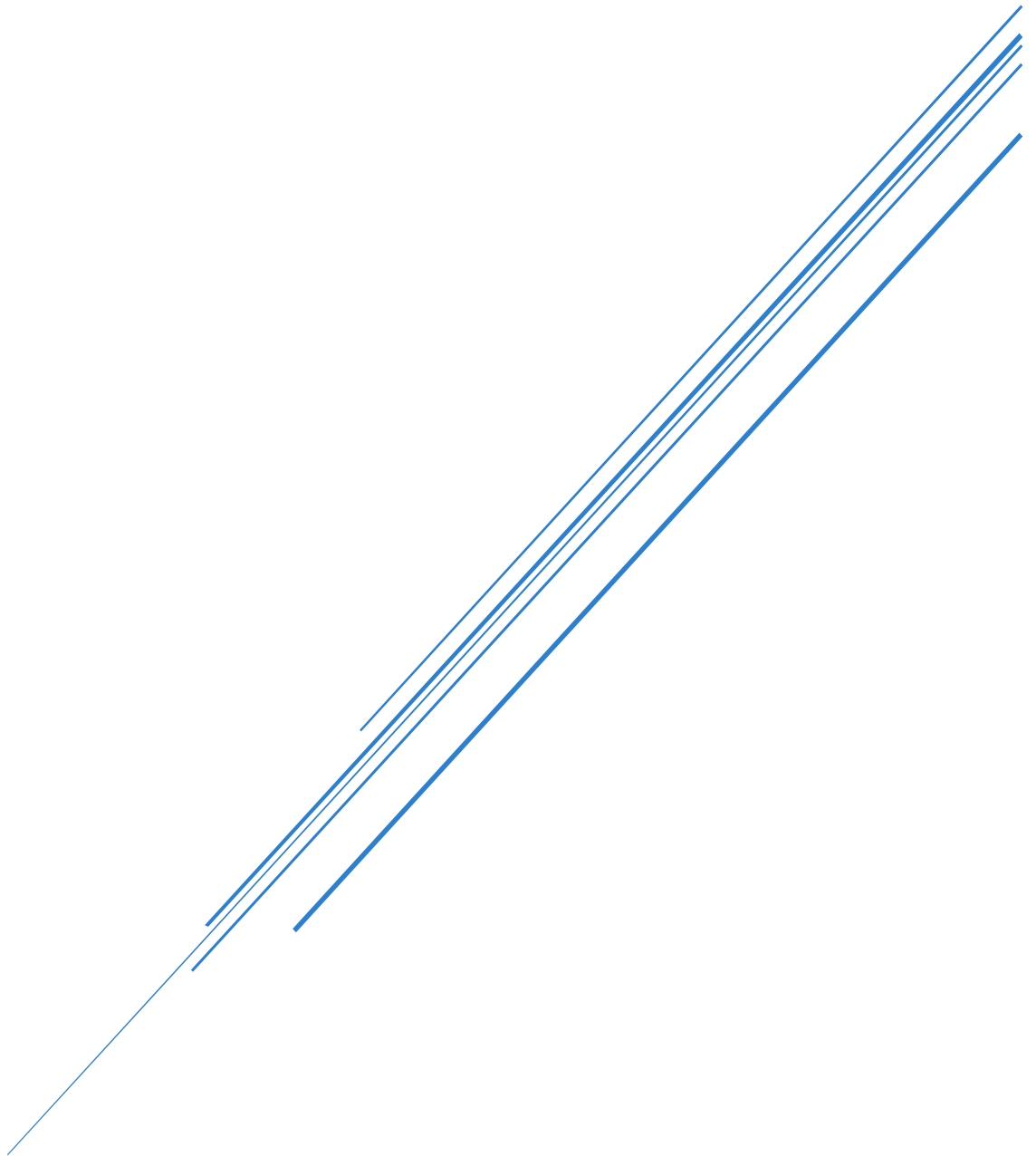


7ISWSC MONOCHROMATOR / SPECTROMETER SOFTWARE

## User Manual



*Optics Focus Instruments Co., Ltd.*

*[www.optics-focus.com](http://www.optics-focus.com)*

# Table of Contents

1. Introduction .....	2
2. Software Installation .....	2
2.1 Application Software Installation .....	2
2.2 7IDA4 driver installation .....	4
3. Use of Software .....	6
3.1 Main Interface .....	6
3.2 Menu Bar .....	7
3.2.1 Files .....	7
3.2.2 Connection .....	7
3.2.3 System Parameters .....	8
3.2.4 Device .....	8
3.2.4.1 7IMS monochromator window .....	8
3.2.4.2 7IDA1 window .....	12
3.2.4.3 SR830/SR810 window .....	13
3.2.4.4 7IDA4 window .....	13
3.2.5 Grating Calibration .....	14
3.2.6 Background .....	15
3.2.7 Language Selection .....	16
3.3 Shortcuts .....	16
3.4 Operation Interface .....	17
3.4.1 Scan Measure .....	17
3.4.2 Stability Measurement .....	19
3.4.3 CCD Measure .....	20

# 1. Introduction

The 7ISWSC monochromator/spectrometers control software is mainly used for the control of 7ISW series monochromators/spectrometers and can be connected to 7IDA1 and 7IDA4 data acquisition or an SR830/SR810 lock-in amplifier to perform data acquisition. The visual interface is convenient for reading the equipment parameters and is more intuitive.

Software version: 7ISWSC v1.3.0

Available OS: Windows 7, Windows 10, Windows 11


Hardware requirements: The computer must have a standard serial port (can also be connected through a USB-serial port) and have a memory of more than 128MB and a CPU of more than 500M (recommended configuration).


Please connect the monochromator/spectrometer to the PC using the white RS232 cable and the RS232-USB converter before turning on the monochromator.


## 2. Software Installation


### 2.1 Application Software Installation

Please download the software 7ISWSC from our website. Run the setup.exe file in administrator mode and follow the on-screen prompts to install the software correctly into your computer. The small CD along with the monochromator/spectrometer includes the driver of the RS232-USB converter. It doesn't need to install the driver on the small CD.

 DotNetFX40Client

 WindowsInstaller3\_1

 7ISWSC for x64.msi

 setup.exe

### 7ISWSC Spectrometer Control Software

## Welcome to the 7ISWSC Spectrometer Control Software Setup Wizard

The installer will guide you through the steps required to install 7ISWSC Spectrometer Control Software on your computer.

WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.

< Back   **Next >**   Cancel

### 7ISWSC Spectrometer Control Software

## Select Installation Folder

The installer will install 7ISWSC Spectrometer Control Software to the following folder.  
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".

Folder:  
   **Browse...**  
**Disk Cost...**

Install 7ISWSC Spectrometer Control Software for yourself, or for anyone who uses this computer:

☒ Everyone  
☐ Just me

< Back   **Next >**   Cancel

### 7ISWSC Spectrometer Control Software

## Confirm Installation

The installer is ready to install 7ISWSC Spectrometer Control Software on your computer.  
Click "Next" to start the installation.

< Back   **Next >**   Cancel

### 7ISWSC Spectrometer Control Software

## Installing 7ISWSC Spectrometer Control Software

7ISWSC Spectrometer Control Software is being installed.

Please wait...

< Back   < Back   Next >   **Cancel**

### 驱动安装(X64)

## 驱动安装/卸载

选择INF文件(1/1): **CH341SER.INF**

**安装**   WCH.CN  
 |\_\_ USB-SERIAL CH340  
 |\_\_ 02/11/2023, 3.8.2023.02

卸载

**Install the driver of RS232-USB converter.**

### 驱动安装(X64)

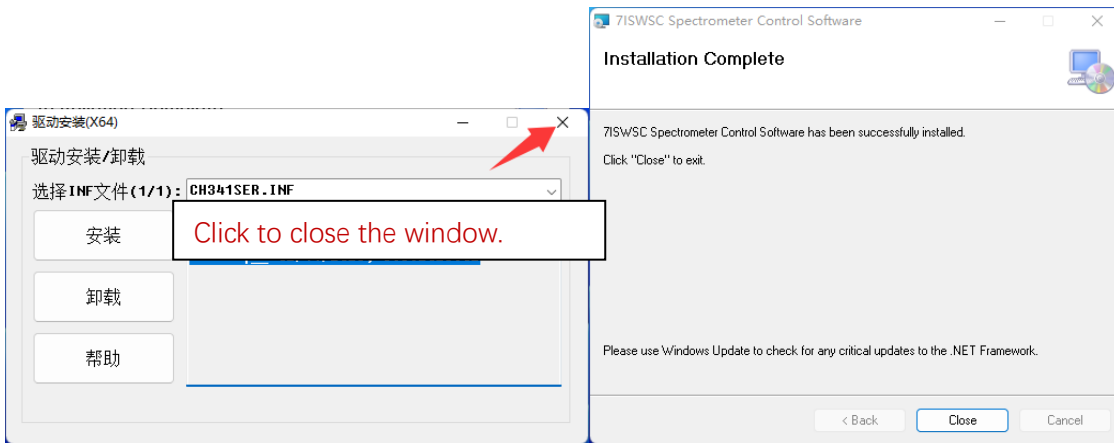
## 驱动安装/卸载

选择INF文件(1/1): **CH341SER.INF**

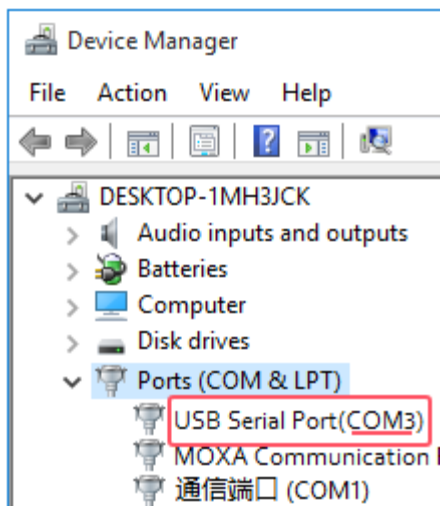
安装   卸载   帮助

**DriverSetup**  
 驱动预安装成功!  
 确定

**Click to complete the installation.**

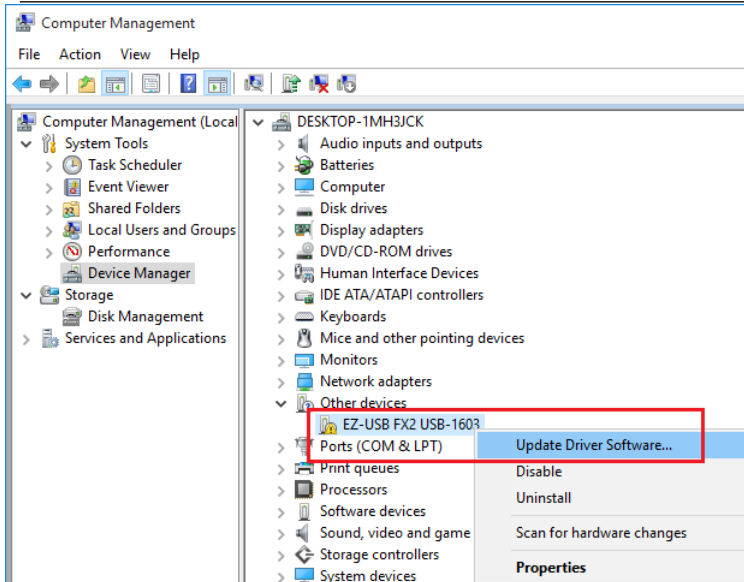


Once the hardware is connected and the necessary drivers are installed, go to the Device Manager window on your computer and look at the port items. Find the corresponding COM number in the figure below and manually connect it in the "Connection Settings" interface of the 7ISWSC monochromator control software.

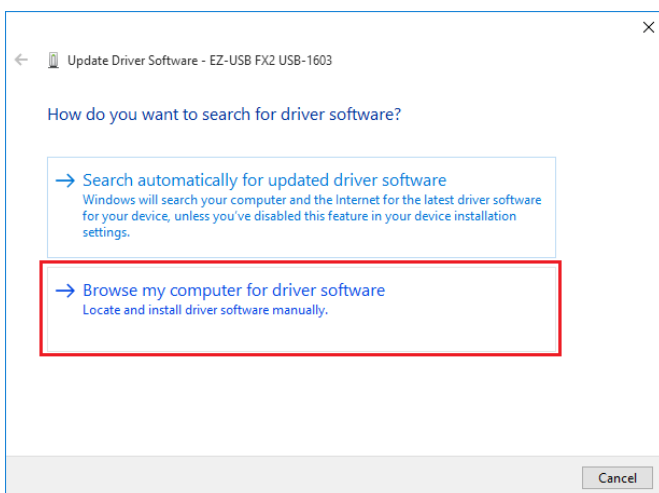


## 2.2 7IDA4 driver installation

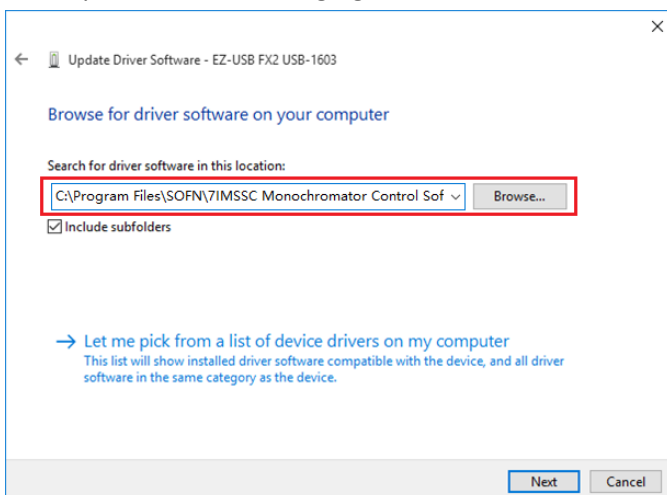
Connect the 7IDA4 collector to the computer through the USB cable, you need to install the driver for the first time, enter the "Device Manager", find which device has an exclamation mark or question mark or the like, see the figure below, in the right-click menu of the device, click "Update Driver Software".



Click on "Browse your computer for driver software".

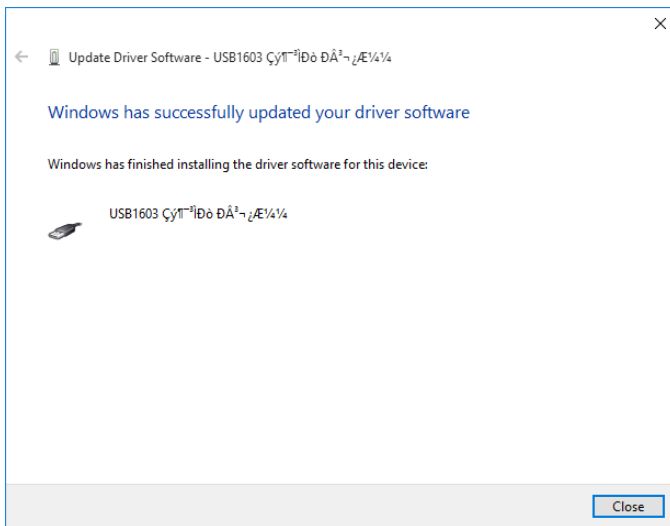


Click the "Browse" button, specify the "Driver" folder under the installation directory of the control software, select the directory corresponding to the current system, if the default path used in the software installation, you can refer to the path in the following figure to enter. When the setup is complete, click "Next".



Automatically start the installation of the driver until the following interface appears, and the driver installation is

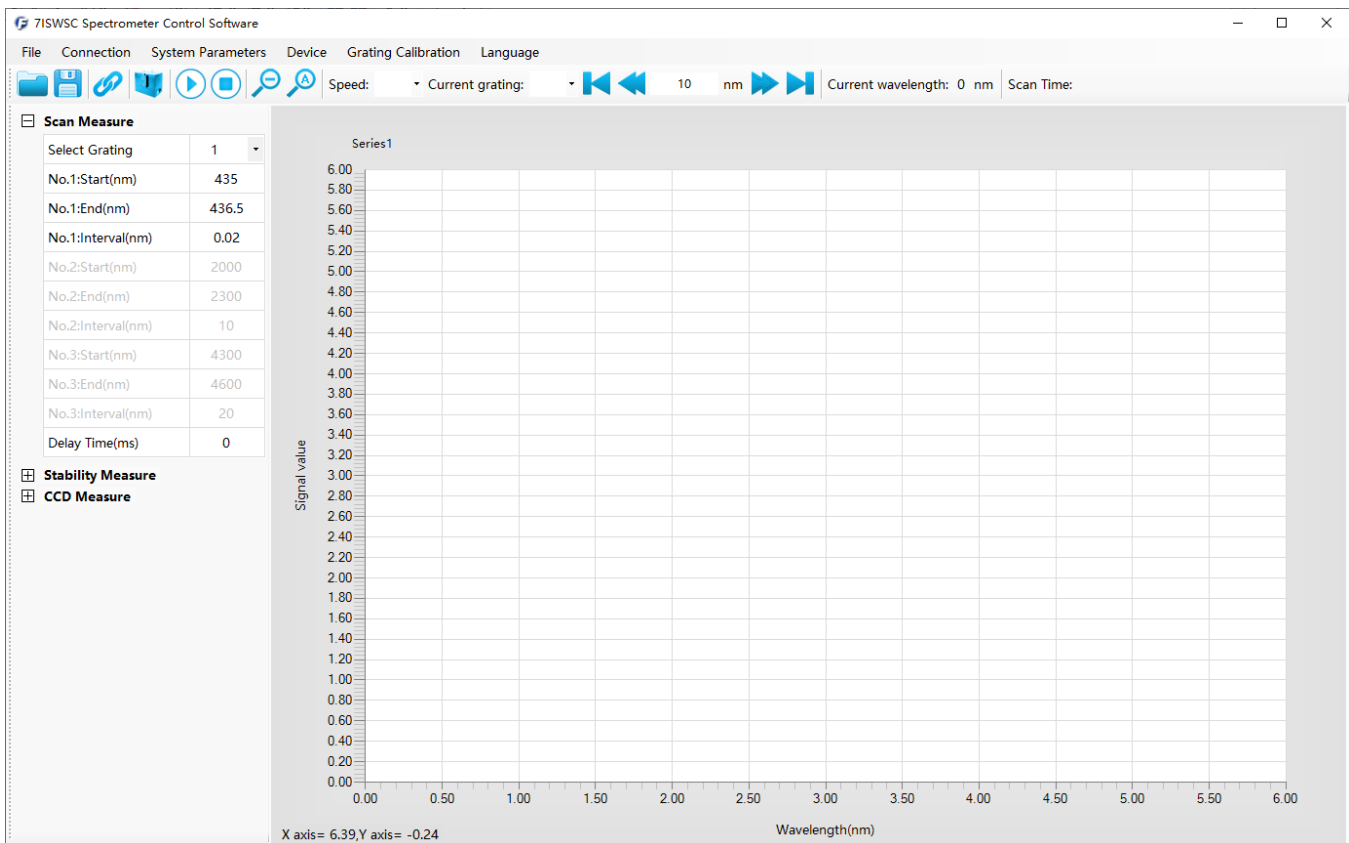
completed.



## 3. Use of Software

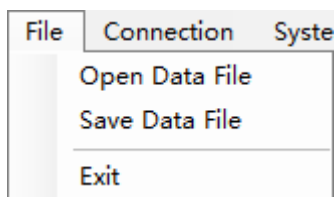
### 3.1 Main Interface

Launch the software, if the device is connected normally, the main interface as shown below will appear:



## 3.2 Menu Bar

### 3.2.1 Files



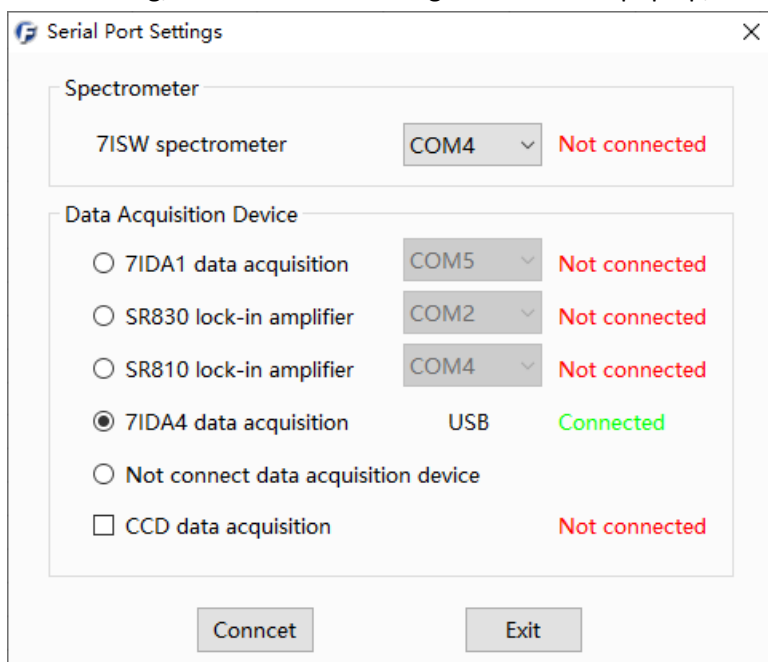
**Open Data File:** Retrieve the saved Txt data file.

**Save Data File:** Users can save the current chart as a file in txt, png, jpeg format, where the txt file contains detailed data information, and after saving it in txt format, it can be opened later through ".Data File button to import curves and data.

**Exit:** Exit the monochromator control software.

### 3.2.2 Connection

After clicking, the connection settings interface will pop up, see the figure below.



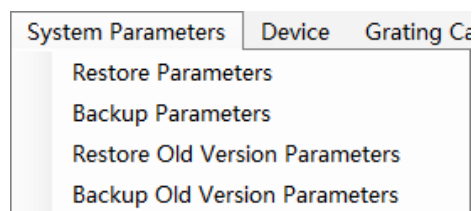
You can check the connection status of each device or set the serial connection of each device. If each device is successfully connected, the corresponding green "Connected" will be displayed on the right, otherwise a red "Not Connected" will be displayed.

To change the serial port settings, select the corresponding serial port in the drop-down box according to the actual connection. If you are using a 7IDA1 data acquisition device, select it, click the "Connect" button after selection, and the software will reconnect to the device. If an error occurs, restart the instrument, then restart the software, and check the serial port settings.



If the spectrometer is equipped with the function of CCD data collection, check the "CCD data collection" option for batch acquisition.

### 3.2.3 System Parameters



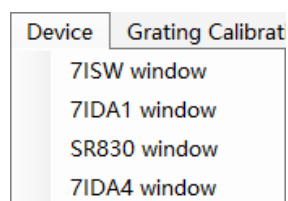
**Restore Parameters:** Recall the stored system parameter settings. (Please proceed with caution)

**Backup Parameters:** Save the settings of the current system parameters.

**Restore Old Version Parameters:** Recall the system parameter settings in the storage format of the old version. (Please proceed with caution)

**Backup Old Version Parameters:** Save the setting information of the current system parameters according to the storage format of the old version.

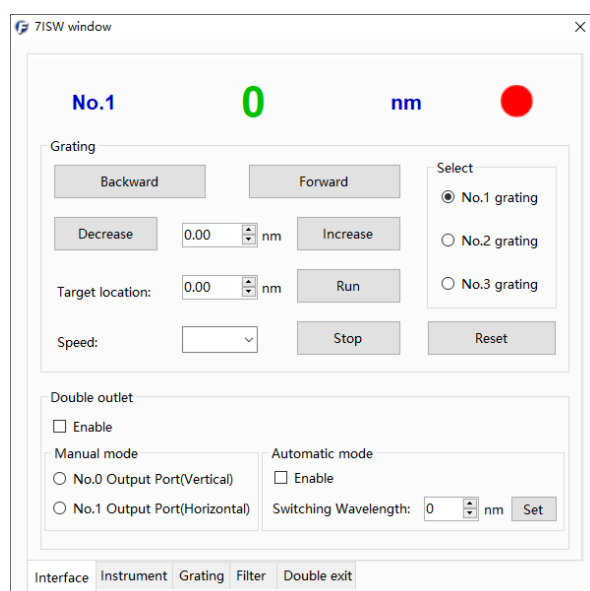
### 3.2.4 Device



This menu allows you to manually control the 7IWS monochromator/spectrometer, 7IDA1/7IDA4 DAQ, and SR830/SR810 lock-in amplifiers.

#### 3.2.4.1 7IMS monochromator window

##### ■ Interface



**Backward/Forward:** When the mouse is pressed, the wavelength of the monochromator decreases (or increases). Runs at the same speed as the user settings. For details, see Shortcut Speed Selection.

**Decrease/Increase:** Enter the wavelength value you want to decrease (or increase) in the incremental input box (must be a positive number), click the decrease (or increase) button, and the instrument will decrease (or increase) the corresponding wavelength value.

**Target Location:** Enter the wavelength you want to run to in the target input box, and then click the "Run" button on the right to automatically run to the target wavelength.

**Reset:** Clicking this button is equivalent to restarting the monochromator. The monochromator will automatically go to the positioning position of the No. 1 grating. If the filter wheel has been enabled, the filter wheel will automatically return to the filter corresponding to the positioning wavelength. If the monochromator is motorized with dual outlets and the dual outlets are enabled, the outlet will be automatically converted to the outlet corresponding to the positioning wavelength. If there is no automatic switching wavelength setting, it will be NO.0 outlet.

**Stop:** Used to forcibly stop the monochromator during the above operation. The monochromator cannot be stopped while resetting and switching gratings.

**Select Grating:** Select and switch to the specified grating.

**Double Outlet:** This parameter can only be set in the instrument equipped with an electric dual outlet. When this item is selected, the electric dual outlet will be enabled, and at this time, both the manual mode and the automatic mode are available for the user to use. When the instrument is restarted, it will automatically switch to the outlet corresponding to the startup positioning wavelength. If this item is not selected, the electric dual outlet will not be enabled. At this time, the outlet cannot be selected, and the automatic wavelength switching cannot be set either. Moreover, when the instrument is restarted, it will automatically switch to NO. 0 outlet (the axial exit).

**Manual Mode:** Displays the current exit status and can click to switch outlets.

**Automatic Mode:** If selected, the instrument will automatically switch to NO. 0 outlet when it runs to less than the switching exit wavelength, and automatically switch to NO.1 outlet when it is greater than the switching exit wavelength. If unchecked, the instrument will not automatically switch the outlet.

**Switching Wavelength:** Set the wavelength value for automatic outlet switching. When the current wavelength is less than this wavelength value, the outlet will automatically switch to NO.0 outlet, and data will be automatically read from channel A of the 7IDA1 data acquisition device. When the current wavelength is greater than this wavelength value, the outlet will automatically switch to NO.1 outlet, and data will be automatically read from channel B of the 7IDA1 data acquisition device. This application is suitable for detectors in two different wavelength bands. The detector that is sensitive to short wavelengths should be connected to NO.0 outlet, and its signal output should be connected to channel A of the 7IDA1 data acquisition device. The detector that is sensitive to long wavelengths should be connected to NO.1 outlet, and its signal output should be connected to channel B of the 7IDA1 data acquisition device. During scanning, continuous scanning of both short and long wavelengths can be carried out without the need for manual intervention to switch the outlet or change the channel.

**Attention:** During the outlet switching process, the user cannot operate the interface.

## ■ Instrument

System parameters

Type
7ISW0152
Total steps
1152000
Instrument NO.
02010020
Grating number
2
Exports Select
Single outlet

Initialize grating position

No.1 grating
0
nm
No.2 grating
0
nm
No.3 grating
nm

Begin Position

☐ Instrument was shutten down last time
☒ 1 grating 0 nm

OK

Interface Instrument Grating Filter Double exit

**Type:** The model number of the instrument.

**Instrument NO.:** The serial number of the instrument.

**Exports Select:** The type of outlet. Single outlet, Electric double outlet and Manual double outlet.

**Total Steps:** The grating table rotates once, stepping the number of steps taken by the motor.

**Grating Number:** The total number of installed gratings.

**Initialize Grating Position:** When switching from one grating to another, it stops at a certain wavelength of the latter. A certain wavelength can be set for each grating.

**Begin Position:** Set the position to which the instrument will automatically run when turned off and turned on again.

## ■ Grating

No.1 grating

Zero-order position
6998
Density(g/mm)
1200
Correction factor
1638.544
Blaze(nm)
300

No.2 grating

Zero-order position
581487
Density(g/mm)
600
Correction factor
3274.192
Blaze(nm)
1000

No.3 grating

Zero-order position
Density(g/mm)
Correction factor
Blaze(nm)

Ok

Interface Instrument Grating Filter Double exit

**Zero-order position:** The number of zero-point offset steps corresponding to the grating.

**Density:** The number of lines per millimeter width of the grating.

**Blaze:** The wavelength value with the highest grating efficiency.

## ■ Filter

### Positioning parameters

Effective number  
8

Total steps  
11200

Zero position  
4

### Locating position

No.0	0	step
No.1	1400	step
No.2	2800	step
No.3	4200	step
No.4	5600	step
No.5	7000	step
No.6	8400	步
No.7	9800	步

### Working wavelength

☒ Enable filter

Use number  
3

### Start wavelength

No.0	0	nm
No.1	380	nm
No.2	600	nm
No.3	900	nm
No.4	4	nm
No.5	5	nm
No.6	6	nm
No.7	7	nm

Ok

Interface Instrument Grating Filter Double exit

**Effective number:** The number of filters that have been installed on the current filter wheel.

**Total steps:** The number of steps taken by the stepper motor when the filter wheel rotates for one turn.

**Zero position:** The number of offset steps relative to the mechanical zero point.

**Locating position:** The number of offset steps for each filter.

**Enable filter:** It is checked to enable the function of automatic filter conversion. It needs to be properly connected with the 7IFW6 filter first.

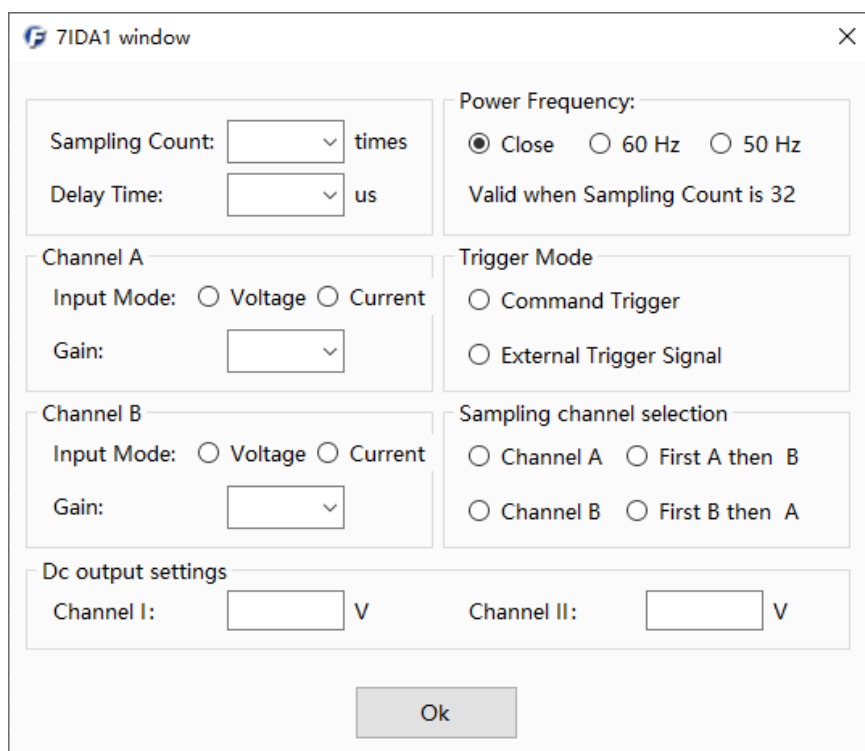
**Use number:** The number of filters used in the filter wheel.

**Start wavelength:** After the filter wheel is enabled, the filter will automatically switch according to the start wavelength set. The wavelength value must be set from small to large, assuming the set value is  $n_1, n_2, n_3 \dots (n_1 < n_2 < n_3 \dots)$ , then the monochromator does not use a filter in the  $0 \sim n_1$  wavelength range, and switches to the first filter in the  $n_1 \sim n_2$  wavelength range, and switches to the second filter in  $n_2 \sim n_3$  wavelength range....and so on.

### Note:

1. The filter wheel can only be enabled after the filter wheel is properly connected to the corresponding interface of the instrument.
2. The number of filters used is the number of filters that have been installed in the filter wheel. The filter wheel has a total of 6 positions from 0 to 5. Number 0 is vacant and no filter is installed. In the standard 7IFW6 filter wheel, 3 filters are installed, so the number of filters used is 3. The starting wavelengths are: 380, 600, 900 in nm.

### 3.2.4.2 7IDA1 window



The screenshot shows the '7IDA1 window' interface. It contains several sections: 'Sampling Count' and 'Delay Time' (both dropdown menus with units 'times' and 'us' respectively); 'Power Frequency' (radio buttons for 'Close', '60 Hz', and '50 Hz', with a note 'Valid when Sampling Count is 32'); 'Channel A' and 'Channel B' (each with 'Input Mode' radio buttons for 'Voltage' and 'Current', and a 'Gain' dropdown menu); 'Trigger Mode' (radio buttons for 'Command Trigger' and 'External Trigger Signal'); 'Sampling channel selection' (radio buttons for 'Channel A', 'First A then B', 'Channel B', and 'First B then A'); and 'Dc output settings' (two input fields for 'Channel I' and 'Channel II' with units 'V'). An 'Ok' button is at the bottom.

**Sampling Count:** The acquisition system does multiple acquisitions at a certain position and takes the average number as the final value. The selection range is: 1 to 32, and it is generally recommended to choose 32.

**Delay Time:** The time between the monochromator moves to a certain wavelength and the start of sampling by the acquisition system.

**Input Mode:** Set the input mode of channel A and channel B.

**Gain:** Select transmission gain for channel A and channel B. It can be 1, 2, 4, 8, 16, 32, 64, 128 or 256.

**Power Frequency:** Enable the function of power frequency noise filter, which is only effective when the integration number is 32. This parameter is the frequency of the grid to which the instrument is connected.

**Trigger Mode:** Select the mode to control the sampling of the data acquisition system, usually select command trigger.

#### **Sampling channel selection:**

Single Channel Mode: (Channel A/Channel B)

The data acquisition only samples according to the channel selected by the user.

If the user sets the wavelength of automatic exit switching for the motorized dual outlet, the software will automatically switch the outlet according to the wavelength position and select the channel. The input voltage and current of each channel can be set in the above input mode.

Ratio Mode: (A before B/B before A)

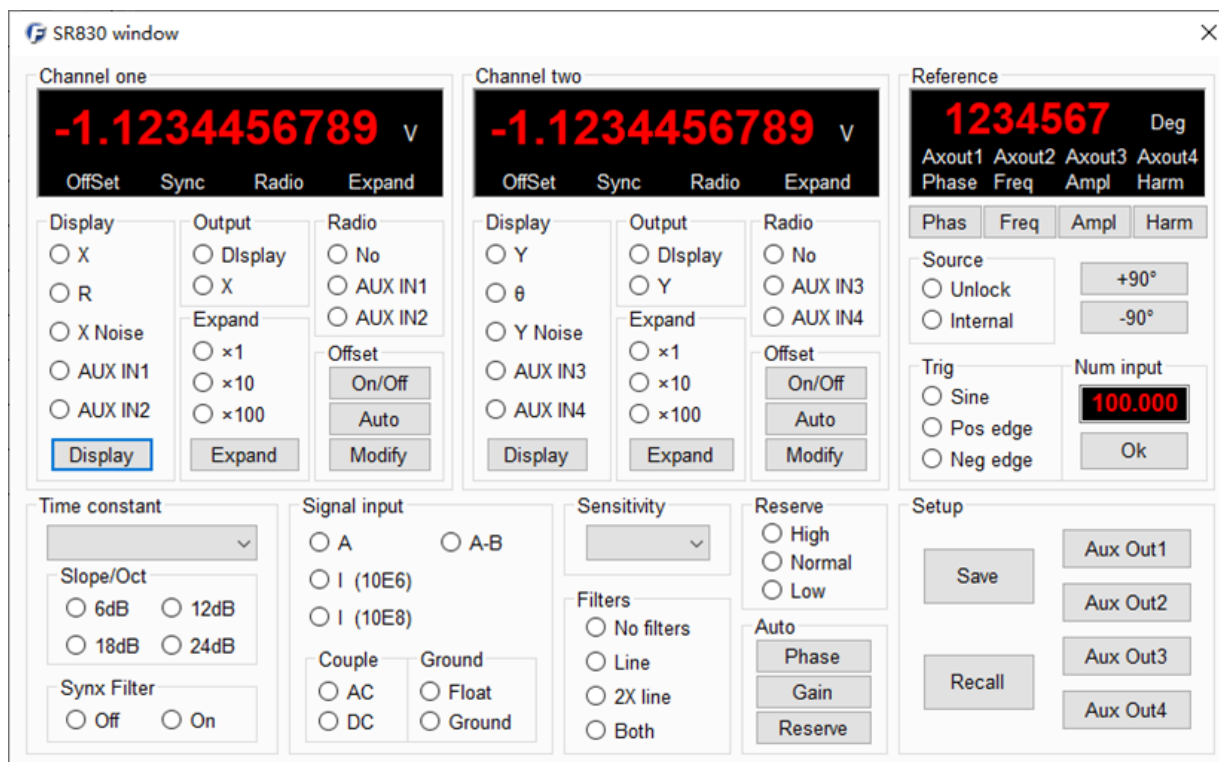
In this mode, DAQ can collect channel A first and then channel B (or collect channel B first and then channel A). The sampled values of the two channels are displayed separately in the data sampling process.

**DC channel I Output:** The DC channel I output of the data acquisition system, which can provide an output voltage from 0 to 10V.

**DC Channel II Output:** The DC Channel II output of the data acquisition system can provide an output voltage

from 0 to 10V.

### 3.2.4.3 SR830/SR810 window

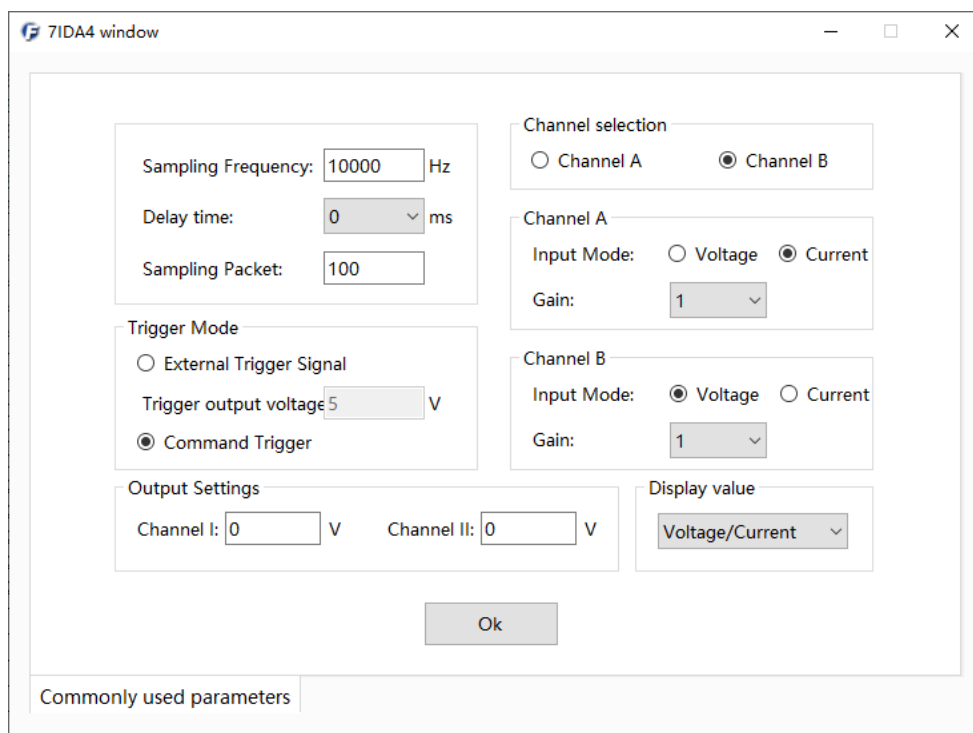


The SR830 window is divided into several sections for configuring two channels and a reference.

- Channel one:**
  - Display: -1.1234456789 V
  - Buttons: OffSet, Sync, Radio, Expand
  - Display options: ☐ X, ☐ R, ☐ X Noise, ☐ AUX IN1, ☐ AUX IN2,  (highlighted)
  - Output: ☐ Display, ☐ X, ☐ Expand (x1, x10, x100),
  - Radio: ☐ No, ☐ AUX IN1, ☐ AUX IN2,  (On/Off, Auto, Modify)
- Channel two:**
  - Display: -1.1234456789 V
  - Buttons: OffSet, Sync, Radio, Expand
  - Display options: ☐ Y, ☐  $\theta$ , ☐ Y Noise, ☐ AUX IN3, ☐ AUX IN4,
  - Output: ☐ Display, ☐ Y, ☐ Expand (x1, x10, x100),
  - Radio: ☐ No, ☐ AUX IN3, ☐ AUX IN4,  (On/Off, Auto, Modify)
- Reference:**
  - Display: 1234567 Deg
  - Buttons: Phas, Freq, Ampl, Harm
  - Source: ☐ Unlock (+90°), ☐ Internal (-90°)
  - Trig: ☐ Sine, ☐ Pos edge, ☐ Neg edge
  - Num input: 100.000,
- Time constant:**
  - Slope/Oct: 6dB, 12dB, 18dB, 24dB
  - Synx Filter: ☐ Off, ☐ On
- Signal input:**
  - ☐ A, ☐ A-B, ☐ I (10E6), ☐ I (10E8)
  - Couple: ☐ AC, ☐ DC
  - Ground: ☐ Float, ☐ Ground
- Sensitivity:**
  - Filters: ☐ No filters, ☐ Line, ☐ 2X line, ☐ Both
- Reserve:**
  - ☐ High, ☐ Normal, ☐ Low
  - Auto: , ,
- Setup:**
  - ,
  - Aux Out1, Aux Out2, Aux Out3, Aux Out4

The columns shown here correspond to the lock-in amplifier panel, so you can make various settings for the lock-in amplifier from here. Please refer to the SR830/SR810 lock-in amplifier manual for details.

### 3.2.4.4 7IDA4 window



The 7IDA4 window is used for configuring the 7IDA4 lock-in amplifier.

- Sampling Frequency:** 10000 Hz
- Delay time:** 0 ms
- Sampling Packet:** 100
- Channel selection:**
  - ☐ Channel A, ☒ Channel B
- Channel A:**
  - Input Mode: ☐ Voltage, ☒ Current
  - Gain: 1
- Channel B:**
  - Input Mode: ☒ Voltage, ☐ Current
  - Gain: 1
- Trigger Mode:**
  - ☐ External Trigger Signal
  - Trigger output voltage: 5 V
  - ☒ Command Trigger
- Output Settings:**
  - Channel I: 0 V, Channel II: 0 V
- Display value:** Voltage/Current
- 
- Commonly used parameters**

**Sampling Frequency:** Set the current maximum sampling frequency, the effective range is 100-250000Hz.

**Delay Time:** The time between the monochromator moves to a certain wavelength and the start of sampling by the acquisition system.

**Sampling Packet:** The maximum number of packets that can be sampled.

**Trigger Mode:** When the external signal is triggered, it needs to be exposed to the source, and the data will be collected only after the trigger source reaches the trigger output voltage; When the command is triggered, it will directly enter the data collection state.

**Channel Selection** (Channel A/Channel B): In this mode, the data acquisition only samples according to the channel selected by the user (channel A or channel B). As shown in the figure above, if channel B is selected in the figure, the data acquisition only collects data from channel B.

**Input mode:** Set the input mode of channel A and channel B.

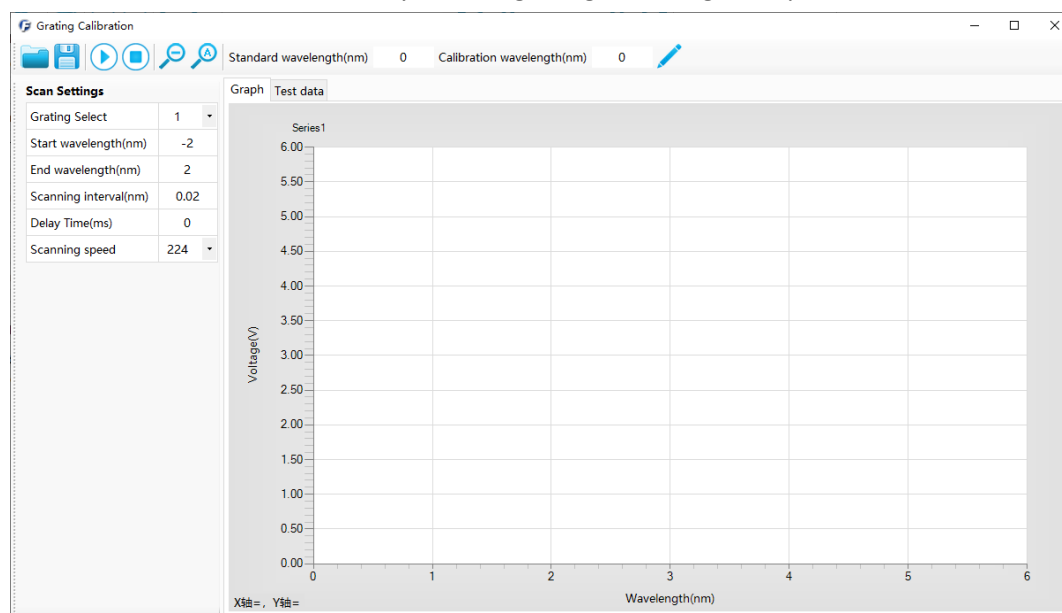
**Gain:** Select transmission gain for channel A and channel B. It can be 1, 2, 4, 8, 16, 32, 64, 128 or 256.

**Output Settings:** Channel I and channel II outputs, both of which can provide output voltages from 0 to 10V.

**Display Value:** The sample display data can display the original signal value, or the converted voltage/current value.

### 3.2.5 Grating Calibration

It is used to calibrate the accuracy of each grating wavelength in spectrometer.



(A) When the spectrometer is used simultaneously with our 7IDA1, 7IDA4 or other compatible data acquisition devices, calibration can be carried out by scanning the zero - order spectrum of the grating. At this time, it is best to use a standard light source for calibration, such as a mercury lamp. The calibration method is as follows:

- 1) Ensure that the spectrometer and the data acquisition device are properly connected.
- 2) Adjust the slits at the outlet and inlet of the spectrometer to the position of 10um.
- 3) Select the grating number to be calibrated in the scanning settings and fill in the following parameters:

Start wavelength: - 0.5nm, End wavelength: 0.5nm, Scanning interval: 0.01nm, Delay time: 1s, Number of measurements: 1, Scanning speed: 255.

Note: The three parameters of start wavelength, end wavelength and scanning interval can all be set according to the deviation situation. If the deviation situation is uncertain, the scanning range and interval can be set larger to correctly characterize the deviation situation.

- 4) Click "Start running" to start the search.
- 5) Adjust the cross - hairs by moving the mouse, check the corresponding position of the peak in the test results, and fill in the wavelength value corresponding to this point in the standard wavelength text box.
- 6) Enter 0 in the corrected wavelength text box.
- 7) Click the calibration button.

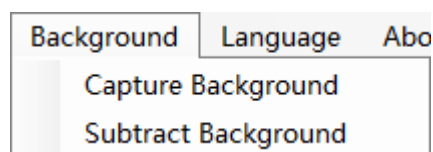
(B) If a third - party device is used to test the deviation value of the spectrometer, the calibration method is as follows:

- 1) Ensure that the spectrometer and the data acquisition device are properly connected.
- 2) Control the spectrometer to run to the 0nm position of the specified calibration grating through the main interface of the software.
- 3) Input the deviation value tested by the third - party device.

Note: During the test, different monochromatic light output values should be selected first to confirm that there is an equal (or approximately equal) deviation at each wavelength. And input this value as the zero - order offset in the standard wavelength text box.

- 4) Click "Start running" to start the search.
- 5) Enter 0 in the corrected wavelength text box.
- 6) Click the calibration button.

### 3.2.6 Background



This function can only be used during CCD measurement.

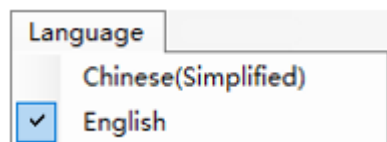
**Capture Background:** Record the current curve as the background. This function is used to eliminate the background caused by stray light.

**Subtract Background:** Subtract the ordinate value of each point of the curve stored in "Taking the background" from the ordinate value of each point of the current curve to eliminate the background caused by stray light.

Explanation: When the light to be measured is incident on the CCD, collect the image and click "Taking the background". Since the light to be measured is not incident on the CCD, the images collected at this time are all the stray light backgrounds generated when the stray light is incident on the CCD. Record the spectrum at this time as the background. Then introduce the light to be measured and make it incident on the CCD and click "Subtracting the background". At this time, the spectral line is the image generated when the light to be measured is incident on the CCD. That is, the measurement error caused by stray light is eliminated.

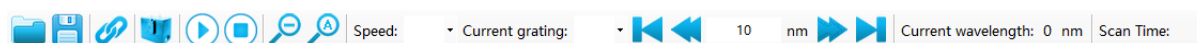


### 3.2.7 Language Selection



Two language options are supported: Chinese Simplified and English.

## 3.3 Shortcuts



**Open Data File:** Import the existing scan curve information.

**Save Data File:** Save the current scan curve result to the specified file.

**Connection:** Open the connection settings interface, select the correct serial port number and connect the instrument.

**7ISW Manual Control:** Open the 7IMS manual control interface.

**Start Run:** For Scan Measure or Stability Measure. After confirming that the data input is correct, you can click the button to scan and sample, in the process of sampling, the curve of scanning and sampling is dynamically displayed in the curve display area below, and the data of scanning and sampling is dynamically displayed in the data display area in the lower part.

**Stop Run:** Stop the current scan sampling, and the display and data of the curve will also stop being updated.

**Narrow Display:** When the curve display is enlarged, you can retract the display by using this button.

**Automatic Display:** When the curve display part is enlarged, it will automatically return to the original display state through this button.

**Speed:** Select the speed you want to set in the drop-down selection box, there are a total of 225 speed levels from 0 to 224 in the table, the higher the value, the faster the speed. The formula for calculating velocity is:

$$V = (32 + 78 \times N) \times 360 / \text{TotalSteps}$$

V represents the speed of the grating table of the monochromator, in degrees per second, N represents the speed level, and TotalSteps represents the total number of steps of the instrument.

**Current Grating:** Select the grating number you want to switch to in the drop-down box.

**Backward/Forward:** When the mouse is pressed, the wavelength of the monochromator decreases (or increases). Runs at the same speed as the user settings. For details, see Shortcut Speed Selection.

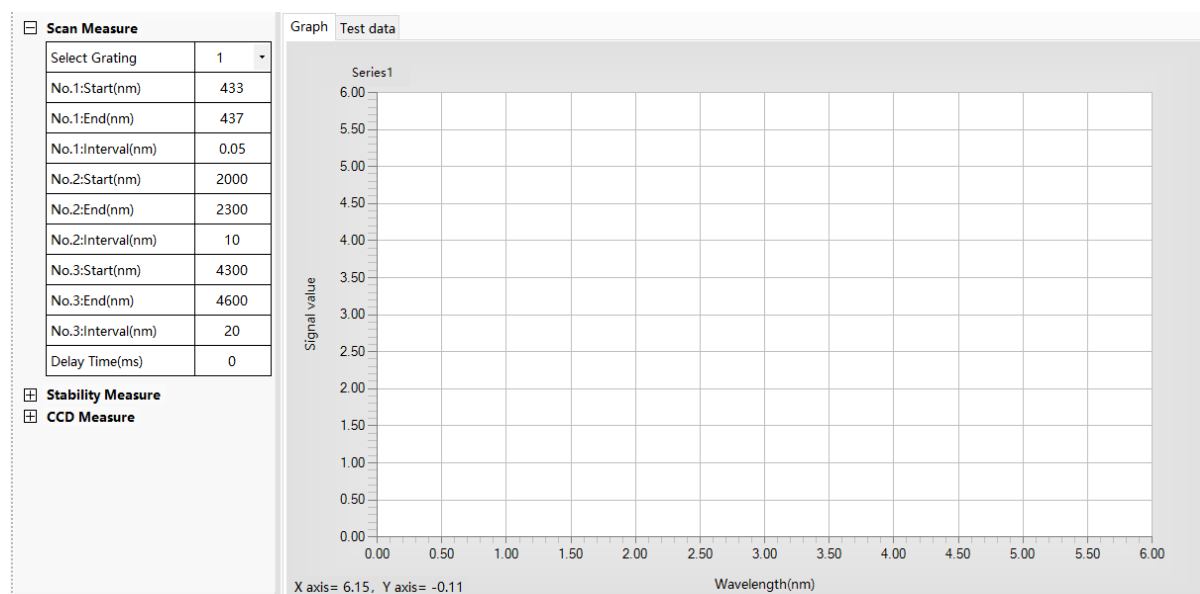
**Decrease/Increase:** Enter the wavelength value you want to decrease (or increase) in the incremental input box (must be a positive number), click the decrease (or increase) button, and the instrument will decrease (or increase) the corresponding wavelength value.

**Current Wavelength:** The value corresponding to the current wavelength, in nm.

**Scan Time:** When running a Scan Measure or Stability Measure, the scanning time is displayed in real time.

**Collection Times:** The current actual number of acquisitions.

## 3.4 Operation Interface



Three measurement methods are available: Scan Measure, Stability Measure and CCD Measure

### 3.4.1 Scan Measure

Scan Measure	
Select Grating	1
No. 1: Start (nm)	576
No. 1: End (nm)	1389
No. 1: Interval (nm)	30
No. 2: Start (nm)	10
No. 2: End (nm)	20
No. 2: Interval (nm)	1
No. 3: Start (nm)	10
No. 3: End (nm)	20
No. 3: Interval (nm)	1
Delay Time (ms)	0

Scan Measure is used to scan and sample a wavelength band, and can be scanned by a single grating or continuously by multiple gratings.

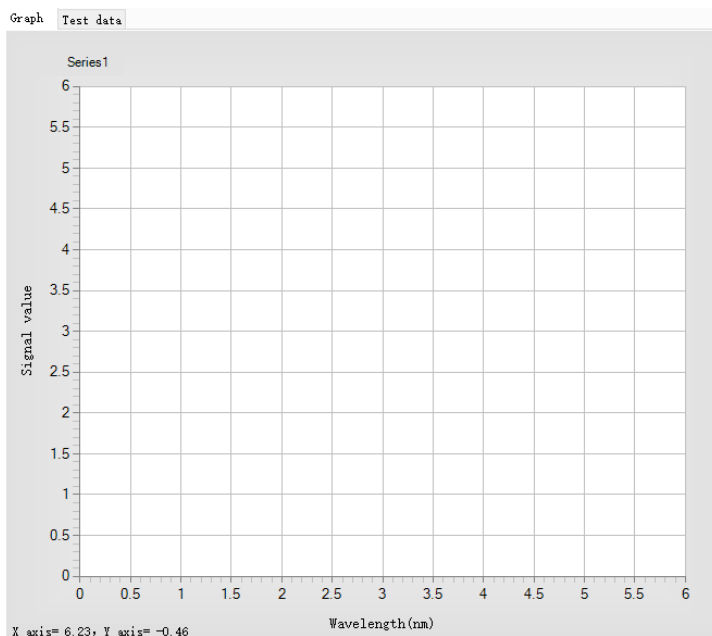
**Select Grating:** Select the grating to be used for the scan. If a single grating number is selected, a single-grating scan will be carried out, such as 1, or 2, or 3. If multiple grating numbers are selected, a continuous scan of multiple gratings will be performed, (12, or 23, or 13, or 123). After selecting the scanning grating, you can change the parameters of the corresponding grating below.

**Scanning wavelength setting:** The starting wavelength is the lower limit of the scan, the ending wavelength is the upper


limit of the scan, and the scanning interval is the interval wavelength of each two data acquisitions.

**Note:** The starting wavelength should not be greater than the end wavelength, and should not exceed the working range of each grating, and the scanning interval should not be too small, that is, the 1200-line grating should not be less than 0.01nm, the 600-line grating should not be less than 0.02, and the 300-line grating should not be less than 0.04, 150 line grating shall not be less than 0.08. And the smaller the scan interval, the longer the scan time.

In the process of scanning and sampling, the software displays the current sampling data curve in the right area in real time:



**X / Y axis:** The X axis represents the wavelength, the unit is nm, the Y axis represents the signal value, there is no unit, the range is from -32768~32767. It means saturation when the curve reaches upper and lower bounds, then you should reduce the gain of the data acquisition, the width of the slit, or the output of the photodetector.

**X, Y axis range adjustment:** Use the left mouse button to select an area from the upper left corner to the lower right corner to enlarge it. After magnifying in, the horizontal and vertical sliders will appear, drag the slider to make curve to move and display accordingly, click  to restore the original curve display of the corresponding axis. When the mouse is moving, the X-axis value and Y-axis value corresponding to the current mouse pointer are displayed in the lower left. Right-click the mouse to pop up the following menu:

- Narrow display
- Automatic display
- Delete a curve
- Reverse a curve
- Change the color
- Delete all curves

**Narrow display and Automatic display:** The same function as the buttons on the shortcut bar.

**Delete a curve:** You can delete a specified curve. Move the mouse over the curve you want to delete and click "Delete a curve".

**Reverse a curve:** Reverse the specified curve up and down. Move the mouse over the curve you want to reverse and click "Reverse a curve".

**Change the color:** Adjust the display color for the specified curve. Move the mouse over the curve you want to change the color and click "Change the color".

**Delete all curves:** Delete all displayed curves and clear the data.

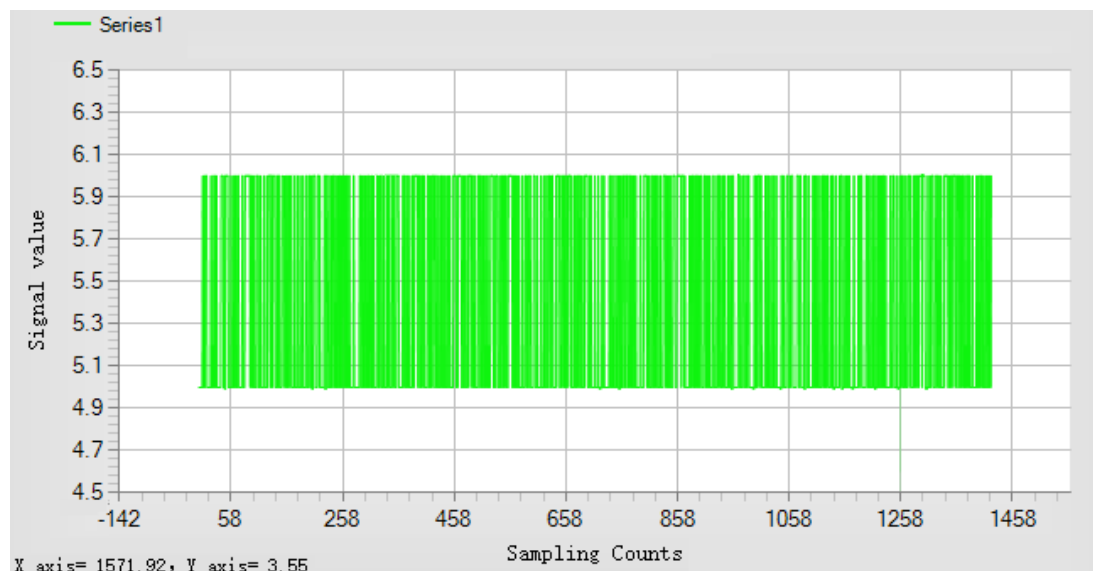
### 3.4.2 Stability Measurement

Stability Measure	
A: Max value	0
A: Min value	0
A: Average	0
A: Current value	0
A: Stability	0
B: Max value	0
B: Min value	0
B: Average	0
B: Current value	0
B: Stability	0

This function module is designed to facilitate the user to measure the stability of a signal at a specific wavelength.

Steps:

- Run the monochromator to a certain wavelength to be measured.
- Click the "Start Run" button, the system samples discretely at the current wavelength with a certain period (about 1/4 second), and displays the maximum, minimum, average, current value, and stability of the sampled data in real time.
- Click the "Stop Run" button to stop sampling.
- During the sampling process, the curve and data are displayed in real time as follows.



### 3.4.3 CCD Measure

#### CCD Measure

Exposure time(0.2ms)	1
Average number	1

**Exposure time:** It refers to the time during which the CCD is exposed to light for sampling. The range is 1 to 100 (0.2 ms to 20 ms). The longer the exposure time, the higher the value of the collected result. When the signal is weak, the signal value can be increased by increasing the exposure time. When the signal is strong, the exposure time should be reduced.

**Averaging times:** Take the average of multiple measured values, and the range is from 1 to 10,000.

When the "Start Running" button is clicked, the program will display the data collected by the spectrometer in real time. When the "Stop Running" button is clicked, the program will freeze the current data to facilitate operations such as observation and storage for the user.

