



Orbitrap Tribrid Series

Getting Connected Guide

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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.

Regulatory compliance results for the following Thermo Scientific™ mass spectrometers:

- [Orbitrap Fusion Lumos](#)
- [Orbitrap Fusion and Orbitrap ID-X](#)

Orbitrap Fusion Lumos

Low Voltage Directive 2014/35/EU

This device complies with Low Voltage Directive 2014/35/EU and the harmonized safety standard IEC/EN/CSA/UL 61010-1, 3rd Edition.

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

This device was tested by TÜV Rheinland of North America and complies with the following EMC standards:

| | | |
|-------------------------------------|------------------------------|---------------------|
| 47 CFR 15, Subpart B, Class A: 2015 | EN 61000-3-2: 2006 + A1 + A2 | EN 61000-4-5: 2006 |
| CISPR 11: 2009 + A1 | EN 61000-3-3: 2008 | EN 61000-4-6: 2009 |
| ICES-003: 2014 | EN 61000-4-2: 2009 | EN 61000-4-8: 2010 |
| EN 55011: 2009 + A1 | EN 61000-4-3: 2006 + A1 + A2 | EN 61000-4-11: 2004 |
| EN 61326-1: 2013 | EN 61000-4-4: 2004 + A1 | |

Orbitrap Fusion and Orbitrap ID-X

Low Voltage Directive 2014/35/EU

This device complies with Low Voltage Directive 2014/35/EU and the harmonized safety standard IEC/EN/CSA/UL 61010-1, 3rd Edition.

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

This device was tested by TÜV Rheinland of North America and complies with the following EMC standards:

| | | |
|-------------------------------------|------------------------------|-------------------------|
| 47 CFR 15, Subpart B, Class A: 2012 | EN 61326-1: 2013 | EN 61000-4-4: 2004 + A1 |
| CISPR 11: 2009 + A1 | EN 61000-3-2: 2006 + A1 + A2 | EN 61000-4-5: 2006 |
| AS/NZS CISPR 22: 2009 + A1 | EN 61000-3-3: 2008 | EN 61000-4-6: 2009 |
| ICES-003: 2012 | EN 61000-4-2: 2009 | EN 61000-4-8: 2010 |
| EN 55011: 2009 + A1 | EN 61000-4-3: 2006 + A1 + A2 | EN 61000-4-11: 2004 |

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, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.



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.

WEEE Directive 2012/19/EU



Thermo Fisher Scientific is registered with B2B Compliance ([B2Bcompliance.org.uk](https://www.b2bcompliance.org.uk)) in the UK and with the European Recycling Platform ([ERP-recycling.org](https://www.eur-recycling.org)) in all other countries of the European Union and in 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.

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Preface

The *Orbitrap Tribrid Series Getting Connected Guide* is intended for the following Thermo Scientific™ mass spectrometers (MSs):

- Orbitrap Fusion™ (also known as Fusion™)
- Orbitrap Fusion Lumos™ (also known as Lumos™)
- Orbitrap ID-X™ (also known as ID-X™)

This guide describes how to install the MS system in your laboratory and connect any external liquid chromatography (LC) devices. External devices include those that are controlled from or are independent of Thermo Scientific mass spectrometry applications, such as the Thermo Xcalibur™ data system. For a list of hardware differences for this MS series, see [Model Differences](#).

Also, because this guide uses drawings of various connections and component parts to help illustrate procedures, be sure to start from [1](#), no matter where it appears.

IMPORTANT Thermo Fisher Scientific field service engineers access internal components by opening the top cover. Ensure that the instrument location allows for a vertical clearance of at least 92 cm (36 in.) above the instrument. For additional clearance guidelines, refer to the Preinstallation Requirements Guide.

Contents

- [Accessing Documentation](#)
- [Providing Documentation Feedback](#)
- [Special Notices, Symbols, and Cautions](#)
- [Model Differences](#)
- [Contacting Us](#)

Accessing Documentation

The Orbitrap Tribrid Series MS includes complete documentation.

- [Viewing the Product Manuals](#)
- [Viewing Online User Documentation](#)

For system requirements, refer to the release notes on the software DVD.

Viewing the Product Manuals

The Thermo Fisher Scientific service engineer installs the instrument control applications and the instrument manuals on the data system computer.

❖ To view the product manuals

From the Microsoft™ Windows™ taskbar, choose **Start > All Apps** (Windows 10) or **All Programs** (Windows 7) > **Thermo Instruments > model x.x**, and then open the applicable PDF file.

Viewing Online User Documentation

Visit the Thermo Fisher Scientific website for product manuals and more.

❖ To view user documentation from the Thermo Fisher Scientific website

1. Go to thermofisher.com.
2. Point to **Services & Support** and click **Manuals** on the left.
3. In the Refine Your Search box, search by the product name.
4. From the results list, click the title to open the document in your web browser, save it, or print it.

To return to the document list, click the browser **Back** button.

Providing Documentation Feedback

❖ To suggest changes to the documentation or to the Help







Complete a brief survey about this document by clicking the button below.
Thank you in advance for your help.



Special Notices, Symbols, and Cautions

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. Some symbols are also marked on the instrument itself and can appear in color or in black and white. For complete definitions, see [Table 1](#).

Table 1. Notices, symbols, labels, and their meanings




| Notice, symbol, or label | Meaning |
|---|---|
| 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 Tribrid Series MS, excluding its workbench, weighs over 227 kg (500 lb). Never try to detach and move the instrument from its workbench; you can suffer personal injury or damage the instrument. |
|  | Pinch point: Keep hands away from the specified areas. |
|  | 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. |

Model Differences

This table lists the required number of forepumps and the available options for the Orbitrap Tribrid Series MSs.

| Instrument | Number of forepumps | Available options | | | | |
|-----------------------|---------------------|--------------------|---------------------|-----------------------------|------------------------|-------------------|
| | | EASY-IC ion source | EASY-ETD ion source | Advanced peak determination | 1M Orbitrap resolution | UVPD laser module |
| Orbitrap Fusion Lumos | 2 | ✓ | ✓ | ✓ | ✓ | ✓ |
| Orbitrap Fusion | 1 | ✓ | ✓ | ✓ | | |
| Orbitrap ID-X | 1 | ✓ | | | | |

Contacting Us

| Contact | Email | Telephone | QR Code ^a |
|--|--|-------------------------|---|
| U.S. Technical Support | us.techsupport.analyze@thermofisher.com | (U.S.) 1 (800) 532-4752 |  |
| U.S. Customer Service and Sales | us.customer-support.analyze@thermofisher.com | (U.S.) 1 (800) 532-4752 |  |
| Global Support | <ul style="list-style-type: none"> ❖ To find global contact information or customize your request <ol style="list-style-type: none"> 1. Go to thermofisher.com. 2. Click Contact Us, select the country, and then select the type of support you need. 3. At the prompt, type the product name. 4. Use the phone number or complete the online form. ❖ To find product support, knowledge bases, and resources <p>Go to thermofisher.com/us/en/home/technical-resources.</p> ❖ To find product information <p>Go to thermofisher.com/us/en/home/brands/thermo-scientific.</p> | |  |
| <p>Note To provide feedback for this document, go to surveymonkey.com/s/PQM6P62 or send an email message to Technical Publications (techpubs-lcms@thermofisher.com).</p> | | | |

^a You can use your smartphone to scan a QR Code, which opens your email application or browser.

Connecting the Forepump for the Vacuum System

To connect the forepump or forepumps to the Orbitrap Tribrid Series MS and the lab exhaust system, follow these procedures.

Contents

- [Connecting the Forepumps to the Mass Spectrometer](#)
- [Connecting the Forepumps to the Lab Exhaust System](#)
- [Locking the Workbench Wheels](#)



CAUTION In addition to reading the forepump's operating and maintenance instructions, follow the instructions for adding and changing the oil.

Connecting the Forepumps to the Mass Spectrometer

Before you begin, lift up and remove the workbench's front panel. To determine which instrument requires two forepumps, see [Model Differences](#).



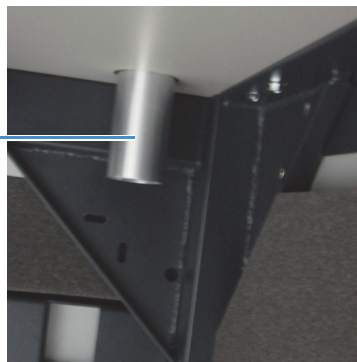
CAUTION Possible pinch points. Be aware where you place your hands when you remove or attach the workbench's front panel.

1 Connecting the Forepump for the Vacuum System

Connecting the Forepumps to the Mass Spectrometer

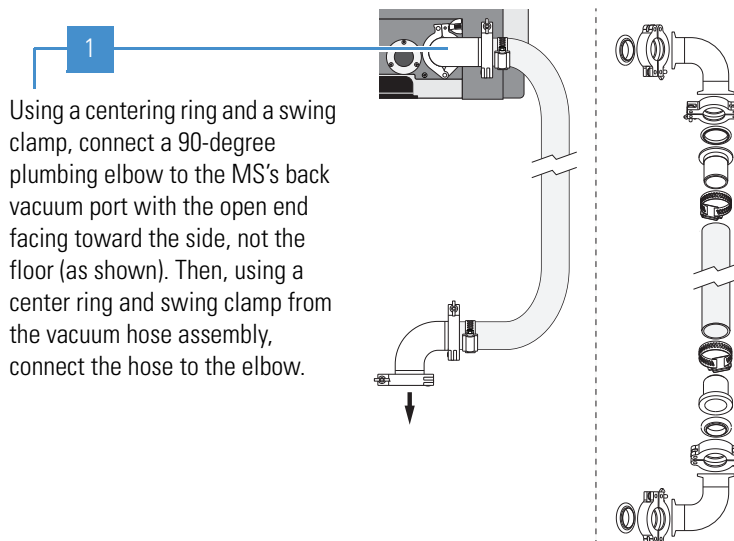
❖ To attach the vacuum hose assembly

Two-pump MS System

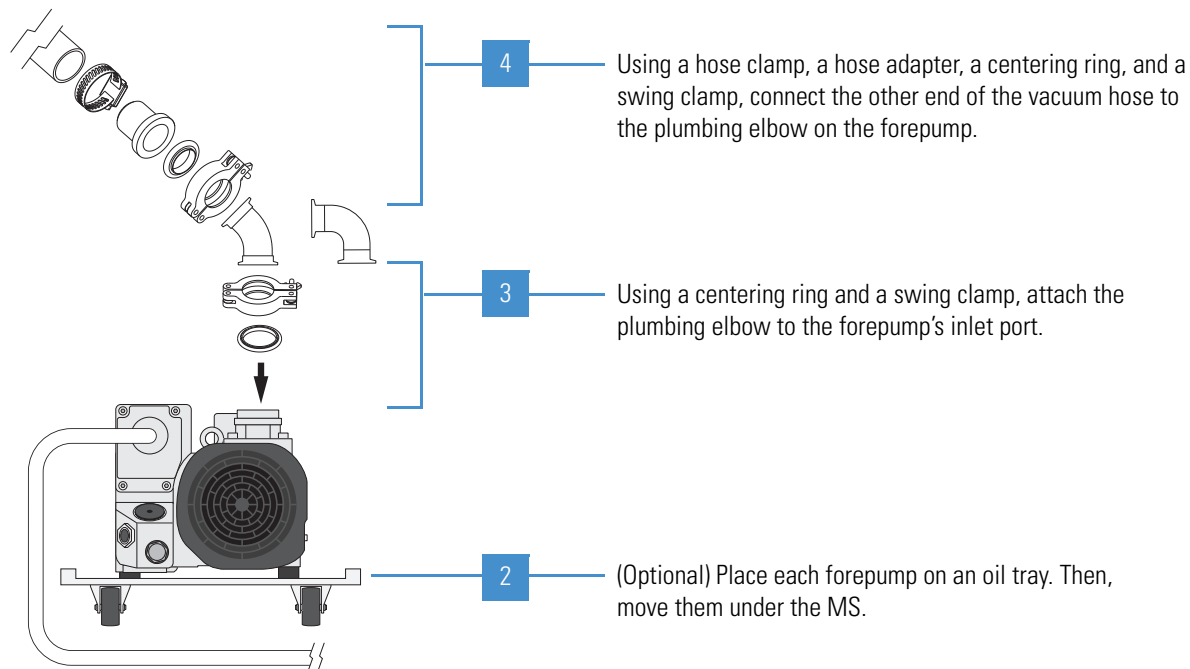


Using the stainless steel clamp, connect the short tubing on the vacuum hose assembly to the vacuum port located under the workbench (front, left corner).

Single-pump MS System



Using a centering ring and a swing clamp, connect a 90-degree plumbing elbow to the MS's back vacuum port with the open end facing toward the side, not the floor (as shown). Then, using a center ring and swing clamp from the vacuum hose assembly, connect the hose to the elbow.



IMPORTANT For optimal performance of the forepumps, place them as follows:

- For a two-forepump MS system, place the forepumps under the workbench.
- For a single-forepump MS system, place the forepump under the workbench or within 2.4 m (8 ft) of the instrument.
- Prevent the forepump from overheating by ensuring that there is sufficient air clearance around each forepump.

Connecting the Forepumps to the Lab Exhaust System

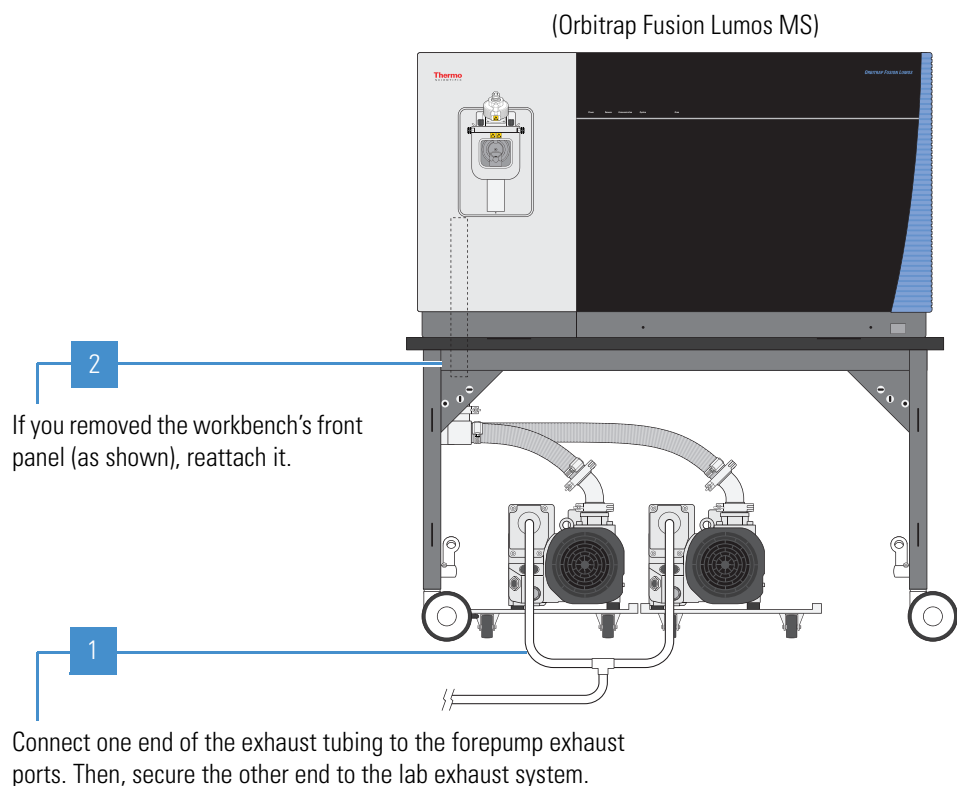
Most atmospheric pressure ionization (API) applications contribute to solvents accumulating in the forepump. Choose an exhaust system that can accommodate the periodic purging of these solvents. The frequency of the purging depends on the throughput of the system—never operate the pump continuously with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



CAUTION

- Run the exhaust hose at floor level for at least 2 m (79 in.). 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).
- Although Thermo Fisher Scientific recommends that you periodically open the gas ballast valve for at least 30 minutes (on the side of the pump) 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.

❖ To connect the forepumps to the exhaust system



Locking the Workbench Wheels

After you position the forepumps and workbench, lock the workbench wheels.

❖ To lock the workbench wheels

1. Lift up the workbench's front panel to remove it, and set it aside.



CAUTION Possible pinch points. Be aware where you place your hands when you remove or attach the workbench's front panel.

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 when you are ready.

Connecting 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.

Contents

- Gas Specifications
- Connecting the Instrument Gas Lines

Gas Specifications

Make sure that the ultra-high-purity (UHP) and high-purity (HP) supply gases are delivered with the necessary pressure and purity as listed in [Table 2](#).

Table 2. Summary of the required gases for the Orbitrap Tribrid Series MS

| Type | Recommended purity | Required pressure | Typical daily consumption ^a | Function |
|----------|--|-------------------------------|---|---|
| Helium | UHP (99.999%)—Has less than 1.0 ppm each of water, oxygen, and total hydrocarbons. | 275 ±70 kPa (40 ±10 psi) | 9.22 L (0.325 ft ³) | Linear ion trap damping gas and collision gas |
| Nitrogen | UHP (99.999%)—Has less than 3.0 ppm each of water, oxygen, and total hydrocarbons. | 345 ±70 kPa (50 ±10 psi) | 46 L (1.62 ft ³) | Venting gas, ion routing multipole (IRM) collision gas, and make-up gas and reagent carrier gas for the IC and ETD configurations |
| | HP (99%) | 690 ±140 kPa (100 ±20 psi) | 11 500–26 700 L (406–943 ft ³) | API source auxiliary gas, sheath gas, and sweep gas |

^a Approximate value when operating 24 hours and 7 days a week

2 Connecting the Nitrogen and Helium Gases

Connecting the Instrument Gas Lines

Connecting the Instrument Gas Lines



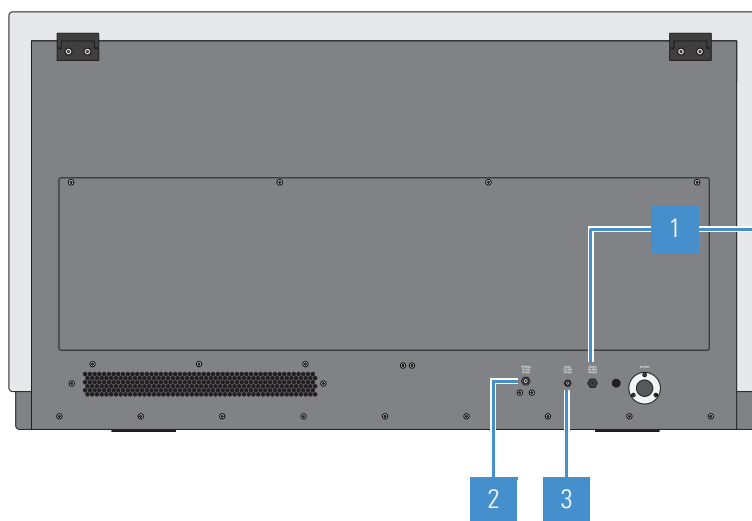
CAUTION You must use either copper (provided) or stainless steel for the UHP gas lines.



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

❖ To connect the gas lines to the back of the MS

(Orbitrap Fusion Lumos MS)

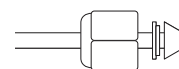


(HP nitrogen gas) Cut a length of the Teflon™ PFA tubing and push it into the **Nitrogen In** inlet. On the other end, connect an appropriate fitting that connects to your HP nitrogen gas supply.

(UHP nitrogen gas) Cut a length of the copper tubing, attach the 1/8 in. 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.

(UHP helium gas) Repeat Step 2 with another length of copper tubing, except 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.



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.

2 Connecting the Nitrogen and Helium Gases

Connecting the Instrument Gas Lines

Connecting the API Source and Waste Container

To install the Thermo Scientific API source and the solvent waste container to the Orbitrap Tribrid Series MS, follow these procedures.

Contents

- [Installing the API Source](#)
- [Setting Up the Fume Exhaust Connections](#)
- [Connecting the Solvent Waste Container](#)

Installing the API Source

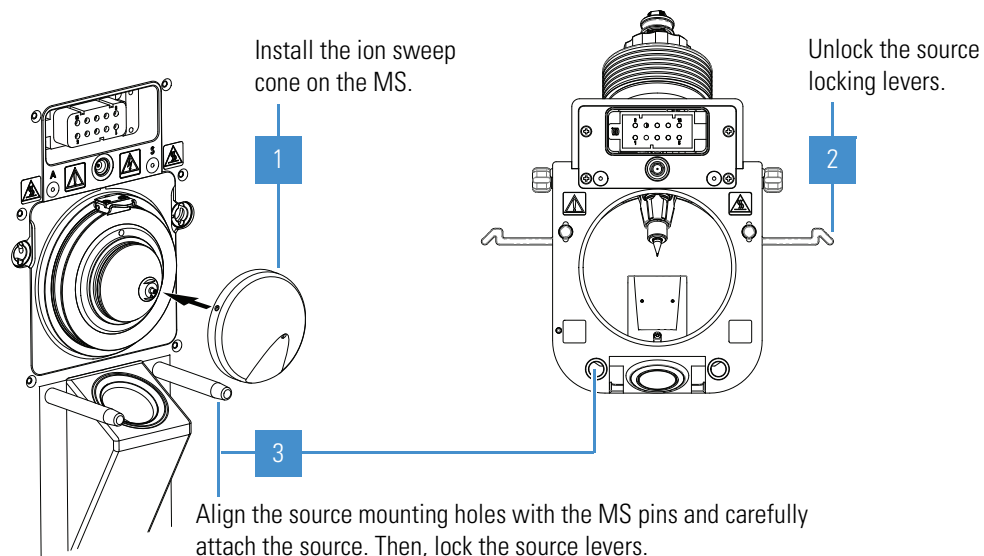
All the wiring and gas plumbing for the API source are internal. This means you can install or remove the API source or change the ionization mode¹ (H-ESI, APCI, or APPI) by changing the spray insert—all without the use of tools. For information about the spray inserts, optional interface kits, and switching ionization modes, refer to the API source manual.

¹ APCI and APPI modes require that you purchase and install the applicable kits.

3 Connecting the API Source and Waste Container

Setting Up the Fume Exhaust Connections

❖ To install the API source onto the MS



Setting Up the Fume Exhaust Connections

❖ To equip your lab with at least two fume exhaust systems

Do the following:

- 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.

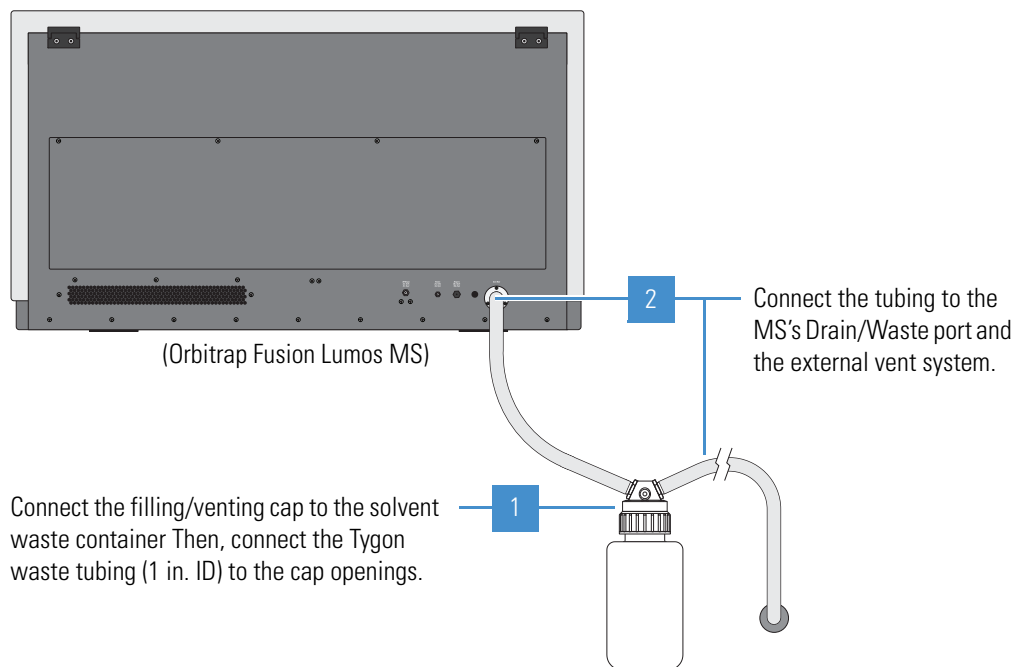
- Ensure that the waste container vents to a dedicated fume exhaust system—do not vent the Tygon™ drain tube (or any vent tubing connected to the waste container) to the same fume exhaust system that connects to the forepump.

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

Connecting the Solvent Waste Container

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

❖ To connect the solvent waste container to the MS



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 exhaust system



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

3 Connecting the API Source and Waste Container

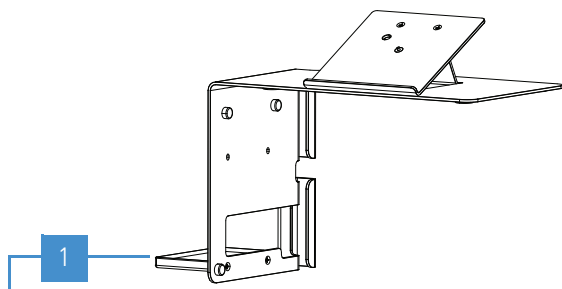
Connecting the Solvent Waste Container

Installing the Syringe Pump and Modular Valve

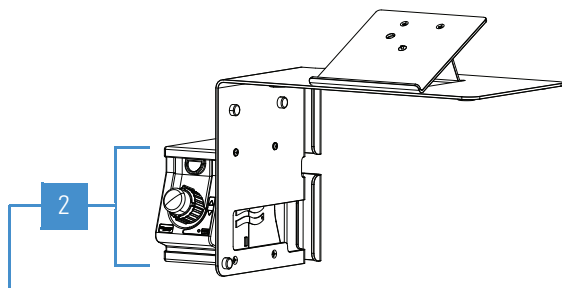
To install the syringe pump and the modular divert/inject valve, follow this procedure. The only tool required is a #2 Phillips screwdriver.

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

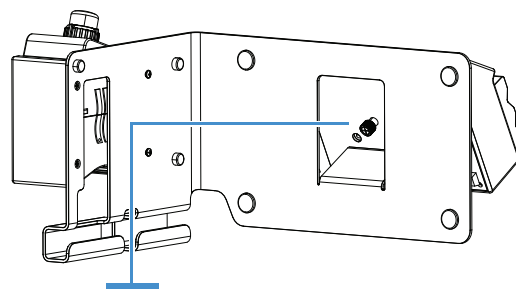
❖ To assemble and install the syringe pump and modular valve



Using the screwdriver and two of the provided screws, attach the bottom shelf to the holder.



Place the valve on the bottom shelf; using the screwdriver and two screws, attach the top shelf.



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

(Not shown) Place the assembly on the top, left surface of the MS and adjust its position as needed.

4 Installing the Syringe Pump and Modular Valve

Connecting the Cables and Power Cords

Read and understand the following cautions before you make the electrical connections in the next procedure. If the API source contains the optional APPI lamp, you must provide a USB splitter to accommodate the three USB connections. See also [Chapter 6, “External Devices.”](#)



CAUTION Avoid an electric shock and equipment damage.

- Forepumps—Read the warning 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.
- Mass spectrometer—Be aware of the following:
 - The AC Output receptacle is not used at this time—do not plug the forepump (or any other appliance) power cord into this receptacle; see step 5 on [page 16](#).
 - Before you begin the installation, place the Main Power switch in the Off (down) position and the Electronics service switch in the Service Mode (down) position.
- Syringe pump—Make sure that the voltage selector switch 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, maximum 3 m (10 ft) long.



CAUTION After completing these connections, route all cables and power cords so that they are not a trip hazard.

5 Connecting the Cables and Power Cords

❖ To connect the MS and data system cables and power cords¹

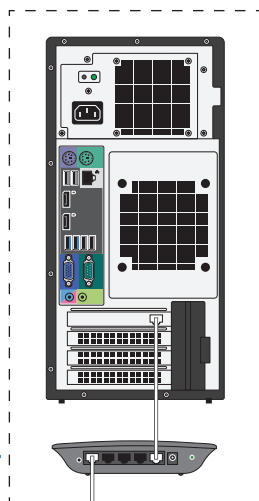
Connect the **Ethernet cables** from the Ethernet switch to the computer's LC/MS Ethernet network card and the MS.



(Not shown) Connect the **Ready Out cable** (not provided) and **contact closure cable** (Start In and Ground pins) between the MS and the external device. Then, attach the **connector housings**. See [External Devices](#).



Connect the **USB cables** from the MS to the syringe pump and the modular valve.

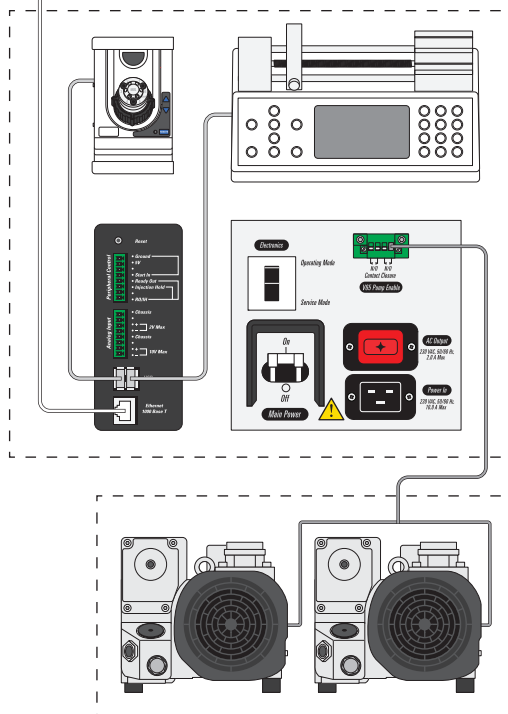


5

(Not shown) Connect both ends of the **power cords** (for the computer, Ethernet switch, modular valve, syringe pump, MS, and forepumps).

IMPORTANT Plug the power cords for the MS and forepumps into separate, dedicated 230 Vac electrical outlets—that is, circuits A, B, and C for a dual-forepump system.

Note If the modular valve's LED remains off, press its front Remote button to exit local mode.



4

Connect the **relay control cable** between the MS (V65 Pump Enable) and the forepumps.

IMPORTANT Before turning on the MS, make sure to complete all of the system connections described in this guide.

Tip For troubleshooting purposes, you might want to record which devices connect to which ports on the Ethernet switch.

¹ The back of the data system computer might not be as shown.

External Devices

Control of external devices (through a contact closure cable) might or might not be through one of the Thermo Scientific mass spectrometry applications, such as the Xcalibur data system. For instructions on how to set the external device as the start instrument for data acquisition, refer to the Getting Started Guide.

Contents

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

The Orbitrap Tribrid 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.



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.

IMPORTANT

- 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 (Start In) pin-out description (see Table 3). 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 Table 3). Then, configure the Contact Closure settings in the Method Editor. You are responsible for providing this cable.

Communication Connectors

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

Table 3 lists the pin-out descriptions for the connectors shown in Figure 1.



CAUTION After connecting the external device cables, attach the connector housings.

Table 3. Pin-out descriptions for the communication connectors (Sheet 1 of 3)

| Pin | Name | Description |
|--|--------|---|
| – | Reset | Resets the instrument to a power-up state. |
| <p>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.</p> | | |
| Peripheral Control | | |
| 1 | Ground | Earth ground. |
| 2 | 5V | Provides a 5 Vdc, 500 mA output (with pin 1). |

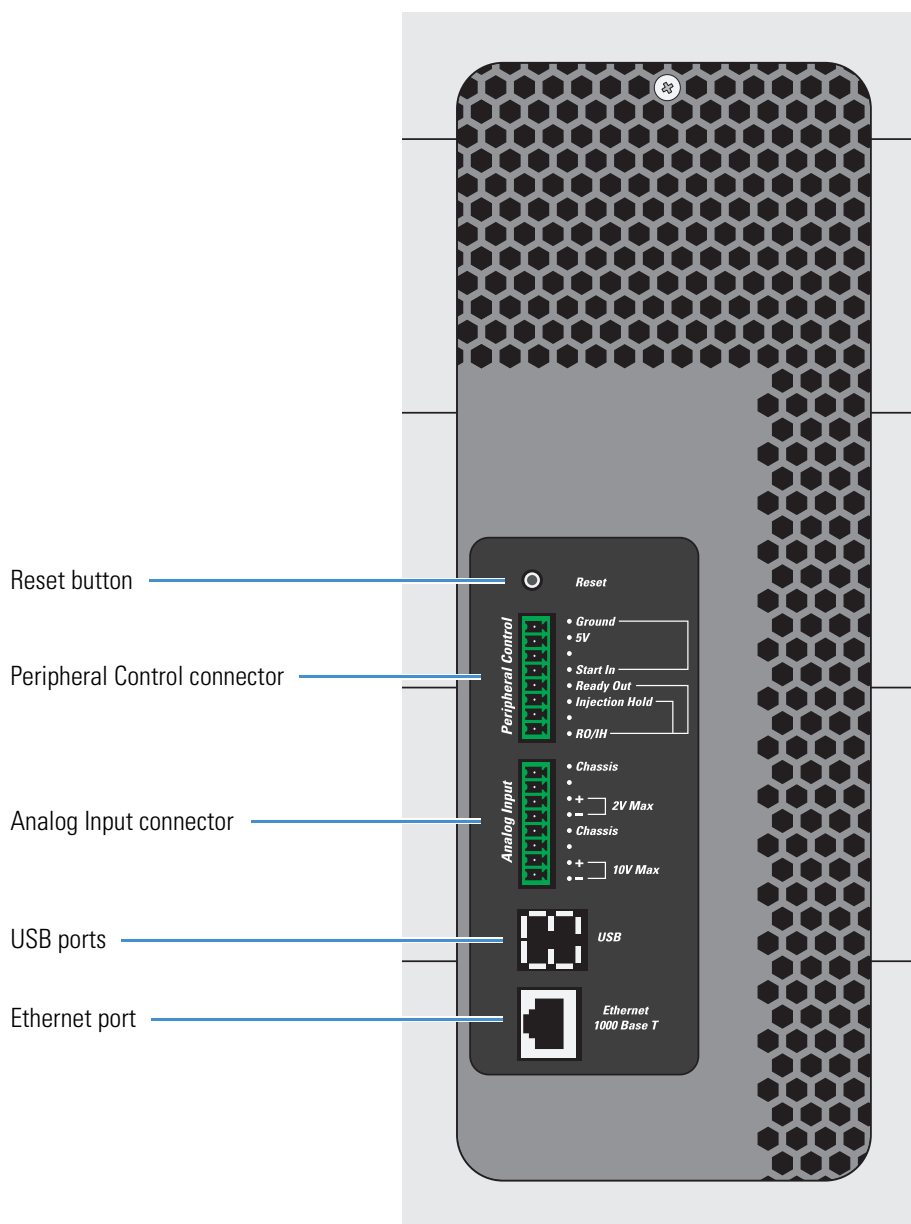
Table 3. Pin-out descriptions for the communication connectors (Sheet 2 of 3)

| Pin | Name | Description |
|---|--|---|
| 4 | Start In | <p>Receives the start signal from the contact closure connection of a connected external device.</p> <p>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.</p> <p>Note In the Instrument Configuration window, set the contact closure signal to “High-to-low edge” or “Low-to-high edge,” whichever matches the setting for the connected external device.</p> |
| 5 | Ready Out | <p>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.</p> <p>Output: Maximum 24 Vdc, 3 A</p> |
| 6 | Injection Hold | <p>Provides a relay-driven programmable output signal to the connected external device, such as a fraction collector.</p> <p>Output: Maximum 24 Vdc, 3 A</p> |
| 8 | RO/IH | Common (return) connection for the Ready Out and Injection Hold pins. |
| Analog Input | | |
| <p>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.</p> | | |
| 1 | Chassis | Earth ground (for pins 3 and 4). |
| 3, 4 | 2V Max: + (positive, pin 3) and – (negative, pin 4) | <p>(Channel 2) Provides a connection for an external device, such as an LC instrument.</p> <p>Input: 0–2 Vdc (voltage clamps at 5 Vdc)</p> |
| 5 | Chassis | Earth ground (for pins 7 and 8). |
| 7, 8 | 10V Max: + (positive, pin 7) and – (negative, pin 8) | <p>(Channel 1) Provides a connection for an external device, such as an LC instrument.</p> <p>Input: 0–10 Vdc (voltage clamps at 15 Vdc)</p> |

Table 3. Pin-out descriptions for the communication connectors (Sheet 3 of 3)

| Pin | Name | Description |
|-------------------------|----------------------|---|
| Other connectors | | |
| – | USB (2 ports) | Provides a connection for the syringe pump and modular valve. |
| – | Ethernet 1000 Base T | Provides a connection for the Ethernet switch. |

Figure 1. Communication connectors (left side of the MS)



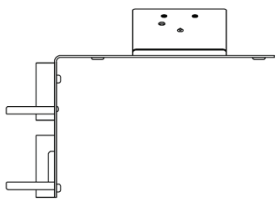
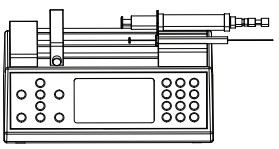
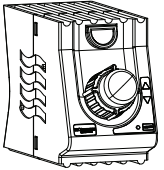
Installation Kits and Power Cords

The Orbitrap Tribrid Series MS ships with several kits and power cords. This appendix lists the necessary components for the instructions in this guide. For a full list of the kits and their contents, refer to the Hardware Manual.

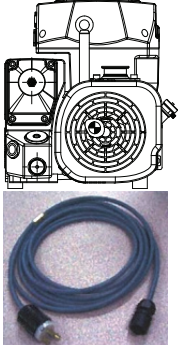


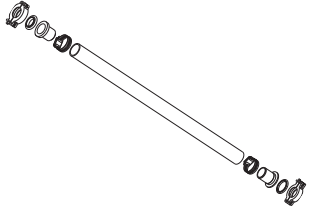
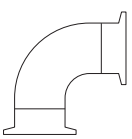

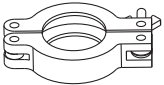

Contents

- Syringe Pump and Modular Valve Assembly
- Single Mechanical Pump Kit
- Dual Mechanical Pumps Kit
- MS Setup Kit
- Power Cords

Syringe Pump and Modular Valve Assembly

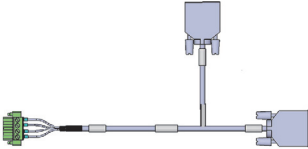
| Image | Item | Quantity | Part number |
|---|--|----------|----------------|
|  | Holder, L-shaped, syringe pump and modular valve | 1 | 80000-60363 |
|  | Chemyx™ Fusion 100T syringe pump with a power cord and USB interface cable | 1 | 00109-99-00045 |
|  | Rheodyne™ MX Series II™ modular divert/inject valve (six-port, two-position) with an ac adapter, power cord, USB interface cable, and high-pressure fitting sets | 1 | 00109-99-00046 |

Single Mechanical Pump Kit



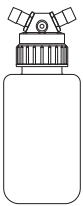
| Image | Item | Quantity | Part number |
|---|---|----------------|----------------|
|  | Forepump, Oerlikon Leybold Vacuum™ SOGEVAC™ SV65BI (rated single-phase 230 Vac, 50/60 Hz) | 1 | 00108-01-00032 |
|  | Forepump oil tray, stainless steel, caster wheels | 1 | 00201-99-00549 |
|  | Relay control cable, single pump, 2.4 m (8 ft) long (preassembled) | 1 | 80000-63139 |
|  | Single pump vacuum hose assembly, KF40 (preassembled; exploded view shown) | 1 | 80000-60229 |
| Elbow connection | | | |
|  | Elbow, aluminum, NW40, 90 degree | 2 ^a | 00108-02-00010 |
|  | Centering ring with O-ring, nitrile and aluminum, NW40 | 2 ^a | 00108-02-00005 |
|  | Swing clamp, aluminum, NW32/40 | 2 ^a | 00108-02-00004 |
| Exhaust waste connection | | | |
|  | Tubing, Tygon, 3/4 in. (19.1 mm) OD, 0.5 in. (12.7 mm) ID, 3 m (10 ft) long | 1 | 00301-22920 |

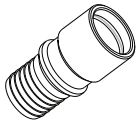

^a Only one piece is required.

Dual Mechanical Pumps Kit

| Image | Item | Quantity | Part number |
|---|--|----------|----------------|
|  | Forepump, Oerlikon Leybold Vacuum SOGEVAC SV65BI (rated single-phase 230 Vac, 50/60 Hz) | 2 | 00108-01-00032 |
|  | Forepump oil tray, stainless steel, caster wheels | 2 | 00201-99-00549 |
|  | Dual relay control cable, 2.4 m (8 ft) long (preassembled) | 1 | 80100-63146 |
|  | Dual pump vacuum hose assembly, including the stainless steel 45-degree elbows and connection parts (preassembled) | 1 | 80011-60077 |
| Exhaust waste connection | | | |
|  | Fitting Tee, barbed, nylon, for 0.5 in. (12.7 mm) ID tubing | 1 | 00103-01-00012 |
|  | Tubing, Tygon, 3/4 in. (19.1 mm) OD, 0.5 in. (12.7 mm) ID, 6 m (20 ft) long | 1 | 00301-22920 |

MS Setup Kit

| Image | Item | Quantity | Part number |
|---|--|----------------|----------------|
| Communications connection | | | |
|  | Connector plug, MINI-COMBICON™, 8-pin, 26.67 mm (1.05 in.) long, rated 160 V, 8 A (contact closure) | 2 | 00004-21512 |
| – | Connector housing, MINI-COMBICON, 8-position | 2 | 00004-21514 |
| – | Ethernet cables, shielded Category 5e, 2.1 m (7 ft) long | 2 | 00302-99-00036 |
| – | Ethernet power supply (rated 100–240 Vac, 50/60 Hz, 0.6/0.3 A input; 18 W, 12 Vdc, 1.5 A output) | 1 | 00012-01-00039 |
|  | Ethernet switch, 5-port gigabit | 1 | 00825-01-00111 |
| Gas connections | | | |
| – | Ferrule, brass, back, 1/4 in. ID | 2 | 00101-04000 |
| – | Ferrule, brass, back, 1/8 in. ID | 2 | 00101-02500 |
| – | Ferrule, brass, front, 1/4 in. ID | 2 | 00101-10000 |
| – | Ferrule, brass, front, 1/8 in. ID | 2 | 00101-08500 |
| – | Swagelok-type nut, brass, 1/4 in. ID | 2 | 00101-12500 |
| – | Swagelok-type nut, brass, 1/8 in. ID | 2 | 00101-15500 |
| – | Tubing, precleaned copper, 1/8 in. OD, 0.030 in. thick, 4.6 m (15 ft) long (for the UHP helium and UHP nitrogen gases) | 1 ^a | 00301-22701 |
| – | Tubing, Teflon PFA, 1/4 in. (6.35 mm) OD, 0.062 in. (1.57 mm) thick, 4.6 m (15 ft) long (for the HP nitrogen gas) | 1 | 00101-50100 |
| – | Fittings to connect the copper and PFA tubings to the gas supplies (customer provided) | – | – |
| Solvent waste connection | | | |
|  | Container, Nalgene™, 4 L heavy-duty; filling/venting cap | 1 | 80100-20265 |

| Image | Item | Quantity | Part number |
|---|---|----------|----------------|
|  | Drain hose adapter with O-ring (not shown) | 1 | 70111-20971 |
|  | Tubing, Tygon, 1-3/8 in. OD, 1 in. ID, 3 m (10 ft) long | 1 | 00301-01-00020 |

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

Power Cords

| Device | Cord length | Country or territory ^a | Plug configuration | Plug rating |
|-----------------------|--------------|---|--------------------|---------------|
| Mass spectrometer | 2.5 m (8 ft) | North America (P/N 96000-98035) | NEMA 6-15 | 250 Vac, 15 A |
| | | International ^b (P/N 80000-63188) | CEE (3-pole) | 250 Vac, 16 A |
| Forepump | 2.5 m (8 ft) | North America (no separate part number) | NEMA 6-15 | 250 Vac, 15 A |
| | | International (P/N 80000-63186) | CEE (3-pole) | 250 Vac, 16 A |
| Peripheral components | 1.8 m (6 ft) | — ^c | — | — |

^a Part numbers are provided for Thermo Fisher Scientific field service use only.

^b “International” designation is for countries or territories that do not use the North American plug configuration.

^c Not specified in this guide

A Installation Kits and Power Cords

Power Cords



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