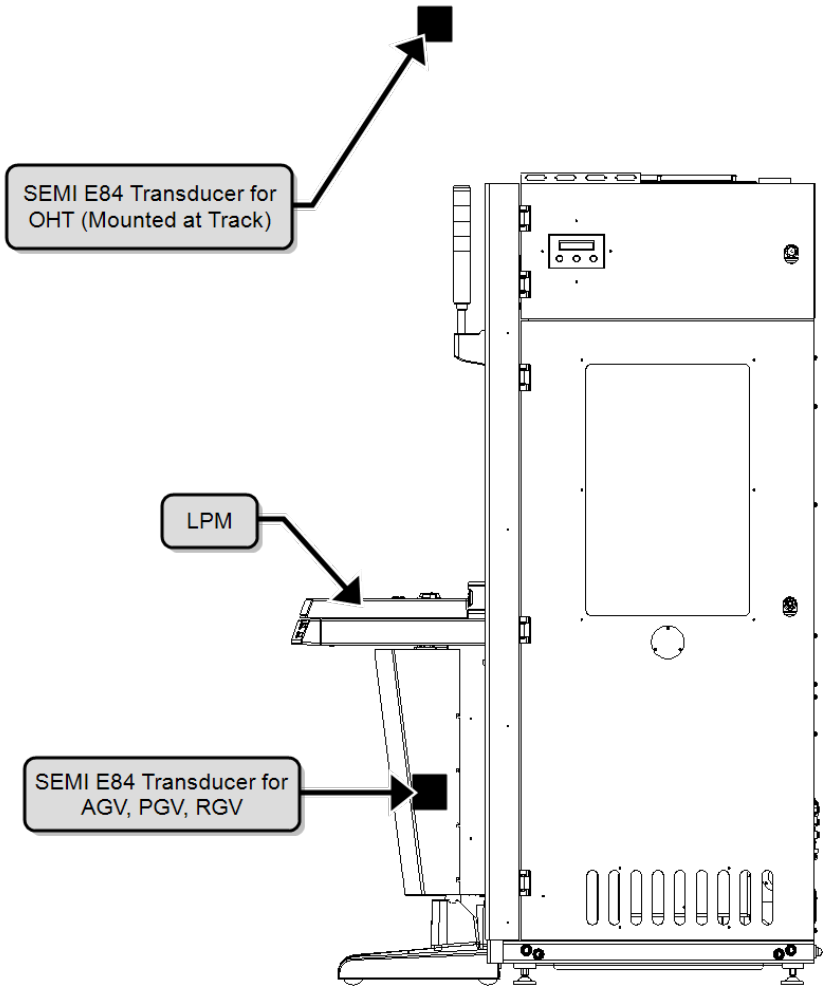


Figure 6-23: Optional SEMI E84 Interface, Typical

Description

Each Load Port Module is equipped with two SEMI E84 interfaces, one for AGV, PGV, or RGV use and the other for OHT use. These interfaces allow the SEMI E84 interface hardware to be connected to the LPM. The LPM then provides the handshaking between the automated material handling equipment and the LPM for the movement of carriers on and off the LPM. The LPM sends Events indicating the status of the SEMI E84 system to the controller directing load port operation, which may then send status information to the user's Tool Controller.

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Safety Interlocks

Interfaces according to SEMI E84 are not designed to be used as a safety interlocking system according to SEMI S2, even if the names of some signals as defined by SEMI E84 could be misunderstood as such. (i.e., Emergency Stop).

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Optional Front Air Intake

An optional Front Air Intake is available for systems that will be mounted in a Bay and Chase environment where it may be preferable to pull air from the Bay environment instead of the Chase environment.

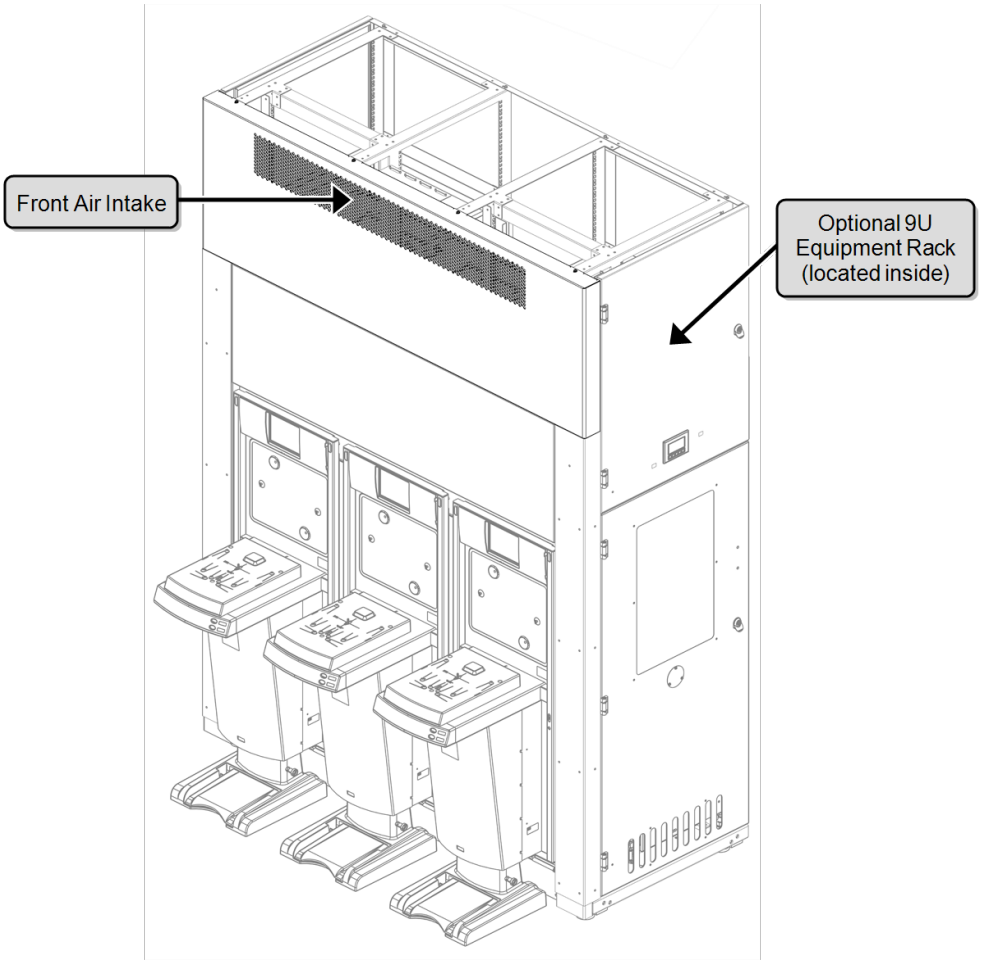


Figure 6-24: Optional Front Air Intake, Typical

Description

The Front Air Intake is mounted on top of the JCP system, as shown in Figure 6-24. The overall dimensions of the Front Air Intake unit are the same as the "Optional Overhead Storage" unit, allowing installation of the 9U Equipment Racks, if desired. Hinged doors at each end of the Front Air Intake unit provide access to the FFU and the optional equipment racks.

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Figure 6-25: Power Strip

A single IEC320 power strip with 4 outlets is provided with overhead storage. The power strip is current limited by PDU-CB3. The recommended current limit on this power strip is 2 Amps.

Optional Wafer Mapping

Optional wafer mappers are either available on the robot end effectors or are integrated into the load port.

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Optional Overhead Storage

Optional equipment storage is available in two 9U Equipment Racks mounted above the FFU.

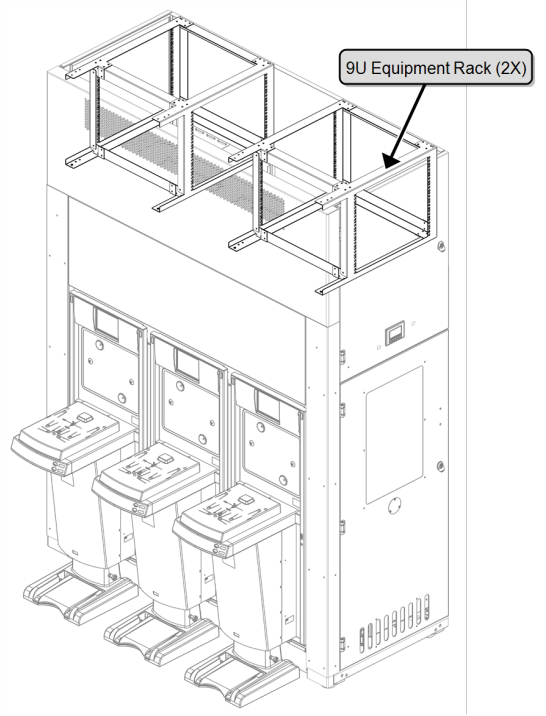


Figure 6-26: Optional Overhead Storage, Typical

Description

Two 9U 19” racks are mounted above the FFU for user electronics (one rack on JCP 2 systems), as shown. Hinged doors at each end of the rack enclosure provide access to the FFU and the optional equipment racks.

To provide ease of service of the FFU, leave the bottom locations on the racks open if the racks are not to be fully populated

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CAUTION

Lift Hazard

The size and location of objects in the overhead storage may cause personal harm if lifted improperly.

- Before lifting, evaluate the weight and location of the object and determine the best lift technique.
- Use proper lift technique, two-man lift, or lift aid with a qualified lift aid operator as required.



Optional Mechanical Protection

An optional Mechanical Protection Bar can be installed on the front of the JCP system. While this option is typically installed on JCP systems used with Over Head Transport (OHT) systems, it can be installed on any JCP.

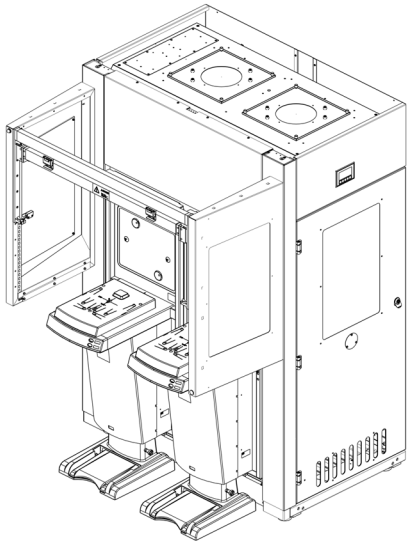


Figure 6-27: Optional Mechanical Protection, Typical

Description

The Protection Bar provides product and operator safety when an operator manually accesses the Load Port Modules attached to the JCP system. The user accessible areas of the LPMs are separated from the general facility area by the Protection Bar. The top of the Protection Bar is open allowing access by an OHT system.

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7. Preventive Maintenance

Overview

When using this manual, always refer to the appropriate documentation for the specific components used on your system.

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.



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Preventive Maintenance

The JCP system is designed to require very little routine maintenance. Refer to the user manuals of the system components for the component preventive maintenance recommendations.

Preventive Maintenance procedures and schedules assume that the JCP system is operating in a clean, dry, inert environment. The user should adjust the Preventative Maintenance Schedule as appropriate.

NOTE: Brooks Automation offers training for troubleshooting and repair of the JCP system. Only qualified, properly trained persons should perform any maintenance or repair procedures. Damage resulting from improperly performing a procedure is not covered under warranty or service agreements.

Parts

If parts are required for preventive maintenance, contact Brooks Automation Technical Support.

Schedule

Refer to the component manuals the corresponding component maintenance procedures.

WARNING





Automatic Motion Hazard

If the Door Interlock for the mini-environment is disabled, the possibility of automatic movement of components within the JCP system exists. These systems have no obstruction sensors and may cause death or serious injury.

Be aware that the Robot, Track, Aligner, Load Port Modules, and FFU Fans have the possibility of automatic movement:

Be aware that the use of the JCP system with the Door Interlock bypassed is at the user's own risk.

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Table 7-1: Preventive Maintenance Schedule

Component	Maintenance Action	Frequency
ATR Robot	Material Support Pad Inspection Material Support Pad Cleaning Robot End Effector Adjustment	Refer to Robot manual
Track	Rail and drive lubrication	Refer to Track manual
Aligner	Material support pad cleaning	Refer to Aligner manual
Ionizer	Ionizer tip cleaning	Refer to Ionizer User Manual

General Cleaning Procedures

The surfaces of the JCP system should be cleaned as a part of normal servicing.

Procedure Category

Type 1 Procedure: Equipment is fully de-energized.

Required Tools and Test Equipment

- Isopropyl alcohol (100%)
- DI water
- Cleanroom wipes

WARNING

Chemical and Environment Hazards

The JCP system may be used in an environment where hazardous materials are present which may cause death or serious injury.

- Be aware that surfaces may be contaminated.
- Know the location of the Safety Data Sheets (SDS)in your facility. (also known as Material Safety Data Sheets - MSDS)
- Follow the facility's procedures to certify the environment is safe.
- Dispose of cleaning cloths per the facility procedures and local regulations.



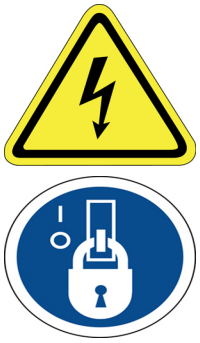
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WARNING

Lockout / Tagout

Working with energized equipment may cause sudden movement or electrical shock and may result in death or serious injury.

- All energy must be removed from the equipment per the facility's Lockout/Tagout procedure before servicing.
- If local procedures are not available, follow the procedure for Lockout/Tagout in **OSHA Standard 29CFR 1910.147**.



General Cleaning Procedure

NOTICE

Wipes used in maintenance must be moistened only. Squeezing the wipe should not cause any cleaning liquid to drip. Do not allow cleaning liquids to come in contact with bearings, seals, etc. Alcohol should not be used on the end effector pads.

Step	Action
1.	Remove any hazardous materials from the JCP system's surfaces, following the facility's procedures for those materials.
2.	Clean all exposed surfaces using cleanroom wipes moistened with isopropyl alcohol.
3.	Once all contaminants have been removed, use cleanroom wipes moistened with DI water to remove any residues.
4.	Once all residues have been removed, use dry cleanroom wipes to dry all surfaces.

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8. Troubleshooting and Repair

See the appropriate component manuals or call Brooks Technical Support for more information. See Contact Us.

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Field Replaceable Units (FRU)

For the most up-to-date and complete list of FRUs, refer to the FRU list. Contact Brooks for more information.

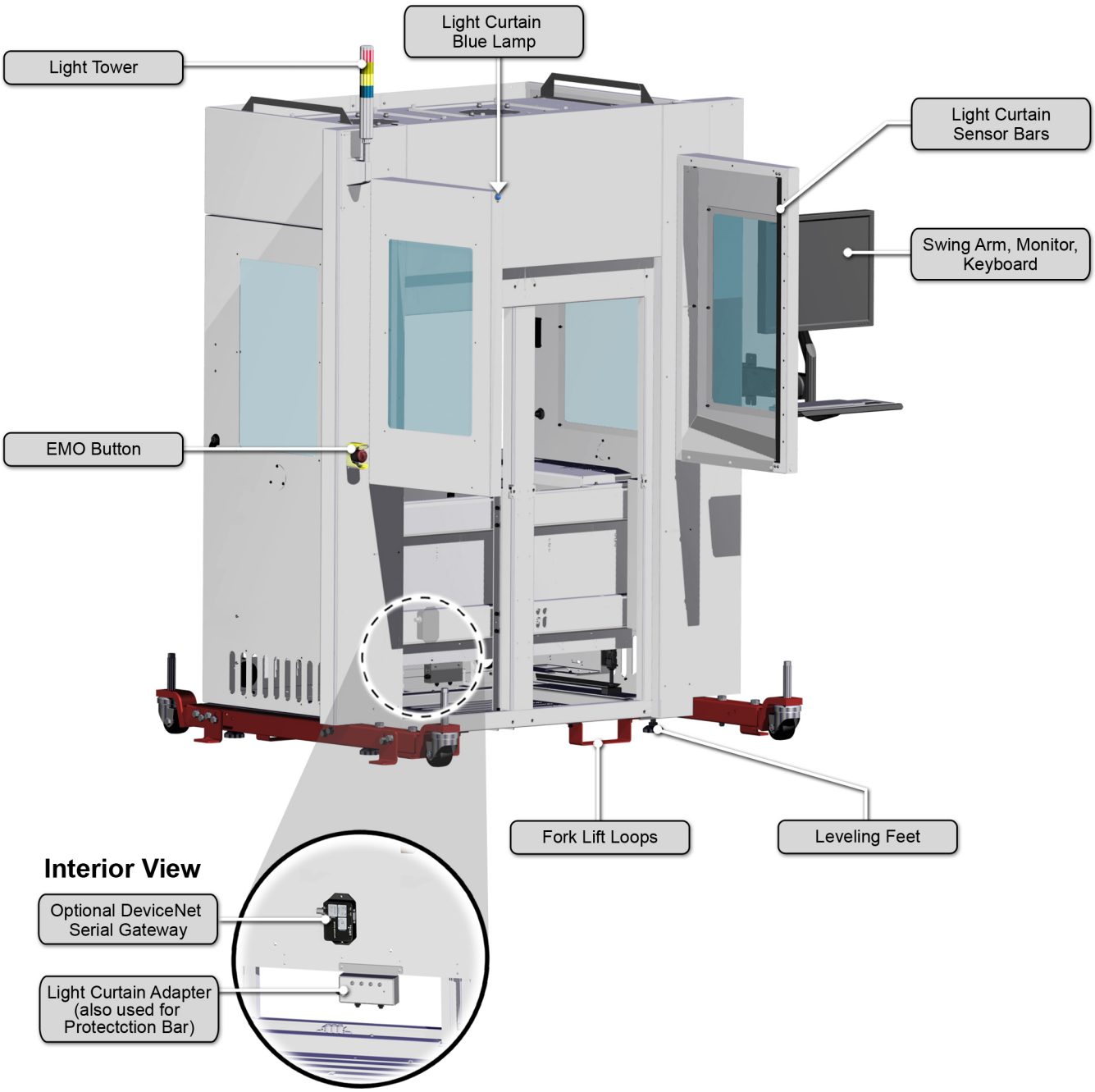


Figure 8-1: Typical Field Replaceable Units (front view)

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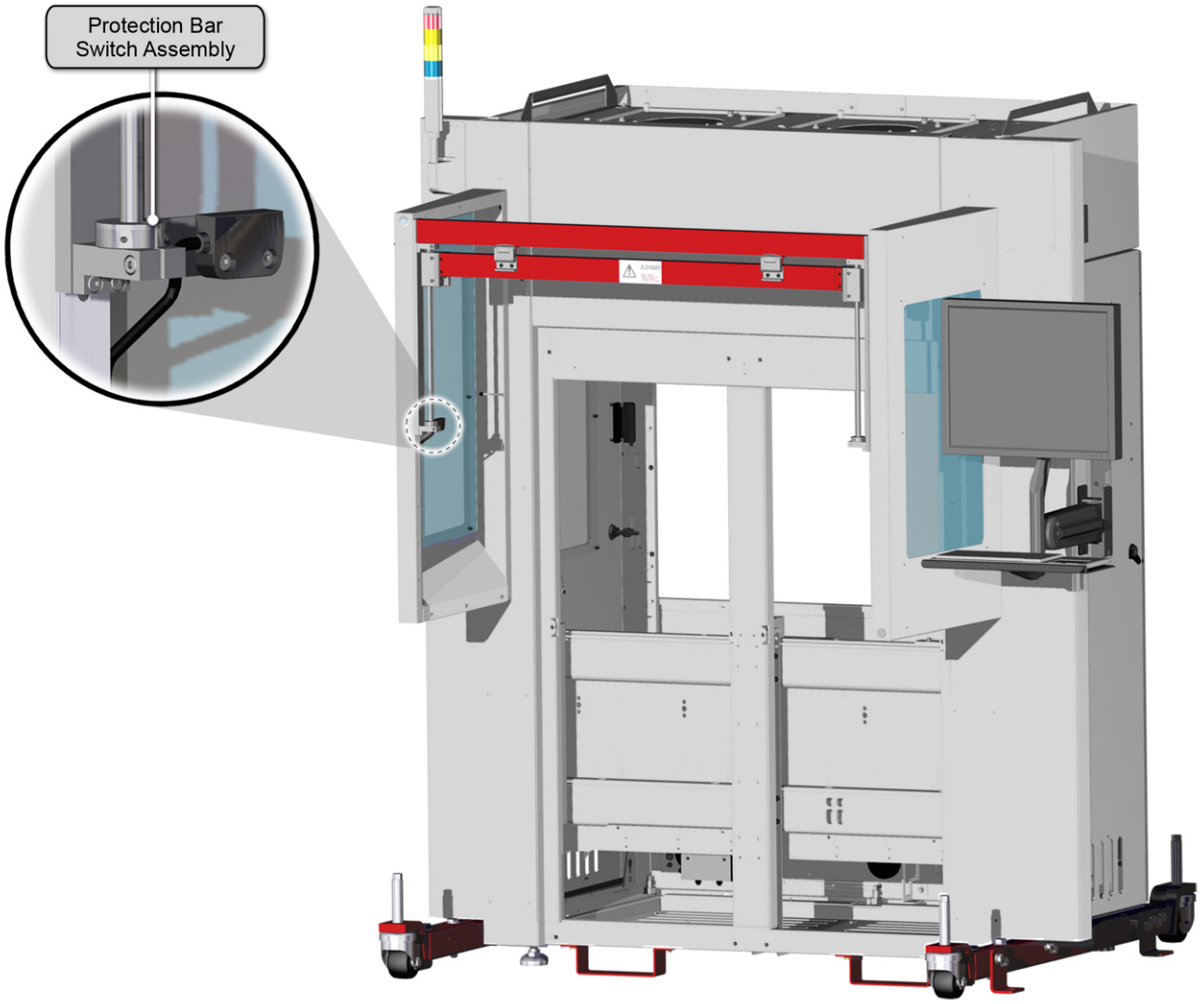


Figure 8-2: Typical Protection Bar Switch Assembly

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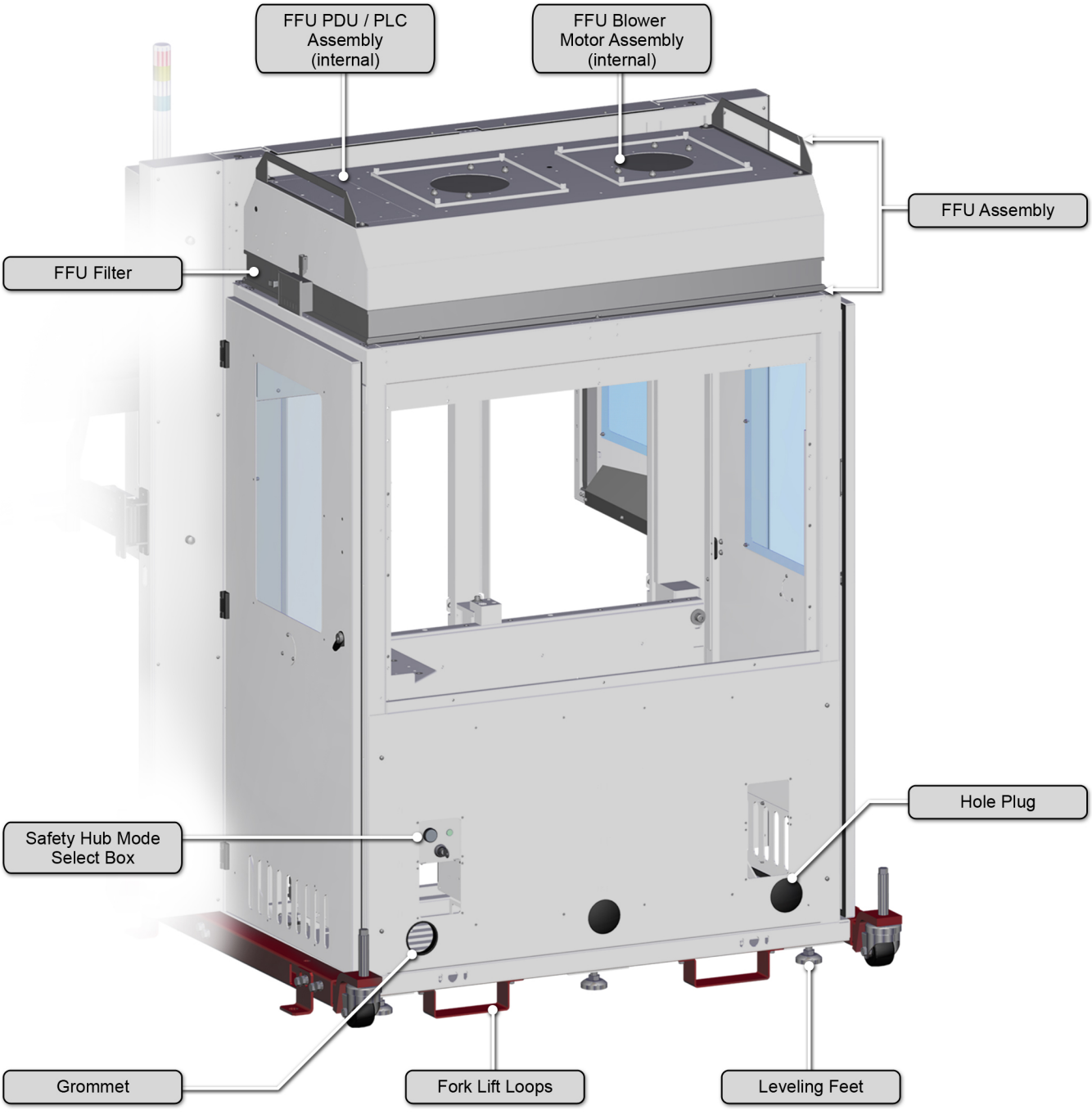


Figure 8-3: Typical Field Replaceable Units (back view)

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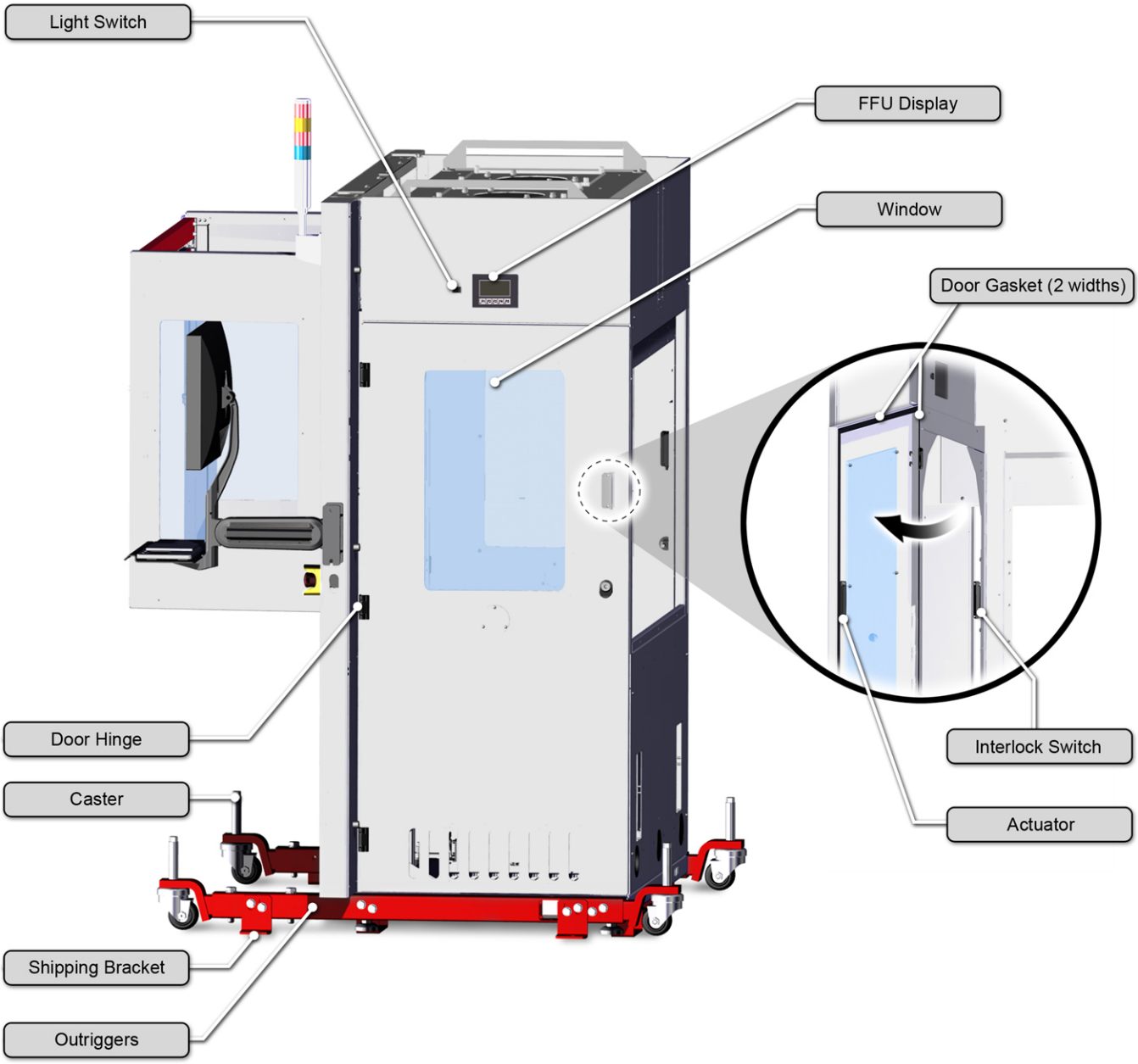


Figure 8-4: Typical Field Replaceable Units (side view)

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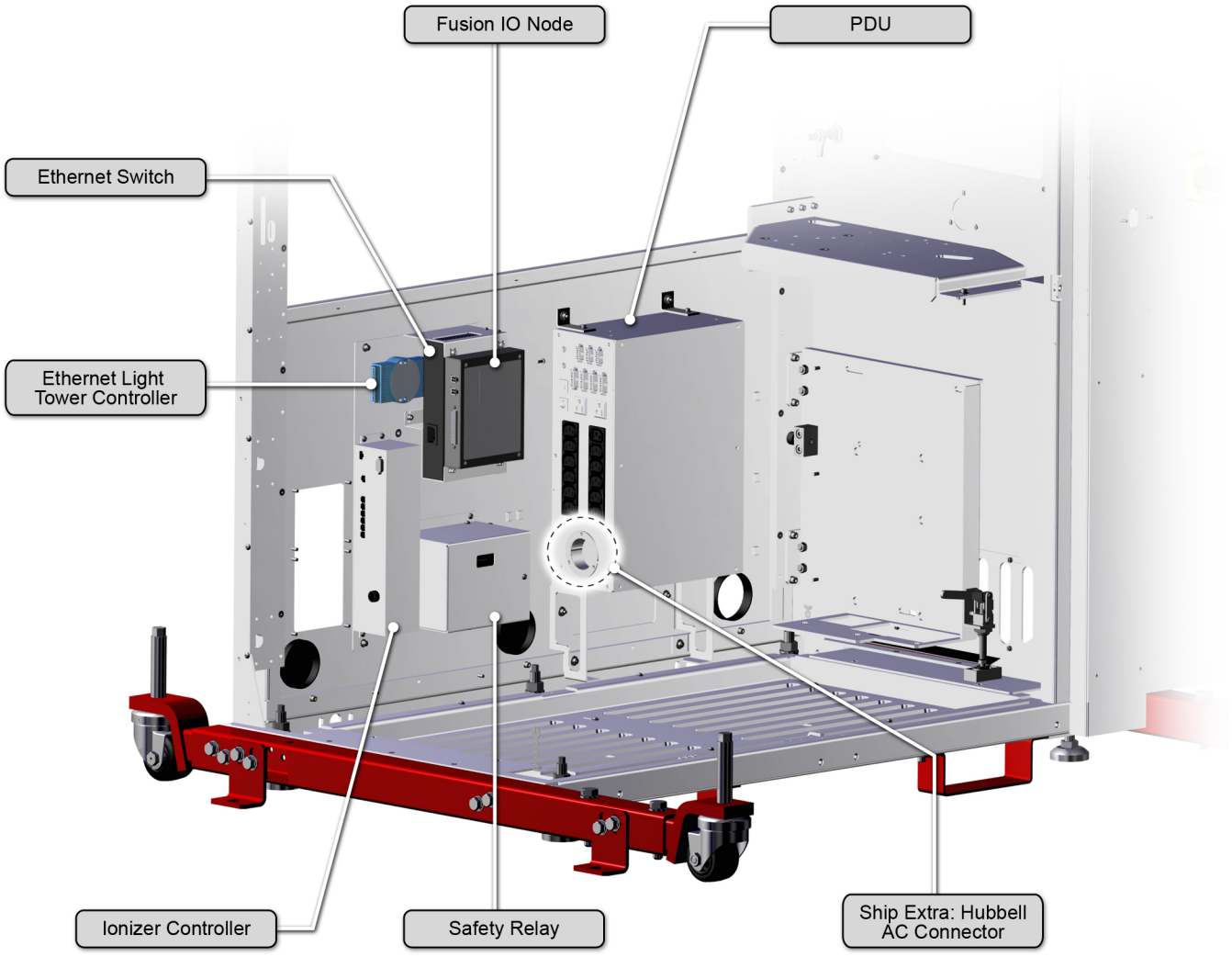


Figure 8-5: Typical Field Replaceable Units (inside view)

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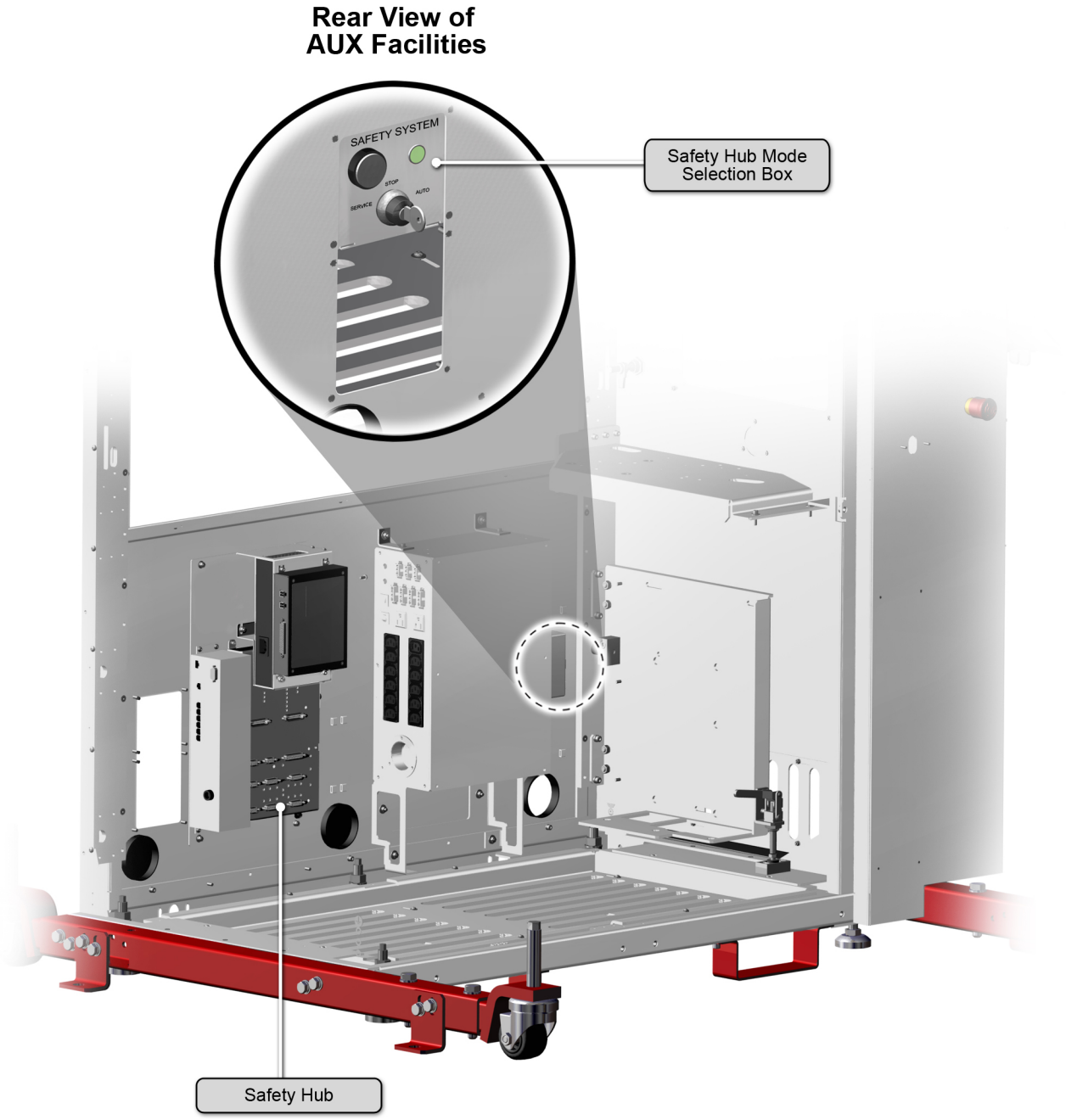


Figure 8-6: Typical Field Replaceable Units (inside view, 2)

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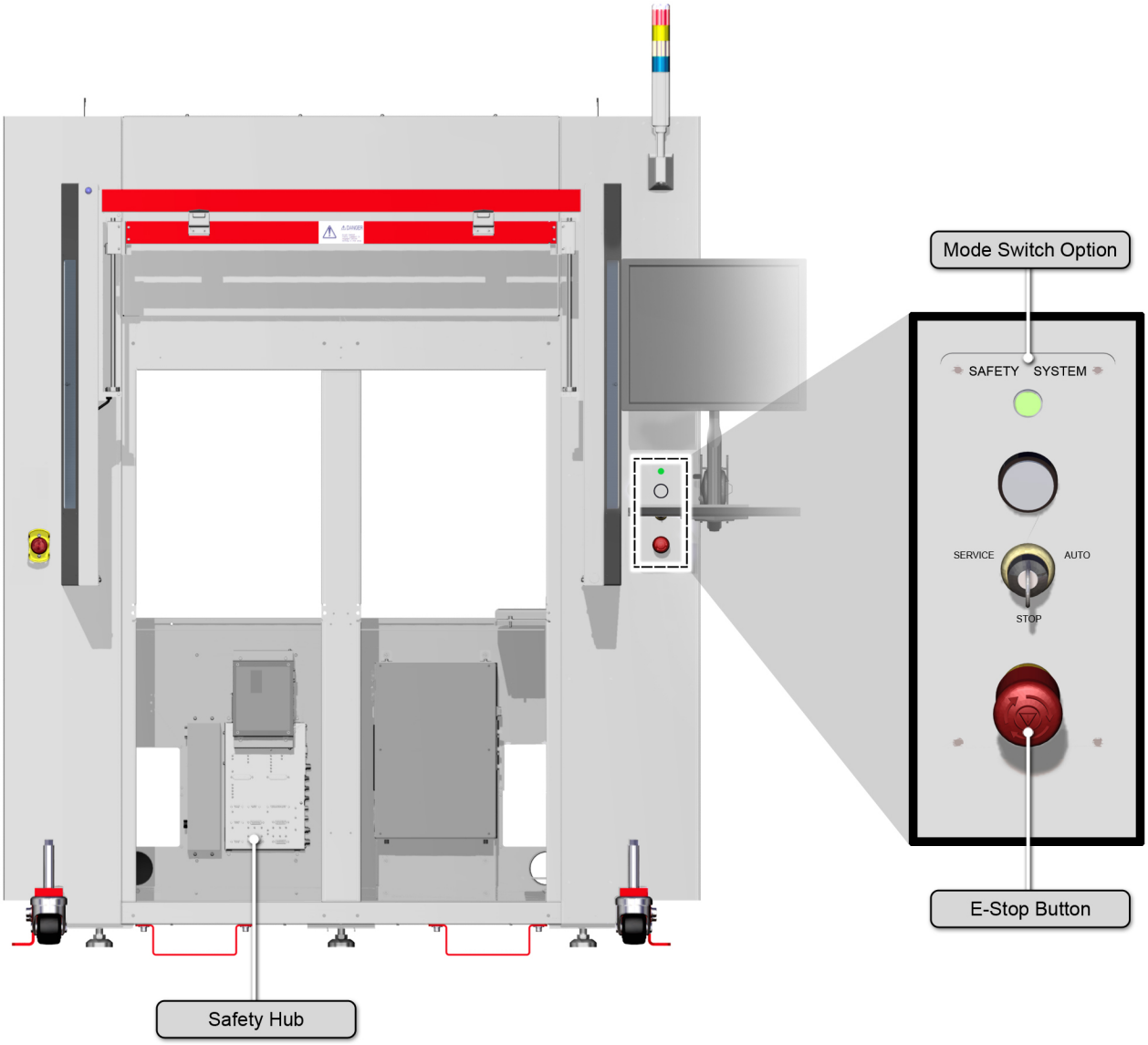


Figure 8-7: Typical Field Replaceable Units (E-Stop Button, Safety Hub, Mode Switch Option)

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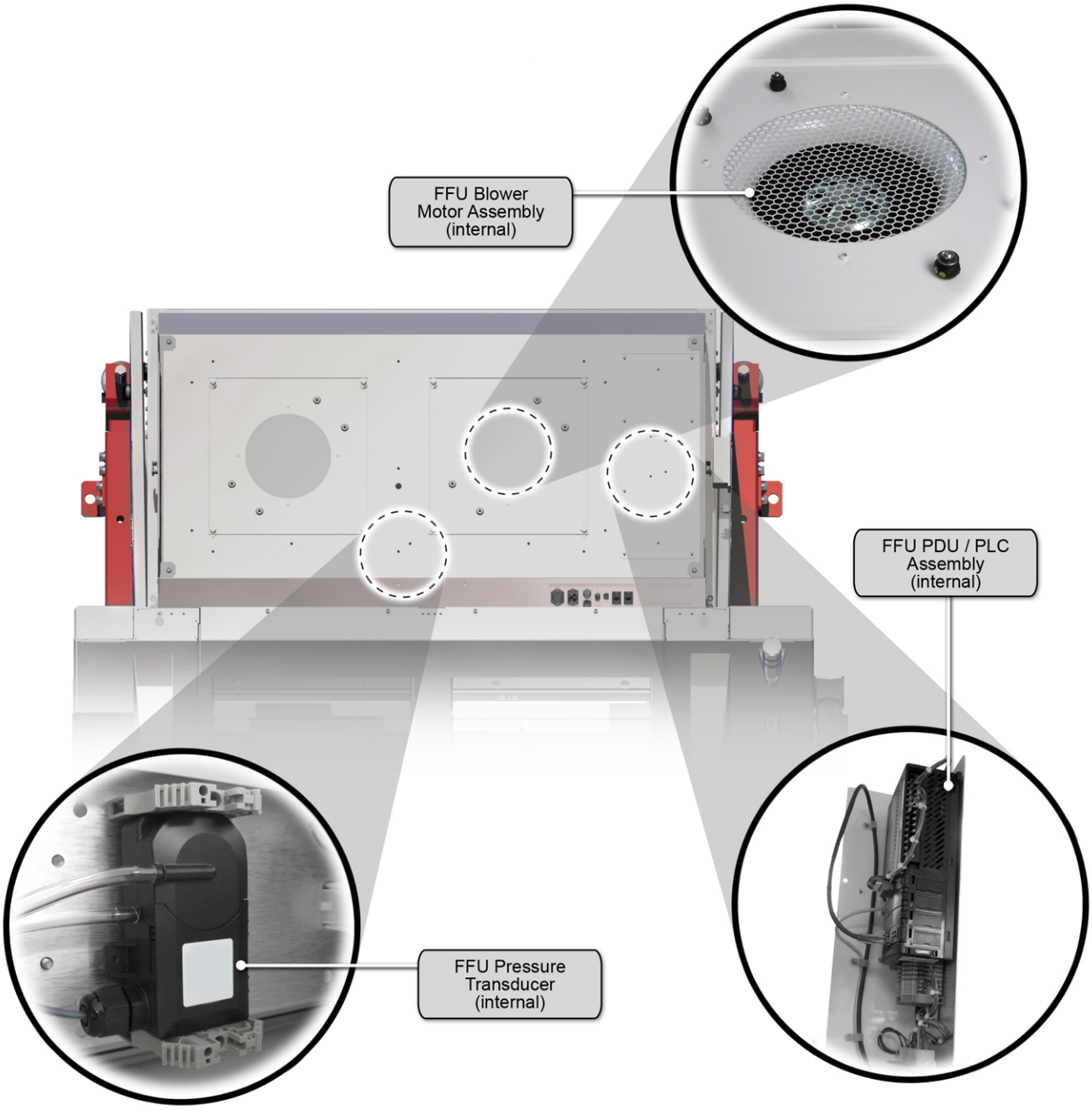


Figure 8-8: Typical Field Replaceable Units (Fan Filter Unit)

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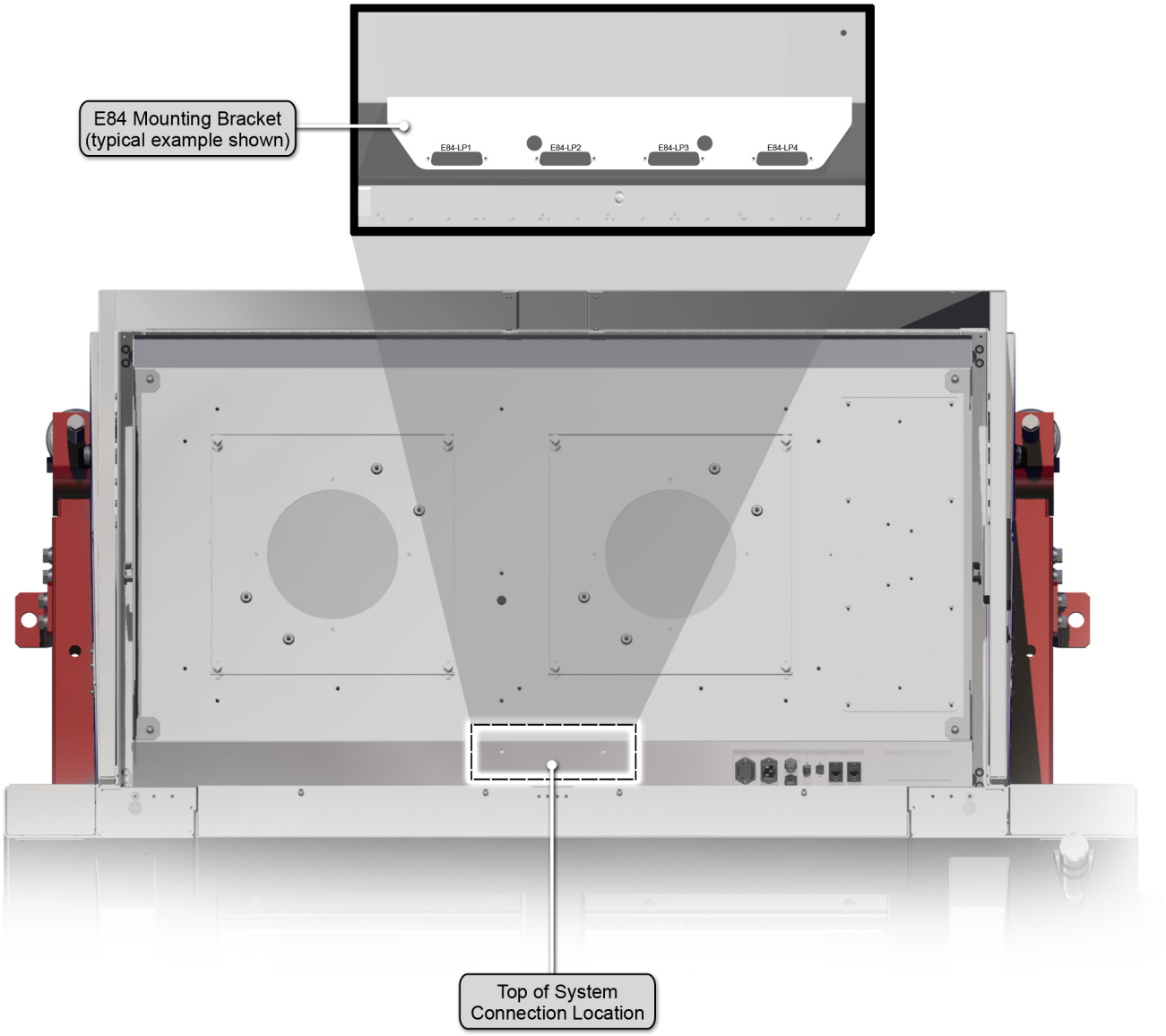


Figure 8-9: Typical Field Replaceable Units (E84 Mounting Bracket)

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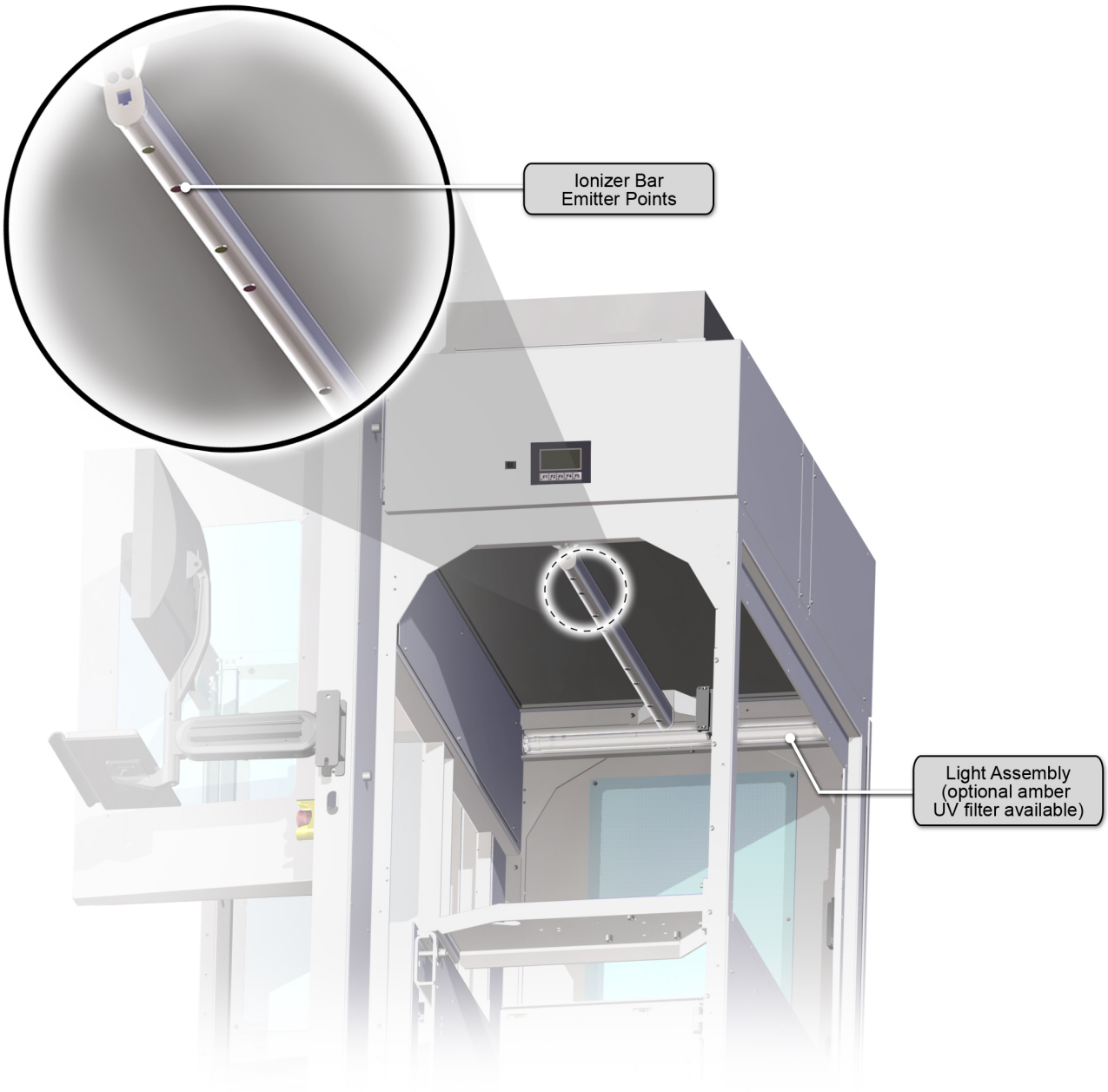


Figure 8-10: Typical Field Replaceable Units (Ionizer Bar Emitter Points, Light Assembly)

Repair Philosophy

Once the failed unit has been identified, a Field Replaceable Unit (FRU) can be ordered. The FRU is shipped with directions for removing the failed unit and installing the new unit. Contact Brooks Technical Support for the most up to date list of FRUs available for the JCP.

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Refer to the appropriate component User Manuals for additional troubleshooting and repair procedures. Refer to the Brooks Customer Care Program for detailed information about Spare Parts, Repair Programs and Maintenance Training.

The following repair options are available:

On-Site Repair

Facilitated On-Site Repair offers the fastest way to fix a hardware problem in the field through the use of Brooks Field Service personnel and factory authorized repair parts.

Exchange Units

Advanced Exchange Units are stocked at the user's facility and are designed to keep Mean Time To Repair (MTTR) and JCP system downtime to a minimum.

Factory Repair Services

Factory Repair Services requires that the failed FRU be removed from the JCP system and returned to Brooks Automation for diagnosis and factory repair.

Two alternatives are available for factory repair:

- Expedited Repair Service provides a typical one-week repair turnaround from receipt of the FRU at Brooks Automation.
- Standard Repair Service provides a typical four-week repair turnaround from receipt of the FRU at Brooks Automation.

Parts Service

The appropriate FRUs may be ordered through the Brooks Priority Part Service (PPS). PPS provides overnight shipment of parts directly from the Brooks Chelmsford, MA facility. Note that any items identified as "long lead time" may take longer to ship.

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Appendices

When using this manual, always refer to the appropriate documentation for the specific components used on your system.

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Appendix A: Contact Brooks Automation Technical Support

When contacting Brooks Automation for Technical Support, please have the following information available.

a. Record the part number and serial number from the equipment.
b. Provide the installed location of the equipment.
c. Provide name, e-mail address, and telephone number of the person to contact.
d. List any error codes received during the failure.
e. Prepare a detailed description of the events relating to the error.
    - Time that the equipment has been in operation
    - Work done on the equipment prior to the error
    - Functions that the equipment was performing when the error occurred
    - Actions taken after the error and results of those actions
    - Other information that may assist the Specialist
f. Contact Brooks Automation Technical Support:

Location	Contact Number	Website
North America	+1-800-447-5007 (Toll Free) +1-978-262-2900 (Local)	http://www.brooks.com/
Europe	+49 800 000 9347 (Toll Free Germany) +49 364 176 9999 6 (Has Toll)	http://www.brooks.com/
Japan	+81 120-255-390 (Toll Free) +81 45-330-9005 (Local)	http://jp.brooks.com/
China	+86 400 627 6657	http://cn.brooks.com/
Taiwan	+886 080-003-5556 (Toll Free) +886 3-5525258 (Local)	http://tw.brooks.com/
Korea	1800-5116 (Toll Free)	http://kr.brooks.com/
Singapore	+65 1-800-4-276657 (Toll Free) +65 6309 0701 (Local)	http://www.brooks.com/

For additional contact information, please go to the Brooks Automation web site at (www.brooks.com) or send an e-mail to techsupport@brooks.com.

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Appendix B: Tooling and Fixtures

Table 9-1 provides a list of the specialized tools and fixtures supplied with the JCP system, including shipping brackets.

Table 9-1: Tool and Fixtures Supplied with the JCP System[2]

Tool	Description and Use
Robot Shipping Brackets	Used to secure the robot arm to the robot flange during shipment.
Track Shipping Brackets	Used to secure the carriage to the track during shipment.
Aligner Shipping Brackets	Used to secure the aligner during shipment.
LPM Shipping Brackets	Used to secure the paddle to the LPM frame during shipment.
Outriggers	Used to support the JCP system when moving it within facility.
Service Key[1]	Used to override the JCP system door interlock switch during service.

[1]For systems with Level 1.5 Controls only.
[2]Contact Technical Support for Brackets for specific configurations.

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Appendix C: Packing and Shipping Instructions

If the JCP system is shipped, it must be properly packaged to ensure it arrives undamaged. The JCP system was originally assembled and packaged in a cleanroom environment. Care should be taken to ensure that it is repackaged in the same type of environment.

The following procedure instructs the correct method of handling and packaging the system for shipment.

NOTE: The original shipping crates must be used when shipping the JCP system. If the original crates have become lost or damaged, contact Brooks Automation for replacements.

CAUTION





Heavy Object / Tip Hazard

The JCP system weighs between 540 kg (1200 lb) to 975 kg (2150 lb). The Load Port modules weigh 59 kg (130 lb).

Failure to take the proper precautions before moving any of these items could result in personal injury.

When moving the JCP system, ensure that all force exerted is below the center of gravity.

Use a minimum of four people to move the JCP system when rolling it across the floor, or use a hoist device.

Required Tools and Equipment

- Metric hex wrenches
- Inch hex wrenches
- Open end and adjustable wrenches
- Fork Lift or appropriate lift device

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Packing Procedure

WARNING





Electrical Shock Hazard

The JCP system uses electrical power that may cause death or serious injury.

Before beginning this procedure, the JCP system must be shut down following the procedure provided in the "Safe Shutdown" section.

a. Turn off and disconnect all power, communications, and vacuum connections as detailed in the "Safe Shutdown" section.
b. Ensure the system has been properly decontaminated following the facilities decontamination procedures. Follow all Federal, State, Local, and Facility procedures for the disposal of any hazardous materials.
c. Remove any tie-downs from the floor and the frame.
d. Release the JCP system from the process tool.
e. Secure the robot to prevent movement and damage during shipment by using the shipping brackets supplied with the JCP system when it was received.
   Secure the robot controller (or Wafer Engine Power Supply) by moving the latch to the locked position.

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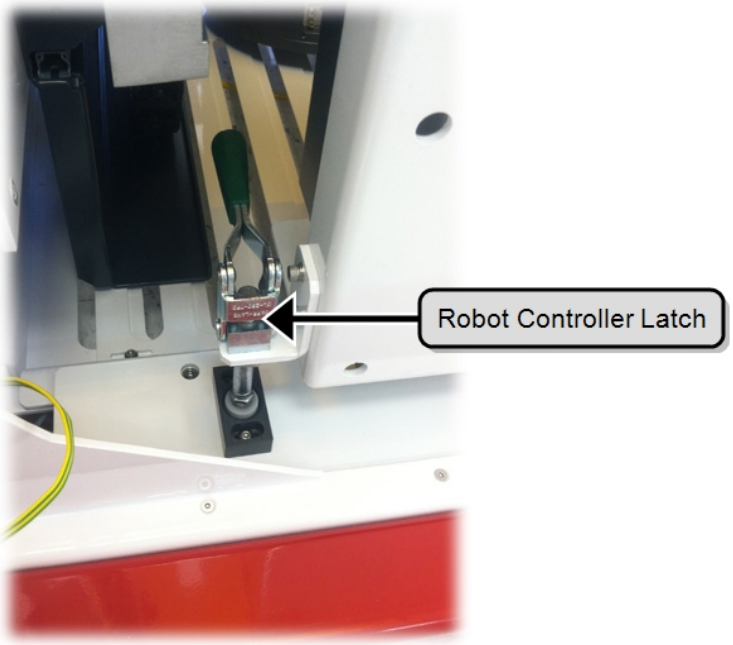


Figure 9-1: Robot Controller Latch

NOTICE

The end effector is delicate and should be handled carefully.

f. If applicable, secure the aligner Rotate Chuck to the Lift Chuck to prevent movement and damage during shipment by placing the pads supplied with the JCP system when it was received between the chucks and using plastic ties to hold the chucks together.

NOTICE

Do not apply any force on either the Rotate Chuck (Theta Axis) or the Lift Chuck (Z Axis) as damage to internal mechanisms may occur.

g. Secure the track Carriage to the track Frame to prevent movement and damage during shipment by installing the shipping fixtures supplied with the JCP system when it was received.
h. If the JCP will be shipped with the load ports attached the pod door opening paddle must be secured with the fixtures supplied with the JCP system when it was received.
i. Replace all other shipping materials (i.e., brackets, foam, etc.).

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j. Attach the two outriggers to the sides of the JCP system frame as shown in "Safe Shutdown".

k. Attach the four tie-down brackets to the outriggers as shown in Figure 9-2.

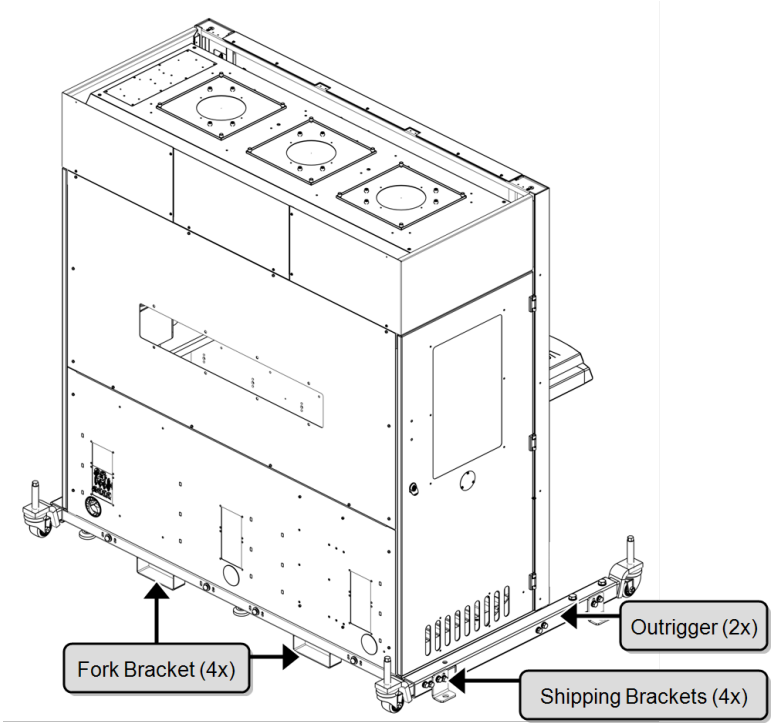


Figure 9-2: Typical Shipping Tie-Downs

l. Raise all feet by loosening the jam nut (against the frame) of each foot and turning until the JCP system is resting on the casters and the feet will clear any obstacles in its path then turn the jam nut until it is locked against the frame to secure the feet.

NOTE: All casters must touch the ground.

m. Roll the JCP system into the Depack area.

NOTICE

When rolling the JCP system on its casters, push on the mini environment only.

Do not push on any externally mounted components (Load Port Modules, Light Tower, etc.) as damage to those components could result.

n. The entire JCP system should be wrapped, bagged, and packed following standard packing procedures for a cleanroom environment. Ensure that all wrapping/bagging covers the bottom of the JCP system to ensure cleanliness.

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o. Install the four Fork Brackets at the lift points as shown in Figure 9-2.
p. Use a fork lift with 6 inch wide forks (maximum). Position the forks at the lift points on the back side of the JCP system and lift the system slightly. Note that the system may tip forward on the forks slightly.
q. Using the fork lift, move the JCP system to the shipping area.
r. Slide the base of the shipping container under the JCP system.
s. Lower the JCP system onto the container base and secure using the tie-down brackets (shown in Figure 9-2).
t. Perform any final bagging and crating required.
u. Add tip indicators, shock indicators, moisture indicators, etc. to the outside of the crate as desired to verify proper handling during shipment.

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