MultiMode Atmospheric Hood

The MultiMode Atmospheric Hood creates a sealed chamber around the MultiMode scanner, head, and sample. This provides the capability to control the gas environment around the sample, for instance for imaging under controlled humidity or in an inert atmosphere. The hood is available in several configurations to support most MultiMode scanners, the low temperature heater accessory, and the application module ready MultiMode heads.

This Support Note covers the following topics:

Document Revision History: Title of Document

Revision	Date	Section(s) Affected	Reference	Approval
A	April 2008	Initial Release	-	B. Ohler

112 Robin Hill Road
Santa Barbara, CA 93117
805.967.2700
Part Number: 013-448-000

1 Warnings and Cautions

DANGER: The environmental hood is not intended to allow operation under pressures significantly above or below normal atmospheric pressure. Never attempt to pressurize or apply a vacuum to the hood! Doing so may cause the hood to separate from the microscope or even shatter, possibly causing bodily injury to the operator and damage to the equipment.

WARNING: The environmental hood is not intended for isolation of dangerous or toxic gases or substances. It does not create a perfectly sealed chamber and must therefore never be relied upon as a containment or safety device.

CAUTION: The clear plastic components of the atmospheric hood are acrylic plastic. Please be aware that acrylic may be damaged by many solvents. This may result in permanent clouding of the plastic or even softening and warping. Therefore Bruker does not warrant the use of the atmospheric hood with solvents either in liquid or vapor form.

CAUTION: Users must take care to ensure that gases introduced into the hood are not so humid as to condense on the microscope. Warm air can hold more moisture than cool air. The interior of the hood will normally be somewhat warmer than the ambient lab environment due to heat from the contained electronics. Therefore air that is at a high relative humidity at ambient lab temperature will not normally condense on the microscope. However, if the microscope is turned off the temperature can drop such that the humidity reaches a condensing level. The microscope should always be attended by a trained user while using humidified gases. If condensation is observed on the microscope the experiment should be aborted immediately and appropriate steps taken to dry the equipment.

2 Supported Configurations

The atmospheric hood consists of a base model, MMAH2-ASSY, and one or more hood cylinders purchased separately that support the following system configurations:

Table 1 MMAH2-ASSY Supported Configurations

Configuration	Required hood cylinder model
AS-12 (“E”) or AS-0.5 (“A”) scanner	MMAH2-161

Configuration	Required hood cylinder model
AS-12 (“E”) or AS-0.5 (“A”) scanner combined with the low temperature heater option (model MMHC-A60)	MMAH2-172H
AS-130 (“J”), AS-130V (“JV”), AS-12V (“EV”), or PicoForce scanner	MMAH2-201
AS-130 (“J”), AS-130V (“JV”), AS-130VLR (liquid resistant “JV”), AS-12V (“EV”), AS-12VLR (liquid resistant “EV”), or PicoForce scanner combined with the low temperature heater option (model MMHC-A60)	MMAH2-212H

Note: The high temperature MultiMode heaters and the closed-loop MultiMode scanner are NOT supported.

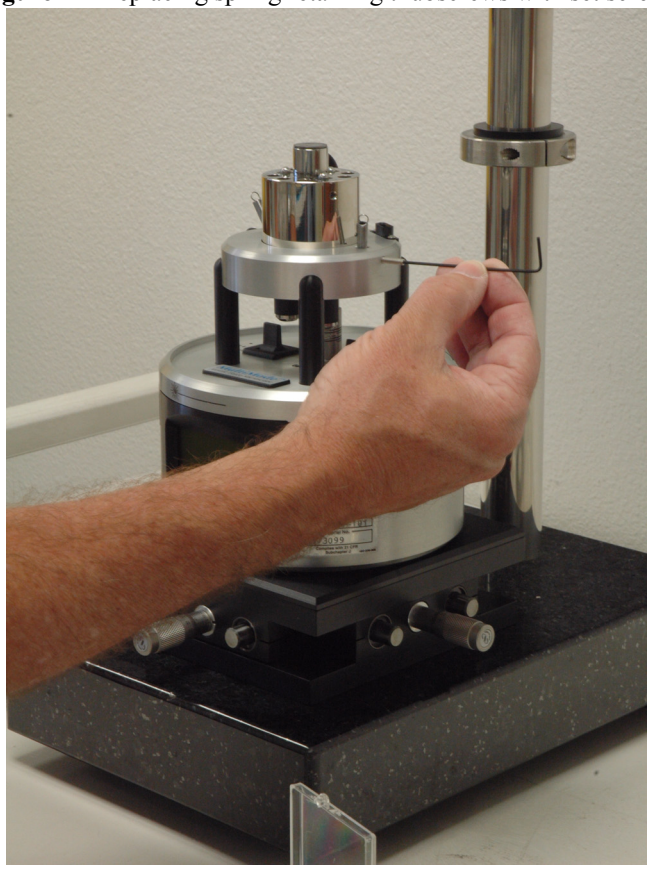
Any of these configurations support using either the regular MultiMode head or the application module ready head.

Note: An optional long working distance objective (model NIKON5X) must be purchased in order to use an optical viewing microscope (i.e. model OMV) with the hood.

3 Installation

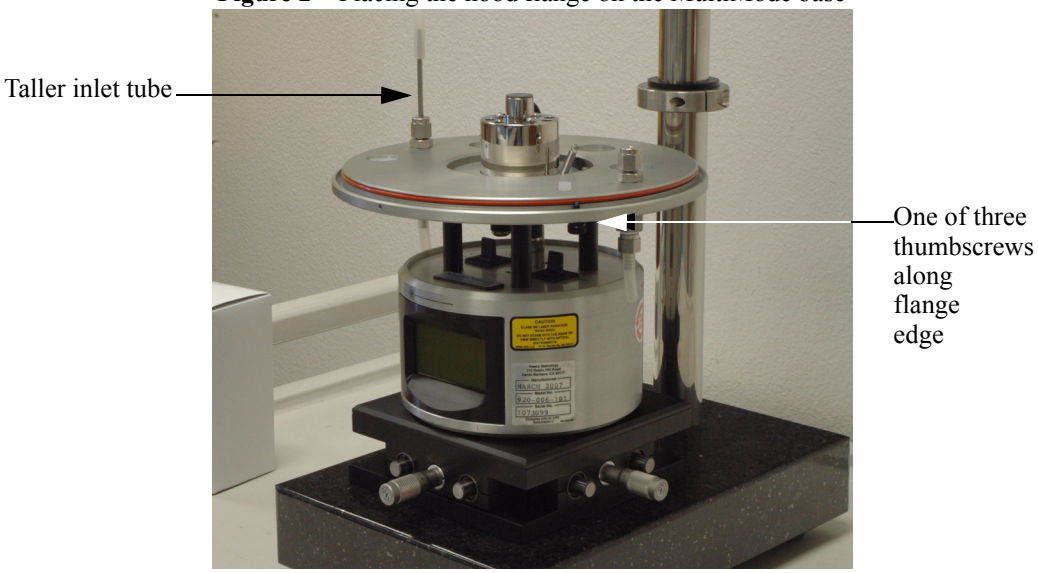
1. Completely power down the MultiMode system.
2. Remove the head and scanner from the MultiMode.
3. Remove the two thumbscrews that are used to retain the head mount springs from the MultiMode base. If you are not using a scanner with built-in head mount springs, these thumbscrews should be replaced by the two included setscrews, which can be installed using the included hex key (see Figure 1). Make sure that the setscrews go through the loops in the end of the springs and that the ends of the setscrews do not protrude from the MultiMode base.

Figure 1 Replacing spring retaining thubscrews with set screws



4. Place the base flange on the MultiMode base as shown in Figure 2. Note that the taller gas inlet port should be on the left and two thumbscrews should be visible under the front edge of the flange. Once aligned correctly, press down firmly to seat the flange securely on the base.

Figure 2 Placing the hood flange on the MultiMode base



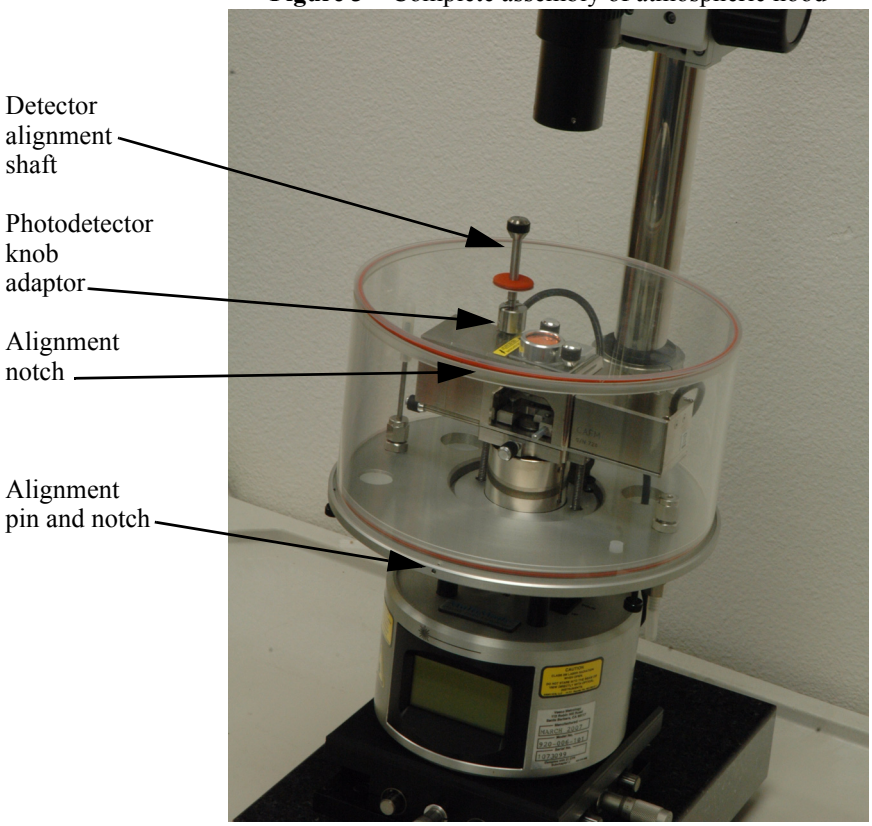
5. Unscrew the three thumbscrews along the bottom edge of the flange so that they do not extend up into the groove along the top edge of the flange.

6. Install the scanner and head as normal. The low temperature heater (model MMHC-A60) can also optionally be used.

7. Place the photodetector knob adaptor over the vertical deflection photodetector knob and gently secure the set screws using the included hex key.

8. Pull the detector adjust shaft up to its highest position so that it does not hit the head when you place the hood assembly in the groove of the flange. Note that there is a notch in the front of the bottom edge of the hood assembly that must align with a pin in the front of the flange groove. This is meant to help in aligning the hood such that the detector adjustment shaft can engage the photodetector knob adaptor. Press the hood down firmly to seat it in the groove. (See Figure 3)

Figure 3 Complete assembly of atmospheric hood



9. *OPTIONAL:* If the detector adjustment shaft does not align with the photodetector knob adaptor you will need to remove the hood and realign the top cover. The flange thumbscrews can be use to help push the hood up out of the flange groove.

CAUTION: Do not just pull up on the hood because the flange may come loose and hit the scanner and head!

Once the hood is off, push up on the inside of the hood top cover to separate it from the cylinder. Then place the cylinder back in the flange groove and seat securely (remember to lower the thumbscrews first). Lay the cover on top of the cylinder and rotate until the detector adjustment shaft is aligned with the photodetector knob adaptor. This should occur when the small notch in the front edge of the cover is aligned with a similar notch in the front, top edge of the cylinder.

Once the correct alignment is determined, remove the hood cylinder again while keeping the cover in correct alignment on the cylinder. Sit the cylinder on a flat surface and press down on the cover to seat it in the cylinder. This may take firm pressure, so never attempt this while the cylinder is mounted on the microscope.

10. Replace the hood in the flange. The detector adjustment shaft can be engaged with the photodetector knob adaptor as needed to adjust the vertical deflection. You may find that it is best to slide the shaft up slightly to disengage from the knob while not making adjustments.

11. *OPTIONAL:* Some Bruker and user accessories will require routing cables through the three large holes along the rear side of the flange. Custom silicon plugs are provided for the PicoForce scanner cable, the MMHC-A60 heater cable, and application module cables. Three additional "blank" plugs are provided, which can be modified as required for custom applications. Two additional holes and matching silicon plugs are provided along the front side of the flange. These are provided for custom applications.

12. *OPTIONAL:* If you need to use your optical viewing microscope (i.e. model OMV) with the hood then you need to replace the standard 10X Nikon objective with a longer working distance 5X objective (Bruker model NIKON5X). The objective can be exchanged by simply unscrewing from the OMV lens tube.

4 Using the Hood for Controlled Humidity Experiments

The hood can be used to control the local humidity around the sample. This is achieved by purging the hood with a gas of the desired humidity through the provided ports. Note that the two gas ports are not strictly designated as inlet versus outlet. Simply choose one as the inlet and leave the other open to allow the gas to flow freely through the hood. Suitable flow rates will depend on your particular application, but in general a flow rate of about 2 L/min can be used for initial purging and then lowered to less than 1 L/min during imaging for best noise performance.

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Low humidity operation is easily realized by purging with dry gas. In-house nitrogen and air supply lines that you may have present at your facility are often dry gases as are most compressed gases. Gases can also be passed through moisture traps to ensure a dry gas supply.

Operation at other humidity levels can be realized by mixing a dry gas stream with a humidified gas stream. One way to get the humidified gas stream is to bubble gas through water. For instance, place a two-holed rubber stopper in a large Erlenmeyer flask filled partially with water. In one side of the stopper place a tube with a diffuser stone submerged in the water. Place another tube in the other stopper hole, being very careful that the bottom of the tube cannot draw water out of the flask. By bubbling gas through the flask you can easily reach a humidity of about 90%.

You can use flowmeters to regulate the mix of dry and humid air. To a good approximation, the humidity can be adjusted by mixing the two gas streams proportionally. The exact humidity inside the hood can be monitored with a hygrometer.

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5 Using the Hood with Other Gases

The hood can also be used with other common gases, including air, nitrogen, argon, and carbon dioxide. It should never be used with gases that are corrosive or contain solvent vapors that might damage the components of the hood and/or microscope.

As with the humidified gases, suitable flow rates will depend on your particular application, but in general a flow rate of about 2 L/min can be used for initial purging and then lowered to less than 1 L/min during imaging for best noise performance. Keep in mind that most gases are either heavier or lighter than air, so it may be beneficial to pick the inlet and outlet ports accordingly.

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