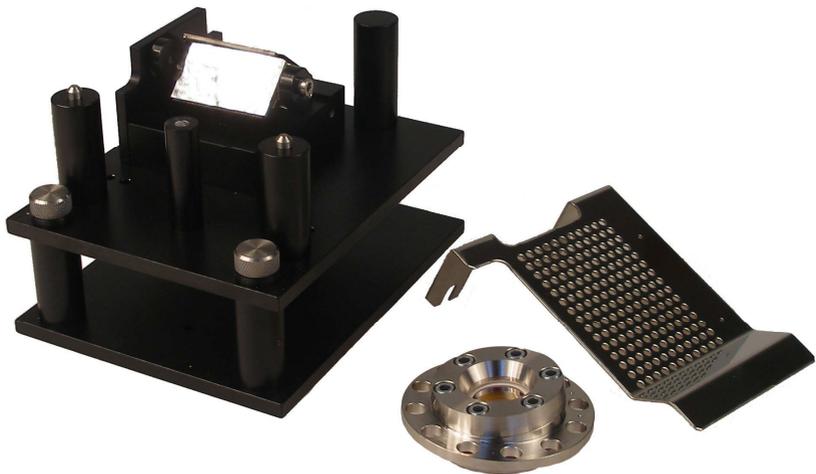


High Temperature High Pressure Cell Reflectance Mode Upgrade Kit



User Manual



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High Temperature High Pressure Cell Reflectance Mode Upgrade Kit P/N GS05860

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1. Introduction

This user instruction manual for the High Temperature High Pressure (HTHP) Cell Reflectance Mode Upgrade Kit P/N GS05860 is a **supplement** to the user instruction manuals supplied with the HTHP Cell if ordered as the standard version from P/N GS05850 or the Advanced version as P/N GS05855. User instruction manuals for the HTHP Cell itself and its dedicated temperature controller are supplied against P/N's GS05850 and GS05855, but the user instruction manual for P/N GS05860 is included with the Advanced version of HTHP Cell when ordered as P/N GS05855.

The user instruction manual for P/N GS05860 provides information on how to install and operate the HTHP Cell when used in the specular reflectance mode of operation. (The angle of incidence for specularly reflected light is 15°). This user instruction manual is to be used in conjunction with the other manuals for complete operation of the HTHP Cell in any mode – transmission, decomposition or specular reflectance.

The fitting of an HTHP Cell Accessory **reflectance baseplate** enables the standard HTHP Cell to be used in the reflectance mode of operation. A **complete reflectance baseplate assembly** consists of two separate assemblies; an optical baseplate (**OB**) (to which the HTHP Cell is attached) and an adapter baseplate (**AB**), compatible for installation and fixing into the specific spectrometer's sample compartment. The optical baseplate (**OB**) fits on top of and is detachable from the adapter baseplate (**AB**) via two thumbscrews (**55**). (See **Figs 2 and 3**.)

The way in which the HTHP Cell itself is mounted in the spectrometer system on the reflectance baseplate is dictated by the direction of the IR sampling beam as it passes through the sample compartment, **left to right** or **right to left** from the source to the detector. Consequently, the accessory packing list for the parts that would be received associated with the P/N GS05860 Reflectance Mode Upgrade Kit for a left to right beam spectrometer is different from a right to left beam spectrometer.

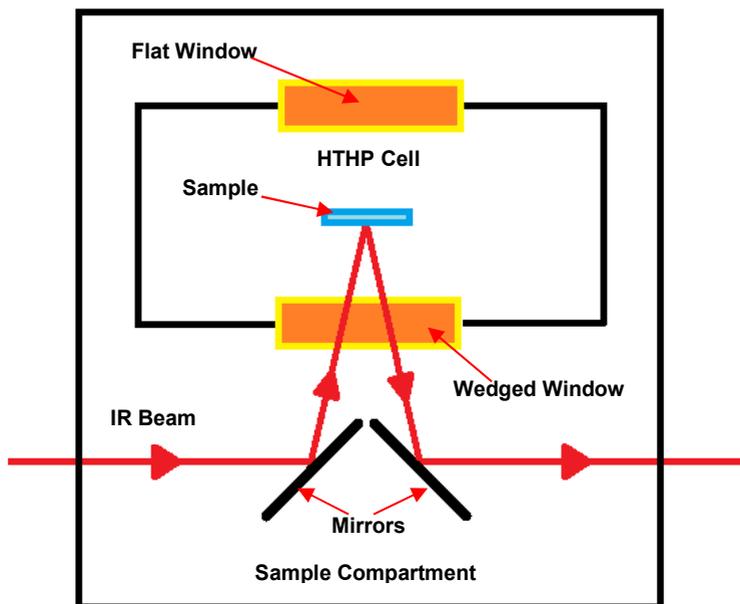


Fig 1. Schematic for HTHP Cell Reflectance Mode of Operation

The general configuration of the HTHP Cell for the reflectance mode of operation is shown at **Fig 1**. It has been shown for a **left to right** beam direction system from source to detector, although the general beam path is also followed for a **right to left** beam spectrometer system.

Important! For any reflectance mode operation of the HTHP Cell the heater block assembly (10) **MUST** be fitted into the HTHP Cell body (3) for the **transmission** mode of operation to enable a solid sample only to be held accordingly for a specular reflectance measurement. (See HTHP Cell instruction manual 2I-05850-16, pages 57 to 62, for loading a sample in transmission mode.)

The HTHP Cell is fitted with a pressure certified **wedged window assembly (56)** (normally a ZnSe window rated to 1000psi) in place of one of the standard plane/flat window assemblies and the HTHP Cell is mounted accordingly onto its reflectance baseplate with the wedged window assembly facing downwards. The incoming (input from source) IR beam is deflected off a **fixed 45° angle mirror (71)** on the reflectance baseplate towards the wedged window assembly (**56**) from below and the IR beam passes through the window to strike a sample held in the heater block assembly (**10**) within the HTHP Cell chamber. Any specularly reflected component of light at a circa 15° angle passes back through the same single wedged window assembly (**56**) to strike the output **movable** mirror (**70**) (for rotation and tilt angle) on the reflectance baseplate towards the detector.

As mentioned, depending upon the beam direction of the spectrometer system being used there is a particular **reflectance baseplate assembly** that needs to be used to mount the HTHP cell accordingly. **Fig 2.** shows a typical left to right HTHP Cell reflectance baseplate assembly of optical baseplate (**OB**) on its adapter baseplate (**AB**) for the spectrometer and **Fig 3.** shows a typical HTHP Cell reflectance baseplate assembly for a right to left beam spectrometer.

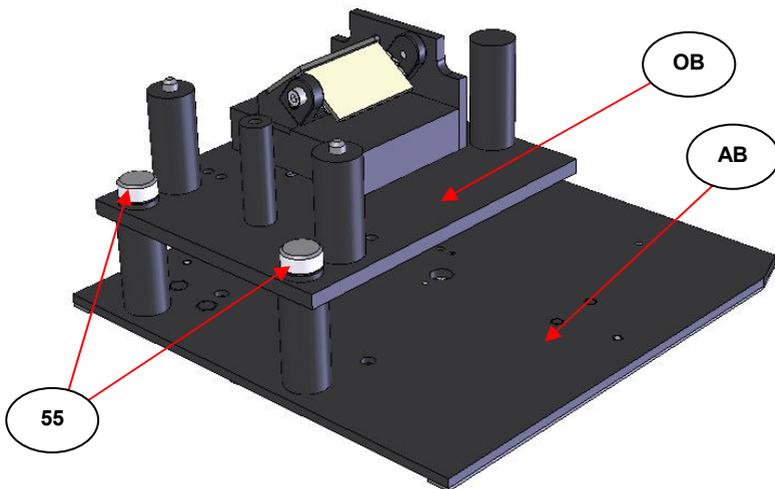


Fig 2. Typical Left to Right Beam Direction HTHP Cell Reflectance Baseplate (for Perkin Elmer Spectrometers)

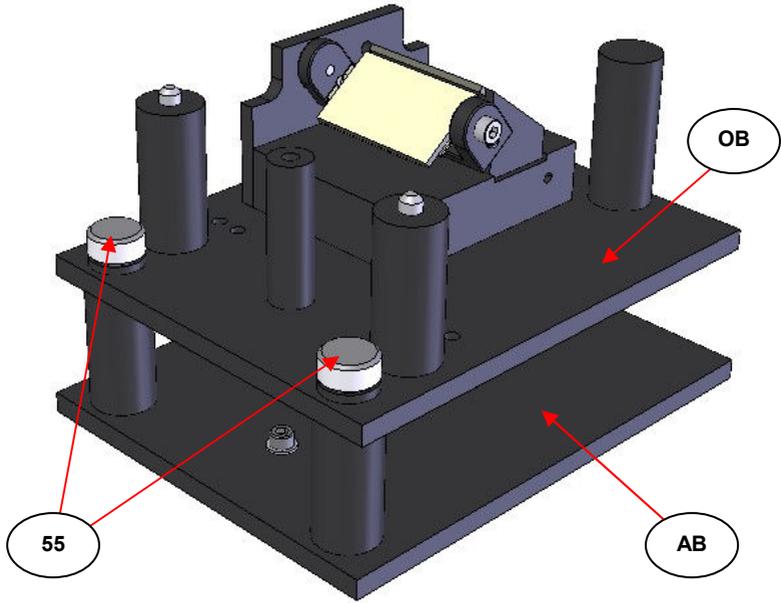


Fig 3. Typical Right to Left Beam Direction HTHP Cell Reflectance Baseplate (for Nicolet Spectrometers)

2. Unpacking and Checklist

The HTHP Cell Reflectance Mode Upgrade Kit when ordered as P/N GS05860 is provided **in its own packaging case** as a separate addition to the standard HTHP Cell Accessory in its packaging, if this has also been ordered separately as P/N GS05850.

If the Advanced HTHP Cell as P/N GS05855 has been ordered there is space in the carry case for the HTHP Cell Accessory to permanently store the additional reflectance mode upgrade kit of parts from P/N GS05860. In essence, if the HTHP Cell Accessory is ordered as the Advanced version P/N GS05855, then the reflectance mode kit of parts are already packed in with the standard HTHP Cell parts.

When checking for the reflectance mode of parts supplied as P/N GS05860 or P/N GS05855, it is important to know for which beam direction (left to right or right to left) of FTIR spectrometer is to be used such that the appropriate parts have been supplied. (See Section 8), Installation of HTHP Cell Reflectance baseplate guide.)

For a Left to Right Beam Spectrometer System

1x Optical baseplate (**OB**) assembly.

1x Spectrometer specific adapter baseplate (**AB**) assembly.

1x Side support plate – long.
(For left to right beam spectrometer.)



1x M4 x 18mm captive screw
with washer.

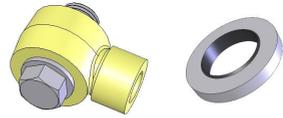


3x M4 x 10mm cap head screws.
(For left to right beam spectrometer.)



HTHP Cell Reflectance Mode Upgrade Kit

4x Right angled water fittings (“Banjo” connections) and sealing washer.
(For left to right beam spectrometer.)



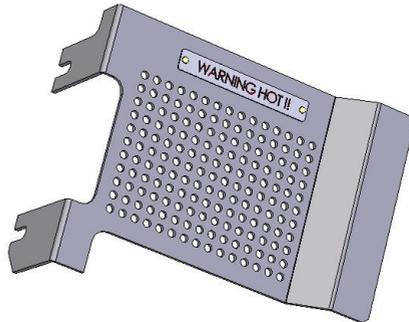
1x Nylon tubing (short length) with ferrules/nuts. (For left to right beam spectrometer).



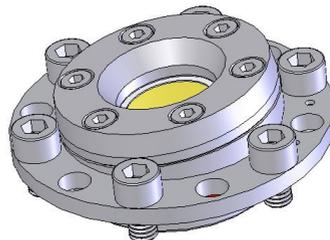
1x Polished 13mm dia. disc. (Reference Mirror).



1x Plain heat shield.
(With drill holes.)



1x Wedged window assembly.



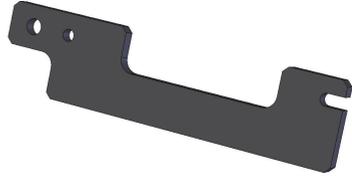
1x Certificate of conformity for window assembly.
1x Allen key 2mm A/F.

For a Right to Left Beam Spectrometer System

1x Optical baseplate (**OB**) assembly.

1x Spectrometer specific adapter baseplate (**AB**) assembly.

1x Side support bracket – long.
(For right to left beam spectrometer.)



1x Side support plate – short.
(For right to left beam spectrometer.)



4x M4 x 10mm cap head screws.
(For right to left beam spectrometer.)



1x M4 x 2mm thick washer (for side support bracket - long).



1x M4 x 18mm captive screw
with washer.

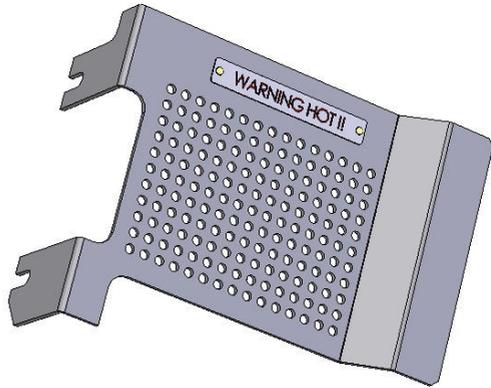


1x Polished 13mm dia. disc. (Reference Mirror).

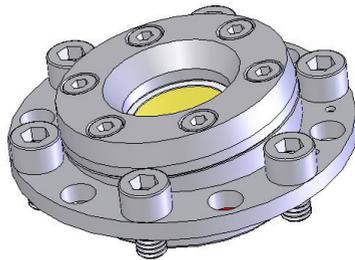


HTHP Cell Reflectance Mode Upgrade Kit

1x Plain heat shield.
(With drill holes.)



1x Wedged window assembly.



1x Certificate of conformity for window assembly.
1x Allen key 2mm A/F.

3. Conversion of the HTHP Cell to the Reflectance Mode of Operation

From the Introduction section, to use the HTHP Cell in the reflectance mode of operation, the HTHP Cell requires fitment of a special pressure certified wedged window assembly (56). (See Fig 4.) This single wedged window assembly (56) replaces one of the plane pressure certified window assemblies (11) needed for transmission or decomposition modes of operation of the HTHP Cell. It is fitted to the HTHP Cell body (3) similarly to a standard plane window assembly (11) by use of the six M6 x 10mm fixing bolts (30) and it seals via the Silicone O-ring (35).

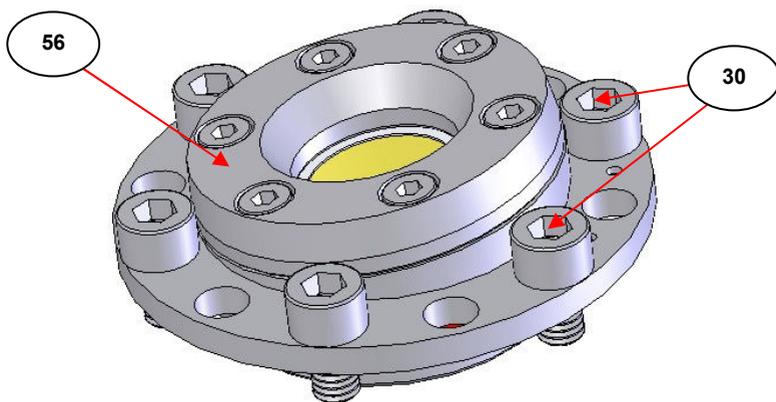


Fig 4. Wedged Window Assembly for Reflectance Mode Operation

The wedged window assembly (56) replaces a standard plane window assembly (11) on the side of the HTHP Cell body (3) that is opposite to the gas feed connection inlet ports (13) and (14). When the HTHP Cell is fitted to the reflectance baseplate assembly (OB) and (AB), the wedged window (56) will be facing downwards for light to be projected into the HTHP Cell chamber from below. The input light is reflected off of the sample surface held in the aperture hole (50) of the heater block

assembly (10) for passage back through the same wedged window assembly (56). The IR beam light path never makes it through to the plane window assembly (11) on the side of the cell body (3) with gas inlet ports (13) and (14), but the plane window assembly is retained to allow for pressurised operation of the HTHP Cell chamber itself.

The wedged window assembly (56) is fitted to the HTHP Cell body in a **specific orientation for the wedged window** depending upon use in a spectrometer for either Left to Right or Right to Left beam direction. Therefore, please follow the conversion instructions of the HTHP Cell for the reflectance mode of operation depending upon which IR beam direction applies from the particular spectrometer set up.

Note: For explanation, **Figs 5. to 16.** show the HTHP Cell Accessory configured with the internal heater block assembly (10) for the **decomposition** mode of operation. The heater block assembly (10) **MUST** be fitted correctly into the HTHP Cell body (3) for the alternative **transmission** mode of operation, when wishing to use the HTHP Cell correctly for the **reflectance mode of operation** (See **Fig 17.**).

Setting Up for Left to Right Beam Spectrometers

For spectrometers with an infrared spectral analysis beam going from left to right through the sample compartment (source to detector), the HTHP Cell with an installed wedged window assembly (56) fits on the optical baseplate (OB) assembly in one orientation. The side of the HTHP Cell that **does not** carry the gas feed inlet ports (13) and (14) is attached directly to the optical baseplate (OB) via attachment of the side support plate (57) that has been fitted to the upper water cooled plate (1) of the HTHP Cell.

Step 1 – Fitting of Right Angled Banjo Water Fittings

For installation into the sample compartment of a left to right beam spectrometer it is necessary to replace the standard brass water fittings (4) on the upper (1) and lower (2) water cooled plates with the alternative right angled “banjo” type fittings (58) as supplied. When the HTHP Cell is installed into the sample compartment on the reflectance

baseplate assembly (**OB**) and (**AB**), the standard water connection fittings (**4**) for the upper (**1**) and lower (**2**) water cooling plates would be projecting straight out to face the right hand side of the sample compartment. However, with their replacement using the right angled banjo fittings (**58**), the Nylon tubing connections with the Quick Connect fittings (**6**)/(**8**) and (**7**)/(**9**) can be made and directed immediately out towards the front of the sample compartment for easier inlet and outlet cooling water tubing accommodation.

Note: *The four gas connection ports will be projected towards the front (**12**)/(**15**) and the top (**13**)/(**14**) of the HTHP cell in this orientation when fitted into the spectrometers sample compartment.*

Using a **17mm A/F spanner** against the hexagonal nut head, undo (turn anti-clockwise) and remove the four standard water connection fittings (**4**) and their sealing washers (**59**) from both the upper (**1**) and lower (**2**) water cooled plates of the HTHP Cell. (See **Fig 5.**)

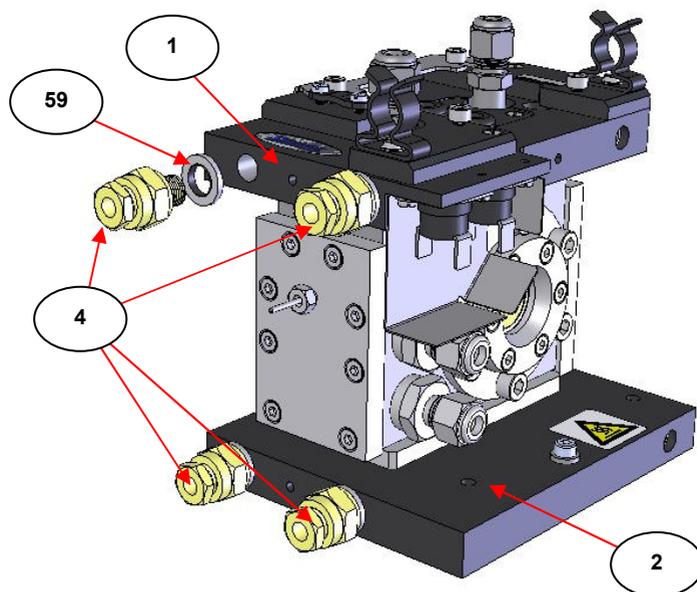


Fig 5. Removal of Standard Water Connection Fittings

Replace the standard water fittings (4) with the supplied banjo fittings (58) and their sealing washers (59). The banjo fittings (58) are tightened to the water cooled plate connection points using an **11mm A/F spanner** against the central bolt fixing (60). The sealing washer (59) is placed between the banjo fitting (58) and the water cooled plate. **Fig 6.** shows the positioning of the banjo fittings (58) and their washers (59) as they will be when the Nylon tubing connections have been made. At this stage though, as shown in **Fig 6.** and before connection of the Nylon tubing, the banjo fittings (58) should **not be fully tightened** into the upper (1) and lower (2) water cooled plates, such that they are free to rotate for easier connection of the Nylon tubing.

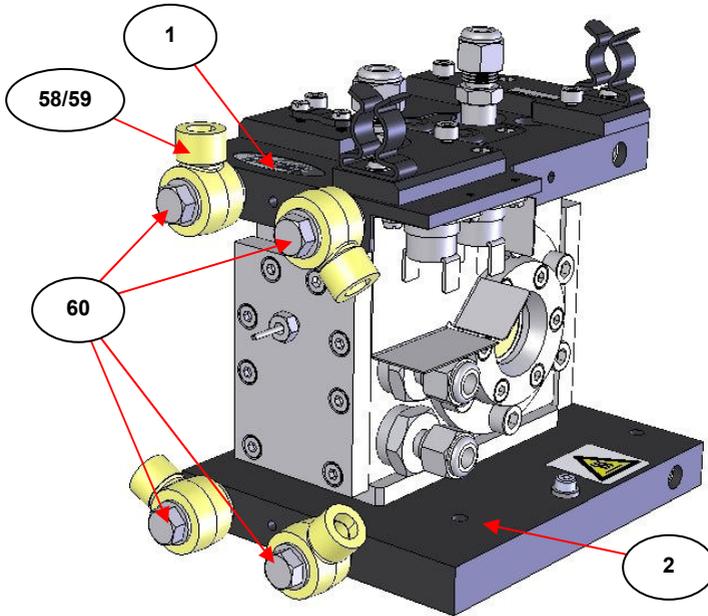


Fig 6. Positioning of the Banjo Water Connection Fittings

When the banjo fittings (58) have been loosely connected into their upper (1) and lower (2) water cooled plate positions, the Nylon water cooling tubing connections can be made. Both the **inlet** Nylon tubing and Quick Connect body parts (6) and (8) and **outlet** Nylon tubing and

Quick Connect insert parts (7) and (9) MUST be removed from the standard water connections fittings (4) for re-use in connection to their appropriate installed banjo fittings. A new shorter Nylon tubing assembly (61) to connect between the upper (1) and lower (2) water cooled plates is provided with a left to right beam kit of parts. Fig 7. shows where the Nylon tubing connections (6 - inlet), (7 - outlet) and (61 - plates connection) are made to the installed banjo fittings (58). The nut and ferrule connections on the Nylon tubing are screwed into the banjo fitting (58) and tightened across the nut head on the tubing by use of the 13mm A/F spanner supplied with the HTHP Cell kit of parts.

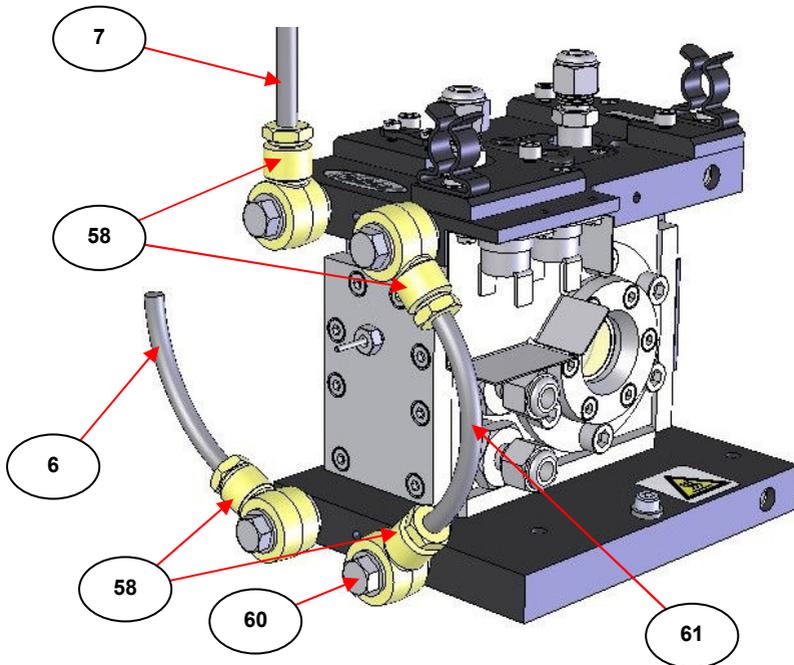


Fig 7. Nylon Tubing Connections to Banjo Fittings

When the Nylon tubing connections have been made the banjo fittings (58) are fully tightened into their positions shown to the upper (1) and

lower (2) water cooled plate from use of the 11mm A/F spanner on the banjo fitting fixing bolts (61). To complete the water cooling circuit for operation, the black silicone rubber tubing connections with appropriate Quick Connect insert (9) and body (8) parts are fitted into their corresponding Quick Connects on the Nylon tubing (6) and (7).

Step 2 - Fitting of the Wedged Window Assembly

For conversion of the HTHP Cell for the reflectance mode of operation a wedged window assembly (56) must be fitted to the HTHP Cell body (3) in a correct orientation for the wedge angle of the window for a left to right beam direction in the spectrometer. For the reflectance mode of operation it must be ensured that the heater block assembly (10) is fitted into the HTHP Cell body (3) in the correct orientation as used for the **transmission** mode of operation.

The two heat shields (31) and (32) from the HTHP Cell will need to be removed (if these are fitted), for the reflectance mode of operation. Subsequently, the alternative heat shield (62) provided for the reflective mode of operation will need to be fitted in position replacing the large heat shield (32) and the side support plate (57) is fitted to the upper water cooled plate (1) that requires removal of the small heat shield (31).

Note: *The heat shields (31) and (32) are not shown in Figs 5., 6. and 7. for explanation of installation of the banjo fittings (58) and water flow Nylon tubing connections required for a left to right beam direction spectrometer.*

At this stage, before fitting the wedged window assembly (56), the new heat shield (62) can be fitted now over the plane window assembly (11) that is being retained on the HTHP Cell body (3). The two cap head fixing screws (33) for the heat shield (62) are tightened to hold it in position as shown for Fig 8.

Fitting the Wedged Window Assembly (56)

Remove the plane window assembly (11) from the side of the HTHP Cell that **does not** contain the side inlet gas ports (13) and (14). (The

side opposite to that shown for **Fig 8.**) This is achieved by unscrewing the six M6 x 10mm cap head fixing bolts (**30**) using the 5mm A/F hexagon key bit and torque wrench supplied. (Please refer to the HTHP Cell instruction manual 2I-05850-15, pages 38 to 44, for removal and fitting of window assemblies.)

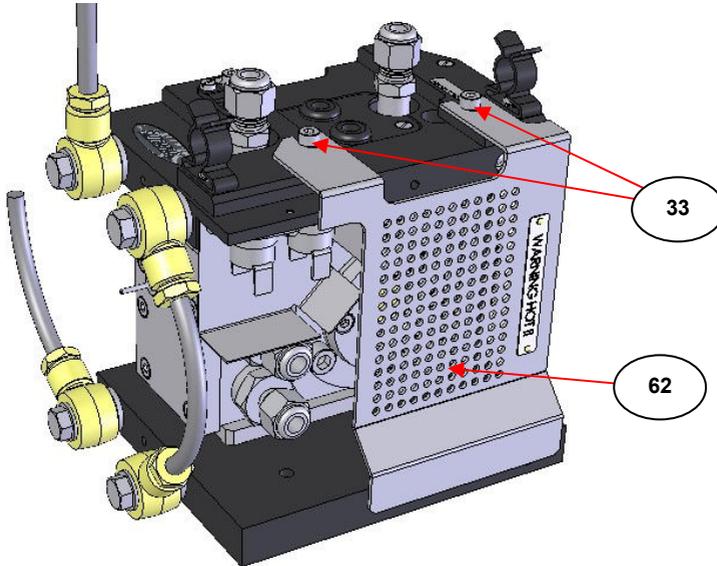


Fig 8. Heat Shield Fitted for Reflectance Mode of Operation

Note: *DO NOT, under any circumstances, attempt to undo the six smaller M4 x 10mm bolts (**27**) that hold the window housing assembly together. There is a blob of black adhesive in the centre of these bolts to prevent them from being loosened.*

Clean the area around the HTHP Cell body (**3**) where the plane window assembly (**11**) was fitted, particularly to the chamfered edge where the silicone sealing O-ring (**35**) is seated.

Take the wedged window assembly (56) with its silicone O-ring (35) fitted in place around its flange plate (63) and orientate it to the HTHP Cell body (3) such that the thickest edge of the wedged window assembly (56) is to the left of the cell body (3) and the thinnest edge is to the right nearest the banjo fittings (58). Around the edge of the flange plate (63) of the wedged window assembly (56) there are **twelve** M6 size bolt location holes. At the thickest edge of the wedged window assembly (56) there are two indentation marks (64) either side of one of the twelve M6 bolt location holes on the flange plate (63). When this bolt location hole on the flange plate (63) and the indentation marks (64) are positioned as shown in **Fig 9**, six of the remaining eleven location bolt holes on the flange plate (63) align with their threaded hole location fittings on the HTHP Cell body (3) to clamp the wedged window assembly (56) in position using the six M6 x 10mm fixing bolts (30).

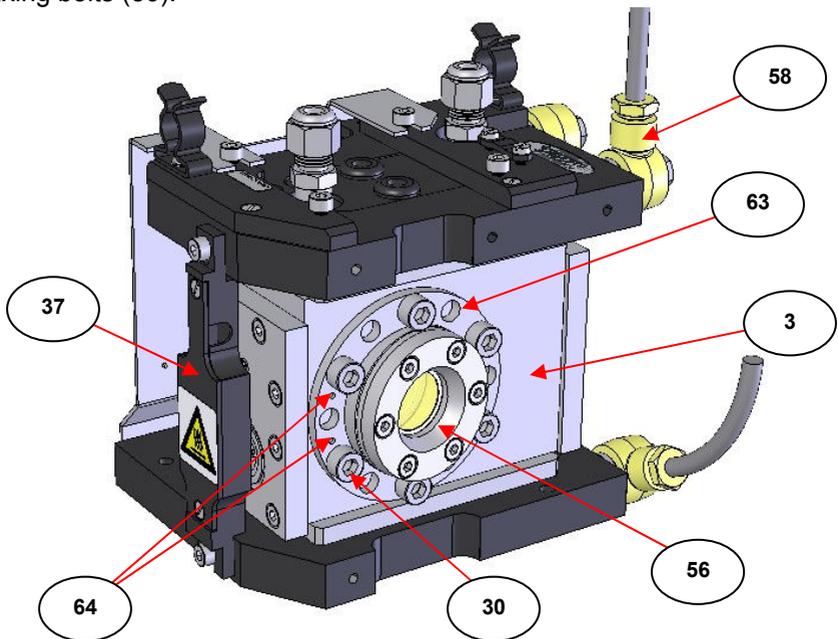


Fig 9. Wedged Window Assembly Fitted for Left to Right Beam Direction Reflectance Mode of Operation

Note: *Fig 9. shows the HTHP Cell with the internal heater block assembly (10) set up for the **decomposition** mode of operation. The position of the heater block assembly (10) and external wiring strap (37) as fitted to either end of the HTHP Cell does not affect any window removal or fitting.*

When the flange plate (63) of the wedged window assembly (56) has been correctly aligned to the six threaded bolt hole locations on the HTHP Cell body (3), ensure that the Silicone O-ring (35) is well seated and place the six M6 x 10mm fixing bolts (30) into position through the flange plate (63) and screw to a finger tightness.

Finally, please follow the instructions from the HTHP Cell instruction manual 2I-05850-16, pages 43 to 44, for the fitting of the wedged window assembly (56) with respect to the correct bolt tightening sequence for sealing.

Note: *The ZnSe wedged window assembly (56) supplied with P/N GS05860 has been tested and certified to 1000psi. Similar to the plane window assemblies (11), DO NOT unscrew any of the six smaller M4 x 10mm bolts (27) that hold the wedged window housing assembly (56) together. There is a blob of black adhesive in the centre of these bolts to prevent them from being loosened.*

Step 3 - Fitting of the Side Support Plate

When the wedged window assembly (56) has been fitted to the HTHP Cell body (3), the long side support plate (57) supplied with the kit of parts for a left to right beam spectrometer system must be fitted.

Use the three M4 x 10mm cap head screws (65) supplied to attach the side support plate (57) to the upper water cooled plate (1) of the HTHP Cell on the same side as the wedged window assembly (56). (See **Fig 10.**) There are three threaded location holes in the water cooled plate (1) corresponding with the three holes in the side support plate into which the screws (65) are fitted.

Note: In fitting of the side support plate (57), the hole and slot locations for attachment to the optical baseplate (OB) are facing uppermost towards the top inlet (12) and outlet (15) gas port connections and the **slot end** is nearest to the banjo water cooling fittings (58).

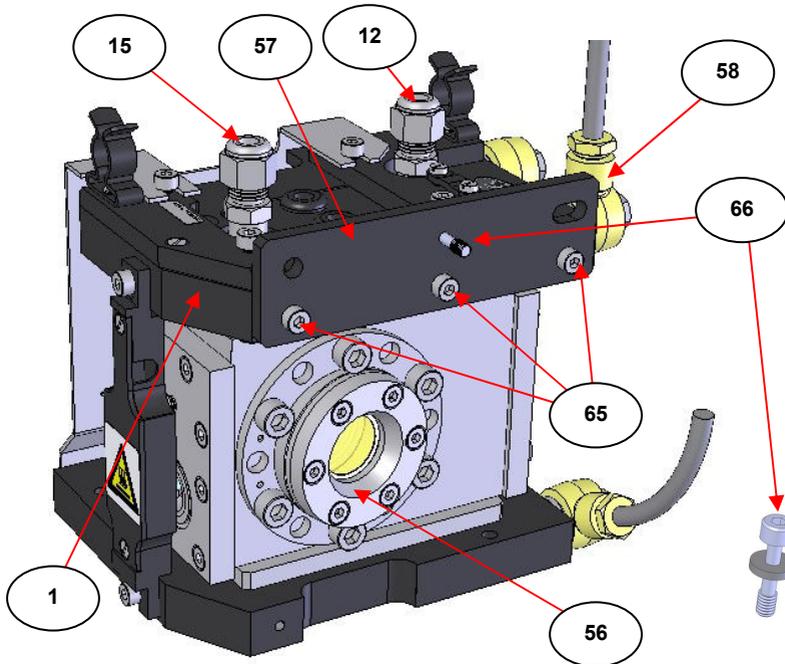


Fig 10. Fitting of the Side Support Plate to the HTHP Cell for a Left to Right Beam Direction Spectrometer

Finally, the supplied M4 x 18mm captive screw fitting with its washer (66) is passed through the central hole between the round hole and slot locations on the side support plate (57) from the direction as shown at Fig 10. This captive screw (66) is used to secure the HTHP Cell to the optical baseplate (OB) assembly when installed upon the adapter baseplate (AB) assembly within a left to right beam spectrometer system sample compartment.

Step 4 – Attachment to the Reflectance Baseplate

When steps 1, 2 and 3 have been completed for construction of the HTHP cell for use in the reflectance mode of operation on a left to right beam direction spectrometer, the whole HTHP cell assembly can now be fitted to its appropriate optical baseplate (OB) assembly, of a complete reflectance baseplate assembly (OB) and (AB).

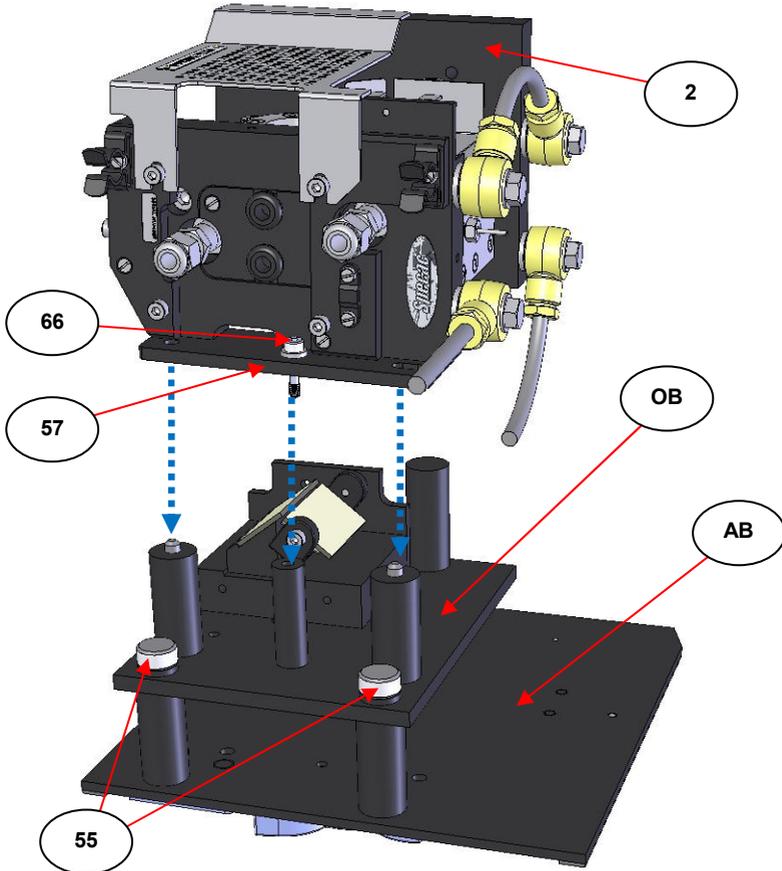


Fig 11. Orientation of the HTHP Cell When Fitting to a Left to Right Beam Direction Spectrometer Reflectance Baseplate Assembly

Fig 11. shows that the complete HTHP Cell assembly is oriented over onto its side such that the fitted side support plate (**57**) is lowered to make contact onto the line of three support pillars of the optical baseplate (**OB**) assembly. The central fixing screw (**66**) engages with the central pillar to screw into and pull the HTHP cell down tightly and securely, whilst the round and slot location holes in the side support plate (**57**) fit over their corresponding pins on the side support pillars. The rear single pillar on the optical baseplate (**OB**) is a support for the HTHP Cell assembly which should rest on this pillar from the edge of the lower water cooled plate (**2**) when the side support plate (**57**) has been tightened securely to the optical baseplate (**OB**).

Note: *For the particular reflectance baseplate assembly of parts (**OB**) and (**AB**) provided for operation and installation of the HTHP Cell in a left to right beam direction spectrometer, please refer to the specific installation instructions at Section 8) of this user instruction manual.*

Although the water cooling fittings and tubing connections have already been made, once the HTHP Cell has been installed into position for the reflectance mode of operation in a left to right beam direction spectrometer, the necessary gas line inlet and outlet connections can be made to the HTHP Cell for a particular form of operation (flow, static pressure or vacuum operation). Please refer to the suggested inlet and outlet gas connections to be made as shown in the user instruction manual for the HTHP Cell 2I-05850-16 on pages 33 to 35.

Setting Up for Right to Left Beam Spectrometers

For spectrometers with an infrared spectral analysis beam going from right to left through the sample compartment (source to detector), the HTHP Cell with an installed wedged window assembly (56) fits on the optical baseplate (OB) assembly in one orientation. The side of the HTHP Cell that **does not** carry the gas feed inlet ports (13) and (14) is attached directly to the optical baseplate (OB) via attachment of the side support bracket (67) and short side support plate (68) that have been fitted to the upper (1) and lower (2) water cooled plates of the HTHP Cell.

Step 1 – Retention of the Standard Water Fittings (4)

For installation into the sample compartment of a right to left beam spectrometer it is not necessary to replace the standard brass water fittings (4) on the upper (1) and lower (2) water cooled plates with the alternative right angled “banjo” type fittings (58) as supplied if configuring the HTHP Cell for a left to right beam direction spectrometer for the reflectance mode of operation. When the HTHP Cell is installed into the sample compartment on a right to left beam direction reflectance baseplate assembly (OB) and (AB), the standard water connection fittings (4) for the upper (1) and lower (2) water cooling plates will be projecting straight out towards the front of the sample compartment for easier inlet and outlet cooling water tubing accommodation.

Note: *The four gas connection ports will be projected towards the left side of the sample compartment (12)/(15) and the towards the top of the HTHP Cell (13)/(14) in this orientation when fitted into the spectrometers sample compartment. The gas connection stainless steel tubing and fittings provided with the HTHP Cell kit of parts enable appropriate initial gas connections to be made that can also project upwards and towards the front of the sample compartment as and if required.*

Step 2 - Fitting of the Wedged Window Assembly

For conversion of the HTHP Cell for the reflectance mode of operation a wedged window assembly (56) must be fitted to the HTHP Cell body (3) in a correct orientation for the wedge angle of the window for a right to left beam direction in the spectrometer. For the reflectance mode of operation it must be ensured that the heater block assembly (10) is fitted into the HTHP Cell body (3) in the correct orientation as used for the **transmission** mode of operation.

The two heat shields (31) and (32) from the HTHP Cell will need to be removed (if these are fitted), for the reflectance mode of operation. Subsequently, the alternative heat shield (62) provided for the reflective mode of operation will need to be fitted in position replacing the large heat shield (32) and the side support bracket (67) and short side support plate (68) are fitted to the upper water cooled plate (1) that requires removal of the small heat shield (31). At this stage, before fitting the wedged window assembly (56), the new heat shield (62) can be fitted now over the plane window assembly (11) that is being retained on the HTHP Cell body (3). The two cap head fixing screws (33) for the heat shield (62) are tightened to hold it in position as shown for **Fig 12**.

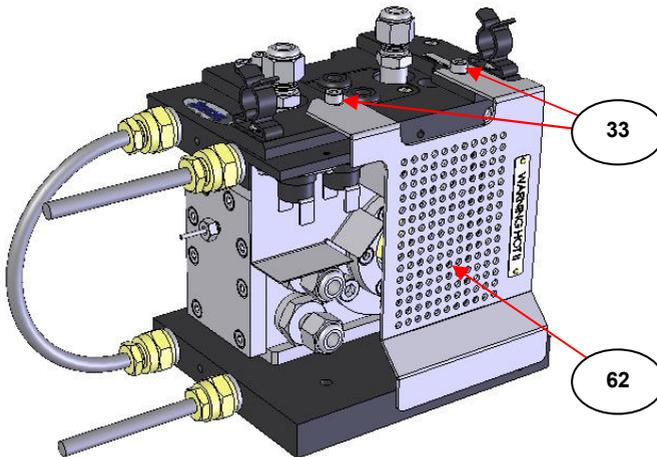


Fig 12. Heat Shield Fitted for Reflectance Mode of Operation

Fitting the Wedged Window Assembly (56)

Remove the plane window assembly (11) from the side of the HTHP Cell that **does not** contain the side inlet gas ports (13) and (14). (The side opposite to that shown for **Fig 12.**). This is achieved by unscrewing the six M6 x 10mm cap head fixing bolts (30) using the 5mm A/F hexagon key bit and torque wrench supplied. (Please refer to the HTHP Cell instruction manual 2I-05850-16, pages 38 to 44, for removal and fitting of window assemblies.)

Note: *DO NOT, under any circumstances, attempt to undo the six smaller M4 x 10mm bolts (27) that hold the window housing assembly together. There is a blob of black adhesive in the centre of these bolts to prevent them from being loosened.*

Clean the area around the HTHP Cell body (3) where the plane window assembly (11) was fitted, particularly to the chamfered edge where the silicone sealing O-ring (35) is seated.

Take the wedged window assembly (56) with its silicone O-ring (35) fitted in place around its flange plate (63) and orientate it to the HTHP Cell body (3) such that the thickest edge of the wedged window assembly (56) is towards the base of the cell body (3) nearest to the lower water cooled plate (2) and the thinnest edge is to top of the HTHP Cell body (3) nearest to the upper water cooled plate (1). Around the edge of the flange plate (63) of the wedged window assembly (56) there are **twelve** M6 size bolt location holes. At the thickest edge of the wedged window assembly (56) there are two indentation marks (64) either side of one of the twelve M6 bolt location holes on the flange plate (63). When this bolt location hole on the flange plate (63) and the indentation marks (64) are positioned as shown in **Fig 13.** five of the remaining eleven location bolt holes on the flange plate (63) align with their threaded hole location fittings on the HTHP Cell body (3) to clamp the wedged window assembly (56) in position using the six M6 x 10mm fixing bolts (30).

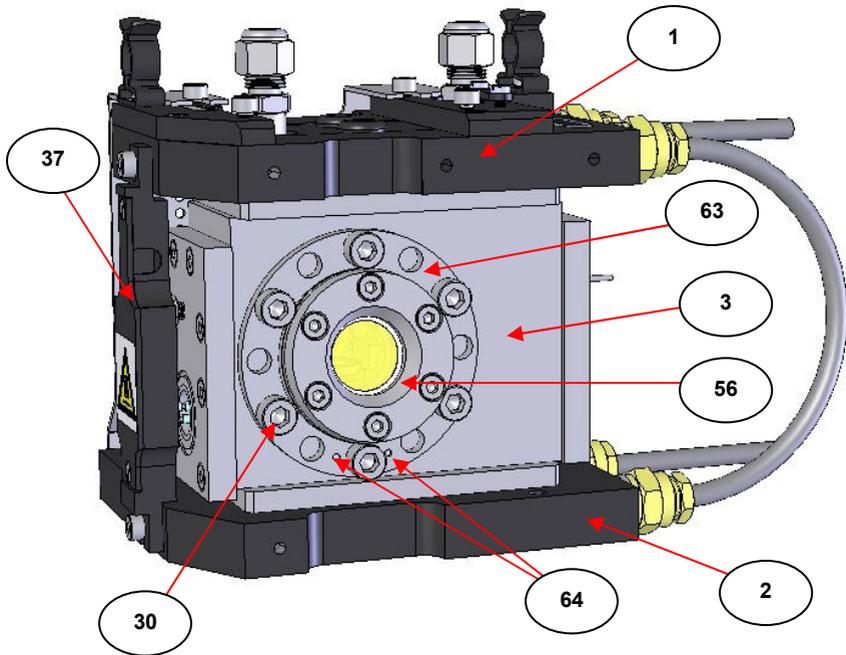


Fig 13. Wedged Window Assembly Fitted for Right to Left Beam Direction Reflectance Mode of Operation

Note: *Fig 13.* shows the HTHP Cell with the internal heater block assembly (10) set up for the **decomposition** mode of operation. The position of the heater block assembly (10) and external wiring strap (37) as fitted to either end of the HTHP Cell does not affect any window removal or fitting.

When the flange plate (63) of the wedged window assembly (56) has been correctly aligned to the six threaded bolt hole locations on the HTHP Cell body (3), ensure that the Silicone O-ring (35) is well seated and place the six M6 x 10mm fixing bolts (30) into position through the flange plate (63) and screw to a finger tightness.

Finally, please follow the instructions from the HTHP Cell instruction manual 2I-05850-16, pages 43 to 44, for the fitting of the wedged window assembly (56) with respect to the correct bolt tightening sequence for sealing.

Note: *The ZnSe wedged window assembly (56) supplied with P/N GS05860 has been tested and certified to 1000psi. Similar to the plane window assemblies (11), DO NOT unscrew any of the six smaller M4 x 10mm bolts (27) that hold the wedged window housing assembly (56) together. There is a blob of black adhesive in the centre of these bolts to prevent them from being loosened.*

Step 3 - Fitting of the Side Support Bracket and the Short Side Support Plate

When the wedged window assembly (56) has been fitted to the HTHP Cell body (3), the long side support bracket (67) and short side support plate (68) supplied with the kit of parts for a right to left beam spectrometer system must be fitted.

Use two of the four M4 x 10mm cap head screws (65) supplied to attach the side support bracket (67) to the upper (1) and lower (2) water cooled plates of the HTHP Cell on the same side as the wedged window assembly (56). (See Fig 14.) There are threaded location holes in the upper (1) and lower (2) water cooled plates corresponding with the fixing hole and cut-out location slot of the support bracket (67) into which the screws (65) are fitted and tightened. The screw (65) fitting into the lower water cooled plate (2) for the support bracket (67) location slot requires use of the M4 x 2mm washer (69) as supplied with the kit of parts for a right to left beam direction spectrometer and as shown in Fig 14..

Note: *In fitting of the support bracket (67), the hole location for attachment to the optical baseplate (OB) is facing uppermost towards the top inlet (12) and outlet (15) gas port connection, with the long edge of the bracket (67) facing outwards to the side of the HTHP Cell as shown for Fig 14..*

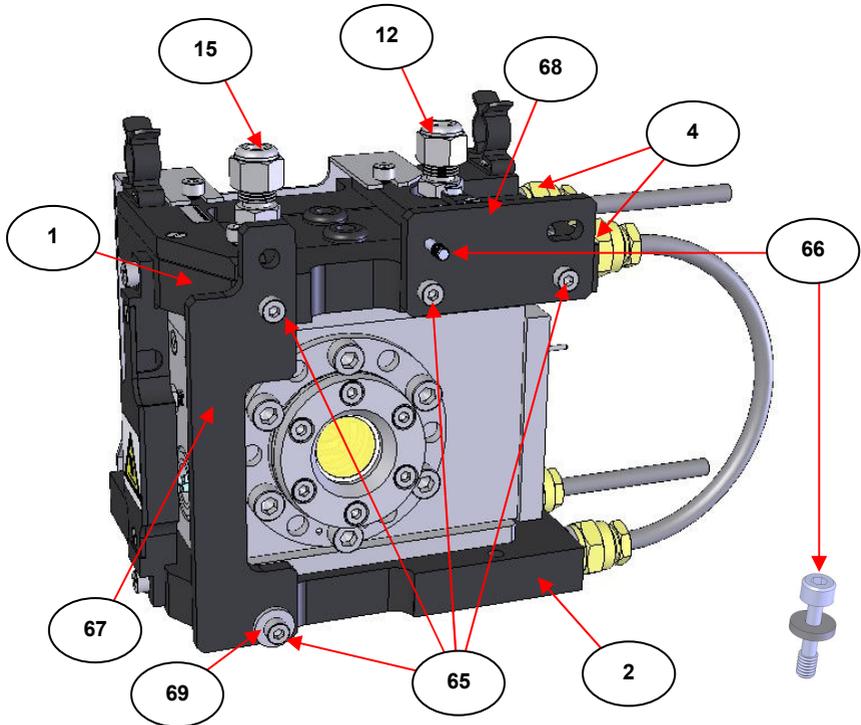


Fig 14. Fitting of the Side Support Bracket and Plate to the HTHP Cell for a Right to Left Beam Direction Spectrometer

The other two of the four M4 x 10mm cap head screws (**65**) are used to fit the short side support plate (**68**) to the upper water cooled plate (**1**) into position as shown from **Fig 14.** There are threaded location holes in the upper water cooled plate (**1**) corresponding with the fixing holes of the support plate (**68**) into which the screws (**65**) are fitted and tightened.

Note: *In fitting of the support plate (**68**), the slot location for attachment to the optical baseplate (**OB**) is facing uppermost towards the top inlet (**12**) and outlet (**15**) gas port connections, and nearest to the water fittings (**4**) as shown for **Fig 14.***

Finally, the supplied M4 x 18mm captive screw fitting with its washer (66) is passed through the central hole next to the location slot for the optical baseplate (OB) of the short side support plate (68) from the direction as shown at Fig 14.. This captive screw (66) is used to secure the HTHP Cell to the optical baseplate (OB) assembly when installed upon the adapter baseplate (AB) assembly within a right to left beam spectrometer system sample compartment.

Step 4 – Attachment to the Reflectance Baseplate

When steps 1, 2 and 3 have been completed for construction of the HTHP Cell for use in the reflectance mode of operation on a right to left beam direction spectrometer, the whole HTHP cell assembly can now be fitted to its appropriate optical baseplate (OB) assembly, of a **complete** reflectance baseplate assembly (OB) and (AB).

Fig 15. shows that the complete HTHP Cell assembly is oriented over onto its side such that the fitted side support bracket (67) and short side support plate (68) parts are lowered to make contact onto the line of three support pillars of the optical baseplate (OB) assembly. The central fixing screw (66) fitted to the support plate (68) engages with the central pillar to screw into and pull the HTHP cell down tightly and securely, whilst the round hole location in the support bracket (67) and slot location in the side support plate (68) fit over their corresponding pins on the side support pillars. The rear single pillar on the optical baseplate (OB) is a support for the HTHP Cell assembly which should rest on this pillar from the edge of the lower water cooled plate (2) when the side support plate (68) has been tightened securely to the optical baseplate (OB) via the fixing screw (66).

Note: *For the particular reflectance baseplate assembly of parts (OB) and (AB) provided for operation and installation of the HTHP Cell in a right to left beam direction spectrometer, please refer to the specific installation instructions at Section 8) of this user instruction manual.*

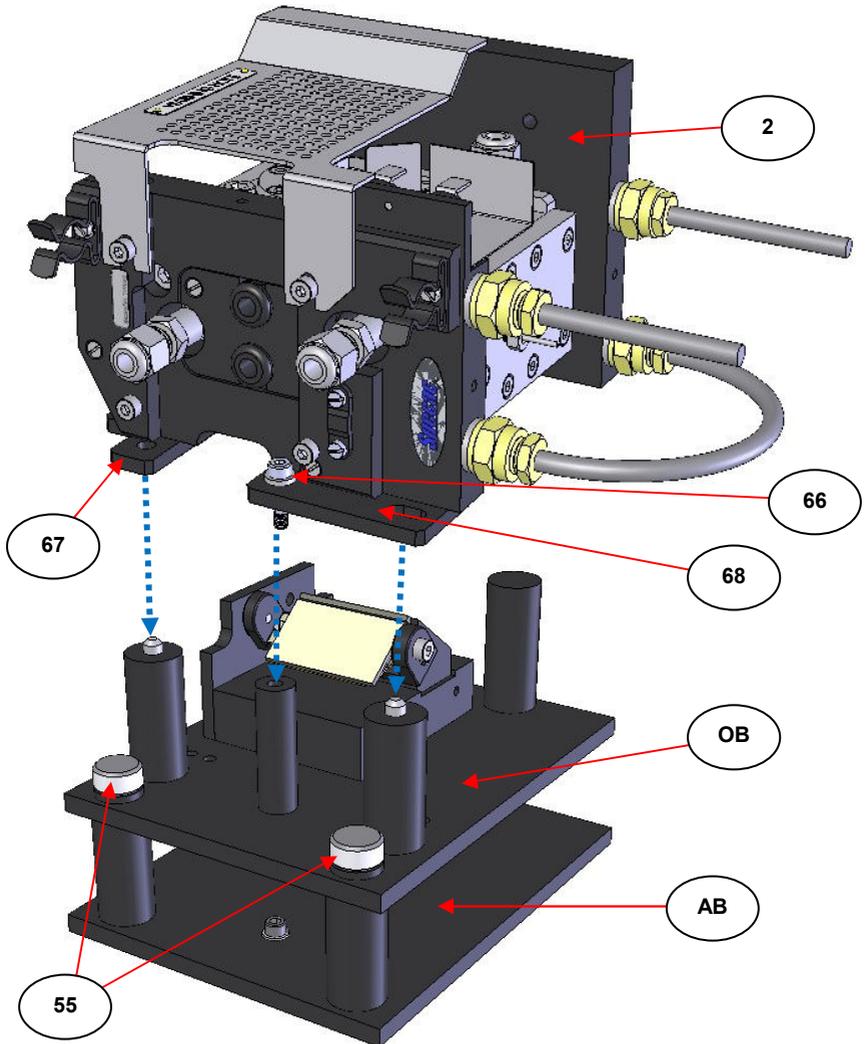


Fig 15. Orientation of the HTHP Cell When Fitting to a Right to Left Beam Direction Spectrometer Reflectance Baseplate Assembly

Although the water cooling fittings and tubing connections have already been made, once the HTHP Cell has been installed into position for the reflectance mode of operation in a right to left beam direction spectrometer, the necessary gas line inlet and outlet connections can be made to the HTHP cell for a particular form of operation (flow, static pressure or vacuum operation). Please refer to the suggested inlet and outlet gas connections to be made as shown in the user instruction manual for the HTHP Cell 2I-05850-16 on pages 33 to 35.

Important Note – Wedged Window Fitting

When constructing the HTHP Cell for the **reflectance mode of operation** for either a left to right or right to left beam direction spectrometer systems, remember to keep any removed fittings and the plane window assembly (**11**) safely in the packing case when not in use. If the HTHP Cell is required for future use in either the transmission or decomposition modes of operation, the parts fitted to the HTHP Cell for the reflectance mode of operation will need to be removed and replaced with the plane window assembly (**11**) and standard heat shields (**31**) and (**32**). However, specifically for a left to right beam direction spectrometer construction of the HTHP Cell that requires fitting of the right angled banjo fittings (**58**) for the reflectance mode of operation, it is possible these water cooling fittings may be retained instead of changing to the standard fittings (**4**) if the HTHP cell is ever converted back to the transmission or decomposition modes of operation.

As mentioned, the wedged window assembly (**56**) has two indentation marks (**64**) on its flange plate (**63**), which identify the correct orientation for the window assembly in construction of a left to right or right to left beam direction system when fitting to the HTHP Cell body (**3**). Effectively, whether the beam path direction (source (**S**) to detector (**D**)) is left to right, or right to left, the centre line of the beam path **MUST PASS BETWEEN** these two indentation marks (**64**). Please see **Fig 16. for underside views** of the wedged window assembly (**56**) orientation in relation to fitting on the HTHP Cell body (**3**) for the appropriate beam direction and as the HTHP Cell is installed into the spectrometer. (Left to right- top, right to left – below.)

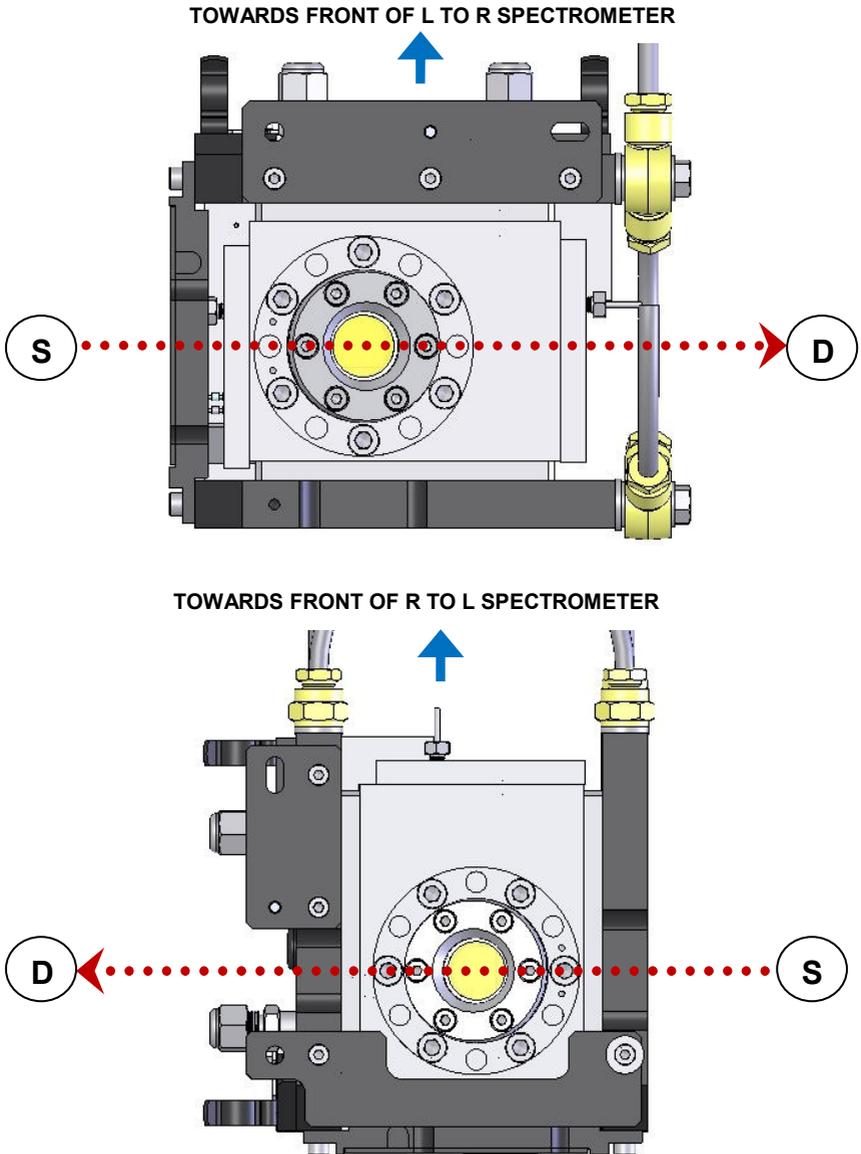


Fig 16. Beam Direction Passing Between Indentation Marks (64)

4. Optical Alignment of the HTHP Cell When Fitted to the Optical Baseplate Assembly

When the HTHP Cell has been converted for the reflectance mode of operation and fitted to its reflectance baseplate assembly, the light beam throughput from source to detector of the spectrometer system will need to be optimised from alignment of the **adjustable** output mirror assembly (70) on the optical baseplate (OB). Depending upon the beam direction, the input mirror (71) on the optical baseplate is **fixed** to direct the beam of light into the HTHP Cell chamber through the wedged window assembly (56) at the base of the HTHP Cell.

Important! *The heater block assembly (10) MUST be fitted into the HTHP Cell chamber the same way as for the transmission mode of operation such that the aperture hole (50) will be in the path of the input beam from the fixed mirror (71) and as it passes through the wedged window assembly (56).*

The 13mm diameter polished disc (72) supplied is representative of how a sample would be accommodated in the HTHP Cell for analysis, but is used as a **reference mirror** for alignment purposes and is fitted into the aperture (50) of the heater block assembly (10) and supported in position by use of one of the keep rings (51). The reference mirror (72) specularly reflects the input beam of light back down through the wedged window assembly (56) and towards the output mirror (70) on the optical baseplate (OB). The mirror (70) is adjusted accordingly for rotation and tilt to direct and optimize the light beam throughput correctly towards the detector.

Fitting of the Polished Disc (72) – (Reference Mirror)

Before alignment can be achieved the reference mirror (72) must be placed first in the heater block assembly (10).

Irrespective of the HTHP Cell being configured for a left to right or right to left beam direction spectrometer, access to the heater block assembly (10) within the HTHP cell body (3) for fitting of the reference

mirror (72) is achieved by removal of the plane window assembly (11) that will be presented towards the top of the HTHP Cell as orientated in the sample compartment of the spectrometer.

The heat shield (62) is removed by loosening of the two clamping screws (33) to gain access to the plane window assembly (11). To remove the plane window assembly (11), unscrew and remove the six M6 x 10mm cap head fixing bolts (30) using the 5mm A/F hexagon key bit and torque wrench supplied. (Please refer to the HTHP Cell instruction manual 2I-05850-16, pages 38 to 44, for removal and fitting of window assemblies.)

Note: *DO NOT, under any circumstances, attempt to undo the six smaller M4 x 10mm bolts (27) that hold the window housing assembly together. There is a blob of black adhesive in the centre of these bolts to prevent them from being loosened.*

Access can now be made through the aperture opening of the HTHP Cell body (3) to the aperture hole (50) in the heater block assembly (10) to fit the reference mirror (72). (See Fig 17.)

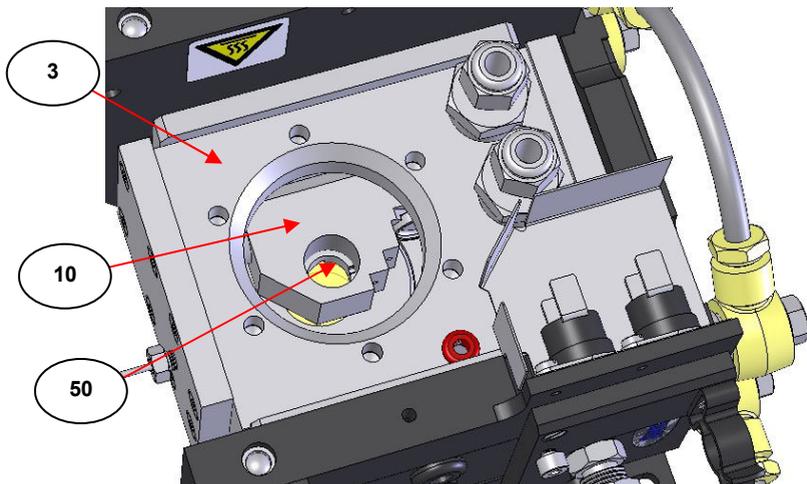
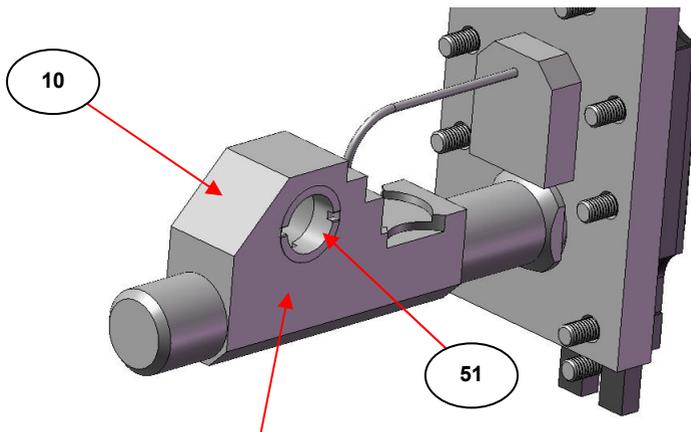


Fig 17. Plane Window Assembly Removed to Gain Access to the Heater Block Assembly (Left to Right Beam Build Example)

Note: *It is very important for consistent spectral subtraction between a reference and sample surface specular reflectance measurement that the reference mirror (72) reflecting surface level and any subsequent **sample** surface level, when mounted in the aperture hole (50) of the heater block assembly (10), are as similar as possible.*

In the assembly of parts for a **horizontal orientation** of the heater block assembly (10) when the HTHP Cell has been set up for the reflectance mode of operation, only **one** of the two keep rings (51) is needed to support the reference mirror (72) or sample into position at the correct level when positioned into the aperture hole (50). To maintain a consistent reflecting surface level for either a reference or sample measurement, which in turn allows for a consistent pathlength for the IR light beam passage within the HTHP Cell chamber, this single keep ring (51) needs to be screwed using the key (52) into the **underside** face of the aperture hole (50) on the heater block assembly (10) within the HTHP Cell chamber to a depth whereby the keep ring (51) is flush with the underside surface of the heater block assembly (10). Fitting of the keep ring (51) is completed prior to installation of the heater block assembly (10) into the HTHP Cell body (3). (See Fig 18.).



Underside Surface When Heater Block Fitted in HTHP Cell

Fig 18. Single Keep Ring (51) Fitted Flush to Underside Surface of Heater Block Assembly (10) as Used for Reflectance Mode

The reference mirror (72) or appropriate sample is simply placed into the aperture hole (50) from above to rest on the installed and fixed keep ring (51) allowing for a consistent and reproducible surface level for analysis of solid sample types. (See Fig 19.)

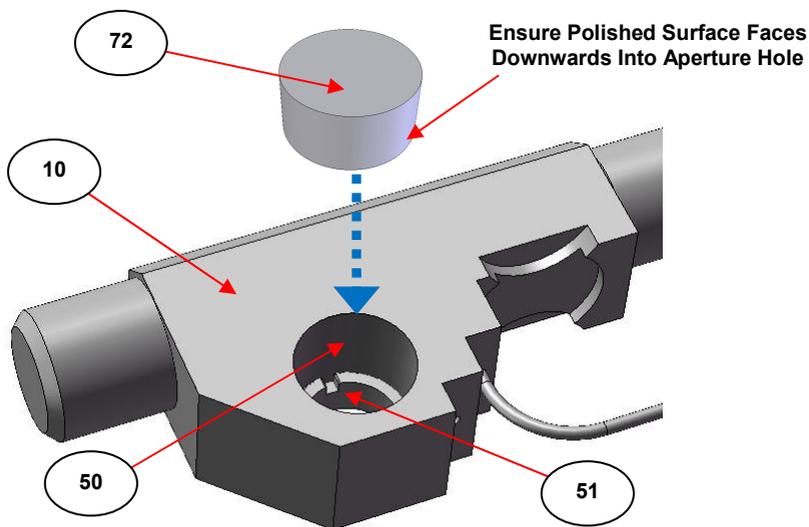


Fig 19. Fitting of Reference Mirror (72) into Aperture Hole (50)

Having fitted the lower keep ring (51) correctly, take the 13mm diameter disc reference mirror (72) and with a pair of forceps, gently place it into the aperture hole (50), with the polished mirror surface facing downwards to rest on the lower keep ring (51).

Tip: *The reference mirror (72) (or a sample) may be removed from the aperture hole (50) using a small rod/stick with a piece of gum-like, tacky material to adhere to the back side of the mirror or sample to pull up and out.*

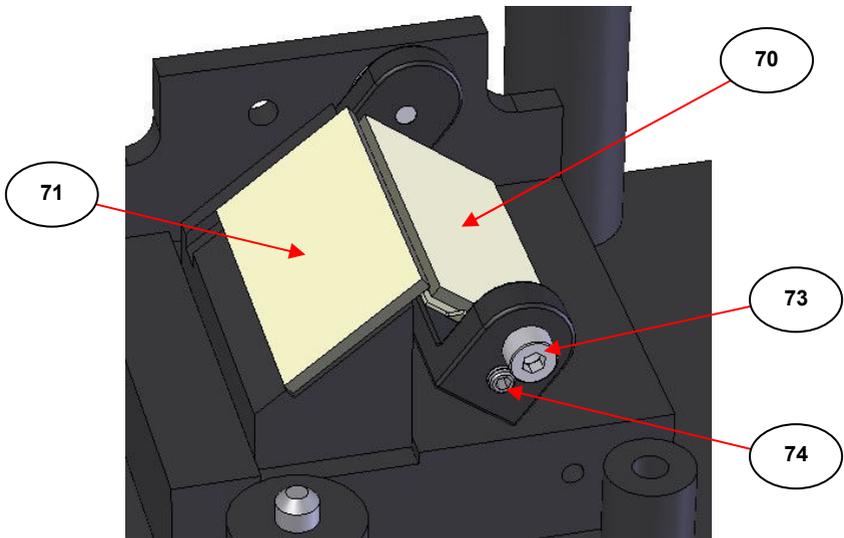
Optimisation of the Adjustable Output Mirror Assembly

For initial alignment and optimisation of a light beam through the HTHP Cell when the reference mirror (**72**) has been correctly installed into the heater block assembly (**10**), it is not necessary to refit the plane window assembly (**11**) and heat shield (**62**) as would be required if carrying out any actual experimentation/analysis for temperature and pressure studies.

When the HTHP Cell accessory is installed into the spectrometer sample compartment on its appropriate reflectance baseplate assembly, fitting of the reference mirror (**72**) completes the beam path to enable an input source beam of light from the fixed mirror (**71**) on the optical baseplate (**OB**) to be reflected back towards the adjustable output mirror (**70**) on the optical baseplate (**OB**) for direction towards the detector. When supplied as new from Specac, the output mirror (**70**) has been roughly aligned for some throughput of the specularly reflected light signal from the HTHP Cell, but it will need to be fine tuned to peak up the signal, when the whole HTHP Cell Accessory is used in a specific spectrometer.

Establish an energy reading indication for the detector on your IR spectrometer system to measure the amount of light throughput passing through the HTHP Cell Accessory from initial installation onto the reflectance baseplate assembly and insertion of the reference mirror (**72**).

There are two adjustment screws on the output mirror (**70**) assembly. (See **Fig 20**.) The M4 x5mm cap head screw (**73**) is used to **rotate** the output mirror (**70**) assembly in this plane and the M4 x 12mm cone point grub screw (**74**) is used to **tilt** the output mirror (**70**) assembly in this plane. To begin the alignment procedure to optimize the signal throughput use the 3mm A/F ball driver (supplied with the HTHP Cell itself) in the M4 cap head screw (**73**) to gently **rotate** the output mirror (**70**) 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 (**73**) anticlockwise to bring back to the maximum point again. (And vice versa).



**Fig 20. Input and Output Mirrors on Optical Baseplate (OB)
(For Left to Right Beam Build Example)**

After maximizing the signal from rotation of the output mirror (70), it can be **tilted** in its plane for final alignment by inserting the 3mm A/F ball driver supplied into the grub screw (74) and turning it clockwise or anticlockwise. Similar to any rotational adjustment, if you travel through a maximum energy position by, say, continued clockwise rotation, then turn the grub screw (74) anticlockwise to bring back to the maximum point again. (And vice versa).

Note: The grub screw (74) cone point is wedged against the back of the output mirror (70) spring clip support plate and excessive anticlockwise rotation of the grub screw (74) will result in the screw being dislocated from the mirror. If this does occur, you must remove the HTHP Cell Accessory from the optical baseplate (OB) to gain access to the output mirror (70). Gently lift/push up the back spring clip support plate of the output mirror and whilst in this position rotate the grub screw (74) clockwise (with the ball driver), such that its tapered cone point engages back in position under the spring clip support plate.

Back Reflections and Optical Height Alignment

Stray Light Back Reflections

Any “stray light” back reflection from the wedged window assembly (56) can cause a signal to be registered by the spectrometer detector system. However, the focus point of this back reflection is different to that originating from the reference mirror (72) and sample position in the aperture hole (50).

To ensure that the energy signal recorded by the spectrometer detector system is from the reference mirror (72) surface remove the reference mirror (72) and check to see if the signal is lost. If the signal level remains the same, this means it is from stray light as a back reflection from the wedged window assembly (56) and so the output mirror (70) must be readjusted (rotate and/or tilt) accordingly for the signal from the reference mirror surface alone.

Note: *If more than one signal originates from the reference mirror (72), then align the optics of the accessory on the strongest signal.*

Optical Height Alignment

To try and optimize the signal throughput after adjustment of the output mirror (70), it may also be necessary to adjust for the optical height alignment of the reference mirror (72) or sample surface position. This is achieved by removing the reference mirror disc (72) from out of the top of the aperture hole (50) and turning the keep ring (51) on which the mirror rests (using the keep ring key (52) through the aperture hole (50) into the keep ring location slots), either clockwise to lower the mirror (72) surface or anticlockwise to raise the mirror (72) surface. When the keep ring (51) has been raised or lowered accordingly, replace the reference mirror (72) and note the effect on the throughput. Continue with this procedure until a maximum throughput has been achieved. On most spectrometer systems a throughput energy level of approximately 25% of an open beam signal, can be achieved after proper alignment.

After the HTHP Cell Accessory has been installed and optimised for an IR light beam energy throughput using the reference mirror (**72**) and from adjustment of the output mirror (**70**) on the optical baseplate (**OB**), whenever the HTHP Cell is removed and reinstalled, the necessary optical alignment should be maintained.

However, if the energy throughput level is reduced from a subsequent re-installation after the initial alignment procedure has been carried out, unless the HTHP Cell is impaired in some way (e.g. wedge window assembly (**56**) or reference mirror (**72**) needs cleaning), it may be necessary to carry out the alignment procedure again.

5. Loading the Sample in the HTHP Cell

After alignment of the HTHP Cell Accessory has been completed, experimentation for sample analyses can now commence from introduction of appropriate samples within the HTHP Cell into the aperture hole (50) of the heater block assembly (10). For actual experimentation, once the sample has been introduced, the upper plane window assembly (11) and heat shield (62) need to be refitted to obtain the particular temperature and pressure conditions that apply for the measurement under safe operation.

The use of a left to right or right to left beam direction spectrometer system and the orientation of the HTHP Cell Accessory within the sample compartment determines how a sample can be loaded into the HTHP Cell. Please follow the instructions given for the beam direction of the spectrometer being used.

For a Left to Right Beam Spectrometer System

A solid sample disc (or reference mirror (72)) is loaded into position **only** by removing the plane window assembly (11) which is orientated at the top of the HTHP Cell under the heat shield (62). (See instructions on pages 35 to 36 of this instruction manual for the heat shield (62) and plane window assembly (11) removal.)

Once access has been gained to the aperture hole (50) of the heater block assembly (10), remove the reference mirror (72) or any other sample within and insert a new sample to rest on the correctly height adjusted keep ring (51).

Note: *If necessary, the sample can be secured in place by using the second keep ring (51) to screw into the aperture hole (50) from the top, to “sandwich” the sample between the two keep rings (51). However, it is important that from installation of the top keep ring (51) it does not disturb the sample and thus could alter the alignment of the sample surface.*

For a Right to Left Beam Spectrometer System

A solid sample disc (or reference mirror **(72)**) can be loaded in to the aperture hole **(50)** of the heater block assembly **(10)** in two ways.

- 1) By removing the plane window assembly **(11)** which is orientated at the top of the HTHP Cell under the heat shield **(62)**. (See instructions on pages 35 to 34 of this instruction manual for the heat shield **(62)** and plane window assembly **(11)** removal.)
- 2) By removing the complete heater block **(10)**, end sealing plate **(38)** and wiring strap **(37)** assembly from the HTHP cell body **(3)**. (Please see instructions for removal of the heater block assembly **(10)** from the HTHP Cell instruction manual 21-05850-16, pages 45 to 48).

Note: *In a right to left beam direction system the heater block assembly **(10)** faces outwards at the front of the spectrometer system which means it can be easily removed if necessary without the need to remove the entire HTHP Cell Accessory from the sample compartment to gain access.*

Once access has been gained to the aperture hole **(50)** of the heater block assembly **(10)**, remove the reference mirror **(72)** or any other sample within and insert a new sample to rest on the correctly height adjusted keep ring **(51)**.

Note: *If necessary, the sample can be secured in place by using the second keep ring **(51)** to screw into the aperture hole **(50)** from the top, to “sandwich” the sample between the two keep rings **(51)**. However, it is important that from installation of the top keep ring **(51)** it does not disturb the sample and thus could alter the alignment of the sample surface.*

6. Operation of the HTHP Cell in the Reflectance Mode

When the HTHP Cell has been configured for the reflectance mode of operation, is correctly installed, aligned and has the sample in position, it is ready to be operated.

Please follow the instruction for set up of water cooling, gas supplies/vacuum connectivity and heating requirements for operation of the HTHP Cell in this reflectance mode of configuration as found from Section 10) of the HTHP Cell instruction manual 2I-05850-16, pages 70 to 71.

Important: *The HTHP Cell MUST be operated at all times with a flow of cooling water. The water flow rate should be sufficient to keep the upper (1) and lower (2) cooling plates cool/cold throughout the entire analysis period. The water supply MUST be turned on before heating and kept flowing after the analysis has been completed and until the temperature indicated for the HTHP cell body (3) at the display of the temperature controller falls below 40°C. Efficient operation of the cooling system has been safeguarded by fixing a thermal switch to the upper (1) cooling plate. The switch will shut down the system if insufficient water flows through the cooling plates and the temperature is detected to rise above 40°C. The thermal switch will reset itself to enable the HTHP Cell to function normally when the water temperature reaches approximately 25°C.*



7. HTHP Cell Specular Reflectance Mode Diagram Parts Identification List

- (55) Fixing thumbscrew of optical baseplate (**OB**) to adapter baseplate (**AB**) (of a **complete** reflectance baseplate assembly).
- (56) Wedged window assembly.
- (57) Side support plate (left to right beam direction spectrometer).
- (58) Right angled “banjo” water connection fitting.
- (59) Sealing washers of standard water fittings (4).
- (60) Central nut fixing of banjo water connection fittings (58).
- (61) Short Nylon tubing connection for banjo fittings (58).
- (62) Heat shield for reflectance mode of operation.
- (63) Flange plate of wedged window assembly (56).
- (64) Indentation marks on flange plate (63) - (Denote thick end of the wedged window assembly (56)).
- (65) M4 x 10mm cap head screw for side support plates fixing.
- (66) M4 x 18mm captive screw and washer for side support plate.
- (67) Side support bracket (right to left beam direction spectrometer).
- (68) Short side support plate (right to left beam direction spectrometer).
- (69) Flat washer for side support bracket (67) fixing.
- (70) Adjustable output mirror on optical baseplate (**OB**).
- (71) Fixed input mirror on optical baseplate (**OB**).
- (72) 13mm dia. polished disc (reference mirror).
- (73) M4 x 5mm cap head screw for output mirror (70) rotation.
- (74) M4 x 12mm tapered grub screw for output mirror (70) tilt.

8. Installation of the HTHP Cell Specular Reflectance Mode Baseplate into the Spectrometer

The following information describes how to fit an HTHP Cell specular reflectance mode baseplate assembly into a particular manufacturers IR spectrometer system (make and model number).

Identify the components that have been supplied with your order for the P/N GS05860 HTHP Cell Reflectance Mode Upgrade Kit and proceed to follow the instructions for installation of the reflectance baseplate assembly described for your particular make and model of IR spectrometer.

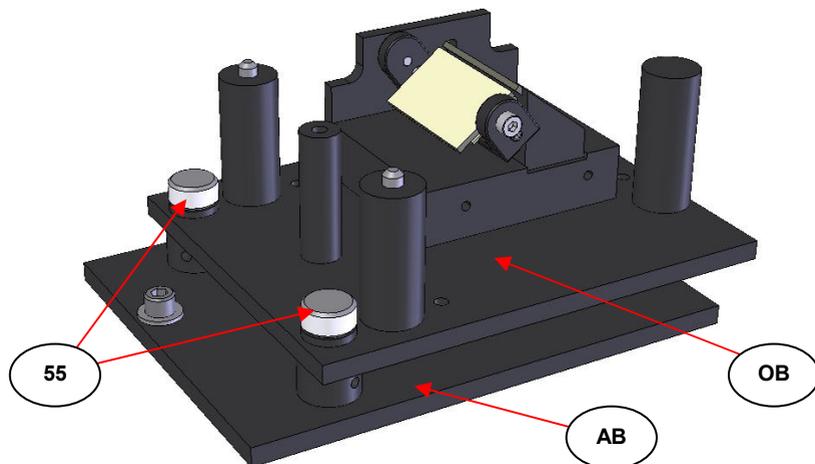
The whole HTHP Cell specular reflectance baseplate assembly consists of an **adapter baseplate (AB)** that will fit to the sample compartment floor of the spectrometer and an **optical baseplate (OB) assembly** (mirror components attached) that interfaces between the adapter baseplate (**AB**) and the HTHP Cell. In most cases for a correct installation procedure it is best to fit the adapter baseplate (**AB**) first to the sample compartment floor and then install the optical baseplate (**OB**) assembly to the adapter baseplate (**AB**) via tightening of the two thumbscrew fixings (**55**).

Finally, the HTHP Cell that has been adapted with the supplied pressure certified wedged window assembly, appropriate fixing support plates and water connection fittings (if necessary) for the specular reflectance mode of operation, is fixed to the optical baseplate (**OB**) assembly of the combined (**AB** and **OB**) installed specular reflectance baseplate assembly.

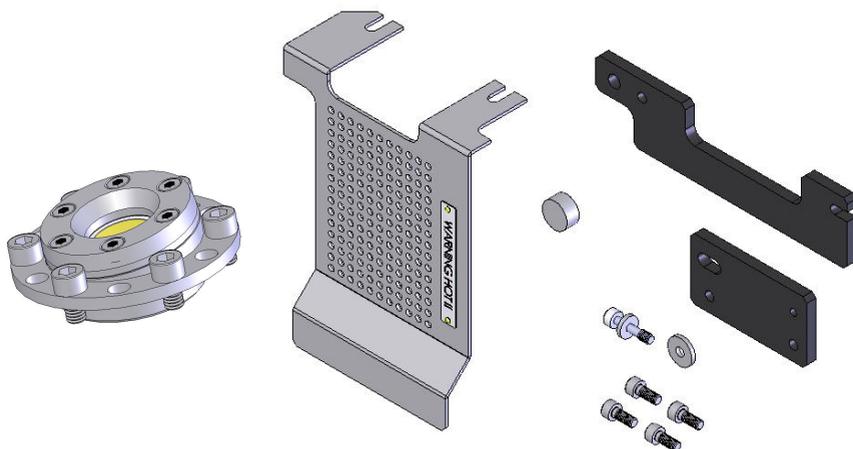
Note: *Examples of both left to right (page 22) and right to left (page 31) beam direction Spectrometer configurations for the HTHP Cell to mount onto its appropriate specular reflectance baseplate assembly have been shown in Section 3) of this user manual as an additional guide.*

P/N 549-073 - Agilent/Varian/Biorad FTS7, 40, 60, 65, 100, 135, 155, 165, 175, 185, 660, 670, 6000, Excalibur, Scimitar

Beam direction: Right to Left



HTHP Cell Reflectance Baseplate Assembly P/N 549-073



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-073 ordered as P/N GS05860

User Manual

Using the wedged window assembly and appropriate support plate parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a right to left beam configuration spectrometer. (See pages 24 to 33 of this user manual.)

Remove any 3" x 2" mount plate used in the Agilent spectrometer.

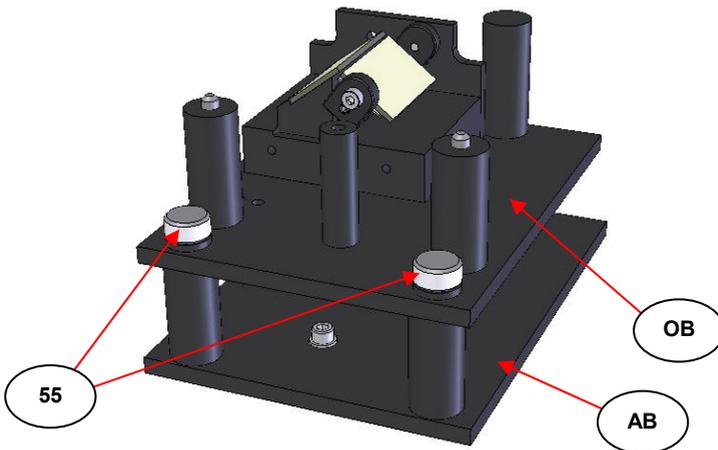
Place the adapter baseplate (**AB**) into the sample compartment and bolt down using the two 1/4-20UNC x 1/2" cap head screws provided. The adapter baseplate (**AB**) is the correct way around when the two pillars for the two thumb screw fixings (**55**) of the optical baseplate (**OB**) are to the left hand side of the sample compartment.

Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate into the pillars of the adapter baseplate (**AB**).

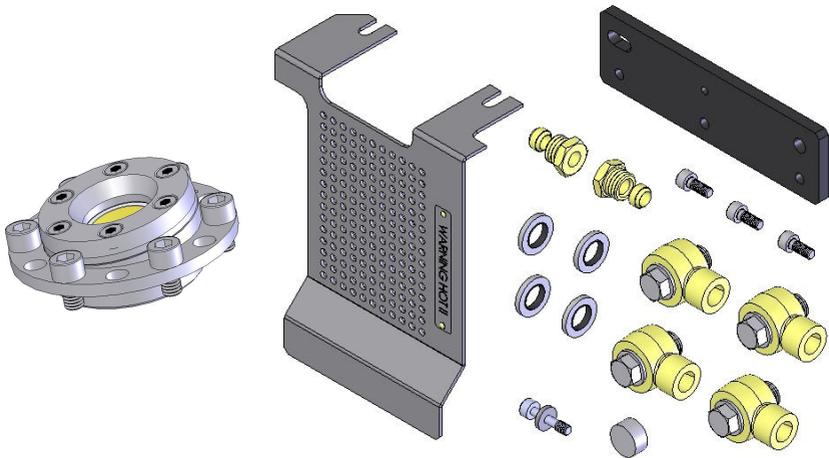
Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

P/N 549-080 - Bomem M100 Series 110, 120

Beam direction: Left to Right



HTHP Cell Reflectance Baseplate Assembly P/N 549-080



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-080 ordered as P/N GS05860

Using the wedged window assembly, appropriate support plate and water connector parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a left to right beam configuration spectrometer. (See pages 13 to 23 of this user manual.)

Remove the spectrometer cover and 3" x 2" sample mount to gain access to the sample compartment.

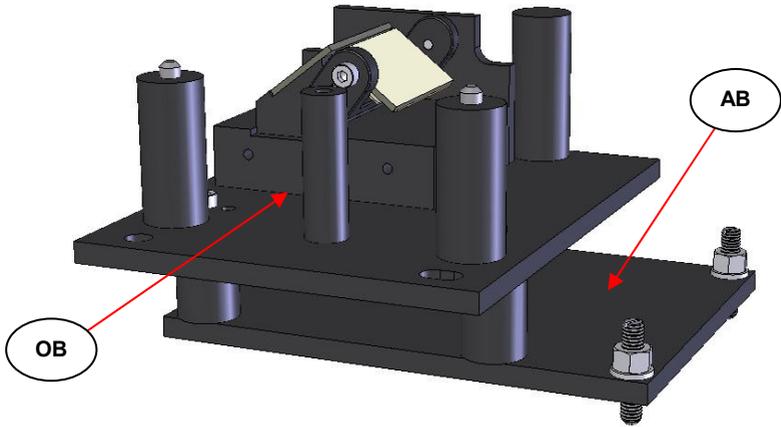
Place the adapter baseplate (**AB**) into the sample compartment and bolt down using the two 10-32UNC x 1/2" cap head screws provided. The adapter baseplate (**AB**) is the correct way around when the two pillars for the two thumb screw fixings (**55**) of the optical baseplate (**OB**) are to the front of the sample compartment.

Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate (**OB**) into the pillars of the adapter baseplate (**AB**).

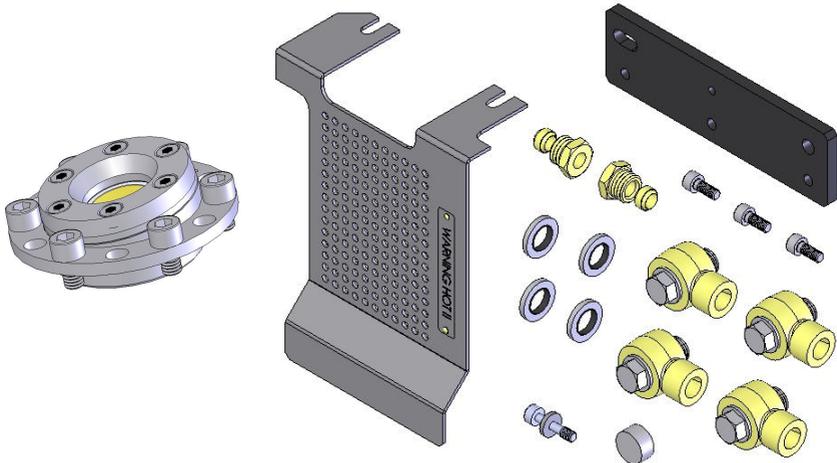
Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

P/N 549-081 - Bomem MB100 Series Kinematic Mount 155, 157 and MB3000

Beam direction: Left to Right



HTHP Cell Reflectance Baseplate Assembly P/N 549-081



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-081 ordered as P/N GS05860

Using the wedged window assembly, appropriate support plate and water connector parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a left to right beam configuration spectrometer. (See pages 13 to 23 of this user manual.)

Remove the spectrometer cover and 3" x 2" sample mount to gain access to the sample compartment. The adapter baseplate (**AB**) has the three correct feet for the kinematic mounting system with the Bomem spectrometer. Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the three M4 x 12mm cap head screws supplied. (It will only affix one way.)

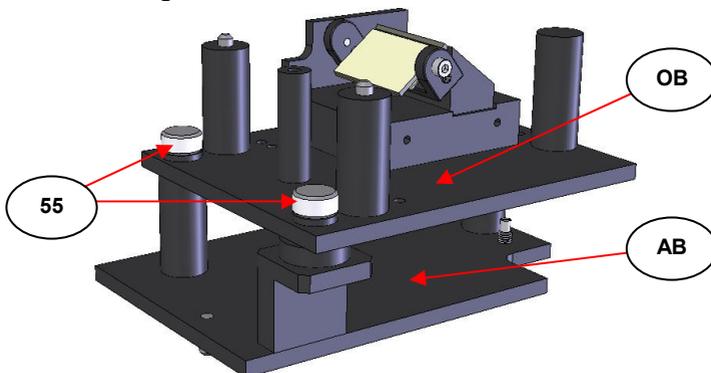
Place the entire baseplate assembly (**AB** and **OB**) into the spectrometer. This involves placing the screws/feet on the underside of the adapter baseplate onto the three location features (a conical countersink, a 'V' slot and a plain flat) on the floor of the spectrometer. The adapter baseplate (**AB**) screws/feet can be adjusted for height and levelling.

Note: *The adapter baseplate (**AB**) should be secured using two 'L-shape' clamp screws which fix into the spectrometer floor. (These are available from Bomem Inc.)*

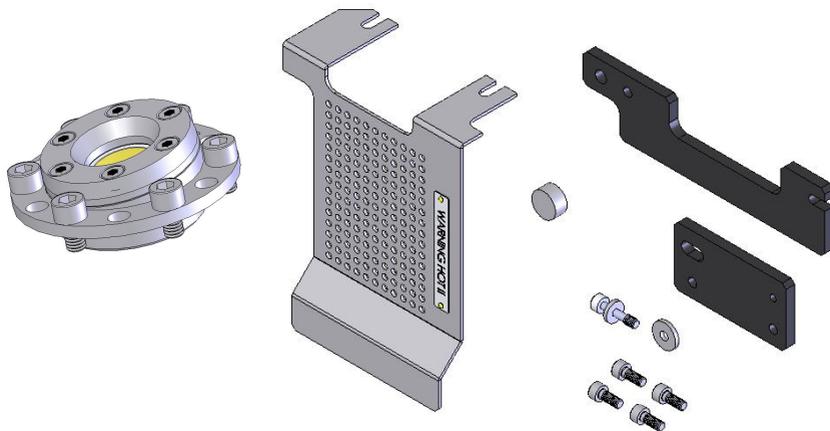
Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

P/N 549-076 - Bruker IFS 25, 55, 66, 66V, 88, Vector22, Equinox

Beam direction: Right to Left



HTHP Cell Reflectance Baseplate Assembly P/N 549-076



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-076 ordered as P/N GS05860

Using the wedged window assembly and appropriate support plate parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a right to left beam configuration spectrometer. (See pages 24 to 33 of this user manual.)

Remove any 3" x 2" mount plate used in the spectrometer from the Bruker baseplate.

Place the adapter baseplate (**AB**) into the sample compartment to attach to the Bruker baseplate. The two fixing screws and dowel pin of the adapter baseplate (**AB**) are passed through the larger hole ends of the slots on the Bruker baseplate and the adapter baseplate (**AB**) is slid from right to left to centralise it on the Bruker base plate. The two fixing screws of the adapter baseplate (**AB**) are then turned anticlockwise to tighten the plates together. The adapter baseplate (**AB**) is the correct way around when the two pillars for the two thumb screw fixings (**55**) of the optical baseplate are to the left hand side of the sample compartment.

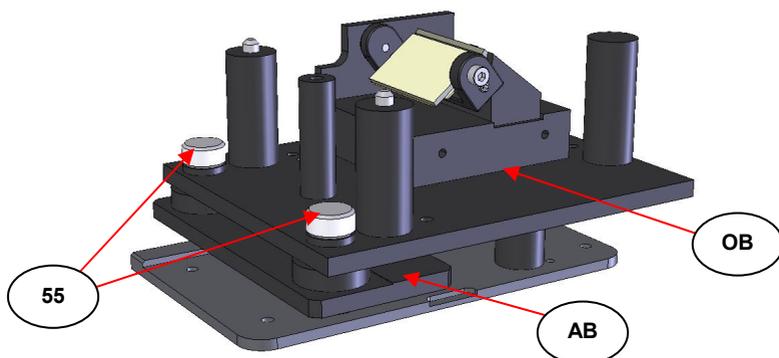
Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate (**OB**) into the pillars of the adapter baseplate (**AB**).

Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

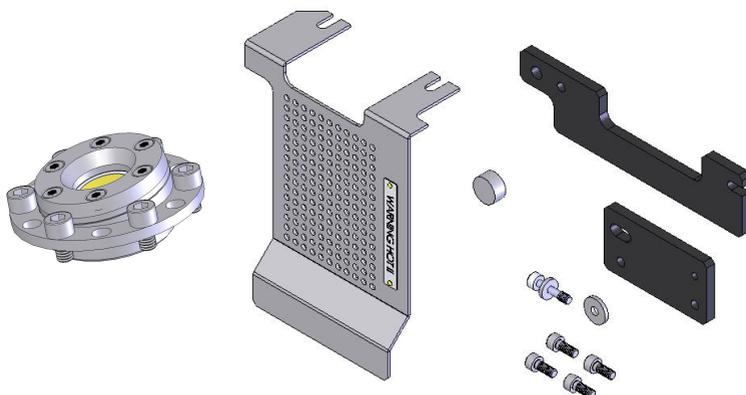
Note: *If you need to reposition the adapter baseplate (AB) on the Bruker baseplate, you will have to remove the HTHP Cell and optical baseplate (OB) to gain access to the fixing screws of the adapter baseplate (AB). When the adapter baseplate (AB) has been moved and re-secured on the Bruker baseplate, the optical baseplate(OB) and HTHP Cell are reinstalled as above.*

P/N 549-392 - Bruker Tensor 25, 37, Quicklock 33, Vertex 70, 80

Beam direction: Right to Left



HTHP Cell Reflectance Baseplate Assembly P/N 549-392



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-392 ordered as P/N GS05860

User Manual

Using the wedged window assembly and appropriate support plate parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a right to left beam configuration spectrometer. (See pages 24 to 33 of this user manual.)

Remove any 3" x 2" mount plate used in the spectrometer from the Bruker baseplate with Quick Lock mechanism.

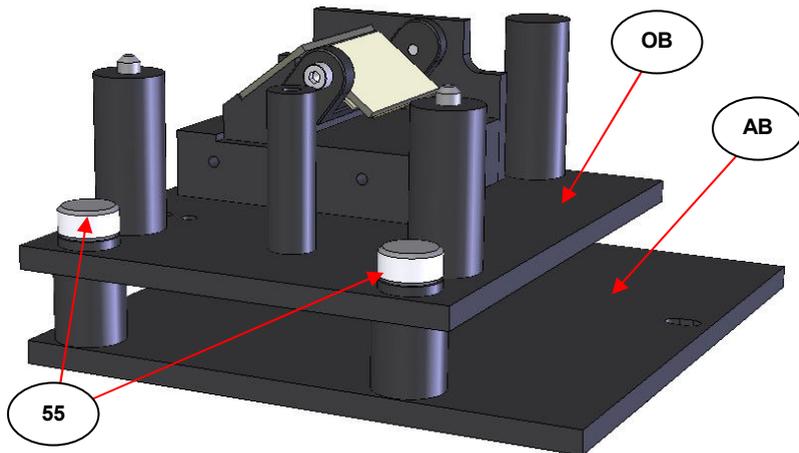
Place the adapter baseplate (**AB**) into the sample compartment to attach to the Bruker baseplate via the Quick Lock mechanism attachment. It will only fit in one orientation.

Locate the optical baseplate onto the two positioning discs of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate (**OB**) and into the positioning discs of the adapter baseplate (**AB**).

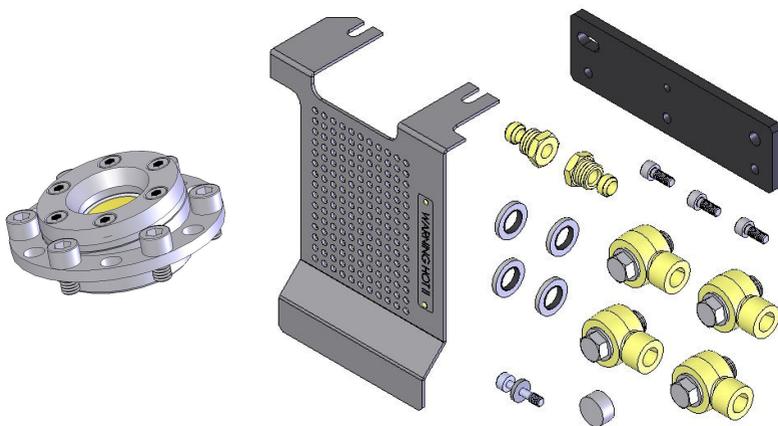
Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

P/N 549-405 - Jasco (All Jasco models)

Beam direction: Left to Right



HTHP Cell Reflectance Baseplate Assembly P/N 549-405



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-405 ordered as P/N GS05860

Using the wedged window assembly, appropriate support plate and water connector parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a left to right beam configuration spectrometer. (See pages 13 to 23 of this user manual.)

Remove any 3" x 2" mount plate used in the Jasco spectrometer.

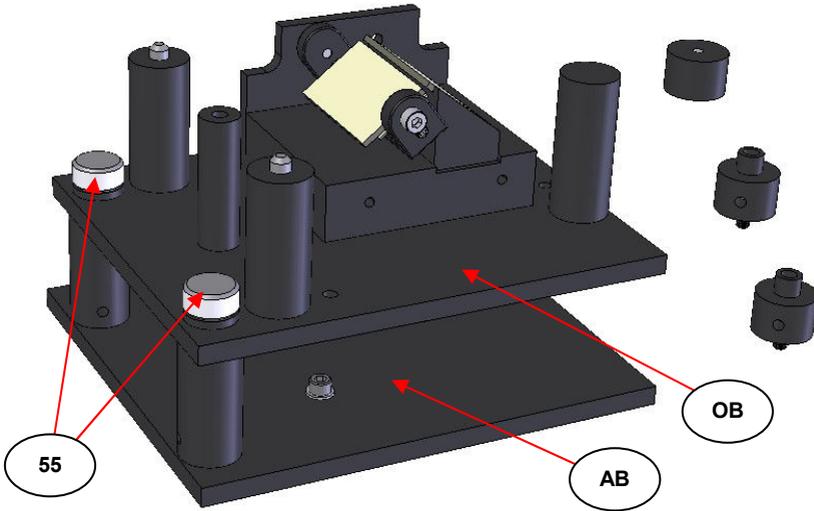
Place the adapter baseplate (**AB**) into the sample compartment and bolt down using the M4 x 12mm cap head screw provided. The adapter baseplate (**AB**) is the correct way around when the two pillars for the two thumb screw fixings (**55**) of the optical baseplate (**OB**) are facing towards the front of the sample compartment.

Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate into the pillars of the adapter baseplate (**AB**).

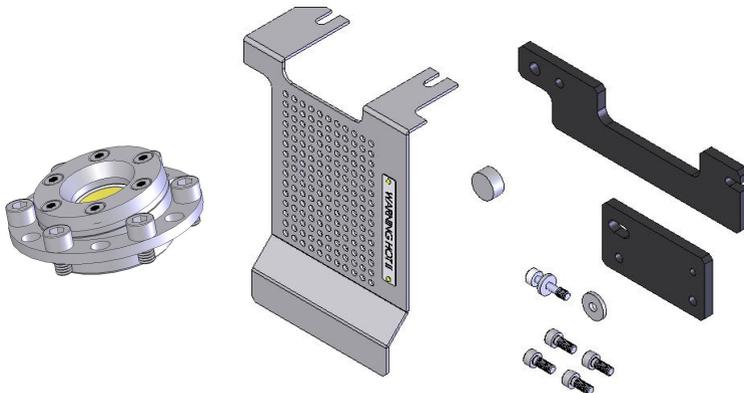
Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

P/N 549-074 - Mattson Galaxy Series 2000, 3000, 4000, 5000, 6000, 7000, 8000 Genesis Series, RS, Infinity

Beam direction: Right to Left (8000 is Left to Right)



HTHP Cell Reflectance Baseplate Assembly P/N 549-074



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-074 ordered as P/N GS05860

Using the wedged window assembly and appropriate support plate parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a right to left beam configuration spectrometer. (See pages 24 to 33 of this user manual.)

Two sets of support pillars are supplied with the adapter baseplate (**AB**) to allow the accessory to be mounted in both Galaxy Series (tall pillars required) and Genesis Series (short pillars required) spectrometers.

To change the adapter baseplate (**AB**), remove the M4 cap head screw which fastens the rear support pillar and attach the alternative pillar. The front locating pillars may be simply unscrewed and changed over. (Tommy bar holes have been provided for use to turn the pillars in case of tight assemblies.)

Remove any 3" x 2" mount plate used in the spectrometer.

Place the adapter baseplate (**AB**) into the sample compartment such that the dowel pins at the bottom fit into the location hole and slot in the spectrometer floor. Secure the adapter baseplate (**AB**) using the two 8-32UNC x 1/2" cap head screws provided.

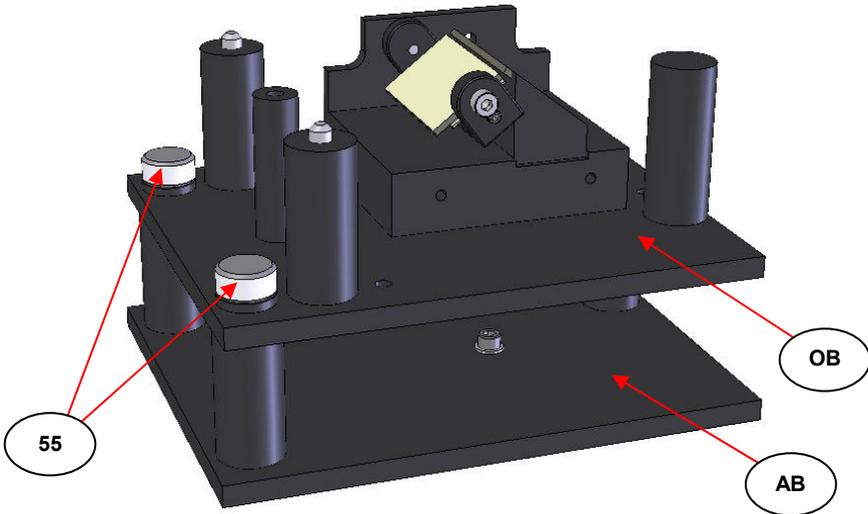
The adapter baseplate (**AB**) is the correct way around when the two pillars for the two thumb screw fixings (**55**) of the optical baseplate (**OB**) are to the left hand side of the sample compartment.

Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate (**OB**) into the pillars of the adapter baseplate (**AB**).

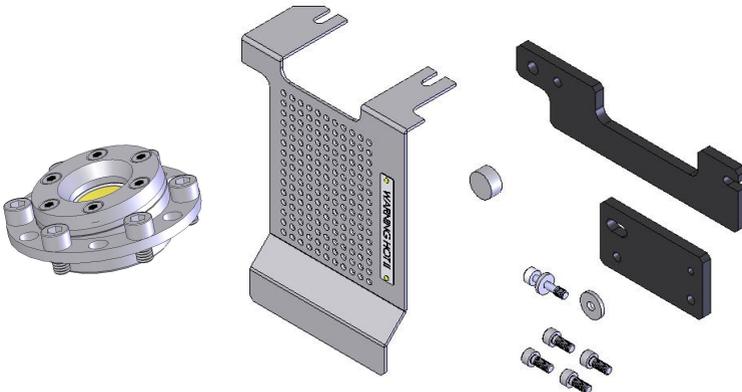
Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

P/N 549-072 - Nicolet 500, 700, 710, 740, 800, 5PC, 5SXC, Magna, Protege, Avatar, Nexus, 6700, 8700, iS10, iS50

Beam direction: Right to Left



HTHP Cell Reflectance Baseplate Assembly P/N 549-072



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-072 ordered as P/N GS05860

Using the wedged window assembly and appropriate support plate parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a right to left beam configuration spectrometer. (See pages 24 to 33 of this user manual.)

Remove any 3" x 2" mount plate used in the spectrometer.

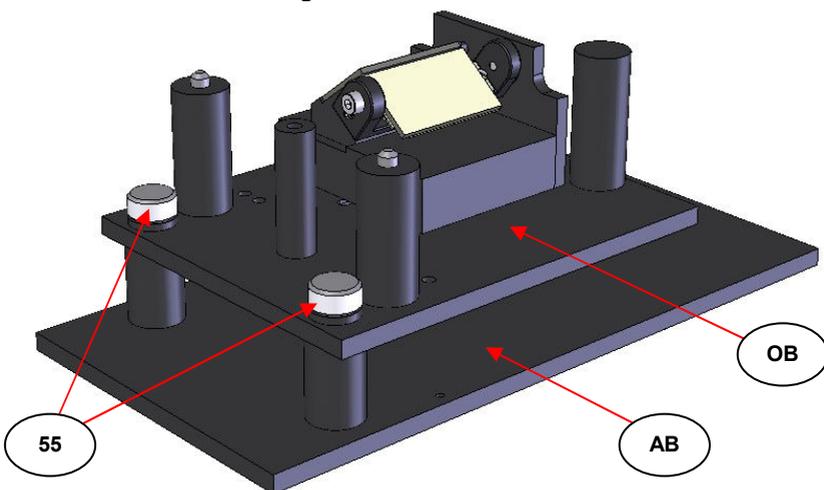
Place the adapter baseplate (**AB**) into the sample compartment and bolt down using the two 8-32 UNC x 1/2" cap head screws provided. The adapter baseplate is the correct way around when the two pillars for the two thumb screw fixings (**55**) of the optical baseplate (**OB**) are to the left hand side of the sample compartment.

Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate (**OB**) into the pillars of the adapter baseplate (**AB**).

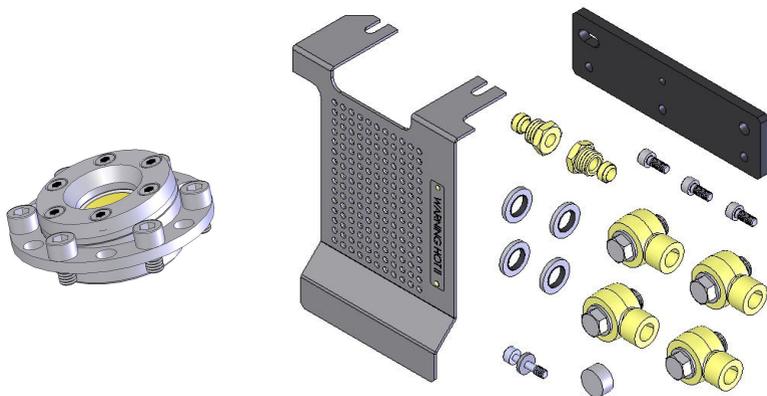
Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

P/N 549-091 - Perkin Elmer PE1700, PE1800

Beam direction: Left to Right



HTHP Cell Reflectance Baseplate Assembly P/N 549-091



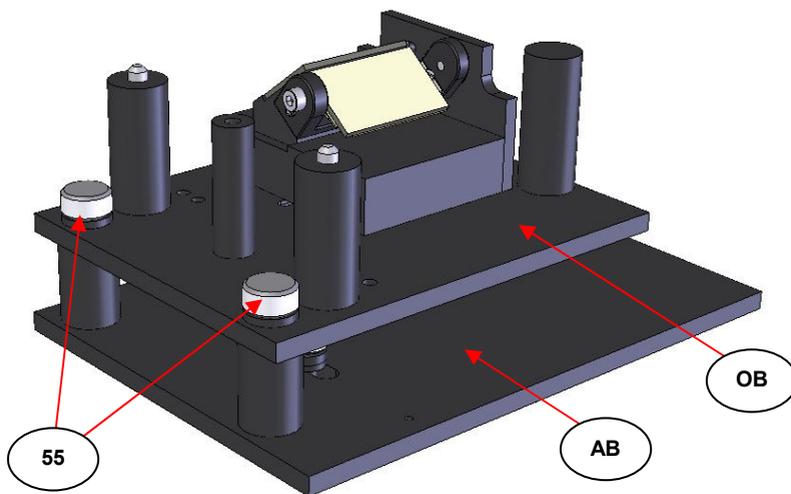
HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-091 ordered as P/N GS05860

Using the wedged window assembly, appropriate support plate and water connector parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a left to right beam configuration spectrometer. (See pages 24 to 33 of this user manual.) Remove any 3" x 2" mount plate in the spectrometer. Place the adapter baseplate (**AB**) into the sample compartment. It is held in position by two location pins into the front support rail of the spectrometer and by tightening of the pull down thumb nut (supplied) to the instruments own fixing screw that passes through the slot at the front of the adapter baseplate (**AB**). The adapter baseplate (**AB**) is the correct way around when the two pillars for the two thumb screw fixings (**55**) of the optical baseplate (**OB**) are to the front of the sample compartment. Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate (**OB**) into the pillars of the adapter baseplate (**AB**). Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

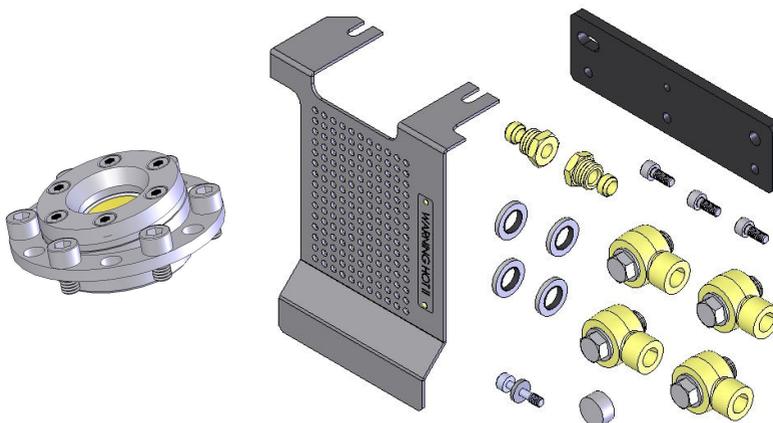
Slide the accessory/baseplate assembly along the spectrometer rail to peak the energy where necessary and secure the assembly with the thumb nut onto the instruments fixing screw. This thumb nut is not accessible with the converted HTHP Cell and optical baseplate (**OB**) in place on the adapter baseplate (**AB**). You will have to temporarily lift the cell and optical baseplate (**OB**) off of the adapter baseplate (**AB**) to tighten the thumb screw.

P/N 549-078 - Perkin Elmer PE2000, Spectrum2000, GX

Beam direction: Left to Right



HTHP Cell Reflectance Baseplate Assembly P/N 549-078



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-078 ordered as P/N GS05860

User Manual

Using the wedged window assembly, appropriate support plates and water connector parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a left to right beam configuration spectrometer. (See pages 13 to 23 of this user manual.)

Remove any 3" x 2" mount plate in the spectrometer.

Place the adapter baseplate (**AB**) into the sample compartment. It is held in position by two location pins into the front support rail of the spectrometer and by tightening of the pull down thumb nut (supplied) to the instruments own fixing screw that passes through the slot at the front of the adapter baseplate (**AB**). The adapter baseplate (**AB**) is the correct way around when the two pillars for the two thumb screw fixings (**55**) of the optical baseplate (**OB**) are to the front of the sample compartment.

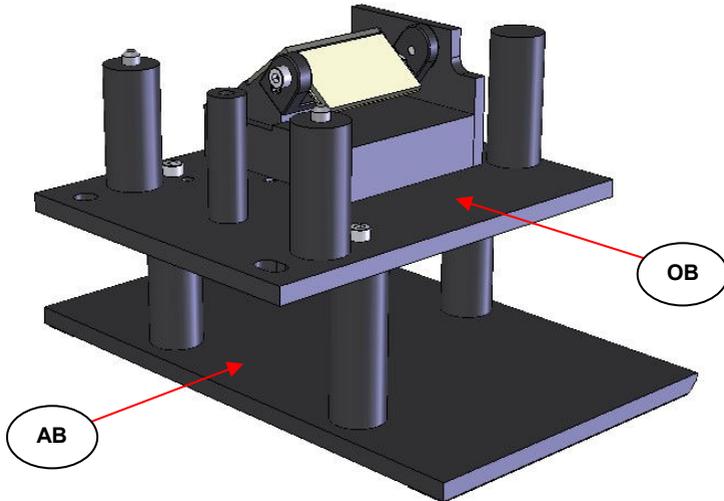
Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate (**OB**) into the pillars of the adapter baseplate (**AB**).

Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

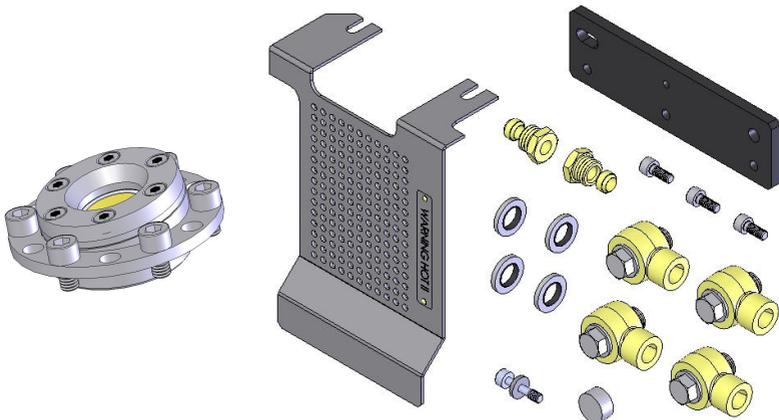
Slide the accessory/baseplate assembly along the spectrometer rail to peak the energy where necessary and secure the assembly with the thumb nut onto the instruments fixing screw. This thumb nut is not accessible with the converted HTHP Cell and optical baseplate (**OB**) in place on the adapter baseplate (**AB**). You will have to temporarily lift the cell and optical baseplate (**OB**) off of the adapter baseplate (**AB**) to tighten the thumb screw.

P/N 549-090 - Perkin Elmer PE1600 Series, Paragon, Spectrum 1000, BX, RX

Beam direction: Left to Right



HTHP Cell Reflectance Baseplate Assembly P/N 549-090



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-090 ordered as P/N GS05860

User Manual

Using the wedged window assembly, appropriate support plate and water connector parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a left to right beam configuration spectrometer. (See pages 13 to 23 of this user manual.)

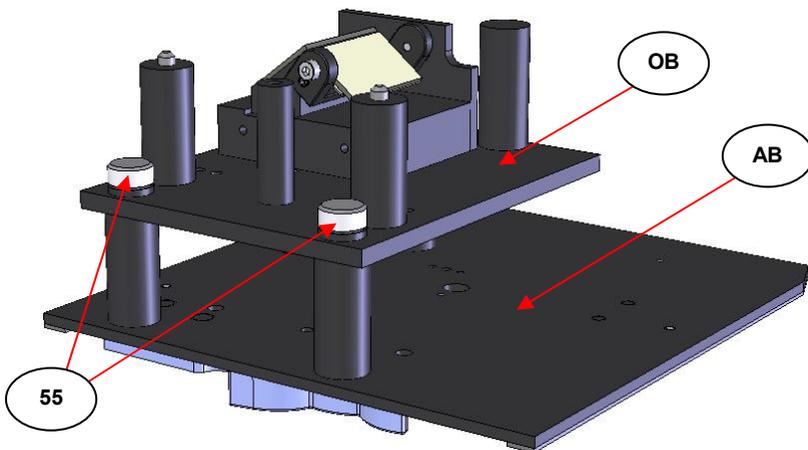
Remove the instrument's own sliding baseplate floor from the sample compartment by pulling it firmly forward. The catch mechanism at the rear will release automatically.

The adapter baseplate (**AB**) is a similar type of baseplate that slides into the spectrometer sample compartment. Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the three M4 x 12mm cap head screws supplied through the optical baseplate (**OB**) into the pillars of the adapter baseplate (**AB**). Slide the combined baseplate assembly (**AB** and **OB**) all the way into the sample compartment. The catch at the back of the assembly baseplate (**AB**) secures the cell when mounted and the Velcro type strip eliminates any movement.

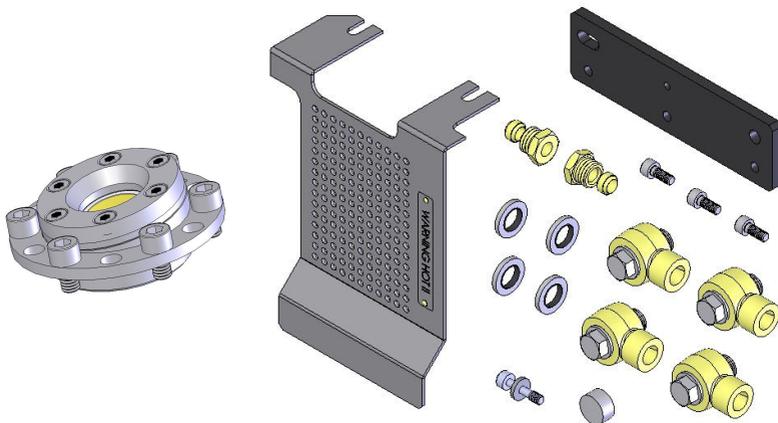
Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

P/N 549-294 - Perkin Elmer Spectrum One, Spectrum 100, 400, 4000, 8000 (Frontier)

Beam direction: Left to Right



HTHP Cell Reflectance Baseplate Assembly P/N 549-294



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-294 ordered as P/N GS05860

Using the wedged window assembly, appropriate support plate and water connector parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a left to right beam configuration spectrometer. (See pages 13 to 23 of this user manual.)

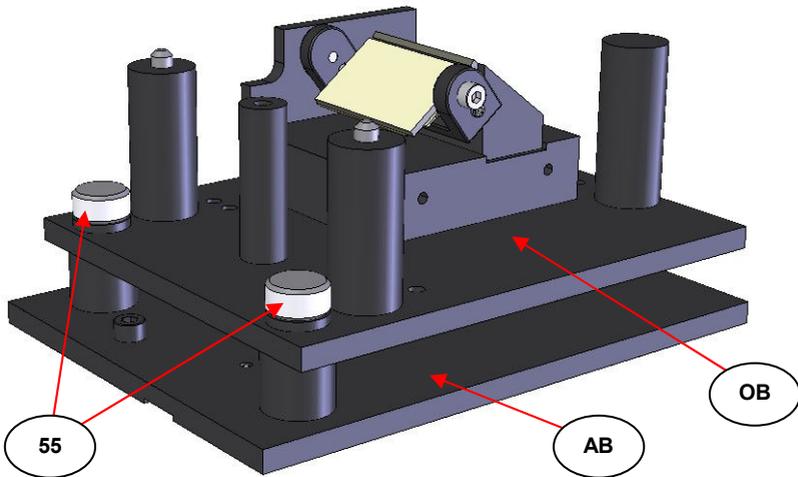
Remove the instrument's own sliding baseplate floor from the sample compartment. The lilac colored pivoting handle on the underside of the plate is pulled towards you when you need to remove the plate from the spectrometer.

The adapter baseplate (**AB**) is a similar type of baseplate that slides into the spectrometer sample compartment. Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate (**OB**) into the pillars of the adapter plate (**AB**). Slide the combined baseplate assembly (**AB** and **OB**) all the way into the sample compartment until it locates into the spectrometer by engagement of the 15pin connector at the back of the plate into the spectrometer and by guidance clips on the underside of the adapter baseplate (**AB**).

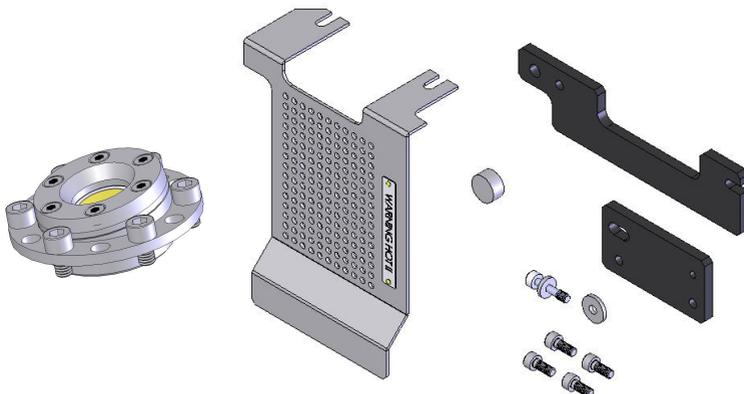
Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

**P/N 549-082 - Shimadzu 8000, 8100, 8200, 8300, 8400, 8500,
Prestige 21, IR Affinity**

Beam direction: Right to Left



HTHP Cell Reflectance Baseplate Assembly P/N 549-082



HTHP Cell Reflectance Fittings Kit of Parts supplied with the HTHP Cell Reflectance Baseplate Assembly P/N 549-082 ordered as P/N GS05860

Using the wedged window assembly and appropriate support plate parts provided, convert the HTHP Cell for reflectance mode operation and for installation into a right to left beam configuration spectrometer. (See pages 24 to 33 of this user manual.)

Remove any 3" x 2" mount plate used in the spectrometer.

Place the adapter baseplate (**AB**) into the sample compartment with the location bar on the underside and the two screw hole fixings aligning with their corresponding holes in the spectrometer floor. Make sure that the location bar on the underside of the adapter baseplate (**AB**) locates in the slot in the spectrometer sample compartment floor.

Secure the adapter baseplate (**AB**) by screwing the two cap head M5 x 10mm cap head screws through the adapter baseplate (**AB**) into the spectrometer sample compartment floor. The adapter baseplate (**AB**) is the correct way around when the two pillars for the two thumb screw fixings (**55**) of the optical baseplate (**OB**) are to the left hand side of the sample compartment.

Locate the optical baseplate (**OB**) onto the pillars of the adapter baseplate (**AB**) and secure with the two thumb screws (**55**) through the optical baseplate (**OB**) into the pillars of the adapter baseplate (**AB**).

Install the converted HTHP Cell onto the location pillars and support pillar of the optical baseplate (**OB**). Secure the cell by screwing the M4 captive screw in the cell location plate into the small fixing pillar of the optical baseplate (**OB**).

Any Other Spectrometers

For advice concerning spectrometers not included in this instruction manual please consult your nearest Specac representative.

This is to certify that the:

**HIGH TEMPERATURE HIGH PRESSURE CELL
5850/5855**

Manufactured by:
SPECAC LIMITED

Conforms with the protection requirements of Council directives 2004/108/EC , relating to the EMC DIRECTIVE,

by the application of:

- 1) Testing to the following standard:
EN-61326:2006/8 EMC (Emissions/Immunity) requirements for Electrical Equipment for measurement, control and laboratory use.
- 2) Supported by SPECAC Technical File No. **TF5850**

and also conforms to the general safety requirements of Council Directives 2006/95/EC , relating to the LOW VOLTAGE DIRECTIVE,

by the application of:

- 1) EN61010-1:2010, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory use.
- 2) Supported by SPECAC Technical File No. **TF5850**

Conforms with the protection requirements of Council directives 97/23/EC , relating to the PRESSURE DIRECTIVE,

by the application of:

- 1) The Pressure Equipment Regulations 1999 amendment 2002.
The Pressure Systems Safety Regulations 2000.
The Simple Pressure Vessels (Safety) Regulations 1991.
- 2) Supported by SPECAC Technical File No. **TF5850**
And adopting (SEP) Sound Engineering Practice as referenced in the above Regulations.

Responsible Person:

Name: Mr.G.Poulter
Position: Technical Director
Serial No:
Name:
Position:

Signature: 
Of: Specac Ltd. **Date:** 21st Aug 2013
conforms to the above
Signature:
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