

Q Exactive GC and Exactive GC

Mass Spectrometers

Preinstallation Requirements Guide

1R120706-0001 Revision D July 2016

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Release History: Revision A released in June 2015. Revision B released in July 2015. Revision C released in April 2016. Revision D released July 2016.

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Installation Request Form

Please refer to the *Q Exactive GC and Exactive GC Preinstallation Requirements Guide* (P/N 1R120706-0001) for the complete site requirements. Circle “Yes” or “No” as to whether the site meets the requirements as specified in the Preinstallation Guide. Provide the additional information where requested.

1. **Yes** **No** All laboratory remodeling has been completed and the space available is sufficient to meet the minimum requirements for the configuration ordered? The floor meetd the load requirements of the system?
2. **Yes** **No** Personnel are available to deliver system to laboratory?
3. **Yes** **No** Six people are available to lift instrument onto bench during installation?
4. **Yes** **No** The key operator will be available during the installation period. The person with the authority to accept the instrument at the end of the installation will also be available to sign the required acceptance document?
Please provide the names of these individuals:

5. **Yes** **No** The entrance to the laboratory and the route from the loading dock are at least 90 cm (36 in.) wide with additional space at corners?
6. **Yes** **No** Sufficient bench space is available for all of the equipment? List the following:
Width (Maximum 257 cm (101 in.)): _____
Depth (Maximum 95 cm (37 in.)): _____
Height (Maximum 187 cm (74 in.)): _____
7. **Yes** **No** Workbench can support the load of the system including optional equipment and is free from vibration?
Note A typical AS/GC/MS system can weigh more than 532 lbs (242 kg). ▲
8. **Yes** **No** Lighting is adequate?
9. **Yes** **No** Floor vibrations and electromagnetic interferences are below the specified levels?
10. **Yes** **No** Main power is installed and in compliance with local electrical codes? Two independent circuits are required. One dedicated circuit is required for the TRACE 1310 GC and one dedicated circuit is required for the mass spectrometer. Each circuit must provide: 230 VAC \pm 10%, frequency of 50/60 Hz, single phase, 16 A_{MAX}(tripping characteristic C). The GC and MS must not be connected through the same circuit breaker.
11. **Yes** **No** The power outlets for the GC and MS are the correct configuration? See “[Power Outlet Receptacle and Cable](#)” on [page 1-2](#) for images of wall receptacle and power cable used by the GC and MS.
12. **Yes** **No** Power is free from fluctuations due to slow changes in the average voltage or changes due to surges, sags, or transients?
13. **Yes** **No** Air conditioning is adequate for temperature, humidity, and particulate matter control? The laboratory can be maintained at a constant temperature, between 15 and 26 °C (59 and 78 °F)?
Note Temperature fluctuations of 1 °C or more over a 10 minute period can affect performance. ▲
14. **Yes** **No** The relative humidity is between 40% and 70%, with no condensation?
15. **Yes** **No** The system work area is free from magnetic disruption and electrostatic discharge?

16. **Yes** **No** All the gases required are on site, gas lines are installed, and appropriate gas regulators are available?
Note Chemical Ionization installation specifications will not be performed if methane reagent gas is not available. ▲
Nitrogen 99.999%
Helium 99.999%
Methane 99.99%
Note Other system options may require additional gases. See the *Q Exactive GC and Exactive GC Preinstallation Requirements Guide* for additional specifications. ▲
17. **Yes** **No** All relevant local safety regulations have been met and the equipment installed will not affect compliance?
18. **Yes** **No** All required chemicals and equipment for installing the system are on site?
19. **Yes** **No** Have any special acceptance criteria been agreed within the contract?
If **YES**, please attach full details of specification.
20. **Yes** **No** Is there any additional equipment that needs to be interfaced to the system?
If **YES**, please supply details.



I, the undersigned, confirm that the site requirements as stated above have been accomplished and the laboratory is prepared for the installation of the Thermo Scientific Exactive Series instrument. I understand that I may be liable for a Field Service Representatives' travel or lodging expenses if they are unable to carry out the installation on the pre-scheduled date due to insufficient lab preparation. If circumstances warrant, Thermo Fisher Scientific will make every effort to reschedule an installation as soon as possible with the next available representative.

Signed: _____ Print or Type Name: _____
Company name: _____ Email: _____
Date: _____ Phone: _____

Fax or Email to: Unity Lab Services Concierge Team

Note After we receive this checklist, your local Field Service Representative will contact you to schedule installation. ▲

Power Outlet Receptacle and Cable

	
Power wall receptacle ^a	Power Cable

^aTwo are supplied in Preinstallation Kit shipped when customer orders system

Contacting Us

There are several ways to contact Thermo Fisher Scientific.

Assistance

For technical support and ordering information, please visit:

<https://gcgcms.freshdesk.com/support/home>

Service contact details are available under:

www.unitylabservice.com

For brochures, application notes and other material, please visit:

www.thermofisher.com

For operating manuals, please contact your local Service organization.

Suggestions to the Manual

❖ To suggest changes to this manual

- Send your comments to:

Technical Documentation
Thermo Fisher Scientific
2215 Grand Avenue Parkway

Austin, Texas 78728

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

You are encouraged to report errors or omissions in the text or index.
Thank you.

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Chapter 1 Using This Manual

Welcome to the Thermo Scientific™ Q Exactive™ GC or Exactive™ GC system! The Q Exactive GC and Exactive GC systems members of the Thermo Scientific family of mass spectrometer (MS) detectors that are powered by Orbitrap™ technology.

Thermo Scientific Q Exactive GC and Exactive GC instruments are designed to be placed on a bench in the laboratory and come with an Extractabrite™ removable ion source cartridge, a quadrupole mass filter for precursor ion selection, and a collision cell for performing MS/MS experiments.

Contents

- “About This Manual” on page 1-2
- “Typographical Conventions” on page 1-3
- “Reference Documentation” on page 1-5

About This Manual

This *Q Exactive GC and Exactive GC Preinstallation Requirements Guide* is intended primarily for those who are responsible for the site planning of a laboratory in preparation for the installation of a new Exactive Series instrument. This guide should be retained for future guidance if your instrument needs to be relocated in future.

NOTICE 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. ▲

This *Q Exactive GC and Exactive GC 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 installation of your system. For additional information, request specific preinstallation support directly through your local Thermo Fisher Scientific office.

Thermo Scientific mass spectrometers are designed to operate reliably under carefully controlled environmental conditions. Operating a system or maintaining it in a condition 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.

Typographical Conventions

This section describes typographical conventions that have been established for Thermo Fisher Scientific manuals.

Signal Word

Make sure you follow the precautionary statements presented in this manual. The special notices appear different from the main flow of text:

NOTICE Points out possible material damage and other important information in connection with the instrument. ▲

Viewpoint Orientation

The expressions *left* and *right* used in this manual always refer to the viewpoint of a person that is facing the front side of the instrument.

Data Input

Throughout this manual, the following conventions indicate data input and output via the computer:

- Messages displayed on the screen are represented by capitalizing the initial letter of each word and by italicizing each word.
- Input that you enter by keyboard is identified by quotation marks: single quotes for single characters, double quotes for strings.
- For brevity, expressions such as “choose **File** > **Directories**” are used rather than “pull down the File menu and choose Directories.”
- Any command enclosed in angle brackets < > represents a single keystroke. For example, “press <F1>” means press the key labeled *F1*.
- Any command that requires pressing two or more keys simultaneously is shown with a plus sign connecting the keys. For example, “press <Shift> + <F1>” means press and hold the <Shift> key and then press the <F1> key.
- Any button that you click on the screen is represented in bold face letters. For example, “click **Close**”.

Topic Headings

The following headings are used to show the organization of topics within a chapter:

Chapter 1 Chapter Name

Second Level Topics

Third Level Topics

Fourth Level Topics

Reference Documentation

Reference documentation for the Q Exactive GC mass spectrometer includes the following:

- *Q Exactive GC and Exactive GC Operating Manual*
- *Q Exactive GC Software Manual*
- *Q Exactive GC Quick Start Guide*

Reference documentation for the Exactive GC mass spectrometer includes the following:

- *Q Exactive GC and Exactive GC Operating Manual*
- *Exactive GC Software Manual*
- *Exactive GC Quick Start Guide*

You can access PDF files of the documents listed above and of this manual from the data system computer. The software also provides Help.

❖ To view product manuals

Go to **Start > All Programs > Thermo Exactive Series > Manuals**.

A printed version of the *Q Exactive GC and Exactive GC Preinstallation Requirements Guide* is part of the Preinstallation Kit. This kit is sent to your laboratory before the arrival of the mass spectrometer.

NOTICE If this manual is in another language than English: Translations of the above documents that are available in this language are shown with their titles translated and the English title in parentheses. See “[Contacting Us](#)” at the beginning of this manual for information about obtaining current manuals. ▲

Refer also to the autosampler and Thermo Scientific™ TRACE™ 1310 GC user documentation and to the documentation provided by the manufacturers of third-party components:

- Forepump
- Turbomolecular pump
- Data system computer and monitor
- Safety data sheets

Chapter 2 Site Preparation

Before your instrument can be installed by the Thermo Fisher Scientific field service engineer, the site must be prepared. The hallways and doors must be wide enough to allow passage of the instrument.

NOTICE It is your responsibility as the user to provide a suitable location, a source of power of acceptable quality, a suitable operating environment, and a proper exhaust system. ▲

Contents

- “Entrance Requirements” on page 2-2
- “Space and Load Requirements” on page 2-5

Entrance Requirements

This section lists data for packed units of typical Exactive Series systems. The instrument (basic unit) is shipped in the largest container. Other modules such as the data system, gas chromatograph, and accessories are shipped in their own containers. Their dimensions and weight are less than that of the container for the basic unit.

The listed shipping containers may be replaced by other packings because of the legal requirements in the receiving countries, the mode of transportation, or the climatic conditions in some tropic regions. As a result, the dimensions and weights will differ from those shown in the tables.

NOTICE Some chemicals that are needed for installation will be shipped in a separate package. See [“Performance Test Samples for Q Exactive GC and Exactive GC Systems”](#) on [page 7-2](#) for details. ▲

Thermo Fisher Scientific recommends checking whether the container with the instrument fits through the laboratory entrance. Also allow additional room for maneuvering the system around corners, into elevators, or through doorways. Please note that it is necessary to use a means of transport (a pallet jack, for example).

If the entrance to your laboratory will not accommodate the container, you can remove the instrument from the container before moving it into the room. The *unpacked* instrument that is not fully assembled fits through a door with a minimum width of 80 cm (32 in.). Consider that six persons are required to carry the instrument who require considerable space for maneuvering. See [“Placing the MS System”](#) on [page 2-6](#). Therefore, Thermo Fisher Scientific recommends using a pallet jack when passing the unpacked instrument through a narrow door.

NOTICE Do not remove the instrument from its shipping container unless authorized by Thermo Fisher Scientific personnel. Make sure that all the contents of the container remain with the instrument. ▲

Shipping Containers

Your GC-MS instrument is shipped in a container, the smallest dimension of which is 90 cm (36 in.). To allow moving a *packed* instrument, the entrance to your facility and the width of all hallways, elevators, etc., should have a minimum width of 91 cm (36 in.) Dimensions and weights of the shipping containers for Q Exactive GC and Exactive GC GC-MS systems are given in [Table 2-1](#).

Table 2-1. Dimensions of packed units of Q Exactive GC and Exactive GC systems

Module	Height		Width		Length		Weight	
	cm	in.	cm	in.	cm	in.	kg	lb
Q Exactive GC MS (Box 1 of 2)	132	52	90	36	115	46	225	507
Q Exactive GC MS (Box 2 of 2) ^a	61	24	102	40	74	29	68	150
TRACE 1300 or TRACE 1310 GC	61	24	80	31	80	31	64	140
AI/AS 1310 autosampler ^b	36	14	51	20	36	14	10	22
TriPlus RSH (with standard X-axis) ^b	65	26	100	39	32	13	45-55	99-121
TriPlus RSH (with extended X-axis) ^b	65	26	136	54	32	13	55-60	122-132
TriPlus 100 Liquid Sampler ^b	65	26	100	39	32	13	45-55	99-121
TriPlus 300 Headspace Autosampler (Box 1 of 2) ^b	77	30	72	28	84	33	70	154
TriPlus 300 Headspace Autosampler (Box 2 of 2) ^b	79	31	64	25	100	39	25	55

^a The computer, keyboard, monitor, foreline pump, and Installation Kit are included in the box with the system.

^b Optional.

NOTICE An unpacked and fully assembled Q Exactive GC or Exactive GC system will not fit through a door that is narrower than 35 in. ▲

Space and Load Requirements

The floor of your laboratory should be able to carry the weight of the installed Q Exactive GC or Exactive GC system with a data system. Also, consider the weight of any other option (gas chromatograph, for example) that is added to the system and the weights of the workbenches.

To set up a Q Exactive GC or Exactive GC system, Thermo Fisher Scientific recommends having a minimum of two workbenches.

Placing the Data System

Thermo Fisher Scientific recommends using one workbench with minimum dimensions of 1 × 1.20 m (3 × 4 ft) to hold the data system computer and monitor. Thus, it also provides sufficient place for an optional printer.¹ The workbench must be capable of supporting the weight of the data system [20 kg (44 lb)] and the printer, if applicable.

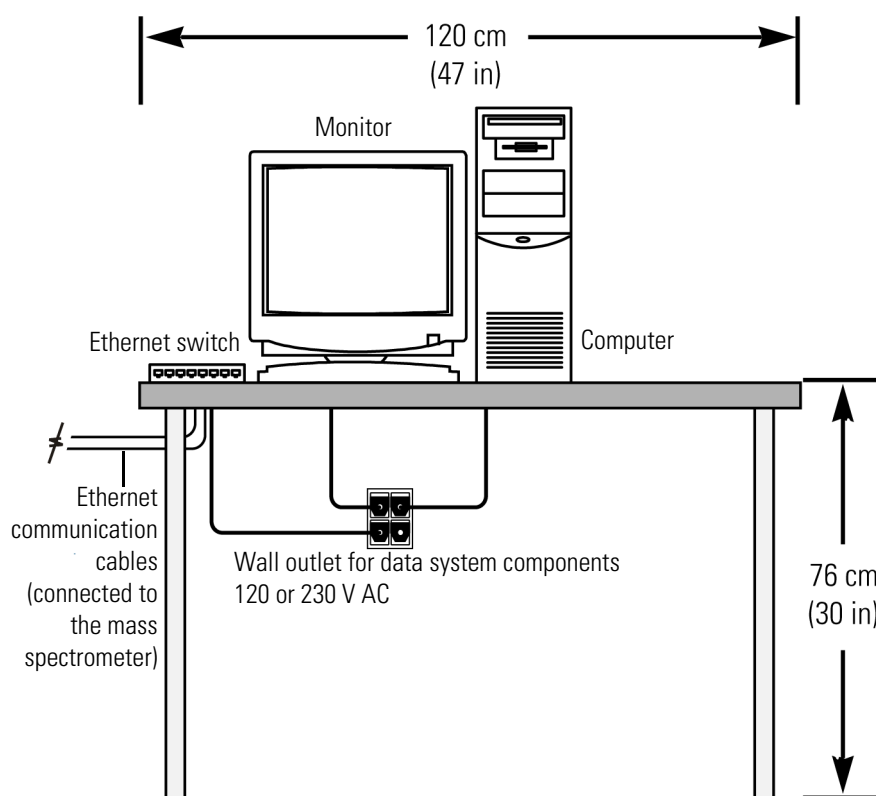


Figure 2-1. Typical data system workbench

¹ A printer is not a standard part of the data system.

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

Table 2-2. Space and load requirements of typical data system hardware components

Module	Height		Width		Length		Weight	
	cm	in.	cm	in.	cm	in.	kg	lb
Monitor	36	14	41	16	18	7	6	13
Minitower computer	48	19	18	7	43	17	14	30
Laser printer ^a	20	8	41	16	46	18	7	16

^a Not a standard part of the data system. The actual values depend upon your equipment.

The Ethernet communication cables between the Ethernet switch and the mass spectrometer must be no longer than 3 m (10 ft) each. Therefore, the workbench that holds the data system must be located next to the workbench or workbenches that hold the mass spectrometer and GC system.

NOTICE To ensure compliance with safety and EMC regulations, use category 5, shielded Ethernet cables no longer than 3 m (10 ft) in length. ▲

Placing the MS System

Use the other workbench to hold the mass spectrometer, GC, and any other MS options such as autosamplers. This workbench must have minimum dimensions of 1 × 1.53 m (3 × 5 ft) and be capable of supporting the weight of the mass spectrometer (about 180 kg) plus the weight of the gas chromatograph and any other options.

NOTICE If you have a TriPlus RSH autosampler with the extended X-axis rail option, the workbench must be at least 1 × 1.92 m (3 × 6 ft 4 in) long for the GC/MS system to accommodate the extra support leg. ▲

The workbench for the GC/MS system must stand in a secure and level position. Note that only workbenches with at least four legs provide sufficient stability for the instrument. The workbench top must be dry and clean (free of grease). Thermo Fisher Scientific recommends using a workbench with a skid proof top.

Ensure you have adequate workbench space for the system. Refer to the [Table 2-3](#) for exact measurements of each component. Use the information in the table below to configure the workbench.

Table 2-3. Space and load requirements of Q Exactive GC and Exactive GC GC/MS systems

Module	Height		Width		Length		Weight	
	cm	in.	cm	in.	cm	in.	kg	lb
Q Exactive GC MS (MS only)	91	36	148	58	95	37	175	386
Foreline Pump ^a	46	18	20	8	25	10	24	52
Computer ^b	48	19	20	8	43	17	12	27
Monitor ^b	16	7	46	18	32	13	4	8
Keyboard ^b	23	9	46	18	5	2	1	2
TRACE 1300 GC ^c	45	18	44	17	60	24	35 ³	77 ³
TRACE 1310 GC ^c	45	18	44	17	67	26	35 ³	77 ³
AI 1310 Auto Injector ^d	28	11	23	9	40	19	6	13
AS 1310 Autosampler ^d	28	11	41	16	40	19	6	13
TriPlus RSH standard X axis autosampler	74 ^e	29 ^e	85	33	80	32	25 ^f	55 ^f
TriPlus RSH extended X axis autosampler	74 ^e	29 ^e	121	47	80	32	27 ^f	60 ^f
TriPlus 300 Headspace autosampler	55	22	82	32	73	29	63	139
TriPlus 100 Liquid Sampler	50 ^e	20 ^e	85	34	54	21	15 ^f	34 ^f
Direct Probe Controller	58	23	33	13	12	5	6	13

^a This item is placed on the floor under the system.

^b Dimensions vary per manufacturer.

^c Add 0.8 kg (1.8 lbs) for each injector/detector module.

^d Mounts on top of the TRACE 1300/TRACE 1310.

^e About 20 cm (8 in.) of the orthogonal crossrail (Y-axis) protrudes from the rear of the GC.

^f Weight without accessories.

Site Preparation

Space and Load Requirements

The Q Exactive GC and Exactive GC systems always include the TRACE 1310 GC and has maximum dimensions of h 95 cm (37 in.), w 91 cm (36 in.), l 148 cm (58 in.). See [Figure 2-2](#).

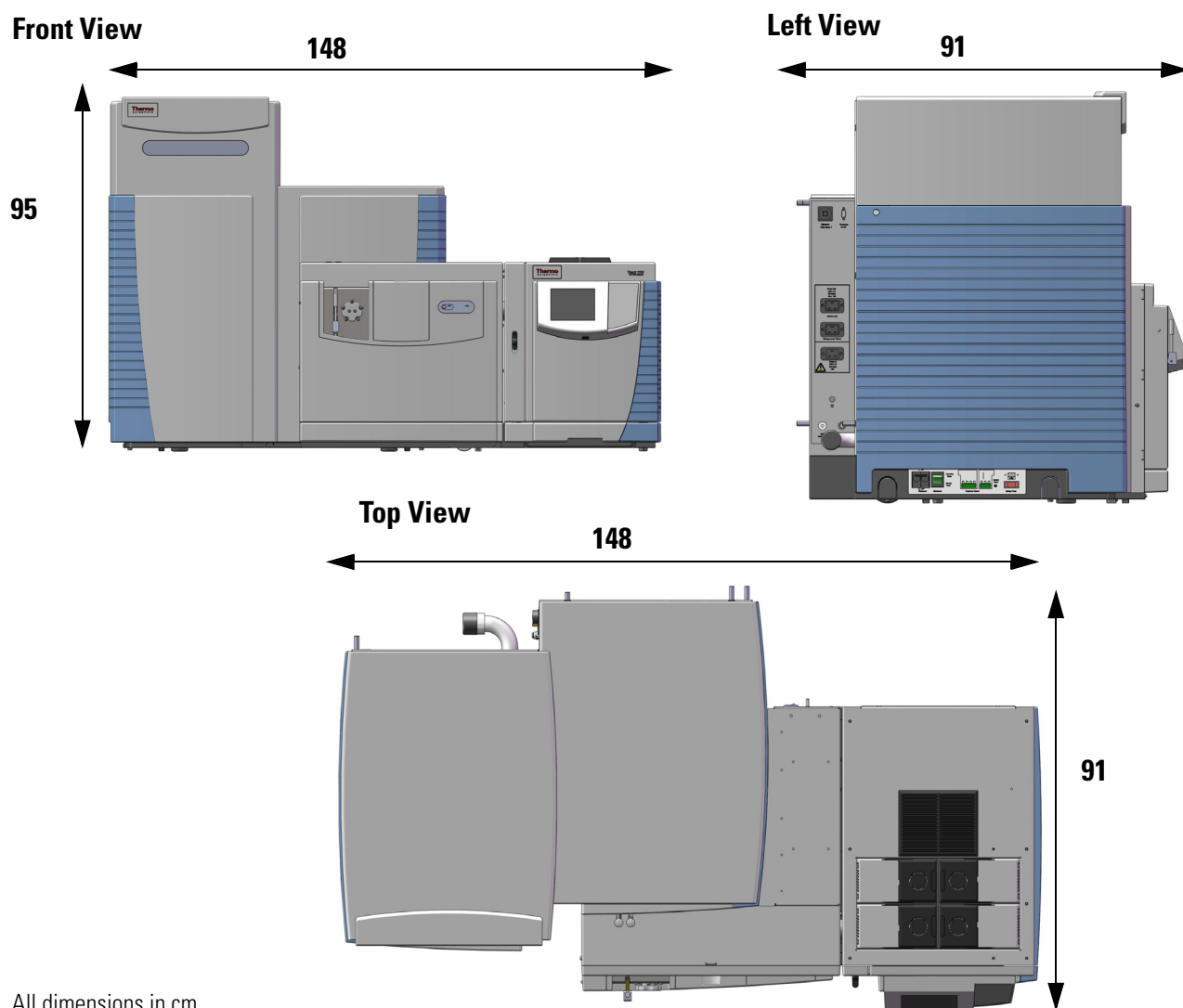
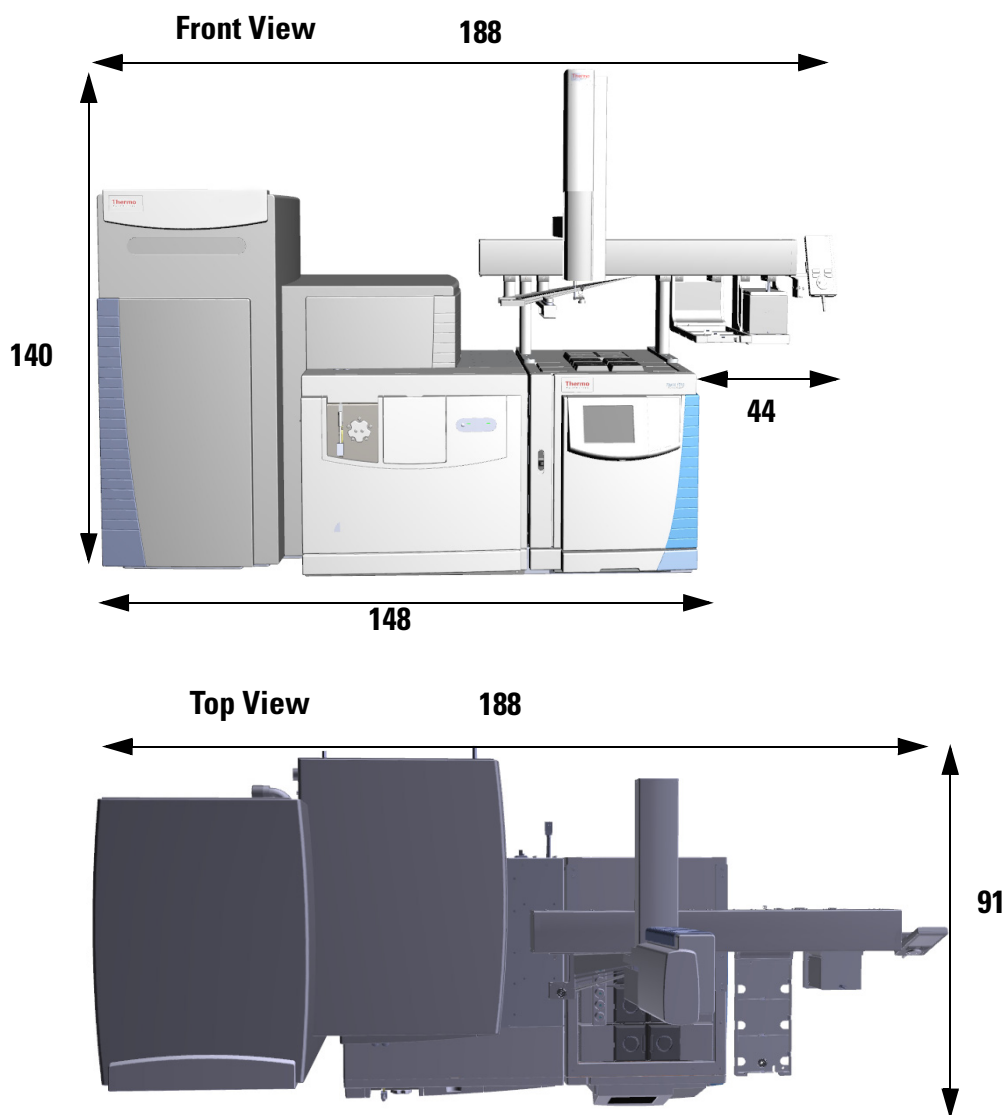


Figure 2-2. Dimensions of the Q Exactive GC and Exactive GC MS without an autosampler

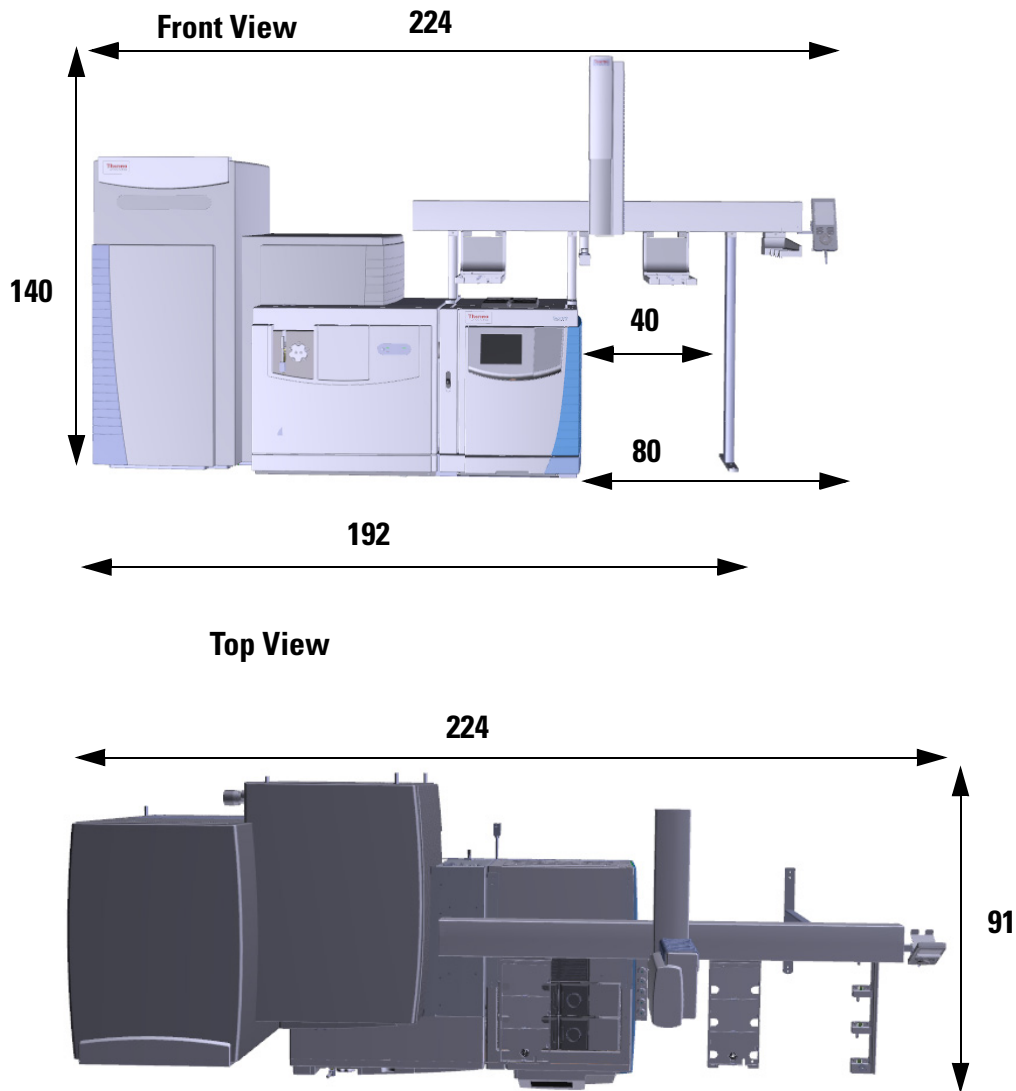
If you have a Q Exactive GC or Exactive GC system with the TriPlus RSH autosampler you need a clearance of 95 cm (37 in.) above the GC and to leave at least 44 cm (17 in.) to the right of the instrument to accommodate the 99 cm (39 in.) working range for the autosampler. See [Figure 2-3](#).



All dimensions in cm.

Figure 2-3. Dimensions of the Q Exactive GC and Exactive GC systems with TriPlus RSH autosampler

If you have a Q Exactive GC or Exactive GC system with the TriPlus RSH autosampler with the extended X-rail you will need a clearance of 95 cm (37 in.) above the GC and to leave at least 80 cm (32 in.) on the right side of the system to accommodate the a 135 cm (53 in.) working range for the autosampler. See [Figure 2-4](#).



All dimensions in cm.

Figure 2-4. Dimensions of the Q Exactive GC and Exactive GC systems with TriPlus RSH autosampler with extended X-axis

NOTICE If you have a TriPlus RSH autosampler with the extended X-axis rail option, the workbench must be at least 1 × 1.92 m (3 × 6 ft 4 in) long for the GC/MS system to accommodate the extra support leg. ▲

Minimum Clearance

Allow at least 15 cm (6 in.) of clear space behind the system for proper air circulation and for clearance of the gas lines and electrical connections. This also provides sufficient space for accessing the fan filters on the rear side of the MS. Also, allow at least 92 cm (36 in.) of vertical clearance between the top of the mass spectrometer and any shelves above it. Be sure to leave 46 cm (18 in.) of extra space to the right of the Q Exactive GC or Exactive GC system for performing maintenance.

The mechanical pump must sit on the floor under the workbench and access the rear of the mass spectrometer via a fore vacuum hose. The mechanical pump sits on a metal tray that acts as secondary containment in case of an oil leak. The tray is 45 cm in length by 32.75 cm in width. If the workbench does not have room underneath for the mechanical pump, the clearance behind the workbench must accommodate the mechanical pump and oil containment tray.

To allow shutting off the mass spectrometer in an emergency, free access to the power panel on the left side and to the power column on the rear side of the instrument must be possible at any time.

NOTICE Avoid blocking the ventilation slots at the rear of the instrument. Items may fall behind the instrument, inhibit airflow, and cause the system to overheat. ▲

Moving the Instrument

Q Exactive GC and Exactive GC instruments are provided with four retractable handles. Each instrument is shipped on a pallet with the handles pulled out and fixed on the pallet. Safety catches prevent the handles from unintentionally being retracted after they have been pulled out.

Because of a weight of about 180 kg, Exactive Series instruments are too heavy for one person alone to handle safely. Lifting and moving an instrument requires the effort of at least *six persons*. The instrument is shipped with two lifting devices, each providing sufficient space for three persons that are standing side by side. Refer to the *Q Exactive GC and Exactive GC Operating Manual* for instructions about using the lifting devices.

An instrument with attached lifting devices does not fit through a door with a width of 80 cm (32 in.), in contrast to the unpacked instrument alone. Furthermore, the six persons that carry the instrument require considerable space for maneuvering. Therefore, Thermo Fisher Scientific recommends using a pallet jack to move the instrument and to lift it to the height of the workbench.

NOTICE The instrument's center of gravity is at the top of the front side: the instrument has a tendency to tilt forward. When lifting the instrument, support the top of the instrument and keep the tilt angle below 5°; never exceed 10°. ▲

The rear pair of the four support points for the instrument consists of wheels. Thus, only two persons are necessary for moving the instrument into its final position on a bench, while holding the two front handles.

Connecting the Forepump

Connect the power supply cord for the forepump of a Q Exactive GC or Exactive GC instrument to the mass spectrometer.

The vacuum hose is made of reinforced material. It has a length of 2.0 m (79 in.). Because of its large bending radius the workable length of the vacuum hose is significantly shorter. For information about the exhaust system, see [page 6-2](#).

Chapter 3 Operating Environment

Attention to the operating environment will ensure continued high performance of your system. Any expenditures for air conditioning are more than offset by good sample throughput and reduced repair costs. The air conditioning must be capable of maintaining a constant temperature in the immediate vicinity of the system without producing excessive draft.

NOTICE It is your responsibility as the user to provide an acceptable operating environment. ▲

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- “Humidity” on page 3-4
- “Vibration” on page 3-4
- “Radio Frequencies” on page 3-4
- “Altitude” on page 3-5

Temperature

The laboratory room temperature must be maintained between 15 and 26 °C (59 and 78 °F).

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

There must be a good flow of room air around the system, and the air conditioning system must be capable of maintaining a constant temperature (within the temperature specification given above) in the immediate vicinity of the system.

We recommend the installation of an air conditioner, if the specified limits will be exceeded due to unfavorable climatic conditions. Preferably, the air conditioner should be equipped with a flow controller valve and PID microprocessor control (available e.g. from Landis & Gyr, Polygyr RWX..., see www.landisgyr.com). This ensures temperature drifts within the limits given above.

NOTICE Do not put the instrument under an air duct, near windows, or near heating and cooling sources. Temperature fluctuations of 1°C or more over a 10 minutes period can affect performance. ▲

Heat Output of Q Exactive GC Systems

The air conditioning load for a typical Q Exactive GC or Exactive GC system (with data system, GC, and autosampler) is approximately 4.6 kW (16000 BTU/h). [Table 3-1](#) shows the approximate heat output of each module.

Table 3-1. Heat output for a typical Q Exactive GC/Exactive GC system

Module	Heat output [W]	Heat output [BTU/h]
Mass spectrometer	1500	5 120
Gas chromatograph	2000	6830
TriPlus RSH autosampler	200 ^a or 400 ^b	683 ^a or 1366 ^b
Monitor	35	120
Computer	470	1 600
Laser printer (optional)	350 ^c	1 200 ^c
Total	4555 or 4755 (GC)	15553 or 16263 (GC)

^a With one power module

^b With two power modules

^c Not a standard part of the data system

Humidity

The relative humidity of the operating environment must be between 40 and 70%, with no condensation. It is recommended that your laboratory be equipped with a temperature/humidity monitor to ensure that your laboratory is always within the required temperature and humidity specifications.

NOTICE Operating a Q Exactive GC or Exactive GC system at very low humidity might cause the accumulation and discharge of static electricity, which can shorten the life of electronic components. Operating the system at high humidity might cause condensation, oxidation, and short circuits, and will also block the filters on the cooling fans. ▲

Vibration

Floors must be free of vibration caused, for example, by equipment in adjoining locations.

NOTICE Because of the natural vibration of the forepump during operation, it must not have any mechanical contact to the mass spectrometer with exception of the vacuum hose. Otherwise, the vibration might impede the performance of the instrument. Therefore, install the pump on the floor beneath the mass spectrometer and not near the system on the workbench. ▲

Propagation of vibrations and their influence on complex instrumentations are difficult to predict. We encourage you to contact us at support.ftms.bremen@thermofisher.com if you have questions or concerns about your laboratory.

Radio Frequencies

Q Exactive GC and Exactive GC instruments are able to withstand electromagnetic fields of 1 V/m in the frequency range 26 MHz to 1 GHz without any influence to operation.

Q Exactive GC and Exactive GC instruments are designed to work in a controlled electromagnetic environment. Do not use radio frequency transmitters, such as mobile phones, in close proximity to the instrument.

If strong radio transmitters are operating close to your laboratory, you should contact us at support.ftms.bremen@thermofisher.com for advice. Because of the complexity of such influences, no general suggestion can be given in this guide.

Altitude

Q Exactive GC and Exactive GC systems are designed for indoor use at an altitude of up to 2000 m (6500 ft) above sea level. Do not use the systems above 2000 m.

Chapter 4 Line Power

The performance and longevity of your system can be affected by the quality of line power supplied to the system. To ensure that your instrument performs optimally and that it is not damaged by line power fluctuations, please verify that you comply with all power quality requirements.

NOTICE It is your responsibility as the user to provide a source of power of acceptable quality for the operation of your system. ▲

Contents

- “Available Outlets” on page 4-2
- “Connecting Mass Spectrometer and Modules to Wall Outlets” on page 4-5

Available Outlets

Exactive Series instruments 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.

Notice for Customers in North America 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. You need to supply a dedicated single phase 30 amp 208 V AC power line with a good earth ground that terminates in a NEMA L6-30R receptacle located within 6 feet of the desired instrument location. ▲

The mass spectrometer must be properly grounded. For this reason, the power cable of the MS must be connected to a wall outlet with grounding pin. Make sure that the grounding pin of this power cable is connected to earth ground, even when a buck/boost transformer or other upstream equipment (for example, UPS) is used.

The interconnected power outlets for the system are to have a common point to one ground connector. If there are two such points, each of which is connected to separate external ground, they will cause noise current to flow through the ground system via the ground loop that is formed.

Voltage between ground and neutral line should be less than 1 Volt.

NOTICE Power is to remain on. The system should remain on and pumping continuously for optimum performance. Nevertheless, the system must be disconnected from mains in case of emergency or for other reasons (for example, maintenance). ▲

Basic Power Requirements for the Q Exactive GC and Exactive GC GC/MS Systems

Use the following guidelines to ensure your site is equipped with enough power to support the Q Exactive GC or Exactive GC GC-MS systems. All circuits should be 50/60 Hz \pm 2 Hz, single-phase with < 6% total harmonic distortion.

- Circuit 1: **Q Exactive GC or Exactive GC MS plus the foreline pump.** 230 VAC \pm 10%, frequency of 50/60 Hz, single phase, 16 A_{MAX} (tripping characteristic C).
- Circuit 2: **GC.** 230 VAC \pm 10%, 10 A_{MAX}. The GC cannot be reconfigured in the field.

- **Additional Circuits:** Additional circuits are needed for the computer or other equipment. 120 VAC+6/-10% or 230 VAC \pm 10%.

NOTICE Due to the power draw of the Q Exactive GC or Exactive GC MS and GC, each instrument must be on its own dedicated circuit. These two circuits must be separate from the circuits used for the computer and other equipment such as the autosampler. ▲

Table 4-1. System power requirements for the Q Exactive GC and Exactive GC GC-MS systems

Equipment	Wall Outlets	Max Current (A) at 230 VAC (\pm 10%)	Maximum Power (W)
Q Exactive GC or Exactive GC MS ^a	1	15	3450 (700 W effective)
Foreline pump	N/A	3.4	550
TRACE 1310 ^a	1	10	2000
Computer ^b	Additional (as needed)	2.6	600
Monitor ^b	Additional (as needed)	1	240
TriPlus RSH ^c Sampling system	Additional (as needed)	1.7	200 with one power module 400 with two power modules
TriPlus 100 Sampler	Additional (as needed)	—	200 with one power module 400 with two power modules
TriPlus 300 Headspace	Additional (as needed)	5.7	1300
Direct Probe Controller	Additional (as needed)	1	240

^aThis instrument must be on its own circuit.
^bPower requirements vary by manufacturer.
^cIf the using the temperature controlled drawer option, one additional circuit is needed.

The power quality supplied to your system is very important. It must be stable and within the minimum specifications listed in “[Quality of Power](#)” on [page 8-5](#).

Power Cables and Connectors

The power cable to the mass spectrometer is 5 m (16 ft) long. See left photo in [Figure 4-1](#). This power cable is shipped with the 16 A version of a 3 pole CEE male connector, which is rated at 16 A and 230 V AC. The right photo in [Figure 4-1](#) shows the wall receptacle required for the mass spectrometer (IP 44; 3 poles; 250 Volt; 50/60 Hz; blue; IEC 60309.1 and 60309.2).

The Q Exactive GC and Exactive GC GC-MS systems require two power cables and wall receptacles: one for the mass spectrometer and one for the TRACE 1310 GC. Two receptacles (P/N 2105500) are provided by Thermo Fisher Scientific as part of the Preinstallation Kit. Two power cables (P/N 2112490) are provided by Thermo Fisher Scientific as part of the Installation Kit.



Figure 4-1. Power cable and wall receptacle

Power Cable for the Forepump

The power cable for the forevacuum pump is shipped as part of the forevacuum pump package. The foreline pump for the Q Exactive GC and Exactive GC systems is plugged into the MS with the same cable used to connect the power strip.

Power Cables of Peripherals

The cables for personal computer, monitor, and Ethernet switch are provided by Thermo Fisher Scientific. They are approximately 2 m (6 ft) long. Local codes in your area might require the installation of another type of plug and receptacle. The Thermo Fisher Scientific field service engineer for your country provides the appropriate power plugs.

Connecting Mass Spectrometer and Modules to Wall Outlets

Ensure that the wall outlet specifications are not exceeded. The mass spectrometer must have a separate “clean” line leading to a main fuse to guarantee disturbance-free operation. Locally supplied personal computer hardware must use the same power line and ground connection as the mass spectrometer.

The electrical wall outlet for the main power of the mass spectrometer should be located at the wall near the intended location of the instrument.

Power Supply for the Forepump

Connect the power supply cord for the forepump of a Q Exactive GC or Exactive GC GC-MS system to the mass spectrometer.

Power Supply for Other Modules

For gas chromatographs and data systems, please use wall outlets. Additional power outlets might be required for test and cleaning equipment, such as an oscilloscope and ultrasonic bath. See [Table 4-2](#) on [page 4-6](#) for a sample laboratory setup.

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. We recommend at least six (6) spare outlets behind the system and three (3) close to the workbench space within your laboratory. All single-phase auxiliary wall outlets should use the same ground as the power line of the instrument. To prevent overloading the circuit, connect mass spectrometer, forepump, gas chromatograph, and data system to separate wall outlets.

NOTICE To prevent overloading the circuit, never connect mass spectrometer and GC to the same electrical wall outlet circuit. ▲

NOTICE The specifications on the individual modules might vary from those in this guide. Refer to the manuals that came with your modules for power requirements and specifications. The power specifications on the module and in the respective manual always supersede those in this guide. ▲

Power Outlets in Laboratories

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. Place the outlets for the MS system and GC system behind the MS workbench. Place the outlets for the data system—computer, monitor, Ethernet switch, and (optional) printer—behind the data system workbench. See [Figure 2-1](#) on [page 2-5](#) for the optimum locations for power outlets in the most typical workbench setups.

See the sample laboratory setup in [Table 4-2](#) for the recommended number of outlets.

Table 4-2. Sample laboratory setup

	Item	Outlets
GC system	Autosampler	1 or 2
	GC	1 (230 V)
MS system	Mass spectrometer	1 (230 V)
	Forepump ^a	—
Data System	Data system computer	1
	Monitor	1
	Printer (optional)	1
	Ethernet switch	1
Optional	High intensity lamp (for help in instrument maintenance)	1
	Nitrogen generator	1
Total outlets required for this configuration		6–14

^a Power is supplied by MS system

NOTICE If your local area is susceptible to corrupted power or power disruptions, then an uninterruptible power supply (UPS) should be installed in your laboratory. Take the values listed in [Table 3-1](#) on [page 3-3](#) as guideline for dimensioning an UPS. ▲

Chapter 5 Consumables

Your instrument requires gases and solvents that must meet defined purity specifications. The Thermo Fisher Scientific field service engineer might also require certain solvents for the installation verification of your system.

NOTICE It is your responsibility as the user to provide correct gas and solvent supplies for the operation of your system. ▲

Contents

- “Fittings and Parts” on page 5-2
- “Gases” on page 5-3
- “Cleaning Agents” on page 5-7

Fittings and Parts

Table 5-1 lists the minimum parts that are required to connect the mass spectrometer to your gas delivery system.

Table 5-1. Gas connection hardware required

Description		Provided / Not provided
Nitrogen	6 mm OD Teflon™ hose (P/N 0690280)	10 m (33 ft) provided. You might require additional length.
	Connection for the opposite end of the Teflon hose to the nitrogen gas source	Not provided in kit. You supply these parts.
	25 ft. of brass tubing	provided
	Reducing union (P/N 1R4038-0003) to reduce Teflon tubing to a 1/8 in. compression fitting	provided
	T-piece (P/N 1128140)	provided

NOTICE Your connections and gas delivery system might vary, and it is your responsibility to supply any fittings or connections necessary during installation.

If the pressure regulator of the laboratory gas supply has an 1/8 inch NPT outlet, examples¹ of suitable 1/8-in.-to-6-mm adapters are Swagelok™ part numbers B-6M0-7-2 (female) and B-6M0-1-2 (male). ▲

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

Gases

Q Exactive GC and Exactive GC instruments require nitrogen gas for the C-Trap bath gas, and HCD collision gas. Your system can use large amounts of gas during daily operations. It is essential that the gas be delivered with the necessary pressure and purity. This section provides information on the purity and pressure that your system requires.

NOTICE Contaminants introduced during the installation of house lines used for gas delivery can cause damage to the system. Ensure that all gas lines used with your system have been cleaned of all particulates and oils. You are responsible for any damage to the instrument caused by contaminants introduced from your gas delivery system. ▲

NOTICE Do not store gas cylinders where they can damage cables or gas lines, and secure them in accordance with standard safety practices. ▲

Nitrogen Gas

The nitrogen gas should be of ultra high purity ($\geq 99.999\%$). Particulate filters can be a source of contamination, they are not recommended. The required gas pressure is 800 ± 30 kPa (8.0 ± 0.3 bar, 116 ± 4 psi).

NOTICE Typical nitrogen gas consumption is <10 atm-mL/min. Having a dedicated ultra high purity nitrogen supply for the C-trap gas is the best way to assure stability and performance. If the system is vented frequently, a lower grade of nitrogen may be used for venting. ▲

Table 5-2. Nitrogen Gas Specifications

Gas Type	Purity	Outlet Pressure	Regulator	Type ^a
Nitrogen	99.999%	800 ± 30 kPa (116 ± 4 psig)	Dual-stage brass regulator with stainless steel diaphragm	CGA-580

^a Connectors vary with cylinder size. Confirm that your regulator will work with your gas tank.

GC Carrier Gas Requirements

You will need a supply of ultra-high purity helium for the GC carrier gas. Typical cylinders are about 23 cm (9 in.) wide by 140 cm (55 in.) tall and output $>15,000$ kPa (>2200 psig). A single full-size tank will last about three months with a typical usage rate of 50 mL/min. If you have

additional detectors or optional accessories, please refer to your GC or autosampler manuals for information about gas requirements. See [Table 5-3](#) for all carrier gas specifications.

NOTICE Thermo Fisher Scientific installation specifications require helium as a carrier gas and nitrogen as a collision gas. You must have one tank of each gas at installation, or the field service engineer will not be able to run specifications on your Q Exactive GC or Exactive GC GC-MS system. ▲

Table 5-3. Carrier Gas Specifications

Gas Type	Purity ^a	Outlet Pressure	Regulator	Type ^b
Helium	99.999%	400–700 kPa (58–100 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.

^b Connectors vary with cylinder size. Confirm that your regulator will work with your gas tank.

Do not use hydrogen as a carrier gas. The Q Exactive GC and Exactive GC GC/MS systems are not designed for use with hydrogen as a carrier gas. ▲

Oxygen and moisture cannot be prevented from entering the system during cylinder changes. To minimize the impact of these contaminants on the GC system, high purity gas handling equipment should be used. To further protect the system from oxygen and moisture, point-of-use purifiers should be installed in the carrier gas lines just prior to the GC to remove any residual contaminants.

GC Chemical Ionization Gas

The Q Exactive GC and Exactive GC GC/MS systems are equipped with a chemical ionization (CI) reagent gas flow module, and must have the proper CI gas to run the system in CI mode. Typical CI gas flow rates are only 1-3 mL/min, so smaller tanks like lecture bottles can be used.

NOTICE Thermo Fisher Scientific installation specifications require methane as a CI gas. You must have one tank of methane at installation, or the field service engineer will not be able to run CI specifications on your Q Exactive GC or Exactive GC GC/MS system. ▲

Table 5-4. CI Gas Specifications

Gas Type	Purity	Outlet Pressure	Regulator	Type ^a
Methane	99.99% high-purity	35–240kPa (5–35 psig)	Dual-stage brass regulator with stainless steel diaphragm	CGA-350
Isobutane	99.9% instrument grade	35–240kPa (5–35 psig)	Dual-stage brass regulator with stainless steel diaphragm	CGA-510
Ammonia	99.99% anhydrous grade	35–240kPa (5–35 psig)	Consult your gas supplier for specific regulator requirements	CGA-240

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

Do not use hydrogen as a carrier gas. The Q Exactive GC and Exactive GC GC/MS systems are not designed for use with hydrogen as a carrier gas.

NOTICE Some CI gases, such as methane and isobutane, are flammable. Make sure these gases are properly exhausted and all gas fittings on the system are leak-free. Consult your local Environmental and Safety Regulations for information about how to properly exhaust fumes from your laboratory.

- Some CI gases, such as ammonia, are toxic. Make sure these gases are properly exhausted and all gas fittings on the system are leak-free. Consult your local Environmental and Safety Regulations for information about how to properly exhaust fumes from your laboratory.
- Do not exceed 240 kPa (35 psi) or you could damage the CI reagent gas flow module. ▲

Other GC Gas Specifications

If you have a TriPlus RSH autosampler with the SPME conditioning station or a TriPlus 300 Headspace autosampler, you need to obtain a low-pressure, single-stage regulator (0-30 psi) for nitrogen purging.

Table 5-5. Other Gas Specifications

Equipment	Gas Type	Purity	Maximum Pressure	Regulator	Type ^a
Direct Insertion Probe	Air	90% ^b	700 kPa (100 psig)	Dual-stage brass regulator	CGA-590
TriPlus SPME Headspace	Nitrogen	99.999%	200 kPa (30 psi)	Dual-stage brass regulator with stainless steel diaphragm	CGA-580

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

^b Pure, particle and oil free, and contained in one tank.

Gas lines should be:

- As short as possible and close to the Q Exactive GC or Exactive GC system.
- Made of copper or stainless steel when using helium, methane, or isobutane.
- Made of stainless steel when using ammonia or other corrosive gases.
- Free of oil and moisture.

Obtain the proper gas line filters, which help prevent impurities and contaminants from entering your system. Water, oxygen, and total hydrocarbons should be less than 1 ppm to avoid high background noise and prevent contamination. The GC is equipped with two intake filters that trap moisture, oxygen, and hydrocarbons.

Store gas tanks and bottles properly so they will not damage cables or gas lines. Ensure they are secured in accordance with standard safety practices.

Cleaning Agents

We recommend having the following cleaning agents available:

- A solvent, preferably acetone, but methanol and ethanol are also acceptable (in accordance with your local safety practices).
- A detergent, for example, Alconox
- Several liters of distilled water.

Chapter 6 Exhaust

The proper performance of your system can be affected by the exhaust arrangements for the instrument. Vacuum wastes must be vented properly.

NOTICE It is your responsibility as the user to provide proper exhaust systems for the operation of your system. ▲

Exhaust System

It is mandatory to connect the forepump to a fume exhaust system. The forepump eventually exhausts much of what is introduced into the mass spectrometer, including the small amount of oil vapor that mechanical pumps can emit. It is your responsibility to provide an adequate exhaust system.

Supply a 1-in. i.d. hose to the building exhaust air system. The pump exhaust contains carrier gas, solvents, analytes, and a small amount of oil vapor. These materials may be flammable, poisonous, or corrosive. Do not allow the exhaust from the foreline pump, which includes your analytes, to accumulate to unsafe levels in your laboratory. Consult your local Environmental and Safety Regulations for information about how to properly exhaust fumes from your laboratory.

NOTICE An efficient fume exhaust system is required for the proper operation of your forepump. The frequency of the purging is dependent on the throughput of your system. ▲

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

Ventilation

Most of the nitrogen that is introduced into the Q Exactive GC and Exactive GC systems escapes into the laboratory atmosphere. Therefore, provide for good air exchange to prevent accumulation of gaseous nitrogen in the laboratory.

Chapter 7 Installation

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

When your lab site preparation is completed and the system is delivered, please call your Thermo Fisher Scientific office to arrange for an installation date.

Contents

- “Performance Test Samples for Q Exactive GC and Exactive GC Systems” on [page 7-2](#)

NOTICE Store the instrument in a protected location indoors. Take the specifications described in “[Temperature](#)” on [page 3-2](#) as a guideline for the temperature in the storage room. ▲

Performance Test Samples for Q Exactive GC and Exactive GC Systems

The performance kit for the Q Exactive GC and Exactive GC instruments listed in [Table 7-1](#) is needed for installation. It does not come with the mass spectrometer but is shipped separately before installation.

The installation will not begin until the arrival the listed in [Table 7-1](#)!

Table 7-1. Performance Kit for Q Exactive GC and Exactive GC instruments

Product Name	Product Number
Performance Kit	1R120705-PERF

Chapter 8 General Preinstallation Information

This chapter provides general preinstallation information for your MS system.

Contents

- “Instrument Arrival” on page 8-2
- “Installation” on page 8-3
- “Operating Environment” on page 8-5

Instrument Arrival

When your lab site preparation is completed, and the system is delivered, call your local Thermo Fisher Scientific office to arrange for an installation date.

Thermo Scientific instruments are transported either by carriers who specialize in the handling of delicate machinery, or for long distance shipment by airfreight. Occasionally, however, equipment inadvertently does get damaged in transit.

Take the following precautions when receiving material:

- Check carefully for obvious damage or evidence of rough handling.
- If external damage is apparent, take photographs, note this fact on all copies of the receiving documents and describe briefly the extent of the damage. Drivers should sign (or put their initials) next to your comments to signify agreement with your observations.
- Contact your Thermo Fisher Scientific office to report the damage and—please—let Thermo Fisher Scientific field service engineers check for further damage.

NOTICE If the instrument shipping container, ShockWatch™, 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. ▲

NOTICE Freight insurance requires that obvious damage be noted on the receiving documents. Thermo Fisher Scientific will 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**, preferably the installation site. Take the specifications described for the laboratory in this guide as a guideline for the temperature and humidity in the storage room. If you have questions about moving your system, contact your local Thermo Fisher Scientific office.

Transportation Risk

Transportation risk depends on the terms of delivery agreed. The terms of shipment determine who has responsibility for filing a claim against the carrier if the system is damaged in transit.

Installation

It is the policy of Thermo Fisher Scientific that the customer should not unpack the system or accessory items prior to installation of the system.

NOTICE Where buck/boost transformers or power conditioning units are supplied, it is the responsibility of the customer to have these units installed by an electrician prior to instrument installation. ▲

NOTICE A forklift or a palette-jack will be of great benefit for unpacking and in-house transportation of the instrument components. ▲

Installing the System

When your new mass spectrometer system is on site, ready for installation, a Thermo Fisher Scientific field service engineer will install it.

During the installation, the Thermo Fisher Scientific field service engineer will demonstrate the following:

- The basics of equipment operation and routine maintenance.
- The performance specifications that are in force at the time of the purchase of the system.

NOTICE Consumables sent with the system are intended for use by the Thermo Fisher Scientific field service engineer during the installation. ▲

Key Operator

Experience has shown that the maximum benefit can be derived from a scientific instrument if there is one person, a key operator, who has major responsibility for that instrument. It is recommended that you designate a key operator to oversee the operation and maintenance of the system in your laboratory. The key operator should be available to the installing engineer throughout the installation. This person will also be the key figure in the communication between your laboratory and Thermo Fisher Scientific.

NOTICE Do not plan to use your new system for sample analysis until the installation is complete and the Acceptance Form has been signed. ▲

Advanced Training Courses

Thermo Fisher Scientific provides both introductory and advanced training courses in analytical techniques, together with specialized operation and maintenance courses for Thermo Scientific products.

It is also recommended that some months after your mass spectrometer system has been installed, the key operator receive an advanced training for the operation and maintenance of the system from Thermo Fisher Scientific. After this training, the key operator can conduct an in-house training program on your site for your own people and certify others to operate the instrument.

For information concerning course schedules and fees, please contact the following address or your local Thermo Fisher Scientific office:

Thermo Fisher Scientific
Hanna-Kunath-Str. 11
28199 Bremen

Germany

Phone: +49 (0) 421 - 54 93 0

Fax: +49 (0) 421 - 54 93 426

E-mail: training.bremen@thermo.com

Preventive Maintenance

Routine and preventive maintenance of mass spectrometer is in the responsibility of the customer. Included in this category are

exchange of pump oil, replacement of filters, etc. on a regular basis. Refer also to the manufacturers manuals delivered with the instrument—especially for the maintenance of mechanical pumps and turbomolecular pumps.

Regular preventive maintenance is essential. Regular preventive maintenance will increase the life of the system, result in maximum uptime of your system, and provide you with optimum system performance. Maintenance techniques are covered in the Operating Manual and manuals that come with your data system computer and other modules of your system.

Operating Environment

These general specifications for the operating environment help ensuring continued high performance of the system.

Lighting

Good lighting makes any work area more enjoyable. Since a lot of work is done on the computer terminal, it may be convenient to have a dimmer switch on the lights to reduce eyestrain. A small, high-intensity lamp is recommended for cleaning mass spectrometer components, source inspection, and manipulation of small components.

Particulate Matter

Particulate matter might contaminate the samples and the ion source and may limit the background level of the instrument.

The air in your laboratory must not contain excessive dust, smoke, or other particulate matter. For reference, the air should contain fewer than 35×10^6 particles per cubic meter (1×10^6 particles per cubic foot) in excess of 5 μm .

Dust can clog the air filters, causing a reduction in air flow around electronic components. Dust will also form a layer on electronic components that will act as an insulating blanket and thus reduce the heat transfer from the components to the surrounding air.

Quality of Power

The quality of power supplied to your system is very important for its performance. The quality of line voltage must be stable and within the specifications listed in this manual. The line voltage must be free voltage surges, sags, or transients.

Below are definitions for the most common voltage disturbances:

- *Harmonic distortion* is a high-frequency disturbance that might affect operation of your system. This disturbance appears as distortion of the fundamental sine wave.
- *Slow average* is a gradual, long-term change in average root mean square (RMS) voltage level, with typical durations greater than 2 s.
- *Sags and surges* are sudden changes in average RMS voltage level, with typical durations between 50 μs and 2 s.
- *Transients* (or impulses) are brief voltage excursions of up to several thousand volts with durations of less than 50 μs .

Harmonic distortion causes noise in the power supply lines and degrades instrument performance. 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 of a few microseconds duration, can cause electronic devices to fail catastrophically or to degrade and eventually shorten the lifetime of your system.

Thermo Fisher Scientific recommends using power monitoring and conditioning devices. Contact your local Thermo Fisher Scientific office and see “[Technical Assistance](#)” on [page 8-8](#) for electrical equipment suppliers.

Power Monitoring Devices

Power line disturbance analyzers are capable of detecting and recording most types of power supply problems. These instruments provide a continuous record of line performance by analyzing and printing out information on three types of voltage disturbances:

- Slow average
- Sag and surge
- Transient

In the first two cases, the duration as well as the amplitude of the disturbance is indicated by time interval recording.

The power line must be monitored continuously for seven consecutive days, 24 hours a day. If inspection of the printout indicates disturbances, the test should be terminated and corrective action taken. Then, the power should be monitored again as described above.

A variety of devices is available to monitor power supply quality. The Leibert Corporation Model 3600 and the Dranetz™ 606 Series power line disturbance analyzers are two devices capable of detecting and recording most types of power supply problems.¹

Line monitors can be rented from electrical equipment suppliers. If necessary, your local Thermo Fisher Scientific office can assist in interpretation of the results and recommend appropriate corrective measures.

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

Power Conditioning Devices

Various line voltage conditioning devices are available that can correct your line voltage problem. If you have good regulation but the power line disturbance analyzer shows transient voltages, then an isolation/noise suppression transformer should be adequate to resolve the problem. If there are both transient and regulation problems, then you should consider power conditioners, which can control both of these problems.

When nominal voltage is free from voltage sags, surges, and impulses but different from 230 V AC line to ground, the supply voltage can be lowered (bucked) or raised (boosted) using a buck/boost transformer. Buck/boost transformers are also available from Thermo Fisher Scientific.

Your electrician should install the buck/boost transformer before the installation of your system is started.

NOTICE For compliance and safety, ensure that your power conditioning devices are certified by recognized domestic and international organizations (for example, UL, CSA, TÜV, and VDE). ▲

Uninterruptible Power Supply

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

NOTICE For compliance and safety, ensure that your uninterruptible power supply (UPS) devices are certified by recognized domestic and international organizations (for example, UL, CSA, TÜV, and VDE). ▲

Technical Assistance

Occasionally, Thermo Fisher Scientific encounters line-voltage sources of unacceptable quality that adversely affect the operation of the mass spectrometer. Rectifying such power-supply problems is the responsibility of the operator. However, (upon request) Thermo Fisher Scientific will attempt to assist in diagnosis, but does not undertake to isolate and correct power-supply quality problems.

Contact your Thermo Fisher Scientific office for assistance in monitoring the line voltage in your laboratory, in selecting a line conditioner, or in locating a power consultant in your area.

Specifying power conditioning equipment is a complex task that is best handled by a company or consultant specializing in that field.

A selection of such companies¹ is listed in [Table 8-1](#):

Table 8-1. Companies specifying power conditioning equipment

Company	Address or comment	Internet
General Electric Company	Worldwide distribution network	www.ge.com
JOVYATLAS Elektrische Umformtechnik GmbH	Groninger Straße 29-37 26789 Leer, Germany Phone: +49 (491) 6002 0 Fax: +49 (491) 6002 48	www.jovyatlas.info
OnLine Power, Inc.	Conform to all applicable standards, worldwide	www.onlinepower.com
POWERVER, Inc.		www.powervar.com
Sola/ HD		www.sola-hevi-duty.com

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

Electrostatic Discharge

Electrostatic discharge (ESD) can damage the electronic components of your MS system. Thermo Scientific instruments are designed to withstand electrostatic discharges (ESD) up to 4 kV (air discharge) and 4 kV (contact discharge) with all panels in place. However, if the panels are removed and the PCBs are handled without proper precautions, the electronic components might be damaged or fail prematurely. Static electricity can develop in a variety of ways. A few examples of how electrostatic charge can develop are as follows:

- When walking across a carpet in a room that is at 20% relative humidity, as much as 35 000 V of electrostatic potential can be generated on the surface of your body. This same motion in a room at 80% 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% relative humidity can cause as much as 18 000 V of electrostatic potential to develop on your skin or 1 500 V at 80% relative humidity.
- Working in laboratory coats and clothing made of synthetic fibers can cause the accumulation of static electricity on your skin.
- Polystyrene cups and packing materials typically have a considerable electrostatic charge on them.

Many electronic components can be damaged by a discharge of electrostatic potential of as little as 50 V. ESD damage can be catastrophic causing your system to cease functioning. More commonly, however, ESD damage might cause latent problems that are detrimental to sensitive electrical components, causing premature failures. Therefore, Thermo Fisher Scientific recommends the following precautions, especially when you are operating your system at the lower end of the relative humidity specification listed above:

- 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 fiber or other static dissipating material.
- When operating the instrument, wear laboratory coats and clothing made of natural fiber or other static-dissipating material.
- Do not place polystyrene cups or packing materials on the instrument.

Legal Documents

This chapter provides legal documents.

Contents

- “FCC Compliance Statement” on [page D-2](#)
- “WEEE Compliance” on [page D-3](#)

FCC Compliance Statement

THIS DEVICE COMPLIES WITH PART 18 OF THE FCC RULES.

WEEE Compliance

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.thermoscientific.com/rohsweee 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.thermoscientific.com/rohsweee.

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 Fisher Scientific qui peuvent aider la détection des substances sujettes à la directive RoHS sont disponibles sur www.thermoscientific.com/rohsweee.

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