Spectrum 100/400 External Input Beam Port

A Spectrum 100 Series FT-IR or Spectrum 400 Series FT-IR instrument can be fitted with a flat mirror that enables you to direct radiation from an external source into the interferometer. This document describes how to:

- Install a window in the external input beam port;
- Remove the source mirror (Spectrum 100) or dual-source mirror (Spectrum 400), and install the flat external-input mirror;
- Remove the flat external-input mirror, and re-fit the source mirror;
- Configure your Spectrum Express or Spectrum software to use an external source;
- Couple an external source to the instrument.

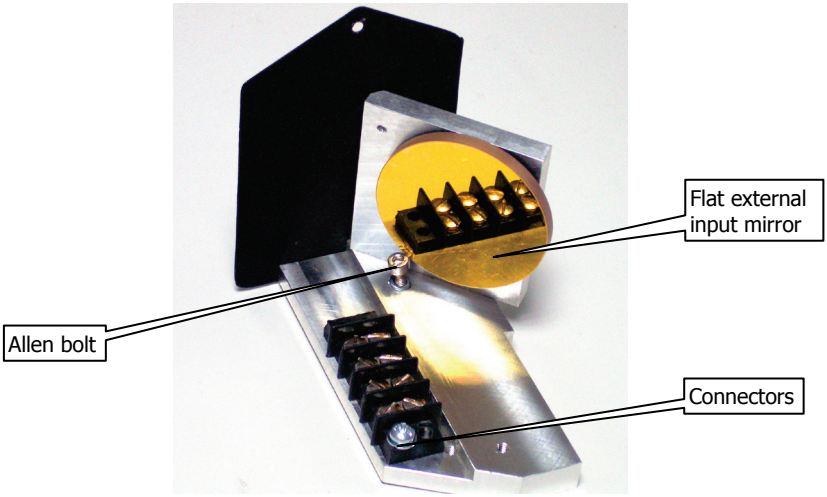

Figure 1 Spectrum 400 Flat External-Input Mirror Assembly

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Beaconsfield, BUCKS, HP9 2FX, United Kingdom.

Produced in the UK.

Warnings and Cautions

Fitting a mirror assembly or beam port window requires you to open the main cover of the spectrometer.

WARNING

Switch off the mains power to the spectrometer, wait 60 seconds, and then disconnect the power cable before you open the spectrometer.

This ensures that you are safe from electrical shock and laser radiation.

CAUTION

If the spectrometer is fitted with KBr optics, do not open the main cover if the humidity is >45% relative humidity.

The humidity sensitive optics will be damaged if subjected to a relative humidity in excess of the specified level.

CAUTION

Be careful not to touch, or otherwise contaminate, the source mirror or flat external-input mirror.

These precision optical devices are easily scratched, and are not easy to clean.

Installing a Window in the External Input Beam Port

1. Switch off the spectrometer, and then remove the power cable.
2. Undo the locks on the front of the spectrometer, and then open the main cover.

   For detailed instructions, refer to the *Advanced Maintenance* section of the *Spectrum 100 Series User's Guide* (L1050021) or the *Spectrum 400 Series User's Guide* (L1050056), as applicable. These are distributed as .pdf files on the *Spectrum Manuals CD* (L1050002).
3. Using the hexagonal wrench supplied, slacken and remove the M2.5 screws securing the external input beam port cover to the main cover.
4. Remove the beam port cover and seal.

   Retain the beam port cover for further use.

5. Ensure the seal is fitted to the window and is correctly seated (Figure 2).

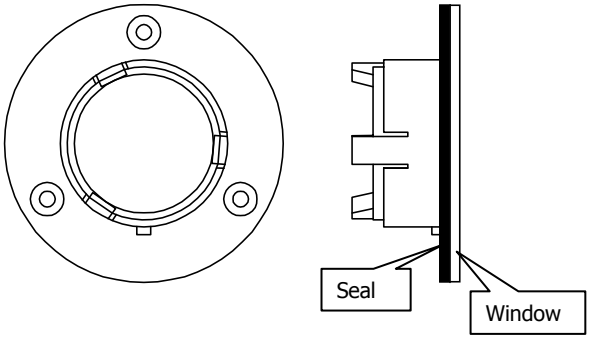


Figure 2 Seal Fitted to Window

6. Fit the window to the main cover from the outside in.

   Ensure the seal is fully seated and the key on the window lines up with the notch in the main cover.

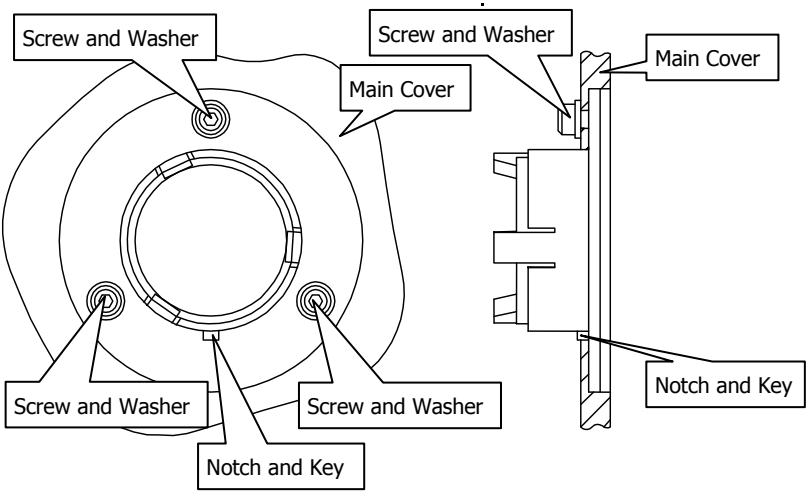


Figure 3 Window Installed in Main Cover

7. Secure the window to the main cover by fitting the screws and washers and tightening the screws using the hexagonal wrench (Figure 3).

8. Close and secure the main cover.

9. Plug in and switch on the instrument.

Fitting the Flat External-Input Mirror Assembly in the Spectrum 100

Before you begin, make sure you have read and understood the "Warnings and Cautions" on page 2.

1. Switch off the spectrometer, and then remove the power cable.
2. Undo the locks on the front of the spectrometer, and then open the main cover.

   For detailed instructions, refer to the *Advanced Maintenance* section of the *Spectrum 100 Series User's Guide* (L1050021), which is provided as a .pdf file on the *Spectrum Manuals CD* (L1050002).
3. Undo the M4 screw under the source mirror using a screwdriver, and then lift the assembly clear of the instrument.

NOTE: Please ensure that the three kinematic balls remain in place.

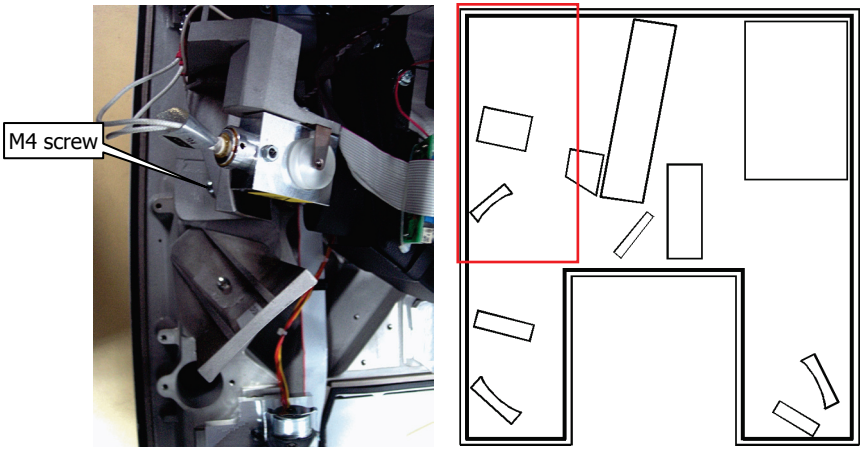


Figure 4 Location of Spectrum 100 Source Mirror Assembly

4. Using a screwdriver, remove the four color-coded wires from the terminal block on the source mirror assembly.

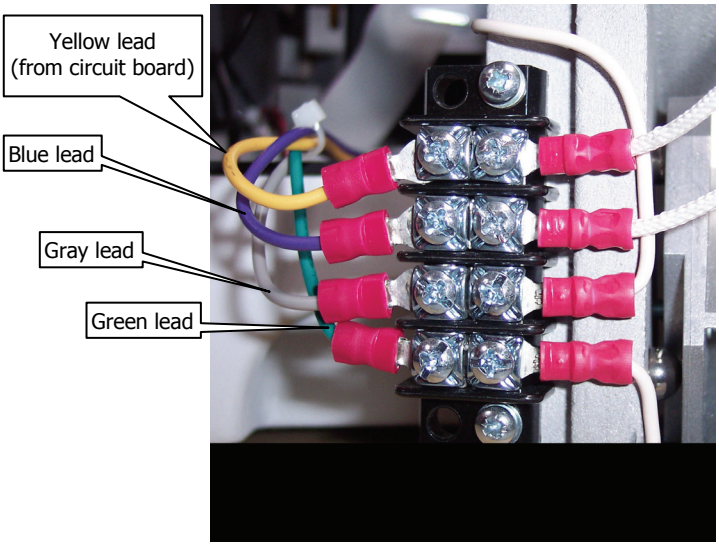


Figure 5 Circuit Board to Source Mirror Connections

The mirror assembly is now free of the spectrometer. Store the assembly in a clean, dry, safe place for future use.

5. Connect the four color-coded wires to the terminal block on the external-input mirror assembly.

   It does not matter which color wire you connect to a particular terminal, but do not connect more than one wire to any one terminal. The terminal block provides a parking position for each wire and ensures that they do not short circuit.

6. Position the external-input mirror assembly on the kinematic balls in the spectrometer, make sure the Allen bolt is vertical, and then carefully tighten the bolt using the ball-ended Allen key provided (L9003209).

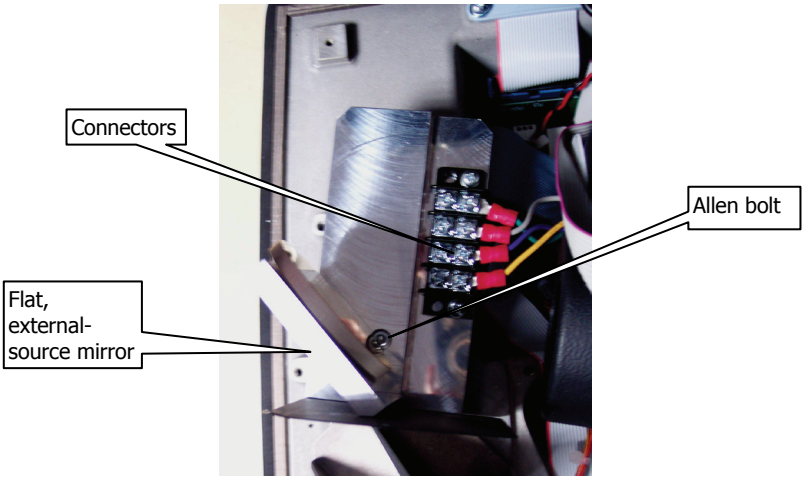


Figure 6 External-Input Mirror Assembly

7. Tuck all cables out of the beampath and then, making sure that no loose cables are trapped, close and lock the spectrometer cover.

Fitting the Flat External-Input Mirror Assembly in the Spectrum 400

Before you begin, make sure you have read and understood the "Warnings and Cautions" on page 2.

1. If you have an MIR/NIR spectrometer, select the MIR configuration in the Spectrum software.

   This improves access to the dual-source mirror assembly.

2. Switch off the spectrometer, and then remove the power cable.

3. Undo the locks on the front of the spectrometer, and then open the main cover.

   For detailed instructions, refer to the *Advanced Maintenance* section of the *Spectrum 400 Series User's Guide* (L1050056), which is provided as a .pdf file on the *Spectrum Manuals CD* (L1050002).

4. Use the ball-ended Allen key supplied to undo the bolt under the dual-source mirror, and then lift the assembly clear of the instrument.

   Do not use a hex-ended Allen key, as this may damage the bolt.

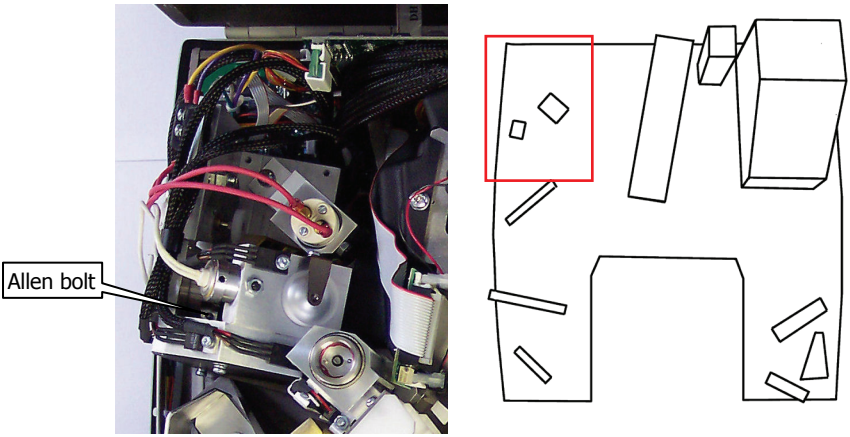


Figure 7 Location of Spectrum 400 Dual-Source Mirror Assembly

The Allen bolt is not easy to see, as it is partially hidden by the mirror. For clarity, Figure 8 shows the mirror assembly removed from the instrument. The light baffle has also been removed, but there is no need for you to remove it.

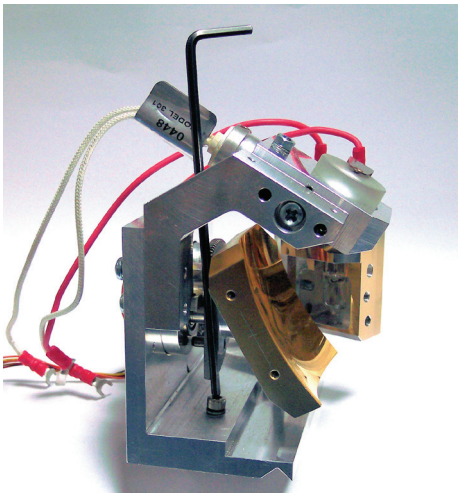


Figure 8 Reaching the Allen Bolt with the Ball-Ended Key

5. Unplug the black source thermostatting cable and the mirror motor cable.

   For clarity, Figure 9 shows the location of these connectors with the mirror assembly and circuit board removed.

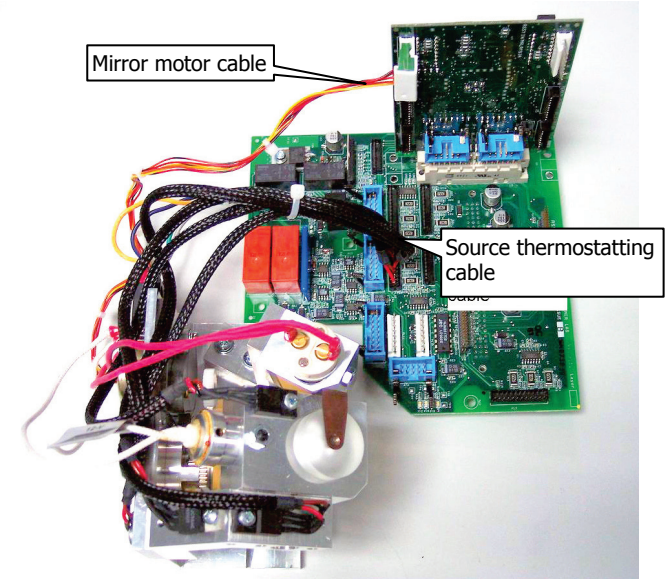


Figure 9 Location of the Motor and Thermostatting Cable Connectors

6. Using a screwdriver, remove the four color-coded wires from the terminal block on the dual-source mirror assembly.

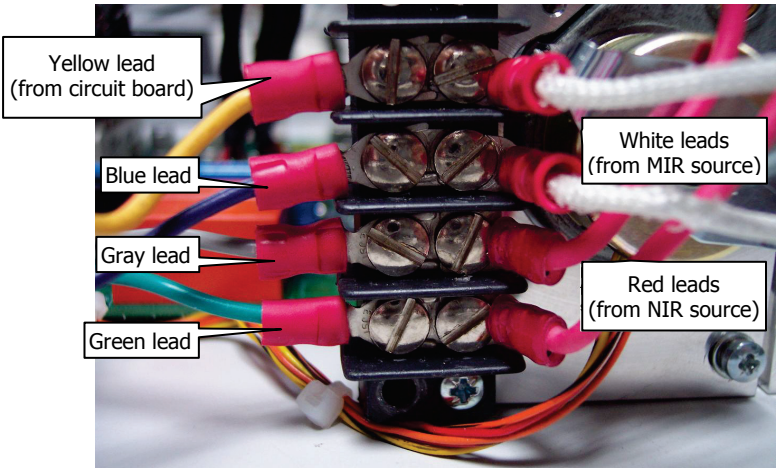


Figure 10 Circuit Board to Dual-Source Mirror Connections

The mirror assembly is now free of the spectrometer. Store the assembly in a clean, dry, safe place for future use.

7. Connect the four color-coded wires to the terminal block on the external-input mirror assembly.

   It does not matter which color wire you connect to a particular terminal, but do not connect more than one wire to any one terminal. The terminal block provides a parking position for each wire and ensures that they do not short circuit.

   For clarity, Figure 5 shows the wires connected to the terminal block with the circuit board removed from the spectrometer.

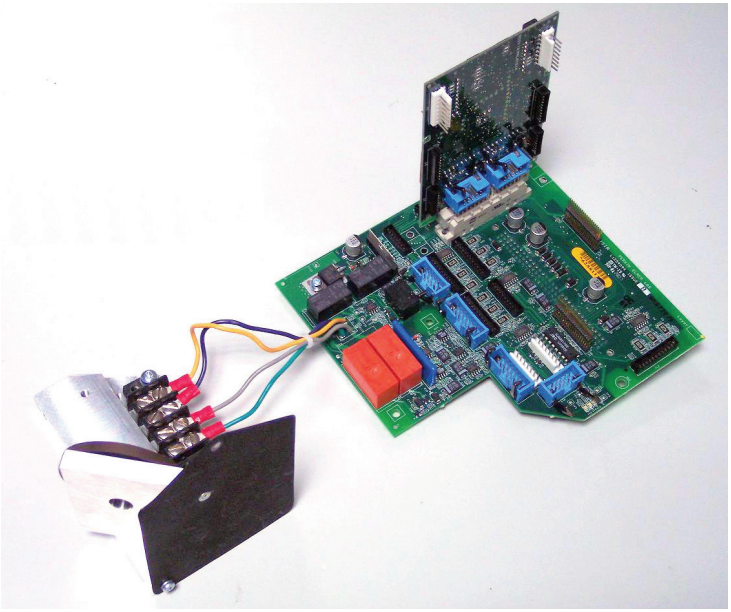


Figure 11 Circuit Board to External-Input Mirror Connections

8. Position the external-input mirror assembly on the kinematic balls in the spectrometer, make sure the Allen bolt is vertical, and then carefully tighten the bolt.

9. Tuck all cables out of the beampath and then, making sure that no loose cables are trapped, close and lock the spectrometer cover.

Re-fitting the Source (Spectrum 100) or Dual-Source (Spectrum 400) Mirror Assembly

Before you begin, make sure you have read and understood the "Warnings and Cautions" on page 2.

1. Switch off the spectrometer, and then remove the power cable.
2. Undo the locks on the front of the spectrometer, and then open the main cover.

   For detailed instructions, refer to the *Advanced Maintenance* section of the *Spectrum 100 Series User's Guide* (L1050021) or the *Spectrum 400 Series User's Guide* (L1050056), as applicable. These are distributed as .pdf files on the *Spectrum Manuals CD* (L1050002).
3. Use the ball-ended Allen key supplied to undo the bolt under the external-input mirror, and then lift the assembly clear of the instrument.

   Do not use a standard Allen key, as this may damage the bolt.
4. Using a screwdriver, remove the four color-coded wires from the terminal block on the external-input mirror assembly.

   The mirror assembly is now free of the spectrometer. Store the assembly in a clean, dry, safe place for future use.
5. Connect the four color-coded wires to the terminal block on the source mirror assembly (Figure 5) or dual-source mirror assembly (Figure 10), as applicable.
6. If you have a Spectrum 400 dual-source instrument, reconnect the black source thermostatting cable and the mirror motor cable (Figure 9).

   The connectors are keyed, so can only be fitted in the correct orientation.
7. Position the source (Figure 4) or dual-source (Figure 7) mirror assembly on the kinematic balls in the spectrometer, make sure the bolt is vertical, and then carefully tighten the bolt.
8. Tuck all cables out of the beampath and then, making sure that no loose cables are trapped, close and lock the spectrometer cover.

Configuring Spectrum or Spectrum Express Software to Use an External Source

NOTE: If you have a Spectrum 100 Series Spectrometer, you will need Spectrum software version 6.3.3 (or later), or Spectrum Express version 1.2 (or later) to use the external input beam port. If you have a Spectrum 400 Series Spectrometer, you will need Spectrum software version 6.3.2 (or later) to use the external input beam port.

This section describes how to create a modified instrument configuration file for use with an external source.

1. Browse to C:\pel_apps\bin\

   The instrument configuration file is named C*****.cfg, where ***** is the five-digit serial number of the instrument.

   The spectrometer serial number is located on its base casting, in the sample compartment, under the sample accessory baseplate.

2. Backup the appropriate C*****.cfg file, saving it as, for example, C*****.intsrc

NOTE: Make sure you save this backup of the original instrument configuration file. If you refit the source (Spectrum 100) or dual-source (Spectrum 400) mirror assembly, you will re-instate this file.

3. Browse to C:\Program Files\PerkinElmer\ServiceIR\

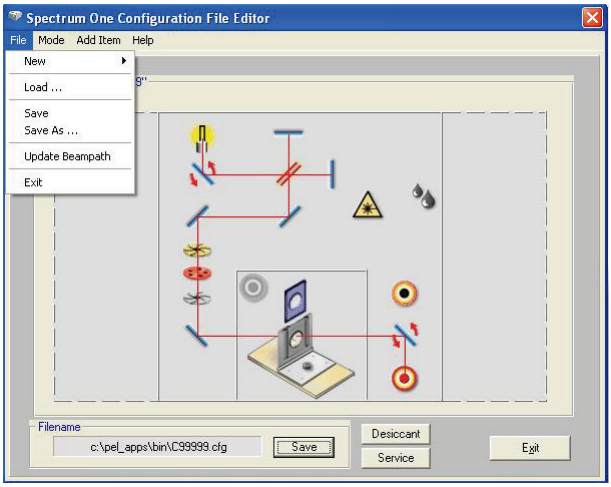
CAUTION *The ServiceIR folder contains a number of utilities, many of which are for use solely by a PerkinElmer Service Engineer.*

If used incorrectly, some utilities could damage the instrument.

4. Double-click **S1_Config.exe**

   The Configuration File Editor utility opens.

5. Click **Load** in the File menu, and then select the instrument serial number.



The configuration file is opened for editing.

6. Right-click  .

The Add source dialog is displayed.

7. Select **Internal 1** in the Select Site pane, select **None** in the Select Type pane, and then click **Install**.

8. Right-click  .

The Add source dialog is displayed.

9. If you have a Spectrum 400 Series dual-source spectrometer, select **Internal 2** in the Select Site pane, select **None** in the Select Type pane, and then click **Install**.

   If you have a Spectrum 100 Series spectrometer, continue at Step 11.

10. Right-click  .

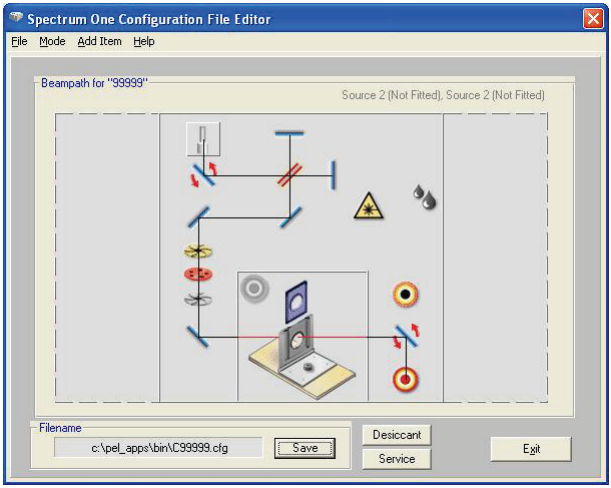
    The Add source dialog is displayed.

11. Select **External** in the Select Site pane, select the source type in the **Select Type** pane, and then click **Install**.

    The selection in the Select Type pane defines the default wavenumber range of the instrument, which can be edited in the Spectrum software. The effective scan range of your instrument will depend on its configuration, such as the detector and the beamsplitter.

NOTE: Selecting NIR prohibits the selection of the internal MIR DTGS or MCT detector, which can be damaged by exposure to high energy NIR light.

12. Click **Save** in the Filename pane.



13. Click **Exit.**

Re-instating the configuration file for the internal source or dual-source

1. Browse to C:\pel_apps\bin\

   The instrument configuration file is named C*****.cfg, where ***** is the five digit serial number of the instrument.

   The spectrometer serial number is located on its base casting, in the sample compartment, under the sample accessory baseplate.

2. Backup the appropriate C*****.cfg file, saving it as, for example C*****.extsrc

NOTE: Make sure that you save this backup of the external source configuration file. You may want to re-instate, or edit, this file when you use an external source on another occasion.

3. Rename C*****.intsrc (the backup of your original internal source configuration file) as C*****.cfg

NOTE: If a backup of the original internal source configuration was not made, uninstall the instrument and then re-install it using the configuration disk supplied with the instrument.

Attaching an External Source

This section provides the information required to couple an external source to the beam port on the rear of the spectrometer.

Two fixing screw positions are provided on the base casting, as shown in Figure 12.

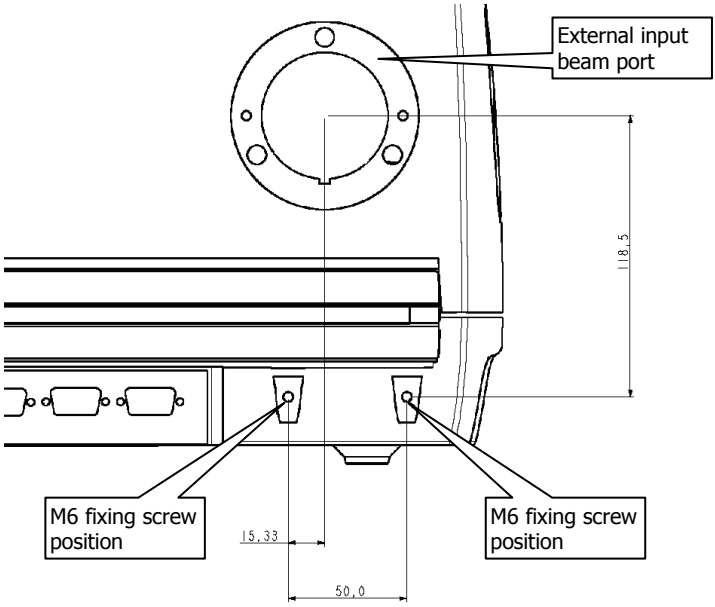


Figure 12 Fixing Screw Positions for the External Beam Port

Power supply

The spectrometer has no provision for powering an external source. You must provide a separate power supply, and ensure that the arrangement meets all the applicable safety standards.

Optical arrangement

The optical arrangement for an external source is shown in Figure 13.

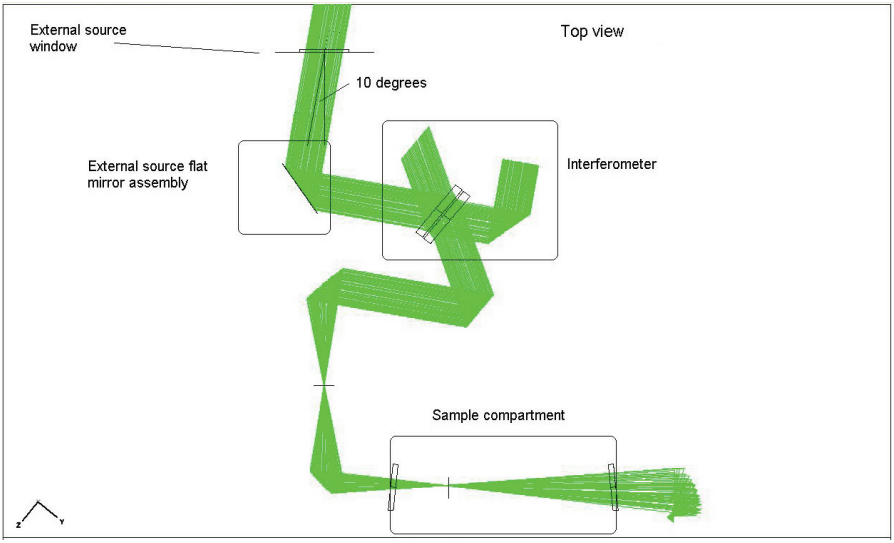


Figure 13 Optical Arrangement for an External Source

The beam should enter the external source window horizontally, at an angle of 10° from the normal to the plane of the screw holes.

For clarity, the external source window is shown not angled. In fact, it is angled at 6° to the back of the spectrometer to prevent multiple reflections. For most purposes this can be ignored.

The external window aperture is approximately 40 mm diameter, which is approximately the size of the beam through the interferometer.

For the highest throughput, you should collimate the beam to a half-cone angle of less than 2°.

NOTE: You can use the **Monitor Energy** function in Spectrum or Spectrum Express software to display the level of infrared energy reaching the detector in your instrument while adjusting your source.