

Right-hand External Beam Option

PerkinElmer Frontier IR Systems, Spectrum 400 Series and Spectrum 100 Series instruments can be fitted with a Right-hand External Beam Option.

The Right-hand External Beam Option includes: a right-hand beam moveable mirror fitted within the spectrometer, a KBr window, and an external accessory bracket fitted in the handhold on the right of the instrument. The bracket allows you to attach and use a pre amplifier and detector of your choice.

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.

This document describes how to:

- Fit a different window in the right-hand external beam port;
- Connect a third-party pre-amplifier and detector to the instrument;
- Configure Spectrum software to use a third-party external detector;
- Use Spectrum software to select the accessory.

The Right-hand External Beam Option is installed, in the first instance, by a PerkinElmer Service Engineer, who will install the external accessory bracket in the handhold on the right of the instrument (if not already fitted), a right-hand beam port window, and any internal parts required. Once fitted, the external accessory bracket should not be removed.



Figure 1 Handhold with external accessory bracket fitted



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Produced in the UK.

Disclaimers

PerkinElmer Ltd. offers no guarantee regarding the operation or performance of any third-party pre-amplifiers and detectors used in conjunction with the Right-hand External Beam Option.



WARNING

When used in conjunction with the Right-hand External Beam Option, the Spectrum software cannot provide protection to the detector. In particular, you should be aware that certain detectors may be damaged by the high energy from an NIR source. Always fit an appropriate beam attenuator.

Warnings and Safety information

Electrical safety

Fitting the external 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.

Any pre-amplifier attached to the Right-hand External Beam Option can obtain power from the instrument; no separate power supply is required. However, the instrument has no provision for powering any other component. If necessary, you must provide a separate power supply, and ensure that the arrangement meets all the applicable safety standards.

CAUTION

You must ensure that any third-party accessories attached to the Right-hand External Beam Option are earthed appropriately. The external accessory bracket provides adequate earthing for any third-party pre-amplifier attached to it.

External electromagnetic interference and electromagnetic compatibility

The Right-hand External Beam Option is supplied for use as an experimental test bed. The user-configurable nature of this product means that PerkinElmer cannot guarantee the level of immunity to external electromagnetic interference (EMI) or the possibility that the product may itself cause interference to other nearby equipment. It is therefore the responsibility of the user to consider Electromagnetic Compatibility (EMC) issues when selecting a suitable site for the system and to install any additional EMC protection that may be required for that location.

Radiation emitted by the instrument source

CAUTION

The NIR source used in PerkinElmer Frontier FT-NIR, Frontier FT-IR/FT-NIR, Spectrum 100N FT-NIR, and Spectrum 400 FT-IR/FT-NIR spectrometers is a quartz halogen bulb that emits ultraviolet, visible and infrared radiation. The majority of this energy is in the infrared region. Do not stare into the beam produced by this bulb. For further safety and warning information, refer to the appropriate User's Guide for your instrument. These are distributed, as .pdf files, on the IR & Raman Manuals CD (L1050002).

Humidity

CAUTION

Never remove the window in the external beam and leave this port open to atmosphere. If the spectrometer is fitted with KBr optics, do not exchange the window 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.

Contamination

CAUTION

Be careful not to touch, or otherwise contaminate, sensitive optical components such as the parabolic mirror assembly.

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

Safe handling



WARNING

The spectrometer is a heavy precision instrument, so two people are required for safe handling.

For information about moving your spectrometer, refer to the appropriate User's Guide for your instrument. These are distributed, as .pdf files, on the IR & Raman Manuals CD (L1050002).

Fitting a window to the right-hand external beam port

Before you begin, make sure you have read and understood the *Warnings and Safety information* beginning on page 2.

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 right-hand external beam port cover to the main cover.
4. Remove the beam port cover and seal. Retain for further use.
5. Ensure the seal is fitted to the window and is correctly seated (Figure 2).

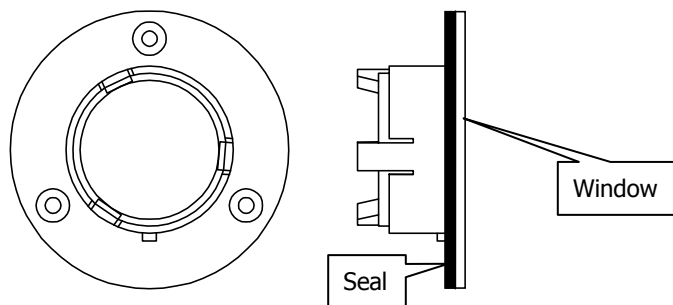


Figure 2 Seal fitted to window

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.

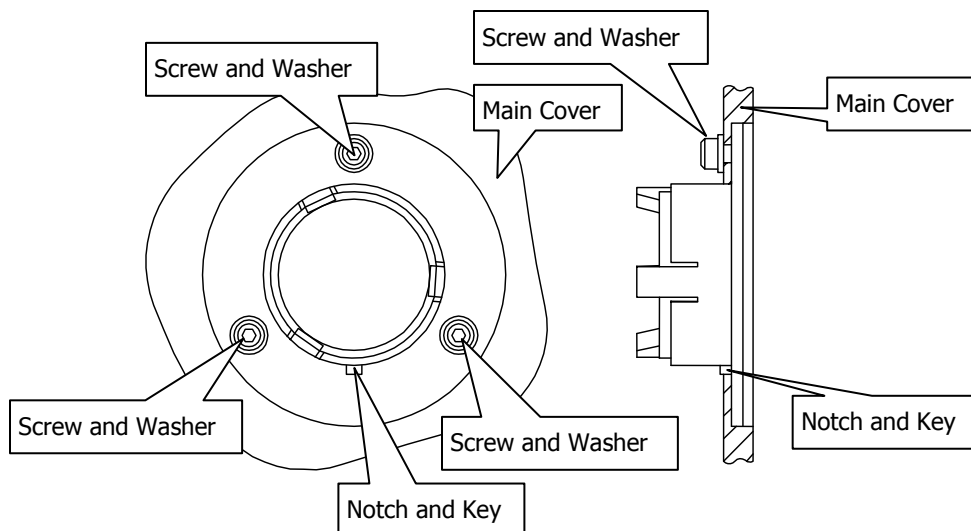


Figure 3 Window installed in main cover

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 a third-party pre-amplifier and detector to the instrument

CAUTION

*You **MUST** ensure that you have switched off the spectrometer and disconnected it from the mains supply before you fit any third-party pre-amplifier and detector to the instrument.*

The EXT.R socket on the instrument is a 15-Way High Density D-type. The connection is NOT hot swappable.

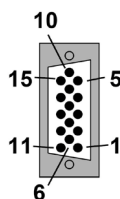


Figure 4 EXT.R socket

The following table details the functionality of the sockets. To connect a third-party external detector, present an analog differential signal to sockets 10 and 11.

Socket number	Function	Notes
1	Accessory Bus Reset	For PerkinElmer use only. Do not connect.
2	0 VL	0 V return for digital circuitry.
3	Accessory Bus Clock	For PerkinElmer use only. Do not connect.
4	Accessory Bus Abort	For PerkinElmer use only. Do not connect.
5	Accessory Bus serial transmit (from spectrometer to external)	For PerkinElmer use only. Do not connect.
6	Accessory Bus serial receive (from external to spectrometer)	For PerkinElmer use only. Do not connect.
7	0 VL	0 V return for digital circuitry.
8	5 VL	5 V supply for digital circuitry. Do not pull more than 1 A from this socket. Output.
9	0 VA	0 V analog return for analog circuitry.
10	EXTDET+	External differential positive analog detector signal. ± 11 V full scale. Input. See Note 1.
11	EXTDET-	External differential negative analog detector signal. ± 11 V full scale. Input. See Note 1.
12	0 VA	0 V analog return for analog circuitry.
13	+12 VA	+12 V analog for any analog circuitry. Do not pull more than 100 mA from this socket.
14	-12 VA	-12 V analog for any analog circuitry. Do not sink more than 100 mA into this socket.
15	TRIG_IN	For PerkinElmer use only. Do not connect.

NOTE:

The differential input signal has a maximum positive value when EXTDET+ is at +11 V and EXTDET- is at -11 V. It has a maximum negative value when EXTDET+ is at -11 V and EXTDET- is at +11 V. The input impedance is 100 K Ω on each input with reference to 0 VA.

Optical arrangement

The optical arrangement for an external detector is shown below.

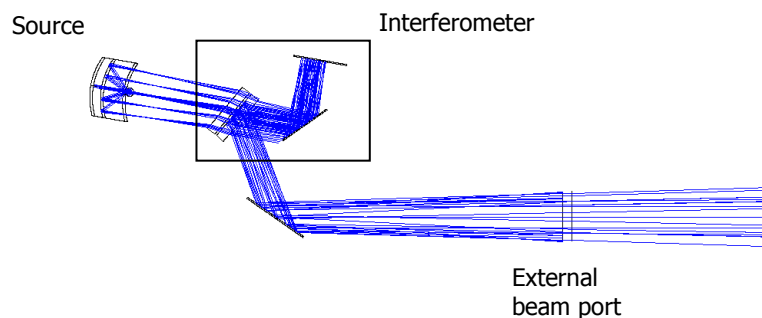


Figure 5 Optical Arrangement for an External Detector

The beam diverges at an approximately 3° half-cone angle.

Configuring Spectrum to use a third-party external detector

This section describes how to create a modified instrument configuration file for use with a third-party external detector.

NOTE: It is not necessary to power the instrument to complete this procedure.

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. Copy the appropriate C*****.cfg file and save it as, for example, C*****.intdet

NOTE: Make sure you save this backup of the original instrument configuration file.

3. 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.

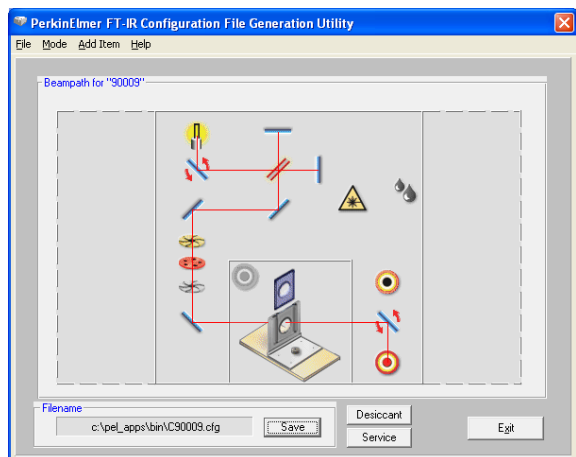
If used incorrectly, some utilities could damage the instrument.

4. 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.



5. Click **Load** in the File menu, and then select the instrument serial number.
The configuration file is opened for editing.
6. Click **Add Item**, and then select the appropriate **Right Hand GPOB** option from those available.
The Beampath representation is updated to show the new configuration.
7. Click **Save**.
The configuration file is updated.
8. Click **Exit**.

Choosing the correct detector type

You should use the Select Type drop-down on the Add Detector dialog to choose the detector type you want to use. If you decide to use a PerkinElmer detector, you will find the drop-down includes all the detector types appropriate to your instrument. Select the one you require.

If you are using a third-party detector, you should select the appropriate Custom option. The default settings for the Custom options are shown below.

Detector type	Default settings		
	Wavenumber range	Detector settle time	Scan speed
Custom MIR	15000–370	15 secs	0.2 cm/s
Custom NIR	15000–1250	15 secs	0.2 cm/s
Custom FIR	720–30	15 secs	1.0 cm/s

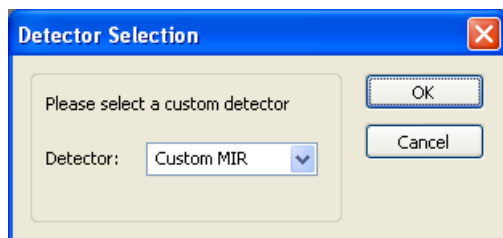
See *Adjusting the default custom detector settings*, below, for details of how to adjust these default settings to suit your specific detector.

Adjusting the default custom detector settings

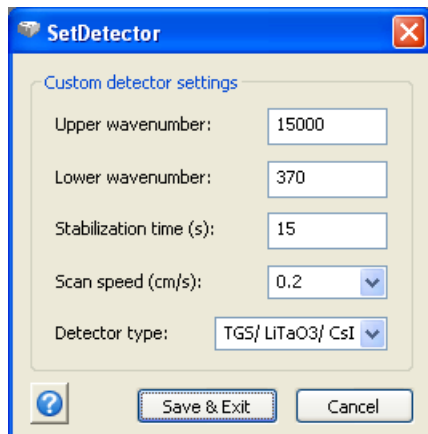
To adjust the default custom detector settings to suit your requirements for the external detector, follow the steps described below.

NOTE: It is your responsibility to ensure that the settings you provide are appropriate to your detector type.

1. Browse to C:\Program Files\PerkinElmer\ServiceIR or C:\Program Files (x86)\PerkinElmer\ServiceIR, as applicable.
2. Double-click the **Set Detector** option.
The PerkinElmer Login dialog is displayed.
3. Enter your login details.
The Detector Selection dialog is displayed.



4. Select the custom detector type you want to work on from the drop-down list, and then click **OK**. The current settings are displayed on the SetDetector dialog.



5. Change the values to suit your detector.

Upper wavenumber / Lower wavenumber	<p>Defines the upper and lower limit for the useable range of the detector.</p> <p>Different detector types are designed to operate in different wavenumber ranges. For further information, see the Detectors topic in the Spectrum online help.</p>
Stabilization time	<p>The time required, in seconds, for the detector to settle after the infrared beam is directed onto it; that is, after the beampath is changed to use the external detector.</p>
Scan speed	<p>The default scan speed to be used when this detector is selected.</p> <p>The standard setting for each detector provides the best signal-to-noise ratio in a reasonable collection time.</p> <p>For further information, see the Scan Speed topic in the Spectrum online help.</p>
Detector type	<p>Select the detector type. Options include:</p> <ul style="list-style-type: none"> • MCT • INGAAS • PAS • TGS, LiTaO3, CsI, etc. (used for all other detector types)

6. When you are finished, select **Save and Exit** or **Cancel**, as appropriate.

Re-instating the configuration file

Should you ever need to revert to the standard instrument configuration file, follow the steps described below.

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. Copy the appropriate C*****.cfg file, and save it as, for example C*****.extdet

NOTE: Make sure that you save this backup of the external detector configuration file.

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

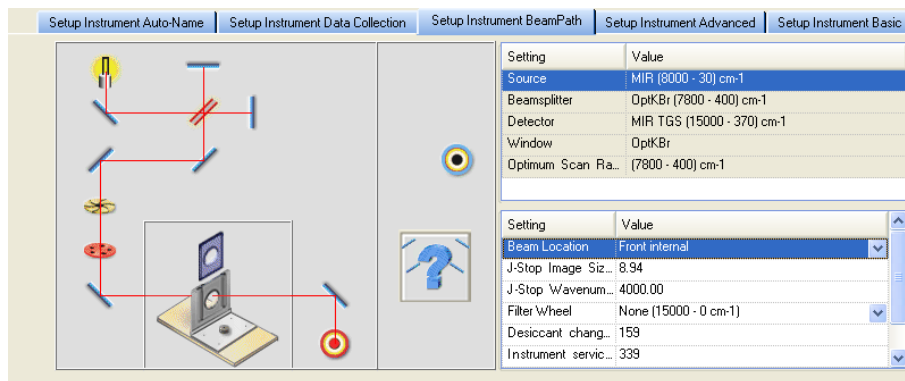
NOTE: If a backup of the original configuration file was not made, uninstall the instrument and then re-install it using the configuration disk supplied with the instrument.

Selecting the third-party detector using Spectrum

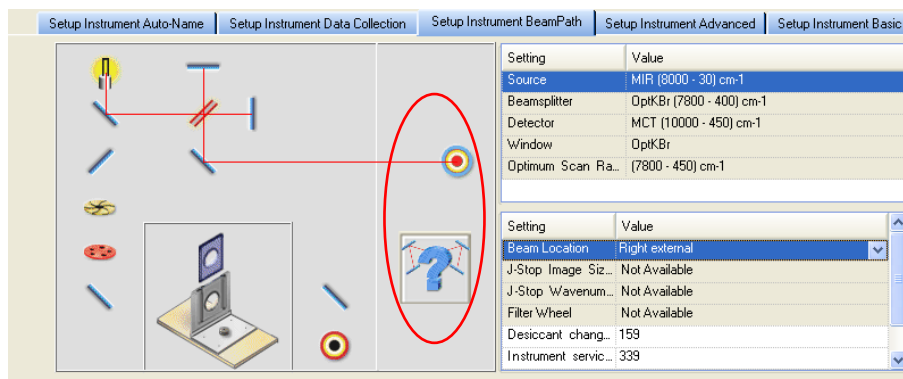
Before you begin, make sure that the instrument is powered on and has been allowed to stabilize.

To select the external detector in Spectrum software:

1. Start Spectrum, select the **Setup** menu and then click **Instrument**.
2. Select the **Setup Instrument BeamPath** tab.




3. Select **Right external** as the **Beam Location** from the drop-down list.
The external detector is selected.



NOTE: The **Beam Location** field is displayed in the settings table only when an external accessory is configured.

Optimizing performance

This section describes how to monitor the energy and provide optimum levels of performance.

1. Start Spectrum, select the Setup menu and then click **Instrument**.
2. Ensure that the external detector is selected on the beam path tab.
3. Switch to **Monitor** by clicking  on the Measurement toolbar, and then click **Energy** to display the signal detected.
The Live tab is displayed.
4. Adjust the optical arrangement of your equipment so as to maximize the energy level detected.
5. Select **Interferogram** on the Live tab, and adjust the height of the interferogram with attenuation or pre-amplifier gain adjustment to give a signal with a peak of about 0.7 units.
If the interferogram is inverted, the peak should be about -0.7 units.