SE100

Spectrophotometer

INSTRUCTION MANUAL

Version 2.0.0

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1 General Information

Contents

1.1 Safety Information

Read this entire manual before installing or operating the SE100. Failure to observe all danger and warning instructions may result in serious personal injury or equipment damage. Do not use this instrument in any manner other than as specified herein. Users must also comply with all applicable National Basic Safety and Accident Prevention Regulations.

1.1.1 Danger and Warning Definitions

Parameter	Specification
DANGER	Indicates a potentially or urgently hazardous situation that, if not avoided, could result in death or serious personal injury.
WARNING	Indicates a potentially dangerous situation that may result in minor or moderate injury.
IMPORTANT	Information that requires special emphasis for correct instrument operation.
NOTE	Supplementary information that supports the main text.

1.1.2 Prevention Labels

Read all labels and tags attached to the instrument before use. The following symbols may appear on the instrument and are defined below:

Parameter	Specification
 **Caution — Danger!**	General hazard warning. Exercise caution in the indicated area.
 **High Voltage!**	Risk of electrical shock. Do not open or contact internal components.
 **Hot Surface!**	Components may be extremely hot. Allow adequate cooling before contact.
 **Recycle**	This instrument must be returned to an authorized Electrical Treatment Department or the original manufacturer for disposal.

1.2 Product Information

1.2.1 Instrument Overview

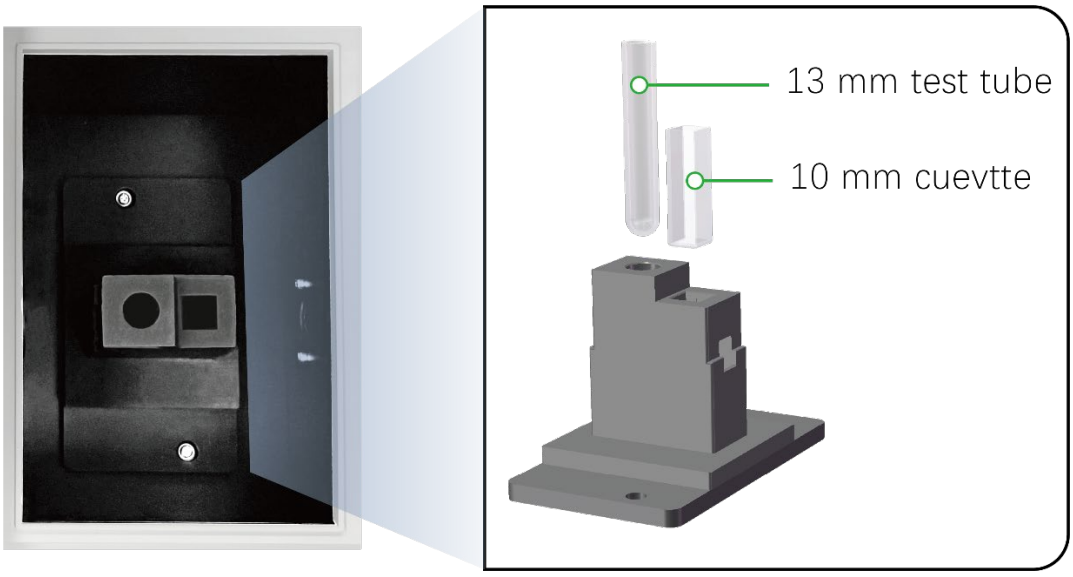
The SE100 is a single-beam visible/near-infrared spectrophotometer designed for precise absorbance, transmittance, and concentration measurements. The instrument features automatic wavelength calibration, a 3.5-inch color TFT display, and a combination 10 mm cuvette / 13 mm test tube sample holder.

Key front-panel and rear-panel components are identified below:

Parameter	Specification
1 — LCD Display	3.5-inch TFT color screen (480 × 320 resolution) showing measurement values and menus.
2 — Knob	Rotary encoder with push-button. Used to adjust wavelength and confirm selections.
3 — Membrane Keyboard	Function button for blank calibration and wavelength confirmation.
4 — Sample Room	Accepts the combination cuvette/test tube sample holder. Keep lid closed during measurements.
5 — USB Port (Type-B)	PC connectivity port for data transfer and instrument control.
6 — Power Socket	IEC power inlet. Connect only to a properly grounded outlet.
7 — Fuse Seat	Holds the 3.15 A / 250 V fuse. See Section 7.3.1 for replacement instructions.
8 — Power Switch	Main power on/off rocker switch.

1.2.2 Sample Holder

The SE100 ships with a combination sample holder that accommodates both 10 mm rectangular cuvettes and 13 mm round test tubes. Ensure the correct adapter position is used to align the optical path properly for each vessel type.



2 Specifications

Parameter	Specification
Model	SE100
Optical System	Single beam, 1200 lines/mm diffraction grating
Light Source	Tungsten lamp
Detector	Silicon photodiode
Spectral Bandwidth	4 nm
Wavelength Range	325–1050 nm
Wavelength Accuracy	±1.5 nm
Wavelength Repeatability	≤ 0.5 nm
Wavelength Resolution	1 nm
Wavelength Selection	Automatic
Wavelength Calibration	Automatic upon power-on
Photometric Range	-0.3 – 3 A | 0 – 200 %T | 0 – 1999 C
Photometric Accuracy	±0.5 %T (0–100 %T)
Photometric Repeatability	±0.2 %T (0–100 %T)
Stray Light	≤ 0.2 %T at 360 nm
Noise	≤ 0.001 A at 500 nm
Sample Holder	10 mm cuvette / 13 mm test tube combination
Display	3.5-inch TFT color LCD, 480 × 320 resolution
Interface	USB-B × 1 (PC)
Power Supply	100–240 V AC, 50–60 Hz, 55 W
Dimensions (W × D × H)	450 × 360 × 160 mm
Weight	8 kg

3 Installation

3.1 Unpacking

Carefully unpack the instrument and verify that all of the following items are included:

Parameter	Specification
Spectrophotometer	1 unit
Instruction Manual	1 copy
Power Cord (US)	1 cord
Dust Cover	1 cover

IMPORTANT: Retain all original packing materials. If the instrument must be returned for service or repair, use the original packaging to prevent damage during transit.

3.2 Operating Environment

To ensure optimal performance and longevity, install the SE100 in an environment that meets the following requirements:

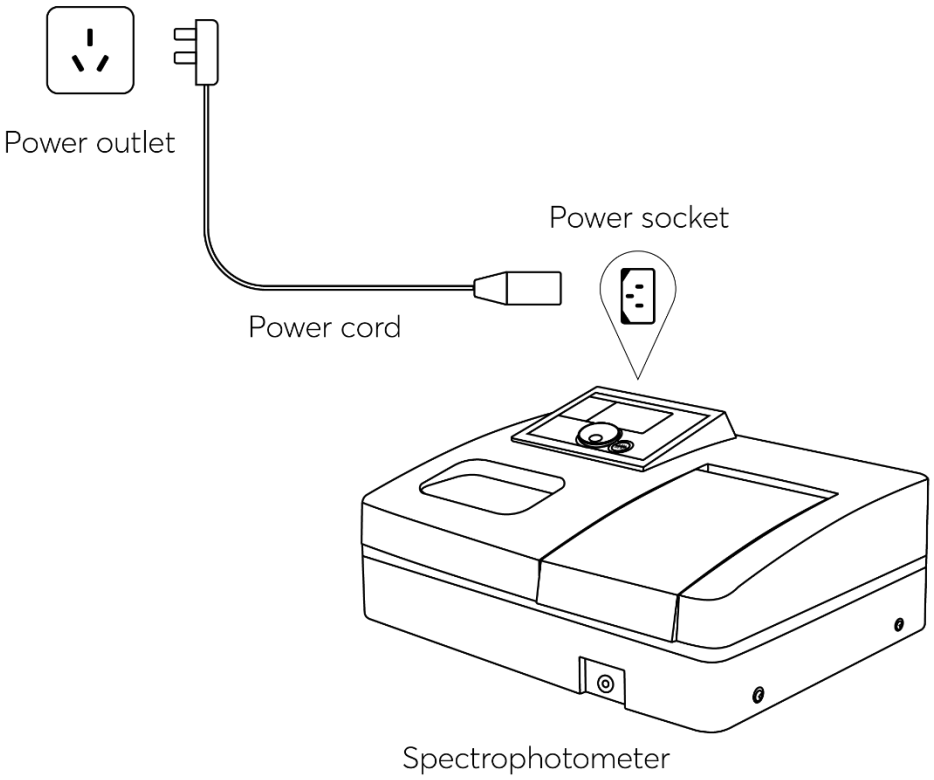
- **Temperature & Humidity:** Operating temperature range is 16–35°C with relative humidity below 80%. Avoid condensation.
- **Electromagnetic Interference:** Keep the instrument away from strong magnetic or electric fields and high-frequency generating devices.
- **Corrosive Gases & Dust:** Operate only in areas free of corrosive vapors, dust, and strong vibrations.
- **Bench Stability:** Place the instrument on a firm, level surface. Ensure adequate clearance for airflow beneath and around the instrument.
- **Power Supply:** Requires 100–240 V AC, 50–60 Hz. Use a voltage regulator if local supply voltage is unstable.
- **Grounding:** Connect only to a properly grounded outlet using the supplied power cord.
- **Direct Sunlight:** Avoid placement in direct sunlight, which can affect detector performance and temperature stability.

3.3 Electrical Connection

3.3.1 Power Connection

Before connecting power, confirm that the power switch is in the OFF position.

1. Verify the power switch is set to OFF.
2. Insert the female connector of the supplied power cord into the instrument's power socket (rear panel).
3. Plug the male end of the power cord into a grounded AC outlet (100–240 V, 50–60 Hz).
4. Confirm the connection is secure before proceeding to start-up.



4 Start-Up Procedure

4.1 Powering On and Off

Powering On

5. Ensure the sample room is empty and the lid is closed.
6. Press the power switch to turn the instrument on.
7. The Start screen appears for approximately 5 seconds.
8. The instrument transitions automatically to the Self-checking screen, during which wavelength calibration is performed.
9. Upon successful completion of self-checking, the Measurement screen is displayed and the instrument is ready for use.

NOTE: Allow the instrument to warm up fully before performing measurements to ensure accuracy and stability. Refer to Section 6.2 for warm-up guidance.

Figure 1 Start

Figure 1 Self-checking

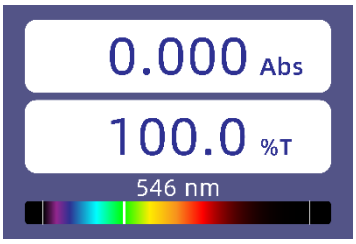


Figure 3 Measurement

Powering Off

10. Remove any cuvettes or test tubes from the sample compartment.
11. Press the power switch to turn the instrument off.

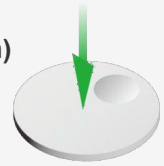
IMPORTANT: Do not turn the instrument on and off in rapid succession. Always wait at least 30 seconds before powering on again. Failure to do so may damage the electronic and mechanical systems.

5 General Operation

5.1 Operation Panel Overview

The SE100 operation panel consists of a rotary knob (with push-button) and a membrane function button. Their behavior depends on the currently active screen.

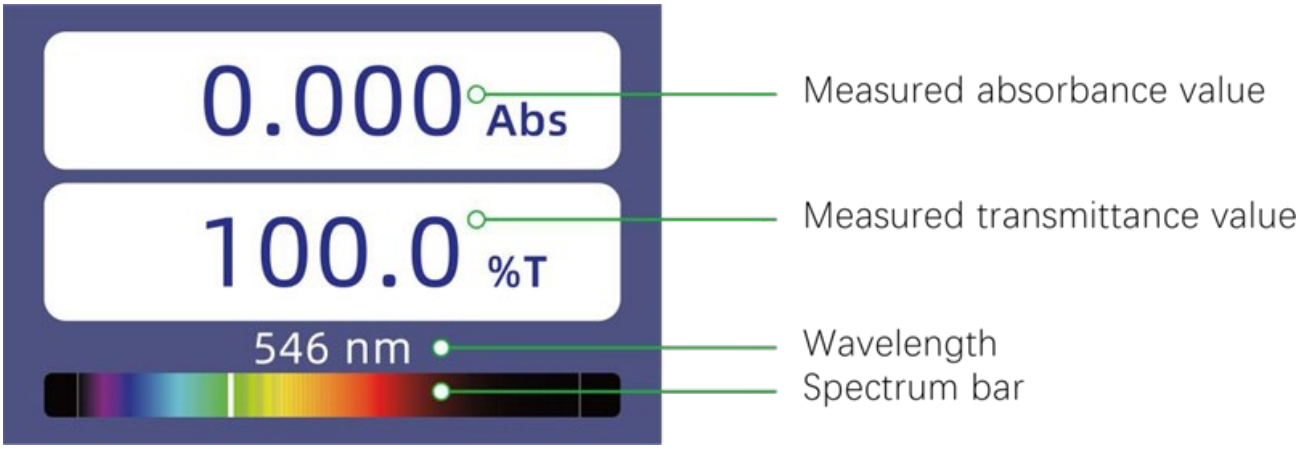
5.1.1 Knob and Button Functions

Parameter	Specification
Knob — Press (Measurement screen) 	Opens the Wavelength screen to change the measurement wavelength.
Knob — Press (Wavelength screen) 	Cancels any pending wavelength change and returns to the Measurement screen.
Knob — Rotate Counterclockwise (Wavelength screen) 	Decreases the target wavelength.
Knob — Rotate Clockwise (Wavelength screen) 	Increases the target wavelength.
Function Button (Measurement screen) 	Initiates blank calibration when a reference sample is loaded.
Function Button (Wavelength screen)	Confirms and steps to the newly selected wavelength.

5.1.2 Measurement Screen Layout

The Measurement screen displays the following information:

- Current wavelength setting (nm)
- Selected measurement mode (Absorbance A, Transmittance %T, or Concentration C)
- Current measured value, updated continuously
- Instrument status and any active warnings



6 Measurement Procedure

6.1 Safety Guidelines

WARNING: Reagents and dilution buffers may be corrosive or otherwise hazardous. Sample materials (nucleic acids, proteins, bacterial cultures) may be infectious. Always observe applicable laboratory safety precautions, including wearing appropriate protective clothing and gloves. Dispose of all sample solutions and cleaning materials in accordance with local laboratory regulations.

6.2 Pre-Measurement Preparation

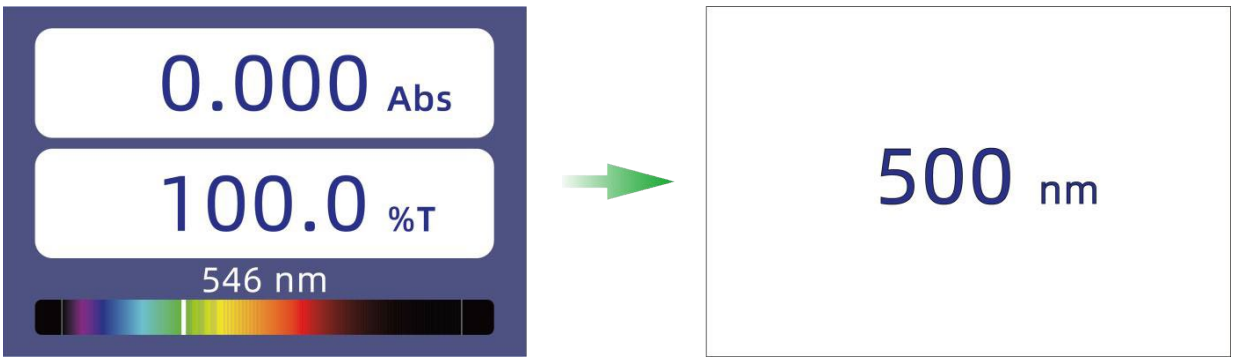
Complete the following checks before beginning any measurement session:

- Allow the instrument to warm up fully after power-on. Adequate warm-up time is essential for photometric stability and measurement accuracy.
- Verify that cuvettes or test tubes are clean, free of scratches, and matched for the intended measurement.
- Prepare blank and sample solutions according to applicable protocols.
- Confirm the sample room lid closes properly and the optical path is unobstructed.

6.3 Step-by-Step Measurement

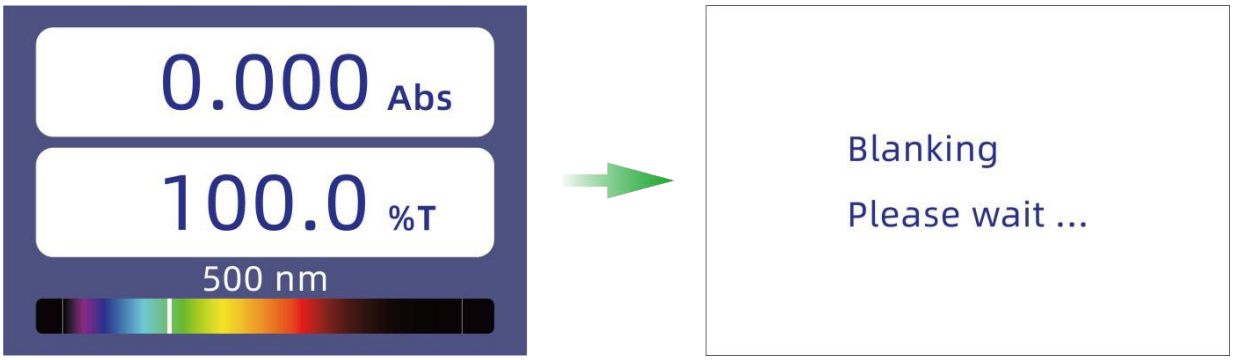
Step 1 — Set Measurement Wavelength

12. On the Measurement screen, press the knob to open the Wavelength screen.
13. Rotate the knob clockwise to increase the wavelength or counterclockwise to decrease it.
14. Press the function button to confirm and apply the selected wavelength.
15. The instrument returns to the Measurement screen at the new wavelength.



Step 2 — Calibrate the Blank

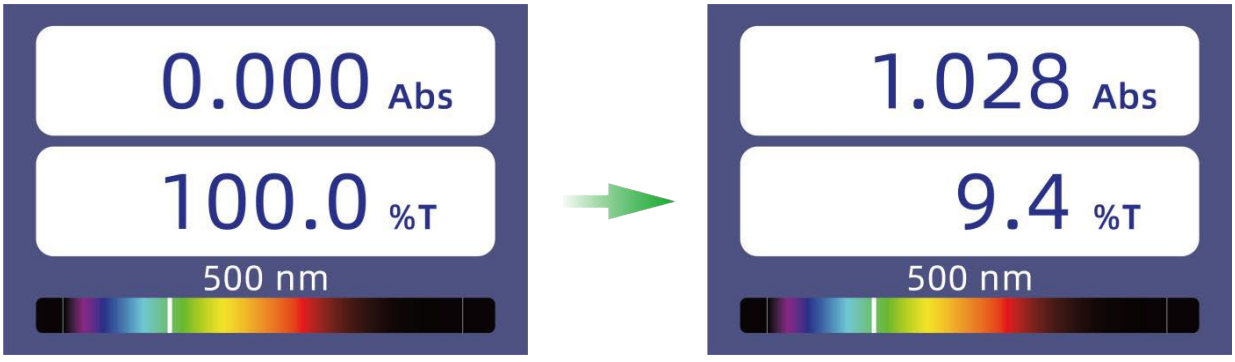
16. Place the blank reference solution (in a cuvette or test tube) into the measurement channel.
17. Close the sample room lid fully.
18. Press the function button to perform blank calibration. The display will zero the photometric reading at this reference point.



NOTE: Perform blank calibration each time the wavelength is changed or whenever a new set of measurements begins.

Step 3 — Measure the Sample

19. Remove the blank and insert the sample solution into the measurement channel.
20. Close the sample room lid.
21. Wait for the displayed value to stabilize, then record the measurement result.
22. Repeat Steps 2–3 for additional samples, recalibrating the blank as needed.



7 Maintenance and Troubleshooting

7.1 Daily Maintenance

Regular maintenance ensures the SE100 continues to operate within its specified performance limits.

- **Sample Room Inspection:** Remove cuvettes and test tubes from the sample compartment immediately after use. Solution vapors can cause mirror fogging and optical degradation. Wipe up any spills immediately, paying particular attention to corrosive or volatile samples.
- **Exterior Cleaning:** Wipe the painted instrument cover with a damp cloth to remove any drips or contamination. Do not use organic solvents on the instrument exterior.
- **Cuvette/Test Tube Cleaning:** Clean cuvettes and test tubes thoroughly after each measurement session or solution change. Residue on optical surfaces introduces systematic measurement error.

7.2 Troubleshooting

Consult the tables below for common symptoms, their probable causes, and recommended corrective actions.

No Response on Power-On

Possible Cause	Recommended Action
Power supply not activated	Verify and switch on the power supply
Power cord not securely connected	Reseat and secure the power cord
Fuse blown	Replace fuse — see Section 7.3.1

Filter Positioning Error During Self-Check

Possible Cause	Recommended Action
Filter wheel drive motor failure	Contact MPD Scientific service
Filter wheel initial positioning sensor failure	Contact MPD Scientific service

Wavelength Calibration Error During Self-Check

Possible Cause	Recommended Action
Object blocking the measurement channel	Clear the obstruction, close the lid, and reboot
Sample room open during self-check	Close the sample room and reboot

Wavelength drive motor failure	Contact MPD Scientific service
Wavelength positioning sensor failure	Contact MPD Scientific service

Unstable Readings

Possible Cause	Recommended Action
Insufficient warm-up time	Allow additional warm-up time
Unstable sample (e.g., particulates, reactions)	Improve sample preparation or homogeneity
Sample concentration too high	Dilute the sample
Supply voltage low or unstable	Use a voltage regulator
Lamp near end of life	Replace the tungsten lamp — see Section 7.3.2

Poor Measurement Repeatability

Possible Cause	Recommended Action
Contaminated cuvette	Clean cuvettes thoroughly
Contaminated sample	Improve sample preparation protocol
Unstable power supply	Use a voltage regulator or stable outlet

Inaccurate Measurement Readings

Possible Cause	Recommended Action
Wavelength offset error	Restart the instrument to recalibrate wavelength
Light source end-of-life	Replace the tungsten lamp — see Section 7.3.2
Mismatched cuvettes	Use matched, calibrated cuvettes

7.3 Spare Parts Replacement

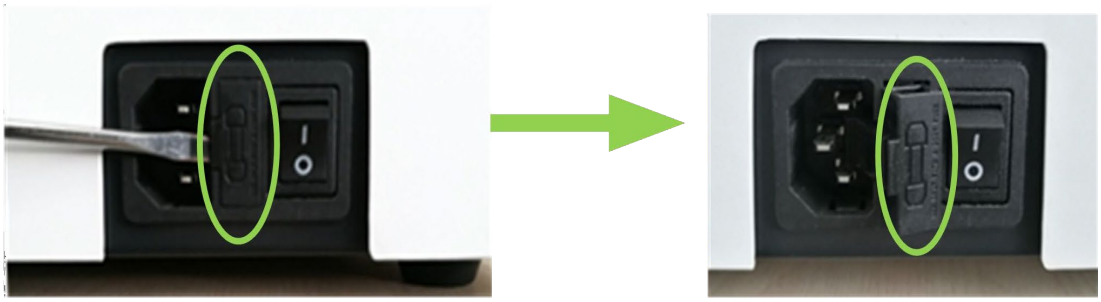
7.3.1 Fuse Replacement

DANGER: Switch off the instrument power and unplug the power cord before beginning fuse replacement. Failure to de-energize the instrument before servicing creates a risk of lethal electric shock.

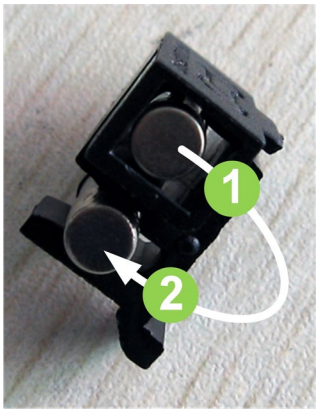
Required tool: Flat-blade screwdriver (3 × 75 mm)

Replacement fuse specification: 3.15 A / 250 V

23. Switch the power off and disconnect the power cord from the outlet.
24. Using the flat-blade screwdriver, remove the fuse seat from the power socket on the rear panel.



25. Extract the failed fuse and insert a new 3.15 A / 250 V fuse into the working position.
26. Reinstall the fuse seat into the power socket.



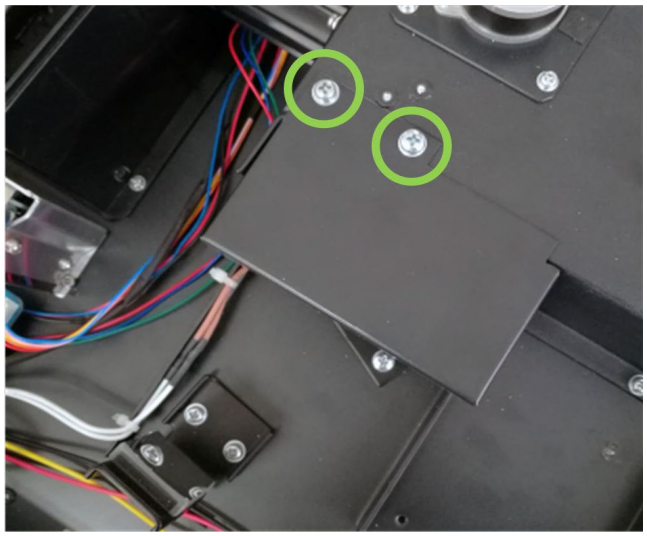
27. Reconnect the power cord and power on the instrument.

7.3.2 Tungsten Lamp Replacement

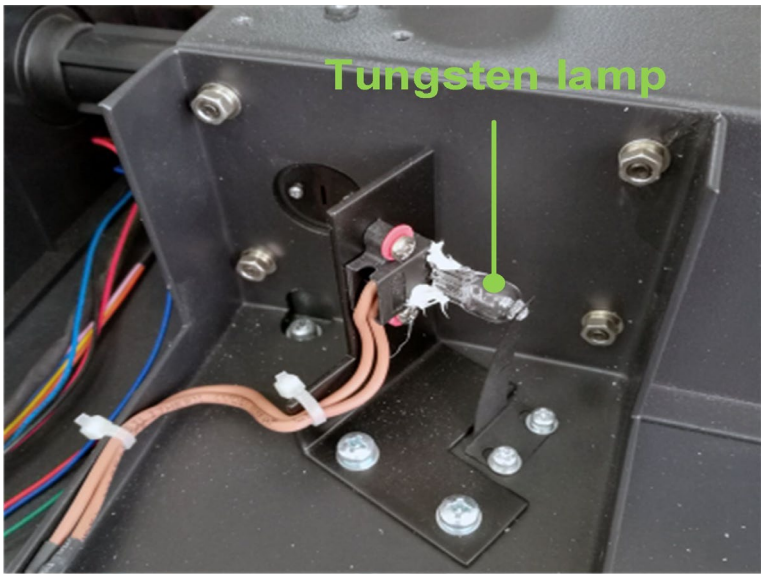
DANGER: The tungsten lamp and surrounding components reach extremely high temperatures during operation. After switching off the instrument, wait a minimum of 20 minutes before opening the lamp chamber to avoid burns.

Required tools: Flat-blade screwdriver (6 × 150 mm), Phillips screwdriver (6 × 150 mm), cotton gloves.

28. Switch the instrument off and disconnect the power cord.
29. Wait at least 20 minutes to allow all components to cool.
30. Rotate the securing rod counterclockwise and remove it. Use the flat-blade screwdriver to loosen the four case-fixing screws, then carefully lift the instrument cover to the right.



31. Unscrew the lamp housing cover fixing screw and remove the lamp housing cover.
32. Put on cotton gloves to protect the new lamp from skin oils. Remove the lamp retaining clip, extract the old tungsten lamp, and insert the new lamp into the lamp holder.



33. Reconnect the instrument power and power on. Observe the light spot on the entrance slit. The spot must be centered vertically within the slit.
34. If the spot is offset left or right, loosen the two screws holding the lamp holder. Fine-adjust the holder position until the spot is correctly centered, then retighten the screws.
35. Power off the instrument, then reinstall the lamp housing cover, instrument case, and securing rod.

NOTE: Do not touch the glass envelope of the tungsten lamp with bare hands. Skin oils can cause uneven heating and premature lamp failure.

8 Spare Parts List

Parameter	Specification
Deuterium Lamp	Order No. 911643
10 mm Glass Cuvette	Order No. 916101

To order spare parts or accessories, contact MPD Scientific:

- Phone: (609) 642-6840
- Email: info@mpdscientific.com
- Web: www.mpdscientific.com