External Input Beam Port

PerkinElmer Frontier IR Systems, Spectrum 400 Series and Spectrum 100 Series instruments can be fitted with a flat mirror that enables you to direct radiation from an external source into the interferometer.

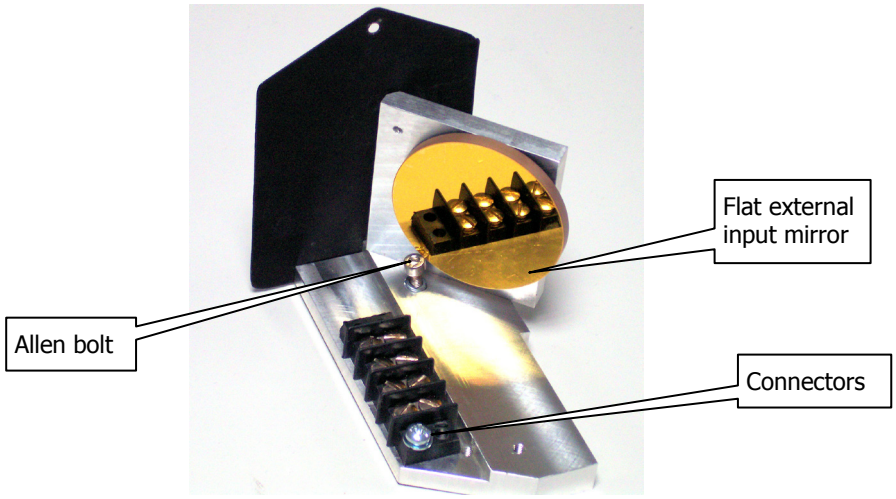

Figure 1 Flat external-input mirror assembly (for dual-source instruments)

This document describes how to:

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

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Produced in the UK.

The External Input Beam Port is installed, in the first instance, by a PerkinElmer Service Engineer, who will fit the external mirror assembly, and an external input beam port window on the rear of the spectrometer.

For Frontier IR Systems, these components form part of the External Beam Path Kit which provides support for a wide range of external beam accessories. See the User's Guide supplied with your instrument for details.

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 supply to the spectrometer, wait 60 seconds, and disconnect the power cable before you open the cover of the spectrometer. This makes sure that you are safe from electrical shock and laser radiation.

CAUTION

If the spectrometer is fitted with KBr or CsI 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

NOTE: The External Beam Path Kit for Frontier IR Systems includes left-hand, right-hand, and rear (external input beam port) windows. All three will be installed, in the first instance, by a PerkinElmer Service Engineer.

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 appropriate User's Guide for your instrument. These are distributed, as .pdf files, on the *IR & Raman 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 on the rear of the spectrometer.

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).

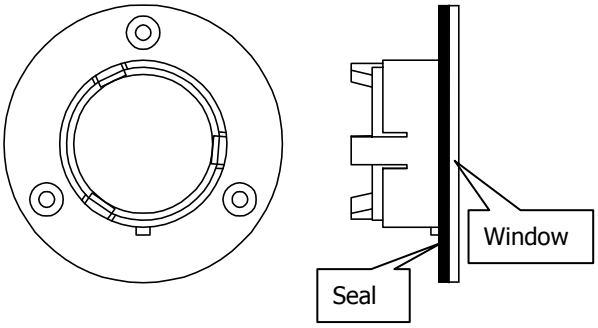


Figure 2 Seal fitted to window

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.

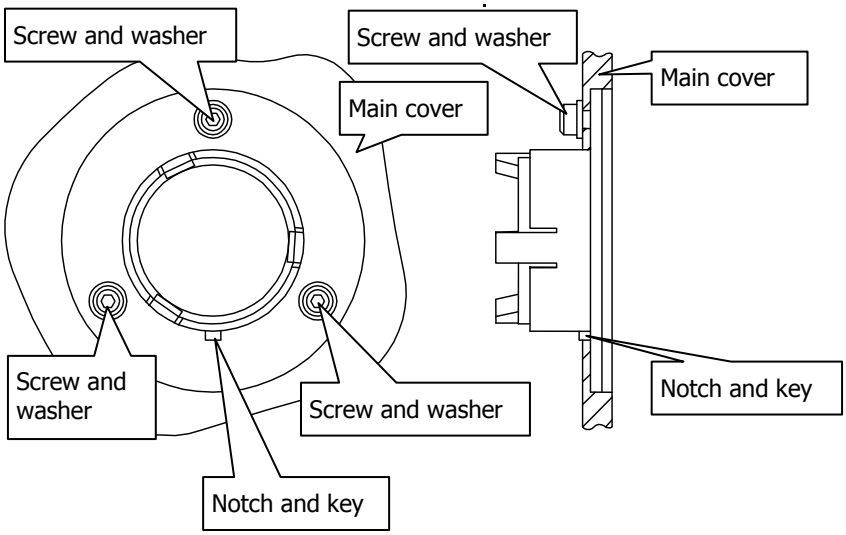


Figure 3 Window installed in main cover

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

The procedure for fitting the flat external-input mirror assembly varies depending on whether your instrument has a single-source or a dual-source.

- For single-source spectrometers (Frontier IR Systems and Spectrum 100 Series instruments with a single-source), refer *to Fitting the mirror in a single-source instrument*, below.
- For dual-source spectrometers (Frontier IR Systems and Spectrum 400 Series instruments with a dual-source), refer to *Fitting the mirror in a dual-source instrument*, on page 6.

Fitting the mirror in a single-source instrument

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 appropriate User's Guide for your instrument. These are distributed, as .pdf files, on the *IR & Raman 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.

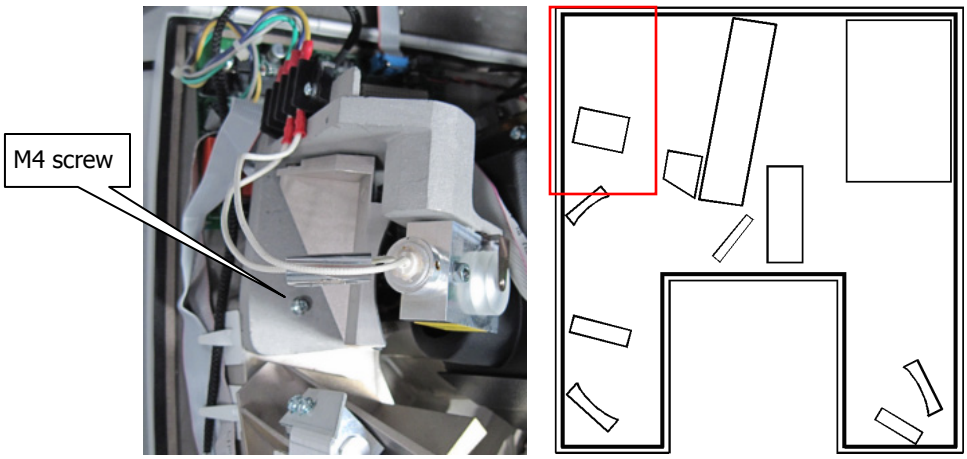


Figure 4 Location of single-source mirror assembly

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

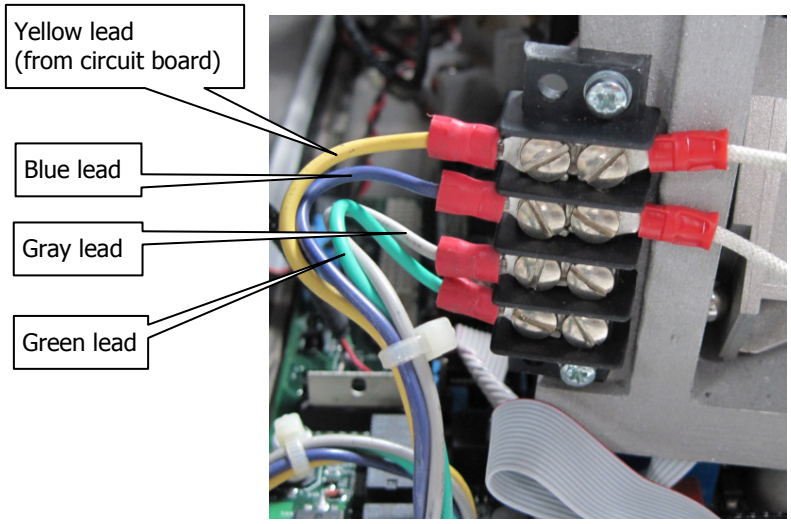


Figure 5 Circuit board to source mirror connections

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 hexagonal wrench provided (L9003209).

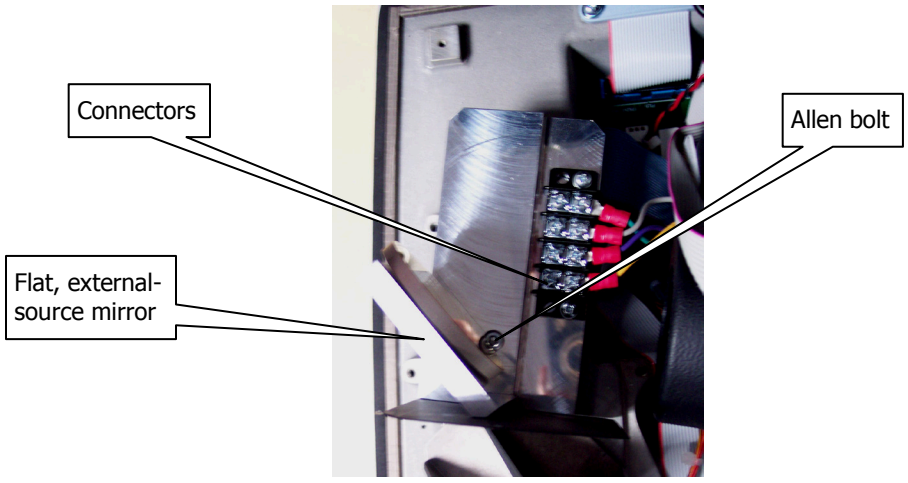


Figure 6 External-input mirror assembly

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 mirror in a dual-source instrument

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

1. If you have an MIR/NIR dual-source 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 appropriate User's Guide for your instrument. These are distributed, as .pdf files, on the *IR & Raman Manuals CD* (L1050002).

4. Use the ball-ended hexagonal wrench 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 wrench, as this may damage the bolt.

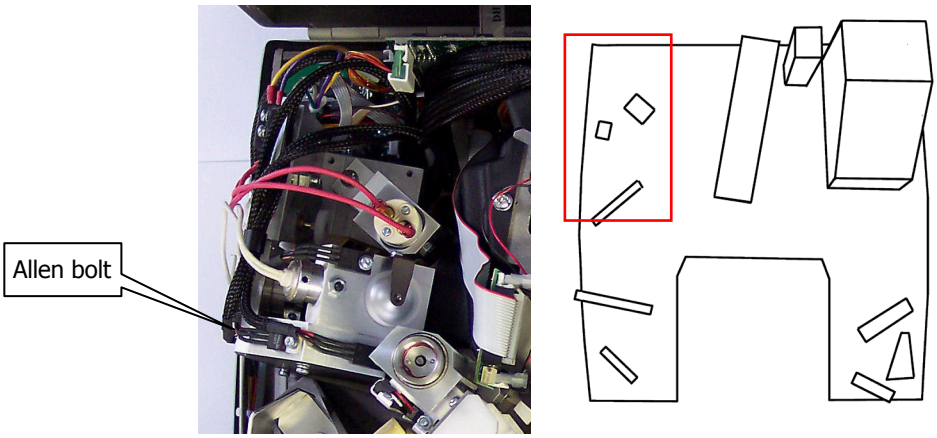


Figure 7 Location of dual-source mirror assembly

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.

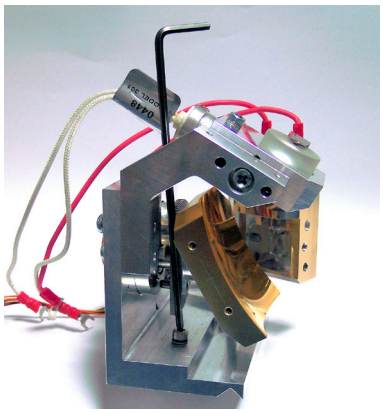


Figure 8 Reaching the Allen bolt with the ball-ended hexagonal wrench

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.

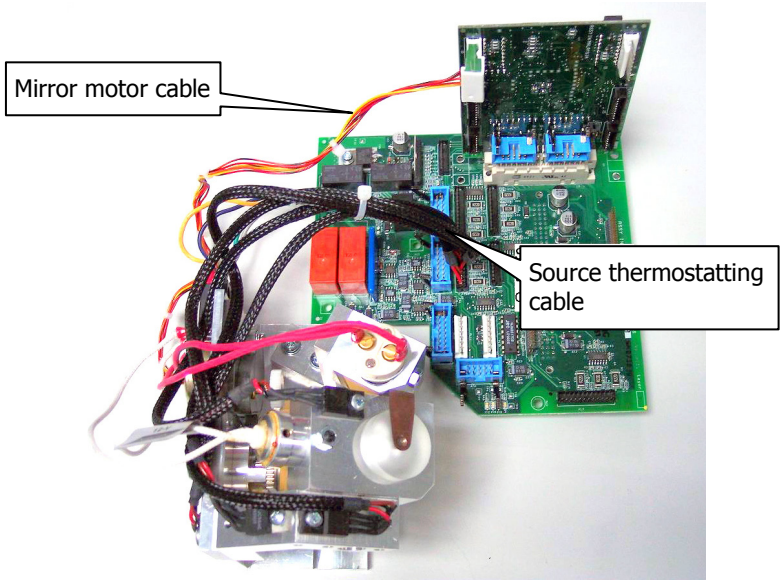


Figure 9 Location of the motor and thermostatting cable connectors

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

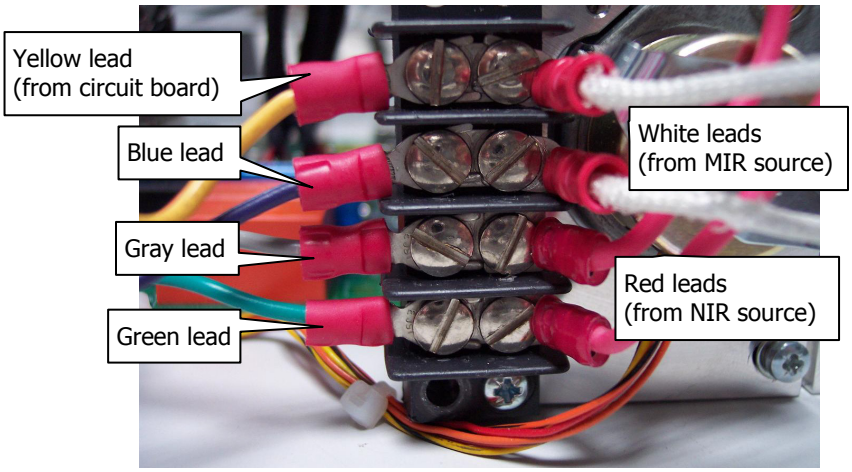


Figure 10 Circuit board to dual-source mirror connections

   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 11 shows the wires connected to the terminal block with the circuit board removed from the spectrometer.

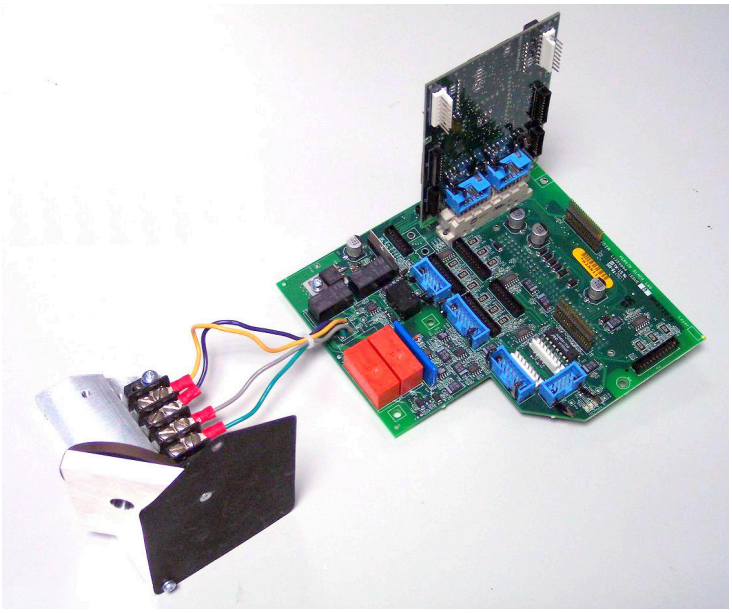


Figure 11 Circuit board to external-input mirror connections

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 or dual-source 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 appropriate User's Guide for your instrument. These are distributed, as .pdf files, on the *IR & Raman Manuals CD* (L1050002).

3. Use the ball-ended hexagonal wrench supplied to undo the bolt under the external-input mirror, and then lift the assembly clear of the instrument.

   Do not use a hex-ended wrench, 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 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 to use an external source

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 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 or dual-source mirror assembly, you will re-instate this file.

1. Browse to the C:\Program Files\PerkinElmer\ServiceIR or C:\Program Files (x86)\ PerkinElmer\ServiceIR directory.

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.

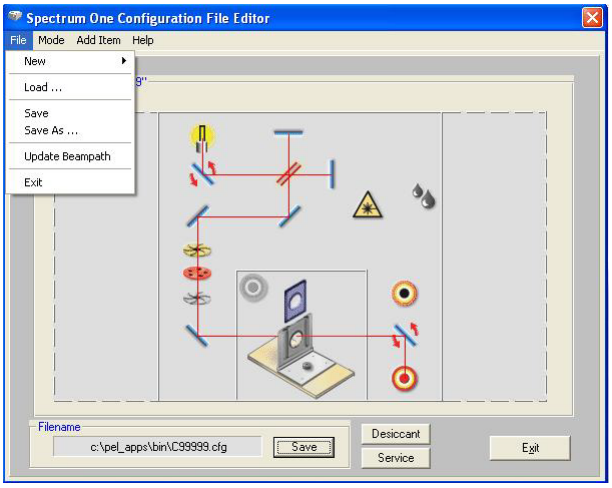
2. If you have Spectrum v.10.3.7, or later, double-click the **Frontier Configuration** shortcut.

   OR

   If you have Spectrum v.10.0.0–v.10.3.6, double-click **S1_Config.exe**.

   The Configuration File utility opens.

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



The configuration file is opened for editing.

4. Right-click  .

The Add source dialog is displayed.

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

6. Right-click  .

The Add source dialog is displayed.

7. If you have a 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 single-source spectrometer, continue at Step 11.

8. Right-click  .

The Add source dialog is displayed.

9. 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.

10. Click **Save**.

11. 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 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.

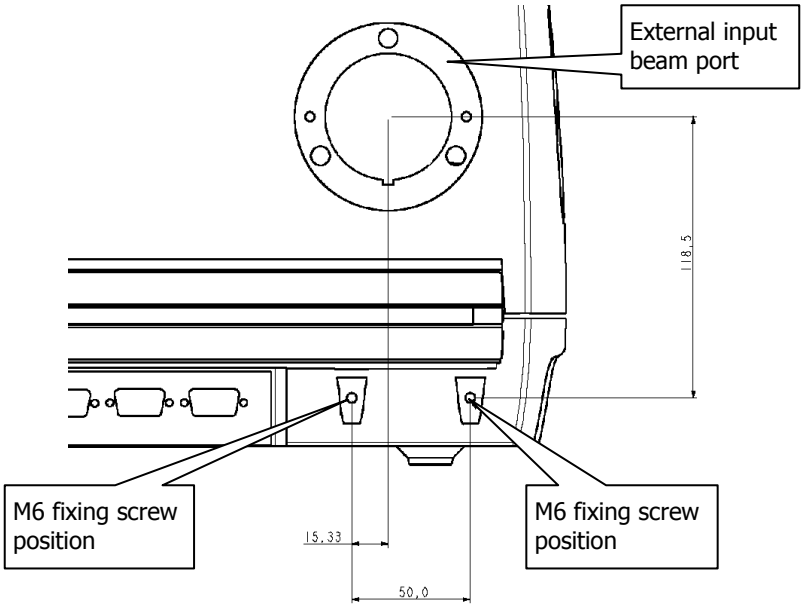


Figure 12 Fixing screw positions for the external beam port

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.

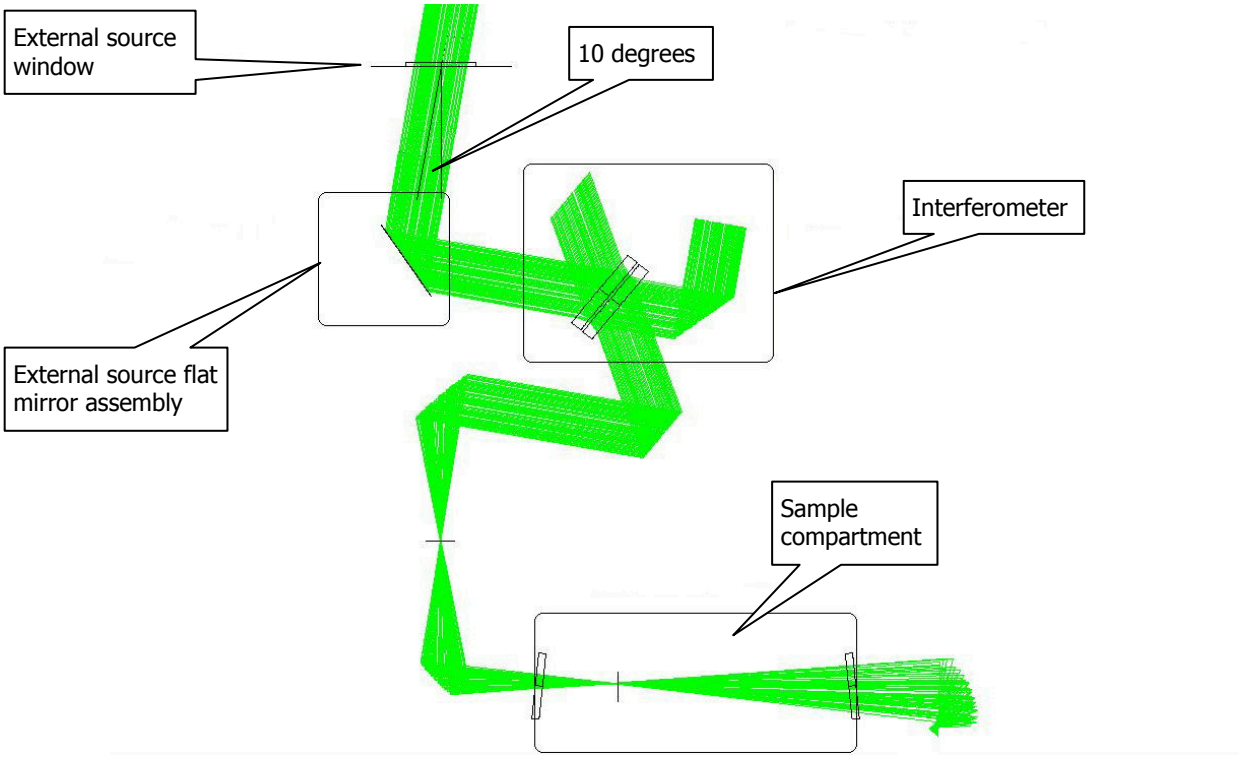


Figure 13 Optical arrangement for an external source (top view of spectrometer)

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 software to display the level of infrared energy reaching the detector in your instrument while adjusting your source.

Using an external source

When using an external source you should ensure that it is switched on before or at the same time as the spectrometer.

When the spectrometer initializes, it performs a series of alignment checks during which it looks for energy from a source. If no source is found, the checks are discontinued and the most recent successful alignment values, or factory defaults, are used. The system keeps an internal record of the fact that the checks were not completed and attempts to perform them every ten minutes. Therefore, if you switch on your external source after the spectrometer, you are advised to wait ten minutes before starting to take measurements.