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Orbitrap Tribrid Series

Getting Connected Guide

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Preface

The *Orbitrap Tribrid Series Getting Connected Guide* is intended for the following Thermo Scientific™ mass spectrometers (MS). It describes the key components and outlines how they are connected during instrument installation.

- Orbitrap™ Ascend Editions Tribrid™
 - BioPharma, MultiOmics, and Structural Biology
- Orbitrap Ascend Tribrid™
- Orbitrap Eclipse™
- Orbitrap Fusion Lumos™
- Orbitrap Fusion™
- Orbitrap IQ-X™
- Orbitrap ID-X™

NOTE

The Orbitrap Ascend Editions and Orbitrap Ascend share the same base hardware, which can be customized depending on the included options. For simplicity in documentation, the Orbitrap Ascend will be referenced by default unless specified otherwise.

Refer to the following introductory topics:

- [Access Documentation](#)
- [Special Notices, Symbols, and Cautions](#)
- [Contact Us](#)

Access Documentation

You can access product documentation using one of the following ways:

1. Go to docs.thermofisher.com.
Create a Thermo Fisher Scientific account to use more features on the documentation portal, such as bookmarking documents, saving searches, and compiling documents into collections for easy reference.
2. [Use the Data System Computer](#)
3. [Open the Help System](#)


Use the Data System Computer

To view the product manuals on the data system computer, do one of the following:

- From the Windows™ taskbar, select **Start** → **Thermo Instruments**, and open the applicable PDF file.
- From the Windows file explorer (Windows logo key + E), navigate to the following path:
C:\Program Files\Thermo Scientific\Instruments\TNG\Instrument Mode\X.X\System\Manuals

Open the Help System

To open the Tune Help or Method Editor Help, do the following as applicable:

- **Tune Help:** From the Tune application, select **Options**  and then select **Tune Help**.
- **Method Editor Help:** From the Xcalibur data system (Roadmap view), double-click **Instrument Setup**. Then select **Help** from the top menu bar and select your instrument Help.







NOTE

To access context-sensitive help from the Tune, Method Editor, or the standalone Method Editor workstation, press **F1** from within the relevant view, page, or dialog box.

Special Notices, Symbols, and Cautions

Special notices, symbols, and caution labels appear in boxes. Those pertaining to safety also have corresponding symbols. Some symbols are also marked on the instrument itself and can appear in color or in black and white. The following table describes the notices, symbols, and cautions labels.

Table 1 Special notices, symbols, and cautions

Item	Description
IMPORTANT	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: Read the cautionary information associated with this task.
	Chemical hazard: Observe safe laboratory practices and procedures when handling chemicals. Only work with volatile chemicals under a fume or exhaust hood. Wear gloves and other protective equipment, as appropriate, when handling toxic, carcinogenic, mutagenic, corrosive, or irritant chemicals. Use approved containers and proper procedures to dispose of waste oil and when handling wetted parts of the instrument.
	Heavy object: The Orbitrap Tribid Series MS weighs approximately 245–318 kg (540–704 lbs). Never try to detach and remove the instrument from its workbench; you can suffer personal injury or damage the instrument. Use caution when rolling the instrument on its workbench.
	Risk of electric shock: This instrument uses voltages that can cause electric shock and/or personal injury. Before servicing, shut down the instrument and disconnect it from line power. While operating the instrument, keep covers on.
	Risk of eye injury: Eye injury can occur from splattered chemicals, airborne particles, or sharp objects. Wear safety glasses when handling chemicals or servicing the instrument.
	Trip obstacle: Be aware of cords, hoses, or other objects located on the floor.

Contact Us

You can find information on all of the different support services of Thermo Fisher Scientific by visiting the following website:

<https://www.thermofisher.com/us/en/home/technical-resources/contact-us.html>

Connect the Forepump for the Vacuum System

Connect the forepump or forepumps to the Orbitrap Tribid Series MS and the lab exhaust system.



IMPORTANT

Read the forepump's operating and maintenance instructions, which includes the instructions for adding and changing the oil on the oil-sealed pump.

For additional details, refer to the topics below:

- [Vacuum Forepump Types](#)
- [Connect the Forepump to the Mass Spectrometer](#)
- [Connect the Forepump to the Lab Exhaust System](#)
- [Power and Remote Switch Settings \(Dry Forepump\)](#)
- [Lock the Workbench Wheels](#)

Vacuum Forepump Types

The Orbitrap Tribid Series instruments can be configured with either a dry multistage roots pump or an oil-sealed rotary vane pump. The following table describes the supported forepump configuration for the various instrument models.

Table 2 Supported forepump configuration

Instrument	Forepump
Orbitrap Ascend (all editions) Orbitrap Eclipse Orbitrap Fusion Lumos	These instruments can be configured with one of the following options: <ul style="list-style-type: none"> • Edwards nXR120i dry pump (1 required) • Edwards nXL110i dry pump (1 required) • Leybold SOGEVAC SV65 oil-sealed pump (2 required)
Orbitrap IQ-X Orbitrap ID-X Orbitrap Fusion	These instruments can be configured with one of the following options: <ul style="list-style-type: none"> • Leybold ECODRY 65 Plus dry pump (1 required) • Leybold SOGEVAC SV65 oil-sealed pump (1 required)

Connect the Forepump to the Mass Spectrometer

Follow the applicable procedure based on your forepump configuration:

- [Connect the Edwards Dry Pump \(models nXR120i and nXL110i\)](#)
- [Connect the Leybold ECODRY 65 Plus Dry Pump](#)
- [Connect the Leybold SOGEVAC SV65 Oil-Sealed Pump \(Single Pump Setup\)](#)
- [Connect the Leybold SOGEVAC SV65 Oil-Sealed Pump \(Dual Pump Setup\)](#)

IMPORTANT

For optimal forepump performance, adhere to the following:

- For a single forepump MS system, place the forepump under the workbench or within 2.4 m (8 ft) of the instrument.
- For a dual forepump MS system, place the forepumps under the workbench.
- Ensure sufficient air clearance around each forepump to prevent overheating. Refer to the forepump manufacturer's instructions.



CAUTION

Do not attempt to lift or move the forepump alone, as this can result in personal injury or equipment damage.



CAUTION

Possible pinch points

Be mindful of hand placement when removing or attaching the front panel of the workbench.

Connect the Edwards Dry Pump (models nXR120i and nXL110i)

Procedure

1. Lift up and remove the workbench's front panel.
2. Using a centering ring and swing clamp, connect one end of the vacuum hose assembly to the hose adapter on the vacuum port connection located under the front left corner of the workbench.

NOTE

The vacuum port connection is preinstalled at the factory and includes a hose adapter, 250 mm tubing, and two steel clamps.

3. Place the forepump under the workbench.
4. Connect the remaining end of the vacuum hose assembly to the forepump inlet using a mesh centering ring and swing clamp.

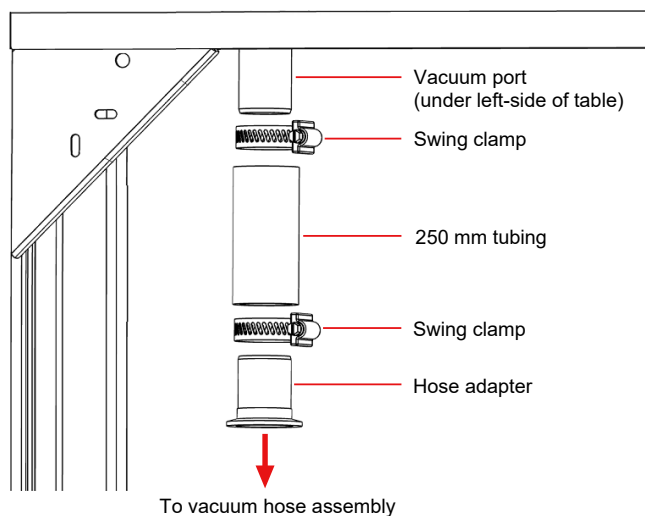
IMPORTANT

The mesh centering ring is provided with the pump from the pump manufacturer.

5. Proceed with the forepump setup. See [Connect the Forepump to the Lab Exhaust System](#).

The following figure shows the vacuum port connection from under the workbench.

Figure 1 Vacuum port connection under workbench (front view)

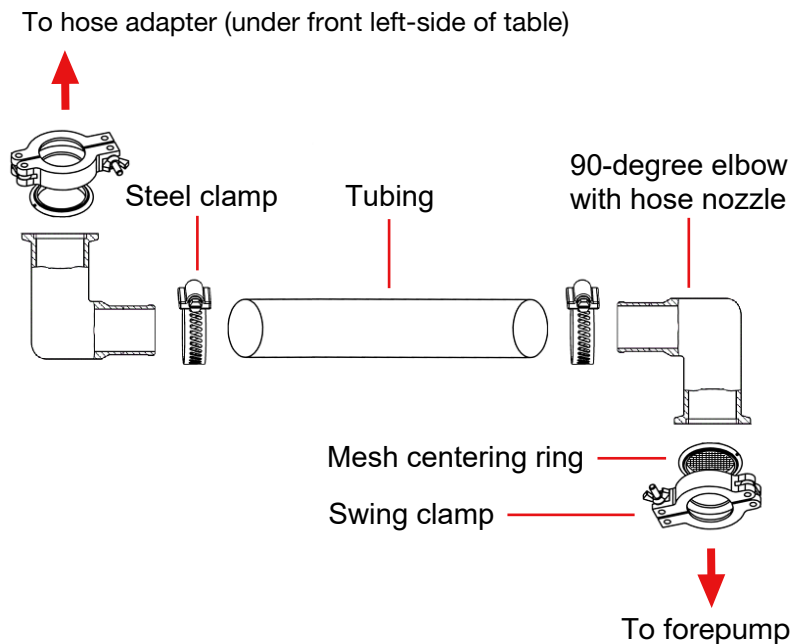


1 Connect the Forepump for the Vacuum System

Connect the Forepump to the Mass Spectrometer

The following figure shows the vacuum hose assembly diagram.

Figure 2 Vacuum hose assembly



Connect the Leybold ECODRY 65 Plus Dry Pump

Procedure

1. Lift up and remove the workbench's front panel.
2. Using a steel clamp, connect one end of the vacuum hose assembly to the vacuum port located under the front left corner of the workbench.

NOTE

For the Orbitrap Fusion and Orbitrap ID-X, the MS vacuum port is located on the rear of the instrument.

3. Place the forepump under the workbench.
4. Connect the remaining end of the vacuum hose assembly to the forepump inlet.
5. (Orbitrap Fusion and Orbitrap ID-X only) Using a centering ring and a swing clamp, connect a 90-degree elbow to the instrument's rear vacuum port with the open end facing toward the side, not the floor. Then, connect the vacuum hose assembly between the 90-degree elbow and the forepump.

1 Connect the Forepump for the Vacuum System

Connect the Forepump to the Mass Spectrometer

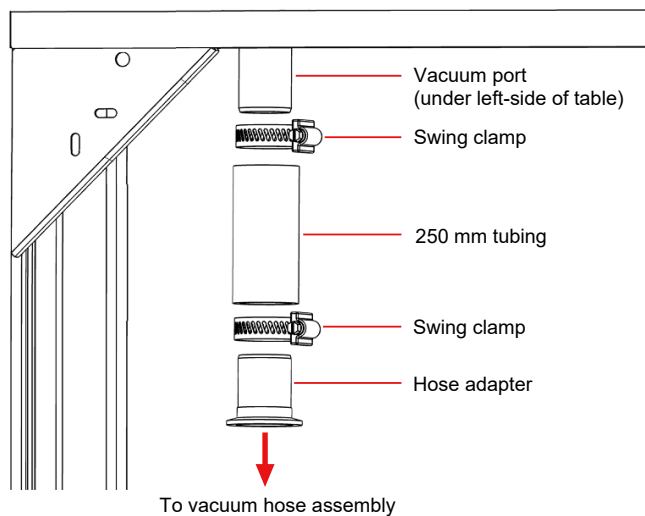
6. Proceed with the forepump setup. See [Connect the Forepump to the Lab Exhaust System](#).

1 Connect the Forepump for the Vacuum System

Connect the Forepump to the Mass Spectrometer

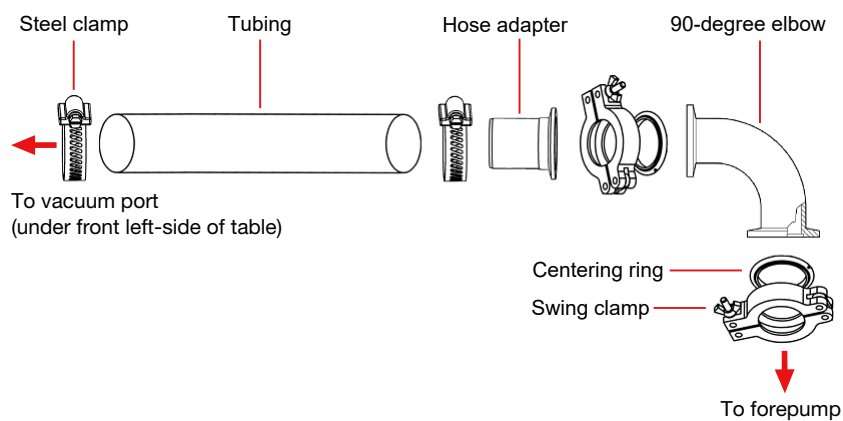
(Orbitrap IQ-X only) The following figure shows the vacuum port connection from under the workbench.

Figure 3 Vacuum port connection under workbench (front view)



(Orbitrap IQ-X only) The following figure shows the vacuum hose assembly diagram.

Figure 4 Vacuum hose assembly (Orbitrap IQ-X)

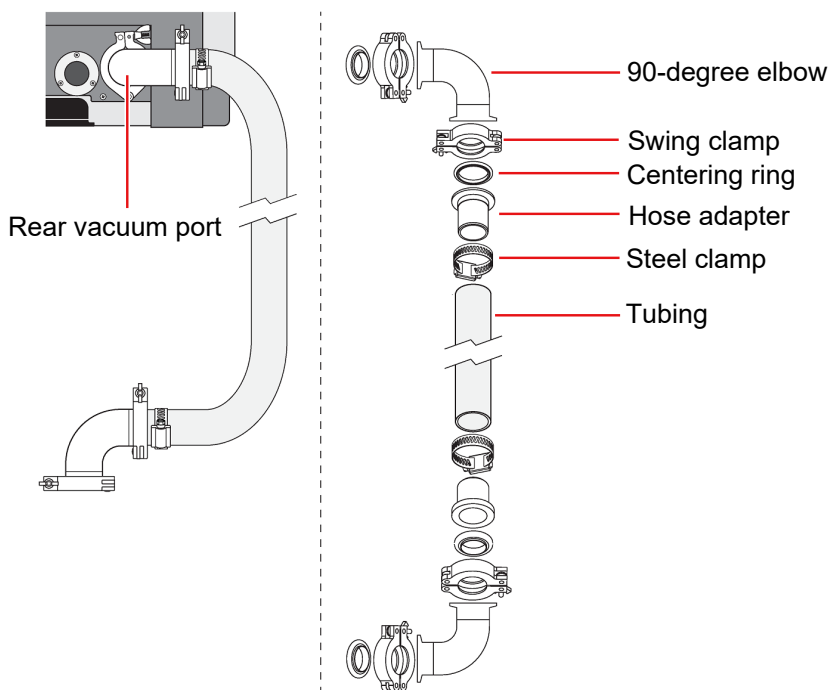


1 Connect the Forepump for the Vacuum System

Connect the Forepump to the Mass Spectrometer

(Orbitrap Fusion and Orbitrap ID-X only) The following figure shows the vacuum hose assembly connection to the rear of the MS

Figure 5 Vacuum hose assembly connection to the rear of the MS



Connect the Leybold SOGEVAC SV65 Oil-Sealed Pump (Single Pump Setup)

Procedure

1. Lift up and remove the workbench's front panel.
2. Using a steel clamp, connect one end of the vacuum hose assembly to the vacuum port located under the front left corner of the workbench.

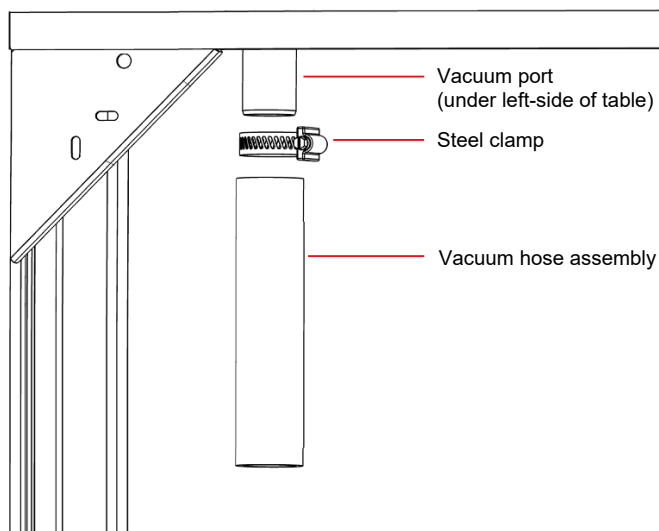
NOTE

For the Orbitrap Fusion and Orbitrap ID-X instruments, the MS vacuum port is located on the rear of the instrument.

3. Place the forepump on the metal rolling tray and move it under the workbench.
4. Connect the remaining end of the vacuum hose assembly to the forepump inlet.
5. (Orbitrap Fusion and Orbitrap ID-X only) Using a centering ring and a swing clamp, connect a 90-degree elbow to the instruments rear vacuum port with the open end facing toward the side, not the floor. Then, connect the vacuum hose assembly between the 90-degree elbow and the forepump.
6. Proceed with the forepump setup. See [Connect the Forepump to the Lab Exhaust System](#).

(Orbitrap IQ-X only) The following figure shows the vacuum port connection from under the workbench.

Figure 6 Vacuum port connection under workbench (front view)

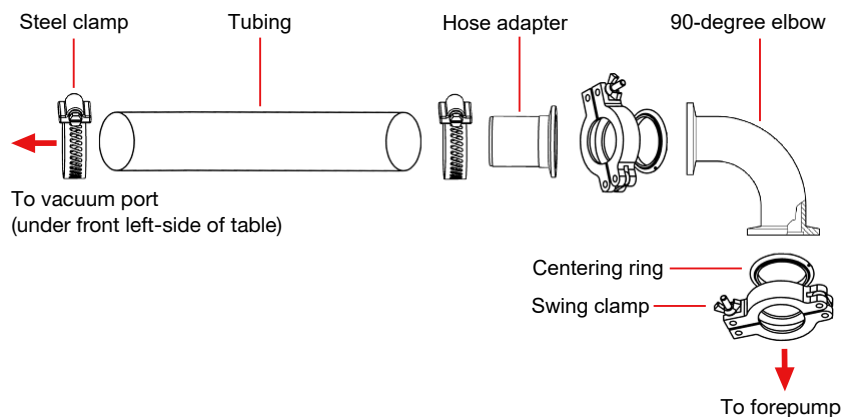


1 Connect the Forepump for the Vacuum System

Connect the Forepump to the Mass Spectrometer

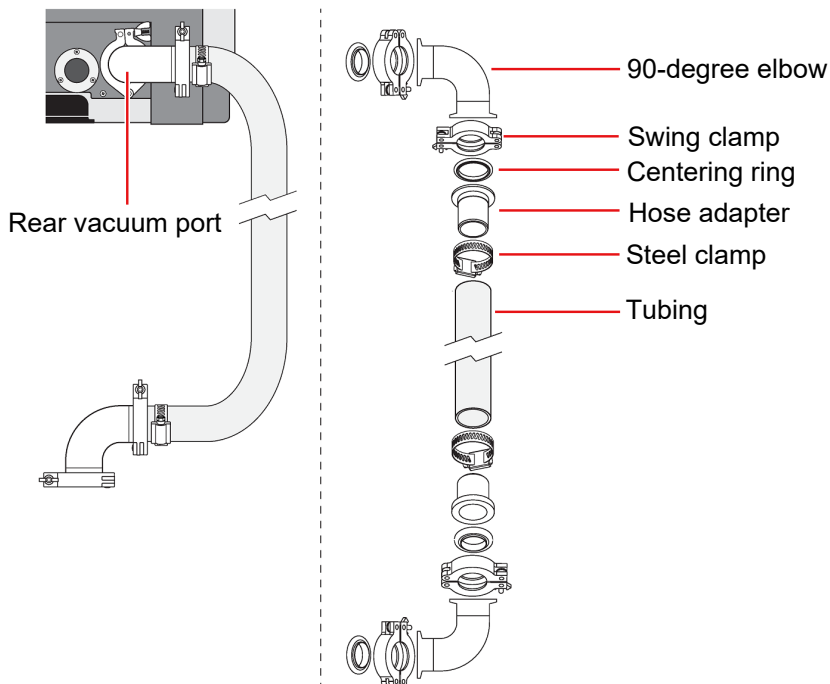
(Orbitrap IQ-X only) The following figure shows the vacuum hose assembly diagram.

Figure 7 Vacuum hose assembly (single pump setup)



(Orbitrap Fusion and Orbitrap ID-X only) The following figure shows the vacuum hose assembly connection to the rear of the MS

Figure 8 Vacuum hose assembly connection to the rear of the MS (single pump setup)



Connect the Leybold SOGEVAC SV65 Oil-Sealed Pump (Dual Pump Setup)

Procedure

1. Lift up and remove the workbench's front panel.
2. Using a centering ring and swing clamp, connect the end with the 3-port adapter of the dual vacuum hose assembly to the hose adapter on the vacuum port connection located under the front left corner of the workbench.

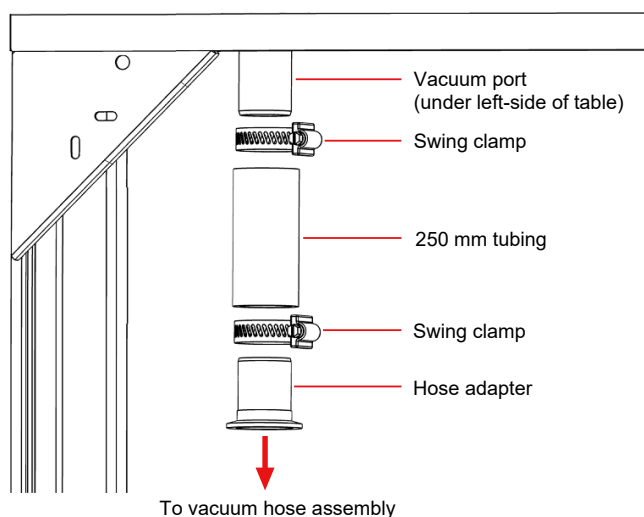
NOTE

The vacuum port connection is preinstalled at the factory and includes a hose adapter, 250 mm tubing, and two steel clamps.

3. Place the two forepumps on their metal rolling trays and move them under the workbench.
4. Using a centering ring and a swing clamp, connect a 45-degree elbow to the inlet port on each forepump. Then connect the double ends of the dual vacuum hose assembly to each forepump.
5. Proceed with the forepump setup. See [Connect the Forepump to the Lab Exhaust System](#).

The following figure shows the vacuum port connection from under the workbench.

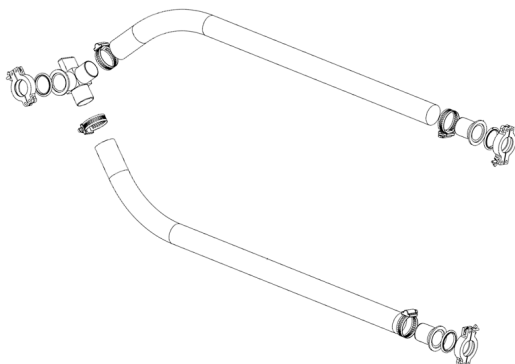
Figure 9 Vacuum port connection (table, front view)



1 Connect the Forepump for the Vacuum System
Connect the Forepump to the Mass Spectrometer

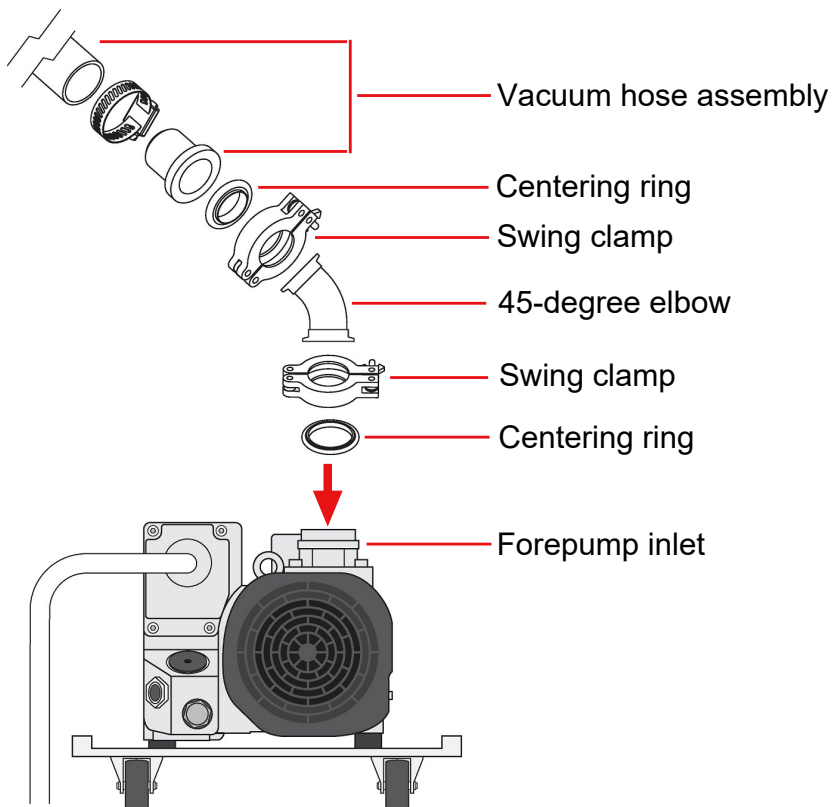
The following figure shows the dual forepump vacuum hose assembly diagram.

Figure 10 Dual forepump vacuum hose assembly



The following figure shows one end of the dual vacuum hose assembly connection to the forepump.

Figure 11 Oil-sealed pump vacuum hose connection



Connect the Forepump to the Lab Exhaust System

Most atmospheric pressure ionization (API) applications contribute to solvents accumulating in the forepump. Choose an exhaust system that can accommodate the periodic purging of these solvents. The frequency of the purging depends on the throughput of the system—never operate the pump continuously with the gas ballast valve open—make sure to close the ballast valve before venting the system.

NOTE

The Orbitrap Tribrid Series dry forepumps do not require the use of the gas ballast.

- The Edwards nXR120i and Leybold ECODRY 65 Plus dry pumps contain a gas ballast valve, ensure it is kept closed.
- The Edwards nXL110i dry pump does not contain a gas ballast valve.
- The Leybold SOGEVAC SV65 oil-sealed pump contains a gas ballast valve. Follow the forepump's manufacturers maintenance instructions.



CAUTION

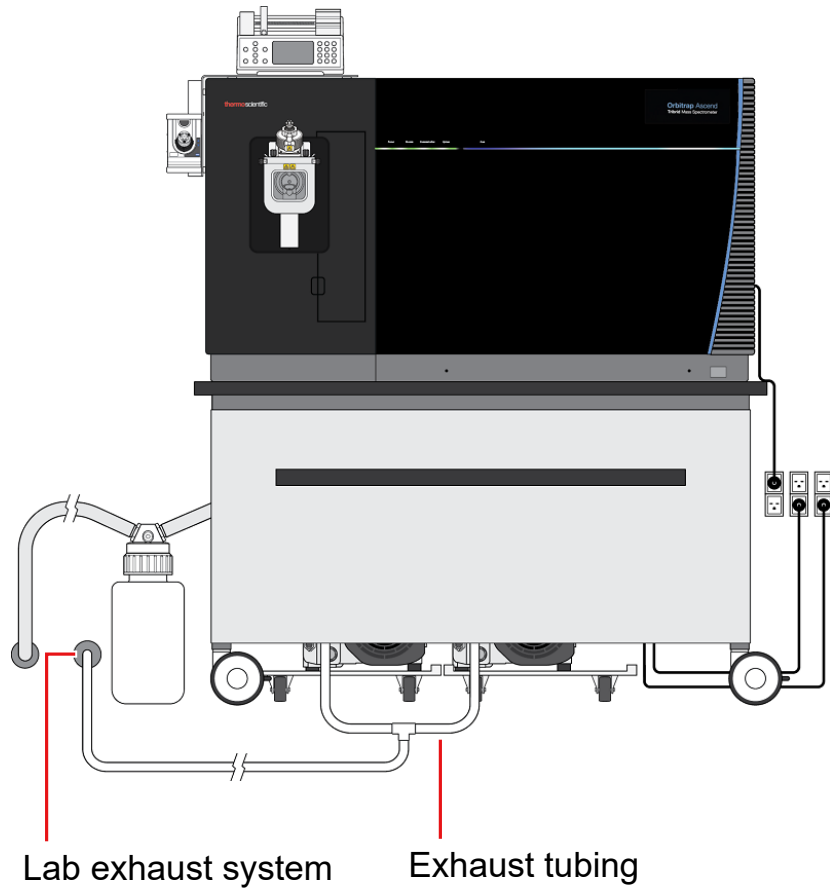
- Run the exhaust hose at floor level for at least 2 m (6.5 ft). This hose acts as a trap for exhaust fumes that would otherwise recondense in the forepump oil.
- Maintain the exhaust pressure from atmospheric pressure minus 15 mbar to 1.15 bar absolute (0.15 bar relative).
- (Oil-sealed forepump only) Although Thermo Fisher Scientific recommends that you periodically open the gas ballast valve for at least 30 minutes to purge the accumulated solvents, opening the valve might allow a large volume of volatile solvent waste to enter the fume exhaust system.
- The forepump exhaust is a health hazard. The dedicated exhaust system must be actively vented and be able to accommodate the periodic purging of the accumulated solvents in the forepump.

Procedure

1. Connect one end of the exhaust tubing to the forepump exhaust port.
2. Secure the remaining end of the exhaust tubing to the lab exhaust system.
3. Verify that the lab exhaust system valve is open, as applicable.

1 Connect the Forepump for the Vacuum System
Connect the Forepump to the Lab Exhaust System

Figure 12 Laboratory exhaust system



NOTE: Oil-sealed forepumps are shown in this example.

Power and Remote Switch Settings (Dry Forepump)

For the system to function properly, ensure that the power and remote switches on the Edwards or Leybold dry pumps are in the correct position. For more information, see the following table.



CAUTION

Connect the pump to the vacuum system before attaching the pump power supply. This will ensure that the pump cannot operate and injure anyone during the installation.

IMPORTANT

The relay control cable must be connected for proper dry forepump operation.

NOTE

The Edwards and Leybold dry pumps can be connected to the MS by using a USB communication interface and cable. Detailed pump status and pump health information is available from the Tune application Status pane (select Peripheral Devices → Foreline Pump).

Table 3 Dry forepump power and remote switch settings

Pump	Switch Positions
Edwards nXR120i	<ul style="list-style-type: none"> Mains circuit breaker: On
Edwards nXL110i	<ul style="list-style-type: none"> Mains circuit breaker: On Auto Restart switch: Off
Leybold ECODRY 65 Plus	<ul style="list-style-type: none"> Mains switch: On Start/Stop switch: On <p>IMPORTANT: Remove the bridging plug and replace it with the pump side of the instrument's remote start cable (similar to the Leybold SOGEVAC SV65 configuration).</p>

Lock the Workbench Wheels

After you position the forepump(s) and workbench, lock the workbench wheels.

Procedure

1. Lift up the workbench's front panel and remove it.
2. Lock the front wheels by moving the locking levers forward to the upright position.

The locking levers have three positions. To fully unlock the roll and swivel movements, push the levers back to the third position (almost horizontal).

3. Reattach the front panel after the wheel lock adjustment.

Connect the Nitrogen and Helium Gases

Connections and gas delivery systems might vary. You are responsible for supplying any additional fittings or connections necessary during installation. If your system includes additional devices that require their own gas connections, refer to those instruments' manuals.

For additional details, refer to the topics below:

- [Gas Supply Requirements](#)
- [Connect the Instrument Gas Lines](#)

Gas Supply Requirements

Ensure that the laboratory site meets the gas supply requirements listed in the following table.

NOTE

If your gas supply is located farther than the length of the provided tubing, you must supply appropriate tubing for the gas connections. Gas consumption values are approximate and based on continuous operation (24 hours a day, 7 days a week).



CAUTION

Contaminants in the laboratory gas lines can damage the instrument. Ensure that all gas lines are thoroughly cleaned and free of particulates and oils. Use only ultra-high purity (UHP) copper (provided) or stainless steel tubing for gas delivery. Do not use particulate filters, as they may introduce contamination. You are responsible for any damage to the instrument caused by contaminants from your gas delivery system.

Table 4 Gas supply requirements

Gas	Requirement
UHP Helium	<p>Ultra-high-purity (UHP) helium gas functions as the Linear ion trap damping gas and collision gas. The typical daily consumption is 9.22 L (0.325 ft³).</p> <ul style="list-style-type: none"> • Purity: UHP 99.995% with less than 2.0 ppm each of water, oxygen, and total hydrocarbons. • Pressure: 275 ±70 kPa (40 ±10 psi) • Tubing (provided): Pre-cleaned copper, 4.6 m (15 ft), 1/8 in OD <p>NOTE: If you intend to use helium for sparging LC solvents, you must have a second tank and regulator.</p>
UHP Nitrogen	<p>Ultra-high-purity (UHP) nitrogen gas functions as a venting gas, ion routing multipole (IRM) collision gas, and make-up gas and reagent carrier gas for the IC and ETD configurations. The typical daily consumption is 46 L (1.62 ft³).</p> <ul style="list-style-type: none"> • Purity: UHP 99.999% with less than 3.0 ppm each of water, oxygen, and total hydrocarbons. • Pressure: 345 ±70 kPa (50 ±10 psi) • Tubing (provided): Pre-cleaned copper, 4.6 m (15 ft), 1/8 in OD
HP Nitrogen	<p>High-purity (HP) nitrogen gas functions as the API source auxiliary gas, sheath gas, and sweep gas. The typical daily consumption is 11,500–26,700 L (406–943 ft³).</p> <ul style="list-style-type: none"> • Purity: HP 99% • Pressure: 690 ±140 kPa (100 ±20 psi) • Tubing (provided): Teflon™ PFA, 4.6 m (15 ft), 1/4 in OD <p>NOTE: If your system includes the optional FAIMS Pro system, you can use a Tee union to connect to the HP Nitrogen gas line. A Tee union is provided with the FAIMS Pro system.</p>

Connect the Instrument Gas Lines



CAUTION

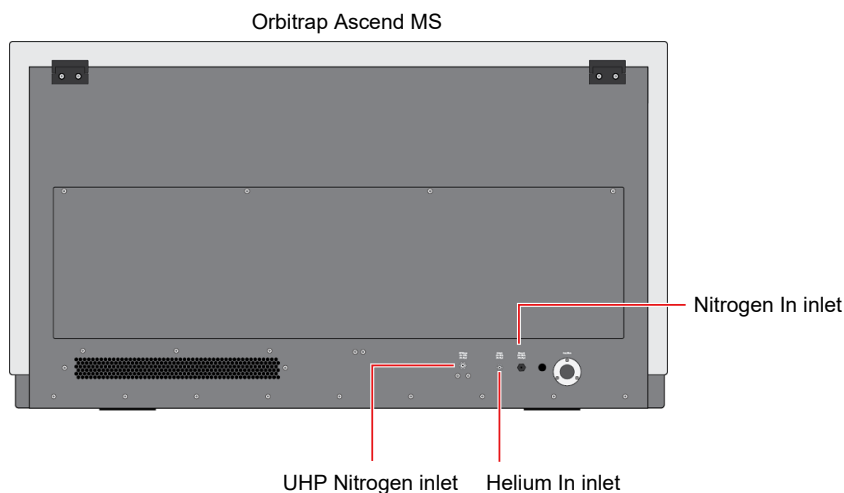
You must use either copper (provided) or stainless steel for the UHP gas lines.



CAUTION

After completing these connections, route the tubing so that they are not a trip hazard.

Figure 13 Gas inlet ports on the rear of the MS



Procedure

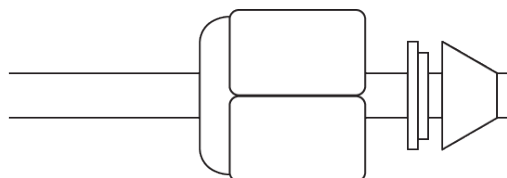
1. Cut a length of the Teflon™ PFA tubing and push it into the **Nitrogen In** inlet. On the other end, connect an appropriate fitting that connects to your HP nitrogen gas supply.
2. Cut a length of the copper tubing, attach the 1/8 inch ID Swagelok™-type nut and ferrule set, and then connect it to the **UHP Nitrogen** inlet until fingertight. On the other end, connect an appropriate fitting that connects to your UHP nitrogen gas supply.

- Cut a second length of the copper tubing, and then connect it between the **Helium In** inlet and your UHP helium gas supply.

NOTE

Use an open wrench to tighten the fitting on the gas inlet another 1/8 to 1/4 turn.

Figure 14 Swagelok fittings, 1/8 in. ID

**IMPORTANT**

- After you start using the MS, do not shut off the gases. Optimum performance requires a continuous gas flow.
- Do not shut off the UHP nitrogen gas unless you have vented the MS.
- If you intend to use helium for sparging your LC solvents, you must have a second tank and regulator.

Connect the API Source, Waste Container, and Check the Auto-Ready Enclosure

This section provides basic information on how to install the API source, the solvent waste container, and how to check the Auto-Ready™ source on the Orbitrap Ascend (all editions) and Orbitrap IQ-X instruments.

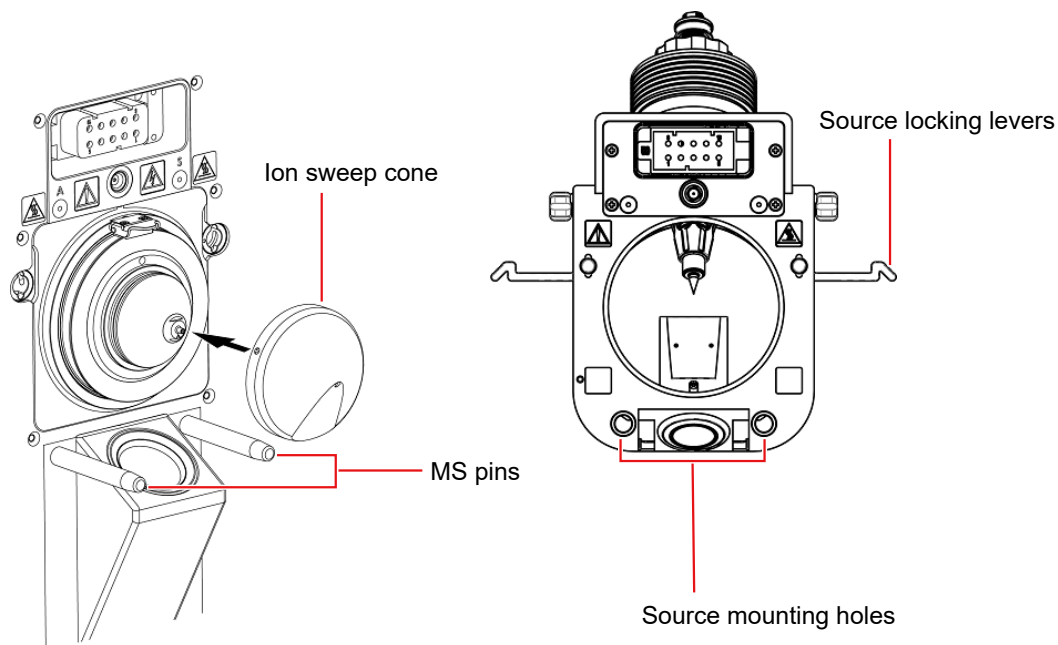
For additional details, refer to the topics below:

- [Install the API Source](#)
- [Set Up the Fume Exhaust Connections](#)
- [Connect the Solvent Waste Container](#)
- [Check the Auto-Ready Enclosure](#)

Install the API Source

All the wiring and gas plumbing for the API source are internal. This means you can install or remove the API source or change the ionization mode^a (H-ESI, APCI, or APPI) by changing the spray insert—all without the use of tools. For information about the spray inserts, optional interface kits, and switching ionization modes, refer to the API source manual.

Figure 15 API source installation



Procedure

1. Install the ion sweep cone on the MS.
2. Unlock the source locking levers located on the left and right side of the source.
3. Align the source mounting holes with the MS pins and carefully attach the source. Then, secure the source locking levers.

^a APCI and APPI modes require that you purchase and install the applicable kits.

Set Up the Fume Exhaust Connections

IMPORTANT

The laboratory must have two fume exhaust systems at minimum.

- Ensure that the exhaust tubing from the forepump connects to a dedicated fume exhaust system.

The analyzer optics become contaminated if the drain/waste tubing and the exhaust tubing from the forepump connect to the same fume exhaust system.

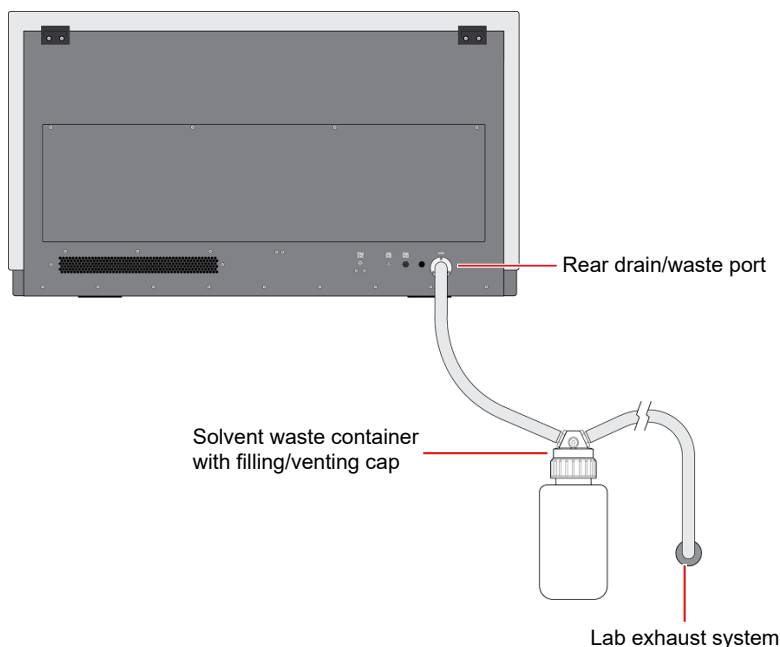
- Ensure that the waste container vents to a dedicated fume exhaust system —do not vent the Tygon™ drain tube (or any vent tubing connected to the waste container) to the same fume exhaust system that connects to the forepump.

The exhaust system for the API source must accommodate a flow rate of up to 30 L/min (64 ft³/h).

Connect the Solvent Waste Container

The MS internally routes the solvent waste from the bottom of the API source to the back drain/waste port.

Figure 16 Solvent waste container connection



Procedure

1. Attach the filling/venting cap to the solvent waste container. Then, connect the Tygon waste tubing (1 inch ID) to the cap openings.
2. Connect the tubing to the rear drain/waste port and the exhaust system.

NOTE

Use the provided Tygon tubing to connect the solvent waste container to a fume exhaust system. To prevent solvent waste from backing up into the instrument, make sure that all Tygon tubing is above the level of liquid in the waste container as follows:

- From the MS to the solvent waste container
- From the waste container to the fume exhaust system



CAUTION

After completing these connections, route the tubing so that they are not a trip hazard.

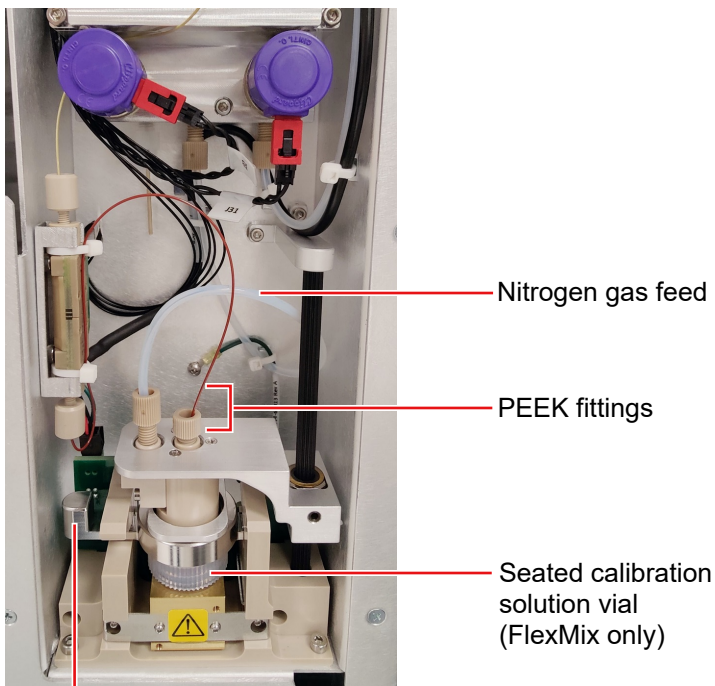
Check the Auto-Ready Enclosure

This section only applies to the Orbitrap Ascend (all editions) and Orbitrap IQ-X instruments.

The Orbitrap Ascend and Orbitrap IQ-X instruments contain the Auto-Ready™ ion source that is used exclusively to calibrate the instrument. The Thermo Fisher Scientific field service engineer verifies that the instrument is set up and running properly, which includes the following checks on the Auto-Ready components.

- Verify that the Auto-Ready calibration solvent vial is seated in place and that the vial calibration (FlexMix) solution level is full.
- Verify that the PEEK fittings are properly tightened. If a fitting is loose, tighten it by using your fingers only—do not use tools. Over-tightening the PEEK fittings can cause leaks.
- Verify that the Auto-Ready sprayer is properly installed.
- Verify that the calibration solution vial locking lever is in the locked position.

Figure 17 Auto-Ready enclosure



Vial locking lever (locked position)

NOTE

- The Auto-Ready calibration solution vial requires periodic replacement when the FlexMix calibration solution falls below a minimum level. Refer to the *Orbitrap Tribrid Series Hardware Guide* for vial replacement information.
- The Tune application continuously monitors the calibration solution level. You can view the current level from the Tune Calibration Pane, Status area.

Install the Syringe Pump and Modular Valve

Install the syringe pump and the modular divert/inject valve onto the holder bracket.

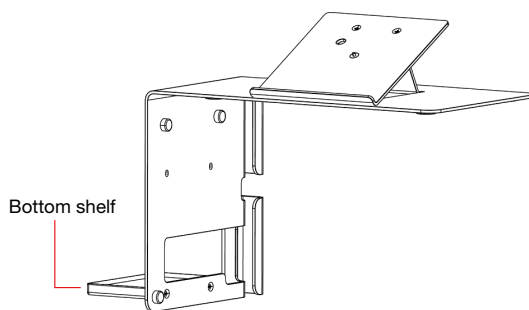
NOTE

For instructions on how to set up the syringe pump and plumb the modular valve, refer to the *Orbitrap Tribrid Series Getting Started Guide*.

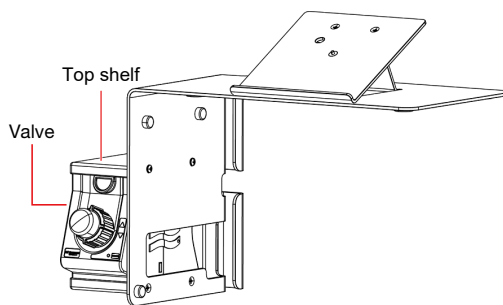
Required tool: #2 Phillips screwdriver

Procedure

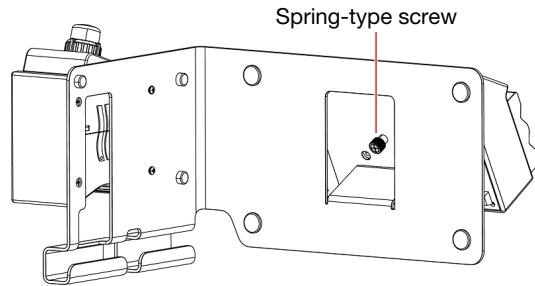
1. Attach the bottom shelf to the holder bracket using the provided screws.



2. Place the valve on the bottom shelf. Then attach the top shelf using two screws.



3. Center the bottom of the syringe pump on the top angled, support bracket. Then, using your fingers or the screwdriver, tighten the knurled, spring-type screw into the pump.



4. Place the holder bracket assembly on the top-left surface of the MS and position it, as needed.

Connect the Cables and Power Cords

Before you turn on the MS, make sure to complete all of the system connections described in this guide. Read and understand the following cautions before you make electrical connections.



CAUTION

Avoid an electric shock and equipment damage

- Before you begin the installation, verify that the Main Power switch is placed in the Off position and that the Electronics switch is placed in the Service Mode position.
- The AC Output receptacle on the MS is not used during the installation. Do not plug the forepump power cord (or any other device) into this receptacle.
- Read the warning label on the forepump. When you disconnect the forepump's power cord from the electrical outlet do not touch the plug's pins for at least 5 minutes to allow time for the voltage potential to dissipate.
- Verify that the voltage selector switch on the syringe pump is set to the appropriate voltage (110 V or 220 V) for your country or territory.



CAUTION

Safety and EMC regulations require the use of Category 5e shielded Ethernet communication cables with a maximum length of 3 m (10 ft).



CAUTION

Trip hazard

Route all cables and power cords so that it is not a trip hazard.

Use one of the following procedures based on your instrument configuration.

- [System Connections with an Edwards nXR120i Dry Pump](#)
- [System Connections with an Oil-Sealed Pump](#)

System Connections with an Edwards nXR120i Dry Pump

The following figure shows the connections between the system components and an Edwards nXR120i dry pump.

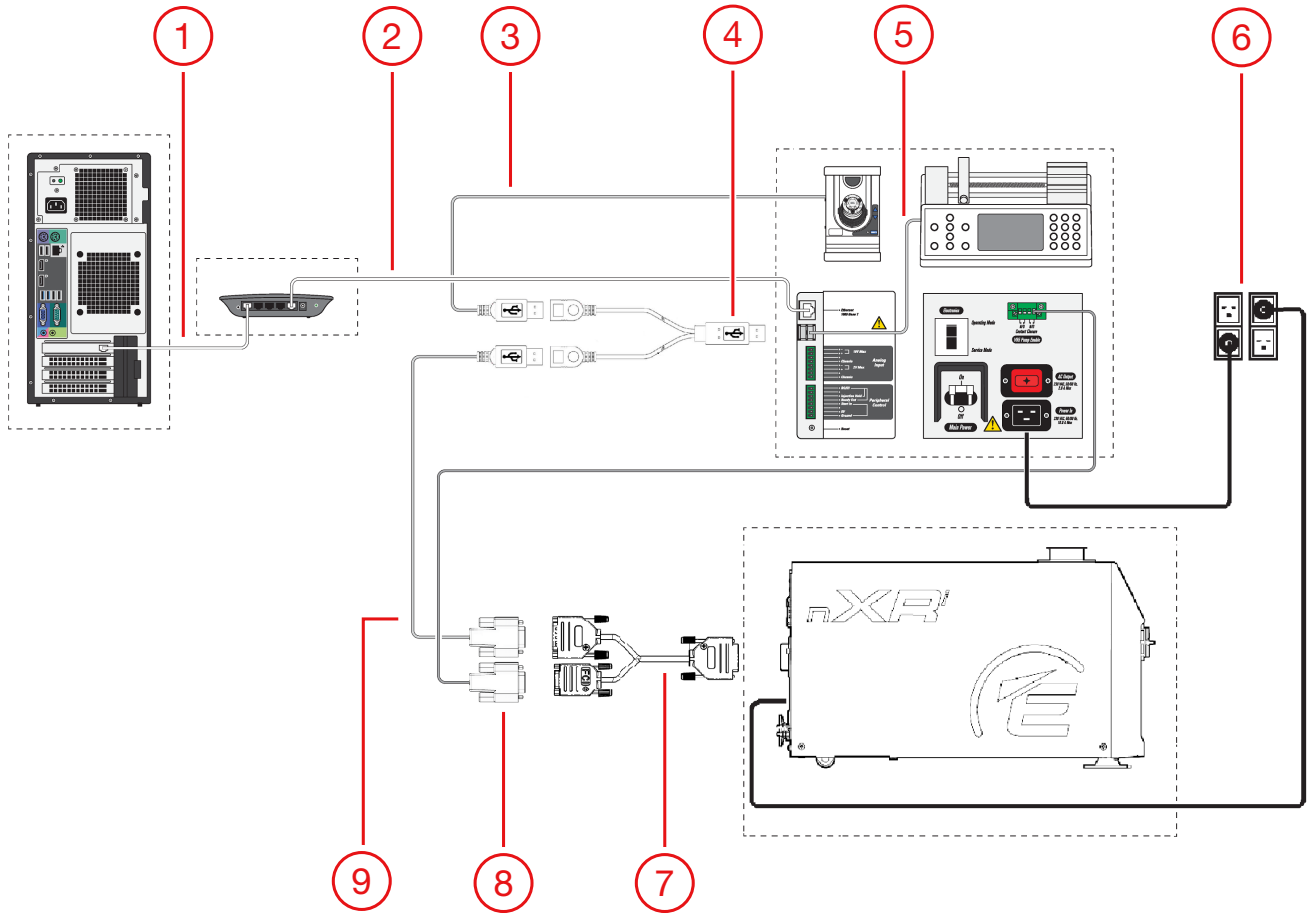
IMPORTANT

Plug the MS power cord and forepump power cord into separate dedicated electrical outlets (230 VAC); that is, circuits A and B.

NOTE

- Not all connections are shown.
- The back of your data system computer might not be as shown.
- You must provide a USB hub to accommodate any additional USB connection to the MS. For example, if you have an API source that contains the optional APPI lamp.

Figure 18 System connections with an Edwards nXR120i dry pump



No.	Description	No.	Description
1	Ethernet cable from PC to optional Ethernet switch	6	Dedicated electrical circuits for MS and forepump
2	Ethernet cable from MS to Ethernet switch	7	Y-adapter cable to forepump
3	USB cable from divert/inject valve to MS	8	Forepump relay control cable to MS
4	USB splitter adapter to MS	9	Forepump communication cable to MS
5	USB cable from syringe pump to MS		

Procedure

1. Connect an Ethernet cable from the Ethernet switch to the LC/MS Ethernet port on the instrument computer.
2. Connect an Ethernet cable from the Ethernet switch to the Ethernet port on the MS.
3. (Not shown) Connect the contact closure cable (Start In and Ground pins) and ready out cable (not provided) between the MS and the external device. See [External Devices](#).

NOTE

Be sure to use the green connector housing cover for the connector.

4. Connect a USB cable from the syringe pump to the USB port on the MS.
5. Connect a USB cable from the divert/inject valve to the USB splitter adapter. Then, connect the USB splitter adapter to the USB port on the MS.
6. Connect a relay control cable to a Y-adapter on the forepump. Then connect the remaining end to the V65 Pump Enable connector on the MS.
7. Connect a communication cable adapter (RS485 to USB) to the Y-adapter on the forepump. Then, connect the remaining end to the USB splitter adapter.

NOTE

Detailed pump status and pump health information is available from the Tune application Status pane (select **Peripheral Devices** → **Foreline Pump**).

8. Connect a power cord between the forepump and a dedicated electrical outlet (230 VAC). Then, turn on the main power switch on the rear of the forepump.
9. Connect the power cords for the instrument computer, Ethernet switch, optional divert/inject valve, syringe pump, and MS.

NOTE

If the divert/inject valve's LED remains off, press the Remote button on the front of the valve housing to exit Local mode.

System Connections with an Oil-Sealed Pump

The following figure shows the connections between the system components and two Leybold SOGEVAC SV65 oil-sealed pumps.

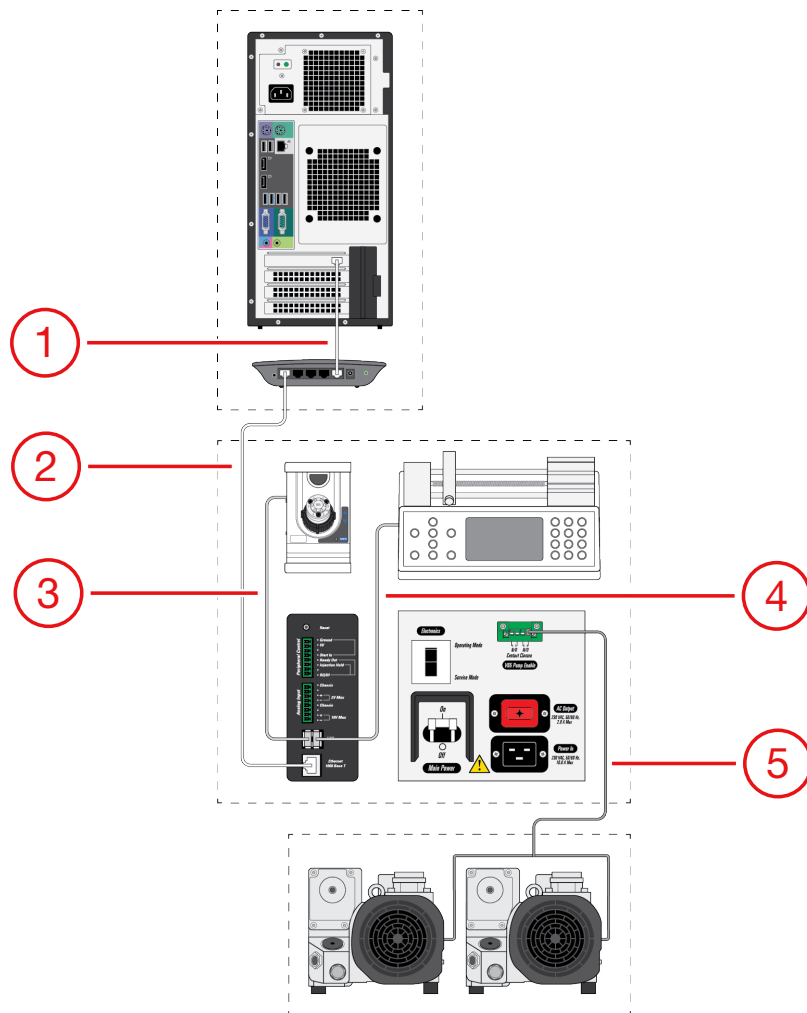
IMPORTANT

Plug the MS power cord and forepump(s) power cord into separate dedicated electrical outlets (230 VAC); that is, circuits A, B, and C for a dual forepump system.

NOTE

- Not all connections are shown.
- The back of your data system computer might not be as shown.
- You must provide a USB hub to accommodate any additional USB connection to the MS. For example, if you have an API source that contains the optional APPI lamp.

Figure 19 System connections with dual oil-sealed pumps



No.	Description	No.	Description
1	Ethernet cable from PC to optional Ethernet switch	4	USB cable from syringe pump to MS
2	Ethernet cable from MS to Ethernet switch	5	Forepump relay control to MS
3	USB cable from divert/valve to MS		

Procedure

1. Connect an Ethernet cable from the Ethernet switch to the LC/MS Ethernet port on the instrument computer.
2. Connect an Ethernet cable from the Ethernet switch to the Ethernet port on the MS.

3. (Not shown) Connect the contact closure cable (Start In and Ground pins) and ready out cable (not provided) between the MS and the external device. See [External Devices](#).

NOTE

Be sure to use the green connector housing cover for the connector.

4. Connect a USB cable from the syringe pump to the USB port on the MS.
5. Connect a USB cable from the divert/inject valve to the USB port on the MS.
6. Connect the relay control cable from the forepump(s) to the V65 Pump Enable connector on the MS.
7. Connect the power cords for the instrument computer, Ethernet switch, optional divert/inject valve, syringe pump, and MS.

NOTE

If the divert/inject valve's LED remains off, press the Remote button on the front of the valve housing to exit Local mode.

External Devices

You can connect an external liquid chromatography (LC) device that is controlled from or independent of a Thermo Scientific mass spectrometry application, such as the Thermo Xcalibur™ data system. The control of the external device is made using a contact closure cable. For instructions on how to set the external device as the start instrument for data acquisition, refer to the *Orbitrap Tribid Series Getting Started Guide*.

For additional details, refer to the topics below:

- [Contact Closure Signal](#)
- [Communication Connectors](#)

Contact Closure Signal

The Orbitrap Tribid Series MS can start data acquisition upon receiving a contact closure (start) signal from an external LC device, which is typically an autosampler. Thermo Scientific mass spectrometry applications can control external devices (for example, autosamplers, pumps, and detectors) from several manufacturers including Thermo Fisher Scientific, Agilent Technologies, and Waters Corporation.

When an external device is not controlled by a Thermo Scientific mass spectrometry application, such as the Xcalibur data system, you must properly connect it to send its contact closure (start) signal. To assemble the two-wire contact closure cable, use the contact closure mating connector (P/N 00004-21512) supplied in the MS Setup Kit and the contact closure cable provided with the LC device.

Before proceeding, verify that the external device is suitable for use with the Orbitrap Tribrid Series MS. Make sure that the signal from the external device meets the requirement stated in the pin 4 pin-out description (see [Pin-out descriptions for the communication connectors](#)). If it does not meet this requirement, you cannot use it with the MS.

To help prevent sample waste if the MS becomes unresponsive, connect a cable between the optional LC device and the MS's Ready Out and Injection Hold pins (see [Pin-out descriptions for the communication connectors](#)). Then, configure the Contact Closure settings in the Method Editor. You are responsible for providing this cable.



CAUTION

The external device providing the start signal must have proper earth grounding. Ground loops can cause problems and create a safety hazard. The complementary metal-oxide-semiconductor (CMOS) integrated circuits that are mounted on the internal input/output (I/O) PCB fail if they receive more than 5 Vdc or 5 mA.

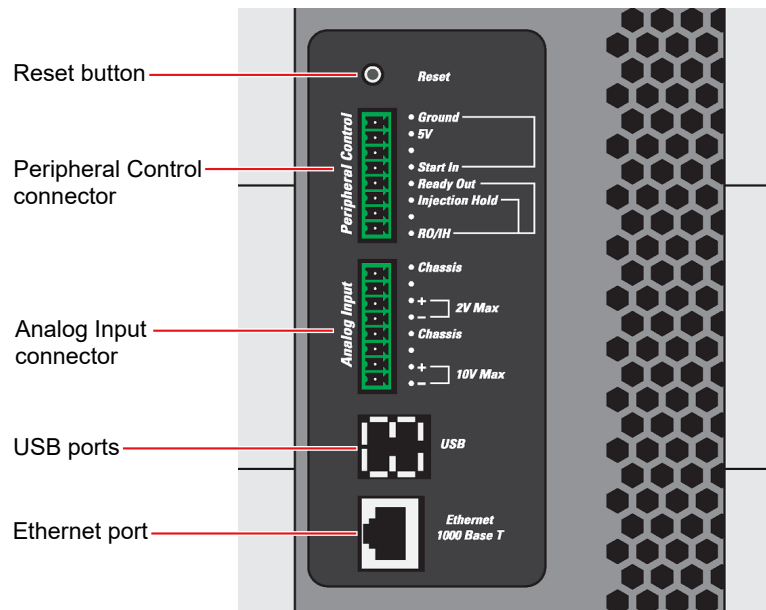
Communication Connectors

Use the communication connectors to connect the MS to the Ethernet switch, syringe pump, modular valve, and any external device.

NOTE

Be sure to use the green connector housing cover for the external device cables.

Figure 20 Communication connectors on the left side of the MS



The following table describes the pin-out descriptions for the communication connectors.

Table 5 Pin-out descriptions for the communication connectors

Pin	Name	Description
–	Reset	Resets the instrument to a power-up state. NOTE: Use this button only if the instrument does not respond to the control program on the data system computer or if you need to restart the instrument without turning off the electronics service switch.
Peripheral Control		
1	Ground	Earth ground.
2	5V	Provides a 5 Vdc, 500 mA output (with pin 1).
4	Start In	Receives the start signal from the contact closure connection of a connected external device. To activate this signal, the external device must pull the signal either low (below 0.75 Vdc) or high (above 2.4 Vdc), depending on the polarity, for at least 100 ms by using a relay, an open-collector driver, or a similar device that connects between pins 4 and 1. NOTE: In the Instrument Configuration window, set the input contact closure signal to "Transition close-to-open" or "Transition open-to-close", whichever matches the setting for the connected external device.
5	Ready Out	Provides a relay-driven programmable output signal to the connected external device. The relay opens when a method starts and closes when the method finishes. Output: Maximum 24 Vdc, 3 A
6	Injection Hold	Provides a relay-driven programmable output signal to the connected external device, such as a fraction collector. Output: Maximum 24 Vdc, 3 A NOTE: You can control this signal in the Method Editor application on the Global Parameters page in the Contact Closure Properties pane.
8	RO/IH	Common (return) connection for the Ready Out and Injection Hold pins.
Analog Input		
The two analog channels connect to two separate 12-bit analog-to-digital converters (ADC) for on-demand conversion of the input voltage. The conversion rate depends on the MS rate.		
1	Chassis	Earth ground (for pins 3 and 4).

Pin	Name	Description
3, 4	2V Max: + (positive, pin 3) and – (negative, pin 4)	(Channel 2) Provides a connection for an external device, such as an LC instrument. Input: 0–2 Vdc (voltage clamps at 5 Vdc)
5	Chassis	Earth ground (for pins 7 and 8).
7, 8	10V Max: + (positive, pin 7) and – (negative, pin 8)	(Channel 1) Provides a connection for an external device, such as an LC instrument. Input: 0–10 Vdc (voltage clamps at 15 Vdc)

Other Connectors

–	USB (2 ports)	Provides a connection for the syringe pump, modular valve, dry forepump, or optional APPI source. The USB communication cable between the dry forepump and MS is necessary only if you want readback information in the Tune application. NOTE: A USB hub is required for three or more connections.
–	Ethernet 1000 Base T	Provides a connection for the Ethernet switch.

Part Numbers

This section provides a comprehensive list of part numbers for the components that are referenced in this guide.

- [Syringe Pump and Modular Valve Assembly](#)
- [MS Setup Kit](#)
- [Edwards nXR120i Dry Pump Kit](#)
- [Edwards nXL110i Dry Pump Kit](#)
- [Leybold ECODRY 65 Plus Dry Pump Kit](#)
- [Single Oil-Sealed Pump Kit](#)
- [Dual Oil-Sealed Pump Kit](#)
- [Power Cords](#)

Syringe Pump and Modular Valve Assembly

Item	Part Number
Chemyx™ Fusion F100-X syringe pump	B51006907
Rheodyne™ divert/inject valve (modular), 6-port, 2-position	00109-99-00046
Holding bracket for divert/inject valve and syringe pump	B51005404

MS Setup Kit

Item	Part Number
Communications Connection	
MINI-COMBICON™ contact closure connector, 8-pin	00004-21512
MINI-COMBICON contact closure connector cover	00004-21514
Ethernet cable, shielded Cat5, 2.1 m (7 ft) long	00302-99-00036
Phihong Ethernet power supply (rated 100–240 VAC, 50/60 Hz, 12 Vdc, 1.6 A output)	00012-01-00039
Ethernet switch, 5-port gigabit	00825-01-00111
Gas Connections	
NOTE: Additional fittings that are required to connect the copper and PFA tubings to the gas supply lines must be provided by the customer.	
Swagelok brass front ferrule, 1/4 in ID	00101-10000
Swagelok brass front ferrule, 1/8 in ID	00101-08500
Swagelok brass back ferrule, 1/4 in ID	00101-04000
Swagelok brass back ferrule, 1/8 in ID	00101-02500
Swagelok brass nut, 1/4 in ID	00101-12500
Swagelok brass nut, 1/8 in ID	00101-15500
Copper tubing, 0.065 in ID x 1/8 in OD, 4.6 m (15 ft) long (for the UHP helium and UHP nitrogen gases) ^b	00301-22701
Teflon PFA tubing, 1/4 in ID, 0.25 in OD, 4.6 m (15 ft) long (for the HP nitrogen gas)	00101-50100
Solvent Waste Connection	
Nalgene™ 4 L waste container with filling/venting cap	80100-20265
Drain hose adapter with O-ring	70111-20971

^b Your order ships with a second length of copper tubing outside of this kit.

Item	Part Number
Tygon tubing, 1 in ID x 1-3/8 in OD, 3 m (10 ft) long (for the drain/waste line)	00301-01-00020

Edwards nXR120i Dry Pump Kit

This kit includes the Edwards nXR120i dry pump, accessories kit, and various other parts required for the installation.

Item	Part Number
Dry pump kit	B51000137
Edwards nXR120i dry pump	B51000097
Pump relay control cable, nXR	B51000125
Communication cable, USB to RS485	80000-63223
Y-adapter for pump relay control and communication cables, nXR	B51000122
Y-cable, USB splitter	00825-01-00212
Pump vacuum hose assembly, KF40	B51000135
Reducer fitting, NW25/16	00108-02-00066
90-degree elbow with hose nozzle, 0.67 inch tube, NW16	00108-02-00077
Clamp ring, NW10/16	00108-02-00065
Swing clamp, KF20/KF25	00102-10020
Centering ring, NW25	00108-02-00033
Centering ring, NW16	00108-02-00026
Tygon tubing, 1/2 in ID x 3/4 in OD, 3 m (10 ft) long	00301-22920

Edwards nXL110i Dry Pump Kit

This kit includes the Edwards nXL110i dry pump, accessories kit, and various other parts required for the installation.

Item	Part Number
Dry pump kit	80011-62023
Edwards nXL110i dry pump	00108-01-00055
Pump relay control cable	80111-63030
(Optional) Communication cable, USB to RS485	80000-63223
Y-adapter for pump relay control and communication cables, nXL	80000-63224

Item	Part Number
Pump vacuum hose assembly, KF50/KF40	80011-60177
Reducer fitting, NW25/16	00108-02-00066
90-degree elbow with hose nozzle, 0.67 inch tube, NW16	00108-02-00077
Swing clamp, KF20/KF25	00102-10020
Clamp ring, NW10/16	00108-02-00065
Centering ring, NW25	00108-02-00033
Centering ring, NW16	00108-02-00026
Tygon tubing, 1/2 in ID x 3/4 in OD, 3 m (10 ft) long	00301-22920

Leybold ECODRY 65 Plus Dry Pump Kit

This kit includes the Leybold ECODRY 65 plus dry pump, accessories kit, and various other parts required for the installation.

Item	Part Number
Dry pump kit (for Orbitrap IQ-X)	80044-62001
Dry pump kit (for Orbitrap Fusion and Orbitrap ID-X)	80111-62055
Leybold ECODRY 65 plus dry pump	00108-01-00052
Single pump relay control cable, 2.4 m (8 ft) long (preassembled)	80000-63139
Communication cable, USB to RS485	80000-63223
Y-cable, USB splitter	00825-01-00212
Single pump vacuum hose assembly, KF40	80000-60229
90-degree aluminum elbow kit, NW40 (includes swing clamp and centering ring)	97055-62036S
Tygon tubing, 1/2 in ID x 3/4 in OD, 3 m (10 ft) long	00301-22920

Single Oil-Sealed Pump Kit

This kit includes the Leybold SOGEVAC SV65 oil-sealed pump, accessories kit, and various other parts required for the installation.

Item	Part Number
Single oil-sealed pump kit	80100-62004
Leybold SOGEVAC SV65 oil-sealed forepump	00108-01-00032
Stainless steel tray with caster wheels for oil-sealed forepump	00201-99-00549

Item	Part Number
Single pump relay control cable, 2.4 m (8 ft) long (preassembled)	80000-63139
Single pump vacuum hose assembly, KF40	80000-60229
90-degree aluminum elbow, NW40 ^c	00108-02-00010
Centering ring, NW40 ^c	00108-02-00005
Swing clamp, NW32/40 ^c	00108-02-00004
Tygon™ tubing, 1/2 in ID x 3/4 in OD, 3 m (10 ft) long	00301-22920

Dual Oil-Sealed Pump Kit

This kit includes two Leybold SOGEVAC SV65 oil-sealed pumps, accessories kit, and various other parts required for the installation.

Item	Part Number
Dual oil-sealed pump kit	80011-62006
Leybold SOGEVAC SV65 oil-sealed forepump	00108-01-00032
Stainless steel tray with caster wheels for oil-sealed forepump	00201-99-00549
Dual pump relay control cable, 2.4 m (8 ft) long (preassembled)	80100-63146
Dual pump vacuum hose assembly with 45-degree elbows and connection parts (preassembled)	80011-60077
Barbed nylon fitting Tee, 1/2 in ID	00103-01-00012
Tygon tubing, 1/2 in ID x 3/4 in OD, 3 m (10 ft) long	00301-22920

Power Cords

IMPORTANT

Follow all applicable safety regulations in your region. If the supplied power cord is incompatible with the local electrical outlet, stop the installation and contact [Thermo Fisher Scientific](#). Replace any damaged cables only with manufacturer-approved replacements.

Item	Part Number
Mass Spectrometer	
North America: NEMA 6-15 plug, rated 250 VAC, 15 A, 2.5 m (8 ft) long	96000-98035
International: CEE (3-pole) plug, rated 250 VAC, 16 A, 2.5 m (8 ft) long	80000-63188

^c Only one piece is required

Item	Part Number
Dry Forepump (Edwards nXR120i, Edwards nXL110i, and Leybold ECODRY 65 Plus)	
North America: NEMA 6-15 plug, rated 250 VAC, 15 A, 2.5 m (8 ft) long	96000-98035
International: CEE (3-pole) plug, rated 250 VAC, 16 A, 2.5 m (8 ft) long	80000-63188
Oil-Sealed Forepump (Leybold SOGEVAC SV65)	
North America: NEMA 6-15 plug, rated 250 VAC, 15 A, 2.5 m (8 ft) long	Provided with the pumps
International: CEE (3-pole) plug, rated 250 VAC, 16 A, 2.5 m (8 ft) long	80000-63186

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Refer to the following topics for information about our copyright and trademark protection, regulatory compliance, instrument notices, and directives.

- [Copyright and Trademarks](#)
- [Regulatory Compliance](#)
- [FCC Compliance Statement](#)
- [Notice on the Use and Handling of Thermo Scientific Instruments](#)
- [WEEE Directive 2012/19/EU](#)

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Regulatory Compliance

Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable North American and European regulations. Your system meets the applicable requirements in the electromagnetic compatibility (EMC) and product safety standards described in this section.

Unauthorized changes that you make to your system will void regulatory compliance and may defeat the built-in protections for your instrument. Some examples of unauthorized changes include using replacement parts or adding components, options, or peripherals that Thermo Fisher Scientific has not qualified and authorized. Unauthorized changes can also result in bodily injury and/or damage to your system and laboratory.

Ensure continued compliance with regulatory standards:

- Follow all installation instructions provided in the documentation that comes with your system.
- Order replacement parts (as specified in the instrument manual) and additional components, options, and peripherals directly from Thermo Fisher Scientific or an authorized representative.

For additional details, refer to the regulatory compliance results for the following Thermo Scientific™ mass spectrometers:

- [Orbitrap Ascend Editions and Orbitrap Ascend](#)
- [Orbitrap Eclipse, Orbitrap Fusion Lumos, and Orbitrap IQ-X](#)
- [Orbitrap Fusion and Orbitrap ID-X](#)

Orbitrap Ascend Editions and Orbitrap Ascend

This instrument complies with the following low voltage directives, EMC test standards, and harmonized safety standards.

Table 6 Low Voltage Directive 2014/35/EU

• CSA C22.2 No. 61010-1-12 + GI1 + GI2 (2017) + A1; UL 61010-2-081: 2019	• EN 61010 1: 2010 + A1: 2019
• CSA C22.2 No. 61010-2-081:19	• UL 61010-1: 2012 (R7.19)
• EN IEC 61010-2-081: 2020	

Table 7 EMC Directive 2014/30/EU and other EMC test standards

• AS CISPR 11: 2017 + A1: 2020	• EN/IEC 61000-4-11: 2004
• BSMI 13438	• EN/IEC 61000-4-4: 2012
• CNS 13803	• EN/IEC 61000-4-5: 2014
• EN 55011: 2009 + A1: 2010	• FCC Part 15 Subpart B, Class A: 2022
• EN 61000-4-2: 2009, IEC 61000-4-2: 2008	• ICES-003 Issue 7
• EN 61000-4-3: 2006 + A1: 2008 + A2: 2010	• IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010
• EN 61000-4-6: 2014, IEC 61000-4-6: 2013	• IEC 61326-1: 2020
• EN 61000-4-8: 2010, IEC 61000-4-8: 2009	• J55011: 2010 & VCCI-CISPR 32: 2016
• EN/IEC 61000-3-3: 2013	• JIS C61000-3-2, EN 61000-3-2: 2019 610000-3-2: 2018

Orbitrap Eclipse, Orbitrap Fusion Lumos, and Orbitrap IQ-X

These instruments comply with the following low voltage directives, EMC test standards, and harmonized safety standards.

Table 8 Low Voltage Directive 2014/35/EU

• CSA C22.2 No. 61010-1-12 + GI1 + GI2 (2017) + A1; UL 61010-2-081: 2019	• EN 61010 1: 2010 + A1: 2019
• CSA C22.2 No. 61010-2-081:19	• UL 61010-1: 2012 (R7.19)
• EN IEC 61010-2-081: 2020	

Table 9 EMC Directive 2014/30/EU and other EMC test standards applicable to Orbitrap Eclipse and Orbitrap Fusion Lumos

• 47 CFR 15, Subpart B, Class A: 2017	• EN 61000-4-3: 2006 + A1 + A2: 2010
---------------------------------------	--------------------------------------

• CISPR 11: 2009 + A1: 2010	• EN 61000-4-4: 2004 + A1: 2010
• EN 55011: 2009 + A1: 2010	• EN 61000-4-5: 2006
• EN 61000-3-2: 2006 + A1 + A2: 2009	• EN 61000-4-6: 2009
• EN 61000-3-3: 2008	• EN 61000-4-8: 2010
• EN 61000-4-11: 2004	• EN 61326-1: 2013
• EN 61000-4-2: 2009	• ICES-003 Issue 6

Table 10 EMC Directive 2014/30/EU and other EMC test standards applicable to Orbitrap IQ-X

• AS/NZS CISPR 11: 2009/A1: 2010	• EN 61326-1: 2013
• CISPR 11: 2009 + A1: 2010	• EN 61326-2-6: 2013
• EN 61000-3-2: 2018	• EN/IEC 61000-4-11: 2004
• EN 61000-3-3: 2013	• EN/IEC 61000-4-4: 2012
• EN 61000-4-2: 2009, IEC 61000-4-2: 2008	• EN/IEC 61000-4-5: 2014
• EN 61000-4-3: 2006: + A1: 2008 + A2: 2010, IEC 61000-4-3:2006 + A1: 2007 + A2: 2010	• FCC Part 15 Subpart B, Class A: 2021
• EN 61000-4-6: 2014, IEC 61000-4-6: 2013	• ICES-003 Issue 7
• EN 61000-4-8: 2010, IEC 61000-4-8: 2009	• J55011: 2010

Orbitrap Fusion and Orbitrap ID-X

These instruments comply with the following low voltage directives, EMC test standards, and harmonized safety standards.

Table 11 Low Voltage Directive 2014/35/EU

• CSA C22.2 No. 61010-1-12 + GI1 + GI2 (2017) + A1; UL 61010-2-081: 2019	• EN IEC 61010-2-081: 2020
• CSA C22.2 No. 61010-2-081: 19	• UL 61010-1:2012 (R7.19)
• EN 61010 1: 2010 + A1: 2019	

Table 12 EMC Directive 2014/30/EU and other EMC test standards

• 47 CFR 15, Subpart B, Class A: 2012	• EN 61000-4-3: 2006 + A1 + A2
• AS/NZS CISPR 22: 2009 + A1	• EN 61000-4-4: 2004 + A1
• CISPR 11: 2009 + A1	• EN 61000-4-5: 2006
• EN 55011: 2009 + A1	• EN 61000-4-6: 2009
• EN 61000-3-2: 2006 + A1 + A2	• EN 61000-4-8: 2010

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- EN 61000-3-3: 2008
 - EN 61326-1: 2013
 - EN 61000-4-11: 2004
 - ICES-003: 2012
 - EN 61000-4-2: 2009
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FCC Compliance Statement

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Notice on the Use and Handling of Thermo Scientific Instruments



CAUTION

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

Notice on the Proper use of Thermo Scientific Instruments

In compliance with international regulations: This instrument must be used in the manner specified by Thermo Fisher Scientific to ensure protections provided by the instrument are not impaired. Deviations from specified instructions on the proper use of the instrument include changes to the system and part replacement. Accordingly, order replacement parts from Thermo Fisher Scientific or one of its authorized representatives.

Notice on the Handling of Thermo Scientific Instruments

For your safety and in compliance with international regulations, the physical handling of this Thermo Fisher Scientific instrument requires a team effort to move or lift. This instrument is too large and heavy for one person to handle safely.

WEEE Directive 2012/19/EU

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EU. It is marked with the following symbol.



This symbol indicates that the equipment must not be thrown into general waste and must be collected separately and processed in accordance with local and state requirements.

Thermo Fisher Scientific is registered with one or more recycling/disposal companies in the United Kingdom, the European Union, and Norway.

If this product is located in Europe and you want to participate in the Thermo Fisher Scientific Business-to-Business (B2B) Recycling Program, send an email request to weee.recycle@thermofisher.com with the following information:

- WEEE product class
- Name of the manufacturer or distributor (where you purchased the product)
- Number of product pieces, and the estimated total weight and volume
- Pick-up address and contact person (include contact information)
- Appropriate pick-up time
- Declaration of decontamination, stating that all hazardous fluids or material have been removed from the product

For additional information about the Restriction on Hazardous Substances (RoHS) Directive for the European Union, search for RoHS on the Thermo Fisher Scientific European language websites.

IMPORTANT

This recycling program is not for biological hazard products or for products that have been medically contaminated. You must treat these types of products as biohazard waste and dispose of them in accordance with your local regulations.