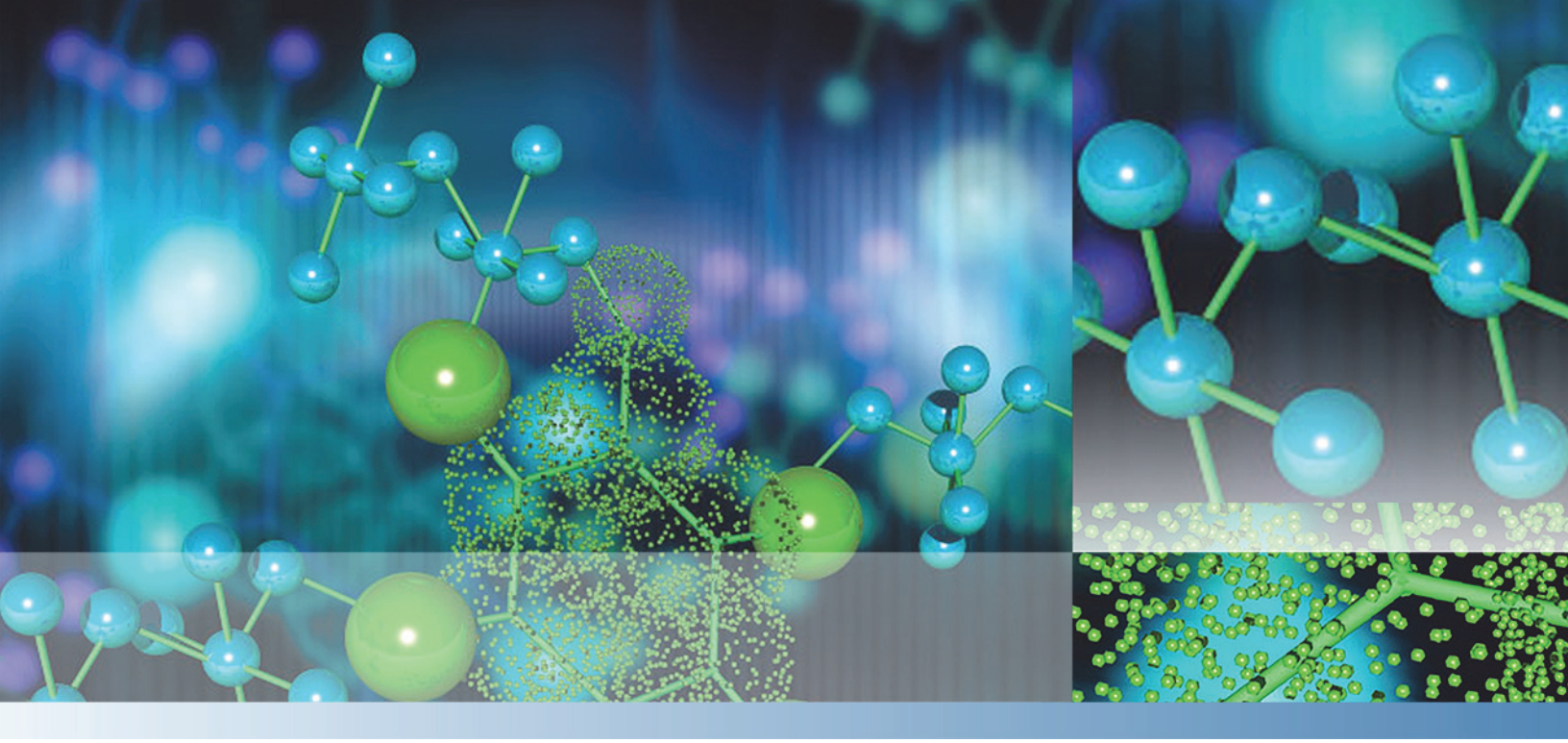

LCQ Fleet

Preinstallation Requirements Guide

97055-97223 Revision A September 2015

DOCUMENTATION SURVEY

Thermo SCIENTIFIC

Release history: Rev A, September 2015

Software version: Microsoft Windows 7 Professional (32-bit and 64-bit) SP1—Thermo Foundation™ 2.0 and later, and Thermo Xcalibur 2.2 and later; Windows XP Workstation SP3—Foundation 1.0.2 SP2 or earlier, and Xcalibur 2.1 SP1 or earlier; Thermo LTQ Tune Plus 2.7.0 and later

For Research Use Only. Not for use in diagnostic procedures.

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LCQ Fleet Installation Request Form

Before completing this installation request form, read the *LCQ Fleet Preinstallation Requirements Guide*. For U.S. laboratory locations, send this completed and signed form to us.customer-support.analyze@thermofisher.com. For other countries or regions, go to www.thermoscientific.com/support, click **Contact Us**, click the email option, , and attach this form to your request to schedule the installation.

Laboratory setup

❑ 1. All laboratory remodeling is complete and complies with all relevant safety regulations.

❑ 2. The LCQ Fleet is on site.

❑ 3. A principal operator will be on site during the installation/certification period.

❑ 4. Doorways, hallways, and so on are a minimum width of 99 cm (39 in.).

❑ 5. Laboratory lighting is adequate.

❑ 6. Air conditioning is adequate for temperature, humidity, and particulate matter control.

❑ 7. Relative humidity is 40–80%, noncondensing.

❑ 8. The work area is free from magnetic disruption and electrostatic discharge.

❑ 9. A step stool is on site.

❑ 10. A voice telephone line is installed near the system.

❑ 11. (Optional) The laboratory has Internet access.

❑ 12. Floor space is sufficient and flooring will support the load.

Power

❑ 13. Main power is installed and complies with local electrical codes.

❑ 14. Power is free from fluctuations due to slow changes in the average voltage or changes due to surges, sags, or transients.

❑ 15. Power outlets are of the correct configuration for the power cords. See page 20.
Note NEMA type: _____

❑ 16. Voltage of power outlet has been measured.
Note measured voltage:
AC line-to-ground: _____ V
AC neutral-to-ground: _____ V
AC line-to-neutral: _____ V

❑ 17. Power outlets are available for testing and cleaning equipment.

Gas and exhaust

❑ 18. All required gases are on site, gas lines are installed, and appropriate gas regulators are available. For pressures, see page 24.
Note gas types and actual purity levels:
Gas: _____ purity:_____
Gas: _____ purity:_____

❑ 19. All gas lines are clean and have no leaks.

❑ 20. A suitable fume exhaust system is separate from the solvent waste and is within 2.4 m (8 ft) of the system. See page 7 and page 29.

System setup

❑ 21. Data system computer: (a) a new computer shows no changes to ANY settings and has no additional software, or (b) an existing computer meets the software system requirements. (a) __ (b) __

❑ 22. System setup provides for collecting solvent waste from the API source.

❑ 23. A new or recently cleaned HPLC system is available that produces pulse-free, continuous flow of 100–1000 µL/min.

❑ 24. LC/MS-grade acetonitrile, isopropyl alcohol, methanol, and water are available for testing the instrument's performance.

❑ 25. Sufficient bench or table space is available for all of the equipment. Note the dimensions:
Width: _____
Depth: _____
Height: _____
Does the bench (table) have wheels? Yes__ No__

❑ 26. Sufficient clearance is provided behind the bench (or table). See page 5.

❑ 27. The bench (or table) can support *twice* the load of the instrument (see page 5) and is free from vibration.

IMPORTANT Thermo Fisher Scientific reserves the right to invoice for the field service engineer's time if the installation requirements are not met by the installation date.

CONTINUED ON THE NEXT PAGE

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For customized installations

Does your contract contain any special acceptance specifications? ❑ Yes ❑ No
If **YES**, attach full details of the specifications.

Does the system require additional equipment? ❑ Yes ❑ No
If **YES**, attach full details of the additional equipment.

I certify that the preinstallation requirements for the LCQ Fleet are complete and accurate.

Signature _____ Date _____

Print name _____ Telephone _____

Email address _____

Principal instrument operator:

Print name _____ Telephone _____

Email address _____

Company _____ Telephone _____

Address _____

Address _____

City _____ State _____ Country _____

Sales order number _____

Note This form is intended to cover the essential components of your LCQ Fleet installation. However, you must use the information in this guide and any additional information that your Thermo Fisher Scientific field service engineer provides to ensure the proper setup of your system. After receiving this form, the field service engineer contacts you to schedule the installation.

Regulatory Compliance

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 in the next section or sections by product name.

Changes that you make to your system may void compliance with one or more of these EMC and safety standards. Changes to your system include replacing a part or adding components, options, or peripherals not specifically authorized and qualified by Thermo Fisher Scientific. To ensure continued compliance with EMC and safety standards, replacement parts and additional components, options, and peripherals must be ordered from Thermo Fisher Scientific or one of its authorized representatives.

EMC Directive 2004/108/EC

EMC compliance has been evaluated by TUV Rheinland of North America.

- CFR 47, FCC Part 15, Subpart B, Class A: 2015
- CISPR 11: 2009 + A1
- ICES-003: 2014
- EN 55011: 2009 + A1
- EN 61326-1: 2013
- EN 61000-3- 2: 2006 + A1 + A2
- EN 61000-3-3: 2008
- EN 61000-4-2: 2009
- EN 61000-4-3: 2006 + A1 + A2
- EN 61000-4-4: 2004 + A1
- EN 61000-4-5: 2006
- EN 61000-4-6: 2009
- EN 61000-4-11: 2004

Low Voltage Safety Compliance

This device complies with Low Voltage Directive 2006/95/EC and harmonized standard IEC/EN/CSA/UL 61010-1, Third Edition.

FCC Compliance Statement

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

CAUTION Read and understand the various precautionary notes, signs, and symbols contained inside this manual pertaining to the safe use and operation of this product before using the device.

Notice on Lifting and Handling of Thermo Scientific Instruments

For your safety, and in compliance with international regulations, the physical handling of this Thermo Fisher Scientific instrument ***requires a team effort*** to lift and/or move the instrument. This instrument is too heavy and/or bulky for one person alone to handle safely.

Notice on the Proper Use of Thermo Scientific Instruments

In compliance with international regulations: This instrument must be used in the manner specified by Thermo Fisher Scientific to ensure protections provided by the instrument are not impaired. Deviations from specified instructions on the proper use of the instrument include changes to the system and part replacement. Accordingly, order replacement parts from Thermo Fisher Scientific or one of its authorized representatives.

WEEE Directive

2012/19/EU

Thermo Fisher Scientific is registered with B2B Compliance (B2Bcompliance.org.uk) in the UK and with the European Recycling Platform (ERP-recycling.org) in all other countries of the European Union and in Norway.

If this product is located in Europe and you want to participate in the Thermo Fisher Scientific Business-to-Business (B2B) Recycling Program, send an email request to weee.recycle@thermofisher.com with the following information:

- WEEE product class
- Name of the manufacturer or distributor (where you purchased the product)
- Number of product pieces, and the estimated total weight and volume
- Pick-up address and contact person (include contact information)
- Appropriate pick-up time
- Declaration of decontamination, stating that all hazardous fluids or material have been removed from the product

For additional information about the Restriction on Hazardous Substances (RoHS) Directive for the European Union, search for RoHS on the Thermo Fisher Scientific European language websites.

IMPORTANT This recycling program is **not** for biological hazard products or for products that have been medically contaminated. You must treat these types of products as biohazard waste and dispose of them in accordance with your local regulations.

Directive DEEE

2012/19/EU

Thermo Fisher Scientific s'est associé avec une ou plusieurs sociétés de recyclage dans chaque état membre de l'Union Européenne et ce produit devrait être collecté ou recyclé par celle(s)-ci. Pour davantage d'informations, rendez-vous sur la page www.thermoscientific.fr/rohs.

WEEE Direktive

2012/19/EU

Thermo Fisher Scientific hat Vereinbarungen mit Verwertungs-/Entsorgungsfirmen in allen EU-Mitgliedsstaaten getroffen, damit dieses Produkt durch diese Firmen wiederverwertet oder entsorgt werden kann. Weitere Informationen finden Sie unter www.thermoscientific.de/rohs.

Contents

Preface

The *LCQ Fleet Preinstallation Requirements Guide* provides information for planning and preparing your laboratory before delivery and installation of your Thermo Scientific™ LCQ™ Fleet™ mass spectrometer (MS). Read each section carefully to ensure that your lab is ready for the system.

Contents

❖ **To suggest changes to the documentation or to the Help**

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

Related Documentation

The LCQ Fleet mass spectrometer includes complete documentation. In addition to this guide, you can also access the following documents as PDF files from the data system computer:

- *LCQ Fleet Getting Connected Guide*
- *LCQ Fleet Getting Started Guide*
- *LCQ Fleet Hardware Manual*

- *Ion Max and Ion Max-S API Source Hardware Manual*
- *Safety and Regulatory Guide*

  The LCQ Fleet also ships with a printed copy of the *Safety and Regulatory Guide*. This guide contains important safety information about Thermo Scientific liquid chromatography (LC) and mass spectrometry (MS) systems. Make sure that all lab personnel have read and have access to this document.

❖ To view the product manuals

From the Microsoft™ Windows™ taskbar, choose **Start > All Programs > Thermo Instruments > Manuals > LCQ Fleet**, and then open the PDF file to view it.

The LCQ Fleet application also provides Help.

❖ To view the data system Help

- From the application window, choose **Help** from the menu bar.
- If information about setting parameters is available for a specific view, page, or dialog box, click **Help** or press the F1 key for information about setting parameters.

❖ To download user documentation from the Thermo Scientific website

1. Go to www.thermoscientific.com.
2. In the Search box, type the product name and press ENTER.
3. In the left pane, select **Documents & Videos**, and then under Refine By Category, click **Operations and Maintenance**.
4. (Optional) Narrow the search results or modify the display as applicable:
   - For all related user manuals and quick references, click **Operator Manuals**.
   - For installation and preinstallation requirements guides, click **Installation Instructions**.
   - For documents translated into a specific language, use the Refine By Language feature.
   - Use the Sort By options or the Refine Your Search box (above the search results display).
5. Download the document as follows:
   a. Click the document title or click **Download** to open the file.
   b. Save the file.

Cautions and Special Notices

Make sure you follow the cautions and special notices presented in this guide. Cautions and special notices appear in boxes; those concerning safety or possible system damage also have corresponding caution symbols.

This guide uses the following types of cautions and special notices.

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.

The *LCQ Fleet Preinstallation Requirements Guide* contains the following caution-specific symbols (Table 1).

Table 1. Caution-specific symbols and their meaning

Symbol	Meaning
	**Chemical hazard:** Observe Good Laboratory Practices (GLP) when handling chemicals. Only work with volatile chemicals under a fume or exhaust hood.Wear gloves and other protective equipment, as appropriate, when handling toxic, carcinogenic, mutagenic, corrosive, or irritant chemicals. Use approved containers and proper procedures to dispose of waste oil and when handling wetted parts of the instrument.
	**Risk of electric shock:** This instrument uses voltages that can cause electric shock and/or personal injury. Before servicing, shut down the instrument and disconnect it from line power. While operating the instrument, keep covers on.
	**Risk of eye injury:** Eye injury could occur from splattered chemicals or airborne particles. Wear safety glasses when handling chemicals or servicing the instrument.
	**Trip obstacle:** Be aware of cords, hoses, or other objects located on the floor.

Contacting Us

There are several ways to contact Thermo Fisher Scientific for the information you need. You can use your smartphone to scan a QR code, which opens your email application or browser.

Contact us	Customer Service and Sales	Technical Support
	(U.S.) 1 (800) 532-4752	(U.S.) 1 (800) 532-4752
	(U.S.) 1 (561) 688-8731	(U.S.) 1 (561) 688-8736
	us.customer-support.analyze@thermofisher.com 	us.techsupport.analyze@thermofisher.com 

❖ **To find global contact information or customize your request**

1. Go to www.thermoscientific.com.
2. Click **Contact Us**, select the **Using/Servicing a Product** option, and then type the product name.
3. Use the phone number, email address, or online form.

❖ **To find product support, knowledge bases, and resources**

Go to www.thermoscientific.com/support.

❖ **To find product information**

Go to www.thermoscientific.com/lc-ms.

Note To provide feedback for this document:

- Send an email message to Technical Publications (techpubs-lcms@thermofisher.com).
- Complete a survey at www.surveymonkey.com/s/PQM6P62.

Introduction

The Thermo Scientific LCQ Fleet mass spectrometer is intended to operate under carefully controlled environmental conditions.

You are responsible for providing a suitable location and operating environment for the system, a source of power of acceptable quality, correct gas and solvent supplies, and proper waste and exhaust systems.

CAUTION Operating a system or maintaining it outside the power and operating environment specifications described in this guide might cause failures of many types. The repair of such failures is specifically excluded from the Thermo Fisher Scientific standard warranty and service contract coverage.

Note

- For preinstallation support and additional information, contact your local Thermo Fisher Scientific office.
- The Glossary defines some of the terms used in this guide.

2

Site Preparation

Before a Thermo Fisher Scientific field service engineer can install your LCQ Fleet MS, make sure your laboratory meets these requirements:

- When transporting the equipment to the designated site, you have a wide turning radius through entrances, hallways, elevators, and so on. Remember to consider the width of the device transporting the shipping container to the lab.
- You have workbenches that are strong enough to support the weight of the instruments.

You are responsible for providing an acceptable installation site before the Thermo Fisher Scientific field service engineer arrives.

Contents

Shipping Containers

You system ships in multiple containers. Table 2 lists the overall dimensions and weights of the shipping containers for the LCQ Fleet system that are too large to carry by hand. Use this information to determine how to transport the containers and remove their contents. Other equipment in your order have their own smaller shipping containers and do not require special considerations. The chemicals kit typically arrives earlier than the other parts of your order.

See "Installation Kits" on page 34 for the kit part numbers.

Table 2. Shipping container dimensions and weights[a]

Box	Size	Weight	Content
1	104 × 94 × 135 cm (*l* × *w* × *h*) (41 × 37 × 53 in.) (*l* × *w* × *h*)	181 kg (400 lb)	LCQ Fleet MS in the system crate
2	71 × 71 × 132 cm (*l* × *w* × *h*) (28 × 28 × 52 in.) (*l* × *w* × *h*)	62 kg (136 lb)	Data system and accessories (in utility box located in system crate)
3	79 × 31 × 46 cm (*l* × *w* × *h*) (31 × 12 × 18 in.) (*l* × *w* × *h*)	50 kg (110 lb)	Forepump

[a] The height and weight measurements include the shipping pallets.

Space and Load Requirements

Table 3 lists the dimensions and weights for the data system and LCQ Fleet system modules. Use this information to ensure that all workbenches are large enough and strong enough to support the modules.

Table 3. Space and load requirements[a] for the system modules

Modules	Width (*w*) cm (in.)	Height (*h*) cm (in.)	Depth (*d*) cm (in.)	Weight kg (lb)
LC/MS system				
LCQ Fleet mass spectrometer	76 (30)	56 (22)	59 (23)[b]	104 (230)
Forepump	58 (23)	25 (10)	18 (7)	44 (97)
(Optional) LC system[c]	38 (15)	73 (29)	51 (20)	68 (150)
Data system				
Computer, mini-tower	17.5 (7)	36 (14.2)	41.7 (16.4)	9.4 (21)
Monitor	57 (22.4)	37 (14.6)	18 (7.1)	6.2 (13.7)
Ethernet switch	15.4 (6.1)	2.9 (1.14)	11 (4.3)	0.165 (0.4)
(Optional) Printer	45 (18)	32 (12.4)	41 (16)	16 (35)

[a] These values are approximate.

[b] Excludes the API source housing.

[c] These values are for an LC system consisting of a Thermo Scientific Accela™ PDA Detector, Accela Autosampler, and Accela pump and excludes the solvent bottles and tubing.

This section discusses the following:

Workbench Requirements

Table 4 lists the recommended minimum surface dimensions and load capacities for each workbench. Thermo Fisher Scientific recommends that workbenches have a load capacity of at least twice the combined weight of all expected devices. You must provide the workbenches for your system.

Table 4. Minimum workbench surface dimensions and load capacities

Equipment	Surface	Load capacity
Data system	122 × 91 cm (48 × 36 in.)	64 kg (140 lb)
LC system and LCQ Fleet MS	152 × 91 cm (60 × 36 in.)	209 kg (460 lb)

Follow these clearance guidelines for the workbenches:

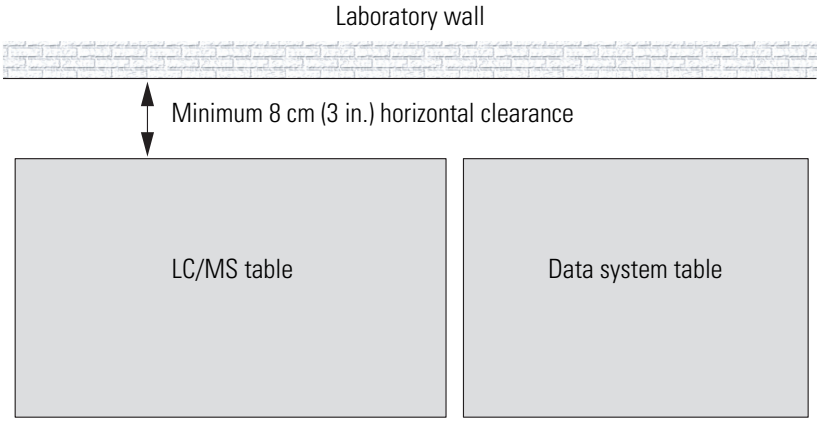
- Place the data system and LC/MS workbenches adjacent to each other to prevent strain on the interconnecting Ethernet communications cables.

CAUTION Safety and EMC regulations require the use of Category 5 shielded Ethernet communications cables, maximum 3 m (10 ft) long.

- For all systems, allow for a minimum vertical clearance of 92 cm (36 in.) between the top of the system and any shelves above it.
- For all systems, allow for 61 cm (24 in.) minimum horizontal clearance on the right side of the system for access to the Main Power Switch.
- For an LC/MS system, allow for a minimum horizontal clearance of 8 cm (3 in.) between the wall and the back of the system for proper air circulation and clearance of the installed gas lines and tubing.

Figure 1 shows the top view (footprint) for the system workbenches.

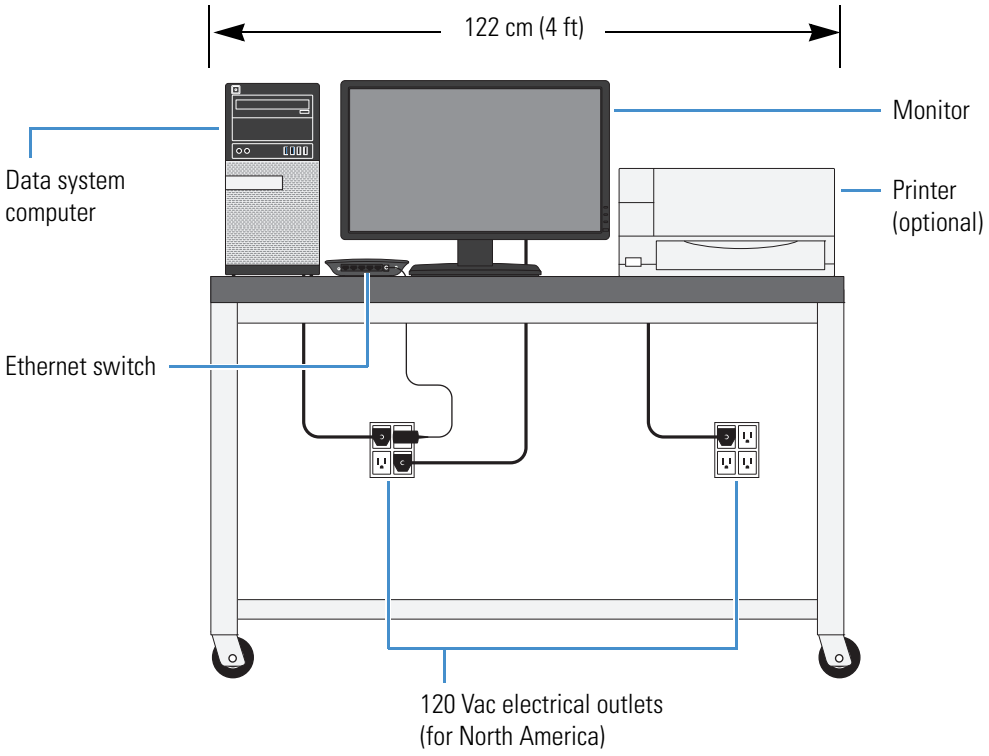
Figure 1. Top view and recommended placement of the workbenches (tables)



Data System Layout

Figure 2 shows an optional layout for the data system. Not all connections are shown; for connection information, refer to the *LCQ Fleet Getting Connected Guide*.

Figure 2. Workbench for the data system

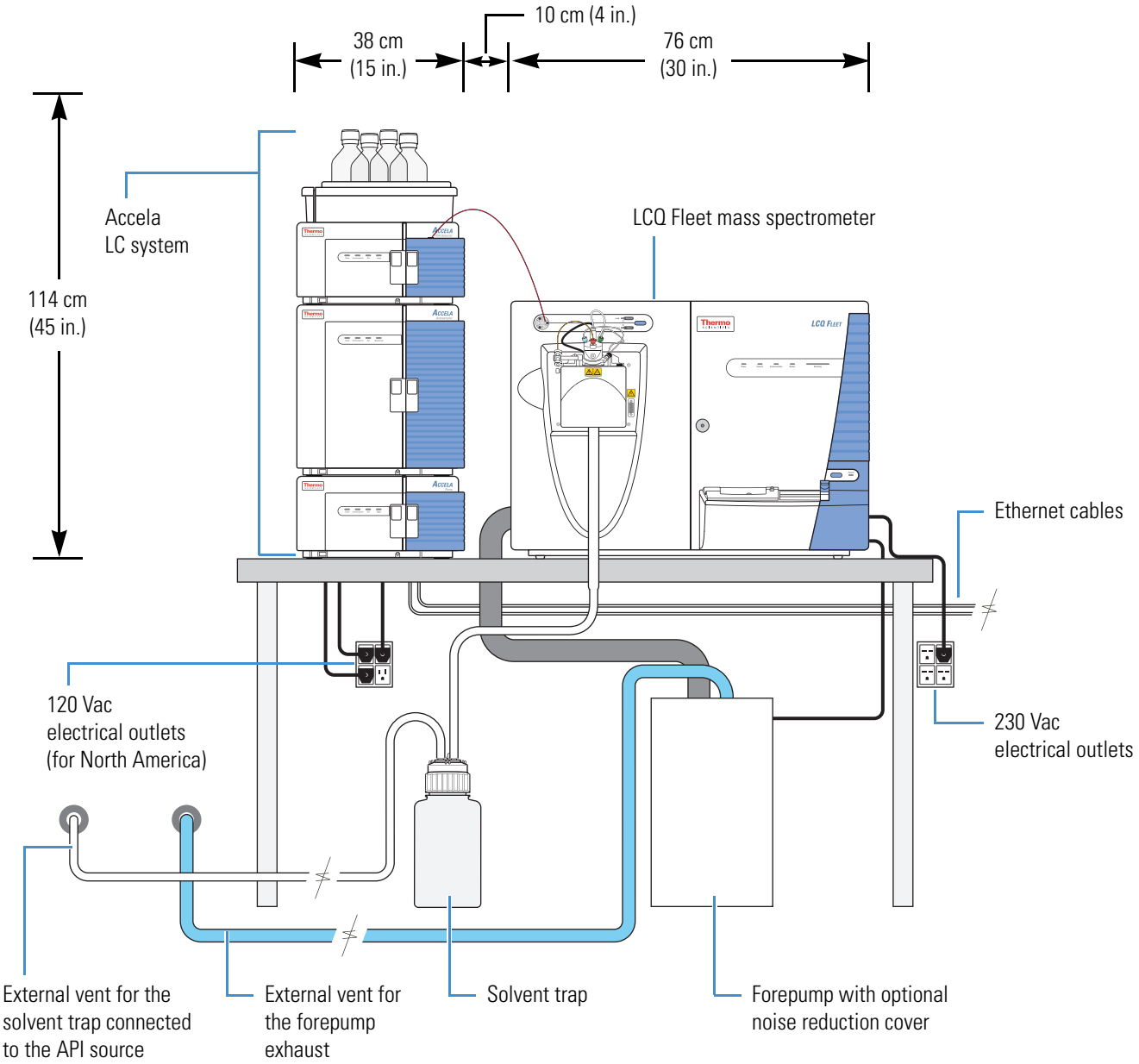


LC and MS System Layouts

Figure 3 show the recommended layout for the LC/MS system. Not all connections are shown; for connection information, refer to the *LCQ Fleet Getting Connected Guide*.

CAUTION For information about the LC drainage systems, refer to the LC instrument manual.

Figure 3. Workbench for the LCQ Fleet mass spectrometer and the optional Accela LC system



Forepump

The LCQ Fleet system includes one forepump. Depending on available space, you have two options for the placement of the forepump and for connecting the vacuum hose from the mass spectrometer to the forepump:

- If there is space below the workbench, place the forepump underneath, immediately behind the mass spectrometer. Either run the vacuum hose behind the workbench or make a 6.4 cm (2.5 in.) diameter hole through the workbench for the vacuum hose and the power supply cord from the forepump.
- If there is no space below the workbench, place the forepump on the floor in front of the mass spectrometer.

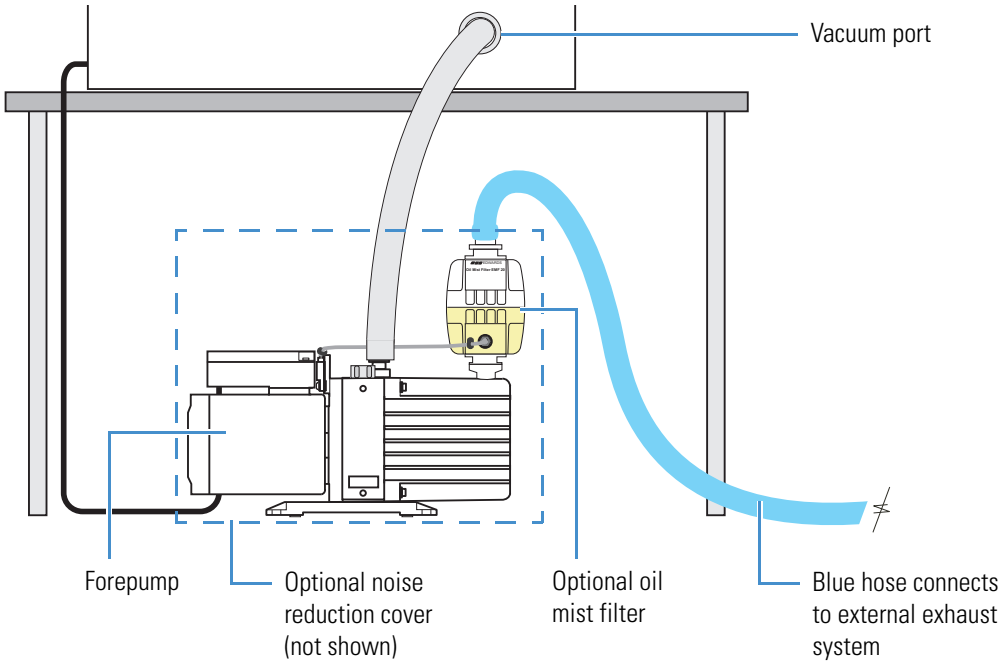
CAUTION Trip hazard. Whenever possible, provide space under the workbench for the forepump. If placed in front of the mass spectrometer, the forepump becomes a trip hazard.

CAUTION

- Do not place the forepump on a shelf or other surface connected to the workbench. Vibration from the pump can affect system performance.
- The exhaust hose tubing acts as a trap for exhaust fumes that would otherwise recondense in the forepump oil.
  - To maintain forepump integrity, route the exhaust tubing from the exhaust port down to the floor, not from the forepump vertically toward the ceiling.
  - Run the exhaust hose at floor level for a minimum of 2 m (79 in.) before it reaches the external exhaust system.

Figure 4 shows the blue exhaust hose connected to the optional oil mist filter, which connects to the exhaust port of the forepump. For information about connecting the forepump, refer to the *LCQ Fleet Getting Connected Guide* and the installation instructions provided with the forepump.

Figure 4. Forepump exhaust system connections



Telephone

Make sure all of the laboratory staff have access to a telephone (landline or mobile) in the lab near the system so that, if necessary, you can operate the mass spectrometer while speaking with Thermo Fisher Scientific Technical Support. For a landline connection, make sure that the telephone jack is within 1.8 m (6 ft) of the mass spectrometer.

3

Operating Environment

Attention to the operating environment ensures continued high performance of your Thermo Scientific LC/MS system. Any expenditures for air conditioning are more than offset by good sample throughput and reduced repair costs.

For proper operation of the system, you are responsible for providing the operating environment described in this chapter.

Contents

Summary of Environmental Requirements

Table 5 lists the environmental requirements for the designated laboratory.

Table 5. Summary of environmental requirements (Sheet 1 of 2)

Parameter	Specification
Humidity	40–80%, noncondensing
Temperature	• Standard performance: 15–27 °C (59–81 °F) • Optimum performance: 18–21 °C (65–70 °F) • Ambient temperature: Fluctuations of less than 1 °C or 2 °F over a one-hour period

Table 5. Summary of environmental requirements (Sheet 2 of 2)

Parameter	Specification
Particulate Matter	Does not exceed 3 500 000 particles per cubic meter (100 000 particles per cubic foot).
Electrostatic Discharge (ESD)	Follow the stated precautions to help prevent ESD.
Lighting	• Operating: Typical laboratory lighting • Cleaning: Use a small, high-intensity lamp
Vibration	Choose a lab location that is vibration-free.

Humidity

Maintain the relative humidity in the designated lab at 40–80 percent, without condensation.

Operating a Thermo Scientific mass spectrometer in an environment with very low humidity can cause the accumulation and discharge of static electricity that can shorten the life of the electronic components. Operating the mass spectrometer in an environment with high humidity can cause condensation, oxidation, and short electronic circuits. It can also cause the accumulation of dust that can block filters on the cooling fans.

To ensure that the lab is always within the required temperature and humidity specifications, Thermo Fisher Scientific recommends that you install a temperature and humidity monitor in the lab.

Temperature

For precision instruments, such as the Thermo Scientific LCQ Fleet MS, maintain the lab temperature at 15–27 °C (59–81 °F). For optimum performance, maintain the lab temperature at 18–21 °C (65–70 °F). Temperature control is vital to acquiring accurate mass measurements. Therefore, make sure that during any one-hour period, ambient temperature fluctuations are less than 1 °C or 2 °F.

IMPORTANT

- All electronic components generate heat while operating. This heat must dissipate to the surrounding air for the components to continue to operate reliably.
- Do not locate the instrument under an air duct, near windows, or near heating and cooling sources. As the lab ambient temperature increases, the LCQ Fleet system reliability decreases.

There must be good air flow around the system, and the air conditioning system must maintain a constant temperature in the immediate vicinity of the instrument. Table 6 lists the approximate heat output (power) for the system. For the heat output of your specific LC devices, refer to the instrument manuals.

Table 6. Maximum heat output

Module	Heat output (W)	Heat output (BTU/h)
LCQ Fleet MS	2300	7848
LC system and data system[a]	1950	6654
Total	**4250**	**14 502**[b]

[a] Approximate values. The actual values depend on your installed equipment.

[b] The maximum heat output for an LC/MS system and data system.

Particulate Matter

Make sure that the air in the lab is free from excessive dust, smoke, or other particulate matter in excess of 5 µm—that is, fewer than 3 500 000 particles per cubic meter (100 000 particles per cubic foot).

Dust can clog the air filters, causing a reduction in air flow around the electronic components. Dust on electronic components can act as an insulating blanket, which reduces the transfer of heat from the components to the surrounding air.

Electrostatic Discharge

Electrostatic discharge (ESD) can damage the electronic components of the LCQ Fleet MS.

Most Thermo Scientific instruments are designed to withstand ESD up to 4 kV (air discharge) and 4 kV (contact discharge) with all panels in place. However, removing the panels and handling the printed circuit boards (PCBs) without proper precautions might damage the electrical components or cause them to fail prematurely.

Because of ESD, take the following precautions, especially when operating the system at the lower end of the relative humidity specification:

- Use a static-dissipating floor covering (such as tile or conductive linoleum) in the lab.
- Use laboratory chairs covered with natural fibers or other static-dissipating material.
- Wear a laboratory coat and clothing made of natural fiber or other static-dissipating material when operating the instrument.
- Keep Styrofoam cups or packing materials away from the instrument.

Lighting

Good lighting makes any work area more enjoyable. Thermo Fisher Scientific recommends that you use a small, high-intensity lamp when cleaning the instrument components.

Vibration

Select a lab location that is free from vibration—floors at ground level usually have less vibration. When selecting the location, be aware of adjacent rooms with equipment that could transmit vibrations through the floor to the instrument workbench.

Because of the natural vibration of the forepump during operation, install the forepump on the floor under the instrument.

Line Power

The quality of line power (ac mains power system) delivered to the LCQ Fleet system can affect its performance and longevity. To ensure that the system performs optimally and is not damaged by line power fluctuations, verify that the lab's electrical supply complies with all power quality requirements.

You are responsible for providing a power source of acceptable quality to operate the system.

CAUTION To support compliance and safety requirements, all devices connected between the power source and the mass spectrometer must be certified by recognized organizations for your country (for example, UL, CSA, SEMKO, VDE, or TÜV).

Such devices include the power supply cords, electrical outlets, circuit breakers, uninterruptible power supplies (UPSs), and so on.

Contents

Quality of Power

Establishing the quality of power supplied to the LC/MS system is very important for these reasons:

- Constant high line voltage, impulses, or surges in voltage can cause overheating and component failures.
- Constant low line voltage or sags in voltage can cause the system to function erratically or not at all.
- Transients—even a few microseconds in duration—can cause electronic devices to degrade or fail catastrophically, shortening the lifetime of the system.

Before a Thermo Fisher Scientific field service engineer arrives to install your system, make sure the line voltage is stable and within the recommended specifications. The line voltage must be free of fluctuations due to slow changes in the average sags, surges, transients, or voltage. For the mass spectrometer's electrical ratings, see Table 8 on page 19.

Table 7 lists the definitions for the three most common voltage disturbances.

Table 7. Common voltage disturbances

Voltage disturbance	Definition
Slow average	A gradual, long-term change in the average root mean square (RMS) voltage level, with typical durations greater than 2 s
Sags and surges	Sudden changes in the average RMS voltage level, with typical durations between 50 ms and 2 s
Transients or impulses	A brief voltage spike of up to several thousand volts, with typical durations up to 50 µs

Power Monitoring Devices

Several devices are available to monitor the quality of the line power. These devices provide a continuous record of line performance by analyzing and printing out data for the three most common voltage disturbances (see Table 7).

In the first two cases, the time interval recording indicates the duration and the amplitude of the disturbance. A power line disturbance analyzer detects and records most types of line power problems. The Dranetz™[1] system is an example of a suitable analyzer. In some countries, electrical equipment suppliers have power line analyzers to rent.

[1] Thermo Fisher Scientific does not endorse any power monitoring company, nor does it endorse products other than its own. Companies and products listed in this guide are given as examples only.

Monitor the power line 24 hours a day for seven consecutive days. If inspection of the printout indicates disturbances, stop the test and take corrective action. Monitor the power again as previously described.

Power Conditioning Devices

You can correct a line voltage problem by using various line voltage conditioning devices. If the power regulation is good but the power line disturbance analyzer shows transient voltages, an isolation/noise-suppression transformer can resolve the problem. For both transient and regulation problems, consider the use of power conditioners to control these problems. See the CAUTION statement on page 15.

CAUTION Any conditioning devices installed with the system must be able to handle the potentially high currents that are drawn during the initial startup of the system. For example, during startup, the forepump can draw a high inrush current.

Because the LCQ Fleet system requires the use of a forepump, it draws an inrush current. The maximum inrush (start) current for the forepump (Edwards Model E2M30) connected to the mass spectrometer is 20 A. The average duration of the forepump's inrush current is less than 1 s. Therefore, this initial energy demand from the ac power line is very low.

Thermo Scientific systems are protected from overcurrents with time-delay fuses and active switches. For more information, contact your Thermo Fisher Scientific field service engineer.

When the line voltage is free from voltage sags, surges, and impulses but is more than 10 percent outside of the voltage specifications, a buck/boost transformer can lower (buck 10 percent) or raise (boost 10 percent) the line voltage as appropriate for the rated voltage.

Order the Buck/Boost Transformer Kit (P/N OPTON-01460) from Thermo Fisher Scientific San Jose. Each buck/boost transformer is encased in a metal housing approximately 13 × 13 × 26 cm (5 × 5 × 10 in.) and ships with a 2 m (6.5 ft) power supply cord. Have a certified electrician install the transformer, using the installation instructions that are included. Then, install the LCQ Fleet system.

CAUTION Systems installed in areas with 208 Vac power can experience voltage sags during high use periods that might place the line voltage below the operating parameters discussed in this section. In this case, protect the system by using a buck/boost transformer to ensure that power stays within the specified parameters.

Uninterruptible Power Supply

If your local area is susceptible to corrupted power or power disruptions, install an uninterruptible power supply (UPS) in the lab. See the CAUTION statement on page 15.

Circuit Breakers

Make sure that each circuit breaker is suitably rated so that the equipment connected to the electrical outlets does not lose power by triggering a current overload condition. For added protection, install a surge protector at the input to the circuit breaker panel.

Earth Ground

Make sure that the earth ground connections in the lab are hardwired to the same ground used for the main circuit breaker panel. Multiple external ground points can cause noise current to flow through the ground loop that is formed.

Electrical Outlets

The lab requires several grounded, electrical outlets that are suitably rated. In addition to the required number of electrical outlets for the LCQ Fleet system, Thermo Fisher Scientific recommends that there be several additional outlets close to the work area for testing and cleaning equipment, such as an oscilloscope and sonicator.

CAUTION To avoid an electric shock, always have a certified electrician install any new wall receptacles.

Installing a complete LCQ Fleet system can require extensive electrical resources. Plan the power system properly, with several outlets, to make sure that you can connect all of the equipment. Table 8 lists the electrical ratings for the modules in a typical lab setup. For the LC modules, refer to the manufacturer's manuals. To prevent overloading the outlets, select outlets with a load rating that is suitable for the expected total current per outlet.

IMPORTANT In North America, the LC/MS system requires both 120 and 230 Vac single-phase electrical outlets.

Table 8. Electrical ratings and required outlets per module

Module	Voltage (Vac)	Current (A)	Required outlets
Data system			
Computer, mini-tower	100–240	5	1
Monitor	100–240	1.5	1
Ethernet switch	100–240	< 1	1
(Optional) Printer, laser	110 –or– 220	8.6 –or– 4.2	1
MS system[a]			
LCQ Fleet smass spectrometer	230	15	1
Optional devices[b]			
High-intensity lamp (for instrument maintenance)	–	–	1
Laboratory stereoscope (for inspecting fused-silica parts)	–	–	1
Total number of electrical outlets[c]			**7+**

[a] The current draw excludes the forepump.

[b] Refer to the equipment manual for the electrical rating.

[c] Remember to add the number of outlets required for your LC system.

IMPORTANT After planning the location of the workbenches (see Chapter 2), consider the following before installing the electrical outlets:

- Each module's location and whether each requires a 120 or 230 Vac outlet (see Table 8)
- The minimum number of outlets needed for a given voltage and adding the number of outlets needed for any additional lab equipment (see Table 8)
- The length of the power supply cords (see Power Supply Cords)

Power Supply Cords

Your order includes two detachable power supply cords for the LCQ Fleet MS: one for North American destinations and the other for international destinations. Both power supply cords measure 2.5 m (8 ft). However, the international power supply cord does not include the plug that connects to the electrical outlet. You must provide a suitable 230 Vac plug that meets your country's compliance requirements. Table 9 lists the plug types and electrical ratings for various countries and territories.

The peripheral components (data system computer, monitor, and Ethernet switch) ship with detachable power supply cords that are appropriate for your country or territory. The power supply cord for the optional laser printer has either a NEMA 5-15P plug or a European CEE 7/7 (Schuko) plug, which is rated 16 A, 220 Vac. The power supply cords for the data system modules are 1.8 m (6 ft).

Note The electrical code for your area might require the use of another type of plug and receptacle (electrical outlet).

Table 9. Power plug type and rating by country or region

Destination	Plug type	Electrical rating
North America	NEMA 5-15P	15 A, 125 Vac
	NEMA 6-15P	15 A, 250 Vac
China	GB 2099-1,GB 1002-1	10 A, 250 Vac
Europe	CEE 7/7	10 A, 250 Vac
India	BS 546	15 A, 250 Vac
Japan	JIS 8303	15 A, 125 Vac
Switzerland	SEV 1011	10 A, 250 Vac
United Kingdom and Ireland	BS 1363	5 A, 250 Vac

Figure 5 through Figure 7 show the specific plug configurations listed in Table 9 on page 20.

Figure 5. Plug configurations for North America

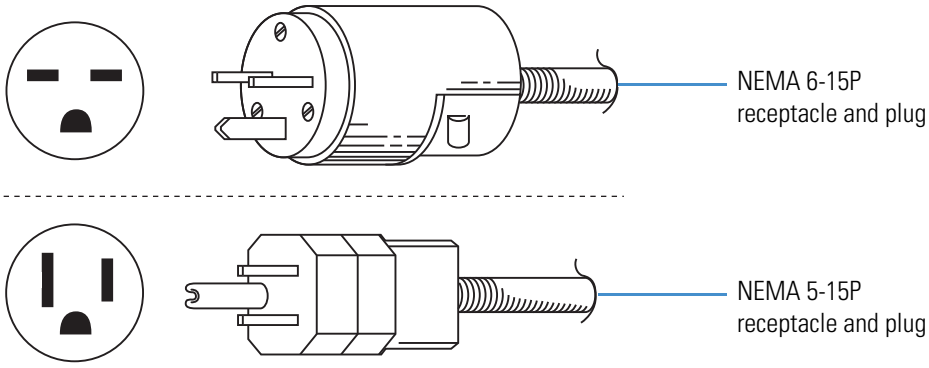


Figure 6. Plug configurations for Europe

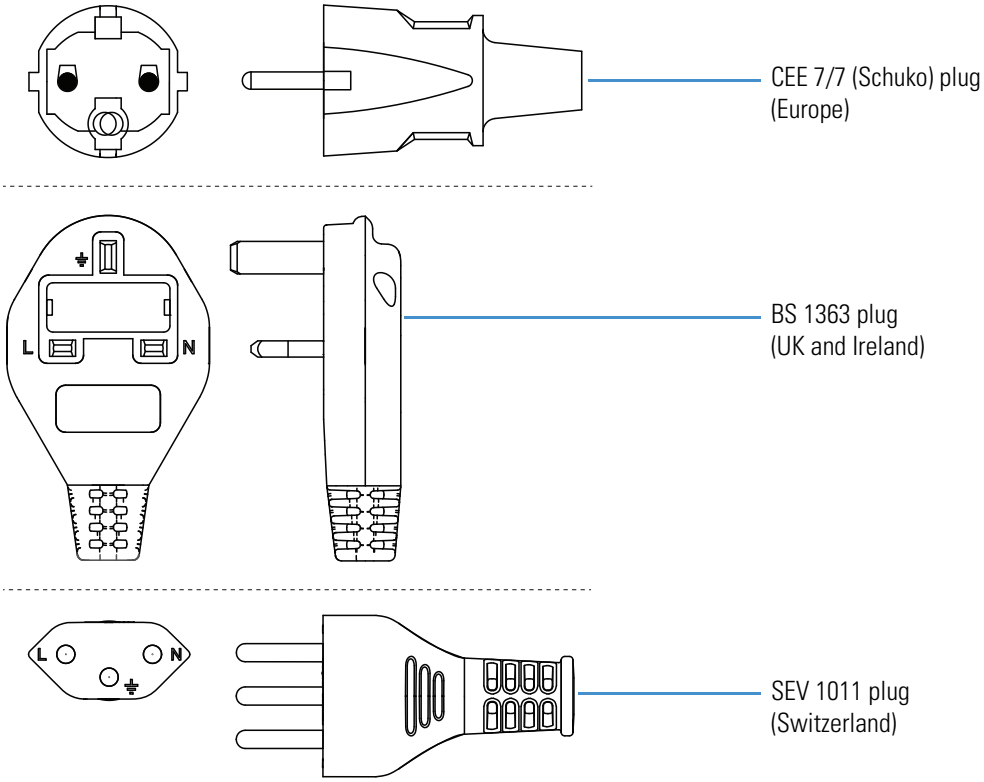
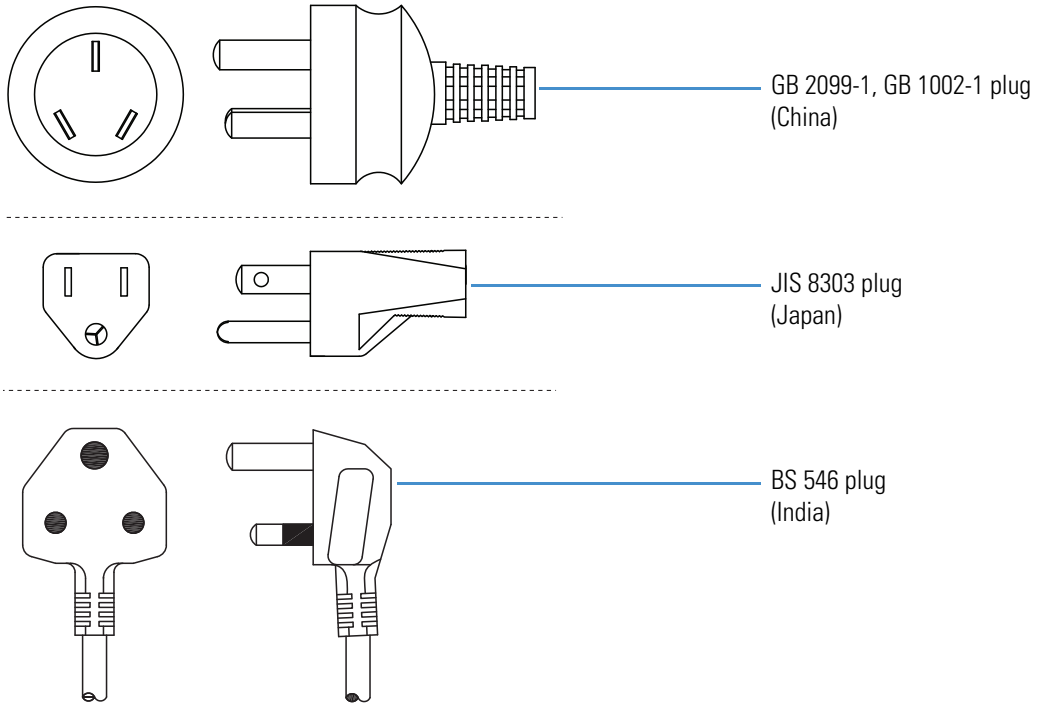


Figure 7. Plug configurations for Asia



Technical Assistance

Occasionally, you might encounter line power sources with unacceptable quality that adversely affect the operation of the LCQ Fleet system. You are responsible for correcting any line power problems. Contact Thermo Fisher Scientific for assistance in monitoring the line voltage in your lab and in selecting a line conditioner.

Specifying power conditioning equipment is a complex task that is best handled by a company or consultant specializing in that field. Contact Thermo Fisher Scientific for assistance in locating a power consultant in your area.

Gases and Solvents

The LCQ Fleet MS requires high-purity (HP) helium and nitrogen gases, and solvents. The Thermo Fisher Scientific field service engineer might also require certain solvents for the installation verification of your system.

You are responsible for providing the correct gas, solvent, and regulators to operate the system.

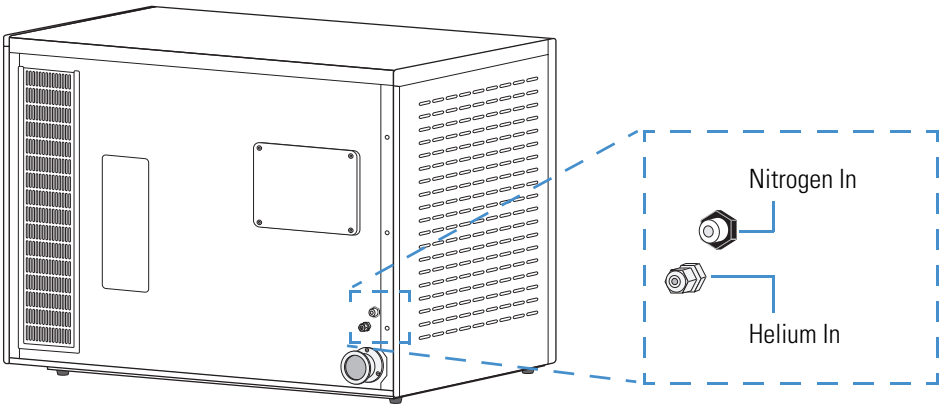
Contents

Gases

The LCQ Fleet MS uses helium as the damping gas and collision gas in the linear trap. Nitrogen is used as the atmospheric pressure ionization (API) sheath gas, auxiliary gas, and sweep gas. The instrument can use large amounts of gases during daily operations. Make sure that the gases are delivered with the necessary pressure and purity.

Figure 8 shows the location of the gas connections on the back of the instrument. For information about connecting the gas lines, refer to the *LCQ Fleet Getting Connected Guide*.

Figure 8. Gas connections on the back of the LCQ Fleet



CAUTION

- Contaminants introduced during the installation of house lines used for gas delivery can cause damage to the instrument. Make sure that all gas lines used with the instrument have been cleaned of all particulates and oils. You are responsible for any damage to the instrument caused by contaminants introduced from your gas delivery system.
- Because particulate filters can be a source of contamination, Thermo Fisher Scientific does not recommend their use.

Helium Supply

The LCQ Fleet MS uses helium as the damping and collision gas. The helium supply requirements are as follows:

- UHP gas of 99.999%, with less than 1.0 ppm each of water, oxygen, and total hydrocarbons
- 275 ±70 kPa (40 ±10 psi) gas pressure

To dispense helium from a tank (such as one containing 245 ft^3 of helium), use a regulator suitable for helium. Use either stainless steel tubing or the provided copper tubing for the helium gas line, and make sure that it is free of oil and preferably flame dried.

Note

- After you start using the LCQ Fleet MS, do not shut off the helium gas. Optimum performance requires a continuous flow of helium.
- If you intend to use helium for sparging your LC solvents, you must have a second tank and regulator.

Nitrogen Supply

The LCQ Fleet MS uses nitrogen as the API sheath, auxiliary, and sweep gases. The nitrogen supply requirements are as follows:

- HP gas of 99%
- 690 ±140 kPa (100 ±20 psi) gas pressure

Note You must provide a regulator for the nitrogen supply that you can adjust over the specified pressure range.

When operating 24 hours a day and 7 days a week, the LCQ Fleet MS typically consumes 5560–26700 L (196–943 ft^3) of nitrogen gas daily. Thermo Fisher Scientific recommends one of the following sources for the nitrogen supply:

- A large, sealed, thermally insulated cylinder containing liquid nitrogen from which the nitrogen gas is boiled off. The selected Dewar flask must be able to provide the required gas flows and a head pressure of 690 ±140 kPa (100 ±20 psi) going to the instrument.
- A nitrogen generator that can generate up to 21 L/min (44.5 ft^3/h) of HP nitrogen with a head pressure of 690 ±140 kPa (100 ±20 psi).

Note When you turn on the system, the initial nitrogen surge might exceed the capacity of the nitrogen generator. This sudden surge causes a flow rate drop that can trigger a low nitrogen warning from the instrument. If low nitrogen warnings happen frequently, call your Thermo Fisher Scientific field service engineer.

Compressed Air

If you intend to connect the Thermo Scientific FAIMS (high-Field Asymmetric waveform Ion Mobility Spectrometry) module to the mass spectrometer during the initial setup or at a later date, plan ahead and have a compressed air supply line installed. You use the compressed air to actively control the temperature of the electrodes in the temperature control module that is part of the FAIMS module assembly. The mass spectrometer does not require compressed air.

The compressed air requirements are as follows:

- 276–414 kPa (40–60 psi) gas pressure
- Supply line tubing, 1/4 in. OD, connected to the FAIMS temperature control port

Note Thermo Fisher Scientific strongly recommends the use of a desiccant air dryer to remove some of the moisture, oil, and dirt that might be present in the compressed gas.

For additional information about the gas connections and operation, refer to the *FAIMS Operator's Manual* provided with the module.

Solvent Recommendations

CAUTION Avoid exposure to potentially harmful materials.

By law, producers and suppliers of chemical compounds are required to provide their customers with the most current health and safety information in the form of Material Safety Data Sheets (MSDSs) or Safety Data Sheets (SDSs). The MSDSs and SDSs must be freely available to lab personnel to examine at any time. These data sheets describe the chemicals and summarize information on the hazard and toxicity of specific chemical compounds. They also provide information on the proper handling of compounds, first aid for accidental exposure, and procedures to remedy spills or leaks.

Read the MSDS or SDS for each chemical you use. Store and handle all chemicals in accordance with standard safety procedures. Always wear protective gloves and safety glasses when you use solvents or corrosives. Also, contain waste streams, use proper ventilation, and dispose of all laboratory reagents according to the directions in the MSDS or SDS.

As specified in Table 10, use only LC/MS-grade solvents and solutions for operating and maintaining the LCQ Fleet system. Installation of the instrument requires LC/MS-grade methanol and water. Installation of some systems might also require solvent modifiers.

Note Visit www.fishersci.com for a wide variety of solvents and consumables for purchase.

Table 10. Recommended solvents and solutions (Sheet 1 of 2)

Product	Grade	Size[a]	Part number
Solvents			
2-Propanol	Optima™ LC/MS	Amber glass, 4 L	A461-4
Acetonitrile	Optima LC/MS	Amber glass, 4 L	A955-4
Methanol	Optima LC/MS	Amber glass, 4 L	A456-4
Water	Optima LC/MS	Amber glass, 4 L	W6-4
Blends			
0.1% Formic acid in acetonitrile	Optima LC/MS	Amber glass, 4 L	LS120-4
0.1% Formic acid in water	Optima LC/MS	Amber glass, 4 L	LS118-4
0.1% Trifluoroacetic acid in acetonitrile	Optima LC/MS	Amber glass, 4 L	LS121-4
0.1% Trifluoroacetic acid in water	Optima LC/MS	Amber glass, 4 L	LS119-4
Additives			
Acetic acid (modifier)	Optima LC/MS	Ampule, 10 × 1 mL	A113-10X1AMP
Ammonium acetate	Optima LC/MS	Amber glass, 50 g	A114-50
Ammonium formate	Optima LC/MS	Amber glass, 50 g	A115-50

Table 10. Recommended solvents and solutions (Sheet 2 of 2)

Product	Grade	Size[a]	Part number
Formic acid (modifier)	Optima LC/MS	Ampule, 10 × 1 mL	A117-10X1AMP
Trifluoroacetic acid	Optima LC/MS	Ampule, 10 × 1 mL	A116-10X1AMP

[a] Size for the stated part number

IMPORTANT

- Some solvent impurities are transparent to a UV-Vis detector. Therefore, some HPLC-grade solvents might contain contaminants that interfere with the performance of the instrument. To operate the instrument, choose HP solvents with minimum contamination.
- Do not filter solvents. Filtering solvents can introduce contamination.

6

Waste Exhaust

The waste and exhaust arrangements can affect the proper performance of the LCQ Fleet system. You must vent vacuum and solvent wastes separately, and collect and dispose of wastes properly.

You are responsible for providing the proper waste and exhaust systems that are required to operate the system.

Contents

Exhaust System

For proper operation of the forepump, Thermo Fisher Scientific strongly recommends that you connect the forepump to an efficient fume exhaust system. The forepump eventually exhausts much of what is introduced into the mass spectrometer, including the small amount of oil vapor that a mechanical pump can emit.

Note Most API applications contribute to solvents accumulating in the forepump. Although Thermo Fisher Scientific recommends that you periodically open the ballast valve (on the top of the pump) to purge the accumulated solvents, opening the valve might allow a large volume of volatile solvent waste to enter the fume exhaust system. Choose an exhaust system that can accommodate the periodic purging of these solvents. The frequency of the purging depends on the throughput of the system.

The forepump requires one 15 mm (0.6 in.) OD exhaust port. The exhaust system for the forepump must be able to accommodate an initial inrush flow rate of 3 L/min (6.4 ft^3/hr) and a continuous flow rate of 1 L/min (2 ft^3/hr).

IMPORTANT The port for the lab exhaust system must be close enough to the forepump so that the exhaust hose is at floor level for a minimum of 2 m (78.7 in.). This hose acts as a trap for exhaust fumes that would otherwise recondense in the forepump oil.

Equip your lab with at least two fume exhaust systems:

- The analyzer optics can become contaminated if the API source drain tube and the (blue) exhaust tubing from the forepump connect to the same fume exhaust system. Route the (blue) exhaust tubing from the forepump to a dedicated fume exhaust system.

CAUTION Do NOT run the forepump exhaust lines vertically near the forepump. Solvents and oils can condense in these lines and flow back into the pump, causing pump damage, and the loss of pump capability. Figure 4 on page 9 shows the forepump tubing connected to the back of the instrument.

- Do not vent the PVC drain tube (or any vent tubing connected to the waste container) to the same fume exhaust system that connects to the forepump. Vent the waste container to a dedicated fume exhaust system. The exhaust system for the API source must accommodate a flow rate of up to 30 L/min (64 ft^3/h).

Solvent Waste

The LCQ Fleet MS comes with parts to collect the solvent waste from the API source. Because the Ion Max API source can accommodate high flow rates, you must use a method of collecting the solvent waste that avoids pressure buildup in the source. Figure 3 on page 7 shows the solvent waste exhaust tubing connected to the bottom of the API source housing located on the front of the instrument.

Use these guidelines for the API source drain:

- Use the PVC tubing provided with the solvent waste container to connect the solvent waste container to a fume exhaust system. Do not connect silicone tubing to the API source drain. If silicone tubing connects to the outlet drain, you might observe background ions at *m/z* 536, 610, and 684.
- Use the Teflon source drain adapter as described in the *LCQ Fleet Getting Connected Guide*. Do not connect Tygon™ tubing directly to the API source drain. At high temperatures, Tygon releases volatile contaminates.
- To prevent solvent waste from backing up into the mass spectrometer, make sure that all tubing is above the level of liquid in the waste container as follows:
  - Tygon tubing from the mass spectrometer to the solvent waste container
  - PVC tubing from the waste container to the exhaust system

For information about connecting the API source housing drain, refer to the *LCQ Fleet Getting Connected Guide*.

Instrument Shipments

Electronic equipment carriers that specialize in the handling and transport of delicate machinery ship the LCQ Fleet MS to your site. When the instrument arrives, move it to a protected indoor location. If you have questions about moving your instrument, contact your local office for Thermo Scientific San Jose products (see "Contacting Us" on page xiv).

CAUTION **Heavy object.** Never lift or move the instrument by yourself; you can suffer personal injury or damage the instrument.

On the occasion when shipments arrive that appear damaged, take these immediate actions.

Contents

Receiving Shipping Packages and Reporting Damage

Upon delivery, visually inspect for any damage to the shipment packages.

❖ **To visually inspect for damage**

Carefully inspect for obvious damage or evidence of rough handling.

If the instrument shipping container, ShockWatch™, or other indicators show visible evidence of damage or mishandling, do NOT open the container.

Follow the next procedure, and then call your Thermo Fisher Scientific sales representative for further instructions.

❖ **To record damages on the receiving documents**

1. Read the information in Filing a Damage Claim Against the Carrier to determine which parties might be responsible for filing a claim against the carrier.
2. On all copies of the receiving documents, note any apparent external damage and briefly describe the extent of the damage.
3. Have the driver sign or initial next to your comments to signify agreement with your observations.
4. Report the list of damages to your Thermo Fisher Scientific representative.

IMPORTANT Freight insurance requires that you note obvious damage on the receiving documents. Thermo Fisher Scientific does not accept liability for damage if materials are received with obvious damage AND the damage is not recorded on the receiving documents.

Filing a Damage Claim Against the Carrier

If the instrument is damaged in transit, the shipment method determines the party who assumes the risk of damage and files a claim against the carrier—Thermo Fisher Scientific or the purchaser. To determine the shipment method for instruments shipped from the San Jose, CA site, check the sales agreement or the sales quote.

Table 11 lists the party who files the damage claim against the carrier for instruments damaged in transit based on the shipment method.

Table 11. Shipment methods for delivery from the San Jose, CA site to domestic and international destinations

Destination	Shipment method	Party responsible for filing a damage claim
Domestic (United States)	Destination or Origin—Thermo Fisher Scientific pays the carrier.	Thermo Fisher Scientific
	Origin—The purchaser pays the carrier.	Purchaser
International	Carriage Paid To (CPT) named destination[a]	Purchaser
	Carriage and Insurance Paid (CIP) to named destination[b]	Thermo Fisher Scientific

[a] Unless specified differently, Thermo Fisher Scientific uses this shipment method for international shipments.

[b] Under special circumstances, Thermo Fisher Scientific uses this shipment method for international shipments.

Installation

Complete all preparations described in the previous chapters before your Thermo Fisher Scientific representative installs the LCQ Fleet MS.

IMPORTANT If the instrument shipping container, ShockWatch, or other indicators show any evidence of damage or mishandling during shipment, do NOT open the container. Call your Thermo Fisher Scientific representative for instructions on what to do. If the instrument arrives safely, proceed with the following instructions.

After you complete the laboratory site preparation and receive the LCQ Fleet instrument, send the completed and signed "LCQ Fleet Installation Request Form" on page iii to your local office for Thermo Fisher Scientific San Jose products. After receiving this form, the field service engineer contacts you to schedule the installation.

Contents

Installation Kits

Your LCQ Fleet MS includes the following kits (Table 12).

Table 12. Kits provided with the LCQ Fleet MS

Kit name	Description	Part number
MS Setup Kit	Contains the installation components, such as the exhaust and waste tubing, and the power supply cords.	70111-62033
MS Accessory Kit	Contains additional components, such as fittings, fuses, tools, and tubing.	97055-62055
Special Accessory Kit for the LCQ Fleet		97055-62060
Chemical Kit	Contains the chemicals for demonstrating the system performance specifications.	97355-62070

Customer-Supplied Hardware

Thermo Fisher Scientific does not provide all parts, materials, or tools that are required for installation. To complete the installation, you must provide these additional parts (Table 13).

Table 13. Customer-supplied hardware for installation (Sheet 1 of 2)

Item	Description
(International destinations only) 230 Vac plug for the detachable power supply cord	See "Power Supply Cords" on page 20.
Communications cable	Connects from the Ready Out and Start Out pins on the instrument to a device not controlled by one of the Thermo Scientific mass spectrometer applications, such as the Xcalibur™ data system. Refer to the *LCQ Fleet Getting Connected Guide*.
Gas line fitting, helium	Connects the 1/8 in. ID copper or stainless steel tubing to the helium gas supply. Refer to the *LCQ Fleet Getting Connected Guide*.
Gas line fitting, nitrogen	Connects the 1/4 in. OD Teflon™ PFA tubing to the nitrogen gas supply. Refer to the *LCQ Fleet Getting Connected Guide*.

Table 13. Customer-supplied hardware for installation (Sheet 2 of 2)

Item	Description
LC system	**IMPORTANT** If your system is manufactured by another company, you must verify that it is suitable for use with the LCQ Fleet MS. The output (start) signal from the external device must be *Normally Hi* (+5 Vdc) and momentarily go to *Low*. If you cannot configure the external device to go from *Normally Hi* to *Low* momentarily, you cannot use it with the LCQ Fleet MS.
LC system, solvents	Used by the Thermo Fisher Scientific field service engineer to calibrate the system during the initial setup. For details, refer to the appropriate manual.
(Optional) Compressed air line fitting	Connection from the compressed air supply to the optional FAIMS module (temperature control module). For details, refer to the *FAIMS Operator's Manual*.

Basic On-Site Training

When your new LCQ Fleet system is on site and ready for installation, a Thermo Fisher Scientific field service engineer unpacks and installs it.

During the installation, the field service engineer demonstrates the following:

- Basics of the instrument operation and routine maintenance
- Marketing specifications that are in effect when you purchased the system

Tip To receive maximum benefit from this on-site training opportunity, plan for the system operators to be available during the entire installation process.

Do not use the new system for sample analysis until the installation is complete and you have signed the Acceptance Form.

Advanced Training Courses

Thermo Fisher Scientific provides introductory and advanced training courses in analytical techniques, in addition to specialized operation and maintenance courses for Thermo Scientific products.

Thermo Fisher Scientific recommends that the key user receive advanced training for operating and maintaining the LCQ Fleet system after using it for several months. After this training from Thermo Fisher Scientific, the key user can conduct in-house training for other staff members, certifying them to operate the system.

Preventive Maintenance

You are responsible for the routine and preventive maintenance of the LCQ Fleet system.

Regular preventive maintenance is essential. It increases the life of the system, maximizes the uptime of the system, and provides optimum system performance. You can find maintenance procedures in the following manuals:

- *LCQ Fleet Hardware Manual*
- *Ion Max and Ion Max-S API Source Hardware Manual*
- Manuals shipped with other devices for your system

Glossary

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A

API source The sample interface between the liquid chromatograph (LC) and the mass spectrometer (MS).

atmospheric pressure chemical ionization (APCI) A soft ionization technique done in an ion source operating at atmospheric pressure. Electrons from a corona discharge initiate the process by ionizing the mobile phase vapor molecules, forming a reagent gas.

atmospheric pressure ionization (API) Ionization performed at atmospheric pressure by using atmospheric pressure chemical ionization (APCI), electrospray ionization (ESI), or nanospray ionization (NSI).

auxiliary gas The outer-coaxial gas (nitrogen) that assists the sheath (inner-coaxial) gas in dispersing and/or evaporating sample solution as the sample solution exits the APCI, ESI, or HESI nozzle.

C

circuit breaker An electronic switch that automatically shuts off power to its designated circuits when there is a current overload or short circuit condition. Multiple circuit breakers are typically housed within one or more panels for a given area. These devices must be certified for compliance by a recognized organization for your country.

collision energy The energy used when ions collide with the collision gas.

collision gas A neutral gas used to undergo collisions with ions.

computer data system *See* data system.

D

damping gas Helium gas introduced into the ion trap mass analyzer that slows the motion of ions entering the mass analyzer so that the ions can be trapped by the rf voltage fields in the mass analyzer.

data system Consists of a computer, a monitor, a keyboard, a mouse, an Ethernet switch, and an optional printer.

E

electrospray (ESI) A type of atmospheric pressure ionization that is currently the softest ionization technique available to transform ions in solution into ions in the gas phase.

electrospray ionization (ESI) *See* electrospray (ESI).

F

FAIMS (high-Field Asymmetric waveform Ion Mobility Spectrometry) An optional module for separating ions at atmospheric pressure. FAIMS provides ion separation by taking advantage of compound-dependent changes in ion mobility at high electric field strengths.

forepump The pump that evacuates the foreline. A rotary-vane pump is a type of forepump. It might also be referred to as a backing, mechanical, rotary-vane, roughing, or vacuum pump.

H

heated-electrospray (H-ESI) A type of atmospheric pressure ionization that converts ions in solution into ions in the gas phase by using electrospray (ESI) in combination with heated auxiliary gas.

heated-electrospray ionization (H-ESI) *See* heated-electrospray (H-ESI).

I

inrush current The initial current flowing through an inductive load, such as a motor, when it is first turned on. On average, the typical duration is less than 100 ms.

N

nanoelectrospray (nanoESI or NSI) A type of electrospray (ESI) that accommodates very low flow rates of sample and solvent at 1–20 nL/min (for static nanospray) or 100–1000 nL/min (for dynamic nanospray).

S

sheath gas The inner coaxial gas (nitrogen), which is used in the API source to help nebulize the sample solution into a fine mist as the sample solution exits the ESI or APCI nozzle.

source *See* API source.

sweep gas Nitrogen gas that flows out from behind the sweep cone in the API source. Sweep gas aids in solvent declustering and adduct reduction.

syringe pump A device that delivers a solution from a syringe at a specified rate.

U

UV-Vis detector Ultraviolet-visible spectroscopy. This type of detector operates in the ultraviolet-visible spectral region.

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