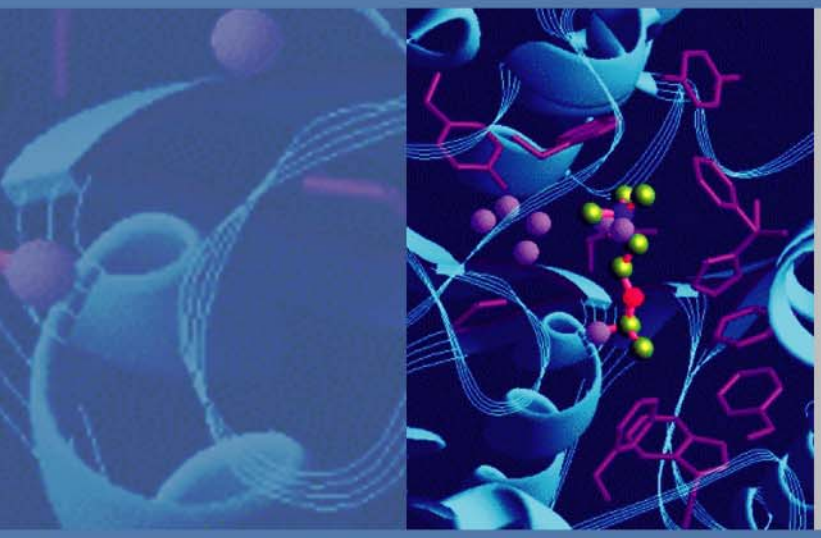

Accela 600 Pump and 1250 Pump

Hardware Manual

60157-97010 Revision F March 2011

DOCUMENTATION SURVEY

Part of Thermo Fisher Scientific

Thermo SCIENTIFIC

Release history: Revision A, August 2009; Revision B, October 2009; Revision C, March 2010; Revision D, April 2010; Revision E, February 2011; Revision F, March 2011

Revision F contains typographical error corrections.

Software versions: ChromQuest 4.2 or later, Xcalibur 2.0.7 (LC Devices 2.2.0 SP1), Xcalibur 2.1.x or later (LC Devices 2.2.1 to 2.5.0), Thermo Foundation 1.0.x (for the Xcalibur 2.1.x data system)

For Research Use Only. Not for use in diagnostic procedures.

Regulatory Compliance

Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When the system is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards as described in the next section or sections by product name.

Changes that you make to your system may void compliance with one or more of these EMC and safety standards. Changes to your system include replacing a part or adding components, options, or peripherals not specifically authorized and qualified by Thermo Fisher Scientific. To ensure continued compliance with EMC and safety standards, replacement parts and additional components, options, and peripherals must be ordered from Thermo Fisher Scientific or one of its authorized representatives.

Accela 600 Pump

EMC Directive 2004/108/EC

EMC compliance has been evaluated by TUV Rheinland of North America Inc.

EN 55011: 2007
EN 61000-3-2: 2006
EN 61000-3-3: 1995, A1: 2001, A2: 2005
EN 61000-4-2: 1995, A1: 1999, A2: 2001
EN 61000-4-3: 2006
FCC Class A: CFR 47, Part 15: 2007
EN 61000-4-4: 2004
EN 61000-4-5: 2005
EN 61000-4-6: 2007
EN 61000-4-11: 2004
EN 61326-1: 2006

Low Voltage Safety Compliance

This device complies with Low Voltage Directive 2006/95/EC and the following harmonized standards:
EN 61010-1: 2001, IEC 61010-1: 2002, UL 61010A-1: 2004, CAN/CSA 22.2 61010-1: 2004.

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Accela 1250 Pump

EMC Directive 2004/108/EC

EMC compliance has been evaluated by TUV Rheinland of North America Inc.

EN 55011: 2007
EN 61000-3-2: 2006
EN 61000-3-3: 1995, A1: 2001, A2: 2005
EN 61000-4-2: 1995, A1: 1999, A2: 2001
EN 61326-1: 2006
FCC Class A: CFR 47, Part 15: 2009
EN 61000-4-3: 2006
EN 61000-4-4: 2004
EN 61000-4-5: 2005
EN 61000-4-6: 2007
EN 61000-4-11: 2004

Low Voltage Safety Compliance

This device complies with Low Voltage Directive 2006/95/EC and the following harmonized standards:
EN 61010-1: 2001, IEC 61010-1: 2002, UL 61010A-1: 2004, CAN/CSA 22.2 61010-1: 2004.

FCC Compliance Statement for the Accela 600 and 1250 Pumps

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.

CAUTION Read and understand the various precautionary notes, signs, and symbols contained inside this manual pertaining to the safe use and operation of this product before using the device.

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Notice on Lifting and Handling of Thermo Scientific Instruments

For your safety, and in compliance with international regulations, the physical handling of this Thermo Fisher Scientific instrument ***requires a team effort*** to lift and/or move the instrument. This instrument is too heavy and/or bulky for one person alone to handle safely.

Notice on the Proper Use of Thermo Scientific Instruments

In compliance with international regulations: Use of this instrument in a manner not specified by Thermo Fisher Scientific could impair any protection provided by the instrument.

Notice on the Susceptibility to Electromagnetic Transmissions

Your instrument is designed to work in a controlled electromagnetic environment. Do not use radio frequency transmitters, such as mobile phones, in close proximity to the instrument.

For manufacturing location, see the label on the instrument.

WEEE Compliance

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:

Thermo Fisher Scientific has contracted with one or more recycling or disposal companies in each European Union (EU) Member State, and these companies should dispose of or recycle this product. See www.thermo.com/WEEERoHS for further information on Thermo Fisher Scientific's compliance with these Directives and the recyclers in your country.

WEEE Konformität

Dieses Produkt muss die EU Waste Electrical & Electronic Equipment (WEEE) Richtlinie 2002/96/EC erfüllen. Das Produkt ist durch folgendes Symbol gekennzeichnet:

Thermo Fisher Scientific hat Vereinbarungen mit Verwertungs-/Entsorgungsfirmen in allen EU-Mitgliedsstaaten getroffen, damit dieses Produkt durch diese Firmen wiederverwertet oder entsorgt werden kann. Mehr Information über die Einhaltung dieser Anweisungen durch Thermo Fisher Scientific, über die Verwerter, und weitere Hinweise, die nützlich sind, um die Produkte zu identifizieren, die unter diese RoHS Anweisung fallen, finden sie unter www.thermo.com/WEEERoHS.

Conformité DEEE

Ce produit doit être conforme à la directive européenne (2002/96/EC) des Déchets d'Equipements Electriques et Electroniques (DEEE). Il est marqué par le symbole suivant:

Thermo Fisher Scientific s'est associé avec une ou plusieurs compagnies de recyclage dans chaque état membre de l'union européenne et ce produit devrait être collecté ou recyclé par celles-ci. Davantage d'informations sur la conformité de Thermo Fisher Scientific à ces directives, les recycleurs dans votre pays et les informations sur les produits Thermo Fisher Scientific qui peuvent aider la détection des substances sujettes à la directive RoHS sont disponibles sur www.thermo.com/WEEERoHS.

CAUTION Symbol	CAUTION	VORSICHT	ATTENTION	PRECAUCION	AVVERTENZA
	**Electric Shock:** This instrument uses high voltages that can cause personal injury. Before servicing, shut down the instrument and disconnect the instrument from line power. Keep the top cover on while operating the instrument. Do not remove protective covers from PCBs.	**Elektroschock:** In diesem Gerät werden Hochspannungen verwendet, die Verletzungen verursachen können. Vor Wartungsarbeiten muß das Gerät abgeschaltet und vom Netz getrennt werden. Betreiben Sie Wartungsarbeiten nicht mit abgenommenem Deckel. Nehmen Sie die Schutzabdeckung von Leiterplatten nicht ab.	**Choc électrique:** L'instrument utilise des tensions capables d'infliger des blessures corporelles. L'instrument doit être arrêté et débranché de la source de courant avant tout intervention. Ne pas utiliser l'instrument sans son couvercle. Ne pas enlever les étuis protecteurs des cartes de circuits imprimés.	**Descarga eléctrica:** Este instrumento utiliza altas tensiones, capaces de producir lesiones personales. Antes de dar servicio de mantenimiento al instrumento, éste debera apagarse y desconectarse de la línea de alimentacion eléctrica. No opere el instrumento sin sus cubiertas exteriores quitadas. No remueva las cubiertas protectoras de las tarjetas de circuito impreso.	**Shock da folgorazione.** L'apparecchio è alimentato da corrente ad alta tensione che puo provocare lesioni fisiche. Prima di effettuare qualsiasi intervento di manutenzione occorre spegnere ed isolare l'apparecchio dalla linea elettrica. Non attivare lo strumento senza lo schermo superiore. Non togliere i coperchi a protezione dalle schede di circuito stampato (PCB).
	**Chemical:** This instrument might contain hazardous chemicals. Wear gloves when handling toxic, carcinogenic, mutagenic, or corrosive or irritant chemicals. Use approved containers and proper procedures to dispose waste oil.	**Chemikalien:** Dieses Gerät kann gefährliche Chemikalien enthalten. Tragen Sie Schutzhandschuhe beim Umgang mit toxischen, karzinogenen, mutagenen oder ätzenden/reizenden Chemikalien. Entsorgen Sie verbrauchtes Öl entsprechend den Vorschriften in den vorgeschriebenen Behältern.	**Chimique:** Des produits chimiques dangereux peuvent se trouver dans l'instrument. Portez des gants pour manipuler tous produits chimiques toxiques, cancérigènes, mutagènes, ou corrosifs/irritants. Utiliser des récipients et des procédures homologuées pour se débarrasser des déchets d'huile.	**Química:** El instrumento puede contener productos quimicos peligrosos. Utilice guantes al manejar productos quimicos tóxicos, carcinogenos, mutagenos o corrosivos/irritantes. Utilice recipientes y procedimientos aprobados para deshacerse del aceite usado.	**Prodotti chimici.** Possibile presenza di sostanze chimiche pericolose nell'apparecchio. Indossare dei guanti per maneggiare prodotti chimici tossici, cancerogeni, mutageni, o corrosivi/irritanti. Utilizzare contenitori aprovo e seguire la procedura indicata per lo smaltimento dei residui di olio.
	**Heat:** Before servicing the instrument, allow any heated components to cool.	**Hitze:** Warten Sie erhitzte Komponenten erst nachdem diese sich abgekühlt haben.	**Haute Temperature:** Permettre aux composants chauffés de refroidir avant tout intervention.	**Altas temperaturas:** Permita que lop componentes se enfríen, ante de efectuar servicio de mantenimiento.	**Calore.** Attendere che i componenti riscaldati si raffreddino prima di effetturare l'intervento di manutenzione.
	**Fire:** Use care when operating the system in the presence of flammable gases.	**Feuer:** Beachten Sie die einschlägigen VorsichtsmaBnahmen, wenn Sie das System in Gegenwart von entzündbaren Gasen betreiben.	**Incendie:** Agir avec précaution lors de l'utilisation du système en présence de gaz inflammables.	**Fuego:** Tenga cuidado al operar el sistema en presencia de gases inflamables.	**Incendio.** Adottare le dovute precauzioni quando si usa il sistema in presenza di gas infiammabili.
	**Eye Hazard:** Eye damage could occur from splattered chemicals or flying particles. Wear safety glasses when handling chemicals or servicing the instrument.	**Verletzungsgefahr der Augen:** Verspritzte Chemikalien oder kleine Partikel können Augenverletzungen verursachen. Tragen Sie beim Umgang mit Chemikalien oder bei der Wartung des Gerätes eine Schutzbrille.	**Danger pour les yeux:** Des projections chimiques, liquides, ou solides peuvent être dangereuses pour les yeux. Porter des lunettes de protection lors de toute manipulation de produit chimique ou pour toute intervention sur l'instrument.	**Peligro par los ojos:** Las salicaduras de productos químicos o particulas que salten bruscamente pueden causar lesiones en los ojos. Utilice anteojos protectores al mnipular productos químicos o al darle servicio de mantenimiento al instrumento.	**Pericolo per la vista.** Gli schizzi di prodotti chimici o delle particelle presenti nell'aria potrebbero causare danni alla vista. Indossare occhiali protettivi quando si maneggiano prodotti chimici o si effettuano interventi di manutenzione sull'apparecchio.
	**General Hazard:** A hazard is present that is not included in the above categories. Also, this symbol appears on the instrument to refer the user to instructions in this manual.	**Allgemeine Gefahr:** Es besteht eine weitere Gefahr, die nicht in den vorstehenden Kategorien beschrieben ist. Dieses Symbol wird im Handbuch auBerdem dazu verwendet, um den Benutzer auf Anweisungen hinzuweisen.	**Danger général:** Indique la présence d'un risque n'appartenant pas aux catégories citées plus haut. Ce symbole figure également sur l'instrument pour renvoyer l'utilisateur aux instructions du présent manuel.	**Peligro general:** Significa que existe un peligro no incluido en las categorias anteriores. Este simbolo también se utiliza en el instrumento par referir al usuario a las instrucciones contenidas en este manual.	**Pericolo generico.** Pericolo non compreso tra le precedenti categorie. Questo simbolo è utilizzato inoltre sull'apparecchio per segnalare all'utente di consultare le istruzioni descritte nel presente manuale.
	When the safety of a procedure is questionable, contact your local Technical Support organization for Thermo Fisher Scientific San Jose Products.	Wenn Sie sich über die Sicherheit eines Verfahrens im unklaren sind, setzen Sie sich, bevor Sie fortfahren, mit Ihrer lokalen technischen Unterstützungsorganisation für Thermo Fisher Scientific San Jose Produkte in Verbindung.	Si la sûreté d'une procédure est incertaine, avant de continuer, contacter le plus proche Service Clientèle pour les produits de Thermo Fisher Scientific San Jose.	Cuando la certidumbre acerca de un procedimiento sea dudosa, antes de proseguir, pongase en contacto con la Oficina de Asistencia Tecnica local para los productos de Thermo Fisher Scientific San Jose.	Quando e in dubbio la misura di sicurezza per una procedura, prima di continuare, si prega di mettersi in contatto con il Servizio di Assistenza Tecnica locale per i prodotti di Thermo Fisher Scientific San Jose.

CAUTION Symbol	CAUTION	危険警告	危險警告
	**Electric Shock:** This instrument uses high voltages that can cause personal injury. Before servicing, shut down the instrument and disconnect the instrument from line power. Keep the top cover on while operating the instrument. Do not remove protective covers from PCBs.	**電撃：**この計測器は高電圧を使用し、人体に危害を与える可能性があります。保守・修理は、必ず操業を停止し、電源を切ってから実施して下さい。上部カバーを外したままで 計測器を使用しないで下さい。プリント配線板の保護カバーは外さないで下さい。	電擊：儀器設備使用會造成人身傷害的高伏電壓。在維修之前，必須先關儀器設備並切除電源。務必要在頂蓋蓋上的情況下操作儀器。請勿拆除PCB保護蓋。
	**Chemical:** This instrument might contain hazardous chemicals. Wear gloves when handling toxic, carcinogenic, mutagenic, or corrosive or irritant chemicals. Use approved containers and proper procedures to dispose waste oil.	**化学物質：**危険な化学物質が計測器中に存在している可能性があります。毒性、発がん性、突然変異性、腐食・刺激性などのある薬品を取り扱う際は、手袋を着用して下さい。廃油の処分には、規定の容器と手順を使用して下さい。	化學品：儀器設備中可能存在有危險性的化學物品。接觸毒性致癌、誘變或腐蝕／刺激性化學品時，請配帶手套。處置廢油時，請使用經過許可的容器和程序。
	**Heat:** Before servicing the instrument, allow any heated components to cool.	**熱：**熱くなった部品は冷えるのを待ってから保守・修理を行って下さい。	高温：請先等高温零件冷卻之後再進行維修。
	**Fire:** Use care when operating the system in the presence of flammable gases.	**火災：**可燃性のガスが存在する場所でシステムを操作する場合は、充分な注意を払って下さい。	火災：在有易燃氣體的場地操作該系統時，請務必小心謹慎。
	**Eye Hazard:** Eye damage could occur from splattered chemicals or flying particles. Wear safety glasses when handling chemicals or servicing the instrument.	**眼に対する危険：**化学物質や微粒子が飛散して眼を傷つける危険性があります。化学物質の取り扱い、あるいは計測器の保守・修理に際しては防護眼鏡を着用して下さい。	眼睛傷害危險：飛濺的化學品或顆粒可能造成眼睛傷害。處理化學品或維修儀器設備時請佩戴安全眼鏡。
	**General Hazard:** A hazard is present that is not included in the above categories. Also, this symbol appears on the instrument to refer the user to instructions in this manual.	**一般的な危険：**この標識は上記以外のタイプの危険が存在することを示します。また、計測器にこの標識がついている場合は、本マニュアル中の指示を参照して下さい。	一般性危險：說明未包括在上述類別中的其他危險。此外，儀器設備上使用這個標誌，以指示用戶本使用手冊中的說明。
	When the safety of a procedure is questionable, contact your local Technical Support organization for Thermo Fisher Scientific San Jose Products.	**安全を確保する手順がよくわからない時は、作業を一時中止し、お近くのサーモエレクトロンサンローゼプロダクトのテクニカールサポートセンターごご連絡ください。**	如对安全程序有疑问，请在操作之前与当地的菲尼根技术服务中心联系。

Contents

Preface

This manual describes how to install, maintain, and troubleshoot the Thermo Scientific Accela™ 600 Pump and Accela 1250 Pump. You can operate the Accela pumps from a computer with the ChromQuest™ data system or the Xcalibur™ data system (version 2.0.7 or later).

Contents

Related Documentation

In addition to this manual, you can find information related to the Accela 600 Pump and the Accela 1250 Pump in the following documents provided as PDF files and Help accessed from the data system:

- Accela user guide for your Thermo Scientific data system —Provides instructions on how to control the Accela LC system from your Thermo Scientific data system.
- *Accela Preinstallation Requirements Guide*—Provides information about the appropriate laboratory setup for your Accela LC system.
- *Accela Getting Connected Guide*—Provides instructions on how to set up your Accela LC system and interconnecting the system modules.
- Accela Pump Help for the ChromQuest data system—Provides instructions on how to control the Accela pumps from the ChromQuest data system.
- Thermo Pump Help for LC Devices—Provides instructions on how to configure the pumps from the Thermo Foundation application and control the pumps from the Xcalibur data system.

Safety and Special Notices

Make sure you follow the precautionary statements presented in this guide. The safety and other special notices appear in boxes.

Safety and special notices include the following:

CAUTION Highlights hazards to humans, property, or the environment. Each CAUTION notice is accompanied by an appropriate CAUTION symbol.

CAUTION Highlights electric shock hazards to humans. Each electric shock notice is accompanied by the international high voltage symbol.

CAUTION Highlights chemical hazards to humans, property, or the environment. Each chemical notice is accompanied by the chemical caution symbol.

Note Highlights information of general interest.

Safety Information

Observe the precautions listed in this section to ensure the safe operation and longevity of the instrument.

CAUTION When you use the pump, follow the generally accepted procedures for quality control and method development. If you use the pump in the field of chromatographic analysis and you observe a change in retention time of a particular compound, in the resolution between two compounds, or in peak shape, immediately determine the reason for the changes. Until you determine the cause of the change, do not rely on separation results.

CAUTION Use equipment only in the manner specified by its manufacturer, or risk impairing the protection provided by the equipment.

CAUTION Do not service any part when operating the instrument. Do not remove the front panel when the instrument is running. Do not run the instrument without the front panel.

CAUTION The instrument contains voltage lines. Switch off the power and disconnect the power cable prior to servicing the instrument. There is no need to open the pump enclosure, as all user serviceable components are outside of the instrument.

CAUTION Follow the maintenance procedures in this manual when replacing or repairing the pump's serviceable components. Never try to repair or replace components not described in this manual without the assistance of a Thermo Fisher Scientific field service representative.

CAUTION To prevent personal injury, observe good laboratory practice when handling solvents, changing tube lines. or both. Consult the pertinent material safety data sheets (MSDSs) for the solvents used for HPLC analysis.

Environmental Conditions

The installation category (over voltage category) for this instrument is Category 2, which pertains to equipment that receives its electrical power from the local level, such as an electrical wall outlet.

The pollution degree for this instrument is Pollution Category 2 (Laboratory): Normally, only nonconductive pollution occurs. Expect temporary conductivity caused by condensation.

Observe the following environmental specifications.

CAUTION Only use the pump according to the conditions stated, or risk personal injury or damage to the pump.

Table 1. Environmental specifications

Environmental condition	Recommendation
Location	Indoor use only
Altitude	Up to 2000 meters
Temperature	5 to 40 °C (41 °F to 104 °F)
Maximum relative humidity	80% for temperatures up to 31 °C (88 °F) non-condensing, decreasing linearly to 50% relative humidity at 40 °C (104 °F)
Voltage fluctuation limit	Not to exceed ± 10% of the nominal voltage

Good Laboratory Practices

To obtain optimal performance from your ultra-high-pressure liquid chromatography (UHPLC) system and to prevent personal injury or injury to the environment, do the following:

- Keep good records.
- Read the manufacturers' MSDSs for the chemicals you use in your laboratory.
- Remove particulate matter from your samples before injecting them into the liquid chromatograph.
- Use HPLC-grade or LC/MS-grade solvents
- Connect the drainage tubes from the pump, autosampler, and detector to an appropriate waste receptacle. Dispose of solvents as specified by local regulations.

Keeping Good Records

To help identify and isolate problems with either your equipment or your methodology, keep good records of all system conditions (for example, %RSDs on retention times and peak areas, peak shape, and resolution). At a minimum, keep a chromatogram of a typical sample and standard mixture, well documented with system conditions, for future reference. Careful comparison of retention times, peak shapes, peak sensitivity, and baseline noise can provide valuable clues to identifying and solving future problems.

Chemical Toxicity

Although the large volume of toxic and flammable solvents used and stored in laboratories can be quite dangerous, do not ignore the potential hazards posed by your samples. Take special care to read and follow all precautions that ensure proper ventilation, storage, handling, and disposal of both solvents and samples. Become familiar with the toxicity data and potential hazards associated with all chemicals by referring to the manufacturers' MSDSs.

Solvent Requirements

Use HPLC-grade solvents that are free of particulates. Choose a mobile phase that is compatible with the sample and column you have selected for your separation. Be aware that some solvents are corrosive to stainless steel.

CAUTION Do not use solvents containing Freon™ and perfluorinated solvents, such as Fluorinert™ and Fomblin™ perfluoro polyether solvents. They adversely affect the Teflon™ AF degassing membrane.

Solvent Disposal

Make sure you have a solvent waste container or other kind of drain system available at or below the benchtop level. Most solvents have special disposal requirements prohibiting disposal directly down a drain. Follow all governmental regulations when disposing of any chemical.

High-Pressure Systems and Leaks

LC systems operate at high pressures. There is little immediate danger from the high pressures in an LC system. However, if a leak occurs, correct it as soon as possible. Always wear eye and skin protection when operating or maintaining an LC system. Always shut down the system and return it to atmospheric pressure before attempting any maintenance.

Contacting Us

There are several ways to contact Thermo Fisher Scientific for the information you need.

❖ To contact Technical Support

Phone	800-532-4752
Fax	561-688-8736
E-mail	us.techsupport.analyze@thermofisher.com
Knowledge base	www.thermokb.com

Find software updates and utilities to download at mssupport.thermo.com.

❖ To contact Customer Service for ordering information

Phone	800-532-4752
Fax	561-688-8731
E-mail	us.customer-support.analyze@thermofisher.com
Web site	www.thermo.com/ms

❖ To get local contact information for sales or service

Go to www.thermoscientific.com/wps/portal/ts/contactus.

❖ To copy manuals from the Internet

Go to mssupport.thermo.com, agree to the Terms and Conditions, and then click **Customer Manuals** in the left margin of the window.

❖ To suggest changes to documentation or to Help

- Fill out a reader survey online at www.surveymonkey.com/s/PQM6P62.
- Send an e-mail message to the Technical Publications Editor at techpubs-lcms@thermofisher.com.

Introduction

This chapter introduces the Accela 600 Pump (see Figure 1) and the Accela 1250 Pump.

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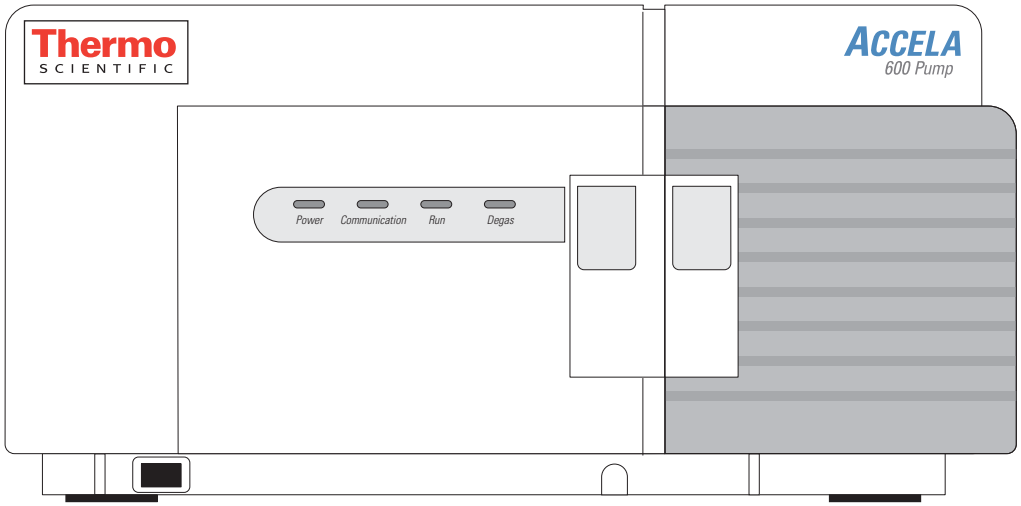
Figure 1. Accela 600 Pump



Functional Description

The 600 and 1250 pumps are quaternary, low-pressure mixing pumps with a built-in solvent degassing system and an automatic calibration feature. Table 2 lists the flow rate ranges where these pumps provide optimal performance as well as their maximum operating pressures. With the latest firmware versions (see Table 5 and Table 6), the minimum programmable flow rate for both pumps is 1 µL/min.

Tip For gradient applications, Thermo Fisher Scientific recommends that you use a flow rate equal to or greater than twice the gradient delay volume of the pump's liquid displacement assembly (LDA).

Table 2. Flow rate range and maximum operating pressure

Pump	Flow rate range for optimal performance	Maximum operating pressure
Accela 600 Pump	50 to 5000 µL/min (isocratic) 180[a] to 5000 µL/min (gradient)	600 bar (8702 psi)
Accela 1250 Pump	50 to 2000 µL/min (isocratic) 140[b] to 2000 µL/min (gradient)	1250 bar (18 130 psi)

[a] The gradient delay volume of the LDA is 90 µL.

[b] The gradient delay volume of the LDA is 70 µL.

These pumps use a force sensor feedback controller, which continuously calibrates valve timing and pumping efficiency based on the measured compressibility of the solvent. This patent-pending feature enables these pumps to form accurate gradients virtually pulsation-free; no pulse damping device is required.

The integral vacuum degasser offers superb solvent degassing efficiency using a built-in vacuum membrane degasser that removes dissolved gasses from the mobile phase.

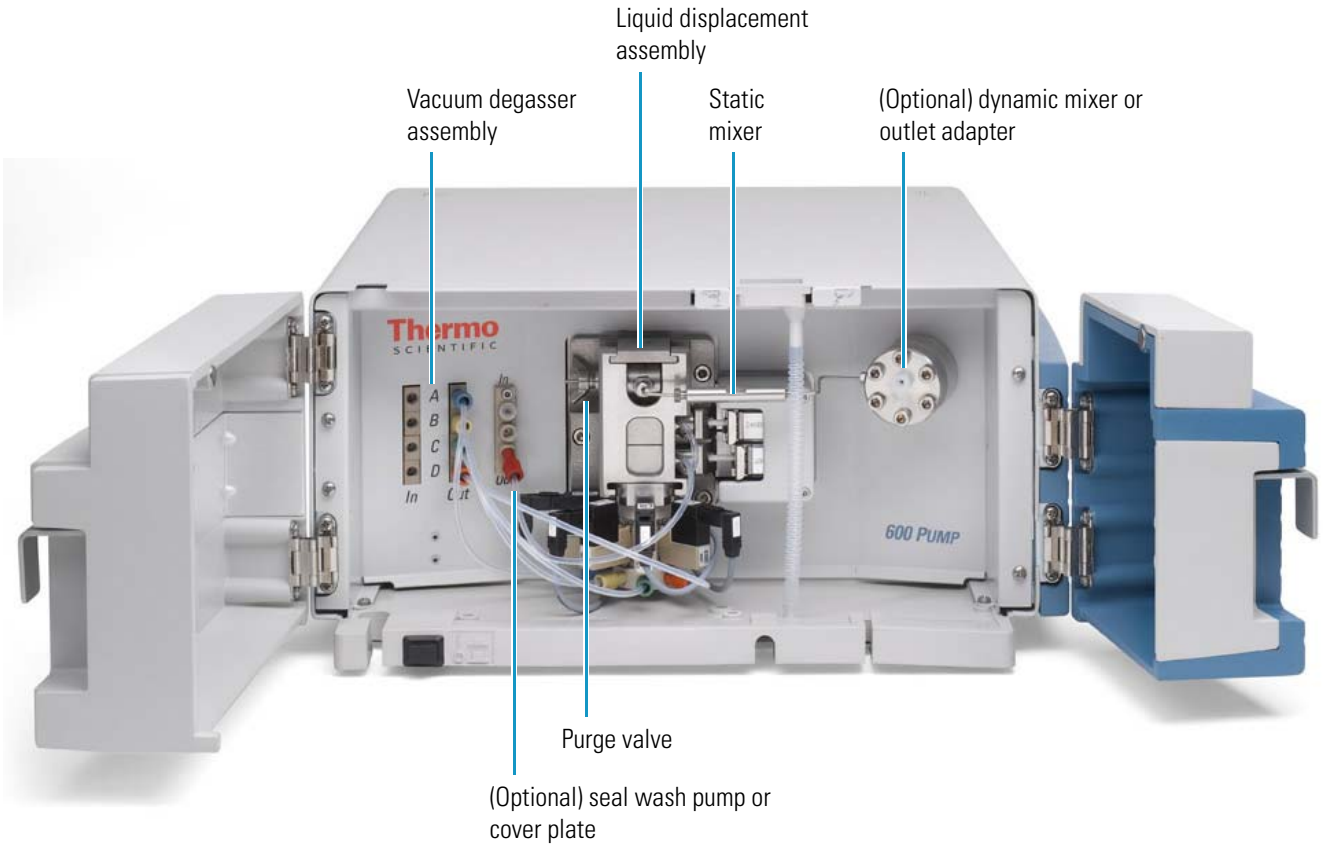
The Accela 600 Pump and 1250 Pump are benchtop units that you can integrate with other Accela instruments.

Hardware Components

The 600 and 1250 pumps have these major components: the vacuum degasser assembly, the liquid displacement assembly (LDA), a 65 µL static mixer, an optional dynamic mixer, an optional seal wash pump, and an optional leak sensor. Status LEDs on the left door of the pump enclosure display the power, communication, run, and degas states of the pump.

Figure 2 shows the front panel of the 600 Pump with the optional seal wash pump and optional dynamic mixer installed. Figure 46 on page 53 shows the optional leak sensor installed on the pump drip tray.

Figure 2. Front panel of the 600 Pump



These topics describe the main components of the LC pump:

- Vacuum Degasser Assembly
- Liquid Displacement Assembly (LDA)
- Purge Valve
- Dynamic Mixer
- Seal Wash Pump

Vacuum Degasser Assembly

The 600 and 1250 pumps contains a built-in vacuum membrane degasser that removes dissolved gasses from the mobile phase. Dissolved gasses can cause many problems in HPLC and must be kept to an absolute minimum for best performance. The solvent degassing system consists of four independent channels that are maintained at a constant vacuum of approximately 50 mm Hg absolute. Each channel has a volume of less than 500 µL, which provides superior degassing efficiency capable of limiting dissolved oxygen to a level of only 0.8 ppm. By varying its speed, the vacuum pump maintains a constant vacuum level. This eliminates the excess baseline noise and drift caused by vacuum pump cycling.

Liquid Displacement Assembly (LDA)

The frame of the liquid displacement assembly (LDA) consists of two components: the LDA body and the inlet module. The LDA body contains the inlet and outlet check valves, two pistons and their seals, upper and lower piston chambers, and various PEEK™ seal rings. The inlet module contains four high-precision proportioning valves.

The 600 pump has ceramic pistons. Its primary piston seals are made of graphite fiber-reinforced polytetrafluoroethylene (GFP) and its secondary piston seals are made of polyethylene (PE).

The 1250 pump has sapphire pistons. Its primary and secondary piston seals are identical and are made of GFP.

Purge Valve

The purge valve is located to the left of the LDA (see Figure 2 on page 3). Turning the wingnut counterclockwise opens the purge valve.

When the purge valve is open and the solvent flow is experiencing backpressure from either an LC column or a backpressure regulator, mobile phase exits the LDA from the left side of the outlet module.

When the purge valve is closed, mobile phase flows out the front of the LDA assembly and into the high-pressure tubing that connects the LDA to the mixer or outlet adapter and the mixer to the autosampler.

Dynamic Mixer

The 600 and 1250 pumps ship with an outlet adapter that you can replace with the optional dynamic mixer. Adding the optional dynamic mixer to the Accela or Transcend pump ensures the mixing of complex or relatively incompatible solvents and reduces the chromatographic baseline noise for applications using proportioned mobile phases. The integrated dynamic

mixer also increases the accuracy and reproducibility of complex ternary and quaternary gradients. The dynamic mixer adds 35 µL of gradient delay volume to the system. You can plumb the system to bypass the dynamic mixer for mobile phases that do not require additional mixing.

Seal Wash Pump

You can also add an optional seal wash pump to the 600 and 1250 pumps for continuous flushing of the piston guide bushings. Use the seal wash pump for optimal pump performance when working with highly concentrated buffer solutions.

As the pistons move back and forth within the displacement chambers, a small quantity of mobile phase leaks behind the primary piston seals. With buffered mobile phases, a precipitate (also known as creep or salt build-up) forms as the liquid fraction evaporates. The abrasion caused by this precipitate can scratch the piston and shorten the life of the piston seals. With the seal wash pump option, a large reservoir above the pump continuously feeds the pump and flushes the piston guide bushings to prevent the precipitation of salt crystals behind the primary piston seals.

Leak Sensor

In addition to the dynamic mixer and the seal wash pump, you can add an optional leak sensor that detects the presence of liquid on the pump's drip tray.

Status LEDs

The 600 and 1250 pumps have four status LEDs on the left door that provide information about the pump. Table 3 describes the states of the four status LEDs.

Table 3. Status LEDs for the pump

LED	Status	Description
Power	Green	The pump is switched on and is receiving power.
Comm	Amber	The pump is not communicating with the data system computer.
	Green	Communication to the data system computer has been established.
	Flashing green	A pump program is downloading from the data system computer.
Run	Amber	The power is switched on, but the pump pistons are idle, producing no flow.
	Flashing amber	A firmware download is in progress or an error condition has occurred.
	Green	The pump pistons are moving, but a pump program is not running. This can occur when the pump is under direct control or a pump program has ended.
	Flashing green	The pump is running a pump program from a downloaded method.
Degas	Amber	The degas unit is building vacuum.
	Flashing amber	A failure, such as a loss of vacuum, has occurred.
	Green	Sufficient vacuum has developed to perform liquid chromatography.

Specifications

Table 4 through Table 8 list the pump's physical dimensions, pump and degasser operating specifications, and electronic specifications.

Thermo Fisher Scientific provides periodic firmware updates that are backward compatible with all hardware versions of the pump. For information about firmware updates, contact your local Thermo Fisher Scientific field service representative.

Table 4. Physical dimensions

Specification	Description
Width	36.0 cm (14 in.)
Depth	45.7 cm (18 in.)
Height	18.0 cm (7.1 in.)
Weight	19.5 kg (43 lbs)

Table 5. Accela 600 Pump operating specifications

Specification	Description
Flow rate range[a]	1 to 5000 µL/min
Backpressure range	0 to 600 bar (8702 psi)
Residual pulsation	< 2 bar Amplitude
Flow rate accuracy	±0.5% or 1 µL/min, whichever is greater
Gradient composition accuracy	±0.5% absolute
Gradient resolution	1% from 0 to 100%
Firmware version (November 2010)	23.67 e
Gradient composition range	0 to 100% from up to 4 independent feed channels employing 2 of them at the same time
Delay volume	90 µL (LDA) + 65 µL (static mixer)

[a] The minimum flow rate for firmware versions earlier than 23.67 e is 10 µL/min.

Table 6. Accela 1250 Pump operating specifications

Specification	Description
Flow rate range	1 to 2000 µL/min
Backpressure range	0 to 1250 bar (18 130 psi)
Pressure signal accuracy	±1% absolute at calibration point ±5% full range
Residual pulsation	< 1.5 bar standard deviation full working range Typical < 0.5 bar amplitude
Flow rate accuracy	±0.5% or 1 µL/min, whichever is greater
Gradient composition accuracy	±0.5% absolute from 1 to 1500 µL/min ± 2% absolute from 1500 to 2000 µL/min
Gradient resolution	1% from 0 to 100%
Firmware version (November 2010)	23.67 f
Gradient composition range	0 to 100% from up to 4 independent feed channels employing 2 of them at the same time
Delay volume	70 µL (LDA) + 65 µL (static mixer)

Table 7. Degasser operating specifications

Specification	Description
Channels	4
Degassing technology	Gas permeation through a fluoropolymer membrane
Maximum flow rate	10 mL/min
Degassing capacity	~2 ppm residual gas at 1 mL/min
Delay volume per channel	~480 µL
Wetted surfaces	PEEK, glass-filled PTFE, Teflon™ AF

Table 8. Electronic specifications

Specification	Description
Outputs	5 relays (4 programmable), 2 analog (1 for pressure)
Inputs	2 voltage actuated, 1 analog
Communications	19 200 baud, 1 start, 8 data, 1 stop, no parity and no handshaking, proprietary protocol/USB 1.0
Audio output	Piezo buzzer

Accela 600 or 1250 Pump Installation

To install an Accela 600 or 1250 Pump as part of an Accela LC system, follow the "Accela Pump Installation Checklist" on page 10 and the procedures in this chapter.

For information about installing hardware options, see Chapter 3, "Hardware Upgrades."

Contents

Accela Pump Installation Checklist

When the Accela pump arrives at your facility, a Thermo Fisher Scientific field service engineer performs the initial installation. When you move the pump from one location to another, follow the steps in this installation checklist to ensure that the Accela pump operates properly as part of an Accela LC system.

This installation checklist summarizes the steps that must be completed to properly install the Accela pump:

- ❒ Unpack and inspect your instrument (see "Unpacking and Inspecting the Instrument" on page 11).
- ❒ Read the safety precautions in "Safety Information" on page xvi.
- ❒ Position the Accela pump appropriately on the benchtop (see "Making the Initial Instrument Preparations" on page 11).
- ❒ Make the back panel connections (see system installation procedures or "Connecting the Pump to the Data System Computer" on page 17 and "Connecting the Accela System Interconnect Cables" on page 17).
- ❒ Connect the low-pressure solvent lines (see "Connecting the Low-Pressure Solvent Lines" on page 24).
- ❒ Connect the high-pressure solvent line between the Accela pump and the autosampler ("Connecting the Solvent Line Between the Pump and the Autosampler" on page 27).
- ❒ Connect the power cord and turn on the instrument (see "Connecting the Power Cable" on page 16).
- ❒ Add the Accela pump to the instrument configuration for the data system (see Chapter 4).

This Accela pump was installed by:

(Name) (Date)

Unpacking and Inspecting the Instrument

Carefully remove the Accela pump from the shipping container and inspect the pump and packing for any signs of damage. If you find any damage, save the shipping materials and immediately contact the shipping company.

Ensure that you have received all the items listed on the packing list. If any items are missing, contact your Thermo Fisher Scientific field service engineer immediately.

Making the Initial Instrument Preparations

Place the Accela pump on a laboratory bench as close as possible to a designated electrical outlet. Be sure to place the system in a *draft-free* location away from an open window, air conditioner vents, or other circulating air source. A stable room temperature is necessary for applications requiring maximum detection sensitivity. Choose an area that is free from dust, moisture, direct sunlight, strong electromagnetic fields, and physical vibrations. Allow at least 15 cm (6 in.) of clear space between the back panel of the pump and any wall or obstruction. This provides access to the back-panel connections and a free flow of cooling air.

Depending on the autosampler sampler model, follow these recommended benchtop layouts:

- Layout for an Accela LC System with an Accela Autosampler
- Layout for an Accela LC System with an Accela Open Autosampler

Layout for an Accela LC System with an Accela Autosampler

Figure 3 shows the recommended layout for a stand-alone Accela LC system with an Accela Autosampler. The autosampler rests on top of the LC pump, followed by the detector and the solvent platform. This setup requires a minimum benchtop area 38 cm (15 in.) wide by 51 cm (20 in.) deep. The height of the LC stack and a solvent platform with standard 1 liter solvent bottles is 114 cm (45 in.). If you plan to use larger solvent containers, allow more vertical space.

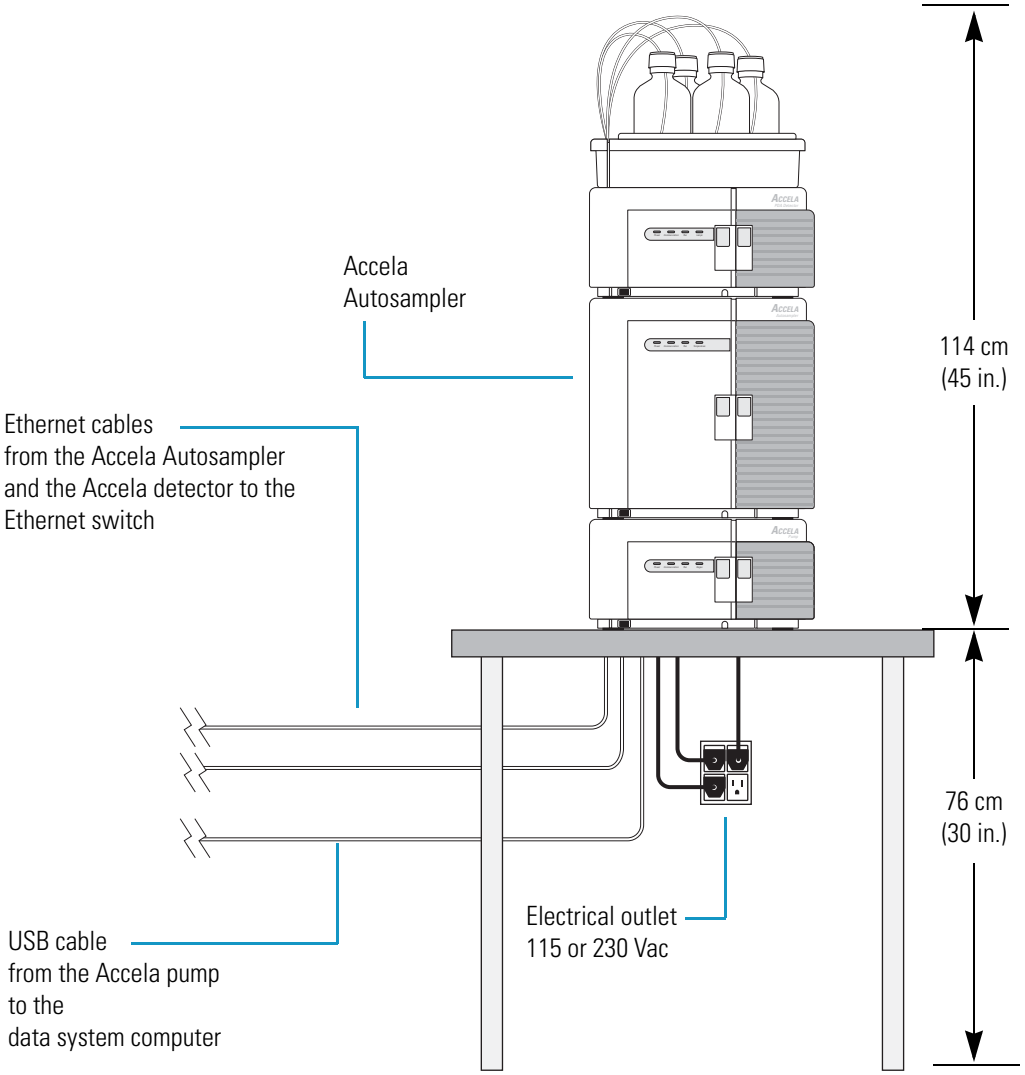
For safety reasons, limit the maximum height of the LC stack to 114 cm (45 in.). To minimize the stack height for systems that include additional Accela instruments, follow these guidelines:

- If your LC system includes two pumps, create a stack that includes the two pumps and the solvent platform, and place the stack to the left of the autosampler.
- If your LC system includes an RI detector in addition to a UV/Vis detector or a PDA detector, place the RI detector at the end of the solvent path to the right of the LC stack.

The minimum benchtop width for a system that includes an additional LC pump or an additional detector is 94 cm (37 in.). The minimum benchtop width for a system that includes an additional LC pump and an additional detector is 1.5 m (5 ft).

Allow at least 15 cm (7 in.) of space between the system and any wall or obstruction. This allowance provides access to the back-panel connectors and allows sufficient room for venting the electronic components.

Figure 3. Recommended layout for an LC system with an Accela Autosampler



Layout for an Accela LC System with an Accela Open Autosampler

Figure 4 shows the recommended layout for a stand-alone Accela LC system with an Accela Open Autosampler. This setup requires a minimum benchtop area 68 cm (27 in.) wide by 72 cm (28 in.) deep. The LC pump and detector are stacked below the autosampler table. The height of the Accela Open Autosampler with attached table is 104.5 cm (41 in.).

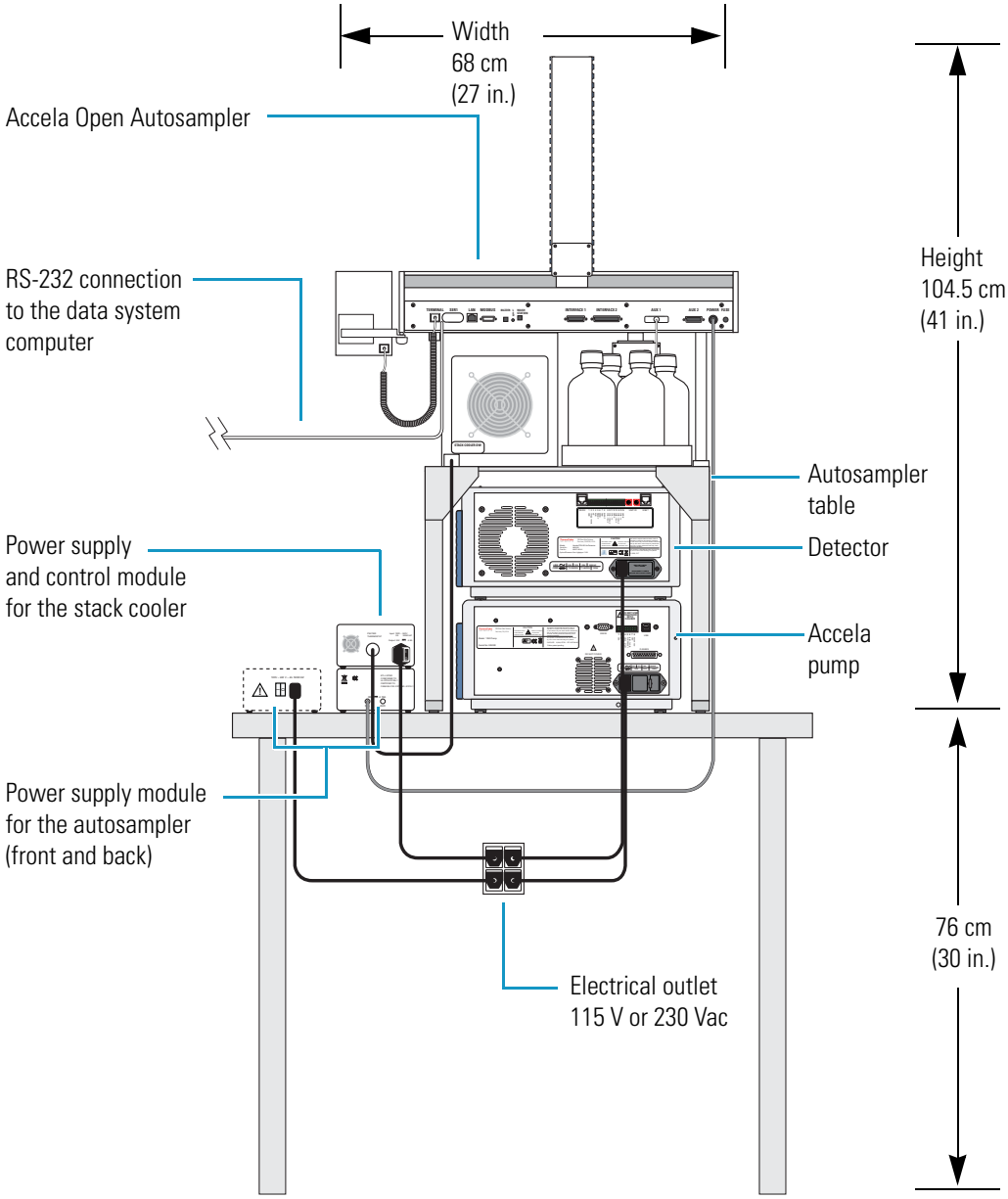
For Accela LC systems that include additional Accela instruments, follow these guidelines:

- If your LC system includes two LC pumps and a detector, stack the pumps under the autosampler table and place the detector to the side of the table.
- If your LC system includes two pumps and two detectors, place the pump stack under the autosampler table and the detector stack to the side of the table. If your LC system includes an RI detector in addition to a UV/Vis detector or a PDA detector, place the RI detector at the end of the solvent path.

The minimum benchtop width for a system that includes additional Accela modules is 1.2 m (4 ft).

Allow at least 25 cm (10 in.) of space between the system and any wall or obstruction. This allowance provides access to the back-panel connectors and allows sufficient room for venting the electronic components. The solvent bottle tray is located behind the injection valve and is bolted to the autosampler table.

Figure 4. Recommended layout for an Accela LC system with an Accela Open Autosampler

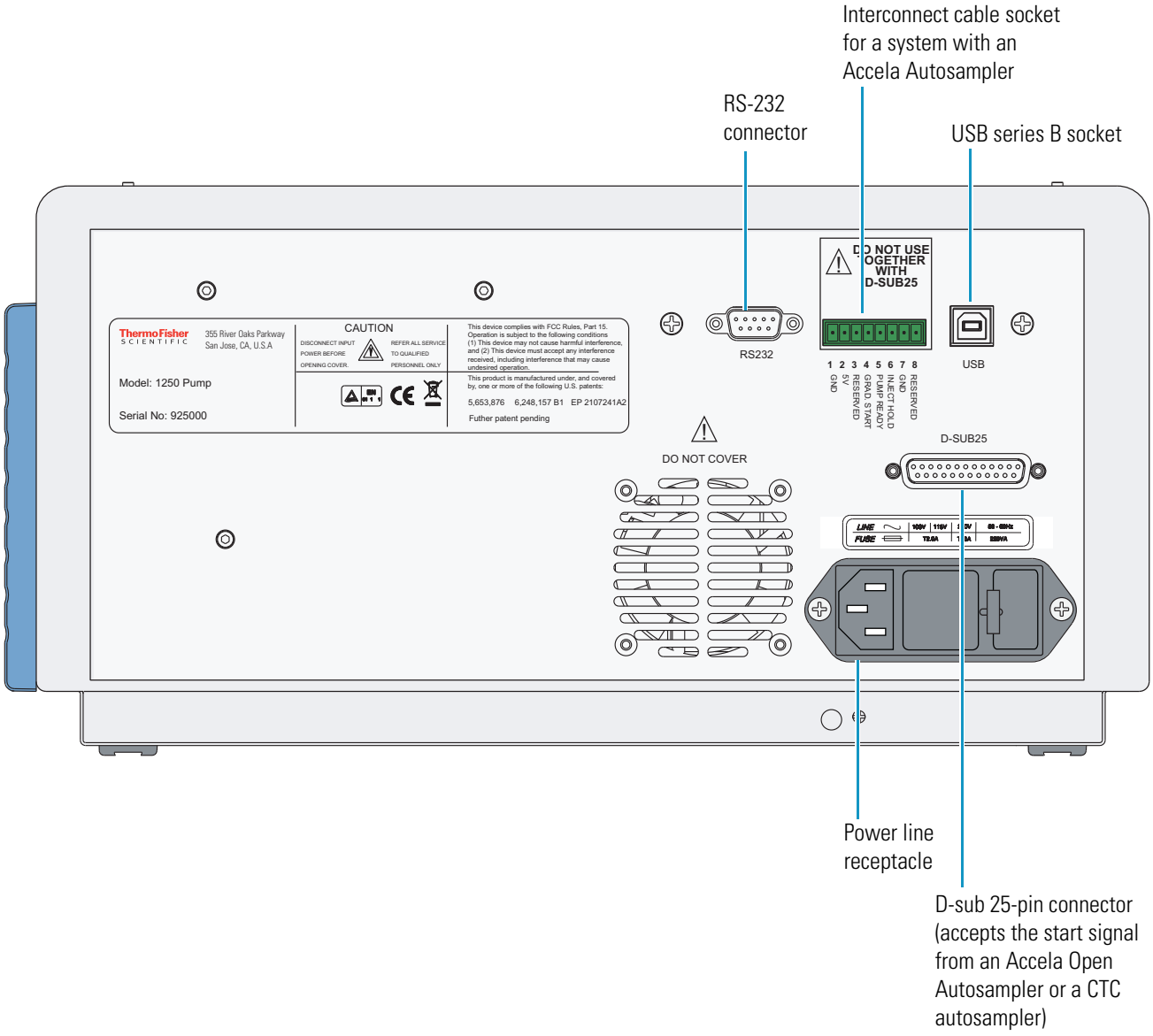


Back Panel Connections

To operate the Accela pump from the data system computer, connect the power cable and the USB communication cable. To operate the Accela pump as part of an Accela LC system, connect the interconnect cable that coordinates the operation of the pump with the other Accela modules. Figure 5 shows the back panel of the Accela 1250 Pump.

CAUTION Never connect the Accela pump to an electrical line source that has power drops or fluctuations of 10% below the nominal rated line voltage.

Figure 5. Back panel of the Accela 1250 Pump



To make the back panel connections, follow these procedures:

- Connecting the Power Cable
- Connecting the Pump to the Data System Computer
- Connecting the Accela System Interconnect Cables
- Additional Hardware Configurations

Connecting the Power Cable

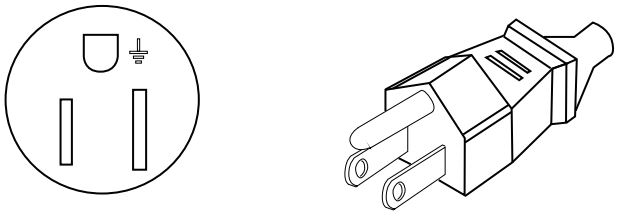
The Accela LC modules ship with power cords appropriate to their shipping destination (see Table 9). Local codes in your area might require that you install another type of plug and receptacle. Your local Thermo Fisher Scientific field service engineer will provide the appropriate power plugs.

Table 9. Power cords supplied according to shipping destination

Destination	Plug type	Voltage rating	Current rating	P/N
United Kingdom	BS 1363	250 Vac	5 A	6003-0810
Switzerland	SEV 1011	250 Vac	10 A	6003-0620
Europe	CEE 7/7	250 Vac	10 A	6003-0330
United States and Canada	NEMA 5-15P	125 Vac	10 A	6003-0160
China	C13	250 Vac	10 A	00302-99-00026

The NEMA 5-15P plug and its corresponding receptacle are shown in Figure 6.

Figure 6. NEMA 5-15P power plug and receptacle



Receptacle Plug

❖ **To connect the pump to line power**

1. Connect the power cord to the line power receptacle on the back panel of the Accela pump (see Figure 5 on page 15).
2. Connect the power cord to an appropriate line power source.

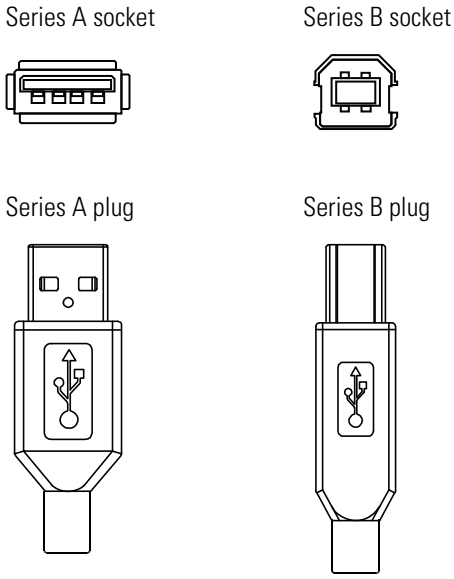
Connecting the Pump to the Data System Computer

The Accela pump communicates with the data system computer through a USB connection.

❖ **To connect the pump to the computer with a USB cable**

1. Connect the series A plug (see Figure 7) of the USB cable to an available USB port on the computer.

   Figure 7. USB plugs and sockets

2. Connect the series B plug (see Figure 7) of the USB cable to the USB port on the back of the Accela pump.

Connecting the Accela System Interconnect Cables

An Accela LC system can include an Accela Autosampler or an Accela Open Autosampler[1], one or two Accela pumps, and one to three LC detectors.

The contact closure connections depend on the autosampler model. For information about making the contact closure connections for your system, see one of these topics:

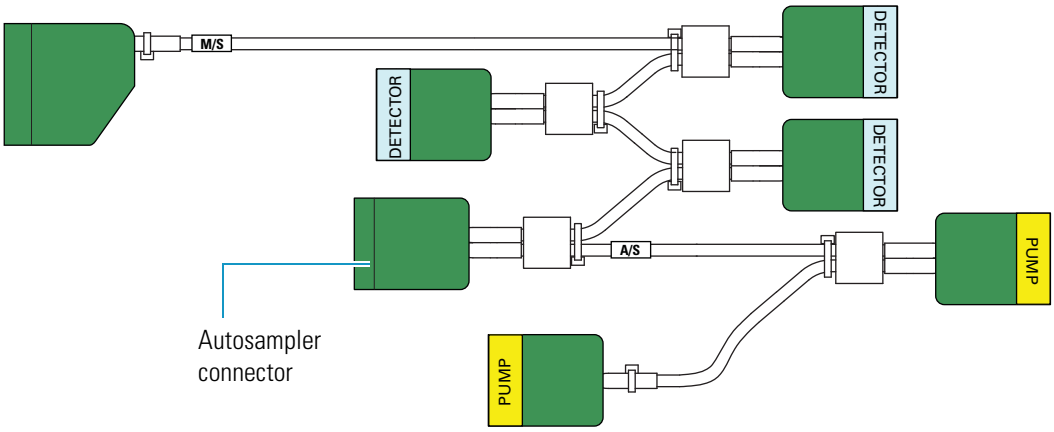
- Contact Closure Connections for Accela Systems with an Accela Autosampler
- Contact Closure Connections for Accela Systems with an Accela Open Autosampler

[1] You can control the Accela Open Autosampler from the ChromQuest 5.0 data system or the Xcalibur 2.1.x data system or later.

Contact Closure Connections for Accela Systems with an Accela Autosampler

The system interconnect cable synchronizes the timing of the Accela devices. The interconnect cable has seven combicon connectors: three are labeled DETECTOR; two are labeled PUMP; one has a small, A/S tag on its adjacent cable; and one has a small, M/S tag on its adjacent cable (see Figure 8). Figure 9 on page 19 shows the connections to the system modules.

Figure 8. System interconnect cable with seven combicon connectors



❖ To connect the system interconnect cable

1. Plug one of the pump connectors with a yellow PUMP sticker into the 8-pin socket on the back panel of the Accela pump (all models).

   Table 10 lists the pin out descriptions for the 8-pin socket.

   Table 10. Accela 600 Pump interconnect cable socket pin out descriptions

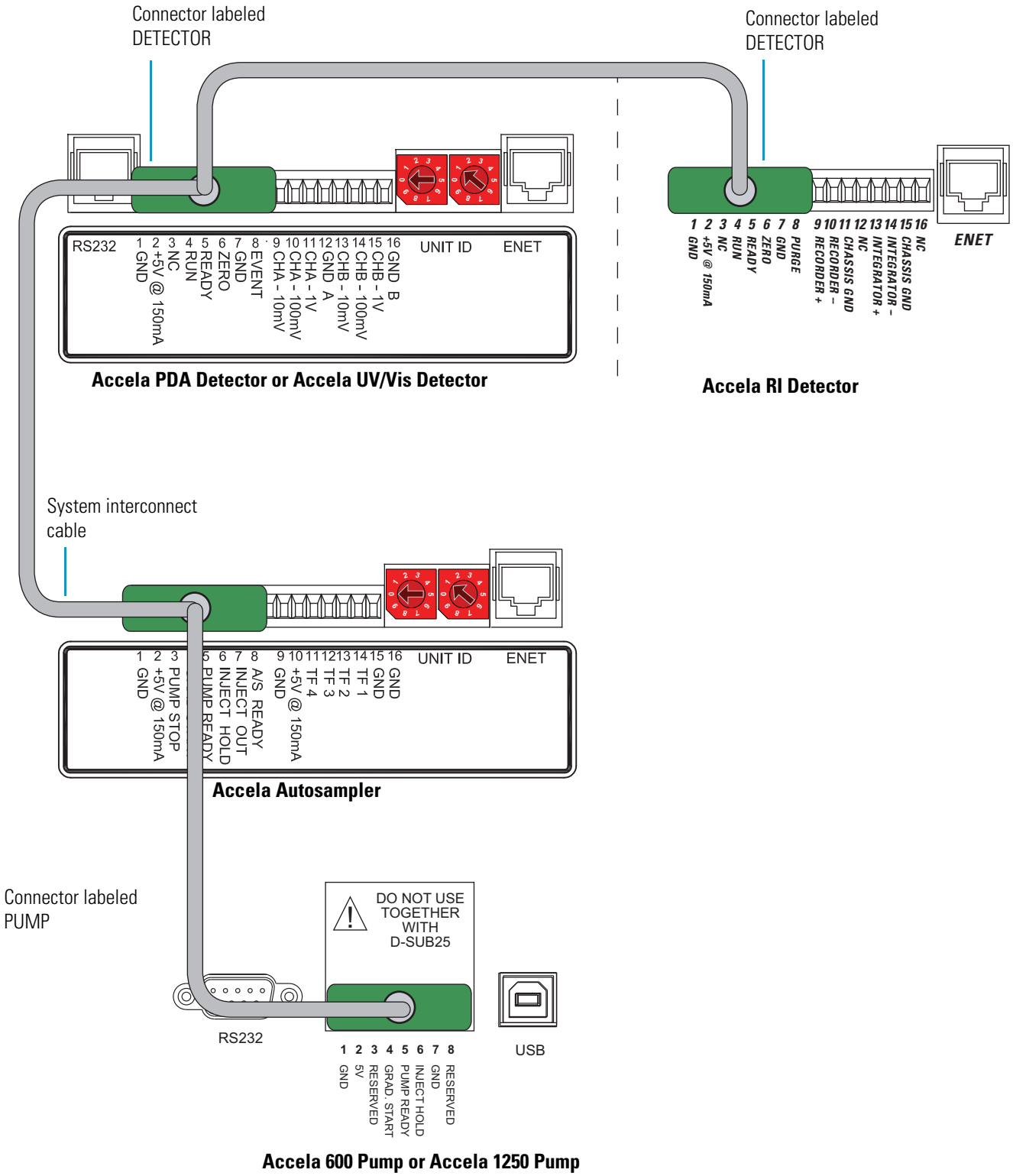
Pin	Description	Pin	Description
1	GND	**5**	Pump ready
2	5 V	**6**	Inject hold
3	Reserved	**7**	GND
4	Grad start	**8**	Reserved

2. Plug the autosampler connector with the A/S tag on its adjacent cable into the left, 8-pin socket on the back panel of the Accela Autosampler.

3. If your LC system contains an Accela PDA Detector, an Accela UV/Vis Detector, or an Accela RI Detector, plug one of the detector connectors with a blue DETECTOR sticker into the left, 8-pin socket on the back panel of the detector.

   Your Accela LC system can contain one or two pumps and up to three detectors.

Figure 9. System interconnect cable connections for the Accela LC system



Contact Closure Connections for Accela Systems with an Accela Open Autosampler

The contact closure cable for an Accela LC system with an Accela Open Autosampler is provided with the Accela Open Autosampler. LC/MS systems that include a TSQ™ Series or Exactive™ mass spectrometer or an Accela detector require an additional adapter cable, which is also supplied with the Accela Open Autosampler.

Figure 10 shows the contact closure cable for an Accela LC system with an Accela Open Autosampler and one or two Accela 600 Pumps, Accela 1250 Pumps, or a combination of these pumps.

Tip An unlabeled cable equivalent to the Accela Open Autosampler interconnect cable (P/N 60157-63024) ships with the autosampler.

This unlabeled cable has three connectors:

- The DB15 connector plugs into the Interface 1 port on the back panel of the autosampler.
- The DB25 connector plugs into the D-Sub 25 port on the back panel of an Accela 600 or 1250 Pump. For a dual-pump system, plug this connector into the eluting pump's D-Sub 25 port. Do not connect a contact closure cable to the loading pump.
- The 2-socket connector connects to the Start In pins of an MSQ™ or LTQ™ Series mass spectrometer.

Figure 10. Accela Open Autosampler interconnect cable (P/N 60157-63024)

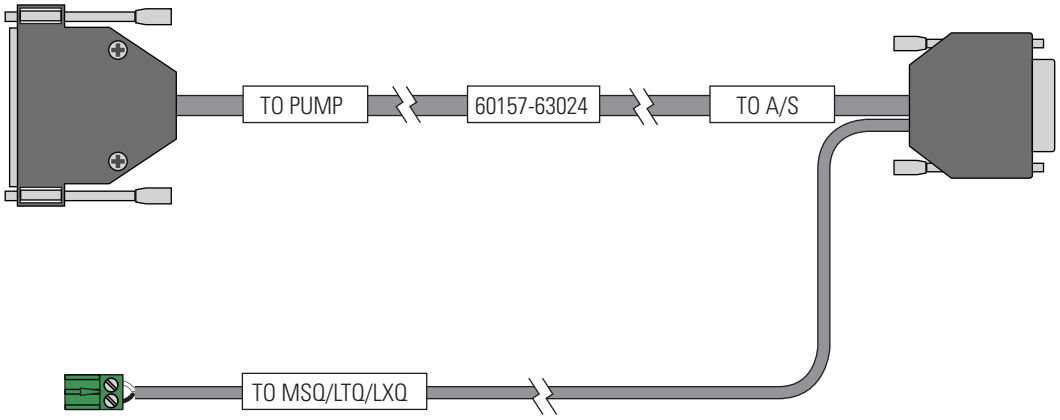
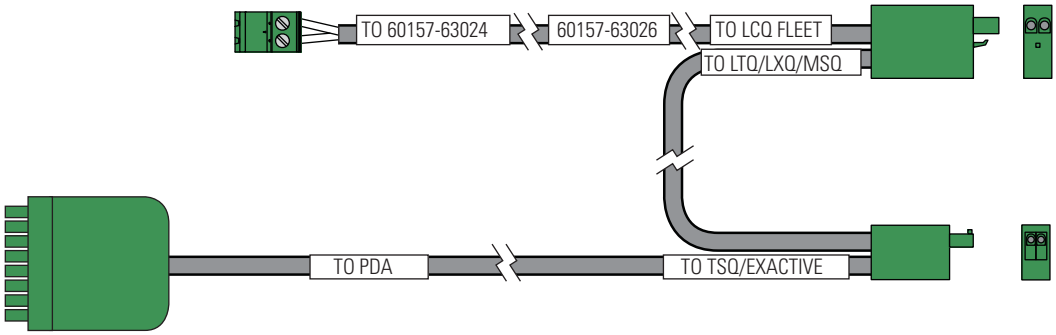


Figure 11 shows the adapter cable for an Accela LC system with an Accela Open Autosampler and an Accela detector (refractive index, UV/Vis, or photodiode array detector) or TSQ Series or Exactive mass spectrometer.

Figure 11. Adapter cable for an Accela detector (P/N 60157-63026)



❖ To connect the contact closure cables to the Accela LC system modules

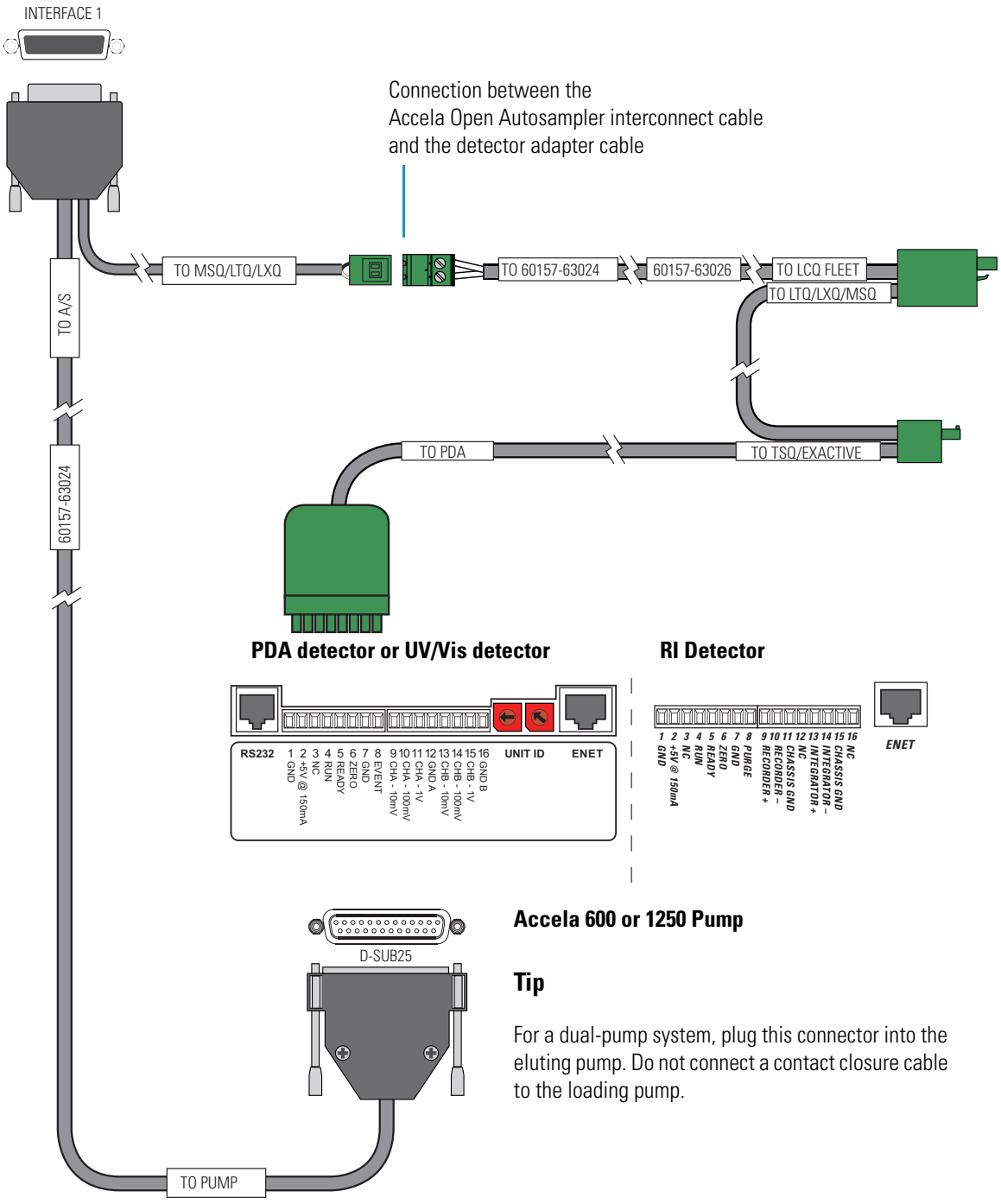
1. Connect the Accela Open Autosampler interconnect cable (P/N 60157-63024) to the Accela Open Autosampler and the Accela 600 or 1250 Pump as follows:
   a. Plug the DB15 connector into the Interface 1 receptacle on the back panel of the Accela Open Autosampler.
   b. Plug the 25-pin connector into the D-Sub25 receptacle on the back panel of the Accela 600 or 1250 pump.

   Tip For a dual-pump system, connect the 25-pin connector to the eluting pump. Do not connect a contact closure cable to the loading pump.

   For information about setting up the configuration for the device drivers, see Chapter 4, "Instrument Driver Configuration." For information about setting up the trigger signal for the loading pump (typically pump 2) and the pump programs for both pumps, refer to the Accela user guide for your data system.
2. Connect the 2-pin connector labeled "TO 60157-63024" on the adapter cable to the 2-pin connector labeled "TO MSQ/LTQ/LXQ" on the Accela Open Autosampler interconnect cable.
3. Connect the adapter cable to pins 1 through 8 on the back panel of the Accela detector.

Figure 12 shows the contact closure connections for an Accela LC system with an Accela Open Autosampler, Accela 600 or 1250 Pump, and Accela detector.

Figure 12. Contact closure connections for an Accela LC system with an Accela Open Autosampler



Additional Hardware Configurations

Use the D-sub 25-pin connector on the back panel of the Accela pump to connect the pump to a CTC autosampler or a valve interface module.

IMPORTANT Never use both the D-sub 25 pin connector and the pump interconnect connector (pins 1 through 8).

Table 11 lists the pin out descriptions for the D-sub 25-pin connector.

Table 11. D-sub 25 pin connector pin out descriptions

Pin	Description	Pin	Description	Pin	Description
1	Rel. 1 Input	**10**	Dig. In2+	**19**	Rel. 4 NC
2	Rel. 1 NC	**11**	Rel. Error In.	**20**	GND
3	Rel. 2 NO	**12**	Rel. Error NC	**21**	GND
4	Rel. 3 Input	**13**	GND	**22**	Dig. In1-
5	Rel. 3 NC	**14**	Rel. 1 NO	**23**	Dig. In2-
6	Rel. 4 NO	**15**	Rel. 2 Input	**24**	Rel. Error NO
7	Pressure Out	**16**	Rel. 2 NC	**25**	+5 Vdc
8	+24 Vdc	**17**	Rel. 3 NO		
9	Dig. In1+	**18**	Rel. 4 Input		

Connecting the Low-Pressure Solvent Lines

The Accela 600 Pump Inlet Tubing Kit contains preassembled, low-pressure solvent lines that have a 20 µm particle size, stainless steel filter at one end and a flangeless fitting at the other end (see Figure 13).

To install the solvent lines, follow these procedures:

- Assembling the Solvent Reservoir Bottles
- Connecting the Solvent Reservoir Bottles to the Degassing Unit
- Priming the Degassing Membranes

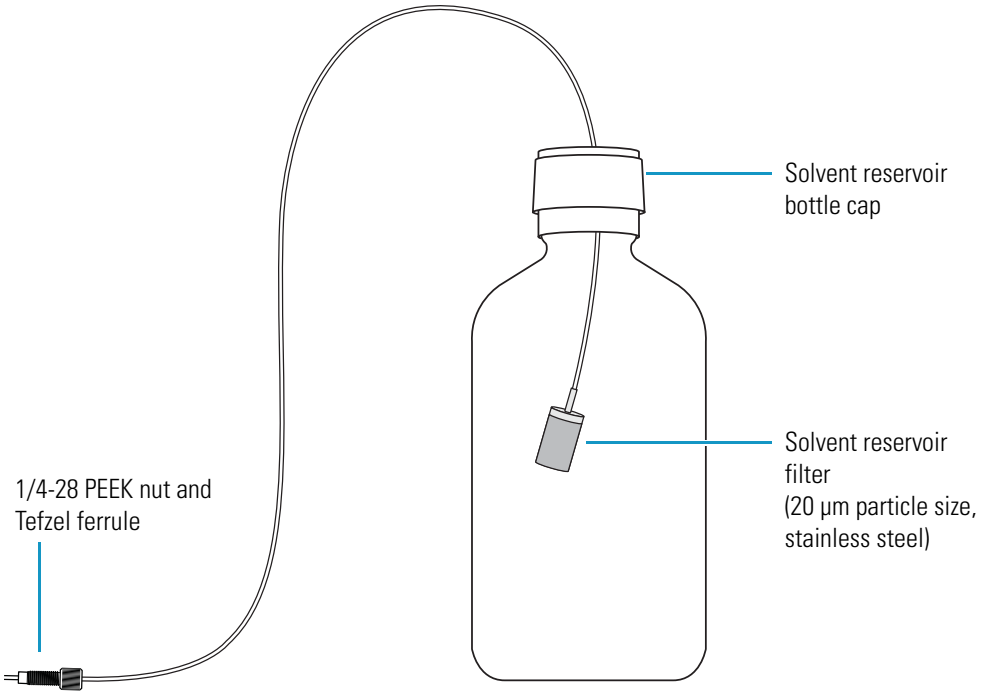
Assembling the Solvent Reservoir Bottles

❖ **To assemble the solvent reservoir bottles**

1. Label one of the four solvent reservoir bottle caps "**A**."
2. Pull the filter off the end of the solvent line, and then pass the tubing through the solvent reservoir bottle cap labeled A.
3. Reconnect the filter to the end of the solvent line (see Figure 13).

IMPORTANT Only use stainless steel, 20 µm particle size sinker frits to terminate the solvent reservoir lines.

Figure 13. Solvent reservoir cap assembly with the solvent line assembly



4. Insert the solvent reservoir filter and inlet line into one of the solvent reservoir bottles, and screw the cap onto the solvent reservoir bottle until it is secure.

   Tip The cap is a two-piece assembly. The upper section (see Figure 13) snaps onto a threaded section. You can screw the threaded section onto the bottle and snap on the upper section after installing the tube, or, if you are replacing existing tubing, you can unscrew the entire cap from the bottle. You might also be able to use the upper section alone for solvent bottles with a wider neck.

5. Position the bottle in the solvent platform or tray, allowing the solvent inlet line to hang down along the left side of the system.
   - For an LC system with an Accela Autosampler, the solvent reservoir bottles reside in the solvent platform at the top of the system.
   - For an LC system with an Accela Open Autosampler, the solvent reservoir bottles reside in the solvent tray attached to the autosampler table.
6. Repeat step 1 through step 5 for solvents B, C, and D if applicable.

Connecting the Solvent Reservoir Bottles to the Degassing Unit

Use HPLC-grade solvents that are free of particulate matter and terminate the solvent reservoir lines with the stainless steel, 20 µm particle size sinker frit provided in the Accela 600 Pump Inlet Tubing Kit. The Accela 600 Pump Inlet Tubing Kit ships with both the Accela 600 Pump and the Accela 1250 Pump.

CAUTION Do not use solvents containing Freon™ and perfluorinated solvents, such as Fluorinert™ and Fomblin™ perfluoro polyether solvents. They adversely affect the Teflon AF degassing membrane.

CAUTION To prevent personal injury, observe good laboratory practice when handling solvents, changing tube lines, or both. Consult the pertinent material safety data sheets for the solvents used for HPLC analysis.

❖ To connect the solvent reservoir bottles to the degassing unit

1. Route the solvent reservoir lines through the access slots on the top-left side of the module enclosures and the bottom-left sides of the module drip trays.
2. For each solvent reservoir line, connect the flangeless fitting to the appropriate inlet port of the built-in degassing unit.

   Figure 14 shows the flangeless fitting connected to the solvent reservoir line. The flangeless fittings come in four colors: blue, green, yellow, and orange.

Figure 14. Low-pressure solvent line with flangeless fitting

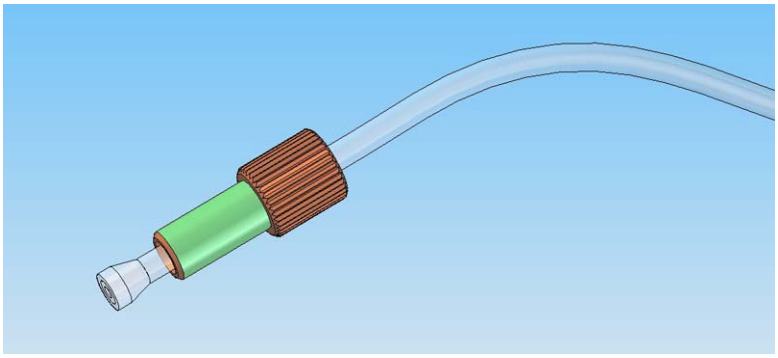
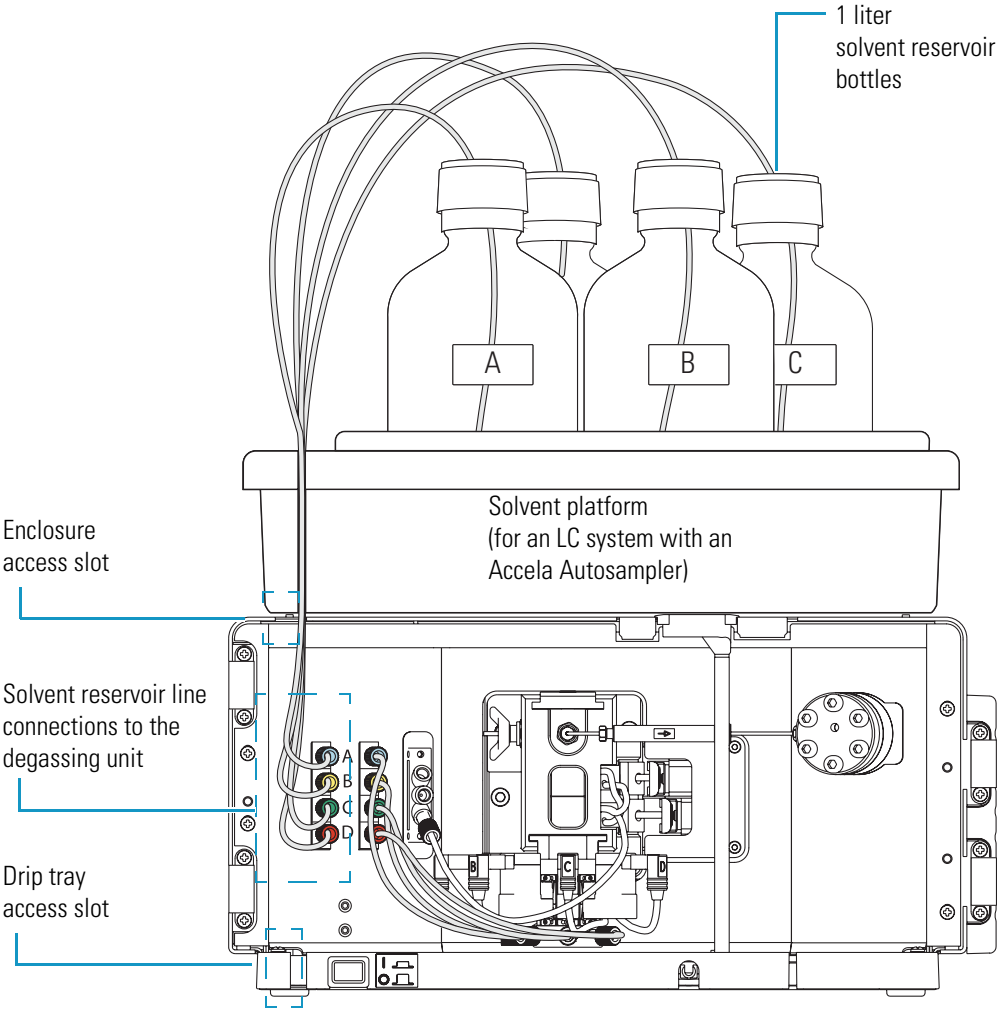


Figure 15 shows the inlet ports of the built-in degassing unit and the access slots in the module enclosure and drip tray.

Figure 15. Solvent reservoir line connections to the inlet ports of the vacuum degasser



Priming the Degassing Membranes

Prime the degassing membranes as part of the initial Accela pump installation procedure.

CAUTION To avoid damaging the degassing unit and the piston seals, prime the degassing membranes by using a syringe to pull solvent through the solvent lines into the degassing unit.

Do not *push* the solvent into the degasser. Pushing the solvent can generate excessive pressure and rupture the degassing membranes. The maximum recommended pressure on the membrane is 10 bar.

Do not use the pump to prime the solvent lines and the degassing membranes. Drawing excessive amounts of air through the liquid displacement assembly can damage the piston seals.

❖ **To prime the degassing membranes**

1. Remove the tubing connected to inlet valve A.
2. Connect a 10 mL syringe to the end of the tubing you removed in step 1.
3. Draw approximately 5 mL solvent into the syringe.
4. Disconnect the syringe and reconnect the tubing to inlet valve A.
5. Repeat step 1 through step 4 to prime solvents B, C, and D through the degasser if applicable.

Connecting the Solvent Line Between the Pump and the Autosampler

To connect the high-pressure solvent line between the pump and the autosampler, follow these procedures:

- Connecting the High-Pressure Solvent Line to the Pump Outlet
- Connecting the High-Pressure Solvent Line to the Autosampler

IMPORTANT Avoid using PEEK tubing and fittings with system pressures above 276 bar (4000 psi). Thermo Fisher Scientific ships precut 1/16 in. OD, stainless steel tubing and two-piece, stainless steel compression fittings with the Accela autosamplers.

CAUTION To prevent personal injury caused by skin contact with hazardous solvents, turn off the pump flow before you connect the high-pressure solvent line between the LC pump and the autosampler.

Connecting the High-Pressure Solvent Line to the Pump Outlet

When you operate the Accela pump at pressures above 276 bar (4000 psi), use the supplied precut, stainless steel tubing (0.005 in. ID × 1/16 in. OD) to connect the pump to the autosampler:

- For the Accela Autosampler, use the 26 cm (10 in.) length of precut tubing in the Accela System Kit.
- For the Accela Open Autosampler, use the 0.6 m (2 ft.) length of precut tubing in the Accela Open Autosampler Accessory Kit.

Tip To identify the tubing ID, the precut tubing has a color-coded band:

- Red = 0.005 in.
- Black = 0.007 in.
- Blue = 0.010 in.
- Yellow = 0.020 in.

❖ To connect the high-pressure solvent line to the LC pump outlet

1. Turn off the pump flow.
2. Using the supplied two-piece, compression fitting, connect the precut, stainless steel tubing to the pump outlet (dynamic mixer outlet [see Figure 16] or placeholder blind module outlet).

Figure 16. Dynamic mixer outlet

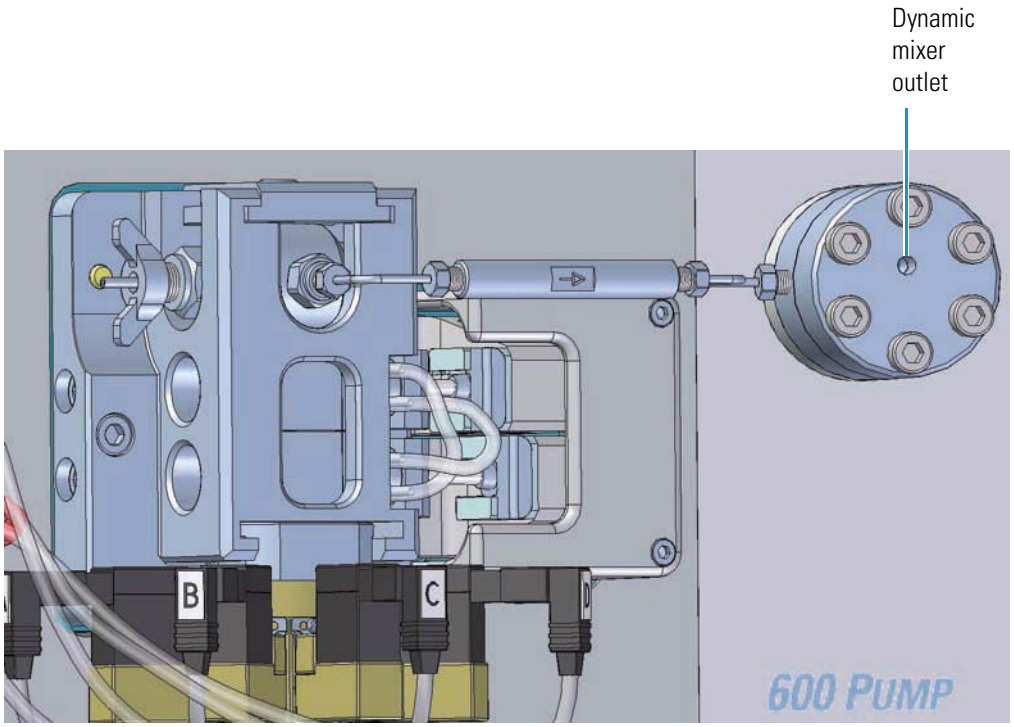
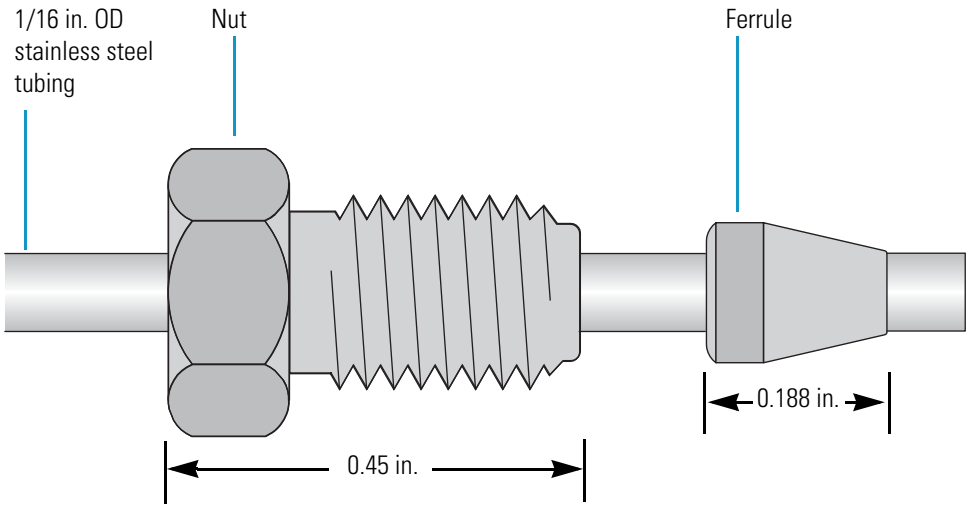


Figure 17 shows the two-piece, compression fitting. The length of the nut is 0.45 inches, and the length of the ferrule is 0.188 inches.

Figure 17. Two-piece compression fitting (stainless steel)



3. Using a 1/4 in. open-ended wrench, tighten the nut.

Connecting the High-Pressure Solvent Line to the Autosampler

The Accela family of liquid chromatography instruments includes two autosamplers: the Accela Autosampler and the Accela Open Autosampler.

To connect the high-pressure solvent line, follow the procedure for your autosampler:

- Connecting the Solvent Line to the Accela Autosampler Heat Exchanger
- Connecting the Solvent Line to the Accela Open Autosampler Injection Valve

Connecting the Solvent Line to the Accela Autosampler Heat Exchanger

The metal plate in front of the Accela Autosampler heat exchanger can reach temperatures as high as 95 °C (203 °F).

CAUTION To prevent personal injury, before installing the LC column or connecting the pump to the autosampler, ensure that the column oven compartment is at room temperature. The column oven compartment can reach temperatures as high as 95 °C (203 °F).

Figure 18 shows the Hot Surface caution symbols on the column oven surface.

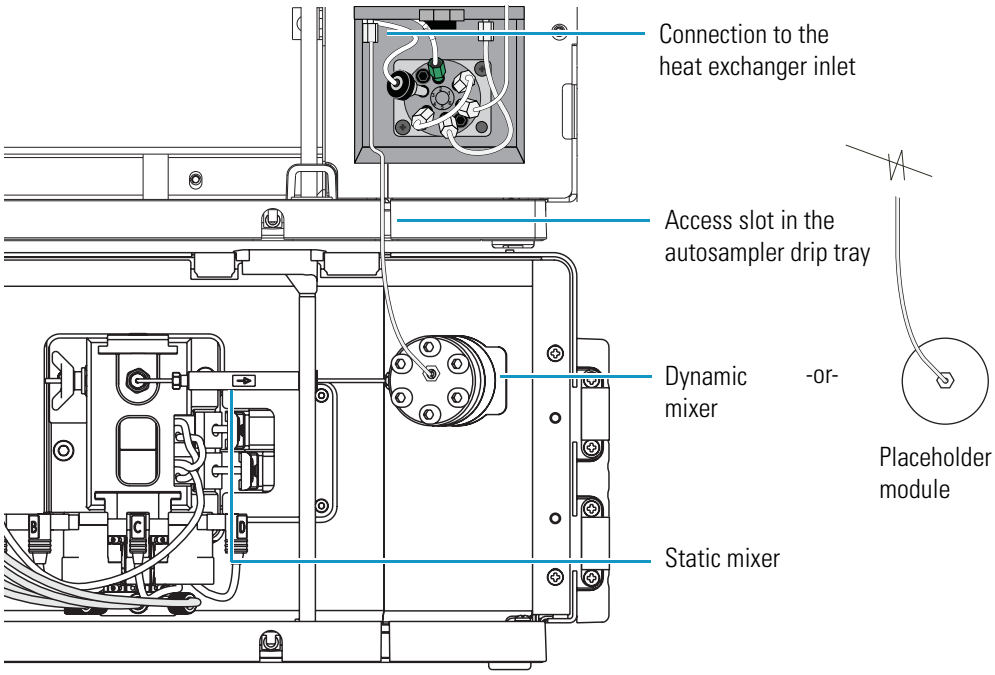
Figure 18. Hot surface cautions on the surface of the Accela Autosampler column oven

❖ **To connect the high-pressure solvent line to the heat exchanger inlet**

1. Ensure that the column oven compartment is at room temperature and that the pump flow is turned off.
2. Route the high-pressure tubing through the access slot in the autosampler drip tray.
3. Connect the tubing to the heat exchanger inlet as follows:
   a. Using a two-piece, compression fitting (see Figure 17 on page 29), connect the tubing to the heat exchanger inlet.
   b. Using a 1/4 in. open-ended wrench, tighten the nut.

Figure 19 shows the high-pressure connection between the Accela Autosampler and the Accela 600 or 1250 Pump.

Figure 19. Connection between the Accela 600 or Accela 1250 Pump and the Accela Autosampler



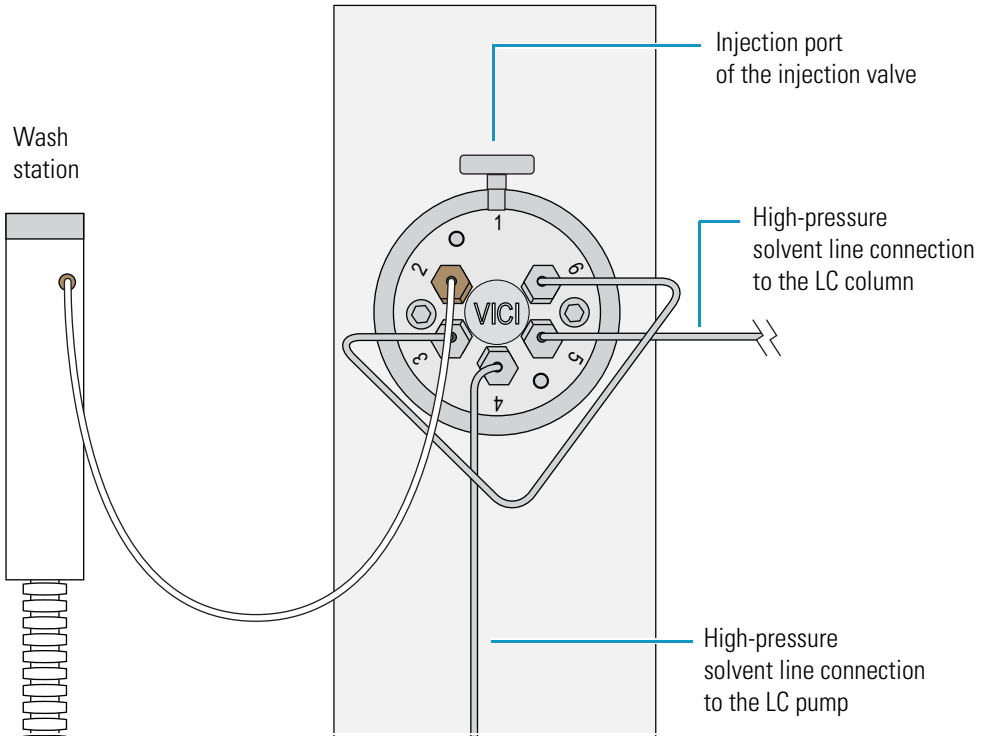
Connecting the Solvent Line to the Accela Open Autosampler Injection Valve

The Accela Open Autosampler has a high-pressure Valco™ injection valve (18 500 psi). To make connections to this valve, use high-pressure compression fittings and the 0.6 m (2 ft), precut stainless steel tubing in the Accela Open Autosampler Accessory Kit.

❖ To connect the high-pressure solvent line to the injection valve

1. Route the stainless steel tubing connected to the LC pump outlet through the cutout on the top of the pump enclosure behind the right door, through the access slot in the detector drip tray, and through the cutout on the top of the detector enclosure behind the right door.
2. Using a two-piece, compression fitting (see Figure 17 on page 29), connect the tubing to port 4 of the injection valve (see Figure 20).

Figure 20. Accela Open Autosampler injection valve and wash station



3. Using a 1/4 in. open-end wrench, tighten the fitting.
4. Turn on the pump flow and check for solvent leaks at the pump outlet and the autosampler inlet.

Powering On the Pump

❖ **To turn on the pump**

1. Verify that the pump's power switch is in the Off position.
2. Connect the power cord (see "Connecting the Power Cable" on page 16).
3. Connect the pump to the computer (see "Connecting the Pump to the Data System Computer" on page 17).
4. Connect the solvent lines (see "Connecting the Low-Pressure Solvent Lines" on page 24).
5. Connect the high-pressure solvent line between the pump and the autosampler (see "Connecting the Solvent Line Between the Pump and the Autosampler" on page 27).
6. Press the power On button.

   The Power LED turns solid green.

   To control the pump from the data system computer, add the pump to the data system configuration (see Chapter 4, "Instrument Driver Configuration," on page 59).

Hardware Upgrades

You can order these hardware options from Thermo Fisher Scientific for your Accela or Transcend pump: a dynamic mixer, a seal wash pump, and a leak sensor.

Note Because the installation involves the removal of the pump chassis from the pump enclosure, Thermo Fisher Scientific recommends that you have a Thermo Fisher Scientific field service engineer install these hardware options.

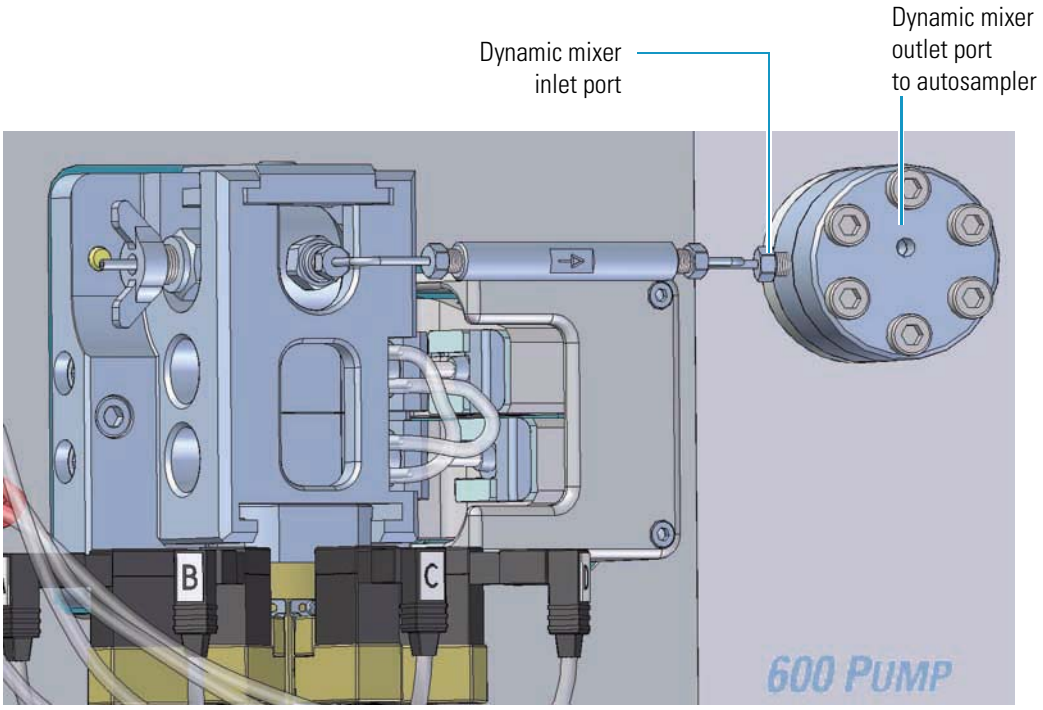
To install the optional seal wash pump, dynamic mixer, or leak sensor, follow these procedures.

Contents

Dynamic Mixer Installation

For high-pressure gradient applications, Thermo Fisher Scientific recommends that you install the optional 35 µL dynamic mixer (see Figure 21). To install the dynamic mixer, refer to the product insert provided with the mixer or the following instructions.

Figure 21. Dynamic mixer inlet and outlet ports



To install the dynamic mixer, you must have these tools:

Tool	Use
1/4 in. open-end wrench	To disconnect the high-pressure lines
#2 Phillips head screwdriver	To disconnect the chassis from the enclosure
2.5 mm ball driver wrench	To disconnect the screws that secure the blind outlet (placeholder) module or the dynamic mixer to the front panel of the pump

To install the dynamic mixer, follow these steps:

1. Removing the Pump Chassis from the Enclosure
2. Connecting the Dynamic Mixer to the Pump's Front Panel
3. Connecting the Dynamic Mixer to the Controller Board
4. Reconnecting the Static Mixer and the High-Pressure Lines
5. Reconnecting the Pump Chassis to the Enclosure

Removing the Pump Chassis from the Enclosure

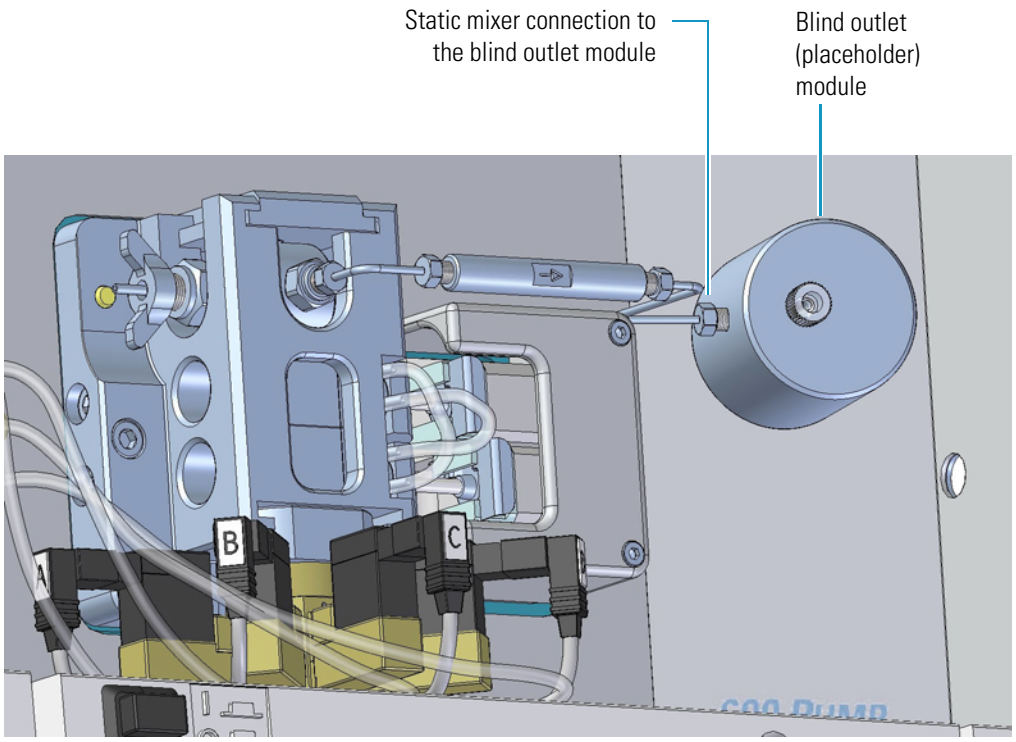
❖ **To remove the pump chassis from the enclosure**

1. Turn off the power to the LC pump.
2. Unplug the pump from line power.

CAUTION To prevent electrical shock, turn off the pump and disconnect it from line power before you pull the pump chassis out of the enclosure.

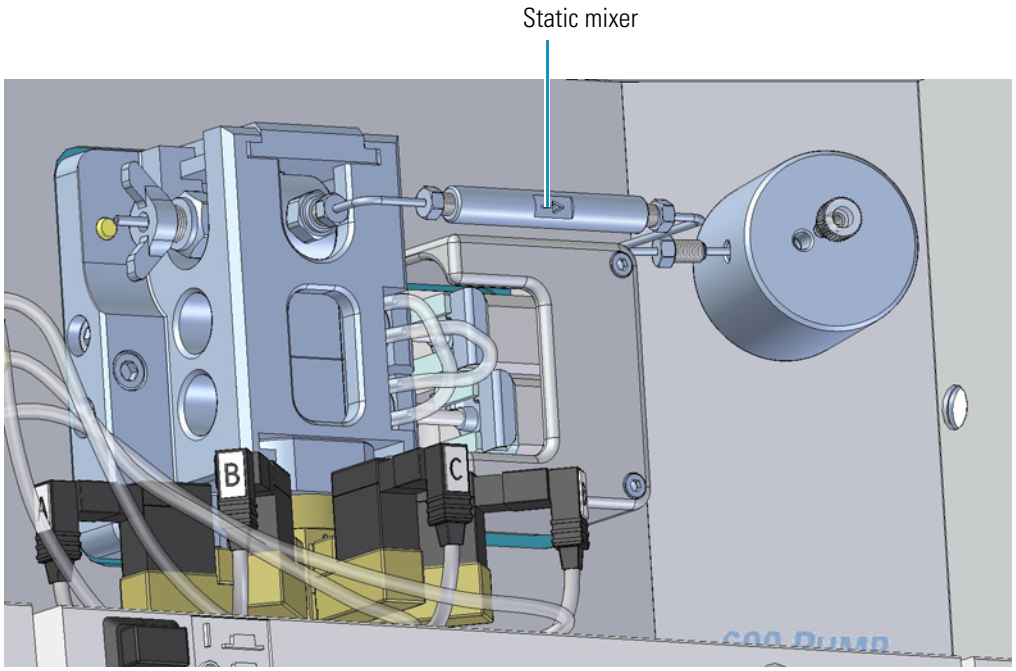
3. Using a 1/4 in. open-end wrench, disconnect the static mixer from the blind outlet (placeholder) module (see Figure 22 and Figure 23).

Figure 22. Static mixer connection to the blind outlet module



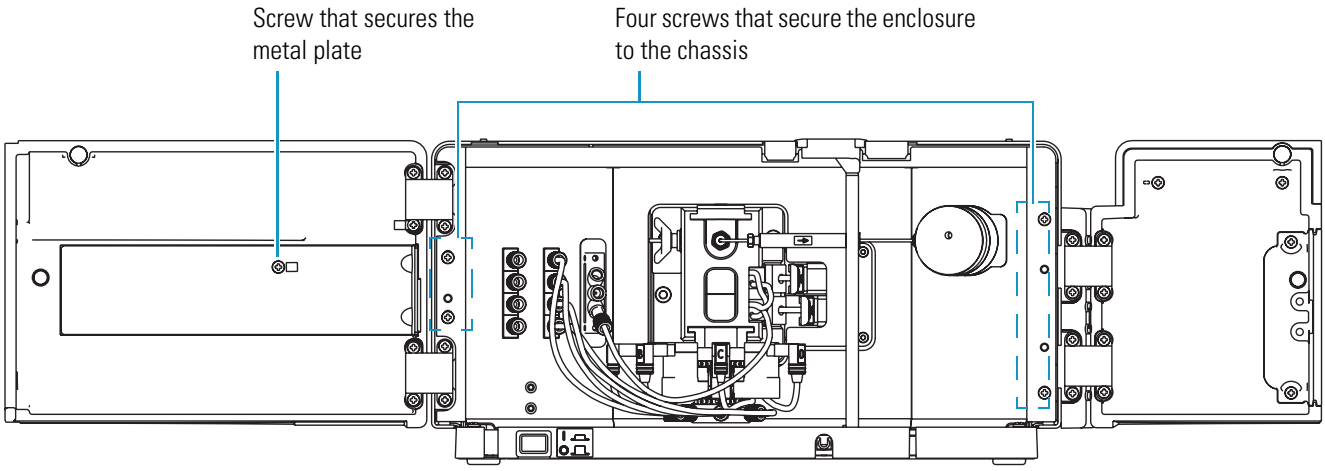
4. If the high-pressure tubing is connected between the pump and the autosampler, using a 1/4 in. open-end wrench, disconnect the high-pressure solvent line from the blind outlet module.

Figure 23. Static mixer disconnected from the blind outlet (placeholder) module



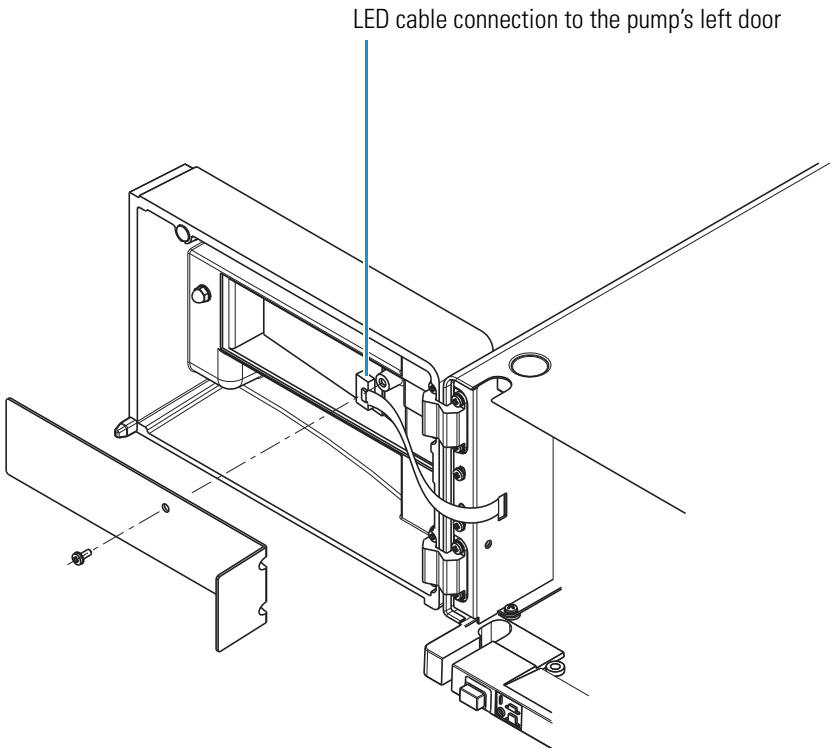
5. Using a #2 Phillips head screwdriver, remove the screw that secures the metal plate covering the LED board, and then remove the metal plate (see Figure 24 and Figure 25).

Figure 24. Front view of the pump with the doors open



6. Disconnect the LED cable from the left door of the pump (see Figure 25).

Figure 25. LED cable connection



7. Using a #2 Phillips head screwdriver, remove the four screws that secure the pump chassis to the enclosure (see Figure 24 on page 36), and then pull the chassis out of the enclosure.

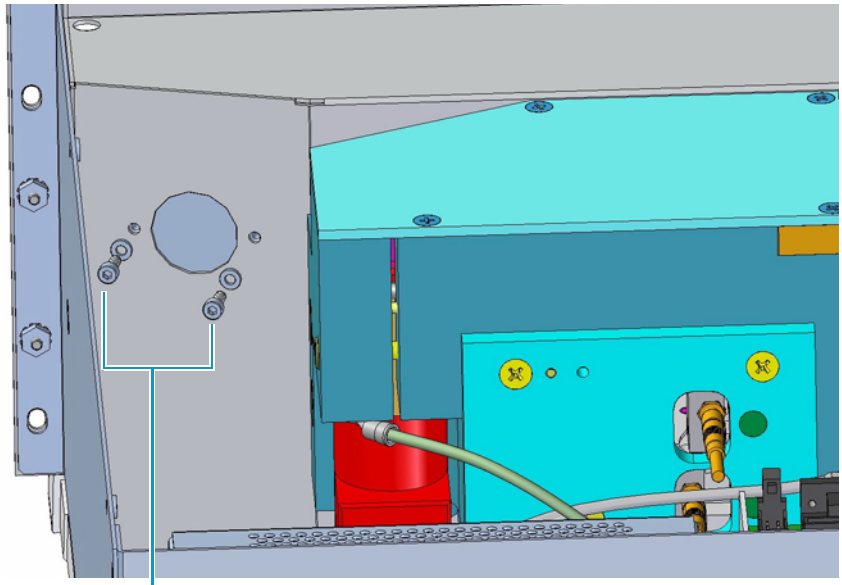
Go to the next procedure, "Connecting the Dynamic Mixer to the Pump's Front Panel."

Connecting the Dynamic Mixer to the Pump's Front Panel

❖ **To connect the dynamic mixer to the front panel of the pump**

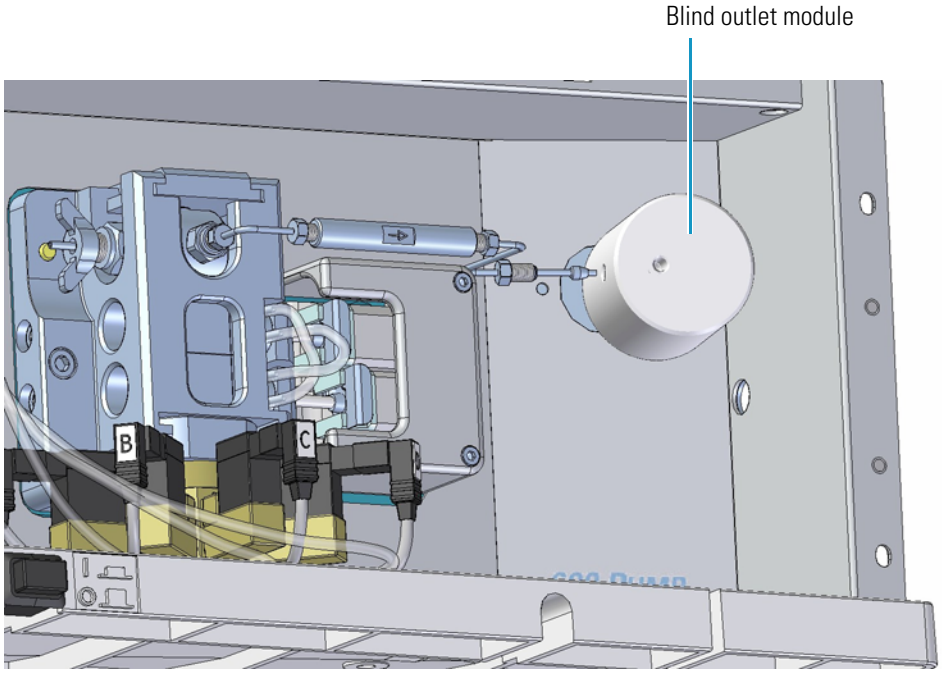
1. Using a 2.5 mm hex ball driver, remove the two screws (with washers) that secure the blind outlet (placeholder) module to the front panel of the pump (see Figure 26). Set the screws and washers aside. You use them in step 5 to secure the dynamic mixer to the pump.

Figure 26. Back side of the pump's front panel, showing the screws (with washers) being removed



2. Remove the blind outlet (placeholder) module from the front panel of the pump (see Figure 27).

Figure 27. Blind outlet module removed from the front panel



3. Using a 1/4 in. open-end wrench, disconnect the static mixer from the LDA (see Figure 28 and Figure 29).

Figure 28. Static mixer connection to the LDA

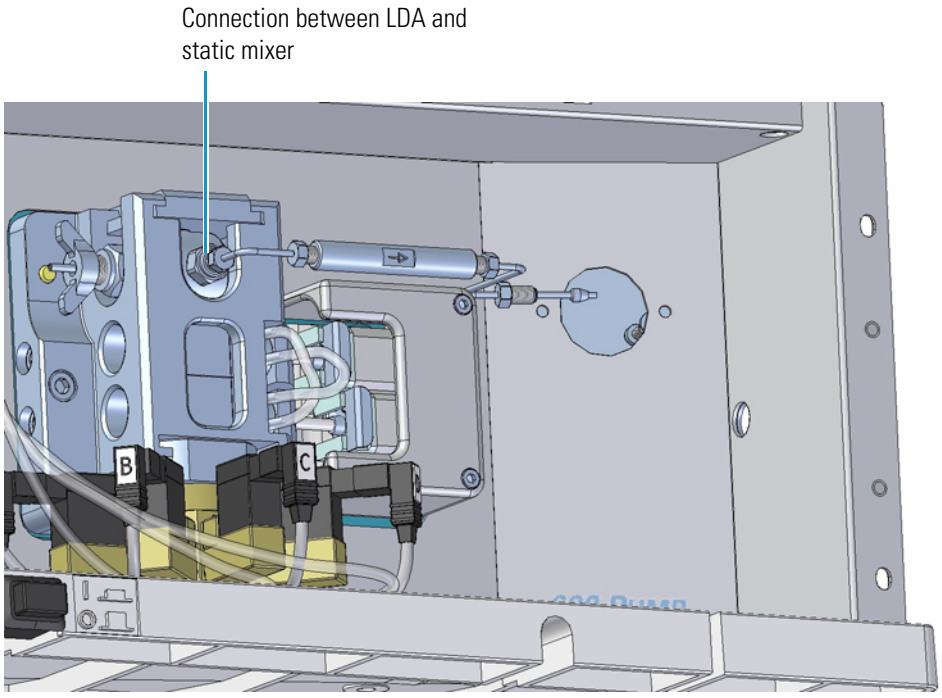
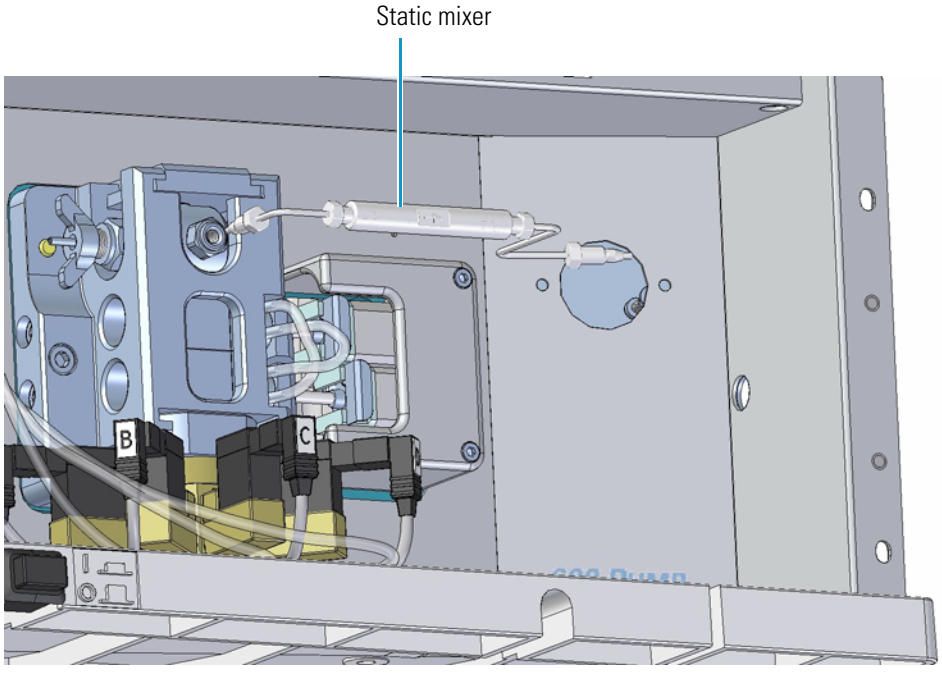
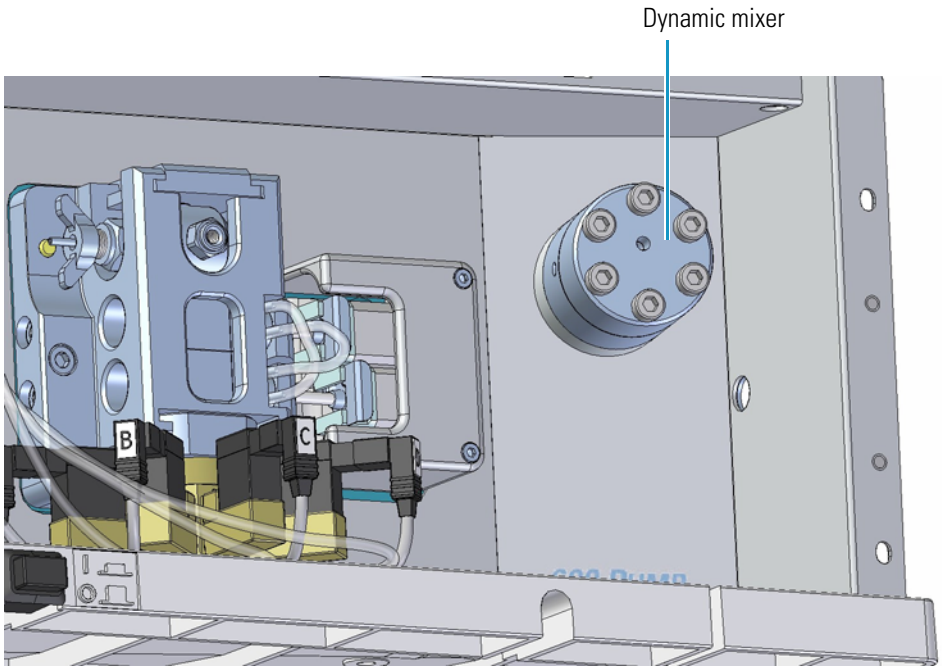


Figure 29. Static mixer disconnected from the pump



4. Insert the dynamic mixer into the port vacated by the blind outlet (placeholder) module (see Figure 30).

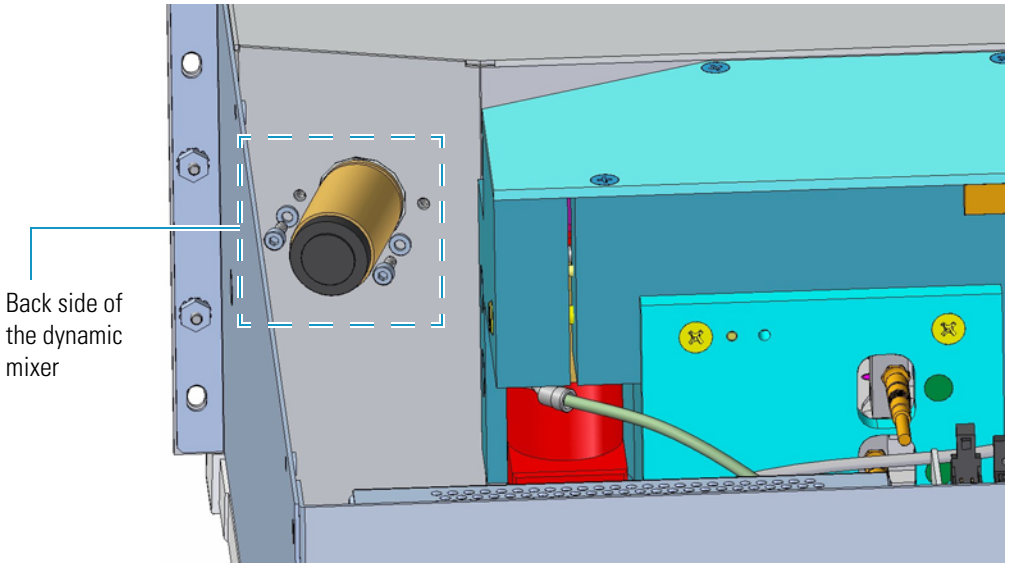
Figure 30. Dynamic mixer inserted into the port vacated by the blind outlet module



5. From the back side of the front panel (see Figure 31), secure the dynamic mixer with the screws that you removed in step 1 on page 37.

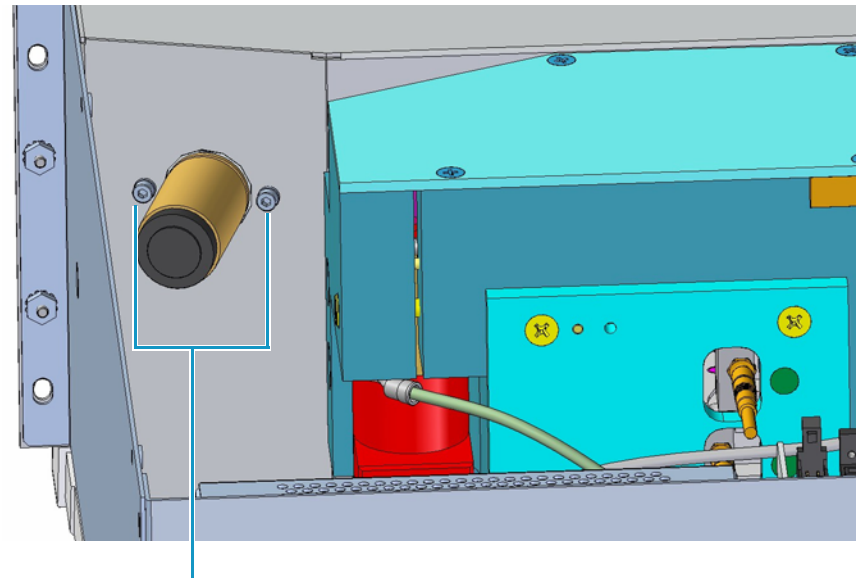
Note Figure 31 and Figure 32 do not show the cable portion of the dynamic mixer.

Figure 31. Dynamic mixer, as viewed from the inside of the pump chassis



6. Using a 2.5 mm hex ball driver, tighten the screws that secure the dynamic mixer to the pump (see Figure 32).

Figure 32. Dynamic mixer secured to the pump chassis



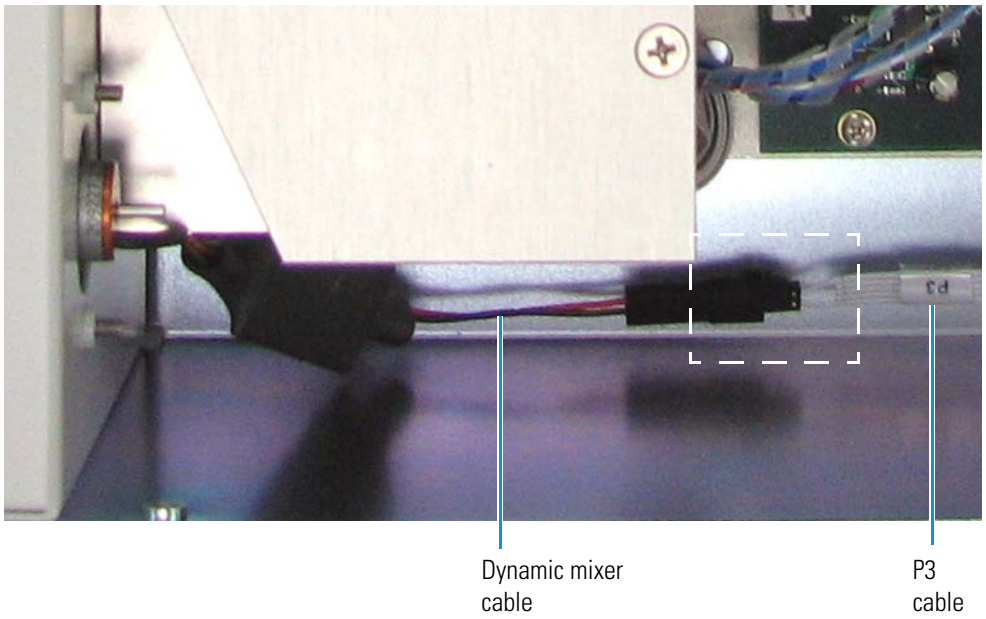
Go to the next procedure, "Connecting the Dynamic Mixer to the Controller Board."

Connecting the Dynamic Mixer to the Controller Board

❖ **To connect the dynamic mixer to the Controller board**

Connect the dynamic mixer's cable to the P3 cable (see Figure 33). One end of the P3 cable is connected to the Controller board and the other end is free inside the pump chassis.

Figure 33. Dynamic mixer connection to the P3 cable



Go to the next procedure, "Reconnecting the Pump Chassis to the Enclosure."

Reconnecting the Pump Chassis to the Enclosure

❖ **To reconnect the pump chassis to the enclosure**

1. Push the pump chassis back into the enclosure, and then secure the chassis to the enclosure with the four screws that you removed in step 7 on page 37.
2. Reconnect the LED cable to the LED board.
3. Align the hole in the LED cover plate with the port in the door for the screw. Slide the screw through the hole. Using a #2 Phillips head screwdriver, tighten the screw to secure the metal plate to the left door of the pump.

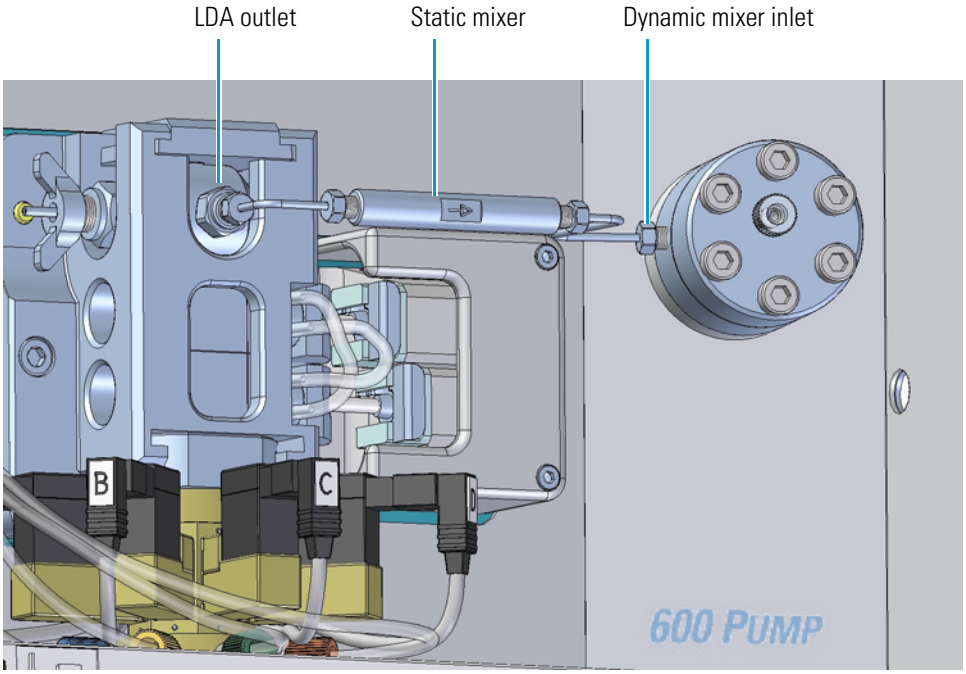
Go to the next procedure, "Reconnecting the Static Mixer and the High-Pressure Lines."

Reconnecting the Static Mixer and the High-Pressure Lines

❖ **To reconnect the static mixer and the high-pressure lines**

1. Reinstall the static mixer as follows:
   a. Using a 1/4 in. open-end wrench, reconnect the static mixer to the LDA.
   b. Using a 1/4 in. open-end wrench, connect the static mixer to the inlet of the dynamic mixer (see Figure 34).

Figure 34. Static mixer connected to the LDA and the dynamic mixer



2. Connect the outlet of the dynamic mixer to the autosampler inlet (see "Connecting the Solvent Line Between the Pump and the Autosampler" on page 27).

Seal Wash Pump Installation

If your applications use highly buffered mobile phases, Thermo Fisher Scientific recommends installing the optional seal wash pump.

To install the optional seal wash pump, you must have these tools:

Tool	Use
#2 Phillips head screwdriver	To disconnect the LED cover plate from the inside of the pump's left door and the chassis from the enclosure
2.5 mm hex ball driver	To disconnect the screws that secure the cover plate to the front panel and secure the seal wash pump to the front panel

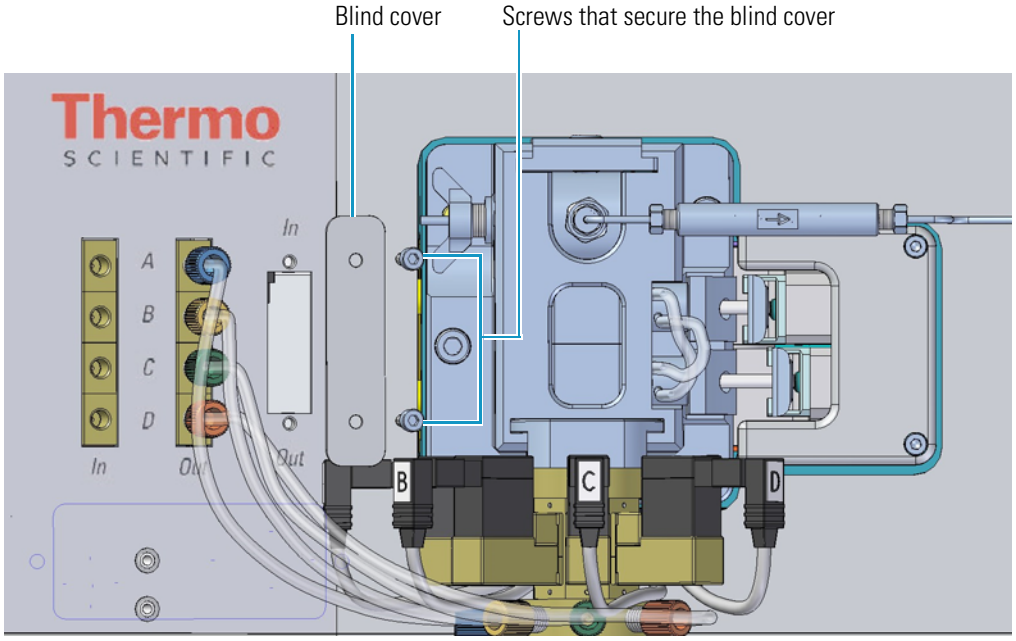
❖ To install the optional seal wash pump

1. Turn off the power to the pump.
2. Unplug the pump from line power.

CAUTION To prevent electrical shock, turn off the pump and disconnect it from line power before you install the seal wash pump.

3. Using a 2.5 mm hex ball driver, remove the two screws that secure the blind cover to the front panel of the pump (see Figure 35). Set the screws aside. You will use these screws in step 5 on page 45 to secure the seal wash pump to the front panel of the pump.

Figure 35. Blind cover and screws removed from the pump's front panel



4. With the cable connector facing up (see Figure 36), slide the seal wash pump into the front panel of the pump (see Figure 37).

Figure 36. Seal wash pump

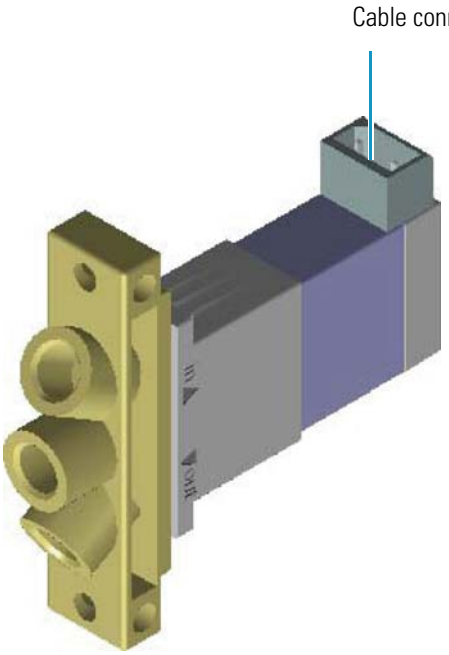
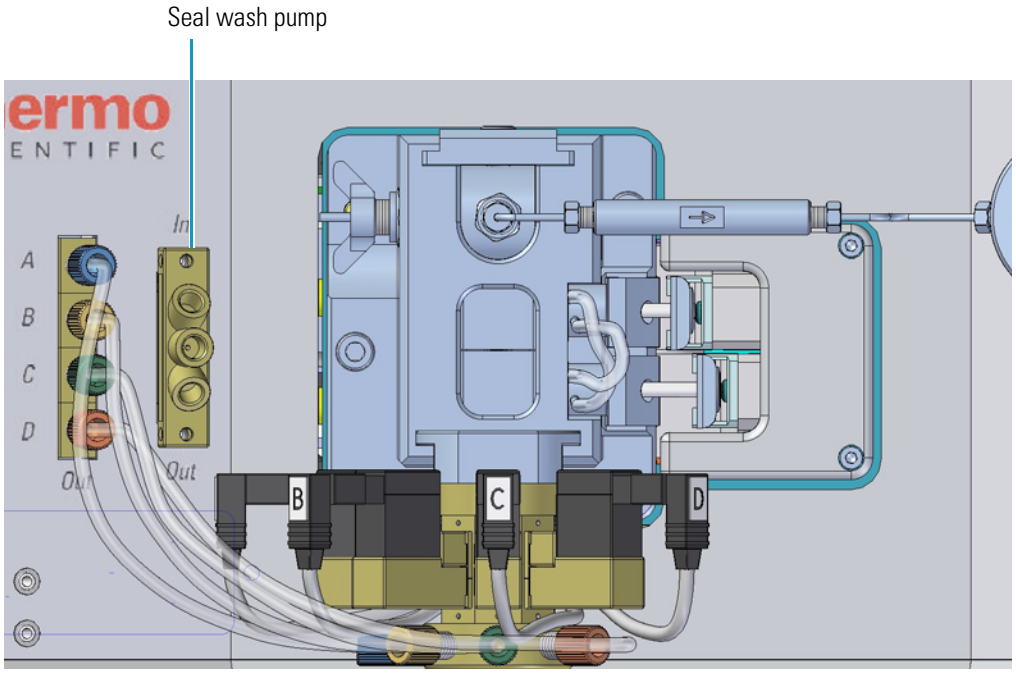
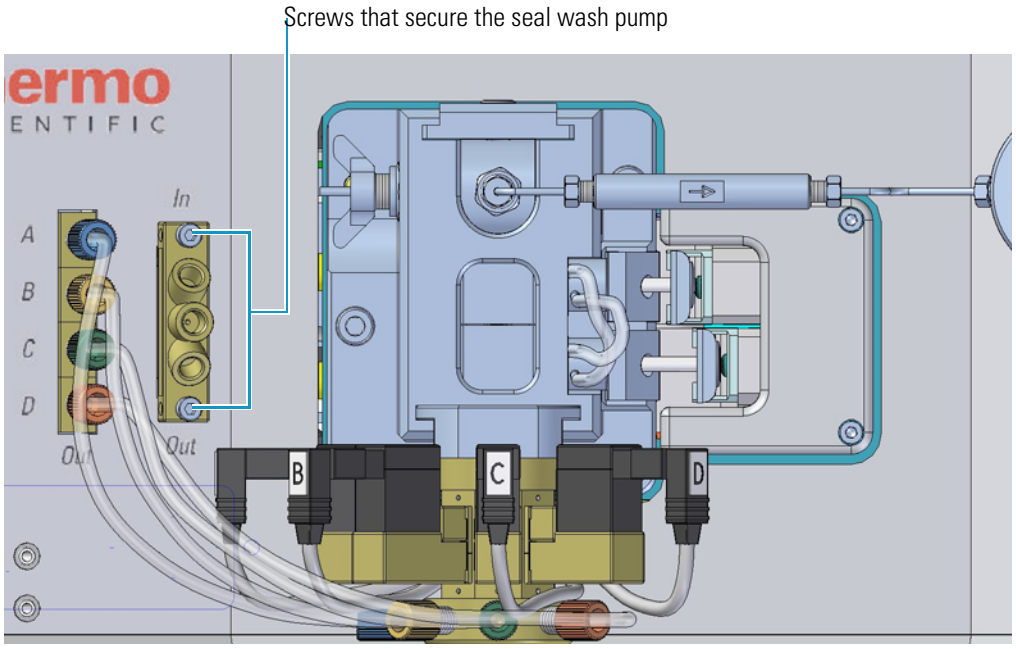


Figure 37. Seal wash pump placed into the front panel of the pump



5. Using the two screws that you removed in step 3 on page 44, secure the seal wash pump to the front panel of the pump (see Figure 38).

Figure 38. Seal wash pump secured to the front panel of the pump

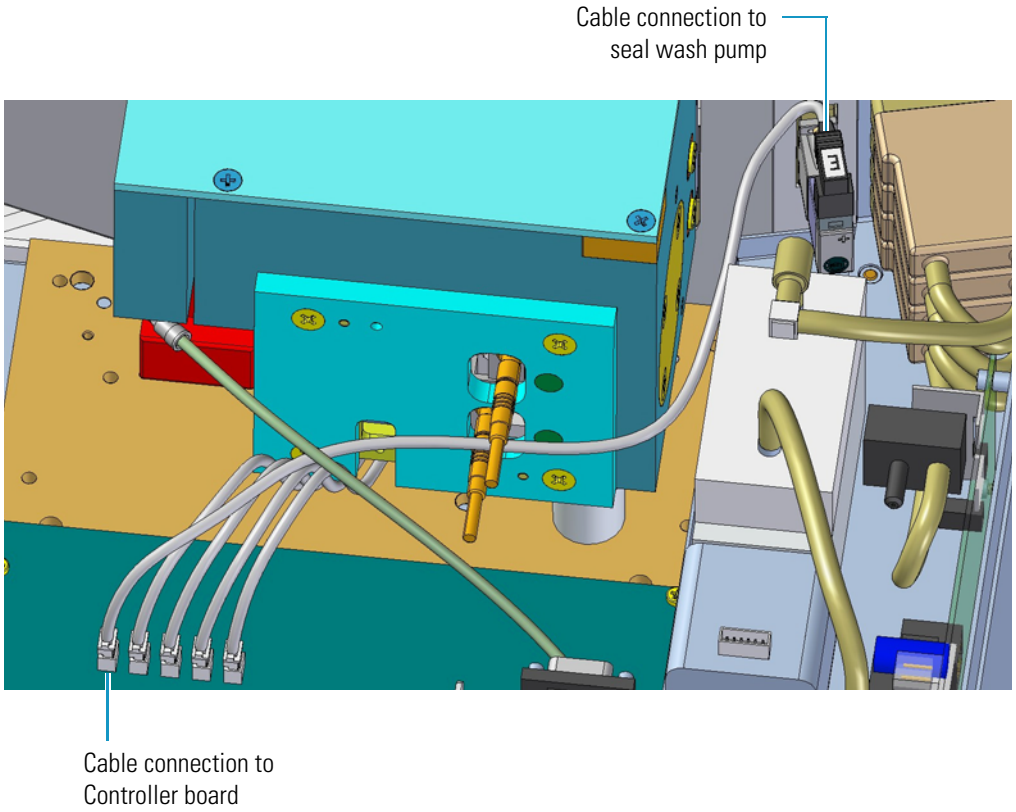


6. Using a 2.5 mm hex ball driver, tighten the screws.
7. Remove the pump chassis from the enclosure (see "Removing the Pump Chassis from the Enclosure" on page 35).

CAUTION Observe precautions for handling electrostatic sensitive devices.

8. Using the cable supplied with the seal wash pump, connect the seal wash pump to Valve E on the Controller board (see Figure 39).

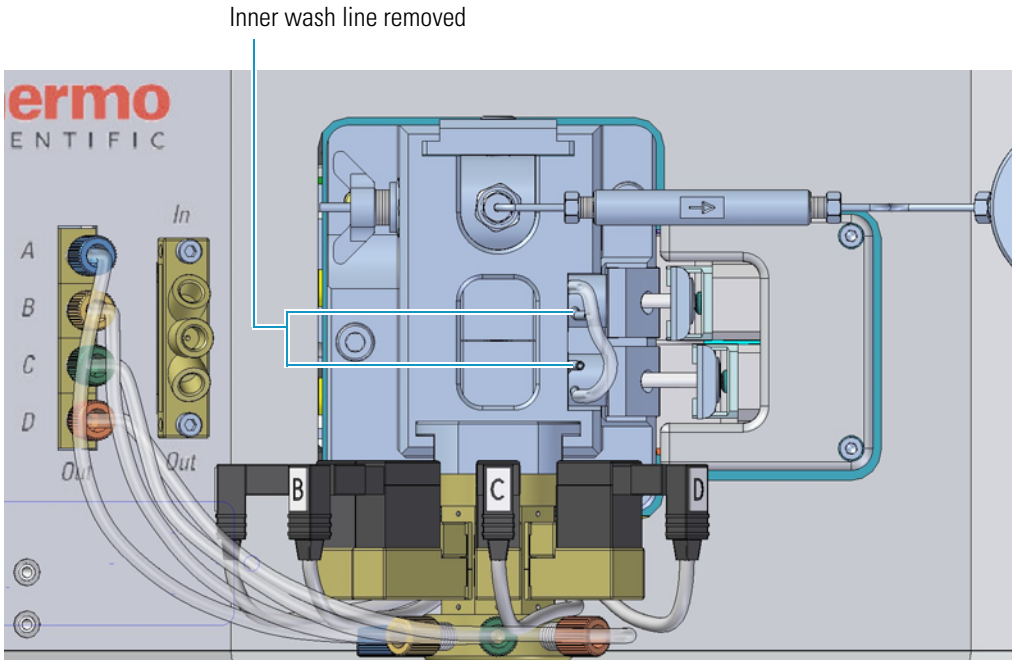
Figure 39. Seal wash pump connection to the Controller board



9. Reconnect the pump chassis to the enclosure (see "Reconnecting the Pump Chassis to the Enclosure" on page 42).

10. Remove the inner wash line from the guide bushings (see Figure 40).

Figure 40. Guide bushings with the inner wash line removed



11. To set up the seal wash pump for continuous flushing, go to "Setting Up Continuous Flushing" on page 57.

Leak Sensor Installation

Thermo Fisher Scientific recommends installing the optional leak sensor to stop the solvent flow from the pump when a leak occurs.

The Leak Sensor Kit (P/N 00960-01-00024) contains these items:

- Leak sensor with attached cable
- Mounting bracket
- Locating fixture
- Two-component adhesive

❖ To install the optional leak sensor

1. Turn off the power to the pump and unplug the pump from line power.
2. Glue the mounting bracket for the leak sensor to the pump's drip tray as follows:
   a. Place the locating fixture against the front panel of the pump as shown in Figure 41.

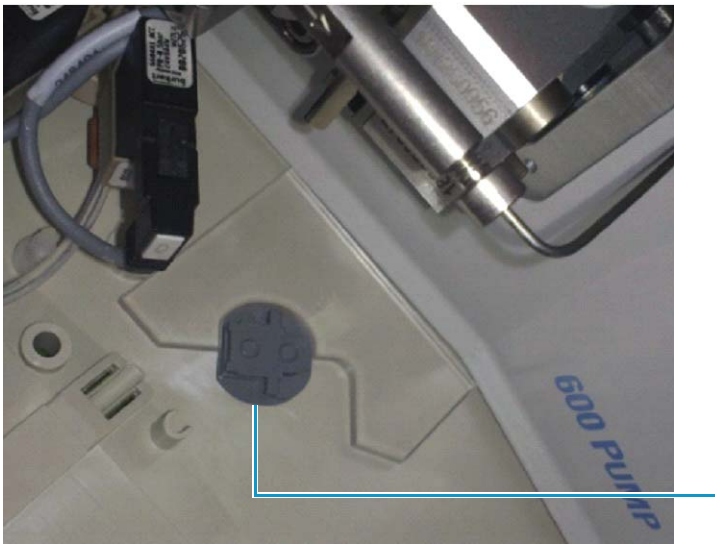
   Figure 41. Appropriate position for the locating fixture

   b. Mix the two-component adhesive on a disposable surface, such as a sheet of weighing paper.
   c. Add a thin layer of adhesive to the back side of the mounting bracket.

d. Adjust the position of the mounting bracket as shown in Figure 42.

Figure 42. Appropriate position for the mounting bracket



e. Gently press the mounting bracket against the drip tray for approximately two minutes.

f. Remove the locating fixture before the adhesive solidifies.

3. Pull the sinker frits above the solvent level in the solvent reservoir bottles. Then disconnect the solvent lines from the degasser inlet ports and drain the solvent in the solvent lines into a waste container.

4. Remove the LDA from the pump (see "Removing the LDA from the Pump" on page 75).

CAUTION Because the pump contains a high voltage supply, turn off the power to the pump and unplug it from line power before you pull the chassis out of the enclosure.

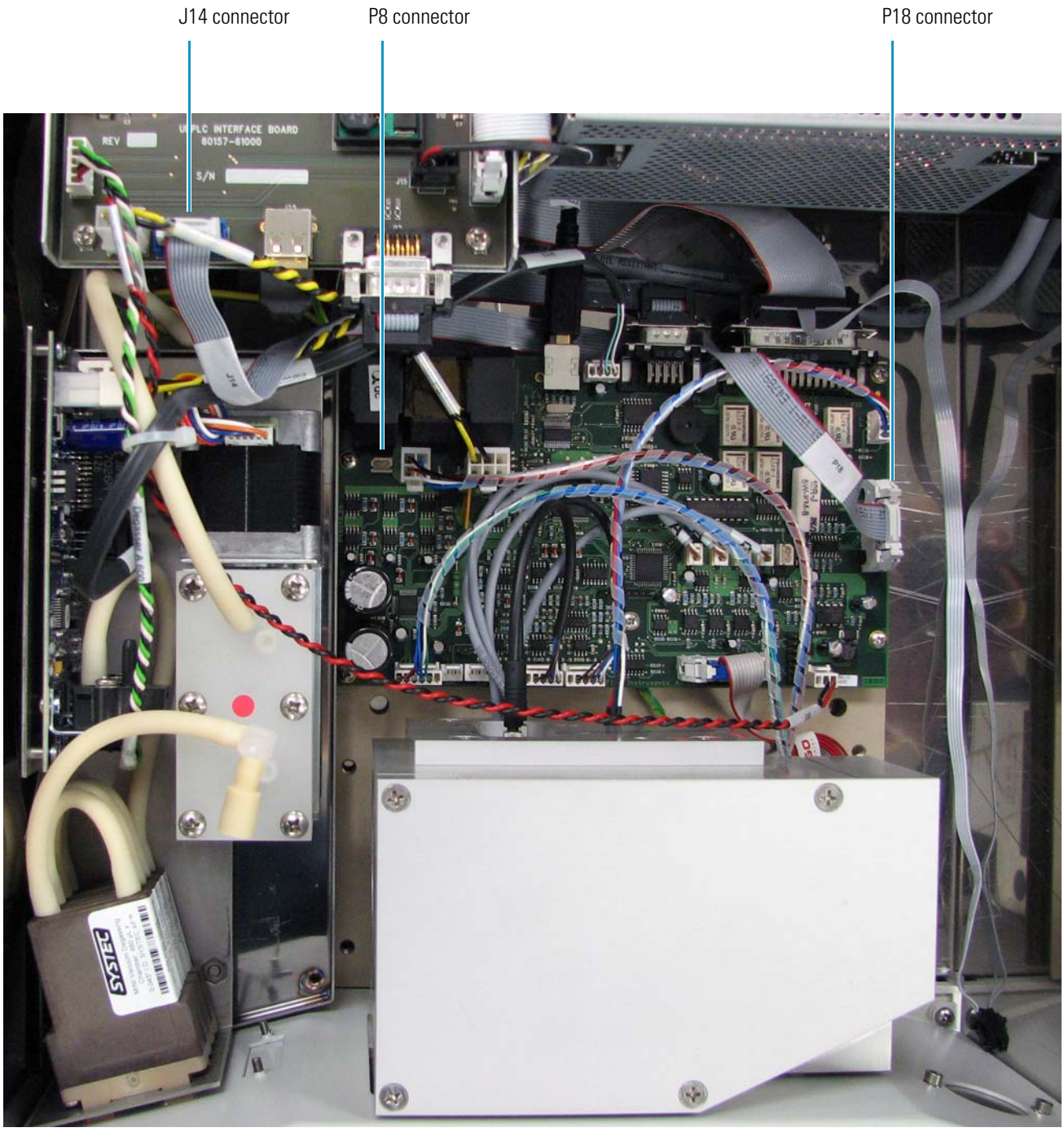
CAUTION To avoid damage to the Interface board and the Controller board, observe precautions for handling electrostatic sensitive devices.

5. Remove the pump chassis from the enclosure (see "Removing the Pump Chassis from the Enclosure" on page 35).

6. Remove the cable that is connected to the J14 connector on the Interface board and the P18 connector on the Controller board (see Figure 43).

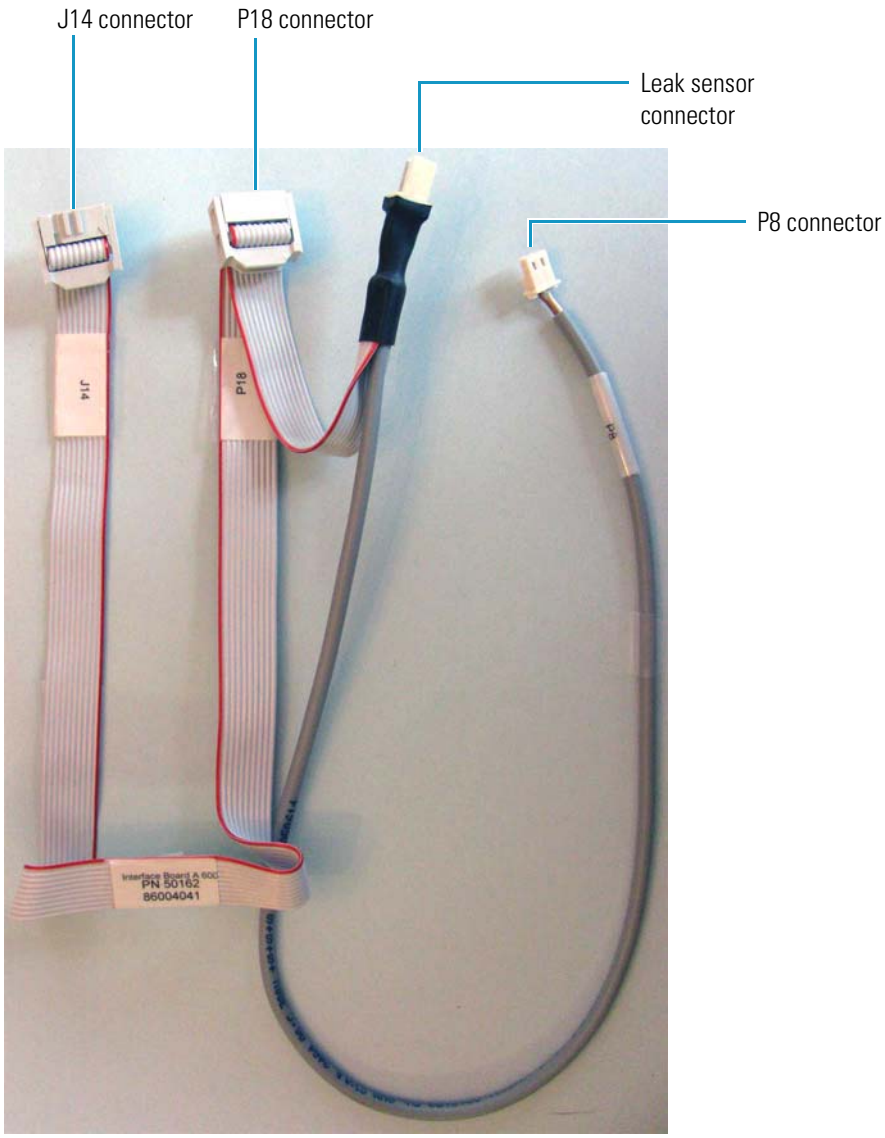
   In step 7 on page 52, you replace this cable with a cable that connects to the J14, P18, and P8 connectors.

Figure 43. Pump chassis with a view of the Interface board and the Controller board



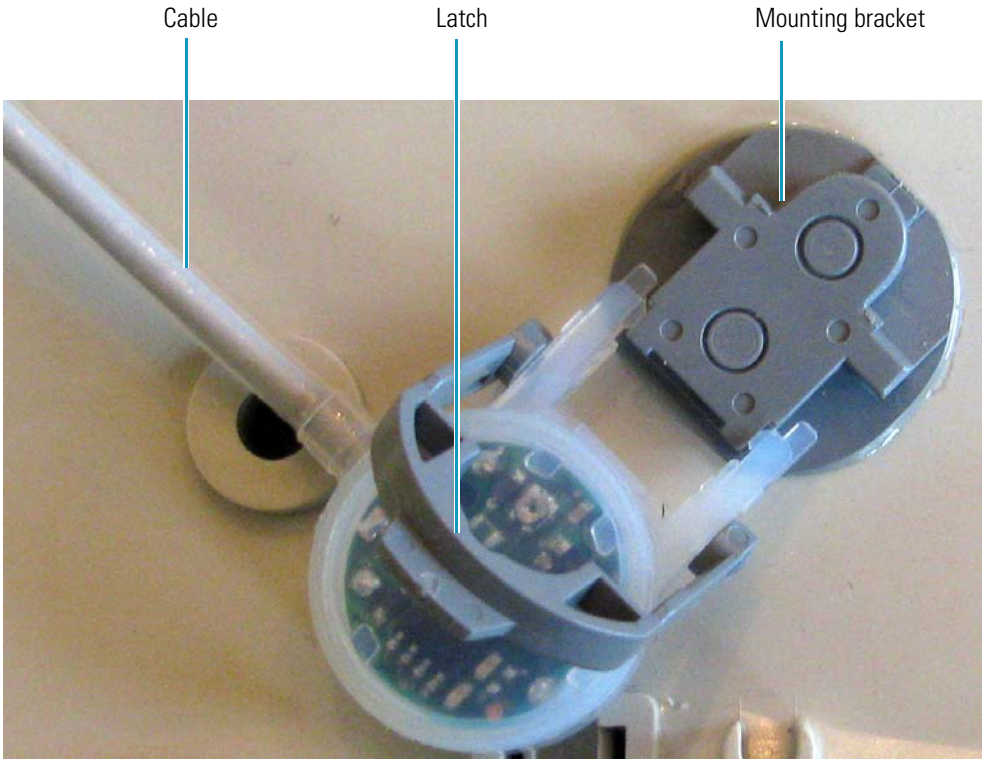
7. Connect the new cable (see Figure 44) to the J14 connector on the Interface board and the P18 and P8 connectors on the Controller board.

Figure 44. New cable (provided in the Leak Sensor Kit)



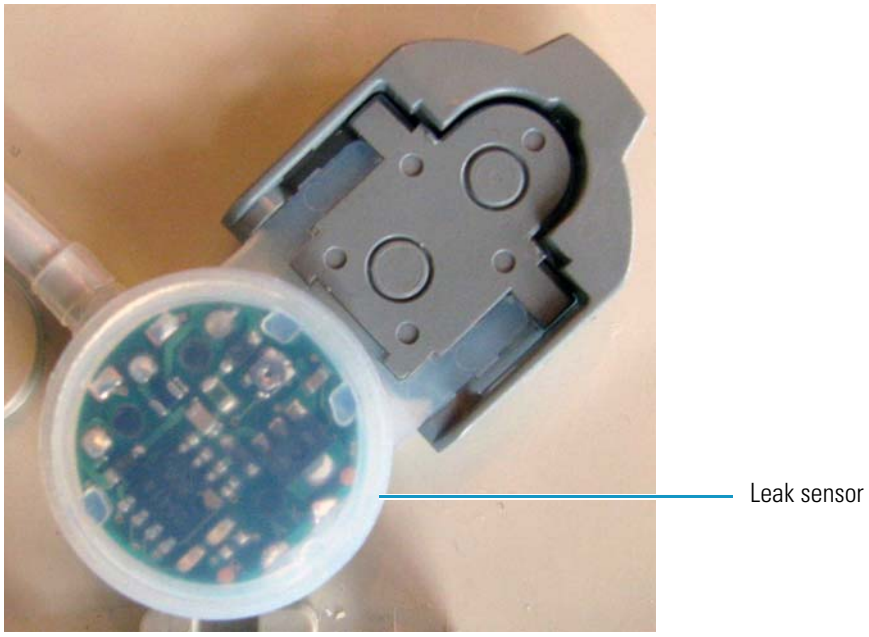
8. Slide the leak sensor onto the mounting bracket (see Figure 45).

Figure 45. Sliding the leak sensor onto the mounting bracket



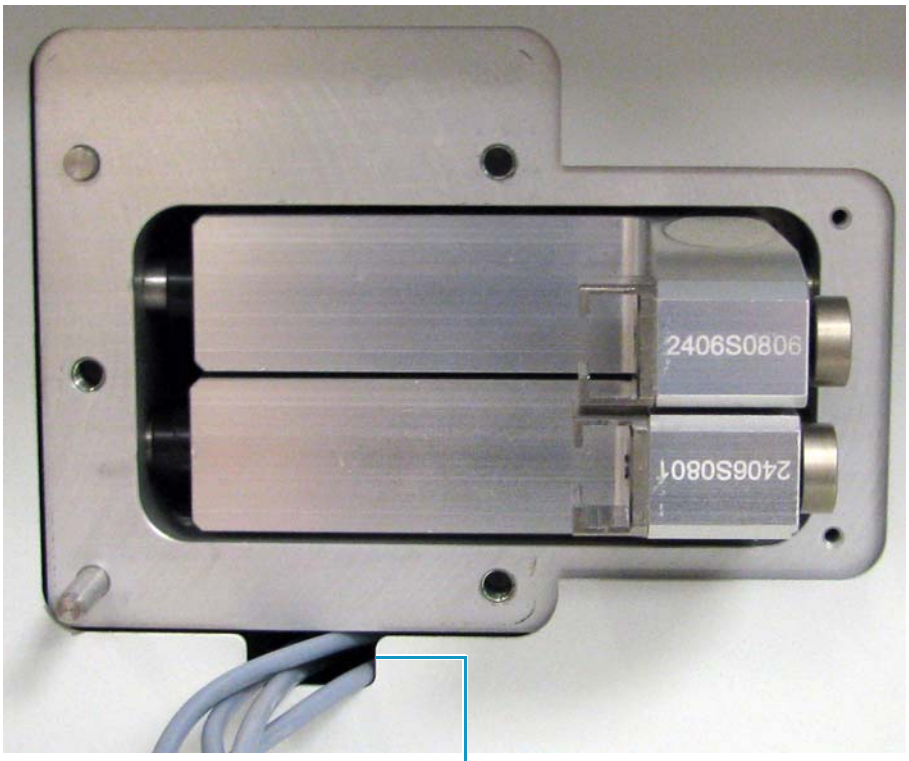
9. Press the leak sensor latch against the mounting bracket until it clicks in place (see Figure 46).

Figure 46. Leak sensor secured to the mounting bracket



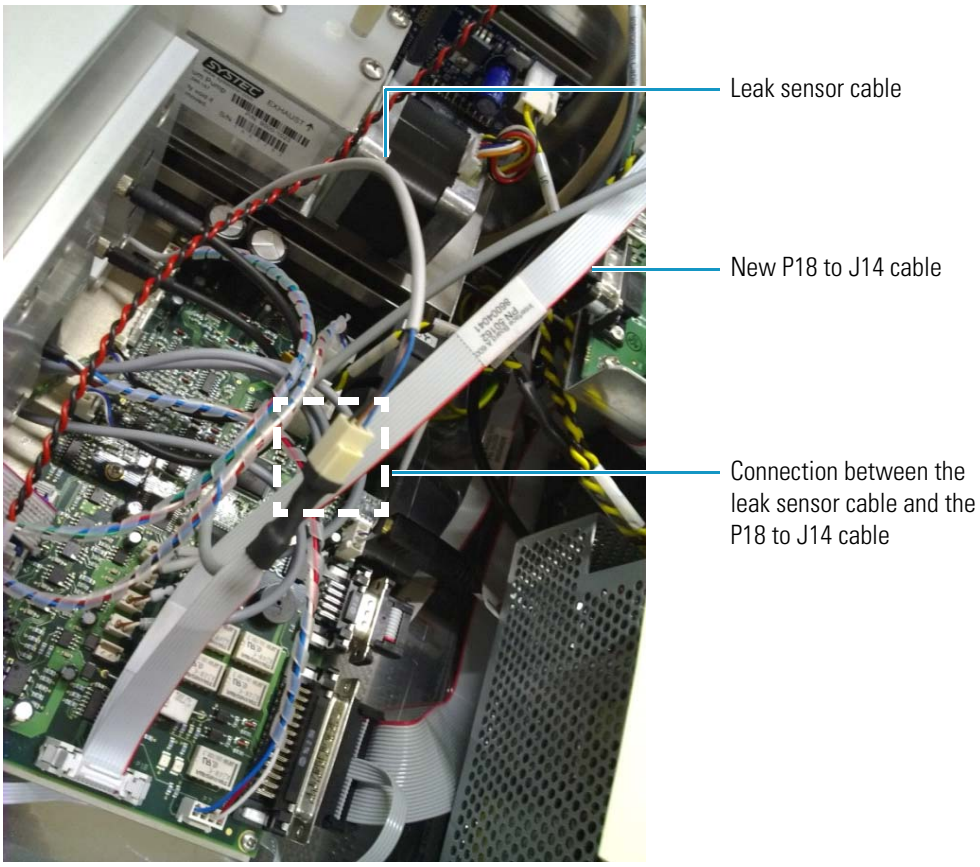
10. Route the leak sensor cable through the slot for the proportioning valve cables on the front panel of the pump (see Figure 47).

Figure 47. Front panel of the pump with the LDA removed



11. Connect the leak sensor cable to the new P18 to J14 cable as shown in Figure 48.

Figure 48. Connection between the leak sensor cable and the new P18 to J14 cable



12. Reconnect the pump chassis to the enclosure (see "Reconnecting the Pump Chassis to the Enclosure" on page 42).

13. Reattach the LDA to the pump's front panel (see "Reattaching the LDA to the Pump" on page 87).

14. Power on the pump.

    While the drip tray is dry, the leak sensor's LED remains green (see Figure 49). If solvent comes in contact with the sensor, the leak sensor's LED turns red (see Figure 50).

Figure 49. Green LED indicates a dry drip tray

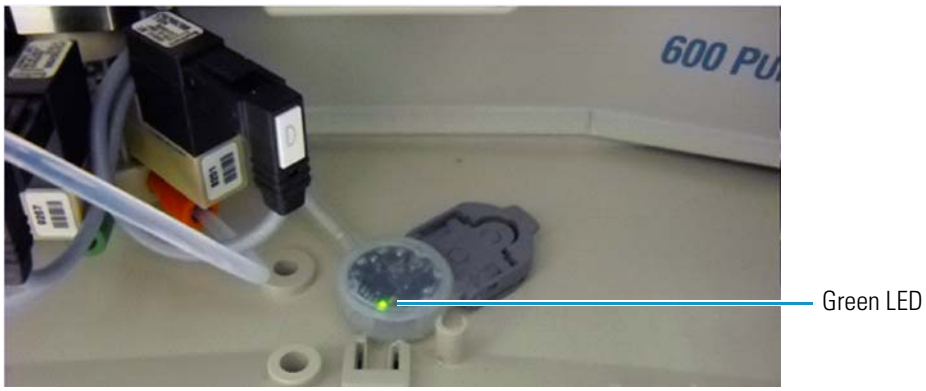
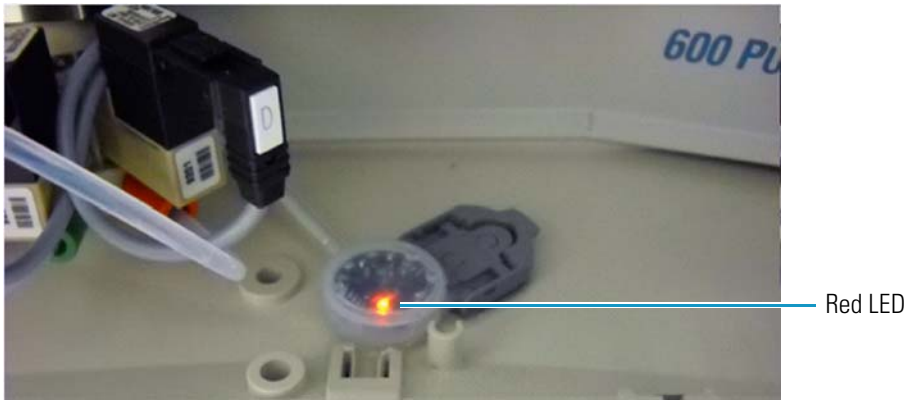


Figure 50. Red LED indicates a wet drip tray



For information on specifying the configuration settings for the leak sensor, see Chapter 4, "Instrument Driver Configuration."

Setting Up Continuous Flushing

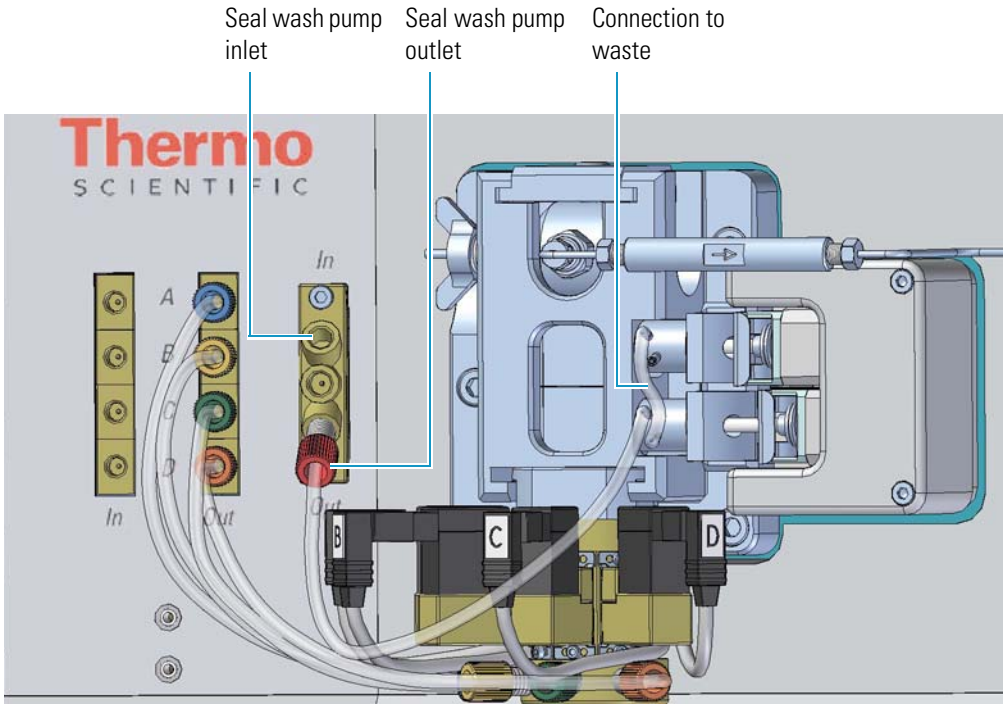
If your Accela or Transcend pump is equipped with a seal wash pump, you can set up continuous flushing of the piston guide bushings. Thermo Fisher Scientific recommends this setup if you use mobile phases with a high concentration of salts.

The Seal Wash Pump Kit (see "Seal Wash Pump Kit" on page 128) contains the seal wash pump, the tubing and fittings that you must have to set up the seal wash pump, and the cable that connects the seal wash pump to the Controller board.

❖ To set up continuous flushing

1. Connect a reservoir of distilled water to the In port (see Figure 51) of the seal wash pump.
2. Using the tubing with the red, flangeless fitting that is provided in the Seal Wash Pump Kit, connect the lower guide bushing to the Out port of the seal wash pump.
3. Using the tubing (without fittings) provided in the Seal Wash Pump Kit, connect the lower wash tubing of the upper guide bushing to a waste reservoir.

Figure 51. Seal wash pump solvent line connections



Instrument Driver Configuration

You can control one or two Accela pumps from your Thermo Scientific chromatography data system or mass spectrometry application.

To configure the device driver for the Accela 600 Pump or Accela 1250 Pump, the Accela pump must be turned on and connected to the data system computer.

To add instrument control for the Accela pump to the data system configuration, follow the appropriate procedure in this chapter.

Contents

ChromQuest Instrument Configuration

To control the Accela 600 Pump or the Accela 1250 Pump from the ChromQuest data system, add an Accela instrument to the ChromQuest Enterprise or add the pump to an existing Accela instrument.

An instrument can include one or two Accela pumps.

❖ To add a new Accela instrument to the ChromQuest Enterprise

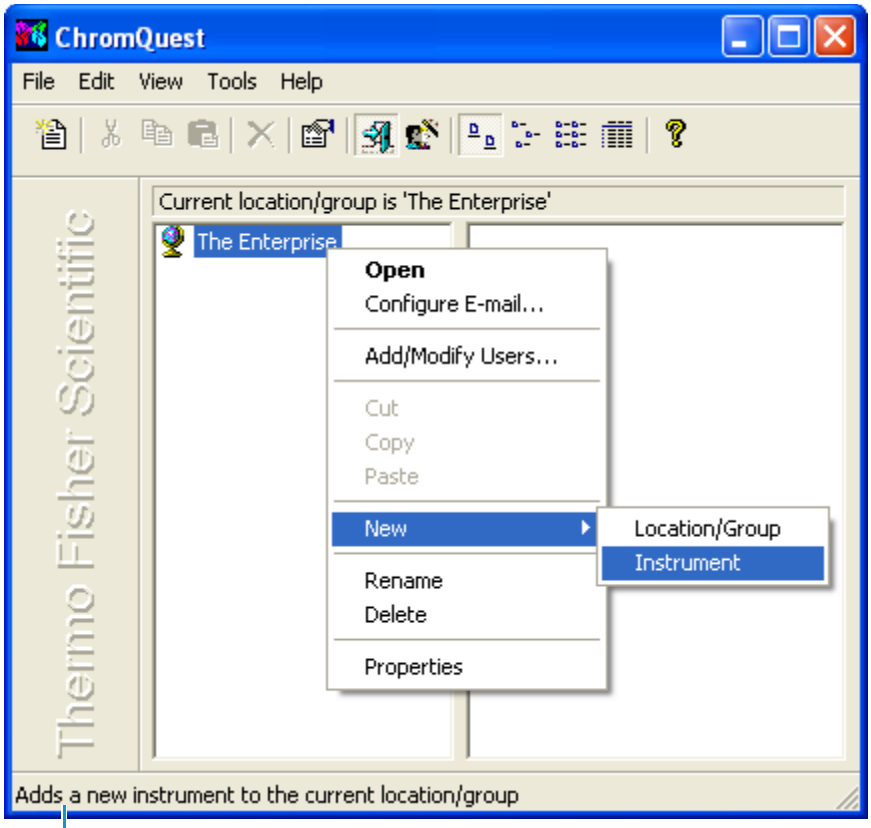
1. Open the ChromQuest data system.

   The Main Menu window appears (see Figure 52).

   IMPORTANT If the Instrument window of the ChromQuest data system is open, close it. You can access the Main Menu window from the Instrument window and modify the instrument's configuration while the Instrument window is open, but you must exit the Instrument window for the changes to take effect.

2. Right-click **The Enterprise**, and then choose **New > Instrument** from the shortcut menu (see Figure 52).

Figure 52. Adding an instrument to the Enterprise



Action performed by choosing this menu item

The New Instrument icon appears in the right pane.

3. To open the Instrument Configuration dialog box, do one of the following:

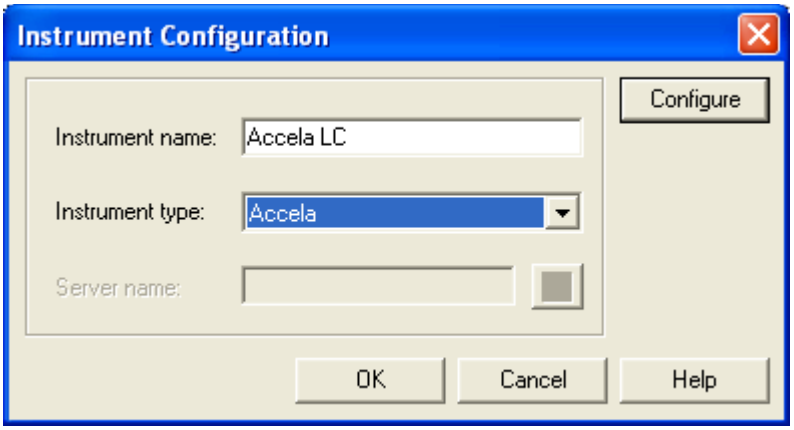
   - Select the new instrument, and then choose **File > Configure > Instrument**.

   –or–

   - Right-click the new instrument and choose **Configure > Instrument** from the shortcut menu.

     The Instrument Configuration dialog box appears (see Figure 53).

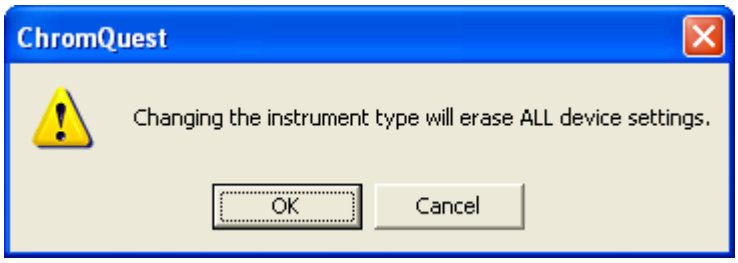
Figure 53. Instrument Configuration dialog box



4. In the Instrument Name box, type a name for the instrument to distinguish it from other instruments with different configurations or stack IDs.
5. In the Instrument Type list, select **Accela**.

   The message shown in Figure 54 appears.

   Figure 54. Message that appears when you select an instrument type



6. Do one of the following:

   - To create a new instrument, click **OK** to close the message box.

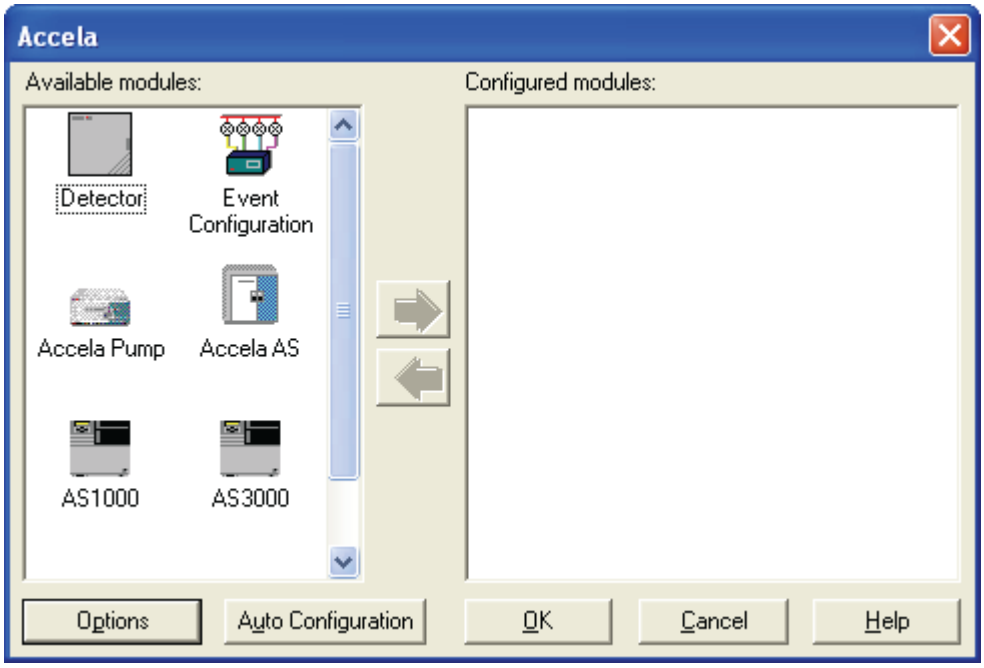
   –or–

   - To modify the configuration of an existing instrument, click **Cancel** and do not make a selection in the Instrument Type list.

7. Click **Configure**.

   The Accela dialog box appears (see Figure 55).

Figure 55. Accela dialog box



To add one or two pumps to the instrument configuration, leave the Accela dialog box open and go to the next procedure.

❖ To add one or two Accela pumps to the instrument configuration

1. Open the Accela dialog box as described in the previous procedure.
2. In the Available Modules list, double-click  (Accela Pump).

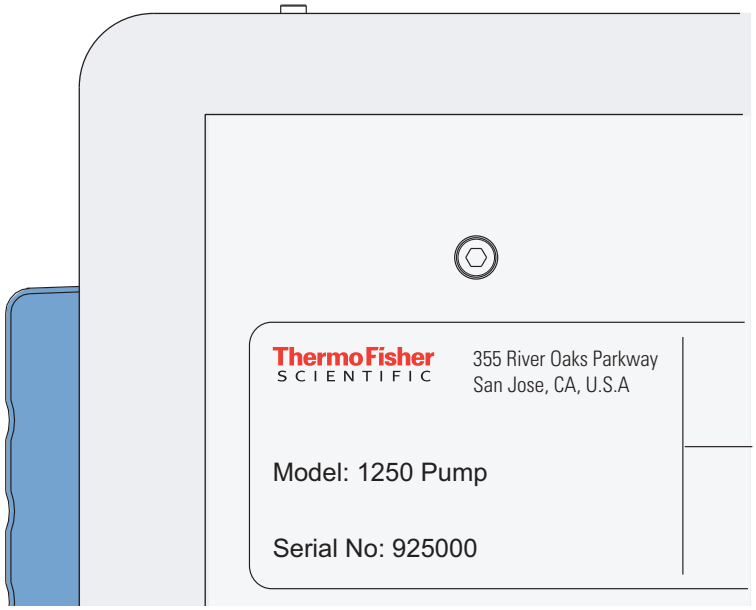
   A copy of the Accela Pump icon appears in the Configured Modules pane.
3. In the Configured Modules pane, double-click  (Accela Pump).

   The Accela Pump Configuration dialog box appears.
4. In the Serial Number list, select the serial number for the pump.

   If you have connected two pumps to the data system computer, the last five digits of the serial numbers for both pumps appear in the two Serial Number lists.

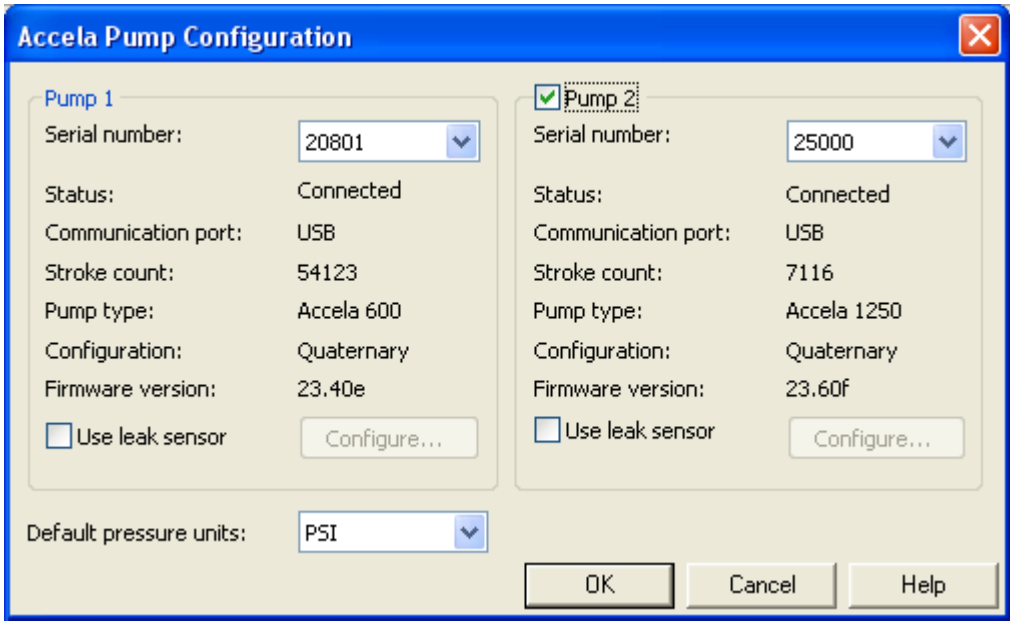
   The serial numbers in the Serial Number list match the last five digits of the serial numbers on the back panels of the pumps (see Figure 56).

Figure 56. Serial number on the pump's back panel



The Status readback changes from Disconnected to Connected, and the Pump Type readback for Pump 1 (and Pump 2 for a dual-pump system) specifies Accela 600 or Accela 1250 (see Figure 57). In a dual-pump system, the two pumps can be different pump types.

Figure 57. Accela Pump Configuration dialog box with the pump's serial number selected



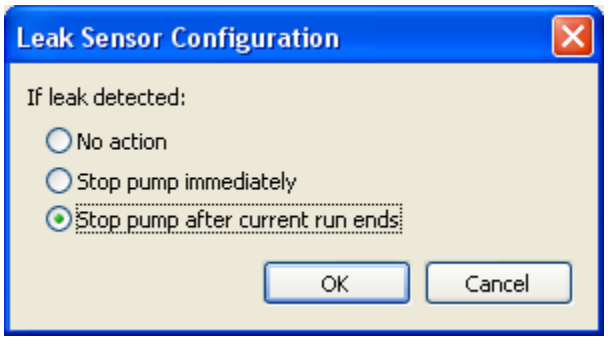
5. If your pump has a leak sensor, specify the leak sensor settings as follows:
   a. Select the **Use Leak Sensor** check box (see Figure 57).

      The Configure button becomes enabled.

b. Click **Configure**.

The Leak Sensor Configuration dialog box appears (see Figure 58).

Figure 58. Leak Sensor Configuration dialog box



c. Select the action that you want the pump to take if the leak sensor detects a leak.

d. Click **OK** to accept the setting and close the Leak Sensor Configuration dialog box.

6. In the Default Pressure Units list, select the pressure units that you want the data system to display.

   The available selections are PSI, bar, and MPa.

7. Click **OK** to accept the configuration and close the Accela Pump Configuration dialog box.

8. Click **OK** to close the Accela dialog box.

9. Click **OK** to close the Instrument Configuration dialog box.

Xcalibur Instrument Configuration

If you are controlling the Accela 600 Pump or Accela 1250 Pump from a 2.0.7 version of the Xcalibur data system, use the Xcalibur Instrument Configuration application to add the pump to the instrument configuration.

❖ **To add one or two Accela pumps to the Xcalibur instrument configuration**

1. If the Xcalibur data system is open, close it.

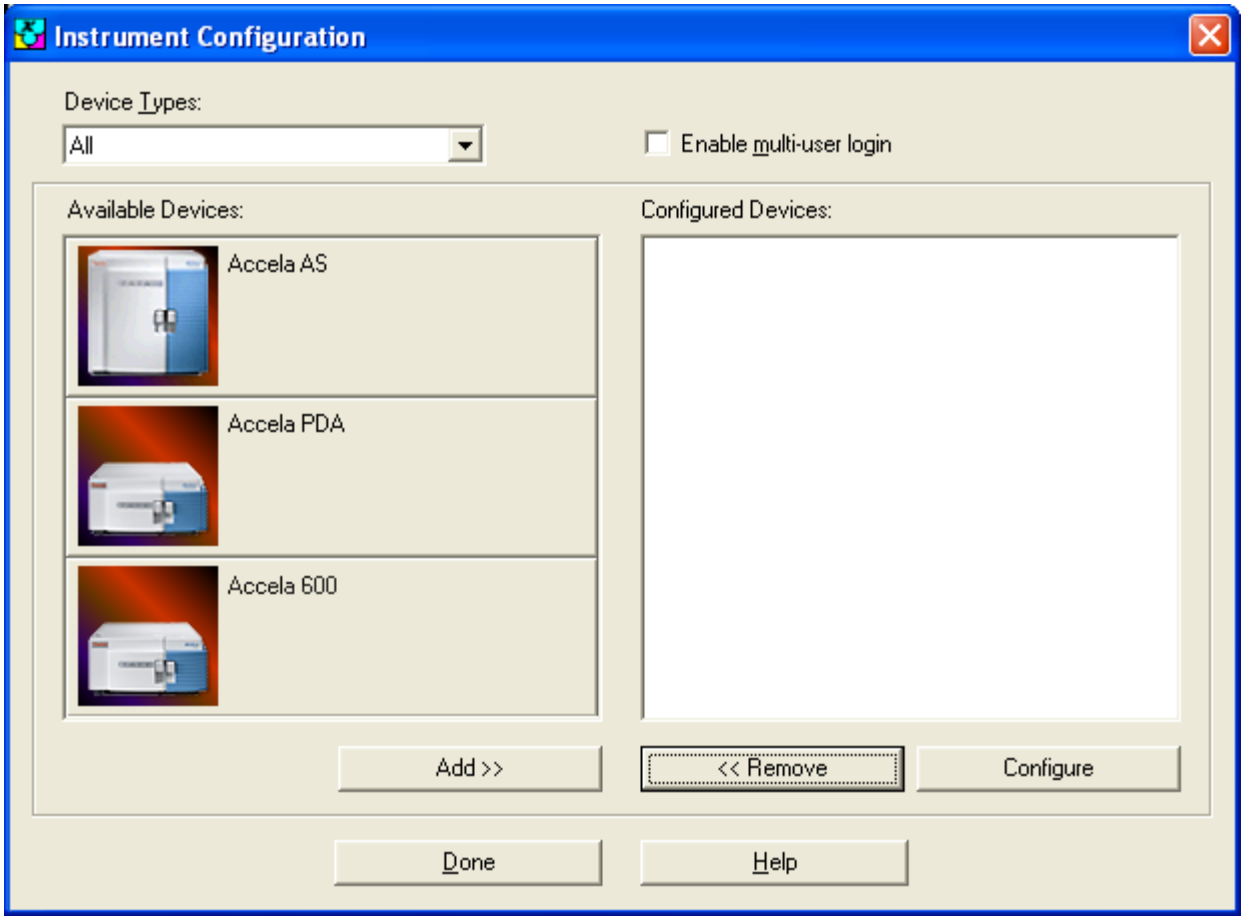
1. Connect the pump or pumps to the data system computer.

2. Turn on pump 1 by pressing its power switch. If you have a dual-pump system, turn off pump 2.

3. For Xcalibur versions below 2.1, from the computer desktop, choose **Start > Programs > Xcalibur > Instrument Configuration**.

   The Instrument Configuration window appears (see Figure 59).

Figure 59. Instrument Configuration window (for Xcalibur version 2.0.7)



4. To complete the configuration setup, do one of the following:
   - To add one pump to the instrument configuration, go to step 5 on page 67 in "Adding Pump 1 to the Instrument Configuration."
   - To add two pumps to the instrument configuration, go to step 5 of this procedure.
5. To add two pumps to the instrument configuration, do the following:
   a. Follow step 5 through step 10 on pages 67 to 68 in "Adding Pump 2 to the Instrument Configuration."
   b. Ensure that pump 2 is connected to the data system computer.
   c. Turn on pump 2.
   d. Reopen the Instrument Configuration window as described in step 3 on page 64.
   e. Go to step 4 in "Adding Pump 2 to the Instrument Configuration" on page 69.

Thermo Foundation Instrument Configuration

You can control one or two Accela pumps from the data system computer. A dual-pump system can contain two Accela 600 Pumps, two Accela 1250 Pump, or an Accela 600 Pump and an Accela 1250 Pump. The Accela 600 Pump and Accela 1250 Pump drivers can recognize and control either pump.

Tip To increase throughput for a gradient analysis, you can set up your liquid chromatography/mass spectrometry (LC/MS) system in a dual-pump, dual-column configuration and equilibrate one column while performing sample elution with the other column.

To alternate columns between consecutive injections, use two instrument methods. In the first method, pump 1 produces a gradient for sample elution on the first column, and pump 2 produces a gradient that re-equilibrates the second column. In the second method, pump 1 produces a gradient for sample elution on the second column, and pump 2 produces a gradient that re-equilibrates the first column.

Using these alternating instrument methods (along with valve switching) allows for each injection to run through a separate column and removes the wait time for column equilibration.

To minimize the gradient delay volume between the eluting pump's proportioning valve and the autosampler's injection valve, place the eluting pump on top of the equilibration pump. Typically, the eluting pump is designated as pump 1 and the equilibration pump is designated as pump 2.

Depending on whether you are adding one or two pumps to your instrument configuration, follow one or both of these procedures:

- Adding Pump 1 to the Instrument Configuration
- Adding Pump 2 to the Instrument Configuration

Adding Pump 1 to the Instrument Configuration

❖ **To add the pump (or pump 1 of a dual-pump system) to the instrument configuration**

1. Connect the pump or pumps to the data system computer.
2. Turn on pump 1 by pressing its power switch. If you have a dual-pump system, turn off pump 2.
3. Close the data system if it is open.
4. From the computer desktop, choose **Start > Programs > Thermo Foundation 1.0 > Instrument Configuration**.

   The Unloading Device Drivers status box appears (see Figure 60), followed by the Thermo Foundation Instrument Configuration dialog box (see Figure 61).

Figure 60. Unloading Device Drivers status box

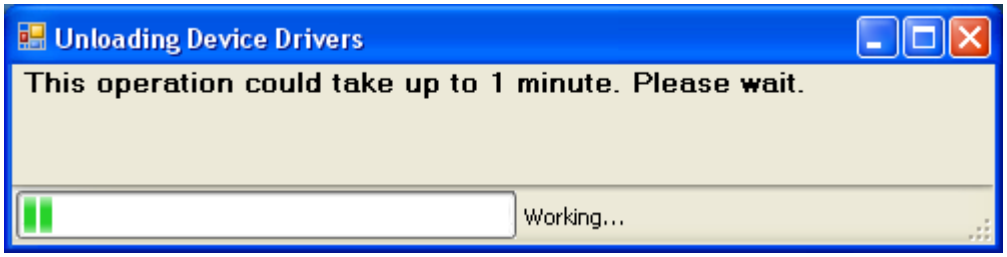
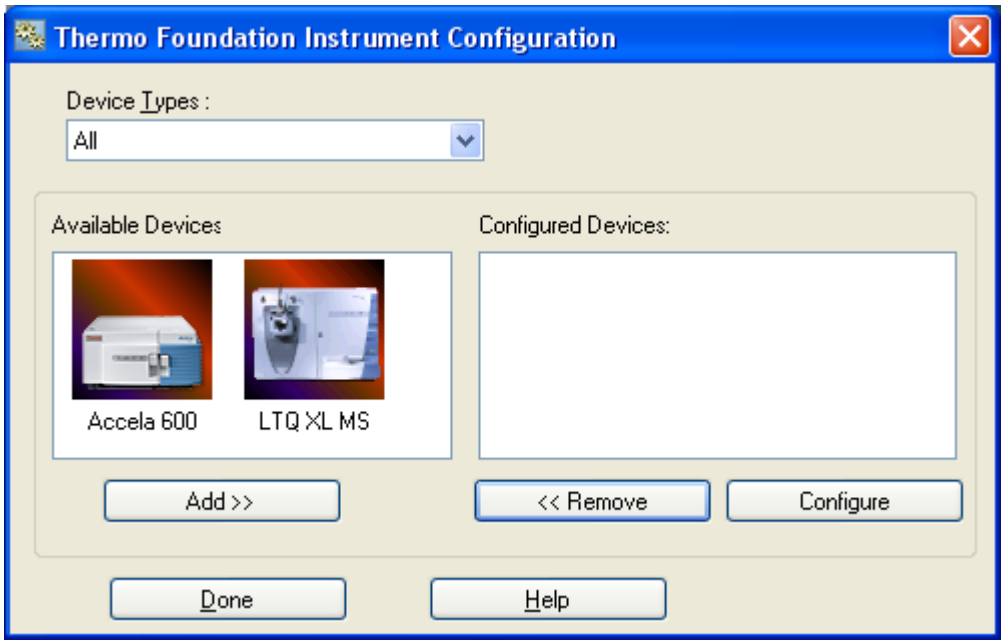


Figure 61. Thermo Foundation Instrument Configuration dialog box




Accela 600

5. In the Available Devices area, double-click the **Accela 600** icon or the **Accela 1250** icon.

   Note Because you can install only one Accela pump driver, the Available Devices area contains either an Accela 600 or Accela 1250 icon.

   A copy of the Accela *pump type* icon appears in the Configured Devices area.

   Tip Even though you can only install one pump driver, you can control both the Accela 600 Pump and the Accela 1250 Pump from one data system computer because the Accela 600 Pump and Accela 1250 Pump drivers can recognize and control both pump models.

6. In the Configured Devices area, double-click the **Accela 600** or the **Accela 1250** icon.

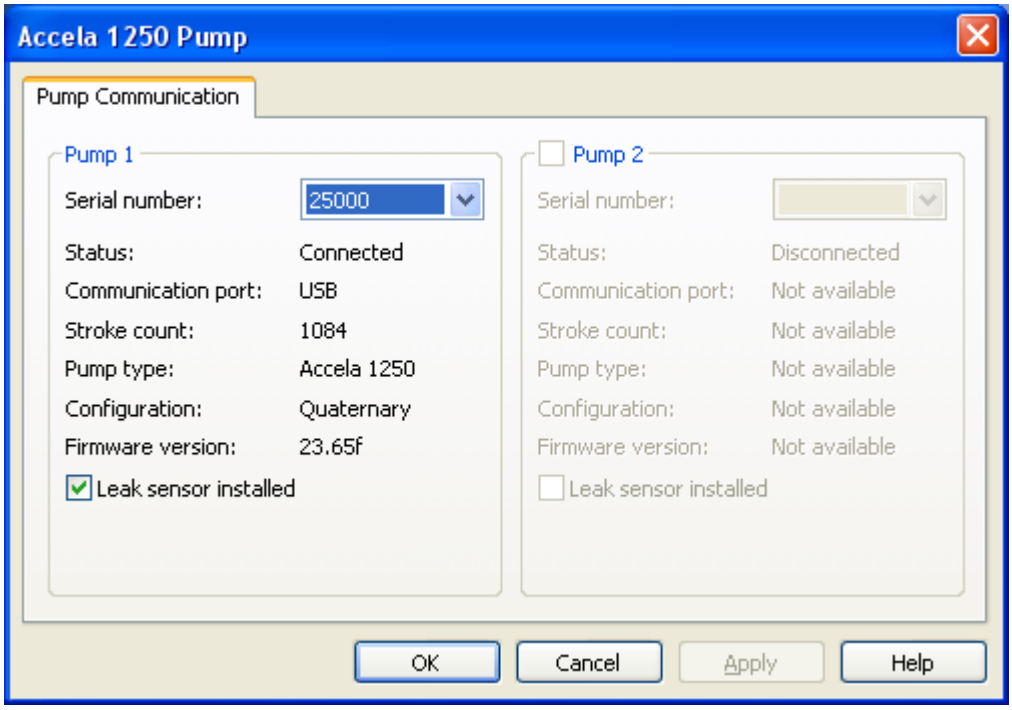
   The Accela *pump type* dialog box appears (see Figure 62). The Serial Number list contains the serial number of the Accela pump that is powered on and connected to the data system computer.

7. Ensure that the Serial Number list displays the pump's serial number and that the Status readback displays Connected.

The serial number is listed on the pump's back panel (see Figure 56 on page 63).

Note The firmware version compatible with the current version of LC Devices is subject to change.

Figure 62. Accela *pump type* dialog box



8. If your Accela pump has a leak sensor, select the **Leak Sensor Installed** check box.

   The leak sensor is an option for the Accela 600 Pump and the Accela 1250 Pump. The leak sensor has an optical sensor that turns red when covered by liquid.

   For instructions about installing the leak sensor, see "Leak Sensor Installation" on page 49.

   For information about setting up leak sensor actions, such as stopping a run, see "Specifying the Leak Sensor Settings in the Xcalibur Data System" on page 70.

9. Click **OK** to accept the configuration settings and close the Accela *pump type* dialog box.
10. Click **Done** to close the Instrument Configuration application.

    If you have a dual-pump system, continue to the next procedure.

Adding Pump 2 to the Instrument Configuration

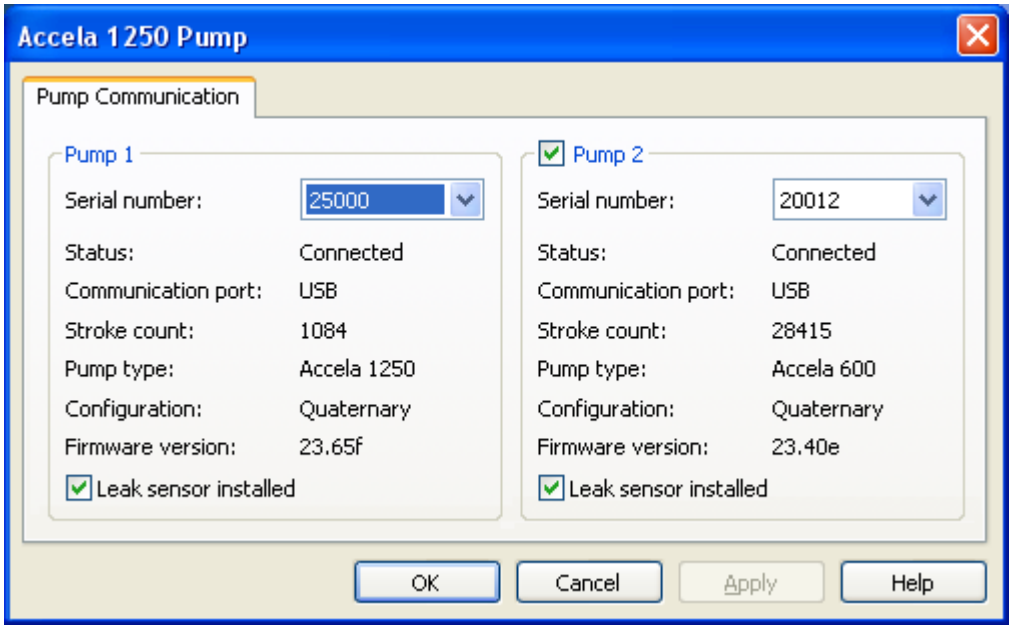
❖ **To add pump 2 to the instrument configuration for a dual-pump system**

1. Ensure that pump 2 is connected to the data system computer.
2. Turn on pump 2.
3. From the computer desktop, choose **Start > Programs > Thermo Foundation 1.0 > Instrument Configuration**.

   The Unloading Device Drivers status box appears (see Figure 60), followed by the Thermo Foundation Instrument Configuration application.
4. In the Configured Devices area, double-click the Accela *pump type* icon.

   The Accela *pump type* dialog box appears.
5. Select the Pump 2 check box (see Figure 63).

   Figure 63. Accela 1250 Pump dialog box with the settings for a dual-pump system



6. Ensure that the Serial Number list displays the pump's serial number and that the Status readback displays Connected.

   The serial number is listed on the pump's back panel (see Figure 56 on page 63).
7. If your Accela pump has a leak sensor, select the **Leak Sensor Installed** check box.
8. Click **OK** to accept the configuration settings and close the Accela *pump type* dialog box.
9. Click **Done** to close the Instrument Configuration application.

Specifying the Leak Sensor Settings in the Xcalibur Data System

The leak sensor is a hardware option that can detect the presence of liquid on the pump's drip tray. When liquid comes in contact with the leak sensor, the leak sensor's optical LED turns green and the leak sensor sends a signal to the data system.

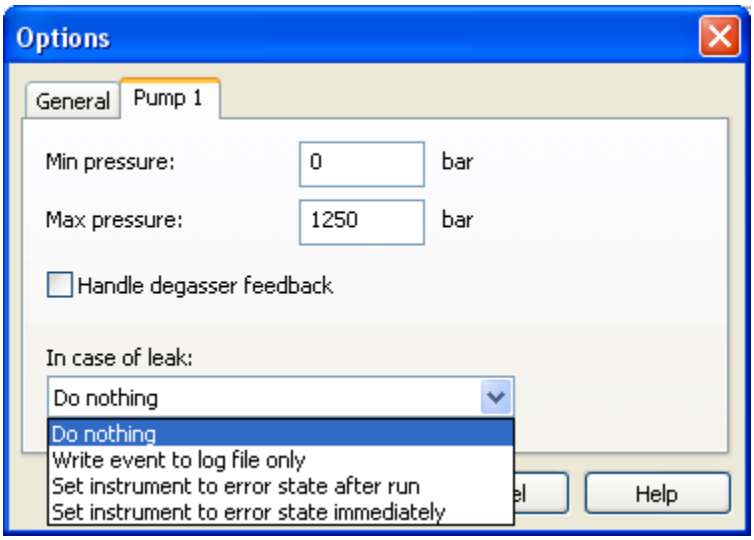
❖ To set up the leak sensor actions

1. Check the configuration settings for your Accela pump (see "Thermo Foundation Instrument Configuration" on page 66). Ensure that the **Leak Sensor Installed** check box is selected.
2. Open the Xcalibur Instrument Setup window.
3. In the view bar, click the icon that represents your Accela pump.

   The instrument setup view for your Accela pump appears.
4. From the menu bar, choose **Accela 600 Pump** or **Accela 1250 Pump > Options**.

   The Options dialog box appears (see Figure 64).

Figure 64. Options dialog box



5. Select the action that you want the pump to take when the leak sensor detects a leak.

   The default selection is Do nothing.

Selection	Meaning
Do Nothing	The pump pistons continue moving.
Write Event to Log File Only	The pump pistons continue moving, but the following text appears in the log file: Leak detected.
Set Instrument to Error State after Run	When the current run ends, the pump pistons stop moving and the sequence pauses.
Set Instrument to Error State Immediately	When the leak sensor detects the presence of liquid on the pump's drip tray, the pump pistons stop moving and the sequence pauses.

Tip To restart the pump after the leak sensor detects a leak, do the following:

1. Stop the sequence and delete it from the run queue.
2. Close the data system.
3. Fix the leak and make sure that the pump's drip tray is dry and that the leak sensor LED is green.
4. Reopen the data system and check the status of the instrument's modules.
5. Resubmit the sequence.

–or–

1. Fix the leak and make sure that the pump's drip tray is dry and that the leak sensor LED is green.
2. Open the Information view in the Xcalibur data system.
3. Right-click the directory listing for the pump and choose **Turn Device On** from the shortcut menu.

4. Click **OK** to accept the selection and close the Options dialog box.

Maintenance

To maintain the optimal performance of your Accela pump, follow the "Maintenance Schedule" on page 74 and the procedures in this chapter.

CAUTION Read all safety precautions before performing any maintenance procedures on the pump. See "Safety Information" on page xvi.

CAUTION The instrument contains voltage lines. Switch off the power and disconnect the power cable prior to servicing the instrument. There is no need to open the pump enclosure, however, as all user serviceable components are outside of the instrument.

Contents

Maintenance Schedule

To ensure optimal performance of the pump, perform preventive maintenance at regularly scheduled intervals. Perform corrective maintenance when you observe poor performance or when you have been instructed to do so by a Thermo Fisher Scientific field service representative.

Tip With time, acetonitrile mobile phases coat the sapphire check valve seats with an aliphatic amine residue that can cause the check valves to stick. To prevent residue buildup, periodically pump HPLC-grade methanol or isopropanol (IPA) through the system as described in "Flushing the LDA" on page 99. If you are using a buffered mobile phase, pump a non-buffered solvent that is miscible with the buffered mobile phase through the system before pumping methanol or IPA through the system.

Table 12 lists the recommended maintenance schedule for the pump.

Table 12. Maintenance frequency

Procedure	Frequency	Page
Flushing the LDA	If the LC pump does not have the optional seal wash pump, flush the LDA once per day if you use buffered mobile phases and once per month if you use mobile phases that contain acetonitrile.	99
Flushing the Piston Guide Bushings	Once per day if you use buffered mobile phases and you do not have the seal wash pump installed	100
Replacing the Primary Piston Seals	Every 6 to 12 months depending on usage	92
Cleaning the Check Valves	Every 6 to 12 months if you use buffered mobile phases	98
Cleaning the Pistons	Every 6 to 12 months depending on usage	98
Cleaning the Instrument Casing	As needed	99
Removing Air from the Piston Chambers	As needed	101
Cleaning the Displacement Chambers and the Inlet Module	As needed	102
Replacing the Fuses	As needed	103
Replacing the Secondary Piston Seals	As needed	96

Accessing the LDA Components

To replace the primary piston seals or to clean the components of the LDA, you must detach the LDA from the pump, and then disassemble the LDA. To access the LDA components and return the pump to operating condition, follow these procedures:

1. Removing the LDA from the Pump
2. Dismantling the LDA
3. Reassembling the LDA
4. Reattaching the LDA to the Pump

For a description of the LDA, see "Liquid Displacement Assembly (LDA)" on page 4.

Removing the LDA from the Pump

Remove the LDA to access the piston seals, which you replace during regularly scheduled preventive maintenance.

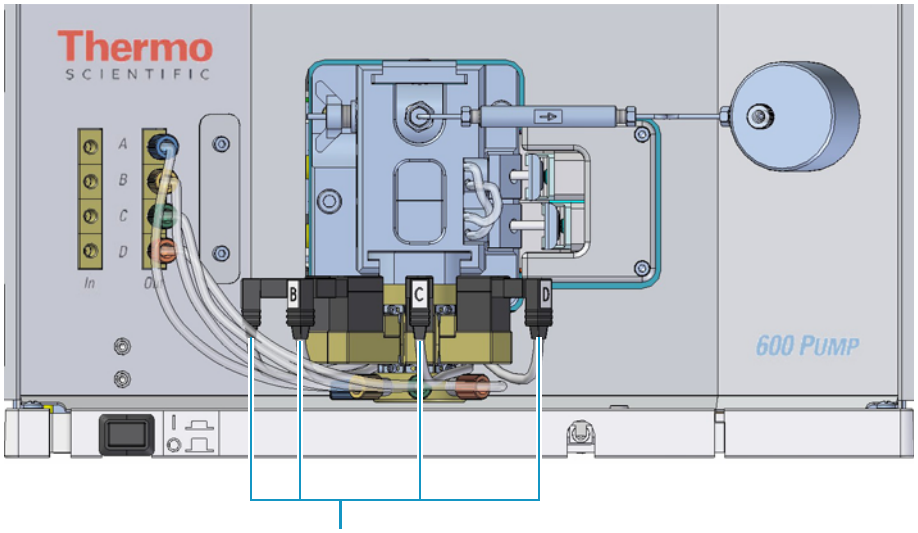
Removing the LDA requires these tools:

Tool	Use
1/4 in. open-end wrench	To disconnect the high-pressure lines
#2 Phillips head screwdriver	To disconnect the chassis from the enclosure
	To disconnect the LED cover
4 mm hex wrench	To loosen the clamping screws
	To loosen the compression lid set screw
4 mm ball driver	To loosen the LDA attachment screws
	To loosen the fastening screws that secure the holding hooks to the LDA
2.5 mm ball driver	To remove the Z-arm cover

❖ To remove the liquid displacement assembly

1. Turn off the power to the pump.
2. Unplug all four inlet valves (see Figure 65).

Figure 65. Inlet valves connected to the LDA



3. Disconnect all four solvent lines from the inlet module (see Figure 66 and Figure 67).

Figure 66. Pump with inlet valves cables removed and solvent lines connected

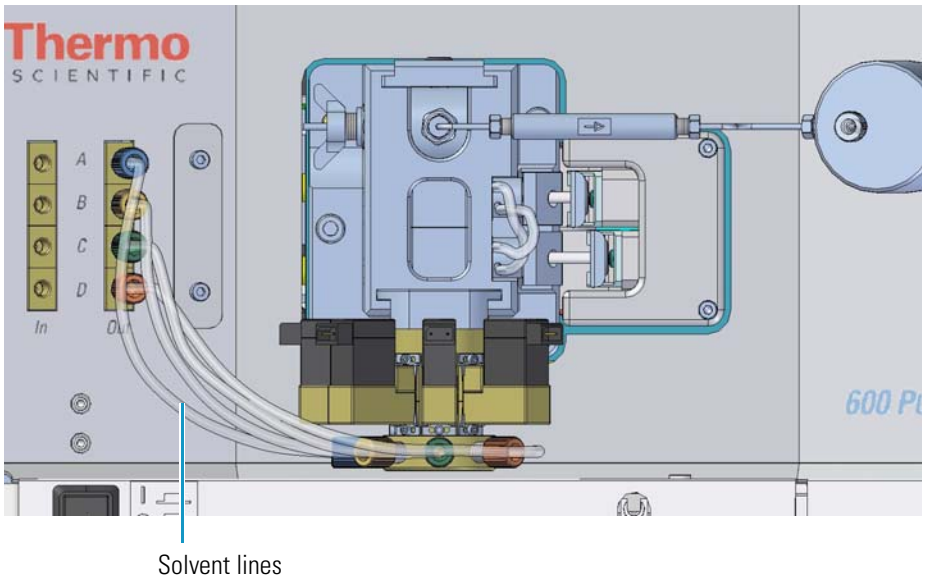
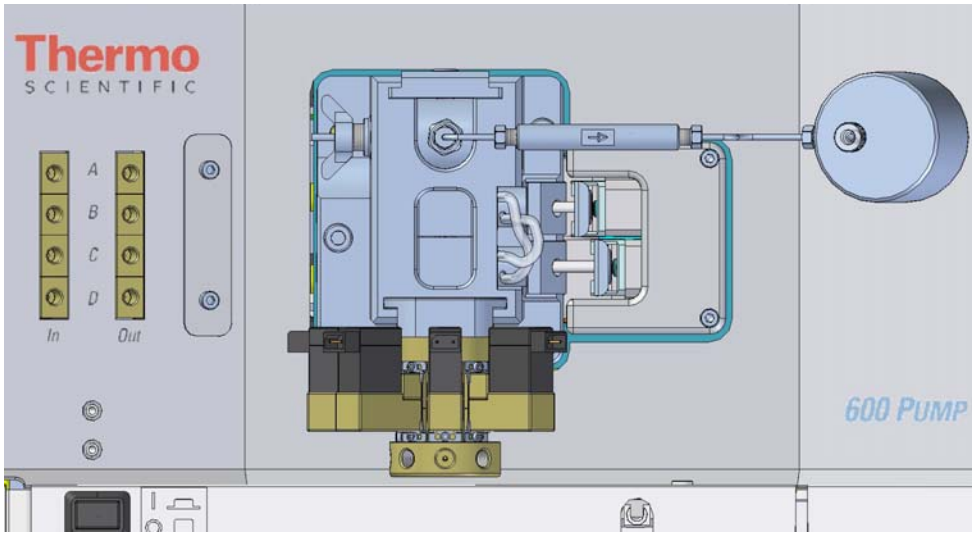
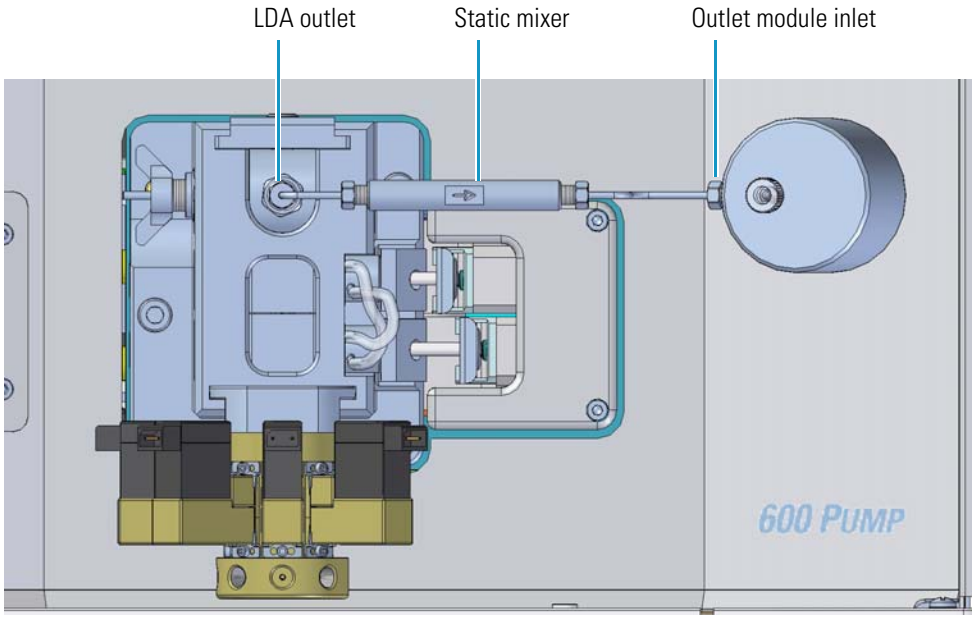


Figure 67. Pump with the solvent lines disconnected



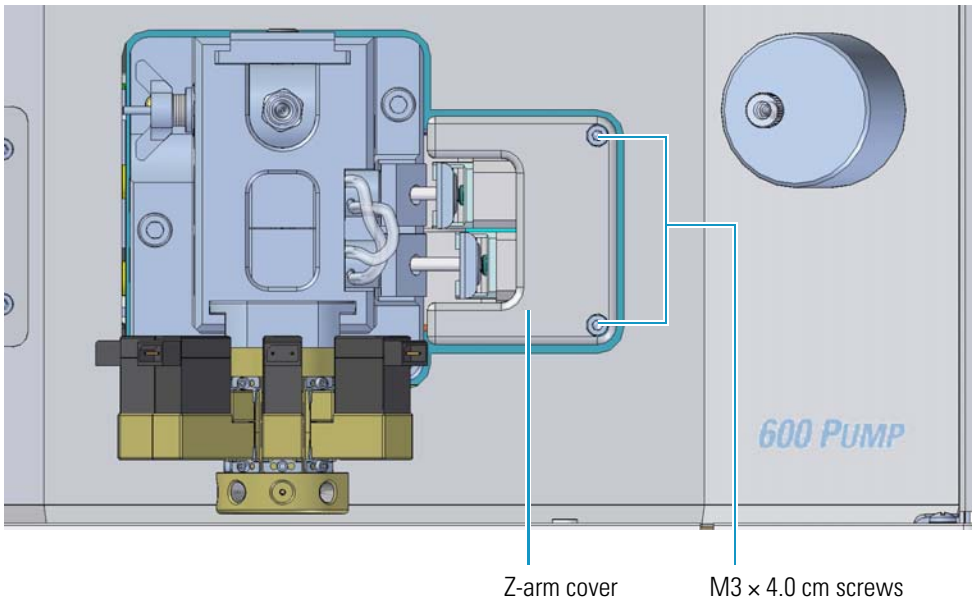
4. Using a 1/4 in. open-end wrench, unscrew the static mixer at the outlet of the LDA and at the inlet of the outlet module (see Figure 68).

Figure 68. Static mixer connections to the LDA and the outlet module



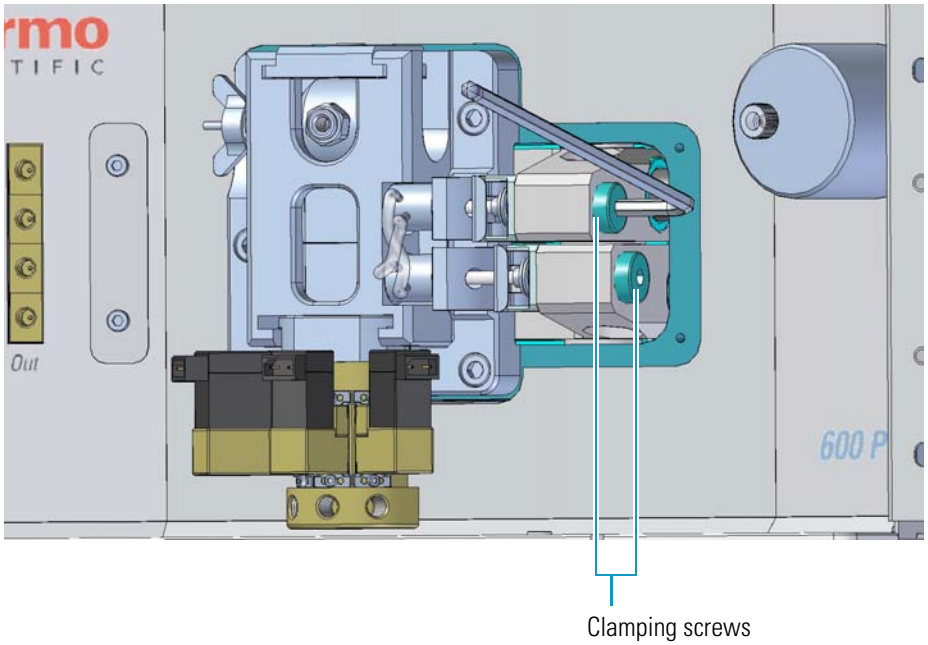
5. Using a 2.5 mm ball driver, loosen the two M3 × 4.0 cm screws on the Z-arm cover and remove the cover (see Figure 69).

Figure 69. Z-arm cover in place over the Z-arms



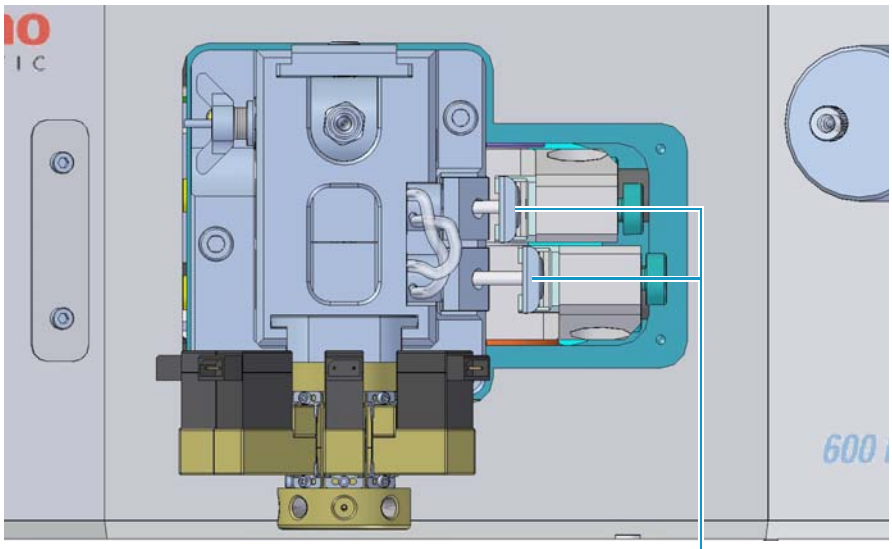
6. Using a 4 mm hex wrench, loosen the two clamping screws by three or four turns (see Figure 70).

Figure 70. Two clamping screws that secure the position of the pistons



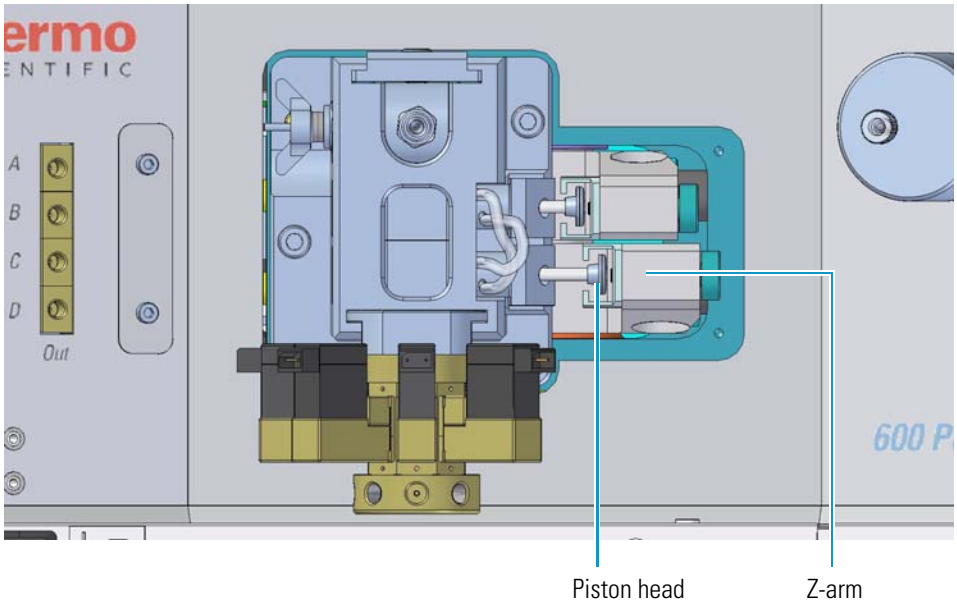
7. Pull out the two piston retaining springs (see Figure 71).

Figure 71. Location of the two piston retaining springs



8. Gently push the piston heads to the left so that they do not contact the Z-arms (see Figure 72).

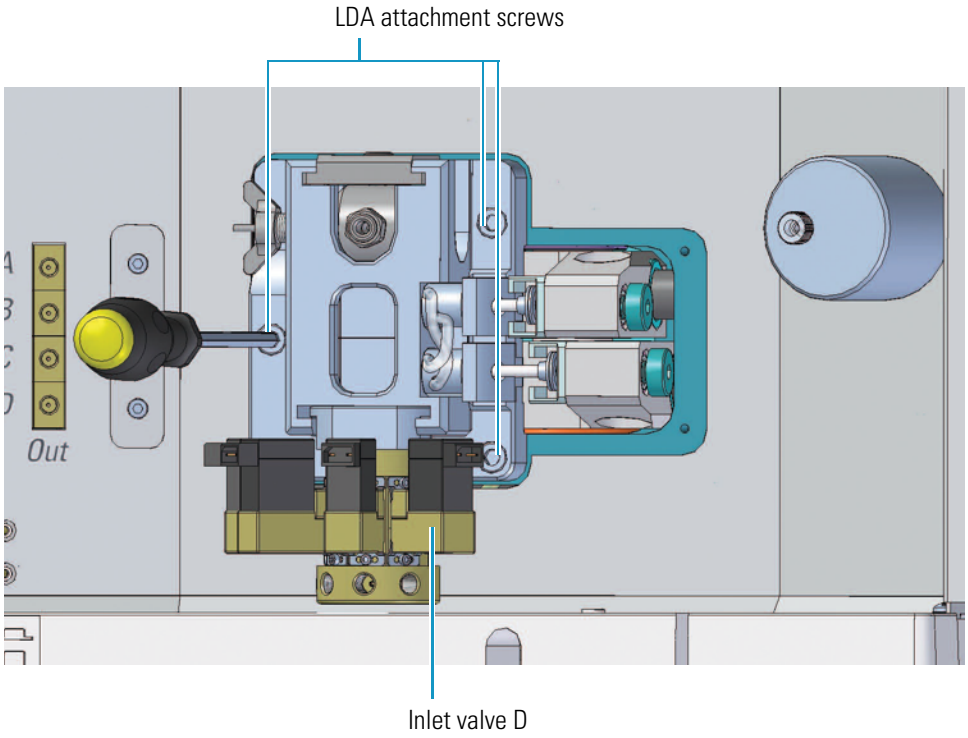
Figure 72. Piston heads pushed to the left away from the Z-arms



9. Using a 4 mm ball driver, loosen the three LDA attachment screws (see Figure 73).

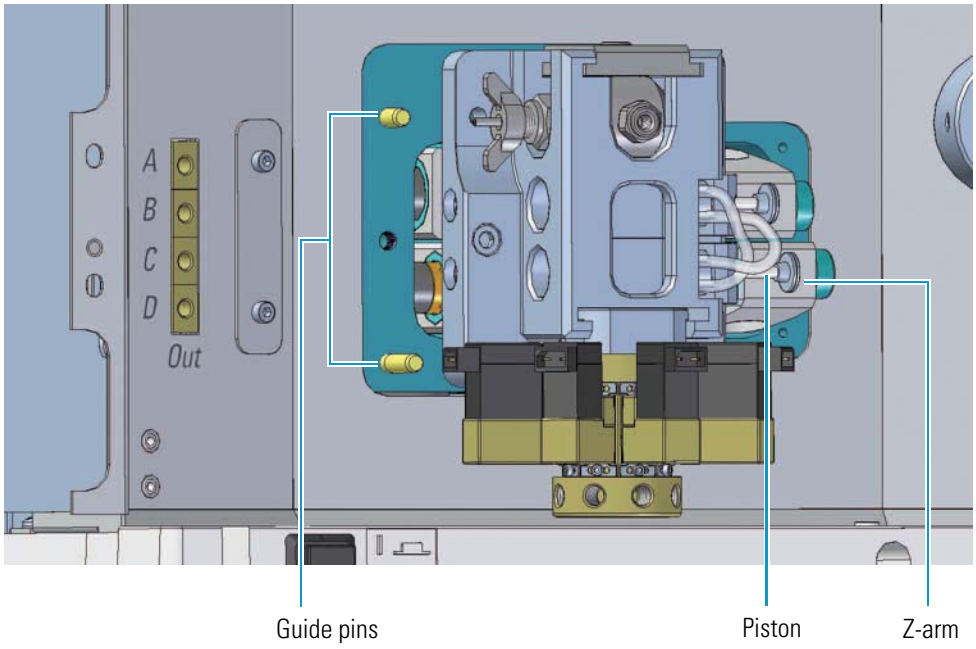
CAUTION To avoid breaking inlet valve D, do not touch or apply force to the valve when loosening the LDA attachment screw.

Figure 73. Location of the LDA attachment screws



10. Gently pull the LDA off the two guide pins. Do not let the pistons touch the Z-arms (see Figure 74).

Figure 74. Removing the LDA from the pump



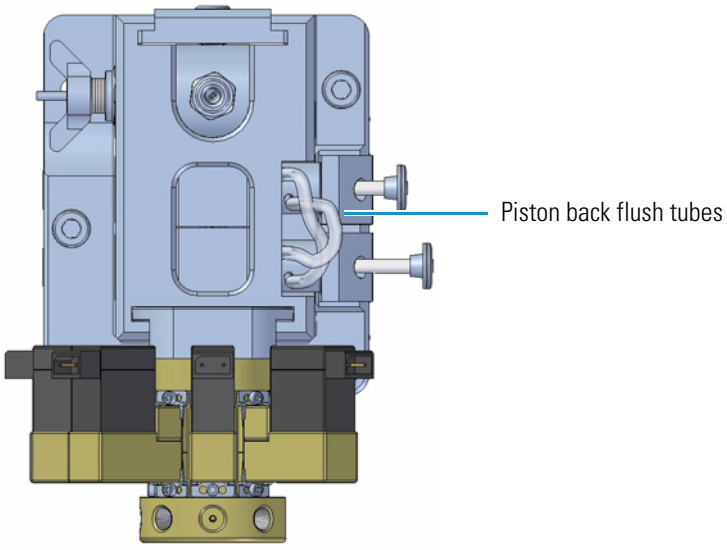
Dismantling the LDA

Dismantle the LDA as part of the procedure to replace the piston seals or if your Thermo Fisher Scientific field service representative instructed you to do so as part of a corrective or troubleshooting procedure.

❖ To disassemble the LDA

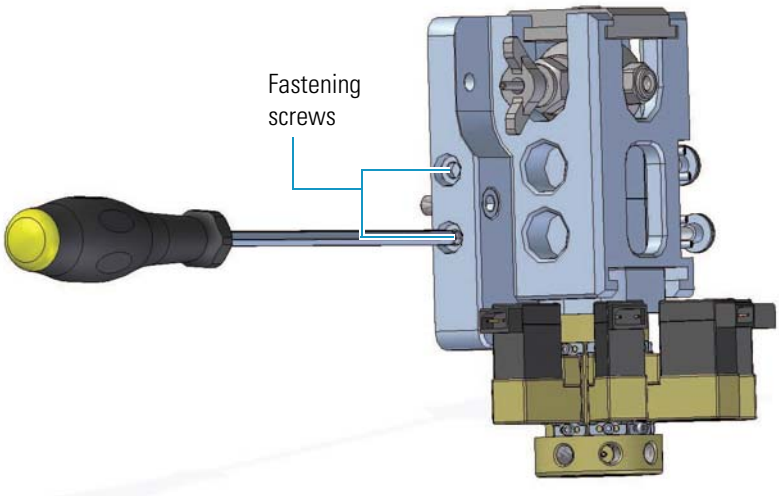
1. Remove the piston back flush tubes by gently pulling them off (see Figure 75).

Figure 75. Location of the piston back flush tubes



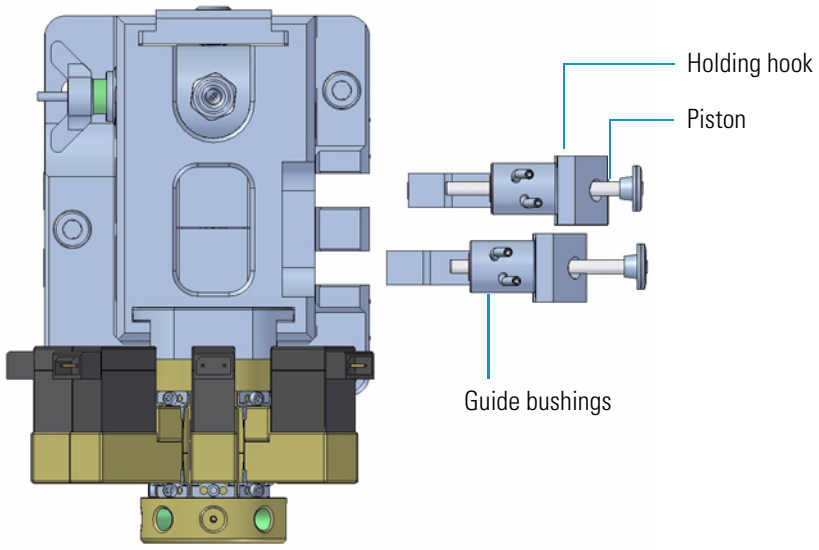
2. Put the LDA onto a level surface. Using a 4 mm ball driver, loosen, but do not remove, the fastening screws that secure the holding hooks (see Figure 76).

Figure 76. Location of the fastening screws that secure the holding hooks



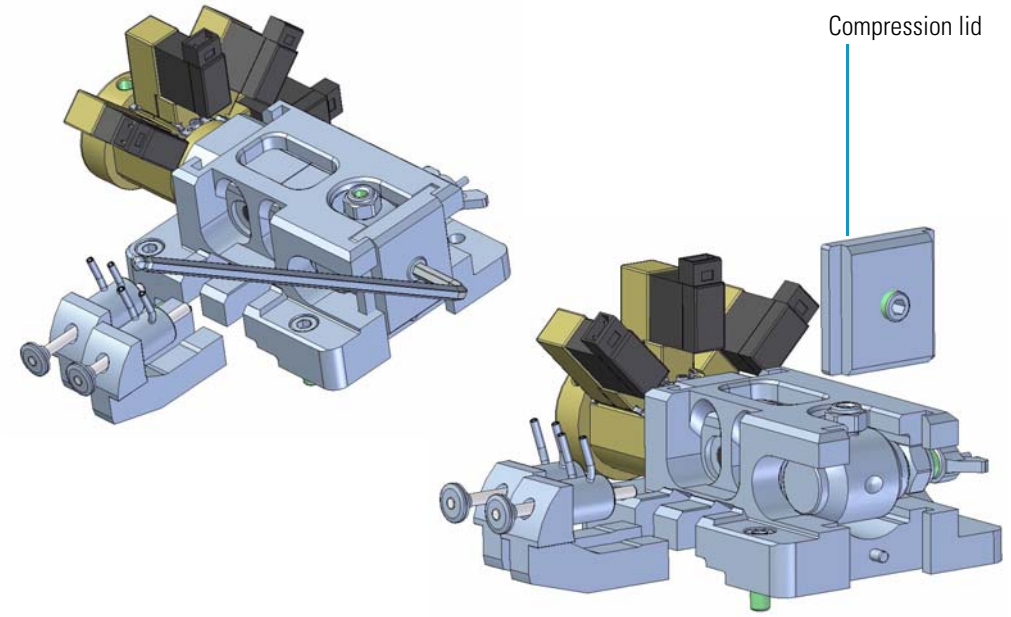
3. Carefully remove the pistons, guide bushings, and holding hooks from the LDA body (see Figure 77).

Figure 77. LDA with the pistons, guide bushings, and holding hooks removed



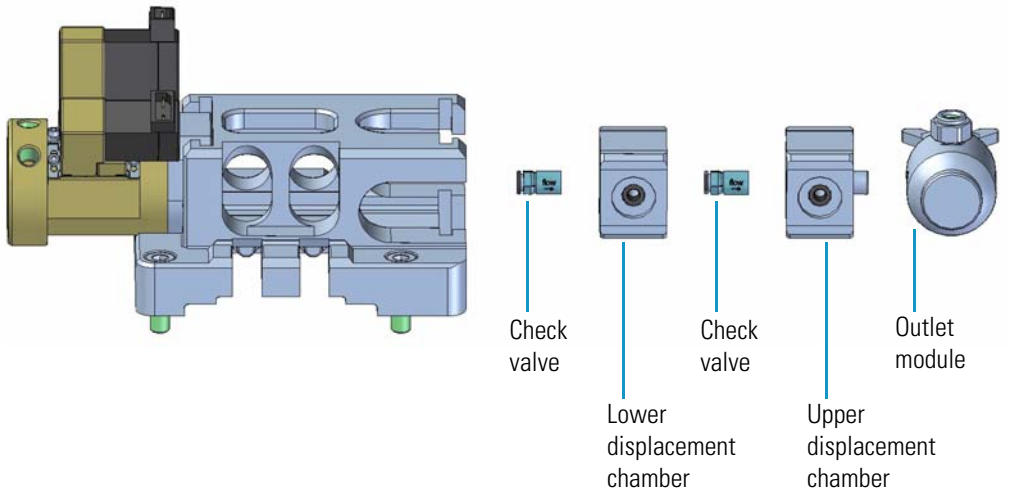
4. Using the 4 mm hex wrench, loosen the compression lid set screw. Remove the compression lid by sliding it out (see Figure 78).

Figure 78. LDA with and without the compression lid



5. Slide out the outlet module, check valves, and displacement chambers (see Figure 79).

Figure 79. Sliding out the check valves, displacement chambers, and outlet modules



Reassembling the LDA

Reassemble the LDA after replacing the piston seals or completing a corrective or troubleshooting procedure that requires you to disassemble it.

❖ To reassemble the LDA

1. Place the LDA on a clean, level surface.
2. Verify that the first check valve is facing the appropriate direction (see Figure 80), and then insert it into the main body of the LDA (see Figure 81).

Figure 80. Check valve orientation

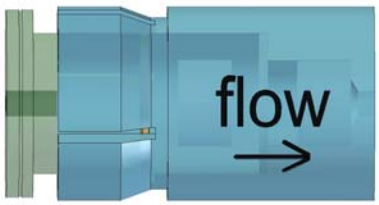
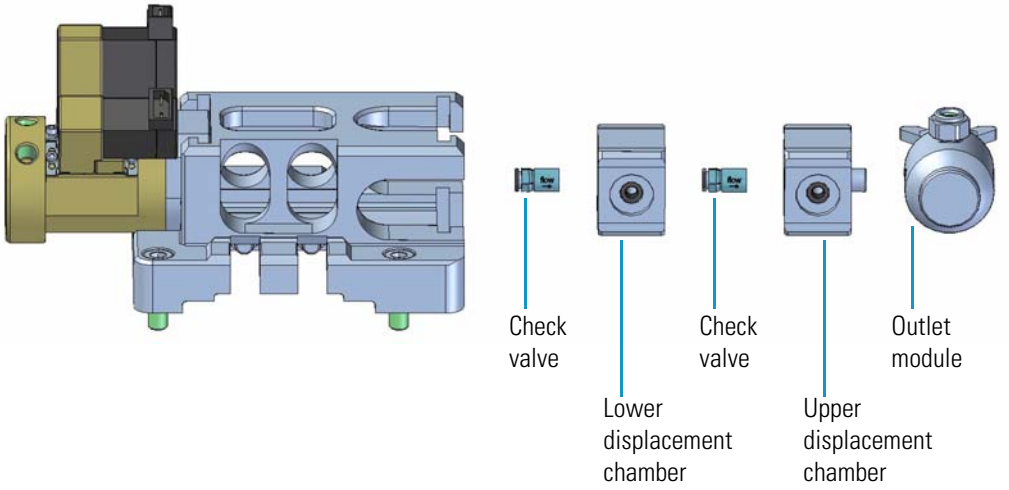


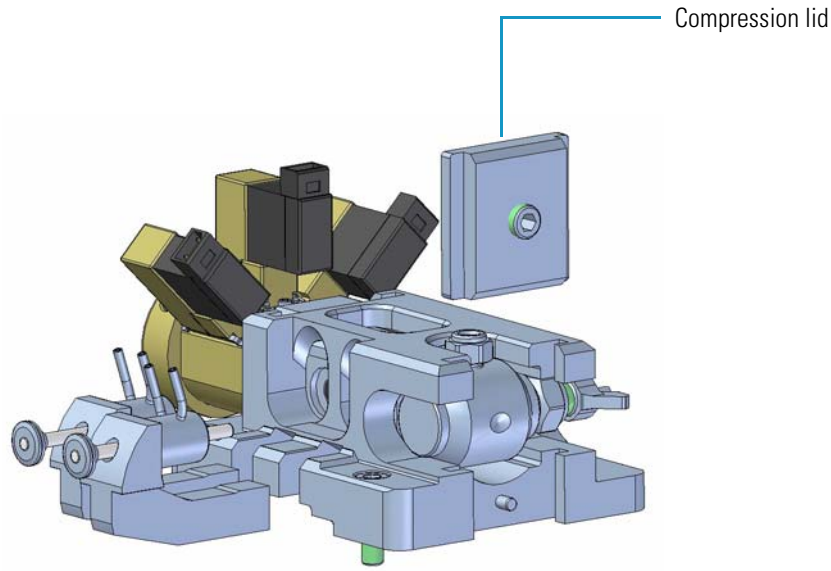
Figure 81. Inserting the displacement chambers, check valves, and outlet module into the LDA



3. Insert the lower displacement chamber into the main body of the LDA.
4. Verify that the second check valve is facing the appropriate direction (see Figure 80), and then insert it into the main body of the LDA.
5. Insert the upper displacement chamber into the main body of the LDA.
6. Insert the outlet module into the main body of the LDA.

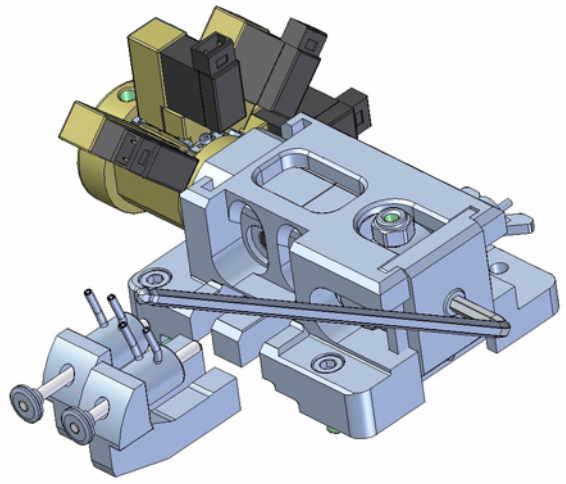
7. Carefully slide the compression lid into the LDA main body (see Figure 82). If the compression lid does not fit, verify that the parts are installed correctly.

Figure 82. Installing the compression lid



8. Using the 4 mm hex wrench, firmly tighten the compression lid screw (see Figure 83).

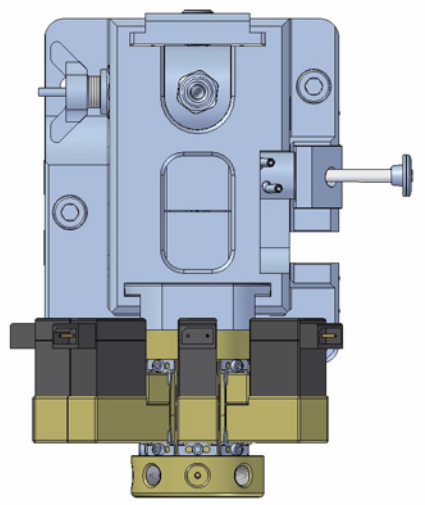
Figure 83. Tightening the compression lid screw



9. If you have not already done so, insert the pistons into the holding hook bores and bushing guides. Align the piston wash tubes so that they protrude away from the holding hook (see Figure 103 on page 97).

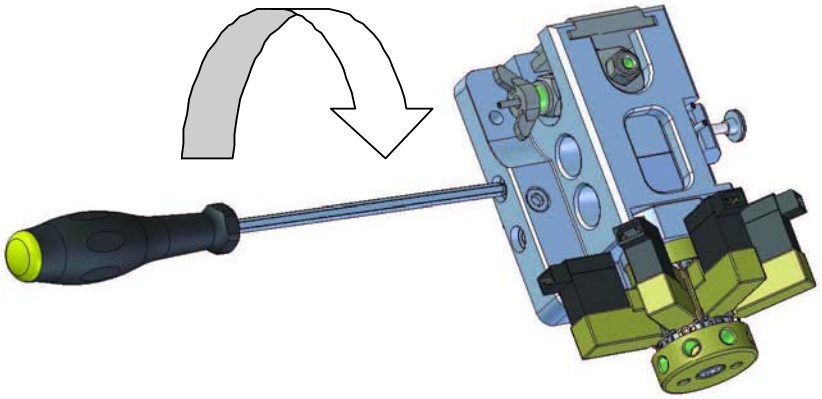
10. Carefully insert the piston into the bore of the displacement chamber and seal (see Figure 84). At the same time, tighten the holding hook using the 4 mm ball driver. Repeat the same procedure for the second piston unit.

Figure 84. Inserting the piston/guide bushing/holding hook assembly



11. Firmly tighten both holding hooks (see Figure 85).

Figure 85. Tightening the holding hooks



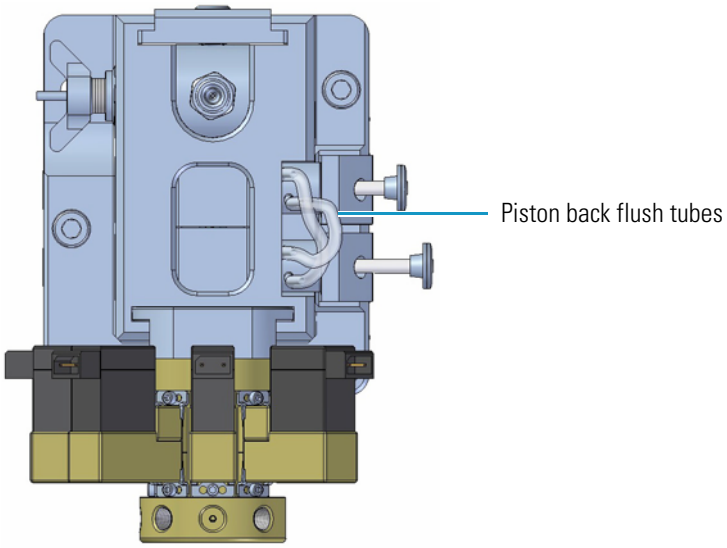
Reattaching the LDA to the Pump

Reattach the LDA to the pump after you have completed the routine or corrective maintenance procedure that required you to remove it.

❖ To reattach the LDA to the pump

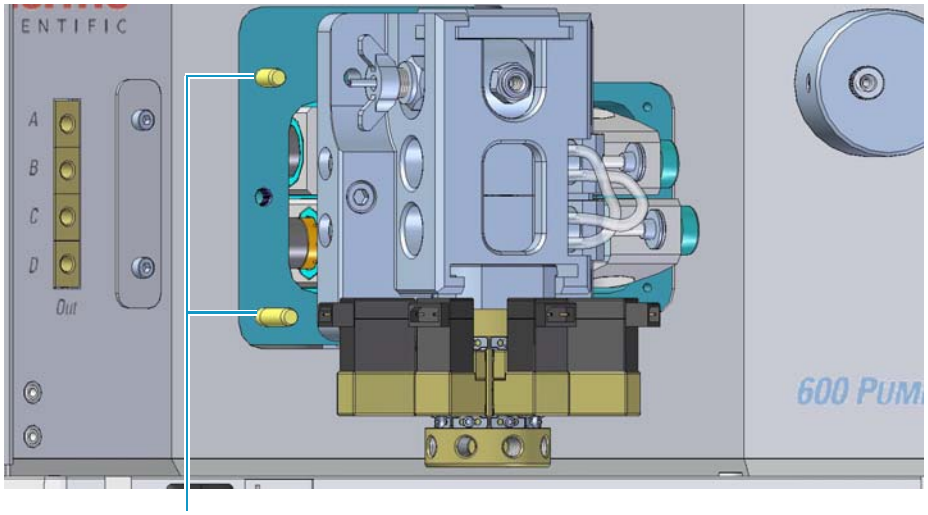
1. Align the pistons in such a way that they do not touch the Z-arms while you insert them. Do not insert the piston springs at this time.
2. Reinstall the piston back flush tubes (see Figure 86).

Figure 86. LDA with the piston back flush tubes reinstalled



3. Place the LDA onto the drive unit using the two alignment pins as a guide (see Figure 87).

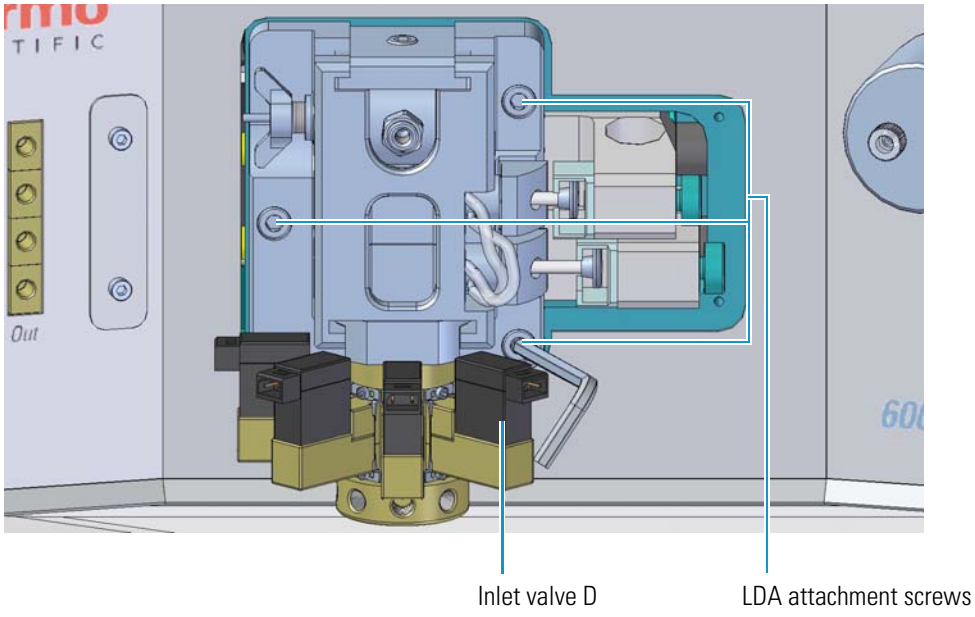
Figure 87. Replacing the LDA onto the pump



4. Using a 4 mm hex wrench, tighten the three LDA attachment screws (see Figure 88).

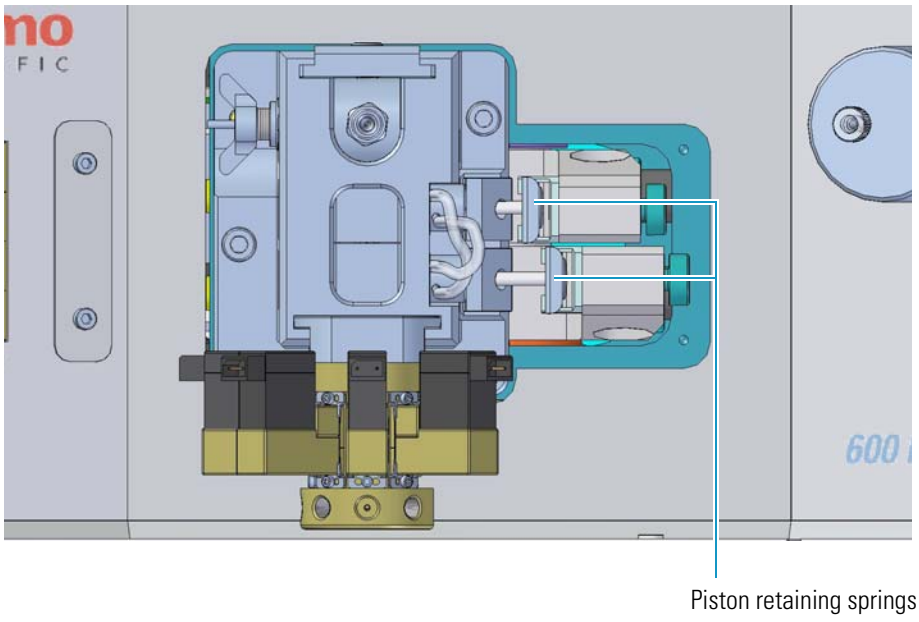
CAUTION When tightening the screw near the inlet valve, do not touch or apply force on inlet valve D or it might break.

Figure 88. Tightening the LDA attachment screw near the inlet valve



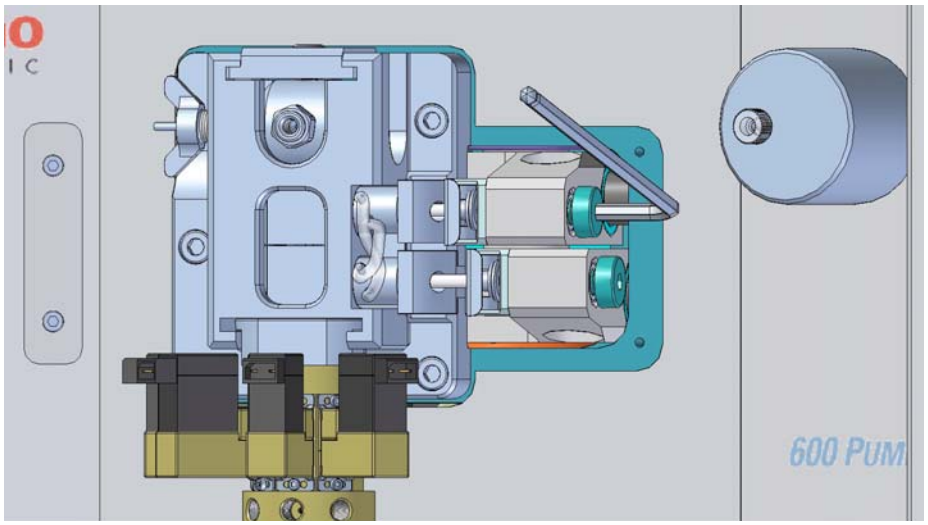
5. Insert the piston springs. The lip of the spring faces toward the right (see Figure 89).

Figure 89. Proper orientation of the piston springs



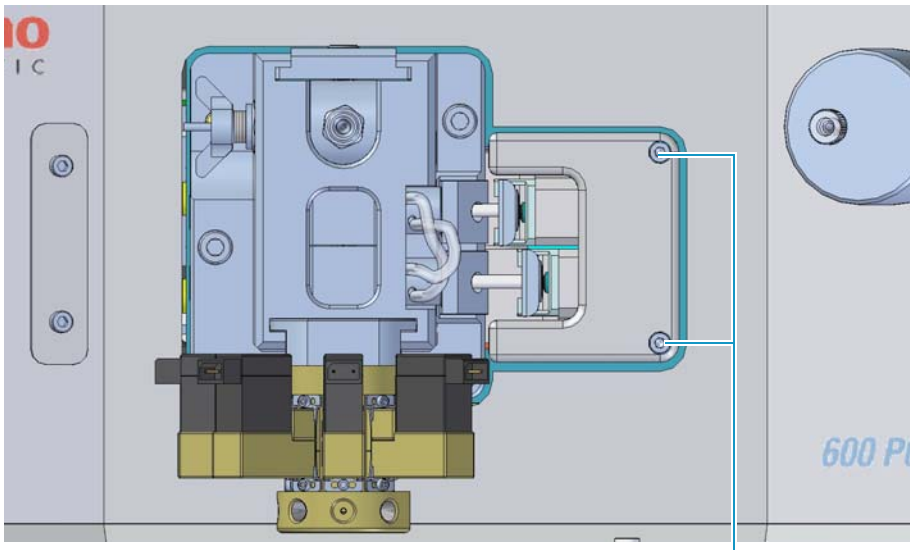
6. Using the 4 mm wrench, tighten the two clamping screws (see Figure 90).

Figure 90. Tightening the two clamping screws



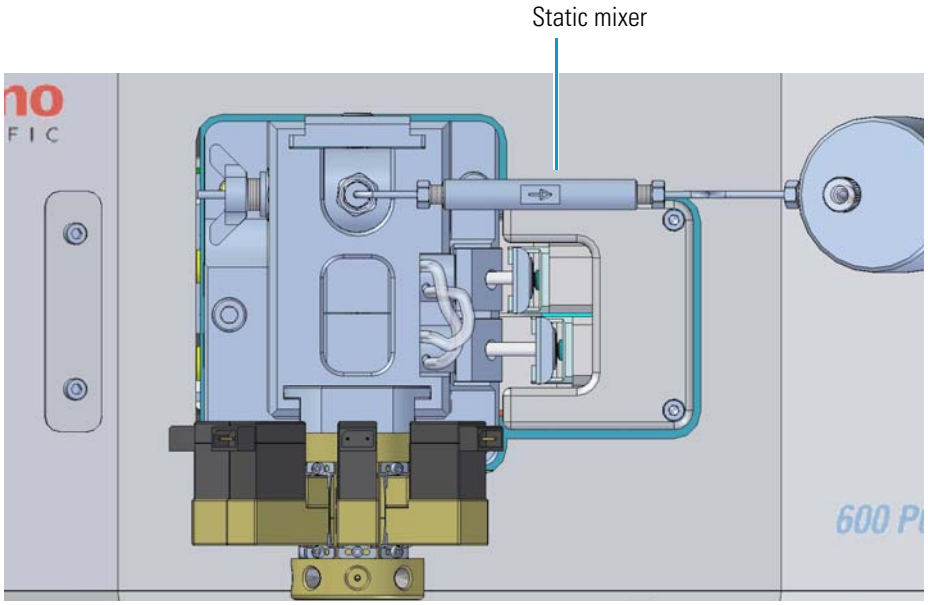
7. Replace the Z-arm cover and tighten the screws using a 2.5 mm ball driver (see Figure 91).

Figure 91. Z-arm cover in place over the Z-arms



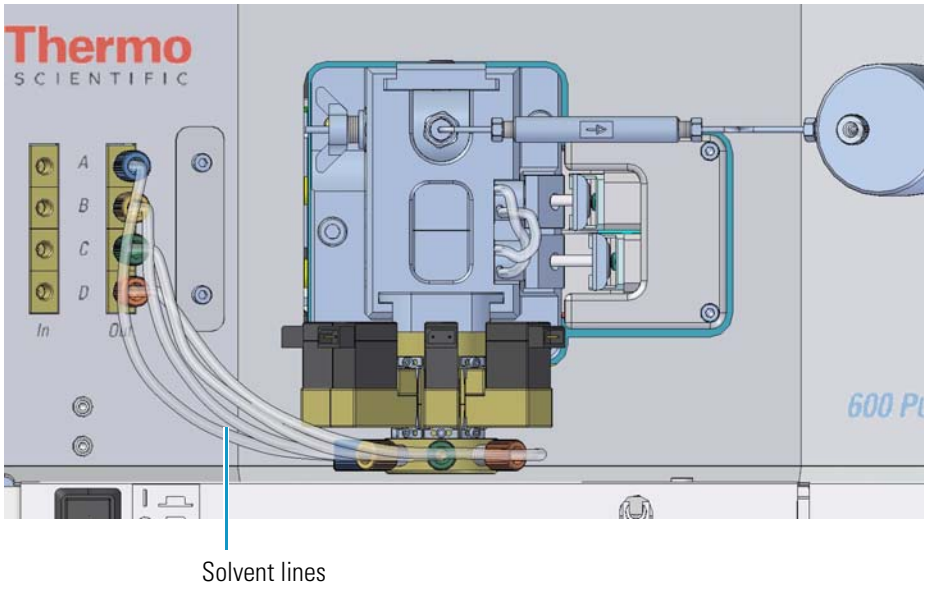
8. Carefully reconnect the static mixer (see Figure 92).

Figure 92. Static mixer connected to the LDA and the outlet module



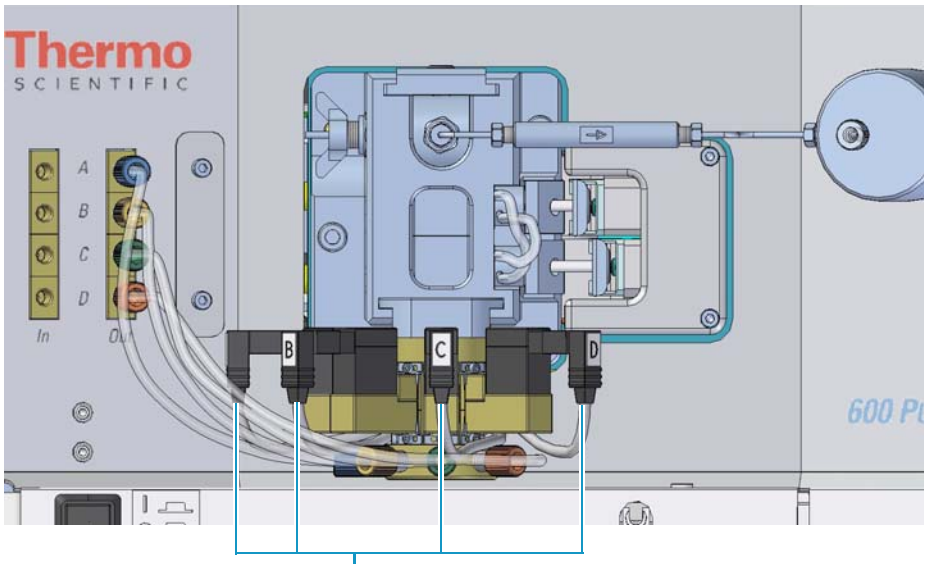
9. Reconnect the solvent lines (see Figure 93).

Figure 93. Solvent lines connected to the LDA



10. Connect the inlet valves (see Figure 94).

Figure 94. Inlet valves connected to the LDA

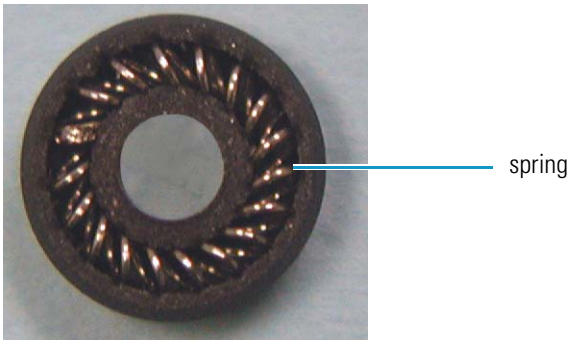


Replacing the Primary Piston Seals

Replace the two primary piston seals with new piston seals as part of a regularly scheduled, preventive maintenance routine or if you detect a leak from the LDA. Thermo Fisher Scientific recommends replacing the primary piston seals every 6 to 12 months, depending on your pump usage.

The primary piston seals for the Accela 600 Pump and the Accela 1250 Pump are made of GFP and have a spring made of Hastelloy™, an alloy of stainless steel.

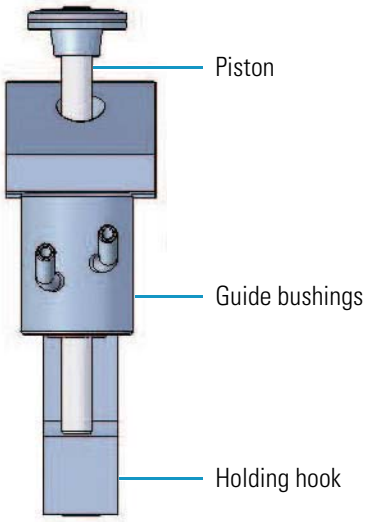
Figure 95. Primary piston seal with a view of the spring



❖ To replace the primary piston seals

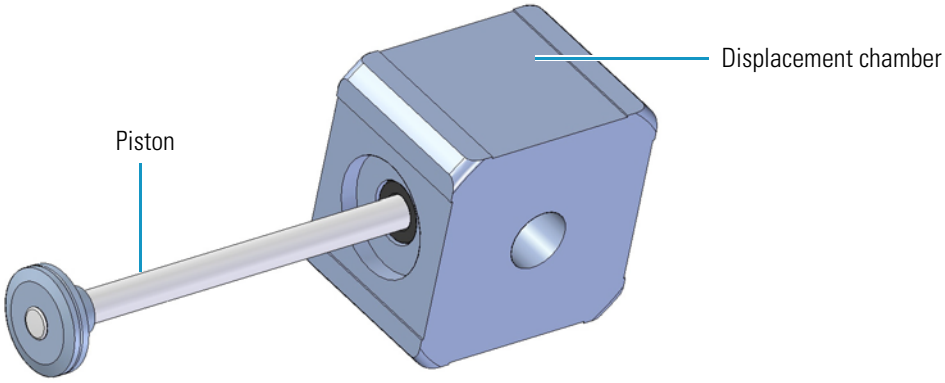
1. Remove the LDA from the pump (see "Removing the LDA from the Pump" on page 75).
2. Dismantle the LDA (see "Dismantling the LDA" on page 81).
3. Remove the piston from the holding hook and guide bushing (see Figure 96).

   Figure 96. Piston, holding hook, and guide bushings assembly



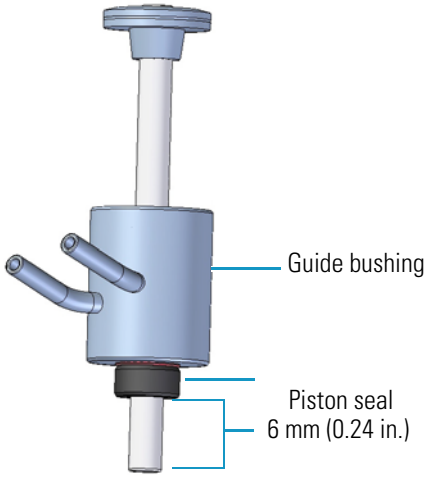
4. Insert the piston into the primary seal no more than 3 mm (0.12 in.) (see Figure 97). The primary seal is located inside the displacement chamber.

Figure 97. Displacement chamber with piston inserted



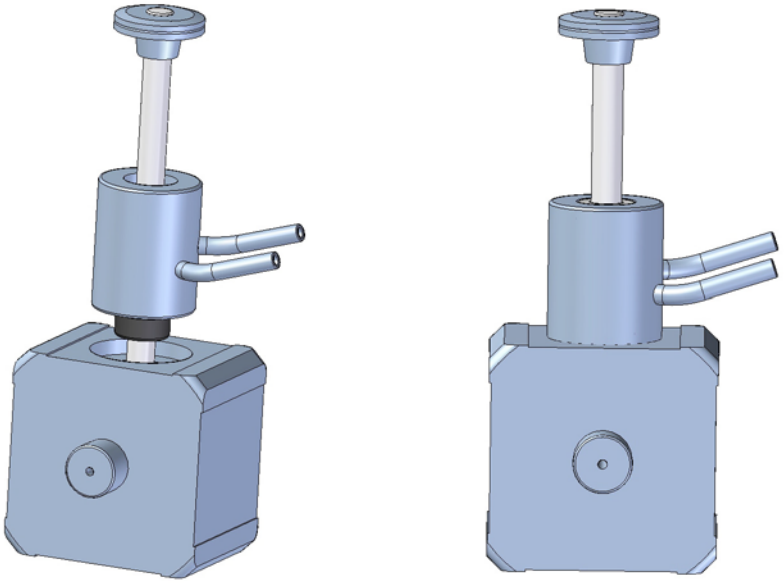
5. Gently remove the seal by pulling on the piston while applying side force. Do not allow the piston to touch any metal parts.
6. Remove the primary piston seal from the piston and discard the primary piston seal.
7. Insert the piston into the guide bushing.
8. With the spring (see Figure 95 on page 92) facing away from the guide bushing, slide the replacement seal over the piston. Ensure that the replacement seal is flush with the guide bushing and the piston protrudes out of the seal by 6 mm (0.24 in.) (see Figure 98).

Figure 98. Piston, guide bushing, and replacement piston seal assembly



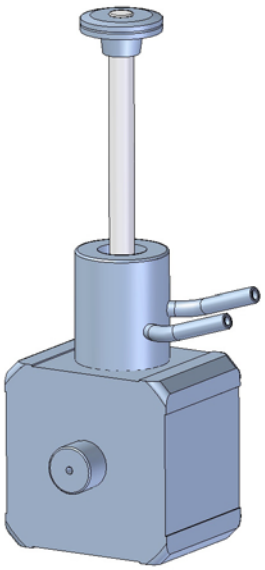
9. Insert the piston into the bore of the displacement chamber. Do not apply any side load onto the seal during this process (see Figure 99).

Figure 99. Using the guide bushing and piston to insert the piston seal



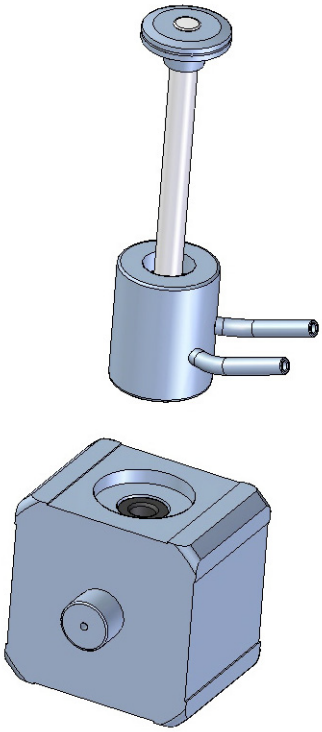
10. Hold down the guide bushing and slide the piston up until it is out of the seal (see Figure 100).

Figure 100. Sliding the piston out of the seal



11. Remove the guide bushing/piston assembly from the displacement chamber (see Figure 101).

Figure 101. Removing the bushing/piston assembly from the displacement chamber



12. Repeat step 3 through step 11 to replace the primary piston seal of the second displacement chamber with a new piston seal.

13. Continue with one of the following:

    - Perform other procedures that require access to the LDA (see "Removing the LDA from the Pump" on page 75).
    - Reassemble the LDA and reattach it to the pump (see "Reassembling the LDA" on page 84 and "Reattaching the LDA to the Pump" on page 87).

Replacing the Secondary Piston Seals

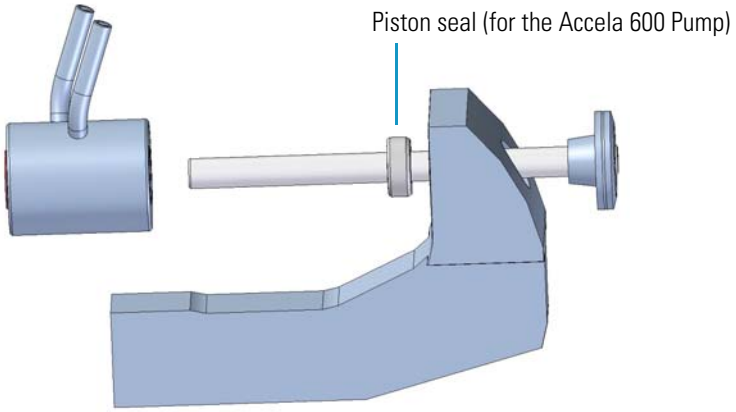
The secondary piston seals rarely require replacement. Replace the two secondary piston seals if a Thermo Fisher Scientific representative has instructed you to do so as part of a corrective or troubleshooting procedure.

The secondary piston seals are made of polyethylene (PE) for the Accela 600 Pump and GFP for the Accela 1250 Pump.

❖ To replace the secondary piston seals

1. Remove the LDA from the pump (see "Removing the LDA from the Pump" on page 75).
2. Dismantle the LDA (see "Dismantling the LDA" on page 81).
3. Carefully guide the piston through the bore of the holding hook (see Figure 102).
4. Carefully slide a new secondary piston seal over the piston with the spring facing away from the holding hook.

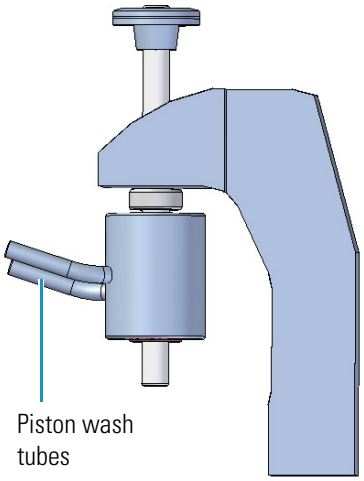
   Figure 102. Holding hook with piston and seal

5. Remove the secondary piston spring from the piston guide bushing.

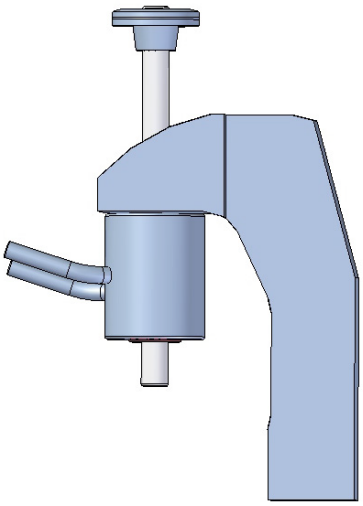
6. Carefully slide the piston guide bushing over the piston and align the piston wash tubes so that they face away from the holding hook (see Figure 103).

Figure 103. Proper alignment of the piston wash tubes



7. Gently push the new secondary piston seal into its groove by pushing the guide bushing up toward the end of the holding hook (see Figure 104).

Figure 104. Holding hook/piston/guide bushing assembly



8. Repeat step 3 through step 7 for the remaining secondary piston seal.
9. Continue with one of the following:
   - Perform other procedures that require access to the LDA (see "Removing the LDA from the Pump" on page 75).
   - Reassemble the LDA and reattach it to the pump (see "Reassembling the LDA" on page 84 and "Reattaching the LDA to the Pump" on page 87).

Cleaning the Check Valves

If you use buffers with high concentrations of salts, clean the check valves as part of a regularly scheduled, preventive maintenance procedure every 6 to 12 months depending on your usage. Clean the check valves if they are not functioning properly or if you experience residual pulsation that is too high.

CAUTION Do not use an ultrasonic bath to clean the check valves. Sonicating the check valves can damage their small ruby balls.

❖ To clean the check valves

1. Remove the LDA from the pump body (see "Removing the LDA from the Pump" on page 75).
2. Dismantle the LDA (see "Dismantling the LDA" on page 81).
3. Using a 10 mL syringe with a very short piece of silicon tubing at the Luer exit, gently flush the check valves with 10 mL of distilled water.
4. Repeat step 3 with 10 mL of isopropanol.
5. Verify that fluid flows freely through the check valve. If you cannot achieve free flow through the check valve, replace it with a new one.
6. Continue with one of the following:
   - Perform other procedures that require access to the LDA (see "Removing the LDA from the Pump" on page 75).
   - Reassemble the LDA and reattach it to the pump (see "Reassembling the LDA" on page 84 and "Reattaching the LDA to the Pump" on page 87).

Cleaning the Pistons

Clean the pistons as part of a regularly scheduled preventive maintenance procedure or if you observe precipitate on them.

❖ To clean the pistons

1. Remove the LDA from the pump (see "Removing the LDA from the Pump" on page 75).
2. Dismantle the LDA (see "Dismantling the LDA" on page 81).
3. Moisten a soft tissue with isopropanol and wipe the pistons with it.

4. Continue with one of the following:
   - Perform other procedures that require access to the LDA (see "Removing the LDA from the Pump" on page 75).
   - Reassemble the LDA and reattach it to the pump (see "Reassembling the LDA" on page 84 and "Reattaching the LDA to the Pump" on page 87).

Cleaning the Instrument Casing

If the pump enclosure becomes dirty, clean it with a soft cloth lightly moistened with a mild detergent solution. Do not use any type of abrasive pad, scouring powder, or solvent.

Flushing the LDA

To maintain optimal performance of the LDA, do the following:

- If you use buffered mobile phases, flush the pump's LDA daily with a non-buffered mobile phase. Flushing the LDA helps prevent particulates from sticking in the check valves, which might cause pressure problems.
- If you use mobile phases that contain acetonitrile, flush the LDA monthly with HPLC-grade methanol or IPA. This removes the aliphatic amine residue that can build up on the sapphire check valve seats and cause the check valves to stick.

❖ **To flush buffered mobile phases, aliphatic amine residues, or both out of the LDA**

1. If your chromatographic applications use buffered mobile phases, set up the system to pump a non-buffered solvent that is miscible with the buffered mobile phase through the LDA for 10 minutes.
2. If your chromatographic applications use acetonitrile mobile phases, pump HPLC-grade methanol or IPA through the LDA for an additional 10 minutes.

Flushing the Piston Guide Bushings

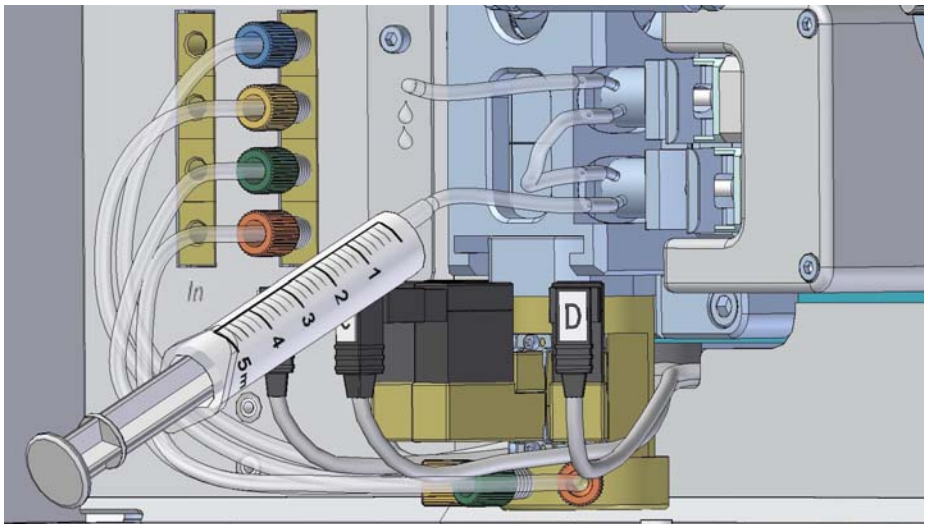
As the pistons move back and forth within the displacement chambers, a small quantity of mobile phase leaks behind the primary piston seals. With buffered mobile phases, a precipitate (also known as creep or salt build-up) forms as the liquid fraction evaporates. The abrasion caused by this precipitate can scratch the piston and shorten the life of the piston seals.

If you use mobile phases that contain a high concentration of salts and you do not have the seal wash pump, flush the piston seals at least once a day. The seal wash pump is an optional pump that periodically flushes the piston guide bushings (see "Seal Wash Pump Installation" on page 44).

❖ To flush the piston guide bushings

1. Connect a 10 mL syringe filled with distilled water to the bottom-outer tubing (see Figure 105).

   Figure 105. Syringe connected to the guide bushings for flushing

2. Gently push the water through the guide bushings.

Removing Air from the Piston Chambers

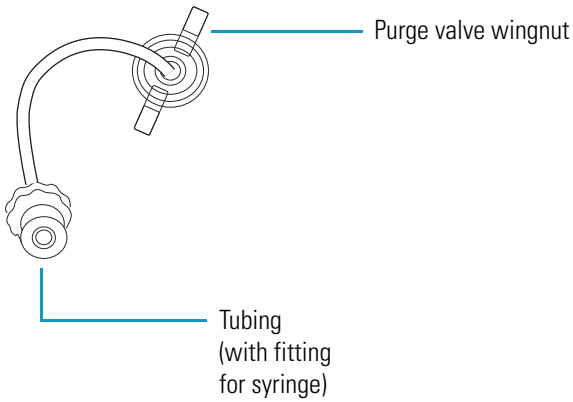
Air trapped in the piston chambers causes an excessive variation in the backpressure.

Note All low-pressure HPLC pumps require eluents that have been properly degassed. The pump has a built-in vacuum degasser. Plumbing the pump to bypass this degasser introduces a potentially unacceptable level of air into the piston chambers.

❖ To purge air out of the piston chambers

1. Open the purge valve by turning its wingnut counterclockwise (see Figure 106).
2. To collect the solvent being pumped through the liquid displacement assembly (LDA), insert the tip of a 10 mL disposable syringe into the tubing attached to the purge valve.

   Figure 106. Purge valve with tubing attached

3. Pump 100% methanol or 100% acetonitrile through the LDA at a flow rate of 200 µL/min for 10 to 15 minutes.

   Note Purging the pump at a low flow rate with 100% organic solvent works much better than purging the pump at a high flow rate with (partly) aqueous eluents.

   Note Due to seal friction, the system backpressure does not drop to zero when you pump solvent through the open purge valve. Depending on the flow rate and solvent composition, typical backpressure values range from 5 to 15 bar.

4. Close the purge valve, remove the syringe, and return to the initial conditions.
5. Check the pressure variation to determine if removing the trapped air stabilized the system pressure.

Cleaning the Displacement Chambers and the Inlet Module

If the primary piston seals have started to decompose and you observe black, fibrous particles in the chamber, clean the displacement chambers.

❖ To clean the displacement chambers and the inlet module

1. Remove the liquid displacement assembly (LDA) from the pump (see "Removing the LDA from the Pump" on page 75).
2. Dismantle the LDA (see "Dismantling the LDA" on page 81).
3. Pry the piston seals out of the bores of the displacement chambers:
   a. Carefully insert a piston into the hole in the center of the seal without pushing the piston further into the bore of the displacement chamber.
   b. Gently pry the seal out of the bore.
4. Using a needle, graphite pencil, or equivalent tool, carefully remove the PEEK film seals. Be careful not to scratch the displacement chambers as you remove the film seals, as this might cause leaking.

   Note Both ends of the lower displacement chamber, the lower end of the upper displacement chamber, and the bottom of the outlet module contain a PEEK film seal for a total of five film seals.

5. Place the displacement chambers and the inlet module in a container of water and place the container in an ultrasonic bath for 10 minutes.
6. Place the displacement chamber and the inlet module in a container of acetone and place the container in an ultrasonic bath for 10 minutes.
7. Install the PEEK film seals if they are not damaged; otherwise, replace them with new ones.
8. Replace the primary and secondary piston seals (see "Replacing the Primary Piston Seals" on page 92 and "Replacing the Secondary Piston Seals" on page 96).
9. Continue with one of the following:
   - Perform other procedures that require access to the LDA (see "Removing the LDA from the Pump" on page 75).
   - Reassemble the LDA and reattach it to the pump (see "Reassembling the LDA" on page 84 and "Reattaching the LDA to the Pump" on page 87).

Replacing the Fuses

Replace the pump fuses if you suspect that the current fuses are not functioning properly.

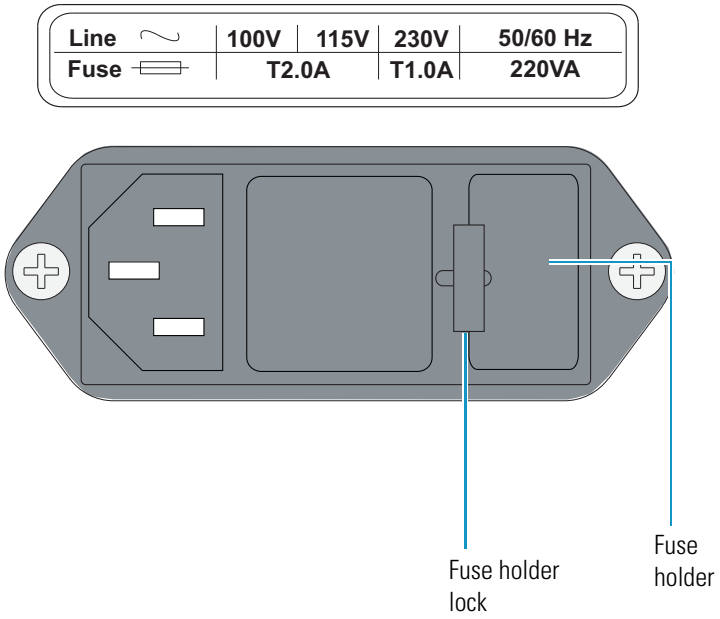
❖ To replace the fuses

1. Unplug the pump from the power outlet.

CAUTION To avoid an electrical shock, turn off the power to the pump and unplug the pump from line power before you remove the fuse holder.

2. Using a flat head screwdriver, push the fuse holder lock to the right and pull out the fuse box.

Figure 107. Power entry module and fuse label



3. Remove the fuses and replace with the appropriate fuses.

Line power	Fuse
100 Vac or 115 Vac	5 × 20 mm, 2.0 A, 250 V, TL, UL, CSA
230 Vac	5 × 20 mm, 1.0 A, 250 V, TL, UL, VDE

4. Plug the pump power cord into the power outlet.

Troubleshooting

To troubleshoot the pump's performance, use the diagnostic tests and troubleshooting guides in this chapter.

Contents

Diagnostic Tests

Run these tests if you want to validate the pump's performance or if you suspect the pump is not functioning properly.

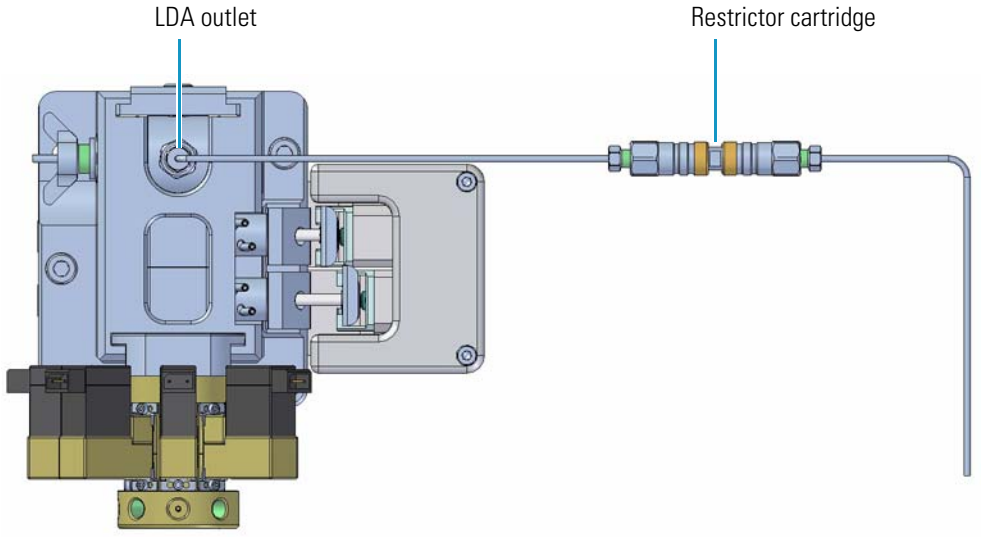
Testing the Flow Rate

Run this test to compare the actual flow rate with the flow rate you assigned to the pump.

❖ **To measure the actual flow rate**

1. Connect a 40 bar (~580 psi) restrictor cartridge to the LDA outlet. Align the restrictor so that the flow is in the direction of the arrow marked on the restrictor.

   Figure 108. LDA attached to a restrictor



2. Fill a mobile phase reservoir with HPLC-grade methanol and connect it to inlet channel A.
3. Use the instrument control system to set channel A to 100%.
4. Set the flow rate to 1 mL/min.
5. Do one of the following:
   - Connect the other end of the restrictor cartridge to an instrument that measures flow rate.
   - Connect the other end of the restrictor cartridge to a length of tubing and place the tubing into an empty, 10 mL graduated cylinder.
6. Start the pump, wait 2 minutes, and then stop the pump.
7. If you do not have a flow rate meter, measure the fluid in the graduated cylinder. The actual flow rate equals the measured volume divided by two.
8. Compare the actual flow rate with the set flow rate. Under these conditions, the accuracy of the flow should be ±0.5%.

9. If your flow rate is unstable or inaccurate, see Table 13.

Table 13. Reasons for unstable flow rates

Possible reason for unstable flow rate	Correction
Damaged or dirty check valve	Clean the check valves. See "Cleaning the Check Valves" on page 98.
Worn out primary piston seals	Replace the seals. See "Replacing the Primary Piston Seals" on page 92.
Unstable load (column)	Use a backpressure restrictor or another column.

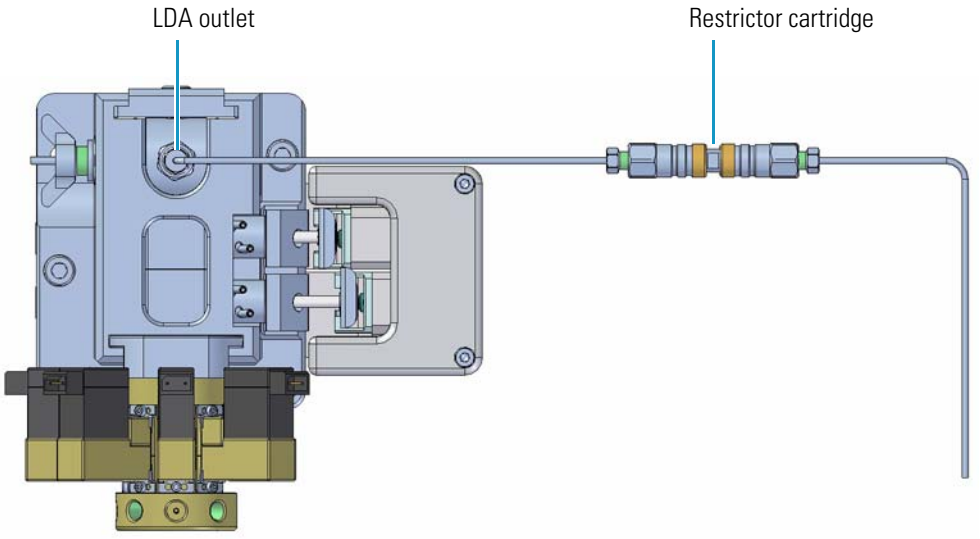
Testing the Residual Pulsation

This test measures the pump pulsation.

❖ To measure the pump pulsation

1. Connect a 40 bar (~580 psi) restrictor cartridge to the LDA outlet. Align the restrictor so that the flow is in the direction of the arrow marked on the restrictor (see Figure 109).

Figure 109. LDA attached to a restrictor



2. Fill a mobile phase reservoir with HPLC-grade methanol and connect it to inlet channel A.
3. Open the purge valve.

Tip For information on viewing the pump's status and starting and stopping the solvent flow from the pump, refer to the data system Help.

4. Set the pressure unit to bar.

5. Verify that the pressure is 0.
6. Set channel A to 100%.
7. Set the flow rate to 500 µL/min.
8. Start the pump, wait 1 minute, and then close the purge valve.
9. Wait 5 minutes to allow the pump pressure to equilibrate.
10. Observe the pressure graph for pressure fluctuations. The pressure standard deviation should be less than 1 bar (14.5 psi).

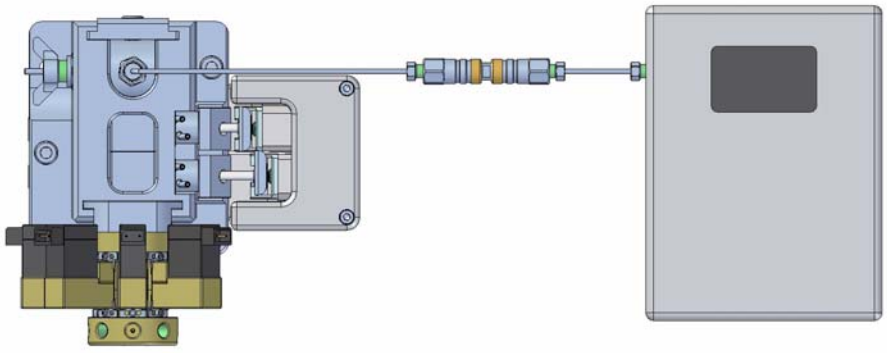
Testing the Pump Proportioning Accuracy

This procedure tests the pump's proportioning accuracy.

❖ To test the pump proportioning accuracy

1. Set up the system as follows:
   a. Plumb your system to bypass the autosampler.
   b. Connect a 40 bar (~580 psi) restrictor cartridge to the LDA outlet.
   c. Connect the other end of the cartridge to a UV detector with an analytical flowcell (see Figure 110).

      Figure 110. LDA attached to a flow restrictor

   d. Fill a mobile phase reservoir bottle with HPLC-grade methanol and connect it to inlet channels A and B.
   e. Fill a mobile phase reservoir bottle with HPLC-grade methanol spiked with 0.5% acetone and connect it to inlet channels C and D.
2. Draw solvent through all four channels:
   a. Set each channel to 25%.
   b. Open the purge valve.
   c. Set the flow rate to 1000 µL/min and start the pump.

d. Wait 2 minutes, and then close the purge valve.

e. Wait an additional 2 minutes.

3. Pump 100% methanol and stabilize the baseline at 254 nm as follows:

   a. Set channel A to 100%.

   b. Set the UV detector to monitor 254 nm.

   c. Wait until the system is equilibrated (that is, until the baseline is stable).

   d. Set the detector to zero at 254 nm.

   e. Stop the pump.

4. Use Table 14 to create a method to run a step gradient two times. Set the detector to acquire data at 254 nm for 160 minutes.

5. Run the method and acquire the data.

Table 14. Gradient file for quaternary pumps (Sheet 1 of 2)

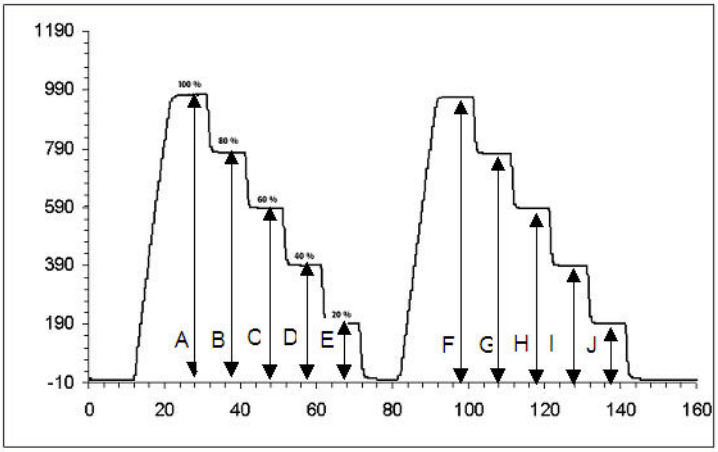
Time	% A	% B	% C	%D	Flow rate (µL/min)
0	100	0	0	0	1000
5	100	0	0	0	1000
10	0	0	0	100	1000
15	0	0	0	100	1000
15.1	20	0	0	80	1000
20	20	0	0	80	1000
20.1	40	0	0	60	1000
25	40	0	0	60	1000
25.1	60	0	0	40	1000
30	60	0	0	40	1000
30.1	80	0	0	20	1000
35	80	0	0	20	1000
35.1	100	0	0	0	1000
40	0	100	0	0	1000
45	0	0	100	0	1000
50	0	0	100	0	1000
50.1	0	20	80	0	1000
55	0	20	80	0	1000
55.1	0	40	60	0	1000

Table 14. Gradient file for quaternary pumps (Sheet 2 of 2)

Time	% A	% B	% C	%D	Flow rate (µL/min)
60	0	40	60	0	1000
60.1	0	60	40	0	1000
65	0	60	40	0	1000
65.1	0	80	20	0	1000
70	0	80	20	0	1000
70.1	0	100	0	0	1000
75	0	100	0	0	1000

6. Determine the height (absorbance value) of the steps (A through J) from baseline to top (see Figure 111).

Figure 111. Step gradient profile for testing compositional accuracy



7. Perform the calculations in Table 15.

Table 15. Step gradient calculation

Step%	Calculation
20%	$\frac{(E + J)/2}{(A + F)/2} \times 100 = \_\_\_\_\_$
40%	$\frac{(D + I)/2}{(A + F)/2} \times 100 = \_\_\_\_\_$
60%	$\frac{(C + H)/2}{(A + F)/2} \times 100 = \_\_\_\_\_$
80%	$\frac{(B + G)/2}{(A + F)/2} \times 100 = \_\_\_\_\_$

8. Compare your results for each step gradient with the pass criteria in Table 16.

Table 16. Pass criteria for gradient test.

Gradient forming performance	Pass criteria
20% Step Height: _____%	19.5–20.5%
40% Step Height: _____%	39.5–40.5%
60% Step Height: _____%	59.5–60.5%
80% Step Height: _____%	79.5–80.5%
20% Step Height: _____%	19.5–20.5%
40% Step Height: _____%	39.5–41.5%
60% Step Height: _____%	59.5–60.5%
80% Step Height: _____%	79.5–80.5%

9. If any value falls outside the range, call Thermo Fisher Scientific Technical Support.

Error Messages

Table 17 describes the pump-related error messages that might appear in the system control software event log or status area.

Table 17. Error messages

Error message	Description
Low Pressure Error	The system pressure has fallen below the set minimum pressure.
High Pressure Error	The system pressure has risen above the set maximum pressure.
Index Error	The system expected an index signal that never arrived. Physical problem with the hardware or connectors: Contact an authorized dealer.
Leak detected	Indicates the presence of liquid on the pump's drip tray.
Motor Error	The motor is malfunctioning. Indicates that too much torque is required to drive the pump accurately.
Position Error	The system was unable to maintain accurate positioning of the motor. Restart the pump.
Power Failure Error	The drive motor has drawn excessive current.
Solenoid Error	A proportioning valve's solenoid has been disconnected or is defective. Physical problem with the hardware or connectors: Contact an authorized dealer.

Troubleshooting Guides

This section provides troubleshooting guides for the pump and degasser.

Pump Troubleshooting Guide

Table 18 describes symptoms you might observe with the pump, possible causes for the symptom, and corrective actions.

Table 18. Pump health check/troubleshooting guide

Symptom	Possible cause	Solution
No response when power is switched on	Power cord not properly installed	Place cord correctly.
	Defective power cord	Replace cord.
	Blown fuse	Replace the fuse.
No connection to software	Communication cable not firmly installed	Reinstall the cable.
	Defective communication cable	Replace the cable.
	Wrong or corrupted firmware	Download the current firmware to the pump.
Flow unstable/pulsation	Check valve failure	Clean/replace the check valve. See "Cleaning the Check Valves" on page 98.
	Immiscible solvents	Test/change the solvent system.
	Insufficient degassing	Use helium degassing.
	Solvent frit clogged	Replace the solvent frit.
	Insufficient system pressure	Add a backpressure regulator or increase the flow rate.
	Defective seals	Replace the primary piston seals. See "Replacing the Primary Piston Seals" on page 92.
No flow from the pump	Valve failure	Clean/replace the check valve. See "Cleaning the Check Valves" on page 98.
	Pressure error	Check the pressure limits.
Pump remote start/stop not working	Incorrect wiring	Check the wiring.
	Incorrect software/gradient table settings	Check the method and the method options.

Degasser Troubleshooting Guide

Table 19 describes symptoms you might observe with the degasser, probable causes of the symptoms, and corrective actions.

Table 19. Degasser health check/troubleshooting guide

Symptom	Probable cause	Solution
Yellow status LED is on steadily, pump is running, and RPM seems high.	Pump is in start up phase or system's degassing demand has increased.	If vacuum pump speed continues to rise for an extended period of time (as heard by the pitch of the stepper motor), it might indicate a potential fault condition.
Yellow status LED is flashing approximately 1 second off, 1 second on. Vacuum pump is not running.	Possible leak.	Contact your Thermo Fisher Scientific field service representative.
Yellow status LED is flashing approximately 2 seconds off, 1 second on. Vacuum pump is not running.	Possible sensor or control board fault.	Contact your Thermo Fisher Scientific field service representative.
Power and Vacuum LEDs illuminate green, but the pump cannot be heard.	Due to the design of the pump and degasser, the pump is very silent at low RPMs, even though vacuum is good and degassing is normal.	Monitor the UV absorbance of non-degassed methanol at 215 nm versus degassed methanol coming through the degasser. Proper performance of the degasser should decrease the UV absorbance of the methanol significantly.
Bubbles move through the output tubing.	Loose fitting or fittings.	Tighten the input and output fittings.
No solvent flow.	If a buffer was left in the degasser for some time after use, it might plug the degasser.	Prime/purge the pump head. Use a different channel, or connect the channel to a beaker of the solvent without the buffer. Draw the solvent through the channel to dissolve the buffer. Do not push the solvent through the channel. If this flushing action does not work, contact your Thermo Fisher Scientific field service representative.

Replacement Parts

This chapter contains a list of replaceable parts and their corresponding part numbers. To place an order, contact your local Thermo Fisher Scientific customer service representative or technical support.

Contents

Main Body

The replaceable parts listed in Table 20 correspond to the items shown in Figure 112. These parts are compatible with both the Accela 600 Pump and the Accela 1250 Pump.

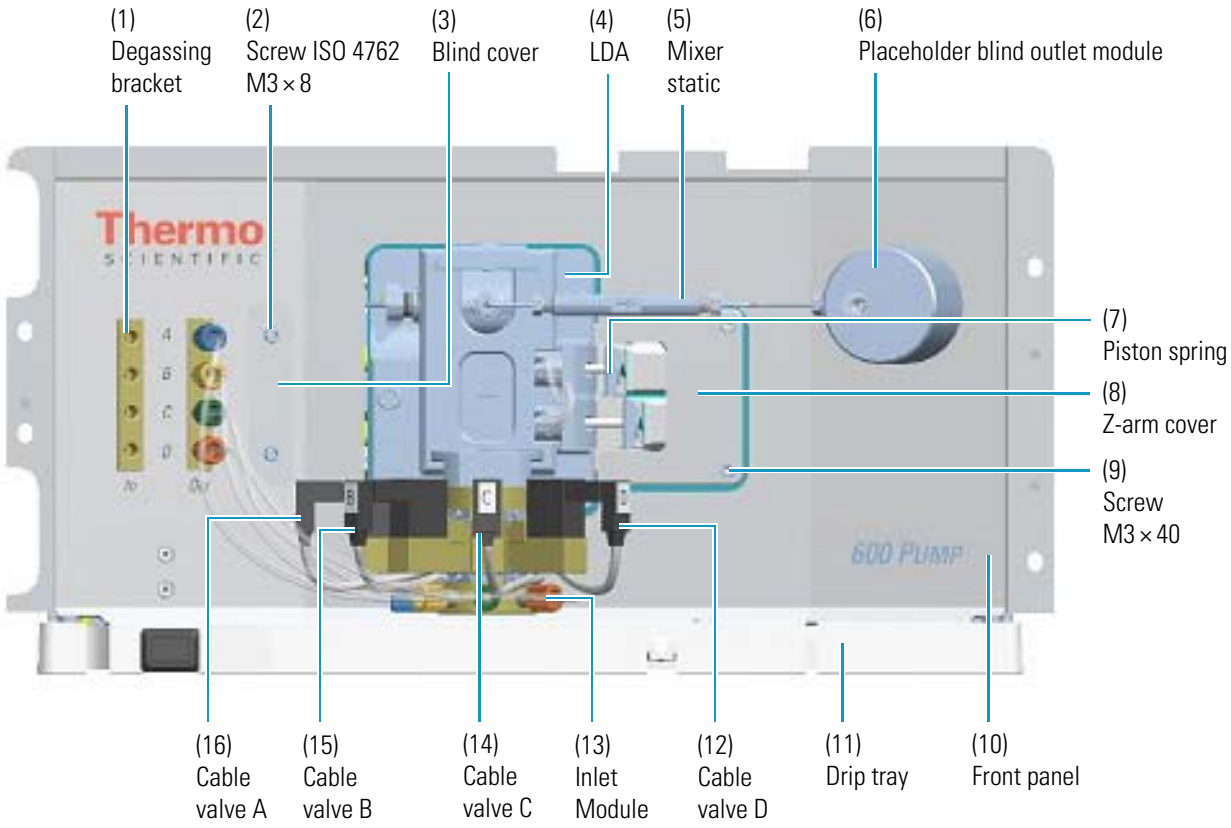
Table 20. Main body assembly parts

Item	Description	Part number
1	Degassing bracket assembly, Accela	00950-01-00297
2	Screw, ISO 4762, M3 × 8[a]	N/A
3	Cover, metal plate, Accela 600	N/A
4	LDA, Accela 600	00950-01-00294
5	Mixer static, Accela 600	00950-01-00292
6	Placeholder Accela 600	00950-01-00293
7	Piston spring stainless steel	00201-11324
8	Z-arm cover Accela 600	N/A
9	Screw, M3 × 4.0[b]	N/A
10	Front panel Accela 600	N/A
11	Drip tray Accela 600	60057-40001
12	Cable valve D, Accela 600	N/A
13	Inlet module Accela 600	N/A
14	Cable valve C, Accela 600	N/A
15	Cable valve B, Accela 600	N/A
16	Cable valve A, Accela 600	N/A
N/A	Cable assembly, proportioning valve, Accela 600 (includes the cable valves A, B, C, and D and other cables)	00950-01-00289

[a] The length of the screw is 8 cm and the diameter is 3 mm.

[b] The length of the screw is 4 cm and the diameter is 3 mm.

Figure 112. Main pump—front view



Accela 600 Pump LDA

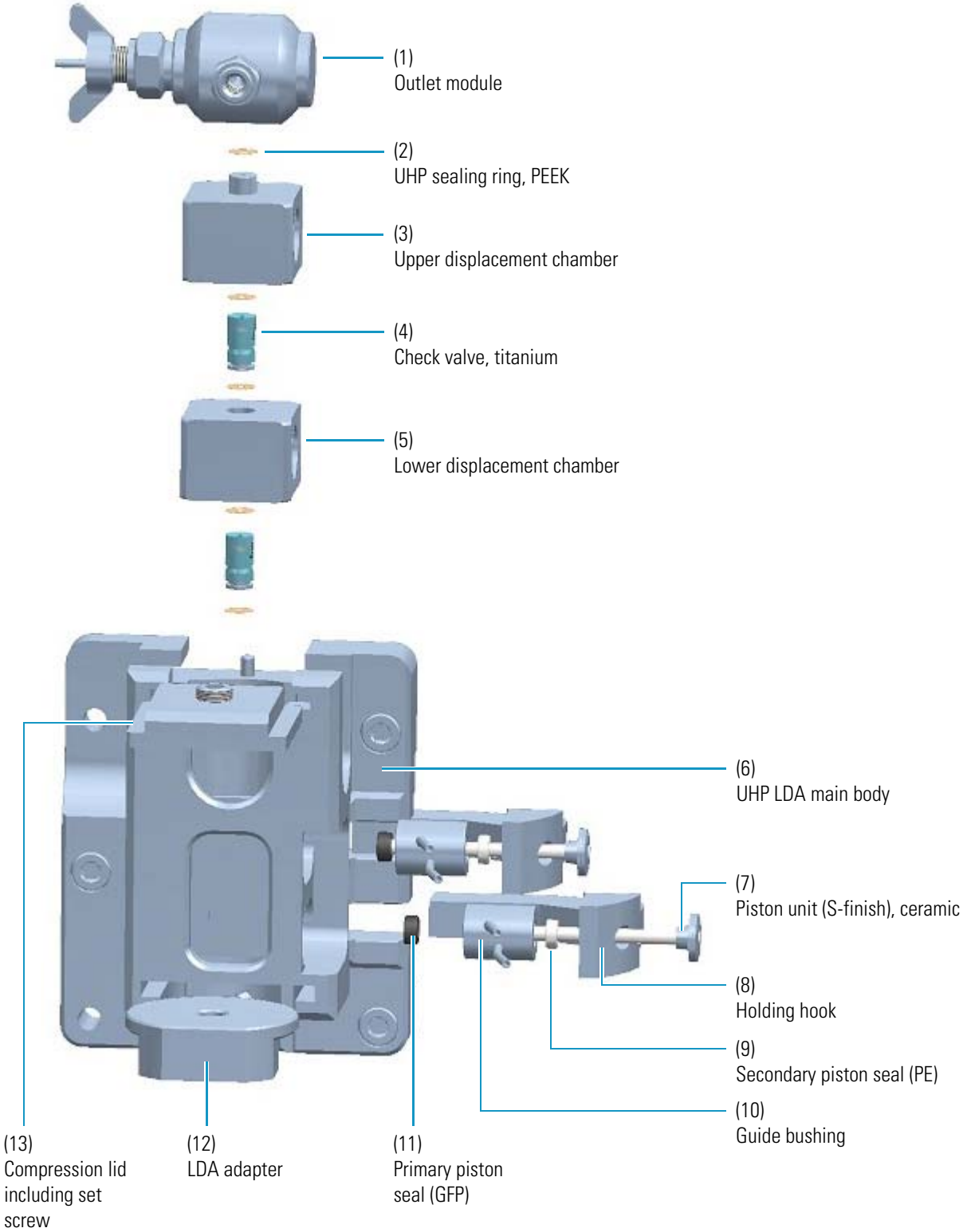
The replaceable parts listed in Table 21 correspond to the items shown in Figure 113.

The Accela 600 Pump has ceramic pistons. The primary piston seal is made of graphite fiber-reinforced polytetrafluoroethylene (GFP) and the secondary piston seal is made of polytetrafluoroethylene (PTFE).

Table 21. Accela 600 Pump LDA parts

Item	Quantity	Description	Part number
1	1	Outlet module, complete (compatible with both the Accela 600 Pump and the Accela 1250 Pump)	00950-01-00284
2	5	UHP PEEK sealing ring	00950-01-10013
3	1	Displacement chamber, upper	00950-01-00282
4	2	Check valve, titanium	00110-05110
5	1	Displacement chamber, lower	00950-01-00281
6	1	UHP LDA main body	N/A
7	2	Piston unit (S-finish), ceramic	00201-11324
8	2	Holding hook	N/A
9	2	Secondary piston seal, polyethylene (PE)	00107-18114
10	2	Guide bushing	00950-01-00283
11	2	Primary piston seal, graphite fiber-reinforced polytetrafluoroethylene (GFP)	00107-18110
12	1	Adapter, LDA	N/A
13	1	Compression lid including set screw	00950-01-00125

Figure 113. Accela 600 Pump LDA parts



Accela 1250 Pump LDA

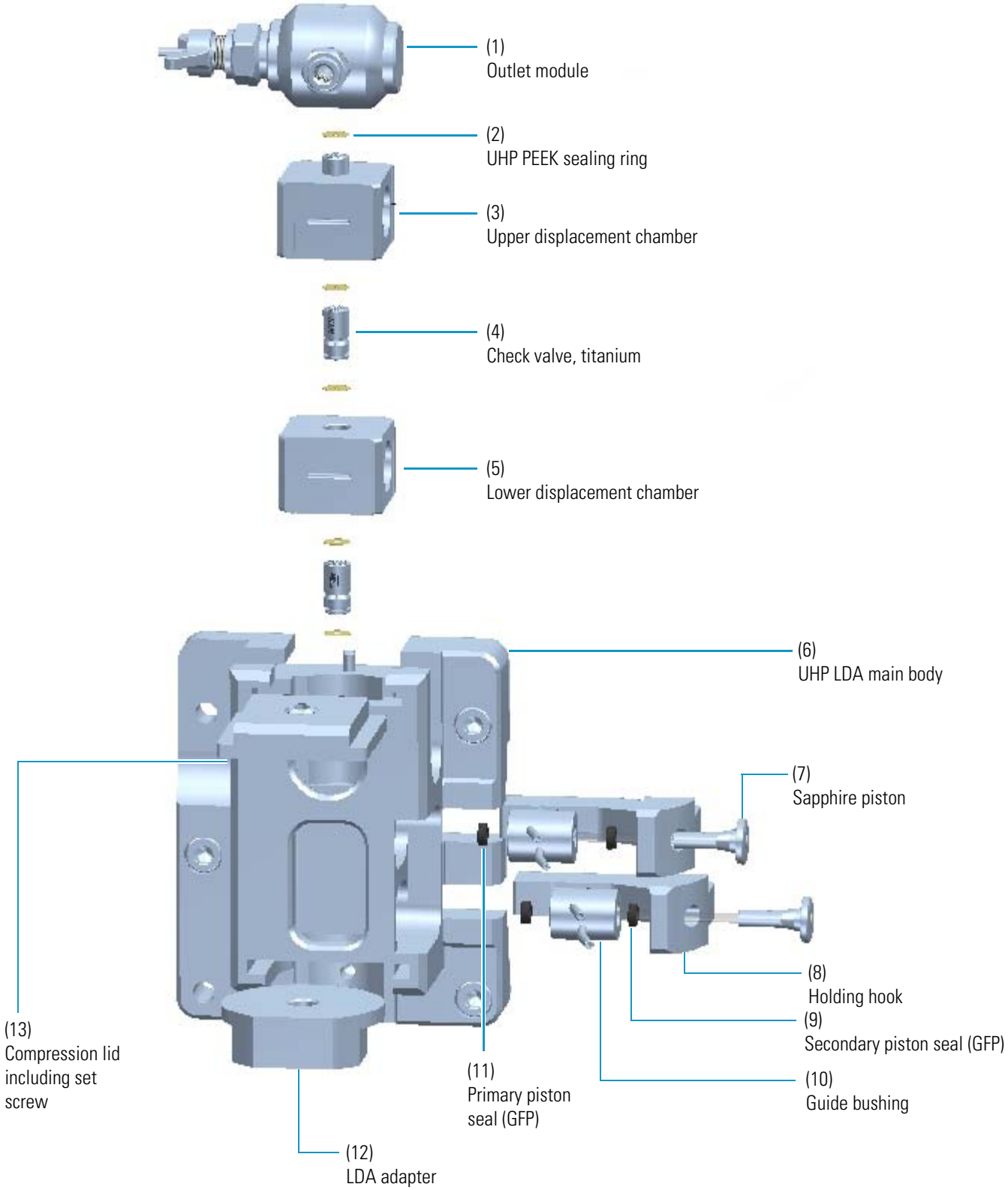
The replaceable parts listed in Table 22 correspond to the items shown in Figure 114.

The Accela 1250 Pump has sapphire pistons and graphite fiber-reinforced polytetrafluoroethylene (GFP) primary and secondary piston seals.

Table 22. Accela 1250 Pump LDA parts

Item	Quantity	Description	Part number
1	1	Outlet module, complete (compatible with both the Accela 600 Pump and the Accela 1250 Pump)	00950-01-00284
2	5	UHP PEEK sealing ring	00950-01-10013
3	1	Displacement chamber, upper	00950-01-00123
4	2	Check valve, titanium and ruby	00110-05110
5	1	Displacement chamber, lower	00950-01-00121
6	1	UHP LDA main body	N/A
7	2	Piston unit, sapphire	00950-01-00126
8	2	Holding hook	N/A
9	2	Secondary piston seal, (GFP)	00950-01-00129
10	2	Guide bushing	00950-01-00283
11	2	Primary piston seal, (GFP)	00950-01-00129
12	1	Adapter, LDA	N/A
13	1	Compression lid including set screw	00950-01-00125

Figure 114. Accela 1250 Pump LDA parts



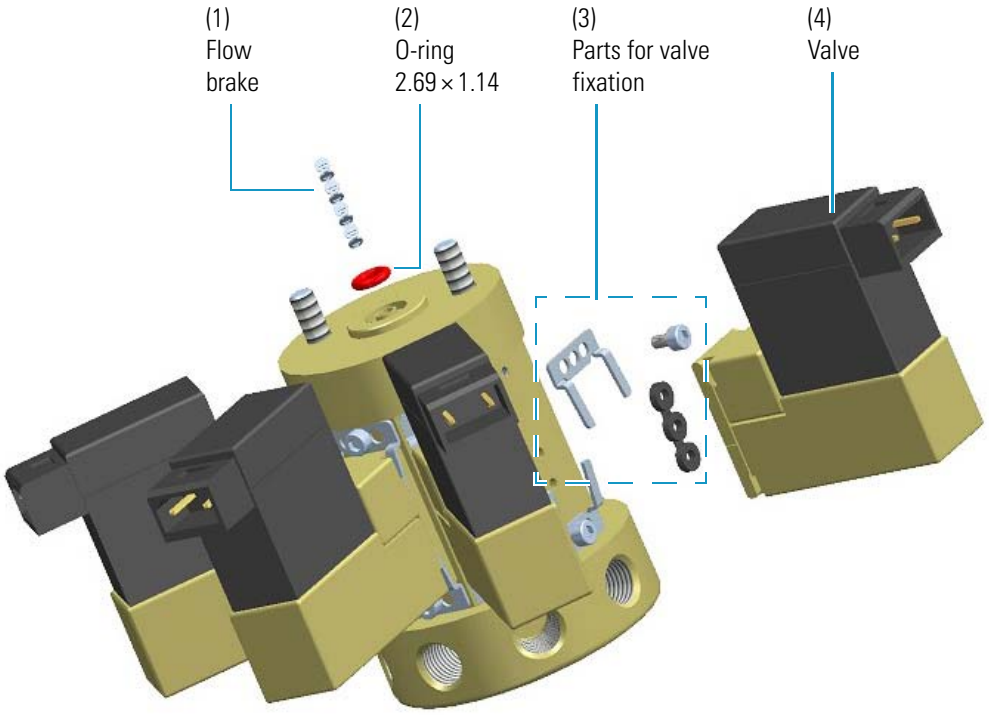
Inlet Valve Assembly

The replaceable parts listed in Table 23 correspond to the items shown in Figure 115.

Table 23. Inlet valve assembly parts (compatible with both pumps)

Item	Quantity	Description	Part number
1	1	Flow brake (Accela 600)	00950-01-00287
2	1	O-ring, 2.69 × 1.14 mm	00950-01-00286
3	4	Parts for valve fixation	00950-01-00288
4	4	Valve (Accela 600)	00950-01-00285

Figure 115. Inlet valve assembly



Service Spares

Table 24 lists services spares common to the Accela 600 Pump and the Accela 1250 Pump that you can order from Thermo Fisher Scientific.

Table 24. Service spares that are common to both pumps (Sheet 1 of 2)

Description	Part number
Brake, flow, inlet module, Accela 600 Pump	00950-01-00287
Cable assembly, AC power, internal	60157-63014
Cable assembly, RS-232, internal, Degasser board	60157-63004
Cable assembly, fan, Diablo, UHPLC	60157-63002
Cable assembly, RS-232 internal, Interface board	60157-63012
Cable assembly, COMM and Gradient LED	60157-63010
Cable assembly, Degasser LED	60157-63008
Cable assembly, LED, front panel	60157-63006
Cable assembly, proportioning valve, Accela 600 Pump, RoHS	00950-01-00289
Cable assembly, force sensor, Accela 600 Pump, RoHS	00950-01-00290
Cable assembly, digital I/O, Accela 600 Pump, RoHS	00950-01-00291
Cable, Bowden, Accela	00302-99-00010
Cable, motor index, MS pump	00950-01-00001
Cable, USB 2.0, A to B, 12 in. UL RoHS	00302-99-00009
Fuseholder, drawer, 5 × 20 mm, 2 pole, safe, RoHS	2109-0740
Fuse, 1.0 A, 250 V, 5 × 20 mm, time-lag, UL, VDE, RoHS	N/A
Fuse, IEC, 2.0 A, 250 V, 5 × 20 mm, time-lag, UL, CSA, RoHS	N/A
Kit, Inlet Tubing, Accela 600 Pump	60157-62008
Kit, Proportioning Valve Fixation, Accela 600 Pump	00950-01-00288
Mixer, static, 65 µL, Accela 600 Pump, RoHS	00950-01-00292
Module, outlet, Accela 600 Pump	00950-01-00284
O-ring, 2.69 × 1.14 mm, perfluor	00950-01-00286
PCB, UHPLC Interface board	60157-61000
Placeholder for the dynamic mixer, blind outlet module, Accela 600 Pump, RoHS	00950-01-00293
PCB, Control, new, Accela 600 Pump, RoHS	00950-01-00296
Power supply, 24 V, 2.5 A, 60 W, RoHS	00012-01-00013
Seal, face, PEEK, check valve	00950-01-10013

Table 24. Service spares that are common to both pumps (Sheet 2 of 2)

Description	Part number
Spring, piston retaining	00201-11328
Valve, proportioning, Accela 600 Pump	00950-01-00285
Valve, check	00110-05110

Table 25 lists the services spares for the Accela 600 Pump that you can order from Thermo Fisher Scientific.

Table 25. Accela 600 Pump service spares

Description	Part number
Bushing, guide, Accela 600 Pump	00950-01-00283
Chamber, displacement, lower, Accela 600 Pump	00950-01-00281
Chamber, displacement, upper, Accela 600 Pump	00950-01-00282
Gearbox, new, Accela 600 Pump, RoHS	00950-01-00295
Piston, 1/8 in. diameter, tetragonal zirconia polycrystal (TZP)	00201-11324
Seal, piston, secondary, PE	00107-18114
Seal, piston, primary, GFP	00107-18110

Table 26 lists the services spares for the Accela 1250 Pump that you can order from Thermo Fisher Scientific.

Table 26. Accela 1250 Pump service spares

Description	Part number
Bushing, guide, Accela Pump	00950-01-00127
Chamber, displacement, lower, Accela 1250 Pump	00950-01-00121
Chamber, displacement, upper, Accela 1250 Pump	00950-01-00123
Gear box, Accela 1250 Pump	00950-01-00308
Piston, sapphire	00950-01-00126
Seal, piston, secondary and primary, GFP	00950-01-00129
Spring, piston retaining	00201-11328

Accela 600 Pump Accessory Kit

Table 27 lists the parts provided in the Accela 600 Pump Accessory Kit.

Table 27. Accela 600 Pump Accessory Kit (P/N 60157-62006)

Quantity	Description	Part number
1	Luer adapter	N/A
2	Fuse, 1.0 A, 250 V, 5 × 20 mm, time-lag, UL, VDE, RoHS	N/A
1	Fuse, IEC, 2.0 A, time-lag, 5 × 20 mm, RoHS, UL, CSA	N/A
1	Wrench, 1/4 × 5/16 in., super krome, RoHS	N/A
1	Tubing, convoluted, pump waste	F5034-040
1	Syringe, Luer-Lok™, 10 mL	N/A
1	Screwdriver, balldriver, hex, 4 mm, RoHS	N/A
1	Connector, cable, plug, 8 positions, 3.81 mm pitch, Phoenix, RoHS	00004-02511
1	Cable, USB, A to B, 3.0 m, shielded, RoHS	00302-99-00014
1	Wrench, L-hex, 4 mm, RoHS	N/A
1	Tool, balldriver, 2.5 mm	N/A
2	Seal, high-pressure	00107-18110
1	Tool, fitting extender, Accela 600 Pump	00725-01-00023
1	Kit, Inlet Tubing, Accela 600 Pump	60157-62008

Accela 1250 Pump Accessory Kit

Table 28 lists the parts provided in the Accela 1250 Pump Accessory Kit (P/N 60157-62009).

Table 28. Accela 1250 Pump Accessory Kit (Sheet 1 of 2)

Quantity	Description	Part number
1	Luer adapter	N/A
1	Fuse, IEC, 2.0 A, time-lag, 5×20 mm, RoHS, UL, CSA	N/A
2	Fuse, 1.0 A, 250 V, 5 × 20 mm, time-lag, UL, VDE, RoHS	N/A
1	Wrench, 1/4 × 5/16 in., super krome, RoHS	N/A
1	Tubing, convoluted, pump waste	F5034-040
1	Syringe, Luer-Lok, 10 mL	N/A

Table 28. Accela 1250 Pump Accessory Kit (Sheet 2 of 2)

Quantity	Description	Part number
1	Screwdriver, balldriver, hex, 4 mm, RoHS	N/A
1	Connector, cable, plug, 8 positions, 3.81 mm pitch, Phoenix, RoHS	N/A
1	Cable, USB, A to B, 3.0 m, shielded, RoHS	00302-99-00014
1	Wrench, L-hex, 4 mm, RoHS	N/A
1	Tool, balldriver, 2.5 mm	N/A
2	Seal, high-pressure, GFP, Accela Pump	00950-01-00129
1	Tool, fitting extender, Accela 600 Pump	00725-01-00023
1	Kit, Inlet Tubing, Accela 600 Pump	60157-62008

Inlet Tubing Kit

The Accela 600 Pump Inlet Tubing Kit contains four solvent reservoir lines. Each solvent line consists of a 3 m length of 1/8 in. OD×1/16 in. ID, FEP tubing with a 1/4-28 PEEK flangeless fitting at one end and a 20 µm particle size, stainless steel filter at the other end.

Table 29 lists the parts provided in the Accela 600 Pump Inlet Tubing Kit (P/N 60157-62008).

Table 29. Accela 600 Pump Inlet Tubing Kit

Quantity	Description	Part number
288 in.	0.062 in. ID × 1/8 in. OD, FEP tubing (order by the inch)	3219-2004
4	Filter, solvent inlet, stainless steel, 20 µm, RoHS	00109-02-00022
4	Fitting, ferrules for 1/8 in. OD tubing, short, Tefzel™	00101-18223
1	Fitting, nut, for 1/8 in. OD tubing, 1/4-28[a], PEEK, blue, RoHS	N/A
1	Fitting, nut, for 1/8 in. OD tubing, 1/4-28, PEEK, yellow, RoHS	N/A
1	Fitting, nut, for 1/8 in. OD tubing, 1/4-28, PEEK, green, RoHS	N/A
1	Fitting, nut, for 1/8 in. OD tubing, 1/4-28, PEEK, orange, RoHS	N/A

[a] The nut has a 1/4 inch thread barrel with 28 threads per inch.

Compression Fittings for High-Pressure Connections

Table 30 lists the fittings used to connect the high-pressure solvent line between the pump and the autosampler.

Table 30. Compression fitting for high-pressure connections and 1/16 in. OD tubing

Description	Part number
Compression nut, stainless steel, 0.45 in. length	2522-1880
Ferrule, stainless steel, 0.188 in. length	00101-18187

Tools

Table 31 lists the tools that you must have to perform maintenance on the pump.

Table 31. Tools required to maintain the pump

Description	Part number
Tool, fitting extender, Accela 600 Pump	00725-01-00023
Balldriver, hex, 4 mm, RoHS	N/A
Wrench L hex 4 mm, RoHS	N/A
Ball driver, 2.5 mm	N/A
Wrench, 1/4 × 5/16 in., super krome, RoHS	N/A

Seal Wash Pump Kit

The Seal Wash Pump Kit (P/N 00960-01-00023) contains the seal wash pump, the tubing and fittings that you must have to set up the seal wash pump, and the cable that connects the seal wash pump to the Controller board. Figure 116 through Figure 118 show the components of the Seal Wash Pump Kit.

Figure 116. Tubing, fittings, solvent filter, and solvent bottle in the Seal Wash Pump Kit

Figure 117. Seal wash pump in the Seal Wash Pump Kit

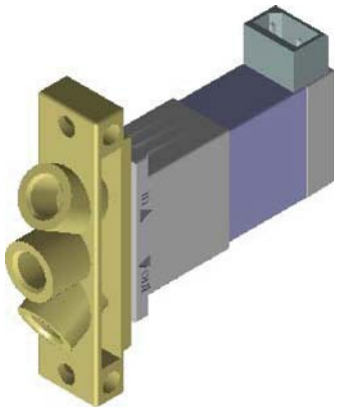


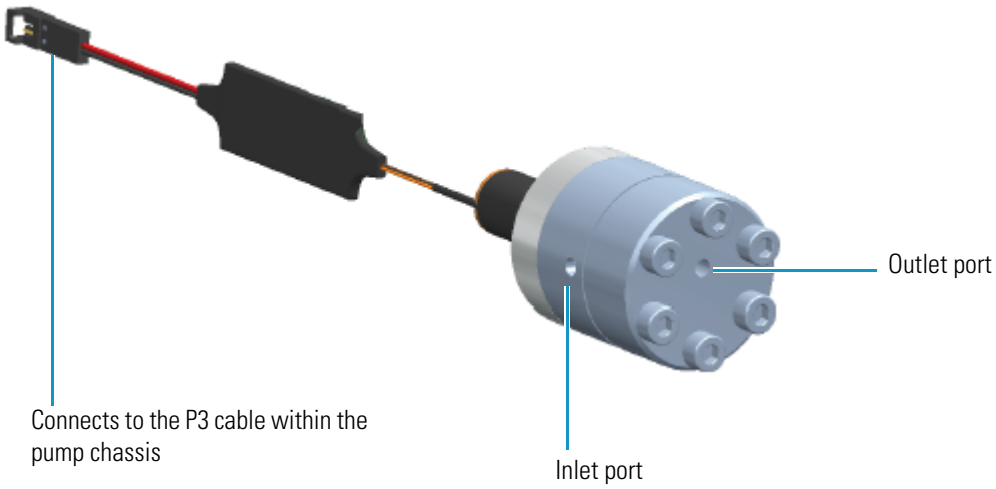
Figure 118. Cable for seal wash pump

Dynamic Mixer

The part number for the optional dynamic mixer (see Figure 119) is 00950-01-00298.

Tip To secure the dynamic mixer to the Accela 600 Pump, use the screws that secure the blind outlet (placeholder) module.

Figure 119. Dynamic mixer



Leak Sensor Kit

The Leak Sensor Kit (P/N 00960-01-00024) contains the following items:

- Leak sensor with attached cable
- Mounting bracket
- Locating fixture
- Two-component adhesive

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