UV/VIS Spectrophotometer
MS-SP320-1100/MS-SP195-1100
User Manual

MARSHALL

Content

Preface

1. Safety

This instruments are designed according to the following safety documents:《IEC 61010 — 1：2001》(Which is:《Measurement, Control and Laboratory Electric Equipments Safety Requirement》Part 1) and 《IEC 60601 — 1：1988》(Which is:《Electric Apparatus of Medical Treatment》 Part 1).

2. About the Instrument

Scanning Series UV/Vis Spectrophotometer is an electrical test instruments which is widely used in the laboratories.

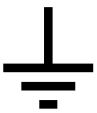
- Use Frequency: Intermittence
- Excessive Voltage (Current): No
- Pollution Class: Class 1

3. Symbols

Caution, Danger!

Caution, High Voltage!

Caution, Hot!



Ground

Fuse

Recall, this instrument will be called back by the appointed Electrical Treatment Department or by the original Manufacturer when wasted.

Chapter 1. Summary

Scanning Series UV/Vis Spectrophotometer have the characters of wide range of wavelength, high sensitivity, powerful function, easy to use, simple structure and pretty figure. Besides these, the large LCD, High Precise A/D and easy to store RAM makes the instrument much more superior than other originals. It is widely used in Chemistry, Pharmaceuticals, Biochemical, metallurgy, Light Industry, Textile, Material, Environments, Medical, Education and some other fields. It is one of the most important instruments in Quality Control and an essential in normal laboratories.

1. Working Principle and Structure

Different matter has different but special absorbance wavelength point. Also, when at the fixed wavelength point, the absorbance has some relation to the substance's (Always transparent Solution) concentration and its thickness. The relation can be concluded as the following Formula which is called Lambert-Beer Law.

$$T= I/I_o$$
$$A=KCL= -\log I/I_o$$

A	Absorbance
C	Concentration of the Solution
K	Absorbance Coefficient of the Solution
L	The length of the Solution in the light path
I	The intensity of the light focused on the A/D after it permeate the solution to be measured.
Io	The intensity of the light focused on the A/D after it permeate the Solution.

Note:
When test, the solvent is usually taken as the Reference Solution and its Transmittance is considered as 100%T. While the Transmittance of the sample to be tested is a relative value which is got comparing to that of the Reference.

2. Main Specifications

- Wavelength Range：

MS-SP195-1100: 195-1100nm; MS-SP320-1100: 325-1020nm

- Stray Light： ≤0.1%T @ 220nm, 360nm
- Bandwidth： 4nm
- Photometric Range： 0-200%T,-0.301-3.0A
- Wavelength Accuracy： ±1.5nm
- WL. Repeatability： 0.2nm
- Photometric Accuracy： ±0.5%T
- Stability： 0.002A/h @ 500nm
- Display： 128×64 Dots Matrix LCD
- Data Output： USB, Parallel

Chapter 2. Install Instrument

1. Environment Required

To ensure the best performance, the following conditions are required:

- The best working temperature range is 16-35℃and the humidity is 45-80%.
- Keep it as far as possible away from the strong magnetic or electrical fields or any electrical device that may generate high-frequency fields.
- Set the unit up in an area that is free of dust, corrosive gases and strong vibrations.
- Remove any obstructions or materials that could hinder the flow of air under and around the instrument.
- The power requirement is 220±22V@50±1Hz or 110±11V@60±1 Hz.
- Use the appropriate power cord and plug into a grounded outlet.
- If the local voltage is not stable enough, a manostat is required.
- Be away from direct sunlight.

Voltage Confirmation

Be sure to set the instrument's voltage switch at your local power supply, or severe damage may occur!

2. Installation

Step 1: Check the packing list

Unpack the contents, check the materials with the Packing List. Any damage or
Lost found, please contact us or the local dealer.

Step 2: Position

Place the instrument on the stable table carefully.

Step 3: Install printer (Optional)

Make sure the printer is power off. link the printer's data cable to the Instrument's parallel port.

Step 4: Link the power cord

Make sure the instrument's power switch is in the Off condition, link the power cord to the instrument and insert another end in the socket provided with a protective earth contact.

Step 5: Switch on the power

Check again. make sure that all the links are right. Switch on the power. Then the instrument begins to self-test. After self-test and 15 minutes' pre-warm, it can work.

Chapter 3. Introduction of the Instrument

1. Introduction

Appearance of the instrument (Fig. 3-1)：

Front

Back

Fig. 3-1

1 —Lid of the room
2 —Cell Holder
3 —Operation Panel
4 —Rod
5 —Power Switch
6 —Power Socket
7 —Fan
8 —USB Port
9 —Print Port

2. Operation Panel

Operation panel of Scanning UV/Vis Spectrophotometer(Fig.3-2)：

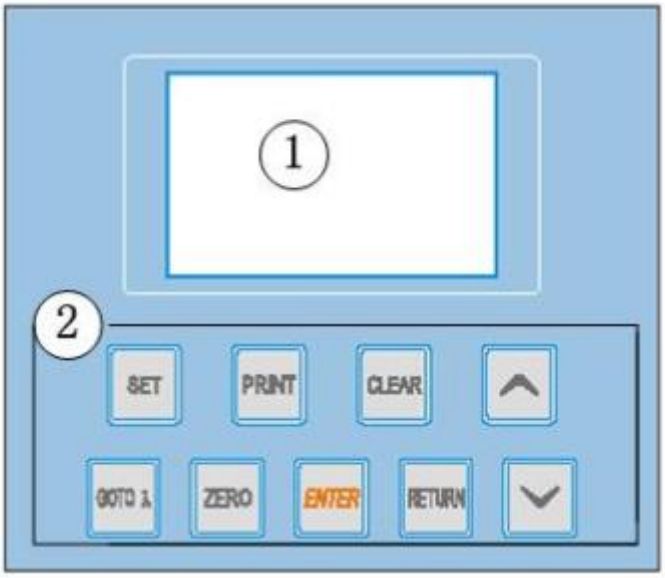


Fig. 3-2

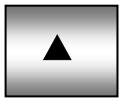
1 —LCD Displayer
2 —Keypad

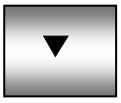
3. Keypad Description

Setup

Print

Clear





Up, down key, change test mode, plus or minus wavelength.

Wavelength

Zero

Confirm

Return

Chapter 4. Instrument Operation

1. Software System

Instrument is consist of three modes: BASIC Mode, QTY Mode and System Tools.

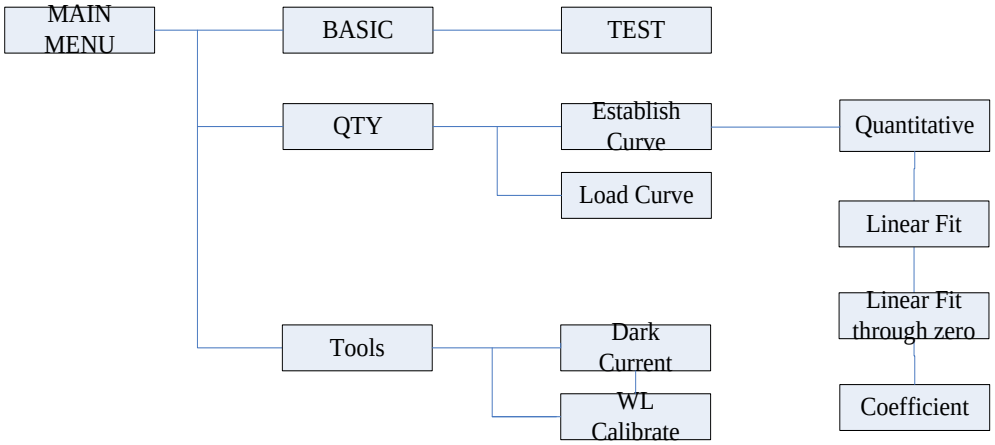


Fig. 4-1

2. Basic Operation

- **Select Test Method**

Press up, down key to change the test mode.

- **Set Wavelength**

Press GOTOλto setup wavelength, wavelength can be adjusted by up and down key, the wavelength value will display on the screen, the minimum value is 0.1nm.

- **Set Parameters**

The instrument will guide to input concentration or k, b, which can be changed by up and down key, press ENTER to confirm and save the value.

- **Calibrate Zero**

Press ZERO can calibrate zero.

- **Calibrate 100%T**

Put the Reference in the light path, press ZERO to calibrate 100%T/0Abs.

- **Print the Test Result**

In the test interface, press PRINTto print the test result.

3. Before Measurement

- **Self-check**

Remove all the blocks in the light path and close the lid of the compartment. Switch on the power supply to begin the self-test.

- **Pre-warming**

After self-test, the instrument goes into pre-warm state. For accurate test, at least 30 minutes of warm up is required.

- **Check the Cuvettes**

The cuvettes must be clear and there's no remains of the samples on the surface of it. Only Silicon (Quartz) cuvettes are permitted to be used in the range of less 300nm.

4. Measurement

(1) BASIC MODE

Step 1, Choose "**BASIC**" by up and down key, ENTER to confirm. (Fig. 4-1)

Fig. 4-1

Step 2, Press GOTOλ, up and down key to choose the wavelength you need, ENTER to confirm.
Step 3,Put the Reference in the light path and press ZERO to calibrate 100%T/0Abs.
Step 4, Sample Measurement, put the sample to be measured in the light path, then the result displays on the screen automatically.(Fig. 4-2)

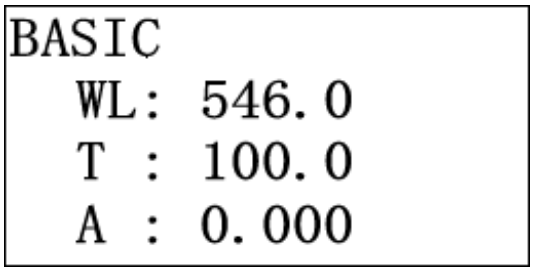


Fig. 4-2

Step5, Press PRINT to print the test result.
Step 6, Repeat Step 4, 5 to test other samples.

(2) Establish curve, linear fit

Step 1, Choose "**QUANTITY**" by up and down key, ENTER to confirm. (Fig. 4-3)

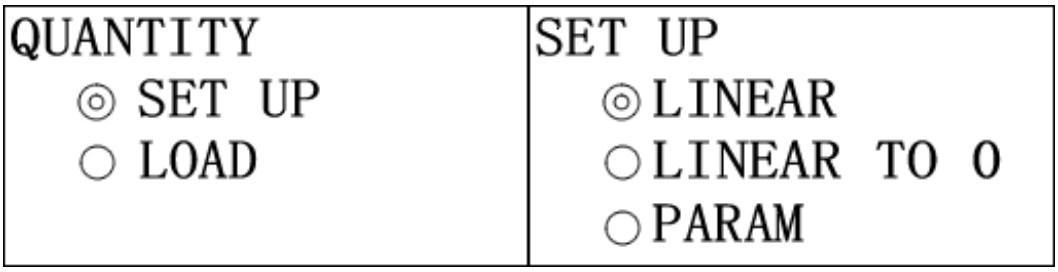


Fig. 4-3

Step 2,Choose "**SET UP**" by up and down key, ENTER to confirm. (Fig. 4-3)
Step 3, Choose "**LINEAR**" by up and down key, ENTER to confirm. (Fig. 4-3)
Step 4, Setup test wavelength by up and down key, ENTER to confirm. (Fig. 4-4)

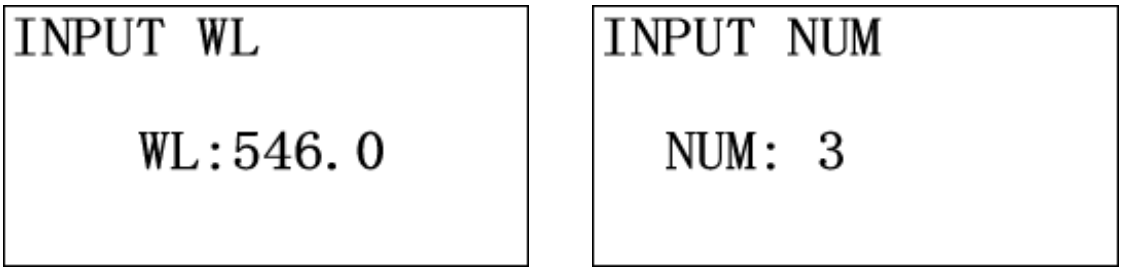


Fig. 4-4

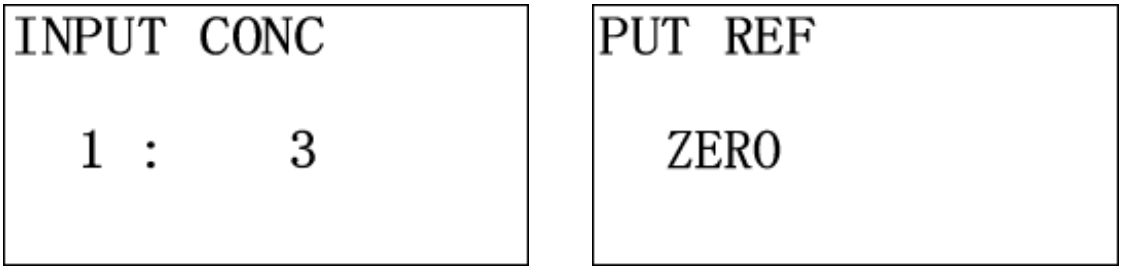


Fig. 4-5

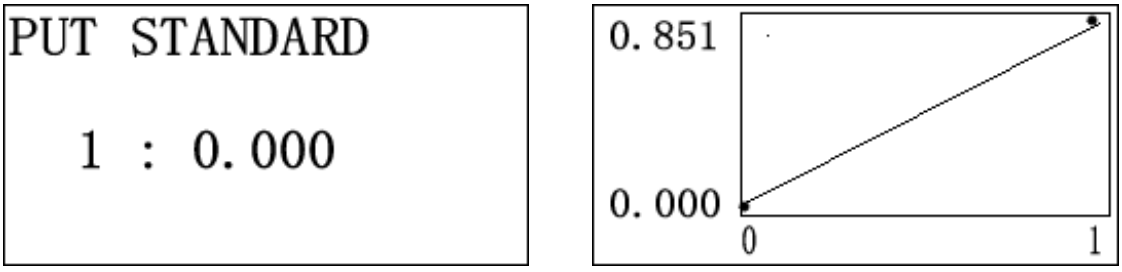


Fig. 4-6

Step 5, Input sample no. 2-8 samples by up and down key (Fig. 4-4)
Step 6, Input sample concentration by up and down key, ENTER to confirm. Repeat this step to input all sample concentration. (Fig. 4-5)
Step 7, Put Reference into room, press ZERO. (Fig. 4-5)
Step 8, Put standard sample one by one, press ENTER to test the Abs.; press ENTER after testing the last one to display the curve. (Fig. 4-6)

Step 9, In the Interface of Linear fit, press ENTER (Fig. 4-7) to display all parameters, , curve equation A=K1*C+B, relevant coefficient r2, test wavelength, K1, K2, ID:2 means 2 standard curves, the curve established now is the second one. Press ENTER to test sample.
Step 10, Test sample interface (Fig. 4-7), put Reference, press ZERO, put the sample in the light path, ENTER to test sample concentration. Press CLEAR to delete current test data.
Step 11, After test, PRINT to print current test data.

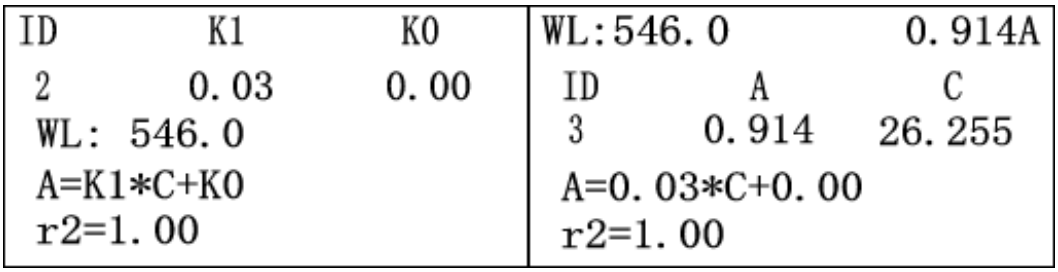


Fig. 4-7

(3) Establish curve, linear fit through zero

Step 1, In the menu of establish curve, choose Linear fit through zero by up and down key, ENTER to confirm.
Step 2, About establish curve, refer the step 4 to 11 of Linear fit.
P.S.: Linear fit through zero will start from 0 to begin fitting, intercept K0=0.

(4) Establish curve, coefficient.

Step 1, In the menu of establish curve, choose Coefficient by up and down key, ENTER to confirm.
Step 2, Input the test wavelength by up and down key, ENTER to confirm.
Step 3, Input K1, K0 by up and down key, ENTER to confirm. (Fig. 4-8)
Step 4, Test concentration of sample, refer Linear step 7 to 11.

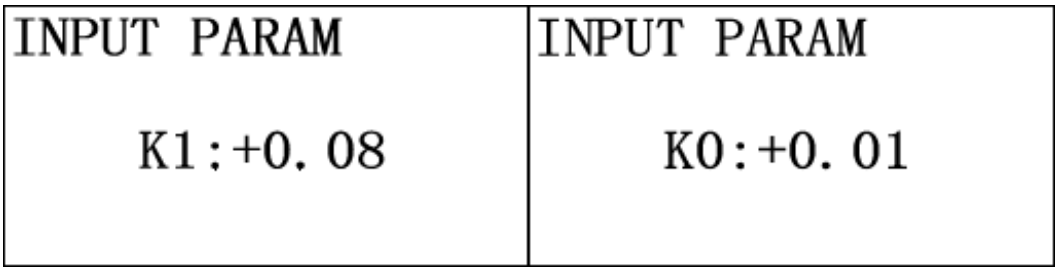


Fig. 4-8

(5) Load curve

Step 1, In the Quantitative mode, choose "**LOAD**" by up and down key, ENTER to confirm.
Step 2, Choose the curve to be tested by up and down key; ID:6 means the no. of current curve.
Step 3, Press SET, up and down key to change the value of K, B, ENTER to enter the test interface. (Fig. 4-9)

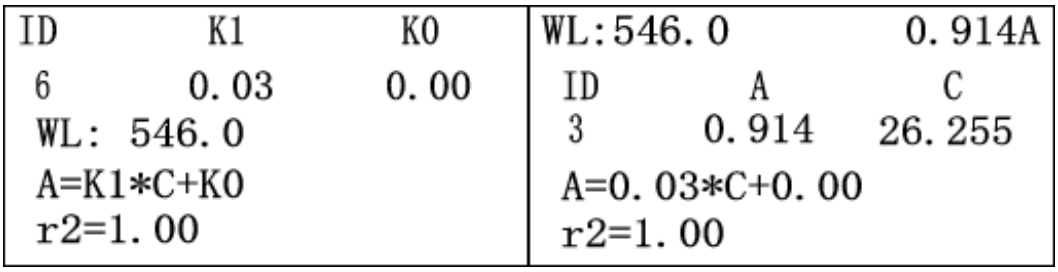


Fig. 4-9

Step 4: Put the Reference into the light path, ZERO to calibrate blank.
Step 5: Put the Sample into the light path, read the concentration value. (Fig. 4-9)
Step 6: PRINT to print test result.
Step 7: Repeat step 5, 6 to test other samples.

(6) System Tools

Step 1: Choose System tools from the main menu. ENTER to confirm. (Fig. 4-10)

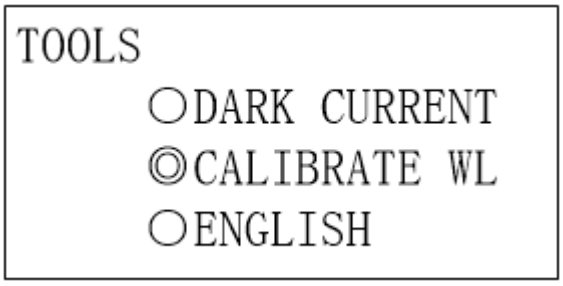


Fig. 4-10

Step 2: Choose Dark Current by up and down key, ENTER to confirm. The instrument will calibrate dark current automatically.
Step 3: Choose Wavelength Calibration by up and down key, ENTER to calibrate automatically.

Chapter 5. Instrument Maintenance

To keep the instrument work in good condition, constant maintain is needed.

1. Daily Maintain

(1) Check the Room

After measurement, the cuvettes with sample solutions should be taken out of the compartment in time. Or the volatilization of the solution would make the mirror go moldy. Users must pay more attention to the corrosive sample and liquid easy to volatilize. Any solution remains in the compartment should be wipe off immediately.

(2) Surface Clean

The cover of the instrument is with paint. Please use wet towel to wipe off the drips on the surface immediately. Organic solution is forbidden to be used to cleanthe cover. Please wipe off the dirt on the cover timely.

(3) Clean the Cuvettes

After every test or after a solution change, the cuvettes should be cleaned carefully, or the remains on the surface would cause measuring error.

2. Troubleshooting

(1) Dark Current Error when Self-check

Possible Cause	Solution
· Open the lid of the compartment during the course of self-test.	Close the lid of the compartment and switch on the power again.

(2) No Response After Power On

Possible Cause	Solution
· Bad contact in power supply	Improve the contact
· Fuse melt	Replace a new fuse

(3) Printer Not Work, Printer Error

Possible Cause	Solution
· No power supply	Switch on the power supply
· Bad contact in power supply	Improve the contact
· Bad contact of the data cable	Improve the contact

(4) No Stable Reading

Possible Cause	Solution
· No enough pre-warm	Increase the pre-warm time
· Glass cuvettes used in UV Range	Use Silicon Cuvettes.
· No stable Sample	Improve the sample
· Much higher sample concentration	Dilute the sample
· Low voltage or unstable power supply	Improve the power condition
· Lights defect	Replace a new lamp
· Light used up	Replace a new lamp

(5) Worse Repeatability

Possible Reason	Solution
▪ Unstable sample	Improve the sample
▪ Cuvettes polluted	Clean the cuvettes

(6) Incorrect Reading

Possible Reason	Solution
▪ Dark Current Error	Re-get the dark current
▪ Worse matching of the cuvettes	Improve the matching of the cuvettes

3. Spare parts replacement

(1) Replace the Fuse

Danger! Be sure to switch off the power and unplug the socket before replacement!

Step 1, Tools Preparation
Prepare a 3×75 Flat Blade screwdriver**.**
Step 2, Switch Off the Power Supply
Switch off the power supply, and unplug the socket.
Step 3, Take Out the Fuse Seat
Take out the fuse seat by the screwdriver(Fig.5-1).

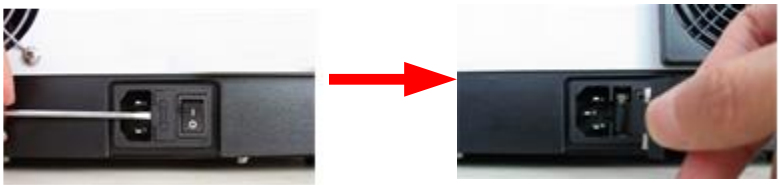


Fig. 5-1

Step 4, Replace a New Fuse
Pick out the spare fuse and replace it to the working position(Fig.5-2).

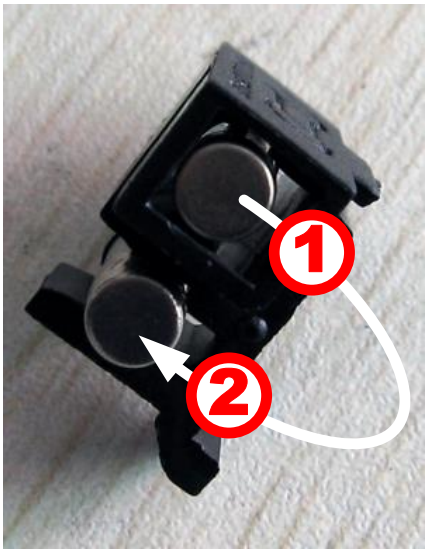


Fig. 5-2

Step 5, Reset the Fuse Seat

Replace the fuse seat in the power socket.

Step 6, Switch On the Power

Plug the socket and switch on the power.

(2) Replace Lamps

High temperature！ Wait 20 minutes before open the lamp chamber after power off to avoid scald!

Step 1, Tools Preparation

Prepare a 6×150mm Cross Blade screwdriver and a pair of glove.

Step 2, Power Off

Switch off the power supply and unplug the socket.

Step 3, Open the Cover

Unscrew the 4 screws indicated in Fig.5-3(Each side with 2 screws) and remove the cover.

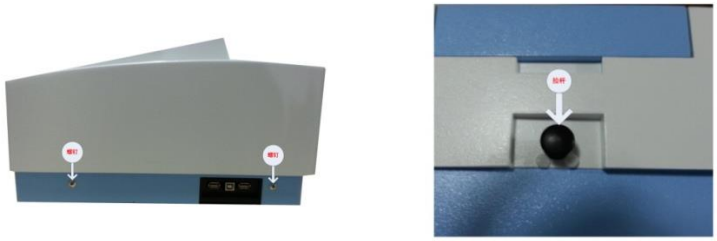


Fig. 5-3

Step 4, Open the Cover of the Light Chamber

Unscrew the 2 screws on the light chamber cover and remove it(Fig.5-4).

Fig. 5-4

Step 5, Replace the D2 Lamp

Unscrew the 2 screws on the D2 Flange (No.1 in Fig. 5-5), unplug the connector in the power board(No. 2)and remove the D2 lamp. Draw on the cotton glove and replace a new lamp. Fix the 2 screws and plug the connector again.

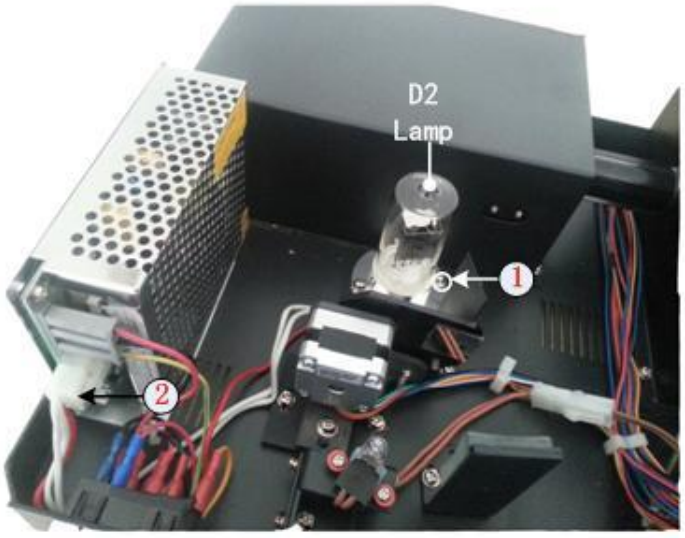


Fig. 5-5

Step 6, Replace W Lamp

Remember the direction of the filament before pull out the W lamp. Be sure that the new lamp's filament is in the same direction as before.

Pull out the defected W lamp and draw on the cotton glove. Insert the new W lamp as deep as possible on the lamp seat. Be sure to keep the filament in the same direction as the old one face.

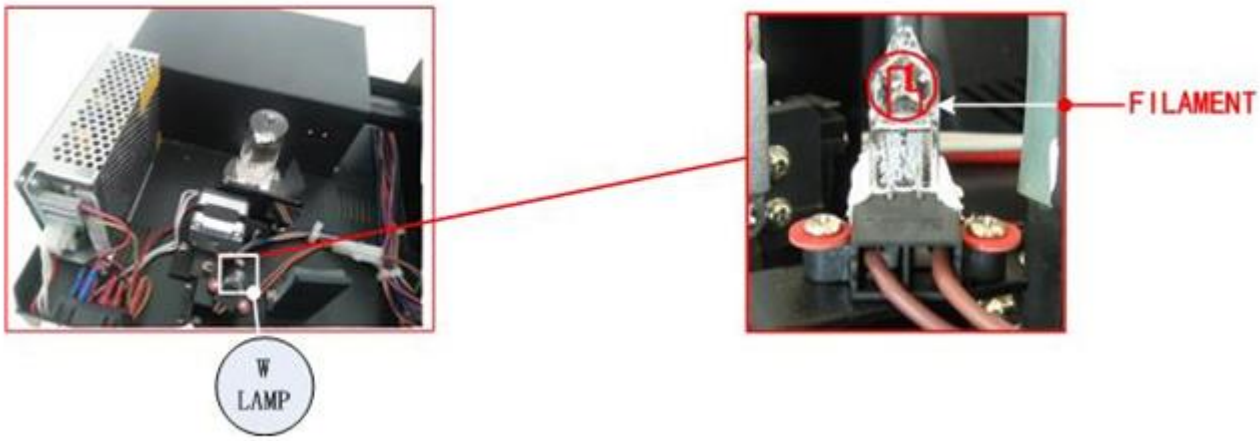


Fig. 5-6

Step 7, Adjust the Position of the W Lamp

Switch on the power,(the Switch Mirror should be placed to the position as Fig. 5-7 indicates). Observe the entrance facula, and it should in the center of the entrance hole(Fig.5-7). If the facula deviate to Left or Right, then loosen the No.1 screws in Fig. 5-8 and move the lamp seat to Left or Right until it focus on the center of the slot. Then fix the screws. If the facula deviate to Up and Down, then loosen the No.2 screws in Fig. 5-8 and move the lamp seat Up and Down until the facula focus on the center of the slot. Then fix the No. 2 screws again.

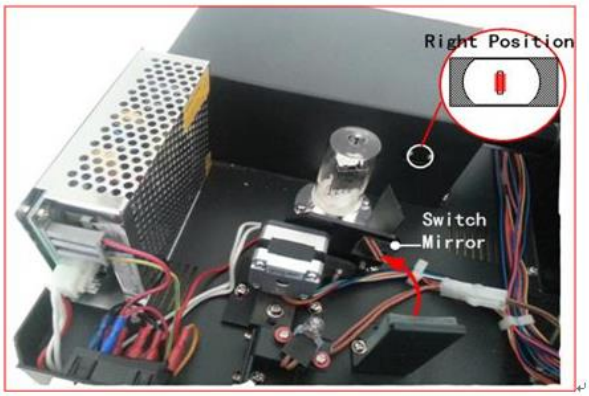


Fig. 5-7

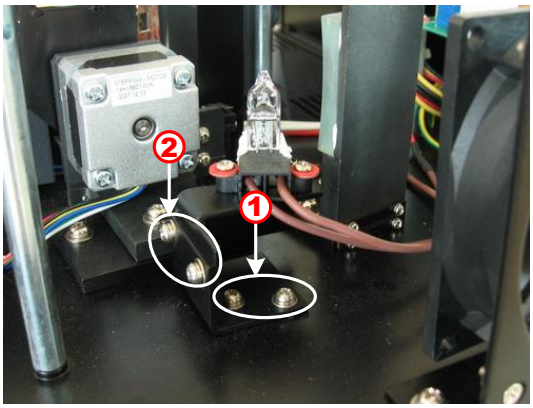


Fig. 5-8

Step 8, Finish

Reset the cover of the light chamber and fix the screws. Reset the cover of the instrument and fix the screws. Recover the Pole in the compartment, then the course finished.

Marshall Scientific
102 Tide Mill Road, Units 1-5
Hampton, NH 03842 USA
(603) 601-8511
new.marshallscientific.com