Waters

THE SCIENCE OF WHAT'S POSSIBLE.™

Waters Tool-Free Probe Maintenance Guide Supplement

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Revision B

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Manufacturing information

Manufacturer:

	Waters Corporation 34 Maple Street Milford, MA 01757 USA

Safety considerations

Some reagents and samples used with Waters instruments and devices can pose chemical, biological, or radiological hazards (or any combination thereof). You must know the potentially hazardous effects of all substances you work with. Always follow Good Laboratory Practice

(GLP), and consult your organization’s standard operating procedures as well as your local requirements for safety.

Safety hazard symbol notice

The  symbol indicates a potential hazard. Consult the documentation for important information about the hazard and the appropriate measures to prevent and control the hazard.

Considerations specific to the Tool-free Probe

High temperature hazard

Warning: To avoid burn injuries, exercise care when handling the components of the source enclosure heated to high temperatures. Wait until the hot components have sufficiently cooled before you handle them.

Solvent leakage hazard

The source exhaust system is designed to be robust and leak-tight. Waters recommends that you perform a hazard analysis, assuming a maximum leak into the laboratory atmosphere of 10% LC eluate.

Warning: To avoid exposure to toxic substances and biohazards from O-ring leaks in the source exhaust system, observe these precautions:

- Replace the source O-rings at intervals not exceeding one year.
- Prevent chemical degradation of the source O-rings, which can withstand exposure only to certain solvents, by determining whether any solvents you use are chemically compatible with the composition of the O-rings.

Equipment misuse notice

Read all instructions provided by the manufacturer before using the equipment. If the equipment is used in a manner not specified by its manufacturer, the protections against personal injury inherent in the equipment's design can be rendered ineffective.

Safety advisories

Waters products display safety symbols that identify hazards associated with the product's operation and maintenance. The symbols also appear in product manuals with statements that describe the hazards and advise how to avoid them. This appendix presents all safety symbols and statements that apply to Waters' product offerings. The symbols and statements can apply to a specific product, or apply to other products within the same system.

Operating the device

When operating the device, follow standard quality-control (QC) procedures and the guidelines presented in this section.

Applicable symbols

The following symbols can be present on the device, system, or packaging.

Symbol	Definition
	Manufacturer
	Date of manufacture
	Confirms that a manufactured product complies with all applicable European Community directives
	Australia EMC compliant
	Confirms that a manufactured product complies with all applicable United States and Canadian safety requirements
	Environmentally friendly use period (China RoHS): indicates the number of years from the date of manufacture until the product, or components within the product, are likely to be discarded or degrade into the environment
	Consult instructions for use
	Alternating current

Symbol	Definition
	Electrical and electronic equipment with this symbol may contain hazardous substances and should not be disposed of as general waste For compliance with the Waste Electrical and Electronic Equipment Directive (WEEE) 2012/19/EU, contact Waters Corporation for the correct disposal and recycling instructions
	For indoor use only
	No pushing
	Indicates the maximum load you can place on that item (for example, 10kg)
	Serial number
	Part number, catalog number

Audience and purpose

This guide provides instructions on the setup and maintenance of the Waters Tool-free Probe. This guide is intended for professionally trained and qualified laboratory personnel who install, operate, and maintain Waters products. This guide should be used in conjunction with the Overview and Maintenance Guide supplied with your Waters instrument. This guide should also be used in conjunction with instruction and training provided by Waters personnel.

Intended use of the Tool-free Probe

The Tool-free Probe is intended for research and routine analysis only and is not intended for use with in vitro diagnostic applications.

EMC considerations

FCC radiation emissions notice

Changes or modifications not expressly approved by the party responsible for compliance, could void the user's authority to operate the equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canada spectrum management emissions notice

This class A digital product apparatus complies with Canadian ICES-001.

Cet appareil numérique de la classe A est conforme à la norme NMB-001.

ISM classification: ISM group 1 class A

This classification has been assigned in accordance with CISPR 11 Industrial Scientific and Medical (ISM) instruments requirements.

Group 1 products apply to intentionally generated and/or used conductively coupled radio-frequency energy that is necessary for the internal functioning of the equipment.

Class A products are suitable for use in all establishments other than residential locations and those directly connected to a low voltage power supply network supplying a building for domestic purposes.

There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbances.

EMC emissions

Do not use the equipment in close proximity to sources of strong electromagnetic radiation (for example, unshielded intentional RF sources). The radiation can interfere with the equipment’s proper operation.

This equipment complies with the emission and immunity requirements described in the relevant parts of IEC/EN 61326: Electrical equipment for measurement, control, and laboratory use — EMC requirements.

Table of contents

1 Waters Tool-free Probe overview

The Waters Tool-free Probe is available in two varieties: the Tool-free ESI Probe, which supports ESI and ESCi operation; and the Tool-free APCI Probe, which supports APCI and APPI operation. You can switch between probe adapters quickly, without tools.

1.1 Compatible enclosures

The Waters Tool-free Probe is compatible with the following Waters source enclosures:

- Waters API source enclosure
- Waters LockSpray source enclosure
- Waters combined APPI/APCI source enclosure

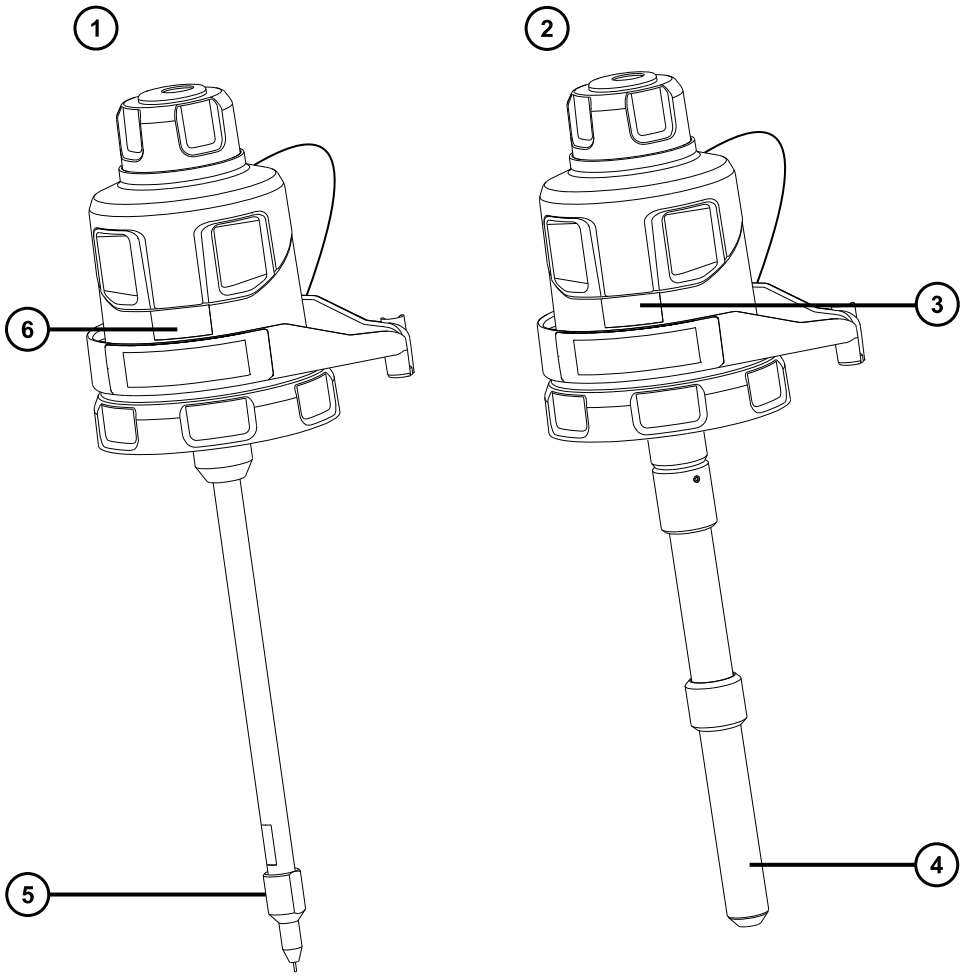
2 Setup procedures

This section describes the procedures required to install and remove the Waters Tool-free Probe.

2.1 Probe adapter and probe assembly types

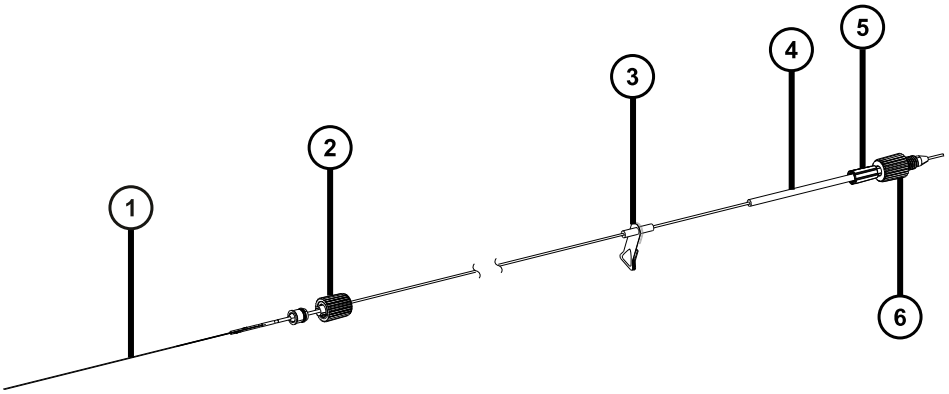
There are two tool-free probe adapters, one for ESI and ESCi operation, and one for APCI and APPI operation. Install the appropriate probe adapter for your application.

Figure 2–1: Probe adapter types



1. ESI probe adapter
2. APCI probe adapter
3. APCI identification label
4. APCI probe heater
5. ESI probe tip
6. ESI identification label

Figure 2–2: Probe assembly



1. Capillary
2. Probe adapter PEEK fitting
3. Warning label
4. Identification label showing part number
5. Fitting spring retainer
6. Probe inlet fitting

Requirement: For ESCi, APCI, and APPI modes, you must also install a corona pin in the source (see the mass spectrometer's overview and maintenance guide).

Notes:

- The high-voltage warning label (3) does not appear on all probe assemblies.
- The fitting used for ACQUITY UPC² systems differs from the probe inlet fitting (6) shown here. See Connecting the probe assembly to a UPC² system.

Table 2–1: Configuration for ESI/ESCi/APCI/APPI modes

Mode	Probe adapter	Install corona pin
ESI	ESI	No
ESCi	ESI	Yes
APCI	APCI	Yes
APPI	APCI	Yes

For more information on using each mode, see the mass spectrometer's online Help.

The following chapters explain how to complete the following tasks:

- Installing the probe adapter
- Installing the probe assembly
- Removing the probe adapter

2.2 Setting up the probe holder

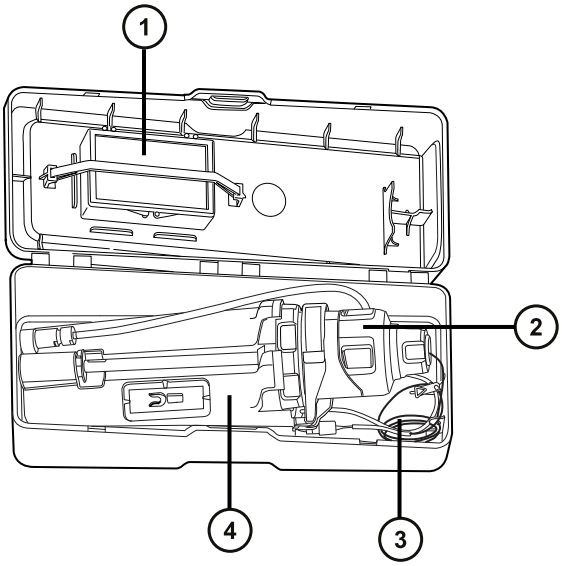
Waters ships the Tool-free Probe in a storage case. You can remove the probe holder from the case, and use it to store the probe safely on a flat surface, or use the supplied hook to hang it from a vertical surface.

Requirements:

- The underside of the probe case lid holds a corona discharge pin. You must install the corona pin in the mass spectrometer's source before operating in ESCi, APCI, or APPI modes.
- Before fitting the Tool-free ESI Probe variant to a mass spectrometer's source enclosure, you must remove the protective cap from the probe tip.

Tips:

- You can stack multiple storage cases.
- You can make notes on the storage case label.
- You can store the probe adapter in the case with the probe assembly fitted.



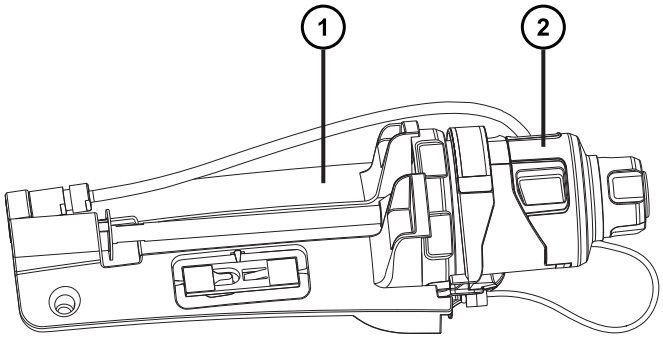
1. Corona pin case (APCI only)
2. Probe adapter
3. Probe assembly (if fitted)
4. Removable probe adapter holder

Required materials

- Chemical-resistant, powder-free gloves
- Two suitable screws (not supplied), if fixing the holder to a vertical surface.

To set up the probe holder:

1. Remove the probe and holder from the case and place it on a flat surface.

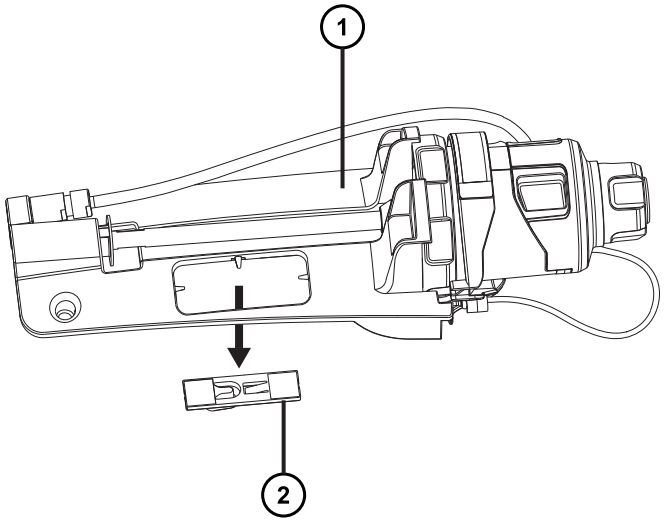


① Probe adapter holder

② Probe adapter

2. To hang the probe holder from a vertical surface, follow these steps:

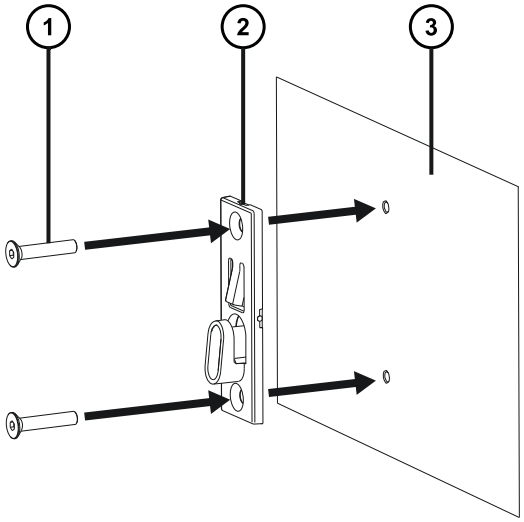
   a. Remove the hook from the body of the probe holder by pushing it from one side.



① Probe holder

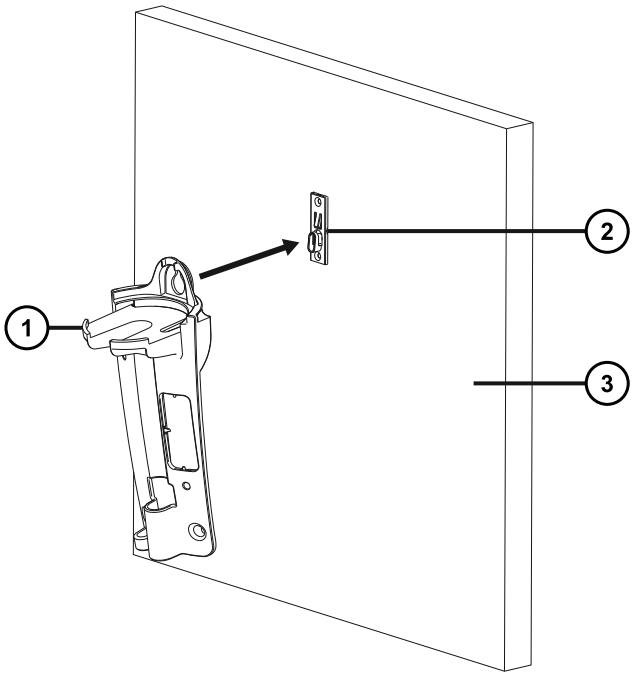
② Hook

   b. Fit the hook to a vertical surface using screws of an appropriate type for your choice of surface.



1. Screw
2. Hook
3. Vertical surface

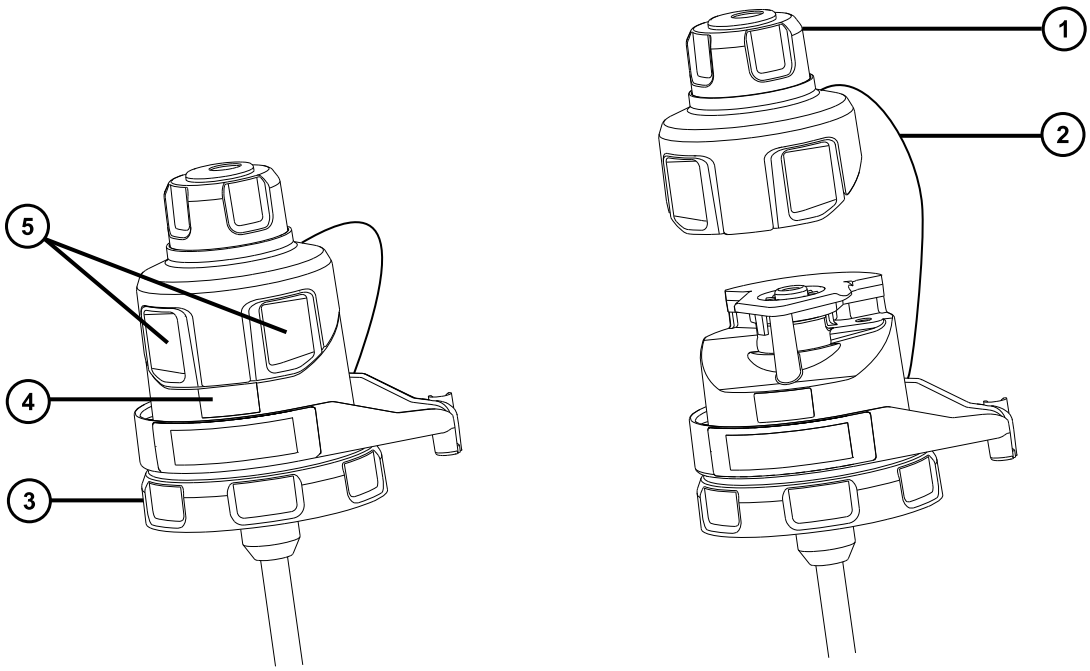
c. Remove the probe adapter from the holder, and then hang the holder from the hook.



1. Probe holder
2. Hook
3. Vertical surface

2.3 Installing the probe adapter

Figure 2–3: Probe adapter parts



1. Probe adapter cap removed from probe adapter
2. Probe adapter cap tether
3. Locking ring
4. Probe adapter identification label
5. Probe adapter cap release buttons

Required materials

- Chemical-resistant, powder-free gloves

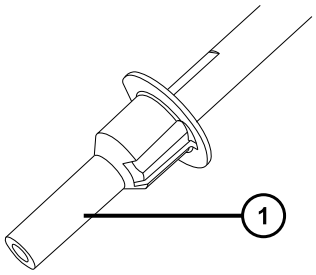
To install the probe adapter:

Warning: To avoid personal contamination with biologically hazardous or toxic compounds, wear clean, chemical-resistant, powder-free gloves when performing this procedure.

Warning: To avoid puncture wounds, handle sharp parts and materials with care.

1. For ESI probe adapters, remove the protective cap, if fitted, from the probe tip.

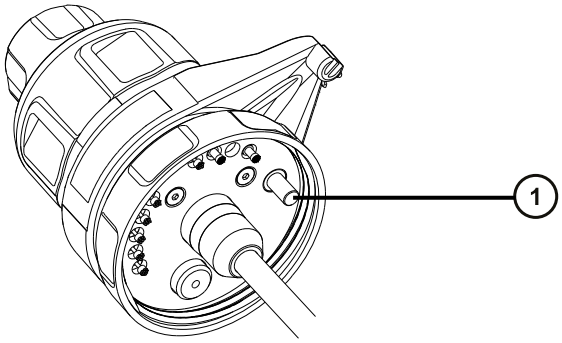
Figure 2–4: ESI probe protective cap



1 Protective cap

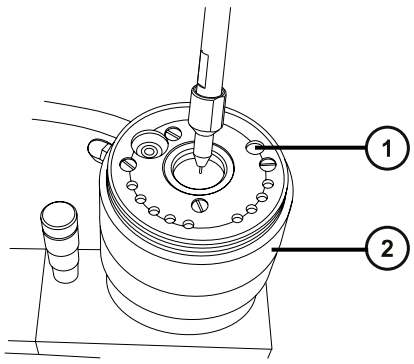
2. Carefully slide the probe adapter into the hole in the source enclosure's probe adjuster assembly, ensuring that the probe location dowel aligns with the location hole in the probe adjuster assembly.

Figure 2–5: Probe location dowel



1 Probe location dowel

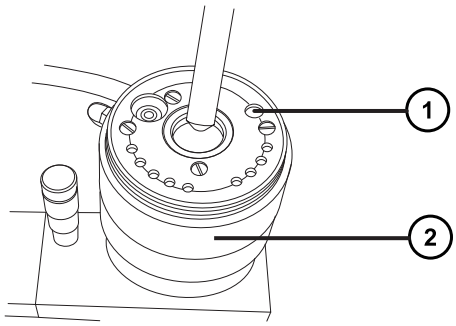
Figure 2–6: Locating the ESI probe adapter



1 Location hole for probe location dowel

2 Probe adjuster assembly

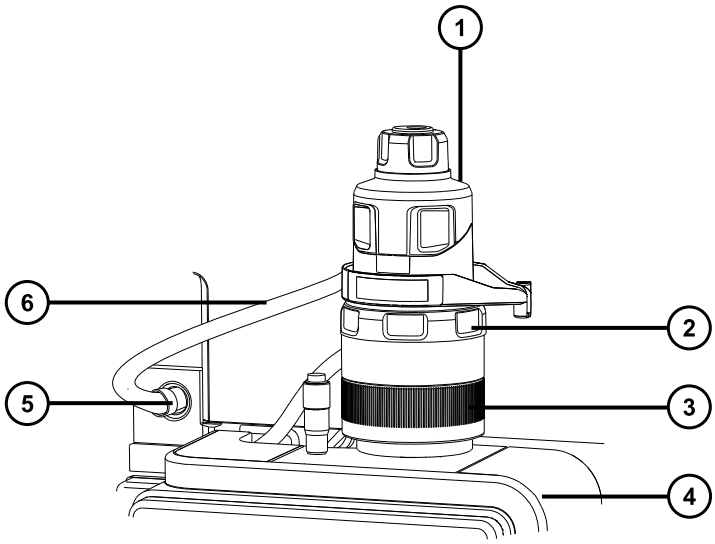
Figure 2–7: Locating the APCI probe adapter



1. Location hole for probe location dowel
2. Probe adjuster assembly

3. Rotate the probe adapter locking ring clockwise to secure the probe adapter in place.

Figure 2–8: Probe adapter mounted on the source enclosure:



1. Probe adapter cap
2. Probe adapter locking ring
3. Probe adjuster assembly
4. Source enclosure
5. High-voltage connector
6. ESI probe adapter cable (ESI probe adapter only)

4. For ESI probe adapters, connect the ESI probe adapter's cable to the high-voltage connector.
5. Install the probe assembly. See Installing the probe assembly.

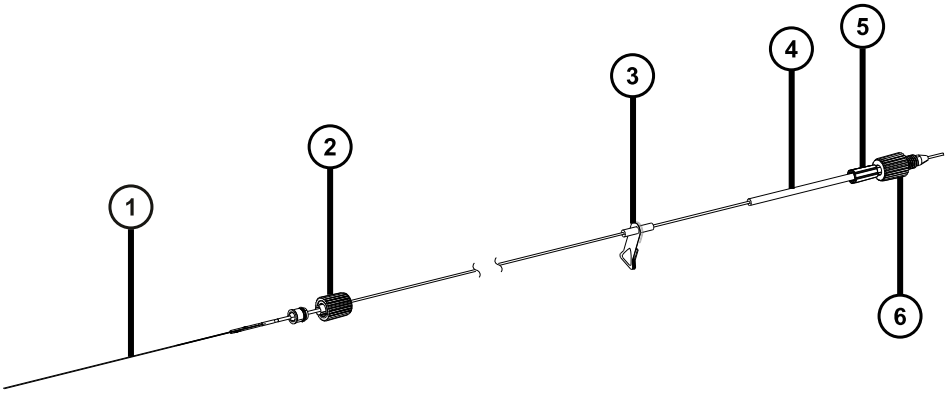
2.4 Installing the probe assembly

Requirements:

- Ensure that you use a probe assembly appropriate for your application. For example, using an ESI probe assembly with an APCI probe adapter compromises instrument performance. Use the part number on the identification label to verify the probe assembly type.
- Ensure that the probe adapter is installed on the source, with the probe adapter cap removed. See Installing the probe adapter.
- To minimize delays and dispersion, select the shortest probe assembly to connect the diverter valve to the probe.

Notice: Do not adjust the length of the probe assembly. Cutting the PEEKsil tubing renders the probe assembly unusable.

Figure 2–9: Probe assembly



1. Capillary
2. Probe adapter PEEK fitting
3. Warning label
4. Identification label showing part number
5. Fitting spring retainer
6. Probe inlet fitting

Notes:

- The high-voltage warning label (3) does not appear on all probe assemblies.
- The fitting used for ACQUITY UPC² systems differs from the probe inlet fitting (6) shown here. See Connecting the probe assembly to a UPC² system.

Required materials

- Chemical-resistant, powder-free gloves

To install the probe assembly:

Warning: To avoid personal contamination with biologically hazardous or toxic compounds, wear clean, chemical-resistant, powder-free gloves when performing this procedure.

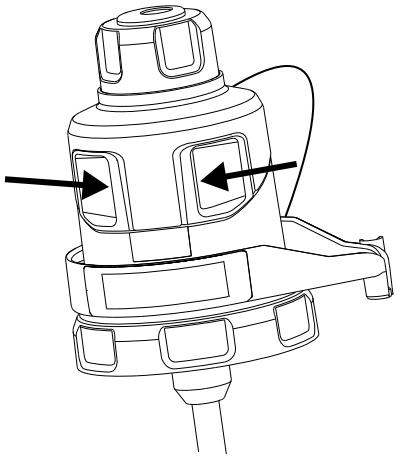
Warning: To avoid electric shock, do not insert any item into the probe cap aperture when the probe cap is fitted to the instrument.

Notice: To avoid damaging the probe assembly, take care when inserting the capillary into the probe adapter. Do not use force.

Warning: To avoid harmless, static-like electric shock, ensure that the mass spectrometer is in Standby mode before you touch any of its external surfaces that are marked with this high-voltage warning symbol.

1. To prepare for installing a probe assembly, press together the probe-adapter-cap release buttons, in the direction shown by the arrows in the following figure, and lift the probe adapter cap off the probe adapter.

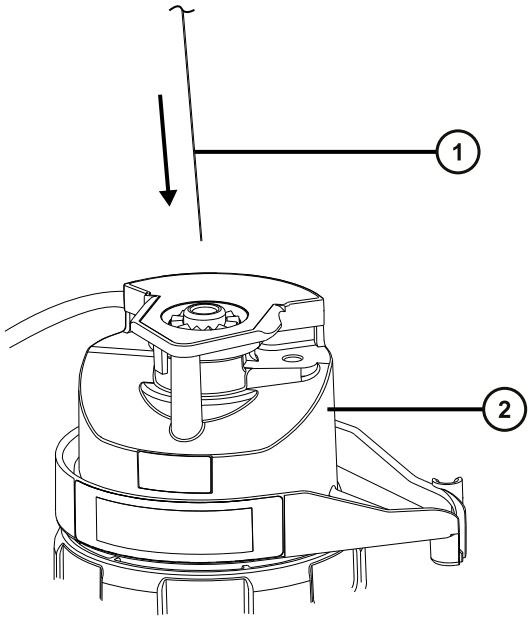
Figure 2–10: Probe adapter cap release



2. Carefully insert the probe assembly capillary into the probe adapter.

Tip: To aid insertion, turn the capillary gently as you insert it, feeding the entire capillary into the probe adapter.

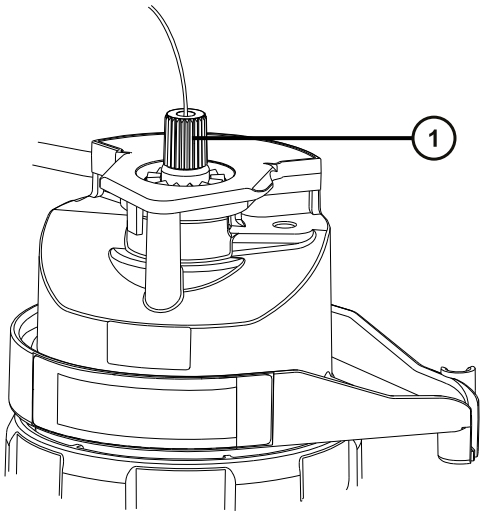
Figure 2–11: Inserting the probe assembly



1. Probe assembly capillary
2. Probe adapter

3. Screw the probe adapter fitting into the probe adapter, finger-tight only, until you hear a click.

Figure 2–12: Probe assembly fitted to the probe adapter

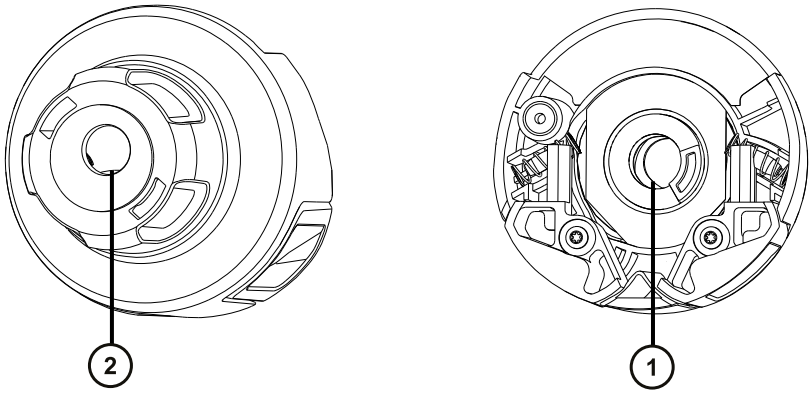


1. Probe adapter fitting

Tip: The probe adapter fitting varies in size depending on the probe assembly type. If you cannot fit the probe adapter cap fully, as described in step 6, ensure that you are installing the correct probe assembly. For example, the Unispray probe assembly will not fit the tool-free probe adapter.

4. Tilt the probe adapter cap so that the ball bearing is located in the recess at the bottom of the aperture, and then insert the probe assembly tubing through the aperture.

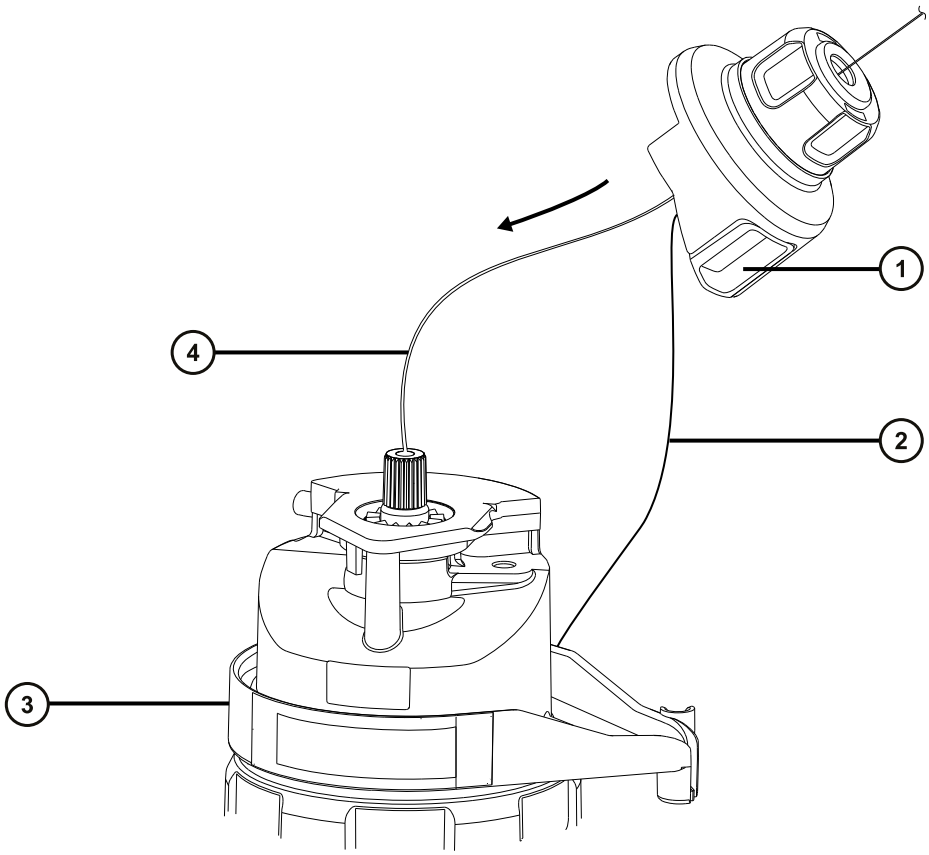
Figure 2–13: Probe adapter cap



1. Probe cap aperture from the underside
2. Probe cap aperture from the top

Tip: The probe assembly tubing can pass through the aperture only when the ball bearing is located in the recess at the bottom and does not block the aperture. To ensure that the probe assembly does not contact the high voltage inside the probe adapter, the ball bearing prevents you from installing the probe assembly when the probe adapter is fitted to the source enclosure.

Figure 2–14:



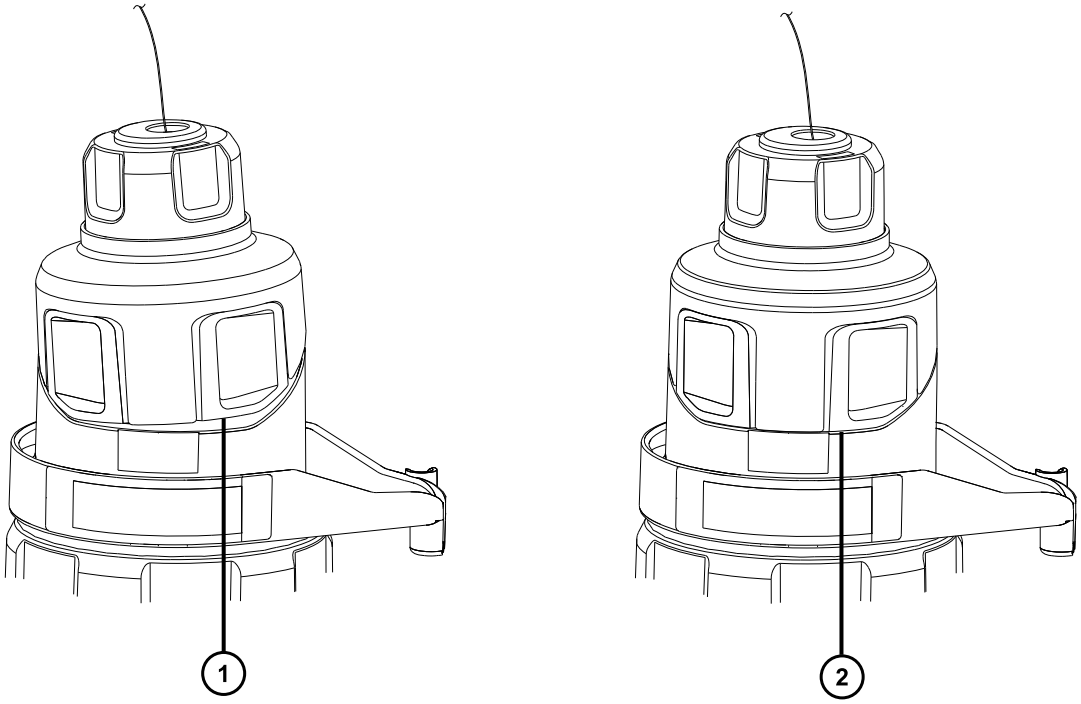
1. Probe adapter cap
2. Probe adapter cap tether
3. Probe adapter
4. Probe assembly tubing

5. Slide the probe adapter cap along the probe assembly, over the probe adapter inlet fitting.
6. Push the probe adapter cap onto the probe adapter until it clicks.

Tips:

- Do not squeeze the probe adapter cap release buttons when fitting the probe adapter cap.
- Ensure that the probe adapter cap is correctly seated and that both release buttons engage with the probe adapter, producing a click.
- If you cannot fit the probe adapter cap fully, ensure that you are installing the correct probe assembly type.

Figure 2–15: Seating the probe adapter cap



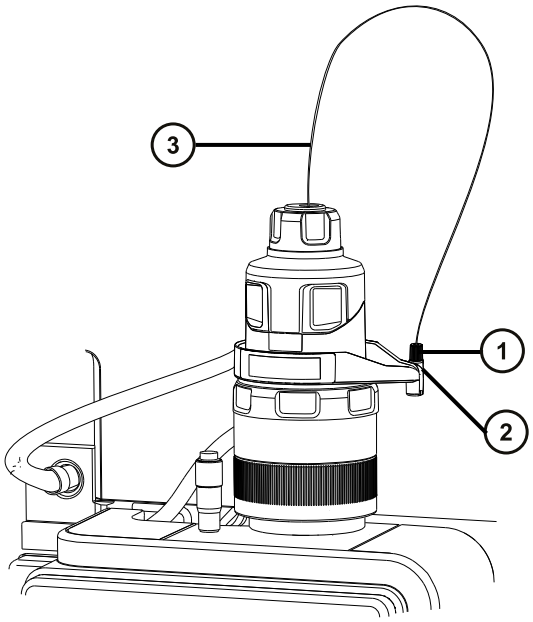
1 Probe adapter cap seated incorrectly: edge does not align with the edge of the probe adapter

2 Probe adapter cap seated correctly: edge aligns with the edge of the probe adapter

Note: If you fit the probe adapter cap when the source enclosure is closed and the mass spectrometer is in Operate, the high-voltage supply to the probe turns on and the instrument performs a pressure test. To prevent gas escaping audibly through the probe adapter, ensure that the instrument is not in Operate mode until a probe assembly is installed. You must remove the probe adapter cap before installing the probe assembly.

Tip: If you are not immediately connecting the probe assembly to the inlet system, insert the probe inlet fitting into the inlet fitting holder.

Figure 2–16: Inlet fitting holder



1. Probe inlet fitting
2. Inlet fitting holder
3. Probe assembly tubing

Warning: To avoid electric shock or solvent ignition, when connecting ESI or UPC^2 source probes directly to non-Waters equipment, ensure that the liquid outlet connection is grounded.

7. Connect the probe inlet fitting to the inlet system.

   Note: If you are connecting to a UPC^2 system, see Connecting the probe assembly to a UPC² system.

2.5 Removing and refitting the probe inlet fitting

To feed the probe assembly through narrow channels, you might need to remove the probe inlet fitting, and then refit it on the other side of the channel. The inlet end of the probe assembly features a spring-loaded design to minimize dead-volume at the connection to the inlet.

Requirement: When connecting the probe assembly to an ACQUITY UPC² system, you must use the supplied gold-plated UPC² fitting. See Connecting the probe assembly to a UPC² system.

Required materials

- Chemical-resistant, powder-free gloves

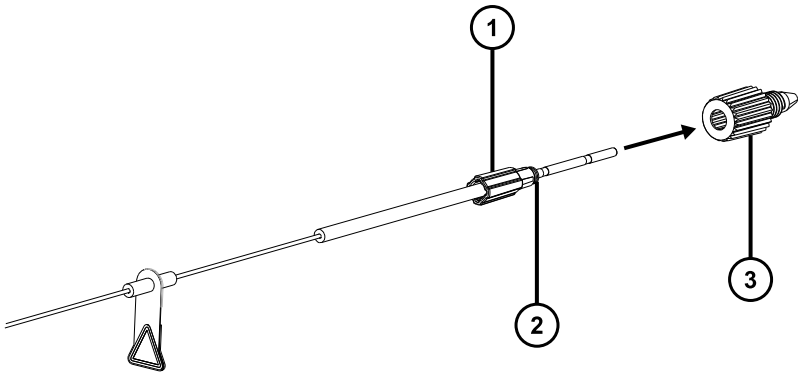
To remove the probe inlet fitting:

Warning: To avoid personal contamination with biologically hazardous or toxic compounds, wear clean, chemical-resistant, powder-free gloves when performing this procedure.

1. Pull the inlet fitting from the end of the probe assembly.

   Tip: Hold the fitting spring retainer in place while the probe inlet fitting is removed to prevent it from sliding along the probe assembly.

   Figure 2–17: Removing the probe inlet fitting

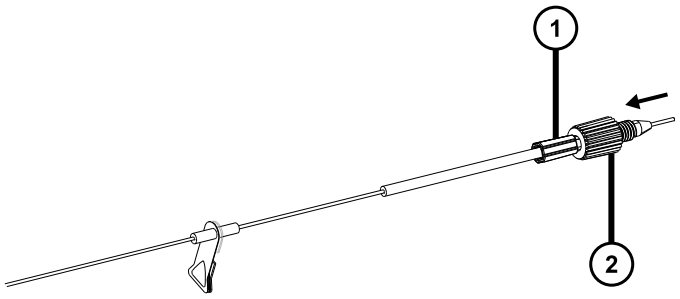
   1 Fitting spring retainer

   2 Fitting spring

   3 Probe inlet fitting

2. Feed the probe assembly through the narrow channel.
3. Slide the probe inlet fitting onto the probe assembly.
4. Push the probe inlet fitting onto the fitting spring retainer, ensuring that the retainer remains fully attached to the spring.

Figure 2–18: Fitting the probe inlet fitting



1 Fitting spring retainer

2 Probe inlet fitting

2.6 Connecting the probe assembly to a UPC² system

To connect the probe assembly to a UPC² system, first fit the supplied UPC² inlet fitting to the end of the probe assembly. The probe assembly connects to the UPC² system's Isocratic Solvent Manager (ISM).

Requirement: You must use the supplied UPC² fitting to connect the probe assembly to a UPC² system. Do not use the PEEK inlet fitting.

Required materials

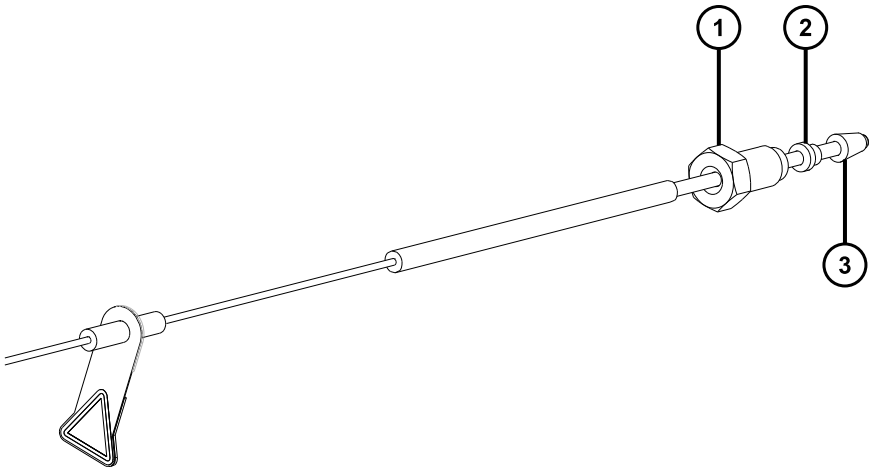
- Chemical-resistant, powder-free gloves
- 1/4-inch open-end wrench

To connect the probe to a UPC² system:

Warning: To avoid personal contamination with biologically hazardous or toxic compounds, wear clean, chemical-resistant, powder-free gloves when performing this procedure.

1. Slide the compression nut, backing ring, and ferrule onto the inlet end of the probe assembly.

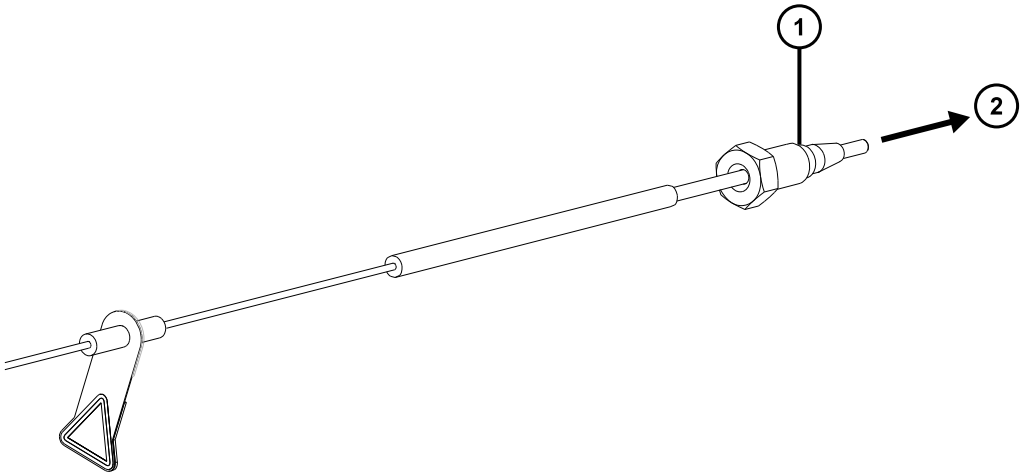
Figure 2–19: Fitting the compression nut, backing ring, and ferrule to the probe assembly



1. Compression nut
2. Backing ring
3. Ferrule

2. Insert the probe assembly into the ISM's restrictor port until you encounter resistance.

Figure 2–20: Connecting the probe assembly to the ISM

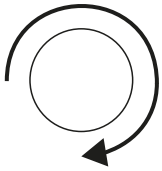


1. Compression nut, backing ring, and ferrule
2. To ISM restrictor port

3. Slide the compression nut, backing ring, and ferrule into the restrictor port.

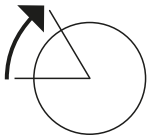
4. Using your fingers, screw the compression nut into the splitter port until you feel resistance.
5. If you are connecting the probe assembly for the first time, using a 1/4-inch open-end wrench, tighten the compression nut until you feel an increase in resistance, and then tighten by another 3/4-turn.

Figure 2–21: 3/4-turn



If you are refitting a previously installed probe assembly, using a 1/4-inch open-end wrench, tighten the compression nut up to a 1/6-turn.

Figure 2–22: 1/6-turn



2.7 Removing the probe adapter

Remove the probe adapter before performing any of the following actions:

- Switching between ESI and APCI modes (see Installing the probe adapter).
- Installing the Low-flow ESI probe (see the *Low-flow ESI Probe Operator's Guide*).
- Replacing the ESI probe tip or gasket (see Replacing the ESI probe tip or gasket).

Tip: You can replace the probe assembly without removing the ESI probe tip.

You can remove the probe adapter with or without the probe assembly installed. To remove the probe assembly, see Removing the existing probe assembly.

Required materials

Chemical-resistant, powder-free gloves

To remove the probe adapter:

Warning: To avoid personal contamination with biologically hazardous or toxic compounds, wear clean, chemical-resistant, powder-free gloves when performing this procedure.

Warning: To avoid harmless, static-like electric shock, ensure that the mass spectrometer is in Standby mode before you touch any of its external surfaces that are marked with this high-voltage warning symbol.

Warning: To avoid burn injuries, take great care while working with the probe and source; these components can be hot.

1. Prepare the mass spectrometer for working on the source (see the maintenance chapter of the instrument's overview and maintenance guide).

   Warning: To avoid electric shock or solvent ignition, when connecting ESI or UPC^2 source probes directly to non-Waters equipment, ensure that the liquid outlet connection is grounded.

2. If the probe assembly is fitted, disconnect it from the inlet system.
3. For ESI probes, disconnect the probe adapter cable from the high voltage connector.
4. Unscrew the probe adapter locking ring.

   Warning: To avoid puncture wounds, handle sharp parts and materials with care.

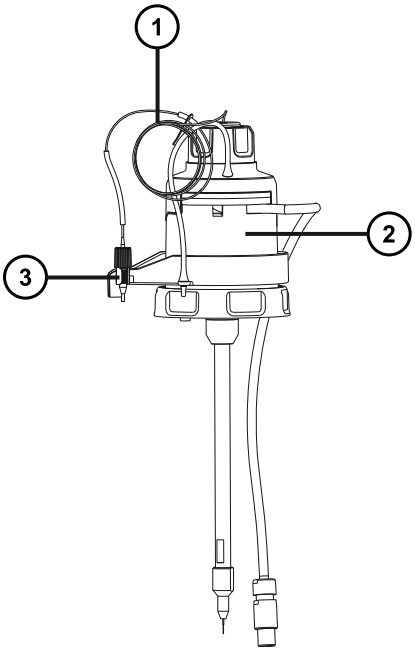
5. Carefully remove the probe adapter from the probe adjustor assembly.
6. For ESI probe adapters, if available, fit the protective cap to the probe tip.

2.8 Storing the probe assembly in the protective packaging

Waters ships the probe assembly in protective packaging that you can retain and use to store the probe assembly when it is not in use.

Tips:

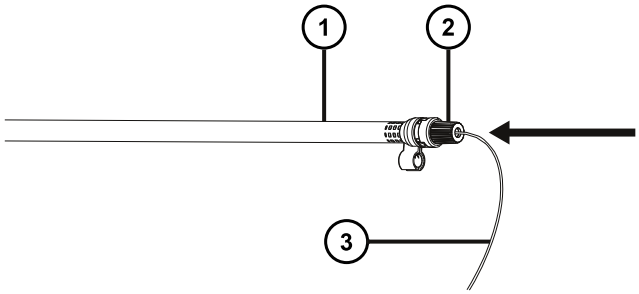
- The packaging is designed to store probe assemblies of various lengths. Your probe assembly might be shorter than the packaging.
- You can store the Tool-free Probe in the storage case with the probe assembly fitted. To do so, coil the probe assembly to ensure that it fits inside the case, and screw the inlet fitting into the holder on the probe adapter, as shown in the figure below.



1. Probe assembly (coiled)
2. Probe adapter
3. Inlet fitting holder

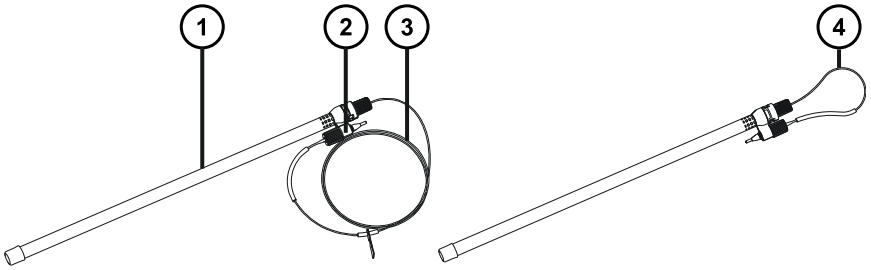
To store the probe assembly in the packaging:

1. Carefully screw the probe fitting into the open end of the packaging.



1. Probe assembly packaging.
2. Probe assembly PEEK fitting.
3. Probe assembly.

2. Loosely coil or loop the probe assembly, as shown in the figure below, and slide the free end of the assembly into the PEEK fitting holder on the side of the packaging.



1. Probe assembly package
2. PEEK fitting holder
3. Long probe assembly (coiled)
4. Short probe assembly

3 Maintenance procedures

This section provides the maintenance guidelines and procedures necessary to maintain the probe's performance.

Keep to a maintenance schedule, and perform maintenance as required and described in this section.

3.1 Maintenance schedule

The following table lists periodic maintenance procedures that ensure optimum instrument performance.

Table 3–1: Maintenance schedule:

Procedure	Frequency	For information...
Replace the probe assembly	When sensitivity decreases to unacceptable levels or signal is unstable due to inconsistent sample flow.	See Replacing the probe assembly.
Replace the ESI probe tip and gasket	When sensitivity decreases to unacceptable levels, or if blocked or damaged.	See Replacing the ESI probe tip and gasket.
Clean the APCI probe tip	When sensitivity decreases to unacceptable levels or when significant chemical interference is present.	See Cleaning the APCI probe tip.
Replace the APCI probe heater	If the heater fails to heat when the instrument is switched to Operate.	See Replacing the APCI probe heater.

3.2 Replacing the probe assembly

Replace probe assembly if it becomes irreversibly blocked, or if it becomes contaminated or damaged.

3.2.1 Removing the probe assembly

Required materials

- Chemical-resistant, powder-free gloves

To remove the probe assembly:

Warning: To avoid personal contamination with biologically hazardous, toxic, and corrosive materials, wear chemical-resistant, powder-free gloves when performing this procedure.

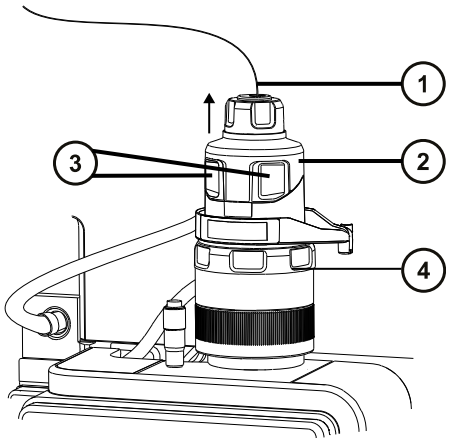
Warning: To avoid puncture wounds, handle sharp parts and materials with care.

Warning: To avoid electric shock or solvent ignition, when connecting ESI or UPC^2 source probes directly to non-Waters equipment, ensure that the liquid outlet connection is grounded.

1. If the probe assembly is fitted, disconnect it from the inlet system.
2. Squeeze the probe adapter cap release buttons together and lift the probe cap off the probe adapter, sliding it over the probe assembly.

   Tip: Removing the probe adapter cap disconnects the high-voltage supply and the gas flow to the probe, and stops the source nebulizer and desolvation gas flows.

Figure 3–1: Removing the probe adapter cap



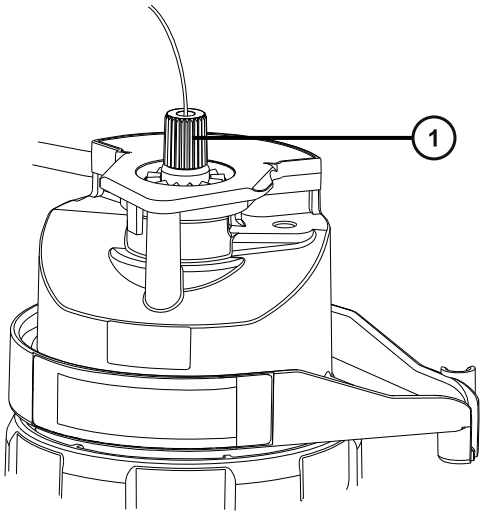
1 Probe assembly

2 Probe adapter cap

③ Probe adapter cap release buttons

④ Probe adapter

3. Unscrew the finger-tight PEEK fitting.



① PEEK fitting

4. Remove the probe assembly.

Warning: To avoid spreading contamination with biologically hazardous, toxic, and corrosive materials, dispose of all waste materials according to local environmental regulations.

5. Dispose of the probe assembly in accordance with local environmental regulations.
6. To install a new probe assembly, see Installing the probe assembly.

3.3 Replacing the ESI probe tip and gasket

Replace the ESI probe tip if a blockage occurs in the internal metal sheathing through which the stainless steel capillary passes or if the probe tip is damaged.

3.3.1 Removing the ESI probe tip and gasket

Required materials

- Chemical-resistant, powder-free gloves
- 7-mm open-end wrench
- 10-mm open-end wrench

To remove the ESI probe tip and gasket:

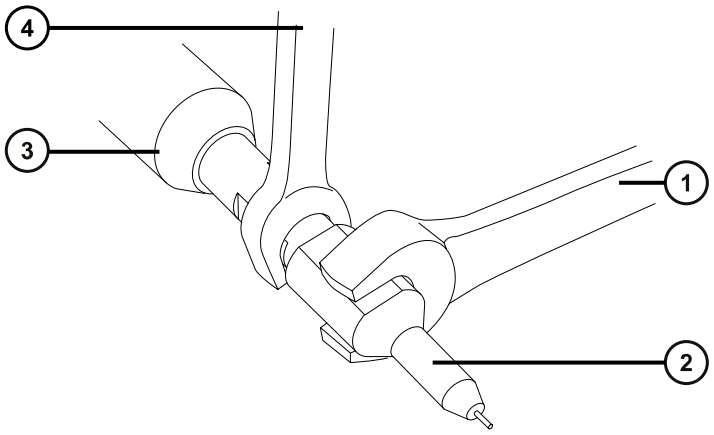
Warning: To avoid personal contamination with biologically hazardous materials, wear clean, chemical-resistant, powder-free gloves when performing this procedure.

Warning: To avoid burn injuries, take great care while performing this procedure.

Warning: To avoid puncture injuries, handle sample needles, syringes, fused silica lines, and borosilicate tips with extreme care.

1. Remove the ESI probe adapter from the source (see Removing the probe adapter).
2. Use the 7-mm wrench in conjunction with the 10-mm wrench to remove the probe tip.

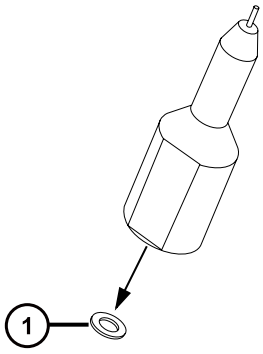
   Figure 3–2:



   1. 10-mm wrench
   2. Probe tip
   3. ESI probe adapter
   4. 7-mm wrench

3. Remove the metal gasket from the probe tip.

Figure 3–3:



1 Metal gasket

Warning: To avoid spreading contamination with biologically hazardous, toxic, and corrosive materials, dispose of all waste materials according to local environmental regulations.

4. Dispose of the metal gasket in accordance with local environmental regulations.
5. If the probe tip is damaged, dispose of it in accordance with local environmental regulations.

3.3.2 Fitting the ESI probe tip and gasket

Required materials

- Chemical-resistant, powder-free gloves
- 10-mm open-end wrench
- 7-mm open-end wrench
- New metal gasket

To fit the ESI probe tip and gasket:

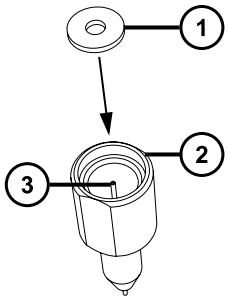
Warning: To avoid personal contamination with biologically hazardous materials, wear clean, chemical-resistant, powder-free gloves when performing this procedure.

Warning: To avoid puncture injuries, handle sample needles, syringes, fused silica lines, and borosilicate tips with extreme care.

Notice: To avoid damage, do not reuse metal gaskets. Always fit a new gasket.

1. Fit the new metal gasket into the probe tip.

Figure 3–4: Inserting the gasket



1. Metal gasket
2. ESI probe tip
3. Stainless steel tube

2. Fit the probe tip, and screw the tip onto the probe assembly.
3. Use the 7-mm wrench in conjunction with the 10-mm wrench to tighten the probe tip.

   Important: To avoid gas leakage, fully tighten the probe tip.
4. Fit the ESI probe adapter to the source (see Installing the probe adapter).
5. If required, re-optimize the probe position (see the mass spectrometer's online Help).

3.4 Cleaning the APCI probe tip

Clean the APCI probe tip when you detect buffer buildup on the probe tip or when the signal intensity weakens. See the mass spectrometer's online Help for further details.

To clean the APCI probe tip:

1. On the Manual Optimization page, click **Stop fluidics**  .
2. To start the API gas flow, click **Gas**  .
3. Set Desolvation Gas to 650 L/h.
4. Set APCI probe Temp to 650 °C.
5. Click **Operate**  .
6. Wait 10 minutes.

Rationale: The high APCI probe heater temperature removes any chemical contamination from the probe tip.

7. Click **Standby**  .

3.5 Replacing the APCI probe heater

Replace the APCI probe heater it fails to heat the probe.

3.5.1 Removing the APCI probe heater

Required materials

Chemical-resistant, powder-free gloves

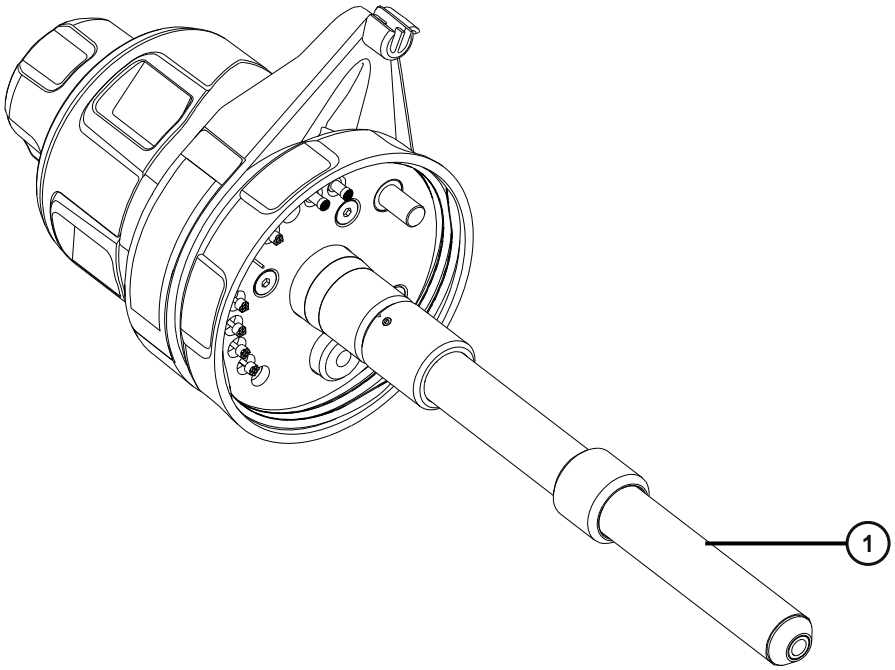
To remove the APCI probe heater:

Warning: To avoid burn injuries, take great care while working with the probe and source; these components can be hot.

Warning: To avoid personal contamination with biologically hazardous, toxic, and corrosive materials, wear chemical-resistant, powder-free gloves when performing this procedure.

1. Remove the probe adapter from the source (see Removing the probe adapter).

Figure 3–5:



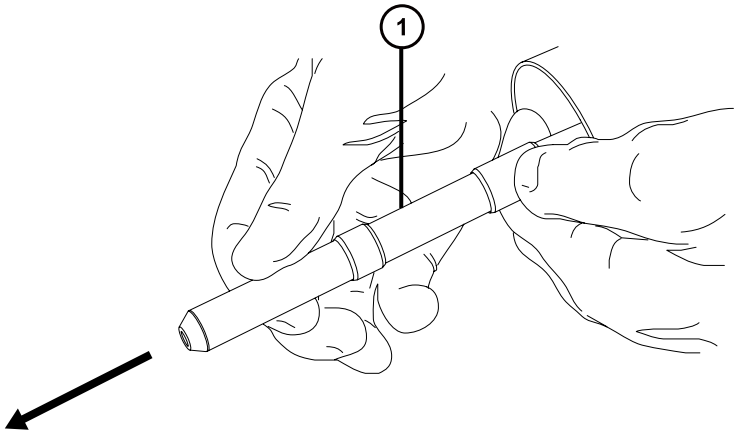
1 Probe heater

Notice: To avoid damaging the probe heater's electrical connections, do not twist the heater when removing it from or refitting it to the probe adapter.

Warning: To avoid burn injuries, take great care while performing this procedure.

2. Gripping the probe heater as shown, carefully pull it off the probe adapter.

Figure 3–6:



① Probe heater

Warning: To avoid spreading contamination with biologically hazardous, toxic, and corrosive materials, dispose of all waste materials according to local environmental regulations.

3. Dispose of the probe heater in accordance with local environmental regulations.

3.5.2 Fitting the new APCI probe heater

Required materials

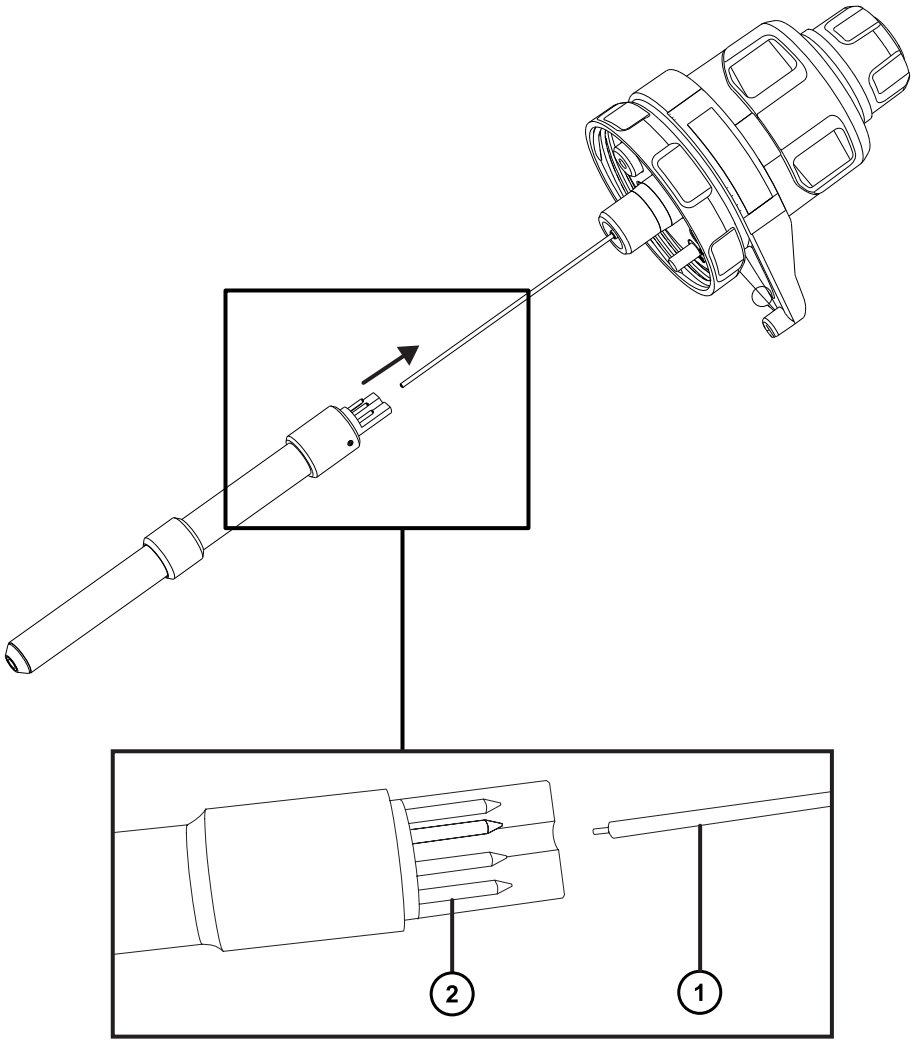
- Chemical-resistant, powder-free gloves
- APCI probe heater

To fit the new APCI probe heater:

Notice: Take great care not to damage the probe heater's electrical connections, capillary sleeve, or capillary when fitting the heater over the capillary sleeve.

1. Carefully slide the probe heater over the capillary sleeve on the probe adapter, ensuring that the heater is fully seated on the probe adapter.

Figure 3–7: Fitting the probe heater



1. Capillary sleeve
2. Probe heater connections

Notice: To avoid damaging the probe heater's electrical connections, do not twist the heater when removing it from or refitting it to the probe adapter.

2. Fit the probe adapter to the instrument (see Installing the probe adapter).

A Safety advisories

Waters products display safety symbols that identify hazards associated with the product's operation and maintenance. The symbols also appear in product manuals with statements that describe the hazards and advise how to avoid them. This appendix presents all safety symbols and statements that apply to Waters' product offerings. The symbols and statements can apply to a specific product, or apply to other products within the same system.

A.1 Warning symbols

Warning symbols alert you to the risk of death, injury, or seriously adverse physiological reactions associated with the misuse of an instrument or device. Heed all warnings when you install, repair, or operate any Waters instrument or device. Waters accepts no liability in cases of injury or property damage resulting from the failure of individuals to comply with any safety precaution when installing, repairing, or operating any of its instruments or devices.

The following symbols warn of risks that can arise when you operate or maintain a Waters instrument or device or component of an instrument or device. When one of these symbols appears in a manual's narrative sections or procedures, an accompanying statement identifies the applicable risk and explains how to avoid it.

Warning: (General risk of danger. When this symbol appears on an instrument, consult the instrument's user documentation for important safety-related information before you use the instrument.)

Warning: (Risk of burn injury from contacting hot surfaces.)

Warning: (Risk of electric shock.)

Warning: (Risk of fire.)

Warning: (Risk of sharp-point puncture injury.)

Warning: (Risk of hand crush injury.)

Warning: (Risk of injury caused by moving machinery.)

Warning: (Risk of exposure to ultraviolet radiation.)

Warning: (Risk of contacting corrosive substances.)

Warning: (Risk of exposure to a toxic substance.)

Warning: (Risk of personal exposure to laser radiation.)

Warning: (Risk of exposure to biological agents that can pose a serious health threat.)

Warning: (Risk of tipping.)

Warning: (Risk of explosion.)

Warning: (Risk of high-pressure gas release.)

A.1.1 Specific warnings

A.1.1.1 Burst warning

This warning applies to Waters instruments and devices fitted with nonmetallic tubing.

Warning: To avoid injury from bursting, nonmetallic tubing, heed these precautions when working in the vicinity of such tubing when it is pressurized:

- Wear eye protection.
- Extinguish all nearby flames.
- Do not use tubing that is, or has been, stressed or kinked.
- Do not expose nonmetallic tubing to compounds with which it is chemically incompatible: tetrahydrofuran, nitric acid, and sulfuric acid, for example.
- Be aware that some compounds, like methylene chloride and dimethyl sulfoxide, can cause nonmetallic tubing to swell, significantly reducing the pressure at which the tubing can rupture.

A.1.1.2 Mass spectrometer shock hazard

The following warning applies to all Waters mass spectrometers.

Warning: To avoid electric shock, do not remove protective panels from the device. The components within are not user-serviceable.

The following warning applies to certain mass spectrometers when they are in Operate mode.

Warning: To avoid harmless, static-like electric shock, ensure that the mass spectrometer is in Standby mode before you touch any of its external surfaces that are marked with this high-voltage warning symbol.

A.1.1.3 Mass spectrometer flammable solvents warning

This warning applies to mass spectrometers performing an analysis that requires the use of flammable solvents.

Warning: To prevent ignition of flammable solvent vapors in the enclosed space of a mass spectrometer’s ion source, ensure that nitrogen flows continuously through the source. For information on nitrogen supply pressure limits, refer to your Mass Spectrometer's Overview and Maintenance Guide. The nitrogen supply pressure must not fall below this limit during an analysis requiring the use of flammable solvents. Also, you must install a gas-fail device to interrupt the flow of LC solvent should the nitrogen supply fail.

A.1.1.4 Biohazard warning

The following warning applies to Waters instruments and devices that can process biologically hazardous materials. Biologically hazardous materials are substances that contain biological agents capable of producing harmful effects in humans.

Warning: To avoid infection from blood-borne pathogens, inactivated microorganisms, and other biological materials, assume that all biological fluids that you handle are infectious.

Specific precautions appear in the latest edition of the US National Institutes of Health (NIH) publication *Biosafety in Microbiological and Biomedical Laboratories* (BMBL).

Warning: Observe Good Laboratory Practice (GLP) at all times, particularly when working with hazardous materials. Consult the Material Safety Data Sheets regarding the solvents you use. Additionally, consult the safety representative for your organization regarding its protocols for handling such materials.

A.1.1.5 Biohazard and chemical hazard warning

This warning applies to Waters instruments and devices that can process biohazards, corrosive materials, or toxic materials.

Warning: To avoid personal contamination with biologically hazardous, toxic, or corrosive materials, you must understand the hazards associated with their handling.
Guidelines prescribing the proper use and handling of such materials appear in the latest edition of the National Research Council's publication, *Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards*.
Observe Good Laboratory Practice (GLP) at all times, particularly when working with hazardous materials, and consult the safety representative for your organization regarding its protocols for handling such materials.

A.2 Notices

Notice advisories appear where an instrument, device, or component can be subject to use or misuse that can damage it or compromise a sample's integrity. The exclamation point symbol and its associated statement alert you to such risk.

Notice: To avoid damaging the case of the instrument or device, do not clean it with abrasives or solvents.

A.3 Bottles Prohibited symbol

The Bottles Prohibited symbol alerts you to the risk of equipment damage caused by solvent spills.

Prohibited: To avoid equipment damage caused by spilled solvent, do not place reservoir bottles directly atop an instrument or device or on its front ledge. Instead, place the bottles in the bottle tray, which serves as secondary containment in the event of spills.

A.4 Required protection

The Use Eye Protection and Wear Protective Gloves symbols alert you to the requirement for personal protective equipment. Select appropriate protective equipment according to your organization's standard operating procedures.

Requirement: Use eye protection when performing this procedure.

Requirement: Wear clean, chemical-resistant, powder-free gloves when performing this procedure.

A.5 Warnings that apply to all Waters instruments and devices

When operating this device, follow standard quality-control procedures and the equipment guidelines in this section.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Avertissement : Toute modification sur cette unité n'ayant pas été expressément approuvée par l'autorité responsable de la conformité à la réglementation peut annuler le droit de l'utilisateur à exploiter l'équipement.

Warnung: Jedwede Änderungen oder Modifikationen an dem Gerät ohne die ausdrückliche Genehmigung der für die ordnungsgemäße Funktionstüchtigkeit verantwortlichen Personen kann zum Entzug der Bedienungsbefugnis des Systems führen.

Avvertenza: qualsiasi modifica o alterazione apportata a questa unità e non espressamente autorizzata dai responsabili per la conformità fa decadere il diritto all'utilizzo dell'apparecchiatura da parte dell'utente.

Advertencia: cualquier cambio o modificación efectuado en esta unidad que no haya sido expresamente aprobado por la parte responsable del cumplimiento puede anular la autorización del usuario para utilizar el equipo.

警告： 未经有关法规认证部门明确允许对本设备进行的改变或改装，可能会使使用者丧失操作该设备的合法性。

警告： 未經有關法規認證部門允許對本設備進行的改變或修改,可能會使使用者喪失操作該設備的權利。

경고: 규정 준수를 책임지는 당사자의 명백한 승인 없이 이 장치를 개조 또는 변경할 경우, 이 장치를 운용할 수 있는 사용자 권한의 효력을 상실할 수 있습니다.

警告: 規制機関から明確な承認を受けずに本装置の変更や改造を行うと、本装置のユーザーとしての承認が無効になる可能性があります。

Warning: Use caution when working with any polymer tubing under pressure:

- Always wear eye protection when near pressurized polymer tubing.
- Extinguish all nearby flames.
- Do not use tubing that has been severely stressed or kinked.
- Do not use nonmetallic tubing with tetrahydrofuran (THF) or concentrated nitric or sulfuric acids.
- Be aware that methylene chloride and dimethyl sulfoxide cause nonmetallic tubing to swell, which greatly reduces the rupture pressure of the tubing.

Avertissement : Manipulez les tubes en polymère sous pression avec precaution:

- Portez systématiquement des lunettes de protection lorsque vous vous trouvez à proximité de tubes en polymère pressurisés.
- Eteignez toute flamme se trouvant à proximité de l’instrument.
- Evitez d'utiliser des tubes sévèrement déformés ou endommagés.
- Evitez d'utiliser des tubes non métalliques avec du tétrahydrofurane (THF) ou de l'acide sulfurique ou nitrique concentré.
- Sachez que le chlorure de méthylène et le diméthylesulfoxyde entraînent le gonflement des tuyaux non métalliques, ce qui réduit considérablement leur pression de rupture.

Warnung: Bei der Arbeit mit Polymerschläuchen unter Druck ist besondere Vorsicht angebracht:

- In der Nähe von unter Druck stehenden Polymerschläuchen stets Schutzbrille tragen.
- Alle offenen Flammen in der Nähe löschen.
- Keine Schläuche verwenden, die stark geknickt oder überbeansprucht sind.
- Nichtmetallische Schläuche nicht für Tetrahydrofuran (THF) oder konzentrierte Salpeter- oder Schwefelsäure verwenden.
- Durch Methylenchlorid und Dimethylsulfoxid können nichtmetallische Schläuche quellen; dadurch wird der Berstdruck des Schlauches erheblich reduziert.

Avvertenza: fare attenzione quando si utilizzano tubi in materiale polimerico sotto pressione:

- Indossare sempre occhiali da lavoro protettivi nei pressi di tubi di polimero pressurizzati.
- Spegnere tutte le fiamme vive nell'ambiente circostante.
- Non utilizzare tubi eccessivamente logorati o piegati.
- Non utilizzare tubi non metallici con tetraidrofurano (THF) o acido solforico o nitrico concentrati.
- Tenere presente che il cloruro di metilene e il dimetilsolfossido provocano rigonfiamenti nei tubi non metallici, riducendo notevolmente la pressione di rottura dei tubi stessi.

Advertencia: se recomienda precaución cuando se trabaje con tubos de polímero sometidos a presión:

- El usuario deberá protegerse siempre los ojos cuando trabaje cerca de tubos de polímero sometidos a presión.
- Si hubiera alguna llama las proximidades.
- No se debe trabajar con tubos que se hayan doblado o sometido a altas presiones.
- Es necesario utilizar tubos de metal cuando se trabaje con tetrahidrofurano (THF) o ácidos nítrico o sulfúrico concentrados.
- Hay que tener en cuenta que el cloruro de metileno y el sulfóxido de dimetilo dilatan los tubos no metálicos, lo que reduce la presión de ruptura de los tubos.

警告： 当有压力的情况下使用管线时，小心注意以下几点：

- 当接近有压力的聚合物管线时一定要戴防护眼镜。
- 熄灭附近所有的火焰。
- 不要使用已经被压瘪或严重弯曲的管线。
- 不要在非金属管线中使用四氢呋喃或浓硝酸或浓硫酸。
- 要了解使用二氯甲烷及二甲基亚枫会导致非金属管线膨胀，大大降低管线的耐压能力。

警告： 當在有壓力的情況下使用聚合物管線時，小心注意以下幾點。

- 當接近有壓力的聚合物管線時一定要戴防護眼鏡。
- 熄滅附近所有的火焰。
- 不要使用已經被壓癟或嚴重彎曲管線。
- 不要在非金屬管線中使用四氫呋喃或濃硝酸或濃硫酸。
- 要了解使用二氯甲烷及二甲基亞楓會導致非金屬管線膨脹，大大降低管線的耐壓能力。

경고: 가압 폴리머 튜브로 작업할 경우에는 주의하십시오.

- 가압 폴리머 튜브 근처에서는 항상 보호 안경을 착용하십시오.
- 근처의 화기를 모두 끄십시오.
- 심하게 변형되거나 꼬인 튜브는 사용하지 마십시오.
- 비금속(Nonmetallic) 튜브를 테트라히드로푸란(Tetrahydrofuran: THF) 또는 농축 질산 또는 황산과 함께 사용하지 마십시오.
- 염화 메틸렌(Methylene chloride) 및 디메틸술폭시드(Dimethyl sulfoxide)는 비금속 튜브를 부풀려 튜브의 파열 압력을 크게 감소시킬 수 있으므로 유의하십시오.

警告: 圧力のかかったポリマーチューブを扱うときは、注意してください。

- 加圧されたポリマーチューブの付近では、必ず保護メガネを着用してください。
- 近くにある火を消してください。
- 著しく変形した、または折れ曲がったチューブは使用しないでください。
- 非金属チューブには、テトラヒドロフラン(THF)や高濃度の硝酸または硫酸などを流さないでください。
- 塩化メチレンやジメチルスルホキシドは、非金属チューブの膨張を引き起こす場合があり、その場合、チューブは極めて低い圧力で破裂します。

This warning applies to Waters instruments fitted with nonmetallic tubing. This warning applies to instruments operated with flammable solvents.

Warning: The user shall be made aware that if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Avertissement : L'utilisateur doit être informé que si le matériel est utilisé d'une façon non spécifiée par le fabricant, la protection assurée par le matériel risque d'être défectueuses.

Warnung: Der Benutzer wird darauf aufmerksam gemacht, dass bei unsachgemäßer Verwendung des Gerätes die eingebauten Sicherheitseinrichtungen unter Umständen nicht ordnungsgemäß funktionieren.

Avvertenza: si rende noto all'utente che l'eventuale utilizzo dell'apparecchiatura secondo modalità non previste dal produttore può compromettere la protezione offerta dall'apparecchiatura.

Advertencia: el usuario deberá saber que si el equipo se utiliza de forma distinta a la especificada por el fabricante, las medidas de protección del equipo podrían ser insuficientes.

警告： 使用者必须非常清楚如果设备不是按照制造厂商指定的方式使用，那么该设备所提供的保护将被削弱。

警告： 使用者必須非常清楚如果設備不是按照製造廠商指定的方式使用，那麼該設備所提供的保護將被消弱。

경고: 제조업체가 명시하지 않은 방식으로 장비를 사용할 경우 장비가 제공하는 보호 수단이 제대로 작동하지 않을 수 있다는 점을 사용자에게 반드시 인식시켜야 합니다.

警告: ユーザーは、製造元により指定されていない方法で機器を使用すると、機器が提供している保証が無効になる可能性があることに注意して下さい。

A.6 Warnings that address the replacement of fuses

The following warnings pertain to instruments and devices equipped with user-replaceable fuses. Information describing fuse types and ratings sometimes, but not always, appears on the instrument or device.

Finding fuse types and ratings when that information appears on the instrument or device:

Warning: To protect against fire, replace fuses with those of the type and rating printed on panels adjacent to instrument fuse covers.

Avertissement : pour éviter tout risque d'incendie, remplacez toujours les fusibles par d'autres du type et de la puissance indiqués sur le panneau à proximité du couvercle de la boite à fusible de l'instrument.

Warnung: Zum Schutz gegen Feuer die Sicherungen nur mit Sicherungen ersetzen, deren Typ und Nennwert auf den Tafeln neben den Sicherungsabdeckungen des Geräts gedruckt sind.

Avvertenza: per garantire protezione contro gli incendi, sostituire i fusibili con altri dello stesso tipo aventi le caratteristiche indicate sui pannelli adiacenti alla copertura fusibili dello strumento.

Advertencia: Para evitar incendios, sustituir los fusibles por aquellos del tipo y características impresos en los paneles adyacentes a las cubiertas de los fusibles del instrumento.

警告： 为了避免火灾，应更换与仪器保险丝盖旁边面板上印刷的类型和规格相同的保险丝。

警告： 為了避免火災，更換保險絲時，請使用與儀器保險絲蓋旁面板上所印刷之相同類型與規格的保險絲。

경고: 화재의 위험을 막으려면 기기 퓨즈 커버에 가까운 패널에 인쇄된 것과 동일한 타입 및 정격의 제품으로 퓨즈를 교체하십시오.

警告: 火災予防のために、ヒューズ交換では機器ヒューズカバー脇のパネルに記載されているタイプおよび定格のヒューズをご使用ください。

Finding fuse types and ratings when that information does not appear on the instrument or device:

Warning: To protect against fire, replace fuses with those of the type and rating indicated in the “Replacing fuses” section of the Maintenance Procedures chapter.

Avertissement : pour éviter tout risque d'incendie, remplacez toujours les fusibles par d'autres du type et de la puissance indiqués dans la rubrique "Remplacement des fusibles" du chapitre traitant des procédures de maintenance.

Warnung: Zum Schutz gegen Feuer die Sicherungen nur mit Sicherungen ersetzen, deren Typ und Nennwert im Abschnitt "Sicherungen ersetzen" des Kapitels "Wartungsverfahren" angegeben sind.

Avvertenza: per garantire protezione contro gli incendi, sostituire i fusibili con altri dello stesso tipo aventi le caratteristiche indicate nel paragrafo "Sostituzione dei fusibili" del capitolo "Procedure di manutenzione".

Advertencia: Para evitar incendios, sustituir los fusibles por aquellos del tipo y características indicados en la sección "Sustituir fusibles".

警告： 为了避免火灾，应更换“维护步骤”一章的“更换保险丝”一节中介绍的相同类型和规格的保险丝。

警告： 為了避免火災，更換保險絲時，應使用「維護步驟」章節中「更換保險絲」所指定之相同類型與規格的保險絲。

경고: 화재의 위험을 막으려면 유지관리 절차 단원의 “퓨즈 교체” 절에 설명된 것과 동일한 타입 및 정격의 제품으로 퓨즈를 교체하십시오.

警告: 火災予防のために、ヒューズ交換ではメンテナンス項目の「ヒューズの交換」に記載されているタイプおよび定格のヒューズをご使用ください。

A.7 Electrical symbols

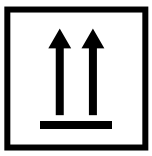
The following electrical symbols and their associated statements can appear in instrument manuals and on an instrument’s front or rear panels.

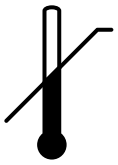
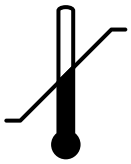
Symbol	Description
	Electrical power on

Symbol	Description
	Electrical power off
	Standby
	Direct current
	Alternating current
	Alternating current (three phase)
	Safety ground
	Frame or chassis terminal connection
	Fuse
	Functional ground
	Input
	Output
	Indicates that the device or assembly is susceptible to damage from electrostatic discharge (ESD)

A.8 Handling symbols

The following handling symbols and their associated statements can appear on labels affixed to the packaging in which instruments, devices, and component parts are shipped.

Symbol	Description
	Keep upright!
	Keep dry!

Symbol	Description
	Fragile!
	Use no hooks!
	Upper limit of temperature
	Lower limit of temperature
	Temperature limitation

B Materials of construction and compatible solvents

Warning: To avoid personal contamination with biologically hazardous, toxic, or corrosive materials, you must address any safety issues raised in the instrument's overview and maintenance guide. Doing so confirms the integrity of the source exhaust system.

Notes:

- Refer to the instrument's overview and maintenance guide for the list of compatible solvents. While the Tool-free Probe might be compatible with a wider range of solvents than the mass spectrometer on which the probe is installed, you must use only those solvents listed in the solvent compatibility appendix of the mass spectrometer's overview and maintenance guide.
- The lists of solvents presented in the instrument's overview and maintenance guide are not comprehensive. Some solvents might be chemically compatible with the instrument even though they are not referenced in the lists. Some solvents that are referenced in the lists, but used at higher concentrations than specified, might also be compatible with the instrument. Where solvents are used at higher concentrations than specified in the lists, it is important that you determine whether their use is compatible with the instrument.