NICOLET™ CONTINUμM™

Microscope User's Guide

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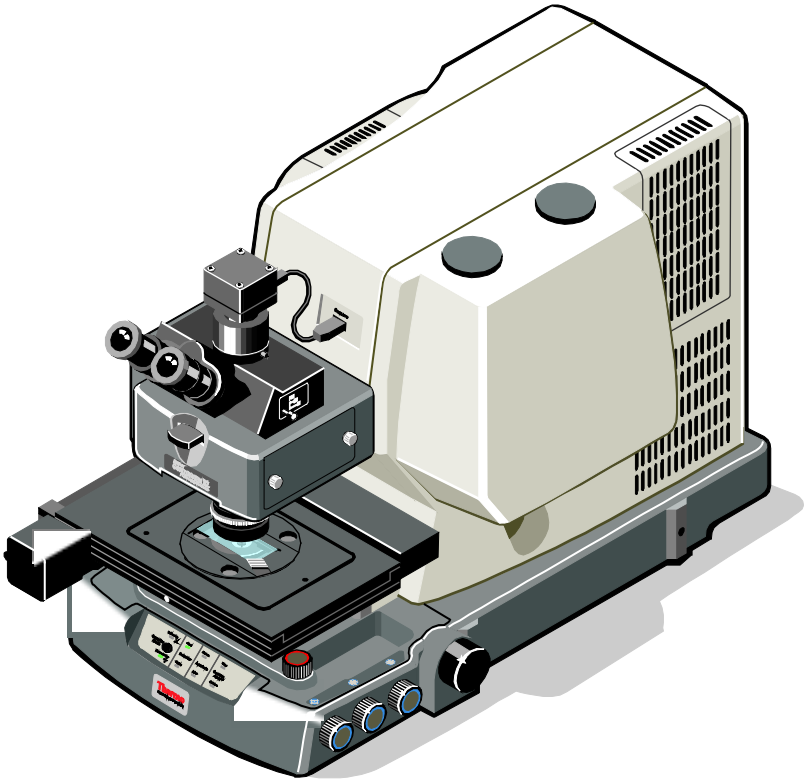
Contents

Nicolet Continuμm Microscopes

Congratulations on your purchase of a Thermo Scientific Nicolet Continuμm microscope! The Continuμm™ microscope is an infrared microsampling system that provides the highest available IR spatial resolution. The Continuμm design enables unlimited sampling and mapping capability, and incorporates unprecedented ease of use.

The on-axis infinity corrected optical design of the Continuμm microscope provides exceptional sample viewing quality and exceptional infrared sampling.



The microscope features the TruView™ illumination system, which allows continuous optical-quality viewing of the sample. The Reflex™ aperture minimizes diffraction by using a single aperture to provide aperturing before and after the sample.

You should be familiar with the operation of your spectrometer and system software before using the microscope. The microscope was designed to be used with either OMNIC™ Atlμs™ or OMNIC software. μView™ software is also available for video management during visible and discrete point microanalysis. For complete information on using these packages, see the on-line Help system or other documentation that came with the software. In this manual, we will refer to OMNIC Atlμs commands. If your system is not equipped with OMNIC Atlμs, see the instructions for collecting data that came with your spectrometer.

The Continuμm microscope must be installed as part of a Thermo Scientific spectrometer system and can be used only after it is properly connected to the spectrometer.

The Microscope Safety Guide that came with your microscope contains important safety information. This guide is available in several languages. Contact our local office for information about the languages that are available. To prevent personal injury and damage to equipment, read the guide and follow the safety precautions contained in it whenever you use the system.

Questions and concerns

In case of emergency, follow the procedures established by your facility. If you have questions or concerns about safety or need assistance with operation, repairs or replacement parts, you can contact our sales or service representative in your area or use the information at the beginning of this document to contact us.

About this manual

This manual explains how to use the system to collect and process FT-IR spectra after a Nicolet™ Series spectrometer and Nicolet Continuμm microscope are installed. Included is basic information about using OMNIC Atlμs software, as well as chapters on how to operate the microscope. (If you did not purchase OMNIC Atlμs software, see the documentation that came with your spectrometer for information about using OMNIC to collect data.)

A Continuμm microscope is used for illustration purposes. The following conventions are used in this manual to draw your attention to important information:

This symbol tells you that you can find more information in the on-line help and tutorials. To access help or a tutorial, click the Help menu in OMNIC.

This symbol tells you that you can find more information in this manual or other printed documentation that came with your instrument.

Note Notes contain helpful supplementary information. ▲

Notice Follow instructions labeled "Notice" to avoid damaging the system hardware or losing data. ▲

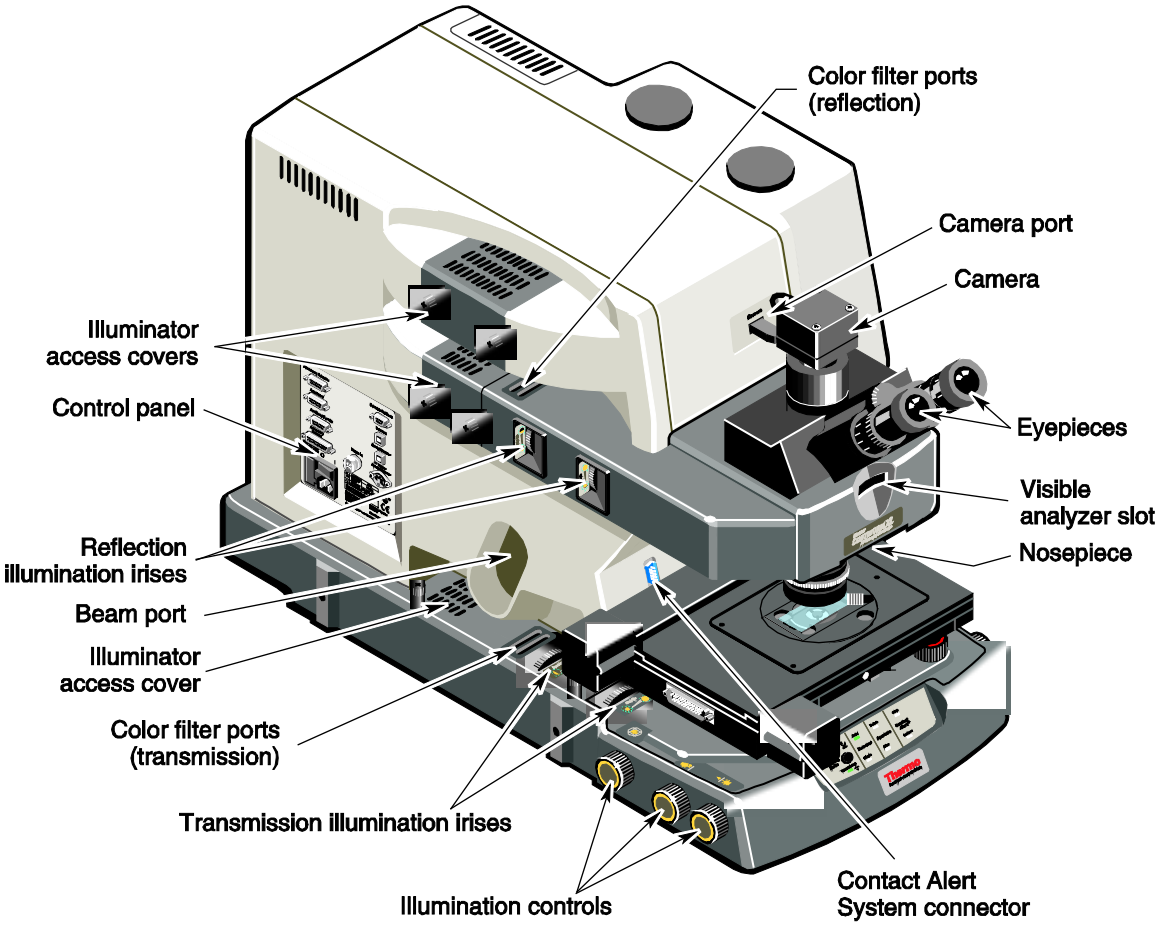
⚠ Caution Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. ▲

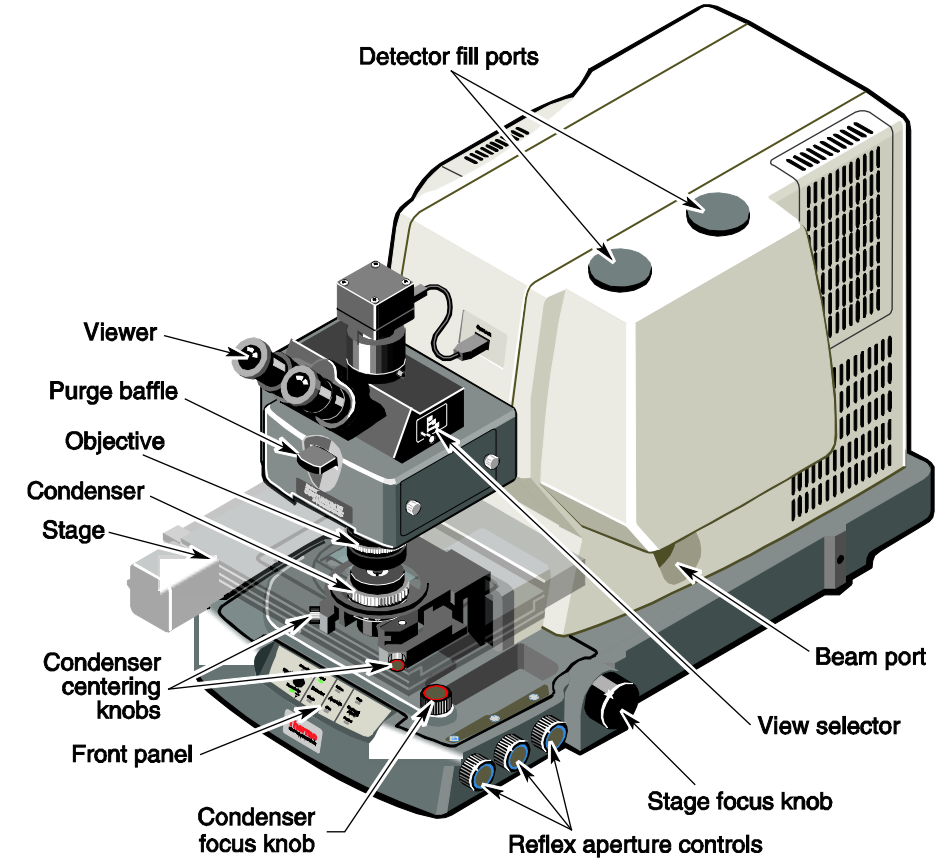
⚠ Warning Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. ▲

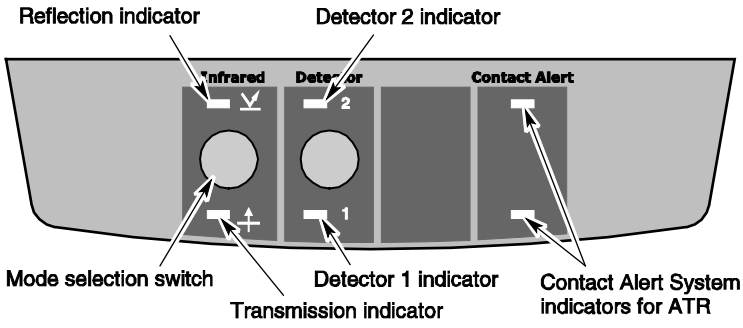
⚠ Danger Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. ▲

Microscope components

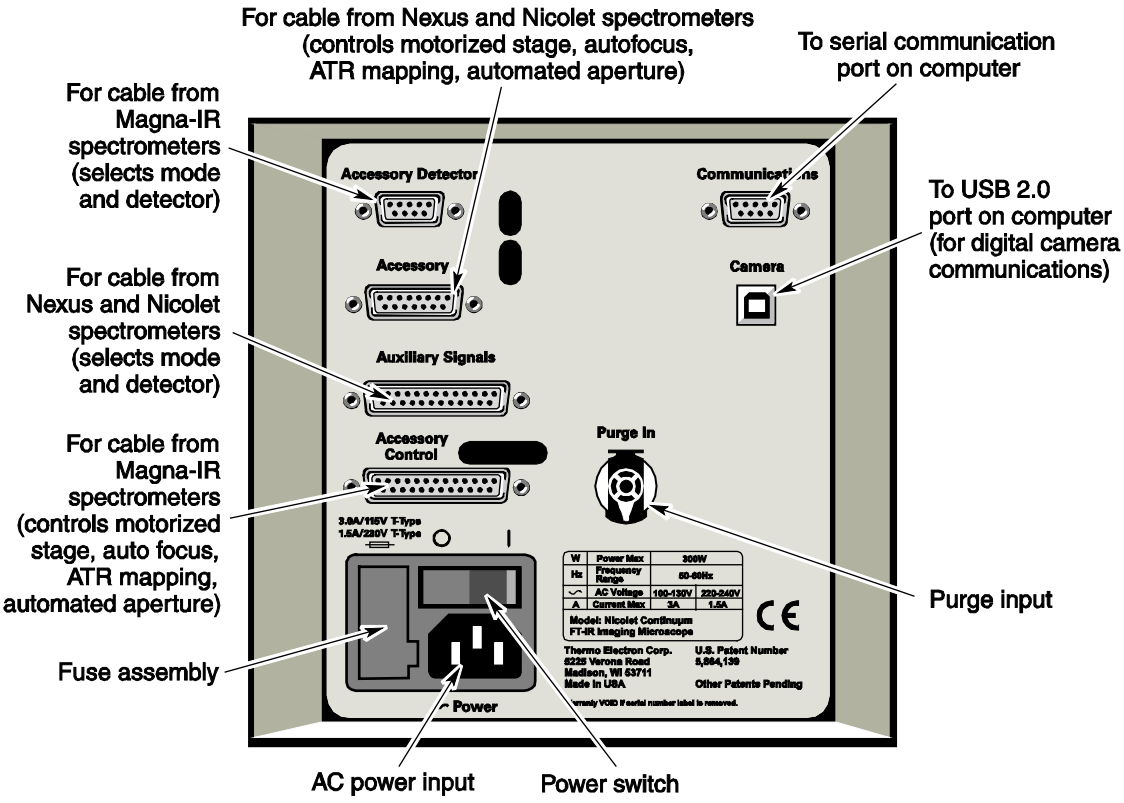
The following illustrations identify the microscope controls and components.




Detector fill ports
Viewer
Purge baffle
Objective
Condenser
Stage
Condenser centering knobs
Front panel
Condenser focus knob
Beam port
View selector
Stage focus knob
Reflex aperture controls


Reflection indicator
Detector 2 indicator
Contact Alert
2
1
Mode selection switch
Transmission indicator
Detector 1 indicator
Contact Alert System indicators for ATR

Front panel



Control panel (on left side)

Preparing the Microscope

This chapter explains how to prepare a Continuμm microscope for data collection. It includes information about:

- Turning on the power
- Cooling the detector
- Initializing the microscope stage and, if necessary, limiting stage travel
- Preparing the optics

Notice The computer and microscope components of your system should always be powered on before the spectrometer. To ensure that all the features of your microscope are available, allow at least 20 seconds to elapse between the time that you power on the computer and microscope components and powering on the spectrometer. ▲

Turning on power

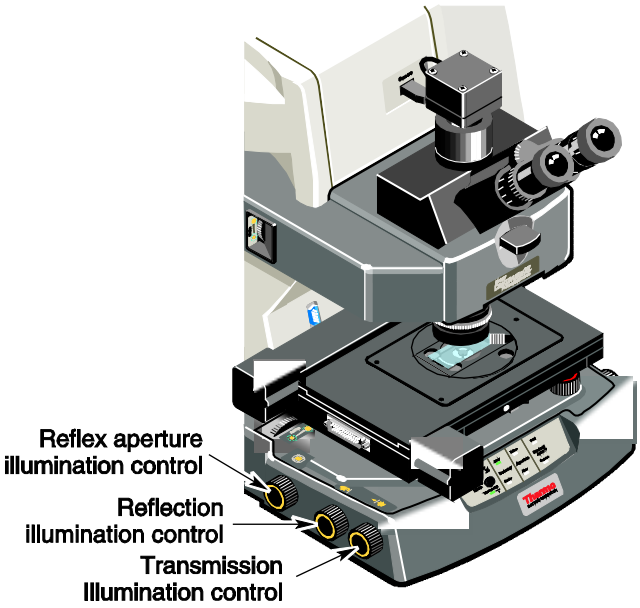
Always power on the components in your microscope system in the order that follows.

1. **Microscope**
2. **Stage controller** (systems with optional motorized stages only)
4. **Illuminators**
5. **Computer, monitor, printer and other computer peripheral devices**
6. **Spectrometer**

Notice To ensure that all system components can communicate, be sure that the microscope has been powered on for at least 20 seconds before you power on the spectrometer. ▲

If you are turning on the microscope for the first time or the microscope has been off for several hours and you are going to perform precision mapping experiments, allow one hour following power on for its temperature to stabilize before continuing. If you are going to collect routine spectra, the system is ready for use as soon as you power on.

Before you turn on the microscope power, it is a good idea to verify that the illuminator controls are in the OFF position. Rotate the controls counterclockwise until they click into the OFF position.



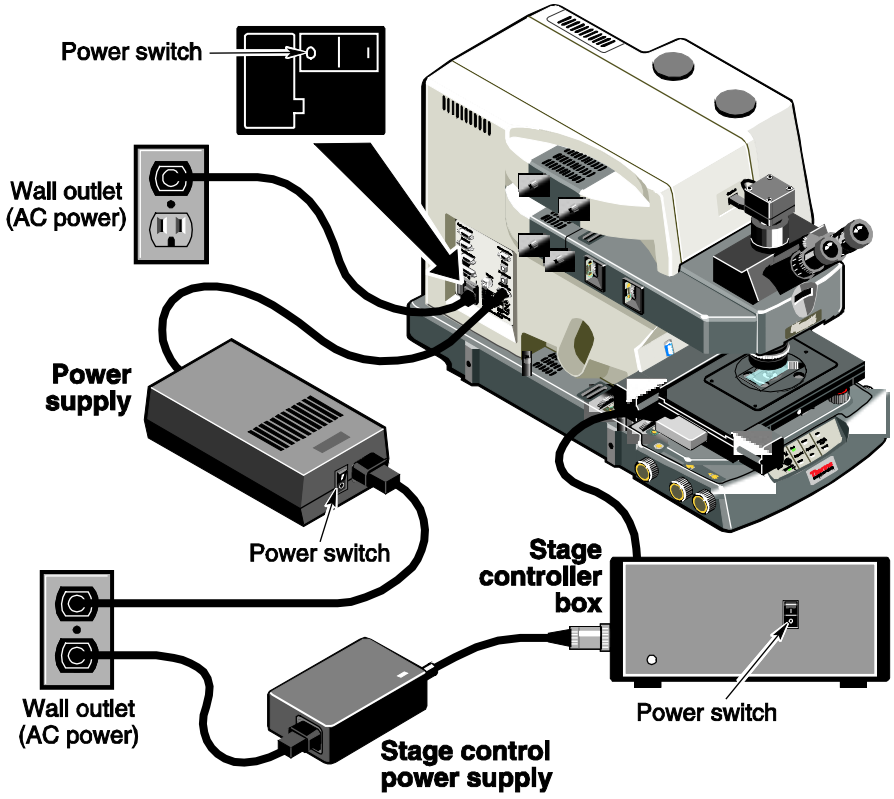
Then move the power switches to the ON position.

"**I**" = On

"**O**" = Off

The power switches are located:

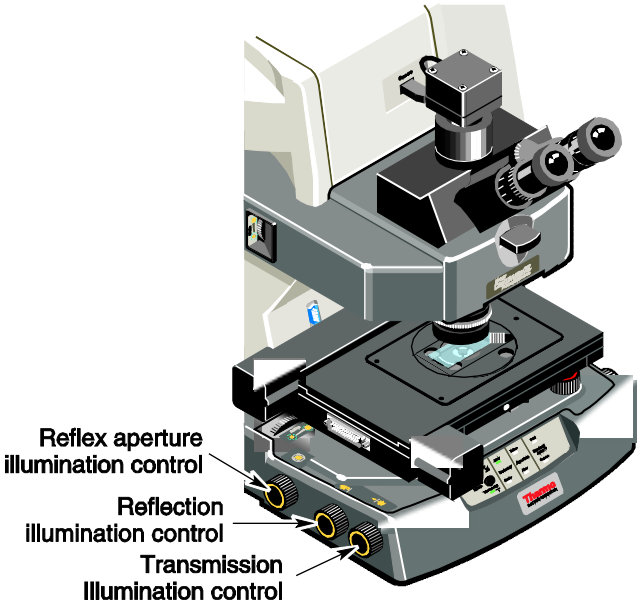
- On the control panel on the left side of the microscope.
- On the front panel of the optional stage controller.
- On the computer, monitor, printer and other peripheral devices.
- On the spectrometer power supply.



Once the microscope is powered on, turn on the illuminators and computer hardware.

- Rotate the illumination controls clockwise to the mid-point.
- For optimum performance, leave the transmission and reflection illuminators on and set to medium intensity at all times except when a different intensity is required for viewing.

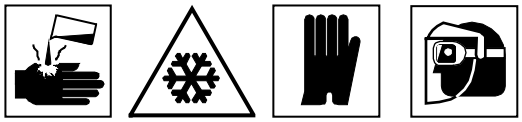
Finally, turn on the spectrometer power. To ensure that all the components are recognized, the spectrometer always should be the last component in a microscope system that is powered on.



Cooling the detector

The microscope is equipped with one or two single-element detectors. Most of these detectors must be cooled with liquid nitrogen before use.

⚠ Caution Liquid nitrogen is extremely cold and can cause injury. A warm laboratory dewar, funnel, and detector may cause the liquid nitrogen to boil rapidly and spatter. When filling the detector dewar, be careful not to contact the liquid nitrogen with your skin.



Wear protective gloves and splash-proof goggles and follow precautions described in the material safety data sheets provided by your liquid nitrogen vendor.

Also note that liquid nitrogen can be hazardous and create an oxygen deficient atmosphere if handled in an insufficiently ventilated room. ▲

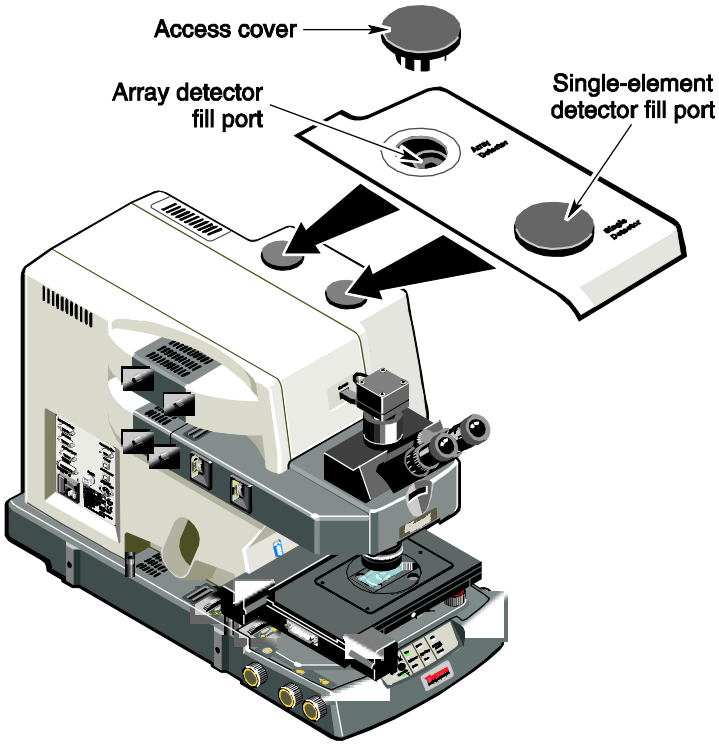
Detectors that require cooling are encased in a stainless steel dewar. Once cooled, the detector will remain cold for about 13 hours. You can add liquid nitrogen as needed at any time except while you are collecting spectra.

To cool a detector:

1. **Fill a laboratory dewar with approximately 750 ml (26 fluid ounces) of liquid nitrogen.**

   Less liquid nitrogen may be needed if the detector was cooled recently.

2. **Remove the access cover for the detector fill port you wish to use.**



3. **Insert the laboratory funnel into the fill port.**

   The fill ports are offset, toward the front of the access port.

   To prevent damage to the microscope internal components, be sure that the neck of the funnel is inside the fill port. Damage caused by spilled or misdirected liquid nitrogen is not covered by warranty.

4. **After you have filled the funnel once, allow the detector dewar to cool for one to two minutes before adding more liquid nitrogen.**

   Filling the detector too quickly can cause unnecessary boil off and hazardous splatter.

5. **Continue filling the funnel and allowing the nitrogen to drain into detector dewar.**

   The dewar is full when liquid nitrogen no longer drains into it.

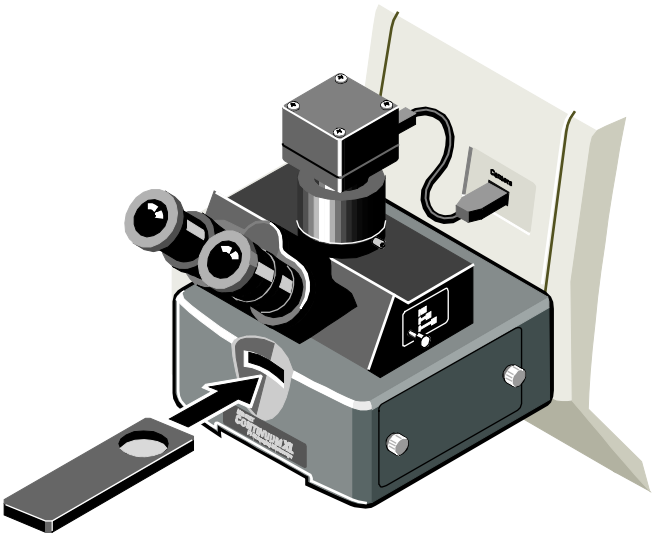
6. **Allow the detector temperature to stabilize.**

   For best results, allow the detector to stabilize for at least 20 minutes before analyzing samples.

Installing the purge baffle

The purge baffle protects the optical components in the microscope from moisture in your breath. The baffle deflects your breath away from the polarizer slot when you do not have a polarizer installed.

The purge baffle should be installed at all times, unless you have a polarizer or filter installed in the slot.



Initializing the stage

Both vertical and horizontal movement of optional motorized stages should be initialized whenever the OMNIC Atlμs or μView software is installed, you change computers, and whenever you upgrade or replace the stage. They also must be initialized any time the microscope and stage controller are powered off. Neither manual nor glide stages require initialization.

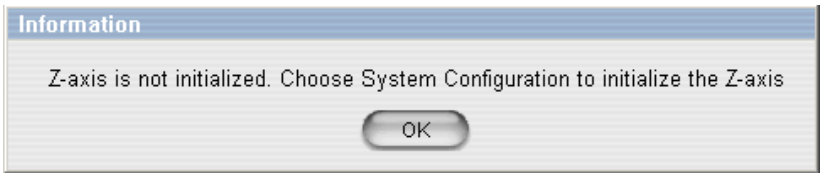
Because the stage moves during the automated initialization process, it is necessary to protect hardware components that could interfere with the stage's movement. Prompts that appear during the initialization ask you to take precautions such as lowering the condenser or removing the nosepiece.

Note Whenever the OMNIC Atlμs or μView software is installed, you change computers, and whenever you upgrade or replace the stage, you also need to calibrate the horizontal movement of the stage. ▲

For more information about calibrating the X-Y movement of the stage, find "calibrating stage" in the Atlμs Help system Index and go to "How to calibrate the stage".

Z-axis

Whenever the Z-axis of the stage requires initialization, you will see the message:



when you open the Atlμs window. This message indicates that the system needs to initialize vertical stage movement to allow accurate vertical positioning through the software.

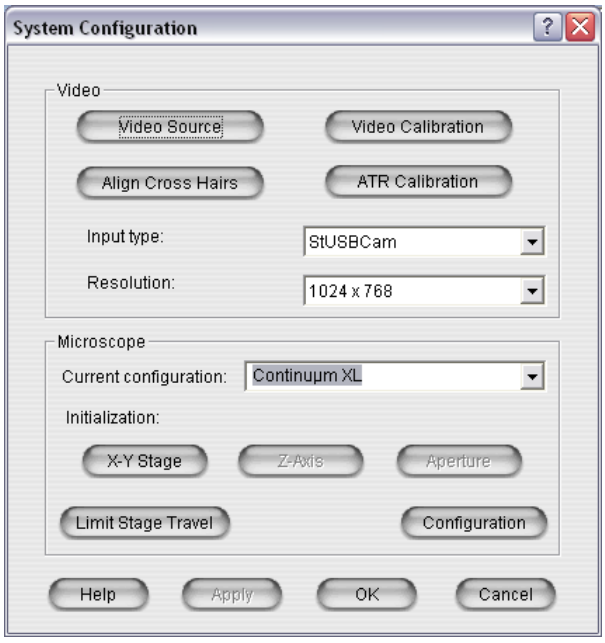
Notice Always remove the nosepiece and lower the condenser completely before you initialize the stage. Stage collision damage is not covered by warranty. ▲

See "Changing the condenser" and "Changing the objective" in the "Setting up for experiments" Help book available through Microscope Help topics in the OMNIC Help menu, if you are unfamiliar with the procedures for removing and reinstalling the nosepiece or lowering the condenser.

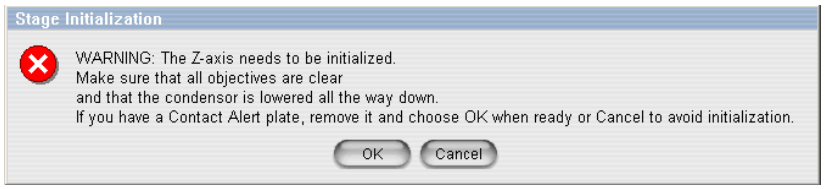
To initialize the Z-axis:

1. **Remove the nose piece and lower the condenser completely.**

2. **Choose System Configuration from the Atlμs menu in OMNIC.**



3. **Click the Z-Axis button in the Microscope field.**



Notice Always remove the nosepiece and lower the condenser completely before initializing the stage. Damage resulting from stage collisions is not covered by warranty. ▲

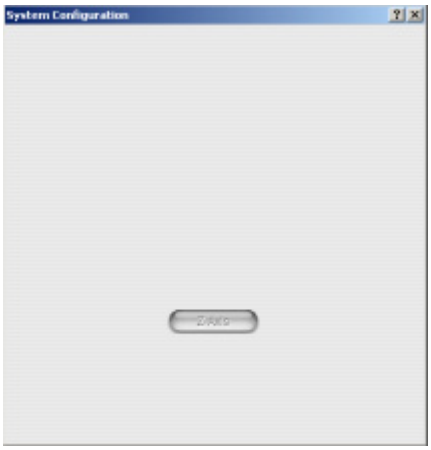
4. **Choose OK when the Stage Initialization information box appears to begin the initialization.**

   Choose Cancel if you do not wish to calibrate the Z-axis at this time.

5. **Wait while the stage initializes.**

   While the stage is being initialized, no other system configuration parameters are available for change and no other system configuration operations can be conducted.

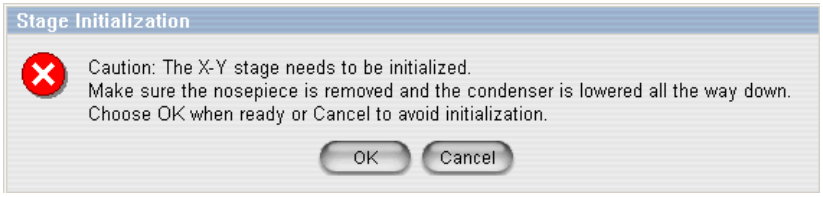
   To prevent accidental initiation of other actions during stage initialization, no other fields are visible and the initialization button is disabled, as shown below.



   When the initialization is complete, all fields in the System Configuration dialog box become visible again and all controls are reactivated. The software has the information about the location of the stage that it needs to control vertical stage movement and display accurate stage coordinate values.

XY-axes

Whenever the XY-axes of the stage requires calibration, you will see the message:



when you open the Atlμs window. This message indicates that the system needs to initialize horizontal stage movement to allow accurate horizontal stage positioning.

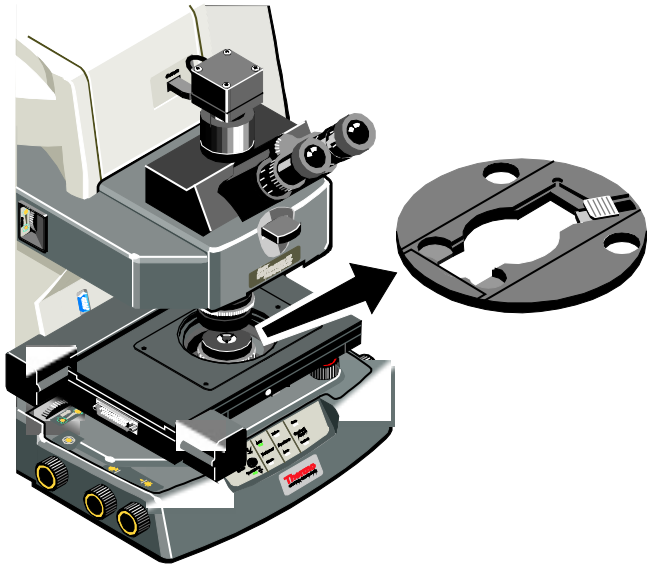
Notice Always remove the nosepiece and lower the condenser completely before you initialize the stage. Damage resulting from stage collisions is not covered by warranty. ▲

See "Changing the condenser" and "Changing the objective" in the "Setting up for experiments" Help book available through Microscope Help topics in the OMNIC Help menu, if you are unfamiliar with the procedures for removing and reinstalling the condenser and nosepiece.

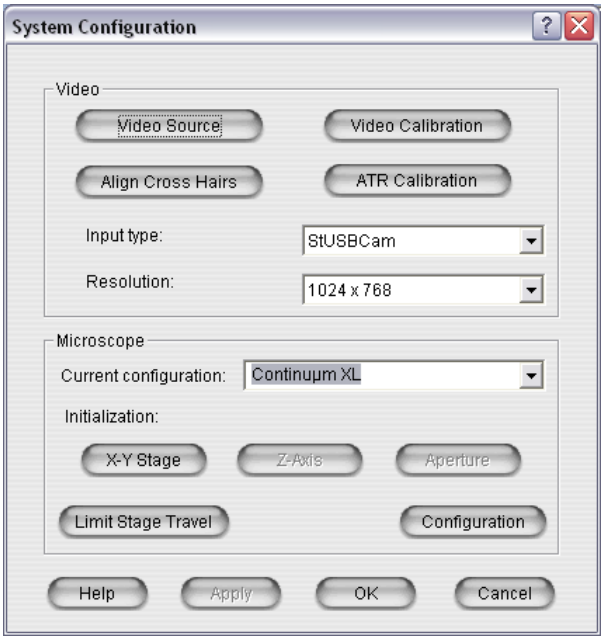
To initialize the XY-axes:

1. **Remove the nose piece and condenser.**

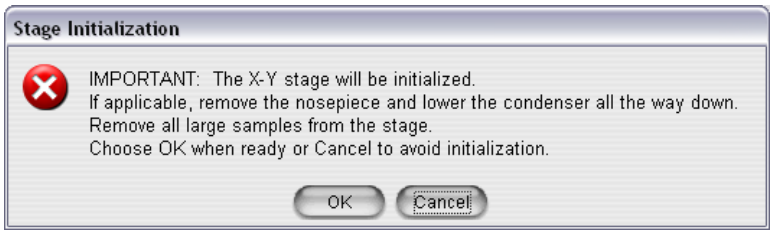
2. **If a universal slide holder is installed, remove it.**



3. **Choose System Configuration from the Atlμs menu.**



4. **Click the X-Y Stage button in the Microscope field.**



Notice Always remove the nosepiece and lower the condenser completely before you initialize the stage. Damage resulting from stage collisions is not covered by warranty. ▲

5. **When the Stage Initialization information box appears, choose OK to begin calibrating horizontal stage movement.**

   Choose Cancel if you do not wish to calibrate the XY-axes at this time.

6. **Wait while the stage initializes.**

   While the stage is being calibrated, no other system configuration parameters can be edited and no other system configuration operations can be conducted.

To prevent accidental initiation of other operations during stage initialization, no other fields are visible and the initialization button is disabled, as shown below.

When the initialization is complete, all fields in the System Configuration dialog box become visible again and all controls are reactivated. The software now has the information about the location of the stage that it needs to control horizontal stage movement and display accurate stage coordinate values.

Limiting stage travel

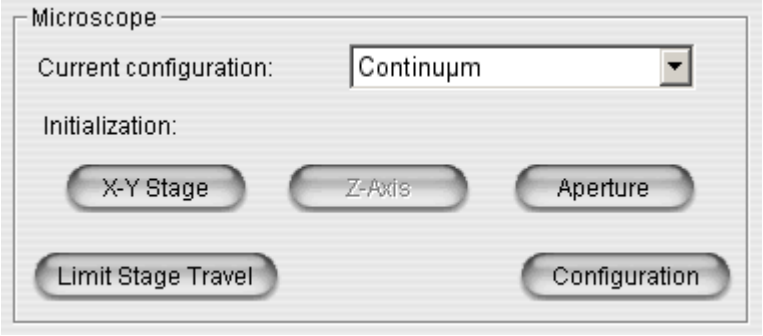
Limit stage travel, available for motorized stages through System Configuration in the Atlμs menu, allows you to further control horizontal movement of the stage. This is useful to prevent stage collision damage when performing transmission experiments on thick samples (greater than 2250 μm (0.09 in)) and/or with large condensers (such as the Reflachromat condensers) installed. A checkbox allows you to toggle between restricted travel and full travel with a single mouse click. This feature is not available for standard manual or glide stages.

While performing reflection experiments on samples that are 2250 μm (0.09 in) or less in thickness, there in no need to use stage travel limits. Simply lower the condenser to a level below the bottom of the stage (or remove it all together) and the full 27000 μm x 76200 μm (5 in x 3 in) stage travel is available.

Notice Use care and avoid collisions while setting the travel limits. Be sure that the physical center of the stage is centered under the objective and that the universal slide holder is removed from the stage before opening the Limit Stage Travel dialog. Damage due to stage collision is not covered under warranty. ▲

To limit stage travel:

1. **Click the Limit Stage Travel button in the Microscope field of the System Configuration dialog box.**

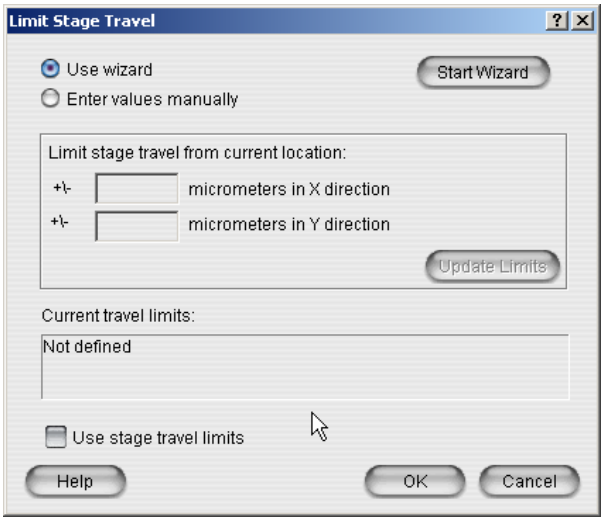


2. **When the Limit Stage Travel dialog box appears, choose the method for entering the travel limits.**

   Choose “Use wizard” if you do not know the limits of stage travel. The Stage Travel Wizard will prompt you to move the stage to the travel limits and record coordinates.

   Choose “Enter values manually” if you know the limitations you wish to set.

   If any stage travel limits were defined previously, they are displayed in the Current Travel Limits box.



3. **If you chose Enter values manually, type the stage limits in micrometers in the X and Y text boxes. When you finish, click the Update Limits.**

   You can use the values in the table below to quickly set the limits to protect a Reflachromat condenser.

			Travel limit (µm)	
Objective	*Sampling mode*	*with*	**±***X*	**±***Y*
15X Reflachromat	Reflection	Condenser fully lowered	63500	38100
	Transmission	Sample thickness <0.1”	63500	38100
		Sample thickness >0.1”	63500	33337
32X Reflachromat	Reflection	Condenser fully lowered	63500	38100
	Transmission	Rectangular stage insert installed	35797	19060
		Without stage insert	47371	37084

4. **If you chose to use the wizard, click the Start Wizard button.**

   Move the stage as instructed on the screen. When you are finished, the new limits appear in the current Travel Limits box.

5. **Select Use Stage Travel Limits to save the setting and restrict stage travel when you choose OK.**

   If Use Stage Travel Limits is not selected, the settings are saved, but stage travel is not restricted when you choose OK.

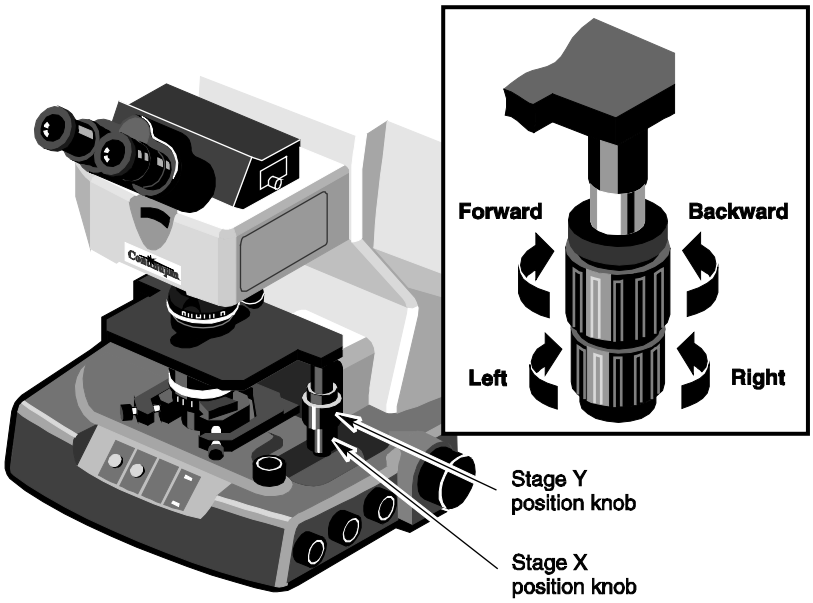
   You can select this option later to put the settings into effect. This lets you easily limit the stage travel just when you want to.

6. **Choose OK to save your setting and close the dialog box.**

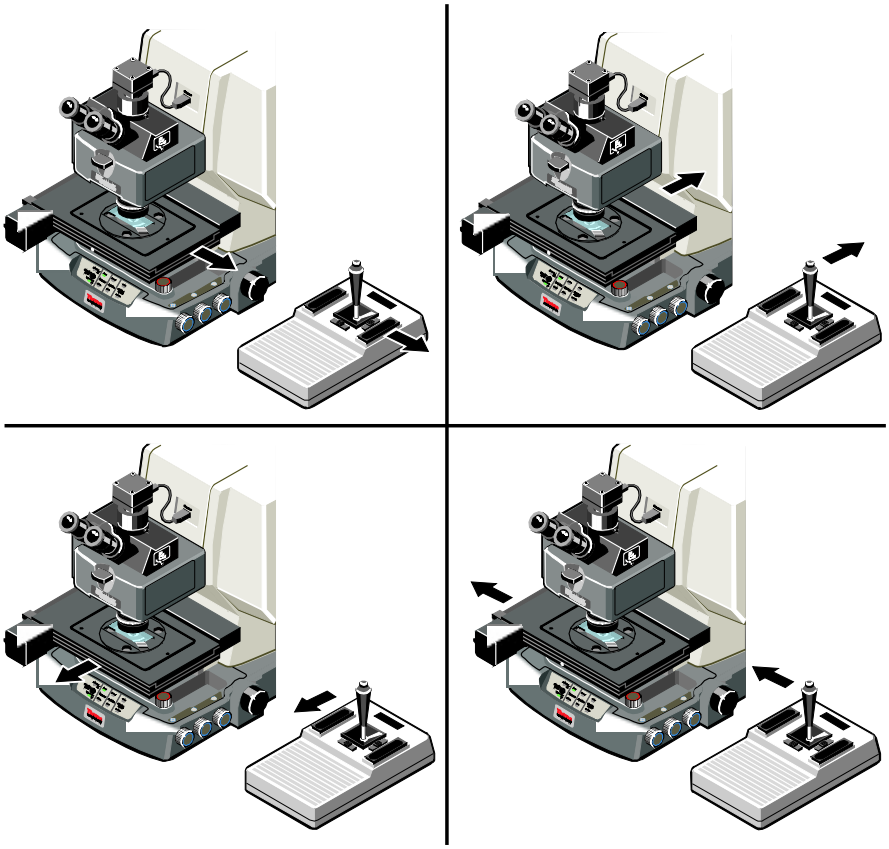
   Choose Cancel to close the dialog without saving the limits you entered.

Controlling stage movement

For microscopes equipped with the standard manual stage, horizontal movement of the stage is controlled with the X and Y knobs, located on the right side of the microscope.

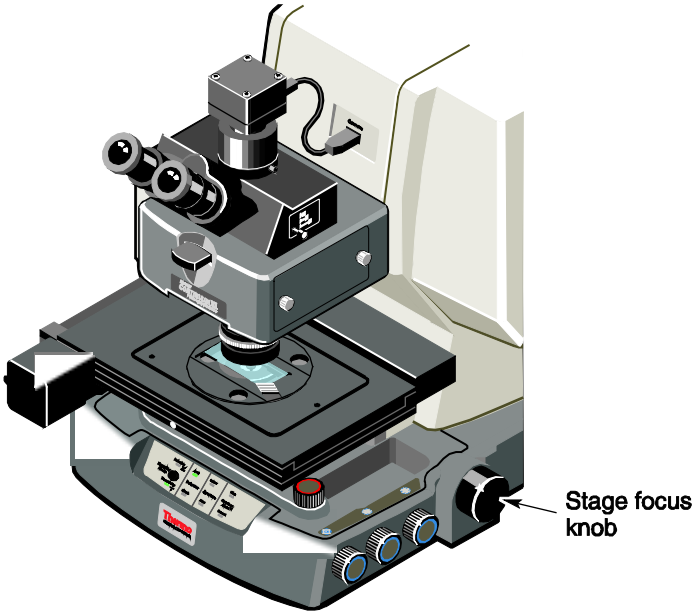


If your microscope is equipped with an optional motorized stage, you can use the stage movement tools or the joystick to move the stage horizontally. Be sure that the stage has been initialized before you use either the joystick or software controls.



For all microscopes, use the stage focus knob or the Z-axis tools to move the stage up or down to focus the microscope.

Notice To avoid damaging the microscope, be careful not to move the stage up into the objective or down onto the condenser. Stage and/or sample collisions can permanently damage the optical components. Damage caused by stage or sample collisions is not covered under warranty. ▲



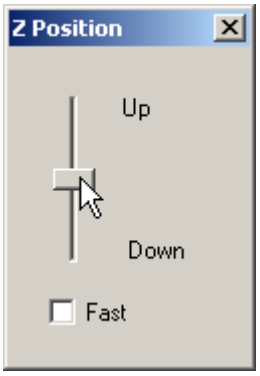
The manual control has two speeds: slow for fine focus and fast for coarse focus. Very fine focus controls are in OMNIC Atlµs.

To make a fine adjustment, turn the knob just enough to cause movement of the stage.

To make a coarse adjustment, turn the knob farther. The harder the knob is turned, the more course the adjustment, the faster the stage movement.

Very fine focus adjustments can be made using the Z-axis control in OMNIC Atlµs.

Begin by clicking Z-axis control from the Atlµs tool palette. When the Z-position control appears, left mouse click the slider and drag it to the Up or Down position. Continue to hold the mouse button until the image is clearly focused. Once the image is in clear focus, release the mouse button.



Note The stage moves very, very slowly using the software controls. You can turn on the Fast checkbox for more rapid movement. ▲

For systems equipped with a 32x objective and condenser, we recommend using the fine adjustment (slow) speed. This gives you greater control over the stage movement and can help prevent collisions between the stage and the optical components. Damage caused by stage collisions is not covered under warranty.

Preparing the optical components

The optical components can be optimized for each user. Use the following procedures to prepare the optical system for use. Have each user record their individual settings. Using these settings, the microscope optics can be quickly returned for each individual's optimum viewing.

Adjusting the eyepieces

The eyepieces are individually adjustable for focus and viewing comfort. The ability to sharply focus on sample features is critical to obtaining good data.

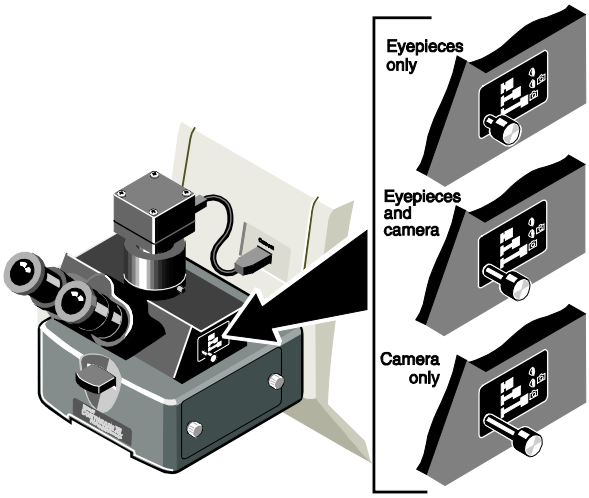
1. **Set the view selector for viewing through the eyepieces only.**

   A three-position view selector is located on the side of the microscope, between the camera and the nosepiece.

Push the selector all the way in to view through the eyepieces only.

Pull the selector half way out when you want to direct visible light to both the eyepieces and the camera. You will feel the rod click into place when you reach the correct position.

Pull the selector all the way out to direct visible light to the camera only.



2. **Select an infrared objective and condenser.**

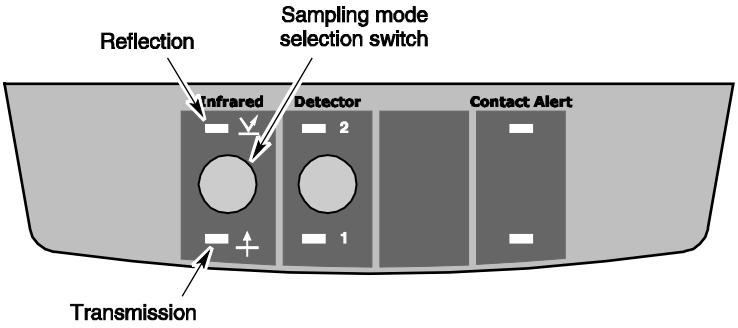
   Make sure the condenser is of the same type as the objective and has the same magnification.

See “Using objectives and condensers” in the “More about the Hardware” chapter for more information about choosing objectives and condensers.

See the “Setting up for experiments” Help book available through Microscope Help topics in the OMNIC Help menu, if you need to install or change the objective and/or condenser.

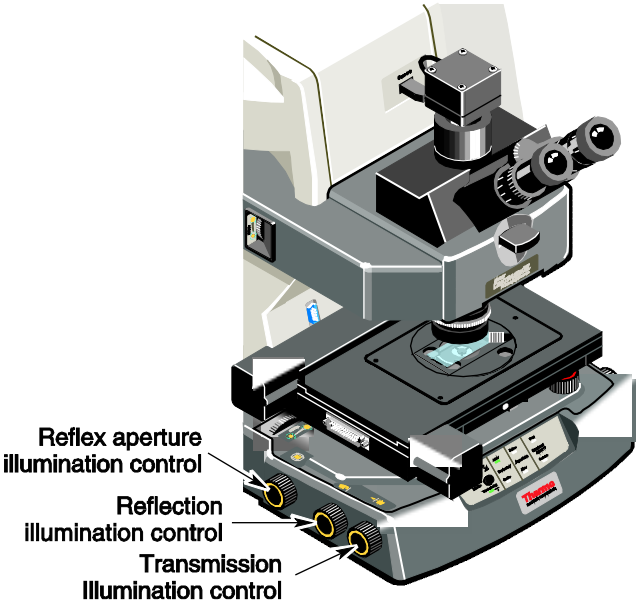
3. **Select reflection viewing mode by pressing the Sampling Mode switch on the front panel.**

   The Reflection indicator glows when reflection mode is selected.

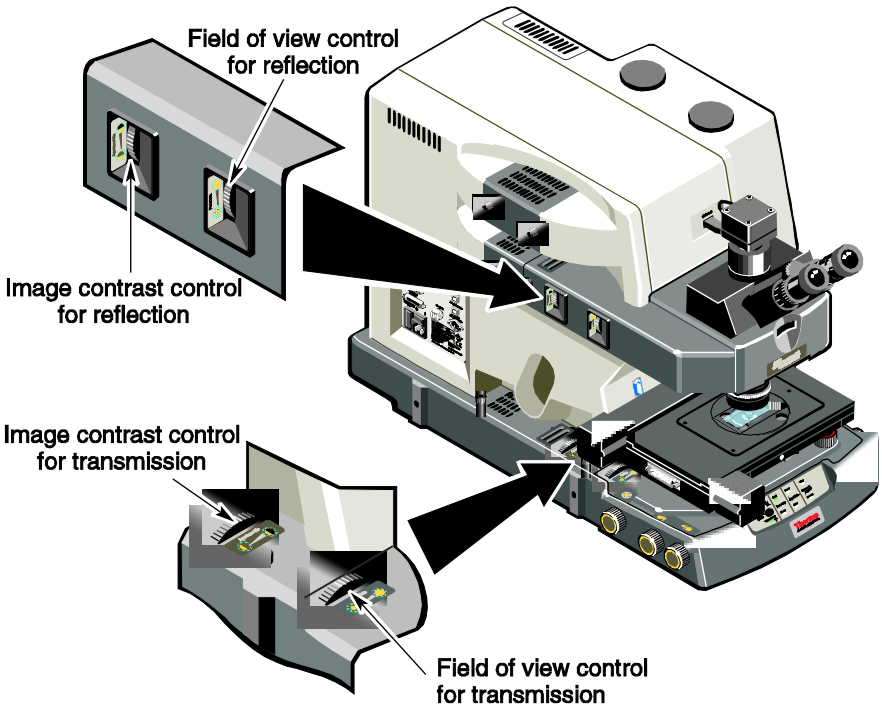


Note The Sampling Mode switch is not active while Experiment Setup (available through the OMNIC Atlμs Collect menu) is open. ▲

4. **Adjust the reflection illumination to high intensity, then adjust the transmission and Reflex aperture illumination to their lowest intensities.**



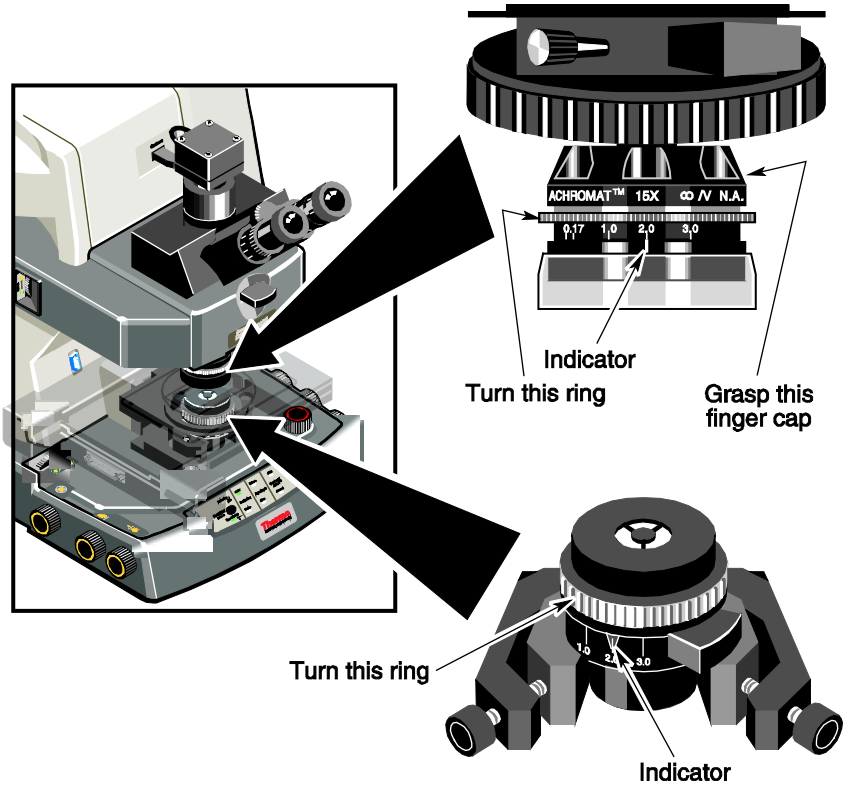
5. **Open both field of view irises completely and then set both aperture irises for low contrast.**



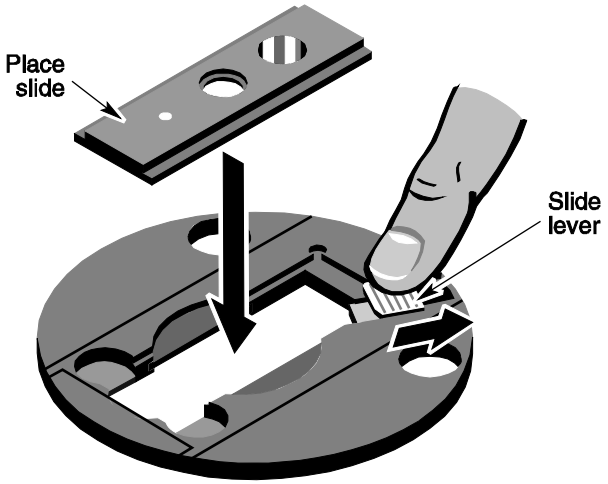
See “Adjusting field of view and image contrast” in the “More about the Hardware” chapter if you are not familiar with adjusting irises.

6. **If you are using a Reflachromat objective and condenser, set the objective and condenser compensation rings to 0.**

   If you are using a fixed objective and condenser, be sure it is rated for 0 refractive index compensation.



7. **Place the pinhole slide that came with your microscope in the universal slide holder.**

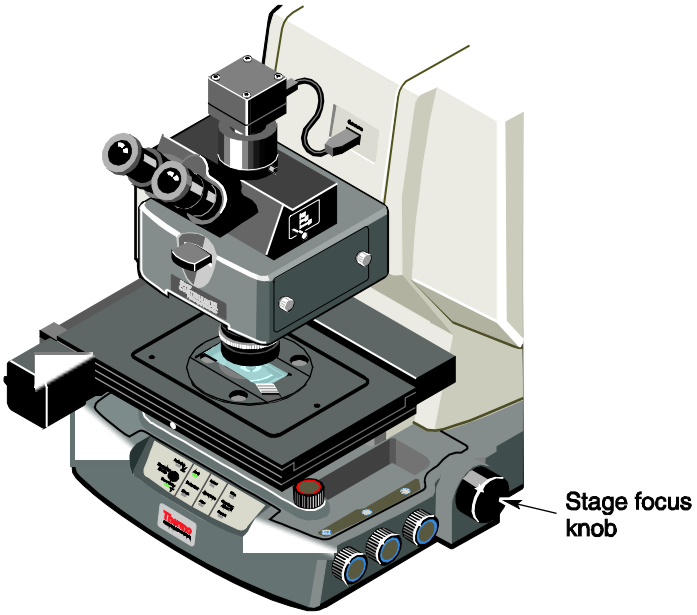


Notice Avoid damaging the microscope. Do not allow the stage to bump the objective or condenser. Damage from stage collisions is not covered by warranty. ▲

8. **Position the pinhole directly under the objective.**

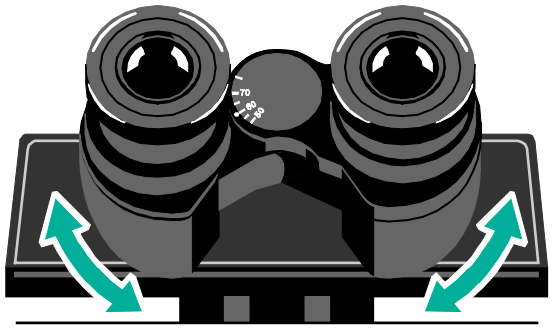
   Look directly at the slide (not through the viewer) and use the stage focus controls to raise or lower the stage until the spot of white light on the slide is most concentrated (the smallest spot size).

Then, while looking directly at the slide, move the stage so that the pinhole is centered on the spot of white light. When you are finished, set the reflection illumination to medium intensity.



9. **Adjust the interocular distance on the eye pieces for comfort.**

   You should see a single image of the pinhole through the viewer when the eyepieces are positioned correctly.

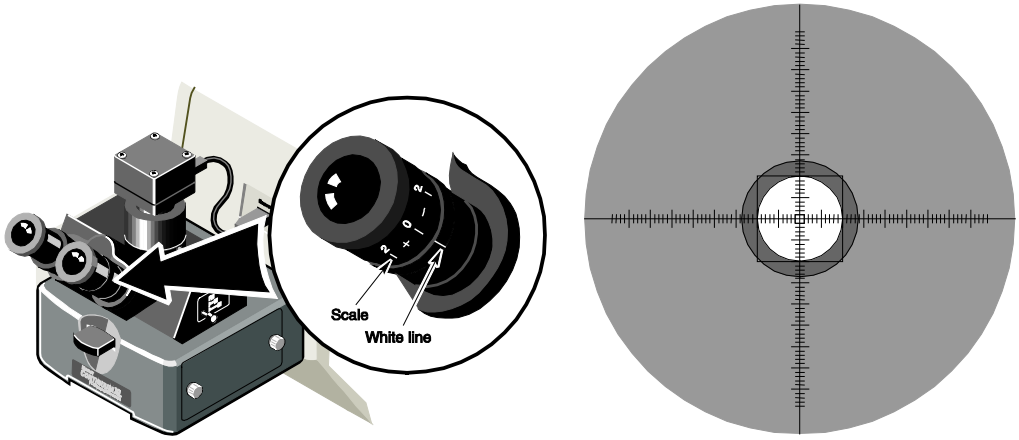


Reticle focus and diopter adjustments

Each eyepiece is marked with a scale. When you finish focusing the reticle and adjusting the diopter to match focus, take note of the scale settings. In the future you will be able to adjust the diopter quickly by turning the eyepiece to this reading.

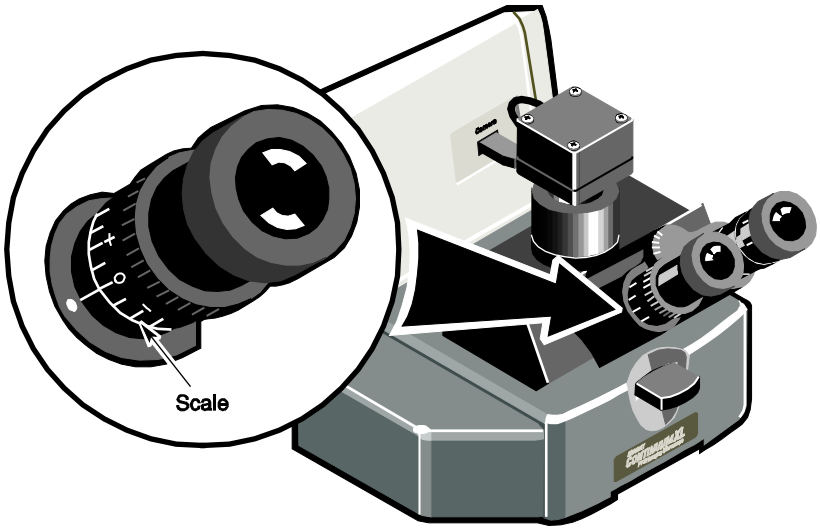
1. **Focus the reticle in the right eyepiece.**

   Hold the inner ring with one hand and turn the outer ring until the reticle cross hairs are clear. Once the cross hairs are clear, use the stage focus knob to obtain a sharp image of the pinhole through the right eyepiece.



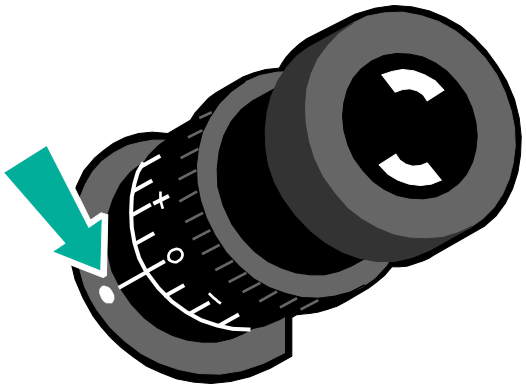
2. **Match the focus of the eyepieces.**

   While looking through the left eyepiece with your left eye, turn the eyepiece until the image is in focus.



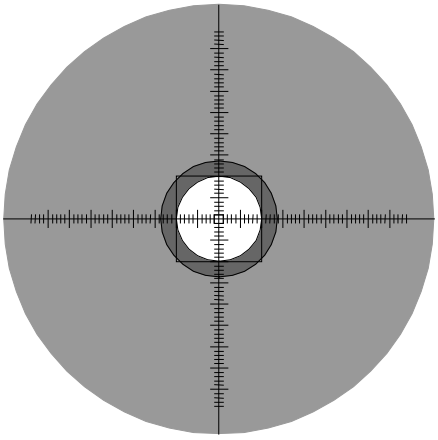
3. **When you are finished, look at the reading on the scale on the outside of the left eyepiece (the white dot indicates the numerical value).**

   In the future you will be able to adjust the diopter quickly by turning the eyepiece to this reading.



4. **Confirm the focus by looking through both eye pieces with both eyes.**

   You should see one, clear image while viewing the pinhole with both eyes.



Condenser focus and alignment

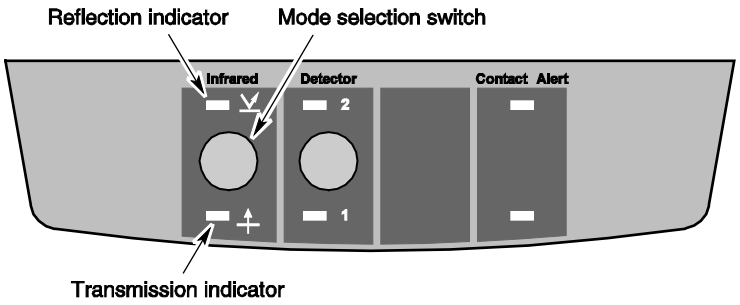
A focused and centered condenser is important in transmission mode for proper alignment of the infrared beam path. (In reflection mode the condenser is not in the beam path.)

To focus the condenser:

1. **Use the Sampling Mode button on the front panel to switch the microscope into transmission sampling mode.**

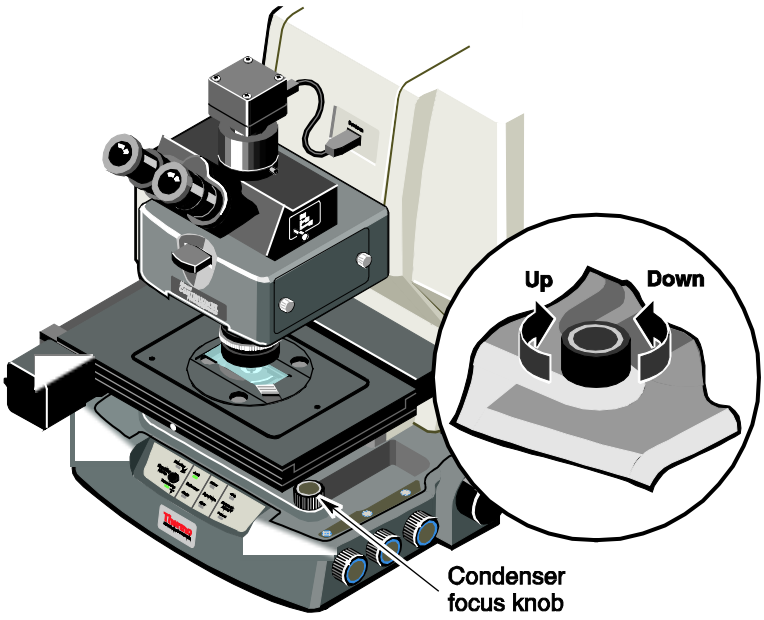
   The transmission indicator lights whenever the microscope is in transmission sampling mode.

When you look through the eyepieces, you may notice that the aperture has gone out of focus.



Note The Sampling Mode switch is not active while Experiment Setup (available through the OMNIC Atlµs Collect menu) is open. ▲

2. **While looking through the eyepieces, use the condenser focus knob to move the condenser up or down to bring the aperture back into sharp focus.**

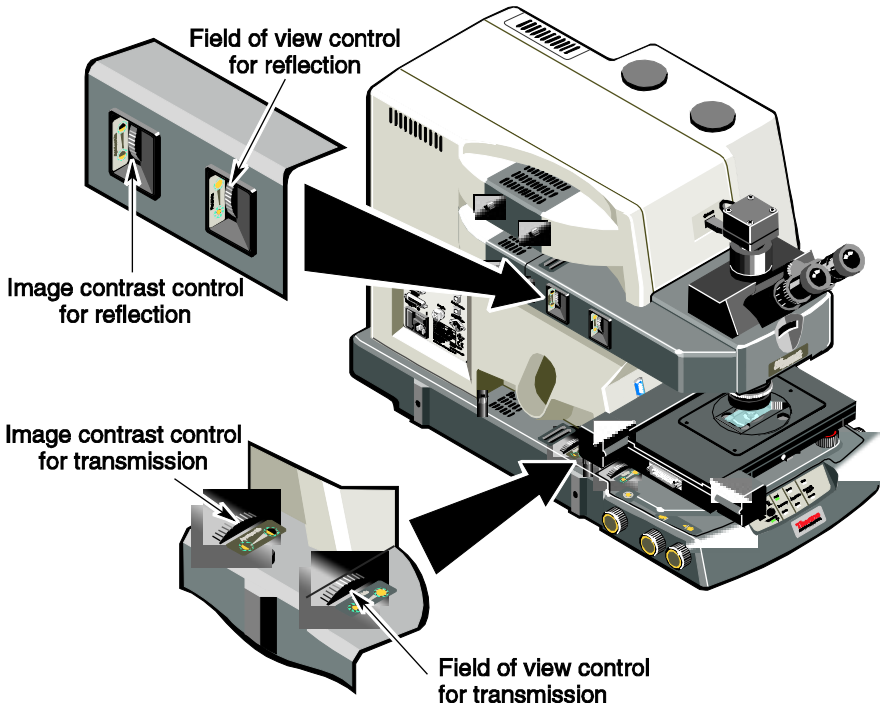


3. **Remove the pinhole slide from the stage.**

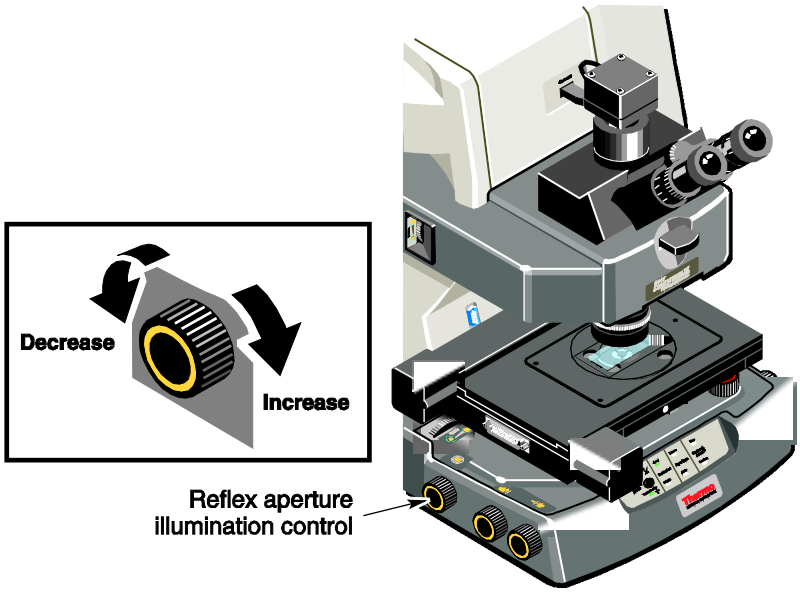
Once the condenser is focused, you can verify that it is centered. The post-sample and pre-sample aperture images should be centered on the same point.

To check condenser centering:

1. **Open the transmission and reflection field of view controls fully.**

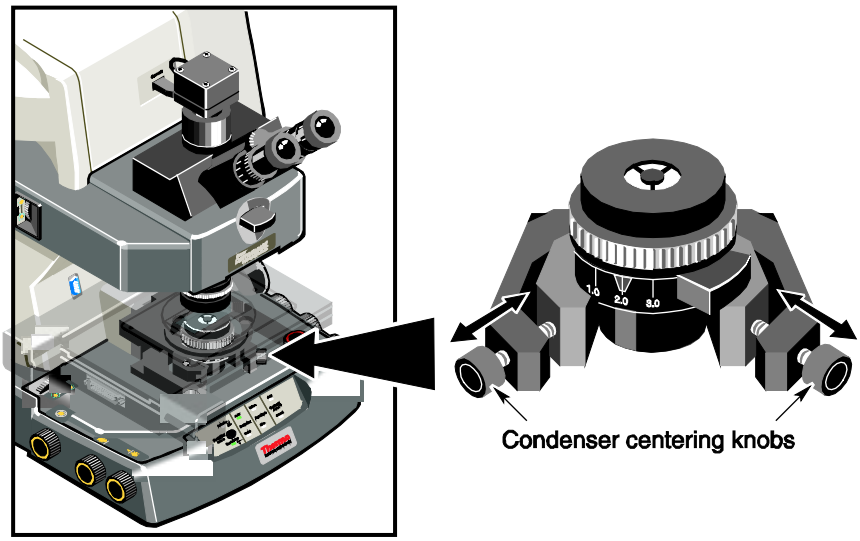


2. **Turn on Reflex aperture illuminator.**



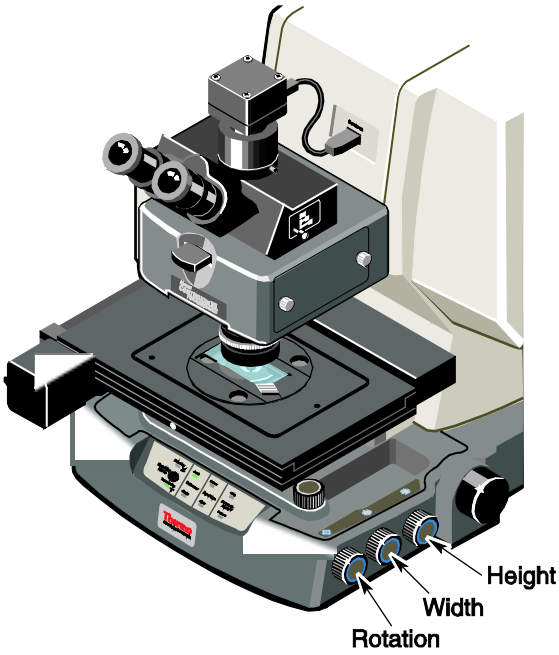
3. **If the post-sample aperture image produced by the condenser is offset, use the knobs to center it.**

   Each knob moves the condenser diagonally. While their effect is independent, these knobs are usually adjusted simultaneously to center the condenser image. You will find that your adjustment technique improves with practice.



Initializing the Reflex aperture

Your microscope may be equipped with an optional automated Reflex aperture system. For visual microscopy applications, you can adjust the aperture manually, using the controls on the right side of the microscope.

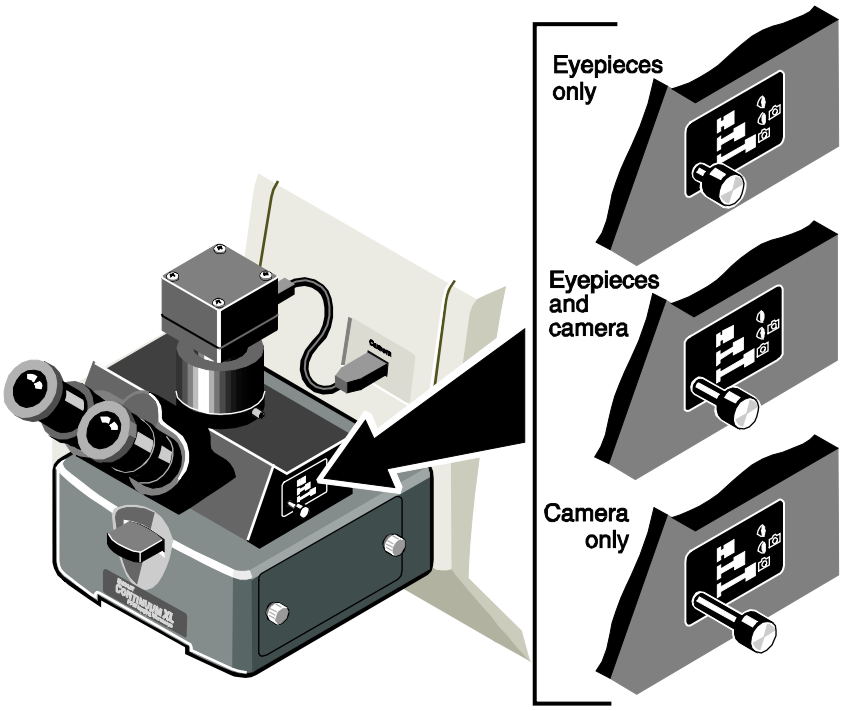


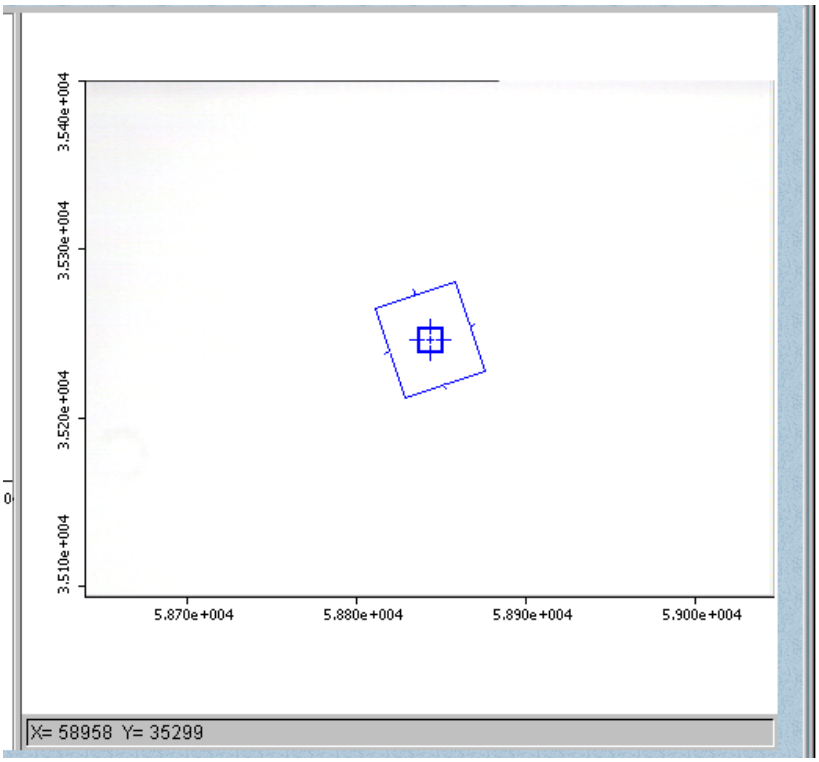
For all other applications, use the controls in OMNIC Atlμs or μView software to adjust the size, shape and orientation of this aperture.

Be sure to set the view selector to allow viewing through the camera (or through the eyepieces and the camera) when setting the aperture using software.

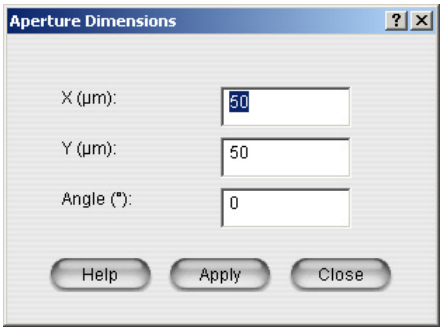
Pull the control rod completely out to direct visible light to the camera only.

Pull the control rod half-way out to direct visible light to the camera and to the eyepieces.


Eyepieces
only
Eyepieces
and
camera
Camera
only



For systems with automated Reflex apertures, adjustments can be made to the Reflex aperture graphically, using the box shown above, or numerically in the Aperture Dimensions dialog box available through the Atlµs menu.



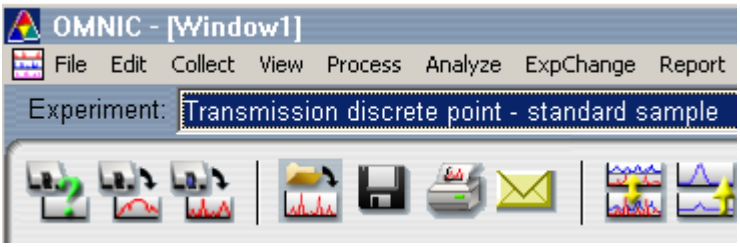
The aperture must be initialized before the first use and any time that the physical aperture and the virtual aperture are out of synch.

The aperture automation software cannot track manual changes to the aperture (changes made using the knobs on the right side of the microscope). Any time you make manual changes to the aperture, you must re-synchronize the hardware and software controls.

Notice If you do not synchronize the aperture with the software before loading an experiment with aperture settings or attempting to use the software to adjust the aperture, the size and shape of the aperture may be unpredictable. ▲

To synchronize the physical aperture with the automated aperture system:

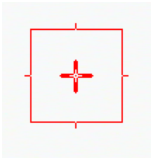
1. **Open OMNIC and select Transmission discrete point – standard sample from the Experiment drop-down list box.**



2. **Choose Show Atlµs Window from the Atlµs menu to open the Atlµs window.**

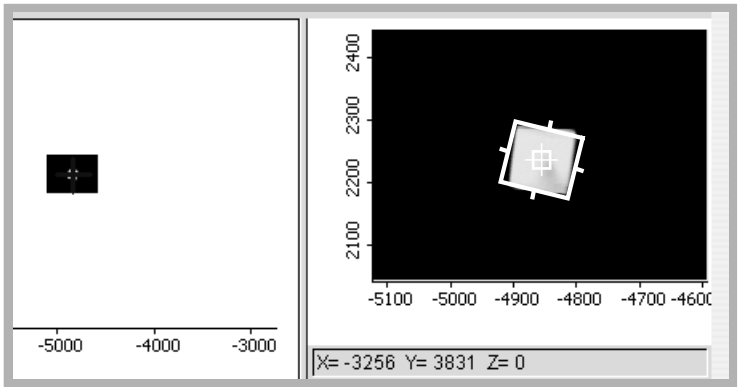
   When the Atlµs window opens, you will see navigation pane (left side of screen) that shows the current stage location and a video pane (right side of screen).

   The colored box in the video pane represents the virtual aperture.

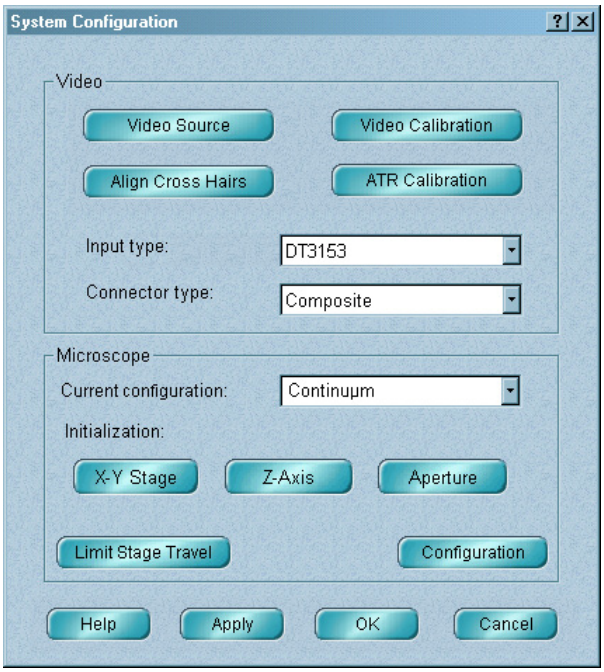


3. **Adjust the Reflex aperture illumination so that the physically apertured area is brighter than the rest of the field of view.**

   The apertured area is rectangular. Its current size, shape and orientation depend on how the aperture was last adjusted.



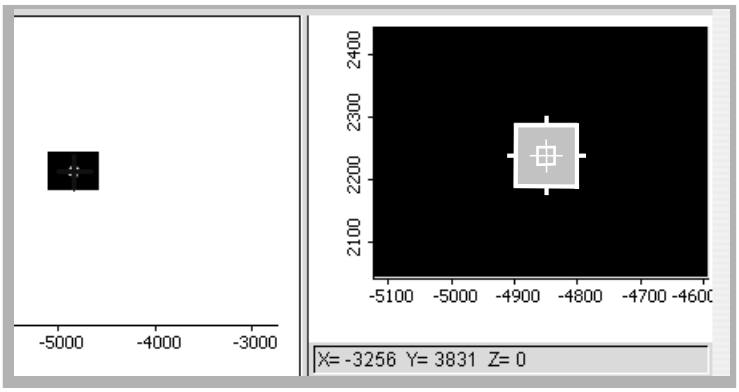
4. **If the physical aperture and the virtual aperture are not the same size and orientation, choose System Configuration from the Atlμs menu.**



5. **When the System Configuration dialog box opens, click the Aperture button from the Initialize group.**

   Wait while the physical aperture cycles from minimum to maximum size, through full rotations clockwise and counterclockwise, and then settles to match the size, shape and orientation of the virtual aperture.

   When the initialization is finished, the physical and virtual apertures are set to a 100 µm x 100 µm square (50 µm x 50 µm for objectives with greater than 15x magnification) at 0 degrees rotation.



Analyzing Samples

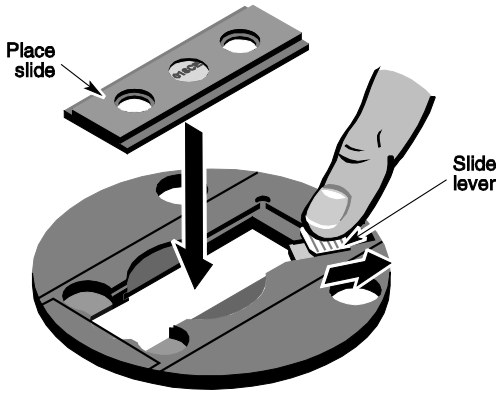
This chapter explains how to use a Nicolet Continuμm microscope and OMNIC Atlμs to collect infrared spectra of samples in reflection and transmission modes. Use the standard experiments and the samples that came with the microscope to perform these experiments and familiarize yourself with the microscope controls and software.

Performing a reflection experiment

A standard reflection experiment sample was shipped in the accessory box. This sample can be used to perform your first discrete point reflection experiment and whenever you wish to confirm that your microscope is operating properly.

1. **Locate the Soda Can sample slide and install the slide in the universal holder and then install the holder on the stage.**

   The slide was provided with your microscope in the accessory box. It includes two open beam positions and an ink on brushed aluminum sample.

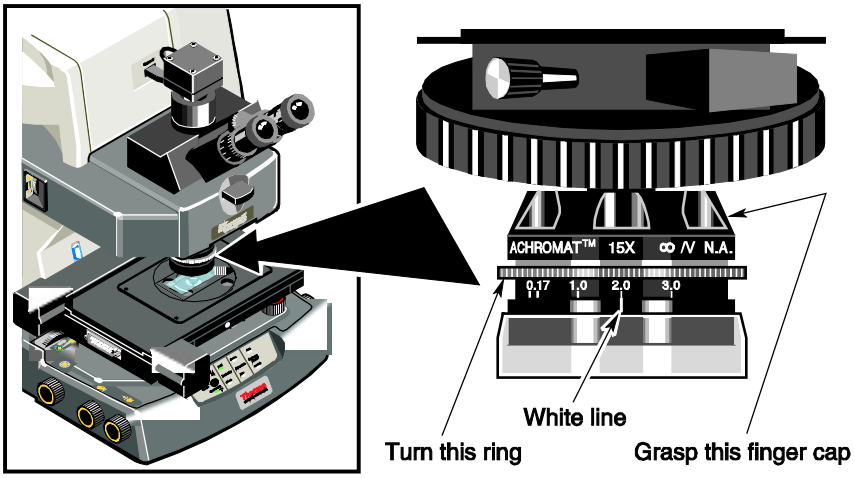


2. **Set the refractive index compensation for the objective.**

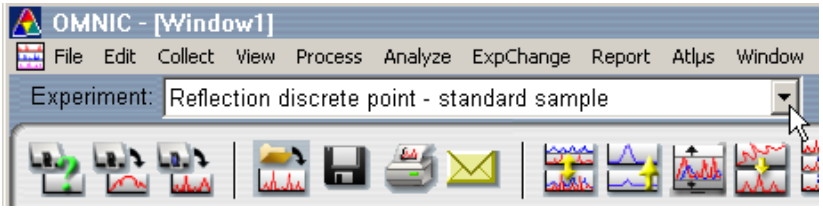
   Since this sample is a thin layer of ink on a reflective surface, set the ring to 0.

If you were analyzing a sample that is compressed between windows or in a compression cell, you would set the objective compensation ring to match the thickness of the top window.

If you were analyzing the sample with a fixed-compensation objective, you would use an objective with a refractive index compensation value of 0.

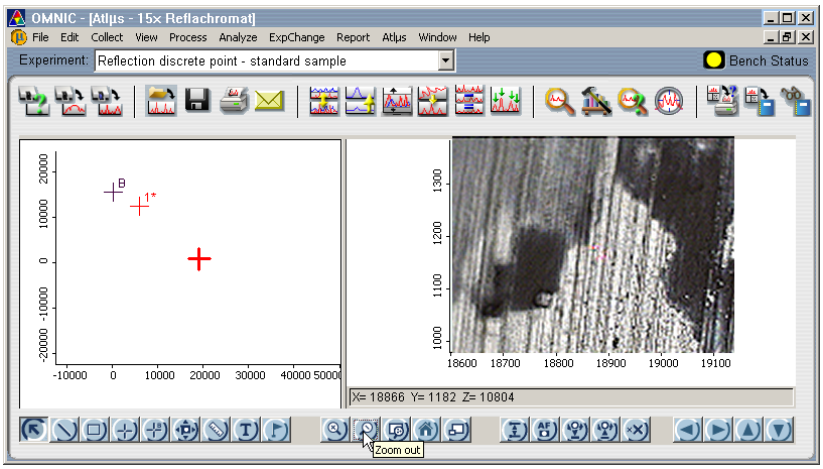


3. **Start OMNIC and select "Reflection discrete point – standard sample" from the Experiment drop-down list box.**



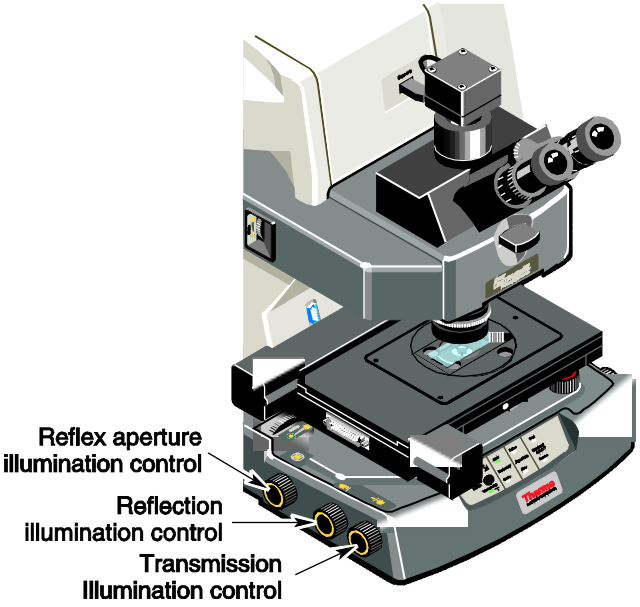
4. **Choose Show Atlµs Window from the Atlµs menu.**

When the Atlµs window opens you will see the video pane on the right side of the screen, the navigation (stage position) pane on the left, and the Atlµs tool palettes near the bottom of the screen. You may or may not be able to see a clear image in the video pane at this point.



5. **Adjust the illumination intensity.**

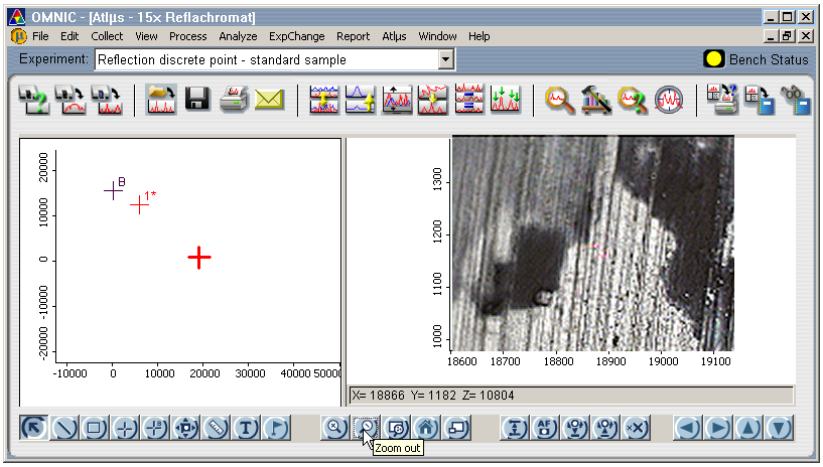
   Set the transmission and Reflex aperture illumination to their lowest intensities. Set the reflection illumination to a comfortable viewing level.



Notice Use care when focusing images. Be sure that the stage does not bump the objective or condenser. Damage from stage collisions is not covered by warranty. ▲

6. **Use the joystick or Move Stage tools to move the sample into the field of view and then use the Z-axis or stage focus knob sharply focus on the ink pattern.**

   You should now be able to see a clear image of the ink in the video pane.



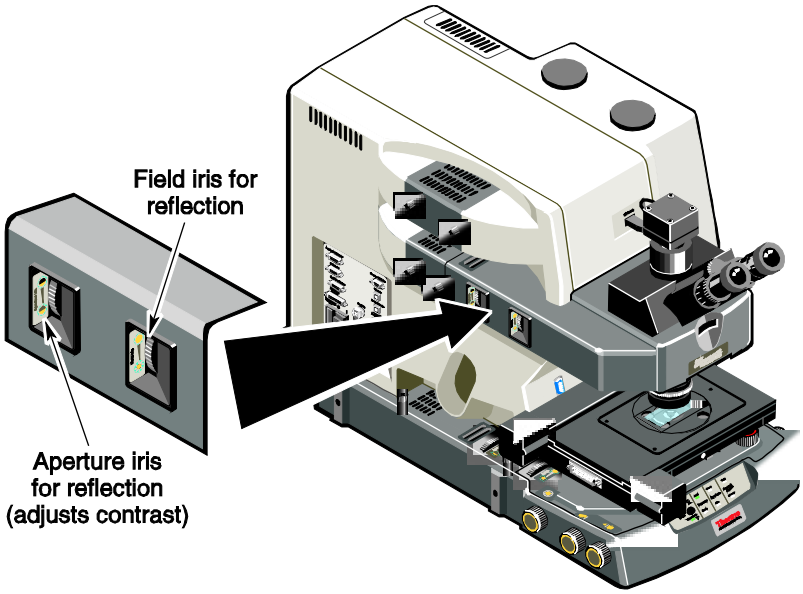
Note A yellow circle in the Bench Status field usually indicates that the detector has not been cooled. If you already added liquid nitrogen to the detector dewar, simply wait for temperature to stabilize. If you have not yet cooled the detector, do so before attempting to collect data.

You may also see a yellow circle in the Bench Status field if the quality checks, available through the Quality tab in Experiment Setup have not been disabled. The default quality check settings were designed for experiments conducted in the spectrometer sample compartment. They are not useful for sampling with the microscope. ▲

7. **Set the irises.**

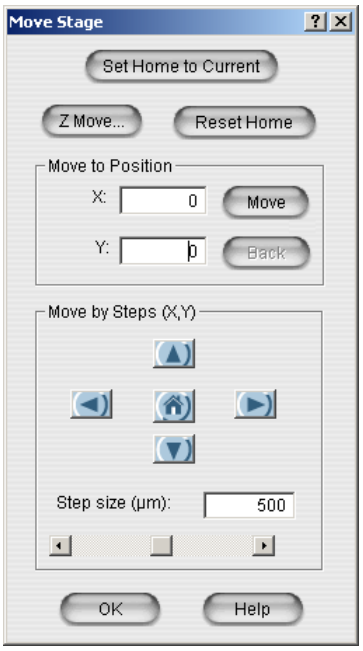
   Fully open the reflection field iris.

Adjust the reflection aperture iris for good contrast in the video image.



8. **If you have an optional motorized stage, home the stage to the area of interest in your sample.**

   Choose Move Stage from the Atlμs menu and then choose Set Home to Current.



9. **Refine the standard experiment background and sample point area settings for your sample position.**

   Use the tool palette and Atlμs menu items as follows:

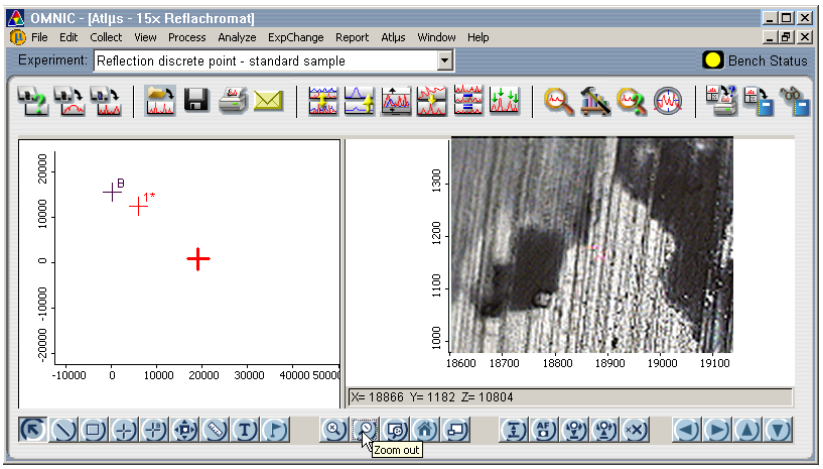
   Click the Full Range View button to zoom the navigation pane all the way out to display the full range of stage travel allowed by your stage controller. You should now be able to see the sample (crosshairs labeled with a number) and the background point (crosshairs with the letter B) defined in the standard experiment.

   If you cannot, use the Zoom buttons to zoom in until you can see the both sample and background point indicators.

Click the Sample Point tool. Move the crosshairs to the sample point until the hand cursor appears. Press the left mouse button and drag the sample point until it is centered on the stage position crosshairs (usually red) in the navigation pane.

Click the Zoom buttons until the sample and background points are as large as possible, without either disappearing from view.

For automated aperture systems, use the Arrow tool to adjust the size, shape, and orientation of the virtual aperture to mask the area of interest immediately surrounding the sample point. For other systems, use the manual controls. Adjust the Reflex aperture illumination, if necessary.



If necessary, adjust the location of the sample point so that it is completely within an inked pattern.

Use the X-Y knobs, joystick or move stage buttons and move the stage until an ink-free area is centered under the objective.

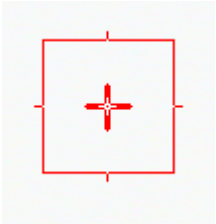
Click the Background Point tool. Choose an ink-free point near the center of the video pane and click. Atlµs moves the background point to the new point you chose.

10. Center the sample point of interest in the field of view.

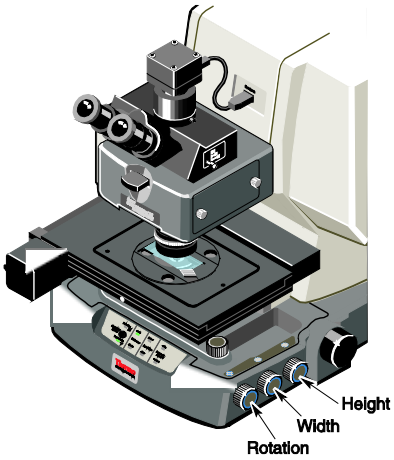
11. **If necessary make final adjustments to the Reflex aperture to mask an area of interest on the sample.**

For automated apertures, use the arrow tool to grab a handle on any side of the virtual aperture to drag the aperture to the size and shape preferred for your ink spot. Release the mouse when the aperture sides reach the size and position you desire.

Use the arrow tool to grab a corner of the virtual aperture and drag it to the orientation preferred for your ink spot. The aperture can be rotated to any angle between +45° and -45°.



For manual systems, use the controls on the right side of the microscope.



12. Verify the experiment parameters.

Choose Experiment Setup from the Collect menu and verify the experiment parameters, as follows. Close Experiment Setup when you are finished.

Where	Parameter	Setting
Collect tab	Number of scans	16
	Resolution	8
	Final format	%Reflectance
	Correction	None
	Background handling	Background before every sample
		Collect 64 scans for background
Bench tab	Sample Compartment	Left µscope %R OR
		Right µscope %R
	Detector	your single-element detector (Usually MCT-A)
	Beamsplitter	your compatible beamsplitter (usually KBr)
	Source	IR
	Accessory	None
	Window	None

continued…

Where	*Parameter*	*Setting*
Bench tab, *continued…*	Max range limit	4000
	Min range limit	650
	Gain	Autogain
	Velocity	1.8988
	Aperture	95
Advanced tab	Zero filling	none
	Apodization	Happ-Genzel
	Phase correction	Mertz
	Set sample spacing based on spectral range	On
	Set filters based on velocity	On
	Single-sided interferogram	Off
	Reset bench at start of collection	Off
	Start collection with external trigger	Off
	Blanking regions	None
Quality tab	All	Off

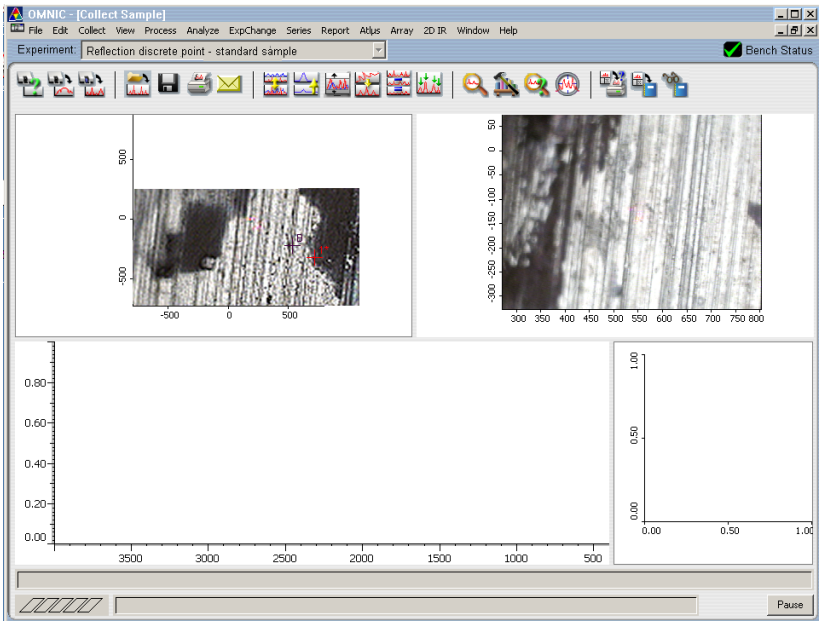
continued…

Where	Parameter	Setting
Diagnostic tab	All	OK
Configure tab	All	As you prefer
Mapping tab	Dimensions	Collect type: Discrete points
	Background	Background point is defined
		Stage position of the background point was automatically set when you adjusted the point to your sample position
	Save video frames in map file	On
	Prompt before collecting data	On
	All others	Off
	Rectangular	On
	None	Off
	Mapping focus options	Do not focus during map collection

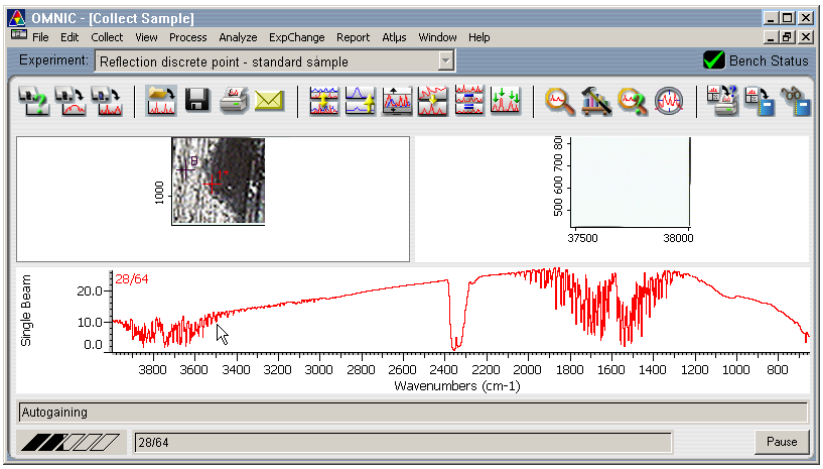
When you are finished, choose OK to save the settings and return to the Atlμs window.

13. Choose Collect Map from the Collect menu.

Observe as the video mosaic is collected.



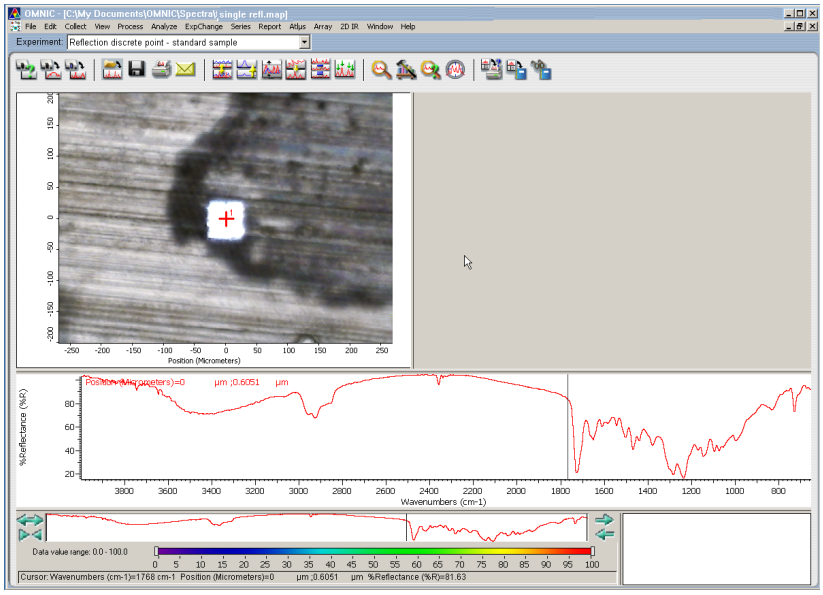
14. When the software prompts, check, if necessary, adjust the position of your background point, and then choose OK.



15. **When the software prompts, check and adjust the sample point location and focus and then choose OK.**

    Respond to any other prompts and then observe as the sample data is collected.

16. **When data collection is finished, use the viewer pane to isolate areas of interest.**



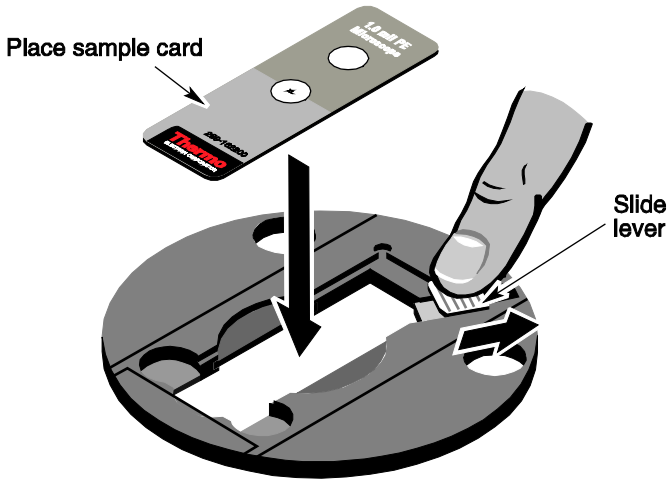
Performing a transmission experiment

A standard transmission experiment sample was shipped in the accessory box. This sample can be used to perform your first transmission discrete point experiment and whenever you wish to confirm that your microscope is operating properly. Before you begin, be sure that the condenser is centered and focused. Data taken through a condenser that is not centered and focused will not be accurate or repeatable.

1. **Locate the 1.0 mil PE Microscope sample slide.**

   It was provided with your microscope in the accessory box. The slide includes an open beam position and an ink on polyethylene sample.

2. **Install the sample slide in the universal holder and then install the holder on the stage.**



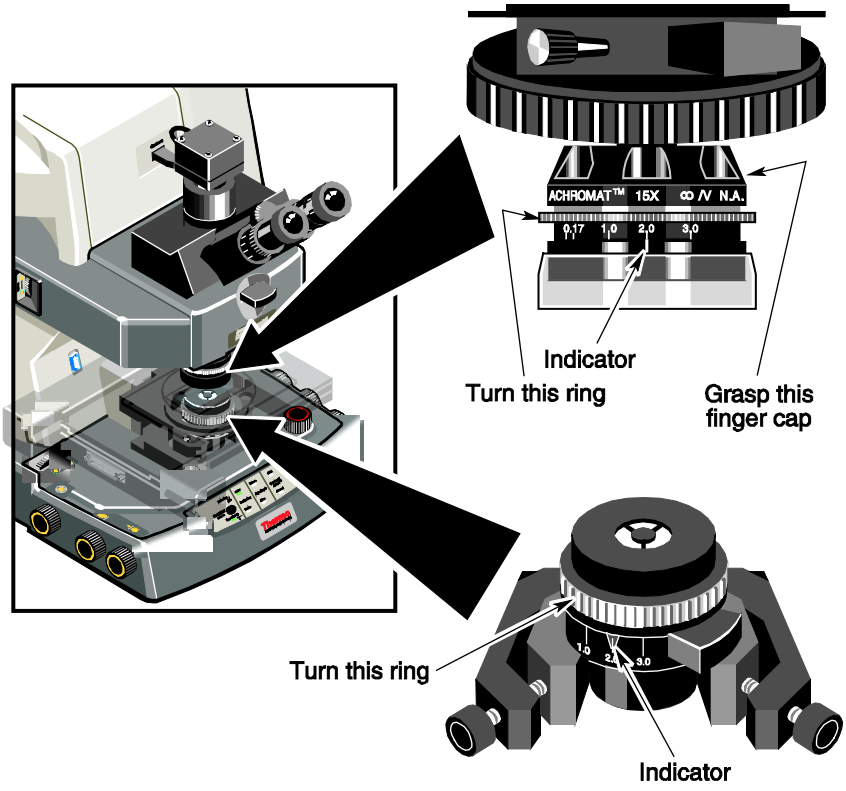
3. **If you are using a Reflachromat objective and condenser, set the compensation rings.**

   Since this sample is free standing, set the rings to 0.

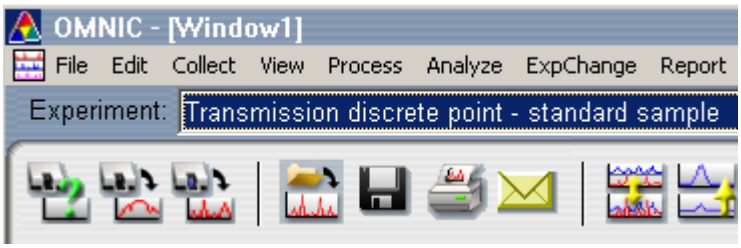
If you were analyzing a sample that is compressed between windows or in a compression cell, you would set the objective compensation ring to match the thickness of the top window.

If your sample was on a substrate or in a compression cell, you would set the condenser compensation ring to match the thickness of the substrate or bottom window of the cell.

If you were analyzing the sample with a fixed-compensation objective and condenser, you would use an objective and condenser with a refractive index compensation value of 0.

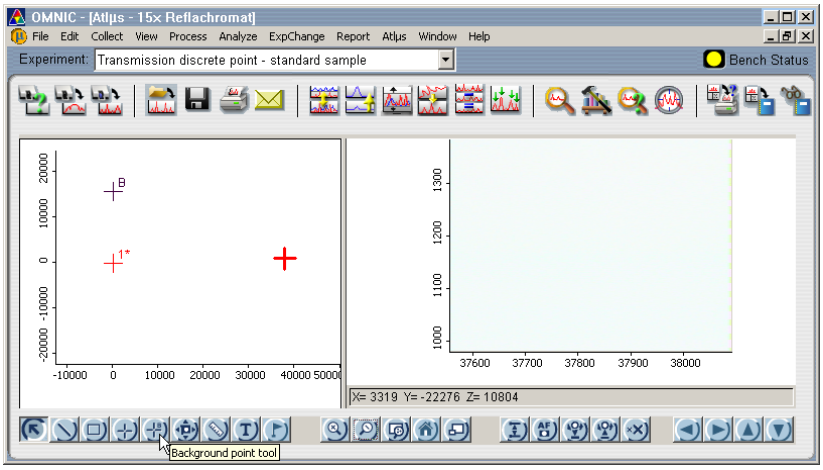


4. **Start OMNIC and select "Transmission discrete point – standard sample" from the Experiment drop-down list box.**



5. **Choose Show Atlµs Window from the Atlµs menu.**

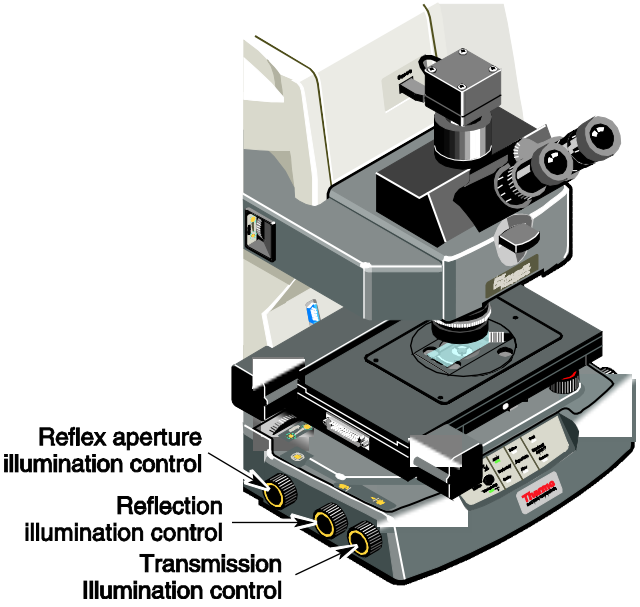
When the Atlµs window opens you will see the video pane on the right side of the screen, the navigation (stage position) pane on the left, and the Atlµs tool palettes near the bottom of the screen. You may or may not be able to see a clear image in the video pane at this point.



You may also be able to see the default background (crosshairs with the letter B) and sampling points (crosshairs with a number and an asterisk). Whenever video capture is enabled at the sampling point, an asterisk appears in the designator. When more than one discrete sampling point is mapped for an experiment, data will be collected from sampling point 1, then 2, and so on.

6. **Adjust the illumination intensity.**

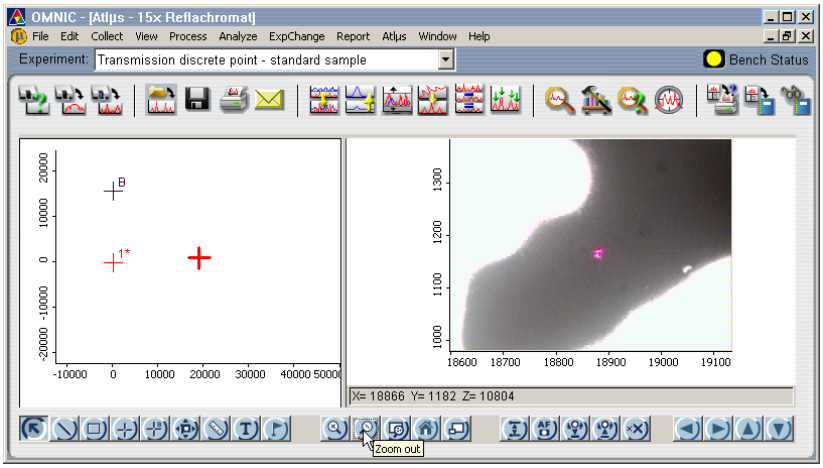
   Set the transmission to its lowest intensity. Set Reflex aperture illumination to a comfortable level. Set the reflection illumination to a comfortable viewing level.



Notice Use care when focusing images. Be sure that the stage does not bump the objective or condenser. Damage from stage collisions is not covered by warranty. ▲

7. **Use the joystick to move the sample into the field of view and then sharply focus on the XL pattern.**

   You should now be able to see a clear image of the ink in the video pane.



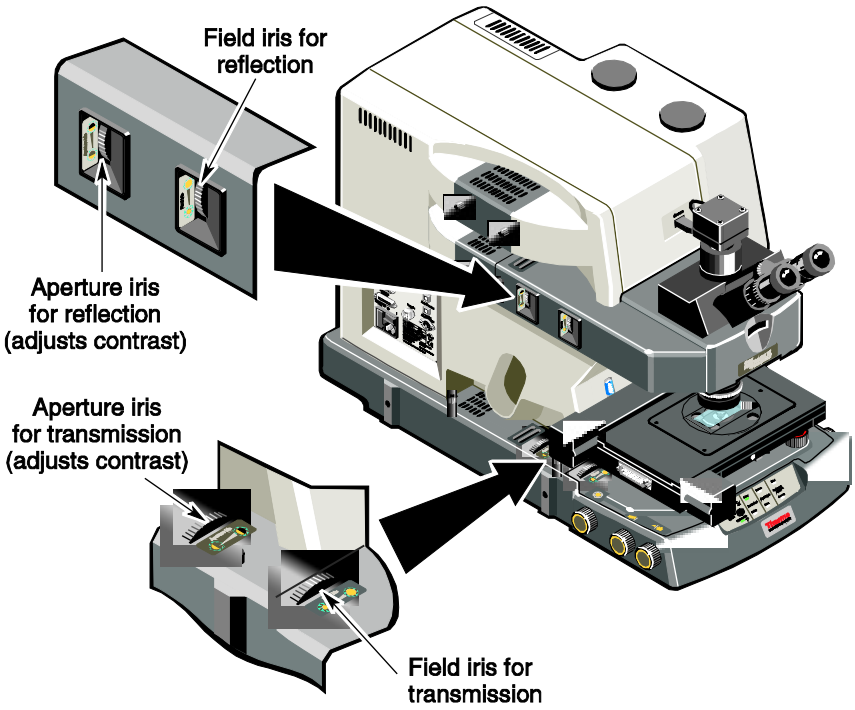
Note A yellow circle in the Bench Status field usually indicates that the detector has not been cooled. If you already added liquid nitrogen to the detector dewar, simply wait for temperature to stabilize. If you have not yet cooled the detector, do so before attempting to collect data.

You may also see a yellow circle in the Bench Status field if the quality checks, available through the Quality tab in Experiment Setup have not been disabled. The default quality check settings were designed for experiments conducted in the spectrometer sample compartment. They are not useful for sampling with the microscope. ▲

8. **Set the irises.**

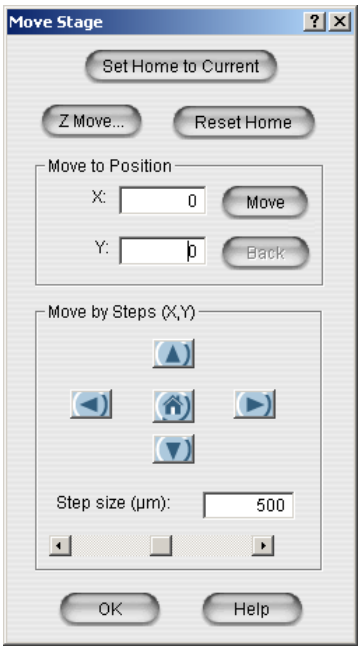
   Fully open both field irises.

Adjust the transmission and reflection aperture irises for good contrast in the video image.



9. **If you have an optional motorized stage, home the stage the area of interest in your sample.**

   Select Move Stage from the Atlμs menu and then choose Set Home to Current. This allows you to easily return to your data sampling point.



10. **Refine the standard experiment background and sample point area settings for your sample position.**

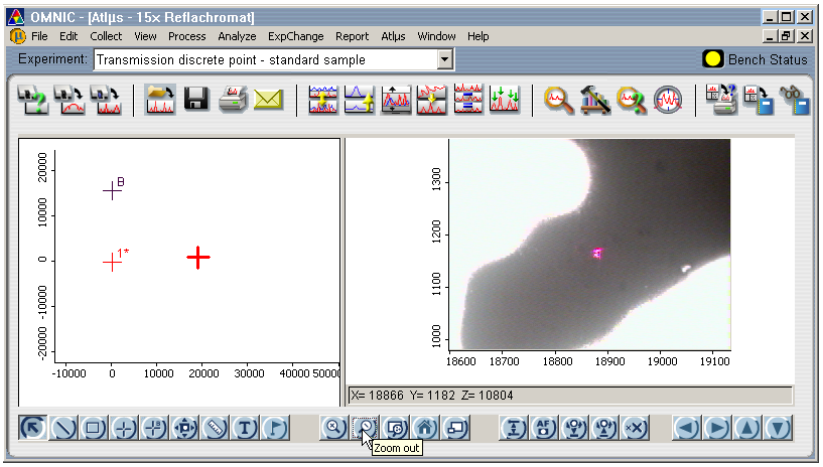
    Use the tool palette and Atlμs menu items as follows:

Click the Full Range View button to zoom the navigation pane all the way out to display the full range of stage travel allowed by your stage controller. You should now be able to see sample (crosshairs labeled with a number) the background point (crosshairs with the letter B) defined in the standard experiment.

If you cannot, use the Zoom buttons to zoom in until you can see the both sample and background point indicators.

Click the Sample Point tool. Move the crosshairs to the sample point until the hand cursor appears. Click the left mouse button and drag the sample point until it is centered on the stage position crosshairs (usually red) in the navigation pane.

Click the Zoom buttons until the sample and background points are as large as possible, without either disappearing from view.



If necessary, adjust the location of the sample point so that it is completely within the XL ink pattern.

For automated aperture systems, use the Arrow tool to adjust the size, shape, and orientation of the virtual aperture to mask the area of interest immediately surrounding the sample point. for other systems, use the manual controls. Adjust the Reflex aperture illumination, if necessary.

Use the X-Y knob, joystick or move stage buttons and move the stage until the open beam position is centered under the objective.

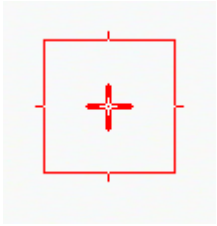
Click the Background Point tool. Choose a point near the center of the video pane and click. Atlμs moves the background point to the point you select.

11. Center the sample point of interest in the field of view.

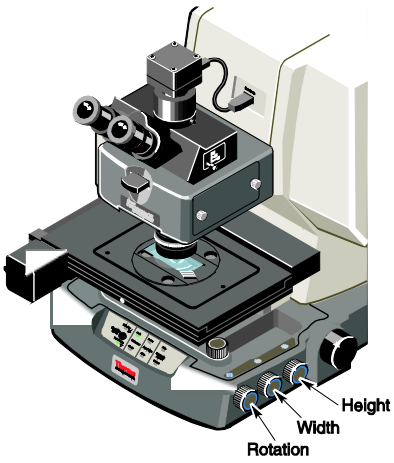
12. If necessary, make final adjustments to the Reflex aperture to mask an area of interest on the sample.

For systems equipped with an automated Reflex aperture, use the arrow tool to grab a handle on any side of the virtual aperture to drag the aperture to the size and shape preferred for your ink spot. Release the mouse when the aperture sides reach the size and position you desire.

Use the arrow tool to grab a corner of the virtual aperture and drag it to the orientation preferred for your ink spot. The aperture can be rotated to any angle between +45° and -45°.



For manual aperture systems, use the controls on the right side of the microscope.



13. Verify the experiment parameters.

Select Experiment Setup from the Collect menu and verify the experiment parameters, as follows. Close Experiment Setup when you are finished.

Where	*Parameter*	*Setting*
Collect tab	Number of scans	16
	Resolution	8
	Final format	%Transmittance
	Correction	None
	Background handling	Background before every sample
		Collect 64 scans for background
Bench tab	Sample Compartment	Left µscope %T OR
		Right µscope %T
	Detector	your single-element detector (Usually MCT-A)
	Beamsplitter	your compatible beamsplitter (usually KBr)
	Source	IR
	Accessory	None
	Window	None
Bench tab	Sample Compartment	Left (or right, depending on your setup) µScope, %T

Where	*Parameter*	*Setting*
Bench tab, *continued…*	Detector	your single element detector (Usually MCT-A)
	Beamsplitter	KBr
	Source	IR
	Accessory	None
	Window	None
	Max range limit	4000
	Min range limit	650
	Gain	Autogain
	Velocity	1.8988
	Aperture	95
Advanced tab	Zero filling	none
	Apodization	Happ-Genzel
	Phase correction	Mertz
	Set sample spacing based on spectral range	On
	Set filters based on velocity	On
	Single-sided interferogram	Off
	Reset bench at start of collection	Off
	Start collection with external trigger	Off
	Blanking regions	None

continued…

Where	*Parameter*	*Setting*
Quality tab	All	Off
Diagnostic tab	All	OK
Configure tab	All	As you prefer
Mapping tab	Dimensions	Collect type: Discrete points
	Background	Background point is defined
	Save video frames in map file	On
	Prompt before collecting data	On
	All others	Off
	Rectangular	On
	None	Off
	Mapping focus options	Do not focus during map collection

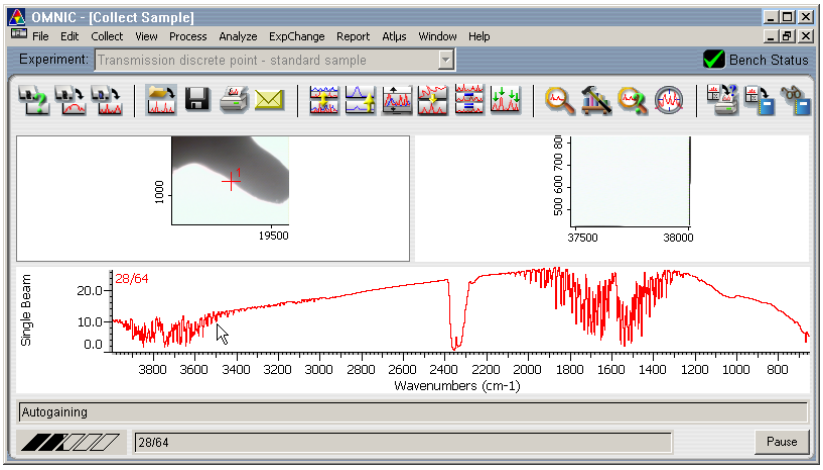
When you are finished, choose OK to save the settings and return to the Atlμs window.

14. Choose Collect map from the Collect menu.

Observe as the video mosaic is collected.

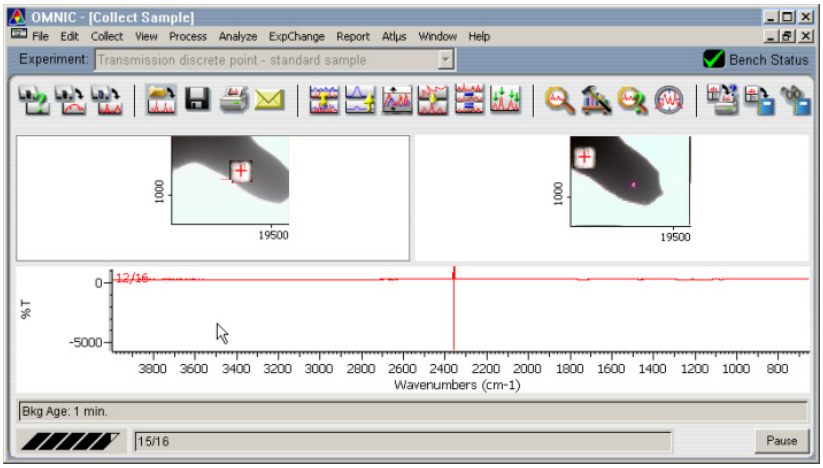
15. **When the software prompts, check the position of your background point (adjust if necessary) and then choose OK.**

Observe as the background is collected. If prompted to save the background, choose Yes.

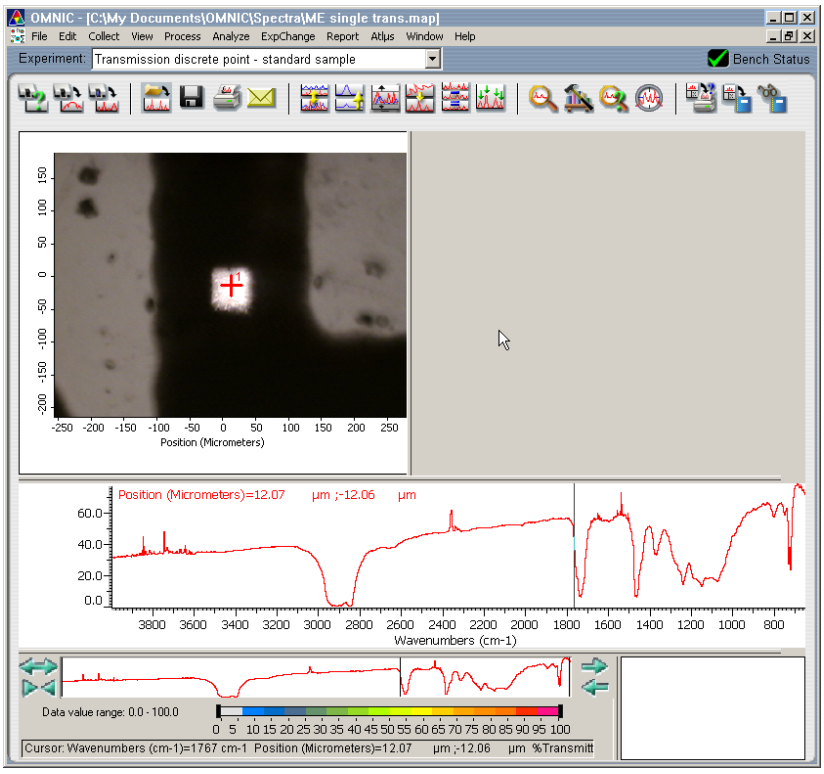


16. **When the software prompts, check and, if necessary, adjust the sample point. When you are finished, choose OK.**

Respond to any other prompts and then observe as the sample data is collected.



17. **When data collection finishes, use the viewer pane to isolate peaks of interest.**



Advanced Techniques

This chapter describes the following optional, advanced techniques that you can perform with a Continuμm microscope:

- Polarization
- Attenuated total reflection
- Grazing angle reflection

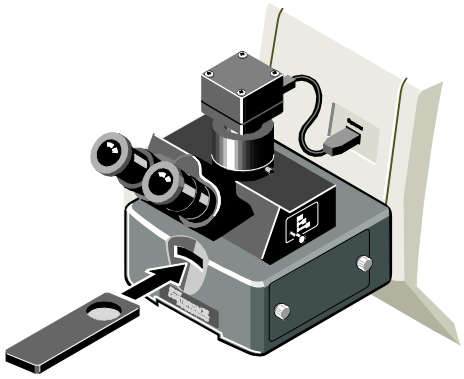
Polarization options

The Continuμm microscope can be equipped with optional polarizers that polarize visible or infrared beams. Visible polarization is used to generate contrast in anisotropic materials. Polarization of the IR beam is used to determine molecular orientation.

Visible polarization

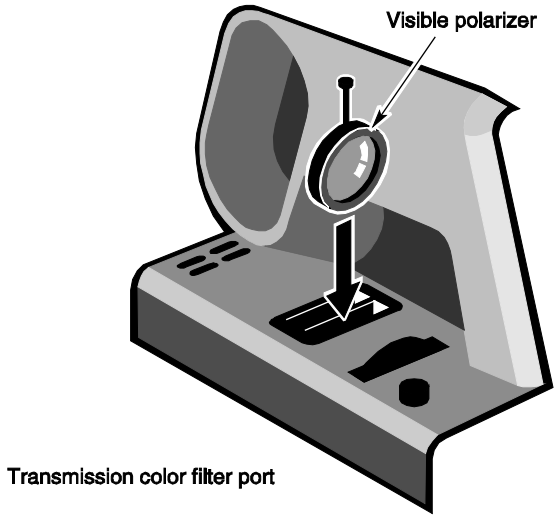
To locate a feature of interest with visible light polarization:

1. **Slide the visible analyzer into the slot directly below the viewer.**

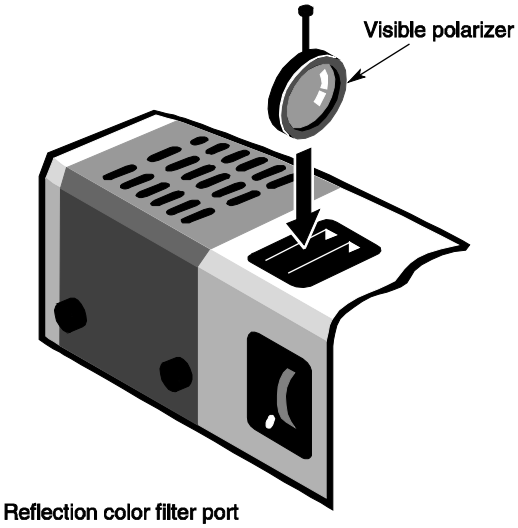


2. **Insert the round visible polarizer into either of the color filter ports.**

   If your sample is suited for transmission data collection, insert the polarizer in the transmission color filter port. The transmission color filter port is located on the base of the microscope on the left side.



If your sample is suited for reflection data collection, insert the polarizer into the reflection color filter port. The reflection color filter port is located on the left side of the microscope, adjacent to the reflection illuminator.



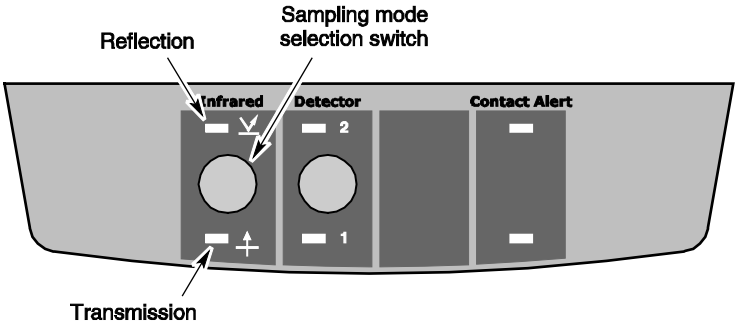
3. **Select a sampling mode.**

   Check to be sure that Experiment Setup (available through the Collect menu of OMNIC Atlμs) is closed and then use the Sampling Mode switch on the front panel.

   If your sample is suited to reflection techniques, choose reflection mode.

   If your sample is suited to transmission techniques, choose transmission mode.

The Transmission indicator lights when transmission mode is selected. The Reflection indicator lights when reflection mode is selected.



4. **Rotate the round visible polarizer with your finger until the field of view becomes dark.**

   The polarizers are now crossed.

5. **Install the sample and focus.**

   If you have difficulty seeing the sample to focus, try rotating the sample.

   If you still cannot see the sample after completely rotating it, it is likely that there is no polarization data. Try another technique.

6. **While viewing the sample through the eyepieces or through the video display, rotate the sample or the round visible polarizer to see the differences in sample composition.**

Note The optional rotatable stage is ideal for this type of experiment. The universal slide holder can also be rotated. We recommend that you rotate the sample rather than the polarizer while looking for differences in sample composition. ▲

7. **Use the X-Y knobs, joystick or Move stage tools to center the features of interest in the field of view.**

8. **Adjust the Reflex aperture to mask the area of interest on the sample.**

9. **Prepare to take data as you normally would for a typical infrared transmission or reflection experiment.**

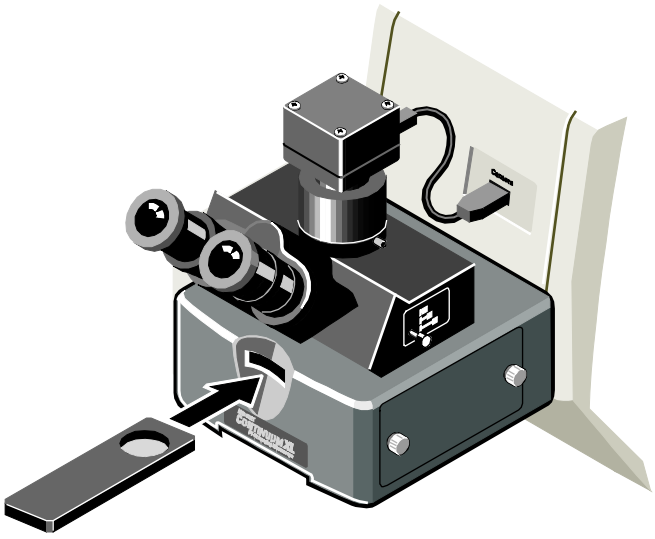
Nomarski differential interference contrast

The Nomarski differential interference contrast (DIC) technique is an extension of visible polarization. It facilitates visual contrast in samples where achieving visualization is difficult. The technique uses crossed polarizers to produce a dark field. The Nomarski prisms use differences in optical pathlengths and refractive indices through the sample to enhance your view of the sample.

Note DIC prisms are opaque in the infrared and must be removed prior to data collection. ▲

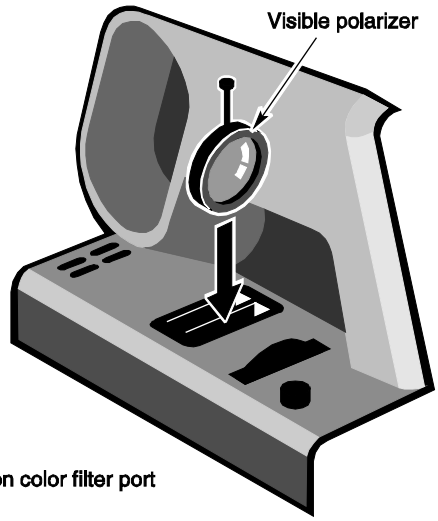
Follow these steps to perform DIC experiments:

1. **Remove the purge baffle and then slide the visible analyzer into the slot directly below the viewer.**

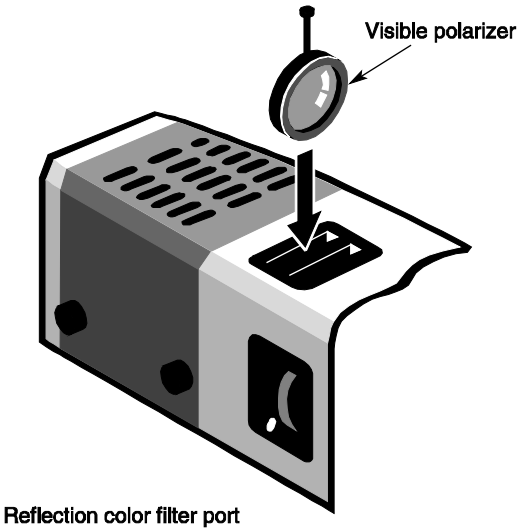


2. **Insert the round visible polarizer into one of the color filter ports.**

   If your sample is suited for transmission data collection, insert the polarizer in the transmission color filter port. The transmission color filter port is located on the base of the microscope on the left side.



If your sample is suited for reflection data collection, insert the polarizer into the reflection color filter port. The reflection color filter port is located on the left side of the microscope, adjacent to the reflection illuminator.



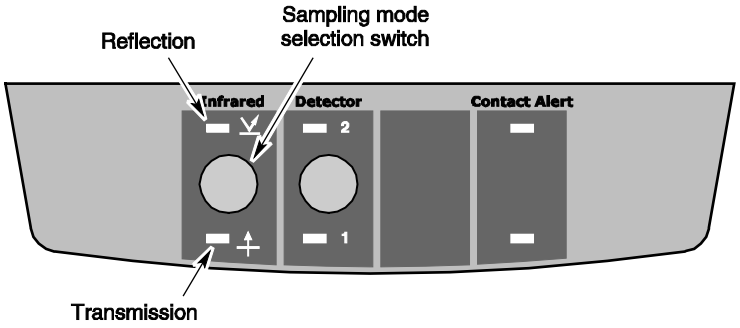
3. **Select a sampling mode.**

   Check to be sure that Experiment Setup (available through the Collect menu of OMNIC Atlμs) is closed and then use the Sampling Mode switch on the front panel.

   If your sample is suited to reflection techniques, choose reflection mode.

   If your sample is suited to transmission techniques, choose transmission mode.

The Transmission indicator lights when transmission mode is selected. The Reflection indicator lights when reflection mode is selected.

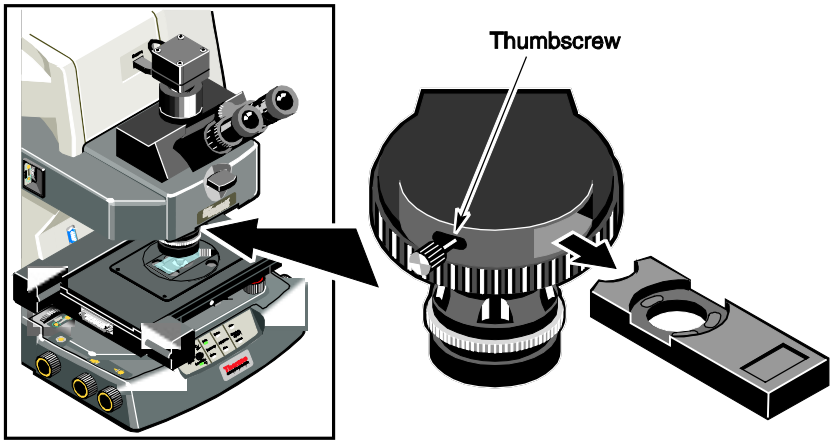


4. **Rotate the round visible polarizer with your finger until the field of view becomes dark.**

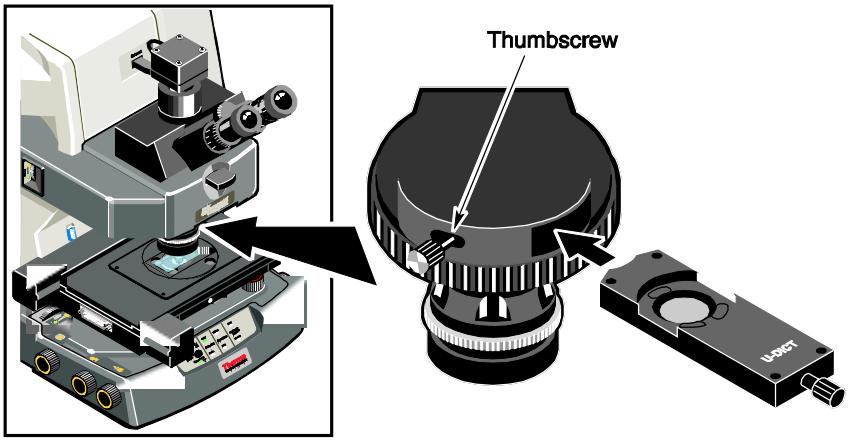
   The polarizers are now crossed.

Note Some video cameras include autogain features that make it difficult to see when the polarizers are crossed. Use the eyepieces for viewing while you are looking for crossed polarizers. ▲

5. **Loosen the thumbscrew and remove the purge baffle from the nosepiece.**

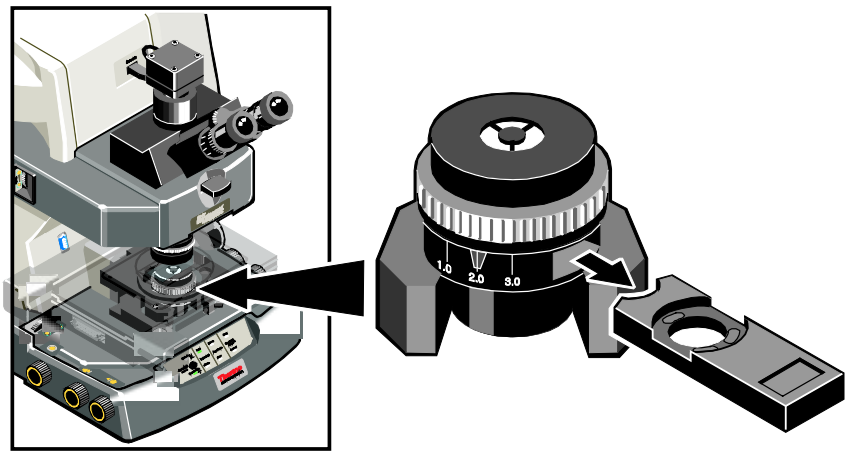


6. **Insert a DIC prism (with the lettering facing up) into the nosepiece slot.**

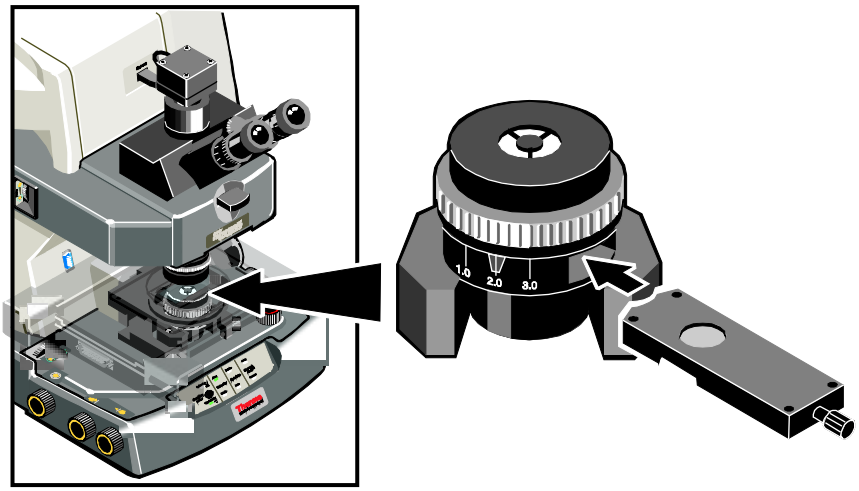


7. **If your sample is suited to transmission data collection, remove the purge baffle from the condenser.**

   If your sample is suited to reflection data collection, proceed to step 9.

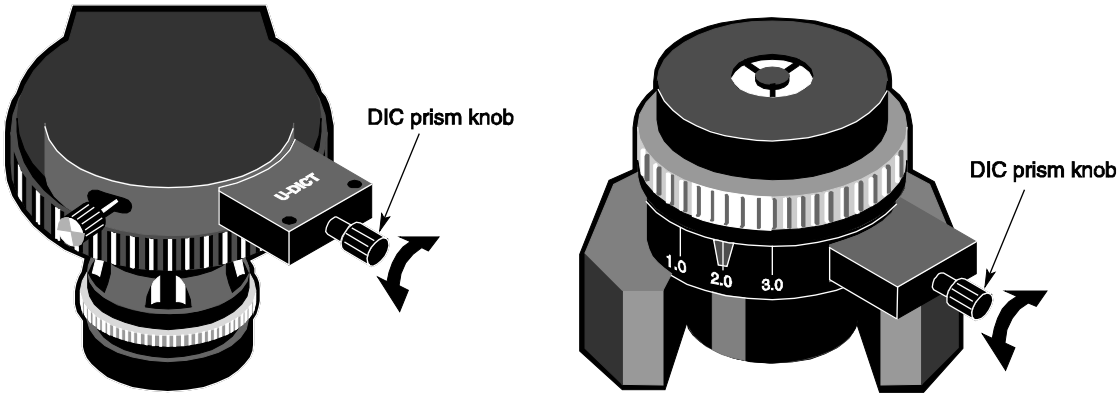


8. **If your sample is suited to transmission data collection, insert a DIC prism (with the lettering facing down) into the condenser slot.**



9. **Install the sample and focus.**

10. **Rotate the DIC prism knob(s) to change the colors and contrast of the sample image.**



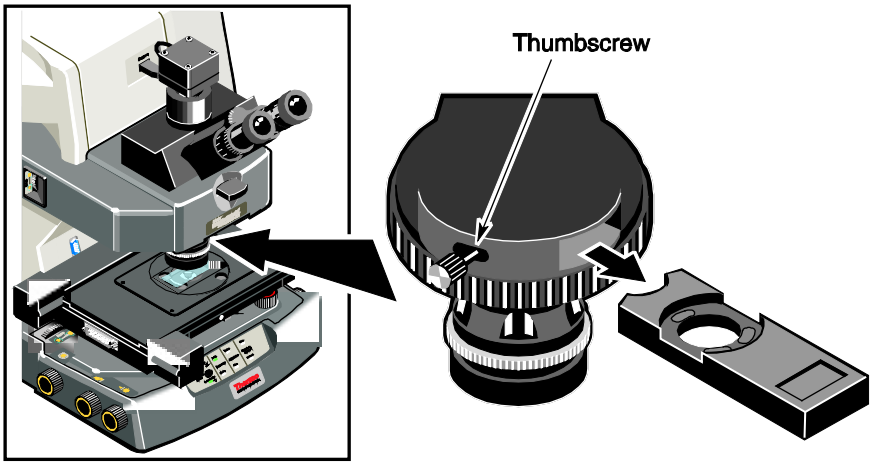
Note You can usually obtain the greatest contrast by rotating the knobs until the image is black and white (without visible color). ▲

Infrared polarization

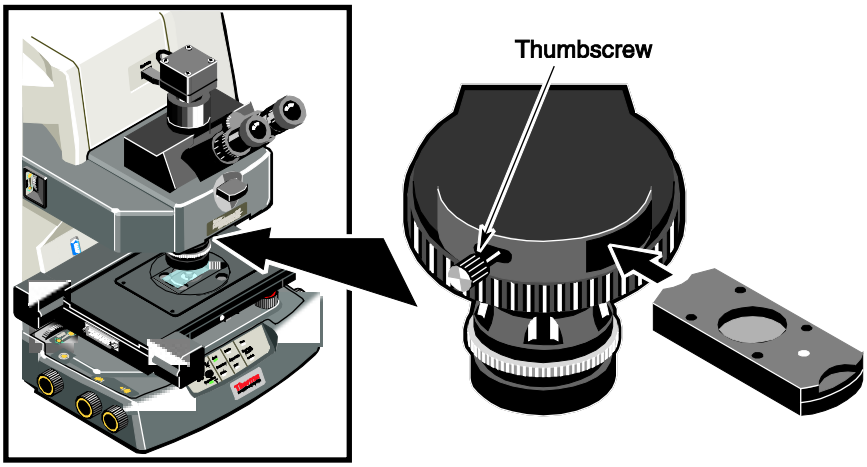
If you are interested in obtaining information that is specific to sample orientation, that gives precise information about the molecular structure and molecular orientation of a sample, or that is specific to polarization angle you can use the microscope to conduct polarized studies of infrared data.

An optional wire-grid infrared polarizer can be installed in the nosepiece of the microscope and used for both transmission and reflection experiments.

1. **Loosen the thumbscrew and slide the purge baffle out of the objective.**

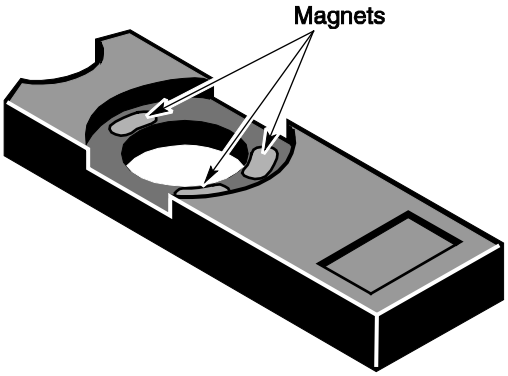


2. **Slide the polarizer into the slot and secure it with the thumbscrew.**



Optical filters

The purge baffles located in the objective and the condenser can be used as holders for custom filters. Round filters ranging in diameter from 29 to 36 mm with a maximum thickness of 3.5 mm. The magnetic pads can be used to secure filters.



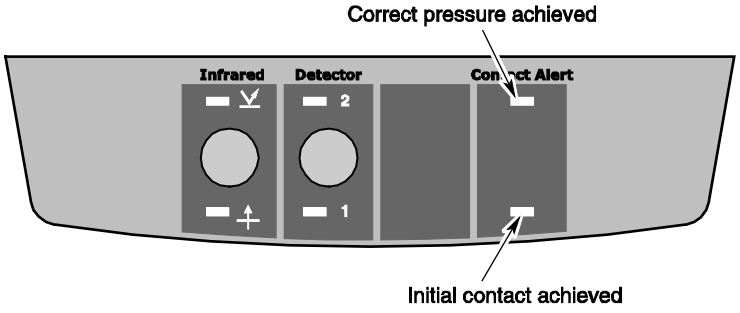
Attenuated total reflection

An optional ATR (attenuated total reflection) objective and slide-on ATR attachment lets you analyze highly infrared-absorbent or hard-to-prepare microscopic materials, often with little or no sample preparation. Examples of these materials include polymers, coatings, rubbers, coated papers and biological materials.

Applications of ATR microscopy include:

- Analyzing the surface of a sample
- Analyzing highly absorbing materials and thick samples
- Analyzing surface coatings
- Analyzing surface defects, inclusions or degradation

For most ATR experiments, the internal Contact Alert™ System helps you achieve proper contact pressure with an ATR objective or slide-on ATR attachment. During an ATR experiment, the system monitors the force between the sample and ATR crystal. Indicators on the front panel of the microscope illuminate to show when you have achieved initial contact and optimum pressure. For quantitative studies, we recommend using the external, quantitative Contact Alert System. Instructions for using the external system also are included in this chapter.



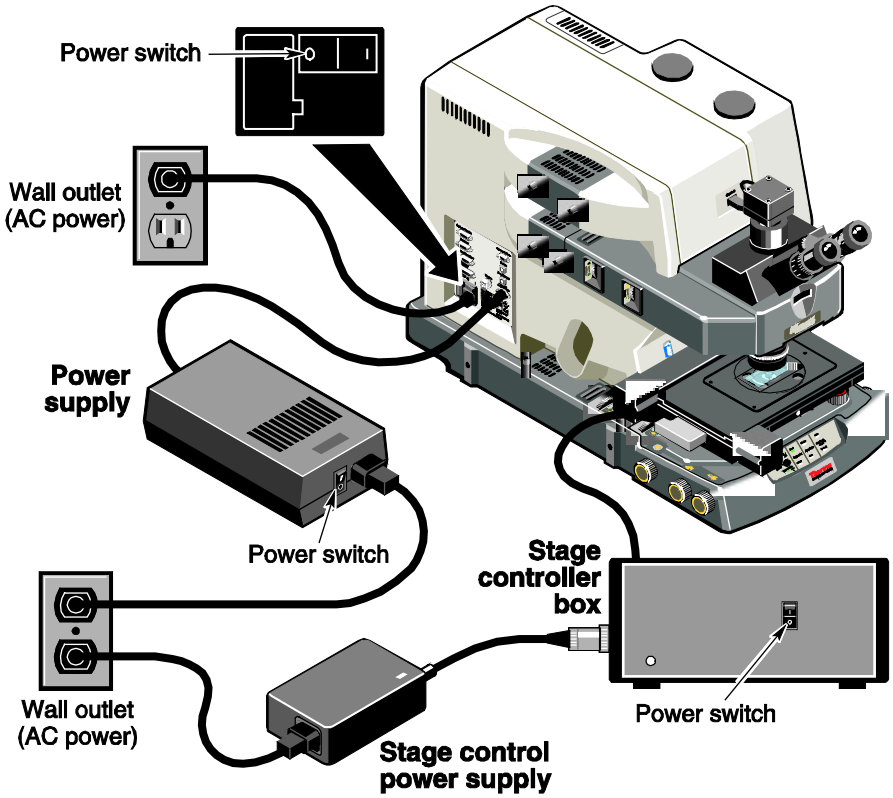
Setting up the internal Contact Alert System

Before you begin…

Make sure the standard ATR objective or slide-on ATR attachment is properly installed and aligned (centered) on the microscope. See the documentation that came with the objective or attachment for details.

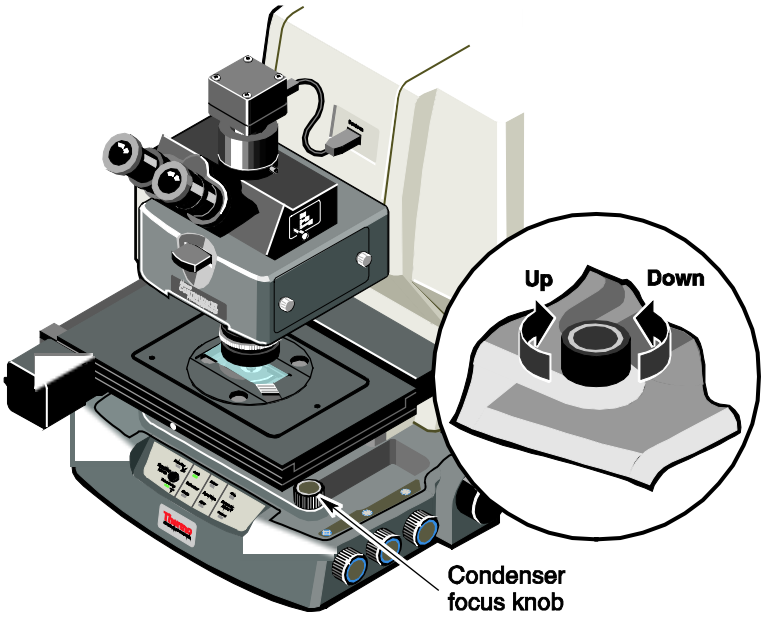
⚠ Caution Avoid shock hazard. Before connecting the sensor plate, always turn off the microscope power. ▲

1. **Turn off the microscope, computer, spectrometer, and stage controller power.**

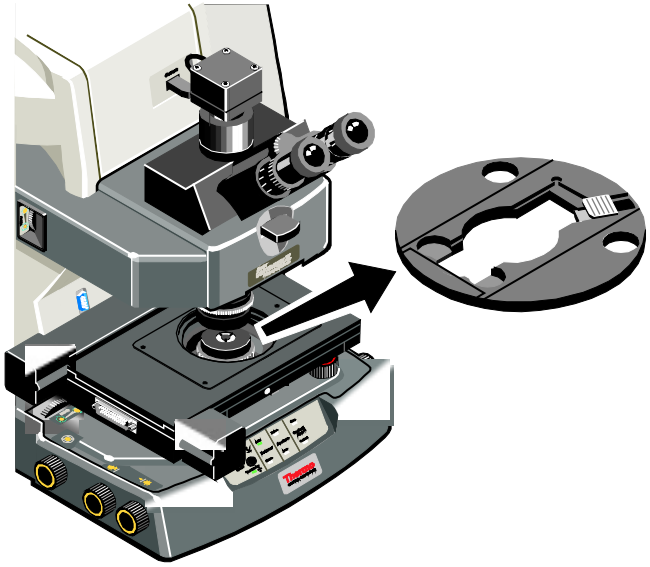


2. **Lower the condenser completely.**

   Use the condenser focus knob.

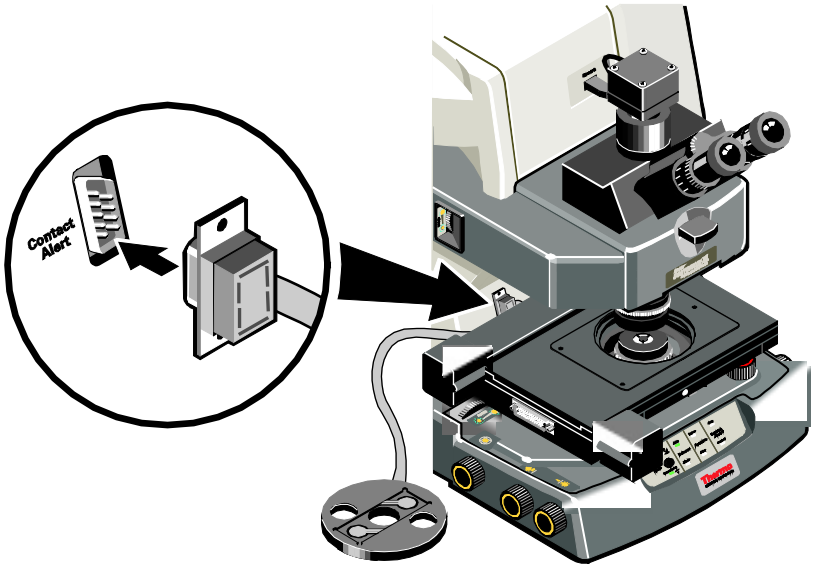


3. **If the universal slide holder is in place, remove it from the stage.**



4. **Connect the cable from the sensor plate to the connector on the front of the microscope and set the sensor plate aside.**

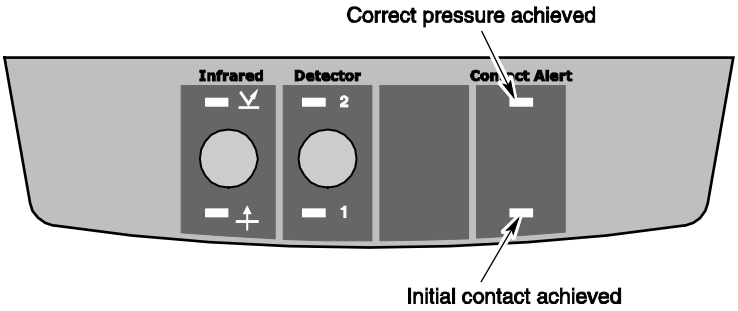
   To prevent damage when the stage initializes, be sure that the cable that connects the sensor plate to the microscope is behind and under the stage.



5. **Power on the microscope, stage controller (if installed), illuminators, computer, monitor, printer, and other computer peripherals and then, finally, power on the spectrometer.**

   Be sure that at least 20 seconds elapses between powering on the microscope and powering on the spectrometer.

The indicators for the internal Contact Alert System on the front panel becomes active. Neither should be glowing until the sample is in place and contact occurs.



See “Turning on power” in the “Preparing the Microscope” chapter, if you need help with powering on the system.

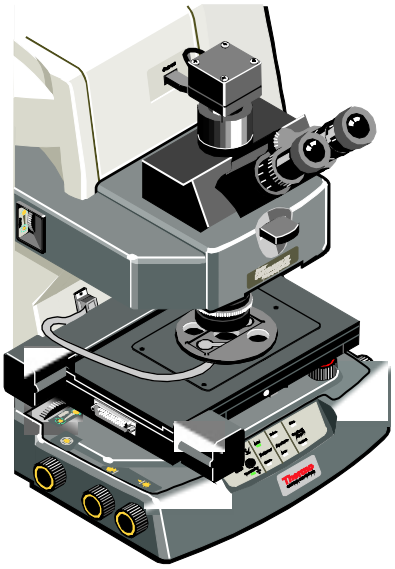
6. **For systems with optional motorized stages, initialize the stage.**

See “Initializing the stage” in the “Preparing the Microscope” chapter, if you are unfamiliar with the stage initialization procedures.

7. **Place the sensor plate onto the stage.**

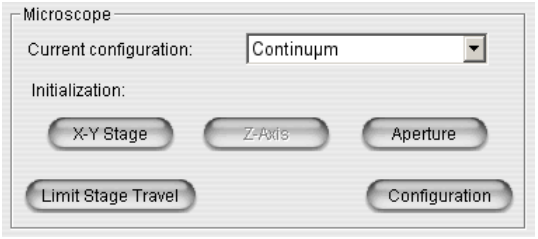
   The raised surface on the bottom of the sensor plate fits into the recess on the stage.

Be sure that the cable that connects the sensor plate to the microscope is on top of the stage.



8. **Choose System Configuration from the Atlμs menu in OMNIC.**

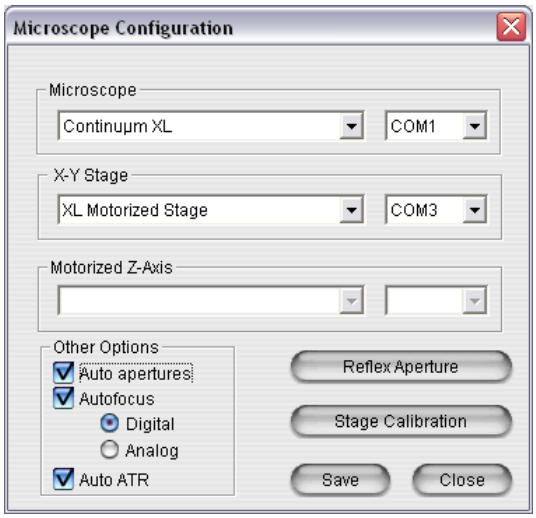
9. **Click the Configuration button under Initialization in the Microscope field.**



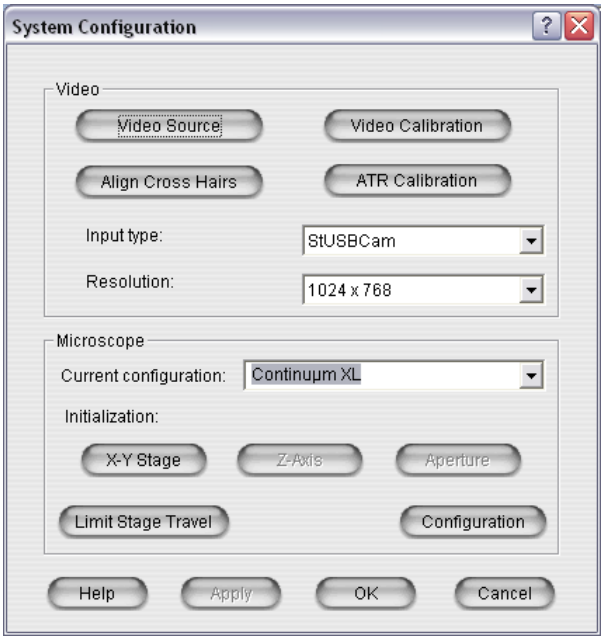
10. **When the Microscope Configuration dialog box opens, confirm that the Auto ATR checkbox is checked.**

    If Auto ATR is checked, click the Close button to close the dialog box without changes.

    If it is not, check the box, click the Save button, and then click the Close button to enable Auto ATR and close the dialog box.



11. **Once you return to the System Configuration dialog box, click OK to save the Auto ATR setting and close the dialog box.**



12. **Click the ATR Calibration button in the Video field.**

See the OMNIC Atlμs Help system for more information about ATR calibration.

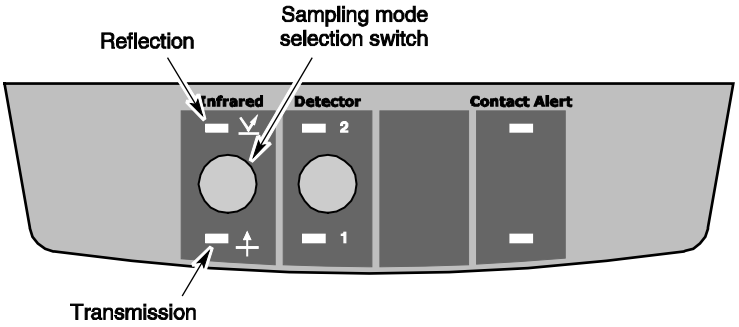
Using the internal Contact Alert System

Follow the steps that follow to collect data using the internal Contact Alert System.

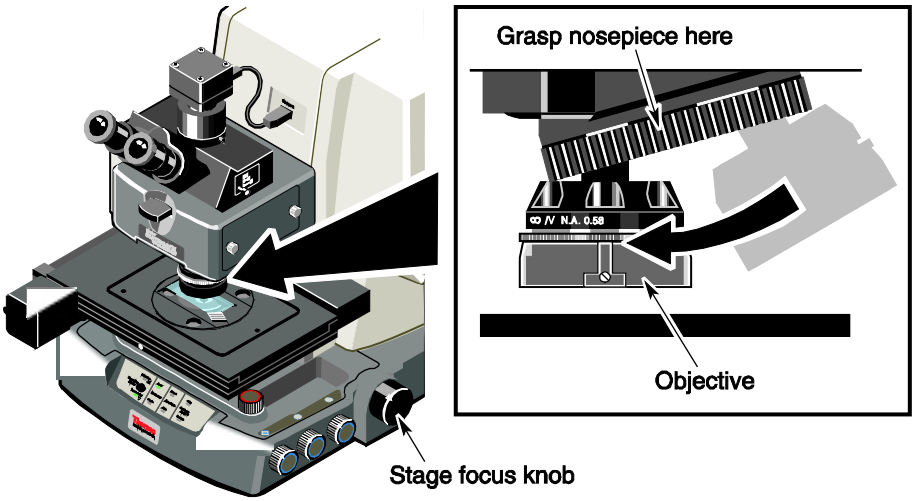
Notice Before rotating the objective into position, lower the stage to provide sufficient clearance between the stage and the objective. ▲

1. **Select reflection viewing mode.**

   Check to be sure that Experiment Setup (available through the Collect menu of OMNIC Atlμs) is closed and then use the Sampling Mode switch on the front panel.



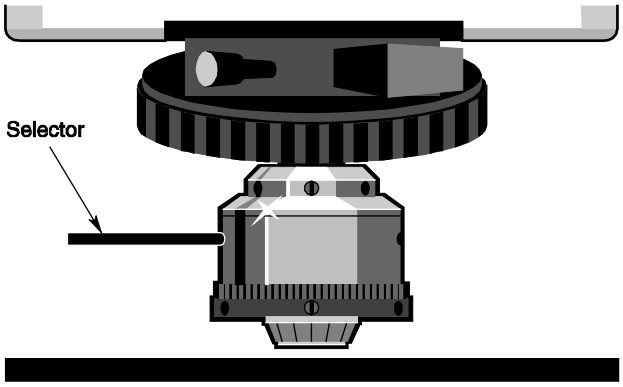
2. **Firmly grip the nosepiece ring and rotate the ATR objective or the standard infrared objective with the slide-on ATR attachment into the viewing-analyzing position.**



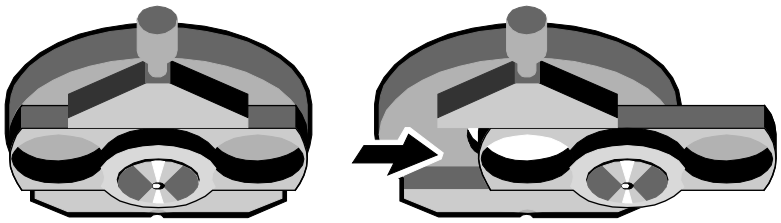
3. **Select a "view through" position for the objective.**

   If you are using an ATR objective with a ZnSe or diamond crystal, slide the selector into the survey position.

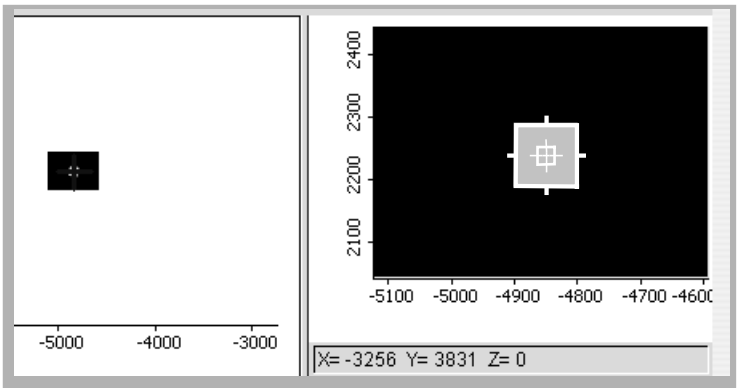
   If you are using an ATR objective with a Ge or Si crystal, you can move the selector to the ATR position. The sample is not visible through Ge or Si crystals.



If you are using the slide-on ATR attachment, move the crystal slide to an open position.



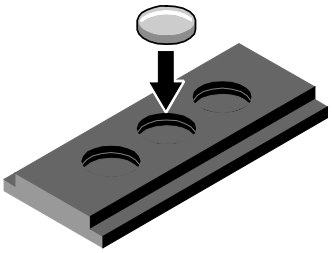
4. **Open the Reflex aperture fully.**



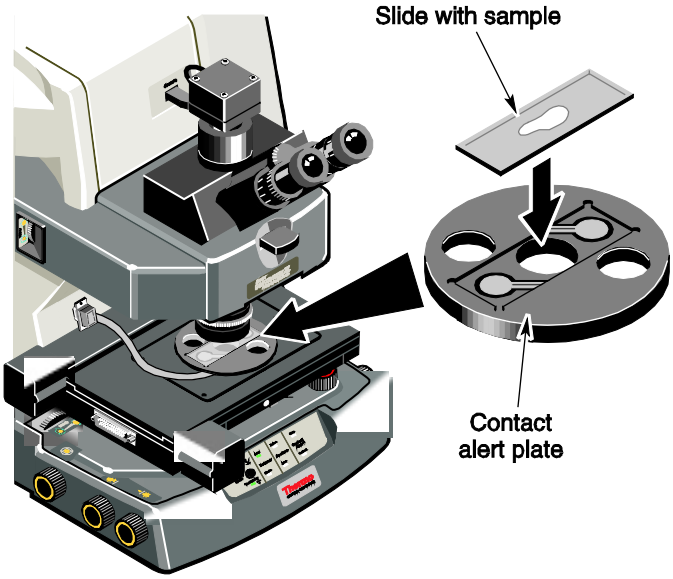
5. **Install the sample on a sample slide.**

   Placing the sample on a glass slide helps protect the ATR objective in case you apply too much pressure when making contact with the sample. The glass will crack before the objective is damaged. Applying transparent tape to the underside of the glass slide will prevent pieces from falling into the condenser should the slide break.

You can insert a round window made of KBr or other appropriate material into one of the holes in the metal slide that came with your system and then place the sample on that window. If you choose to use the metal slide, be very careful when you apply pressure. It is very easy to damage the ATR crystal.



6. **Place the sample slide onto the sensor plate.**



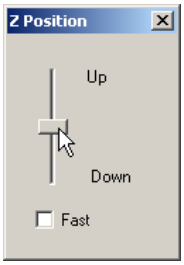
7. **While watching the sample directly (not through the viewer), use the X-Y knobs, joy stick (or Move Stage tools) to position the sample area of interest directly under the objective.**

   If you are using an ATR objective with a ZnSe or diamond crystal or the slide-on ATR attachment, look through the viewer and center the sample area of interest.

   The sample is not visible through a Ge or Si crystal. When using a an ATR objective fixed with a crystal that does not allow you to see your sample, center the sample area using a regular infrared objective and then select the ATR objective.

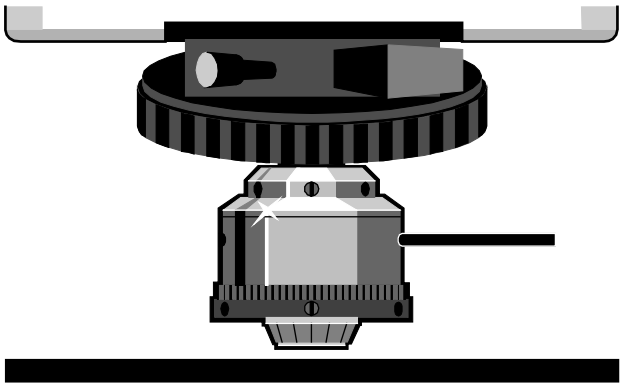
8. **While watching the sample directly (not through the viewer), carefully raise the stage using the stage focus knob (or a Z position tool) until the sample is close to the objective.**

   If you are using an ATR objective with a Ge or Si crystal, look directly at the sample from the side and position it as desired under the objective.

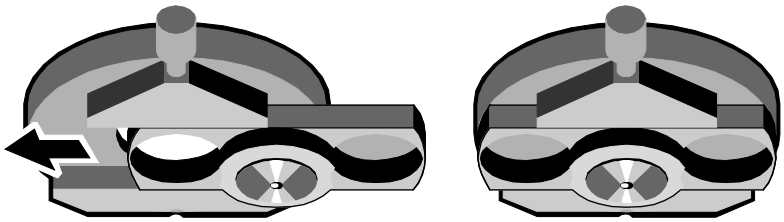


9. **Move the crystal into the beam path.**

   If you are using an ATR objective with a ZnSe or diamond crystal type, slide the selector into the ATR position.



   If you are using the slide-on ATR attachment, move the crystal slide to the middle position.



   If you are using an ATR objective with a Ge or Si crystal, you can move the selector to ATR.

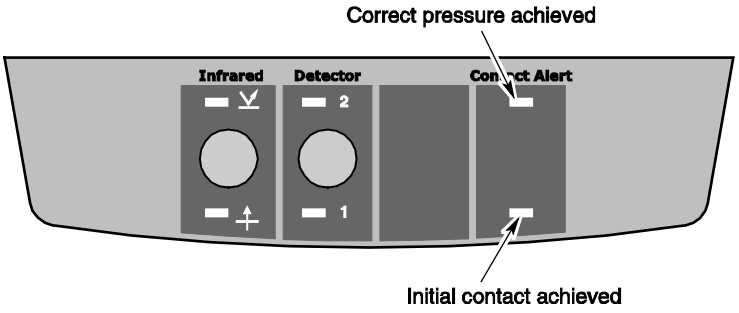
10. **While watching the lower Contact Alert indicator on the front panel, carefully and slowly raise the stage using the stage focus knob until the indicator illuminates.**

    This green indicator shows that the sample has made initial contact with the ATR crystal.

Notice Excessive pressure can damage the ATR crystal. Be sure to stop raising the stage in the next step when the upper indicator illuminates. ▲

11. **Slowly raise the stage and stop immediately when the upper Contact Alert indicator on the front panel illuminates.**

    This red indicator shows that the contact pressure of the sample area against the ATR crystal is optimal for infrared analysis.



12. **If you are using an ATR objective with a ZnSe or diamond crystal, look through the viewer and make sure the sample area of interest is positioned as desired in the field of view.**

    Good contact between the crystal and sample is indicated by a darkening or "wetting" of the sample image.

    If the area of interest is not positioned as desired, lower the stage until the sample is slightly below the objective, reposition and focus the sample with the selector in survey position, and then return to step 10.

13. **Choose Experiment Setup from the Collect menu, and verify that the detector signal intensity is adequate.**

    The detector signal is shown in the live display on the Bench tab of the Experiment Setup dialog box.

If you need help, find “live display’ in the OMNIC Help system Index and go to “Using the live display.”

14. Set Background Handling on the Collect tab to collect Background After Every Sample.

Set the other experiment parameters to the appropriate settings. (If you have set up and saved an experiment for ATR data collection, you can set the parameters in one step by opening the experiment.)

If you need help, find “experiment” in the OMNIC Help system Index and go to “Using Experiment Setup.”

Note If you experience difficulty with sample material contaminating your background material, try collecting the background first and checking it for contamination before you collect your sample data. ▲

15. Choose OK to close the Experiment Setup dialog box.

16. Choose Collect Sample from the Collect menu to collect the sample spectrum.

Follow the instructions that appear on the screen.

17. When you are prompted to collect the background spectrum, lower the stage so that the sample is no longer in contact with the ATR objective crystal, and then choose OK.

18. **When data collection is finished, follow the instructions that appear on the screen to display the ratioed sample spectrum in a spectral window.**

    This spectrum shows the results of your analysis. (If Collect To A New Window is turned on in the Collect options, the spectrum is displayed in a new spectral window automatically.)

If you need help, find "sample spectrum" in the OMNIC Help system Index and go to "How to collect a sample spectrum."

Setting up the external quantitative Contact Alert System

The external quantitative Contact Alert System has its own indicators, an adjustable audible alarm, and an analog meter for measuring the contact pressure. While you are using the external Contact Alert system, the Contact and Stop indicators on the front panel of the microscope do not light; they are replaced by the visual and audible alarms available through the controller.

Notice The contact alarm lines for this system are not monitored by software. Always disable Auto ATR while using the external qualitative Contact Alert System. Damage resulting from stage crashes is not covered by warranty. ▲

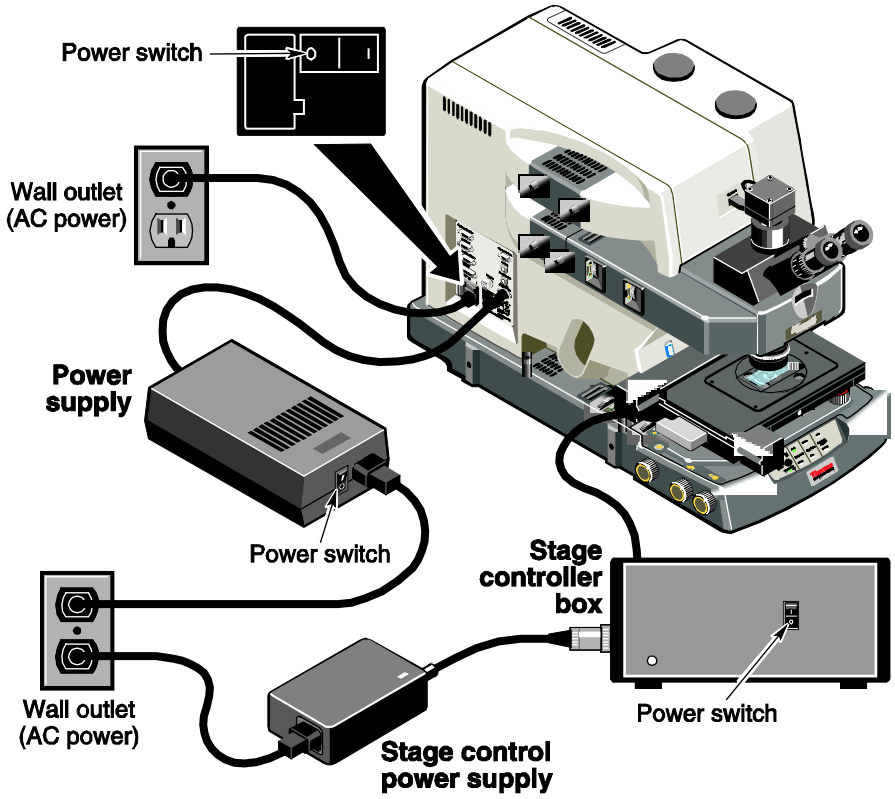
See the Contact Alert User's Manual for detailed procedures for using the quantitative Contact Alert system.

Use the following procedure to set up the external, quantitative Contact Alert system. Use this option when you need to measure samples with the best possible reproducibility of contact pressure; for example, for quantitative analyses or research studies.

⚠ Caution Avoid shock hazard. Before connecting the quantitative Contact Alert System, always turn off the microscope power. ▲

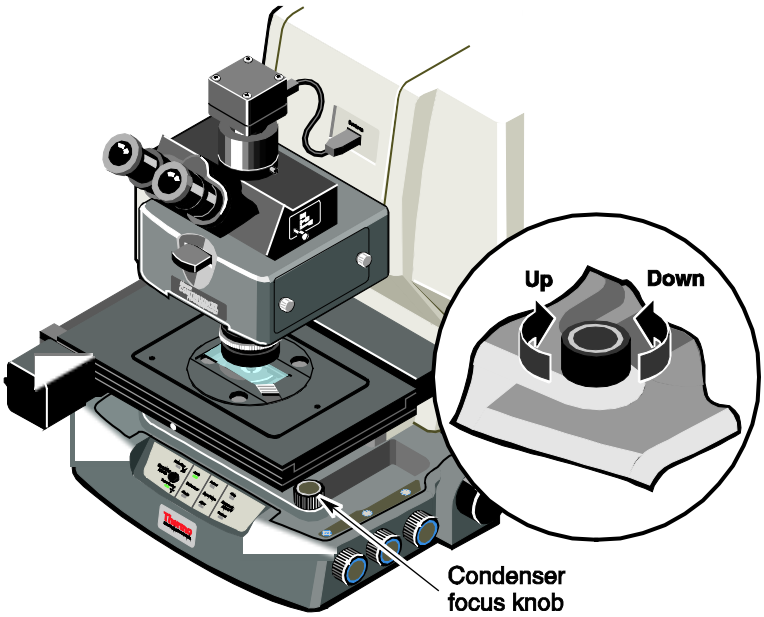
To set up the external Contact Alert System:

1. **Turn off the microscope, computer, spectrometer, and stage controller (if installed) power.**

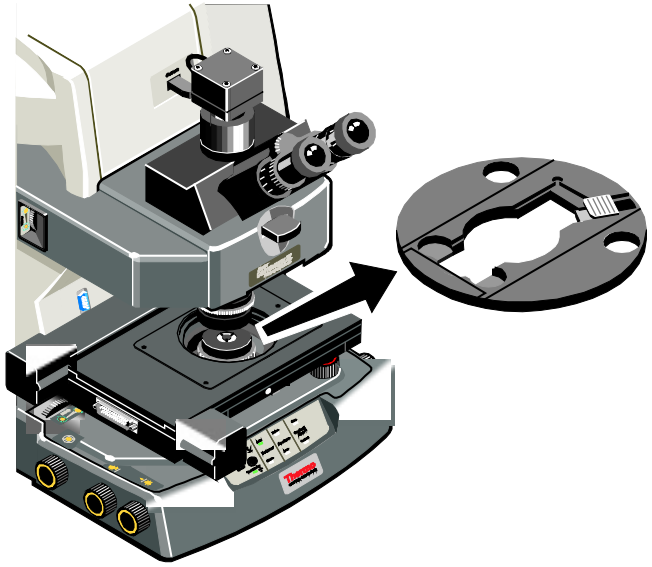


2. **Lower the condenser fully.**

   Use the condenser focus knob.

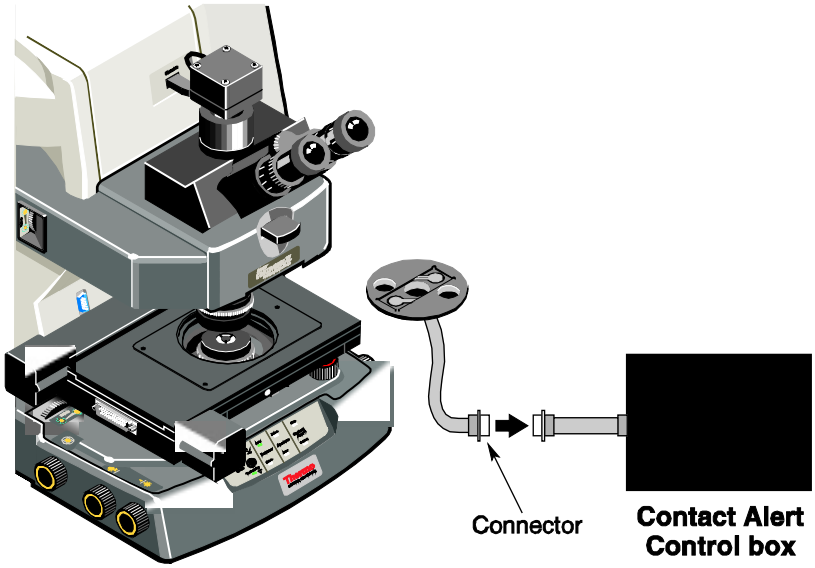


3. **If the universal slide holder is in place, remove it from the stage.**



4. **Connect the cable from the sensor plate to the connector on the Contact Alert Control box and set the sensor plate aside.**

   To prevent damage when the stage initializes, be sure that the cable that connects the sensor plate to the microscope is behind and under the stage.



5. **Power on the microscope, stage controller, illuminators, computer, monitor, printer, and other computer peripherals, Contact Alert controller, and then, finally, power on the spectrometer.**

   Be sure that at least 20 seconds elapses between powering on the microscope and powering on the spectrometer.

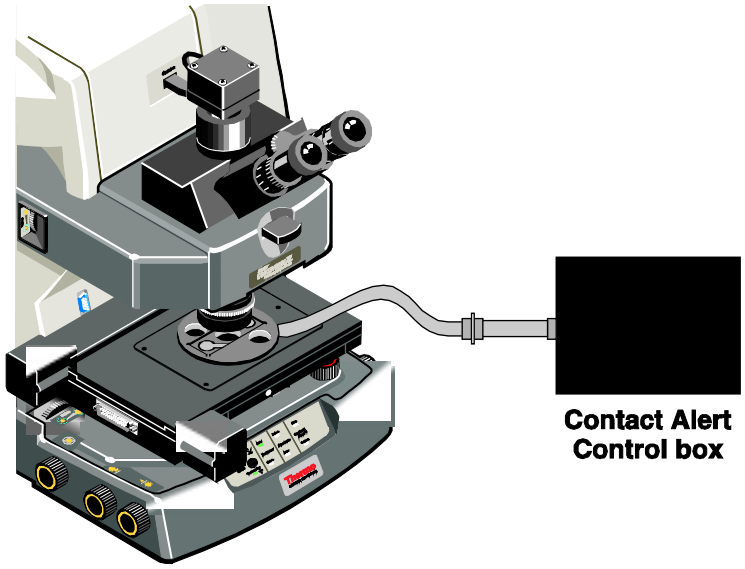
See “Turning on power” in the “Preparing the Microscope” chapter, if you need help with powering on the system.

6. **Initialize the stage.**

See “Initializing the stage” in the “Preparing the Microscope” chapter, if you are unfamiliar with the stage initialization procedures.

7. **Place the sensor plate onto the stage.**

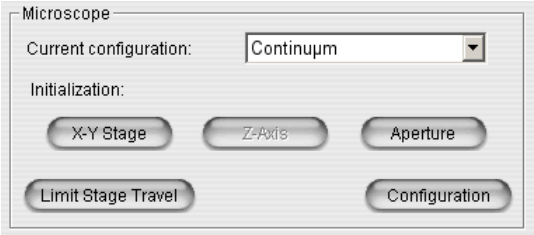
The raised surface on the bottom of the sensor plate fits into the recess on the stage.



⚠ Caution Avoid shock hazard. Before connecting the cable in the next step, make sure the power cord for the Contact Alert system controller is disconnected from the AC source and that the controller power switch is in the OFF position. ▲

8. **Choose System Configuration from the OMNIC Atlμs menu.**

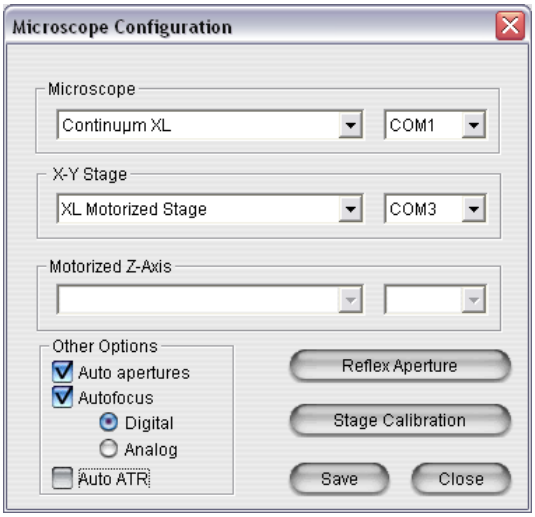
9. **Click the Configuration button under Initialization in the Microscope field.**



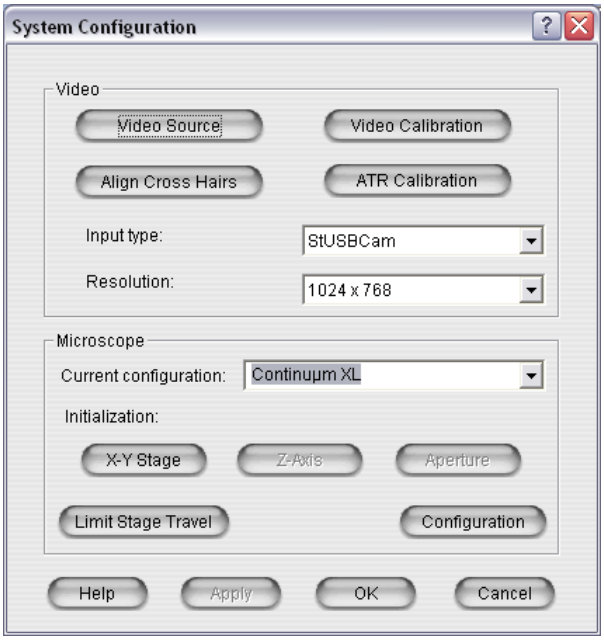
10. **When the Microscope Configuration dialog box opens, confirm that the Auto ATR is disabled (the checkbox is not checked).**

    If Auto ATR is not checked, click the Close button to close the dialog box without changes.

    If it is, click the checkbox to uncheck it, click the Save button, and then click the Close button to disable Auto ATR and close the dialog box.



11. **Once you return to the System Configuration dialog box, click OK to save the Auto ATR setting and close the dialog box.**



12. **Click the Video Calibration button in the Video field.**

See the OMNIC Atlμs Help system for more information about ATR calibration.

13. **Use the documentation that came with your external Contact Alert System and the OMNIC Atlμs documentation if you need information about using the system for data collection.**

Grazing angle reflection

An optional grazing angle objective (GAO) lets you analyze thin films down to monolayer thicknesses with a high degree of sensitivity in microscopic areas. Typically samples consist of organic or inorganic ultra-thin films on metallic surfaces. Measuring the energy reflected from the surface of these samples can yield important spectral data, providing information about the molecular chemistry and orientation of surface films.

Applications of grazing angle microscopy include:

- Analyzing contaminants on semiconductors
- Analyzing surface impurities on magnetic disks
- Analyzing imperfections on metallic surfaces
- Analyzing self-assembled monolayers and Langmuir-Blodgett films on metal surfaces.

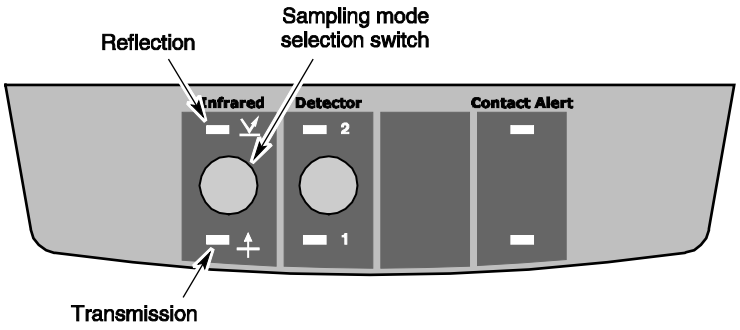
Before you begin…

Make sure the GAO is properly installed and aligned on the microscope.

Notice Before rotating the GAO into position, lower the stage to provide sufficient clearance between the stage and the objective. The working distance of the GAO when focused on the sample is 1 mm. ▲

1. **Select reflection sampling mode.**

   Check to be sure that Experiment Setup (available through the Collect menu of OMNIC Atlμs) is closed and then use the Sampling Mode switch on the front panel.

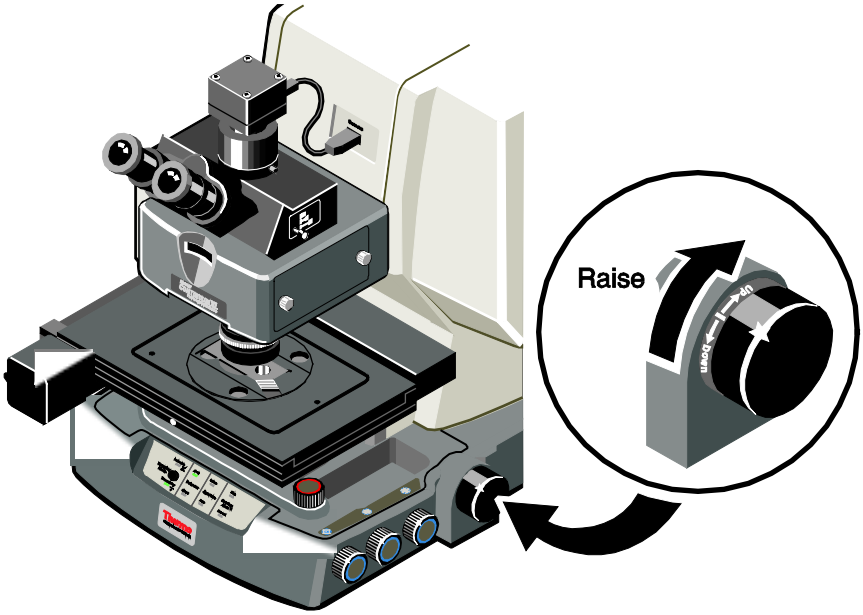


2. **Install the sample on an appropriate reflective substrate on a sample slide and place it on the microscope stage.**

3. **Use the X-Y knobs, joystick or Move Stage tools to center the sample under the GAO.**

Notice To avoid damaging the microscope, be careful not to move the stage up into the GAO in the next steps. Raise the stage slowly. ▲

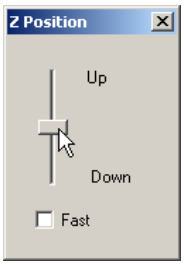
4. **Using the stage focus knob, slowly raise the stage so that the sample is approximately 2 mm from the bottom of the GAO.**



5. **Slide the GAO mode selector to “View”.**

6. **Using the Z position tool, slowly raise the stage so that the sample is approximately 1 mm from the bottom of the GAO.**

   Check the Fast checkbox if you have difficulty controlling the stage using the very fine adjustment mode.

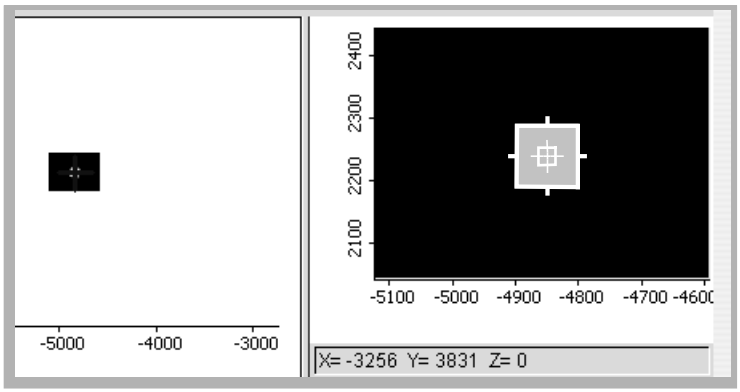


7. **While looking though the viewer (or at the video image), center and focus the sample image.**

8. **Slide the GAO mode selector to the grazing position.**

9. **Refocus the sample image.**

10. **Adjust the Reflex aperture to define the area of interest on the sample.**



11. **Set the experiment parameters.**

    Use Experiment Setup in the collect menu to test the parameters. (If you have set up and saved an experiment for GAO data collection, you can set the parameters in one step by selecting or opening the experiment.) Set Background Handling on the Collect tab to Collect Background After Every Sample.

Note Grazing angle measurements may require more than 1000 scans to achieve an adequate signal-to-noise ratio, especially when band intensities are weak. ▲

If you need help setting parameters, find "experiment" in the OMNIC Help system Index and go to "Using Experiment Setup."

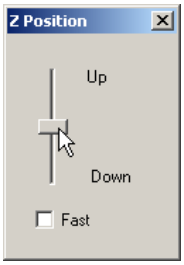
12. **Choose collect Sample from the Collect menu to collect the sample spectrum.**

    Follow the instructions that appear on the screen.

13. **When you are prompted to collect the background spectrum, position under the GAO a clean area of the reflective substrate on which the sample is installed.**

    Do not adjust the Reflex aperture or the GAO.

14. **While looking through the viewer (or at the video image), finely focus the image of the substrate surface.**



15. **Choose OK to collect the background spectrum (spectrum of the substrate).**

16. **When data collection is finished, follow the instructions that appear on the screen to display the ratioed sample spectrum in a spectral window.**

    If Collect To a New Window is turned on in the Collect options, the spectrum is displayed in a new spectral window automatically.

    This spectrum shows the results of your analysis.

More about the Hardware

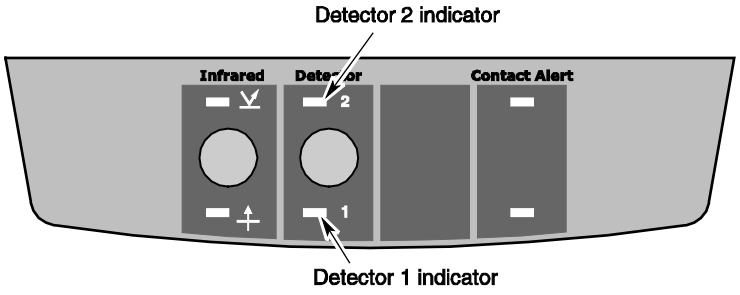
This chapter provides more information about components of the Continuμm microscope. We will cover these topics:

- Selecting a detector
- Using objectives and condensers
- Masking off areas of interest
- Adjusting contrast and the field of view
- Using autofocus
- Using auto ATR contact
- Purging the microscope

Many accessories and other hardware options are available for your microscope. These include filters and polarizers, objectives and condensers, sample stages, viewers and eyepieces, detectors, and automation products. See the documentation that came with the hardware for complete instructions.

Selecting a detector

Continuμm microscopes are equipped with one single-element detector. A second, optional detector may also be installed. The Detector indicator on the front panel shows which detector is selected for data collection.



A variety of detectors are available to meet sampling requirements that demand flexibility in the step and sampling area size. Used in conjunction with the Reflex aperture, they permit accurate data collection from samples smaller than 10 µm square. Any one of the detectors from the tables that follow can be factory-installed. Unlike detectors in the spectrometer, microscope detectors are not interchangeable. You can, as required by your sample, vary the beamsplitter and light source used with the detector to collect data over a more broad spectral range. The table that follows lists the single element detectors that are available and provides element size, spectral range and sensitivity specifications for each.

Detector	*Element size*	*Spectral range*	*Sensitivity (D*)*
MCT-A*	50 µm	11,700 - 700 cm^{-1}	$> 60 \times 10^9 \frac{cm(Hz)^{1/2}}{W}$
MCT-A*	250 µm	11,700 - 750 cm^{-1}	$> 60 \times 10^9 \frac{cm(Hz)^{1/2}}{W}$
MCT-A	250 µm	11,700 - 600 cm^{-1}	$> 42 \times 10^9 \frac{cm(Hz)^{1/2}}{W}$
MCT-B	250 µm	11,700 - 450 cm^{-1}	$> 7 \times 10^9 \frac{cm(Hz)^{1/2}}{W}$
InGaAs	250 µm	12,000 - 3800 cm^{-1}	$> 80 \times 10^9 \frac{cm(Hz)^{1/2}}{W}$

Once you have selected the microscope as the sample compartment, use the Detector parameter on the Bench tab of the Experiment Setup dialog box to select the detector you wish to use. With these parameters set, the infrared beam is directed to the detector you specified.

See the OMNIC Help system for more information about setting Experiment parameters.

Note Before you can collect data using either the array or a single element detector, you will need to cool it. ▲

See "Cooling the detector" in the "Preparing the Microscope" chapter for instructions for cooling a detector.

Also, be sure that the beamsplitter and source installed in your spectrometer are compatible with the microscope detector you have selected. The table that follows lists the beamsplitter-detector combinations that can be used.

	Beamsplitter					
	Near-IR				*Mid-IR**	*Far-IR*
Detector	*Quartz*	*CaF_2*	*XT-KBr*	*KBr*	*CsI*	*Solid substrate*
MCT-A*	OK	OK	Best	Best	OK	**X**
MCT-A	OK	OK	Best	Best	OK	**X**
MCT-B	OK	OK	Best	Best	OK	**X**
InGaAs	OK	Best	OK	**X**	**X**	**X**

Notes:

Best = Optimum beamsplitter-detector combination.

OK = Compatible beamsplitter-detector combination.

X = Incompatible beamsplitter-detector combination.

* A ZnSe beamsplitter may also be used as a mid-IR beamsplitter in extremely humid environments.

The next table lists the spectral ranges of compatible beamsplitter-detector-source combinations.

Light Range	*Beamsplitter*	*Detector*	*Spectral Range (cm^{-1})*	*Source*
near-IR	quartz	MCT-A*[1]	11,700 - 2,800[2]	ETC, white light
		MCT-A[1]	11,700 - 2,800[2]	ETC, white light
		MCT-B[1]	11,700 - 2,800[2]	ETC, white light
		InGaAs[1]	12,000 - 3,800	ETC, white light
	CaF_2	MCT-A*[1]	11,700 - 1,200[2]	ETC, white light
		MCT-A[1]	11,700 - 1,200[2]	ETC, white light
		MCT-B[1]	11,700 - 1,200[2]	ETC, white light
		InGaAs[1]	12,000 - 3,800	ETC, white light
	XT-KBr	MCT-A*[1]	11,000 - 600[2]	ETC, white light
		MCT-A[1]	11,000 - 600[2]	ETC, white light
		MCT-B[1]	11,000 - 400[2]	ETC, white light
		InGaAs[1]	12,000 - 3,800	ETC, white light
mid-IR	KBr	MCT-A*	7,400 - 600[2]	ETC
		MCT-A	7,400 - 600[2]	ETC
		MCT-B	7,400 - 400[2]	ETC
	CsI[3]	MCT-A*	6,400 - 600[2]	ETC
		MCT-A	6,400 - 600[2]	ETC
		MCT-B	6,400 - 400[2]	ETC
	ZnSe	MCT-A*	4,000 - 650[2]	ETC
		MCT-A	4,000 - 650[2]	ETC
		MCT-B	4,000 - 650[2]	ETC

Notes:

1. This spectral range reflects the combination of the ranges of the ETC and white light sources, as well as the limits of the beamsplitter-detector combination. The range achieved using one of these sources will not be as broad as the total range shown.
2. These detectors must be cooled with liquid nitrogen before use.
3 CsI beamsplitters are extremely hygroscopic (sensitive to moisture).

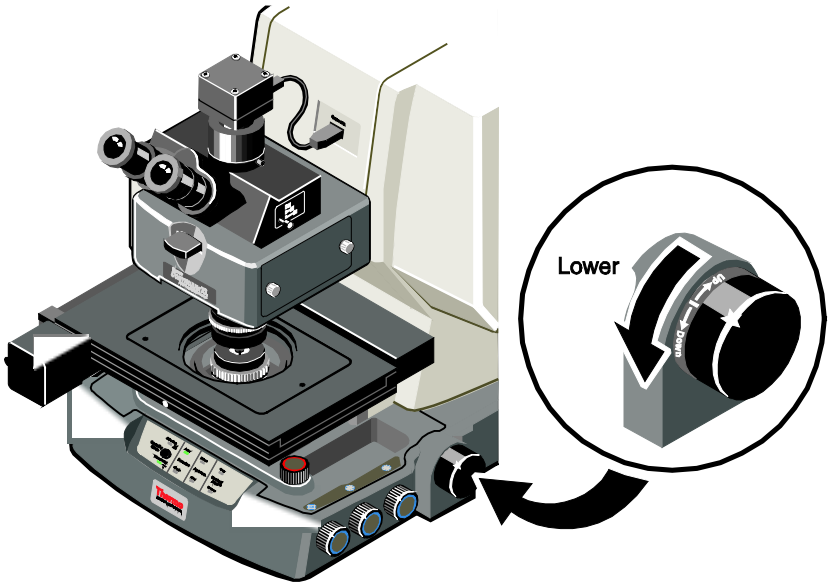
Using objectives and condensers

A wide variety of objectives and condensers are available from us. Each nosepiece may have 1–4 objectives installed. With the nosepiece installed, it is a simple matter to move a particular objective into the beam path.

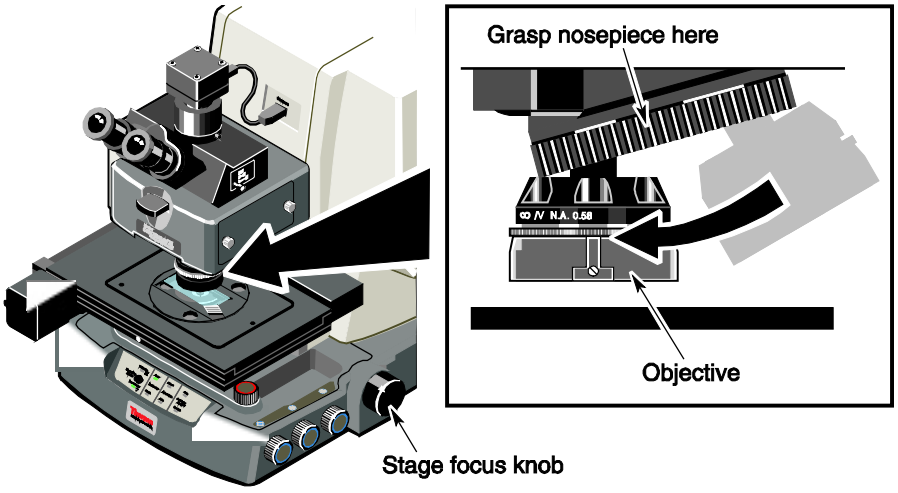
Notice To prevent damage to the internal mirror, avoid inserting your finger or any other object through the opening on the underside of an infrared objective or on the top of a condenser. ▲

To move an objective into the beam path:

1. **Use the stage focus knob if necessary to lower the stage to provide adequate clearance for the objective.**



2. **Grasp the nosepiece (do not grasp the objective) and swing the objective into position.**



Specifications and typical uses

The table that follows lists many of the objectives that are available for use with a Continuμm microscope. It includes a summary of their specifications, and typical uses. For transmission applications, choose a condenser that matches magnification of the objective you are using.

Objective	*Specifications*	*Used for*
Glass	Wide variety ranging from 4X to 50X magnifications	Visual microscopy and as an aid in sample alignment. Useful for adjusting image contrast for video and photomicrography or to aid in measuring optical properties such as refractive index, angle of extinction, birefringence, and signs of elongation
15X Cassegrain	Numerical aperture: 0.58 Working distance: 11 mm Visual field of view: 1400 µm Sample sizes:20-150 µm Refractive index compensation 0 or 2mm, fixed	Transmission and reflection Optional Slide-on ATR accessory
15X Reflachromat	Numerical aperture: 0.58 Working distance: 11 mm Visual field of view: 1400 µm Sample sizes: 20-150 µm Refractive index compensation: variable	Used for transmission and reflection with variety of window thicknesses Optional Slide-on ATR accessory
32X Reflachromat	Numerical aperture: 0.65 Working distance: 7 mm Visual field of view: 700 µm Sample sizes: 10-70 µm Refractive index compensation: variable	Transmission and reflection No slide-on ATR option
ATR Slide-on accessory for 15X	Crystal options: Si, ZnSe, and Ge	Reflective techniques that sample non-reflective surfaces such as infrared absorbing materials, coatings on non-reflective surfaces, and liquids
Stand-alone ATR	Crystal options: Si, Ge, ZnSe, and diamond	Reflective techniques that sample non-reflective surfaces such as infrared absorbing materials, coatings on non-reflective surfaces, and liquids

Refractive index compensation

When light traveling through one material enters another material with a different refractive index, the path of the light changes. This is called refraction.

In transmission experiments, the sample is often installed on or between an infrared-transparent substrate, such as potassium bromide (KBr), barium fluoride (BaF_2), sodium chloride (NaCl) or diamond. When placed in the optical path between the sample and the objective or condenser, these (and other) substrates displace the focus and cause optical aberrations.

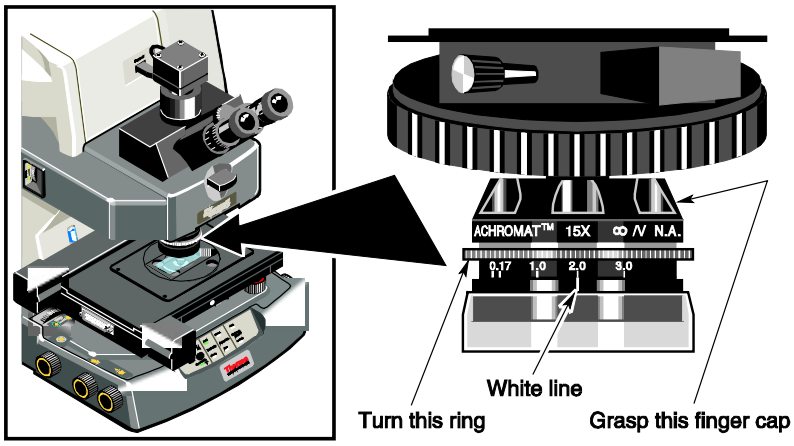
Reflachromat objectives and condensers are adjustable and can correct for focal displacement and aberrations introduced by a sample substrate. The compensation rings have five marked positions: 0, .17, 1.0, 2.0 and 3.0. For substrates with a refractive index equal to 1.49, the compensation ring settings correspond to the thickness of the substrate between the sample and the objective. Check with the manufacturer if you are unsure about the refractive index of your substrate. Thus, if the sample is between 2 mm salt (NaCl) plates, set the compensation rings to 2.0 If the sample is in a diamond compression cell, set the compensation rings to 1.0. If the substrate and superstrate are of different materials, set the objective compensation to match the superstrate and the condenser compensation to match the substrate.

Note Many commonly used substrates are 2 mm thick. ▲

If you use fixed-compensation objectives and condensers, be sure to use an objective and condenser with the appropriate compensation values. If the sample is installed on a substrate, the condenser compensation value should match the substrate thickness. If a window is placed on top of the sample, the objective compensation value should match the window thickness.

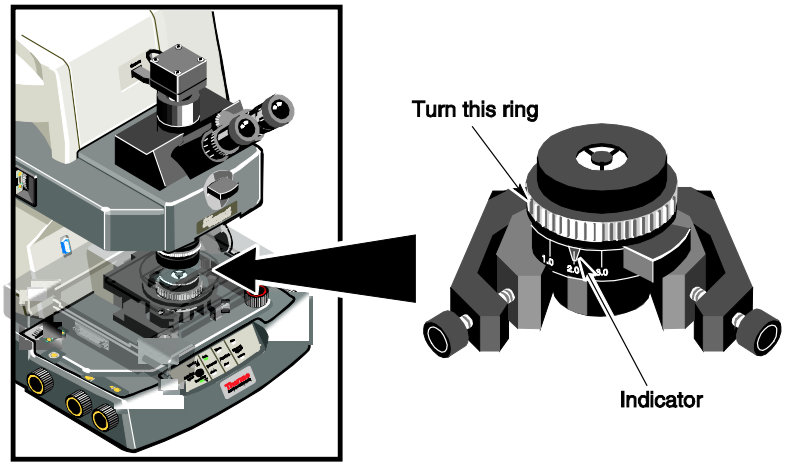
Adjusting objective compensation

To adjust the compensation of a Reflachromat objective, firmly grasp the black finger cap and rotate the knurled, silver ring so that the number corresponding to the sample substrate thickness is aligned with the vertical, white line.



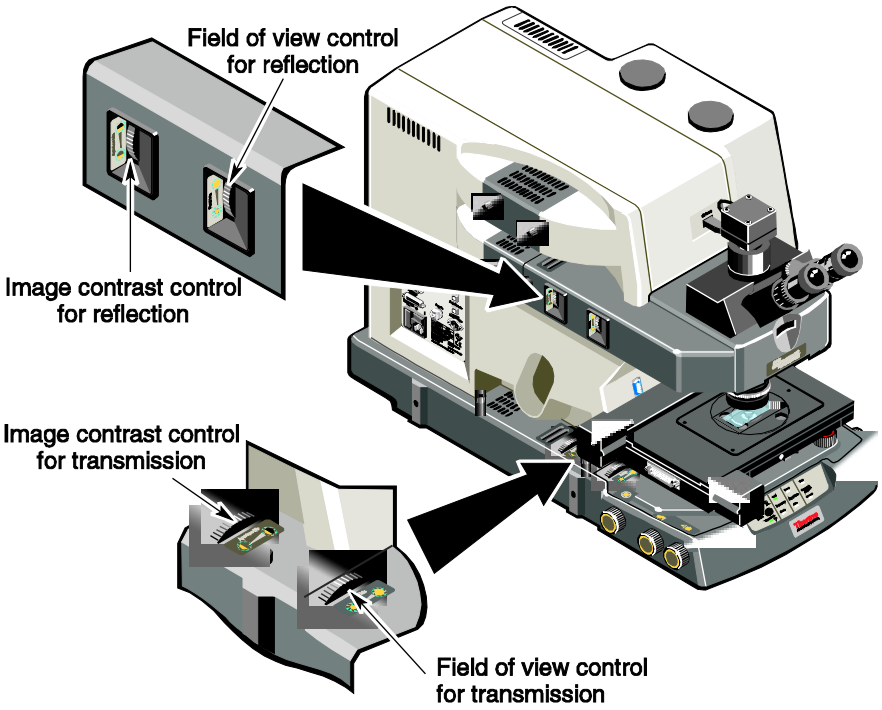
Adjusting condenser compensation

To adjust he compensation of the Reflachromat condenser, rotate the wide, knurled, silver ring so that the indicator is aligned with the mark that corresponds to the sample substrate thickness.



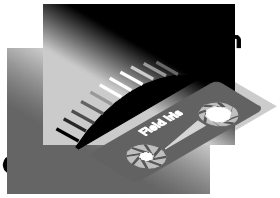
Adjusting field of view and image contrast

The transmission and reflection illuminators each have a set of irises that control the field of view and image contrast. The controls for the irises are located adjacent to the illuminator bulbs they serve.



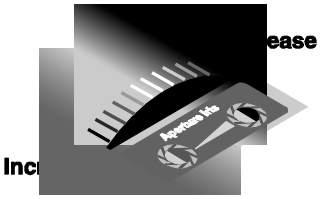
Transmission irises

The transmission illuminator has two circular irises that control the size of the illuminated field of view and the image contrast for transmission experiments.



Field iris – Use the field iris to adjust the size of the illuminated field of view. It opens and closes concentrically with respect to the reticle cross hairs.

Typically this iris is fully opened so that it is out of the full field of view. If a sample surface is uneven, you may find it easier to focus on the area of interest if you first partially close the iris so that only area you intend to study is visible.



Aperture iris – Use the aperture iris to increase or decrease the contrast for best image quality. You should not use it to control the light intensity.

Reflection irises

The reflection illuminator has two circular irises that control the size of the illuminated field of view and the image contrast.

Field iris – Use the field iris to adjust the size of the illuminated field of view. It opens and closes concentrically with respect to the reticle cross hairs.

Typically this iris is fully opened so that it is out of the full field of view. If a sample surface is uneven, you may find it easier to focus on the area of interest if you first partially close the iris so that only that area is visible.

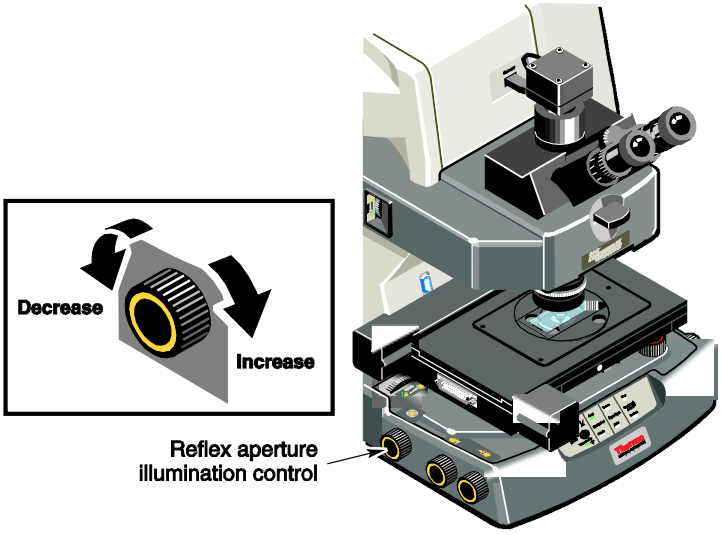
Aperture iris – Use the aperture iris to increase or decrease the contrast for best image quality. You should not use it to control the light intensity.

Masking off areas of interest

The Reflex aperture allows areas outside you sampling area to be masked off. The dual apertures prevent light from reaching the medium surrounding your sample and minimize the effects of scatter and diffusion, particularly as your sampling area approaches 50 µm. Using the TruView feature, you can view the sample at all times, including during data collection. In dual aperture mode, this allows you to see the actual area that is exposed to the infrared beam. The outlying areas that are masked by the Reflex aperture are not visible. By positioning the aperture while viewing the sample, you ensure that "what you see is what you get."

Each time the microscope is powered on, the physical aperture initializes. At the end of the initialization, the physical aperture is synchronized with the virtual aperture that is tracked by software.

The Reflex aperture illumination control adjusts the illumination intensity of the aperture image in either transmission mode or reflection mode.



The selectable, adjustable, Reflex aperture lets you define the infrared beam area, ensuring that the infrared energy strikes only the area of interest and not the adjacent sample medium. It also ensures that the small amount of diffracted radiation that passes around the edges of the sample area of interest does not reach the detector.

The microscope's optical design is symmetrical with respect to the sample and aperture. This lets you use a single aperture for masking both before and after the sample. Also, the pre-and post-sample aperture size and orientation are identical. The pre-sample aperture position is fixed in relation to the objective in both transmission mode and reflection mode. In transmission mode the aperture image is in focus when the condenser image is in focus; in reflection mode the aperture image is in focus when the sample is in focus.

In transmission mode, you adjust the post-sample aperture image by adjusting the condenser: centering and focusing the condenser also centers and focuses the post-sample aperture image. See "Condenser focus and alignment" in the "Preparing the Microscope" chapter for instructions.

Adjusting the aperture size, shape and orientation

For systems with an optional automated Reflex aperture, the size, shape, and orientation of the Reflex aperture can be set by:

- Loading an experiment file that has an aperture setting included in the saved parameters.
- Using the mouse to point to a side or unmarked corner of the aperture box in the video pane and dragging it to the size, shape, and orientation you wish to use.
- Setting the size and rotation in the Aperture Dimensions dialog.

For all systems, the aperture can be set by physically changing the setting of the Reflex aperture controls on the right-side of the microscope.

Notice The aperture automation software cannot track changes made using the knobs on the right-side of the microscope. To synchronize the physical aperture with the automated aperture system choose System Configuration from the Atlμs menu and then press the Aperture button in the Initialization field. If you have used the manual controls and do not synchronize the aperture with the software before loading an experiment with automated aperture settings or attempting to use the software to adjust the aperture, the size and shape of the aperture may not adjust correctly. ▲

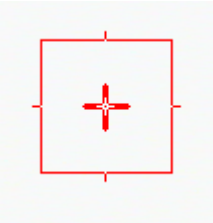
Using the software to adjust the aperture

Using OMNIC Atlµs or µView software, you can adjust the size, shape and orientation of the Reflex aperture. Adjustments can be made graphically or numerically.

The software contains a video pane in which the aperture is represented by a box whose size, shape and orientation you can manipulate. The physical aperture is adjusted automatically to match the box.

To rotate the aperture – Drag a corner of the box. Release the mouse button when the box is at the desired angle.

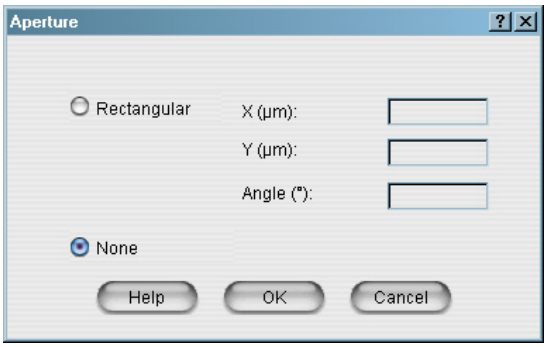
To change the size or shape of the aperture – Use the mouse to point to a side or any corner of the box and drag it to the orientation you require. Release the mouse button when the box is the desired size and shape.



Note If the post-sample aperture image is not perfectly aligned with the box when the microscope is in transmission mode, use the condenser centering knobs to align it. See “Condenser focus and alignment” in the “Preparing your microscope” chapter for more information. ▲

1. **Choose Aperture Dimensions from the Atlμs menu.**

   The Aperture dialog box appears.



Note The settings in this dialog box are not linked to those in the dialog box displayed by the Aperture button on the Mapping tab of the Experiment Setup dialog box. If different settings are included in Experiment Setup, the dimensions you enter here will be overridden by those in Experiment setup during data collection. ▲

2. **Choose rectangular and then type the dimensions (in micrometers) you wish to use for the aperture in the X (µm) and Y (µm) text boxes.**

   When calculating dimensions for the aperture, assume 0° of rotation, with the X dimension parallel to the X-axis.

3. **Type an angle of rotation (in degrees) you wish to use for the aperture in the Angle (degrees) text box.**

   The aperture can be rotated about the center of the field of view within the plane of the sample using values from 45° to -45°.

   An angle of 0° positions the aperture with its X dimension parallel to the X-axis. A negative angle rotates the aperture clockwise.

4. **Choose Apply.**

   The aperture adjusts according to your settings. You can view the sample and, if needed, make further adjustments.

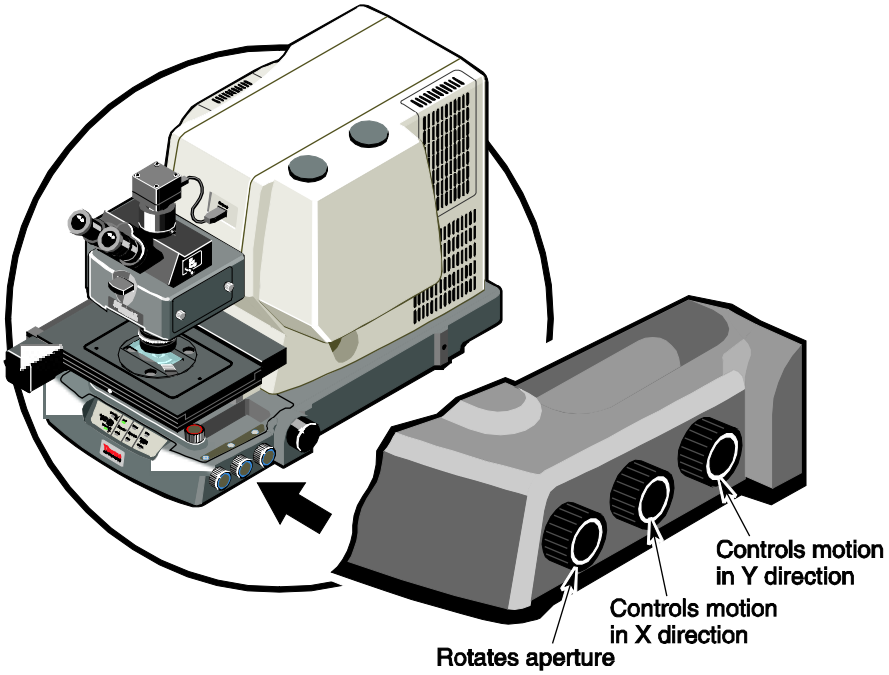
5. **When you are finished, choose Close.**

See the documentation that came with the OMNIC Atlμs and/or μView software for information about calibrating the aperture image for a specific objective magnification.

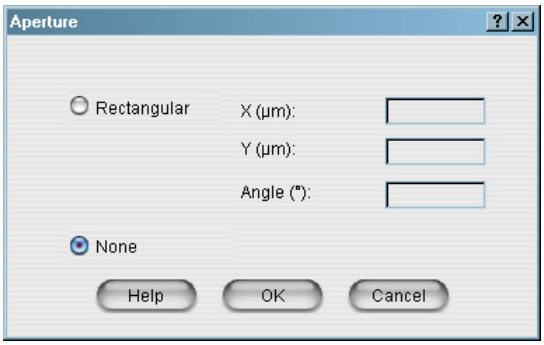
Using the manual controls to adjust the aperture

Although your microscope is equipped with an automated Reflex aperture system, you can adjust the aperture size, shape or orientation manually. This is useful for setting the aperture size while viewing the sample through the eye pieces. Use the knobs on the right-side of the microscope to manually adjust the aperture.

Manual changes to the aperture size, shape, or orientation are not tracked by the automated aperture software. If the aperture is set in software, software will attempt to return the aperture to the size, shape, and orientation set in the experiment parameter prior to data collection. Since the size and orientation of the aperture have been changed from that stored by the software, the aperture may respond unpredictably.



Be sure that you choose None from the Aperture dialog box (available through the Aperture button on the Mapping tab of the Experiment Setup dialog box) when you wish to make manual changes to the aperture setting. This ensures that the aperture is being set by the manual controls only and that the software will not unpredictably change the size and shape you chose.



After you use the manual controls to adjust the aperture, you must re-initialize the aperture before loading or collecting data using an experiment that includes software settings to adjust the aperture. If you do not initialize the aperture before using software aperture settings, the physical aperture may not be synchronized with the virtual aperture and the size and shape of the aperture may adjust unpredictably.

The rear knob controls the motion of the aperture blades in the Y direction turn the knob clockwise to move the blades outward from the center (open), or counterclockwise to move the blades inward toward the center (close).

The middle knob controls the motion of the aperture blades in the X direction. Turn the knob clockwise to move the blades outward from the center (open), or counterclockwise to move the blades inward toward the center (close).

The front knob controls the orientation of the aperture. Turn the knob clockwise to rotate the aperture clockwise; turn the knob counterclockwise to rotate the aperture counterclockwise. You can rotate the aperture a maximum of 45 degrees in either direction.

Using autofocus

If your system is equipped with an optional autofocus package, you can use the OMNIC Atlμs or μView software to focus the microscope automatically when a sample is centered in the field of view.

Follow the steps below to perform an experiment using autofocus. For complete information on using the software features, see the documentation that came with the software.

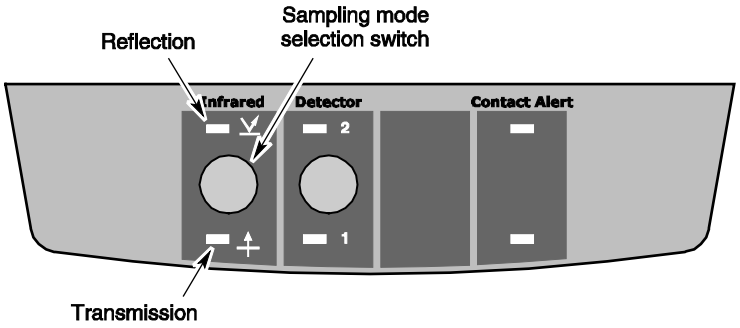
1. **Select a sampling mode.**

   Check to be sure that Experiment Setup (available through the Collect menu of OMNIC Atlμs) is closed and then use the Sampling Mode switch on the front panel.

   If your sample is suited to reflection techniques, choose reflection mode.

   If your sample is suited to transmission techniques, choose transmission mode.

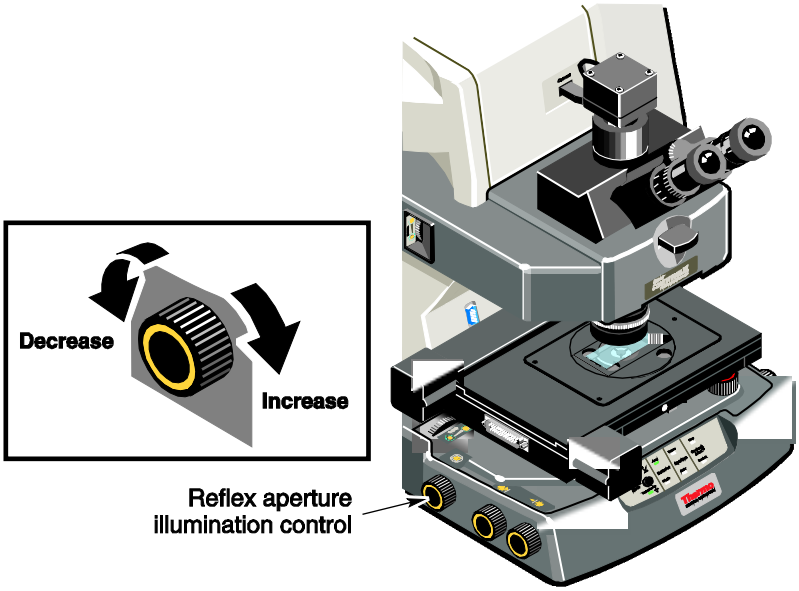
   The Transmission indicator lights when transmission mode is selected. The Reflection indicator lights when reflection mode is selected.



For transmission experiments make sure the condenser has been centered and focused. *See* “Condenser focus and alignment” in the “Preparing the Microscope” chapter, if you are not familiar with the procedures for focusing and aligning the condenser.

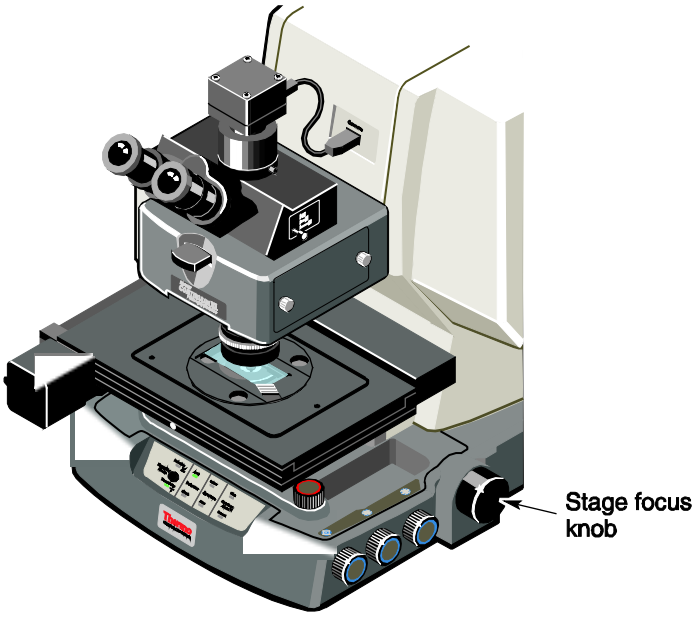
2. **Place the sample on the stage and position it within the field of view.**

3. **Increase the reflection illumination so that it is brighter than normal viewing intensity.**



4. **While viewing the sample from the side (not through the eyepieces), use the stage focus knob to raise or lower the stage to focus the dot of white light hitting the sample plane.**

   You may need to increase the reflection illumination further to see the dot clearly.



5. **Return the illumination to a comfortable viewing level.**

6. **Select the autofocus (AF) tool from the OMNIC Atlμs tool palette.**

   The system automatically focuses on the sample plane.

Some samples may be difficult to focus on automatically. To improve the reliability of autofocus without affecting infrared performance, you can:

- Use the Z-position tool for very fine focusing.
- Increase the contrast (use the aperture iris controls).
- Decrease the field of view and create an artificial sharp contrast between the iris and the sample area (use the field iris controls).

Note The autofocus feature moves the stage a maximum of 1 mm up or down to find the best image contrast. You must be within 1 mm of focus for autofocus to succeed. ▲

7. **Center the sample area of interest in the field of view and adjust the aperture.**

8. **Start the experiment.**

Using auto ATR contact

If you have the auto ATR contact option and are using the Contact Alert circuitry that was built into the microscope, you can use the OMNIC Atlμs software to make sample contact automatically.

Follow the steps below to perform an ATR experiment using auto ATR contact. For more information on collecting ATR data, including illustrations of ATR objectives and slide-on ATR attachments, see "Attenuated total reflection" in the "Advanced Techniques" chapter. For complete information on using the software features, see the documentation that came with the software.

Notice Auto ATR contact monitors only the Contact Alert circuitry that is built into the microscope. Always disable Auto ATR whenever an external Contact Alert System is connected to the microscope. Damage resulting from stage crashes is not covered by warranty. ▲

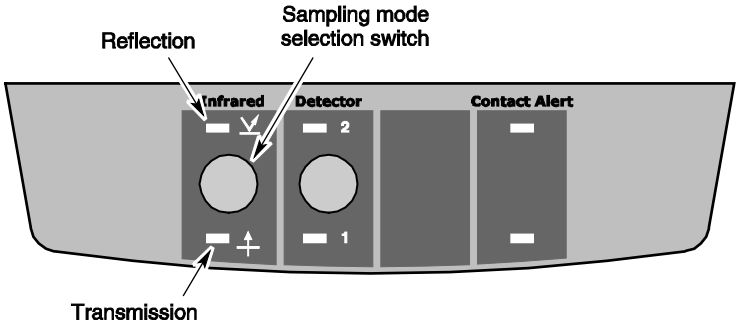
1. **Prepare the Contact Alert System.**

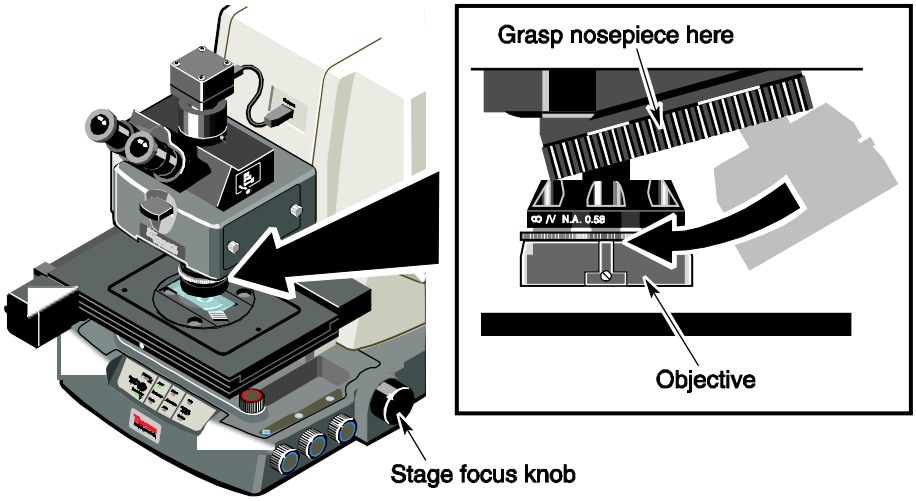
   See "Setting up the internal Contact Alert System" earlier in this chapter for details.

2. **Select reflection viewing mode.**

   Check to be sure that Experiment Setup (available through the Collect menu of OMNIC Atlμs) is closed and then use the Sampling Mode switch on the front panel.

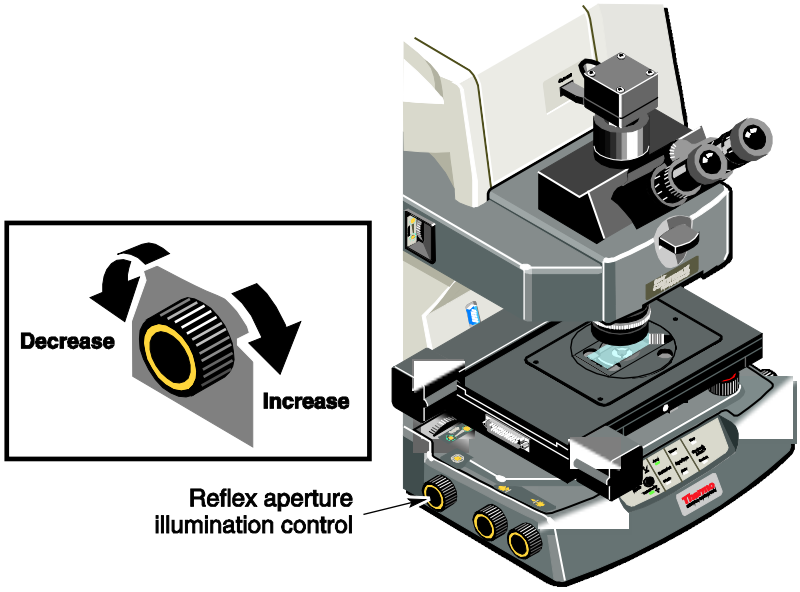


3. **Select a refractive (glass) objective or a 15X or 32X Reflachromat objective.**



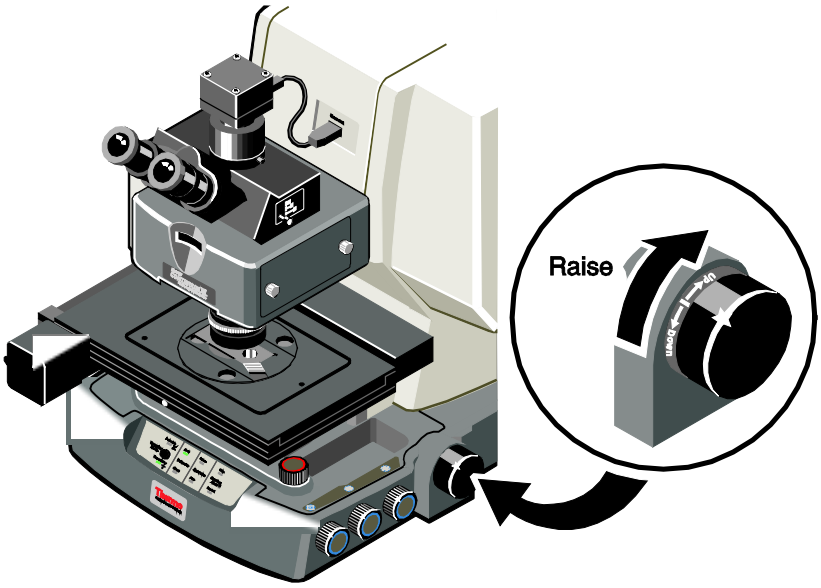
4. **Place the sample on the stage and position it within the field of view.**

5. **Increase the reflection illumination so that it is brighter than normal viewing intensity.**



6. **While viewing the sample from the side (not through the eyepieces), use the stage focus knob to raise or lower the stage to focus the dot of white light hitting the sample plane.**

   You may need to increase the reflection illumination further to see the dot clearly.



7. **Return the illumination to a comfortable viewing level.**

8. **While viewing the video image of the sample or looking through the eyepieces, center and finely focus the sample image.**

9. **Adjust the Reflex aperture.**

   Only the portion of the sample to be analyzed should be illuminated.

10. **Select the ATR objective or the 15X Reflachromat objective with the slide-on ATR attachment.**

11. **If you are using an ATR objective, slide the selector into the ATR position. If you are using the slide-on ATR attachment, move the crystal slide to the middle position.**

12. **Click the Contact button in the software.**

    The system automatically moves the stage along the Z-axis to make contact with the sample. Either the green or red Contact Alert indicator on the front panel illuminates when contact between the sample and crystal is made.

    It is not recommended, but you can increase the contact pressure by using the software**.** If you exceed the optimum contact pressure, as determined by OMNIC Atlμs, the software cannot caution you about potential damage to the crystal or sample from applying too much pressure when you increase the pressure beyond optimum.

Notice If you use the software to increase the contact pressure, apply the pressure slowly while monitoring the single-beam background spectrum in the live display for sample absorption peaks. Do not continue to increase the pressure after adequate peak intensities have been achieved. Excessive pressure will damage the crystal and the sample. Damage from pressure beyond optimum is not covered by warranty. ▲

Troubleshooting

This chapter provides information about symptoms and possible solutions for problems you might encounter while using the microscope. It also provides information about how to check the microscope performance.

Symptoms and solutions

The following table describes some problems that could occur when you use the microscope and explains how to solve them.

If you still cannot solve the problem after using the information in this table, contact technical support.

Symptom	*Possible Cause*	*Solution*
No signal appears in the Bench tab live display available through Experiment Setup	Microscope is not in correct mode.	Select mode by setting Sample compartment parameter. *Find* "Sample Compartment parameter" in OMNIC Help system Index and go to "Specifying the sample location."
	Microscope is not focused.	Focus the microscope. *See* "Preparing the optics" in the "Preparing the Microscope" chapter.
	Parameter settings are incorrect.	Make sure Detector, Aperture, Velocity and Gain parameters are set correctly. *Find* "parameters" in OMNIC Help system Index and go to "Bench features."

continued...

Symptom	*Possible Cause*	*Solution*
No signal appears in the Bench tab live display available through Experiment Setup, *continued*...	Detector is not cool.	Make sure detector dewar if filled with liquid nitrogen. Allow enough time for detector to cool (about 10 minutes). *See* "Cooling the detector" in the "Preparing the Microscope" chapter.
	A cable is disconnected or damaged.	Make sure the cables that connect the microscope to the spectrometer are firmly seated at both ends. Replace any damaged cables.
	Beam path through microscope is blocked.	Remove any foreign objects from beam path. Make sure Sample Compartment parameter is set for microscope location.
	Reflex aperture is closed.	Adjust aperture. *See* "Adjusting the aperture size, shape and orientation" in the "More about the Hardware" chapter. If aperture does not respond, turn microscope, computer, stage controller (if installed), and spectrometer power off and then power back on in the correct sequence. *See* "Turning on the microscope power" in the "Preparing the Microscope" chapter if you are not familiar with the power up sequence.
	Microscope is misaligned.	Center and focus the condenser and focus the objective. *See* "Preparing the optics" in the "Preparing the Microscope" chapter. When you are finished, run the Noise Test in transmission modes *See* "Testing microscope performance" later in this chapter if you need help. If the image cannot be brought into sharp focus, performance has dropped off, or the Noise Test fails, contact technical support.
		continued...

Symptom	*Possible Cause*	*Solution*
No signal appears in the Bench tab live display available through Experiment Setup, *continued*...	The spectrometer is powered OFF.	Verify that the spectrometer power is ON and that the power supply and power cord are firmly seated and connected to an AC source (working wall outlet or power strip).
Image, as seen through the eyepieces, is blurred	Microscope is not focused.	Center the condenser and focus objective and the condenser. *See* "Preparing the optics" in the "Preparing the Microscope" chapter.
	Compensation ring on infrared objective or condenser is set incorrectly.	Set the compensation rings to match the thickness and refractive index of the compression cell windows, substrate and/or superstrate. If the sample is free standing, set the compensation rings to 0.
	Illumination is not adjusted properly.	Adjust Reflex aperture illuminator and appropriate aperture and field irises. *See* "Initializing the Reflex aperture" in the "Preparing the Microscope" chapter.
	Infrared polarizers are in place.	Remove the polarizers. *See* "Polarization options" in the "Advanced Techniques" chapter.
	Stage bumped the condenser or objective.	Center and focus the condenser and focus the objective. *See* "Preparing the optics" in "Preparing the Microscope" chapter. When you are finished, run the Noise Test in transmission and reflection modes. *See* "Testing microscope performance" later in this chapter if you need help. If the image cannot be brought into sharp focus, performance has dropped off, or the Noise Test fails, contact technical support.
No image is seen through the eyepieces.	Illuminators are improperly adjusted.	Adjust the illuminator intensity. *See* "Preparing the optics" in "Preparing the Microscope" chapter if you are unfamiliar with the illumination controls.

continued...

Symptom	*Possible Cause*	*Solution*
No image is seen through the eyepieces, *continued...*	Field of view and/or contrast controls are improperly adjusted.	Adjust the field and aperture iris settings. *See* "Adjusting field of view and contrast" in the "More about the hardware" chapter.
	Microscope and/or illuminators are turned off.	Verify that the microscope and illuminator power is ON. *See* "Turning on the microscope power" in the "Preparing the Microscope" chapter.
		Verify that the power cords are connected to an AC source (a working wall outlet or power strip) and are firmly seated at both ends.
	The illuminator bulb(s) is burned out.	Replace the bulb(s). *See* "Replacing an illuminator bulb" in the "Service and Maintenance" Help book, available through Microscope Help Topics in the OMNIC Help menu for step-by-step instructions.
	A fuse is blown.	Check fuses and replace any fuse that is blown. *See* "Checking and changing fuses" in the "Service and Maintenance" Help book available through "Microscope Help topics" in the OMNIC Help menu for step-by-step instructions.
	The microscope is malfunctioning	Contact technical support.
Video pane of the OMNIC Atlμs or μView window is dark grey or black.	The sample is out of focus.	Use the stage focus knob or Move Stage tools and bring the sample into focus.
		Remove the sample, focus and center the condenser, re-install the sample and then attempt to bring it into focus.
		continued...

Symptom	*Possible Cause*	*Solution*
Video pane of the OMNIC Atlμs or μView window is dark grey or black, *continued…*	Field of view and/or contrast controls are improperly adjusted.	Adjust the field and aperture iris settings. *See* "Adjusting field of view and contrast" in the "More about the hardware" chapter.
	Microscope and/or illuminators are turned off.	Verify that the microscope and illuminator power is ON. *See* "Turning on the microscope power" in "Preparing the Microscope" chapter. Verify that the power cords are connected to a working AC source (wall outlet or power strip) and firmly seated at both ends.
	Illuminators are improperly adjusted.	Adjust the illuminator intensity. *See* "Preparing the optics" in "Preparing the Microscope" chapter.
	No video signal is reaching the computer.	Verify that the microscope and illuminator power is ON. *See* "Turning on the microscope power" in "Preparing the Microscope" chapter. Verify that the power cords are connected to a working AC source (wall outlet or power strip) and firmly seated at both ends. Replace any damaged cables. Verify that the video cable (composite or S Video) is connected between the camera and the microscope (analog) or the USB cable is connected from the microscope to the computer (digital).. Replace any damaged cables. *continued…*

Symptom	*Possible Cause*	*Solution*
Video pane of the OMNIC Atlμs or μView window is dark grey or black, *continued…*	A fuse is blown.	Check fuses and replace any fuse that is blown. *See* "Replacing a fuse" in "Microscope Help topics" in the OMNIC Help menu.
	The illuminator bulb(s) is burned out.	Replace the bulb(s). *See* "Replacing an illuminator bulb" in the "Service and Maintenance" Help book, available through Microscope Help Topics in the OMNIC Help menu.
	Microscope power is turned off or power cord is disconnected.	Make sure power cord is connected and power switch is turned on ("I" position). *See* "Turning on the microscope power" in "Preparing your Microscope" chapter.
	The microscope, camera, computer, and/or video capture card are malfunctioning.	Contact technical support.
Video pane of the OMNIC Atlμs or μView window is a solid blue color.	View selector is set for viewing through the eyepieces only.	Set view selector to allow the image to pass to the camera. *See* "Preparing the optical components" in the "Preparing the microscope" chapter.
	Field iris is closed.	Open field iris for current mode. *See* "Adjusting field of view and image contrast" in the "More about the Hardware" chapter.
	The microscope power or illuminator power is OFF.	Verify that the microscope and illuminator power is ON. *See* "Turning on the microscope power" in "Preparing the Microscope" chapter.
	The power source or power cord is damaged.	Verify that the power cords are connected to a working AC source (wall outlet or power strip) and firmly seated at both ends. Replace any damaged cables.
		continued…

Symptom	*Possible Cause*	*Solution*
Video pane of the OMNIC Atlμs or μView window is a solid blue color, *continued…*	Video signal is not reaching the computer.	Verify that a video cable (composite or S Video) is connected between the computer and to the microscope control panel. Be sure it is firmly seated at both ends. Verify that the video cable (composite or S Video) is connected between the camera and the microscope and between the microscope and the computer (analog).
	Video cables have been damaged	Inspect and replace any faulty cables.
	The microscope, camera, computer, and/or video capture card are malfunctioning.	Contact technical support.
	The video capture hardware and software was incorrectly installed.	Contact technical support.
Mosaic image does not stitch together properly.	Video requires recalibration.	Calibrate the video image. *Find* "video image" in the OMNIC Atlμs Help system Index and go to "How to calibrate the video image" for step-by-step instructions.
	Video camera is misaligned.	Contact technical support.
Mosaic image and data do not stitch together properly.	The fast mapping stage calibration parameters are not correct.	Enter the correct compensation numbers. A label on the bottom of the stage provides the correct compensation numbers for your stage. Find "stage" in the OMNIC Atlμs Help system Index and go to "Calibrating the stage" for further information. *continued…*

Symptom	*Possible Cause*	*Solution*
No image appears in the video pane or the viewer.	View selector is set for viewing through the eyepieces only.	Set view selector to allow the image to pass to the camera. *See* "Preparing the optical components" in the "Preparing the microscope" chapter.
	Field iris is closed.	Open field iris for current mode. *See* "Adjusting field of view and image contrast" in the "More about the Hardware" chapter.
	Microscope is not focused.	Use the stage focus knob or the Z-stage tools in OMNIC Atlμs and focus the objective. *See* "Preparing the optics" in "Preparing the Microscope" chapter. If the image cannot be sharply focused, contact technical support.
	Compensation ring on infrared objective or condenser is set incorrectly	Set compensation ring and refocus microscope. See "Refractive index compensation" in the "More about the Hardware" chapter.
	Stage bumped the objective or condenser.	Center and focus the condenser and focus the objective. *See* "Preparing the optics" in the "Preparing the Microscope" chapter. When you are finished, run the Noise Test in transmission and reflection modes. *See* "Testing microscope performance" later in this chapter if you need help. If the image cannot be brought into sharp focus, performance has dropped off, or the Noise Test fails, contact technical support.
	One or more illuminators are turned off or not adjusted properly.	Make sure illuminators are turned on and adjusted properly. See "Preparing the optical components" in the "Preparing the Microscope" chapter.

continued…

Symptom	*Possible Cause*	*Solution*
No image appears in the video pane or the viewer, *continued...*	One or more illuminator bulbs are burned out.	Verify that bulbs are still functioning by adjusting illumination to maximum intensity and looking for light inside bulb access covers. *See* "Replacing an illuminator bulb" in the Service and Maintenance" Help book, available through "Microscope Help topics" in the OMNIC Help menu for step-by-step instructions.
	Microscope power is turned off or power cord is disconnected.	Make sure power cord is connected and power switch is turned on ("I" position). *See* "Turning on the microscope power" in "Preparing your Microscope" chapter.
	A fuse is blown.	Check fuses and replace any fuse that is blown. *See* "Replacing a fuse" in "Microscope Help topics" in the OMNIC Help menu.
	Video signal is not reaching the computer.	Verify that the video cable (composite or S Video) is connected between the camera and the microscope and between the microscope and computer (analog) or the USB cable is connected from the camera to the microscope and from the microscope to the computer (digital). Be sure it is firmly seated at all ends.
	Video cables have been damaged	Inspect and replace any faulty cables.
	The microscope, camera, computer, and/or video capture card are malfunctioning.	Contact technical support.

continued...

Symptom	*Possible Cause*	*Solution*
No image appears in the video pane or the viewer, *continued…*	The video capture hardware and software was incorrectly installed or the camera driver was incorrectly installed.	Contact technical support.
The video in the navigation pane of the Atlμs window is not proportional to the live video feed in the video pane.	An optional motorized stage is not initialized or needs to be re-initialized.	Initialize the stage. *See* "Initializing the stage" in the "Preparing the Microscope" chapter if you are not familiar with the stage initialization procedure.
Signal is weak without a sample in beam path.	Microscope is not in correct mode.	Select mode by setting Sample Compartment parameter. *Find* "Sample Compartment parameter" in OMNIC Help system Index and go to "Specifying the sample location."
	Microscope is not focused.	Focus microscope. See "Preparing the optics" in the "Preparing the Microscope" chapter.
	Detector is not cool.	Make sure detector dewar is filled with liquid nitrogen. Allow enough time for detector to cool (about 10 minutes). *See* "Cooling the detector" in "Preparing the Microscope" chapter.
	Microscope is misaligned.	Center and focus the condenser and focus the objective. *See* "Preparing the optics" in the "Preparing the Microscope" chapter. When you are finished, run the Noise Test in transmission modes *See* "Testing microscope performance" later in this chapter if you need help. If the image cannot be brought into sharp focus, performance has dropped off, or the Noise Test fails, contact technical support. *continued…*

Symptom	*Possible Cause*	*Solution*
Signal is weak without a sample in beam path, *continued…*	Stage bumped the condenser or objective	Center and focus the condenser and focus the objective. *See* "Preparing the optics" in the "Preparing the Microscope" chapter. When you are finished, run the Noise Test in transmission and reflection modes. *See* "Testing microscope performance" later in this chapter if you need help. If the image cannot be brought into sharp focus, performance has dropped off, or the Noise Test fails, contact technical support.
	Parameter settings are incorrect.	Make sure Sample Compartment, Detector, Aperture, Velocity and Gain parameters are set correctly. *Find* "parameters" in OMNIC Help system Index and go to "Bench features."
Signal is weak without a sample in beam path, *continued…*	Infrared energy from spectrometer is low.	Set Sample Compartment to Main and verify that infrared energy level in spectrometer sample compartment is normal (check signal intensity on Bench tab in Experiment Setup dialog box). *Find* "parameters" in OMNIC Help system Index and go to "Bench features," if you need help.
	Microscope is not in correct mode.	Select mode by setting Sample Compartment parameter. *Find* "Sample compartment parameter" in OMNIC Help system Index and go to "Specifying the sample location."
	Compensation ring on infrared objective or condenser (or both) is set incorrectly.	Adjust compensation ring and refocus the objective and condenser. *See* "Refractive index compensation" in the "More about the Hardware" chapter.
		continued…

Symptom	*Possible Cause*	*Solution*
Signal is weak with a sample in beam path.	Infrared energy from spectrometer is low.	Set Sample Compartment to Main and verify that infrared energy level in spectrometer sample compartment is normal (check signal intensity on Bench tab in Experiment Setup dialog box). *Find* "parameters" in OMNIC Help system Index and go to "Bench features," if you need help.
	Sample is too thick.	Make sure sample is properly prepared. *See* the "Microscope Basic Sampling" tutorial, available through the OMNIC Help menu for information about sample preparation.
	Infrared polarizers, if used, are set incorrectly.	Make sure polarizers are adjusted properly. *See* "Polarization options" in the "Advanced Techniques" chapter, if you need help.
	Nomarski prisms (used for DIC) are in place.	Remove prisms. *See* "Polarization options" in "Advanced Techniques" chapter, if you need help.
	Infrared objective is not centered.	Contact technical support for assistance.
Signal is weak with a sample in beam path, *continued*...	Stage bumped the condenser or objective	Center and focus the condenser and focus the objective. *See* "Preparing the optics" in the "Preparing the Microscope" chapter. When you are finished, run the Noise Test in transmission and reflection modes. *See* "Testing microscope performance" later in this chapter if you need help. If the image cannot be brought into sharp focus, performance has dropped off, or the Noise Test fails, contact technical support.

continued...

Symptom	*Possible Cause*	*Solution*
	The condenser is out of focus and/or off center.	Center and focus the condenser and focus the objective. *See* “Preparing the optics” in the “Preparing the Microscope” chapter. When you are finished, run the Noise Test in transmission modes *See* “Testing microscope performance” later in this chapter if you need help. If the image cannot be brought into sharp focus, performance has dropped off, or the Noise Test fails, contact technical support.
Noise test failed.	Microscope is misaligned.	Center and focus the condenser and focus the objective. *See* “Preparing the optics” in The “Preparing the Microscope” chapter. When you are finished, run the Noise Test in transmission and reflection modes. *See* “Testing microscope performance” later in this chapter if you need help. If the image cannot be brought into sharp focus, performance has dropped off, or the Noise Test fails, contact technical support.
	Stage bumped the condenser or objective	Center and focus the condenser and focus the objective. *See* “Preparing the optics” in “Preparing the Microscope” chapter. When you are finished, run the Noise Test in transmission and reflection modes. *See* “Testing microscope performance” later in this chapter if you need help. If the image cannot be brought into sharp focus, performance has dropped off, or the Noise Test fails, contact technical support.
	Infrared objective is not centered.	Contact technical support for assistance.

continued...

Symptom	*Possible Cause*	*Solution*
Pre-sample aperture is not centered on reticle cross hairs.	Viewer is misaligned.	Contact technical support for assistance.
The scale in the navigation pane is not as expected or is zoomed in to an extreme when the Atlμs window opens.	An optional motorized stage is not initialized or needs to be re-initialized.	Initialize the stage. *See* "Initializing the stage" in the "Preparing the Microscope" chapter if you are not familiar with the stage initialization procedure.
Stage does not move predictably and the Move Stage tools are intermittent or do not work at all.	An optional motorized stage is not initialized.	Initialize the stage. *See* "Initializing the stage" in the "Preparing the Microscope" chapter if you are not familiar with the stage initialization procedures.
An optional motorized stage does not move and the Move Stage tools are not visible in the OMNIC Atlμs Window.	The stage controller is OFF.	Turn on the stage controller.
	The microscope system was powered on in an incorrect sequence.	Power off the microscope, stage controller (if installed), spectrometer and computer. Power the system on in the following sequence: Microscope Stage controller, if installed Illuminators Quantitative Contact Alert, if installed Computer Spectrometer
	The stage controller cannot communicate with the computer.	Verify that the communications cable is firmly seated.
	The stage and/or stage controller is malfunctioning	Replace the fast mapping stage, Contact technical support.

continued…

Symptom	*Possible Cause*	*Solution*
The optional fast mapping stage moves erratically.	The stage calibration parameters are not correct.	Enter the correct compensation numbers. A label on the bottom of the stage provides the correct compensation numbers for your stage. Find "stage" in the OMNIC Atlμs Help system Index and go to "Calibrating the stage" for further information.
A detector installed does not appear on the Bench tab of Experiment Setup.	The microscope is turned off or the microscope system was powered on in an incorrect sequence.	Power off all of the system components (the microscope, stage controller (if installed), spectrometer and computer). Power the system on in the following sequence: Microscope Stage controller, if installed Illuminators Quantitative Contact Alert, if installed Computer Spectrometer
	The detector, computer, or microscope is malfunctioning.	Contact technical support.
	The optional stage controller, the microscope or the computer are malfunctioning.	Contact technical support

continued...

Symptom	*Possible Cause*	*Solution*
The Reflex aperture does not match the virtual aperture.	The aperture size, shape or orientation has been changed manually.	Initialize the aperture. See “Initializing the Reflex aperture” in the “Preparing your Microscope” chapter if you are unfamiliar with the procedure.
	The computer cannot communicate with the aperture.	Verify that the cable between the microscope Communications connector and the computer serial port is connected and firmly seated.
	The computer or microscope are malfunctioning.	Contact technical support.
The message “Failed to open communications. All microscope and X-Y automation has been disabled” appears when you start OMNIC Atlμs.	The microscope and/or optional motorized stage controller is turned off.	Power off all of the system components (the microscope, stage controller, spectrometer and computer). Power the system on in the following sequence: Microscope Stage controller, if installed Illuminators Quantitative Contact Alert, if installed Computer Spectrometer
The message “Failed to open communications. All microscope and X-Y automation has been disabled” appears when you start OMNIC Atlμs, *continued*...	The stage controller cannot communicate with the computer.	Verify that the cable that connects the stage controller to the computer is connected and firmly seated. Verify that the stage controller is powered ON. Verify that the stage controller power cord is connected to an AC source (working wall outlet or power strip). Verify that the cable that connects the stage controller to the fast mapping stage is connected. Replace any damaged cables or cords.

continued...

Symptom	*Possible Cause*	*Solution*
When the Atlμs window is open, OMNIC does not respond but the Windows Task Manager does not list OMNIC as “Not Responding”.	Serial communications problem.	Verify that the microscope and the stage controller are powered on. Verify that the microscope and stage controller are connected to an AC source (a working wall outlet or power strip). Verify that the serial cable that connects the microscope to the computer is attached firmly seated at both ends. Verify that the serial cable that connects the stage controller to the computer is attached firmly seated at both ends. Verify that the cable that connects the stage controller to the stage is firmly seated at both ends. Replace any damaged cables. Verify that the serial ports identified in System Configuration match the hardware connections for the microscope and stage controller. Shutdown the computer, power OFF the illuminators, microscope, stage controller, spectrometer, and Contact Alert (if installed). Wait 30 seconds and then power ON the system using the sequence described in “Turning on the microscope power” in the “Preparing the Microscope” chapter.

Testing microscope performance

To confirm that the microscope is performing well, you should periodically measure its performance. Typically the signal-to-noise ratio (SNR) from 2600 to 2500 wavenumbers is used for this purpose. (The following procedures give the desired noise level limits.)

Follow the instructions in the next sections to check the microscope performance using a noise test. You should run the test at least once a week in both transmission mode and reflection mode. (If you will be performing only reflection experiments, you do not need to run the test in transmission mode.)

Before you begin…

Make sure the single-element detector is cooled and selected, the objective is focused. If you plan to run the test in transmission mode, be sure the condenser is focused and centered.

See "Cooling the detector" in the "Preparing the Microscope" chapter and "Selecting a detector" in the "More about hardware" chapter if you are not familiar with the procedures for cooling and selecting the single-element detector.

See "Preparing the optical components" in the "Preparing the Microscope" chapter if you are unfamiliar with the procedures for focusing the objective, focusing the condenser, and centering the condenser.

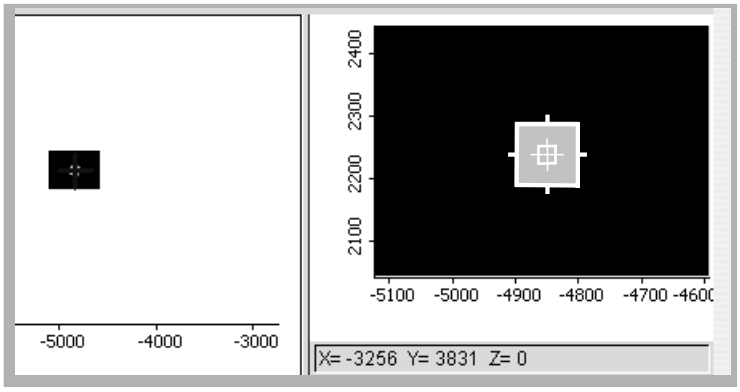
In reflection mode

Follow these steps to run the noise test in reflection mode:

1. **Open the Atlμs window and initialize the Reflex aperture.**

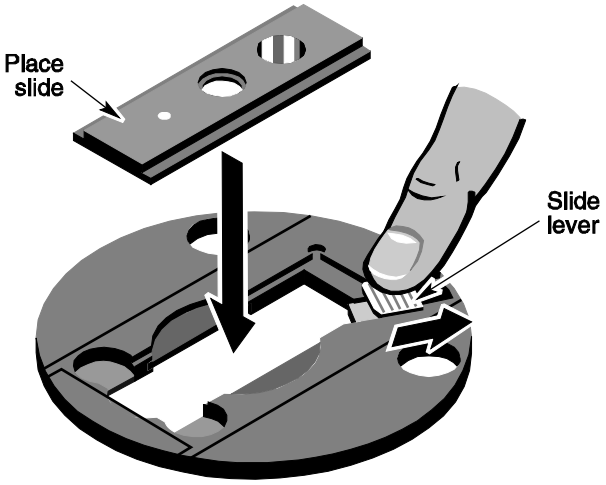
   This gives an aperture size of 100 by 100 μm if you are using the 15X objective, or a size of 46.875 by 46.875 μm if you are using the 32X objective.

When you are finished, the image should look like this:

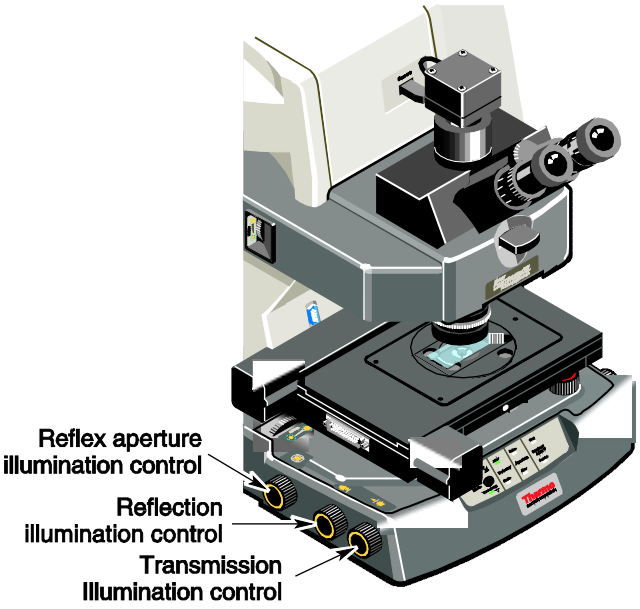


See the section entitled “Initializing the Reflex aperture” in the “Preparing the Microscope” chapter, if you need help.

2. **Install the pinhole slide on the stage and use the joystick or software stage controls to position the gold mirror directly under the infrared objective.**

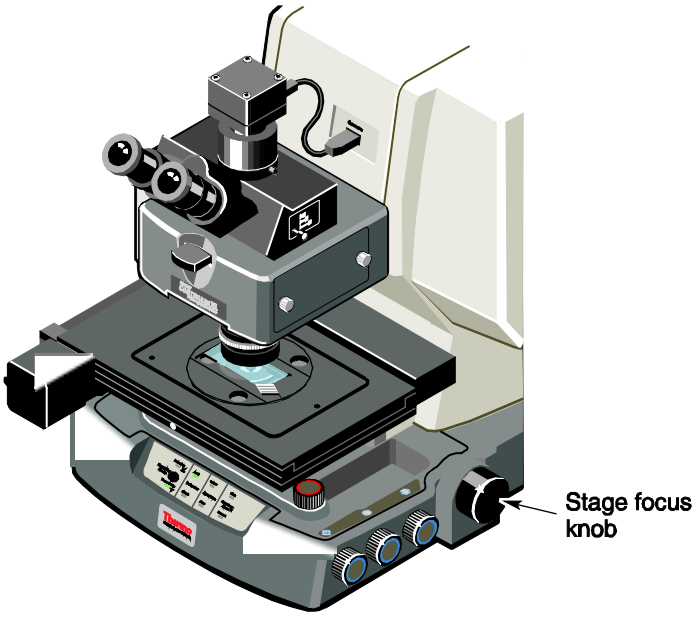


3. **Adjust the reflection illumination and Reflex aperture illumination to a comfortable viewing level.**



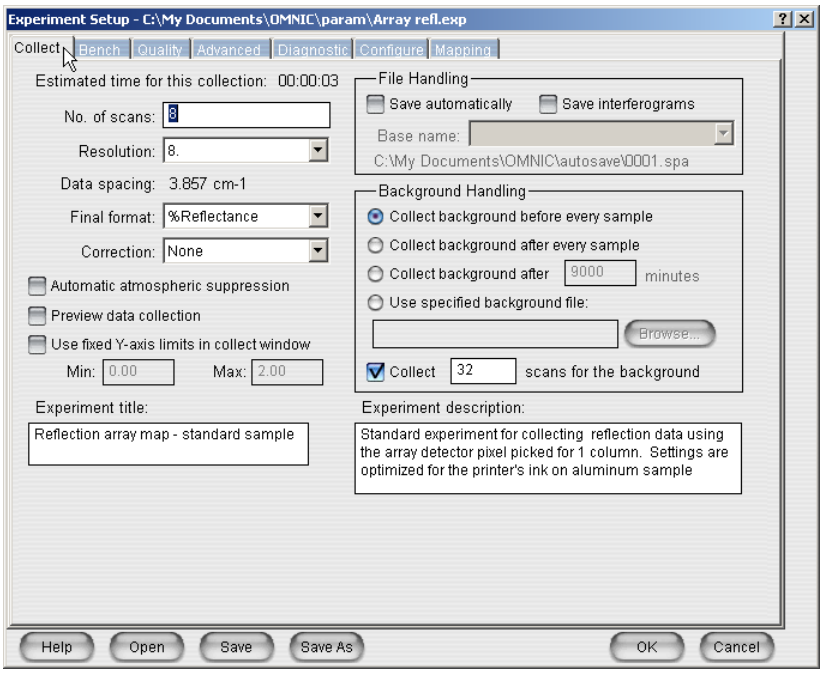
4. **Use the stage focus knob to obtain a sharp image of the mirror surface.**

   If you find it difficult to focus the image, move the stage to position the edge of the mirror under the objective and focus on the edge. Then move the stage so that the mirror is approximately centered under the objective.



5. **Choose Experiment Setup from the Collect menu.**

The Experiment Setup dialog box appears.



6. Set the following experiment parameters:

Where	*Parameter*	*Setting*
Collect tab	Number of scans	200
	Resolution	4
	Final format	% Reflectance
	Correction	None
	Background handling	Background before every sample
		Collect 32 scans for background
Bench tab	Sample Compartment	Left µscope %R OR
		Right µscope %R
	Detector	your single element detector
	Beamsplitter	your compatible beamsplitter
	Source	IR
	Accessory	None
	Window	None
	Max range limit	2600[1]
	Min range limit	2500[2]

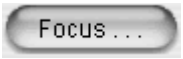
Notes:

1. For InGaAs detectors set the Max range limit to 12000 cm^{-1}.
2. For InGaAs detectors, set the Min range limit to 3800 cm^{-1}.

continued…

Where	*Parameter*	*Setting*
Bench tab, *continued…*	Gain	Autogain
	Velocity	1.8988
	Aperture	95
Advanced tab	Zero filling	none
	Apodization	Triangular
	Phase correction	Mertz
	Set sample spacing based on spectral range	On
	Set filters based on velocity	On
	Single-sided interferogram	Off
	Reset bench at start of collection	Off
	Start collection with external trigger	Off
	Blanking regions	None

continued…

Where	*Parameter*	*Setting*
Quality tab	All	Off
Diagnostic tab	All	OK
Configure tab	All	As you prefer
Mapping tab	Dimensions	Collect type: Discrete points
	Background	Background point is defined
	Profile type	Chemigram
	Advanced mapping options	On
	Save video frames in map file	Off
	Prompt before collecting data	On
	All others	Off
	Rectangular	On
	None	Off
	Mapping focus options	Do not focus during map collection

Find "experiment" in the OMNIC Help system Index and go to "Using Experiment Setup," if you need help setting parameters.

10. Choose OK to close the Experiment Setup dialog box.

11. Choose Collect Sample from the Collect menu to collect a sample spectrum.

12. **When you are prompted to collect the background spectrum, choose OK.**

13. **When data collection finishes, follow the instructions that appear on the screen to display the ratioed sample spectrum in a spectral window.**

    If Collect To a New Window is turned on in the Collect options, the spectrum is displayed in a new spectral window automatically.

14. **Choose Noise from the Analyze menu.**

    The Noise dialog box appears. The peak-to-peak noise should be less than 0.09 for MCT-A detectors using a 15X objective. For other detectors, contact technical support to discuss areas of concern. (Older spectrometers that do not meet basic mid-IR performance standards may have a higher noise level.) If the noise exceeds this level, discuss the matter with your service representative.

Find "noise" in the OMNIC Help system Index and go to "Measuring noise," if you need more information about the Noise Command.

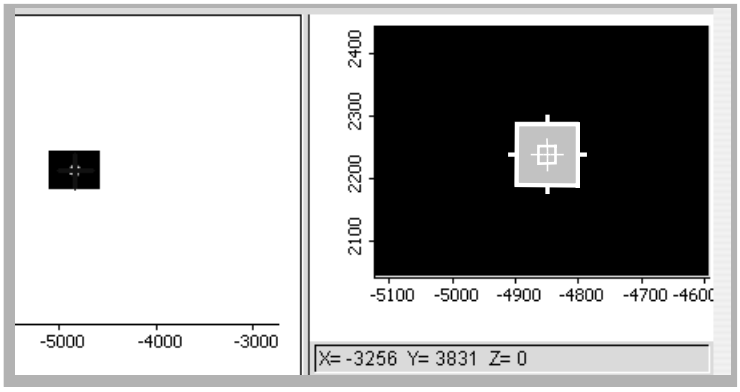
In transmission mode

Follow these steps to run the noise test in transmission mode:

1. **Open the Atlμs window and initialize the Reflex aperture.**

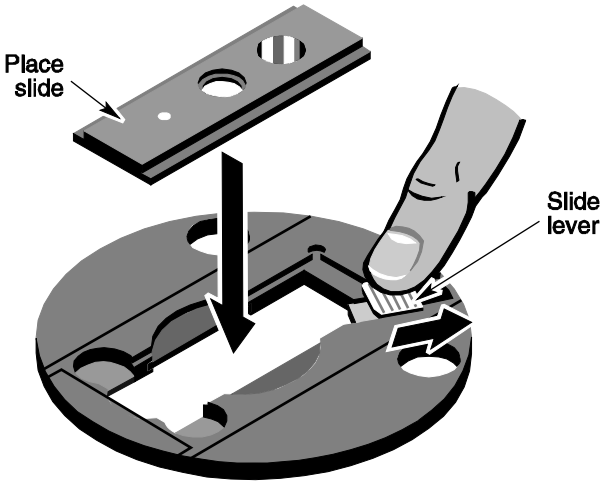
   This gives an aperture size of 100 by 100 μm if you are using the 15X objective, or a size of 46.875 by 46.875 μm if you are using the 32X objective.

When you are finished, the image should look like this:



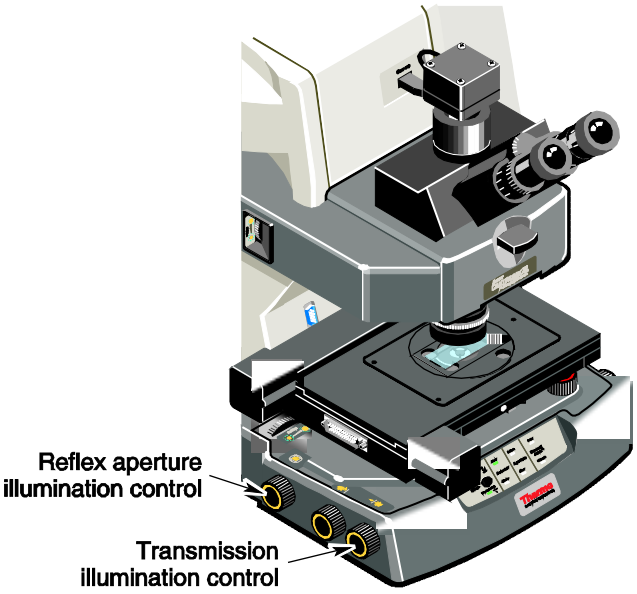
See the section entitled “Initializing the Reflex aperture” in the “Preparing the Microscope” chapter, if you need help.

2. **Install the pinhole slide on the stage and use the joystick or software stage controls to position the large open hole directly under the infrared objective.**



If you need help setting the parameters, find “experiment” in the OMNIC Help system Index and go to “Using Experiment Setup.”

3. **Adjust the transmission illumination to a comfortable viewing level.**

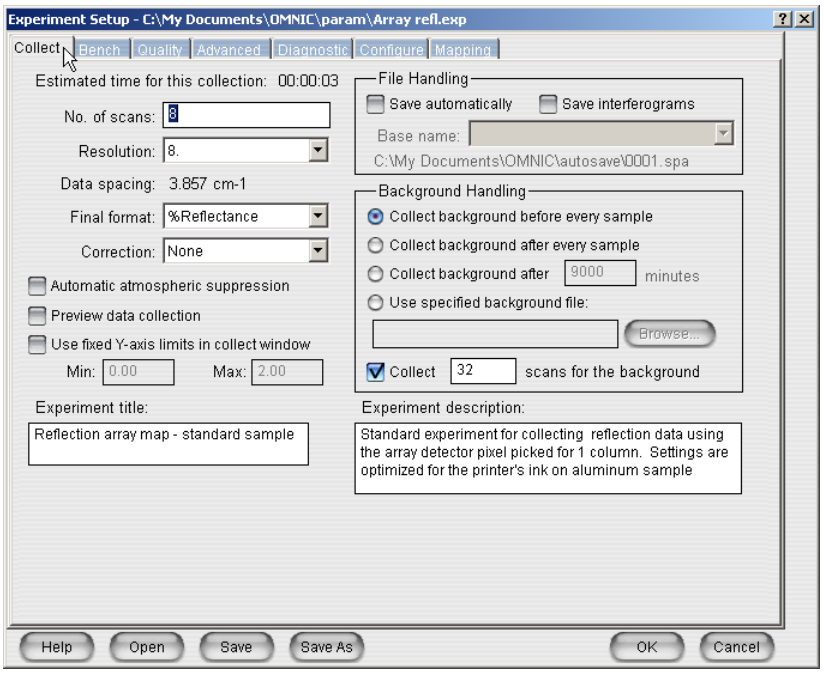


4. **Focus and then center the condenser image.**

See “Condenser focus and alignment” in the “Preparing the Microscope” chapter if you need help.

5. **Choose Experiment Setup from the Collect menu.**

The Experiment Setup dialog box appears.



6. Set the following experiment parameters:

Where	*Parameter*	*Setting*
Collect tab	Number of scans	200
	Resolution	4
	Final format	%Transmittance
	Correction	None
	Background handling	Background before every sample
		Collect 32 scans for background
Bench tab	Sample Compartment	Left µscope %T OR
		Right µscope %T
	Detector	your single element detector
	Beamsplitter	your compatible beamsplitter
	Source	IR
	Accessory	None
	Window	None
	Max range limit	2600[1]
	Min range limit	2500[2]

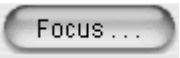
Notes:

1. For InGaAs detectors set the Max range limit to 12000 cm^{-1}.
2. For InGaAs detectors, set the Min range limit to 3800 cm^{-1}.

continued…

Where	*Parameter*	*Setting*
Bench tab, *continued…*	Gain	Autogain
	Velocity	1.8988
	Aperture	95
Advanced tab	Zero filling	none
	Apodization	Triangular
	Phase correction	Mertz
	Set sample spacing based on spectral range	On
	Set filters based on velocity	On
	Single-sided interferogram	Off
	Reset bench at start of collection	Off
	Start collection with external trigger	Off
	Blanking regions	None

continued…

Where	*Parameter*	*Setting*
Quality tab	All	Off
Diagnostic tab	All	OK
Configure tab	All	As you prefer
Mapping tab	Dimensions	Collect type: Discrete points
	Background	Background point is defined
	Profile type	Chemigram
	Advanced mapping options	On
	Save video frames in map file	Off
	Prompt before collecting data	On
	All others	Off
	Rectangular	On
	None	Off
	Mapping focus options	Do not focus during map collection

If you need help setting the parameters, find “experiment” in the OMNIC Help system Index and go to “Using Experiment Setup.”

7. Choose OK to close the Experiment Setup dialog box.

8. **Choose Collect Sample from the Collect menu to collect a sample spectrum.**

   Follow the instructions that appear on the screen.

9. **When you are prompted to collect the background spectrum, choose OK.**

10. **When data collection is finished, follow the instructions that appear on the screen to display the ratioed sample spectrum in a spectral window.**

    If Collect To A New Window is turned on in the Collect options, the spectrum is displayed in a new spectral window automatically.

11. **Choose Noise from the Analyze menu.**

    The Noise dialog box appears. The peak-to-peak noise should be less than 0.06 for MCT-A detectors using a 15X objective and a 15X condenser. For other detectors, contact technical support to discuss areas of concern. (Older spectrometers that do not meet basic mid-IR performance standards may have a high noise level.) If the noise is greater, follow the instruction in "Preparing the optics" to focus and center the condenser and then perform the noise test again.

Find "noise" in the OMNIC Help system Index and go to "Measuring noise," if you need more information about the Noise command.

Upgrading the computer, recovering from viral attacks, and reinstalling software

As computer technology advances and your experiments and analyses become more complex, you may wish to upgrade the computer being used with your microscope system.

At other times, due to viral attacks or hardware failures, you may need to reinstall your spectroscopy software and drivers. Use the procedure that follows to ensure proper operation of the hardware and software.

1. **Verify that the computer meets or exceeds minimum hardware and operating system requirements.**

   If you are unfamiliar with the minimum computer hardware and software requirements for your microscope system, see the "Computer requirements" section in the manual entitled *Preparing Your Site*.

   Contact technical support if you have further questions or wish information about supported computer upgrades.

2. **Power off the computer, disconnect from the AC power source, and then remove any of the following add-in cards that are installed in the computer:**

   - **video acquisition**
   - **USB 2.0**
   - **serial port**

   If you are unfamiliar with the procedures for adding and removing cards from your computer, see the documentation that accompanied the computer.

3. **Power on the computer and, if necessary, install the operating system.**

4. **Install OMNIC Atlμs.**

Notice **For many video capture (and other add-on cards) the drivers and software must be installed before the hardware.**

Read and follow the installation instructions that accompany the card(s). Incorrectly installed software, hardware, and drivers can render your computer inoperable.

In many cases, the installation instructions are included on a compact disc that was shipped with the card. Adobe® Acrobat® Reader software frequently is required to view and print the documentation. If the instructions are provided in electronic form, we recommend that you print a copy. You will be powering off and restarting the computer during the remainder of this procedure. Having a paper copy of all the manuals will simplify the installation.

Pay attention to any Display or other Control Panel setting requirements.

Service calls required to correct problems caused by incorrect installation and display settings are not covered under warranty. ▲

5. **Install the video capture software and hardware.**

6. **Shutdown and power off the computer.**

7. **Power on the computer and install the serial port driver software that accompanied your add-on serial port cards.**

8. **Shutdown and power off the computer and then install the add-on serial ports.**

9. **If your computer requires an add-in card to meet the required number of USB 2.0 ports (do not include hubs in your count), power on the computer and install the USB 2.0 port driver software that accompanied the add-on card.**

   If your computer does not require an add-in USB2 card, skip to step 11.

10. **Shutdown and power off the computer and install the USB 2.0 port add-on card.**

11. **Power on the computer and verify that all of the add-on cards (video capture, serial port, and USB 2.0 port) have been recognized by the operating system and are working properly.**

12. **Shut down and power off the computer and then, if you are using a Magna-IR or Nexus spectrometer, install the spectrometer interface card.**

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