SCIEX
The Power of Precision

SCIEX 7500+ System

System User Guide

RUO-IDV-05-15633-A

January 2024

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Contents

Operational Precautions and Limitations 1

Note: Before operating the system, carefully read all of the sections of this guide.

This section contains information about general safety and regulatory compliance. This section gives descriptions of possible hazards and the related warnings for the system, and the precautions that should be obeyed to minimize the hazards.

In addition to this section, for information about the symbols and conventions that are used in the laboratory environment, on the system, and in this documentation, refer to the section: Glossary of Symbols. For site requirements, including mains supply, source exhaust, ventilation, compressed air, nitrogen, and roughing pump requirements, refer to the document: *Site Planning Guide*.

General Safety Information

To prevent personal injury or system damage, read, understand, and obey all of the safety precautions and warnings in this document, the manufacturer chemical safety data sheets (SDSs), and product label information. Labels are shown with internationally recognized symbols. Failure to heed these warnings could result in serious injury.

This safety information is intended to supplement federal, state, provincial, and local environmental health and safety (EHS) regulations. The information provided includes system-related safety information applicable to the operation of the system. It does not include every safety procedure that should be practiced. Ultimately, the user and the organization are responsible for compliance with federal, state, provincial, and local EHS regulations and for maintaining a safe laboratory environment.

Refer to the correct laboratory reference material and standard operating procedures.

Documentation Symbols and Conventions

The following symbols and conventions are used throughout the guide.

DANGER! Danger identifies an action that can cause severe injury or death.

WARNING! Warning identifies an action that can cause personal injury if precautions are not obeyed.

CAUTION: Caution identifies an operation that can cause damage to the system or corruption or loss of data if precautions are not obeyed.

Note: Notes supply important information in a procedure or description.

Tip! Tips supply information that helps to apply the techniques in a procedure or gives a shortcut, but that is not essential to the completion of a procedure.

Regulatory Compliance

This system complies with the regulations and standards listed in this section. For dated references, refer to the declaration of conformity included with the system and the individual system components. Applicable labels have been affixed to the system.

Australia and New Zealand

- **Electromagnetic Compatibility (EMC):** Radio Communications Act 1992 as implemented in these standards:
  - Electromagnetic Interference—AS/NZS CISPR 11/ EN 55011/ CISPR 11 (Class A). Refer to the section: Electromagnetic Interference.
- **Safety:** AS/NZ 61010-1 and IEC 61010-2-061

Canada

- **Electromagnetic Interference (EMI):** CAN/CSA CISPR11. This ISM device complies with Canadian ICES-001. Refer to the section: Electromagnetic Interference.
- **Safety:**
  - CAN/CSA C22.2 No. 61010-1
  - CAN/CSA C22.2 No 61010-2-061

Europe

- **Electromagnetic Compatibility (EMC):** Electromagnetic Compatibility Directive 2014/30/EU as implemented in these standards:
  - EN 61326-1
  - EN 55011 (Class A)

  Refer to the section: Electromagnetic Compatibility.
- **Safety:** Low Voltage Directives 2014/35/EU as implemented in these standards:
  - EN 61010-1

  - EN 61010-2-061
- **Waste Electrical and Electronic Equipment (WEEE):** Waste Electrical and Electronic Equipment Directive 2012/19/EU, as implemented in EN 40519. Refer to the section: Waste Electrical and Electronic Equipment.
- **Packaging and Packaging Waste (PPW):** Packaging and Packaging Waste Directive 94/62/EC
- **RoHS Restriction of Hazardous Substances:** RoHS Directive 2011/65/EU and 2015/863/EU

United States

- **Radio Emissions Interference Regulations:** 47 CFR 15, as implemented in FCC Part 15 (Class A)
- **Safety:** Occupational Safety and Health Regulations, 29 CFR 1910, as implemented in these standards:
  - UL 61010-1
  - IEC 61010-2-061

International

- **Electromagnetic Compatibility (EMC):**
  - IEC 61326-1
  - IEC CISPR 11 (Class A)
  - IEC 61000-3-2
  - IEC 61000-3-3

  Refer to the section: Electromagnetic Compatibility.
- **Safety:**
  - IEC 61010-1
  - IEC 61010-2-061

Electrical Precautions

WARNING! Electrical Shock Hazard. Do not remove the covers. If the covers are removed, then injury or incorrect system operation can occur. Removal of the covers is not required for routine maintenance, inspection, or adjustment. For repairs that require removal of the covers, contact a SCIEX field service employee (FSE).

WARNING! Fire Hazard or Electrical Shock Hazard. Contact SCIEX if a fuse must be installed or replaced. Always turn off the power and then disconnect the power cable before working with fuses. Replace a fuse only with a fuse of the correct type and rating.

- Obey the required electrical safe work practices.
- Use cable management practices to control electrical cables and decrease the risk of a tripping hazard.

For information about system electrical specifications, refer to the document: *Site Planning Guide*.

Mains Supply

Connect the system to a compatible mains supply as instructed in this guide.

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

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

WARNING! Electrical Shock Hazard. Use only the mains supply cables that are supplied with the system. Do not use mains supply cables that are not correctly rated for the operation of this system.

An external line transformer is not needed for the mass spectrometer, optional bench, or roughing pump.

Protective Earth Conductor

The mains supply must include a correctly installed protective earth conductor. The protective earth conductor must be installed or examined 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 causes an electrical shock hazard.

WARNING! Electrical Shock Hazard. Make sure that a protective earth conductor (grounding cable) is connected between the sample loop and an applicable grounding point at the ion source. This supplementary grounding reinforces the safety configuration specified by SCIEX.

Chemical Precautions

WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. Before cleaning or maintenance, identify whether decontamination is required. If radioactive materials, biological agents, or toxic chemicals have been used with the system, then the customer must decontaminate the system before cleaning or maintenance.

WARNING! Puncture Hazard, Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. If the ion source window is cracked or broken, then do not use the ion source. Contact a SCIEX field service employee (FSE). Any toxic or injurious materials introduced in the equipment will be present in the source exhaust output. Exhaust from equipment should be vented from the room. Dispose of sharps following established laboratory safety procedures.

WARNING! Environmental Hazard. Do not discard system components in municipal waste. To discard components correctly, obey local regulations.

WARNING! Biohazard or Toxic Chemical Hazard. To prevent leaks, connect the drain tubing to the mass spectrometer and the source exhaust drain bottle correctly.

- Before servicing and regular maintenance, identify the chemicals that have been used in the system. For the health and safety precautions that must be obeyed for a chemical, refer to the safety data sheet (SDS). For storage information, refer to the certificate of analysis. To find a SCIEX SDS or certificate of analysis, go to sciex.com/tech-regulatory.
- Always wear assigned personal protective equipment, including powder-free gloves, protective eyewear, and a laboratory coat.

  Note: Nitrile or neoprene gloves are recommended.

- Do work in a well-ventilated area or fume hood.
- When flammable materials such as isopropanol, methanol, and other flammable solvents are in use, do not go near ignition sources.
- Be careful with the use and disposal of any chemicals. If the correct procedures for chemical handling and disposal are not obeyed, then personal injury can occur.

- During cleaning, do not let chemicals touch the skin. Wash hands after use.
- Make sure that all exhaust hoses are connected correctly and that all connections are functioning as designed.
- Collect all spent liquids and discard them as hazardous waste.
- Obey all of the local regulations for the storage, handling, and disposal of biohazardous, toxic, and radioactive materials.
- Oil-sealed roughing pump: (Recommended) Use a secondary containment tray below the roughing pump.

  Note: Secondary containment is not required for the dry roughing pump.

- (Recommended) Use secondary containment trays below the solvent bottles and the waste container to collect potential chemical spills.

System Safe Fluids

The following fluids can safely be used with the system. For information about safe cleaning solutions, refer to the section: Required Materials.

CAUTION: Potential System Damage. Do not use any other fluid until confirmation is received from SCIEX that it does not cause a hazard. This is not an exhaustive list.

Note: Use only new, freshly prepared LC-MS-grade or better solvents for the LC mobile phases.

- **Organic Solvents**
  - LC-MS-grade acetonitrile, up to 100%
  - LC-MS-grade methanol, up to 100%
  - LC-MS-grade isopropanol, up to 100%
  - LC-MS-grade or higher water, up to 100%
- **Buffers**
  - Ammonium acetate, less than 100 mM
  - Ammonium formate, less than 100 mM
- **Acids and Bases**
  - Formic acid, less than 1%
  - Acetic acid, less than 1%
  - Trifluoroacetic acid (TFA), less than 1%
  - Heptafluorobutyric acid (HFBA), less than 1%

- Ammonia/ammonium hydroxide, less than 1%

Ventilation Precautions

The venting of fumes and disposal of waste must comply with all of the federal, state, provincial, and local health and safety regulations. It is the responsibility of the customer to make sure that the air quality is maintained in compliance with local health and safety regulations.

The source exhaust system and roughing pump must be vented to a dedicated laboratory fume hood or an external exhaust system.

WARNING! Fire Hazard. Make sure that the source exhaust system is connected and functioning, to prevent flammable vapor from accumulating in the ion source.

WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. If hazardous, biohazardous, or radioactive materials have been analyzed in the mass spectrometer, then make sure to vent exhaust gases to a dedicated laboratory fume hood or exhaust system, and make sure that the ventilation tubing is secured with clamps. Make sure that the laboratory has correct air exchange for the work performed.

WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. Do not operate the mass spectrometer if the source exhaust drain and roughing pump exhaust hoses are not properly connected to the laboratory ventilation system. Examine the exhaust tubing regularly to make sure that there are no leaks. The use of mass spectrometers without proper system ventilation might constitute a health hazard and might result in serious injury.

WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. Do not use the ion source without knowledge of and training in the proper use, containment, and evacuation of toxic or injurious materials used with the ion source.

WARNING! Puncture Hazard, Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. If the ion source window is cracked or broken, then do not use the ion source. Contact a SCIEX field service employee (FSE). Any toxic or injurious materials introduced in the equipment will be present in the source exhaust output. Exhaust from equipment should be vented from the room. Dispose of sharps following established laboratory safety procedures.

Physical Precautions

WARNING! Hot Surface Hazard. Before any maintenance procedures are started, let the temperature of the OptiFlow Pro ion source decrease for at least 40 minutes. Some surfaces of the ion source and vacuum interface become hot during operation.

WARNING! Lifting Hazard. Use a mechanical lifting device to lift and move the mass spectrometer. If the mass spectrometer must be moved manually, then at least seven people are required to move it safely. Follow established safe lifting procedures. We recommend the use of a professional moving service. For the weights of system components, refer to the document: *Site Planning Guide*.

Environmental Precautions

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

When the system is set up, make sure that there is sufficient access space around the equipment.

DANGER! Explosion Hazard. Do not operate the system in an environment that contains explosive gases. The system is not designed for operation in an explosive environment.

WARNING! Biohazard. If biohazardous materials have been used with the system, always obey local regulations for hazard assessment, control, and handling. Neither this system nor any part is intended to be used as a biological containment.

WARNING! Environmental Hazard. Obey established procedures for disposal of biohazardous, toxic, radioactive, and electronic waste. The customer is responsible for the disposal of hazardous substances, including chemicals, waste oils, and electrical components, in accordance with local laws and regulations.

CAUTION: Potential Mass Shift. Maintain a stable ambient temperature. If the temperature changes by more than 2 °C per hour, then the resolution and mass calibration might be affected.

Electromagnetic Environment

Electromagnetic Compatibility

Basic Electromagnetic Environment: Environment existing at locations characterized by being supplied directly at low voltage from the public mains network.

Performance Criteria A (Criteria A): Equipment shall operate as intended with no degradation of performance and no loss of function during or after the test.

Performance Criteria B (Criteria B): Equipment may experience loss of function (one or more) during the test but shall operate as intended after the test.

Performance Criteria C (Criteria C): LOSS OF FUNCTION is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

The equipment is intended for use in a basic electromagnetic environment.

The permissible performance loss under the electromagnetic immunity conditions is less than 20% change in total ion count (TIC).

Make sure that a compatible electromagnetic environment for the equipment can be maintained so that the device will operate as intended. If the power supply line is subject to high electrical noise, then install a surge protector.

Electromagnetic Interference

Group 1 Equipment: This equipment is classified as industrial, scientific, and medical (ISM) equipment that might use RF energy for internal operation.

Class A Equipment: Equipment which is suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes. [Derived from CISPR 11:2009, 5.3] Class A equipment shall meet Class A limits.

CAUTION: Potential Radio Interference. This equipment is not intended for use in residential environments and may not supply adequate protection to radio reception in such environments.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC (Federal Communications Commission) Compliance Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the operator's manual, can cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case you will be required to correct the interference, at your own expense. Changes or

modifications not expressly approved by the manufacturer could void your authority to operate the equipment.

Decommissioning and Disposal

WARNING! Environmental Hazard. Obey established procedures for disposal of biohazardous, toxic, radioactive, and electronic waste. The customer is responsible for the disposal of hazardous substances, including chemicals, waste oils, and electrical components, in accordance with local laws and regulations.

Before decommissioning, obey local regulations to decontaminate the entire system.

When the system is removed from service, obey national and local environmental regulations to divide and recycle different materials. Refer to the section: Storage and Handling.

Note: SCIEX will not accept any system returns without a completed *Decontamination Form*. Contact an FSE to get a copy of the form.

Do not discard system components or subassemblies, including computer parts, as unsorted municipal waste.

Waste Electrical and Electronic Equipment

Obey local municipal waste ordinances for the correct disposal provisions to decrease the environmental impact of waste, electrical, and electronic equipment (WEEE). To discard this equipment safely, contact a local Customer Service office for complimentary equipment pick-up and recycling.

Qualified Personnel

Only qualified SCIEX personnel are permitted to install, examine, and supply servicing for the equipment. After the system has been installed, the field service employee (FSE) uses the document: *Customer Familiarization Checklist* to help the customer become familiar with system operation, cleaning, and basic maintenance. If a system under warranty is serviced by personnel who are not authorized by SCIEX, then SCIEX is not responsible to repair any damage caused by the servicing.

Only personnel qualified by the manufacturer shall maintain the equipment. A laboratory designate can be familiarized with the qualified maintenance person (QMP) procedures during the installation. A QMP is a person who is suitably aware of the electrical and chemical risks associated with servicing laboratory equipment.

Laboratory Conditions

Safe Environmental Conditions

The system is designed to operate safely in these conditions:

- Indoors
- Altitude: Up to 2,000 m (6,560 ft) above sea level
- Ambient temperature: 5 °C (41 °F) to 40 °C (104 °F)
- Relative humidity: 20% to 80%, noncondensing
- Mains supply voltage fluctuations: ±10% of the nominal voltage
- Transient overvoltages: Up to the levels of Overvoltage Category II
- Temporary overvoltages on the mains supply
- Pollution Degree 2

Performance Specifications

The system is designed to meet specifications under these conditions:

- An ambient temperature of 15 °C to 30 °C (59 °F to 86 °F)

  Over time, the temperature must remain within a range of 4 °C (7.2 °F), with the rate of the change in temperature not exceeding 2 °C (3.6 °F) per hour. Ambient temperature fluctuations exceeding the limits might result in mass shifts in spectra.
- Relative humidity from 20% to 80%, noncondensing

Equipment Use and Modification

WARNING! Electrical Shock Hazard. Do not remove the covers. If the covers are removed, then injury or incorrect system operation can occur. Removal of the covers is not required for routine maintenance, inspection, or adjustment. For repairs that require removal of the covers, contact a SCIEX field service employee (FSE).

WARNING! Personal Injury Hazard. Use only parts that are recommended by SCIEX. The use of parts that are not recommended by SCIEX or the use of parts for any purpose other than their intended purpose can put the user at risk of harm or have a negative effect on system performance.

WARNING! Lifting Hazard. Use a mechanical lifting device to lift and move the mass spectrometer. If the mass spectrometer must be moved manually, then at least seven people are required to move it safely. Follow established safe lifting procedures. We recommend the use of a professional moving service. For the weights of system components, refer to the document: *Site Planning Guide*.

CAUTION: Potential System Damage. Do not use laboratory cleaning solvents or waxes that give off gas near the mass spectrometer. The gas can cause high background noise.

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

If the system is used in conditions or in an environment that are not approved by the manufacturer, then the performance and protection that is supplied by the equipment might be decreased or lost.

Contact an FSE for information about servicing the system. Unauthorized modification or operation of the system might cause personal injury and equipment damage, and might void the warranty. If the system is operated outside the recommended environmental conditions or with unauthorized modifications, then the acquired data might be inaccurate.

Principles of Operation 2

The system is designed for the qualitative and quantitative analysis of chemical species.

This section includes information about the mass spectrometer. For an overview of the ion source, refer to the document: *OptiFlow Pro Ion Source Operator Guide*.

System Overview

This system is intended for the qualitative and quantitative analysis of chemical species.

The SCIEX 7500+ system includes an upgrade path to QTRAP functionality. Users can purchase a QTRAP license to get access to the linear ion trap (LIT) features. For more information, go to sciex.com.

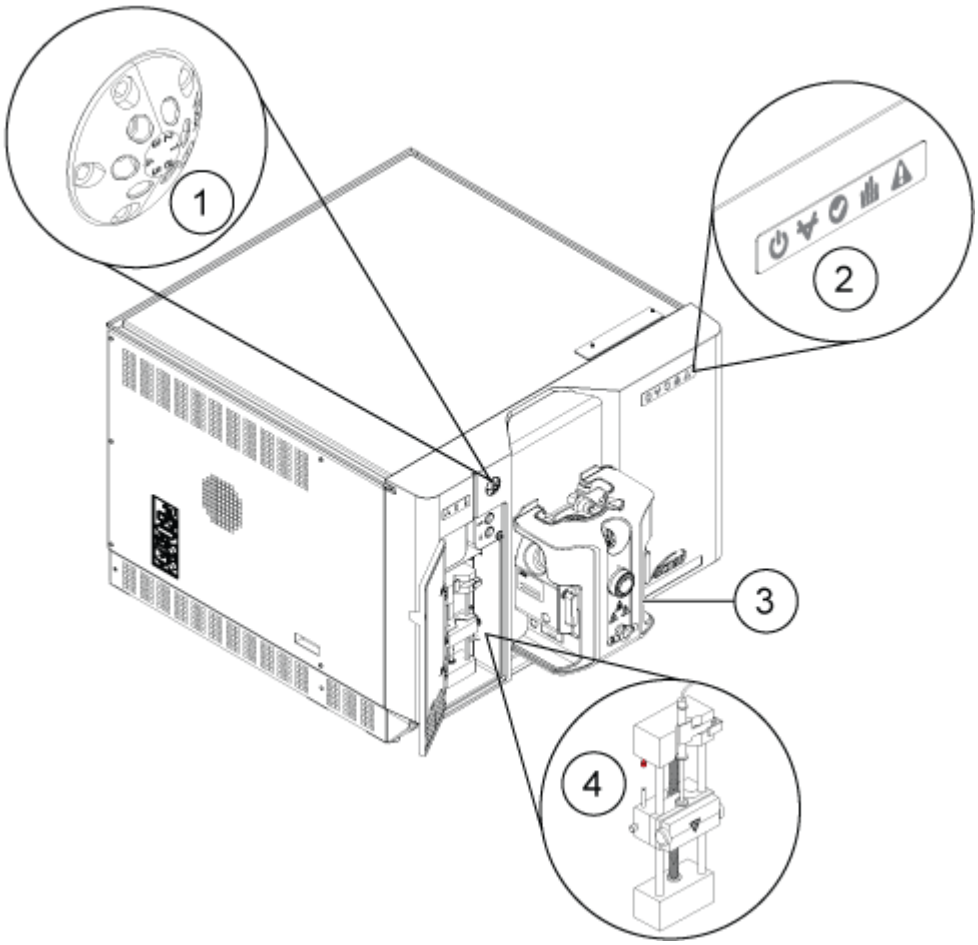
The system includes the following components:

- A SCIEX 7500+ mass spectrometer.
- Roughing pumps. The following roughing pump configurations are available:
  - Two oil-sealed roughing pumps
  - Two dry pumps

  Note: Do not use the oil-sealed roughing pump and the dry pump on the same mass spectrometer.
- An OptiFlow Pro ion source that uses the analytical flow ESI probe and the analytical flow E Lens probe. Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.
- A SCIEX-supplied computer and monitor with the control software for instrument optimization, acquisition method development, data acquisition, and processing. For computer specifications and requirements, refer to the software documentation.

Hardware Overview

Figure 2-1 Front View



Item	Description	For More Information
1	Diverter valve	Refer to the section: Diverter Valve.
2	Panel symbols	Refer to the section: Panel Symbols.
3	Ion source	Refer to the document: *OptiFlow Pro Ion Source Operator Guide*, available from the ion source documentation USB or DVD or at sciex.com.
4	Syringe pump	Adjust the Integrated Syringe Pump Position.

Panel Symbols

The following table gives a description of the status LEDs on the mass spectrometer.

Table 2-1 Panel Symbols

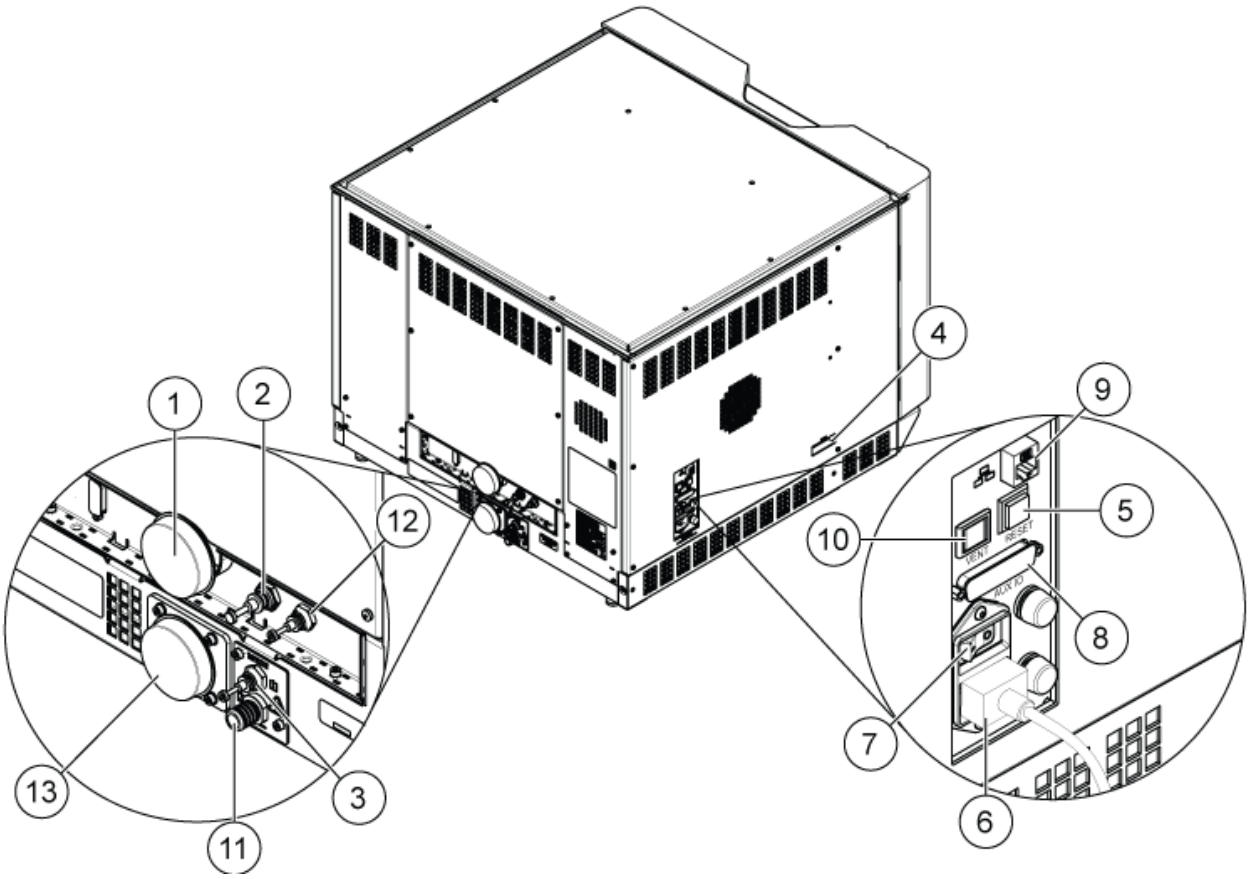
LED	Color	Name	Description
	Green	Power	Illuminates when power to the system is on.
	Green	Vacuum	Illuminates during pumpdown and when the mass spectrometer is at the operating vacuum level, that is, when the mass spectrometer is in the Ready or Idle state. Flashes approximately 30 minutes after venting starts. Does not illuminate when the mass spectrometer is vented.
	Green	Ready	Flashes when the mass spectrometer is vented.
	Blue	Scanning	Flashes when the system is acquiring data.
	Red	Fault	Illuminates when a system fault is found. Flashes slowly during pumpdown, when the mass spectrometer is in the Idle or Ready state, and when the mass spectrometer is vented. Flashes quickly approximately 30 minutes after venting starts.

When power to the system is turned on, all of the LEDs illuminate. The power LED stays illuminated. The other LEDs flash for 2 seconds and then goes off. The vacuum LED starts to flash. When the system gets to the operating vacuum level, the vacuum LED stays illuminated.

Connections

The following figure shows the location of the mass spectrometer connections. The locations of the **RESET** and **VENT** buttons and the mass spectrometer convenience switch are shown.

Figure 2-2 Back and Side Views



Item	Description	For More Information
1	Roughing pump vacuum connection (MS 40 or MSR 90)	Contact an FSE.
2	Air supply (Gas 1/Gas 2)	Refer to the document: *Site Planning Guide*. Gas tubing from the Gas 1/Gas 2 supply connects to this port.
3	Source exhaust supply	Refer to the document: *Site Planning Guide*. Gas tubing from the source exhaust gas supply connects to this port.
4	Source communication connection	Contact an FSE.
5	**RESET** button	Refer to the section: Reset the Mass Spectrometer.

Item	Description	For More Information
6	Mains supply connection	Refer to the section: Start Up the System or Shut Down and Vent the System.
7	Mass spectrometer convenience switch	Refer to the section: Start Up the System or Shut Down and Vent the System. • Up: Power to the system is on. • Down: Power to the system is off.
8	Aux I/O connection	Refer to the document: *Devices Setup Guide*.
9	Ethernet connection (connects the mass spectrometer and the computer)	Contact an FSE.
10	**VENT** button	Refer to the section: Start Up the System or Shut Down and Vent the System.
11	Source exhaust waste (to the source exhaust drain bottle)	Refer to the document: *Site Planning Guide*.
12	Nitrogen gas supply (gas for the Curtain Gas interface, CAD gas)	Refer to the document: *Site Planning Guide*. Gas tubing from the nitrogen gas supply connects to this port.
13	Roughing pump vacuum connection (MS 120 or MSR 130)	Contact an FSE.

Theory of Operation—Hardware

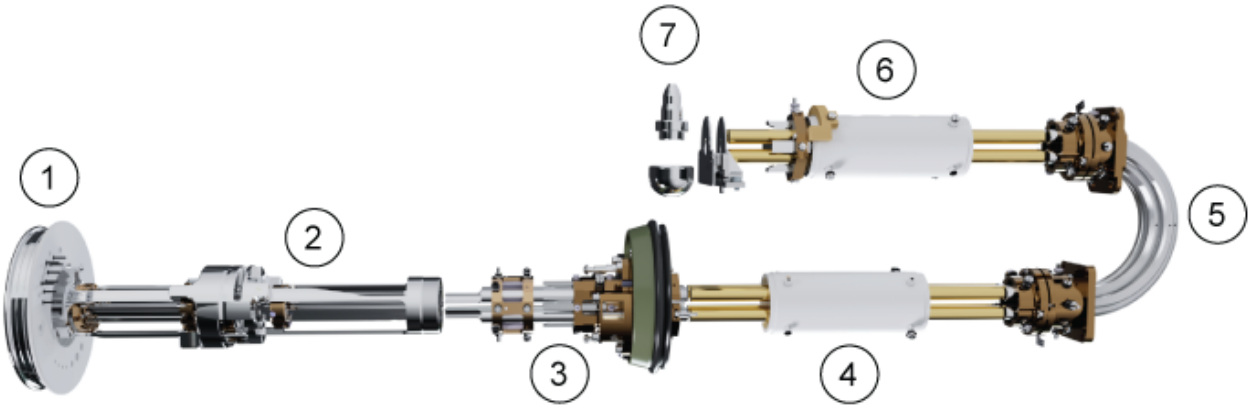
Mass spectrometry measures the mass-to-charge ratio (*m/z*) of ions to identify unknown compounds, quantify known compounds, and supply information about the structural and chemical properties of molecules.

The SCIEX 7500+ system uses Mass Guard technology, a hardware and software technology that can increase system uptime.

The mass spectrometer has a series of quadrupole filters that use the *m/z* value of the ions to transmit them. The first quadrupole in this series is the DJet+ assembly, which is between the orifice plate and the Q0 region. To increase sensitivity and get a better signal-to-noise ratio, the DJet+ assembly puts the ions in focus before they go into the Q0 region. In the Q0 region, the T Bar electrodes, which are one of the features of Mass Guard technology, help to prevent the

transmission of contaminants into the system. The Q0 region puts the ions into focus again, before they go into the Q1 quadrupole.

Figure 2-3 Ion Path



Item	Description
1	Curtain plate and orifice plate
2	DJet+ ion guide
3	Q0 region, with the T Bars
4	Q1 quadrupole
5	Q2 collision cell
6	Q3 quadrupole
7	Detector

The Q1 quadrupole is a filtering quadrupole that organizes the ions before they go into the Q2 collision cell. In the Q2 collision cell the internal energy of an ion is increased through collisions with gas molecules until the molecular bonds break to make product ions. This technique lets users make experiments that measure the *m/z* of product ions to find the composition of the parent ions.

After the ions go through the Q2 collision cell, they go into the Q3 quadrupole for more filtering. Then they go into the detector. In the detector, the ions supply a current that is changed into a voltage pulse. The voltage pulses that go out of the detector are directly proportional to the quantity of ions that go into the detector. The system monitors these voltage pulses and then changes the information into a signal. The signal shows the ion intensity for an *m/z* value and the system shows this information as a mass spectrum.

The linear ion trap (LIT) functionality supplies a number of Enhanced modes of operation. A common factor of the Enhanced modes is that ions are trapped in the Q3 quadrupole region and

then scanned out to supply full spectrum data. Many spectra are collected quickly, and are much more intense than spectra collected in a comparable standard quadrupole mode of operation.

Note: Linear ion trap features are only available on systems that have the QTRAP feature activated.

During the collection phase, ions go through the Q2 collision cell, where the CAD gas puts the ions in focus. Then the ions go into the Q3 region. The Q3 quadrupole is operated with only the main RF voltage applied. An exit lens to which a DC barrier voltage is applied keeps ions in the Q3 quadrupole. After the fill time, which is configured by the user or controlled by the Dynamic Fill Time feature, a DC barrier voltage is applied to the Q3 entrance lens (IQ3). This voltage keeps the collected ions in the Q3 region and prevents the entry of more ions. The entrance and exit lens DC voltage barriers and the RF voltage applied to the quadrupole rods keep the ions in the Q3 region.

During the scan-out phase, the voltage on the exit lens, the auxiliary RF voltage, and the main RF voltage are increased gradually to supply increased resolution and sensitivity as compared to quadrupole scan types. An auxiliary AC frequency is applied to the Q3 quadrupole. The main RF voltage amplitude is increased gradually from low to high values, which sequentially puts masses in resonance with the auxiliary AC frequency. When ions are in resonance with the AC frequency, they get enough axial velocity to go through the exit lens barrier and are axially ejected toward the mass spectrometer ion detector. Full spectra data can be acquired from the ions collected in the Q3 region with fast scans of the main RF voltage.

For information about the available software parameters, refer to the document: *Help System*.

Operating Instructions — Hardware 3

WARNING! Personal Injury Hazard. To use the system safely, follow the instructions in the documentation. If the equipment is used in a manner not specified by SCIEX, then the protection supplied by the equipment might be decreased.

Start Up the System

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

Note: Before operation of the system, read the safety information in the section: Operational Precautions and Limitations.

Prerequisites

- The site requirements specified in the *Site Planning Guide* are met. The *Site Planning Guide* includes information about the requirements for the mains supply and connections, compressed air, nitrogen, roughing pump, ventilation, exhaust, and site clearance. If required, then contact SCIEX for a copy of the *Site Planning Guide*. For contact information, go to sciex.com/contact-us.
- The source exhaust gas, compressed air, and nitrogen gases are connected to the mass spectrometer.
- The 4 L source exhaust drain bottle is connected to the exhaust waste connection of the mass spectrometer and to the laboratory ventilation system.
- The source exhaust hoses are securely clamped at the mass spectrometer, source exhaust drain bottle, and ventilation connections.
- Exhaust hoses from the roughing pumps have been connected to the laboratory ventilation system.
- The mass spectrometer convenience switch is turned off and the mains supply cable is connected to the mass spectrometer.
- The mass spectrometer and roughing pump mains supply cables are connected to the 200 VAC to 240 VAC mains supply.
- The Ethernet cable is connected to both the mass spectrometer and the computer.

1. Turn on the mass spectrometer convenience switch. Refer to the figure: Figure 2-2.
2. Turn on the computer.
3. Open the control software.

Syringe Pump

Adjust the Integrated Syringe Pump Position

WARNING! Puncture Hazard. Take care when handling the syringe. The tip of the syringe is extremely sharp.

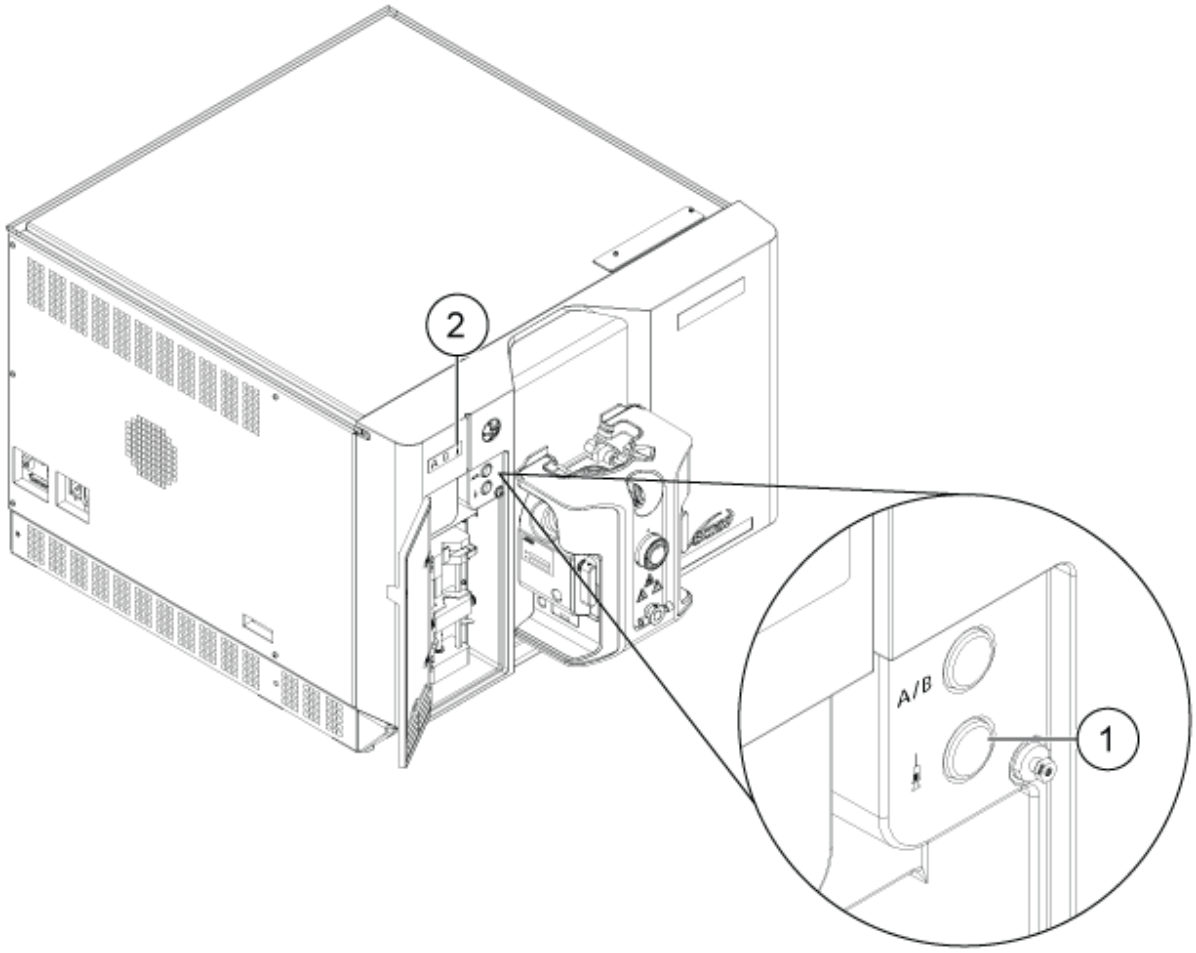
WARNING! Puncture Hazard. To prevent damage to the glass syringe, make sure that the syringe is installed correctly in the syringe pump and that the automatic syringe pump stop is adjusted correctly. If the syringe breaks, then obey the established safety procedures for sharps disposal.

For the location of the syringe pump on the mass spectrometer, refer to the figure: Figure 2-1.

1. Open the syringe cover.
2. Press the Release button on the right side of the syringe pump to lower the base and then insert the syringe.
3. Make sure that the end of the syringe is flush with the base and that the shaft of the syringe rests in the cutout.
4. Adjust the post so that it triggers the automatic syringe stop before the syringe plunger hits the bottom of the glass syringe.
5. Make sure that the mass spectrometer and integrated syringe pump are activated in the software.

Note: For subsequent manual use, after the mass spectrometer is in Ready state, start the flow by pressing the button on the mass spectrometer that is to the right of the syringe. The syringe pump flow can also be controlled automatically by the control software.

Figure 3-1 Syringe Pump LED



Item	Description
1	Syringe pump on and off button
2	Syringe pump status LED

6. Use the control software to start or stop the syringe pump.

Diverter Valve

WARNING! Electrical Shock Hazard. Ground the sample line through the diverter valve to avoid an electrical discharge from the high voltage between the ion source and the syringe pump.

The front panel of the mass spectrometer contains an integrated six-port, two position diverter valve. It can be configured as either a diverter valve, to move solvents to waste until sample is in the liquid stream, or an injector valve with an injector loop.

The diverter valve is located at the top left of the front cover. The stator face is visible when the front cover is closed under operating conditions.

Buttons inside the syringe panel, on the dress panel, can be used to manually change the state of the diverter valve.

CAUTION: Potential Wrong Result. Do not press the diverter valve button during a run. Doing so might result in incorrect data.

Plumb the Diverter Valve in Injector Mode

When the valve is in position A, the sample flows through the external loop. When the valve changes to position B, the sample is injected.

- Plumb the valve for Injector mode.

Figure 3-2 Diverter Valve: Injector Mode Position A

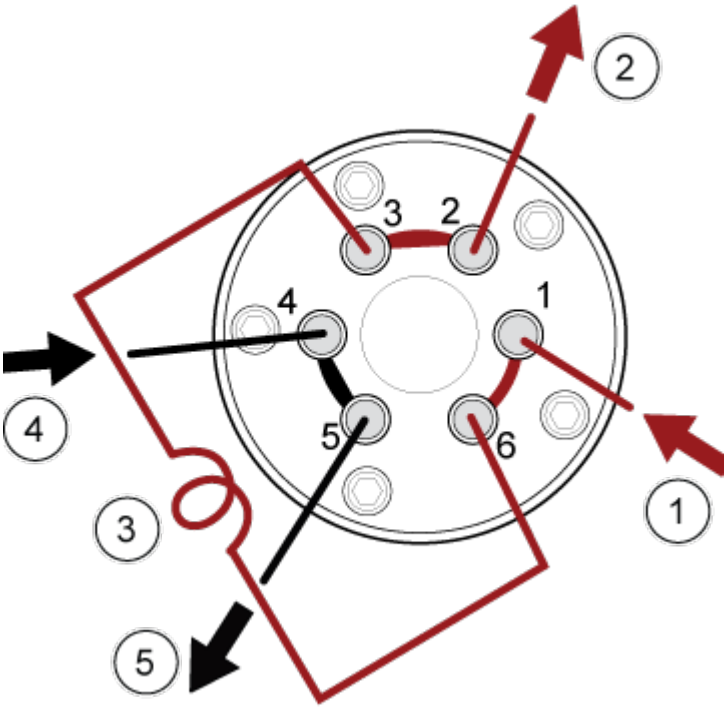
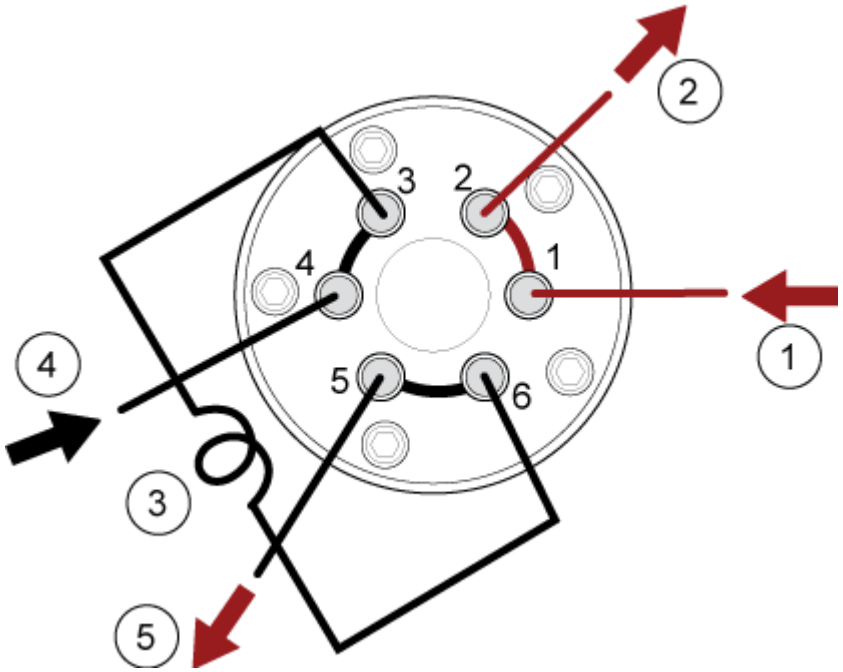


Figure 3-3 Diverter Valve: Injector Mode Position B



Item	Description
1	Sample in
2	Waste out
3	Sample loop (ports 3 and 6)
4	Mobile phase in
5	To the column, or to the mass spectrometer, if a column is not installed

Plumb the Diverter Valve in Diverter Mode

When the valve is in position A, the sample flow goes to the mass spectrometer. When the valve changes to position B, the flow goes to waste.

- Plumb the valve for Diverter mode.

Figure 3-4 Diverter Valve: Diverter Mode Position A

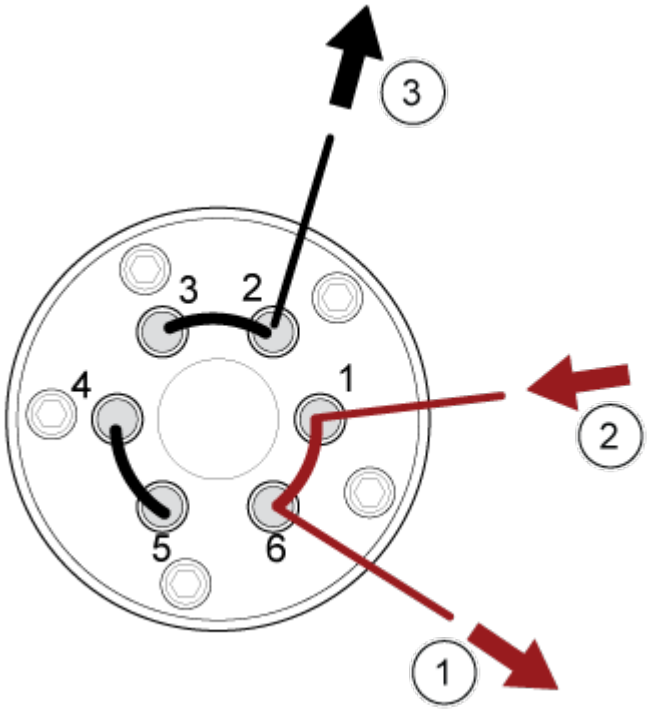
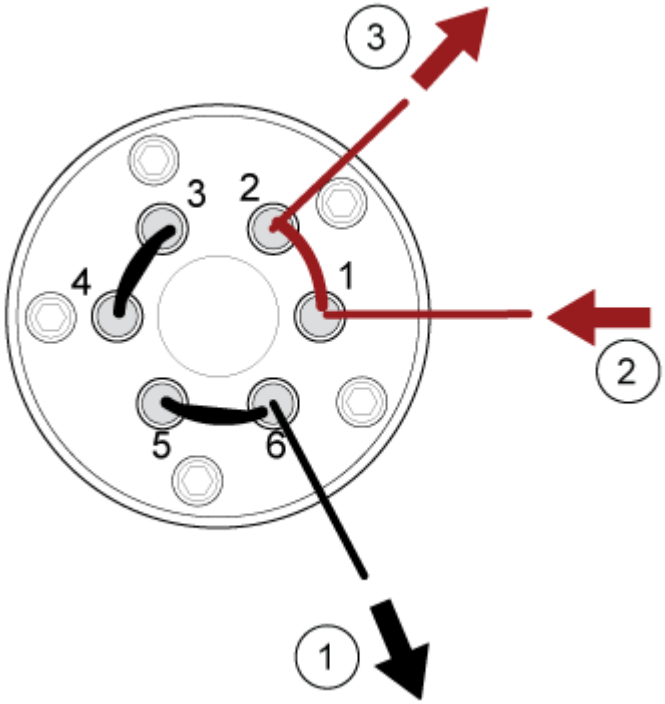


Figure 3-5 Diverter Valve: Diverter Mode Position B



Item	Description
1	To the mass spectrometer
2	From the column
3	Waste out

Shut Down and Vent the System

Some procedures require that the system be shut down, that is that the power to the system be turned off. Others require that it be *vented*, that is, that the vacuum pressure be released. Follow these steps to shut the system down or release the pressure, as required.

Note: If the input gas supply must be disconnected, then relieve the pressure in the gas lines before disconnecting it.

Tip! If the mass spectrometer must be shut down, then follow these instructions.

1. Complete or stop any ongoing scans.

   CAUTION: Potential System Damage. Turn off the sample flow before the system is shut down.

2. Turn off the sample flow to the system.
3. If the mass spectrometer is active, then in the control software, deactivate it. Refer to the document: *Software User Guide*.
4. Close the control software.
5. To vent the system, do these steps:

   a. Press and hold the **Vent** button for 3 seconds. Refer to the figure: Figure 2-2. The Vacuum LED begins flashing more quickly than during pump down. The turbo pump spins down gradually.

   b. Allow the system to vent for 10 minutes.

6. Turn off the mass spectrometer convenience switch.
7. Disconnect the mass spectrometer mains supply cable from the mains supply outlet.
8. (If venting the system) Disconnect the roughing pump mains supply cable from the mains supply outlet.

   Note: Make sure to connect this cable before starting up the mass spectrometer. If it is not connected, then the mass spectrometer will remain in Idle state, and the pump down sequence will not be initiated.

Reset the Mass Spectrometer

CAUTION: Potential System Contamination. Make sure to vent the system, to avoid damage to the mass spectrometer.

1. Stop any ongoing scans and then turn off sample flow to the mass spectrometer.
2. In the control software, deactivate the mass spectrometer. Refer to the document: *Software User Guide*.
3. Close the control software.
4. Follow these steps to vent the system:
    a. Press and hold the **Vent** button for 3 seconds. Refer to the figure: Figure 2-2.
    The Vacuum LED begins flashing more quickly than during pump down. The turbo pump spins down gradually.
    b. Allow the system to vent for 10 minutes.
5. Press and hold the **Reset** button for five seconds.
    A click is heard when the relay activates. After approximately 10 minutes, the mass spectrometer reaches operating pressure.

Operating Instructions — User Workflows 4

After the system is installed and configured, it is ready for use. The following table shows the workflows available. For each task, a reference that contains more information is listed.

Table 4-1 User Workflows

Task	Reference
Analyst	
Monitor the system status	*Help System*
Create and submit batches	*Help System*
View and manage samples in the queue	*Help System*
Explore data	*Help System*
Method Developer	
Configure the system	• Configure the mass spectrometer: *Help System* • Create projects and data folders: *Help System* • Configure the LC devices: *Help System*
Tune the mass spectrometer	*Help System*
Create MS methods	*Help System*
Create LC methods	*Help System*
Develop processing methods	*Help System*
Administrator	
Set the Windows file permissions	*Laboratory Director Guide*
Configure the LIMS	*Help System*.
Add users to the software and assign roles	*Laboratory Director Guide* or *Help System*
Archive logs	*Help System*
Reviewer	
Review processed results	*Help System*

Table 4-1 User Workflows (continued)

Task	Reference
Explore data	*Help System*
Review logs	*Help System*

Service and Maintenance Information 5

Regularly clean and maintain the system for optimal performance.

WARNING! Electrical Shock Hazard. Do not remove the covers. If the covers are removed, then injury or incorrect system operation can occur. Removal of the covers is not required for routine maintenance, inspection, or adjustment. For repairs that require removal of the covers, contact a SCIEX field service employee (FSE).

WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. Before cleaning or maintenance, identify whether decontamination is required. If radioactive materials, biological agents, or toxic chemicals have been used with the system, then the customer must decontaminate the system before cleaning or maintenance.

Maintenance Overview

Tip! Do maintenance tasks regularly to make sure that system performance is optimal.

- At intervals, do a general maintenance inspection, and examine all connections, to make sure that system operation is safe. Refer to the section: Examine the Connections.
- Clean the system regularly to keep it in the correct condition for operation.
- During system maintenance, carefully examine the components of the external gas supply system. To make sure that the condition is satisfactory, examine the tubing that is connected to the equipment. Replace tubing that is collapsed or that has cracks or pinches.

For information about maintenance of the ion source, refer to the document: *OptiFlow Pro Ion Source Operator Guide*.

Maintenance Frequency

How often maintenance should be done on the mass spectrometer and ion source is related to the following factors. These factors can cause changes in mass spectrometer performance over time.

- Compounds tested
- Cleanliness of the samples and the sample preparation methods
- Amount of time that the probe is exposed to the sample

- Overall system run time

Use the **System Check** feature in the MS Tune workspace regularly to examine system health. Refer to the document: *SCIEX OS Help System*.

Note: For information about tuning frequency, refer to the section: Calibration Ions and Solutions.

To order consumable parts and for basic service and maintenance requirements, contact a qualified maintenance person (QMP) or refer to the document: *Parts and Equipment Guide*. Contact a SCIEX field service employee (FSE) for all other service and maintenance requirements.

Recommended Maintenance Schedule

The following tables supply a recommended schedule for system cleaning and maintenance.

Table 5-1 Mass Spectrometer Maintenance Tasks

Component	Frequency	Task	For More Information
System	Daily	Examine for leaks	Refer to the section: Chemical Precautions.
Curtain plate	Daily	Clean	Refer to the section: Clean the Curtain Plate.
Oil-sealed roughing pump[1]: Roughing pump oil	Weekly	Examine the level	Refer to the section: Inspect the Roughing Pump Oil Level (Oil-Sealed Roughing Pump). Contact the local QMP or FSE to add oil, if required.
Oil-sealed roughing pump[1]: Roughing pump oil	Every 2 years, or as required	Replace	Contact the local QMP or FSE.
Oil-sealed roughing pump[1]: Roughing pump oil	As required	Refill	Contact the local QMP or FSE.
Orifice plate (front)	As required	Clean	Refer to the section: Clean the Front of the Orifice Plate.
Orifice plate (front and back)	As required	Clean	Contact the local QMP or FSE.
Mass spectrometer air filter	As required	Replace	Contact the local QMP or FSE.

[1] This procedure is not applicable for the dry roughing pump.

Table 5-1 Mass Spectrometer Maintenance Tasks (continued)

Component	Frequency	Task	For More Information
DJet+ assembly	As required	Clean	Contact the local QMP or FSE.
IQ00 lens	As required	Clean	Contact the local QMP or FSE.
IQ0 lens	As required	Clean	Contact the local QMP or FSE.
Instrument surfaces	As required	Clean	Refer to the section: Clean the Surfaces.
Source exhaust drain bottle	As required	Empty	Refer to the section: Empty the Source Exhaust Drain Bottle.
Interface heater	As required	Replace	Contact the local QMP or FSE.

Table 5-2 Ion Source Maintenance Tasks

Component	Frequency	Task	For More Information
Probes	As required	Examine and replace	Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.
Electrodes	As required	Examine and replace	Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.
Sample tubing	As required	Replace	Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.
Contact pads for the spring-loaded pins	As required	Clean	Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.
E Lens probe	As required	Clean or replace	Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.

For tasks that are done as required, follow these guidelines:

- Clean the mass spectrometer surfaces when they become dirty or after a spill.
- Empty the source exhaust drain bottle before it becomes full.
- If system sensitivity decreases, then clean the orifice plate and DJet+ assembly. Refer to the section: Mass Spectrometer Troubleshooting, or contact an FSE.
- Oil-sealed roughing pump: When the oil level is below the minimum, add oil.
- Examine all of the exhaust connections at regular intervals to make sure that the integrity is satisfactory, and that any exhaust is removed from the customer lab.

Clean the Surfaces

Clean the external surfaces of the mass spectrometer after a spill or when they become dirty.

CAUTION: Potential System Damage. Use only the recommended cleaning methods and materials to avoid damaging the equipment.

1. Wipe the external surfaces with a soft cloth dampened with warm, soapy water.
2. Wipe the external surfaces with a soft cloth dampened with water to remove any soap residue.

Examine the Connections

- Examine the following connections to make sure that they are tight, and that there is no leakage:
  - Source exhaust connections from the mass spectrometer to the source exhaust drain bottle, and from the source exhaust drain bottle to the vent.
  - Roughing pump connections from the roughing pump to the vent.
  - Gas line connections at the back of the instrument, and at the pressure regulators and gas generators.

Clean the Front End

The following warning applies to all of the procedures in this section:

WARNING! Hot Surface Hazard. Before any maintenance procedures are started, let the temperature of the OptiFlow Pro ion source decrease for at least 40 minutes. Some surfaces of the ion source and vacuum interface become hot during operation.

Clean the mass spectrometer front end using the routine cleaning method, to:

- Minimize unscheduled system downtime.
- Maintain optimum sensitivity.
- Avoid more extensive cleaning that requires a service visit.

When contamination occurs, perform an initial routine cleaning. Clean up to and including the front of the orifice plate. If routine cleaning does not resolve issues with sensitivity, then a full cleaning might be necessary. Contact the local QMP or FSE.

This section supplies instructions for performing routine cleaning without breaking vacuum.

Note: Follow all of the applicable local regulations. For health and safety guidelines, refer to the section: Chemical Precautions.

Symptoms of Contamination

The system might be contaminated if any one of the following occurs:

- Significant loss in sensitivity
- Increased background noise
- Additional peaks that are not part of the sample in full scan or survey scan methods
- The charging test in the **System Check** function in the MS Tune workspace gives an indication of charging

If any of these issues occur, then clean the mass spectrometer front end.

Required Materials

The following materials are required to do routine cleaning:

- Powder-free gloves, nitrile or neoprene recommended
- Protective eyewear
- Laboratory coat
- New LC-MS–grade water

  Note: Old water can contain contaminants.

- Cleaning solution, either:
  - 100% LC-MS–grade methanol
  - 100% LC-MS–grade isopropanol (2-propanol)
- Clean 1 L or 500 mL glass beaker to prepare cleaning solutions
- 1 L beaker to collect used solvent
- Organic waste container
- Lint-free wipes. Refer to the section: Tools and Supplies Available from the Manufacturer.
- (Optional) Polyester (poly) swabs. Refer to the section: Tools and Supplies Available from the Manufacturer.

Tools and Supplies Available from the Manufacturer

Note: For part numbers, refer to the document: *Parts and Equipment Guide*.

- Small poly swab, thermally bonded. Also available in the Cleaning kit.
- Lint-free wipe (11 cm x 21 cm, 4.3 inches x 8.3 inches). Also available in the Cleaning kit.
- Cleaning kit. Contains the small poly swabs, lint-free wipes, SCIEX Cleaning Powder, cleaning tray, 1.5-mm long-shaft screwdriver, 2.5-mm long-shaft screwdriver, and retaining ring removal tool.

Cleaning Best Practices

WARNING! Hot Surface Hazard. Before any maintenance procedures are started, let the temperature of the OptiFlow Pro ion source decrease for at least 40 minutes. Some surfaces of the ion source and vacuum interface become hot during operation.

WARNING! Toxic Chemical Hazard. To use, keep, store, and discard chemicals safely, refer to the chemical product safety data sheets. Obey all of the recommended safety procedures.

WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. Before cleaning or maintenance, identify whether decontamination is required. If radioactive materials, biological agents, or toxic chemicals have been used with the system, then the customer must decontaminate the system before cleaning or maintenance.

WARNING! Environmental Hazard. Do not discard system components in municipal waste. To discard components correctly, obey local regulations.

- Let the ion source cool before removing it.
- Always wear clean, powder-free gloves, nitrile or neoprene recommended, for the cleaning procedures.
- After cleaning the mass spectrometer components, and before reassembling them, put on a new, clean pair of gloves.
- Do not use cleaning supplies other than those specified in this procedure.
- If possible, prepare cleaning solutions just before cleaning.
- Prepare and store all of the organic solutions and organic-containing solutions in very clean glassware only. Never use plastic bottles. Contaminants can leach from these bottles and cause more contamination the mass spectrometer.
- To prevent contamination of the cleaning solution, pour the solution on the wipe or swab.
- Let only the center area of the wipe touch the mass spectrometer surface. Cut edges can leave fibers behind.

Tip! Wrap the wipe around a thermally-bonded poly swab.

Figure 5-1 Example: Folding the Wipe

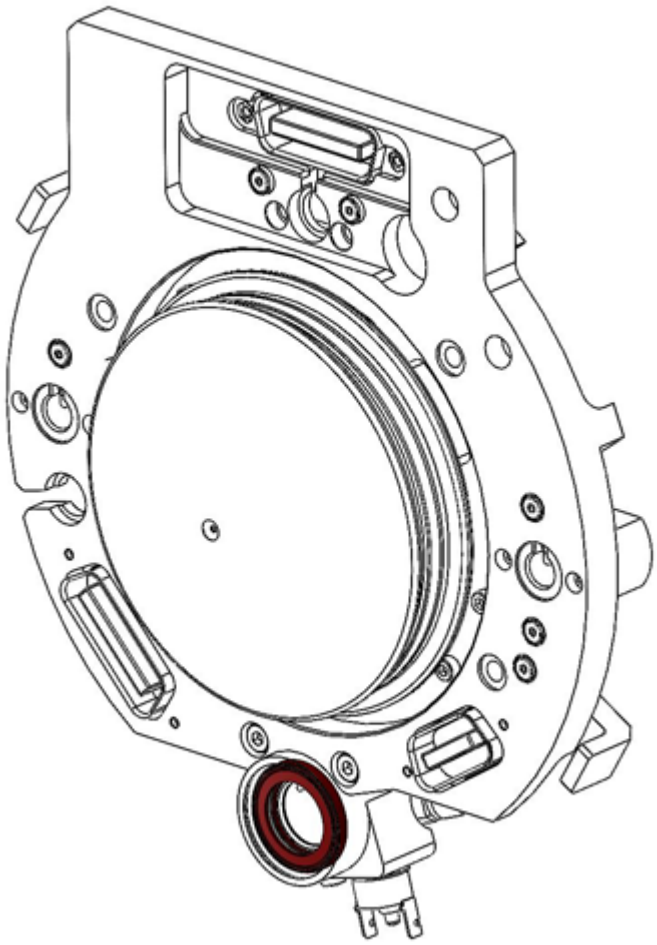
- To avoid cross-contamination, discard the wipe or swab after it has touched the surface once.
- If required, use multiple wipes to clean larger parts of the vacuum interface, such as the curtain plate, multiple times.
- Only dampen the wipe or swab slightly during application of water or cleaning solution. Water might cause the wipe to deteriorate, and thus leave residue on the mass spectrometer.
- Do not rub the wipe across the aperture. Wipe around the aperture to prevent fibers from the wipes from going into the mass spectrometer.
- Do not insert the brush in the aperture on the curtain plate or orifice plate.

Prepare the Mass Spectrometer

WARNING! Hot Surface Hazard. Before any maintenance procedures are started, let the temperature of the OptiFlow Pro ion source decrease for at least 40 minutes. Some surfaces of the ion source and vacuum interface become hot during operation.

CAUTION: Potential System Damage. Do not drop anything in the source drain when the ion source is removed.

Figure 5-2 Source Drain on the Vacuum Interface



1. Deactivate the devices in the SCIEX OS software. Refer to the document: *Help System*.
2. Remove the ion source. Refer to the document: *OptiFlow Pro Ion Source Operator Guide*. When the ion source is not in use, keep it in a safe location to prevent damage.

Clean the Curtain Plate

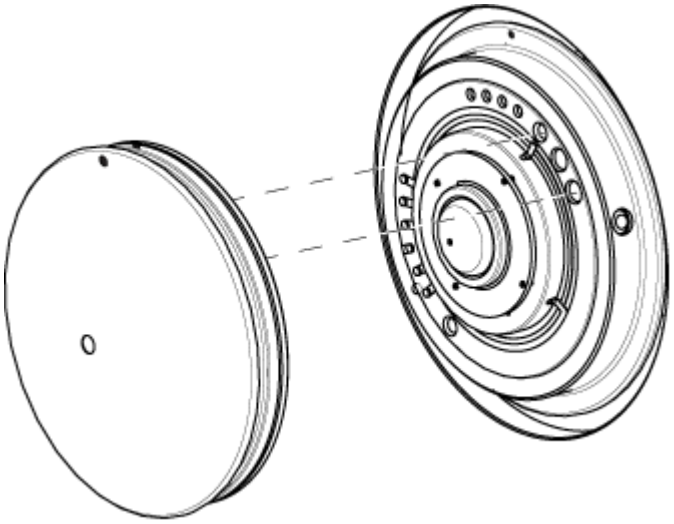
CAUTION: Potential System Damage. Do not rest the curtain plate or orifice plate on the aperture tip. Make sure that the conical side of the curtain plate faces up.

CAUTION: Potential System Damage. To prevent damage to the aperture, do not insert a wire or metal brush in the aperture on the curtain plate, orifice plate, or interface heater.

1. Pull the curtain plate straight off of the vacuum interface and then put it, conical side up, on a clean, stable surface.

   CAUTION: Potential System Damage. Do not touch the surface of the orifice plate with the curtain plate.

   Figure 5-3 Curtain Plate Removal

   The curtain plate is held in place by three retaining ball catches mounted on the orifice plate.

   Tip! If the curtain plate does not immediately separate from the orifice plate, then turn the curtain plate slightly, less than 90 degrees, to release the ball spring latches.

2. Dampen a lint-free wipe with LC-MS-grade water and then clean both sides of the curtain plate.

   Note: Use multiple wipes, as required.

3. Repeat step 2 with the cleaning solution.
4. Use a dampened wipe or small poly swab to clean the aperture.
5. Wait until the curtain plate is dry.
6. Examine the curtain plate for solvent stains or lint. Remove any residue with a clean, slightly damp, lint-free wipe.

   Note: If spotting or filming continues, then the solvent might be contaminated.

Clean the Front of the Orifice Plate

CAUTION: Potential System Damage. Do not remove the interface heater to clean the surface of the orifice plate. Frequent removal of the interface heater can cause damage. Surface cleaning of the interface heater is sufficient for routine cleaning.

CAUTION: Potential System Damage. To prevent damage to the aperture, do not insert a wire or metal brush in the aperture on the curtain plate, orifice plate, or interface heater.

CAUTION: Potential System Contamination. Make sure that the system is fully vented. If the system is cleaned while it is under vacuum, then dirt or debris, such as pieces of wipe, might go into the mass spectrometer.

Note: Do not use SCIEX Cleaning Powder to clean the orifice plate while it is installed on the mass spectrometer.

Prerequisites

- Vent the system. System shutdown is not required. Refer to the section: Shut Down and Vent the System.

1. Dampen a poly swab with LC-MS–grade water, and then wipe the front of the orifice plate and the interface heater.
2. Do step 1 again with the isopropanol or methanol.
3. Wait until the orifice plate is dry.
4. Examine the orifice plate for solvent stains or lint. Use a clean, dampened, lint-free wipe to remove any residue.

   Note: If spotting or filming continues, then the solvent might be contaminated.

Put the Mass Spectrometer Back in Service

1. Install the curtain plate.

   CAUTION: Potential System Damage. Do not touch the surface of the orifice plate with the curtain plate.

2. Install the ion source on the mass spectrometer. Refer to the ion source document: *Operator Guide*.

   Tighten the ion source by turning the source latches down in the locking position.
3. Activate the devices in the SCIEX OS software. Refer to the document: *Help System*.

Empty the Source Exhaust Drain Bottle

WARNING! Hot Surface Hazard. Before any maintenance procedures are started, let the temperature of the OptiFlow Pro ion source decrease for at least 40 minutes. Some surfaces of the ion source and vacuum interface become hot during operation.

WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. Deposit hazardous materials in appropriately labeled waste containers and dispose of them according to local regulations.

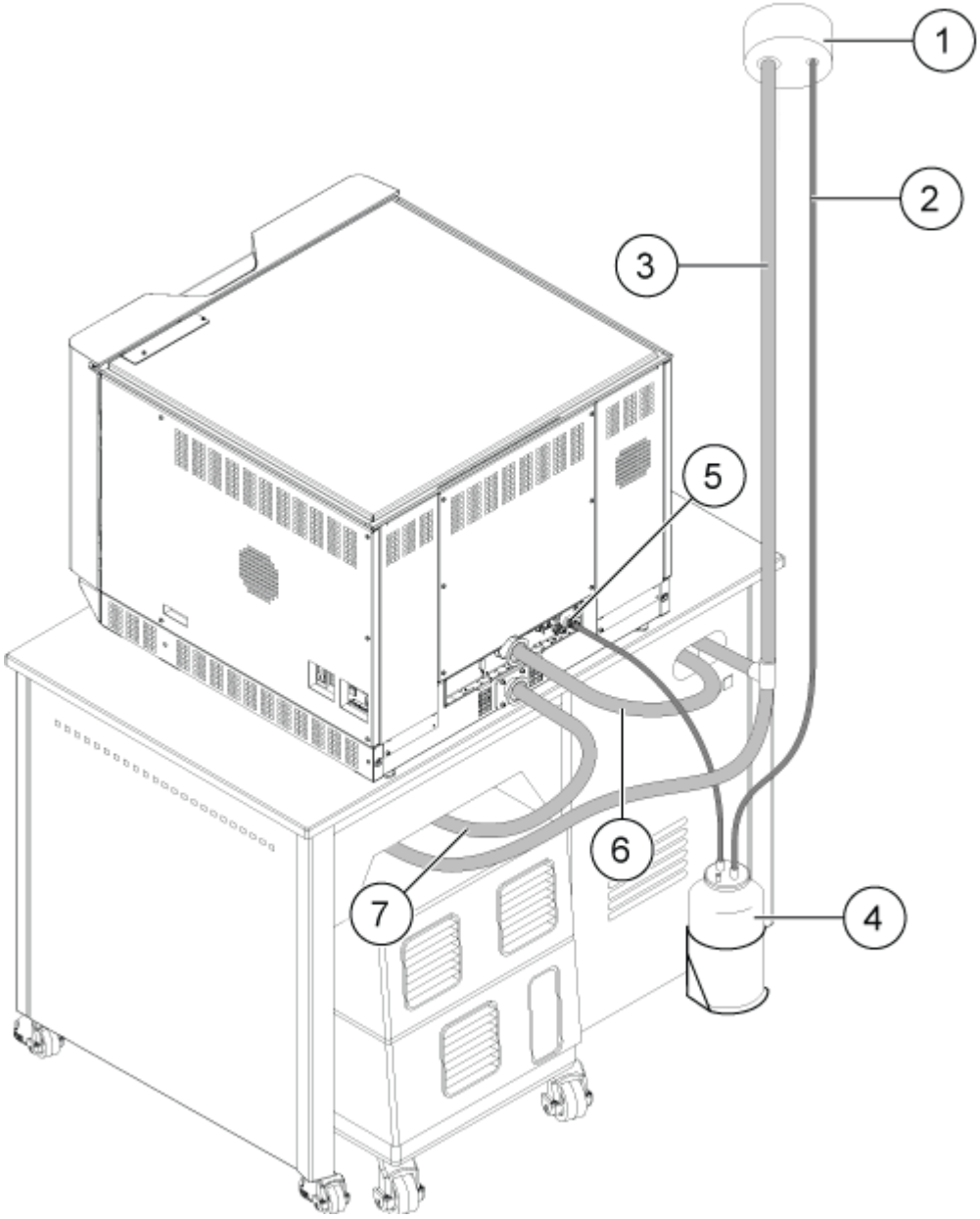
WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. If hazardous, biohazardous, or radioactive materials have been analyzed in the mass spectrometer, then make sure to vent exhaust gases to a dedicated laboratory fume hood or exhaust system, and make sure that the ventilation tubing is secured with clamps. Make sure that the laboratory has correct air exchange for the work performed.

Note: Make sure that there are no kinks, sags, or twists in the source waste line.

Inspect the source exhaust drain bottle regularly, and empty it before it becomes full. Also inspect the bottle and the fitting for leaks, and tighten connections or replace components, if required. Follow the steps in this procedure to empty the bottle.

1. Remove the ion source. Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.
2. Loosen the clamps connecting the hoses to the cap of the source exhaust drain bottle.

Figure 5-4 Source Exhaust Drain Bottle (Oil-Sealed Roughing Pump Configuration)



Item	Description
1	Connection to vent
2	Source exhaust drain tubing: 2.5 cm (1.0 inch) inner diameter (i.d.)
3	Roughing pump exhaust hose: 3.2 cm (1.25 inch) i.d.

Item	Description
4	Source exhaust drain bottle Make sure that the bottle is secured to prevent spillage.
5	Source exhaust connection to the mass spectrometer: 1.6 cm (0.625 inch) i.d.
6	Roughing pump vacuum inlet hose (MS 40 (as shown) or MSR 90).
7	Roughing pump vacuum inlet hose (MS 120 (as shown) or MSR 130).

Note: Source exhaust hose connections at the drain bottle, mass spectrometer, and laboratory vent are attached with hose clamps.

3. If applicable, lift the drain bottle out of the holder.
4. Disconnect the hoses from the cap.
5. Remove the cap from the drain bottle.
6. Empty the drain bottle and then dispose of the waste according to laboratory procedures and local waste regulations.
7. Install the cap on the bottle and then put the bottle in the holder.
8. Attach the hoses to the cap and then secure them tightly with clamps.

Inspect the Roughing Pump Oil Level (Oil-Sealed Roughing Pump)

- Inspect the sight glass on the roughing pump to make sure that the oil is above the minimum level.

  If the oil is below the minimum level, then contact the qualified maintenance person (QMP) or SCIEX field service employee (FSE).

Storage and Handling

WARNING! Environmental Hazard. Do not discard system components in municipal waste. To discard components correctly, obey local regulations.

If the mass spectrometer must be stored for a long time or prepared for shipping, then contact a SCIEX FSE for decommissioning information. To disconnect power from the mass spectrometer, remove the mains supply connector from the AC mains supply.

Note: The ion source and mass spectrometer must be transported and stored at a temperature between –30 °C to +60 °C (–22 °F to 140 °F) and relative humidity not exceeding 99%, non-condensing. Store the system at an altitude not exceeding 2,000 m (6,562 ft) above sea level.

Mass Spectrometer Troubleshooting 6

This section contains information for troubleshooting basic system issues. Certain activities can only be carried out by a SCIEX-trained qualified maintenance person (QMP) in the laboratory. For advanced troubleshooting, contact a SCIEX field service employee (FSE).

Table 6-1 System Issues

Symptom	Possible Cause	Corrective Action
The mass spectrometer convenience switch is in the On position, but the mass spectrometer is not on.	The fuses have blown.	Contact a QMP or FSE to test the fuses.
The DJet+ assembly is extremely dirty or frequently becomes dirty.	The flow rate of the gas for the Curtain Gas interface is too low.	Examine the setting for the gas for the Curtain Gas interface and increase it, if applicable.
A system fault occurred because the vacuum pressure is too high.	1. Oil-sealed roughing pump: The oil level is too low. 2. There is a leak. 3. The wrong orifice plate is installed.	1. Oil-sealed roughing pump: Inspect the oil level in the roughing pump, and then contact the local QMP or an FSE to add oil. Refer to the section: Inspect the Roughing Pump Oil Level (Oil-Sealed Roughing Pump). 2. Examine and repair leaks. 3. Install the correct orifice plate.
The mass spectrometer does not pump down to the correct base pressure.	There is a leak in the area of the orifice plate.	• Remove and then reinstall the orifice plate, or replace it if it is cracked. • Examine all vacuum connections and vacuum seals.

Table 6-1 System Issues (continued)

Symptom	Possible Cause	Corrective Action
The mass spectrometer takes an excessive amount of time to pump down properly. **Note:** The mass spectrometer reaches the base pressure only when the aperture in the orifice plate is plugged. After the aperture is unplugged, the mass spectrometer base pressure increases rapidly and the mass spectrometer goes into pump down mode.	1. The turbo pump controller is defective. The turbo pump controller is reading 35 watts power consumption. The typical reading should be 100 watts. 2. The orifice plate is not sealed properly.	1. Replace the turbo pump controller. 2. Do the following steps to seal the orifice plate properly: a. Press and hold the orifice plate in place to seal it. b. If the orifice plate is not sealed, then remove and reinstall it. c. Replace the orifice plate if it cannot be sealed properly.
A system fault occurred because the QPS exciter module temperature is too high.	1. The mass spectrometer air filter is blocked. 2. The coil box is not tuned. 3. The ambient temperature is too high.	1. Contact the local QMP or FSE. 2. Contact the local FSE. 3. For the ambient temperature specifications, refer to the mass spectrometer document: *Site Planning Guide*.

Table 6-1 System Issues (continued)

Symptom	Possible Cause	Corrective Action
The control software reports that the mass spectrometer is in Fault status because of the ion source.	1. The probe is not installed. 2. The probe is not connected securely. 3. The E Lens probe does not match the probe installed.	Make sure that the fault in the Status panel of the device details page. 1. Install the probe. Refer to the document: *OptiFlow Pro Ion Source Operator Guide*. 2. Remove and then install the probe. Tighten the retaining ring securely. Refer to the document: *OptiFlow Pro Ion Source Operator Guide*. 3. Install the E Lens probe that matches the probe type.
The spray is not uniform.	The electrode is blocked.	Clean, adjust, or replace the electrode. Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.
The interface heater is not ready.	The interface heater is faulty.	Contact the local QMP or FSE.
The mass spectrometer resolution is poor.	The mass spectrometer is not tuned.	Use the control software to optimize the mass spectrometer. Refer to the document: *Help System*.

Table 6-2 Sensitivity Is Decreased (Performance Has Decreased)

Possible Cause	Corrective Action
The ion source parameters are not optimized.	• Optimize the ion source parameters. Refer to the document: *Help System*. • Install and optimize an alternate ion source.

Table 6-2 Sensitivity Is Decreased (Performance Has Decreased) (continued)

Possible Cause	Corrective Action
A failure occurred in the ion source heater.	Make sure that the ion source heater gets to the set temperature. If it does not, then contact an FSE.
The mass spectrometer is not optimized.	Use the control software to optimize the mass spectrometer. Refer to the document: *Help System*.
The curtain plate is dirty.	Clean the curtain plate. Refer to the section: Clean the Curtain Plate or contact the local QMP or FSE.
The orifice plate is dirty.	Clean the orifice plate. Refer to the section: Clean the Front of the Orifice Plate or contact the local QMP or FSE.
The DJet+ assembly is dirty.	Clean the DJet+ assembly. Contact the local QMP or FSE.
The IQ00 lens is dirty.	Contact the local QMP or FSE.
The IQ0 lens is dirty.	Contact the local QMP or FSE.
The Q0 region is dirty.	Use the **System Check** function in the MS Tune workspace of the SCIEX OS software to do a charging test. Obey the instructions supplied by the test.
There is dirt or debris, such as pieces of lint-free wipe, in the mass spectrometer.	Use the **System Check** function in the MS Tune workspace of the SCIEX OS software to do a charging test. Obey the instructions supplied by the test.
The syringe or sample line has a leak.	Examine the syringe or sample line for leaks and repair any leaks found. Make sure that all of the fittings are the correct type and size.
The sample was not prepared correctly, the sample concentration is not correct, or the quality of the sample has decreased.	Use a new sample. Prepare the sample again, and make sure that the concentration is correct.
There is an issue with the LC system or connections.	Troubleshoot the LC system.
The electrode is dirty or blocked.	Replace the electrode. Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.

Table 6-3 No Signal or Signal Is Unstable

Possible Cause	Corrective Action
The sample tubing is blocked.	Replace the sample tubing. Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.

Table 6-4 Background Noise Issues

Possible Cause	Corrective Action
The syringe or sample tubing is dirty.	Clean or replace the syringe or sample tubing.
The curtain plate is dirty.	Clean the curtain plate. Refer to the section: Clean the Curtain Plate.
The orifice plate is dirty.	Clean the front of the orifice plate. Refer to the section: Clean the Front of the Orifice Plate.
The DJet+ assembly or IQ0 lens is dirty.	Do a full cleaning of the front-end components of the mass spectrometer. Contact the local QMP or FSE.
The Q0 region is dirty.	Clean the Q0 region. Contact the QMP or FSE.Contact the FSE.
The mobile phase is contaminated.	Replace the mobile phase.
The ion source is contaminated.	1. Clean the electrode. Refer to the *OptiFlow Pro Ion Source Operator Guide*. 2. Condition (*bake*) the ion source: a. Infuse or inject 50:50 methanol:water with a pump flow rate of 1 mL/min. b. In the control software, set the temperature to `650`, ion source gas 1 to `60`, and ion source gas 2 to `60`. c. Set the flow rate for the gas for the Curtain Gas interface to `45` or `50`. d. Run for a minimum of 2 hours, or preferably overnight, for best results. 3. Replace the ion source electrode or probe. Refer to the *OptiFlow Pro Ion Source Operator Guide*.

For sales, technical assistance, or service, contact an FSE or visit the SCIEX website at sciex.com for contact information.

Calibration Ions and Solutions

A

CAUTION: Potential Wrong Result. Do not use expired solutions or solutions that have not been stored at the indicated storage temperature.

Note: Immediately after use, put a cap on the bottle and then store it at 2 °C to 8 °C. Refer to the information on the label. Refer to the section: Hazardous Substance Information.

Suggested Tuning Solution

- MS Single Tuning Solution, available in the MS Single Tuning Solution Kit, PN 5077206

Tuning Frequency

Calibration		Resolution Optimization
Scan Type	**Frequency**	**Frequency**
Q1 and Q3	3 months to 6 months	3 months to 6 months
LIT	3 months to 6 months	3 months to 6 months

Table A-1 Q1 , Q3, and LIT Scans for the SCIEX 7500+

Polarity	**Masses**							
Low Mass								
Positive	42.03	132.91	266.16	422.27	609.28	829.54	922.01	N/A

Table A-1 Q1 , Q3, and LIT Scans for the SCIEX 7500+ (continued)

Polarity	**Masses**							
Negative	45.00	126.90	265.15	514.28	827.52	966.00	N/A	N/A
High Mass								
Positive	42.03	132.91	266.16	422.27	609.28	829.54	922.01	1,521.97
Negative	45.00	126.90	265.15	514.28	827.52	966.00	1,565.96	N/A

Prepare the Mass Spectrometer to Infuse the Calibration Solution

Required Materials

- Syringe
- Needle
- PEEK tubing
- Syringe adapter
- 1/16" finger-tight fitting
- MS Wash Solvent
- MS Single Tuning Solution

Note: Shake bottles before use. Slight precipitation or inhomogeneity might occur if the solution is stored at refrigerated temperatures for extended periods of time.

CAUTION: To prevent interfering peaks or background noise due to the high sensitivity of the mass spectrometer, make sure to use dedicated tubing and a dedicated syringe with the MS Single Tuning Solution and MS Wash Solvent. Doing so will prevent potential solution interaction with the metal tips used in other syringe fittings.

Note: The MS Wash Solvent must be used to rinse the syringe and tubing before and after use.

1. Connect the syringe and needle and then fill the syringe with the MS Wash Solvent.
2. Disconnect the needle.
3. Connect the tubing to the syringe and then rinse the syringe and tubing with the MS Wash Solvent.
4. Repeat steps 1 and 2 with the MS Single Tuning Solution.
5. Immediately after filling the syringe, install the bottle cap on the MS Single Tuning Solution bottle and tighten it to make sure that the bottle is properly closed. Then store the bottle following the instructions in the *Certificate of Analysis*.

   The *Certificate of Analysis* is available at sciex.com/tech-regulatory.
6. Allow the solution to reach room temperature before infusing it in the system.
7. Disconnect the needle and then connect the tubing and finger-tight fitting to the syringe.
8. Set up the system for infusion using the syringe pump. Refer to the document: *Software User Guide*.

Note: Make sure that the syringe tubing is grounded to the diverter valve before connecting it to the ion source inlet.

Figure A-1 Syringe Tubing Connections

Note: An optional grounding union is supplied with the ion source, to ground the liquid in the tubing. Refer to the document: *OptiFlow Pro Ion Source Operator Guide*.

9. Open SCIEX OS and then open the MS Tune workspace. Follow the onscreen instructions. Refer to the document: *Software User Guide* for more information on how to perform tuning as well as examples of expected spectra.

Note: Make sure to select the correct flow rate and syringe diameter.

Tip! After starting the quadrupole tuning using the MS Scan Tuning procedure, confirm that there are no contamination peaks around masses 132.9 Da and 922 Da before continuing with tuning. Refer to the document: *Software User Guide*.

10. After calibration is complete, disconnect the syringe and tubing from the mass spectrometer, and then clean the lines by repeating steps 1 and 2.
11. Install the bottle cap on the MS Wash Solvent bottle and then tighten it to make sure that the bottle is properly closed. Then store the bottle following the instructions in the *Certificate of Analysis*.

Hazardous Substance Information B

Classification according to OSHA Hazard Communication Standard (29 CFR 1910.1200)

The following information must be noted and the relevant safety measures taken. Refer to the respective safety data sheets for more information. The safety data sheets are available upon request or can be downloaded from our website, at sciex.com/tech-regulatory.

MS WASH SOLVENT

DANGER!

H225 - Highly flammable liquid
H302 - Harmful if swallowed
H319 - Causes serious eye irritation

MS SINGLE TUNING SOLUTION

DANGER!

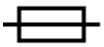
H225 - Highly flammable liquid
H302 - Harmful if swallowed
H319 - Causes serious eye irritation

Glossary of Symbols C

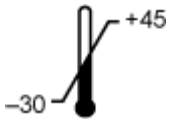
Note: Not all of the symbols in the following table are applicable to every instrument.

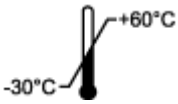
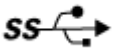
Symbol	Description
	Australian Regulatory Compliance Mark. Indicates that the product complies with Australian Communications Media Authority (ACMA) EMC and Electrical Safety Requirements.
	Alternating current
A	Amperes (current)
	Asphyxiation Hazard
	Authorized representative in the European community
	Biohazard
	CE Marking of Conformity
	cCSAus mark. Indicates electrical safety certification for Canada and USA.
	Catalog number

Symbol	Description
	Caution. Consult the instructions for information about a possible hazard. **Note:** In SCIEX documentation, this symbol identifies a personal injury hazard.
	China RoHS Caution Label. The electronic information product contains certain toxic or hazardous substances. The center number is the Environmentally Friendly Use Period (EFUP) date, and indicates the number of calendar years the product can be in operation. Upon the expiration of the EFUP, the product must be immediately recycled. The circling arrows show the product is recyclable. The date code on the label or product indicates the date of manufacture.
	China RoHS logo. The device does not contain toxic and hazardous substances or elements above the maximum concentration values and the device is an environmentally-friendly product that can be recycled and reused.
	Consult instructions for use.
	Crushing Hazard
	cTUVus mark for TUV Rheinland of North America
	Data Matrix symbol that can be scanned by a barcode reader to obtain a unique device identifier (UDI)
	Environmental Hazard

Symbol	Description
	Ethernet connection
	Explosion Hazard
	Eye Injury Hazard
	Fire Hazard
	Flammable Chemical Hazard
	Fragile
	Fuse
Hz	Hertz
	International safety symbol "Caution, risk of electric shock" (ISO 3864), also known as High Voltage symbol If the main cover must be removed, then contact a SCIEX representative to prevent electric shock.
	Hot Surface Hazard
	In Vitro Diagnostic Device

Symbol	Description
	Ionizing Radiation Hazard
	Keep dry. Do not expose to rain. Relative humidity must not exceed 99%.
	Keep upright.
	Lacerate/Sever Hazard
	Laser Radiation Hazard
	Lifting Hazard
	Magnetic Hazard
	Manufacturer
	Moving Parts Hazard
	Pacemaker Hazard. No access to people with pacemakers.

Symbol	Description
	Pinching Hazard
	Pressurized Gas Hazard
	Protective Earth (ground)
	Puncture Hazard
	Reactive Chemical Hazard
	Serial number
	Toxic Chemical Hazard
	Transport and store the system within 66 kPa to 103 kPa.
	Transport and store the system within 75 kPa to 101 kPa.
	Transport and store the system within the specified minimum (**min**) and maximum (**max**) levels of relative humidity, noncondensing.
	Transport and store the system within –30 °C to +45 °C.

Symbol	Description
	Transport and store the system within –30 °C to +60 °C.
	USB 2.0 connection
	USB 3.0 connection
	Ultraviolet Radiation Hazard
UK CA	United Kingdom Conformity Assessment Mark
UKRP	United Kingdom Responsible Person
VA	Volt Ampere (apparent power)
V	Volts (voltage)
	WEEE. Do not dispose of equipment as unsorted municipal waste. Environmental Hazard
W	Watts (power)
	*yyyy-mm-dd* Date of manufacture

Glossary of Warnings D

Note: If any of the labels used to identify a component become detached, then contact a SCIEX field service employee (FSE).

Label	Translation (if applicable)
FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC PROCEDURES.	FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC PROCEDURES.
HANDLE WITH CARE WARNING 50g SHOCK INDICATOR ROUGH HANDLING WILL CHANGE INDICATOR TO RED If indicator is RED, note on the bill of lading, inspection may be warranted	HANDLE WITH CARE WARNING 50g SHOCK INDICATOR ROUGH HANDLING WILL CHANGE INDICATOR TO RED If indicator is RED, note on the bill of lading, inspection may be warranted **Note:** If the indicator is tripped, then this container has been dropped or otherwise mishandled. Make a note on the Bill of Lading and then check for damage. Any claims for shock damage require a notation.
IMPORTANT! RECORD ANY VISIBLE CRATE DAMAGE INCLUDING TRIPPED “IMPACT INDICATOR” OR “TILT INDICATOR” ON THE WAYBILL BEFORE ACCEPTING SHIPMENT AND NOTIFY YOUR LOCAL AB SCIEX CUSTOMER SUPPORT ENGINEER IMMEDIATELY. DO NOT UNCRATE. CONTACT YOUR LOCAL CUSTOMER SUPPORT ENGINEER FOR UNCRATING AND INSTALLATION.	IMPORTANT! RECORD ANY VISIBLE CRATE DAMAGE INCLUDING TRIPPED “IMPACT INDICATOR” OR “TILT INDICATOR” ON THE WAYBILL BEFORE ACCEPTING SHIPMENT AND NOTIFY YOUR LOCAL AB SCIEX CUSTOMER SUPPORT ENGINEER IMMEDIATELY. DO NOT UNCRATE. CONTACT YOUR LOCAL CUSTOMER SUPPORT ENGINEER FOR UNCRATING AND INSTALLATION.

Label	Translation (if applicable)
MINIMUM OF SIX PERSONS REQUIRED TO SAFELY LIFT THIS EQUIPMENT	MINIMUM OF SIX PERSONS REQUIRED TO SAFELY LIFT THIS EQUIPMENT
TIP & TELL	Tilt Indicator **Note:** Indicates whether the container was tipped or mishandled. Write on the Bill of Lading and inspect for damage. Any claims for tipping require a notation.
TiltWatch PLUS ShockWatch	Tilt Indicator **Note:** Indicates whether the container was tipped or mishandled. Write on the Bill of Lading and inspect for damage. Any claims for tipping require a notation.
WARNING: DO NOT OPERATE WITHOUT FIRST ENSURING BOTTLE CAP IS SECURED.	WARNING: DO NOT OPERATE WITHOUT FIRST ENSURING BOTTLE CAP IS SECURED. **Note:** This warning is attached to the source exhaust drain bottle.
WARNING: NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.	WARNING: NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL. **Note:** Consult instructions for use.

Contact Us

Customer Training

- In North America: NA.CustomerTraining@sciex.com
- In Europe: Europe.CustomerTraining@sciex.com
- Outside the EU and North America, visit sciex.com/education for contact information.

Online Learning Center

- SCIEX Now Learning Hub

SCIEX Support

SCIEX and its representatives maintain a staff of fully-trained service and technical specialists located throughout the world. They can answer questions about the system or any technical issues that might arise. For more information, visit the SCIEX website at sciex.com or contact us in one of the following ways:

- sciex.com/contact-us
- sciex.com/request-support

Cybersecurity

For the latest guidance on cybersecurity for SCIEX products, visit sciex.com/productsecurity.

Documentation

This version of the document supercedes all previous versions of this document.

To see this document electronically, Adobe Acrobat Reader is required. To download the latest version, go to https://get.adobe.com/reader.

To find software product documentation, refer to the release notes or software installation guide that comes with the software.

To find hardware product documentation, refer to the documentation that comes with the system or component.

The latest versions of the documentation are available on the SCIEX website, at sciex.com/customer-documents.

Note: To request a free, printed version of this document, contact sciex.com/contact-us.