

Customer Training 2012

**Isotope Ratio
Mass Spectrometers IRMS**

Training Courses 2012

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1. General Information

Thermo Fisher Scientific offers a number of training courses throughout the year for advanced mass spectrometry product systems, peripherals and software. The courses are designed to suit the requirements of beginners and advanced operators. In order to get the most from your system, we would like to encourage you to take advantage of getting in-depth knowledge of the instrument and technology from our highly experienced application specialists. Certificates are provided upon completion of the training.

Scheduled training courses take place at our Application Laboratory at

Thermo Fisher Scientific (Bremen) GmbH
Hanna-Kunath-Str. 11
28199 Bremen
Germany

Each course requires a minimum of three participants, but each group will not exceed a maximum of six participants. The training course language will be English unless specified otherwise.

For **training fees** please contact your local Thermo Fisher Scientific sales representative. The training fees include catering during training session (two coffee breaks and lunch). The training fees do not include individual travel costs, hotel accommodation or per diem expenses. However, we offer to arrange your hotel accommodation in Bremen. Preferably, we book our training guests into the Holiday Inn Express Bremen Airport, which is conveniently located next to our facilities, in walking distance of the airport (6 minutes) and 15 minutes by tram from the main railway station. Our preferred rate of 77 € includes breakfast and internet access.

Registration deadline is six weeks prior to scheduled dates. For registration please use our registration form. You can also register online at <http://training.thermo-bremen.com>

In case of **cancellation** we strongly recommend to nominate a substitute if possible. Cancellation prior to registration deadline is possible. Cancellations two weeks prior to scheduled courses are subject to a 50 % cancellation fee. Cancellations a week prior to scheduled courses are subject to a 90 % cancellation fee.

Training courses may be rescheduled or cancelled due to a lack of participants or other reasons. Already registered attendees will be informed as soon as possible.

On-site training Thermo Fisher Scientific can also conduct the training courses at your facilities. The on-site training courses will be customized according to your instrument(s), software and application requirement(s). Your own instrument(s) will be used to train operation and maintenance procedures.

Training upon request: Training courses with a very special content will be held upon request only.

2. Visa Formalities

In case you need a visa for Germany, please fill in the form below to enable Thermo Fisher Scientific (Bremen) GmbH to issue the visa invitation letter. Please mail the form to training.bremen@thermo.com or fax to No. +49 421 54 93 396.

Please allow 2-3 weeks for processing and mailing of the invitation letter.

Last name (surname)	
First name(s) (given name(s)):	
Title:	
Gender (male / female)	
Date of birth DD - month (in letters) - YYYY	
Number of passport:	
Dates of planned entry into and exit from Germany	
Correct and complete name and address of customer's company or institute, including telephone and fax numbers (no postbox):	
Expenses for travel, lodging, health insurance and per diem will be borne by:	
Correct and complete address of the embassy where to apply for visa, including telephone and fax numbers:	
Correct and complete address (no postbox) of where the originals of the invitation letters shall be sent by courier, including contact person, telephone and fax numbers:	

2. IRMS Training Arrangements

These Isotope Ratio Mass Spectrometer operator training courses are designed for customers who have purchased the Thermo Scientific DELTA series and MAT 252/253 mass spectrometers with various interfaces and sample preparation units. The **instruments used for training** will be DELTA V. The **software** used for training will be Isodat 3.0.

The **general objective** of these training courses is to familiarize with the instrument features, vacuum system, ion source setting, basic instrument operations, instrument check and maintenance basics, software and trouble shooting.

The training is arranged in **5-day** and **3-day** courses. **5-day** courses are covering the general aspects of isotope ratio mass spectrometry and the basic MS system (MAT 253 or DELTA V) on the first day. Two peripherals in the chronology given by the course name will then be covered on the following days. The **5-day** course is for IRMS users who need to gain a thorough understanding of two different preparation devices and their interfaces. Each technique is trained on two of the following days in the chronology given by the course name. E.g. GC-EA: GC interface and preparation unit on the 2nd and 3rd day of the course, ConFlo and EA on the 4th and 5th day of the training.

Users can also attend on the first three days (see **3-day** course below) of a scheduled 5-day course if the training shall be on the on aspects of isotope ratio mass spectrometry plus one peripheral only - or a combination of two consecutive weeks (see **5+3-day** course).

The **3-day** course covers the general aspects of mass spectrometry and the basic MS system covered on the 1st day and the preparation device and its interface on the 2nd and 3rd day. The preparation device for the 2nd and 3rd day is indicated by the course name, e.g. GC-EA discusses GC on the 2nd and 3rd day. If you are interested in a 3-day course but your desired date only offers your peripheral on the 4th and 5th day please ask. In most cases we can re-arrange the sequence of peripherals according to your needs.

It is also possible to attend any consecutive training days, e.g. **5+3** course staying over the weekend. Our training schedule is arranged in two weeks of 5-day courses which allow covering more than two peripherals when staying over the weekend. For example, the following course schedule below allows getting training for EA, GB and GC, respectively, taking a 5+3 day course. It also allows taking a 2+5 day training GB, GC and EA. Contact your sales representative of the local Thermo Fisher Scientific office for price details.

Week 1	Mon	Tue	Wed	Thu	Fri
	Basics	EA	EA	GB	GB
Week 2	Mon	Tue	Wed	Thu	Fri
	Basics	GC	GC	EA	EA

Please select your course carefully according to the interfaces and sample preparation units that suit your needs best. Ask us for re-arrangements to serve your needs. We will try to meet your requirements. Thank you.

Participants' profile: General understanding of mass spectrometry (MS), English language, 3 – 6 months experience with the instrument.

Interfaces, Sample Preparation Units and Software	Training Courses 2012
GC - EA: GC IsoLink, ConFlo III/IV and Elemental Analyzer and TC/EA Peripherals	06. - 10. February 2012
GB - EA: GasBench II, ConFlo III/IV and Elemental Analyzer and TC/EA Peripherals	13. – 17. February 2012
EA: Elemental Analyzer, TC/EA Peripherals	14. – 16. March 2012
GC - GB: GC IsoLink, ConFlo III/IV and GasBench II	21. - 25. May 2012
GC - EA: GC IsoLink, ConFlo III/IV and Elemental Analyzer and TC/EA Peripherals	21. - 25. May 2012
LC: LC IsoLink and LC Peripherals	17. – 19. September 2012
Dual Inlet and Peripherals (H-Device, Kiel Carbonate Device, Microvolume) <i>3-day operator training</i>	10. – 12. October 2012
GC - EA: GC IsoLink, ConFlo III/IV and Elemental Analyzer and TC/EA Peripherals	15. – 19. October 2012
GB – EA: GasBench II and Elemental Analyzer and TC/EA Peripherals	15. – 19. October 2012
Isodat 3.0 Basic Training <i>2-day training</i>	Upon request
Isodat 3.0 – Advanced Training, Hardware programming <i>3-day training</i>	Upon request

To check the currently available training dates, please visit

<http://training.thermo-bremen.com>

Please also contact your local sales representative for upcoming Isodat trainings, workshop dates, or on-site training. Thank you!

Training Sessions

Monday - Thursday	9:00 – 16:30 h
Friday	9:00 – 15:00 h

2.1 IRMS (GC - EA) Operator Training Course Outline

covering: GC IsoLink and GC Peripherals, Elemental Analyzer, ConFlo III/IV and TC/EA Peripherals - 5-day operator training

The **general objective** of this **5-day** operator training course is to familiarize the operator with DELTA V Plus and DELTA V Advantage instrument features, vacuum system, ion source setting and cleaning, basic instrument operations, instrument check and maintenance basics, software and troubleshooting. It intends to give you the best understanding for the interfaces and sample preparation units GC IsoLink, ConFlo, EA, Elemental Analyzer for N, C, S isotope ratio determination, and TC/EA or Flash 2000 HT for H, O isotope ratio determination.

Participants' profile: General understanding of mass spectrometry (MS), English language, 3 – 6 months experience with the instrument.

Monday

Introduction

Basic Theory

- Ion source operation
- Analyzer and electromagnet
- Ion detection & amplifier

Vacuum System

- General introduction

Maintenance

- Ion source mounting, demounting and cleaning
- Pump maintenance
- Spare parts

Application Software

- Instrument control module
- Mass calibration
- System and signal stability
- File structure and data flow
- Result workshop
- Data import and export

Tuesday/Wednesday

GC Interface and Peripherals

GC Peripheral

- Requirements for IRMS
- Injection methods
- GC columns
- Optimizing of GC pathways
- GC data evaluation
- Autosampler methods

2.1 IRMS (GC - EA) Operator Training Course Outline - continued

covering: GC IsoLink and GC Peripherals, Elemental Analyzer, ConFlo III/IV and TC/EA Peripherals- 5-day operator training

GC Interface and Peripherals - continued

GC IsoLink

- General introduction
- Gas flow modes
- Interface components
- Tests after GC IsoLink maintenance

GC Combustion (GC/C)

- Reactors and conditioning
- C, N sample handling
- Isotope ratio determination and analytical approaches

GC High Temperature Conversion (GC/TC)

- Reactors and conditioning
- H, O sample handling
- Isotope ratio determination and analytical approaches

Maintenance

Thursday/Friday

ConFlo Interface and EA Peripherals

ConFlo

- General introduction
- Interface components

Elemental Analyzer TC/EA

- Reactor packing and maintenance
- H, O sample preparation and handling
- Measurement strategies
- Software setup (Methods, Sequences)

Elemental Analyzer EA (Flash EA 1112, Flash EA HT)

- Reactor packing
- N, C, S sample preparation and handling
- Measurement strategies
- Software setup (Methods, Sequences, EAGER 300)

Data Processing, Corrections, Calibration, Referencing

2.2 IRMS (GB - EA) Operator Training Course Outline

covering: GasBench II, ConFlo III/IV, Elemental Analyzer and TC/EA
Peripherals- *5-day operator training*

The **general objective** of this **5-day** operator training is to familiarize the operator with the DELTA V Plus and DELTA V Advantage instrument features, vacuum system, ion source setting, basic instrument operations, instrument check and maintenance basics, software and troubleshooting. It intends to give you the best understanding for the interfaces and sample preparation units GasBench II and ConFlo , Elemental Analyzer EA for N, C, S isotope ratio determination, TC/EA for H, O isotope ratio determination.

Participants' profile: General understanding of mass spectrometry (MS), English language, 3 – 6 months experience with the instrument.

Monday

Introduction

Basic Theory

- Ion source operation
- Analyzer and electromagnet
- Ion detection & amplifier

Vacuum System

- General introduction

Maintenance

- Ion source mounting, demounting and cleaning
- Pump maintenance
- Spare parts

Application Software

- Instrument control module
- Mass calibration
- System and signal stability
- File structure and data flow
- Result workshop
- Data import and export

2.2 IRMS (GB - EA) Operator Training Course Outline - continued

covering: GasBench II, ConFlo III/IV, Elemental Analyzer and TC/EA Peripherals- 5-day operator training

Tuesday/Wednesday

GasBench II

Basic Operations

- VALCO 8 port valve and switching sequence
- Nafion water traps
- Tray and GC column temperature setting
- Open split and reference inlet
- Carbonate option
- Autosampler operation
- Isotope ratio determination

Applications

- CO₂ in air
- Breath tests
- Water equilibration for ¹⁸O and HD
- Carbonates
- Dissolved inorganic carbon
- Atmospheric gases

Thursday/Friday

ConFlo Interface and EA Peripherals

ConFlo

- General introduction
- Interface components

Elemental Analyzer TC/EA

- Reactor packing and maintenance
- H, O sample preparation and handling
- Measurement strategies
- Software setup (Methods, Sequences)

Elemental Analyzer EA (Flash EA 1112, Flash EA HT)

- Reactor packing
- N, C, S sample preparation and handling
- Measurement strategies
- Software setup (Methods, Sequences, EAGER 300)

Data Processing, Corrections, Calibration, Referencing

2.3 IRMS (EA) Operator Training Course Outline

covering: Elemental Analyzer, ConFlo III/IV and TC/EA Peripherals-
3-day operator training

The **general objective** of this **3-day** operator training course is to familiarize the operator with DELTA V Plus and DELTA V Advantage instrument features, vacuum system, ion source setting, basic instrument operations, instrument check and maintenance basics, software and troubleshooting. It intends to give you the best understanding for the interfaces and sample preparation units ConFlo, EA Elemental Analyzer for N, C, S isotope ratio determination, and TC/EA for H, O isotope ratio determination.

Participants' profile: General understanding of mass spectrometry (MS), English language, 3 – 6 months experience with the instrument.

Monday

Introduction

Basic Theory

- Ion source operation
- Analyzer and electromagnet
- Ion detection & amplifier

Vacuum System

- General introduction

Maintenance

- Ion source mounting, demounting and cleaning
- Pump maintenance
- Spare parts

Application Software

- Instrument control module
- Mass calibration
- System and signal stability
- File structure and data flow
- Result workshop
- Data import and export

Tuesday/Wednesday

ConFlo Interface and EA Peripherals

ConFlo

- General introduction
- Interface components

Elemental Analyzer TC/EA

- Reactor packing and maintenance
- H, O sample preparation and handling
- Measurement strategies
- Software setup (Methods, Sequences)

2.4 IRMS (GC - GB) Operator Training Course Outline

covering: GC IsoLink and GC Peripherals, and GasBench II-
5-day operator training

The **general objective** of this **5-day** operator training course is to familiarize the operator with DELTA V Plus and DELTA V Advantage instrument features, vacuum system, ion source setting and cleaning, basic instrument operations, instrument check and maintenance basics, software and troubleshooting. It intends to give you the best understanding for the interfaces and sample preparation units GC IsoLink, ConFlo, EA, Elemental Analyzer for N, C, S isotope ratio determination, and TC/EA or Flash 2000 HT for H, O isotope ratio determination.

Participants' profile: General understanding of mass spectrometry (MS), English language, 3 – 6 months experience with the instrument.

Monday

Introduction

Basic Theory

- Ion source operation
- Analyzer and electromagnet
- Ion detection & amplifier

Vacuum System

- General introduction

Maintenance

- Ion source mounting, demounting and cleaning
- Pump maintenance
- Spare parts

Application Software

- Instrument control module
- Mass calibration
- System and signal stability
- File structure and data flow
- Result workshop
- Data import and export

Tuesday/Wednesday

GC Interface and Peripherals

GC Peripheral

- Requirements for IRMS
- Injection methods
- GC columns
- Optimizing of GC pathways
- GC data evaluation
- Autosampler methods

2.4 IRMS (GC-GB) Operator Training Course Outline - continued

covering: GC IsoLink and GC Peripherals, and GasBench II-
5-day operator training

Thursday/Friday

GasBench II

Basic Operations

- VALCO 8 port valve and switching sequence
- Nafion water traps
- Tray and GC column temperature setting
- Open split and reference inlet
- Carbonate option
- Autosampler operation
- Isotope ratio determination

Applications

- CO₂ in air
- Breath tests
- Water equilibration for ¹⁸O and HD
- Carbonates
- Dissolved inorganic carbon
- Atmospheric gases

2.5 IRMS (LC) Operator Training Course Outline

covering: LC IsoLink and Peripherals- *3-day operator training*

The **general objective** of this operator training course is to familiarize the operator with DELTA V Plus and DELTA V Advantage instrument features, vacuum system, ion source setting, basic instrument operations, instrument check and maintenance basics, software and troubleshooting. It intends to give you the best understanding for the interfaces and sample preparation units LC IsoLink.

Participants' profile: General understanding of mass spectrometry (MS), English language, 3 – 6 months experience with the instrument.

Monday

Introduction

Basic Theory

- Ion source operation
- Analyzer and electromagnet
- Ion detection & amplifier

Vacuum System

- General introduction

Maintenance

- Ion source mounting, demounting and cleaning
- Pump maintenance
- Spare parts

Application Software

- Instrument control module
- Mass calibration
- System and signal stability
- File structure and data flow
- Result workshop
- Data import and export

Tuesday/Wednesday

LC IsoLink Interface

Basic Operations

- Principle of the new irm-LC/MS strategy
- Setup of the LC IsoLink
- Components of the LC IsoLink
- How to control the LC IsoLink and HPLC system with ISODAT
- Operating modes:
 - Bulk injection mode (μ -EA mode)
 - HPLC mode (CSIA mode)

2.5 IRMS (LC) Operator Training Course Outline - continued

covering: LC IsoLink and LC Peripherals- *3-day operator training*

Tuesday/Wednesday

Application

- Getting started
- Liquid flow area of the interface
- Gas isotope area of the interface
- Requirements on the HPLC systems
- How to start with a new application
- Method Development
- Application examples
- Maintenance of the components
- Surveyor MS Pump and P1000 Pump
- Surveyor Autosampler

Data Processing, Corrections, Calibration, Referencing

2.6 IRMS (Dual Inlet) Operator Training Course Outline

covering: Dual Inlet and Peripherals - *3-day operator training*

The **general objective** of this operator training course is to familiarize the operator with the DELTA V Plus and DELTA V Advantage instrument features, vacuum system, ion source setting, basic instrument operations, instrument check and maintenance basics, software and trouble shooting. It intends to give you the best understanding for Dual Inlet operation with peripherals including Multiport and Microvolume (H/Device, Kiel IV Carbonate Device, HDO II optional).

Participants' profile: General understanding of mass spectrometry (MS), English language, 3 – 6 months experience with the instrument.

Monday

Introduction

Basic Theory

- Ion source operation
- Analyzer and electro magnet
- Ion detection and Amplifier

Vacuum System

- General introduction

Maintenance

- Ion source mounting, demounting and cleaning
- Pump maintenance
- Spare parts

Application Software

- Instrument control module
- Mass calibration
- System and signal stability
- File structure and data flow
- Result workshop
- Data import and export

2.6 IRMS (Dual Inlet) Operator Training Course Outline - continued

covering: Dual Inlet and Peripherals - *3-day operator training*

Tuesday/Wednesday

Dual Inlet and Peripherals

Dual Inlet

- Principle of operation, bellows and valves
- Pressure adjust
- Sample CO₂ acquisition
- Dual inlet system
- Isotope ratio determination (normalization & standardisation)
- Process control and evaluation
- Maintenance
- Microvolume
- Multiport
- H/Device (upon request)
- Kiel IV Carbonate Device (upon request)

Data Processing, Corrections, Calibration, Referencing

2.7 Isodat 3.0 Software Training Course Outline

- **Session 1: System Setup**
 - ISODAT File Structure
 - Version Handler
 - Installation of ISODAT
 - Configurator:
 - Creating Configurations
 - Setup of Devices
 - Instrument Control
 - Mass Scale Calibration
 - Scan Functions
 - Standard and Gas Configuration
 - Diagnosis
 - Mass Spectrometer Tests
- **Session 2: Data Acquisition Strategy**
 - Application Programs: Acquisition, Workspace
 - Method Development: Acquisition, GC and Autosampler Methods
 - Jump Calibration
 - H₂ Calibration
 - H₃⁺ Factor Determination
- **Session 3: Data Handling**
 - Data Processing
 - File Browser and File Search
 - Data Reprocess
 - Export of Results and Chromatograms
- **Session 4: Advanced Features**
 - Ratio Editor
 - Reference Editor
 - Device Editor
 - Panel Designer
 - Result Workshop: Printout of Data

2.8 Registration Form

Isotope Ratio Mass Spectrometer Operator Training

Please mail this form to training.bremen@thermo.com
fax it to our office at ++49 (421) 54 93 396. Thank you.

<p>Participant</p> <p>Last name: _____</p> <p>First name: _____</p> <p>Title: _____</p> <p>Company/Institute: _____</p> <p>Address (street): _____</p> <p>Postal code: _____</p> <p>City / State: _____</p> <p>Country: _____</p> <p>Phone: _____</p> <p>Fax: _____</p> <p>E-Mail: _____</p>	<p>Training Course</p> <p>Course Name: _____</p> <p>Date: _____</p> <p>Accommodation</p> <p>Hotel reservation Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Smoking <input type="checkbox"/> Non-smoking <input type="checkbox"/></p> <p>At Holiday Inn Express Bremen Airport <input type="checkbox"/> (77 € including breakfast and internet access)</p> <p>Other <input type="checkbox"/> (please specify price range / location)</p> <p>Date of Arrival: _____</p> <p>Date of Departure: _____</p>
<p>Instrument type(s)</p> <p>_____</p> <p>Service number (if known): _____</p> <p>S/N _____</p> <p>We use the following software</p> <p>_____</p> <p>Our main application is</p> <p>_____</p>	<p>Peripherals I / We want to be trained in</p> <p><input type="checkbox"/> ConFlo III/IV Interface and EA Peripherals EA Model: _____</p> <p><input type="checkbox"/> GC IsoLink and corresponding devices</p> <p><input type="checkbox"/> GasBench II</p> <p><input type="checkbox"/> PreCon (part of GasBench or GC training)</p> <p><input type="checkbox"/> LC IsoLink and corresponding devices</p> <p><input type="checkbox"/> Dual Inlet and Peripherals (please specify)</p> <p style="margin-left: 20px;"><input type="checkbox"/> Microvolume,</p> <p style="margin-left: 20px;"><input type="checkbox"/> Multiport,</p> <p style="margin-left: 20px;"><input type="checkbox"/> H/Device</p> <p style="margin-left: 20px;"><input type="checkbox"/> Kiel Carbonate Device</p> <p>Model: _____</p>

Date _____

Signature _____

3. Customer Operator Trainings Overview

To check the currently available training dates, please visit
<http://training.thermo-bremen.com>

Instruments	Training Course
<p>Isotope Ratio Mass Spectrometers</p> <p>DELTA Series</p> <p>MAT 253 / MAT 252</p>	<p>GC-EA: GC IsoLink, ConFlo III/IV and Elemental Analyzer and TC/EA Peripherals <i>5-day course</i></p> <p>GB-EA: GasBench II, ConFlo III/IV and Elemental Analyzer and TC/EA Peripherals <i>5-day course</i></p> <p>EA: Elemental Analyzer and TC/EA Peripherals <i>3-day course</i></p> <p>GC-GB: GC IsoLink, ConFlo III/IV and GasBench II <i>5-day course</i></p> <p>GC-EA: Elemental Analyzer and TC/EA Peripherals and GC IsoLink, ConFlo III/IV <i>5-day course</i></p> <p>LC: LC IsoLink and Peripherals <i>3-day course</i></p> <p>Dual Inlet: Dual Inlet and Peripherals <i>3-day course</i></p> <p>GB-GC: GasBench II and GC IsoLink, ConFlo III/IV <i>5-day course</i></p> <p>GC-EA: GC IsoLink, ConFlo III/IV and Elemental Analyzer and TC/EA Peripherals <i>5-day course</i></p> <p>Isodat Workshop Basic Software Training Advanced Software Training, Hardware programming</p>

3. Customer Operator Trainings Overview - continued

To check the currently available training dates, please visit

<http://training.thermo-bremen.com>

Instruments	Training Course
ICP-MS / GD-MS XSERIES 2	XSERIES 2 Operator Training <i>3,5-day course</i>
ELEMENT ELEMENT 2 ELEMENT XR	ELEMENT2 / ELEMENT XR Operator Training <i>5-day course</i> ELEMENT2 / ELEMENT XR German Language Operator Training <i>5-day course</i>
ELEMENT GD	ELEMENT GD Operator Training <i>5-day course</i>
Thermal Ionization Mass Spectrometer TRITON / TRITON Plus	TRITON and TRITON <i>Plus</i> Basic Operator Training <i>5-day course</i> Instrument Maintenance Training <i>2-day course</i>
Multicollector ICP-MS NEPTUNE / NEPTUNE Plus	NEPTUNE and NEPTUNE <i>Plus</i> Basic Operator Training <i>5-day course</i> Instrument Maintenance Training <i>2-day course</i>
DFS	DFS Instrument Operator Training for Quantitative Applications <i>5-day course</i> DFS Instrument Operator Training for Qualitative Applications and Characterization <i>5-day course</i> DFS Dual Data Operator Training <i>3-day course</i>
Exactive Q Exactive Orbitrap Elite Orbitrap Velos Pro LTQ Orbitrap Velos LTQ Orbitrap XL LTQ Orbitrap Discovery LTQ FT	These trainings will be organized by the European Training Institute ETI. For more information please contact: euro.training.hemel@thermofisher.com or catherine.lemardele@thermofisher.com Individual training available upon request.