

MVP-Pro™

USER'S MANUAL

For use with MVR-BR3, MVR-BR4, MVS-BR3 and MVS-BR4





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UNPACKING

Before installing the MVP-Pro™, make sure all the parts on the included check-off list are present. If any parts are missing or damaged, contact Harrick Scientific immediately.

TECHNICAL SUPPORT

For additional information please contact our Technical Support Center at 800-248-3847 between 9 a.m. and 5 p.m. EST; or e-mail your questions to: techsupport@harricksci.com

FEEDBACK

Your comments and suggestions are welcome. Please send them to:

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The MVP-Pro™ accessories are single reflection, 45° angle of incidence ATR accessories. The MVP-Pro model employs a silicon hemisphere as the ATR element, while the MVP-Pro Star includes a diamond prism. Both feature a convenient horizontal sampling surface with a 0.5mm diameter sampling area. Each accessory has a built-in pressure applicator with slip-clutch to provide good contact between a solid sample and the sampling surface of the ATR crystal. The pressure applicator swings out of the way to enable unobstructed access to the sampling surface. An optional force sensor with digital display is also available. This provides more precise control of the force applied to compress solid samples against the ATR crystal.

Liquids and pastes are analyzed by simply covering the sampling area with the sample. Liquids can be placed on the crystal with an eyedropper or syringe. Pastes can be simply smeared over the sampling surface. The optional liquid cell can be used for volatile or hazardous liquids. This cell has Luer-Lok fittings for static or flow-through operation. Powders are analyzed by placing a small amount of the sample on the sampling surface and applying pressure. An optional powder adapter can be used to confine the sample while applying pressure.

Although silicon and diamond are nearly universal materials for ATR elements, occasionally an absorption band of analytical interest may overlap a lattice band. Thus, an alternative ATR crystal material may be required. Optional ZnSe and Ge ATR crystal cartridges and heated cartridges are available. Additional ATR cartridge(s) may be utilized to speed up multiple sample analysis.

The optional reflection sample holder enables analysis of solid samples by specular reflection spectroscopy. The size of the analyzed area is approximately 2 mm. The sample is placed face down over the opening. This method is particularly useful for the analysis of coatings on metal surfaces.

OPEN BEAM SPECTRUM

Prior to installation, collect an open beam background spectrum (no accessory in the sample compartment). This spectrum should be used later to verify the throughput of the MVP-Pro™.

GETTING READY

Next, familiarize yourself with the accessory and its various components by referring to the drawing of the MVP-Pro™ found below (Figure 1).

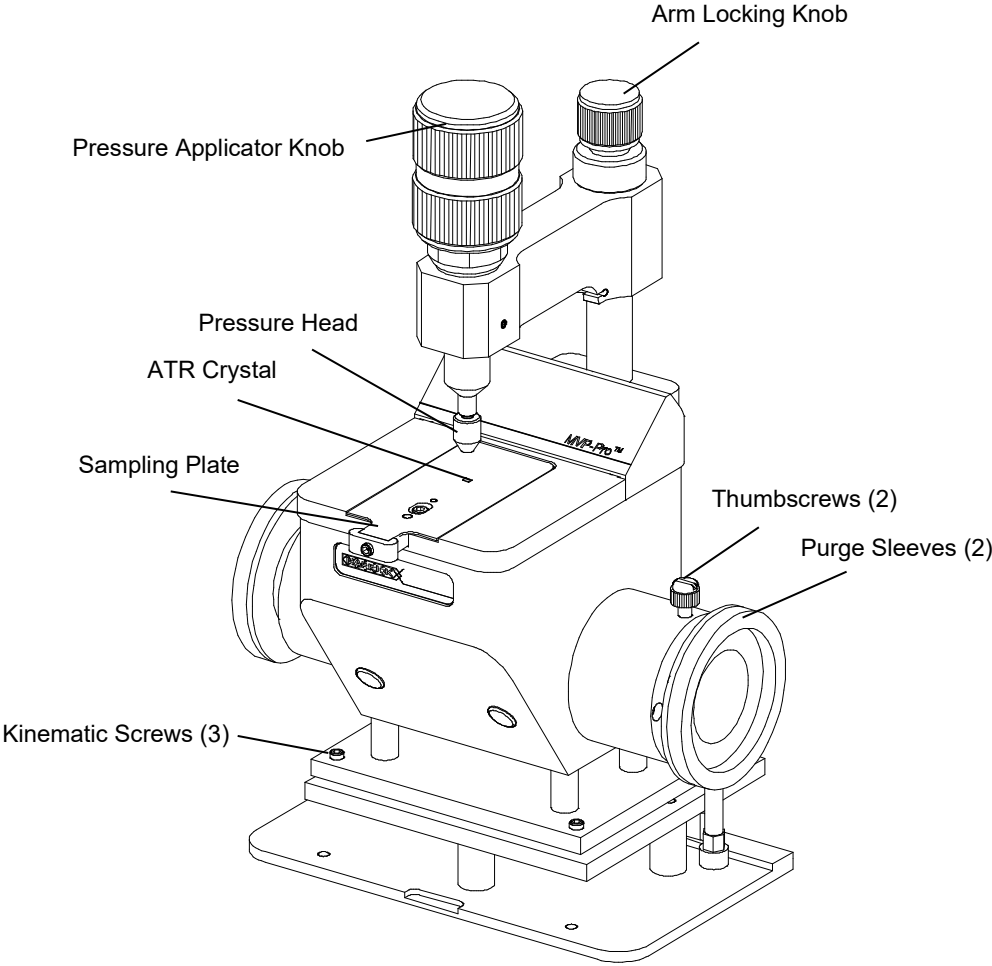


Figure 1 • MVP-Pro™

INSTALLATION AND ALIGNMENT

PURGE INSTALLATION

PURGE SLEEVES

Loosen the thumbscrews and push the purge sleeves in to retract them (Figure 2).

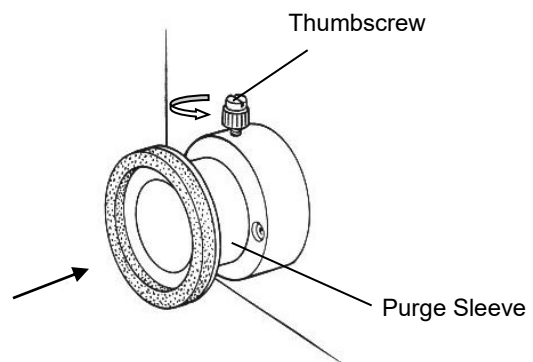


Figure 2 • Purge Sleeve

PURGE LINE

For quicker purging or if the spectrometer has windows on the beam ports, connect an additional purge line to the fitting on the back of the MVP-Pro™ as illustrated in Figure 3.

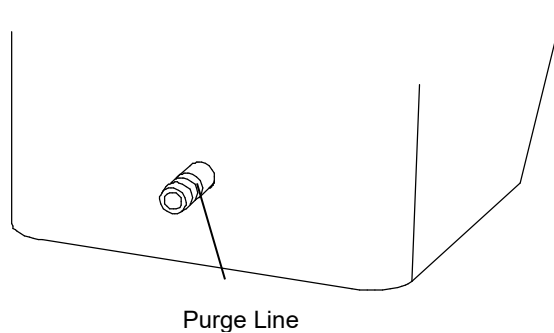


Figure 3 • Purge Line

INSTALLATION AND ALIGNMENT

MVP-Pro™ INSTALLATION

There are two ways to install the MVP-Pro™ into a Bruker spectrometer depending on the base plate with which the spectrometer is equipped. One is the Kinematic Base Plate and the other is the Quick-Lock Plate.

KINEMATIC BASE PLATE

- Remove any sample holders mounted to the kinematic plate.
- Set the spectrometer to measure the “energy” on the detector.
- Place the MVP-Pro™ on the kinematic plate with the logo facing forward (Figure 4).
- Slide the MVP-Pro™ roughly to the center of the kinematic plate.
- Slide the MVP-Pro™ along the beam path to optimize the energy.
- Turn the knob on the locking mechanism counterclockwise to lock the MVP-Pro™ in place.
- Extend the purge sleeves until they firmly contact the sides of the sample compartment.
- Lock the purge sleeves in place with the thumbscrews.

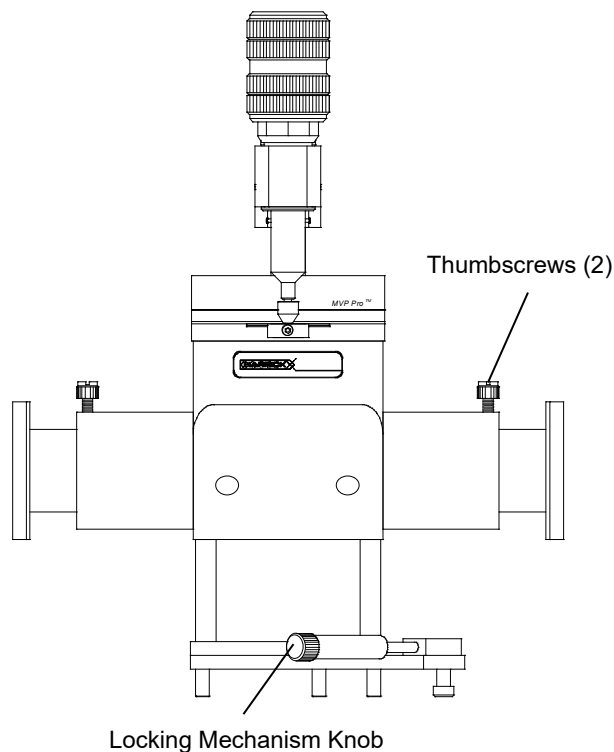


Figure 4 • Locking the MVP-Pro™

INSTALLATION AND ALIGNMENT

QUICK-LOCK PLATE

Install the MVP-Pro™ in a Bruker spectrometer equipped with a Quick-Lock receptical.

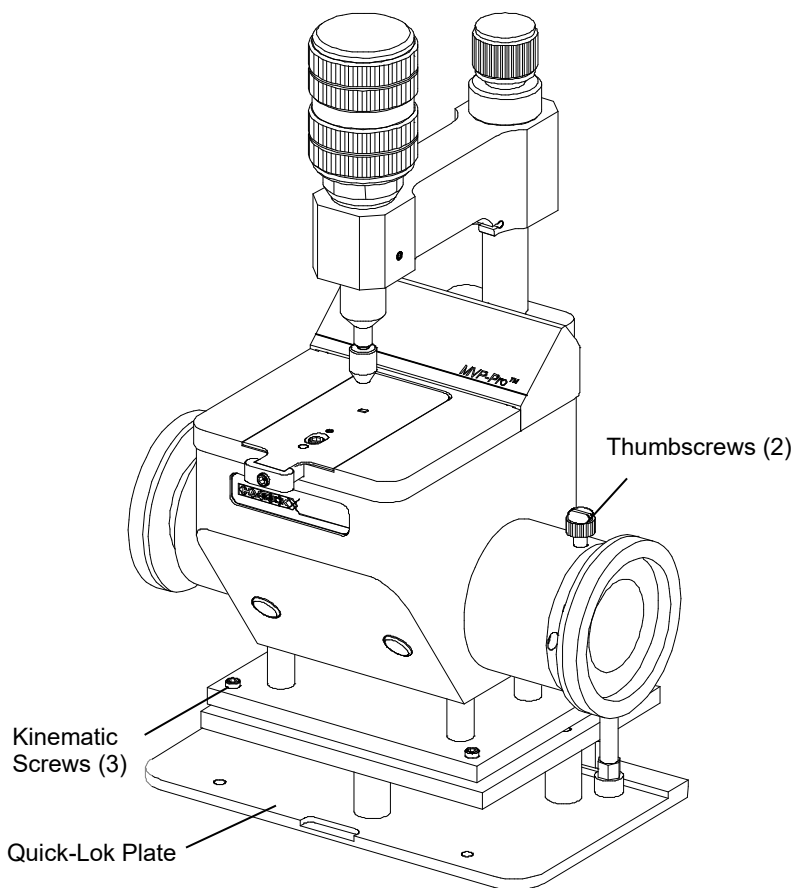


Figure 5 • Adjusting the Kinematic Screws

ALIGNMENT

The MVP-Pro™ has been pre-aligned prior to shipment. To optimize the performance of the MVP-Pro™, it should be aligned to your spectrometer.

ADJUSTING THE KINEMATIC SCREWS (QUICK-LOCK PLATE ONLY)

- Set the spectrometer to display the “energy” on the detector.
- Using the supplied 3/32” ball driver, adjust the three kinematic screws (Figure 5) one by one. Move systematically from screw to screw, optimizing the “energy” at each before moving to the next.

INSTALLATION AND ALIGNMENT

ADJUSTING THE MIRRORS

- Using the supplied 3/32" ball driver, adjust the tilt and turn set screws found on the back of the pressure applicator mounting (Figure 6) optimizing the energy at one before moving to the next.

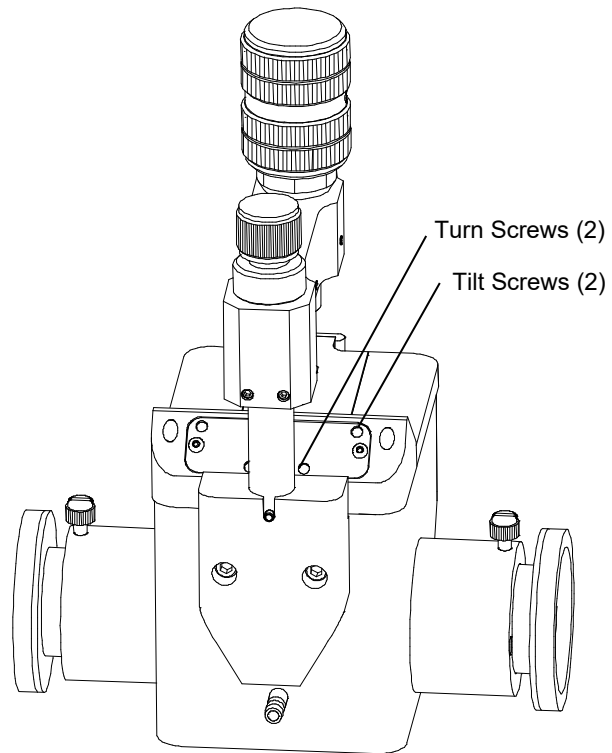


Figure 6 • Adjusting the Mirrors

INSTALLATION AND ALIGNMENT

ADJUSTING THE SAMPLING PLATE

- Loosen the sampling plate mounting screw using the supplied 7/64" ball driver (Figure 7).
- Push the sampling plate down and in while adjusting the setscrew on the front of the sampling plate with the supplied 0.050" ball driver.
- Maximize the energy.

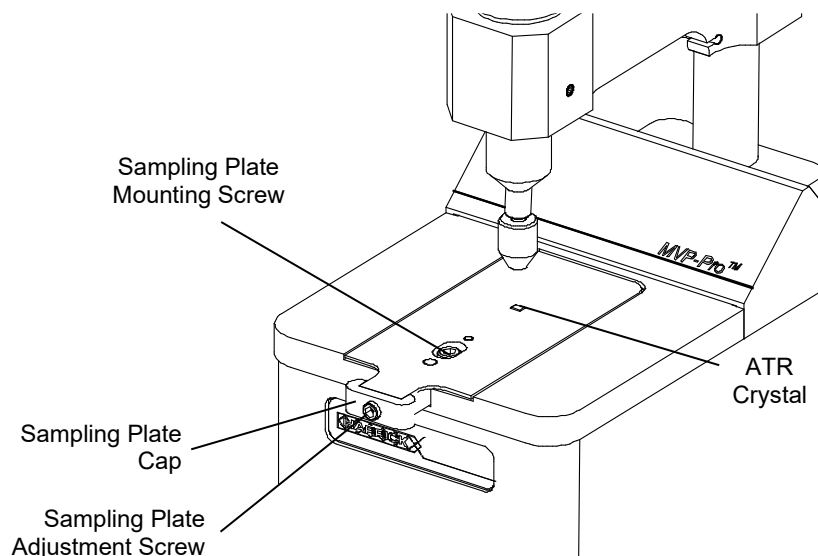


Figure 7 • Adjusting the Sampling Plate

NOTE: The sampling plate set screw is accessed through the sampling plate cap mounting screw.

- Repeat the alignment cycle several times until no further improvement is possible.

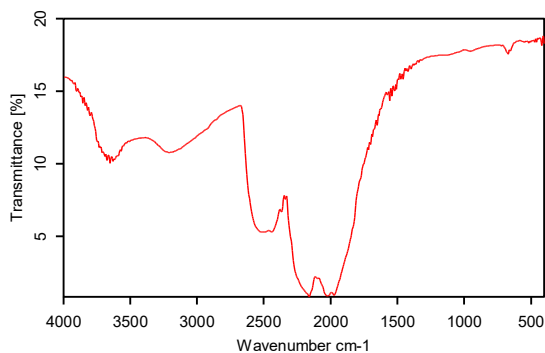
NOTE: Be careful not to disturb the sampling plate adjustment while making the other adjustments. If needed, tighten the mounting screw during the other stages of alignment.

- Hold the sampling plate in the position of maximum “energy” while tightening the mounting screw.
- Extend the purge sleeves (Figure 2) by sliding them until they firmly contact the sides of the sample compartment.
- Tighten the thumbscrews (Figure 2) to keep the purge sleeves in place.

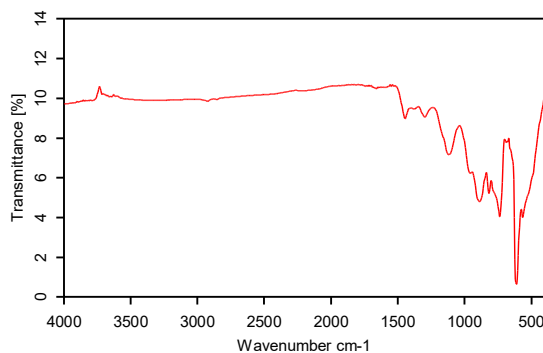
For best performance, your accessory should be checked before first use and at regular intervals thereafter.

VERIFYING THE THROUGHPUT

- Make sure that the specified background spectrum is the previously collected open beam background spectrum.
- Collect a transmittance spectrum with the MVP-Pro™ in the sample compartment.



Diamond ATR Crystal



Si ATR Crystal

Figure 8 • MVP-Pro™ Throughput

- For the MVP-Pro™ with a diamond crystal read the value at 1000 cm⁻¹. The throughput at this wavenumber should be at least 10% and the spectrum should resemble the MVP-Pro™ throughput shown in Figure 8. Note that this throughput spectrum was measured without the angular mask installed on the crystal holder.
- For the MVP-Pro™ with a silicon ATR crystal read the value at 2200 cm⁻¹. The throughput at this wavenumber should be at least 5% and the spectrum should resemble the MVP-Pro™ throughput shown in Figure 7.

NOTE: For further MVP-Pro™ validation, see Appendix A.

CLEANING THE CRYSTAL

- The ATR crystal should be cleaned before each use.

NOTE: *Although the silicon crystal can be cleaned with any solvent, care must be taken not to dissolve the epoxy used to hold the crystal in place. We recommend wiping with MEK or acetone on a cotton swab.*

The diamond ATR crystal is sealed in place with a PTFE gasket. Use appropriate solvents for cleaning.

BACKGROUND SPECTRUM

- Collect the background single beam spectrum with the MVP-Pro™ in the sample compartment.

SOLID SAMPLES

- Raise the pressure head by turning the pressure applicator knob counterclockwise.
- Place the sample face down on the center of the ATR crystal.

APPLYING PRESSURE

- Turn the built-in slip clutch (Figure 9) clockwise until adequate pressure is applied. Pressure is sufficient when the absorption band intensity no longer significantly changes with increased pressure or when the slip clutch begins to 'slip' and the guide lines on the slip clutch base no longer move.

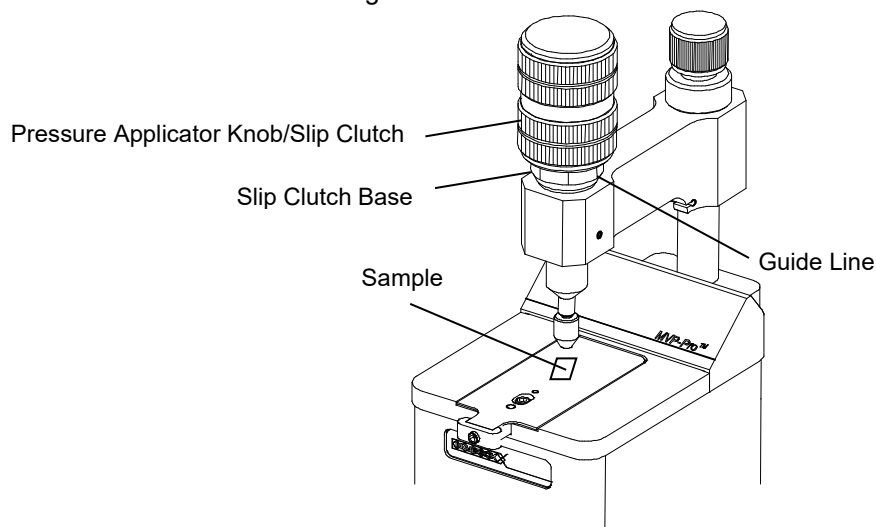


Figure 9 • Pressure Applicator Knob



CAUTION:

Do not use the originally supplied slip-clutch for Ge and ZnSe ATR crystals. A lower torque slip clutch is available for use with these crystals.

SAMPLE SPECTRUM

- Record the sample spectrum.
- Loosen the pressure applicator.
- Remove the sample.
- Clean the crystal prior to running the next sample.

POWDERS

- Place a small amount (covering at least a 2 mm diameter area) of the sample on the center of the crystal.

NOTE: Minute amounts of powder can be analyzed in this way. If the sample is plentiful, use of the optional powder sample adapter is recommended.

- Apply pressure carefully so the powder is not displaced from the center of the crystal.
- Record the sample spectrum.
- Wipe the sample off the crystal with a damp cloth.

NOTE: To avoid spilling powder in the spectrometer, remove the solid sampling plate and clean it outside the spectrometer.

- Clean the crystal.

LIQUIDS AND PASTES

- Retract the pressure applicator about 1/8" away from the surface of the sampling plate.
- Swing the pressure applicator out of the way.
- Place a small amount (covering at least a 2 mm diameter area) of the sample on the center of the crystal.



CAUTION:

If the liquid sample is volatile, the use of the optional liquid cell is recommended. The liquid cell can be filled with a Luer-Lok syringe in a glove box or other enclosed environment.

NOTE: For liquid and paste analysis, no pressure is needed.

- Record the sample spectrum.
- Wipe the sample off the crystal.
- Clean the crystal.

SLIP CLUTCH

The slip clutch supplied with the MVP-Pro™ should be used with the diamond and Si ATR crystals to deliver up to 420N. An optional low-torque slip clutch is available for use with Ge and ZnSe ATR crystals. This slip-clutch is designed to deliver 130N. To replace the slip clutch:

- Raise the pressure applicator so that it is about an 1/8" above the sampling plate.
- Use a 5/64" L-key wrench to unscrew the set screw on the side of the slip clutch.
- Lift the slip clutch off of the accessory and place it in the wooden storage case for the MVP-Pro™.
- Orient the replacement slip clutch so the set screw hole lines up with the flat on the shaft.
- Lower the slip clutch onto the shaft.
- Use a 5/64" L-key wrench to tighten the set screw against the shaft.

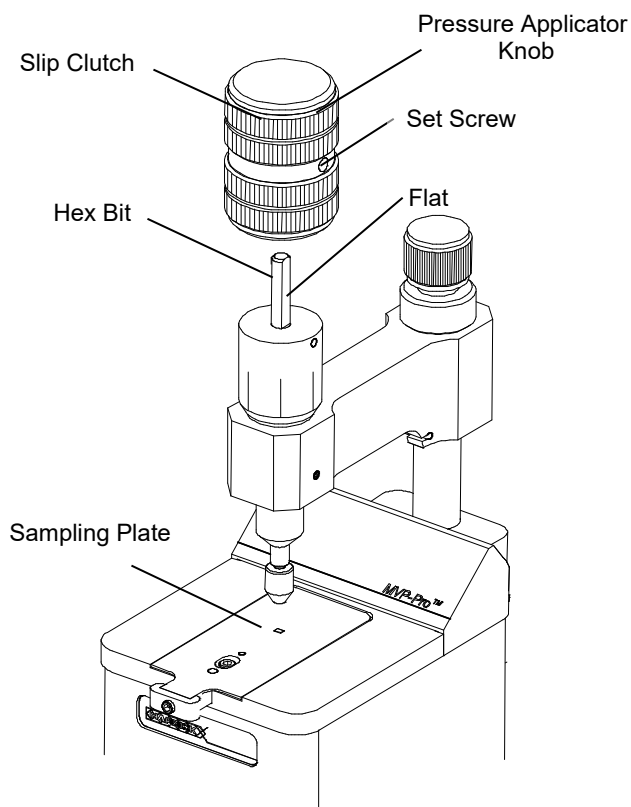


Figure 10 • Slip Clutch

USING THE OPTIONAL EQUIPMENT

ANGULAR MASKS

The MVP-Pro includes masks to reduce the beam spread impinging on the sample. If the measured spectra has inverted bands, distorted bands, or a non-zero baseline installation of the proper mask will eliminate or reduce these effects. For best performance, select the smallest mask that gives transmission-like spectra.

Si, Ge and ZnSe Mask

To install a mask on the crystal holder:

- Swing the pressure applicator out of the way.
- Loosen the mounting screw on the sampling plate to release the sampling plate assembly (Figure 7).
- Remove the sampling plate, turn it upside down and place it on a soft cloth.
- Unscrew the two screws (Figure 11) on the bottom of the sampling plate.
- Remove the mask that is in place.
- Insert the mask. Select the smallest mask that eliminates the dispersive effects for your sample.
- Replace and tighten the screws holding the mask in place.
- Install the sampling plate and tighten the mounting screw.

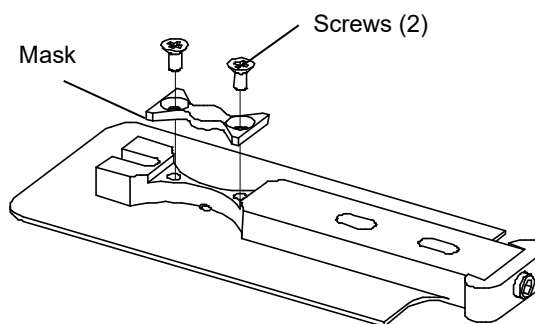


Figure 11 • Installing a mask on the Si, Ge or ZnSe sampling plate

USING THE OPTIONAL EQUIPMENT

- Diamond Mask** To install a mask on the crystal holder:
- Swing the pressure applicator out of the way.
 - Loosen the mounting screw on the sampling plate to release the sampling plate assembly (Figure 7).
 - Remove the sampling plate, turn it upside down and place it on a soft cloth.
 - Lower the mask (Figure 12) onto the bottom of the sampling plate.
 - Using a 0.028" hex L-key, tighten the two set screws to secure the mask in place.
 - Reinstall the sampling plate and tighten the mounting screw.

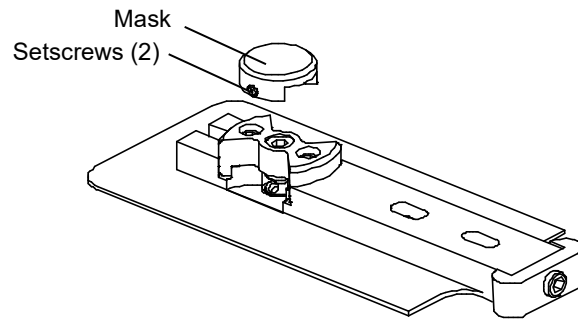


Figure 12 • Installing a mask on the diamond sampling plate

POWDER ADAPTER

To install the powder adapter:

- Make sure the powder adapter o-ring is in place (recessed in the bottom of the adapter)
- Swing the pressure applicator out of the way.
- Position the powder adapter on the sampling plate as shown in Figure 13. Engage the pin on the bottom of the powder adapter in the hole on the sampling plate.
- Center the powder cup on the crystal.
- Thread and tighten the screw supplied with the powder adapter.

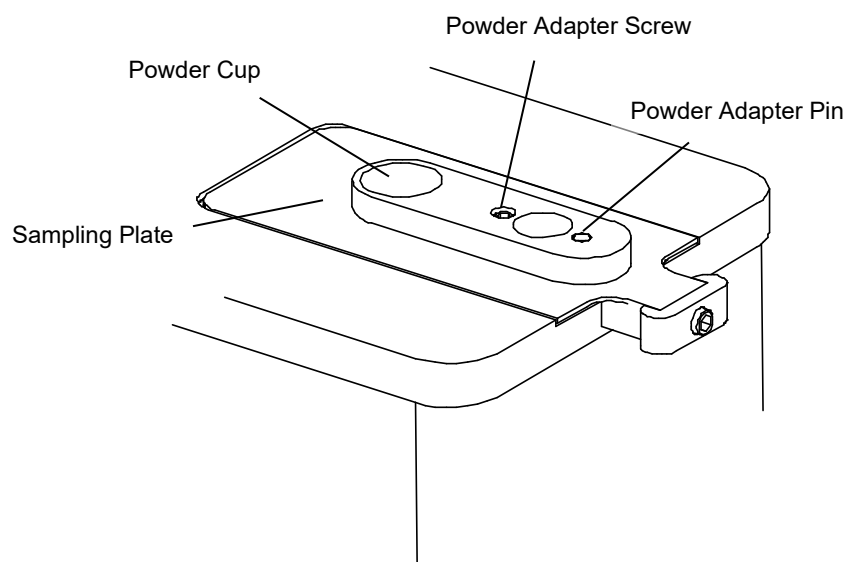


Figure 13 • The Powder Adapter

To use the powder adapter:

- Collect the background spectrum.
- Swing the pressure applicator back into place.
- Fill the powder cup about half full, with sample.
- Apply pressure with the pressure applicator.
- Record the sample spectrum.
- Clean the ATR crystal.

LIQUID CELL

To install the liquid cell:

- Swing the pressure applicator out of the way.
- Make sure that the liquid cell o-ring is in place and clean.
- Position the liquid cell on the sampling plate as shown in Figure 14. Engage the pin on the bottom of the liquid cell in the hole on the sampling plate.
- Using the supplied 5/64" ball driver, tighten the screw included with the liquid cell.

The liquid cell can be used for static (Figure 13) and flow through (Figure 14) applications.

STATIC APPLICATIONS

If the liquid sample is volatile:

- Collect the background spectrum.
- Remove the plugs on the Luer-Lok fittings.
- Use a Luer-Lok syringe to fill the cell.

NOTE: To fill the liquid cell in a glove box or other enclosed environment, undo the mounting screw, with the supplied 7/64" ball driver, to release the liquid cell/sampling plate assembly.

- Reinstall the plugs to seal the cell.

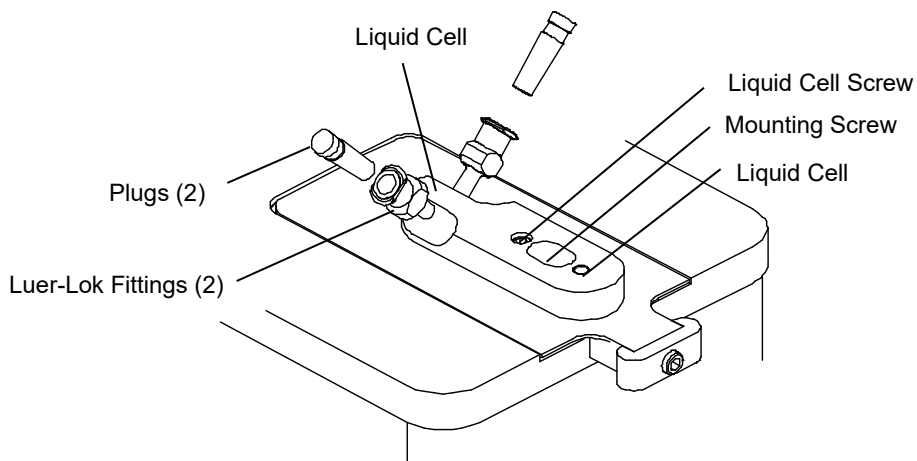


Figure 14 • Liquid Cell Setup for Static Applications

- Collect the sample spectrum.
- Clean the cell by removing it and rinsing with a suitable solvent.

FLOW THROUGH APPLICATIONS

For flow through applications(Figure 15):

- Collect the background spectrum.
- Connect the inlet and outlet, using appropriate adapters, to the Luer-Lok fittings on the cell.
- Turn the flow on and check for leaks. Fix any leaks before proceeding.

NOTE: This should be done outside the spectrometer. Remove the liquid cell/ sampling plate assembly by first removing the mounting screw with the supplied 7/64" ball driver.

- Collect the sample spectrum.
- To clean the cell, flow some of the new sample or some solvent through it. For more thorough cleaning, remove the cell from the sampling plate and rinse it with solvent.

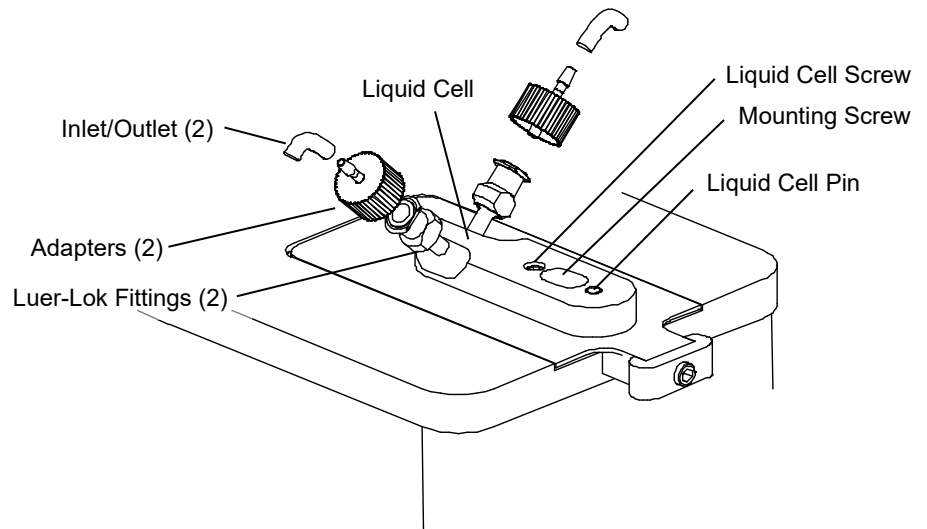


Figure 15 • Liquid Cell Setup for Flow Through Applications

EXTERNAL REFLECTION SAMPLE HOLDER

The ATR crystal is mounted to the sampling plate of the MVP-Pro™. To replace the sampling plate:

- Swing the pressure applicator out of the way.
- Using the supplied 7/64" ball driver, loosen and remove the mounting screw on the sampling plate to release the sampling plate (Figure 16).
- Replace the sampling plate.
- Reinstall the mounting screw, but do not tighten it fully
- Push the sampling plate down and in while adjusting the setscrew on the front of the sampling plate with the supplied 0.050" ball driver.
- Maximize the energy on the detector.
- Tighten the mounting screw

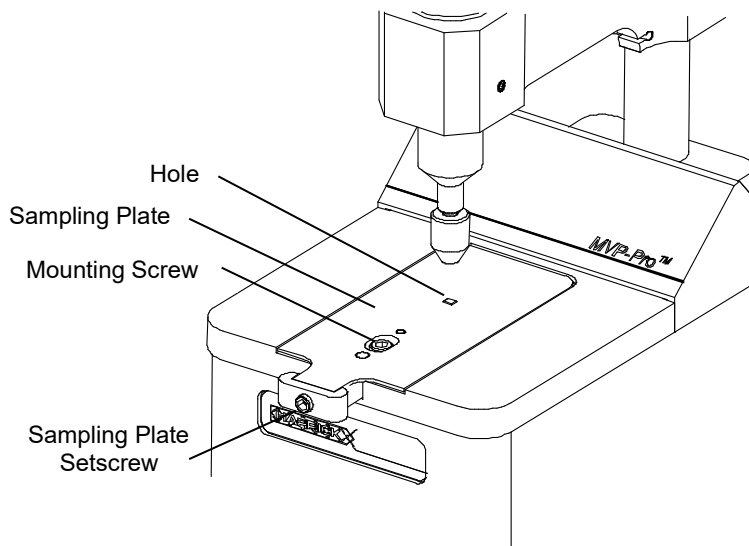


Figure 16 • The External Reflection Sample Holder

To use the external reflection sample holder:

- Place the alignment mirror or reference over the hole in the external reflection sample holder, with the sampling surface facing down.
- Collect the background spectrum.
- Replace the reference with the sample with the sampling surface facing down.
- Collect the sample spectrum.

HEATED ATR CRYSTAL HOLDER

The heated ATR crystal holder is designed to examining samples at elevated temperatures. It can be used for examining drops of liquid placed on the ATR crystal, retained in the trough, or contained in the flow-through liquid cell. For solid samples, use the pressure applicator with its insulated cap to compress the sample against the ATR crystal. It can also be used with the powder retainer and flow-through liquid cell, provided that an appropriate o-ring material is used.

The maximum operating temperature of the heated ATR sample holder is 200°C with diamond or silicon ATR crystals and 80°C for the Ge ATR crystal.

Installation To install the heated ATR sample holder:

- Swing the pressure applicator out of the way.
- Using the supplied 7/64" ball driver, loosen and remove the mounting screw on the sampling plate to release the sampling plate (Figure 17).
- Place three of the PTFE insulating washers on the surface on which the sampling plate normally rests. Two go over the pins and the third goes over the screw hole for the mounting screw.
- Place the heated sampling plate onto the MVP-Pro.
- Thread and tighten the mounting screw to secure it in place.

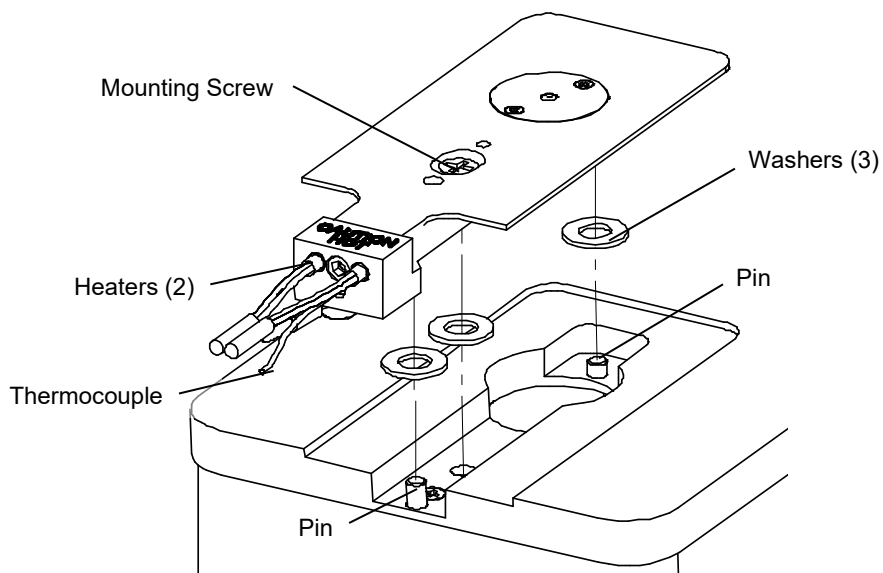


Figure 17 • The Heated ATR Sample Holder

**CAUTION:**

Do not operate the heated ATR crystal holder without the washers installed. Operating without the washers installed may result in damage.

To use the heated sample holder:

- Connect the wires from the K-Type thermocouple and heaters to an appropriate temperature controller, such as the Harrick Temperature Controller.
- Set up the Temperature Controller and heat to the desired temperature.
- Collect the background spectrum.
- Allow the unit to cool.
- Place the sample on the ATR crystal.
- If the sample is a solid sample, raise the pressure head and slip the insulating cap over the head. While continuing to grasp the cap, lower the pressure head and compress the sample against the ATR crystal. See Figure 18.
- Heat as desired.
- Collect the sample spectrum.
- Be sure to allow the unit to cool down fully before disassembling or cleaning.

**CAUTION:**

Do not exceed the maximum recommended operating temperature for the ATR crystal in use.

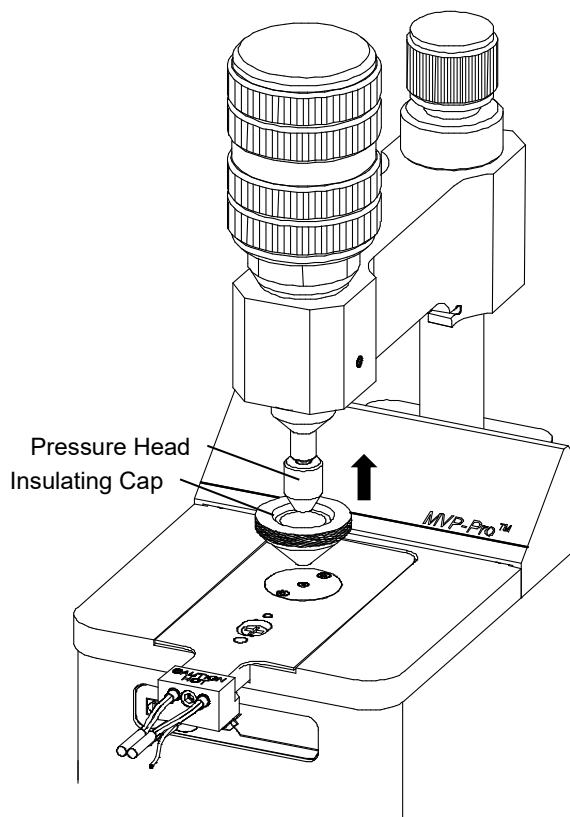


Figure 18 • Installing the insulating cap on the pressure applicator

REPLACING THE HEATERS

Periodically, the heaters on the cell will need to be replaced. To replace the heaters:

- Swing the pressure applicator out of the way.
- Loosen the mounting screw on the sampling plate to release the sampling plate assembly.
- Remove the Heated Crystal Holder from the accessory.
- Turn the holder over and place it on a soft cloth.
- Unscrew the ground wire from the holder, using a 7/64" ball driver (see Figure 19).
- Use a 1/16" hex driver to loosen the two setscrews that secure the heaters in place, as indicated in Figure 19.
- Pull gently on the wires to remove the heaters.
- Push the new heaters into the heater sleeves as far in as they will go.
- Tighten the two setscrews to hold the heaters in place.
- Reconnect the ground wire.
- Reinstall on the accessory.

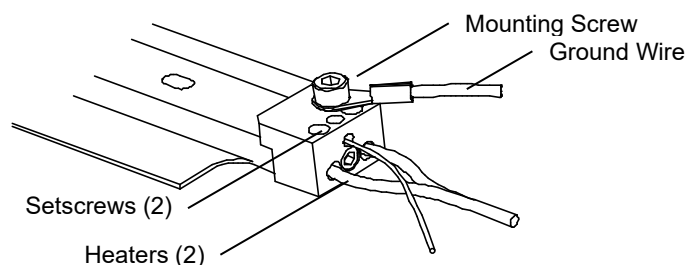


Figure 19 • Heater Replacement

Note Upon initial heating to high temperatures, some vapors may be generated from the new heaters as grease, etc. burns off the surface of the heaters.

REPLACING THE THERMOCOUPLE

If the thermocouple requires replacement, please contact Harrick Scientific to arrange to have the holder returned for repair.

FORCE SENSOR

The optional force sensor provides a highly accurate method of compressing the sample against the ATR crystal. It is ideal for reproducible results and for samples that change optical properties under compression.

Getting Ready

Familiarize yourself with the components of the force sensor of the MVP-Pro™ found below (Figure 20).

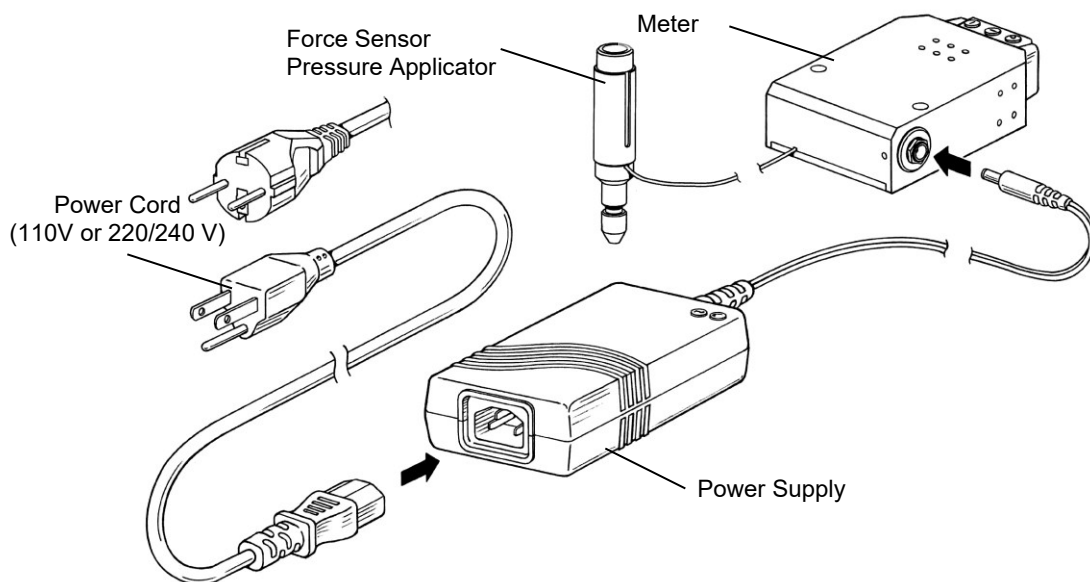


Figure 20 • MVP-Pro™ Force Sensor Components



CAUTION:

Handle the wire connecting the display to the force sensor arm with care to prevent damage.

Installation

- Remove the two caps that cover the threaded holes on the front of the accessory (see Figure 21).
- Rest the force sensor arm on the left side of the MVP-Pro and align the two holes in the display case with the two threaded holes in the front of the accessory.
- Insert the two long screws through the holes in the case and secure them with the supplied 7/64" wrench.
- Push the caps back on so they cover the screws that secure the display in place.

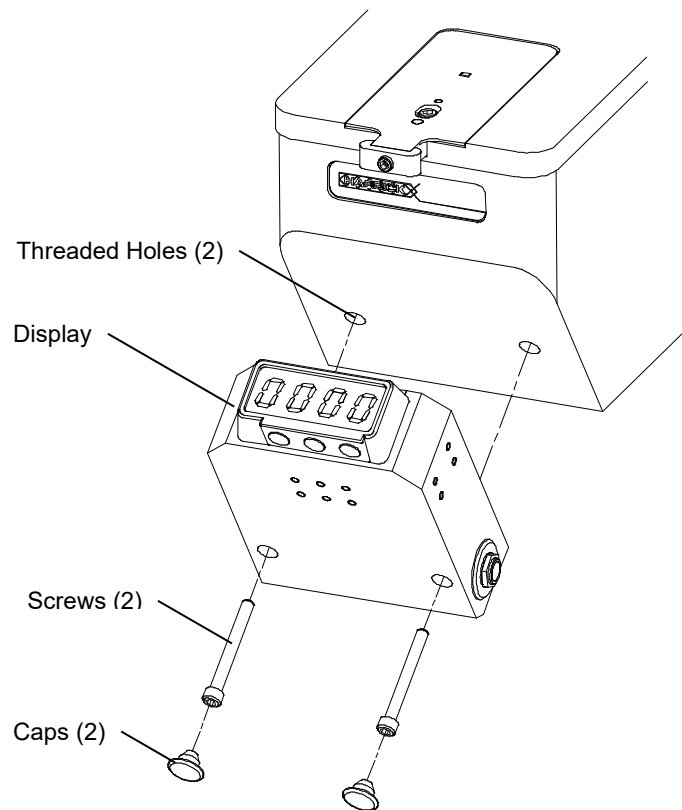


Figure 21 • Mounting the Display

**CAUTION:**

Handle the wire connecting the display to the force sensor pressure applicator with care to prevent damage.

- Protect the ATR crystal with a hard cardboard pad so it does not get damaged during this procedure.
- Raise the pressure applicator up as far as possible.
- Turn the arm locking knob counter-clockwise two turns to loosen the arm,
- Grasp the built-in slip-clutch and swing it 90°, away from the desired location for the meter. Note that the slip-clutch can swing to either side.

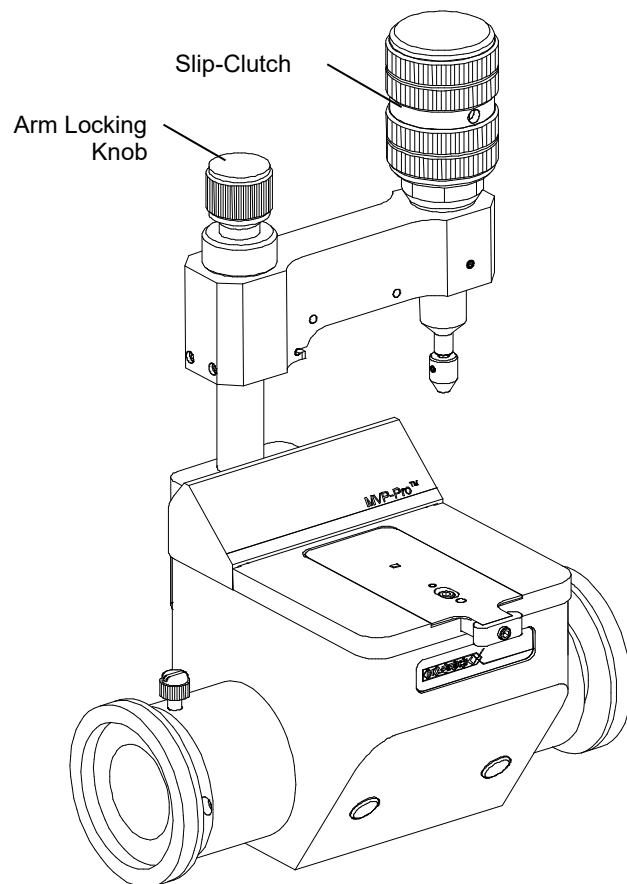


Figure 22 • Swinging the Slip-Clutch

- Hold the pressure head and loosen the setscrew using a 0.050" ball driver enough to be able to slide the pressure head off the pressure applicator assembly (Figure 23).

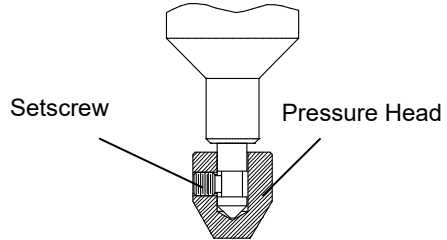


Figure 23 • Removing the Pressure Head

- While holding the pressure applicator assembly, turn the slip-clutch clockwise to lower and then remove the assembly (see Figure 24).

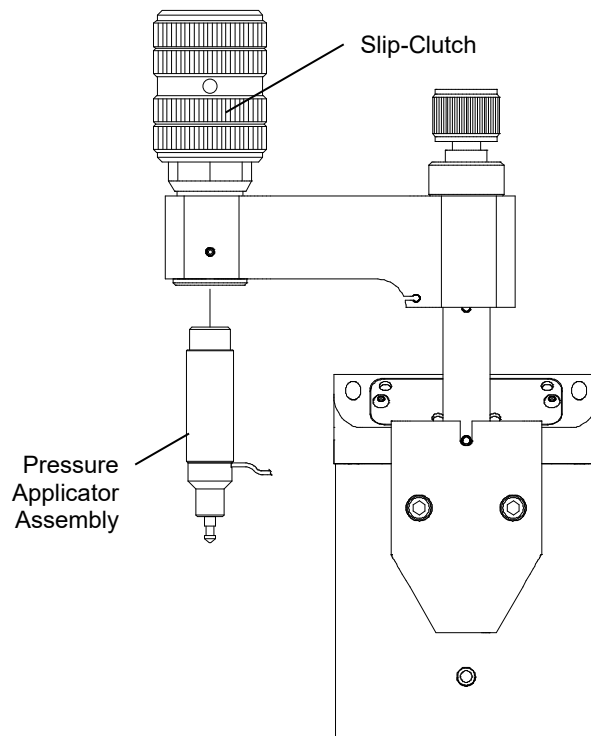


Figure 24 • Removing the Pressure Applicator Assembly



CAUTION:

Move the force sensor assembly carefully to avoid strain on the wire.

- Orient the force sensor pressure applicator as shown in Figure 25.
- Feed the pressure applicator up into the hole below the Slip-Clutch.
- While continuing to hold the pressure applicator assembly, turn the slip-clutch counter-clockwise to thread the pressure applicator assembly into its housing (see Figure 25).

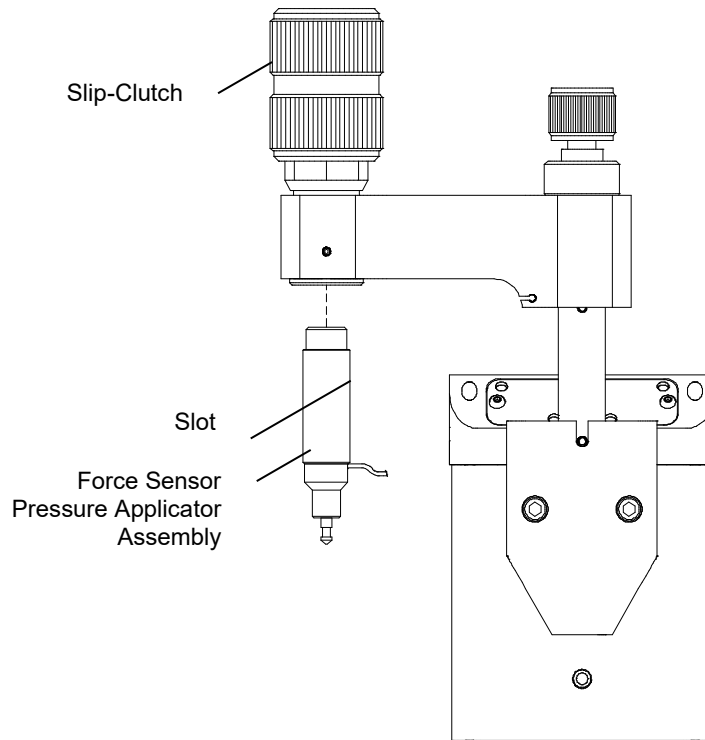


Figure 25 • Installing the Force Sensor Pressure Applicator Assembly

- Slide the pressure head onto the pressure applicator assembly (see Figure 26).
- Tighten the setscrew until it stops using the supplied 0.050" ball driver. Then unscrew it $\frac{1}{4}$ of a turn to allow free rotation of the pressure head.

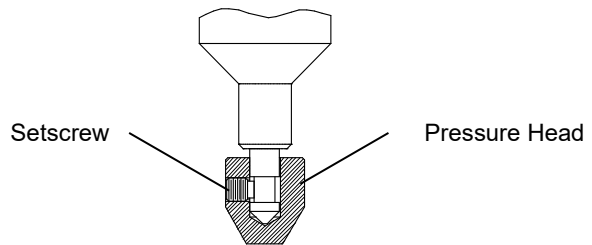


Figure 26 • Installing the Pressure Head

- Grasp the built-in slip-clutch and swing it back into position.
- Tighten the arm locking knob to secure the arm.

- Adjust the Slip-Clutch so 1" (25mm) of the shaft is exposed, as shown in the Figure 26.
- Unscrew the two setscrews on the left side of the arm using a 0.050" hex wrench.
- Gently push the wire into the recess in the bottom of the arm, leaving a loop near the pressure applicator, as shown in Figure 27.

NOTE Figure 26 is roughly to scale and can be held up against the unit to check the length of the loop.

- Make sure the wire is up into the recess as far as possible above one of the setscrews.
- Re-thread and tighten that setscrew.
- Make sure the wire is up into the recess as far as possible above the other setscrew.
- Re-thread and tighten the second setscrew.

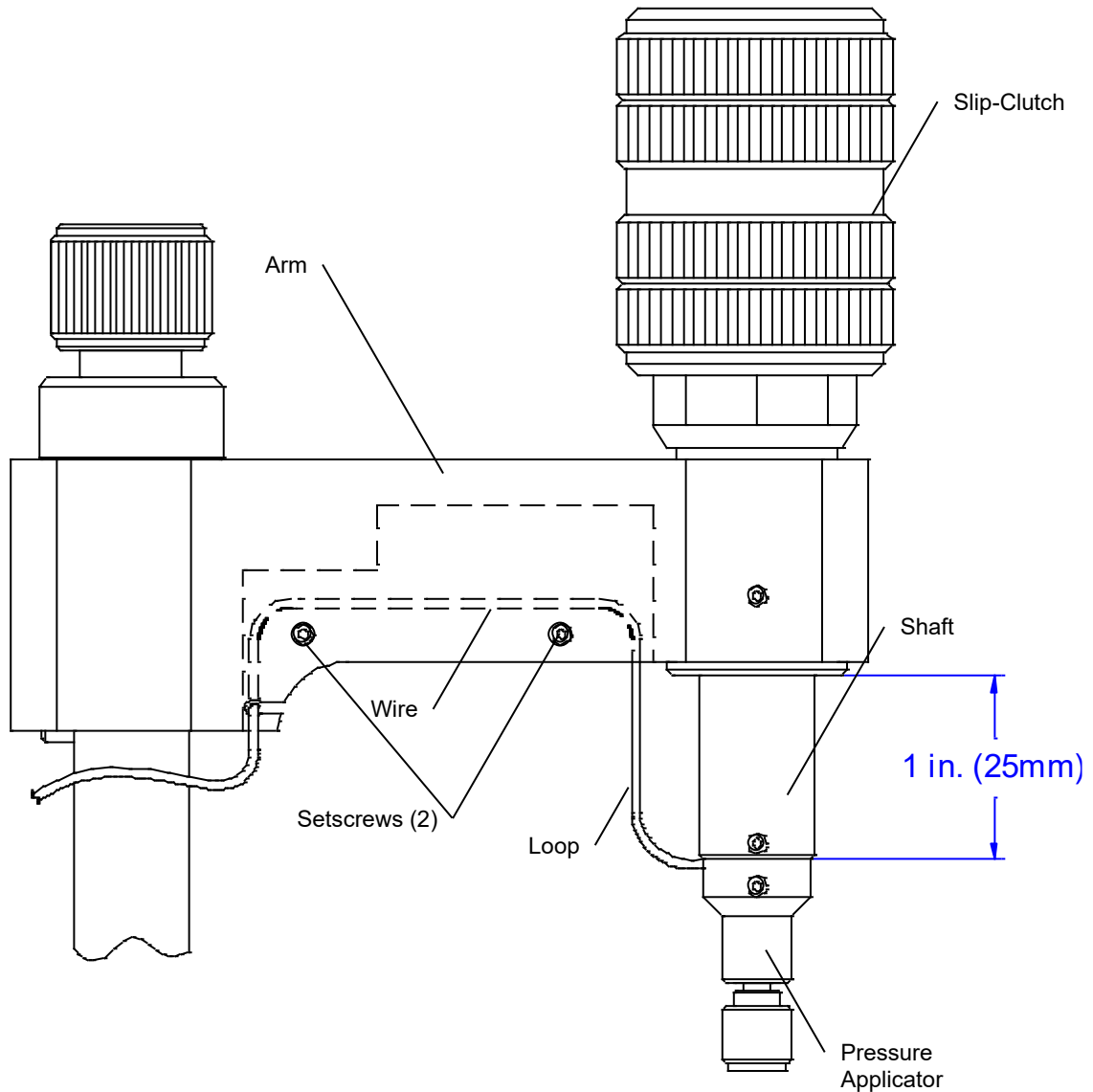


Figure 27 • Routing the wire

- Unscrew the two screws on the back of the accessory (see Figure 28) and pull the mounting bracket straight back, away from the rest of the unit.
- Feed the wire along the center of the mounting bracket between the bracket and the body of the accessory.
- Hold the wire centered on the body of the accessory near the bottom.
- Slide the mounting bracket back on its pins. Keep the wire centered so it is captured inside the groove in the mounting bracket (see Figure 29). Be careful not to pinch the wire between the bracket and the accessory body.

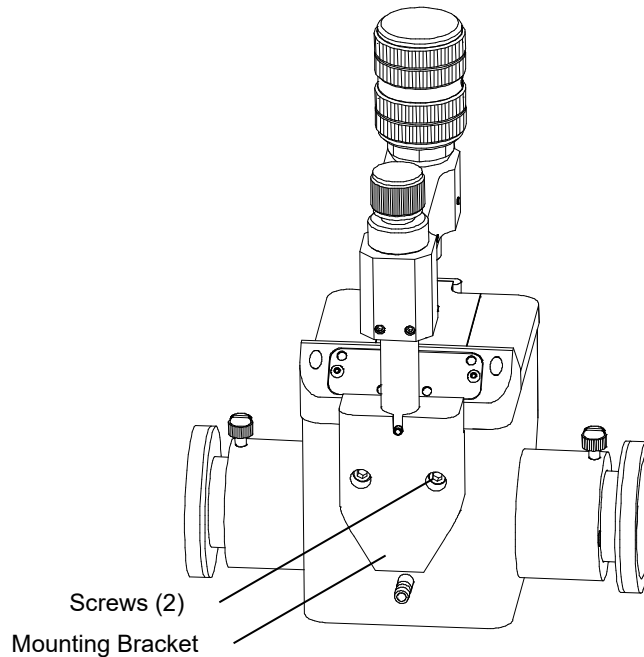


Figure 28 • Securing the Wire Under the Mounting Bracket

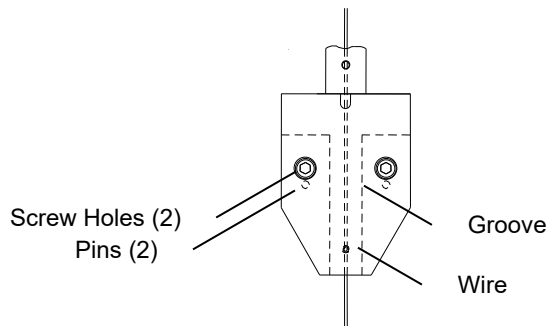


Figure 29 • Mounting Bracket Detail

OPERATION

- Connect the power supply to an appropriate wall outlet.
- Connect the other end of the power supply to the plug on the left side of the display.
- Tighten the pressure applicator knob to compress the sample against the crystal, using the display to measure the force, in Newtons, applied. Apply force as needed.

**CAUTION:**

Do not apply more force than the appropriate slip-clutch allows or damage to the ATR crystal may result.

NOTES: *For diamond and Si ATR crystals, apply up to 420N of force with the slip-clutch supplied with the unit.*

For operation with ZnSe or Ge ATR crystals, change the slip-clutch to the low-torque model and apply up to 130N.

The force sensor is slightly temperature sensitive and this may result in an offset of the zero of $\pm 2N$ if the unit is not at thermal equilibrium.

MVP-Pro™ VALIDATION

For applications requiring higher photometric accuracy, validation on a specific liquid sample is recommended. An example, using water, is shown here (Figure 29).

- Collect a background spectrum with the MVP-Pro™ in the sample compartment.
- Place a few drops of a liquid sample to cover the ATR crystal.
- Collect a sample spectrum.
- Convert the spectrum into absorbance.

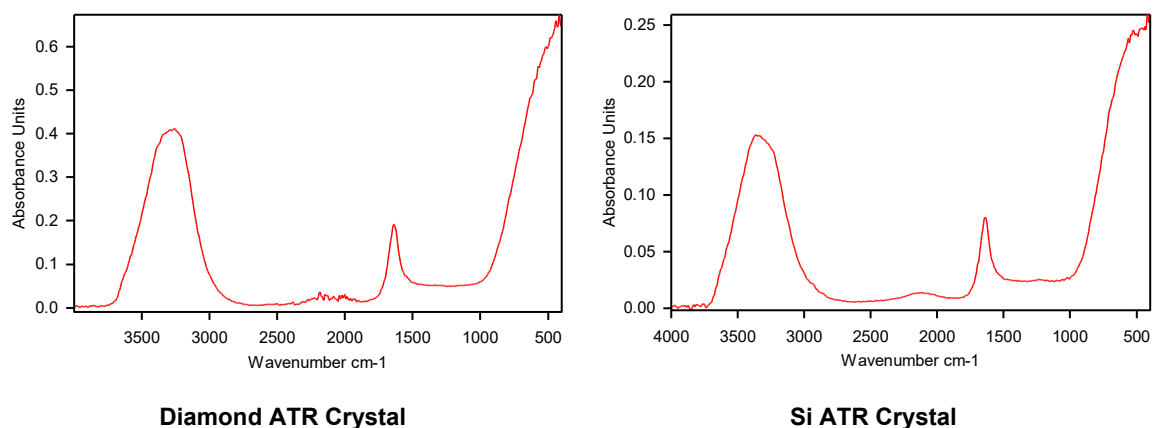


Figure 30 • Absorbance of Water

- Choose two peaks at different ends of the spectrum. Write down the wavenumbers and absorbance values at these peaks. For example, if water is used as the liquid sample on the diamond ATR (Figure 30), the absorption peaks at 3360 cm^{-1} and 1650 cm^{-1} should be within 10% of 0.41 and 0.18 respectively.
- Every time thereafter the validation procedure is performed, the data should be within the noise level of those recorded the first time. On the next page a table is provided to record these values.

APPENDIX A

LIQUID SAMPLE USED				
WAVENUMBER (cm⁻¹)				
ABSORBANCE VALUES				

**REPLACING THE ATR
CRYSTAL**

The ATR crystal is mounted to the sampling plate of the MVP-Pro™. To replace the sampling plate:

- Raise the pressure applicator out of the way.
- Using the supplied 7/64" ball driver, loosen and remove the mounting screw on the sampling plate to release the sampling plate (Figure 30).
- Replace the sampling plate.

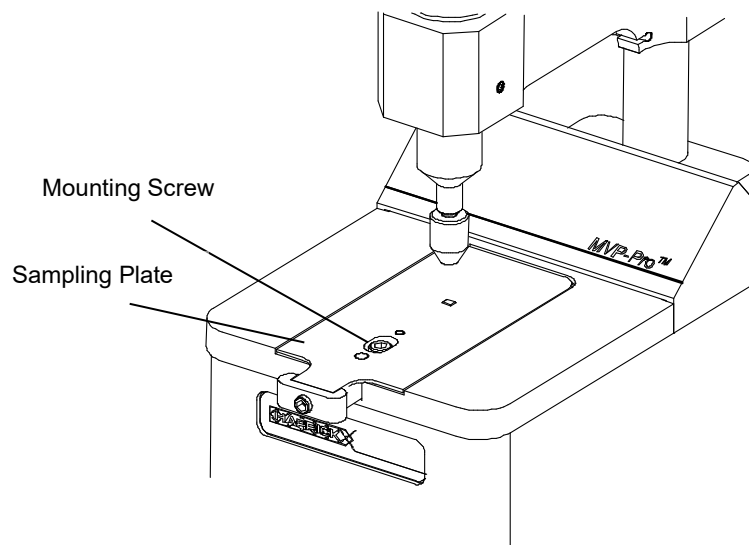


Figure 30 • Replacing the ATR Crystal

OPTIONAL AND REPLACEMENT PARTS

Low-Torque Slip-Clutch for Ge and ZnSe ATR Crystals	SLP-CLL
Force Sensor with Digital Read-Out, 110V	MVR-1-FSD
Force Sensor with Digital Read-Out, 220/240V	MVR-2-FSD
Angular Mask Set for Si, Ge, and ZnSe Mounted ATR Crystals	UNS-ANG
Angular Mask for Diamond Mounted ATR Crystals	UNS-ANG-W
Powder Adapter	UNS-PSC
Powder Adapter Viton O-Ring	ORV-012
Liquid Cell with Luer-Lok Fittings.....	UNS-LCF
Liquid Cell Viton O-Ring	ORV-0015
External Reflection Sample Holder	UNS-ERS
Alignment Mirror	MOP-111
Mounted ATR Crystals	
Ge (0.45 mm sampling area).....	MVP2-ATR-J
Si (0.45 mm sampling area)	MVP2-ATR-E
Diamond (1.50 mm sampling area).....	MVP2-ATR-0W
Diamond Hemisphere (0.5 mm sampling area)	UNS-ATR-0W
Ge (0.25 mm sampling area)	UNS-ATR-0J
Si (0.25 mm sampling area)	UNS-ATR-0E
Heated Sampling Plates	
Si ATR Crystal (0.25 mm sampling area)	UNS-HOT-0E
Ge ATR Crystal (0.25 mm sampling area)	UNS-HOT-0J
Diamond Hemisphere (0.50 mm sampling area)	UNS-HOT-0W
Temperature Controller Kit, 110V	ATK-024-3
Temperature Controller Kit, 220/240V	ATK-024-4



Manual Part No. MV-M-BR-06

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