



MPS150

Probe Station

User Guide



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Contents

Before You Begin	iii
About This Guide.....	iii
Notational Conventions	iii
Safety Information	iii
Labels	iv
For More Information	v
Chapter 1: Unpacking	1
Unpacking the Station.....	1
Removing the Transport Locks.....	3
Chapter 2: Configuring Station Components.....	5
Set Up the Universal Probe Platen	5
Set Up the Microscope	6
Set Up the Bridge-Mounted Microscope	6
Adjust Microscope Height	7
Level the Microscope	8
Adjust the Microscope Lift Stage	8
Install the Camera	9
Set Up the Boom Stand-Mounted Microscope	10
Install the Boom Stand	11
Install the Ring Light	12
Install the Camera	13
Position the Microscope	13
Set Up the Probe Card Holder	14
Install the Probe Card Holder	14
Planarize the Probe Card	16
Adjust the Edge Connector Clamps	16
Install the Probe Card	17
Connect the Station	17
Connect Power, Grounds and Accessories	17
Connect Chuck Vacuum	19
Connect Compressed Air	20
Configure the Supply Loop	20
Chapter 3: Preparing the Station for Testing.....	21
Load the Wafer	21
Set Up Chuck Vacuum.....	22
Turn on Universal Chuck Vacuum	23
Configure Triax or Thermal Chuck Vacuum	23
Configure RF Chuck Vacuum	25
Mount the Positioners	25

Position the Platen	26
Adjust the Platen Height	26
Adjust Platen Contact/Separation	26
Set the Platen Lock	26
Position the Chuck	27
Adjust X/Y Position	27
Adjust X/Y Stage Friction	28
Adjust Chuck Z Stroke	28
Adjust Theta Position	29
Set Standard Theta	29
Set Fine Theta	29
Planarize the Chuck	29
Removing the Chuck	31
Chapter 4: Maintenance and Service.....	33
Maintenance.....	33
Troubleshooting.....	34
Returning for Service.....	34
RMA Number	34
Repacking	34
Appendix A: Accessories.....	35
Standard Accessories	35
Common MPS150/EPS150 Accessories	35
Package-Specific EPS150 Accessories	39
Optional Accessories: Installation and Operation.....	41
Positioner Rails	41
Platen Level Gauge	42
DC Tip Holder	44
DUT Holder	45
Monitors	45
Video Monitors	45
HDTV Kit	46
Vibration Isolation	46
Vibration Isolation Platform	46
Vibration Isolation Table	48
Shield Enclosure	49
Index	51

Before You Begin

About This Guide

Welcome to the *MPS150 User Guide*. The MPS150 probe stations are intended for the analysis of wafers and substrates up to 150 mm (6-inch). This guide contains information about installing, operating and maintaining your probe station.

Notational Conventions

This manual uses the following conventions:



NOTE

Note is used to indicate important information about the product that is not hazard related.



CAUTION

Caution is used to indicate the presence of a hazard which will or can cause minor personal injury or property damage if the warning is ignored.



WARNING

Warning is used to indicate the presence of a hazard which can cause substantial personal injury or property damage if the warning is ignored.



DANGER

Danger is used to indicate the presence of a hazard which will cause severe personal injury, death or substantial property damage if the warning is ignored.

Safety Information

The information contained in this guide will enable safe and effective operation of your equipment. Any deviation from recommended practices or modification or use for which the equipment is not designed, or which departs from good industry practice may create a hazardous or unsatisfactory operating situation. Cascade Microtech, Inc. disclaims any responsibility for consequences resulting from any such deviation, modification or application.






Be sure to follow these basic guidelines to avoid personal injury or damage to the equipment:

General Precautions	Ensure that the safety cover is in place during station operation.
	Do not touch the probe needles.
	Earthquake protection for the probe system consists of interlocking coupling between the table and the probe station when the system configuration includes a shield enclosure.
Electrical Precautions	Voltage can remain in the system until the main switch is turned off, even during equipment failure. Do not touch the electrical connections.
	When probing high voltage devices, lethal voltages may be present at the probe tips, probe head connectors and on non-shielded or non-isolated probe arms.
Laser Precautions	Your station configuration may include a laser cutter. Avoid eye and skin exposure to direct or scattered radiation.

Moving Parts	<p>Risks during station operation include crushing, tripping, burning or being caught up in the equipment. Possible danger areas are marked with the labels.</p> <p>Be careful to keep loose clothing or long hair from getting caught in the system.</p> <p>Be careful when raising and lowering the microscope.</p>
Magnetic Precautions	<p>When handling components with powerful built-in magnets, take special care to avoid injury or damage to the equipment.</p>
Thermal Precautions	<p>Illuminator bulbs can reach high temperatures. Allow adequate time for bulbs to cool before replacing.</p> <p>Thermal chucks operate at high temperatures. Avoid touching the chuck during operation. The use of vacuum tweezers is recommended.</p>

Labels

The following labels may be present on your station, depending on your configuration.

	<p>Attention, moving parts! Danger of injury! Do not touch the machine when switched on!</p> <p>Achtung, bewegte Teile! Verletzungsgefahr! Im eingeschalteten Zustand nicht hineingreifen!</p> <p>Attention, pièces en mouvement! Risque de blessures! Ne pas toucher pendant le fonctionnement de la machine!</p> <p>Attenzione, parti in movimento! Pericolo, non toccare se la macchina è in funzione!</p>
	<p>Attention, hot surfaces! Danger of burning! Do not touch when active!</p> <p>Achtung, heiße Flächen! Verbrennungsgefahr! Im aktiven Zustand nicht berühren!</p> <p>Attention, zones chaudes! Risque de brûlures! Ne pas toucher si actif!</p> <p>Attenzione superficie calda! Rischio di ustioni, non toccare una volta attivo!</p>
	<p>Attention, laser beams! Danger of getting hurt without eye protection!</p> <p>Achtung, Laserstrahlen! Ohne Augenschutz Verletzungsgefahr!</p> <p>Attention rayonnement Laser! Risque de cécité en l'absence de lunettes de sécurité!</p> <p>Attenzione raggio laser! Pericolo ustioni, non toccare se la macchina è in funzione!</p>
	<p>Attention, high voltage! Danger of electrical shock! Do not touch during operation!</p> <p>Achtung, spannungsführende Teile! Gefahr des elektrischen Schlages! Im eingeschalteten Zustand nicht berühren!</p> <p>Attention, haute tension! Risque d'électrocution! Ne pas toucher pendant le fonctionnement de la machine!</p> <p>Attenzione alta tensione! Pericolo, non toccare se la macchina è in funzione!</p>
	<p>Attention, general hazard! Pay attention to the information given in the manuals!</p> <p>Achtung, allgemeiner Gefahrenhinweis! Informationen im Handbuch beachten!</p> <p>Attention, danger! Consulter les informations fournies dans les notices de la machine!</p> <p>Attenzione pericolo! Leggere attentamente il manuale!</p>

For More Information

More information may be available from these sources:

- **World Wide Web:** Cascade Microtech maintains an active site on the World Wide Web at www.cascademicrotech.com. The site contains current information about the company and locations of sales offices, new and existing products, contacts for sales, service and technical support information. You can also send e-mail to Cascade Microtech using the web site. Requests for sales, service and technical support information will receive a prompt response.



NOTE

When sending e-mail for technical support, please include information about both the hardware and software, with a detailed description of the problem, including how to reproduce it.

- **Other:** If you purchased your Cascade Microtech product from a third-party vendor, you can contact that vendor for service and support.

1 Unpacking

Unpacking the Station

To unpack the station:

1. Open the crate.
2. Locate the large tool box labeled **Open Me First**. This toolbox contains tools and parts required for installation and setup (see [Large Toolbox Contents](#) on page 35).



NOTE

Save the shipping materials and transport locks for any possible future transport. The toolbox can be used for storing these items.

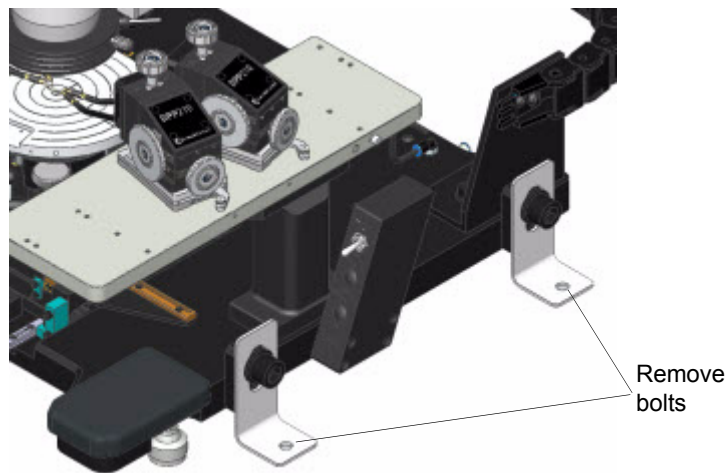
3. Unpack the individually wrapped parts and subassemblies.



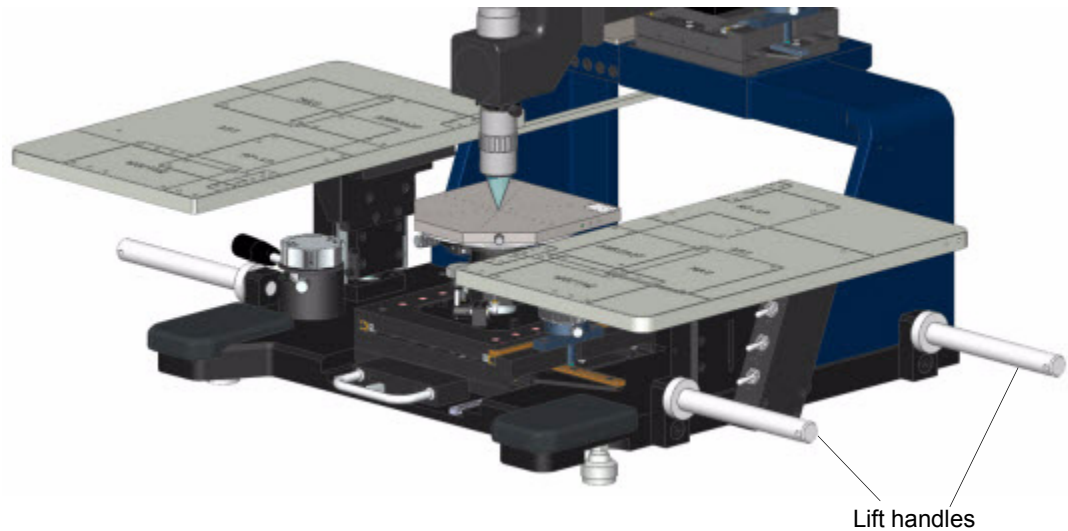
CAUTION

Use caution when handling the microscope and other fragile parts.

4. Remove the bolts from the four shipping brackets at each corner of the shipping palette.



5. Lift the system and place it in its final location.
- Coax, Triax, RF and FA stations - two people, one at each side, are required to move the station. Lift the station from underneath the base platen.
 - Millimeter Wave station – replace the corner brackets with the four supplied lift handles. Using the handles to lift the system, place it in its final location.

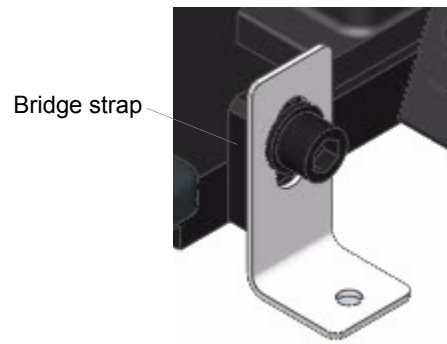


6. Adjust the station feet. Be sure that all three feet are flat on the table. Adjust the feet one at a time by lifting the station slightly, turning each foot in the ball and socket joint until it is parallel to the table below and then lowering the station back onto the table. Be careful to keep hands and fingers clear when lowering the station.



7. Remove the shipping brackets or lift handles.

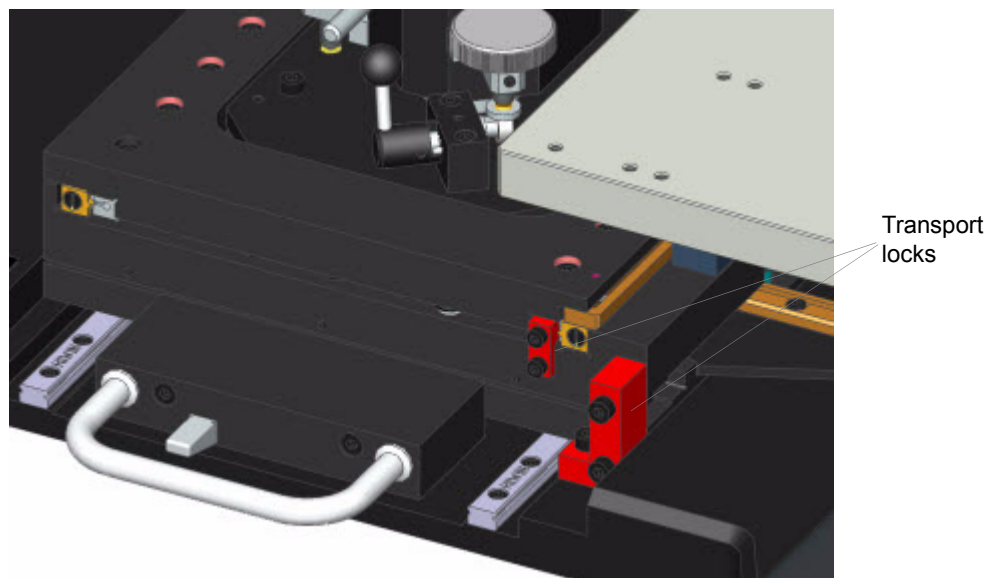
8. Remove the bridge straps from the station.



Removing the Transport Locks

All moveable station components are secured by transport locks, which must be removed prior to operation.

1. Remove the two transport locks securing the stage transport.



2. If applicable, remove the transport locks securing the microscope platform.



2 Configuring Station Components

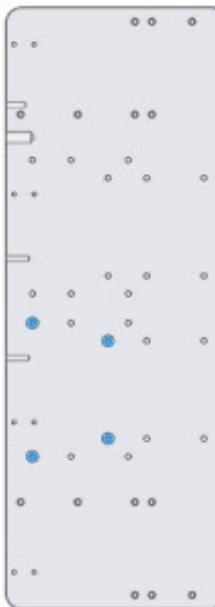
Set Up the Universal Probe Platen

The probe platen is mounted and planarized at the factory. However, you may need to adjust the platen mounting position to accommodate additional components when upgrading or reconfiguring your system.

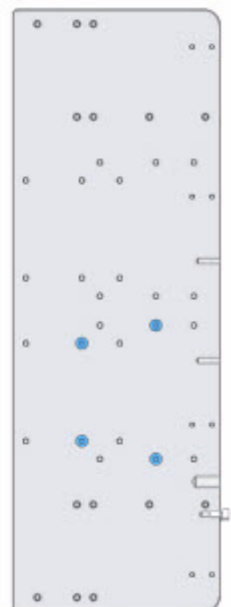
To change the platen mounting position:

1. Remove all equipment from the platen.
2. If your configuration incorporates a boom stand, move the boom arm out of the way.
3. Remove the four platen screws from underneath the platen
4. Move the platen to the right or left as required for your new configuration.
5. Reinstall and tighten the platen screws securely.

Mounting position for Coax/Triax/FA application (bottom view)



Mounting position for RF application and probe card holder (bottom view)



Refer to the *EPS150 Millimeter Wave Quick Reference Guide* for details on probe platen mounting position for the mmW station.

Set Up the Microscope

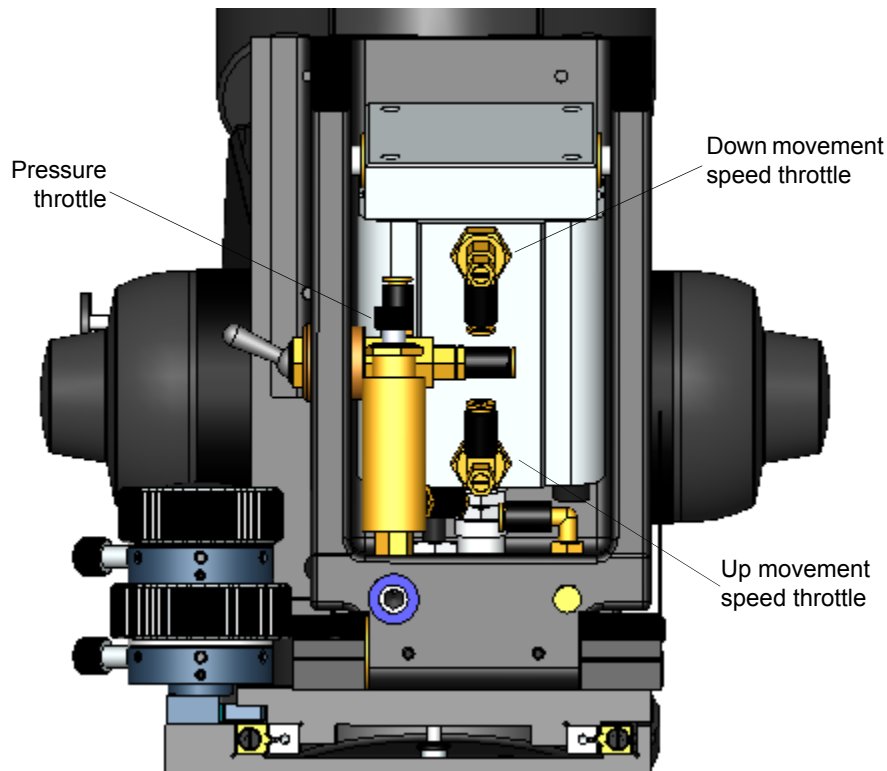
The MPS150 station is configured with either a boom stand or a bridge-mounted microscope, depending on your configuration:

Set Up the Bridge-Mounted Microscope

If your station configuration includes a bridge-mounted microscope, the microscope bridge and microscope will arrive pre-installed on the station.

To set up the bridge-mounted microscope:

1. Connect the air lines.
2. The up and down movement speed throttle adjustments are preset at the factory and will not normally require adjustment. However, if the system does not lift up to the end stop, the pressure throttle may require adjustment. The throttle adjusts the pressure of the up/down microscope motion. Turn the throttle knob clockwise to increase the pressure for a full up position.



3. If your system is configured with a Mitutoyo F70 or a MOTIC PSM1000 microscope, plug in the light fiber cable at the top of the microscope and tighten the thumbscrew to secure it in place.

**NOTE**

This step does not apply to the mmW station, as it is configured with the SlimVue microscope.



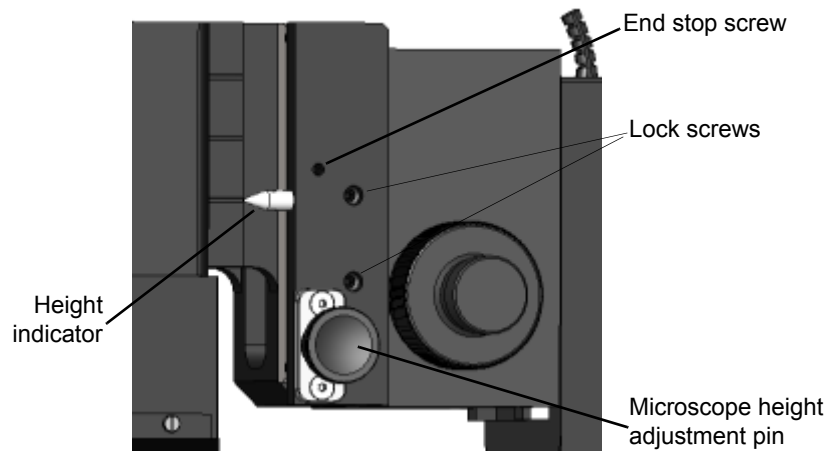
Light fiber cable

Thumbscrew

Adjust Microscope Height

The bridge-mounted microscope can be set at three different heights. To adjust the microscope height:

1. Release the 2 lock screws above the height adjustment pin to enable movement of the dovetail.



2. Support the microscope with your arm.
3. Pull the microscope height adjustment pin straight out from the side of the microscope assembly.
4. Carefully slide the microscope up or down to the correct position. The microscope height indicator enables you to easily determine height setting. Three positions are available. For normal setup, set the microscope to the lowest position. Higher positions are required for raised chuck setups or DUT board evaluations.

**NOTE**

The end stop screw prevents the adapter from sliding completely off the dovetail when the assembly is raised. To remove the adapter from the dovetail, be sure the stop screw and the lock screws must be loosened completely. Pull the microscope height adjustment pin straight out from the side of the microscope assembly, and carefully slide the adapter up and off of the dovetail.

5. Push the height adjustment pin back in to lock the microscope into position.

6. Tighten the two lock screws above the height adjustment pin to lock the dovetail in place. This step is not required for operation, but is recommended if further height adjustment is not required.

Level the Microscope

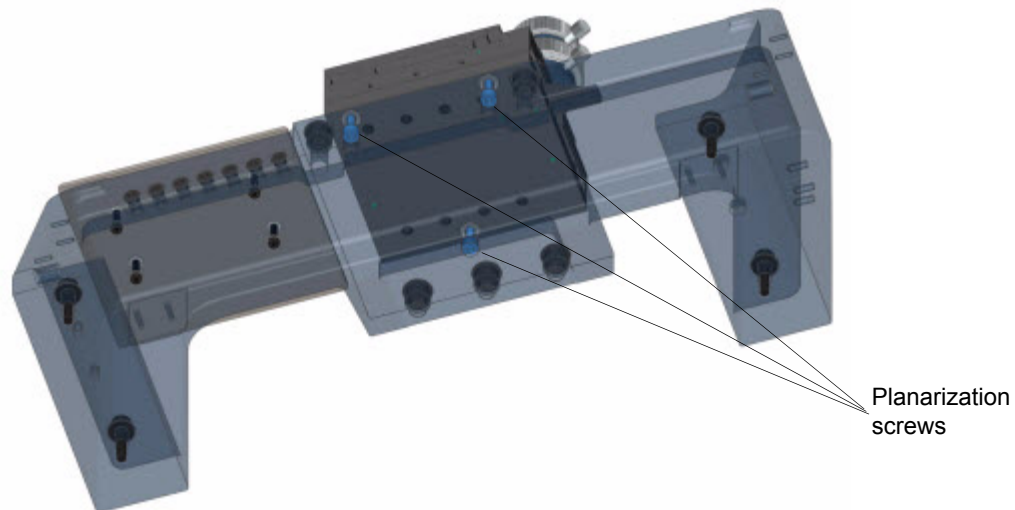


NOTE

The microscope is mounted and adjusted at the factory. Unless the scope stage has been removed, adjustment is not normally required.

Before starting this procedure, ensure that the chuck has been planarized. See [Planarize the Chuck on page 29](#) for details.

Three screws located under the back of the microscope bridge are used for adjusting tilt and planarity.



To level the microscope:

1. Move the microscope to its most forward position.
2. Move the microscope as far left as possible.
3. Focus the microscope at the highest magnification available (20x or higher is recommended).
4. Move the microscope to the far right.
5. Adjust the right-hand screw under the microscope until a sharp image can be seen.
6. Repeat steps 2 and 3 until the image remains in focus at both the far left and far right positions.
7. Move the microscope to its rear-most position and focus.
8. Move the microscope forward and adjust the back screw until the image comes into focus.
9. Repeat steps 5 and 6 until the image remains in focus in both positions.

Adjust the Microscope Lift Stage

The lift motion of the microscope should be smooth and precise.

1. Adjust the main incoming pressure regulator (located next to the cylinder) to ensure that a minimum of 4 bar is available.
2. Adjust the individual up and down speeds. The up speed can be slightly faster than the down speed.
 - a. Use the cylinder incoming throttle to adjust the up direction.

- b. Use the cylinder exhaust throttle to adjust the down direction.

Install the Camera

Analog Camera

1. Remove the blind from the top of the microscope body.
2. Attach the 1/2-inch 0.65X C-mount with adapter and the camera on top.
 - a. Use the knurled screw to fix the position.
 - b. Use the two allen screws to center.



3. Adjust the DIP switch on the camera. Attach the camera.
4. Connect the camera cables, including the video monitor entrance.

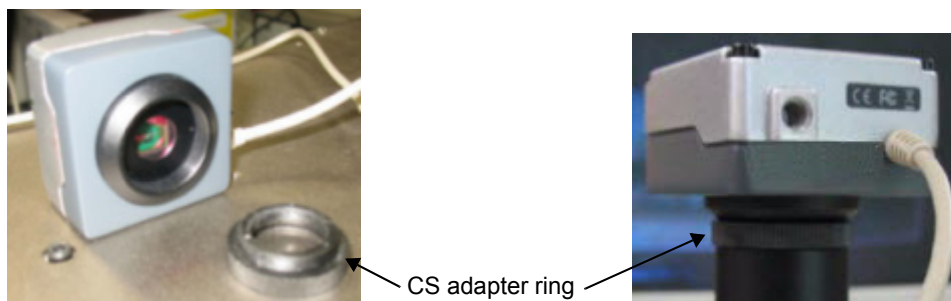


Digital Moticam With CS Adapter

The Moticam 2300 camera uses a CS mount and is supplied with a CS adapter. The CS adapter adjusts the camera position to achieve a focused image and is required for use with C-mount microscopes.

1. Remove the blind from the top of the microscope body.

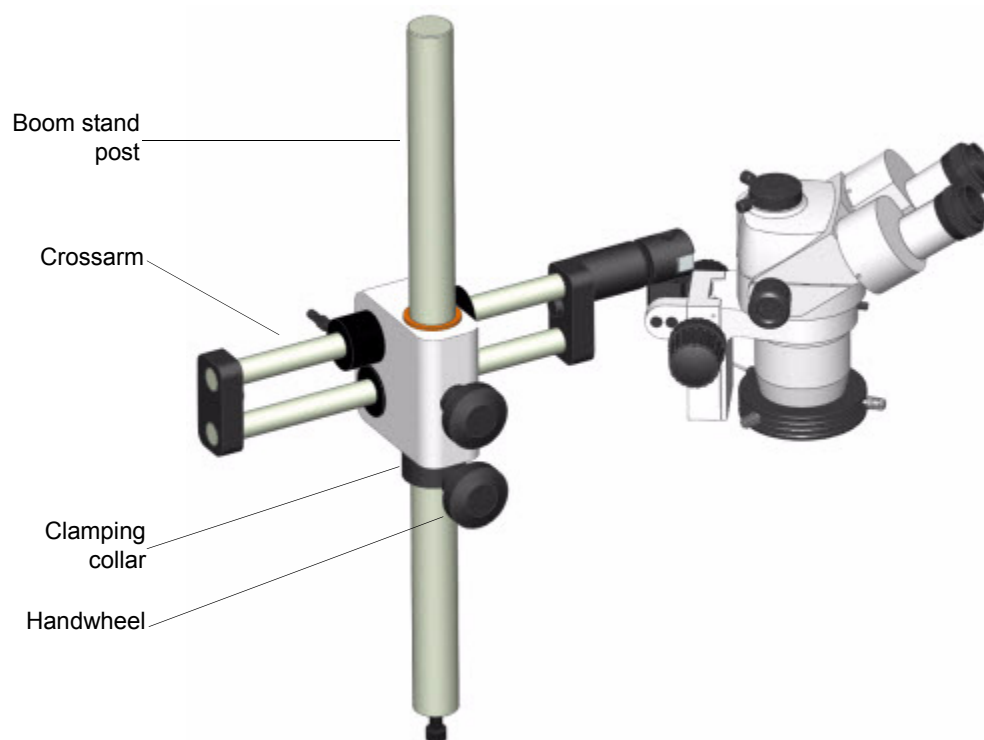
2. Thread the CS adapter ring into the camera until snug.



3. Thread the adapter/camera assembly into the mounting post.
4. Connect the camera USB cable to the PC.

Set Up the Boom Stand-Mounted Microscope

If your station configuration includes a boom stand mounted microscope, the boom stand and microscope will arrive pre-installed on the station.

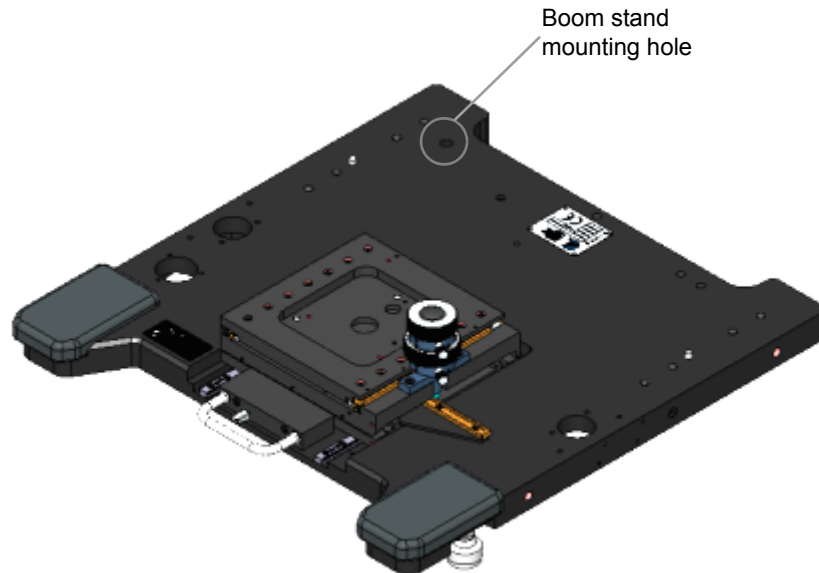


Install the Boom Stand

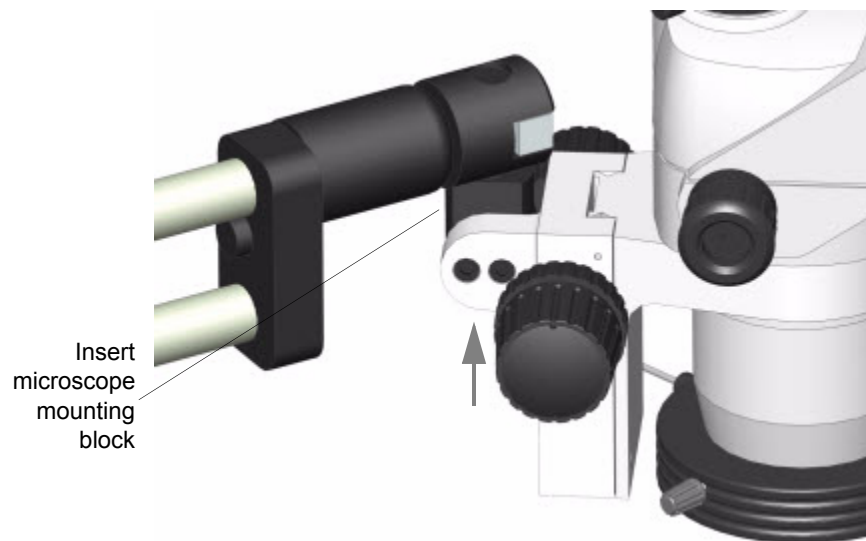
The microscope bridge and microscope will arrive pre-installed on the station. However, the boom stand can be easily disassembled and reassembled if required.

To set up the boom stand:

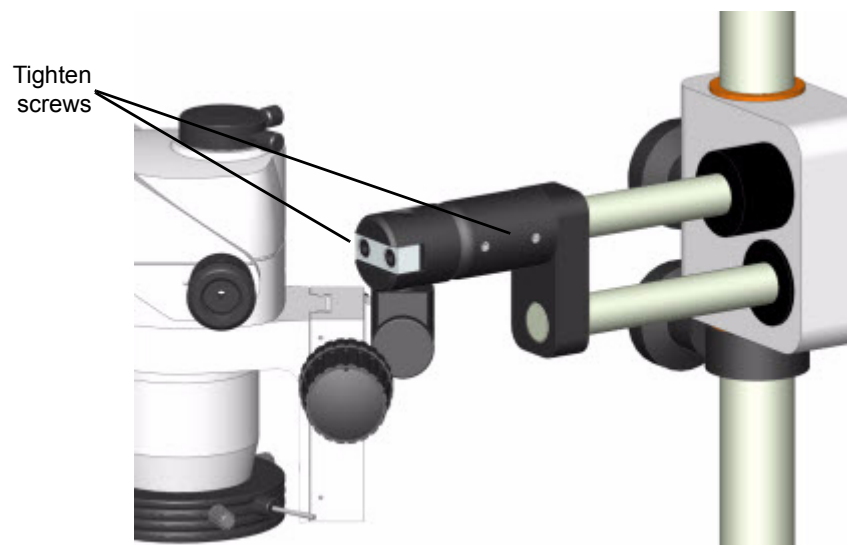
1. Install the vertical boom stand post at the left rear corner of the base. The lock screw is accessed from the underside of the base. The boom stand has only one mounting position on the platen.



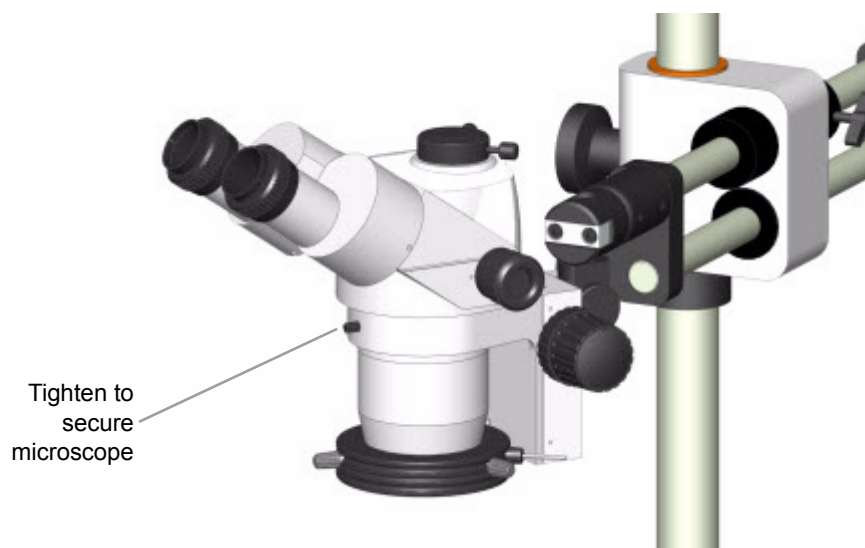
2. Slide the horizontal crossarm assembly over the post.
3. Move the clamping collar to the approximate desired Z height and tighten with the handwheel.
4. Insert the microscope mounting block into the hole in the crossarm assembly.



5. Tighten the two screws on the end of the crossarm, and the two screws on the side of the crossarm extension.



6. Insert the microscope body and secure it with the screw at the front of the microscope.



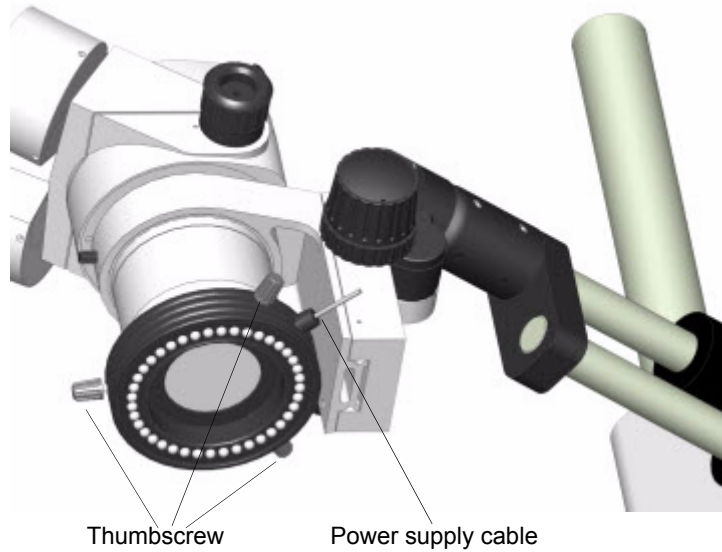
7. If necessary, readjust the z-height by loosening the handwheel.

Install the Ring Light

To install the ring light:

1. Slide the ring light over the microscope objective housing.
2. Tighten the thumbscrews to secure the ring.

3. Connect the cable and the power supply to the control box.



4. Check the microscope focus on the chuck. The microscope should focus on the chuck near the middle of its range of travel.

Install the Camera

See [Install the Camera on page 9](#) for details.

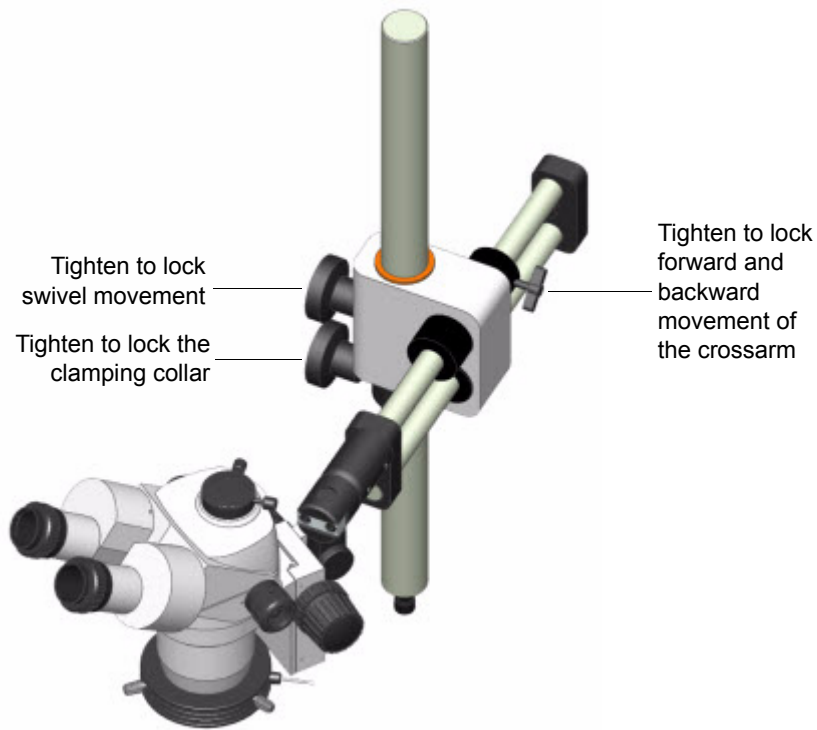
Position the Microscope

Use the boom stand adjustment knobs to adjust the height and position of the microscope.



CAUTION

Be sure to support the microscope when adjusting the height.



Set Up the Probe Card Holder

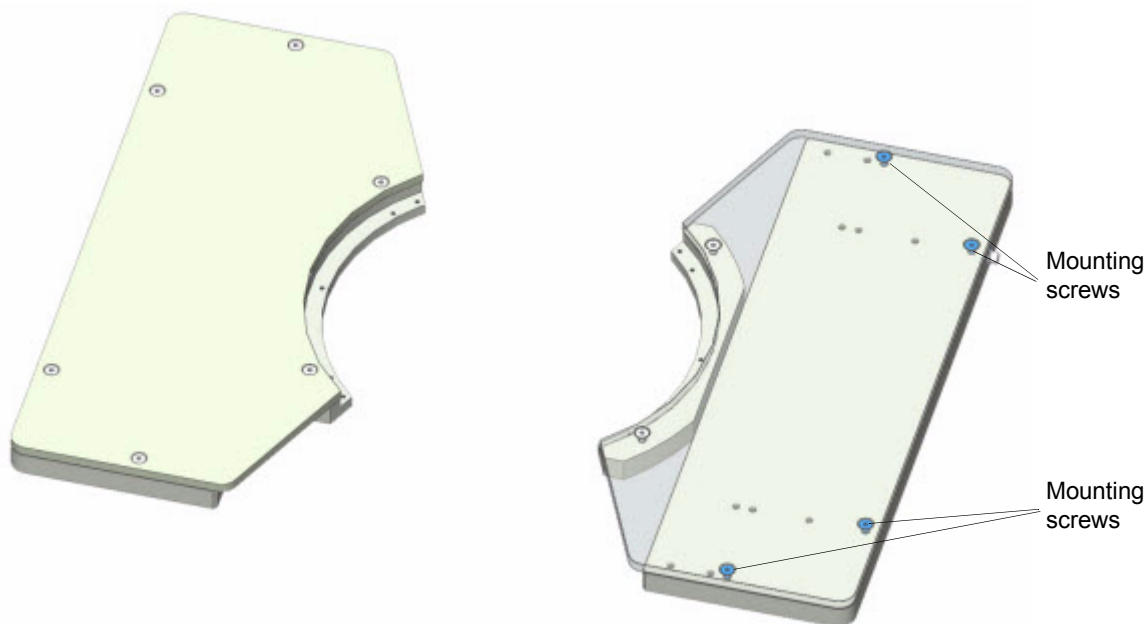
The probe card holder is available for use with the Coax, FA and Triax application configurations. It is designed for use with probe cards which have needles protruding 2 mm - 3.5 mm below the lower face of the card, and mounts to the universal platen to provide easy testing for fixed arrays.

Install the Probe Card Holder

To install the probe card holder:

1. Be sure the platen is installed in the center position. See [Set Up the Universal Probe Platen on page 5](#) for details on universal probe platen configuration.

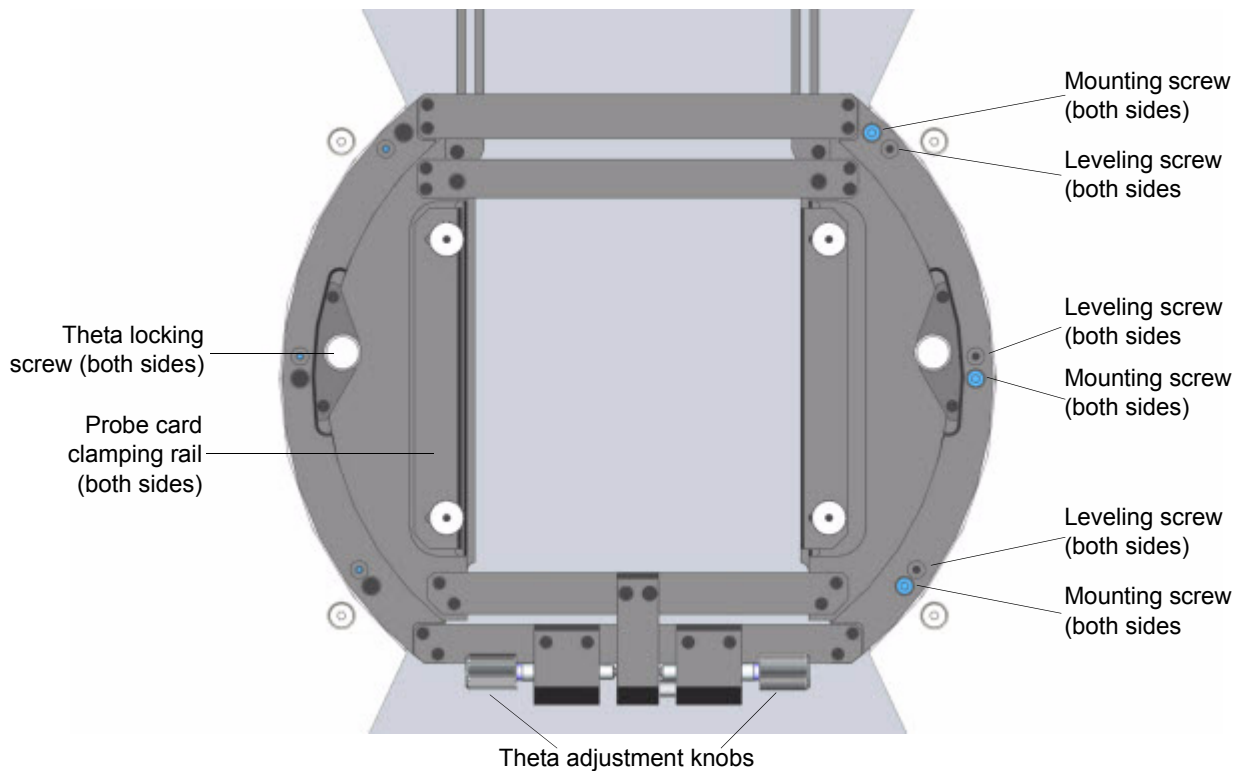
2. Four mounting screws on each corner of the probe card holder adapter secure it to the platen. Use the supplied screws and hex wrench to mount the probe card adapter plates.



NOTE

When installing the adapter on a probe system with a bridge, use the microscope lift to provide easy access to the top of the platen.

3. Carefully set the probe card holder into the adapter and secure it by tightening the three mounting screws on each side.



Planarize the Probe Card

The probe card must be parallel with the plane of the device under test (DUT). Spring washers between the probe card adapter and the platen enable adjustment of the plane of the probe card to match the DUT.

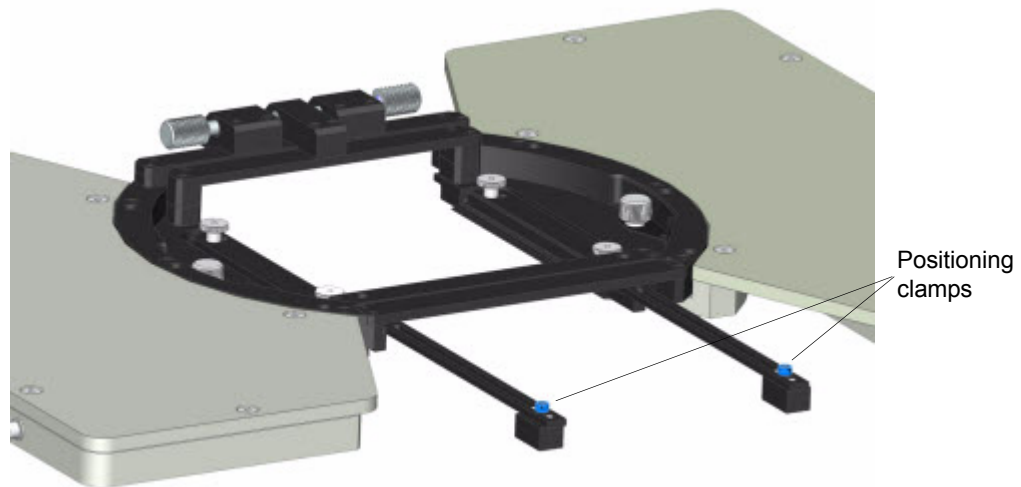
To planarize the probe card:

1. Adjust the leveling screws to compress or release the washers as required to achieve planarity.
2. Adjust Theta:
 - a. Loosen the two theta locking screws at either side of the adapter frame.
 - b. Turn the theta adjustment knobs at the front of the probe card to adjust theta. These knobs enable rotation of the probe card through a 5° adjustment range to match the DUT.
 - c. Retighten the theta locking screws after the adjustment is complete.

Adjust the Edge Connector Clamps

Adjustable positioning clamps fitted with a connector bar can be used to change the location of the edge connector to accommodate probe cards of varying sizes. Adjust these clamps so that

the microscope travel is centered over the probe array when the probe card is firmly mounted in the edge connector.]



Install the Probe Card

To install the probe card:

1. . Loosen the four knurled screws on the probe card clamping rails.
2. Slide the probe card into the edge connector from the front.
3. Tighten the four knurled screws to secure the probe card in place. Once the clamping rails are tightened, the lower side of the adapter will be level with the lower side of the platen.
4. A second edge connector may then be fastened to the front edge of the card if necessary.

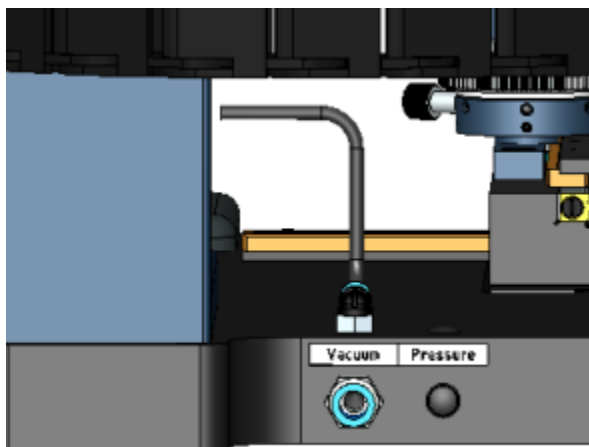
Connect the Station

Connect Power, Grounds and Accessories

All optional accessories that require AC power will be labeled with the required input voltage, VA and wattage. Ensure that all AC power outlets are correct.

Ground contacts are located on either side of the platen.



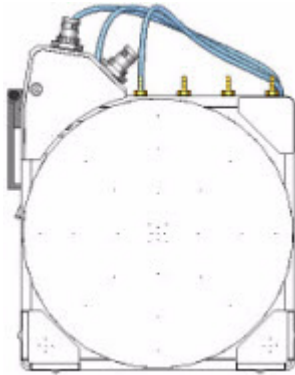
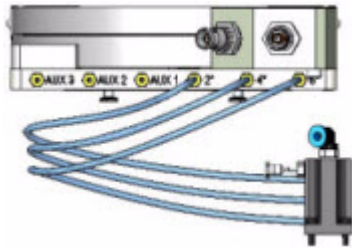
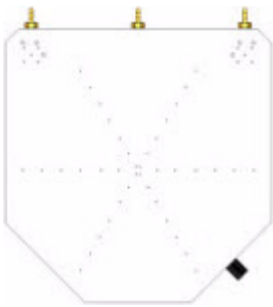

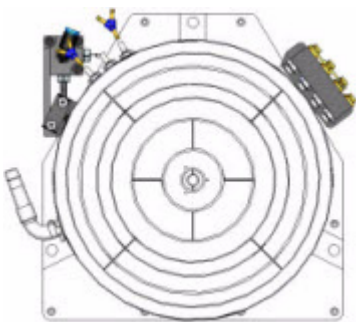

Connect vacuum and air to the station. Make sure vacuum and air sources are operating properly.



The probe system can be equipped with a wide range of accessories and options, each with its own electrical interconnects. Use caution when connecting other components. Generally, all plugs and jacks will have matching number or function labels. Make certain all cable retainers are mounted properly.

Connect Chuck Vacuum

1. Connect the supplied vacuum tubes to the fittings at the rear center of the chuck.

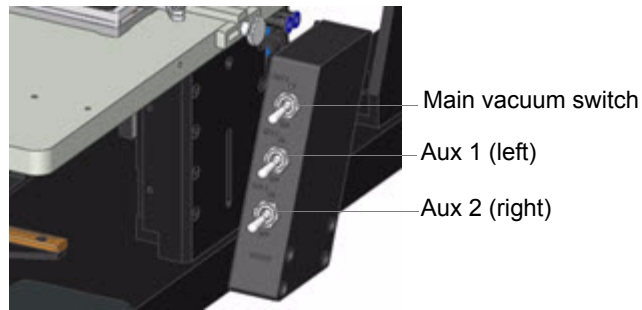
Chuck Type	Top View	Vacuum Connections
Universal		
Triax		
RF		
Thermal		

2. If your facility is equipped with 8 mm hose fittings, the other end of this hose can connect directly to the vacuum source.

If your facility is not equipped with 8 mm hose fittings, connect the 8 mm hose to the adapter coupler supplied with your station.

3. Turn on the vacuum source and confirm that vacuum is supplied to the chuck holder by turning on one of the vacuum zones.

The main vacuum on/off switch is located on the right side of the station. (The bottom two switches are present only if your chuck includes auxiliary chucks.)



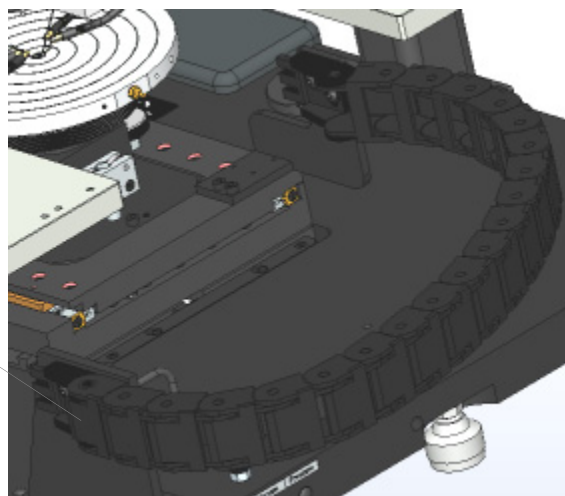
Connect Compressed Air

1. Connect the 8 mm diameter hose to the fitting on the stage.
2. If necessary, use the supplied hose-to-hose adapters appropriate to your air source. The MPS150/EPS150 systems use 8 mm pressure and vacuum inputs. The supplied accessory toolkit includes 6 mm and 1/4-inch hose adapters.
3. Connect to your compressed air source.

Configure the Supply Loop

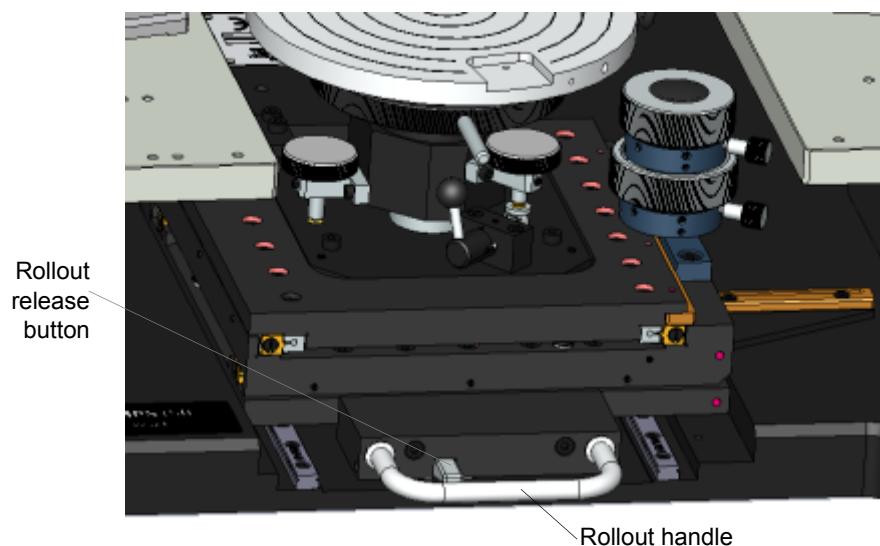
The supply loop protects your cables and keeps them out of the way while the station is in operation. To add cables to the supply loop, snap open the clip elements on the outside of the loop one at a time, starting at the left-most element.

Snap supply loop elements open one at a time to add cables



3 Preparing the Station for Testing

Load the Wafer



CAUTION

To safely load or unload a wafer, the stage must be pulled all the way forward.

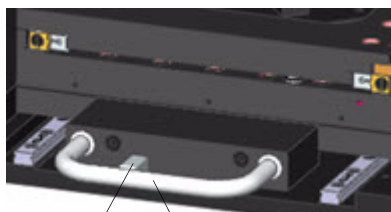
To load a wafer:

1. Press the rollout release button and use the handle to pull the chuck stage out to its maximum extension (90 mm).



NOTE

For maximum accessibility, move both the stage and rollout to the forward-most position.



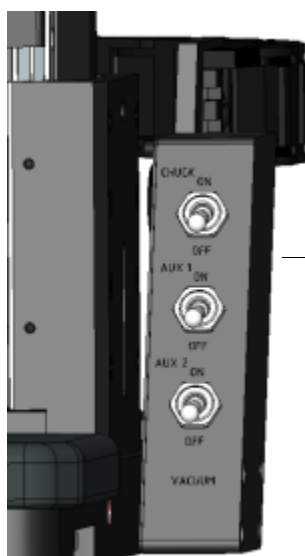
Press lever down
to release

Use handle to
pull stage out

2. Load and center the wafer on the chuck.
3. To replace the stage, push it back in until you hear an audible click, indicating that the stage is locked in place

Set Up Chuck Vacuum

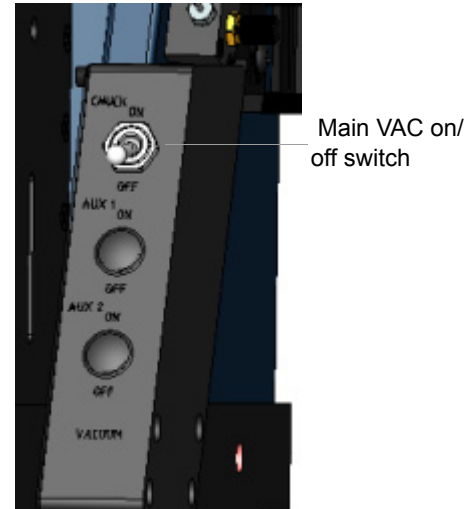
The vacuum switches on the panel at the right-hand side of the station control main and auxiliary vacuum. The main vacuum switch turns on vacuum to chucks and positioners.



Main VAC on/
off switch

Turn on Universal Chuck Vacuum

The universal chuck has only one vacuum zone. The main vacuum switch on the panel at the right-hand side of the station controls the main vacuum. A small cutout at the front of the universal chuck provides space for using tweezers to add and remove wafers.



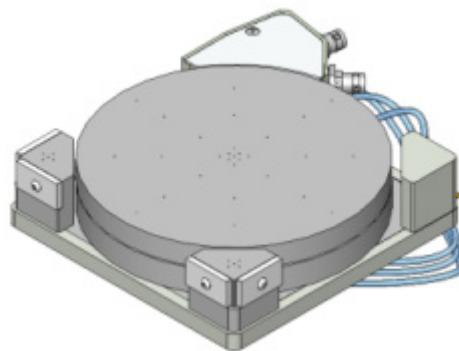
Configure Triax or Thermal Chuck Vacuum

The triax and thermal chucks provide three vacuum zones:

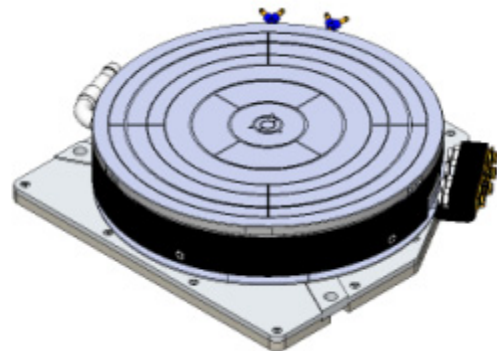
- 2-inch zone
- 4-inch zone
- 6-inch zone

The triax chuck includes two auxiliary chucks at the front, and a passive (no vacuum) auxiliary chuck at the back. Auxiliary chucks are optional on thermal systems.

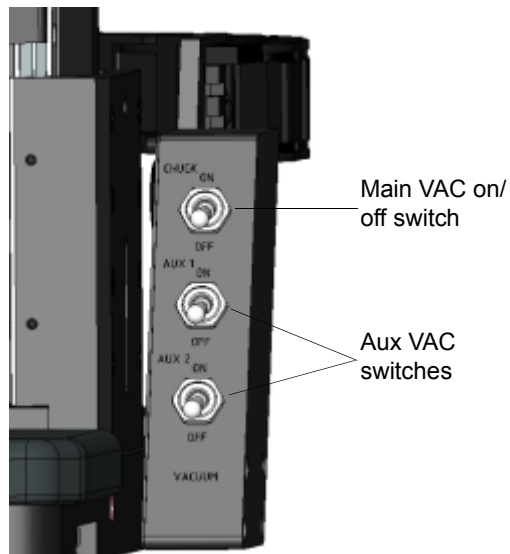
Triax chuck



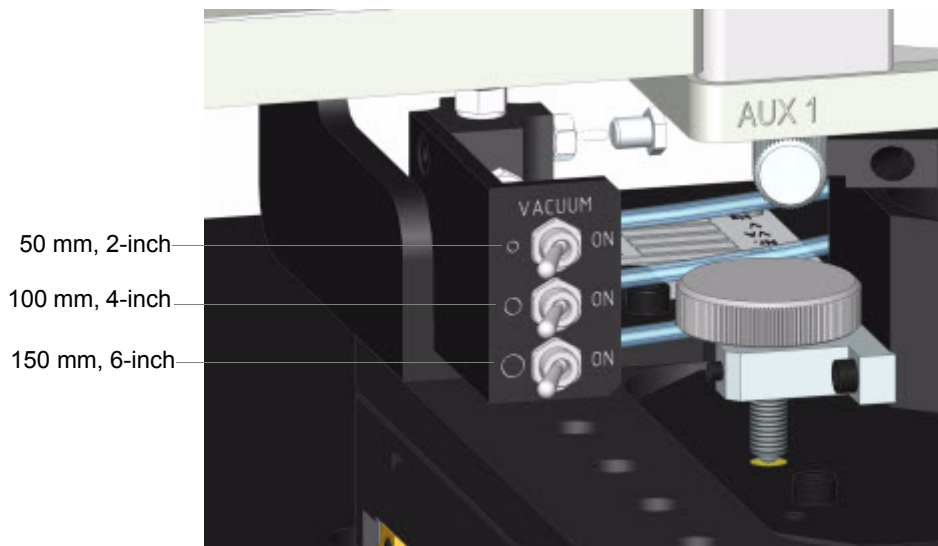
Thermal chuck



The vacuum switches on the panel at the right-hand side of the station control main and auxiliary vacuum. The main vacuum switch turns on vacuum to the chuck. Auxiliary vacuum zones are controlled by the Aux 1 and Aux 2 switches.



Use the switches under the stage on the left side of the station to control the chuck vacuum zones.

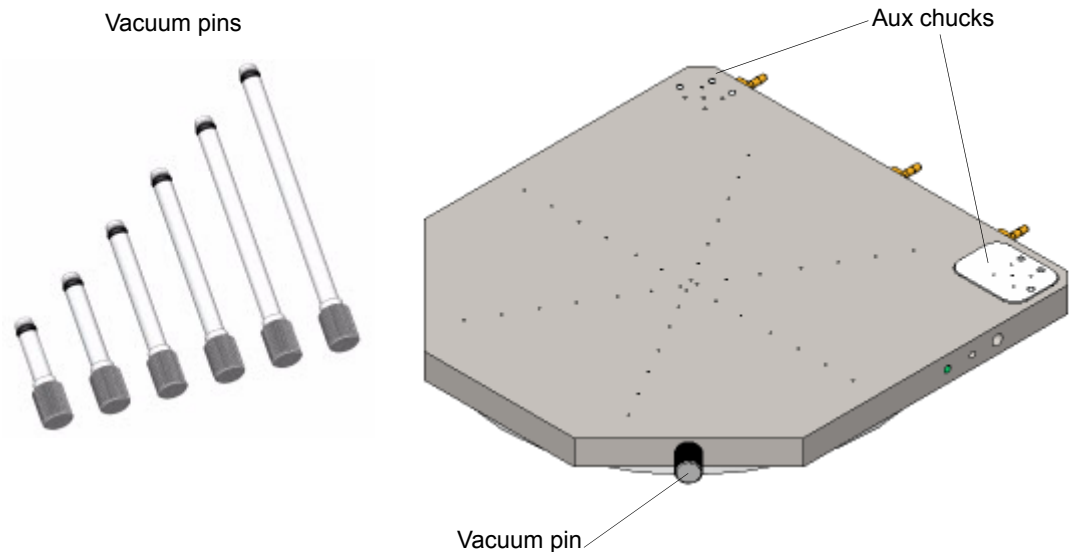


The center vacuum is always active when the main switch is on. The vacuum zone switches can be set in the following configurations:

ON	OFF	Wafer Size
none	all	N/A
2	4, 6	50 mm
2, 4	6	100 mm
2, 4, 6	none	150 mm

Configure RF Chuck Vacuum

The RF chuck provides seven vacuum zones and includes two auxiliary chucks at the back corners of the chuck. The vacuum switches on the panel at the right-hand side of the station control main and auxiliary vacuum. To set the vacuum zones, use the pins supplied with the chuck. The longest pin provides center vacuum only. The shortest pin supplies all seven vacuum areas.



Mount the Positioners

The universal platen supports both vacuum and magnetic positioner mounting options. Each side of the universal platen will accommodate one of the following positioner configurations:

- 4 DPP2xx-S or DPP3xx-S positioners
- 6 DPP105-AI-S positioners
- 2 RPP210-S or RPP305-S positioners

Two seven-position manifolds and a vacuum distribution system provide individual shut-offs for each installed vacuum-mounted positioner.

If your system is configured with vacuum mounted positioners, unused vacuum connections at the manifolds should be secured in the closed position to preserve maximum system vacuum.

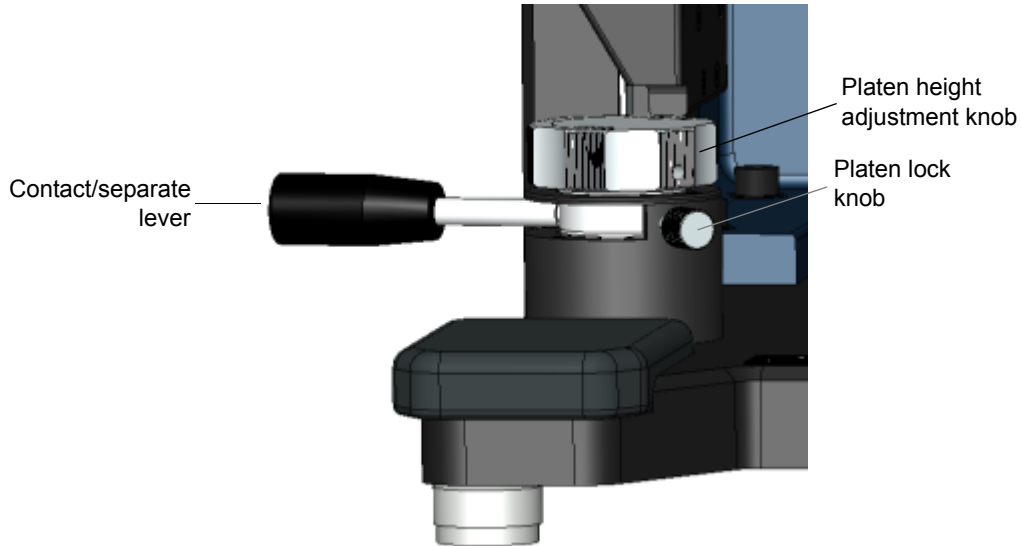
To install the positioners:

1. Mount the individual positioners on the platen and move them close to each other in the center of the field. Be sure that the X-Y micrometers are near the center of their range of travel to take advantage of the full adjustment range.
2. Make test connections to the positioner connectors or directly to the probes.
3. Use the positioner X-Y controls (micrometers or screws) to move the probes to the desired contact points (see [Adjust X/Y Position on page 27](#)).

See the *MPS150: Coax, Triax, RF and FA Stations Quick Reference Guide* for further details on configuring positioners.

Position the Platen

The platen movement control knob is located on the left-front corner of the station. It provides a precise contact/separation stroke and a coarse set-up range.



Ensure that the chuck and wafer are able to safely pass under the platen. If you detect any inaccuracies in the platen planarization, contact a Cascade Microtech service representative.

Adjust the Platen Height

The platen height adjustment knob provides up to 40 mm of platen height adjustment to accommodate test fixtures of various heights. Lock the knob by turning the the separation/contact lever clockwise. To enable platen height adjustment, unlock the lever by turning it counter-clockwise. [TEXT OK?]

Turn the platen height adjustment knob clockwise to raise the platen, or counterclockwise to lower the platen.

Turn the platen lock knob clockwise to lock the platen height.

Adjust Platen Contact/Separation

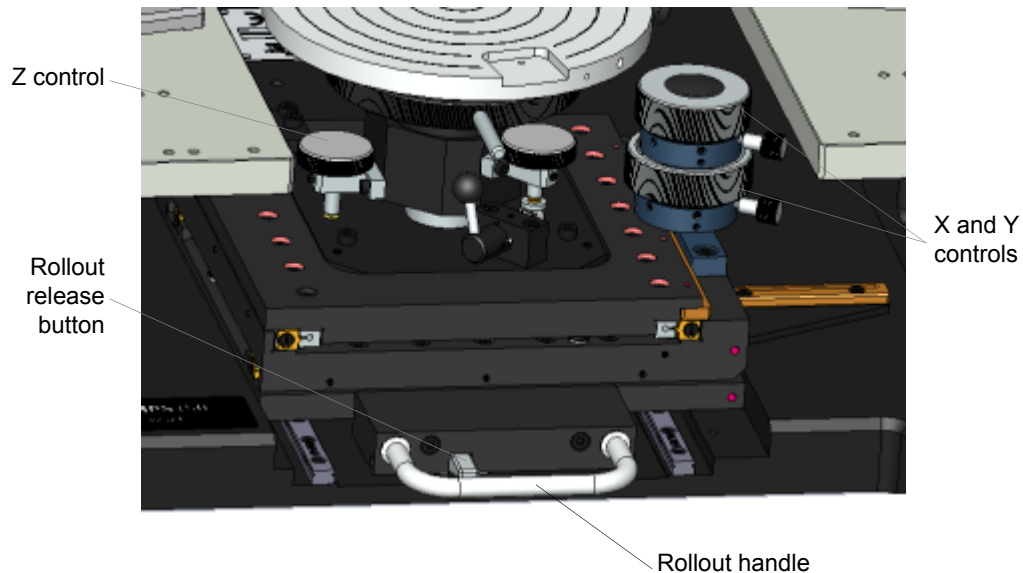
Slide the lever to the rear to raise the platen for separation, and forward to lower the platen for contact.

Turn the lever to alternate between coarse and separation movement. Turn counterclockwise to loosen for coarse movement with no separation movement. Turn clockwise to tighten, for separation stroke only.

Set the Platen Lock

Turn platen lock knob clockwise until tight to lock the platen in the current position and limit the movement of the platen height adjustment knob.

Position the Chuck



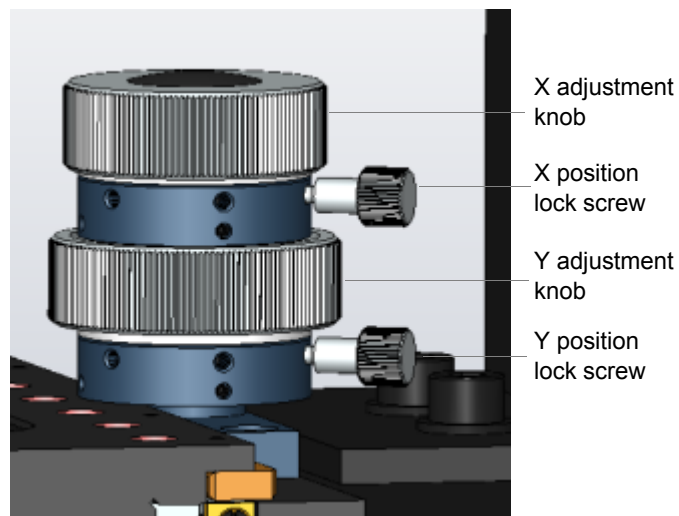
The MPS150 platform supports four types of chucks:

- Universal chuck
- RF chuck (+2 aux chucks)
- Triax chuck (+3 aux chucks)
- Thermal chuck

The chucks are always isolated from ground and include a jack that can be used to ground or bias the chuck.

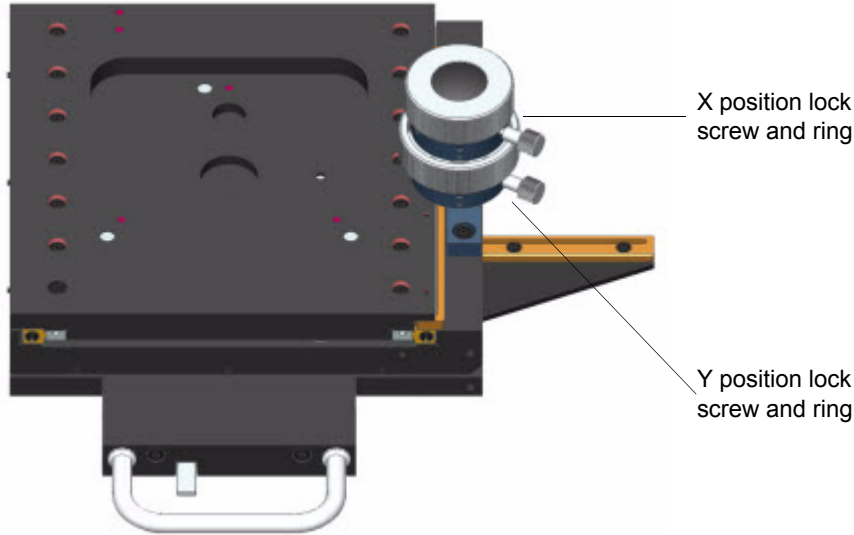
Adjust X/Y Position

Use the X adjustment knob to move the stage in the X direction. Turning the knob clockwise moves the stage to the right. Turning the knob counterclockwise moves the stage to the left. Tighten the X position lock screw to lock the X position.



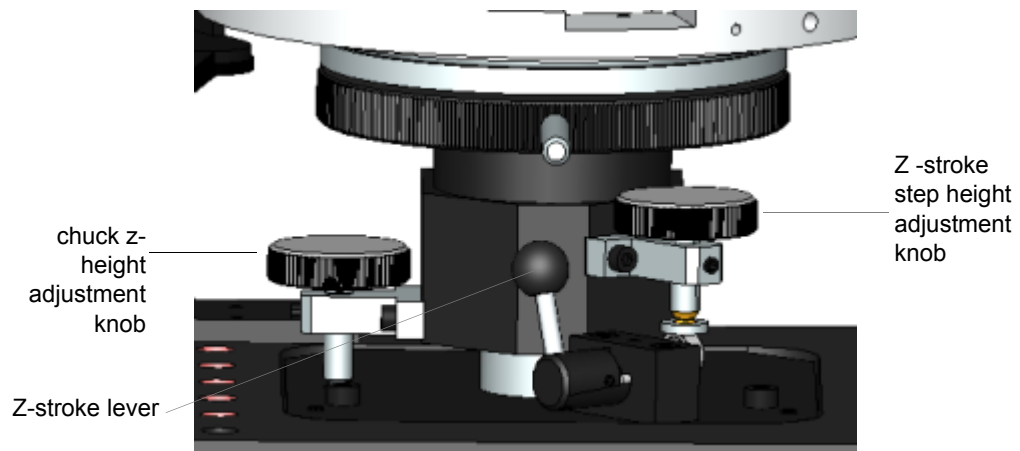
Use the Y adjustment knob to move the stage in the Y direction. Turning the knob clockwise moves the stage backward. Turning the knob counterclockwise moves the stage forward. Tighten the Y position lock screw to lock the Y position.

Adjust X/Y Stage Friction



Each lock screw is mounted to an adjustable ring. When the lock screws are loosened, the screw and ring can be turned together clockwise/counterclockwise to tighten/loosen the friction of the corresponding X and Y adjustment knobs. This adjustment can be set to the most comfortable friction level for moving the stage in exact increments.

Adjust Chuck Z Stroke



Use the chuck z-height adjustment knob to set basic chuck Z height. Turn the permanent Z knob clockwise to move the chuck up. Turn it counterclockwise to move down (maximum 10 mm).

Use the Z-stroke step height adjustment knob for an additional fine adjustment in Z height. Turn knob clockwise to fix the Z stroke lever movement (maximum 3 mm)

Move the z-stroke lever back to raise the chuck for separation. Slide the lever forward to lower the chuck for contact.

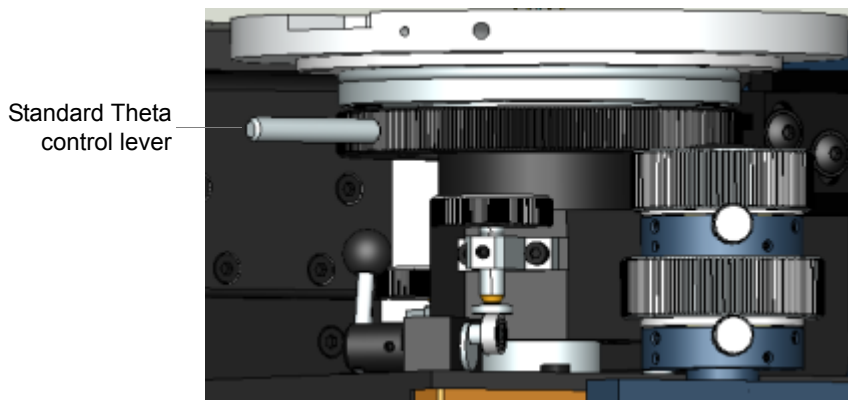
Adjust Theta Position

Set Standard Theta

The theta control is used to correct rotational error of the wafer. It is generally not required when probing a single device or package, but is useful when probing multiple dies.

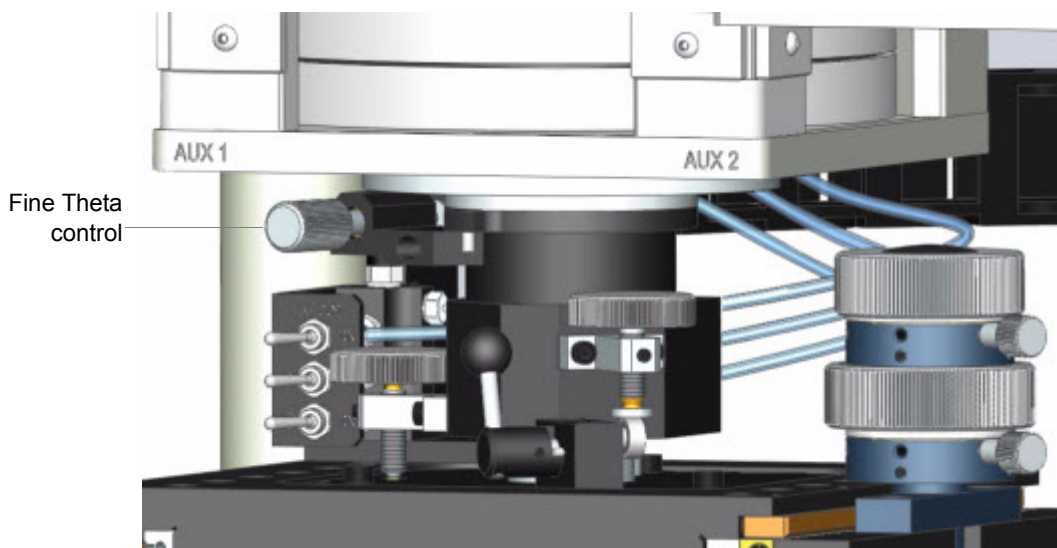
Standard theta free travel is based on frictional resistance. Use the theta handle to turn the chuck.

Standard theta free travel is included with the Coax and FA application packages, and bundled with the universal chuck (a la carte).



Set Fine Theta

The micrometer on the left side of the stage provides fine travel movement. Fine theta is included with the RF, Triax and mmW application packages, and bundled with the RF, Triax and thermal chuck (a la carte).



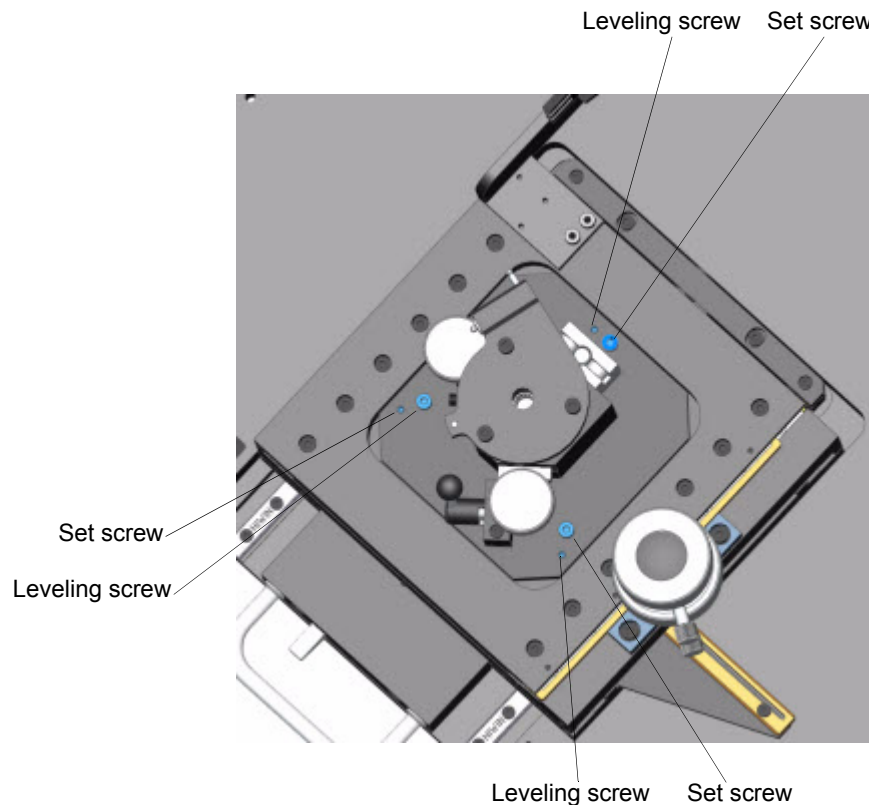
Planarize the Chuck

Chuck planarization ensures equal probe contact force from tip-to-tip of probe cards and throughout the chuck range of travel. The chuck is planarized at the factory, but adjustment may be required at installation.

Typically, the chuck will not become unplanarized with use, but if the chuck has been replaced, or if you notice that the chuck begins to lose focus at high magnifications, planarization may be required.

Planarization is performed using the chuck surface without a wafer. The microscope is used to verify the chuck level near the edge of the chuck and in line with each leveling screw.

A high resolution microscope with a 20x or higher objective lens is highly recommended.



To planarize the chuck:

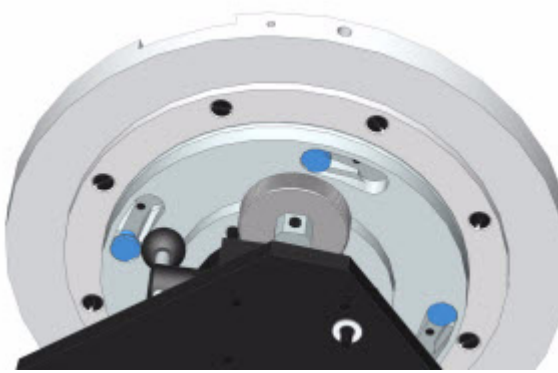
1. Focus the microscope at the three outer chuck positions of the chuck, in the direction of the respective leveling screw. Determine which one is the lowest by noting if the microscope was raised or lowered to focus. The lowest point will be the reference point to which the other two will be adjusted.
2. Move to the lowest leveling screw and bring the microscope into focus.
3. Move to the second lowest leveling screw and adjust the chuck leveling screw so that the chuck is in focus. Do not adjust the microscope focus.
4. Move to the third leveling screw and repeat actions in [step 3](#).
5. Repeat [step 2](#) through [step 4](#) until all three sites remain in focus.
6. Tighten the set screws to secure the chuck in the correct position.

Removing the Chuck

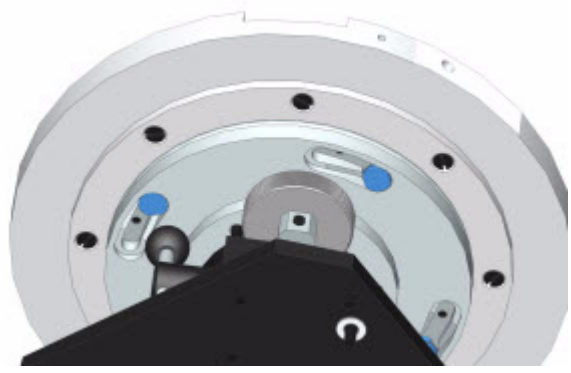
To remove the chuck:

1. Hold the 360° theta lever firmly in your left hand and turn the coax chuck counterclockwise with your right hand to release the chuck from the base.

Locked position



Unlocked position



2. Lift the chuck straight up from the stage to remove.

4 Maintenance and Service

Maintenance



CAUTION

Solvents or other aggressive cleaners must not be used to clean this equipment.

Visual Checks	Perform a thorough visual check of the system before each use. Key areas include the chuck assembly, X/Y stage, platen separation, microscope stage assembly, individual positioners and the microscope. These parts should be free of dust and residue.
Routine Maintenance	<p>A typical examination of components should include the Z stroke movement, the platen separation mechanism, and the positioners, as well as the vacuum and air pressure systems.</p> <ul style="list-style-type: none"> • Pay particular attention to positioner operation. X, Y and Z travel motion should exhibit complete freedom from any kind of irregular movement. • Check that all lines and cables are installed correctly and regularly checked for malfunctions. • Probe arms and tip-holding mechanisms should be secure in their mounts, free from oxidation, and should provide secure mounting of all standard probe tips. • The probe card holder should be kept free of dust, lubricant, residue and other foreign particles. • Use a small vacuum cleaner, such as a printer vacuum, to remove dust and debris from the interior of the probe station and hard-to-reach areas. Blow dry air or nitrogen over the station surface to remove dust and large chunks of debris. • Wipe the top of the chuck with a soft, lint-free cloth, lightly dampened with IPA.
DUT Holder	<ul style="list-style-type: none"> • Whenever you handle a DUT holder, clean the surface using a lint-free cloth dampened with alcohol or methanol (or a solvent such as Precision Cleaning Solvent). Do not use facial tissues or paper towels as they can leave fragments on the surface. After cleaning, dry the surface of the DUT holder with dry compressed air. • When not in use, store the DUT in the container it was shipped in.
Lubrication	<p>Clean the spindles and rails before applying grease or oil to them. Use fine fibrous textile material and alcohol for cleaning.</p> <ul style="list-style-type: none"> • Once per year, lubricate the microscope stage spindles and the microscope stage bearing rails. • Every six months, lubricate the chuck X-Y stage drive spindles and chuck Z axis spindle. • Lubricate the theta spindles every six months for production probing, and once per year for analytical probing.
Accessories	If the probe station includes modules that are not manufactured by Cascade Microtech, refer to that manufacturer's documentation for maintenance procedures. To maintain the probes and positioners, refer to the user guides for those accessories.
Bulb Maintenance	Illuminator bulbs can reach high temperatures. Allow adequate time for bulbs to cool before handling.

Troubleshooting

This section discusses diagnostic and repair actions for some common issues. This section does not cover invasive troubleshooting or component level repair. Attempting to troubleshoot beyond the instructions in this section may cause further damage to the probe station or related equipment, and may also void the station warranty.

Problem	Solution
The stage is difficult to move	Check that the stage rails and spindles are properly oiled. Check knob friction adjustment and adjust friction if needed. Check for any loose axis lock screws.
The wafer does not hold on the chuck	Check that the vacuum hose is properly connected. Check that the vacuum pump is switched on and the tap is open.
The pneumatic microscope lift does not function	Check that the compressed air hoses are properly connected. Check that the microscope pneumatic compressor is switched on and the tap is open.

Returning for Service

RMA Number

Before shipping a probe station to Cascade Microtech, obtain a Return Material Authorization number (RMA #). Contact the nearest Cascade Microtech sales office, or in the U.S. call customer service at (800) 550-3279 or (503) 601-1000.

Write the following information on a tag and attach it to the probe station:

- Owner's name and address
- RMA number
- Probe station model number
- Probe station serial number
- Description of the service required or failure indications

Repacking

To retain the validity of the warranty, always use the original packing materials. Contact a Cascade Microtech representative for replacement shipping materials or hardware.

Remove all probes and accessories from the probe station. Do not ship probes or accessories unless they are associated with the failure symptoms.

Appendix

A Accessories

Standard Accessories

Common MPS150/EPS150 Accessories

Outside Crate

	Qty	PN	Usage
Torx 20	1	161-660	For opening the transport crate.
Torx 25	1	161-661	For opening the transport crate.



Large Toolbox Contents









Item	Qty	PN	Usage
Metric hex wrenches	1	161-663	For various purposes, metric hex wrenches. Sizes (in mm): 1.5, 2, 2.5, 3, 4, 5, 6, 8 and 10.
Inch hex wrenches	1	103-333	For probe arms, inch hex wrenches. Sizes (in inches): 0.050, 1/16, 5/64, 3/32, 7/64, 1/8, 9/64, 5/32, 3/16, 7/32, 1/4 and 5/16.



Large Toolbox Contents



Item	Qty	PN	Usage
Cleaning cloth 	1	161-664	For machine cleaning.
8 mm vacuum tube 	3m	61424	For station vacuum connection.
8 mm pressure tube 	3m	18791	For station compressed air connection.
6 mm vacuum/pressure tube] 	1m	18807	For interface to 6 mm vacuum/pressure supply. Use adapter 6-8 to adapt to 8 mm main connection hose.
6.35 mm (1/4-inch) vacuum/pressure tube 	1m	57889	For interface to 1/4-inch (6.35 mm) vacuum/pressure supply. Use adapter 1/4 - 5/16 (8 mm) to adapt to 8 mm main connection hose.
Adapter, 6-8 mm 	3	18804	For adapting 6 mm hose to 8 mm main hose.


Large Toolbox Contents



Item	Qty	PN	Usage
Adapter, 1/4-in (6.35 mm) - 5/16-in (8 mm) 	3	61710	For adapting 1/4-inch (6.35 mm) hose to 8 mm main hose.
QST-8 	1	23404	T for 8 mm main hose (for example, to create the branch to vibration isolation platform/table).
QS-1/4-8 	2	27158	Universal connector for use with external equipment (vibration isolation table, etc).
QSF-1/4-8 	2	23471	Universal connector for use with external equipment (vibration isolation table, etc.).
Dust cover, 650x500x500 	1	44812	For protecting the system from dust when not in use.




Large Toolbox Contents






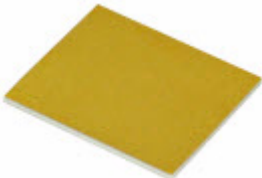

Item	Qty	PN	Usage
14 mm hex wrench 	1	67366	For unlocking the machine from transport base.

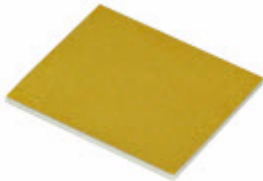





Small Toolbox Contents





	Qty	PN	Explanation
Cleaning brush 	1	113-477	For cleaning probes.
Wafer tweezer (6-in) 	1	159-436	For use with wafers.
Tweezer 	1	159-435	For use with single DUT and probe needles.

Package-Specific EPS150 Accessories

EPS150 Package	Item	PN	Qty	Usage
EPS150MMW and 146433 (MMW probe platen)	Lift handles 	900019	4	For moving the machine. Note that this is the only station for which lift handles are required, due to its large platen size.
EPS150FA	Side cutter 	161-435	1	For shortening the probe needles to avoid collision with the high resolution optics.
EPS150RF	Torque wrench (8 mm, 8 lb-in) 	159-438	1	For tightening the provided RF cables to the probes and the measurement instrument.
	Contact substrate 	67105	1	For probe alignment check.
	Substrate (Probe Clean, 5x.75-in, ITS) 	134-208	1	For cleaning RF probes. Use the included adhesive to put on the chuck.

EPS150MMW	Contact substrate	67105	1	For probe alignment check.
				
	Substrate (Probe Clean, 5x.75-in, ITS)	134-208	1	For cleaning the RF probes. Use the included adhesive to put on the chuck.
				
157-450 Advanced triax option	Screwdriver, small	161-434	1	For locking/unlocking probe tips for DCP probe exchange.
				
	Wrench (4 mm)	70897	1	For locking/unlocking DCP probe coax cables.
				
EPS-ACC-150MMW-ARS	Torque wrench (6 mm)	159-437	1	For tightening the provided MMW probe and tuner/mixer cables.
				
	Wrench (4 mm)	70897	1	For counterholding when tightening.
				

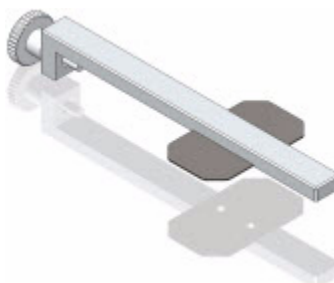
EPS-ACC-150MMW-ANR	Torque wrench (6 mm) 	159-437	1	For tightening the provided MMW probe and tuner/mixer cables.
	Wrench (4 mm) 	70897	1	For counterholding when tightening cables.

Optional Accessories: Installation and Operation

Positioner Rails

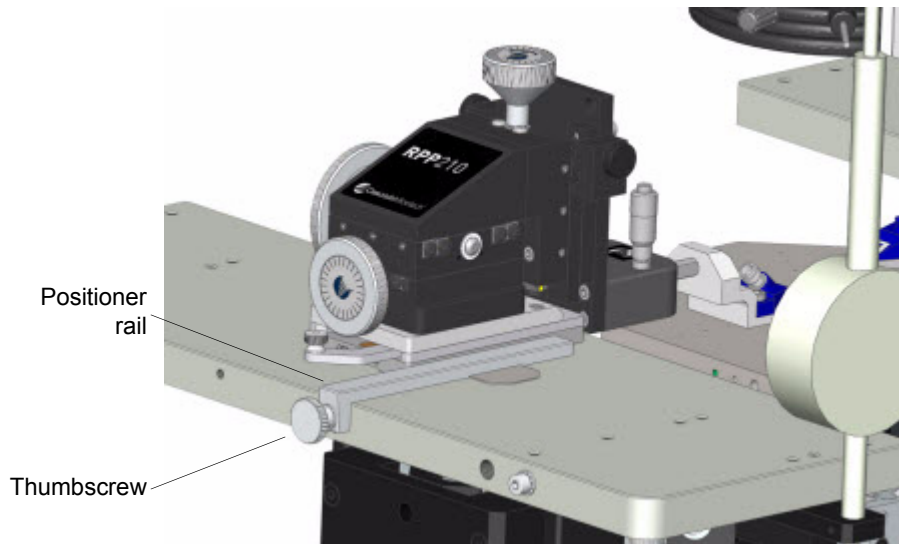
The positioner rails provide an easy means of placing East and West positioners in the correct location on the platen.

The positioner rails are included with the RF application package, but can be used with any system that uses a universal platen. They are intended for use with magnetic-mount RPP2xx positioners.



To install positioner rail on universal platen:

1. Position the rail on the platen.

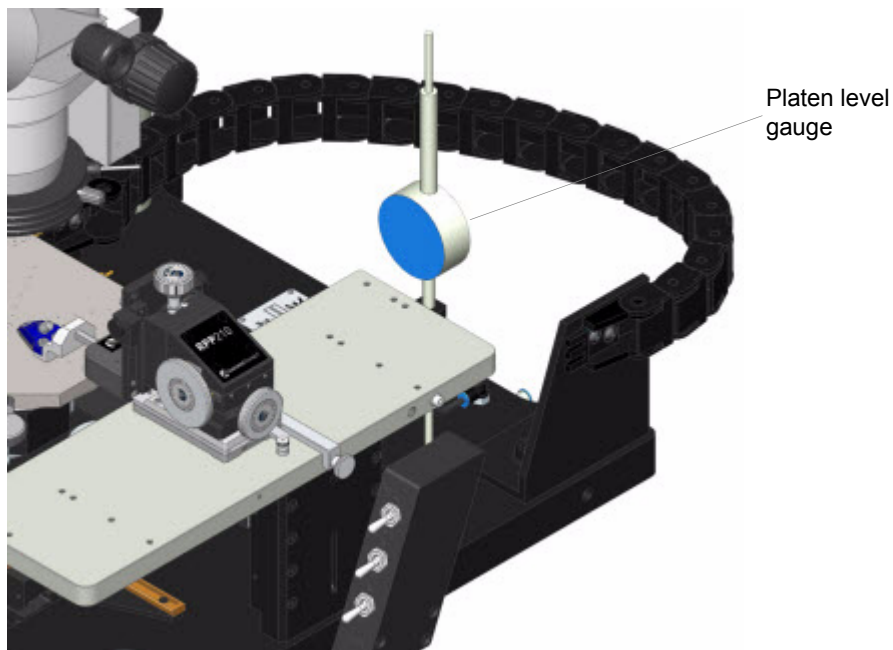


2. Tighten the thumbscrew in hole at the edge of the platen.
3. Place the positioner snugly against the positioner rail
4. Slide the positioner into the forward-most position.

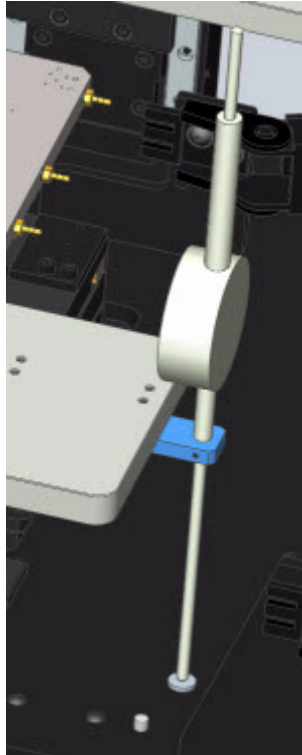
Platen Level Gauge

The platen level gauge is included with the RF and Millimeter Wave application packages, but can be ordered separately for use with other systems.

The platen level gauge provides precise detail about contact height.



To install the platen level gauge, insert the gauge post as shown. Tighten the thumbscrew to secure the gauge in position.



To use the platen level gauge for setting contact height:

1. Adjust your probe tips to the contact position; so that they are just making contact with the DUT, which is indicated by a lateral needle movement when needle position is lowered.
2. Turn the crystal on the front of the gauge to set the black indicator needle to 0 on the outer fine scale.

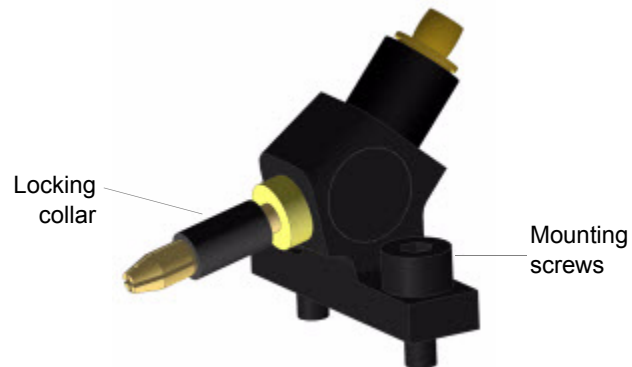


3. Use the platen height adjustment knob (see [Adjust the Platen Height on page 26](#)) to set the overtravel between 20 and 30 μm according to the settings on the indicator. Each mark on the indicator equals 10 μm . Note that 20-30 μm is a typical value, but can be quite different as determined by DUT and needle.
4. Move the contact/separate lever (see [Adjust Platen Contact/Separation on page 26](#)) to the right until it hits the end stop.
5. Turn the contact/separate lever clockwise to fix and lock it with the mechanism.

DC Tip Holder

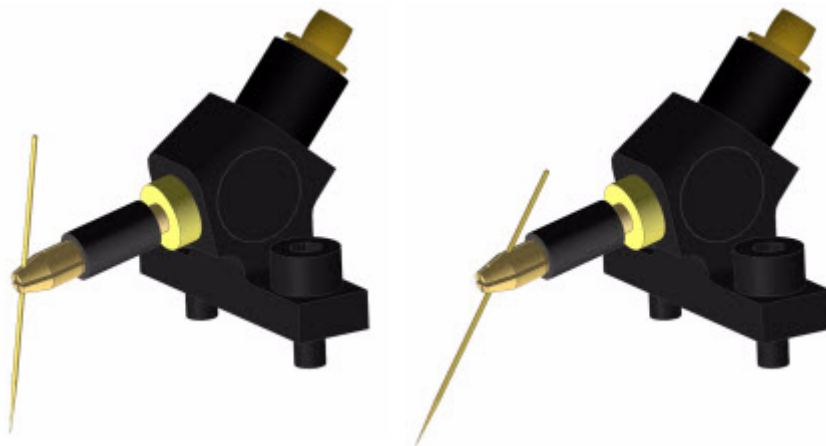
To set up the DC Tip Holder:

1. Mount the DC tip holder to the RF probe arm using the 2 supplied mounting screws.



2. Install the probe needle:
 - a. Loosen the locking collar.
 - b. Install the probe needle in the desired position. Note that the needle can be installed in two different positions.

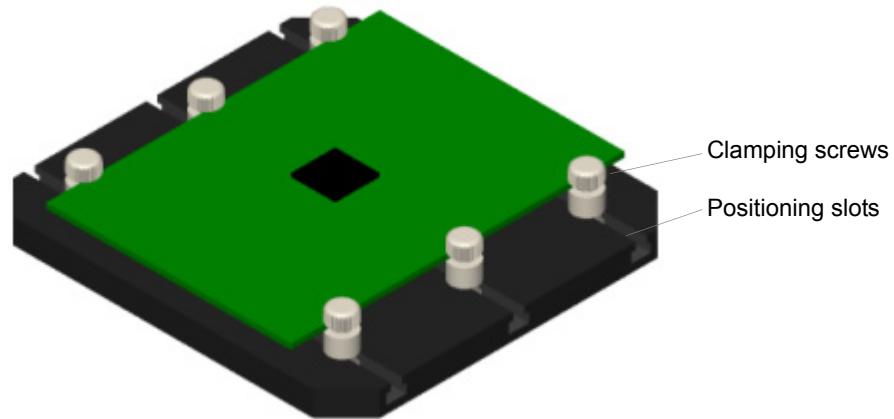
Needle positions



- c. Re-tighten the locking collar to secure the needle.
3. Connect the dedicated coaxial cable to the top of the DC Tip Holder. The cable ends in a standard BNC connector.

DUT Holder

The DUT holder provides a secure surface to position your DUT board.



To place your DUT board in the DUT holder:

1. Loosen the six isolating clamping screws.
2. Place your device into the DUT holder between the clamping screws.
3. Slide the clamping screws in the positioning slots until they are snug against the DUT board.
4. Finger-tighten the clamping screws.
5. Place the DUT holder on the chuck and secure using the chuck vacuum.

Monitors

Video Monitors



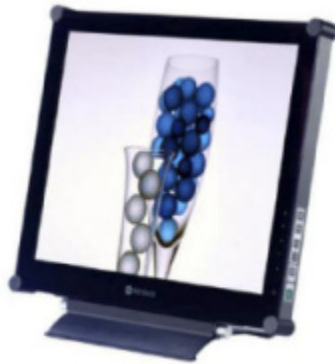
Two video monitor options are available:

- Analog
- Digital

All connections on both types of monitor are labeled. To connect the video monitors:

1. Connect the power supply to facility power.
2. Connect the video output to the monitor.

HDTV Kit



All connections are labeled. To connect the HDTV kit:

1. Connect the power supply and HDMI cable to the camera.
2. Connect HDMI cable between monitor and camera.

Vibration Isolation

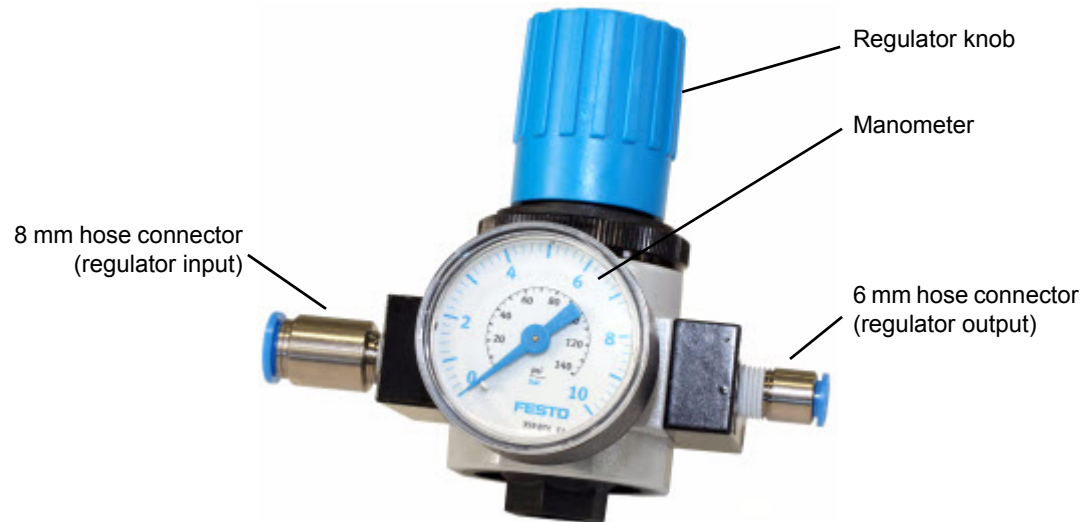
Vibration Isolation Platform

The vibration isolation platform provides additional vibration dampening for your system. The platform will arrive with a pre-installed pressure hose (6 mm) and pressure regulator. However, the vibration isolation platform assembly can be easily disassembled and reassembled if required.,



1. Assemble the pressure regulator:
 - a. Secure the manometer display on the front of the regulator.
 - b. Secure the 8 mm hose connector to the pressure regulator input.

- c. Secure the 6 mm hose connector to the regulator output.



2. Connect the pressure regulator lines:
 - a. Use the supplied 8 mm T-connector to create a branch in the main pressure hose.
 - b. Connect an 8 mm hose to the pressure regulator input.
 - c. Connect the pre-installed 6 mm vibration platform hose to the pressure regulator output.
3. Turn the blue knob counterclockwise until it stops (setting 0 bar output).



WARNING

Never set the pressure regulator above 4 bar, as it will cause damage to the table.

4. Install the platform on a flat, stable surface.
5. Center the probe station on top of the platform.
6. Turn the blue pressure regulator knob clockwise just until the vibration isolation platform begins to float.

7. If necessary, use the three valves on the table to adjust the table leveling.



Leveling adjustment valves

Vibration Isolation Table

The VIT802 Vibration Isolation Table provides additional vibration dampening. Please refer to the documentation supplied with the vibration isolation table for further details.

Note that the supplied T-connector can be used to connect the table to the existing pressure tube.

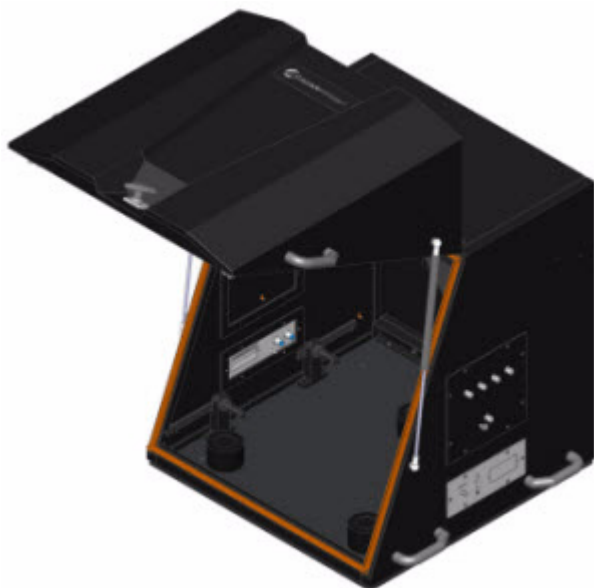


Shield Enclosure

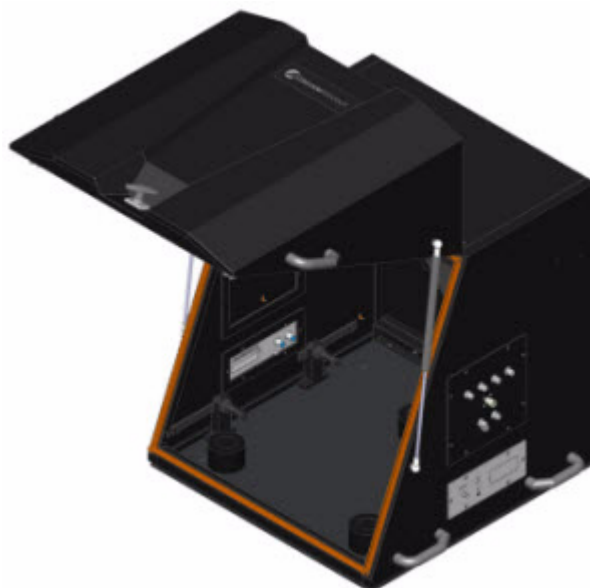
The SE750 shield enclosure provides a light-tight, shielded environment for testing. A vibration isolation or other stable table is required as base. A grounding strip provides conducting material as a seal.

The shield enclosure is available in both Coax and Triax application configurations.

Coax shield enclosure



Triax shield enclosure



To open the shield enclosure, turn the handle counterclockwise. A hydraulic lift opens the door slowly and safely. Pull down the door to close and turn the handle clockwise to lock.

See the *MPS150: Coax, Triax, RF and FA Stations Quick Reference Guide* for information on feedthrough panels.

Index

A

Accessories

- connecting [17](#)
- MPS150/EPS150 [35](#)
- optional [41](#)
- outside crate [35](#)
- shield enclosure [49](#)
- standard [35](#)

Air, connecting [20](#)

Analog camera [9](#)

Aux chucks [20](#), [25](#)

Aux vacuum switches [24](#)

B

Boom stand

- clamping collar [10](#)
- crossarm [10](#)
- handwheel [10](#)
- installation [11](#)
- microscope mounting block [11](#)
- mounting hole [11](#)
- post [10](#)
- ring light [12](#)

Boom stand-mounted microscope [10](#)

Bridge strap [3](#)

Bridge-mounted microscope [6](#)

- down movement speed throttle [6](#)
- light fiber cable [7](#)
- lock screws [7](#)
- pressure throttle [6](#)
- up movement speed throttle [6](#)

C

Camera

- analog [9](#)
- digital CS adapter [9](#)
- digital, CS adapter ring [10](#)
- installation [9](#), [13](#)

Chuck

- grounding and biasing [27](#)
- planarization [29](#)
- positioning [27](#)
- removing [31](#), [31](#)
- X adjustment knob [27](#)
- X and Y controls [27](#)
- X position lock screw [27](#)
- X/Y position [27](#)
- Y adjustment knob [27](#)

Y position lock screw [27](#)

Z control [27](#)

Z stroke [28](#)

Chuck planarization [30](#)

set screw [30](#)

Chuck stage

rollout handle [27](#)

rollout release button [21](#)

Chuck type [19](#)

Chuck vacuum [19](#), [22](#)

Chuck Z stroke [28](#)

Chuck z-height adjustment knob [28](#)

Clamping collar, boom stand [10](#)

Clamping rail, probe card holder [16](#)

Coax shield enclosure [49](#)

Coax/Triax/FA

universal probe platen mounting position [5](#)

Coax/Triax/FA mounting position [5](#)

Compressed air [20](#), [20](#)

Configuring

- probe card holder [14](#)
- supply loop [20](#)
- thermal chuck [23](#)

Connecting

- chuck vacuum [19](#)
- compressed air [20](#)
- grounds [17](#)
- power [17](#)
- station [17](#)

Contact/separate lever [26](#)

Crossarm, boom stand [10](#)

CS adapter ring, digital camera [10](#)

D

DC tip holder [44](#)

locking collar [44](#)

mounting screws [44](#)

needle positions [44](#)

Digital camera

CS adapter [9](#)

CS adapter ring [10](#)

Down movement speed throttle [6](#)

DUT holder [45](#)

clamping screws [45](#)

positioning slots [45](#)

E

Edge connector, positioning clamps [16](#)

EPS150 accessories
 EPS150 accessories
 package-specific 39

F

Fine Theta 29
Fine Theta control 29

G

Grounding and biasing 27
Grounds, connecting 17

H

Handwheel, boom stand 10
HDTV Kit 46

I

Illuminator bulbs 33

L

Labels iv
Large toolbox 35
Level the microscope 8
Leveling procedure, microscope 8
Leveling screw, probe card holder 16
leveling screws 30
Leveling screws, chuck planarization 30
Leveling valves, vibration isolation platform 48
Lift handles 2
Light fiber cable 7
Loading wafers 21
Lock screws 7
Locked position, chuck 31
Locking collar, DC tip holder 44
Lubrication, maintenance 33

M

Maintenance 33
Maintenance, lubrication 33
Manometer
 vibration isolation platform 47
Microscope
 boom stand-mounted 10
 bridge-mounted 6
 leveling 8
 leveling procedure 8
 light fiber cable 7
 lock screws 7
 positioning 13
 pressure throttle 6
Microscope height 7
Microscope leveling, planarization screws 8
Microscope lift stage 8
Microscope mounting block, boom stand 11

mmW station, lift handles 2

Monitors 45

 HDTV 46
 video 45

Mounting positioners 25

Mounting screws
 DC tip holder 44
 probe card holder 16

N

Needle positions, DC tip holder 44
Notational conventions iii

O

Optional accessories 41

P

Planarization
 chuck 29
 probe card holder 16
Planarization screws, microscope leveling 8
Platen
 height adjustment knob 26
 level gauge 42
 lock knob 26
 positioning 26
 separation/contact lever 26
Platen contact/separation 26
Platen height 26
Platen lock 26
Platen lock knob 26
Positioner rails 41
Positioners, mounting 25
Positioning clamps, edge connector 16
Positioning clamps, probe card holder 17
Power, connecting 17
Pressure regulator, manometer 47
Pressure throttle, bridge-mounted microscope 6
Probe card holder 14
 clamping rail 16
 leveling screw 16
 mounting screws 16
 planarization 16
 positioning clamps 17
Probe platen 5

R

Removing the chuck 31, 31
Removing transport lock 3
Repacking 34
Returning for service 34, 34
RF chuck vacuum 25
RF/PCH mounting position, universal platen 5
Ring Light

installation [12](#)
RMA Number [34](#)
Rollout handle, chuck stage [27](#)
Rollout release button, chuck stage [21](#)

S

Safety information [iii](#)
Separation/contact lever [26](#)
Set screw, chuck planarization [30](#)
Shield enclosure [49](#)
Shield enclosure, coax [49](#)
Shield enclosure, triax [49](#)
Small toolbox [38](#)
Stage friction [28](#)
 X position lock screw and ring, X position lock
 screw and ring
 stage friction [28](#)
 Y position lock screw and ring [28](#)
Standard accessories [35](#)
Standard Theta [29](#)
Standard Theta control lever [29](#)
Station, connecting [17](#)
Step height adjustment knob, z stroke [28](#)
Supply loop [20](#)

T

Thermal chuck [23](#)
Theta
 fine positioning [29](#)
 fine Theta [29](#)
 standard [29](#)
Theta adjustment knobs [16](#)
Theta locking screw (both sides) [16](#)
Theta position [29](#)
Transport locks [3, 3](#)
Triax chuck [23](#)
Triax shield enclosure [49](#)
Triax, thermal chuck vacuum [23](#)
Troubleshooting [34](#)

U

Universal chuck [23](#)
Universal chuck vacuum [23](#)
Universal platen, RF/PCH mounting position [5](#)
Universal probe platen [5, 5](#)
Unpacking the station [1](#)
Unpacking, bridge strap [3](#)

Up movement speed throttle [6](#)

V

Vacuum
 chuck [22](#)
 connecting [19](#)
 on/off switch [20, 22, 24](#)
 RF chuck [25](#)
 triax, thermal chuck [23](#)
Vacuum pin [25](#)
Vacuum switches [24](#)
Vacuum zones
 100 mm, 4-inch [24](#)
 150 mm, 6-inch [24](#)
 50 mm, 2-inch [24](#)
Vacuum, aux chucks [20](#)
Vibration isolation [46](#)
Vibration isolation platform [46](#)
 6 mm hose connector (regulator output) [47](#)
 8 mm hose connector (regulator input) [47](#)
 Leveling valves [48](#)
 pressure regulator manometer [47](#)
Vibration isolation table [48](#)
Video monitors [45](#)

W

Wafer loading [21](#)
Website, Cascade Microtech [v](#)

X

X adjustment knob, chuck [27](#)
X and Y controls, chuck [27](#)
X position lock screw, chuck [27](#)
X/Y position, chuck [27](#)
X/Y stage friction [28](#)

Y

Y adjustment knob, chuck [27](#)
Y position lock screw and ring, stage friction [28](#)
Y position lock screw, chuck [27](#)

Z

Z control, chuck [27](#)
Z stroke [28](#)
Z stroke lever [28](#)
Z stroke, step height adjustment knob [28](#)
Z-height adjustment [28](#)

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