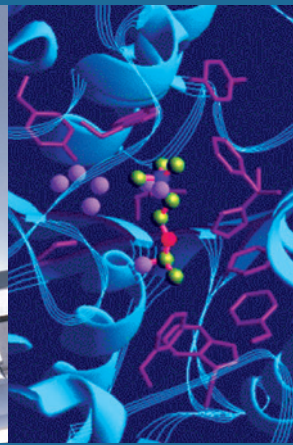
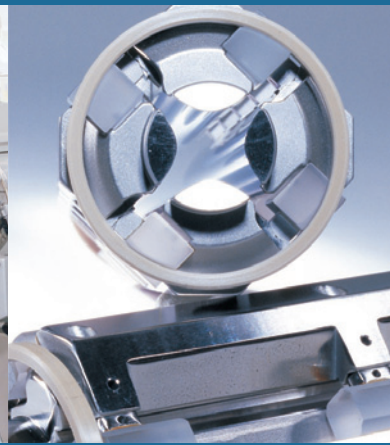


Thermo Fisher Scientific

MAT 253

**Preinstallation Requirements
Guide**

Revision C - 1990991



© 2009 Thermo Fisher Scientific Inc. All rights reserved.

“Swagelok” is a registered trademark of the Crawford Fitting Company. “Teflon” is a registered trademark of E. I. du Pont de Nemours & Co. “Viton” is a registered trademark of DuPont Dow Elastomers. “RBS” is a registered trademark of Carl Roth, Karlsruhe, Germany.

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

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

The contents of this document are subject to change without notice. All technical information in this document is for reference purposes only. System configurations and specifications in this document supersede all previous information received by the purchaser.

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

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

Release History: Revision B released in February 2004.
Revision C released in June 2009.

MAT 253 Installation Request Form

Refer to the MAT 253 Preinstallation Requirements Guide (1990991) for the complete site requirements. Circle "Yes" or "No" as to whether the site meets the requirements as specified in the Preinstallation Requirements Guide. Provide the additional information where requested.

- 1: **Yes** **No** All laboratory remodeling has been completed and the space available is sufficient to meet the minimum requirements for the configuration ordered? The floor is certified to meet the load requirements of the system (680 kg or 1500 lbs + weight of optional equipment)? Refer to "Space Requirements" on page 2-4.
- 2: **Yes** **No** Your MAT 253 instrument has been delivered and is either in the laboratory or can be delivered immediately on the arrival of the installation engineer?
- 3: **Yes** **No** The entrance to the laboratory and the route from the loading dock are at least 89 cm (35") wide with additional space at corners? Refer to "Hallways and Doors" on page 2-2.
- 4: **Yes** **No** Sufficient bench space is available for all of the equipment? List the following:
Width: _____
Depth: _____
Height: _____
Yes **No** Lighting is adequate?
- 5: **Yes** **No** Floor vibrations and electromagnetic interferences are below the specified levels? Refer to "Floor Conditions" on page 2-6 and "Electromagnetic Fields" on page 2-9.
- 6: **Yes** **No** Main power is installed and in compliance with local electrical codes?
- 7: **Yes** **No** The power outlets are of the correct configuration? Refer to "Electrical Power Specification" on page 3-2.
- 8: **Yes** **No** The electrical power has been measured?
Please note voltages: _____ Volts AC phase 1 to ground at output of transformer.
Please note voltages: _____ Volts AC phase 2 to ground at output of transformer.
Please note voltages: _____ Volts AC phase 3 to ground at output of transformer.
Please note voltages: _____ Volts AC neutral 1 to ground at output of transformer.
- 9: **Yes** **No** Power is free from fluctuations due to slow changes in the average voltage or changes due to surges, sags, or transients?
- 10: **Yes** **No** Air conditioning is adequate for temperature, humidity, and particulate matter control? The laboratory can be maintained at a constant temperature, between 15 and 27 °C (59 and 81 °F)? Refer to "Room Temperature" on page 2-7.
- 11: **Yes** **No** The key operator will be available during the installation period. Refer to "Key Operator" on page 6-3. The person with the authority to accept the instrument at the end of the installation will also be available to sign the required acceptance document?
Provide the names of these individuals: _____
- 12: **Yes** **No** The relative humidity is between 50% and 80%, with no condensation? Refer to "Humidity" on page 2-8.
- 13: **Yes** **No** The system work area is free from magnetic disruption and electrostatic discharge? Refer to "Electrostatic Discharge" on page 2-9.
- 14: **Yes** **No** All gases required are on site, gas lines are installed, and appropriate gas regulators are available? Refer to "Gases" on page 4-2.
List gases and purity: _____
- 15: **Yes** **No** Is there a suitable exhaust system? Refer to "Exhaust Fumes" on page 2-8.
- 16: **Yes** **No** There is a functional telephone close to the system? Phone number _____
- 17: **Yes** **No** All relevant local safety regulations have been met and the equipment installed will not affect compliance?
- 18: **Yes** **No** All required chemicals and equipment for installing the system are on site?
- 19: **Yes** **No** Have any special acceptance specifications been agreed within the contract?
- 20: **Yes** **No** Is there any additional equipment that needs to be interfaced for the system?
If **YES**, supply details.

I, the undersigned, confirm that the site requirements as stated above have been accomplished and the laboratory is prepared for the installation of the Thermo Scientific, MAT 253 instrument. I understand that I may be liable for a Field Service Representatives' travel or lodging expenses if they are unable to carry out the installation on the pre-scheduled date due to insufficient lab preparation. If circumstances warrants, Thermo Fisher Scientific will make every effort to reschedule an installation as soon as possible with the next available representative.

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

Fax to: Attn: Local Service Engineer

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

Offices for Thermo Scientific Products

United States

Fax.....+1 561 688 8731
E-mail ...us.customer-support.analyze@thermofisher.com

Canada

2845 Argentia Road, Unit 4
Mississauga, Ontario
L5N 8G6
Phone+1 800 530 8447
Fax.....+1 905 890 5775
E-mail ...analyze.ca@thermofisher.com

Europe

Austria

Wehlistrasse 27b
1200 Wien
Phone+43 1 333 50340
Fax.....+43 1 333 503426
E-mail ...analyze.au@thermofisher.com

Belgium

Z3 Doornveld 172
1731 Zellik
Phone+32 2 482 30 30
Fax.....+32 2 482 30 31
E-mail ...analyze.be@thermofisher.com

Denmark

Fruebjergvej 3
2100 København
Phone+45 2 70 23 62 60
Fax.....+45 2 70 23 62 63
E-mail ...analyze.dk@thermofisher.com

France

(also representing French speaking N. Africa, Algeria, Morocco, and Tunisia)

16 Avenue du Québec
Silic 765
Z.A. de Courtaboeuf
91963 Les Ulis Cédex, France
Phone+33 1 60 92 48 00
Fax.....+33 1 60 92 49 00
E-mail ...analyze.fr@thermofisher.com

Germany

Im Steingrund 4-6
63303 Dreieich, Germany
Phone.... +49 6103 408 1050
Fax +49 6103 408 1213
E-mail ... analyze.de@thermofisher.com

Italy

Strada Rivoltana
20090 Rodano (Milano)
Phone....Numero Verde 800823162
Fax+39 2 950 59 225

Netherlands

Takkebijsters 1
4817 BL Breda, Netherlands
Nederland
Phone.... +31 76 579 55 55
Fax +31 76 571 41 71
E-mail ... analyze.nl@thermofisher.com

Spain

Valportillo I, 22 1a Planta, Edificio Caoba
ES-28108 Alcobendas (Madrid)
Phone.... +34 914 845 965
Fax +34 914 843 598
E-mail ... analyze.es@thermofisher.com

Spain

Acer 30-32
Edificio Sertram – Planta 2, Modulo 3
ES-08038 (Barcelona)
Phone.... +34 93 223 0918
Fax +34 93 223 0982
E-mail ... analyze.es@thermofisher.com

Sweden, Norway, and Finland

Pyramidbacken 3
SE-141 75 Kungens Kurva (Stockholm)
Phone.... +46 8 556 468 00
Fax +46 8 556 468 08
E-mail ... analyze.se@thermofisher.com

Switzerland

Neuhofstrasse 11
4153 Reinach
Phone.... +41 61716 77 00
Fax +41 61716 77 20
E-mail ... analyze.ch@thermofisher.com

Offices for Thermo Scientific Products - Continued

Europe - Continued

United Kingdom

Stafford House
1 Boundary Park
Boundary Way
Hemel Hempstead
Hertfordshire HP2 7GE
Phone+44 1442 233 555
Fax.....+44 1442 233 667
E-mail ...analyze.uk@thermofisher.com

Other Europe, Middle East, and Africa

Wehlistrasse 27b
A-1200 Wien
Phone+43 1 333 50 34 0
Fax.....+43 1 333 50 34 26
E-mail ...analyze.au@thermofisher.com

Australia and Asia

Australia

P.O. Box 239 Rydalmere
Unit 14, 38 - 46 South Street
Rydalmere, N.S.W. 2116
Phone.... +61 2 8844 9500
Fax +61 2 8844 9599
E-mail ... analyze.au@thermofisher.com

Japan

C-2F 3-9 Moriya-cho, Kanagawa-ku
Yokohama, Kanagawa 221-0022
Phone.... +81 45 453 9197
Fax +81 45 453 9235
E-mail ... analyze.jp@thermofisher.com

Japan

6F, Ryokuchi-eki Building
2-4-1 Terauchi, Toyonaka City
Osaka 561-0872
Phone.... +81 6 6863-1551
Fax +81 6 6863-1096
E-mail ... analyze.jp@thermofisher.com

P.R. China

Rm. 702-715, 7F Tower West, Younghe Plaza
No. 28, Andingmen East Street
Beijing 100007
Phone.... 800 810 5118, 400 650 5118 (Free lines)
Fax +86 10 88370548
E-mail ... analyze.cn@thermofisher.com

P.R. China

Building 6
No. 27 Xin Jin Qiao Road
Shanghai 201206m
Phone.... 800 810 5118, 400 650 5118 (Free lines)
Fax +86 21 64457830
E-mail ... analyze.cn@thermofisher.com

WEEE Compliance

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



Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on Thermo Fisher Scientific's compliance with these Directives, the recyclers in your country, and information on Thermo Fisher Scientific 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 Fisher Scientific hat Vereinbarungen getroffen mit Verwertungs-/Entsorgungsanlagen in allen EU-Mitgliederstaaten und dieses Produkt muss durch diese Firmen wiederverwertet oder entsorgt werden. Mehr Informationen über die Einhaltung dieser Anweisungen durch Thermo Fisher Scientific, die Verwerter und Hinweise die Ihnen nützlich sein können, die Thermo Fisher Scientific Produkte zu identifizieren, die unter diese RoHS Anweisung fallen, finden Sie unter www.thermo.com/WEEERoHS.

Conformité DEEE

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



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

Übereinstimmungserklärung gemäß ISO/IEC 17050-1:2004

Declaration of conformity according to ISO/IEC 17050-1:2004

Dichiarazione di conformità alla ISO/IEC 17050-1:2004

Name des Herstellers: Thermo Fisher Scientific
manufacturers name
nome produttore

Adresse des Herstellers: Hanna-Kunath-Strasse 11
manufacturers address
indirizzo produttore
28199 Bremen
Germany

erklärt, dass das Produkt

declares that the following product

dichiara che il seguente prodotto

MAT 253

mit den folgenden Produktspezifikationen übereinstimmt:

complies with the following product specifications

rispetta le seguenti specifiche del prodotto

EMV (Störemissionen): EN 50081-1; EN 55022 class B
EMC (emissions)
EMC (emissioni)

EMV (Störfestigkeit): EN 61000-3-2, -3; EN 61000-4-2, -3, -4, -5, -6, -11; EN 61000-6-2; EN 50204
EMC (immunity)
EMC (immunità)

Elektrische Sicherheit: EN 61010-1
electrical safety
sicurezza elettrica

Ergänzende Informationen:
complementary information
informazioni complementari

Dieses Produkt erfüllt die EMV-Richtlinie 89/336/EWG und Niederspannungsrichtlinie 73/23/EWG.

This product complies with EMC directive 89/336/EEC and Low Voltage Directive 73/23/EEC.

Questo prodotto rispetta la direttiva 89/336/EEC e la direttiva 73/23/EEC.

Bremen, Germany, 2. März 2007

Technischer Leiter:
Director of Operations
Direttore fabbricazione

ThermoFisher
SCIENTIFIC


(Jörg Behrens)

Read This First

Welcome to the Thermo Scientific, MAT 253 system! The MAT 253 are members of the family of isotope ratio mass spectrometer (IRMS) instruments.

About This Guide

This *MAT 253 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.

Who Uses This Guide

This *MAT 253 Preinstallation Requirements Guide* is intended primarily for those who are responsible for the site planning of a laboratory in preparation for the installation of a new MAT 253 instrument. This guide should be retained for future guidance if your instrument needs to be relocated in future.

Scope of This Guide

This manual includes the following chapters:

- **Chapter 1: “Introduction”** describes the purchaser’s responsibilities for installation and maintenance of the system.
- **Chapter 2: “Site Requirements”** gives details on the physical, electrical, gas, air conditioning requirements, and other laboratory requirements for the IRMS detector and data system.
- **Chapter 3: “Electrical Power”** describes details on the electrical outlets, power conditioning devices, and power supplies required to properly install your system.
- **Chapter 4: “Resources Requirements”** provides information on the gases, cryogenes, solvents, and solvent modifiers required to install and operate your system.
- **Chapter 5: “Instrument Arrival”** provides information on insurance claims and on domestic and international shipments.

Read This First
About This Guide

- [Chapter 6: “Installation”](#) provides details on the final preparations necessary before the arrival of the Service Engineer for installation of the system.
- [Chapter 7: “Options”](#) describes the requirements for the peripheral options of your MAT 253.

Related Documentation

In addition to this guide, Thermo Fisher Scientific provides the following documents for MAT 253 as hardcopies:

- *MAT 253 Operating Manual (P/N 1149090)*
- *ConFlo IV Operating Manual (P/N 1224730)*
- *GasBench II Operating Manual (P/N 1118342)*
- *Kiel IV Carbonate Device Operating Manual (P/N 1196820)*
- *TC/EA Operating Manual (P/N 1127601)*
- *LC IsoLink Operating Manual (P/N 1156140)*
- *GC IsoLink Operating Manual (P/N 1222980)*
- *LC IsoLink Preinstallation Requirements Guide (P/N 1178230)*

Contacting Us

There are several ways to contact Thermo Fisher Scientific.

Assistance

For technical support and ordering information, **visit us on the Web:**

www.thermo.com/advancedms

Customer Information Service

cis.thermo-bremen.com is the Customer Information Service site aimed at providing instant access to

- latest software updates
- manuals, application reports, and brochures.

Note Thermo Fisher Scientific recommends that you register with the site as early as possible. ▲

To register, visit register.thermo-bremen.com/form/cis and fill in the registration form. Once your registration has been finalized, you will receive confirmation by e-mail.

Changes to the Manual

❖ To suggest changes to this manual

- Please send your comments (in German or English) to:

Editors, Technical Documentation
Thermo Fisher Scientific (Bremen) GmbH
Hanna-Kunath-Str. 11

28199 Bremen

Germany

- Send an e-mail message to the Technical Editor at

documentation.bremen@thermofisher.com

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

Typographical Conventions

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

Data Input

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

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

Topic Headings

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

Chapter 1 Chapter Name

Second Level Topics

Third Level Topics

Fourth Level Topic

Safety and EMC Information

In accordance with our commitment to customer service and safety, this instrument has satisfied the requirements for the European CE Mark including the Low Voltage Directive.

Designed, manufactured and tested in an ISO9001 registered facility, this instrument has been shipped to you from our manufacturing facility in a safe condition.

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

Notice on Lifting and Handling of Thermo Scientific Instruments

For your safety, and in compliance with international regulations, the physical handling of this Thermo Scientific 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 Scientific Instruments

In compliance with international regulations: If this instrument is used in a manner not specified by Thermo Fisher Scientific, 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.

Safety and Special Notices

Make sure you follow the precautionary statements presented in this guide. The safety and other special notices appear different from the main flow of text. Safety and special notices include the following:



Warning Warnings highlight hazards to human beings. Each Warning is accompanied by a Warning symbol. ▲

Caution Cautions highlight information necessary to protect your instrument from damage. ▲

Note Notes highlight information that can affect the quality of your data. In addition, notes often contain information that you might need if you are having trouble. ▲

Identifying Safety Information

This guide contains precautionary statements that can prevent personal injury, instrument damage, and loss of data if properly followed. Warning symbols alert the user to check for hazardous conditions. These appear throughout the manual, where applicable. The most common warning symbols are:



Warning This general symbol indicates that a hazard is present that could result in injuries if it is not avoided. The source of danger is described in the accompanying text. ▲



Warning High Voltages capable of causing personal injury are used in the instrument. The instrument must be shut down and disconnected from line power before service is performed. Do not operate the instrument with the top cover off. Do not remove protective covers from PCBs. ▲



Warning Strong magnetic fields are used in the instrument. Keep away from heart pacemakers, computers, credit cards, and any other magnetically sensitive device. Do not bring compressed gas cylinders within close proximity to the instrument. ▲



Warning Treat heated zones with respect. Parts of the instrument might be very hot and might cause severe burns if touched. Allow hot components to cool before servicing them. ▲



Warning Careless handling of cryogenic liquids might cause severe personal injury including frostbite. Wear protective clothing when operating this equipment including insulated gloves and face shield. ▲



Warning Wear gloves when handling toxic, carcinogenic, mutagenic, or corrosive/irritant chemicals. Use approved containers and procedures for disposal of waste solution. ▲

In addition to the above described, every instrument has specific hazards. So, be sure to read and comply with the precautions described in the subsequent chapters of this guide. They will help ensure the safe, long-term use of your system.

General Safety Precautions

Observe the following safety precautions when you operate or perform service on your instrument:

- Before plugging in any of the instrument modules or turning on the power, always make sure that the voltage and fuses are set appropriately for your local line voltage.
- Only use fuses of the type and current rating specified. Do not use repaired fuses and do not short-circuit the fuse holder.
- The supplied power cord must be inserted into a power outlet with a protective earth contact (ground). When using an extension cord, make sure that the cord also has an earth contact.
- Do not change the external or internal grounding connections. Tampering with or disconnecting these connections could endanger you and/or damage the system.
- The instrument is properly grounded in accordance with regulations when shipped. You do not need to make any changes to the electrical connections or to the instrument's chassis to ensure safe operation.
- Never run the system without the housing on. Permanent damage can occur.
- Do not turn the instrument on if you suspect that it has incurred any kind of electrical damage. Instead, disconnect the power cord and contact a Service Representative for a product evaluation. Do not attempt to use the instrument until it has been evaluated. (Electrical damage may have occurred if the system shows visible signs of damage, or has been transported under severe stress.)
- Damage can also result if the instrument is stored for prolonged periods under unfavorable conditions (e.g., subjected to heat, water, etc.).
- Always disconnect the power cord before attempting any type of maintenance.
- Capacitors inside the instrument may still be charged even if the instrument is turned off.
- Never try to repair or replace any component of the system that is not described in this manual without the assistance of your service representative.
- Do not place any objects – especially not containers with liquids – upon the instrument. Leaking liquids might get into contact with electronic components and cause a short circuit.

Safety Advice for Possible Contamination

Hazardous Material Might Contaminate Certain Parts of Your System During Analysis.

In order to protect our employees, we ask you to adhere to special precautions when returning parts for exchange or repair.

If hazardous materials have contaminated mass spectrometer parts, Thermo Fisher Scientific can only accept these parts for repair if they have been properly decontaminated. Materials, which due to their structure and the applied concentration might be toxic or which in publications are reported to be toxic, are regarded as hazardous. Materials that will generate synergetic hazardous effects in combination with other present materials are also considered hazardous.

Your signature on the **Repair-Covering letter** confirms that the returned parts have been decontaminated and are free of hazardous materials.

The Repair-Covering letter can be ordered from your service engineer or downloaded from the **Customer Information Service (CIS)** site. Please register under <http://register.thermo-bremen.com/form/cis>.

Parts contaminated by radioisotopes are not subject to return to Thermo Fisher Scientific – either under warranty or the exchange part program. If parts of the system may be possibly contaminated by hazardous material, please make sure the Field engineer is informed before the engineer starts working on the system.

Contents

Chapter 1	Introduction.....	1-1
Chapter 2	Site Requirements.....	2-1
	Moving the System	2-2
	Hallways and Doors	2-2
	Space Requirements	2-4
	Floor Conditions.....	2-6
	Placing the Computer	2-6
	Environmental Requirements.....	2-7
	Room Temperature.....	2-7
	Humidity	2-8
	Air Purity	2-8
	Lighting	2-8
	Exhaust Fumes	2-8
	Electromagnetic Fields	2-9
	Radio Frequencies	2-9
	Electrostatic Discharge	2-9
	Telephone.....	2-10
Chapter 3	Electrical Power	3-1
	Electrical Power Specification.....	3-2
	Single-Phase Wall Outlets for Options.....	3-2
	Heat Output	3-2
	Power Cables and Connectors.....	3-2
	Location of Wall Outlets (Power)	3-4
	Location of Auxiliary Wall Outlets.....	3-4
	Power Quality	3-4
	Power Monitoring Devices.....	3-5
	Power Conditioning Devices.....	3-7
	Uninterruptible Power Supply	3-7
	Technical Assistance.....	3-8
	Delta-to-Y Conversion Transformer.....	3-9
Chapter 4	Resources Requirements.....	4-1
	Gases.....	4-2
	Gas Samples for Basic Instrument Setup	4-2
	Gases for Specification Measurements.....	4-3
	Test Gas.....	4-3
	Compressed Air.....	4-4
	Cryogenic Coolants.....	4-5
	Cleaning Agents	4-5

Chapter 5	Instrument Arrival	5-1
	Possible Damage during Transport	5-1
	Transportation Risk	5-2
Chapter 6	Installation.....	6-1
	Preparing the Installation	6-2
	Unpacking the System	6-2
	Installing the System	6-2
	Key Operator	6-3
	Advanced Training Courses	6-4
	Preventive Maintenance	6-5
Chapter 7	Options	7-1
	PreCon.....	7-2
	Power Requirements	7-2
	Resources Requirements.....	7-2
	GC/C III.....	7-3
	Power Requirements	7-3
	Resources Requirements.....	7-3
	Equilibration Unit	7-4
	Power Requirements	7-4
	Resources Requirements.....	7-4
	ConFlo IV and Elemental Analyzer	7-5
	Power Requirements	7-5
	Resources Requirements.....	7-5
	TC/EA.....	7-6
	Power Requirements	7-6
	Resources Requirements.....	7-6
	GC/TC.....	7-7
	Power Requirements	7-7
	Resources Requirements.....	7-7
	GasBench II	7-9
	Power Requirements	7-9
	Resources Requirements.....	7-9
	Kiel Carbonate IV Device	7-11
	Power Requirements	7-11
	Resources Requirements.....	7-11
	LC IsoLink.....	7-13
	Power Requirements	7-13
	Gas Requirements	7-13
	GC IsoLink.....	7-14
	Power Requirements	7-14
	Gas Requirements	7-14
	Glossary	G-1

Index..... I-1

Figures

View of installed instrument	2-4
Space requirements of MAT 253 and tables	2-5
Space requirements of MAT 253	2-5
Receptacle	3-4
Delta-to-Y conversion	3-9
Reference gas vial with one valve and 1/4" fitting (~ 5 mL P/N 1003560)	4-2
Reference gas vial with two Viton® valves and 1/4" fitting, (200 mL, P/N 0254650)	4-2
Reference gas vial with two valves (two ports) and 1/4" fitting (~ 10 mL, P/N 1003840)	4-2
Compressed air connection	4-4

Tables

Data of boxes of MAT 253	2-3
Dimensions of an MAT 253 instrument	2-4
Companies specifying power conditioning equipment	3-8
Gas requirements of PreCon	7-2
Gas requirements of GC/C III	7-3
Gas requirements of equilibration unit	7-4
Gas requirements of ConFlo IV and Elemental Analyzer	7-5
Gas requirements of TC/EA	7-6
Gas requirements of GC/TC	7-7
Helium requirements for GasBench II	7-9
Gas requirements for water equilibration	7-9
CO ₂ requirements for carbonate measurements	7-9
CO ₂ requirements for DIC measurements	7-10
Parts of Kiel Carbonate IV Device Preinstallation Kit	7-11
Gas requirements of Kiel Carbonate IV Device	7-11
Site requirements of several devices	7-13
Gas requirements of LC IsoLink	7-13
Power consumption of GC IsoLink	7-14
Gas consumptions of GC IsoLink	7-14

Chapter 1 Introduction

Information in this guidebook will help you to prepare a suitable site for installation of your system. The MAT 253 MS detector is designed to operate reliably under carefully controlled environmental conditions.

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

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. ▲

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

Chapter 2 Site Requirements

Before your instrument 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. A telephone must be installed within reach of the workbench.

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

More information on each of the requirements is available under the following topics:

- “Moving the System” on page 2-2
- “Hallways and Doors” on page 2-2
- “Space Requirements” on page 2-4
- “Environmental Requirements” on page 2-7

Moving the System

The following steps must only be performed by a Thermo Fisher Scientific service engineer:

1. A forklift or a lifting truck will be used to transport the box that contains your IRMS as near as possible to your laboratory door. Then your box will be unpacked. The IRMS will be carefully rolled on its wheels to its final place.
2. When the IRMS reached its final location, the supporting feet will be screwed out. This will lift the IRMS, and the wheels will hang in the air slightly above the floor.
3. Now a forklift or a lifting truck will be used to carefully transport the magnet near to the IRMS. You should provide a suitable lifting device (a crane, for example) to let the magnet be lifted on its platform (height of 90 cm, that is 36 inch) so that the service engineer can attach the magnet to the IRMS.

Caution Never roll the IRMS with the magnet attached to it! Rather, take away the magnet carefully by using a lifting device before rolling the IRMS to its final location. ▲

Note If the IRMS must be transported to a new location, screw in the supporting feet again. The wheels will then touch the floor again. The IRMS (without the magnet that must be carefully detached first) can then be rolled away. ▲

Hallways and Doors

In order to move the instrument into the laboratory, the whole way from the loading dock to the desired place including the entrance to your facility, the width of all hallways, doors, elevators, etc. should be wide enough for the instrument. For dimensions of the largest part during transportation inside the building, see [Figure 2-2](#) on [page 2-5](#).

The minimum width necessary to transport the unpacked instrument to the installation site is 0.9 m (36 in). Consider additional room to allow maneuvering of the system around corners and/or through doors. Elevators and hallways should be able to take the load. For weight information, refer to topic “[Floor Conditions](#)” on [page 2-6](#).

Your MAT 253 is shipped in several boxes. Their data are summarized in [Table 2-1](#). The largest of them has the approximate dimensions of ($l \times w \times h$) 160×109×155 cm. Its weight is approximately 140 kg. The electromagnet is separately packed in a box of ($l \times w \times h$) 72×106×72 cm.

Its weight is approximately 370 kg. A suitable crane or fork lift should be provided to lift the magnet on its platform (height of 90 cm, that is 36 in).

Table 2-1. Data of boxes of MAT 253

Parameter	Dimensions
dimensions of largest box or one-way pallet [l×w×h] ¹	160 cm×109 cm×155 cm
weight of largest box or one-way pallet	140 kg
dimension of box containing electromagnet [l×w×h]	72 cm×106 cm×72 cm
weight of box containing electromagnet	370 kg (gross weight)
weight of electromagnet	310 kg
dimensions of box containing basic unit [l×w×h]	160 cm×109 cm×155 cm
weight of box containing basic unit	550 kg (gross weight, that is basic unit included) ²
weight of basic unit	410 kg ²
dimensions of box containing optional GC [l×w×h]	80 cm×80 cm×89 cm
mass of box containing optional GC	100 kg (gross weight, that is GC included) 56 kg (net weight)

¹contains accessories (computer and kits, for example)

²without magnet (delivered in a box of its own)

Owing to the climatic conditions in some tropic regions, some boxes may be replaced by special packings. As a result, the dimensions will differ from those mentioned above.

Space Requirements

MAT 253 is shown in front view in [Figure 2-1](#).



Figure 2-1. View of installed instrument

The dimensions of the instrument and the minimum floor space required for its installation and operation are summarized in [Table 2-2](#). The height of the MAT 253 main cabinet (#1 in [Figure 2-2](#) on [page 2-5](#)) amounts to 1360 mm. The peripherals support table (#2) for an Elemental Analyzer, a GC or a GasBench is 1700 mm high. The table (#3) for the computer is 720 mm high. See also [Figure 2-3](#) on [page 2-5](#).

Table 2-2. Dimensions of an MAT 253 instrument

Parameter	Dimensions
width	101 cm (40")
depth	135 cm (53")
height	136 cm (53")
minimum width during transport	87 cm (35")

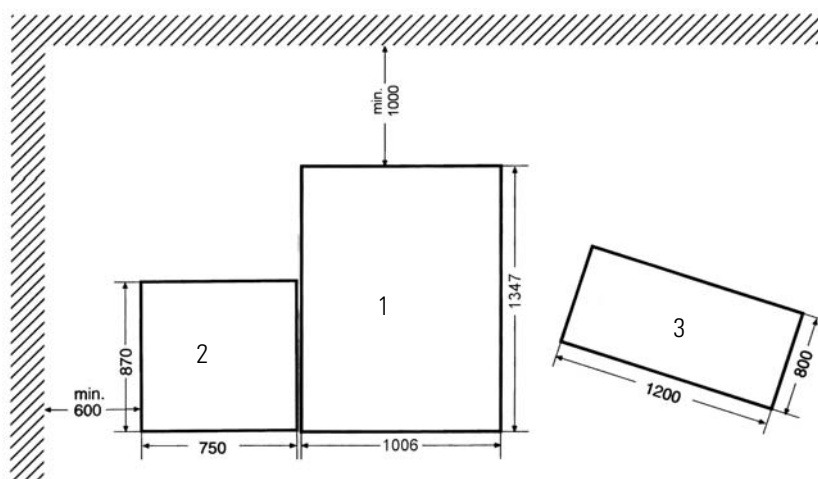


Figure 2-2. Space requirements of MAT 253 and tables

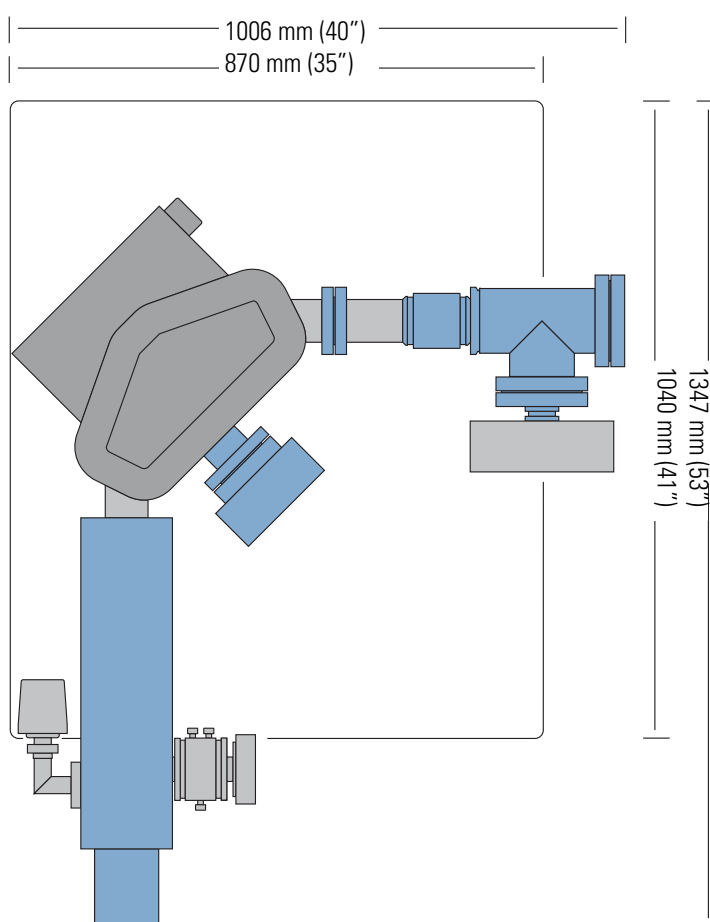


Figure 2-3. Space requirements of MAT 253

Note Take the minimum distance behind the units into account. This distance is imperative to allow easy access to the rear side of each module for service and repair. ▲

To ensure that operating personnel are easily able to carry out their work and to facilitate heat dissipation, we recommend selecting room dimensions which are considerably larger than the minimum dimensions given in [Figure 2-2](#).

Because the MAT 253 is supported with wheels, one can easily pull the instrument out to the nearest hallway to perform the service operation there. Afterwards, simply push the instrument back to its original place.

Floor Conditions

The floor must be level and must be sufficient to carry the weight of the instrument of approximately 680 kg (1500 lb) including the electromagnet. The electromagnet alone weighs about 310 kg (680 lb). The floor must have a compressive strength of more than 1.5 N/mm². Also consider the weight of any option that is delivered with the instrument.

The floor in the laboratory must be free of mechanical vibration caused by equipment in adjoining locations. The maximum acceptable amplitude is 10 µm (peak to peak) movement for all frequencies above 30 Hz.

Placing the Computer

The fiber optics data cable connecting your computer to the fiber optics connectors at the rear panel of your IRMS is about 6 m long. This allows you to place the computer even on a desk outside the direct vicinity of the IRMS. For specific space requirements of your peripheral options, refer to [Chapter 5: “Options”](#).

Environmental Requirements

Attention to the operating environment will ensure continued high performance of your system and help protect your investment. Any expenditures for air conditioning and power supply are normally more than offset by good throughput and reduced repair costs.

Once the laboratory environment has been properly adjusted, it is still important to observe some fundamental maintenance principles: make sure panels having air intakes are not obstructed. Air must be allowed to circulate freely in the electronics cabinet. Pumps should be serviced regularly as described in the manufacturer's Operating Manual supplied with the instrument.

Room Temperature

The ambient temperature of the laboratory must range between 18 °C and 28 °C.

Caution Operating at temperatures above those recommended may cause premature failure of transistors and integrated circuits. ▲

Note Heat dissipation of the instrument must be considered in accordance with the power requirements, also for peripherals. Refer to "Heat Output" on page 3-2 and to "Summary of Technical Data" on page 5-1. ▲

Large temperature fluctuations, that is fluctuations caused mainly by air conditioning or draft and only secondarily by direct sunlight, should be avoided when measuring. Temperature changes greater than 1 °C/h should be avoided during measurements.

Air Conditioning

We recommend installing an air conditioner, if the specified limits will be exceeded due to unfavorable climatic conditions.

Preferably, the air conditioner should be equipped with a flow controller valve and PID microprocessor control. It is available from Landis & Gyr, Polygyr RWX, for example. See www.landisgyr.com. This ensures temperature drifts within the limits given above.

When planning air conditioning, take into consideration the heat dissipated by the instrument during normal operation. Air conditioning must be capable of maintaining a constant temperature within operable limits in the immediate vicinity of the instrument.

Caution The considerable short-term variations in temperature caused at the air-outlet of mainly newer air conditionings are much more problematic than long-term variations. Because considerable temperature differences may exist between adjacent air-conditioned rooms, never place the IRMS near to such a connecting door. The system must never be exposed to air draft! ▲

Humidity

Relative humidity should be between 20 % and 70 %. In no case should the humidity exceed 70 % to avoid high ohmic insulator breakdown.

Caution Operating the system or maintaining it in an operational condition outside the specified limits may cause many types of failures. Their repair is specifically excluded from our standard warranty and service contract coverage. ▲

Caution Operating at very low humidity will cause problems due to accumulation and discharge of static electricity. Operating at high humidity may cause condensation with associated short circuits. ▲

Air Purity

Air must be free of smoke, dust, particulate matter, and aggressive vapors.

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

Lighting

Good lighting makes an area more enjoyable to work in. Since a lot of work is done at the computer terminal, it may be convenient to have a dimmer switch on the lights to reduce eyestrain. We recommend a small lamp for source inspection and manipulation of small components.

Exhaust Fumes

The exhaust port of the rotary pump should be connected to an exhaust gas line leading out of the building. The inner diameter of the pipe should be at least 1.5 cm.

Electromagnetic Fields

The instrument site must be free of interfering electromagnetic fields. The maximum acceptable field amplitude (AC) for any frequency is 5×10^{-6} T (50 mG).

Note Sources of disturbing fields are for example other analytical instruments (as NMR systems or other mass spectrometers); train, tram, subway; power cables crossing the ceiling; large electric motors (elevators); radio stations nearby ▲

Radio Frequencies

If strong radio transmitters are operating close to your laboratory, you should contact your local support for advise. Because of the complexity of such influences, no general suggestion can be given in this guide.

Electrostatic Discharge

Electrostatic discharge (ESD) can damage the electronic components of your MAT 253 system. Thermo Scientific instruments are designed to withstand electrostatic discharges (ESD) up to 4 kV (air discharge) and 4 kV (contact discharge) with all panels in place. However, if the panels are removed and the PCBs are handled without proper precautions, the electronic components might be damaged or fail prematurely. Static electricity can develop in a variety of ways. A few examples of how electrostatic charge can develop are as follows:

- When walking across a carpet in a room that is at 20% relative humidity, as much as 35 000 V of electrostatic potential can be generated on the surface of your body. This same motion in a room at 80% relative humidity generates about 1 500 V of electrostatic potential.
- Sitting and working in a chair padded with polyurethane foam in a room at 20% relative humidity can cause as much as 18 000 V of electrostatic potential to develop on your skin or 1 500 V at 80% relative humidity.
- Working in laboratory coats and clothing made of synthetic fibers can cause the accumulation of static electricity on your skin.
- 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 can be damaged by a discharge of electrostatic potential of as little as 50 V. ESD damage can be catastrophic causing your system to cease

functioning. More commonly, however, ESD damage might cause latent problems that are detrimental to sensitive electrical components, causing premature failures. Therefore, Thermo Fisher Scientific recommends the following precautions, especially when you are operating your system at the lower end of the relative humidity specification listed above:

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

Telephone

It is recommended that a telephone be installed in your laboratory near the instrument so, if necessary, you can conveniently operate the system while you are working by telephone with a Thermo Fisher Scientific Customer Service Engineer. The voice telephone outlet should be within 2 m (7 ft) of your system.

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.

Chapter 3 Electrical 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 that is not damaged by line power fluctuations please verify that you comply with all power quality requirements.

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

More information on each of the requirements is available under the following topics:

- “Electrical Power Specification” on page 3-2
- “Heat Output” on page 3-2
- “Power Cables and Connectors” on page 3-2
- “Location of Wall Outlets (Power)” on page 3-4
- “Power Quality” on page 3-4
- “Power Conditioning Devices” on page 3-7
- “Uninterruptible Power Supply” on page 3-7
- “Technical Assistance” on page 3-8
- “Delta-to-Y Conversion Transformer” on page 3-9

Electrical Power Specification

The MAT 253 is designed to operate at a nominal voltage of 230 V ac; 50/60 Hz. Its basic power requirements are as follows:

- Nominal voltage 230/400 V \pm 10 %, 50 or 60 Hz ac
- The voltage must be free of spikes.
- Three phases, 5-wire system in Y configuration (neutral wire connected to earth). For further information, see [Figure 3-2](#).
- Each phase is fused with 16 A (recommended for Germany).
- Maximum permissible voltage between ground and neutral lines must be less than 400 mV.

Single-Phase Wall Outlets for Options

- Nominal voltage 230 V \pm 10 %, 50 or 60 Hz ac
- Fused with 10 A or 16 A (recommended for Germany)

Note Four outlets (“Schuko” type, nominal voltage 230 V ac, fused with 10 A) are installed in the MAT 253 to be used for connecting the peripheral options. Therefore, wall outlets are not necessary for them. Refer to topic [“Power Cables and Connectors”](#) on [page 3-2](#) as well. ▲

Consider different voltages (e.g. 110 V ac) in other countries. Check this with your local officials and/or your local Thermo Fisher Scientific office.

Heat Output

The heat output of the MAT 253 amounts to approximately 2.5 kW during normal operation and to approximately 4.5 kW during bakeout. For the power consumption of the installed peripherals, refer to topic [“Options”](#) on [page 7-1](#).

Power Cables and Connectors

The MAT 253 must have a separate “clean” line leading to a main fuse to guarantee operation free of disturbances. The length of the supplied power cable is approximately 3 m (10 ft). Locally supplied computer hardware must use the same power line and ground connection as the MAT 253.

The MAT 253 is per default equipped with a CE plug in standard configuration. A suitable receptacle will be sent to the customer upon order receipt in Bremen. See [Figure 3-1](#).

Note Additional devices like recirculating chillers or compressors must not be connected to the instrument. Use a wall outlet instead. Recirculation chillers or compressors can be noisy, and they blow warm air into the room. Install those devices outside the laboratory. ▲

Location of Wall Outlets (Power)

The MAT 253 Preinstallation Kit, P/N 1244650, comprises:

- this *MAT 253 Preinstallation Requirements Guide*
- a receptacle (CEE, 16 A, 5-pole)
- a certificate (Walther 110, CEE)



Figure 3-1. Receptacle

The wall outlet for the main power of the MAT 253 should be located at the wall behind the intended location of the instrument. Install the receptacle shown in [Figure 3-1](#), left. The service engineer will later connect the power cable to it as shown in [Figure 3-1](#), right. Refer to topic “[Electrical Power Specification](#)” on [page 3-2](#) as well.

Location of Auxiliary Wall Outlets

Additional single-phase 230 V (or 110 V) ac outlets are needed for options and test equipment such as compressor or water chillers etc. We recommend at least six spare 230 V (110 V) ac outlets behind the system and three close to the workbench space within your laboratory.

Note All single-phase auxiliary wall outlets should use the same ground as power line of the instrument. ▲

Power Quality

The power quality supplied to your MAT 253 instrument is very important and must be established in your laboratory prior to installing the IRMS.

Disturbances in power can be caused by weather, accidents, or utility equipment failure. They can last for milliseconds to seconds or even longer. The resulting production outages, however, can last much longer. To find possible solutions, it is first necessary to characterize the actual problem.

The line voltage must be stable and within the specifications listed in this guide. It must be free of fluctuations due to slow changes in the average voltage, surges, sags or transients.

Caution Constant high or elevated line voltage, impulses, or voltage surges can cause overheating and component failures. Constant low or too low line voltage or voltage sags can cause the system to function erratically or not at all. Transients, even of a few microseconds duration, can cause electronic devices to fail catastrophically or to degrade and eventually shorten the lifetime of your system. ▲

In addition, the voltage between ground and neutral should not exceed 1 V. See [Figure 3-2 on page 3-9](#). Note the definitions for the most common voltage disturbances below:

- 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 μ s and 2 s.
- Transients or impulses are brief voltage excursions of up to several thousand volts with durations of less than 50 μ s.

Dysfunctional power conditions can be corrected by installing a new “clean” line or by using filter transformers or power conditioners. You can arrange with your Thermo Fisher Scientific service representative to have the quality of your line voltage checked. The service representative will recommend any necessary action.

Note If special measurements of electric or magnetic fields are necessary, contact your local Thermo Fisher Scientific support or your local dealer for advice. ▲

Power Monitoring Devices

Line regulation equipment may be purchased from Thermo Fisher Scientific or from an appropriate vendor. A 24-hour power supply is necessary to assure proper instrument function.

A variety of devices are available to monitor the quality of your line power. The power line disturbance analyzers are capable of detecting and recording most types of power supply problems. These instruments provide a continuous record of line performance by analyzing and printing out information on three types of voltage disturbances:

- Slow average
- Sag and surge
- Transient

In the first two cases, both 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 be taken. Then, the power should be monitored again as described above.

Renting Line Monitors

Line monitors can be rented from electrical equipment suppliers. Refer to “[Technical Assistance](#)” on [page 3-8](#). If necessary, your local Thermo Fisher Scientific office can assist in interpreting the results and recommend appropriate corrective measures.

Power Conditioning Devices

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

When the nominal voltage is free from voltage sags, surges and impulses but more than $\pm 10\%$ outside the required 230 V, the supply voltage can be lowered (bucked) or raised (boosted) using a buck/boost transformer. Buck/boost transformers are also available from Thermo Fisher Scientific. Your electrician should install the buck/boost transformer before the installation of your system is started.

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

Uninterruptible Power Supply

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

Technical Assistance

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

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

Specifying power conditioning equipment is a complex task that is best handled by a company or consultant specialized in that field. A selection of such companies¹ is listed in [Table 3-1](#).

Table 3-1. Companies specifying power conditioning equipment

Company	Address or comment	Internet
General Electric Company	worldwide distribution network	www.ge.com
JOVYATLAS Elektrische Umformtechnik GmbH	Groninger Straße 29-37 26789 Leer, Germany Phone: +49 (491) 6002 0 Fax: +49 (491) 6002 25	www.jovyatlas.info
Junge Störschutz Nord GmbH	Zum Steenshoop 17 27412 Tarmstedt, Germany Phone: +49 (4283) 93030	-----
OnLine Power, Inc.	conform to all applicable standards, worldwide	www.onlinepower.com
POWERVAR, Inc.		www.powervar.com
Sola/Hevi-Duty		www.sola-hevi-duty.com
Warner Electric, Inc.	Motors and Controls division	www.warnernet.com

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

Delta-to-Y Conversion Transformer

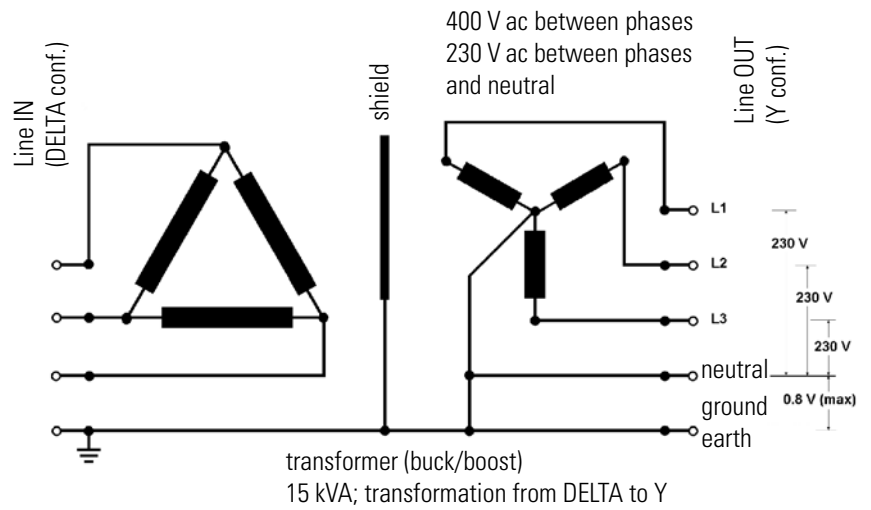


Figure 3-2. Delta-to-Y conversion

Note In Y configuration, the nominal voltage of 230 V ac must be measured phase to ground. Between the phases, 400 V ac is measured. See [Figure 3-2](#). ▲

In case of a Delta configuration in your location (ask the responsible electrician), an isolation transformer is required which steps up the three phases 120 V ac (Delta) to 230 V ac (Y) with respect to ground. A suitable transformer is available from Thermo Fisher Scientific. Beside other advantages, line conditioners have the same capability.

Chapter 4 Resources Requirements

Note As the user, it is your responsibility to provide correct gas, cryogen, and solvent supplies for operating your system. ▲

Your instrument requires high purity gases and cryogens. The service engineer might also require certain solvents for the installation verification of your system. More information on each of the requirements is available under the following topics:

- “Gases” on page 4-2
- “Compressed Air” on page 4-4
- “Cryogenic Coolants” on page 4-5
- “Cleaning Agents” on page 4-5

Gases

Your system can use large amounts of gases during daily operations. It is essential that the gases be delivered with the necessary pressure and purity. Refer to the following topics for information on the purity and pressure that your system requires. See also [Chapter 5: “Options”](#) for the gas requirements of the peripheral options that are installed with your system.

Gas Samples for Basic Instrument Setup

You will need to supply gas samples for the installation of your instrument: either CO₂ or H₂ depending on the type of collector system. The inlet system of a MAT 253 instrument terminates in 1/4” Swagelok connectors. Two standard taper 14/23 male connectors are also provided. Suitable sample vials can be procured from Thermo Fisher Scientific. See [Figure 4-1](#), [Figure 4-2](#), and [Figure 4-3](#).

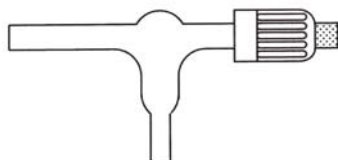


Figure 4-1. Reference gas vial with one valve and 1/4” fitting (~ 5 mL, P/N 1003560)

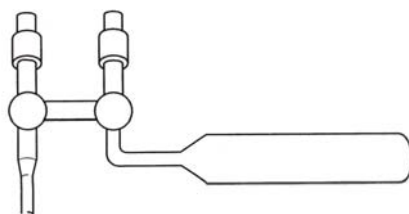


Figure 4-2. Reference gas vial with two Viton® valves and 1/4” fitting, (200 mL, P/N 0254650)

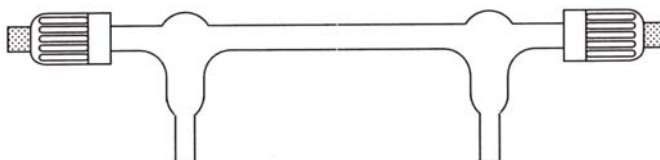


Figure 4-3. Reference gas vial with two valves (two ports) and 1/4” fitting (~ 10 mL, P/N 1003840)

Gases for Specification Measurements

All gases needed for specification measurements (international standards) are to be supplied by the customer.

Test Gas

A bottle of argon is required for leak checking. 99.5 % welding argon is sufficient. Additional gases are required for normal operation, if the instrument is connected to a GC or to an Elemental Analyzer.

Compressed Air

Compressed air with a pressure of 5 bar (70 psi) is required to operate the pneumatic valves of the instrument. A suitable compressor can be ordered from Thermo Fisher Scientific (P/N 0261850). If you run the compressor in an environment of high humidity, we recommend using an air dryer, for example the membrane dryer of the series IDG5M-F01 manufactured by SMC that includes a microfilter.

It is recommended to filter the compressed air in order to remove particulate matter and moisture. The compressed air must be free of oil and water. In most cases, this can be achieved by using your own built-in compressed air supply. However, if you instead use a compressor, often water and oil will not be filtered out sufficiently. On the contrary, by using a compressor water will be accumulated within the water reservoir of the pressure reducer. The water reservoir must be emptied regularly.

Caution If the water reservoir of the pressure reducer is not maintained properly, residual water will be spread within the system, especially around the valves. ▲

Note Do not use gas tanks for compressed air supply. The amounts of compressed air needed are much higher, especially for Dual Inlet applications. ▲

The main supply has to be connected to the compressed air service unit of the MAT 253 via the provided 6×1 mm PVC tube. Figure 4-4 shows the connector for the compressed air tube.



Figure 4-4. Compressed air connection

Cryogenic Coolants

Some MAT 253 options require liquid nitrogen. A suitable stainless steel Dewar vessel of either 25 L or 75 L can be procured from Thermo Fisher Scientific.

Cleaning Agents

We recommend having the following cleaning agents available:

- methanol
- a detergent (RBS 50®, for example)
- distilled water

Chapter 5 Instrument Arrival

When your lab site preparation is completed, the Thermo Scientific Installation Request Form has been mailed or faxed to your Thermo Fisher Scientific office, and the system is delivered, please call your Thermo Fisher Scientific office to arrange for an installation date. Refer to the Installation Request Form for your instrument at the beginning of this guide. Telephone and fax numbers for Thermo Fisher Scientific offices are listed immediately following the Installation Request Form.

Possible Damage during Transport

MAT 253 instruments are transported either by carriers specialized in handling delicate machinery, or for long distance shipment by airfreight. Occasionally however, equipment inadvertently may be damaged in transit.

Take the following precautions when receiving material:

- Carefully check for obvious damage or evidence of rough handling.
- If external damage is apparent, take photographs, note this fact on all copies of the receiving documents and briefly describe the extent of the damage. The driver should sign or initial next to your comments to signify agreement with your observations.
- Contact the appropriate local Thermo Fisher Scientific office to report the damage and let the Thermo Fisher Scientific people check for further damage.

Note Freight insurance requires obvious damage to be noted on the receiving documents. Thermo Fisher Scientific will not accept liability for damage, if materials are received with obvious damage and the damage is not recorded on the receiving documents. ▲

When your system arrives, move it to a protected location indoors. If you have questions about moving your system, contact your local Thermo Fisher Scientific office. Telephone and fax numbers of the offices are listed in the beginning of this guide.

Instrument Arrival

Possible Damage during Transport

Transportation Risk

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

Chapter 6 Installation

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

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 Fisher Scientific representative for instructions on what to do. If the system arrives safely, proceed with the following instructions. ▲

When your lab site preparation is completed, the Installation Request Form for your instrument has been mailed or faxed to your local office for Thermo Scientific products, and the system is delivered, please call your Thermo Fisher Scientific office to arrange for an installation date. Refer to the Installation Request Form at the beginning of this guide. Telephone and fax numbers for Thermo Fisher Scientific offices are listed immediately following the Installation Request Form.

More information on each of the requirements is available under the following topics:

- “Preparing the Installation” on page 6-2
- “Advanced Training Courses” on page 6-4
- “Preventive Maintenance” on page 6-5

Preparing the Installation

This topic provides advice for preparing the installation of the instrument.

Caution Store the instrument in a protected location indoors. Take the specifications described in topic “Room Temperature” on page 2-7 as a guideline for the temperature in the storage room. ▲

Unpacking the System

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

Two exceptions to this policy are as follows:

- You are encouraged to locate the Operating Manuals and to begin to become familiar with the operation of the instrument.
- Where buck/boost transformers or power conditioning units are supplied, it is the customer's responsibility to have these units installed by an electrician prior to instrument installation.

Installing the System

When your new MAT 253 system is on site, ready for installation, a Thermo Fisher Scientific service engineer will install it.

During the installation, the service engineer will demonstrate the following:

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

Note Consumables sent with the system are intended for use by the service engineer during the installation. It is the responsibility of the customer to replace any consumables used during the installation. ▲

Key Operator

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

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

Advanced Training Courses

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

It is also recommended that some months after your MAT 253 system has been installed, the key operator receive an advanced training for the operation and maintenance of the system from Thermo Fisher Scientific. After this training, the key operator can conduct an in-house training program on your site for your own people and certify others to operate the instrument.

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

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

Germany

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

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

E-mail: training.bremen@thermo.com

Preventive Maintenance

Routine and preventive maintenance of MAT 253 MS detector and data system is in the user's responsibility. Included in this category are exchange of pump oil, replacement of filters, etc. on a regular basis. Please refer also to the manufacturers manuals delivered with the instrument – especially for the maintenance of mechanical pumps and turbopumps.

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

- *MAT 253 Operating Manual (P/N 1149090)*
- Manuals that come with your data system computer and other modules of your system

Chapter 7 Options

Information on the requirements for the peripheral options is available at the following topics:

- “PreCon” on page 7-2
- “GC/C III” on page 7-3
- “Equilibration Unit” on page 7-4
- “ConFlo IV and Elemental Analyzer” on page 7-5
- “TC/EA” on page 7-6
- “GC/TC” on page 7-7
- “GasBench II” on page 7-9
- “Kiel Carbonate IV Device” on page 7-11
- “LC IsoLink” on page 7-13
- “GC IsoLink” on page 7-14

PreCon

The PreCon interface is attached to any Thermo Scientific isotope ratio mass spectrometer configured for a GC/IRMS interface, either GC/Combustion interface or GC/GP interface.

In case of the GC/GP interface, the required space is approximately 900 mm width×700 mm depth. In case of the GC/Combustion interface, a second table of 250 mm width×700 mm depth is required.

Power Requirements

PreCon will be supplied by the IRMS line distributor. Therefore, the power consumption of the IRMS will increase by 0.5 kW.

Resources Requirements

Table 7-1 summarizes the gas requirements for the PreCon interface.

Table 7-1. Gas requirements of PreCon

Gas	Purity	Comment
He	5.0, that is 99.999 %	200 bar as carrier gas
CO ₂	4.5, that is 99.995 %	60 bar as reference gas

For the LN₂-cooled trap provide approximately 3 L of liquid nitrogen per day.

All gas lines should be oil-free and preferably flame-dried. The gas lines or the gas bottles should be at a distance of 1 m to 1.5 m to the instrument.

All regulators should be oil- and grease-free and specified for gases of high purity. The supply lines should terminate with 1/8" male Swagelok-type connectors. Thermo Fisher Scientific recommends using regulators with an outlet pressure range between 0 and 5 bar (0 and 73 psi).

For the GC separation of gases, provide an appropriately fused silica capillary column (plot fused silica coating Poraplot Q; length of 25 m and ID of 32 mm), for example Thermo Fisher Scientific, P/N 0171911.

Compressed air will be supplied by the compressed air distributor of the IRMS and should be in the range between 2.75 bar and 4.85 bar (40 psi and 70 psi).

Sometimes it may be necessary to check the unit for leaks. Therefore, provide a bottle of argon.

GC/C III

The GC/C III attaches to any Thermo Scientific isotope ratio mass spectrometer configured for a GC/IRMS and will be placed on top of the peripherals support table. The required space is 900 mm width×700 mm depth.

Power Requirements

GC/C III will be supplied by the IRMS line distributor. Therefore, the power consumption of the IRMS will increase by 2.5 kW. If you intend to use a second GC, it will require a separate socket outlet with a 16 A fuse.

Resources Requirements

Table 7-2 summarizes the gas requirements for the GC/C III.

Table 7-2. Gas requirements of GC/C III¹

Gas	Purity	Comment
He	5.0, that is 99.999 %	200 bar as carrier gas
CO ₂	4.5, that is 99.995 %	60 bar as reference gas
N ₂	5.0, that is 99.999 %	200 bar as reference gas
O ₂	4.6, that is 99.996 %	60 bar as reference gas

¹H₂ and synthetic or water- and oil-free compressed air, if using the FID detector

All gas lines should be oil-free and preferably flame-dried. The gas lines or the gas bottles should be at a distance of 1 m to 1.5 m to the instrument.

All regulators should be oil- and grease-free and specified for gases of high purity. The supply lines should terminate with 1/8" male Swagelok-type connectors. Thermo Fisher Scientific recommends using regulators with an outlet pressure range between 0 and 5 bar (0 and 73 psi).

Compressed air will be supplied by the compressed air distributor of the IRMS and should be in the range between 2.75 bar and 4.85 bar (40 psi and 70 psi).

Sometimes it may be necessary to check the unit for leaks. Therefore, provide a bottle of argon.

Equilibration Unit

The required space for the equilibration unit and the cooling unit is 1400 mm width×700 mm depth.

Power Requirements

The equilibration unit will be supplied by the IRMS line distributor. Therefore, the power consumption of the IRMS will increase by 2 kW.

Resources Requirements

Table 7-3 summarizes the gas requirements of the equilibration unit.

Table 7-3. Gas requirements of equilibration unit

Gas	Purity	Comment
H ₂	4.5, that is 99.995 %	200 bar as equilibrium; consumption: 1 tank per year
CO ₂	4.5, that is 99.995 %	60 bar as equilibrium; consumption: 1 tank per year

The gas lines should be oil-free and preferably flame-dried. The gas lines or the gas bottles should be at a distance of 1 m to 1.5 m to the instrument.

All regulators should be oil- and grease-free and specified for gases of high purity. The supply lines should terminate with 1/8" male Swagelok-type connectors. Thermo Fisher Scientific recommends using regulators with an outlet pressure range between 0 and 5 bar (0 and 73 psi).

For the water trap, either provide a cooling device or a mixture of alcohol and dry ice. The temperature should be approximately -70 °C (-94 °F).

Compressed air will be supplied by the compressed air distributor of the IRMS and should be in the range between 2.75 bar and 4.85 bar (40 psi and 70 psi).

Sometimes it may be necessary to check the unit for leaks. Therefore, provide a bottle of common argon.

ConFlo IV and Elemental Analyzer

The ConFlo IV is small enough to be put on top of the IRMS or the Elemental Analyzer. The Elemental Analyzer requires a peripherals support table of 900 mm width×700 mm depth.

Power Requirements

The Elemental Analyzer will be supplied by the IRMS line distributor. Therefore, the power consumption of the IRMS will increase by 2 kW.

Resources Requirements

Table 7-4 summarizes the gas requirements for the ConFlo IV and the Elemental Analyzer.

Table 7-4. Gas requirements of ConFlo IV and Elemental Analyzer

Gas	Purity	Comment
He	5.0, that is 99.999 %	200 bar as carrier gas and make up gas
N ₂	5.0, that is 99.999 %	200 bar as reference gas
CO ₂	4.5, that is 99.995 %	60 bar as reference gas
CO	4.7, that is 99.997 %	200 bar as reference gas
H ₂	5.0, that is 99.999 %	200 bar as reference gas
O ₂ ¹	4.5, that is 99.995 %	200 bar for sample oxidation
SO ₂ ²	3.8, that is 99.98 %	4 bar as reference gas

¹for the Elemental Analyzer

²if a sulfur kit is ordered

All gas lines should be oil-free and preferably flame-dried. The gas lines or the gas bottles should be at a distance of 1 m to 1.5 m to the instrument. All regulators should be oil- and grease-free and specified for gases of high purity. The supply lines should terminate with 1/8" male Swagelok-type connectors. Thermo Fisher Scientific recommends using regulators with an outlet pressure range between 0 and 5 bar (0 and 73 psi).

Compressed air will be supplied by the compressed air distributor of the IRMS and should be in the range between 2.75 bar and 4.85 bar (40 psi and 70 psi). Sometimes it may be necessary to check the unit for leaks. Therefore, provide a bottle of argon.



Warning If the ConFlo IV is used for CO and/or H₂ measurements, a gas detector with an alarm function must be installed in the laboratory! Use an exhaust line (50 mm ID) with a slight negative pressure and a suction rate of 50 m³/h or more. ▲

TC/EA

The TC/EA (Temperature Conversion Elemental Analyzer) has the following dimensions: 450 mm width×700 mm depth×500 mm height. Its weight is 59 kg. Place it on a flat and solid table that can carry at least 150 kg.

Power Requirements

The TC/EA will be supplied by the IRMS line distributor. Therefore, the power consumption of the IRMS will increase by 1.5 kW.

Resources Requirements

Table 7-5 summarizes the gas requirements of the TC/EA.

Table 7-5. Gas requirements of TC/EA

Gas	Purity	Comment
He (in general)	5.0, that is 99.999 %	200 bar as carrier gas
CO (for oxygen measurement)	4.0, that is 99.99 %	200 bar as reference gas
He (for oxygen measurement)	4.6, that is 99.996 % with 2 % H ₂	150 bar as auxiliary gas
H ₂ (for hydrogen measurement)	6.0, that is 99.9999 % -200 ‰ vs. SMOW	200 bar as reference gas

All gas lines should be oil-free and preferably flame-dried. The gas lines or the gas bottles should be at a distance of 1 m to 1.5 m to the instrument. All regulators should be oil- and grease-free and specified for gases of high purity. The supply lines should terminate with 1/8" male Swagelok-type connectors. Thermo Fisher Scientific recommends using regulators with an outlet pressure range between 0 and 5 bar (0 to 73 psi).

Compressed air will be supplied by the compressed air distributor of the IRMS and should be in the range between 2.75 bar and 4.85 bar (40 psi and 70 psi). Sometimes it may be necessary to check the unit for leaks. Therefore, provide a bottle of argon.



Warning It is strongly recommended to install the gas tanks firmly! ▲



Warning Since CO and/or H₂ are used, a gas detector with an alarm function must be installed in the laboratory. Use an exhaust line (50 mm ID) with a slight negative pressure and a suction rate of 50 m³/h or more. ▲

GC/TC

The GC/TC (High Temperature Conversion Interface) attached to a Thermo Scientific isotope ratio mass spectrometer requires a flat and solid table with 450 mm width×700 mm depth×500 mm height.

Power Requirements

The power consumption of the IRMS will increase by 0.5 kW. If you intend to use a second GC, it will require a separate socket outlet with a 16 A fuse.

Resources Requirements

Table 7-6 summarizes the gas requirements of the GC/TC.

Table 7-6. Gas requirements of GC/TC

Gas	Purity	Comment
He (in general)	5.0, that is 99.999 %	200 bar as carrier gas
CO (for oxygen measurement)	4.7, that is 99.997 %	200 bar as reference gas
He (for oxygen measurement)	4.6, that is 99.996 % with 2 % H ₂	150 bar as auxiliary gas
H ₂ (for hydrogen measurement)	6.0, that is 99.9999 % - 200 ‰ vs. SMOW	200 bar as standard gas

All gas lines should be oil-free and preferably flame-dried. The gas line or the gas bottles should be at a distance of 1 m to 1.5 m to the instrument.

All regulators should be oil- and grease-free and specified for gases of high purity. The supply lines should terminate with 1/8" male Swagelok-type connectors. Thermo Fisher Scientific recommends using regulators with an outlet pressure range between 0 and 5 bar (0 and 73 psi).

Compressed air will be supplied by the compressed air distributor of the IRMS and should be in the range between 2.75 bar and 4.85 bar (40 psi and 70 psi).

Sometimes it may be necessary to check the unit for leaks. Therefore, provide a bottle of argon.

Warning It is strongly recommended to install the gas tanks firmly! ▲





Warning Since CO and/or H₂ are used, a gas detector with an alarm function must be installed in the laboratory. Use an exhaust line (50 mm ID) with a slight negative pressure and a suction rate of 50 m³/h or more. ▲

GasBench II

GasBench II is attached to Thermo Scientific isotope ratio mass spectrometers and placed on top of the instrument or on a peripherals support table. The required space is 900 mm width×900 mm depth.

Power Requirements

GasBench II will be supplied by the IRMS line distributor. Therefore, the power consumption of the IRMS will increase by 0.5 kW.

Resources Requirements

Table 7-7 shows the helium requirements for GasBench II.

Table 7-7. Helium requirements for GasBench II

Gas	Purity	Comment
He (as carrier gas)	5.0, that is 99.999 %	200 bar as carrier gas
He (for acceptance tests)	4.6, that is 99.996 % with 0.3 % CO ₂ 4.5	150 bar for acceptance tests

Resources Requirements for Water Equilibration

Table 7-8 summarizes the gas requirements for water equilibration.

Table 7-8. Gas requirements for water equilibration

Gas	Purity	Comment
He (in general)	4.6, that is 99.996 % with 0.3-1 % CO ₂ 4.5	150 bar as auxiliary gas
CO ₂	4.5, that is 99.995 %	60 bar as reference gas
He (for hydrogen measurement)	4.6, that is 99.996 % with 2 % H ₂	150 bar as auxiliary gas
H ₂ (for hydrogen measurement)	4.5, that is 99.995 %	200 bar as reference gas

Resources Requirements for Carbonate Measurements

Table 7-9 gives the CO₂ requirements for carbonate measurements.

Table 7-9. CO₂ requirements for carbonate measurements

Gas	Purity	Comment
CO ₂	4.5, that is 99.995 %	60 bar as reference gas

Resources Requirements for DIC Measurements

Table 7-10 gives the CO₂ requirements for measurements of dissolved inorganic carbon (DIC).

Table 7-10. CO₂ requirements for DIC measurements

Gas	Purity	Comment
CO ₂	4.5, that is 99.995 %	60 bar as reference gas

All gas lines should be oil-free and preferably flame-dried. The gas lines or the gas bottles should be at a distance of 1 m to 1.5 m to the instrument.

All regulators should be oil- and grease-free and specified for gases of high purity. The supply lines should terminate with 1/8" male Swagelok-type connectors. Thermo Fisher Scientific recommends using regulators with an outlet pressure range between 0 and 5 bar (0 and 73 psi).

Compressed air will be supplied by the compressed air distributor of the IRMS and should be in the range between 2.75 bar and 4.85 bar (40 psi and 70 psi).

Sometimes it may be necessary to check the unit for leaks. Therefore, provide a bottle of argon.

Kiel Carbonate IV Device

The Kiel Carbonate IV Device is attached to Thermo Scientific isotope ratio mass spectrometers equipped with a Dual Inlet system.

The Kiel Carbonate IV Device Preinstallation Kit, P/N 1244640, comprises the parts summarized in [Table 7-11](#).

Table 7-11. Parts of Kiel Carbonate IV Device Preinstallation Kit

P/N	Designation	Qty.
1196850	Kiel Carbonate IV Device Preinstallation Requirements Guide	1
2105500	receptacle (CEE, 16 A, 3 pole)	1
1112640	ortho-phosphoric acid (500 g)	1
2112330	certificate (CCC Walther 110)	1
1249700	phosphorous pentoxide (for analysis, 500 g)	1

The space required is 900 mm width×900 mm depth. Its height is 1900 mm and it weighs approximately 100 kg (220 lb).

Power Requirements

The Kiel Carbonate IV Device will be supplied by the IRMS line distributor. The power consumption of the IRMS will increase by 1.2 kW.

Resources Requirements

[Table 7-12](#) shows the gas requirements of the Kiel Carbonate IV Device.

Table 7-12. Gas requirements of Kiel Carbonate IV Device

Gas	Purity	Comment
He	99.996 %	200 bar as sample vial vent gas
N ₂	99.996 %	200 bar as sample vial vent gas

For the LN₂-cooled trap provide approximately 0.5 L of liquid nitrogen per sample.

All gas lines should be oil-free and preferably flame-dried. The gas lines or the gas bottles should be at a distance of 1 m to 1.5 m to the instrument.

All regulators should be oil- and grease-free and specified for gases of high purity. The supply lines should terminate with 1/8" male Swagelok-type connectors. Thermo Fisher Scientific recommends using regulators with an outlet pressure range between 0 and 5 bar (0 and 73 psi).

Options

Kiel Carbonate IV Device

Compressed air will be supplied by the compressed air distributor of the IRMS and should be in the range between 2.75 bar and 4.85 bar (40 psi and 70 psi).

Sometimes it may be necessary to check the unit for leaks. Therefore, provide a bottle of argon.

LC IsoLink

If the LC IsoLink will not be positioned upon the IRMS, arrange a peripheral desk (P/N 1087600) close to the IRMS, preferably left to it.

A connection for compressed air must be available at the IRMS. A connection of the LC IsoLink via a needle valve must be available. The needle valve is included in delivery.

[Table 7-13](#) summarizes the site requirements of various devices used together with the LC IsoLink.

Table 7-13. Site requirements of several devices

Device	Height/mm	Width/mm	Depth/mm	Mass/kg
LC IsoLink	553	360	468	21
Surveyor MS pump	200	360	430	12
Surveyor autosampler	370	360	460	30
Surveyor PDA detector	180	360	470	19.5
TSP P 1000	370	150	470	18
CTC Analytics HTC PAL	648	534	385	~ 10
Spark Mistral column oven	544	170	325	16

Power Requirements

230 V, single phase, 0.5 A (to be obtained at rear panel of the IRMS)

Gas Requirements

Ensure that the distances between gas tanks and the LC IsoLink are less than 2 m each. Provide the gases listed in [Table 7-14](#).

Table 7-14. Gas requirements of LC IsoLink

Gas	Purity	Comment
CO ₂	≥ 99.995 %	used as reference gas
He	≥ 99.999 %	for LC IsoLink and degassing unit
compressed air		≥ 4 bar

GC IsoLink

The GC IsoLink must be arranged left to the GC.

Power Requirements

Table 7-15 summarizes the power consumption of the GC Iso Link.

Table 7-15. Power consumption of GC IsoLink

Device	Power consumption [kWh]	Comment
GC IsoLink CNH	ca. 0.4	maximum energy demand; both ovens on maximum temperature
GC IsoLink CN	ca. 0.2	maximum energy demand; combustion oven on maximum temperature

Gas Requirements

Table 7-16 summarizes the gas consumptions of the GC IsoLink.

Table 7-16. Gas consumptions of GC IsoLink

Gas	Device	Consumption [mL/h]	Comment
He	GC IsoLink	ca. 240	backflush flow (depending on the application)
		ca. 600	water removal
He	Trace GC Ultra	no estimation of Trace GC Ultra flow	depending on application (split/splitless mode, with or without gas saver, column flow, with or without FID, etc.)
O ₂	GC IsoLink	ca. 30, only once per week	only for regeneration
CH ₄	GC IsoLink	nearly zero ¹	purity 4.5, that is 99.995 %, only for regeneration
H ₂	Trace GC Ultra	no estimation	depending on the configuration of the GC (with or without FID)
Air	Trace GC Ultra	no estimation	depending on the configuration of the GC (with or without FID)

¹As CH₄ is not necessary for running the GC IsoLink, it is only optional. When using it for conditioning the HTC reactor for the very first time, less than 1 mL/min of methane is needed for three minutes.

Glossary

This section lists and defines terms used in this manual. It also includes acronyms, metric prefixes, symbols, and abbreviations.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A	CRM consecutive reaction monitoring
A ampere	<Ctrl> control key on the terminal keyboard
ac alternating current	D
ADC analog-to-digital converter	d depth
AGC automatic gain control	Da dalton
AP acquisition processor	DAC digital-to-analog converter
APCI atmospheric pressure chemical ionization	dc direct current
API atmospheric pressure ionization	DS data system
ASCII American Standard Code for Information Interchange	DSP digital signal processor
B	E
b bit	EI electron ionization
B byte (8 b)	EMBL European Molecular Biology Laboratory
baud rate data transmission speed in events per second	<Enter> Enter key on the terminal keyboard
C	ESD electrostatic discharge
°C degrees Celsius	ESI electrospray ionization
cfm cubic feet per minute	eV electron volt
CI chemical ionization	F
CID collision-induced dissociation	f femto (10^{-15})
cm centimeter	°F degrees Fahrenheit
cm³ cubic centimeter	ft foot
CPU central processing unit (of a computer)	FFT Fast Fourier transformation
CRC cyclic redundancy check	FT Fourier Transformation
	FTMS Fourier Transformation Mass Spectroscopy

Glossary: FTP

FTP file transfer protocol

FWHM Full Width at Half Maximum

G

g gram

G Gauss; giga (10^9)

GC gas chromatograph; gas chromatography

GC/MS gas chromatograph / mass spectrometer

GUI graphical user interface

H

h hour

h height

HCD Higher Energy Collision Induced Dissociation

HPLC high-performance liquid chromatograph

HV high voltage

Hz hertz (cycles per second)

I

ICIS™ Interactive Chemical Information System

ICL™ Instrument Control Language™

ID inside diameter

IEC International Electrotechnical Commission

IEEE Institute of Electrical and Electronics Engineers

in inch

I/O input/output

K

k kilo (10^3 , 1000)

K kilo (2^{10} , 1024)

KEGG Kyoto Encyclopedia of Genes and Genomes

kg kilogram

L

l length

L liter

LAN local area network

lb pound

LC liquid chromatograph; liquid chromatography

LC/MS liquid chromatograph / mass spectrometer

LED light-emitting diode

log file A text file, with a .log file extension, that is used to store lists of information.

μ micro (10^{-6})

M

m meter

m milli (10^{-3})

M mega (10^6)

M⁺ molecular ion

MB Megabyte (1048576 bytes)

MH⁺ protonated molecular ion

min minute

mL milliliter

mm millimeter

MS mass spectrometer; mass spectrometry

MS MSⁿ power: where n = 1

MS/MS MSⁿ power: where n = 2

MSⁿ MSⁿ power: where n = 1 through 10

m/z mass-to-charge ratio

N

n nano (10^{-9})

NCBI National Center for Biotechnology Information
(USA)

NIST National Institute of Standards and Technology
(USA)

O

OD outside diameter

Ω ohm

P

p pico (10^{-12})

Pa pascal

PCB printed circuit board

PE protective earth

PID proportional / integral / differential

P/N part number

P/P peak-to-peak voltage

ppm parts per million

psig pounds per square inch, gauge

R

RAM random access memory

RF radio frequency

RMS root mean square

ROM read-only memory

RS-232 industry standard for serial communications

S

s second

SIM selected ion monitoring

SPI Serial Peripheral Interface

SRM selected reaction monitoring

T

TCP/IP transmission control protocol / Internet
protocol

TIC total ion current

Torr torr

U

u atomic mass unit

UHV ultra high vacuum

V

V volt

V ac volts alternating current

V dc volts direct current

vol volume

W

w width

W watt

Index

A

acceptance form 6-3
air
 compressed 4-4, 7-2-7-4, 7-12
 conditioning 2-7
 distributor 7-2-7-3
argon, for leak checking 4-3, 7-2-7-7, 7-10, 7-12
assistance, technical 3-8

C

cell phones 2-10
checking, leaks 7-6-7-7, 7-10, 7-12
chillers 3-4
cleaning agents 4-5
CO₂ 7-13
compressed air 4-4, 7-5-7-7, 7-10, 7-13
compressors 3-3-3-4, 4-4
computer
 connection to IRMS 2-6
 table 2-4
ConFlo IV 7-5
consumables 6-2
conversion transformer 3-9
crane 2-2

D

damages
 to electronic components 2-9
 to equipment 5-1
Delta-to-Y conversion transformer 3-9
Dewar vessel 4-5
Dual Inlet system 7-11
dust 2-8

E

electromagnetic fields 2-9
electronic components 2-8-2-9
electrostatic discharge 2-9
Elemental Analyzer 7-5
entrance width 2-2
Equilibration Unit 7-4
equipment
 line regulation 3-5
 suppliers 3-6

ESD

 damage 2-10
 precautions 2-10
exhaust
 line 7-5-7-6, 7-8
 pumps 2-8

F

failures, repair 1-1
fiber optics data cable 2-6
fields, electromagnetic 2-9
floor
 condition 2-6
 covering 2-10
 space 2-4
 vibration 2-6
forklift 2-2
fuse 3-2

G

gas
 detector 7-5-7-6, 7-8
 exhaust 2-8
 samples 4-2
 vials 4-2
GasBench II 7-9
GC IsoLink 7-14
GC/C 7-3
GC/Combustion interface 7-2
GC/GP interface 7-2
GC/TC 7-7
grounding 3-4

H

heat dissipation 2-6-2-7
heat output 3-2
High Temperature Conversion Interface 7-7
humidity 2-8

I

installation
 buck/boost transformer 3-7
 scope 6-2

Index: K

Installation Request Form 5-1, 6-1
instrument
 failures 1-1
 heat dissipation 2-7
 installation requirements 4-2
 location 3-4
 moving 2-2
 pneumatic valves 4-4
 power line 3-4
 repair 1-1
 setup 4-2
international standards 4-3

K

key operator 6-3–6-4
Kiel Carbonate IV Device 7-11

L

laboratory
 chairs 2-10
 coats 2-9–2-10
 floor 2-6
 gas detector 7-5–7-6, 7-8
 telephone 2-10
 temperature 2-7
 voltage quality 3-4
LC IsoLink 7-13
leak checking 4-3, 7-6–7-7, 7-10, 7-12
lifting truck 2-2
lighting 2-8
line
 monitors 3-6
 voltage 3-5
liquid nitrogen 7-2

M

magnet
 box 2-2
 moving 2-2
 weight 2-6
maintenance
 principles 2-7
 techniques 6-5
manuals 6-2, 6-5
marketing specifications 6-2
minimum width, for instrument transport 2-2
mobile phones 2-10
moving, the system 5-1

N

needle valve 7-13
nitrogen, liquid 4-5
Notes
 certification of power conditioning devices 3-7
 do not connect additional devices to instrument 3-3
 freight insurance 5-1
 nominal voltage in Y configuration 3-9

O

outlet pressure 7-2–7-7, 7-10–7-11
outlets
 grounding 3-4
 location 3-4

P

P/N 0171911 7-2
P/N 0254650 4-2
P/N 0261850 4-4
P/N 1003560 4-2
P/N 1003840 4-2
P/N 1087600 7-13
P/N 1149090 6-5
P/N 1244640 7-11
P/N 1244650 3-4
packing materials 2-9–2-10
peripherals, support table 2-4, 7-3, 7-5–7-7, 7-9
power
 cables 2-9, 3-2
 conditioners 3-5, 3-7
 conditioning devices 3-7
 conditioning equipment 3-8
 consumption 3-2, 7-2–7-7, 7-11
 disturbances 3-5
 line 3-2, 3-4
 monitoring 3-6, 3-8
 requirements 2-7, 7-2–7-7, 7-9, 7-11
 sags and surges 3-5
 slow average 3-5
 transients 3-5
 uninterruptible supply 3-7
PreCon interface 7-2
preventive maintenance 6-5
pumps
 exhaust port 2-8

R

radio transmitters 2-9
receptacle 3-3–3-4
recirculating chillers 3-3

renting, line monitors 3-6
 replacing, consumables 6-2
 requirements
 compressed air 4-4
 resources 7-2–7-7, 7-9, 7-11
 space 7-2, 7-9, 7-11
 test gas 4-3
 resources requirements 7-2–7-7, 7-9, 7-11

S

solvents 4-1
 space
 requirements 7-2, 7-9, 7-11
 static electricity 2-9
 storing, instrument and installation equipment 6-2
 Styrofoam cups 2-9–2-10
 suppliers, equipment 3-6

T

table, for supporting peripherals 7-7, 7-9
 TC/EA (Temperature Conversion Elemental Analyzer) 7-6
 technical assistance 3-8
 telephone 2-10
 temperature 2-7
 Temperature Conversion Elemental Analyzer 7-6
 training courses 6-4
 transformers
 buck/boost 3-7
 delta-to-Y conversion 3-9
 installation 6-2
 isolation/noise suppression 3-7
 transportation risk 5-2

U

uninterruptible power supply 3-7
 unpacking, the system 6-2
 UPS 3-7
 user's responsibilities 1-1, 2-1, 3-1, 3-8, 4-1, 6-5
 using, your new instrument 6-3

V

valves 4-4
 vials 4-2
 vibration 2-6
 voltage
 conditioning devices 3-7
 disturbances 3-5–3-6
 nominal 3-2, 3-7
 quality 3-4

W

wall
 outlets 3-2, 3-4
 water 4-5
 chillers 3-4
 trap 7-4
 weight
 instrument 2-6
 magnet 2-6
 peripheral options 7-6
 wheels 2-2, 2-6

Y

Y configuration 3-9

Thermo Fisher Scientific Inc.

81 Wyman Street

P.O. Box 9046

Waltham, Massachusetts 02454-9046

United States

www.thermo.com