

TSQ Series

TSQ Endura and TSQ Quantiva

Getting Connected Guide

80100-97012 Revision C September 2016



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EMC Directive 2004/108/EC

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 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: 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
EN 61326-1: 2013	EN 61000-4-4: 2004 + A1	

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Contents

	Preface	ix
	Accessing Documentation	x
	Special Notices, Symbols, and Cautions	x
	Contacting Us	xii
Chapter 1	Vacuum System	1
	Connecting the Forepumps to the Mass Spectrometer	2
	Connecting the Forepumps to the Lab Exhaust System	3
Chapter 2	Gas Connections	5
Chapter 3	API Source and Waste Container Connections	7
	Installing the API Source	7
	Connecting the Solvent Waste Container	8
Chapter 4	Syringe Pump and Modular Valve Assembly	9
Chapter 5	Electrical Connections	11
Chapter 6	External Devices	13
	Contact Closure Signal	13
	Communication Connectors	14
Appendix A	Installation Kits and Power Cords	17
	Syringe Pump and Modular Valve Assembly	17
	Single Mechanical Pump Kit	18
	Dual Mechanical Pumps Kit	19
	MS Setup Kit	20
	Power Cords	21
	Index	23

Contents

Preface

The *TSQ Endura and TSQ Quantiva Getting Connected Guide* describes how to install the Thermo Scientific™ TSQ Endura™ or TSQ Quantiva™ 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 mass spectrometry applications, such as the Thermo Xcalibur™ data system.

This guide is intended for the following Thermo Scientific mass spectrometers (MSs):

- TSQ Endura (requires one forepump)
- TSQ Quantiva (requires two forepumps)

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 Scientific field service engineers access some 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 *TSQ Endura and TSQ Quantiva Preinstallation Requirements Guide*.

Contents

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

❖ 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.



Accessing Documentation

The TSQ Endura and TSQ Quantiva MSs include complete documentation. For system requirements, refer to the release notes on the software DVD.

❖ To view the product manuals

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

❖ 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.






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 (Sheet 1 of 2)






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.

Table 1. Notices, symbols, labels, and their meanings (Sheet 2 of 2)

Notice, symbol, or label	Meaning
	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: Never lift or move the instrument by yourself; you can suffer personal injury or damage the instrument.
	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.

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	us.customer-support.analyze@thermofisher.com 	us.techsupport.analyze@thermofisher.com 



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Note To provide feedback for this document:

- Send an email message to Technical Publications (techpubs-lcms@thermofisher.com).
- Complete a survey at surveymonkeys.com/s/PQM6P62.

Vacuum System

To connect the forepump or forepumps to the TSQ Endura or TSQ Quantiva 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](#)



CAUTION In addition to reading the forepump's operating and maintenance instructions, do the following:

- Prevent the forepump from overheating by ensuring that there is sufficient air clearance around the pump.
- Maintain the exhaust pressure from atmospheric pressure minus 15 mbar to 1.15 bar absolute (0.15 bar relative).
- Follow the instructions for adding and changing the oil.

1 Vacuum System

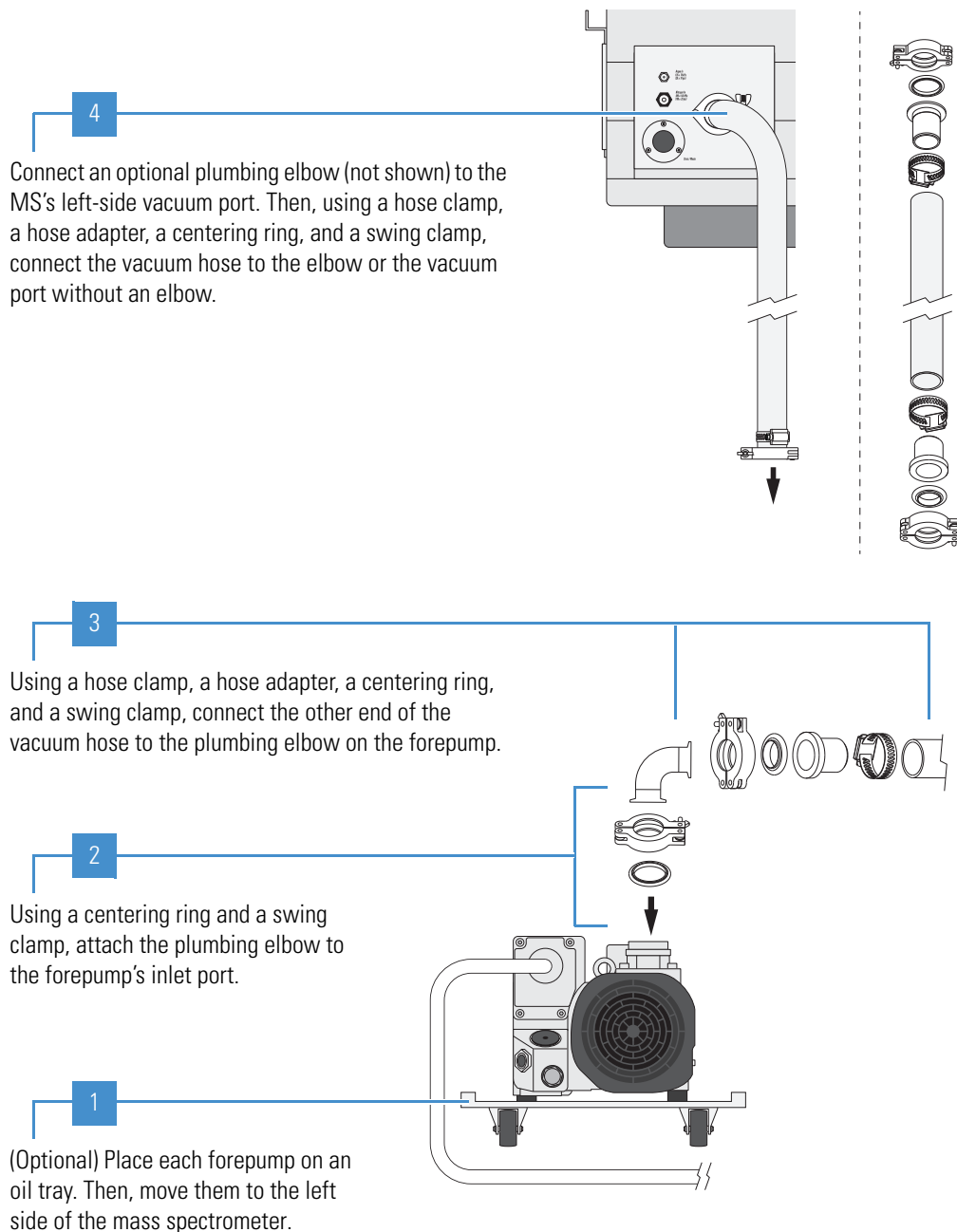
Connecting the Forepumps to the Mass Spectrometer

Connecting the Forepumps to the Mass Spectrometer



IMPORTANT To ensure the best pumping performance, limit the length of the vacuum hose that connects the mass spectrometer to the forepumps to no more than 2.4 m (8 ft).

❖ To attach the vacuum hose assembly



Connecting the Forepumps to the Lab Exhaust System

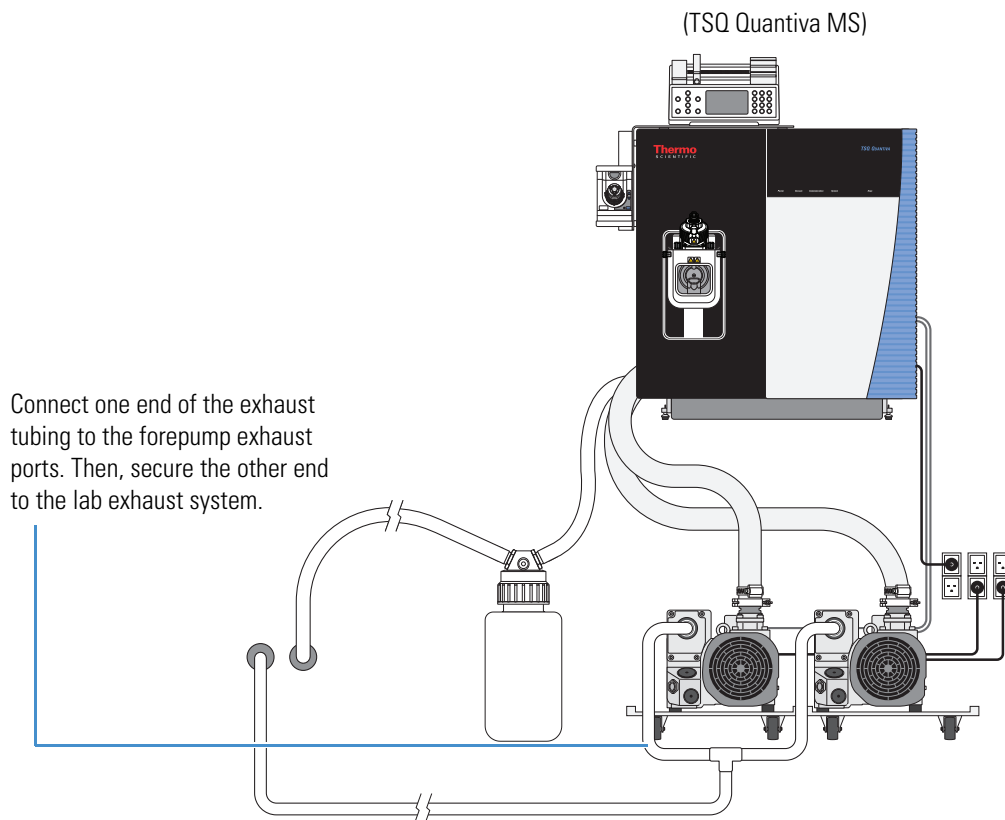
Most atmospheric pressure ionization (API) applications contribute to solvents accumulating in the forepump. Choose an exhaust system that can accommodate the periodic purging of these solvents. The frequency of the purging depends on the throughput of the system—never operate the pump continuously with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



CAUTION

- Run the exhaust hose at floor level for at least 2 m (78.7 in.). This hose acts as a trap for exhaust fumes that would otherwise recondense in the forepump oil.
- The forepump exhaust is a health hazard. Therefore, make sure that the forepump exhaust vents to an appropriate external, active exhaust system.
- Although Thermo Fisher Scientific recommends that you periodically open the gas ballast valve (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.

❖ To connect the forepumps to the exhaust system



1 Vacuum System

Connecting the Forepumps to the Lab Exhaust System

Gas Connections

To connect the gas lines to the back of the TSQ Endura or TSQ Quantiva MS, follow the next procedure. 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 TSQ Endura or TSQ Quantiva MS

Type	Recommended purity	Required pressure	Typical daily consumption ^a	Function
Argon	UHP (99.995%)—Has less than 1.0 ppm each of water, oxygen, and total hydrocarbons.	135 ±70 kPa (20 ±10 psi)	17 L (0.6 ft ³)	Collision gas
Nitrogen	HP (99%)	690 ±140 kPa (100 ±20 psi)	11 500–26 700 L (406–943 ft ³)	Venting gas; API source auxiliary gas, sheath gas, and sweep gas

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

Note 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.



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



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

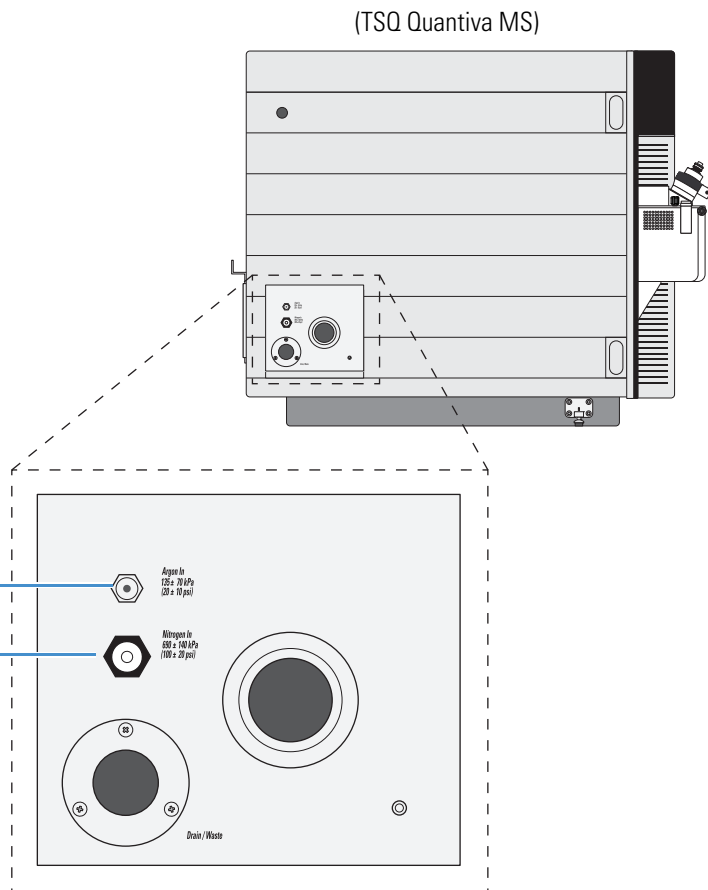
❖ To connect the gas lines to the left side of the mass spectrometer

(UHP argon 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 **Argon In** inlet until fingertight. On the other end, connect an appropriate fitting that connects to your UHP argon gas supply.

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

1
2

(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.



IMPORTANT

- After you start using the mass spectrometer, 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 mass spectrometer.
- If you intend to use helium for sparging your LC solvents, you must have a second tank and regulator.

API Source and Waste Container Connections

To install the API source and the solvent waste container to the TSQ Endura or TSQ Quantiva MS, follow these procedures.

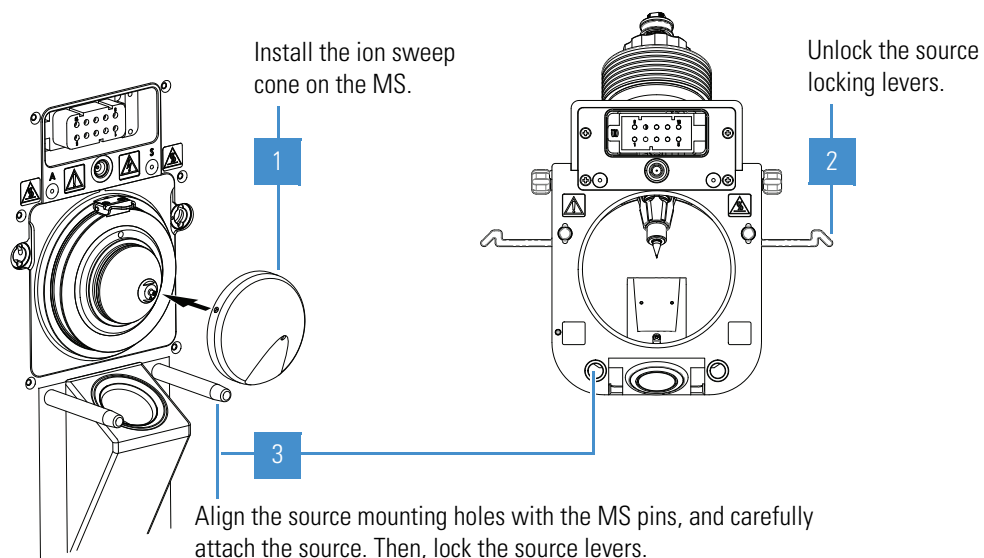
Contents

- [Installing the API Source](#)
- [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 *Ion Max NG and EASY-Max NG Ion Sources User Guide*.

❖ To install the API source onto the MS



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

Connecting the Solvent Waste Container

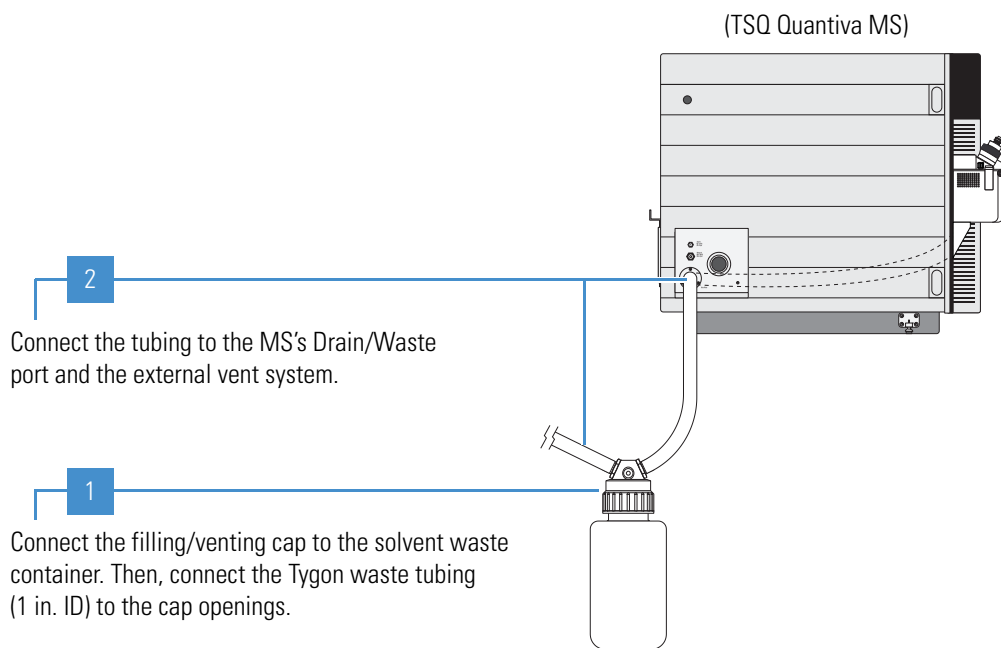
The mass spectrometer internally routes the solvent waste from the bottom of the API source to the left side drain/waste port. Use the provided Tygon™ tubing to connect the solvent waste container to a fume exhaust system. To prevent solvent waste from backing up into the instrument, make sure that all 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

Equip your lab with at least two fume exhaust systems:

- The analyzer optics become contaminated if the drain/waste tubing and the exhaust tubing from the forepump connect to the same fume exhaust system. Route the exhaust tubing from the forepump 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. Vent the waste container to a dedicated fume exhaust system. The exhaust system for the API source must accommodate a flow rate of up to 30 L/min (64 ft³/h).

❖ To connect the solvent waste container to the MS



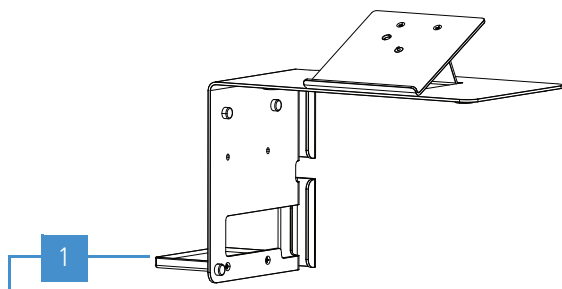
CAUTION After completing these connections, route the tubing so that they are not a trip hazard.

Syringe Pump and Modular Valve Assembly

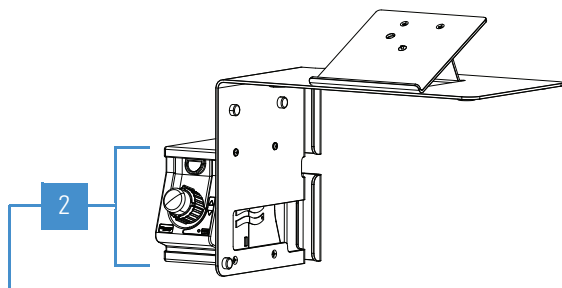
To attach the syringe pump and the modular divert/inject valve, follow this procedure. The only tool required is a #2 Phillips screwdriver.

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

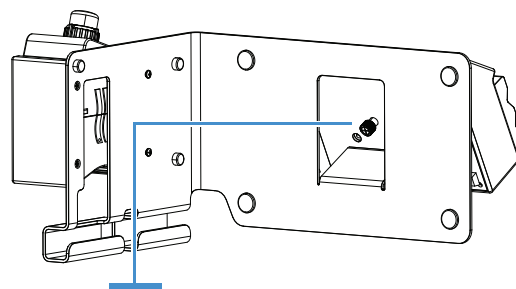
❖ To assemble the syringe pump and modular valve



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 mass spectrometer and adjust its position as needed.

4 Syringe Pump and Modular Valve Assembly

Electrical Connections

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.

- Mass spectrometer—Before you begin, placed the Main Power switch in the Off (down) position and the Electronics service switch in the Service Mode (down) position. The AC Output receptacle is not used at this time—do not plug the forepump power cord into this receptacle.
- 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.
- 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.

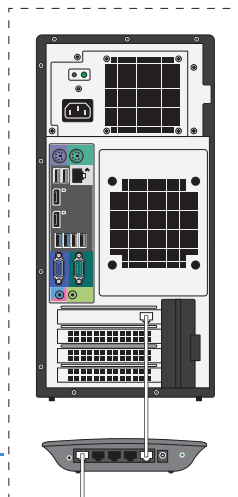


CAUTION After completing these connections, route all cables and power cords so that they are not a trip hazard.

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

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

1

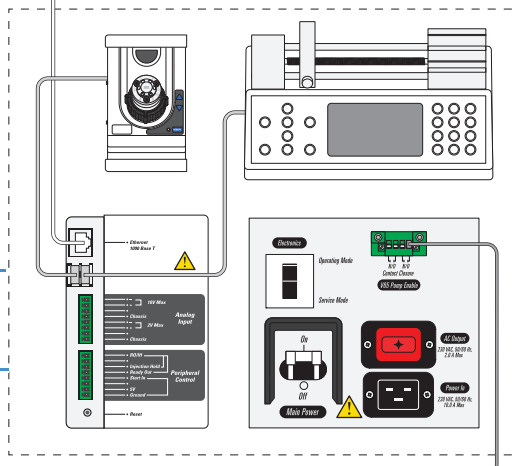


Connect the **USB cables** from the MS to the syringe pump and the modular valve.

2

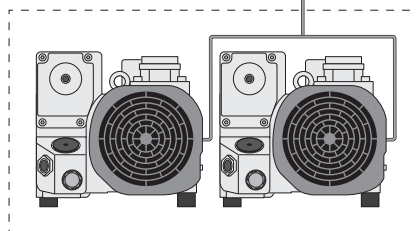
3

(Not shown) Connect the **contact closure cable** and the **Ready Out cable** (not provided) between the MS and the external device. See Chapter 6, "External Devices."



4

Connect the **relay control cable** between the MS (SV65 Pump Enable) and the forepumps.



5

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

IMPORTANT For the MS and the forepumps, plug their power cords 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.

IMPORTANT Before turning on the mass spectrometer, 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.

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 *TSQ Endura and TSQ Quantiva Getting Started Guide*.

Contents

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

Contact Closure Signal

The TSQ Endura or TSQ Quantiva 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 TSQ Endura or TSQ Quantiva 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 mass spectrometer.
- To help prevent sample waste if the mass spectrometer 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.

❖ To connect the contact closure cable

1. Connect the contact closure cable to the [Start In](#) and Ground pins on the left side of the mass spectrometer ([Figure 1](#)).
2. Connect the other end of the cable to the external device according to its manual.

Communication Connectors

Use the right-side communication connectors to connect the mass spectrometer 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](#).

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).

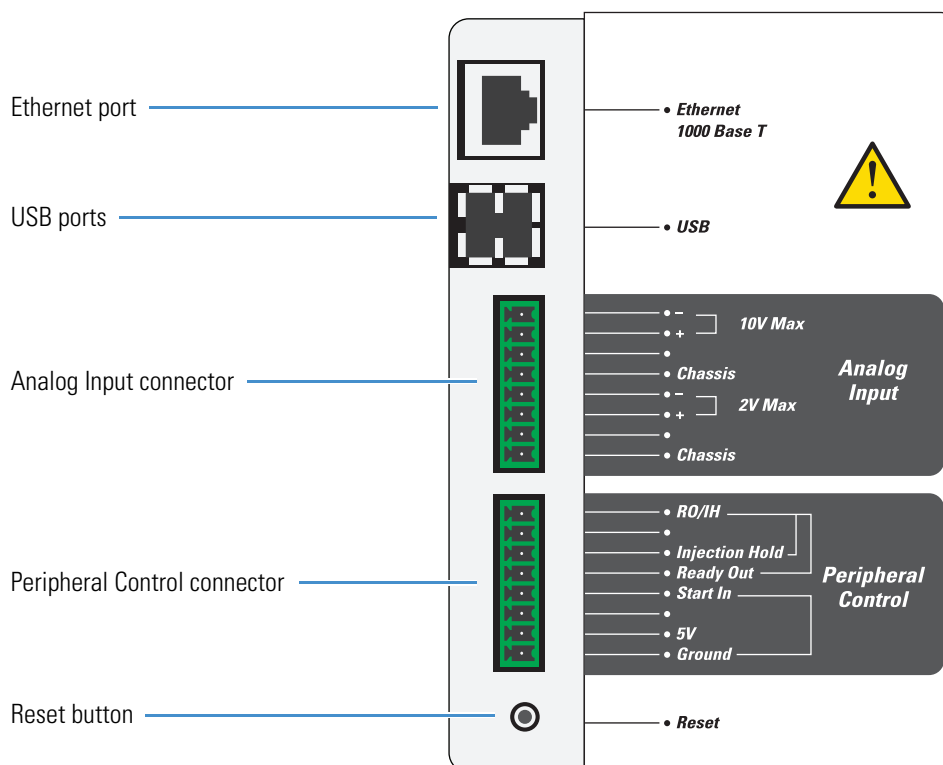
Table 3. Pin-out descriptions for the communication connectors (Sheet 2 of 3)

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 mass spectrometer 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 (right side of the MS)



Installation Kits and Power Cords

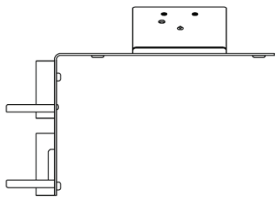
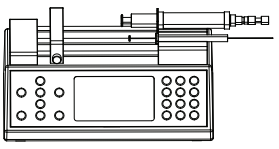
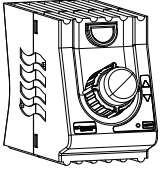
The TSQ Endura or TSQ Quantiva MS ships with several kits and power cords. This appendix lists the necessary components for the instructions in this guide. For a full list of the kits and their contents, refer to the *TSQ Endura and TSQ Quantiva Hardware Manual*.

Contents

- [Syringe Pump and Modular Valve Assembly](#)
- [Single Mechanical Pump Kit](#) (one-forepump system)
- [Dual Mechanical Pumps Kit](#) (two-forepump system)
- [MS Setup Kit](#)
- [Power Cords](#)

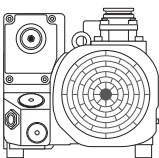


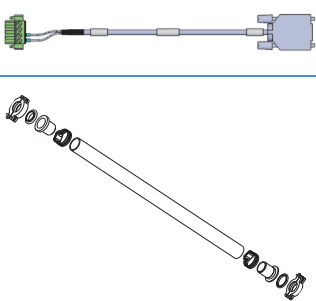
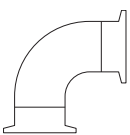

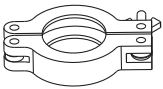

Syringe Pump and Modular Valve Assembly

Table 4. 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

Table 5. Single Mechanical Pump Kit (P/N 80100-62004)

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

Table 6. Dual Mechanical Pumps Kit (P/N 80100-62013) (Sheet 1 of 2)

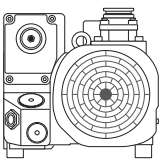


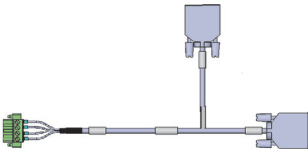
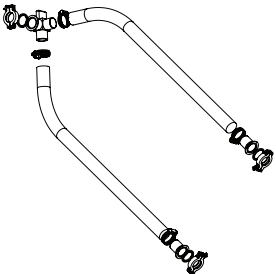
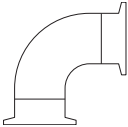

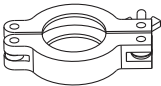


Image	Item	Quantity	Part number
	Forepump, Oerlikon Leybold Vacuum SOGEVAC SV 65 BI	2	00108-01-00032
			
	Forepump oil tray, stainless steel, caster wheels	2	00201-99-00549
	Dual relay control cable, 2.4 m (8 ft) long (preassembled)	1	80100-63146
	Dual pump vacuum hose assembly (preassembled; exploded view shown)	1	80100-60049
Elbow connection			
	Elbow, aluminum, NW40, 90 degree	3	00108-02-00010
	Centering ring with O-ring, nitrile and aluminum, NW40	3	00108-02-00005
	Swing clamp, aluminum, NW32/40	3	00108-02-00004

Table 6. Dual Mechanical Pumps Kit (P/N 80100-62013) (Sheet 2 of 2)

Image	Item	Quantity	Part number
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

Table 7. MS Setup Kit (P/N 80100-62003) (Sheet 1 of 2)




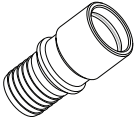

Image	Item	Quantity	Part number
Communications connection			
	Connector plug, MINI-COMBICON™, 8-pin, 26.67 mm (1.05 in.) long, rated 160 V, 8 A (contact closure)	2	00004-21512
–	Ethernet cables, shielded Category 5e, 2.1 m (7 ft) long	2	00302-99-00036
–	Ethernet power supply (rated 100–240 Vac, 50/60 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

Table 7. MS Setup Kit (P/N 80100-62003) (Sheet 2 of 2)

Image	Item	Quantity	Part number
–	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
	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

Table 8. Power cord specifications

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



Index

C

- communication connectors 16
- compliance
 - EMC 11
 - FCC iii
 - regulatory iii
- contact closure, start instrument signal 13
- contacting us xii

D

- directives
 - regulatory iii
 - WEEE v
- documentation, accessing x

E

- electromagnetic compatibility iii
- EMC compliance 11
- exhaust hose, connecting 3
- external devices
 - earth ground caution 13
 - important notes 14

F

- FCC compliance iii
- forepump connections
 - fume exhaust system cautions 3
 - vacuum hose 2
- forepumps
 - fume exhaust system cautions 8
 - gas ballast valve, opening 3
 - maintenance instructions 1

G

- gases, specifications and consumptions 5

K

- kits, installation 17

P

- power cords 21
- procedures
 - API source, installing 7
 - contact closure cable, connecting 14
 - forepumps, connecting 1
 - gases, connecting 6
 - modular valve and syringe pump, installing 9
 - MS and data system, connecting the cables 12
 - solvent waste container, connecting 8

R

- regulatory compliance iii
- relay switch circuit, external device 15
- Reset pin 14

S

- safety standards iii
- solvent waste system, connecting 8
- symbols, meaning x

T

- Thermo Fisher Scientific website, user documents x
- tools 9
- troubleshooting, Ethernet switch 12

V

- viewing documents x

W

- WEEE directive v

