



NanoScope Optical Viewing System

Model OMV-UNIVERSAL

Support Note 213 details the components, assembly, and adjustments to the NanoScope Optical Viewing System, model OMV-Universal. Compliance with the following assembly and adjustment directions are essential to successful and safe installation. This support note includes:

- **Components:** [Section 213.1](#)
- **Assembly of Optical Viewing System:** [Section 213.2](#)
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Document Revision History: Support Note 213

Rev.	Date	Sections	Ref. DCR	Approval
C	01-19-2011	Re-branded		Ruth Wishengrad
B	11/21/08	OMV-Universal Update	N/A	D. Paszkeicz

Bruker offers the NanoScope optical viewing system as an aid for aligning “TipView” STM and MultiMode™ scanning probe microscopes (SPMs). The optical viewing system consists of a camera, which is mounted vertically over the head of the SPM to view both sample surface and tip.

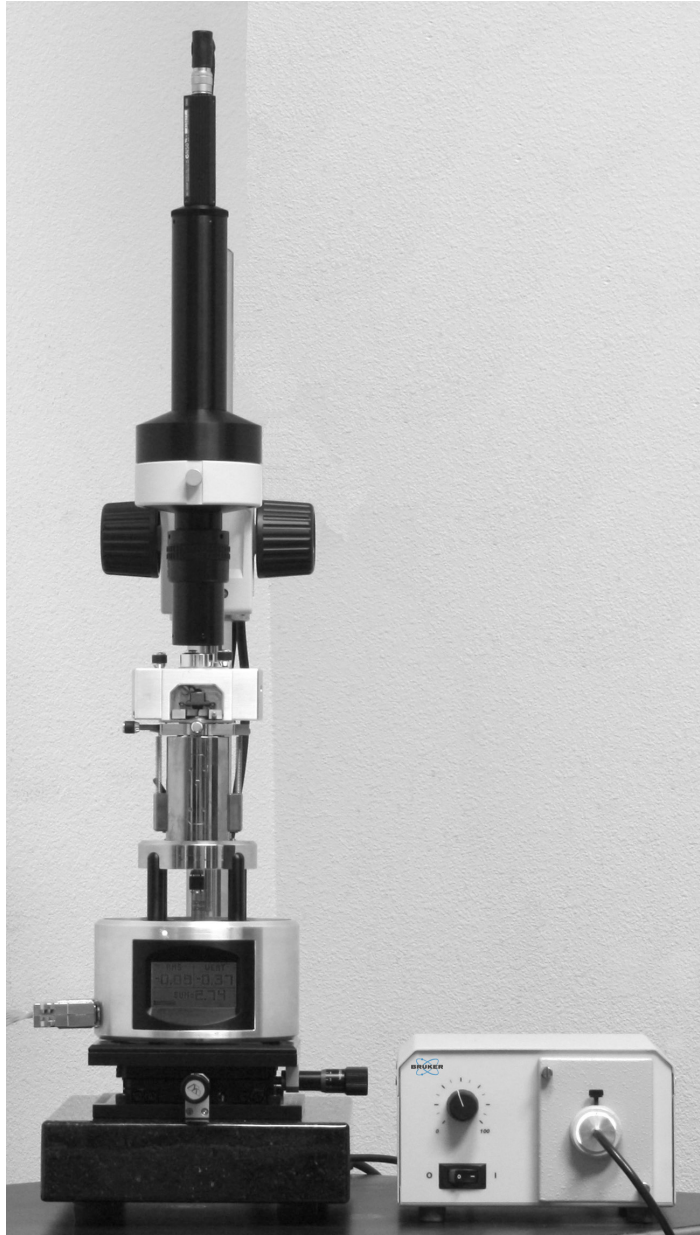


Figure 213.0a Complete NanoScope Optical Viewing System

213.1 Components

The optical viewing system includes the following:

- Granite Base— The twenty pound granite slab is supported on four isolation pads to dampen vibration for general scanning. An X-Y translation stage is bolted to the granite for convenient lateral positioning of the SPM. For extremely high magnification scans, the optical viewing system should be set atop a vibration isolation table.
- Support Pole— The stainless steel pole is screwed onto the granite base to support the combined focus mounting and optical assemblies.
- Bolt, Washer and Allen Wrench— Secure the support pole to the granite base.
- Optical Assembly— Consists of camera, objective and microscope body.
- Focus Mount Assembly— Supports the optical assembly and permits vertical motion for focusing.
- Split Collar— Clamps to the support pole to rest the focus mount assembly. This may be positioned anywhere along the length of the support pole.
- Delrin Washer— Fits over the pole, between the focus mount assembly and the split collar. Allows low-friction rotation of the focus mount assembly.
- Illuminator— Provides light for the optical viewing system, relayed via fiber optic cable to the optical assembly.
- Fiber Optic Cable— Connects the illuminator to the optical assembly.
- Camera Power Supply— Connects the optical viewing system camera to the monitor using a BNC connector cable and provides power to the camera.
- Monitor (Optional)— Displays the video image.
- Support Note 213, NanoScope Optical Viewing System - (This document.)



CAUTION: Cables should not be removed or installed while power is applied to the system.

CAUTION: Connecting cables while power is applied may damage the instrument.

213.2 Assembly of Optical Viewing System

311.2.1 Remove Contents from Packing Box

Carefully unpack all components from the packing box and check against the list supplied in this document. If components are damaged or missing, contact Bruker immediately.

311.2.2 Screw Support Pole to Granite Base

Set the granite base on its side, with the counter-bored side of the hole accessible, and both X-Y translation stage adjustment knobs projecting into free space. **DO NOT REST THE GRANITE BASE ON EITHER OF THE TWO X-Y TRANSLATION ADJUSTMENT KNOBS—THEY MAY BE DAMAGED.**

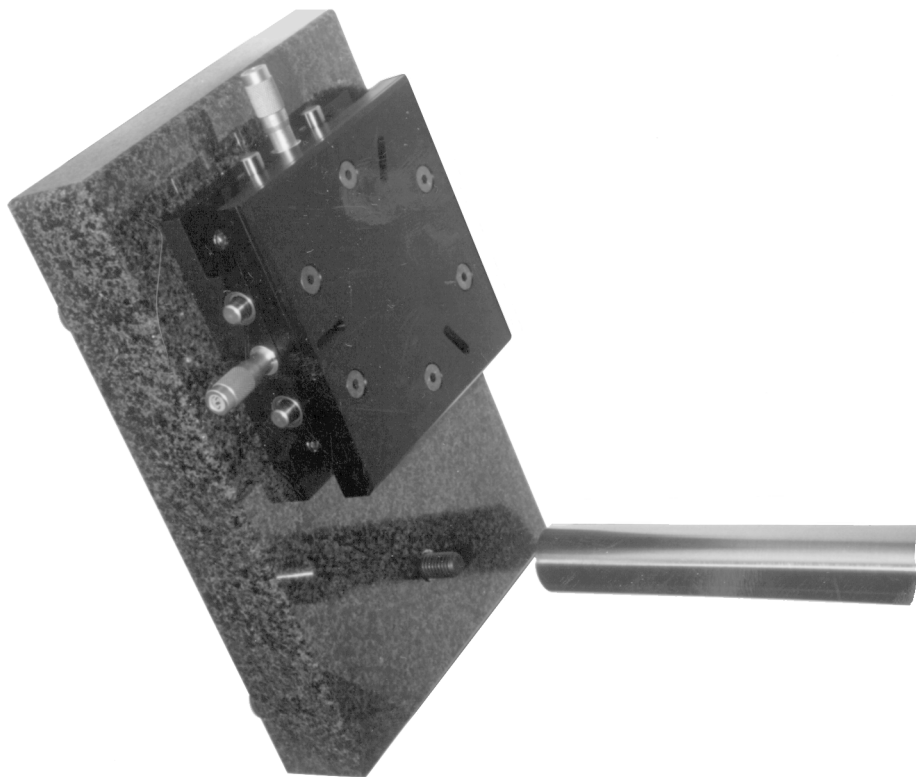


Figure 213.2a Granite Base Positioning for Insertion of Socket Head Bolt

Insert the 1/2-13 socket head bolt and 1.5" OD washer from the underside of the granite base through the hole. Screw the bolt into the support pole until snug, then tighten the socket head bolt using the allen wrench supplied. Carefully set the base and support pole in an upright position on a stable surface.

311.2.3 Mount Split Collar and Delrin Washer

Orient the split collar with its grooved side upward, then slide it over the support pole and position half way down the pole. Tighten the split collar until the collar is firmly secured. Slide the delrin washer over the pole and rest atop the split collar.

311.2.4 Install Focus Mount Assembly

Slide the focus mount assembly down the support pole until it rests atop the delrin washer and split collar. The focus mount assembly should be oriented with its mounting ring up. Tighten the focus mount assembly until firmly secured.

311.2.5 Mount the Optical Assembly

Fit the optical assembly into the focus mount assembly, then rotate the optical assembly until the fiber optic cable is oriented as shown in Figure 213-3. Insert and tighten a thumbscrew through the mounting ring to secure the optical assembly.

311.2.6 Attach Camera and Fiber Optic Cable

Attach the camera cable to the top of the camera using the elbow connector provided. The connector is keyed so that it plugs onto the camera's connector in the proper orientation. Push the connector down until the outside ring snaps into place, locking the cable connector to the camera. Route the cable through the retaining clip on the left side of the focus mount assembly. Plug the camera power supply into the power strip. The power supply is autoranging to line voltages 100-240 VAC and 50 or 60 Hz.



Figure 213.2b Mounted Optical Assembly.

Note: Orient camera body as shown (inset)

311.2.7 Connect the Illuminator

The free end of the fiber optic cable mounts in the front of the illuminator. The included adaptor, an aluminum ring, reduces the nosepiece of the illuminator down to hold the 5-mm diameter fiber cable. Insert the ring in the illuminator first, making sure that the clamping pin in the ring is aligned with the thumbscrew in the illuminator. Then insert the fiber and tighten the thumbscrew by hand until the fiber is firmly held in place. If the fiber is not held securely, then re-check that the thumbscrew is aligned with the clamping pin in the adaptor ring. Once the fiber is in place, the illuminator should be plugged into the power strip. The illuminator is autoranging on line voltages 100-240 VAC and 50 or 60 Hz.

311.2.8 Connect the Video Output

The video output of the OMV camera is NTSC format. The video output cable is the free BNC connector attached to the camera power supply.

MultiMode V systems include a video framegrabber in an expansion slot in the control computer. The included BNC-to-RCA adaptor should be used to connect the video output cable to the framegrabber card.

MultiModes with NanoScope 3D controllers may be sold with either an optional framegrabber (model BIOFG) or an optional monitor (model OMV-MONITOR). In the case of the framegrabber, the video output cable connects to the framegrabber with the BNC connector. In the case of the optional monitor, plug the video output cable into the "V1 IN" BNC on the back of the monitor. Then plug the monitor into the power strip. The monitor is also autoranging on line voltages 100-240 VAC and 50 or 60 Hz.

213.3 Adjustment of the Optical Viewing System

311.3.1 Mount the SPM and Adjust the Camera Height

Using the focus mount assembly's adjustment knob, raise the optical viewing system to a height sufficient to clear the SPM to be used with the optical viewing system. Set the SPM atop the X-Y translation stage on the granite base.

NOTE: Slots are provided on the X-Y translation stage to accommodate "TipView" STM and MultiMode scanning probe microscopes. These microscopes feature precision balls on their bases and will mate kinematically with the stage. The SPM should be oriented to face forward.

Using the split collar and focus mount assembly adjustment knob, carefully position the camera objective until it is aligned with the SPM head's viewing aperture. The camera objective should be positioned approximately 13 mm above the height of the head's laser adjustment screws.

DO NOT CRASH THE CAMERA OBJECTIVE INTO THE SPM HEAD! It is safest to position the camera objective just barely above the head's laser adjustment screws, then focus the optical viewing system by raising it upward (never downward!). This will prevent crashing the camera objective.

311.3.2 Set Illuminator Level

Switch the illuminator on and then adjust the illuminator knob, increasing the light intensity until an image appears on the monitor.

The illuminator intensity should be set to a level which is sufficiently bright to clearly view objects in the camera's field of view, but no brighter.

311.3.3 Fine Alignment of SPM and Camera

Use the X-Y translation stage to align the SPM and optical viewing system. The camera may be rotated in the beam splitter body to obtain proper angular alignment on the monitor. The monitor should render a "true" image, showing the probe positioned at the right side of the screen.

213.4 Suggestions

When operating your SPM with the optical viewing system, it is recommended that the tip be brought close to the sample surface BEFORE aligning the laser with the tip.

If specks of dirt appear on the video image, clean the camera objective's dust cover (the clear glass plate located on the business end of the camera). The dust cover is removed by unscrewing the camera objective. Clean inside and out, then replace.

Use adjustment knobs on the focus mount assembly to raise and lower the camera; however, tension in the mount assembly's slide must be maintained sufficiently to prevent the optical assembly from slipping downward. To adjust tension in the focus mount assembly slide, counter-rotate left-right adjustment knobs clockwise as shown below:

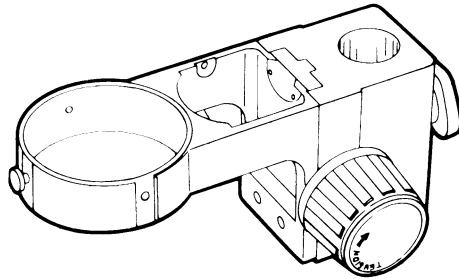


Figure 213.4a To increase tension, turn both knobs CW

It is recommended that tension be adjusted with the SPM removed to ensure the objective does not drop onto the SPM head.