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# ExionLC™ UV Detector

Operator Guide

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AB Sciex Pte. Ltd.  
Blk 33, #04-06  
Marsiling Ind Estate Road 3  
Woodlands Central Indus. Estate.  
SINGAPORE 739256

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This guide describes the basic operation and troubleshooting for the ExionLC™ UV Detector. Read this guide thoroughly before using the product and operate the product in accordance with the instructions in this guide.

This guide provides safety instructions and precautions to make sure that the user operates the system safely. Follow all Warning and Caution instructions provided in the guide.

Keep this guide for future reference. Make sure that it is accessible to the operator of the system.

## Electrical Precautions

### AC Mains Supply



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**WARNING! Electrical Shock Hazard.** Use only qualified personnel for the installation of all electrical supplies and fixtures, and make sure that all installations adhere to local regulations and safety standards.

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**WARNING! Electrical Shock Hazard.** Make sure that the system can be disconnected from the AC mains supply outlet in an emergency. Do not block the AC mains supply outlet.

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**WARNING! Electrical Shock Hazard.** Do not remove the covers. Removing the covers might cause injury or malfunctioning of the system. The covers need not be removed for routine maintenance, inspection, or adjustment. Contact the SCIEX FSE for repairs that require the main cover to be removed.

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Connect the system to a compatible AC mains supply as instructed in this guide. For information on system electrical specifications, refer to the *Site Planning Guide*.

#### Guidelines:

- Do not connect the wiring in a manner other than that prescribed by the manufacturer.
- Do not rest heavy objects on the power cable.
- Do not bend or pull on the power cable. To unplug the system, pull on the plug and not the cable.
- Do not route the power cable near heat-generating equipment.
- Do not modify the power cable in any way.

## Protective Earth Conductor

The mains supply must include a correctly installed protective earth conductor. The protective earth conductor must be installed or checked by a qualified electrician before the system is connected.



**WARNING! Electrical Shock Hazard. Do not intentionally interrupt the protective earth conductor. Any interruption of the protective earth conductor will create a potential electric shock hazard.**

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## Environmental Precautions

Use qualified personnel for the installation of electrical mains, heating, ventilation, and plumbing supplies and fixtures. Make sure that all of installations comply with local bylaws and biohazard regulations. For more information about the required environmental conditions for the system, refer to the *Site Planning Guide*.



**WARNING! Fire Hazard. Do not operate the system in the presence of an open flame, or in the same room as equipment that could potentially emit sparks.**

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**WARNING! Fire Hazard. Do not use flammable sprays (such as hair sprays or insecticide sprays) near the system. They could ignite and cause a fire.**

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**WARNING! Biohazard. For biohazardous material use, always comply with local regulations for hazard assessment, control, and handling. This system or any part is not intended to act as a biological containment system.**

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**CAUTION: Potential System Damage. Avoid exposure to corrosive gas and excessive dust.**

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**CAUTION: Potential System Damage. Take precautions to prevent the system from falling in the event of an earthquake.**

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## Electromagnetic Environment

**CAUTION: Potential Wrong Result. Do not use this device in close proximity to sources of strong electromagnetic (EMC) radiation (for example, unshielded intentional RF sources), as EMC radiation might interfere with the proper operation and cause a wrong result.**

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Make sure that a compatible electromagnetic environment for the equipment can be maintained so that the device will perform as intended.

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## Decommissioning and Disposal (Waste, Electrical, and Electronic Equipment)

Decontaminate the system before decommissioning following local regulations. Follow the SCIEX Red Tag process and complete an instrument Decontamination Form for instrument returns.

When removing the system from service, separate and recycle different materials according to national and local environmental regulations..

Do not dispose of system components or subassemblies, including computer parts, as unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of WEEE (waste, electrical, and electronic equipment). To safely dispose of this equipment, contact a local Customer Service office for complimentary equipment pick-up and recycling.

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**Note:** SCIEX will not accept any system returns without a completed Decontamination Form.

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## Ventilation Precautions

The venting of fumes and disposal of waste must comply with all federal, state, provincial, and local health and safety regulations. Use the system indoors in a laboratory that complies with the environmental conditions recommended in the *Site Planning Guide* for the system.



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**WARNING! Fire and Toxic Chemical Hazard. Make sure that the laboratory in which the system operates is well ventilated. Solvents used in high performance liquid chromatography are flammable and toxic.**

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## Chemical Precautions



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**WARNING! Toxic Chemical Hazard. Make sure that a water supply, such as a wash basin, is available. If solvent gets onto the eyes or skin, flush it away immediately.**

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**WARNING! Biohazard, Toxic Chemical Hazard. Connect the drain tubing properly, to prevent leaks.**

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**CAUTION: Potential System Damage. Do not submerge the end of the drain tubing in the waste liquid in the waste container.**

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## Introduction

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- Determine which chemicals have been used in the system prior to service and regular maintenance. Refer to Safety Data Sheets for the health and safety precautions that must be followed with chemicals.
- Work in a well-ventilated area.
- Always wear assigned personal protective equipment, including powder-free neoprene or nitrile gloves, safety glasses, and a laboratory coat.
- Follow required electrical safe work practices.
- Avoid ignition sources when working with flammable materials, such as isopropanol, methanol, and other flammable solvents.
- Take care in the use and disposal of any chemicals. Potential risk of personal injury if proper procedures for handling and disposing of chemicals are not followed.
- Avoid skin contact with chemicals during cleaning, and wash hands after use.
- Comply with all local regulations for the storage, handling, and disposal of biohazardous, toxic, or radioactive materials.
- (Recommended) Use secondary containment trays beneath solvent bottles and the waste collection container to capture potential chemical spills.

## Static Electricity Precautions

Liquid chromatography (LC) uses flammable organic solvents as the mobile phase. LC systems are also often used where large amount of flammable substances are present. Thus, there is a risk of accidents involving fire or explosion.

The major cause of these accidents is static electricity. Devising preventative measures for static electricity can be difficult, because the symptoms before an accident vary and can be hard to detect, because such accidents occur as a result of several simultaneous incidents. For recommended methods for preventing static electricity accidents, refer to the *Hardware User Guide* for the ExionLC™ system.

## Precautions for Handling the Deuterium and Tungsten Lamps



**WARNING! Environmental Hazard. Do not dispose of system components in municipal waste. Follow established procedures when disposing of components.**

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The materials of deuterium (D2) lamp are as follows:

- Metals (Tungsten, Aluminum)



- Quartz glass
- Ceramic
- Plastic

The materials of tungsten (W) lamp are as follows:

- Metals (Tungsten, Stainless steel)
- Quartz glass
- Ceramic
- Plastic

## Equipment Use and Modification

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**WARNING! Personal Injury Hazard.** Contact the SCIEX representative if product installation, adjustment, or relocation is required.

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**WARNING! Electrical Shock Hazard.** Do not remove the covers. Removing the covers might cause injury or malfunctioning of the system. The covers need not be removed for routine maintenance, inspection, or adjustment. Contact the SCIEX FSE for repairs that require the main cover to be removed.

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Use the system indoors in a laboratory that complies with the environmental conditions recommended in the *Site Planning Guide*.

If the system is used in an environment or in a manner not prescribed by the manufacturer, then the protection provided by the equipment might be impaired.

Unauthorized modification or operation of the system might cause personal injury and equipment damage, and might void the warranty. Erroneous data might be generated if the system is operated either above or below the recommended environmental conditions or operated with unauthorized modifications. Contact an FSE for information on servicing the system.



**WARNING! Personal Injury Hazard.** Use SCIEX-recommended parts only. Use of parts not recommended by SCIEX or use of parts for any use other than their intended purpose may place the user at risk of harm or negatively impact system performance. The protection provided by the equipment might be impaired if the equipment is used in a manner not specified by SCIEX.

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# Hazard Symbols


# 2

This section lists the hazard symbols and conventions used in the laboratory environment, on the system, and in the documentation.

## Occupational Health and Safety Symbols

This section describes some occupational health and safety symbols found in the documentation and laboratory environment.

**Table 2-1 General Hazard Symbol**

Safety Symbol	Description
	Personal Injury Hazard

**Table 2-2 Chemical Hazard Symbols**




Safety Symbol	Definition
	Biohazard
	Explosion Hazard
	Toxic Chemical Hazard

Table 2-3 Electrical Hazard Warning Symbols






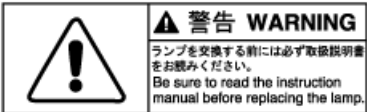
Safety Symbol	Definition
	Electrical Shock Hazard

Table 2-4 Mechanical Hazard Symbols

Safety Symbol	Definition
	Hot Surface Hazard
	Ultraviolet Radiation Hazard
	Laser Radiation Hazard

## Symbols, Indicators, and Labels

Label	Description
	See instruction manual before replacing fuses.
	Be sure to read the instruction manual before replacing the lamp.

## Documentation Symbols and Conventions

The following symbols and conventions are used throughout the guide.



**DANGER!** Danger signifies an action which leads to severe injury or death.

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**WARNING!** Warning signifies an action that could cause personal injury if precautions are not followed.

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**CAUTION:** Caution signifies an operation that could cause damage to the system or corruption or loss of data if precautions are not followed.

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**Note:** Note emphasizes significant information in a procedure or description.

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**Tip!** Tip provides useful information that helps apply the techniques and procedures in the text for a specific need and provides shortcuts, but is not essential to the completion of a procedure.

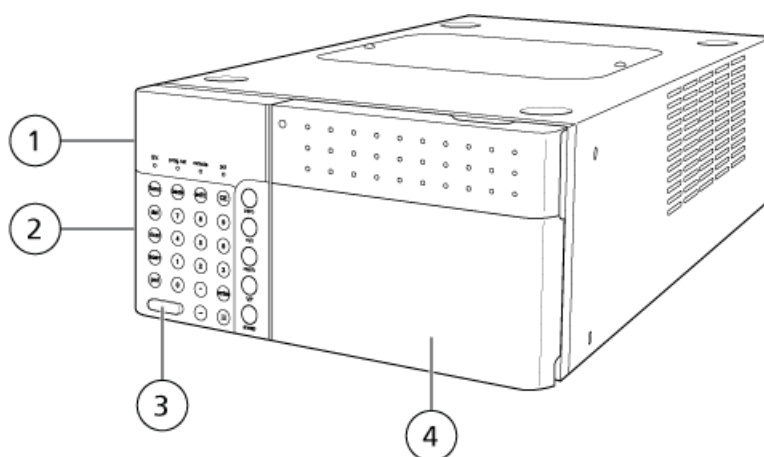
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The ExionLC™ UV Detector is a high-performance, multi-function ultra-violet visible spectrophotometric detector, for use in high performance liquid chromatography (HPLC). It incorporates both deuterium (D2) and tungsten (W) halogen lamps. The deuterium lamp is used for ultraviolet applications, as in the PDA Detector, while the tungsten lamp extends the analytical capability into the visible region.

It has three measurement modes: single wavelength, dual wavelength, and wavelength scanning.

- The dual wavelength mode performs simultaneous detection of two wavelengths, and can provide chromatograms of both the wavelengths, or a chromatogram of one wavelength and one ratio chromatogram.
- In wavelength scanning mode, the absorbance spectrum is measured. The wavelength scanning mode is designed to be used while the flow is stopped.

**Figure 3-1 UV Detector, Front View**

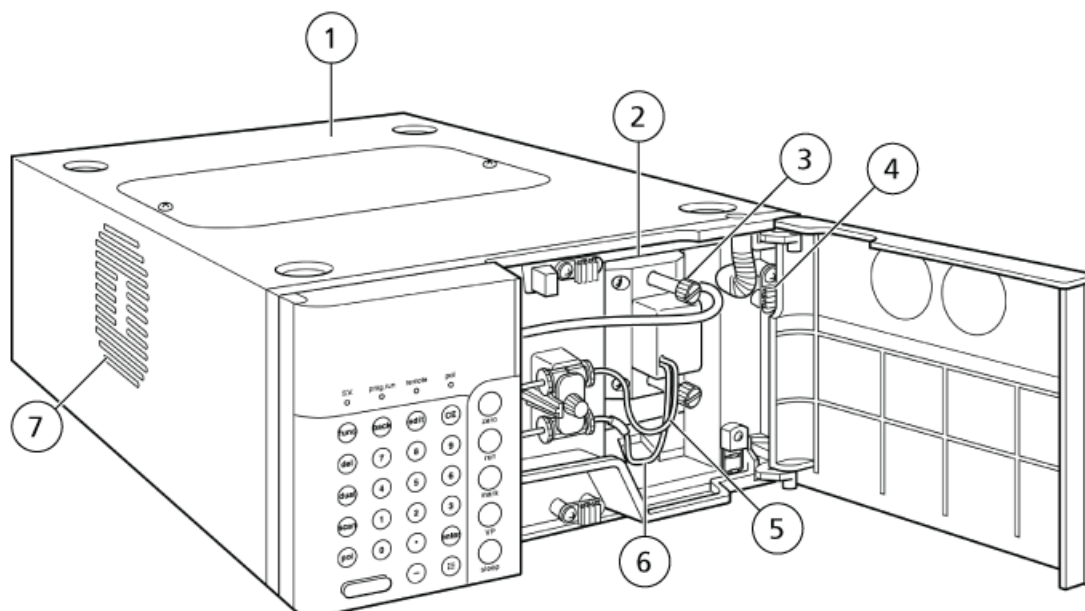


Item	Part	Function
1	Operation Keys	To operate and configure settings. Press  to show the operation keys. Refer to <a href="#">Status Panel and Keypad</a> .
2	Display Panel	Comprises the status panel screen and the LED indicators. Refer to <a href="#">Status Panel and Keypad</a> .

## Overview

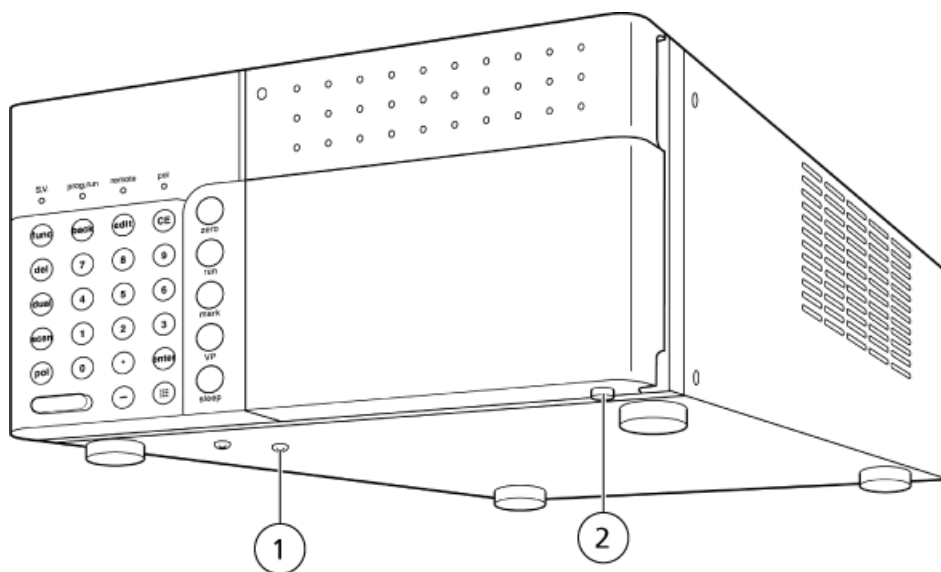
Item	Part	Function
3	Power switch	Turns the power on or off. Press the switch in to turn power on and press again to turn the power off.
4	Front Cover	Open the cover to install and remove the flow cell, or to attach tubing. Must be closed during analysis.

**Figure 3-2 Top, Left Side, Behind Front Cover**



Item	Part	Function
1	Top cover	Remove the cover to replace the lamps. The cover must be replaced after lamp replacement.
2	Flow cell	Monitors the mobile phase eluted from the column.
3	Cell screws	Remove these to remove the cell.
4	Tubing clamp	Secures the connected tubing.
5	Cell outlet tube	Drain tubing is connected here.
6	Cell inlet tube (marked with blue cover)	Tubing from the column is connected here.
7	Cooling fan	Cools the interior of the module.

Figure 3-3 Right Side and Base Panel

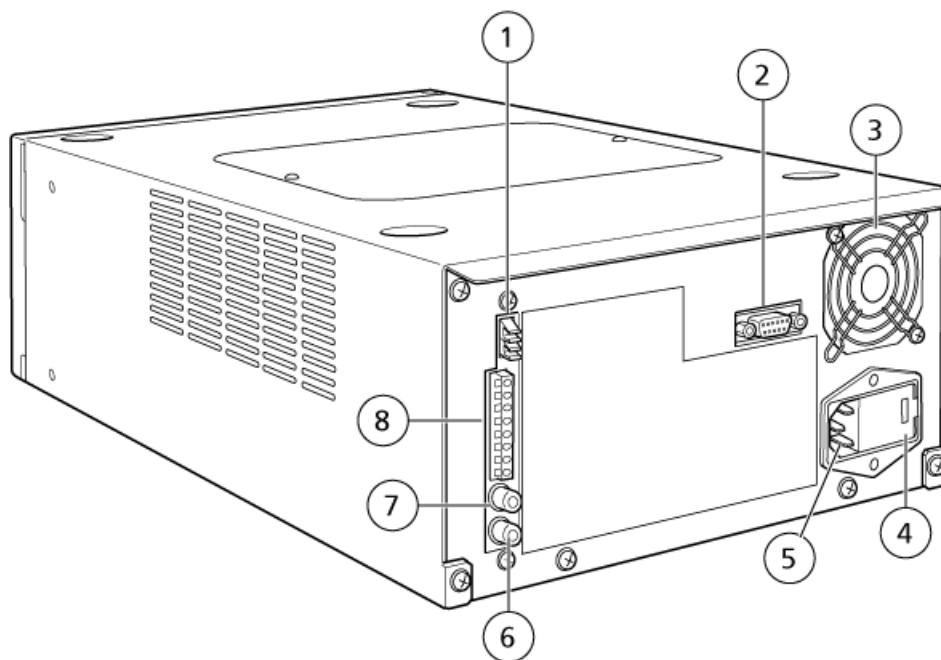


Item	Part	Function
1	Shipping screw	To prevent the shock during transportation. Remove before installation.
2	Leakage drain outlet	Instrument leaks drain from this port to the system component below.

## Overview

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Figure 3-4 Back



Item	Part	Function
1	REMOTE connector	For the fiber optic connection to system controller.
2	SV connector	For the connection to solvent recycling valve.
3	Cooling fan	Cools the module interior.
4	Fuse holder	Fuses are inserted here.
5	Power cord connector	Connects the power cord.
6	RECORDER connector	For connection to the recorder.
7	[INTEGRATOR] connector	Not applicable.
8	External input/output terminals	Connects to external equipment.



## Precautions

### Precautions before Operation

- Install the flow cell in the detector before turning the power switch on.  
If the power switch is turned on with no cell installed, the home position will not be detected and the wavelength will be set incorrectly. If this occurs, turn the power switch off, install the cell, and then turn the power on. The cell can be removed after the initial screen is shown.
- Before turning the power switch on, perform any of the following on the flow cell interior:
  - Flush the cell with a mobile phase that does not absorb light in the wavelength range of 230 nm or above (such as water, acetonitrile, or methanol).
  - Fill the cell with the above described mobile phase.
  - Purge the cell with air or nitrogen, and make sure that it is dry.  
When the power is turned on, the module carries out an automatic wavelength accuracy check. The auto wavelength check uses as a reference the intensity of the emission line wavelengths of the deuterium lamp (656 nm) and the mercury lamp (254 nm). If a sample that absorbs these wavelengths is used, or if bubbles remain in the flow cell, the amount of transmitted light becomes exceedingly small. This prevents an accurate wavelength check from being performed and can produce errors.
- When highly sensitive analysis is necessary, take into account the time needed for the baseline to stabilize and turn the lamp on ahead of time.  
After it is turned on, the lamp requires 1 hour to stabilize for optimal performance.
- Make sure that there are no leaks in the flow cell and connected tubing.

### Precautions during Operation

Keep the front cover closed during analysis. In high-sensitivity analysis, opening or closing the front cover will cause the baseline to fluctuate. The noise level might increase if the front cover is open. Refer to [Figure 3-1 on page 13](#).

### Precautions after Operation

To prevent clogging of the flow cell:

- Dusty or clogged flow cells are the most frequent cause of detector problems. After analyzing a highly concentrated sample, flush the flow cell thoroughly, using plenty of mobile phase. If a buffer solution is used as the mobile phase, then wash the flow cell with water after completing analysis. Buffer solutions crystallize upon evaporation, and can clog the flow cell and tubing.

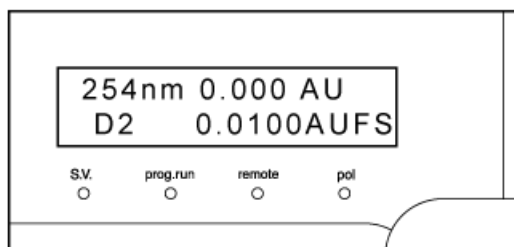
### Turn on the UV Detector

- Press the power switch to turn the power on.

The following events occur:

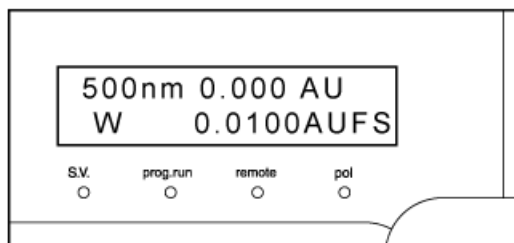
- a. All the dots in the status panel screen matrix and all the indicator lamps illuminate.
- b. The system performs a memory test.
- c. The version number of the control program is shown.
- d. The system tests the lamp switching function.
- e. The lamps are preheated for 30 seconds.
- f. The module is initialized for 1 minute.
- g. The wavelength accuracy is checked for 20 seconds, by using the 254 nm emission line of the mercury lamp and the 656 nm emission line of the D2 lamp.
- h. If no error is detected, the message CHECK GOOD is shown for several seconds, followed by the initial screen.
- i. If the D2 lamp has been selected, the screen shown in [Figure 5-1 on page 18](#) is shown. The module is now in the initial state and is ready for operation.

**Figure 5-1 Initial Screen if the D2 Lamp Is Selected**



- j. If the W (tungsten) lamp has been selected, it is checked and the module goes into the initial state.

**Figure 5-2 Initial Screen if the W (tungsten) Lamp Is Selected**



## Troubleshooting

- If an alarm sounds and a CHECK NO GOOD message is shown on the screen:
  - a. No peak has been detected within 1 nm of 656 nm or 254 nm. To stop the alarm, press **CE**.
  - b. Verify that the cell is installed properly. Refer to [Re-install the Flow Cell](#).
  - c. Make sure that no air bubbles have been introduced into the flow cell, and that no mobile phase or sample which absorbs light in the vicinity of 254 nm or 656 nm remains in the cell.  
The wavelength calibration function, WAVE CALIB, and wavelength accuracy check function, WAVE CHECK, measure the intensity of light transmitted through the cell in the vicinity of the 656 nm and 254 nm emission lines of the D2 lamp and mercury lamp. The module operates based on these intensity values. Consequently, if a sample that absorbs ultraviolet or visible light remains in the cell, or if large air bubbles are introduced, the amount of transmitted light becomes exceedingly small and the module will not operate correctly.  
  
Operate using a flow cell that has been flushed or filled with a mobile phase which does not absorb visible and UV light, or that has been purged of air or nitrogen and dried thoroughly.
  - d. Execute wavelength calibration, referring to WAVE CALIB in [VP Functions](#).
  - e. When the calibration is complete, the WAVE CHECK will be run automatically to recheck the wavelength accuracy. If CHECK NO GOOD is shown once again, turn off the module and contact a representative.
- If an alarm sounds and a NOT PROTECTED message is shown on the screen:
  - Press **CE** to clear the alarm.  
When this message is shown, the time program, along with the LAMBDA (wavelength) and certain other parameters, will be initialized (replaced with default values).
- If any other error message is shown, refer to [Error Messages](#).

# Service and Maintenance Information

# 6

Regularly clean and maintain the system for optimal performance. Refer to [List of Periodic Inspection and Maintenance](#).



**WARNING! Radiation Hazard, Biohazard, or Toxic Chemical Hazard.** Determine whether mass spectrometer decontamination is required prior to cleaning or maintenance. Decontamination should be performed prior to cleaning if radioactive materials, biological agents, or toxic chemicals have been used with a mass spectrometer.

## Maintenance, Inspections, and Adjustment



**WARNING! Personal Injury Hazard.** Contact the SCIEX representative if product installation, adjustment, or relocation is required.



**WARNING! Electrical Shock Hazard.** Always turn off the power and then unplug the instrument prior to performing inspection and maintenance. Otherwise, fire, electric shock, or a malfunction might occur.

To maintain the performance of the module and to obtain accurate measurement data, perform daily inspection and periodic calibration.

- For daily maintenance and inspection, refer to [Precautions](#).
- For planned maintenance, contact a SCIEX representative.
- For replacement parts, refer to [Consumables and Spares](#).
- Replacement cycles described for periodic replacement parts are estimates. Replacement might be required earlier than the described replacement cycles depending on usage environment and frequency.

### Prior to Inspection and Maintenance

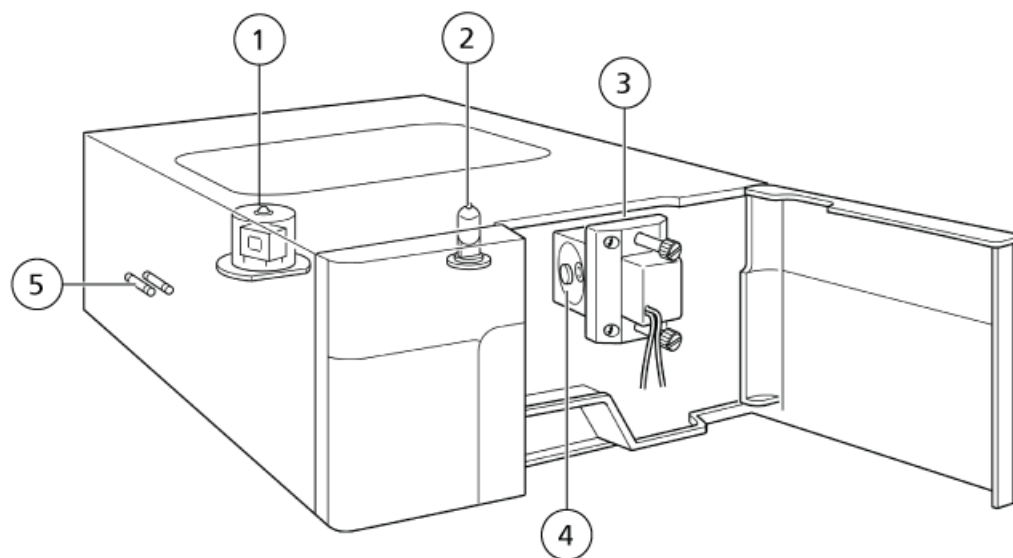
- Purge the mobile phase in the flow lines with water.
- Wipe away any dirt from the front panel and the main cover.
- Wipe away any dirt from the screen with tissue paper or a soft cloth moistened with water.

Refer to [Clean the Module Surfaces](#).

## List of Periodic Inspection and Maintenance

Inspection/ Maintenance Item	1 year	2 year	3 year	Remark
Cell gasket replacement	X			Replace whenever the cell is dismantled. Refer to <a href="#">Remove and Inspect the Flow Cell</a> .
Dismantling, cleaning & inspection of flow cell		X		
D2 lamp replacement		X		Service life: 2000 cumulative hours (D2 LAMP USED VP function provides alert). Refer to <a href="#">Lamp Replacement</a> .
W lamp replacement (SPD-20AV only)			X	Service life: 2000 cumulative hours (W LAMP USED VP function provides alert). Refer to <a href="#">Lamp Replacement</a> .
Fuse replacement			X	Refer to <a href="#">Fuse Replacement</a> .

Figure 6-1 Detector



Item	Description
1	Deuterium lamp
2	Tungsten lamp

## Service and Maintenance Information

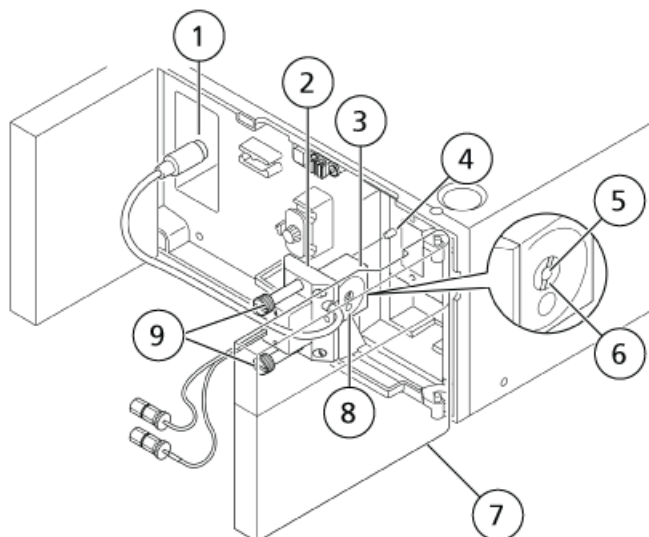
Item	Description
3	Flow cell
4	Lens and Cell gasket
5	Fuse

After inspection and maintenance, inspect for leakage during pumping. Refer to [Troubleshooting](#).

# Flow Cell Inspection and Basic Cleaning

## Remove and Inspect the Flow Cell

Figure 6-2 Flow Cell Parts

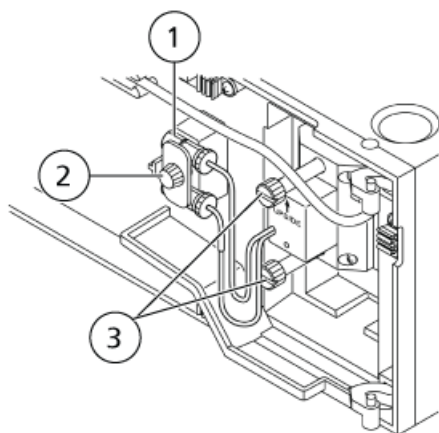


Item	Part Name
1	Connector
2	Plastic cover
3	Cell housing
4	Positioning pin
5	Cell window
6	Cell window screw
7	Front cover

Item	Part Name
8	Reference hole
9	Cell screw

1. Open the front cover.
2. Remove the coupling screw and then remove the coupling 1.6-0.8C from the detector.

**Figure 6-3 Coupling Screw**



Item	Description
1	Coupling 1.6-0.8C
2	Coupling screw
3	Cell screw

3. Remove the connector from the detector, remove the two cell screws (upper and lower), and then remove the flow cell from the detector.

**Note:** Do not remove the plastic cover from the cell housing.

4. Leave the flow line plumbing connected, and pump mobile phase through the flow lines.
5. With the mobile phase flowing through the flow lines, inspect the cell interior for air bubbles or dirt through the cell window. If there are any, clean the flow cell. Refer to [Clean the Flow Cell](#).

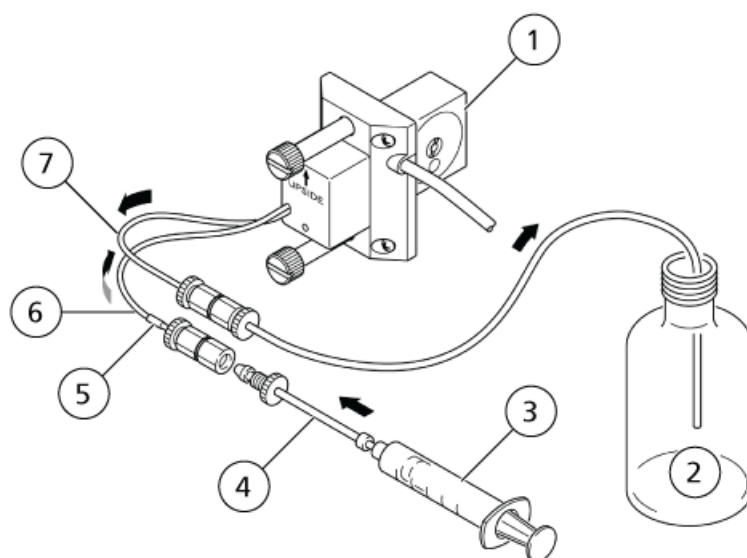
### Clean the Flow Cell

Follow this procedure to clean air bubbles or dirt from the flow cell interior.

#### Required Materials

- Syringe
- Syringe adapter

Figure 6-4 Cleaning the Flow Cell



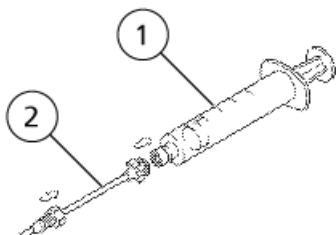
Item	Part name
1	Flow Cell
2	Waste container
3	Syringe
4	Syringe adapter
5	Blue cover
6	Cell inlet tubing
7	Cell outlet tubing

**Note:** The arrow indicates the direction of flow.



1. Insert the syringe adapter on the tip of the syringe, and then turn it clockwise to secure it.

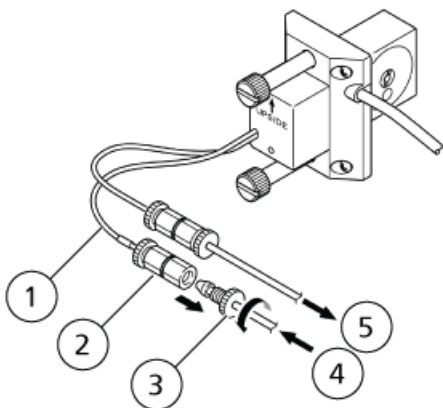
**Figure 6-5 Insert the Syringe Adapter on the Syringe Tip**



Item	Description
1	Syringe
2	Syringe adapter

2. Remove the male PEEK nut from the coupling 1.6-0.8C on the end of the cell inlet tubing (marked with a blue cover).

**Figure 6-6 Remove Male PEEK Nut from the Coupling**



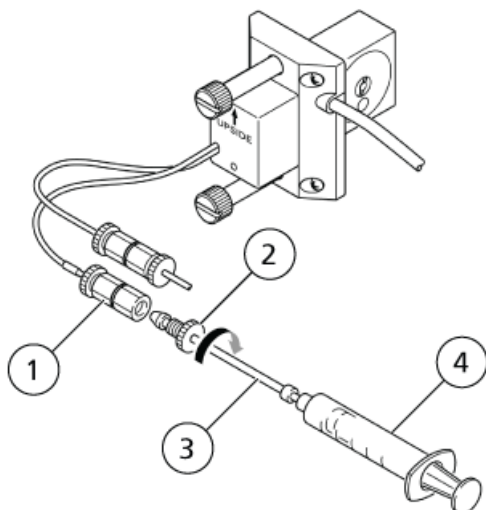
Item	Description
1	Cell inlet tubing
2	Coupling 1.6-0.8C
3	Male PEEK nut
4	From column
5	To waste container

## Service and Maintenance Information

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3. Insert the end of the syringe adapter, with its 1.6MN male nut, into the coupling 1.6-0.8C, and screw in the male nut.

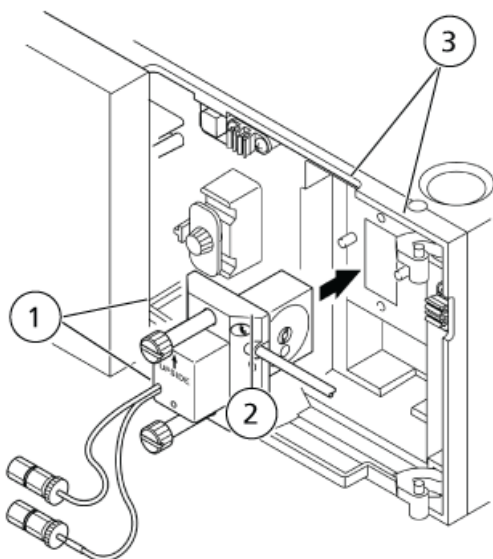
**Figure 6-7 Insert Syringe Adapter into Coupling**



Item	Description
1	Coupling 1.6-0.8C
2	1.6MN male nut
3	Syringe adapter
4	Syringe

4. Fill the syringe with isopropanol, and gently push in the plunger.

**Figure 6-8 Pushing in the Plunger**



The alcohol will be injected into the cell interior, cleaning it.

5. Fill the syringe with mobile phase and then press the syringe plunger.

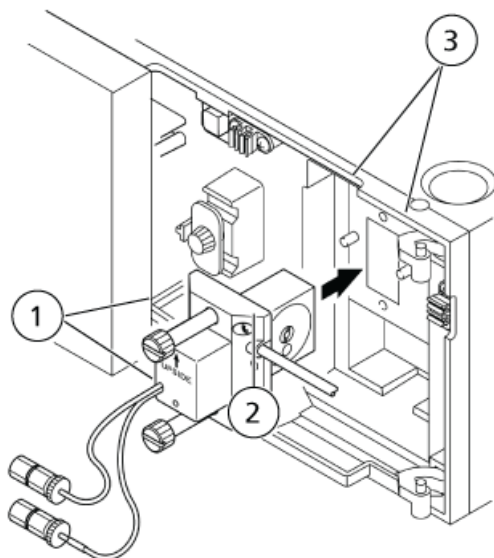
The mobile phase will be injected into the cell interior, cleaning it further.

6. Loosen the 1.6MN male nut on the end of the syringe adapter, and then remove the end of the syringe adapter from the union.

## Re-install the Flow Cell

1. Orient the cell so that the arrow on it points upward. Then, align the pin holes in the cell with the positioning pins on the detector, slide the cell onto the pins, and press it flush against the detector.

**Figure 6-9 Re-install Flow Cell**



Item	Description
1	Cell screw
2	Pin hole
3	Positioning pin

2. Tighten the two cell retaining screws alternately.
3. Insert the connector into the detector.
4. Affix coupling 1.6-0.8C to the detector using the coupling screw. Refer to [Figure 6-4 on page 23](#).
5. Connect the tubing from the column to the cell inlet tube (marked with a blue cover), and the cell outlet tubing to the tubing going to the waste container.

---

**Note:** When performing this step, do not let air enter the flow lines.

---

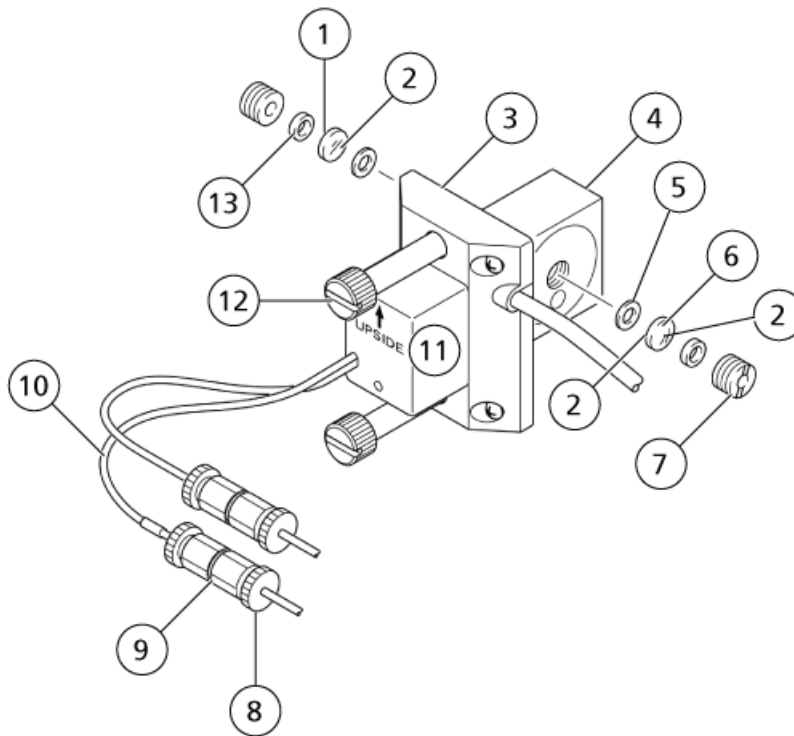
6. Install the front cover.

# Flow Cell Disassembly/Cleaning and Replacement

## Required Materials

- Cell Gaskets
- Lens
- Cell window

Figure 6-10 Flow Cell Parts



Item	Description
1	Convex side
2	Flat side
3	Plastic cover
4	Cell housing
5	Cell gasket
6	Cell window

## Service and Maintenance Information

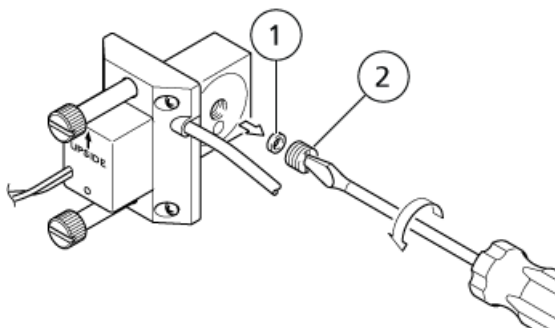
Item	Description
7	Cell window screw
8	Male PEEK nut
9	Coupling 1.6-0.8C
10	Cell inlet tubing
11	Upside
12	Cell screw
13	Lens

1. Open the front cover.
2. Remove the male PEEK nut from the coupling 1.6-0.8C on the end of the cell inlet tubing (marked with a blue cover).
3. Remove the flow cell connector and coupling 1.6-0.8C, loosen the cell screws (one upper and one lower), and then remove the flow cell from the module.

**Note:** Do not remove the plastic cover from the cell housing.

4. Remove the cell window screws on either side of the cell. Remove the packing at the same time.

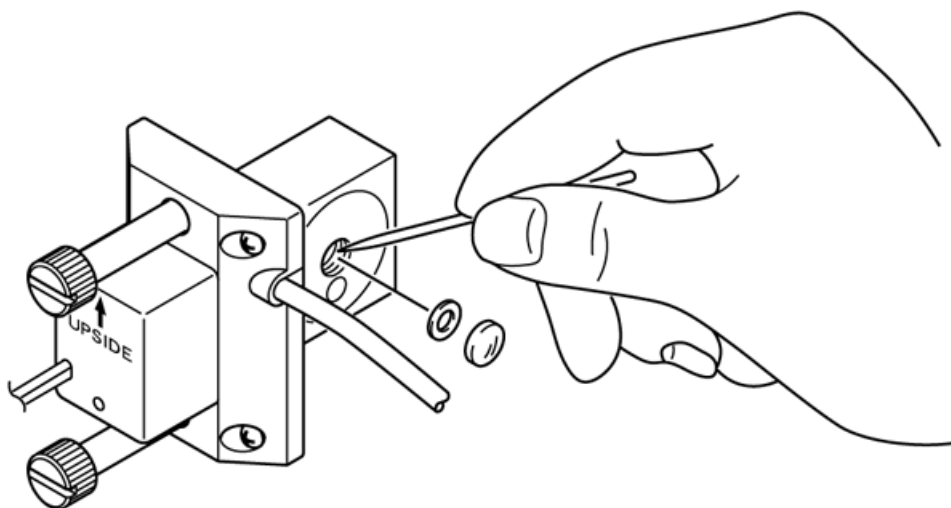
**Figure 6-11 Removing Cell Window Screws**



Item	Description
1	Packing
2	Cell window screw

5. Using a toothpick or similar utensil, remove the lens, cell window, and gaskets from both sides of the cell.

Figure 6-12 Removing Lens, Cell Window, and Gaskets



6. Clean the lens and cell window for 5 minutes in an ultrasonic bath of isopropanol.

If this does not remove the stains, discard the lens or cell window, and install new ones.

---

**Note:**

- Clean the inner surfaces of the cell housing with a clean swab moistened with isopropanol.
- Replace the cell gaskets whenever the flow cell is dismantled.
- Remove any dust from the new gaskets before use.

7. Install the new cell gaskets, lenses, and packing, in that order, and then tighten the cell window screws.

---

**Note:**

- Install the lenses with their convex sides facing outward. Otherwise, they will be damaged.
  - Do not install the lens and cell window in reverse because it can ruin the detector performance.
-

## Service and Maintenance Information

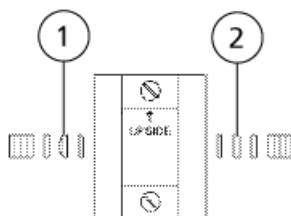
---

### Note:

#### Post-assembly Inspection

- Before re-installing the flow cell on the module, pass mobile phase through the cell through the cell inlet tubing, and inspect for leaks.
  - Leakage from the flow cell might result in incorrect data or deterioration of the optical parts.
- 

**Figure 6-13 Install New Cell Gaskets, Lenses, and Packing**

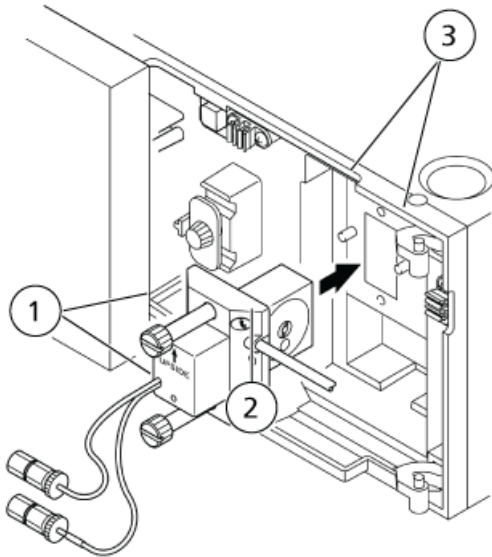


Item	Description
1	Lens
2	Cell window

8. Orient the cell so that the arrow on it points upward. Then, align the pin holes in the cell with the positioning pins on the detector, slide the cell onto the pins, and press it flush against the detector.



Figure 6-14 Re-install Flow Cell



Item	Description
1	Cell screw
2	Pin hole
3	Positioning pin

9. Tighten the two cell retaining screws alternately.
10. Affix coupling 1.6-0.8C to the detector using the coupling screw. Refer to [Figure 6-4 on page 23](#).
11. Insert the flow cell connector into the detector.
12. Install the male PEEK nut removed in [2](#) into the coupling 1.6-0.8C of the cell inlet tubing.
13. Install the front cover.

## Lamp Replacement



**WARNING! Electrical Shock Hazard. Fire Hazard. Before replacing a lamp, turn the detector power switch off and unplug the detector. Otherwise, fire, electric shock, or malfunction could result.**

## Service and Maintenance Information

---



**WARNING! Radiation Hazard.** Do not turn on the power while the lamp housing is exposed to view. You could be exposed to harmful ultraviolet rays.

---



**WARNING! Hot Surface Hazard.** Before replacing a lamp, turn off the power and allow sufficient time for the lamp to cool thoroughly. A hot lamp will cause burns.

---

---

**CAUTION: Potential System Damage.**

- Be careful that the lamp does not break.
  - Do not shake the lamp.
- 

---

**CAUTION: Potential Wrong Result.**

- When replacing the lamp, be careful not to get any dust or stains on the mirror surfaces, D2 lamp, filter surfaces or tungsten lamp. If these surfaces become dirty, accurate analyses will not be possible.
  - Be careful not to touch the glass parts directly with your hands when replacing the lamp. Wrap the lamp in cotton gauze when carrying it.
  - When the lamp is dirty, wipe it with lens paper soaked in ethanol.
- 

The UV Detector has a deuterium (D2) lamp and a tungsten (W) lamp. The lamps must be replaced periodically.

As the D2 lamp and W lamp in this detector approach the end of their life, their intensity decreases and baseline noise increases. Replace the lamps with new ones using the life ratings listed below as a guide.

**Table 6-1 Lamp Life Ratings**

Lamp name	Lamp life ratings
D2 (deuterium) lamp	about 2,000 hours
W (tungsten) lamp	about 2,000 hours*
*About the guaranteed life of the W lamp	

According to the manufacturer, the life rating for the W lamp is defined as the average lifespan of numerous lamps. Understand that, depending on the individual lamp, it might burn out before reaching the 2,000-hour life rating.

The guaranteed life of the W lamp is 1,200 hours. The lamp can be replaced free of charge if it burns out before reaching 1,200 hours of use.

The guaranteed life of the D2 lamp is the same as the life rating, 2,000 hours.

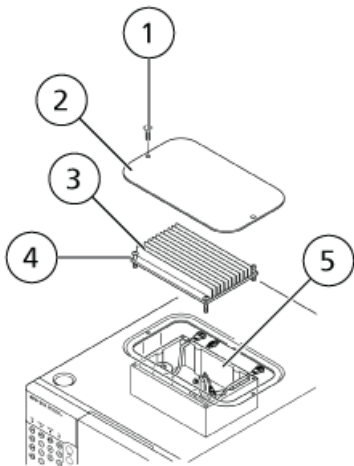
**Required Materials**

- D2 (deuterium) lamp
- W (tungsten) lamp

## Remove Top Cover and Radiating Fin Assembly

1. Remove the two top cover installation screws, and then remove the top cover.
2. Loosen the four screws holding the radiating fin assembly in the lamp compartment, and then remove the fin assembly.

**Figure 6-15 Removing the Top Cover and the Radiating Fin Assembly**

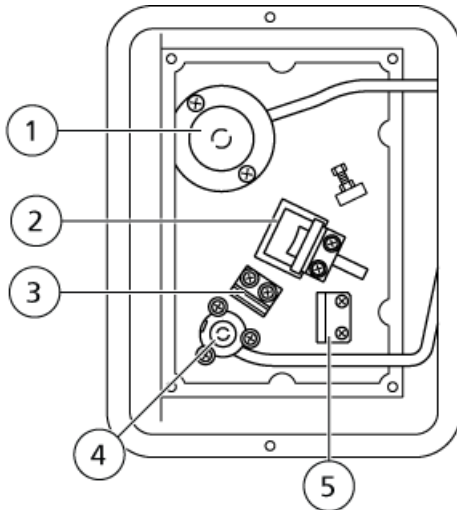


Item	Description
1	Installation screw
2	Top cover
3	Radiating fin assembly
4	Screw
5	Lamp housing

The D2 and W lamps are visible inside the lamp housing.

**Note:** The four screws of the fin assembly cannot be removed.

Figure 6-16 Lamp Installation Layout

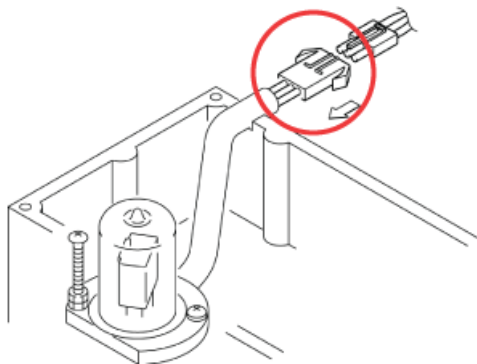


Item	Description
1	D2 lamp
2	Mirror
3	Filter
4	Tungsten lamp
5	Low pressure mercury lamp

## Deuterium Lamp Replacement

1. Disconnect the 3-pin connector on the D2 lamp cable.

**Figure 6-17 3-pin Connector**



2. Remove the D2 lamp screws (one long, one short), and then remove the D2 lamp.

---

**Note:**

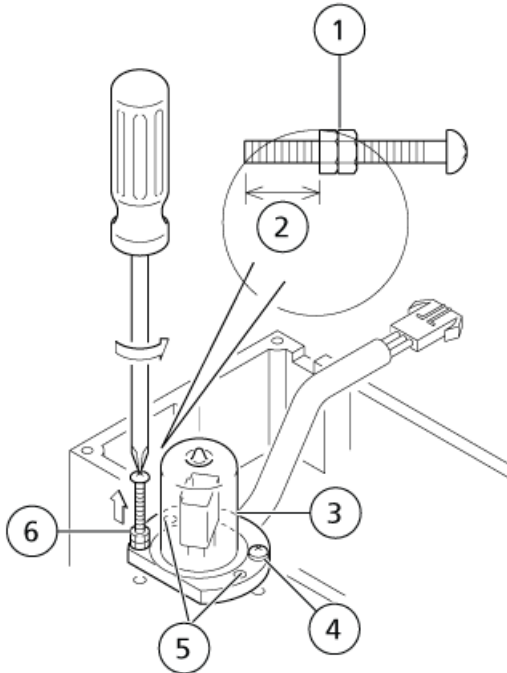
- The nut on the long screw has been set to a particular position. Do not loosen or move it.
- Avoid dropping the screws into the detector chassis. It is difficult to retrieve them. However, be sure to retrieve them if they are dropped.

---

**Tip!** If it is difficult to remove the D2 lamp, tighten two of the screws slowly and evenly and then remove the D2 lamp from the lamp housing.

---

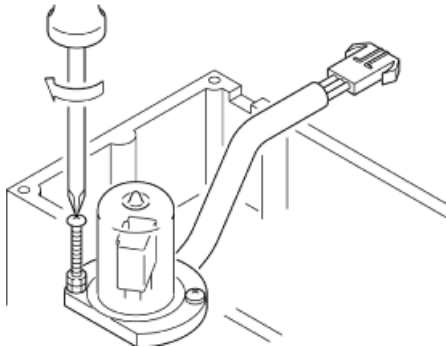
Figure 6-18 Removing the D2 Lamp Screws



Item	Description
1	Nut
2	Adjusted to this position
3	D2 lamp
4	Short screw
5	Bolt hole
6	Long screw

3. Fit the new D2 lamp in place, and then secure it with the screws.

**Figure 6-19 Installing the New D2 Lamp**



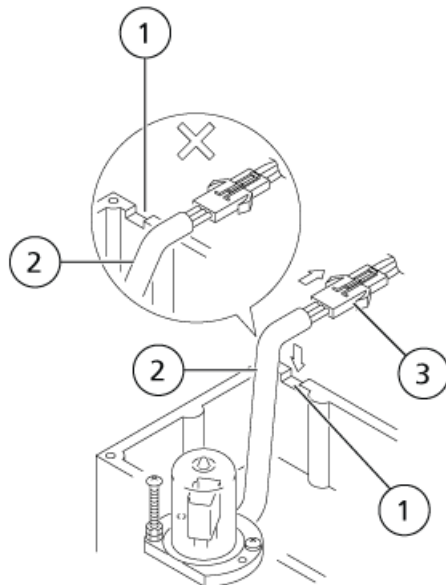
4. Wipe off fingerprints on the glass with a cloth moistened with alcohol.
5. Attach the 3-pin connector.

---

**CAUTION: Potential System Damage.** Make sure that the cable is fitted into the notch in the lamp housing, with the connector located outside the housing. If the cable is not in the notch, it could be broken, resulting in shorting or lamp failure.

---

**Figure 6-20 Attaching the 3-pin Connector**



## Service and Maintenance Information

---

Item	Description
1	Notch
2	Cable
3	3-pin connector

6. Replace the fin assembly and top cover of the lamp housing and detector respectively, and then tighten the screws.

### Reset the Lamp Operating Time

1. Plug in the detector, and then turn the power switch on.

The initial screen is shown.

2. Show the D2 LAMP USED VP function. Refer to [VP Functions](#).

3. Press **0** and then press **enter**.

The timer is reset, and the D2 LAMP USED value changes to 0.

---

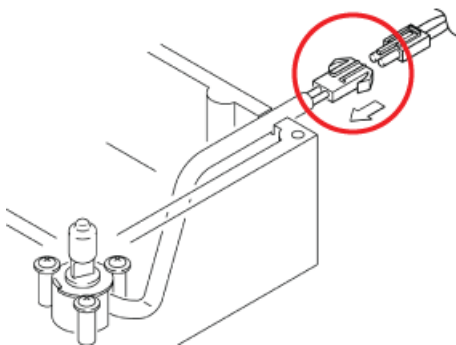
**Note:** Dispose of used up deuterium (D2) lamps as a form of industrial waste. Refer to [Precautions for Handling the Deuterium Lamp and Tungsten Lamp](#).

---

## Tungsten Lamp Replacement

1. Disconnect the 2-pin connector at the end of the W lamp cable.

**Figure 6-21 Disconnecting the 2-pin Connector**

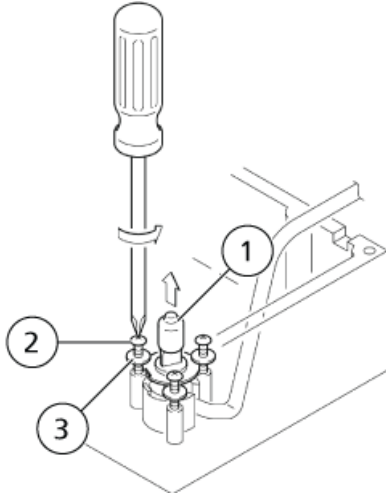


2. Loosen the three lamp screws, and then remove the W lamp.



**Note:** The W lamp is secured by washers (one for each screw). To remove the lamp, loosen the screws. Do not remove them or the washers from the lamp housing.

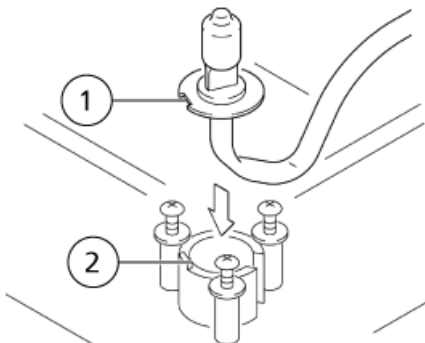
**Figure 6-22 Removing the W Lamp**



Item	Description
1	W lamp
2	Screw
3	Washer

- Place the new lamp in position in the lamp socket, aligning the projection on the socket with the notch in the lamp flange.

**Figure 6-23 Installing the New Lamp**



## Service and Maintenance Information

---

Item	Description
1	Lamp flange notch
2	Projection

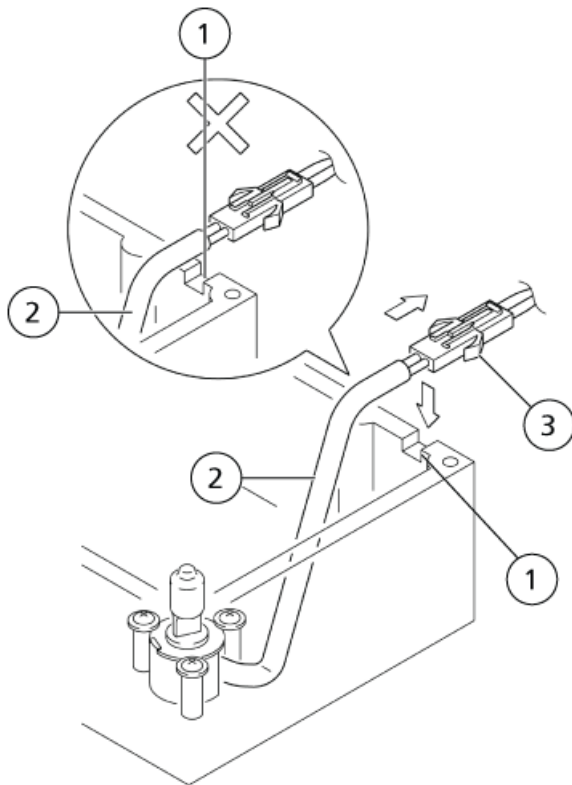
4. Wipe off fingerprints on the glass with a cloth moistened with alcohol.
5. Tighten the three lamp screws alternately.
6. Attach the 2-pin connector.

---

**CAUTION: Potential System Damage.** Make sure that the cable is fitted into the notch in the lamp housing, with the connector located outside the housing. If the cable is not in the notch, it could be broken, resulting in shorting or lamp failure.

---

Figure 6-24 Attach the 2-Pin Connector



Item	Description
1	Cable
2	Notch
3	2-pin connector

7. Replace the fin assembly and the top cover of the lamp housing and detector respectively, and then tighten the screws.

### Reset the Lamp Operating Time

1. Plug in the detector, and then turn the power switch on.  
The initial screen is shown.
2. Show the W LAMP USED VP function. Refer to [VP Functions](#).
3. Press **0** and then press **enter** .  
The timer will be reset, and the W LAMP USED value will change to 0.
4. Press **CE** twice.  
The initial screen is shown.

## Fuse Replacement



**WARNING! Electrical Shock Hazard. Before replacing fuses, turn off the power and unplug the module. For replacement, only use fuses of the correct type and rating. Failure to heed the above could result in fire, electric shock or short circuits.**

The correct rating for the fuses is:

<b>Required Materials for 100V AC / 120V AC module</b>
--

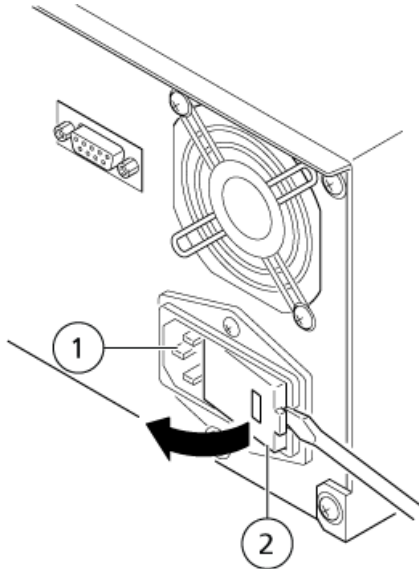
- |   |
|---|
| <ul style="list-style-type: none"> <li>• 250V 4AT (5 × 20)</li> </ul> |
|---|

<b>Required Materials for 230V AC / 240V AC module</b>
--

- |  |
|--|
| <ul style="list-style-type: none"> <li>• 250V 3.15AT (5 × 20)</li> </ul> |
|--|

1. Use a flathead screwdriver to pry off the fuse holder cover.

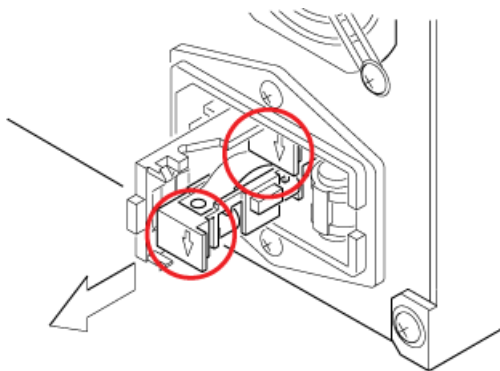
**Figure 6-25 Remove Fuse Holder Cover**



Item	Description
1	Power supply connector
2	Fuse holder cover

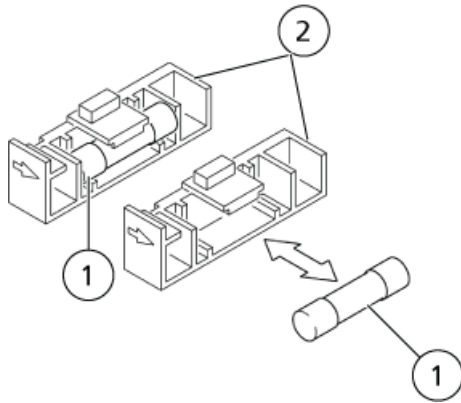
2. Remove both fuse holders.

**Figure 6-26 Fuse Holders**



3. Remove the blown fuse from its holder.
4. Press the new fuse into the holder.

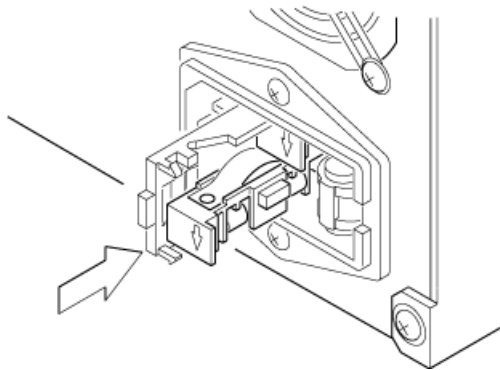
**Figure 6-27 Install the New Fuse in the Holder**



Item	Description
1	Fuse
2	Fuse holders

- Orient the fuse holders so that the arrows point to the bottom, and place them into the detector.

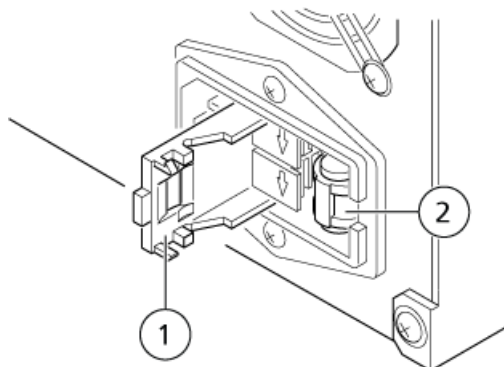
**Figure 6-28 Put the Fuse Holder into the Detector**



- Replace the fuse holder cover, so that it clicks into place.

**CAUTION: Potential System Damage.** When the fuse holder cover is opened, the power voltage selector (a rotary switch) is exposed. Do not touch this selector, or the module could be damaged.

**Figure 6-29 Replace the Fuse Holder Cover**



Item	Description
1	Fuse holder cover
2	Power voltage selector

# Troubleshooting







# 7

This section describes the probable causes of problems that can arise, and the corrective action to be taken to eliminate the causes. For more detailed procedures, refer to the indicated page.

If the problem cannot be resolved even after taking the indicated measures, or if there are problems not included in the following tables, contact your representative.





Symptom	Possible Cause	Corrective Action
Power does not turn on even after switching on power.	The power plug is disconnected.	Connect the power plug correctly.
	Internal wires on the cable are cut.	Replace the power cable with a new cable of the same type.
	The power supply does not meet the specifications for this module.	Use a power supply that meets the specifications for this module.
	A fuse is blown.	Replace the fuse.
OVER is shown for absorbance value.	The recorder pen is far below the original baseline.	Press <b>zero</b> .
The recorder baseline does not change.	The RANGE set to 0.	Set an appropriate value for RANGE.
	The lamp is not on.	Set the LAMP parameter to 1, 2, or 3 to turn on the lamp.
	The recorder pen is far below the original baseline. (OVER will be shown for the absorbance value.)	Press <b>zero</b> . The pen will return to the baseline.
	There are fault in the circuits.	Replace any faulty parts.
Noise amplitude is 10 or more times higher in dual wavelength mode than in single wavelength mode.	Changes in mobile phase absorbance for small changes in wavelength are excessively large. The module detects wavelengths by means of scanning using a grating, which produces	Change to a wavelength that produces the smallest possible absorbance change per unit of wavelength change.

## Troubleshooting

Symptom	Possible Cause	Corrective Action
	small fluctuations in measurement wavelength - so small as to be in the range of the wavelength reproducibility of the module. This produces some noise. The greater the absorbance variation, the greater the noise.	Set the response to a higher value.
Transient spiking  Sawtooth baseline  Continuous spiking 	Bubbles are flowing through the cell. <sup>0</sup>	Connect a back pressure device or 0.3 mm i.d. × 2 m tubing to apply back pressure to the cell outlet.  Degas the mobile phase.
Spiking occurring at every stroke of the pump  No equilibration of baseline 	Bubbles are trapped in the cell. <sup>0</sup>	Connect a back pressure device or 0.3 mm i.d. × 2 m tubing to apply back pressure to the cell outlet.  Use isopropanol (injected with the provided syringe) to rinse the cell interior.
Drift 	Cell lenses are dirty. <sup>0</sup>	Dismantle cell and clean lenses. If stains cannot be removed, install new lenses.

<sup>0</sup> For the procedure to inspect for bubbles or stains in the flow cell, refer to [Flow Cell Inspection and Basic Cleaning](#).



Symptom	Possible Cause	Corrective Action
<p>Excessive noise</p> 	<p>There are impurities in the mobile phase if drift stops when pump is turned off or the air cell is used.<sup>1</sup></p>	<p>Inspect the mobile phase and the flow line, and eliminate impurities.</p>
<p>Swell</p> 	<p>If excessive noise continues when the air cell is used<sup>1</sup>, then the lamp intensity has deteriorated.</p>	<p>Replace the lamp with a new one.</p>
<p>Baseline wanders</p> 	<p>The module is exposed to air current or changes in room temperature are excessive.</p>	<p>Change the location of the module, or protect it from excessive changes.</p>
<p>Noise occurs corresponding to the pump stroke</p> 	<p>Mobile phase is pulsing.</p>	<p>Eliminate pump pulsation with a damper.</p>

<sup>1</sup> An air cell refers to a flow cell that has no cell lenses and no gaskets, and is dried thoroughly.

# Error Messages

# A

Each message is classified as shown in [Table A-1](#).

**Table A-1 Message Classifications**

Type	Description
Fatal	The module stops operating. Pressing <b>CE</b> does not clear the error message.
Alarm	The module stops operating. Press <b>CE</b> to clear the error message.
Warning	The module does not stop operating. Press <b>CE</b> to clear the error message. For the column oven, this is a set temperature error.

## Error Messages, Possible Causes, and Corrective Actions

The module has several diagnostic functions. Upon detection of a problem, an alarm sounds and an error message is shown on the status panel screen.

Error Message	Type	Possible Cause	Corrective Action
ROM FAILURE (ROM error)	Fatal	ROM error (electronic failure)	Turn off the power and then contact the FSE.
RAM FAILURE (RAM error)	Fatal	RAM error (electronic failure)	Turn off the power and then contact the FSE.
ERR GR HOME POS (Grating home position error)	Fatal		
ERR FIL HOME POS (Filter home position error)	Fatal	The motor home position sensor does not operate properly.	Turn off the power and then contact the FSE.
ERR LAMP HOME PO (Lamp home position error)	Fatal		

<b>Error Message</b>	<b>Type</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
ERR EEPROM WRITE (EEPROM write error)	Fatal	A write error onto non-volatile memory (EEPROM) has occurred.	Turn off the power and then contact the FSE.
ERR OVER CURRENT (Lamp over current error)	Alarm	An abnormally high current is flowing through lamp.	Replace the D2 lamp. If this error is shown after the lamp is replaced, then turn off the power and then contact the FSE.
ERR D2 LAMP (Deuterium lamp error)	Alarm	A fault in deuterium lamp or in its circuits.	Replace the D2 lamp. If this error is shown after the lamp is replaced, then turn off the power and then contact the FSE.
ERR OVER HEAT (Overheating)	Alarm	The module interior temperature has risen to an abnormal level.	Make sure that the rear fan can move, and that the exhaust vent and side air intake are not blocked. If this error is still shown, then turn off the power and then contact the FSE.
ERR LEAK DETECT (Leak detected)	Alarm	A leak has been detected.	Inspect and repair plumbing. Wipe away leakage.
NOT PROTECTED (Set value loss error)	Alarm	When power was turned on, previous parameters and time programs were not saved.	Pressing <b>CE</b> while this message is shown initializes parameters and time program. Make new settings and write new programs.
CHECK NO GOOD Wavelength check failed	Alarm	The wavelength discrepancy exceeds 1 nm. Refer to <a href="#">Table A-2</a> .	If CHECK NO GOOD is shown again when WAVE CHECK is run after the above action has been taken, then turn off the power and then contact the FSE.

## Error Messages

**Table A-2 Causes and Actions for Wavelength Check Failed Error Message**

Possible Cause	Corrective Action
The cell is not installed properly.	Install the cell properly.
An error occurred during wavelength calibration.	Run WAVE CALIB. (VP function) to calibrate wavelength, then run WAVE CHECK to verify wavelength accuracy.
<ul style="list-style-type: none"> <li>Sample in the cell is highly absorptive of UV and visible light.</li> <li>Large air bubbles in sample greatly restrict amount of light transmitted through cell at emission line wavelengths (656 nm and 254 nm) of the D2 lamp.</li> </ul>	<ul style="list-style-type: none"> <li>Flush the inside of the cell with a mobile phase solvent that does not absorb light in the vicinity of 254 nm and 656 nm.</li> <li>Purge cell interior with air or nitrogen.</li> </ul>

**Table A-3 Other Messages and their Possible Causes and Corrective Actions**


Other Message	Type	Possible Cause	Corrective Action
LAMP NOT LIT (Lamp not lit)	Warning	<b>zero</b> or <b>mark</b> is pressed when the lamp is not on.	Set the LAMP parameter to 1, 2, or 3 to turn on the lamp.
SELECT D2 SINGLE (Wavelength check error)	Warning	The WAVE CHECK function can only be used in single wavelength mode, with the D2 lamp on. This message is shown if WAVE CHECK is run under any other conditions.	Switch to single mode, and turn on the D2 lamp.
SET ANOTHER  (Wavelength setting error in dual wavelength mode)	Warning	Wavelengths outside the following ranges were set in dual wavelength mode. <ul style="list-style-type: none"> <li>190 - 370 nm</li> <li>371 - 700 nm</li> <li>701 - 900 nm</li> </ul>	Set wavelengths inside the applicable ranges.
KEY CLOSED (Keypad disabled)	Warning	Keys were pressed after keypad was disabled using the KEY CLOSE auxiliary function.	Press and hold <b>del</b> and press <b>CE</b> . The keypad will be enabled.
DATA NOT EXIST (Empty file)	Warning	Spectrum data was requested for output from a file that does not contain scanned data.	Determine the file number set when scanning was executed, and use that file.

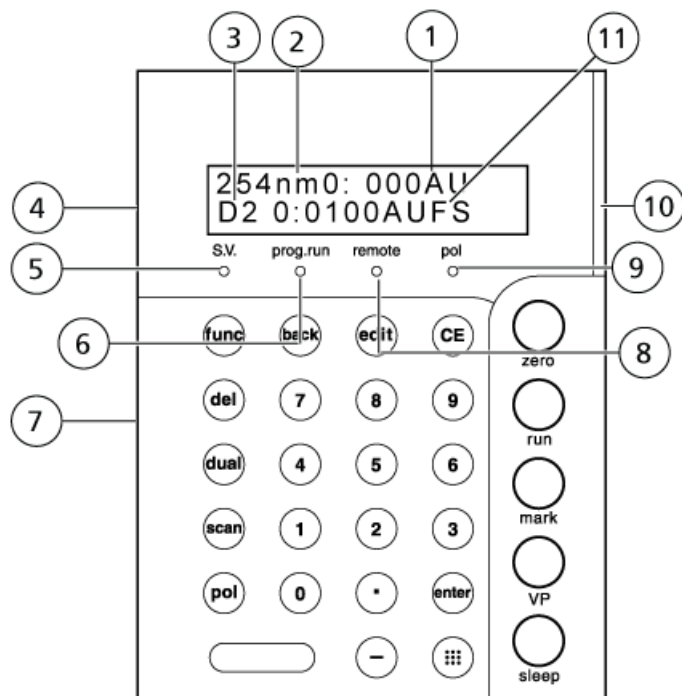
Table A-3 Other Messages and their Possible Causes and Corrective Actions (continued)


Other Message	Type	Possible Cause	Corrective Action
LOW SET TEMP (Temperature control error in the temperature controlled flow cell)	Warning	This warning is shown when the flow cell temperature fails to coincide with temperature settings after 5 minutes or more of temperature adjustment. This occurs when the flow cell temperature is set to a value too close to room temperature, or when the column oven is set to a higher temperature than the flow cell.	Set the flow cell temperature to a value at least 5 °C above room temperature. If the warning is still shown, set the temperature to a value near or above the column oven temperature. If the temperature setting satisfies the above requirements and the warning is still shown, then turn shown, then turn off the power and then contact the FSE.
NO D2 LAMP (D2 lamp disconnected)	Warning	This warning is shown when the D2 lamp is turned on and the lamp is not recognized.	Make sure the D2 lamp is connected and replace it if necessary. If the lamp has been replaced and this warning is still shown, then turn off the power and then contact the FSE.
NO W LAMP (W lamp disconnected)	Warning	This warning is shown when the W lamp is turned on and the lamp is not recognized.	Make sure that the W lamp is connected and replace it if necessary. If the lamp has been replaced and this warning is still shown, then turn off the power and then contact the FSE.

# Status Panel and Keypad

# B


Figure B-1 Status Panel and Keypad



Item	Function
1	Absorbance. Shows absorbance (in AU).
2	 Shows measurement wavelength (in nm).
3	Lamp. Shows D2 or W, indicating D2/W source lamp is on. When the deuterium (D2) lamp is on, D2 is shown. When the tungsten (W) lamp is on, W is shown. When both the deuterium and tungsten lamps are on, D2/W is shown. The D2, W, and D2/W indications are selectable.
4	Display panel
5	SV. Solvent recycling valve indicator. On when solvent recycling valve is draining liquid.
6	Program indicator. Illuminates when a program is being executed.

Item	Function
7	Keypad
8	Remote. Remote control mode indicator. On when the module is controlled by system controller.
6	Prog. run. Time program indicator. On when a method is being executed.
9	Pol. Polarity indicator. On in reverse polarity output mode.
10	Status indicator <ul style="list-style-type: none"> <li>• Green: Power is on</li> <li>• Red: Error</li> <li>• Orange: In sleep mode</li> </ul>
11	Range. Shows a full scale value (in AUFS) of the signal output to recorder terminals. Can also show a full scale value (in AU/V) of the signal output to integrator terminals by means of a VP function.

**Table B-1 Keys**

Key	Function
 Display key	To show the operation keys.
zero	Adjusts recorder zero position, returning the baseline to the zero position set with BL OFS ITG and BL OFS REC in the parameter settings group.
run	Starts and stops time programs.
mark	Draws a mark on the recorder chart paper and has no effect on the integrator output.
VP	Switches from initial screen to VP mode.
sleep	Turns off the status panel screen and has no effect on operation.

**Table B-2 Keys Operable By Pressing the Display Key**

Key	Function
edit	Activates the time program edit mode (from the initial screen).
dual	Switches between dual and single wavelength modes.
pol	Switches the polarity of the recorder output. The pol (-) indicator illuminates for (-) polarity.
scan	Activates the wavelength scanning function.

## Status Panel and Keypad

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**Table B-2 Keys Operable By Pressing the Display Key (continued)**

Key	Function
0 – 9	Enter numbers with these keys.
enter	Validates entries.
CE	<ul style="list-style-type: none"><li>• Initializes the screen.</li><li>• Cancels values input since <b>enter</b> was last pressed.</li><li>• Clears error messages and cancels alarms (but does not resolve the source of the error).</li></ul>
del	Deletes individual lines of a time program on the status panel screen (when time program is being written).
func	<ul style="list-style-type: none"><li>• Scrolls forward through auxiliary functions. Press repeatedly to reach desired parameters.</li><li>• In time program editing, scrolls through list of time-programmable functions.</li></ul>
back	<ul style="list-style-type: none"><li>• Scrolls backward through auxiliary functions. Press repeatedly to reach desired parameters.</li><li>• In time program editing, scrolls back through list of time-programmable functions.</li></ul>
–	Enters a negative number.



# VP Functions



VP functions support the validation of the instrument by check functions or displaying the instrument information. There are four groups for VP functions: Product Information, Maintenance Information, Validation Support, and Calibration Support.

Command	Description
<b>Product Information Group</b>	
SERIAL NUMBER	It shows the module serial number.
S/W ID : V *.*	It shows the module name and ROM version.
<b>Maintenance Information Group</b>	
TOTAL OP TIME	It shows the total cumulative operating time of the module.
D2 LAMP USED	It shows the deuterium lamp operating time and replacement alert time.
W LAMP USED	It shows the tungsten lamp operating time and replacement alert time.
PART REPLACEMENT	It is used to input records of parts replacement.
MAINTENANCE LOG	It shows the maintenance log.
OPERATION LOG	It shows the operation log.
ERROR LOG	It shows the error log.
<b>Validation Support Group</b>	
DATE YY-MM-DD	It shows or sets the date.
TIME HH:MM:SS	It shows or sets the date.
AUTO CHECK	Runs auto checks on memory, wavelength accuracy and light intensity.
LEAK SENSOR TEST	It runs check on leak sensor.
<b>Calibration Support Group</b>	
Input PASSWORD <sup>2</sup>	It is used to enter the password.
WAVE CALIB	It is used to perform wavelength calibration.
D2 TIME	It is used to enter the D2 lamp replacement alert time.
D2 ENERGY	It is used to enter the alert energy value for D2 lamp replacement.

<sup>2</sup> If the password is not input correctly, the functions in the Calibration Support Group cannot be accessed, even if **func** is pressed.

## VP Functions

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<b>Command</b>	<b>Description</b>
W TIME	It is used to enter W lamp replacement alert time.
W ENERGY	It is used to enter alert energy value for W lamp replacement.
ABS CALIB	It is used for absorbance calibration (absorbance compensation coefficient is set with ABS COMP).
ABS COMP	It is used to enter absorbance calibration coefficient.
LINEAR CALIB	It is used to enter the linearity compensation.
LEAK CALIB	It is used for the leak sensor primary calibration.
LEAK THR	It is used to enter the leak sensor actuation level.
RNG DISP MODE	It is used to set the full scale absorbance initially shown.
OP MODE	It is used to set the operation mode.
INITIALIZE PARAM	It is used to initialize parameters.
CHANGE PASSWORD	It is used to change the password.
CBM PARAMETER	It is used to show and set CBM parameters and is shown when the link connection is made with the CBM-20A.

# Consumables and Spares

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# D

Option	Part No.	Features
Air filter	228-45603-91	Filter to prevent dust from being drawn into the inner parts of the module. It is installed on the air intake opening on the right side of the module.
D2 (deuterium) lamp	228-34016-02	
W (tungsten) lamp	670-14602	
Syringe	046-00017-01	
Syringe adapter	228-15672-91	
Cell gasket	228-35097-95	
Lens	228-14572	
Cell window	228-18058	
D2 lamp	S228-54515	
Dust filter	S228-54534	
Fuse 250 V, 4AT	S072-02004-22	
Fuse 250 V, 3.15AT	S072-02004-21	

# Revision History

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Revision	Description	Date
A	First release of document.	April 2015