

TSQ Series

TSQ Quantum XLS Series

Preinstallation Requirements Guide

70111-97226 Revision A

December 2011

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TSQ Quantum XLS and TSQ Quantum XLS Ultra

EMC Directive 2004/108/EC

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

EN 55011	2007; A2: 2007	EN 61000-4-5	2005
EN 61000-3-2	2006	EN 61000-4-6	2007
EN 61000-3-3	1995; A1: 2001; A2: 2005	EN 61000-4-11	2004
EN 61000-4-2	1995; A1: 1999; A2: 2001	EN 61326-1	2006
EN 61000-4-3	2006	FCC Class A	2008, CFR 47, Part 15
EN 61000-4-4	2004		

Low Voltage Directive 2006/95/EC

This device complies with Low Voltage Directive 2006/95/EC and harmonized standards: EN 61010-1: 2001; IEC 61010-1: 2002; UL 61010A-1: 2004; CAN/CSA 22.2 61010-1: 2004.

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TSQ Quantum XLS Series Installation Request Form

Dear User:

Read the TSQ Quantum XLS Series Preinstallation Requirements Guide, and then print and 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 Thermo Fisher Scientific sales/service office. The address and fax number for your local office are located on the following pages.

- | | |
|--|---|
| <input type="checkbox"/> 1. All laboratory remodeling has been completed. | <input type="checkbox"/> 13. Power is free from fluctuations due to slow changes in the average voltage or changes due to surges, sags, or transients. |
| <input type="checkbox"/> 2. TSQ Quantum XLS Series system is on site. | <input type="checkbox"/> 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). |
| <input type="checkbox"/> 3. Principal operator will be available during the installation / certification period. | <input type="checkbox"/> 15. Relative humidity is between 40% and 80% with no condensation. |
| <input type="checkbox"/> 4. Doorways, hallways, and so on are a minimum width of 94 cm (37 in.). | <input type="checkbox"/> 16. System work area is free from magnetic disruption and electrostatic discharge. |
| <input type="checkbox"/> 5. Available floor area is sufficient and flooring will support the load. | <input type="checkbox"/> 17. All required gases (argon, helium, and chemical ionization reagent gas) are on site and the appropriate gas regulators and fittings to the regulators are available.
List gases and their purity: _____ |
| <input type="checkbox"/> 6. Sufficient bench space is available for all of the equipment. List the following:
Width: _____
Depth: _____
Height: _____ | <input type="checkbox"/> 18. There is a suitable exhaust system. |
| <input type="checkbox"/> 7. Workbench can support the load of the system [191 kg (420 lbs)] and is free from vibration. | <input type="checkbox"/> 19. One voice telephone line is installed near the system. |
| <input type="checkbox"/> 8. Lighting is adequate. | <input type="checkbox"/> 20. All relevant safety regulations are complied with. |
| <input type="checkbox"/> 9. Main power is installed and is in compliance with local electrical codes. | |
| <input type="checkbox"/> 10. Power for test and cleaning equipment is installed. | |
| <input type="checkbox"/> 12. Voltage of power outlet has been measured.
Note measured voltage: _____ | |

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.

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Preface

The Thermo Scientific TSQ Quantum™ XLS and TSQ Quantum XLS Ultra systems make up the TSQ Quantum XLS Series and are member of the TSQ Quantum family of mass spectrometers.

This Preinstallation Requirements Guide provides information to assist in planning and preparing your lab site prior to delivery and installation of the system. To ensure that your laboratory is ready for the installation, read each section carefully.

Contents

- [Related Documentation](#)
- [Safety and Special Notices](#)
- [Contacting Us](#)

❖ To suggest changes to documentation or to Help

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



Related Documentation

In addition to this guide, Thermo Fisher Scientific provides the following PDF document and Help for the TSQ Quantum XLS Series systems:

- *TSQ Quantum XLS Series User Guide*
- Manuals that come with other modules of your system
- Help that is included with the software

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:



WARNING Highlights hazards to humans. Each WARNING notice is accompanied by an appropriate hazard symbol.



WARNING Fire Hazard. Some CI gases, such as methane and isobutane, are flammable. Make sure these gases are properly exhausted and all gas fittings are leak free. Consult your local environmental and safety regulations for information on exhausting vapors from your laboratory.



CAUTION Highlights hazards to property or the environment.



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

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.

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Phone	800-532-4752
Fax	561-688-8736
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Find software updates and utilities to download at mssupport.thermo.com.

❖ To contact Customer Service for ordering information

Phone	800-532-4752
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Introduction

The TSQ Quantum XLS Series systems are designed to operate under carefully controlled environmental conditions.

As the purchaser, you are responsible for providing a suitable location, a suitable 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 your instrument can be installed by a Thermo Fisher Scientific service engineer, you must prepare the site. Transport of the equipment to the site requires wide entrances and hallways. Supporting the weight of the mass spectrometer, computer, and gas chromatography (GC) system requires large and strong workbenches. You must install a telephone within reach of the workbench. [Table 1](#) summarizes the site preparation requirements and indicates where you will find additional information.

You are responsible for providing an acceptable installation site.

Table 1. Site preparation requirements

Requirement	Page
Entrance	4
Verify that your entrances and hallways are a minimum of 94 cm (37 in.) wide to provide clearance for the instrument.	
Space and Load Requirements	4
Use two workbenches:	
(1) The workbench for the GC/MS must have minimum dimensions of 1 × 1.75 m (3 × 5.7 ft) and be capable of supporting the weight of the TSQ Quantum XLS Series mass spectrometer (118 kg [258 lbs]) and the weight of the TRACE™ GC Ultra gas chromatograph (48 kg [105 lbs]) with the (optional) TriPlus™ autosampler (25 kg [56 lbs]).	
(2) 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 optional printer (26 kg [57 lbs]).	
Telephone	8
Install a telephone line near the workbench.	

Entrance

The entrance to your facility and the width of all hallways, elevators, and so on must be a minimum of 84 cm (33 in.).¹ However, allow additional room for maneuvering the system around corners, into elevators, or through doorways.

The TSQ Quantum XLS Series mass spectrometers and accessories are shipped in a container with the following dimensions: *l* 102 cm (40 in.), *w* 92 cm (36 in.), *h* 117 cm (46 in.). The container and its contents weigh approximately 160 kg (350 lb). Other modules—such as the GC (container dimensions: *l* 79 cm [31 in.], *w* 79 cm [31 in.], *h* 79 cm [31 in.], weight: 73 kg [160 lb]), optional autosampler (container dimensions: *l* 102 cm [40 in.], *w* 81 cm [32 in.], *h* 43 cm [17 in.], weight: 46 kg [100 lb]), computer, forepump, monitor, and other options—are shipped in their own containers. Their dimensions and weights are less than that of the container for the mass spectrometer.

Space and Load Requirements

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 to place the TSQ Quantum XLS Series modules on workbenches or on the floor (forepump).

❖ To place the TSQ Quantum XLS Series modules

1. Place the TSQ Quantum XLS Series system on two separate workbenches next to each other. See [Figure 1](#) and [Figure 2](#).
 - Workbench 1 holds the mass spectrometer, the GC, and any other options and must have minimum dimensions of 1 × 1.75 m (3 × 5.7 ft). This workbench must also be capable of supporting the weight of the mass spectrometer (118 kg [258 lbs]), TRACE GC Ultra GC (48 kg [105 lbs]), and (optional) TriPlus autosampler (25 kg [56 lbs]).
 - Workbench 2 holds the data system computer, monitor, and printer, and must have minimum dimensions of 1 × 1.22 m (3 × 4 ft). This second workbench must be capable of supporting the weight of the data system and printer (26 kg [57 lbs]).
2. 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 Quantum XLS Series system and any shelves above it.

¹ Your instrument is shipped in a shipping container with the smallest dimension of 92 cm (36 in.). If the entrance to your laboratory does 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.

3. Install the forepump on the floor close to the mass spectrometer. The total length of the vacuum hose connecting the mass spectrometer to the forepump should not exceed 2.5 m (8 ft.).

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 the workbench has space beneath it, place the forepump under the workbench immediately behind the mass spectrometer as shown in [Figure 1](#). 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. If necessary, allow room to run the power cords from the forepump through the hole.
- If the workbench has limited space under or at the end of it, place the forepump on the floor in front of the mass spectrometer.



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

IMPORTANT You must be able to move the GC away from the mass spectrometer by 36 cm (14 in.) to remove or install the transfer line. Ensure there is sufficient table space to the left of the GC, as shown in [Figure 2](#).

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

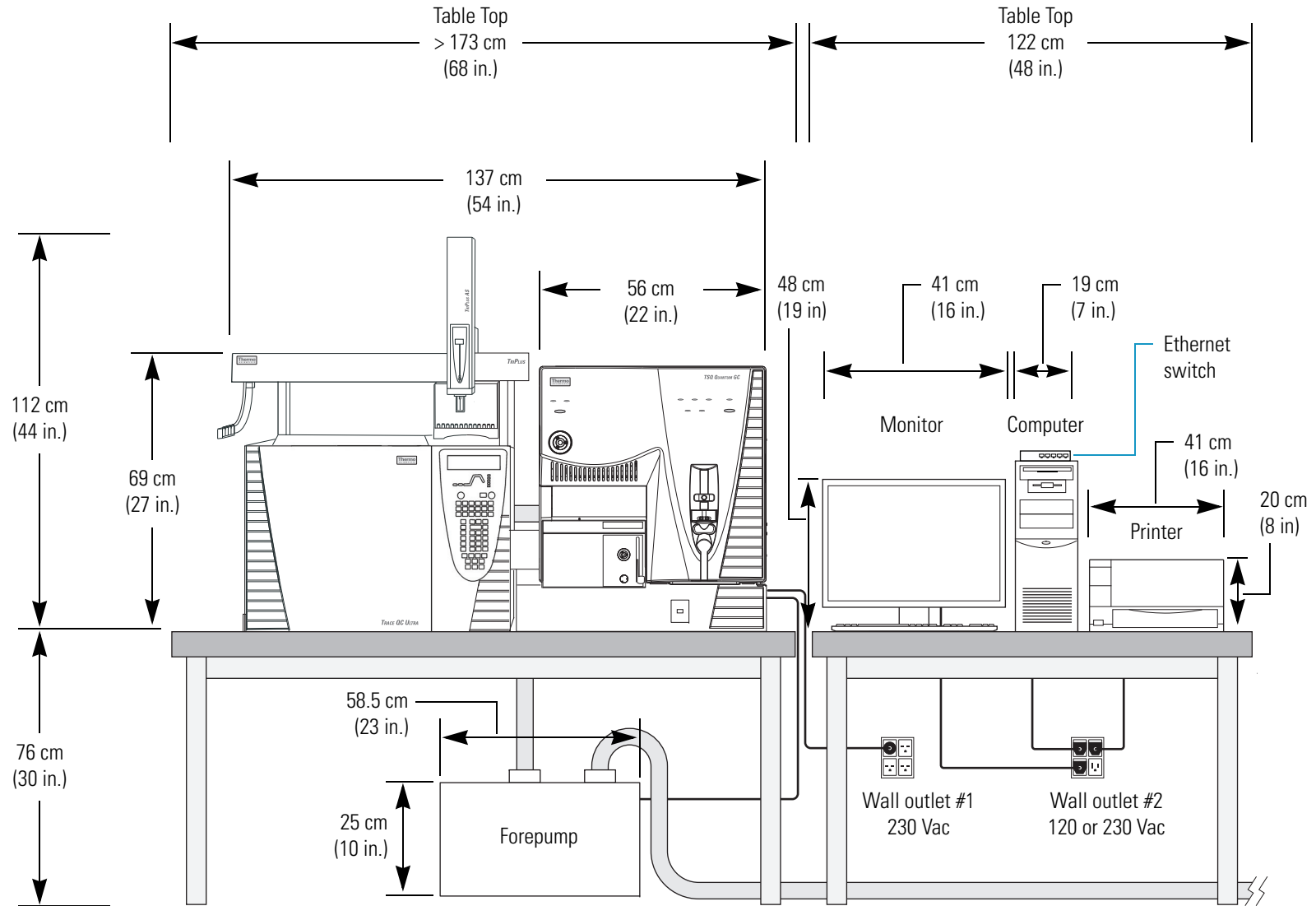
[Table 2](#) lists the space requirements and weights of the typical TSQ Quantum XLS Series system components.

Table 2. TSQ Quantum XLS Series system dimensions and weights

Module	Height		Width		Depth		Weight	
	cm	in.	cm	in.	cm	in.	kg	lb
TSQ Quantum XLS Series mass spectrometer	69	27	56	22	76	30	118	258
TRACE GC Ultra GC	51	20	61	24	66	26	48	105
TriPlus AS (optional)	67	26	87	34	77	30	25	56
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
Forepump	30	12	20	7	64	25	34	75
Laser printer ^a (optional)	20	8	41	16	46	18	7	16

^a Approximate. The actual value depends on your equipment.

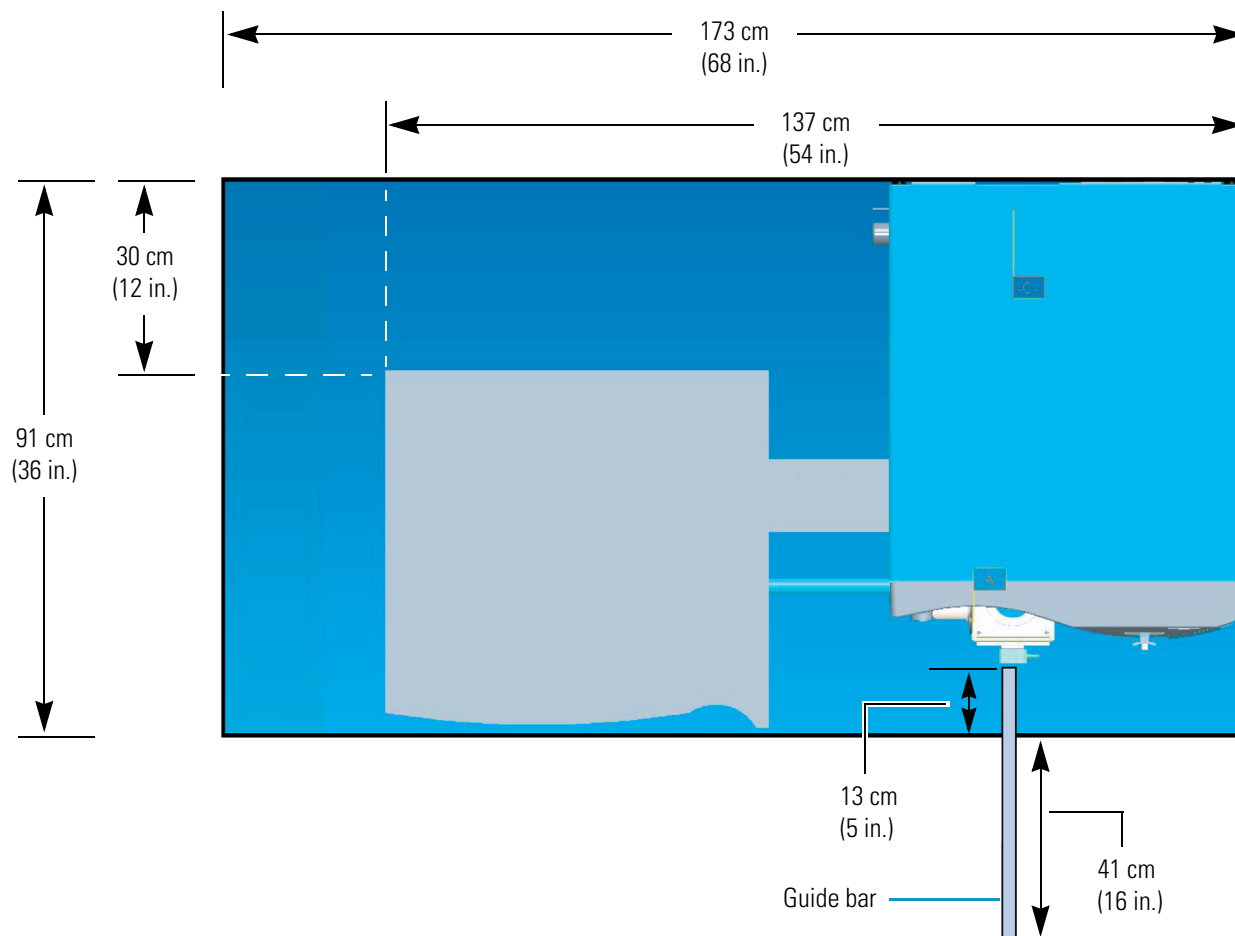
Figure 1. TSQ Quantum XLS Series systems space requirements



The removable guide bar of the insertion/removal tool extends approximately 40 cm (16 in.) beyond the table.

Allow adequate space to the left of the GC. The GC must be moved away from the mass spectrometer by 36 cm (14 in.) during the installation or removal of the transfer line. See [Figure 2](#).

Figure 2. Top view and dimensions of the TRACE GC Ultra gas chromatograph (left) and TSQ Quantum XLS Series mass spectrometer (right)



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 GC/MS system.



CAUTION 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 TSQ Quantum XLS Series system. Any expenditures for air conditioning are more than offset by good sample throughput and reduced repair costs. [Table 3](#) lists the operating environment requirements and indicates where you will find additional details.

You are responsible for providing the operating environment necessary for the proper use of the TSQ Quantum XLS Series GC/MS system.

Table 3. Operating environment preinstallation requirements

Requirement	Page
Temperature	10
The laboratory room temperature must be maintained between 15 and 27 °C (59 and 81 °F). Also, ensure that the temperature does not fluctuate by more than ±5 °C (±9 °F) to ensure good performance.	
For the TSQ Quantum XLS Series instruments, 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 the TSQ Quantum XLS Series instruments is between 18 and 21 °C (65 and 70 °F). The temperature must be controlled to within 2 °C (3.6 °F).	
Humidity	11
Ensure that the relative humidity of the operating environment is between 40 and 80%, with no condensation.	
Vibration	11
Requires a vibration-free workbench.	
Lighting	11
Requires adequate lighting for instrument operation. A high-intensity lamp for instrument maintenance is recommended.	
Particulate matter	11
The air should contain fewer than 100 000 particles per cubic foot (3 500 000 particles per cubic meter) in excess of 5 µm.	



CAUTION Take precautions for electrostatic discharge, especially when operating the system at the lower end of the relative humidity range listed above. See “[Electrostatic Discharge](#)” on [page 12](#).

Temperature

For precision instrumentation, such as the TSQ Quantum XLS Series mass spectrometers, the temperature stability of the environment where the instrument is installed can affect performance. Maintain the laboratory room temperature between 15 and 27 °C (59 and 81 °F). The optimum operating temperature is between 18 and 21 °C (65 and 70 °F).

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

IMPORTANT Do not locate the TSQ Quantum XLS Series system 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 basic TSQ Quantum XLS Series system (with a Trace GC Ultra gas chromatograph) is approximately 5470 W (19 000 Btu/h).

[Table 4](#) lists the approximate heat output of each module.

Table 4. Heat output

Module	Heat output (in Watts)	Heat output (in Btu/h)
TSQ Quantum XLS Series mass spectrometer	2301	7851
TRACE GC Ultra gas chromatograph	1901	6485
TriPlus autosampler (optional)	220	750
Monitor	240	820
Computer	470	1604
Laser printer (optional)	350 ^a	1195 ^a
Total	5482	18 705

^a 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 TSQ Quantum XLS Series system 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 dust to accumulate 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 during operation, install the forepump on the floor beneath the mass spectrometer 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 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 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 Quantum XLS Series system.

TSQ Quantum XLS Series instruments are designed to withstand ESD up to 15 kV (air discharge) and 8 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.

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 1 500 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 static electricity to accumulate 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.

As a precaution, Thermo Fisher Scientific recommends the following practices, 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. [Table 5](#) summarizes the line power requirements and indicates where you can find more details.

As the user you are responsible for providing a source of power of acceptable quality to operate your system.

Table 5. Line power preinstallation requirements (Sheet 1 of 3)

Requirement	Page
Quality of Power	15
Ensure that line power is free from the following:	
<ul style="list-style-type: none"> • Long-term changes in average root mean square (RMS) voltage level, with durations greater than 2 s. • Sudden changes in average RMS voltage level, with durations between 50 μs and 2 s. • Brief voltage excursions of up to several thousand volts with durations up to 50 μs. 	
Power Monitoring Devices	15
Before connecting your TSQ Quantum XLS Series mass spectrometer to its line power, Thermo Fisher Scientific recommends that you monitor the line power 24 hours a day for seven consecutive days.	
Power Conditioning Devices	16
To free line power from voltage changes, sags, surges, and transients, the following devices are available:	
<ul style="list-style-type: none"> • Noise suppression transformer • Buck/boost transformer • Power conditioning 	

Table 5. Line power preinstallation requirements (Sheet 2 of 3)

Requirement	Page
Available Outlets	19
<p>For systems installed where there is 110 and 230 V:</p> <ul style="list-style-type: none"> Nominal voltage of 120 Vac, +6 to –10%, and 230 Vac, $\pm 10\%$ 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. Frequency of 50/60 Hz. One fourplex outlet (single-phase power, NEMA 20-5 receptacles) with a minimum power rating of 20 A (120 Vac). One single outlet (single-phase power) with a minimum power rating of 30 A (230 Vac). Earth ground hardwired to the main panel. <p>For systems with only 230 V line power:</p> <ul style="list-style-type: none"> Nominal voltage of 230 Vac, $\pm 10\%$. 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. Frequency of 50/60 Hz. One fourplex outlet (NEMA 20-5 receptacles), with a minimum power rating of 20 A. (In the U.S., with only 15 and 20 A power rating options available, you must choose the 20 A option.) One single outlet (single-phase power) with a minimum power rating of 30 A (230 Vac). Earth ground hardwired to the main panel. 	
Connecting the TSQ Quantum XLS Series Mass Spectrometer, GC, and Other Modules to Wall Outlets	19
<p>Balance the current load on the circuits that your system is connected to.</p>	

Table 5. Line power preinstallation requirements (Sheet 3 of 3)

Requirement	Page
Uninterruptible Power Supply	19
Systems installed in areas with intermittent line power must have an agency recognized (NRTL approved), uninterruptible power supply installed.	
Technical Assistance	20
For additional assistance in monitoring line power or selecting a line conditioner, contact Thermo Fisher Scientific.	

Quality of Power

The quality of power supplied to your TSQ Quantum XLS 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 6 contains definitions for the three most common voltage disturbances.

Table 6. 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 μ s and 2 s
Transients or impulses	Brief voltage excursions of up to several thousand volts with durations up to 50 μ 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. To keep your system running effectively, it is important to establish the quality of the line voltage in your laboratory before installing the TSQ Quantum XLS 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 duration and the amplitude of the disturbance are indicated by time interval recording. A power line disturbance analyzer is a device capable of detecting and recording most types of line power problems. The Dranetz^{™1} 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.

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, such as a buck/boost transformer, that can control these problems.



CAUTION Any conditioning devices installed with your system must be able to handle the potentially high currents that are drawn during the initial startup of the system. For example, forepumps can draw as much as 30 A during startup. Contact your service engineer for more information.

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.

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 the installation of your system. The installation instructions for the transformer are included.



CAUTION For compliance and safety, ensure that your power conditioning devices are certified by recognized domestic and international organizations, such as UL, CSA, TÜV, and VDE.

Available Outlets

The TSQ Quantum XLS Series mass spectrometers are designed to operate at a nominal voltage of 230 Vac, 50/60 Hz. Line voltages can vary between a minimum of 207 Vac and a maximum of 253 Vac.

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.



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 IEC 950, Amend 2, 1993, paragraph 1.6.5, as follows:

“Equipment intended to operate directly from the main supply shall be designed for a minimum supply tolerance of +6% and -10%. If the rated voltage is 230 Vac single phase or 400 Vac three phase, the equipment shall operate safely within a minimum supply tolerance of $\pm 10\%$.”

For systems installed in regions with both 120 Vac and 230 Vac service, the basic power requirements for a TSQ Quantum XLS Series system consist of the following:

- Nominal voltage of 120 Vac, +6 to -10% and 230 Vac, $\pm 10\%$ and free from voltage variations above or below this operating range.
- Frequency of 50/60 Hz.
- One fourplex outlet (single-phase power, NEMA 20-5 receptacles) with a minimum power rating of 20 A (120 Vac).
- One single outlet (single-phase power) with a minimum power rating of 30 A (230 Vac).
- Earth ground hard wired to the main panel.

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

- Nominal voltage of 230 Vac, $\pm 10\%$.
- Frequency of 50/60 Hz.
- One fourplex outlet (NEMA 20-5 receptacles), with a minimum power rating of 20 A. (In the United States, with only 15 and 20 A power rating options are available, you must choose the 20 A option.)
- One single outlet (single-phase power) with a minimum power rating of 30 A (230 Vac).
- Earth ground hardwired to the main panel.

Note Make sure that the power remains on. The TSQ Quantum XLS Series systems should remain on and pumping continuously for optimum performance.

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.

Figure 1 on page 6 shows the optimum location of the power outlets.

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

The TSQ Quantum XLS Series mass spectrometers ship with a NEMA L6-30 plug, rated at 30 A and 250 Vac. For international wiring, the Thermo Fisher Scientific field service engineer for your country will install an international power cable (P/N 70111-63625) and a country-specific plug.

[Table 7](#) lists the maximum current that each component of a typical TSQ Quantum XLS Series system requires. The TSQ Quantum XLS mass spectrometers operates with 230 Vac only. You can manually set other components to 120 Vac or 230 Vac, or order them with a 120 Vac or 230 Vac option.



CAUTION The values listed in [Table 7](#) 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 as much as 30 A. For more details on the surge requirements for your system, consult the forepump manual or your service engineer.

Table 7. Maximum current (single phase) drawn

Module	Voltage 120 Vac current (in amperes)	Voltage 230 Vac current (in amperes)
TSQ Quantum XLS Series main power (230 V only)		30
Mass spectrometer ^a		10
Forepump ^b		5
Trace GC Ultra gas chromatograph ^a		16
TriPlus autosampler ^a (optional)		2
Computer	4	2
Monitor	2	1
Laser printer (optional)	7	3.5

^a Plugs into TSQ Quantum XLS Series main power

^b Plugs into mass spectrometer

Installing a complete GC/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. For the recommended number of outlets, see the sample laboratory setup in [Table 8](#).

Table 8. A sample laboratory setup

Item	Outlets
TSQ Quantum XLS Series system	1 (230 V)
Mass spectrometer ^a	0
Autosampler ^a	0
Gas chromatograph ^a	0
Data system computer	1
Monitor	1
Printer	1
Ethernet switch	1
Total outlets required for this configuration	5

^a Plugs into TSQ Quantum XLS Series main power

Connecting the TSQ Quantum XLS Series Mass Spectrometer, GC, and Other Modules to Wall Outlets

Take care not to exceed the wall outlet specifications. The maximum load for a 120 Vac fourplex outlet is typically 20 A, and the maximum load for a 230 Vac fourplex outlet is typically 16 A. See [Table 7](#) for the maximum current ratings for the TSQ Quantum XLS Series systems and the data system.

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.

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

Uninterruptible Power Supply

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

Note For compliance and safety, ensure that your power conditioning devices are certified by recognized domestic and international organizations, such as UL, CSA, TÜV, and VDE.

Technical Assistance

Occasionally, you might encounter line power sources of unacceptable quality that adversely affect the operation of TSQ Quantum XLS Series systems. 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.

Waste and Exhaust

The arrangement of the exhaust system for the TSQ Quantum XLS Series instrument can affect instrument performance. Also, take care to collect and dispose of solvent waste properly.

You are responsible for making the proper exhaust arrangement that is required to operate your system.

Table 9. Waste and exhaust preinstallation requirements

Requirement	Page
Exhaust system	21
Vent the forepump to a fume exhaust system.	
Solvent waste	22
Follow local regulations for the proper method of disposing solvent waste.	

Exhaust System

Make sure to provide an adequate fume exhaust system. Samples and solvents that you introduce into the TSQ Quantum XLS Series mass spectrometers are eventually exhausted from the forepump, which should then be connected to a fume exhaust system. Consult local regulations for the proper method of exhausting the vapors from your system.

Note The proper operation of your forepump requires an efficient fume exhaust system. While Thermo Fisher Scientific recommends that you periodically open the ballast valves (on the top of the pump) 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 backing pressure for the turbomolecular pump.

The forepump requires a 25 mm (1 in.) OD exhaust port. The exhaust system for the forepump 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

Consult local regulations for the proper method of disposing solvent waste.

Gas and Plumbing Requirements

As the user you are responsible for providing the correct gas supplies and regulators to operate the TSQ Quantum XLS Series system.

Your GC and mass spectrometer require high purity gases. [Table 10](#) summarizes system gas and plumbing requirements and indicates where to find additional information.

Table 10. Summary of gas and plumbing preinstallation requirements

Requirement	Page
Argon collision gas	24
99.995% purity with less than 1.0 ppm each of water, oxygen, and total hydrocarbons. The required gas pressure is 65 to 205 kPa (10 to 30 psi).	
Helium GC carrier gas	24
99.999% purity with less than 1.0 ppm each of water, oxygen, and total hydrocarbons. The required gas pressure is 700 kPa (100 psig).	
CI reagent gas	24
99.995% purity recommended. The required gas pressure is 35–240 kPa (5–35 psi).	
Plumbing	25
Dual-stage, high-purity regulators that contain stainless steel diaphragms. The regulator output pressures must be consistent with the pressures listed in this table. Equip each regulator with a 1/8 in. Swagelok™ compression fitting or equivalent to connect a 1/8 in. metal tube.	

Gases

Your mass spectrometer and GC require argon collision gas, helium carrier gas, and CI reagent gases. These gases must be delivered with the necessary pressure and purity. Always consider using ultra high-purity (99.999%) gases when available.



CAUTION Installing house lines to deliver gas can introduce contaminants that might damage your system. Ensure that all gas lines used with your system are clean and free of all particulates and oils. You are responsible for any damage to the instrument caused by contaminants introduced from your gas delivery system.

Argon Collision Gas

The argon for the collision gas must be high purity (99.995%) with less than 1.0 ppm each of water, oxygen, and total hydrocarbons. The required gas pressure is 135 ± 70 kPa (20 ± 10 psi). Avoid particulate filters, which can be a source of contamination.

GC Carrier Gas

You need a supply of ultra high-purity GC carrier gas. Typical cylinders are approximately 23 cm (9 in.) wide by 140 cm (55 in.) tall with output greater than 15 000 kPa (2200 psi). A single full-size tank contains 8000 L of helium will last approximately three months with a typical usage of 50 mL/min. Table 11 provides specifications for the GC carrier gas.

Table 11. GC carrier gas specifications

Gas type	Purity ^a	Outlet pressure	Regulator	Connector ^b
Helium	99.999%	700 kPa (100 psig)	Dual-stage brass regulator with stainless steel diaphragm	CGA-580

^a Ultra high purity with less than 1.0 ppm each of water, oxygen, and total hydrocarbons and contained in one tank. Oxygen and hydrocarbon traps are supplied in the TSQ Quantum Accessory Kit.

^b Connectors will vary with cylinder size. Confirm that your regulator works with your gas cylinder. All connections to the GC/MS are 1/8 in. Swagelok fittings.

CI Reagent Gas

Table 12 provides specifications for chemical ionization (CI) gas. Typical flow rates are only 1–3 mL/min, so you can use smaller tanks like lecture bottles.

Table 12. CI gas specifications

Gas type	Purity	Outlet pressure	Regulator	Connector ^a
Methane	99.995%	35–240 kPa (5–35 psi)	Dual-stage brass regulator with stainless steel diaphragm	CGA-350
Isobutane	99.995%	35–240 kPa (5–35 psi)	Dual-stage brass regulator with stainless steel diaphragm	CGA-510
Ammonia	99.995%	35–240 kPa (5–35 psi)	Dual-stage brass regulator with stainless steel diaphragm	CGA-240

^a Connectors will vary with cylinder size. Confirm that your regulator works with your gas cylinder. All connections to the GC/MS are 1/8 in. Swagelok fittings.



WARNING Fire Hazard. Some CI gases, such as methane and isobutane, are flammable. Make sure these gases are properly exhausted and all gas fittings are leak free. Consult your local environmental and safety regulations for information on exhausting vapors from your laboratory.



WARNING Toxic Substances. Some CI gases, such as ammonia, are toxic. Make sure these gases are properly exhausted and all gas fittings are leak free. Consult your local environmental and safety regulations for information on exhausting vapors from your laboratory.



CAUTION High CI Gas Pressure Can Damage the Instrument. CI gas pressure in excess of 240 kPa (35 psi) can damage the CI reagent gas control module.

Plumbing

The TSQ Quantum Accessory Kit contains the fittings, connections, and tubing you need to connect the mass spectrometer and GC to the gas supplies. You are responsible for supplying the gas regulators and parts that are necessary to connect the tubing to the tanks.

Use dual-stage, high-purity regulators that contain stainless steel diaphragms. The regulator output pressures must be consistent with the pressures listed in [Table 10](#). Each regulator must be equipped with a 1/8 in. Swagelok compression fitting (or equivalent) to connect a 1/8 in. metal tube.

Installation

Prior to having your TSQ Quantum XLS Series system installed, make sure to complete all preparations described in the previous chapters.

After you have completed your laboratory site preparation, mailed or faxed the TSQ Quantum XLS Installation Request Form, and received the system, call your Thermo Fisher Scientific office to set up an installation date. See the Installation Request Form at the front of this guide. Telephone and fax numbers for Thermo Fisher Scientific San Jose offices are listed in the preface of this guide and immediately following the Installation Request Form. [Table 13](#) summarizes information about installing your system and indicates where you will find additional details.

Table 13. Summary of the installation process for your system (Sheet 1 of 2)

	Page
Preinstallation Survey	28
Complete the Installation Request Form at the front of this guide, and fax or mail it to your local service representative before the service engineer arrives to install your system.	
Installation Kits	29
To install your system, the Thermo Fisher Scientific service engineer uses the kits supplied with the TSQ Quantum XLS Series system. To complete the installation of your system, the service engineer might need additional parts and chemicals.	
Installation	30
The Thermo Fisher Scientific service engineer completes the installation of your system and demonstrates that it meets specifications. Do not plan to use your system before the engineer has demonstrated that the system operates within specifications.	

Table 13. Summary of the installation process for your system (Sheet 2 of 2)

	Page
Preventive Maintenance	30
Regular preventive maintenance is essential. Make sure to maintain your system properly. The following manuals cover preventive maintenance techniques:	
<ul style="list-style-type: none"> • <i>TSQ Quantum XLS Series User Guide</i> • Manuals that come with other modules of your system 	

Preinstallation Survey

Verify that your lab meets the following preinstallation requirements before the Thermo Fisher Scientific service engineer installs the TSQ Quantum XLS Series system. To check off each requirement, use the TSQ Quantum XLS Series Installation Request Form at the front of this guide.

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 requirements check.

1. All laboratory remodeling is completed.
2. Doorways, hallways, and so on are a minimum width of 94 cm (37 in.).
3. Available floor area is sufficient and flooring can support the load.
4. The bench space is sufficient for all of the equipment. List the following:
 Width:
 Depth:
 Height:
5. The workbench can support the load of the system (202 kg [445 lbs]) and does not vibrate.
6. One voice telephone line is installed near the system.
7. Air conditioning is adequate for temperature, humidity, and particulate matter control, and can maintain a constant temperature, between 15 and 27 °C (59 and 81 °F) while the GC/MS system is in operation.
8. Relative humidity is between 40 and 80 percent with no condensation.
9. Lighting is adequate.
10. System work area is without magnetic disruption and electrostatic discharge.

11. Main power is installed and is in compliance with local electrical codes.
12. Installation of power for test and cleaning equipment is complete.
13. Power outlets are correctly configured.
NEMA type:
14. Voltage of power outlet has been measured.
Measured voltage:
15. There are no fluctuations in power because of slow changes in the average voltage or changes as a result of surges, sags, or transients.
16. All required gases (helium and argon) are on site, with gas lines installed and appropriate gas regulators available.
List gases and their purity:
17. A suitable fume exhaust system is present.
18. The lab complies with all relevant safety regulations.
19. Your TSQ Quantum XLS Series system is on site.
20. The principal operator is available during the installation and certification period.

Installation Kits

The following kits are shipped with the TSQ Quantum XLS Series systems:

- MS Ship Kit (P/N 70111-62033): Contains installation components, such as the exhaust tubing and power cords.
- Accessory Kit (P/N 70111-62077): Contains parts such as fittings, tubing, and tools.
- Standard Chemicals Kit (P/N 70111-62078): Contains the necessary chemicals for demonstrating system performance specifications. The Chemicals Kit is located in the Accessory Kit box.
- GC Ship Kit (P/N 70111-62079): Contains the transfer line insulation and transfer line cover.

Note You are responsible for replacing any consumables used during the installation.

Installation

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

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

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

Note To receive maximum benefit from this on-site training opportunity, Thermo Fisher Scientific recommends that the instrument operator 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 Quantum XLS Series system.

Regular preventive maintenance is essential. It increases the life of the system, maximizes the uptime of your system, and provides optimum system performance. The following manuals cover maintenance techniques:

- *TSQ Quantum XLS Series User Guide*
- Manuals that come with other modules of your system

Instrument Arrival

Electronic equipment carriers that specialize in the handling of delicate machinery ship the TSQ Quantum XLS Series system to your site. Occasionally, however, equipment is damaged in transit.

Take the following precautions when receiving 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 acknowledge your observations by signing (or placing initials) next to your comments to signify agreement.
- To report the damage, contact the Traffic Department, telephone [1] (408) 965-6000, at the Thermo Fisher Scientific office in San Jose, California, United States.

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, United States
- FOB destination

If the system is damaged in transit, the method of shipment determines who is responsible for filing a claim against the carrier. 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 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 filing claims 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 the United States) 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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