ThermoQuest

Finnigan TRACE MS

[Including Voyager and MD Series]

Preinstallation Requirements Guide

Revision C

FM101553

Technical information contained in this publication is for reference purposes only and is subject to change without notice. Every effort has been made to supply complete and accurate information; however, ThermoQuest Corporation assumes no responsibility and will not be liable for any errors, omissions, damage, or loss that might result from any use of this manual or the information contained therein (even if this information is properly followed and problems still arise).

This publication is not part of the Agreement of Sale between ThermoQuest Corporation and the purchaser of a ThermoQuest system. In the event of any conflict between the provisions of this document and those contained in ThermoQuest Corporation's Terms and Conditions, the provisions of the Terms and Conditions shall govern.

Reference to System Configurations and Specifications supersede all previous information and are subject to change without notice.

Printing History: Revision A printed in June 1999. Revision B printed in August 1999. Revision C printed in May 2000.

The products of ThermoQuest are produced under ISO 9001 accredited quality management systems.

Australia: ThermoQuest • P.O. Box 239 Rydalmere• Unit 20, Metro Centre • 38 – 46 South Street • Rydalmere, N.S.W. 2116 • [61] (02) 9898-9000
Austria: ThermoQuest GmbH • Wehlistrasse 27b • A-1200 Wein • [43] (01) 333 50 34-0
Belgium: Interscience SPRL• Rue du Fonds Jean Paques 8 • 1348 Louvain-la-Neuve • Belgium • [32] (0104) 50025
Canada: ThermoQuest Canada • 5716 Coopers Avenue, Unit 1 • Mississauga, Ontario • L4Z2E8 • [1] (905) 712-2258
France: ThermoQuest France SA • Parc Hightec Sud • 12 Avenue des Tropiques • Z.A. de Courtaboeuf BP141 • F-91944 Les Ulis Cédex • [33] (01) 69 18 88 10
Germany: ThermoQuest Analytische Systeme GmbH • Boschring 12 • D-63329 Egelsbach • [49] (06103) 408 0
Italy: ThermoQuest Italia S.p.A. • Strada Rivoltana • I-20090 Rodano (Milano) • [39] (02) 95059 1
Japan: ThermoQuest K.K. • Nishi-Shinjuku Toyokuni Bldg. 3F • 2-5-8 Hatsudai, Shibuya-ku • Tokyo 151-0061 • [81] (03) 3372-3001
Japan: ThermoQuest K.K. • Esaka Grand Building • 2-3-1 Esaka-cho, Suita City • Osaka 564-0063 • [81] (06) 6387-6681
Netherlands: Interscience • Tinsraat 16 • Postbus 2148 • 4823 CC Breda • [31] (076) 541 1800
P.R. China: ThermoQuest China • Suite 912-916, Ping An Mansion. • No. 23, Jin Rong Street • Xicheng District • Beijing 100032 • [86] (010) 6621 0839
Spain: ThermoQuest SA • Acer 30 – 32 • Edificio Sertram – Planta 2, Modulo 3 • ES-08038 Barcelona • [34] (093) 223 0918
Spain: ThermoQuest SA • Avenida de Valdelaparra 27 • Edificio Alcor – Planta 2a • ES-28108 Alcobendas (Madrid) • [34] (091) 657 4930
Sweden: ThermoQuest AB • Pyramidbacken 3 • S-141 75 Kungens Kurva (Stockholm) • [46] (08) 680 0101
Switzerland: Brechbuhler AG • Steinwiesenstrasse 3 • 8592 Schlierer • Switzerland • [41] (01) 732 3131
United Kingdom: ThermoQuest Ltd. • Paradise • Hemel Hempstead • Herts HP2 4TG • [44] (01442) 233 555
U.S.A.: ThermoQuest GC/MS Division • 2215 Grand Avenue Parkway • Austin, TX 78728-3812 , USA • [1] (512) 251 1515

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.

Published by Technical Publications, ThermoQuest, Manchester, UK.

PREINSTALLATION CHECKLIST
Finnigan TRACE MS Preinstallation Requirements Guide
Revision C
P/N FM101553

Remove this sheet and use it as a guide while preparing your site for the installation of your TRACE MS system. First, make sure that your site meets all the requirements listed in this guide. Then, request installation by returning this completed form to your local ThermoQuest Customer Service office.

1. Complete the checklist below and answer the questions.

Refer to the related topic in this guide for more information about each step.

- ❑ All laboratory refurbishment is complete.
- ❑ The entrance to the laboratory is at least 940 mm (37 in.) wide.
- ❑ Sufficient bench space is available for all the equipment, including any optional items fitted.
- ❑ The workbench can support the load of the system.
- ❑ There is an acceptable power source.
- ❑ The power outlets meet the specifications.
- ❑ The laboratory can be maintained at a constant temperature between 18 and 24 °C (above 24 °C the optional water chiller is required).
- ❑ The relative humidity is between 40 and 80%, with no condensation.
- ❑ The air in the laboratory is free of excess particulate matter.
- ❑ The system workbench and surroundings are free from vibration.
- ❑ The system work area is free from electromagnetic disruption and electrostatic discharge.
- ❑ There is a telephone near the system.
- ❑ The work area is properly lit.
- ❑ There is a suitable exhaust system.
- ❑ There is proper gas equipment: all gases required are on site, gas lines are installed, and appropriate gas regulators are available.
- ❑ All relevant safety regulations are complied with.
- ❑ The principal operator will be available during the installation / certification period.

fold →

Have any special acceptance specifications been agreed within the contract? If YES please attach full details of specifications.	Yes	No
Is there any additional equipment that needs to be interfaced to the system? If YES please supply details.	Yes	No
Are there any special precautions that an engineer should take when on site? If YES please supply details.	Yes	No

Please note: If the laboratory is not ready for the installation when the engineer arrives, we reserve the right to invoice for the engineer's time.

2. Request installation.

fold →

Once you have completed the checklist, fill out the form below and fax or mail this page to your local ThermoQuest Customer Service office. If you are not sure where to send this form, contact the Customer Service office assigned to your area.

Name _____

Title _____

Company _____

Address _____

City/State/Postal Code _____

Country _____

Telephone _____ Fax _____

TRACE MS Serial # _____ Date purchased _____

Signature _____ Date _____

ThermoQuest

READER SURVEY
Finnigan TRACE MS Preinstallation Requirements Guide
Revision C
P/N FM101553

Please help us improve the quality of our documentation by completing and returning this survey. Circle one number for each of the statements below.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The manual is well organized.	1	2	3	4	5
The manual is clearly written.	1	2	3	4	5
The manual contains all the information I need.	1	2	3	4	5
The instructions are easy to follow.	1	2	3	4	5
The instructions are complete.	1	2	3	4	5
The technical information is easy to understand.	1	2	3	4	5
The figures are helpful.	1	2	3	4	5

If you would like to make additional comments, please do. (Attach additional sheets if necessary.)

fold →

_____

_____

_____

Customer Registration Card

Register now…and receive all the privileges associated with being a ThermoQuest / Finnigan product user including customer support, application reports, technical reports, and the ThermoQuest / Finnigan publication, *Analytical News*.

MY ORGANIZATION IS: (Check one only)
- ❑ Commercial (for profit) lab
- ❑ Government lab
- ❑ Hospital / Clinic
- ❑ Industrial Lab
- ❑ Research Institute
- ❑ University / College
- ❑ Veterinary
- ❑ Other _____

***MY PRIMARY APPLICATION IS*:** (Check one only)
- ❑ Analytical
- ❑ Biomedical
- ❑ Clinical / Toxicology
- ❑ Energy
- ❑ Environmental
- ❑ Food / Agriculture
- ❑ Forensic / Toxicology
- ❑ Pharmaceutical
- ❑ Research / Education
- ❑ Other _____

***JOB FUNCTION*:** (Check one only)
- ❑ Administration
- ❑ Lab Management
- ❑ Operator
- ❑ Other _____

fold →

Name _____

Title _____

Company _____

Address _____

City/State/Postal Code _____

Country _____

Telephone _____ Ext. _____

TRACE MS Serial # _____ Date purchased _____

Thank You!

ThermoQuest

Please fold this sheet closed, stamp it, and drop it in the mail.

Technical Publications Manager
ThermoQuest
Crewe Road
Wythenshawe
Manchester
M23 9BE
UK

MassLab Ltd
Crewe Road
Wythenshawe
Manchester M23 9BE
UK
Tel: + 44 (161) 946 1060
Fax: + 44 (161) 998 9882
Web: www.finnigan.co.uk

EU DECLARATION OF CONFORMITY

The EU Directives covered by this Declaration

89/336/EEC	Electromagnetic Compatibility Directive, amended by 92/31/EEC & 93/68/EEC
73/23/EEC	Low Voltage Equipment Directive, amended by 93/68/EEC
93/68/EEC	CE Marking Directive

The Products covered by this Declaration

The Finnigan TRACE MS series (formerly MD series) of mass spectrometers for GC/MS.

The Basis on which Conformity is being Declared

The products identified above comply with the EU directive 89/336/EEC by meeting the following standards:

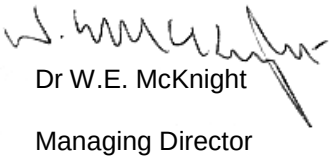
EN55022 Class A:1994	Limits and methods of measurement of radio interference characteristics of information technology equipment.
EN50082-1:1992	Electromagnetic compatibility - Generic immunity standard. Part 1. Residential, commercial and light industry.
FCC Part 15	SubPart B Class A (Digital Devices). FCC EMC emissions standard for USA.

The products identified above comply with the EU directive 73/23/EEC by meeting the following standard:

EN61010-1:1993	Safety requirements for electrical equipment for measurement, control and laboratory use.

The technical documentation is available for inspection by the relevant enforcement authorities.

The CE mark was first applied in 1997.

Signed: 
Dr W.E. McKnight

Authority: Managing Director

Date: May 1999

ATTENTION!

The attention of the purchaser, installer and user is drawn to the special measures and limitations to use which must be observed when the product is taken into service to maintain compliance with the above directives. Details of these measures are contained in the User Manual.

ISO 9001
Accredited 925584

Contents

Read This First

Welcome to the Finnigan TRACE MS system!

This Preinstallation Requirements Guide provides you with all the information you need to prepare for the arrival of your TRACE MS system. Please read the contents carefully and make sure that your laboratory meets the requirements before you request installation.

> **Note.** The information contained within this manual can also be applied to the Voyager and MD Series of mass spectrometers. However, the reader should be aware that all text, examples and Figures refer only to the Finnigan TRACE MS for the purpose of simplification.

We recommend that you use the Preinstallation Checklist as a guide when you are preparing your site.

You are responsible for making sure that the Preinstallation Checklist is complete before the Customer Support Engineer (CSE) arrives for installation.

Completing the Checklist prior to installation helps our CSEs get your TRACE MS system up and running quickly and properly. If any items on the Checklist are not completed prior to installation, additional CSE service visits and fees may be required.

The Preinstallation Requirements Guide includes the following chapters:

Chapter 1: Site Preparation contains all the information needed to prepare your site for the arrival of your TRACE MS system.

Chapter 2: Instrument Delivery gives an overview of shipping and receiving procedures, installation, consumables, and preventive maintenance. The information in this chapter describes what to expect when your TRACE MS system arrives.

Changes to the Manual and Online Help

To suggest changes to this manual or the online Help, please send your comments to:

Technical Publications Manager
ThermoQuest
Crewe Road
Wythenshawe
Manchester
M23 9BE
UK

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

Abbreviations

The following abbreviations are used in this and other TRACE MS manuals and in the online Help.

A	ampere
ac	alternating current
ADC	analog-to-digital converter
amu	atomic mass unit
AP	acquisition processor
APCI	atmospheric pressure chemical ionization
API	atmospheric pressure ionization
ASCII	American Standard Code for Information Interchange
b	bit
B	byte (8 b)
baud rate	data transmission speed in events per second
°C	degrees Celsius
cfm	cubic feet per minute
CD	compact disc
CD-ROM	compact disc read-only memory
CI	chemical ionization
CIF	Carriage, Insurance and Freight Paid to
CIP	Carriage and Insurance Paid to
cm	centimeter
cm^3	cubic centimeter
CPU	central processing unit (of a computer)
CRM	consecutive reaction monitoring
CSE	customer support engineer
<Ctrl>	control key on the terminal keyboard
d	depth
Da	dalton
DAC	digital-to-analog converter
dc	direct current
DDS	direct digital synthesizer
DS	data system
DSP	digital signal processor

EI	electron ionization
<Enter>	<Enter> key on the terminal keyboard
EMC	electromagnetic compatibility
ESD	electrostatic discharge
ESI	electrospray ionization
eV	electron volt
f	femto (10^{-15})
°F	degrees Fahrenheit
FID	Flame Ionization Detector
FOB	Free on Board
FPD	Flame Photometric Detector
ft	foot
FTP	file transfer protocol
g	gram
G	giga (10^{9})
GC	gas chromatograph
GC/MS	gas chromatograph / mass spectrometer
GND	electrical ground
GPIB	general-purpose interface bus
GUI	graphical user interface
h	height
h	hour
HPLC	high-performance liquid chromatograph
HV	high voltage
Hz	hertz (cycles per second)
ICIS™	Interactive Chemical Information System
ICL™	Instrument Control Language™
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
in.	inch
I/O	input/output
k	kilo (10^{3}, 1000)
K	kilo (2^{10}, 1024)
kg	kilogram

l	length
L	liter
LAN	local area network
lb	pound
LC	liquid chromatograph
LC/MS	liquid chromatograph / mass spectrometer
LED	light-emitting diode
m	meter
m	milli (10^{-3})
M	mega (10^{6})
M+	molecular ion
µ	micro (10^{-6})
min	minute
mL	milliliter
mm	millimeter
MS	scan power: MS^1
MS/MS	scan power: MS^2
MS^n	scan power: MS^n, n = 1 through 10
m/z	mass-to-charge ratio
n	nano (10^{-9})
NCBI	National Center for Biotechnology Information (USA)
NIST	National Institute of Standards and Technology
Ω	ohm
p	pico (10^{-12})
Pa	pascal
PC	personal computer
PCB	printed circuit board
PID	Photo Ionization Detector
PMD	Photo Multiplier Detector
PMT	Photo Multiplier Tube
P/N	part number
P/P	peak-to-peak voltage
ppm	parts per million
psig	pounds per square inch, gauge

RAM	random access memory
<Return>	<Return> key on the terminal keyboard
RF	radio frequency
RMS	root mean square
ROM	read-only memory
RS232	industry standard for serial communications
s	second
SCSI	small computer system interface
SIM	selected ion monitoring
solids probe	direct insertion probe
TIC	total ion current
TCP/IP	transmission control protocol / Internet protocol
Torr	torr
u	atomic mass unit
URL	uniform resource locator
V	volt
V ac	volts alternating current
V dc	volts direct current
VGA	Video Graphics Array
w	width
W	Watt
WWW	World Wide Web

Note. Exponents are written as superscripts. In the corresponding online Help, exponents are written with a caret (^) or with *e* notation because of design constraints in the online Help. For example:

MS^n (in this manual)	MS^n (in the online Help)
10^5 (in this manual)	10^5 (in the online Help)

Typographical Conventions

Typographical conventions have been established for ThermoQuest manuals for the following:

- Data input
- Notes, Cautions, and WARNINGS
- Topic headings

Data Input

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

- Prompts and messages displayed on the screen are represented in this manual by capitalizing the initial letter of each word and italicizing each word.
- Input that is to be entered by keyboard or buttons that are to be clicked on by the mouse is represented in **bold face letters**. (Titles of topics, chapters, and manuals also appear in bold face letters.)
- For brevity, expressions such as "choose **File | Directories**" are used rather than "pull down the File menu and choose Directories."
- Any command enclosed in angle brackets < > represents a single keystroke. For example, "press **<F1>**" means press the key labeled *F1*.
- Any command that requires pressing two or more keys simultaneously is shown with a hyphen connecting the keys. For example, "press **<Shift>-<F1>"** means depress and hold the <Shift> key and then press the <F1> key.

Notes, Cautions, and Warnings

Notes, Cautions, and WARNINGS are displayed in boxes such as the one below.

> **Note.** Boxes such as this are used to display Notes, Cautions, and WARNINGS.

A ***Note*** contains information that can affect the quality of your data. In addition, notes often contain information that you may need if you are having trouble.

A ***Caution*** contains information necessary to protect your instrument from damage.

A ***WARNING*** describes hazards to human beings.

Topic Headings

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

Chapter 1

Chapter Name

1.1 Second Level Topics

Third Level Topics

Fourth Level Topics

Fifth Level Topics

Reply Card

TRACE MS manuals contain a Reader Survey card located at the front of each manual.

A message on the Reader Survey card asks the user to fill out and return the card after he or she has had an opportunity to use the manual. The Reader Survey card has two functions. Firstly, it allows the user to tell ThermoQuest what he or she does and doesn't like about the manual. Secondly, when the user returns the card, he or she is registered and placed on the ThermoQuest mailing list. Once registered, the user will receive ThermoQuest's newsletter *Analytical News* and will be notified of events of interest, such as user meetings.

Customer Support

ThermoQuest products are supported by ThermoQuest Customer Service Engineers with customer support available in North America, in Europe, and in Australasia and Asia.

In North America

In North America, ThermoQuest Customer Service Engineers are available from each of the ThermoQuest field offices as follows:

Northeastern Region

Phone ..... [1] (732) 981-0390
Fax ..... [1] (732) 981-0029

Southern Region

Phone .... [1] (770) 424-7880
Fax ..... [1] (770) 423-1114

Central Region

Phone ..... [1] (847) 310-0140
Fax ..... [1] (847) 310-1681

Western Region

Phone ..... [1] (408) 965-6800
Fax ..... [1] (408) 965-6123

Canada

Phone ..... [1] (905) 712-2258
Fax ..... [1] (905) 712-4203

Ordering Replaceable Parts

In North America you can order parts from the factories in Austin, Texas or San Jose, California.

For parts use the following telephone number or fax number.

Phone: [1] (800) 626-8996
Fax: [1] (408) 965-6122

Technical Support

ThermoQuest Technical Support for Finnigan products is available at the following location:

ThermoQuest Technical Support Operations
3661 Interstate Park Road North
Riviera Beach, FL 33404

Phone.....[1] (800) 354-9731
Fax.....[1] (561) 845-8819

In Europe

In Europe, customer support, replaceable parts, and technical support are available from each of the ThermoQuest offices as follows:

Vienna (Wien), Austria

Phone ..... [43] (01) 333 50 34-0
Fax ..... [43] (01) 333 50 34-26

Louvain-la-Neuve, Belgium

Phone ..... [32] (0104) 50025
Fax ..... [32] (0104) 53080

Les Ulis, France

Phone ..... [33] (01) 69 18 88 10
Fax ..... [33] (01) 69 29 93 82

Egelsbach, Germany

Phone ..... [49] (06103) 408 0
Fax ..... [49] (06103) 408 222

Milano, Italy

Phone ..... [39] (02) 95059 1
Fax ..... [39] (02) 95059 225

Breda, Netherlands

Phone ..... [31] (076) 541 1800
Fax ..... [31] (076) 542 0088

Madrid, Spain

Phone ..... [34] (091) 657 4930
Fax ..... [34] (091) 657 4937

Barcelona, Spain

Phone ..... [34] (093) 223 0918
Fax ..... [34] (093) 223 0982

Kungens Kurva (Stockholm), Sweden

Phone ..... [46] (08) 680 0101
Fax ..... [46] (08) 680 0315

Schlierer, Switzerland

Phone ..... [41] (01) 732 3131
Fax ..... [41] (01) 730 6141

Hemel Hempstead, United Kingdom

Phone ..... [44] (01442) 233 555
Fax ..... [44] (01442) 233 667

For all other countries, contact your local ThermoQuest dealer.

In Australasia and Asia

In Australasia and Asia, customer support, replaceable parts, and technical support are available from each of the ThermoQuest offices as follows:

Rydalmere, N.S.W., Australia

Phone.....[61] (02) 9898-9000
Fax.....[61] (02) 9898-9800

Beijing, P.R. China

Phone.....[86] (010) 6621 0839
Fax.....[86] (010) 6621 0851

Tokyo, Japan

Phone.....[81] (03) 3372-3001
Fax.....[81] (03) 3372-7051

Osaka, Japan

Phone.....[81] (06) 6387-6681
Fax.....[81] (06) 6387-6641

For all other countries, contact your local ThermoQuest dealer.

Training

ThermoQuest offers valuable training on Finnigan instruments and software in North America, in Europe, and in Australasia and Asia.

Experience has shown that maximum value can be derived from a scientific instrument if there is one person, the key operator, who has a major responsibility for the instrument. It is recommended that you designate a key operator to manage the operation and maintenance of your Finnigan instrument in your laboratory. It is also recommended that about one month after your instrument has been installed the key operator receive training for the operation and maintenance of the system at the ThermoQuest Institute, at your site, or at one of the local ThermoQuest offices.

In North America

In North America, ThermoQuest offers training at the ThermoQuest Institute in Florida. For information on enrollment or courses, please write, fax, call, or visit the web page site listed below:

ThermoQuest Institute
3661 Interstate Park Road North
Riviera Beach, FL 33404

Phone ..... [1] (561) 844-5241
Phone ..... [1] (800) 765-4532
Fax ..... [1] (561) 845-8819
Web pages http://www.thermoquest.com

In Europe

In Europe, training is available from ThermoQuest field applications chemists. Contact your local ThermoQuest office for information:

Vienna (Wien), Austria

Phone.....[43] (01) 333 50 34-0
Fax.....[43] (01) 333 50 34-26

Louvain-la-Neuve, Belgium

Phone.....[32] (0104) 50025
Fax.....[32] (0104) 53080

Les Ulis, France

Phone.....[33] (01) 69 18 88 10
Fax.....[33] (01) 69 29 93 82

Egelsbach, Germany

Phone.....[49] (06103) 408 0
Fax.....[49] (06103) 408 222

Milano, Italy

Phone.....[39] (02) 95059 1
Fax.....[39] (02) 95059 225

Breda, Netherlands

Phone.....[31] (076) 541 1800
Fax.....[31] (076) 542 0088

Madrid, Spain

Phone.....[34] (091) 657 4930
Fax.....[34] (091) 657 4937

Barcelona, Spain

Phone.....[34] (093) 223 0918
Fax.....[34] (093) 223 0982

Kungens Kurva (Stockholm), Sweden

Phone.....[46] (08) 680 0101
Fax.....[46] (08) 680 0315

Schlierer, Switzerland

Phone.....[41] (01) 732 3131
Fax.....[41] (01) 730 6141

Hemel Hempstead, United Kingdom

Phone.....[44] (01442) 233 555
Fax.....[44] (01442) 233 667

For all other countries, contact your local ThermoQuest dealer.

In Australasia and Asia

In Australasia and Asia, training is available from ThermoQuest field applications chemists. Contact your local ThermoQuest office for information.

Rydalmere, N.S.W., Australia

Phone ..... [61] (02) 9898-9000
Fax ..... [61] (02) 9898-9800

Beijing, P.R. China

Phone ..... [86] (010) 6621 0839
Fax ..... [86] (010) 6621 0851

Tokyo, Japan

Phone ..... [81] (03) 3372-3001
Fax ..... [81] (03) 3372-7051

Osaka, Japan

Phone ..... [81] (06) 6387-6681
Fax ..... [81] (06) 6387-6641

For all other countries, contact your local ThermoQuest dealer.

Chapter 1

Site Preparation

This chapter contains all the information needed to prepare your site for the arrival of your TRACE MS system. The information in this chapter will help you plan and fully equip your laboratory. Your laboratory must meet the requirements for power, exhaust systems, and environmental conditions explained in this chapter before your system can be installed.

This chapter includes the following topics:

- Introduction
- Entrance
- Space and Load Requirements
- Power
- Operating Environment
- Exhaust System
- Gas Supplies

1.1 Introduction

The TRACE MS is designed to operate reliably under carefully controlled environmental conditions. It is your responsibility as the purchaser to provide a suitable location, a source of power of acceptable quality, a suitable operating environment, a proper exhaust system, and the correct gas supplies.

Operating a system or maintaining it in a condition outside the specifications listed 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 ThermoQuest office.

1.2 Entrance

Ensure that the entrance to your laboratory is a minimum of 940 mm (37 in.) across. Allow additional room for maneuvering the containers around corners, into elevators, or through doorways.

WARNING. Risk of injury: the TRACE MS and TRACE GC 2000 are heavy items and require at least two fit people for lifting and moving safely.

The TRACE MS, rotary pump and accessories are shipped in a container with the dimensions shown in Table 1-1. The TRACE MS container and its contents weigh approximately 60 kg.

Table 1-1. Approximate dimensions for the TRACE MS container

Dimension	Length
Length	870 mm
Width	770 mm
Height	630 mm

The TRACE GC 2000 and accessories are shipped in a container with the dimensions shown in Table 1-2. The TRACE GC 2000 container and its contents weigh approximately 65 kg.

Table 1-2. Approximate dimensions for the TRACE GC 2000 container

Dimension	Length
Length	920 mm
Width	760 mm
Height	880 mm

Other modules, such as the PC, monitor, and options, are shipped in their own containers. Their dimensions and weights are less than that of the container for the TRACE MS.

1.3 Space and Load Requirements

The recommended layout for the standard TRACE MS system is shown in Figure 1-1. The actual size of the instruments and the minimum bench space required, allowing for connections and proper air circulation, is illustrated.

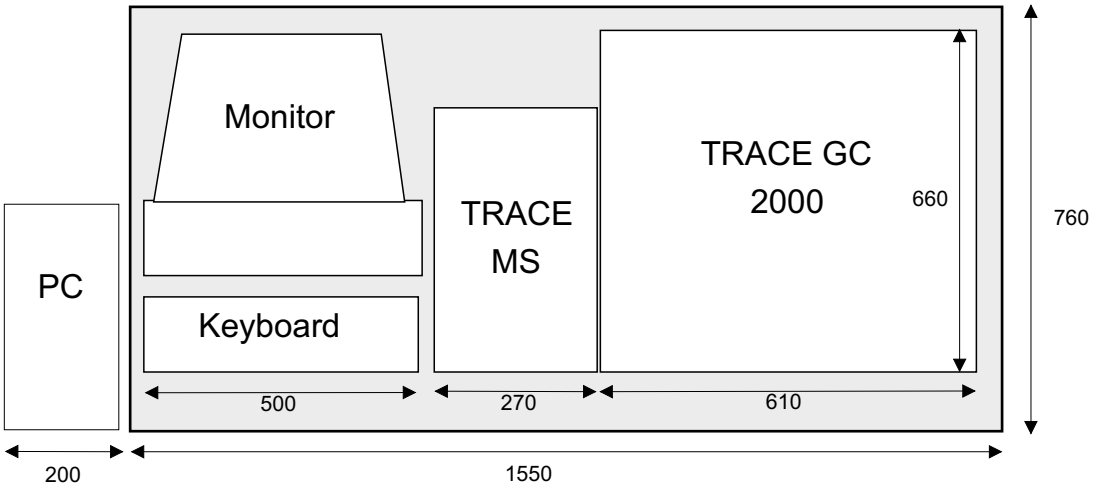


Figure 1-1. TRACE MS System Footprint: all dimensions in mm

Table 1-3 below contains approximate weights and dimensions for the main components of the standard TRACE MS system.

Table 1-3. Approximate weights and dimensions for the main components of the standard TRACE MS system

	Width (mm)	Depth (mm)	Height (mm)	Weight (kg)
TRACE MS	270	520	430	35
TRACE GC 2000	610	660	510	48
Rotary pump	140	320	340	7
Monitor	440	480	440	17
Keyboard	500	200	50	1
PC	200	500	500	16
			TOTAL WEIGHT	**124**

Note. The information shown in Table 1-3 may vary with different PC configurations.

Ensure that your laboratory meets the following space and load requirements:

- The TRACE MS system should be installed on a clean, flat surface. The minimum bench space required is 760 mm x 1550 mm. The instrument bench should be capable of supporting the total weight of the system: at least 130 kg plus allowances for any options.
- The rotary pump should be positioned within 1.5 m of the rear of the TRACE MS and be accessible for maintenance. We recommend that the pump is sited in a well-ventilated area on the floor, in which case it may be necessary to have a 40 mm diameter hole in the bench top/rear to allow for vacuum connection. The pump is approximately 320 mm x 140 mm in size. Allow approximately 400 mm height clearance for the pump and foreline trap.
- The controlling PC can be positioned either alongside the TRACE MS, or on a separate PC table. If on a separate PC table, this should be within 3 m of the rear of the TRACE MS.
- Allow 0.5 m of clear space at the rear of the TRACE MS system for proper air circulation, clearance of vacuum hoses, and maintenance purposes. In addition, there must be at least 1 m of vertical clearance above the system. 0.50 m space is also required on the left of the TRACE MS to access the circuit boards (the keyboard and monitor can be moved).
- Provide enough space around the system for operators to work beside it and in front of it. Keep in mind that the TRACE GC 2000 oven vents to the rear. Any material exposed to the oven exhaust must withstand repeated exposure to temperatures of up to 400 °C (750 °F).

Note. If your system configuration includes optional extras, such as an autosampler, thermal desorber, or purge and trap devices, extra bench space and/or vertical clearance will be required. Consult your local ThermoQuest Customer Support Engineer for assistance.

WARNING. GC oven exhausts can cause severe burns. Avoid working behind the TRACE GC 2000 when the oven vents during cooling. Do not expose gas tanks or bottles, chemicals, regulators, electrical cords, or other temperature-sensitive items to the oven exhaust.

1.4 Power

It is your responsibility as the user to provide an acceptable source of power for your TRACE MS system. Ensure that your laboratory is equipped to meet the power requirements given in this guide.

Power Requirements

The basic power requirements for the standard TRACE MS system are as follows:

- Nominal voltage of 230 V ac, ±10%
- Frequency of 50/60 Hz
- One power outlet for the GC with a minimum current rating of 13 A. A minimum of four other outlets with a total current rating of 13 A.

The maximum supply current requirements are shown in Table 1-4.

Table 1-4. Maximum supply current requirements

TRACE MS	5 A
TRACE GC 2000	13 A
PC	5 A

Note. Additional power outlets may be required for other equipment. We recommend that there are several additional power outlets close to the workbench space within your laboratory.

Note. Ensure that the interconnected power outlets for the TRACE MS system have a common point to one ground connector. If there are two such common points, each connected to separate external grounds, this may cause noise current to flow through the ground system via the ground loop that is formed.

WARNING. Ensure that all instruments are earthed. You are recommended to use an earth leakage circuit breaker to protect the power supply.

WARNING. Take care to ensure that the wall outlet specifications are not exceeded.

Cables

Please note the following:

- The power cables for the TRACE MS, PC and monitor are approximately 2 m (6 ft) long.
- The TRACE MS is supplied with a 3 m power cable to connect it to the PC.

Quality of Power

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

Below are definitions for the most common voltage disturbances:

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

Constant high line voltage or surges in the line voltage can cause overheating and component failure. Constant low line voltage or sags in the voltage can cause the system to function erratically or not at all. Transients, even of a few microseconds duration, can cause electronic devices to fail or degrade, significantly shortening their lives. Therefore, it is important to

establish the quality of the line power in your laboratory prior to the installation of your TRACE MS system.

Power Monitoring

If required, a variety of devices are available to monitor the quality of your line power. Line monitors can be rented from electrical equipment suppliers.

These instruments provide a continuous record of line performance by analyzing and printing out information on three types of voltage disturbances: (1) slow changes, (2) sag and surge, and (3) transient. In the first two cases, the duration and the amplitude of the disturbance are indicated by time interval recording.

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

> **Caution.** In North America, any power monitoring device that you use should meet regulatory compliance certification for your region, for example: UL, CSA, NRTL.

Power Conditioning Devices

Various line conditioning devices are available that will probably correct your line power problem. If you have good regulation but the power line monitor shows transient voltages, then an isolation / noise-suppression transformer is adequate. If there are transient and regulation problems, then power conditioners, which can control both of these problems, should be considered.

1.5 Operating Environment

It is your responsibility as the user to provide an acceptable operating environment for your TRACE MS system. Paying attention to the operating environment will ensure continued high performance of your TRACE MS system. The operating environment requirements are best met by locating your system in an air-conditioned area. Any expenditure for air-conditioning is more than offset by good sample throughput and reduced repair costs.

Altitude

The TRACE MS system must not be operated at altitudes in excess of 2000 m.

Temperature

Ensure that your laboratory can be maintained at a constant room temperature between 18 and 24 °C (unless the water cooling option is included). If your laboratory room temperature is above 24 °C, it is recommended that an external water chiller is used (available as an option, see the section on **Water Supply** on page 1-10.

> **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.

The maximum overall heat dissipation to the room is 2 kW. There must be a good flow of air around the system, and the air conditioning must be capable of maintaining a constant temperature (within the operational limits) in the immediate vicinity of the system.

> **Caution.** Do not directly expose the TRACE MS system to any cooling duct outlets.

Water Supply

If the ambient temperature in your laboratory is above 24 °C, it will be necessary to fit a chilled water supply to cool the turbomolecular pumps. Please note that configuring the TRACE MS for a chilled water supply is a factory-fitted option that must be specified at the time of ordering your TRACE MS system. The installation kit supplied with this option includes 2 x 3 m lengths of water hose for connection to the turbo pump water cooling connectors situated at the rear of the TRACE MS.

The specification for the water chiller, if not supplied by ThermoQuest, is detailed in Table 1-5. To connect the chiller, 3/8 in. hosetails are required.

Table 1-5. Water chiller specification

Cooling Capacity	200 V ac at 20 °C
Temperature Stability	+/- 2 °C
Reservoir Volume	2 L minimum
Supply Pressure	40 psig maximum

Note. The TRACE MS cannot be used at temperatures above 35 °C, even when it is water-cooled.

Humidity

Ensure that the relative humidity of your operating environment is between 40 and 80%, with no condensation.

Operating a TRACE MS system at very low humidity will cause the accumulation and discharge of static electricity, which shortens the life of electronic components. Operating the system at high humidity will cause condensation and short circuits, and will also block filters on cooling fans.

We recommend that you equip your laboratory with a temperature and humidity monitor to ensure that your laboratory is always within the required temperature and humidity specifications.

Particulate Matter

Ensure that the air in your laboratory does not have excessive dust, smoke, or other particulate matter. (IEC 664, Installation category II, Pollution degree 2.)

Dust, smoke and other particulate matter can clog air filters, causing a reduction in airflow around your electronic components. Dust also forms a layer on electronic components that reduces their heat dissipation, causing them to overheat.

Vibration

The TRACE MS is a sensitive instrument. Make sure that your system workbench is free from vibration. Also be aware of vibrations caused by equipment in adjoining locations.

Do not install the rotary pump on the same workbench as your TRACE MS. The rotary pump gives off vibrations while it operates. Therefore, we recommend that the pump is installed on the floor underneath the TRACE MS.

Electromagnetic Disruption

The TRACE MS system must be positioned at least 3 m away from strong magnetic fields such as may emanate from NMR systems, magnetic sector mass spectrometers, power lines, transformers, and so on.

Note. Magnetic fields can penetrate through walls and similar barriers.

Caution. Do not use the TRACE MS in a high RF environment.

Electrostatic Discharge

Electrostatic discharge (ESD) can damage the electronic components of your TRACE MS system. Static electricity can develop in a variety of ways.

A few examples are listed below:

- Walking across a carpet in a room that is at 20% relative humidity can cause as much as 35,000 V of electrostatic potential to be generated on your skin. 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.
- Styrofoam cups and packing materials typically have a considerable electrostatic charge on them.

The discharge of static electricity is not perceptible to a human being until the potential is at least 4,000 V. Many electronic components, however, are damaged by a discharge of electrostatic potential of as little as 100 V. ESD damage can be catastrophic: your system can cease to function altogether. More commonly, however, ESD damage causes latent problems by damaging sites in sensitive components that might cause premature failures.

Therefore, the following precautions are recommended, especially when you are operating your system at the lower end of the relative humidity specification listed above:

- Use a static-dissipating floor covering (such as tile or conductive linoleum) in the room housing your TRACE MS system.
- Use laboratory chairs covered with natural fiber or other static-dissipating material.
- When operating the system, wear laboratory coats and clothing made of natural fiber or other static-dissipating material.
- Do not place Styrofoam cups or packing materials on the system.

Telephone

Ensure that a telephone is installed in your laboratory within 2 m (6 ft) of your TRACE MS system. This will allow you to conveniently operate the system while speaking with ThermoQuest Technical Support personnel.

Lighting

Ensure that your TRACE MS system working area is properly lit. Good overhead lighting makes any work area more enjoyable. A small, high-intensity lamp is recommended for use when cleaning TRACE MS components.

1.6 Exhaust System

It is your responsibility as the user to provide an adequate exhaust system. Most of what is introduced into the TRACE MS will eventually be exhausted from the rotary pump, along with a small amount of oil vapor that these pumps characteristically emit. Therefore, the pump should be connected to a fume exhaust system.

The rotary pump connects to the rear of the TRACE MS at bench level by a reinforced vacuum hose. A connector suitable for 13 mm (1/2") i.d. tubing is fitted to the pump exhaust.

Consult local regulations for the proper method of exhausting the fumes from your system.

To carry out the venting, a user-supplied fume cupboard or oil mist filter is recommended.

Caution. Do not use an oil mist filter with CI instruments.

Note. Instrument damage resulting from incorrectly plumbed exhaust lines is not covered under warranty.

1.7 Gas Supplies

Follow the guidelines in this section to ensure that the gases used by your TRACE MS system meet the required specifications. It is important to note that the purity of the gas supply (particularly the carrier gas) can affect the sensitivity of your TRACE MS.

Carrier Gas

- The carrier gas should be research grade helium (99.9999% purity).
- Ensure that water and oxygen impurities are less than 1 ppm.
- Oxygen, water and hydrocarbon traps are recommended in the supply line close to the TRACE GC 2000.
- The carrier gas connects to the rear of the TRACE GC 2000 (top center). The maximum input pressure is 70 psig; pressure regulation should be delivered via a double-stage high purity regulator.

CI Reagent Gas

- The reagent gas should be research grade (99.9999% purity). Methane, ammonia and isobutane may be used depending on the application.
- Ensure that water and oxygen impurities are less than 1 ppm.
- The gas line connector is located at the rear of the TRACE MS at bench level. If a pressurized bottle is used, a suitable regulator should be supplied with the bottle. The normal operating pressure is 5 psig.

Gas Connectors

- All gas lines must be in place and leak-checked prior to the installation of your TRACE MS system.
- Ensure all tubing and connectors are new to avoid contamination.
- Sharing gas lines from other instruments is acceptable, providing their operation does not affect the pressure or flow available to your TRACE MS system.

Table 1-6 on page 1-15 provides information on the types of tubing suitable for different gases.

Table 1-6. Gas tubing requirements

Gas	Tubing
Helium Carrier Gas	1/8 in OD Stainless Steel / Copper
CI Reagent Gas	1/8 in OD Stainless Steel / Copper

Chapter 2
Instrument Delivery

This chapter gives an overview of shipping and receiving procedures, installation, consumables, and preventive maintenance. The information in this chapter describes what to expect when your TRACE MS system arrives.

This chapter contains the following topics:

- Shipping Information
- Receiving the Instrument
- Installation
- Consumables
- Preventive Maintenance

2.1 Shipping Information

The following topics detail the procedures for domestic (UK) and international shipments.

Domestic Shipments

Instruments are shipped CIF Site (Carriage, Insurance and Freight Paid to Site) unless specified differently.

If the system is shipped CIF Site and if any damages are incurred in shipment, ThermoQuest will file a claim against the carrier.

> **Note.** ThermoQuest will not accept liability for damage if materials are signed for in good condition.

International Shipments

Instruments shipped outside the UK are usually shipped CIF Port of Entry (Carriage, Insurance and Freight Paid to Port of Entry) unless specified differently. If the system is shipped CIF Port of Entry and if any damages are incurred in shipment, ThermoQuest will file a claim against the carrier.

> **Note.** ThermoQuest will not accept liability for damage if materials are signed for in good condition.

2.2 Receiving the Instrument

ThermoQuest instruments are shipped by electronic equipment carriers (arranged by ThermoQuest), who specialize in the handling of delicate equipment. The delivery advice note will detail the number of boxes and their contents. Please do not open any boxes without prior permission from ThermoQuest. Your warranty and/or ThermoQuest's insurance risk may be invalidated if permission is not sought in writing.

Please take the following precautions when receiving your instrument:

- Check carefully for obvious damage or evidence of rough handling.
- If external damage is apparent, note this fact on all copies of the receiving documents and describe briefly the extent of the damage. The driver should sign next to your comments to signify agreement with your observations. Contact the appropriate ThermoQuest office to report the damage.
- If no external damage is apparent, ThermoQuest strongly recommend that all copies of the receiving documents are signed *"Received but not inspected"* to indicate that the boxes have not been opened.
- Place the boxes near to the place of installation, in a warm, dry, secure area until the installation engineer arrives. If you have any questions about moving your system, contact your local ThermoQuest office.

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

2.3 Installation

A ThermoQuest Customer Support Engineer will install your system and demonstrate the system marketing specifications that are in force at the time of purchase (as defined in your Sales Order Contract). Contact your local ThermoQuest office for details.

It is important to ensure that your laboratory is prepared for the installation. Once the laboratory is ready, complete and return the Preinstallation Checklist (at the front of this guide) to your local ThermoQuest representative, who will ensure an engineer is allocated to carry out the installation as soon as possible.

The major part of your acceptance of your TRACE MS system is the demonstration, by the engineer, that the system conforms to the specifications laid down under standard operating conditions.

During installation, your nominated operator will be made familiar with the basic operation of the instrument and any techniques purchased with it. At the end of each session, a specification will be verified and the acceptance record signed by the responsible person. It is important that the responsible person is available for the duration of the installation.

Upon successful completion of the acceptance specifications, the instrument will pass into the agreed warranty period, during which ThermoQuest will rectify, free of charge, faults attributable to defective materials or workmanship. Routine maintenance arising from normal use of the instrument is not covered by this warranty and we recommend that the user takes out a preventive maintenance contract.

2.4 Consumables

The standard installation package contains enough consumable items (such as a column, injector liners, septa, ferrules, and seals) for the immediate use of your system. Please contact your nearest ThermoQuest Sales or Service Department if you require assistance with further supplies.

> **Note.** It is the responsibility of the customer to replace any consumables used during the installation.

2.5 Preventive Maintenance

Routine and preventive maintenance of your TRACE MS system is your responsibility as the user.

Regular preventive maintenance is essential. Regular preventive maintenance will increase the life of your system, result in maximum uptime, and provide you with optimum performance. Maintenance techniques are covered in the following manuals:

- **Finnigan TRACE MS Hardware Manual** (P/N FM101555)
- Manuals that come with your PC, GC, and other modules of your TRACE MS system.