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EASY-Spray Series Ion Source

User Guide

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ThermoFisher SCIENTIFIC

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WEEE Directive

2012/19/EU

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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 *EASY-Spray Series Ion Source User Guide* describes the hardware components, and provides installation and configuration procedures for the Thermo Scientific™ EASY-Spray™ Series ion sources. Depending on the installed camera type, you view the ion source spray by using the camera software or an LCD monitor that is placed on the mass spectrometer (MS).

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.

Contents

Accessing Documentation

Thermo Scientific mass spectrometers (MS) include complete 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** (or **Thermo *model***) and so on, where *model* is the specific MS.

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.

Compatible Mass Spectrometers

Use the EASY-Spray Series ion source with the appropriate Thermo Scientific MS for nanoelectrospray (commonly referred to as nanoES or nanospray™) analysis. Table 1 lists several compatible MSs. For information about your specific instrument, refer to its manuals.

CAUTION If you connect the EASY-Spray Series ion source to another type of MS, you might impair the safety protection provided by the equipment.

Table 1. Ion sources and compatible mass spectrometers

Ion source model	Part Number	Thermo Scientific mass spectrometer
EASY-Spray NG	ES082	Orbitrap Tribrid Series[a] and TSQ™ Series II
EASY-Spray	ES081	Exactive™ Series, LCQ Fleet™, LTQ™ Series, Orbitrap Series, and TSQ Series I

[a] In 2018, the name “Orbitrap Fusion™ Series” changed to “Orbitrap Tribrid Series.”

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 ion source itself and can appear in color or in black and white. For complete definitions, see Table 2.

Table 2. 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 wet parts of the instrument.
	**Caution: Avoid Burns.** Allow any heated components to cool before touching them.
	**Risk of electric shock:** This ion source uses voltages that can cause electric shock and personal injury. Before removing the ion source for servicing, shut down the MS and disconnect it from line power.
	**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 ion source.
	**Trip obstacle:** Be aware of cords or other objects located on the floor.

Safety Precautions

Observe the following safety precautions when you operate or perform service on the ion source.

CAUTION Only perform service procedures in this manual. To avoid personal injury or damage to the ion source, only the perform service procedures in this manual,

CAUTION The ion source must connect to a certified Thermo Scientific MS, which supplies high voltage capable of delivering a maximum of 8 kV and 100 µA. If you connect the source to another type of MS, you might impair the protection provided by the equipment.

Regulatory Compliance

Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable North American and European regulations. The EASY-Spray Series ion sources were tested as part of the Thermo Scientific MS system, which meets the applicable requirements for electromagnetic compatibility (EMC) and product safety. For additional regulatory information, refer to the MS manuals.

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.

Contacting Us

Contact	Email	Telephone	QR Code
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	
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1

Introduction

The EASY-Spray Series ion source, shown in Figure 1, maintains excellent spray stability to ensure efficient evaporation and ionization of the liquid samples—the key to achieving the highest sensitivity at nano-flow rates.

Key benefits of the EASY-Spray Series are as follows:

- Simple and robust design for nano liquid chromatography (nanoLC)/MS integration
- Better separation with zero dead volume (ZDV) connections
- Increased productivity with the temperature-controlled EASY-Spray column

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Figure 1. nanoLC/MS system (example) using the EASY-Spray ion source, camera, and monitor

Equipment Ratings

Easy Spray Ion Source input rating; 24 VDC, 20 W temperature control board; and High-voltage 2.5 kVDC from Mass Spectrometer

Easy Spray Column input rating: 24 VDC for heater.

Technical Specifications

Item	Dimensions	Weight
Easy Spray Ion Spray Sources, Models ES081 and ES082	18 cm high by 14 cm wide by 13 cm deep	2.6 Kg
Easy Spray Columns, all Models ES8xxA, xx= 00, 01, 02, 03, 04, 05, 06, 10, 11, 12	37 mm high by 8 mm wide by 100 mm length	21 g

Input and Output Connections

- Easy Spray Ion Source, inputs: P-BUS, 24 VDC/20W, Mass Spectrometer High Voltage, Mass Spectrometer Interlock detection;
- Easy Spray Ion Source, output: Heater (to Easy Spray Column)

Environmental Conditions

The Preinstallation Guide has the environmental conditions.

Advantages of Nanoelectrospray

The use of electrospray ionization (ESI) has evolved as a leading technique for generating intact, gas-phase ions from thermally labile, polar analytes in solution. In this technique, an emitter (a capillary tube or needle) induces ionization at a controlled distance from a counter electrode. Direct current (dc) voltage is applied, either to the needle or to the solvent, to produce a strong electrical field at the emitter tip. The electric field excites the ions in the solution as they leave the emitter tip. This interaction results in electrohydrodynamic disintegration of the fluid, generation of droplets, and formation of an aerosol jet.

Conventional ESI employs flow rates from 1 µL/min to 1 mL/min. Expediting desolvation and droplet shrinkage often requires a drying gas, thermal heating, or both, due to the high volume of liquid that exits the emitter. Nanospray ionization (NSI), also known as nanoelectrospray ionization (nanoESI or NSI), is a form of ESI that employs low flow rates of 10 to 1000 nL/min. NSI (or nanoESI) generally does not require a drying gas or thermal heating. Compared with ESI, NSI tolerates a wider range of liquid compositions including pure water.

As you lower the flow rate, a lower volume of mobile phase passes through the emitter, producing smaller aerosol droplets. This makes NSI more effective than conventional ESI at concentrating the analyte at the emitter tip, which produces significant increases in sensitivity as demonstrated by the signal response of the MS.

Note The MS instrument control applications use the terms *nanospray* and *NSI*.

Functional Description

This section describes the following principal components of the EASY-Spray Series ion source and their functions:

- Source Housing
- Temperature Controller PCB
- Controller Power Supply

Source Housing

The EASY-Spray Series ion source housing (Figure 2 or Figure 3) arrives assembled and is easy to install on the appropriate MS (see Table 1). The ion source housing includes two locking levers, two observation windows, a position-adjustable column holder, and a controller printed circuit board (PCB).

Using the top and front observation windows, you can view the tip of the emitter positioning tool while you move it into position. To enhance your view of the tool and then later of the emitter, connect the video camera and LCD monitor (if applicable). For instructions, see Chapter 3, "Installing the Camera and LCD Monitor."

The column holder is mounted onto the front observation window and includes a position control knob. Use the control knob to align the *z* axis (front-to-back) of the emitter positioning tool (page 14) with the MS ion transfer tube. To align the tool's *x*-axis (side-to-side) and *y*-axis (up-and-down) positions, use the controls that are built into the EASY-Spray Series housing. For instructions, see To adjust the emitter tip position.

Figure 2. EASY-Spray NG ion source (P/N ES082) with the USB camera

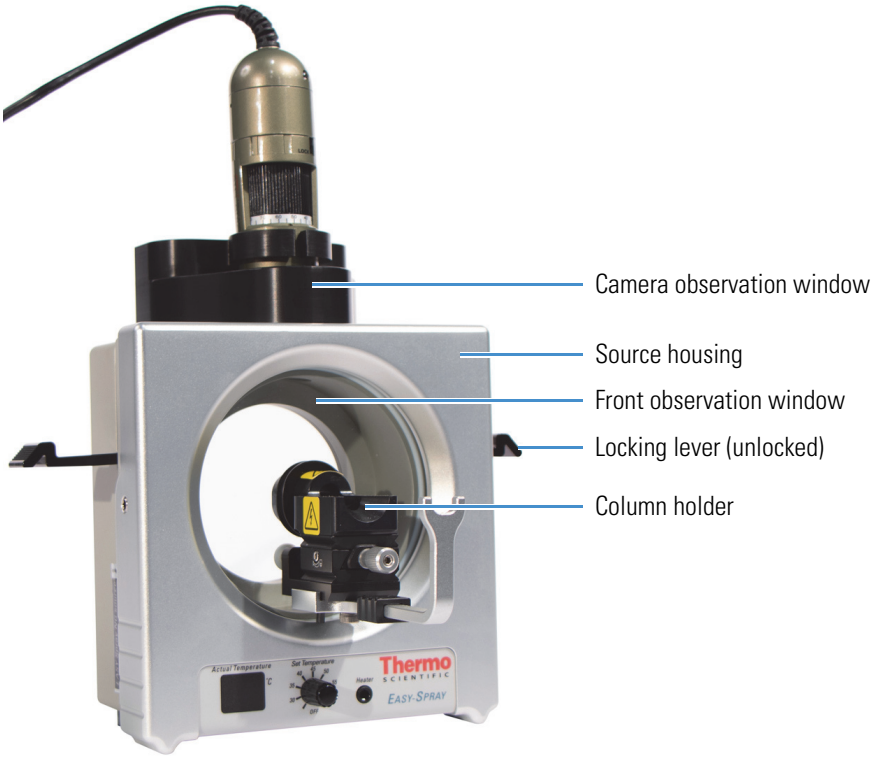
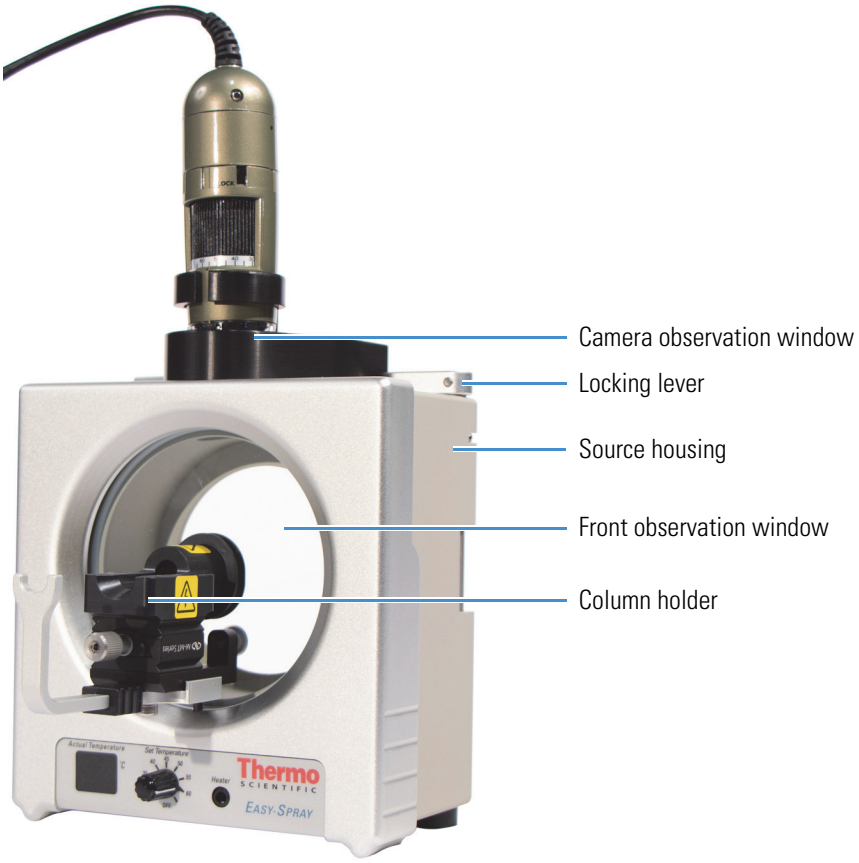


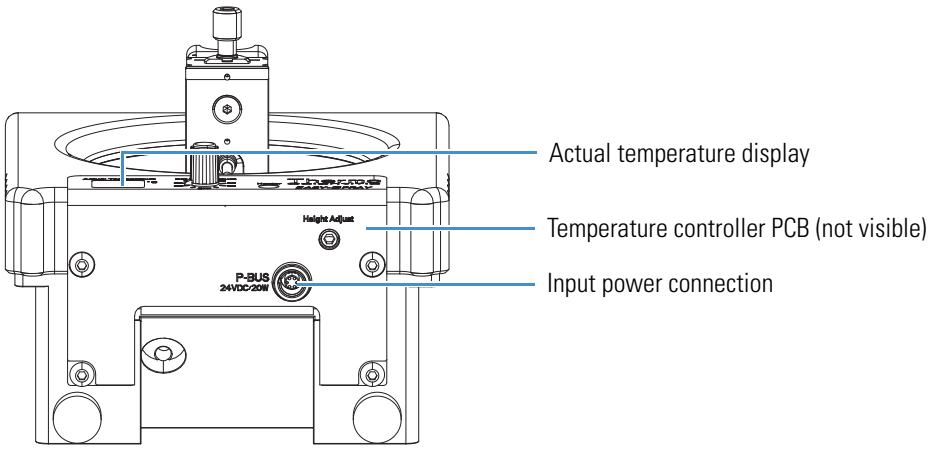
Figure 3. EASY-Spray ion source (P/N ES081) with the USB camera



Temperature Controller PCB

The EASY-Spray Series ion source contains a temperature controller PCB that powers and controls the heat generated for the connected EASY-Spray column. The temperature controller PCB includes an input power socket, an output heater socket, a temperature control knob, and an actual temperature display. The bottom panel for the EASY-Spray NG ion source (Figure 4) is slightly different from that of the EASY-Spray ion source.

Figure 4. Temperature controller PCB located on the EASY-Spray NG ion source (bottom)



The controller power supply connects to the input power socket (labeled P-BUS), which is located on the bottom right side of the ion source. The heater cable from the EASY-Spray column connects to the heater socket, which is located on the front (labeled Heater).

The temperature control knob has an OFF setting and temperature settings in 5 °C increments from 30 through 60 °C. As the column heats up, the actual temperature appears on the display.

Tip If you have the Thermo Scientific EASY-nLC 1200 instrument and the EASY-Spray P-Bus Temp Control Cable[a] (P/N 70005-63055), you can power the EASY-Spray Series ion source by connecting the cable between the ion source and the LC instrument. This connection also enables touch-screen control of the EASY-Spray column temperature.

For cable installation instructions, see To connect the EASY-Spray P-Bus Temp Control Cable. For information about controlling the column temperature through the EASY-nLC 1200 instrument's touch screen or the Xcalibur™ Instrument Setup window, refer to the LC instrument manuals.

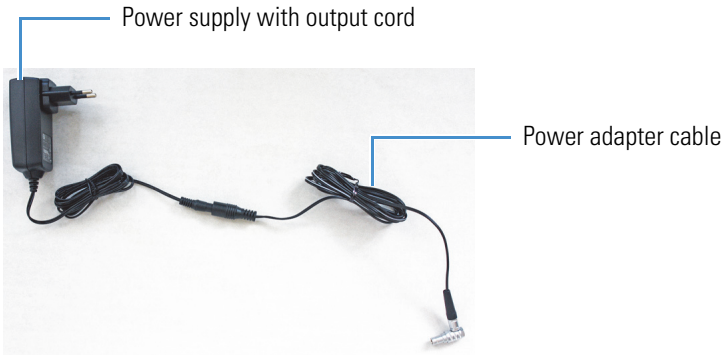
[a] For use with the EASY-nLC 1200 touch-screen application version 4.1 and later

Controller Power Supply

The installation method for the EASY-Spray Series ion source includes the controller power supply when using an LC instrument other than the EASY-nLC 1200. For instructions, see Powering the Ion Source for Other nanoLC/MS Systems.

Figure 5 shows the controller power supply assembly that consists of a wall-mounted power supply with a detachable input plug and a power adapter cable. The other end of the power adapter cable connects to the input power socket (labeled P-BUS) located on the bottom of the ion source to provide the 24 Vdc input for the temperature controller PCB.

Figure 5. Controller power supply assembly (shown with a European input plug)



Note The total length of the output cord and power adapter cable is approximately 274 cm (9 ft). Make sure that an electrical wall outlet is within reach for the power supply and that you provide suitable clearance around it for cooling.

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Installing the EASY-Spray Series Ion Source

The complete EASY-Spray Series ion source installation requires up to three electrical wall outlets, depending on the installed camera type and the method for supplying power to the ion source. Ensure that your lab has the appropriate outlets near the nanoLC/MS system.

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Connecting Power to the Ion Source

This section describes how to connect power to the EASY-Spray Series ion source when using either the EASY-nLC 1200 instrument or another LC instrument, such as the Thermo Scientific Dionex™ UltiMate™ 3000 RSLCnano system.

Follow the applicable procedure:

Powering the Ion Source for an EASY-nLC 1200/MS System

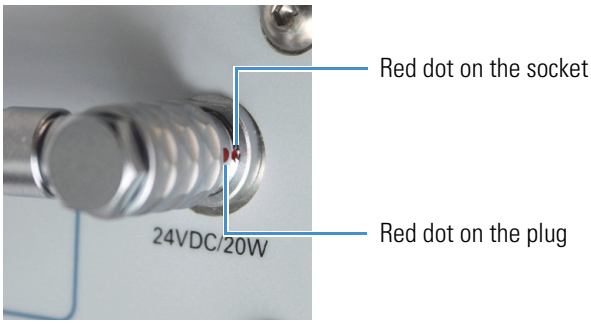
Instead of using the controller power supply (Figure 5), use the EASY-Spray P-Bus Temp Control Cable (P/N 70005-63055) that comes with the EASY-nLC 1200 instrument to connect the instrument to the ion source. This cable provides power from the LC instrument to the ion source and allows the instrument to control the EASY-Spray column temperature.

❖ To connect the EASY-Spray P-Bus Temp Control Cable

IMPORTANT Be sure to follow the specified connection order for the cable.

1. Connect the cable's right-angle connector to the P-BUS socket located on the bottom of the ion source as follows:
   a. Align the red dot on the plug with the red dot on the right side of the socket (Figure 6).
   b. Push the plug into the socket.

   Figure 6. Power connection for the temperature controller PCB (bottom view)

2. Connect the other end of the cable to the P-BUS socket on the back of the EASY-nLC 1200 instrument.

❖ To add the EASY-Spray ion source to the EASY-nLC 1200 configuration

1. On the LC touch screen, press **Maintenance > Devices > Add Device** (top, right corner).
2. In the dialog box, press **EASY-Spray (Column Heater)**, and then press **Accept**.

   After the installation is complete, the ion source's actual temperature display briefly shows "b.L." and then two dashes (--).

Powering the Ion Source for Other nanoLC/MS Systems

Follow this procedure to connect the power supply that is provided with the ion source.

❖ **To connect the controller power supply to the ion source**

1. Turn the ion source's temperature knob to the OFF position.
2. If not already connected, connect the detachable input plug and power adapter cable to the power supply (Figure 5).

CAUTION To avoid an electric shock, always use the detachable input plug that is appropriate for your country or region and comes with the power supply.

3. Connect the power adapter cable to the P-BUS socket located on the bottom of the ion source as follows:
   a. Align the red dot on the plug with the red dot on the right side of the socket (Figure 6).
   b. Push the plug into the socket.
4. Plug the power supply into an electrical wall outlet.

CAUTION After completing the power supply connections, route the output cord so that it is not a trip hazard.

Attaching the Ion Source

Follow these procedures to install the EASY-Spray Series ion source.

- To install the ion source onto the MS
- To install the optional Tee holder under the column holder

Tip The EASY-Spray NG ion source (ES082) ships with the Tee holder attached to the column holder. If you have the EASY-Spray ion source (ES081), you can order the optional Tee holder to support the venting Tee; see Chapter 8, "Replaceable Parts."

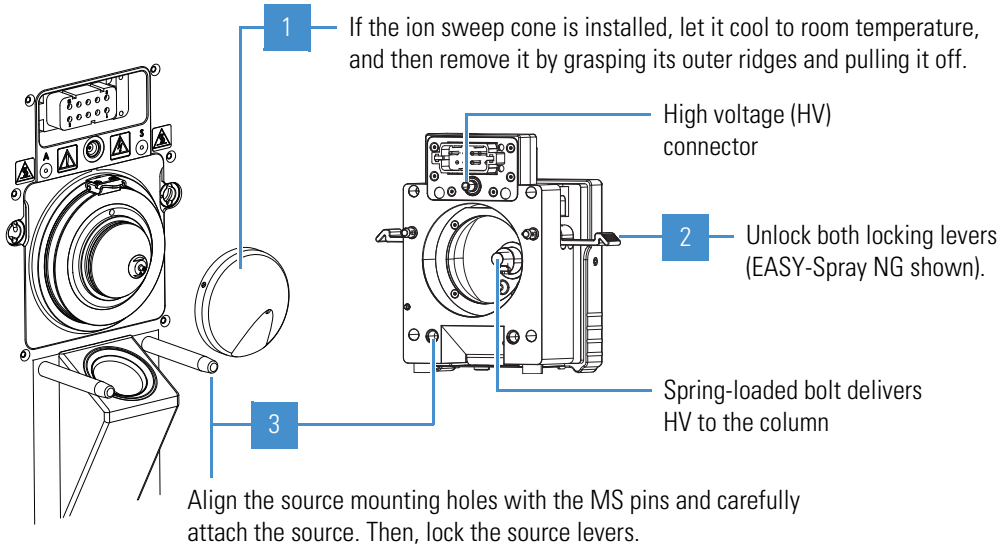
CAUTION Avoid Burns Before you touch an ion source that was recently in use or touch its components, allow the system to cool for a minimum of 20 minutes.
Do not touch the column during use - There is a remote possibility the column might exceed its 60°C upper limit.
Turn the Source Heater knob to "OFF" and allow the Column to cool to room temperature (approximately 10 minutes) before you touch it.

CAUTION

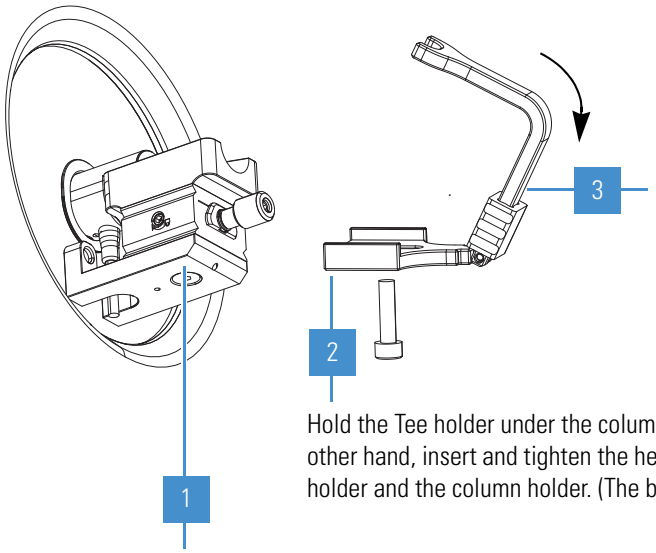
- Make sure that you do not accidentally lift the release lever located at the top of the API source interface, which could interfere with or prevent installation of the ion source.
- To avoid contaminating the ion transfer tube, do not touch its exposed entrance.

❖ To install the ion source onto the MS

Note You might need to use a small slotted screwdriver to loosen the screws on the ion sweep cone. The spray cone is directly behind the ion sweep cone.



❖ To install the optional Tee holder under the column holder



3 Bend the top part of the Tee holder down to the extended position. Move the sliding lock toward the column holder.

2 Hold the Tee holder under the column holder with one hand. With the other hand, insert and tighten the hex bolt through the bottom of the Tee holder and the column holder. (The bolt is provided with the Tee holder.)

1 Remove the hex screw located on the bottom of the column holder.

Note If the ion source is not to be used for an extended period of time, unlock and bend the Tee holder upward as shown in the preceding image.

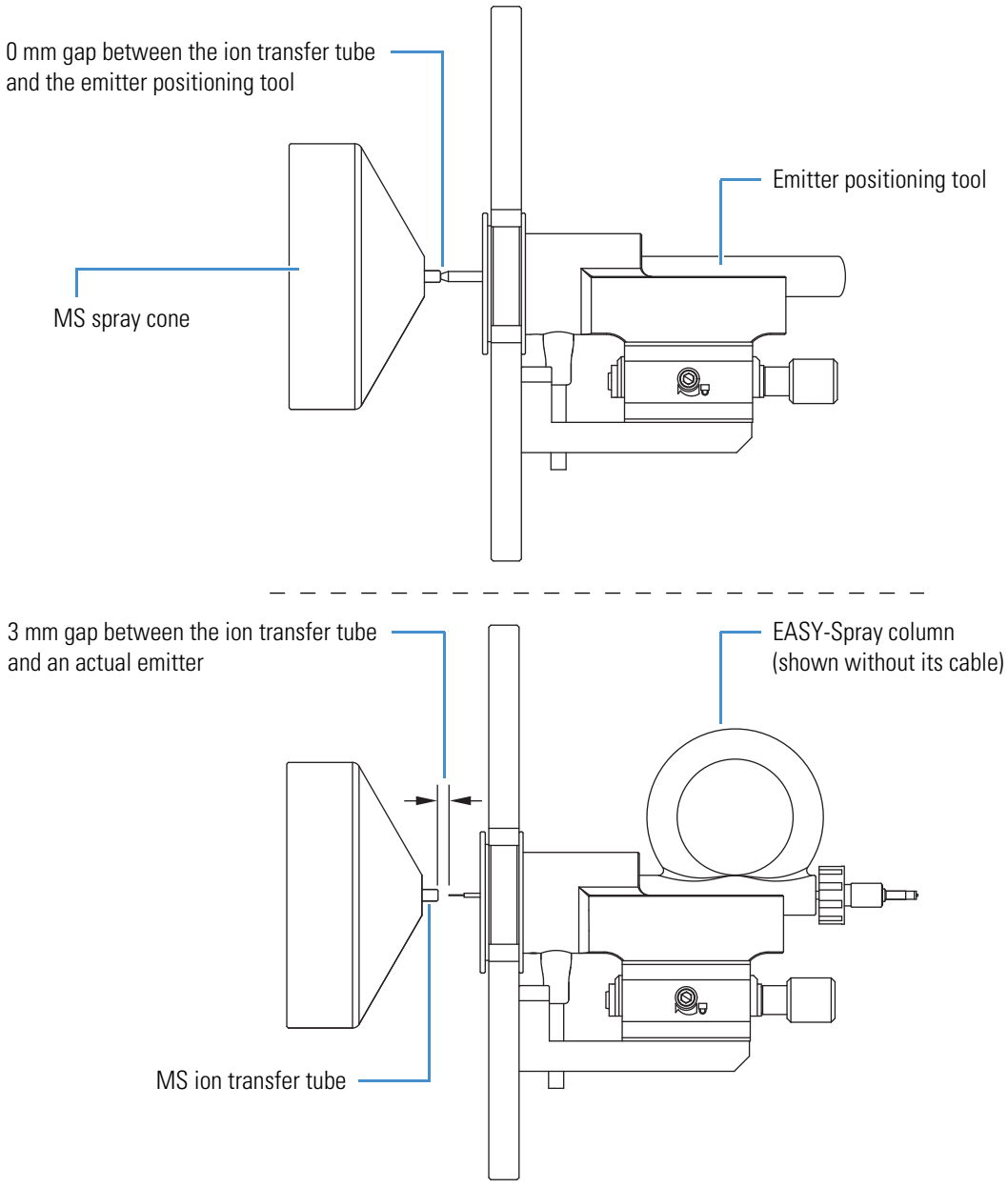
Adjusting the Emitter Tip Position

Before installing the EASY-Spray column, use the emitter positioning tool (Figure 7) and a 3 mm hex key to adjust the position of the column holder.

Figure 8 shows the emitter positioning tool touching the MS ion transfer tube (0 mm gap). The length of the tool's tip ensures the 3 mm gap for the EASY-Spray column's emitter.

Figure 7. Emitter positioning tool

Figure 8. Gap positions in front of the MS ion transfer tube (side view)

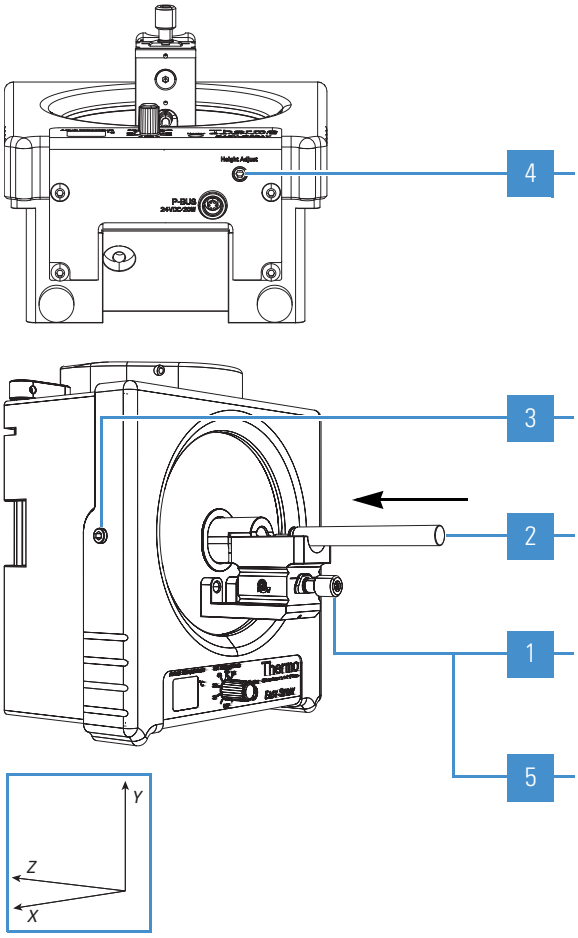


❖ To adjust the emitter tip position

Tip To enhance your view of the emitter positioning tool's tip, install the camera and LCD monitor (if applicable) before you begin this procedure. For instructions, see Chapter 3, "Installing the Camera and LCD Monitor."

IMPORTANT The fused-silica emitter is fragile. Make sure that the emitter positioning tool gently touches the ion transfer tube when you adjust its position or you will damage the actual emitter when fully inserted, requiring you to replace the EASY-Spray column.

CAUTION High voltage. To prevent electric shock, never insert a foreign object, especially a conductive part, into the ion source opening. The opening is intended only for the emitter positioning tool and the EASY-Spray column.



The position of the column holder is now calibrated for use with any EASY-Spray column. You must repeat this procedure if you later change the *x*-, *y*-, or *z*-axis position.

Removing the EASY-Spray Series Source

Follow this procedure if you must remove the ion source from the MS.

❖ **To remove the ion source from the MS**

1. In the applicable instrument control application, place the MS in **Standby** mode.

   For instructions, refer to the MS documentation.

2. Turn the ion source's temperature knob to the OFF position.

CAUTION Avoid Burns Before you touch an ion source that was recently in use or touch its components, allow the system to cool for a minimum of 20 minutes.
Do not touch the column during use - There is a remote possibility the column might exceed its 60°C upper limit.
Turn the Source Heater knob to "OFF" and allow the Column to cool to room temperature (approximately 10 minutes) before you touch it.

3. Turn off the LC liquid flow to the source.

CAUTION To prevent damage to the EASY-Spray column, ensure that the inlet pressure is below 5 bar (70 psi) before you disconnect the column.

4. Disconnect the LC plumbing from the EASY-Spray column, and then remove the EASY-Spray column.

Tip Do not pull on the cable from the EASY-Spray column. Use the plug to disconnect the column from the heater socket.

5. If the Tee holder is installed, move the sliding lock away from the column holder, and then bend the unattached end upward.
6. As applicable, disconnect the camera and monitor connections, including their power supplies.
7. Do one of the following, as applicable:
   - Disconnect the EASY-Spray P-Bus Temp Control Cable from the ion source.
   - Unplug the controller power supply from the electrical wall outlet, and then disconnect the output cable from the ion source.
8. After the system has cooled to room temperature, unlock the source's locking levers.
9. Grasp the source housing with both hands and slowly pull it away from the MS.

   The MS automatically switches to off mode after a few seconds.
   You can store the source in its original shipping box after you remove the camera. The EASY-Spray Series ion source does not require cleaning.

Installing the Camera and LCD Monitor

Depending on your camera model (Table 3), follow the applicable procedure to install the camera, with or without the monitor. Afterwards, follow the applicable procedure in Adjusting the Video Picture.

Contents

Table 3. Camera types and installation procedures

Camera	P/N	Monitor?	Procedure[a]
Dino-Lite™, USB	ES218	No	To install the USB camera
Dino-Lite, analog	ES216	Yes[b]	To install the analog camera and LCD monitor

[a] Might require a 1.5 mm hex key to complete.

[b] LCD monitor (P/N ES217)

Installing the USB Camera

Using the DinoCapture™ application through the data system computer, you can use the monitor to view the tip of the emitter tool and then the spray from the installed EASY-Spray column.

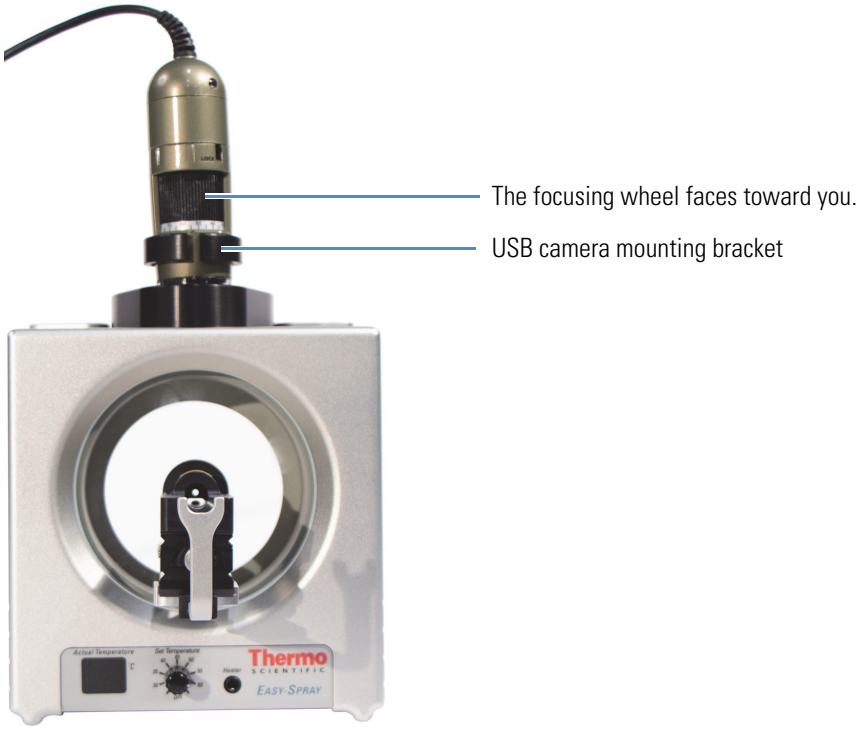
❖ To install the USB camera

1. Install the camera's DinoCapture application onto the data system computer.

   IMPORTANT You must install this application before connecting the camera cable to the data system computer.

2. With the focusing wheel facing toward you, slowly press the camera into the camera opening (Figure 9).

   Figure 9. USB camera installed on the EASY-Spray ion source



3. (Optional) Connect the camera to the USB extension cord.
4. Plug the USB cord into the data system computer's USB port.

   IMPORTANT Do not connect the camera to a USB hub.

   Tip For troubleshooting purposes, record the USB port used for the camera.

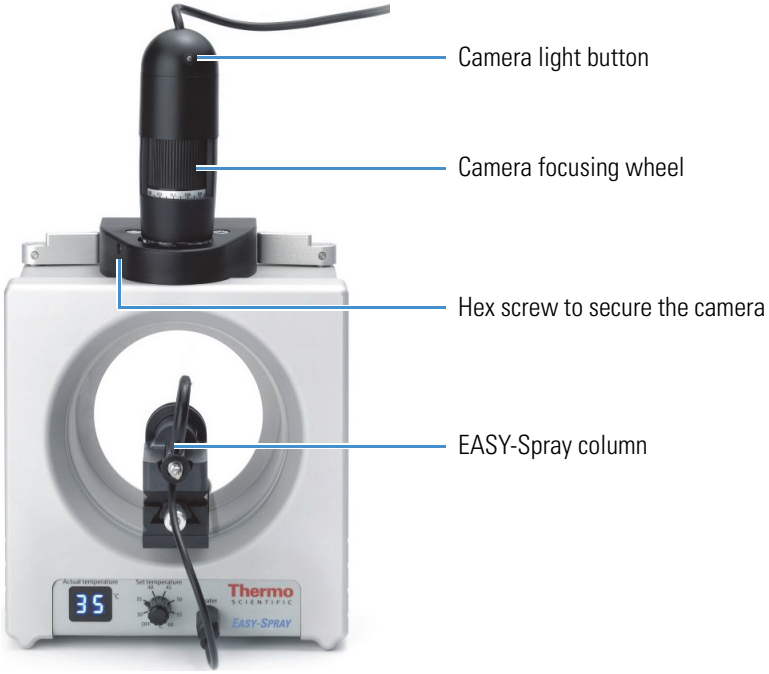
Installing the Analog Camera and LCD Monitor

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

❖ To install the analog camera and LCD monitor

1. Install the monitor as follows:
   a. On the back, attach the BNC adapter (if provided) to a Video IN port.
   b. Connect the power supply for the monitor between the DC 12V IN socket and an electrical outlet.
   c. Place the monitor on top of the MS near the source, making sure that it is not too close to the edge of the instrument.
2. Install the camera as follows:
   a. Using a 1.5 mm hex key, loosen the hex screw near the camera opening, and then insert the camera with its focusing wheel facing toward you (Figure 10).
   b. Tighten the hex screw until it touches the camera—do not overtighten it.

Figure 10. Analog camera installed on the EASY-Spray ion source



   c. Connect the yellow video connector to the monitor's Video IN port (see step 1a).
   d. Connect the black connector to its power supply, and then connect the power supply to an electrical outlet.

Adjusting the Video Picture

Depending on your camera model, follow the applicable step to focus the video picture. As needed, refer to the manuals for the camera and monitor.

❖ To adjust the video picture

- For the USB camera application, do the following:
  i. In the DinoCapture window, use the mouse to move the video image as needed.

  Tip To learn more about this application, such as the measurement and time-lapse video features, choose **Help > FAQ** or **User's Guide**.

  ii. If the picture is too dark, turn on the camera's light.
  iii. If the picture is out of focus, adjust the camera's focusing wheel.
- For the LCD monitor, do the following:
  i. Turn on the monitor by pressing its POWER button.
  ii. If the picture is too dark, turn on the camera's light.
  iii. If the picture is out of focus, adjust the camera's focusing wheel.
  iv. If there is no picture, press the SOURCE button.

  The monitor displays the selected video input channel (AV1 or AV2) for a few seconds.

4

Connecting the EASY-Spray Column Plumbing

To connect the plumbing from the Thermo Scientific LC instrument to the EASY-Spray column, follow these topics.

Contents

Tools and Supplies

Table 4 lists the required tools and supplies for configuring the LC plumbing and EASY-Spray column connections. Not all parts are required.

Note The kit for the EASY-Spray Series ion source supplies the venting Tee, fittings, and sleeves only. You are responsible for supplying the remaining parts and tools.

Table 4. Tools and supplies (Sheet 1 of 2)

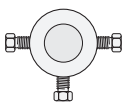
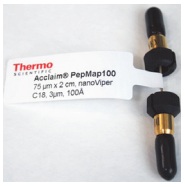
Image	Description	Part number
One- and two-column setups		
	A/B mixing/venting Tee, stainless steel, with three attached ferrules and nuts	SC901

Table 4. Tools and supplies (Sheet 2 of 2)

Image	Description	Part number
—	Gloves, lint-free and powder-free	Fisher Scientific™ 19-120-2947[a] Unity Lab Services: • 23827-0008 (medium size) • 23827-0009 (large size)
Two-column setup		
	Any nanoViper™-equipped precolumn This image shows the Acclaim™ PepMap100 Nano-Trap.	(For the PepMap100 Nano-Trap) Fisher Scientific, 164705
	Viper™ union (for use with the EASY-nLC 1200)	SC904
—	UltiMate 3000 RSLCnano EASY-Spray Application Kit	Thermo Fisher Scientific 6720.0395

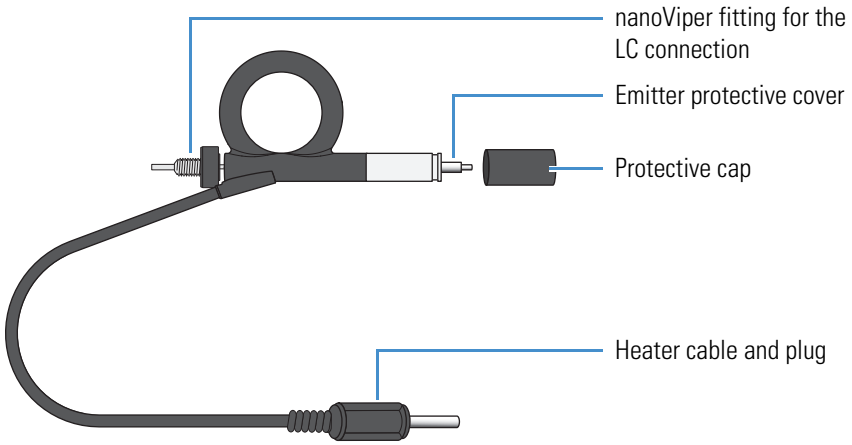
[a] Multiple sizes are available.

Installing the EASY-Spray Column for the First Time

The EASY-Spray column (Figure 11) contains an integrated heatable column and a fused-silica emitter. For available columns, see Chapter 8, "Replaceable Parts."

IMPORTANT The EASY-Spray column assembly includes an emitter protective cover. If you push back this cover by hand, you could damage the fused-silica emitter and make the EASY-Spray column unusable.

Figure 11. EASY-Spray column



❖ To install the EASY-Spray column

1. (Optional) Follow the procedure To install the optional Tee holder under the column holder.
2. Make sure that the mass spectrometer is in standby mode.
3. Follow the procedure To adjust the emitter tip position.

   Note You can skip this step after the first time if you have not adjusted the column holder's position.

4. Remove the protective cap on the end of the EASY-Spray column.
5. With the cable on the bottom, slowly push the tip of the EASY-Spray column into the column holder opening until it clicks into place.

   As the EASY-Spray column moves forward into the ion source, the protective cover over the emitter retracts to expose the emitter tip.

CAUTION High voltage.

- To prevent electric shock, never insert a foreign object, especially a conductive part, into the ion source opening. The opening is intended only for the emitter positioning tool and the EASY-Spray column.
- To prevent electric shock do not disconnect the column heater cable from the Ion Source during operation. High Voltage may exist on the column heater cable plug and is a risk for electric shock. Once the column is installed into the Easy-Spray Series Ion Source, the column heater cable must remain plugged into the temperature controller of the Ion Source.
- Use the plug to connect and disconnect the EASY-Spray column. Use the plug to connect and disconnect the column.

6. Connect the cable to the front output heater socket.

Note Do not pull the cable from the EASY-Spray column. Use the plug to connect and disconnect it.

7. Follow the appropriate procedure in Examples of LC Connections to the EASY-Spray Column.

Setting the Column Temperature

Before you begin, turn the temperature control knob to the lowest temperature setting.

❖ **To set the temperature for the EASY-Spray column**

Do one of the following:

- Manually turn the ion source's temperature control knob.
- (EASY-nLC 1200 instrument) Use either the Thermo Xcalibur Instrument Setup window, or use the EASY-nLC 1200 instrument's touch screen as follows:
  i. On the touch-screen's Home page (top, right corner), press the **EASY-Spray** icon,  .
  ii. In the EASY-Spray dialog box, press the temperature box, enter a temperature value in the range 30–60 °C, press **Accept**, and then press **Set** and **Close**.

  IMPORTANT If you later manually turn the temperature control knob, you must repeat this procedure to reset the touch-screen value.

–or–

- (RSLCnano system) Use the temperature control knob on the front of the ion source.

Table 5 lists the display readings that can appear on the actual temperature display.

Table 5. Readings for the actual temperature display

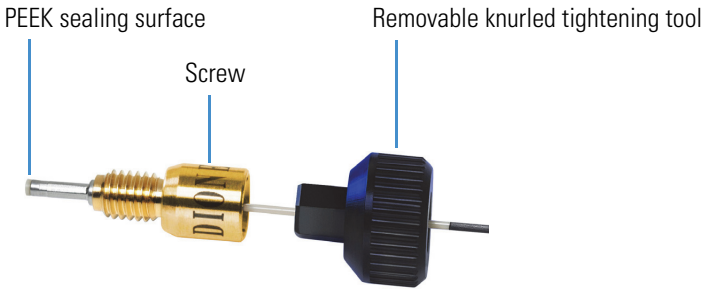
Display	Description
--	EASY-Spray column is not connected.
xx.	Actual temperature while heating up
xx	Actual temperature, stabilized
b.L.	Disconnect and reconnect power to the ion source to exit boot loader mode (b.L.).
No display	See Replacing the Temperature Controller PCB.

Using the nanoViper Fitting

For some LC instruments, the plumbing connects to the EASY-Spray column through several nanoViper fittings, such as the one shown in Figure 12. Although these fittings can withstand ultra-high-performance LC (UHPLC) backpressures up to 1200 bar (17 400 psi), they are fingertight fittings that require only very small torques to seal. Therefore, you must follow the next procedure to avoid damage by overtightening.

Tip Refer to the packing for your nanoViper fittings to determine compatibility with either the 1000 bar capillaries (beige tubing) or the 1200 bar capillaries (blue tubing).

Figure 12. nanoViper fitting



❖ To use a nanoViper fitting

1. Insert the nanoViper fitting into the target port and slowly rotate the screw clockwise until you feel resistance.
2. Using the black knurled fitting tool, tighten the screw clockwise to an angle of 0–45 degrees (1/8-turn).
3. Start operating the system at the desired working pressure and check the backpressure.
4. If the backpressure is too low, check the system for leaks.

   For instructions, refer to the LC instrument's manuals.
5. If the backpressure continues to be too low, return the system to atmospheric pressure.

   IMPORTANT To extend the lifetime of the nanoViper fittings, open and close the connections at only atmospheric system pressures. Opening and closing connections at high system pressures can reduce the lifetime of the fittings.
6. Tighten the screw by as much as an additional 45 degrees. Do not turn the screw beyond an angle of 90 degrees from where you felt the initial resistance.

   IMPORTANT To prevent damage to the sealing surface of the nanoViper fitting, do not overtighten the fitting.

Examples of LC Connections to the EASY-Spray Column

This section describes how to connect the one or two plumbing lines from a Thermo Scientific nanoLC instrument to the EASY-Spray column in a one- or two-column configuration. Table 4 lists the required parts.

Note The EASY-nLC 1200 instrument identifies the two solvent lines as "Column Out" and "Waste In."

CAUTION Wear protective gloves and eye wear when handling the solvent lines.

Follow the appropriate topic:

- Connecting the EASY-nLC 1200 to the EASY-Spray Column
- Configuring the EASY-nLC 1200 Plumbing for Two Columns
- Connecting an RSLCnano System to the EASY-Spray Column

Connecting the EASY-nLC 1200 to the EASY-Spray Column

Follow the appropriate procedure for a one- or two-column setup. The two-column setup includes a precolumn connected in the column-out flow path to the venting Tee.

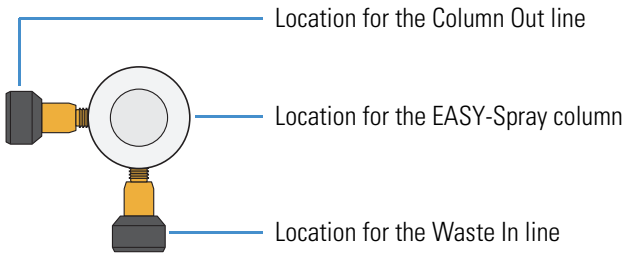
Note Remove the nuts and ferrules from the venting Tee.

- To plumb a one-column setup for the EASY-nLC 1200 instrument
- To plumb a two-column setup for the EASY-nLC 1200 instrument

❖ To plumb a one-column setup for the EASY-nLC 1200 instrument

1. On the Column Out line, insert the nanoViper fitting into the venting Tee's side port as shown in Figure 13, tighten the fitting by hand until you feel resistance, and then tighten the fitting again by an additional 1/8- to 1/4-turn. Do not tighten the fitting by more than a 1/4-turn.

Figure 13. Recommended plumbing locations on the venting Tee (nanoViper example)

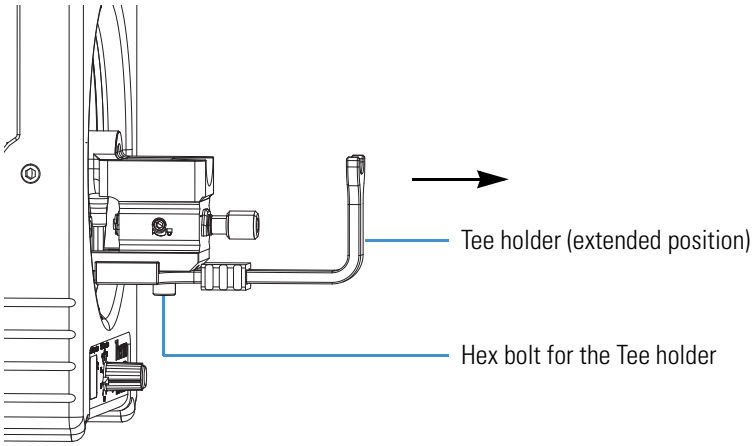


CAUTION Do not tighten the fittings by more than 1/4-turn (90 degrees). Overtightening them can irreparably damage their sealing surfaces. For additional information about nanoViper fittings, see Using the nanoViper Fitting.

2. On the Waste In line, insert the fitting into the venting Tee's bottom port, tighten the fitting by hand until you feel resistance, and then tighten the fitting by an additional 1/8- to 1/4-turn. Do not tighten the fitting by more than a 1/4-turn.

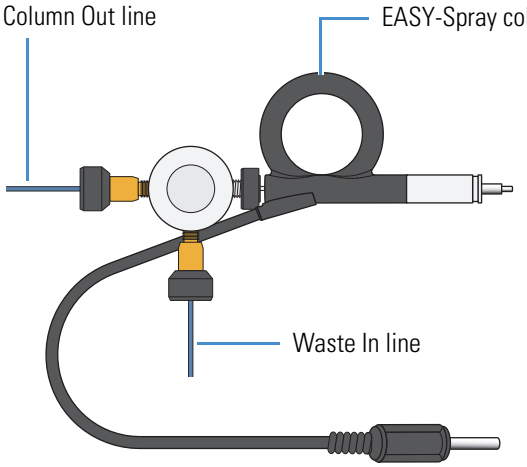
3. Insert a 3 mm hex key into the bolt that secures the (venting) Tee holder to the column holder, loosen the hex bolt, and then slowly move the Tee holder forward (Figure 14).

Figure 14. Tee holder secured to the bottom of the column holder



4. Connect the venting Tee to the EASY-Spray column (Figure 15).

Figure 15. Example of a one-column setup with nanoViper fittings



5. Adjust the Tee holder's position so that it supports the nanoViper fitting, and then use a 3 mm hex key to tighten the hex bolt on the bottom of the column holder.

❖ To plumb a two-column setup for the EASY-nLC 1200 instrument

1. Assemble and connect the Column Out line as follows:
   a. Insert the Column Out line's nanoViper fitting into the Viper union, and then connect the other end of the union to the appropriate end of the nanoViper precolumn.

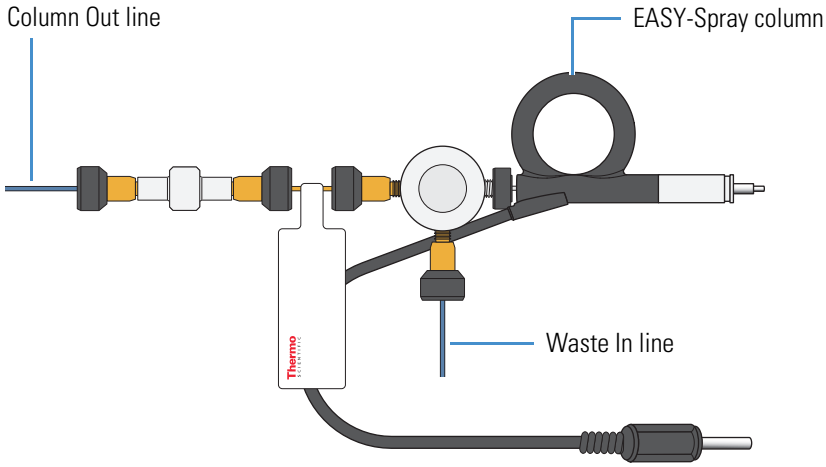
      Note Follow the recommended flow direction stated on the precolumn label.

   b. Alternate tightening each fitting in increments until you feel resistance, and then tighten both fittings by an additional 1/8-turn (45 degrees). Do not tighten the fittings by more than 1/4-turn.

      Note See the Caution on page 27 regarding the nanoViper fittings.

   c. On the other end of the precolumn, insert the fitting into the venting Tee's side port (Figure 13), and then tighten 1/8- to 1/4-turn (45–90 degrees).
2. On the Waste In line, insert the fitting into the venting Tee's bottom port, tighten the fitting by hand until you feel resistance, and then tighten the fitting again by an additional 1/8- to 1/4-turn. Do not tighten the fitting by more than a 1/4-turn.
3. Insert a 3 mm hex key into the bolt that secures the (venting) Tee holder to the column holder, loosen the hex bolt, and then slowly move the Tee holder forward.
4. Connect the venting Tee to the EASY-Spray column (Figure 16).

   Figure 16. Example of a two-column setup with nanoViper fittings and a Viper union



5. Adjust the Tee holder's position so that it supports the nanoViper fitting, and then use a 3 mm hex key to tighten the hex bolt on the bottom of the column holder.

Configuring the EASY-nLC 1200 Plumbing for Two Columns

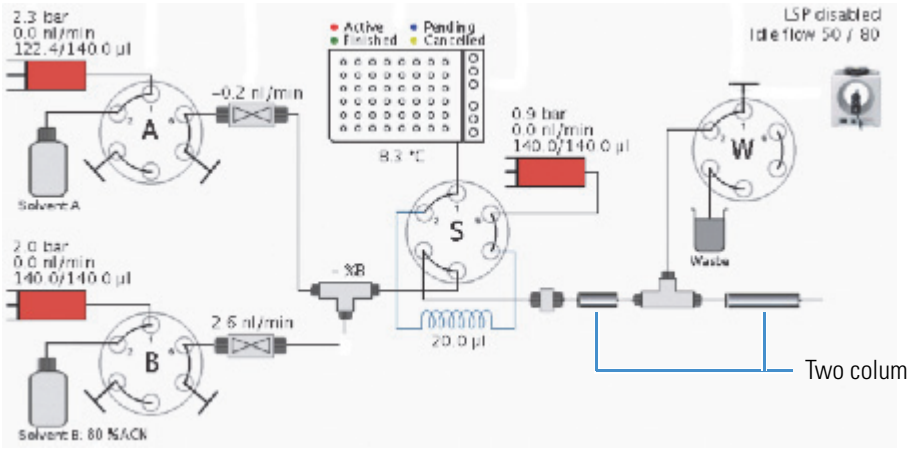
Use the touch screen on the EASY-nLC 1200 to configure the use of two columns.

❖ **To configure the EASY-nLC 1200 for use with two columns**

1. On the LC touch screen, press **Maintenance > Devices**.
2. In the Devices list, press **EASY-nLC (HPLC)**.
3. Press **Properties**, clear the **One Column Setup** check box, and then press **Apply**.

   The Home page shows the two-column setup (Figure 17). For additional instructions, refer to the LC instrument manual.

Figure 17. EASY-nLC 1200 touch screen showing a two-column configuration



Connecting an RSLCnano System to the EASY-Spray Column

Follow the appropriate procedure for a one- or two-column setup for an RSLCnano system. The two-column setup includes a precolumn connected across the autosampler valve.

Note To connect the RSLCnano system to the EASY-Spray column, you must use the Thermo Scientific Dionex UltiMate 3000 RSLCnano EASY-Spray Application Kit (P/N 6720.0395).

- To plumb a one-column setup for the RSLCnano instrument
- To plumb a two-column setup for the RSLCnano instrument

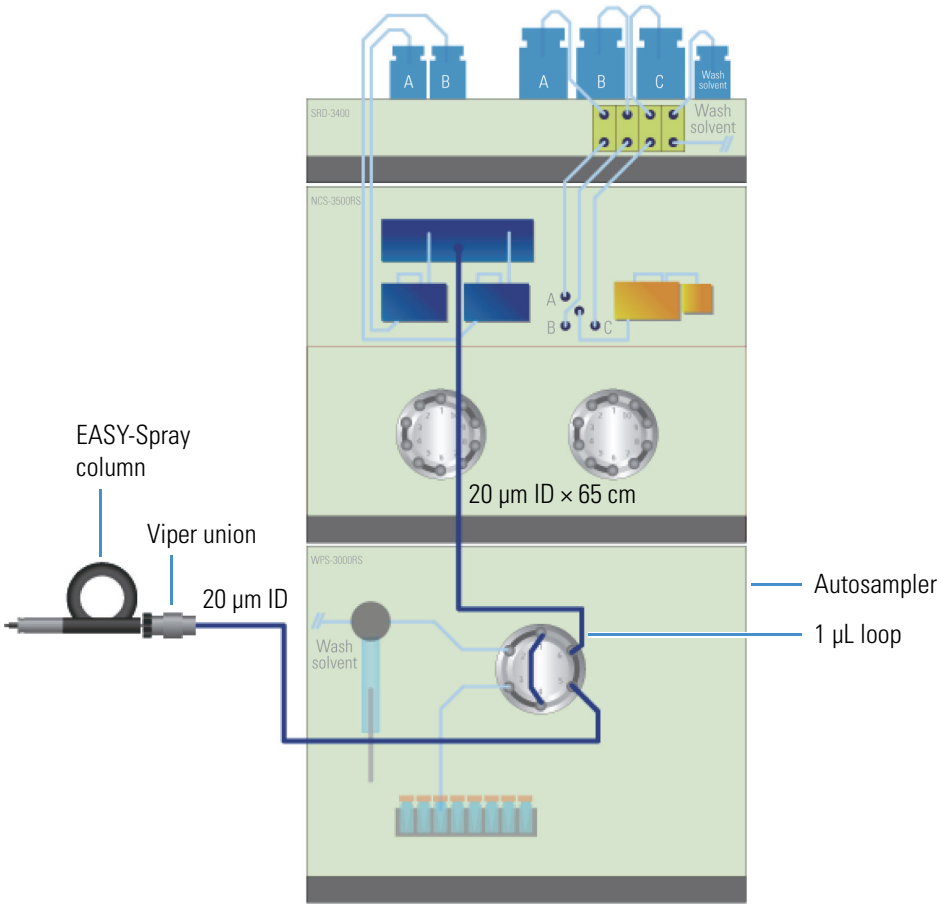
❖ To plumb a one-column setup for the RSLCnano instrument

1. Insert the nanoViper fitting on the 20 µm ID nanoViper capillary into port 5 of the autosampler valve (Figure 18).
2. Insert the fitting on the other end of the capillary into the Viper union, tighten the fitting by hand.

CAUTION Overtightening the fittings can irreparably damage their sealing surfaces. For additional information about nanoViper fittings, see Using the nanoViper Fitting.

3. Connect the union to the EASY-Spray column to complete the one-column setup (Figure 18).

Figure 18. Example of a one-column setup for an RSLCnano system (direct injection)



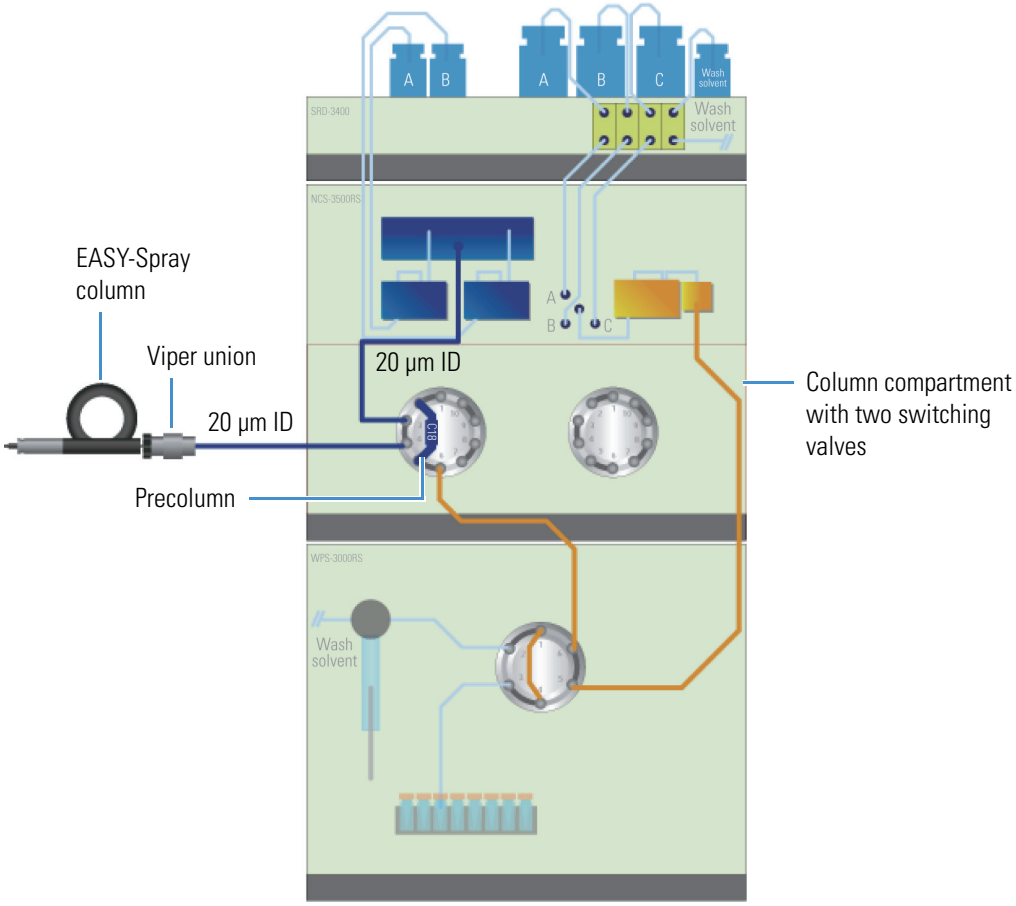
❖ To plumb a two-column setup for the RSLCnano instrument

1. Connect the precolumn to ports 2 and 5 on one of the switching valves (Figure 19).
2. Insert the nanoViper fitting on the 20 µm ID nanoViper capillary into port 4 on the same switching valve.
3. Insert the fitting on the other end of the capillary into the Viper union, tighten the fitting by hand.

CAUTION Overtightening the fittings can irreparably damage their sealing surfaces. For additional information about nanoViper fittings, see Using the nanoViper Fitting.

4. Connect the union to the EASY-Spray column to complete the two-column setup (Figure 19).

Figure 19. Example of a two-column setup for an RSLCnano system (preconcentration)



Additional Resources

For general information about configuring Thermo Scientific nanoLC sources, log in (free) to planetorbitrap.com, choose **Library > Scientific Library > Keyword**, and search for **A1969**.

Refer to the Thermo Scientific EASY-nLC Series documentation for the following:

- Setting up the column assembly
- Modifying the LC instrument before connecting it to the EASY-Spray Series ion source

For other LC instruments, refer to their documentation.

5

Configuring the Mass Spectrometer for NSI Mode

Follow the applicable procedures to configure the Thermo Scientific MS for NSI mode.

Contents

Configuring the EASY-Spray NG Source's NSI Parameters

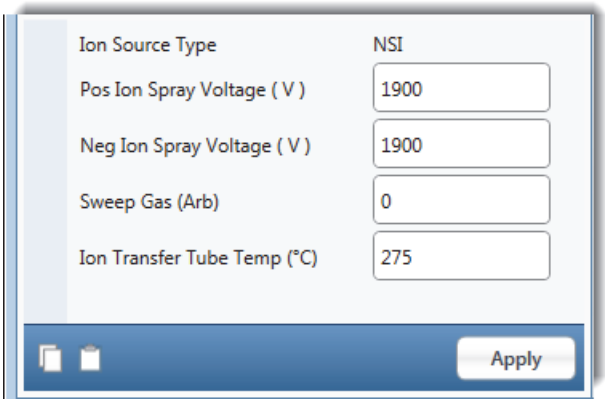
After you complete the instrument configuration, use the Thermo Tune application to configure the NSI source parameters. For additional information, refer to the Tune Help.

❖ **To set the NSI source parameters**

1. Open the Tune application by choosing **Start > All Apps** (Windows 10) or **All Programs** (Windows 7) **> Thermo Instruments** (or **Thermo *Model***) and so on.
2. Click the **Ion Source** tab, and then type **1900** in the Pos Ion Spray Voltage (V) box (Figure 20).

   Use 1900 V as the start value for the spray voltage. If the intensity of the full-scan spectrum is low, gradually increase the spray voltage to improve the spectrum. The recommended range for the spray voltage is 1400–2400 kV.
3. In the Sweep Gas (Arb) box, type **0**.

Figure 20. Ion Source pane in the Tune window (example)



4. Click **Apply**.

Configuring the EASY-Spray Source's NSI Parameters

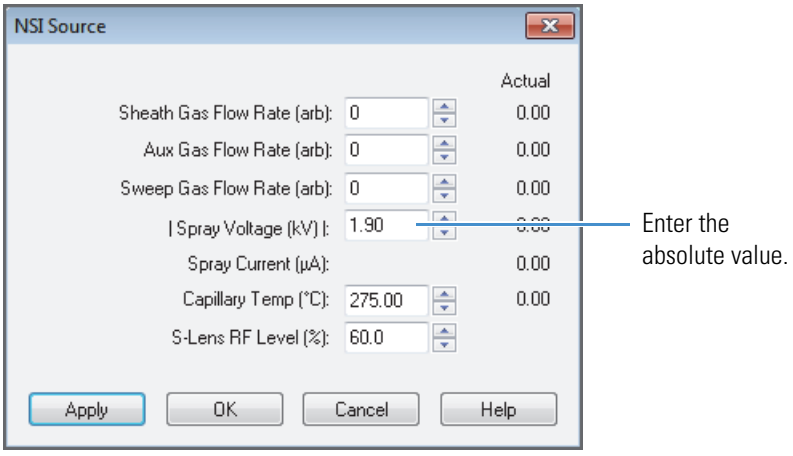
After you complete the instrument configuration, use the Thermo Tune Plus application to configure the NSI source parameters. For additional information, refer to the Tune Plus Help.

❖ To set the NSI source parameters

1. Open the Tune Plus application by choosing **Start > All Apps** (Windows 10) or **All Programs** (Windows 7) **> Thermo Instruments** (or **Thermo *Model***) and so on.
2. Choose **Setup > NSI Source**, and then enter **1.90** in the Spray Voltage (kV) box (Figure 21).

   Use 1.90 kV as the start value for the spray voltage. If the intensity of the full-scan spectrum is low, gradually increase the spray voltage to improve the spectrum. The recommended range for the spray voltage is 1.40–2.40 kV.

Figure 21. NSI Source dialog box



3. Click **OK**.

6

Maintenance

This chapter provides maintenance guidelines, a list of required tools and supplies, and instructions for replacing the temperature controller PCB in the EASY-Spray Series ion source.

Contents

Guidelines

For optimal results, follow these guidelines when performing the procedure in this chapter:

- Always wear a new pair of lint- and powder-free gloves when handling solvents. Never reuse gloves after you remove them because the surface contaminants on them recontaminate clean parts.
- Always place the components on a clean, lint-free surface.
- Have nearby the necessary tools, supplies, and replacement parts (when applicable).
- Never overtighten a screw or use excessive force.
- Proceed methodically.

Tools and Supplies

The EASY-Spray Series ion source requires very few tools to perform routine maintenance procedures. Table 6 lists the necessary tools and supplies for maintaining the ion source and column.

CAUTION Avoid exposure to potentially harmful materials.

By law, producers and suppliers of chemical compounds are required to provide their customers with the most current health and safety information in the form of Material Safety Data Sheets (MSDSs) or Safety Data Sheets (SDSs). The MSDSs and SDSs must be freely available to lab personnel to examine at any time. These data sheets describe the chemicals and summarize information on the hazard and toxicity of specific chemical compounds. They also provide information on the proper handling of compounds, first aid for accidental exposure, and procedures to remedy spills or leaks.

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

Table 6. Tools, equipment, and chemicals

Description	Part number
Tools and equipment	
Temperature controller PCB and a cover plate for use on the EASY-Spray ion source	ES233
EASY-Spray column wash cap	ES235
Gloves, lint-free and powder-free	Fisher Scientific 19-120-2947[a] Unity Lab Services: • 23827-0008 (medium size) • 23827-0009 (large size)
Graduated cylinder or beaker, glass, 20–60 mm diameter (for use with cleaning solvent)	–
Sonicator	–
Chemicals	
Any organic solvent (for example): • Acetonitrile, Optima™ LC/MS grade • Methanol, Optima LC/MS grade	Fisher Scientific (for example): • A956-1 (amber glass, 1 L) • A458-1 (amber glass, 1 L)

[a] Multiple sizes are available.

Cleaning the EASY-Spray Column Emitter Tip

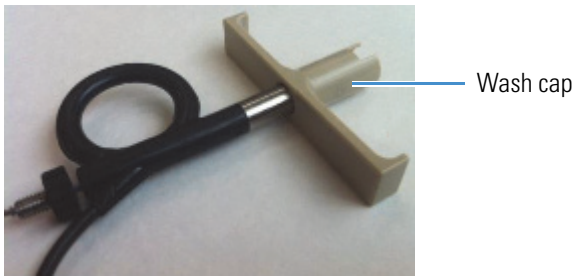
If the video camera's output shows dust particles on the EASY-Spray column's emitter tip or if there are unresolved spray issues, follow the procedure in this section to clean the emitter.

CAUTION Wear protective gloves and eye wear when handling solvents.

❖ **To clean the EASY-Spray column emitter**

1. Carefully remove the EASY-Spray column from the ion source.
2. Carefully insert the column into the wash cap (Figure 22).

   Figure 22. Wash cap installed over the column emitter tip

3. Over a wash container, hold the column and wash cap with one hand, and then slowly pull back on the wash cap to expose the emitter tip.
4. With the other hand, gently wash the emitter tip with a stream of organic solvent.
5. Reinstall the column in the ion source, and then use the video camera to inspect the emitter tip for any residual lint or particulates.
6. If the emitter tip is not fully clean, use the sonicator as follows:
   a. With the column inserted into the wash cap, place the emitter tip into the graduated cylinder or beaker.
   b. Fill the container with the organic solvent to cover the emitter tip.
   c. Place the container with the wash cap and column into the sonicator.
   d. Hold onto these components and run the sonicator for 1 minute.

This completes the cleaning procedure. If you have further issues with the emitter, you might need to replace the column.

Replacing the Temperature Controller PCB

If the temperature controller PCB becomes damaged, the actual temperature display might remain off and the EASY-Spray column might not heat. Follow this procedure to install a new PCB.

❖ To replace the temperature controller PCB

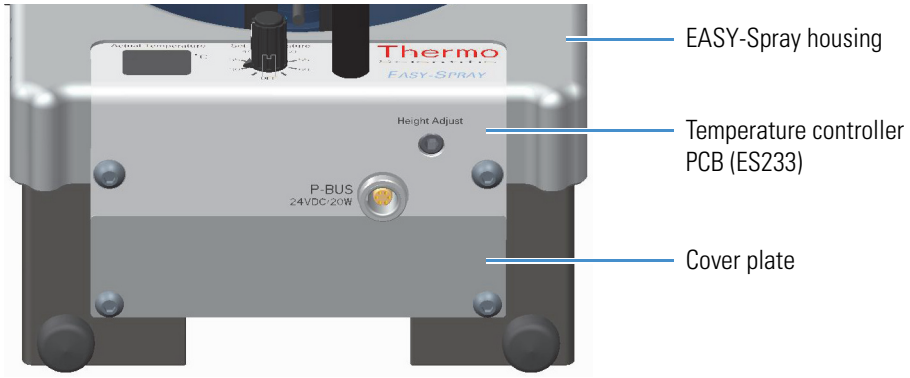
1. Follow the procedure To remove the ion source from the MS.

CAUTION High voltage. To prevent electric shock, make sure that you disconnect the P-Bus cable before you remove the PCB.

2. Using a 2.5 mm hex key, remove the four hex screws located on the bottom of the ion source. If you previously installed the temperature controller PCB, P/N ES233, in the EASY-Spray source, remove the additional cover plate (Figure 23).

Note The cover plate is for use on the EASY-Spray ion source (ES081) only when installing the ES233 temperature controller PCB.

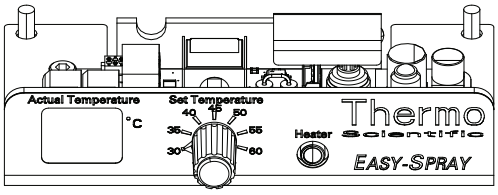
Figure 23. EASY-Spray ion source (bottom) with the new temperature controller PCB and extra cover plate



3. Slowly pull out the enclosure for the temperature controller PCB (Figure 24).

IMPORTANT If you remove the temperature controller PCB too quickly or at an angle, you might damage the PCB components or the internal heater cable routed above the PCB.

Figure 24. Temperature controller PCB (P/N ES233)

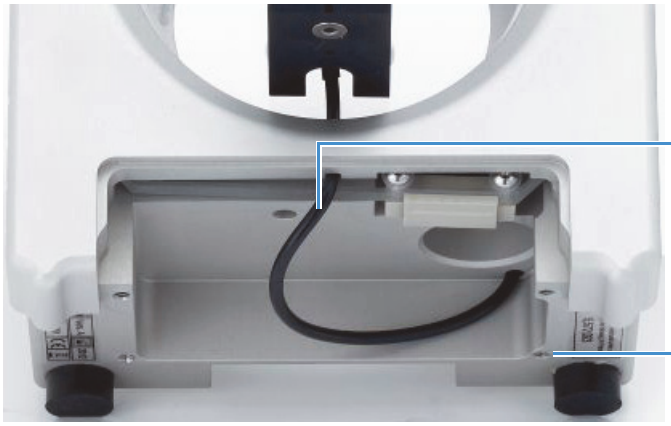


4. Unpack the new temperature controller PCB and make sure it is not damaged.

CAUTION To prevent damage to the electronic components on the PCB due to ESD, hold the new controller unit by the metal enclosure instead of the PCB.

5. Slowly push the new PCB enclosure into place, and route the heater cable so that it does not become damaged (pinched) (Figure 25).

Figure 25. EASY-Spray ion source (bottom) without the temperature controller PCB



6. (EASY-Spray only) Align the screw holes on the additional cover plate over the PCB's back two screw holes (Figure 24).

7. Using a 2.5 mm hex key, install the four hex screws into the bottom of the ion source.

You can now install the EASY-Spray Series ion source back onto the MS. To dispose of the old PCB, see WEEE Directive 2012/19/EU.

Troubleshooting

Table 7 lists some EASY-Spray Series ion source and column problems, their causes, and their possible solutions. You can resolve most problems by using a new EASY-Spray column.

If you need further troubleshooting assistance, contact your local Thermo Fisher Scientific field service engineer. See Contacting Us.

Table 7. EASY-Spray Series ion source problems, causes, and possible solutions (Sheet 1 of 3)

Problem	Cause	Solution
Camera issues		
The light is not on. –or– The video output is too dark.	The camera light is off.	Turn on the camera light (Figure 9).
Column heater issues		
The column is not heated. –or– The actual temperature display is blank.	The heater is off, or there might be a loose connection or a damaged PCB.	Try these solutions: • (EASY-nLC 1200) Using the touch screen, remove the EASY-Spray from the devices list, and then reenter it. (See To add the EASY-Spray ion source to the EASY-nLC 1200 configuration.) Then, follow the procedure in To set the temperature for the EASY-Spray column. • (RSLCnano system) Check all of the connections for the ion source power supply from the electrical wall outlet to the EASY-Spray Series ion source. • See Replacing the Temperature Controller PCB.
	The EASY-Spray column is damaged.	Replace the EASY-Spray column.

Table 7. EASY-Spray Series ion source problems, causes, and possible solutions (Sheet 2 of 3)

Problem	Cause	Solution
Signal issues		
The signal intensity is weak.	The parameters for the LC, MS, or both might need adjusting.	Try these solutions: • Verify that the EASY-Spray column is correctly positioned (that is, clicks on insertion). • Check the LC method and MS tune method parameters. • Run a known standard to check the sensitivity.
	The MS ion transfer tube is dirty.	Clean the ion transfer tube. For instructions, refer to the MS documentation.
The spray is unstable. –or– There is no spray.	There is a leak somewhere in the liquid path.	Check all of the LC connections.
	Air bubbles in the emitter might cause the spray to "spit."	Try degassing the mobile phase or purging the line, and then recheck the line for air bubbles.
	There is an emitter blockage from particles in the sample, other small particles from the flow lines or valves, and so on.	Try adjusting the spray voltage. If that does not resolve the blockage problem, either clean the emitter (see Cleaning the EASY-Spray Column Emitter Tip) or insert a new EASY-Spray column.
	The cleaning solvent is not LC/MS grade, which can negatively affect the spray stability.	Use an LC/MS-grade solvent to clean the emitter tip.
	The EASY-Spray column is out of alignment, which might occur if you bumped the ion source or moved the ion source from one MS to another MS.	Follow the procedure To adjust the emitter tip position.

Table 7. EASY-Spray Series ion source problems, causes, and possible solutions (Sheet 3 of 3)

Problem	Cause	Solution
(continued)	The source high-voltage (HV) connection might be unstable.	Check the high voltage contact on the back of the ion source (page 12) and the front of the mass spectrometer. If the problem continues for the EASY-Spray NG ion source, do the following: 1. Open Tune and view the Ion Source page (Figure 20). 2. Compare the setting for the spray voltage to the adjacent readback value. A green box ( ) indicates that the parameter is functioning properly. If the problem continues for the EASY-Spray ion source, do the following: 1. Open Tune Plus, choose **View > Display Status View**, and then click the **All** tab. 2. Choose **Setup > NSI Source**. 3. Compare the setting in the NSI Source dialog box to the readback value for the NSI source's absolute spray voltage. A green check mark (✓ Spray Voltage (kV):) indicates that the parameter is functioning properly.
	The ion source's HV connector has a loose connection.	If you have a digital multimeter that can measure 20 MΩ (mega ohms), do the following: 1. Test the meter's batteries, and then set the meter to the appropriate resistance setting or range. 2. Measure the resistance from the HV pin on the back of the ion source to the spring-loaded bolt located inside the housing (page 12). A functional HV connection has a measured resistance of 18–22 MΩ.

Replaceable Parts

To order any of these parts for the EASY-Spray Series ion sources, contact your local Thermo Fisher Scientific service engineer.

Spare Parts

A/B mixing/venting Tee SC901
Camera, analog (composite video) interface, and power supply ES216
Camera, USB interface, and software disc ES218
EASY-Spray temperature controller PCB and cover plate ES233
EASY-Spray controller power supply with power adapter cable ES231
EASY-Spray P-Bus Temp Control Cable
(for the EASY-nLC 1200 instrument) LC167
EASY-Spray tools: emitter positioning tool and 3 mm hex key ES232
LCD monitor and power supply ES217
Tee holder ES234
USB extension cord 00302-99-00095
Wash cap (for the EASY-Spray column) ES235

Consumables

Peptide Columns

EASY-Spray column, 15 cm × 75 µm ID, PepMap™ C18, 3 µm particles,
100 Å pore size ES800
EASY-Spray column, 15 cm × 50 µm ID, PepMap RSLC C18, 2 µm particles,
100 Å pore size ES801
EASY-Spray column, 15 cm × 75 µm ID, PepMap RSLC C18, 2 µm particles,
100 Å pore size ES804
EASY-Spray column, 15 cm × 150 µm ID, PepMap RSLC C18, 2 µm particles,
100 Å pore size ES806
EASY-Spray column, 25 cm × 75 µm ID, PepMap RSLC C18, 2 µm particles,
100 Å pore size ES802

EASY-Spray column, 50 cm × 75 µm ID, PepMap RSLC C18, 2 µm particles, 100 Å pore size ES803
EASY-Spray column, 75 cm × 75 µm ID, PepMap RSLC C18, 2 µm particles, 100 Å pore size ES805

Intact Protein Columns

EASY-Spray column, 25 cm × 200 µm ID, PepSwift™ Monolith ES810
EASY-Spray column, 15 cm × 75 µm ID, Accucore™ C4, 2.6 µm particles, 150 Å pore size ES811
EASY-Spray column, 15 cm × 75 µm ID, PepMap C18, 3 µm particles, 300 Å pore size ES812

For other consumables, visit www.thermofisher.com/easyspray, www.fishersci.com, and www.unitylabservices.com.

Transfer Lines

EASY-Spray transfer line, 7 µm ID emitter, 20 µm × 50 cm ES791
EASY-Spray transfer line, microflow, 20 µm ID emitter, 75 µm × 50 cm ES792

Contents of the Installation Kits

Table 8 lists the parts supplied in the EASY-Spray NG Ion Source Kit (P/N ES082) and the EASY-Spray Ion Source Kit (P/N ES081), which are identical except for the source housing. For a list of replaceable parts, see Chapter 8, "Replaceable Parts."

Note As of 2018, these ion source kits exclude the LCD monitor (P/N ES217) and the 1.5 mm hex key.

Table 8. Contents of the EASY-Spray Series ion source kits (Sheet 1 of 2)

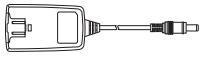
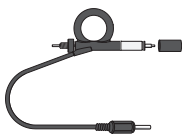
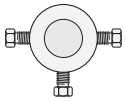
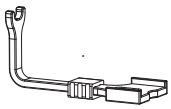
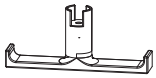
Image	Description	Quantity	Part number
Provided in the EASY-Spray NG Ion Source Kit (P/N ES082)			
See Figure 2.	EASY-Spray NG housing	1	–[a]
Provided in the EASY-Spray Ion Source Kit (P/N ES081)			
See Figure 3.	EASY-Spray housing	1	–[b]
Provided in both ion source kits			
	Controller power supply assembly: • Power supply, 24 Vdc output (shown without the input plug) • Power adapter cable	1	ES231
 	Dino-Lite analog camera and power supply –or– Dino-Lite USB camera and software disc; USB extension cord	1[c]	ES216 –or– ES218 (camera); 00302-99-00095 (cord)
	EASY-Spray column, 15 cm × 75 µm ID, PepMap C18, 3 µm particle size	1	ES800

Table 8. Contents of the EASY-Spray Series ion source kits (Sheet 2 of 2)

Image	Description	Quantity	Part number
	Tools: • Emitter positioning tool • 3 mm hex key	1 set	ES232
	A/B mixing/venting Tee, stainless steel, with three attached ferrules and nuts (for 1/16 in. OD tubing)	1 set	SC901
	Tee holder (for the mixing/venting Tee)	1	ES234
	Sleeves, PEEK, 1/16 in. OD	3	IDEX™, F-233
	Wash cap (for the EASY-Spray column)	1	ES235

[a] The EASY-Spray NG source housing comes with the EASY-Spray NG Ion Source Kit (P/N ES082) and cannot be purchased separately.

[b] The EASY-Spray source housing comes with the EASY-Spray Ion Source Kit (P/N ES081) and cannot be purchased separately.

[c] The ion source kit includes either the analog camera (P/N ES216) with the LCD monitor (P/N ES217) or the USB camera with a USB extension cord.

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