The Quest
Single Reflection ATR Accessory
User Manual

2I-10800-6

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1. Introduction

Thank you for buying a Specac product. We trust it will provide you with invaluable and excellent service in use.

The Quest Single Reflection ATR Accessory is designed for the quantitative and qualitative analysis of solids, powders, liquids, pastes and gum-like samples. Sufficient sample is required to cover an ATR crystal surface offered from type IIIa monocrystalline diamond, zinc selenide (ZnSe) and germanium (Ge) flat crystal top plate assembly (puck) options.

The Quest ATR Accessory is based upon Synopti-Focal technology – an innovative synoptic focusing array of highly reflective gold coated mirror only reflective optics – in an optical unit that supports the interchangeable ATR crystal puck assemblies. An IR light beam that is projected towards the ATR crystal is presented at a nominal 45° angle of incidence to the sample surface.

An adjustable clamp arm assembly with a set load torque limiter screw knob is permanently affixed to the optical unit. There is a choice of self leveling flat or concave pellet compression head anvils to use with the clamp arm assembly depending upon the sample type to be studied.

The torque limiter screw knob, as part of the clamp arm assembly, provides for a consistent and reproducible load to either one of the flat or pellet anvils to enable excellent close contact of a solid sample with the ATR crystal. In operation the entire torque screw knob is rotated until a sufficient load and hence pressure has been applied to the sample. The torque screw knob will continue to rotate when the set load is reached, but the drive connection slips and no more force will be applied. A “clicking” sound with continual rotation of the knob acts as the indicator when the set applied load has been reached.

When using the clamp arm assembly with a compression head anvil for pressure application to solid sample types, the anvil does not rotate against the sample. This ensures that heat is not generated by friction

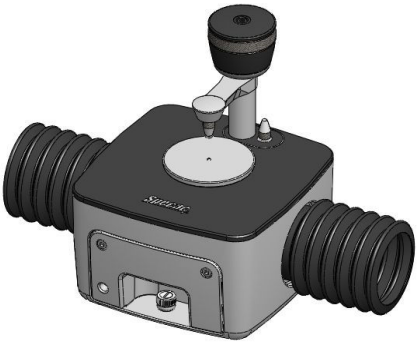
which may cause changes to the sample, and the sample is not displaced from the correct sampling position.

The Quest ATR Accessory of optical unit with clamp arm assembly and choice of ATR crystal top plate is mounted into a spectrometer via Specac's system of Benchmark™ type baseplates for correct positioning of the accessory to maximize for an optical throughput signal.

The optical unit of the Quest ATR Accessory can also be supplied in a variety of different top surface colours on a white optical unit. The standard colour is black (B), but there are options of red (R), yellow (Y), orange (O), green (G), aqua (A) and purple (P).

As the optical unit of the Quest ATR Accessory consists of mirrors and reflective components only, it allows for as wide a range as possible of the spectral frequency throughput for the particular ATR crystal puck assemblies that can be used. For mid IR spectral data the typical spectral range that can be collected for the different ATR crystal puck types are as follows:-

Diamond puck – 7,800cm-1 to 400cm-1 (AR coated crystal).
Diamond puck – 10,000cm-1 to 40cm-1 (Extended Range – non AR coated crystal).
ZnSe puck – 7,800cm-1 to 500cm-1. (AR coated crystal).
Germanium puck – 5,500cm-1 to 480cm-1. (AR coated crystal).



Quest ATR Accessory

2. Safety Considerations

With use of any spectroscopic accessory that involves the study of a wide range of chemical samples, the associated risk in handling may mostly be attributed to the specific sample type to be handled itself. As far as it possible you should follow a procedure for safe handling and containment of the type of sample to be used.

With respect to safety of use specifically to the Quest ATR Accessory, this uses different crystal materials for the ATR crystal puck assemblies where a sample is bought into contact for analytical spectroscopic study. As standard, Diamond (type IIIA), Germanium (Ge) and Zinc Selenide (ZnSe) are the three crystal materials of choice that can be used.

Caution: *Out of these three different crystal types, ZnSe is the most potentially hazardous material with respect to toxicity risk in use and handling.*

Both diamond and Ge crystal materials can be considered relatively safe to use, although germanium may be harmful to the body if it is ingested in significant quantity. The general rule when working with **any** crystal material (and sample) **is to always wear gloves and safety gear** (e.g. safety spectacles) when handling to obviate the risk of contact with the skin.

Provided with each crystal version of puck assembly is a window material safety data sheet for the crystal material itself that can be consulted for safe handling. A copy of each of these datasheets can also be found in this Quest instruction manual in the **Notes On Cleaning** Section found on pages 37, 38 and 39.

3. Checklist of Contents

The Quest ATR Accessory is provided in its own specific packaging.

Depending on which Quest ATR system (colour of optical unit and particular crystal puck assembly) has been ordered will determine the items to check on delivery.

Please check for the following.

1 Quest ATR Accessory including optical unit (with top surface colour of choice) and clamp arm and anvil assembly.
1 Stainless steel flat anvil P/N GS10820.
1 Stainless steel pellet anvil P/N GS10821.
1 Pair of purge bellows P/N GS10707.
1 Volatiles cover P/N GS10825.
1 ATR crystal puck assembly (choice of Diamond, ZnSe or Ge crystal puck assembly).

Any additional Quest ATR crystal pucks ordered with the accessory.

1 Ball driver 3.0mm (for optical unit cover plate removal).
1 Ball driver 2.5mm (for mirror adjustment in optical unit).
1 Benchmark™ baseplate for your FTIR spectrometer.
1 Instruction manual for Benchmark™ baseplate installation.
1 Instruction manual for Quest ATR Accessory.
1 Quickstart guide for Quest ATR Accessory.

Carefully remove your Quest ATR Accessory and ATR crystal puck assembly(ies) from the packaging in readiness for use.

4. Installation Using Benchmark™ Baseplate

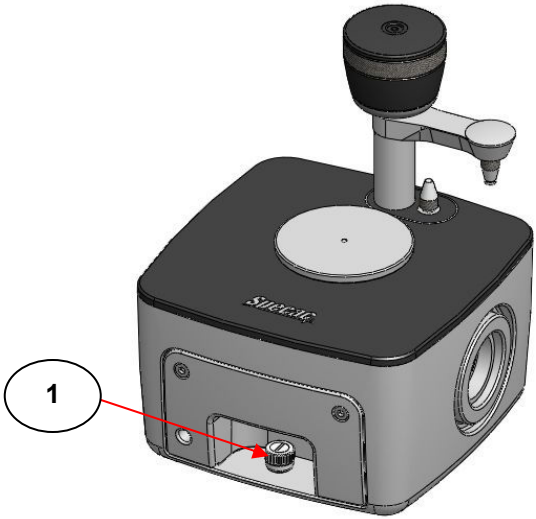


Fig 1. Quest ATR Accessory – Optical Unit with Clamp Arm/Anvil Assembly and ATR Crystal Puck Assembly

The Quest ATR Accessory is supported on a Benchmark™ baseplate when installed into a spectrometer. The Benchmark™ baseplate typically has three support pillars (one flat support pillar towards the rear and two at the front with location pins) and a fourth front central pillar into which the fixing thumb screw (**1**) of the Quest ATR optical unit is tightened.

Note: *It is normally best to install the Benchmark™ baseplate in the spectrometer first before locating the Quest ATR Accessory.*

Fixing holes and studs in the Benchmark™ baseplate will vary dependant on the make and model of the spectrometer for which the Quest ATR is to be installed. For details on how to install your accessory in the spectrometer, refer to the Benchmark™ baseplate Installation Guide/User Manual supplied.

5. Alignment Procedure for Quest ATR

When you have installed the Quest ATR Accessory into your spectrometer on its appropriate Benchmark™ baseplate, you should check for alignment of the accessory. An overall spectral throughput of light energy between 12% and 35%, dependent upon the ATR crystal puck assemblies and spectrometer should be achievable. The Quest ATR Accessory with your choice of crystal puck will be supplied having a preliminary factory alignment. On installation, some transmitted energy should be recorded on the spectrometers energy/light detector monitoring system, but it will be necessary to maximize the optical throughput for any specific spectrometer by adjusting the mirrors in the optical unit of the Quest ATR accessory. To carry out any alignment procedure one of the Quest ATR flat crystal puck assemblies **must** be fitted to the optical unit.

Fitting of the Quest ATR Crystal Puck to the Optical Unit

Four different versions of Quest ATR crystal puck assemblies can be fitted to the optical unit. They are:-

Quest ATR Diamond crystal puck, P/N GS10810.
Quest ATR Diamond extended range crystal puck, P/N GS10811.
Quest ATR ZnSe crystal puck, P/N GS10812.
Quest ATR Ge crystal puck, P/N GS10813.

All of the ATR crystals in these puck assemblies have an antireflection (AR) coating on their underside surfaces for improved light throughput characteristics, **except** the extended range diamond crystal puck P/N GS10811. Serial number and puck crystal identification labels are affixed to the underside surface of the puck assembly. A note of the serial number of your crystal puck assembly can be made on page 43 of this user instruction manual for your reference records.

Top and underside views of the ATR crystal puck assemblies using the diamond crystal as an example is seen as Figs 2 and 3.. (ZnSe and Ge top plates are similar.) The top surface on the Quest ATR optical unit, showing where to fit the ATR crystal pucks, is seen in Fig 4.

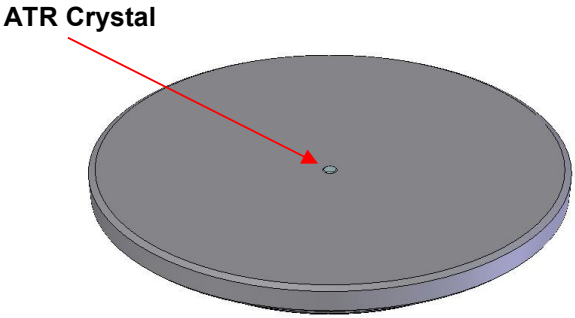


Fig 2. Top view of Quest ATR Diamond Crystal Puck Assembly

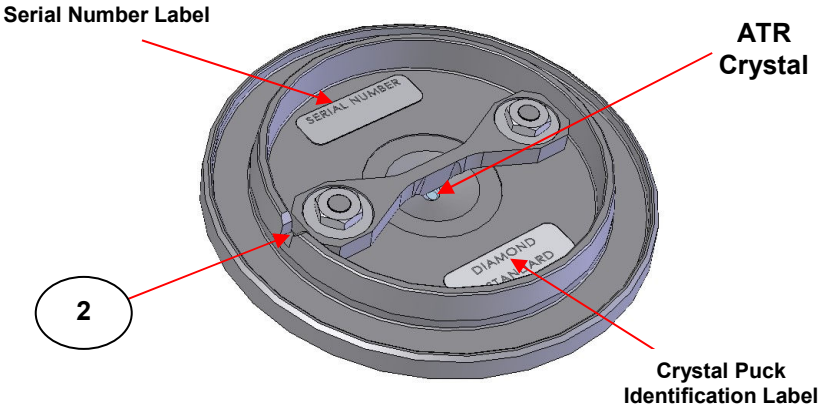


Fig 3. Underside view of Quest ATR Diamond Crystal Puck Assembly

Note: *The fixing nuts for the underside support bracket of the puck assembly will be covered with tamperproof red marking strips and these fixing nuts* ***should never be touched****. Any attempt to adjust these nut fixings will be identifiable and will invalidate any warranty for the puck assembly.*

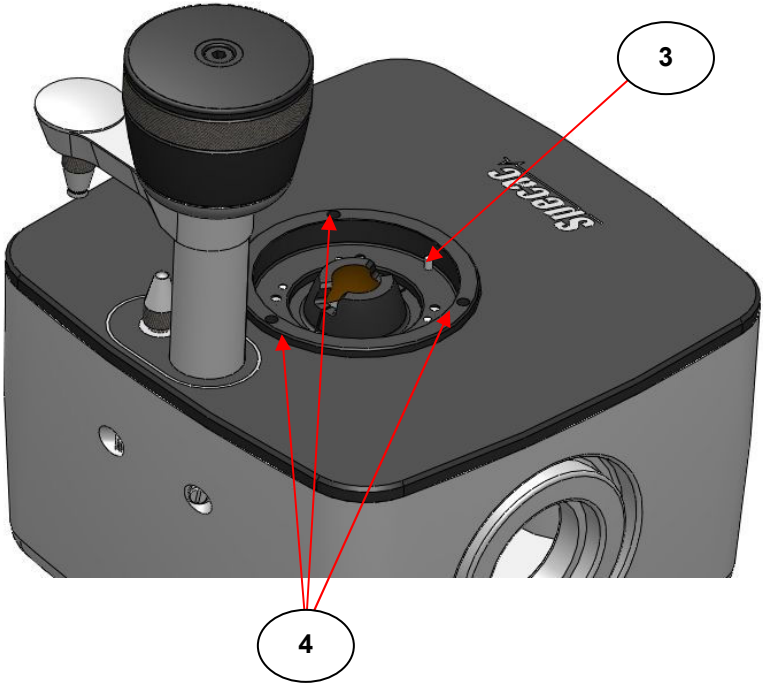


Fig 4. Top view of Quest ATR Optical Unit showing location area for the Crystal Puck Assemblies

The ATR crystal puck assemblies will fit onto the top surface area of the Quest ATR Accessory in one orientation only. Align the location slot (notch) (**2**) on the underside of the crystal puck (see Fig 3.) with the location pin (**3**). The location slot (**2**) of the ATR crystal puck must be facing towards the front of the Quest ATR Accessory where the thumbscrew fixing (**1**) is located. (See Fig 1.) Allow the three magnetic circular spot catches (**4**) to engage to the underside circumference surface of the ATR crystal puck to hold it securely in position. To remove and swap over with any other ATR crystal puck assembly, just grip the sides of the ATR crystal puck and pull it up to release the hold of the magnetic catches.

Alignment

With a Quest ATR crystal puck assembly in position on the optical unit and when this completed assembly is installed in the spectrometer on an appropriate Benchmark™ baseplate, the Quest ATR accessory can be finely aligned. The optical unit front cover plate (**5**) is removed by undoing the two captive cover plate screws (**6**) (see Fig 5.) using the 3mm ball driver supplied. The front cover plate (**5**) is pulled up and forward over the fixing thumb screw (**1**) for its removal to gain access to the internal mirrors for adjustment.

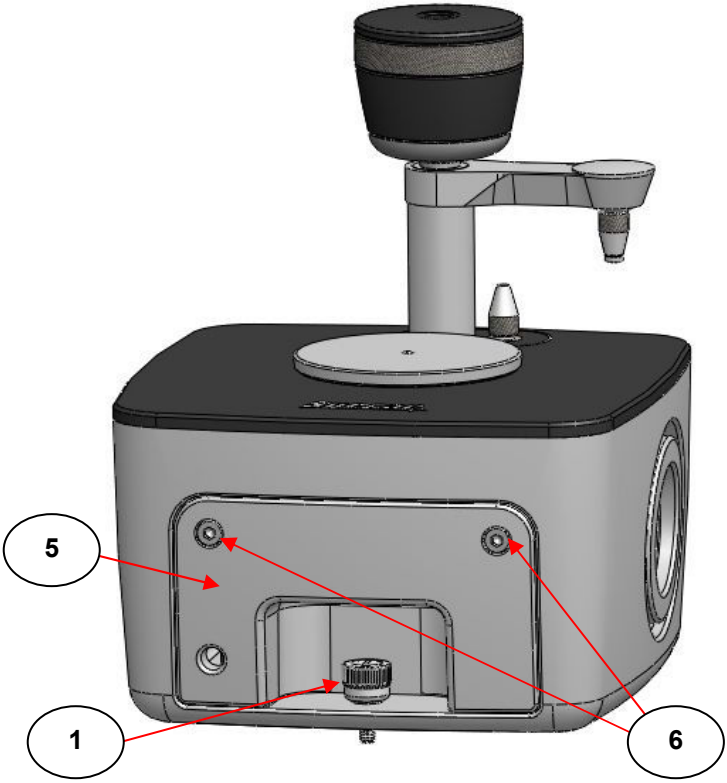


Fig 5. Quest ATR to show for Front Cover Plate removal

Synopti-Focal Mirror System

The Quest ATR Accessory is based upon Synopti-Focal technology which uses an innovative synoptic focusing array of highly reflective gold coated mirrors only for the optical pathway when a different ATR crystal puck assembly is positioned for use on the optical unit. The mirror arrangement and IR beam sequence through the Quest ATR Accessory can be seen from the cutaway front view in Fig 6.

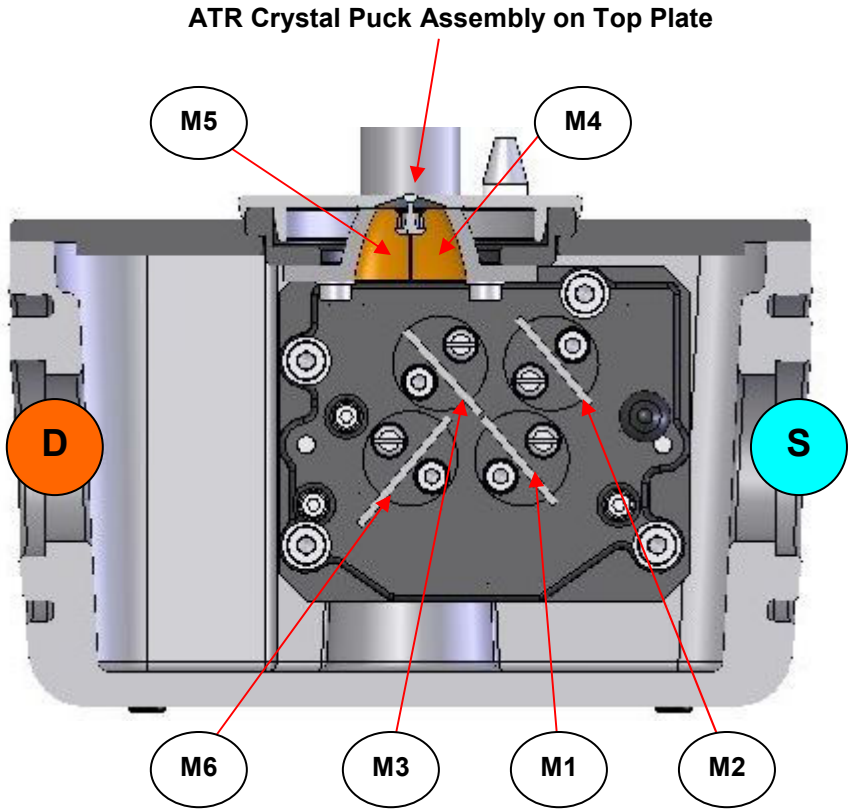


Fig 6. Cutaway front view of Quest ATR Accessory to show the Synopti-Focal arrangement of mirror components

The Quest ATR Accessory can be used in **any** standard spectrometer system irrespective of the beam direction of light through the sample compartment from source to detector. However, for explanation of the internal IR beam passage through the Quest ATR Accessory the sequential labeling of mirror components has been assigned for a spectrometer that has an IR beam running through the sample compartment from a source (**S**) on the right hand side towards a detector (**D**) on the left hand side. For this configuration the IR beam passage is as follows:-

S, M1, M2, M3, M4 – ATR Crystal – M5, M6, D.

The mirrors **M1, M2, M3** and **M6** are flat, gold coated mirrors. (**M6** is a slightly larger sized mirror, wider and longer than the **M1**, **M2** and **M3** mirrors, to eliminate any potential stray light throughput.) Mirrors **M4** and **M5** are aspheric focussing gold coated mirrors. The angle of incidence for the IR light beam when it interacts at the crystal sample interface surface is nominally set at 45° for the ATR effect.

Alignment Procedure

When the front cover plate (**5**) has been removed (see Fig 5.) to gain access to the internal **M1**, **M2**, **M3** and **M6** flat mirrors frame assembly, the mirrors **M1, M3** and **M6 only** in the optical unit can be adjusted for **rotation** and **tilt** for alignment, to optimise the light throughput of the Quest ATR Accessory for your spectrometer system.

Note: *The flat mirror **M2** and the hemispherical mirrors **M4** and **M5** do not require adjustment for the alignment procedure. A cover has been placed over the rotation adjustment screw for mirror **M2** (see Fig 6.) to prevent access for accidental movement.*

A 2.5mm ball driver tool has been supplied for adjustment of the rotation and tilt screws for the mirrors **M1**, **M3** and **M6**. Please refer to Fig 7. which identifies the rotation and tilt screws that need to be adjusted for the mirrors **M1**, **M3** and **M6**.

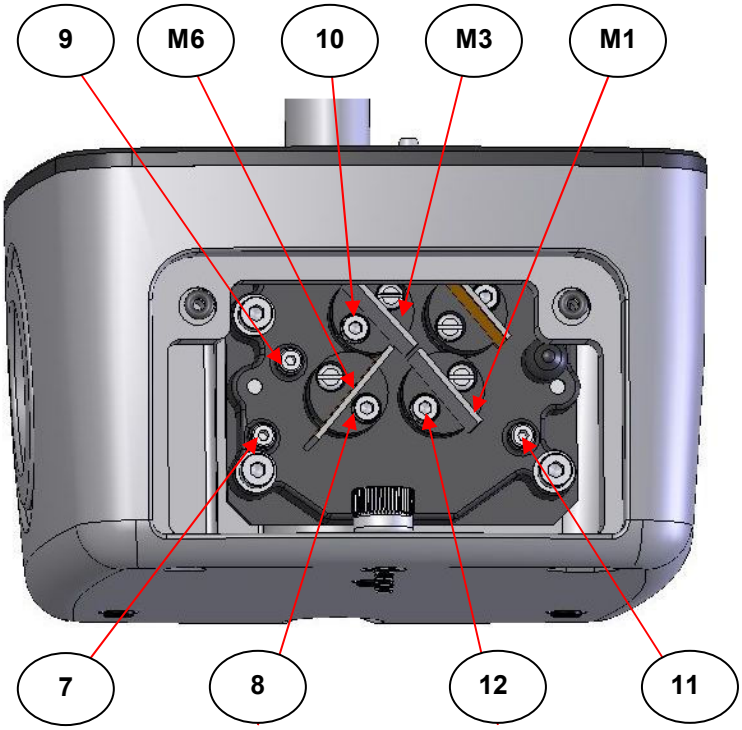


Fig 7. Access to Mirrors M1, M3 and M6 - Cover Plate Removed

The grub screw (**7**) allows for **rotation** of the **M6** mirror and the cap head screw (**8**) allows for **tilt** of the **M6** mirror, as fitted to the main mirror frame assembly.

The grub screw (**9**) allows for **rotation** of the **M3** mirror and the cap head screw (**10**) allows for **tilt** of the **M3** mirror, as fitted to the main mirror frame assembly.

The grub screw (**11**) allows for **rotation** of the **M1** mirror and the cap head screw (**12**) allows for **tilt** of the **M1** mirror, as fitted to the main mirror frame assembly.

To begin any alignment, first establish that there is a throughput of IR light radiation passing through the system from (**S)**ource to (**D)**etector with the Quest ATR Accessory installed correctly on it baseplate in the spectrometer sample compartment and with an ATR crystal puck assembly in position on the optical unit.

1. Using the 2.5mm ball driver tool (supplied), the alignment procedure initially involves **rotational** movement of the mirrors **M6**, **M3** and **M1** in this sequential order. The grub screws, (**7**), (**9**) and (**11**) are turned to make the rotational adjustment for each mirror. One at a time, very gently rotate each screw, (**7**), then (**9**) and finally (**11**), clockwise or anticlockwise to achieve a maximum energy signal reading. If you travel through a maximum energy position by, say, continued clockwise rotation, then turn the screw anticlockwise to bring back to the maximum point again. (And vice versa).

2. Having achieved a maximum throughput reading from rotation of the **M6, M3** and **M1** mirrors from step 1, now use the 2.5mm ball driver tool in the cap head screws (**8**), (**10**) and (**12**) in turn for these three mirrors (in the same sequence) for their **tilt** adjustment position by turning the screws similarly clockwise or anticlockwise to maximise the energy.

Having optimised all three mirrors **M6**, **M3** and **M1** for both their rotation and tilt settings for optical alignment, there is likely to be an overall improvement in the light throughput energy value for the Quest ATR accessory. Specac would recommend though that a second “iteration” or sequence of rotation and tilt adjustments for these three mirrors is carried out to optimize the energy throughput further for the Quest ATR Accessory. Therefore, repeat the mirror adjustment steps 1 and 2 again.

When satisfied after one (or two) adjustment sequences have been carried out that an acceptable throughput energy has been established, the alignment procedure has been completed and the front cover plate (**5**) can be repositioned onto the optical unit.

For some spectrometer configurations, if the Benchmark™ baseplate is mounted on a rail or is movable in the spectrometer, then an overall energy throughput may be improved by moving the Quest ATR Accessory on the Benchmark™ baseplate to find the best position where the transmission energy throughput is at a maximum. Firmly secure the Benchmark™ baseplate with the Quest Accessory into this new position if an improvement has been gained.

Note: *In some spectrometers it may be necessary to remove the Quest ATR optical unit before securing the baseplate. Where this is the case, ensure that the Benchmark™ baseplate does not move when removing the Quest ATR optical unit.*

Procedure to Follow from Any Accidental Mis-Alignment

If during the course of alignment a mistake is made and no signal response from the detector of the spectrometer can be obtained, then it may be possible to recover the situation for a partial rough re-alignment of the mirror optics **M1**, **M3** and **M6** to re-establish a small energy level through the system and allow for the correct alignment procedure to be followed again to optimise the light throughput.

Note: *The following procedure can also be adopted if any Quest ATR accessory to be used is ever found to be out of alignment when installed into a spectrometer system and there is no register of an energy throughput to the detector. Mirror **M2** should never need to be adjusted in any alignment procedure.*

1) With the front cover plate (**5**) removed from the optical unit to a gain access to the mirror frame assembly, also remove any crystal puck assembly from the top of the optical unit and remove the Quest optical unit from the Benchmark™ baseplate.

2) Using the 2.5mm ball driver tool in the screws (**8**), (**10**) and (**12**), adjust all three mirrors **M1**, **M3** and **M6** ONLY for their angle of tilt such that these mirror surfaces are **normal** (i.e. at a 90° right angle) with relation to the **back plane** of the main mirror mount frame assembly affixed to the rear of the optical unit.

3) Using the 2.5mm ball driver tool in the grub screw (**9**) to rotate mirror **M3** and in the grub screw (**11**) to rotate the mirror **M1**, adjust both mirrors to form a straight line for both of their mirror surfaces. Refer to **Fig 6** to indicate how they need to be roughly aligned to form a straight line orientation.

4) Mirror **M6** now needs to be adjusted for its rotation using the 2.5mm ball driver in the grub screw (**7**) such that its surface is similar in angular relation to the straight line formed by the two mirrors **M3** and **M1** as seen at **Fig 6.** An indication that a correct rotational angle for mirror **M6** has been achieved is when the grub screw (**7**) is proud of its mirror carriage frame assembly housing by circa 2mm. This depth indication for the grub screw (**7**) position can be observed looking through the aperture port (**16**) on the left hand side of the optical unit.

5) With the three mirrors **M1**, **M3** and **M6** now roughly positioned for their tilt and rotation angles, the optical unit can be placed back onto the Benchmark™ baseplate and the crystal puck assembly is repositioned on top of the optical unit to complete a beam path for light to travel through the Quest ATR accessory.

6) Set up the IR spectrometer to record an energy throughput level at the detector. Having followed steps 2) to 5) from the procedure above, there should now be some energy level indication (however small), at the detector after passage of light through the Quest ATR accessory and so the correct fine alignment procedure can now be followed starting with further rotation of mirror **M6** as described from step 1) on page 15 of this instruction manual. However, even if there is still **no signal** after steps 2) to 5), then turning the grub screw (**7**) for rotation of the mirror **M6** (first one way and then the other), at this stage now should lead to the energy level signal returning.

6. Purging the Quest ATR Optical Unit

When the Quest ATR Accessory has been installed and aligned in the spectrometer you have an option for purging the Quest ATR optical unit if this is necessary.

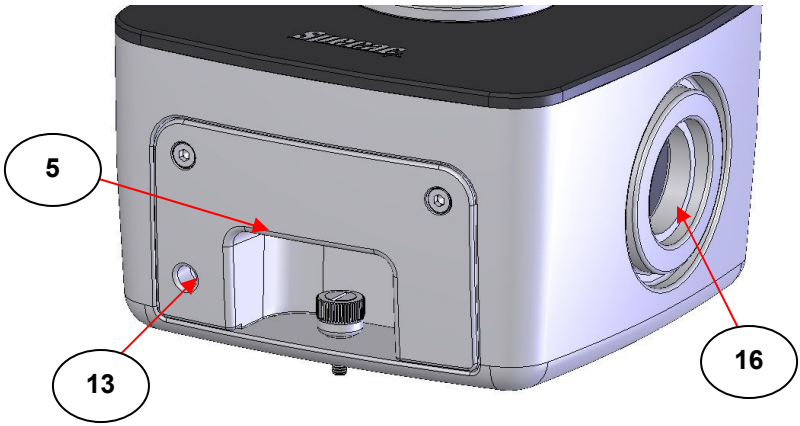


Fig 8. Aperture Ports and Purge Connection on the Quest ATR Optical Unit

On the front cover plate (**5**) there is small hole (**13**) into which 1/4" O.D. hard plastic tubing can be inserted to provide a gas supply such as N2 that creates a purged environment within the Quest ATR optical unit. The tubing is introduced through the front of the hole (**13**) and is held fast by two small curved grip plates (**14**). (See Fig 9.)

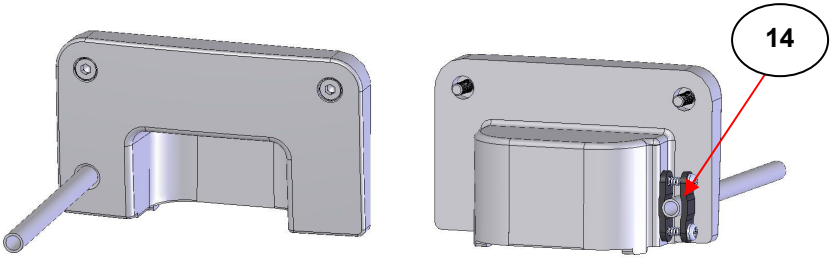


Fig 9. Front Cover Plate with Purge Tube – Front and Back Views

To introduce any tubing the front cover plate (**5**) is removed from the optical unit. The screws holding the two curved grip plates (**14**) are loosened to allow the open end of the tubing to pass through the grips, which has been introduced into the hole (**13**) from the front side of the cover plate. When a small length of tubing has passed through between the curved grips (**14**) their screws are retightened to hold the tubing firmly into position. The front cover plate (**5**) with attached purge tubing can now be refitted to the optical unit.

To help maintain a purged environment within the optical unit from introduction of a gas via the attached purge tubing, a pair of purge bellows (**15**) (P/N GS10707) have been supplied with the Quest ATR Accessory for attachment to the optical units two aperture ports (**16**). (See Figs 8 and 10.)

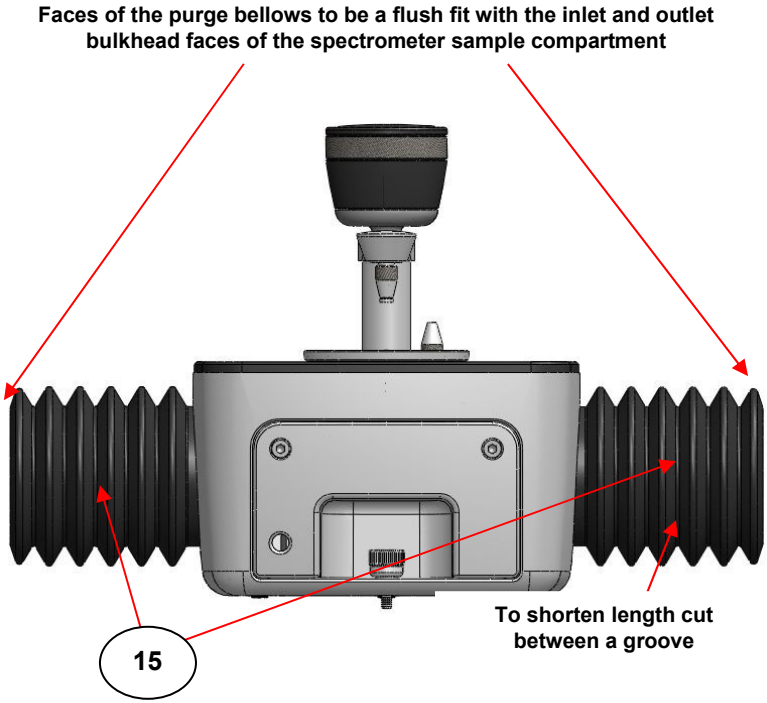


Fig 10. Quest ATR Accessory fitted with Purge Bellows

The purge bellows (**15**) grip fit between the circular recess and around the circumference protrusion part of the aperture ports (**16**). They fit the aperture port from one end only of their design as seen in Fig 10. The purge bellows (**15**) bridge any gap between the optical unit and the spectrometer sample compartment bulkheads from the (**S)**ource and to the (**D**)etector and thus help to contain any purged environment created within the optical unit whilst installed into the spectrometer sample compartment. If the gap/distance between the optical unit and bulkhead is small, the purge bellows can be cut to size for a better compressible fit. It is best to cut all the way around and in between one of the ridged grooves in the purge bellows moulding itself when shortening the length for fit.

Tip: *It is recommended that purge bellows (**15**) are fitted during use to help stabilize the spectrometer/instrument background even if purging is not to be carried out.*

Fitting the Purge Bellows P/N GS10707

1. With the Benchmark™ baseplate secured and the Quest ATR Accessory in position, measure the distance between the spectrometer source and detector bulkhead/side walls and the side end faces of the Quest ATR optical unit. (This is dimension "'X").

2. Using a sharp blade, cut lengths of the flexible purge bellows (**15**) which are equivalent to the measured length ("X") allowing for an additional 10mm for each length to cut. (e.g. X + 10mm.)

3. Unscrew the Quest ATR optical unit fixing thumb screw (**1**) from the Benchmark™ baseplate and remove the Quest ATR Accessory from the sample compartment.

4. Fit the shortened flexible purge bellows (**15**) over both end apertures (**16**) on the Quest ATR optical unit.

5. Replace the Quest ATR Accessory with the fitted purge bellows (**15**) back onto the Benchmark™ baseplate. Ensure that the compressed purge bellows (**15**) are not obstructing the optical beam and retighten the fixing thumb screw (**1**) to secure the Quest ATR Accessory back into position.

7. Quest ATR Anvils and Clamp Arm Assembly

Choice of Anvils and their Uses

There are two different compression head anvils (**17**) that can be used with the Quest ATR Accessory when fitted to the clamp arm assembly. The type of anvil and its uses are tabulated as follows:-

Anvil	Description	Sample Type / Use
GS10820	Stainless Steel Flat	Solids, films and powders
GS10821	Stainless Steel Pellet	Polymer beads, softish irregular shaped solids

Self Leveling Flat Anvil P/N GS10820 (Fig 11.)

Fig 11.

The stainless steel flat anvil P/N GS10820 has a self leveling surface head and should be used generally for all solid and powder samples to bring the sample into good contact with any of the Quest ATR diamond, ZnSe or Ge crystal puck assemblies.

Pellet Anvil P/N GS10821 (Fig 12.)

Fig 12.

The stainless steel pellet anvil P/N GS10821 has a concave recessed surface head designed to take round shaped samples such as polymer beads. **Relatively soft** irregular shaped samples can be used with this anvil on **any** of the Quest ATR diamond, ZnSe or Ge crystal puck assemblies, but **hard** or **very hard** samples should be used with **diamond** only.

Either the flat or the pellet anvil (**17**) is fitted to the clamp anvil arm assembly (**18**) by the screw threading on the anvil. For storage of the anvil (**17**) that is not fitted to the clamp anvil arm, there is a threaded location port (**19**) by the clamp arm assembly support post. (See Fig 13. – the flat anvil is in the clamp anvil arm assembly and the pellet anvil is in the storage port.)

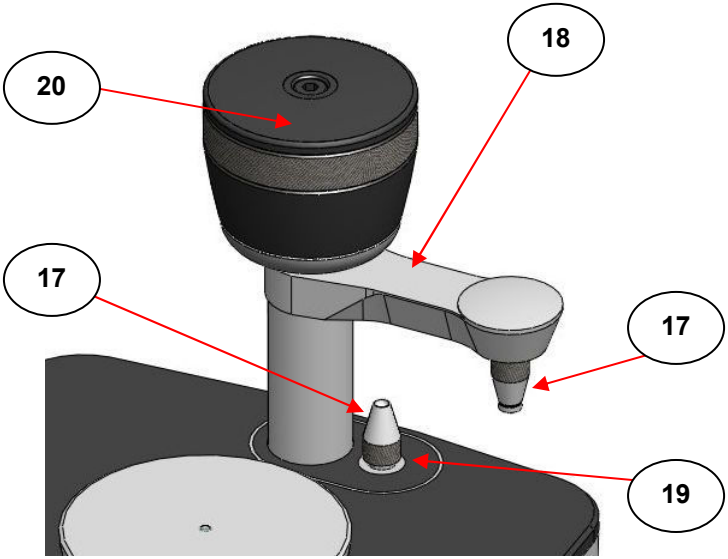


Fig 13. Anvil in Clamp Anvil Arm Assembly and in Storage Port

Clamp Anvil Arm Assembly

When using the Quest ATR Accessory, a liquid or solid sample is placed onto the crystal surface area of the flat ATR crystal puck assembly being used to obtain an ATR spectrum for the sample. Particularly for solid samples, the best ATR spectra are produced when the sample is in close contact with the ATR crystal, so it is recommended to use the clamp arm assembly (**18**) of the Quest ATR accessory on the optical unit. In this way a load can be applied to the solid sample from the appropriate flat or pellet compression head anvil (**17**) fitted in position, to force the sample into good and close contact with the diamond, ZnSe or Ge ATR crystal.

The clamp arm assembly (**18**) rotates on it support post for positioning of the arm assembly. For application of a load force onto the ATR crystal puck the clamp arm (**18**) is rotated to a central click stop position pointing towards the front of the Quest ATR optical unit seen in Fig 14. This is known as the "**sampling**" position.

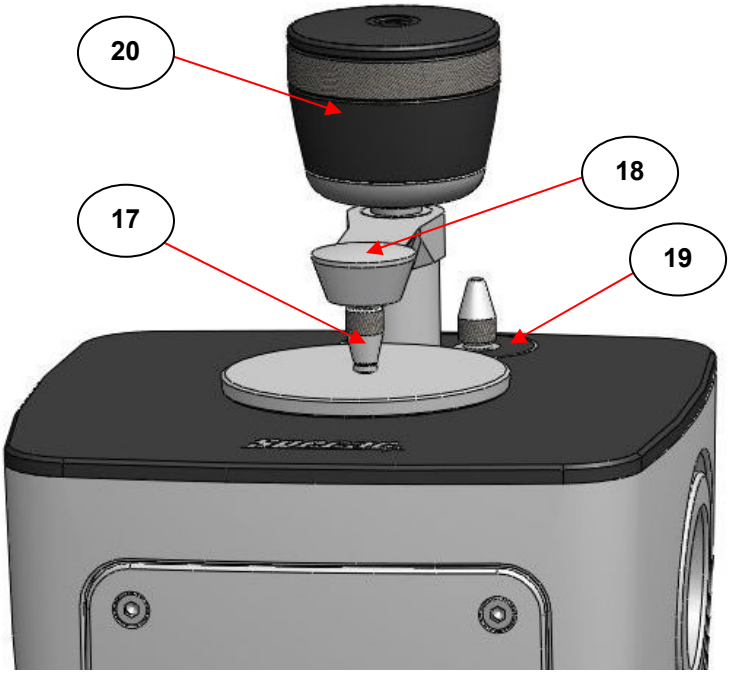


Fig 14. Clamp Arm Assembly with Flat Anvil in Sampling Position

If the clamp arm assembly is not required for sampling it can be rotated to a **"parked"** position to either the left or right side of the central post. As seen in the example image for Fig 13. the clamp arm assembly (**18**) has been rotated to the right side of the optical unit and is positioned above the screw threaded port (**19**) for storage of an anvil (**17**).

When turning the clamp arm assembly (**18**) from the **parked** to **sampling** position, the level of the anvil (**17**) pressing face must be sufficiently clear from the crystal surface to place a sample. The anvils height position is controlled by rotation of the torque limiter screw knob assembly (**20**). In Fig 14. the flat anvil (**17**) is shown being forced down onto the crystal puck from clockwise rotation and tightening of the torque limiter screw knob (**20**).

Torque Limiter Screw Knob Assembly

The Quest ATR clamp arm assembly (**18**) is provided with a special built in torque limiter screw knob assembly (**20**). (See Figs 13. and 14.) For solid sampling, an appropriate anvil (**17**) is fitted in position. A solid sample is placed upon the diamond, ZnSe or Ge ATR crystal of the crystal puck assembly being used and the clamp arm assembly is positioned towards the front of the optical unit with the anvil (**17**) pressing surface at a suitably clear distance from and over the sample, in readiness for turning the torque limiter screw knob (**20**) to bring the anvil (**17**) down and into contact with the sample.

With an appropriate anvil (**17**) fitted, the torque limiter screw knob (**20**) is turned in a clockwise fashion to provide a pre-determined set pressure (40lbs **load** spread over the anvil face) which is transferred to the sample. In operation the entire torque limiter screw knob (**20**) is rotated until a sufficient load and hence pressure has been applied to the sample which is in turn forced into close contact with the surface of the ATR crystal.

The torque limiter screw knob (**20**) will continue to rotate if being turned when the set load is reached, but the drive connection slips and no more force will be applied. A “clicking” sound with continual rotation of the knob acts as the indicator when the set applied load has been reached.

8. Sampling Using the Quest ATR Accessory

Important Note for Usage!

The diamond, ZnSe and Ge crystals in the Quest ATR crystal puck assemblies have a specific hardness and chemical resistance and should be treated accordingly. The crystals have been sealed into position to the stainless steel top plate mounting using Indium material. Check on the chemical nature of a sample before potentially damaging materials are brought into contact with the ATR crystal and the Indium seal.

Be careful not to put a “point load” on the ATR crystal, particularly with the ZnSe and Ge crystal materials, from hard or abrasive samples. When using samples such as rubbers and polymer sheeting there should be no problem and normal anvil pressures may be used. The measurement of thin films on plastic substrates should present a minimal risk for crystal damage, but care should be taken if the substrate material is hard and metallic in nature.

Apply pressure from the torque limiter screw knob (**20**) by turning it gradually. For some sample types, if there is a risk of damage to the ATR crystal, it is advisable to try and acquire an infra red spectrum to see if an acceptable load has already been applied for sample contact, before the maximum load setting has been reached from clockwise rotation of the torque limiter screw knob.

Preparing the Quest ATR Accessory for Analysis

For the diamond, ZnSe and Ge ATR crystal puck assemblies the active sampling area extends across the whole of the ATR crystal surface. It is therefore preferable to have enough sample to completely cover the ATR crystal to utilise the maximum energy throughput available for the Quest ATR Accessory.

The procedure for collecting a sample ATR spectrum requires first obtaining a background spectrum as a reference using the Quest ATR Accessory with no sample in position on the ATR crystal puck and then repeating the procedure with a sample in position.

Collecting a Background Spectrum

1. Choose a diamond, ZnSe or Ge ATR crystal puck assembly to be used on the Quest ATR optical unit and clamp arm assembly.

2. Attach the Quest ATR optical unit to the installed Benchmark™ baseplate and fit the chosen ATR crystal puck assembly to the optical unit.

3. If wishing to analyse a **solid** sample type, choose the appropriate compression head anvil (**17**) (P/N GS10820 flat or P/N GS10821 pellet- see Figs 11. and 12.) to fit to the clamp arm assembly (**18**).

4. The Quest ATR accessory should already be aligned to register an acceptable signal throughput with an ATR crystal puck assembly in position. Having ensured that the diamond, ZnSe or Ge ATR crystal is clean, proceed to collect a background spectrum using any preferred acquisition conditions set on the spectrometer.

Note: *The chosen anvil (**17**) fitted to the clamp anvil arm assembly **does not** need to be in contact with the ATR crystal to record a background spectrum.*

Collecting ATR Spectra of Powder Samples

When analyzing for a **powder** sample it is best to use the self leveling flat anvil (**17**) of the two anvil options, fitted to the clamp arm assembly (**18**). The procedure for spectral collection is as follows:-

1. Collect a **background spectrum** as described in steps 1 to 4 (page 26).

2. Take the powder sample and spread it very carefully to form a level surface that covers the entire central surface of the diamond, ZnSe or Ge or ATR crystal. Ideally the powder sample should be fine, smooth and homogenous with no hard lumps or inclusions. This will help to avoid any risk of “point load” to the ATR crystal when being pressed.

3. Rotate the clamp arm assembly (**18**) with fitted anvil (**17**) from its **parked** position towards the front of the optical unit, ensuring there is enough clearance of the anvil pressing surface from the sample that has been placed into position over the crystal. The clamp arm assembly will click correctly into the **sampling** position over the crystal area when turned towards the front.

4. Begin turning the torque screw knob (**20**) clockwise to lower the Self leveling flat anvil (**17**) towards the sample surface. Continue rotation until the knob "clicks" with further rotation. At this point the maximum load achievable will be applied to the powder sample forcing it against the ATR crystal.

Note: *If the sample may be hard or could produce a point load effect, carry out rotation of the torque knob slowly and apply the load gradually. An acceptable ATR spectrum for the sample may be produced without having to apply a maximum load setting from the torque knob assembly.*

5. Collect and record the ATR spectrum for the sample.

6. To remove or change the sample, release the load/pressure on the sample by unscrewing the torque knob assembly (**20**) to retract the anvil (**17**) and turn the clamp arm (**18**) from its **sampling** position to a **parked** position.

7. Clean the powder sample carefully away from the ATR crystal (avoid the possibility of scratching the ATR crystal surface if using a ZnSe or Ge crystal puck) and wipe and clean any powder off the surface of the self leveling flat anvil (**17**). If using a diamond ATR puck there is a minimal risk of damage to the ATR crystal because of the chemical and structural resilience of diamond material.

After cleaning (see **Notes On Cleaning** page 35), the Quest ATR Accessory is ready to accept a new sample for measurement.

Collecting ATR Spectra of Flat Solid Samples

When analyzing for a **flat solid sample** it is best to use the self leveling flat anvil (**17**) of the two anvil options, fitted to the clamp arm assembly (**18**). The procedure for spectral collection is as follows:-

1. Collect a **background spectrum** as described in steps 1 to 4 (page 26).

2. Take the flat solid sample and place it very carefully such that it covers the entire central surface of the diamond, ZnSe or Ge or ATR crystal. Ideally the flat solid sample should be smooth and homogenous with no hard lumps or inclusions. This will help to avoid any risk of “point load” to the ATR crystal when being pressed.

3. Rotate the clamp arm assembly (**18**) with fitted anvil (**17**) from its **parked** position towards the front of the optical unit, ensuring there is enough clearance of the anvil pressing surface from the sample that has been placed into position over the crystal. The clamp arm assembly will click correctly into the **sampling** position over the crystal area when turned towards the front.

4. Begin turning the torque screw knob (**20**) clockwise to lower the Self leveling flat anvil (**17**) towards the sample surface. Continue rotation until the knob “clicks” with further rotation. At this point the maximum load achievable will be applied to the flat solid sample forcing it against the ATR crystal.

Note: *If the sample may be hard or could produce a point load effect, carry out rotation of the torque knob slowly and apply the load gradually. An acceptable ATR spectrum for the sample may be produced without having to apply a maximum load setting from the torque knob assembly.*

5. Collect and record the ATR spectrum for the sample.

6. To remove or change the sample, release the load/pressure on the sample first by unscrewing the torque knob assembly (**20**) to retract the anvil (**17**) and turn the clamp arm (**18**) from its **sampling** position to a **parked** position.

7. Remove the flat solid sample carefully away from the ATR crystal (avoid the possibility of scratching the ATR crystal surface if using a ZnSe or Ge crystal puck) and wipe and clean any sample off the surface of the self leveling flat anvil (**17**). If using a diamond ATR puck there is a minimal risk of damage to the ATR crystal because of the chemical and structural resilience of diamond material.

After cleaning (see **Notes On Cleaning** page 35), the Quest ATR Accessory is ready to accept a new sample for measurement.

Collecting ATR Spectra of Pellet/Bead Samples

When analyzing for a **pellet bead or irregular shaped sample** it is best to use the pellet anvil (**17**) of the two anvil options, fitted to the clamp arm assembly (**18**), to help centralise the sample for contact to the ATR crystal. The procedure for spectral collection is as follows:-

1. Collect a **background spectrum** as described in steps 1 to 4 (page 26).

2. Take the pellet/bead or irregular shaped sample and place it very carefully such that it covers the entire central surface of the diamond, ZnSe or Ge or ATR crystal. Ideally the pellet/bead sample should be smooth and homogenous with no hard lumps or inclusions. This will help to avoid any risk of “point load” to the ATR crystal when being pressed.

Note: *Pellet/beads of 1.5mm in diameter or less are not suitable for pressing using the concave recessed pellet anvil (**17**).Small pellet/beads may have to be analysed by careful manipulation using the self-leveling flat anvil (**17**) instead. Beware to avoid any point loading on the ATR crystal with a small pellet/bead sample. **For hard or very hard samples** Specac recommend using **diamond ATR crystal pucks only.***

3. Rotate the clamp arm assembly (**18**) with fitted anvil (**17**) from its **parked** position towards the front of the optical unit, ensuring there is enough height clearance of the anvil pressing surface from the sample. The clamp arm (**18**) will “click” correctly into the **sampling** position over the crystal area when turned towards the front.

4. Begin turning the torque screw knob (**20**) clockwise to lower the pellet anvil (**17**) towards the sample surface. As the concave, recessed surface of the pellet anvil begins to touch the pellet/bead sample it will help to keep the sample centralised over the ATR crystal. Continue rotation until the knob “clicks” with further rotation. At this point the maximum load achievable will be applied to the pellet/bead sample forcing it against the ATR crystal.

Note: *If the sample may be hard or could produce a point load effect, carry out rotation of the torque knob slowly and apply the load gradually. An acceptable ATR spectrum for the sample may be produced without having to apply a maximum load setting from the torque knob assembly.*

5. Collect and record the ATR spectrum for the sample.

6. To remove or change the sample, release the load/pressure on the sample by unscrewing the torque knob assembly (**20**) to retract the pellet anvil (**17**) and turn the clamp arm (**18**) from its **sampling** position to a **parked** position.

7. Remove the pellet/bead sample carefully away from the ATR crystal (avoid the possibility of scratching the ATR crystal surface if using a ZnSe or Ge crystal puck) and wipe and clean any sample off the surface of the stainless steel anvil (**17**). If using a diamond ATR puck there is a minimal risk of damage to the ATR crystal because of the chemical and structural resilience of diamond material.

After cleaning (see **Notes On Cleaning** page 35), the Quest ATR Accessory is ready to accept a new sample for measurement.

Collecting ATR Spectra of Fiber Samples

When analyzing for a **fiber sample** it is best to use the self leveling flat anvil (**17**) of the two anvil options, fitted to the clamp arm assembly (**18**). The procedure for spectral collection is as follows:-

Note: *When fitted, some movement of the self leveling flat anvil (**17**) pressing surface is allowed to adjust to the sample shape during compression. This movement enables even pressure to be applied across the sample contact area.*

1. Collect a **background spectrum** as described in steps 1 to 4 (page 26).

2. Take the fiber (or fibers) sample and place it very carefully such that it covers the entire central surface of the diamond, ZnSe or Ge or ATR crystal. Lay the fiber centrally across the ATR crystal surface and affix/tape down the fiber ends outside of the ATR crystal surface if necessary. Ideally the fiber sample should be smooth and homogenous with no hard lumps or inclusions. This will help to avoid any risk of “point load” to the ATR crystal when being pressed.

3. Rotate the clamp arm assembly (**18**) with fitted anvil (**17**) from its **parked** position towards the front of the optical unit, ensuring there is enough clearance of the anvil pressing surface from the sample that has been placed into position over the crystal. The clamp arm assembly will click correctly into the **sampling** position over the crystal area when turned towards the front.

4. Begin turning the torque screw knob (**20**) clockwise to lower the Self leveling flat anvil (**17**) towards the sample surface. Continue rotation until the knob “clicks” with further rotation. At this point the maximum load achievable will be applied to the pellet/bead sample forcing it against the ATR crystal.

Note: *If the sample may be hard or could produce a point load effect, carry out rotation of the torque knob slowly and apply the load gradually. An acceptable ATR spectrum for the sample may be produced without having to apply a maximum load setting from the torque knob assembly.*

5. Collect and record the ATR spectrum for the sample.

6. To remove or change the sample, release the load/pressure on the sample by unscrewing the torque knob assembly (**20**) to retract

the anvil (**17**) and turn the clamp arm (**18**) from its **sampling** position to a **parked** position.

7. Remove the fiber sample carefully away from the ATR crystal (avoid the possibility of scratching the ATR crystal surface if using a ZnSe or Ge crystal puck) and wipe and clean any sample off the surface of the stainless steel anvil (**17**). If using a diamond ATR puck there is a minimal risk of damage to the ATR crystal because of the chemical and structural resilience of diamond material.

After cleaning (see **Notes On Cleaning** page 35), the Quest ATR Accessory is ready to accept a new sample for measurement.

Collecting ATR Spectra of Liquids and Paste Samples

In general, liquid and paste like samples make good, close contact with the ATR crystal and it is not necessary to use the clamp arm assembly (**18**) fitted with an anvil, **unless** a liquid solvent or solution is volatile by nature. In this case Specac recommend use of the volatiles cover (**21**) (P/N GS10825 - supplied) to place over the sample on the crystal with the self leveling flat anvil (**17**) fitted into the clamp arm assembly (**18**) to apply a force and seal the volatiles cover (**21**) into position.

For analyzing a liquid or a paste:

1. Collect a **background spectrum** as described in steps 1 to 4 (page 26).

2. Take the liquid or paste sample and place it very carefully such that it covers the entire surface of the diamond, ZnSe or Ge or ATR crystal. A dropping pipette can be used to dispense a liquid and a soft bladed spatula can be used to spread a paste over the ATR crystal of the flat ATR crystal top plate assembly.

3. Place the volatiles cover (**21**) into position over the sample and use the clamp arm assembly (**18**) with the self leveling flat anvil (**17**) if necessary. (See Figs 15. and 16. and how to use the volatiles cover from pages 33 and 34.)

4. Collect and record the ATR spectrum for the sample.

5. To remove a liquid sample, any excess can be removed by sucking up into a dropping pipette and cleaning any residual liquid sample away using soft lens tissues and an appropriate solvent. To remove a paste sample, any excess can be removed by careful use of the soft bladed spatula and cleaning any residual sample away using soft lens tissues and an appropriate solvent. For either a liquid or paste sample be careful when cleaning away from the ZnSe or Ge crystal top plate assemblies to avoid risk of damage to these crystal materials.

After cleaning (see **Notes On Cleaning** page 35), the Quest ATR accessory is ready to accept a new sample for measurement.

The Volatiles Cover P/N GS10825

Included with the Quest ATR Accessory is a volatiles cover (**21**) (P/N GS10825) that can be used when sampling volatile liquid samples for their prolonged containment and surface contact with the ATR crystal material from the crystal puck option fitted to the Quest ATR optical unit. The volatiles cover is a flat circular plate with an O-ring on the underside for sealing into position when a force is applied from the flat anvil (**17**) fitted to the clamp arm assembly (**18**). (See Figs 15. and 16.)

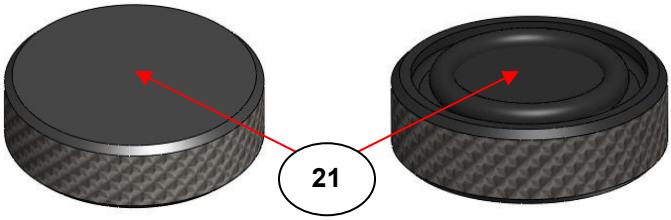


Fig 15. Volatiles Cover (top view left – underside view right)

When a volatile solvent or solution sample has been spotted into position over the crystal of an ATR crystal puck, the underside of the volatiles cover (**21**) is placed over the sample. Rotate the clamp arm assembly (**18**) with fitted flat anvil (**17**) from its **parked** position towards

the front of the optical unit, ensuring there is enough clearance of the anvil pressing surface from the top side of the volatiles cover (**21**) that has been placed into position over the crystal. The clamp arm assembly (**18**) will click correctly into the **sampling** position over the crystal area when turned towards the front. Begin turning the torque screw knob (**20**) clockwise to lower the stainless steel flat anvil (**17**) towards the volatile cover (**21**). Continue rotation until the knob “clicks” with further rotation. At this point the maximum load achievable will be applied to the volatiles cover to seal its O -ring against the top plate surface surrounding the ATR crystal and to trap the volatile solvent or solution sample within.

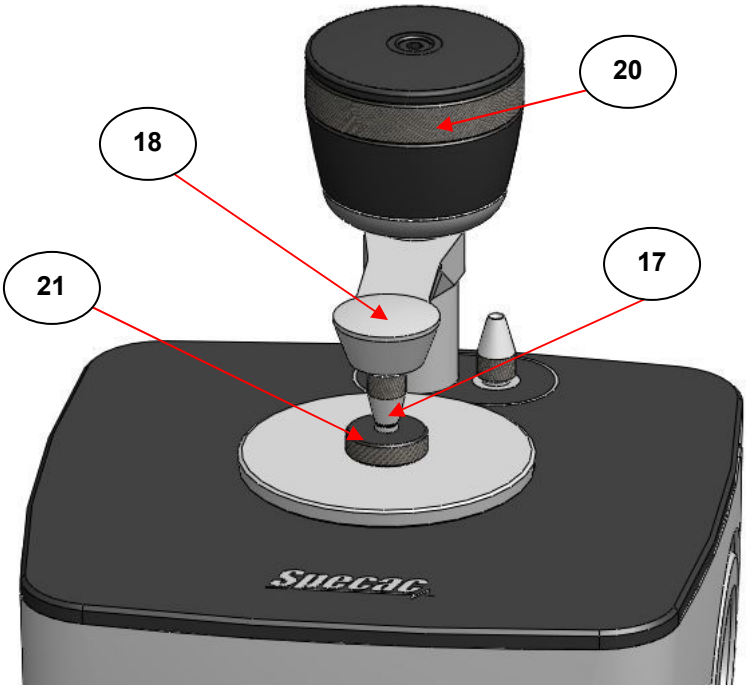


Fig 16. Volatiles Cover clamped into position using the Flat Anvil with the Clamp Arm Assembly

Notes On Cleaning

When cleaning a diamond, ZnSe or Ge ATR crystal of the Quest ATR crystal puck assembly in preparation for a new sample, it is **very important to take care** to avoid damage to the crystal materials**.** As also mentioned in the Safety Considerations (Section 2, page 5), of the three crystal materials ZnSe is potentially the most hazardous in terms of risk of toxicity if it comes into contact with the skin.

Note: ***Always wear gloves to protect yourself and the ATR crystal material.***

A useful feature of the Quest ATR Accessory is the capability for removal of the ATR crystal puck from the optical unit, such that any sample can be prepared remotely and safely, if desired, onto the ATR crystal surface and then the ATR crystal puck assembly can be bought for fitting onto the optical unit whilst installed in the spectrometer. Similarly for cleaning, it may be useful to remove the crystal puck from the optical unit and carry it to a safe area for solvent cleaning and wiping with a tissue and therefore minimise any risk of contamination being carried over to other components of the accessory whilst in situ.

Solvents such as water, methanol and acetone are suitable to use for cleaning purposes. Sample solutions that fall within the pH range of pH4 to pH11 are tolerated by the ZnSe crystal material. Stronger acids and bases will damage ZnSe irreparably.

When wiping away any solid or liquid sample, use very soft lens tissues to avoid scratches being caused on the surface of the ATR crystal, **particularly if using the ZnSe or Ge crystal pucks as these crystal materials are not as resilient as diamond.** Scratches and blemishes to the ATR crystal surface will result in poor light throughput for the ATR technique and an overall degradation in the accessories performance.

In common and general usage it will only be necessary to wipe and clean away at the top surface of any Quest ATR crystal puck between samples. If possible try to avoid any solvent or cleaning solution materials from getting to the underside of the crystal puck. There is a

risk that any dried solution components that have been introduced to this underside of the ATR crystal puck could be seen as an “impurity” against the ATR crystal in any “background” spectrum to be collected, and so this contaminant would need to be removed before any further sampling can continue.

Diamond Crystal Considerations

The diamond crystal material in the crystal puck (P/N’s GS10810 and GS10811 options) is much more chemically durable than either the ZnSe or Ge crystal puck options. Therefore, if a sample is stubbornly resistant to removal from the crystal surface, a more “vigorous” method of cleaning may be carried out for the diamond material than could be achieved with the ZnSe or Ge crystal puck options. More aggressive solvents and abrasive cleaners could be considered suitable for use to remove the sample, if these are necessary.

Warning*: A procedure for cleaning away a stubborn sample from the top surface of* ***a diamond crystal puck assembly,*** *should it prove to be effective,* ***should never*** *be considered for use with either the ZnSe or Ge crystal puck options. It is highly likely these crystal materials themselves will be irreparably damaged from the cleaning regime*.

Data Sheet For Diamond

General

Hardest substance known for carbon (C) elemental form.
Can be shaped, cut and polished to form spectral transmission window or crystal for ATR spectroscopy.
Has a highish Refractive Index value and can suffer reflection losses but these can be improved with antireflection optical coatings
Extremely chemically resistant to practically all known materials.
Element symbol: C
Chemical Abstracts Service (CAS) No: 7440-44-0 (Synthetic) : 7782-42-5 (Natural)

Physical Data

Appearance: Clear, transparent and generally colourless solid. Has no odour.
Melting point: N/A.
Boiling point: 4827°C.
Vapour pressure: N/A.
Specific gravity: 2.26 g cm^{-3}.
Solubility in water: Insoluble
Hardness: 5700 Kg/mm^2.
Refractive Index: 2.43 (at 2000cm-1 - wavenumbers).
Spectroscopic transmission range: 40,000 to 10 cm-1 (wavenumbers).

Stability

Stable.

Toxicology

Not classified as a dangerous or harmful material according to EC directives.

Personal Protection

Always wear safety spectacles and gloves when handling the window or crystal material.
Allow for adequate ventilation.

Storage

Keep windows or crystal stored in a cool, dry container.

Data Sheet For Zinc Selenide

General

Toxic and hard, yellow coloured crystalline powder when fused together as a solid can be used as a transmission window material or as a crystal material for attenuated total reflectance (ATR) FTIR spectroscopy.
Insoluble in water, but attacked by strong acids and bases. (pH range 4 to 11 tolerant). Organic solvents have no effect.
Fairly brittle as a window material and sensitive to thermal and mechanical shock.
Molecular formula: ZnSe
Chemical Abstracts Service (CAS) No: 1315-09-9.

Physical Data

Appearance: Yellow crystals, granular powder or amber coloured window material.
Melting point: 1515°C at 1.8 atmospheres. (26.5psi)
Solubility in water: 0g/100g at 0°C.
Hardness: 120 Kg/mm^2.
Refractive Index: 2.43 (at 2000cm-1 - wavenumbers).
Spectroscopic transmission range: 20,000 to 500 cm-1 (wavenumbers).

Stability

Stable. Reacts with acids to give highly toxic hydrogen selenide. May be air and moisture sensitive. Incompatible with strong acids, strong bases and strong oxidising agents.

Toxicology

Toxic if small amounts are inhaled or swallowed. In stomach toxic hydrogen selenide (H2Se) is liberated. Skin and eye irritant. Danger of cumulative effects from frequent handling without protection.

Personal Protection

Always wear safety spectacles and gloves when handling the powder or window material. Allow for good ventilation.

Storage

Keep powder or windows stored in a cool, dry container, with appropriate safety labelling.

Data Sheet For Germanium

General

Hard and very brittle material, but can be shaped, cut and polished to form spectral transmission window or crystal for ATR spectroscopy.
Because of its high Refractive Index value suffers from large reflection losses but these can be improved with antireflection optical coatings
Is temperature sensitive and loses transmission when heated. (Is optically opaque to IR transmission at 190°C temperature.)
Insoluble in water and alcohols. Soluble in hot sulphuric acid and aqua regia.
Element symbol: Ge
Chemical Abstracts Service (CAS) No: 7440-56-4.

Physical Data

Appearance: Greyish/black, opaque, elemental, metallic solid. Has no odour.
Melting point: 737°C.
Boiling point: 2830°C.
Vapour pressure: 2.66 x 10^{-56} mm Hg at 25°C.
Specific gravity: 5.323 g cm^{-3}.
Solubility in water: Insoluble
Hardness: 780 Kg/mm^2.
Refractive Index: 4.01 (at 2000cm-1 - wavenumbers).
Spectroscopic transmission range: 5,500 to 500 cm-1 (wavenumbers).

Stability

Stable.

Toxicology

Harmful if ingested in large amounts, if inhaled, or if in repeated contact with the skin.

Personal Protection

Always wear safety spectacles and gloves when handling the window or crystal material.
Allow for adequate ventilation.

Storage

Keep windows or crystal stored in a cool, dry container.

9. Quest ATR Accessory "Bubble Numbers" Part Identification List

(**1**) Optical unit fixing thumb screw to Benchmark™ baseplate.
(**2**) Location slot of ATR crystal puck assemblies.
(**3**) Location pin on top surface of the optical unit.
(**4**) Magnetic catch for ATR crystal puck assemblies.
(**5**) Front cover plate of optical unit.
(**6**) Captive screw of front cover plate.
(**7**) Grub screw for M6 mirror rotation.
(**8**) Cap head screw for M6 mirror tilt.
(**9**) Grub screw for M3 mirror rotation.
(**10**) Cap head screw for M3 mirror tilt.
(**11**) Grub screw for M1 mirror rotation.
(**12**) Cap head screw for M1 mirror tilt.
(**13**) Purge tube location port in front cover plate.
(**14**) Curved grip plate for purge tubing in front cover plate.
(**15**) Purge bellow.
(**16**) Aperture port on optical unit.
(**17**) Flat or pellet compression head anvil.
(**18**) Clamp arm assembly.
(**19**) Anvil storage port.
(**20**) Torque screw knob.
(**21**) Volatiles cover.

10. Quest ATR Accessory Spare Parts

Complete Accessories – (Optical unit with clamp arm assembly, specific ATR crystal puck option and Benchmark™ baseplate)

P/N GS10800-X Quest ATR Diamond Accessory.
P/N GS10801-X Quest ATR Diamond Extended Range Accessory.
P/N GS10802-X Quest ATR ZnSe Accessory.
P/N GS10803-X Quest ATR Ge Accessory.

Note: *To purchase a Quest ATR Accessory with a particular coloured top surface, specify the appropriate letter for colour coding in place of 'X 'after the part number when ordering. (See page 4. e.g. GS10800-R for Quest ATR Diamond Accessory (Red)).*

Replacement Crystal Puck Assemblies

P/N GS10810 Quest ATR Diamond Crystal Puck.
P/N GS10811 Quest ATR Diamond Extended Range Crystal Puck.
P/N GS10812 Quest ATR ZnSe Crystal Puck.
P/N GS10813 Quest ATR Ge Crystal Puck.

Spare Parts

P/N GS10820 Quest ATR Self Leveling Flat Anvil.
P/N GS10821 Quest ATR Pellet Anvil.
P/N GS10825 Quest ATR Volatiles Cover.
P/N GS10707 Purge Bellows (pair).

Quest ATR Crystal Replacement

If damage is sustained to the diamond, ZnSe or Ge ATR crystal of the crystal puck assemblies, a new replacement puck assembly can be ordered from Specac, or the damaged puck assembly can be returned to Specac for inspection to try and effect a repair. In the event of such an occurrence please contact Specac to arrange for return of the item.

11. Quest ATR Technical Specifications

	ZnSe	Germanium	Diamond
ATR Crystal Active Area	ZnSe 45° 3.4 mm dia.	Ge 45° 3.4 mm dia.	Diamond 45° 1.8 mm dia.
Accessory Transmission Range cm^{-1}	7,800 - 500 (AR coated)	5,500 - 480 (AR coated)	7,800 - 400 (AR coated) 10,000 - 40 (Extended)
Refractive Index at 1000cm^{-1}	2.43	4.0	2.40
Depth of Penetration	2.0µm (For Sample of Refractive index 1.5 @ 1000cm^{-1})	0.7µm (For Sample of Refractive index 1.5 @ 1000cm^{-1})	2.0µm (For Sample of Refractive index 1.5 @ 1000cm^{-1})
ATR Crystal Plate Assembly	ZnSe sealed with Indium into hardened stainless steel top plate	Ge sealed with Indium into hardened stainless steel top plate	Diamond sealed with Indium into hardened stainless steel top plate
Applied Force From Clamp Anvil	40 lbs	40 lbs	40 lbs
Maximum Compression Head (Anvil) Travel	18mm	18mm	18mm
Quest ATR Accessory Weight	1.6Kgs	1.6Kgs	1.6Kgs
Quest ATR Dimensions W x D X H (mm)	150 x 150 x 180	150 x 150 x 180	150 x 150 x 180

12. Quest ATR Serial Numbers

Your Quest ATR Accessory will be provided with a serial number for identification of certain individual part assemblies. To help you, please use the grid below to fill in the serial number information of the Quest ATR Accessory parts you have received. If you need to contact Specac for any issues regarding your Quest ATR Accessory it may be necessary to provide the serial number of the item to identify for replacement parts.

Quest ATR Part Number and Description	Serial Number
P/N GS10800 – optical unit with clamp arm assembly and diamond (AR coated) top plate assembly	
P/N GS10801 – optical unit with clamp arm assembly and diamond (extended range) top plate assembly	
P/N GS10802 – optical unit with clamp arm assembly and ZnSe (AR coated) top plate assembly	
P/N GS10803 – optical unit with clamp arm assembly and Ge (AR coated) top plate assembly	
P/N GS10810 – Diamond (AR coated) puck	
P/N GS10811 – Diamond (extended range) puck	
P/N GS10812 – ZnSe (AR coated) puck	
P/N GS10813 – Ge (AR coated) puck	

Notes for Use of Quest ATR Accessory

Worldwide Distribution

France
Eurolabo - Paris.
Tel.01 42 08 01 28
Fax 01 42 08 13 65
email: contact@eurolabo.fr

Germany
L.O.T. - Oriel GmbH & Co,
KG - Darmstadt
Tel: 06151 88060
Fax: 06151 880689
email:info@LOT-Oriel.de
Website: www.LOT-Oriel.com/de

Japan
Systems Engineering Inc. -Tokyo
Tel: 03 3946 4993
Fax: 03 3946 4983
email:systems-eng@systems-eng.co.jp
Website: www.systems-eng.co.jp

Spain
Teknokroma S.Coop C. Ltda
Barcelona
Tel: 93 674 8800
Fax: 93 675 2405
email: comercial@teknokroma.es

Switzerland
Portmann InstrumentsAG
Biel-Benken
Tel: 061 726 6555
Fax: 061 726 6550
email: info@portmann-instruments.ch
Website:www.portmann-instruments.ch

USA
SPECAC INC.
414 Commerce Drive
Suite 175,
Fort Washington,
PA 19034, USA
Tel: 215 793 4044
Fax: 215 793 4011

United Kingdom
Specac Ltd. - London
River House, 97 Cray Avenue,
Orpington
Kent BR5 4HE
Tel: +44 (0) 1689 873134
Fax: +44 (0) 1689 878527
Registered No. 1008689 England

Brilliant Spectroscopy™

www.specac.com

SPECAC INC.
414 Commerce Drive
Suite 175,
Fort Washington,
PA 19034, USA
Tel: 215 793 4044
Fax: 215 793 4011

SPECAC LTD.
River House, 97 Cray Avenue,
Orpington
Kent BR5 4HE
Tel: +44 (0) 1689 873134
Fax: +44 (0) 1689 878527
Registered No. 1008689 England