

PX-2

Pulsed Xenon Light Source

Installation and Operation Instructions

Description

The PX-2 Pulsed Xenon Light Source is a high flash rate, short-arc xenon lamp for applications involving absorbance, reflection, fluorescence and phosphorescence measurements, and especially for measuring optically or thermally labile samples.

The PX-2 has an SMA 905 Connector that couples to Ocean Optics miniature fiber optic spectrometers and accessories, including optical fibers, cuvette holders, probes and other sampling optics.

The PX-2 operates at speeds up to 220 Hz, offers excellent pulse-to-pulse stability, and has two trigger modes for software control of the flash rate. Any external TTL positive pulse can be used to trigger the PX-2. When it is coupled to a spectrometer, you can easily synchronize operation of both the light and detector.

Because it produces a pulsed signal, the PX-2 is less likely to contribute to solarization in optical fiber assemblies, which can occur when fibers are illuminated with signals less than 260 nm.

For an example of a phosphorescence application using the PX-2 with an Ocean Optics spectrometer and an HR4-BREAKOUT Box, see **Configuring Ocean Optics Spectrometers for Phosphorescence Measurements** in the Engineering Documents at www.oceanoptics.com.



Parts Included

The PX-2 ships with the following items:

- ❑ PX-2 Pulsed Xenon Light Source
- ❑ 12 VDC power adapter
- ❑ 15-pin interface cable

Additional Accessories

The following are additional accessories available from Ocean Optics that you may need, depending on your system set-up:

- USB2000/PX-2 adapter (USB-ADP-PX2)
- Replacement bulb (PX-2-B)

WARNING

The PX-2 produces ultraviolet radiation. Direct eye contact can cause permanent eye damage. Always wear safety eyewear, and never look directly into the light source.

Dangerous voltages are present in the PX-2. Do not operate the PX-2 without the housing intact.

The SMA 905 Connector can get hot during operation. Allow the lamp to cool after operation before handling.

Do not drop the instrument, as this may cause permanent damage to the unit. Handle with care.

Connecting the PX-2

The set-up procedure differs, depending on the spectrometer to which you are connecting the PX-2.

Connecting to a USB2000/USB2000+/USB4000/HR2000 Spectrometer

The USB2000 and HR2000 Spectrometers have a 10-pin connector. The USB2000+/USB4000/HR2000 have a 20-pin connector. For these spectrometers, you need to use the USB-ADP-PX2 serial adapter.

► Procedure

Follow the steps below to connect the PX-2 to a USB2000/HR2000 Spectrometer:

1. Remove the PX-2 from the product packaging.
2. Connect the USB-ADP-PX2 Adapter to the spectrometer's accessory connector. For USB2000+/USB4000/HR2000 Spectrometers with the 20-pin connector, skip the first column of pins (A1 and A2 on the right) when plugging in the adapter.
3. Tighten the jackscrew to hold the adapter in place.
4. Connect the DB15 cable that came with your PX-2 to the USB-ADP-PX2 Adapter, then to your PX-2 light source.

You have now connected the PX-2 for operation.

Connecting to Ocean Optics Spectrometers with a 30-pin Connector

Our other spectrometers such as the NIRQuest, Maya, QE *Pro* and HR4000 use a 30-pin accessory connector.

► Procedure

Follow the steps below to connect the PX-2 to spectrometer with a 30-pin accessory connector:

1. Remove the PX-2 from the product packaging.
2. Connect the HR4000-CBL-BB ribbon cable to the spectrometer's 30-pin accessory connector.
3. Connect DB15 cable assembly to the spectrometer's ribbon cable and the other end to the PX-2's 15-pin connector.

You have now connected the PX-2 for operation.

Connecting the PX-2 Using the Breakout Box

The Breakout Box (HR4-BREAKOUT) offers another option for connecting the PX-2 to our spectrometers with the 30-pin connector. The Breakout Box is a passive module that separates the signals from the 30-pin port of the spectrometer into an array of standard connectors and headers. You'll want to use the Breakout Box if you need multiple interfaces to your spectrometer. See the [Breakout Box Installation and Operation Instructions](#) for information on using the Breakout Box.

Note

If you are connecting the Breakout Box to the USB4000 Spectrometer, you must first attach the USB-ADP-BB adapter to the spectrometer.

Configuring the PX-2

After setting up the PX-2, you must configure it to operate with the spectrometer and software.

► Procedure

1. Connect an optical fiber to the SMA 905 Connector on the front panel of the PX-2.
2. Turn the PX-2 on via the power switch on the rear of the unit.
3. Select Multiple or Single TTL mode by moving the toggle switch on the rear panel of PX-2. You must also configure this mode in the operating software. See [TTL Mode Information](#) below.
4. Download the latest version of your spectrometer operating software, if necessary.

Continue to the next section for controlling your PX-2 with OceanView software.

TTL Mode Information

The PX-2 features a TTL switch that provides two modes of operation: Multiple mode and Single mode.

Multiple Mode

In Multiple mode, the flash timing (pulse rate) is determined by the spectrometer. The Continuous strobe rate is either fixed or software controlled. See your spectrometer operating software manual for more information.

In either case, you must alter the spectrometer's integration time so that a constant number of flashes are observed during each integration period.

When using Multiple mode, you must ensure that a constant number of flashes occurs for each integration cycle. This is accomplished by setting the pulse rate and integration time, which is controlled by the operating software.

Note

For SpectraSuite users, if you are using Multiple Mode you must enter the continuous strobe delay. To do this, select **Spectrometer | Spectrometer Features** from the SpectraSuite menu. Click on the **Continuous Strobe** tab and enter the continuous strobe delay.

Spectrometer Strobe Rate Adjustments

The table below shows the Continuous Strobe frequency (multiple strobe operation) for each type of OOI spectrometer.

Spectrometer	Strobe Rate Adjustment
USB2000	Fixed at 122Hz ¹
All other OOI Spectrometers	Software-controlled 220Hz-1Hz ²
¹ Fixed frequency when the USB2000 is programmed with the PX2 firmware	
² The maximum frequency of the PX2; the spectrometer can actually run faster	

Single Mode

In Single mode, a single lamp flash occurs during each integration period. You can modify the flash rate by changing the integration period. Since the PX-2 has a maximum repetition rate of 220 Hz, the minimum integration time allowed in Single mode is 5 milliseconds.

Controlling the PX-2 in OceanView with Single Strobe

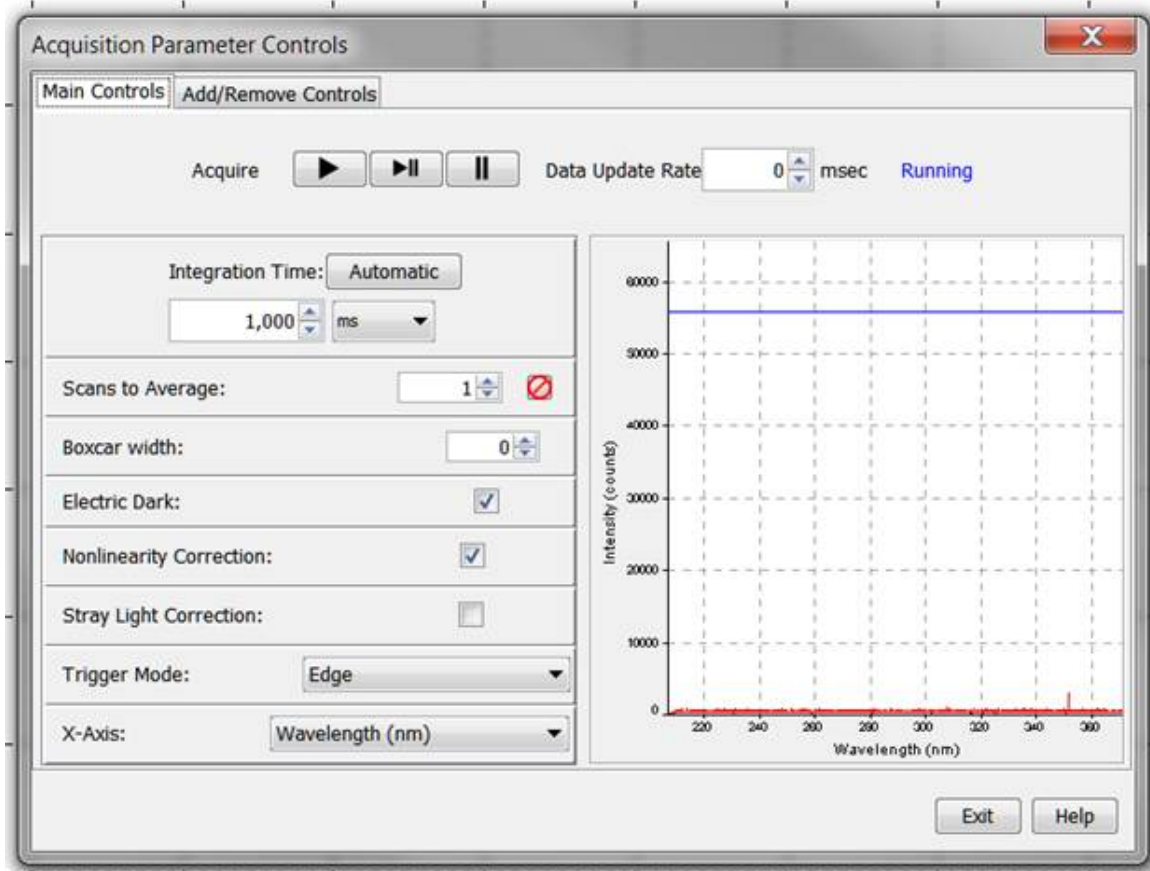
The Single Strobe control in OceanView is used to adjust the PX-2 lamp strobe timing.

Note

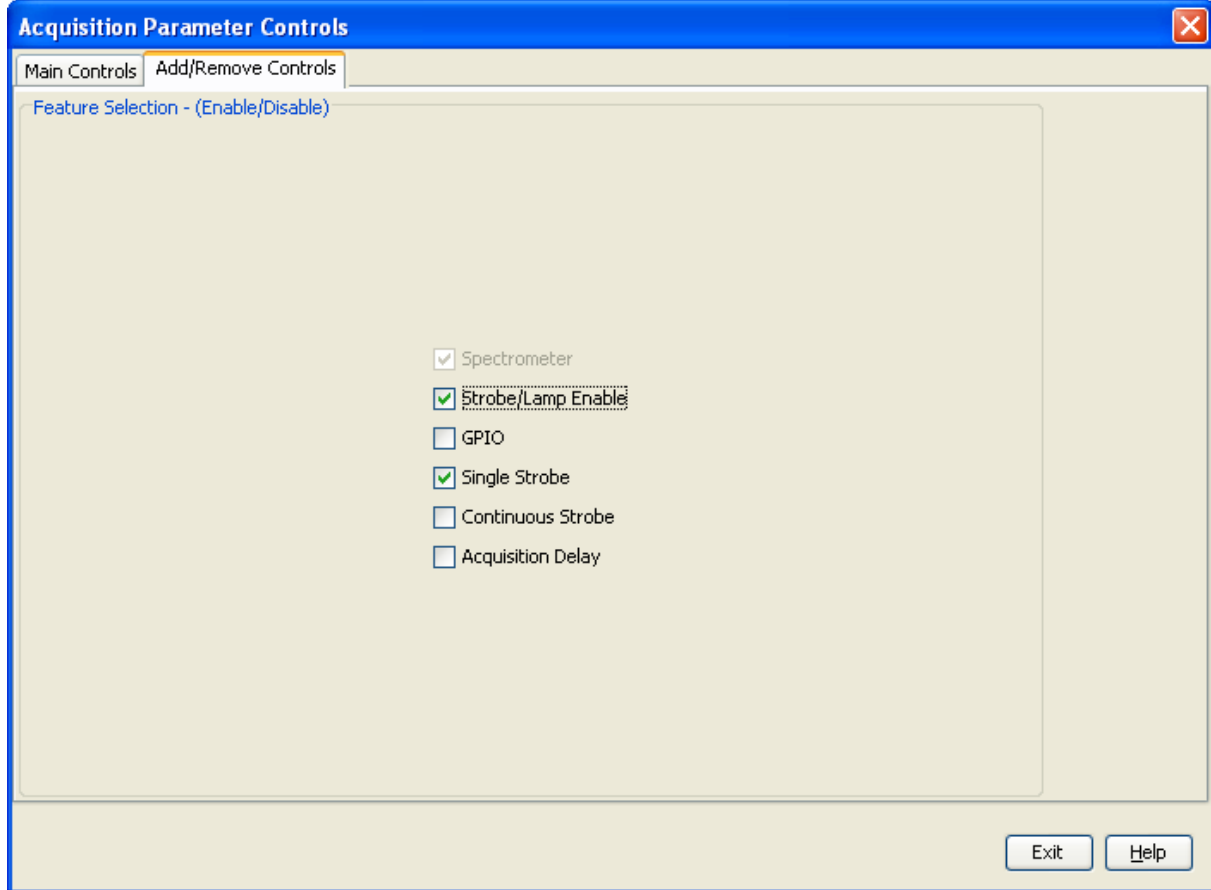
The following procedure can also be performed in OceanView using the Graph View. Right-click on the spectrometer node and select New Output Control → Single Strobe.

► Procedure

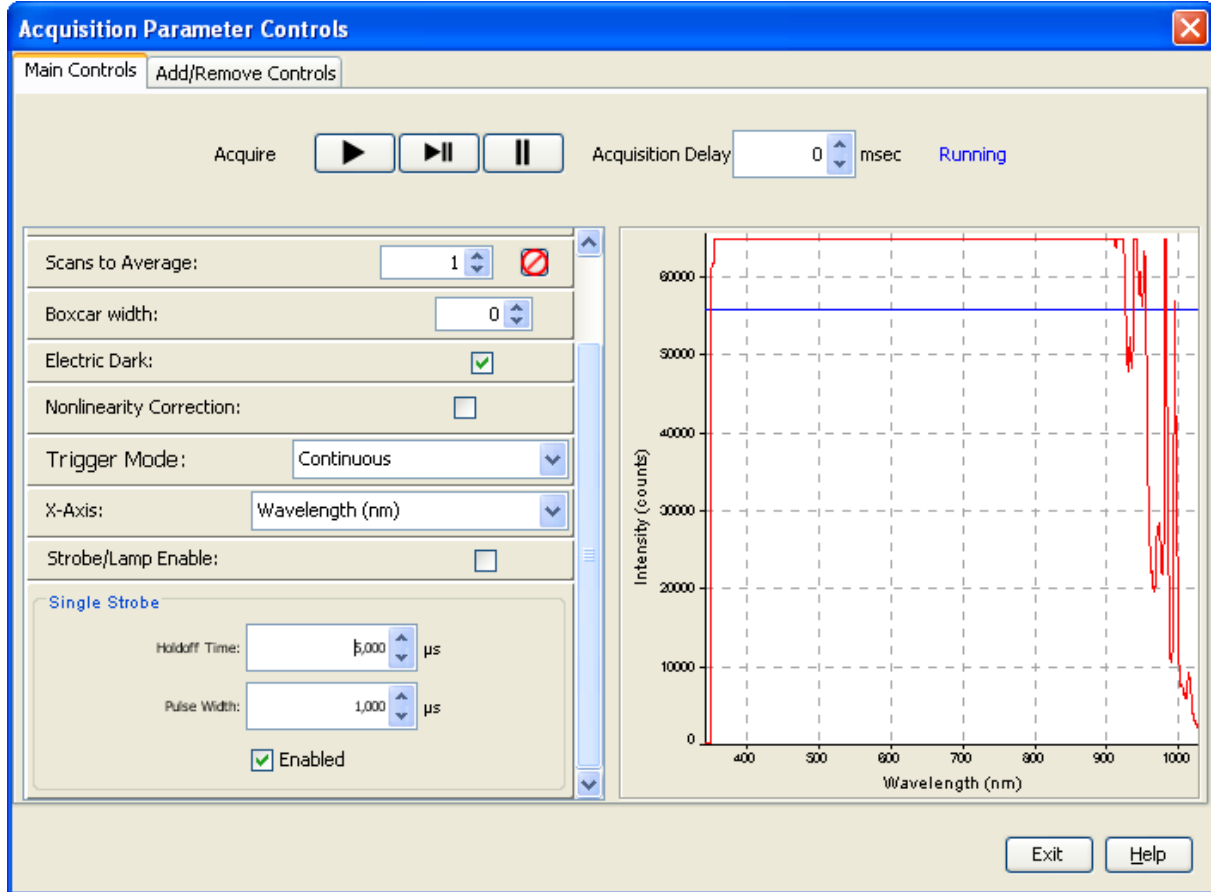
1. Add the Single Strobe control to the Main Controls tab of the Acquisition Controls. To do this, click the **Add/Remove Controls** tab in the Acquisition Parameter Controls.



2. Check the **Single Strobe** option.



3. Click the **Main Controls** tab to go back to the Main Controls.
4. Set the PX-2 Flash Mode switch (on the back of the PX-2) to Single mode to flash the lamp once per integration period.
5. Set the Holdoff Time (the time allowed before the pulse) and the Pulse Width in the Single Strobe panel in the Acquisition Controls. See the data sheet for your spectrometer model for pulse width limits.



- Click **Enabled** in the Single Strobe panel to pulse the lamp. (Make sure the lamp is turned on.)

Controlling the PX-2 in OceanView with Continuous Strobe

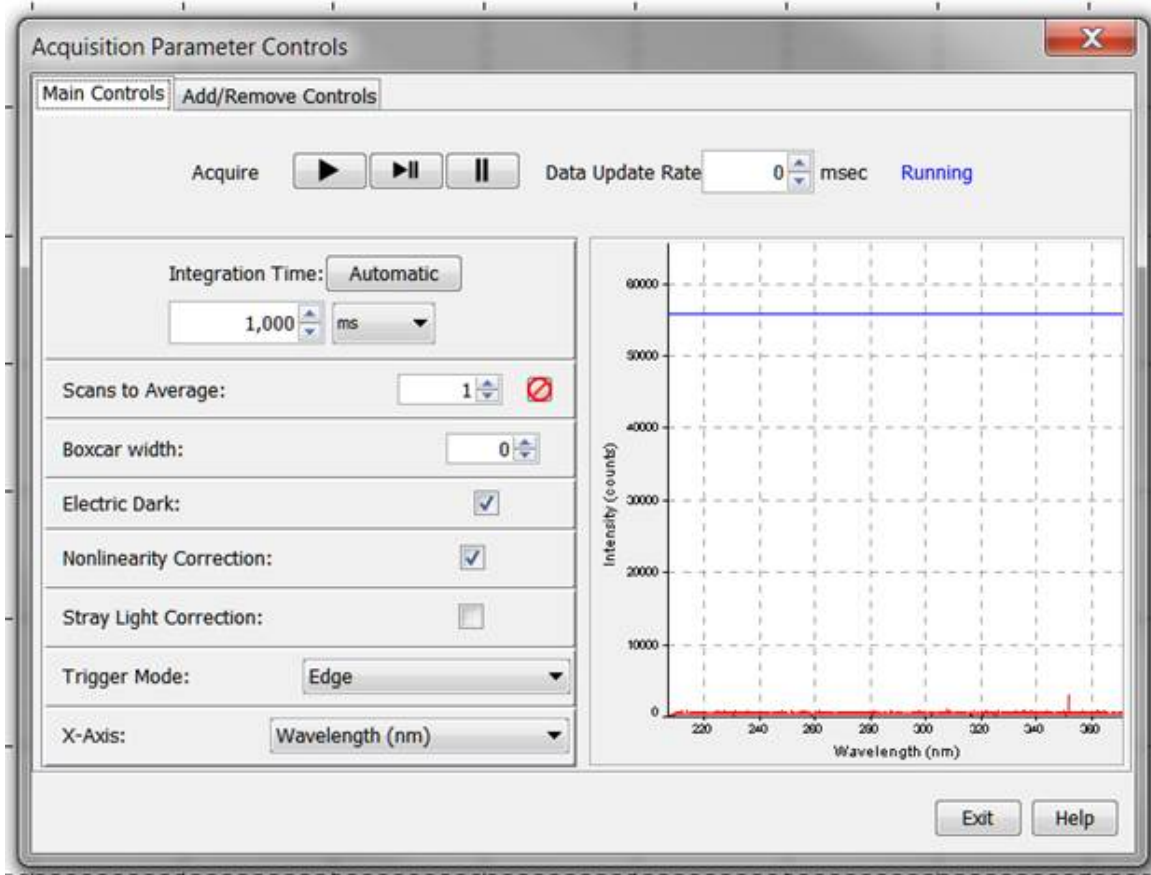
The Continuous Strobe control in OceanView is used to adjust the PX-2 lamp intensity per integration period.

Note

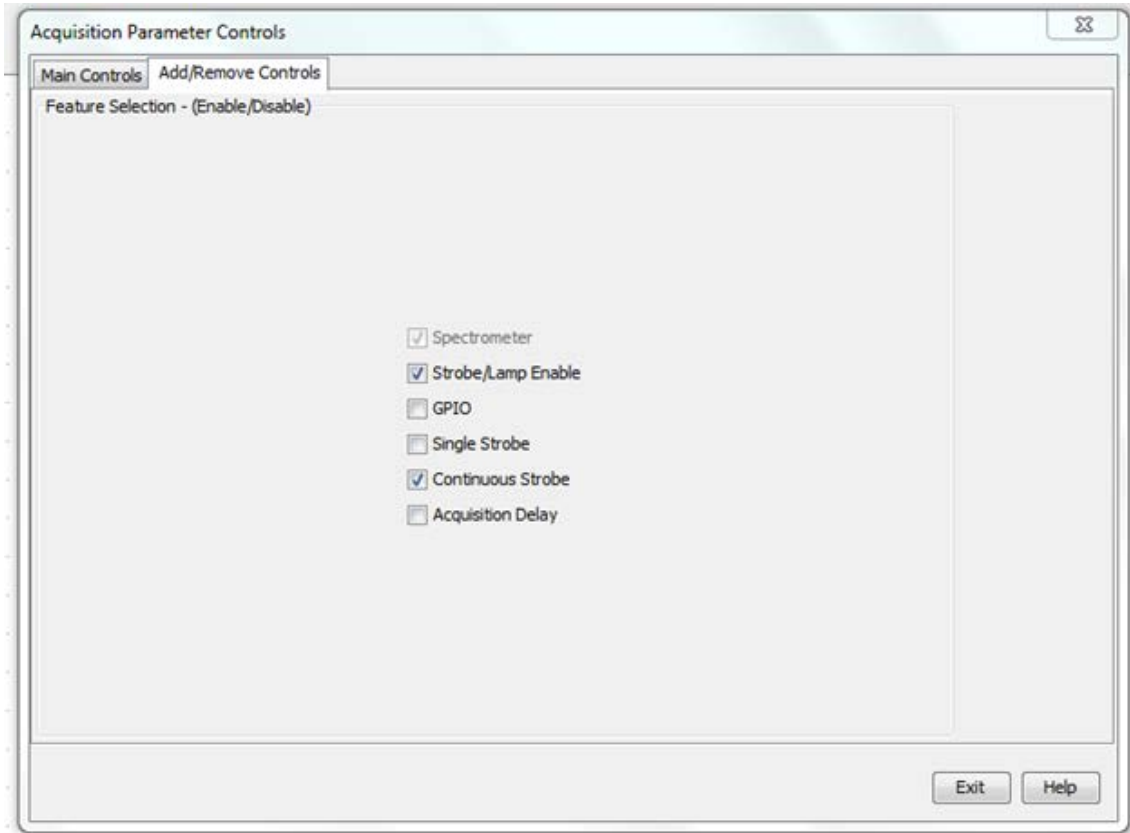
The following procedure can also be performed in OceanView using the Graph View. Right-click on the spectrometer node and select New Output Control → Continuous Strobe.

► Procedure

1. Add the Continuous Strobe control to the Main Controls tab of the Acquisition Controls. To do this, click the **Add/Remove Controls** tab in the Acquisition Parameter Controls.



2. Check the **Continuous Strobe** option.



3. Click the **Main Controls** tab to go back to the Main Controls.
4. Set the PX-2 Flash Mode switch (on the back of the PX-2) to flash the lamp multiple times per integration period.
5. Set the Strobe Period in the Continuous Strobe panel in the Acquisition Controls so that:
 - a. Strobe Period is equal to or smaller than the Integration Time
 - b. Strobe Period is a dividend/multiple of the Integration Time
 - c. Strobe Period is equal to or greater than 5 msec (5000 μ sec). This applies only to the PX-2 lamp. Other pulsed lamps may have a faster repetition rate, enabling a lower value for the strobe period.

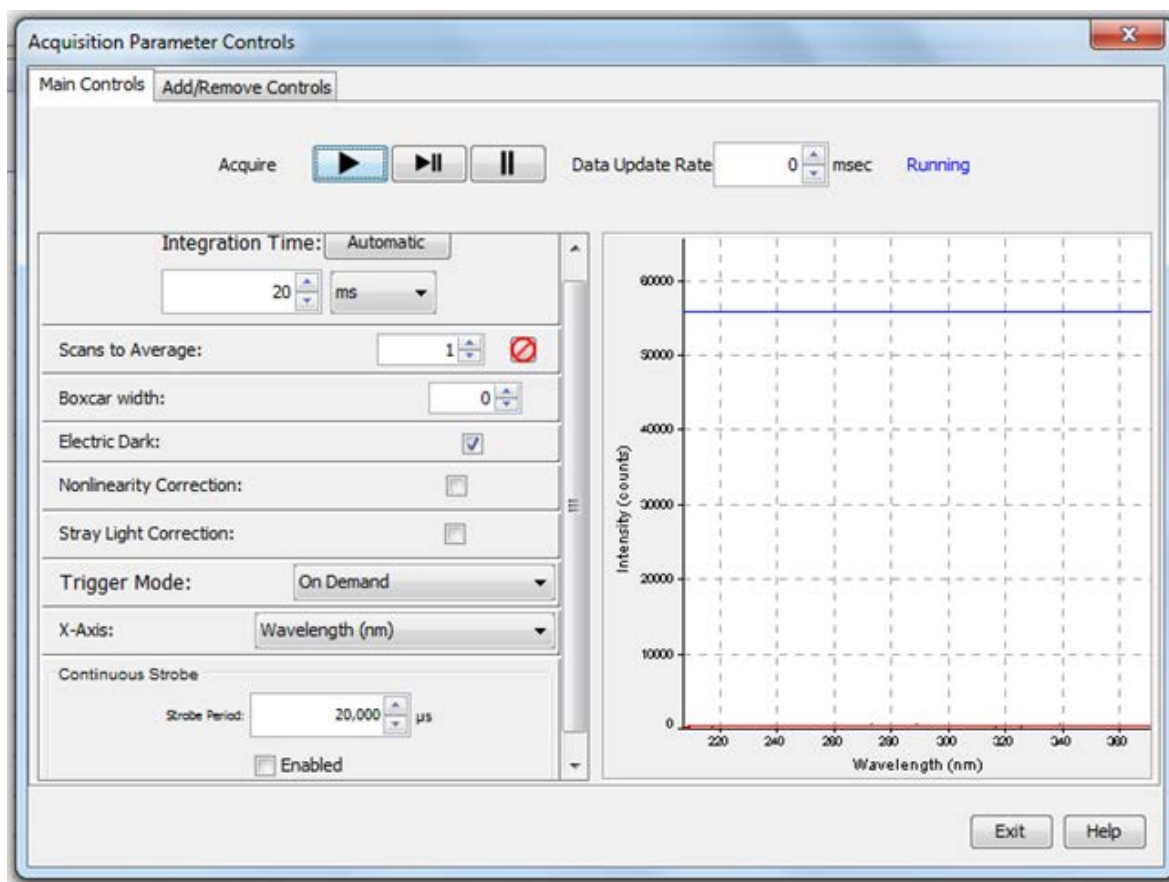
Example:

- Set the Integration Time to 20 msec
- Set the Strobe Period to 20000 μ sec

You can decrease Strobe Period to 10000 μ sec or 5000 μ sec to increase the repetition rate of the lamp and increase the lamp intensity acquired per integration period.

Note

If incorrect settings are used for the measurements, some spectra will be collected when the lamp is flashing and others when the lamp is not flashing, or spectra may be acquired with an inconsistent number of pulses per integration cycle. Improper settings will cause variability in the results.



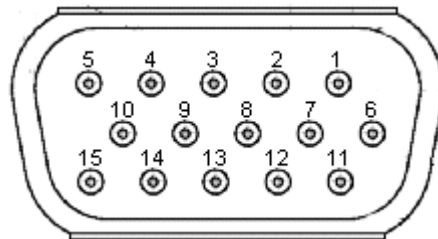
6. Click **Enabled** in the **Continuous Strobe** panel to pulse the lamp. (Make sure the lamp is turned on.)

PX-2 Specifications

Specification	Value
Dimensions (mm)	153.4 x 104.9 x 40.9 mm
Weight	370 g
Power consumption	1.5 A @ 12 VDC
Power output	45 microjoules per pulse maximum 9.9 watts average power 220 Hz pulse rate maximum
Spectral range	220-750 nm
Pulse duration	5 microseconds (at 1/3 height of pulse)
Aperture	3 mm
Connector	SMA 905
Lifetime	10 ⁹ pulses (estimated 230 days continuous operation)

PX-2 Pinout Information

The following section contains information on the 15-pin connector on the PX-2.



Pin Number	Description
1	Single strobe
2	Continuous strobe
10	Ground

PX-2 Information for S2000 Customers

The following information for the PX-2 light source applies only to customers with an S2000 Spectrometer.

Connecting to an S2000 Spectrometer

► Procedure

1. Remove the PX-2 from the product packaging.
2. Plug the 12 VDC power supply into a wall outlet, then connect the barrel connector on the power supply to the rear of the PX-2.
3. Connect the 15-pin cable to the rear of the PX-2, and then connect the other end to the 15-pin connector on the S2000 Spectrometer.

You have now connected the PX-2 for operation with the S2000 Spectrometer.

TTL Multiple Mode Information When Using an S2000 Spectrometer

The PX-2 features a TTL switch that provides two modes of operation: Multiple mode and Single mode. In Multiple mode using an S2000 Spectrometer, flash timing is determined by the JP3 jumper block setting. See your S2000 Spectrometer manual for more information.

S2000 Spectrometer Strobe Rate Adjustments

To achieve a constant number of flashes per integration cycle, the integration time must be a multiple of those shown in the following table.

S2000 JP3 Setting	Integration time must be a multiple of (in milliseconds)			
	ADC500/SAD500	ADC1000	DAQ700	ADC2000-PCI
2 ¹⁶ (factory default)	128	64	512	32
2 ¹⁴	32	16	128	8
2 ¹²	8	4	32	2
2 ¹⁰	N/A	N/A	8 (with a minimum value of 24 ms)	N/A

The PX-2 repetition rate is determined by the JP3 setting on the S2000 Spectrometer, but it is also dependent on the frequency of the A/D card. The table below shows the repetition rate for the various combinations of hardware and jumper settings. The default factory setting is 2¹⁶:

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JP3 Post #	Function	Frequency (Hz)			
		ADC500/SAD500	ADC1000	DAQ700	ADC2000-PCI
1	Not enabled – Reserved for future software control				
2	Divide by 2^{10}	Too fast	Too fast	98	Too fast
3	Divide by 2^{12}	122	Too fast	24	Too fast
4	Divide by 2^{14}	30	60	6.1	120
5	Divide by 2^{16}	7.6	15.2	1.5	30