



TSQ Duo

Mass Spectrometer

Preinstallation Requirements Guide

1R120587-0001 Revision C December 2015

Thermo
SCIENTIFIC

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Software version: Thermo Foundation 3.1 SP1; Thermo Scientific™ Dionex™ Chromeleon™ 7 (release 7.2 SR3 MUa or later).

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TSQ Duo Installation Request Form

Dear Customer:

Read the *TSQ Duo 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, scan and email, 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.

- | | |
|---|--|
| <ul style="list-style-type: none"><input type="checkbox"/> 1. All laboratory remodeling has been completed.<input type="checkbox"/> 2. Your <i>TSQ Duo</i> system is on site.<input type="checkbox"/> 3. The principal operator is scheduled to be available during the installation / certification period.<input type="checkbox"/> 4. Doorways, hallways, and so on are a minimum width of 81 cm (32 in.).<input type="checkbox"/> 5. Available floor area is sufficient and flooring will support the load.<input type="checkbox"/> 6. Sufficient bench space is available for all of the equipment. List the following: Width: _____ Depth: _____ Height: _____<input type="checkbox"/> 7. Workbench can support the load of the system and is free from vibration.<input type="checkbox"/> 8. Lighting is adequate.<input type="checkbox"/> 9. Work area is free of magnetic disruption and electrostatic discharge.<input type="checkbox"/> 10. Main power is installed and is in compliance with local electrical codes.<input type="checkbox"/> 11. Power for test and cleaning equipment is installed.<input type="checkbox"/> 12. Match power cables specified on the sales order. Refer to the power requirements for more information. | <ul style="list-style-type: none"><input type="checkbox"/> 13. Voltage of power outlet has been measured. Note <i>measured</i> voltage: _____<input type="checkbox"/> 14. Air conditioning is adequate for temperature, humidity, and particulate matter control. The laboratory can be maintained at a constant temperature, between 15 and 35 °C (59 and 95 °F).<input type="checkbox"/> 15. Relative humidity is between 5% and 95% with no condensation.<input type="checkbox"/> 16. All gases required are on site, gas lines are installed, and gas regulators that terminate in 1/8" fittings are available. List gases and purity: _____ _____ _____<input type="checkbox"/> 17. All relevant safety regulations have been followed.<input type="checkbox"/> 18. I have read and agree to the End User License Agreements for any software purchased with my system: Signature: _____ _____ |
|---|--|

Principal Operator Level of Experience

GC, Injector and Column Knowledge:
Mass Spectrometer Theory Knowledge:
Chromeleon Data System Knowledge:

- | | | |
|--------------------------------------|-----------------------------------|----------------------------------|
| <input type="checkbox"/> Experienced | <input type="checkbox"/> Moderate | <input type="checkbox"/> Limited |
| <input type="checkbox"/> Experienced | <input type="checkbox"/> Moderate | <input type="checkbox"/> Limited |
| <input type="checkbox"/> Experienced | <input type="checkbox"/> Moderate | <input type="checkbox"/> Limited |

Additional Information

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 you for the Field Service Engineer's time if the installation requirements are not met on the date of the installation. To avoid any additional cost, please ensure your site is properly prepared.

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

Name _____
Company _____ Telephone _____
Address _____
City _____ State _____ Country _____
Signature _____ Date _____

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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., 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.

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Declaration

Manufacturer: Thermo Fisher Scientific

Thermo Fisher Scientific is the manufacturer of the instrument described in this manual and, as such, is responsible for the instrument safety, reliability and performance only if:

- installation,
- recalibration, and
- changes and repairs

have been carried out by authorized personnel and if:

- the local installation complies with local law regulations,
- the instrument is used according to the instructions provided, and
- if its operation is only entrusted to qualified trained personnel.

Thermo Fisher Scientific is not liable for any damages derived from the non-compliance with the aforementioned recommendations.

Regulatory Compliance

Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When the system is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards as described in the next section or sections by product name.

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

EMC and Safety Standards

- ITQ, and Ion Trap Series standards: EMC: EN 61326-1:2006. Safety: IEC 61010-1:2001, IEC 61010-2-081:2001
- Direct Probe Controller (DPC) standards: EMC: EN 61326-1:2013. Safety: IEC 61010-1:2001, IEC 61010-2-081:2001
- ISQ Series standards: EMC: EN 61326-1:2013. Safety: IEC 61010-1:2010 (ed. 3); IEC 61010-2-081:2015 (ed. 2); IEC 61010-2-010:2014 (ed. 3); IEC CB SCHEME CERT NO. DE 3-30000
- TSQ 8000 Evo and TSQ Duo standards: EMC: EN 61326-1:2013. Safety: IEC 61010-1:2010 (ed. 3); IEC 61010-2-081:2015 (ed. 2); IEC 61010-2-010:2014 (ed. 3); IEC CB SCHEME CERT NO. DE 3-30034

Low Voltage Safety Compliance

This device complies with Low Voltage Directive 2011/95/EC.

FCC Compliance Statement

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



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

Notice on Lifting and Handling of Thermo Scientific Instruments

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

Notice on the Proper Use of Thermo Scientific Instruments

In compliance with international regulations: Use of this instrument in a manner not specified by Thermo Fisher Scientific could impair any protection provided by the instrument.

Notice on the Susceptibility to Electromagnetic Transmissions

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

For manufacturing location, see the label on the instrument.

WEEE Compliance

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



Thermo Fisher Scientific has contracted with one or more recycling or disposal companies in each European Union (EU) Member State, and these companies should dispose of or recycle this product. See www.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:



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Conformité DEEE

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



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Preface

This guide contains detailed information for preparing your site for installing a Thermo Scientific™ TSQ Duo triple-quadrupole mass spectrometer.

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- [About Your System](#)
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About Your System

Thermo Scientific systems provide the highest caliber gas chromatography/mass spectrometry (GC/MS) instrumentation available on today's market.

GC/MS represents a combination of two powerful analytical techniques: GC, which acts as a separation technique, and MS, which acts as a detection technique. Complex mixtures of individual compounds can be injected into the GC, either manually or by an autosampler and then separated for presentation to the MS. The MS will generate a mass spectrum of the GC eluate and its components. The mass spectrum can then be used for qualitative identification as well as accurate and precise quantification of the individual compounds present in the sample.

A triple-quadrupole GC/MS/MS system provides the extra selectivity required for trace analysis of compounds in complex matrices.



WARNING Thermo Scientific systems operate safely and reliably under carefully controlled environmental conditions. If the equipment is used in a manner not specified by the manufacturer, the protections provided by the equipment might be impaired. If you maintain a system outside the specifications listed in this guide, failures of many types, including personal injury or death, might occur. The repair of instrument failures caused by operation in a manner not specified by the manufacturer is specifically excluded from the standard warranty and service contract coverage.

Related Documentation

The TSQ Duo system includes Help and these manuals as PDF files:

- *TSQ Duo Preinstallation Guide*, PN 1R120587-0001
- *TSQ Duo User Guide*, PN 1R120587-0002
- *TSQ Duo Hardware Manual*, PN 1R120587-0003
- *TSQ Duo Spare Parts Guide*, PN 1R120587-0004
- *TSQ Duo AutoSRM User Guide*, PN 1R120587-0005

❖ To view product manuals

Go to the desktop and then **Manuals > TSQ Duo**.

❖ To open Help

- From the TSQ Duo window, choose **Help > TSQ Series Help**.
- If available for a specific window or dialog box, click **Help** or press the F1 key for information about setting parameters.

For more information, visit www.thermoscientific.com.

System Requirements

Your TSQ Duo data system must meet these minimum requirements.

| System | Requirements |
|----------|--|
| Hardware | <ul style="list-style-type: none"> • 4.6 GHz processor with 16GB RAM • DVD/CD-ROM drive • Video card and monitor capable of 1680 × 1050 resolution • 1000 GB hard drive • Quad core processor |
| Software | <ul style="list-style-type: none"> • Microsoft™ Windows™ 7 SP1 Operating System (64-bit) • Thermo Foundation¹ • Thermo Scientific™ Dionex™ Chromeleon™ 7 (release 7.2 SR3 MUa or later)² |

¹Check release notes for compatibility with TSQ Series instrument control software.

²Check release notes for compatibility with Thermo Foundation and TSQ Series instrument control 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.

Special Notices

Special notices include the following:

IMPORTANT Highlights information necessary to prevent damage to software, loss of data, or invalid test results; or might contain information that is critical for optimal performance of the system.

Note Highlights information of general interest.

Tip Highlights helpful information that can make a task easier.

Safety Symbols and Signal Words

All safety symbols are followed by **WARNING** or **CAUTION**, which indicates the degree of risk for personal injury, instrument damage, or both. Cautions and warnings are following by a descriptor. A **WARNING** is intended to prevent improper actions that *could* cause personal injury. A **CAUTION** is intended to prevent improper actions that *might* cause personal injury or instrument damage. You can find the following safety symbols on your instrument or in this guide.

| | |
|---|---|
|  | BIOHAZARD: Indicates that a biohazard <i>will, could, or might</i> occur. |
|  | BURN HAZARD: Alerts you to the presence of a hot surface that <i>could or might</i> cause burn injuries. |
|  | ELECTRICAL SHOCK HAZARD: Indicates that an electrical shock <i>could or might</i> occur. |
|  | FIRE HAZARD: Indicates a risk of fire or flammability <i>could or might</i> occur. |
|  | FLAMMABLE GAS HAZARD: Alerts you to gases that are compressed, liquefied or dissolved under pressure and can ignite on contact with an ignition source. This symbol indicates this risk <i>could or might</i> cause physical injury. |
|  | GLOVES REQUIRED: Indicates that you must wear gloves when performing a task or physical injury <i>could or might</i> occur. |
|  | HAND AND CHEMICAL HAZARD: Indicates that chemical damage or physical injury <i>could or might</i> occur. |
|  | INSTRUMENT DAMAGE: Indicates that damage to the instrument or component <i>might</i> occur. This damage might not be covered under the standard warranty. |
|  | LIFTING HAZARD: Indicates that a physical injury <i>could or might</i> occur if two or more people do not lift an object. |
|  | MATERIAL AND EYE HAZARD: Indicates that eye damage <i>could or might</i> occur. |
|  | RADIOACTIVE HAZARD: Indicates that exposure to radioactive material <i>could or might</i> occur. |



READ MANUAL: Alerts you to carefully read your instrument's documentation to ensure your safety and the instrument's operational ability. Failing to carefully read the documentation *could* or *might* put you at risk for a physical injury.



TOXIC SUBSTANCES HAZARD: Indicates that exposure to a toxic substance could occur and that exposure *could* or *might* cause personal injury or death.



For the prevention of personal injury, this general warning symbol precedes the **WARNING** safety alert word and meets the ISO 3864-2 standard. In the vocabulary of ANSI Z535 signs, this symbol indicates a possible personal injury hazard exists if the instrument is improperly used or if unsafe actions occur. This symbol and another appropriate safety symbol alerts you to an imminent or potential hazard that *could cause personal injury*.

Hydrogen Safety Precautions

Hydrogen is a colorless, odorless, highly flammable gas with the molecular formula H_2 and an atomic weight of 1.00794, making it the lightest element. Hydrogen gas presents a hazard as it is combustible over a wide range of concentrations: at ambient temperature and pressure, this ranges from about 4% to 74.2% by volume.

Hydrogen has a flash point of $-423^\circ F$ ($-253^\circ C$) and an auto-ignition temperature of $1,040^\circ F$ ($560^\circ C$). It has a very low ignition energy and the highest burning velocity of any gas. If hydrogen is allowed to expand rapidly from high pressure, it can self-ignite. Hydrogen burns with a flame that can be invisible in bright light.



WARNING FIRE HAZARD: The use of hydrogen as a carrier gas is dangerous. Hydrogen is potentially explosive and must be used with extreme care. Any use of hydrogen gas must be reviewed by appropriate health and safety staff and all installations of hydrogen systems must be performed to applicable codes and standards. Thermo Fisher Scientific assumes no liability for the improper use of hydrogen as a carrier gas.

Before you begin using hydrogen, you should conduct a risk assessment based on the quantity of hydrogen to be used and the conditions of your laboratory. You should ask yourself:

“What hydrogen hazards associated with this project are most likely to occur?”

“What hydrogen hazards associated with this project have the potential to result in the worst consequences?”

- Try to reduce or eliminate the higher risks by using the proper ventilation to remove hydrogen gas before an ignitable concentration can accumulate. You should also consider purging the hydrogen to further reduce hazards and ensure anyone who will be working with hydrogen has basic hydrogen safety training.

- As with laboratory safety in general, be sure to wear safety glasses, laboratory coats, gloves, etc. Typically there are no specific requirements for gaseous hydrogen, other than eye protection when working with a compressed gas. If working with liquid (cryogenic) hydrogen, insulated gloves and protective shoes should be worn in addition to eye protection.
- You should post “No Smoking” and “No Open Flames” signs to identify hydrogen sources and cylinders. Maintain, inspect and leak-test all hydrogen sources regularly.
- All hydrogen shutoff valves should be clearly marked and permanent hydrogen piping should be labeled as such at the supply or discharge point and at regular intervals along its length. Where hydrogen gas piping passes through a wall, the piping should be labeled on both sides of the wall.
- There should also be contingency plans in place should an incident occur.
- The site emergency response team, as well as the local fire department, should know the location of all hydrogen storage tanks.

Using Hydrogen with TSQ Duo

To use hydrogen with the TSQ Duo, you must always shut off the GC carrier gas before venting or turning off the TSQ Duo. There are three hydrogen safety screws on the TSQ Duo that **must** be in place. These are attached to your instrument at the factory.

Figure 1. Hydrogen Safety Screws on the TSQ Duo



Before powering on the TSQ Duo system, ensure that:

- All the covers and panels of the TSQ Duo system are firmly attached.
- The vent valve is tightly closed if you vented the system.
- All fittings, ferrules, and o-rings are sealed.

Hydrogen Connection Guidelines

Use the following guidelines to safely connect hydrogen to your system:

- **Piping**—Hydrogen must be delivered to equipment using appropriate piping and be done in such a way as to pose essentially no hazard to end-users. Piping systems for the delivery of hydrogen should be designed and installed by a person qualified by specific training and experience with hydrogen piping systems.

Stainless steel is usually recommended because it is a safe, cost-effective material. Piping of *black iron* or copper must not be used, as the pipe can become brittle with age. Elastomeric/plastic tubing of various plastics and polymers should not be used, unless the tubing is approved for use with hydrogen. If elastomeric/plastic tubing is used for hydrogen gas delivery, the tubing should be tested for hydrogen permeability to minimize leakage.

The hydrogen piping system must be flexible enough to endure routine thermal expansion and contraction. The system should also include considerations for the most severe condition of temperature and pressure expected during service. Piping and supports must be able to withstand static loading introduced by such things as ice and snow; and dynamic loading from high wind and earthquake.

Caution should be used if burying hydrogen piping. Proper controls should be used to protect against damage and corrosion, and also to prevent Hydrogen from entering a building if there is any leakage.

- **Fittings**—All fittings must be of the proper type approved or designed for use with hydrogen gas. Use as few fittings as possible to minimize the potential for leaks. After installation, ensure that leak testing is carried out prior to system use, and on a regular basis.

There must be no PTFE tape or other things like *plumber's putty* used to enhance a seal, as this actually is a detriment to a good seal. Ideally the best installation would use stainless steel tubing with appropriate gas-tight fittings.

Welding is usually preferred for joints in hydrogen piping systems since welding provides a better connection and reduces the potential for leaks compared to mechanical fittings. Soft solder joints are not permitted for hydrogen systems (due to the low melting point of soft solder and its potential for brittle failure at cryogenic temperatures). Brazed joints are permitted, but such joints should be protected against the possibility of external fire.

Tubing connections should be clamped to barbed or press-fit type connections. Hose clamps or *jubilee clamps* must not be used.

- **Valves**—All valves must be suitable for hydrogen service and for the specific operating conditions. Valves, including regulators, must not be used for hydrogen, unless they are designed and identified for such a use. Ball valves are often chosen because of their superior leak tightness through the valve seat. Pneumatic operators are usually chosen for remotely operated valves so that potential ignition sources (electricity) are remote from the valve.

Manual shutoff valves should be provided near each point of use, within immediate reach. If a hydrogen cylinder or hydrogen generation system is located within immediate reach, a separate point-of-use shutoff valve is usually not necessary.

Line regulators that have their source away from the point of use should have a manual shutoff valve near the point of use.

An emergency gas shutoff device in an accessible location outside the use area should be provided in addition to the manual point-of-use valve in each educational and instructional laboratory space that has a piped gas supply system.

If necessary, the piping system should have uninterruptible pressure relief. The pressure relief system should be designed to provide a discharge rate sufficient to avoid further pressure increase and should vent to a safe location outside or to a ventilation system exhaust.

Purchasing Hydrogen

Use the following guidelines when purchasing hydrogen:

- **Hydrogen Generator**—Because it minimizes the amount of hydrogen present and reduces the degree of hazard, a hydrogen generator (also called an electrolyzer) is the safest way to purchase hydrogen in the quantity used in GC/MS.

However, to minimize the degree of hazard, the hydrogen generator must only be operated in a non-explosive environment because hydrogen buildup can be ignitable. This means that your ventilation system for the room or lab hood must maintain an air exchange rate that is at least two orders of magnitude greater than the maximum hydrogen production rate of the hydrogen generator. Be sure to follow the manufacturers' directions about proper use and maintenance of the regulator.

To prevent the possibility of releasing hydrogen, the hydrogen generator should be set to shut down if:

- There is a loss of flow to the ventilation system
- A hydrogen detector alarms at 25% of the lower flammable limit of hydrogen in air.

The oxygen exhausted by the electrolyzer should be vented to the outside as well.

- **Hydrogen Cylinder**—Hydrogen can be delivered in standard laboratory gas bottles or cylinders. These cylinders have a limited amount of hydrogen in them and are a safe way to transport and store hydrogen. However, compressed hydrogen gas cylinders, like all compressed gas cylinders, must be secured in an upright position, ideally with a non-combustible chain or cable. If the cylinder falls over, the valve can be knocked off and the pressurized cylinder can take off like a rocket, which leads to the release of hydrogen and possibly an explosion, severe injury, or death. Never crack a hydrogen cylinder valve to remove dust or dirt from fittings prior to attaching a regulator, as there is a risk of self-ignition.

Properly Storing Hydrogen

Storing and handling compressed hydrogen gas and cryogenic liquid hydrogen present potential health and safety hazards. Using proper storage and handling techniques is essential to maintaining a safe work environment.

Use the following guidelines when storing hydrogen:

- Store spare hydrogen gas cylinders outside and away from doors, windows, building air intake vents, structures, and vehicle routes. This precaution applies when the hydrogen is or is not in use. Indoor storage of spare hydrogen cylinders has special requirements, which is beyond the scope of this document. Documentation for each vessel should include a description of the vessel, a list of available drawings or other documents, the most recent inspection results, and the responsible person's name.
- Prevent spare cylinders from toppling by wrapping them with chains. The chains should also be protected against corrosion and excessive heat.
- Separate spare hydrogen cylinders from oxidizing gases (such as oxygen) with a 5 ft (1.5 m) tall fire barrier with a half-hour fire rating or place the cylinders at least 20 ft (6 m) apart.
- When moving hydrogen cylinders:
 - Remove the regulator and replace the cylinder valve cap before moving.
 - Move cylinders on cylinder carts or with other appropriate transport devices.
 - Never roll or drop a cylinder and never lift a cylinder by its protective cap.
- Bulk hydrogen systems include either gaseous or liquid hydrogen in fixed installations; in some gas systems a semi-permanent trailer (tube trailer) can be used. Storage vessels for compressed hydrogen gas or liquid hydrogen should be designed, constructed, tested, and maintained in accordance with applicable codes and standards. Bulk hydrogen systems represent a level of complexity again which is beyond the scope of this document; however some general guidelines are provided.

Preface

Hydrogen Safety Precautions

- The bulk hydrogen storage system should not be located beneath electric power lines, close to other flammable gases/liquids, or close to public areas. It should be readily accessible to authorized personnel and delivery equipment, but protected from physical damage or tampering.
- As liquid hydrogen systems also have a cryogenic hazard, additional safety considerations for the use of cryogenic liquids might be necessary.

Hydrogen Safety Codes, Standards and References

The following list of safety codes, standards and references is in no way an exhaustive list. In fact, there might be federal, state or local codes that apply to your specific location. Check with all appropriate agencies with jurisdiction before installing or using a hydrogen system.

- Air Products Safetygram #4 Gaseous Hydrogen
- ANSI/AIAA standard for hydrogen safety guidelines is AIAA G-095-2004, Guide to Safety of Hydrogen and Hydrogen Systems
- ASME B31.1, Power Piping Code
- ASME B31.3, Process Piping Code
- ASME B31.8, Gas Transmission and Distribution Systems
- BCGA Code Of Practice CP4 Industrial Gas Cylinder Manifolds and Gas Distribution Pipework
- BCGA Code Of Practice CP33 The Bulk Storage of Gaseous Hydrogen at Users' Premises
- CGA G-5, Hydrogen
- CGA G-5.4, Standard for Hydrogen Piping Systems at Consumer Locations
- CGA G-5.5, Hydrogen Vent Systems
- CGA G-5.6, Hydrogen Pipeline Systems
- CGA G-5.8, High Pressure Hydrogen Piping Systems at Consumer Locations.
- FM Global Property Loss Prevention Data Sheets 7-50: Compressed Gases in Cylinders
- FM Global Property Loss Prevention Data Sheets 7-91: Hydrogen
- IGC Doc 121/04/E, Hydrogen Transportation Pipelines System Design Features
- NASA
- NSS 1740.16 Safety Standard For Hydrogen And Hydrogen Systems Guidelines for Hydrogen System Design, Materials Selection, Operations, Storage, and Transportation
- NFPA 52, Vehicular Fuel Systems Code
- NFPA 55, Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks, 2005 Edition
- NFPA 68, Standard on Explosion Protection by Deflagration Venting
- NFPA 70, National Electrical Code

- NFPA 497, Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
- NFPA 13, Standard for the Installation of Sprinkler Systems
- NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals
- NFPA 55, Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks
- NFPA 68, 2007 Standard on Explosion Protection by Deflagration Venting
- NFPA 69, Standard on Explosion Prevention Systems
- NFPA 91, Standard for Exhaust Systems for Air Conveying of Vapors
- NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials
- OSHA 29CFR1910.103 1910.103 Hydrogen

Hazardous Substances Precautions



WARNING Before using hazardous substances (toxic, harmful, and so on), please read the hazard indications and information reported in the applicable Material Safety Data Sheet (MSDS). Use personal protective equipment according to the safety requirements.

Biological Hazard Warning Note



In laboratories where samples with potential biological hazards are handled, the user must label any equipment or parts which might become contaminated with biohazardous material.

The appropriate warning labels are included with the shipment of the instrument. It is the user's responsibility to label the relevant parts of the equipment.

When working with biohazardous materials, you are responsible for fulfilling the following mandatory requirements:

- Providing instructions on how to safely handle biohazardous material.
- Training operators to be aware of potential hazards.

- Providing personal protective equipment.
- Providing instructions for what to do if operators are exposed to aerosols or vapors during normal operation (within the intended use of the equipment) or in case of single fault situations such as a broken vial. The protective measures must consider potential contact with the skin, mouth, nose (respiratory organs), and eyes.
- Providing instructions for decontamination and safe disposal of relevant parts.



WARNING The user or operator is responsible for the safe handling of hazardous chemicals or biological compounds including (but not limited to) bacterial or viral samples and the associated waste, according to international and local regulations.

Venting Toxic Gases

When analyzing toxic compounds, be aware that during the normal operation of the GC some of the sample might be vented outside the instrument through the split and purge flow vents; therefore, be sure to vent the exhaust gases to a fume hood. Consult local environmental and safety regulations for instructions in exhausting fumes from your system.

Contacting Us

There are several ways to contact Thermo Fisher Scientific for the information you need.

❖ To find out more about our products

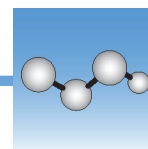
Go to www.thermoscientific.com/en/products/mass-spectrometry.html for information about our products.

❖ To get local contact information for sales or service

Go to www.thermoscientific.com/en/support-landing/support.html.

❖ To suggest changes to documentation or to Help

- Fill out a reader survey online at www.surveymonkey.com/s/PQM6P62.
- Send an e-mail message to the Technical Publications Editor at techpubs-austin@thermofisher.com.



Site Preparation

This chapter describes how to prepare your site before the Thermo Scientific Field Service Engineer arrives to install the TSQ Duo mass spectrometer.

Contents

- [Entrance Requirements](#)
- [Workbench and Space Requirements](#)
- [Lighting Requirements](#)
- [Power Requirements](#)
- [Environmental Requirements](#)
- [Gas Equipment Requirements](#)
- [Receiving Requirements](#)
- [What Happens Next?](#)

Entrance Requirements

Use the following guidelines to ensure the entrance to your site will allow for the delivery of your TSQ Duo system:

1. Ensure the width of your delivery door opening is at least 81 cm (32 in.).
2. Make sure you have enough room to move boxes around corners, into elevators, or through doorways. The table below contains the dimensions and weight of shipping boxes, so that you can make accommodations.

Table 1. Shipping Box Dimensions and Weight

| Box Contents | Length | | Width | | Height | | Weight | |
|---|--------|-----|-------|-----|--------|-----|--------|--------|
| | cm | in. | cm | in. | cm | in. | kg | lbs. |
| TSQ Duo MS* | 107 | 43 | 71 | 28 | 112 | 45 | 138 | 304 |
| TRACE 1300 or TRACE 1310 GC | 60 | 24 | 80 | 31 | 80 | 31 | 64 | 140 |
| AI/AS 1310 autosampler | 36 | 14 | 51 | 20 | 36 | 14 | 10 | 22 |
| TriPlus RSH (with standard X-axis) | 65 | 26 | 100 | 39 | 32 | 13 | 45-55 | 99-121 |
| TriPlus RSH (with extended X-axis) | 65 | 26 | 136 | 54 | 32 | 13 | 60 | 132 |
| TriPlus 100 Liquid Sampler | 65 | 26 | 100 | 39 | 32 | 13 | 45-55 | 99-121 |
| TriPlus 300 Headspace Autosampler (Box 1 of 2) | 77 | 30 | 72 | 28 | 84 | 33 | 70 | 154 |
| TriPlus 300 Headspace Autosampler (Box 2 of 2) | 79 | 31 | 64 | 25 | 100 | 39 | 25 | 55 |

* The computer, keyboard, monitor, foreline pump, and TSQ Duo Installation Kit are included in the box with the TSQ Duo.

Workbench and Space Requirements

Use the following guidelines to ensure you have enough space to set up the TSQ Duo system. See [Figure 3](#) and [Figure 4](#) for system orientation.

1. Ensure you have adequate workbench space for the system. Refer to the table below for exact measurements of each component. Use the information in the table below to configure the workbench. Be sure to leave 46 cm (18 in.) of extra space to the left of the TSQ Duo system for performing maintenance. You will also need space near the instrument for the monitor and keyboard.

Table 2. Workbench and Space Requirements

| Instrument | Depth | | Width | | Height | | Weight | |
|---|-----------------|-----------------|-------|-----|--------|-----|-----------------|-----------------|
| | cm | in. | cm | in. | cm | in. | kg | lbs |
| TSQ Duo MS | 89 | 35 | 40 | 16 | 45 | 18 | 61 | 135 |
| Foreline Pump ¹ | 46 | 18 | 20 | 8 | 25 | 10 | 24 | 52 |
| Computer ² | 48 | 19 | 20 | 8 | 43 | 17 | 12 | 27 |
| Monitor ² | 16 | 7 | 46 | 18 | 32 | 13 | 4 | 8 |
| Keyboard ² | 23 | 9 | 46 | 18 | 5 | 2 | 1 | 2 |
| TRACE 1300 GC | 60 | 24 | 44 | 17 | 45 | 18 | 35 ³ | 77 ³ |
| TRACE 1310 GC | 67 | 26 | 44 | 17 | 45 | 18 | 35 ³ | 77 ³ |
| AI 1310 Auto Injector ⁴ | 28 | 11 | 23 | 9 | 40 | 19 | 6 | 13 |
| AS 1310 Autosampler ⁴ | 28 | 11 | 41 | 16 | 40 | 19 | 6 | 13 |
| TriPlus RSH standard X axis autosampler | 80 | 32 | 99 | 39 | 74 | 29 | 25 | 55 |
| TriPlus RSH extended X-axis autosampler | 80 | 32 | 135 | 53 | 74 | 29 | 27 | 60 |
| TriPlus 300 Headspace autosampler | 55 | 22 | 82 | 32 | 73 | 29 | 63 | 139 |
| TriPlus 100 Liquid Sampler | 50 ⁵ | 20 ⁵ | 85 | 34 | 54 | 21 | 15 ⁶ | 34 ⁶ |
| Direct Probe Controller ⁷ | 58 | 23 | 33 | 13 | 12 | 5 | 6 | 13 |

¹ This item is placed on the floor under the system.

² Dimensions vary per manufacturer.

³ Add 0.8 kg (1.8 lbs) for each injector/detector module.

⁴ Mounts on top of the TRACE 1300/TRACE 1310.

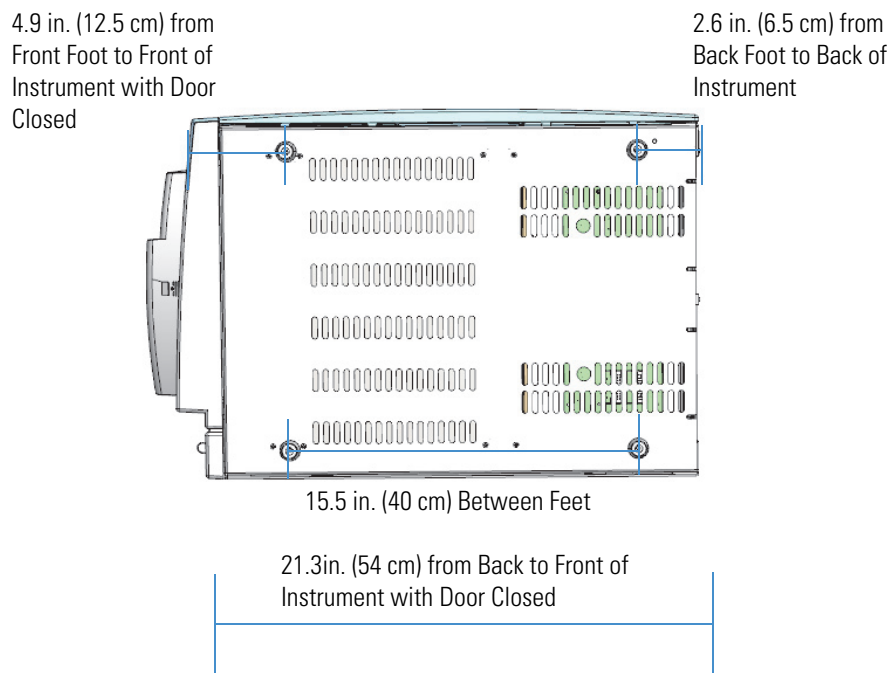
⁵ About 20 cm (8 in.) of the orthogonal crossrail (Y-axis) protrudes from the rear of the GC.

⁶ Weight without accessories.

⁷ Mounts on top of the TSQ Duo.

2. Be sure the TRACE 1300/TRACE 1310 instrument's feet fit securely on the workbench. See [Figure 1](#) for the dimensions of the feet on the bottom of the instrument.

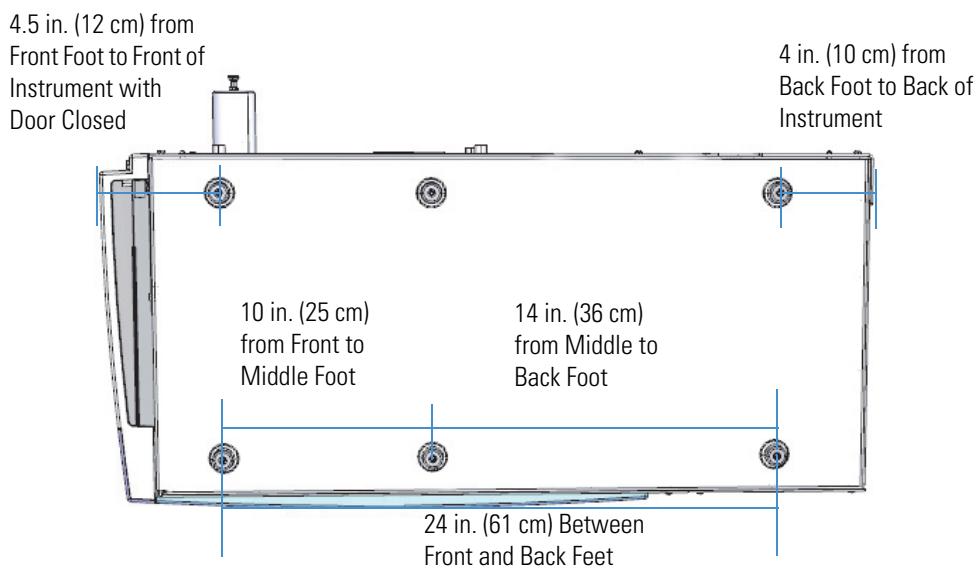
Figure 1. Dimensions of the Feet on the Bottom of the TRACE 1310/TRACE 1310 Instrument



Tip Thermo Fisher Scientific requires that all four of the instrument's feet be positioned on a bench. Overhang of the front, the back, or both ends of the instrument off the bench front or back is acceptable. If the depth of your bench is less than the distance between the factory-installed feet, please contact the factory (usaus.gcms.licensing@thermofisher.com) for your other options of positioning the instrument on such a narrow bench.

3. Be sure the TSQ Duo instrument's feet fit securely on the workbench. See [Figure 2](#) for the dimensions of the feet on the bottom of the instrument.

Figure 2. Dimensions of the Feet on the Bottom of the TSQ Duo Instrument



Tip Thermo Fisher Scientific requires that all six of the instrument's feet be positioned on a bench. Overhang of the front, the back, or both ends of the instrument off the bench front or back is acceptable. If the depth of your bench is less than the distance between the factory-installed feet, please contact the factory (usaus.gcms.licensing@thermofisher.com) for your other options of positioning the instrument on such a narrow bench.

4. Supply a 1-in. i.d. hose to the building exhaust air system, an oil mist filter, or other scrubbing device. 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.
5. Make sure you have at least 91 cm (3 ft.) of clearance above the system. This space allows room for optional accessories (such as autosamplers) and proper heat dissipation.
6. Make sure your workbench can support a standard TSQ Duo system. Keep in mind, additional instruments add to the total weight.

7. Ensure that your work area is stable and free of vibration from nearby equipment. The TSQ Duo system is a sensitive instrument. For this reason, the foreline pump must be placed on the floor below the system.

Figure 3. TSQ Duo MS and TRACE1300/TRACE 1310 GC bench setup

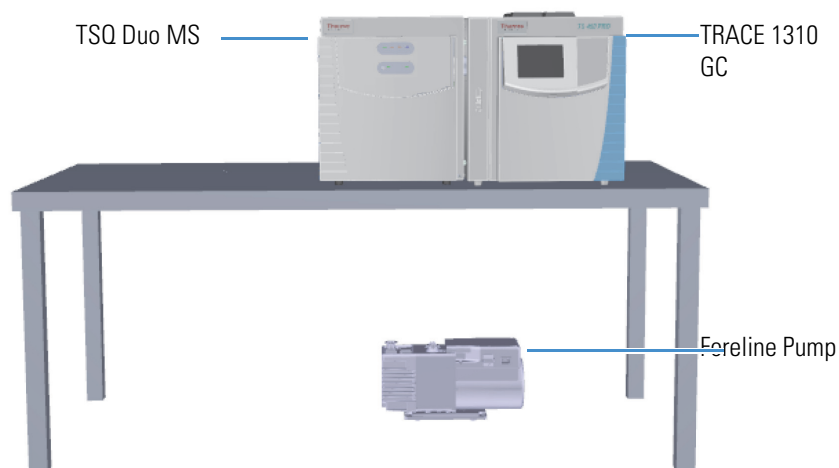
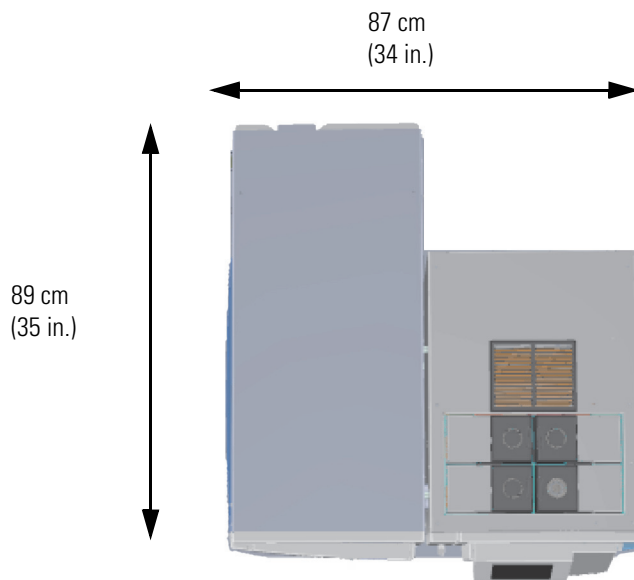


Figure 4. TSQ Duo and TRACE 1300/TRACE 1310 system dimensions



Lighting Requirements

Use the following guidelines to ensure your site has the proper lighting:

1. Ensure that the work area is properly lit. You may need an overhead lamp to light your work area.

2. You may need a small, high-intensity lamp when you clean the TSQ Duo or work inside the GC column oven.

Power Requirements

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

- **Circuit 1: TSQ Duo MS plus the foreline pump and optional mech pump.** 100-240 Vac, 15 A_{MAX}. The foreline pump and mech pump must be set to the line voltage used at your location.
- **Circuit 2: GC.** 120 Vac +6/-10%, 16 A_{MAX} or 230 Vac \pm 10%, 10 A_{MAX}. Refer to your customer sales order to determine if the GC is 120 Vac or 230 Vac. 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%.

Note Due to the power draw of the TSQ Duo 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 3. System Power Requirements (Sheet 1 of 2)

| Equipment | Circuits | Max Current (A) at 120 Vac (+ 6/- 10%) | Max Current (A) at 230 Vac (\pm 10%) | Maximum Power (W) |
|--|------------------------|--|---|---|
| TSQ Duo MS ¹ | 1 | 5.9 | 3.1 | 710 |
| Foreline pump ² | N/A | 4.6 | 2.7 | 550 |
| Optional mech pump ^{2,3} | N/A | 4.6 | 2.7 | 550 |
| TRACE 1300 and TRACE 1310 ¹ | 2 | 16 | 10 | 2000 |
| Computer ⁴ | Additional (as needed) | 5 | 2.6 | 600 |
| Monitor ⁴ | Additional (as needed) | 2 | 1 | 240 |
| AI/AS 1310 Sampling systems | Additional (as needed) | 0.8 | 0.4 | 95 |
| TriPlus RSH ⁵ Sampling system | Additional (as needed) | 3.2 | 1.7 | 200 with one power module 400 with two power modules |
| TriPlus 100 Liquid Sampler | Additional (as needed) | – | – | 200 with one power module 400 with two power modules |

Table 3. System Power Requirements (Sheet 2 of 2)

| Equipment | Circuits | Max Current (A) at 120 Vac (+ 6/- 10%) | Max Current (A) at 230 Vac (\pm 10%) | Maximum Power (W) |
|-----------------------|------------------------|--|---|-------------------|
| TriPlus 300 Headspace | Additional (as needed) | 10.8 | 5.7 | 1300 |

¹This instrument must be on its own circuit.

²Foreline pump and optional mech pump plug into the TSQ Duo MS. At startup, the foreline pump and optional mech pump draw an additional 30.8 A at 120 Vac and an additional 17 A at 230 Vac.

³If using the foreline pump and optional mech pump at the same time, the peak power may reach up to 905 W for a brief period of time.

⁴Power requirements vary by manufacturer.

⁵If the using the temperature controlled drawer option, one additional circuit is needed.

1. The power quality supplied to your system is very important. It must be stable and within the minimum specifications listed in this section.

- Test the power source quality in your laboratory to offset line voltage problems. Improving power source quality is a complex task best handled by a company or consultant specializing in that field. Contact your regional Thermo Fisher Scientific Customer Service office for assistance in locating a power consultant. Having a poor quality power source degrades TSQ Duo system performance. Some examples of poor power source quality are:
 - Harmonic distortion causes noise in the power supply lines and degrades instrument performance. Harmonic distortion is a high-frequency disturbance that may affect operation of your TSQ Duo MS. This disturbance appears as distortion of the fundamental sine wave. Total harmonic distortion should be less than 6%. For more information, refer to the [EMC and Safety Standards](#). However, the power specifications for the TSQ Duo system are more exact than those of the IEC.
 - Slow changes are gradual, long-term changes in average root mean square (RMS) voltage level, with typical durations greater than 2 s.
 - Sags and swells are slow changes in average root mean square (RMS) voltage level, with typical durations between 50 ms and 2 s.
 - Transients, even of a few microseconds duration cause electronic devices to fail or to degrade and significantly shorten their lives. Transients (or impulses) are brief voltage excursions of up to several thousand volts with durations less than 50 ms.
- Voltage variations must not exceed 10% of the nominal value.
- Transient overvoltages must not exceed those specified in category II of IEC 60364-4-443.

2. Use [Table 3](#) or to determine how many circuits and wall outlets you need. Keep in mind:

- Power must be single-phase.
- Wall outlets must have earth-ground hard-wired to the main panel.

- Included power cords are 2 m (6 ft) long .

Contact your local Customer Service office to discuss power cordset concerns.

3. The TSQ Duo MS comes with the required number and type of power cords for your region. [Table 4](#) will help you identify the correct power cord for your region and instrument. If you need to replace your power cord or buy an additional cord, you may use any brand of power cord, as long as it is appropriate for your region.

Table 4. Power cord identification information by region. (Sheet 1 of 2)

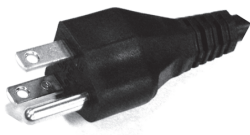



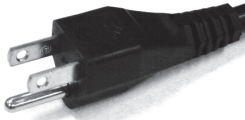
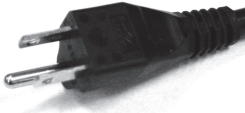


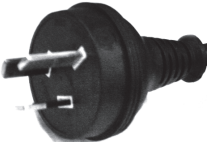
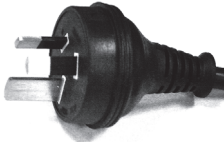




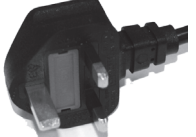
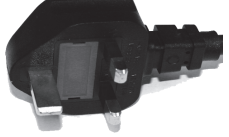
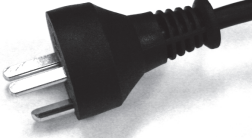
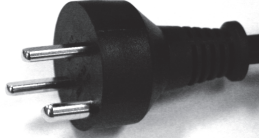
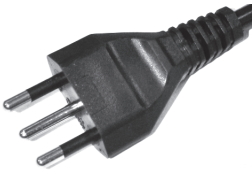
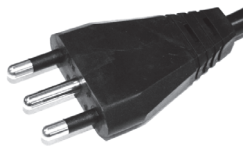

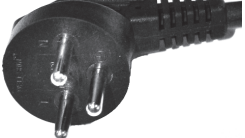
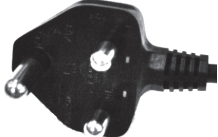
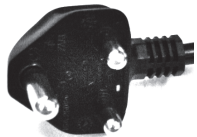

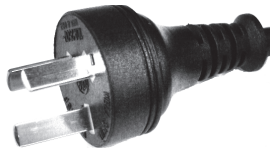
| Region | C13 Power Cords (For PC, Monitors, and Autosamplers) | C19 Power Cords (For GC and MS) |
|---------------------|--|---|
| North American 120V |  |  |
| North American 250V |  |  |
| Japanese 125V |  |  |
| Switzerland 250V |  |  |
| Australian 250V |  |  |
| China 250V |  |  |

Table 4. Power cord identification information by region. (Sheet 2 of 2)

| Region | C13 Power Cords (For PC, Monitors, and Autosamplers) | C19 Power Cords (For GC and MS) |
|---|--|---|
| Europe-Schuko 250V |  |  |
| United Kingdom 250V |  |  |
| Danish 250V |  |  |
| Italian 250V |  |  |
| Israeli 250V |  |  |
| Indian 250V |  |  |
| Argentina 250V |  |  |
| Note The 250V region power cords will work with the 230V circuits. | | |

Environmental Requirements

The normal operating environment for the TSQ Duo MS must have the following characteristics:

- Indoor use only
- Altitude up to 2000 meters
- Maximum relative humidity between 5% and 95% up to 31 °C. The maximum relative humidity decreases linearly to 67% as the temperature climbs to 35 °C.

Use the following guidelines to ensure your site has the proper environmental conditions for the system:

1. Ensure that your room temperature is 15–35 °C (59–95 °F). The analytical performance is only confirmed for these temperatures. For best performance, the operating temperature should be constant. Use [Table 5](#) to calculate the amount of heat your system will generate and ensure your air-conditioning system can handle that amount of heat.

IMPORTANT If you are not operating the TSQ Duo MS, it is safe to leave the instrument powered on in a room with a temperature between 5 and 40 °C.

Table 5. Heat output of system components

| Instrument | Heat Output (BTU per Hr) | Heat Output (W) |
|--------------------------------------|---------------------------------------|--------------------------------------|
| TSQ Duo, including foreline pump | 4300 | 1260 |
| TRACE 1300 and TRACE 1310 | 6830 | 2000 |
| Computer ¹ | 2050 | 600 |
| Monitor ¹ | 820 | 240 |
| Optional mech pump | 1880 | 550 |
| AI/AS 1310 auto-injector/autosampler | 325 | 95 |
| TriPlus RSH autosampler | 683 ² or 1366 ³ | 200 ² or 400 ³ |
| TriPlus 100 Liquid Sampler | 683 ² or 1366 ³ | 200 ² or 400 ³ |
| TriPlus 300 Headspace autosampler | 4440 | 1300 |

¹Power requirements vary by manufacturer.

²With one power module.

³With two power modules.

2. Ensure that the relative humidity in your laboratory is between 5 and 95% with no condensation. A temperature and humidity monitor in your laboratory helps ensure that the climate is within these specifications.

3. Ensure that the air in your site is free of excess particulate matter.

For reference, the air should contain fewer than 100,000 particles (larger than 5 µm) per cubic meter. If the concentration is larger than this amount, dust can accumulate on electronic components. This accumulation reduces their ability to cool off properly and could cause them to overheat. If your environment is particularly dusty, we recommend that you purchase the optional dust filter for your system.

4. Ensure that your site is free of electrostatic discharge (ESD), which may damage the electronic components of your system. Ensure your static has been discharged before touching internal components of the instrument. ESD can damage sensitive components, resulting in premature failures.

Gas Equipment Requirements

Use the following guidelines to ensure you have the proper gas supplies ready in advance of installation:

GC Carrier Gas

- You will need a supply of ultra-high purity 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.

Note Thermo Fisher Scientific installation specifications require helium as a carrier gas and argon 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 TSQ Duo MS.

Table 6. Carrier Gas Specifications

| Gas Type | Purity ¹ | Outlet Pressure | Regulator | Connector ² |
|----------|---------------------|------------------------------|---|------------------------|
| Helium | 99.999% | 400-700 kPa (58-100 psig) | Dual-stage brass regulator with stainless steel diaphragm | CGA-580 |
| Hydrogen | 99.999% | 400-700 kPa (58-100 psig) | Dual-stage brass regulator with stainless steel diaphragm | CGA-350 |

¹ Ultra-high purity with less than 1.0 ppm each of water, oxygen, and total hydrocarbons and contained in one tank.
² 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.



WARNING FIRE HAZARD: When using hydrogen, be aware that it can flow into the oven and create a fire hazard. Turn off the supply until the GC column is in the inlet of the TSQ Duo MS. Whenever you use hydrogen, it is critical to test all connections, lines, and valves for leaks before using the instrument. When performing maintenance, be sure to turn off the hydrogen supply.

- 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.

Other 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 7. Other Gas Specifications

| Equipment | Gas Type | Purity | Maximum Pressure | Regulator | Connector |
|------------------------|----------|---------|------------------|---|----------------------|
| TriPlus SPME Headspace | Nitrogen | 99.999% | 200 kPa (30 psi) | Dual-stage brass regulator with stainless steel diaphragm | CGA-580 ¹ |

¹ 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.

- Gas lines should be:
 - As short as possible and close to the TSQ Duo system.
 - Made of copper or stainless steel when using helium, hydrogen, 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.

Using Hydrogen

To safely use hydrogen in your TSQ Duo system, you should have a hydrogen sensor installed in your GC. Field Service Engineers can install a sensor, but they are not authorized to install or repair any instrument using hydrogen as a carrier gas unless the instrument is equipped with the appropriate sensor. The sensor must be calibrated occasionally, as described in the sensor's documentation.

Use the following safety precautions when using hydrogen:

- Ensure that all hydrogen cylinders comply with the safety requirements for proper use and storage. Hydrogen cylinders and delivery systems must comply with local regulations.
- Make sure the gas supply is turned completely off when connecting hydrogen lines.
- Ensure your GC has a Thermo Fisher Scientific hydrogen sensor installed. A hydrogen sensor continuously monitors the hydrogen level in the oven.
- Always turn off the GC and shut off the hydrogen at its source before venting the TSQ Duo MS.
- If you use a hydrogen pump, ensure it has a palladium drier.
- Remove as many sources of ignition as possible from your laboratory. Sources can include open flames, electrostatic discharges, or devices that spark.
- Do not open a cylinder of hydrogen without a regulator attached because it may self-ignite.

Receiving Requirements

When you receive the TSQ Duo system:

1. Inspect the boxes for damage when the instrument arrives. Our instruments are shipped by electronic equipment carriers who specialize in the handling of delicate equipment. Occasionally, however, equipment is inadvertently damaged in transit. If you notice evidence of external damage, do not refuse shipment. Instead, call Customer Service.
2. Once you are finished inspecting your shipment, move the cartons to a protected location, preferably the installation site. Leave the boxes as complete as possible and do not unpack or open the boxes without our Field Service Engineer (FSE) present. Doing otherwise may void your warranty or order.
3. Complete the Installation Request Form located at the front of this guide and forward it to Customer Support.

What Happens Next?

Review the “[License Agreements](#)” on [page 17](#) and fill out the *TSQ Duo Installation Request Form*. After the Installation Request Form is received, Customer Support will contact you to schedule the installation of your system. It is important to confirm that all the requirements on the form are met BEFORE the Field Service Engineer arrives.

The Field Service Engineer will install the system and confirm that all performance tests pass.

License Agreements

This appendix contains the end user license agreements (EULA) for TraceFinder 4.0 with Apache OpenOffice 4.0.1 with TraceFinder 4.0 and Microsoft Office Professional Plus 2013 with TraceFinder 4.0, and the Chromeleon individual license agreement. Read the agreement and sign the designated area of the Preinstallation Survey.

Contents

End-User License Agreement–Apache OpenOffice 4.0.1 and TraceFinder 4.0

End-User License Agreement–Microsoft Office Professional Plus 2013 and TraceFinder 4.0

Chromeleon–Individual License Agreement

End-User License Agreement–Apache OpenOffice 4.0.1 and TraceFinder 4.0

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3. **Small Claims Court.** You may also litigate any dispute in small claims court in your county of residence or the licensor’s principal place of business, if the dispute meets all requirements to be heard in the small claims court. You may litigate in small claims court whether or not you negotiated informally first.
4. **BINDING ARBITRATION.** **IF YOU AND THE LICENSOR, OR MICROSOFT, DO NOT RESOLVE ANY DISPUTE BY INFORMAL NEGOTIATION OR IN SMALL CLAIMS COURT, ANY OTHER EFFORT TO RESOLVE THE DISPUTE WILL BE CONDUCTED EXCLUSIVELY BY BINDING ARBITRATION. YOU ARE GIVING UP THE RIGHT TO LITIGATE (OR PARTICIPATE IN AS A PARTY OR CLASS MEMBER) ALL DISPUTES IN COURT BEFORE A JUDGE OR JURY.** Instead, all disputes will be resolved before a neutral arbitrator, whose decision will be final except for a limited right of appeal under the Federal Arbitration Act. Any court with jurisdiction over the parties may enforce the arbitrator’s award.
5. **CLASS ACTION WAIVER.** **ANY PROCEEDINGS TO RESOLVE OR LITIGATE ANY DISPUTE IN ANY FORUM WILL BE CONDUCTED SOLELY ON AN INDIVIDUAL BASIS. NEITHER YOU, THE LICENSOR, NOR MICROSOFT, WILL SEEK TO HAVE ANY DISPUTE HEARD AS A CLASS ACTION, AS A PRIVATE ATTORNEY GENERAL ACTION, OR IN ANY OTHER PROCEEDING IN WHICH ANY PARTY ACTS OR PROPOSES TO ACT IN A REPRESENTATIVE CAPACITY. NO ARBITRATION OR PROCEEDING WILL BE COMBINED WITH ANOTHER WITHOUT THE PRIOR WRITTEN CONSENT OF ALL PARTIES TO ALL AFFECTED ARBITRATIONS OR PROCEEDINGS.**
6. **Arbitration Procedure.** Any arbitration will be conducted by the American Arbitration Association (the “AAA”) under its Commercial Arbitration Rules. If you are an individual and use the software for personal or household use, or if the value of the dispute is \$75,000 or less whether or not you are an individual or how you use the software, the AAA Supplementary Procedures for Consumer-Related Disputes will also apply. To

commence arbitration, submit a Commercial Arbitration Rules Demand for Arbitration form to the AAA. You may request a telephonic or in-person hearing by following the AAA rules. In a dispute involving \$10,000 or less, any hearing will be telephonic unless the arbitrator finds good cause to hold an in-person hearing instead. For more information, see adr.org or call 1-800-778-7879. You agree to commence arbitration only in your county of residence or in the licensor's principal place of business. The licensor agrees to commence arbitration only in your county of residence. The arbitrator may award the same damages to you individually as a court could. The arbitrator may award declaratory or injunctive relief only to you individually, and only to the extent required to satisfy your individual claim.

7. Arbitration Fees and Incentives.

- a. Disputes Involving \$75,000 or Less. The licensor will promptly reimburse your filing fees and pay the AAA's and arbitrator's fees and expenses. If you reject the licensor's last written settlement offer made before the arbitrator was appointed ("last written offer"), your dispute goes all the way to an arbitrator's decision (called an "award"), and the arbitrator awards you more than the last written offer, the licensor will give you three incentives: (1) pay the greater of the award or \$1,000; (2) pay twice your reasonable attorney's fees, if any; and (3) reimburse any expenses (including expert witness fees and costs) that your attorney reasonably accrues for investigating, preparing, and pursuing your claim in arbitration. The arbitrator will determine the amounts.
 - b. Disputes Involving More Than \$75,000. The AAA rules will govern payment of filing fees and the AAA's and arbitrator's fees and expenses.
 - c. Disputes Involving Any Amount. In any arbitration you commence, the licensor will seek its AAA or arbitrator's fees and expenses, or your filing fees it reimbursed, only if the arbitrator finds the arbitration frivolous or brought for an improper purpose. In any arbitration the licensor commences, it will pay all filing, AAA, and arbitrator's fees and expenses. It will not seek its attorney's fees or expenses from you in any arbitration. Fees and expenses are not counted in determining how much a dispute involves.
8. Claims or Disputes Must be Filed Within One Year. To the extent permitted by law, any claim or dispute under this agreement to which Section B applies must be filed within one year in small claims court (Section B.3) or in arbitration (Section B.4). The one-year period begins when the claim or dispute first could be filed. If such a claim or dispute is not filed within one year, it is permanently barred.
9. Severability. If the class action waiver in Section B.5 is found to be illegal or unenforceable as to all or some parts of a dispute, then Section B (arbitration) will not apply to those parts. Instead, those parts will be severed and proceed in a court of law, with the remaining parts proceeding in arbitration. If any other provision of Section B is found to be illegal or unenforceable, that provision will be severed with the remainder of Section B remaining in full force and effect.
10. Third-Party Beneficiary. Microsoft Corporation is not a party to this agreement but is a third-party beneficiary of your and the licensor's agreement to resolve disputes through

informal negotiation and arbitration. If your dispute is with Microsoft, Microsoft agrees to do everything the licensor agrees to do in Section B, and you agree to do everything regarding Microsoft that Section B requires you to do regarding the licensor. Mail a Notice of Dispute with Microsoft to Microsoft Corporation, ATTN: LCA ARBITRATION, One Microsoft Way, Redmond, WA 98052-6399. You may commence an arbitration or small claims court case against Microsoft in your county of residence or King County, Washington.

C. CHOICE OF LAW

The laws of the state or country where you live govern all claims and disputes under this agreement, including breach of contract claims and claims under state consumer protection laws, unfair competition laws, implied warranty laws, for unjust enrichment, and in tort. If you acquired the software in any other country, the laws of that country apply. This agreement describes certain legal rights. You may have other rights, including consumer rights, under the laws of your state or country. You may also have rights with respect to the party from whom you acquired the software. This agreement does not change those other rights if the laws of your state or country do not permit it to do so.

D. ACTIVATION

1. More on How Activation Works. During activation, the software will send information about the software and your computer to Microsoft. This information includes the version, license version, language, and product key of the software, the Internet protocol address of the computer, and information derived from the hardware configuration of the computer. For more information about activation, see microsoft.com/piracy/activation.msp. If the licensed computer is connected to the Internet, the software will automatically connect to Microsoft for activation. You can also activate the software manually by Internet or telephone. In either case, Internet and telephone service charges may apply.
2. Re-activation. Some changes to your computer components or the software may require re-activation of the software.
3. Activation Failure. During online activation, if the licensing or activation functions of the software are found to be counterfeit or improperly licensed, activation will fail. The software will notify you if the installed copy of the software is improperly licensed. In addition, you will receive reminders to obtain a properly licensed copy of the software.
4. Updates and Upgrades. You may only obtain updates or upgrades for the software from Microsoft or authorized sources. Certain upgrades, support, and other services may be offered only to users of genuine Microsoft software. To identify genuine Microsoft software, see howtotell.com.

E. INTERNET-BASED FEATURES; PRIVACY

The following software features use Internet protocols, which send to Microsoft (or its suppliers or service providers) computer information, such as your Internet protocol address, the type of operating system, browser and name and version of the software you are using, and the language code of the computer where you installed the software. Microsoft uses this information to make the Internet-based features available to you, in accordance with the Office 2013 Privacy Statement, at r.office.microsoft.com/r/rlidOOPrivacyState15HighLight?clid=1033. Some Internet-based features may be delivered at a later date via Microsoft's Update service.

1. **Consent for Internet-Based Services.** The software features described below and in the Office 2013 Privacy Statement connect to Microsoft or service provider computer systems over the Internet. In some cases, you will not receive a separate notice when they connect. In some cases, you may switch off these features or not use them. For more information about these features, see the Office 2013 Privacy Statement at r.office.microsoft.com/r/rlidOOPrivacyState15HighLight?clid=1033. **BY USING THESE FEATURES, YOU CONSENT TO THE TRANSMISSION OF THIS INFORMATION.** Microsoft does not use the information to identify or contact you.
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3. **Online Features and Content.** Features in the software can retrieve online content from Microsoft and provide it to you. Certain features may also permit you to search for and access information online. Examples of these features include clip art, templates, online training, online assistance and help, and Outlook Weather on the Calendar. If you save a template provided by Office.com, information will be sent online to Microsoft, such as information that identifies the template, but not any specific document you have created using the template. This information is used to provide you with content you request and to improve our services. You may choose not to use these online features and content. See the Office 2013 Privacy Statement linked at the end of this agreement for more information.
4. **Cookies.** If you choose to use online features in the software, such as online assistance and help, and templates, cookies may be set. To learn how to block, control and delete cookies, please read the cookies section of the Office 2013 Privacy Statement linked at the end of this agreement.
5. **Digital Certificates.** The software uses digital certificates. These digital certificates confirm the identity of Internet users sending X.509 standard encrypted information. They also can be used to digitally sign files and macros to verify the integrity and origin of the file contents. The software retrieves certificates and updates certificate revocation lists using the Internet, when available.

6. Automatic Update. Software with Click-to-Run technology may periodically check with Microsoft for updates and supplements to the software. If found, these updates and supplements might be automatically downloaded and installed on your licensed computer.
7. Use of Information. Microsoft may use the computer information, error reports, and malware reports to improve our software and services. We may also share it with others, such as hardware and software vendors. They may use the information to improve how their products run with Microsoft software.
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F. ADDITIONAL LICENSING REQUIREMENTS AND/OR USE RIGHTS

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G. GEOGRAPHIC AND EXPORT RESTRICTIONS

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TraceFinder 4.0**

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4. IN NO EVENT MAY ANY ACTION BE BROUGHT AGAINST THERMO OR INFORMATION PARTNERS ARISING OUT OF THIS AGREEMENT MORE THAN ONE YEAR AFTER THE CLAIM OR CAUSE OF ACTION ARISES, DETERMINED WITHOUT REGARD TO WHEN THE CUSTOMER SHALL HAVE LEARNED OF THE ALLEGED DEFECT, INJURY, OR LOSS.
5. IN NO EVENT SHALL THE TOTAL LIABILITY OF INFORMATION PARTNERS AND THERMO EXCEED THE LICENSE FEE PAID BY CUSTOMER FOR THE

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6. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF IMPLIED WARRANTIES OR LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE EXCLUSIONS OR LIMITATIONS MAY NOT APPLY TO EVERY CUSTOMER WHERE APPLICABLE.

F. APPLICABLE LAW

1. This Agreement will be governed by and construed in accordance with the laws of the Commonwealth of Massachusetts without giving effect to the principles of conflict of laws thereof, and both parties consent to the jurisdiction of the federal and state courts situated in the Commonwealth of Massachusetts in any action arising under this Agreement. In the event of any legal proceeding between Thermo and Customer relating to this Agreement, neither party may claim the right to a trial by jury, and both parties waive any right to a trial by jury. The application of the U.N. Convention on Contracts for the International Sale of Goods to this Agreement is hereby expressly excluded.

G. EXPORT COMPLIANCE

1. Customer acknowledges that the Software and Documentation is subject to export controls of the U.S. Government, which may include those of the Export Administration Regulations of the U.S. Department of Commerce. Customer agrees to comply with the Export Administration Regulations and all other applicable laws and regulations relating to the export, re-export, or import of the Software and Documentation.

H. ENTIRE UNDERSTANDING

1. This Agreement constitutes the entire understanding of the parties with respect to the subject matter hereof. Without limiting the generality of the foregoing, it is expressly agreed that the terms of any prior Customer purchase order will be subject to the terms of this license and that any acceptance of a purchase order by Thermo will be for acknowledgment purposes only and none of the terms set forth in the purchase order will be binding upon Thermo. Any representation, promise, warranty, covenant or undertaking not expressly set forth in this license shall not be deemed a part of the Agreement or otherwise legally effective.

I. SEVERABILITY

1. If a term or condition of this Agreement is held to be invalid or unenforceable, the remaining terms and conditions of this Agreement will remain in full force and effect.

J. AUDIT

1. Customer grants Thermo the right to audit, during regular business hours, Customer's use of the Software and Documentation to ensure compliance with this Agreement.

K. INDEMNIFICATION

1. Customer agrees to indemnify, defend and hold harmless Thermo and Information Partners from and against any and all claims of third parties arising out of or related to Customer's use of the Software, regardless whether such claims were foreseeable by Thermo or the Information Partners.

L. TERMINATION

1. Thermo may, in addition to its other legal rights and remedies and upon written notice to Customer, terminate this Agreement in the event Customer breaches any term of this Agreement or becomes insolvent, files or has filed against it a petition in bankruptcy or undergoes a reorganization pursuant to a petition in bankruptcy filed with respect to it.
2. Upon termination, Customer will, unless otherwise agreed to in writing by Thermo, immediately return to Thermo the Software and Documentation, and all copies thereof, and will erase all electronic storage of copies of the Software.
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