

# TSQ Series

## Preinstallation Requirements Guide

70111-97160 Revision B

March 2009

DOCUMENTATION  
**SURVEY**

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# TSQ Series Installation Request

Dear User:

Read the *TSQ Series Preinstallation Requirements Guide*, and then complete the following installation request form. After all items on the form are fulfilled, sign and date the form. Then, mail or fax this form to your local sales/service office for Thermo Fisher Scientific San Jose products. The address and fax number for your local office are located on the following pages.

- 1. All laboratory remodeling has been completed.
- 2. Your TSQ is on site.
- 3. Principal operator will be available during the installation / certification period.
- 4. Doorways, hallways, etc. are a minimum width of 94 cm (37 in.).
- 5. Available floor area is sufficient and flooring will support the load.
- 6. Sufficient bench space is available for all of the equipment. List the following:  
Width: \_\_\_\_\_  
Depth: \_\_\_\_\_  
Height: \_\_\_\_\_
- 7. Workbench can support the load of the system [205 kg (450 lbs)] and is free from vibration.
- 8. Lighting is adequate.
- 9. Main power is installed and is in compliance with local electrical codes.
- 10. Power for test and cleaning equipment is installed.
- 11. Power outlets are of the correct configuration. Note NEMA type: \_\_\_\_\_
- 12. Voltage of power outlet has been measured. Note **measured** voltage: \_\_\_\_\_
- 13. Power is free from fluctuations due to slow changes in the average voltage or changes due to surges, sags, or transients.
- 14. Air conditioning is adequate for temperature, humidity, and particulate matter control. The laboratory can be maintained at a constant temperature, between 15 and 27 °C (59 and 81 °F).
- 15. Relative humidity is between 40% and 80% with no condensation.
- 16. System work area is free from magnetic disruption and electrostatic discharge.
- 17. All gases required (argon and nitrogen) are on site, gas lines are installed, and appropriate gas regulators are available. List gases and purity: \_\_\_\_\_
- 18. New or recently cleaned HPLC system is available that produces pulse-free, continuous flow from 100 to 1000 µL/min.
- 19. LCMS grade water, methanol, acetonitrile and isopropyl alcohol are available for testing the performance of your instrument.
- 20. There is a suitable exhaust system present that is separate from solvent waste.
- 21. Provision has been made for collecting solvent waste from the API source.
- 22. One voice telephone line is installed near the system.
- 23. All relevant safety regulations are complied with.

Have any special acceptance specifications been agreed to in the contract? Yes  No   
If **YES**, attach full details of specifications.

Is there any additional equipment that needs to be interfaced to the system? Yes  No   
If **YES**, attach full details of additional equipment.

**Note:** We reserve the right to invoice against the engineer's time if the installation requirements are not met on the date of the installation.

**Print your name, company name, and company address clearly below:**

Name \_\_\_\_\_

Company \_\_\_\_\_ Telephone \_\_\_\_\_

Address \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Country \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

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## 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 below.

Changes that you make to your system might 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.

- [TSQ Quantum Access MAX](#)
- [TSQ Quantum Ultra](#)
- [TSQ Vantage](#)
- [TSQ Quantum Access](#)

## TSQ Quantum Access MAX

### EMC Directive 2004/108/EEC

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

EN 55011: 2007, A2: 2007

EN 61000-4-4: 2004

EN 61000-3-2: 2006

EN 61000-4-5: 2005

EN 61000-3-3: 1995, A1: 2001, A2: 2005

EN 61000-4-6: 2007

EN 61000-4-2: 1995, A1: 1999, A2: 2001

EN 61000-4-11: 2004

EN 61000-4-3: 2006

EN 61326-1: 2006

FCC Class A: CFR 47 Part 15: 2007

### Low Voltage Safety Compliance

This device complies with European Union Directive 2006/95/EC implemented by 61010-1: 2001.



## TSQ Quantum Ultra

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

EMC compliance has been evaluated by U.L. Underwriter's Laboratory Inc.

EN 55011: 1998	EN 61000-4-4: 1995, A1: 2001, A2: 2001
EN 61000-3-2: 1995, A1: 1998, A2: 1998, A14: 2000	EN 61000-4-5: 1995, A1: 2001
EN 61000-3-3: 1998	EN 61000-4-6: 2001
EN 61000-4-2: 2000	EN 61000-4-11: 1994, A1: 2001
EN 61000-4-3: 2002	EN 61326-1: 1998
FCC Class A, CFR 47 Part 15: 2005	CISPR 11: 1999, A1: 1999, A2: 2002

### Low Voltage Safety Compliance

This device complies with Low Voltage Directive 73/23/EEC and harmonized standard EN 61010-1: 2001.

## TSQ Vantage

### EMC Directive 2004/108/EC

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

EN 55011: 1998, A1: 1999, A2: 2002	EN 61000-4-4: 2004
EN 61000-3-2: 2006	EN 61000-4-5: 2006
EN 61000-3-3: 1995, A1: 2001, A2: 2005	EN 61000-4-6: 2001
EN 61000-4-2: 2001	EN 61000-4-11: 2004
EN 61000-4-3: 2006	EN 61326-1: 2006
FCC Class A, CFR 47 Part 15: 2007	CISPR 11: 1999, A1: 1999, A2: 2002

### Low Voltage Safety Compliance

This device complies with the Low Voltage Directive 2006/95/EC and harmonized standard EN 61010-1.

## TSQ Quantum Access

### EMC Directive 89/336/EEC, 92/31/EEC, 93/68/EEC

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

EN 55011: 1998, A1: 1999, A2: 2002

EN 61000-3-2: 2000

EN 61000-3-3: 1995, A1: 2001

EN 61000-4-2: 2001

EN 61000-4-3: 2002

EN 61000-4-4: 1995, A1: 2000, A2: 2001

EN 61000-4-5: 2001

EN 61000-4-6: 2003

EN 61000-4-11: 2001

EN 61326: 1997, A1: 1998, A2: 2001, A3: 2003

FCC Class A, CFR 47 Part 15: 2005

CISPR 11: 1999, A1: 1999, A2: 2002

### Low Voltage Safety Compliance

This device complies with the Low Voltage Directive EN 61010-1:2001 and harmonized standard EN 61010-1: 2001.

## 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 UNDESIRE 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: Use of this instrument in a manner not specified by Thermo Fisher Scientific could impair any protection provided by the instrument.

## Notice on the Susceptibility to Electromagnetic Transmissions

Your instrument is designed to work in a controlled electromagnetic environment. Do not use radio frequency transmitters, such as mobile phones, in close proximity to the instrument.

For manufacturing location, see the label on the instrument.



## WEEE Compliance

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:



Thermo Fisher Scientific has contracted with one or more recycling or disposal companies in each European Union (EU) Member State, and these companies should dispose of or recycle this product. See [www.thermo.com/WEEERoHS](http://www.thermo.com/WEEERoHS) for further information on Thermo Fisher Scientific's compliance with these Directives and the recyclers in your country.

## WEEE Konformität

Dieses Produkt muss die EU Waste Electrical & Electronic Equipment (WEEE) Richtlinie 2002/96/EC erfüllen. Das Produkt ist durch folgendes Symbol gekennzeichnet:



Thermo Fisher Scientific hat Vereinbarungen mit Verwertungs-/Entsorgungsfirmen in allen EU-Mitgliedsstaaten getroffen, damit dieses Produkt durch diese Firmen wiederverwertet oder entsorgt werden kann. Mehr Information über die Einhaltung dieser Anweisungen durch Thermo Fisher Scientific, über die Verwerter, und weitere Hinweise, die nützlich sind, um die Produkte zu identifizieren, die unter diese RoHS Anweisung fallen, finden sie unter [www.thermo.com/WEEERoHS](http://www.thermo.com/WEEERoHS).

## Conformité DEEE

Ce produit doit être conforme à la directive européenne (2002/96/EC) des Déchets d'Equipements Electriques et Electroniques (DEEE). Il est marqué par le symbole suivant:



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# Preface

## About This Guide

This *TSQ Series Preinstallation Requirements Guide* provides you with information that will assist you in planning for and preparing your lab site prior to delivery and installation of your system. Please read each section carefully to be sure that your laboratory is ready for the installation of your system.

## Related Documentation

In addition to this guide, Thermo Fisher Scientific provides the following documents for the TSQ™ Series mass spectrometers:

- *TSQ Series Getting Connected Guide*
- *TSQ Series Getting Started Guide*
- *TSQ Series Hardware Manual*
- *H-ESI Probe User Guide*
- *HESI-II Probe User Guide*
- *Ion Max and Ion Max-S API Source Hardware Manual*

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.

## 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	<a href="mailto:us.techsupport.analyze@thermofisher.com">us.techsupport.analyze@thermofisher.com</a>
Knowledge base	<a href="http://www.thermokb.com">www.thermokb.com</a>

Find software updates and utilities to download at [mssupport.thermo.com](http://mssupport.thermo.com).

### ❖ To contact Customer Service for ordering information

Phone	800-532-4752
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E-mail	<a href="mailto:us.customer-support.analyze@thermofisher.com">us.customer-support.analyze@thermofisher.com</a>
Web site	<a href="http://www.thermo.com/ms">www.thermo.com/ms</a>

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## Introduction

Thermo Scientific mass spectrometers operate under carefully controlled environmental conditions.

The purchaser is responsible for providing a suitable location and operating environment, 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 standard warranty and service contract coverage.

For additional information, request specific preinstallation support directly through your local Thermo Fisher Scientific office.





## Site Preparation

Before a Thermo Fisher Scientific field service engineer can install your instrument, you must prepare the site. Transport of the equipment to the site requires wide entrances and hallways. Supporting the weight of the MS detector, computer, and liquid chromatography (LC) system requires large and strong workbenches. You must install a telephone within reach of the workbench. See [Table 1](#) for a summary of site preparation requirements, and see the pages indicated in the table for details.

It is your responsibility to provide an acceptable installation site.

**Table 1.** Site preparation requirements summary

Requirement	Page
<b>Entrance requirements</b>	4
The entrances and hallways must be a minimum of 94 cm (37 in.) wide to provide clearance for the instrument.	
<b>Space and load requirements for the data system hardware</b>	4
The workbench for the data system must have minimum dimensions of 1 × 1.22 m (3 × 4 ft) and be capable of supporting the weight of the data system computer, monitor, and printer 48 kg (105 lbs).	
<b>Space and load requirements for a TSO Series LC/MS system</b>	4
The workbench for the LC/MS system must have the minimum dimensions of 1 × 1.53 m (3 × 5 ft) and be capable of supporting the weight of the TSO mass spectrometer [118 kg (260 lbs)] and an LC system [67 kg (147 lbs)].	
<b>Forepumps</b>	8
Install the forepumps according to specific guidelines.	
<b>Telephone</b>	9
Install a telephone line near the workbench.	

## Entrance Requirements

The entrance to your facility and the width of all hallways, elevators, and so on must be a minimum of 94 cm (37 in.).<sup>1</sup> However, additional room must be allowed for maneuvering the system around corners, into elevators, or through doorways.

The TSQ Series mass spectrometer and accessories are shipped in a container with the following dimensions: *l* 104 cm (41 in.), *w* 92 cm (36 in.), *h* 112 cm (44 in.). The container and its contents weigh approximately 180 kg (394 lb).<sup>2</sup> Other modules—such as the computer, forepump, monitor, and options—are shipped in their own containers. Their dimensions and weights are less than that of the container for the TSQ system.

## Space and Load Requirements

The recommended layout for the TSQ Quantum Access or TSQ Quantum Access MAX systems is shown in [Figure 2](#), and the recommended layout for the TSQ Vantage or TSQ Quantum Ultra systems is shown in [Figure 3](#). The space requirements and weights of the components of the typical TSQ system are given in [Table 2](#).

Place the TSQ system on a workbench that has minimum dimensions of 1 × 1.5 m (3 × 5 ft). The workbench must be capable of supporting the weight of the TSQ mass spectrometer [118 kg (260 lb)] plus the weight of your liquid chromatograph and any options. Allow about 8 cm (3 in.) of clear space behind the system for proper air circulation and for clearance of the gas lines and electrical connections. In addition, allow at least 92 cm (36 in.) of vertical clearance between the top of the TSQ instrument and any shelves above it.



**CAUTION** For your safety and to avoid instrument damage, Thermo Fisher Scientific recommends that the load rating for the table where you place the LC/MS system be at least twice the weight of the equipment placed on that table.

The data system (with printer) [27 kg (59 lb)] can be placed on a second workbench that has minimum dimension of 1 × 1.2 m (3 × 4 ft). See [Figure 1](#).

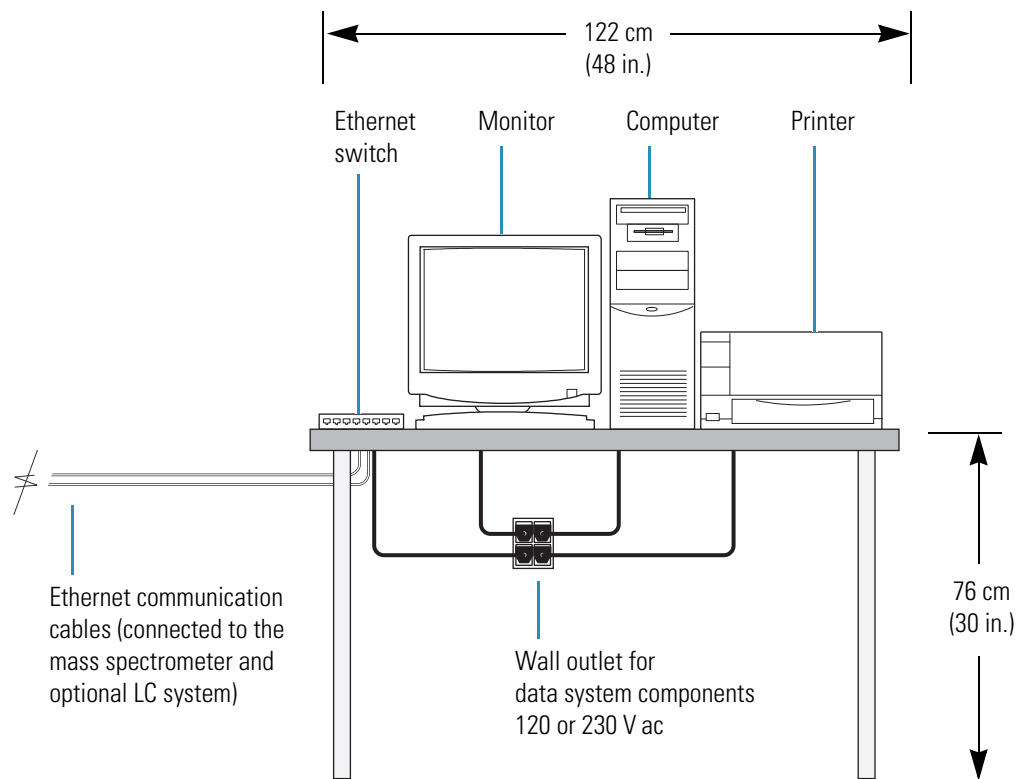
**Note** Do not route exhaust tubing from the pump vertically toward the ceiling. To maintain pump integrity, route the tubing from the exhaust port down to the floor.

See [Figure 1](#) and [Table 2](#) for the space requirements and weights of the typical data system hardware components.

<sup>1</sup>Your instrument is shipped in a shipping container that is 92 cm (36 in.) at its narrowest. If the entrance to your laboratory will not accommodate a 92 cm container, you can remove the individual modules from the container before moving them into the room. If you remove the instrument from its shipping container before it is delivered to the lab site, be sure that all the contents of the container remain with the instrument.

<sup>2</sup>If the instrument shipping container, Shock Watch, or other indicator shows 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 there is no evidence of shipping damage or mishandling, then you can proceed with the instructions that follow.

**Figure 1.** Typical data system workbench



**Table 2.** Data system hardware components space and load requirements

Module	Height		Width		Depth		Weight	
	cm	in.	cm	in.	cm	in.	kg	lb
Minitower computer	48	19	18	7	43	17	14	30
Monitor	41	16	41	16	43	17	5	11
Keyboard	5	2	48	19	20	8	1	2
Laser printer*	20	8	41	16	46	18	7	16

\* Approximate. The actual value depends on your equipment.

See [Figure 2](#) for the TSQ Quantum Access or TSQ Quantum Access MAX system, and [Figure 3](#) for the TSQ Quantum Ultra or TSQ Vantage. [Table 3](#) on [page 8](#) summarizes the space and weight requirements for the TSQ series mass spectrometers.

**Figure 2.** Workbench for TSQ Quantum Access or TSQ Quantum Access MAX system with an Accela LC system

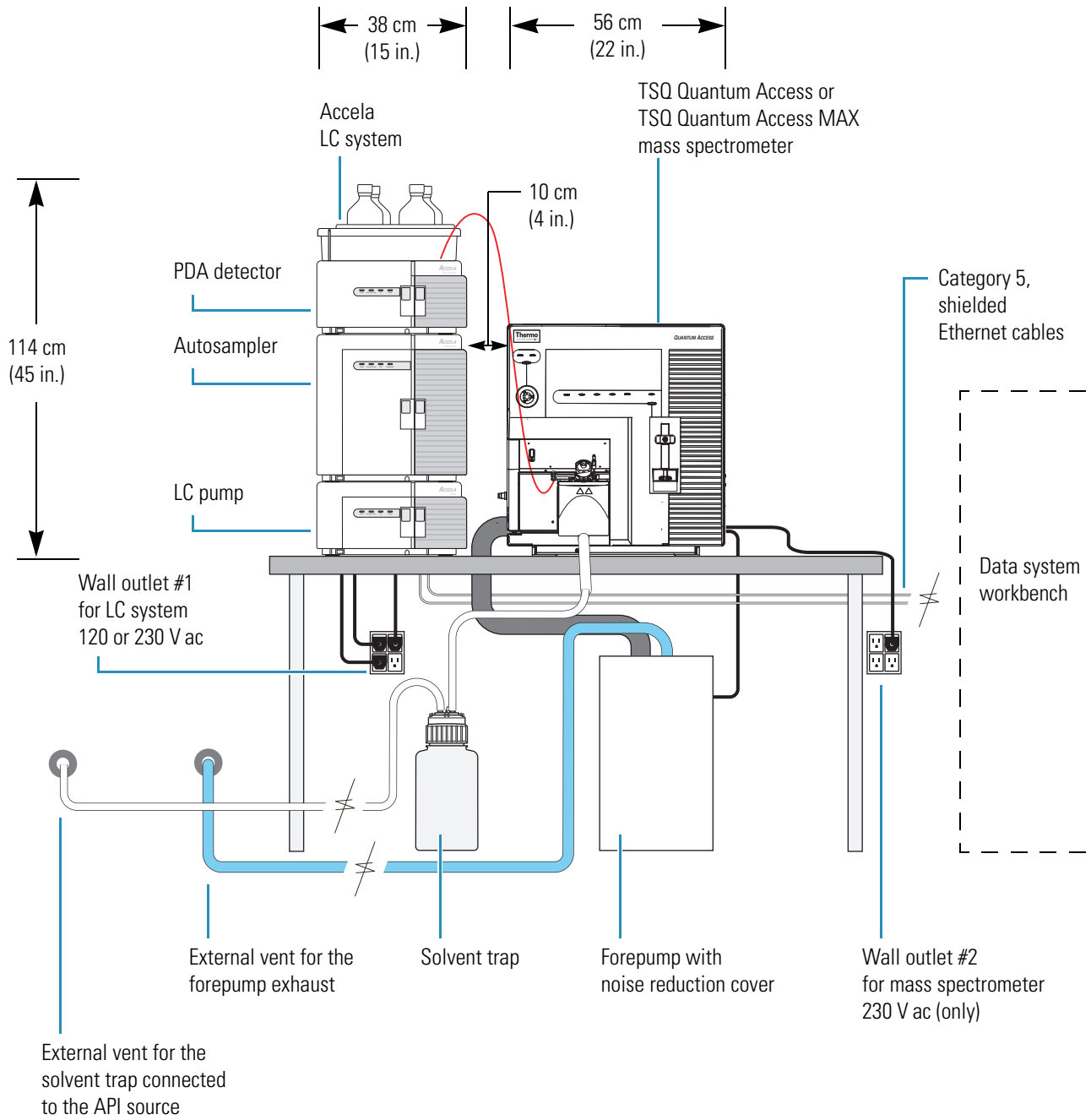
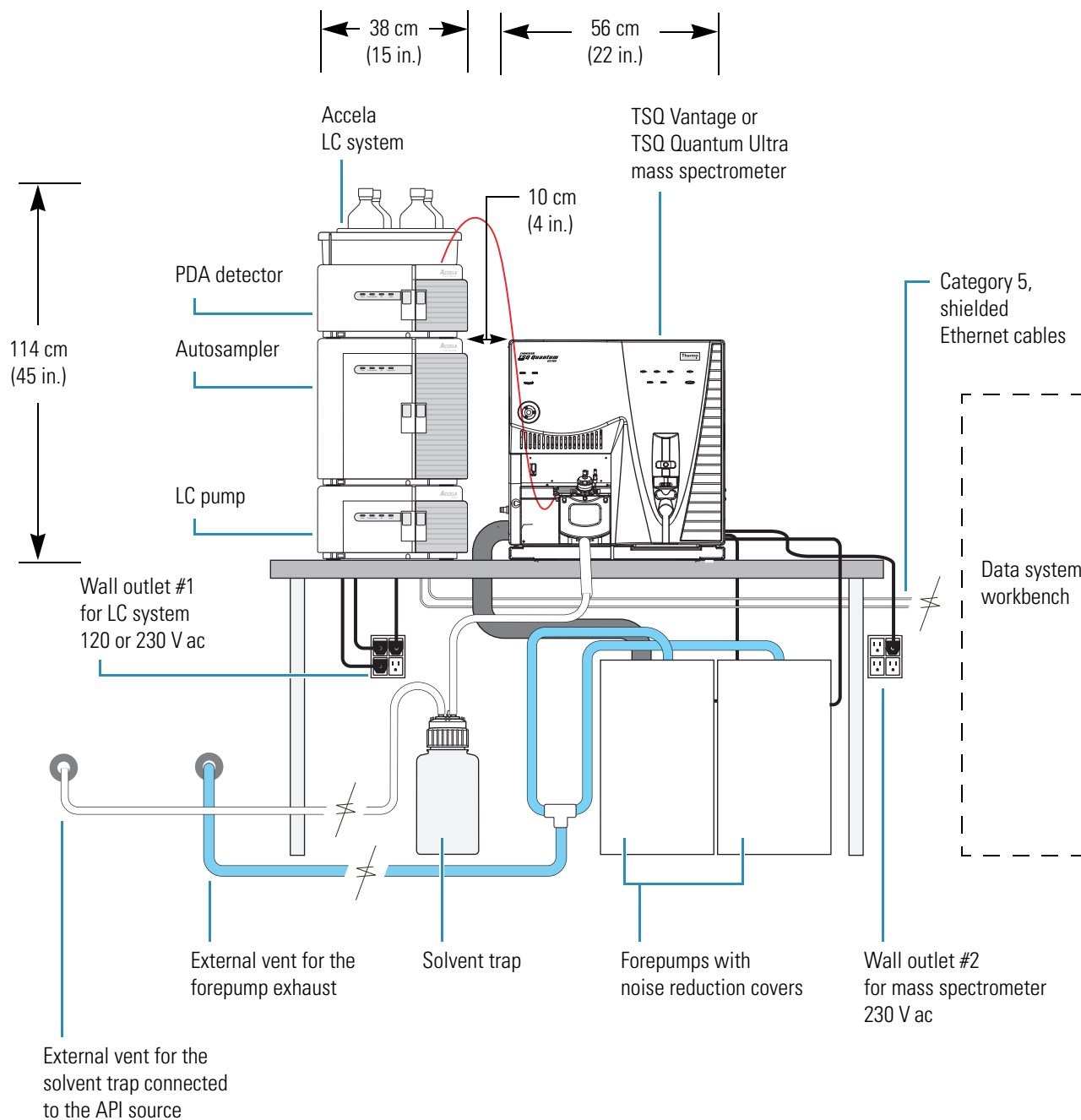


Figure 3. Workbench for TSQ Vantage or TSQ Quantum Ultra mass spectrometer with optional LC system



**Table 3.** TSQ system space and load requirements

Module	Height		Width		Depth		Weight	
	cm	in.	cm	in.	cm	in.	kg	lb
TSQ mass spectrometer	61	24	56	22	79	31	118	260
Forepump	30	12	20	7	64	25	34	75
Liquid chromatograph*	61	24	36	14	46	18	45	100

\*Approximate. The actual value depends on your equipment.

## Forepumps

Depending on available space, you have two options for the placement of the forepumps and for connecting the vacuum hose from the mass spectrometer to the forepumps.

- If the workbench has space beneath it, place the forepumps under the workbench immediately behind the TSQ mass spectrometer. Either run the vacuum hose behind the workbench or make a 6.4 cm (2.5 in.) diameter hole through the bench for the vacuum hose. Allow for room to run the power cords from the forepumps through the hole. [Figure 2](#) on [page 6](#) shows the setup for the TSQ Quantum Access or the TSQ Quantum Access MAX, which both use one forepump. [Figure 3](#) on [page 7](#) shows the setup for the TSQ Vantage or TSQ Quantum Ultra which use two forepumps.
- If the workbench has no space under or at the end of it, place the forepumps on the floor in front of the TSQ mass spectrometer.



**CAUTION** Whenever possible, provide space under the workbench for the forepumps. If placed in front of the mass spectrometer, the forepumps can block access to drawers and cabinets and can represent a trip hazard.



**CAUTION** Do not place the forepumps on a shelf or other surface connected to the table supporting the TSQ system. Vibration from the pumps can affect system performance.

**IMPORTANT** To maintain forepump integrity, route the exhaust tubing from the exhaust port down to the floor, not from the forepump vertically toward the ceiling.

**IMPORTANT** The exhaust hose should travel at floor level for a minimum of two meters (78.5 in.) before it reaches the external exhaust system. This tubing acts as a trap for exhaust fumes that would otherwise recondense in the forepump oil.

## Telephone

Install a telephone in your laboratory near the instrument so that, if necessary, you can conveniently operate the system while you are working by telephone with Thermo Fisher Scientific Technical Support. Place the voice telephone outlet within 2 m (6 ft) of your LC/MS system.

**IMPORTANT** Your instrument is designed to work in a controlled electromagnetic environment. Do not use radio frequency transmitters, such as mobile phones, in close proximity to the instrument.





## Operating Environment

Attention to the operating environment will ensure 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. See [Table 4](#) for more information on operating environment requirements, and see the pages indicated in the table for more details.

It is your responsibility to provide the operating environment necessary for proper operation of the Thermo Scientific LC/MS system.

**Table 4.** Operating environment preinstallation requirements summary

Requirement	Page
<p><b>Temperature</b></p> <p>Maintain the laboratory room temperature between 15 and 27 °C (59 and 81 °F). The temperature must not fluctuate by more than ±5 °C to ensure optimal performance of the LC/MS.</p> <p>For systems with accurate mass capabilities, the temperature in the room must not vary at a rate greater than 2 °C/h (3.6 °F/h). The ideal operating temperature for TSQ Vantage and TSQ Quantum Ultra instruments with accurate mass capability is between 18 and 21 °C (65 and 70 °F). The temperature must be controlled to within 2 °C (3.6 °F).</p>	12
<p><b>Humidity</b></p> <p>Ensure that the relative humidity of the operating environment is between 40% and 80%, with no condensation.</p>	13
<p><b>Vibration</b></p> <p>Requires a vibration-free workbench.</p>	13
<p><b>Lighting</b></p> <p>Requires adequate lighting for instrument operation. A high intensity lamp for instrument maintenance is recommended.</p>	13
<p><b>Particulate matter</b></p> <p>The air should contain fewer than 100 000 particles per cubic foot (3 500 000 particles per cubic meter) in excess of 5 µm.</p>	13
<p><b>Electrostatic discharge</b></p> <p>Take precautions for electrostatic discharge, especially when operating the system at the lower end of the relative humidity range listed above.</p>	14

## Temperature

For precision instrumentation, such as the Thermo Scientific mass spectrometer, maintain the laboratory room temperature between 15 and 27 °C (59 and 81 °F). For optimum performance, maintain the room temperature between 18 and 21 °C (65 and 70 °F). For TSQ Vantage and TSQ Quantum Ultra instruments with accurate mass capability, temperature control is vital to the success of your accurate mass measurements.

**Note** As the laboratory temperature increases, system reliability decreases. All electronic components generate heat while operating. This heat must be dissipated to the surrounding air for the components to continue to operate reliably.

There must be a good flow of room air around the system, and the air conditioning system must be capable of maintaining a constant temperature in the immediate vicinity of the system.

**Note** Do not locate the mass spectrometer under an air duct, near windows, or near heating and cooling sources. Temperature fluctuations of 5 °C or more over a five-minute period of time can affect performance.

The air conditioning load for a TSQ Series mass spectrometer is approximately 2300 W (8000 Btu/h). Refer to your LC manual for the heat output of your LC equipment.

Table 5 lists the approximate heat output of each module.

**Table 5.** Heat output

Module	Heat output (in Watts)	Heat output (in Btu/h)
TSQ mass spectrometer	2300	8000
Liquid chromatograph*	1060	3690
Monitor	240	820
Computer	470	1640
Laser printer*	350	1230
Total	4420	15 380

\* Approximate. The actual values depend on your equipment.

## Humidity

Maintain the relative humidity of the operating environment between 40 and 80 percent, with no condensation.

Operating a Thermo Fisher 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 system in an environment with high humidity can cause condensation, oxidation, and short circuits. It can also cause the accumulation of dust that can block filters on cooling fans.

To ensure that your laboratory is always within the required temperature and humidity specifications, Thermo Fisher Scientific recommends that you equip your laboratory with a temperature/humidity monitor.

## Vibration

Keep floors free of vibration caused, for example, by equipment in adjoining locations.

Because of the natural vibration of the forepump or forepumps during operation, install the forepump on the floor beneath the TSQ Series system and not near the system on the workbench.

## Lighting

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

## Particulate Matter

Ensure that the air in your laboratory is free from excessive dust, smoke, or other particulate matter in excess of  $5\ \mu\text{m}$ —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 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 your TSQ Series system.

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 PCBs without proper precautions might damage the electrical components or cause them to fail prematurely.

Static electricity can develop in a variety of ways. Some examples follow:

- Walking across a carpet in a room that is at 20 percent relative humidity can generate as much as 35 000 V of electrostatic potential on the surface of your body. A similar trip in a room at 80 percent relative humidity generates about 1500 V of electrostatic potential.
- Sitting and working in a chair padded with polyurethane foam in a room at 20 percent relative humidity can cause as much as 18 000 V of electrostatic potential to develop on your skin. At 80 percent relative humidity, the electrostatic potential can be as much as 1500 V.
- Working in laboratory coats and clothing made of synthetic fibers can cause the accumulation of static electricity on your skin.
- Using Styrofoam™ cups and packing materials results in a considerable electrostatic charge.

The discharge of static electricity is not perceptible to humans until the potential is at least 4000 V. However, a discharge of electrostatic potential as little as 50 V can damage many electronic components. While ESD damage can be catastrophic and cause your system to cease functioning, more commonly, ESD damage might cause latent problems that are detrimental to sensitive electrical components, causing premature failures.

Because of ESD, Thermo Fisher Scientific recommends the following precautions, especially when operating your system at the lower end of the relative humidity specification:

- Use a static-dissipating floor covering (such as tile or conductive linoleum) in the room that houses your instrument.
- 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 you are operating the instrument.
- Keep Styrofoam cups or packing materials away from the instrument.

## Line Power

The quality of line power delivered to your system can affect its performance and longevity. In order to ensure that your instrument performs optimally and is not damaged by line power fluctuations, verify that your laboratory electrical supply complies with all power quality requirements. See [Table 6](#) for a summary of line power requirements, and see the pages indicated in the table for more details.

It is your responsibility as the user to provide a power source of acceptable quality to operate your system.

**Table 6.** Line power preinstallation requirements summary (Sheet 1 of 2)

Requirement	Page
<b>Quality of power</b>	17
Ensure that line power is free from the following:	
<ul style="list-style-type: none"> <li>• Long-term changes in average root mean square (RMS) voltage level, with durations greater than 2 s.</li> <li>• Sudden changes in average RMS voltage level, with durations between 50 ms and 2 s.</li> <li>• Brief voltage excursions of up to several thousand volts with durations up to 50 <math>\mu</math>s.</li> </ul>	
<b>Power monitoring devices</b>	17
Before connecting your TSQ Series to its line power, Thermo Fisher Scientific recommends that you monitor the line power 24 hours a day for seven consecutive days.	
<b>Power conditioning devices</b>	18
To free line power from voltage changes, sags, surges, and transients, the following devices are available:	
<ul style="list-style-type: none"> <li>• Noise suppression transformer</li> <li>• Buck/boost transformer</li> <li>• Power conditioning</li> </ul>	

**Table 6.** Line power preinstallation requirements summary (Sheet 2 of 2)

Requirement	Page
<b>Available outlets</b>	19
For systems installed where there is 110 and 230 V:	
<ul style="list-style-type: none"> <li>• Nominal voltage of 120 V ac, +6% to -10% and 230 V ac, <math>\pm 10\%</math> and free from voltage variations above or below this operating range. For systems installed in areas with 208 V, you must protect your instrument by using a buck/boost transformer to ensure that power is within the specified parameters at all times.</li> <li>• Frequency of 50/60 Hz.</li> <li>• Two fourplex outlets (single-phase power) with a minimum power rating of 20 A (120 V ac).</li> <li>• One fourplex outlet (single-phase power) with a minimum power rating of 16 A (230 V ac).</li> <li>• Earth ground hardwired to the main panel.</li> </ul>	
For systems with only 230 V line power:	
<ul style="list-style-type: none"> <li>• Nominal voltage of 230 V ac, <math>\pm 10\%</math>. For systems installed in areas with 208 V, you must protect your instrument by using a buck/boost transformer to ensure that power is within the specified parameters at all times.</li> <li>• Frequency of 50/60 Hz.</li> <li>• Three fourplex outlets, with a minimum power rating of 16 A at each fourplex outlet. (In the U.S., only 15 and 20 A power rating options are available; therefore, you must choose the 20 A option.)</li> <li>• Earth ground hardwired to the main panel.</li> </ul>	
<b>Connecting the modules to wall outlets</b>	23
Balance the current load on the circuits that are connected to your system.	
<b>Uninterruptible power supply</b>	23
Systems installed in areas with intermittent line power must have uninterruptible power supplies installed.	
<b>Technical assistance</b>	23
Contact Thermo Fisher Scientific for additional assistance in monitoring line power or selecting a line conditioner.	

## Quality of Power

The quality of power supplied to your TSQ Series system is very important. The line voltage must be stable and within the specifications listed in this guide. The line voltage must be free of fluctuations due to slow changes in the average voltage, surges, sags, or transients.

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

**Table 7.** Common voltage disturbances

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

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 fail catastrophically or degrade, eventually shortening the lifetime of your system. Therefore, it is important to establish the quality of the line voltage in your laboratory before installing your TSQ Series system.

## Power Monitoring Devices

Several devices are available to monitor the quality of your line power.

These devices provide a continuous record of line performance by analyzing and printing out data on the three most common voltage disturbances: slow average, sag and surge, and transient.

In the first two cases, the time interval recording indicates the duration and the amplitude of the disturbance. A power line disturbance analyzer is a device capable of detecting and recording most types of line power problems. The Dranetz™<sup>1</sup> system is an example of a suitable analyzer. Power line analyzers can be rented from electrical equipment suppliers.

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

<sup>1</sup>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.

## Power Conditioning Devices

You can correct a line voltage problem using various line voltage conditioning devices. If you have good regulation but the power line disturbance analyzer shows transient voltages, then an isolation/noise-suppression transformer should resolve the problem. If there are both transient and regulation problems, consider power conditioners that can control these problems.

**CAUTION** Any conditioning devices installed with your system must be able to deal with 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.



Inrush current is the initial current flowing through an inductive load, such as a motor, when it is first turned on. Because Thermo Scientific MS systems require the use of one or two mechanical vacuum pumps, they draw an inrush current. The maximum inrush current for each mechanical vacuum pump is less than 30 A at 230 V, with an average duration of less than one second. (On average, the typical duration of the inrush current is less than 100 ms.) Therefore, this initial energy (watts-sec) demanded from the Vac Power line is very low. Thermo Scientific MS systems are protected from an overcurrent with time-delay fuses and active switches. Contact your Thermo Fisher Scientific field service engineer for more information.

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

**IMPORTANT** The nitrogen generator requires a buck/boost transformer if the line voltage is outside of the 230 V  $\pm$ 10% voltage specification.

Each buck/boost transformer is encased in a metal housing approximately 13 × 13 × 26 cm (5 × 5 × 10 in.) and is equipped with a 2 m (6 ft) power cable. To order the buck/boost transformer kit (P/N OPTON-01460), contact Thermo Fisher Scientific San Jose, and then have your electrician install the buck/boost transformer before you start to install your system. The installation instructions for the transformer are included.



**CAUTION** For compliance and safety, any device connected between the Thermo Scientific MS system and the Vac Power line (for example, UPS, line conditioners, buck/boost transformers, or isolation/noise suppression devices) must be certified by recognized domestic and international organizations (for example, UL, CSA, TÜV, or SEMKO).



## Available Outlets

The TSQ Series mass spectrometer is designed to operate at a nominal voltage of 230 V ac, 50/60 Hz. Line voltages can vary between a minimum of 207 V ac and a maximum of 253 V ac.



**CAUTION** Systems installed in areas with 208 V power experience voltage sags during high use periods that might place the line voltage below the operating parameters discussed in this section. In this case, you must protect your instrument by using a buck/boost transformer to ensure that power is within the specified parameters at all times.

The minimum and maximum voltage tolerances are in compliance with EN60950-1:2001, as follows:

“If the equipment is intended for direct connection to an AC mains supply, the tolerances on rated voltage shall be taken as +6% and -10% unless the rated voltage is 230 V single phase or 400 V three-phase, in which case the tolerance shall be taken as +10% and -10%.”

For systems installed in regions with both 120 V ac and 230 V ac service, the basic power requirements for an TSQ Series system consist of the following:

- Nominal voltage of 120 V ac, +6% to -10% and 230 V ac,  $\pm 10\%$  and free from voltage variations above or below this operating range
- Frequency of 50/60 Hz
- Two fourplex outlets (single-phase power) with a minimum power rating of 20 A (120 V ac)
- One fourplex outlet (single-phase power) with a minimum power rating of 16 A (230 V ac)
- 20 A option in the U.S., where only 15 and 20 A power rating options are available
- Earth ground hard-wired to the main panel

For systems installed in areas with 230 V ac only service, the basic power requirements for a TSQ Series system consist of the following:

- Nominal voltage of 230 V ac,  $\pm 10\%$
- Frequency of 50/60 Hz
- Three fourplex outlets, with a minimum power rating of 16 A at each fourplex outlet
- Earth ground hardwired to the main panel

**IMPORTANT**

1. Ensure that the TSQ Series system has an earth ground hardwired to the main panel. The interconnected power outlets for the TSQ Series system are to have a common point to one ground connector. If two points are connected to separate external ground, they can cause noise current to flow through the ground system via the ground loop that is formed.
2. Ensure that the power remains on. The TSQ Series system should remain on and pump continuously for optimum performance.
3. Have additional power outlets available for test and cleaning equipment, such as an oscilloscope and ultrasonic bath. Thermo Fisher Scientific recommends that there be several additional power outlets close to the workbench space within your laboratory.

To view the optimum locations for power outlets in the most typical workbench setups, see [Table 8](#).

**Table 8.** Typical workbench setup

Typical workbench setup	See the following
Data system	<a href="#">Figure 1 on page 5</a>
TSQ Quantum Access or TSQ Quantum Access MAX system	<a href="#">Figure 2 on page 6</a>
TSQ Vantage or TSQ Quantum Ultra system	<a href="#">Figure 3 on page 7</a>

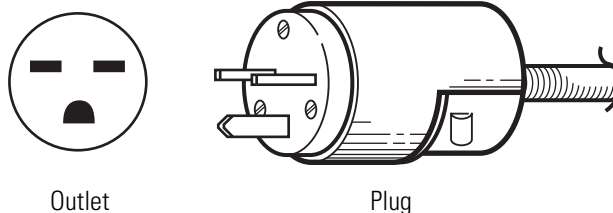
The power cable from the TSQ Series mass spectrometer is 3 m (9 ft), and the cables from the personal computer, monitor, and printer are approximately 2 m (6 ft) long.

The TSQ Series mass spectrometer is shipped with a NEMA 6-15P plug, rated at 15 A and 250 V ac. The data system computer is shipped with a NEMA 5-15P plug, rated at 15 A and 125 V ac. The printer is shipped with either a NEMA 5-15P plug or with a 220 V ac European CEE 7/7 (Schuko) plug. Local codes in your area might require the installation of another type of plug and receptacle. The Thermo Fisher Scientific field service engineer for your country provides the appropriate power plugs.

[Figure 4](#) shows the NEMA plugs and their corresponding outlets.

**Figure 4.** NEMA 6-15P and NEMA 5-15P power plugs and their respective outlets

NEMA 6-15P



NEMA 5-15P

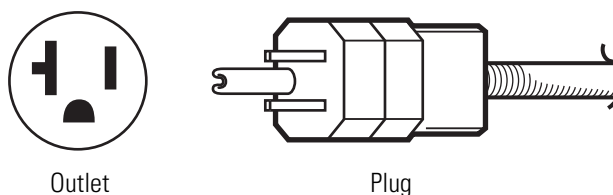


Table 9 lists the maximum current that each component of a typical TSQ Series system requires. The TSQ Series mass spectrometer operates with 230 V ac only. You can manually set other components to 120 V ac or 230 V ac or order them with a 120 V ac or 230 V ac option.



**CAUTION** The values listed in Table 9 are the average currents drawn by each of the listed components. Any conditioning devices installed with your system must also handle the potentially high currents drawn during the initial startup of the system. For example, during startup, the forepump can draw a high inrush current.

Inrush current is the initial current flowing through an inductive load, such as a motor, when it is first turned on. Because Thermo Scientific MS systems require the use of one or two mechanical vacuum pumps, they draw an inrush current. The maximum inrush current for the mechanical vacuum pump is approximately 20 A, with a maximum duration of less than one second. (The typical duration of the inrush current is below 100 ms.) Therefore, this initial energy demand for the 230 V ac line is very low. Time-delay fuses and active switches protect Thermo Scientific MS systems from an overcurrent.

For more details on the surge requirements for your system, consult the forepump manual or your Thermo Fisher Scientific field service engineer.

**Table 9.** Maximum current (single phase) drawn

Module	Voltage 120 V ac Current (in amperes)	Voltage 230 V ac Current (in amperes)
TSQ Series mass spectrometer (230 V only) (not including the forepumps)	N/A	5
Forepumps (each)	N/A	5 (20 A inrush)
Liquid chromatograph	10	5
Monitor	2	1
Computer	4	2
Laser printer *	3	2

\* Approximate. The actual value depends on your equipment.

**Note** Refer to your LC equipment manual for power requirements and specifications.

Installing a complete LC/MS system can require extensive electrical resources. Plan the power system properly, with numerous outlets, to ensure that you can connect and power all of your equipment. See the sample laboratory setup in [Table 10](#) for the recommended number of outlets.

**Table 10.** A sample laboratory setup

	Item	Outlets
LC system	Autosampler	1
	LC pump	1
	UV/Vis or PDA detector (optional)	1
	Column heater (optional)	1
	External controller (optional)	1
MS system	Mass spectrometer	1 (230V)
	API source plugs into the mass spectrometer	N/A
	Forepumps plug into the mass spectrometer	N/A
Data System	Data system computer	1
	Monitor	1
	Printer	1
	Ethernet switch	1
Optional	High intensity lamp (for help in instrument maintenance)	1
	Laboratory stereoscope (for inspecting fused-silica parts)	1

## Connecting the Modules to Wall Outlets

Take care not to exceed the wall outlet specifications. The maximum load for a 120 V ac fourplex outlet is typically 20 A, and the maximum load for a 230 V ac fourplex outlet is typically 16 A. See [Table 9](#) on [page 22](#) for the maximum current ratings for the TSQ Series system and the data system.

To prevent overloading the circuit, connect the mass spectrometer, liquid chromatograph, and data system to separate wall outlets. The TSQ Series mass spectrometer operates with 230 V ac only. You can manually set other components to 120 V ac or 230 V ac or order them with a 120 V ac or 230 V ac option.

The specifications for the modules in your system might vary from those in this guide. The power specifications on the module always supersede those in the guide.



**CAUTION** To prevent overloading the circuit, never connect the mass spectrometer and LC to the same electrical wall outlet circuit.

## Uninterruptible Power Supply

If your local area is susceptible to corrupted power or power disruptions, install an uninterruptible power supply (UPS) in your laboratory.



**CAUTION** For compliance and safety, your uninterruptible power supply (UPS) devices must be certified by recognized domestic and international organizations (for example, UL, CSA, TÜV, and VDE).

## Technical Assistance

Occasionally, you might encounter line power sources of unacceptable quality that adversely affect the operation of a TSQ Series system. You are responsible for correcting line power problems. Contact your Thermo Fisher Scientific office for assistance in monitoring the line voltage in your laboratory 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 your Thermo Fisher Scientific office for assistance in locating a power consultant in your area.



## Gases and Solvents

The TSQ Series mass spectrometer requires high purity gases and solvents. The Thermo Fisher Scientific field service engineer might also require certain solvents for the installation verification of your system. See [Table 11](#) for a summary of gas, solvent, and plumbing requirements, and see the pages indicated in the table for more details.

**Note** It is your responsibility as the user to provide the correct gas, solvent, and regulators for the operation of your TSQ system.

**Table 11.** Gas, solvent, and plumbing preinstallation requirements summary

Requirement	Page
<b>Fittings and parts</b>	26
All fittings and parts necessary to connect gases during the installation of your system.	
<b>Argon gas supply</b>	27
The argon gas supply must be ultra high-purity (minimum purity, 99.995%; recommended purity, 99.999%) with less than 1.0 ppm each of water, oxygen, and total hydrocarbons. The required gas pressure is $135 \pm 70$ kPa ( $20 \pm 10$ psi).	
<b>Nitrogen gas supply</b>	27
The nitrogen gas supply must be high-purity (99%). The required gas pressure is $690 \pm 70$ kPa ( $110 \pm 10$ psi).	
<b>Solvents, reagents, and modifiers</b>	29
Installation of the TSQ instrument requires LCMS grade methanol and water and might require solvent modifiers.	

## Fittings and Parts

Table 12 lists the minimum parts that are required to connect your TSQ Series system to your gas delivery system. Connections and gas delivery systems might vary. It is your responsibility to supply any fittings or connections necessary during installation.

The following kits that are shipped with the TSQ Series system contain the tubing and fittings listed in Table 12.

- MS Ship Kit (P/N 70111-62033)
- MS Accessory Kit (P/N 70111-62034)

**Table 12.** Gas connection hardware requirements

Description	Part Number
Two 6 ft lengths of 1/4 in. OD Teflon™ PFA hose	00101-50100
You might require an additional length of tubing for your installation.	
Brass Swagelok™-type 1/4 in. nut	00101-12500
2-piece brass 1/4 in. ferrule	00101-10000 (front) 00101-04000 (back)
Connection for the opposite end of the Teflon hose to the nitrogen gas source	These fittings are not provided. You supply these parts.
Two 6 ft lengths of 1/8 in. OD copper	00301-22701
You might require an additional length of tubing for your installation.	
Brass Swagelok-type 1/8 in. nut	00101-15500
2-piece brass 1/8 in. ID ferrule	00101-08500 (front) 00101-02500 (back)
Connection for the opposite end of the tubing to the helium gas source	These fittings are not provided. You supply these parts.



## Gases

The TSQ Series mass spectrometer uses argon as the collision gas and nitrogen as the API sheath gas, auxiliary gas, and sweep gas. The gas connections are located on the left side panel of the mass spectrometer.

Your TSQ Series mass spectrometer can use large amounts of gases during daily operations. It is essential that the gases are delivered with the necessary pressure and purity. Refer to the following topics for information on the purity and pressure that your system requires:

- [Argon Supply](#)
- [Nitrogen Supply](#)



**CAUTION** Contaminants introduced during the installation of house lines used for gas delivery can cause damage to the system. Ensure that all gas lines used with your system 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.

### Argon Supply

The argon for the collision gas must be ultra high-purity (minimum purity, 99.995%; recommended purity, 99.999%) with less than 1.0 ppm each of water, oxygen, and total hydrocarbons. The required gas pressure is  $135 \pm 70$  kPa ( $20 \pm 10$  psi). Particulate filters can be a source of contamination; they are not recommended.

Argon can be dispensed from a tank containing 245 ft<sup>3</sup> of gas using a Matheson™ 3120 Series<sup>1</sup> regulator or equivalent tank and regulator.

The gas lines for argon can be copper or stainless steel. All gas lines need to be free of oil and preferably flame dried. Run the gas lines to the left side of the TSQ system. Terminate the argon gas supply lines with 1/8 in., female, Swagelok-type connectors.

### Nitrogen Supply

The TSQ Series mass spectrometer uses nitrogen as the API sheath gas, auxiliary gas, and sweep gas. The required gas pressure is  $690 \pm 140$  kPa ( $100 \pm 20$  psi).

**Note** You must provide a regulator for the nitrogen supply that is adjustable over the specified pressure range.

Run the nitrogen gas line to the left side of the TSQ Series mass spectrometer. Terminate the nitrogen gas supply line with a 1/4 in., female, Swagelok-type connector. Because particulate filters can be a source of contamination, Thermo Fisher Scientific does not recommend their use.

<sup>1</sup>For more information, visit: <http://www.matheson-trigas.com>

With typical nitrogen gas consumption (when nitrogen is on 24 hours per day) at 5560 L (200 ft<sup>3</sup>) per day, up to 26700 L (960 ft<sup>3</sup>) maximum usage per day, Thermo Fisher Scientific recommends one of the following sources for your nitrogen supply:

- A large, sealed, thermally insulated cylinder containing liquid nitrogen from which the nitrogen gas is boiled off. Because the 35 psi (240 kPa) and 80 psi (550 kPa) models do not provide sufficient gas pressure, Thermo Fisher Scientific recommends a 230 psi (1590 kPa) model. A typical 240 L cylinder yields 143 850 L (5080 ft<sup>3</sup>) of gas. Replace the cylinder approximately once every month.
- A nitrogen generator with a minimum capacity of 5560 L (200 ft<sup>3</sup>) per day at 99% purity with 100 psi (689 kPa) at the side panel. Maximum consumption of nitrogen gas is 21 L/min (40 ft<sup>3</sup>/h). Nitrogen generators require an air compressor. Because some models of air compressors are quite noisy, be careful to select a quiet compressor. A generator is a continuous source, with no replacement required.

**Note** Liquid nitrogen conversion factors:

- 1.0 lb of liquid nitrogen = 0.5612 L
- 1.0 kg of liquid nitrogen = 1.237 L

**Note** When you turn on the TSQ Series 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 TSQ Series system. If low nitrogen warnings happen frequently, call your Thermo Fisher Scientific field service engineer.

## Solvent Recommendations

As specified in [Table 13](#), use only LCMS-grade solvents and reagents for operating and maintaining your TSQ Series system. Installation of the TSQ Series system requires LCMS-grade methanol and water. Installation of some systems might also require solvent modifiers.

**Note** Some solvent impurities are transparent to UV/Vis detectors. Therefore, some HPLC-grade solvents might contain contaminants that interfere with the performance of the mass spectrometer. For operation of your TSQ Series system, choose high purity solvents with minimum contamination.

For a wide variety of solvents and consumables, visit [www.FisherLCMS.com](http://www.FisherLCMS.com).

**Table 13.** Recommended solvents and reagents

Solvent / Reagent	Specifications
Methanol	LCMS grade
Acetonitrile	LCMS grade
Water	LCMS grade
Isopropyl alcohol	LCMS grade
Acetic acid (modifier)	LCMS grade
Formic acid (modifier)	LCMS grade (It is required that this acid be supplied in a glass bottle.)

**Note** Do not filter solvents. Filtering solvents can introduce contamination.

Store and handle all chemicals in accordance with standard safety procedures.



## Waste and Exhaust

The waste and exhaust arrangements for the instrument can affect the proper performance of your system. Vacuum and solvent wastes must be vented separately, and wastes must be collected and disposed of properly. See [Table 14](#) for a summary of exhaust and waste system requirements, and see the pages indicated in the table for more information on each requirement.

It is your responsibility to provide the proper waste and exhaust systems that are required to operate the system.

**Table 14.** Waste and exhaust preinstallation requirements summary

Requirement	Page
<b>Exhaust system</b>	32
Vent the forepumps* and solvent wastes to fume exhausts. Connect the forepumps and solvent waste containers to separate fume exhaust systems.	
<b>Solvent waste</b>	33
Install a suitable container for the solvent wastes.	

\*The TSQ Vantage and TSQ Quantum Ultra mass spectrometers use two forepumps. The TSQ Quantum Access and TSQ Quantum Access MAX mass spectrometers use one forepump.

## Exhaust System

Thermo Fisher Scientific strongly recommends connecting the forepumps to a fume exhaust system. The forepumps eventually exhaust much of what is introduced into the TSQ Series mass spectrometer, including the small amount of oil vapor that mechanical pumps can emit. It is your responsibility to provide an adequate exhaust system.

**Note** The proper operation of the forepumps requires an efficient fume exhaust system. Most atmospheric pressure ionization (API) applications contribute to the accumulation of solvents in the forepumps. While Thermo Fisher Scientific recommends that you periodically open the ballast valves (on the top of the pumps) to purge the accumulated solvents, opening the valves 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 your system.

The forepump (also referred to as a mechanical, rotary-vane, roughing, or backing pump) provides a vacuum for the capillary skimmer of the API source and for the backing pressure for the turbomolecular pump.



**CAUTION** The forepump waste line must not have a vertical run near the forepump. Solvents and oils can condense in this line. A waste line vertical run near the forepump could allow condensed vapors to flow back into the pump. This will cause the loss of pump capability and damage to the pump.

The forepumps require one 25 mm (1 in.) OD exhaust port. For a TSQ Vantage or TSQ Quantum Ultra system, which uses two forepumps, you can Tee the blue exhaust hosing from each forepump into a third section of hosing, and connect the third section of hosing to the external exhaust system. See [Figure 3](#) on [page 7](#). The exhaust system for the forepumps must be able to accommodate an initial inrush flow rate of 3 L/min and a continuous flow rate of 1 L/min.

## Solvent Waste

Because the Ion Max and Ion Max-S API sources can accommodate high flow rates, you must collect the waste solvent in a manner that avoids pressure buildup in the source. The Ion Max API source is fitted with a 25.4 mm (1.0 in.) OD outlet for solvent drainage. A 25.4 mm to 12.7 mm (1 in. to 0.5 in.) reducing fitting (P/N 00101-03-00001) connects to a waste container (P/N 00301-57020), both of which come with the system. To avoid pressure buildup in the source, make sure that the 1-inch diameter hose from the API source drain to the reducing fitting (P/N 00101-03-00001) is as long as possible. The 25.4 mm (1 in.) diameter Tygon™ PVC tubing (P/N 00301-22922) that comes with the system is 1.52 m (5 ft) long.



**CAUTION** Do **not** vent the PVC drain tubing (or any vent tubing connected to the waste container) to the same fume exhaust system that the forepump is connected to.

**IMPORTANT** Excessive draw from the fume exhaust system to the API source drain line can affect the system performance. Thermo Fisher Scientific recommends a maximum flow rate of 30 L/min.





# Installation

Prior to installation, make sure to complete all preparations described in the previous chapters.

**Note** If the instrument shipping container, Shock Watch, or other indicator shows 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 system arrives safely, proceed with the following instructions.

After you have completed your laboratory site preparation, mailed or faxed the *TSQ Series Installation Request* (at the front of this guide) to your local office for Thermo Fisher Scientific San Jose products, and received the system, please call your Thermo Fisher Scientific office to set an installation date. Telephone and fax numbers for Thermo Fisher Scientific San Jose offices are listed in the Preface of this guide and immediately follow the *TSQ Series Installation Request*. See [Table 18](#) for a summary of information about installing your system, and see the pages indicated for more information on each item.

**Table 15.** More information on the installation of your system (summary)

Requirement	Page
<b>Preinstallation Survey</b>	36
You must complete the Installation Request at the front of this guide and fax or mail it to your local service representative before the Thermo Fisher Scientific field service engineer arrives.	
<b>Installation kits</b>	36
To install your system, the Thermo Fisher Scientific field service engineer uses the kits supplied with the TSQ Series system. To complete the installation of your system, the field service engineer might need additional parts and chemicals.	
<b>Installation</b>	37
The Thermo Fisher Scientific field service engineer completes the installation of your system and demonstrates that it meets specifications. Do not plan to use your system before the field service engineer has demonstrated that the system operates within specifications.	
<b>Preventive maintenance</b>	38
Make sure to maintain your system properly.	

## Preinstallation Survey

Verify that your lab meets the following list of preinstallation requirements before your instrument is installed. Use the TSQ Series Installation Request at the front of this guide to check off each item as it is completed or verified.

1. All laboratory remodeling has been completed.
2. Doorways, hallways, and so on are a minimum width of 94 cm (37 in.).
3. Available floor area is sufficient and flooring will support the load.
4. Sufficient bench space is available for all of the equipment. Please list the following:  
Width:  
Depth:  
Height:
5. Workbench can support the load of the system [202 kg (445 lb)] and is free from vibration.
6. One voice telephone line is installed near the system.
7. Air conditioning is adequate for temperature, humidity, and particulate matter control. The laboratory can be maintained at a constant temperature, between 15 and 27 °C (59 and 81 °F).
8. Relative humidity is between 20% and 80% with no condensation.
9. Lighting is adequate.
10. System work area is free from magnetic disruption and electrostatic discharge.
11. Main power is installed and is in compliance with local electrical codes.
12. Power for test and cleaning equipment is installed.
13. Power outlets are of the correct configuration.  
Please note NEMA type:
14. Voltage of power outlet has been measured. Please note *measured* voltage:
15. Power is free from fluctuations due to slow changes in the average voltage or changes due to surges, sags, or transients.
16. All gases required (argon and nitrogen) are on site, gas lines are installed, and appropriate gas regulators are available.  
Please list gases and purity:
17. New or recently cleaned HPLC system is available that produces pulse-free, continuous flow from 100 to 1000 µL/min.
18. HPLC grade water, methanol, acetonitrile, ammonium hydroxide, and isopropyl alcohol are available for testing your instrument.

19. There is a suitable exhaust system present that is separate from solvent waste.
20. Provision has been made for collecting solvent waste from API source.
21. All relevant safety regulations are complied with.
22. Your TSQ system is on site.
23. The principal operator will be available during the installation/certification period.

## Installation Kits

The following kits are shipped with the TSQ Series system:

**Note** It is your responsibility to replace any consumables used during the installation.

- MS Ship Kit (P/N 70111-62033), which contains installation components, such as the exhaust and waste tubing and power cords.
- MS Accessory Kit (P/N 70111-62034), which contains parts such as fuses, fittings, tubing, and tools.
- Standard Chemicals Kit (P/N 97000-62042), which contains the necessary chemicals for demonstrating system performance specifications. The Chemicals Kit is located in the Accessory Kit box.

## Installation

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

During the installation, the field engineer demonstrates the following:

- The basics of equipment operation and routine maintenance.
- The marketing specifications that are in effect when you purchased the system.

**Note** To receive maximum benefit from this on-site training opportunity, the instrument operator should be available during the entire installation process.

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

## Preventive Maintenance

You are responsible for the routine and preventive maintenance of your TSQ Series system and data system computer.

Regular preventive maintenance is essential. It increases the life of the system, maximizes the uptime of your system, and provides optimum system performance. Maintenance procedures are covered in the following manuals:

- *TSQ Series Hardware Manual*
- *H-ESI Probe User Guide*
- *HESI-II Probe User Guide*
- *Ion Max and Ion Max-S API Source Hardware Manual*
- *FAIMS Operator's Manual*
- Manuals that are shipped with other modules of your system

## Instrument Shipments

Electronic equipment carriers that specialize in the handling of delicate machinery ship the TSQ Series system to your site. However, occasionally equipment is damaged in transit.

Take the following precautions when receiving instruments, supplies, or material:

- Check carefully for obvious damage or evidence of rough handling.
- Note any apparent external damage on all copies of the receiving documents and describe briefly the extent of the damage. Have the driver sign (or initial) next to your comments to signify agreement with your observations.
- To report the damage, contact the Traffic Department, telephone [1] (408) 965-6000, at the Thermo Fisher Scientific office in San Jose, California USA.

**Note** Freight insurance requires that obvious damage be noted on the receiving documents.

For domestic shipments, instruments are shipped by one of the following methods:

- FOB (freight on board) San Jose, California, USA
- FOB destination

If the system is damaged in transit, the method of shipment determines who has responsibility for filing a claim against the carrier. If the instrument shipping container, Shock Watch, or other indicators show any evidence of damage or mishandling during shipment, do NOT open the container. Call your Thermo Fisher Scientific representative for further instructions.

Most systems are shipped FOB San Jose, and any damage incurred in shipment is the responsibility of the purchaser and the carrier. However, Thermo Fisher Scientific San Jose will assist with claims filing and (billable) repairs if necessary.

If the system is shipped FOB destination and is damaged, Thermo Fisher Scientific San Jose files a claim against the carrier.

**Note** For domestic shipments, Thermo Fisher Scientific San Jose does not accept liability for damage if materials are received with obvious damage AND the damage is not recorded on the receiving documents.

When your system arrives, move it to a protected location indoors. If you have questions about moving your system, contact your local office for Thermo Fisher Scientific San Jose products. Telephone and fax numbers for the offices are listed in the Preface of this guide.

For international shipments, instruments (outside of the USA) are shipped CIP (carriage and insurance paid to) destination unless specified differently. If the system is shipped CIP destination and if any damages are incurred in shipment, Thermo Fisher Scientific San Jose files a claim against the carrier.

**Note** For international shipments, Thermo Fisher Scientific San Jose does not accept liability for damage if materials are received with obvious damage AND the damage is not recorded on the receiving documents.

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