

Waters APPI Source

Operator's Guide Supplement

71500137602/Revision A



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We seriously consider every customer comment we receive. You can reach us at tech_comm@waters.com.



Contacting Waters

Contact Waters[®] with enhancement requests or technical questions regarding the use, transportation, removal, or disposal of any Waters product. You can reach us via the Internet, telephone, or conventional mail.

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Telephone	In the USA or Canada, phone 508 478-2000.
Conventional mail	Waters Corporation 34 Maple Street Milford, MA 01757 USA

Instrument information

Intended use

This guide supplements the information in the operator's guides of the following instruments and ion sources:

- LCT Premier™/ Premier XE
- APPI/IonSABRE (which applies to the Quattro micro™ and ZQ™)
- Quattro Premier™/ Premier XE Combined APPI and APCI Source
- Q-Tof Premier™

Consult this supplement, together with the applicable operator's or source operator's guide after a Waters field service engineer upgrades your mass spectrometer's source pursuant to one of these engineering change notes (ECNs).

- ECN 9120292 (as indicated by a label affixed to the instrument's rear panel)
- ECN 9126449 (as indicated by a label affixed to the APPI lamp assembly)

Safety considerations

When operating the Waters LCT Premier, LCT Premier XE, Quattro micro API, Quattro Premier, Quattro Premier XE, Q-Tof Premier, or ZQ mass spectrometer, follow standard quality control procedures. Also, in addition to following the operating guidelines in this section, follow those in the operator's guide for your instrument or source.

See also: [“Safety Advisories” on page A-1.](#)

Considerations specific to the Waters APPI lamp

Solvent leakage hazard

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



Warning:

- To confirm the integrity of the source exhaust system, renew the APPI lamp drive assembly seals at intervals not exceeding one year.
- To avoid chemical degradation of the APPI lamp drive assembly seals, which can withstand exposure only to certain solvents (see [“Common ingredients used to prepare mobile phases” on page B-2](#)), determine whether any solvents you use that are not listed are chemically compatible with the composition of the seals.

High voltage hazard



Warning: To avoid nonlethal electric shock, any equipment connected to the APCI probe and APPI lamp drive assembly must be grounded.

Table of Contents

Copyright notice	ii
Trademarks	ii
Customer comments	ii
Contacting Waters	iii
Instrument information	iv
Intended use.....	iv
Safety considerations	iv
Considerations specific to the Waters APPI lamp	v
Solvent leakage hazard	1-v
High voltage hazard	1-v
1 Maintenance Procedures	1-1
Maintenance schedule	1-2
Safety and handling	1-2
Replacing O-rings	1-3
Removing O-rings and seals	1-3
Replacing the UV lamp bulb	1-4
Cleaning the lamp window	1-7
Required materials	1-7
Replacing the APPI lamp drive assembly O-rings	1-9
Fitting the new APPI lamp drive assembly O-rings	1-13
A Safety Advisories	A-1
Warning symbols	A-2
Task-specific hazard warnings.....	A-2
Warnings that apply to particular instruments, instrument components, and sample types.....	A-3

Burst warning	A-3
Mass spectrometer flammable solvents warning	A-3
Mass spectrometer shock hazard	A-4
Biohazard warning	A-4
Chemical hazard warning	A-5
Caution symbol	A-5
Warnings that apply to all Waters instruments	A-5
Electrical and handling symbols	A-13
Electrical symbols	A-13
Handling symbols	A-14
B Materials of Construction and Compliant Solvents	B-1
Items exposed to solvent	B-2
Common ingredients used to prepare mobile phases	B-2

1 Maintenance Procedures

This chapter explains supplemental maintenance procedures that you can perform on your mass spectrometer after a Waters field service engineer upgrades its source pursuant to one of these engineering change notes (ECNs):

- ECN 9120292 (as indicated by a label affixed to the instrument's rear panel)
- ECN 9126449 (as indicated by a label affixed to the APPI lamp assembly)

Follow these procedures as well as those in your instrument's operator's guide and, if applicable, the relevant source operator's guide.

Contents:

Topic	Page
Maintenance schedule	1-2
Safety and handling	1-2
Removing O-rings and seals	1-3
Replacing the UV lamp bulb	1-4
Cleaning the lamp window	1-7
Replacing the APPI lamp drive assembly O-rings	1-9

Maintenance schedule

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

The maintenance frequencies shown apply to instruments that normally receive moderate use.

Maintenance schedule:

Procedure	Frequency
Change the UV lamp bulb.	When the bulb fails.
Clean the lamp window.	When the window becomes visibly dirty, or when the sensitivity decreases to unacceptable levels.
Replace the APPI lamp drive assembly O-rings.	Annually.

Safety and handling

Bear in mind the following safety considerations when performing maintenance procedures.



Warning: Many procedures in this chapter involve removing contaminating deposits using toxic, flammable, or caustic agents. Be aware of the attendant risks, and take suitable precautions.



Warning: The probe and source can be contaminated with biologically hazardous materials. Wear chemical-resistant, powder-free gloves at all times while handling the components.



Warning: To avoid nonlethal electric shock, ensure these conditions are met before starting any maintenance procedure:

- The instrument is in Standby mode
- All gases are stopped
- The HPLC flow is stopped



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



Warning: To avoid eye injury from UV radiation, ensure that the APPI lamp is switched off before commencing any source maintenance.

Replacing O-rings



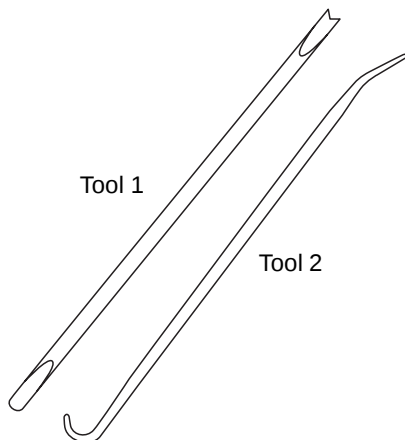
Warning: To ensure the integrity of the APPI source system, renew the O-rings listed below at intervals of no greater than one year:

- Lamp bulb sealing O-ring
- Mounting shaft O-ring
- Lamp mounting flange O-ring

Removing O-rings and seals

When performing certain maintenance procedures, you must remove O-rings or seals from instrument components using the O-ring removal kit provided with the instrument. You must dispose of all O-rings and seals that you remove according to local environmental regulations. Never re-use O-rings or seals.

O-ring removal kit:



To remove an O-ring:



Warning: The probe, source, and APPI lamp drive assembly can be contaminated with biologically hazardous materials. Wear chemical-resistant, powder-free gloves at all times while handling the components.



Caution: When removing an O-ring or seal from a component, be careful not to scratch the component with a removal tool.

1. Use the forked end of Tool 1 to impale the O-ring or seal.
2. Pull the O-ring or seal from its groove; if necessary, use Tool 2 as an aid.



Warning: The O-ring or seal can be contaminated with biohazardous and/or toxic materials. Ensure that it is correctly disposed of according to local environmental regulations.

3. Dispose of the O-ring or seal according to local environmental regulations.

Replacing the UV lamp bulb

Important: To complete this procedure, you pressure test the source as described in the *Waters Source Pressure Test Unit Operator's Guide*.

Required materials

- Chemical-resistant, powder-free gloves
- Small, flat-blade screwdriver
- Small, cross-head screwdriver
- Short length of length 4-mm nylon tube

To change the UV lamp bulb:



Warning: The probe and source can be contaminated with biologically hazardous materials. Wear chemical-resistant powder-free gloves at all times while handling the components.

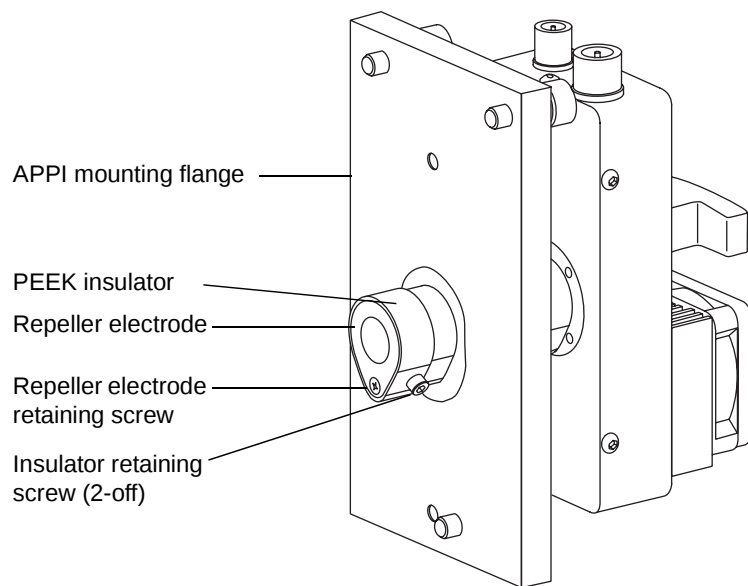


Warning: To avoid electric shock, ensure that the instrument is in Standby mode while working with its front access door open.



Warning: To avoid burn injuries, take great care to avoid the probe and source while working with the instrument's front access door open.

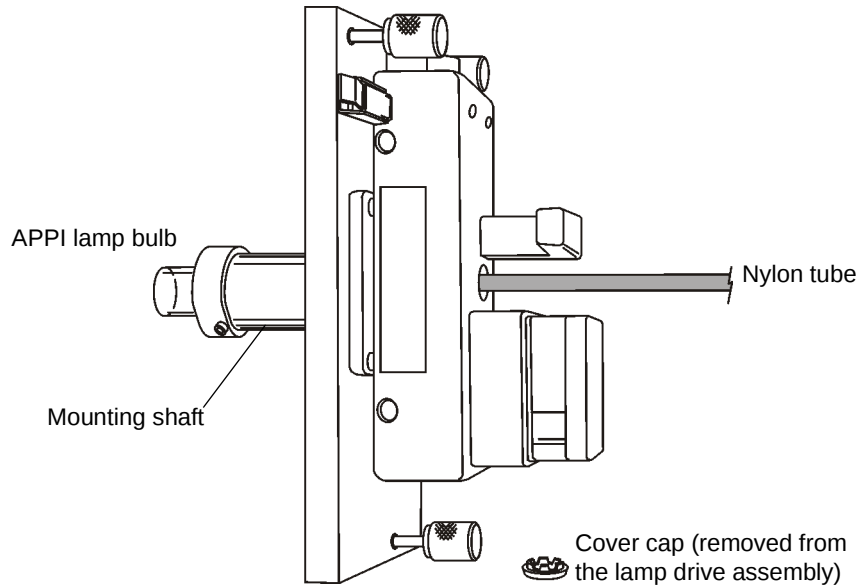
APPI lamp drive assembly:



1. On the MassLynx Tune window, click , and confirm that the instrument status indicator is red.
2. Wait for three minutes for the desolvation gas to cool the probe and source.
3. Click  to stop the nitrogen flow.

4. Remove the APPI lamp drive assembly from the source enclosure.
5. Use the cross-head screwdriver to remove the repeller electrode retaining screw.
6. Remove the repeller electrode from the PEEK insulator.
7. Remove the cover cap from the back of the lamp drive assembly.

Changing the UV lamp bulb:



Caution: To avoid breaking the bulb, do not use a screwdriver to push the bulb out of the lamp drive assembly.

8. Insert the length of 4-mm nylon tube through the back of the electronics housing, and push the bulb forward.
9. Withdraw the bulb from the lamp drive assembly.
10. Insert the new bulb into the lamp drive assembly.
11. Refit the cover cap to the lamp drive assembly.
12. Fit the repeller electrode to the PEEK™ insulator.

13. Use the cross-head screwdriver to fit and tighten the retaining screw for the repeller electrode.
14. Fully retract the lamp's mounting shaft in the APPI lamp drive assembly.



Warning: To confirm the integrity of the source exhaust system, you must pressure test the source as described in the *Waters Source Pressure Test Unit Operator's Guide*.

15. Fit the APPI lamp drive assembly to the source enclosure, and perform a source pressure test.

Cleaning the lamp window

The transmission of the high-energy photons responsible for APPI relies on the cleanliness of the magnesium fluoride lamp window. The window should be cleaned to keep the surface clear of contamination and avoid reduced sensitivity.

Required materials

- Chemical-resistant, powder-free gloves
- Lint-free cloth
- Isopropanol

To clean the lamp window:



Warning: The source components can be contaminated with biohazardous and/or toxic materials. Always wear chemical-resistant, powder-free gloves while performing this procedure.



Warning: To avoid nonlethal electric shock, ensure these conditions are met before starting any maintenance procedure:

- The instrument is in Standby mode
- All gases are stopped
- The HPLC flow is stopped



Warning: To avoid eye injury from UV radiation, ensure that the APPI lamp is switched off before commencing this procedure.

1. On the MassLynx Tune window, click , and confirm that the instrument status indicator is red.
2. Wait for three minutes for the desolvation gas to cool the probe and source.
3. Click  to stop the nitrogen flow.



Caution: Do not apply any downward force to the source enclosure door while the door is open.

4. Open the instrument's front access door.



Warning: To avoid puncture wounds, take great care if a corona pin is fitted to the source; its tip is sharp.

5. Unfasten the source enclosure door's securing clips, and open the door.
6. Use isopropanol, applied to the lint-free cloth, to carefully clean the lamp window.
7. Close the source enclosure door, and fasten the door handle.
8. Close the instrument's front access door.

Replacing the APPI lamp drive assembly O-rings



Warning: To ensure the integrity of the source exhaust system, replace the APPI lamp drive assembly's O-rings (listed below) at intervals not exceeding one year. Perform the replacement exactly as described in this section.

The following APPI lamp drive assembly O-rings must be replaced at intervals not exceeding one year:

- Lamp bulb sealing O-ring
- Mounting shaft O-rings
- Lamp mounting flange O-ring

Note: To complete this procedure, you must perform a pressure test on the source as described in the *Waters Source Pressure Test Unit Operator's Guide*.

Required materials

- Chemical-resistant, powder-free gloves
- 2.5-mm Allen wrench
- O-ring removal kit

To remove the APPI lamp drive assembly O-rings:



Warning: The probe and source can be contaminated with biologically hazardous materials. Wear chemical-resistant, powder-free gloves at all times while handling the components.



Warning: To avoid nonlethal electric shock, ensure that the instrument is in Standby mode before commencing this procedure.

1. Remove the lamp bulb.

See also: “To change the UV lamp bulb:” on page 1-5.

2. Use a 2.5-mm hex (Allen) key to remove the two insulator retaining screws.

See also: Figure titled “APPI lamp drive assembly” on page 1-5.

3. Remove the PEEK insulator from the mounting shaft.

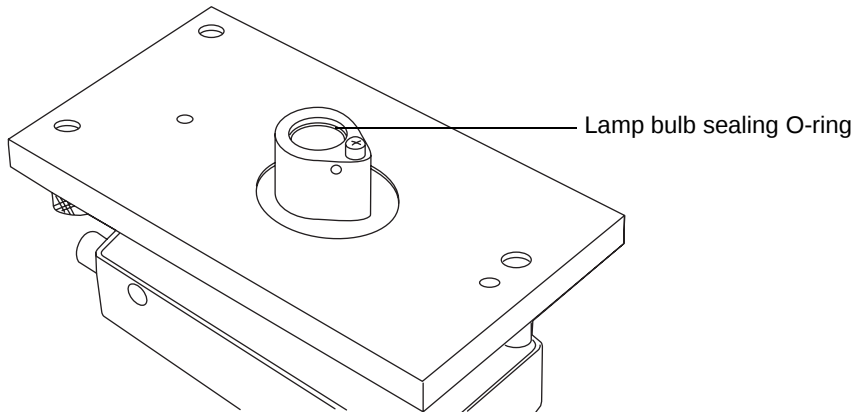


Caution: When removing the O-ring, be careful not to scratch the mounting shaft with a removal tool.

4. Use the O-ring removal kit to carefully remove the lamp bulbs sealing O-ring from inside the end of the mounting shaft.

See also: “Removing O-rings and seals” on page 1-3.

Lamp bulb sealing O-ring:



5. Extract the mounting shaft from the APPI source enclosure side plate.

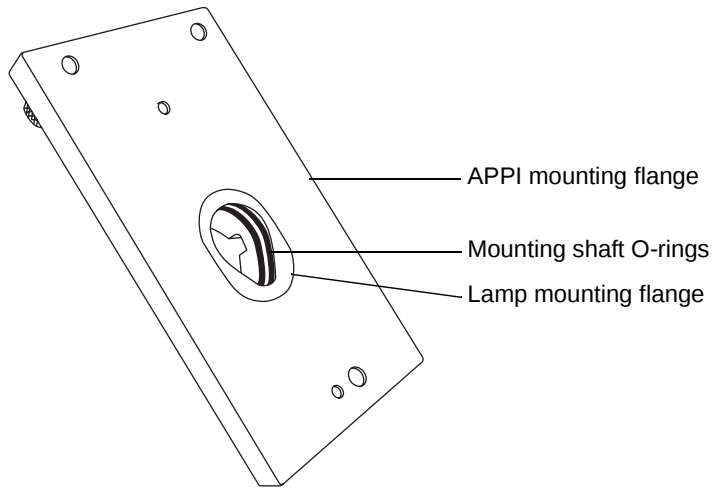


Caution: When removing the O-rings, be careful not to scratch the lamp mounting flange aperture with a removal tool.

6. Use the O-ring removal kit to carefully remove the mounting shaft O-rings from inside the lamp mounting flange aperture.

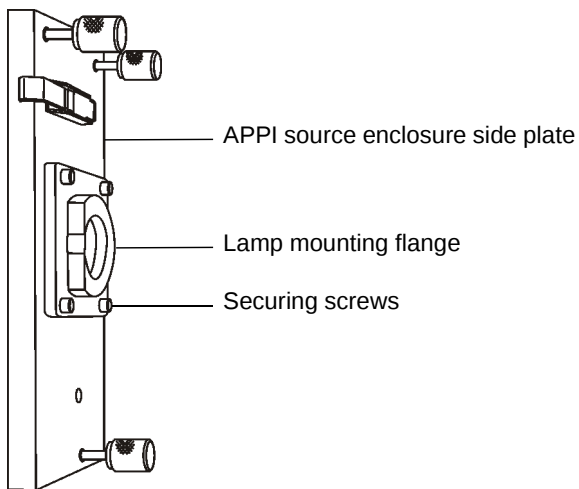
See also: “Removing O-rings and seals” on page 1-3.

Mounting shaft O-rings:



7. Use a 2.5-mm Allen wrench to unscrew the four captive screws securing the lamp mounting flange.

Lamp mounting flange:



8. Remove the lamp mounting flange from the APPI mounting flange.

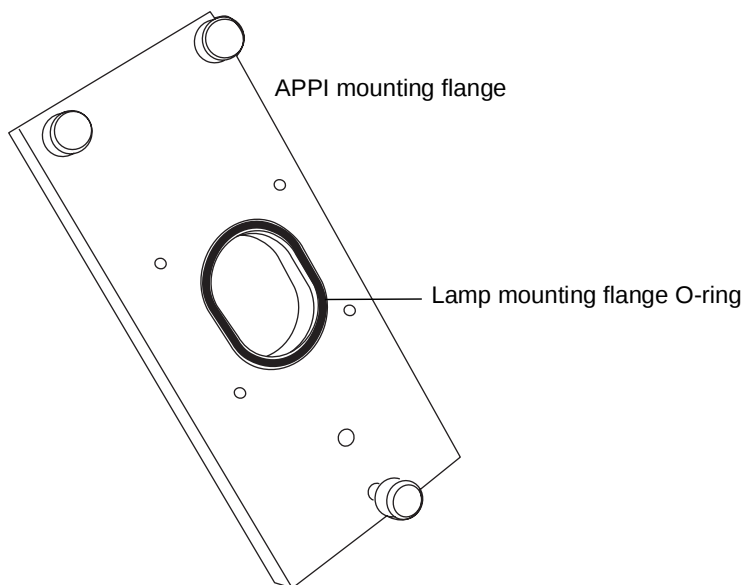


Caution: When removing the O-rings, be careful not to scratch the APPI mounting flange with a removal tool.

9. Use the O-ring removal kit to carefully remove the lamp mounting flange O-ring from the APPI mounting flange.

See also: [“Removing O-rings and seals” on page 1-3.](#)

Lamp mounting flange O-ring:



Warning: The O-rings can be contaminated with biohazardous and/or toxic materials. Ensure that they are correctly disposed of according to local environmental regulations.

10. Dispose of the O-rings in compliance with local environmental regulations.



Warning: To ensure the integrity of the source exhaust system, the APPI lamp drive assembly O-rings listed below must be renewed at intervals not exceeding one year, exactly as described in this section.

Fitting the new APPI lamp drive assembly O-rings

Required materials

- Chemical-resistant, powder-free gloves
- 2.5-mm Allen wrench
- 1:1 methanol/water
- Lint-free cloth
- Mounting shaft insertion tool
- O-ring removal kit

To fit the new APPI lamp drive assembly O-rings:



Warning: Many procedures in this section involve removing contaminated deposits using toxic, flammable, or caustic agents. Be aware of the attendant risks, and take the suitable precautions.



Warning: The probe and source can be contaminated with biologically hazardous materials. Wear chemical-resistant, powder-free gloves at all times while handling the components.

1. Ensure that all the grooves for the O-rings are free from dirt and fibres.

Tip: If contamination is present, use 1:1 methanol/water, applied to a lint-free cloth, to carefully clean the grooves.

2. Fit the new lamp mounting flange O-ring to the APPI mounting flange.
3. Fit the lamp mounting flange to the APPI mounting flange.



Caution: To ensure that the lamp mounting flange seats uniformly on the APPI mounting flange, sequentially tighten its four securing screws in small increments until they are fully tight.

4. Use the 2.5-mm Allen wrench to tighten the four lamp mounting flange securing screws.

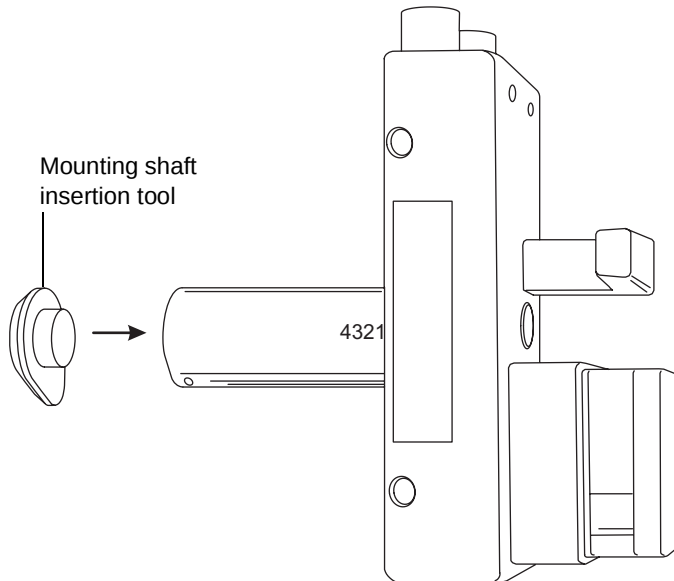


Caution: Take care not to damage the APPI lamp drive assembly mounting shaft O-rings when fitting them to the lamp mounting flange.

5. Fit the mounting shaft O-rings to the lamp mounting flange.

Tip: First seat the O-ring in the small radius at the bottom of the groove in the mounting flange. Then use the circular portion of O-ring removal kit tool 1 or tool 2 to “roll” the remainder of the O-ring into the groove.

6. Fit the mounting shaft insertion tool to the mounting shaft.



Caution: To avoid damaging to the mounting shaft O-rings, fit the mounting shaft insertion tool to the mounting shaft before fitting the shaft to the lamp mounting flange.

7. Insert the mounting shaft in the lamp mounting flange.
8. Remove the mounting shaft insertion tool from the mounting shaft.
9. Fit the lamp bulb's sealing O-ring to the mounting shaft.
10. Fit the PEEK insulator to the mounting shaft.

11. Use the 2.5-mm Allen wrench to fit and tighten the two insulator retaining screws.
12. Insert the new bulb into the lamp drive assembly.
13. Refit the cover cap to the lamp drive assembly.
14. Fit the repeller electrode to the PEEK insulator.
15. Fit and tighten the repeller electrode retaining screw.
16. Fully retract the lamp's mounting shaft in the APPI lamp drive assembly.
17. Ensure that the source enclosure side flange O-ring is in place on the right-hand side of the source enclosure.
18. Fit the APPI lamp drive assembly onto the right-hand side of the source enclosure.



Caution: To ensure that the APPI lamp drive assembly seats uniformly on the source enclosure, sequentially tighten its three securing thumbscrews in small increments until they are fully tight.

19. Fit and tighten the three securing thumbscrews.
20. Close the source enclosure door, and fasten its securing clips.
21. Connect the APPI link drive cable between the APPI lamp drive assembly APPI electrical connection and the APPI connector on the instrument front panel.
22. Connect the APPI HT cable between the APPI lamp drive assembly's HV electrical connection and the HV connector on the instrument front panel.



Warning: To confirm the integrity of the source exhaust system, pressure test the source as described in the *Waters Source Pressure Test Unit Operator's Guide*.

23. Pressure test the source.

A Safety Advisories

Waters® instruments display hazard symbols designed to alert you to the hidden dangers of operating and maintaining the instruments. Their corresponding user guides also include the hazard symbols, with accompanying text statements describing the hazards and telling you how to avoid them. This appendix presents all the safety symbols and statements that apply to the entire line of Waters products.

Contents:

Topic	Page
Warning symbols	A-2
Caution symbol	A-5
Warnings that apply to all Waters instruments	A-5
Electrical and handling symbols	A-13

Warning symbols

Warning symbols alert you to the risk of death, injury, or seriously adverse physiological reactions associated with an instrument's use or misuse. Heed all warnings when you install, repair, and operate Waters instruments. Waters assumes no liability for the failure of those who install, repair, or operate its instruments to comply with any safety precaution.

Task-specific hazard warnings

The following warning symbols alert you to risks that can arise when you operate or maintain an instrument or instrument component. Such risks include burn injuries, electric shocks, ultraviolet radiation exposures, and others.

When the following symbols appear in a manual's narratives or procedures, their accompanying text identifies the specific 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 needle puncture.)



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.)

Warnings that apply to particular instruments, instrument components, and sample types

The following warnings can appear in the user manuals of particular instruments and on labels affixed to them or their component parts.

Burst warning

This warning applies to Waters instruments fitted with nonmetallic tubing.



Warning: Pressurized nonmetallic, or polymer, tubing can burst. Observe these precautions when working around such tubing:

- 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 incompatible compounds like tetrahydrofuran (THF) and nitric or sulfuric acids.
- Be aware that some compounds, like methylene chloride and dimethyl sulfoxide, can cause nonmetallic tubing to swell, which significantly reduces the pressure at which the tubing can rupture.

Mass spectrometer flammable solvents warning

This warning applies to instruments operated with flammable solvents.



Warning: Where significant quantities of flammable solvents are involved, a continuous flow of nitrogen into the ion source is required to prevent possible ignition in that enclosed space.

Ensure that the nitrogen supply pressure never falls below 400 kPa (4 bar, 58 psi) during an analysis in which flammable solvents are used. Also ensure a gas-fail connection is connected to the HPLC system so that the LC solvent flow stops if the nitrogen supply fails.

Mass spectrometer shock hazard

This warning applies to all Waters mass spectrometers.



Warning: To avoid electric shock, do not remove the mass spectrometer's protective panels. The components they cover are not user-serviceable.

This warning applies to certain instruments when they are in Operate mode.



Warning: High voltages can be present at certain external surfaces of the mass spectrometer when the instrument is in Operate mode. To avoid nonlethal electric shock, make sure the instrument is in Standby mode before touching areas marked with this high voltage warning symbol.

Biohazard warning

This warning applies to Waters instruments that can be used to process material that might contain biohazards: substances that contain biological agents capable of producing harmful effects in humans.



Warning: Waters's instruments and software can be used to analyze or process potentially infectious human-sourced products, inactivated microorganisms, and other biological materials. To avoid infection with these agents, assume that all biological fluids are infectious, observe good laboratory practices and, consult your organization's biohazard safety representative regarding their proper use and handling. Specific precautions appear in the latest edition of the US National Institutes of Health (NIH) publication, *Biosafety in Microbiological and Biomedical Laboratories* (BMBL).

Chemical hazard warning

This warning applies to Waters instruments that can process corrosive, toxic, flammable, or other types of hazardous material.



Warning: Waters instruments can be used to analyze or process potentially hazardous substances. To avoid injury with any of these materials, familiarize yourself with the materials and their hazards, observe Good Laboratory Practices (GLP), and consult your organization's safety representative regarding proper use and handling. Guidelines are provided in the latest edition of the National Research Council's publication, *Prudent Practices in the Laboratory: Handling and Disposal of Chemicals*.

Caution symbol

The caution symbol signifies that an instrument's use or misuse can damage the instrument or compromise a sample's integrity. The following symbol and its associated statement are typical of the kind that alert you to the risk of damaging the instrument or sample.



Caution: To avoid damage, do not use abrasives or solvents to clean the instrument's case.

Warnings that apply to all Waters instruments

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



Attention: 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.

Important: 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.

Achtung: 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: eventuali modifiche o alterazioni apportate a questa unità e non espressamente approvate da un ente responsabile per la conformità annulleranno l'autorità dell'utente ad operare l'apparecchiatura.

Atencion: 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.

注意：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。

注意：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。

주의： 기기 검교정 담당자의 승인 없이 무단으로 기기를 변경 또는 수정하는 경우에는, 그 기기 운영에 대한 허가가 취소될 수 있습니다.

注意：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.

Attention: Manipulez les tubes en polymère sous pression avec précaution:

- Portez systématiquement des lunettes de protection lorsque vous vous trouvez à proximité de tubes en polymère pressurisés.
- Éteignez toute flamme se trouvant à proximité de l'instrument.
- Évitez d'utiliser des tubes sévèrement déformés ou endommagés.
- Évitez 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.

Vorsicht: 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.



Attenzione: prestare attenzione durante l'utilizzo dei tubi di polimero pressurizzati:

- Indossare sempre occhiali da lavoro protettivi nei pressi di tubi di polimero pressurizzati.
- Estinguere ogni fonte di ignizione circostante.
- Non utilizzare tubi soggetti che hanno subito sollecitazioni eccessive o sono stati incurvati.
- Non utilizzare tubi non metallici con tetraidrofurano (THF) o acido solforico o nitrico concentrato.
- Tenere presente che il cloruro di metilene e il dimetilsolfossido provocano rigonfiamento nei tubi non metallici, riducendo notevolmente la resistenza alla 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：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。
- 不要使用已經被壓癢或嚴重彎曲管線。
- 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。



警告：当在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砜会导致非金属管线膨胀，大大降低管线的耐压能力。

경고: 폴리머재질의 튜빙을 압력하에서 사용할 때는 다음 사항에 유의하십시오.

- 압력을 받은 폴리머 튜빙 부근에서는 반드시 보호안경을 착용할 것
- 모든 화기의 접근을 금함
- 늘리거나 뒤틀린 튜빙은 사용하지 말 것
- 비금속 튜빙을 테트라히드로퓨란(THF)이나 염산 및 황산과 함께 사용하지 말 것
- 디글로로메탄(methylene chloride)와 디메틸설폭사이드(dimethyl sulfoxide)는 비금속 튜빙을 팽창시켜 쉽게 파열되므로 주의할 것

警告：ポリマーチューブに圧力をかけて取り扱う場合は、次のように注意してください。

- 加圧したポリマーチューブの付近では、常に保護めがねを着用してください。
- 付近の火はすべて消してください。
- 激しい応力やねじれを受けたチューブは使用しないでください。
- テトラヒドロフラン(THF)、濃硝酸、あるいは濃硫酸には、非金属製のチューブを使用しないでください。
- ジクロロメタンやジメチルスルホキシドは非金属製のチューブを膨張させ、チューブの破断圧力を大幅に低下させますので、注意してください。



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.

Attention: 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.

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

Attenzione: l'utente deve essere al corrente del fatto che, se l'apparecchiatura viene usata in un modo specificato dal produttore, la protezione fornita dall'apparecchiatura potrà essere invalidata.

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。

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：제조사가 지정한 것 이외의 방법으로 기기를 사용하는 경우에는, 사용자가 위험으로부터 보호될 수 없는 경우가 발생할 수 있음에 유념하십시오.

警告：ユーザは製造業者が指定していない方法で装置を使用した場合は装置が提供する保護が損なわれることがあるということを承知しているものとします。



Warning: To protect against fire hazard, replace fuses with those of the same type and rating.

Attention: Remplacez toujours les fusibles par d'autres du même type et de la même puissance afin d'éviter tout risque d'incendie.

Vorsicht: Zum Schutz gegen Feuergefahr die Sicherungen nur mit Sicherungen des gleichen Typs und Nennwertes ersetzen.

Attenzione: per una buona protezione contro i rischi di incendio, sostituire i fusibili con altri dello stesso tipo e amperaggio.

Advertencia: sustituya los fusibles por otros del mismo tipo y características para evitar el riesgo de incendio.

警告：為了避免火災的危險，應更換同種類型及規格的保險絲。

警告：为了避免火灾的危险，应更换同种类型及规格的保险丝。

경고： 화재를 방지하기 위해서는 퓨즈 교체 시 같은 종류, 같은 등급의 것을 사용하십시오.

警告：火災の危険防止のために、ヒューズの交換は同一タイプおよび定格のもので行なってください。



Warning: To avoid possible electrical shock, disconnect the power cord before servicing the instrument.

Attention: Afin d'éviter toute possibilité de commotion électrique, débranchez le cordon d'alimentation de la prise avant d'effectuer la maintenance de l'instrument.

Vorsicht: Zur Vermeidung von Stromschlägen sollte das Gerät vor der Wartung vom Netz getrennt werden.

Attenzione: per evitare il rischio di scossa elettrica, scollegare il cavo di alimentazione prima di svolgere la manutenzione dello strumento.

Precaución: para evitar descargas eléctricas, desenchufe el cable de alimentación del instrumento antes de realizar cualquier reparación.

警告：要避免觸電，請在修理或保養器材前把電源線拔出。

警告：为避免可能引起得触电危险，在修理前请切断电源连接。

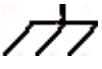
경고: 전기 충격의 가능성을 피하기 위해서는, 기기를 수리하기 이전에 전원 코드를 차단하십시오.

警告：感電の危険性を避けるために、装置の保守を行う前には装置の電源コードを引き抜いてください。

Electrical and handling symbols

Electrical symbols

These can appear in instrument user manuals and on the instrument's front or rear panels.

	Electrical power on
	Electrical power off
	Standby
	Direct current
	Alternating current
	Protective conductor terminal
	Frame, or chassis, terminal
	Fuse
	Recycle symbol: Do not dispose of in municipal waste.

Handling symbols

These handling symbols and their associated text can appear on labels affixed to the outer packaging of Waters instrument and component shipments.

	Keep upright!
	Keep dry!
	Fragile!
	Use no hooks!

B Materials of Construction and Compliant Solvents



Warning: To confirm the integrity of the source exhaust system, you must address any safety issues raised by the contents of this Appendix.

Contents:

Topic	Page
Items exposed to solvent	B-2
Common ingredients used to prepare mobile phases	B-2

Items exposed to solvent

The items detailed in the following table may be exposed to solvent. You must evaluate the safety issues involved if the solvents used in your application differ from the solvents normally used with these items.

See also: [“Common ingredients used to prepare mobile phases” on page B-2](#) for details of the most common ingredients used to prepare mobile phases.

Items exposed to solvent :

Item	Material
Mounting shaft	Stainless steel
Repeller electrode	Stainless steel
Insulator	PEEK
Lamp window	Magnesium fluoride
O-rings and seals	Fluorocarbon (Viton [®]) or FEP-encapsulated silicone

Common ingredients used to prepare mobile phases

The following lists the most common ingredients used to prepare mobile phases for reverse-phase LC/MS (API):

- Water
- Methanol
- Acetonitrile
- Formic acid (<0.1%)
- Acetic acid (<0.1%)
- Trifluoroacetic acid (<0.1%)
- Ammonium acetate (<10 mM)
- Ammonium formate (<10 mM)

These solvents are not expected to cause any problems with the materials identified in [“Items exposed to solvent” on page B-2](#).