

# Orbitrap Exploris Series

## Mass Spectrometers

### Preinstallation Requirements Guide

BRE0015334 Revision H • October 2025

**Orbitrap Exploris Series installation request form**

Refer to the *Orbitrap Exploris Series Preinstallation Requirements Guide* (P/N BRE0015334) for the complete site requirements. On this form, circle either Yes or No for each question to indicate if the site meets the requirements as specified in this guide. Provide the additional information where requested. After Thermo Fisher Scientific receives this checklist, your local Field Service Representative will contact you to schedule the installation.

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?
2. **Yes No** Your 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 key operator will be available during the installation period. 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?  
Please provide the names of these individuals:  
\_\_\_\_\_
4. **Yes No** The entrance to the laboratory and the route from the loading dock are at least 88 cm (34 <sup>5</sup>/<sub>8</sub> in.) wide with additional space at corners?
5. **Yes No** Sufficient bench space is available for all of the equipment? List the following:  
Width: \_\_\_\_\_, Depth: \_\_\_\_\_, Height: \_\_\_\_\_  
Width: \_\_\_\_\_, Depth: \_\_\_\_\_, Height: \_\_\_\_\_
6. **Yes No** Workbench can support the load of the system including optional equipment and is free from vibration?
7. **Yes No** Lighting is adequate?
8. **Yes No** Floor vibrations and electromagnetic interferences are below the specified levels?
9. **Yes No** Main power is installed and in compliance with local electrical codes?
10. **Yes No** Additional power outlets are available for the forepump and three peripherals?
11. **Yes No** The power outlets are of the correct configuration? Please note the type of country cable kit required: \_\_\_\_\_  
If you have ordered the optional Ardia Platform, also note the type of country cable kit required for it: \_\_\_\_\_
12. **Yes No** The electrical power for the mass spectrometer has been measured?  
Please note voltage: \_\_\_\_\_ Vac input to ground.  
Please note voltage: \_\_\_\_\_ Vac neutral to ground.  
Please note voltage: \_\_\_\_\_ Vac input to neutral.
13. **Yes No** Power is free of voltage surges, sags, or transients?
14. **Yes No** Air conditioning is adequate for temperature, humidity, and particulate matter control? The laboratory can be maintained at a constant temperature, between 18 and 27 °C (64 and 81 °F)?
15. **Yes No** The relative humidity is between 20% and 80%, with no condensation?
16. **Yes No** The system work area is free from magnetic disruption and electrostatic discharge?

---

17. **Yes No** All gases required are on site, gas lines are installed, and appropriate gas regulators are available?  
List gases and purity:  
\_\_\_\_\_

---

18. **Yes No** Is there is a suitable exhaust system present that is separate from solvent waste? You must provide one exhaust system for the API source and a second exhaust system for the forepump(s).

---

19. **Yes No** Provision has been made for collecting solvent waste from the API source?

---

20. **Yes No** There is a functional telephone close to the system?

Phone number: \_\_\_\_\_

---

21. **Yes No** Provide the dedicated PC name for the control PC according to the local IT requirements: \_\_\_\_\_

---

22. **Yes No** All relevant local safety regulations have been met and the equipment installed will not affect compliance?

---

23. **Yes No** All required chemicals and equipment for installing the system are on site?

---

24. **Yes No** Have any special acceptance specifications been agreed within the contract? If **YES**, please attach full details of specification.

---

25. **Yes No** Is there any additional equipment that needs to be interfaced for the system? If **YES**, please 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 Orbitrap Exploris Series 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.

Signed: \_\_\_\_\_

Print name: \_\_\_\_\_

Company name: \_\_\_\_\_

Email: \_\_\_\_\_

Date: \_\_\_\_\_

Phone: \_\_\_\_\_

**Send to:** Local Thermo Fisher Scientific service representative

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# Technical data of Orbitrap Exploris Series systems

The tables in this chapter summarize the most important data of the instruments. See the corresponding chapters of this manual for more details.

## Technical data of Orbitrap Exploris 480 systems

**Table 1** Technical data of Orbitrap Exploris 480 systems

Parameter	Specification	Value	
<b>Instrument Properties</b>			
Mass Spectrometer	Length × width × height	763 × 534 × 703 mm	
	Weight	120 kg	
Source Vacuum Pump <sup>a</sup>	Length × width × height	82 kg	
	Weight	411 × 127 × 191 mm	
Auxiliary Forepump <sup>b</sup>	Length × width × height	411 × 127 × 191 mm	
	Weight	17 kg	
Complete system (incl. data system)	Noise emission	Below 70 dB(A)	
	Heat generation	2650 W	
<b>Power Requirements</b>			
Mass Spectrometer	Input	Nominal voltage	208–240 V AC, 50/60 Hz, 10 A
		Power	apparent power: 800 VA; effective power: 750 W
		Fuse <sup>c</sup>	15/16 A (tripping characteristic C)
	Output	4×	208–240 V AC, 50/60 Hz, 3 A total
		Protection class	Class I
		Overvoltage category	II
Source Vacuum Pump	Input	Nominal voltage	200–240 V AC, 50/60 Hz
		Power	2.2 kW

<sup>a</sup> Leybold SOGEVAC™ SV 120 BI, or approved equivalent model. Values depend on the actually used pump model.

<sup>b</sup> Pfeiffer DUO 11, or approved equivalent model. Values depend on the actually used pump model.

<sup>c</sup> dedicated wall outlet

Parameter	Specification	Value	
Auxiliary Forepump	Input	Fuse <sup>c</sup>	15/16 A (tripping characteristic C)
		Nominal voltage	115 V or 230 V AC, 50/60 Hz, single phase
		Power	0.25 kW (50 Hz) / 0.3 kW (60 Hz)
Data System	Input	Fuse <sup>c</sup>	16 A (115 V) / 6 A (230 V), slow
		Nominal voltage	100–240 V AC, 50/60 Hz
		Fuse	15/16 A
<b>Gas Requirements</b>			
Source gas (minimum requirement)	Type	Nitrogen	
	Purity	99% or better (high purity)	
	Supply rate	max. 45 LN/min	
	Pressure	0.6 ± 0.05 MPa	
HCD gas (mandatory)	Type	Nitrogen	
	Purity	99.999% or better (ultra high purity)	
	Supply rate <sup>d</sup>	max. 0.03 LN/min	
	Pressure	0.6 ± 0.05 MPa	
<b>Operating Environment</b>			
	Laboratory temperature	18–27 °C	
	Max. temperature fluctuation	0.5 °C/10 min	
	Humidity	20–80%, non-condensing and non-corrosive atmosphere	
	Pollution degree	2	
	Max. altitude	3000 m above sea level	
Pump exhaust requirements	Inrush flow rate	10 L/min	
	Continuous flow rate	7 L/min	
Ion source exhaust requirements	Maximum flow rate	45 L/min	

**TIP**

The unit *NL* refers to liters at normal conditions, measured at a temperature of 0 °C and a pressure of 1013.25 hPa(a). These reference conditions are indicated by the added letter “N” in the unit of volume used.

<sup>d</sup> When the internal calibration source is switched off, the maximum consumption of UHP nitrogen is 0.04 LN/min.

## Technical data of Orbitrap Exploris 120, Orbitrap Exploris 240, Orbitrap Exploris MX, and Orbitrap Exploris EFOX systems

**Table 2** Technical data of Orbitrap Exploris 120, Orbitrap Exploris 240, Orbitrap Exploris MX, and Orbitrap Exploris EFOX systems

Parameter	Specification	Value	
<b>Instrument Properties</b>			
Mass Spectrometer	Length × width × height	763 × 534 × 703 mm	
	Weight	120 kg	
Source Vacuum Pump <sup>e</sup>	Length × width × height	530 × 330 × 360 mm	
	Weight	60 kg	
Complete system (incl. data system)	Noise emission	Below 70 dB(A)	
	Heat generation	2350 W	
<b>Power Requirements</b>			
Mass Spectrometer	Input	Nominal voltage	208–240 V AC, 50/60 Hz, 10 A
		Power	apparent power: 800 VA; effective power: 750 W
		Fuse <sup>f</sup>	15/16 A (tripping characteristic C)
	Output	4×	208–240 V AC, 50/60 Hz, 3 A total
		Protection class	Class I
		Overvoltage category	II
Source Vacuum Pump	Input	Nominal voltage	200–240 V AC, 50/60 Hz
		Power	1.5 kW
		Fuse <sup>f</sup>	15/16 A (tripping characteristic C)
Data System	Input	Nominal voltage	100–240 V AC, 50/60 Hz
		Fuse	15/16 A
<b>Gas Requirements</b>			
Source gas (minimum requirement)	Type	Nitrogen	
	Purity	99% or better (high purity)	
	Supply rate	max. 45 NL/min	
	Pressure	0.6 ± 0.05 MPa	
HCD gas (mandatory)	Type	Nitrogen	
	Purity	99.999% or better (ultra high purity)	

<sup>e</sup> Leybold SOGEVAC™ SV 65 BI, or approved equivalent model. Values depend on the actually used pump model.

<sup>f</sup> dedicated wall outlet

Parameter	Specification	Value
	Supply rate <sup>9</sup>	max. 0.03 LN/min
	Pressure	0.6 ± 0.05 MPa
<b>Operating Environment</b>		
	Laboratory temperature	18–27 °C
	Max. temperature fluctuation	0.5 °C/10 min
	Humidity	20–80%, non-condensing and non-corrosive atmosphere
	Pollution degree	2
	Max. altitude	3000 m above sea level
Pump exhaust requirements	Inrush flow rate	10 L/min
	Continuous flow rate	7 L/min
Ion source exhaust requirements	Maximum flow rate	45 L/min

**TIP**

The unit *NL* refers to liters at normal conditions, measured at a temperature of 0 °C and a pressure of 1013.25 hPa(a). These reference conditions are indicated by the added letter “N” in the unit of volume used.

<sup>9</sup> When the internal calibration source is switched off, the maximum consumption of UHP nitrogen is 0.04 LN/min.

## About this manual

### IMPORTANT

Export classification: not listed / Exportklassifizierung: nicht ausfuhrgenehmigungspflichtig

Orbitrap Exploris™ Series systems are members of the Thermo Scientific™ family of mass spectrometers (MS) that are powered by Orbitrap™ technology.

The Orbitrap Exploris Series comprises these instruments:

- Orbitrap Exploris 120 MS
- Orbitrap Exploris 240 MS
- Orbitrap Exploris 480 MS
- Orbitrap Exploris MX MS
- Orbitrap Exploris EFOX MS

### Contents

- [Special notices and safety symbols](#)
- [Typographical conventions](#)
- [Access documentation](#)
- [Reference documentation](#)
- [Training](#)

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

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.

This 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. For additional information, request specific pre-installation support directly through your local Thermo Fisher Scientific representative.

Thermo Scientific instruments are 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.

## Special notices and safety symbols

Make sure you understand the special notices, symbols, and caution labels in this guide. Most of the special notices and cautions appear in boxes; those pertaining to safety also have corresponding symbols.

### NOTICE

Highlights information necessary to prevent damage to software, loss of data, or invalid test results; or might contain information that is critical for optimal performance of the product.

### NOTE

Highlights information of general interest.

### TIP

Highlights helpful information that can make a task easier.



### CAUTION

Indicates a hazardous situation that can lead to minor or medium injury if it is not avoided.



### WARNING

Indicates a hazardous situation that can lead to severe injury or death if it is not avoided.



### DANGER

Indicates a hazardous situation that leads to severe injury or death if it is not avoided.

For comprehensive information about machine safety, refer to the Operating Manual for your instrument.

## Typographical conventions

Different typographical conventions have been established for Thermo Fisher Scientific manuals.

### Viewpoint orientation

The expressions *left* and *right* used in this manual always refer to the viewpoint of a person that is facing the front side of the instrument.

### Data input

Throughout this manual, the following conventions indicate data input and output with 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 **Close**.”

## Access documentation

You can access full product documentation before your scheduled instrument installation. The documentation (including release notes, installation instructions, and operation manual) is maintained on the Thermo

Fisher Scientific Chromatography and Mass Spectrometry Help Portal. This documentation portal is regularly updated with the latest content, including video tutorials. Go to [docs.thermofisher.com](https://docs.thermofisher.com).

With a Thermo Fisher Scientific account, you can use features on the documentation portal, such as bookmarking documents, saving searches, and compiling documents into collections for easy reference.

### Procedure

1. Go to [docs.thermofisher.com/p/TechDocAccess](https://docs.thermofisher.com/p/TechDocAccess) to display a registration form.
2. Fill out the form to request access as a customer. Among other data, you have to provide the serial number (S/N) of your instrument. You can find the serial number of your instrument on the name plate. Refer to the Operating Manual of your instrument for information about its location.
3. Click **Submit Form**. The form contents will be sent using your default email client. You will receive an email with additional login information.

### Result

Upon submitting the form, you will be directed to home page of the Help Portal.

## Reference documentation

Reference documentation for the Orbitrap Exploris Series mass spectrometers includes the following:

- *Orbitrap Exploris Series Operating Manual*  
This manual contains precautionary statements that can prevent personal injury and instrument damage. It also describes the modes of operation and principle hardware components of the instrument. In addition, this manual provides instructions for cleaning and maintaining the instrument.
- *Orbitrap Exploris Performance Maintenance Manual*  
This manual describes the user maintenance for the quadrupole and the bent flatapole.
- *Orbitrap Exploris 120 Software Manual* (with Orbitrap Exploris 120 system)
- *Orbitrap Exploris 240 Software Manual* (with Orbitrap Exploris 240 system)
- *Orbitrap Exploris 480 Software Manual* (with Orbitrap Exploris 480 system)

- *Orbitrap Exploris MX Software Manual* (with Orbitrap Exploris MX system)
- *Orbitrap Exploris EFOX Software Manual* (with Orbitrap Exploris EFOX system)

You can access PDF files of the documents listed above and of this manual from the data system computer. Refer also to the user documentation provided by the manufacturers of the following third-party components:

- Forepumps
- Turbomolecular pump
- Syringe pump
- Data system computer and monitor
- Safety data sheets

## Training

Thermo Fisher Scientific offers worldwide training on instruments and software. Experience has shown that maximum results can be obtained from a scientific instrument if the instrument operators receive an adequate training.

We recommend that the key users participate in a basic operator training. For information on training courses and enrollment, contact your local Thermo Fisher Scientific office.

## Site preparation

Before your instrument can be installed by the Thermo Fisher Scientific field service engineer, the site must be prepared. The hallways and doors must be wide enough to allow passage of the instrument.

### IMPORTANT

You are responsible for providing an acceptable installation site for the Orbitrap Exploris Series system before the Thermo Fisher Scientific service engineer arrives.

### Contents

- [Entrance requirements](#)
- [Space and load requirements](#)
- [Place the forepumps](#)

## Entrance requirements

This section lists data for packed units of a typical Orbitrap Exploris Series system. The instrument (basic unit) is shipped in the largest container. Other modules such as the data system, liquid chromatograph, and accessories are shipped in their own containers. Their dimensions and weight are less than that of the container for the basic unit.

The listed shipping containers may be replaced by other packings because of the legal requirements in the receiving countries, the mode of transportation, or the climatic conditions in some tropic regions. As a result, the dimensions and weights will differ from those shown in the table.

Thermo Fisher Scientific recommends that you check whether the container with the instrument fits through the laboratory entrance. Also allow additional room for moving the system around corners, into elevators, or through doorways. Please note that it is necessary to use a means of transport (a pallet jack, for example).

If the entrance to your laboratory is not wide enough for the container, you can remove the instrument from the container before you move it into the room. The unpacked instrument fits through a door with a minimum width of 55 cm (21 <sup>5</sup>/<sub>8</sub> in.). Consider that at least four persons are required to carry the instrument who require considerable space for maneuvering. Therefore, Thermo Fisher Scientific recommends that you use a pallet jack when you pass the unpacked instrument through a narrow door.

Your Orbitrap Exploris Series instrument is shipped in a container, the smallest dimension of which is 79 cm (31 <sup>1</sup>/<sub>8</sub> in.). To allow moving a packed instrument, the entrance to your facility and the width of all hallways, elevators, etc., should have a minimum width of 80 cm (31 <sup>1</sup>/<sub>2</sub> in.). Dimensions and weights of the shipping containers for Orbitrap Exploris Series MS systems are given in the table.

**Table 3** Data of packed units of a typical Orbitrap Exploris Series system

Module	Size (l × w × h)	Weight
Basic unit	119 × 79 × 89 cm (46 <sup>7</sup> / <sub>8</sub> × 31 <sup>1</sup> / <sub>8</sub> × 35 <sup>1</sup> / <sub>16</sub> in.)	174 kg (384 lb)
Auxiliary box	111 × 69 × 90 cm (43 <sup>11</sup> / <sub>16</sub> × 27 <sup>3</sup> / <sub>16</sub> × 35 <sup>7</sup> / <sub>16</sub> in.)	163 kg (360 lb)
Box on pallet	120 × 80 × 122 cm (47 <sup>1</sup> / <sub>4</sub> × 31 <sup>1</sup> / <sub>2</sub> × 48 in.)	91 kg (201 lb)

#### NOTICE

Do not remove the instrument from its shipping container unless you are authorized by Thermo Fisher Scientific personnel. Make sure that all the contents of the container remain with the instrument.

The chemicals that are needed for installation will be shipped in a separate package.

## Space and load requirements

The floor of your laboratory should be able to carry the weight of the installed Orbitrap Exploris Series instrument with the forepump(s) and the data system. Also, consider the weight of any other option (liquid chromatograph, for example) that is added to the system and the weights of the workbenches.

## Workbench for the LC/MS system

Use the other workbench to hold the mass spectrometer, the LC, and any other LC/MS options. Make sure that this workbench can support the weight of the mass spectrometer (about 120 kg) plus the weight of any option (liquid chromatograph, for example).

If you intend to place the MS separately, use a workbench with minimum dimensions of 1 × 1 m (3 × 3 ft). Thermo Fisher Scientific recommends using a workbench with a width of 1.5 m (59 in.).

### TIP

The usual placement of the LC system is to the left of the mass spectrometer. However, in the case of a Thermo Scientific EASY-nLC™ system, the optimal position of the LC system is in front of the mass spectrometer.

The workbench for the LC system must stand in a secure and level position. Note that only workbenches with four legs provide sufficient stability for the instrument. The workbench top must be dry and clean (free of grease). Thermo Fisher Scientific recommends that you use a workbench with a skidproof top.

The data in following table use the space and load requirements for a Vanquish Neo system containing a system controller, pump, autosampler, display, and column compartment.

**Table 4** Space and load requirements of Orbitrap Exploris Series LC/MS systems

Module	Height		Width		Length		Weight	
	cm	in.	cm	in.	cm	in.	kg	lb
<b>These modules are placed on a workbench.</b>								
Mass spectrometer	70	27 <sup>11</sup> / <sub>16</sub>	53	20 <sup>7</sup> / <sub>8</sub>	76	30 <sup>1</sup> / <sub>16</sub>	120	265
Liquid chromatograph	75	29 <sup>1</sup> / <sub>2</sub>	54	21 <sup>1</sup> / <sub>4</sub>	62	24 <sup>7</sup> / <sub>16</sub>	86	190
<b>These modules are placed on the floor.</b>								
	Orbitrap Exploris 120 MS / Orbitrap Exploris 240 MS / Orbitrap Exploris MX / Orbitrap Exploris EFOX							
Forepump	36	14 <sup>3</sup> / <sub>16</sub>	33	13	53	21	60	132
Noise reduction cover	53.5	21 <sup>1</sup> / <sub>16</sub>	50	19 <sup>11</sup> / <sub>16</sub>	82.5	32 <sup>1</sup> / <sub>2</sub>	10	22
	Orbitrap Exploris 480 MS							
Source vacuum pump	49	19 <sup>5</sup> / <sub>16</sub>	42	16 <sup>9</sup> / <sub>16</sub>	73	28 <sup>3</sup> / <sub>4</sub>	82	181
Noise reduction cover	53	21	62	24 <sup>7</sup> / <sub>16</sub>	98	38 <sup>9</sup> / <sub>16</sub>	10	22
Auxiliary forepump	19	7 <sup>1</sup> / <sub>2</sub>	13	5 <sup>1</sup> / <sub>8</sub>	41	16 <sup>1</sup> / <sub>8</sub>	17	37 <sup>1</sup> / <sub>2</sub>

Module	Height	Width	Length	Weight
Noise reduction cover	43	16 <sup>7</sup> / <sub>8</sub>	35	13 <sup>3</sup> / <sub>4</sub>
			73	28 <sup>11</sup> / <sub>16</sub>
				9
				20

**NOTE**

Allow at least 116 cm (46 in.) of vertical height for the stack with the pump, autosampler, detector, column compartment, solvent platform, and standard 1 L solvent bottles. This height provision allows sufficient access to the 1 L solvent bottles in the solvent platform. If you plan to use larger solvent containers, use a location with more vertical space.

### Workbench for the data system

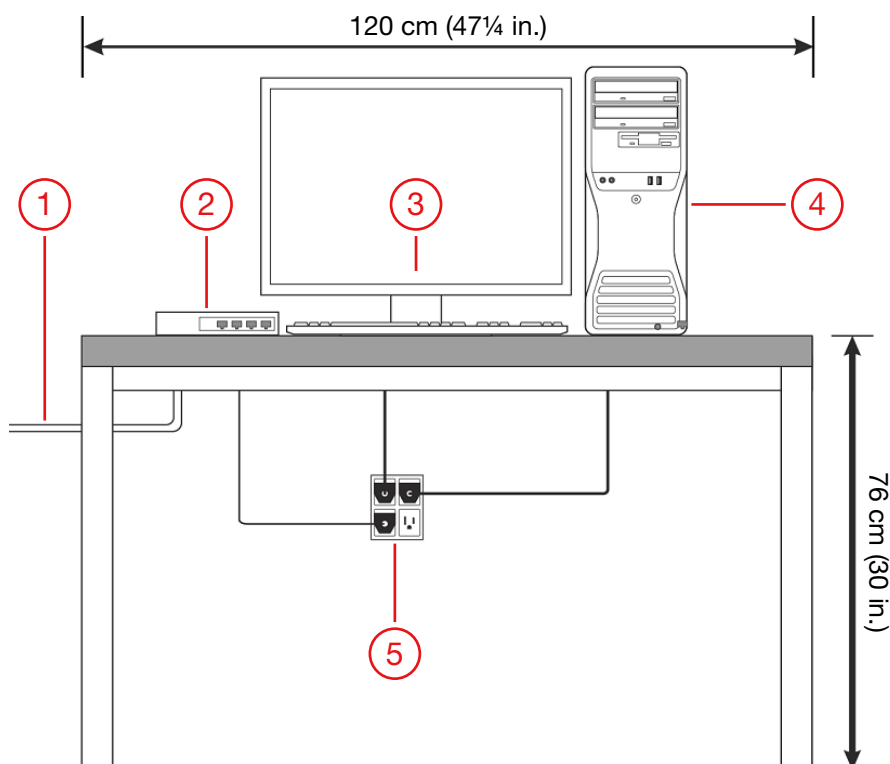
Use one workbench to hold the data system computer and the monitor. The recommended surface dimensions provide sufficient space for an optional printer. Make sure that the workbench can support the weight of the data system and the printer, if applicable.

**NOTE**

A printer is not a standard part of the data system. The actual values depend upon your equipment.

See the following table and figure for the space requirements and weights of the typical data system hardware components.

**Figure 1** Typical data system workbench



No.	Description	No.	Description
1	Ethernet communication cables	4	Minitower computer
2	Ethernet switch	5	Wall outlet for data system components (120 or 230 Vac)
3	Monitor		

**Table 5** Space and weights of typical data system components

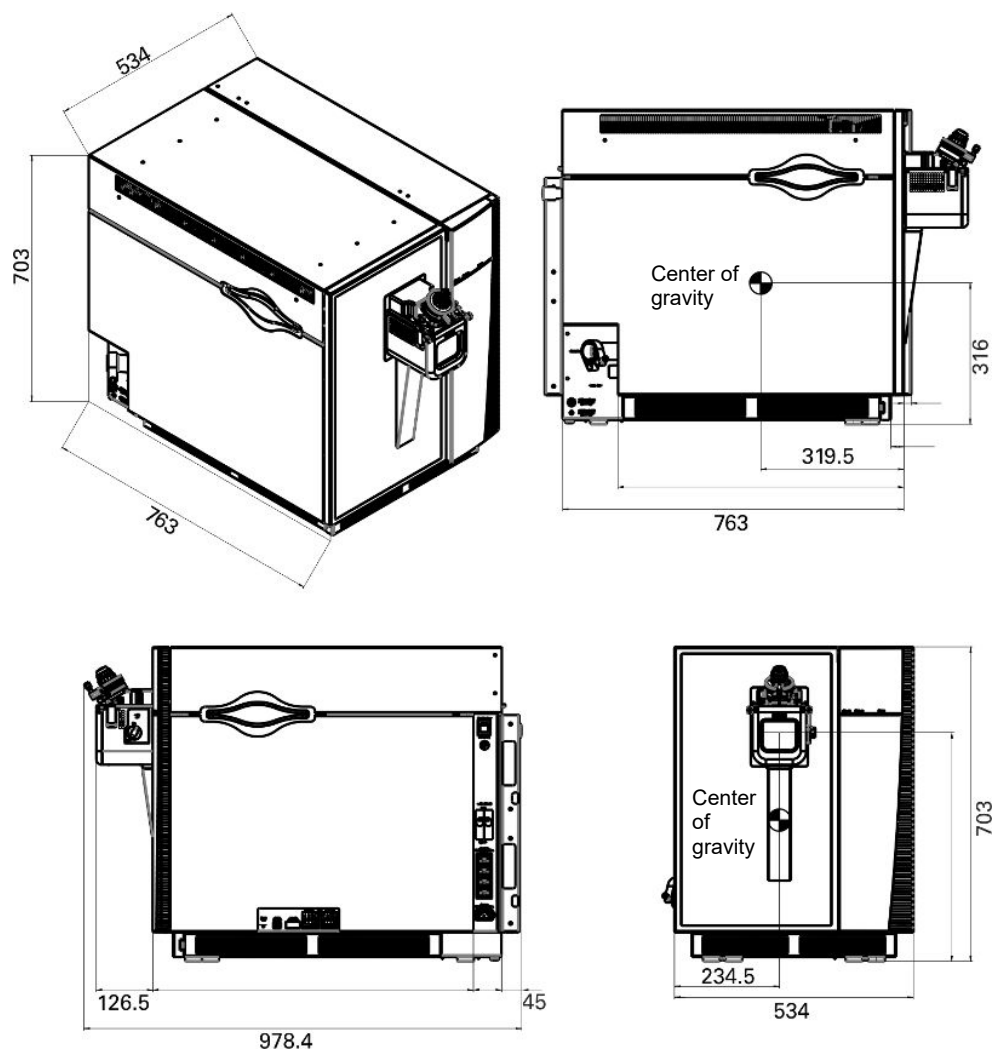
Module	Size	Weight
Monitor	18 cm <i>l</i> × 51 cm <i>w</i> × 46 cm <i>h</i> (7 <sup>1</sup> / <sub>16</sub> in. <i>l</i> × 20 <sup>1</sup> / <sub>16</sub> in. <i>w</i> × 18 <sup>1</sup> / <sub>8</sub> in. <i>h</i> )	5 kg (11 lb)
Minitower computer	43 cm <i>l</i> × 18 cm <i>w</i> × 48 cm <i>h</i> (16 <sup>15</sup> / <sub>16</sub> in. <i>l</i> × 7 <sup>1</sup> / <sub>16</sub> in. <i>w</i> × 18 <sup>7</sup> / <sub>8</sub> in. <i>h</i> )	14 kg (30 lb)

Place the mass spectrometer, the data system workbench, and the LC workbench adjacent to each other to prevent strain on the interconnecting Ethernet communications cables. The Ethernet port of the mass spectrometer is located at the back side of the instrument.

## Instrument dimensions

The body of the Orbitrap Exploris Series MS has maximum dimensions of h 703 mm (27 11/16 in.), w 534 mm (21 in.), l 763 mm (30 1/16 in.). [Figure 2: Dimensions of Orbitrap Exploris Series MS](#) shows a schematic view of the instrument with important instrument dimensions.

Figure 2 Dimensions of Orbitrap Exploris Series MS



## Move the instrument

For shipment, the instrument is fixed with two brackets on a pallet.

### NOTE

Because of a weight of about 120 kg, Orbitrap Exploris Series instruments are too heavy for one person alone to handle safely. Lifting and moving an instrument requires the effort of at least four persons. Refer to the *Orbitrap Exploris Series Operating Manual* for instructions. Wear steel-reinforced safety shoes when you move the instrument during the installation.

The four persons that carry the instrument require considerable space for maneuvering. Therefore, Thermo Fisher Scientific recommends that you use a pallet jack to move the instrument and to lift it to the height of the workbench.

Only two persons are necessary for moving the instrument into its final position on a bench. The rear row of the support points below the instrument consists of synthetic material that has a low frictional resistance and should easily slide above the surface of your work bench. The front row of the support points below the instrument consists of synthetic material that has a high frictional resistance and should keep the instrument safely in position.

## Place the forepumps

The Orbitrap Exploris 480 MS is shipped with a high-throughput source vacuum pump<sup>i</sup> and a low-throughput auxiliary forepump<sup>h</sup>. All other Orbitrap Exploris Series MS use a single-stage rotary vane pump<sup>j</sup> as forepump.

All forepumps come with separate noise reduction covers. Each pump is placed on a drip pan with wheels. Install the pumps on the floor below the workbench. If the workbench has no space below it, place the pumps at the end of the workbench. Before you place the pumps, Thermo Fisher Scientific strongly recommends that you consider the information contained in [Vibration](#).



### CAUTION

#### Heavy object

Because of their weight (~80 kg resp. ~60 kg), the large forepumps might move uncontrollably and cause injuries. Wear steel-reinforced safety shoes when you move the pump during the installation.

## Connect the forepumps

The forepumps are connected to the mass spectrometer and the laboratory in various ways.

<sup>i</sup> Leybold SOGEVAC™ SV 120 BI, or approved equivalent model. Values depend on the actually used pump model.

<sup>h</sup> Pfeiffer DUO 11, or approved equivalent model. Values depend on the actually used pump model.

<sup>j</sup> Leybold SOGEVAC™ SV 65 BI, or approved equivalent model. Values depend on the actually used pump model.

## Vacuum hoses

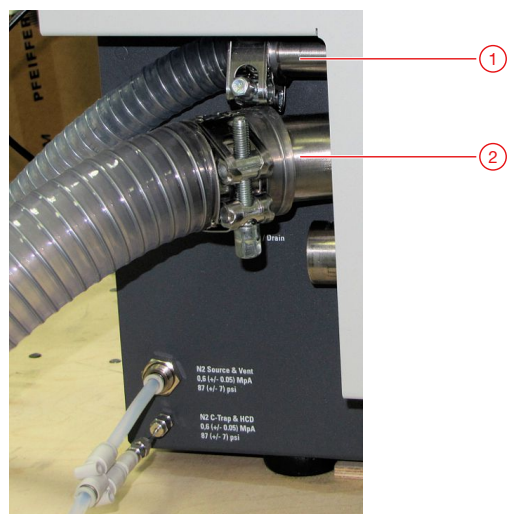
The vacuum hose of the source vacuum pump has an inner diameter of 38 mm (1½ in.). Connect the vacuum hose of the source vacuum pump to the large vacuum port at the left side of the mass spectrometer.

### TIP

The Orbitrap Exploris 120, Orbitrap Exploris 240, Orbitrap Exploris MX, and Orbitrap Exploris EFOX mass spectrometers are not equipped with an auxiliary forepump. Therefore, the small vacuum port is missing in these instruments.

The vacuum hose of the auxiliary forepump of the Orbitrap Exploris 480 MS has an inner diameter of 19 mm (¾ in.). Connect the vacuum hose of the auxiliary forepump to the small vacuum port at the left side of the MS. Run the auxiliary vacuum hose according to the same instructions as described above for the main vacuum hose. To avoid a vacuum leak, the hose clamp should be positioned only about 2 mm away from the end of the vacuum port, where the metal tube is not curved.

**Figure 3** Vacuum ports of Orbitrap Exploris 480 MS



No.	Description	No.	Description
1	Vacuum port for auxiliary forepump	2	Vacuum port for source vacuum pump

Both vacuum hoses have a length of 2.0 m (79 in.). They are made of reinforced material. Because of its large bending radius, the actual length of a vacuum hose is significantly shorter.

## Exhaust hoses

Install the oil mist filter and return unit of the auxiliary forepump of the Orbitrap Exploris 480 MS as described in the pump's manual.

Connect the exhaust hoses of the pumps to the exhaust system of the laboratory. Use the T-piece that is shipped with the Orbitrap Exploris 480 MS to join the exhaust lines of both forepumps.

**NOTICE**

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

The maximum length for the exhaust hose of the forepump is 10 m.

---

**Power supply**

Connect the power supply cords of the pumps to wall outlets. See Power supply for the specifications of the power supply.

**NOTICE**

To prevent an unwanted operation of the forepump, connect the MS and the pump to the power supply in the correct sequence:

- When you install a system, first connect the switch cable between the instrument and the pump, then connect the power supply cords.
  - When you deinstall or service a system, first disconnect the power supply cords, then disconnect the switch cable between the instrument and the pump.
- 

**NOTICE**

The auxiliary forepump of the Orbitrap Exploris 480 MS has a voltage selector switch. Make sure that you have set the correct voltage (115 V or 230 V) before you connect the pump's power supply cord to the wall outlet.

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**Contact closure signals**

All forepumps are switched on and off by a contact closure signal from the mass spectrometer. Connect the switch cable of the pumps to the D-sub port on the control panel at the right side of the MS. Connect the power supply cords of the pumps to wall outlets. See Power supply for the specifications of the power supply.

**Pump status control**

With the Tune application, a Thermo Fisher Scientific field service engineer can read out basic parameters of the source vacuum pump and modify the forepump frequency. Modifying the pump frequency may be necessary for

Orbitrap Exploris Series systems that are installed at an altitude higher than 500 m above sea level. Reducing the pump frequency will help adjusting the forepressure to a value within the specification.

With exception of the auxiliary forepump of the Orbitrap Exploris 480 MS, all standard forepumps and the optional dry pumps can communicate their status to the mass spectrometer through a USB-to-RS-485 (D-sub) adapter cable, which is used in addition to the switch cable. The Edwards nXL110iDE dry pump for the Orbitrap Exploris 480 MS uses a standard USB cable for that purpose.

To change the pump parameters with this connection, service privileges for the Tune application are required. We recommend to leave the adapter/USB cable in place after the service intervention.

### **Connect the pump status control cable**

#### **Procedure**

1. Connect the USB plug of the cable to a USB port of the mass spectrometer.
2. Connect the other plug of the cable:
  - a. Connect the D-Sub plug to the service connector of the standard source vacuum pumps (Leybold SOGEVAC™ SV 65 or SV 120), or the RS485 interface X104 of the Leybold ECODRY 65 plus dry pump.
  - b. Connect the other USB plug to the USB port of the Edwards nXL110iDE dry pump.

## **Option: Drypumps**

Thermo Fisher Scientific offers dry pumps as alternative to the standard forepumps. The dry pumps have these advantages:

- Lower power consumption
- Less air conditioning needed
- Less acoustic noise
- Smaller footprint
- No regular oil exchange (maintenance every four years by the manufacturers)

The table shows the correct dry pump for each Orbitrap Exploris Series mass spectrometer. The dry pump for the Orbitrap Exploris 480 MS has two vacuum ports and replaces both forepumps for the MS.

**Table 6** Dry pumps for Orbitrap Exploris Series MS

Instrument	Dry Pumps Model
Orbitrap Exploris 120 MS, Orbitrap Exploris 240 MS, Orbitrap Exploris MX MS Orbitrap Exploris EFOX MS	Leybold ECODRY 65 plus
Orbitrap Exploris 480 MS	Edwards nXL110iDE

Because of the lower noise level, the dry pumps are shipped without noise reduction covers. The following tables show important properties of the dry pumps.

**Table 7** Space and load requirements of dry pumps

Dry Pump	Noise Level	Height		Width		Length		Weight	
	dB(A)	mm	in.	mm	in.	mm	in.	kg	lb
Leybold ECODRY 65 plus	52	298	11 <sup>3</sup> / <sub>4</sub>	320	12 <sup>5</sup> / <sub>8</sub>	623	24 <sup>1</sup> / <sub>2</sub>	43	95
Edwards nXL110iDE	57	344	13 <sup>9</sup> / <sub>16</sub>	308	12 <sup>1</sup> / <sub>8</sub>	704	27 <sup>3</sup> / <sub>4</sub>	78	172

**CAUTION****Heavy object**

Use suitable lifting equipment when you move a pump during the installation. For detailed instructions (maximum tilt angle, for example), refer to the manufacturer's documentation that is shipped with the pump.

**Table 8** Electrical data of dry pumps

Parameter	Values	
<b>Leybold ECODRY 65 plus</b>		
Nominal voltage	120 V AC	200–240 V AC
Frequency	60 Hz	50/60 Hz
Phases	Single	
Rated current	15 A	10 A
Rated power	1200 VA	
Fuse	15 A (slow blow)	16 A (slow blow)
<b>Edwards nXL110iDE</b>		
Nominal voltage	200–230 V AC, 50/60 Hz, single phase	
Input current	8.5 A	
Fuse	15/16 A (tripping characteristic C)	

## Operating environment

Attention to the operating environment will ensure continued high performance of your system. Any expenditures for air conditioning are more than offset by good sample throughput and reduced repair costs. The air conditioning must be capable of maintaining a constant temperature in the immediate vicinity of the system without producing excessive draft.

### IMPORTANT

You are responsible for providing an acceptable operating environment.

### Contents

- [Temperature](#)
- [Humidity](#)
- [Lighting](#)
- [Altitude](#)
- [Dust-free environment](#)
- [Vibration](#)
- [Radio frequencies](#)
- [Electrostatic discharge](#)

## Temperature

Keep the laboratory room temperature between 18 and 27 °C (64 and 81 °F).

### NOTICE

Do not put the mass spectrometer below an air duct, near windows, or near heating and cooling sources. Temperature fluctuations of 0.5 °C or more over a 10 minutes period can affect instrument performance.

If the temperature in the laboratory has changed for more than 2 °C since the last mass calibration, Thermo Fisher Scientific strongly recommends that you refresh the mass calibration.

All electronic components generate heat while operating. This heat must be dissipated to the surrounding air for the components to continue to operate reliably.

There must be a good flow of room air around the system, and the air conditioning system must be capable of maintaining a constant temperature (within the temperature specification given above) in the immediate vicinity of the system. We recommend the installation of 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 (available e.g. from Landis & Gyr, Polygyr RWX..., see [www.landisgyr.com](http://www.landisgyr.com)). This ensures temperature drifts within the limits given above.

## Heat output of Orbitrap Exploris Series LC/MS systems

The air conditioning load for a typical Orbitrap Exploris Series MS system (with data system and two forepumps) is approximately 2.7 kW (9200 BTU/h). Refer to your LC manual for the heat output of your LC equipment. The table shows the approximate heat output of each module.

**Table 9** Heat output for a typical Orbitrap Exploris Series LC/MS system

Module	Heat output [W]	Heat output [BTU/h]
Mass spectrometer	750	2560
Source vacuum pump	1500	5120
Auxiliary forepump <sup>k</sup>	300	1020
Data system (mini-tower computer and monitor)	100	350
Dionex™ UltiMate™ 3000 RSLCnano UHPLC system <sup>l</sup>	265	900
EASY-nLC™ 1200 system <sup>l</sup>	125	430

## Humidity

The instrument is designed to be operated in an environment that is rated with pollution degree 2. This means that only non-conductive pollution occurs.

<sup>k</sup> In case of an Orbitrap Exploris 480 MS.

<sup>l</sup> optional

The relative humidity of the operating environment must be between 20 and 80%, with no condensation. Thermo Fisher Scientific recommends to install a temperature/humidity monitor in your laboratory. This makes sure that the laboratory is always within the specifications for temperature and humidity.

#### NOTICE

Operating a Orbitrap Exploris Series system at very low humidity might cause the accumulation and discharge of static electricity, which can shorten the life of electronic components. Operating the system at high humidity might cause condensation, oxidation, and short circuits, and will also block the filters on the cooling fans.

## Lighting

Good lighting makes any work area more enjoyable. Since a lot of work is done on the computer terminal, it may be convenient to have dimmed lights to reduce eyestrain. A small, high-intensity lamp is recommended for cleaning instrument components, source inspection, and manipulation of small components. Contact your local safety officer for advice and regulations on adequate working place conditions.

## Altitude

Orbitrap Exploris Series mass spectrometers are designed for indoor use at an altitude of up to 3000 m (10,000 ft) above sea level. To check whether a peripheral (for example, LC or printer) is suitable for the intended altitude, refer to the peripheral's manual or contact Thermo Fisher Scientific.

## Dust-free environment

Particulate matter might contaminate the samples, the sample introduction as well as the ion source and may limit the background level of the instrument. The air in your laboratory must not contain excessive dust, smoke, or other particulate matter. For reference, the air should contain fewer than  $35 \times 10^6$  particles per cubic meter ( $1 \times 10^6$  particles per cubic foot) in excess of 5  $\mu\text{m}$ .

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

#### NOTICE

Dust is most critical when you perform instrument maintenance. The best is to keep the instrument under vacuum and the source housing mounted with the automatic source background flow activated.

Open the instrument only when you have to perform maintenance in the instrument. Otherwise, keep the instrument closed.

---

## Vibration

Floors must be free of vibration caused, for example, by equipment in adjoining locations. Excessive vibration can lead to a reduced lifetime of mechanical components and potentially can have an impact on performance. We recommend to maintain the vibration levels below the levels for office spaces as defined in ISO 9241-6:1999.

#### NOTICE

Because of the natural vibration of a forepump during operation, it must not have any mechanical contact to the mass spectrometer with the exception of the vacuum hose. Otherwise, the vibration might affect instrument performance. Therefore, install the pump on the floor below the mass spectrometer and not near the system on the workbench.

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## Radio frequencies

Orbitrap Exploris Series instruments are able to withstand electromagnetic fields of 1 V/m in the frequency range 26 MHz to 1 GHz without any influence to operation.

Orbitrap Exploris Series instruments are designed to work in a controlled electromagnetic environment. Do not use radio frequency transmitters, such as mobile phones, in close proximity to the instrument.

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

## Electrostatic discharge

Static charges and electrostatic discharge (ESD) are common natural phenomena. Although ESD is not always perceptible to a human being, it can cause damage to the electronic components of your instrument. Thermo Scientific instruments (with all panels in place) are designed to withstand ESDs up to 4000 V from air discharge and 4000 V from contact discharge. 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 various ways, including the following:

- Walking across a carpet in a room with 20% relative humidity can generate as much as 35,000 V of electrostatic potential on the surface of your body. This same motion in a room with 80% relative humidity generates about 1,500 V of electrostatic potential.
- Sitting and working in a chair padded with polyurethane foam in a room with 20% relative humidity can generate as much as 18,000 V of electrostatic potential 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.
- Polystyrene cups and packing materials typically have a considerable electrostatic charge on them.

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. However, more commonly, ESD damage might cause latent problems that are detrimental to sensitive electrical components, which causes premature failures. Therefore, Thermo Fisher Scientific recommends the following precautions, especially when operating your system at the lower end of the relative humidity specification (see Humidity):

- 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 you operate the instrument, wear laboratory coats and clothing made of natural fiber or other static-dissipating material.
- Do not place polystyrene cups or packing materials on the instrument.

## Line power

The performance and longevity of your system can be affected by the quality of line power supplied to the system. To ensure that your instrument performs optimally and that it is not damaged by line power fluctuations, please verify that you comply with all power quality requirements.

### IMPORTANT

You are responsible for providing a source of power of acceptable quality for the operation of your system.

### Contents

- [Basic power requirements for Orbitrap Exploris Series LC/MS systems](#)
- [Power supply](#)
- [Power cords](#)
- [Connect the mass spectrometer and the modules to wall outlets](#)
- [Quality of power](#)
- [Typical power consumption](#)

## Basic power requirements for Orbitrap Exploris Series LC/MS systems

A Orbitrap Exploris Series LC/MS system has the basic power requirements as shown in the table. See the sample laboratory setup in [Power outlets in laboratories](#) for the recommended number of power outlets.

Any conditioning devices that are installed with the system must be able to handle the potentially high currents that are drawn during the initial startup of the system. The system inrush (start) current for Orbitrap Exploris Series mass spectrometers is 25 A. The average duration of the forepump's inrush current is less than 1 second. Therefore, this initial energy demand from the AC power line is very low.

**Table 10** Power requirements

<b>Mass spectrometer</b>	
Nominal voltage	208–240 V AC, 50/60 Hz, single phase
Power	apparent power: 800 VA; effective power: 750 W
Fuse <sup>m</sup>	15/16 A (tripping characteristic C)
<b>Source vacuum pump<sup>n</sup></b>	
Nominal voltage	200–240 V AC, 50/60 Hz, single phase
Power	1.5 kW (2.2 kW) <sup>o</sup>
Fuse <sup>m</sup>	15/16 A (tripping characteristic C)
<b>Auxiliary forepump<sup>o</sup></b>	
Nominal voltage	115 V or 230 V AC, 50/60 Hz, single phase
Power	0.25 kW (50 Hz) / 0.3 kW (60 Hz)
Fuse <sup>m</sup>	16 A (115 V) / 6 A (230 V), slow
<b>Data system (computer, monitor, and Ethernet switch) and LC</b>	
Nominal voltage	100–240 V AC, 50/60 Hz, single phase
Fuse <sup>m</sup>	15/16 A
<b>Syringe Pump and Switching Valves</b>	
The mass spectrometer provides electric power for the syringe pump and the switching valve(s).	

## Power supply

Orbitrap Exploris Series instruments operate at nominal voltages between 208 V AC and 240 V AC, 50/60 Hz.

### NOTICE

The instrument is tested and certified for a line voltage between 208 V and 240 V. In some areas of the world, voltage sags during high use periods might decrease the working voltage. For nominal voltages below 208 V or for areas with working voltages below 187 V due to voltage sags, you must protect your instrument by using a suitable power conditioner or an uninterruptible power supply (UPS).

<sup>m</sup> dedicated wall outlet

<sup>n</sup> Orbitrap Exploris 120, Orbitrap Exploris 240, Orbitrap Exploris MX, and Orbitrap Exploris EFOX MS

<sup>o</sup> In case of an Orbitrap Exploris 480 MS.

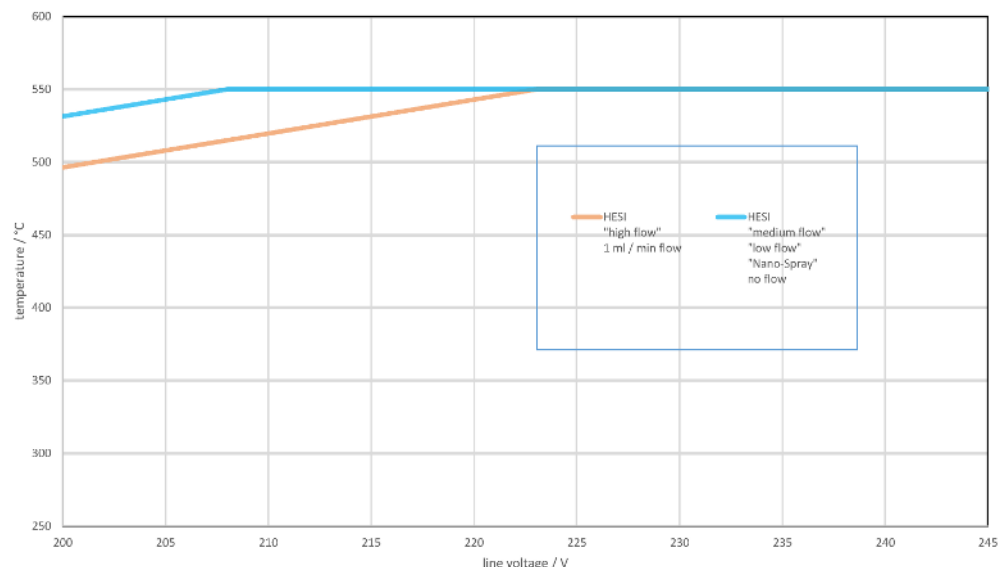
The mass spectrometer must be properly grounded. For this reason, the power cord of the MS must be connected to a wall outlet with grounding pin. Make sure that the grounding pin of this power cord is connected to earth ground, even when a buck/boost transformer or other upstream equipment (for example, UPS) is used.

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

## Voltage dependency of the ion source heater

The heater of the ion source operates with line voltage. If the main supply voltage drops below its nominal value, the maximum temperature of the heater might not be available anymore. [Figure 4: Maximum vaporizer temperature vs. line voltage](#) shows the derating curve of the maximum vaporizer temperature in dependence of the line voltage and the operating conditions for the HESI source.

**Figure 4** Maximum vaporizer temperature vs. line voltage



## Power cords

Thermo Fisher Scientific provides six power cords for the mass spectrometer, forepumps, data system, monitor, and Ethernet switch. They are approximately 2.5 m (8 ft) long. One power cord fits into a standard

IEC 60320 C19 socket on the source vacuum pump. The other cords fit into standard IEC 60320 C13 sockets on the mass spectrometer and the other system components.

**TIP**

The MS provides the electric power for the syringe pump. The MS can also supply the electric power for the Ethernet switch. This allows positioning the Ethernet switch near the MS and the LC.

**NOTICE**

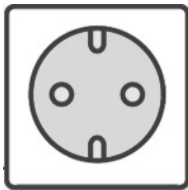
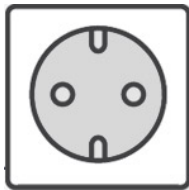
The instrument is equipped with a detachable mains cable. Use only mains supply cords with an adequate rating. All spare parts and consumable items used must be approved by Thermo Fisher Scientific.

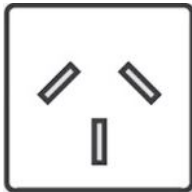
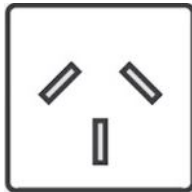
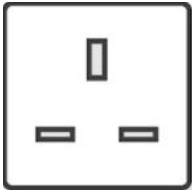
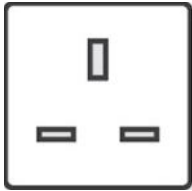
Depending on the location of your laboratory, various types of plugs may be required. The table gives an overview of the possible wall outlets. Write the part number of the corresponding country kit into the Orbitrap Exploris Series installation request form at the beginning of this guide and send it to the factory before the installation.

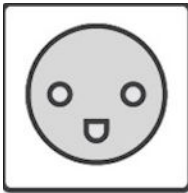
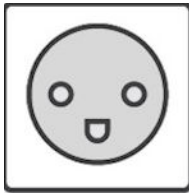
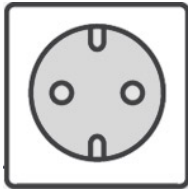
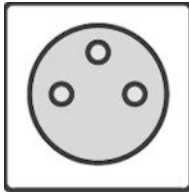
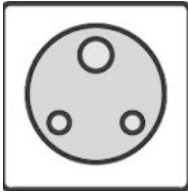
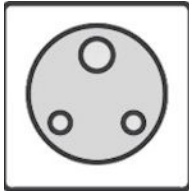
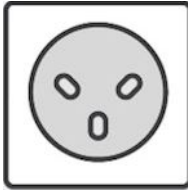
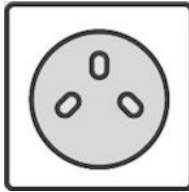
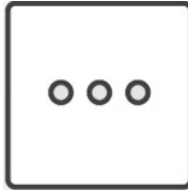

**NOTICE**

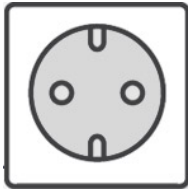
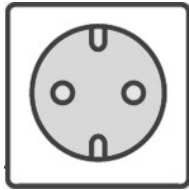

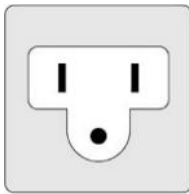


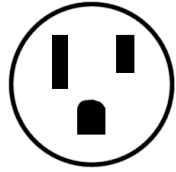

For more information on the correct cable kit, contact your certified Thermo Fisher Scientific service representative.

**Table 11** Country kits for the Orbitrap Exploris Series mass spectrometer






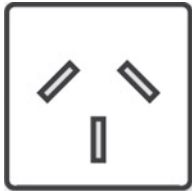

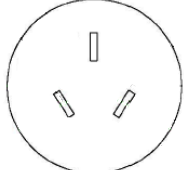
P/N	Designation	Socket for source vacuum pump (C19 plug)	Socket for MS system, auxiliary forepump <sup>p</sup> , PC, monitor, and Ethernet switch (C13 plug)	Qty.
BRE0016334	Country Kit Continental Europe (Afghanistan, Algeria, Angola, Armenia, Austria, Azores [Portugal], Belarus, Belgium, Benin, Bosnia-Herzegovina, Bulgaria, Burundi, Cambodia, Cameroon, Canary Islands [Spain], Rep. of Cape Verde, Central African Rep., Chad, Chile, Congo, Croatia, Czech. Rep., Rep. of Djibouti, Egypt, Equatorial Guinea, Estonia, Ethiopia, Finland, France, French Guiana, Gabon, Germany, Greece, Guadeloupe, Guinea,	 CEE 7 plug	 CEE 7 plug	1+5

P/N	Designation	Socket for source vacuum pump (C19 plug)	Socket for MS system, auxiliary forepump <sup>p</sup> , PC, monitor, and Ethernet switch (C13 plug)	Qty.
	Guinea-Bissau, Hungary, Iceland, Indonesia, Iran, Iraq, Ivory Coast, Jordan, Kyrgyzstan, Laos, Latvia, Lebanon, Liberia, Libya, Lithuania, Luxembourg, Madagascar, Mali, Martinique [France], Mauritania, Moldova, Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, North Korea, Norway, Oman, Paraguay, Peru, Poland, Portugal, Romania, Russia Federation, Rwanda, Saudi Arabia, Senegal, Slovakia, Slovenia, South Korea, Spain, Svalbard [Norway], Sweden, Syria, Thailand, Togo, Tunisia, Turkey, Ukraine, Uruguay, Vietnam, and Yugoslavia)			
BRE0017109	Country Kit Australia/New Zealand (American Samoa, Australia, Christmas Is. [Austral.], Cocos Is. [Austral.], Cook Is. [N.Z.], New Zealand, Papua New Guinea, Fiji, Tonga, and Western Samoa)			1+5
		AS 3112 plug	AS 3112 plug	
BRE0017112	Country Kit United Kingdom/Ireland (Anguilla [U.K.], Antigua, Bahrain, Bangladesh, Botswana, Burkina Faso, Channel Islands, Cyprus, Dominica, England, Gambia, Ghana, Gibraltar, Grenada, Hong Kong, Ireland, Rep. of Kenya, Kuwait, Lesotho, Macao, Malawi, Malaysia, Maldives, Malta, Mauritius, Myanmar [formerly Burma], Rep. of Namibia [W.S.Africa], Nigeria, North Ireland, Qatar, Scotland, Seychelles, Sierra Leone, Singapore, South Africa, Sri Lanka, St. Kitts & Nevis, St. Lucia, St. Vincent, Sudan, Swaziland,			1+5
		BS 1363 plug	BS 1363 plug	

P/N	Designation	Socket for source vacuum pump (C19 plug)	Socket for MS system, auxiliary forepump <sup>p</sup> , PC, monitor, and Ethernet switch (C13 plug)	Qty.
	Tanzania, Uganda, United Arab Emir., United Kingdom & Ire., Wales, Yemen, Zambia, and Zimbabwe)			
BRE0017114	Country Kit Denmark (Denmark and Greenland [Den.])			1+5
		DS 60884-2-D1 plug	DS 60884-2-D1 plug	
BRE0017116	Country Kit France/Belgium (Belgium and France)			1+5
		CEE 7 plug	CEE 7/7 plug	
BRE0017124	Country Kit India/ South Africa (India, Nepal, Pakistan, Pitcairn Is. [U.K.], and Somalia)			1+5
		BS 546 15 A	BS 546 15 A	
BRE0017127	Country Kit Israel (Israel)			1+5
		SI 32 plug	SI 32 plug	
BRE0017129	Country Kit Italy (Italy)			1+5
		IT2-16P	YP-45	

P/N	Designation	Socket for source vacuum pump (C19 plug)	Socket for MS system, auxiliary forepump <sup>p</sup> , PC, monitor, and Ethernet switch (C13 plug)	Qty.
				1+1
		CEE 7 plug	CEE 7 plug	
BRE0017132	Country Kit Japan (Japan)			1+4
		NEMA L6-20P	JIS C 8303	
				2
			NEMA L6-20	
BRE0017135	Country Kit NA (Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Curacao Is., Dominican Rep., Ecuador, El Salvador, Guam, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Montserrat, Neth. Antilles, Nicaragua, Panama, Philippines, Puerto Rico, St. Pierre & Miquelon [Fr.], Suriname, Tahiti, Taiwan, Thailand, Trinidad & Tobago, United States, Venezuela, and Virgin Islands)			1+4
		NEMA L6-20*	NEMA 5-15	
				1
			NEMA L6-20*	

\* One socket supplies the source vacuum pump, and the other socket supplies the mass spectrometer.

P/N	Designation	Socket for source vacuum pump (C19 plug)	Socket for MS system, auxiliary forepump <sup>P</sup> , PC, monitor, and Ethernet switch (C13 plug)	Qty.
BRE0017141	Country Kit Switzerland (Liechtenstein and Switzerland)			1+5
		SW2-16P	SEV 1011: 2009	
BRE0017143	Country Kit Brazil (Brazil)			1+5
		NBR 14136 (BR3-20P)	NBR 14136 (BR3-20P)	
BRE0017145	Country Kit Argentina (Argentina)			1+5
		IRAM2073 AR2-20P	IRAM2073 RA/3	
BRE0017147	Country Kit China (China)			1+5
		CH2-16P	PRC/3	

Power cables and connectors for the options are standard equipment delivered by the manufacturers.

<sup>P</sup> In case of an Orbitrap Exploris 480 MS.

## Connect the mass spectrometer and the modules to wall outlets

Make sure that the wall outlet specifications are not exceeded. The mass spectrometer must have a separate “clean” line that leads to a main fuse to guarantee disturbance-free operation. Locally supplied personal computer hardware must use the same power line and ground connection as the mass spectrometer.

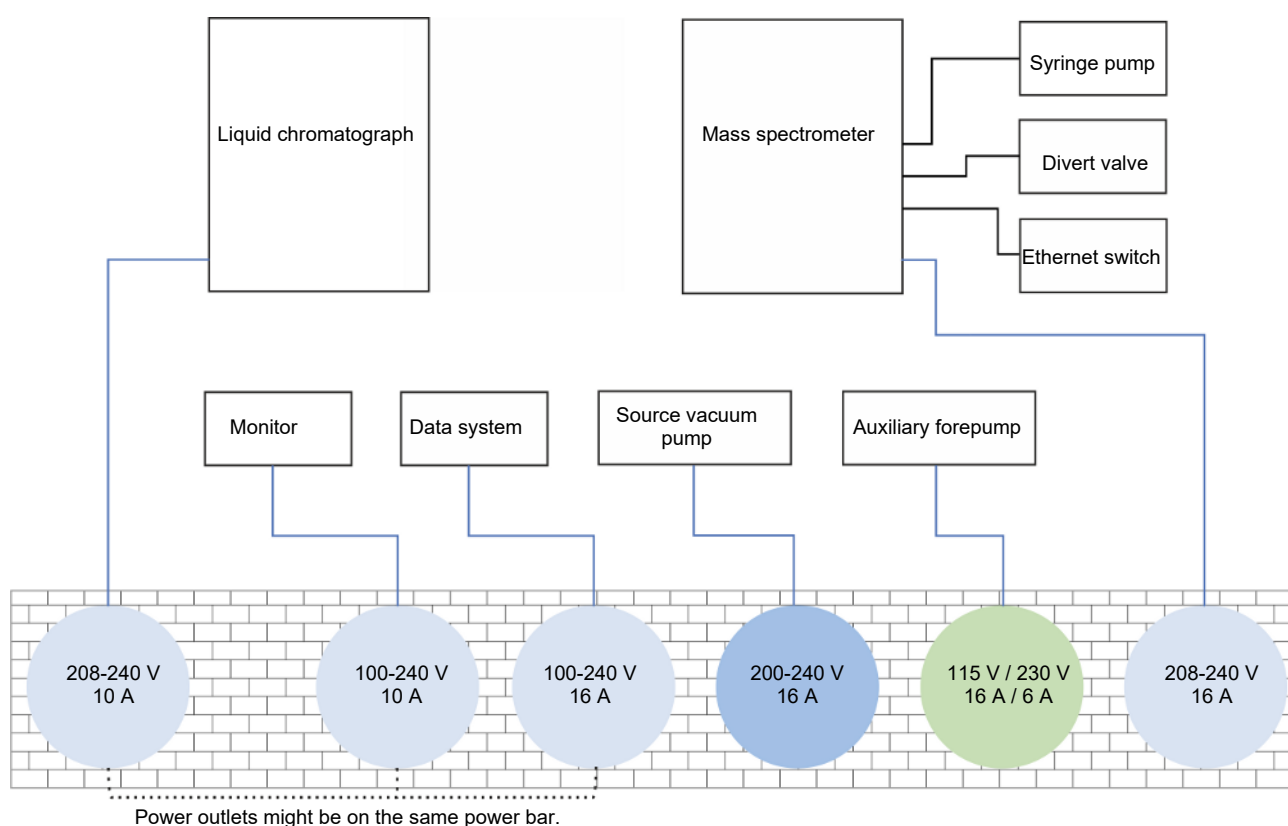
All single-phase auxiliary wall outlets must use the same ground as the power line of the instrument.

### NOTE

The specifications on the individual modules might vary from those in this guide. Refer to the manuals that came with your modules for power requirements and specifications. The power specifications on the module and in the respective manual always supersede those in this current guide.

The figure shows a block diagram of the line power connections for the components of the Orbitrap Exploris Series LC/MS system.

**Figure 5** Line power installation



Note the following:

- Four outlets for secondary consumers are available on the mass spectrometer. The total maximum current of the secondary consumers must not exceed 3 A.
- You can connect the Ethernet switch to a wall outlet with a power cord that is shipped with the instrument. Or, connect the Ethernet switch to a wall outlet with a power cord that is shipped with the instrument
- A power bar is not part of the standard system. You have to provide it.

**NOTICE**

To prevent overloading the circuit, do not connect the mass spectrometer and the LC system to the same electrical wall outlet circuit.

## Place the power outlets

Place the outlets for the MS system, forepumps, and LC system behind the LC system's workbench. Place the outlets for the data system—computer, monitor, Ethernet switch, and (optional) printer—behind the data system workbench. For the LC system, use wall outlets. Additional power outlets might be required for testing and cleaning equipment, such as an oscilloscope and ultrasonic bath.

The maximum load for a 120 Vac fourplex outlet is typically 20 A, and the maximum load for a 230 Vac fourplex outlet is typically 16 A. Thermo Fisher Scientific recommends that you have at least 6 spare outlets behind the system and 3 spare outlets close to the workbench space within your laboratory.

## Power outlets in laboratories

Installing a complete LC/MS system can require extensive electrical resources. Plan your power system so that it includes numerous outlets to ensure that you can connect and power all of your equipment. See the sample laboratory setup in the table for the recommended number of outlets.

**Table 12** Sample laboratory setup

System	Item	Outlets
LC system	Autosampler	1
	LC pump	1
	UV/Vis or PDA detector (optional)	1
	Column heater (optional)	1
	External controller (optional)	1
MS system	Mass spectrometer	1 (208–240 Vac)

System	Item	Outlets
	Source vacuum pump	1 (200–240 Vac)
	Auxiliary forepump <sup>q</sup>	1 (115 V or 230 V AC)
	Syringe pump	— <sup>r</sup>
Data system	Data system computer	1
	Monitor	1
	Printer (optional)	1
	Ethernet switch	1
Optional	High intensity lamp (for help in instrument maintenance)	1
	Laboratory stereoscope (for inspecting fused-silica parts)	1
	Nitrogen generator	1
	Switching valve(s)	— <sup>r</sup>
Total outlets required for this configuration		7–14

#### TIP

If your local area is susceptible to corrupted power or to power disruptions, Thermo Fisher Scientific recommends that you install a UPS in your laboratory. Use the values listed in Basic power requirements as a guideline for selecting an appropriate UPS.

## Quality of power

The quality of power supplied to your system is very important for its performance.

The most common voltage disturbances are as follows:

- **Harmonic distortion:** A high-frequency disturbance that appears as distortion of the fundamental sine wave, and that might affect the operation of your system.
- **Slow average:** A gradual, long-term change in the average root mean square (RMS) voltage level, with typical durations greater than 2 s.
- **Sags and surges:** Sudden changes in the average RMS voltage level, with typical durations between 50 ms and 2 s.
- **Transients (or impulses):** Brief voltage excursions of up to several thousand volts, with durations of less than 50 ms.

<sup>q</sup> In case of an Orbitrap Exploris 480 MS.

<sup>r</sup> Power is supplied by the mass spectrometer.

The instrument is tested in accordance with EN 61326. However, excessive distortion, slow average disturbances, transients, as well as sags and surges on the power line can affect the quality of the measurement. Non-standard power fluctuations and excessive noise on the power lines degrade electronic components over time, which reduces their life span. Use power monitoring and conditioning devices to ensure stable performance of the instrument.

## **Power monitoring devices**

Power monitoring devices help to determine whether a power conditioning device is needed.

Power line disturbance analyzers can detect and record 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, the duration as well as the amplitude of the disturbance is indicated by time interval recording.

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

You can rent line monitors from electrical equipment suppliers. If necessary, your local Thermo Fisher Scientific representative can assist in the interpretation of 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, use an isolation/noise suppression transformer. If there are both transient and regulation problems, consider using power conditioners, which can control both of these problems.

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

#### TIP

For compliance and safety, make sure that your power conditioning devices are certified by recognized domestic and international organizations (for example, UL, CSA, TÜV, and VDE).

## Uninterruptible power supply

If your local area is susceptible to corrupted power or power disruptions, install a UPS in your laboratory.

#### TIP

For compliance and safety, make sure that your UPS devices are certified by recognized domestic and international organizations (for example, UL, CSA, TÜV, and VDE).

## Technical assistance

Occasionally, Thermo Fisher Scientific encounters line-voltage sources of unacceptable quality that adversely affect the operation of the instrument. Rectifying such power supply problems is the responsibility of the operator. Upon request, Thermo Fisher Scientific can try to diagnose your power supply quality problems, but does not perform actions to isolate and correct the problems.

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

## Typical power consumption

The following tables give an overview about the typical power consumption of different LC/MS combinations. The actual consumption depends on the individual settings for a certain instrument status. The table lists typical operating conditions assessed in steady-state continuous operation that were used to determine the values in the tables.

**Table 13** Definition of typical operating conditions

Operating conditions	Off-mode	Nano-/Low-flow/Standby	High-flow settings
Sheath gas [arb.]	0	3	60
Aux. gas [arb.]	1(6)	2(5)	20

Operating conditions	Off-mode	Nano-/Low-flow/Standby	High-flow settings
Sweep gas [arb.]	0	0	5
Transfer tube temperature [°C]	30	320	350
Vaporizer temperature [°C]	30	30	400

**NOTE:** The values in parentheses are valid for the Orbitrap Exploris 480 MS.

**Table 14** Power consumption of sub-units (typical values)

Power consumption [W]	Off-mode	Nano-/Low-flow/Standby	High-flow settings
Orbitrap Exploris Series instrument	281	430	554
Leybold Sogevac 65	859	852	847
Leybold Ecodry 65 Plus	568	565	563
Leybold Sogevac 120 + Pfeiffer Duo 11	1517	1493	1481
Edwards nXL110iDE	758	742	739
PC (Monitor in Standby)	56	56	56

**Table 15** Instrument power consumption (typical values)

Power consumption [W]	Off-mode	Nano-/Low-flow/Standby	High-flow settings
Orbitrap Exploris 120/240/MX/ EFOX MS	1160	1280	1391
Orbitrap Exploris 120/240/MX/ EFOX MS with dry pump option <sup>s</sup>	908	1030	1145
Orbitrap Exploris 480 MS	1839	1973	2086
Orbitrap Exploris 480 MS with dry pump option <sup>t</sup>	1061	1181	1304

### Cost savings

The table gives an estimation of the yearly cost savings for an Orbitrap Exploris Series LC/MS system that you can achieve when you use a dry pump with the MS instead of a standard forepump. For the calculation, the power consumption of a typical LC system (Thermo Scientific Vanquish™ Flex [158 W]) was used.

<sup>s</sup> Leybold Ecodry 65 Plus dry pump

<sup>t</sup> Edwards nXL110iDE dry pump

**Table 16** Savings with dry pump option

Instrument	Saving
<b>Savings with dry pump option [kWh / year]</b>	
Orbitrap Exploris 120/240/MX/EFOX MS	2200
Orbitrap Exploris 480 MS	7400
<b>Cost saving [€], assuming 24/7 operation and cost for power supply and AC cooling at 0.5€/kWh</b>	
Orbitrap Exploris 120/240/MX/EFOX MS	1100
Orbitrap Exploris 480 MS	3700

## Consumables

Your instrument requires gases and solvents that must meet defined purity specifications. The Thermo Fisher Scientific field service engineer may also require certain solvents for the installation verification of your system.

### IMPORTANT

You are responsible for providing the correct gas and solvent supplies for the operation of your system.

### Contents

- [Nitrogen gas](#)
- [Solvent recommendations](#)
- [Cleaning agents](#)

## Nitrogen gas

Orbitrap Exploris series instruments require nitrogen gas for its different components. The required gas pressure is  $600 \pm 50$  kPa ( $87 \pm 7$  psi), and the maximum line pressure is 650 kPa (94 psi).

### NOTICE

Your laboratory gas supply might provide nitrogen also for other consumers or peripherals. In this case, make sure that the supply for the mass spectrometer always meets the requirements for pressure, purity, and stability described in this topic.

The instrument can operate reliably only when the pressure of the source gas stays within the required limits. If your laboratory gas supply also provides nitrogen for other consumers, then you must install a pre-regulator in the gas line that leads to the source-gas port of the mass spectrometer. Contaminants that are introduced during the installation of house lines that are used for gas delivery can cause damage to the system. Make sure that all gas lines that are used with your system are free of all particulates and oils. You are responsible for any damage to the instrument that is caused by

contaminants introduced from your gas delivery system. Because particulate filters can be a source of contamination, Thermo Fisher Scientific does not recommend their use.

Your system can use large amounts of gas during daily operations. The gas consumption strongly depends on the type of analysis the instrument is used for. It is essential that the different gas types be delivered with the necessary pressure and purity, as described in the following tables.

**Table 17** Nitrogen supply requirements

Gas type	Pressure	Purity	Connector size	Maximum flow	Consumption
Source gas	0.6 ± 0.05 MPa	99% (HP)	6 mm	45 NL/min	65,000 L/day
Reagent carrier gas / HCD collision gas		99.999% (UHP)	1/16 in.	0.07 NL/min	100 L/day

**NOTE** The use of ultra-high purity nitrogen (UHP, 99.999%) for the reagent carrier gas and HCD collision gas (and C-Trap bath gas) is mandatory.

**Table 18** Typical nitrogen consumption of LC/MS applications

Application	LC flow rate (approximate)	Source settings [arbitrary units]	Consumption [NL/min]	
			Source gas	HCD collision gas
Nano-Spray	N/A	Sheath gas: 0, aux gas: 0, sweep gas: 0	0	0.07
Low flow	5 µL/min	Sheath gas: 5, aux gas: 0, sweep gas: 0	7	
Medium flow	200 µL/min	Sheath gas: 35, aux gas: 10, sweep gas: 0	15	
High flow	1 mL/min	Sheath gas: 60, aux gas: 20, sweep gas: 5	28	

**NOTE**

When the Internal Calibration source is switched off, the maximum consumption of UHP nitrogen gas is 0.04 NL/min. Refer to the *Orbitrap Exploris Series Operating Manual*.

The following table shows the estimated nitrogen consumption for different calibration types at ambient pressure and with low-flow settings (source gas consumption: 7 NL/min).

**Table 19** Estimated nitrogen consumption for a calibration

Action	Estimated duration	Estimated consumption
Manual spray stability optimization	30 min	195 NL
Mass calibration	1 min	5 NL
Full system calibration	2 h	800 NL

**NOTE**

The duration of the full system calibration includes 30 minutes to ensure a stable spray.

Make sure that the maximum flow rate of the nitrogen source of your choice matches the requirements of your applications. You can supply the nitrogen for your instrument from one source (single supply) or two sources (dual supply). See the following table for an overview.

**Table 20** Gas supply properties for single supply and dual supply

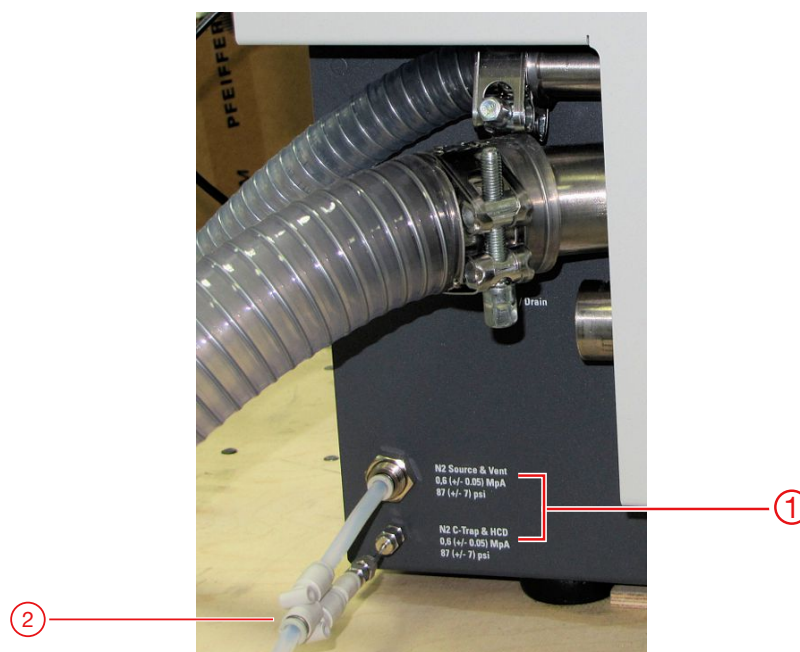
Supply type	Nitrogen purity	Nitrogen source (Examples)
Single Supply	>99.999% purity (<0.001% oxygen content)	LN2 evaporator, cylinder bundle, PSA nitrogen generator
Dual Supply	Collision gas: >99.999% purity (5.0)	LN2 evaporator, cylinder bundle, PSA nitrogen generator
	Source gases: Required: >95% (<5% oxygen content)	Membrane nitrogen generator
	Recommended: >99% (<0.5% oxygen content)	LN2 evaporator, cylinder bundle, PSA nitrogen generator

**TIP**

A nitrogen generator can expel a considerable amount of water (about 10 L per day) from its drain port, dependant on the ambient humidity. Connect the drain tubing to a suitable drain connection or container. If a container is used, it should be emptied at regular intervals. The container must not have an air tight seal because water and air are expelled at pressure. Fix the drain ending of the tube firmly to prevent it from vibrating during draining.

The instrument is prepared for single supply. It comes with a Y-piece that has a 6 mm press-in fitting for the hose coming from the nitrogen source. A short segment of 6 mm hose connects the Y-piece to the source-gas port of the instrument. A 6 mm-to-1/16 in. adapter connects the Y-piece to the HCD collision gas port of the instrument.

Figure 6 Y-piece attached to gas ports



No.	Description	No.	Description
1	Gas inlets: Source & Vent (top), Trap & HCD (bottom)	2	Y-piece

If you want to use two nitrogen sources of different purities, you can connect them to the instrument with 6 mm hoses. Use the Y-piece as an adapter to connect the hose for the UHP nitrogen to the HCD collision gas port of the instrument. A 6 mm plug is shipped with the Y-piece to close the unused tube, so you do not need to provide 1/16 in. stainless-steel tubing.

## Fittings and parts

The following table lists the minimum parts that are required to connect the mass spectrometer to your gas delivery system.

Table 21 Gas connection hardware required

Description	Provided / Not provided
6 mm OD Teflon™ hose (P/N 0690280)	10 m (33 ft) provided. You might require additional length.

Description	Provided / Not provided
Connection for the opposite end of the Teflon hose to the nitrogen gas source	Not provided in kit. You must supply these parts.

**TIP**

Your connections and gas delivery system might vary, and it is your responsibility to supply any fittings or connections necessary during installation.

If the pressure regulator of the laboratory gas supply has a 1/8 inch NPT outlet, you can use the following Swagelok™ 1/8-in.-to-6-mm adapters: B-6M0-7-2 (female) and B-6M0-1-2 (male).

## Solvent recommendations

The installation of the instrument requires LC/MS-grade methanol and water. Solvent modifiers might also be required during the installation of some systems. The following solvents are useful in operating and maintaining your instrument:

- Methanol
- Acetonitrile
- Water
- Isopropanol
- Acetic acid (modifier)
- Formic acid (modifier)
- Trifluoro acetic acid (modifier)

Some solvent impurities are transparent to UV/VIS detectors. Therefore, some LC/MS-grade solvents might contain contaminants that the detector does not detect but that interfere with the performance of the mass spectrometer. To operate your instrument, use high purity solvents with minimum contamination.

You can order LC/MS grade consumables from Thermo Fisher Scientific, which are sold under its Fisher Scientific™ brand. Visit [www.fishersci.com](http://www.fishersci.com). Use only Optima™ LC/MS grade chemicals for operating your system.



**CAUTION**

By law, producers and suppliers of chemical compounds are required to provide their customers with the most current health and safety information in the form of Safety Data Sheets (SDSs). The SDSs must be freely available to lab personnel to examine at any time. These data sheets describe the

chemicals and summarize information on the hazards and toxicities of specific chemical compounds. They also provide information on the proper handling of compounds, first aid for accidental exposure, and procedures to remedy spills or leaks.

Read the SDS for each chemical you use. Store and handle all chemicals in accordance with standard safety procedures. Always wear protective gloves and safety glasses when you use solvents or corrosives. Also, contain waste streams, use proper ventilation, and dispose of all laboratory reagents according to the directions in the SDS.

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**NOTICE**

Do not filter solvents. Filtering solvents can introduce contamination.

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## Cleaning agents

Thermo Fisher Scientific recommends that you have the following agents for cleaning surfaces and equipment available:

- A solvent like isopropanol (in accordance with your local safety practices)
- A detergent, for example, Liquinox™
- Several liters of distilled water

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**NOTICE**

Prevent any liquids from entering the inside of the instrument. Leaking liquids might get into contact with electronic components and cause a short circuit.

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## Exhaust and waste

The proper performance of your system can be affected by the waste and exhaust arrangements for the instrument. The vacuum waste and the solvent waste must be vented separately, and the wastes must be collected and disposed of properly.

### IMPORTANT

You are responsible for providing proper waste and exhaust systems for the operation of your system.

### Contents

- [Exhaust system](#)
- [Solvent waste](#)
- [Ventilation](#)

## Exhaust system

You must connect each forepump to an active fume exhaust system. The forepump eventually exhausts much of what is introduced into the mass spectrometer, including the small amount of oil vapor that mechanical pumps can emit. It is your responsibility to provide an adequate exhaust system.

### NOTICE

An efficient fume exhaust system is required for the proper operation of your forepump. Most API applications contribute to the accumulation of solvents in the forepump. These solvents must be purged from the mechanical pump oil periodically by opening the ballast valve. When the ballast valve is opened, a large volume of volatile solvent waste might enter the fume exhaust system. Therefore, your fume exhaust system must be able to accommodate the periodic purging of the solvents. The frequency of the purging is dependent on the throughput of your system.

The forepumps (also referred to as a mechanical, rotary-vane, roughing, or backing pump) provide a vacuum for the API source and backing pressure for the turbomolecular pump in the Orbitrap Exploris Series system. The Orbitrap Exploris 480 MS is shipped with a high-throughput source vacuum pump and a low-throughput auxiliary forepump. All other instruments are shipped with one large forepump.

Connect the exhaust port of each forepump to an exhaust gas line that leads to an active exhaust system. The inner diameter of the pipe should be at least 25 mm (1 in.). For each forepump, an exhaust hose for connecting it to the exhaust system comes with the system. It has dimensions of 13 mm (½ in.) ID and 20 mm (<sup>25</sup>/<sub>32</sub> in.) OD and is 5 m (16 ft) long. For the Orbitrap Exploris 480 MS, a T-piece to join the exhaust lines of both forepumps is shipped with the instrument.

**Table 22** Forepumps fume exhaust requirements

Parameter	Requirement
Initial inrush flow rate	10 L/min (21.2 ft <sup>3</sup> /h)
Continuous flow rate	7 L/min (14.8 ft <sup>3</sup> /h)

#### NOTICE

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

The maximum length for the exhaust hose of the forepumps is 10 m.

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

The exhaust hose should travel at floor level for a minimum of two meters (78½ in.) before it reaches the external exhaust system. This tubing acts as a trap for exhaust fumes that would otherwise recondense in the forepump oil.

## Solvent waste

The mass spectrometer comes with parts to collect the solvent waste from the API source. Because the API source can accommodate high flow rates, you must use a method of collecting the waste solvent that avoids pressure buildup in the source. The solvent drain/waste exhaust port is at the left side of the instrument.

### NOTICE

Always operate the API source with the drain tubing assembly mounted to the instrument. The drain tubing must lead to a waste container that is connected to a dedicated fume exhaust system. The exhaust system for the API source must accommodate a flow rate of up to 45 L/min (95 ft<sup>3</sup>/h).

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

To prevent the laboratory from being accidentally contaminated by solvent waste, protect the waste container against overturning.

Use these guidelines for the API source drain:

- Use the provided Tygon™ tubing to connect the solvent waste container to the instrument.
- Use the provided black spiral tubing to connect the waste container to the exhaust system. Make sure that your lab exhaust system can accommodate this tubing (1 in. ID, 1¼ in. OD) without using reducing connectors along the solvent waste path.
- To prevent solvent waste from backing up into the mass spectrometer, make sure that all tubing is above the level of liquid in the waste container as follows:
  - From the mass spectrometer to the solvent waste container.
  - From the solvent waste container to the exhaust system.

### TIP

The cap adaptor insert of the solvent waste container has a small vent. If the exhaust port of the laboratory is always at negative pressure, Thermo Fisher Scientific recommends that you remove the cap that covers the vent. This makes the atmosphere in the

For additional information, refer to the *Orbitrap Exploris Series Operating Manual*.

## Ventilation

A significant amount of the gas that is introduced into the API source can potentially escape into the laboratory atmosphere. Therefore, provide good air exchange to prevent the accumulation of source gas in the laboratory.

## Prepare the installation

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

### Contents

- [Instrument arrival](#)
- [Installation](#)
- [Advanced training courses](#)
- [Preventive maintenance](#)

## Instrument arrival

When your lab site preparation is completed and the system is at your site, call your Thermo Fisher Scientific representative to arrange for an installation date.

### TIP

After arrival, move the instrument as packed by Thermo Fisher Scientific to a protected indoor location. The temperature of the storage site must be between  $-10$  and  $+50$  °C (14 and 122 °F). The relative humidity of the storage site must be between 20 and 80%, with a non-condensing and non-corrosive atmosphere. The maximum storage time under these conditions is four months.

## Transit damage

Thermo Scientific instruments are transported either by carriers who specialize in the handling of delicate machinery or by airfreight for long distance shipment. However, equipment occasionally gets inadvertently 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 and briefly note the damage on all copies of the receiving documents.

**NOTE**

Drivers sign (or put their initials) next to your comments to signify agreement with your observations.

- Contact your Thermo Fisher Scientific representative to report any damage and let a certified Thermo Fisher Scientific service representative check for further damage.

If the instrument shipping container, ShockWatch™, 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 rest of the site preparation.

**NOTE**

Freight insurance requires that obvious damage is 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.

**NOTE**

After arrival, move the instrument as packed by Thermo Fisher Scientific to a protected indoor location.

**Transportation risk**

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

## Installation

It is the policy of Thermo Fisher Scientific that the customer must not unpack the system or accessory items before the installation of the system.

**TIP**

Where buck/boost transformers or power conditioning units are supplied, it is the responsibility of the operator to have these units installed by an electrician before instrument installation.

A forklift or a pallet jack can help with unpacking the instrument components and transporting them in-house.

## Install the system

When your new instrument is on site and ready for installation, a certified Thermo Fisher Scientific service representative installs it.

During the installation, the certified Thermo Fisher Scientific service representative demonstrates the following:

- The basics of equipment operation and routine maintenance.
- The performance specifications that are applicable at the time of the purchase of the system.

### TIP

Consumables sent with the system are intended for use by the certified Thermo Fisher Scientific service representative during the installation.

## Key operator

Thermo Fisher Scientific recommends that you designate one person as the key operator to oversee the operation and maintenance of the system in your laboratory. This person also manages the communication between your laboratory and Thermo Fisher Scientific. Make sure that the key operator is available during the installation of your system.

### TIP

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

## Equipment needed for installation

The mass spectrometer requires a syringe pump for delivering sample solution from a syringe into the API ion source. A suitable syringe pump is shipped with the mass spectrometer. Place the syringe pump next to the API source in the accessories cabinet of the mass spectrometer.

## Calibration solution

The chemicals that are needed for the installation of the instrument do not come with the mass spectrometer. They are shipped separately as part of the Preinstallation Kit.

The Thermo Scientific™ Pierce™ FlexMix™ Calibration Solution is a mixture of 16 highly pure, ionizable components (mass ranges: 40 to 3000 *m/z*). This mixture is designed for both positive and negative ionization calibration with

the Instrument Control Software for the Orbitrap Astral mass spectrometer and other Thermo Scientific instruments that are powered by Orbitrap™ technology.

This solution comes ready-for-use, so you may directly load it into a syringe and inject it into the instrument without any preparation. The solution is also stable at room temperature for up to 18 months.

The stable solution is provided in a leak-proof, high-purity PTFE bottle.

**Table 23** Available calibration solution packages

Product name	Unit size	Product number
Pierce™ FlexMix™ Calibration Solution	10 mL	A39239

You can order the calibration solution from [www.thermofisher.com](http://www.thermofisher.com) or [www.fishersci.com](http://www.fishersci.com). The calibration solution is shipped at ambient temperature. Keep it in a dry, cool and well-ventilated place. Keep it in a properly labeled container. Store it in accordance with local regulations.



#### CAUTION

#### Hazardous chemicals


Samples and solvents might contain toxic, carcinogenic, mutagenic, or corrosive/irritant chemicals. Avoid exposure to potentially harmful materials. Always wear protective clothing, gloves, and safety glasses when you handle solvents or samples. Also contain waste streams and use proper ventilation. Refer to your supplier's Safety Data Sheet (SDS) for proper handling of a particular solvent.

## Dispose of packaging material

Upon receiving the instrument, we advise you to properly dispose of any packaging material that is used to secure the instrument during the shipping process.

Refer to the international recycling codes defined by the European commission and dispose of any packaging materials accordingly. The packaging of your instrument may differ.

**Table 24** International recycling codes

Code	Example
	The wooden crate <b>2</b> (shipping box of the instrument)




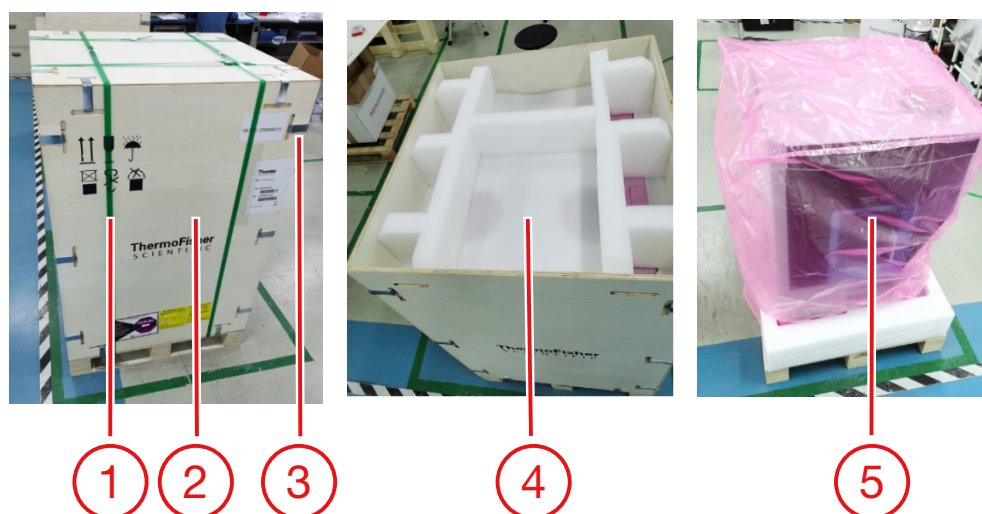
Code	Example
	All bands <b>1</b> and metal clips <b>3</b> (made of stainless steel, for example) arranged at the wooden crate
	All damping foam inlays <b>4</b> used to fix the instrument within the wooden crate (made of Polythene, for example)
	All plastic covers, bags and foils <b>5</b> (made of PE, for example)

Figure 7 Packaging materials to be disposed of correctly



No.	Description	No.	Description
1	Bands	4	Foam inlays
2	Wooden crate	5	Bags
3	Clips		

For information on waste disposal sites, refer to your local waste provider.

## Advanced training courses

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

Thermo Fisher Scientific recommends that, some time after your instrument has been installed, the key operator undergoes advanced training from Thermo Fisher Scientific for the operation and maintenance of the system.

After this training, the key operator can conduct an in-house training program on your site for your own people and can certify others to operate the instrument.

For information concerning course schedules and fees, contact your local Thermo Fisher Scientific representative.

## Preventive maintenance

Routine and preventive maintenance of the instrument is the responsibility of the operator. Included in this category are the replacement of worn parts, the exchange of operating resources, and similar activities.

Regular preventive maintenance is essential, because it increases the life of the system, results in maximum uptime of the system, and ensures optimal system performance.

### NOTE

Refer to the Operating Manual for your Thermo Scientific instrument for appropriate maintenance techniques. Refer also to the manufacturers' manuals shipped with the chiller, autosampler, and other accessories.


Your local Thermo Fisher Scientific office can provide details for different levels of service contracts.

## Customer feedback

You are encouraged to report errors or omissions in the text or index. Send an email to the Technical Documentation at [documentation.bremen@thermofisher.com](mailto:documentation.bremen@thermofisher.com). The PDF versions of our manuals allow adding comments with Adobe Acrobat Reader or other freely available PDF reader programs.

You can also send feedback about our product documentation through the Thermo Scientific Help Portal.

### Procedure

1. Go to [docs.thermofisher.com](https://docs.thermofisher.com).
2. Enter the product name in the search bar and press ENTER (or select the search icon).
3. From the search results list, select a product manual or topic.
4. Select **Send Feedback** .

The Feedback window opens.

### TIP

If you are not signed in to the Thermo Scientific Help Portal, your default email application will generate an email with a basic template for providing your feedback.

5. Enter your feedback in the text box.
6. (Optional) Select **Drop Files to Attach, or Browse** to upload supporting documents and images to your submission.
7. Select **Send**.

## Legal notices

### Contents

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- [FCC Compliance statement](#)
- [WEEE Compliance statement](#)
- [EU REACH statement](#)

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Published by:

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Revision	Release date
H	October 2025
G	February 2024
F	October 2022
E	October 2021
D	February 2021
C	May 2020
B	May 2019
A	February 2019

**FCC Compliance statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, might cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by doing one or more of the following:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the receiver into an outlet on a circuit that is different from that to which the equipment is connected.
- Consult the dealer or an experienced radio or TV technician for help.

## WEEE Compliance statement

This product is marked with the crossed-out wheeled bin symbol to indicate that it must not be disposed of with household waste. Dispose of this product at designated collection points for the recycling of electronic waste in accordance with your local regulations or contact Thermo Fisher Scientific.

**Figure 8** WEEE symbol



## EU REACH statement

The European Commission promulgated legislation that covers the registration, evaluation, authorization and restriction of chemicals within the European Union community under (EC) No 1907/2006. This regulation is commonly known as REACH. Thermo Fisher Scientific is committed to meeting all compliance obligations under REACH. As per Article 33 of the Regulation, this product may include items that contain more than 0.1% by weight of some SVHC Candidate Substance. Some electronic parts and copper alloys can contain lead.



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