

Echo[®] MS+ System

User Guide



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Operational Precautions and Limitations

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 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, 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. 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 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 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.

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

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:
 - EN 61010-1
- 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

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

International

- Electromagnetic Compatibility (EMC):
 - IEC 61326-1
 - IEC CISPR 11 (Class A)

Refer to the section: Electromagnetic Compatibility.

- · Safety:
 - IEC 61010-1

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).

- 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. 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.

Protective Earth Conductor

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.



WARNING! Electrical Shock Hazard. Do not intentionally interrupt the protective earth conductor. Interruption of the protective earth conductor causes an electrical shock hazard.

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.



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). Any 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.



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

- 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 neoprene 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 any chemicals. If the correct procedures for chemical use and disposal are not obeyed, then personal injury can occur.
- During cleaning, do not let chemicals touch the skin. Wash hands after use.
- 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.

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.

Physical Precautions



WARNING! Lifting Hazard. Use a mechanical lifting device to lift and move the Echo[®] MS+ module. If the Echo[®] MS+ module must be moved manually, then at least four people are required to move it safely. Use established safe lifting procedures. 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 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.



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 the disposal of hazardous substances, which include
 chemicals, waste oils, and electrical components, in accordance with local
 laws and regulations.

Electromagnetic Environment Electromagnetic Compatibility

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

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

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.

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 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 the disposal of hazardous substances, which include chemicals, waste oils, and electrical components, in accordance with local laws and regulations.



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 any 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.

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
- Mains supply voltage fluctuations: ±10% of the nominal voltage
- 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 stay in a range of 2 °C (3.6 °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 from 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 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 Echo[®] MS+ module. If the Echo[®] MS+ module must be moved manually, then at least four people are required to move it safely. Use established safe lifting procedures. For the weights of system components, refer to the document: *Site Planning Guide*.



WARNING! Crushing Hazard. Wear protective footwear when moving heavy objects.

This section includes information about the Echo® MS+ module and the SCIEX OS software. Refer to the document: System User Guide for the mass spectrometer for an overview of the mass spectrometer.

The Echo[®] MS+ system contains the Echo[®] MS+ module, the base structure, the fluidics module, the wash module, and the chiller module.

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 **I** Echo[®] MS+ module. If the Echo[®] MS+ module must be moved manually, then at least four people are required to move it safely. Use established safe lifting procedures. For the weights of system components, refer to the document: Site Planning Guide.

The Echo[®] MS+ system includes these components:

- An Echo[®] MS+ module
- A fluidics module
- A chiller module
- A wash module

The Echo[®] MS+ system with the ZenoTOF 7600 system includes these components:

- An Echo[®] MS+ system.
- A ZenoTOF 7600 system.
- A base structure.
- An OptiFlow Turbo V ion source. Refer to the document: OptiFlow Turbo V Ion Source Operator Guide.
- A Turbo V ion source. Refer to the document: Turbo V Ion Source Operator Guide.
- A SCIEX-supplied computer and monitor with SCIEX OS for instrument optimization, acquisition method development, processing, and data acquisition. For computer specifications and requirements, refer to the document: Software Installation Guide for the SCIEX OS software.

Note: The Echo[®] MS+ system supports the ZenoTOF 7600+ system.

The Echo[®] MS+ system with the SCIEX Triple Quad 6500+ system includes these components:

- An Echo[®] MS+ system.
- A SCIEX Triple Quad 6500+ system.
- An OptiFlow Turbo V Ion Source. Refer to the document: OptiFlow Turbo V Operator Guide.
- An IonDrive Turbo V ion source. Refer to the document: *IonDrive Turbo V Ion Source Operator Guide*.
- A SCIEX-supplied computer and monitor with the SCIEX OS software for instrument optimization, acquisition method development, processing, and data acquisition. For computer specifications and requirements, refer to the document: *Software Installation Guide* for the SCIEX OS software.

Hardware Overview

CAUTION: Potential System Damage. Only use the replacement parts specified in the documentation that comes with the system. Use of any other parts might result in system damage and incorrect operation.

The Echo[®] MS+ system includes these components:

- Echo[®] MS+ module
- Fluidics module
- Wash module
- Chiller module
- Base structure for the Echo[®] MS+ ZenoTOF 7600 system or the Echo[®] MS+ ZenoTOF 7600+ system



Figure 2-1 Front and Left Side View: Echo[®] MS+ Module

ltem	Description
1	Front dress panel status indicator
2	Plate load/unload button
3	Emergency off button



Figure 2-2 Back and Right Side View: Echo[®] MS+ Module

ltem	Description
1	Wash solvent in
2	Carrier solvent in
3	Coupling fluid out
4	Coupling fluid in
5	Waste out
6	Convenience switch
7	Mains power connection
8	Ethernet port (to the acquisition PC)
9	Emergency Off (EOFF) connector and EOFF plug
10	Wash interconnect connector
11	Fluid interconnect connector





ltem	Description
1	Coupling fluid bottle
2	Carrier solvent bottle
3	Carrier solvent level indicator



Figure 2-4 Back and Right Side View: Fluidics Module

ltem	Description
1	Power LED
2	Fluid interconnect connector
3	Carrier solvent outlet
4	Coupling fluid inlet
5	Chiller module inlet
6	Chiller module outlet
7	Coupling fluid outlet





ltem	Description
1	Wash solvent level indicator



Figure 2-6 Back and Right Side View: Wash Module

ltem	Description
1	Wash interconnect connector

Figure 2-7 Front View: Chiller Module



ltem	Description
1	Convenience switch

Figure 2-8 Back View: Chiller Module



ltem	Description
1	Circulating fluid inlet
2	Circulating fluid outlet
3	Mains supply connector

Theory of Operation

The Echo[®] MS+ module is a high-speed, high-throughput liquid sampling device. The Echo[®] MS+ module uses the ADE and OPI technology to introduce the sample from the wellplate to the mass spectrometer. This contactless transfer of samples from the microplates into the mass spectrometer reduces cross contamination of samples and mass spectrometer signals.

The Echo[®] MS+ module interfaces with the SCIEX OS software. Sample management, data acquisition, and data processing are monitored and analyzed with the acquisition computer. The sample plate is placed on the plate gripper either manually or by a robotic handler. The user then optimizes and sets the parameters for an acquisition method in the SCIEX OS software. The plate gripper inserts the sample wellplate to the Echo[®] MS+ module. The Echo[®] MS+ module makes use of the ADE and OPI technology to introduce the sample from the microplate to the mass spectrometer.

Fluid Line Connections

Prerequisites

- Make sure that the site requirements are met. Refer to the document: *Site Planning Guide*. This document includes information about the mains supply and connection, ventilation, and site clearance requirements. If required, then, contact SCIEX for a copy of the *Site Planning Guide*. For contact information, go to sciex.com/contact-us.
- The Echo[®] MS+ Module convenience switch is turned off.
- The chiller module power switch is turned off.
- 1. Connect the two coupling fluid tubes from the Echo[®] MS+ module to the fluidics module.



Figure 3-1 Fluid Line Connection

ltem	Description
1	Carrier solvent tube
2	Coupling fluid tubes
3	Chiller module tubes
4	Wiper waste tube
5	Solvent waste tube
6	Wash solvent tube

- 2. Connect the carrier solvent tube from the Echo[®] MS+ module to the fluidics module.
- 3. Connect the two chiller module tubes from the fluidics module module to the chiller module.

System Preparation

- 4. Connect the wash solvent tube from the wash solvent bottle in the wash module to the Echo[®] MS+ module.
- 5. Connect the solvent waste tube from the Echo[®] MS+ module to the waste bottle.
- 6. Connect the wiper waste tube from the Echo[®] MS+ module to the waste bottle.

Prerequisites

Prerequisites

- Start up the mass spectrometer. Refer to the document: *System User Guide* for the mass spectrometer.
- Install the ion source. Refer to the document: OptiFlow Turbo V Ion Source Operator Guide.

Start Up the Echo[®] MS+ Module



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

- Make sure that the site requirements are met. Refer to the document: *Site Planning Guide*. This document includes information about the mains supply and connection, ventilation, and site clearance requirements. If required, then, contact SCIEX for a copy of the *Site Planning Guide*. For contact information, go to sciex.com/contact-us.
- The Echo[®] MS+ module convenience switch is turned off and the mains supply cable is connected to the Echo[®] MS+ module.
- The chiller module power switch is turned off and the mains supply cable is connected to the chiller module.
- The cables are connected on the Echo[®] MS+ module, fluidics module, and the chiller module.
- The Ethernet cable is connected to the Echo® MS+ module and the computer.
- The coupling fluid has been replaced. Refer to the section: Replace the Coupling Fluid.
- The EOFF plug is connected to the EOFF connector.

 Turn on the convenience switch on the Echo[®] MS+ module. The convenience switch is at the back of the Echo[®] MS+ module.



Figure 3-2 Echo[®] MS+ Module Convenience Switch

ltem	Description
1	Convenience switch

2. Turn on the chiller module convenience switch.



Figure 3-3 Convenience Switch on the Chiller Module

ltem	Description
1	Convenience switch

- 3. Turn on the computer.
- 4. Open SCIEX OS.

Add an Echo[®] MS+ Module Device

Note: To prevent activation issues, always add the mass spectrometer module before adding any other devices.

- 1. Open the Configuration workspace.
- 2. Click Devices.
- 3. If the devices are active, then click **Deactivate**.
- 4. Click Add.
- 5. In the Type list, select Integrated System.
- 6. In the Model list, select Echo MS .
- 7. To edit settings or restore default values, click Settings.

- 8. Click **Cancel** to leave the Settings dialog and return to the Device dialog.
- 9. Click **Test Device** to make sure that the device is configured correctly and available for use. In the **Intergrated System** field, **Echo[®] MS+** is shown.
- 10. Click Save.
- 11. Do step 4 to step 10 again, as required.
- 12. Select the Activate check box beside each device to be activated, and then click Activate Devices.
- 13. To edit or delete devices, refer to the Help System.

Purge the Solvent Lines

Prerequisites

- Make sure that the fluid lines are connected. Refer to the section: Fluid Line Connections.
- Make sure that the carrier and wash solvent bottles are filled with correct solvents. Refer to the sections: Replace the Carrier Solvent and Replace the Wash Solvent.
- 1. Open SCIEX OS.



- Click (Direct device control). 2.
- Click Tools > Maintenance. 3. The Echo[®] MS+ - Maintenance window opens.
- 4. Click **Pumps**, and then click **Carrier Solvent**.
- 5. To select the proportions of the different components of the carrier solvent in use, in the Composition section, do this:
 - From the Methanol list, select the percentage of methanol.
 - From the Acetonitrile list, select the percentage of acetonitrile.
 - From the Water list, select the percentage of water.

Note: If a carrier solvent with a high aqueous composition is used, for example, more than 30% water by volume, then the MSF is usually lower, and an undetected overflow of the OPI port might occur. Make sure that the flow rate is optimized a minimum of once each day.

- 6. In the **Purge** section, make sure that the **Duration** is set to a minimum of 8 minutes.
- 7. Click Purge.
- Click Wash Solvent. 8.

System Preparation

- 9. Do step 5 to step 7.
- 10. After the purge is completed, close the Echo[®] MS+ Maintenance panel.

Note: For new installation, make sure to purge the carrier solvent before the OPI wash solvent.

Install the OPI Electrode Assembly

- 1. In the status panel, click (Direct device control).
- 2. Click Tools > Maintenance.
- 3. In the OPI Port Access section, click Lift.

Figure 3-4 Maintenance: OPI Port Access

Maintenance	2 C C C C C C C C C C C C C C C C C C C
Maintenance Select a maintenance category to view associated to	sés
Pumps	Lift the OPI Port
OPI Port Wash	Lift the OPI Port to replace the OPI electrode assembly or to dry the leak sensors for the OPI Port.
OPI Port Access	do Life do Los
Coupling Fluid	

4. Deactivate the devices.

Figure 3-5 Deactivate Devices

C	Configuration	0 I 🔅			A A	O Offine	1-0×
_				Activate Devices Add	tat Dalata 🖉	Projects	
L						Defect	• •
	Devices •	Devices				0	
	Projects	1000	Echo® MS= system		🖌 Activate	Queue	
	User Management	15	Type Integrated System Echol & MEx system	Subdevices Echo# Mi Autolampler		Arguiden sangle time remaining Arguiden gase line ensuring	1111
L	Queue		Siles Last Modified			Devices	
	Print Templates		8/3/2023			Advete Devices	_
	Licenses		SCIEX Triple Quad 6500+		🖌 Activate	Echert. MS1. system	
	LIMS Communication	1580	Type Mais Spectrometer	Subdevices		Line # MS Autolompies	
	General		SCIEX Triple Qued 6500+ Sciex			SCIER Triple Quest 69981	
L	Software Updates		Last Modified 8/4/2023				
	CAC					Direct Control	
L	About					<u> </u>	
						- I I	CQLARGE PC4
L							

5. Disconnect the tubing from the Open Port Interface (OPI).





- a. Loosen the headless nut.
- b. Disconnect the tubing from the OPI. Do not remove the headless nut.
- 6. Remove the probe from the OptiFlow Turbo V ion source.





7. Remove the electrode assembly from the probe.

Note: Do not turn the top fitting.





8. Remove the protective tubing from the new electrode assembly.

Note: Make sure to use the electrode assembly that is supplied with the probe.

9. Install and then fully tighten the new electrode assembly.

Figure 3-9 Install the New Assembly



Note: The mark on the electrode assembly is not aligned with the mark on the probe.



Figure 3-10 The Marks on the Electrode Assembly and Probe Are not Aligned

Note: Make sure that there is no space between the bottom fitting and the probe.

System Preparation

10. Loosen the electrode assembly slowly, and then align the mark on the electrode assembly with the mark on the probe.

The mark identifies the position of the probe and electrode set after the assembly is optimized in the factory.

Figure 3-11 The Marks on the Electrode Assembly and Probe Are Aligned



11. Install the probe in the ion source.




12. Connect the tubing to the OPI.

Figure 3-13 Connect the Tubing



- a. Install the tubing through the headless nut until the stopper is flushed with the nut.
- b. Tighten the nut.

Note: Make sure that there is no space between the stopper and the headless nut.

13. Activate the devices.

Figure 3-14 Activated Devices

O Configuration	6 🕸	🛕 🔗 🤗 Ready	7 - O X
	fractional Add	Projects	
		Delault	• •
Devices +	Devices	in Asset Dr. (C.B.) Of Own	
Projects	Echo # MS+ system	Activity Queue	
User Management	Type Subservers Integrated System Educ# MS-system	Ac guideline sample time senarring Ac quidlost queue time senarring	No.
Queue	Som Lat Modified	Devices	
Print Templates	8/3/0823	Exhert MS: system	11 🙂
Licenses	Zeno10f ²² 7600 System	Edu# Millindulergile	
LIMS Communication	Type Subdevices Main Spectrometer Calibrate Delivery System	Zene TOP** 7900 System	11 🙂
General	Since State	Californit Delivery System	0
Software Updates	8/3/3023		
CAC		MS-Overk	
About		Direct Control	
		• • • • • • • • • • • • • • • • • • •	0
		tanday 6	quitorate

Note: An OPI Drip Sensor Fault detected error might occur if the system is initiated immediately after the electrode assembly is replaced. This error occurs when the carrier solvent flows out after the vacuum in the OPI is released. Wait for a minimum 5 minutes for the sensor to dry and for the system to recover. To dry the OPI overflow sensor manually, refer to the section: OPI Port and Drip Sensor Maintenance.

14. In the OPI Port Access section, click Lower.

Figure 3-15 Maintenance: OPI Port Access

Maintenance	2 C
Maintenance Select a maintenance category to view associated to	rsās,
Pumps	Lift the OPI Port
OPI Port Wash	Lift the OPI Port to replace the OPI electrode assembly or to dry the leak sensors for the OPI Port.
OPI Port Access	💩 Litt 👘 💩 Los
Coupling Fluid	
	-

Optimize the Flow Rate in the Echo[®] MS+ System

1. Click MS Method.

The MS Method window opens.

- 2. Click Open.
- 3. Select an MS method that can be used to monitor the XICs and make sure that the duration is more than 60 minutes.
- 4. Click Start.

Note: Let the Echo[®] MS+ system equilibrate for a minimum of 30 minutes before the next step is done. The ion source temperature set in the MS method has an effect on the emitter protrusion and hence the optimized flow rate of the electrode assembly.

5. Add 60 µL of the test sample to the H12 well of the 384-wellplate.

Note: If required, spin the sample plate in a centrifuge, and then shake the sample plate on an orbital shaker.

6. Put the sample plate in the Echo[®] MS+ system.



7.

Click (Direct device control).

- 8. If the carrier solvent has a high organic content, for example, contains less than 30% of water by volume, then calculate the MSF (Maximum Supported Flow) as follows:
 - a. In the Carrier Solvent section, set the flow rate to 300 μ L/min.
 - b. Click Start.
 - c. Increase the flow rate in increments of 30 µL/min every two minutes until the OPI overflow error occurs.
 Wait until the fault clears when the carrier solvent dries at the OPI overflow sensor.

Note: The MSF will be the flow rate at which the overflow occurs, minus 30 µL/min.

- 9. If the carrier solvent has a low organic content, for example, contains more than 30% of water by volume, then calculate the MSF (Maximum Supported Flow) as follows:
 - a. In the Carrier Solvent section, set the flow rate to 200 $\mu L/min.$
 - b. Click Start.
 - c. In the Device Control dialog, click Direct Ejection.
 - d. Set the parameters as shown in the figure that follows:

Figure 3-16 Direct Ejection

			S Ke	ady
Tools About		li i		< 🏘 🖃
Plate Gripper	▲ Car	rier Solvent		
Current Plate	0 0	arrier Pump		0
Parked	N/A ld	fle		0 µl/min
Þ In 🔺 0	ut N	60H 100%		
		Rart Stop	220	🗘 Set
OPI Port Wash				
Wash Solvent : M	AeOH 50% H2O	50%		Settings
Flow Rate : 150	ul/min			
Port Wash Durat	011: 30 360			
Start Stop				
Last OPI port wa	sh: 14/11/2024 1	3:59:00		
Last OPI port wa	sh: 14/11/2024 1 Port Wash: The p	3:59:00 oort wash runs i	for 10 min	
Last OPI port wa Extended Direct Ejection	sh: 14/11/2024 1 Port Wash: The p	3:59:00 xort wash runs t	for 10 min	
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Last OPI port wa Extended Direct Ejection Fluid Class Plate Type	AQ 384PP	3:59:00 cort wash runs	for 10 min	Å
Last OPI port wa Extended Direct Ejection Fluid Class Plate Type Ejection Info	di: 14/11/2024 1 Port Wash: The p AQ 384PP Ision	3:59:00 cort wash runs l	for 10 min	
Last OPI port wa Extended Direct Ejection Fluid Class Plate Type Ejection Info Peak Type	Ac 14/11/2024 1 Port Wash: The p AQ 384PP asion Standard	3:59:00 cort wash runs	for 10 min	
Last OPI port wa Extended Direct Ejection Fluid Class Plate Type Frection Infr Peak Type Well #/List	A: 14/11/2024 1 Port Wash: The p AQ 384PP asion Standard	3:59:00 cort wash runs	for 10 min	A
Last OPI port wa Extended Direct Ejection Fluid Class Plate Type Fluid Class Plate Type Well #/List	Ac 14/11/2024 1 Port Wash: The p AQ 384PP asion Standard	3:59:00 cort wash runs 1	for 10 min	
Last OPI port wa Extended Direct Ejection Fluid Class Plate Type Ejection Info Peak Type Well #/List	Ac 14/11/2024 1 Port Wash: The p AQ 384PP asion Standard Repeat 10	3:59:00 xort wash runs 1 x	for 10 min	Full Plate
Last OPI port wa Extended Direct Ejection Fluid Class Plate Type Ejection Info Peak Type Well #/List Ejection Vol	Ac 14/11/2024 1 Port Wash: The p AQ 384PP sion Standard Repeat 10 2.5	3:59:00 xort wash runs 1	for 10 min	Full Plate
Last OPI port wa Extended Direct Ejection Fluid Class Plate Type Ejection Inft Peak Type Well #/List Ejection Vol Interval	sh: 14/11/2024 1 Port Wash: The p AQ 384PP silon Standard Repeat 10 2.5	3:59:00 xort wash runs 1	for 10 min	Full Plate
Last OPI port wa Extended Direct Ejection Fluid Class Plate Type Ejection Infe Peak Type Well #/List Ejection Vol Interval	di: 14/11/2024 1 Port Wash: The p AQ 384PP asion Standard Repeat 10 2.5 1000	a:59:00 xort wash runs 1 v v n n ms	for 10 min	Full Plate

- e. Click Start.
- f. Examine the peaks shown. Make sure that the peaks are resolved. Refer to the figure: Figure 3-19.
- g. Increase the flow rate by 30 μ L/min, and then examine if the peaks are resolved.
- h. Do the step 9.g until the peaks are no longer resolved. Refer to the figure: Figure 3-20
- i. Stop any more increment in flow rate or ejection. The MSF for the carrier solvent is the flow rate at which the peaks become unresolved.
- 10. Create a batch and then set the batch parameters as shown in the table, that follows:

Table 3-1 Batch Parameters

Parameter	Value
Number of ejections	60
Well plate type	384
Well location	H12

11. Create eight AE methods with the parameters as shown in the table that follows:

Table 3-2 AE Method Parameters

Parameter	Value
Fluid Class	AQ
Peak Type	Standard
Ejection Vol (nl)	2.5
Interval (ms)	1000

Note: For each batch, set a flow rate, that ranges from MSF to MSF–210 μ L/min, in decrements of 30 μ L/min, as shown in the table that follows.

Batch	Flow Rate (µL/min)	Example (μL/min)
1	MSF	If MSF = 450
2	MSF–30	420
3	MSF–60	390
4	MSF–90	360
5	MSF-120	330
6	MSF-150	300
7	MSF-180	270
8	MSF-210	240

Table 3-3 Flow Rate Example

- 12. Submit the batch eight times, once for each of the AE methods.
- 13. In the Analytics workspace, review the acquired data, and then select the flow rate that supplies the required peak area CV % or average peak width.

Note: If required, then adjust the emitter protrusion, which might improve the system performance. Refer to the section: Optimize the Electrode Assembly in the Echo[®] MS+ System.

Optimize the Electrode Assembly in the Echo[®] MS+ System

Prerequisites

 The Echo[®] MS+ system electrode assembly is installed. Refer to the section: Install the OPI Electrode Assembly.

Note: The Echo[®] MS+ probe and electrode assembly sets are optimized and marked in the factory, and the performance might be different for different laboratory configurations.

Note: The system might go to a fault state and an error message is seen when the leak sensor detects a leak during these steps. If the system goes to a fault state, then wait for the fault to clear when the solvent dries.

Do this procedure to optimize the performance of the electrode assembly for the laboratory configuration.

1. Tighten the electrode assembly on the probe completely.

Figure 3-17 Electrode Assembly



2. Click **MS Method**. The MS Method window opens.

System Preparation

- 3. Click **Open**.
- 4. Select an MS method that can be used to monitor the XICs, and then make sure that the duration is 60 minutes.
- 5. Click Start.

Note: Let the Echo[®] MS+ system equilibrate for a minimum of 30 minutes before the next step is done. The ion source temperature set in the MS method has an effect on the emitter protrusion and hence the optimized flow rate of the electrode assembly.

- 6. In the Device Control dialog, select **Carrier Solvent**, and then set the flow rate to MSF–100 μ L/min.
- 7. Add 60 μ L of the testing sample to the H12 well of the 384-wellplate.

Note: If required, spin the sample plate in a centrifuge, and then shake the sample plate on an orbital shaker.

- 8. Put the sample plate in the Echo[®] MS+ system.
- 9. In the Device Control dialog, click **Direct Ejection**.

10. In the Direct Ejection section, set the parameters as shown in the figure that follows:

		- I	Þ 🔺 💈	< ☆ ≡
Plate Gripper	▲ Ca	rrier Solvent		
Current Plate	0	arrier Pump		Ø
Parked	N/A I	dle		0 µl/min
Þ in 🛕 Ou		4eOH 100%	_	
		Start Stop	220	💲 Set
OPI Port Wash				
Wash Solvent : N	IeOH 50% H2O	50%		Settings
Flow Rate : 150 µ Port Wash Duration	l/min on : 50 sec			
Start Stop				
Last OPI port was	h: 14/11/2024 1	13:59:00		
Extended I	Port Wash: The	port wash runs	for 10 min	
Direct Ejection				
Fluid Class	AQ	~		
Plate Type	384PP	~		
	sion			
Ejection Infu				
Ejection Infu Peak Type	Standard	×		
Ejection Infu Peak Type Well #/List	Standard	*		
Ejection Infu Peak Type Well #/List	Standard	•		
Ejection Infu Peak Type Well #/List	Standard Repeat 10	•		Full Plate
Ejection Infu Peak Type Well #/List Ejection Vol	Standard Repeat 10			Full Plate

Figure 3-18 Direct Ejection

11. Click Start.

Figure 3-19 Resolved Peaks



Figure 3-20 Unresolved Peaks



12. If the peaks are resolved, then do this:

Note: For an example of resolved peaks, refer to the figure: Figure 3-19.

a. Increase the flow rate by 20 µL/min.

- b. In the Carrier Solvent pane, click **Set**, and then, in the Direct Ejection window, click **Start**.
- 13. If the peaks are unresolved, then do this:

Note: For an example of unresolved peaks, refer to the figure: Figure 3-20.

- a. Decrease the flow rate by 40 µL/min.
- b. Turn the lower fitting of the electrode assembly one step in the counterclockwise direction.
- c. Increase the flow rate by 40 μ L/min, click **Start**, and then make sure that the peaks are resolved.
- d. If the peaks are resolved, do step 12.a to step 13.c again.
- e. Do step 12.a to step 13.c again, until the peaks cannot be resolved.
- f. Adjust the fitting clockwise by one step. This adjustment lets the electrode assembly support the highest possible flow rate, optimized against the laboratory configurations.

Figure 3-21 Protrusion Adjustment



Note: When the flow rate is at its highest level, do not turn the electrode assembly again and then stop the ejection.



Figure 3-22 Flow Chart to Optimize the Electrode Assembly

Method Developer Workflow for the Echo[®] MS+ System with the SCIEX Triple Quad 6500+ System

Table 4-1 Automatic Workflow

Task	Software Access
Configure the mass spectrometer in the Configuration workspace in SCIEX OS.	Refer to the document: <i>System User Guide</i> for the mass spectrometer.
 Configure the mass spectrometer in low mass mode. 	
2. Configure the OptiFlow Turbo V ion source.	
3. Configure the integrated syringe pump.	
In the MS Tune workspace, tune the mass spectrometer with the OptiFlow Turbo V ion source and the syringe pump.	Refer to the section: "MS Tune Workspace", in the <i>Help System</i> .
Configure the Echo [®] MS System in the Configuration workspace in SCIEX OS.	Refer to the document: <i>Help System</i> .
In SCIEX OS, optimize the MS method with the Guided MRM	Refer to the section: "Create an AE Method", in the Software User Guide or Help System
feature, and then make an AE method.	Refer to the section: "MS Method Workspace", in the Software User Guide or Help System
	Refer to the section: "Analytics Workspace", in the Software User Guide or Help System

Task	Software Access
(Optional) Make a processing method in the Analytics workspace in	 Refer to the section: "Create an AE Method", in the Software User Guide or Help System
SCIEX OS.	 Refer to the section: "MS Method Workspace", in the Software User Guide or Help System
	 Refer to the section: "Analytics Workspace", in the Software User Guide or Help System
In the Batch Workspace, submit a batch that uses the optimized MRM,	 Refer to the section: "Batch Workspace", in the Help System
AE, and processing methods.	 Refer to the section: "MS Method Workspace", in the Help System
	 Refer to the section: "Analytics Workspace", in the Help System

Table 4-1	Automatic	Workflow	(continued)
	/ latomatio		(oonaoa)

Note: For manual optimization workflow, refer to the section: "MRM Infusion," in the document: *Help System*.

For information about the AE Method workspace, refer to the document: Help System.

Method Developer Workflow for the Echo[®] MS+ System with the ZenoTOF 7600 System and the ZenoTOF 7600+ System

For the method developer workflow for the Echo[®] MS+ system with the ZenoTOF 7600 system, refer to the sections: Method Developer Workflow for the Echo[®] MS+ System with the SCIEX Triple Quad 6500+ System and the Guided MRM HR Optimization in the document: *Help System*.

Operating Instructions

Prerequisites

• Make sure that the preparation of the Echo[®] MS+ system is completed. Refer to the section: System Preparation.

Prepare the Plates

1. Add the sample in the well plate.

Note: If the Dimethyl Sulfoxide (DMSO) fluids are aspired and dispensed, then make sure that the pipette tip goes out of the liquid surface slowly. DMSO fluids can adhere to the external surface of the pipette tip and cause inaccurate dispenses.

- 2. Put the sample plates in the centrifuge.
- 3. Configure the centrifuge with the recommended settings that follows:
 - For AQ, SP, and DMSO fluids: 1,533 g for 2 minutes

Note:

- A 6 inch long-arm centrifuge is recommended for the best performance.
- The sample plates must be spun in a centrifuge to remove any bubbles that were created when the samples were dispensed to the plate.
- The centrifuge speed (rpm) is calculated in inches as follows:

rpm = sqrt (G-Force / $(0.0000284 \times \text{Rotor Radius}))$

- The specifications for the sample volume for the the 384 and 1536 plates are as follows:
 - Echo[®] MS+ qualified 384 plate: 20 uL to 65 uL
 - Echo[®] MS+ qualified 1536 plate: 3 uL to 6 uL
 - DMSO sample: 3 uL to 5.5 uL

Note: DMSO samples are hygroscopic and can absorb moisture from the air, which can cause them to contain more than the specified volume range.

- 1536 plate: It is recommended to avoid volumes close to the top and bottom limits of the specifications. DMSO samples are hygroscopic and can absorb moisture from the air and can cause well plate to overflow.
- 4. Remove each sample plate and then put it on the orbital shaker.
- 5. Shake the plate with the recommended shaker settings that follows:
 - For AQ, SP, and DMSO fluids: 1,350 rpm for 1 minute
- 6. Put the sample plate on the Echo[®] MS+ module.

Note: We recommend that the sample plate be prepared with the previously specified settings. Make sure that the centrifuge and shaker settings are correct for the centrifuge, shaker, and fluid combination used.

Load the Plate Manually

CAUTION: Potential System Damage. Do not touch the plate gripper when the plate gripper in operation. If the plate gripper is touched, then it might be damaged. The Plate load/unload LED flashes when the gripper assembly moves.



WARNING! Pinching Hazard. Be careful not to pinch fingers when the plate gripper is in operation.

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

To load the plate, use one of the procedures that follows:

Use the Software to Load the Plate

- 1. Open the Echo[®] MS+ status window.
- 2. Click **Out**. The gripper assembly extends with the sample plate.
- 3. Put the sample plate in the plate gripper assembly.
- 4. Click **In**. The gripper assembly retracts with the sample plate.
- 5. Close the Echo[®] MS+ status window.

Use the Hardware to Load the Plate

- 1. Press the **Plate load/unload** button on the left side of the Echo[®] MS+ module. The gripper assembly extends.
- 2. Put the sample plate in the gripper assembly.
- 3. Press the **Plate load/unload** button on the left side of the Echo[®] MS+ module. The gripper assembly with the sample plate retracts.

Note: The Plate load/unload LED flashes when the gripper assembly extends and retracts.

Submit the Batch and Then Start the Acquisition

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

Submit a batch and then start the acquisition in the Queue workspace Refer to the section: "Batch Workspace," in the *Help System*.

Emergency Off Function

The emergency off function stops all mechanical movement and turns off the fluid flow in the Echo[®] MS+ module and the fluidics module.

The emergency off function contains these components:

- The emergency off button on the front panel of the Echo[®] MS+ module.
- The emergency off connector and plug on the back panel of the Echo[®] MS+ module.

Operating Instructions

Start the emergency off function in one of these ways:

- Press the emergency off button in the front panel.
- Use a closed external button or relay that is connected to the emergency off connector at the back panel.

The emergency off connector and plug on the back panel let the user connect a closed external button or relay. When the user causes a short between the pins, the emergency off function is disabled. The emergency off connector and plug accept a 26AWG to 16AWG cable. The resistance of the cable with the closed external button or relay, must not be more than 500 ohms.

Note: Make sure to use the shielded cable or the unshielded cable with a ferrite core added.

Figure 5-1 Unshielded Cable With Ferrite Core





Figure 5-2 Emergency Off Button on the Front Panel of the Echo[®] MS+ Module

ltem	Description
1	Emergency off button

Operating Instructions

Figure 5-3 Emergency Off Connector and Plug on the Back Panel of the ${\rm Echo}^{\rm @}\,{\rm MS+}$ Module



ltem	Description
1	Emergency off connector and plug

Use the emergency off button if the these events are seen in the Echo[®] MS+ module:

- Pinch hazard
- A loud or potentially damaging noise
- Liquid leakage

When the emergency off button is pressed, these events occur:

- The movement of the Echo[®] MS+ module stops.
- The fluid flow turns off.
- Acquisition stops and an error message is shown in the SCIEX OS software.
- The fault LED is illuminated.
- A fault indicator is shown in the Device Control dialog. The **Error** field shows that the emergency off button was activated.

Figure 5-4 Device Control Dialog

s About 🕑 🔝 🗶 🔘 💻	Detailed Status	
About Pool Carrier Solvent Solvent	Detailed Status Rusling Data Sorray Data Device Fived Logs Connection Status Device State Emorgia Connection Finit Imagency Off Switch engaged, (OP) Ware Pump is etf. Accessible in period off. (Details for the state of the period off.) Device Centroller Supple Information System Centroller Parts Graper Current Plate OP Mater Out NA Device Centroller Parts Graper Current Plate System Centroller Parts Graper Current Plate NA Carlier Solvent Plate Graper Of Mater Out Device Rate Barne Out Device Rate Out of 100% Solvent Lond Plate Temp, 20 Solvent Lond Nolvent IPeriod Out Out of 20% Carlier Plate Series Out of 20% Carlier Plate Interiod Out of 20% Carlier Plate Interiod	Purg] is powerd dft, [Carier Solvert Purg] is powerd dft, Power supply to CMI Wash er supply to Carier Solvert Purg is dft Power supply to Ware & CMI wash, [CMI Mater ef aff, [Wigel is powerd aff.

When the emergency off button is activated, the emergency off button does not stop these components:

• The controller and power supply for the Echo[®] MS+ module

Note: However, the power output is interrupted.

- External communications, such as Ethernet and USB
- The chiller module

Use the Emergency Off Button

Note: Make sure that all of the operational precaution guidelines that are supplied in the documentation are obeyed.



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.

• Press the emergency off button on the front panel of the Echo[®] MS+ module.

Reset the Emergency Off Button

Note: The emergency off button can be reset from the front panel or the back panel.

After the emergency off button is used to stop the Echo[®] MS+ module, do these steps to start the system:

- 1. Correct these issues:
 - Pinch hazard
 - A loud or potentially damaging noise
 - Water leakage
- 2. To reset the Echo[®] MS+ module, turn the emergency off button in the direction of the arrows on the button until it comes out.



Figure 5-5 Turn the Emergency Off Button Clockwise

The emergency off button goes to its initial position and the supply of power to the Echo[®] MS+ module is turned on.

If the emergency off button is pressed, then the Fault status is shown in the Device Control dialog.



ols About 🕑 🔝 🗙 🙋 🗮 🔹	Detailed Status							
te Gripper A Carrier Solvent A	Detailed Status Auxiliary D	Data Survey Data Device Event Logs 😫						
Amerik Pasta A Dut NCA Baut 0 pl/min MeCH 1025	Connection Status	Device State A Enor(5) Fault Emergency Off Switch Pump is off, Acoustic is powered off, (Illiach	engaged, (OPI Wash Pump) Y is powered off, Power sup Toay Motor) is powered off,	is powered off, (Carrier Solvert Pump) is powere ply to Carrier Solvert Pump is off, Power supply t Wigne's powered off.	d offi, Power supply to OPI Wash Is Wiper & OPI is off, [OPI Motor]			
Start Stop 200 🕃 Set	Device Controllers	Sample Introduction		OPI Wesh	Subsystem Status			
1 Port Wash *	System Controller 🔺	Plate Gripper	Current Plate	Rotary Motor	Emergency Off Switch			
lach Solvent : MaCH 50% H2O 50% Settings Iow Rate : 135 µJ/min ort Walh Duration : 50 sec	OR Motor	Carrier Solvent	Coupling Fluid	Wesh Module Online O Wesh Tray Leak Sensor O	Pump Leak Sensor			
92a1 920p at 0PI port wash 19/12/2024 15:56:45	Wger 🔺 1 mm	0 µt/min Carrier Solvant	1200 Red Level 30 mm	Wash Solvent	Leak Pan Sensor Q 154 Overflow Q			
Extended Port Wash: The port wash runs for 10 min	Plate Sensor O 6.8 mm	MeOH 100%	Ruid Temp. 233 1C	Flow Rate 🔒	Acoustic Power Q XY Henning Q			
Nuid Clem AQ V	Diverter 1 Pos Weste	John Chill Party C		Wash Solvent MeOH 50% H20 50%	IS Amplifier Q Degesser Q			
Tete Type 3849 V	Diverter 2 Pos Carrier			Solvent Level Normal Q	Deloniter Check			
Peak Type Standard V								
Repeat 1 C Full Plate								
ljection Vol 2.5 C ni Interval 1000 C ms								

After the emergency off button is reset, the system clears the error message and the Idle status is shown in the Device Control dialog.

Turn Off the Echo[®] MS+ System

- 1. Open the Configuration workspace.
- 2. Click Devices.
- 3. Click Deactivate.
- 4. Turn off the Echo MS module convenience switch. Refer to the figure: Figure 3-2.
- 5. Turn off the chiller module convenience switch. Refer to the figure: Figure 2-7.

Start the Echo[®] MS+ System after a Power Shutdown

Prerequisites

- Refer to the section: Replace the Coupling Fluid
- 1. Turn on the Echo[®] MS+ module convenience switch. Refer to the figure: Figure 3-2.
- 2. Turn on the chiller module convenience switch. Refer to the figure: Figure 2-7.
- 3. Open SCIEX OS.

Waste Disposal

Correctly dispose of any effluent waste in a an appropriate chemical waste container. After disposal of the waste liquid, make sure that the waste tubing has no loops and that the end of the tubing is 2.5 cm (1 inch) above the waste bottle.



WARNING! Biohazard or Toxic Chemical Hazard. Obey local directives to discard chemicals, cartridges, reagent plates, sample plates, and the remains of the prepared samples. They might contain regulated compounds and biohazardous agents.

Clean the Surfaces

If an overflow occurs or the external services are dirty, then clean the external surfaces of the system.

Required Materials

- Soft cloth
- Use a soft, damp cloth to clean the surfaces of the system. 1.
- 2. Use a soft, dry cloth to remove any moisture from the surfaces.

Replace the Carrier Solvent



WARNING! Toxic Chemical Hazard. Take care when filling carrier solvent bottles. Refer to the chemical product safety data sheets and then take applicable safety precautions. Do not fill the carrier solvent bottle while it is in the fluidics module. Disconnect the fluid line from the bottle, fill the bottle in a safe location, and then install the bottle and fluid line in the fluidics module.

1. Open the SCIEX OS software.



2. Click (Direct device control). The Echo[®] MS+ Device Control dialog opens.

- 3. In the Carrier Solvent section, click **Stop** to turn off the carrier solvent pump.
- 4. Remove the cap, with the carrier solvent tubing and the solvent filter attached, from the carrier solvent bottle.
- 5. Remove the carrier solvent bottle from the fluidics module.
- 6. Rinse the 2 L carrier solvent bottle fully to obey the standards of use with the Echo[®] MS+ system.
- 7. Prepare the carrier solvent as applicable. Take the applicable safety precautions. For the list of supported carrier solvents, refer to the list selection in the Pumps section of the **Maintenance** window. Refer to Figure: Figure 6-1.

Note: Make sure that the carrier solvent bottle contains a minimum 400 mL of solvent and is not more than the 2 L carrier solvent bottle.



- Click (Direct device control). 8.
- 9. Click Tools > Maintenance > Pumps.
- 10. Click Carrier Solvent.
- 11. In the Composition section, do this:

- a. From the **Methanol** list, select the percentage of methanol.
- b. From the **Acetonitrile** list, select the percentage of acetonitrile.
- c. From the Water list, select the percentage of water.

Note: If a carrier solvent with a high aqueous composition is used, for example, more than 30% water by volume, then the MSF is usually lower, and an undetected overflow of the OPI port might occur. Make sure that the flow rate is optimized a minimum of once each day.

- 12. In the **Purge** section, make sure that the **Duration** is set to a minimum of 8 minutes.
- 13. To fill the carrier solvent line, click **Purge**.

Tip! If required, then set the purge duration to more than 8 minutes to purge the fluid line longer.

Figure 6-1 Maintenance: Pumps

Maintenance		X
Maintenance Select a maintenance category to view associated t	usis.	
Pumps OPI Port Wash OPI Port Access	Carrier Solvent OWash Solvent Composition	
Coupling Fluid	Methanol 100 🕶 % Acetonitrile 0 🕶 % Water 0 🕶 %	
	Purge Purge the system daily to supply clean solvent in the pump. It is recommended to purge for a minimum of 8 minutes after the solvent is changed or the system has been idle for an extended period. A purge of 8 minutes or more makes sure that the solvent is fully replaced. Duration 8 min	A Purge Stop

Replace the Wash Solvent

WARNING! Toxic Chemical Hazard. Take care when filling mobile phase wash solvent bottles. Refer to the chemical product safety data sheets and the take applicable safety precautions. Do not fill the mobile phase wash solvent bottle while it is in the wash module. Disconnect the fluid line from the bottle, fill the bottle in a safe location, and then install the bottle and fluid line in the wash module.

- 1. Remove the cap of the wash solvent bottle, with the wash solvent tubing and the solvent filter attached.
- 2. Remove the wash solvent bottle from the wash module.
- 3. Prepare the wash solvent as applicable. Take the applicable safety precautions. For the list of supported wash solvents, refer to the list selection in the Pumps section of the **Maintenance** window. Refer to Figure: Figure 6-2.

Note: Make sure that the wash solvent bottle contains a minimum 250 mL of wash solvent and is not more than 1 L.

- 4. Install the wash solvent bottle in the wash module.
- 5. Put the wash solvent solvent cap, with the wash solvent tubing and the solvent filter attached, on the wash solvent bottle. Tighten the cap.

Note: Make sure that the solvent filter is fully in the wash solvent.



- 6. Click **(Direct device control)**.
- 7. Click Tools > Maintenance > Pumps.
- 8. Click Wash Solvent.
- 9. In the Composition section, do this:
 - a. From the **Methanol** list, select the percentage of methanol.
 - b. From the **Acetonitrile** list, select the percentage of acetonitrile.
 - c. From the Water list, select the percentage of water.

Tip! Click the **Default** button to select the default wash solvent.

- 10. In the **Purge** section, make sure that the **Duration** is set to a minimum of 8 minutes.
- 11. To fill the wash line, click **Purge**.

Tip! If required, then set the purge duration to more than 8 minutes to purge the fluid line longer.

Figure 6-2 Pumps: Wash Solvent

Maintenance		×
Maintenance Select a maintenance category to view associated to	askx	
Numps Image: Compared state OPI Port Wash OPI Port Access Coupling Fluid Coupling Fluid	Carrier Solvent Wash Solvent Composition Methanol S0 K Acetonitrile 0 K Water S0 K Restore Def Purge	ـ میلا
	Purge the system daily to supply clean solvent in the pump. It is recommended to purge for a minimum of 8 minutes after the solvent is changed or the system has been idle for an extended period. A purge of 8 minutes or more makes sure that the solvent is fully replaced. Duration 8	
	Parge State	

Solvent Line Maintenance

Do this procedure to keep the growth of biofilm and the accumulation of insoluble deposits in the solvent pumps and fluid lines to a minimum.

Prerequisite

• Make sure that the fluid lines are connected. Refer to the section: Fluid Line Connections.

Tip! Use a minimum of 10% organic solvent in the carrier and wash solvents, to minimize the growth of biofilm.

Use a minimum of 0.1% v/v formic acid in the carrier and wash solvents, to keep the collection of insoluble materials in the pumps and solvent lines to a minimum.

1. Replace the carrier solvent and the wash solvent with 100% methanol. Refer to the sections: Replace the Carrier Solvent and Replace the Wash Solvent.

Note: Make sure that the wash solvent bottle contains to a minimum 250 mL of methanol and the carrier solvent bottle contains a minimum of 400 mL of methanol.

2. Purge the carrier solvent and the wash solvent lines each for 3 minutes, and then let the pumps rest for 5 seconds.

Maintenance		2
Maintenance Select a maintenance category to view associated to	ыйь.	
Aurops • OPi Part Wash OPi Part Access Coupling Ruid	Carrier Solvent OWash Solvent Composition Methanol 100 V S. Acetonitolie 0 V S. Water 0 V S. Purge Purge Purget daily to supply clean solvent in the pump.	
	it is recommended to page to a moment of a mounts and the power is over a complete of the potent nas been on the an economy product. A purge of a mount of the solvent is fully replaced. Duration <u>b</u> <u>c</u> min	Parge Strong Last dance 29/11/2024 00:56:09

Figure 6-3 Maintenance: Carrier Solvent

- 3. Do step 2 five more times.
- 4. Replace the 100% methanol with the acquisition carrier and wash solvents in the correct solvent inlets. Refer to the sections: Replace the Carrier Solvent and Replace the Wash Solvent.

Note: To increase the shelf of the solvent lines, do these maintenance tasks weekly:

- · Replace the aqueous-based solvents
- Purge the solvent lines with 100% methanol

Replace the Coupling Fluid

1. Open the SCIEX OS software.



- 2. Click (Direct device control).
- 3. Click Tools > Maintenance > Coupling Fluid.
- 4. To turn off the coupling fluid pump, click Off.
- 5. Remove the cap from the coupling fluid bottle, with the coupling fluid tubing and the waterlevel sensor attached.

- 6. Remove the coupling fluid bottle from the fluidics module.
- 7. Discard any water in the coupling fluid bottle.
- 8. Rinse the coupling fluid bottle fully to obey the standards of use with the Echo[®] MS+ system.
- 9. Add 900 mL of ASTM Type-1 water to the coupling fluid bottle.

Note: Add 1 L of ASTM Type-1 water to the coupling fluid bottle after the Echo[®] MS+ system is installed for the first time.

- 10. Install the coupling fluid bottle in the fluidics module.
- 11. Put the cap for the coupling fluid bottle, with the coupling fluid tubing and the water-level sensor attached, on the coupling fluid bottle. Then tighten the cap.

Note: Make sure that the coupling fluid is replaced each week.

12. To turn on the coupling fluid pump, click **ON** in the Coupling Fluid Maintenance panel.

OPI Port and Drip Sensor Maintenance

If an overflow is detected by the OPI overflow sensor, then a Fault status is shown in the Device Control dialog.



- 1. Click **IIII (Direct device control)**.
- 2. Click Tools > Maintenance.
- 3. Click **OPI Port Access**.
- Click Lift. The OPI port moves up.

Note: Use the OPI door to get access to the OPI port.

- 5. Use the angled tip swab to clean the OPI port. After the liquid is removed, the fault is cleared in the Device Control dialog.
- 6. In the **OPI Port Access** section of the Maintenance window, click **In**. The OPI port retracts into the system.

Tip! Use this procedure to do routine maintenance of the OPI port. To clean any residue or deposits on the external surfaces or the rim of the OPI port correctly, make sure to wet the angled tip swab with 100% methanol.

OPI Port Wash

The OPI port wash flushes the OPI capture port and the OPI electrode assembly with the OPI wash solvent.

Note: The OPI Port Wash option must not be used if an acquisition or method is currently in the Queue.

Configure the OPI Port Wash

Prerequisite Procedures

- Make sure that the fluid line connections are connected. Refer to the section: Fluid Line Connections.
- Make sure that the carrier and wash solvent bottles are filled with correct solvents. Refer to the sections: Replace the Carrier Solvent and Replace the Wash Solvent.
- Install the OPI Electrode Assembly.



1. Click (Direct device control).

2. Click **Tools > Maintenance**.

Figure 6-4 Maintenance: OPI Port Wash

Maintenance				
Maintenance Select a maintenance category to view associated & Pumps Off Port Access Coupling Fluid	of tools. OPI Port Wash Wash Solvent Exchange OPI Port Wash Approximately 30 s	OFF Part Wash Wash Solvent MeOH 50% H2O 50% Flow Rate 150 150 50 50 5	Carrier Solvent Exchange Carrier Solvent Recovery Approximately 30 s	Carrier Solvent Recovery Carrier Solvent MeOH 100% Flow Rate Duration 65 Iss Last Registered AE Method: Flow Rate: 220 µ/min Carrier Solvent: N/A
	Extended Port Wash: The Run only OPI Carrier Solv	port wash runs for 20 C s	Defar	It Settings Save Cancel Start Stop

- 3. Click **OPI Port Wash**.
- 4. Configure the settings as shown in the figure: Figure 6-4.

Tip! To go back to the default settings in the **OPI Port Wash** and the **Carrier Solvent Recovery** sections, click **Default Settings**. Refer to the figure: Figure 6-4.

Make sure that the wash solvent is replaced with 50% methanol in water as the default wash solvent. Refer to the section: Replace the Wash Solvent.

5. Click Save.

Note: Use the Control API in the integrated automation application to get access to the saved wash setting for the OPI port.

- 6. (Optional) Select these options:
 - Extended Port Wash
 - Run only OPI Carrier Solvent Recovery

Note: The Extended Port Wash option lets the user do a one-time extended flush with the OPI wash solvent without changes to the saved OPI port wash protocol. The OPI carrier solvent recovery purges any liquid that stays in the OPI. This keeps the mixing of different solvents in the OPI to a minimum. The software then automatically primes and equilibrates the OPI port with the carrier solvent and makes sure that the Echo[®] MS+ system is ready for the next analysis.

7. Click Start.

Tip!

To get quick access to the OPI port wash with the saved protocol, click Device Control > OPI Port Wash.



Figure 6-5 Device Control: OPI Port Wash

• To increase the life of the OPI electrode assembly and for optimal data quality, SCIEX recommends that the OPI port wash be operated daily.

Clean the OPI Wash Tray

If an overflow occurs at the OPI during the OPI wash, then the sensor on the wash tray is activated and a Fault status is shown in the Device Control dialog. To clear the fault, clean the wash tray with the angled-tip swab, make sure that the surface is dry, and then do the OPI carrier solvent recovery.

Required Materials

· Angled tip swab



2. Click **Tools > Maintenance**.

Figure 6-6 Maintenance: OPI Port Access

Maintenance		8
Maintenance Select a maintenance category to view associated to	six	
Pumps	Lift the OPI Port	
OPI Port Wash	Lift the OPI Port to replace the OPI electrode assembly or to dry the leak sensors for the OPI Port.	
OPI Port Access		de Life de Los
Coupling Fluid		

- 3. Click **OPI Port Access**.
- 4. Click Lift.

The OPI port comes up and the wash tray is accessible.

5. Use the angled tip swab to clean the wash tray.

Figure 6-7 Angled Tip Swab



In the Device Control dialog, click Detailed Status.
 After the liquid is removed, a green check mark is shown in the Wash Tray Leak Sensor field.

atailed Status							C standoj	
etailed Status								
etailed Status A	usiliary	Data Survey Data	Device Event Logs					
opportion Option		Davice State (0)	Emorie)					
onnection statu		Standby	enorsy					
onnected		Standoy						
Device Controll	ers	Sample Introdu	ction		OPI Wash		Subsystem Status	
System Controller	O	Plate Gripper		Current Plate	Rotary Motor	0	Emergency Off Switch	
StandBy		Parked		N/A	1.*		OPI Drip Sensor	
OPI Motor	0				Wash Module Online	0	Pump Leak Sensor	
20 mm		Carrier Solven	t	Coupling Fluid	Wash Trav Leak Sensor	ā	Acoustic Leak Sensor	
	~	Flow Rate	0	Speed 🔘	Waste Pump Leak Sensor		Inlet Leak Sensor	
1 mm		0 µl/min		800		_	Leak Pan Sensor	
		Carrier Solvent		Fluid Level 136 mm	Wash Solvent		TFA Overflow	
Plate Sensor	0	MeOH 100%		Fluid Temp. 22 *C	Flow Rate	0	Acoustic Power	
7.022 mm		Column Laured	Normal		0 µl/min		XY Homing	
Diverter 1 Pos		Sowent Lever	ionna 🕑		Wash Solvent		RF Amplifier	
Waste					MeOH 50% H2O 50%		Degasser	
Diverter 2 Pos					Columbia Marmal		Deionizer Error	
Carrier					Sorvent Level reormal	0	Deiceizer Check	
							Contraction Contract	_

Figure 6-8 Device Control: Wash Tray Leak Sensor

7. In the OPI Port Access section, click **Lower**. The OPI port goes back to its position in the system.

Tip! If the OPI overflow sensor is activated, then the user can also do step 1 to step 7 to clean the OPI overflow.

- 8. Click Tools > Maintenance > OPI Port Wash.
- 9. Click Run only OPI Carrier Solvent Recovery.
- 10. Click Start.

This purges any wash solvent from the OPI, and the OPI equilibrates with the carrier solvent. The system then returns to Idle status.
Examine the Fluidics Module

- 1. Examine the fluidics module for evidence of biological growth or dirt. If either is present, then contact an FSE to clean the fluidics module.
- Visually examine the system tubing and fittings.
 Look for broken fittings and dried deposits that might show a slow leak.
 - a. Tighten any loose connections.
 - b. If a fluid tubing connection is broken, then replace the tubing, and then clean the fluidics module. Contact an FSE to replace and then clean the fluidics module.
- 3. Visually examine the system for pinched tubing and for bubbles in the flow path. If required, straighten the tubing. If the issue, is not resolved, then replace the tubing.

OPI Leak or Overflow

An OPI overflow shows that the carrier or wash solvent is delivered to the OPI port faster than the ion source can aspirate it. The overflow might be caused by wear on the electrode assembly or collected deposits of matrix material at the OPI port. SCIEX recommends to do the required maintenance of the OPI port more frequently. Refer to the section: OPI Port Wash.

To troubleshoot an OPI leak or overflow, refer to the flow-diagram as follows:





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.	
\sim	Alternating current	
А	Amperes (current)	
	Asphyxiation Hazard	
EC REP	Authorized representative in the European community	
	Biohazard	
CE	CE Marking of Conformity	
C S C US	cCSAus mark. Indicates electrical safety certification for Canada and USA.	
REF	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.
Ø	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.
Ĩ	Consult instructions for use.
	Crushing Hazard
C Brits American US	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	
哈	Ethernet connection	
	Explosion Hazard	
	Eye Injury Hazard	
	Fire Hazard	
	Flammable Chemical Hazard	
Ţ	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	
IVD	In Vitro Diagnostic Device	

Symbol	Description
	Ionizing Radiation Hazard
Ť	Keep dry. Do not expose to rain.
	Relative humidity must not exceed 99%.
<u>1 1</u>	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	
Ŕ	Reactive Chemical Hazard	
SN	Serial number	
	Toxic Chemical Hazard	
66 kPa	Transport and store the system within 66 kPa to 103 kPa.	
75 kPa	Transport and store the system within 75 kPa to 101 kPa.	
min% max%	Transport and store the system within the specified minimum (min) and maximum (max) levels of relative humidity, noncondensing.	
-30	Transport and store the system within –30 °C to +45 °C.	

Symbol	Description
-30°C-	Transport and store the system within –30 °C to +60 °C.
● ~ _	USB 2.0 connection
ss 🛟	USB 3.0 connection
SS ← ¹⁰	USB 3.2 connection
	Ultraviolet Radiation Hazard
КA	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

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	FOR RESEARCH USE ONLY. NOT FOR USE
IN DIAGNOSTIC PROCEDURES.	IN DIAGNOSTIC PROCEDURES.

Contact Us

Addresses

EC Authorized Person

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Made in Singapore AB Sciex Pte. Ltd. Blk33, #04-06 Marsiling Industrial Estate Road 3 Woodlands Central Industrial Estate, Singapore 739256

SCIEX Headquarters

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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 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.