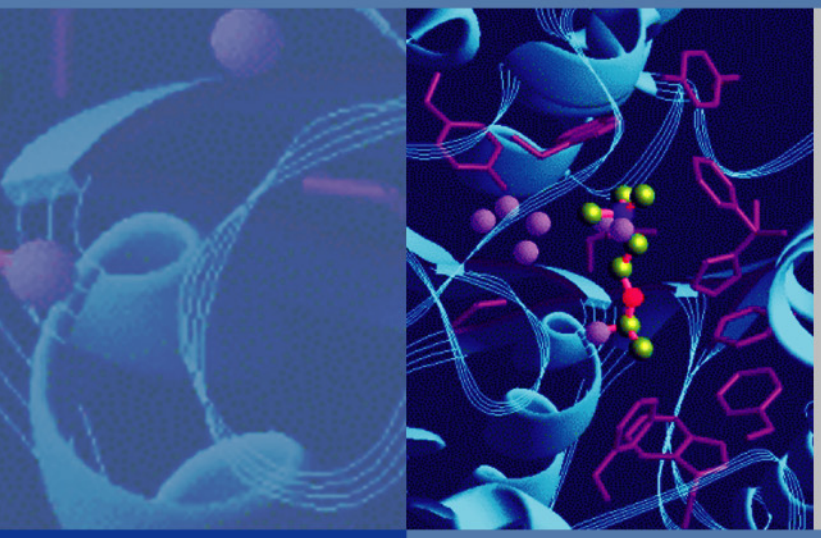

TSQ Quantum GC

Preinstallation Requirements Guide

70111-97150 Revision A September 2007

Thermo SCIENTIFIC

Release history: Revision A, September 2007

Software revision: Xcalibur 2.0.5 and higher, Quantum 1.5

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.

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

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

EN 55011	1998, 1999, 2002	EN 61000-4-3	2002
EN 61000-3-2	1995, A1; 1998, A2; 1998, A14; 2000	EN 61000-4-4	1995, A1; 2000, A2; 2001
EN 61000-3-3	1998, 2001	EN 61000-4-5	1995, A1; 2001
EN 61326-1	1998, 2001, 2003	EN 61000-4-6	1996, A1; 2003
EN 61000-4-2	2001	EN 61000-4-11	1994, A1; 2001
		CISPR 11	1998

FCC Class A, CFR 47 Part 15

Low Voltage Safety Compliance

Compliance with safety issues is declared under Thermo Fisher Scientific sole responsibility.
This device complies with Low Voltage Directive 73/23/EEC and harmonized standard EN 61010-1:2001.

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

FCC Compliance Statement

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

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

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Notice on Lifting and Handling of Thermo Fisher Scientific San Jose Instruments

For your safety, and in compliance with international regulations, the physical handling of this Thermo Fisher Scientific San Jose 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 Fisher Scientific San Jose Instruments

In compliance with international regulations: Use of this instrument in a manner not specified by Thermo Fisher Scientific San Jose 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.

IMPORTANT PREINSTALLATION INFORMATION... PLEASE READ

Thermo SCIENTIFIC

TSQ Quantum GC Installation Request Form

Dear User:

Read the TSQ Quantum GC 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.

❑ 1. All laboratory remodeling has been completed.
❑ 2. TSQ Quantum GC system is on site.
❑ 3. Principal operator will be available during the installation / certification period.
❑ 4. Doorways, hallways, and so on 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 [191 kg (420 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.
❑ 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 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: _____
❑ 18. There is a suitable exhaust system.
❑120. One voice telephone line is installed near the system.
❑ 21. 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 _____

Offices for Thermo Fisher Scientific San Jose Products

North America

Northeastern Region

265 Davidson Avenue, Suite 101
Somerset, NJ 08873
Phone.....[1] (732) 627-0220
Fax .....[1] (732) 627-0260

Southern Region

665 Molly Lane, Suite 140
Woodstock, GA 30189
Phone .....[1] (770) 516-5589
Fax .....[1] (770) 516-6916

Central Region

1201 E. Wiley Road, Suite 160
Schaumburg, IL 60173
Phone.....[1] (847) 310-0140
Fax .....[1] (847) 310-0145

Western Region

355 River Oaks Parkway
San Jose, CA 95134
Phone.....[1] (408) 965-6000
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Canada

5716 Coopers Avenue, Unit 1
Mississauga, Ontario, L4Z 2E8
Phone.....[1] (905) 712-2258
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Austria

Wehlistrasse 27b
A-1200 Wien
Phone.....[43] (01) 333 50 34-0
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Technologiestraat 47
B-1082 Brussels
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Fax .....[32] (02) 482 30 31

France

(also representing French speaking N. Africa, Algeria, Morocco, and Tunisia)

16 Avenue du Québec
Silic 765
Z.A. de Courtaboeuf
F-91963 Les Ulis Cédex
Phone.....[33] (01) 60 92 48 00
Fax .....[33] (01) 60 92 49 00

Germany

Im Steingrund 4-6
D-63303 Dreieich
Phone.....[49] (06103) 408 0
Fax .....[49] (06103) 408 1222

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Strada Rivoltana
I-20090 Rodano (Milano)
Phone.....[39] (02) 95059 226
Fax .....[39] (02) 95320 370

Netherlands

Takkebijsters 1
NL-4817 BL Breda
Phone.....[31] (076) 587 8722
Fax .....[31] (076) 571 4171

Spain

Sepulveda 7 A
ES-28108 Alcobendas (Madrid)
Phone.....[34] (091) 657 4930
Fax .....[34] (091) 657 4937

Notes: The country code is enclosed in square brackets [ ]. The city code or area code is enclosed in parenthesis ( ). For countries other than the U.S.A., when you are dialing from within the specified country, dial the 0 of the city code. For countries other than Italy, when you are dialing from outside the country, do not dial the 0 of the city code.

Offices for Thermo Fisher Scientific San Jose Products - Continued

Europe - Continued

Spain

Acer 30-32
Edificio Sertram – Planta 2, Modulo 3
ES-08038 Barcelona
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Sweden

Pyramidbacken 3
S-141 75 Kungens Kurva (Stockholm)
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Fax .....[46] (08) 556 468 08

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Stafford House
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Hertfordshire HP2 7GE
Phone .....[44] (01442) 233 555
Fax .....[44] (01442) 233 667

Australasia and Asia

Australia

P.O. Box 239 Rydalmere
Unit 14, 38 - 46 South Street
Rydalmere, N.S.W. 2116
Phone.....[61] (02) 9898-9000
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Japan

C-2F
3-9 Moriya-cho, Kanagawa-ku
Yokohama, Kanagawa 221-0022
Phone.....[81] (45) 453-9100
Fax .....[81] (06) 453-9110

Japan

Esaka Grand Building
2-3-1 Esaka-cho, Suita City
Osaka 564 - 0063
Phone.....[81] (06) 6387-6681
Fax .....[81] (06) 6387-6641

P.R. China

Room 901, Ping-an Mansion
No. 23, Jin Rong Street
Xi Cheng District
Beijing 100032
Phone.....[86] (010) 6621 0839
Fax .....[86] (010) 6621 0851

P.R. China

23/F Peregrine Plaza
1325 Middle Huaihai Rd.
Shanghai 200031, P.R.China
Phone.....[86] (21) 5465-7588 ext 212
Fax .....[86] (21) 6445-7830

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 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.

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:

Thermo Fisher Scientific s'est associé avec une ou plusieurs compagnies de recyclage dans chaque état membre de l'union européenne et ce produit devrait être collecté ou recyclé par celles-ci. Davantage d'informations sur la conformité de Thermo Fisher Scientific à ces directives, les recycleurs dans votre pays et les informations sur les produits Thermo Electron qui peuvent aider la détection des substances sujettes à la directive RoHS sont disponibles sur www.thermo.com/WEEERoHS.

Contents

Preface

About This Guide

The TSQ Quantum GC system is a member of the Thermo Scientific family of mass spectrometers.

This Preinstallation Requirements Guide provides information to assist in planning and preparing your lab site for the system prior to delivery and installation. Read each section carefully to be sure that your laboratory is ready for the system installation.

Related Documentation

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

- *TSQ Quantum GC User Manual*
- 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:

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 information critical for optimal performance of the system.

Note Highlights information of general interest.

Tip Helpful information that can make a task easier.

Contacting Us

There are several ways to contact Thermo Fisher Scientific.

❖ To contact Technical Support

Phone	800-685-9535
Fax	561-688-8736
E-mail	TechSupport.C+MS@thermofisher.com
Knowledge base	www.thermokb.com

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

❖ To contact Customer Service for ordering information

Phone	800-532-4752
Fax	561-688-8731
Web site	www.thermo.com/finnigan

❖ To suggest changes to documentation or to Help

- Fill out a reader survey online at www.thermo.com/lcms-techpubs.
- Send an e-mail message to the Technical Publications Editor at techpubs.finnigan-lcms@thermofisher.com.

Introduction

The TSQ™ Quantum GC system is designed to operate under carefully controlled environmental conditions.

The purchaser is 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. 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

Requirement	Page
Entrance Verify that your entrances and hallways are a minimum of 94 cm (37 in.) wide to provide clearance for the instrument.	4
Space and Load Requirements 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 GC 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 × 1.22m (3 × 4 ft) and be capable of supporting the weight of the data system computer, monitor, and printer [26 kg (57 lbs)].	4
Telephone Install a telephone line near the workbench.	6

Entrance

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

The TSQ Quantum GC mass spectrometer 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, 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 Quantum GC 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 that follow.

Place the TSQ Quantum GC system on two separate workbenches next to each other. See Figure 1 and Figure 2. Workbench 1 holds the TSQ Quantum GC 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 TSQ Quantum GC mass spectrometer [118 kg (258 lbs)], TRACE GC Ultra GC [48 kg (105 lbs)], and (optional) TriPlus autosampler [25 kg (56 lbs)]. 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 GC system and any shelves above it.

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)]. Because the total length of the vacuum hose connecting the TSQ Quantum GC mass spectrometer to the forepump should not exceed 8 ft., install the forepump on the floor close to the TSQ Quantum GC mass spectrometer. Depending on available space, you have two options for the placement of the forepump and for connecting the vacuum hose from the TSQ Quantum GC mass spectrometer to the forepump.

[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.

- If the workbench has space beneath it, place the forepump under the workbench immediately behind the TSQ Quantum GC 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 TSQ Quantum GC mass spectrometer.

CAUTION Whenever possible, provide space under the workbench for the forepump. If placed in front of the TSQ Quantum GC 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.

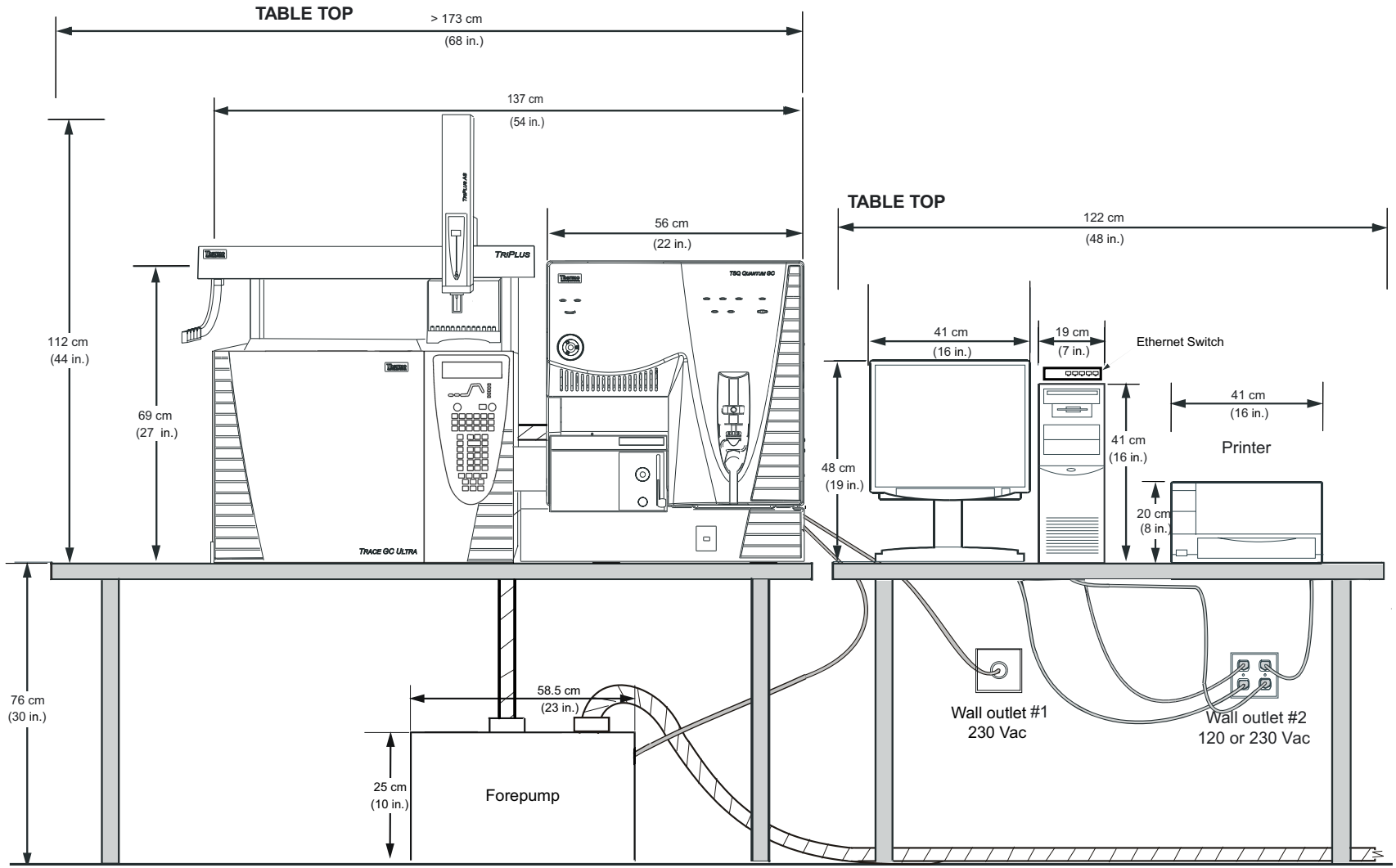
Table 2 lists the space requirements and weights of the typical TSQ Quantum GC system components.

Table 2. TSQ Quantum GC system dimensions and weights

	Height		Width		Depth		Weight	
Module	**cm**	**in.**	**cm**	**in.**	**cm**	**in.**	**kg**	**lb**
TSQ Quantum GC MS	69	27	56	22	76	30	118	258
TRACE GC Ultra GC	51	20	61	24	66	26	48	105
TriPlus AS	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*	20	8	41	16	46	18	7	16

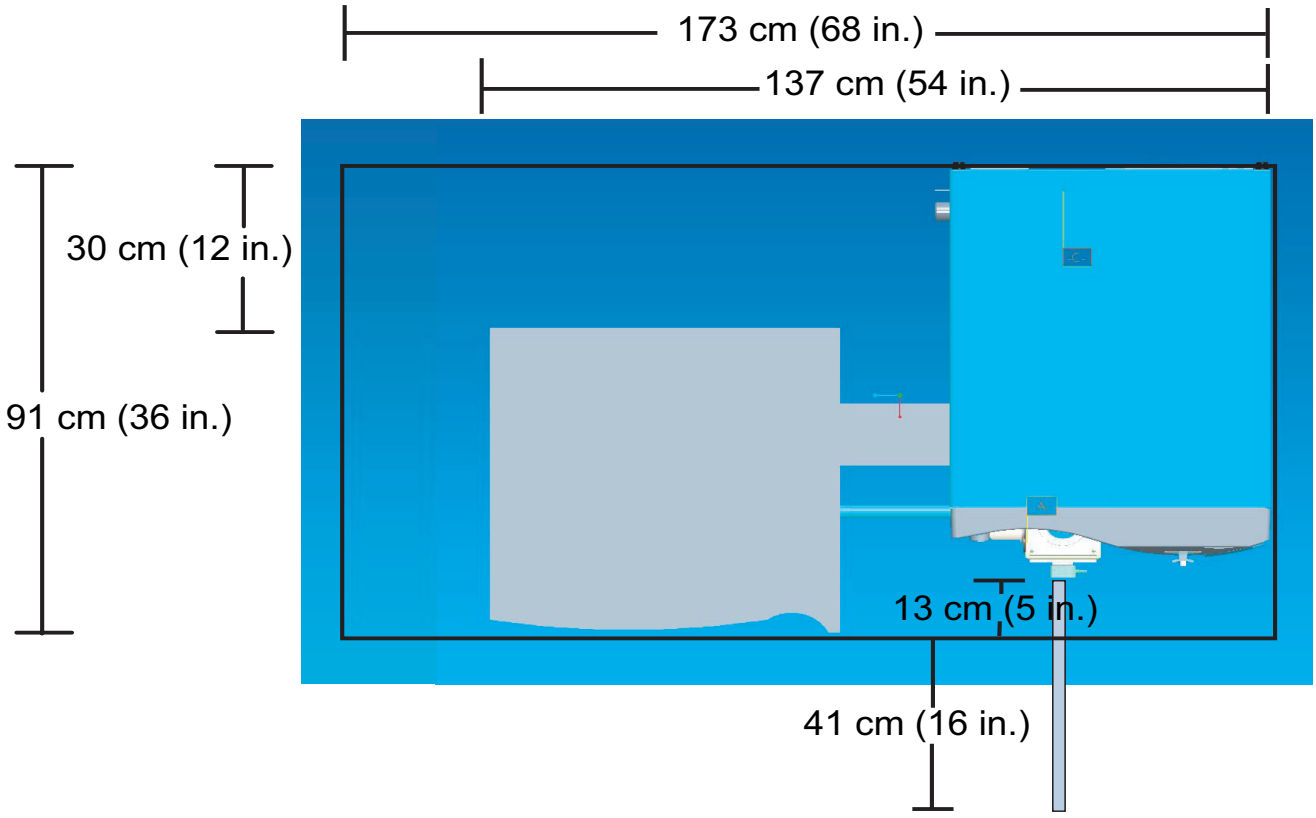
*Approximate. The actual value depends upon your equipment.

Figure 1. TSQ Quantum GC system space requirements



The removable guide bar of the insertion/removal tool extends approximately 40 cm (16 in.) beyond the table. The GC must be moved away from the mass spectrometer by 36 cm (14 in.) to remove or install the transfer line. See Figure 2.

Figure 2. Top view and dimensions of the TRACE GC Ultra gas chromatograph (left) and TSQ Quantum GC 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 Quantum GC/MS system. Any expenditures for air conditioning are more than offset by good sample throughput and reduced repair costs. See Table 3 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 Quantum GC/MS system.

Table 3. Operating environment preinstallation requirements

Requirement	Page
Temperature 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 Quantum GC instrument, 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 GC instrument is between 18 and 21 °C (65 and 70 °F). The temperature must be controlled to within 2 °C (3.6 °F).	10
Humidity Ensure that the relative humidity of the operating environment is between 40% and 80%, with no condensation.	11
Vibration Requires a vibration-free workbench.	11
Lighting Requires adequate lighting for instrument operation. A high intensity lamp for instrument maintenance is recommended.	11
Particulate matter The air should contain fewer than 100 000 particles per cubic foot (3 500 000 particles per cubic meter) in excess of 5 µm.	11

Table 3. Operating environment preinstallation requirements

Requirement	Page
Electrostatic discharge	12
Take precautions for electrostatic discharge, especially when operating the system at the lower end of the relative humidity range listed above.	

Temperature

For precision instrumentation, such as the Quantum GC mass spectrometer, the temperature stability of the environment in which the instrument is installed can affect performance. Maintain the laboratory room temperature between 15 and 27 °C (59 and 81 °F). The optimum temperature of operation 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 Quantum 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 Quantum system (with a Trace GC Ultra gas chromatograph) is approximately 5 470 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 GC mass spectrometer	2301	7851
TRACE GC Ultra gas chromatograph	1901	6485
TriPlus autosampler	220	750
Monitor	240	820
Computer	470	1604
Laser printer	350*	1195*
Total	5482	18 705

*Approximate. The actual values depend upon your equipment.

Humidity

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

Operating a Quantum 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 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 during operation, install the forepump on the floor beneath the Quantum GC 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 3500000 particles per cubic meter (100000 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 Quantum system.

Quantum 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 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 35000 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 18000 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.

As a precuation, Thermo Fisher Scientifict 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. See Table 5 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 source of power of acceptable quality for the operation of your system.

Table 5. Line power preinstallation requirements (Sheet 1 of 2)

Requirement	Page
Quality of Power Ensure that line power is free from the following: • 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.	15
Power Monitoring Devices Before connecting your TSQ Quantum GC mass spectrometer to its line power, Thermo Fisher Scientific recommends that you monitor the line power 24 hours a day for seven consecutive days.	15
Power Conditioning Devices To free line power from voltage changes, sags, surges, and transients, the following devices are available: • Noise suppression transformer • Buck/boost transformer • Power conditioning	16

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

Requirement	Page
Available Outlets For systems installed where there is 110 and 230 V: • Nominal voltage of 120 V ac, +6% to -10% and 230 V ac, ±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 V ac). • One single outlet (single-phase power) with a minimum power rating of 30 A (230 V ac). • Earth ground hardwired to the main panel. For systems with only 230 V line power: • Nominal voltage of 230 V ac, ±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 V ac). • Earth ground hardwired to the main panel.	19
Connecting the TSQ Quantum GC, GC, and Other Modules to Wall Outlets Balance the current load on the circuits to which your system is connected.	19
Uninterruptible Power Supply Systems installed in areas with intermittent line power must have an agency recognized (NRTL approved), uninterruptible power supply installed.	19
Technical Assistance Contact Thermo Fisher Scientific for additional assistance in monitoring line power or selecting a line conditioner.	20

Quality of Power

The quality of power supplied to your TSQ Quantum GC 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 µs and 2 s
Transients or impulses	Brief voltage excursions of up to several thousand volts with durations up to 50 µs

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 GC 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.

[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.

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% outside of the voltage specifications, a buck/boost transformer can lower (buck 10%) or raise (boost 10%) 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.

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.

Available Outlets

The TSQ Quantum GC 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 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 V ac single phase or 400 V ac three phase, the equipment shall operate safely within a minimum supply tolerance of ±10%."

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

- Nominal voltage of 120 V ac, +6% to -10% and 230 V ac, ±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 V ac).
- One single outlet (single-phase power) with a minimum power rating of 30 A (230 V ac).
- 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 Quantum GC system consist of the following:

- Nominal voltage of 230 V ac, ±10%.
- 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 are available, you must choose the 20 A option.)
- One single outlet (single-phase power) with a minimum power rating of 30 A (230 V ac).
- Earth ground hardwired to the main panel.

Note Make sure that the power remains on. The TSQ Quantum GC system 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 GC 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 GC mass spectrometer ships with a NEMA L6-30 plug, rated at 30 A and 250 V ac. 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 GC system requires. The TSQ Quantum GC 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 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 V ac Current (in amperes)	Voltage 230 V ac Current (in amperes)
TSQ Quantum GC main power (230 V only)		30
Mass spectrometer*		10
Forepump**		5
Trace GC Ultra gas chromatograph*		16
TriPlus autosampler*		2
Computer	4	2
Monitor	2	1
Laser printer	7	3.5

*Plugs into TSQ Quantum GC main power

**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. See the sample laboratory setup in Table 8 for the recommended number of outlets.

Table 8. A sample laboratory setup

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

*Plugs into TSQ Quantum GC main power

Connecting the TSQ Quantum GC, GC, and Other 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 7 for the maximum current ratings for the TSQ Quantum GC system 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.

Technical Assistance

Occasionally, you might encounter line power sources of unacceptable quality that adversely affect the operation of a TSQ Quantum GC 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.

Waste and Exhaust

The exhaust arrangement for the instrument can affect the proper performance of your system, and wastes must be collected and disposed of properly.

It is your responsibility to provide the proper exhaust system that is required for the operation of the system.

Table 9. Waste and exhaust preinstallation requirements

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

Exhaust System

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

It is also your responsibility to provide an adequate fume exhaust system. Samples and solvents that are introduced into the TSQ Quantum GC 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 fumes from your system.

Note The proper operation of your forepump requires an efficient fume exhaust system. While it is recommended 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

It is your responsibility as the user to provide the correct gas supplies and regulators for the operation of your TSQ Quantum GC system.

Your GC and mass spectrometer require high purity gases. Refer to Table 10 for a summary of gas and plumbing requirements. More information on each requirement is available on the page indicated in the table.

Table 10. Summary of gas and plumbing preinstallation requirements

Requirement	Page
Argon gas: 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).	24
Helium gas: 99.995% purity with less than 1.0 ppm each of water, oxygen, and total hydrocarbons. The required gas pressure is 400 to 700 kPa (60 to 100 psi).	24
CI reagent gas: 99.995% purity is recommended. The required gas pressure is 65 to 205 kPa (10 to 30 psi) for methane. The gas pressure of other reagent gases requires optimization.	24
Plumbing: Single- or dual-stage high purity regulators that contain stainless steel diaphragms. The regulator output pressures must be consistent with the pressures listed below. Equip each regulator with a 1/8-in. Swagelok® compression fitting or equivalent to connect a 1/8-in. metal tube.	24

Gases

It is essential that the gases are delivered with the necessary pressure and purity. Your mass spectrometer and GC require argon, helium, and CI reagent gases. Always consider using ultra-high purity (99.999%) gases when available.

CAUTION Contaminants that are 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 you gas delivery system.

Argon

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). Particulate filters can be a source of contamination and are not recommended.

Helium

For GC carrier gas, use 99.995% helium with less than 1.0 ppm each of water, oxygen, and total hydrocarbons. One full-size tank has an outlet pressure of 400 to 700 kPa (60 to 100 psi). Oxygen and hydrocarbon traps are supplied in the TSQ Quantum GC Accessory Kit.

CI Reagent Gas

For chemical ionization reagent gas, 99.995% purity is recommended. The required gas pressure is 65 to 205 kPa (10 to 30 psi) for methane. The gas pressure of other reagent gases requires optimization.

Plumbing

The TSQ Quantum Accessory Kit contains most fittings, connections, and tubing to connect the mass spectrometer and GC to the gas supplies. It is your responsibility to supply the gas regulators and parts that are necessary to connect the tubing to the tanks.

Gas tanks may be equipped with single- or dual-stage, high-purity regulators that contain stainless steel diaphragms. The regulator output pressures must be consistent with the pressures listed above. 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 installation, 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 GC Installation Request Form to your local office for Thermo Fisher Scientific San Jose products, and received the system, please 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. See Table 11 for a summary of information about installing your system, and see the pages indicated for more information on each item.

Table 11. More information on the installation of your system

	Page
Preinstallation Survey 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.	26
Installation Kits To install your system, the Thermo Fisher Scientific service engineer uses the kits supplied with the TSQ Quantum GC system. To complete the installation of your system, the service engineer might need additional parts and chemicals.	27
Installation 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.	27
Preventive Maintenance Make sure to maintain your system properly.	28

Preinstallation Survey

Verify that your lab meets the following list of preinstallation requirements before the Thermo Fisher Scientific service engineer installs the TSQ Quantum GC system. To check off each requirement, use the TSQ Quantum GC 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 following instructions.

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% 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 exhaust system is present that is separate from the solvent waste exhaust.
18. The lab complies with all relevant safety regulations.
19. Your TSQ Quantum GC 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 GC mass spectrometer:

- MS Ship Kit (P/N 70111-62033), which contains installation components, such as the exhaust tubing and power cords.
- Accessory Kit (P/N 70111-62077), which contains parts such as fittings, tubing, and tools.
- Standard Chemicals Kit (P/N 70111-62078), which 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), which contains the transfer line insulation and transfer line cover.

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

Installation

Once your new TSQ Quantum GC 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 the TSQ Quantum GC mass spectrometer 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 techniques are covered in the following manuals:

- *TSQ Quantum GC 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 GC 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 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 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 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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