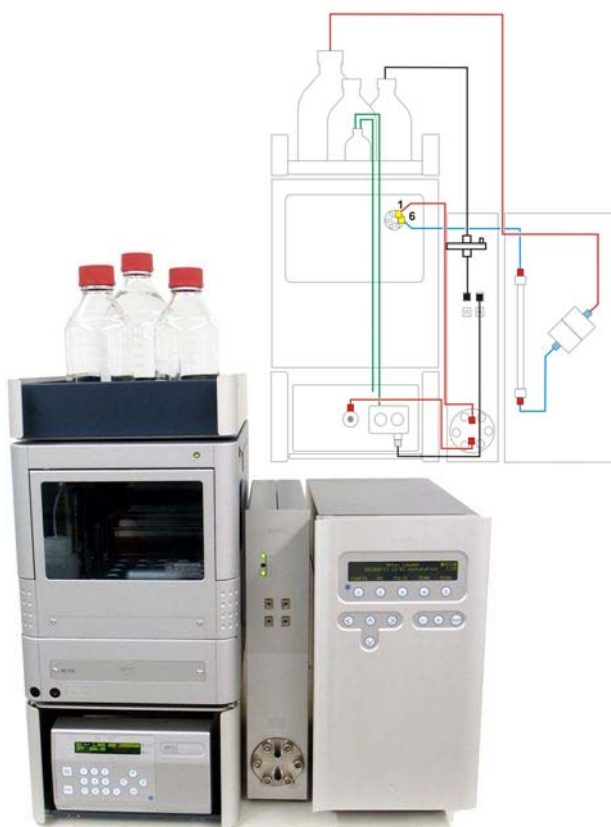


ALEXYS[®] LC connection kit, universal installation guide



Symbols

The following pictogram is used in this installation guide:



Caution

General precautions



Execute periodic leak checks on LC tubing and connections. Do not allow flammable and/or toxic solvents to accumulate. Do not close or block drains. Follow a regulated, approved waste disposal program. Never dispose of such products through the municipal sewage system.



Use proper eye and skin protection when working with solvents.



Use of this product outside the scope of this guide may present a hazard.

Spare parts and service availability

Manufacturer provides operational spare parts of instruments and current accessories for a period of five years after shipment of the final production run of the instrument. Spare parts will be available after this five years period on an 'as available' basis.

Manufacturer provides a variety of services to support her customers after warranty expiration. Repair service can be provided on a time and material basis. Contact your local supplier for servicing. Technical support and training can be provided by qualified chemists on both contractual or as-needed basis.

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CHAPTER 1

Installation

Introduction

The universal LC connection kit (p/n 190.0150A) is a basic kit consisting of a set of tubing and connectors to make all necessary LC connections in an ALEXYS® LC-EC system yourself.



This LC connection kit contains tubing for standard-bore LC only and is not suitable for use in micro LC applications.

This document is not a full installation manual of all LC connections, but gives general guidelines about how to make tubing connections on a standard-bore LC system. Please consult the equipment manuals for detailed information. The following manuals are available (depending on the system purchased):

Part no.	User manual
184.0010	OR 100 / 110 organizer rack
193.0010	LC 110 pump
181.0010	AS 100 autosampler
191.0010	AS 110 autosampler
174.0010	DECADE II™ SDC
171.0010	DECADE II

The kit has all the necessary tubing and connections for to set up a single LC-EC system with one pump. If more pumps etc. have to be connected additional parts have to be ordered separately.

Unpacking

Inspect the *transport box* for possible damage as it arrives. Immediately inform the transport company in case of damage, otherwise she may not accept any responsibility. Keep the transport box as it is designed for optimum protection during transport and it may be needed again. Carefully unpack the instrument and inspect it for completeness and possible damage. Contact your supplier in case of damage or if not all marked items on the checklist are included. Prior to shipment, your LC connection kit has been inspected and tested to ensure the best possible performance.

Tools

The following tools are necessary for the installation of the LC connection kit:



Figure 1. 5/16" - 1/4" wrench.

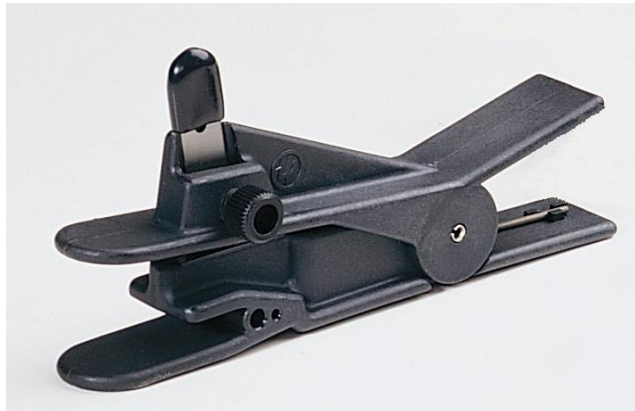


Figure 2. Tubing cutter.

The tubing cutter (p/n 250.1020) is part of the LC connection kit and the wrench (p/n 193.0406) a part of the LC 110 shipkit.

LC connections in ALEXYS LC-EC system

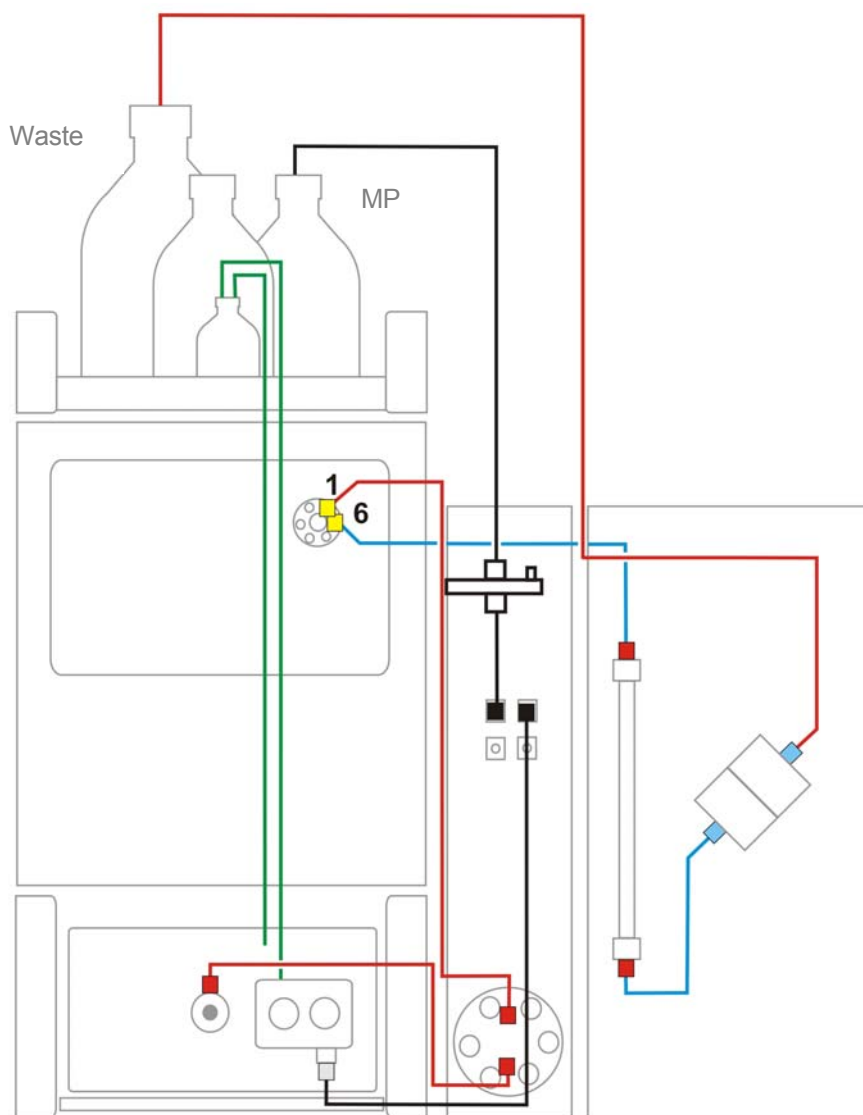











Figure 3. Schematic drawing of the LC connections in a standard ALEXYS LC-EC system. See legend on the next page for the explanation of the color coding of tubing and connectors.

Table I Tubing and connector color coding reference.

<u>LC connections</u>	
	250.1566/1568 ferrule/nut LC 110 inlet
	250.1550/1552 ferrule/nut OR 100/110
	250.1570 fingertight
	250.1572 fingertight, small
	110.1045 fingertight M5 (VT-03)

<u>LC tubing</u>	
	250.0910 FEP 1/8", 1.59mm ID
	250.0912 PEEK 1/16", 0.50mm ID
	250.0914 PEEK 1/16", 0.25mm ID
	193.0426 silicone 3mm, 1mm ID

Installation guidelines

For a standard-bore ALEXYS LC-EC system the LC connections are shown in figure 3. The corresponding tubing and connector color coding reference table is shown above. When setting up LC connections using the universal connection kit please take into account the following precautions:

- Use the proper connectors to connect tubing to the different systems components. See the color coding table I for reference.



Connection tubing with the wrong type of nut and ferrule can damage the port or result in large dead volumes!



Figure 4. Tubing configuration LC 110.

Red circle :opening (slit) for 1/8" inlet and 1/16" outlet tubing connected to the pump. Red arrow: make sure that the inlet and outlet tubing have sufficient length inside the PR 110 housing to assure that the LC 110 can be pulled forward to access the pump head and purge valve. Blue arrow: the LC 110 piston wash tubing should be directed to the back side of the pump and then into the wash bottle on the SR 110 rack located on top of the AS 110.

Low pressure connections

See black-colored tubing in figure 3 for a schematic representation of all 1/8" low pressure lines:

Mobile Phase (MP) bottle → Degasser
Degasser → LC 110 inlet.

- For all low pressure LC connections in the flow path use p/n 250.0910, 1/8" FEP tubing, 1.59 mm (1/16") ID. See also figure 4 for installation guidelines.
- Instructions for the installation and use of the Whatman inline filter can be found in chapter 3.
- For the connection of the 1/8" FEP tubing to the degasser ports use the OR100/OR110 nut and ferrule (p/n 250.1550 and 250.1552). See figure 5 .

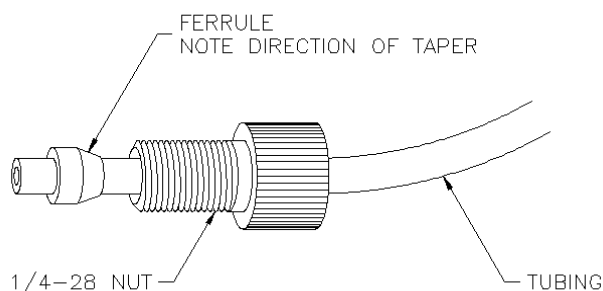


Figure 5. Configuration of 1/4-28 Nut, Ferrule and Tubing.

- Use the LC 110 inlet nut and ferrule (p/n 250.1566 and 250.1568) to connect the FEP tubing from the degasser to the inlet of the LC 110 pump.
- For the automatic piston wash use the LC 110 piston wash assembly (p/n 180.0208A). Connect one tubing to the inlet and the other the outlet of the piston wash on the LC 110 designated with ▲▼. The open ends of the tubing should be inserted in the bottle with wash solvent. See figure 4 for further installation guidelines.
- To prime the piston wash tubing for the first time, attach a syringe to the outlet line and prime the tubing with wash liquid once.

Priming low pressure lines

- Place the end of the FEP tubing (inlet) in a mobile phase bottle filled with demi-water as depicted in figure 3. Open the filter (vent) and draw the mobile phase through the tubing using a syringe until the filter is completely wetted and the upper compartment is air bubble free. Close the vent. Connect the syringe to the outlet and gently draw the plunger to fill the outlet tubing with solvent. Remove the syringe and hold the outlet tubing well below the liquid level in the mobile phase bottle. The outlet tubing should spontaneously siphon solvent by gravity. If this is not the case consult the trouble-shooting section in chapter 3.

Tip: If the filter does not wet easily inject a small amount of methanol on the filter via the vent opening in the filter.



Never push the solvent through the channel of the degasser

- For priming instructions of the pump please consult the manual of the LC 110 (p/n 193.0010).

High pressure connections

See figure 3 for a schematic representation of all high pressure lines (from pump outlet to the column):

Pump outlet → Pulse damper

Pulse damper → Injector

Injector → Column inlet

- For all high pressure LC connections from the pump to the injector use p/n 250.0912, 1/16" PEEK tubing, 0,50 mm ID (orange-striped).
- For the high pressure LC connections from injector to the column use p/n 250.0914, 1/16" PEEK tubing, 0,25 mm ID (blue-striped). Note the direction of flow indicated on the column.
- Use the correct nut/ferrule or fingertight to establish the tubing connections, as indicated in figure 3 and the corresponding reference table.



For optimal performance of your LC-EC system:

- Keep tubing length between injector-to- column and column-to-cell to a minimum.
- Use a tubing cutter to make straight & neat tubing cuts and make proper connections to avoid dead volumes (see figure below).

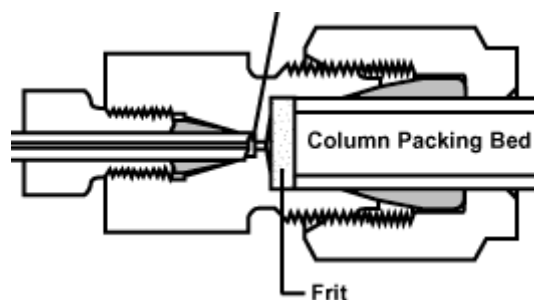


Figure 6. If the capillary tubing does not "bottom-out" inside the union, or if it does not have a smooth, flat end, an unacceptable amount of dead volume may be added to the system.

Cell connections

See figure 3 for a schematic representation of all 1/16" low pressure lines connected to the electrochemical flow cell:

Column outlet → Flow cell

Flow cell → Mobile phase bottle

- For the LC connection between the column and the flow cell use p/n 250.0914, 1/16" PEEK tubing, 0,25 mm ID (blue-striped).
- For the connection from flow cell to waste use p/n 250.0912, 1/16" PEEK tubing, 0,50 mm ID (orange-striped).
- Use the correct nuts/ferrules or fingertights as indicated in figure 3 and the corresponding reference table.

For detailed priming instructions refer to the DECADE II user manual (p/n 170.0010).

Table II. Tubing dimensions and material .

p/n	Material	I.D. (Inch)	I.D. (mm)	O.D. (Inch)
250.0910	FEP	1/16	1.59	1/8
180.0208A	Silicone	0.04	1.00	0.12
250.0914	PEEK (Blue)	0.01	0.25	1/16
250.0912	PEEK (Orange)	0.02	0.50	1/16

CHAPTER 2

Accessories

The LC connection kit is shipped with the following parts, which can be ordered separately.

Table II. Accessories LC connection kit, universal.

Part no	Description
110.1045	Fingertight M5 (VT-03)
250.1020	Tubing cutter
250.0910	Tubing, FEP 1/8", 0.75mm ID, 2m
250.0912	Tubing, PEEK 1/16", 0.50mm ID, 4m
250.0914	Tubing, PEEK 1/16", 0.25mm ID, 3m
180.0208A	LC 110 piston wash assembly
250.1550	Ferrule for OR 100/110 degasser
250.1552	Nut for OR 100/110 degasser
250.1562	Ferrule for LC 100/110 outlet
250.1564	Nut for LC 100/110 outlet
250.1570	PEEK fingertight
250.1572	PEEK fingertight , small
250.1566	Ferrule for LC 110 inlet
250.1568	Nut for LC 110 inlet
250.1700	In-line filter (aqueous)

CHAPTER 3

Operating instructions Whatman IFD**Specifications**

The information listed below is compiled from the original Whatman data sheet (reference number 90600A):

Table III. Specifications of Whatman AQUEOUS IFD Disposable Filters.

Parameter	Specification
Dimensions:	53 mm (2.1 in.) x 44.5mm (1.75 in.)
Weight:	11.5 grams (20 grams with ferrule nuts)
Filtration Area:	16 cm ²
Maximum Pressure:	
Housing Burst	4.1 bar (60 psi)
Operating	2.1 bar (30 psi)
Housing	Polypropylene
Vent	On Inlet with Luer Lock Cap
Volume "Hold Up"	Full housing 1.0 ml, with Air Purge < 0.1 ml
Filter Media	Nylon
Flow Direction	Flow should enter from the inlet
Operating Flow Rate	< 2.5 mL/min
Connectors	5/16-24 Threads + 1/18" O.D. Ferrule Nuts
Biosafe	All Materials Pass USP Class VI

Table III. Chemical compatibility summary.*

Classes of Substances 20°C	Polypropylene/Nylon Guide for use
Acids, dilute	Usable
Acids, concentrated	Not usable
Alcohols (selected)	Usable
Aldehydes	Not usable
Bases	Usable
Esters	Short term use
Hydrocarbons, aromatic	Not usable
Hydrocarbons, halogenated (selected)	Short term use
Ketones	Not usable

*) This chemical compatibility chart is intended as a general guide only. This guide has been compiled from results of inhouse studies, material supplier

studies and currently available technical literature. Because of solvent condition variabilities, which may exist from lab to lab, component compatibility cannot be guaranteed. In order to verify chemical compatibility, studies on individual chemicals of interest should be undertaken.

The AQUEOUS IFD, product number 6726-5002A, is designed to work with aqueous mobile phases. Whatman recommends the SOLVENT IFD product number 6725-5002A for organically based mobile phases (organic modifier concentrations > 30%).

Operating instructions

Safety: Considering the special factors of your application consult the table of Technical Data to determine the correctness of use. Do not exceed the pressure, temperature or chemical compatibility recommendations.



High pressures are easily obtained when using syringes. Care should be taken not to exceed the recommended pressures. Hold the filter to the syringe when pressure is applied to prevent disengaging the filter from the syringe. This could occur if excessive pressure is applied.

Filter Media Considerations: The 0.2 μm nylon membrane filter media provides an excellent means of filtering aqueous based HPLC mobile phases. It provides high flow rates and throughput. For specific solutions see the Chemical Compatibility Summary. "Wetted" media will not allow gas to easily pass through the media. The pressure required for gas to pass through wetted media (bubble point) is dependent on the media's pore size. Air entrained on the upstream side of wetted media blocks the flow path and reduces or stops flow.

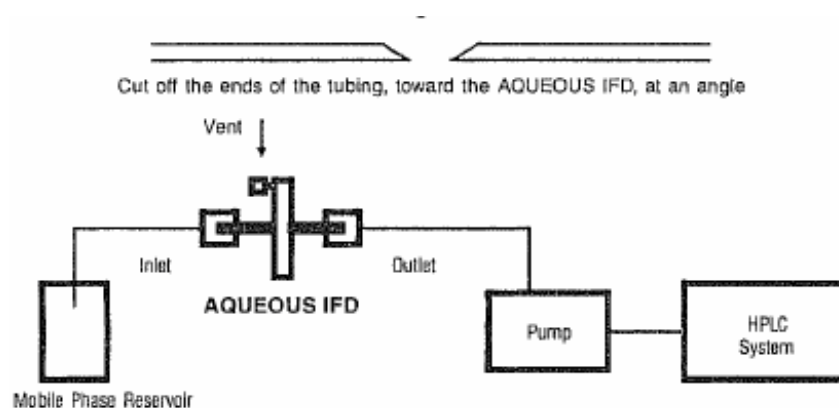


Figure 13 Schematic drawing of filter Installation in HPLC set-up.

Filter installation and priming

1. Establish continuous, bubble free flow from mobile phase reservoir to pump by aspirating with a syringe through the pump bleed valve.
2. Cut, at an angle, an appropriate length of 1/8" O.D. tubing to reach comfortably from the mobile phase reservoir to the inlet of the AQUEOUS IFD. Slide a ferrule nut over the cut tubing. Connect tubing to the inlet of the AQUEOUS IFD, angled end toward the AQUEOUS IFD, by tightening the nut firmly.



Gently insert cutted tubing ends into filter to prevent damage of the filter media.

3. Plug the inlet tubing, or seal the end by attaching and clamping off a short length of flexible tubing.
4. Fill a 10 ml syringe with the mobile phase, remove vent cap and secure the syringe to the vent.
5. With outlet pointed up SLOWLY push the syringe plunger completely wetting out the filter media and filling the AQUEOUS IFD housing.
6. Connect outlet to 1/18" O.D. pump inlet tubing (cut at an angle) with a ferrule nut, as in step 2.
7. Unplug or unclamp AQUEOUS IFD inlet tubing and place it in the mobile phase reservoir.
8. Making sure the vent is on the upper side of the AQUEOUS IFD, fill the tubing leading to the mobile phase reservoir by pushing slowly on the syringe plunger.
9. Slowly pull on the syringe plunger to withdraw a few ml of the mobile phase into the syringe. Note: This should remove any remaining entrapped air from the inlet side of the AQUEOUS IFD housing.
10. Maintaining the AQUEOUS IFD at the same level as the mobile phase in the reservoir, remove the syringe and replace the vent cap on the vent.
11. Pump mobile phase through system, bypassing the column, for 15 minutes to purge any remaining entrapped air in the tubing between the AQUEOUS IFD and the pump.

Trouble shooting

1. To check the AQUEOUS IFD connections for air tightness: plug the tubing at the mobile phase reservoir. Remove vent cap and secure an empty syringe to the vent. Pull back on the plunger. If there are any air leaks, air bubbles will be observed.
2. Air present in the inlet side of the AQUEOUS IFD during operation: The air may be evacuated by holding the AQUEOUS IFD level with the mobile phase in the mobile phase reservoir, removing the vent cap, securing an empty syringe to the vent and pulling back on the syringe plunger. Then remove the syringe and replace the vent cap. Normally a small bubble of air will remain in the vent. This will not interfere with mobile phase flow.
3. Trouble with priming: Follow steps 7 through 10 exactly. Check for mobile phase leaks and or air leaks (bubbles), step 1 of Trouble Shooting section.
4. No flow immediately after Installation:
 - a. Check for air blocking the inlet side of the AQUEOUS IFD by repeating steps 7 through 10.
 - b. To determine if the mobile phase is flowing from the mobile phase reservoir to the inlet side of the AQUEOUS IFD; secure a syringe filled with mobile phase to the vent and push the syringe plunger. Mobile phase should flow back from the AQUEOUS IFD to the mobile phase reservoir with a small amount of pressure on the syringe plunger.
 - c. To determine if the mobile phase is flowing through the AQUEOUS IFD to the pump; plug the tubing to the mobile phase reservoir, secure a syringe filled with mobile phase to the vent and push the syringe plunger. mobile phase should flow easily through the AQUEOUS IFD and the tubing to the pump.
5. Slow or no flow after use: Check for air blockage and clear any entrapped air by following steps 7 through 10. If problem persists, the AQUEOUS IFD is probably clogged with particulates and should be replaced.
6. Air appears to be passing through the AQUEOUS IFD: Check for air leaks by following Trouble Shooting step 1. If no air leaks are observed on the outlet side, replace the AQUEOUS IFD, the media may have ruptured. Operating Considerations: Proper

operation of the system requires flow rates of < 2.5 ml/min. The filter unit should always be changed when changing from one mobile phase to another.

7. Integrity Testing: Bubble Point (BP) Test: Flush filter with 10 ml or more of an appropriate solution. After the media is completely wet, with outlet pointed upward, apply air under controlled pressure to the inlet until air breaks through the media and bubbles from the outlet. The pressure where air begins to pass through the media is the BP.

