



ISQ EC and ISQ EM

Mass Spectrometer

Preinstallation Requirements Guide

1R120591-0001 Revision B • October 2018

thermo
scientific

Copyright © 2018 Thermo Fisher Scientific Inc. All rights reserved.

Preinstallation Requirement Guide

Trademarks

Acrobat, Adobe, and Adobe Reader are trademarks of Adobe Systems Incorporated. Microsoft and Windows are trademarks of Microsoft Corporation.

All other trademarks are property of Thermo Fisher Scientific and its subsidiaries.

Thermo Fisher Scientific Inc. provides this document to its customers with a product purchase to use in the product operation. The document is copyright protected; any reproduction of the whole or any part of this document is strictly prohibited, except with the written authorization of Thermo Fisher Scientific Inc.

This manual is provided "as is." The contents of this manual are subject to being changed, without notice, in future revisions.

Thermo Fisher Scientific Inc. makes no representations that this document is complete, accurate, or error-free. Thermo Fisher Scientific Inc. assumes no responsibility and will not be liable for any errors, omissions, damage, or loss that might result from any use of this document, even if the information in the document is followed properly.

This document is not part of any sales contract between Thermo Fisher Scientific Inc. and a purchaser. This document shall in no way govern or modify any Terms and Conditions of Sale. The Terms and Conditions of Sale shall govern all conflicting information between the two documents.

Contacting Us

There are several ways to contact us:

Ordering Information

For ordering information or sales support for HPLC products, contact your local Thermo Fisher Scientific sales organization. For contact information, go to Contact Us on <http://www.thermofisher.com>.

Technical Assistance

For technical support for HPLC products, contact your local Thermo Fisher Scientific support organization. For contact information, go to Contact Us on <http://www.thermofisher.com>.

Legal Manufacturer Address

Thermo Finnigan LLC, a part of Thermo Fisher Scientific
355 River Oaks Parkway
San Jose, California 95134
United States

Contents

Contacting Us.....	3
1 Using this Manual	7
1.1 About this Manual	8
1.2 Conventions	9
1.2.1 Safety Messages.....	9
1.2.2 Special Notices and Informational Notes.....	9
1.2.3 Typographical Conventions.....	10
1.3 Reference Documentation.....	12
2 Safety.....	14
2.1 Safety Symbols and Signal Words.....	15
2.1.1 Safety Symbols and Signal Words in This Manual	15
2.1.2 Observing this Manual	16
2.1.3 Safety Symbols on the Detector	16
2.2 Intended Use.....	18
2.3 Safety Precautions	19
2.3.1 General Safety Information	19
2.3.2 Qualification of the Personnel	19
2.3.3 Personal Protective Equipment	20
2.3.4 Electrical Safety Precautions.....	21
2.3.5 General Residual Hazards	21
2.4 Solvent and Additive Information.....	26
2.5 Compliance Information	27
3 Site Preparation	28
3.1 Entrance Requirements	29
3.2 Workbench and Space Requirements	30

3.3	Lighting Requirements.....	34
3.4	Power Requirements	35
3.5	Environmental Requirements.....	40
3.6	Gas Requirements.....	42
3.6.1	Nitrogen Gas Supply.....	42
3.7	Exhaust Requirements	45
3.7.1.1	Foreline Pump Exhaust	45
3.7.1.2	Ion Source Exhaust.....	45
3.8	Solvents and Sample Preparation.....	47
3.8.1	Standard Installation.....	47
3.9	Receiving Requirements	48
3.10	What Happens Next?	49
4	Appendix.....	50
4.1	Compliance Information	51
4.1.1	Declarations of Conformity.....	51
4.1.2	WEEE Compliance	52
4.1.3	FCC Compliance	53
4.1.4	Regulatory Compliance	54
4.1.5	Low Voltage Safety Compliance.....	54
4.1.6	Notice on Lifting and Handling of Thermo Scientific Instruments.....	54
4.1.7	Notice on the Proper Use of Thermo Scientific Instruments.....	54
4.1.8	Notice on the Susceptibility to Electromagnetic Transmissions.....	54
4.1.9	Manual Release History	56

1 Using this Manual

This chapter provides information about this manual, the conventions used throughout the manual, and the reference documentation that is available in addition to this manual.

1.1 About this Manual

This guide contains detailed instructions to prepare your site for installation of a Thermo Scientific™ ISQ™ EC or a Thermo Scientific™ ISQ™ EM mass spectrometer.

This manual also contains safety messages, precautionary statements, and special notices that can prevent personal injury, damage to the detector, or loss of data when followed properly.

1.2 Conventions

This section describes the conventions that are used throughout this manual.

1.2.1 Safety Messages

The safety messages and precautionary statements in this manual appear as follows:

- ◆ Safety messages or precautionary statements that apply to the entire manual and all procedures in this manual are grouped in the Safety chapter.
- ◆ Safety messages or precautionary statements that apply to an entire section or to multiple procedures in a section appear at the beginning of the section to which they apply.
- ◆ Safety messages that apply to only a particular section or procedure appear in the section or procedure to which they apply. They appear different from the main flow of text.

Safety messages are often preceded by an alert symbol and/or alert word. The alert word appears in uppercase letters and in bold type.

Make sure that you understand and follow all safety messages presented in this manual.

1.2.2 Special Notices and Informational Notes

Special notices and informational notes in this manual appear different from the main flow of text. They appear in boxes and a note label identifies them. The label text appears in uppercase letters and in bold type.

WARNING Indicates that failure to take note of the accompanying information may result in personal injury.

NOTICE Indicates that failure to take note of the accompanying information could cause wrong results or may result in damage to the device.

TIP Highlights information of general interest or helpful information that can make a task easier or optimize the performance of the detector.

1.2.3 Typographical Conventions

These typographical conventions apply to the descriptions in this manual:

Data Input and Output

- The following appears in **bold** type:
 - ◆ Input that you enter by the keyboard or that you select with the mouse
 - ◆ Buttons that you click on the screen
 - ◆ Commands that you enter by the keyboard
 - ◆ Names of, for example, dialog boxes, properties, and parameters
- For brevity, long expressions and paths appear in the condensed form, for example: Click **Start > All Programs > Thermo Chromeleon 7 > Services Manager > Start Instrument Controller**.

References and Messages

- References to additional documentation appear *italicized*.
- Messages that appear on the screen are identified by quotation marks.

Viewpoint

If not otherwise stated, the expressions *left* and *right* in this manual always refer to the viewpoint of a person that is facing the detector from the front.

Particularly Important Words

Particularly important words in the main flow of text appear *italicized*.

Electronic Manual Version (PDF)

The electronic version (PDF) of the manual contains numerous links that you can click to go to other locations within the manual. These include:

- ◆ Table of contents entries
- ◆ Index entries
- Cross-references (in blue text), for example, to sections and figures

1.3 Reference Documentation

In addition to this operating manual, other documentation is available for reference.

Hardware Documentation

Additional hardware documentation includes the following:

- *ISQ EC and ISQ EM Mass Spectrometer Operating Manual*

Operating manuals for the other modules of the LC or IC system

TIP Electronic versions of these manuals are available as PDF (Portable Document Format) files. To open and read the PDF files, Adobe™ Reader™ or Adobe™ Acrobat™ is required.

Software Documentation

Additional software documentation includes the following:

- *Chromeleon™ 7 Help and documents*
The *Chromeleon 7 Help* provides extensive information and comprehensive reference material for all aspects of the software. For basic information about device installation and configuration, refer to the *Installation Guide*; for specific information about a certain device, refer to the *Instrument Configuration Manager Help*. In Chromeleon 7, devices are called modules.

For information about the main elements of the user interface and step-by-step guidance through the most important workflows, refer to the *Quick Start Guide*.

For a concise overview of the most important workflows, refer to the *Reference Card*.

TIP The *Chromeleon Help* and documents are included in the software shipment. The ISQ EC and ISQ EM do not support Chromeleon software versions before 7.2.6.

Third-Party Documentation

Refer also to the user documentation provided by the manufacturers of third-party components and materials, for example, Safety Data Sheets (SDSs).

Third-party documentation includes the user documentation for the optional gas supply, as applicable:

- ◆ User documentation for the nitrogen generator

2 Safety

This chapter provides general and specific safety information and informs about the intended use of the detector.

2.1 Safety Symbols and Signal Words

2.1.1 Safety Symbols and Signal Words in This Manual

This manual contains safety messages to prevent injury of the persons using the detector. The safety symbols and signal words in this manual include the following:



Always be aware of the safety information. Do not proceed until you have fully understood the information and consider the consequences of what you are doing.



CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.



WARNING Indicates a hazardous situation that, if not avoided, could result in serious injury.

2.1.2 Observing this Manual

Observe the following:

- ◆ Before installing or operating the instrument, read this manual carefully to be familiar with the instrument and this manual. The manual contains important information with regard to user safety as well as use and care of the instrument.
- ◆ Always keep the manual near the instrument for quick reference.
- ◆ Save this manual and pass it on to any subsequent user.






Read, understand, and comply with all safety messages and precautionary statements presented in this manual.

2.1.3 Safety Symbols on the Instrument

The table lists the safety symbols that appear on the instrument or on labels affixed to the instrument. Follow the safety notices in this manual to prevent the risk of operator injury or damage to the instrument.

Symbol	Description
	Indicates a potential hazard. Refer to this manual to avoid the risk of personal injury and/or to prevent damage to the device.
I O	Power supply is on Power supply is off
~	Indicates alternating current.
	Indicates a terminal for protective grounding.
	Indicates that an electrical shock <i>could or might</i> occur.
	Alerts you to the presence of a hot surface that could or might cause burn injuries.

Symbol	Description
	Indications that eye damage <i>could</i> or <i>might</i> occur.
	Alerts you to carefully read your instrument's documentation to ensure your safety and the instrument's operation ability. Failing to carefully read the documentation could or might put you at risk for a physical injury.
	Indicates that physical injury could or might occur if two or more people do not lift an object.

2.2 Intended Use

The instrument is intended for use in liquid chromatography (LC) and ion chromatography (IC) mass spectrometry (MS) applications. The system is for use by qualified personnel and in laboratory environment only.

The instrument is intended for laboratory research use only. It is not intended for use in diagnostic procedures.

Laboratory Practice

Thermo Fisher Scientific recommends that the laboratory in which the MS system is used follow best practices for LC-MS and IC-MS analyses. This includes among others:

- ◆ Using appropriate standards
- ◆ Regularly running calibration
- ◆ Establishing shelf life limits and following them for all consumables used with the system
- ◆ Running the system according to the laboratory's verified and validated 'lab developed test' protocol

2.3 Safety Precautions

2.3.1 General Safety Information

All users must observe the general safety information presented in this section and all specific safety messages and precautionary statements elsewhere in this manual during all phases of installation, operation, troubleshooting, maintenance, shutdown, and transport of the detector.



If the instrument is used in a manner not specified by Thermo Fisher Scientific, the protection provided by the detector could be impaired. Observe the following:

- Operate the instrument only within its technical specifications.
- Use only the replacement parts and additional components, options, and peripherals specifically authorized and qualified for the detector by Thermo Fisher Scientific.
- Perform only the procedures that are described in this operating manual and in supporting documents for the detector. Follow all instructions step by step and use the tools recommended for the procedure.
- Open the enclosure of the detector and other components only if specifically instructed to do so in this manual.
- Thermo Fisher Scientific cannot be held liable for any damage, material or otherwise, resulting from inappropriate or improper use of the detector. If there is any question regarding appropriate usage, contact Thermo Fisher Scientific before proceeding.

Safety Standard

This device is a Safety Class I instrument (provided with terminal for protective grounding). The device has been manufactured and tested according to international safety standards.

2.3.2 Qualification of the Personnel

Observe the information below on the proper qualification of the personnel installing and/or operating the detector.



Installation

Only skilled personnel are permitted to install the detector and to establish the electrical connections according to the appropriate regulations. Thermo Fisher Scientific recommends always having service personnel certified by Thermo Fisher Scientific perform the installation (for brevity, referred to as Thermo Fisher Scientific service engineer).

If a person other than a Thermo Fisher Scientific service engineer installs and sets up the module, the installer is responsible for ensuring the safety of the module and system.

General Operation

The detector is designed to be operated only by trained and qualified personnel in a laboratory environment.

All users must know the hazards presented by the detector and the substances they are using. All users should observe the related Safety Data Sheets (SDSs).

2.3.3 Personal Protective Equipment

Wear personal protective equipment and follow good laboratory practice to protect you from hazardous substances. The appropriate equipment depends on the hazard. For advice on the hazards and the equipment required for the substances you are using, refer to the material handling and safety data sheet provided by the vendor.



An eyewash facility and a sink should be available nearby. If any substance contacts your skin or eyes, wash the affected area and seek medical attention.

Protective Clothing

To protect you from chemical splashes, harmful liquids, or other contamination, when performing any work on or near the LC-MS or IC-MS system put on appropriate protective clothing, such as a lab coat. For information about the proper handling of a particular substance and for advice on specific hazards, refer to the safety data sheet (SDS) for the substance you are using.

Protective Eyewear

To prevent liquids from striking your eyes, put on appropriate protective eyewear, such as safety glasses with side shields. If there is a risk of splashing liquids, put on goggles.

Gloves

To protect you from harmful liquids and avoid personal injury during maintenance or service, put on appropriate protective gloves.

2.3.4 Electrical Safety Precautions



WARNING— Electric Shock or Damage to the Device

High voltages are present inside the device that could cause an electric shock or damage to the device.

- Do not make any changes to the electrical or grounding connections.
- If you suspect any kind of electrical damage, disconnect the power cord and contact Thermo Fisher Scientific Technical Support for assistance.
- Do not open the housing or remove protective panels unless specifically instructed to do so in this manual.
- Do not place liquid reservoirs directly upon the device. Liquid might leak into the device and get into contact with electronic components causing a short circuit. Instead, place liquid reservoirs in the solvent rack that is available for the HPLC system.

2.3.5 General Residual Hazards

Pay attention to the following general residual hazards when working with the instrument:



WARNING—Hazardous Substances

Many organic solvents, mobile phases, and samples are harmful to health. Be sure that you know the toxic and infectious properties of all substances that you are using. You may not know the toxic or infectious properties of many substances that you are using. If you have any doubt about a substance, treat it as if it contains a potentially harmful substance. For advice on the proper handling of a particular substance, refer to the Safety Data Sheet (SDS) of the manufacturer. Observe the guidelines of Good Laboratory Practice (GLP).

- Be sure that you know the properties of all substances that you are using. Avoid exposure to harmful substances. If you have any doubt about a substance, handle the substance as if it is potentially harmful.
- Wear personal protective equipment as required by the hazard and follow good laboratory practice.
- Reduce the volume of substances to the minimum volume required for sample analysis.
- Do not operate the detector in a potentially flammable environment.
- Avoid accumulation of harmful substances. Make sure that the installation site is well ventilated.
- Dispose of hazardous waste in an environmentally safe manner that is consistent with local regulations. Follow a regulated, approved waste disposal program.

**WARNING—Biohazard**

Biohazardous material, for example microorganisms, cell cultures, tissues, body fluids, and other biological agents can transmit infectious diseases. To avoid infections with these agents:

- Assume that all biological substances are at least potentially infectious.
- Wear personal protective equipment as required by the hazard and follow good laboratory practice.
- Dispose of biohazardous waste in an environmentally safe manner that is consistent with local regulations. Follow a regulated, approved waste disposal program.

**WARNING—Self-Ignition of Solvents**

Solvents with a self-ignition temperature below 150 °C might ignite when in contact with a hot surface (for example, due to leakage in the chromatography system). Avoid the use of these solvents.

**WARNING—Hazardous Vapors**

Install the LC-MS or IC-MS system in a well-ventilated laboratory. If the mobile phase or sample includes volatile or flammable solvents, do not allow them to enter the workspace. If the mobile phase or sample includes volatile or flammable solvents, avoid open flames and sparks.

- The exhaust gas may contain hazardous fumes. To avoid an accumulation of the exhaust gasses, ensure that the exhaust gas is absorbed by a fume hood or other ventilating device. Maintain a well-ventilated laboratory. Do not vent directly into the laboratory.
- Avoid open flames and sparks. Do not operate the detector in the presence of flammable gases or fumes.



CAUTION—Escape of Hazardous Substances from PEEK Capillaries

In the LC or IC system, capillaries made of PEEK may be used. Swelling or attack by acids can cause PEEK capillaries to start leaking or to burst.

- Certain chemicals, for example, trichloromethane (CHCl_3), dimethyl sulfoxide (DMSO), or tetrahydrofuran (THF) can cause PEEK to swell.
- Concentrated acids, such as sulfuric acid and nitric acid, or a mixture of hexane, ethyl acetate, and methanol, can attack PEEK.
- Swelling or attack is not a problem with brief flushing procedures.
- For more information, refer to the technical literature on the chemical resistance of PEEK.



CAUTION

Fused silica is used in flow cells and capillaries. To avoid personal injury always wear safety glasses when handling fused silica tubing, for example, when cutting fused silica tubing to length.



CAUTION—Allergic Reaction

Some capillaries in the HPLC system are made of MP35N™, a nickel-cobalt based alloy. Individuals with sensitivity to nickel/cobalt may show an allergic reaction from skin contact.



CAUTION—Sparking due to Electrostatic Discharge

Liquid flowing through capillaries can generate static electricity. This effect is particularly present with insulating capillaries and non-conductive solvents (for example, pure acetonitrile). Discharge of electrostatic energy might lead to sparking, which could constitute a fire hazard. Prevent the generation of static electricity near the chromatography system.

**CAUTION—Instrument Damage**

Clean tubing cutters with methanol prior to use. Otherwise, tubing may be contaminated with oil and grease from packing material.

2.4 Solvent and Additive Information

To protect optimal functionality of the instrument observe these recommendations on the use of solvents and additives:

- Use only solvents and additives that are compatible with all parts in the flow path.
- Follow any specific recommendations presented in other sections of this manual. Refer also to the *operating manuals for all modules in the LC or IC system*. They may provide additional guidelines and information.

2.5 Compliance Information

Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When the device is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards as described in this manual. For details, see 4.1.

Changes that you make to the device may void compliance with one or more of these EMC and safety standards. Changes to the device include replacing a part or adding components, options, or peripherals not specifically authorized and qualified for the product 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.

The device has been shipped from the manufacturing site in a safe condition.

3 Site Preparation

This chapter describes how to prepare your site before the Thermo Fisher Scientific representative arrives to install the ISQ EC or ISQ EM mass spectrometer.

NOTICE—For the ISC EC and ISQ EM mass spectrometers only

These instructions are for the ISQ EC and ISQ EM mass spectrometers only. You will also need to follow the specific preinstallation requirements for the LC or IC which will be connected.

3.1 Entrance Requirements

Use the following guidelines to ensure the entrance to your site will allow for the delivery of your ISQ EC or ISQ EM system:

- 1) Ensure the width of your delivery door opening is at least 95 cm (37.5 in.).
- 2) Make sure you have enough room to move boxes around corners, into elevators, or through doorways. [Table 1](#) contains the dimensions and weight of shipping boxes, so that you can make accommodations.
- 3) The calibrant solution and optional computer are shipped separately

Box Contents	Length		Width		Height		Weight	
	cm	in.	cm	in.	cm	in.	kg	lbs.
ISQ EC/ ISQ EM	112	44	95	37.5	107	42	150 ¹	330

Table 1: Shipping box dimensions and weight

¹ Total weight includes the foreline pump.

3.2 Workbench and Space Requirements

Use the following guidelines to ensure you have enough space to set up the ISQ EC or ISQ EM system.

- 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. You will also need space near the instrument for the monitor and keyboard.

See [Table 2](#) for of the workbench and space requirements for components of the ISQ EC or ISQ EM system.

Note: Review site preparation requirements guides for additional system components such as IC or LC instrument.

Box Contents	Length		Width		Height		Weight	
	cm	in.	cm	in.	cm	in.	kg	lbs.
ISQ EC/ ISQ EM	91	36	42	16.5	52	20.5	71	156
Foreline Pump ²	47	18.5	20	8	26	10	28	62
Computer ³	42	16.5	18	7	37	14.5	7.5	17
Monitor ²	19	7.5	54	21	44	17	5.5	12
Keyboard ²	23	9	46	18	5	2	1	2

Table 2: Workbench and space requirements

- 2) The instrument is designed to sit on a standard 30 in (76.2 cm) deep bench. Be sure the ISQ EC or ISQ EM instrument's feet fit securely on the workbench. See [Figure 1](#) for the position of the feet on the bottom of the instrument.

² This item is placed on the floor under the system.

³ Dimensions vary by manufacturer.

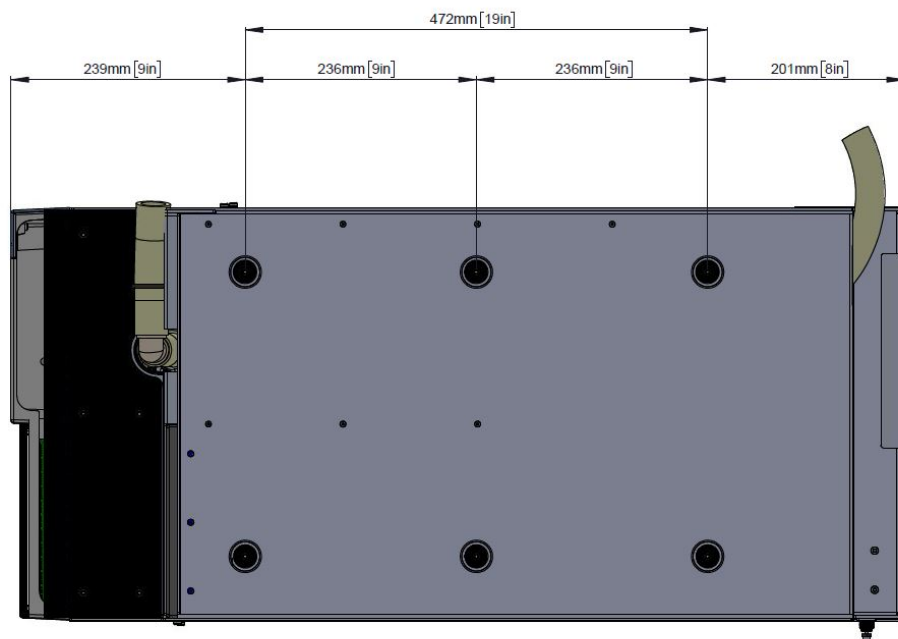


Figure 1: Location of the feet on the bottom of the ISQ EC or ISQ EM instrument

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.

The foreline hose exits at the rear of the instrument and is connected to the foreline pump. The hose can be moved to exit to the right, the left, or back.

The foreline pump is placed on the floor below or next to the system. The foreline hose is 250 cm long measured from the back of the MS. It cannot be extended because that will adversely affect the pressure in the MS. See [Figure 2](#) and [Figure 3](#) for front and back views of the ISQ EC or ISQ EM system with all the hoses and gas lines attached.

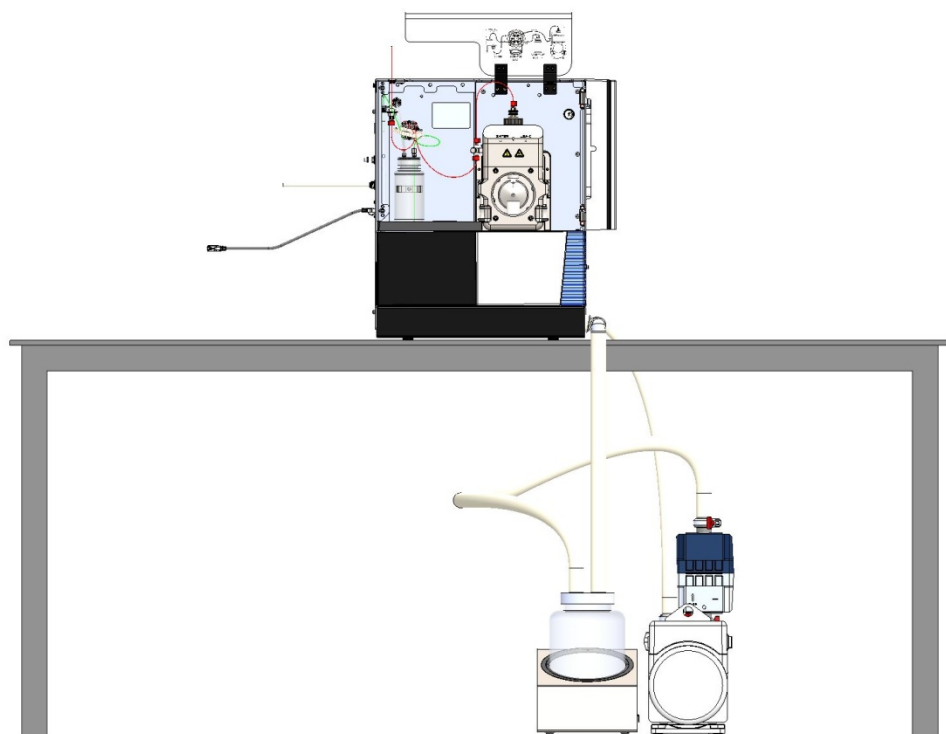


Figure 2: ISQ EC or ISQ EM system, front view

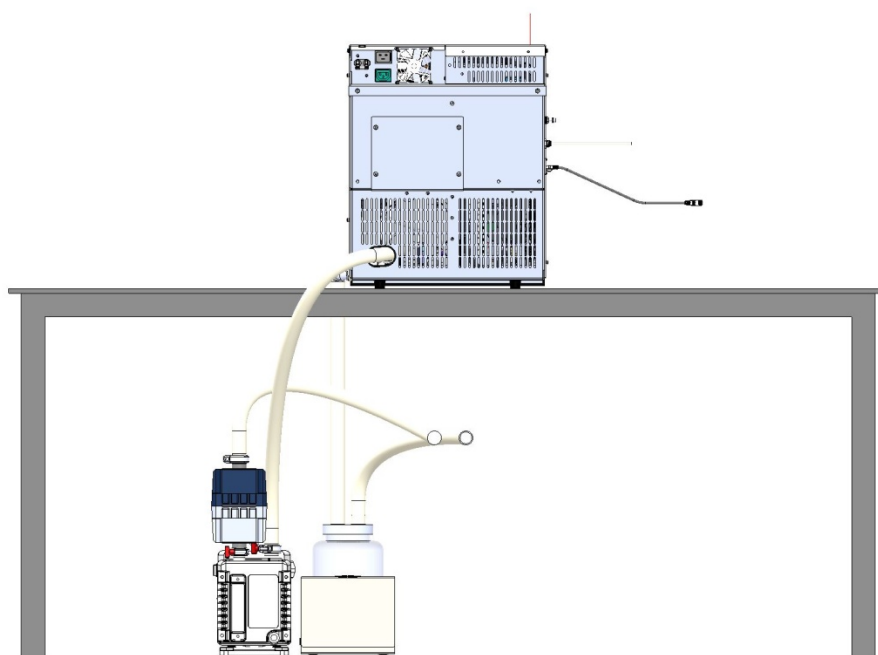


Figure 3: ISQ EC or ISQ EM system, back view

-
- 3) Make sure your workbench can support a standard ISQ EC or ISQ EM system. Keep in mind, additional instruments add to the total weight.
 - 4) Ensure that your work area is stable and free of vibration from nearby equipment. The ISQ EC or ISQ EM mass spectrometer is a sensitive instrument. For this reason, the foreline pump must be placed on the floor below or next to the system. It is quiet at only 48 dB (A). See [Figure 4](#).

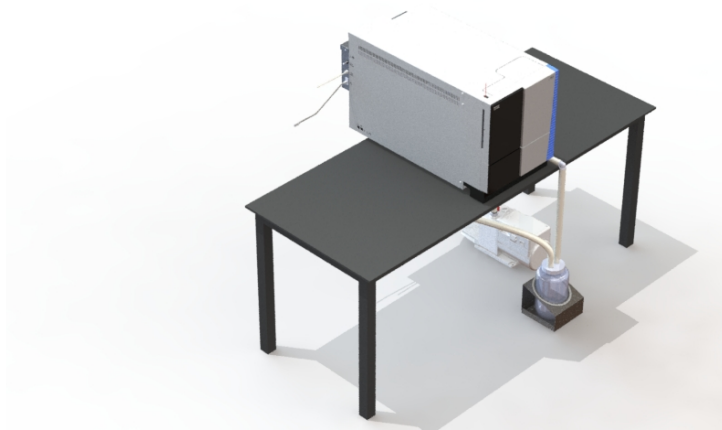


Figure 4: ISQ EC Bench Setup

3.3 Lighting Requirements

Use the following guidelines to ensure your site has the proper lighting to run an ISQ EC or ISQ EM system.

1. Ensure that the work area is properly lit. You might need an overhead lamp to light your work area.
2. You might need a small, high intensity lamp when you clean the ISQ EC or ISQ EM system or work on the foreline pump.

3.4 Power Requirements

Use the following guidelines to ensure your site is equipped with enough power to support the system. All circuits must be 50 or 60 Hz \pm 2 Hz, single-phase with < 6% total harmonic distortion. See [Table 3](#) for additional power requirements.

- ◆ **Circuit 1: ISQ EC or ISQ EM MS plus the foreline pump.** 100-240 Vac, 15 A_{MAX}. The foreline pump must be set to the line voltage used.
- ◆ **Circuit 2: LC or IC and computer.** See manuals for power requirements for the specific system. Each module (e.g. pump, autosampler, column compartment, detector) needs its own plug on circuit 2.
- ◆ Additional circuits may be needed for other equipment.

Equipment	Circuit	Max Current (A) at 120 V AC	Max Current (A) at 230 V AC	Maximum Power (VA)
ISQ EC or ISQ EM MS ^{4, 5}	1	11.7	6.1	1400
LC or IC ⁶	2	See instrument specifications	See instrument specifications	See instrument specifications
Computer ⁶	2	5	2.6	600
Monitor ⁶	2	2	1	240

Table 3: Power requirements

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

⁴ This instrument must be on its own circuit.

⁵ Foreline pump plugs into the ISQ EC or ISQ EM MS. At startup, the foreline pump draws an additional 21.5 A at 120 V and an additional 20 A at 230 V.

⁶ Power requirements may vary.

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 the ISQ EC or ISQ EM MS 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 ISQ EC MS. This disturbance appears as distortion of the fundamental sine wave. Total harmonic distortion should be less than 6%.
 - 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.






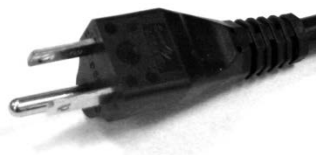


Use Table 3 to determine how many circuits and wall outlets you need. Keep in mind:


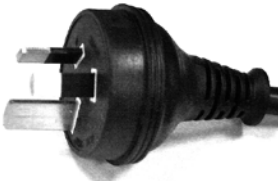





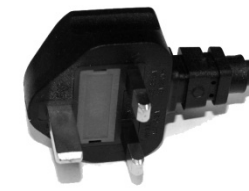
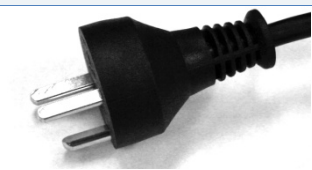
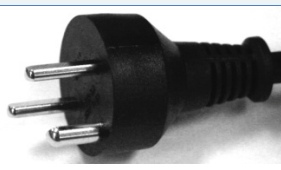



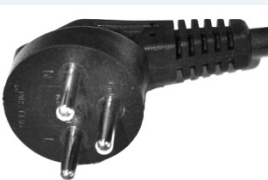
- ◆ Power must be single-phase.
- ◆ Wall outlets must have earth-ground hard-wired to the main panel.
- ◆ Included power cords are 2 m (6 ft) long.

Contact your local customer service office to discuss power cordset concerns.

The ISQ EC or ISQ EM MS come 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.

The power cords are designed to match the wall socket requirements of the country in which they are used. The end of the power cords that plugs into the power socket on the device is identical for all power cords. The end of the power cords that plugs into the wall socket is different.

Region	Thermo Scientific Part Number C13 (for PC, monitors, LC, and IC)	Thermo Scientific Part Number C19 (for MS)
North America 120V		
North America 250V		
Japan 125V		
Switzerland 250V		

Region	Thermo Scientific Part Number C13 (for PC, monitors, LC, and IC)	Thermo Scientific Part Number C19 (for MS)
Australia 250V		
China 250V		
Europe-Schuko 250V		
United Kingdom 250V		
Denmark 250V		
Italy 250V		
Israel 250V		


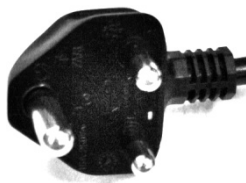

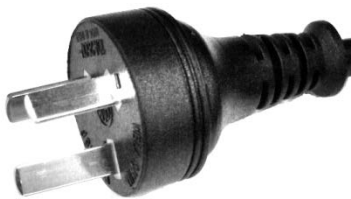
Region	Thermo Scientific Part Number C13 (for PC, monitors, LC, and IC)	Thermo Scientific Part Number C19 (for MS)
India 250V		
Argentina 250V		

Table 4: Power Cord Identification by Region

3.5 Environmental Requirements

The normal operating environment for the ISQ EC and ISQ EM MS must have the following characteristics:

- ◆ Indoor use only
- ◆ Altitude up to 2000 m
- ◆ Relative humidity from 20–80 % (non-condensing) 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 ISQ EC or ISQ EM MS, it is safe to leave the instrument powered on in a room with a temperature between 5 and 40 °C.

Instrument	Heat Output (BTU per hr)	Heat Output (W)
ISQ EC or ISQ EM , including foreline pump	4780	1400
Computer ⁷	2050	600
Monitor ⁷	820	240

Table 5: Heat output of system components

- 2) Ensure that the relative humidity in your laboratory is between 20 and 80% with no condensation. A temperature and humidity monitor in

⁷ Power requirements vary by manufacturer

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.

3.6 Gas Requirements

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



CAUTION—Hazardous Fumes

The exhaust gas of the instrument may contain hazardous fumes that pose health and safety risks. Avoid an accumulation of gas. The exhaust gas must always be removed by proper ventilation. Make sure that the installation site is well ventilated. Do not vent directly into the laboratory.

- ◆ Operate the instrument near the gas supply and ventilation sources.

3.6.1 Nitrogen Gas Supply

NOTICE—Gas Specifications

The requirements and specifications for the gas supplied to the instrument have major impact on the instrument performance. Observe the following notes:

- If the gas supply pressure is varying or dropping below the specified pressure range, it can impair the performance of the instrument.
- Non-volatile hydrocarbons, such as compressor oils, in the gas supplied to the system can cause permanent damage to the instrument.
- If the supply gas is contaminated with particles (size $\geq 0.1 \mu\text{m}$), water vapor or other non-volatile substances, it can impair the performance or even damage the instrument.
- Observe all requirements and specifications for the supply gas in this manual to avoid damage to the detector.

Make sure that the location fulfils the following requirements:

- ◆ Make sure that the gas supply is regulated to a stable gas pressure that is within the specified gas pressure range. (95-110 psig or 655-760 kPa)).

TIP—For sheath gas settings at or below 65 psig, nitrogen gas supply pressure of 90-100 psig (620-690 kPa) is sufficient.

TIP—If operating the ISQ EC or ISQ EM at maximum source gas settings, it is recommended that 100-110 psig (690-760 kPa) input pressure is used.

- ◆ Nitrogen gas (typically $\geq 99\%$ nitrogen purity) is recommended for most applications.
 - ◆ Each instrument requires up to 30 L/min of nitrogen
 - ◆ In standby, the instrument consumes ~ 15 L/min of nitrogen.
 - ◆ $\frac{1}{4}$ in. OD Teflon tubing should be used to connect to each instrument. 760 cm is provided in the installation kit.

NOTICE—Do not use 6 mm tubing. This can damage the fittings. Use only $\frac{1}{4}$ in. OD Teflon tubing.

- ◆ If connecting multiple instruments to one nitrogen line, ensure the minimum pressure is delivered to each instrument when all are consuming the maximum amount of gas.
- ◆ The system should be placed close to the nitrogen gas source since gas pressure decreases as the length of tubing increases.
- Options for delivering nitrogen are (in order of convenience):
 - ◆ A nitrogen generator: These are available in larger units that may be remotely located or as point-of-use systems. Work with the specific vendor in order to determine output purity via an oxygen sensor. Point-of-use systems require compressor maintenance every 3,000 hrs.
 - ◆ Facility size Dewar: These are large globes located outside a facility. They are filled as needed.
 - ◆ Portable Dewar: These are roll around Dewars. Be sure to get one capable of outputting 100 psig. The 35 and 80 psig models do not provide sufficient gas pressure and there can be

problems with them not boiling off nitrogen fast enough at high flow rates. Plan to change Dewars more often than you think, especially when operating the ISQ EC or ISQ EM with lowered Nitrogen consumption rates. At low, or no, consumption, the Dewar must still vent off nitrogen during the day to prevent it from going too high in pressure. This boil off rate is a function of the ambient temperature. In general, a Dewar will go empty in 2-3 weeks even if not used.

NOTICE—There are different types of liquid nitrogen Dewars: some are rated to supply liquid and some are rated to supply liquid or gas. Ensure that the Dewar used with the system is rated to supply high-pressure gas. Dewars rated to a higher pressure are better at maintaining pressure when under high loads. A Dewar that can output significantly higher than 100 psig is recommended. A regulator should be used to drop the pressure down to 95-110 psig (655–760 kPa) when connecting to the ISQ EC or ISQ EM mass spectrometers.

3.7 Exhaust Requirements

A connection to your building exhaust / ventilation system must be provided. This could be a fume hood or other industrial vent. Separate connections for the foreline pump and ion source exhaust are preferred to prevent contamination of the ion source from foreline pump oil vapor.

Ventilation must be at atmospheric or at slightly negative pressure with no positive pressure applied.

Install the instrument in a well-ventilated laboratory. The foreline pump exhaust and ion source exhaust contains gas, solvents, analytes, and a small amount of oil vapor. These materials may be flammable, poisonous, or corrosive. Do not allow the exhaust 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.

1.1.1 Foreline Pump Exhaust

Must handle up to 1 L/min

Connection to top of pump is 25.4 mm (1 in) i.d.

305 cm of flexible tubing is provided in the installation kit

This tubing can be cut to any length needed

1.1.2 Ion Source Exhaust

Must handle up to 30 L/min

Connection to ion source is 25.4 mm (1 in) i.d.

305 cm of tubing is provided in the installation kit along with two 90° elbows for routing around the edge of the bench.

A 4 L solvent trap bottle is also provided with the instrument. This helps separate solvent from the LC or IC from the nitrogen gas from the ion source. This tubing can be cut to connect from the front, right of the instrument to the bottle and then from the bottle to the building exhaust. Two 90° elbows are included to make bends around the edge of the table if desired.

This tubing can be cut to any length needed. See Figure 5.



Figure 5: Ion source exhaust tubing

3.8 Solvents and Sample Preparation

3.8.1 Standard Installation

Installation of the ISQ EC and ISQ EM requires suitable solvents. At least one of the following solvents must be available. Solvents should be new and un-opened for best results during installation.

Recommended solvent quality for installation:

- ◆ Methanol – Optima LC/MS grade, Fisher Scientific A456-4 or equivalent
- ◆ Water – Optima LC/MS grade, Fisher Scientific W6-4 or equivalent
- ◆ Water – Ultrapure, Type 1 ≥ 18 Mohm resistance, degassed
- ◆ Acetonitrile – Optima LC/MS grade, Fisher Scientific A955-4 or equivalent

3.9 Receiving Requirements

When you receive the ISQ EC or ISQ EM 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 a Thermo Fisher Scientific Service Representative present. Doing otherwise may void your warranty or order.

3.10 What Happens Next?

A Thermo Fisher Scientific Representative will contact you to schedule the installation of your system. It is important to confirm that all the requirements in this guide are met BEFORE scheduling an installation.

4 Appendix

This chapter provides additional information about compliance.

4.1 Compliance Information

4.1.1 Declarations of Conformity

CE Declaration of Conformity

The device has satisfied the requirements for the CE mark and is compliant with the applicable requirements.



RoHS Compliance

This product complies with the RoHS (Restrictions of Hazardous Substances) directives:

- *European RoHS Directive*
Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment

The CE mark on the device indicates that the product is compliant with the directive.
- *China RoHS regulations*
Measures for Administration of the Pollution Control of Electronic Information Products

One of following logos may be present on the device if applicable:

	The green logo marks items that do not contain the hazardous substances identified by the regulations.
	The orange logo including a one-digit or two-digit number mark items that contain hazardous substances identified by the regulations. The number indicates the environment-friendly use period (EFUP) of the item. During this period, the item (when used as intended) will not cause serious damage to human health or environment. For more information, go to http://www.thermofisher.com/us/en/home/technical-resources/rohs-certificates.html

4.1.2 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:



Figure 6: WEEE 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. For further information, contact Thermo Fisher Scientific.

4.1.3 FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the U.S. FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his expense.

4.1.4 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 EMC EN 61326-1:2013. Safety IEC 61010-1:2010, IEC 61010-2-010:2014, IEC 61010-2-081:2015. Restriction of Hazardous Substances Directive (2011/65/EU).

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.

4.1.5 Low Voltage Safety Compliance

This device complies with Low Voltage Directive 2014/35/EU and harmonized standard EN 61010-1:2001.

4.1.6 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.

4.1.7 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.

4.1.8 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.

4.1.9 Manual Release History

Revision	Released	Covering
A	August 2017	ISQ EC MS
B	October 2018	ISQ EC MS and ISQ EM MS