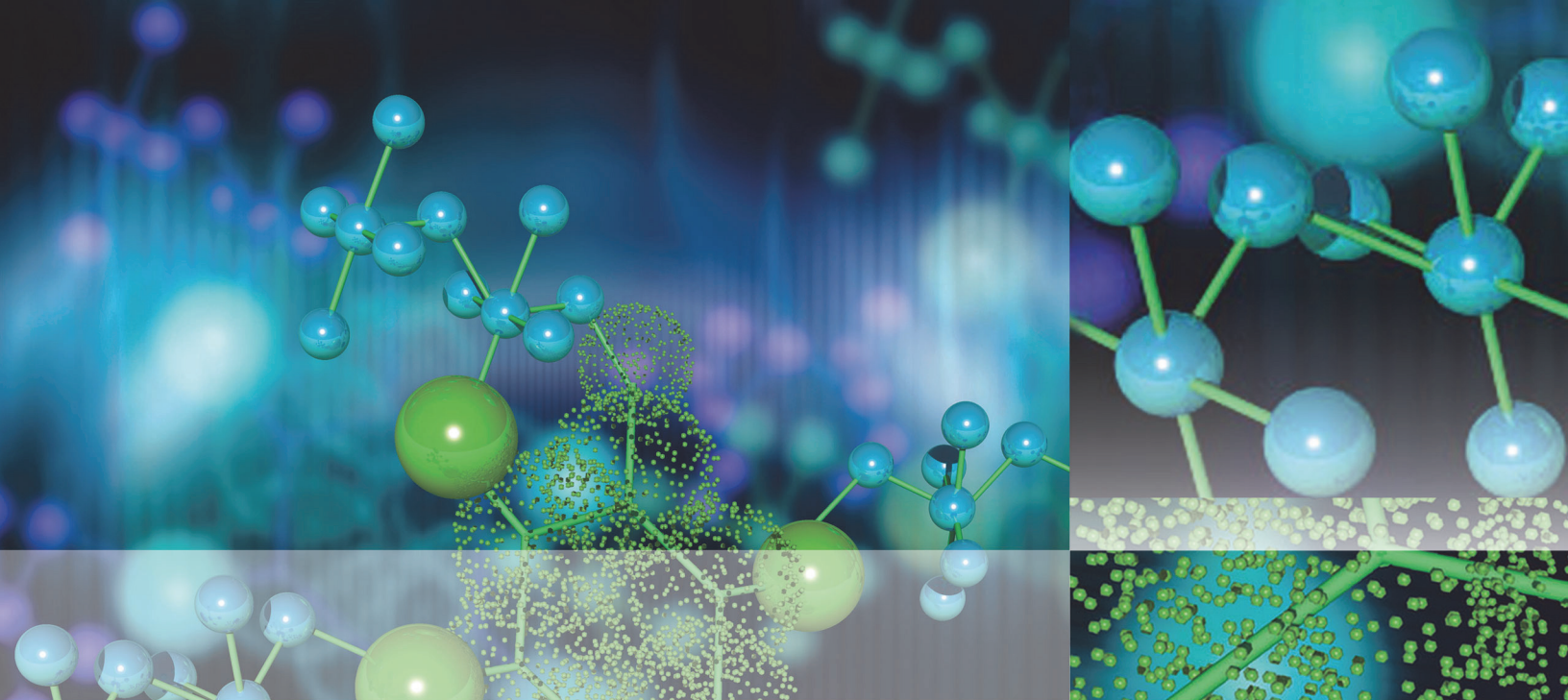




MSQ Plus Mass Detector

Getting Connected Guide

60111-97047 Revision A September 2013



Thermo
SCIENTIFIC

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Release history: Revision A September 2013

Software version: (Thermo) MSQ Plus Mass Detector 2.0 or later; Xcalibur 2.2 SP1 or later; Foundation 2.0 SP1, 2.1, 3.0 or later

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Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When the system is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards as described below.

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EMC Directive 89/336/EEC as amended by 92/31/EEC and 93/68/EEC

EMC compliance has been evaluated by UNDERWRITERS LABORATORY, INC (UL).

EN 55011	(1998)	EN 61000-4-3	(2002)
EN 61326-1	(1998)	EN 61000-4-4	(2001)
EN 61000-3-2	1995	EN 61000-4-5	(2001)
EN 61000-3-3	1995	EN 61000-4-6	(2001)
EN 61000-4-2	(2001)	EN 61000-4-11	(2001)

CFR 47 Part 15 Subpart B: 2004

Code of Federal Regulations, Part 15, Subpart B, Radio Frequency Devices Unintentional Radiators
Class A

Low-Voltage Safety Compliance

This device complies with the EU directive 73/23/EEC (equivalent to IEC 1010-1, 1990 plus Amendment 1, 1991 and Amendment 2, 1995) by meeting the following standard: EN 61010-1: 2001 with Corrigendum No. 1 and 2.

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--



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Preface

This *MSQ Plus Mass Detector Getting Connected Guide* explains how to set up your Thermo Scientific™ MSQ Plus™ Mass Detector and how to connect an external device to the mass detector.

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❖ To suggest changes to documentation or to Help

Complete a brief survey about this document by clicking the button below.
Thank you in advance for your help.



Related Documentation

In addition to this guide, Thermo Fisher Scientific provides the following documents in PDF format for the MSQ Plus Mass Detector:

- *MSQ Plus Mass Detector Hardware Manual*
- *MSQ Plus Mass Detector Getting Started Guide*
- *MSQ Plus Mass Detector Preinstallation Guide*
- *MSQ Plus Mass Detector Calmix Kit Preparation Guide*
- *Dionex AXP/AXP-MS Metering Pump Operator's Manual*
- *Dionex Chromelon/MSQ Plus Operator's Guide*

- *Dionex MSQ Plus Facilities Preinstallation Requirements Guide*
- *Dionex MSQ Hardware Manual*
- *Dionex Installation and Commissioning Guide*
- *Dionex MSQ Preventive Maintenance*
- *Dionex MSQ10LA Nitrogen Generator for Mass Spectrometers*
- *Dionex MSQ18LA Nitrogen Generator for Mass Spectrometers*
- *Dionex N118LOA/N418LA Unpacking & Installation*
- *Dionex N*18KLA Nitrogen Generator User Manual*
- *Dionex MSQ Getting Started*
- *Safety and Regulatory Guide*

You also receive a printed copy of the *Safety and Regulatory Guide* with your MSQ Plus Mass Detector. This guide contains important safety information about Thermo Scientific LC and MS systems. Make sure that all lab personnel have read and have access to this document.

The software also provides Help.

Safety and Special Notices

Make sure you follow the precautionary statements presented in this guide. The safety and other special notices appear in boxes.

Safety and special notices include the following:



CAUTION Highlights hazards to humans, property, or the environment. Each CAUTION notice is accompanied by an appropriate CAUTION symbol.

IMPORTANT Highlights information necessary to prevent damage to software, loss of data, or invalid test results; or might contain information that is critical for optimal performance of the system.

Note Highlights information of general interest.

Tip Highlights helpful information that can make a task easier.

Safety Precautions

Observe the following safety precautions when you operate or perform service on the MSQ Plus Mass Detector:



CAUTION Do not perform any servicing other than that contained in the MSQ Plus Mass Detector Hardware Manual. To avoid personal injury or damage to the instrument, do not perform any servicing other than that contained in the *MSQ Plus Mass Detector Hardware Manual* or related manuals unless you are qualified to do so.



CAUTION Shut down the mass detector and disconnect it from line power before you service it. High voltages capable of causing personal injury are used in the instrument. Some maintenance procedures require that the mass detector be shut down and disconnected from line power before service is performed. Do not operate the mass detector with the top or side covers off. Do not remove protective covers from PCBs.



CAUTION Do not interfere with the safety interlock. Interfering with the safety interlock will expose you to potentially lethal electrical hazards.



CAUTION Respect heated zones. Treat heated zones with respect. The ion transfer capillary and the APCI vaporizer might be very hot and might cause severe burns if touched. Allow heated components to cool before you service them.



CAUTION Place the mass detector in Standby (or Off) mode before you open the atmospheric pressure ionization (API) source. The presence of atmospheric oxygen in the API source when the mass detector is on could be unsafe. The mass detector automatically goes into standby mode when you open the API source; however, take this added precaution for safety reasons.



CAUTION Take care when handling the corona pin. The corona pin is sharp and can cause personal injury. Take care when removing or installing the corona pin.



CAUTION Make sure you have sufficient nitrogen for your API source. Before you begin normal operation each day, make sure that you have sufficient nitrogen for your API source. The presence of atmospheric oxygen in the API source when the mass detector is on could be unsafe.



CAUTION Contain waste streams. Because the API source can accommodate high solvent flow rates, you must make provisions to collect the waste solvent.



CAUTION Provide adequate fume exhaust systems for the API source solvent waste container and the forepump. Your laboratory must be equipped with at least two fume exhaust systems: one to vent the waste container connected to the exhaust port (API solvent drain) on the back of the mass detector and the other to vent the forepump exhaust. As described in the *MSQ Plus Mass Detector Getting Connected Guide*, route the (blue) forepump exhaust hose to a dedicated fume exhaust system. Because the exhaust hose acts as a trap for exhaust fumes that would otherwise recondense in the forepump oil, the hose should travel at floor level for a minimum of two meters (78.5 in.) before it reaches the external exhaust system. Route tubing from the waste container connected to the exhaust port on the back of the mass detector to a second dedicated fume exhaust system. Consult local regulations for the proper method of exhausting the fumes from your system.

Do **not** vent the PVC drain tube (or any vent tubing connected to the waste container) to the same fume exhaust system that is connected to the forepump. The forepump exhaust contains pump oil, which can seriously contaminate the analyzer optics of the mass spectrometer.

Contacting Us

There are several ways to contact Thermo Fisher Scientific for the information you need.

To contact Technical Support

Phone	800-532-4752
Fax	561-688-8736
E-mail	us.techsupport.analyze@thermofisher.com
Knowledge base	www.thermokb.com

Find software updates and utilities to download at mssupport.thermo.com.

To contact Customer Service for ordering information

Phone	800-532-4752
Fax	561-688-8731
E-mail	us.customer-support.analyze@thermofisher.com
Web site	www.thermo.com/ms

To get local contact information for sales or service

Go to www.thermoscientific.com/wps/portal/ts/contactus.

To copy manuals from the Internet

Go to mssupport.thermo.com, agree to the Terms and Conditions, and then click **Customer Manuals** in the left margin of the window.

To suggest changes to documentation or to Help

Fill out a reader survey online at www.surveymonkey.com/s/PQM6P62.

Send an e-mail message to the Technical Publications Editor at techpubs-lcms@thermofisher.com.

Introduction

This chapter explains how to connect your MSQ Plus Mass Detector, shown in [Figure 1](#), to your nitrogen source, line power, and data system computer. It also describes how to connect the Edwards™ forepump to your mass detector and how to connect the exhaust lines from the mass detector and the forepump to your laboratory venting system.

Contents

- [Connecting the Forepump](#)
- [Using the Oil Mist Filter Kit and the Drain Oil Return Kit](#)
- [Connecting the Exhaust Lines](#)
- [Connecting to the Nitrogen Source](#)
- [Connecting to Line Power](#)
- [Connecting to the Data System Computer](#)

Figure 1. MSQ Plus Mass Detector and Accela™ LC



Connecting the Forepump

Your MSQ Plus Mass Detector is shipped with an Edwards forepump. Before connecting the forepump, ensure that it is filled to the correct level with the factory-supplied oil. For more detailed information on these procedures, refer to the manual that comes with the Edwards forepump or to the *MSQ Plus Mass Detector Hardware Manual*.

Note At the time of installation, a Thermo Fisher Scientific service engineer will connect the forepump to the MSQ Plus Mass Detector.

❖ To connect the Edwards forepump to the mass detector

1. Use a KF25 O-ring (part number 6071201) and a KF25 clamp (part number 6071203) to connect the T-piece to the inlet port of the Edwards forepump.
2. To connect the vacuum hose that exits the back of the MSQ Plus Mass Detector through the source manifold to one side of the T-piece (see connection 1 in [Figure 2](#) on [page 4](#)), do the following:
 - a. Fit a hose clamp over the free end of the vacuum hose and insert a KF25 adapter into the end of the hose. Tighten the clamp to secure the adapter.

- b. Use a KF25 O-ring and a KF25 clamp to connect the KF25 adapter on the end of the vacuum hose one side of the T-piece. Tighten the clamp to secure the connection.
3. To connect the vacuum hose that exits the back of the MSQ Plus Mass Detector through the backing manifold to the other side of the T-piece (see connection 2 in [Figure 2](#)):
 - a. Fit a hose clamp over the free end of the vacuum hose and insert a KF25 adapter into the end of the hose. Tighten the clamp to secure the adapter.
 - b. Use a KF25 O-ring and a KF25 clamp to connect the KF25 adapter on the end of the vacuum hose to the other side of the T-piece. Then tighten the clamp to secure the connection.

Note The vacuum hoses are hard-wired into the MSQ Plus Mass Detector. Do not attempt to remove them.

4. Connect the power cord of the Edwards forepump to the PUMP OUT receptacle on the back panel of the MSQ Plus Mass Detector. See connection 3 in [Figure 2](#).

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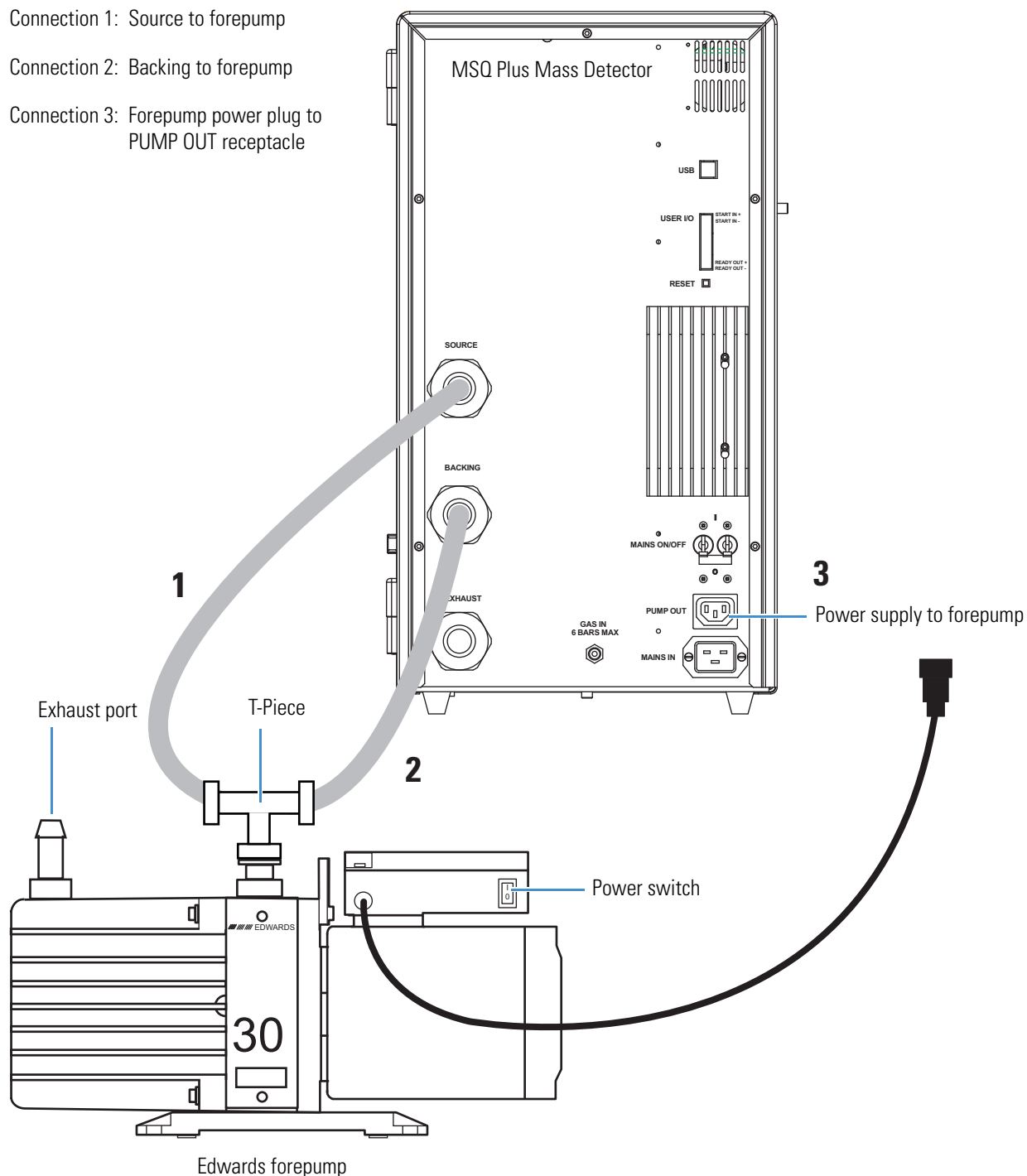
Connecting the Forepump

Figure 2. Connecting the forepump to the MSQ Plus Mass Detector

Connection 1: Source to forepump

Connection 2: Backing to forepump

Connection 3: Forepump power plug to
PUMP OUT receptacle



For information on connecting the forepump exhaust line, see [“Connecting the Exhaust Lines”](#) on [page 9](#).

IMPORTANT You must place the MSQ Plus Mass Detector on a benchtop within 2.5 m (8.2 ft) of a connection to your laboratory venting system.

Using the Oil Mist Filter Kit and the Drain Oil Return Kit

The oil mist filter captures oil mist from the exhaust port of the forepump that would otherwise be ejected into the atmosphere. The oil drain return kit allows you to periodically return oil trapped in the oil mist filter back to the forepump.

The oil mist filter kit contains both the EMF20 oil mist filter kit and the drain oil return kit. Instructions for installing the oil mist filter and the drain oil return are included in this kit, as well as in this section. The EMF20 oil mist filter kit contains the parts listed in [Table 1](#). The drain oil return kit contains the parts listed in [Table 2](#).

Table 1. Oil mist filter kit

Part	Quantity
Oil mist filter	1
Adapter	1
O-ring seal	1
Centering ring and O-ring	1
Clamp	1

Table 2. Drain oil return kit

Part	Quantity
Drain adapter	1
Gas ballast adapter	1
O-ring	1
Bonded seals	2
Banjo bolt	1
Flexible return tubing	1
Flow restrictor	1
Hose clips	2

To connect the oil mist filter and the drain oil return to your forepump, follow these procedures:

1. [Connecting the Oil Mist Filter to the Forepump](#)
2. [Connecting the Drain Adapter to the Oil Mist Filter](#)

1 Introduction

Using the Oil Mist Filter Kit and the Drain Oil Return Kit

3. [Connecting the Hose Adapter to the Forepump](#)
4. [Connecting the Drain of the Oil Mist Filter to the Gas Ballast Port](#)

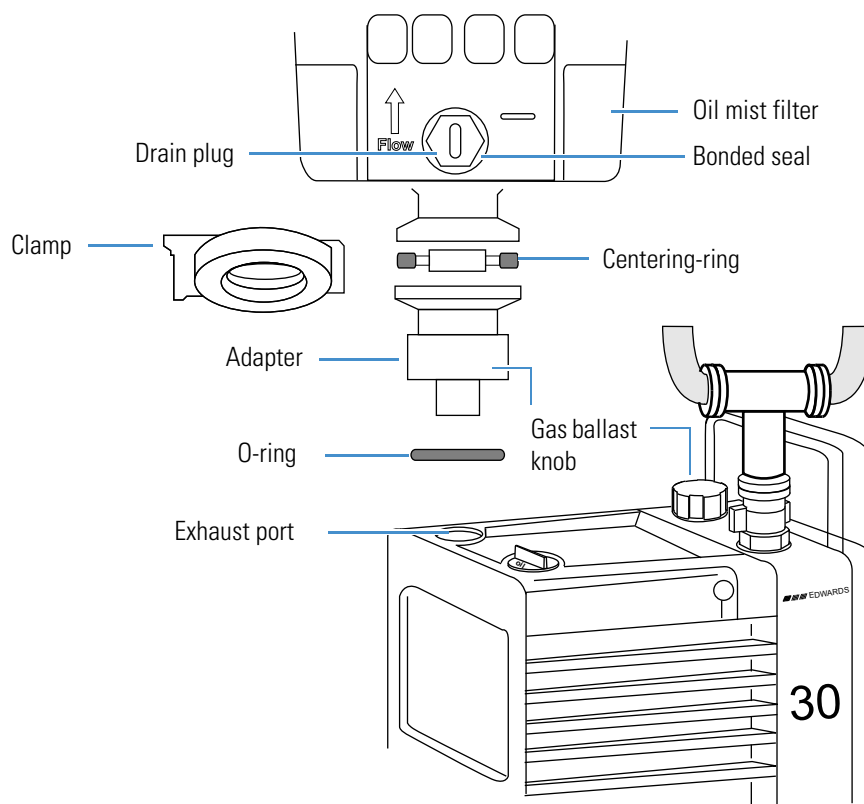
Connecting the Oil Mist Filter to the Forepump

Follow these steps to connect the oil mist filter to the forepump.

❖ To connect the oil mist filter to the exhaust port of the Edwards forepump

1. Turn the power switch on the Edwards forepump to the Off position. If its power cable is attached to Pump Out receptacle on the back panel of the MSQ Plus Mass Detector, detach it. See [Figure 2](#) on [page 4](#).
2. Use a 1.25 in. wrench to remove the brass pipe fitting (see [Figure 2](#)) that extends from the exhaust port of the Edwards forepump.
3. Clean the area around the exhaust port of the forepump.
4. Fit the O-ring seal to the adapter.
5. Screw the adapter into the exhaust port of the forepump and hand-tighten. See [Figure 3](#). Do not overtighten the adapter or you will damage the O-ring seal.

Figure 3. Connecting the oil mist filter to the Edwards forepump



6. Slip the centering ring onto the adapter.
7. Position the flange of the oil mist filter on the centering ring.
8. Fit the clamp over the flange and hand tighten.

Connecting the Drain Adapter to the Oil Mist Filter

Follow this procedure to connect the drain adapter to the oil mist filter.

❖ To connect the drain adapter to the oil mist filter

1. Remove the drain plug and the bonded seal from the oil mist filter ([Figure 3](#) on [page 6](#)).
2. Place the bonded seal onto the drain adapter and screw the drain adapter into the opening that you created by removing the drain plug.

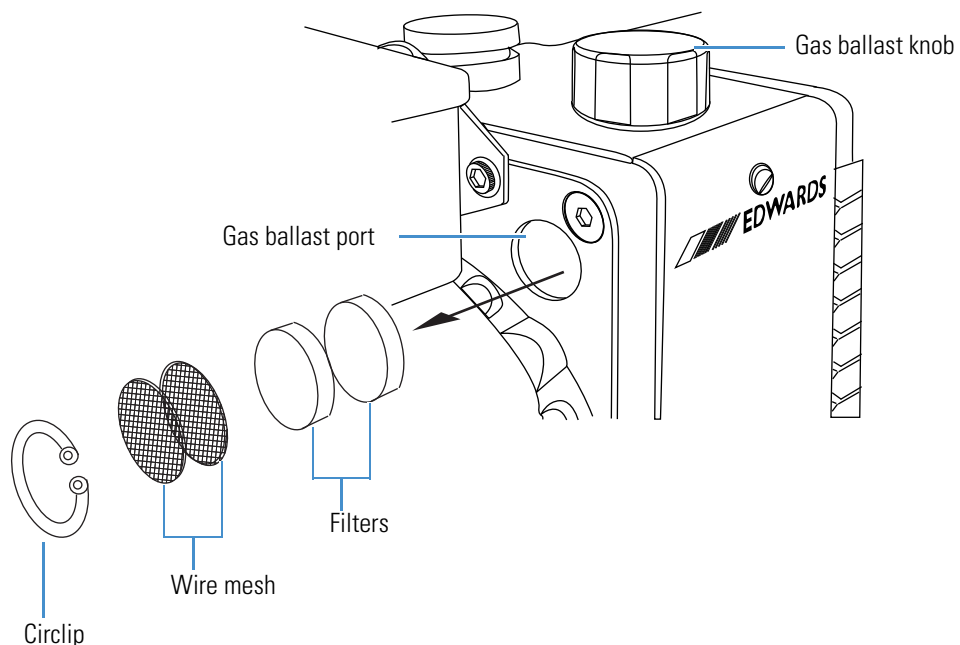
Connecting the Hose Adapter to the Forepump

Follow these steps to connect the hose adapter to the forepump.

❖ To connect the hose adapter to the gas ballast port of the forepump

1. Using a right-hand circlip removal tool, remove the circlip from the gas ballast port on the forepump.
2. Using a screwdriver, pry the wire mesh and filters out of the gas ballast port, as shown in [Figure 4](#).

Figure 4. Removing the circlip, wire mesh, and filters

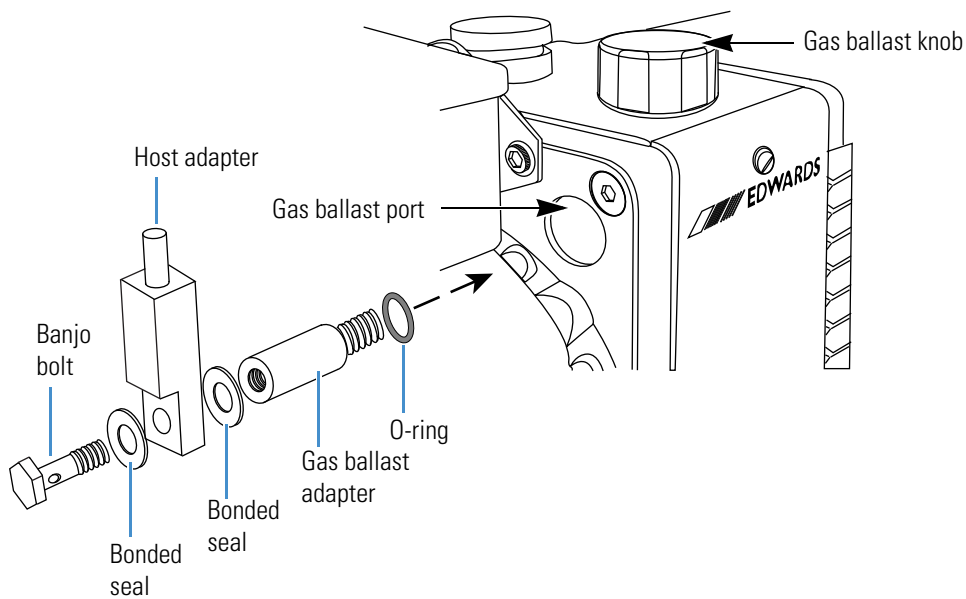


1 Introduction

Using the Oil Mist Filter Kit and the Drain Oil Return Kit

3. Fit the O-ring to the gas ballast adapter, and screw the gas ballast adapter into the gas ballast port on the forepump, as shown in [Figure 5](#).
4. Using the banjo bolt and the two bonded seals, attach the hose adapter to the gas ballast adapter, as shown in [Figure 5](#).

Figure 5. Installing the hose adapter



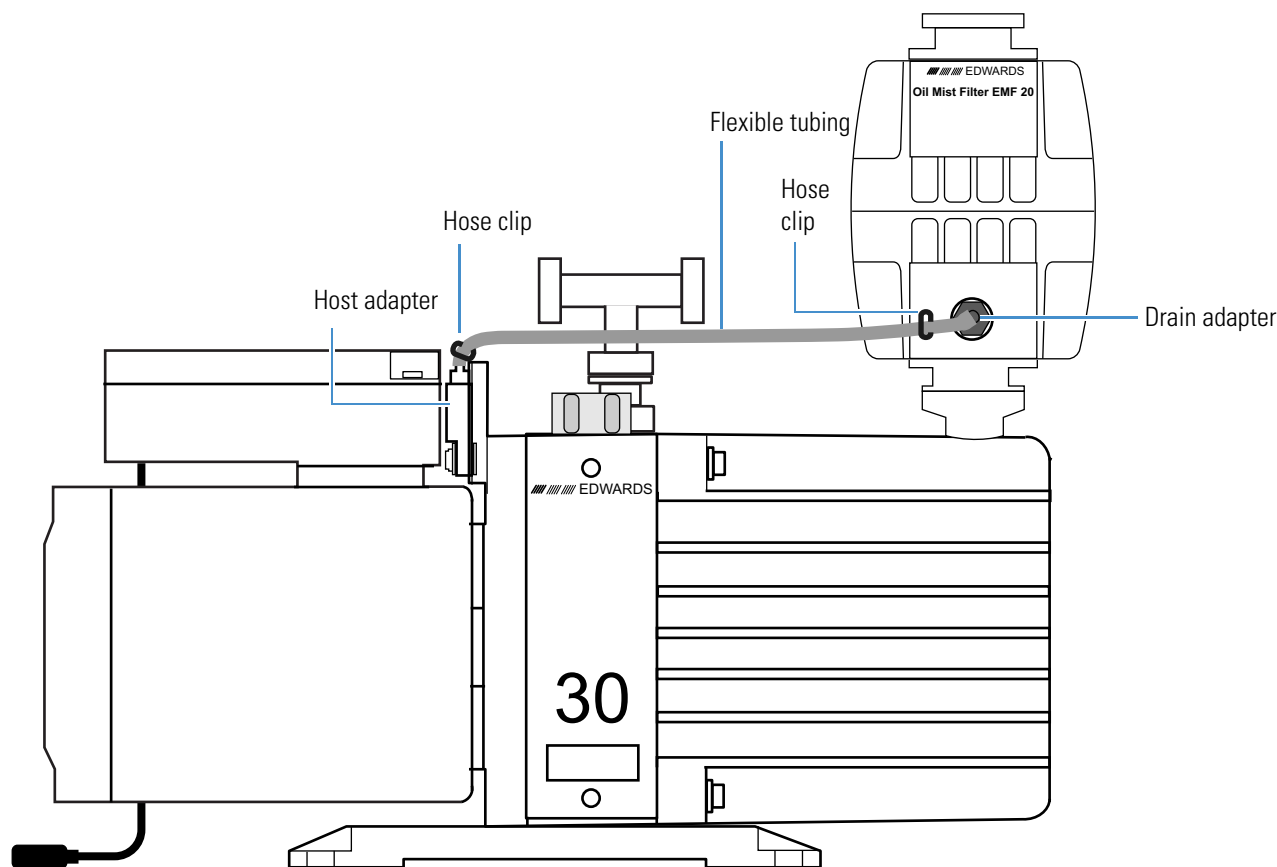
Connecting the Drain of the Oil Mist Filter to the Gas Ballast Port

This section explains how to connect the oil mist filter drain to the gas ballast port.

❖ To connect the drain adapter on the oil mist filter to the hose adapter on the gas ballast port

1. Cut a suitable length from the flexible oil return tubing. Ensure that the ends of the tubing are free of burrs and that they are squarely cut.
2. Insert the brass restrictor into one end of the tubing.
3. Attach one end of the tubing to the drain adapter on the oil mist filter and the other end of the tubing to the hose adapter.
4. Using the two hose clips, secure the ends of the tubing. Ensure that the tubing is neither taut nor kinked and that the flow path from the drain adapter on the oil mist filter to the hose adapter on the forepump is downhill all the way. See [Figure 6](#).

Figure 6. Connecting the flexible oil return tubing



You must connect the oil mist filter to a vent. A blue exhaust hose with a 1 in. ID is included in the Edwards forepump installation kit for this purpose. Exhaust hose clamps are included in this kit; however, clamping the exhaust hose is not required, because the press fit makes an adequate seal. For instructions on connecting the oil mist filter to a vent, see the next section, “[Connecting the Exhaust Lines.](#)”

Connecting the Exhaust Lines

The forepump exhaust must be vented to atmosphere external to the laboratory. In addition, the liquid waste that exits the system through the MSQ Plus Mass Detector exhaust port must be captured in a solvent trap. This trap must be vented to atmosphere external to the laboratory. Both of these exhausts must have a separate vent, and the venting must be carried out by way of separate user-supplied fume hoods or industrial vents. Consult local regulations for the proper method of exhausting gases from your system.



CAUTION The tubing that extends from the Exhaust port must be connected to a solvent trap. Vapor phase solvents produced in the source chamber drain through this tubing. Therefore, connecting this tubing to the forepump exhaust can cause serious instrument damage.

IMPORTANT Place the forepump within 2.5 m (8.2 ft) of the laboratory connection to an external vent.

❖ **To connect the exhaust lines for your system**

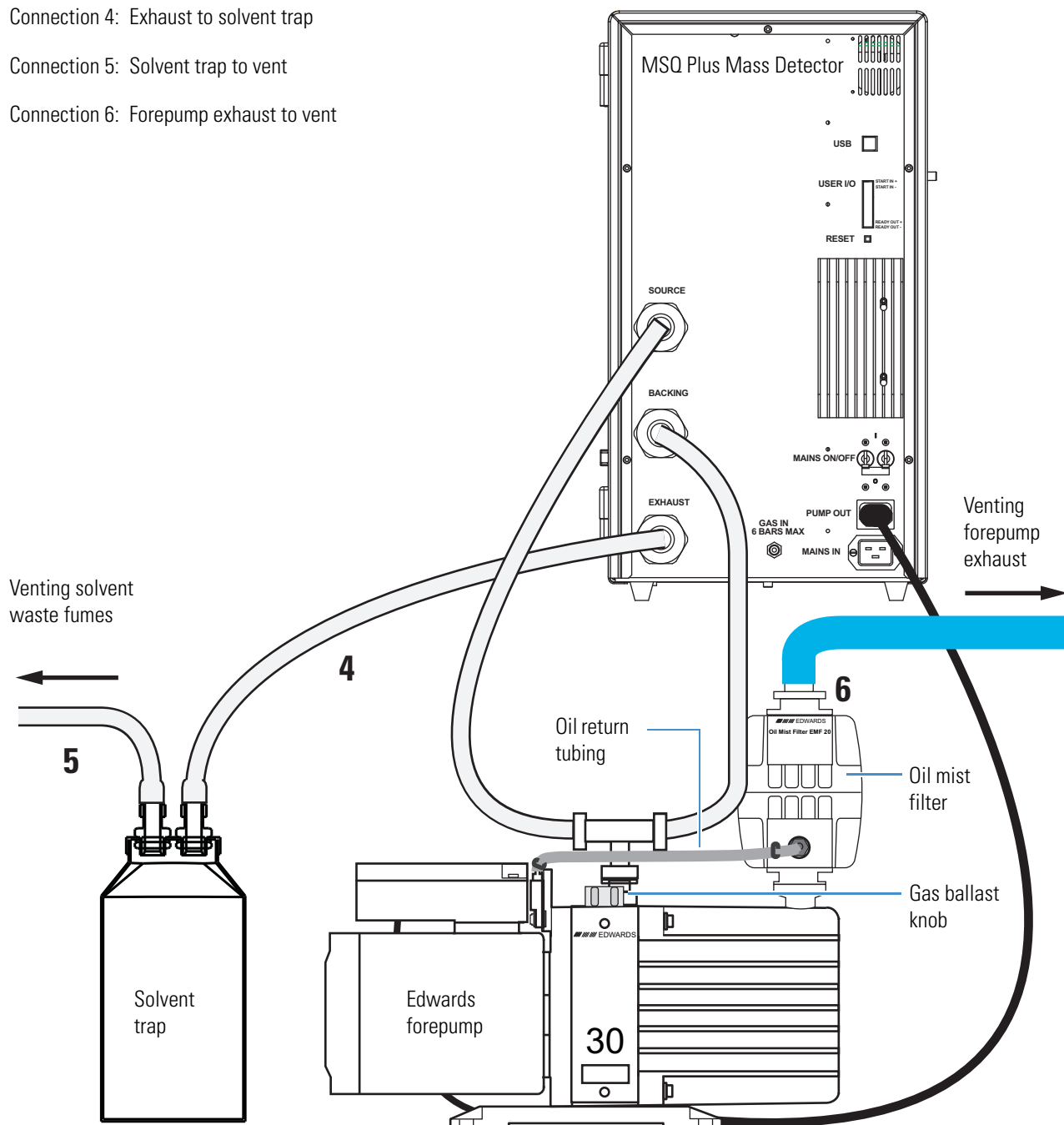
1. Cut the tubing that extends from the exhaust port on the back panel of the MSQ Plus Mass Detector to an appropriate length for your system. Then connect the free end of the tubing to the solvent trap. See connection 4 in [Figure 7](#).

Figure 7. Connecting exhaust lines from the source and forepump without oil mist filter

Connection 4: Exhaust to solvent trap

Connection 5: Solvent trap to vent

Connection 6: Forepump exhaust to vent



2. Use the extra length of exhaust tubing that you just cut to connect the solvent trap to the user-supplied vent for the exhaust fumes from the solvent trap. See connection 5 in [Figure 7](#).

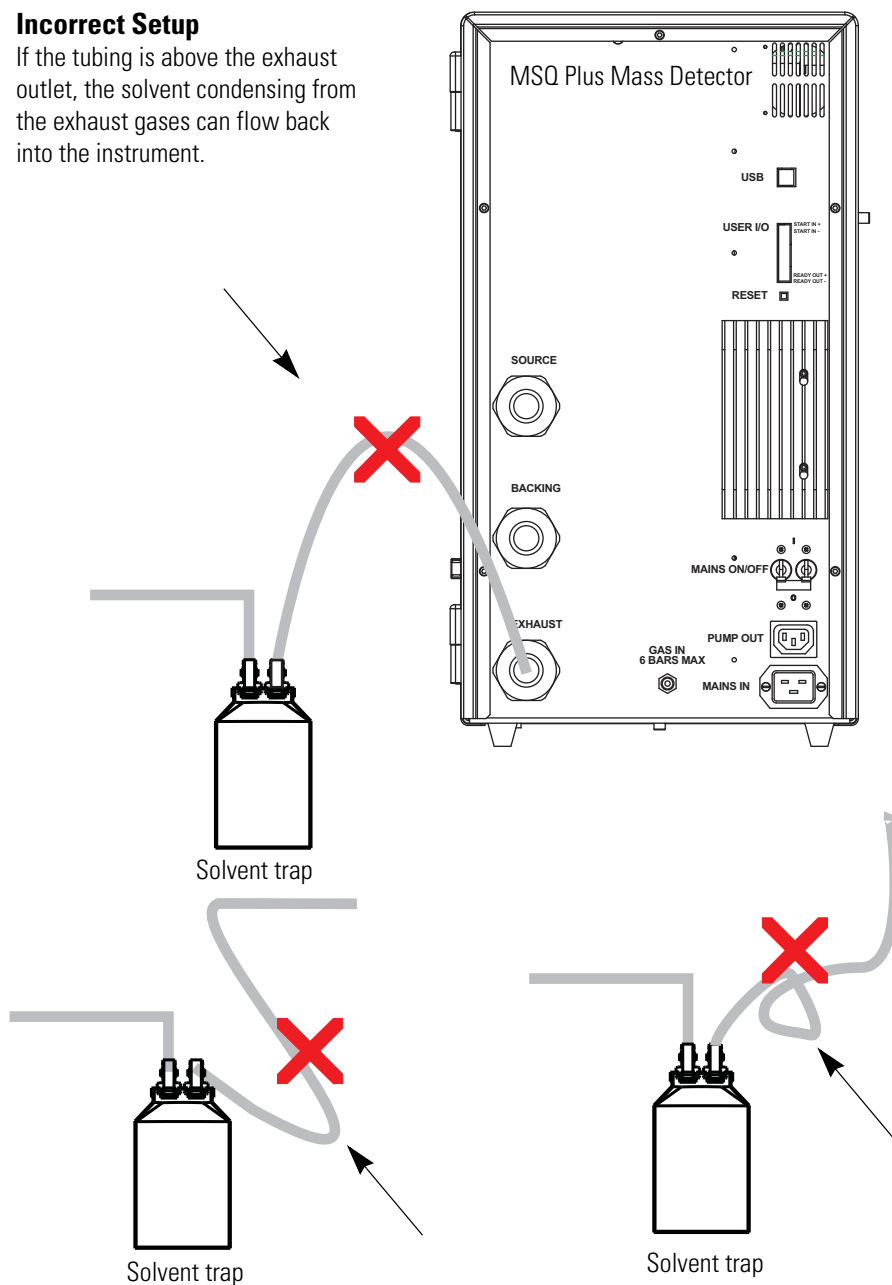


CAUTION For the solvent trap to work effectively, you must place it on a lower level than the instrument so that solvent exiting the exhaust port can flow into it. Do not raise the tubing from the exhaust port above the level of the port, because this will cause solvent to flow back into the instrument. Serious instrument damage can occur as a result. Cut the tubing to a suitable length so that it does not loop down below the top of the solvent trap. If it does, solvent will collect in the tubing and might cause a blockage. See [Figure 8](#).

Figure 8. Incorrectly connecting exhaust lines from the source and forepump

Incorrect Setup

If the tubing is above the exhaust outlet, the solvent condensing from the exhaust gases can flow back into the instrument.



3. Use an adapter, a centering ring, and a clamp to attach the blue hose to the top of the oil mist filter.
4. Direct the other end of the blue hose to a vent that you have supplied for the forepump exhaust. See connection 6 in [Figure 7](#) on [page 11](#).



CAUTION Do not allow the oil mist filter to become overfilled with oil. To empty the oil mist filter, open the gas ballast knob at the end of a sequence run or at the end of the day before you place the system in the Off mode. After the oil in the filter returns to the forepump, close the gas ballast knob.

Connecting to the Nitrogen Source

The MSQ Plus Mass Detector requires a nitrogen gas supply for the source. The nitrogen must be of high purity (99%). The required gas pressure is 520 kPa (5.2 bar, 75 psi). Nitrogen gas consumption is 12 L per min in ESI mode and 8 L per min in APCI mode. Therefore, Thermo Fisher Scientific recommends you use one of the following sources for your nitrogen supply:

- A large, sealed, thermally insulated cylinder containing liquid nitrogen, from which the nitrogen is boiled off. The 230 psi model is recommended. A typical cylinder of size 240 L yields 143850 L (5080 ft³) of gas. Replacement frequency is approximately every 9 to 12 days.

Note Liquid nitrogen conversion factors:

- 1.0 lb of liquid nitrogen = 0.5612 L
 - 1.0 kg of liquid nitrogen = 1.237 L
- A nitrogen generator, such as the Peak Scientific Model N418LA (part number OPTON-97104), with minimum capacity of 720 L per hour at 99% purity with 100 psi at the side panel. Maximum consumption of nitrogen gas is 12 L per minute. Replacement frequency is continuous source with no replacement required. Routine maintenance is required for commercial nitrogen generators, usually on an annual basis.

Connecting the Nitrogen Supply to the Mass Detector

Nitrogen enters the MSQ Plus Mass Detector by way of an inlet labeled GAS IN on its back panel. The MSQ Plus Mass Detector is supplied with the following gas line connections:

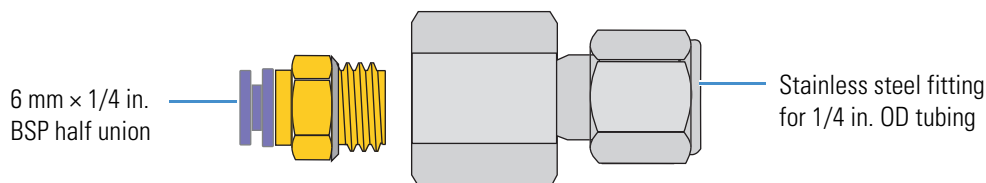
- 6 mm OD PTFE tubing
- Built-in pressure regulator
- 6 mm × 1/4 in. BSP half union (part number 00103-02-00001)
- Swagelok™ stainless steel fitting for 1/4 in. OD tubing (part number 00101-02-00006)

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Connecting to the Nitrogen Source

You must supply suitable adapters to connect your gas line to the 6 mm × 1/4 in. BSP half union. The Swagelok fitting is easily adaptable to typical (U.S.) 1/4 in. laboratory gas supply lines. See [Figure 9](#).

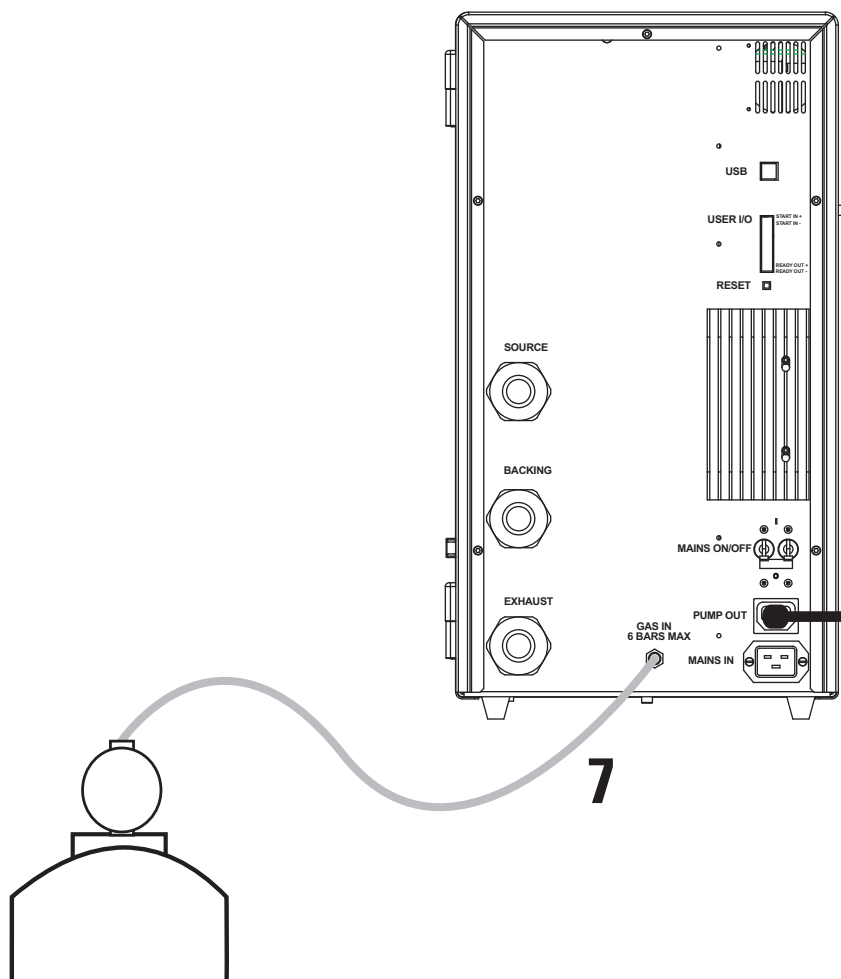
Figure 9. Fitting for 6 mm OD tubing and stainless steel fitting for 1/4 in. OD tubing



❖ To connect the MSQ Plus Mass Detector to the nitrogen supply

1. Cut a suitable length of the supplied 6 mm OD PTFE tubing.
2. Screw the 6 mm × 1/4 in. BSP half union into the stainless steel adapter for 1/4 in. OD tubing. Connect the free end of the stainless steel adapter to your nitrogen supply source.
3. Push one end of the 6 mm PTFE tubing into the 6 mm - 1/4 in. BSP half union.
4. Connect the other end of the 6 mm OD PTFE tubing to the inlet marked GAS IN inlet on the back of the MSQ Plus Mass Detector. See connection 7 in [Figure 10](#).

Figure 10. Connecting the nitrogen supply to the GAS IN port



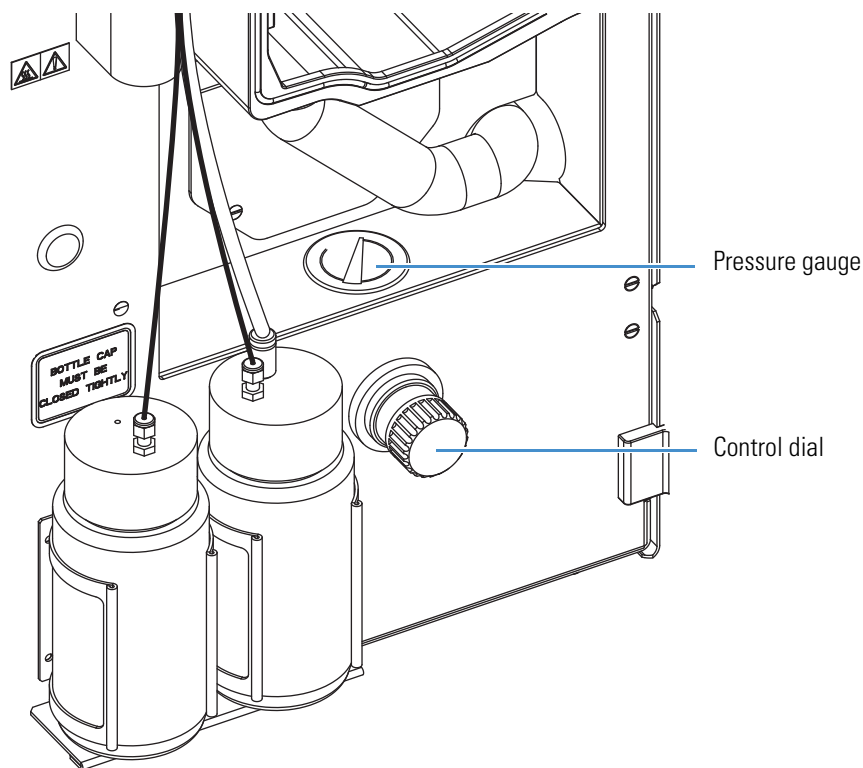
Checking for Air Leaks

Follow this procedure to check the gas supply system for air leaks.

❖ To check the gas supply system for leaks

1. Prepare a test solution of 50:50 isopropanol/water (v/v).
2. Set the pressure to 10 psi:
 - a. Pull out the control dial on the auxiliary pressure regulator, and turn it clockwise. See [Figure 11](#).

Figure 11. Pressure regulator on MSQ Plus Mass Detector



- b. When the pressure gauge reads approximately 10 psi, push the adjuster back to its locked position.
3. Apply the test solution to all the joints between the regulator and the MSQ Plus Mass Detector. Ensure that no test solution enters the MSQ Plus Mass Detector through the gas inlets.

The test solution indicates a leak by foaming.
4. If you observe any foaming of the test solution, tighten the connection until the foaming stops, or replace the connection.
5. Increase the pressure to 50 psi. Then check for leaks.
 - If the system is airtight, go to [step 6](#)
 - If you find a leak, return to [step 4](#).
6. Increase the pressure to 100 psi. Then check for leaks.
 - If the system is airtight, go to [step 7](#).
 - If you find a leak, return to [step 4](#).
7. After you have determined that the system is airtight, reduce the pressure of the nitrogen gas supply line to 75 psi.

The recommended operating pressure required for the gas inlet on the back of the MSQ Plus Mass Detector is 75 to 80 psi.

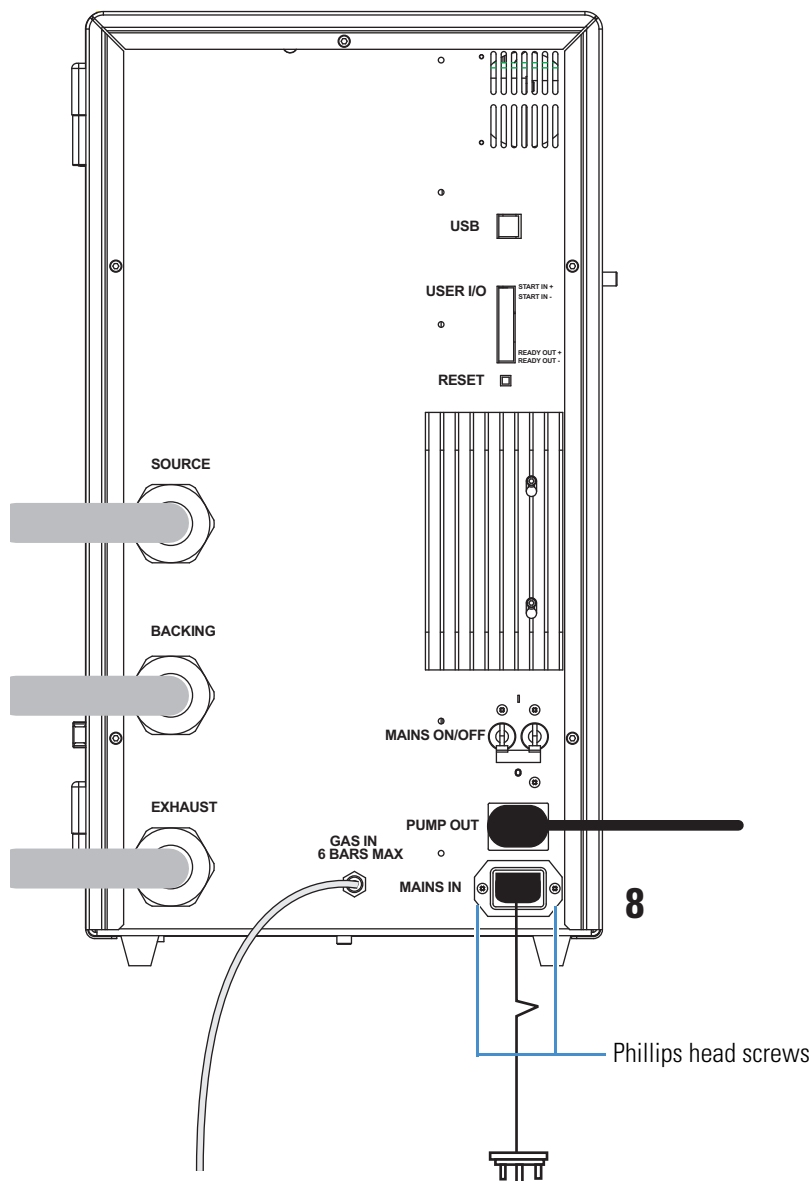
Connecting to Line Power

See the *MSQ Plus Mass Detector Preinstallation Guide* for information on power supply requirements. Ensure that the power cable is fitted with the correct cable termination for your electrical power supply outlets.

❖ To connect the MSQ Plus Mass Detector to a power supply

1. Remove the 2 Phillips-head screws that secure the MAINS IN panel on the back of the MSQ Plus Mass Detector. See [Figure 12](#). Retain the screws.

Figure 12. Connecting the MSQ Plus Mass Detector to the line power



2. Plug the 3-pin IEC socket into the port marked MAINS IN on the back of the MSQ Plus Mass Detector. See connection 8 in [Figure 12](#).
3. Slide the 2 Phillips-head screws through the brackets in the 3-pin IEC socket, and tighten the screws.
4. Plug the other end into a suitable electrical wall outlet.



CAUTION Do not switch on the power until the installation and all connections are complete.

Note If your local area is subject to power fluctuations or power interruptions, a power-conditioning device or an uninterruptible power supply (UPS) should be installed in your laboratory. (See the “Power Conditioning Devices” topic in the *MSQ Plus Mass Detector Preinstallation Guide*.)

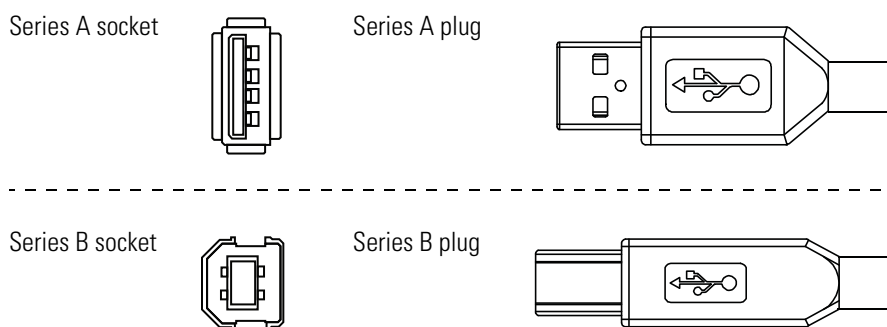
Connecting to the Data System Computer

The data system for the MSQ Plus Mass Detector consists of a computer, a monitor, and a user-supplied printer. The MSQ Plus Mass Detector communicates with the data system computer (PC) through a USB cable (part number FM103073).

❖ To connect the USB cable

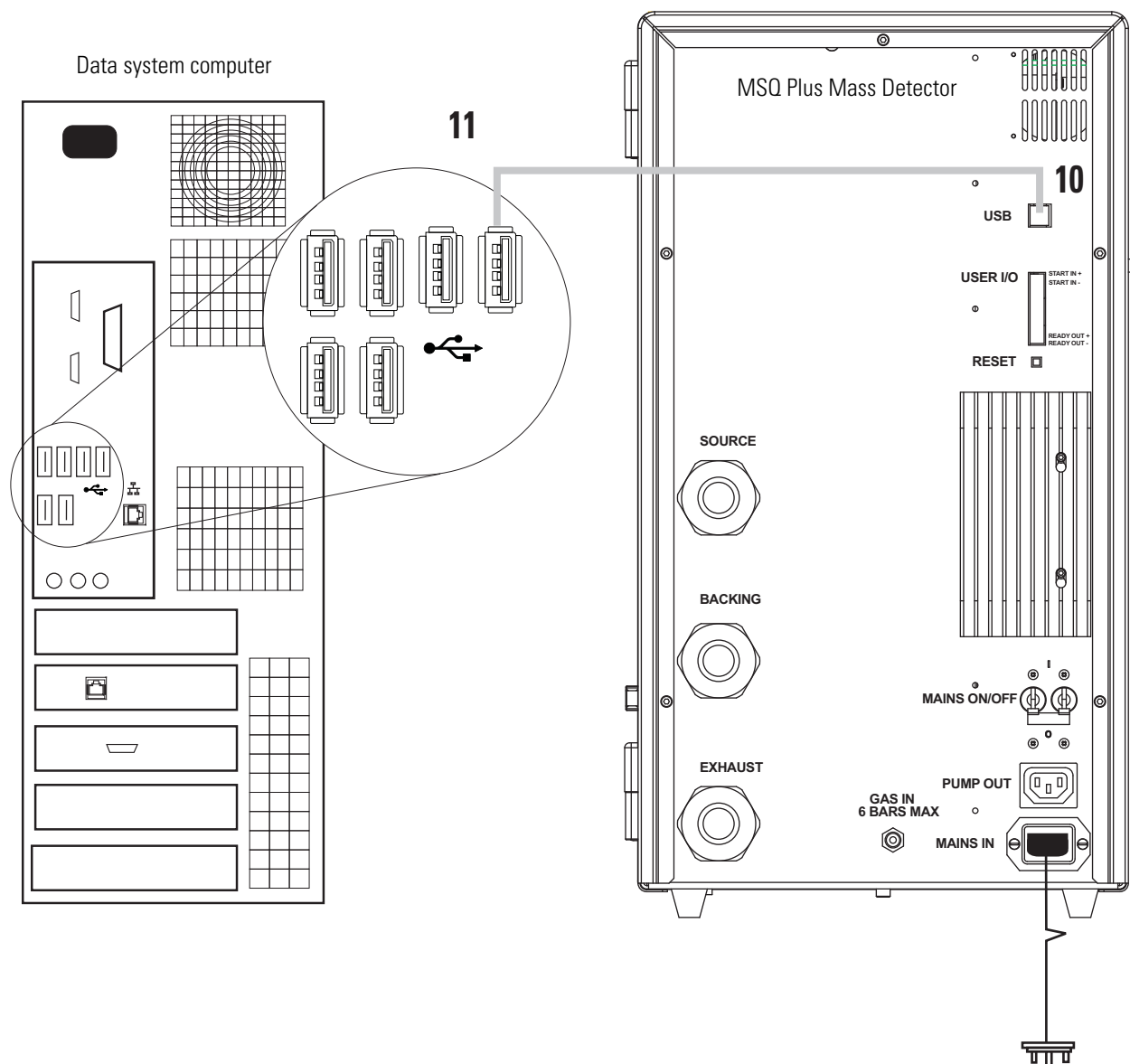
1. Locate the USB cable, consisting of series A plug linked to a series B plug. See [Figure 13](#).

Figure 13. USB cable connection plugs



2. Connect the series B plug to the port marked USB on the back of the MSQ Plus Mass Detector. See connection 10 in [Figure 14](#).

Figure 14. Connecting the MSQ Plus Mass Detector to the data system computer



3. Connect the series A plug to the back of the computer, in the USB slot. See Connection 11 in [Figure 14](#).

At a minimum, do not use a USB hub adjacent to the MSQ series A plug.

Note Leave the other USB slots on the back of the computer vacant. Use the USB slots located on the front of the data system computer to connect other USB devices, such as the keyboard and the mouse.

Connecting the Accela LC System

This chapter describes aspects of connecting the MSQ Plus Mass Detector to the Thermo Scientific Accela LC system. For detailed information on connecting the MSQ Plus Mass Detector to the Accela LC, refer to the *Accela Getting Connected Guide*.

An Accela LC system consists of an Accela pump, an Accela Autosampler, and an optional Accela PDA Detector.

IMPORTANT Thermo Fisher Scientific ships a system interconnect (synchronization harness) cable that has seven combicon connectors for the Accela LC. The M/S connector of the 7-connector interconnect cable connects directly to the MSQ Plus Mass Detector.

Contents

- [Checking the Ethernet Card Settings](#)
- [Connecting the System Interconnect Cable](#)
- [Connecting the LC Outlet to the Mass Detector](#)

Checking the Ethernet Card Settings

Before you connect the system interconnect cable, check the settings of the Ethernet card.

❖ To check the IP address of the network card for the LC system

1. From the Windows 7 taskbar, choose **Start > Control Panel**.
2. From the View By menu, choose **Small Icons** or **Large Icons**.
3. Click the **Network and Sharing Center** icon.

The Network and Sharing Center window opens.

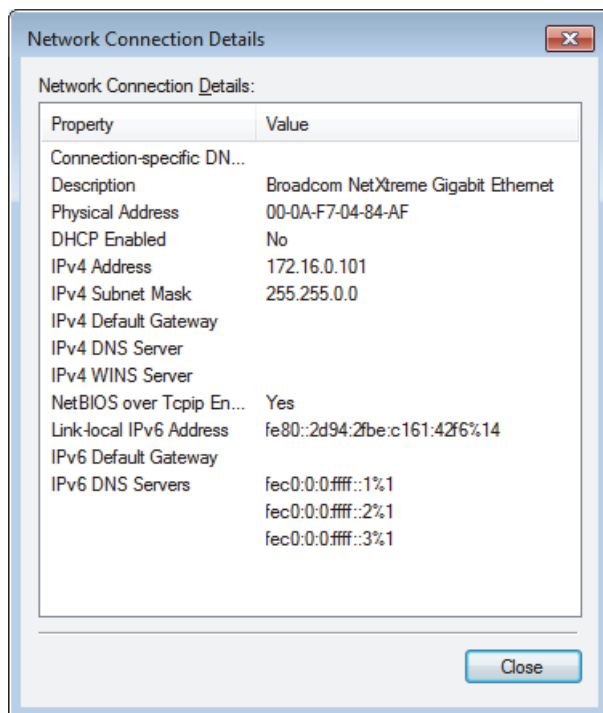
4. Next to Connections beneath the Access Type: No Internet Access, click **Surveyor**.

The Surveyor Status dialog box opens.

5. Click **Details**.

The Network Connection Details dialog box opens, as shown in [Figure 15](#).

Figure 15. Network Connection Details dialog box



6. Confirm that the IP address for the Broadcom NetXtreme Gigabit Ethernet card is 172.16.0.101.
7. Click **Close** to close the dialog box.

Connecting the System Interconnect Cable

The Accela system interconnect cable synchronizes the timing of the Accela modules during an injection sequence. If this cable is not connected properly, the status of an injection remains at Waiting for Contact Closure.

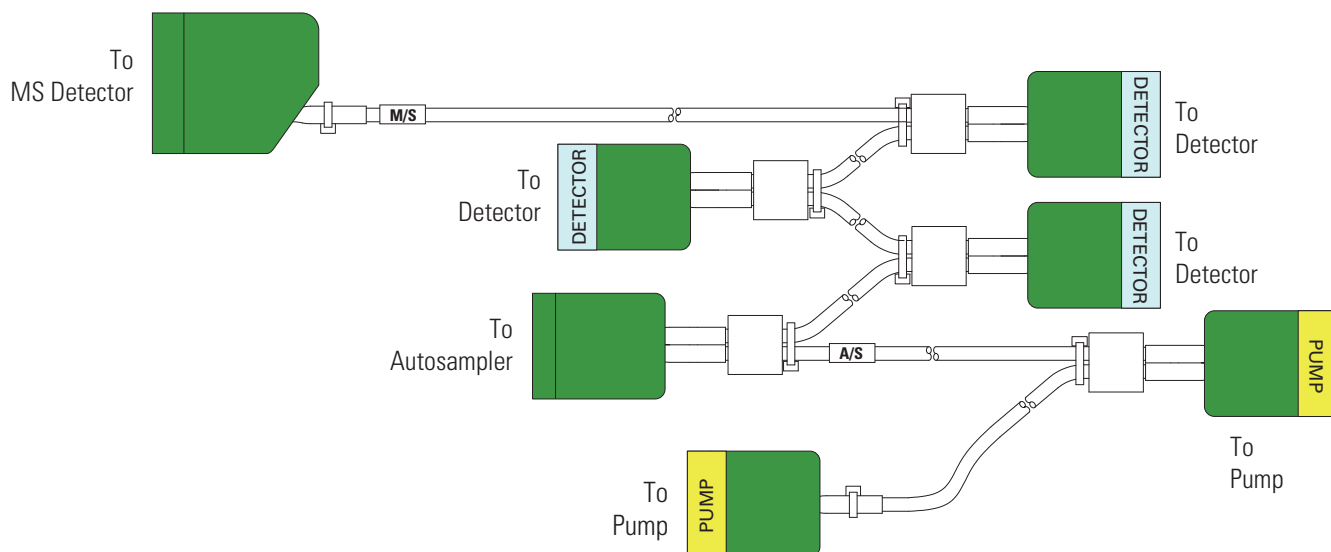


CAUTION The Surveyor LC system comes with a 5-connector cable. Do not use this cable with the Accela LC system. For Surveyor LC system users, refer to the *Surveyor Plus Getting Connected Guide* for instructions on connecting your synchronization cable.

Note The Accela Open Autosampler uses a different contact closure cable. For information about connecting an Accela LC system with an Accela Open Autosampler, refer to the *Accela Open Autosampler Hardware Manual*.

Figure 16 shows the interconnect cable that has seven combicon connectors. The detector connectors have a blue sticker labeled DETECTOR. The pump connectors have a yellow sticker labeled PUMP. The autosampler connector has a small tag labeled A/S on its adjacent cable. The mass detector connector has a small tag labeled M/S on its adjacent cable.

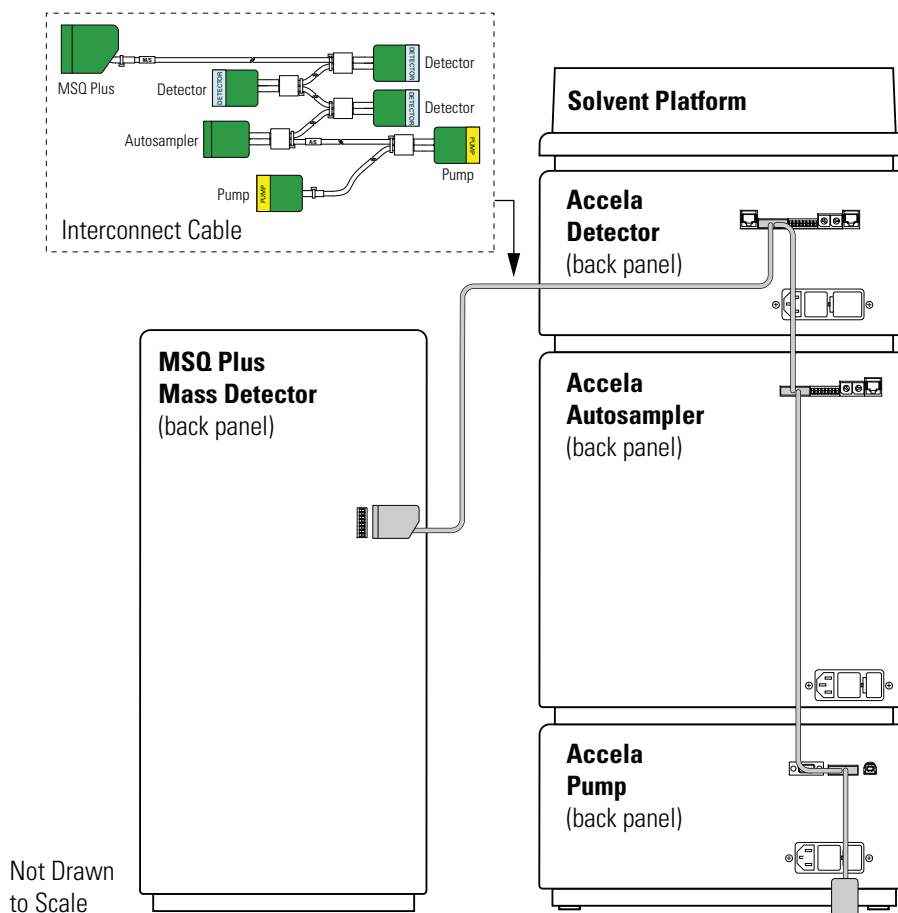
Figure 16. System interconnect cable with 7-combicon connectors (part number 60053-63034)



❖ **To connect the LC/MS system with the 7-connector interconnect cable**

- Plug the M/S combicon connector of the 7-connector system interconnect cable into the User I/O 8-pin socket on the back panel of the MSQ Plus Mass Detector, as shown in Figure 17.

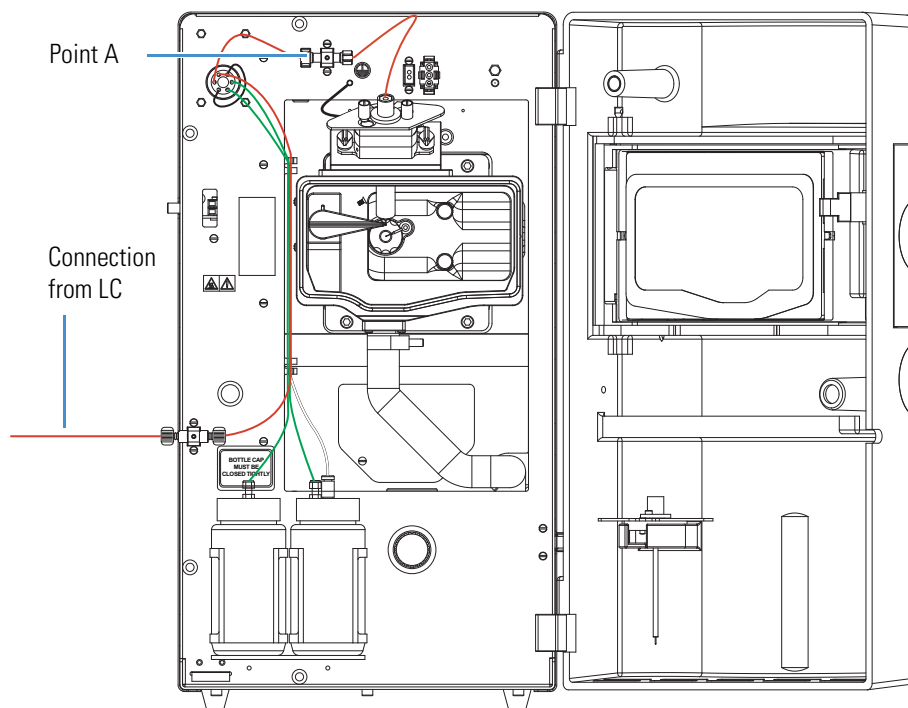
Figure 17. Connections for the 7-connector interconnect cable



Connecting the LC Outlet to the Mass Detector

To connect the Accela LC System to the MSQ Plus Mass Detector, use the fittings for 1/16 in. OD tubing and the red 0.005 in. ID PEEK™ tubing that are included in the MS accessory kit (part number 60111-62006) to connect the outlet of the LC column or the outlet of the LightPipe flowcell to the inlet of the MSQ Plus Mass Detector. See [Figure 18](#).

Figure 18. Connecting to the MSQ Plus Mass Detector



For high-speed chromatography, minimize bandspread by connecting the outlet of the LC directly to the grounded union at point A, shown in [Figure 18](#), being careful not to crimp the LC tubing when you close the door. If you disconnect the original calibration line from point A, you must re-plumb the system to perform subsequent autotune procedures.

Installing the API Probe

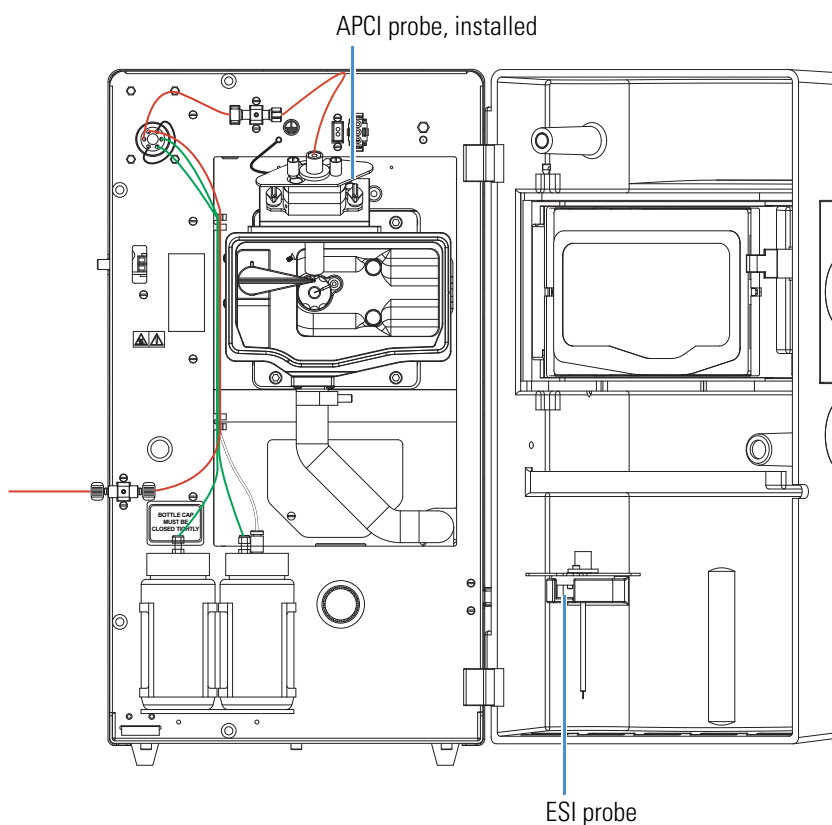
This chapter describes how to install the ESI probe or the APCI probe in the MSQ Plus Mass Detector.

Contents

- [Switching from ESI to APCI](#)
- [Switching from APCI to ESI](#)

The MSQ Plus Mass Detector ships with an ESI probe and an APCI probe. The API probe that is not being used is stored in the front door of the mass detector, as shown in [Figure 19](#).

Figure 19. MSQ Plus Mass Detector with opened front door



Switching from ESI to APCI

Follow these steps to install the APCI probe in the MSQ Plus Mass Detector.

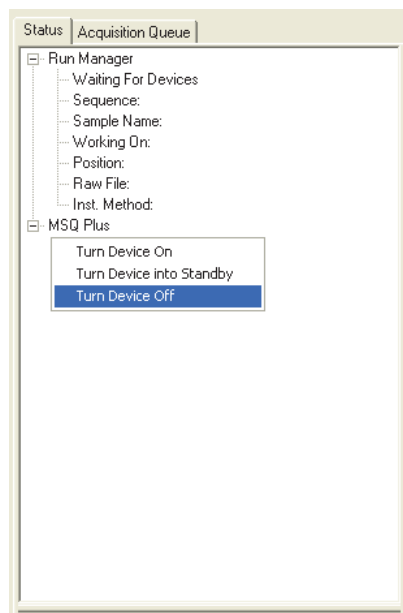
❖ **To switch from ESI mode to APCI mode**



CAUTION Allow the probe heater to cool before you remove the ESI probe.

1. Turn off the LC pump flow. If you are using the cone wash pump, turn it off.
2. Turn off the nitrogen gas, ion optics, and probe heater by doing one of the following:
 - From the Status page in the Information view in the Xcalibur™ data system, right-click the **MSQ Plus** listing to display a shortcut menu, and choose **Turn Device Off**, as shown in [Figure 20](#).

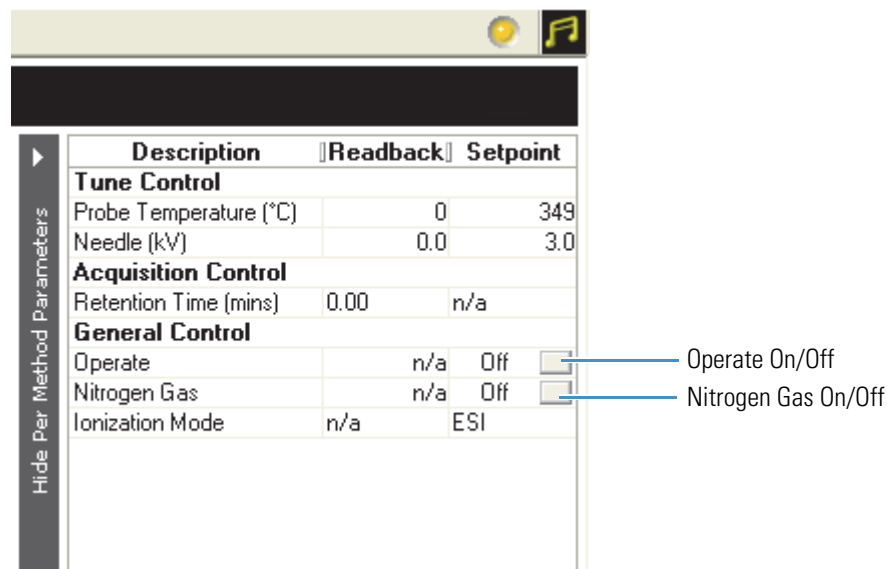
Figure 20. Status page in the Xcalibur data system



—or—

- Open the Per Method Parameters table in the Tune window. Take the system out of Operate mode by clicking the **Operate On/Off** toggle button, shown in [Figure 21](#). Then turn off the nitrogen gas by clicking the **Nitrogen Gas On/Off** toggle button, shown in [Figure 21](#).

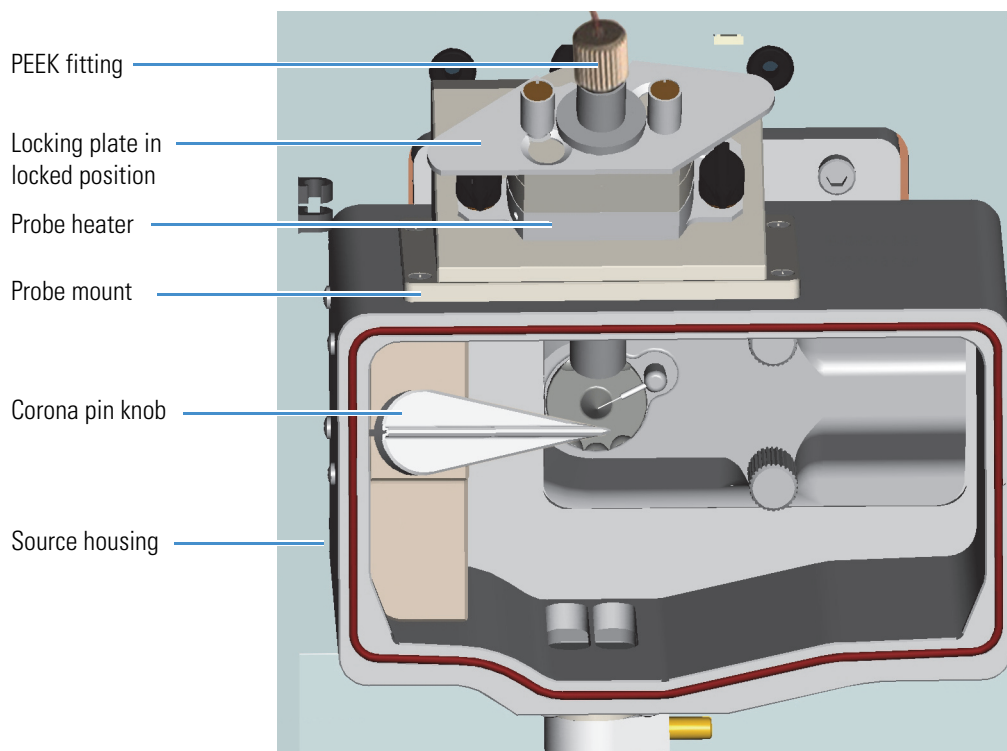
Figure 21. Operate and Nitrogen Gas toggle buttons



3. Allow the probe heater to cool.
4. Unscrew and remove the PEEK fingertight fitting from the ESI probe. See [Figure 19](#) on [page 27](#).
5. Turn the locking plate on the ESI probe clockwise to the open position. Pull the ESI probe out of the probe heater. See [Figure 19](#).
6. Remove the APCI probe from the holder located in the door of the MSQ Plus Mass Detector, and replace it with the ESI probe.
7. Turn the locking plate on the APCI probe clockwise to the open position. Insert the APCI probe into the probe heater, as shown in [Figure 19](#). Turn the locking plate counterclockwise to the closed position.

[Figure 22](#) shows the MSQ Plus Mass Detector setup for APCI mode.

Figure 22. MSQ Plus Mass Detector setup for APCI mode



8. Turn the corona pin knob 90 degrees to its full horizontal position.

Note You might obtain a better signal using pin positions up to 1–2 centimeters below a full right angle.

9. Insert the PEEK fingertight fitting into the APCI probe and screw it in.

Switching from APCI to ESI

Follow these steps to install the ESI probe in the MSQ Plus Mass Detector.

❖ To switch from APCI mode to ESI mode



CAUTION Allow the probe heater to cool before you remove the APCI probe.

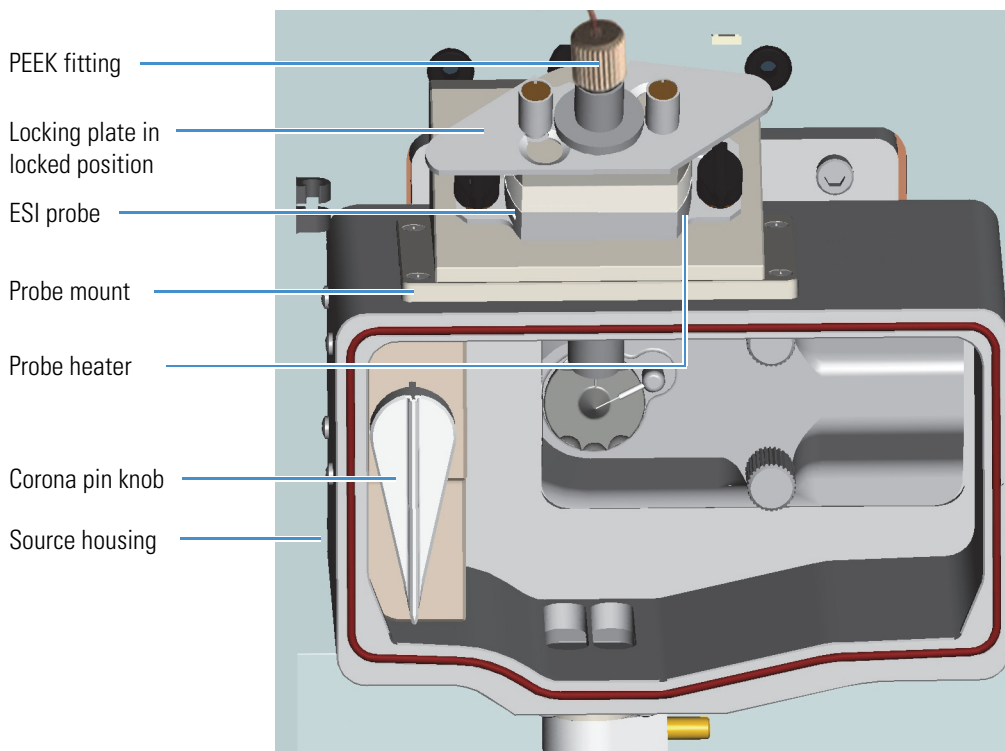
1. Turn off the LC pump flow. If you are using the cone wash pump, turn it off.
2. Turn off the nitrogen gas, ion optics, and probe heater by doing one of the following:
 - From the Status page of the Information view in the Xcalibur data system, right-click the **MSQ Plus** listing to display a shortcut menu, and choose **Turn Device Off**. See [Figure 20](#) on [page 28](#).

—or—

- Open the Per Method Parameters table in the Tune window. Take the system out of the Operate mode by clicking the **Operate On/Off** toggle button. Then, turn off the nitrogen gas by clicking the **Nitrogen Gas On/Off** toggle button. See [Figure 21](#) on [page 29](#).
3. Allow the probe heater to cool.
 4. Unscrew and remove the PEEK fingertight fitting from the APCI probe. See [Figure 19](#) on [page 27](#).
 5. Turn the corona pin knob 90 degrees to its full vertical position.
 6. Turn the locking plate of the APCI probe clockwise to the open position and remove the APCI probe from the mass detector.
 7. Remove the ESI probe from the holder located in the door of the MSQ Plus Mass Detector and replace it with the APCI probe.
 8. Turn the locking plate on the ESI probe clockwise to the open position. Insert the ESI probe into the probe heater, as shown in [Figure 19](#). Turn the locking plate counterclockwise to the closed position.

[Figure 23](#) shows the MSQ Plus Mass Detector setup for ESI mode.

Figure 23. MSQ Plus Mass Detector setup for the ESI mode



9. Insert the PEEK fingertight fitting into the ESI probe and screw it in.

Connecting the Cone Wash Pump

This chapter describes how to set up the cone wash system.

If your chromatographic method consists of a mobile phase with non-volatile buffers, or you want to inject samples in dirty matrices, or both, Thermo Fisher Scientific recommends that you set up the cone wash system to prevent the build-up of precipitates on the entrance cone during a long sequence run.

Contents

- [Connecting the Cone Wash Pump to the MSQ Plus Mass Detector](#)
- [Adjusting the Cone Wash Nozzle](#)
- [Controlling the Cone Wash Pump Through Timed Events](#)
- [Adjusting the Flow Rate of the Cone Wash Solvent](#)

Note It is necessary to use the cone wash only for dirty matrices or with nonvolatile buffers. Choose the cone wash solvent to give the most effective solubility for the expected contaminants.

Connecting the Cone Wash Pump to the MSQ Plus Mass Detector

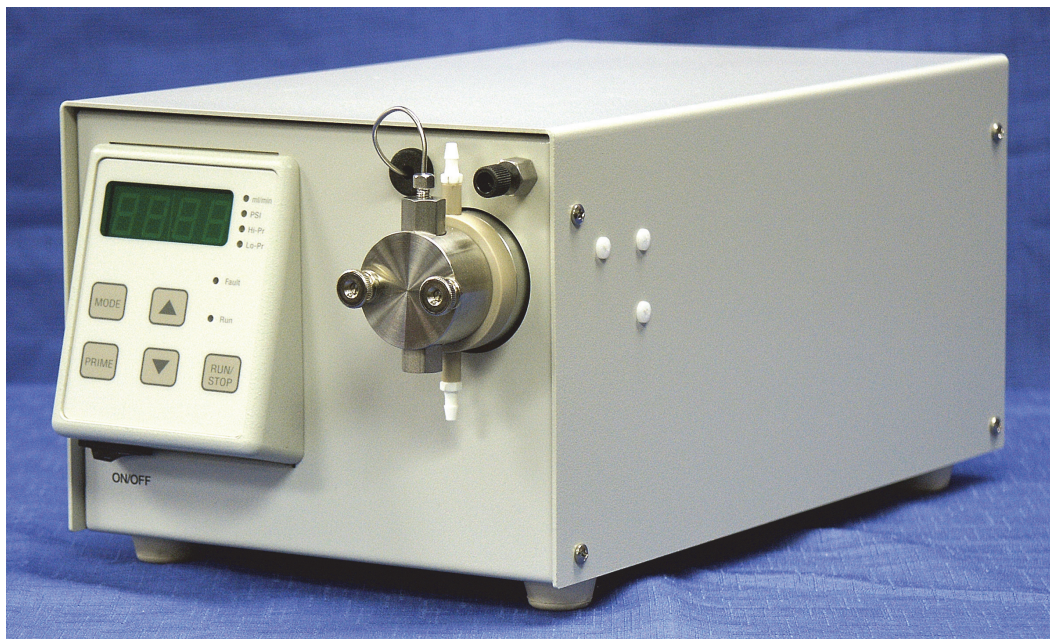
A separate cone wash pump is used to pump solvent through the cone wash nozzle. [Figure 24](#) shows the front of the cone wash pump, part number OPTON-97010.

Note The current cone wash system includes a single-piston cone wash pump from Scientific Systems, Inc. The previous cone wash system used an Eldex™ micrometer pump; for information on adjusting the flow, refer to the instructions or operator's manual for that pump.

4 Connecting the Cone Wash Pump

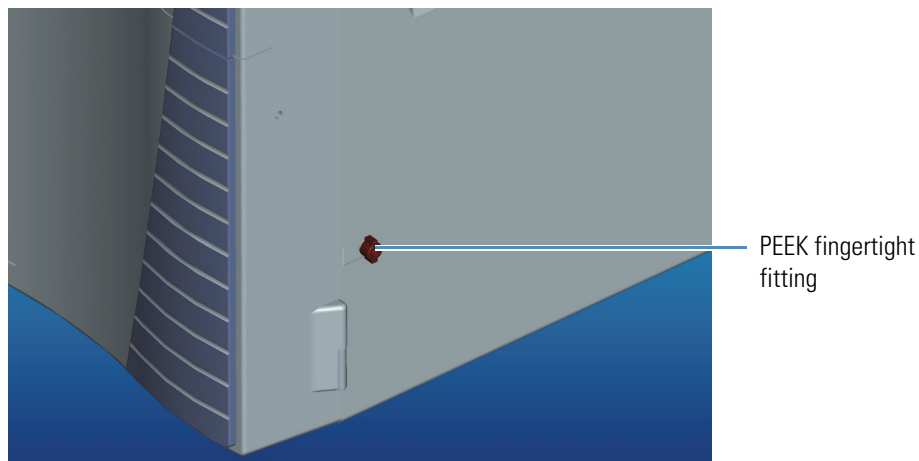
Connecting the Cone Wash Pump to the MSQ Plus Mass Detector

Figure 24. Front of the cone wash pump¹



Red PEEK tubing (1/16 in. OD $\times$ 0.005 in. ID) connects to a fitting on the outer right side of the MSQ Plus Mass Detector. The PEEK tubing is located in the installation kit, part number 60111-62006. See [Figure 25](#). The cone wash pump comes supplied with a fittings kit that includes the inlet tubing, as well as inlet and outlet nuts and ferrules.

Figure 25. Cone wash port



¹ Image of the Scientific Systems, Inc. single-piston pump from the *Series 1+ Pump Operator's Manual* 90-2518 Rev. D by Scientific Systems, Inc.

Thermo Fisher Scientific recommends that you follow these guidelines when you set up the cone wash pump:

- Only use HPLC solvents.
- Purge and prime the pump before use.

For instructions on priming and running the cone wash pump, refer to the manual that accompanies the pump (*Series 1+ Pump Operator's Manual 90-2518 Rev. D* by Scientific Systems, Inc.).

❖ **To connect the cone wash pump to the mass detector**

1. Connect the high-pressure 1/16 in. OD PEEK red tubing to the cone wash pump:
 - a. Use a fingertight fitting to connect one end of the high-pressure tubing to the port on the lower right-side of the MSQ Plus Mass Detector. See [Figure 25](#) on [page 34](#).
 - b. Slide the stainless steel nut and ferrule onto the free end of the tubing.



CAUTION Do not use the outlet valve to set the stainless steel ferrule onto the PEEK tubing. Setting the ferrule in the valve can compress and damage the valve components.

- c. Use a non-compressible fixture to set the ferrule onto the tubing.
- d. Use a 1/2 in. wrench to stabilize the valve housing, and then use a 1/4 in. wrench to attach the 1/16 in. OD PEEK red tubing to the outlet valve.

Adjusting the Cone Wash Nozzle

The effectiveness of the cone wash system depends on the position of the cone wash nozzle.

❖ **To position the cone wash nozzle for maximum efficiency**

1. Turn the cone wash nozzle counterclockwise until the tip of the nozzle is positioned immediately above the top of the entrance cone.
2. Turn the cone wash pump on.
3. Set the flow rate to 0.2 mL/min.

Lower flow rates might be adequate in APCI mode with reduced nitrogen flow.

4. Adjust the position of the nozzle so that the drops of wash solvent just touch the inlet orifice as they fall towards the drain at the bottom of the source compartment. See [Figure 26](#) and [Figure 27](#).



CAUTION Do not leave the cone wash running when the source heater is turned off, because this can lead to cone wash solvents condensing on the RF/dc prefilter.

Figure 26. Operating position for the cone wash nozzle

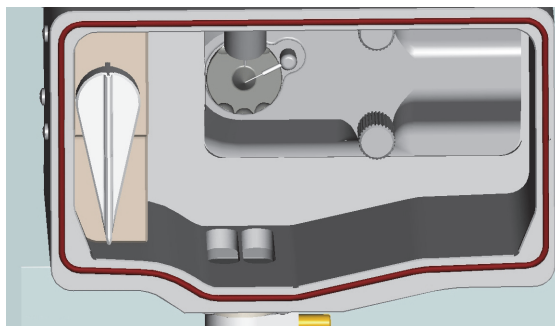
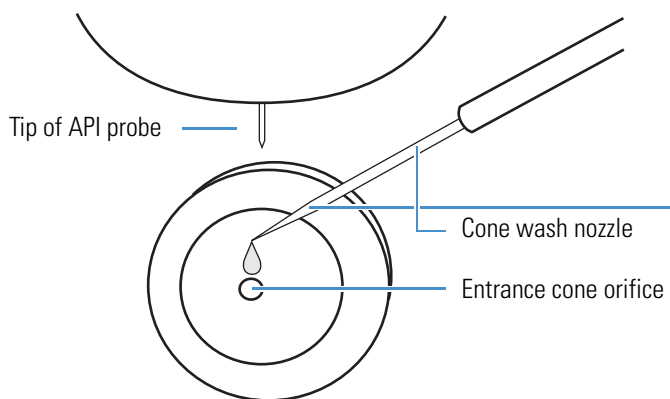


Figure 27. Orientation of the cone wash nozzle



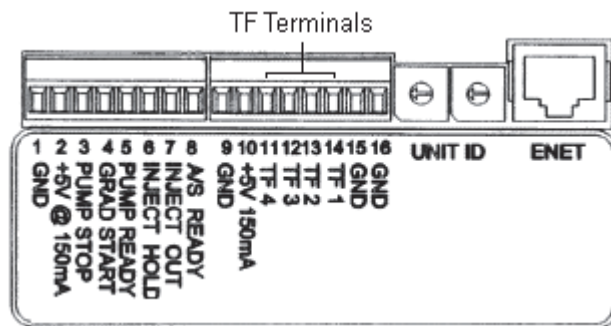
Controlling the Cone Wash Pump Through Timed Events

Use the Timed Events page, shown in [Figure 28](#), to set timed events for the time function terminals (TF1 to TF4) located on the back panel of the Accela Autosampler. See [Figure 29](#). You can use the TF terminals to control the cone wash pump.

Figure 28. Timed Events page of the Accela AS Instrument Setup view

Accela AS Method Sample Preparation Reservoir Content Timed Events					
	Time(min)	TF1	TF2	TF3	TF4
1	0.0	Off	Off	Off	Off
*	0.0	Off	Off	Off	Off

Figure 29. Time function event terminals on the back panel of the Accela Autosampler



The Timed Event output signals are issued after the Inject Out signal in the signal sequence.

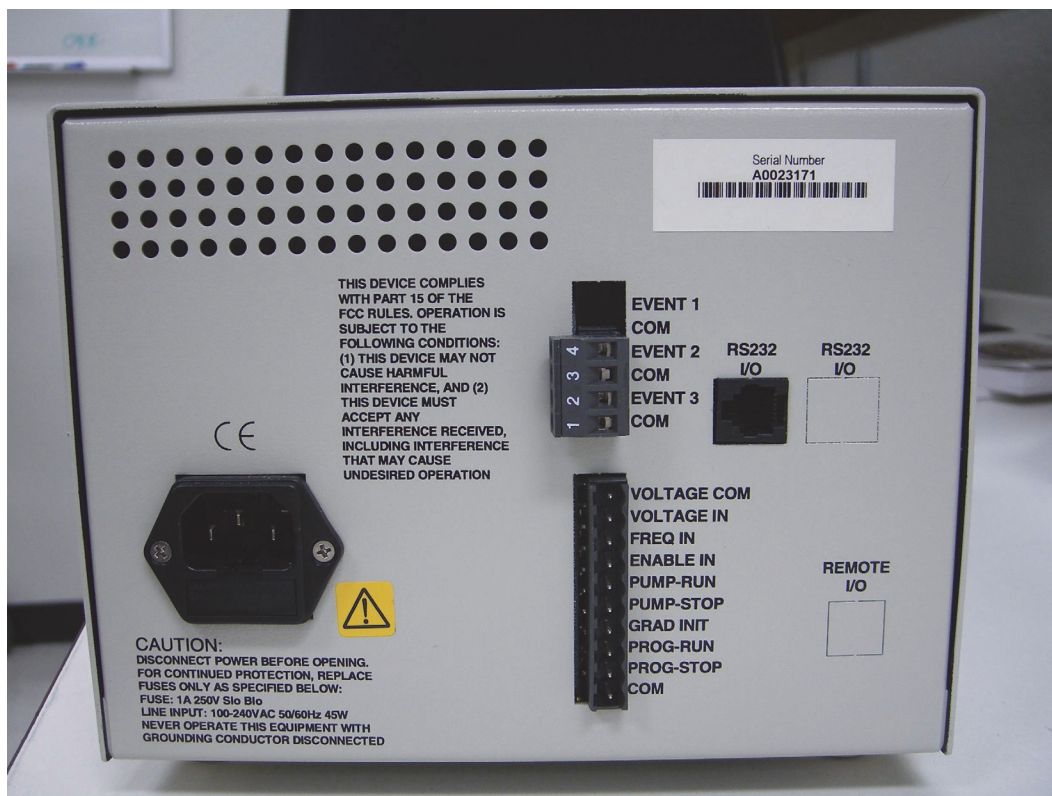
To display the Timed Events page, click the **Timed Events** tab in the Accela AS Instrument Setup view. You program timed events by adding entries to the Timed Events table.

The Timed Events table contains Time boxes and event lists (TF1, TF2, TF3, and TF4):

- Use the Time box to specify the time, in minutes, when the Accela Autosampler TF terminal (TF1 to TF4) signals an event. Time 0.0 is defined as the time when the Accela Autosampler issues an Inject Out signal. The range of values is 0.0 to 9999.9 minutes.
- Use the event (TF1, TF2, TF3, and TF4) lists to select whether the TF1, TF2, TF3, and TF4 output terminal is On or Off at the time specified in the Time box.

Figure 30 shows the back of the cone wash pump, including the inputs.

Figure 30. Back of the cone wash pump



The pump's inputs are on the 10-pin terminal board connector. [Table 3](#) shows the pinouts of the cone wash pump.

Table 3. Pinout of the cone wash pump

Pin	Function
10	VOLTAGE COM
9	VOLTAGE IN
8	FREQ IN
7	ENABLE IN
6	PUMP-RUN
5	PUMP-STOP
4	No connection
3	No connection
2	No connection
1	COM

Adjusting the Flow Rate of the Cone Wash Solvent

Thermo Fisher Scientific recommends a flow rate of 100 to 200 $\mu\text{L}/\text{min}$ for cleaning the entrance cone of the source. The pump performs more reproducibly if there is some degree of backpressure (preferably at least 1.7 bar [25 psi]). The red PEEK tubing included in the MSQ spares kit provides adequate backpressure.

To adjust the flow rate of the cone wash solvent, refer to the manual that accompanies the cone wash pump (part number OPTON 97010).

Control of External Devices

This chapter describes how to connect the MSQ Plus Mass Detector to an external device (typically an autosampler) used to trigger data acquisition.

The MSQ Plus Mass Detector can start data acquisition upon receiving a contact closure (closed contact or open contact) signal from an external device. The external device can be controlled from the Xcalibur data system or it can be controlled from outside the Xcalibur data system, for example, from a front panel keypad.

Contents

- [MSQ Plus Mass Detector User I/O Terminals](#)
- [External Devices Controlled by Xcalibur Data System](#)
- [External Devices Not Controlled by the Xcalibur Data System](#)

MSQ Plus Mass Detector User I/O Terminals

[Table 4](#) provides functional descriptions and typical uses for the terminals (pins 1 and 2) located on the MSQ Plus Mass Detector user I/O panel.

Table 4. MSQ Plus Mass Detector user I/O panel

Pins	Functional description	Typical use
1 and 2 Start In	The Start In internal circuit is a digital latch that provides a 5 V High TTL signal. The external device must be capable of pulling the signal Low to less than 2.5 V.	The Start In circuit allows an external device to signal a start to the MSQ Plus Mass Detector.
Note The external circuit must have a true ground.		



External Devices Controlled by Xcalibur Data System

The Xcalibur data system can respond to control from external devices (for example, autosamplers, pumps, and detectors) from Thermo Fisher Scientific and several other manufacturers. You can find additional information about using these devices to trigger data acquisition from the mass detector in the following documents:

- For the Accela LC system, refer to the *Accela Getting Connected Guide*.
- For third-party LC devices controlled by the Xcalibur data system, refer to the manuals on the LC devices CD.

To trigger data acquisition with an external device controlled by the Xcalibur data system, you must connect the external device to the MSQ Plus Mass Detector for contact closure. In addition, you must ensure that the appropriate device (typically an autosampler) is listed as the start instrument in the Xcalibur Run Sequence dialog box.

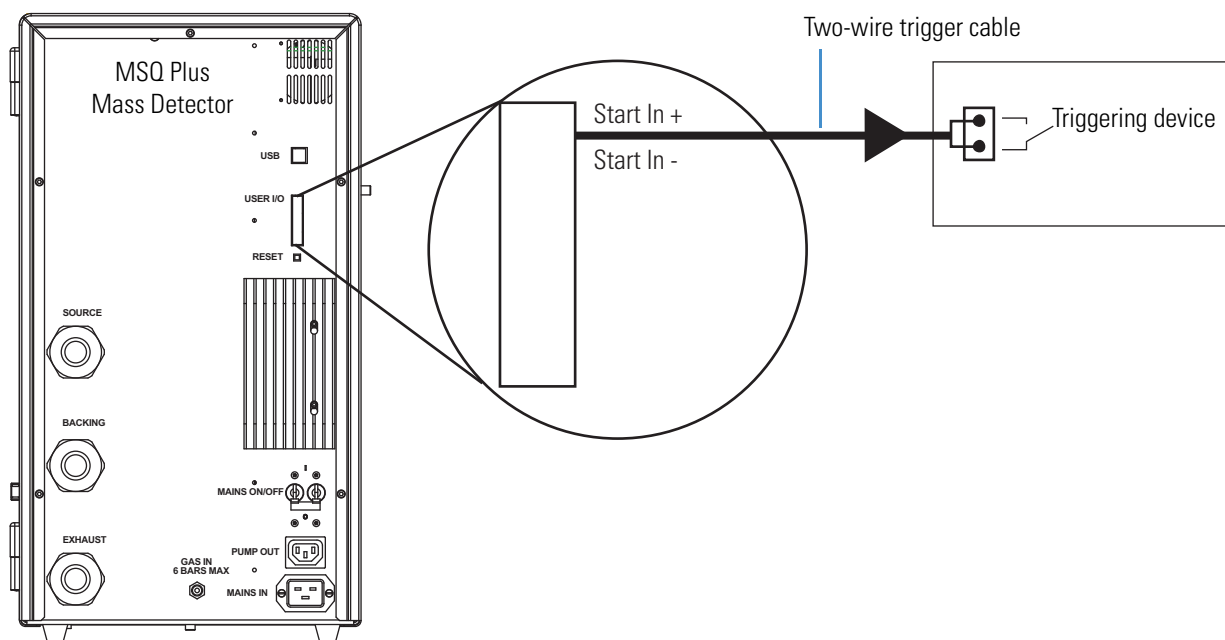
Wiring a System Controlled by Xcalibur for Contact Closure

Figure 31 shows a simplified block diagram of the MSQ Plus Mass Detector contact closures to an external device.

For information on controlling your LC devices from the Xcalibur data system, refer to the Help available from the Xcalibur Instrument Setup window. For front-panel (keypad) operation of the LC devices and maintenance procedures for the LC devices, refer to the documentation provided with the LC.

Note The external device providing the start signal must have a good ground.

Figure 31. Contact closures for the MSQ Plus Mass Detector and an external device



Selecting the Appropriate Start Instrument

Ensure that the appropriate device is listed as the start instrument.

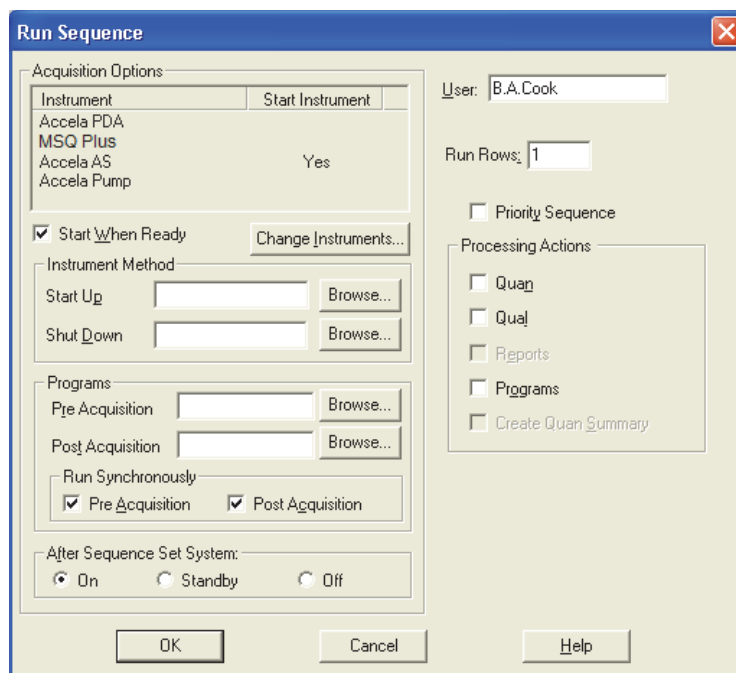
❖ To select the appropriate start instrument

1. On the Xcalibur Roadmap view, click the **Sequence Setup** icon, , to open the Sequence Setup window.
2. Open the sequence that you want to run:
 - a. Choose **File > Open** to open the Open dialog box.
 - b. Browse to the appropriate folder, and then select a sequence file.
 - c. Click **Open** to open the sequence, and exit the Open dialog box.

Sequence files are identified by their .sld file extension.

3. Choose **Actions > Run Sequence or Actions > Run This Sample** to open the Run Sequence dialog box, shown in [Figure 32](#).

Figure 32. Run Sequence dialog box with the Accela AS selected as the start instrument

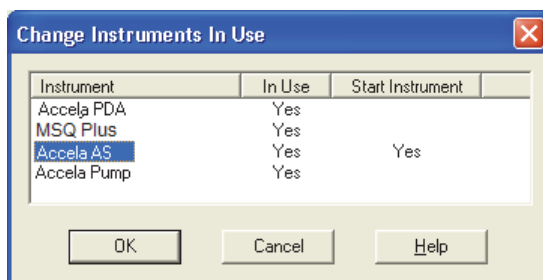


4. Verify that the appropriate device is listed as the start instrument in the Acquisition Options box.
5. If the appropriate device is not listed as the start instrument, change the starting device:
 - a. Click **Change Instruments** to open the Change Instruments In Use dialog box, shown in [Figure 33](#).

5 Control of External Devices

External Devices Not Controlled by the Xcalibur Data System

Figure 33. Change Instruments In Use dialog box with the Accela AS selected as the start instrument



- b. Click the blank field in the Start Instrument column to the right of the appropriate triggering device (typically an autosampler).

The word **Yes** moves to this field.

- c. Click **OK** to save the setting, and close the Change Instruments In Use dialog box.
6. Complete the remaining selections in the Run Sequence dialog box. Click **OK** to save the settings, close the dialog box, and start the sequence or queue it.

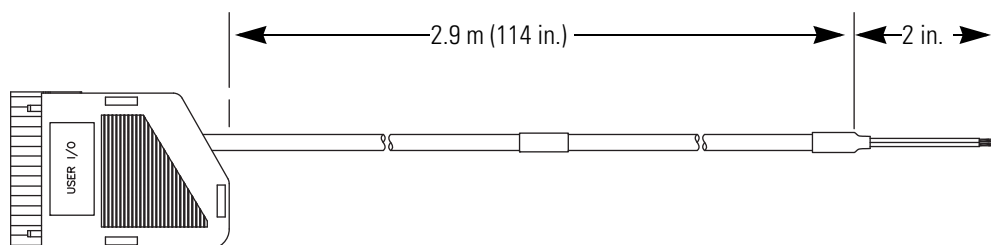
External Devices Not Controlled by the Xcalibur Data System

To trigger data acquisition by using an external device that is not controlled by the Xcalibur data system, you must connect the external device to the MSQ Plus Mass Detector for contact closure. In addition, you must ensure that the mass detector is not listed as the start instrument in the Xcalibur Run Sequence dialog box.

Note The output (start) signal from the external device must be normally High (+5 V) and go to Low momentarily to start data acquisition on the MSQ Plus Mass Detector. If you cannot configure the external device to go from normally High to Low momentarily, you cannot use it with the MSQ Plus Mass Detector.

Wiring Your System for Contact Closure

To hard-wire an external device that is not controlled by the Xcalibur data system to the MSQ Plus Mass Detector, connect the two-wire trigger cable (part number 60111-63008 and provided in the MSQ Plus Mass Detector installation kit) shown in [Figure 34](#) from the user I/O of the mass detector to the contact closure terminal of the external device. Follow the wiring scheme shown in [Table 5](#).

Figure 34. MSQ Plus Mass Detector remote start cable**Table 5.** Wiring the MSQ Plus Mass Detector and an external device not controlled by the Xcalibur data system for contact closure

MSQ Plus Mass Detector user I/O	External device contact closure terminal
Start In +	Output (start) terminal
Start In -	Ground terminal

Running a Sequence from the Xcalibur Data System

When you are ready to inject a set of samples, ensure that the MSQ Plus Mass Detector is *not* listed as the start instrument in the Xcalibur data system.

❖ To start the sequence run

1. On the Xcalibur Roadmap view, click the **Sequence Setup** icon, , to open the Sequence Setup window.
2. Open the sequence that you want to run:
 - a. Choose **File > Open** to open the Open dialog box.
 - b. Browse to the appropriate folder, and select a sequence file.
 - c. Click **Open** to open the sequence, and exit the Open dialog box.

Sequence files are identified by their .sld file extension.

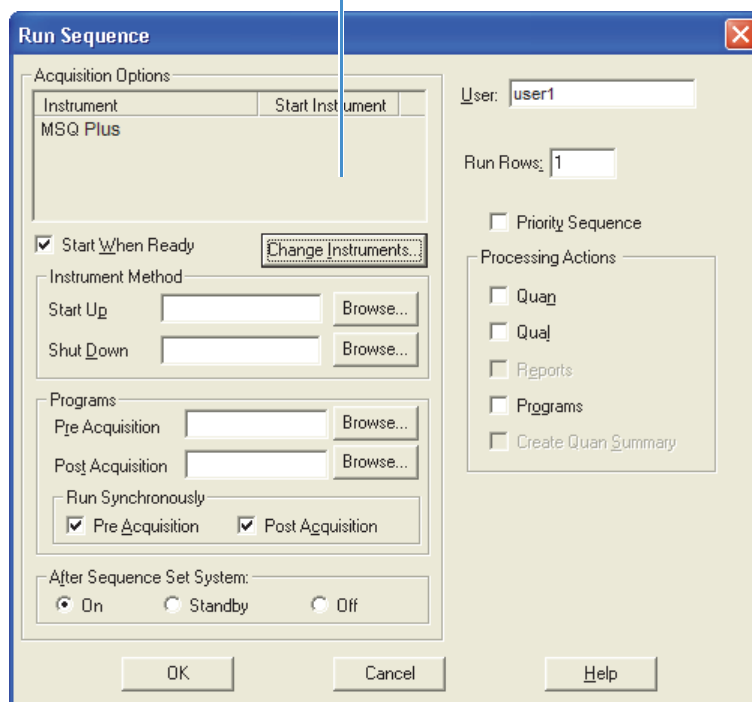
3. Choose **Actions > Run Sequence or Actions > Run This Sample** to open the Run Sequence dialog box, shown in [Figure 35](#).

5 Control of External Devices

External Devices Not Controlled by the Xcalibur Data System

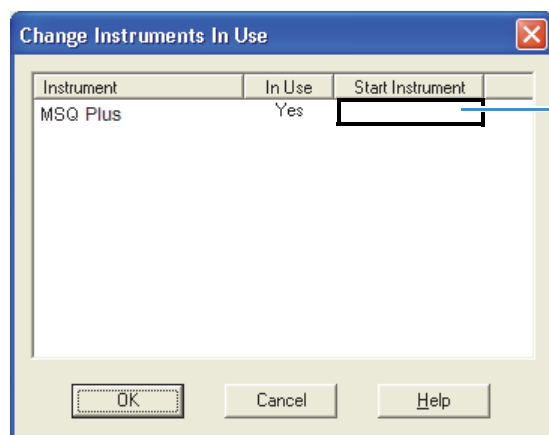
Figure 35. Run Sequence dialog box

The MSQ Plus Mass Detector is not the start instrument.



4. Click **Change Instruments** to open the Change Instruments In Use dialog box, shown in Figure 36.

Figure 36. Change Instruments In Use dialog box



MSQ Plus Mass Detector is not selected as a start instrument.

The MSQ Plus Mass Detector is not in the Start Instrument: Yes mode.

5. Check the status of the MSQ Plus Mass Detector in the Acquisition Options box.
 - If the MSQ Plus Mass Detector is in the Start Instrument: Yes mode, go to [step 6](#).
 - If the MSQ Plus Mass Detector is not in the Start Instrument: Yes mode, click **OK** to close the dialog box and go to [step 7](#).
6. In the MSQ Plus Mass Detector row of the Start Instrument column, click **Yes** to change the mode to Off (field is blank), and click **OK** to save the setting and close the dialog box.
7. In the Acquisition Options group box, select the **Start When Ready** check box, and click **OK** to save the settings, close the dialog box, and start the sequence or queue it.

The instrument method is downloaded to the MSQ Plus Mass Detector, and the Status page displays **waiting - Contact Closure**.

Tip If the Information view is not displayed, click the **Information View** toggle button, , to display it. Then click the **Status** tab to display the Status page.

8. Push the Start button on the external device to start the external device.

Data acquisition from the MSQ Plus Mass Detector begins after the external device sends the contact closure signal to the MSQ Plus Mass Detector.

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