MS/ETD System

Preinstallation Guide

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Analyze • Detect • Measure • Control™

Thermo
ELECTRON CORPORATION

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IMPORTANT PREINSTALLATION INFORMATION... PLEASE READ

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MS/ETD System System Installation Request Form

Dear User:

Read the MS/ETD System Preinstallation Requirements Guide, and then print and complete the following installation request form. After all of the items on the form are completed, sign and date the form. Then, mail or fax this form to your local Thermo Electron sales/service office. The address and fax number for your local office is supplied by your Thermo Electron sales representative or can be located on the following pages.

- ❑ 1. All laboratory remodeling has been completed.
- ❑ 2. Your *MS/ETD System* is on site.
- ❑ 3. Principal operator will be available during the installation / certification period.
- ❑ 4. Doorways, hallways, etc. are a minimum width of 94 cm (37 in.).
- ❑ 5. Available floor area is sufficient and flooring will support the load.
- ❑ 6. Sufficient bench space is available for all of the equipment. List the following:
  Width: _____
  Depth: _____
  Height: _____
- ❑ 7. Workbench can support the load of the system [202 kg (445 lbs)] and is free from vibration.
- ❑ 8. Lighting is adequate.
- ❑ 9. Main power is installed and is in compliance with local electrical codes.
- ❑ 10. Power for test and cleaning equipment is installed.
- ❑ 11. Power outlets are of the correct configuration.
  Note NEMA type: _____
- ❑ 12. Voltage of power outlet has been measured.
  Note ***measured*** voltage: _____
- ❑ 13. Power is free from fluctuations due to slow changes in the average voltage or changes due to surges, sags, or transients.
- ❑ 14. Air conditioning is adequate for temperature, humidity, and particulate matter control. The laboratory can be maintained at a constant temperature, between 15 and 27 °C (59 and 81 °F).
- ❑ 15. Relative humidity is between 40% and 80% with no condensation.
- ❑ 16. System work area is free from magnetic disruption and electrostatic discharge.
- ❑ 17. All gases required (helium and nitrogen) are on site, gas lines are installed, and appropriate gas regulators are available.
  List gases and purity: _____
- ❑ 18. New or recently cleaned HPLC system is available that produces pulse-free, continuous flow from 100 to 1000 μL/min.
- ❑ 19. HPLC grade water, methanol, acetonitrile and isopropyl alcohol are available for testing the performance of your instrument.
- ❑ 20. There is a suitable exhaust system present that is separate from solvent waste.
- ❑ 21. Provision has been made for collecting solvent waste from API source.
- ❑ 22. One voice telephone line is installed near the system.
- ❑ 23. All relevant safety regulations are complied with.

Have any special acceptance specifications been agreed to in the contract? Yes ❑ No ❑
If **YES**, attach full details of specifications.

Is there any additional equipment that needs to be interfaced to the system? Yes ❑ No ❑
If **YES**, attach full details of additional equipment.

Note: We reserve the right to invoice against the engineer's time if the installation requirements are not met on the date of the installation.

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

Name _____

Company _____ Telephone_____

Address _____

Address _____

City _____ State _____ Country_____

Signature _____ Date _____

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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.A., when you are dialing from within the specified country, dial the 0 of the city code. For countries other than Italy, when you are dialing from outside the country, do not dial the 0 of the city code.

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Regulatory Compliance

Thermo Electron San Jose performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When the system is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards as described below.

EMC Directive 89/336/EEC

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

EN 61000-3-2	1995, A1; 1998, A2; 1998, A14; 2000	EN 61000-4-4 IEC 61000-4-4	1995, A1; 2001, A2; 2001; A2-1995
EN 61000-3-3	1998	EN 61000-4-5	1995, A1; 2001
		IEC 61000-4-5	2005
EN 61326-1	1998, A3	EN 61000-4-6	1996, A1; 2001
		IEC 61000-4-6	2004
EN 61000-4-2	2000	EN 61000-4-11	1994, A1; 2001
IEC 61000-4-2	2001	IEC 61000-4-11	2001-03
FCC Class A, CFR 47 Part 15	2005	CISPR 11	1999, A1; 1999, A2; 2002

Low Voltage Safety Compliance

This device complies with Low Voltage Directive 73/23/EEC and harmonized standard EN 61010-1:2001.

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

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FCC Compliance Statement

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

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

Notice on Lifting and Handling of Thermo Electron San Jose Instruments

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

Notice on the Proper Use of Thermo Electron San Jose Instruments

In compliance with international regulations: If this instrument is used in a manner not specified by Thermo Electron San Jose, the protection provided by the instrument could be impaired.

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.

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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 Electron has contracted with one or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on Thermo Electron's compliance with these Directives, the recyclers in your country, and information on Thermo Electron products which may assist the detection of substances subject to the RoHS Directive are available at www.thermo.com/WEEERoHS.

WEEE Konformität

Dieses Produkt muss die EU Waste Electrical & Electronic Equipment (WEEE) Richtlinie 2002/96/EC erfüllen. Das Produkt ist durch folgendes Symbol gekennzeichnet:

Thermo Electron hat Vereinbarungen mit Verwertungs-/Entsorgungsfirmen in allen EU-Mitgliedsstaaten getroffen, damit dieses Produkt durch diese Firmen wiederverwertet oder entsorgt werden kann. Mehr Information über die Einhaltung dieser Anweisungen durch Thermo Electron, über die Verwerter, und weitere Hinweise, die nützlich sind, um die Produkte zu identifizieren, die unter diese RoHS Anweisung fallen, finden sie unter www.thermo.com/WEEERoHS.

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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:

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

Contents

Preface

About This Guide

Welcome to the Thermo Electron MS/ETD System. The MS/ETD System is a member of the Thermo Electron family of mass spectrometer (MS) detectors.

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

Related Documentation

In addition to this guide, Thermo Electron provides the following documents for the MS/ETD System as .PDF files:

- ETD Module Hardware
- MS/ETD System Getting Started
- LTQ XL manual set

Help is also available from within the software.

Safety and Special Notices

Follow the precautionary statements presented in this guide. The safety and other special notices appear in boxes.

Safety and special notices include the following:

CAUTION Highlights hazards to humans, property, or the environment. Each CAUTION notice is accompanied by an appropriate CAUTION symbol.

IMPORTANT Highlights information necessary to avoid damage to software, loss of data, invalid test results, or information critical for optimal performance of the system.

Note Highlights information of general interest.

Tip Helpful information that can make a task easier.

Contacting Us

There are several ways to contact Thermo Electron.

Assistance

For new product updates, technical support, and ordering information, contact us in one of the following ways:

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www.thermo.com/finnigan

Contact Technical Support

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Fax: 1-561-688-8736
techsupport.finnigan@thermo.com

Contact Customer Service

In the US and Canada for ordering information:
Phone: 1-800-532-4752
Fax: 1-561-688-8731

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Changes to the Manual and Online Help

To suggest changes to this guide or to the Online Help, use either of the following methods:

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

Chapter 1 Introduction

The MS/ETD System is designed to operate under carefully controlled environmental conditions. The MS/ETD System consists of the LTQ XL MS System and the ETD Module.

Note The purchaser is responsible for providing a suitable location, a suitable operating environment, a source of power of acceptable quality, correct gas and solvent supplies, and proper waste and exhaust systems.

Operating the system or maintaining it outside the power and operating environment specifications described in this guide might cause failures of many types. The repair of such failures is specifically excluded from the standard warranty and service contract coverage.

For additional information, request specific preinstallation support directly through your local Thermo Electron office.

Chapter 2 Site Preparation

Note It is your responsibility to provide an acceptable installation site.

Before your MS/ETD System can be installed by the service engineer, the site must be prepared. The hallways and doors must be wide enough to allow passage of the instrument. The workbench must be large enough and strong enough to support the MS/ETD System (LTQ XL+ETD Module), computer and LC system. A telephone must be installed within reach of the workbench. For a summary of site preparation requirements see Table 1. More information on each of the requirements is available on the page indicated in the table.

Table 1. Site preparation requirements

Requirement	Page
Entrance: For the system to be delivered to the site, your entrances and hallways must be a minimum of 94 cm (37 in.) wide for passage of the instrument.	5
Space and Load Requirements: Two workbenchs are required. The MS detector workbench must have minimum dimensions of 1 × 1.53 m (3 × 5 ft). The data system workbench must have minimum dimensions of 1 x 1.22 m (3 x 4 ft). The MS detector workbench must be capable of supporting the weight of the MS/ETD system [141 kg (310 lbs)] plus the weight of your liquid chromatograph and any options. The data system workbench must be capable of supporting the weight of the data system and printer [48 kg (105 lbs)]. The fully extended ion probe handle extends 48 cm (19 in.) beyond the back panel of the MS/ETD system. A *minimum* clearance of 31 cm (12 in.) is required between the wall and the fully extended ion probe handle on the back of the ETD system, or 79 cm (31 in) from the back panel of MS/ETD system to the wall is the *minimum* clearance. The *recommended* clearance is 46 cm (18 in.) between the wall and the fully extended ion probe handle on the back of the ETD system, or 94 cm (37 in) from the back panel of MS/ETD system to the wall is the *recommended* clearance.	6

Table 1. Site preparation requirements

Requirement	Page
Telephone: A telephone line must be installed near the workbench.	10

Entrance

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

The LTQ XL system and accessories are shipped in a container with the following dimensions: *l*=102 cm (40 in.), *w*=92 cm (36 in.), *h*=117 cm (46 in.). The container and its contents weigh approximately 160 kg (350 lb). Other modules—such as the computer, forepump, monitor, and options—are shipped in their own containers. Their dimensions and weights are less than that of the containers for the LTQ XL System.

The ETD module, forepump, and accessories are shipped in a container with the following approximate dimensions: *l~97* cm (38 in.), *w~*71 cm (28 in.), *h~94* cm (37 in.). The container and its contents weigh approximately 105 kg (230 lb).

[1]If the instrument shipping container, Shock Watch, or other indicator shows any evidence of damage or mishandling during shipment do NOT open the container. Call your Thermo Representative for instructions on what to do. If there is no evidence of shipping damage or mishandling then you can proceed with the instructions that follow. Your instrument is shipped in a shipping container with a smallest dimension of 92 cm (36 in.). If the entrance to your laboratory will not accommodate a 92 cm container, you can remove the individual modules from the container before moving them into the laboratory. If you remove the instrument from its shipping container before it is delivered to the lab site, be sure that all the contents of the container remain with the instrument, including software, documentation and accessories.

Space and Load Requirements

The recommended layout for the MS/ETD system is shown in Figure 1. The space requirements and weights of the components of the typical ETD system are given in Table 2.

Place the MS/ETD system and associated systems on two separate workbenchs that are next to each other (see Figure 1). One workbench will hold the MS/ETD system, the LC, and any other MS/LC options and must have minimum dimensions of 1 × 1.53 m (3 × 5 ft). This workbench must also be capable of supporting the weight of the MS/ETD System [141 kg (310 lbs)] plus the weight of the liquid chromatograph and any other MS/LC options. Allow at least 92 cm (36 in.) of vertical clearance between the top of the MS/ETD System and any shelves above it.

Free access to the rear of the MS/ETD system is required. The fully extended ion probe handle extends 48 cm (19 in.) beyond the back panel of the MS/ETD system. A *minimum* clearance of 31 cm (12 in.) is required between the wall and the fully extended ion probe handle on the back of the ETD system, or 79 cm (31 in) from the back panel of MS/ETD system to the wall is the *minimum* clearence. The *recommended* clearance is 46 cm (18 in.) between the wall and the fully extended ion probe handle on the back of the ETD system, or 94 cm (37 in) from the back panel of MS/ETD system to the wall is the *recommended* clearance.

The second workbench will hold the data system and printer and must have minimum dimensions of 1 × 1.22 m (3 × 4 ft). This second workbench must be capable of supporting the weight of the data system and printer (48kg, 105lb).

The system includes three forepumps, two large pumps (for the MS unit) and a smaller one (for the ETD module). Install the forepumps on the floor close to the MS/ETD System. The total length of the vacuum hose connecting the MS unit to the MS unit forepumps (large pumps) should not exceed 8 ft. for each pump. The total length of the vacuum hose connecting the ETD module to the ETD module forepump (small pump) should not exceed 6 ft. The requirement for locating the forepumps and for connecting the vacuum hoses from the MS/ETD System to the pumps is :

- If the workbench has space beneath it, place the forepumps under the workbench immediately behind the MS/ETD System. See the tabletop layout in Figure 1. Either run the vacuum hose behind the workbench or make a 64 mm (2.5 in.) diameter hole through the bench for the vacuum hose. Allow for room to run the power cords from the forepumps through the hole.
- Table 2 gives the approximate space and weight requirements of the various components of the system.
- Do not place the forepumps on a shelf or other surface connected to the table supporting the MS/ETD system. Vibration from the pumps may affect system performance.

CAUTION Whenever possible, provide space under the workbench for the forepumps. If the pumps are placed in front of the MS/ETD System, they can block access to drawers and cabinets and can represent a trip hazard.

Do not place the forepumps on a shelf or other surface connected to the table supporting the MS/ETD system. Vibration from the pumps may affect system performance.

Note Do not route exhaust tubing from the pumps vertically toward the ceiling. To maintain pump integrity, route the tubing from the exhaust ports down to the floor.

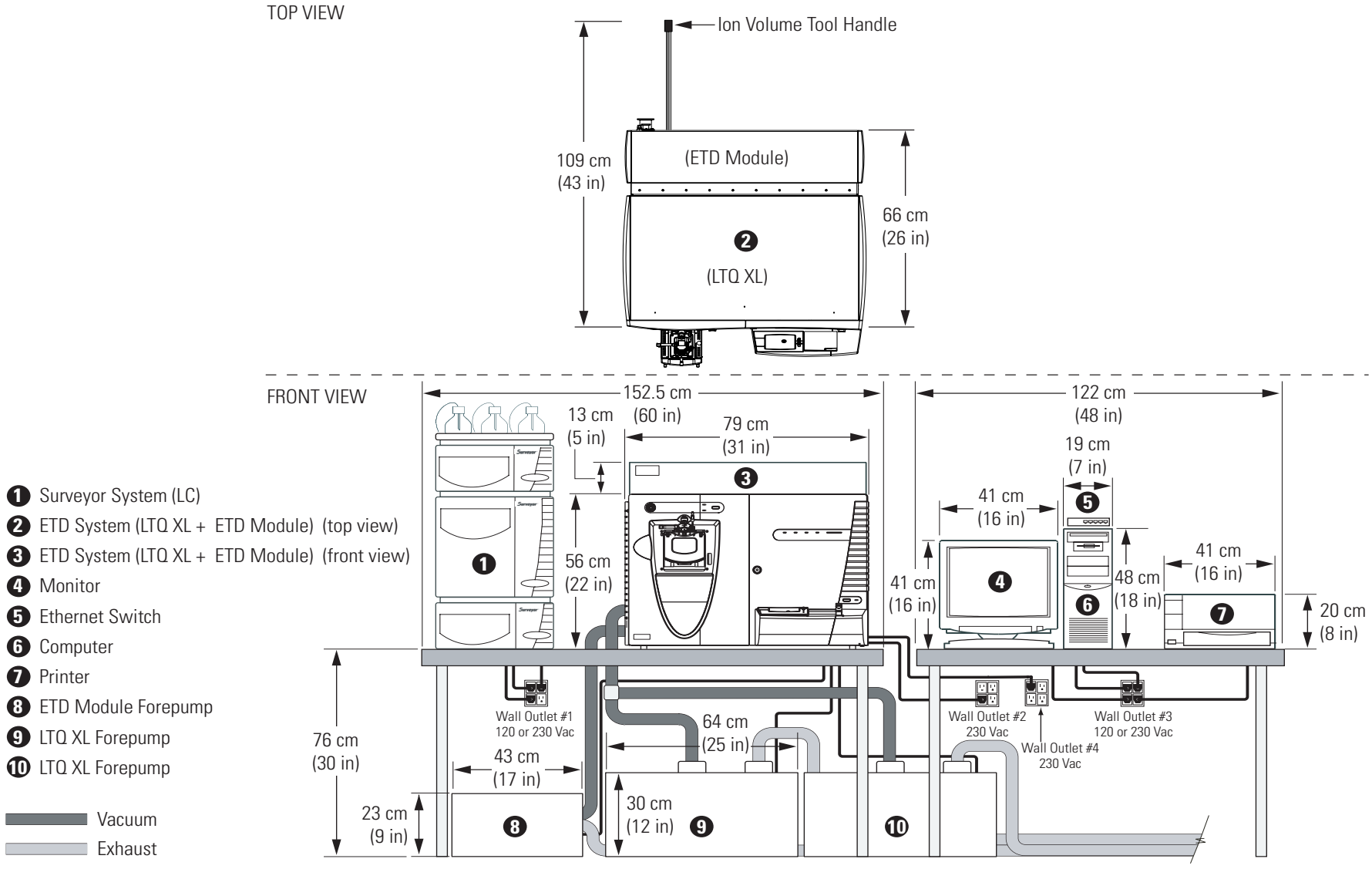


Figure 1. ETD system installation and space requirements

Table 2. MS/ETD System space and weight requirements*

	Height		Width		Depth		Weight	
Module	**cm**	**in.**	**cm**	**in.**	**cm**	**in.**	**kg**	**lb**
MS/ETD System (Ion Volume Tool handle fully extended)	69	27	79	31	109	43	141	310
Liquid chromatograph*	61	24	76	30	61	24	45	100
Minitower computer	48	19	18	7	43	17	14	30
Monitor	41	16	41	16	43	17	17	38
Keyboard	5	2	48	19	20	8	1	2
LTQ XL Forepumps (each)	30	12	20	7	64	25	34	75
ETD Module Forepump	23	9	43	17	16	6	26	58
Laser printer*	20	8	41	16	46	18	7	16

*Approximate. The actual values depend upon your equipment.

Telephone

Install a telephone in your laboratory near the instrument so that, if necessary, you can conveniently operate the system while you are working by telephone with Thermo Electron Technical Support. Place the voice telephone outlet within 2 m (6 ft) of your system.

Chapter 3 Operating Environment

Note It is your responsibility to provide the operating environment necessary for proper ETD system operation.

Attention to the operating environment will ensure continued high performance of your MS/ETD System. Any expenditures for air conditioning are more than offset by good sample throughput and reduced repair costs. Refer to Figure 3 for more information on operating environment requirements.

Table 3. Summary of Operating Environment preinstallation requirements

Requirement	Page
Temperature The laboratory room temperature must be maintained between 15 and 27 °C (59 and 81 °F). Also, ensure that the temperature does not fluctuate by more than ±5 °C to ensure good performance.	12
Humidity The relative humidity of the operating environment must be between 40% and 80%, with no condensation.	13
Vibration Workbench must be free from vibration.	14
Lighting Adequate lighting for instrument operation is required. A high intensity lamp for instrument maintenance is also recommended.	15
Particulate matter Air should contain fewer than 100,000 particles per cubic foot (3,500,000 particles per cubic meter) in excess of 5 µm.	16
Electrostatic discharge Precautions are recommended, especially when operating the system at the lower end of the relative humidity range listed above.	17

Temperature

For precision instrumentation such as the MS/ETD System, the temperature stability of the environment in which the instrument is installed can affect performance. The laboratory room temperature must be maintained between 15 and 27 °C (59 and 81 °F). The optimum temperature of operation is between 18 and 21 °C (65 and 70 °F).

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

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

Note Do not locate the ETD under an air duct, near windows, or near heating and cooling sources. Temperature fluctuations of 5 °C or more over a 5 min period of time can affect performance.

The air conditioning load for a basic MS/ETD System (with a typical LC) is approximately 2300 W (8,000 Btu/h). Refer to your LC manual for the heat output of your LC equipment.

Table 4 shows the approximate heat output of each module.

Table 4. Approximate Heat output

Module	Approximate Heat output (in Watts)	Approximate Heat output (in Btu/h)
MS/ETDSystem	2,300	8,000
Liquid chromatograph*	1,060	3,690
Monitor	240	820
Computer	470	1,640
Laser printer*	350	1,230
Total	4,420	15,380

*Approximate. The actual values depend upon your equipment.

Humidity

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

Operating an MS/ETD System in an environment with very low humidity can cause the accumulation and discharge of static electricity, which can shorten the life of the electronic components. Operating the system in an environment with high humidity can cause condensation, oxidation, and short circuits. It can also cause the accumulation of dust that can block filters on cooling fans.

It is recommended that your laboratory be equipped with a temperature/humidity monitor to insure that your laboratory is always within the required temperature and humidity specifications.

Vibration

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

Because of the natural vibration of the forepumps during operation, install the pumps on the floor beneath the MS/ETD System and not on the workbench used for the system.

CAUTION Do not place the forepumps on a shelf or other surface connected to the table supporting the MS/ETD system. Vibration from the pumps may affect system performance.

Lighting

Good lighting makes any work area more enjoyable. A small, high-intensity lamp is recommended for cleaning the mass spectrometer components.

Particulate Matter

The air in your laboratory must not have excessive dust, smoke, or other particulate matter. For reference, the air should contain fewer than 100,000 particles per cubic foot (3,500,000 particles per cubic meter) in excess of 5 µm.

Dust can clog the air filters, causing a reduction in air flow around electronic components. Dust on electronic components can act as an insulating blanket which reduces the transfer of heat from the components to the surrounding air.

Electrostatic Discharge

Electrostatic discharge (ESD) can damage the electronic components of your MS/ETD System.

MS/ETD Systems are designed to withstand ESD up to 4 kV (air discharge) and 4 kV (contact discharge) with all panels in place. However, if the panels are removed and the PCBs are handled without proper precautions, the electronic components might be damaged or fail prematurely.

Static electricity can develop in a variety of ways. A few examples of how electrostatic charge can develop are as follows:

- When walking across a carpet in a room that is at 20% relative humidity, as much as 35,000 V of electrostatic potential can be generated on the surface of your body. A similar trip in a room at 80% relative humidity generates about 1,500 V of electrostatic potential.
- Sitting and working in a chair padded with polyurethane foam in a room at 20% relative humidity can cause as much as 18,000 V of electrostatic potential to develop on your skin or 1,500 V at 80% relative humidity.
- Working in laboratory coats and clothing made of synthetic fibers can cause the accumulation of static electricity on your skin.
- Using Styrofoam® cups and packing materials which typically have a considerable electrostatic charge on them.

The discharge of static electricity is not perceptible to humans until the potential is at least 4,000 V. Many electronic components can be damaged by a discharge of electrostatic potential of as little as 50 V. ESD damage can be catastrophic, causing your system to cease functioning. More commonly, however, ESD damage might cause latent problems that are detrimental to sensitive electrical components, causing premature failures.

Therefore, the following precautions are recommended, especially when operating your system at the lower end of the relative humidity specification on page 13.

- Use a static-dissipating floor covering (such as tile or conductive linoleum) in the room that houses your instrument.
- Use laboratory chairs covered with natural fibers or other static-dissipating material.
- wear a laboratory coat and clothing made of natural fiber or other static-dissipating material when you are operating the instrument.
- Keep Styrofoam cups or packing materials away from the instrument.

Chapter 4 Line Power

The performance and longevity of your system can be affected by the quality of line power delivered to the system. In order to ensure that your instrument performs optimally and is not damaged by line power fluctuations, verify that your lab electrical supply complies with all power quality requirements. Refer to Table 5 for a summary of line power requirements. More information on each of the requirements is available on the page indicated in the table.

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

Table 5. Summary of line power preinstallation requirements

Requirement	Page
Quality of Power Line power must be free from: Long-term changes in average root mean square (RMS) voltage level, with durations greater than 2 s. Sudden changes in average RMS voltage level, with durations between 50 ms and 2 s. Brief voltage excursions of up to several thousand volts with durations up to 50 ms.	23
Power Monitoring Devices Before connecting your MS/ETD System to line power, it is strongly recommended that the line power to the anticipated location of the system be monitored 24 hours a day for seven consecutive days. Contact your local service manager to inquire about having this monitoring performed at your facility.	24

Table 5. Summary of line power preinstallation requirements, continued

Requirement	Page
Power Conditioning Devices	25
To free line power from voltage changes, sags, surges and transients, the following devices are available:	24
Noise suppression transformer	25
Buck/boost transformer (P/N OPTON-01460)	25
Power conditioning	25

Table 5. Summary of line power preinstallation requirements, continued

Requirement	Page
Available Outlets	31
For systems installed where there is 110 and 230 V:	
Nominal voltage of 120 V ac, +6% to -10% and 230 V ac, ±10% and free from voltage variations above or below this operating range	
Systems installed in areas with 208 V power will experience voltage sags during high use periods that might place the line voltage below the operating parameters discussed in this section. In this case, it is required that you protect your instrument by using a buck/boost transformer to ensure that power is within the specified parameters at all times.	
Frequency of 50/60 Hz	
Two fourplex outlets (single-phase power) with a minimum power rating of 20 A (120 V ac)	
Two fourplex outlets (single-phase power) with a minimum power rating of 16 A (230 V ac)	
Earth ground hard-wired to the main panel	
For systems with only 230 V line power:	
Nominal voltage of 230 V ac, ±10% (Note: For systems installed in areas with 208 V ac nominal line power, you are required to use a buck/boost transformer to keep your line power within operating parameters.)	
Frequency of 50/60 Hz	
Four fourplex outlets, with a minimum power rating of 16 A at each fourplex outlet (In the U.S., only 15 and 20 A power rating options are available, therefore you must choose the 20 A option.)	
Earth ground hard-wired to the main panel	
Connecting the MS/ETD System, LC, and Other Modules to Wall Outlets	31
Balance the current load on the circuits to which your system is connected.	

Table 5. Summary of line power preinstallation requirements, continued

Requirement	Page
Uninterruptible Power Supply Systems installed in areas with intermittent line power must have uninterruptable power supplies installed.	33
Technical Assistance Contact Thermo Electron for additional assistance in monitoring line power or selecting a line conditioner.	34

CAUTION It is absolutely necessary that an earth ground be provided to protect the system from the ac power line. The adequacy of the ground protection must be measured and verified during the pre-installation procedure.

If the ground protection is inadequate or not present, the system must not be installed. Installation with inadequate or non-existent ground protection violates all United States and international safety standards.

Quality of Power

The quality of power supplied to your ETD system is very important. The line voltage must be stable and within the specifications listed in this guide. The line voltage must be free of fluctuations due to slow changes in the average voltage, surges, sags, or transients.

The following are definitions for the most common voltage disturbances:

- Slow average is a gradual, long-term change in average root mean square (RMS) voltage level, with typical durations greater than 2 s.
- Sags and surges are sudden changes in average RMS voltage level, with typical durations between 50 µs and 2 s.
- Transients (or impulses) are brief voltage excursions of up to several thousand volts with durations up to 50 µs.

Constant high line voltage, impulses, or surges in voltage can cause overheating and component failures. Constant low line voltage or sags in voltage can cause the system to function erratically or not at all. Transients, even a few microseconds in duration, can cause electronic devices to fail catastrophically or to degrade and eventually shorten the lifetime of your system. Therefore, it is important to establish the quality of the line voltage in your laboratory before your ETD system is installed.

Power Monitoring Devices

A variety of devices are available to monitor the quality of your line power.

These devices provide a continuous record of line performance by analyzing and printing out data on three types of voltage disturbances:

- slow average
- sag and surge
- transient.

In the first two cases, the duration and the amplitude of the disturbance are indicated by time interval recording. A power line disturbance analyzer is a device capable of detecting and recording most types of line power problems. The Dranetz® [1] system is an example of a suitable analyzer. Line monitors can be rented from electrical equipment suppliers.

Monitor the power line 24 hours a day for seven consecutive days. If inspection of the printout indicates disturbances, terminate the test and take corrective action. Monitor the power again as previously described.

[1]Thermo Electron Corporation does not endorse any power monitoring company, nor does it endorse products other than its own. Companies and products listed in this guide are given as examples only.

Power Conditioning Devices

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

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

When the line voltage is free from voltage sags, surges, and impulses but is more than 10% outside of the voltage specifications, the line voltage can be lowered (bucked 10%) or raised (boosted 10%) by using a buck/boost transformer.

The buck/boost transformer kit (P/N OPTON-01460) can be ordered from the Thermo Electron San Jose.

Each buck/boost transformer is encased in a metal housing approximately 13 × 13 × 26 cm (5 × 5 × 10 in.) and is equipped with a 2 m (6 ft) power cable. The installation instructions for the transformer are included.

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

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

Available Outlets

The MS/ETD System is designed to operate at a nominal voltage of 230 V ac, 50/60 Hz. Line voltages can vary between a minimum of 207 V ac and a maximum of 253 V ac.

CAUTION Systems installed in areas with 208 V power will experience voltage sags during high use periods that might place the line voltage below the operating parameters discussed in this section. In that case, it is required that you protect your instrument by using a buck/boost transformer to ensure that power is within the specified parameters at all times.

The minimum and maximum voltage tolerances are in compliance with IEC 950, Amend 2, 1993, paragraph 1.6.5., and EN60950:1992/A2:1993 paragraph 1.6.5 as follows:

> "Equipment intended to operate directly from the main supply shall be designed for a minimum supply tolerance of +6% and -10%. If the rated voltage is 230 V ac single phase or 400 V ac three phase, the equipment shall operate safely within a minimum supply tolerance of ±10%."

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

- Nominal voltage of 120 V ac, +6% to -10% and 230 V ac, ±10% and free from voltage variations above or below this operating range
- Frequency of 50/60 Hz
- Two fourplex outlets (single-phase power) with a minimum power rating of 20 A (120 V ac)
- Two fourplex outlets (single-phase power) with a minimum power rating of 16 A (230 V ac). (In the U.S., only 15 and 20 A power rating options are available, therefore you must choose the 20 A option.)
- Earth ground hard-wired to the main panel
- For systems installed in areas with 230 V ac only service, the basic power requirements for a ETD system consist of the following:
- Nominal voltage of 230 V ac, ±10%
- Frequency of 50/60 Hz
- Four fourplex outlets, with a minimum power rating of 16 A at each fourplex outlet
- Earth ground hard-wired to the main panel

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

Note

1. Power must remain ON. The MS/ETD system should remain ON and pumping continuously for optimum performance.
2. Additional power outlets might be required for test and cleaning equipment, such as an oscilloscope and ultrasonic bath. It is recommended that there be several additional power outlets close to the workbench space within your laboratory.

Figure 1 on page 8 shows the optimum location of the power outlets.

The power cables from the MS/ETD System are 3 m (9 ft) and the cables from the personal computer, monitor, and printer are approximately 2 m (6 ft) long.

The MS/ETD System is shipped with a NEMA 6-15P plug, which is rated at 15 A and 250 V ac. The data system is shipped with a NEMA 5-15P plug, which is rated at 15 A and 125 V ac. The printer is shipped with either a NEMA 5-15P plug or with a 220 V ac European CEE 7/7 (Schuko) plug. Local codes in your area might require that another type of plug and receptacle be installed. The Thermo Electron Field Engineer for your country provides the appropriate power plugs.

The NEMA plugs and their corresponding outlets are shown in Figure 2.

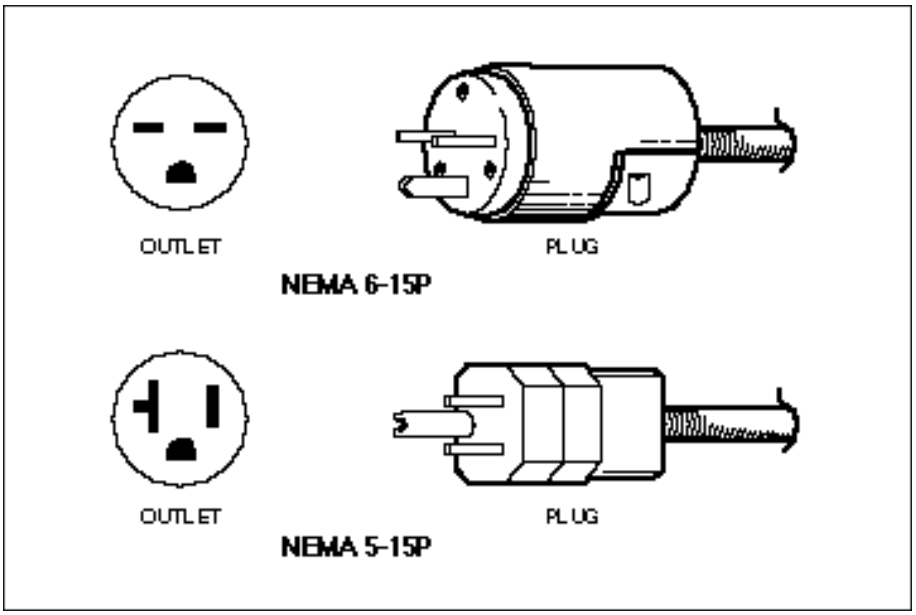


Figure 2. NEMA 6-15P and NEMA 5-15P power plugs and their respective outlets.

Table 6 shows the maximum current required by each component of a typical MS/ETD System. The MS/ETD System components (LTQ XL and ETD Module) each operate with 230 V ac only. Other components can be manually set to 120 V ac or 230 V ac or can be ordered as a 120 V ac or 230 V ac option

CAUTION The values listed in Table 6 are the average currents drawn by each of the listed components. Any conditioning devices installed with your system must also be able to deal with the potentially high currents drawn during the initial startup of the system. For example, each forepump can draw as much as 30 A during startup. For more details on the surge requirements for your system, consult the forepump manuals or your Service Engineer.

Table 6. Maximum current (single phase) for a ETD at 230 V ac, an LC at 120 or 230 V ac, and the data system (with printer) at 120 or 230 V ac

Module	Voltage 120 V ac Current (in amperes)	Voltage 230 V ac Current (in amperes)
MS/ETD System (LTQ XL + ETD Module) (230 V only)		3-5 (10A inrush) for each component
LTQ XL forepumps (each)		5 (30 A inrush)
ETD Module forepump		5 (20 A inrush)
Liquid chromatograph*	10	5
Monitor	2	1
Computer	4	2
Laser printer*	3	2

*Approximate. The actual value depends on your equipment.

Note Refer to your LC equipment manual for power requirements and specifications.

Installation of a complete LC/MS system can require extensive electrical resources. The number of outlets required to connect and power all of your equipment can easily exceed your line power's ability to deliver what you need if you have not planned your power system properly. Refer to Table 7 for an example of the number of outlets that might be necessary in your laboratory .

Table 7. A sample laboratory setup*

Item	Outlets
HPLC Sytem	
Autosampler	1
Heater	1
Pump	1
PDA Detector	1
External Controller	1
LTQ XL mass spectrometer	1 (230V)
ETD Module	1 (230V)
Ion source (APPI or NSI)	1 (for either source)

Table 7. A sample laboratory setup*

Item	Outlets
Data system	
CPU	1
Monitor	1
Printer	1
High intensity lamp (Optional: For help in instrument maintenance)	1
Laboratory stereoscope for inspecting fused-silica parts (Optional-useful when performing nanoflow or microfluidic experiments)	1
Total outlets required for this configuration	**13**

*Your setup might vary and depends upon the line voltages and current supplied

Connecting the MS/ETD System, LC, and Other Modules to Wall Outlets

Care must be taken to ensure that the wall outlet specifications are not exceeded. The maximum load for a 120 V ac fourplex outlet is typically 20 A, and the maximum load for a 230 V ac fourplex outlet is typically 16 A. Refer to Table 6 for the maximum current ratings for the ETD system and the data system.

Table 8 and Table 9 show examples of how to balance the power load among three wall outlets without exceeding their specifications. (See Figure 1 on page 8 for a typical installation.)

The specifications for the modules in your system might vary from those in this guide. The power specifications on the module always supersede those in the guide.

Table 8. Suggested power connections for an MS/ETD system at 230 V ac, an LC at 120 V ac, and the data system (with printer) at 120 V ac

Module	Outlet #1	Outlet #2	Outlet #3	Outlet #4
LTQ XL (MS unit,230 V ac only)		15 A		
ETD Module (230 V ac only)				15A
Liquid chromatograph*	10 A			
Monitor			2 A	
Computer			4 A	
Laser printer*			3 A	
Total	10 A	15 A	9 A	15A

*Approximate. The actual value depends on your equipment.

Table 9. Suggested power connections for an MS/ETD system, an LC, and the data system (with printer) at 230 V ac

Module	Outlet #1	Outlet #2	Outlet #3	Outlet #4
LTQ XL (MS unit)		15 A		
ETD module				15 A
Liquid chromatograph*	5 A			
Monitor			1 A	
Computer			2 A	
Laser printer*			2 A	
Total	5 A	15 A	5 A	15 A

*Approximate. The actual value depends on your equipment.

CAUTION The MS/ETD system components (LTQ XL + ETD module) and LC should never be connected to the same electrical wall outlet circuit.

It is absolutely necessary that an earth ground be provided to protect the system from the ac power line. The adequacy of the ground protection must be measured and verified during the pre-installation procedure.

If the ground protection is inadequate or not present, the system must not be installed. Installation with inadequate or non-existent ground protection violates all United States and international safety standards.

Uninterruptible Power Supply

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

CAUTION For compliance and safety, ensure that your uninterruptible power supply (UPS) devices are certified by recognized domestic and international organizations, such as UL, CSA, TÜV, VDE, etc.

Technical Assistance

Occasionally, line power sources of unacceptable quality are encountered that adversely affect the operation of a MS/ETD system. Correcting line power problems is your responsibility. Contact your Thermo Electron office for assistance in monitoring the line voltage in your laboratory and in selecting a line conditioner.

Specifying power conditioning equipment is a complex task that is best handled by a company or consultant specializing in that field. Contact your Thermo Electron office for assistance in locating a power consultant in your area.

Chapter 5 Gases and Solvents

Note It is your responsibility to provide the correct gas and solvent supplies necessary for the operation of the system.

Your instrument requires high purity gases and solvents. The Service Engineer might also require certain solvents for the installation verification of your system. Refer to Table 10 for a summary of gas and solvent requirements. More information on each of the requirements is available on the page indicated in the table.

Table 10. Summary of solvent and gas preinstallation requirements

Requirement	Page
Fittings All fittings and parts necessary for connecting gases during the installation of your system.	36
Gases: Ultra-high purity (99.995%) helium gas with less than 1.0 ppm each of water, oxygen, and total hydrocarbons. The required gas pressure is 275 ± 70 kPa (40 ±10 psi).	37
High purity (99%) nitrogen gas. The required gas pressure is 760 ± 70 kPa (110 ± 10 psi).	36
Solvents and modifiers Any solvents and modifiers necessary for the installation of your system.	39

Fittings and Parts

Table 11 lists the minimum parts that are required to connect your ETD System to your gas delivery system. Connections and gas delivery systems might vary. It is your responsibility to supply any fittings or connections necessary during installation.

Table 11. Gas connection hardware requirements (these parts are included in the LTQ XL install kit)

Description	LTQ XL P/N (in Accessory kit P/N 97055-62003)
1/4-in. OD PFA (Teflon®-like material) hose for nitrogen	2 m (6 ft) provided. You might require additional length.
Brass Swagelok®-type 1/4-in. nut	00101-12500
2-piece brass 1/4-in. ferrule	00101-10000 (front) 00101-04000 (back)
Connection for the opposite end of the Teflon hose to the nitrogen gas source	Not provided in kit. You supply these parts.
1/8-in. OD copper for helium	2 m (6 ft) provided. You might require additional length.
Brass Swagelok-type 1/8-in. nut	00101-15500
2-piece brass 1/8-in. ID ferrule	00101-08500 (front) 00101-02500 (back)
Connection for the opposite end of the tubing to the helium gas source	Not provided in kit. You supply these parts.

Gases

Your system can use large amounts of gases during daily operations. It is essential that the gases are delivered with the necessary pressure and purity. Refer to the following topics for information on the purity and pressure that your system requires:

- Helium
- Nitrogen

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

Helium

Helium for ETD System damping gas:

Ultra-high purity (99.999%) with less than 1.0 ppm each of: water, oxygen, and total hydrocarbons. The required gas pressure is 275 ± 35 kPa (40 ±5 psi). Particulate filters can be a source of contamination, they are not recommended.

Helium can be dispensed from a tank (such as one containing 245 ft^3 of helium) using a regulator suitable for helium[1].

Gas lines for helium must be copper or stainless steel. All gas lines should be free of oil and preferably flame dried. The gas lines should run to the back of the ETD module. Helium gas supply lines should terminate with 1/8-in., female, Swagelok®-type connectors.

Note

1. Do not shut off the helium gas. A continuous flow of helium is required for the optimum performance of the MS detector.
2. If you intend to use helium for sparging your LC solvents, a second tank and regulator is required. The helium gas line should run to the left side of the MS/ETD System. Helium gas supply lines should terminate with a 1/8-in., female, Swagelok®-type connector.

[1]For more information, visit: http://www.matheson-trigas.com or a consult a regulator supplier of your choice.

Nitrogen

The nitrogen for the API sheath gas and auxiliary/sweep gas needs to be high purity (99%). The required gas pressure is 760 ± 70 kPa (110 ± 10 psi).

Note To calibrate the MS/ETD System nitrogen gas proportioning valves, a nitrogen gas regulator must be available that can be adjusted from 0 to 900 kPa (0 to 130 psi

Run the nitrogen gas line to the back of the ETD Module. Terminate the nitrogen gas supply line with a 1/4-in., female, Swagelok-type connector. Particulate filters can be a source of contamination; they are not recommended.

Typical nitrogen gas consumption (nitrogen On 24 hours per day) is approximately 5,560 L (200 ft^3) per day. Maximum usage can be up to approximately 26,700 L (960 ft^3) per day. Therefore, it is recommended that nitrogen be supplied from one of the following sources:

- A large, sealed, thermally insulated cylinder containing liquid nitrogen from which the nitrogen gas is boiled off. The 230 psi model is recommended. The 35 and 80 psi models do not provide sufficient gas pressure. A typical cylinder of size 240 L yields 143,850 L (5,080 ft^3) of gas. The replacement frequency is approximately once every month.

Note Liquid nitrogen conversion factors :

- 1.0 lb of liquid nitrogen = 0.5612 L
- 1.0 kg of liquid nitrogen = 1.237 L

- A nitrogen generator with a minimum capacity of approximately 5,560 L (200 ft^3) per day at 99% purity with 100 psi at the side panel. Maximum consumption of nitrogen gas is 21 L/min (40 ft^3/h). Nitrogen generators require an air compressor. Some models of air compressor are quite noisy. Therefore, be careful to select a quite compressor. This is a continuous source; no replacement is required.

Note When the MS/ETD System turns On, the initial nitrogen surge may exceed the capacity of the nitrogen generator. This causes a flow rate drop that can trigger a low nitrogen warning from the MS/ETD System. If this happens frequently, call your Thermo Customer Service Representative.

Solvent Recommendations

The solvents listed in Table 12 can be used in operating and maintaining your MS/ETD System. Installation of the MS/ETD System requires HPLC-grade methanol and water. Solvent modifiers might also be required during the installation of some systems.

Note Some solvent impurities are transparent to UV/Vis detectors. Therefore, some HPLC grade solvents might contain contaminants that interfere with the performance of the mass spectrometer. For operation of your MS/ETD System, choose high purity solvents with minimum contamination.

Table 12. Solvents and reagents and modifiers

Solvents / Reagent	Specifications
Methanol	HPLC grade
Acetonitrile	HPLC grade
Water	HPLC grade
Isopropyl alcohol	HPLC grade
Acetic acid (modifier)	A.C.S. reagent
Formic acid (modifier)	99-100% (it is required that this acid be supplied in a glass bottle)

Note Do not filter solvents. Filtering solvents can introduce contamination.

Note Solvents from the following manufactures are recommended: Merck, Mallinckrodt, J.T. Baker or Burdick & Jackson.

Store and handle all chemicals in accordance with standard safety procedures.

Chapter 6 Waste and Exhaust

Note It is your responsibility to provide the proper waste and exhaust systems that are required for the operation of the system.

The proper performance of your system can be affected by the waste and exhaust arrangements for the instrument. Vacuum and solvent wastes must be vented separately, and wastes must be collected and disposed of properly. See Table 13 for a summary of exhaust and waste system requirements. More information on each requirement is available on the page indicated in the table.

Table 13. Summary of waste and exhaust preinstallation requirements

Requirement	Page
Exhaust system Vacuum pumps and solvent wastes must both be vented to fume exhausts. The pumps must be connected to a fume exhaust system that is separate from that to which solvents are vented.	42
Solvent waste A suitable container for the solvent wastes must be installed with the system.	43

Exhaust System

It is your responsibility to provide an adequate exhaust system.

Much of what is introduced into the MS/ETD System is eventually exhausted from the forepumps, along with the small amount of oil vapor that these pumps characteristically emit. Therefore, the pumps should be connected to a fume exhaust system.

Note An efficient fume exhaust system is required for the proper operation of your forepumps. Most atmospheric pressure ionization (API) applications contribute to the accumulation of solvents in the forepumps. These solvents must be purged from the mechanical pump oil periodically by opening the ballast valves located on the top of the pumps. When the ballast valves are opened, a large volume of volatile solvent waste might enter the fume exhaust system. Therefore, your fume exhaust system must be able to accommodate the periodic purging of the solvents. The frequency of the purging is dependent on the throughput of your system.

The forepumps have three functions:

1. Providing vacuum for the capillary skimmer of the API source
2. Providing backing pressure for the turbomolecular pumps in the LTQ XL MS.
3. Providing backing pressure for the turbomolecular pumps in the ETD module.

The rotary-vane pumps require a 25 mm (1 in.) exhaust port. The exhaust system for the forepumps must be able to accommodate a continuous flow rate of 1 L/min and an initial inrush flow rate of several times this.

CAUTION The forepump waste line must not have a vertical run near the forepump.. Solvents and oils can condense in this line. A waste line vertical run near the forepump could allow condensed vapors to flow back into the pump. This will cause the loss of pump capability and damage to the pump.

Solvent Waste

The Ion Max API source can accommodate high flow rates. Therefore, provisions must be made to collect the waste solvent in a manner that avoids pressure build up in the source. The Ion Max API source is fitted with a 25.4 mm (1.0 in.) OD outlet for solvent drainage. A 25.4 mm to 12.7 mm (1 in. to 0.5 in) reducing fitting (P/N 00101-03-00001) is supplied to allow connection to the waste container (P/N 00301-57020) supplied with the system. The 1 in. diameter hose from the API source drain to the reducing fitting (P/N 00101-03-00001) should be as long as possible to avoid pressure build up in the source. The 25.4 mm (1 in.) diameter Tygon PVC tubing (P/N 00301-22922) supplied with the system is 1.52 m (5 ft.) long.

CAUTION Do **not** vent the PVC drain tubing (or any vent tubing connected to the waste container) to the same fume exhaust system to which you have connected the forepumps.

Chapter 7 Installation

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

When your lab site preparation is completed, the MS/ETD System Installation Request Form has been mailed or faxed to your local office for Thermo Electron San Jose products, and the system is delivered, please call your Thermo Electron office to arrange for an installation date. Refer to the Installation Request Form at the front of this guide. Telephone and fax numbers for Thermo Electron San Jose offices are listed in the **Preface** of this guide and immediately following the Installation Request Form. See Table 14 for a summary of information about installing your system. More information on each of the items is available on the page indicated in the table.

Table 14. More information on the installation of your system

	Page
Preinstallation Survey The Installation Request Form at the front of this guide must be completed and faxed or mailed to your local service representative before the Service Engineer arrives to install your system.	46
Installation Kits Some kits are supplied to help you complete the installation of your system. You might require additional parts or chemicals to complete the installation of your system.	48
Installation The Service Engineer will complete the installation of the system and demonstrate that your system meets specifications. Do not plan to use the system before the engineer has demonstrated that your system operates within specifications.	49
Preventive Maintenance You are responsible for the proper maintenance of your system.	50

Preinstallation Survey

Verify that your lab meets the following list of preinstallation requirements before your instrument is installed. Use the MS/ETD System Installation Request Form at the front of this guide to check off each item as it is completed or verified.

Note If the instrument shipping container, Shock Watch, or other indicator shows any evidence of damage or mishandling during shipment do NOT open the container. Call your Thermo Representative for instructions on what to do. If there is no evidence of shipping damage or mishandling, proceed with the instructions that follow in this Note. Your instrument is shipped in a shipping container, the smallest dimension of which is 92 cm (36 in.). If the entrance to your laboratory will not accommodate a 92 cm container, remove the individual modules from the container before moving them into the room. If you remove the instrument from its shipping container before it is delivered to the lab site, all the contents of the container must remain with the instrument.

1. All laboratory remodeling has been completed.
2. Doorways, hallways, etc. are a minimum width of 94 cm (37 in.).
3. Available floor area is sufficient and flooring will support the load.
4. Sufficient bench space is available for all of the equipment. List the following:

   Width:
   Depth:
   Height:

5. Workbench can support the load of the system [202 kg (445 lbs)] and is free from vibration.
6. One voice telephone line is installed near the system.
7. Air conditioning is adequate for temperature, humidity, and particulate matter control. The laboratory can be maintained at a constant temperature, between 15 and 27 °C (59 and 81 °F).
8. Relative humidity is between 40% and 80% with no condensation.
9. Lighting is adequate.
10. System work area is free from magnetic disruption and electrostatic discharge.
11. Main power is installed and is in compliance with local electrical codes.
12. Power for test and cleaning equipment is installed.
13. Power outlets are of the correct configuration.
    NEMA type:
14. Voltage of power outlet has been measured.
    Measured voltage:

15. Power is free from fluctuations due to slow changes in the average voltage or changes due to surges, sags, or transients.
16. All required gases (helium and nitrogen) are on site, gas lines are installed, and appropriate gas regulators are available.
    List gases and purity:
17. New or recently cleaned HPLC system is available that produces pulse-free, continuous flow from 0.1 to 100 µL/min.
18. HPLC-grade water, methanol, acetonitrile, isopropyl alcohol, formic acid and acetic acid are available for testing your instrument.
19. A suitable exhaust system is present that is separate from the solvent waste exhaust.
20. Provision has been made for collecting solvent waste from API source.
21. All relevant safety regulations are complied with.
22. Your MS/ETD System is on site.
23. The principal operator will be available during the installation and certification period.

Installation Kits

The following kits are shipped with the LTQ XL MS detector:

- Ship Kit (P/N 97055-62008), which contains installation components such as vacuum pump oil, exhaust and waste tubing, power cords, instrument lifting kit, etc.
- Accessory Kit (P/N 97055-62003), which contains parts such as fuses, fittings, tubing, tools, gloves, etc.
- Standard Chemicals Kit (P/N 97000-62042) which contains the necessary chemicals for demonstrating system performance specifications. (The Chemicals Kit is located in the Accessory Kit box.)

The following kits are shipped with the ETD module:

- Ship Kit, P/N (Vacuum Hoses, other items)
- Accessory Kit, P/N (Filaments, other items)
- Reagent Kit, P/N 98000-62001
- LTQ XL Components Kit, P/N (ETD Analog Board, other items)

Note You are required to replace any consumables used during the installation.

Installation

When your new MS/ETD System is on site and is ready for installation, a Thermo Electron Field Service Engineer will install it.

During the installation, the Field Engineer will demonstrate the following:

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

Note To receive maximum benefit from this on-site training opportunity, the instrument's operator(s) should be available during the entire installation process.

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

Preventive Maintenance

Routine and preventive maintenance of the MS/ETD System and data system is your responsibility.

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

- LTQ XL Hardware Manual and ETD Module Hardware Manual
- Ion Max API Source Hardware Manual
- Manuals that come with your MS/ETD System, computer or other modules of your system

Chapter 8 Instrument Arrival

MS/ETD Systems are shipped by electronic equipment carriers who specialize in the handling of delicate machinery. However, equipment occasionally gets damaged in transit.

Take the following precautions when receiving material:

- Check carefully for obvious damage or evidence of rough handling.
- Note any apparent external damage on all copies of the receiving documents and describe briefly the extent of the damage. The driver should sign (or initial) next to your comments to signify agreement with your observations.
- Contact the Traffic Department, telephone [1] (408) 965-6000, at the Thermo Electron office in San Jose, California USA to report the damage.

Note Freight insurance requires that obvious damage be noted on the receiving documents.

Domestic Shipments: Instruments are shipped domestically by one of the following methods:

- FOB (freight on board) San Jose, California, USA
- FOB destination

The method of shipment determines who has responsibility for filing a claim against the carrier if the system is damaged in transit. If the instrument shipping container, Shock Watch, or other indicator shows any evidence of damage or mishandling during shipment do NOT open the container. Call your Thermo Representative for further instructions.

Most systems are shipped FOB San Jose and any damage(s) incurred in shipment is the responsibility of the purchaser and the carrier. However, Thermo Electron San Jose will assist with claims filing and (billable) repairs if necessary.

If the system is shipped FOB destination, Thermo Electron San Jose will file a claim against the carrier.

Note Thermo Electron San Jose will not accept liability for damage if materials are received with obvious damage and the damage is not recorded on the receiving documents.

When your system arrives, move it to a protected location indoors. If you have questions about moving your system, contact your local office for Thermo Electron San Jose products. Telephone and fax numbers for the offices are listed in the **Preface** of this guide.

International Shipments: Instruments shipped outside of the USA are shipped CIP (carriage and insurance paid to) destination unless specified differently. If the system is shipped CIP destination and if any damages are incurred in shipment, Thermo Electron San Jose will file a claim against the carrier.

Note Thermo Electron San Jose will not accept liability for damage if materials are received with obvious damage and the damage is not recorded on the receiving documents.

Appendix A Fluoranthene

Fluoranthene is used as the Electron Transfer Dissociation (ETD) reagent in the ETD Module portion of the ETD System. The fluoranthene radical anion is generated according to the reaction shown in Figure 3.

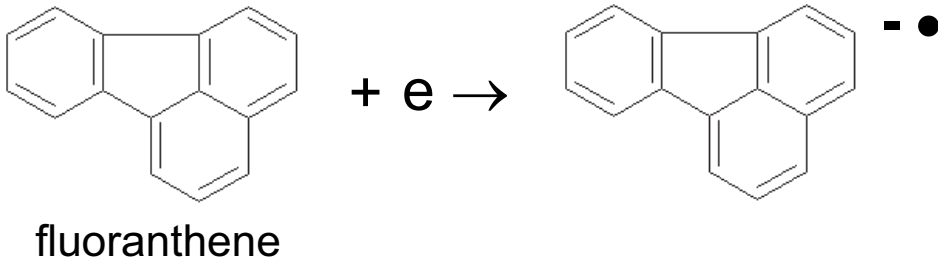
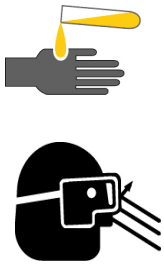


Figure 3. ETD Reagent (fluoranthene radical anion) generation from fluoranthene

Fluoranthene is potentially hazardous. Use it in accord with its MSDS.



CAUTION Store and handle all chemicals in accordance with standard safety procedures. The Material Safety Data Sheet (MSDS) describing the chemicals being used are to be freely available to lab personnel for them to examine at any time. Material Safety Data Sheets (MSDSs) provide summarized information on the hazard and toxicity of specific chemical compounds. MSDSs also provide information on the proper handling of compounds, first aid for accidental exposure, and procedures for cleaning spills or dealing with leaks. Producers and suppliers of chemical compounds are required by law to provide their customers with the most current health and safety information in the form of an MSDS. Read the MSDS for each chemical you use. Dispose of all laboratory reagents in the appropriate way (see the MSDS).

The fluoranthene in your MS/ETD System chemical kit is Sigma/Aldrich Supelco #48535. The fluoranthene MSDS is obtained by clicking the MSDS link at:

http://www.sigmaaldrich.com/catalog/search/ProductDetail/SUPELCO/48535

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