

System User Guide

SCIEX 6500+ Systems



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Operational Precautions and Limitations

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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 keep hazards to a minimum.

For information about the symbols and conventions that are used in the laboratory environment, on the system, and in this documentation, refer also 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 obey these warnings might result in serious injury.

This safety information is a supplement to federal, state, provincial, and local environmental health and safety (EHS) regulations. The information supplied includes system-related safety information applicable to the operation of the system. It does not include every safety procedure that must be done. 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 applicable laboratory reference material and standard operating procedures.

Documentation Symbols and Conventions

The symbols and conventions that follow 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.

Operational Precautions and Limitations

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 required for 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 applied 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 might 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).

Operational Precautions and Limitations

- 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 prevent access to 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 required for the mass spectrometer, optional bench, or roughing pump.

Protective Earth Conductor



WARNING! Electrical Shock Hazard. Do not intentionally interrupt the protective earth conductor. 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.

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

Chemical Precautions



WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. Before cleaning or maintenance procedures are started, identify if 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 procedures are done.



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, which includes powder-free gloves, protective eyewear, and a laboratory coat.

Note: Nitrile or chloroprene gloves are recommended.

- Do work in a well-ventilated area or fume hood.
- When flammable materials, for example, isopropanol and methanol, are in use, do not go near ignition sources.
- Be careful with the use and disposal of chemicals. If the correct procedures for chemical use and disposal are not obeyed, then personal injury can occur.
- If solvent gets into the eyes or on the skin, then flush the solvent away immediately.
- During cleaning, do not let chemicals touch the skin. Wash hands after use.
- Make sure that all of the exhaust hoses are connected correctly and that all of the connections are functioning as designed.
- Collect all of the spent liquids and discard them as hazardous waste.
- Obey all of the local regulations for the storage, use, and disposal of biohazardous, toxic, and radioactive materials.
- Oil-sealed roughing pump: (Recommended) Use a secondary containment tray below the roughing pump.

Operational Precautions and Limitations

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 fluids that follow can safely be used with the system.

CAUTION: Potential System Damage. Do not use other fluids until confirmation is received from SCIEX that the fluid 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 water, up to 100%
 - Tetrahydrofuran, up to 100%
 - Toluene and other aromatic solvents, up to 100%
 - Hexanes, up to 100%
- **Buffers**
 - Ammonium acetate, less than 100 mM
 - Ammonium formate, less than 100 mM
 - Phosphate, less than 1%
- **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%
 - Phosphoric acid, less than 1%
 - Trimethylamine, less than 1%

- Triethylamine, 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 kept 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 operates correctly, to prevent the collection of flammable vapor 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 attached with clamps. Make sure that the laboratory has correct the air exchange rate for the work done.



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 correctly 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 be 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 correct 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 has cracks or is broken, then do not use the ion source. Contact a SCIEX field service employee (FSE). Toxic or injurious materials that go into the equipment will be in the source exhaust output. Exhaust from equipment should be vented from the room. Follow approved laboratory procedures to discard sharps.

Physical Precautions



WARNING! Hot Surface Hazard. Before maintenance procedures are started, wait a minimum of 90 minutes for the temperature of the IonDrive Turbo V ion source to decrease sufficiently to prevent a burn hazard. 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 six people are required to move it safely. Use 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



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



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



WARNING! Environmental Hazard. Obey approved procedures for the disposal of biohazardous, toxic, radioactive, and electronic waste. The customer is responsible for and must obey local laws and regulations for the disposal of hazardous substances, which include chemicals, waste oils, and electrical components.

CAUTION: Potential Mass Shift. Keep a stable ambient temperature. A temperature change of more than 2 °C per hour might have an effect on resolution and mass calibration.

Use qualified personnel for the installation of electrical mains, heating, ventilation, and plumbing supplies and fixtures. Make sure that all of the installations obey the 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.

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] 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 sufficient 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

Operational Precautions and Limitations

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

Decommissioning and Disposal



WARNING! Environmental Hazard. Obey approved procedures for the disposal of biohazardous, toxic, radioactive, and electronic waste. The customer is responsible for and must obey local laws and regulations for the disposal of hazardous substances, which include chemicals, waste oils, and electrical components.



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

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

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

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

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 pickup 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 personnel who are not authorized by SCIEX do maintenance on a system under warranty, then SCIEX is not responsible to repair any damage caused by the servicing.

Only personnel qualified by the manufacturer shall do maintenance on 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 aware of the electrical, chemical, burn, and mechanical risks, such as compressed gas and sharp edges, related to 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 (6,562 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: $\pm 10\%$ 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:

- Ambient temperature: 15 °C (59 °F) to 30 °C (86 °F)

Over time, the temperature must stay in a range of 4 °C (7.2 °F), with the rate of the change in temperature not more than 2 °C (3.6 °F) per hour. Ambient temperature fluctuations that are more than the limit might cause mass shifts in spectra.

- Relative humidity: 20% to 80%, noncondensing

Equipment Use and Modification



WARNING! Personal Injury Hazard. If product installation, adjustment, or relocation is required, then contact a SCIEX representative.



WARNING! Electrical Shock Hazard. Do not remove the covers. If the covers are removed, then injury or incorrect system operation might 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 a purpose other than their intended purpose can put the user at risk of harm or have a negative effect on system performance.

Operational Precautions and Limitations



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 six people are required to move it safely. Use 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*.



WARNING! Crushing Hazard. When heavy objects are moved, wear protective footwear. If a heavy object falls during a move, then personal injury might occur.

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 document: *Site Planning Guide*.

If the system is used in conditions or 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.

The system does 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: *IonDrive Turbo V Ion Source Operator Guide*.

For information on the computer and software, refer to the document: *Software Installation Guide* for the software.

System Overview



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 six people are required to move it safely. Use 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*.

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

The system contains the components as follows:

- SCIEX Triple Quad 6500+ or QTRAP 6500+ mass spectrometer.
- Roughing pumps. These roughing pump configurations are available:
 - Two oil-sealed roughing pumps
 - One dry pump

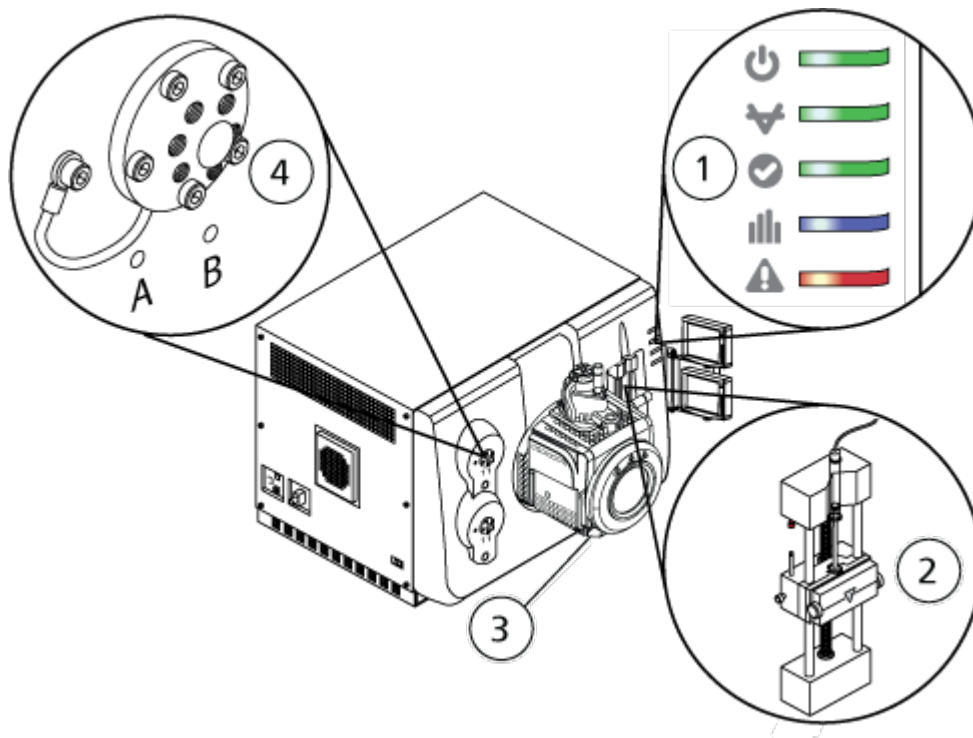
Note: This configuration requires the SCIEX OS software.

Note: Do not use the oil-sealed roughing pump and the dry pump on the same mass spectrometer.

- IonDrive Turbo V ion source that uses either the TurbolonSpray probe or the atmospheric pressure chemical ionization (APCI) probe. Refer to the document: *IonDrive Turbo V Ion Source Operator Guide*.
- SCIEX-supplied computer and monitor with the control software for system 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	Panel symbols	Refer to the section: Panel Symbols .
2	Syringe pump	Refer to the section: Adjust the Integrated Syringe Pump Position .
3	Ion source	Refer to the document: <i>IonDrive Turbo V Ion Source Operator Guide</i> , available on the ion source documentation USB or DVD or at sciex.com .
4	Diverter valve	Refer to the section: Diverter Valve .

Panel Symbols

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

Table 2-1 Panel Symbols

LED	Color	Name	Description
	Green	Power	Comes on when power to the system is on.
	Green	Vacuum	Comes on when the system gets to the operating vacuum level. Flashes if the vacuum is not at the correct level, that is, during pumpdown and venting.
	Green	Ready	Comes on when the system is in the Ready status. The system must be in the Ready status to operate.
	Blue	Scanning	Flashes during the acquisition of data.
	Red	Fault	Comes on when a system fault is found.

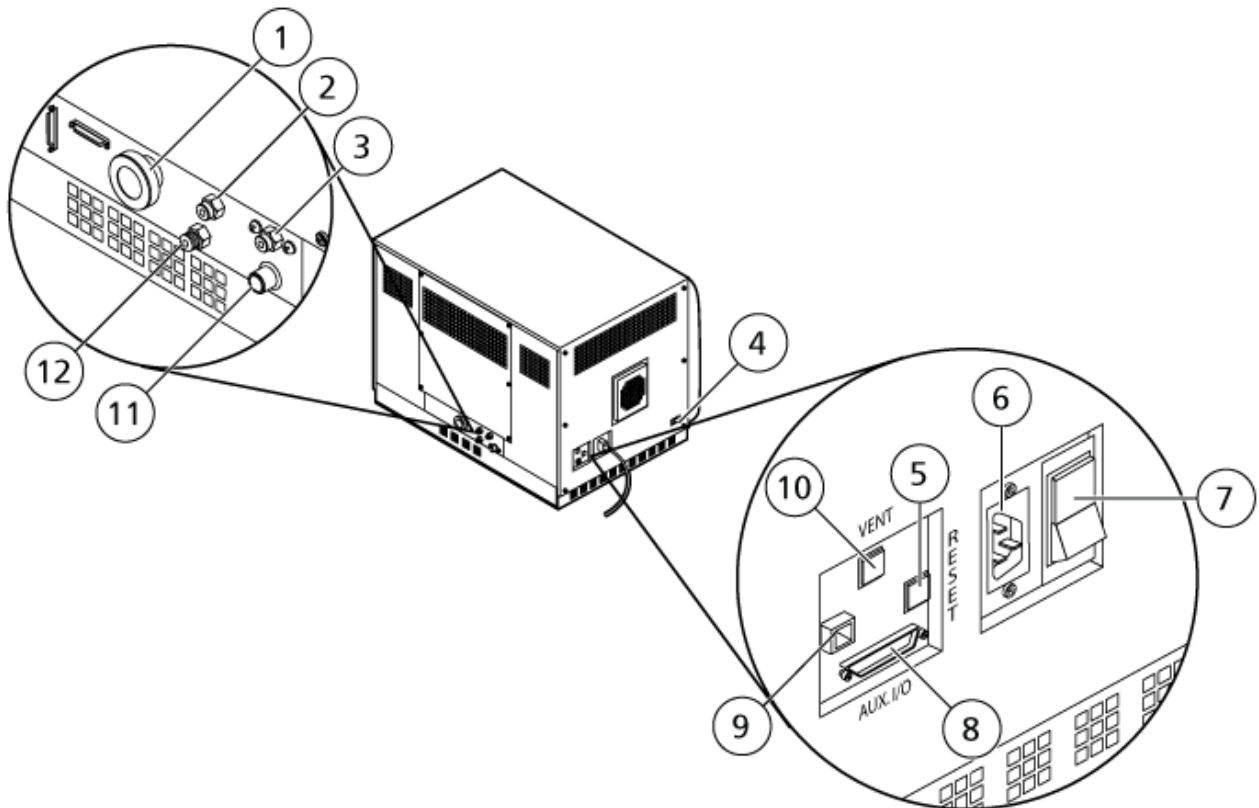
When power to the system is turned on, all of the LEDs come on. The Power LED stays on. The other LEDs flash for 2 seconds and then go off. The Vacuum LED starts to flash. When the system gets to the operating vacuum level, the Vacuum LED stays on.

Connections

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

Principles of Operation

Figure 2-2 Back and Side Views



Item	Description	For More Information
1	Roughing pump vacuum connection	Contact an FSE.
2	Air supply (Gas 1/Gas 2)	Refer to the document: <i>Site Planning Guide</i> . Gas tubing from the Gas 1/Gas 2 supply connects to this port.
3	Source exhaust supply	Refer to the document: <i>Site Planning Guide</i> . 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 .
6	Mains supply connection	Refer to the section: Start Up the System or Shut Down and Vent the System .

Item	Description	For More Information
7	Mass spectrometer convenience switch	Refer to the section: Start Up the System or Shut Down and Vent the System . <ul style="list-style-type: none"> Up: Power to the system is on. Down: Power to the system is off.
8	Aux I/O connection	Refer to the document: <i>Devices Setup Guide</i> or <i>Peripheral Devices Setup Guide</i> .
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: <i>Site Planning Guide</i> .
12	Nitrogen gas supply (gas for the Curtain Gas interface, CAD gas)	Refer to the document: <i>Site Planning Guide</i> . Gas tubing from the nitrogen gas supply connects to this port.

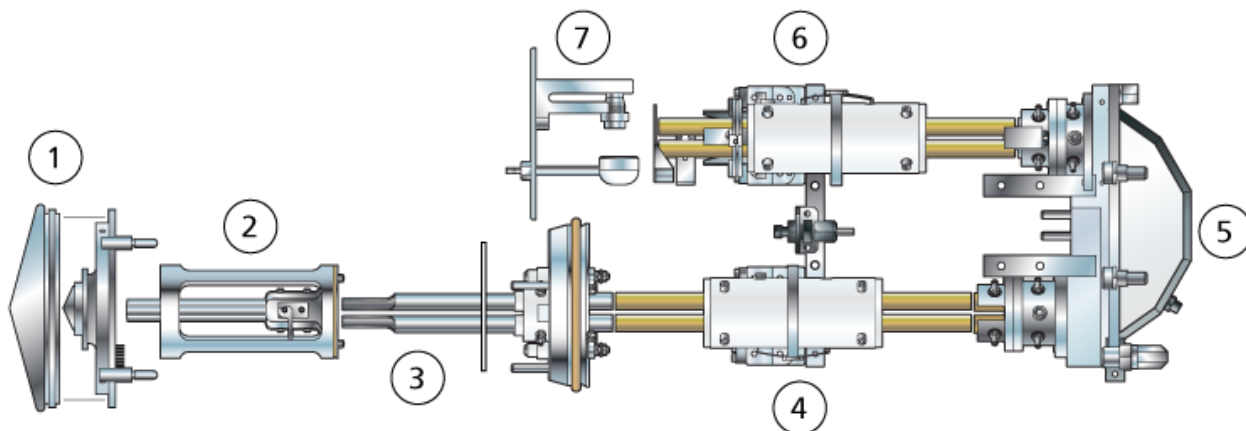
Theory of Operation—Hardware

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 mass spectrometer has a series of ion filters that use the m/z value of the ions to transmit them. The first quadrupole in this series is the IonDrive QJet ion guide, which is between the orifice plate and the Q0 region. To increase sensitivity and get a better signal-to-noise ratio, the IonDrive QJet ion guide puts the ions in focus before they go into the Q0 region. The Q0 region puts the ions into focus again, before they go into the Q1 quadrupole.

Principles of Operation

Figure 2-3 Ion Path



Item	Description
1	Curtain plate and orifice plate
2	IonDrive QJet ion guide
3	Q0 region
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.

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*.

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 prevent access to the mains supply outlet.

Note: Before the system is used, read the safety information in the section: [Operational Precautions and Limitations](#).

Prerequisites

- The site requirements supplied in the document: *Site Planning Guide* are met. This document 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 document: *Site Planning Guide*. For contact information, go to sciex.com/contact-us.
- The source exhaust gas, compressed air, and nitrogen gases are correctly 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 correctly attached to the mass spectrometer, source exhaust drain bottle, and ventilation connections.
- Exhaust hoses from the roughing pumps are connected to the laboratory ventilation system.
- The convenience switch is 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. Be careful with the handling of the syringe. The tip of the syringe is very sharp.

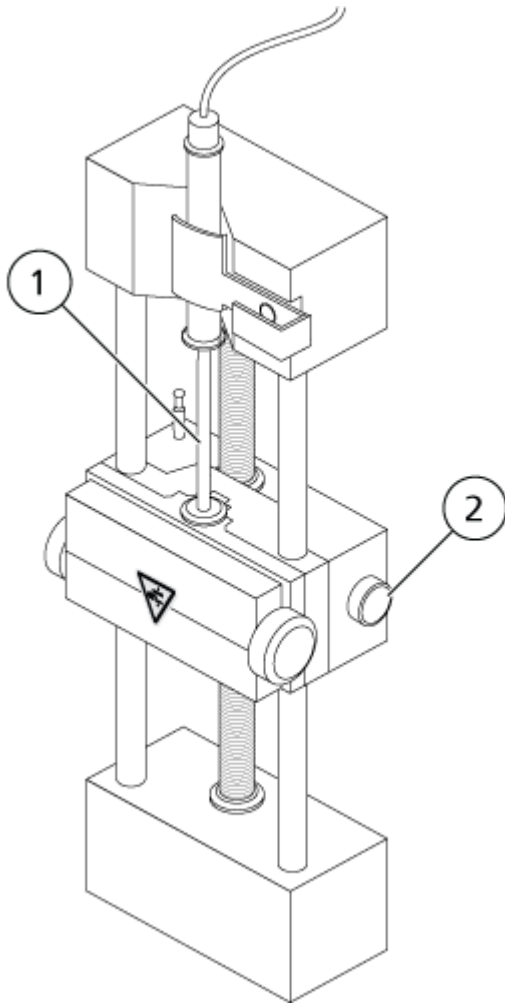


WARNING! Puncture Hazard. To prevent damage to the glass syringe, make sure that the syringe is installed correctly in the syringe pump and that the automatic syringe pump stop is adjusted correctly. If the syringe breaks, then obey the approved safety procedures for sharps disposal.

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.

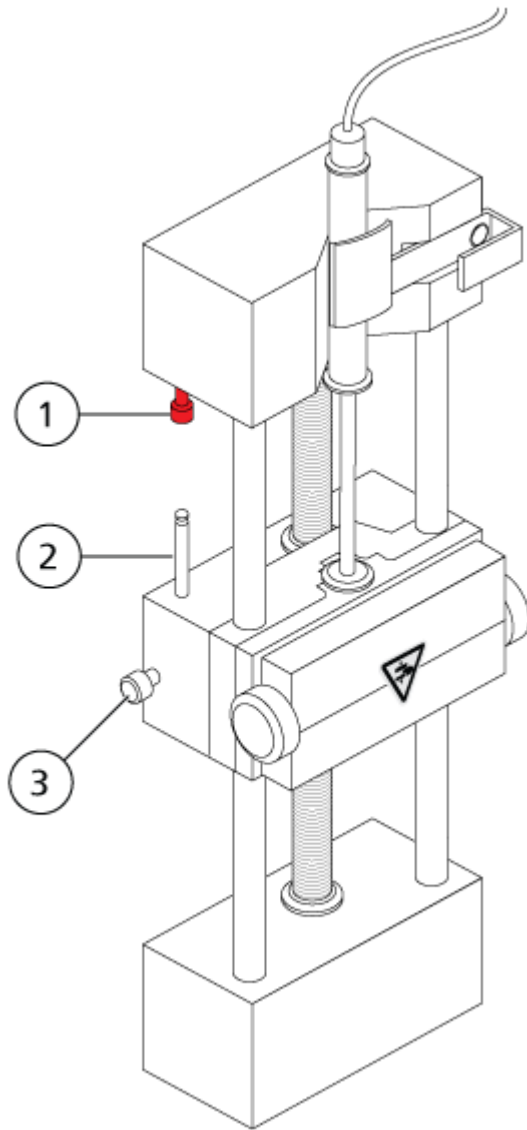
Figure 3-1 Lowering the Syringe



Item	Description
1	Syringe plunger
2	Release button. Press to raise or lower the base.

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.

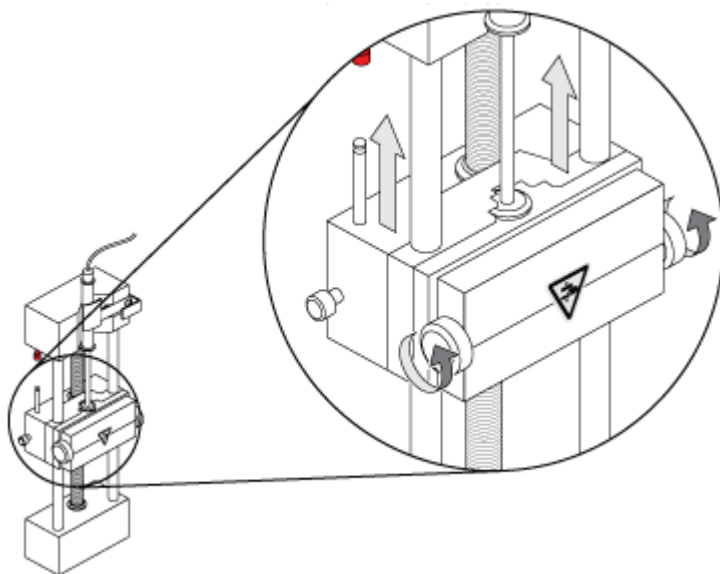
Figure 3-2 Automatic Syringe Stop



Item	Description
1	Automatic syringe stop. After the post hits the automatic syringe stop, the syringe pump stops.
2	Post. Adjust the height to prevent the syringe plunger from hitting the syringe during sample infusion.
3	Post lock screw. Tighten the screw after the height of the post is adjusted.

5. Turn the syringe pump screws to secure the syringe.

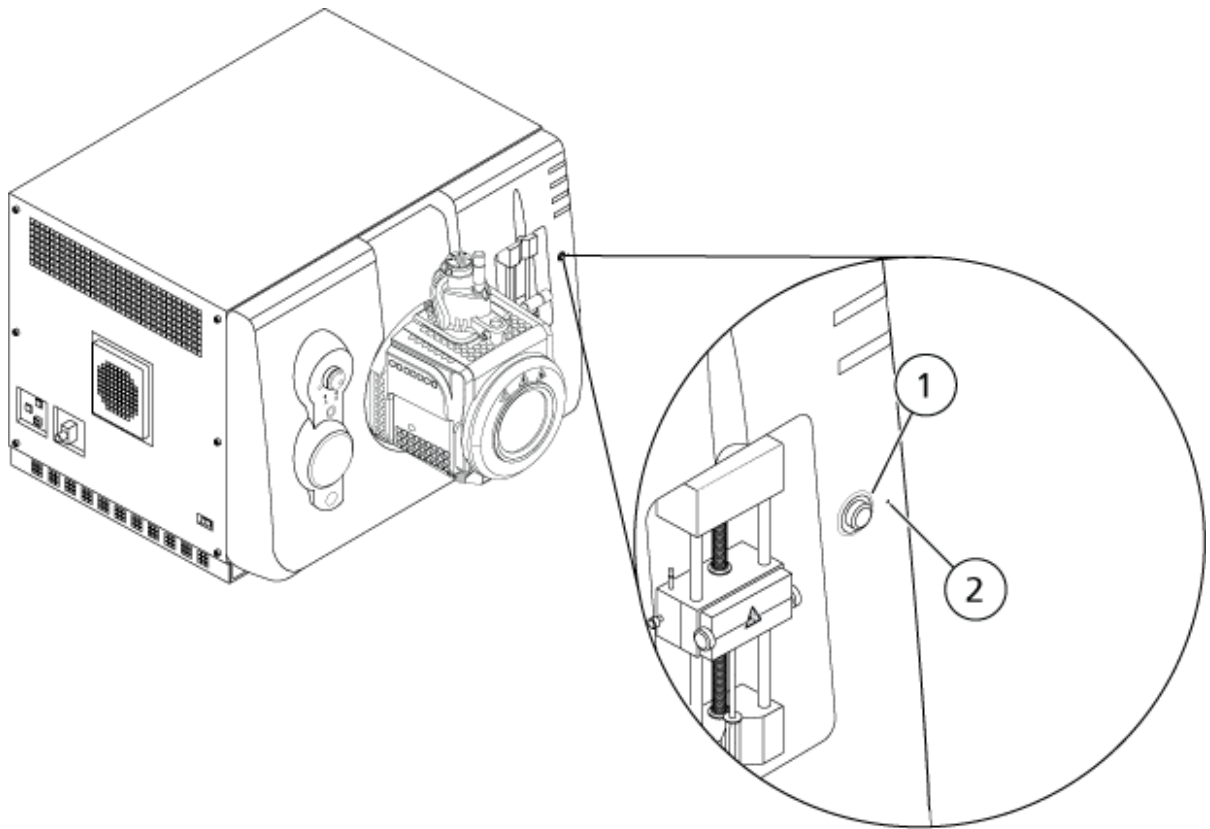
Figure 3-3 Syringe Pump Screws



6. 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 LED beside the button flashes when the syringe pump is in use. The syringe pump flow can also be controlled automatically by the control software.

Figure 3-4 Syringe Pump LED



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

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

Diverter Valve

The diverter valve is a two-position, six-port valve. It can be connected in Injector mode or Diverter mode. In Injector mode, it can be configured with a sample loop for sample injection. In Diverter mode, it can be configured to send sample to waste at the start of each LC run.

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

Connect 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.

- Connect the valve for Injector mode.

Figure 3-5 Diverter Valve: Injector Mode Position A

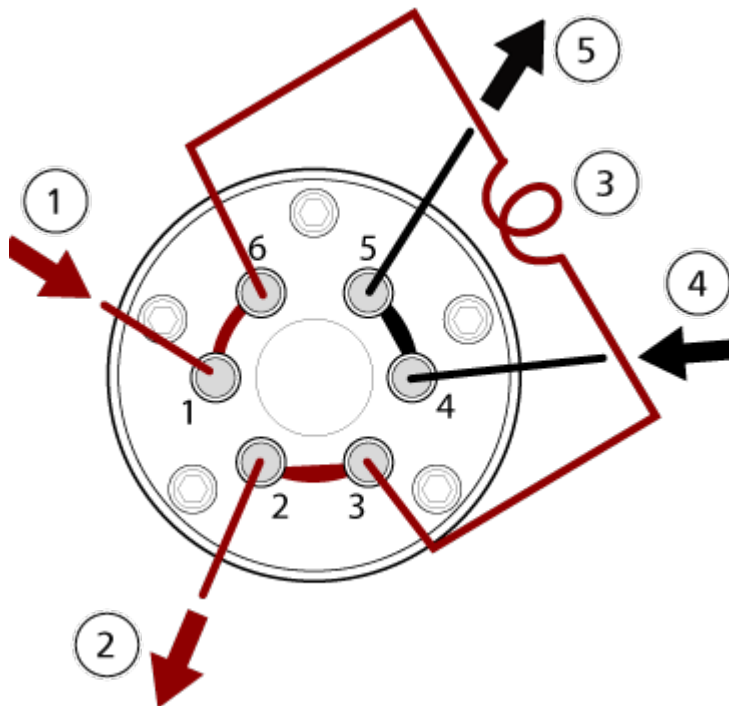


Figure 3-7 Diverter Valve: Diverter Mode Position A

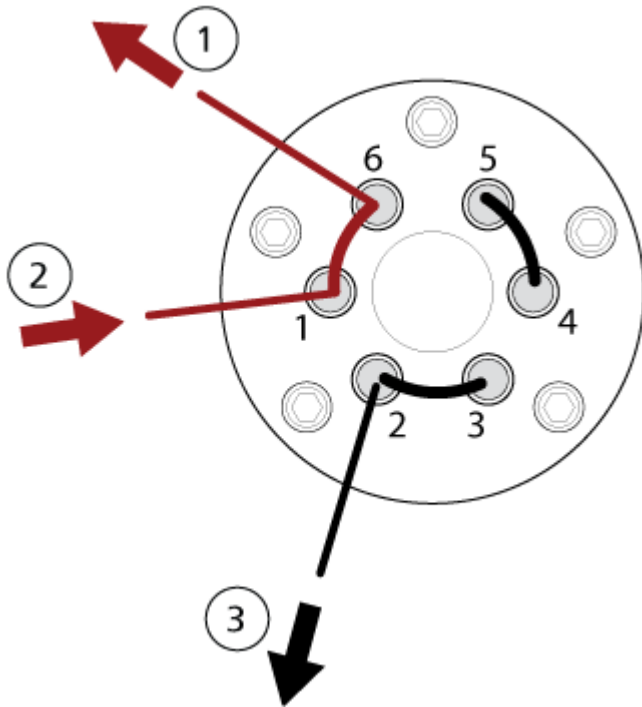
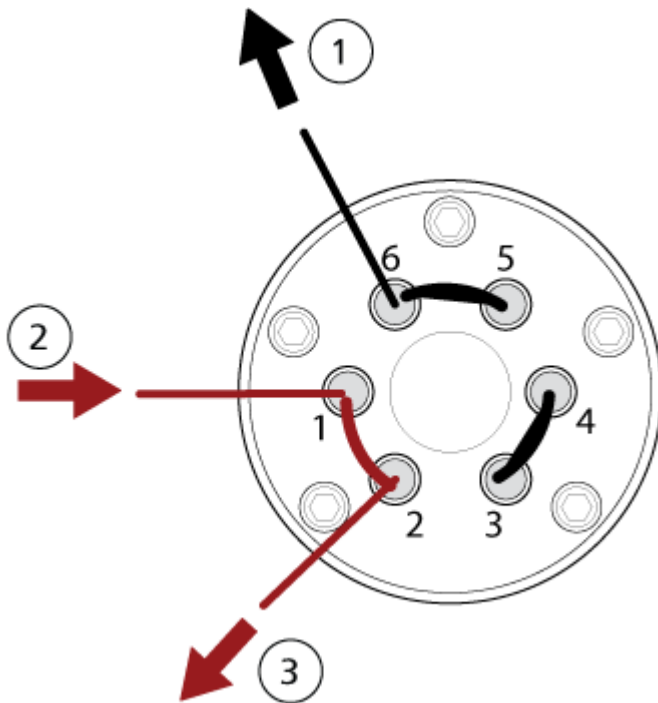


Figure 3-8 Diverter Valve: Diverter Mode Position B



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. Do these steps to shut the system down or release the pressure, as required.

CAUTION: Potential System Damage. Do not turn off the roughing pumps until after the turbo pumps have spun down.

Note: If the input gas supply must be disconnected, then release the pressure in the gas tubing before disconnection.

Tip! If the mass spectrometer will not be used for an extended period, then keep it in Standby status with the ion source installed. 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: *Help*.
4. Close the control software.
5. If required, then to vent the system, do these steps:

Note: Vent the system before a full cleaning of the vacuum interface is done, before the Q0 region is cleaned, and before the oil in the oil-sealed roughing pump is replaced. For more information, contact the qualified maintenance person (QMP) or FSE.

- a. Push and hold the **Vent** button for 3 seconds. Refer to the figure: [Figure 2-2](#). The Vacuum LED starts to flash more quickly than during pump down. The turbo pump gradually turns less quickly.
 - b. Let the system vent for 15 minutes.
-

6. Turn off the convenience switch for the mass spectrometer.
7. Disconnect the mains supply cable for the mass spectrometer from the mains supply outlet.
8. If the system will be vented, then disconnect the mains supply cable for the roughing pump from the mains supply outlet.

Reset the Mass Spectrometer

1. Stop any scans that are in progress, and then turn off sample flow to the mass spectrometer.
2. In the control software, deactivate the mass spectrometer and devices. Refer to the document: *Help*.
3. Close the control software.
4. Press and hold the **Reset** button for five seconds.
A click is heard when the relay closes. After approximately 3 minutes, the mass spectrometer gets to operating pressure.

Operating Instructions — User Workflows

4

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

Table 4-1 User Workflows

Task	Reference
Analyst	
Monitor the system status	<i>Help</i>
Create and submit batches	<i>Help</i>
Monitor and manage samples in the queue	<i>Help</i>
Explore data	<i>Help</i>
Method Developer	
Configure the system	<ul style="list-style-type: none">• Configure the mass spectrometer: <i>Help</i>• Create projects and data folders: <i>Help</i>• Configure the LC devices: <i>Help</i>
Tune the mass spectrometer	<i>Help</i>
Create MS methods	<i>Help</i>
Create LC methods	<i>Help</i>
Create processing methods	<i>Help</i>
Administrator	
Set the Windows file permissions	<i>Laboratory Director Guide</i>
Configure the LIMS	<i>Help</i>
Add users to the software and assign roles	<i>Laboratory Director Guide or Help</i>
Archive logs	<i>Help</i>
Reviewer	
Review processed results	<i>Help</i>
Explore data	<i>Help</i>

Table 4-1 User Workflows (continued)

Task	Reference
Review logs	<i>Help</i>

Service and Maintenance Information

5

Regularly clean and do maintenance on the system for optimum performance.



WARNING! Electrical Shock Hazard. Do not remove the covers. If the covers are removed, then injury or incorrect system operation might 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 procedures are started, identify if 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 procedures are done.

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: *IonDrive Turbo V 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. For example, if insulin, proteins, cannabis, or oligonucleotides are tested, then frequent cleaning is required.

Service and Maintenance Information

- Cleanliness of the samples and the sample preparation methods.
 - Amount of time that the probe is exposed to the sample.
 - Total system run time.
-

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 tables that follow 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: Examine 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.

¹ This procedure is not applicable for the dry pump.

Table 5-1 Mass Spectrometer Maintenance Tasks (continued)

Component	Frequency	Task	For More Information
Mass spectrometer air filter	As required	Replace	Contact the local QMP or FSE.
IonDrive QJet ion guide and IQ0 lens	As required	Clean	Contact the local QMP or FSE.
Q0 rod set and IQ1 lens	As required	Clean	Contact the local QMP or FSE.
System 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
TurbolonSpray and APCI probes	As required	Examine and replace	Refer to the document: <i>IonDrive Turbo V Ion Source Operator Guide</i> .
Electrodes for the TurbolonSpray and APCI probes	As required	Examine and replace	Refer to the document: <i>IonDrive Turbo V Ion Source Operator Guide</i> .
Corona discharge needle	As required	Replace	Refer to the document: <i>IonDrive Turbo V Ion Source Operator Guide</i> .
Turbo heater	As required	Replace	Contact the local QMP or FSE.
Sample tubing	As required	Replace	Refer to the document: <i>IonDrive Turbo V Ion Source Operator Guide</i> .

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, IonDrive QJet ion guide, and Q0 region.

Service and Maintenance Information

Tip! Clean the Q0 region regularly to minimize the impact of charging, a significant loss of sensitivity of the ions of interest over a short period of time, on the quadrupoles and lenses. Contact the Qualified Maintenance Person (QMP) or 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.

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 connections as follows 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 tubing connections at the back of the system, and at the pressure regulators and gas generators.

Clean the Front End

The warning that follows is applicable to all of the procedures in this section:



WARNING! Hot Surface Hazard. Before maintenance procedures are started, wait a minimum of 90 minutes for the temperature of the IonDrive Turbo V ion source to decrease sufficiently to prevent a burn hazard. Some surfaces of the ion source and vacuum interface become hot during operation.

Use the routine cleaning method to clean the mass spectrometer front end, to:

- Keep unscheduled system downtime to a minimum.
 - Keep sensitivity to a maximum.
-

- Prevent contamination that requires a service visit for cleaning.

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

This section supplies instructions for routine cleaning under vacuum.

Note: Obey 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 one of the issues that follow occur:

- Significant loss in sensitivity
- Increased background noise
- Peaks that are not part of the sample in full scan or survey scan methods

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

Required Materials

These materials are required to do routine cleaning:

- Powder-free gloves, nitrile or chloroprene 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 swab, lint-free wipes, Q0 cleaning tool, tapered custom brush, and SCIEX Cleaning Solution.

Cleaning Best Practices



WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. Before cleaning or maintenance procedures are started, identify if 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 procedures are done.



WARNING! Hot Surface Hazard. Before maintenance procedures are started, wait a minimum of 90 minutes for the temperature of the IonDrive Turbo V ion source to decrease sufficiently to prevent a burn hazard. Some surfaces of the ion source and vacuum interface become hot during operation.



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



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

- Before removal of the ion source, wait until the temperature decreases.
- Always wear clean, powder-free gloves, nitrile or chloroprene recommended, for the cleaning procedures.
- After the mass spectrometer components are cleaned, and before reassembly, put on a new, clean pair of gloves.
- Do not use cleaning supplies other than those identified in this procedure.
- If possible, then prepare cleaning solutions immediately before cleaning starts.
- Prepare and stow all of the organic solutions and organic-containing solutions in clean glassware only. Never use plastic bottles. Contamination can leach from plastic bottles and cause more contamination in the mass spectrometer.

- To prevent contamination of the cleaning solution, pour the solution on the wipe or swab.
- Make sure that only the center area of the wipe touches the mass spectrometer surface. Fibers from cut edges can cause contamination.

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

Figure 5-1 How to Fold the Wipe



- To prevent cross-contamination, discard the wipe or swab after it has touched the surface once.
- If required, then use multiple wipes to clean larger parts of the vacuum interface, such as the curtain plate, multiple times.
- Only dampen the wipe or swab with a small amount of water or cleaning solution. Water might cause deterioration of the wipe, and thus contamination of the mass spectrometer.
- Do not rub the wipe across the aperture. Wipe around the aperture so that fibers from the wipes do not go into the mass spectrometer.
- Do not put the brush in the aperture on the curtain plate or orifice plate.

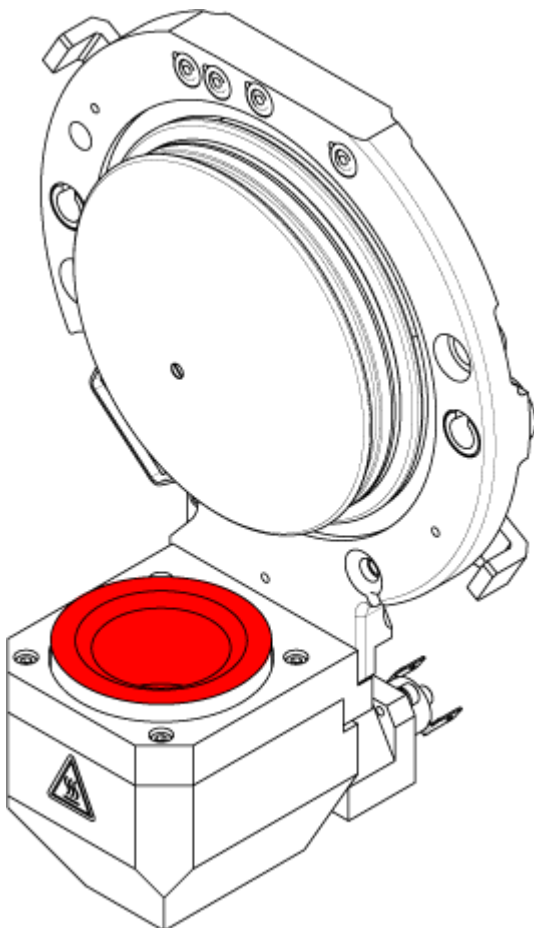
Prepare the Mass Spectrometer



WARNING! Hot Surface Hazard. Before maintenance procedures are started, wait a minimum of 90 minutes for the temperature of the IonDrive Turbo V ion source to decrease sufficiently to prevent a burn hazard. Some surfaces of the ion source and vacuum interface become hot during operation.

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

Figure 5-2 Source Drain on the Vacuum Interface



1. Deactivate the mass spectrometer. Refer to the document: *Help*.
2. Remove the ion source. Refer to the ion source document: *Operator Guide*.
When the ion source is not in use, keep it in a safe location to prevent damage.

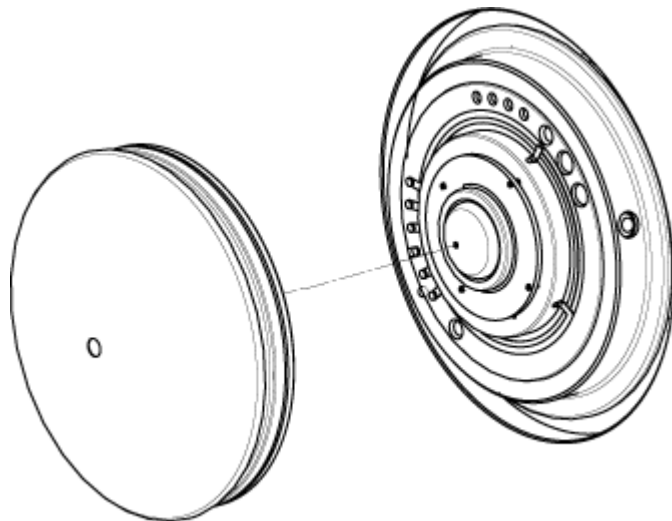
Clean the Curtain Plate

CAUTION: Potential System Damage. When the curtain plate or orifice plate is put on a surface, do not let the aperture tip touch the surface. Make sure that the conical side of the curtain plate points up.

CAUTION: Potential System Damage. To prevent damage to the aperture, do not put a wire or metal brush in the aperture on the curtain plate, orifice plate, interface heater, IQ0 lens, or IQ00 lens.

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

Figure 5-3 Curtain Plate Removal



The curtain plate is held in position by three ball spring latches on the orifice plate.

Tip! If the curtain plate does not immediately disconnect from the orifice plate, then turn the curtain plate a small amount, 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: If required, then use multiple wipes.

3. Do step 2 again with 100% LC-MS-grade isopropanol or 100% LC-MS-grade methanol.
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. Use a clean, slightly damp, lint-free wipe to remove any residue.

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 put a wire or metal brush in the aperture on the curtain plate, orifice plate, interface heater, IQ0 lens, or IQ00 lens.

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.

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

To tighten the ion source in position, turn the source latches down into the locking position.

Empty the Source Exhaust Drain Bottle



WARNING! Hot Surface Hazard. Before maintenance procedures are started, wait a minimum of 90 minutes for the temperature of the IonDrive Turbo V ion source to decrease sufficiently to prevent a burn hazard. Some surfaces of the ion source and vacuum interface become hot during operation.



WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. Put hazardous materials in correctly labeled waste containers, and obey local regulations to discard them.



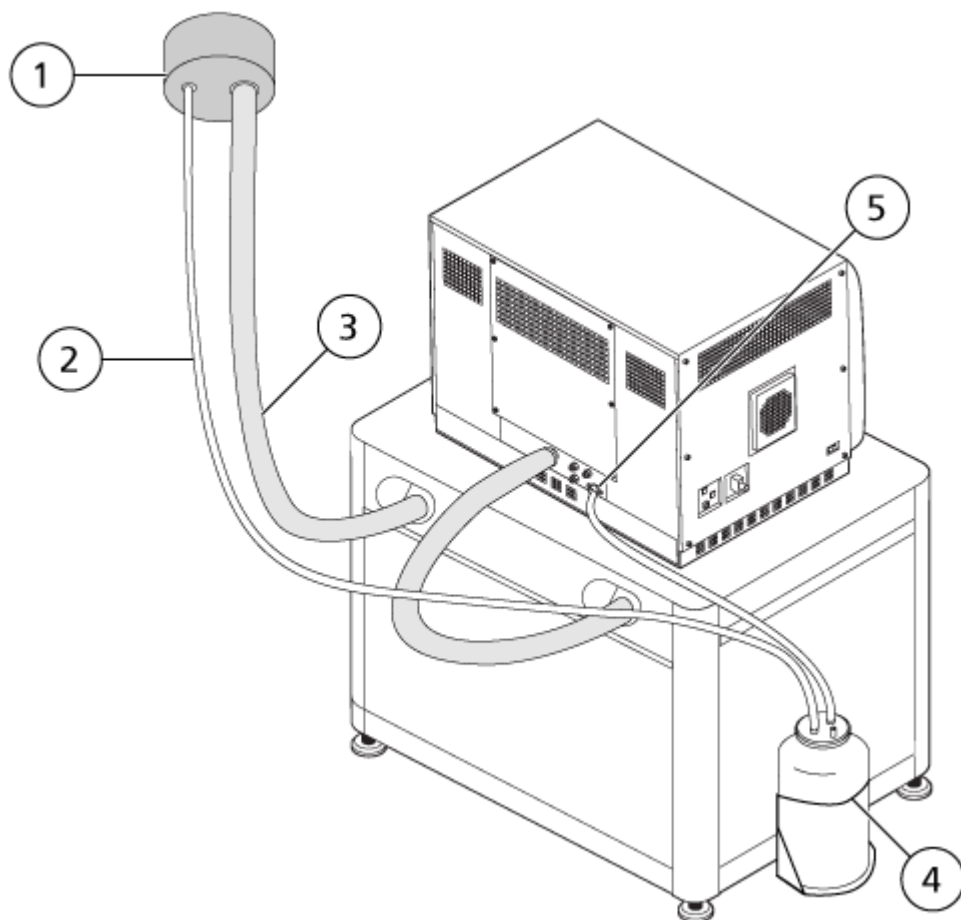
WARNING! Ionizing Radiation Hazard, Biohazard, or Toxic Chemical Hazard. If hazardous, biohazardous, or radioactive materials have been analyzed in the mass spectrometer, then make sure to vent exhaust gases to a dedicated laboratory fume hood or exhaust system, and make sure that the ventilation tubing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

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

Examine the source exhaust drain bottle regularly, and empty it before it becomes full. Also examine 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: *IonDrive Turbo V Ion Source Operator Guide*.
2. Loosen the clamps that connect 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 inch) inner diameter (i.d.)
3	Roughing pump exhaust hose: 3.2 cm (1.25 inches) i.d.
4	Source exhaust drain bottle To prevent spillage, make sure that the bottle is correctly installed.
5	Source exhaust connection to the mass spectrometer: 1.6 cm (0.625 inch) i.d.

Note: Hose clamps attach the source exhaust hose to the drain bottle, mass spectrometer, and laboratory vent.

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 obey laboratory procedures and local waste regulations to discard the waste.
7. Install the cap on the bottle, and then put the bottle in the holder.
8. Attach the hoses to the cap, and then attach them tightly with clamps.

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

- Examine 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 put into storage 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 kept at a temperature between $-30\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$ ($-22\text{ }^{\circ}\text{F}$ to $140\text{ }^{\circ}\text{F}$) and relative humidity not more than 99%, non-condensing. Stow the system at an altitude not more than 2,000 m (6,562 ft) above sea level.

Mass Spectrometer Troubleshooting 6

This section contains information for troubleshooting basic system issues. Some activities can only be done 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 IonDrive QJet ion guide is very 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. If required, then increase it.
A system fault occurred because the vacuum pressure is too high.	<ol style="list-style-type: none"> Oil-sealed roughing pump: The oil level is too low. There is a leak. The incorrect orifice plate is installed. 	<ol style="list-style-type: none"> Oil-sealed roughing pump: Examine the oil level in the roughing pump, and then contact the local QMP or an FSE to add oil. Refer to the section: Examine the Roughing Pump Oil Level (Oil-Sealed Roughing Pump). Install the correct orifice plate.
The mass spectrometer does not pump down to the required base pressure.	There is a leak in the area of the orifice plate.	<ol style="list-style-type: none"> Remove the orifice plate, and examine it for cracks. If the orifice plate has cracks, then replace it. Examine all vacuum connections and vacuum seals for leaks. If a leak is found, then replace the applicable component.

Table 6-1 System Issues (continued)

Symptom	Possible Cause	Corrective Action
<p>The mass spectrometer requires too much time to pump down correctly.</p> <hr/> <p>Note: The mass spectrometer gets to the base pressure only when the aperture in the orifice plate is blocked. When the aperture is not blocked, the mass spectrometer base pressure increases quickly and the mass spectrometer goes into pumpdown mode.</p> <hr/>	<ol style="list-style-type: none"> The turbo pump controller is defective. The turbo pump controller shows that power consumption is 35 W. Typical power consumption is 100 W. The orifice plate is not sealed correctly. 	<ol style="list-style-type: none"> Replace the turbo pump controller. Contact the local QMP or FSE. Do these steps to seal the orifice plate correctly: <ol style="list-style-type: none"> Press and hold the orifice plate in position to seal it. If the orifice plate is not sealed, then remove and install it again. If the orifice plate cannot be sealed correctly, then replace it.
<p>A system fault occurred because the temperature of the QPS exciter module is too high.</p>	<ol style="list-style-type: none"> The air filter in the mass spectrometer is blocked. The ambient temperature is too high. 	<ol style="list-style-type: none"> Contact the local QMP or FSE. <hr/> <p>Note: For the ambient temperature specifications, refer to the document: <i>Site Planning Guide</i>.</p> <hr/>
<p>The mass spectrometer is in Fault status because of the ion source.</p>	<ol style="list-style-type: none"> The probe is not installed. The probe is not connected correctly. 	<ol style="list-style-type: none"> Install the probe. Refer to the ion source document: <i>Operator Guide</i>. Remove and then install the probe. Tighten the retaining ring fully. Refer to the ion source document: <i>Operator Guide</i>.
<p>The control software shows that the APCI probe is in use, but the TurbolonSpray probe is installed.</p>	<p>The F3 fuse is blown.</p>	<p>Contact an FSE.</p>

Mass Spectrometer Troubleshooting

Table 6-1 System Issues (continued)

Symptom	Possible Cause	Corrective Action
The spray is not stable.	The electrode is blocked.	Clean or replace the electrode. Refer to the ion source document: <i>Operator Guide</i> .
The interface heater is not Ready.	The interface heater is defective.	Contact the local QMP or FSE.
The mass spectrometer resolution is unsatisfactory.	The mass spectrometer is not tuned.	Use the control software to optimize the mass spectrometer. Refer to the document: <i>Help</i> .
Arcing or sparks occur.	The position of the corona discharge needle is incorrect.	If the TurbolonSpray probe is in use, then turn the corona discharge needle in the direction of the curtain plate and away from the stream of heater gas. Refer to the ion source document: <i>Operator Guide</i> .

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

Possible Cause	Corrective Action
The ion source parameters are not optimized.	<ol style="list-style-type: none"> Optimize the ion source parameters. Refer to the ion source document: <i>Operator Guide</i>. Install and optimize an alternative ion source.
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 the local QMP or FSE.
The mass spectrometer is not optimized.	Use the control software to optimize the mass spectrometer. Refer to the document: <i>Help</i> .
The curtain plate is dirty.	Clean the curtain plate. Refer to the section: Clean the Curtain Plate or contact the local QMP or FSE.

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

Possible Cause	Corrective Action
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 IonDrive QJet ion guide or IQ0 lens is dirty.	Clean the IonDrive QJet ion guide and IQ0 lens. Contact the local QMP or FSE.
The Q0 region is dirty.	Clean the Q0 region. Contact the local QMP or FSE.
Front end of the mass spectrometer is dirty.	Clean the front end of the mass spectrometer frequently.
The syringe or sample line has a leak.	Examine the syringe or sample line for leaks. Repair any leaks that are 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.
The probe is not installed correctly.	Remove and install the probe. Refer to the ion source document: <i>Operator Guide</i> .
The ion source is not installed correctly or it is faulty.	Remove and install the ion source. Make sure that the latches are down. If this does not correct the issue, then install and optimize an alternative ion source. Refer to the ion source document: <i>Operator Guide</i> .
One or more of the O-rings on the vacuum interface is missing.	If the O-rings are on the ion source, then install them on the vacuum interface. If they are missing, then replace them.
There is an issue with the LC system or connections.	Troubleshoot the LC system.
The declustering potential (DP) is not optimized.	Optimize the DP.
The electrode is dirty or blocked.	Replace the electrode. Refer to the ion source document: <i>Operator Guide</i> .

Mass Spectrometer Troubleshooting

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 ion source document: <i>Operator Guide</i> .

Table 6-4 Background Noise Issues

Possible Cause	Corrective Action
The ion source temperature, spray voltage, or flow rate for ion source gas 2 (heater gas) is too high.	Optimize the ion source parameters. Refer to the ion source document: <i>Operator Guide</i> .
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 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 IonDrive QJet ion guide 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.
The mobile phase is contaminated.	Replace the mobile phase.

Table 6-4 Background Noise Issues (continued)

Possible Cause	Corrective Action
<p>The ion source is contaminated.</p>	<ol style="list-style-type: none"> 1. Make sure that the ion source parameters are correct. Refer to the document: <i>IonDrive Turbo V Ion Source Operator Guide</i>. 2. Make sure that the solvent is LC-MS-grade. 3. Clean the electrode. Refer to the document: <i>IonDrive Turbo V Ion Source Operator Guide</i>. 4. Condition (<i>bake</i>) the ion source: <ol style="list-style-type: none"> a. Move the probe to the farthest position from the aperture, vertically and horizontally. b. Infuse or inject 50:50 methanol:water with a pump flow rate of 1 mL/min. c. In the control software, set the temperature to 650, ion source gas 1 to 60, and ion source gas 2 to 60. d. Set the gas for the Curtain Gas interface to 45 or 50. e. Operate the system for a minimum of 2 hours. For best results, we recommend that the procedure be done overnight. 5. Replace the ion source electrode or probe. Refer to the document: <i>IonDrive Turbo V Ion Source Operator Guide</i>. 6. Make sure that the concentration of the sample is correct. 7. Clean the ion source more frequently.

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 stowed at the indicated storage temperature.

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

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 Suggested Tuning Solutions

System	Q1 and Q3		LIT
	Positive	Negative	Positive and Negative
Triple quadrupole LC-MS/MS system	POS PPG, 2e-7 M	NEG PPG, 3e-5 M	N/A
Linear ion trap LC-MS/MS system	POS PPG, 2e-7 M	NEG PPG, 3e-5 M	ES Tuning Solution (1:100 dilution)

Table A-2 Q1 and Q3 Scans

Polarity	Masses							
Low Mass								
Positive	59.05	175.13	500.38	616.46	906.67	N/A	N/A	N/A
Negative	45.00	411.26	585.39	933.64	N/A	N/A	N/A	N/A
High Mass								
Positive	59.05	175.13	500.38	616.46	906.67	1,254.93	1,545.13	1,952.43
Negative	45.00	411.26	585.39	933.64	1,223.85	1,572.10	1,863.31	1,979.39









Table A-3 LIT Scans









Polarity	Masses				
Low Mass					
Positive	118.09	322.05	622.03	922.01	N/A
Negative	112.99	431.98	601.98	N/A	N/A
High Mass					
Positive	118.09	322.05	622.03	922.01	1,521.97
Negative	112.99	431.98	601.98	1,033.99	1,633.95

Glossary of Symbols







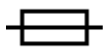



B











Note: Not all of the symbols in this table are applicable to every system.

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









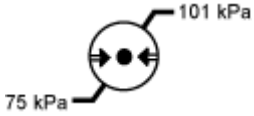
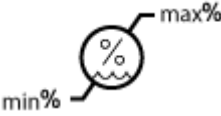

Symbol	Description
	<p>Caution. Consult the instructions for information about a possible hazard.</p> <hr/> <p>Note: In SCIEX documentation, this symbol identifies a personal injury hazard.</p>
	<p>China RoHS Caution Label. The electronic information product contains certain toxic or hazardous substances. 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.</p>
	<p>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.</p>
	<p>Consult instructions for use.</p>
	<p>Crushing Hazard</p>
	<p>cTUVus mark for TUV Rheinland of North America</p>
	<p>Data Matrix symbol that can be scanned by a barcode reader to obtain a unique device identifier (UDI)</p>
	<p>Environmental Hazard</p>









Glossary of Symbols

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.

Glossary of Symbols

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 $-30\text{ }^{\circ}\text{C}$ to $+45\text{ }^{\circ}\text{C}$.

Symbol	Description
	Transport and store the system within –30 °C to +60 °C.
	USB 2.0 connection
	USB 3.0 connection
	USB 3.2 connection
	Ultraviolet Radiation Hazard
	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)
	<i>yyyy-mm-dd</i> Date of manufacture

Glossary of Warnings

C

Note: If a label that is used to identify a component becomes 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.
<p>HANDLE WITH CARE</p> <p>WARNING 50g</p> <p>SHOCK INDICATOR</p> <p>ROUGH HANDLING WILL CHANGE INDICATOR TO RED</p> <p>If indicator is RED, note on the bill of lading, inspection may be warranted</p>	<p>HANDLE WITH CARE</p> <p>WARNING 50g</p> <p>SHOCK INDICATOR</p> <p>ROUGH HANDLING WILL CHANGE INDICATOR TO RED</p> <p>If indicator is RED, note on the bill of lading, inspection may be warranted</p> <hr/> <p>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.</p>
<p>IMPORTANT!</p> <p>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.</p> <p>DO NOT UNCRATE. CONTACT YOUR LOCAL CUSTOMER SUPPORT ENGINEER FOR UNCRATING AND INSTALLATION.</p>	<p>IMPORTANT!</p> <p>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.</p> <p>DO NOT UNCRATE. CONTACT YOUR LOCAL CUSTOMER SUPPORT ENGINEER FOR UNCRATING AND INSTALLATION.</p>

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	<p>Tilt Indicator</p> <hr/> <p>Note: Indicates if the container was tipped or mishandled. Write on the Bill of Lading and inspect for damage. Any claims for tipping require a notation.</p>
TiltWatch PLUS ShockWatch	<p>Tilt Indicator</p> <hr/> <p>Note: Indicates if the container was tipped or mishandled. Write on the Bill of Lading and inspect for damage. Any claims for tipping require a notation.</p>
WARNING: DO NOT OPERATE WITHOUT FIRST ENSURING BOTTLE CAP IS SECURED.	<p>WARNING: DO NOT OPERATE WITHOUT FIRST ENSURING BOTTLE CAP IS SECURED.</p> <hr/> <p>Note: This warning is attached to the source exhaust drain bottle.</p>
WARNING: NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.	<p>WARNING: NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.</p> <hr/> <p>Note: Consult instructions for use.</p>

Contact Us

Addresses



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Blk33, #04-06 Marsiling Industrial Estate Road 3
Woodlands Central Industrial Estate, Singapore 739256

SCIEX
Headquarters

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250 Forest Street
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USA

Customer Training

- Global: sciex.com/contact-us

Online Learning Center

- [SCIEX Now Learning Hub](#)

SCIEX Support

SCIEX and its representatives have a global staff of fully-trained service and technical specialists. They can supply answers to questions about the system or any technical issues that might occur. For more information, go to the SCIEX website at sciex.com or use one of the following links to contact us.

- 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 supersedes all of the previous versions of this document.

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.
