Agilent

Agilent InfinityLab
Online LC Solutions

User Manual

Notices

Document Information

Document No: D0006652 Rev. E
Edition: 06/2024

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CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

In this Guide

This document is for the Agilent InfinityLab Online LC Solution including the following modules:

- Agilent 1260 Infinity II Online Sample Manager (G3167A)
- Agilent 1290 Infinity II Bio Online Sample Manager (G3167B)

8 Parts for Maintenance and Repair

This chapter provides information on parts material required for the solution modules.

9 Test Functions and Calibration

This chapter describes the built in test functions.

10 Error Information

This chapter describes the meaning of error messages, and provides information on probable causes and suggested actions how to recover from error conditions.

11 Identifying Cables

This chapter provides information on cables used with the solution modules and how to set up an external device.

12 Hardware Information

This chapter describes the modules in more detail on hardware and electronics.

13 Appendix

This chapter provides additional information on safety, legal, and web.

Contents

1 Introduction

This chapter gives an introduction to the Agilent InfinityLab Online LC Solution.

Solution Product Overview

Product Structure

The Agilent InfinityLab Online LC Solution hardware consists of the following

- Either the Agilent 1260 Online Sample Manager Set (G3167AA), including
  - Agilent 1260 Infinity II Online Sample Manager module (G3167A)
  - Agilent 1290 Infinity II Valve Drive (G1170A) equipped with a 3-position/6-port FI valve
- Or the Agilent 1290 Infinity II Bio Online Sample Manager Set (G3167BA), including
  - Agilent 1290 Infinity II Bio Online Sample Manager module (G3167B)
  - Agilent 1290 Infinity II Valve Drive (G1170A) equipped with a biocompatible 3-position/6-port, MP35N FI valve

These sets can be connected to an external reaction system. The InfinityLab Online LC Solution is designed to enable online sample collection and analysis during a reaction process.

The Agilent Online LC Monitoring Software is included to control the solution modules and adjust parameters for the sample analysis.

Product Description

Online Sample Manager (G3167A)

The Agilent 1260 Infinity II Online Sample Manager is an online sampling module that connects the analytical world with the process world. The module provides automated sample analysis via direct injections or retained samples from flow reactors, batch reactors, as well as upstream bioreactors and downstream purification devices.

The Online Sample Manager supports both classical flow-through injection and Feed Injection, mediating the chromatographic sample diluent incompatibility of challenging process samples. The Online Sample Manager provides automated dilutions of up to 1:1000, retain-sample functionality, and direct analysis of the process samples, as well as automated sample preparation.

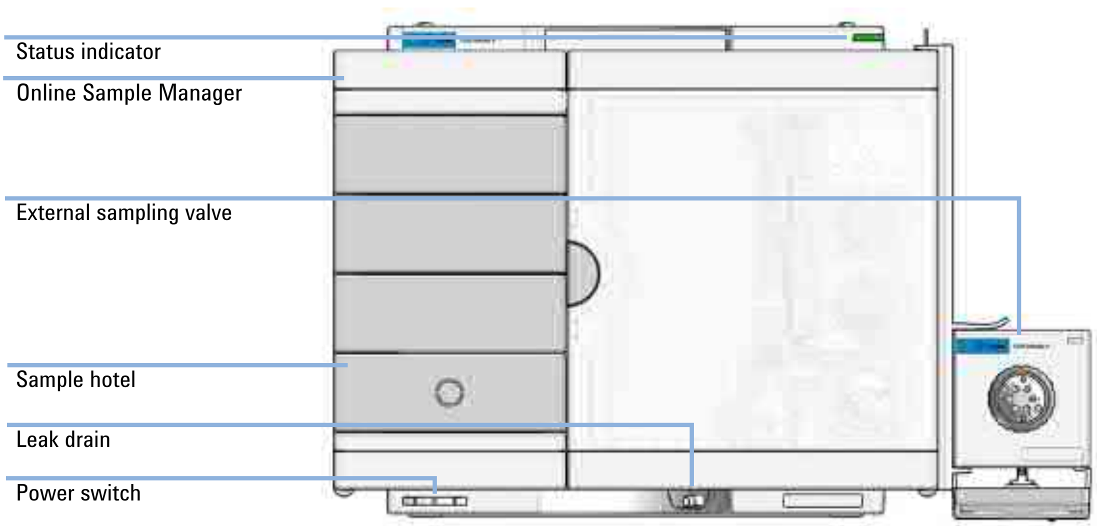

Figure 1 Overview of the Online Sample Manager Set modules

Bio Online Sample Manager (G3167B)

The 1290 Infinity II Bio Online Sample Manager combines the 1260 Infinity II Online Sample Manager and the 1290 Infinity II Bio Multisampler, offering a biocompatible flow path and a maximum pressure capability of 1300 bar, for the most demanding (bio-)process monitoring applications. The Online Sample Manager mediates sample diluent incompatibility in challenging (bio-)process samples by supporting both flow-through and Agilent Feed Injection methods. It automates dilutions up to 1:1000 and offers retain-sample functionality for further analysis. The system also enables direct analysis of process samples and provides automated sample preparation.

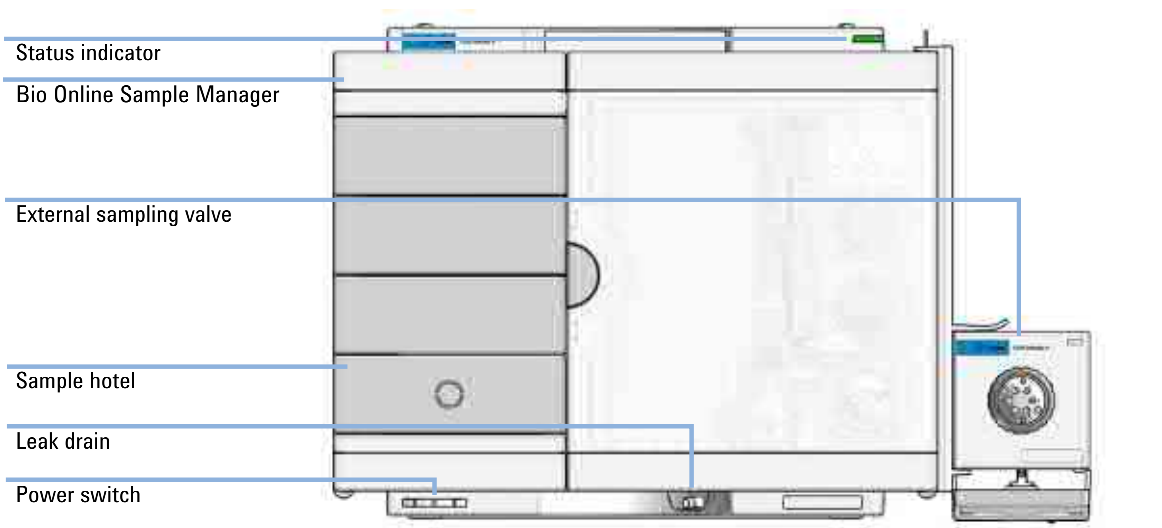

Figure 2 Overview of the Bio Online Sample Manager Set modules

External Sampling Valve (G1170A)

The Agilent 1290 Infinity II Valve Drive (G1170A) is an external valve drive that can be equipped with different valve heads. It comes with a flexible mounting bracket for left- or right-side mounting on LC stacks. The 1290 Infinity II Valve Drive is compatible with all currently available InfinityLab Quick Change Valve heads to allow maximum flexibility and a variety of applications.

In the 1260 Online Sample Manager, it is used with a special valve head (3-position/6-port FI) and serves as an external sampling interface. The external sampling interface is highly synchronized with the inner valve of the 1260 Online Sample Manager. It transfers the sample from the process stream into the 1260 Online Sample Manager and enables automated process monitoring.

In the 1290 Bio Online Sample Manager, it is used with a special valve head (3-position/6-port FI MP35N) and serves as an external sampling interface. The external sampling interface is highly synchronized with the inner valve of the 1290 Bio Online Sample Manager. It transfers the sample from the process stream into the 1290 Bio Online Sample Manager and enables automated process monitoring.

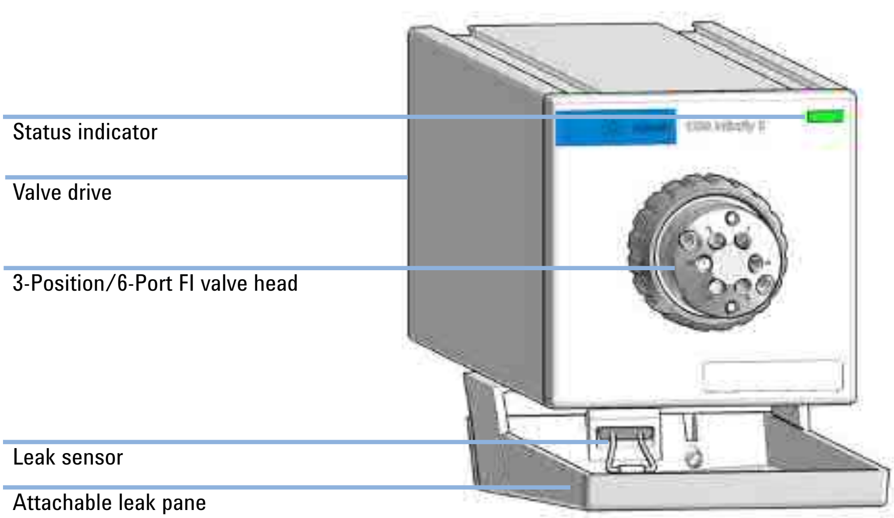

Figure 3 Overview of the External Sampling Valve

Product Features

Online Sample Manager (G3167A)

- Interfaces the analytical with the process world in PAT applications via the easy-to-access external sampling interface, enabling automated process sample analysis via LC applications.
- Provides a broad range of sampling and injection volumes from 0.1 to 100 µL for enhanced injection flexibility of process samples.
- Enables fast process monitoring of critical process parameters (CPPs) and critical quality attributes (CQAs) via direct injections, providing real-time data for greater control and faster understanding of processes.
- Supports automated dilutions (up to 1:1000), reaction quenching, sample preparation, and sample archiving via retain-sample functionality.
- Efficient sample handling and logistics: 432 vials (2 mL) can be used for at-line sample analyses or with the online retain-sample functionality.
- Hybrid injection technology: Classical flow-through for seamless method transfer and Feed Injection to mediate strong sample diluent effects.

Bio Online Sample Manager (G3167B)

- Interfaces the analytical with the process world in PAT applications via an external sampling interface for automated process sample analysis.
- Provides a wide range of sampling volumes (0.1 – 100 µL) for flexible injection of process samples (up to 1300 bar).
- Enables fast monitoring of critical process parameters and quality attributes through direct injections, delivering real-time data for enhanced control and process understanding.
- Supports automated dilutions, reaction quenching, sample preparation, and archiving via retain-sample functionality.
- Offers efficient sample handling with a capacity of 432 vials (2 mL) for at-line sample analysis or online retain-sample functionality.
- Utilizes hybrid injection technology for seamless method transfer and effective sample dilution control.
- Includes an integrated sample thermostat option for handling temperature-sensitive samples (4 – 40 °C).
- Biocompatible sample flow path ensures integrity of biomolecules and minimizes unwanted surface interaction.

Hardware Concept

The Figure 4 on page 17 shows the overview of the main hardware components of the Agilent InfinityLab Online LC Solution.

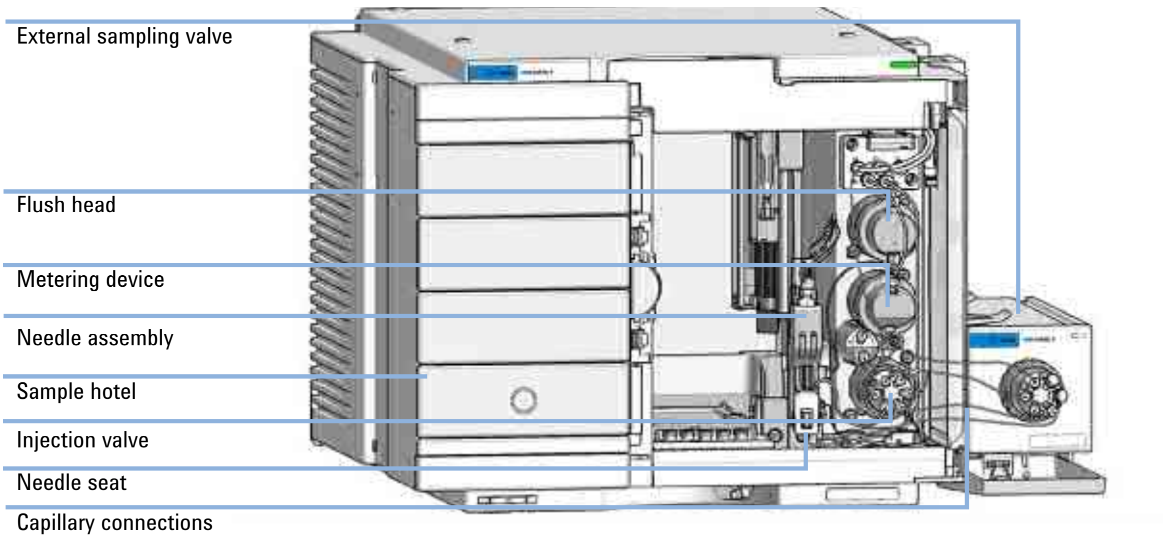

Figure 4 Overview of the hardware components of the Agilent InfinityLab Online LC Solution

The following components of the Online Sample Manager Set are shown schematically:

- 1260 Infinity II Online Sample Manager (G3167A) / 1290 Infinity II Bio Online Sample Manager (G3167B)
- External Sampling Valve (External Valve Drive (G1170A) equipped with 3-position/6-port FI Valve head or with 3-position/6-port FI MP35N Valve head)
- Capillary connections

The Injection Valve is part of the Online Sample Manager (G3167A/B). It has capillary connections to the Flush Head, the Flexible Pump (G7104C), the column, and the outlet. Two transfer capillaries connect the Injection Valve with the External Sampling Valve on the External Valve Drive (G1170A). With the External Sampling Valve, samples can be taken from the reaction stream. Therefore, the External Sampling Valve is connected to the Metering Device and the Needle Seat. Depending on the injection mode, the drawn sample can be directly analyzed via Flow Through or Feed Injection, diluted or stored in a vial.

More details about the Online Sample Manager Set Hardware Concept can be found in the *Introduction to G3167AA(BA) Online Sample Manager Sets* videos on the Online LC Monitoring Software USB installation media, p/n G2954-64000.

The detailed flow scheme of the Online Sample Manager Set is shown in the following figure.

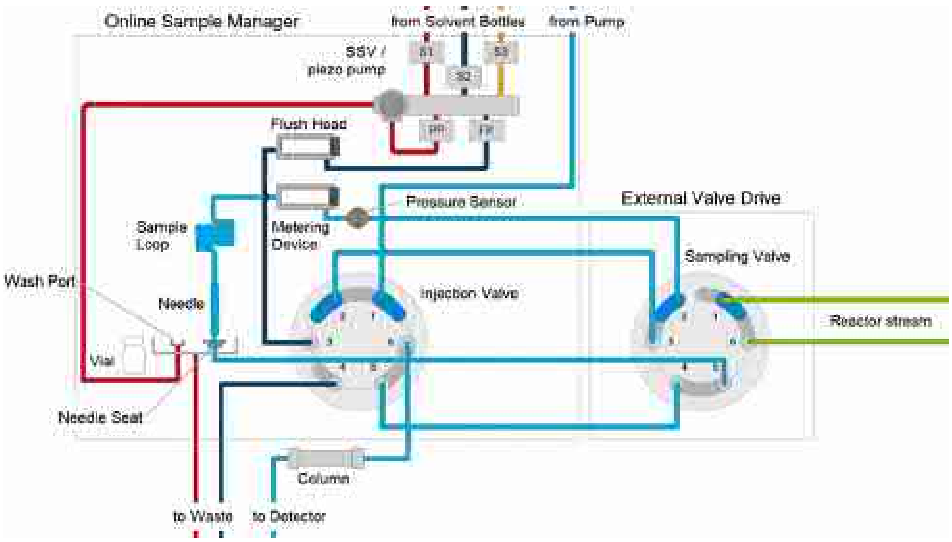

Figure 5 Flow scheme of the 1260 Infinity II Online Sample Manager Set (G3167AA) / 1290 Infinity II Bio Online Sample Manager Set (G3167BA)

More details about the Online Sample Manager Set operation modes can be found in the Operation Principles videos on the Online LC Monitoring Software USB installation media, p/n G2954-64000.

Software Concept

Software Concept

The Online LC Monitoring Software is designed to schedule, observe, and evaluate sampling and analysis results acquired by the LC System equipped with the Online Sample Manager Set as a solution for Technological Process Monitoring experiments.

The Online LC Monitoring Software - Workstation Topology - relies on an OpenLab CDS v2.6, or higher, Workstation installation.

The Online LC Monitoring Software is used to control the modules of the InfinityLab Online LC Solution. The analysis methods are imported from OpenLab CDS and the Online LC Monitoring Software will not alter them.

Distributed client/server installations extend the all-in-one workstation with additional user interfaces (UIs). This extension enables several users to control, monitor, and share experiments for complex workflows. For further information, see “Distributed Client/Server Topology” on page 21.

User Interface Structure

To optimally support the user, the software reflects the structure of an experiment workflow with the following views:

- Configuration of an HPLC instrument.
- Experiment Setup for timing and technical planning of an experiment with which the reaction sequence is to be investigated.
- Experiment Run for execution of the experiment.
- Experiment Comparison for comparison of results across experiments.

NOTE

The User Interface is structured into Ribbon, Navigation pane and Workspace. This concept is the same as in OpenLab CDS. For details on this generic concept, see OpenLab Help & Learning: Home > How To > OpenLab CDS > Data Analysis.

Software Remote Control

The Online LC Monitoring Software controls the HPLC and Sample Delivery Interface.

Controlling the Sample Delivery Interface is possible in two ways:

- Using the Online Monitoring Software, after setting up the sample delivery interface.
- Using remote control via Application Programming Interface (API).

For remote control, two API variants are integrated into the Online LC Monitoring Software and can be activated on demand:

- Web API
- Open Platform Communications (OPC) API

These APIs allow you to integrate the Online LC Monitoring Software into external applications, e.g. to implement complex workflows. They provide the capability to initiate and control experiment runs.

Once the instrument configuration is completed and an experiment setup have been created, the APIs enable a client application to:

- Initiate experiment runs
- Control and monitor running experiments
- Stop running experiments
- Retrieve experiment run data from running and completed experiments

How to use the API for the Online LC Monitoring Software is described in more detail in the *Online LC Monitoring Software Application Programming Interface Reference Guide (D0020920)*.

For the activation of each type of API (Web or OPC UA), a separate license is required, see “Remote Control API License” on page 74.

Distributed Client/Server Topology

The Agilent Online LC Solution can be used in two different ways:

- As all-in-one workstation.
- As all-in-one workstation with additional user interfaces (UIs).

When used as all-in-one workstation, there is one workstation that runs all components as a standalone system. This standalone system supports the use of up to four systems.

When used as all-in-one workstation with additional UIs, servers which host the Online LC Monitoring Software extend the standalone workstation. Those additional servers provide further user interfaces, e.g. for control or monitoring of the experiments. The number of UIs is based on the purchased licenses.

2 Site Requirements and Specifications

This chapter provides information on environmental, hardware and software requirements, physical and performance specifications.

Site Requirements

Power Considerations

The module power supply has wide ranging capability. It accepts any line voltage in the range described in Table 6 on page 33. Consequently there is no voltage selector in the rear of the module. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

WARNING

Hazard of electrical shock or damage of your instrumentation

can result, if the devices are connected to a line voltage higher than specified.

- ✓ Connect your instrument to the specified line voltage only.

WARNING

Electrical shock hazard

The module is partially energized when switched off, as long as the power cord is plugged in.

The cover protects users from personal injuries, for example electrical shock.

- ✓ Do not open the cover.
- ✓ Do not operate the instrument and disconnect the power cable in case the cover has any signs of damage.
- ✓ Contact Agilent for support and request an instrument repair service.

WARNING

Inaccessible power plug.

In case of emergency it must be possible to disconnect the instrument from the power line at any time.

- ✓ Make sure the power connector of the instrument can be easily reached and unplugged.
- ✓ Provide sufficient space behind the power socket of the instrument to unplug the cable.

Power Cords

Country-specific power cords are available for the module. The female end of all power cords is identical. It plugs into the power-input socket at the rear. The male end of each power cord is different and designed to match the wall socket of a particular country or region.

Agilent makes sure that your instrument is shipped with the power cord that is suitable for your particular country or region.

WARNING Unintended use of power cords

Using power cords for unintended purposes can lead to personal injury or damage of electronic equipment.

- ✓ **Never use a power cord other than the one that Agilent shipped with this instrument.**
- ✓ **Never use the power cords that Agilent Technologies supplies with this instrument for any other equipment.**
- ✓ **Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.**

WARNING Absence of ground connection

The absence of ground connection can lead to electric shock or short circuit.

- ✓ **Never operate your instrumentation from a power outlet that has no ground connection.**
- ✓ **Do not use portable multi power outlet to connect the products to mains to avoid potential electric shock hazard if the protective (grounding) conductor of the portable multi power outlet fails.**
- ✓ **Product is a Safety Class I instrument connected to electrical ground (protective earthing).**
- ✓ **Protective earth of different power lines are potentially on different voltage level which could damage your product if connected together. If you connect multiple products or accessories to different power lines (electrical ground) contact your building services to check grounding system.**

WARNING

Electrical shock hazard

Solvents may damage electrical cables.

✓ Prevent electrical cables from getting in contact with solvents.

✓ Exchange electrical cables after contact with solvents.

Room Size and Ventilation

WARNING

Flammable refrigerant

Formation of flammable gas-air mixtures inside the Sample Thermostat and laboratory.

✓ Keep open fire or sources of ignition away from the device.

✓ Ensure a room size of 4 m^3 (1 m^3 for every 8 g of R600a refrigerant inside of the Sample Thermostat).

✓ Ensure adequate ventilation: typical air exchange of 25 m^3/h per m^2 of laboratory floor area.

✓ Keep all ventilation openings in the enclosure clear of obstructions. Do not block the openings on the circumference of the Sample Thermostat.

Bench Space

The module dimensions and weight (see Table 6 on page 33) allow you to place the module on almost any desk or laboratory bench. It needs an additional 2.5 cm (1.0 inches) of space on either side and approximately 8 cm (3.1 inches) in the rear for air circulation and electric connections.

If the bench shall carry a complete HPLC system, make sure that the bench is designed to bear the weight of all modules.

NOTE

Agilent recommends that you install the HPLC instrument in the InfinityLab Flex Bench rack. This option helps to save bench space as all modules can be placed into one single stack. It also allows to easily relocate the instrument to another laboratory.

WARNING

Heavy weight

The module is heavy.

- ✓ Carry the module at least with 2 people.
- ✓ Avoid back strain or injury by following all precautions for lifting heavy objects.
- ✓ Ensure that the load is as close to your body as possible.
- ✓ Ensure that you can cope with the weight of your load.

Condensation

CAUTION

Condensation within the module

Condensation can damage the system electronics.

- ✓ Do not store, ship or use your module under conditions where temperature fluctuations could cause condensation within the module.
- ✓ If your module was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.

Workstation Requirements

The Online LC Monitoring Software controls the modules of the InfinityLab Online LC Solution. Since this software relies on OpenLab CDS v2.6 Workstation Plus, the following prerequisites must be met to enable its use.

NOTE

At least 5 GB free disk space is required to use the Online LC Monitoring Services without problems. If the free disk space falls beneath this threshold, the message bus (RabbitMQ) will stop sending messages to prevent a potential service crash. This precaution will impair the function of the system.

Table 1 PC Workstation Hardware Requirements

Specification Description	Workstation Plus
Processor type and speed	Intel® i5, i7, or Xeon E3 or equivalent 3.0 GHz or greater 4 Core
Memory	Ensure that at least 4 GB is reserved for the Windows operating system. Ensure that at least 5 GB of free disk space is available for the Online LC Monitoring Services.
USB Port	USB 2 required for installation via provided media
Video devices	Graphic resolution: 1600 x 900 minimum 1920 x 1080 recommended

Table 2 Software Requirements

Specification Description	Details
Operating system name, version	Windows 10, Enterprise or Professional, 64-bit
O/S .NET and other add-ons	.NET 3.5 SP1 (must be enabled on Windows 10) and .NET 4.x (installed by OpenLab CDS v2.6 Installer)
Web browser	Internet Explorer 11 Google Chrome 40, or higher Edge
Antivirus Software	Symantec Endpoint Protection Trend Micro Microsoft Security Essentials McAfee
Account settings/privileges	Domain user with local administrator privilege required for installation and configuration

Table 3 Network Requirements

Specification Description	Supported
Network type, bandwidth, speed, protocol etc.	Internet Protocol Version 4 (TCP/IPv4) only Internet Protocol Version 6 (TCP/IPv6) is not supported
IP Address	Static or DHCP Reservation
Additional network or instrument devices/cards requirements	100 MB / 1 GB LAN for instrument control 2nd LAN card required for house, to isolate the instrument's data traffic from the lab intranet connection

Specifications

System Specifications

1260 Infinity II Online LC System

Table 4 Performance Specifications G3167AA

Type	Specification	Comment
Injection Mode	Classical Flow Through or Agilent Feed Injection	
Sample Preparation	Dilutions, Pipetting	2 mL vials recommended for best performance
Sample Capacity (vial injections / retain process samples)	*1H Drawer* up to 8 drawers and 16 positions shallow well plates (MTP)	Max. 6144/1536 samples (384 MTP/96)
	2H Drawer up to 4 drawers and 8 positions MTP, deep well plates, vials, Eppendorf	3072 samples, 432 vials (2 mL)
	3H Drawer up to 2 drawers and 4 positions MTP, deep well plates, vials up to 6 mL, Eppendorf	1536 samples, 60 vials (6 mL), 384 vials (1 mL), 216 vials (2 mL)
Injection Range	Default 0.1 – 100 µL in 0.1 µL increments (0.1 – 40 µL with Agilent Feed Injection)	Up to 800 bar
Dilution Range	Up to 1:1000	
Carry-over	<0.003 % (30 ppm) for Chlorhexidine (Vial Injections and injections from the external sampling interface)	
Injection Precision (without Dilution)	<0.15 % RSD or SD ≤30 nL, whatever is greater	
Injection Precision (with Dilution)	<3 % RSD	
Injection, Dilution, Wash Cycle	<2.5 min	
Minimum on-line sample volume	0.1 µL	Metered withdrawal out of external interface

Table 4 Performance Specifications G3167AA

Type	Specification	Comment
Injection cycle time *vial injections*	<10 s using following standard conditions: Default draw speed: 100 µL/min Default eject speed: 400 µL/min Injection volume: 1 µL	Time between 2 injections is not mechanically limited, time delay depends on communication speed of software, OS or network connections
Injection cycle time *Direct Injections from External Sampling Interface*	<60 s	Time delay depends on communication speed of software, OS or network connections

1290 Infinity II Bio Online LC System

Table 5 Performance Specifications G3167BA

Type	Specification	Comment
Injection Mode	Classical Flow Through or Agilent Feed Injection	
Sample Preparation	Dilutions, Pipetting	2 mL vials recommended for best performance
Sample Capacity (vial injections / retain process samples)	*1H Drawer* up to 8 drawers and 16 positions shallow well plates (MTP)	Max. 6144/1536 samples (384 MTP/96)
	2H Drawer up to 4 drawers and 8 positions MTP, deep well plates, vials, Eppendorf	3072 samples, 432 vials (2 mL)
	3H Drawer up to 2 drawers and 4 positions MTP, deep well plates, vials up to 6 mL, Eppendorf	1536 samples, 60 vials (6 mL), 384 vials (1 mL), 216 vials (2 mL)
Injection Range	Default 0.1 – 100 µL in 0.1 µL increments (0.1 – 40 µL with Agilent Feed Injection)	Up to 1300 bar
Dilution Range	Up to 1:1000	
Carry-over	<0.003 % (30 ppm) for Chlorhexidine (Vial Injections and injections from the external sampling interface)	
Injection Precision (without Dilution)	<0.15 % RSD or SD ≤30 nL, whatever is greater	
Injection Precision (with Dilution)	<3 % RSD	
Injection, Dilution, Wash Cycle	<2.5 min	
Minimum on-line sample volume	0.1 µL	Metered withdrawal out of external interface

Table 5 Performance Specifications G3167BA

Type	Specification	Comment
Injection cycle time *vial injections*	<10 s using following standard conditions: Default draw speed: 100 µL/min Default eject speed: 400 µL/min Injection volume: 1 µL	Time between 2 injections is not mechanically limited, time delay depends on communication speed of software, OS or network connections
Injection cycle time *Direct Injections from External Sampling Interface*	<60 s	Time delay depends on communication speed of software, OS or network connections

Physical Specifications (G3167A)

Table 6 Physical Specifications G3167A

Type	Specification	Comments
Weight	22 kg (48.5 lbs)	w/o sample thermostat
Dimensions (height × width × depth)	320 x 396 x 468 mm (12.6 x 15.6 x 18.4 inches)	
Line voltage	100 – 240 V~, ± 10 %	Wide-ranging capability
Line frequency	50 or 60 Hz, ± 5 %	
Power consumption	180 VA, 180 W	
Ambient operating temperature	4 – 40 °C (39 – 104 °F)	
Ambient non-operating temperature	-40 – 70 °C (-40 – 158 °F)	
Humidity	< 95 % r.h. at 40 °C (104 °F)[1]	Non-condensing
Operating altitude	Up to 3000 m (9842 ft)	
Safety standards: IEC, EN, CSA, UL	Overvoltage category II, Pollution degree 2	For indoor use only
ISM Classification	ISM Group 1 Class B	According to CISPR 11
Permitted solvents	Boiling point ≥56 °C (133 °F). Auto-ignition temperature ≥200 °C (392 °F).	

1 If a sample thermostat is included the upper value for humidity can be reduced. Please check your lab conditions to stay beyond dew point values for non–condensing operation.

Physical Specifications (G3167B)

Table 7 Physical Specifications G3167B

Type	Specification	Comments
Weight	22 kg (48.5 lbs)	w/o sample thermostat
Dimensions (height × width × depth)	320 x 396 x 468 mm (12.6 x 15.6 x 18.4 inches)	
Line voltage	100 – 240 V~, ± 10 %	Wide-ranging capability
Line frequency	50 or 60 Hz, ± 5 %	
Power consumption	180 VA, 180 W	
Ambient operating temperature	4 – 40 °C (39 – 104 °F)	
Ambient non-operating temperature	-40 – 70 °C (-40 – 158 °F)	
Humidity	< 95 % r.h. at 40 °C (104 °F)[1]	Non-condensing
Operating altitude	Up to 3000 m (9842 ft)	
Safety standards: IEC, EN, CSA, UL	Overvoltage category II, Pollution degree 2	For indoor use only
ISM Classification	ISM Group 1 Class B	According to CISPR 11
Permitted solvents	Boiling point ≥56 °C (133 °F). Auto-ignition temperature ≥200 °C (392 °F).	

1 If a sample thermostat is included the upper value for humidity can be reduced. Please check your lab conditions to stay beyond dew point values for non–condensing operation.

Performance Specifications (G3167A)

Table 8 Performance Specifications G3167A

Type	Specification	Comments
Injection mode	Classical Flow Through or Agilent Feed Injection	
Injection range	Default 0.1 – 100 µL in 0.1 µL increments (0.1 – 40 µL with Agilent Feed Injection)	Up to 800 bar
Injection precision	<0.15 % RSD or SD ≤30 nL, whatever is greater	Measured caffeine
Injection linearity	0.9999 in the range of 0.1 – 40 µL	Measured caffeine
Pressure range	Up to 800 bar	
Sample capacity	*1H Drawer* up to 8 drawers and 16 positions shallow well plates (MTP)	Max. 6144/1536 samples (384 MTP/96)
	2H Drawer up to 4 drawers and 8 positions MTP, deep well plates, vials, Eppendorf	3072 samples, 432 vials (2 mL)
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Injection cycle time *vial injections*	<10 s using following standard conditions: Default draw speed: 100 µL/min Default eject speed: 400 µL/min Injection volume: 1 µL	Time between 2 injections is not mechanically limited, time delay depends on communication speed of software, OS or network connections
Carryover	<0.003 % (30 ppm)	Sample: Chlorhexidine
Instrument control	LC & CE Drivers 3.4 or above Lab Advisor 2.17 or above	For details about supported software versions refer to the compatibility matrix of your version of the LC & CE Drivers

Table 8 Performance Specifications G3167A

Type	Specification	Comments
Communication	Controller Area Network (CAN), Local Area Network (LAN), ERI: ready, start, stop and shut-down signals	
Maintenance and safety-related features	Extensive diagnostics, error detection and display with Agilent Lab Advisor software Leak detection, safe leak handling, leak output signal for shutdown of pumping system, and low voltages in major maintenance areas	
GLP features	Early maintenance feedback (EMF) for continuous tracking of instrument usage with user-settable limits and feedback messages. Electronic records of maintenance and errors	
Housing	All materials recyclable	

Performance Specifications (G3167B)

Table 9 Performance Specifications G3167B

Type	Specification	Comments
Injection mode	Classical Flow Through or Agilent Feed Injection	
Injection range	Default 0.1 – 100 µL in 0.1 µL increments (0.1 – 40 µL with Agilent Feed Injection)	Up to 1300 bar
Injection precision	<0.15 % RSD or SD ≤30 nL, whatever is greater	Measured caffeine
Injection linearity	0.9999 in the range of 0.1 – 40 µL	Measured caffeine
Pressure range	Up to 1300 bar	
Sample capacity	*1H Drawer* up to 8 drawers and 16 positions shallow well plates (MTP)	Max. 6144/1536 samples (384 MTP/96)
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Communication	Controller Area Network (CAN), Local Area Network (LAN), ERI: ready, start, stop and shut-down signals	
Maintenance and safety-related features	Extensive diagnostics, error detection and display with Agilent Lab Advisor software Leak detection, safe leak handling, leak output signal for shutdown of pumping system, and low voltages in major maintenance areas	
GLP features	Early maintenance feedback (EMF) for continuous tracking of instrument usage with user-settable limits and feedback messages. Electronic records of maintenance and errors	
Housing	All materials recyclable	

Physical Specifications (G1170A)

Table 10 Physical Specifications G1170A

Type	Specification	Comments
Weight	1.9 kg (4.3 lbs)	
Dimensions (height × width × depth)	90 x 90 x 300 m (3.54 x 3.54 x 11.8 inches)	
Line voltage	100 – 240 V~, ± 10 %	Wide-ranging capability
Line frequency	50 or 60 Hz, ± 5 %	
Power consumption	20 VA, 4 W	
Ambient operating temperature	4 - 55 °C (39 - 131 °F)	
Ambient non-operating temperature	-40 – 70 °C (-40 – 158 °F)	
Humidity	< 95 % r.h. at 40 °C (104 °F)	Non-condensing
Operating altitude	Up to 3000 m (9842 ft)	
Safety standards: IEC, EN, CSA, UL	Overvoltage category II, Pollution degree 2	For indoor use only
ISM Classification	ISM Group 1 Class B	According to CISPR 11

Specifications of the Sample Cooler

The Agilent Infinity II Sample Cooler is a vapor-compression refrigeration system that uses a fluorinated greenhouse gas (HCF-134a) as the refrigerant. For information on carbon dioxide equivalency (CDE) and global warming potential (GWP), see the instrument label.

Table 11 Physical Specification of the Sample Cooler

Type	Specification	Comment
Weight	< 6 kg (< 13.2 lbs)	
Dimensions (height × width × depth)	205 x 340 x 370 mm (8.1 x 13.4 x 14.6 inches)	
Refrigerant gas	HFC-134a (0.042 kg)	Ozone depletion potential (ODP) = 0
Supply voltage	24 VDC	
Current	10 A max.	
Ambient operating temperature	4 – 40 ° C (39 – 104 ° F)	
Ambient non-operating temperature	-40 – 70 ° C (-40 – 158 ° F)	
Humidity	< 95 % r.h. at 40 °C (104 °F)	Non-condensing
Operating altitude	Up to 3000 m (9842 ft)	
Safety standards: IEC, EN, CSA, UL	Installation category II, Pollution degree 2	For indoor use only
ISM Classification	ISM Group 1 Class B	According to CISPR 11

CAUTION

General hazards and improper disposal

Improper disposal of the media and components used pollutes the environment.

- ✓ The disposal or scrapping of the Sample Cooler or the Sample Thermostat must be carried out by a qualified disposal company.
- ✓ All media must be disposed of in accordance with national and local regulations.
- ✓ Please contact your local Agilent Service Center in regard to safe environmental disposal of the appliance or check www.agilent.com for more info.

Table 12 Performance Specifications of the Sample Cooler

Type	Specifications
Operating principle	High performance, low-energy consumption micro-compressor based cooler with ozone-friendly HFC-134a coolant (42 g), user-upgradable.
Temperature range	from 4 °C to 5 °C below ambient
Temperature settable	from 4 – 40 °C in 1 ° increments
Temperature accuracy (<25 °C, <50 % r.H.)	2 °C to 6 °C at a setpoint of 4 °C

NOTE

The Agilent Infinity II Sample Cooler is not available for trade sales anymore and has been replaced by the Agilent InfinityLab Sample Thermostat.

Specifications of the Sample Thermostat

The Agilent InfinityLab Sample Thermostat is the combination of an electric heater and a vapor-compression refrigeration system. It uses isobutane as a non-Freon refrigerant, which is harmless to the environment and does not affect the ozone layer and global warming, but it is combustible. Please adhere to the warnings listed in the manual.

Table 13 Physical Specifications of the Sample Thermostat (G7167-60101 and G7167-60201)

Type	Specification	Comments
Weight	<6 kg (< 13.2 lbs)	
Dimensions (height x width x depth)	205 x 340 x 370 mm (8.1 x 13.4 x 14.6 inches)	
Refrigerant gas	R600a (max. 0.030 kg)	Ozone depletion potential (ODP) =0 Global warming potential (GWP) =3
Supply voltage	24VDC	
Current	10 A max.	
Ambient operating temperature	4 °C to 40 °C (39 °F to 104 °F)	For sample cooling, ambient temperature ≥10 °C
Ambient non-operating temperature	-40 °C to +70 °C (-40 °F to +158 °F)	
Humidity	< 95 % r.h. at 40 °C (104 °F)	Non-condensing
Operating altitude	Up to 3000 m (9842 ft)	
Safety standards: IEC, EN, CSA, UL	Pollution degree 2	For indoor use only
ISM Classification	ISM Group 1 Class B	According to CISPR 11

CAUTION

General hazards and improper disposal

Improper disposal of the media and components used pollutes the environment.

- ✓ The disposal or scrapping of the Sample Cooler or the Sample Thermostat must be carried out by a qualified disposal company.
- ✓ All media must be disposed of in accordance with national and local regulations.
- ✓ Please contact your local Agilent Service Center in regard to safe environmental disposal of the appliance or check www.agilent.com for more info.

Table 14 Performance Specifications for the Sample Thermostat (G7167-60101 and G7167-60201)

Type	Specifications
Operating principle	High performance, low-energy consumption micro-compressor based cooler with natural R600a coolant (Isobutane max. 0.030 kg), user-upgradable
Temperature range	from 4 °C to 40 °C
Temperature settable	from 4 °C to 40 °C in 1 ° increments
Temperature accuracy (<25 °C, <50 % r.H.)	2 °C to 6 °C at a setpoint of 4 °C

Table 15 Minimum System Requirements for the G7167-60101 Sample Thermostat

Type	Specification
LC & CE Drivers	A.02.14, (A.02.18)[1] or above
Instrument Control Framework (ICF)	A.02.04, (A.02.05)[1] or above
Lab Advisor Software	B.02.11 or above
Firmware	D.07.22 or above

1 Minimum version for full thermostat functionality.

Table 16 Minimum System Requirements for the G7167-60201 Sample Thermostat

Type	Specification
LC & CE Drivers	A.02.14, (A.02.18)[1] or above
Instrument Control Framework (ICF)	A.02.04, (A.02.05)[1] or above
Lab Advisor Software	2.19 or above
Firmware	D.07.37 or above

[1] Minimum version for full thermostat functionality.

3 Installing the Solution

This chapter provides an overview of the installation and setup of the hardware and software.

Hardware Installation

Leak and Waste Handling

The Agilent InfinityLab Online LC System has been designed for safe leak and waste handling. It is important that all security concepts are understood and instructions are carefully followed.

The solvent cabinet is designed to store a maximum volume of 8 L solvent. The maximum volume for an individual bottle stored in the solvent cabinet should not exceed 2 L. For details, see the usage guideline for the Agilent Infinity II Solvent Cabinets (a printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available on the Internet).

All leak plane outlets are situated in a consistent position so that all Infinity and Infinity II modules can be stacked on top of each other. Waste tubes are guided through a channel on the right hand side of the instrument, keeping the front access clear from tubes.

The leak plane provides leak management by catching all internal liquid leaks, guiding them to the leak sensor for leak detection, and passing them on to the next module below, if the leak sensor fails. The leak sensor in the leak plane stops the running system as soon as the leak detection level is reached.

Solvent and condensate is guided through the waste channel into the waste container:

- from the detector's flow cell outlet
- from the Online Sample Manager needle wash port
- from the Sample Cooler or Sample Thermostat (condensate)
- from the pump's Seal Wash Sensor (if applicable)
- from the pump's Purge Valve or Multipurpose Valve
- from the External Sampling Valve's leak pane

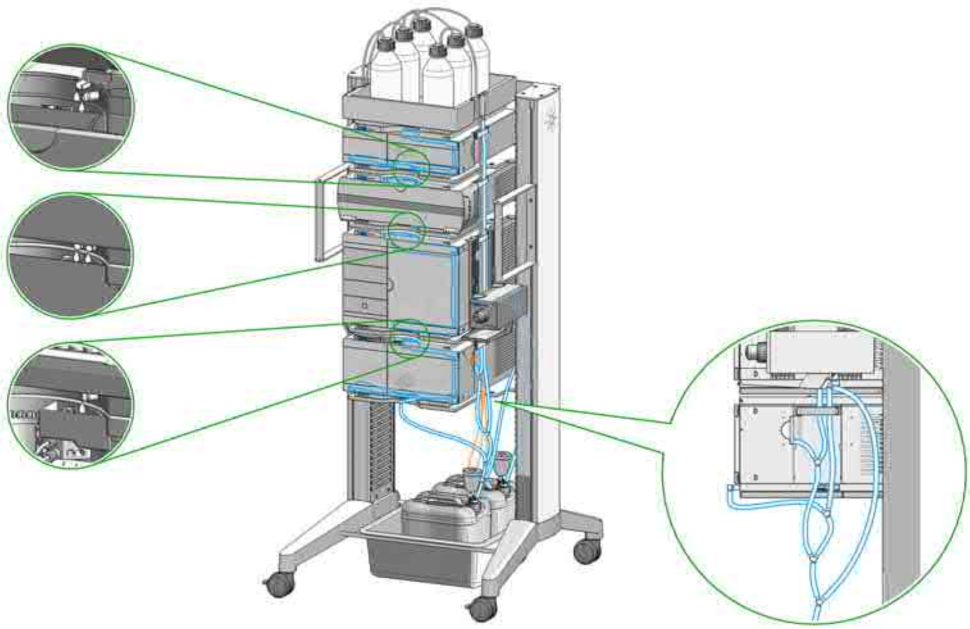


Figure 6 Online LC System Leak Waste Concept (Flex Bench installation)

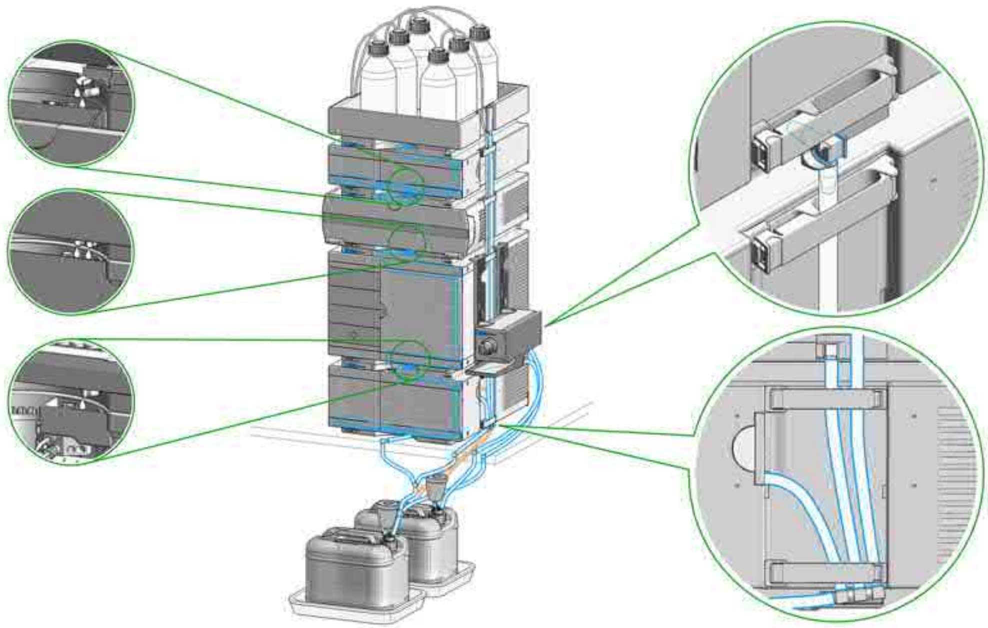


Figure 7 Online LC System One Stack Leak Waste Concept (bench installation)

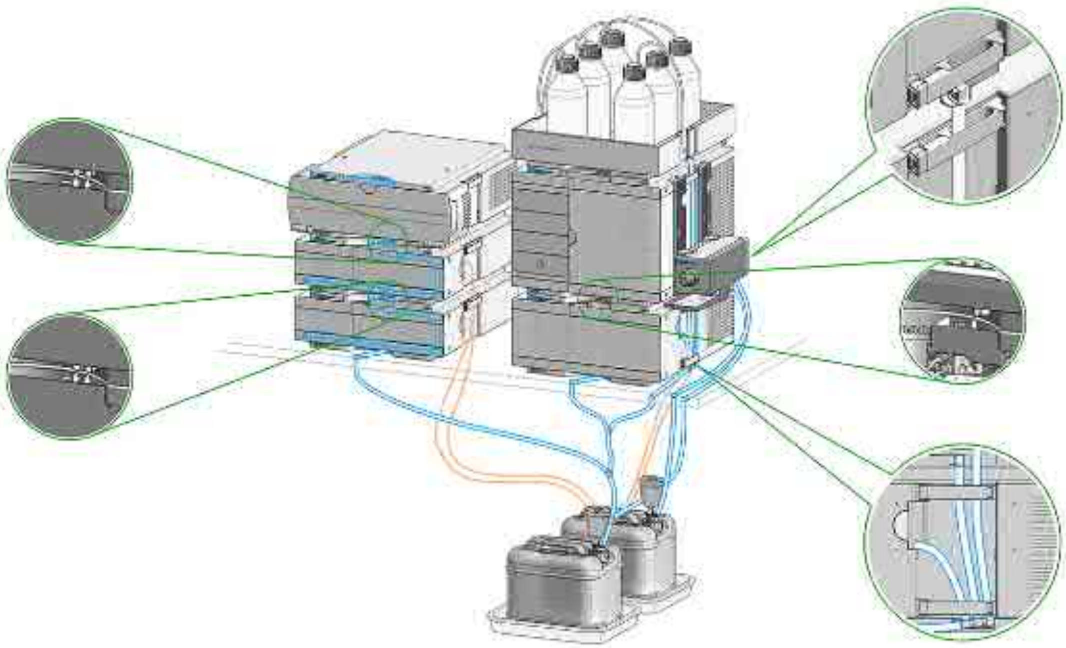
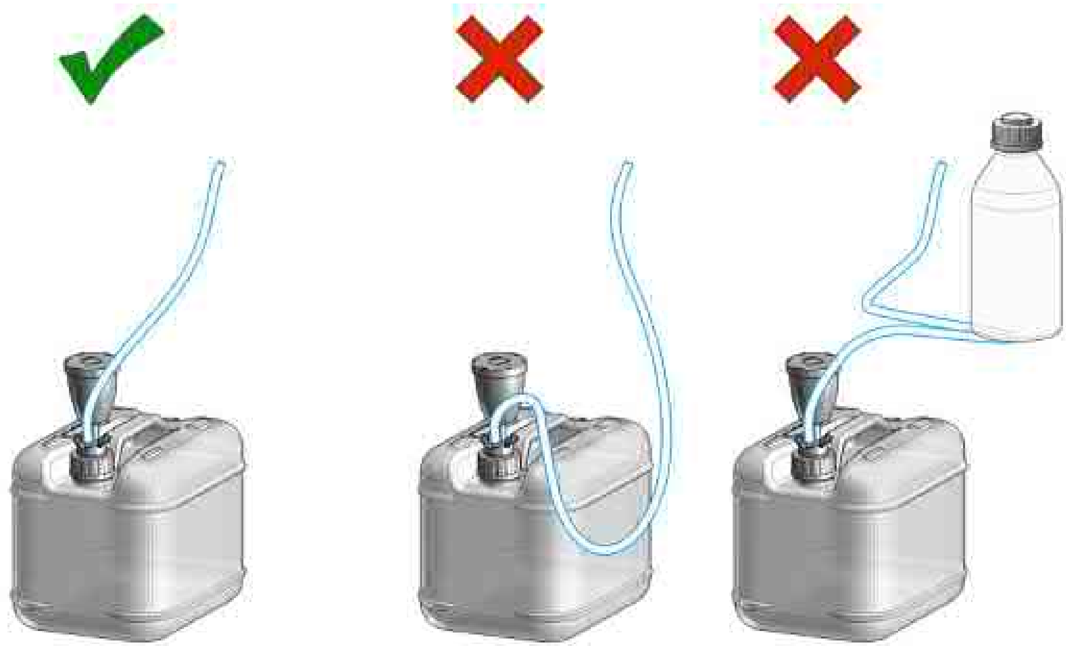


Figure 8 Online LC System Two Stack Leak Waste Concept (bench installation)

The waste tube connected to the leak pane outlet on each of the bottom instruments guides the solvent to a suitable waste container.

Waste Guidance



NOTE

The waste drainage must go straight into the waste containers. The waste flow must not be restricted at bends or joints.

Waste Concept

1 Agilent recommends using the 6 L waste can with 1 Stay Safe cap GL45 with 4 ports (5043-1221) for optimal and safe waste disposal. If you decide to use your own waste solution, make sure that the tubes don't immerse in the liquid.

Preparing the Solution Modules

Leak and Waste Handling

WARNING

Toxic, flammable and hazardous solvents, samples and reagents

The handling of solvents, samples and reagents can hold health and safety risks.

- ✓ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.
- ✓ Do not use solvents with an auto-ignition temperature below 200 °C (392 °F). Do not use solvents with a boiling point below 56 °C (133 °F).
- ✓ Avoid high vapor concentrations. Keep the solvent temperature at least 40 °C (72 °F) below the boiling point of the solvent used. This includes the solvent temperature in the sample compartment. For the solvents methanol and ethanol keep the solvent temperature at least 25 °C (45 °F) below the boiling point.
- ✓ Do not operate the instrument in an explosive atmosphere.
- ✓ Do not use solvents of ignition Class IIC according IEC 60079-20-1 (for example, carbon disulfide).
- ✓ Reduce the volume of substances to the minimum required for the analysis.
- ✓ Never exceed the maximum permissible volume of solvents (8 L) in the solvent cabinet. Do not use bottles that exceed the maximum permissible volume as specified in the usage guideline for solvent cabinet.
- ✓ Ground the waste container.
- ✓ Regularly check the filling level of the waste container. The residual free volume in the waste container must be large enough to collect the waste liquid.
- ✓ To achieve maximal safety, regularly check the tubing for correct installation.

NOTE

For details, see the usage guideline for the solvent cabinet. A printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available in the Agilent Information Center or via the Internet.

For details on correct installation, see separate installation documentation.

Preparing the Online Sample Manager

For best performance of the Online Sample Manager:

- When using the Online Sample Manager in a system with a vacuum degassing unit, shortly degas your samples before using them in the Online Sample Manager.
- Filter samples before use in an InfinityLab LC Series system. Use 1290 Infinity II inline filter (0.3 µm) (5067-6189) for inline filtering.

Table 17 Choice of Priming Solvents for Different Purposes

Activity	Solvent	Comments
After an installation	Isopropanol	Best solvent to flush air out of the system
When switching between reverse phase and normal phase (both times)	Isopropanol	Best solvent to flush air out of the system
After an installation	Ethanol or methanol	Alternative to isopropanol (second choice) if no isopropanol is available
To clean the system when using buffers	Bidistilled water	Best solvent to re-dissolve buffer crystals
After a solvent change	Bidistilled water	Best solvent to re-dissolve buffer crystals

NOTE This inline filter contains stainless steel and is not indicated for use in bio-inert or biocompatible systems.

- When using buffer solutions, flush the system with water before switching it off.
- Check the Online Sample Managers plungers for scratches, grooves, and dents when changing the piston seal. Damaged plungers cause micro leaks and will decrease the lifetime of the seal.
- Solvent Information: Observe recommendations on the use of solvents, see “Solvent Information” on page 212.
- Priming and Purging the System - When the solvents have been exchanged or the system has been turned off for a certain time (for example, overnight) oxygen will re-diffuse into the solvent channel. Therefore priming and purging of the system is required before starting an application.

Recommended Mats and Vials

Table 18 Recommended plates and closing mats

Description (Part Number)	Rows	Columns	Plate height (mm)	Volume (µL)	Package	Closing mat compatibility
384Agilent (5042-1388)	16	24	14.4	80	30	
384Corning (No Agilent PN)	16	24	14.4	80		
384Nunc (No Agilent PN)	16	24	14.4	80		
96 well plate 0.5 mL, PP (pack of 10) (5042-1386) 96 well plate 0.5 mL, PP (pack of 120) (5042-1385)	8	12	14.3	500	10 120	1 1
96Agilent conical (5042-8502)	8	12	17.3	150	25	1
96CappedAgilent (5065-4402)	8	12	47.1	300	1	1
96Corning (No Agilent PN)	8	12	14.3	300		
96CorningV (No Agilent PN)	8	12	14.3	300		
96DeepAgilent31mm (5042-6454)	8	12	31.5	1000	50	1
96DeepNunc31mm (No Agilent PN)	8	12	31,5	1000		
96DeepRitter41mm (No Agilent PN)	8	12	41.2	800		
96Greiner (No Agilent PN)	8	12	14.3	300		
96GreinerV (No Agilent PN)	8	12	14.3	250		
96Nunc (No Agilent PN)	8	12	14.3	400		
96 Well plate, square wells, U shape, PP (5043-9300)	8	12	41	2200	30	2
96 Well plate, round wells, U shape, PP (5043-9302)	8	12	45.3	2000	30	3
96 Well plate, round wells, U shape, PP (5043-9305)	8	12	32	1000	50	3
96 Well plate, round wells, U shape, PP (5043-9308)	8	12	27	1200	25	3
96 Well plate, round wells, U shape, PP (5043-9309)	8	12	27	1200	50	3

Table 18 Recommended plates and closing mats

Description (Part Number)	Rows	Columns	Plate height (mm)	Volume (µL)	Package	Closing mat compatibility
96 Well plate, round wells, U shape, PP (5043-9310)	8	12	14	500	30	[3]
96 Well plate, round wells, U shape, PP (5043-9311)	8	12	14	500	120	[3]
96 Well plate, round wells, V shape, PP (5043-9312)	8	12	14	330	25	[3]
96 Well plate, round wells, V shape, PP (5043-9313)	8	12	14	330	50	[3]
96 Well plate, round wells, V shape, PP (5043-9314)	8	12	14	330	100	[3]
384 Well plate, square wells, V shape, PP (5043-9315)	16	24	22	190	25	[4]

[1] Closing mat for all 96 Agilent plates (5042-1389)

[2] Mat 96 wells, square, pierceable, silicone 50/pk (5043-9319)

[3] Mat 96 wells, round, pierceable, silicone 50/pk (5043-9317), Mat 96 wells, round, piercable, silicone 100/pk (5043-9318)

[4] Mat 384 wells, square, pierceable, silicone 50/pk (5043-9320)

Table 19 Recommended vial plates

Description (part number)	Rows	Columns	Plate height (mm)	Volume (µL)	Package
Vial plate for 54 x 2 mL vials (6/pk) (G2255-68700)	6	9	36	2000	6
Vial plate 40 x 2 mL vials (5023-2471)	5	8	43	2000	1
Vial plate for 15 x 6 mL vials (1/pk) (5022-6539) only compatible with 3H drawers	3	5	42	6000	1
Vial plate for 27 Eppendorf tubes (1/pk) (5022-6538)	3	9	40	500 – 2000	1

NOTE For good chromatographic results the maximum filling should not exceed 3/4 of the total volume of the vial.

NOTE Agilent Technologies recommends to use preslit septa.

NOTE Bottom sensing is a feature to detect the depth of vials or plates via the software.

If the bottom sensing feature is used, the bottom of the plates and vials must resist the needle. Make sure that the material supports this feature. Inserts with flexible support should not be used.

NOTE The default needle height offset value (0 mm) equates to an approximate distance of 2 mm above the bottom of a wellplate or a standard 2 mL vial at the reference bar, whereas it corresponds to an approximate distance of 5 mm above the bottom of a standard 2 mL vial in a vial tray. Using vial inserts or high recovery vials will impact the apparent distance between the needle tip and the bottom of the vessel.

NOTE In case of custom-made wellplates or vials, please keep in mind the physical limitations of each drawer.

The maximum total height allowed (including sample container and vial caps, if present) is:

- 1H: 19 mm
- 2H: 45 mm
- 3H: 50 mm

NOTE Adhesive foils are not recommended to seal wellplates. Alternatively, plates can be sealed with a Pierceable aluminium foil (06644-001).

Configure Well Plate Types

If the plate you are using is not found on the "Recommended Mats and Vials" on page 54 you may configure a custom plate. Measure the exact dimensions of the plate as marked below and enter the values in the plate configuration table of the chromatographic data system.

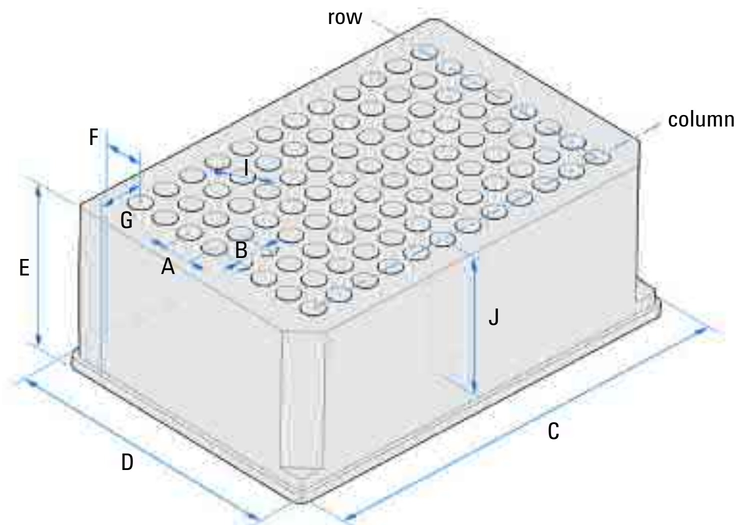


Figure 9 Well Plate Dimensions (straight)

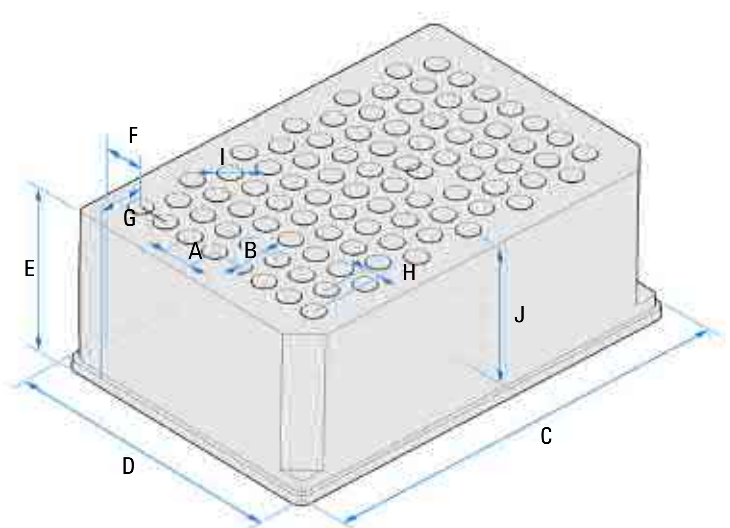


Figure 10 Well Plate Dimensions (staggered)

Table 20 Well Plate Dimensions

Location	Description	Definition	Limits
	Rows	Number of rows on the plate	up to 16
	Columns	Number of columns on the plate	up to 24
	Volume	Volume (in µl) of a sample vessel	
A	Row distance	Distance (in mm) between the center of two rows	
B	Column distance	Distance (in mm) between the center of two columns	
C	Plate length	X size (in mm) at the bottom of the plate	127.75+/- 0.25 mm (SBS Standard)
D	Plate width	Y size (in mm) at the bottom of the plate	85.50+/-0.25 mm (SBS Standard)
E	Plate height	Size (in mm) from the bottom to the top of the plate	up to 47 mm
F	Row offset	Distance (in mm) from the back edge (bottom) to the center of the first hole (A1)	
G	Column offset	Distance (in mm) from the left edge (bottom) to the center of the first hole (A1)	
H	Column shift	Offset (in mm) to Y when the rows are not straight but staggered	
I	Well diameter	Diameter (in mm) of the well	at least 4 mm
J	Well depth	Distance (in mm) from the top of the plate to the bottom of the well	up to 45 mm

NOTE

The distances need to be measured with high precision. It is recommended to use calipers.

Capillary Color Coding Guide

Syntax for Capillary Description

The tables below are your guide to identifying the proper specifications for your capillary. On all capillaries, dimensions are noted in id (mm), length (mm) and, where applicable, volume (µL). When you receive your capillary, these abbreviations are printed on the packaging.

Using the guide: This fitting is coded as *SPF*, for Swagelok, PEEK, Fingertight.

Table 21 Capillary coding guide

Type The type gives some indication on the primary function, like a loop or a connection capillary.		Material The material indicates which raw material is used.		Fitting left/fitting right The fitting left/right indicate which fitting is used on both ends of the capillary.	
Key	Description	Key	Description	Key	Description
Capillary	Connection capillaries	ST	Stainless steel	W	Swagelok + 0.8 mm Port id
Loop	Loop capillaries	Ti	Titanium	S	Swagelok + 1.6 mm Port id
Seat	Autosampler needle seats	PK	PEEK	M	Metric M4 + 0.8 mm Port id
Tube	Tubing	FS/PK	PEEK-coated fused silica[1]	E	Metric M3 + 1.6 mm Port id
Heat exchanger	Heat exchanger	PK/ST	Stainless steel-coated PEEK[2]	U	Swagelok union
		PFFE	PTFE	L	Long
		FS	Fused silica	X	Extra long
		MP35N	Nickel-cobalt-chromium-molybdenium alloy	H	Long head
				G	Small head SW 4
				N	Small head SW 5
				F	Finger-tight
				V	1200 bar
				B	Bio
				P	PEEK
				I	Intermediate

1 Fused silica in contact with solvent

2 Stainless steel-coated PEEK

At-a-Glance Color-Coding Keys

The color of your capillary will help you quickly identify the capillary id.

Table 22 Color-coding key for Agilent capillary tubing

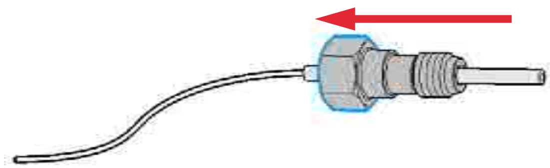
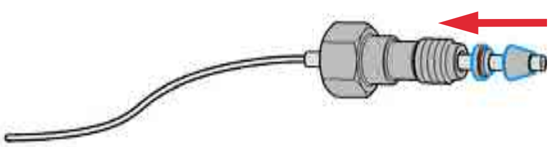
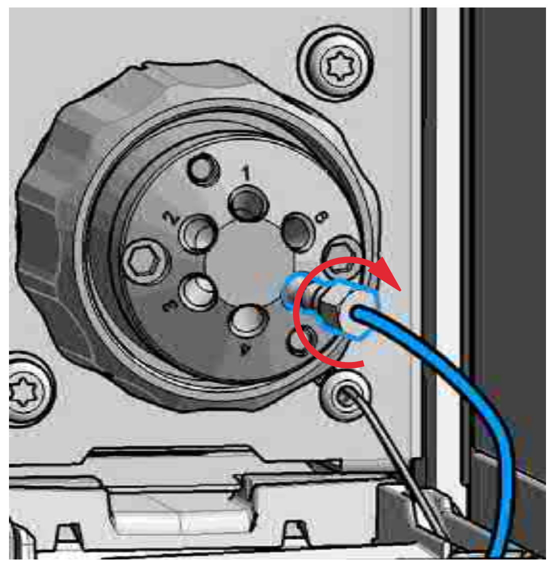
Internal diameter in mm			Color code
0.015			Orange
0.025			Yellow
0.05			Beige
0.075			Black
0.075	MP35N		Black with orange stripe
0.1			Purple
0.12			Red
0.12	MP35N		Red with orange stripe
0.17			Green
0.17	MP35N		Green with orange stripe
0.20/0.25			Blue
0.20/0.25	MP35N		Blue with orange stripe
0.3			Grey
0.50			Bone White

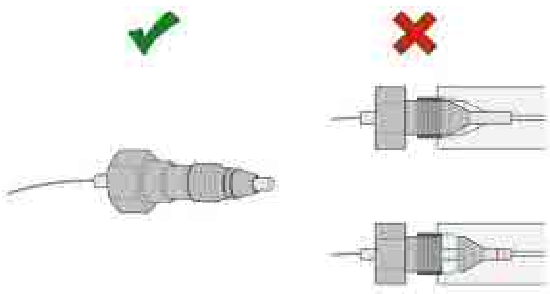
HINT

As you move to smaller-volume, high efficiency columns, you'll want to use narrow id tubing, as opposed to the wider id tubing used for conventional HPLC instruments.

Installing Capillaries

For correct installation of capillary connections it's important to choose the correct fittings, see “Syntax for Capillary Description” on page 59.

1 Select a nut that is long enough for the fitting you'll be using. 	2 Slide the nut over the end of the tubing or capillary. 
3 Carefully slide the ferrule components on after the nut and then finger-tighten the assembly while ensuring that the tubing is completely seated in the bottom of the end fitting. 	4 Use a column or injection valve to gently tighten the fitting, which forces the ferrule to seat onto the tubing or capillary.  **NOTE** Don't overtighten. Overtightening will shorten the lifetime of the fitting.

5 Loosen the nut and verify that the ferrule is correctly positioned on the tubing or capillary. 	

NOTE The first time that the swagelock fitting is used on a column or an injection valve, the position of the ferrule is permanently set. If changing from a column or an injection valve to another, the fitting may leak or decrease the quality of the separation by contributing to band broadening.

Connection Reference Tables

Use the following tables as a reference for all capillary connections of the 1290 Infinity II Bio Online Sample Manager Set.

Use the following tables as a reference for all capillary connections of the 1260 Infinity II Online Sample Manager Set and 1290 Infinity II Bio Online Sample Manager Set.

Table 23 Capillary Connections of the Injection Valve (in G3167AA)

p/n	Description	From	To
5500-1246	Capillary ST 0.17 mm x 500 mm SI/SI	Injection Valve Port 1	Pump
5005-0057	Transfer Capillary II, ST 0.17 mm x 160 mm SL/SL	Injection Valve Port 2	External Sampling Valve Port 3
5067-5709	FH Capillary, ST 0.25 mm x 250 mm SL/SL	Injection Valve Port 3	Flush Head
5004-0015	PTFE Tubing 0.8 mm x 180 mm	Injection Valve Port 4	Waste
5004-0011	Transfer Capillary I, ST 0.12 mm x 160 mm SL/SL	Injection Valve Port 5	External Sampling Valve Port 4
5500-1246[1] 5500-1217[2]	Capillary ST 0.17 mm x 500 mm SI/SI Capillary ST 0.17 mm x 900 mm SI/SX	Injection Valve Port 6	Column

1 one stack configuration

2 two stack configuration

Table 24 Capillary Connection of the Hydraulic Box (in G3167AA)

p/n	Description	From	To
5500-1159	PS Capillary, ST 0.17 mm x 100 mm SX/S-2.3	Analytical Head	Pressure Sensor

Table 25 Capillary Connections of the External Sampling Valve (in G3167AA)

p/n	Description	From	To
	Depending on external equipment	External Sampling Valve Port 1	Reactor Waste
5500-1234	MD Capillary, ST 0.17 mm x 180 mm	External Sampling Valve Port 2	Pressure Sensor
5005-0057	Transfer Capillary II, ST 0.17 mm x 160 mm SL/SL	External Sampling Valve Port 3	Injection Valve Port 2
5004-0011	Transfer Capillary I, ST 0.12 mm x 160 mm SL/SL	External Sampling Valve Port 4	Injection Valve Port 5
G3167-60018	Needle Seat Capillary, ST 0.17 mm x 230 mm SL/SL	External Sampling Valve Port 5	Needle Seat
	Depending on external equipment	External Sampling Valve Port 6	Reactor Inlet

Table 26 Capillary Connections of the Injection Valve (in G3167BA)

p/n	Description	From	To
5500-1419	Capillary MP35N 0.17 mm x 500 mm SI/SI	Injection Valve Port 1	Pump
5005-0069	Transfer Capillary II, MP35N 0.17 mm x 160 mm SL/SL	Injection Valve Port 2	External Sampling Valve Port 3
5005-0074	FH Capillary, MP35N 0.25 mm x 250 mm SL/SL	Injection Valve Port 3	Flush Head
5004-0015	PTFE Tubing 0.8 mm x 180 mm	Injection Valve Port 4	Waste
5005-0072	Transfer Capillary I, MP35N 0.12 mm x 160 mm SL/S	Injection Valve Port 5	External Sampling Valve Port 4
5500-1279[1] 5500-1282[2]	Capillary MP35N 0.12 mm x 500 mm SI/SI Capillary MP35N 0.17 mm x 900 mm SI/SX	Injection Valve Port 6	Column

1 one stack configuration

2 two stack configuration

Table 27 Capillary Connection of the Hydraulic Box (in G3167BA)

p/n	Description	From	To
5500-1278	PS Capillary, MP35N 0.17 mm x 100 mm SL/SL	Analytical Head	Pressure Sensor

Table 28 Capillary Connections of the External Sampling Valve (in G3167BA)

p/n	Description	From	To
	Depending on external equipment	External Sampling Valve Port 1	Reactor Waste
5005-0073	MD Capillary, MP35N 0.17 mm x 180 mm	External Sampling Valve Port 2	Pressure Sensor
5005-0069	Transfer Capillary II, MP35N 0.17 mm x 160 mm SL/SL	External Sampling Valve Port 3	Injection Valve Port 2
5005-0072	Transfer Capillary I, MP35N 0.12 mm x 160 mm SL/S	External Sampling Valve Port 4	Injection Valve Port 5
G3167-60017	Needle Seat Capillary, Bio 0.17 mm x 230 mm	External Sampling Valve Port 5	Needle Seat
	Depending on external equipment	External Sampling Valve Port 6	Reactor Inlet

Flow Connections Specific for the Online Sample Manager Set

Capillary and solvent tubing connections specific for the Online Sample Manager Set.

Preparations

- Module is installed in the system.
- Use an appropriate solvent based on the sample and mobile phase chemistries.
- The composition of the wash solvent should be the most solubilizing compatible solvent (your strongest diluent). Selecting the wash solvent is part of the method development.
- A mixture of 50 % up to 100 % organic solvent in distilled water is a good choice for many applications.

1 Place solvent reservoirs into the solvent cabinet.
2 Connect the Bottle Head Assemblies to the solvent reservoirs and close the bottles.
3 Connect Solvent Tubings to the SSV of the Multiwash Hydraulic Box. The following solvent assignment is recommended:
   a S1 - Wash Solvent.
   b S2 - Feed/Flush-out Solvent.
   c S3 - Dilution Solvent.

NOTE Due to chemical compatibility issues, THF and Hexane are not recommended solvents to be used in Multiwash SSV.

4 Route the drainage of the wash port outlet to the waste container.
5 Prime or auto clean the wash solvent tubings.
6 Check setting up the Online Sample Manager with OpenLab CDS.

Depending on the version of the hydraulic box, the orientation of the SSV is different. Version 2.0 is the newer version. Below graphics show the capillary connections for the SSV version 2.0 and 1.0.

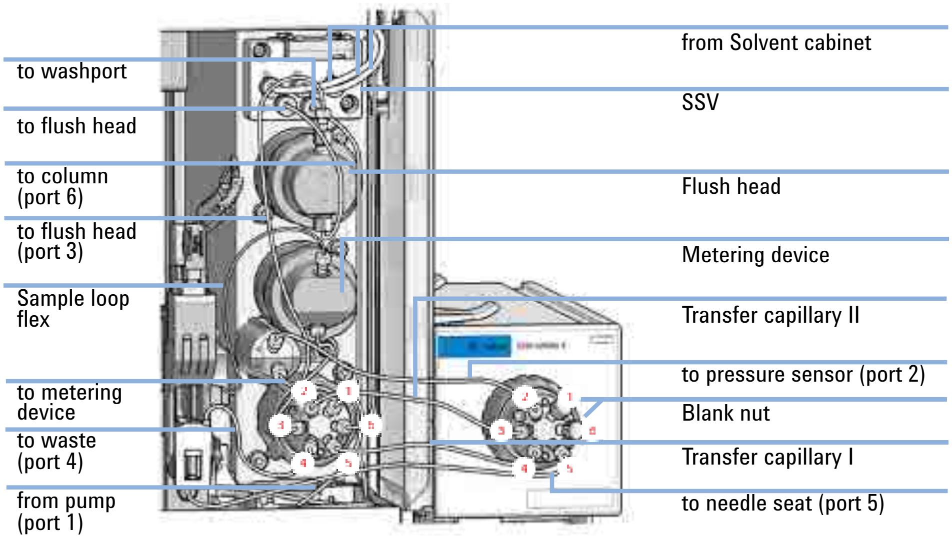


Figure 11 Flow Connection to the Online Sample Manager (SSV version 2.0)

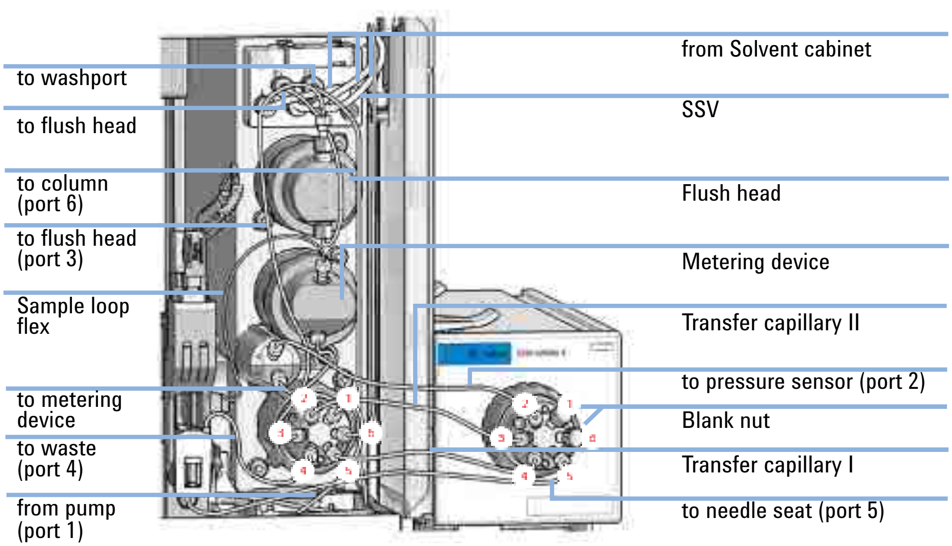


Figure 12 Flow Connection to the Online Sample Manager (SSV version 1.0)

NOTE

The ports covered with blank nuts can be used as process stream line connections to the external sample delivery device, if applicable.

External Sampling Devices Connection

Electronic Interface Connection

The Online LC System consists of an analytical system and a sample delivery device (optional). Electronic communication between the analytical and the sample delivery part of the system can be established via ERI/APG Cable connection.

It allows easy connection between single instruments or systems to ensure coordinated analysis with simple coupling requirements between them.

The subminiature ERI or APG D-connector is used. The module provides one remote connector, which is inputs/outputs.

When connecting to a non-Agilent product, corresponding default pin assignment might be considered. See chapter “Remote Cables” on page 401 for default pin assessment details.

The inputs/outputs signal levels, through assigned pins in the remote interface sockets, are defined as:

- standard TTL levels (0 V is logic true, + 5.0 V is false),
- fan-out is 10,
- input load is 2.2 kOhm against + 5.0 V, and
- output is open collector type, inputs/outputs (wired- or technique).

NOTE

All common TTL circuits operate with a 5 V power supply. A TTL signal is defined as "low" or L when between 0 V and 0.8 V and "high" or H when between 2.0 V and 5.0 V (with respect to the Digital ground: Pin 10 in ERI (violet wire) socket, Pin 1 in APG socket, see tables in chapter “Remote Cables” on page 401).

The type of most suitable connection depends on the customer's sample delivery device. The Agilent 1260 Infinity II Online Sample Manager Set and 1290 Infinity II Bio Online Sample Manager Set are equipped with an ERI (Enhanced Remote Interface) interface. Depending on the sample delivery device, ERI-ERI, ERI-APG or ERI-general purpose connection to the Online LC System are possible. For information about the corresponding most suitable cable connections, see “Remote Cables” on page 401.

To set up the ERI Interface in the Online LC Monitoring Software, see “Setup the ERI Interface” on page 102.

Sample Delivery Lines Connection

Sample delivery lines are used to transfer the sample from the process stream (optionally through sample delivery device) to the sampling valve. The requirements for the sample delivery lines connection are listed in this chapter.

Fittings:

- Type: Swagelok 1/16" OD:

Female on Agilent Sampling Valve.

Male on the external tubing/capillary from Sampling Point/Sample delivery Equipment.

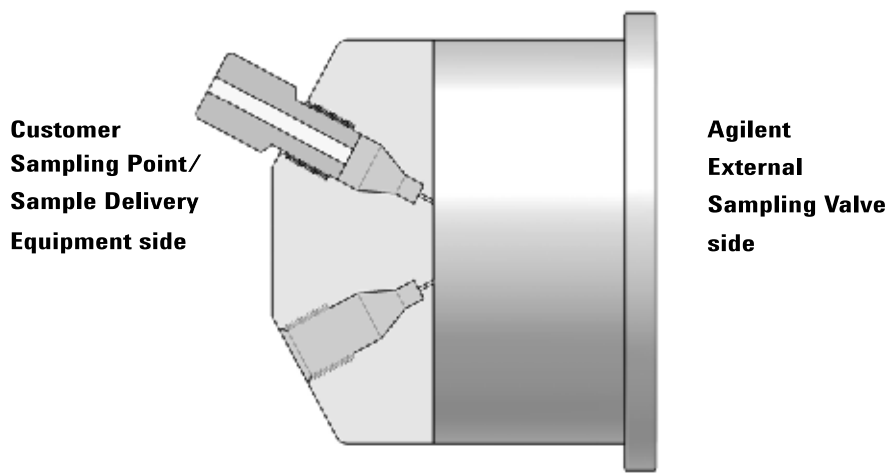


Figure 13 Example of Sample Line Connection in Valve Port (Cross section)

Tubing/Capillaries:

- Material: nonconductive, selected by customer considering chemical resistance and compatibility with the collected sample.
- Inner diameter: 0.5 mm or above.
- Outside diameter: 1/16" (1.5875 mm).

Software Installation

NOTE

The Online LC Monitoring Software - Workstation Topology - relies on an OpenLab CDS v2.6, or higher, Workstation, or Workstation Plus installation, depending on its use as standalone or distributed system. For guidance, see *OpenLab CDS Workstation Installation and Configuration* and *OpenLab CDS Workstation Plus (with Content Management) Installation and Configuration*.

Installation

Software Installation

The installation of the Online LC Monitoring Software is part of the installation service rendered by Agilent.

Software Upgrade

Uninstall the previous Online LC Monitoring Software version before installing the new version.

Before installing the Online LC Monitoring Software v1.3, you must install or upgrade to OpenLab CDS 2.8.

Compatibility of OpenLab CDS with Online LC Monitoring Software

NOTE

Online LC Monitoring Software v1.3 requires OpenLab CDS 2.8. If you install OpenLab CDS 2.8, or upgrade OpenLab CDS to version 2.8, your Online LC Monitoring Software needs to be uninstalled first.

For the new installation, follow the instructions as described (“Main Installation Tasks” on page 71).

OpenLab CDS is compatible with the following Online LC Monitoring Software versions:

Table 29 Compatible software versions

OpenLab CDS version	Online LC Monitoring Software version
OpenLab CDS 2.6	Online LC Monitoring Software v.1.0 Online LC Monitoring Software v.1.1 Online LC Monitoring Software v.1.2
OpenLab CDS 2.7	Online LC Monitoring Software v.1.1 Online LC Monitoring Software v.1.2 Online LC Monitoring Software v.1.2 update 01
OpenLab CDS 2.8	Online LC Monitoring Software v.1.3

Main Installation Tasks

NOTE

To install Online LC Monitoring Software v.1.3, it is required to have OpenLab CDS 2.8 installed.

1 Log into Windows as a Domain user who is a local administrator.
2 Run *Agilent.OnlineMonitoring.Setup.exe* from the installation media folder as administrator.
3 In the **Welcome Installer** tab, click **Next**.
4 In the **License Agreement** tab, agree with Agilent Software terms and conditions, and click **Next**.
5 In the **Installation Directory** tab, choose the folder in which the software will be installed, and click **Next**.
6 In the **Installation Packages** tab, select the packages for Installation. When finished, click **Next**.

NOTE

Make sure that at least 5 GB free space will be available on the hard disk after installation.

a Select the software packages to be installed depending on the installation instance:

For a standalone installation:

- Select all packages

In a distributed OpenLab CDS environment:

- Workstation PC: select all packages
- OpenLab CDS Server: select Services
- OpenLab CDS Client PC: select CDS Adapter and User Interface (UI)
- Online LC Monitoring Software Client PC: select User Interface (UI)

Agilent Instrument Controller (AIC):

- no packages are installed on AIC

[OPTIONAL] 7 If obsolete transport layer security (TLS) protocols were identified, decide if they should be disabled or not.

HINT

During installation, the software automatically checks the validity of the used encryption protocols. If obsolete TLS protocols are found, this extra step will be displayed during the installation procedure.

8 In the **Prerequisite: Shared Services** tab,
   a Choose connection to **Standalone workstation** or **OpenLab Server**.
   b Select the authentication method.
   c Fill out necessary fields for authentication method (**Domain**, **Username**, and **Password**).
   d Make sure you can successfully connect (**Check Connection**).
   e Click **Next**.
9 In the **Prerequisite: Data Repository** tab,
   a Provide Data Repository Parameters (**Port**).
   b Create and confirm the App Module **Password**.
   c Make sure you can successfully connect (**Check Connection**).
   d Click **Next**.
10 In the **Review** tab, review the installation overview and click **Next**.
11 In the **Install** tab, click **Install**. Once the installation is complete, click **Next**.
12 In the **Finish** tab,
   a Click **Run Software Verification**, and address any noted issues from the reports.
   b Click **Exit**.
13 Make sure to reboot the computer if you are prompted so.

Licensing

Online LC Monitoring License

The Online LC Monitoring Software (G2954AA) contains an authorization code, which includes two license components necessary to use and, control the Agilent InfinityLab Online LC Solution.

License components

1. UI Client License
2. Experiment License

The UI Client License is required to:

- Get an overview of existing experiments and experiment setups in form of a dashboard.
- Configure a system.
- Create experiment setups.
- View the status of existing/running experiments.
- Review experiment results.
- Create reports.

The Experiment License is required to:

- Start one experiment for processing.
  - Creates experiment data frame.
  - Links sample information to the experiment data frame.
- Perform sampling according to the experiment schedule.
- Process/Re-process sample data analysis.
- Create experiment results.

A startup license for the system allows you to run the Online LC Monitoring Software for 60 days after the installation. In order to run the software after the 60-day period, you must install your license file.

Online LC Monitoring UI License

The Online LC Monitoring UI License, G2955AA, is used in distributed systems (client/server). It consists of one User Interface License. For each launch of the user interface, one license is required.

Compliance License

The audit trail license, G2957AA, is required to operate the Online LC Monitoring Software in compliance mode. Compliance mode includes features like the audit trail. A valid license for audit trails is required to start this feature. After activation, an invalid audit trail license (e.g. expiration of the Startup License) will lead to inoperability of the software.

For information on how to generate a license, see "Obtain a license with SubscribeNet" on page 75.

The audit trail license can be imported and activated in Shared Services.

Remote Control API License

For the control of the Online LC Monitoring Software via third party software, the following Remote Control API licenses are available:

1 Online LC Monitoring Remote Control API (G2956AA) that includes method based APIs for both Web and OPC.
2 Online LC Monitoring OPC UA API (G2958AA) that enables the subscription based OPC UA API.

The OPC UA License (method based) is required for the remote control via OPC UA interface. The Web API License is required for remote control via Web.

Before using any of the APIs, you must generate a license using Agilent's site https://agilent.subscribenet.com.

Use your activation code to generate a license file. This license file can be added to OpenLab's license system using the OpenLab **Control Panel**.

Further information on how to activate the API service is given in the *Online LC Monitoring Software Application Programming Interface Reference Guide (D0020920)*.

Get a License

Obtain a license with SubscribeNet

Prerequisites

To generate, download, and install a final license for your product, you will need:

- The authorization code label provided in the lavender envelope containing your Software Entitlement Certificate.

  If you have not received a lavender envelope for your product, contact your vendor or internal support.
- The URL for SubscribeNet from the Software Entitlement Certificate.
- The host name of the computer where the Online LC Monitoring software is running.
- The MAC address.

  To retrieve your MAC address from a computer where OpenLab CDS is already installed, open the Control Panel and browse to the **Administration > Licenses** section. Use the **Copy MAC Address** or **Save MAC Address** function to obtain the MAC address for license generation.

  During this process you will have to enter the MAC address of your license server. For workstations, this is the local computer. For client/server systems, this is the server.

NOTE If any changes are made to the computer name or domain reference after the license is installed, remove the license. A new license will need to be created in SubscribeNet, downloaded, and installed.

NOTE If the network adapter that provides the MAC address used during license creation is removed from the machine, your license will no longer be valid. A new license will need to be generated with a currently available MAC on the license server.

1 Go to https://agilent.subscribenet.com/control/agil/AgilRegisterToAccount to register the product with SubscribeNet.

2 On the registration page, enter the authorization code from the label and complete the profile information (required fields are marked with an asterisk *).

   The email address you enter will become your login ID.

3 Click **Submit**. The system will generate and display an account name for you.

   SubscribeNet will send a welcome email with your login ID and password.

4 Log in to SubscribeNet using your login ID and password.

   Once you log in, you can use the online user manual link for help with any questions you have.

5 Select **Generate or View licenses** from the left navigation bar.

6 Follow the prompts to generate your new license. You will be prompted for the HOST NAME of the computer.

   Enter the server hostname. Do not include any DNS suffix (*domain.com*) references in the entered machine name.

7 When the system generates the license, view its details, then click **Download License File**. Save the license file to your computer and to a backup location (such as a portable storage device).

   Use your login ID and password when you revisit the Agilent SubscribeNet site to regenerate a license file, add new authorization codes, or further configure the license for your system.

8 If you already have a SubscribeNet account, use https://agilent.subscribenet.com/.

   Lost your SubscribeNet password? Use https://agilent.subscribenet.com/control/agil/password to have it emailed to you.

9 Select the SubscribeNet account associated with this authorization code, if you have more than one account.

10 From the SubscribeNet navigation pane, select **Register Authorization Code**.

   This will allow you to enter your new authorization code and make available the new license entitlements.

11 Follow steps 5 through 7 in the previous procedure, *New Users*, to *generate or view* your new licenses.

Other ways to obtain a license

If you are unable to generate a license, contact your nearest Agilent technical support office. A representative will tell you how to submit a license Generation Form in your location.

Offline licensing

If an internet connection is not available in your laboratory:

You or your local on-site service engineer will collect the necessary information from you to allow Agilent to create a license account on your behalf. For phone support in your region, call the sales and service number for your region. See the Appendix for contact information.

Required Customer Information for Agilent License Support:

The following information must be provided to Agilent in order to enable us to create a licensing account on your behalf.

1 Collect Account Information:

   Your account name will be your company name and Lab name separated by a comma. Employee information provided here will be used to define the first administrator of your account for future access to the system as required. Please prepare the following pieces of information prior to contacting your local Agilent sales and service center in order to expedite service:

   - Company Name
   - Lab/Department Name
   - First Name
   - Last Name
   - E-mail address
   - Job Title
   - Phone #
   - Address, City, State/Province, Postal Code, Country

2 Collect Authorization Code(s):

   The authorization code is an alpha-numeric code provided on a label which is enclosed in a lavender envelope. If you have received more than one code you must provide all codes to ensure that all ordered licenses are granted to your account.

3 Receiving your license:

   Once the above information is provided Agilent will then work on your behalf to generate a license file through SubscribeNet. The license file will either be sent to your shipping address (on a CD), or your local FSE will deliver it in person (usually on USB media). Once your license is received follow the below section on “Install your License” to finish installing your license on your system(s).

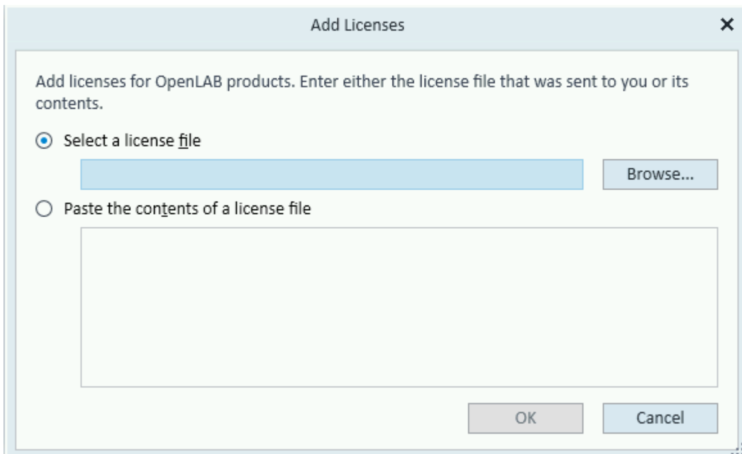
Install Your License

The license must be added to your system using the Control Panel.

1 Start the **Control Panel** shortcut on the desktop or go to **Start >All Programs >Agilent Technologies >OpenLab Shared Services >Control Panel**.

2 Navigate to **Administration >Licenses**.

3 In the ribbon, click **Add License** + .



4 Choose to install the license by:

- Using the license file option to browse to and open the license file (.lic) saved from the license generation process in SubscribeNet.
- Selecting the License Text option and copying the license text from a text file received into the provided field.

5 Click **OK**.

The **Administration** interface in the Control Panel will now display the status of installed licenses.

NOTE A full restart is required in order for any license to have an immediate effect.

Software Maintenance

To avoid the unlikely case of inoperability due to a hardware or software failure, its important to prepare a disaster recovery plan, regular backups, and restore procedures. Details are given in the *OpenLab CDS Workstation Installation and Configuration* guide.

All data for the Online LC Monitoring Software is stores in a datebase (Data Repository). Detailed Data Backup Procedures and Data Recovery Procedures are described in the *System Setup and Maintenance* chapter of the *OpenLab CDS Workstation Installation and Configuration* guide.

For a distributed system, the Data Repository backup and restore procedures must be performed on the OpenLab CDS Server (on which the Data Repository is installed).

Upgrade options for the Online LC Monitoring Software, if any, are available in https://agilent.subscribenet.com. To log into SubscribeNet, use your customer account.

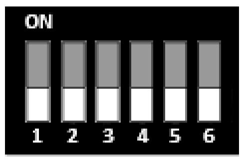
Configuring the System

Hardware Configuration Settings

Example shows an instrument configuration with a Diode Array Detector.

1 Set the switches of the Configuration switch at the rear of the module:

   a All switches DOWN: module uses the default IP address 192.168.254.11.



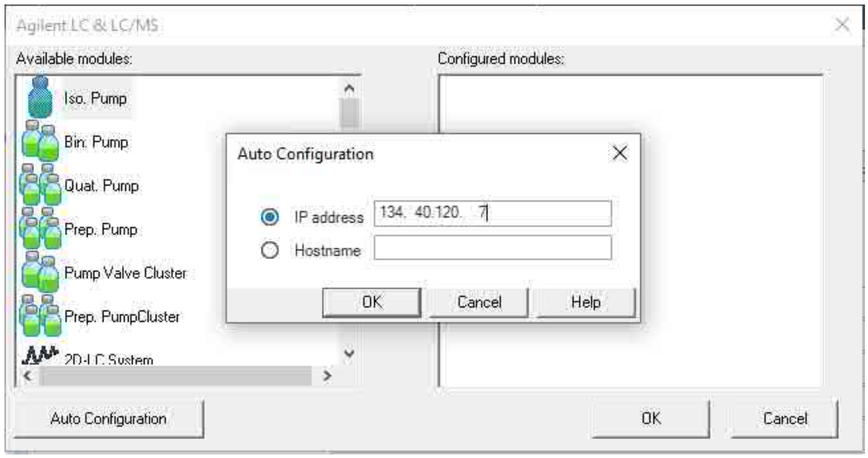
   b Switch 4 UP and others DOWN: module uses DHCP.

   c Switch 5 UP and others DOWN: modules uses STORED address.

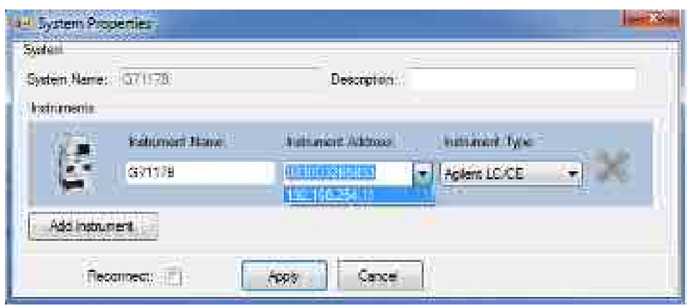
NOTE For more details about the configuration switch settings, see Setting the 6-bit Configuration Switch (“Setting the 6-bit Configuration Switch” on page 424).

2 Enter the setup information (MAC[1] / IP address and/or Instrument Name) in the Control or Diagnostic software.

a Agilent OpenLab CDS (Configure Instrument):



b Lab Advisor (Instrument Overview - Add Instrument):



1 MAC address can only be used in DHCP DIP-switch configuration.

Control Software Configuration Settings

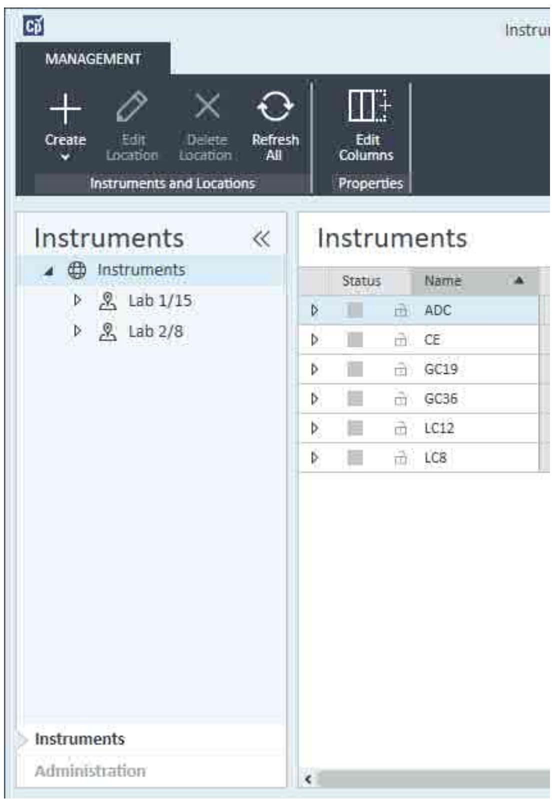
Configuration of the Online Sample Manager Set in OpenLab CDS

To control the Online LC System, the Online LC Monitoring Software is required. This software relies on an OpenLab CDS v2.x Workstation Plus installation.

The configuration of the Online LC System with Online Sample Manager Set needs to be done in OpenLab CDS to enable control functions through the Online LC Monitoring Software.

1 Open the **Agilent OpenLab Control Panel**:

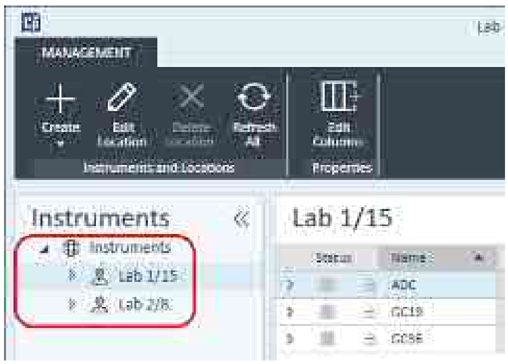
2 Select the **Instruments** tab:



3 Select the location of the new instrument:

NOTE

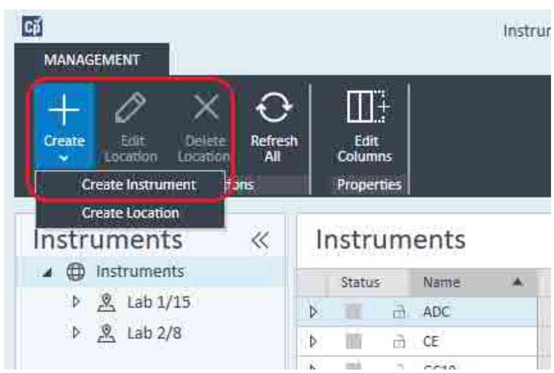
To create and edit locations, refer to the Control Panel online help.



NOTE

You can also add instruments directly in the **Instruments** node.

4 Click **Create** >**Create Instrument**



5 Enter the instrument details and click **OK**.

6 Navigate to the new instrument and click the Configure Instrument icon or right click the instrument name and select Configure Instrument.

7 Use Autoconfiguration if possible.

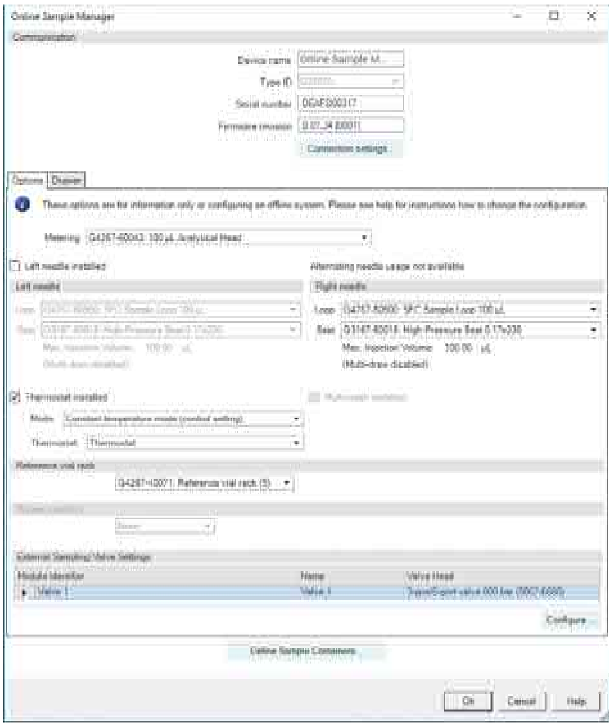
OR

Select the module(s) for the instrument configuration and click the > button.

8 Enter the IP address for the configured LC system and click OK.

9 Select the clustering option for the Online Sample Manager and External Valve Drive.

10 Check the configuration of the External Sampling Valve type and select the Sample Thermostat option (if installed).



- Device name: based on the module.
- Type ID: based on the module (product number). Some modules may allow changing the type based on hardware/firmware. This results in a change of features and functions.
- Serial number: based on the module.
- Firmware revision: based on the module.
- Options: lists installed options.

Set Up Sample Custom Parameter in OpenLab CDS

In the Online LC Monitoring Software, each sample of an experiment must be assigned a unique identifier. This unique identifier is displayed as column header (**Sample ID** and **Injection ID**) in the **Samples** and **Results** table and can be also submitted to the CDS, where it can be used for reporting and calculations. The identifier is configured as Sample Custom Parameter in the Control Panel on the project level.

1 Launch Control Panel.
2 Edit your project.
3 Under **Sample Custom Parameters**, add a new parameter and assign the following values:

Name	ONLINE_LC_SAMPLE_ID
Type	Text

Do not specify a default value and do not define the parameter as mandatory.

4 Save your project.

Graphical User Interface

The view of the Online Sample Manager is shown with the Agilent OpenLab CDS v2.6.

NOTE

This section describes the Online Sample Manager settings only. For information on Agilent OpenLab CDS v2.x or other InfinityLab LC Series modules refer to the corresponding documentation.

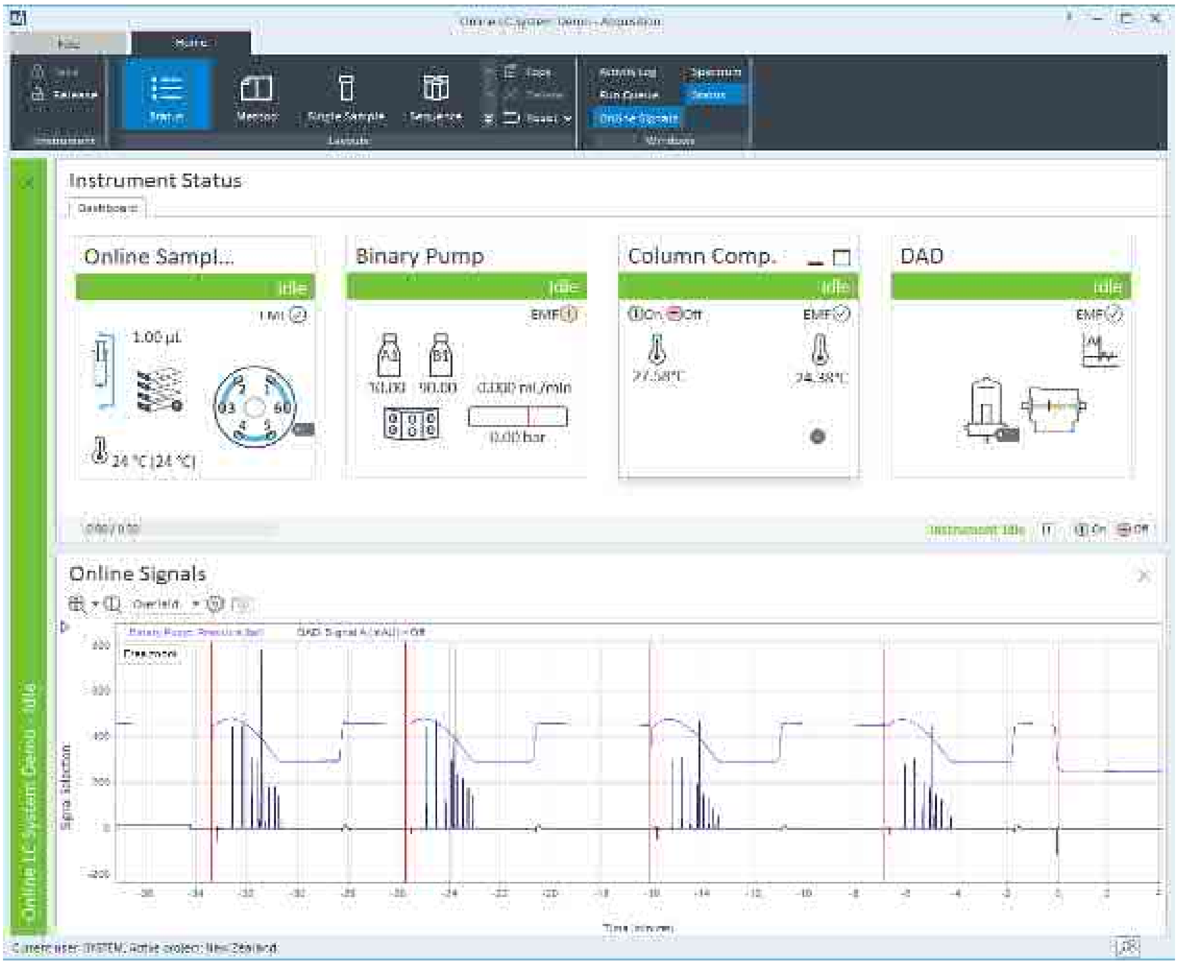


Figure 14 OpenLab method and run control

After successful load of the OpenLab CDS v2.x or higher Aquisition, you should see the selected modules as active items in the graphical user interface (GUI).

Table 30 The Online Sample Manager User Interface

A.

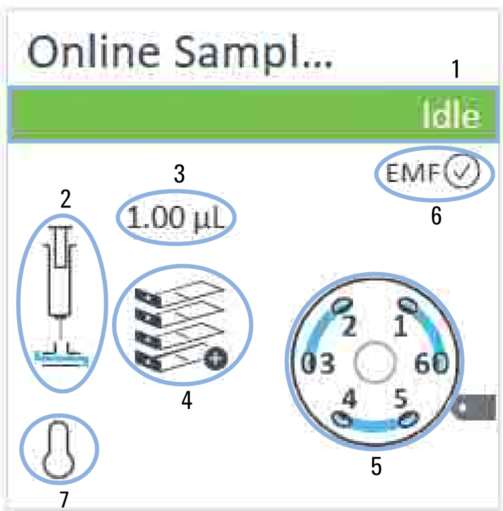


Figure 15 Feed Injection mode user interface

B.

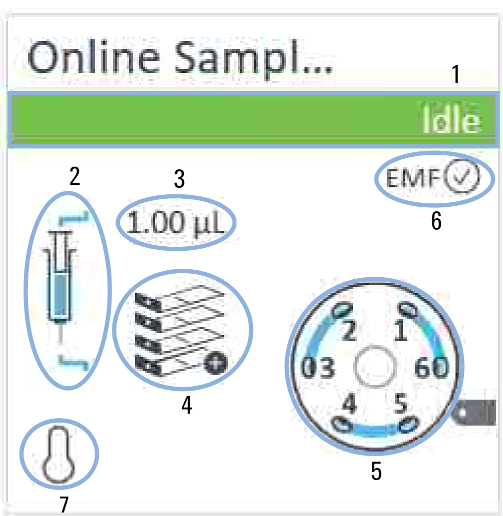


Figure 16 Flow-Through Injection user interface

The Online Sample Manager user interface shows different icons:

1 Sampler status indicator
2 Sampler injection mode
3 Sampler injection volume
4 Sampler hotel configuration
5 External sampling valve status
6 Sampler EMF (Early Maintenance Feedback) status indicator
7 Sample Cooler/Thermostat status indicator

Depending on selected injection mode, the graphics vary.

A. Feed Injection

B. Flow-Through Injection

Table 30 The Online Sample Manager User Interface

A.

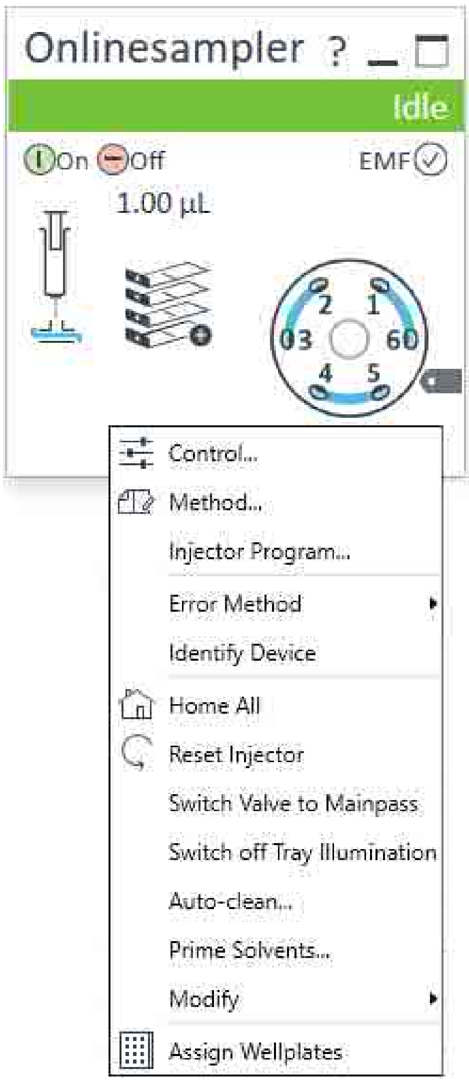


Figure 17 Online Sample Manager drop-down menu

A right-click into the Active Area will open a menu to

- Show the Control User Interface (special module settings)
- Show the Method User interface
- Injector Program

  When you activate a pretreatment/injector program, it replaces the standard injection cycle.
- Error Method
- Identify Device
- Home All
- Reset Injector
- Switch Valve to Mainpass
- Switch off Tray Illumination
- Auto-clean
- Prime Solvents
- Modify
  - Drawer Configuration

    Changing the load capacity of the Sample Hotel
  - Capillaries

    Changing Sample Loop, Needle Seat, and bypass capillary configuration
  - Reference Vial Rack
  - Temperature Mode

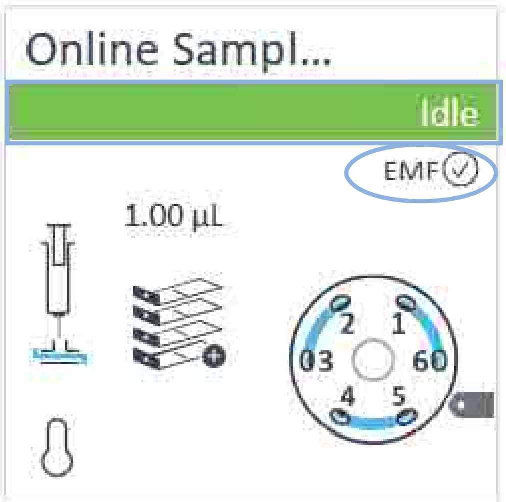
    Defining the Sample Cooler/Thermostat temperature as Control or Method parameter
- Assign Wellplates

  Wellplate Configuration (same as click on the Tray icon)

NOTE

For customizing a wellplate in the CDS, click on Define Sample Containers in the instrument configuration view.

Table 30 The Online Sample Manager User Interface

A.  Figure 18 Module and EMF status	**Module Status** shows Run / Ready / Error state and “Not Ready text” or “Error text” • **Error** (Red) • **Not ready** (yellow) • **Ready** (green) • **Pre run**, **Post run** (purple) • **Run** (blue) • **Idle** (green) • **Offline** (dark gray) • **Standby** (light gray) EMF Status shows Run / Ready / Error state and “Not Ready text” or “Error text” • Offline (gray) • Ok No Maintenance required (green) • EMF warning. Maintenance might be required (yellow) • EMF warning. Maintenance required (red)

NOTE

The Online Sample Manager configuration is done in the module dashboard context menu, not in the instrument configuration.

Control Settings

The control settings are available via right click on the active area of the graphical user interface.

Table 31 Control settings

Figure 19 Control settings

The Sampler control parameters are in the following sections:

- Missing Vial
  Mark the Ignore missing vial check box to specify that, if a vial is missing, the injector ignores it and continues with a 6-second dummy run. The message "Missing vial <x>" is logged, and the system continues with the next injection.
- Illumination
  Toggles the illumination of the sample area, On or Off.
- At Power On
  The section is available when a cooler/thermostat is installed and configured. Mark the Turn on Thermostat check box to specify that the cooler/thermostat is switched on automatically when the instrument is switched on.
- Thermostat
  The section is available when a cooler/thermostat is installed and configured and the Constant temperature mode is selected.
  Select On to switch on the cooler/thermostat. Specify the required temperature in the adjacent field. The specified temperature must be at least 5 °C below ambient for proper temperature control.
  Select Off to switch off the cooler/thermostat.
- Automatic Turn On
  You can set a date and time at which the cooler/thermostat switches on automatically.
- Pump connected to Sampler
  Use this section to specify the pump that is used with the Sampler. If more than one pump is configured, display the drop-down list and select the appropriate pump from the list.
- Clear Workspace
  Immediately Returns the sample container on the workspace to its position in the sample hotel immediately after the injection has been completed. This allows you to quickly retrieve the sample container for further processing.
  At End of Analysis Returns the sample container on the workspace to its position in the sample hotel after the current run or sequence/worklist has been completed. This is the default setting.
  Never Leaves the sample container on the workspace until a different sample container is required to replace it.
- Enable Analysis
  This feature requires LC & CE Drivers A.02.19 or newer and is only available for the Sample Thermostat. With this function, you can specify if the analyses should start With any temperature or only when the Temperature is within ± 2 °C range of the setpoint temperature.

NOTE

The Enable Analysis section is disabled when Not controlled is selected in the Temperature section.

NOTE

For additional help and support, highlight the desired area and press the **F1** key. A help screen will open with additional information and documentation about the topic.

Method Parameter Settings

These settings are available via the Method Ribbon tab or via right click the Active area of the corresponding Instrument Dashboard.

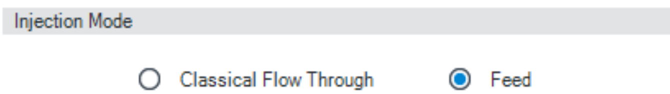


Figure 20 Injection Mode

Injection Mode
It is possible to select between **Classical flow-through** and **Feed** Injection mode.

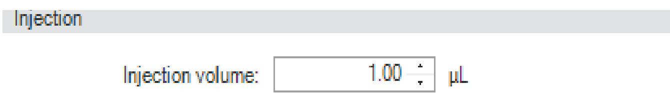


Figure 21 Injection volume

Injection
The settable **Injection volume** is depending on what kind of configuration is installed. Default configuration 0.1 – 100 µL.

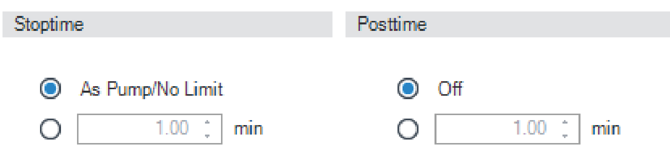


Figure 22 Stoptime and Posttime

Stoptime/Posttime
A **Stoptime** can be set. For equilibration of the sampler, a **Posttime** can be set.

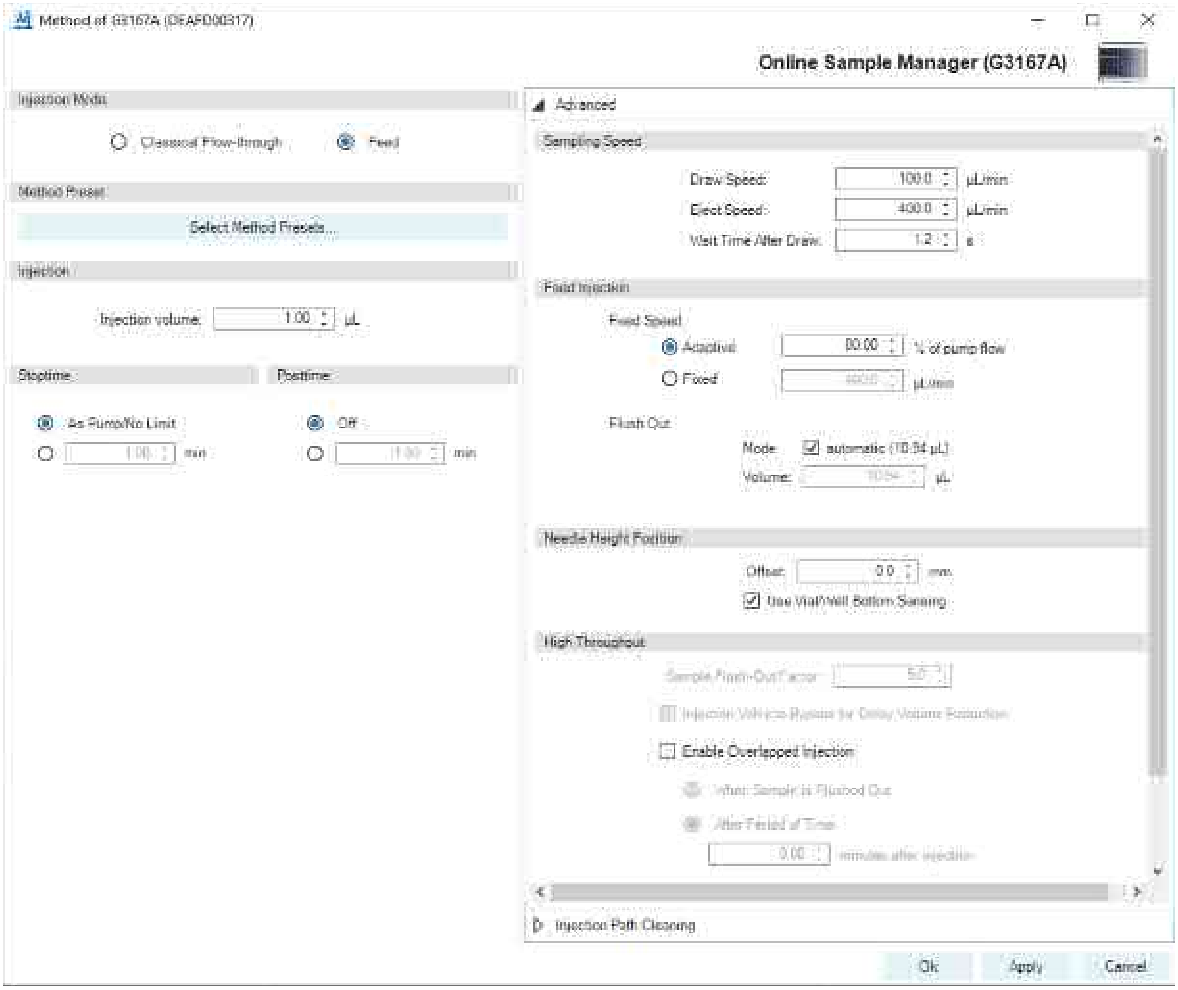


Figure 23 Online Sample Manager method parameters (example shows Feed Injection parameters)

NOTE Usually default draw offset = 0 equates to 2 mm above the wellplate bottom.

NOTE For help and support, highlight the desired cell and press the **F1** key. A help screen will open with additional information and documentation about the topic.

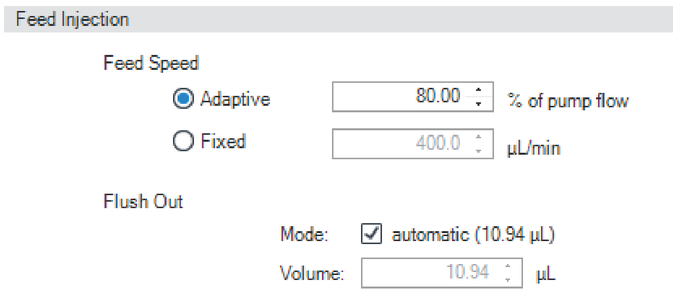


Figure 24 Specific Feed Injection Parameter Details

Specific Feed Injection Parameter Details

Feed Speed

The Feed Speed influences the sample dilution degree during injection into the mobile phase flow path, affecting peaks shape.

Selectable options:

- Adaptive, as percentage of the pump flow.
- Fixed, as absolute injection flow rate in µL/min.

Flush Out

The Flush Out influences the carryover and sample recovery from the injection flow path.

Selectable options:

- Mode: automatic, depending on the injection volume.
- specific absolute Volume, in µL.

NOTE

For further details about Feed Injection parameter optimization, see chapter "Optimizing Performance" on page 222.

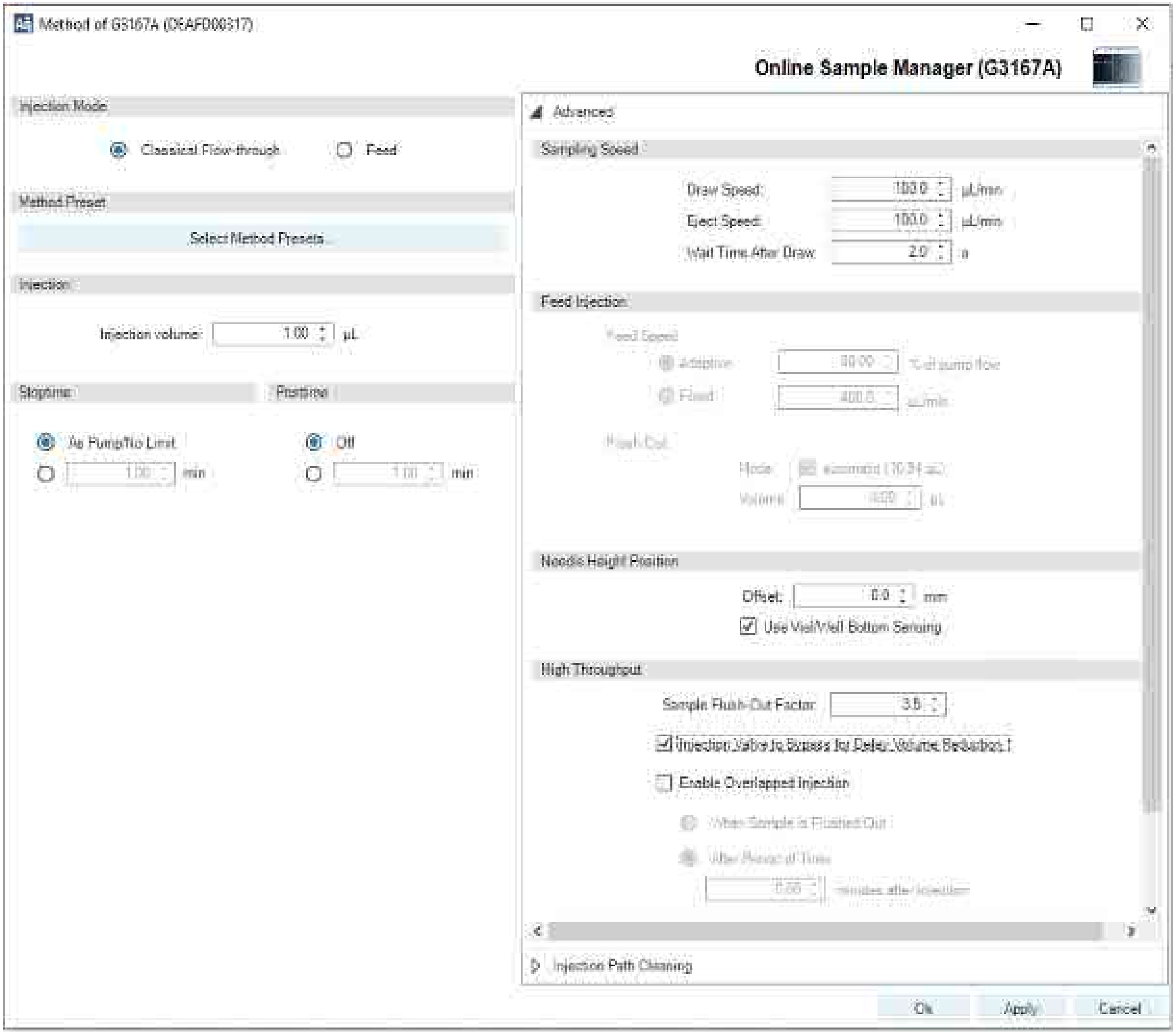


Figure 25 Online Sample Manager method parameters (example shows Flow-through Injection parameters)

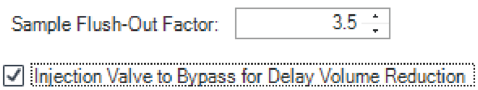


Figure 26 Specific flow-through injection Parameter Details

Specific Flow-through Injection Parameter Details

Injection Valve to Bypass for Delay Volume Reduction

Automatic Delay Volume Reduction (ADVR) helps to optimize the injection cycle to reduce the system delay volume related to the injection flow path. As a result, also to decrease retention time for sample components.

Sample Flush-Out Factor

The **Sample Flush-Out Factor** defines the moment, in which the Online Sample Manager switches from main pass to bypass for delay volume reduction after injection.

NOTE

For further details about Flow-through Injection parameter optimization, see chapter “Optimizing Performance” on page 222.

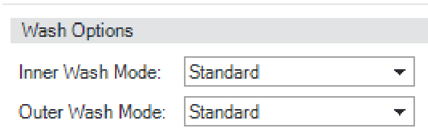


Figure 27 Injection Path Cleaning Wash Options

Injection Path Cleaning

It is possible to choose between different **Wash Options**:

- Off
- Standard
- Extended

The **Wash Options** provide different combinations of wash steps, which can be performed in addition to a basic **Reconditioning** step.

The **Reconditioning** step flushes the flow path with Feed/Flush-out Solvent (S2) to restore it to the initial default condition. Besides the default settings, you can change which solvent is used. The step is fixed and cannot be adjusted in terms of volume and duration.

The **Reconditioning** happens:

- Flow-through injection mode
  - before injection
- Feed Injection mode
  - after injection

The **Inner wash** enables an additional wash step for the flow path. You can choose the solvent type, solvent volume, and duration of the step.

The **Outer wash** is a wash step for the outer Needle surface in the Wash port. You can choose the solvent type, solvent volume, and duration of the step.

The **Seat wash** is a wash step for the surface of the Needle Seat. You can choose the solvent type, solvent volume, and duration of the step.

NOTE

It takes approximately 30 s to fully exchange one solvent for another in the flush port. To flush and exchange the solvent in the needle seat, it takes 18 s.

Also it is highly recommended to use Auto-Clean function to flush the module regularly with all installed solvents.

Flow-through injection, standard wash option

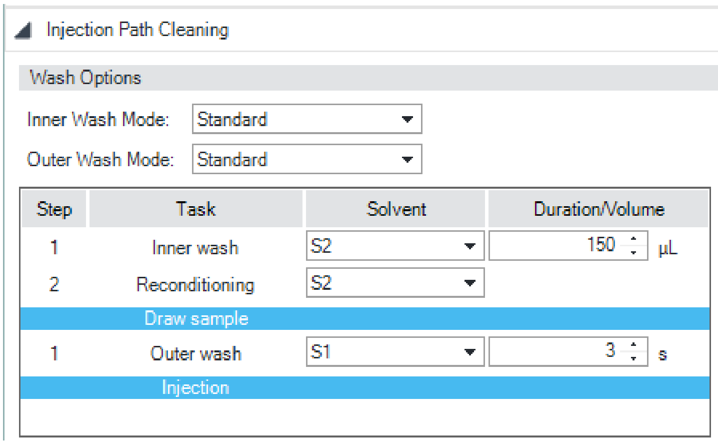


Figure 28 Standard Wash Options, flow-through injection

Feed Injection, standard wash option

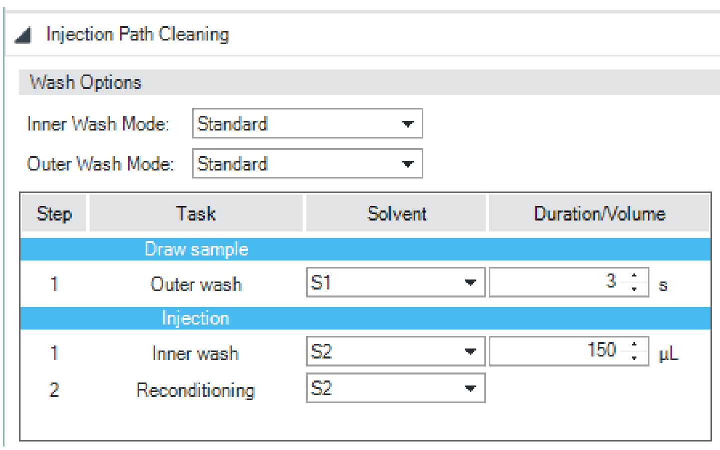


Figure 29 Standard Wash Options, Feed Injection

Depending on the selected **Wash Option** and **Injection Mode**, the sequence of the wash steps is different.
If Off is selected for **Inner Wash Mode** and **Outer Wash Mode**, only the **Reconditioning** step cleans the flow path.

Standard is selected for **Inner Wash Mode** and **Outer Wash Mode**:

- Flow-through injection mode
  - a **Inner wash before Draw sample**
  - b **Reconditioning**
  - c Outer wash before injection
- Feed Injection mode
  - a **Outer wash after Draw sample**
  - b Inner wash after injection
  - c **Reconditioning**

Extended is selected for **Inner Wash Mode** and **Outer Wash Mode**:

- Flow-through injection mode
  - a **Inner wash before Draw sample**
  - b **Seat wash before Draw sample**
  - c **Reconditioning before Draw sample**
  - d Outer wash before injection
- Feed Injection mode
  - a **Outer wash after Draw sample**
  - b Inner wash after injection
  - c Seat wash after injection
  - d **Reconditioning**

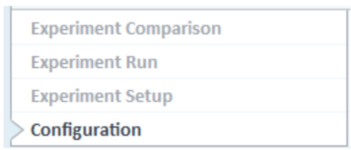
Configuration of the Online Monitoring System in the Online LC Monitoring Software

To create an Online Monotoring System, it is recommended to synchronize the project and instrument configuration in the navigation pane. Analytical instruments can only be used if a connection has been established.

For detailed information on the available GUI-element, see the Online Help of the Online LC Monitoring Software.

Synchronize the System

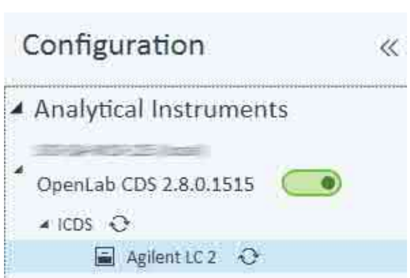
1 In the navigation pane, select Configuration view.



In the Navigation pane of the **Configuration** view, the **Online Monitoring System** and available analytical instruments are displayed. The Ribbon shows specific elements.

2 Synchronize with external equipment with the slider next to the installed OpenLab CDS (optional).

The available projects and their analytical instruments are listed and assigned with  to update the configuration.



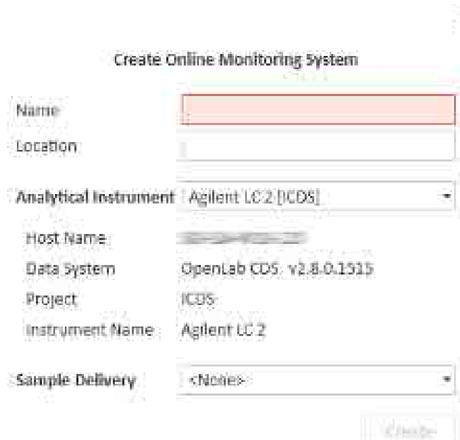
Update the project to query for available instruments and methods configured for this project.

Update the instrument to establish a connection to this instrument and to retrieve the current configuration.

Create Online Monitoring System

1 In the **HomeRibbon** tab, click **Create**.

The **Create Online Monitoring System** window opens.



2 To name your system appropriately, fill in the field **Name**.

3 Specify the system **Location** (optional).

4 Select an **Analytical Instrument** from the drop-down list.

If the required instrument is not displayed in the list, it is not yet connected to the Online LC Monitoring Software. To do this, select the update  option for the corresponding instrument in the navigation pane.

5 Select a **Sample Delivery** option from the drop-down list.

Save the Configuration

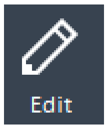
1 To save your configuration click **Create**.

For an example of a configured system, see Figure 30 on page 101.

Modify an Existing System

1 In the Online Monitoring Systems selector, select the system.

2 In the HomeRibbon tab , click Edit.



The fields Name and Location are now editable.

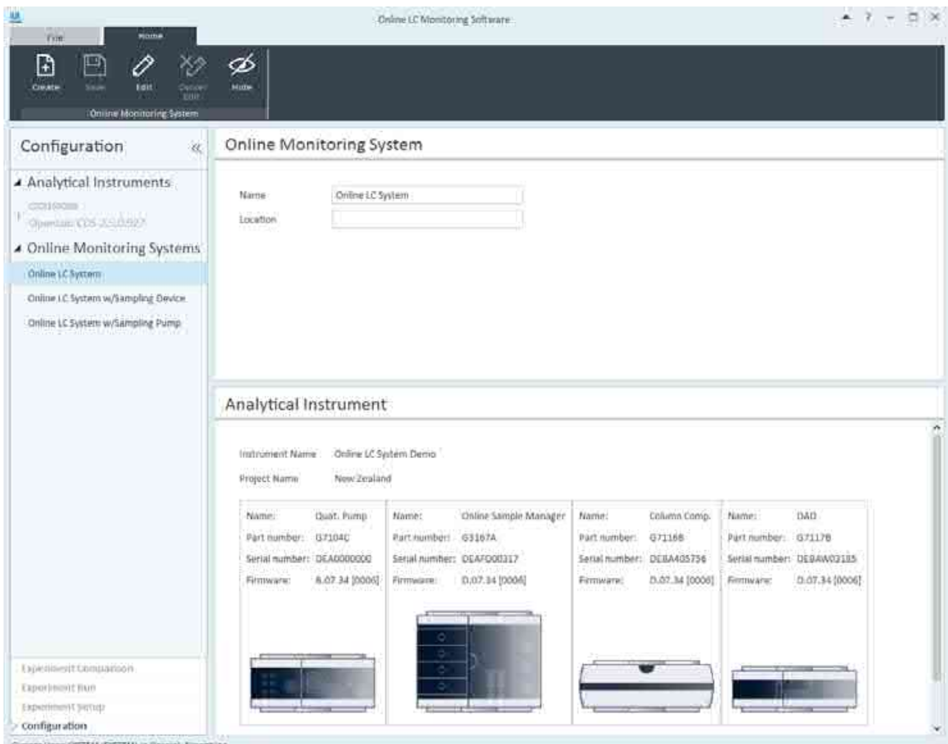


Figure 30 Configuration view of Online LC System without Sample Delivery Device

Hide/Unhide an Existing System

1 To hide an existing system, in the **Home**Ribbon tab click **Hide**.

The system is inactive.

2 To unhide a hidden system, in the **Home**Ribbon tab click **Unhide**.

The system is active.

Setup the ERI Interface

The Online Monitoring System can consist of an analytical system and a sample delivery device (optional). To enable communication between the analytical and the sample delivery part of the system, the Online LC Monitoring Software supports configuration of an ERI interface.

This interface can be configured with one of the following options, depending on the type of sample delivery equipment:

- **Generic Sample Delivery Pump**
- **Generic Sample Delivery Device**

Set up the ERI interface for a Generic Sample Delivery Pump

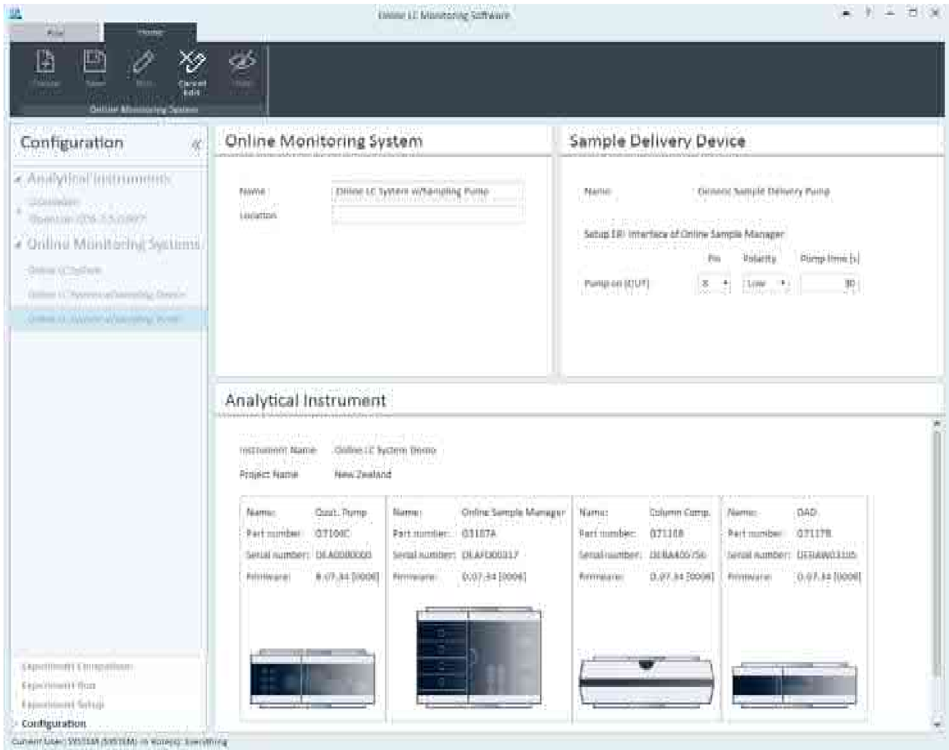


Figure 31 Configuration view of Online LC System with Generic Sample Delivery Pump

1 To enable triggering **Pump on (OUT)**, select the correct **Pin** from the drop-down list.

NOTE

Recommended Pin number is 8 in the ERI socket (Online LC side). It corresponds to the red wire for the open-end wires cable p/n 5188–8029 or Pin 2 in the APG socket for the ERI to APG cable, p/n 5188–8045, see “Remote Cables” on page 401. The signal is sent according to the timing scheduled in **Experiment Setup** of Online LC Monitoring Software.

2 Select the correct **Polarity** from the drop-down list.

3 Define **Pump time [s]** in the field.

Set up the ERI interface for a Generic Sample Delivery Device

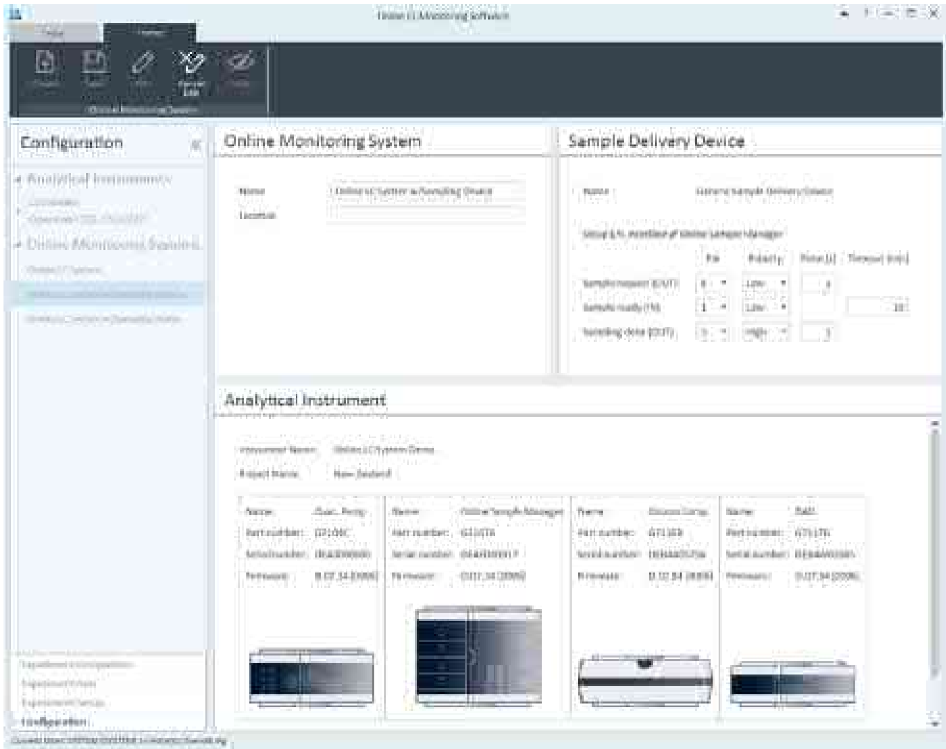


Figure 32 Configuration view of Online LC System with Generic Sample Delivery Device

1 Define parameters for **Sample request (OUT)**:

   a Select correct **Pin** from drop-down list.

NOTE

Recommended Pin number is 8 in the ERI socket (Online LC side). It corresponds to the red wire for the open-end wires cable p/n 5188–8029 or Pin 2 in the APG socket for the ERI to APG cable, p/n 5188–8045, see “Remote Cables” on page 401. The signal is sent according to the timing scheduled in **Experiment Setup** of Online LC Monitoring Software.

   b Select the correct **Polarity** from the drop-down list.

   c Define **Pulse [s]** in the field.

2 Define **Sample ready (IN)**:

a Select correct **Pin** from drop-down list.

NOTE

Recommended Pin number is 1 in the ERI socket (Online LC side). It corresponds to the white wire for the open-end wires cable p/n 5188–8029 or Pin 9 in the APG socket for the ERI to APG cable, p/n 5188–8045, see “Remote Cables” on page 401.

b Select the correct **Polarity** from the drop-down list.

c Define **Timeout [min]** in the field.

3 Define parameters for **Sampling done (OUT)**:

a Select correct **Pin** from drop-down list.

NOTE

Recommended Pin number is 3 in the ERI socket (Online LC side). It corresponds to the green wire for the open-end wires cable p/n 5188–8029 or Pin 7 in the APG socket for the ERI to APG cable, p/n 5188–8045, see “Remote Cables” on page 401.

b Select the correct **Polarity** from the drop-down list.

c Define **Pulse [s]** in the field.

NOTE

Unless stated otherwise by the manufacturer of the third-party equipment in use, the table in “Remote Cables” on page 401 can be used as reference for the selection of the pin **Polarity**.

NOTE

The **Pump time [s]** defines how long the sample should be delivered through the sample delivery lines before the sampling by the Online Sample Manager is started for the next analysis.

NOTE

Unless stated otherwise by the manufacturer of the third-party equipment in use, the recommended **Pulse** duration is 1 s.

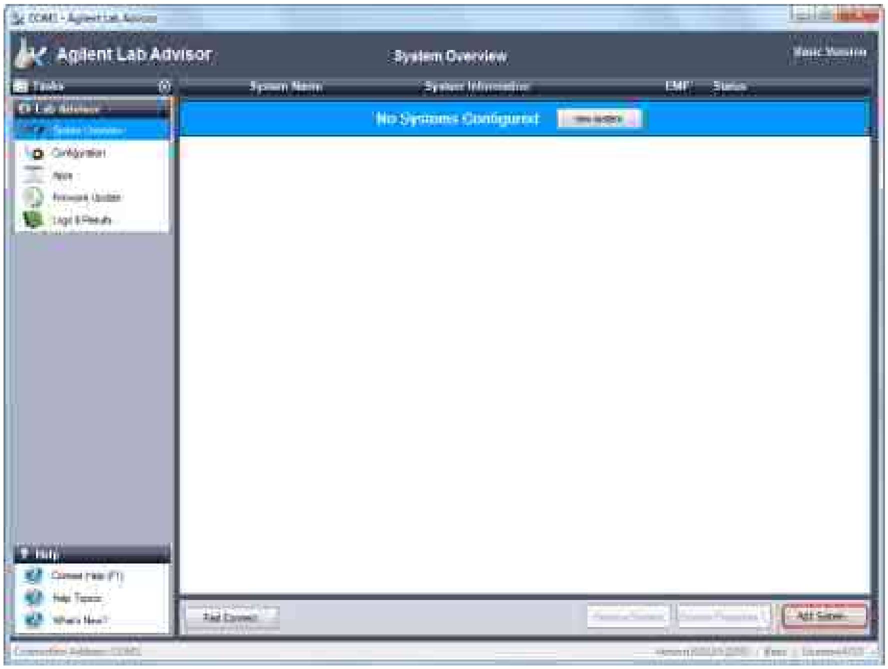
NOTE

The **Timeout [min]** value defines the time, how long the Online LC Monitoring Software waits for an answer from the sample delivery device, since the timing for every next run starts according to the schedule in the Experiment Setup or Sample Request signal.

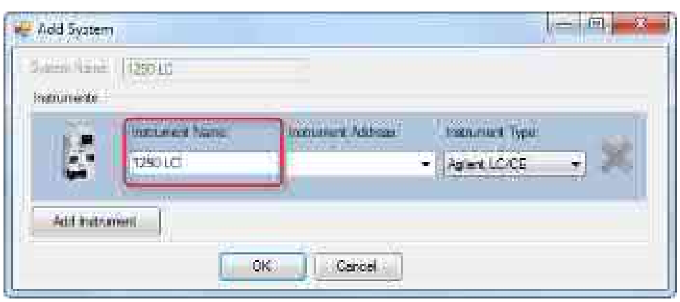
If no answer is coming back, the software sets this sample to missed and continues working on other items or runs in the Experiment Setup schedule.

Lab Advisor Configuration Settings

1 In the Action Panel of the **System Overview**, click **Add System**.



The **Add System** dialog box is displayed.

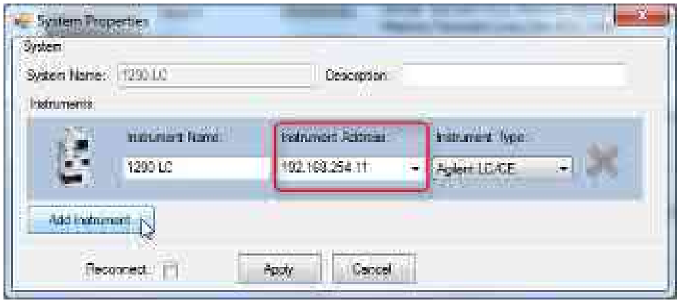


2 Enter a name in the **Instrument Name** field.

NOTE

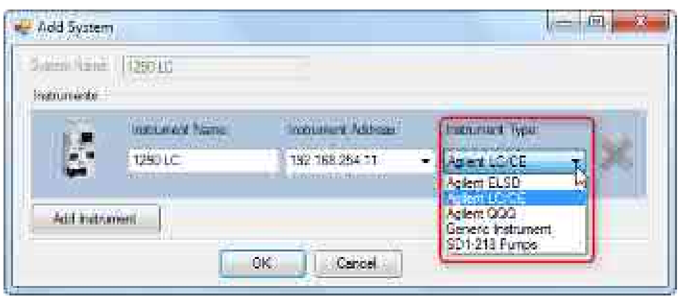
If your system comprises just one instrument, the **Instrument Name** is copied to the **System Name** field.

3 Enter the connection details in the **Instrument Address** field.



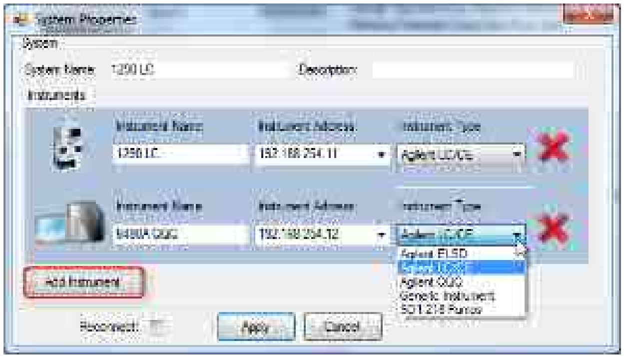
NOTE The **Instrument Address** can be an IP address, the host name or, if you are connecting using a serial cable, the COM port.

4 Click the **Instrument Type** down-arrow and select the type of instrument you are adding from the list. The default setting is **Agilent LC/CE**. Additional instrument types become available when the respective add-ons are installed.



NOTE By default, the **Instrument Type** drop-down list contains only the entry **Agilent LC/CE**. Addition instrument types can be added by installing the respective add-ons (see “Installing Add-ons” on page 109).

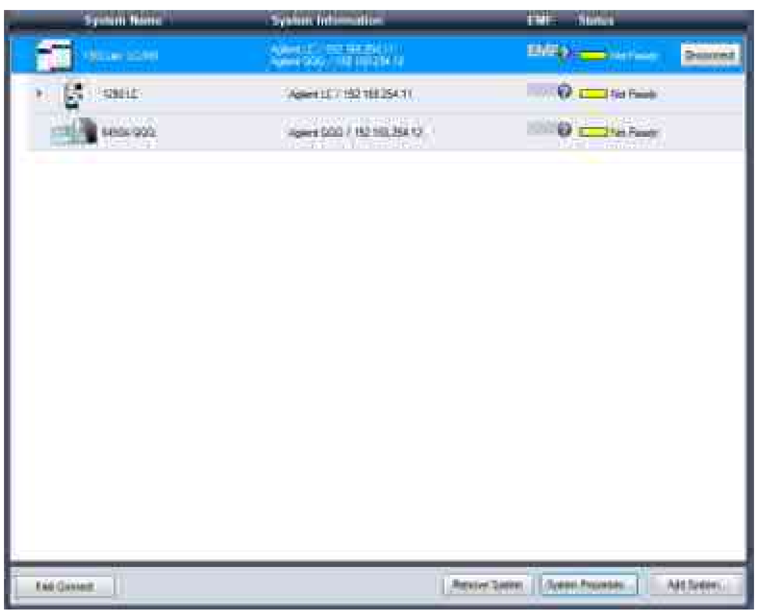
5 If your system comprises more than one instrument, click **Add Instrument** and complete the details as above.



NOTE As soon as you add a second instrument, the **System Name** field is activated to allow you to edit the system name.

6 Click **OK** to finish adding the system and close the **Add System** dialog box.

The system becomes visible in the **System Overview**, and Lab Advisor tries to connect to it.



Installing Add-ons

Add-ons are installed from the **Configuration** screen, using a Lab Advisor Extension file with the with the extension.LAX.

NOTE You need Administrator rights in order to install Add-ons.

1 In the Global Tasks section of the Navigation Panel, click **Configuration**.

The **Configuration** screen is displayed.

2 Click **Add-ons** to navigate to the **Configuration - Add-ons** screen.

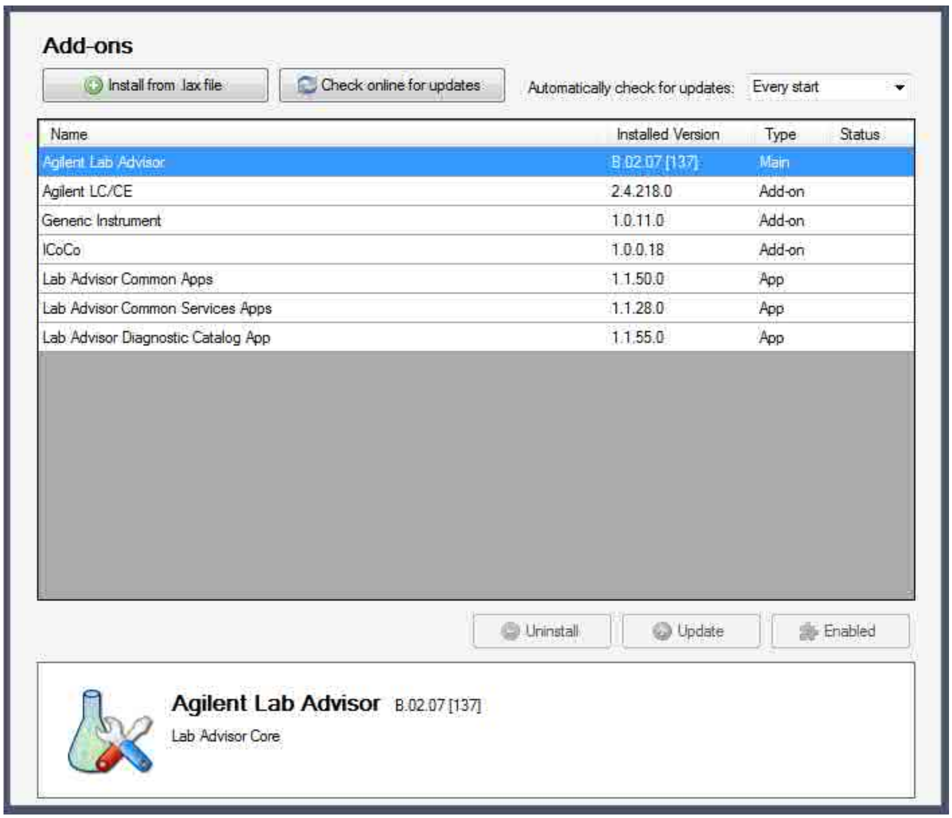


Figure 33 Add-ons in Configuration

The **Configuration - Add-ons** screen contains a table listing all the Add-ons that are already installed.

3 Click **Install from.lax file.**

A file selection dialog box is displayed to allow you to select the App or Add-on to install.

4 Navigate to the folder containing the Add-on files, select the.lax file and click **Open** to install the Add-on.

5 Click **Yes** when the request to shut down Lab Advisor appears.

Lab Advisor shuts down and the Add-on installation is started.

When the installation is finished, the newly installed Add-on is included in the table in the **Configuration - Add-ons** screen.

4 Scheduling Software Workflow Tasks

This chapter describes how to use your Online LC Monitoring Software for the Online Sample Management.

Introduction to the Online LC Monitoring Software

The Online LC Monitoring software is designed to schedule, observe and evaluate sampling and analysis results acquired by the Online LC System equipped with the Online Sample Manager Set as a solution for Technological Process Monitoring experiments.

To optimally support the user, the software reflects the structure of an experiment workflow with the following views:

- "Configuration" on page 116 of an HPLC instrument.
- "Experiment Setup" on page 117 for timing and technical planning of an experiment with which the reaction sequence is to be investigated.
- "Experiment Run" on page 132 for execution of the experiment.
- "Experiment Comparison" on page 137 for comparison of results across experiments.

Each view has its particular set of menu items, tabs, and toolbars, which allow a certain set of task activities.

NOTE

The User Interface is structured into Ribbon, Navigation pane and Workspace. This concept is the same as in OpenLab CDS.

For details on this generic concept, see OpenLab Help & Learning.

User Interface Reference

This section contains descriptions of all items of the Online LC Monitoring Software user interface:

- Menus,
- Toolbars, and
- Dialog boxes.

The following figure gives an overview on terms used to describe user interface elements.

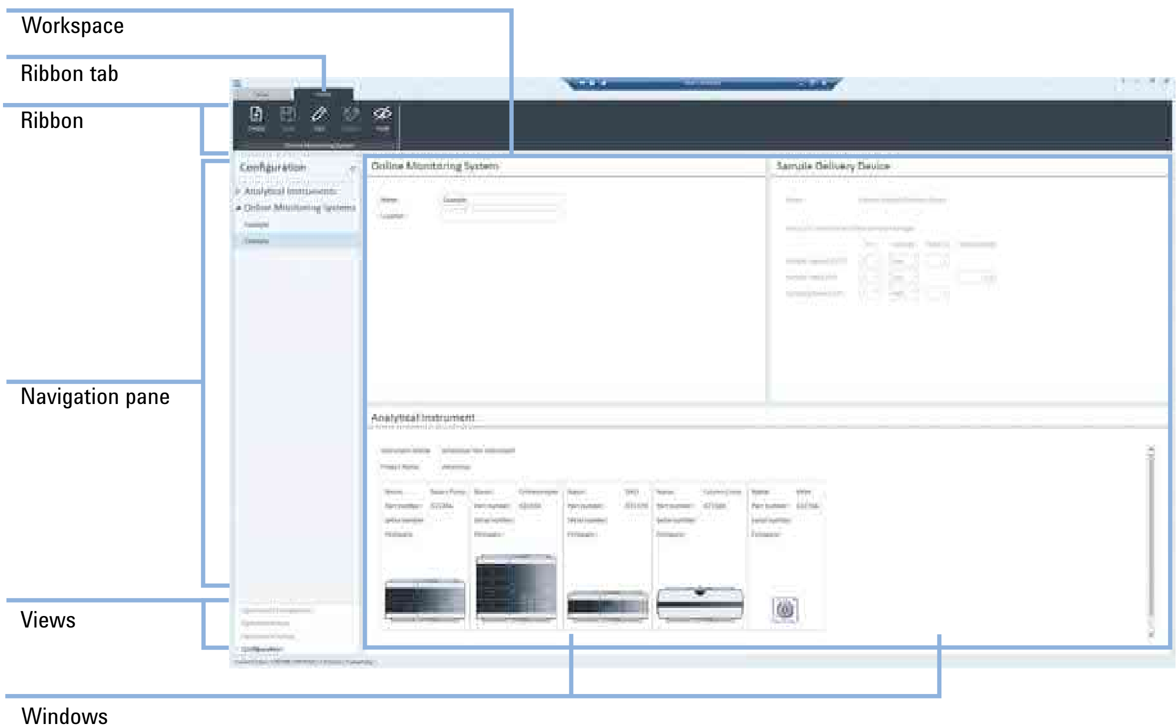


Figure 34 Overview of the Online LC Monitoring Software graphical user interface (GUI) - Configuration view

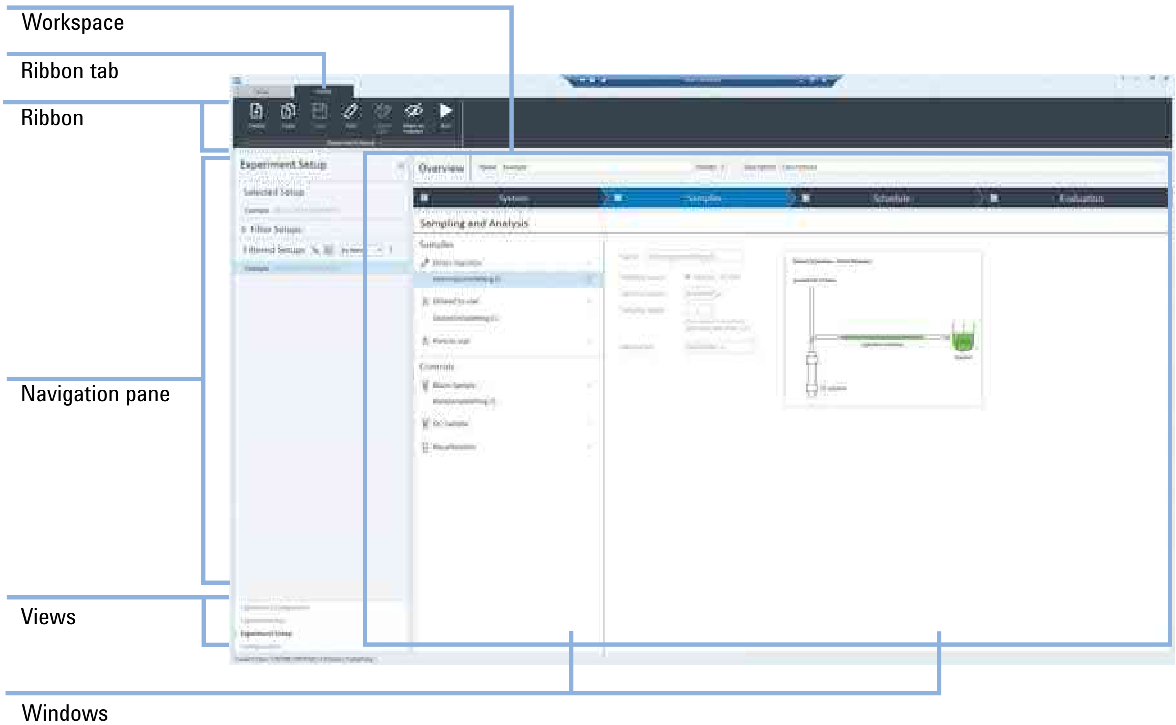


Figure 35 Overview of the Online LC Monitoring Software graphical user interface (GUI) - Experiment Setup view

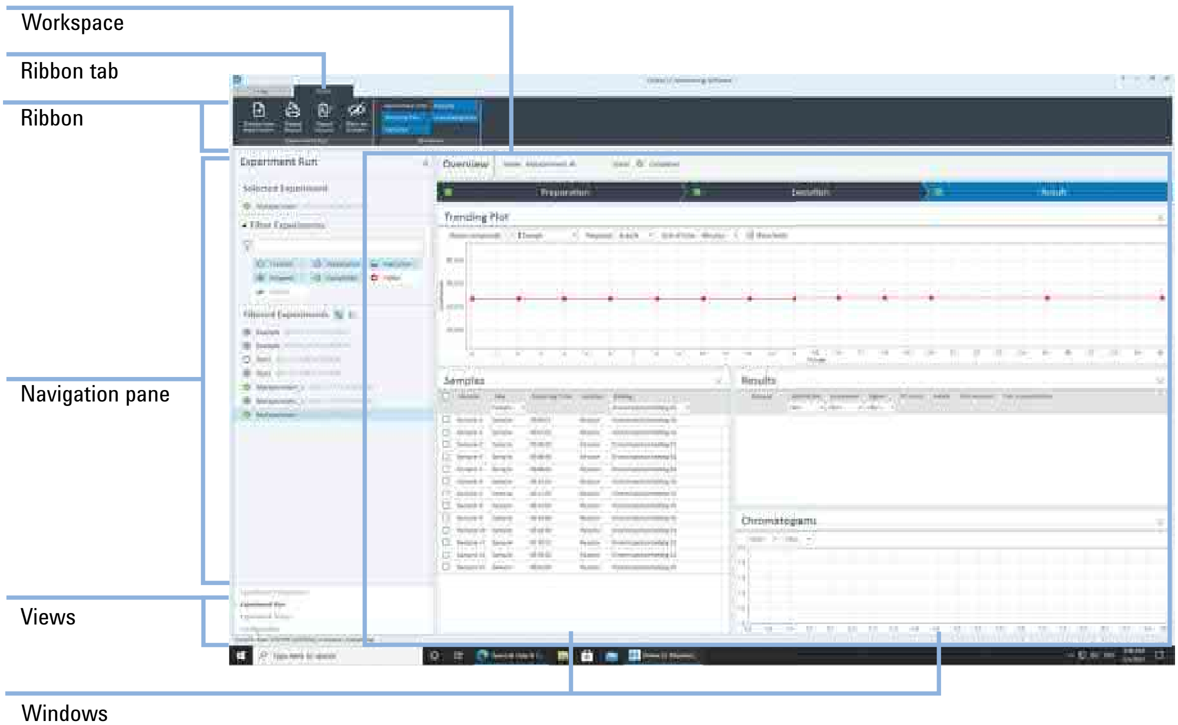


Figure 36 Overview of the Online LC Monitoring Software graphical user interface (GUI) - Experiment Run view

Configuration

In this view you can perform tasks to configure Online Monitoring System and Analytical Instrument Hardware connected to the OpenLab CDS.

Ribbon Tab

The **Configuration** Ribbon tab provides the following functions:

Create	This button initiates the creation of an Online Monitoring System.
Save	This button saves an Online Monitoring System. Afterwards the Online Monitoring System is no longer editable.
Edit	This button enables the modification of a chosen Online Monitoring System.
Cancel Edit	This button cancels the edit mode.
Show Audit Trail	Shows the Audit Trail of a selected Online Monitoring System, if Audit Trail has been enabled.
Report	This button creates a configuration report of a selected Online Monitoring System.
Hide	This button hides a chosen Online Monitoring System.

Navigation Pane

The **Configuration** Navigation pane provides the following options:

Analytical Instruments	List of available instruments, which are set up in OpenLab and can be set up.
Online Monitoring Systems	List of already configured Systems, which can be selected.

Workspace

The **Configuration** Workspace shows details of:

Online Monitoring System	Shows **Name** and **Location** of the selected system.
Analytical Instrument	Shows **Instrument Name**, **Project Name**, and detailed information about the modules of the selected analytical instrument.
Sample Delivery Device	Optional, only visible if defined.

Experiment Setup

This view provides functions to set up the online monitoring **Experiment** details.

Ribbon Tab

The **Experiment Setup** Ribbon tab provides following functions:

Create	Begins the creation of an experiment setup.
Copy	Copies an experiment setup.
Save	Saves the experiment setup. Afterwards the experiment setup is no longer editable. NOTE Saving is only possible, if the chosen experiment setup name is valid. The experiment setup name must be unique across all existing experiment setups.
Edit	Enables the modification of a chosen experiment setup.
Cancel Edit	Cancels the edit mode.
Show Audit Trail	Shows the Audit Trail of a selected Setup, if Audit Trail has been enabled.
Report	Opens a dialog box to print the selected experiment setup information to a file in PDF-format.
Import	Opens a dialog box to import an experiment *.setup file.
Export	Opens a dialog box to export an experiment *.setup file.
Mark as hidden	Hides a chosen experiment setup.
Create Experiment Run	Starts an experiment run using the currently selected setup.

NOTE

The functions **Report**, **Import**, and **Export** provide a dialog box with the following user interface elements:

- Default Export/Import Path and File Name
- **...** browse-button to select a different folder
- Drop-down list, to select an available file (if at import an *.setup file exists, an error is indicated)

Navigation Pane

The **Experiment Setup** Navigation pane provides the following functions:

Selected Setup	Shows the selected setup (as selected under **Filter Setups**, see below)
Filter Setups	Typing for example 'ABC' in the field, filters the list **Filtered Setups**, so that only setups starting with 'ABC...' are displayed.
Filtered Setups	The filtered setups can be displayed as follows: • Folder Content can be structured, by renaming, creation of folders and subfolders or moving (drag & drop) experiment setups into folders or subfolders. Folders can be expanded or collapsed. • List Experiment setups can be sorted ascending or descending either by creation date or by name.

Experiment Setup Workspace

For instructions on how to set up an Experiment, see:

- "Create a new Experiment Setup" on page 143
- "Edit an Existing Experiment Setup" on page 149

The **Experiment Setup**Workspace is organized in the following steps:

System

Step **System** for setup of:

Analytical Instrument	For definition of **Method Sets**.
Conditioning	For definitions of **Finish**, **Sleep/Wake-up**, and **Notifications** parameters.
Notification Settings (Optional)	For configuration of external notifications. Provides a dialog box to configure external notifications via **Email** or **ERI signal** •  adds an external notification to the list •  removes an external notification configuration from the list

Functions of the Analytical Instrument Window

The Analytical Instrument window provides information about the defined method sets.

Method Sets

Each Method Set consists of the following methods.

Pre-run Method (Optional)	You can select a Pre-run Method to prepare the system. This is optional.
Acquisition Method	You can select an Acquisition Method for your Experiment. Acquisition methods can be setup in OpenLab CDS.
Processing Method	You can select a Processing Method. Processing Methods can be setup in OpenLab CDS.
Sample Prep Method	Sample Prep Methods (aka Injector program) can be setup in OpenLab CDS independent from the acquisition method. Setup of Sample Prep Method is optional.
Post-run Method (Optional)	You can select a Post-run Method. This is optional.

NOTE

All in the drop-down lists available methods derive from OpenLab CDS, where they must be defined for your instrument.

For details, see OpenLab Help & Learning: **Home >How To >OpenLab CDS >Acquisition >Acquisition Overview.**

To add a new method set to the method sets table, click this button.

To remove an existing method set from the method sets table, click this button.

To update the method sets table with your selections, click this button.

Functions of the Conditioning Window

The conditioning window has the following sections:

Finish (Optional)	Offers a drop-down list to select the **Stand-by method**.
Sleep / Wake-up (Optional)	To create a **Sleep / Wake-up** method, click + : • Select **Sleep method** and **Wake-up method** from a drop-down list, and • Define **Minimum idle time** (> 0) and **Wake-up time** (>**Minimum idle time**).

NOTE

All in the drop-down lists available methods derive from OpenLab CDS, where they must be defined for your instrument.

For details, see OpenLab Help & Learning: **Home >How To >OpenLab CDS >Acquisition >Acquisition Overview.**

Notifications	Offers drop-down lists to select the type of notification depending on the following events: • **On instrument error** • **On experiment finished** • **On sample failed** • **On sample done**

NOTE

The target groups and notification types that can be selected, must have been configured under “Functions of the Notification Settings Window” on page 121.

Functions of the Notification Settings Window

Email

Use to create and configure an Email notification list.

The following functional elements are available:

- Entry field to **Name** the Email notification
- to add **Email addresses** to the Email notification list
- to remove **Email addresses** from the Email notification list

ERI signal

Use to create and configure an ERI signal.

The following functional elements are available:

- Entry field to **Name** the ERI signal configuration
- A drop-down list to select and define an ERI **Pin**
- A drop-down list to select and define the **Low** or **HighPolarity** of an ERI signal
- A field to define the ERI signal **Pulse [s]** duration in seconds

Samples

Step **Samples** with window **Sampling and Analysis** for setup of:

Samples

Possible options are:

- Direct injection

- Diluted to vial

- Pure to vial

Controls

Possible options are:

- Blank Sample

- QC Sample

- Recalibration

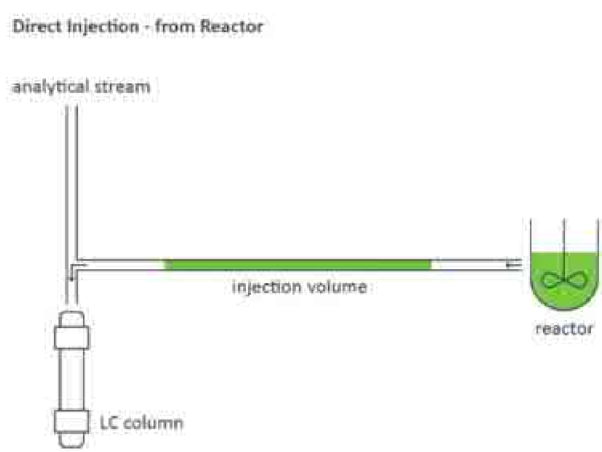
Customization Options for Sample Injections

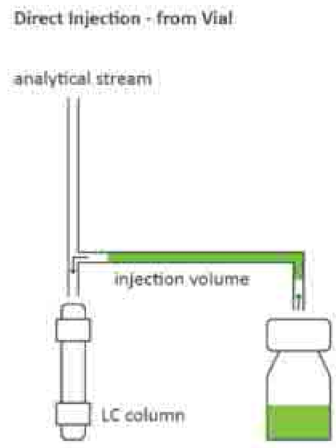
NOTE For each setting, a graphic illustrates the principle of the injection type.

The Samples window provides functions to change the default settings for the following injection types:

Options for Direct Injection Settings

Name	In this field, you can specify the name of the injection.
Sampling source	You can select either Reactor or Vial as source of your sample injections. • If Reactor is selected, your sample will be pulled from the reactor. • If Vial is selected, your sample will be pulled from a vial.
Injection volume	You can define the injection volume of your sample. By default the method defines the volume, but it is possible to overwrite the parameter.
Sampling speed	You can select one of four predefined sampling speeds that fits best to your sample.
Method Set	You can select a method set. The options available here derive from the method sets defined in the System step.





Options for **Diluted to Vial** Settings

Name	In this field, you can specify the name of the injection.

Sampling

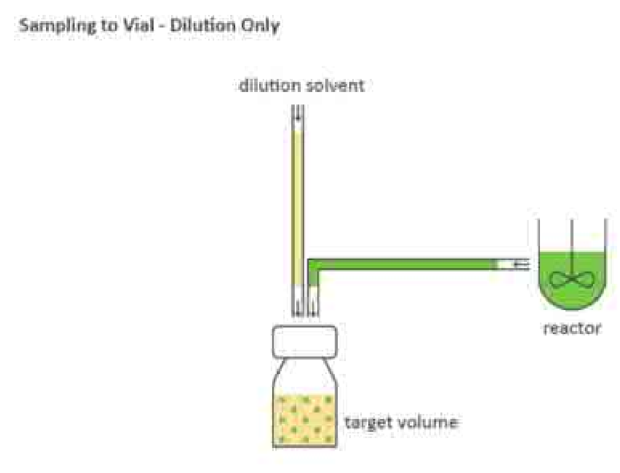
Target volume	In this field, you can specify the target volume of the injection. Target volume = Sampling volume + Dilution volume
Sampling volume	This field shows the calculated sampling volume. Sampling volume = Target volume/Dilution factor
Sampling speed	You can select one of four predefined sampling speeds that fits best to your sample.
Dilution factor	In this field, you can specify the dilution factor.
Dilution solvent	You can select from the options S1, S2, and S3. These options relate to the Solvent Selection Valves of the pump.
Dilution speed	You can define the dilution speed, which fits best to your method/sample.

Analytical Methods

Selection table You can select a method set as defined in step **System**. And you can customize the injection volume.

HINT

To analyze the sample, select at least one method set. Otherwise, the sample is retained in the vial without analysis.



Options for **Pure to Vial** Settings

Name In this field, you can specify the name of the injection.

Sampling

Retain volume You can specify the volume that is pulled from the reactor.

Sampling speed You can select one of four predefined sampling speeds that fits best to your sample.

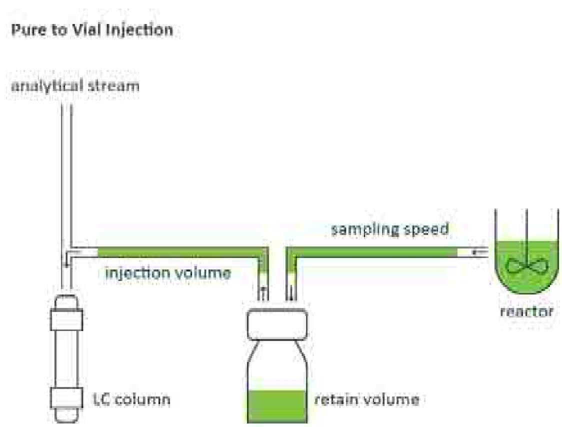
Transport solvent You can select from the options S1, S2, and S3. These options relate to the Solvent Selection Valves of the pump.

Analytical Methods

Selection table You can select a method set as defined in step **System**. And you can customize the injection volume.

HINT

To analyze the sample, select at least one method set. Otherwise, the sample is retained in the vial without analysis.



Customization Options for Control Injections

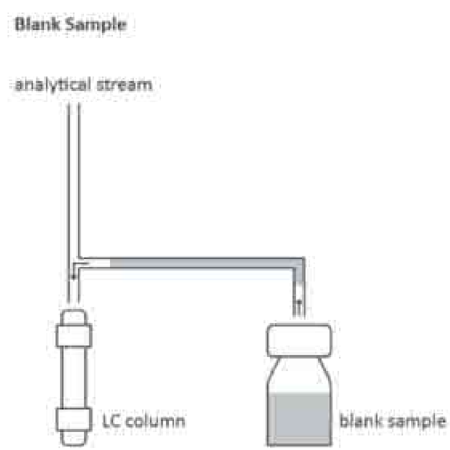
NOTE

For each setting, a graphic illustrates the principle of the injection type.

The Controls window provides functions to change the default settings for the following injection types:

Options for **Blank Sample** Settings

Name	In this field, you can specify the name of the injection.
Method Set	Drop-down list with Method Set options, as defined under **System**.
Radio buttons	• **Run without injection** • **Run with injection from vial** Injection volume can be defined (default: as method)
Check box	If checked, the interval of measurement of the blank sample can be defined.



Options for QC Sample Settings

Name	In this field, you can specify the name of the injection.
Method Set	Drop-down list with Method Set options, as defined under System.
Injection volume	You can define the injection volume of your sample. By default the method defines the volume, but it is possible to overwrite the parameter.
Check box	If checked, the interval of measurement of the QC sample can be defined.

QC Limits

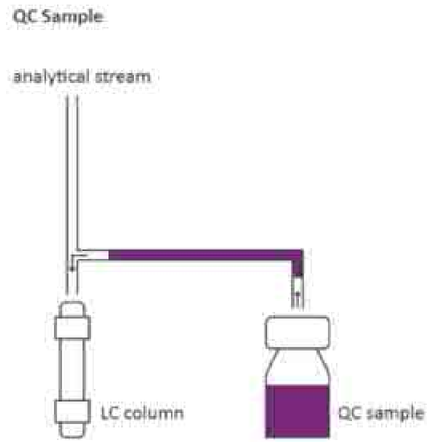
Response	You can select the type of response, which should be used for qualification from the drop-down list.
Limit table	You can define Lower limit and Upper limit for the QC compound.

Notifications

Compound Name	You can select the compound for which to set up a notification, depending on the selected Method Set.
Below lower limit	Offers drop-down lists to select defined groups for notifications.
Above upper limit	Offers drop-down lists to select defined groups for notifications.

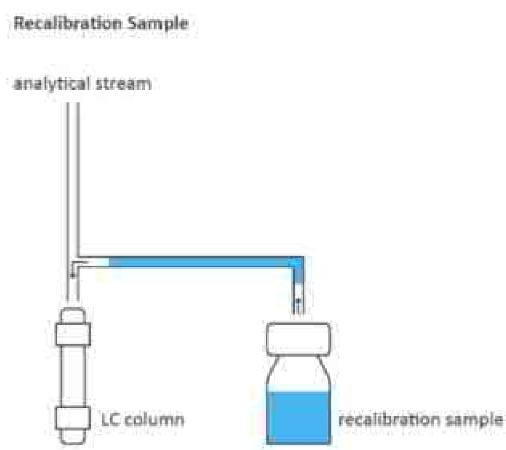
NOTE

Drop-down lists are only available after configuration, see "Functions of the Notification Settings Window" on page 121.



Options for Recalibration Settings

Name	In this field, you can specify the name of the injection.
Method Set	Drop-down list with Method Set options, as defined under System.
Calibration levels	Defined setting: 3 The number of levels is defined by the chosen processing method (as part of the chosen method set) and cannot be changed here.



Schedule

Step **Schedule** for setup of rule and timeline of an experiment:

Rule based	Rules for the experiment.
Time based	Table to define the timeline of the experiment.
Preview	Option that helps to identify and eliminate time conflicts in an experiment.

Rule Based Schedule

Table with information on rules

Type	Derives from definition in step **SystemConditioning**, or step **SamplesControls** window.
Setting	Derives from definition in step **SystemConditioning**, or step **SamplesControls** window.
Description	Derives from definition in step **SystemConditioning**, or step **SamplesControls** window.
	Button to navigate to the source of setting in the given row.

Time Based Schedule

This table helps to plan and schedule experiments.

	Button to add a row to define injections or injections series to the schedule table.
	Button to remove a row from the schedule table.
Type	Derives from definition in step **Samples**.
Setting	Dropdown list to select an injection as defined under step **Samples**.
	Button to navigate to the source of setting, that was defined in previous steps.
Start time	Field to define start time of an action.
Interval	Field to define intervals between actions. If field is empty, only one action occurs.
Count	Field to define number of actions. If **Count** is defined, the software calculates the time to **Start last action**.
Start last action	Field to define start time of an action. If **Start last action** is defined, the software calculates the **Count**.

Preview Schedule

Preview table that assists the user to plan an experiment. Time conflicts inbetween injections are highlighted in orange.

Planned Time	Shows the planned time of an action.
Type	Shows type of the action.
Setting	Shows the selected method of the action.

Limits

Step **Limits** for setup of the criteria for sample analysis results

Compound limits	Provides the option to create compound limits for different compounds and responses.
Notification Settings (Optional)	Shows an overview table of the configured **Notifications**.

Compound Limits

The **Compound Limits** window helps the user to define the evaluation of an experiment. It provides the evaluation parameters in a plot.

Compound Name	Drop-down list to select a compound.
Response	Drop-down list to select a response type.
Compound Limits	Table to define compound limits.
	Button to add a row to the Compound Limits table.
	Button to remove a row from the Compound Limits table.
Sampling time	Point in time, when the **Lower limit** and **Upper limit** will be evaluated.
Lower limit	Field to define the lower limit.
Upper limit	Field to define the upper limit.
Notifications (Optional)	Only visible after **Compound Limits** are defined. Offers drop-down lists to select defined groups for notifications.

NOTE

Drop-down lists are only available after configuration, see “Functions of the Notification Settings Window” on page 121.

Experiment Run

The view Experiment Run offers functions to execute experiments with the Online LC Monitoring Software.

Ribbon Tab

The Experiment RunRibbon tab provides following functions:

Experiment

Create new experiment	Opens a dialog box to create a new experiment.
Reprocess	Opens the dialog box Reprocess Samples, where the user decides, which samples to reprocess. Reprocessing requires the following further actions: • Select the sample and specify the adequate method that is available from the drop-down menu in the column New Processing Method. • Specify the New Result Set Name. • Save the reprocessing results by pressing Reprocess. NOTE • Reprocessing is only possible, if at least one sample in the Samples window is selected. • To ensure accurate and complete data, reprocessing of data must always be initiated by the Online LC Monitoring Software.
Show Audit Trail	Shows the Audit Trail of a selected experiment, if Audit Trail has been enabled.
Report Options	Opens a dialog box where the user selects, which report type is used when printing a result report. Available report types: • Short report (Amount) • Short report (Concentration) • Extended report (Amount) • Extended report (Concentration)
Create Report	Creates a detailed report in PDF format.
Export Results	Creates a detailed results sheet in CSV format.
Export Locations	Opens a dialog box to save a Location information file in *.locations format.

Import	Opens a dialog box to Import Path and Files of a previously saved Experiment.

NOTE

It is not possible to import an experiment twice. Each experiment contains a unique document identifier that enables the software to identify if it has been imported before. Exporting an experiment run and importing it again is prevented. It is not allowed to create copies of results. This restriction is a means to ensure data integrity.

Export	Opens a dialog box to Export Path and File Name and save as *.experiment file.
Mark as hidden	Hides an experiment.

Windows	Enables the user to view/hide following windows: • Trending plot • Chromatograms • Samples • Results • Experiment Info • Reprocessing Info

Navigation Pane

The **Experiment Run** Navigation pane provides the following functions:

Selected Experiment	Shows which experiment is selected in **Filtered Experiments**.
Filter Experiments	Typing for example 'ABC' in the field, filters the list **Filtered Experiments**, so that only experiments starting with 'ABC...' are displayed.
Created	Shows/hides experiments in status 'Created'.
Preparation	Shows/hides experiments in status 'Preparation'.
Execution	Shows/hides experiments in status 'Execution'.
Stopped	Shows/hides experiments in status 'Stopped'.
Completed	Shows/hides experiments in status 'Completed'.
Completed with errors	Shows/hides experiments in status 'Completed with errors'.
Failed	Shows/hides experiments in status 'Failed'.
Hidden	Shows/hides hidden experiments.
Imported	Shows/hides imported experiments.
Filtered Experiments	The filtered experiments can be displayed as follows: • Folder Content can be structured, by renaming, creation of folders and subfolders or moving (drag and drop) experiments into folders or subfolders. Folders can be expanded or collapsed. • List Filtered experiments can be sorted ascending or descending either by creation date or by name.

Experiment Run Workspace

For instructions on how to run an experiment, see “Start an Experiment” on page 157.

The Experiment Run Workspace provides the following functions:

Preparation

Step **Preparation** with windows:

System Preparation	Window to specify Injection and sample.
Experiment Info (Optional)	To view details of experiment. Offers the option to create Experiment Info tags. • Experiment Info tags can be specified as Read only. • Once a Experiment Info tag is saved as Read only, it cannot be modified or deleted.

Execution

Step **Execution** with windows:

Status	Table that displays the status of the Experiment Run.
Experiment Info (Optional)	To view and edit information on the experiment.
Activity Log (Optional)	To see details of the experiment run.
Modify Setting (Optional)	To see details of the experiment settings (read-only).
Method Sets (Optional)	To see details of the method sets (read-only).

Result

Step **Result** with windows:

Overview

Shows the status of the experiment.

Trending Plot (Optional)

Plots the results over time.

Offers options to do the following:

- Select **Shown compounds** from a drop-down list,
- Select **Response** type from a drop-down list,
- Select **Unit of time** from a drop-down list, and
- Check box to show/hide limits.

Samples (Optional)

List of sample injections. Offers check boxes to select individual samples. Selection of **Samples** in this table determines, which results are visible in the windows **Trending Plot**, **Samples**, and **Chromatograms**.

Offers options to do the following:

- Filter **Type** from a drop-down list,
- Filter **Setting** from a drop-down list.
- Select **Sample**.

  Data of selected samples are synchronized and shown in the other windows.

Results (Optional)

Shows the results of the samples selected under **Samples**.

Offers options to do the following:

- Filter **MethodSet** from a drop-down list,
- Filter **Signal Name** from a drop-down list.
- Icon  to highlight the corresponding peak in the window **Chromatogram**,
- Filter **Compound** from a drop-down list.

Chromatograms (Optional)

Shows **Chromatograms** of selected **Samples**.

Offers options to do the following:

- Filter **MethodSet** from a drop-down list,
- Filter detector signal from a drop-down list.

Experiment Info (Optional)

Pop up window that shows additional information of the experiment.

Reprocessing Info (Optional)

Pop up window that shows details about the reprocessing.

Experiment Comparison

The view **Experiment Comparison** offers functions to compare the results of different experiments with the Online LC Monitoring Software.

Ribbon Tab

Mark as hidden/visible	Hides/Shows a selected experiment.

Navigation Pane

The **Experiment Run** Navigation pane provides the following functions:

Selected Experiment	Shows which experiment is selected in **Filtered Experiments**.
Filter Experiments	Typing for example 'ABC' in the field, filters the list **Filtered Experiments**, so that only experiments starting with 'ABC...' are displayed.
Created	Shows/hides experiments in status 'Created'.
Preparation	Shows/hides experiments in status 'Preparation'.
Execution	Shows/hides experiments in status 'Execution'.
Stopped	Shows/hides experiments in status 'Stopped'.
Completed	Shows/hides experiments in status 'Completed'.
Completed with errors	Shows/hides experiments in status 'Completed with errors'.
Failed	Shows/hides experiments in status 'Failed'.
Hidden	Shows/hides hidden experiments.
Imported	Shows/hides imported experiments.
Filtered Experiments	The filtered experiments can be displayed as follows: • Folder Content can be structured, by renaming, creation of folders and subfolders or moving (drag and drop) experiments into folders or subfolders. Folders can be expanded or collapsed. • List Filtered experiments can be sorted ascending or descending either by creation date or by name.

Compound Trending Comparison Workspace

The Compound Trending Comparison Workspace provides the following functions.

On top of the Workspace, the selected experiments are shown.

NOTE

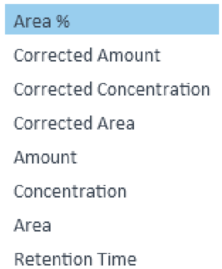
The Workspace allows you to compare a maximum number of 12 trending plots.

If the maximum number of trending plots that can be displayed is exceeded, the fields Rows or Columns turn red.

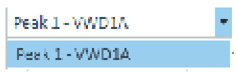
Buttons, drop-down menus, and fields to configure the Workspace

Time unit	Drop-down list to select the value range of the X-axis of the shown trending plots. Possible values are the following: • Minutes • Hours • Days
Rows	Field to define the number of trending plots ordered in rows.
Columns	Field to define the number of trending plots ordered in columns.
Set	Button to reset the Workspace to default.
Link X-Axis	If Link X-Axis is selected, all X-axes are aligned and any manipulation, e.g. of value range, x = 0 position, etc. Any change on one x-Axe manipulates all other X-axis in the same way.
Link Y-Axis	If Link Y-Axis is selected, all Y-axes are aligned and any manipulation, e.g. of value range, y = 0 position, etc. Any change on one y-Axe manipulates all other X-axis in the same way.

Drop-down menus to select parameters, and detection data.



Drop-down list to select a measured parameter.



Drop-down list to select a specific detector signal.

File Tab Options

The following options are available in the **File** tab.

Email

Enter email settings for outgoing email notifications:

Host	Hostname of the outgoing SMTP server
Port	Port number of the outgoing SMTP server
Sender Email	Account used to send the emails
Password	Password of the account used to send the emails
Test Email Recipient email	This recipient email is used to test whether a test email is successfully sent to the SMTP server. After a successful test, you can save the settings.

The conditions for the email notifications are defined in the Experiment Setup.

Audit Trail

Generates a secure, time-stamped electronic record which tracks the history of each event related to the creation or modification of data by the Online LC Monitoring Software. For details, see “Audit Trail” on page 171.

System Activity Log

Contains information of the various events associated with Shared Services or with specific instruments. For details, see “System Activity Log” on page 181.

OPC Server Configuration

Define specific compounds to be applied to one or multiple executing Experiment setup(s) in the OPC server configuration. For details, see “Send Compound Results to the API Client” on page 155.

Help

Access the Online help, to access information about the application.

About

Access the installed version of Online LC Monitoring Software.

Exit

Exit the application.

How to Work with the Online LC Monitoring Software

This section gives an overview, on how to work with the Online LC Monitoring Software.

Control System Access Using Roles And Privileges

Control System Access Using Roles And Privileges is a functionality of OpenLab CDS Shared Services and is only available, if OpenLab is configured accordingly. For details, see OpenLab CDS Shared Services Help.

After installation, the following predefined user roles are available.

Table 32 Default Online Monitoring specific user roles

Role (Display name)	Description
Online Monitoring Technician	• Executes Online Sampling experiments, • Monitors execution, and • Creates reports
Online Monitoring Process Chemist	• Configures system, • Develops experiment setups, • Gives the user the capability to mark audit trail entries as reviewed • Gives the user the capability to create a report of a configuration
Online Monitoring System Administrator	• Gives the user the capability to switch on audit trail
Online Monitoring API User	• Allows the user to use API functionality[1]

[1] For further information about the API functionality, see Online LC Monitoring Software Application Programming Interface Reference Guide.

Configure a System

For information about the configuration of a system in the Online LC Monitoring system, see:

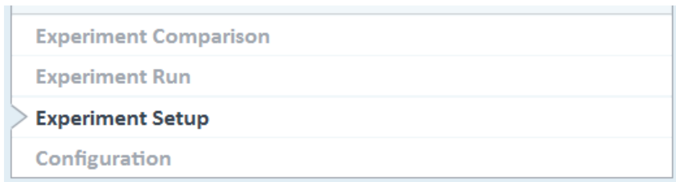
- “Configuration of the Online Monitoring System in the Online LC Monitoring Software” on page 99
- “Modify an Existing System” on page 101
- “Hide/Unhide an Existing System” on page 102
- “Setup the ERI Interface” on page 102

Setup an Experiment

Create a new Experiment Setup

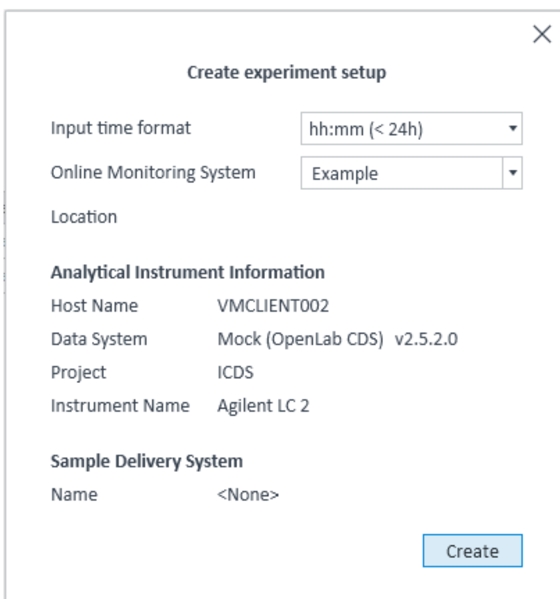
For detailed in information on the available GUI-elements, see “Experiment Setup” on page 117.

1 To enable setup of an experiment, in the Navigation pane click **Experiment Setup**.



2 In the **HomeRibbon** tab, click **Create**.

The **Create experiment setup** window opens.



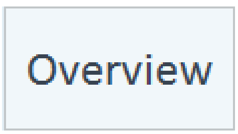
3 From the drop-down list, select an **Online Monitoring System** and click **Create**.

You can now set up an experiment, see

- “Define and Describe an Experiment” on page 144,
- “Setup Method Sets” on page 145,
- “Add Sampling Settings” on page 146
- “Define Experiment Schedule” on page 147, and
- “Define Compound Limits” on page 148.

Define and Describe an Experiment

In the **Overview** Workspace:



1 Define a **Name** and add a **Description**.

NOTE You can change name and description of an experiment at any time.

Continue to set up the experiment.

Setup Method Sets

The user needs to define the analytical methods to b0e used during the experiment.

In the step **System**:

1 To define your method sets, in the **Analytical Instrument** Workspace, click:

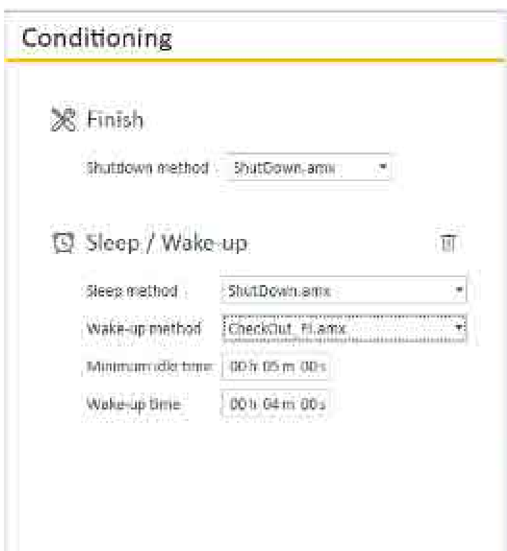
This action adds a method set to the **Definition of method sets** table. You can select the desired method from a dropdown list. For details about the included methods, see “Functions of the Analytical Instrument Window” on page 119.

NOTE

All in the dropdown lists available methods derive from OpenLab CDS, where they must be defined for your instrument.

For details, see **Home >How To >OpenLab CDS >Acquisition >Acquisition Overview.**

2 In the **Conditioning**Workspace define additional settings (optional) for **Start**, **Finish**, and **Sleep/WakeUp** functions. For details, see “Functions of the Conditioning Window” on page 120.



The **System** is defined.

Add Sampling Settings

The step **Samples** allows the user to setup multiple sampling modes.

Customize a Samples injection

1. To add a **Samples** injection, in the **Samples** window click:

2. To add a **Controls** injection, in the **Controls** window click:

Define Experiment Schedule

The Online Sample Manager Set and the Online LC Monitoring software are designed to monitor chemical reactions.

Since chemical reactions can vary greatly in time, it is essential to define reasonable times when samples should be taken. The step **Schedules** provides a table to enter meaningful values.

1 To change **Rule based** settings, click:

The window, where you can edit these previously set up settings, opens.

2 To add a **Time based** sampling event to the schedule, click:

a Select **Setting** from a dropdown list.

NOTE These settings were defined in the step **Samples**.

You can click to see and change these settings.

b Fill in **Start time**, and optionally two of the following parameters:

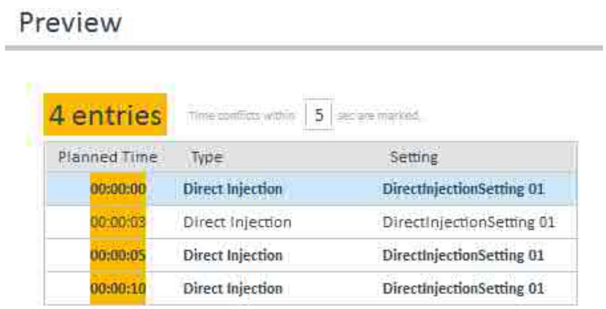
- To calculate **End time**, fill in **Interval** and **Count**.
- To calculate **Count**, fill in **Interval** and **Start last action**.
- To calculate **Interval**, fill in **Count** and **Start last action**.

The software automatically calculates the missing parameter.

NOTE To identify time conflicts, use the window **Preview**:

Problematic entries are marked orange.

Example for conflicting entries



Planned Time	Type	Setting
00:00:00	Direct Injection	DirectInjectionSetting 01
00:00:03	Direct Injection	DirectInjectionSetting 01
00:00:05	Direct Injection	DirectInjectionSetting 01
00:00:10	Direct Injection	DirectInjectionSetting 01

Define Compound Limits

To set up warning limits for compound values, the user can define **Upper limits** and/or **Lower limits** at certain time points.

Definition of Compound Limits in step Limits

1 Select **Compound Name** and **Response** from drop-down lists.

2 To add a limit, click:

This adds a row to the **Compound Limit** table.

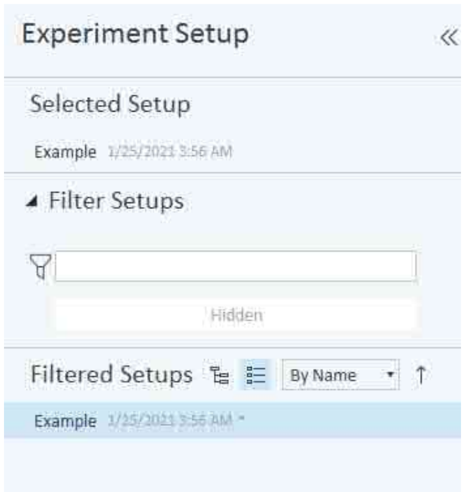
NOTE Define at least two lower limits.

NOTE To enable this option, the compound must be calibrated in the OpenLab CDS Data Analysis method that was selected in the table for definition of Method Sets in the step System during Experiment Setup.

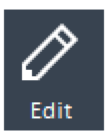
Edit an Existing Experiment Setup

It is possible to edit an existing experiment setup.

1 In the **Experiment Setup** Navigation pane select the experiment.



2 In the **Home** Ribbon tab click **Edit**.



You can now edit the settings.

Configure Automatic Notifications

Preparations The required **Experiment Setup** is selected and in **Edit** mode.

Configure the SMTP Server

1 Under ribbon tab **File**, click **Email**.

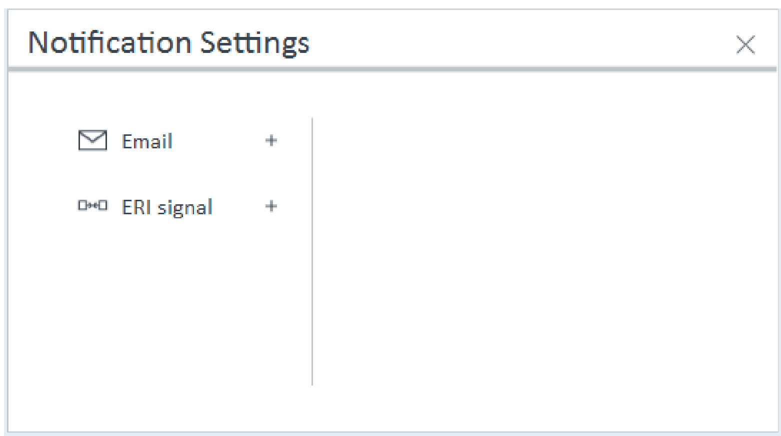
2 To configure the **SMTP Server**, fill in the following fields (entries depend on the Email-Server):

- Host, Sender Email (Mandatory)
- Port, Password (Optional)

3 Click **Save Settings**.

Define Email recipient groups in the step System

1 To add an Email recipients group, under **Notification Settings** >**Email** click +.



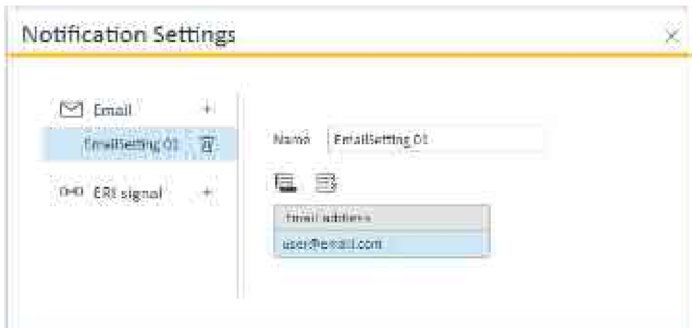
2 To define a target Email group, enter a meaningful Name to the field.

a To add Email recipients to the group, click .

OR

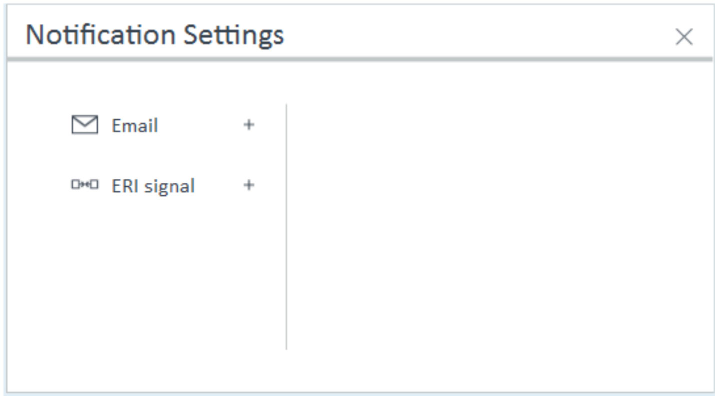
To remove Email recipients from the group, click .

An Email recipient group is defined.



Define ERI signals for automatic notifications in the step System

1 To add a **Notification Settings > ERI signal** click +.

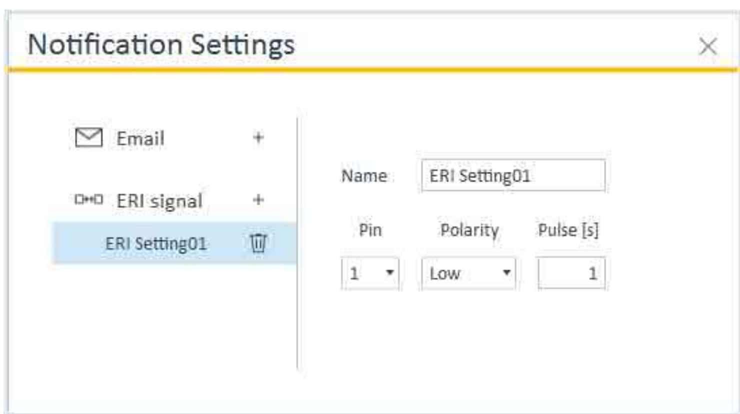


2 To define the ERI signal, enter a meaningful **Name** to the field.

a Select the ERI signal **Pin** from the drop-down list.

b Define the ERI signal **Polarity** from the drop-down list.

c Enter the ERI signal duration to the field **Pulse [s]**.

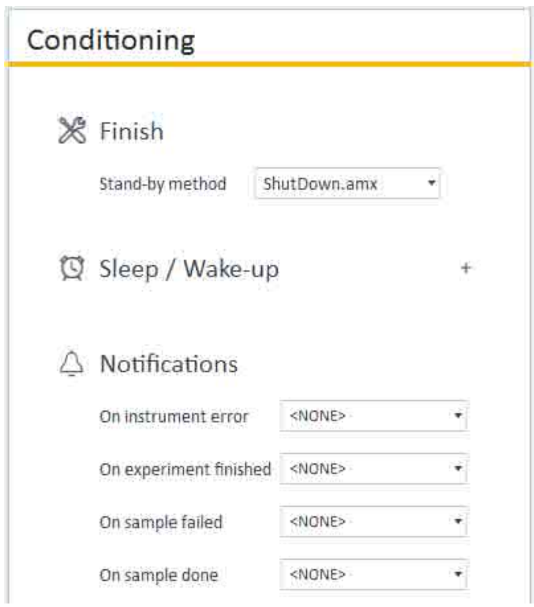


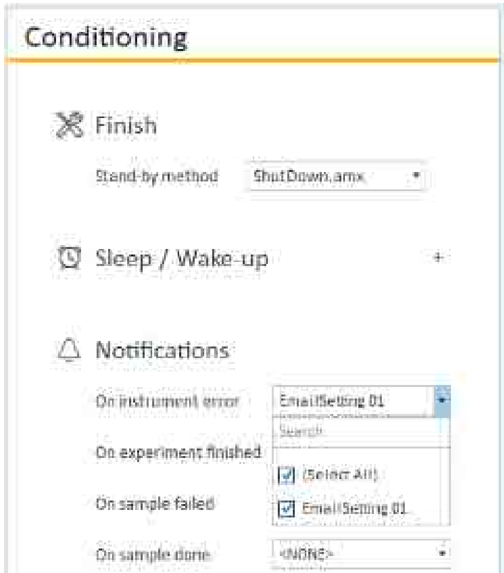
Remove Email recipients or ERI signals

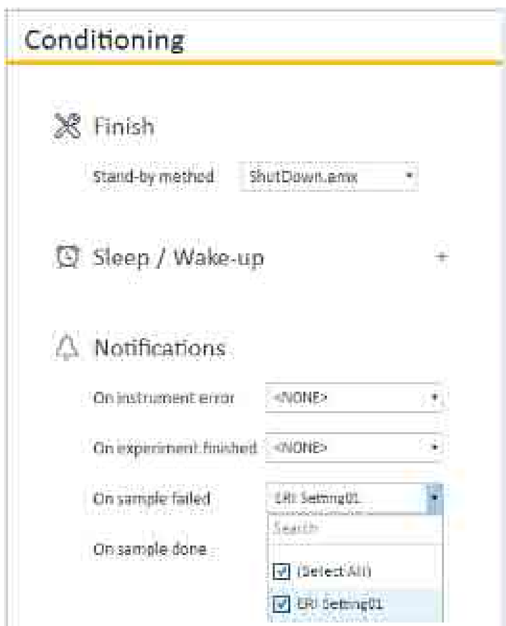
1 To remove Email recipients or ERI signals from the automatic **Notification Settings**, select the group and click .

Define recipients of automatic notifications depending on notification events

1 To define the automatic notification depending on optional events, under **Conditioning > Notifications** select recipients from the drop-down list.







2 In Experiment Setup, click **Save**.

The automatic notification is configured.

Send Compound Results to the API Client

The OPC server configuration allows the automatic transfer of results of certain compounds from running experiments to the API client (based on a OPC UA Push Model configuration). The configuration is performed in the Online LC Monitoring Software (“Configure the OPC Server” on page 155).

For information on the API functionality and experiment run structure, see the *Online LC Monitoring Software Application Programming Interface Reference Guide*.

Configure the OPC Server

You can find this configuration in the **File** tab.

Here you define which compounds from which Experiment setups are sent to the client application.

Prerequisites

- To be able to carry out the procedure as described, you need the following privilege **CanConfigureApi**. By default, it is assigned to the role **Online Monitoring System Administrator** (privileges are configured in the OpenLab CDS Control Panel).
- The compounds that you want to specify here must be defined in the processing method.
- You have already created an Experiment setup in the Online LC Monitoring Software.

Load current OPC server configuration

1 Select  to update the currently existing definitions for compound(s) and Experiment setup(s).

Define compounds for the last executing experiment

Here you define the compounds that are applied to the Experiment setup that is already running. If multiple Experiment setups are running, you must specify the required Experiment setups in the section **Configured Experiment Setups With Compound Definitions** below.

1 Select to enable the editing mode of the OPC server configuration.

2 In section **Last Executing Experiment**, select to add a compound. It is possible to add multiple compounds.

3 Select the desired compound from the field **Compound name**. A drop-down list shows all compounds defined in the processing method.

4 If you want to use a specific signal and method set for the compound, specify them in the corresponding field **Signal name** and **Method set name** (optional).

Define Experiment Setup(s) (optional)

In section **Configured Experiment Setups With Compound Definitions**, you specify the Experiment setup for which the compound configuration is to be used. It is possible to add multiple Experiment setups.

1 In the field **Experiment setup**, select the desired setup from the drop-down list.

2 Select , to define a further Experiment setup.

Remove a compound from the experiment setup

1 In editing mode, select for the compound to be removed from the list.

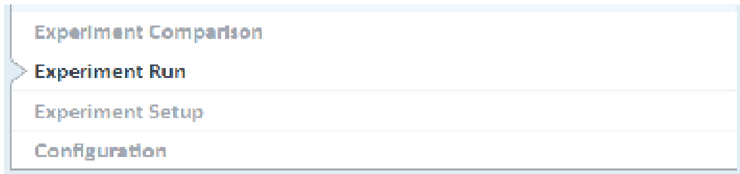
NOTE

In order for the changes to take effect in the OPC server configuration, you must restart the **Agilent Technologies Online Monitoring Software OPC API** service.

Run an Experiment

Start an Experiment

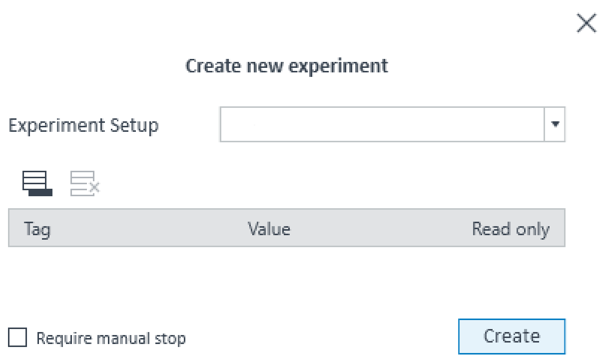
1 In the navigation pane select **Experiment Run** view.



The **Experiment Run** specific Ribbon and **Experiment Run** in the Navigation pane are visible.

2 In the **Home** Ribbon tab, click **Create**.

The dialog box **Create new experiment** opens.



3 Select an **Experiment Setup** from the drop-down list.

NOTE

The drop-down list contains the options that were created under **Experiment Setup**.

[OPTIONAL] 4 Define a tag/value pair (e.g. customer-specific information to categorize the experiment).

- To add a tag/value pair, use:

- To delete a tag/value pair, use:

NOTE This information can by default be modified during the experiment run, and is visible in report, and csv export. The **Read only** check box can be selected to prevent modification of the tag/value pair.

[OPTIONAL] 5 Select the **Require manual stop** check box.

NOTE If selected, the experiment will not finish automatically, and the user needs to explicitly stop it. By selecting the check box, the experiment can be edited in real time during an ongoing run.

6 To start the experiment, click **Create**.

Experiment starts.

NOTE To stop an experiment, in the Ribbon click **Stop experiment**.

You are asked to note down, why you stopped the execution of the experiment.

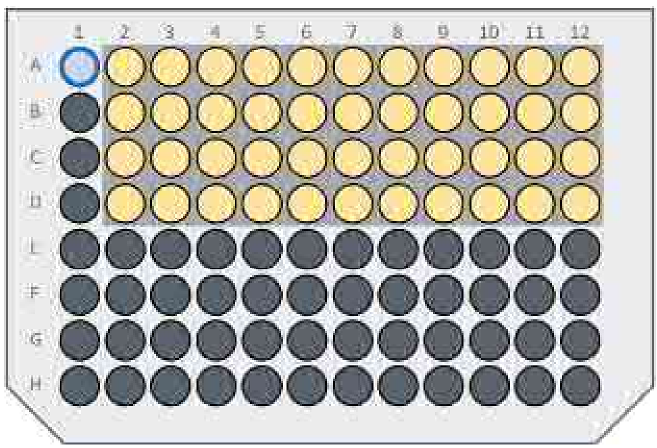
NOTE It is possible to add injections to an experiment. The software therefore provides a table and assists in finding possible settings.

Prepare an Experiment

To successfully run an experiment, the user must provide all source and/or target locations in the step **Preparation**.

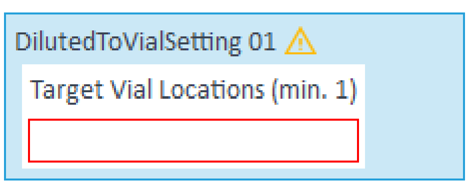
1 Select an action.
2 To specify the source/target location, use the graphical display.

NOTE It is not possible to specify used locations.



The minimum number of required target values is shown.

The setting remains incomplete, if the required number of vial locations is not reached.



NOTE An incomplete setting prevents the start of the experiment.

3 Monitor the experiment run in the step **Execution**.

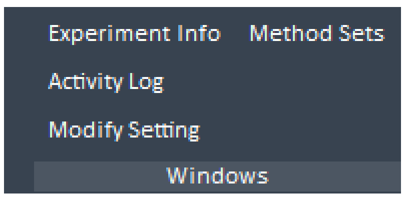
As long as the experiment runs, the following windows help to change or monitor valuable additional information:

- **Experiment Info**

  It is possible to edit informations about the experiment.
- **Activity Log**

  Provides detailed information about the experiment.
- **Modify Setting**
- **Method Sets**

  Shows the Method Sets of the experiment in the run.



Review Experiments

To review experiments, open the step **Results** in the **Experiment Run** workspace.

The Online LC Monitoring software provides several options in the **Results** window.

1 To review the response for one or more compounds over the experiment time, select the **Trending Plot** window.

2 To review the measured samples, select the **Samples** window.

The table shows your sample injections. Select the sample you want to display in the windows **Trending Plot**, **Samples**, and **Chromatograms**.

Show Results	Select the sample you want to show the results. It is recommended to always display this column.
Sample	Name automatically assigned to the sample or control (for example, Sample-1, Sample-2 etc.)
Sample ID	Unique identifier of the sample. It is configured as sample custom parameter.

Type	Sample type descriptions:
	• Sample - A sample with unknown amounts of analytes being analyzed.
	• Controls, that can be:
	  • Blank Sample - A sample without any analytes that is treated like a sample. It is used as a signal-to-noise reference for all subsequent samples and for system suitability. If an ISTD method is being used, then the Blank usually contains the internal standard.
	  • QC Sample - A sample with a known amount of analyte that is used to verify and prove that the calibration is correct.
	  • Recalibration - A sample with a known amount of analyte that is used as a reference to create or update a calibration table in the processing method.

Sampling Time	The sampling time relative to the experiment run start time.
Location	The location from which the sample was injected: reactor or vial.
Setting	Injection setting configured during the Experiment Setup in the **Samples** step. For details about the available injection settings, see "Customization Options for Sample Injections" on page 123 and "Customization Options for Control Injections" on page 126.
Absolute Sampling Time	Date and time when the sample was injected.
Injection ID(s)	Unique identifier of the injection. It is configured as sample custom parameter.

3 To review the results, select the **Results** window.

The **Results** window contains the results of your experimental runs. From the **Samples** window, select the sample injection whose results you want to display in the **Results** table. The table lists the integration results calculated by peak. Each line of the table represents a peak, each column represents a value calculated on the peak.

You can choose the columns that are shown in the table. For example, the following columns are available:

Sample	Name automatically assigned to the sample or control (for example, Sample-1, Sample-2 etc.)
Sample ID	Unique identifier of the sample. It is configured as sample custom parameter.
Open result in DA	Select  to open the result set in OpenLab CDS Data Analysis.
Injection ID	Unique identifier of the injection. It is configured as sample custom parameter.
Method Set	Defined during the Experimental Setup in the **System** step. For details about the included methods, see “Functions of the Analytical Instrument Window” on page 119.
Acquisition Method	Name of the method used to acquire the raw data.
Processing Method	Name of the method used to analyze the data.
Compound	The compounds defined in the processing method.
Signal	Name of the signal on which the peak is integrated.
RT (min)	Retention time of the peak. It corresponds to the time at the peak apex.
Area%	Relative area of the peak (in %) to the area sum of all peaks in the integrated signal.
Corr. amount	Calculated from compound amount in sample, compound multipliers, and compound dilution factors. The dilution factors are used either as a divisor or as another multiplier; you choose this calculation with the **Concentration and corrected amount calculation** setting in the processing method under **Calibration** on the **General** tab.
Corr. concentration	Calculated from compound concentration in sample and a given correction factor.
Corr. area	Calculated from compound area in sample and a given correction factor.
Area (unit)	Area between the signal and the baseline between the two peak edges (peak start and stop markers). A unit shown in the column header only if all listed results use the same unit (for example, mAU*s for a DAD detector), and if the acquisition software provided these units (for example, EZChrom data does not show a unit).
Amount	Amount and unit of the compound as calculated from the calibration curve (before applying multiplier and factors).

Concentration	Concentration (with unit) or mass percentage, of the compound after applying multipliers and factors.
Dilution factor	Dilution factor that was entered in the **Samples (Diluted to vial)** step when setting up the experiment. Used to calculate concentration for all compounds.
Height (unit)	Difference between the value of the signal at the apex of the peak and the value of the baseline at the same time. A unit shown in the column header only if all listed results use the same unit (for example, mAU for a DAD detector), and if the acquisition software provided these units (for example, EZChrom data does not show a unit).
Height%	Relative height of the peak (in %) to the height sum of all peaks in the integrated signal.
Result ID	Shows the CDS data source for the result data.

The columns **Method Set**, **Acquisition Method**, **Processing Method**, **Compound** and **Signal** provide a drop-down list that you can use to filter the table.

4 To review the signals, select the **Chromatograms** window.

Report and Evaluate an Experiment

Report an Experiment

1 To report an experiment, in the **Home** Ribbon tab click **Report**.

Dialog box to save a PDF file opens.

2 Save the PDF file.

NOTE
The type of report is defined under **Report Options**, see “Ribbon Tab” on page 132.

The Experiment Report with the following information is available:

- Information on the System
  - Name
  - Creation Date
  - Version
  - System Name
  - Location
  - Analytical Instrument
  - Sample Delivery System
- Trending Plot
- Sample List
- Analytical Results

If **Extended report** is selected under **Report Options**, the following is included:

- Experiment Setup
- System Configuration
- Analytical Method Sets
- Chromatograms
- Activity Log

Evaluate an Experiment

1 To evaluate an experiment in the Online LC Monitoring software, use the functions of the **Experiment Run** workspace.

   a Filter the **Trending Plot** window for compound, response, and time units.

   b In the **Samples** window select individual samples.

   Selection in this window is automatically reflected in the **Results** and **Chromatograms** windows.

   c In the **Results** window filter for **MethodSet**, **Compound**, or **Signal**.

   d In the **Chromatograms** window, filter for MethodSet or Detector.

2 To evaluate an experiment in an external program, in the **Home** Ribbon tab, click **Export results**.

Dialog box opens to save the results in a CSV file for further investigation in an external program.

CSV file contains information on the following:

- Experiment Name
- Experiment Start
- Experiment End
- Analytical Instrument
- Keyvalue
- Peak Table, with information on the following:
  - Sample
  - Type
  - Time
  - Method Set
  - Compound
  - Amount
  - Signal
  - Ret.Time[min]
  - Area
  - Area%
  - Height
  - Height%

Share Experiment Data Between Different Systems

Share Experiment Setups

For detailed information on the available GUI-elements, see “Experiment Setup” on page 117.

Prerequisites In the Navigation pane the **Experiment Setup** is selected.

Export parameters of an Experiment Setup for use in a different system

1 In **Filtered Setups** select a **Setup**.

2 Click **Export**.

The Export Experiment Setup dialog opens.

[OPTIONAL] 3 To specify folder for export, click **...**

[OPTIONAL] 4 To specify the filename, change the filename.

5 Click **Export**.

The setup parameters are saved to a *.setup file as specified under step on page 167.

Import parameters of an Experiment Setup from a different system

1 Click **Import**.

The **Import Experiment Setup** dialog is available.

[OPTIONAL] 2 To specify the Import Path, click **...**.

3 From the drop down select the desired import file.

[OPTIONAL] 4 Add notes to the **File Comment** field.

5 Specify the **Experiment Setup Name**.

[OPTIONAL] 6 Select the System Set from a drop down.

7 Click **Import**.

The parameters are imported and available in the selected system.

Share Experiment Locations

Prerequisites

- In the Navigation pane **Experiment Run** is selected.
- The experiment is in **Preparation**.

1 Click **Export Locations**.

   The **Save As** dialog opens.

2 Select the target folder.

[OPTIONAL] 3 Specify the *.locations File name.

4 Click **Save**.

   The *.locations file is saved to the target destination, ready to be shared with another system.

Share Experiment Results

For detailed information on the available GUI-elements, see "Experiment Run" on page 132.

Prerequisites

- In the Navigation pane **Experiment Run** is selected.
- An experiment has been finished (is in status **Completed**, **Stopped**, or **Failed**).

Export Experiment Parameters

1 Click **Export**.

[OPTIONAL] 2 To specify folder for export, click **...**

[OPTIONAL] 3 To specify the filename, change the filename.

NOTE Its not possible to export a file if a file with the same filename already exists in the selected folder.

4 Click **Save**.

   The *.experiment file is saved to the target destination, ready to be shared with another system.

Import Experiment Parameters

1 Click **Import**.

[OPTIONAL] 2 To specify the Import Path, click **...**.

3 From the drop down select the desired import file.

[OPTIONAL] 4 Add notes to the **File Comment** field.

5 Click **Import**.

The Experiment is available in the system.

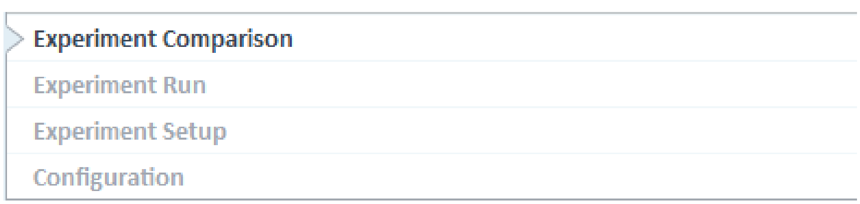
NOTE It is not possible to import an experiment twice. Each experiment contains a unique document identifier that enables the software to identify if it has been imported before. Exporting an experiment run and importing it again is prevented. It is not allowed to create copies of results. This restriction is a means to ensure data integrity.

Compare Experiments

To verify that selected and compared reactions are reproducible or to see where differences occur between the selected reactions, the software provides functionality to visually compare trending plots.

This function is available for either finished/completed experiment results and/or currently running experiments with a reference experiment.

1 In the Navigation pane select Experiment Comparison view.



2 Under **Filtered Experiments** in the Navigation pane, check the experiments radio buttons of the experiments to compare.

3 In the Compound Trending Comparison Workspace, configure the screen to your needs. For details, see "Experiment Comparison" on page 137.

Compliance Functions

Overview of Compliance Features

The Online LC Monitoring Software provides functionalities to demonstrate data integrity in a regulated environment.

These features are:

- Audit Trail
- System Activity Log

Reference about both features can be found in the **File** ribbon tab.

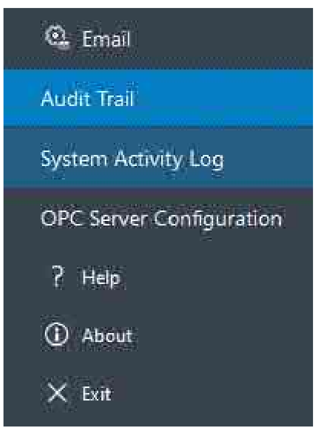


Figure 37 Audit Trail and System Activity Log in the File ribbon tab

Audit Trail

What is Audit Trail

Audit trail is a feature that generates a secure, time-stamped electronic record. This record tracks the history of each event related to the creation or modification of data by the Online LC Monitoring Software.

Once enabled, all user and system activities are automatically documented. The functionality cannot be switched-off after activation.

NOTE

For a system to be fully compliant, ensure to enable compliance in OpenLab CDS and the Online LC Monitoring Software. For information on how to enable compliance in OpenLab CDS, see documentation for OpenLab CDS, e.g. OpenLab Help & Learning.

Depending on the assigned role, users have different permissions concerning Audit Trail:

- *Online Monitoring System Administrators* have the permission **Can Edit Activity Log Properties** and can start the Audit Trail.
- *Online Monitoring Process Chemists* have the permission **Can Review Audit Trail** and can regularly conduct and document a second-person review of the Audit Trail.

Audit Trail Types

There are three types of audit trails in the Online LC Monitoring Software. All three types are started automatically once audit trail was enabled. You cannot start them separately.

For instruction how to start the audit trail, see "Start Audit Trail" on page 175.

Configuration Audit Trail

The initial part of the Online LC Monitoring Software is the configuration of an Online LC Monitoring System. This system is saved within the software and always referenced to when either creating an experiment setup or experiment run. The configuration is therefore considered as electronic record. All changes are tracked and can be reviewed at any time.

Audit trail entries are created for the following events:

- Creation of a new Online LC Monitoring System
- Modification of an existing Online LC Monitoring System
- Marking an Online LC Monitoring System as hidden or visible

The configuration audit trail is part of a configuration report of an Online Monitoring System.

Experiment Setup Audit Trail

Each experiment run is based on an experiment setup template, which has to be created before. The audit trail function tracks all changes to the experiment setup, and they can be reviewed at any time.

Audit trail entries are created for the following events:

- Creation of a new experiment setup
- Modification of an existing experiment setup
- Marking an experiment setup as hidden or visible

The experiment setup audit trail is part of an experiment setup report.

Experiment Run Audit Trail

The experiment run audit trail tracks all changes to experiments, and they can be reviewed at any time.

Audit Trail entries are created for the following events:

- Starting of a new experiment run
- Reaching an end state of an experiment run, either by completion, manual stop or any other state.
- Modification to an experiment (including **Reprocessing**).
- Marking an experiment run as hidden or visible

The experiment run audit trail is part of any experiment run report.

Audit Trail Views

Summary	By default, a summary view is displayed, which shows all entries of the selected audit trail grouped by version and category. • Click + to expand the information about a group of entries. • Click - to hide the information.
Detail	Switch to the **Detail** view, which shows all entries of the selected audit trail listed by date with the newest entry first. In the **Detail** view, you can filter or search the audit trail.

Coloring

Audit trail entries have different background colors to indicate their state:

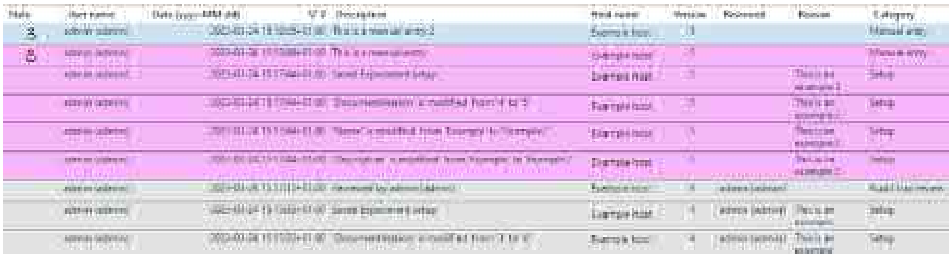
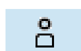


Figure 38 Coloring of audit trail entries

- **Blue** background: the entry is selected.
- **Purple** background: the data has been saved, but the audit trail has not been reviewed yet.
- **Gray** background: the data has been saved, and the audit trail has been reviewed

Person icon  in the **State** column: the entry has been manually added.

Start Audit Trail

This procedure described how to start **Audit Trail**. Once started, **Audit Trail** cannot be switched off again.

An active Audit Trail license is required. If the license gets inactive (e.g. expiration of the Startup License), the software will be inoperable.

Preparations

- User authenticated in the OpenLab Control Panel via **Internal** or **Windows Domain** authentication. For detailed information, see **OpenLab Help and Learning >Home >OpenLab CDS >Control Panel >Administration >System Configuration**.
- User with privilege **Can Edit Activity Log Properties**. This privilege is part of the role **Online Monitoring System Administrator**. Roles are defined in the Control Panel.
- Valid Audit Trail License.

NOTE

After activation, an invalid Audit Trail license (e.g. expiration of the Startup License) will lead to inoperability of this software.

- No active experiments.
- No other active users apart from the Online Monitoring System Administrator.

NOTE

Important Information: To comply with regulations, it is the user's organizations obligation to avoid maintaining non-auditable records in a compliant environment. The Online LC Monitoring Software provides technical means as "Audit Trails" and "System Activity Log" to demonstrate auditability to the authorities. However, to avoid the aforementioned scenario, it is mandatory to activate Audit Trail logging immediately after installation, with an empty Data Repository Scheme (no records created).

It is strongly recommended, if not even required, to perform Operational Qualification (IQ/OQ) to achieve full Compliance Creditability. Our OQ protocols will test the impossibility to deactivate the Audit Trail. In case software installation and OQ **does not** occur in a sequential scenario, activate the Audit Trail (if required by the user's organization) immediately after installation.

1 In the ribbon tab, select **File >Audit Trail**.

2 Select the **Enable Audit Trail** check box.

NOTE

Once started, the Audit Trail cannot be switched off again. An invalid Audit Trail license will lead to inoperability of this software.

If authentication is switched off after Audit Trail was started, login will be denied, and the error message **Application Startup failed** will be displayed.

3 To confirm your choice and start the Audit Trail, select **Save Settings**.

The Online Monitoring UI will be restarted, because Audit Trail was enabled.

4 Log in to the Online LC Monitoring Software.

Online LC Monitoring Software UI is shown. Below the Navigation Pane, there is a note stating **Audit Trail activated**.

NOTE

If Audit Trail is enabled in the Online LC Monitoring Software, but not in OpenLab CDS, the system cannot be considered fully compliant. You will be notified and asked to enable compliance also in OpenLab CDS.

Show Configuration Audit Trail

Prerequisites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see “Start Audit Trail” on page 175.

1 Select the **Configuration** view in the navigation pane.

2 Select the **Online LC Monitoring System** of interest in the navigation pane.

3 Select **Show Audit Trail** in the Home ribbon tab.

The Audit Trail view opens.

Show Experiment Setup Audit Trail

Prerequisites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see “Start Audit Trail” on page 175.

1 Select the **Experiment Setup** view in the navigation pane.

2 Select an **Experiment Setup** of interest in the navigation pane.

3 Select **Show Audit Trail** in the Home ribbon tab.

The Audit Trail view opens.

Show Experiment Run Audit Trail

Prerequisites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see “Start Audit Trail” on page 175.

1 Select the **Experiment Run** view in the navigation pane.

2 Select an **Experiment** of interest in the navigation pane.

3 Select **Show Audit Trail** in the Home ribbon tab.

The Audit Trail view opens.

Filter the Audit Trail

Prerequisites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see “Start Audit Trail” on page 175.

1 In the Audit Trail window, click to show the **Detail** view.

2 Type a date range, or click to select a date from a calendar.

3 Click **Filter**.

The entries are displayed based on your filter.

4 Alternatively, select a predefined data range in the **Date** column, click .

The entries are directly displayed based on the predefined data range.

5 To clear the filter, click **Reset filter** .

Search the Audit Trail

Prerequisites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see “Start Audit Trail” on page 175.

1 In the Audit Trail window, click to show the **Detail** view.

2 Enter a search term, and click **Next** or **Previous** to view results.

The cell containing the search term is highlighted.

Sort the Audit Trail

Prerequisites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see “Start Audit Trail” on page 175.

1 In the Audit Trail window, click ☰ to show the **Detail** view.

  By default, the entries are sorted by date and time.

2 Sort the entries according to your needs, by clicking the column header item of interest.

  The entries are sorted according to the selected column header item (e.g. Version).

HINT

Ascending and descending sorting can be switched by clicking the column header item again.

Add a Manual Entry to the Audit Trail

Prerequisites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see “Start Audit Trail” on page 175.

1 In the Audit Trail window, click ☰ to show the **Detail** view.

2 Enter the text in the **Manual entry** text box.

3 Click **Add** + .

  The entry is added to the top of the table. An avatar icon is shown in the **State** column.

Review the Audit Trail

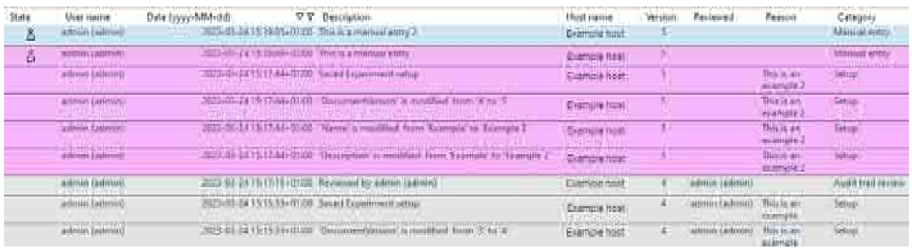
Prerequisites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see “Start Audit Trail” on page 175.

1 In the Audit Trail window, click to show the **Detail** view.

2 In the Audit Trail window, click to show the **Detail** view.

As long as an audit trail has not been reviewed, the entries are shown with a *purple* background. Reviewed entries are shown with a *gray* background.



3 Review all new entries. If required, scroll down until you have seen the last new entry at the bottom of the list.

4 Click **Review**.

HINT The **Review** button is active only after you have scrolled down to the last new entry.

The reviewed entries change their background color from purple to gray. A new entry is added to the audit trail, documenting that it has been reviewed. You can now print or export the audit trail.

Export the Audit Trail

Prerequisites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see “Start Audit Trail” on page 175.

1 In the Audit Trail view, click **PDF Export...**.
2 Select a location for the PDF file and provide a file name.
3 Click **Save**.

Print the Audit Trail

Prerequisites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see “Start Audit Trail” on page 175.

1 In the Audit Trail view, click **Print**. A preview of the printed audit trail report is shown in the **Audit Trail Report** dialog box.
2 Click the printer icon.
3 A Print dialog box opens. Specify your print preferences and click **Print**.

System Activity Log

The System Activity Log is a Shared Services security feature that can be accessed using the OpenLab Control Panel. It allows users with respective privileges to centrally access all system activities. It contains information of the various events associated with Shared Services or with specific instruments.

To see the System Activity Log, open the Control Panel and navigate to Administration >System Activity Log.

For detailed information about the System Activity Log, see OpenLab Help and Learning Home >How To >OpenLab CDS >Control Panel >Administration >System Activity Logs and *OpenLab CDS Workstation Installation and Configuration*.

Reprocessing of Data in a Regulated Environment

When working in a regulated environment, transferred data must always be accurate and complete.

If data is reprocessed during experiment run, the Online LC Monitoring Software triggers the Data Reprocessing in OpenLab Data Analysis.

Reprocessing could also be done through the OpenLab Data Analysis itself. However, reprocessing in OpenLab Data Analysis will not change the result values in the Online LC Monitoring Software. There is no active transfer of reprocessed data from OpenLab Data Analysis to the Online LC Monitoring Software.

Therefore, you must actively reprocess the data in the Online LC Monitoring Software to ensure data integrity.

NOTE To ensure accurate and complete data, always use the Online LC Monitoring Software for reprocessing.

Checksums

The Online LC Monitoring Software automatically calculates and stores checksums for your configurations, experiment setups, and experiment runs. If the checksum is wrong or missing, something has been changed outside of the Online LC Monitoring Software, and changes are not tracked in any Online LC Monitoring Software audit trail.

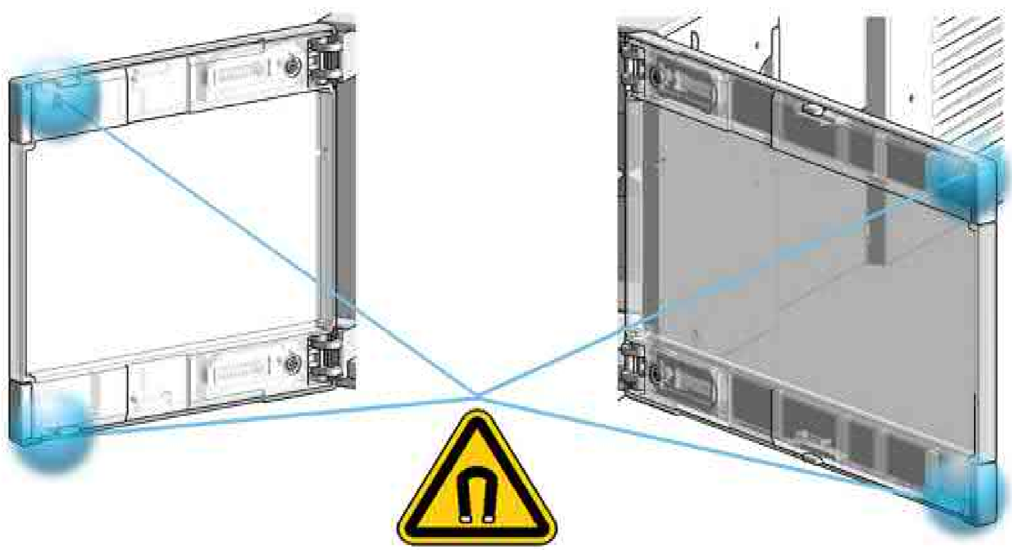
When operated in compliance mode (active audit trail) the Online LC Monitoring Software does not import such methods or data. A corresponding error message will be shown.

5 Using the Solution Modules

This chapter explains the essential operational parameters of the solution modules.

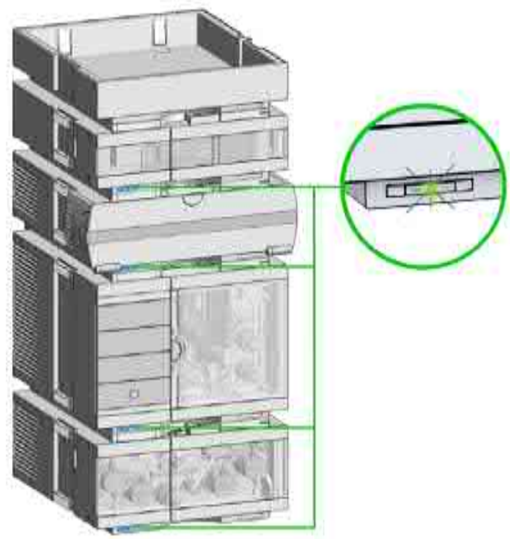
Magnets

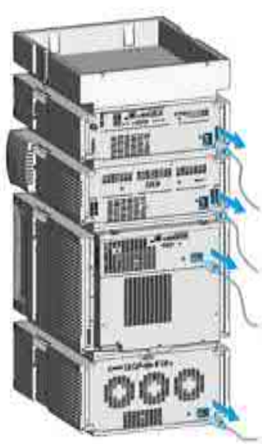
1 Magnets in doors of pumps, autosamplers, detectors, and fraction collectors.



Turn on/off

This procedure exemplarily shows an arbitrary LC stack configuration.

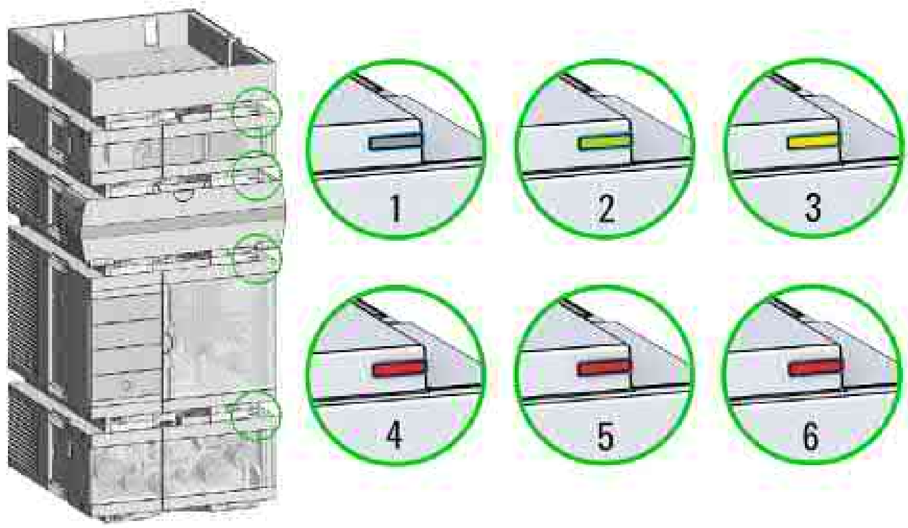
1	2
	 Power switch: On

3 Turn instrument **On/Off** with the control software.  	4  Power switch: Off
5 	

Status indicators

This procedure exemplarily shows an arbitrary LC stack configuration.

1 The module status indicator indicates one of six possible module conditions:



Status indicators

1. Idle

2. Run mode

3. Not-ready. Waiting for a specific pre-run condition to be reached or completed.

4. Error mode - interrupts the analysis and requires attention (for example, a leak or defective internal components).

5. Resident mode (blinking) - for example, during update of main firmware.

6. Bootloader mode (fast blinking). Try to re-boot the module or try a cold-start. Then try a firmware update.

Drawer Status Indicator

The module status indicator indicates one of three possible module conditions:

- When the status indicator is *OFF* no sample containers are loaded.
- When the upper, lower or both semi circle status indicators are *ON*, indicates the rear or front position of the drawer or both positions are loaded with a sample containers.
- When semi circle indicators are *blinking* the robot interacts with a drawer.

NOTE

Do not open the drawers when the drawer status indicator is blinking.

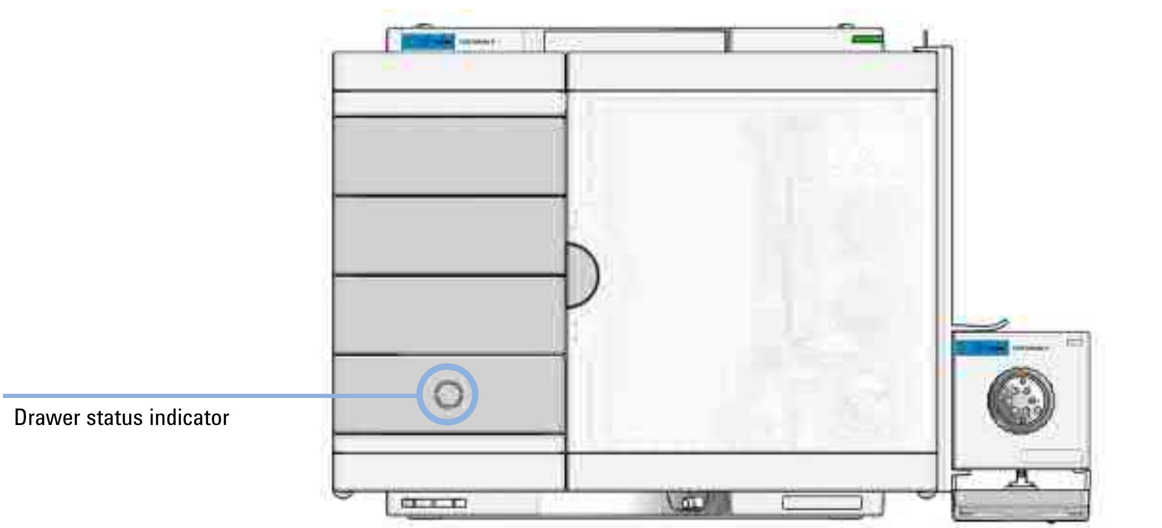
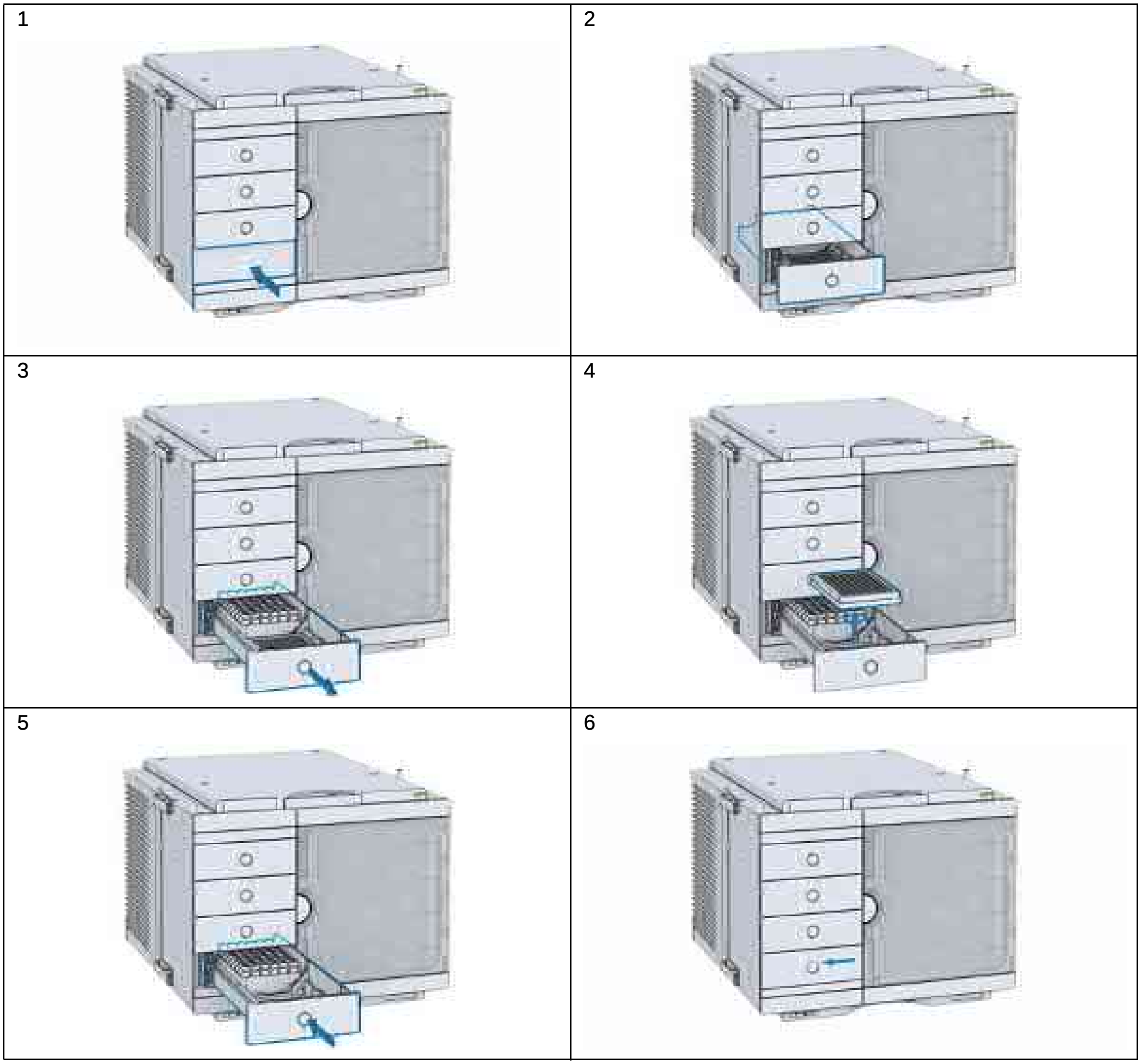


Figure 39 Drawer status indicator

Insert vial trays/wellplates

1 	2 
3 	4 Check the orientation of the vial tray/wellplates and ensure correct seat by pressing down the plate. When the lever sensor has detected the plate correctly the front LED lights up and the device recognizes the assignment. 
5 	6 
7 Configure the vial tray/wellplate type in the chromatographic data system (see Table 30 on page 88).	

Remove vial trays/wellplates



Installing the Optional Sample Cooler/Thermostat

Unpacking the Unit

Damaged Packaging

If the delivery packaging shows signs of external damage, please call your Agilent Technologies sales and service office immediately. Inform your service representative that the instrument may have been damaged during shipment.

CAUTION

"Defective on arrival" problems

If there are signs of damage, please do not attempt to install the module. Inspection by Agilent is required to evaluate if the instrument is in good condition or damaged.

- ✓ **Notify your Agilent sales and service office about the damage.**
- ✓ **An Agilent service representative will inspect the instrument at your site and initiate appropriate actions.**

Delivery Checklist

Ensure that all parts and materials have been delivered with your module. The delivery checklist is shown below. For parts identification, please check the illustrated parts breakdown in “Sample Thermostat” on page 339. Please report any missing or damaged parts to your local Agilent Technologies sales and service office.

Table 33 Delivery checklist for the Sample Thermostat

Description	Quantity
Sample Thermostat (G7167-60201)	1
Condensate Drainage Kit (5067-6208)	1
Declaration of Conformity	1
Customer Letter	1

NOTE

The Agilent Infinity II Sample Cooler is not available for trade sales anymore and has been replaced by the Agilent InfinityLab Sample Thermostat.

Install the Sample Cooler/Sample Thermostat

Tools required	p/n	Description
	8710-0899 A	Screwdriver Pozidrive Shaft (for the Sample Cooler)
	5182-3466 A	Torx screwdriver T10 (for the Sample Thermostat)
OR	5023-3089 A	Torx key set

Parts required	#	p/n	Description
	1	G7167-60005 A	Sample Cooler
OR	1	G7167-60101 A	Sample Thermostat
OR	1	G7167-60201 A	Sample Thermostat
	1		Power cord
	1	5067-6208 A	Condensate Drainage Kit

Preparations

- The hosting sampler is installed in the HPLC stack.
- If needed, update the firmware of the hosting sampler to ensure that it supports the type of thermostat you are about to install, see "Specifications of the Sample Thermostat" on page 42.

WARNING

Flammable refrigerant

Formation of flammable gas-air mixtures inside the Sample Thermostat and laboratory.

✓ Keep open fire or sources of ignition away from the device.

✓ Ensure a room size of 4 m^3 (1 m^3 for every 8 g of R600a refrigerant inside of the Sample Thermostat).

✓ Ensure adequate ventilation: typical air exchange of 25 m^3/h per m^2 of laboratory floor area.

✓ Keep all ventilation openings in the enclosure clear of obstructions. Do not block the openings on the circumference of the Sample Thermostat.

WARNING

Flammable refrigerant used

✓ When handling, installing and operating the Sample Thermostat, care should be taken to avoid damage to the refrigerant tubing or any part of the Sample Thermostat.

CAUTION

Condensate inside the Sample Cooler/Sample Thermostat

Damage to the electronics of the module

- ✓ After installation of the Sample Cooler/Sample Thermostat, wait at least 30 min before switching on the module.
- ✓ Make sure there is no condensate inside the module.

WARNING

In the event of a damage

- ✓ Keep open fire or sources of ignition away from the device.
- ✓ Ventilate the room for several minutes.
- ✓ Do not use the Sample Thermostat any more.

NOTE

If the sample cooler or thermostat is disconnected from the power supply, you should wait for at least five minutes before replugging and switching on the compressor again.

NOTE

Even under average humidity conditions, a significant amount of condensed water gathers every day. A suitable container must be provided and emptied regularly in order to avoid overflow.

NOTE

For best cooling performance of the thermostat, the 2H drawer must be installed in the lowest position. Use the dummy drawers (G4267-60024) if no full hotel configuration is needed.

NOTE

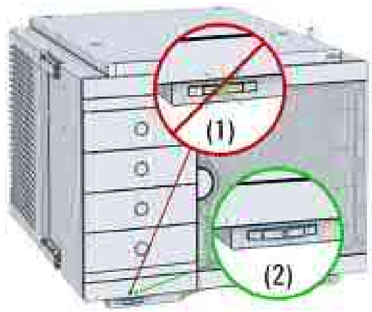
For the Sample Cooler installation in a sampler, the serial number of the Sample Cooler must be DEBAT02001 or higher.

NOTE

Depending on the ambient conditions in the lab, the amount of condensate can vary from 200 mL to 2 L per day. Do not fill waste containers for the condensate to the top. Regularly empty the waste container.

NOTE

The setup with the condensate collector funnel is suitable for bench installations only. For installations on an InfinityLab Laboratory Instrument Bench, use the alternative installation described in the *Installation of the Infinity II Cooler/Thermostat Condensate Drainage Tubing Kit Technical Note*. Enter the link https://www.agilent.com/search/?Ntt=Installation-of-the-Infinity-II-Cooler/Thermostat-Condensate-Drainage-Tubing-Kit-Technical-Note to locate the TechNote on https://www.agilent.com/.

1 Ensure that the power switch on the front of the module is OFF (switch stands out). 	2 Disconnect the power cable from the sampler. 
3 Loosen the four screws on the rear of the module. 	4 Remove the sheet metal back cover of the sampler. 

5 Slide the Sample Cooler/Sample Thermostat halfway into the sampler.

WARNING

Module is partially energized when switched off, as long as the power cord is plugged in.
Repair work at the module can lead to personal injuries, e.g. shock hazard, when the cover is opened and the module is connected to power.

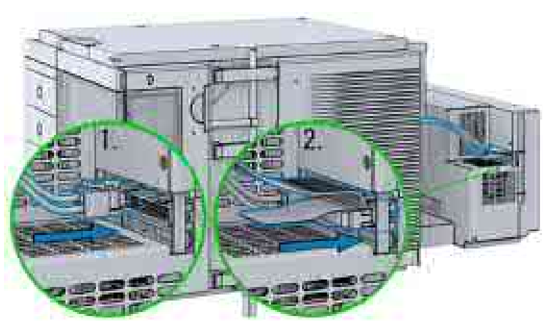
- ✓ Make sure that it is always possible to access the power plug.
- ✓ Do not use the Sample Cooler/Sample Thermostat if it is not operating correctly or has been damaged. Disconnect it from the power supply and call your local service center.
- ✓ Remove the power cable from the module before opening the cover.
- ✓ Do not connect the power cable to the module while the covers are removed.
- ✓ If the Sample Cooler/Sample Thermostat is disconnected from the power supply, you should wait for at least five minutes before switching on the compressor.

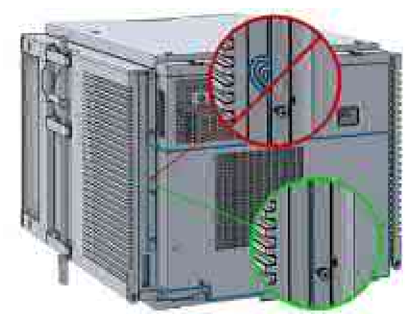
CAUTION

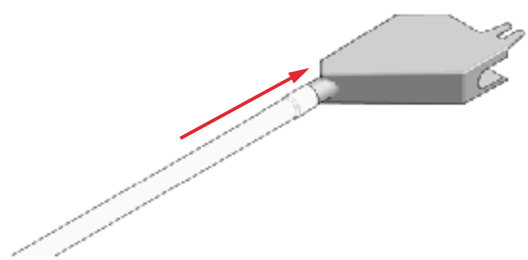
Damaged electronics

- ✓ To avoid damages of the electronics of the module make sure the power cords are unplugged before disconnecting or reconnecting the sampler to the Sample Cooler/Sample Thermostat cables.

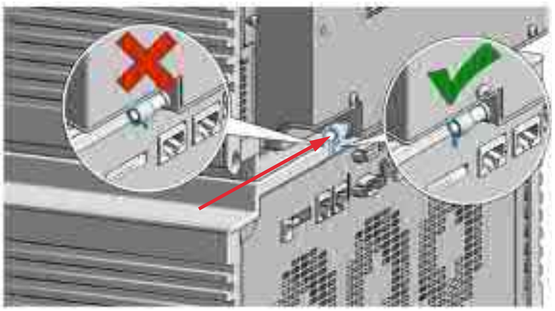
6 Connect the power cable and the data cable to the cooler/thermostat.



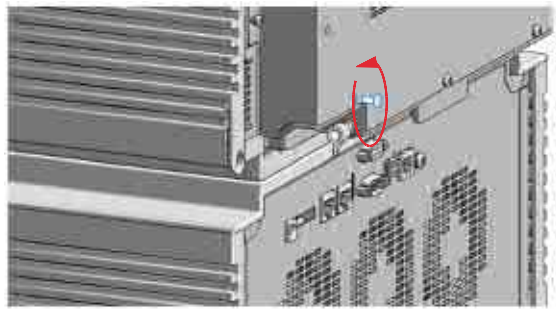
<table>
<tr>
<td>
CAUTION
Damage to the cables
✓ Do not bend or pinch the cables.
✓ Make sure that the Sample Cooler/Sample Thermostat fits perfectly in the sampler.
7 Slide the Sample Cooler/Sample Thermostat all the way into the sampler.

</td>
<td>
8 Fix the Sample Cooler/Sample Thermostat with the four screws.

</td>
</tr>
<tr>
<td>
9 Use a bubble level to check the leveling of the sampler.
NOTE
To ensure adequate drainage for condensate, the module should be operated in a proper horizontal position.
</td>
<td>
10 Attach the condensate tube to the outlet port of the condensate collector funnel.

</td>
</tr>
</table>

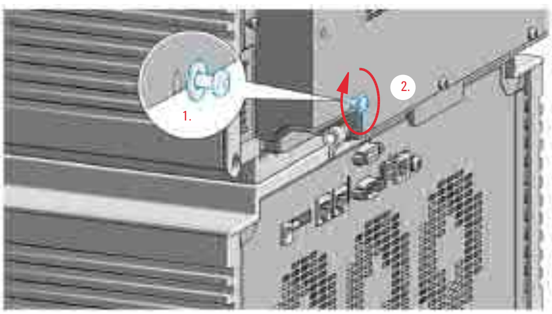
11 Mount the drain connector on the condensate drainage outlet tube. Ensure the correct orientation of the spout.



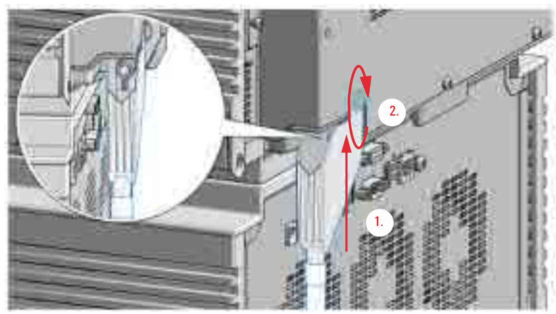
12 Remove the screw situated above the condensate drainage outlet tube.



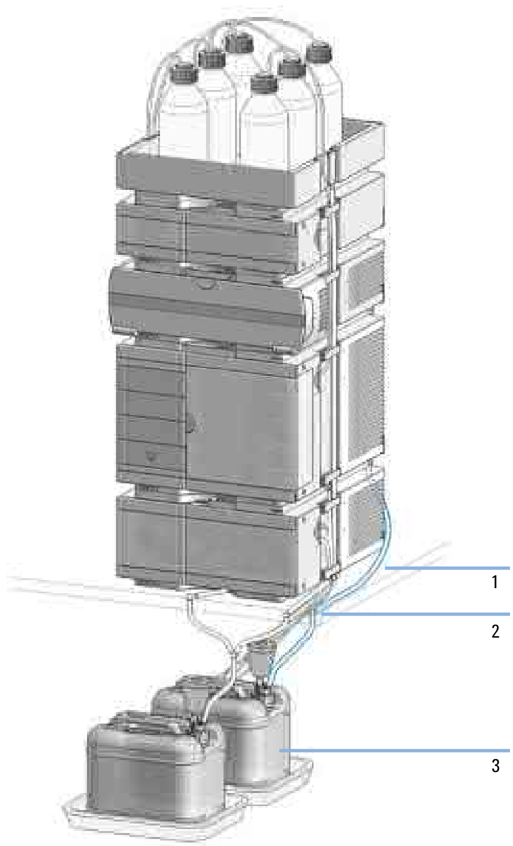
13 Place the washer over the thread of the screw (1). Screw the screw and washer halfway into the hole in the back of the cooler/thermostat (2).



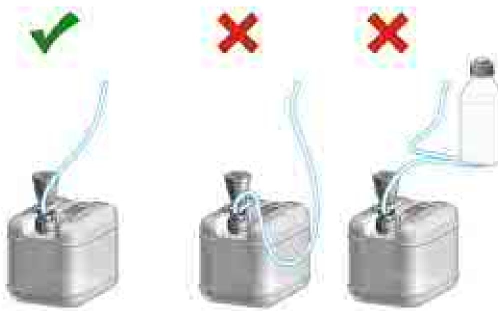
14 Position the condensate collector funnel underneath the condensate drainage outlet tube (1) and fix it to the back of the cooler/thermostat by tightening the screw (2). Ensure correct orientation and avoid overtightening the screw.



15 Shorten the condensate tube so that it runs straight into the waste container without any unnecessary detour (1). If needed, use the 90 ° tubing connector provided in the kit to eliminate uphill sections, which might occur at the edge of the bench (2). Agilent recommends the use of a separate canister for condensate collection to avoid drainage problems (3).



16 Ensure that the tubing runs straight into the waste canister without any bends or joints and it is not hindered by any mechanical obstacle. Agilent recommends using a 6 L waste canister equipped with a suitable InfinityLab Stay Safe cap for optimal condensate handling. If you decide to use your own waste solution, make sure that the tubes don't immerse in the liquid.



NOTE

For more information, see "Leak and Waste Handling" on page 46.

NOTE

Depending on the ambient conditions in the lab, the amount of condensate can vary from 200 mL to 2 L per day. Do not fill the waste container for the condensate to the top. Regularly empty the waste container.

CAUTION

Damage to the Sample Cooler/Sample Thermostat

- ✓ Wait at least 30 min before switching on the compressor of the cooler/thermostat.
- ✓ This allows the refrigerant and system lubrication to reach equilibrium.

17 Connect the power cable to the power connector at the rear of the module.

Next Steps:

18 Configure the Sample Cooler/Sample Thermostat in the CDS.

NOTE

Graphics shown are exemplarily and may look different depending on the module in use.

Using the Optional Sample Cooler/Sample Thermostat

The following section describes how to operate the Agilent Infinity II Sample Cooler and the Agilent InfinityLab Sample Thermostat using the Online Sample Manager as an example for the hosting sampler.

Dashboard

The status indicator of the Sample Cooler/Sample Thermostat is incorporated in the graphical user interface (GUI) of the hosting sampler, which appears automatically when the unit is configured in the chromatography data system (CDS). When the cooler/thermostat is turned on, the set temperature and the actual temperature are also displayed.

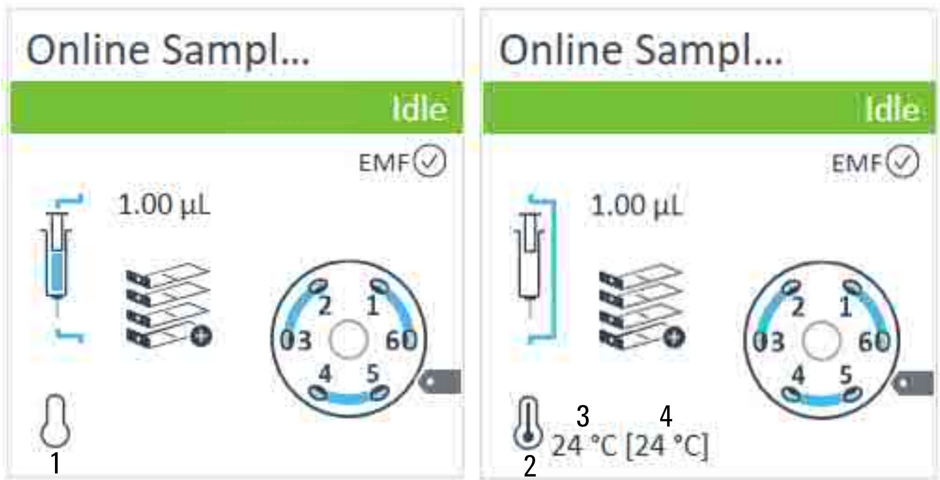


Figure 40 Online Sample Manager user interface

1	Cooler/Thermostat: Status indicator (Off)
2	Cooler/Thermostat: Status indicator (On)
3	Cooler/Thermostat: Actual temperature
4	Cooler/Thermostat: Set temperature

NOTE

The actual temperature may deviate from the set temperature by up to 3 °C, depending on the temperature setting and ambient conditions.

NOTE

If the actual temperature differs by more than ± 2 °C from the set temperature, a yellow highlight is visible around the temperature reading. This, however, will not prevent the system from starting a new analysis, unless the **Enable Analysis >Temperature within +/- 2 °C function** is selected.

Control Interface

Right-clicking the sampler GUI will prompt the control interface, where control and method parameters can be edited, configuration modified, and special commands executed.

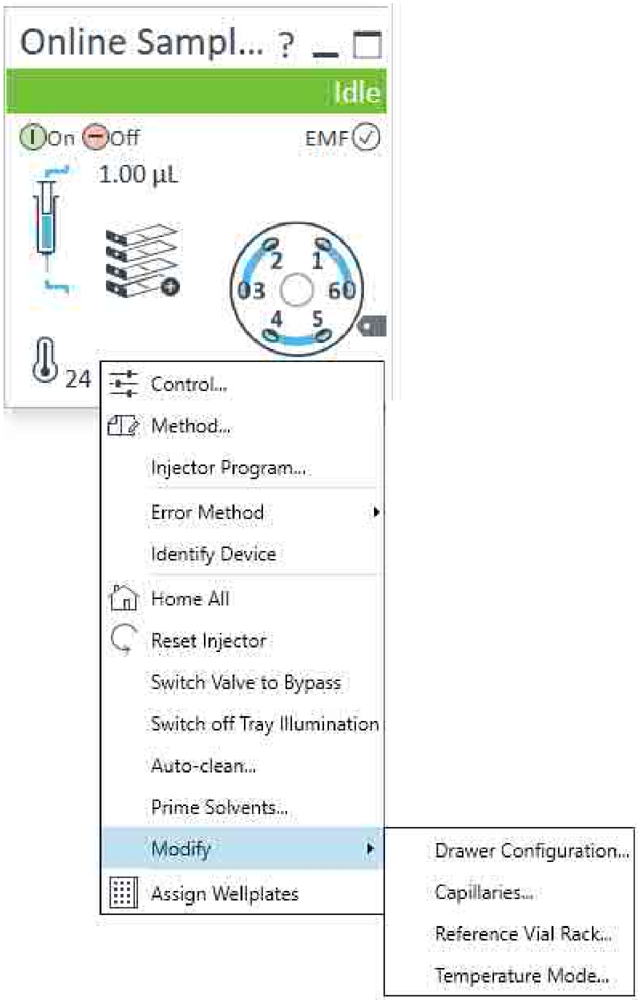


Figure 41 Online Sample Manager control interface

Control

With the Sample Cooler/Sample Thermostat installed, the **Control** dialog box of the hosting Infinity II sampler will include the following cooler/thermostat-specific control options:

- **At Power On**:
  - **Turn On Thermostat**: The cooler/thermostat turns on automatically upon powering on the sampler.
- **Thermostat**:
  - **On**: The cooler/thermostat turns on and the system starts to regulate the temperature inside the sample space towards the setpoint.

NOTE For the Sample Cooler, the set temperature must be at least 5 °C below ambient for proper temperature control.

  - **Off**: The cooler/thermostat turns off.
- **Pump connected to Sampler**

NOTE For the Online Sample Manager, the selection of the pump is mandatory.

- **Enable Analysis**

NOTE The **Enable Analysis** control setting is available since LC & CE drivers A.02.19.

  - **With any temperature**: The analysis starts regardless of the actual temperature inside the sampler.
  - **Temperature within +/- 2 °C**: The analysis starts only when the actual temperature is within the ± 2 °C range of the setpoint temperature.

NOTE The **Temperature within +/- 2 °C** option is only available for the Sample Thermostat.

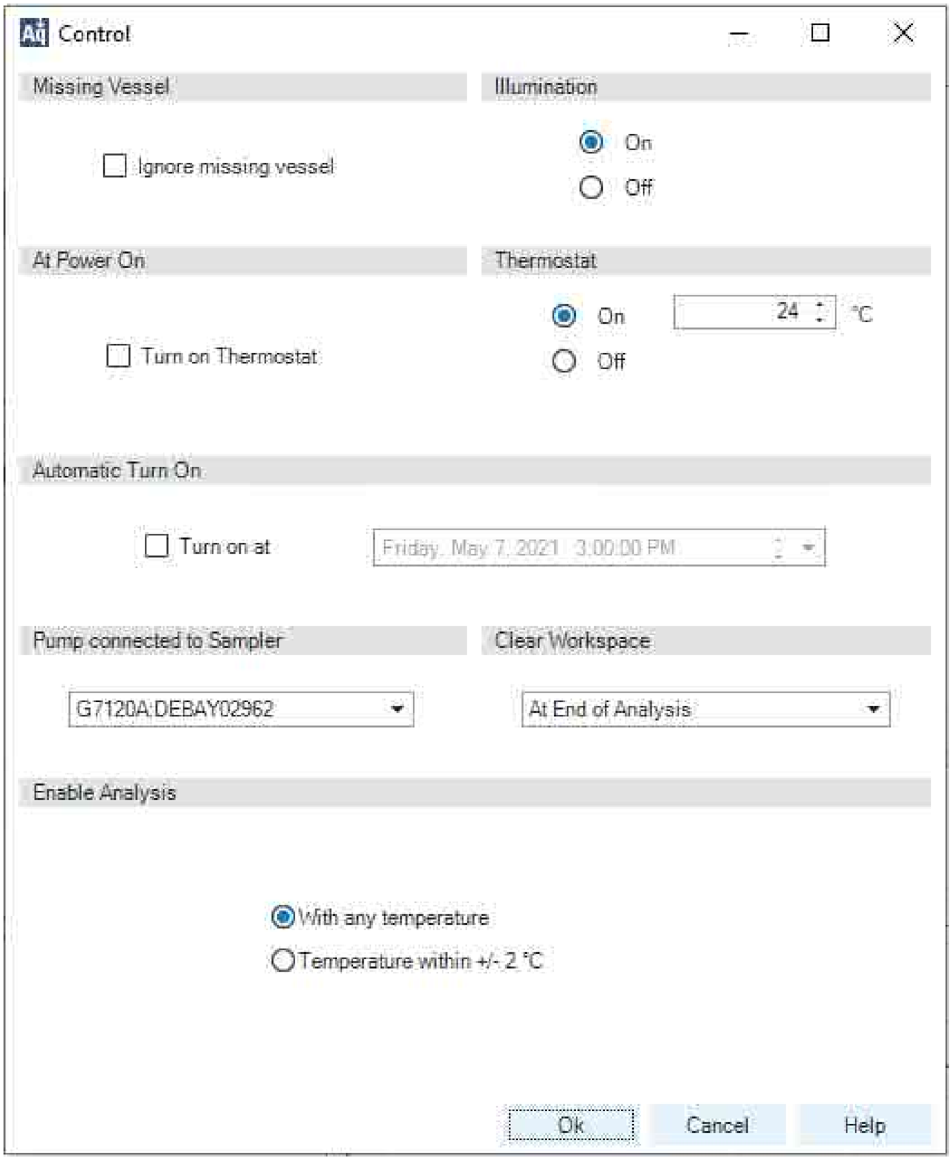


Figure 42 Control interface

Temperature Mode

Selecting **Modify >Temperature Mode** in the **Control Interface** will prompt a dialog box, where the temperature control mode can be switched between being a method parameter or a system (control) setting:

- **Constant Temperature Mode**: The temperature control mode is defined as a system (control) setting, meaning that the temperature setting is independent of the method parameters. The temperature stays constant for all methods within a given sequence. This control mode is the default option and recommended for most applications.
- **Variable Temperature Mode**: The temperature control mode is defined as a method parameter, meaning that the temperature setting is part of the method parameters. The temperature can change from method to method within a given sequence. This control mode is not recommended for most analytical workflows but might be used for some special applications, such as degradation studies.

NOTE

For modifying the temperature mode, LC & CE drivers A.02.12 or higher are required. If the system is run on an earlier driver version, the temperature mode is defined as a system setting.

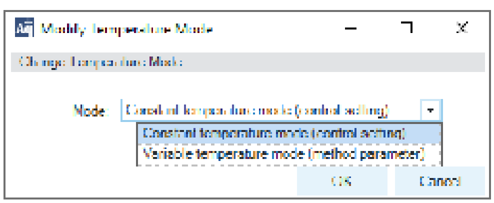


Figure 43 Modify Temperature Mode dialog box

Before using the **Variable Temperature Mode** setting, here are some hints and tips to consider:

- Changing the temperature setting from one method to another will affect all samples inside the sampler.
- Depending on the extent of the temperature change, it could take up to a couple of hours until the sample temperature stabilizes at the new setpoint (for example, from 4 to 40 °C or vice versa).
- It might be beneficial to use the **Temperature within +/- 2 °C** function; otherwise, the next run will start without waiting for the new setpoint being reached.

Online Signal Monitor

In the **Online Signals** tab of the CDS, the actual temperature of the sample space can be configured and plotted together with the other instrument actuals. This enables the user to have a better overview of how the temperature changes over time.

Figure 44 Online Signals tab

Reporting Sample Temperature

The actual and setpoint temperature can be included in the analysis report. For this, the Samples > Advanced Run Information field must be included in the report template.

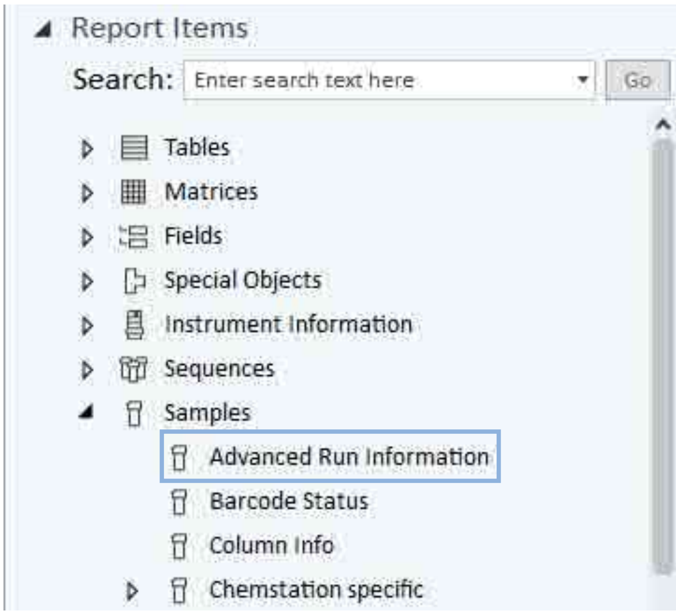


Figure 45 Finding the Advanced Run Information setting in OpenLab CDS 2.x

Method Events

Module	Name	Value
Sampler	Run start - Temperature	5 °C
Sampler	Run start - Temperature setpoint	4 °C
Sampler	Run stop - Temperature	5 °C
Sampler	Run stop - Temperature setpoint	4 °C

Figure 46 Reporting actual and setpoint temperature using the Advanced Run Information setting.

Operation Information

Reaching Setpoint Temperature

Depending on the ambient conditions and the sampler configuration (for example, hotel configuration for the Online Sample Manager), reaching the setpoint temperature can take from 30 min up to a couple of hours.

NOTE

Reaching the 4 °C setpoint from an ambient temperature of 22 °C takes about 45 min for the Online Sample Manager (G3167A/B), as well as for the Vialsampler (G7129A/B/C or G7157A), and the Multisampler (G7167A/B, G7137A, G5668A, or G4767A) with a single 2H drawer installed.

NOTE

This relatively slow ramping down of the temperature is necessary to avoid ice formation.

NOTE

For the best performance of the Sample Cooler/Sample Thermostat, all drawers must be installed in the sampler. For the Online Sample Manager, use dummy drawers if no full hotel configuration is needed.

Condensate Formation

Operating the cooler/thermostat at temperatures below ambient results in condensate formation. This condensed water is collected in the base plate of the cooler/thermostat and drained through the drainpipe at the back of the unit. The container for condensate collection should be regularly emptied to ensure the proper functioning of the system.

NOTE

If the container is overfilled or the condensate tubing is blocked, the condensate sensor is triggered, rendering the HPLC system to enter the error state (see “Sample temperature control switched off due to condensate” on page 387).

NOTE

Depending on the ambient conditions in the lab, the amount of condensate can vary from 200 mL to 2 L per day. Waste containers for the condensate should not be filled to the top. The waste container must be emptied regularly.

Dew Formation

Setting the cooler/thermostat from a lower to a higher temperature setpoint, or just simply turning it off, can result in dew formation on the internal surfaces of the sampler. This is normal and should cease after a couple of hours at the most.

Frequent Door/Drawer Opening

Opening the door(s) and/or the sample drawers frequently can compromise the temperature stability, as fresh warm and humid air will enter each time. In a highly humid environment, this could also lead to the formation of significant amounts of condensate on the internal surfaces of the sampler.

Ice Formation

The Sample Cooler/Sample Thermostat was designed to operate without the risk of icing. In an unlikely event of ice formation, turn off the cooler/thermostat and wait until it defrosts.

NOTE

Do not use mechanical devices or other means to accelerate the defrosting process.

Shutting Down

When the Sample Cooler/Sample Thermostat needs to be turned off for the night or a longer period, the following best practices are recommended:

- Remove all sample containers and/or vials from the sampler.
- Let the system reach the ambient temperature. Opening the door(s) of the sampler facilitates this process.
- Remove any condensate that might appear on the sample drawers or the internal surfaces of the sampler.
- Make sure that all condensate is removed from the cooler/thermostat.

NOTE

Gently tapping on the sides of the sampler facilitates the condensate removal. Tilting the module towards its right back corner is not recommended as it can damage the internal parts.

Transporting the Online Sample Manager

NOTE

There are magnets in the front area of the multisampler, see "Magnets" on page 184.

NOTE

When moving the sampler around the laboratory, make sure that any condensed water inside the thermostat is removed.

- Remove the drainage and place a beaker underneath the drain outlet of the Sample Cooler/Sample Thermostat. Then carefully tilt the module to the back so that the water inside the thermostat can safely flow into the leak funnel. If condensate removal is done improperly, you can harm the electronic of the module.
- Otherwise no special precautions are needed for the modules.

WARNING

Heavy weight

The module is heavy.

✓ Carry the module at least with 2 people.

✓ Avoid back strain or injury by following all precautions for lifting heavy objects.

✓ Ensure that the load is as close to your body as possible.

✓ Ensure that you can cope with the weight of your load.

WARNING

Flammable refrigerant

Formation of flammable gas-air mixtures inside the Sample Thermostat and laboratory.

- ✓ Keep open fire or sources of ignition away from the device.
- ✓ Ensure a room size of 4 m^3 (1 m^3 for every 8 g of R600a refrigerant inside of the Sample Thermostat).
- ✓ Ensure adequate ventilation: typical air exchange of 25 m^3/h per m^2 of laboratory floor area.
- ✓ Keep all ventilation openings in the enclosure clear of obstructions. Do not block the openings on the circumference of the Sample Thermostat.

NOTE

Transporting the sampler with a Sample Cooler/Sample Thermostat installed is only allowed for short distances. For longer distances, you must separate the units and send them independently.

CAUTION

Unsecured transportation

Mechanical damage

- ✓ Secure the transport assembly before transporting the sampler.

If the sampler with a Sample Cooler/Sample Thermostat needs to be shipped to another location via carrier, ensure:

- The two modules are shipped in separate boxes.
- The Sample handler of the sampler is parked, see **Park Robot** in Agilent Lab Advisor online help for more information.
- The sample containers (vial trays) are removed from the sample hotel.
- Install the transport protection.
- The condensed water inside of the Sample Cooler/Sample Thermostat is removed.

Solvent Information

Observe the following recommendations on the use of solvents.

- Follow the recommendations for avoiding the growth of algae, see the pump manuals.
- Small particles can permanently block capillaries and valves. Therefore, always filter solvents through 0.22 µm filters.
- Avoid or minimize the use of solvents that may corrode parts in the flow path. Consider specifications for the pH range given for different materials such as flow cells, valve materials etc. and recommendations in subsequent sections.

Recommended Wash Solvents

- water
- ethanol
- methanol
- water/acid (especially for basic compounds)
- water/base (especially for acidic compounds)
- water/acetonitrile

NOTE

For different wash solvents as mentioned above, verify that the wash solvent is suitable for the silicone wash tubing.

Material Information

Materials in the flow path are carefully selected based on Agilent's experiences in developing highest-quality instruments for HPLC analysis over several decades. These materials exhibit excellent robustness under typical HPLC conditions. For any special condition, please consult the material information section or contact Agilent.

Disclaimer

Subsequent data was collected from external resources and is meant as a reference. Agilent cannot guarantee the correctness and completeness of such information. Data is based on compatibility libraries, which are not specific for estimating the long-term life time under specific but highly variable conditions of UHPLC systems, solvents, solvent mixtures, and samples. Information also cannot be generalized due to catalytic effects of impurities like metal ions, complexing agents, oxygen etc. Apart from pure chemical corrosion, other effects like electro corrosion, electrostatic charging (especially for nonconductive organic solvents), swelling of polymer parts etc. need to be considered. Most data available refers to room temperature (typically 20 – 25 °C, 68 – 77 °F). If corrosion is possible, it usually accelerates at higher temperatures. If in doubt, please consult technical literature on chemical compatibility of materials.

MP35N

MP35N is a nonmagnetic, nickel-cobalt-chromium-molybdenum alloy demonstrating excellent corrosion resistance (for example, against nitric and sulfuric acids, sodium hydroxide, and seawater) over a wide range of concentrations and temperatures. In addition, this alloy shows exceptional resistance to high-temperature oxidation. Due to excellent chemical resistance and toughness, the alloy is used in diverse applications: dental products, medical devices, nonmagnetic electrical components, chemical and food processing equipment, marine equipment. Treatment of MP35N alloy samples with 10 % NaCl in HCl (pH 2.0) does not reveal any detectable corrosion. MP35N also demonstrates excellent corrosion resistance in a humid environment. Although the influence of a broad variety of solvents and conditions has been tested, users should keep in mind that multiple factors can affect corrosion rates, such as temperature, concentration, pH, impurities, stress, surface finish, and dissimilar metal contacts.

Polyphenylene Sulfide (PPS)

Polyphenylene sulfide has outstanding stability even at elevated temperatures. It is resistant to dilute solutions of most inorganic acids, but it can be attacked by some organic compounds and oxidizing reagents. Nonoxidizing inorganic acids, such as sulfuric acid and phosphoric acid, have little effect on polyphenylene sulfide, but at high concentrations and temperatures, they can still cause material damage. Nonoxidizing organic chemicals generally have little effect on polyphenylene sulfide stability, but amines, aromatic compounds, and halogenated compounds may cause some swelling and softening over extended periods of time at elevated temperatures. Strong oxidizing acids, such as nitric acid (> 0.1 %), hydrogen halides (> 0.1 %), peroxy acids (> 1 %), or chlorosulfuric acid degrade polyphenylene sulfide. It is not recommended to use polyphenylene sulfide with oxidizing material, such as sodium hypochlorite and hydrogen peroxide. However, under mild environmental conditions, at low concentrations and for short exposure times, polyphenylene sulfide can withstand these chemicals, for example, as ingredients of common disinfectant solutions.

PEEK

PEEK (Polyether-Ether Ketones) combines excellent properties regarding biocompatibility, chemical resistance, mechanical and thermal stability. PEEK is therefore the material of choice for UHPLC and biochemical instrumentation.

It is stable in the specified pH range (for the Bio-Inert LC system: pH 1 – 13, see bio-inert module manuals for details), and inert to many common solvents.

There are still some known incompatibilities with chemicals such as chloroform, methylene chloride, THF, DMSO, strong acids (nitric acid > 10 %, sulfuric acid > 10 %, sulfonic acids, trichloroacetic acid), halogens or aqueous halogen solutions, phenol and derivatives (cresols, salicylic acid, and so on).

When used above room temperature, PEEK is sensitive to bases and various organic solvents, which can cause it to swell. Under such conditions, normal PEEK capillaries are sensitive to high pressure. Therefore, Agilent uses stainless steel clad PEEK capillaries in bio-inert systems. The use of stainless steel clad PEEK capillaries keeps the flow path free of steel and ensures pressure stability up to 600 bar. If in doubt, consult the available literature about the chemical compatibility of PEEK.

Polyimide

Agilent uses semi-crystalline polyimide for rotor seals in valves and needle seats in autosamplers. One supplier of polyimide is DuPont, which brands polyimide as Vespel, which is also used by Agilent.

Polyimide is stable in a pH range between 1 and 10 and in most organic solvents. It is incompatible with concentrated mineral acids (e.g. sulphuric acid), glacial acetic acid, DMSO and THF. It is also degraded by nucleophilic substances like ammonia (e.g. ammonium salts in basic conditions) or acetates.

Polyethylene (PE)

Agilent uses UHMW (ultra-high molecular weight)-PE/PTFE blends for yellow piston and wash seals, which are used in 1290 Infinity pumps, 1290 Infinity II pumps, the G7104C and for normal phase applications in 1260 Infinity pumps.

Polyethylene has a good stability for most common inorganic solvents including acids and bases in a pH range of 1 to 12.5. It is compatible with many organic solvents used in chromatographic systems like methanol, acetonitrile and isopropanol. It has limited stability with aliphatic, aromatic and halogenated hydrocarbons, THF, phenol and derivatives, concentrated acids and bases. For normal phase applications, the maximum pressure should be limited to 200 bar.

Tantalum (Ta)

Tantalum is inert to most common HPLC solvents and almost all acids except fluoric acid and acids with free sulfur trioxide. It can be corroded by strong bases (e.g. hydroxide solutions > 10 %, diethylamine). It is not recommended for the use with fluoric acid and fluorides.

Stainless Steel (SST)

Stainless steel is inert against many common solvents. It is stable in the presence of acids and bases in a pH range of 1 to 12.5. It can be corroded by acids below pH 2.3. It can also corrode in following solvents:

- Solutions of alkali halides, their respective acids (for example, lithium iodide, potassium chloride) and aqueous solutions of halogens.
- High concentrations of inorganic acids like nitric acid, sulfuric acid, and organic solvents especially at higher temperatures (replace, if your chromatography method allows, by phosphoric acid or phosphate buffer, which are less corrosive against stainless steel).
- Halogenated solvents or mixtures, which form radicals and/or acids, for example:

  $2\ CHCl_3 + O_2 \rightarrow 2\ COCl_2 + 2\ HCl$

  This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol.
- Chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, diisopropyl ether). Such ethers should be filtered through dry aluminum oxide, which adsorbs the peroxides.
- Solutions of organic acids (acetic acid, formic acid, and so on) in organic solvents. For example, a 1 % solution of acetic acid in methanol will attack steel.
- Solutions containing strong complexing agents (for example, EDTA, ethylenediaminetetraacetic acid).
- Mixtures of carbon tetrachloride with isopropanol or THF.

Titanium (Ti)

Titanium is highly resistant to oxidizing acids (for example, nitric, perchloric and hypochlorous acid) over a wide range of concentrations and temperatures. This is due to a thin oxide layer on the surface, which is stabilized by oxidizing compounds. Non-oxidizing acids (for example, hydrochloric, sulfuric and phosphoric acid) can cause slight corrosion, which increases with acid concentration and temperature. For example, the corrosion rate with 3 % HCl (about pH 0.1) at room temperature is about 13 µm/year. At room temperature, titanium is resistant to concentrations of about 5 % sulfuric acid (about pH 0.3). Addition of nitric acid to hydrochloric or sulfuric acids significantly reduces corrosion rates. Titanium is sensitive to acidic metal chlorides like $FeCl_3$ or $CuCl_2$. Titanium is subject to corrosion in anhydrous methanol, which can be avoided by adding a small amount of water (about 3 %). Slight corrosion is possible with ammonia > 10 %.

Diamond-Like Carbon (DLC)

Diamond-Like Carbon is inert to almost all common acids, bases, and solvents. There are no documented incompatibilities for HPLC applications.

Fused silica and Quartz (SiO_2)

Fused silica is used in Max Light Cartridges. Quartz is used for classical flow cell windows. It is inert against all common solvents and acids except hydrofluoric acid and acidic solvents containing fluorides. It is corroded by strong bases and should not be used above pH 12 at room temperature. The corrosion of flow cell windows can negatively affect measurement results. For a pH greater than 12, the use of flow cells with sapphire windows is recommended.

Gold

Gold is inert to all common HPLC solvents, acids, and bases within the specified pH range. It can be corroded by complexing cyanides and concentrated acids like aqua regia.

Zirconium Oxide (ZrO_2)

Zirconium Oxide is inert to almost all common acids, bases, and solvents. There are no documented incompatibilities for HPLC applications.

Platinum/Iridium

Platinum/Iridium is inert to almost all common acids, bases, and solvents. There are no documented incompatibilities for HPLC applications.

Fluorinated polymers (PTFE, PFA, FEP, FFKM, PVDF)

Fluorinated polymers like PTFE (polytetrafluorethylene), PFA (perfluoroalkoxy), and FEP (fluorinated ethylene propylene) are inert to almost all common acids, bases, and solvents. FFKM is perfluorinated rubber, which is also resistant to most chemicals. As an elastomer, it may swell in some organic solvents like halogenated hydrocarbons.

TFE/PDD copolymer tubings, which are used in all Agilent degassers except G1322A/G7122A, are not compatible with fluorinated solvents like Freon, Fluorinert, or Vertrel. They have limited life time in the presence of hexafluoroisopropanol (HFIP). To ensure the longest possible life with HFIP, it is best to dedicate a particular chamber to this solvent, not to switch solvents, and not to let dry out the chamber. For optimizing the life of the pressure sensor, do not leave HFIP in the chamber when the unit is off.

The tubing of the leak sensor is made of PVDF (polyvinylidene fluoride), which is incompatible with the solvent DMF (dimethylformamide).

Sapphire, Ruby, and Al_2O_3-based ceramics

Sapphire, ruby, and ceramics based on aluminum oxide Al_2O_3 are inert to almost all common acids, bases, and solvents. There are no documented incompatibilities for HPLC applications.

Reset the Online Sample Manager in Case of an Error

When

In some cases the sampler has to be reset by the user in order for the system to resume working in normal operation mode.

WARNING

Risk of injury by uncovered needle

An uncovered needle is a risk of harm to the operator.

✓ Open the safety lock of the needle assembly *only* on the sample handler and for this particular procedure.

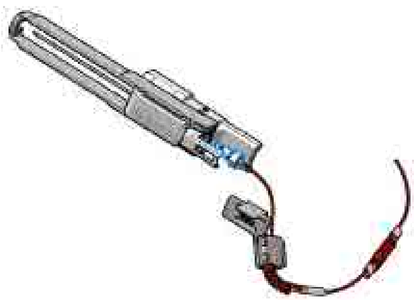
✓ Be careful working at the z-robot.

✓ Wear safety gloves when removing the needle assembly.

1 Check the condition of the needle assembly and the sample loop. Replace them if necessary, see “Exchange the Needle Assembly” on page 247 and “Remove the Sample Loop-Flex” on page 294.

NOTE

Take care that the needle is installed properly. The plastic adapter must be installed correctly and the sample loop should not be kinked.



WARNING

Risk of injury by uncovered needle

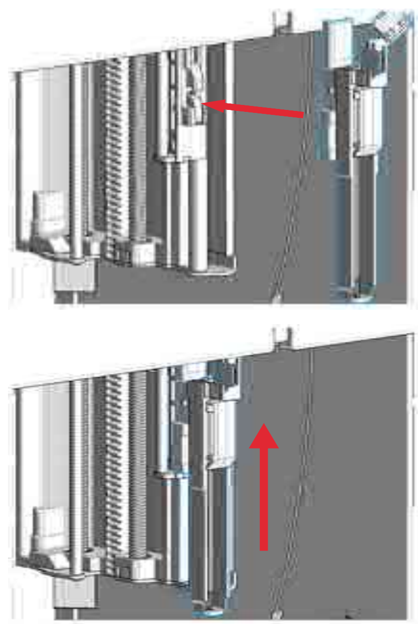
An uncovered needle is a risk of harm to the operator.

- ✓ Open the safety lock of the needle assembly *only* on the sample handler and for this particular procedure.
- ✓ Be careful working at the z-robot.
- ✓ Wear safety gloves when removing the needle assembly.

2 Unlock the needle.

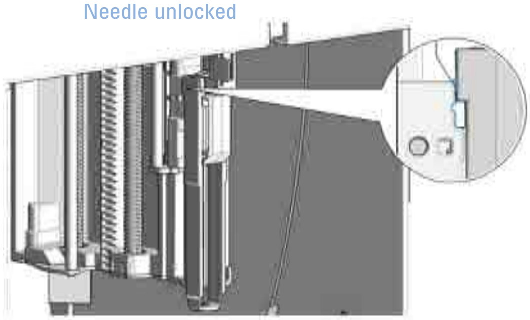
NOTE

This procedure is completely different than the standard PM replacement of the needle assembly in Lab Advisor. The safety lock of the needle assembly has to be released by carefully sliding the pusher upwards.

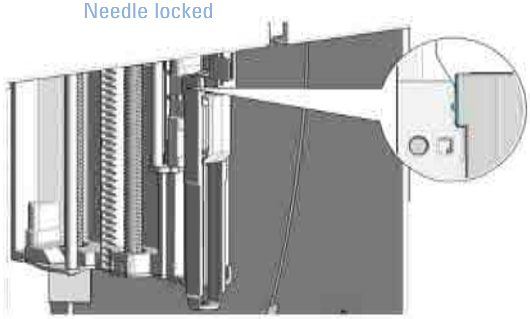


3 Verify that the needle assembly is unlocked after installation.

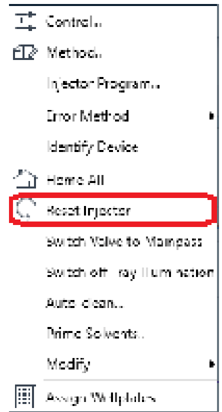
Needle unlocked



Needle locked



4 Reset the sampler (using the instrument control) or turn the instrument Off/On again to start the initialization.



Next Steps:

5 Close the front door.

6 Wait until the initialization of the sampler is completed.

7 If the error persists, contact your local service representive.

6 Optimizing Performance

This chapter gives hints on how to optimize the performance.

Delay Volume and Extracolumn Volume

The *delay volume* is defined as the system volume between the point of mixing in the pump and the front of the column.

The *extracolumn volume* is defined as the volume between the injection point and the detection point, excluding the volume in the column.

Delay Volume

In gradient separations, this volume causes a delay between the mixture changing in the pump and that change reaching the column. The delay depends on the flow rate and the delay volume of the system. In effect, this means that in every HPLC system there is an additional isocratic segment in the gradient profile at the start of every run. Usually the gradient profile is reported in terms of the mixture settings at the pump and the delay volume is not quoted even though this will have an effect on the chromatography. This effect becomes more significant at low flow rates and small column volumes and can have a large impact on the transferability of gradient methods. It is important, therefore, for fast gradient separations to have small delay volumes, especially with narrow bore columns (e.g., 2.1 mm i.d.) as often used with mass spectrometric detection.

How to Optimize Delay Volume

The Online Sample Manager is a type of sampler that can be operated in two injection modes: Flowthrough and Feed Injection.

In flowthrough mode, the Online Sample Manager has a delay volume of approximately 380 µL. This delay volume is due to the main pass flow path. The mobile phase flows through two Transfer Capillaries connecting the Injection Valve and External Sampling Valve, the Metering Device, Sample Loop, and Needle, before being injected onto the column. The Injection Valve switches from main pass to bypass position, so that the Metering Device can draw the sample into the Needle Capillary and Sample Loop. To inject this sample in flowthrough mode, the injection valve switches back to main pass and the sample is flushed onto the column. The injection valve is kept in this position during analysis, so that the sampler is continually flushed and hence the gradient has to flow through this delay volume to reach the column. This can be eliminated by switching the injection valve from mainpass (main path) to bypass after the injection has been made and the injected sample has been flushed onto the column. In practice, this can be done a few seconds after injection by selecting the *Automatic Delay Volume Reduction* (ADVR) function in the autosampler setup menu. The Flush-out Factor (typically five times injection volume) ensures that enough time is allowed to flush the sample out of the injector before switching to bypass.

The delay volume can be completely eliminated using the Feed Injection mode. During Feed Injection, the mobile phase remains in bypass and the sample is directly mixed into the mobile phase in the injection valve.

When using ADVR, it should be noted that the gradient has already started at the pump at the instant of injection. The question should be asked whether the gradient has already reached the autosampler, in which case a small step in the gradient results. This happens when the delay volume is less than the flush-out volume and is not necessarily a problem but may be a factor to be considered in a method transfer. Smaller injection volumes have no effect, but for larger injection volumes this introduces a small step in the gradient. The flow rate in use also has an impact on the decision to use ADVR or not. At a 0.2 mL/min the delay time saved is 21 s, while at 1.0 mL/min it is 4 s.

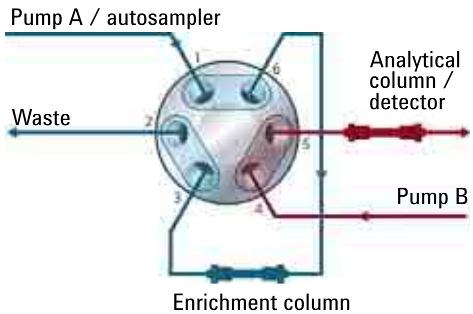
The ADVR function is unlikely to be suitable for applications involving compounds that are known to cause carryover problems. The best way to reduce the delay volume is to inject the sample in Feed Injection mode. To get the best results, it is also recommended to order the Low Dispersion Heat Exchanger and the micro flow cell for UV.

How to Achieve Higher Injection Volumes

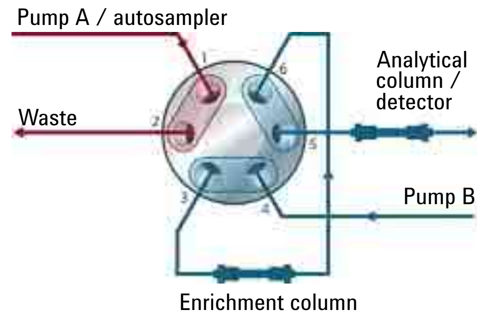
Whenever scaling a method down from a larger to a smaller column it is important that the method translation allows for reducing the injection volume in proportion to the volume of the column to maintain the performance of the method. This keeps the volume of the injection at the same percentage volume with respect to the column. This fact is particularly important if the injection solvent is stronger (more eluotropic) than the starting mobile phase. Any increase will affect the separation particularly for early running peaks (low retention factor). Sometimes, it is the cause of peak distortion and the general rule is to keep the injection solvent the same or weaker than the starting gradient composition. This has a bearing on whether, or by how much, the injection volume can be increased. The user should check for signs of increased dispersion (wider or more skewed peaks and reduced peak resolution) when trying to increase the injection size. If an injection is made in a weak solvent, the volume can probably be increased further because the effect will be to concentrate the analyte on the head of the column at the start of the gradient. Conversely if the injection is in a stronger solvent than the starting mobile phase, then increased injection volume will spread the band of analyte down the column ahead of the gradient resulting in peak dispersion and loss of resolution.

Perhaps the main consideration in determining injection volume is the diameter of the column as this has a big impact on peak dispersion. Peak heights can be higher on a narrow column than with a larger injection on a wider column because there is less peak dispersion. With 2.1 mm i.d. columns typical injection volumes might range up to 5 – 10 µL but it is dependent on the chemistry of the analyte and mobile phase, as discussed earlier. In a gradient separation, injection volumes of about 5 % of the column volume might be achieved while maintaining good resolution and peak dispersion. One way to achieve larger injections is to use a trapping column selected by a switching valve to capture and concentrate the injection before switching and injecting it onto an analytical column, see “Sample Enrichment” on page 226. The valve can be conveniently located in the Multicolumn Thermostat.

Sample Enrichment



Position 1-6



Position 1-2

How to Achieve High Throughput

The injection can be optimized for speed remembering that drawing the sample too fast can reduce the reproducibility. Marginal gains are to be made here as the sample volumes used tend towards the smaller end of the range in any case. A significant portion of the injection time is the time taken with the needle movements to and from the vial and into the flush port. These manipulations can be performed while the previous separation is running. This is known as *overlapped injection* and it can be easily turned on from the sampler setup screen in the control software. The sampler can switch the flow to bypass after the injection has been made and then after, for example, 3 minutes into a 4 minutes run, start aspirating the next sample and preparing for injection. This can typically save 0.5 to 1 minute per injection.

How to Achieve Higher Resolution

Increased resolution in a separation will improve the qualitative and quantitative data analysis, allow more peaks to be separated or offer further scope for speeding up the separation. This section explains how resolution can be increased by examining the following points:

- Optimize selectivity
- Smaller particle-size packing
- Longer columns
- Shallower gradients, faster flow

Resolution between two peaks is described by the resolution equation:

$$Rs = \frac{1}{4}\sqrt{N}\frac{(\alpha - 1)}{\alpha}\frac{(k_2 + 1)}{k_2}$$

where

- R_S=resolution,
- N=plate count (measure of column efficiency),
- α=selectivity (between two peaks),
- k_2=retention factor of second peak (formerly called capacity factor).

The term that has the most significant effect on resolution is the selectivity, α. In practice, varying this term involves changing the type of stationary phase (C18, C8, phenyl, nitrile etc.), mobile phase, and temperature to maximize the selectivity differences between the solutes to be separated. This is a substantial piece of work that is best done with an automated method development system. The method development system allows the assessment of a wide range of conditions on different columns and mobile phases in an ordered scouting protocol. This section considers how to get higher resolution with any chosen stationary and mobile phases. If an automated method development system was used in the decision on phases, it is likely that short columns were used for fast analysis in each step of the scouting.

The resolution equation shows that the next most significant term is the plate count or efficiency, N, which can be optimized in several ways. N is inversely proportional to the particle size and directly proportional to the length of a column. Smaller particle size and a longer column thus result in a higher plate number. The pressure rises with the inverse square of the particle size and proportionally with the length of the column. This is the reason that the 1260 Infinity II Prime Online LC System was designed for 800 bar and the 1290 Infinity II Bio Online LC System for 1300 bar, so that they can run sub-2-micron particles and the column length can be increased to 100 – 150 mm. There are even examples of 100 mm and 150 mm columns linked to give 250 mm length. Resolution increases with the square root of N so doubling the length of the column will increase resolution by a factor of 1.4. What is achievable depends on the viscosity of the mobile phase as this relates directly to the pressure. Methanol mixtures will generate more backpressure than acetonitrile mixtures. Acetonitrile is often preferred because peak shapes are better and narrower in addition to the lower viscosity but methanol generally yields better selectivity (certainly for small molecules less than about 500 Da). The viscosity can be reduced by increasing the temperature but it should be remembered that this can change the selectivity of the separation. The experiment will show if this leads to an increase or decrease in selectivity. As flow and pressure are increased, it should be remembered that frictional heating inside the column will also increase. This can lead to slightly increased dispersion and possibly a small selectivity change, both of which could be seen as a reduction in resolution. The latter case might be offset by reducing the temperature of the thermostat by a few degrees and further experiment will reveal the answer.

The van Deemter curve shows that the optimum flow rate through an STM column is higher than for larger particles and is fairly flat as the flow rate increases. Typical, close to optimum, flow rates for STM columns are: 2 mL/min for 4.6 mm i.d.; and 0.4 mL/min for 2.1 mm i.d. columns.

In isocratic separations, increasing the retention factor, k, results in better resolution because the solute is retained longer. In gradient separations the retention is described by k^* in the following equation:

$$k^* = \frac{t_G}{\Delta\%B} \cdot \frac{F}{V_m} \cdot \frac{100}{S}$$

where:

- k^* = mean k value,
- t_G= time length of gradient (or segment of gradient) (min),
- F = flow (mL/min),
- V_m = column delay volume,
- Δ%B = change in fraction of solvent B during the gradient,
- S = constant (ca. 4 – 5 for small molecules).

This shows that k and hence resolution can be increased by having a:

- Shallower gradient (2 – 5 %/min change is a guideline).
- Higher flow rate.
- Smaller column volume.

This equation also shows how to speed up an existing gradient. If the flow is doubled but the gradient time is halved, k^* remains constant, and the separation looks the same but happens in half the time. Recently published research has shown how a shorter STM column (at temperatures above 40 °C) can generate higher peak capacity than a longer STM column by virtue of running it faster. (See *Petersson et al., J.Sep.Sci, 31, 2346-2357, 2008, Maximizing peak capacity and separation speed in liquid chromatography*.)

How to Reduce Sample Solvent Effects

The 1260 Infinity II Prime Online LC System enables both flow-through and Feed Injection. This provides more parameters and flexibility for further resolution optimization.

During classical flow-through injection, the sample is transported to the column as a solvent plug. Therefore, early eluted compounds, which are partially carried by the sample solvent, may breakthrough the column. This behavior can result in bad peak shapes due to so-called "solvent effects".

The solvent effect depends on the property of the solvent used for the dilution of the sample. Usually, stronger organic solvents will increase the solvent effects in reversed-phase chromatography applications. Using flow-through injection, the easiest way to reduce the solvent effect is to minimize the sample injection volume.

During Feed Injection, the sample is gradually pushed directly into the mobile phase, giving more flexibility to influence the sample while it is transported to the column. Being injected this way, the sample is mixed and diluted with the mobile phase. As a result, the sample reaches the column properly mixed with mobile phase and the sample solvent no longer has a significant influence on the separation process and the peak shape.

The dilution degree can be adjusted by varying the injection feed speed. Using a high feed speed reduces the dilution degree of the sample. This means, that solvent effects may still occur, similarly as for classical flow-through injection. Also, these conditions can only be used for samples, which are diluted in weak solvents. Using a slower feed speed increases dilution degree of the sample. A higher dilution degree results in a reduction of the sample solvent effects and improves the peak shapes of early eluting sample components.

How to Achieve Higher Sensitivity

The sensitivity of a separation method is linked to the choice of stationary and mobile phases as good separation with narrow peaks and a stable baseline with minimal noise are desirable. The choice of instrument configuration will have an effect and a major impact is the setup of the detector. This section considers how sensitivity is affected by:

- Pump mixer volume
- Narrower columns
- Detector flow cell
- Detector parameters

In addition, the discussion on detector parameters also mentions the related topics of selectivity and linearity.

Columns

Sensitivity is specified as a signal-to-noise ratio (S/N) and hence the need to maximize peak height and minimize baseline noise. Any reduction in peak dispersion will help to maintain peak height and so extra-column volume should be minimized by use of short, narrow internal diameter, connection capillaries and correctly installed fittings. Using smaller inner diameter columns should result in higher peak height and is therefore ideal for applications with limited sample amounts. If the same sample amount can be injected on a smaller i.d. column, then the dilution due to column diameter will be less and the sensitivity will increase. For example, decreasing the column i.d. from 4.6 mm to 2.1 mm results in a theoretical gain in peak height of 4.7 times due to the decreased dilution in the column. For a mass spectrometer detector, the lower flow rates of narrow columns can result in higher ionization efficiencies and therefore higher sensitivity.

How to Achieve Lowest Carryover

Carryover is measured when residual peaks from a previous active-containing injection appear in a subsequent blank solvent injection. There will be carryover between active injections, which may lead to erroneous results. The level of carryover is reported as the area of the peak in the blank solution expressed as a percentage of the area in the previous active injection. The Online Sample Manager is optimized for lowest carryover by careful design of the flow path and use of materials in which sample adsorption is minimized. A carryover figure of 0.003 % should be achievable even when a triple quadrupole mass spectrometer is the detector. Operating settings of the Online Sample Manager allow the user to set appropriate parameters to minimize carryover in any application involving compounds liable to stick in the system. The following functions of the Online Sample Manager can be used to minimize carryover:

- Inner needle wash
- Outer needle wash
- Injection valve cleaning

The flow path, including inside the needle, is continuously flushed in flow-through injection mode, providing good elimination of carryover for most situations. Between two injections, the volume or duration of the inner wash can be adjusted in the CDS. Automated delay volume reduction (ADVR) reduces both the delay volume and the flushing of the Online Sample Manager and should not be used with analytes where carryover might be a problem.

In Feed Injection, the flow path, including inside the needle, is flushed after each injection. The duration or volume can also be adjusted in the CDS. The definition of wash options is part of the Method Setup, as shown exemplarily in the following.

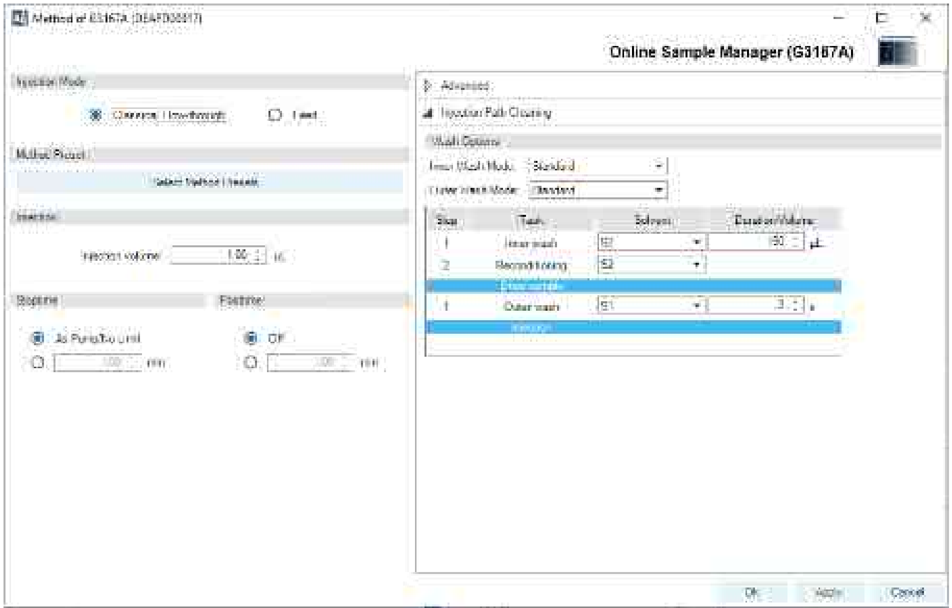


Figure 47 Definition of wash options (Flow-through Injection)

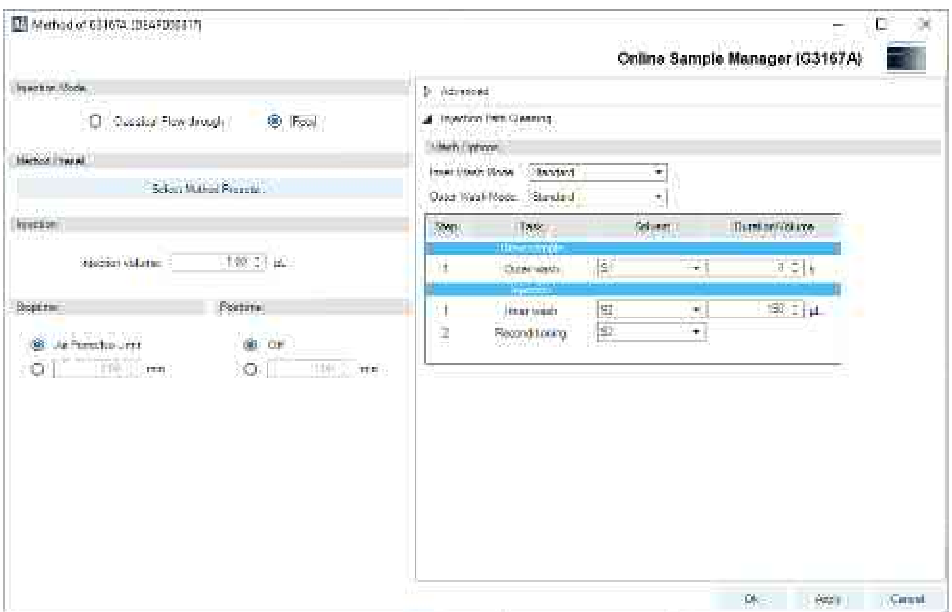


Figure 48 Definition of wash option (Feed Injection)

The outside of the needle can be washed using a wash vial in a specific location or the flush port. If a wash vial is chosen, then this vial should have no septum and should contain a solvent suitable for washing the sample from the needle. The septum is not used to avoid wiping contamination off the needle on the downstream only to re-apply it on the upstroke. The needle can be dipped into the vial multiple times. This will be effective in removing a small degree of carryover, but for more effective external needle wash, use the needle wash port.

The needle wash port is located above and behind the needle seat, and the SSV/piezo pump delivers the wash solvent. It has a volume of 0.68 mL and the SSV/piezo pump delivers 5 mL/min, which means the flush port volume is completely refilled with fresh solvent in 7 s.

If the needle wash port is selected, the user can set how long the outside of the needle is to be washed with fresh solvent. This can last from 2 – 3 s in routine situations where carryover is less of a problem, to 10 – 20 s for complete washing.

The wash port and its solvent delivery pump and tubing should be regularly flushed to ensure the lowest carryover. For example, before using the system each day, prime the flush pump for three minutes with appropriate solvent.

When other measures have failed to eliminate carryover, it might be that analyte is adsorbing to the inner surfaces of the Injection Valve or External Sampling Valve. In this case, the auto clean feature in the CDS can be activated, and the valve will make additional switching movements to clean out the flow path. If the problem compounds need a high percentage of organic phase for elution, it is recommended to switch the valves at the high percentage of organic phase after the last peak has eluted. It is also recommended to switch the valves again after the initial conditions for the mobile phase have stabilized. This ensures that the bypass groove in the rotor seal of the valves contains the gradient start conditions, which is especially important for flow rates below 0.5 mL/min. For samples where the outside of the needle cannot be cleaned sufficiently with water or alcohol from the flush pump, use wash vials with an appropriate solvent. With an injector program, several wash vials can be used for cleaning.

The optimum carryover performance of the Online Sample Manager is achieved after a run-in period of new instruments or after the exchange of consumable parts (like needle, needle seat and valve parts). During injections in this period, surfaces of these parts adjust to each other. Regular preventive maintenance service is recommended as the carryover performance of the sampler depends on the integrity of these consumable parts.

If operated in Feed Injection mode, there are more parameters available to reach the goal of a low carryover.

Optimal adjustments are possible by:

- Increasing the flush-out volume.
- Decreasing the feed speed.
- Increasing the proportion of organic solvent in the flush-out solvent.

7 Maintenance and Repair

This chapter describes the maintenance and repair of the InfinityLab Online LC Solution modules.

Introduction to Maintenance

Figure 49 on page 238 shows the main user accessible assemblies of the Online Sample Manager. These parts can be accessed from the front (simple repairs) and don't require to remove the Online Sample Manager from the system stack.

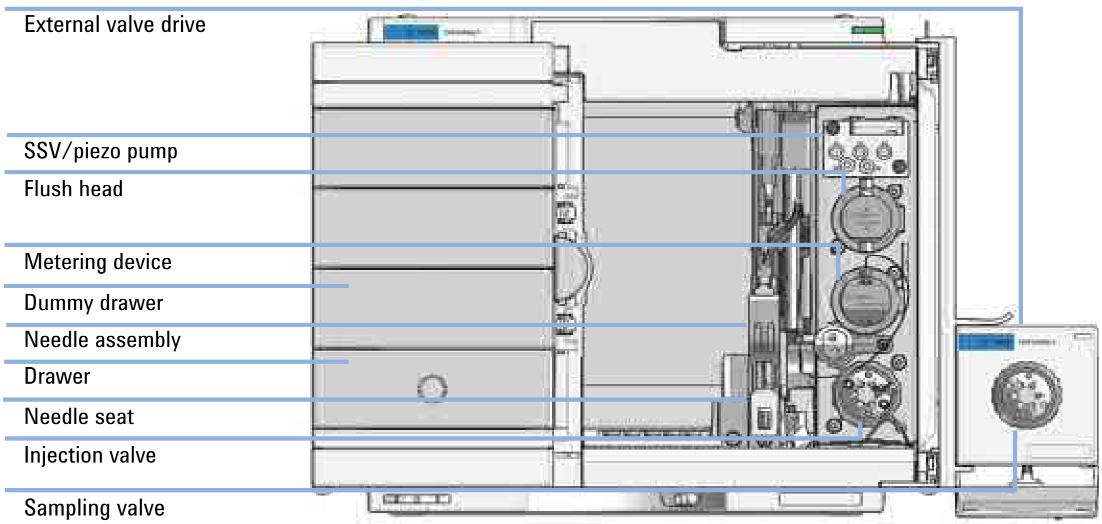


Figure 49 Main user accessible assemblies

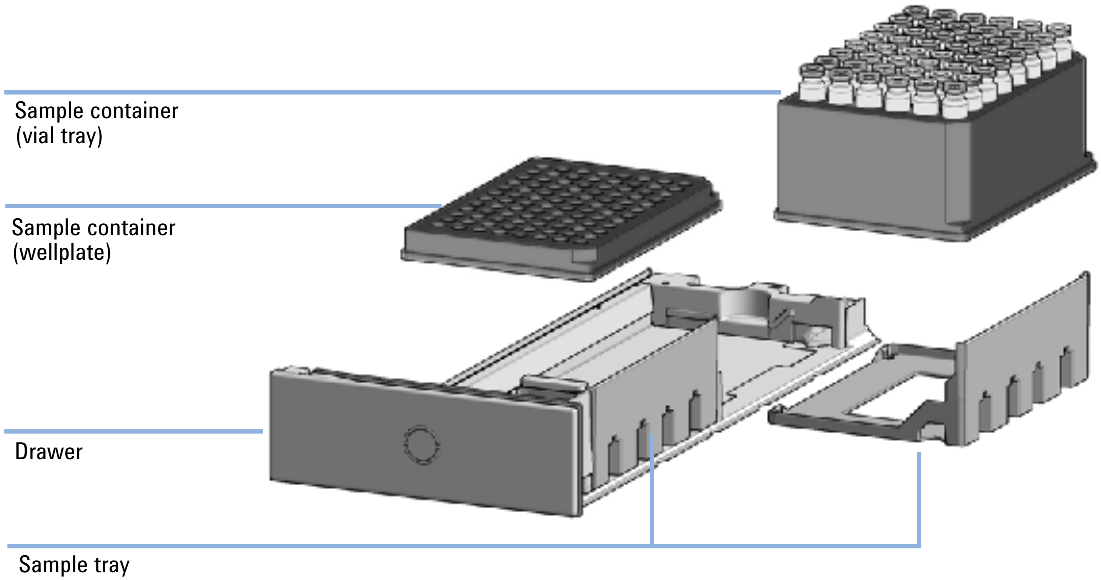


Figure 50 Overview of drawer, sample tray and sample container

Warnings and Cautions

WARNING

Personal injury or damage to the product

Agilent is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent product user guides, or use of the products in violation of applicable laws, rules or regulations.

- ✓ **Use your Agilent products only in the manner described in the Agilent product user guides.**

WARNING

Electrical shock

Repair work at the module can lead to personal injuries, e.g. shock hazard, when the cover is opened.

- ✓ **Do not remove the cover of the module.**
- ✓ **Only certified persons are authorized to carry out repairs inside the module.**

WARNING

Sharp metal edges

Sharp-edged parts of the equipment may cause injuries.

- ✓ **To prevent personal injury, be careful when getting in contact with sharp metal areas.**

WARNING

Toxic, flammable and hazardous solvents, samples and reagents

The handling of solvents, samples and reagents can hold health and safety risks.

- ✓ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.
- ✓ The volume of substances should be reduced to the minimum required for the analysis.
- ✓ Do not operate the instrument in an explosive atmosphere.

CAUTION

Safety standards for external equipment

- ✓ If you connect external equipment to the instrument, make sure that you only use accessory units tested and approved according to the safety standards appropriate for the type of external equipment.

WARNING

Heavy weight

The module is heavy.

- ✓ Carry the module at least with 2 people.
- ✓ Avoid back strain or injury by following all precautions for lifting heavy objects.
- ✓ Ensure that the load is as close to your body as possible.
- ✓ Ensure that you can cope with the weight of your load.

Overview of Maintenance

It is necessary to perform periodic inspection of this instrument to ensure its safe use. It is possible to have these periodic inspections performed by Agilent service representatives on a contractual basis. For information regarding the maintenance inspection contract, contact your Agilent representative.

The following pages describe the maintenance (simple repairs) of the module that can be carried out without opening the main cover.

Table 34 Overview of maintenance

Procedure	Typical interval (minimum)
Change Needle/Needle Seat	60000 needle into seat movements
Change Rotor Seal	As needed
Change Metering Seal	30000 injections
Change Stator or entire Valve Head	10000 injections (approx. 30000 switches) Applies for both Injection and Sampling valves

Clean the Module

To keep the module case clean, use a soft cloth slightly dampened with water, or a solution of water and mild detergent. Avoid using organic solvents for cleaning purposes. They can cause damage to plastic parts.

WARNING

Liquid dripping into the electronic compartment of your module can cause shock hazard and damage the module

- ✓ **Do not use an excessively damp cloth during cleaning.**
- ✓ **Drain all solvent lines before opening any connections in the flow path.**

NOTE

A solution of 70 % isopropanol and 30 % water might be used if the surface of the module needs to be disinfected.

Removal and Installation of the Front Door

When	The instrument doors or the hinges are broken.		
Tools required	Description		
	Flathead screwdriver		
Parts required	#	p/n	Description
	1	5067-5415 A	Door Assy
OR	1	G7167-68718 A	Light Protection Kit
Preparations	Finish any pending acquisition job and return any plate on the workspace back to the hotel.		

NOTE

For detailed information on position of the magnets, refer to “Magnets” on page 184

CAUTION

Magnetic fields

Magnets produce a far-reaching, strong magnetic field.

You can damage for example televisions, laptops, computer harddisks, credit cards, magnetic cards may be damaged as well.

✓ Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.

WARNING

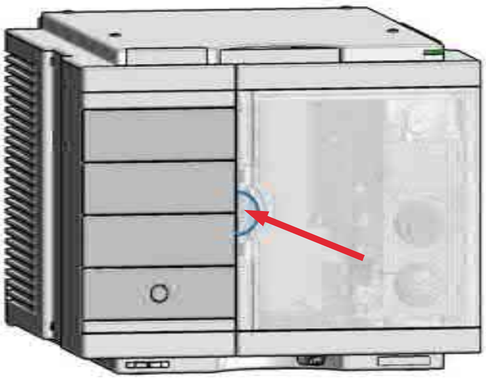
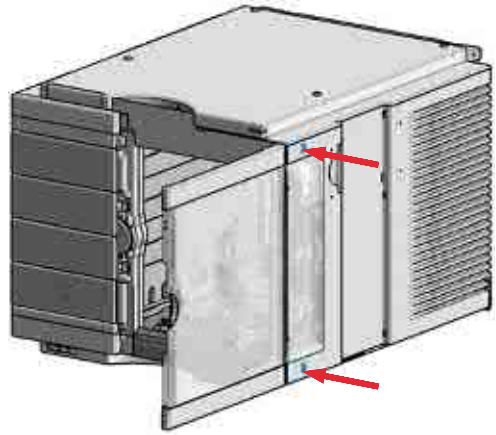
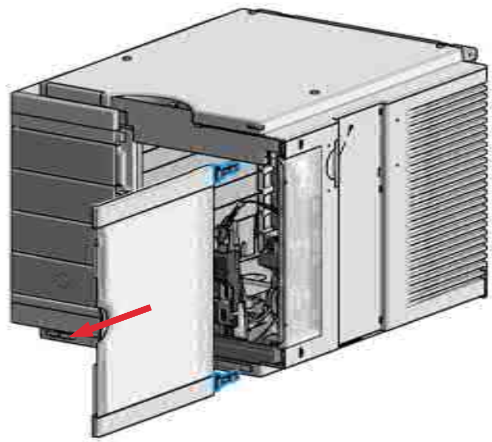
Heart pacemakers

Magnets could affect the functioning of pacemakers and implanted heart defibrillators.

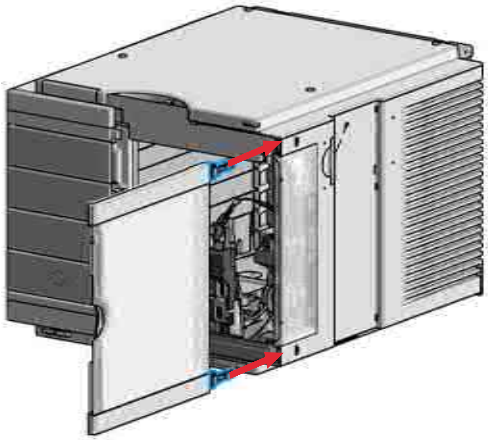
A pacemaker could switch into test mode and cause illness.

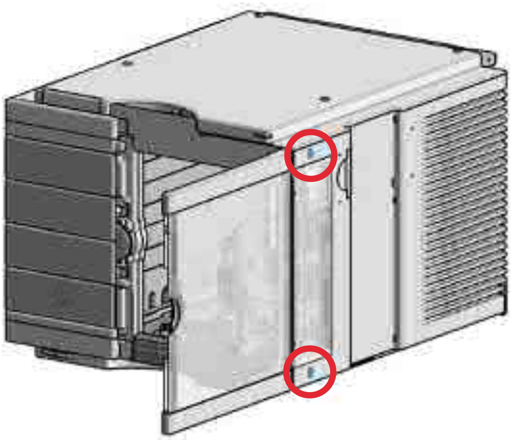
A heart defibrillator may stop working.

✓ Bearers of heart pacemakers or implanted defibrillators must stay off at least 55 mm from the magnets.

1 Open the front door.	2 Press the release buttons and pull the front door out.
	 

3 For the Installation of the front door. Insert the hinges into their guides and move the door in until the release buttons click into their final position.





Exchange the Needle Assembly

BIO

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

When

- The needle is visibly damaged.
- Leaks or blockages are observed.
- The limit for the needle interaction EMF counter is exceeded.
- The needle needs to be replaced as part of the yearly maintenance.

Tools required

p/n	Description
8710-0510	Open-end wrench 1/4 — 5/16 inch

Parts required

	#	p/n	Description
	1	G4267-87201	Needle Assembly (for G3167A)
OR	1	G7137-87201	Needle Biocompatible (for G3167B)

Preparations

- Finish any pending acquisition job.
- Stop the flow at the pump and remove the solvent lines from the eluent bottles to avoid spilling solvent.
- Close the shutoff valves at the pump if available.

WARNING

Risk of injury by uncovered needle

An uncovered needle is a risk of harm to the operator.

✓ Do not open the safety lock of the needle assembly

✓ Be careful working at the z-robot.

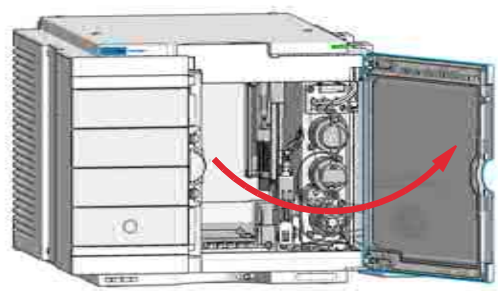
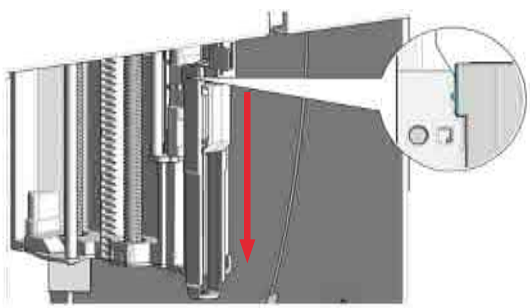
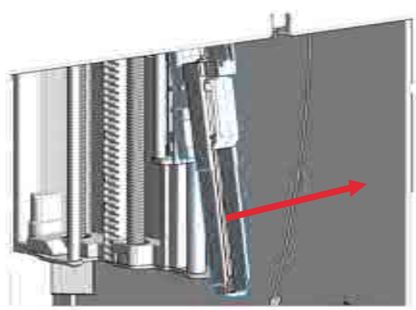
✓ Wear safety goggles, when removing the needle assembly.

WARNING

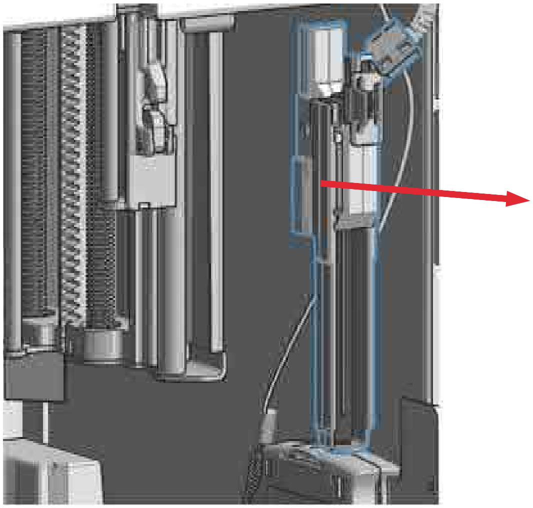
Toxic, flammable and hazardous solvents, samples and reagents

The handling of solvents, samples and reagents can hold health and safety risks.

✓ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.

1 In the Agilent Lab Advisor software select **Service & Diagnostics** >**Maintenance Positions** >**Change Needle**, click **Start** and wait until the needle assembly is in maintenance position. OR In the Local Controller start the maintenance mode and select **Change Needle** function.	2 Open the front door. 
3 Lock the needle in the safety position.  **NOTE** During normal operation of the Online Sample Manager, the needle assembly has to be unlocked.	**WARNING** **Sharp needle** **Uncovered needles may cause injuries** ✓ Make sure the needle is in the safety lock position. 4 Remove the needle assembly by slightly pulling the needle cartridge. 

5 Z-Robot (Z-arm coupler) without the needle assembly.



CAUTION

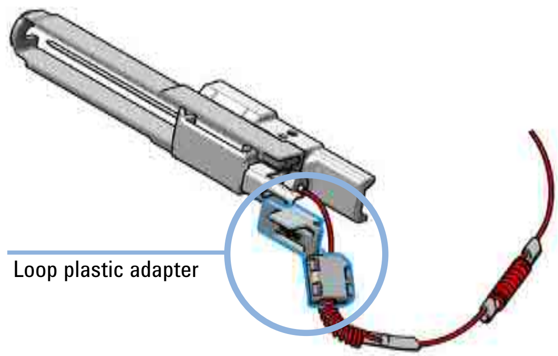
Damage of the loop

The loop shape may be damaged if the loop is stretched or bent too far.

✓ Avoid to change the loop shape.

✓ Do not pull or bend the loop too far.

6 The needle assembly is still connected to the loop capillary.



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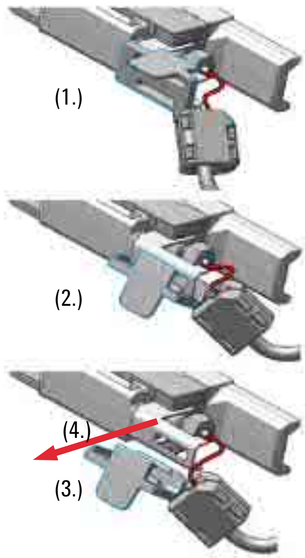
7 Remove the loop plastic adapter.



NOTE

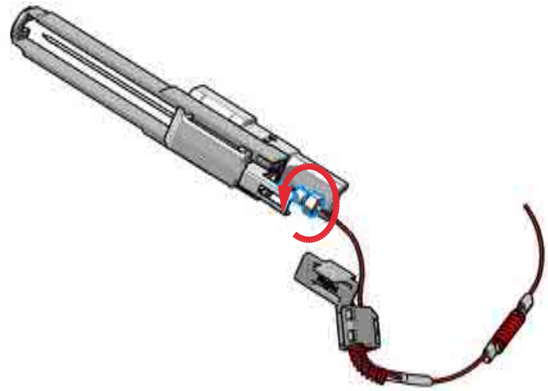
Do not open the rear plastic clamp.

NOTE

If the plastic adapter is damaged the sample loop has to be replaced.

</td>
<td>

8 Use a 1/4 inch wrench to loosen the fitting of the loop capillary.



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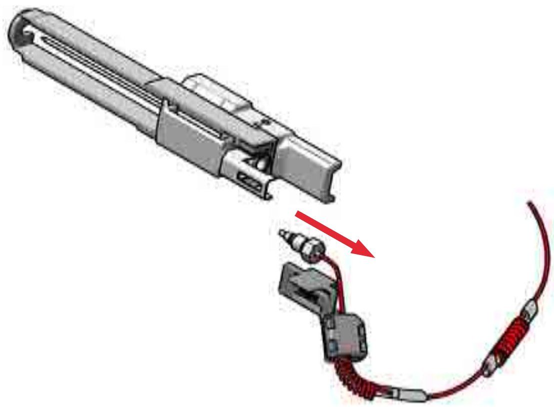
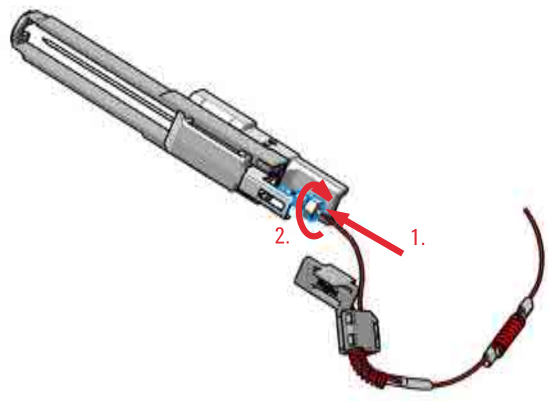
</table>

9 Remove the needle assembly.	10 Install the loop capillary on top of the needle cartridge (1.) and tighten the fitting hand tight (2.).
	
	NOTE If the sample loop is changed, we recommend changing the needle as well.

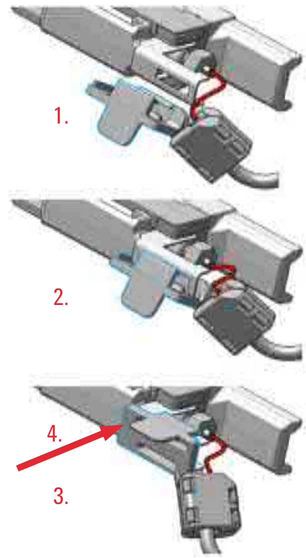
CAUTION

Blockages inside of the needle assembly union

✓ Do not overtighten the fitting. A quarter turn should be sufficient.

11 Use a 1/4 inch wrench to tighten the fitting of the loop capillary.

12 Install loop plastic adapter.



NOTE

Verify the sample loop info on the plastic adapter. A left or a right sample loop must be installed in the correct slot of the needle parkstation. For single needle, the default position is on the right.

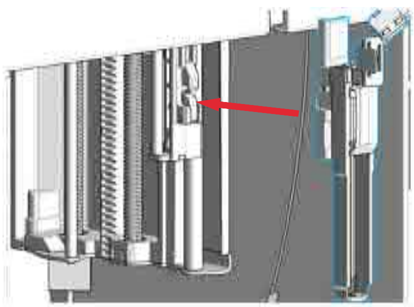
NOTE

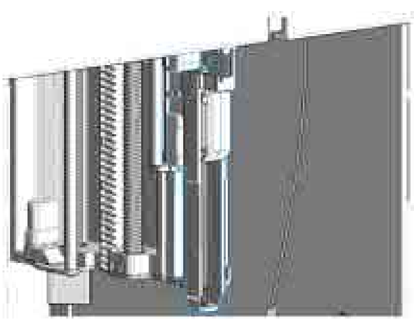
If the plastic adapter is damaged the sample loop has to be replaced.

13 Pinch and reinsert the needle assembly and the connected loop capillary into the z-arm coupler.

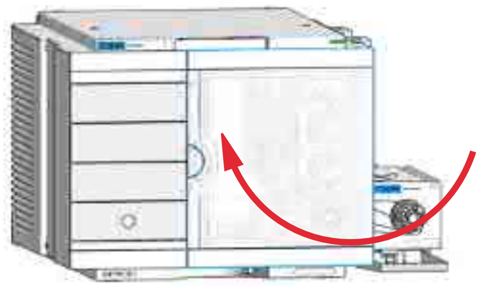
NOTE

Check the tension of the loop capillary. This must be forced and guided to the hydraulic box to prevent it from being caught by the Z-drive.





14 Close the front door.



Next Steps:

15 In the Local Controller close **Change Needle**.

OR

In the Agilent Lab Advisor software **Change Needle**, click **Back** and wait until the needle assembly is in the needle park station.

16 Perform **Hydraulic Path Leak Test**.

17 Perform **Sampler Leak Test** if needed for troubleshooting in case of Hydraulic Path Leak failure.

Exchange the Needle Seat

BIO

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

When

When seat is visibly damaged, blocked or leaks.

Tools required

p/n	Description
8710-0510	Open-end wrench 1/4 — 5/16 inch

Parts required

	#	p/n	Description
	1	G3167-60018	Needle Seat Capillary, ST 0.17 mm x 230 mm SL/SL (for G3167A)
OR	1	G3167-60017	Needle Seat Capillary, Bio 0.17 mm x 230 mm (for G3167B)

Preparations

- Finish any pending acquisition job.
- Stop the flow at the pump and remove the solvent lines from the eluent bottles to avoid spilling solvent.
- Close the shutoff valves at the pump if available.
- Remove the front door.

WARNING

Risk of injury by uncovered needle

An uncovered needle is a risk of harm to the operator.

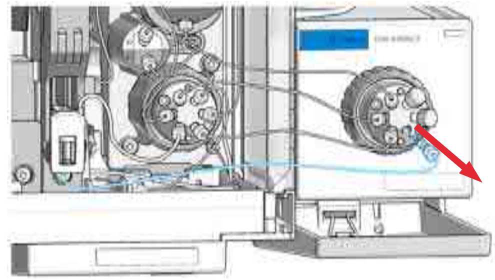
- ✓ Do not open the safety lock of the needle assembly
- ✓ Be careful working at the z-robot.
- ✓ Wear safety goggles, when removing the needle assembly.

1 In the Local Controller start the maintenance mode and select **Change needle/seat** function.

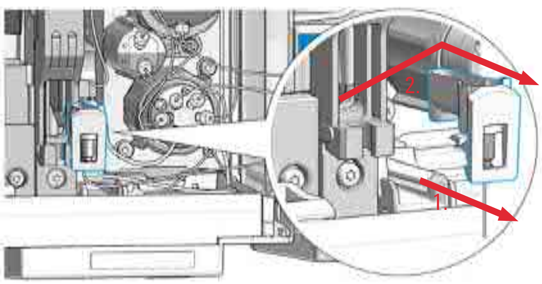
OR

In the Agilent Lab Advisor software select **Service & Diagnostics** in the system screen **Maintenance Positions >Change Seat**, click **Start** and wait until the needle assembly is in maintenance position.

2 Disconnect the seat capillary from the external sampling valve.



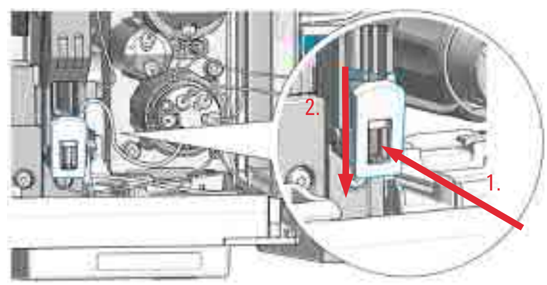
3 Slightly pull (1.) the front clip which holds the needle seat in position. Then carefully lift up (2.) the complete leak tube needle assembly from the holder.



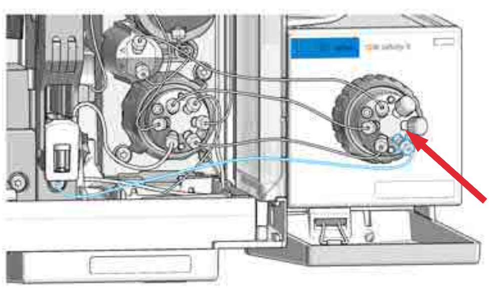
4 Insert the new Needle seat (1.). Press it firmly in position (2.).

NOTE

Verify that the needle seat clip is locked in the needle park station.



5 Reconnect the seat capillary to the external sampling valve.



Next Steps:

6 In the Local Controller close **Change needle /seat**.

OR

In the Agilent Lab Advisor software **Change Seat** click **Back** and wait until the needle assembly is in the needle park position.

7 Perform **Hydraulic Path Leak Test**.

8 Perform **Sampler Leak Test** if needed for troubleshooting in case of Hydraulic Path Leak failure.

Replace the Injection Valve

BIO

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

When	Add new injection valve or replace defective injection valve.			
Tools required	**Description**			
	Wrench 9/64			
Parts required	**#**	**p/n**	**Description**	
	1	5067-6680 A	3-position/6-port FI valve 800 bar (for G3167A)	
OR	1	5320-0003 A	3-position/6-port FI valve, MP35N, 1300 bar (for G3167B)	

Preparations

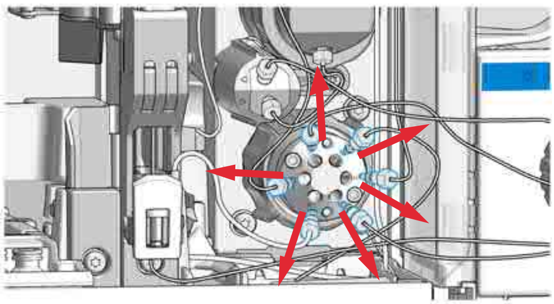
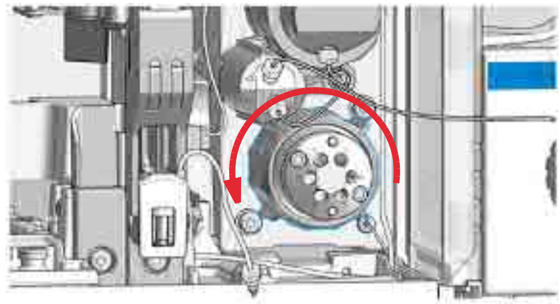
- Switch off the power of the Online Sample Manager.
- Remove the front door.

WARNING

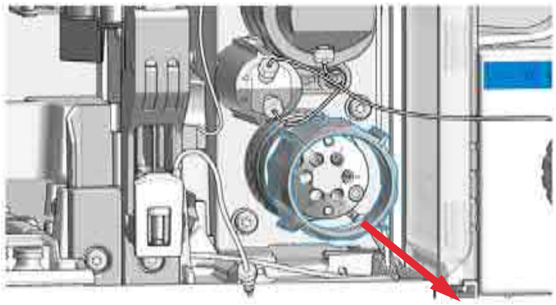
Toxic, flammable and hazardous solvents, samples and reagents

The handling of solvents, samples and reagents can hold health and safety risks.

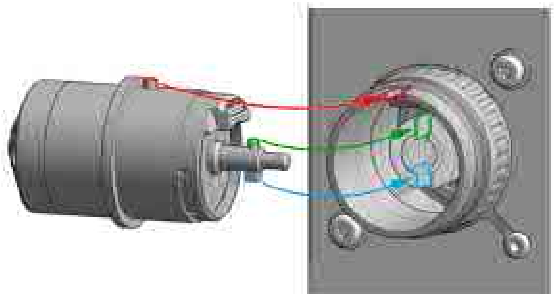
- ✓ Be sure that no solvent can drop out of the solvent connections when removing them from your valve head.
- ✓ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.

1 Remove all capillaries from the injection valve with a 1/4 inch wrench. **NOTE** Remember the correct plumbing. Check the drawing on the side cover of the hydraulic box for correct plumbing. 	2 Turn the spanner nut counter clockwise until the injection valve head detaches from the hydraulic box (Do not use wrenches on the spanner nut). 

3 Remove the spanner nut from the injection valve head.

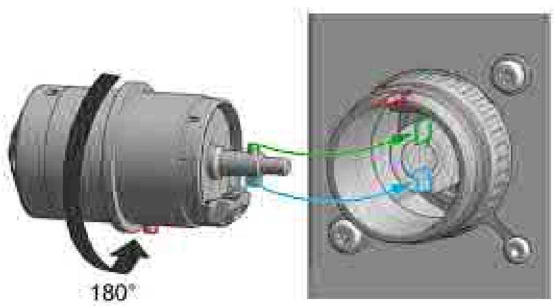


4 Take the replacement injection valve head and insert it into the open actuator slot of the hydraulic box. Rotate until the unions at the base of the replacement injection valve head and the valve actuator engage



OR

If the outside pin does not fit into the outside groove, you have to turn the valve head until you feel that the two pins snap into the grooves. Now you should feel additional resistance from the valve drive while continue turning the valve head until the pin fits into the groove.

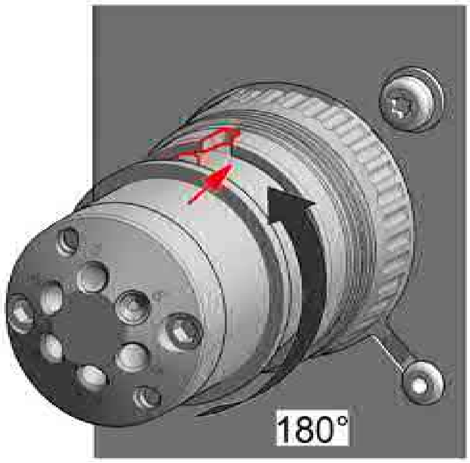


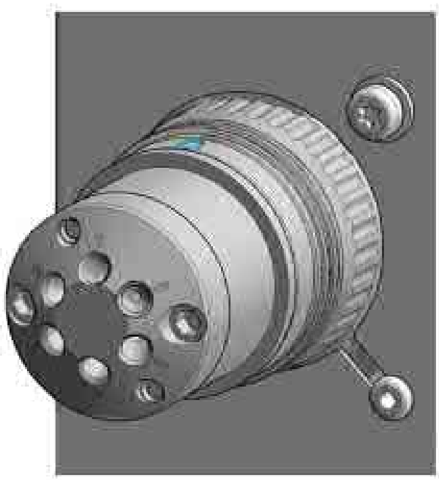
NOTE

Check the orientation of the rear side.

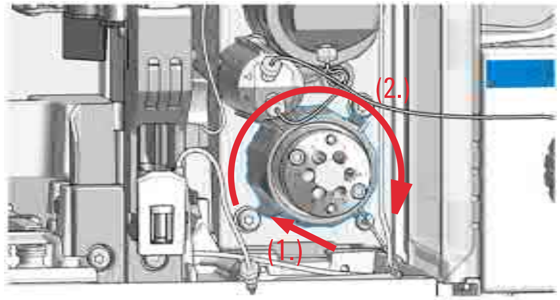
Verify the correct position of the Valve TAG.

5 Continue to rotate until the clocking pin in the injection valve head align with the notch in the housing and press the replacement injection valve head into the actuator.

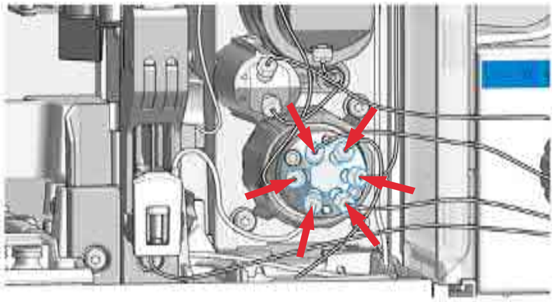




6 Replace the Spanner Nut (1.) and tighten clockwise (2.) (Hand tighten only, do not use wrenches on the Spanner Nut).



7 Reconnect all capillaries to the proper injection valve ports with a 1/4 inch wrench.



Next Steps:

8 Perform **Hydraulic Path Leak Test**.

9 Perform **Sampler Leak Test** if needed for troubleshooting in case of Hydraulic Path Leak failure.

Replace the External Sampling Valve

BIO

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

When Add new External Sampling Valve or replace defective External Sampling Valve.

Tools required

p/n	Description
8710-0510 A	Open-end wrench 1/4 — 5/16 inch

Parts required

	#	p/n	Description
	1	5067-6680 A	3-position/6-port FI valve 800 bar (for G3167AA)
OR	1	5320-0003 A	3-position/6-port FI valve, MP35N, 1300 bar (for G3167BA)

Preparations Switch off the power of the module.

WARNING

Toxic, flammable and hazardous solvents, samples and reagents

The handling of solvents, samples and reagents can hold health and safety risks.

- ✓ Be sure that no solvent can drop out of the solvent connections when removing them from your valve head.
- ✓ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.

CAUTION

The valve actuator contains sensitive optical parts, which need to be protected from dust and other pollution. Pollution of these parts can impair the accurate selection of valve ports and therefore bias measurement results.

✓ Always install a valve head for operation and storage. For protecting the actuator, a dummy valve head (part of Transportation Lock Kit (G1316-67001)) can be used instead of a functional valve. Do not touch parts inside the actuator.

NOTE

The tag reader reads the valve head properties from the valve head RFID tag during initialization of the module. If the valve head is replaced while the module is on, the valve properties will not be updated.

If the instrument does not know the properties of the installed valve, the selection of valve port positions can fail.

NOTE

To have the valve correctly recognized by the module, you must have the module powered off for at least 10 seconds.

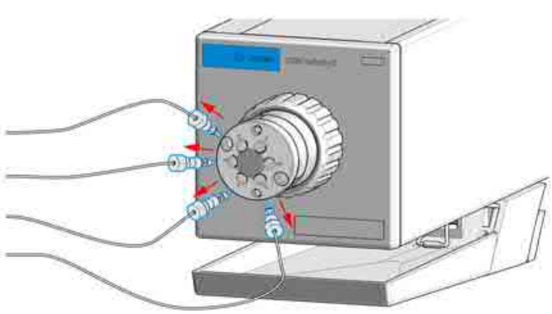
NOTE

When there is any unusual behavior, the rotor seal will need to be cleaned, or replaced. You can clean this seal by wiping with a tissue, and then sonicating in isopropanol.

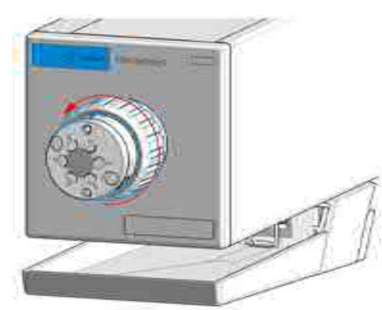
1 Remove all capillaries from the external sampling valve with a 1/4 inch wrench.

NOTE

Remember the correct plumbing.



2 Unscrew the valve head.



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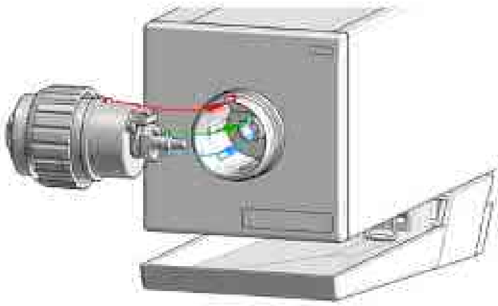
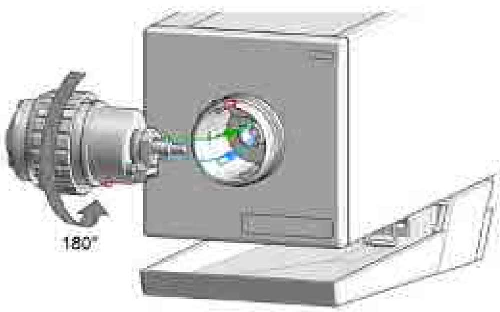
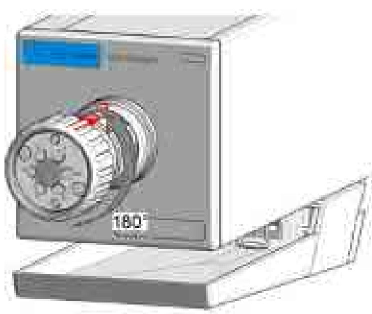
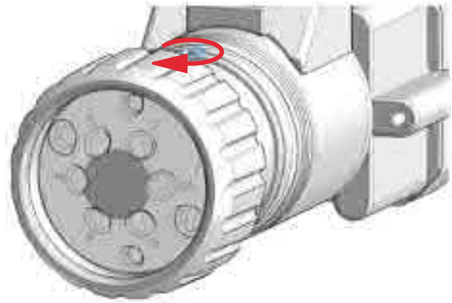
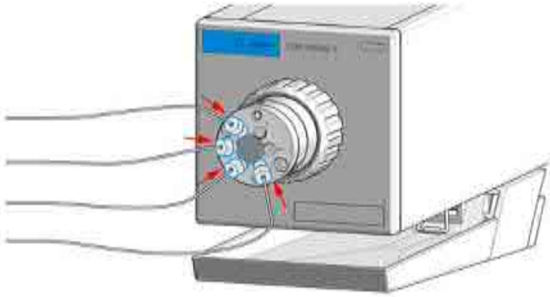
3 Insert the valve head into the valve shaft.

OR
If the outside pin does not fit into the outside groove, you have to turn the valve head until you feel that the two pins snap into the grooves. Now you should feel additional resistance from the valve drive while continuously turning the valve head until the pin fits into the groove.




</td>
<td>
4 When the outer pin is locked into the groove, manually screw the nut onto the valve head.

NOTE
Fasten the nut manually. Do not use any tools.
</td>
</tr>
</table>

5 Reconnect all capillaries to the proper reactor valve ports with a 1/4 inch wrench. 	Next Steps: 6 Perform **Hydraulic Path Leak Test**. 7 Perform **Sampler Leak Test** if needed for troubleshooting in case of Hydraulic Path Leak failure.

Replace the Rotor Seal of the Injection Valve

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

When

- Injection volume reproducibility problems are observed.
- Leaks or blockages are observed.
- The limit for the rotor seal EMF counter is exceeded.
- The rotor seal needs to be replaced as part of the yearly maintenance.

Tools required

p/n	Description
8710-0510	Open-end wrench 1/4 — 5/16 inch
8710-2394	Hex key 9/64 inch 15 cm long T-handle
	Cleaning tissue and appropriate solvent like isopropanol or methanol

Parts required

	#	p/n	Description
	1	5068-0279	Rotor Seal, 3-position/6-port FI Valve, 800 bar (for G3167A)
OR	1	5320-0005	Rotor Seal, 3-position/6-port FI Valve, MP35N, 1300 bar (for G3167B)
	1	5068-0280	Stator (for G3167A), replacement only necessary in case of wear (OPTIONAL)
	1	5320-0004	Stator, Bio (for G3167B), replacement only necessary in case of wear (OPTIONAL)

Preparations

- Remove the front door.

CAUTION

Reduced life time of the injection valve

Component cleanliness is crucial for the life time of the injection valve.

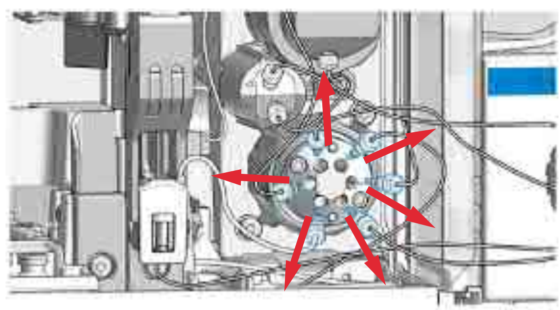
✓ Replace the rotor seal in a clean environment.

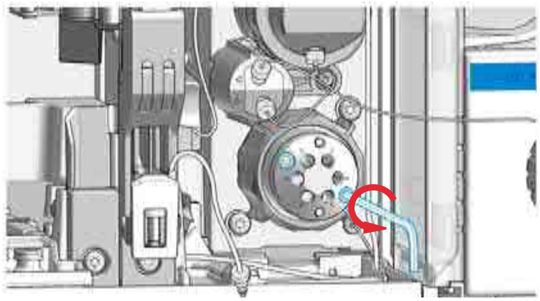
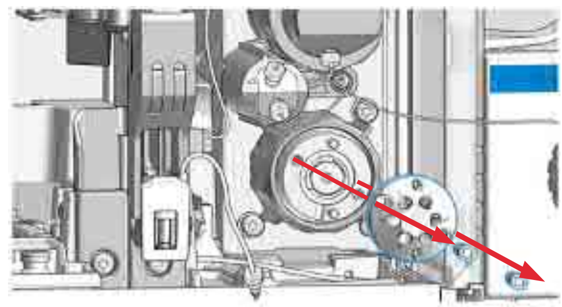
WARNING

Toxic, flammable and hazardous solvents, samples and reagents

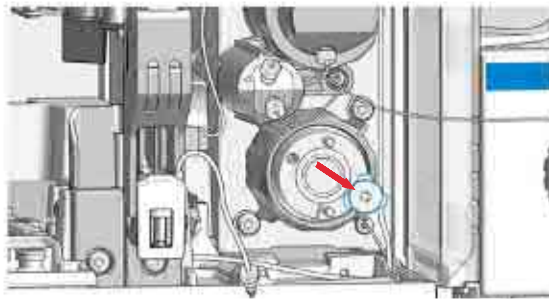
The handling of solvents, samples and reagents can hold health and safety risks.

- ✓ **Be sure that no solvent can drop out of the solvent connections when removing them from your valve head.**
- ✓ **When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.**

1 In the Agilent Lab Advisor software select Service & Diagnostics >Maintenance Positions >Change Rotor Seal, and click Start. OR In the Local Controller start the maintenance mode and select Change Rotor Seal function.	2 Remove all capillaries from the injection valve with a 1/4 inch wrench. **NOTE** Remember the correct plumbing. Check the drawing on the side cover of the hydraulic box for correct plumbing. 

3 Use a 9/64 inch hex driver to unscrew the two socket screws which hold the stator head in place. 	**CAUTION** Damage to the stator head The polished sealing surface of the stator head contains six ports that access handling can easily damage. ✓ Avoid touching the polished surface of the stator head. ✓ Never place the polished surface on a hard surface. 4 Carefully remove the stator head. To ensure that the sealing surface of the stator head is not damaged, place it on its outer face. 

5 Remove the rotor seal.



NOTE

Remove the rotor seal with a small tool, gently pry the rotor seal away from the drive.

Examine the rotor sealing surface for scratches and nicks.

- If scratches are visible the rotor seal must be replaced.
- If no scratches are visible clean all the parts with an appropriate solvent, taking care that no surfaces get scratched.

CAUTION

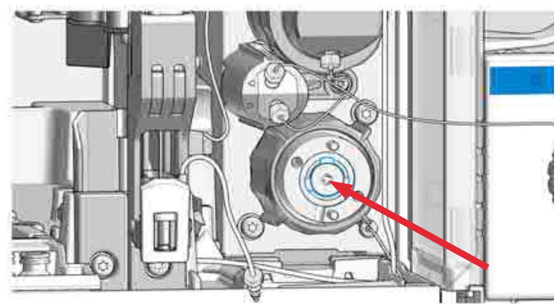
Damage to the rotor seal and cross-port leaks

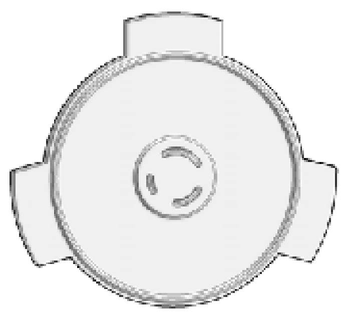
✓ Before you replace the rotor seal, clean the stator.

✓ Inspect the stator head and swab it with the appropriate solvent. If more stringent cleaning is required, use a sonicator. Inspect the remaining valve components for contamination. Clean them as necessary.

✓ If the stator head is scratched, replace it.

6 Install new rotor seal.

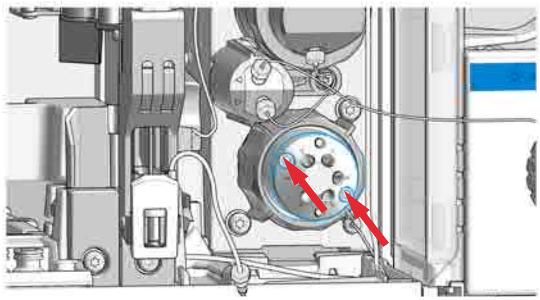




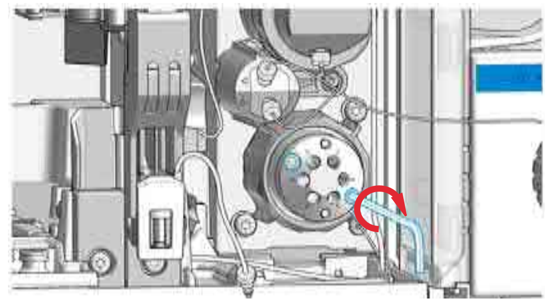
NOTE

Make sure that the rotor sealing surface with its engraved flow passages is facing out. The pattern is asymmetrical to prevent improper placement.

7 Reinstall the stator head. The index pins on the drive and the stator head must engage in the corresponding holes. Insert the two socket head screws.



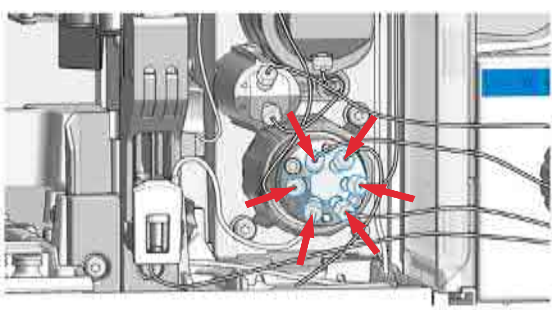
8 Using a 9/64 in. L-Hex wrench, tighten each screw gently until you feel resistance (approximately fingertight). Tighten each screw by 1/8 turn, and then tighten each screw again, until the stator is secured to the driver.



NOTE

Do not over-tighten the screws. The screws hold the assembly together and do not affect the sealing force. The sealing force is automatically set as the screws close the stator head against the valve body.

9 Reconnect all capillaries to the proper injection valve ports with a 1/4 inch wrench.



Next Steps:

10 In the Local Controller close **Change Rotor Seal**.

OR

In the Agilent Lab Advisor software **Change Rotor Seal**, click **Back**.

11 Perform **Hydraulic Path Leak Test**.

12 Perform **Sampler Leak Test** if needed for troubleshooting in case of Hydraulic Path Leak failure.

Replace the Rotor Seal of the External Sampling Valve

BIO

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

When

- Injection volume reproducibility problems are observed.
- Leaks or blockages are observed.
- The limit for the rotor seal EMF counter is exceeded.
- The rotor seal needs to be replaced as part of the yearly maintenance.

Tools required

p/n	Description
8710-0510 A	Open-end wrench 1/4 — 5/16 inch
8710-2394 A	Hex key 9/64 inch 15 cm long T-handle
	Cleaning tissue and appropriate solvent like isopropanol or methanol

Parts required

	#	p/n	Description
	1	5068-0279 A	Rotor Seal, 3-position/6-port FI Valve, 800 bar (for G3167AA)
OR	1	5320-0005 A	Rotor Seal, 3-position/6-port FI Valve, MP35N, 1300 bar (for G3167BA)
	1	5068-0280 A	Stator (for G3167AA), replacement only necessary in case of wear (OPTIONAL)
	1	5320-0004 A	Stator, Bio (for G3167BA), replacement only necessary in case of wear (OPTIONAL)

CAUTION

Reduced life time of the external sampling valve

Component cleanliness is crucial for the life time of the external sampling valve.

✓ Replace the rotor seal in a clean environment.

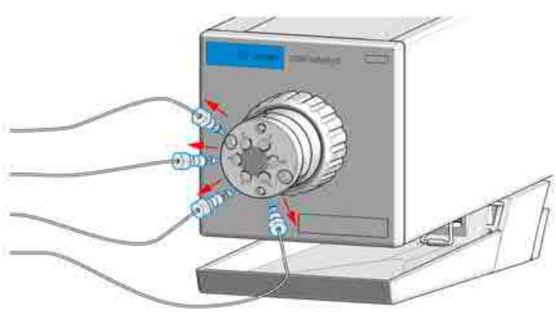
WARNING

Toxic, flammable and hazardous solvents, samples and reagents

The handling of solvents, samples and reagents can hold health and safety risks.

✓ Be sure that no solvent can drop out of the solvent connections when removing them from your valve head.

✓ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.

1 Remove all capillaries from the external sampling valve with a 1/4 inch wrench. **NOTE** Remember the correct plumbing. 	2 Use a 9/64 inch hex driver to unscrew the two socket screws which hold the stator head in place. 

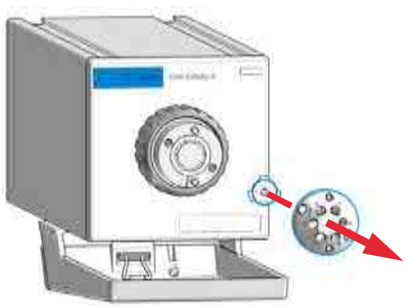
CAUTION

Damage to the stator head
The polished sealing surface of the stator head contains six ports that access handling can easily damage.

✓ Avoid touching the polished surface of the stator head.

✓ Never place the polished surface on a hard surface.

3 Carefully remove the stator head and rotor seal. To ensure that the sealing surface of the stator head is not damaged, place it on its outer face.



NOTE

Remove the rotor seal with a small tool, gently pry the rotor seal away from the drive.

Examine the rotor sealing surface for scratches and nicks.

- If scratches are visible the rotor seal must be replaced.
- If no scratches are visible clean all the parts with an appropriate solvent, taking care that no surfaces get scratched.

CAUTION

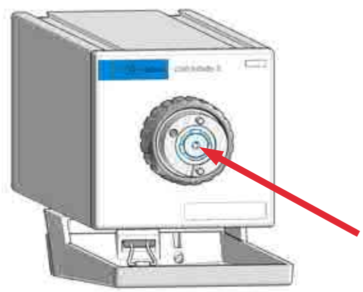
Damage to the rotor seal and cross-port leaks

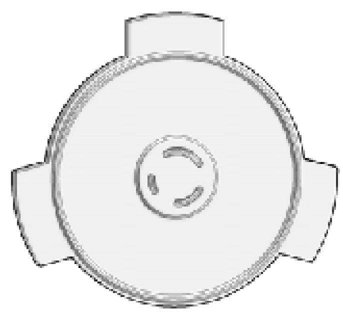
✓ Before you replace the rotor seal, clean the stator.

✓ Inspect the stator head and swab it with the appropriate solvent. If more stringent cleaning is required, use a sonicator. Inspect the remaining valve components for contamination. Clean them as necessary.

✓ If the stator head is scratched, replace it.

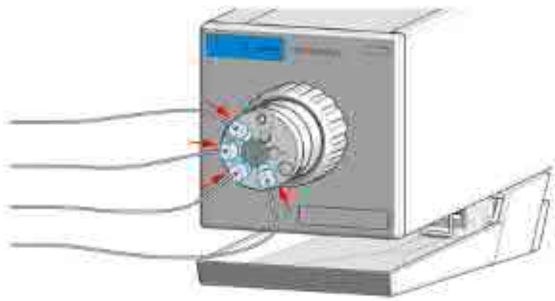
4 Install new rotor seal.





NOTE

Make sure that the rotor sealing surface with its engraved flow passages is facing out. The pattern is asymmetrical to prevent improper placement.

5 Reinstall the stator head. The index pins on the drive and the stator head must engage in the corresponding holes. Insert the two socket head screws. Using a 9/64 in. L-Hex wrench, tighten each screw gently until you feel resistance (approximately fingertight). Tighten each screw by 1/8 turn, and then tighten each screw again, until the stator is secured to the driver. 	6 Reconnect all capillaries to the proper reactor valve ports with a 1/4 inch wrench. 
Next Steps:	
7 Perform **Hydraulic Path Leak Test**.	
8 Perform **Sampler Leak Test** if needed for troubleshooting in case of Hydraulic Path Leak failure.	

Replace the Transfer Capillaries between Injection and External Sampling Valve

BIO

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

When Leaks or blockages are observed.

Tools required

p/n	Description
8710-0510 A	Open-end wrench 1/4 — 5/16 inch

Parts required

	#	p/n	Description
	1	G3167-67000 A	G3167A Online Sample Manager Capillary Kit
OR	1	G3167-67002 A	G3167B Online Sample Manager Capillary Kit

Preparations

- Remove the front door.
- For reference about the capillary names, part numbers, and dimensions, see tables in.

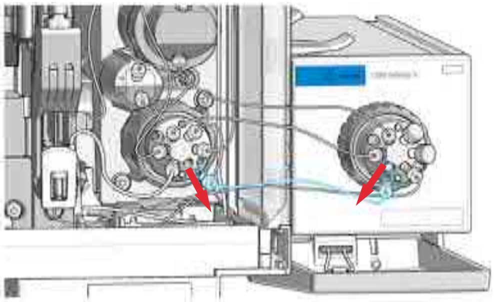
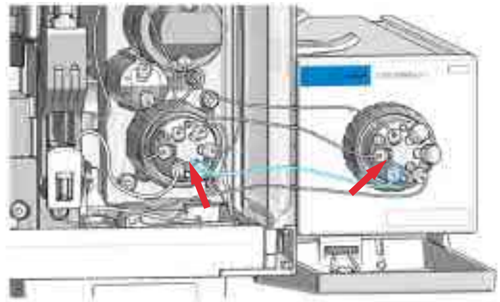
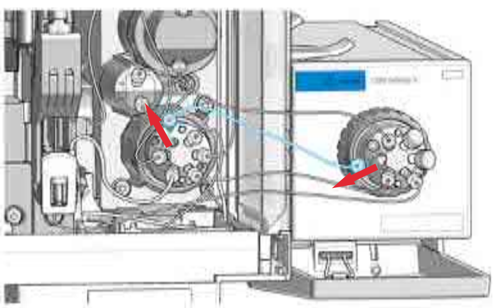
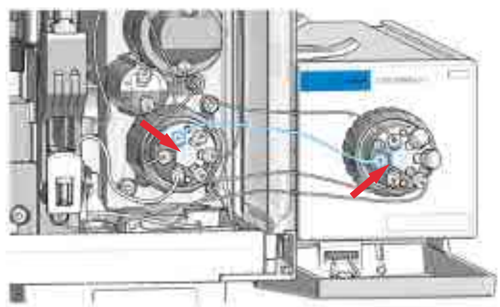
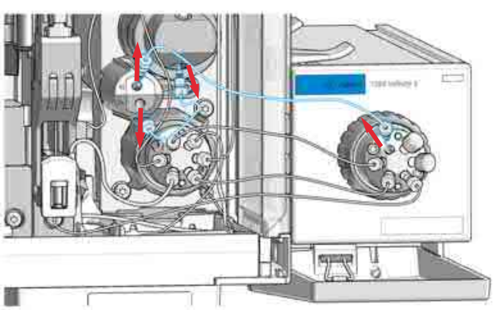
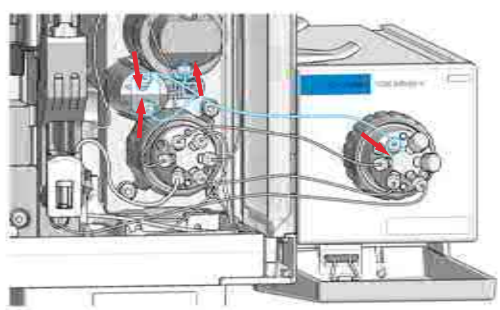
WARNING

Toxic, flammable and hazardous solvents, samples and reagents

The handling of solvents, samples and reagents can hold health and safety risks.

✓ Be sure that no solvent can drop out of the solvent connections when removing them from your valve head.

✓ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.

1 Remove the Transfer Capillary I from port 5 of the injection valve and port 4 of the external sampling valve using a 1/4-inch wrench. 	2 Connect new Transfer Capillary I to port 5 of the injection valve and port 4 of the external sampling valve with a 1/4-inch wrench. 
3 Remove the Transfer Capillary II from port 2 of the injection valve and port 3 of the external sampling valve using a 1/4-inch wrench. 	4 Connect new Transfer Capillary II to port 2 of the injection valve and port 3 of the external sampling valve with a 1/4-inch wrench. 
5 Remove the MD Capillary from port 2 of the external sampling valve and the pressure sensor using a 1/4-inch wrench. Remove the PS Capillary from the pressure sensor and the metering device using a 1/4-inch wrench. 	6 Connect new MD Capillary to port 2 of the external sampling valve and the pressure sensor with a 1/4-inch wrench. Connect new PS Capillary to the pressure sensor and the metering device with a 1/4-inch wrench. 

Next Steps:

7 Perform **Hydraulic Path Leak Test**.

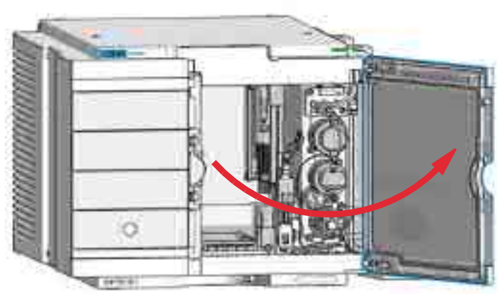
8 Perform **Sampler Leak Test** if needed for troubleshooting in case of Hydraulic Path Leak failure.

Replace Analytical Heads/Metering Device

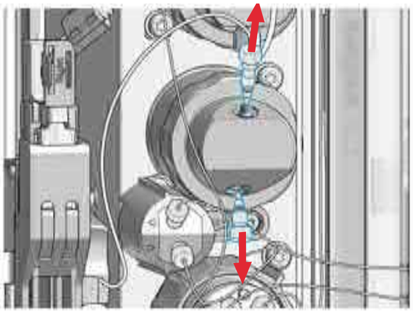
For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

Tools required	p/n	Description
	8710-0510 A	Open-end wrench 1/4 — 5/16 inch

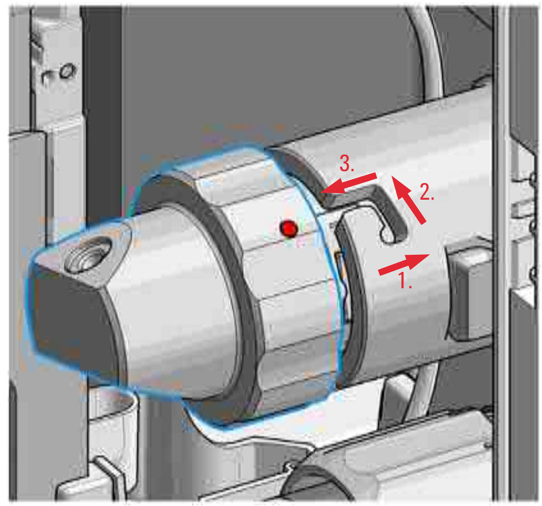
Parts required	#	p/n	Description
	1	G4267-60043 A	Analytical Head, 100 µL (for G3167A)
OR	1	G7137-60043 A	Biocompatible Head 100 µL (for G3167B)

1 In the Local Controller start the maintenance mode and select **Change Metering Device** function. OR In the Agilent Lab Advisor software select **Service & Diagnostics** in the system screen **Maintenance Positions >Change Metering Device**, click **Start** and wait until the metering device is in maintenance position.	2 Open the front door. 

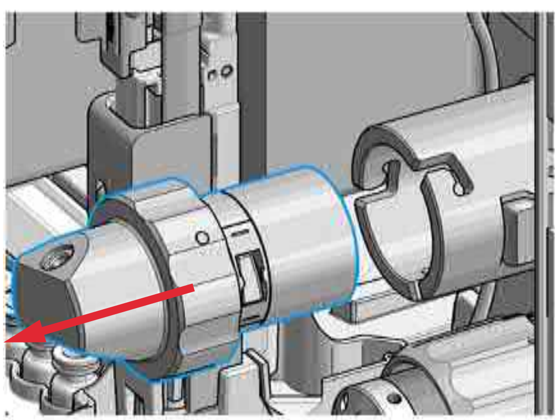
3 Disconnect all capillaries from the metering device.



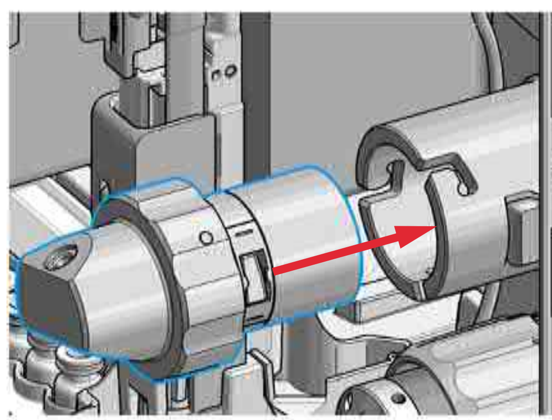
4 To release the bayonet lock, push (1.) and rotate (2.) the analytical head a quarter left. Then you can pull and detach the analytical head assembly from the actuator (3.).



5 Remove the metering device.



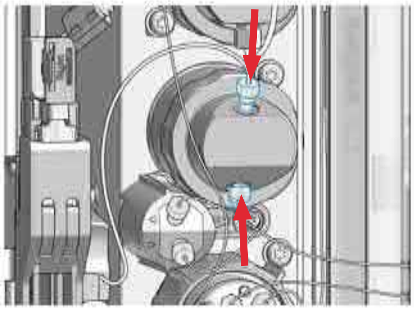
6 Reinstall the complete analytical head with the actuator housing



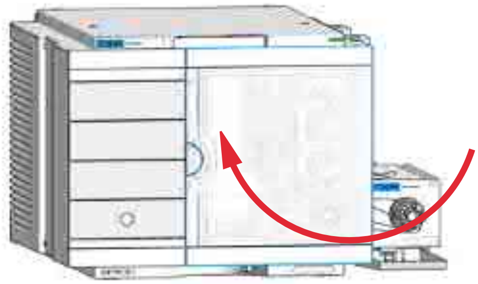
NOTE

For proper installation, check the correct position of the tag.

7 Reconnect the capillaries.



8 Close the front door.



Next Steps:

9 In the Local Controller close **Change Metering Device**.

OR

In the Agilent Lab Advisor software **Change Metering Device** click **Back**.

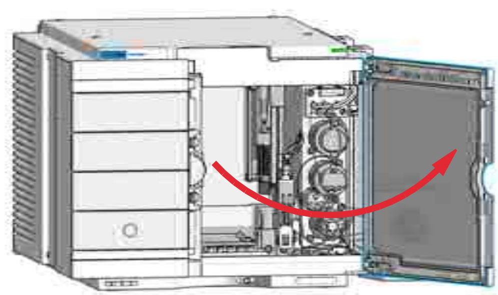
10 Perform a **Hydraulic Path Leak Test** or **Sampler Leak Test** if required.

Remove the Metering Seal

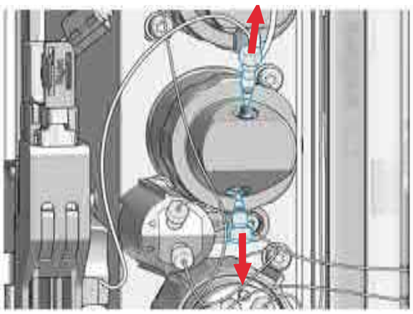
When When poor injection volume reproducibility or when metering device / analytical head is leaking.

Tools required

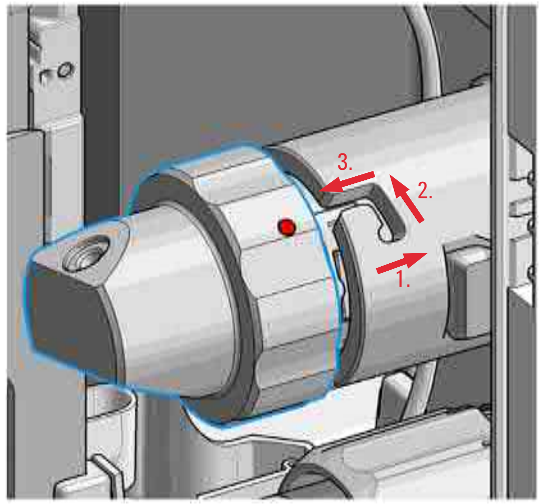
	p/n	Description
	8710-0510 A	Open-end wrench 1/4 — 5/16 inch
	8710-2392 A	4 mm Hex key
	01018-23702 A	Insert tool
OR	G4226-43800 A	Seal insert tool

1 In the Local Controller start the maintenance mode and select **Change Metering Device** function. OR In the Agilent Lab Advisor software select **Service & Diagnostics** in the system screen **Maintenance Positions >Change Metering Device**, click **Start** and wait until the metering device is in maintenance position.	2 Open the front door. 

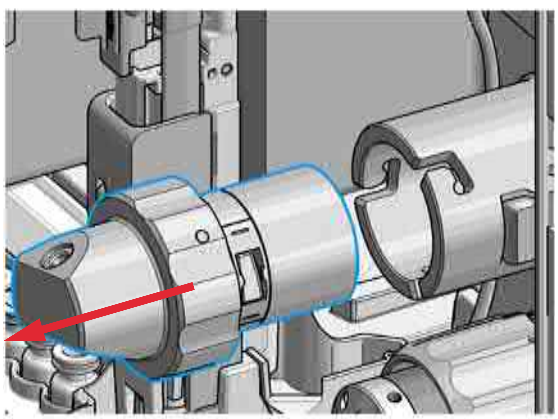
3 Disconnect all capillaries from the metering device.



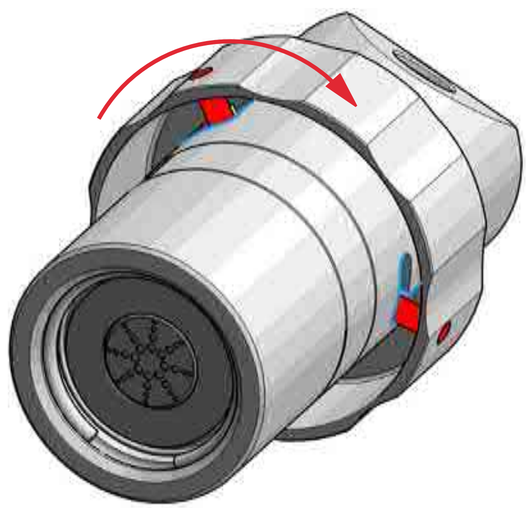
4 To release the bayonet lock, push (1.) and rotate (2.) the analytical head a quarter left. Then you can pull and detach the analytical head assembly from the actuator (3.).

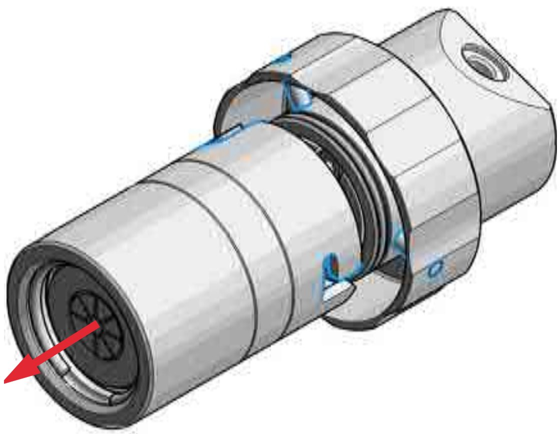
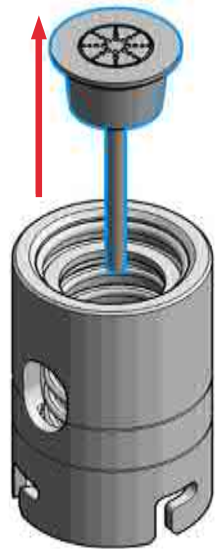
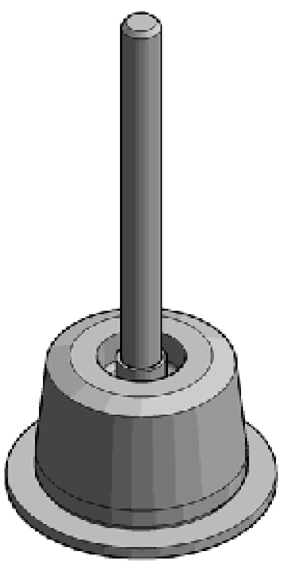
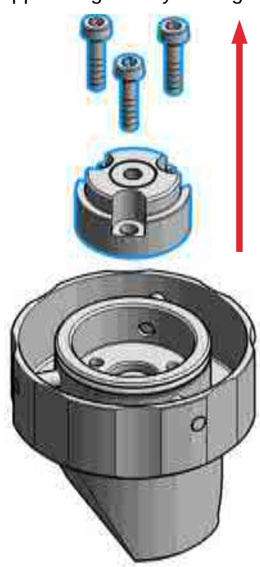


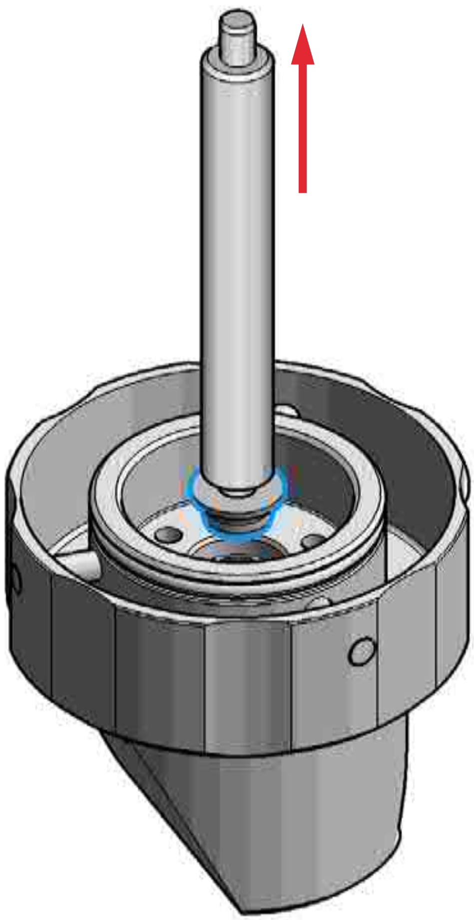
5 Remove the metering device.



6 Take the metering device. Push against the rear side of the metering device and rotate a quarter left to release the bayonet lock.



<table>
<tr>
<td>7 Now you can separate the analytical head and head body.
</td>
<td>8 Remove the piston out of the head body.
</td>
</tr>
<tr>
<td>9 Inspect the piston for cleanliness and scratches.

• If dirty:
Clean the piston with an appropriate solvent.
• If scratched:
Replace the piston by a new one.</td>
<td>10 Take the analytical head and remove the three screws on the rear side, which holds the support ring in place. Check the support ring for any damages.
</td>
</tr>
</table>

11 Carefully remove the metering seal using the steel side of the insert tool. Clean the chamber with an appropriate solvent and ensure that all particulate matter is removed. 	

Install the Metering Seal

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

When After removing the metering seal.

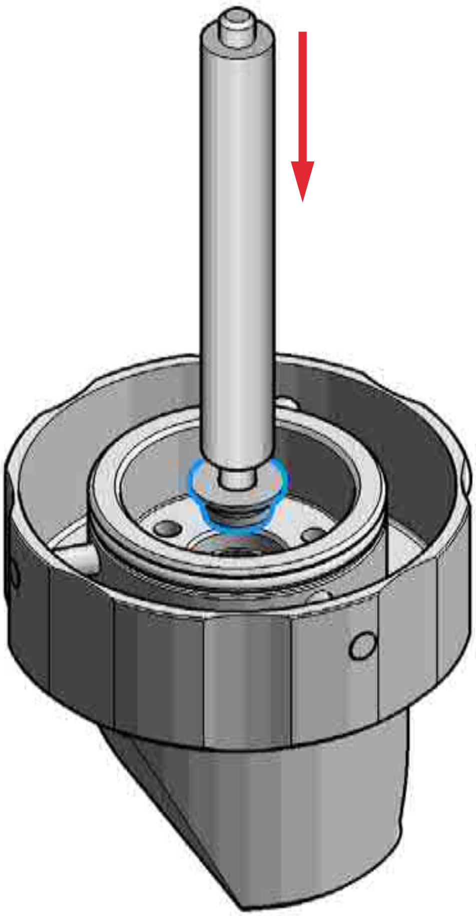
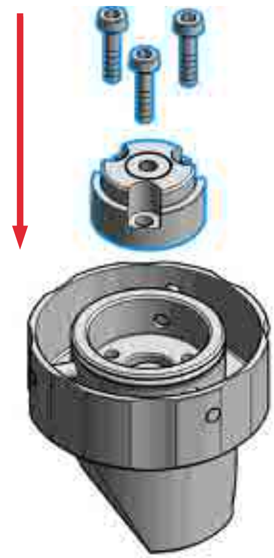
Tools required

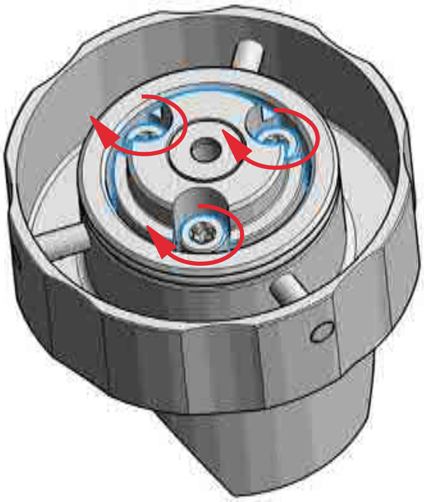
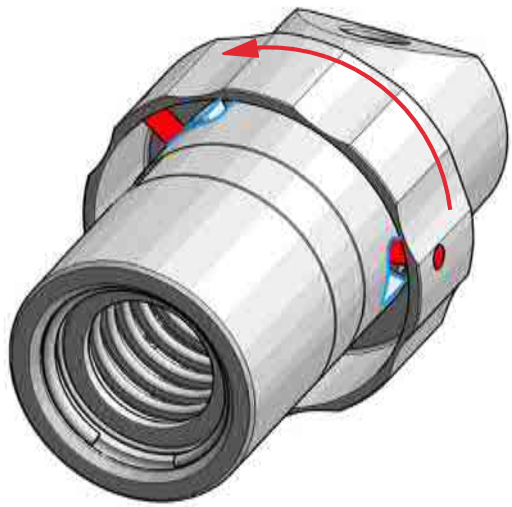
	p/n	Description
	8710-0510 A	Open-end wrench 1/4 — 5/16 inch
	8710-2392 A	4 mm Hex key
	01018-23702 A	Insert tool
OR	G4226-43800 A	Seal insert tool
		Cleaning tissue and appropriate solvent like isopropanol or methanol

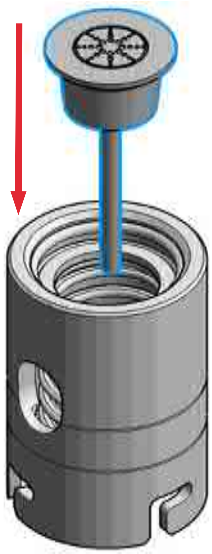
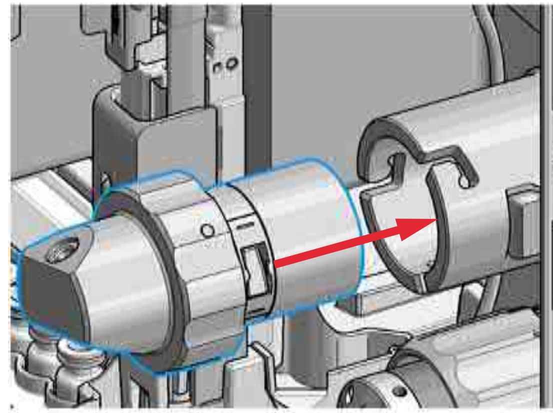
Parts required

	#	p/n	Description
	1	0905-1719 A	Metering Seal, 100 µL (for G3167A)
OR	1	G7131-20009 A	Metering Seal PTFE (Bio), 100 µL (for G3167B)
	1	5067-5678 A	Piston, 100 µL, Zirconium oxide Replacement only necessary in case of wear (OPTIONAL)

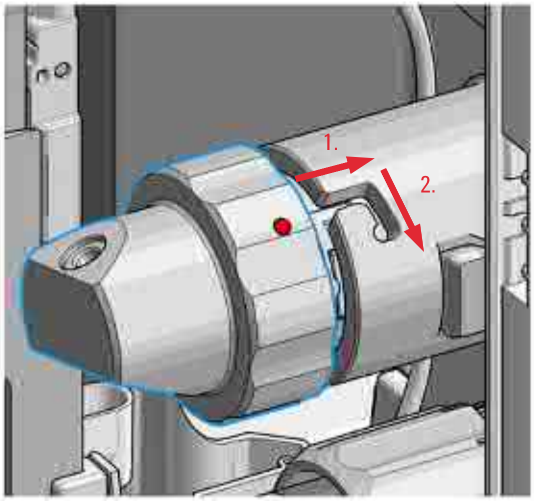
Preparations Remove the metering seal, see “Remove the Metering Seal” on page 280.

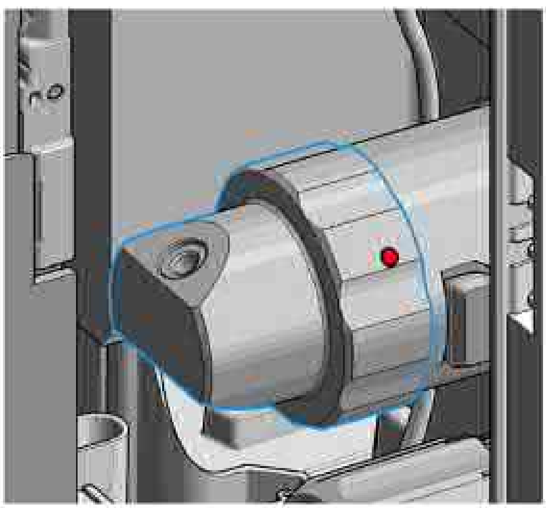
1 Install the new metering seal using the plastic side of the insert tool. Press it firmly into position. Avoid any offset angle as it might deform the seal. 	2 Reassemble the support ring. 

3 Make sure to comply to the following order of actions: a Tighten the three screws fingerthight, then b Tighten the screws a little at a time to keep the support ring surface *parallel* (important!) to the surface of the analytical head. 	4 Use the twist and lock bayonet mechanism to reassemble the analytical head assembly. Push the two parts together to couple the head body with the analytical head. Once the pin reaches the bottom of the slot, one or both parts are rotated so that the pin slides along the horizontal arm of the L until it reaches the *serif*. The spring then pushes the male connector up into the *serif* to keep the pin locked into place. 

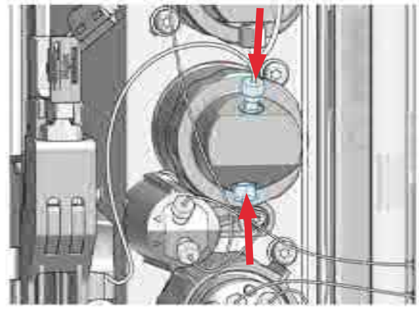
5 Press the piston carefully into the housing of the head body and the seal. 	6 Reinstall the complete analytical head with the actuator housing  **NOTE** For proper installation, check the correct position of the tag.

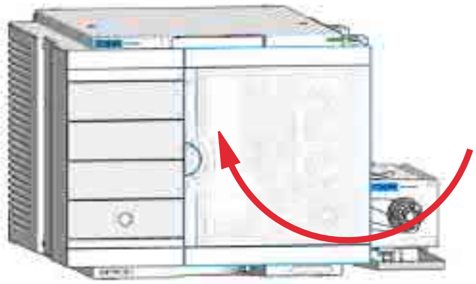
7 Fix the analytical head by pushing (1.) and rotating (2.) via twist and lock bayonet mechanism.





8 Reconnect the capillaries.



9 Close the front door. 	Next Steps: 10 In the Local Controller close **Change Metering Device**. OR In the Agilent Lab Advisor software **Change Metering Device** click **Back**. 11 Perform **Hydraulic Path Leak Test**. 12 Perform **Sampler Leak Test** if needed for troubleshooting in case of Hydraulic Path Leak failure.

Replace the Flushhead Seal

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

When The flush head is leaking.

Tools required

p/n	Description
8710-0510 A	Open-end wrench 1/4 — 5/16 inch
8710-2392 A	4 mm Hex key

Parts required

	#	p/n	Description
	1	5067-5918 A	Flush Head Seal 500 µL (for G3167A)
OR	1	G5668-60494 A	Flush Head Seal 500 µL Bio (for G3167B)

Preparations

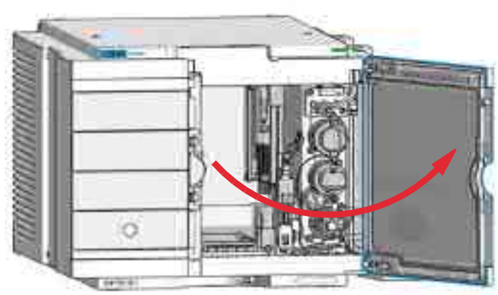
- Cleaning tissue
- Appropriate solvent like isopropanol or methanol

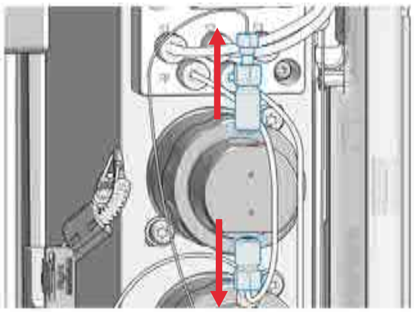
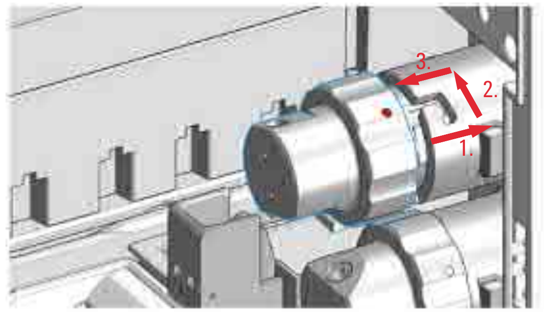
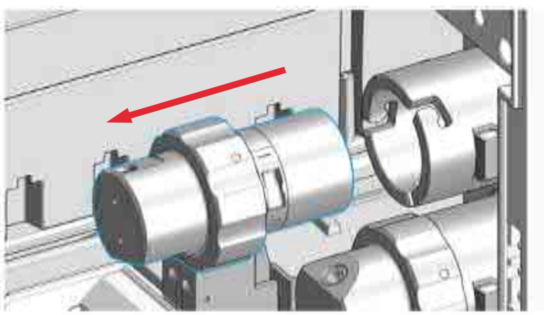
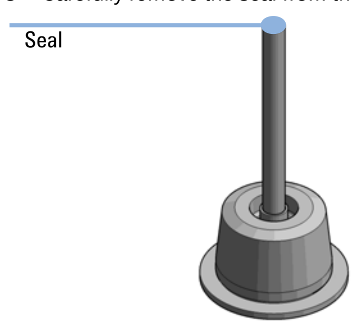
1 In the Local Controller start the maintenance mode and select **Change Metering Device** function.

OR

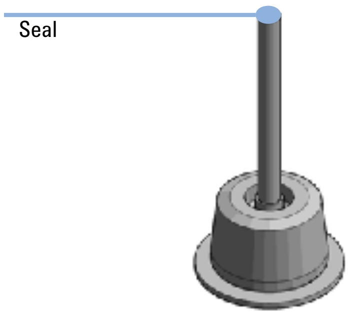
In the Agilent Lab Advisor software select **Service & Diagnostics** in the system screen **Maintenance Positions >Change Metering Device**, click **Start** and wait until the metering device is in maintenance position.

2 Open the front door.



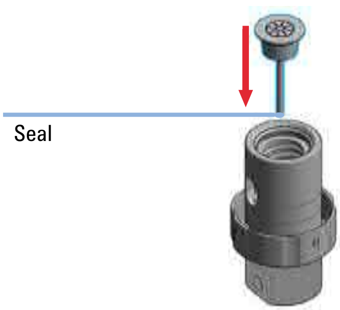
3 Remove capillaries and valves from the flush head. 	4 Press and turn the Flush Head a quarter left (bayonet fitting) and detach the metering device from the actuator. 
5 Pull the flush head away from the hydraulic box. 	6 Press against the rear side of flush head and turn a quarter left (bayonet fitting) and separate the flush head, head body and the piston.  NOTE Be careful not to break the piston.
7 Remove the piston from the head body. 	8 Carefully remove the seal from the tip of the piston. 

9 Place the new seal to the tip of the piston.

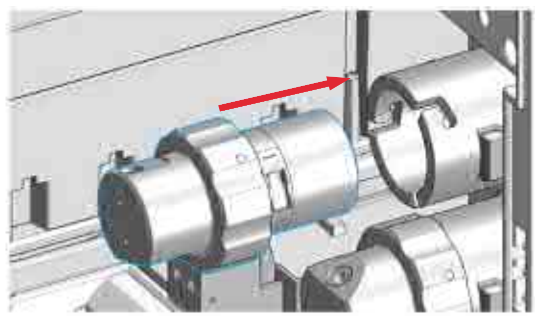


10 Reassemble the flush head and the head body (without piston).

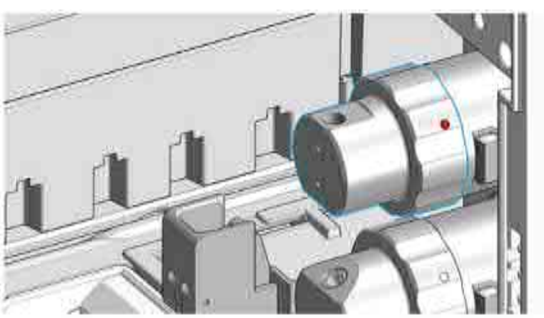
11 Carefully insert the piston with the new seal into the flush head assembly.



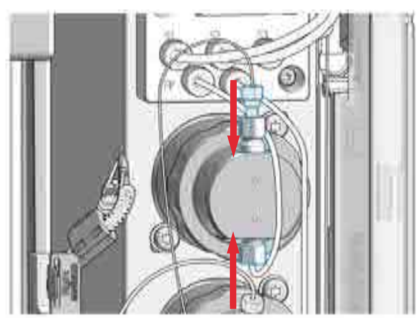
12 Reinstall the flush head to the actuator housing.

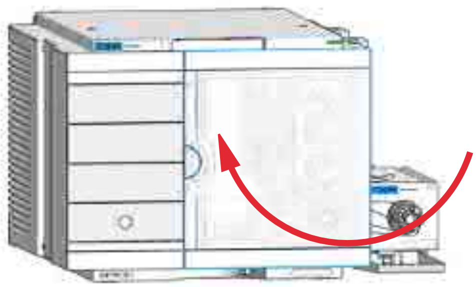


13 Fix the flush head.



14 Connect the capillaries.



15 Close the front door. 	Next Steps: 16 In the Local Controller close **Change Metering Device**. OR In the Agilent Lab Advisor software **Change Metering Device** click **Back**.

Remove the Sample Loop-Flex

When: If the sample loop flex is defective, blocked, or damaged.

Tools required:

p/n	Description
8710-0510 A	Open-end wrench 1/4 — 5/16 inch

Preparations:

- Finish any pending acquisition job.
- Return any plate on the workspace back to the hotel.

WARNING

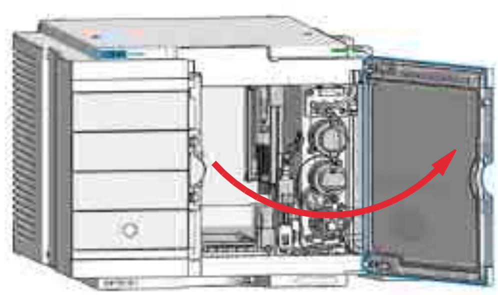
Risk of injury by uncovered needle

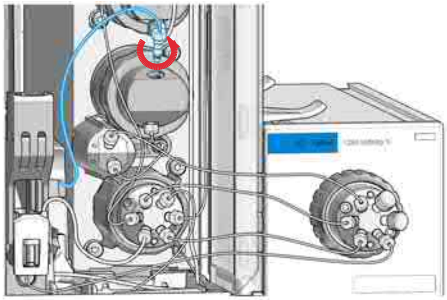
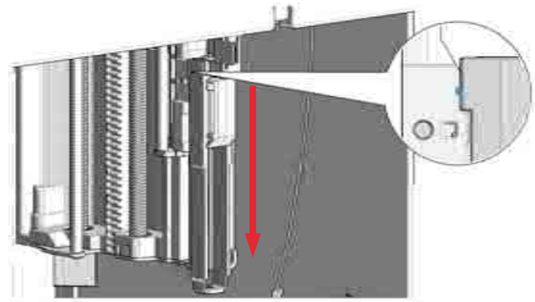
An uncovered needle is a risk of harm to the operator.

✓ Do not open the safety lock of the needle assembly

✓ Be careful working at the z-robot.

✓ Wear safety goggles, when removing the needle assembly.

1 In the Agilent Lab Advisor software select **Service & Diagnostics >Maintenance Positions >Change Loop**, click **Start** and wait until the needle assembly is in maintenance position. OR In the Local Controller start the maintenance mode and select **Change Loop** function.	2 Open the front door. 

3 The needle assembly is still connected to the loop capillary. Use a 1/4 inch wrench to loosen the fitting of the loop capillary connected to the analytical head. 	4 Lock the needle in the safety position.  **NOTE** During normal operation of the Online Sample Manager, the needle assembly has to be unlocked.

CAUTION

Damage of the loop

The loop shape may be damaged if the loop is stretched or bent too far.

- ✓ Avoid to change the loop shape.
- ✓ Do not pull or bend the loop too far.

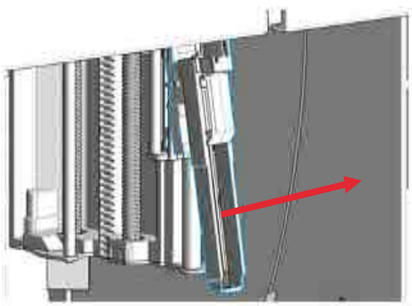
WARNING

Sharp needle

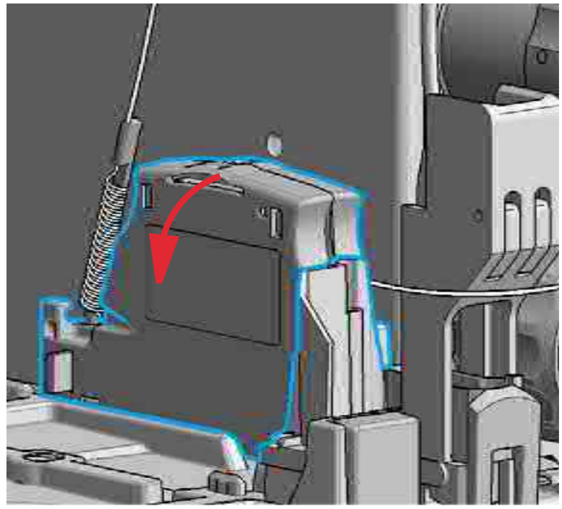
Uncovered needles may cause injuries

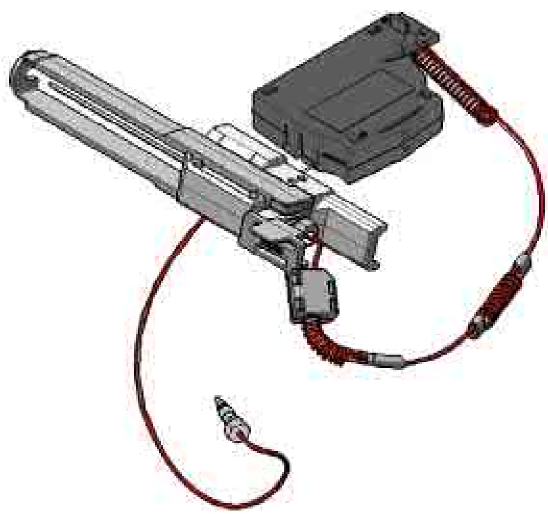
- ✓ Make sure the needle is in the safety lock position.

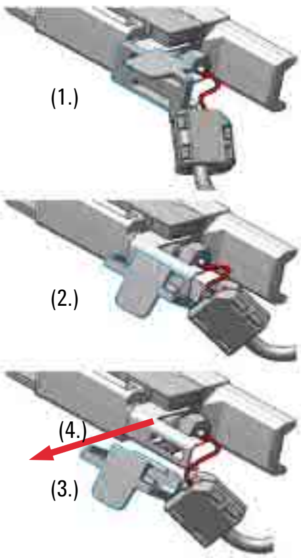
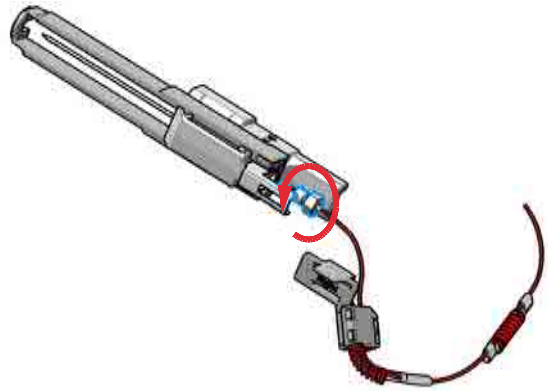
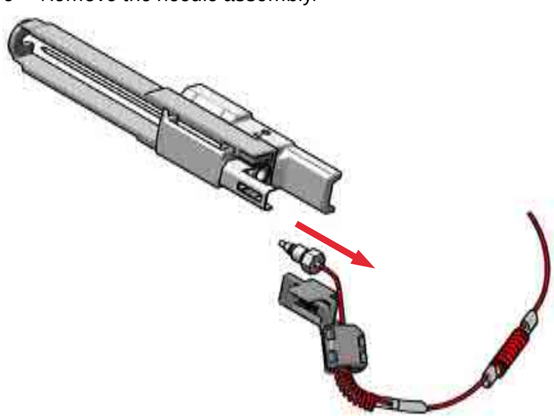
5 Remove the needle assembly by slightly pulling the needle cartridge.



6 Remove the cartridge out of its proper position, by gently tilting and pulling it out of the work space of the sampler.





7 Remove the loop plastic adapter.  NOTE Do not open the rear plastic clamp. NOTE If the plastic adapter is damaged the sample loop has to be replaced.	8 Use a 1/4 inch wrench to loosen the fitting of the loop capillary. 
9 Remove the needle assembly. 	

Install the Sample Loop-Flex

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

When If the sample loop flex is defective, blocked, or damaged.

Tools required

p/n	Description
8710-0510 A	Open-end wrench 1/4 — 5/16 inch

Parts required

	#	p/n	Description
	1	G4767-60500 A	Calibrated Sample Loop, 100 µL, right (blue coded) (for G3167A)
OR	1	G7137-60500 A	Sample Loop MP35N 100 µL, right (blue/orange coded) (for G3167B)

Preparations

- Finish any pending acquisition job.
- Return any plate on the workspace back to the hotel.

WARNING

Risk of injury by uncovered needle

An uncovered needle is a risk of harm to the operator.

✓ Do not open the safety lock of the needle assembly

✓ Be careful working at the z-robot.

✓ Wear safety goggles, when removing the needle assembly.

CAUTION

Mismatching sample loop configuration

Damage to the system

✓ Make sure, that the sample loop configuration matches to the hardware installed.

<table>
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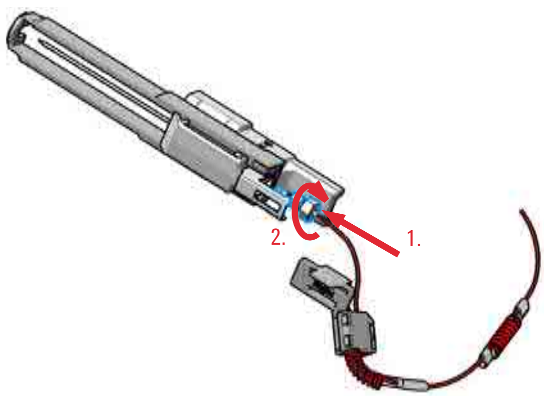
<td>

1 Install the loop capillary on top of the needle cartridge (1.) and tighten the fitting hand tight (2.).



NOTE

If the sample loop is changed, we recommend changing the needle as well.

</td>
<td>

CAUTION

Blockages inside of the needle assembly union

✓ Do not overtighten the fitting. A quarter turn should be sufficient.

2 Use a 1/4-inch wrench to tighten the fitting of the loop capillary.

</td>
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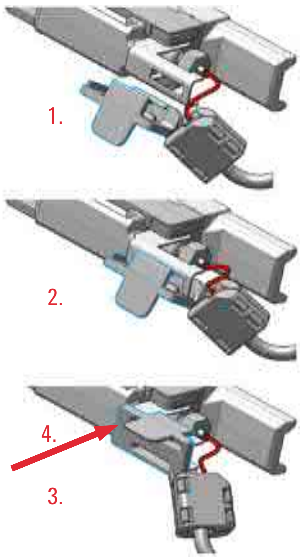
</table>

3 Install loop plastic adapter.



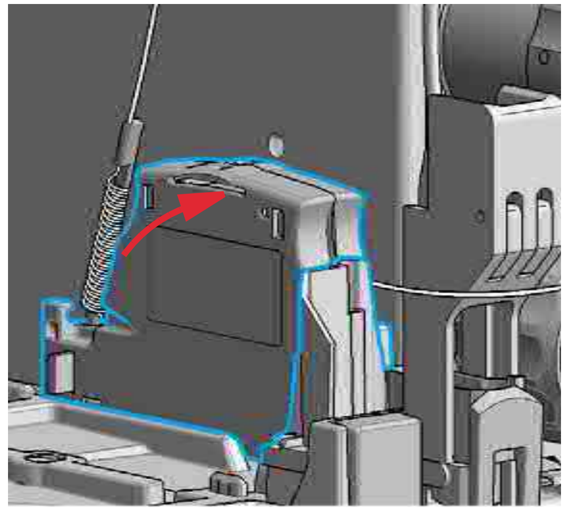
NOTE

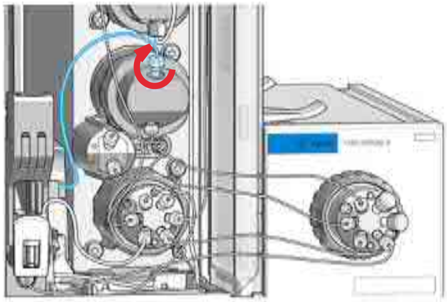
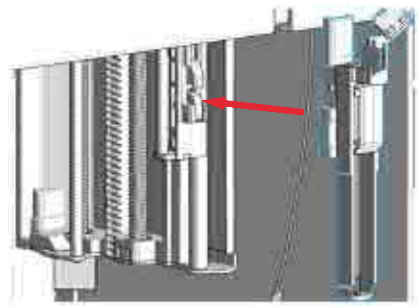
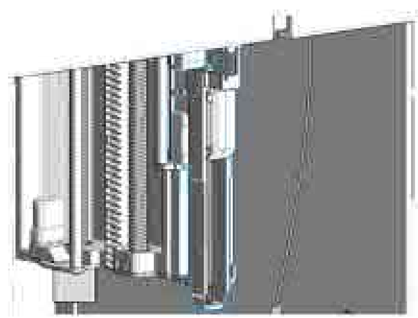
Verify the sample loop info on the plastic adapter. A left or a right sample loop must be installed in the correct slot of the needle parkstation. For single needle, the default position is on the right.

NOTE

If the plastic adapter is damaged the sample loop has to be replaced.

4 Click the sample loop cartridge in the designated location and keep the right orientation.



5 Install the shorter capillary of the sample loop cartridge to the analytical head. 	6 Pinch and reinsert the needle assembly and the connected loop capillary into the z-arm coupler. **NOTE** Check the tension of the loop capillary. This must be forced and guided to the hydraulic box to prevent it from being caught by the Z-drive.  

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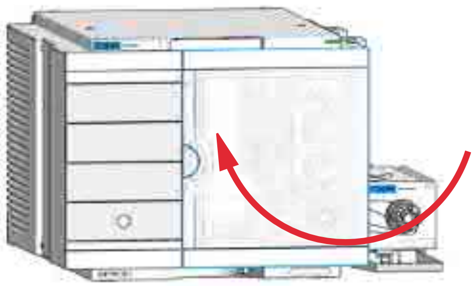
7 Close the front door.


</td>
<td>
Next Steps:

8 In the Local Controller close **Change loop**.

OR

In the Agilent Lab Advisor software **Change Loop**, click **Back** and wait until the needle is in the needle park station.

NOTE

If you need an autoreferencing step included you must choose the change needle procedure

NOTE

If you have changed the sample loop, verify that the correct sample loop is configured in the CDS, see Setting up the Autosampler in OpenLab CDS (“Graphical User Interface” on page 87).

9 Perform **Hydraulic Path Leak Test**.

10 Perform **Sampler Leak Test** if needed for troubleshooting in case of Hydraulic Path Leak failure.
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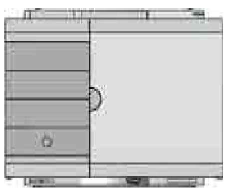
Replace the Dummy Drawer

Optional Configurations

Table 35 Overview on optional configurations (examples for uniform types)

		1H	2H	3H	Dummy-Drawer
	Delivery Status	-	G7167-60020 1x	-	G4267-60024 3x
	Up to 8 single height drawers 16 positions Shallow wellplates and MTP Max Sample capacity 1536 / 6144 samples (96 Shallow Wellplates / 384 MTP)	G7167-60021 8x	-	-	-
	Up to 4 Dual Height drawers 8 positions Vials (2 mL), deep well plates, MTP, Eppendorf Max Sample capacity 432 / 3072 samples (2 mL Vials/ 384 MTP)	-	G7167-60020 4x	-	-
	Up to 2 Drawers Triple Height 4 positions (2H or 2*1H option left over) Vials (6 ml), deep well plates, MTP, Eppendorf Max Sample capacity 60 / 216/ 1536 samples (6 mL Vials/ 2 mL Vials/ 384 MTP)	-	G7167-60020 1x	G7167-60022 2x	-

NOTE

Mixed configurations are possible (for example 1x3H- with 1x2H- and 3x1H-drawer).

All positions in the Sample Hotel must be filled either with dummies or drawers. The drawers must be installed from bottom to top.

Installing and Replacing of Drawers (Upgrade Drawer Kit)

Tools required

Description
Screwdriver

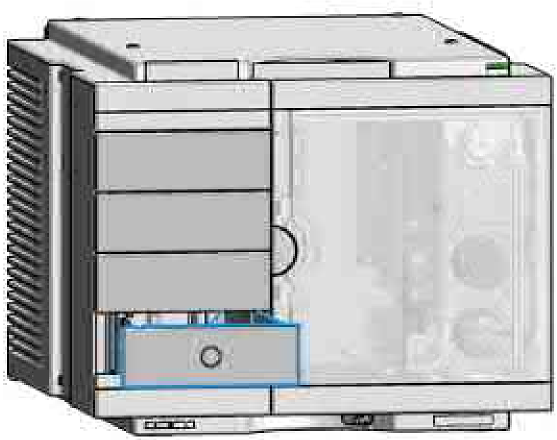
Parts required

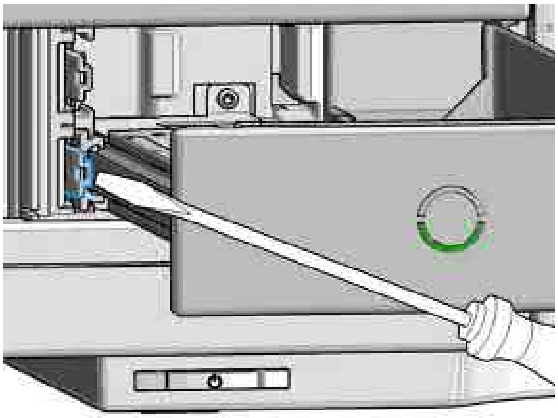
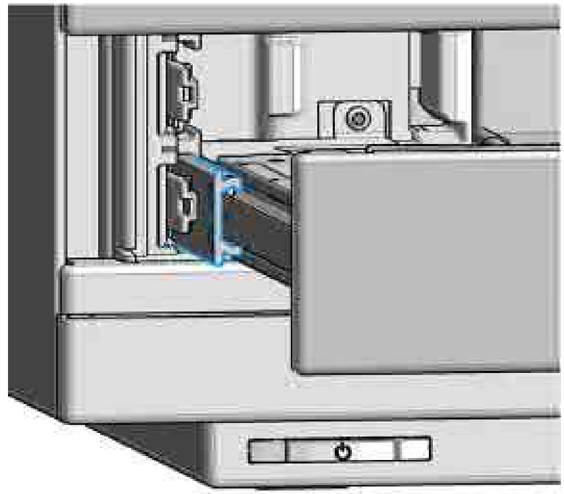
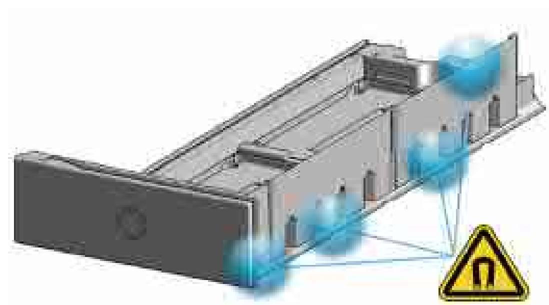
p/n	Description
G7167-60020 A	Drawer 2H
G7167-60021 A	Drawer 1H
G7167-60022 A	Drawer 3H

NOTE Before you start the new drawer installation you have to remove the lower drawer (2H drawer = default configuration) from the Sample Hotel.

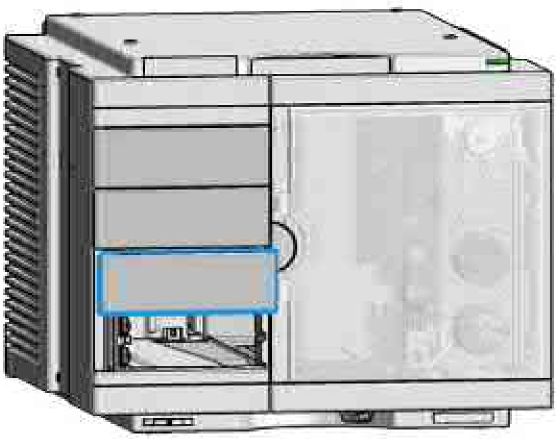
NOTE For best cooling performance the 2H drawer must be installed in the lowest position.

NOTE More detailed video information is available on the Agilent Information Center.

1 Open the drawer.	2 Pull the drawer completely out.
	

3 Unlatch the drawer: Use a screwdriver to press the clamping lever lightly to the left. 	4 Remove the drawer from the rail guide.  The drawer is now out of the hotel. 

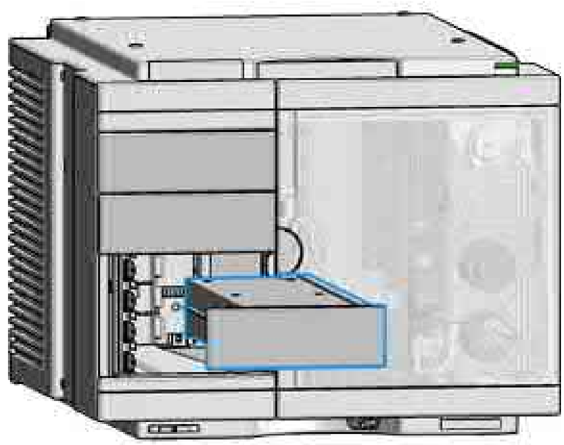
5 Grab in the recession below the dummy drawer front panel (1.) and lift the left side (2.).



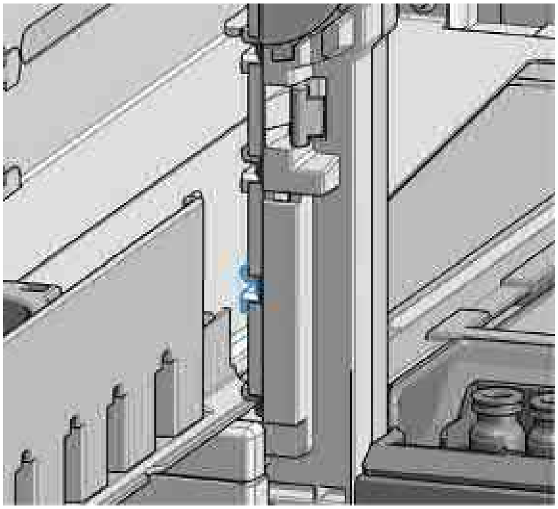
6 Remove the dummy drawer.

NOTE

At this stage remove all other dummies that will be replaced by hotel drawers.



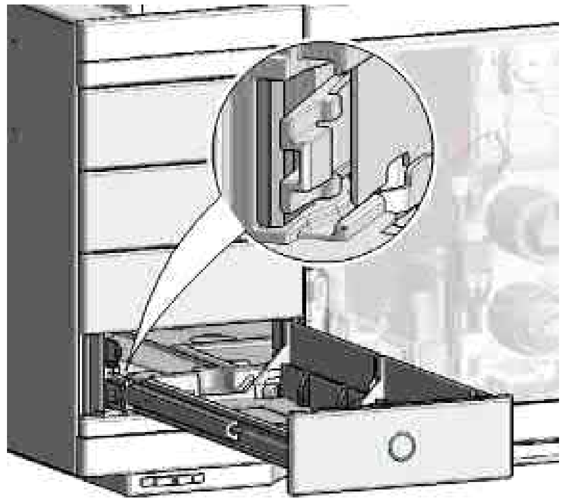
7 Place the new drawer horizontally into the sample hotel. Check that the drawer matches the middle bracket of the sample hotel.



8 Push until the complete drawer locks in place.

NOTE

Take care that the clamping lever locks.



NOTE

Always fill sample hotel completely (no empty drawer slots). Otherwise the drawers can’t be configured in the software.

9 Configure the hotel drawers in the controller software (see the Online Help of the software for details).

Configuration of the Hotel Drawers

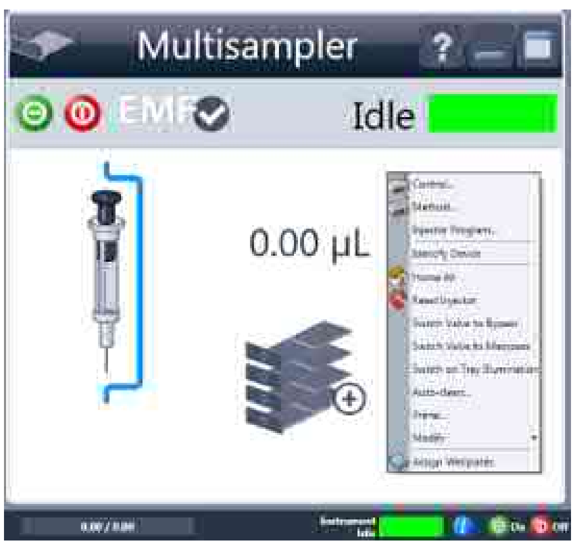
The configuration of your drawers is necessary to detect the new drawer configuration for your CDS system. When a wrong configuration is detected there will be a mismatch in your CDS system and you are not able to use the new drawers. The new drawer configuration is active and stored after you have done the Drawer Configuration.

Configure the Hotel Drawers in the Control Software

Software required	OpenLab CDS (A.02.01 or above) LC driver (A.02.10 or above)
Preparations	• Stop the acquisition run. • Remove the sample containers (trays and well plates) from workspace. • Complete the drawer installation. • Remove the sample containers (trays and well plates) from the drawers. • Verify that all sample trays (palettes) are installed in their drawers. • All open drawers and dummies have to be closed and installed properly.

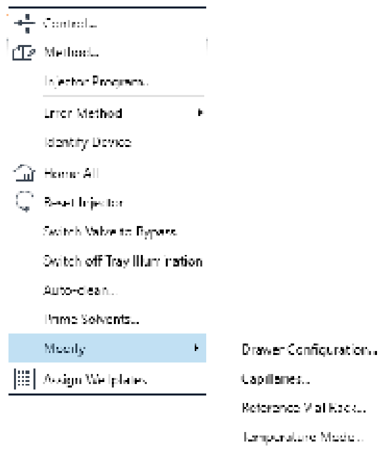
1 Start the Agilent chromatography data system.

2 Right-click on the **Sampler** GUI (example shows a Multisampler).



3 Select **Modify >Drawer Configuration** in the GUI screen.

NOTE For correct detection, it is necessary to remove all sample containers (for example 54 vial tray or well plates).



4 Follow the Setup or Change configuration screen.

5 System is ready after the robot has done Auto Referencing (see “Auto Referencing” on page 352).

Configure the Hotel Drawers in Lab Advisor

Software required Lab Advisor (B.02.05 or above)

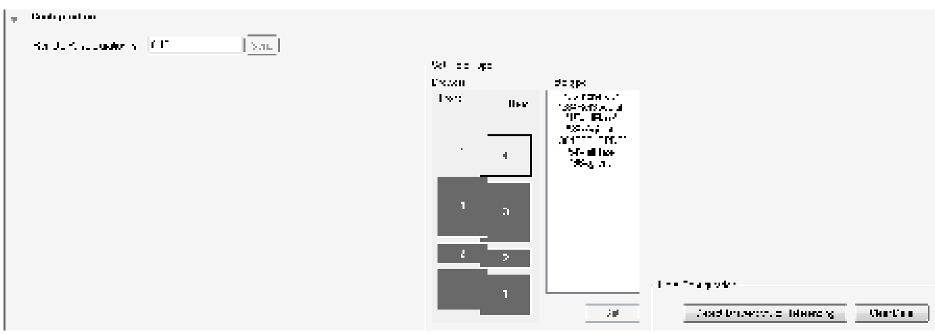
Preparations

- Stop the acquisition run.
- Remove the sample containers (trays and well plates) from workspace.
- Complete the drawer installation.
- Remove the sample containers (trays and well plates) from the drawers.
- Verify that all sample trays (palettes) are installed in their drawers.
- All open drawers and dummies have to be closed and installed properly.

1 Start the Lab Advisor Software.

2 Connect the instrument and select **Instrument Control** in the system screen.

3 Switch In the **Configuration** menu of the Online Sample Manager. Select **Detect Drawers** in the **Hotel Configuration**.



4 Follow the Detect Hotel Configuration screen to detect the physically available drawers.

NOTE For correct detection, it is necessary to remove all sample containers (for example 54 vial tray or well plates).

5 System is ready after the robot has done Auto Referencing (see “Auto Referencing” on page 352).

Replace the Sample Cooler/Sample Thermostat

When The Sample Cooler/Sample Thermostat is damaged or defective.

Tools required

	p/n	Description
	8710-0899 A	Screwdriver Pozidrive Shaft (for the Sample Cooler)
	5182-3466 A	Torx screwdriver T10 (for the Sample Thermostat)
OR	5023-3089 A	Torx key set (part of the G7120-68708 InfinityLab LC Series Tool Kit)

Parts required

	#	p/n	Description
	1	G7167-60005 A	Sample Cooler
OR	1	G7167-60101 A	Sample Thermostat
OR	1	G7167-60201 A	Sample Thermostat

Preparations If needed, update the firmware of the hosting sampler to ensure that it supports the type of thermostat you are about to install, see "Specifications of the Sample Thermostat" on page 42.

WARNING

Flammable refrigerant

Formation of flammable gas-air mixtures inside the Sample Thermostat and laboratory.

- ✓ Keep open fire or sources of ignition away from the device.
- ✓ Ensure a room size of 4 m^3 (1 m^3 for every 8 g of R600a refrigerant inside of the Sample Thermostat).
- ✓ Ensure adequate ventilation: typical air exchange of 25 m^3/h per m^2 of laboratory floor area.
- ✓ Keep all ventilation openings in the enclosure clear of obstructions. Do not block the openings on the circumference of the Sample Thermostat.

WARNING

Flammable refrigerant used

- ✓ When handling, installing and operating the Sample Thermostat, care should be taken to avoid damage to the refrigerant tubing or any part of the Sample Thermostat.

WARNING

In the event of a damage

- ✓ Keep open fire or sources of ignition away from the device.
- ✓ Ventilate the room for several minutes.
- ✓ Do not use the Sample Thermostat any more.

WARNING

Heavy weight

The module is heavy.

- ✓ Carry the module at least with 2 people.
- ✓ Avoid back strain or injury by following all precautions for lifting heavy objects.
- ✓ Ensure that the load is as close to your body as possible.
- ✓ Ensure that you can cope with the weight of your load.

CAUTION

Routing of the condensation tubing

Proper routing of the condensation tubing is critical for correct condensate drainage.

- ✓ Do not place the sampler directly on the bench.

CAUTION

Condensate inside the cooler or thermostat

Damage to the electronics

- ✓ Unplug the power cords.
- ✓ Drain off all condensate before dismounting the sample cooler or thermostat.
- ✓ Make sure that there is no condensate left.

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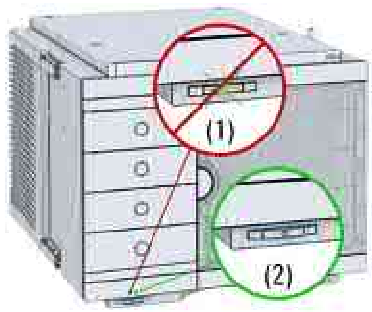
1 Ensure that the power switch on the front of the module is OFF (switch stands out).



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<td>

2 Disconnect the power cable from the sampler.

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3 Ensure that no condensate remains inside the cooler/thermostat before proceeding forward.

NOTE

Gently tapping on the sides of the sampler can help to remove the last traces of condensate from the system.

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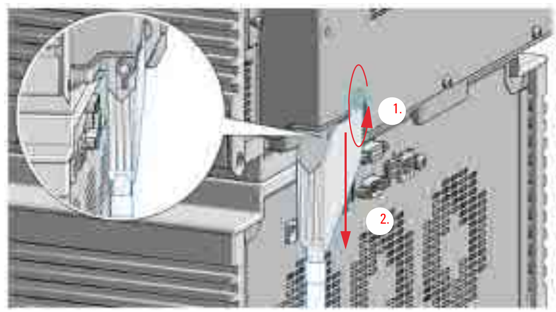
4 Loosen the screw (1) and remove the condensate funnel (2) from the back of the cooler/thermostat.



NOTE

If there is still some condensate inside the cooler/thermostat, place a suitable container underneath the outlet tube, and keep tapping on the sides of the sampler until no more water comes out.

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5 Remove the fixation screws on the back of Sample Cooler/Sample Thermostat.

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6 Pull the cooler/thermostat halfway out, disconnect the power and the data cable and then remove the unit completely from the sampler.

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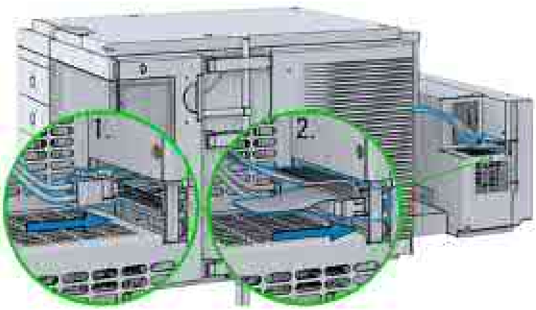
7 Slide the new cooler/thermostat halfway into the sampler and connect the power and the data cable.



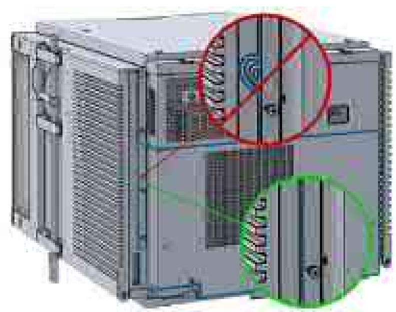
CAUTION

Damage to the cables

✓ Do not bend or pinch the cables.

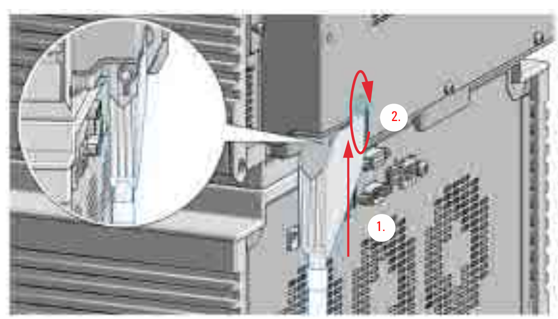
✓ Make sure that the Sample Cooler/Sample Thermostat fits perfectly in the sampler.

8 Slide the cooler/thermostat all the way into the sampler, making sure that the cables don't get jammed between the metal parts.



9 Fix the unit with the four screws.

10 Position the condensate collector funnel underneath the condensate drainage outlet tube (1) and fix it to the back of the cooler/thermostat by tightening the screw (2). Ensure correct orientation and avoid overtightening the screw.



11 Connect the power cable to the power connector at the rear of the module.

CAUTION

Damage to the Sample Cooler/Sample Thermostat

✓ Wait at least 30 min before switching on the compressor of the cooler/thermostat.

✓ This allows the refrigerant and system lubrication to reach equilibrium.

12 Switch on the sampler and perform the **Sample Cooler Function Test** to verify the correct functioning of the new cooler/thermostat, see "Sample Cooler Function Test" on page 360.

Replace the Module Firmware

When	The installation of newer firmware might be necessary • if a newer version solves problems of older versions or • to keep all systems on the same (validated) revision. The installation of older firmware might be necessary • to keep all systems on the same (validated) revision or • if a new module with newer firmware is added to a system or • if third party control software requires a special version.
Tools required	**Description** Agilent Lab Advisor software
Parts required	**#** **Description** 1 Firmware, tools and documentation from Agilent web site
Preparations	Read update documentation provided with the Firmware Update Tool.

To upgrade/downgrade the module's firmware carry out the following steps:

1. Download the required module firmware, the latest FW Update Tool and the documentation from the Agilent web.
   https://www.agilent.com/en-us/firmwareDownload?whid=69761
2. For loading the firmware into the module follow the instructions in the documentation.

Module Specific Information

There is no specific information for this module.

8 Parts for Maintenance and Repair

This chapter provides information on parts material required for the solution modules.

Standard Parts

Standard Parts Used in the 1260 Infinity II Online LC System

p/n	Description
G4267-87201 A	Needle Assembly
G3167-60018 A	Needle Seat Capillary, ST 0.17 mm x 230 mm SL/SL
5068-0279 A	Rotor Seal, 3-position/6-port FI Valve, 800 bar
5068-0280 A	Stator
G4767-60500 A	Calibrated Sample Loop, 100 µL, right (blue coded)
G4267-40033 A	Transport Protection

Standard Parts Used in the 1290 Infinity II Bio Online LC System

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

p/n	Description
G7137-87201 A	Needle Biocompatible
G3167-60017 A	Needle Seat Capillary, Bio 0.17 mm x 230 mm
5320-0005 A	Rotor Seal, 3-position/6-port FI Valve, MP35N, 1300 bar
5320-0004 A	Stator, Bio
G7137-60500 A	Sample Loop MP35N 100 µL, right (blue/orange coded)
G4267-40033 A	Transport Protection

Hotel Drawer

Item	p/n	Description
1	G7167-60021 A	Drawer 1H (including 2*G4267-60206 Sample Tray (Palette))[1]
2	G7167-60020 A	Drawer 2H (including 2*G4267-60205 Sample Tray (Palette))[1]
3	G7167-60022 A	Drawer 3H (including 2*G4267-60205 Sample Tray (Palette))[1]
	G4267-60024 A	Dummy Drawer (not shown)

[1] Note: This partnumber should only be used for repairs. For increasing the capacity in the Sample Hotel please order a pair of drawers via ELSA http://wadnts02.germany.agilent.com/csc/tools/web_elsa/el-sa.htm.

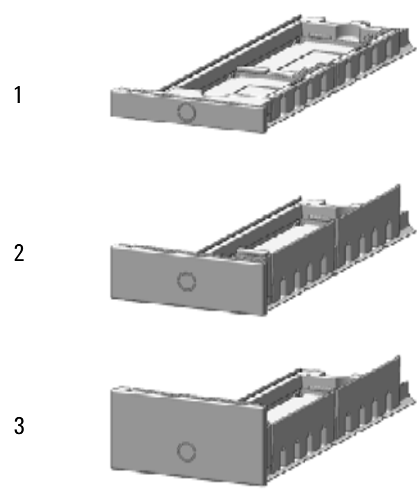


Figure 51 Hotel drawer

Analytical Head Assembly 100 µL

Item	p/n	Description
	G4267-60043 A	Analytical Head, 100 µL (for G3167A)
1	G4267-60433 A	Head Assembly, 100 µL
2	0905-1719 A	Metering Seal, 100 µL
3	G4267-60434 A	Seal Support Assembly, 100 µL
4	0515-1052 A	Screw, ST, M3x0.5, 12 mm, Hex 2.5 mm
5	G4267-60432 A	Spring Adapter Assembly
6	5067-5678 A	Piston, 100 µL, Zirconium oxide
7	G4267-40430 A	RFID Clamp
	5043-1000 A	O-Ring (not shown)
	5500-1159 A	Capillary ST 0.17 mm x 100 mm SX/S-2.3 Capillary from the metering device to the pressure sensor (not shown)

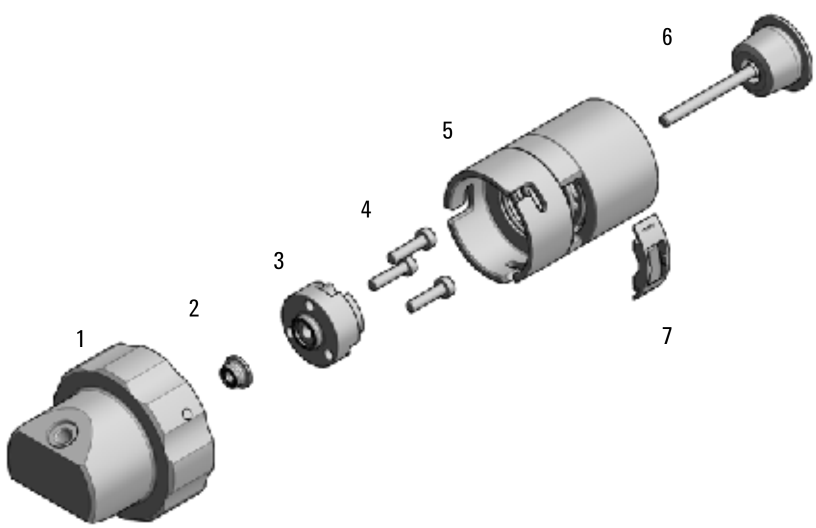


Figure 52 Analytical head assembly, 100 µL

Biocompatible Analytical Head Assembly 100 µL

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

Item	p/n	Description
	G7137-60043 A	Biocompatible Head 100 µL (for G3167B)
1	G7137-60001 A	Biocompatible head assembly, 100 µL
2	G7131-20009 A	Metering Seal PTFE (Bio), 100 µL
3	G4267-60434 A	Seal Support Assembly, 100 µL
4	0515-1052 A	Screw
5	G4267-60432 A	Spring Adapter Assembly
6	5067-5678 A	Piston, 100 µL, Zirconium oxide
7	G4267-40430 A	RFID Clamp
	0960-2971 A	RF Transponder
	5043-1000 A	O-Ring (not shown)
	5500-1278 A	Capillary MP35N 0.17 mm x 100 mm SL/SL Capillary from the metering device to the injection valve (not shown)

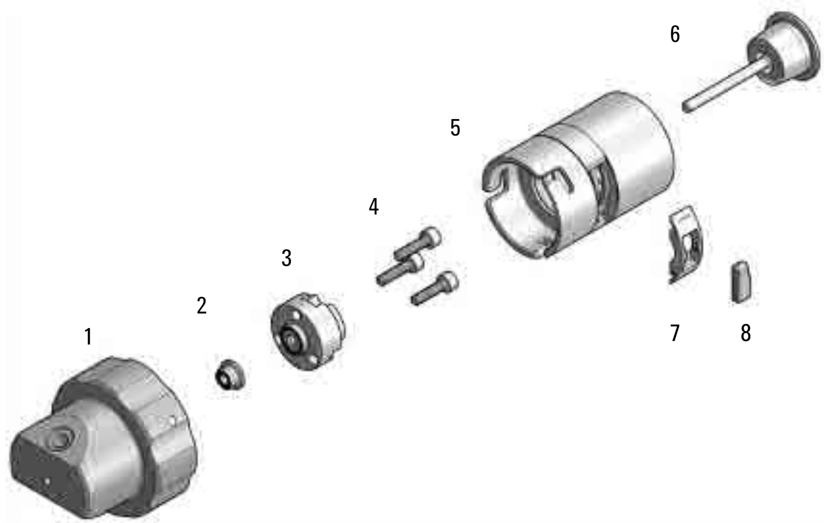


Figure 53 Biocompatible analytical head assembly, 100 µL

Flush Head Assembly 500 µL

Item	p/n	Description
	G4267-60049 A	Flush head, 500 µL (for G3167A)
1	G4267-60491 A	Flush Head Assembly, 500 µL
2	5023-2473 A	Sealing Plate 500 µL
3	G4267-60482 A	Cylinder Assembly, 500 µL
4	5067-5918 A	Flush Head Seal 500 µL
5	0515-5167 A	Screw
6	1410-1881 A	Bearing-Sleeve 8 mm-ID 10 mm-OD 10 mm-LG PI
7	G4267-60432 A	Spring Adapter Assembly
8	5067-5919 A	Piston Assembly 500 µL
9	G4267-60451 A	Pump Valve IN
10	G4267-60452 A	Pump Valve Out
	5043-1000 A	O-Ring (not shown)

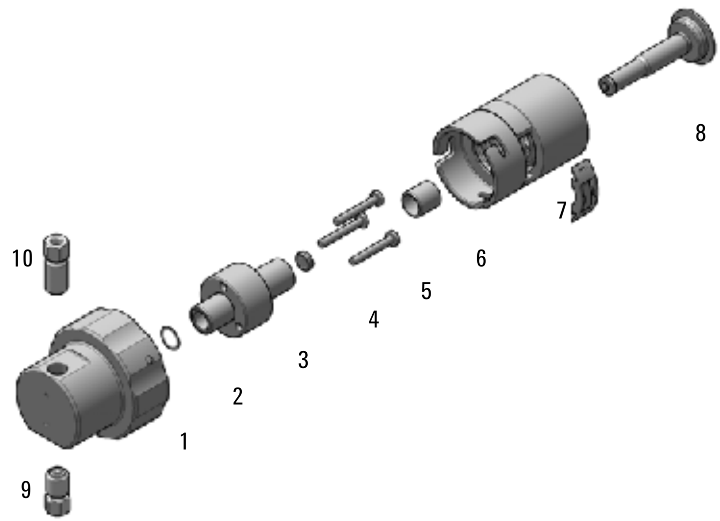


Figure 54 Flush head assembly, 500 µL

Bio Flush Head Assembly 500 µl

For bio-inert modules use bio-inert parts only!

Item	p/n	Description
	G5668-60049 A	Flush Head Bio 500 µL (for G3167B)
1	G5668-60491 A	Flush Head Bio Assembly, 500 µL
2	5023-2473 A	Sealing Plate 500 µL
3	G4267-60482 A	Cylinder Assembly, 500 µL
4	G5668-60494 A	Flush Head Seal 500 µL Bio
5	0515-5167 A	Screw
6	1410-1881 A	Bearing-Sleeve 8 mm-ID 10 mm-OD 10 mm-LG PI
7	G4267-60432 A	Spring Adapter Assembly
8	5067-5919 A	Piston Assembly 500 µL
9	G5668-60492 A	Pump Valve IN
10	G5668-60493 A	Pump Valve Out

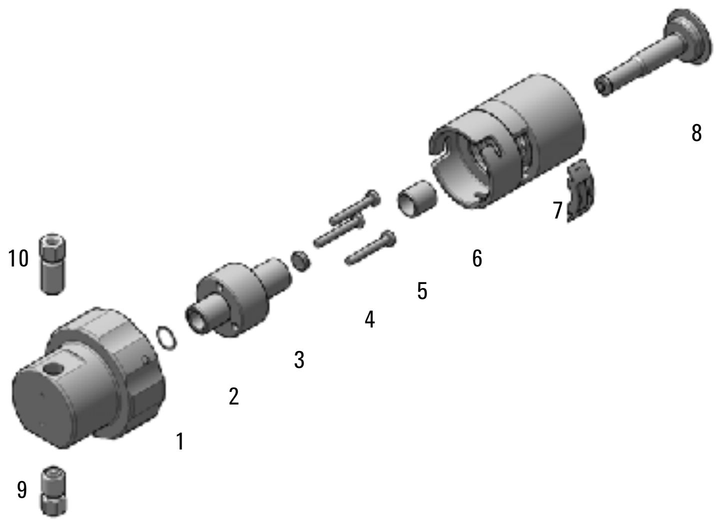


Figure 55 Bio flush head assembly, 500 µL

3-Position/6-Port FI Valve

BIO

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

Item	p/n	Description
	5067-6680 A	3-position/6-port FI valve 800 bar (for G3167AA)
OR	5320-0003 A	3-position/6-port FI valve, MP35N, 1300 bar (for G3167BA)
1	5068-0210 A	Stator screws
2	5068-0280 A	Stator (for G3167AA)
OR	5320-0004 A	Stator, Bio (for G3167BA)
OR 3	5068-0279 A	Rotor Seal, 3-position/6-port FI Valve, 800 bar (for G3167AA)
OR	5320-0005 A	Rotor Seal, 3-position/6-port FI Valve, MP35N, 1300 bar (for G3167BA)

BIO

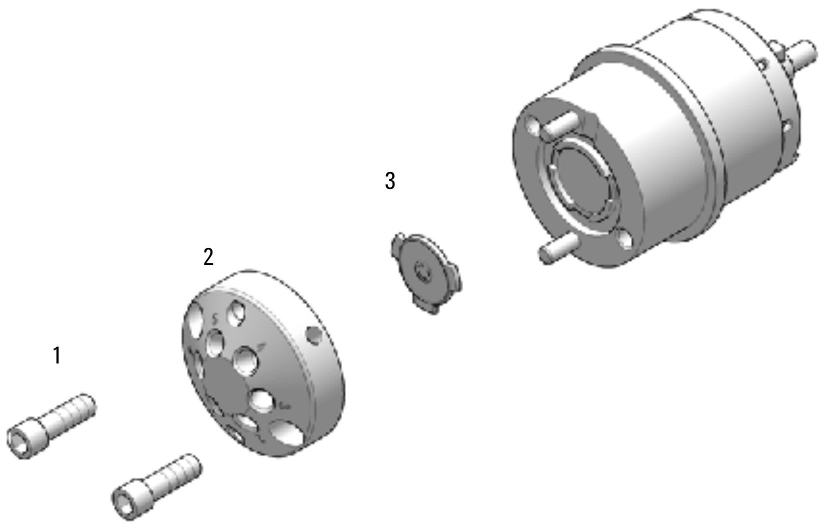


Figure 56 3-Position/6-Port FI Valve Assembly

Needle Port Assembly

Item	p/n	Description
1	G4267-60044 A	Needle Port Assembly Station
2	G4267-40045 A	Needle port Adapter

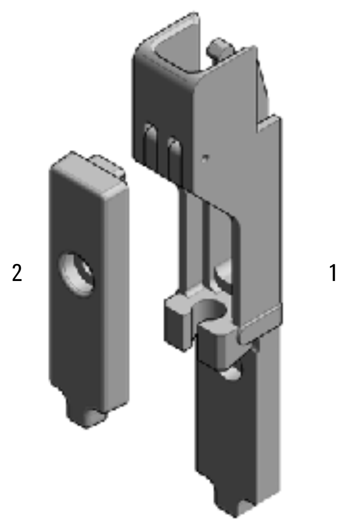


Figure 57 Needle port assembly

Door Assy

Item	#	p/n	Description
	1	5067-5415 A	Door Assy
1	1	5021-1879 A	Permanent Magnet
2	1		Pressure Spring (not available)
3	2	5067-5412 A	Hinge for Infinity II Instrument Doors
	1	G7167-68718 A	Light Protection Kit (not shown)

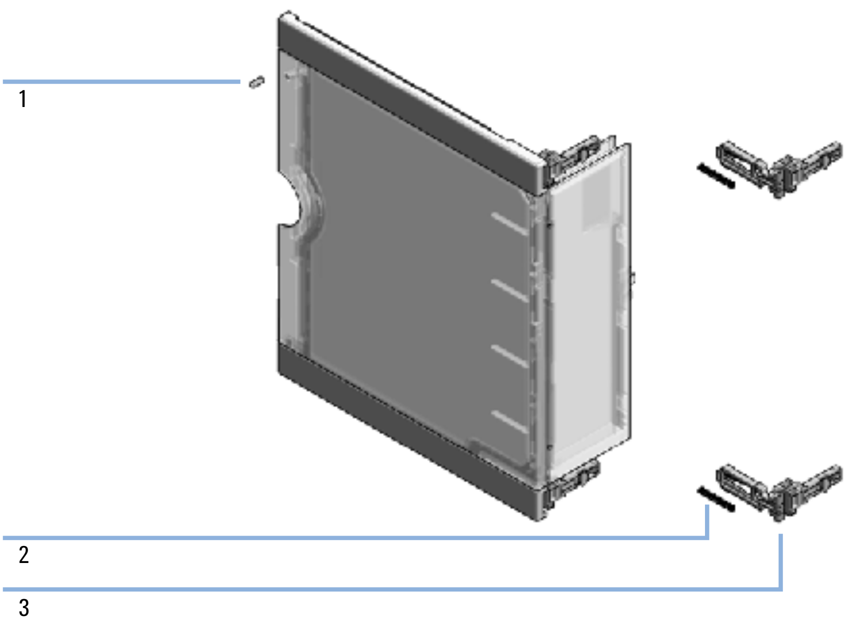


Figure 58 Door assy

1260 Infinity II Online Sample Manager Accessory Kit

Item	#	p/n	Description
	1	G3167-68000 A	1260 Infinity II Online Sample Manager Accessory Kit
1	1	8121-3099 A	CAN Cable, 1 m, flat (not shown)
2	2	G3167-42000 A	Single Holder UVD Multi Function
3	4	0515-5869 A	Screw-Tapping Pan-HD Hexalobular-Recess (not shown)
4	2	5043-1356 A	Column Holder Lamella
5	1	2110-1486 A	Fuse 2 AT250 V
6	1	5043-0270 A	Leak plane
7	1	5043-0271 A	Holder leak plane
8	1	5067-4792 A	Leak sensor assembly
9	1	5063-6527 A	Tubing, Silicon Rubber, 1.2 m, ID/OD 6/9 mm
10	1	5500-1156 A	T-Tube Connector ID6.4
11	1	5067-6680 A	3-position/6-port FI valve 800 bar
12	1	5004-0011 A	Capillary ST 0.12 mm x 160 mm SL/SL
13	1	5005-0057 A	Capillary ST 0.17 mm x 160 mm SL/SL
14	3	G4220-60007 A	Bottle Head Assembly
	1	5004-0014 A	Capillary ST 0.17 mm x 500 mm SX/SL (not shown)
	1	5004-0015 A	Tubing PTFE 0.8 mm x 180 mm (not shown)
	3	5043-1013 A	Tubing Clip IF-II (not shown)
	1	5067-5967 A	Tubing Clip Tube Connector (not shown)

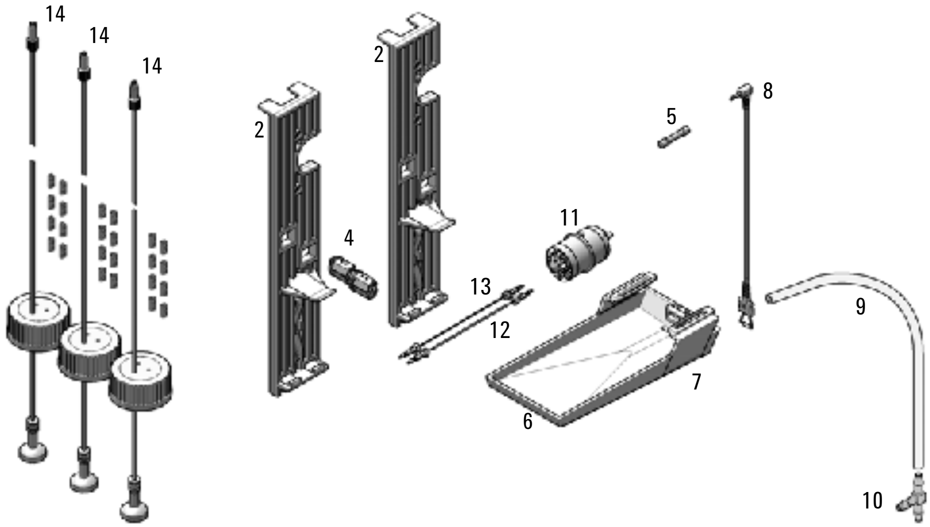


Figure 59 1260 Infinity II Online Sample Manager Accessory Kit

1290 Infinity II Bio Online Sample Manager Accessory Kit

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

Item	#	p/n	Description
	1	G3167-68010 A	1290 Infinity II Bio Online Sample Manager Accessory Kit
1	1	8121-3099 A	CAN Cable, 1 m, flat (not shown)
2	2	G3167-42000 A	Single Holder UVD Multi Function
3	4	0515-5869 A	Screw-Tapping Pan-HD Hexalobular-Recess (not shown)
4	2	5043-1356 A	Column Holder Lamella
5	1	2110-1486 A	Fuse 2 AT250 V
6	1	5043-0270 A	Leak plane
7	1	5043-0271 A	Holder leak plane
8	1	5067-4792 A	Leak sensor assembly
9	1	5063-6527 A	Tubing, Silicon Rubber, 1.2 m, ID/OD 6/9 mm
10	1	5500-1156 A	T-Tube Connector ID6.4
11	1	5320-0003 A	3-position/6-port FI valve, MP35N, 1300 bar
12	1	5005-0072 A	Capillary MP35N 0.12 mm x 160 mm SL/S
13	1	5005-0069 A	Capillary MP35N 0.17 mm x 160 mm SL/SL
14	3	G4220-60007 A	Bottle Head Assembly
	1	5005-0071 A	Capillary MP35N 0.17 mm x 500 mm SL/SL (not shown)
	1	G3167-68300 A	Waste Tube PTFE, 0.70 mm x 180 mm (not shown)
	3	5043-1013 A	Tubing Clip IF-II (not shown)
	1	5067-5967 A	Tubing Clip Tube Connector (not shown)

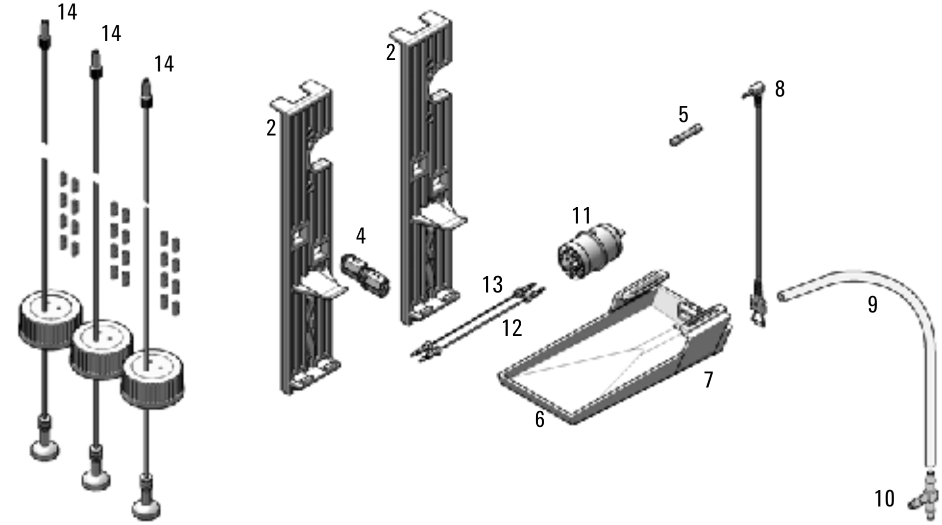


Figure 60 1290 Infinity II Bio Online Sample Manager Accessory Kit

Multisampler Accessory Kit

Item	p/n	Description
	G7167-68715 A	Accessory Kit 1260 Infinity II Multisampler Accessory Kit
OR	G7137-68705 A	Accessory Kit 1290 Infinity II Bio Multisampler Accessory Kit
1	G4220-60007 A	Bottle Head Assembly (not included in Accessory Kit, shipped separately)
2	5063-6527 A	Tubing, Silicon Rubber, 1.2 m, ID/OD 6/9 mm
3	5500-1246 A	Capillary ST 0.17 mm x 500 mm SI/SI
4	5043-1013 A	Tubing Clip IF-II
5	5181-1519 A	CAN cable, Agilent module to module, 1 m
	5067-5967 A	Tubing Clip Tube Connector
	0100-1846 A	UNION-TEFZEL
	5182-0716 A	Screw Cap Vial, 2 mL, amber glass, write-on spot, 100/Pack
	5190-7024 A	Screw Cap, PTFE/silicone, 100/pk
	5043-1834 A	Single Drain Connector ID3.0-Long

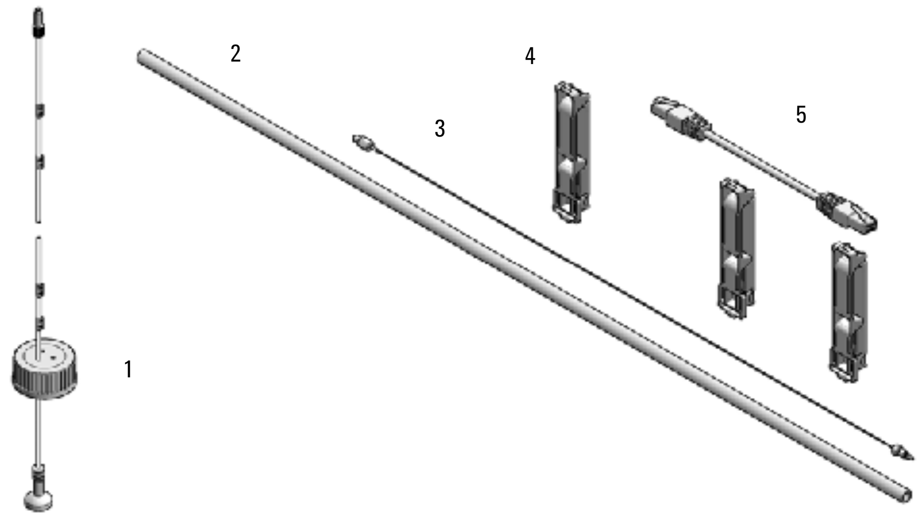


Figure 61 Accessory kit (standard)

Tools

p/n	Description
0100-1710 A	Mounting Tool for Tubing Connections
5023-2533 A	Mounting tool

Tubing Connector Leak Kit (5067-6137)

p/n	Description
5067-6137 A	Tubing Connector Leak Kit

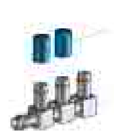


Figure 62 Tubing connector Leak Kit

Leak System Parts

Item	p/n	Description
	G4267-68708 A	Drain management contains:
1	G4267-40013 A	Leak Plane
2		Ref Vial Holder (not orderable as one part)
3		Wash Port Assembly (not orderable as one part)
	5043-1357 A	Seal silicone rubber (Washport; not shown)
	G4267-60060 A	Blind seat (not shown)
	5042-9974 A	Tubing, PE, 1.5 m (not shown)

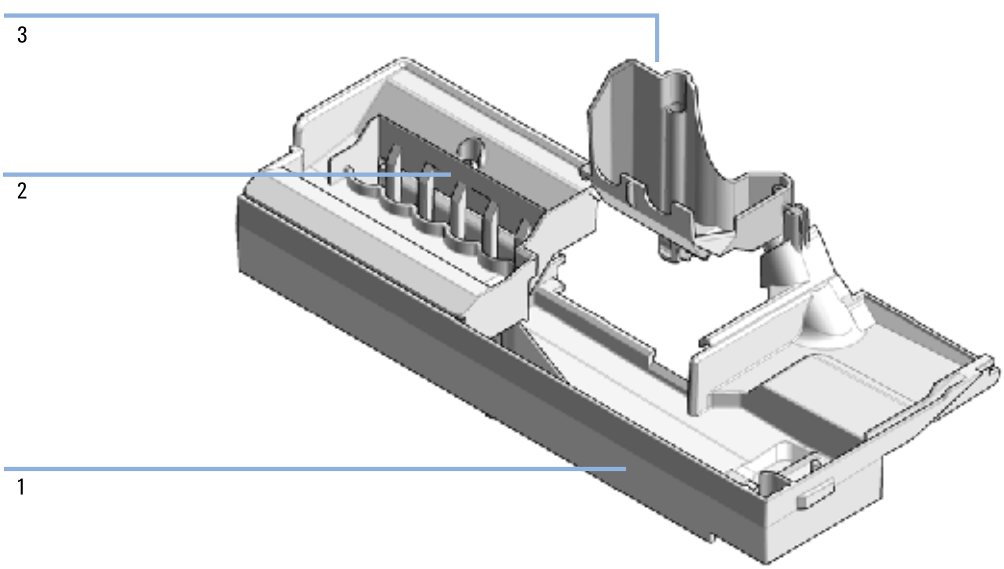


Figure 63 Drain management kit

Sample Thermostat

p/n	Description
G4761A A	InfinityLab Sample Thermostat Upgrade Kit contains:
G7167-60201 A	Sample Thermostat
5067-6208 A	Condensate Drainage Kit (not shown)

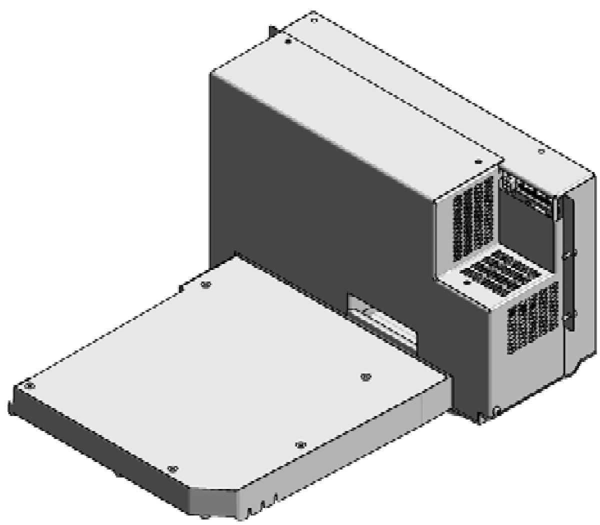


Figure 64 Sample Thermostat

NOTE

The Sample Thermostat contains flammable refrigerant R600a. Please check further details for installation.

1260 Infinity II Online Sample Manager Capillary Kit

Item	#	p/n	Description
	1	G3167-67000 A	G3167A Online Sample Manager Capillary Kit
1	1	5500-1159 A	Capillary ST 0.17 mm x 100 mm SX/S-2.3 PS Capillary
2	1	5500-1234 A	Capillary ST 0.17 mm x 180 mm MD Capillary
3	2	5067-5403 A	UHP fitting
4	1	5004-0011 A	Capillary ST 0.12 mm x 160 mm SL/SL Transfer Capillary I
5	1	5005-0057 A	Capillary ST 0.17 mm x 160 mm SL/SL Transfer Capillary II
6	1	5067-5709 A	Capillary ST 0.25 mm x 250 mm SL/SL FH Capillary

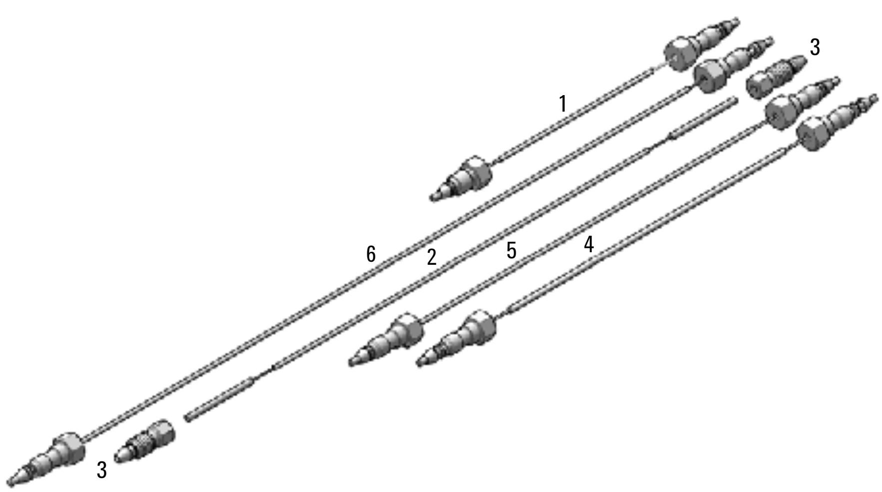


Figure 65 G3167A Online Sample Manager Capillary Kit

1290 Infinity II Bio Online Sample Manager Capillary Kit

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

Item	#	p/n	Description
	1	G3167-67002 A	G3167B Online Sample Manager Capillary Kit
1	1	5500-1278 A	Capillary MP35N 0.17 mm x 100 mm SL/SL PS Capillary
2	1	5005-0073 A	Capillary MP35N 0.17 mm x 180 mm MD Capillary
3	2	5067-5403 A	UHP fitting
4	1	5005-0069 A	Capillary MP35N 0.17 mm x 160 mm SL/SL Transfer Capillary I
5	1	5005-0072 A	Capillary MP35N 0.12 mm x 160 mm SL/S Transfer Capillary II
6	1	5005-0074 A	Capillary MP35N 0.25 mm x 250 mm SL/SL FH Capillary

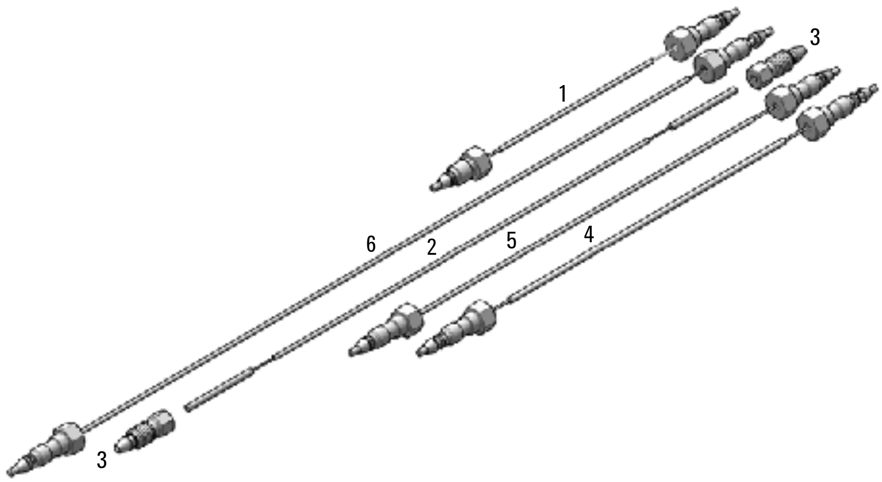


Figure 66 G3167B Online Sample Manager Capillary Kit

1260 Infinity II Online Sample Manager Set PM Kit

Item	#	p/n	Description
	1	G3167-67001 A	G3167AA Online Sample Manager Set PM Kit
1	1	G4267-87201 A	Needle Assembly
2	1	G3167-60018 A	Needle Seat Capillary, ST 0.17 mm x 230 mm SL/SL (UHP fitting (5067-5403) is shown as pre-installed but included as a separate part)
3	2	5068-0279 A	Rotor Seal, 3-position/6-port FI Valve, 800 bar
4	1	5067-5918 A	Flush Head Seal 500 µL

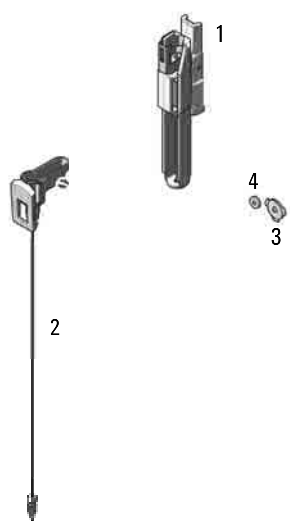


Figure 67 G3167AA Online Sample Manager Set PM Kit

1290 Infinity II Bio Online Sample Manager Set PM Kit

For 1290 Infinity II Bio LC modules, use bio / biocompatible parts only.
Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

Item	#	p/n	Description
	1	G3167-67003 A	G3167BA Online Sample Manager Set PM Kit
1	1	G7137-87201 A	Needle Biocompatible
2	1	G3167-60017 A	Needle Seat Capillary, Bio 0.17 mm x 230 mm (UHP fitting (5067-5403) is shown as pre-installed but included as a separate part)
3	2	5320-0005 A	Rotor Seal, 3-position/6-port FI Valve, MP35N, 1300 bar
4	1	G5668-60494 A	Flush Head Seal 500 µL Bio

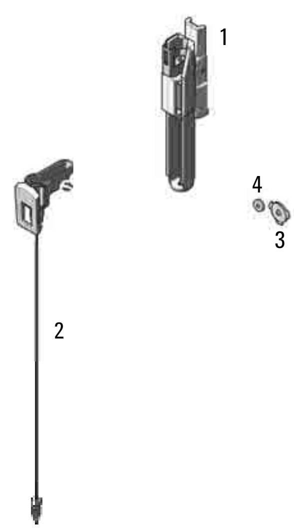


Figure 68 G3167BA Online Sample Manager Set PM Kit

9 Test Functions and Calibration

This chapter describes the built in test functions.

User Interfaces

- Depending on the user interface, the available tests and the screens/reports may vary.
- The preferred tool for troubleshooting and diagnostics should be Agilent Lab Advisor Software, see “Agilent Lab Advisor Software” on page 347.
- The current Agilent OpenLab ChemStation, Agilent OpenLab CDS and Agilent MassHunter software do not include any maintenance/test functions.
- Screenshots used within these procedures are based on the Agilent Lab Advisor Software.
- The Online LC Monitoring Software does not include any maintenance/test functions.

Agilent Lab Advisor Software

The Agilent Lab Advisor Software (basic license, shipped with an Agilent LC pump) is a standalone product that can be used with or without a chromatographic data system. Agilent Lab Advisor helps to manage the lab for high-quality chromatographic results by providing a detailed system overview of all connected analytical instruments with instrument status, Early Maintenance Feedback counters (EMF), instrument configuration information, and diagnostic tests. With the push of a button, a detailed diagnostic report can be generated. Upon request, the user can send this report to Agilent for a significantly improved troubleshooting and repair process.

The Agilent Lab Advisor software is available in two versions:

- Lab Advisor Basic
- Lab Advisor Advanced

Lab Advisor Basic is included with every Agilent 1200 Infinity Series and Agilent InfinityLab LC Series instrument.

The Lab Advisor Advanced features can be unlocked by purchasing a license key, and include real-time monitoring of instrument actuals, all various instrument signals, and state machines. In addition, all diagnostic test results, calibration results, and acquired signal data can be uploaded to a shared network folder. The Review Client included in Lab Advisor Advanced allows to load and examine the uploaded data no matter on which instrument it was generated. This makes Data Sharing an ideal tool for internal support groups and users who want to track the instrument history of their analytical systems.

The optional Agilent Maintenance Wizard Add-on provides an easy-to-use, step-by-step multimedia guide for performing preventive maintenance on Agilent 1200 Infinity LC Series instrument.

The tests and diagnostic features that are provided by the Agilent Lab Advisor software may differ from the descriptions in this manual. For details, refer to the Agilent Lab Advisor software help files.

Introduction

All tests are described based on the Agilent Lab Advisor Software B.02.17 or above. Other user interfaces may not provide any test or just a few. For details on the use of the interface refer to the interface documentation.

Table 36 Interfaces and available test functions

Interface	Comment	Available Function
Agilent Lab Advisor	All tests are available Adding of pressure to chromatographic signals possible	• System Pressure test • Maintenance • Drawer Detection/Auto Referencing • Sample Cooler/Thermostat Function Test • Sampler Leak Test • Hydraulic Path Leak Test

System Pressure Test

The test determines the leak rate of the system between pump outlet valves and a blank nut. The blank nut can be positioned at different locations in the system before the flow cell, to determine and verify the leak rate of individual modules and components. The test allows for setting the pressure at which the test is performed. The leak rate of high pressure parts is not always a linear function and therefore it is recommended to perform the test at a pressure that corresponds to the normal operating pressure of the system.

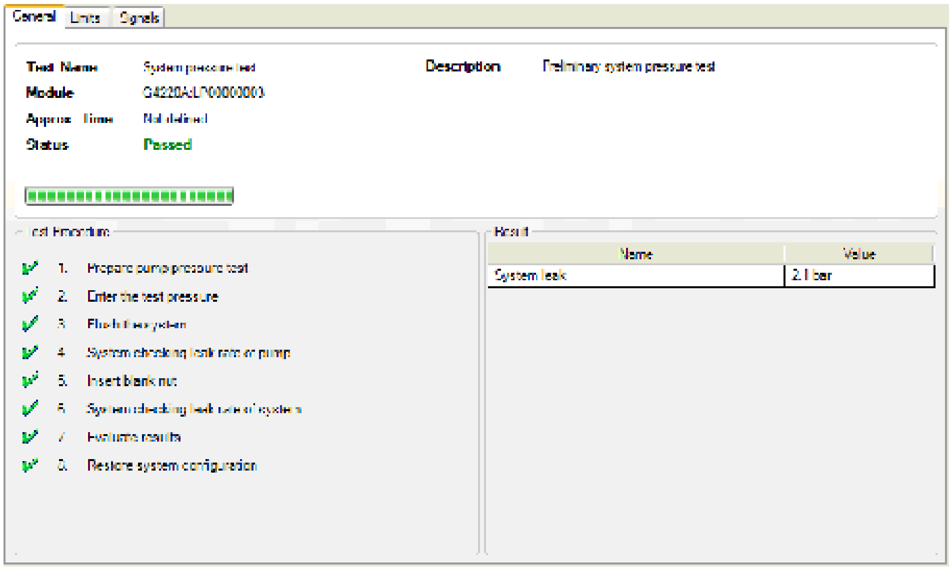
When

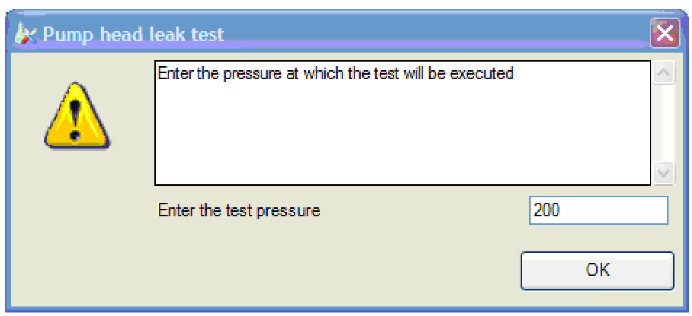
- In case of a suspected leak
- To verify successful execution of maintenance

Parts required

	#	p/n	Description
	1	5067-6127 A	Blank Nut SL For 1260 and 1290 Infinity II sytems.
OR	1	5043-0277 A	Blank nut long 10-32, PEEK For Bio-inert or 1290 Bio systems.

1 Run the System pressure test with the Agilent Lab Advisor (for further information see Online-Help of user interface).





System Pressure Test Evaluation

Test Failed

Probable cause	Suggested actions
1 Damaged blank nut (poorly shaped from over tightening).	Before investigating any other possible sources of failure make sure that the blank nut you are using is in a good condition and properly tightened.
2 Pump leakage.	Perform the Pump Head Leak test.
3 Loose or leaky fittings.	Tighten the fittings or replace capillaries.
4 Autosampler leakage.	Perform the Autosampler Leak test.
5 Thermostatted Column Compartment valve leakage.	Replace the TCC valve rotor seal.

NOTE

Notice the difference between *error* in the test and a *failed* result! An *error* is caused by an abnormal termination during the operation of the test, whereas a *failed* result indicates that the test result were not within the specified limits.

Auto Referencing

The sampler auto referencing uses predefined positions on the base plate and the sample hotel to calibrate the positioning of the needle parkstation and the sample hotel. The auto referencing is required to compensate deviations in positioning the needle assembly and the sample tray. The auto referencing is required after disassembling the system or when you exchange the sample handler, the sample hotel, the needle parkstation, the needle assembly or one of the mainboards. This function is implemented in the drawer detection and in the needle exchange routine.

When After disassembling the module or an exchange of the needle assembly.

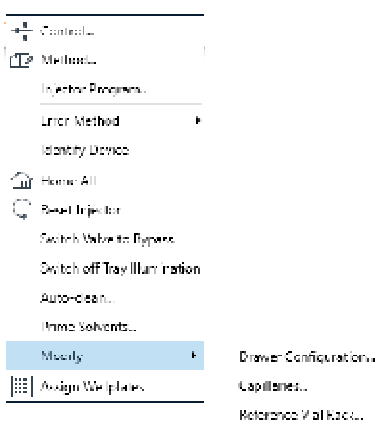
Preparations

- Workspace of the sampler is empty
- All drawers are closed properly
- All drawers have two sample trays installed, but no sample containers
- All drawers have been properly configured
- Needle assembly is installed in the needle parkstation

1 Open the Agilent chromatography data system of the instrument.

A right-click into the Active Area of the sampler will open a menu to modify

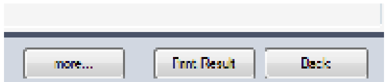
- drawer configuration
- capillaries
- Reference Vial Bar



2 Use drawer configuration and follow the software instructions.

   Auto referencing is done.

3 Click the **Back** button to leave the **Service & Diagnosis** menu.



NOTE

For auto referencing, you can alternatively use the Local Controller.

Maintenance Positions

Some maintenance procedures require the needle assembly, the sample loop flex, the metering device and the needle seat to be moved to specific positions to enable easy access to components. The maintenance functions move these assemblies into the appropriate maintenance position. In the Agilent Lab Advisor Software the maintenance positions can be selected in the Service & Diagnostics view.

When Performing maintenance on the module.

1 Run the Maintenance Positions in the Service & Diagnostics View in the Agilent Lab Advisor (for further information see Online-Help of user interface).

Change Needle Assembly

The Sample handler is positioning the needle assembly so that there is easy access for changing needle assembly or needle seat. The position is far to the left of the needle parkstation, and the current to the motors are off, so that the Z-drive of the robot can be moved while servicing the module.

NOTE For safety reason you have to lock the needle assembly before you detach the needle from the robot. Refer to "Exchange the Needle Assembly" on page 247.

NOTE During normal operation the needle assembly has to be unlocked.

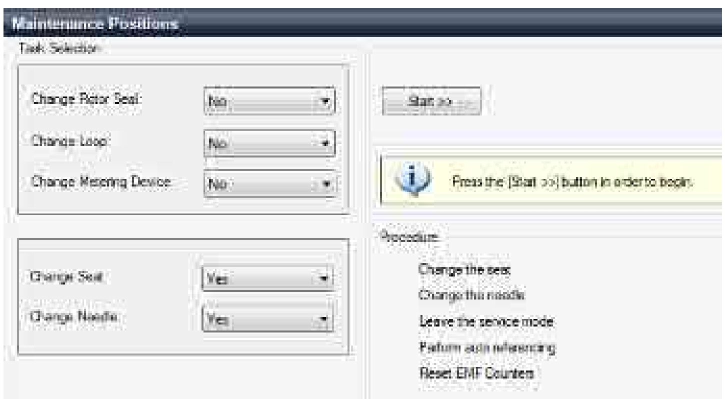


Figure 69 Change Needle Asssembly

Change Sample Loop Capillary

The **Change Loop** command positions the Z-drive of the robotarm far to the left of the needle parkstation to enable easy exchange of the sample loop cartridge.

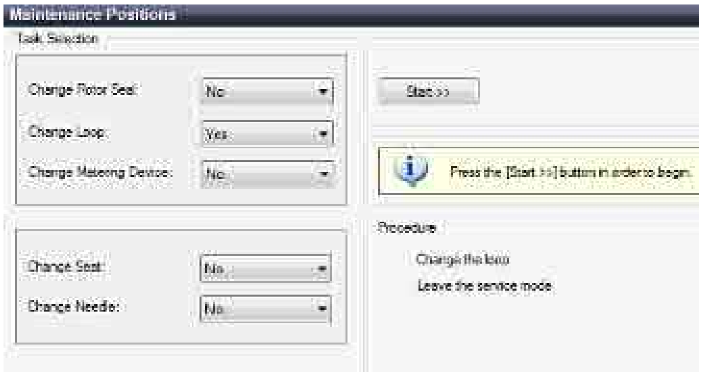


Figure 70 Change Sample Loop Capillary

Arm Position

The home position of the sampler ensures a better access to the workspace. When transporting the module it is highly recommended to use the **Instrument Control >Park Position** command, in order to place the Sample Handler in a position for safe transport.

Figure 71 Park Position Button

NOTE If the transport assembly is not parked and not protected by the transport foam, the module could be damaged due to excessive shock of the shipping container during transport.

Change Metering Device

When removing the metering device is necessary (by exchanging the metering seal for instance), the metering drive needs to be moved to a position at the far back, in order to prevent seal and/or piston damage.

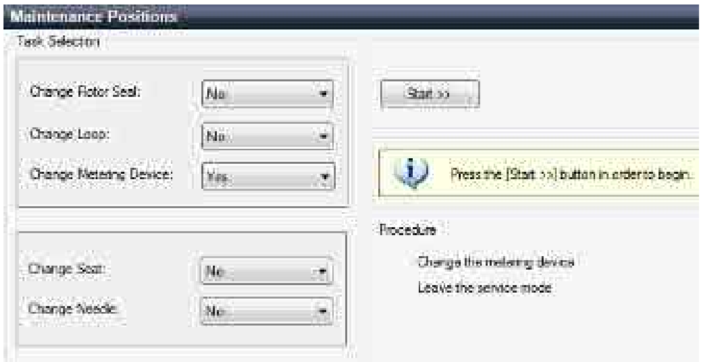


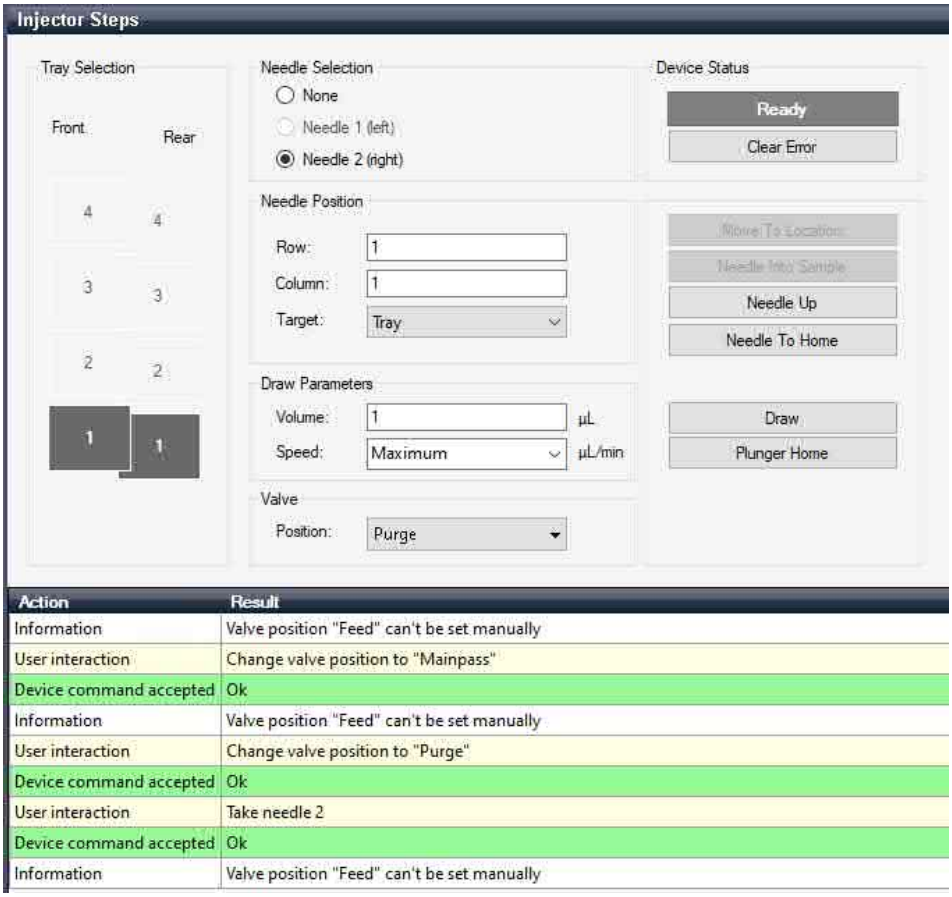
Figure 72 Change Metering Device

Injector Steps

Each movement of the sampling sequence can be done under manual control. This is useful during troubleshooting, where close observation of each of the sampling steps is required to confirm a specific failure mode or verify successful completion of a repair. Each injector step command actually consists of a series of individual commands that move the Online Sample Manager components to predefined positions, enabling the specific step to be done.

1 Run the Injector Steps in the Service & Diagnostics View in the Agilent Lab Advisor (for further information see Online-Help of user interface).

2 Select the individual step command like needle selection and needle position (for further information see Online-Help of user interface).



NOTE

Follow a logical order to use the injector steps function.

Sample Cooler Function Test

The **Sample Cooler Function Test** is a diagnostic test to verify the correct functioning of the Sample Cooler/Sample Thermostat. The test takes up to 15 min to complete and returns a pass/fail type result. If the test failed or was aborted by the system, the final report will include some information on the possible root causes.

Before the test starts, the compressor is turned off to allow the system to reach the initial conditions. The test starts with acquiring data from the evaporator temperature sensor. If the reading is stable for at least 10 s ($\Delta T < 0.5$ °C), the compressor turns on and the temperature inside the cooler/thermostat starts to drop.

For the test to succeed, the system must pass three temperature checkpoints in a timely manner. These checkpoints are the following:

- Checkpoint 1: The temperature drops by 1/3 of the difference between the starting temperature and 5 °C.
- Checkpoint 2: The temperature drops below 5 °C.
- Checkpoint 3: The temperature stabilizes at a value below 5 °C and stays stable for at least 60 s ($\Delta T < 1.0$ °C).

For a Sample Thermostat, the heater resistance of the heating elements will also be tested and checked if the measured value is within the acceptance range (5 – 9 Ohm).

NOTE

Lab Advisor B.02.11 or higher is needed for testing the heater resistance of the G7167-60101 Sample Thermostat.

NOTE

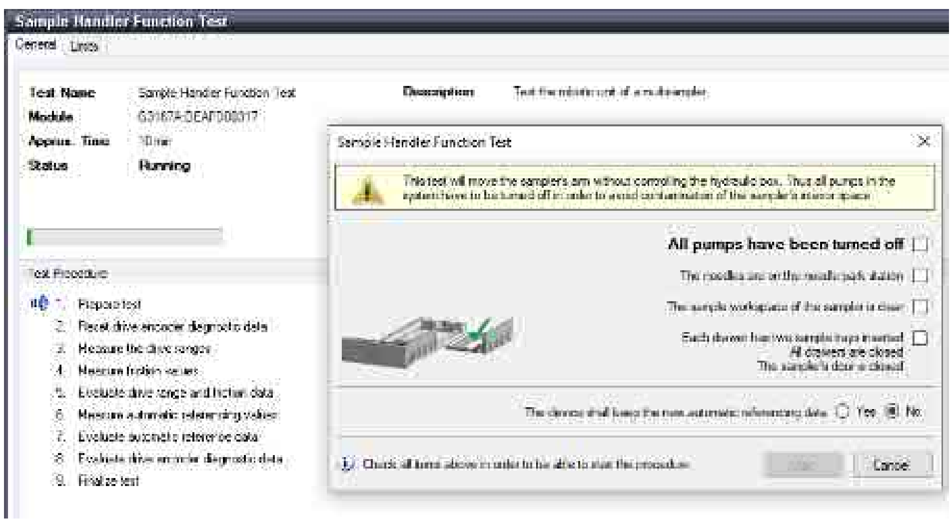
Lab Advisor 2.19 or higher is needed to execute the Sample Cooler Function Test for the G7167-60201 Sample Thermostat.

Sample Handler Function Test

The **Sample Handler Function Test** is designed to check that the sampler's sample handler unit operates as expected. The test collects current and position signals, while the arm moves around in different directions. The collected data is then compared with built-in limits to verify whether the sample handler is defective.

The **Result** screen shows the result of the test as Passed or Failed. In the case of an error, a reason for the error, together with a comment, are displayed.

1 Run the **Sample Handler Function Test** with the Agilent Lab Advisor (for further information see Online-Help of user interface).



The test can only start once all boxes have been checked.

2 Click the **Back** button to leave the **Service & Diagnostics** menu.

Sampler Leak Test

The **Sampler Leak Test** determines the specific leak rates of injection valve, metering device, needle/seat, and system. The test requires that a blank nut gets installed at port 6 (outlet) of the injection valve. The test allows for setting the pressure at which it should be performed, and it is recommended to use a pressure that corresponds to the normal operation of the system.

The test proceeds as follows:

1 A pump head leak test is carried out on the selected channel.

2 A **Pressure Test** is carried out in the bypass position.

3 A **Pressure Test** is carried out in the main pass position.

4 A **Pressure Test** is carried out in the main pass position with the needle at the blocked seat position.

The values obtained are then used to calculate the injection valve, metering device, and needle/seat leak rates.

At the end of the test, the results are evaluated automatically.

When

- In case of a suspected leak
- To verify successful execution of maintenance

Parts required

p/n	Description
5067-6127 A	Blank Nut SL
5043-0277 A	Blank nut long 10-32, PEEK
8710-0510 A	Open-end wrench 1/4 — 5/16 inch

Preparations

Place a bottle of solvent in the channel that shall be tested. The type of solvent is not important.

1 Run the **Sampler Leak Test** with the Agilent LabAdvisor and follow the provided instructions.

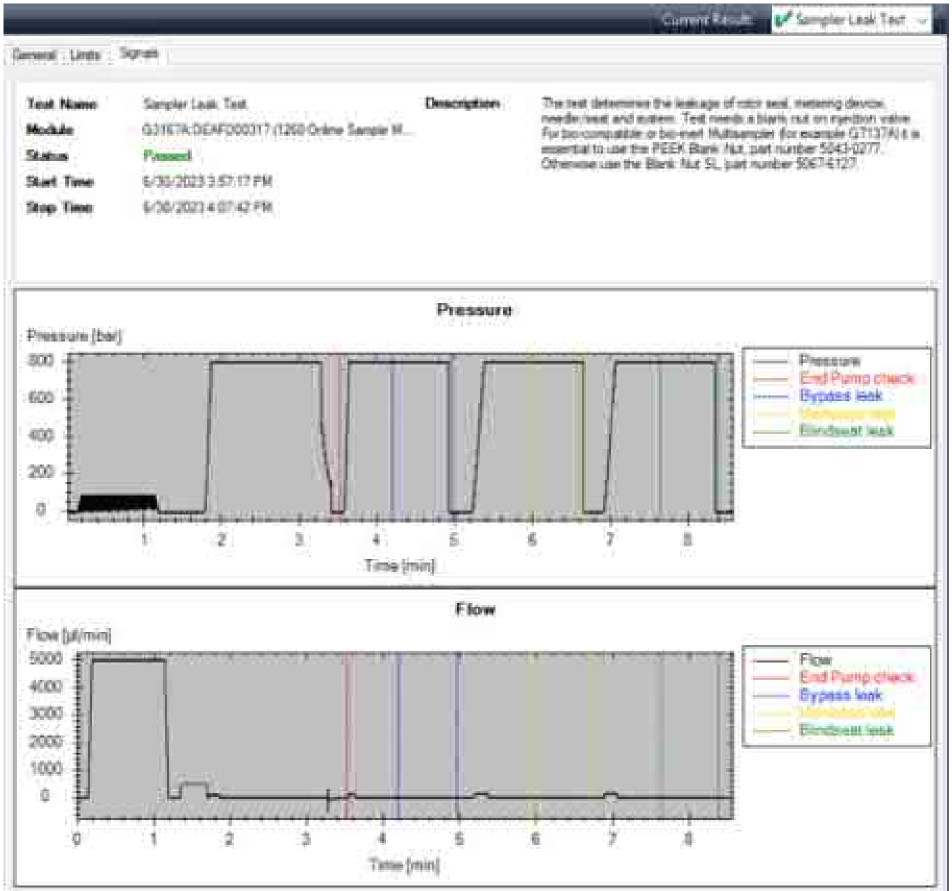


Figure 73 Sampler Leak Test passed

Hydraulic Path Leak Test

The **Sampler Hydraulic Path Leak Test** determines the injection and sampling path leak rates of the samplers internal hydraulic path. Using the Analytical Head and Pressure Sensor, it can be executed without the pump of the LC system.

The test proceeds as follows:

1 Prompt to ensure that the Purge solvent is connected to port S2 of the Solvent Selection Valve.
2 The flow path is purged.
3 A leak measurement is performed for the sampling path.
4 The flow path is purged.
5 A leak measurement is performed for the injection path.
6 The flow path is purged.

When
- In case of a suspected leak
- To verify successful execution of maintenance

Preparations
- Connect the Purge solvent (water) to port S2 of the Solvent Selection Valve.
- External Sampling Valve must be connected to the instrument and configured via the LC drivers.

1 Run the **Sampler Hydraulic Path Leak Test** with the Agilent LabAdvisor and follow the provided instructions.

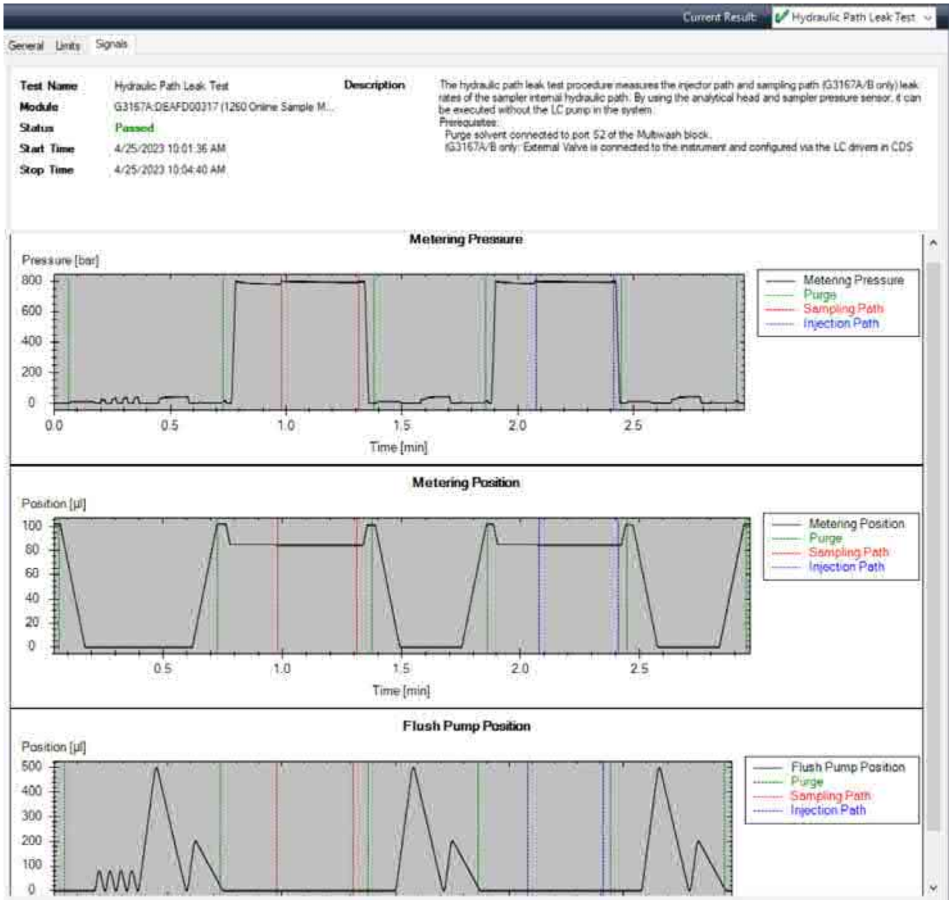


Figure 74 Hydraulic Path Leak Test passed

10 Error Information

This chapter describes the meaning of error messages, and provides information on probable causes and suggested actions how to recover from error conditions.

What Are Error Messages

Error messages are displayed in the user interface when an electronic, mechanical, or hydraulic (flow path) failure occurs which requires attention before the analysis can be continued (for example, repair, or exchange of consumables is necessary). In the event of such a failure, the red status indicator at the front of the module is switched on, and an entry is written into the module logbook.

If an error occurs outside a method run, other modules will not be informed about this error. If it occurs within a method run, all connected modules will get a notification, all LEDs get red and the run will be stopped. Depending on the module type, this stop is implemented differently. For example, for a pump the flow will be stopped for safety reasons. For a detector, the lamp will stay on in order to avoid equilibration time. Depending on the error type, the next run can only be started, if the error has been resolved, for example liquid from a leak has been dried. Errors for presumably single time events can be recovered by switching on the system in the user interface.

Special handling is done in case of a leak. As a leak is a potential safety issue and may have occurred at a different module from where it has been observed, a leak always causes a shutdown of all modules, even outside a method run.

In all cases, error propagation is done via the CAN bus or via an APG/ERI remote cable (see documentation for the APG/ERI interface).

General Error Messages

General error messages are generic to all Agilent series HPLC modules and may show up on other modules as well.

Timeout

Error ID: 0062

The timeout threshold was exceeded.

Probable cause	Suggested actions
1 The analysis was completed successfully, and the timeout function switched off the module as requested.	Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.
2 A not-ready condition was present during a sequence or multiple-injection run for a period longer than the timeout threshold.	Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.

Shutdown

Error ID: 0063

An external instrument has generated a shutdown signal on the remote line.

The module continually monitors the remote input connectors for status signals. A LOW signal input on pin 4 of the remote connector generates the error message.

Probable cause	Suggested actions
1 Leak detected in another module with a CAN connection to the system.	Fix the leak in the external instrument before restarting the module.
2 Leak detected in an external instrument with a remote connection to the system.	Fix the leak in the external instrument before restarting the module.
3 Shut-down in an external instrument with a remote connection to the system.	Check external instruments for a shut-down condition.
4 The degasser failed to generate sufficient vacuum for solvent degassing.	Check the vacuum degasser for an error condition. Refer to the *Service Manual* for the degasser or the pump that has the degasser built-in.

Remote Timeout

Error ID: 0070

A not-ready condition is still present on the remote input. When an analysis is started, the system expects all not-ready conditions (for example, a not-ready condition during detector balance) to switch to run conditions within one minute of starting the analysis. If a not-ready condition is still present on the remote line after one minute the error message is generated.

Probable cause	Suggested actions
1 Not-ready condition in one of the instruments connected to the remote line.	Ensure the instrument showing the not-ready condition is installed correctly, and is set up correctly for analysis.
2 Defective remote cable.	Exchange the remote cable.
3 Defective components in the instrument showing the not-ready condition.	Check the instrument for defects (refer to the instrument's documentation).

Lost CAN Partner

Error ID: 0071

During an analysis, the internal synchronization or communication between one or more of the modules in the system has failed.

The system processors continually monitor the system configuration. If one or more of the modules is no longer recognized as being connected to the system, the error message is generated.

Probable cause	Suggested actions
1 CAN cable disconnected.	• Ensure all the CAN cables are connected correctly. • Ensure all CAN cables are installed correctly.
2 Defective CAN cable.	Exchange the CAN cable.
3 Defective mainboard in another module.	Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.

Leak Sensor Short

Error ID: 0082

The leak sensor in the module has failed (short circuit).

The current through the leak sensor is dependent on temperature. A leak is detected when solvent cools the leak sensor, causing the leak sensor current to change within defined limits. If the current increases above the upper limit, the error message is generated.

Probable cause	Suggested actions
1 Defective leak sensor.	Please contact your Agilent service representative.
2 Leak sensor incorrectly routed, being pinched by a metal component.	Please contact your Agilent service representative.
3 Power switch assembly defective.	Please contact your Agilent service representative.
4 Cable or contact problem.	Please contact your Agilent service representative.

Leak Sensor Open

Error ID: 0083

The leak sensor in the module has failed (open circuit).

The current through the leak sensor is dependent on temperature. A leak is detected when solvent cools the leak sensor, causing the leak sensor current to change within defined limits. If the current falls outside the lower limit, the error message is generated.

Probable cause	Suggested actions
1 Leak sensor not connected to the power switch board.	Please contact your Agilent service representative.
2 Defective leak sensor.	Please contact your Agilent service representative.
3 Leak sensor incorrectly routed, being pinched by a metal component.	Please contact your Agilent service representative.
4 Power switch assembly defective.	Please contact your Agilent service representative.

Compensation Sensor Open

Error ID: 0081

The ambient-compensation sensor (NTC) on the power switch board in the module has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the power switch board is dependent on ambient temperature. The change in resistance is used by the leak circuit to compensate for ambient temperature changes. If the resistance across the sensor increases above the upper limit, the error message is generated.

Probable cause	Suggested actions
1 Loose connection between the power switch board and the mainboard.	Please contact your Agilent service representative.
2 Defective power switch assembly.	Please contact your Agilent service representative.

Compensation Sensor Short

Error ID: 0080

The ambient-compensation sensor (NTC) on the power switch board in the module has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the power switch board is dependent on ambient temperature. The change in resistance is used by the leak circuit to compensate for ambient temperature changes. If the resistance across the sensor falls below the lower limit, the error message is generated.

Probable cause	Suggested actions
1 Defective power switch assembly.	Please contact your Agilent service representative.
2 Loose connection between the power switch board and the mainboard.	Please contact your Agilent service representative.

Fan Failed

Error ID: 0068

The fan in the autosampler module or in the Sample Cooler/Sample Thermostat has failed.

- Error ID: 68,0 → Sampler fan defect
- Error ID: 68,1 → Evaporator fan defect
- Error ID: 68,2 → Condenser fan defect

The hall sensor on the fan shaft is used by the mainboard to monitor the fan speed. If the fan speed falls below a certain limit for a certain length of time, the error message is generated.

This limit is given by 2 revolutions/second for longer than 5 seconds.

Depending on the module, assemblies (e.g. the lamp in the detector) are turned off to assure that the module does not overheat inside.

Probable cause	Suggested actions
1 Fan cable disconnected.	Please contact your Agilent service representative.
2 Defective sampler fan.	Please contact your Agilent service representative.
3 Defective evaporator fan.	Please contact your Agilent service representative.
4 Defective condenser fan.	Please contact your Agilent service representative.
5 Blown fuses.	Please contact your Agilent service representative.
6 Defective mainboard.	Please contact your Agilent service representative.

Leak

Error ID: 0064

A leak was detected in the module.

The signals from the two temperature sensors (leak sensor and board-mounted temperature-compensation sensor) are used by the leak algorithm to determine whether a leak is present. When a leak occurs, the leak sensor is cooled by the solvent. This changes the resistance of the leak sensor which is sensed by the leak sensor circuit on the mainboard.

Probable cause	Suggested actions
1 Loose fittings.	Ensure all fittings are tight.
2 Broken capillary.	Exchange defective capillaries.
3 Leaking rotor seal or needle seat.	Exchange the rotor seal or seat capillary.
4 Defective metering seal.	• Exchange the metering seal. • *Make sure the leak sensor is thoroughly dry before restarting the autosampler.*

Sampler Error Messages

NOTE Please verify the first errors in the list. The last error message could be a subsequent error.

Draw command aborted

Error ID: 25478

The robot (sample handler) failed to move correctly during injection sequence.

Probable cause	Suggested actions
1 Missing vessel.	Check if the sample vial is installed in the correct position, or edit the method or sequence accordingly.
2 Needle command failed.	Check the status of the needle assembly. Perform an autoreferencing.

Sample container vessel missing

Error ID: 25471

No vial was found in the position defined in the method or sequence. When the needle carrier moves to a vial and the needle lowers into the vial, the position of the needle is monitored by an encoder behind the vial pusher. If no vial is present, the encoder detects an error and the message “missing vial” is generated.

Probable cause	Suggested actions
1 No vial in the position defined in the method.	• Install the sample vial in the correct position. • Edit the method or sequence accordingly.
2 Defective needle assembly.	Exchange the needle assembly.
3 Sample container missing or not correctly installed.	Install the sample container correctly on the tray.

Initialization failed

Error ID: 25120

The autosampler failed to complete initialization correctly. The autosampler initialization procedure moves the robot to its reference positions in a predefined routine. During initialization, the processor monitors the position sensors and motor encoders to check for correct movement. During initialization the system also checks the status of the sample hotel and the hydraulic box. If one or more of the movements or the status information of the subparts is not read out successfully, the error message is generated.

Probable cause	Suggested actions
1 Front door not installed correctly.	• Check if the front door is installed correctly. • Check if the magnet is in place in the front door.
2 Sample handler not aligned correctly.	Do an autoreferencing.
3 Mechanical obstruction of the sample handler.	Ensure unobstructed movement.
4 Defective sample handler motors.	Please contact your Agilent service representative.
5 Loose connection between hydraulic box and adapter board.	Please contact your Agilent service representative.
6 Defective sample hotel electronic.	Please contact your Agilent service representative.
7 Defective specific mainboard or fusion board.	Please contact your Agilent service representative.

Injection valve initialization failed

Error ID: 25123

The autosampler failed to complete initialization correctly. The autosampler initialization procedure can recognize and move the injection valve to its reference positions in a predefined routine. During initialization, the processor monitors the position sensor, tag sensors, and actuator motor to check for correct movement. If one or more of the movements or the status information of the subparts is not read out successfully, the error message is generated.

Probable cause	Suggested actions
1 Injection valve not installed correctly.	Check if the injection valve is installed correctly.
2 TAG and TAG reader not aligned correctly.	Check if the TAG or the TAG Reader are aligned correctly.
3 Electrical connection or components are defective.	Please contact your Agilent service representative.

Sampler alignment procedure command failed

Error ID: 25034

The autosampler failed to complete the alignment correctly.

Probable cause	Suggested actions
1 Mechanical obstruction of the sample handler.	Ensure unobstructed movement.
2 Defective sample handler motors.	Please contact your Agilent service representative.

Sampler transport initialization failed

Error ID: 25121

The autosampler failed to complete initialization correctly. The autosampler initialization procedure moves the robot to its reference positions in a predefined routine. During initialization, the processor monitors the position sensors and motor encoders to check for correct movement. During initialization, the processor monitors the position sensor, tag sensors, and actuator motor to check for correct movement. If one or more of the movements or the status information of the subparts is not read out successfully, the error message is generated.

Probable cause	Suggested actions
1 Sample handler not aligned correctly.	Switch off the instrument and do an autoreferencing.
2 Mechanical obstruction of the sample handler.	Ensure unobstructed movement.
3 Defective sample handler motors.	Please contact your Agilent service representative.

Front door error

Error ID: 25051, 25049

During initialization, the autosampler recognizes the position of the front door. If the front door is open, this error message is displayed.

Probable cause	Suggested actions
1 Front door is not closed properly.	Check if the front door is closed or if the magnet is missing.

Alignment procedure: needle command failed

Error ID: 25095

During the parking or movements of the needle assembly, the status information of the subparts is not read out successfully and the error message is generated.

Probable cause	Suggested actions
1 The sample loop capillary was squeezed in the needle parkstation.	• Check if the sample loop is installed correctly. • Do an autoreferencing afterwards (needle assembly must be installed in the needle parkstation during this procedure).
2 The needle assembly was not installed correctly in the needle parkstation.	• Check if the needle assembly is installed correctly. • Install the needle assembly on the sample handler. • Do a reset of the sample handler. • Do an autoreferencing (the needle assembly must be installed in the needle parkstation during this procedure). • If this will not help: Please contact your Agilent service representative.
3 Needle parkstation is loose.	Carefully tighten the needle parkstation.

Needle hit the vessel bottom

Error ID: 25226

The autosampler failed to complete injection sequence correctly. The autosampler can move and draw sample from the draw position and generates the error message.

Probable cause	Suggested actions
1 Sample container is not installed correctly in the pallet.	Check if the sample container is installed correctly.
2 Sample container definition in the CDS is not correct.	• Check if the correct sample container is selected in the CDS. • Verify if the dimension of the sample container match the database of your CDS.
3 Sample handler not aligned correctly.	• Check if the sample handler can move freely. • Do an auto referencing (needle assembly must be installed in the needle parkstation during this procedure). • If this will not help: Please contact your Agilent service representative.

Robot drive current too high

Error ID: 25409

The autosampler failed to complete initialization correctly. The autosampler initialization procedure can not move the motors inside of the sample handler to their reference positions in a predefined routine. During initialization, the processor monitors the position sensor and encoders to check for correct movement. If one or more of the movements or the status information of the subparts is not read out successfully, the error message is generated.

Probable cause	Suggested actions
1 Sample handler is blocked.	• Check if the sample handler can move freely. • Switch off the instrument. • Do an auto referencing (needle assembly must be installed in the needle parkstation during this procedure).
2 Defective sample handler motors.	Please contact your Agilent service representative.

Robot drive hardware overcurrent

Error ID: 25411

The autosampler failed to complete initialization correctly. The autosampler electronic has detected a increasing of the internal limits and has generated the error message.

Probable cause	Suggested actions
1 Bad electronic connections.	Please contact your Agilent service representative.
2 Defective mainboard/fusion board.	Please contact your Agilent service representative.

Cleaning Procedure Failed

Error ID: 25400, 1-4

Cleaning procedure failed. Parameter shows what kind of cleaning procedure has failed: 1 = Wash, 2 = Prime, 3 = Autoclean, 4 = Clooged seat.

Probable cause	Suggested actions
1 Solvent lines not installed correctly (valve block or flushpump).	Check status of the solvent lines. Use isopropanol for verification.
2 Clogged needle seat.	Replace the needle seat.

Metering Device Initialization Failed

Error ID: 25122

Probable cause	Suggested actions
1 Hydraulic box not in place.	Please contact your Agilent service representative.
2 Metering device not properly installed.	Check the correct positioning of RFID tag and tag reader.

Flush Pump Device Initialization Failed

Error ID: 25124

Probable cause	Suggested actions
1 Hydraulic box not in place.	Please contact your Agilent service representative.
2 Flush pump not properly installed.	Check the correct positioning of RFID tag and tag reader.

Peripheral Valve Initialization Failed

Error ID: 25125

Probable cause	Suggested actions
1 Hydraulic box not in place.	Please contact your Agilent service representative.
2 Valve not properly installed.	Check the correct positioning of RFID tag and tag reader.

Move Needle to Parkstation Failed

Error ID: 25106

Probable cause	Suggested actions
1 Autoreferencing values missing or outdated.	Manually install the needle into the parkstation, clear current autoreferencing values (use **Clear data** on Lab Advisor), power cycle the module and perform autoreferencing.

Taking Needle from Parkstation Failed

Error ID: 25105

Probable cause	Suggested actions
1 Parkstation is loose.	Carefully tighten the parkstation. Avoid overtightening, as this could damage the baseplate of the module.
2 Needle assembly is defective.	Replace the needle assembly.
3 Autoreferencing needed.	Manually install the needle into the parkstation, clear current autoreferencing values (use **Clear data** on Lab Advisor), power cycle the module and perform autoreferencing.

Taking sample tray from hotel position failed

Error ID: 25104

Probable cause	Suggested actions
1 Mechanical obstruction of the sample handler by reference vial holder.	Please contact your Agilent service representative.

Transport Motor Index Missing

Error ID: 25235

The index of a transport motor cannot be found. The motor ID is given in the event parameter: 0=A, 1=B, 2=Z1, 3=Z2.

Probable cause	Suggested actions
1 Defective fuse.	Please contact your Agilent service representative.
2 Defective mainboard.	Please contact your Agilent service representative.

Transport Motor Tag cannot be read

Error ID: 25236

The tag data of a transport motor cannot be read. The motor ID is given in the event parameter: 0=A, 1=B, 2=Z1, 3=Z2.

Probable cause	Suggested actions
1 One of the sample handler cables is not properly connected.	Please contact your Agilent service representative.
2 One of the sample handler cables is damaged (corroded or chipped off).	Please contact your Agilent service representative.
3 Defective mainboard.	Please contact your Agilent service representative.

Sample Cooler/Sample Thermostat Error Messages

Sample temperature control voltage too low, check fuses and wires

Error ID: 30713

The compressor voltage is below the lower threshold value.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Sample temperature control switched off due to condensate

Error ID: 30715

The cooler/thermostat was switched off due to a condensate event.

Probable cause	Suggested actions
1 Overfilled container.	Empty the condensate container. Verify that the open end of the tubing doesn't immerse in the liquid.
2 Drainage issues.	• Verify the correct plumbing of the condensate drainage system. • Make sure that no kinks or mechanical blocks are present in the drainage system. • Avoid the formation of the siphoning effect. • Make sure that the hosting sampler is level.

Sample temperature control switched off due to overpressure

Error ID: 30716

The pressure in the refrigerant circuit exceeded the maximum allowed level. To prevent any damage to the system, the compressor was turned off.

Probable cause	Suggested actions
1 Overheated condenser.	Turn off the cooler/thermostat and wait for 15 min to allow the system to cool down. Verify if there is enough space around the sampler for adequate ventilation and the cooler/thermostat is not exposed to direct sunlight.
2 Potential hardware error.	Please contact your Agilent service representative.

Sample temperature control sensor electronics calibration failed

Error ID: 30717

The system is in an error state because the calibration of the analog temperature sensor has failed.

Probable cause	Suggested actions
1 Sampler incompatibility.	If the hosting sampler is a Vialsampler, verify its compatibility with the Sample Cooler installed. Units with the serial number DEBAT02000 or below are equipped with an analog temperature sensor that is not compatible with the Vialsampler.
2 Potential hardware error.	Please contact your Agilent service representative.

Sample temperature control switched off due to supply voltage drop

Error ID: 30718

The compressor is turned off due to an unexpected drop in the supply voltage.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Cooler condensate sensor defect

Error ID: 30719

The condensate sensor of the cooler/thermostat is not working properly.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Cooler PCB is in error mode

Error ID: 30725

The system is in an error state because the compressor control board has encountered an unexpected error.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Cooler condenser fan failed

Error ID: 30726

The condenser fan of the cooler is not working properly.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Thermostat communication error

Error ID: 30738

The system is in an error state because the communication between the sampler and the thermostat has failed.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Heater defect

Error ID: 30739

One of the heating elements is malfunctioning or broken.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Heater in operating error

Error ID: 30744

The system is in an error state because the thermostat heater has encountered an unexpected error.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Heater has power supply failure

Error ID: 30745

The voltage measured at the electric amplifier is below the expected level.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Thermostat sensor defect

Error ID: 30751

One of the digital temperature sensors of the cooler/thermostat is not working properly.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Compressor has error

Error ID: 30756

The system is in an error state because the control board of the compressor has encountered an unexpected error.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Sample Thermostat type unknown, update firmware

Error ID: 30768

The system is in an error state because the type of the thermostat is unsupported by the current firmware revision.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

Thermostat fan defect

Error ID: 30771

One of the cooling fans of the cooler/thermostat is not working properly.

Probable cause	Suggested actions
1 Potential hardware error.	Please contact your Agilent service representative.

External Sampling Valve Messages

Initialization of Valve Failed

Error ID: 24000

During the initialization process the motor of the valve drive moves to some special positions depending on the installed valve head. A failure in this process means either that the movement couldn't be performed properly or it was not noticed correctly by the sensor.

Probable cause	Suggested actions
1 Mechanical problems. Friction too high or blockages on the valve drive's motor or on the valve head.	• Check valve head for correct installation. • Try to identify the source of trouble by installing a different valve head if possible. • Contact your Agilent Service representative.
2 Defect Sensor on the Valve Drive Motor.	• Check valve head for correct installation. • Try to identify the source of trouble by installing a different valve head if possible. • Contact your Agilent Service representative.

Valve Switching Failed

Error ID: 24001

The valve drive was not able to operate the valve head correctly. Either due to mechanical reasons or the movement couldn't be detected correctly.

Probable cause	Suggested actions
1 Mechanical problems. Friction too high or blockages on the valve drive's motor or on the valve head.	• Check valve head for correct installation. • Try to identify the source of trouble by installing a different valve head if possible. • Contact your Agilent Service representative.
2 Defect Sensor on the Valve Drive Motor.	• Check valve head for correct installation. • Try to identify the source of trouble by installing a different valve head if possible. • Contact your Agilent Service representative.

Valve Tag Violation

Error ID: 24006

The valve drive identified a different valve head than it had identified during the last initialization.

Probable cause	Suggested actions
1 A valve head has been exchanged (hot-plugged) while the valve drive was still powered on.	Change the valve head. It is important to have the valve switched off for at least 10 s after or before a new valve head has been installed.

NOTE

Soft power-down power supply of the valve drive.

Whenever you want to power cycle the valve drive for a re-boot, it needs to be powered off for at least 10 seconds.

Pressure Cluster Partner Missing

The connection from the valve drive to a defined pressure cluster partner is lost.

Probable cause	Suggested actions
1 Communication issues.	Check the CAN cable connections of the modules.
2 Configuration mismatch.	Check and correct if necessary the valve configuration and presence of defined pressure cluster partner.

Position Cluster Partner Missing

Probable cause	Suggested actions
1 Communication issues.	Check the CAN cable connections of the modules.
2 Configuration mismatch.	• Check and correct if necessary the valve configuration and presence of defined position cluster partner. • If the module was moved to another LC stack, perform Firmware Declustering in Service & Diagnostic section of Lab Advisor.

11 Identifying Cables

This chapter provides information on cables used with the solution modules and how to set up an external device.

Cable Overview

NOTE

Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

Analog cables

p/n	Description
35900-60750 A	Agilent 35900A A/D converter
01046-60105 A	Analog cable (BNC to general purpose, spade lugs)

Remote cables

p/n	Description
5188-8029 A	ERI to general purpose
5188-8044 A	Remote Cable ERI – ERI
5188-8045 A	Remote Cable APG – ERI
5188-8059 A	ERI-Extension-Cable 1.2 m
5061-3378 A	Remote Cable to 35900 A/D converter
01046-60201 A	Agilent module to general purpose
5188-8057 A	Fraction Collection ERI remote Y-cable

CAN cables

p/n	Description
5181-1516 A	CAN cable, Agilent module to module, 0.5 m
5181-1519 A	CAN cable, Agilent module to module, 1 m

LAN cables

p/n	Description
5023-0203 A	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202 A	Twisted pair network cable, shielded, 7 m (for point to point connection)

RS-232 cables (not for FUSION board)

p/n	Description
RS232-61601 A	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It is also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561 A	RS-232 cable, 8 m

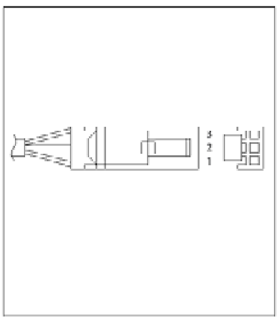
USB cables

p/n	Description
5188-8050 A	USB A M-USB Mini B 3 m (PC-Module)
5188-8049 A	USB A F-USB Mini B M OTG (Module to Flash Drive)

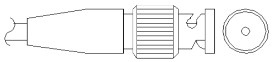
Analog Cables

One end of these cables provides a BNC connector to be connected to Agilent modules. The other end depends on the instrument to which connection is being made.

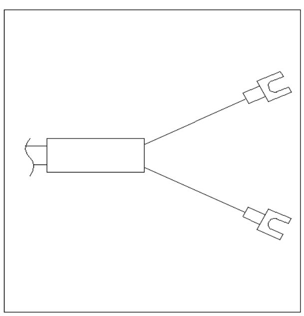
Agilent Module to 35900 A/D converters

p/n 35900-60750	35900	Pin Agilent module	Signal Name
	1		Not connected
	2	Shield	Analog -
	3	Center	Analog +

Agilent Module to BNC Connector

p/n 8120-1840	Pin BNC	Pin Agilent module	Signal Name
	Shield	Shield	Analog -
	Center	Center	Analog +

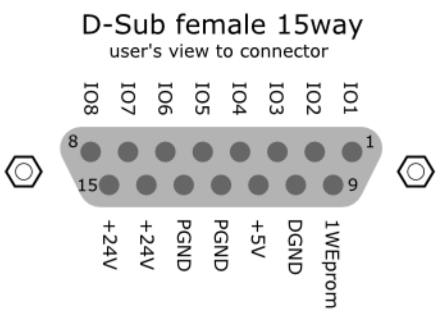
Agilent Module to General Purpose

p/n 01046-60105	Pin	Pin Agilent module	Signal Name
	1		Not connected
	2	Black	Analog -
	3	Red	Analog +

Remote Cables

ERI (Enhanced Remote Interface)

- 5188-8029 ERI to general purpose (D-Sub 15 pin male - open end)
- 5188-8044 ERI to ERI (D_Sub 15 pin male - male)
- 5188-8059 ERI-Extension-Cable 1.2 m (D-Sub15 pin male / female)



p/n 5188-8029	pin	Color code	Enhanced Remote	Classic Remote	Active (TTL)
	1	white	IO1	START REQUEST	Low
	2	brown	IO2	STOP	Low
	3	green	IO3	READY	High
	4	yellow	IO4	PEAK DETECT	Low
	5	grey	IO5	POWER ON	High
	6	pink	IO6	SHUT DOWN	Low
	7	blue	IO7	START	Low
	8	red	IO8	PREPARE	Low
	9	black	1wire DATA		
	10	violet	DGND		
	11	grey-pink	+5V ERI out		
	12	red-blue	PGND		
	13	white-green	PGND		
	14	brown-green	+24V ERI out		
	15	white-yellow	+24V ERI out		
	NC	yellow-brown			

NOTE

Configuration is different with old firmware revisions.

The configuration for IO4 and IO5 is swapped for modules with firmware lower than D.07.10.

NOTE

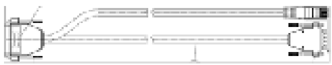
Peak Detection is used for LCMS systems connected with the Fraction Collection Remote Y-Cable (5188-8057).

- 5188-8045 ERI to APG (Connector D_Subminiature 15 pin (ERI), Connector D_Subminiature 9 pin (APG))

p/n 5188-8045	Pin (ERI)	Signal	Pin (APG)	Active (TTL)
	10	GND	1	
	1	Start Request	9	Low
	2	Stop	8	Low
	3	Ready	7	High
	5	Power on	6	High
	4	Future	5	
	6	Shut Down	4	Low
	7	Start	3	Low
	8	Prepare	2	Low
	Ground	Cable Shielding	NC	

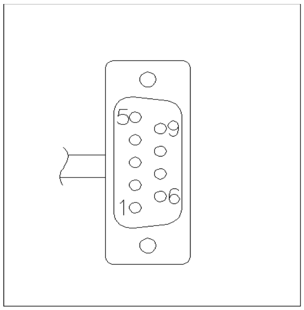
- 5188-8057 ERI to APG and RJ45 (Connector D_Subminiature 15 pin (ERI), Connector D_Subminiature 9 pin (APG), Connector plug Cat5e (RJ45))

Table 37 5188-8057 ERI to APG and RJ45

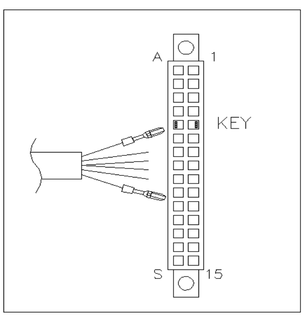
p/n 5188-8057	Pin (ERI)	Signal	Pin (APG)	Active (TTL)	Pin (RJ45)
					
	10	GND	1		5
	1	Start Request	9	High	
	2	Stop	8	High	
	3	Ready	7	High	
	4	Fraction Trigger	5	High	4
	5	Power on	6	High	
	6	Shut Down	4	High	
	7	Start	3	High	
	8	Prepare	2	High	
	Ground	Cable Shielding	NC		

One end of these cables provides an Agilent Technologies APG (Analytical Products Group) remote connector to be connected to Agilent modules. The other end depends on the instrument to be connected to.

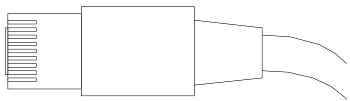
Agilent Module to Agilent 35900 A/D Converters

p/n 5061-3378	Pin 35900 A/D	Pin Agilent module	Signal Name	Active (TTL)
	1 - White	1 - White	Digital ground	
	2 - Brown	2 - Brown	Prepare run	Low
	3 - Gray	3 - Gray	Start	Low
	4 - Blue	4 - Blue	Shut down	Low
	5 - Pink	5 - Pink	Not connected	
	6 - Yellow	6 - Yellow	Power on	High
	7 - Red	7 - Red	Ready	High
	8 - Green	8 - Green	Stop	Low
	9 - Black	9 - Black	Start request	Low

Agilent Module to General Purpose

p/n 01046-60201	Wire Color	Pin Agilent module	Signal Name	Active (TTL)
	White	1	Digital ground	
	Brown	2	Prepare run	Low
	Gray	3	Start	Low
	Blue	4	Shut down	Low
	Pink	5	Not connected	
	Yellow	6	Power on	High
	Red	7	Ready	High
	Green	8	Stop	Low
	Black	9	Start request	Low

CAN/LAN Cables



Both ends of this cable provide a modular plug to be connected to Agilent modules CAN or LAN connectors.

CAN Cables

p/n	Description
5181-1516 A	CAN cable, Agilent module to module, 0.5 m
5181-1519 A	CAN cable, Agilent module to module, 1 m

LAN Cables

p/n	Description
5023-0203 A	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202 A	Twisted pair network cable, shielded, 7 m (for point to point connection)

Agilent Module to PC

p/n	Description
RS232-61601 A	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It is also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561 A	RS-232 cable, 8 m

USB

To connect a USB Flash Drive use a USB OTG cable with Mini-B plug and A socket.

p/n	Description
5188-8050 A	USB A M-USB Mini B 3 m (PC-Module)
5188-8049 A	USB A F-USB Mini B M OTG (Module to Flash Drive)

12 Hardware Information

This chapter describes the modules in more detail on hardware and electronics.

Firmware Description

The firmware of the instrument consists of two independent sections:

- a non-instrument specific section, called *resident system*
- an instrument specific section, called *main system*

Resident System

This resident section of the firmware is identical for all Agilent 1100/1200/1220/1260/1290 series modules. Its properties are:

- the complete communication capabilities (CAN, LAN, USB and RS- 232)
- memory management
- ability to update the firmware of the 'main system'

Main System

Its properties are:

- the complete communication capabilities (CAN, LAN, USB and RS- 232)
- memory management
- ability to update the firmware of the 'resident system'

In addition the main system comprises the instrument functions that are divided into common functions like

- run synchronization through APG/ERI remote,
- error handling,
- diagnostic functions,
- or module specific functions like
  - internal events such as lamp control, filter movements,
  - raw data collection and conversion to absorbance.

Firmware Updates

Firmware updates can be done with the Agilent Lab Advisor software with files on the hard disk (latest version should be used).

Required tools, firmware and documentation are available from the Agilent web: https://www.agilent.com/en-us/firmwareDownload?whid=69761

The file naming conventions are:

PPPP_RVVV_XXX.dlb, where

- PPPP is the product number, for example, 1315B for the G1315B DAD,
- R the firmware revision, for example, A for G1315B or B for the G1315C DAD,
- VVV is the revision number, for example 650 is revision 6.50,
- XXX is the build number of the firmware.

For instructions on firmware updates refer to section *Replacing Firmware* in chapter *"Maintenance"* or use the documentation provided with the *Firmware Update Tools*.

NOTE

Update of main system can be done in the resident system only. Update of the resident system can be done in the main system only.

Main and resident firmware must be from the same set.

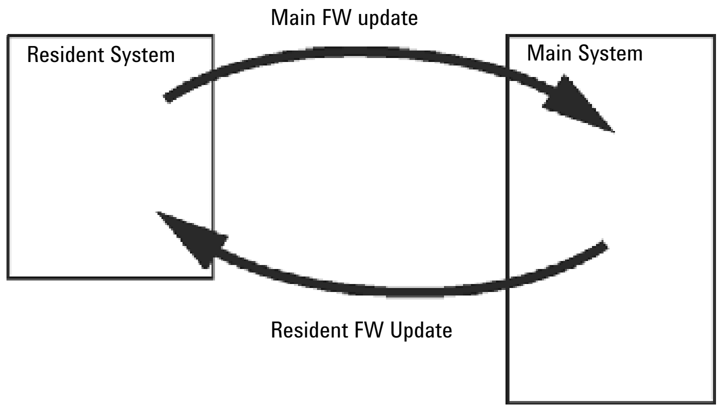


Figure 75 Firmware Update Mechanism

NOTE

Some modules are limited in downgrading due to their mainboard version or their initial firmware revision. For example, a G1315C DAD SL cannot be downgraded below firmware revision B.01.02 or to a A.xx.xx.

Some modules can be re-branded (e.g. G1314C to G1314B) to allow operation in specific control software environments. In this case, the feature set of the target type is used and the feature set of the original one is lost. After re-branding (e.g. from G1314B to G1314C), the original feature set is available again.

All this specific information is described in the documentation provided with the firmware update tools.

The firmware update tools, firmware and documentation are available from the Agilent web.

- https://www.agilent.com/en-us/firmwareDownload?whid=69761

Electrical Connections

- The CAN bus is a serial bus with high-speed data transfer. The two connectors for the CAN bus are used for internal module data transfer and synchronization.
- The ERI/REMOTE connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features such as start, stop, common shutdown, prepare, and so on.
- With the appropriate software, the LAN connector may be used to control the module from a computer through a LAN connection. This connector is activated and can be configured with the configuration switch.
- With the appropriate software, the USB connector may be used to control the module from a computer through a USB connection.
- The power input socket accepts a line voltage of 100 – 240 VAC ± 10 % with a line frequency of 50 or 60 Hz. Maximum power consumption varies by module. There is no voltage selector on your module because the power supply has wide-ranging capability. There are no externally accessible fuses because automatic electronic fuses are implemented in the power supply.

NOTE

Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

Electric Shock

WARNING

Electric shock due to insufficient insulation of connected instruments

Personal injury or damage to the instrument

✓ Any other instruments connected to this instrument shall be approved to a suitable safety standard and must include reinforced insulation from the mains.

Rear view of the solution modules

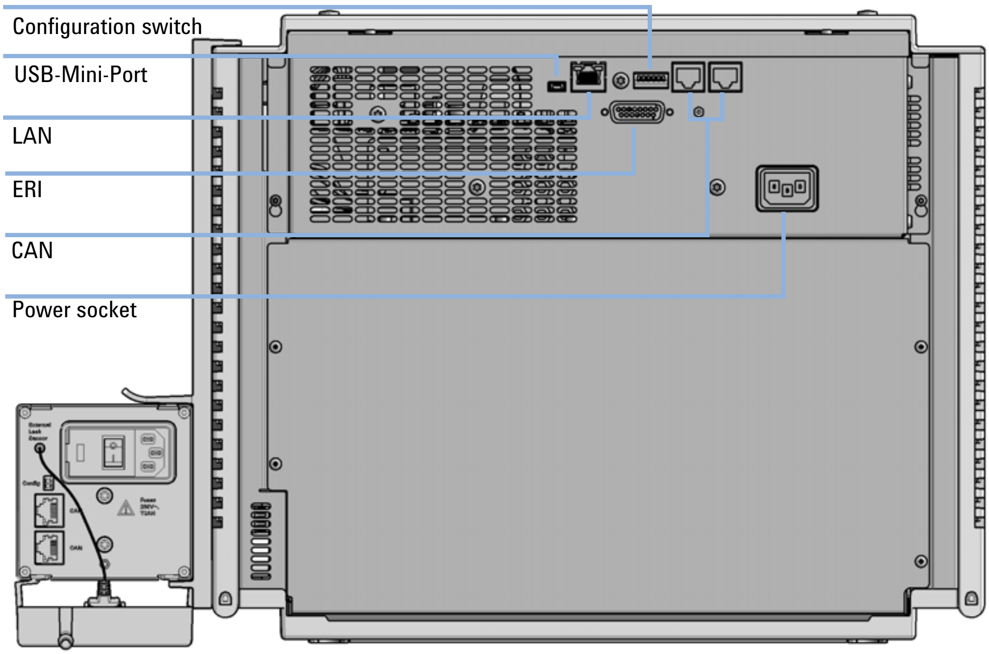


Figure 76 Rear view of the Online Sample Manager - electrical connections

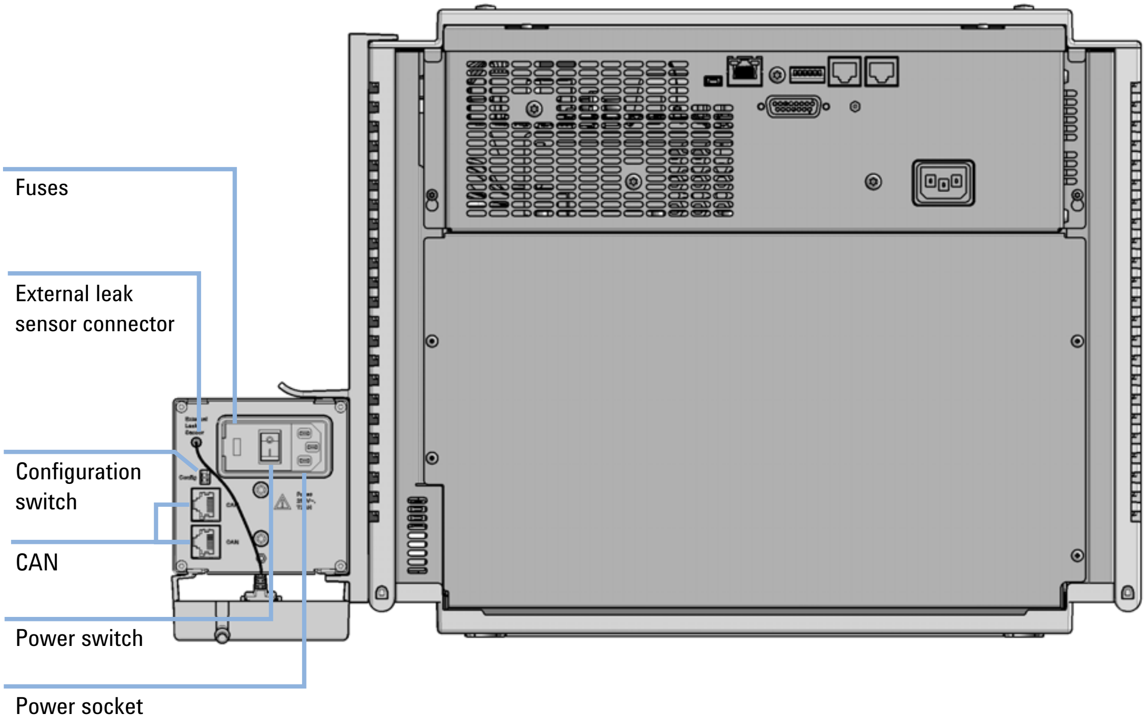


Figure 77 Rear view of the External Sampling Valve - electrical connections

Information on Instrument Serial Number

Serial Number Information 1260/1290 Infinity

The serial number information on the instrument labels provide the following information:

CCXZZ00000	Format
CC	Country of manufacturing • DE = Germany • JP = Japan • CN = China
X	Alphabetic character A-Z (used by manufacturing)
ZZ	Alpha-numeric code 0-9, A-Z, where each combination unambiguously denotes a module (there can be more than one code for the same module)
00000	Serial number

Serial Number Information 1200 Series and 1290 Infinity

The serial number information on the instrument labels provide the following information:

CCYWWSSSSS	Format
CC	country of manufacturing • DE = Germany • JP = Japan • CN = China
YWW	year and week of last major manufacturing change, e.g. 820 could be week 20 of 1998 or 2008
SSSSS	real serial number

Interfaces

The Agilent InfinityLab LC Series modules provide the following interfaces:

Table 38 Agilent InfinityLab LC Series Interfaces

Module	CAN	USB	LAN (on-board)	RS-232	Analog	APG (A) / ERI (E)	Special
Pumps							
G7104A/C	2	No	Yes	Yes	1	A	
G7110B	2	Yes	Yes	No	No	E	
G7111A/B, G5654A	2	Yes	Yes	No	No	E	
G7112B	2	Yes	Yes	No	No	E	
G7120A, G7132A	2	No	Yes	Yes	1	A	
G7161A/B	2	Yes	Yes	No	No	E	
Samplers							
G7129A/B/C	2	Yes	Yes	No	No	E	
G7167A/B/C, G7137A, G5668A, G3167A/B	2	Yes	Yes	No	No	E	
G7157A	2	Yes	Yes	No	No	E	
Detectors							
G7114A/B	2	Yes	Yes	No	1	E	
G7115A	2	Yes	Yes	No	1	E	
G7117A/B/C	2	Yes	Yes	No	1	E	
G7121A/B	2	Yes	Yes	No	1	E	
G7162A/B	2	Yes	Yes	No	1	E	
G7165A	2	Yes	Yes	No	1	E	

Table 38 Agilent InfinityLab LC Series Interfaces

Module	CAN	USB	LAN (on-board)	RS-232	Analog	APG (A) / ERI (E)	Special
Fraction Collectors							
G7158B	2	Yes	Yes	No	No	E	
G7159B	2	Yes	Yes	No	No	E	
G7166A	2	No	No	No	No	No	Requires a host module with on-board LAN with minimum FW B.06.40 or C.06.40, or with additional G1369C LAN Card
G1364E/F, G5664B	2	Yes	Yes	No	No	E	THERMOSTAT for G1330B
Others							
G1170A	2	No	No	No	No	No	
G7116A/B	2	No	No	No	No	No	Requires a host module with on-board LAN or with additional G1369C LAN Card.
G7122A	No	No	No	Yes	No	A	
G7170B	2	No	No	No	No	No	Requires a host module with on-board LAN with minimum FW B.06.40 or C.06.40, or with additional G1369C LAN Card

NOTE

The detector (DAD/MWD/FLD/VWD/RID) is the preferred access point for control via LAN. The inter-module communication is done via CAN.

- CAN connectors as interface to other modules
- LAN connector as interface to the control software
- RS-232C as interface to a computer
- USB (Universal Series Bus) as interface to a computer
- REMOTE connector as interface to other Agilent products
- Analog output connector(s) for signal output

Overview Interfaces

Overview Interfaces

CAN

The CAN is inter-module communication interface. It is a 2-wire serial bus system supporting high speed data communication and real-time requirement.

LAN

The modules have either an interface slot for a LAN card (e.g. Agilent G1369B/C LAN Interface) or they have an on-board LAN interface (e.g. detectors G1315C/D DAD and G1365C/D MWD). This interface allows the control of the module/system via a PC with the appropriate control software. Some modules have neither on-board LAN nor an interface slot for a LAN card (e.g. G1170A Valve Drive or G4227A Flexible Cube). These are hosted modules and require a Host module with firmware B.06.40 or later or with additional G1369C LAN Card.

NOTE

If an Agilent detector (DAD/MWD/FLD/VWD/RID) is in the system, the LAN should be connected to the DAD/MWD/FLD/VWD/RID (due to higher data load). If no Agilent detector is part of the system, the LAN interface should be installed in the pump or autosampler.

USB

The USB interface replaces the RS-232 Serial interface in new FUSION generation modules. For details on USB refer to “USB (Universal Serial Bus)” on page 423.

Analog Signal Output

The analog signal output can be distributed to a recording device. For details refer to the description of the module’s mainboard.

Remote (ERI)

The ERI (Enhanced Remote Interface) connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features as common shut down, prepare, and so on.

It allows easy connection between single instruments or systems to ensure coordinated analysis with simple coupling requirements.

The subminiature D connector is used. The module provides one remote connector which is inputs/outputs (wired- or technique).

To provide maximum safety within a distributed analysis system, one line is dedicated to SHUT DOWN the system’s critical parts in case any module detects a serious problem. To detect whether all participating modules are switched on or properly powered, one line is defined to summarize the POWER ON state of all connected modules. Control of analysis is maintained by signal readiness READY for next analysis, followed by START of run and optional STOP of run triggered on the respective lines. In addition PREPARE and START REQUEST may be issued. The signal levels are defined as:

- standard TTL levels (0 V is logic true, + 5.0 V is false),
- fan-out is 10,
- input load is 2.2 kOhm against + 5.0 V, and
- output are open collector type, inputs/outputs (wired- or technique).

NOTE

All common TTL circuits operate with a 5 V power supply. A TTL signal is defined as "low" or L when between 0 V and 0.8 V and "high" or H when between 2.0 V and 5.0 V (with respect to the ground terminal).

Table 39 ERI signal distribution

Pin	Signal	Description
1	START REQUEST	(L) Request to start injection cycle (for example, by start key on any module). Receiver is the autosampler.
2	STOP	(L) Request to reach system ready state as soon as possible (for example, stop run, abort or finish and stop injection). Receiver is any module performing run-time controlled activities.
3	READY	(H) System is ready for next analysis. Receiver is any sequence controller.
4	POWER ON	(H) All modules connected to system are switched on. Receiver is any module relying on operation of others.
5		Not used
6	SHUT DOWN	(L) System has serious problem (for example, leak: stops pump). Receiver is any module capable to reduce safety risk.
7	START	(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.
8	PREPARE	(L) Request to prepare for analysis (for example, calibration, detector lamp on). Receiver is any module performing pre-analysis activities.

Special Interfaces

There is no special interface for this module.

Electric Shock

WARNING

Electric shock due to insufficient insulation of connected instruments

Personal injury or damage to the instrument

- ✓ **Any other instruments connected to this instrument shall be approved to a suitable safety standard and must include reinforced insulation from the mains.**

ERI (Enhanced Remote Interface)

ERI replaces the AGP Remote Interface that is used in the HP 1090/1040/1050/1100 HPLC systems and Agilent 1100/1200/1200 Infinity HPLC modules. All new InfinityLab LC Series products using the FUSION core electronics use ERI. This interface is already used in the Agilent Universal Interface Box 2 (UIB2)

ERI Description

The ERI interface contains eight individual programmable input/output pins. In addition, it provides 24 V power and 5 V power and a serial data line to detect and recognize further add-ons that could be connected to this interface. This way the interface can support various additional devices like sensors, triggers (in and out) and small controllers, etc.

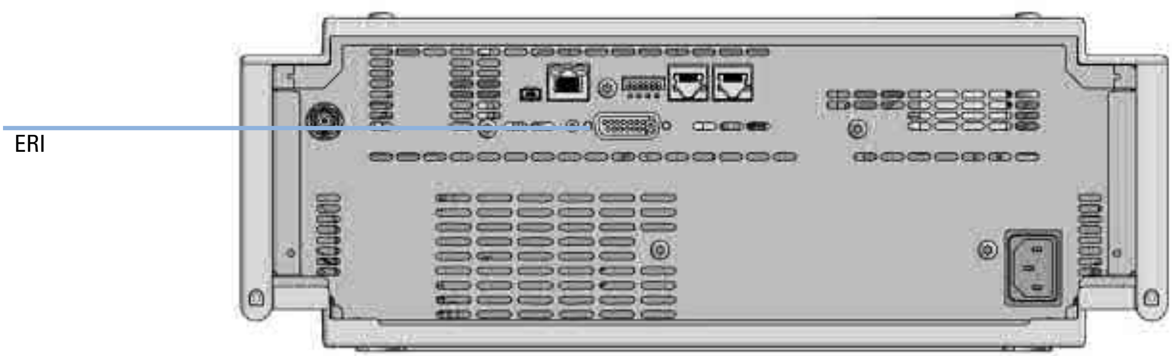
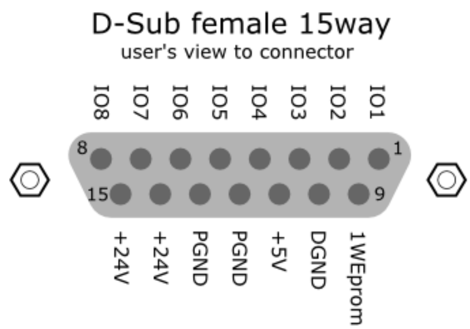


Figure 78 Location of the ERI interface (example shows a G7114A/B VWD)



Pin	Enhanced Remote
1	IO 1 (START REQUEST)
2	IO 2 (STOP)
3	IO 3 (READY)
4	IO 4 (POWER ON)
5	IO 5 (NOT USED)
6	IO 6 (SHUT DOWN)
7	IO 7 (START)
8	IO 8 (PREPARE)
9	1 wire DATA
10	DGND
11	+5 V ERI out
12	PGND
13	PGND
14	+24 V ERI out
15	+24 V ERI out

IO (Input/Output) Lines

- Eight generic bi-directional channels (input or output).
- Same as the APG Remote.
- Devices like valves, relays, ADCs, DACs, controllers can be supported/controlled.

1-Wire Data (Future Use)

This serial line can be used to read out an EPROM or write into an EPROM of a connected ERI-device. The firmware can detect the connected type of device automatically and update information in the device (if required).

5V Distribution (Future Use)

- Available directly after turning on the hosting module (assures that the firmware can detect certain basic functionality of the device).
- For digital circuits or similar.
- Provides 500 mA maximum.
- Short-circuit proof with automatic switch off (by firmware).

24V Distribution (Future Use)

- Available by firmware command (defined turn on/off).
- For devices that need higher power
  - Class 0: 0.5 A maximum (12 W)
  - Class 1: 1.0 A maximum (24 W)
  - Class 2: 2.0 A maximum (48 W)
- Class depends on hosting module's internal power overhead.
- If a connected device requires more power the firmware detects this (overcurrent detection) and provides the information to the user interface.
- Fuse used for safety protection (on board).
- Short circuit will be detected through hardware.

USB (Universal Serial Bus)

USB (Universal Serial Bus) - replaces RS232, supports:

- a PC with control software (for example Agilent Lab Advisor)
- USB Flash Disk

Setting the 6-bit Configuration Switch

The 6-bit configuration switch is located at the rear of the module with FUSION electronics. Switch settings provide configuration parameters for LAN and instrument specific initialization procedures.

All modules with FUSION electronics:

- Default is ALL switches DOWN (best settings).
  - Default IP address for LAN 192.168.254.11
- For specific LAN modes switches 4-5 must be set as required.
- For boot resident/cold start modes switches 1+2 or 6 must be UP.

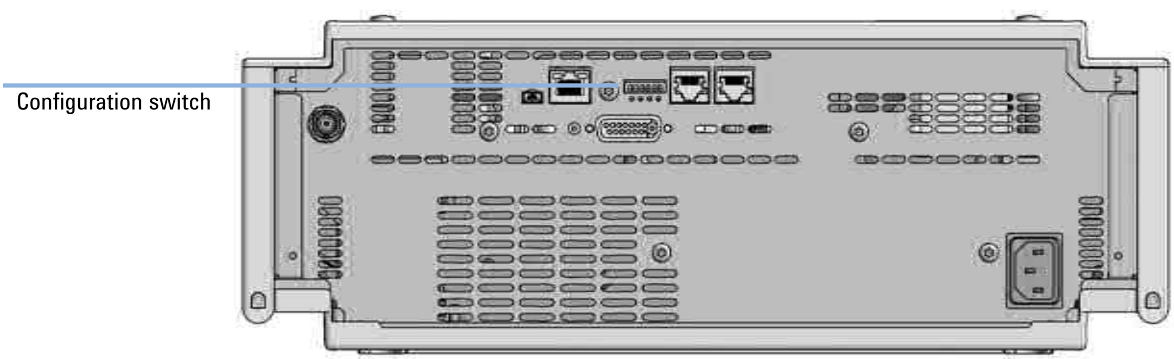


Figure 79 Location of Configuration switch (example shows a G7114A/B VWD)

Table 40 6-bit Configuration Switch

	Mode	Function/Setting				
	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6
COM[1]	0	n.a.[2]	n.a.	LAN Init Mode		n.a.
Use Default IP Address[3]		0	0	0	0	0
Use Stored IP Address		0	0	0	1	0
Use DHCP to request IP Address[4]		0	0	1	0	0
Test	1	System	n.a.	n.a.	n.a.	ColdStart
Boot Main System / Keep Data		0	0	0	0	0
Boot Resident System / Keep Data		1	0	0	0	0
Boot Main System / Revert to Default Data		0	0	0	0	1
Boot Resident System / Revert to Default Data		1	0	0	0	1

1 When selecting mode COM, settings are stored to non-volatile memory. When selecting mode Test, COM settings are taken from non-volatile memory.

2 not assigned - Always keep these switches on position ‘0’ (off)

3 Default IP Address is 192.168.254.11

4 Host Name will be the MAC address.

Config Switch Settings of the Infinity Valve Drive

Configuration Switch Settings

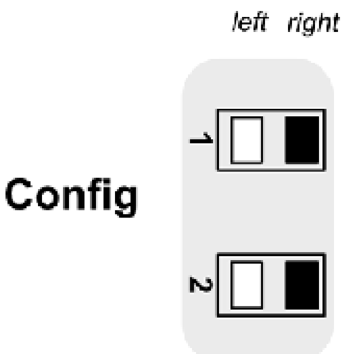


Figure 80 Config Switches

Table 41 Dip switches settings for G1170A

Mode select	1	2
Default	right	right
Coldstart	right	left
Boot resident	left	right
Not supported	left	left

Special Settings

Boot-Resident

Firmware update procedures may require this mode in case of firmware loading errors (main firmware part). If you use the following switch settings and power the instrument up again, the instrument firmware stays in the resident mode. It is not operable as a module. It only uses basic functions of the operating system for example, for communication. In this mode the main firmware can be loaded (using update utilities).

Forced Cold Start

A forced cold start can be used to bring the module into a defined mode with default parameter settings.

CAUTION

Loss of data

Forced cold start erases all methods and data stored in the non-volatile memory. Exceptions are calibration settings, diagnosis and repair log books which will not be erased.

✓ **Save your methods and data before executing a forced cold start.**

Instrument Layout

The industrial design of the module incorporates several innovative features. It uses Agilent's E-PAC concept for the packaging of electronics and mechanical assemblies. This concept is based upon the use of expanded polypropylene (EPP) layers of foam plastic spacers in which the mechanical and electronic boards components of the module are placed. This pack is then housed in a metal inner cabinet which is enclosed by a plastic external cabinet. The advantages of this packaging technology are:

- virtual elimination of fixing screws, bolts or ties, reducing the number of components and increasing the speed of assembly/disassembly,
- the plastic layers have air channels molded into them so that cooling air can be guided exactly to the required locations,
- the plastic layers help cushion the electronic and mechanical parts from physical shock, and
- the metal inner cabinet shields the internal electronics from electromagnetic interference and also helps to reduce or eliminate radio frequency emissions from the instrument itself.

Early Maintenance Feedback

Maintenance requires the exchange of components that are subject to wear or stress. Ideally, the frequency at which components are exchanged should be based on the intensity of use of the module and the analytical conditions, and not on a predefined time interval. The early maintenance feedback (EMF) feature monitors the use of specific components in the instrument, and provides feedback when the user-selectable limits have been exceeded. The visual feedback in the user interface provides an indication that maintenance procedures should be scheduled.

EMF Counters

EMF counters increment with use and can be assigned a maximum limit which provides visual feedback in the user interface when the limit is exceeded. Some counters can be reset to zero after the required maintenance procedure.

Using the EMF Counters

The user-settable EMF limits for the EMF Counters enable the early maintenance feedback to be adapted to specific user requirements. The useful maintenance cycle is dependent on the requirements for use. Therefore, the definition of the maximum limits need to be determined based on the specific operating conditions of the instrument.

Setting the EMF Limits

The setting of the EMF limits must be optimized over one or two maintenance cycles. Initially the default EMF limits should be set. When instrument performance indicates maintenance is necessary, take note of the values displayed by the EMF counters. Enter these values (or values slightly less than the displayed values) as EMF limits, and then reset the EMF counters to zero. The next time the EMF counters exceed the new EMF limits, the EMF flag will be displayed, providing a reminder that maintenance needs to be scheduled.

13 Appendix

This chapter provides additional information on safety, legal, and web.

Safety

General Safety Information

General Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

WARNING

Ensure the proper usage of the equipment.

The protection provided by the equipment may be impaired.

- ✓ **The operator of this instrument is advised to use the equipment in a manner as specified in this manual.**

Safety Standards

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

Before Applying Power

WARNING

Wrong voltage range, frequency or cabling

Personal injury or damage to the instrument

- ✓ Verify that the voltage range and frequency of your power distribution matches to the power specification of the individual instrument.
- ✓ Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.
- ✓ Make all connections to the unit before applying power.

NOTE

Note the instrument's external markings described under "Symbols" on page 436.

Ground the Instrument

WARNING

Missing electrical ground

Electrical shock

- ✓ If your product is provided with a grounding type power plug, the instrument chassis and cover must be connected to an electrical ground to minimize shock hazard.
- ✓ The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.
- ✓ Do not use portable multi power outlet to connect the products to mains to avoid potential electrical shock hazard if the protective (grounding) conductor of the portable multi power outlet fails.
- ✓ Product is a Safety Class I instrument connected to electrical ground (protective earthing).
- ✓ Protective earth of different power lines are potentially on different voltage level which could damage your product if connected together. If you connect multiple products or accessories to different power lines (electrical ground) contact your building services to check grounding system.

Do Not Operate in an Explosive Atmosphere

WARNING

Presence of flammable gases or fumes

Explosion hazard

- ✓ Do not operate the instrument in the presence of flammable gases or fumes.

Do Not Remove the Instrument Cover

WARNING

Instrument covers removed

Electrical shock

- ✓ Do Not Remove the Instrument Cover
- ✓ Only Agilent authorized personnel are allowed to remove instrument covers. Always disconnect the power cables and any external circuits before removing the instrument cover.

Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Sales and Service Office for service and repair to ensure that safety features are maintained.

In Case of Damage

WARNING

Damage to the module

Personal injury (for example electrical shock, intoxication)

- ✓ Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

Solvents

WARNING

Toxic, flammable and hazardous solvents, samples and reagents

The handling of solvents, samples and reagents can hold health and safety risks.

- ✓ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.
- ✓ Do not use solvents with an auto-ignition temperature below 200 °C (392 °F). Do not use solvents with a boiling point below 56 °C (133 °F).
- ✓ Avoid high vapor concentrations. Keep the solvent temperature at least 40 °C (72 °F) below the boiling point of the solvent used. This includes the solvent temperature in the sample compartment. For the solvents methanol and ethanol keep the solvent temperature at least 25 °C (45 °F) below the boiling point.
- ✓ Do not operate the instrument in an explosive atmosphere.
- ✓ Do not use solvents of ignition Class IIC according IEC 60079-20-1 (for example, carbon disulfide).
- ✓ Reduce the volume of substances to the minimum required for the analysis.
- ✓ Never exceed the maximum permissible volume of solvents (8 L) in the solvent cabinet. Do not use bottles that exceed the maximum permissible volume as specified in the usage guideline for solvent cabinet.
- ✓ Ground the waste container.
- ✓ Regularly check the filling level of the waste container. The residual free volume in the waste container must be large enough to collect the waste liquid.
- ✓ To achieve maximal safety, regularly check the tubing for correct installation.

NOTE

For details, see the usage guideline for the solvent cabinet. A printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available in the Agilent Information Center or via the Internet.

Symbols

Table 42 Symbols

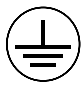
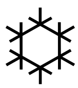
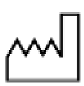
	The apparatus is marked with this symbol when the user shall refer to the instruction manual in order to protect risk of harm to the operator and to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.
	The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.
	Sample Cooler unit is designed as vapor-compression refrigeration system. Contains fluorinated greenhouse gas (refrigerant) according to the Kyoto protocol. For specifications of refrigerant, charge capacity, carbon dioxide equivalent (CDE), and global warming potential (GWP) see instrument label.
	Flammable Material For Sample Thermostat which uses flammable refrigerant consult Agilent Information Center / User Manual before attempting to install or service this equipment. All safety precautions must be followed.
	Confirms that a manufactured product complies with all applicable European Community directives. The European Declaration of Conformity is available at: http://regulations.corporate.agilent.com/DoC/search.htm
	Manufacturing date.
	Power symbol indicates On/Off. The apparatus is not completely disconnected from the mains supply when the power switch is in the Off position
	Pacemaker Magnets could affect the functioning of pacemakers and implanted heart defibrillators. A pacemaker could switch into test mode and cause illness. A heart defibrillator may stop working. If you wear these devices keep at least 55 mm distance to magnets. Warn others who wear these devices from getting too close to magnets.

Table 42 Symbols

	Magnetic field Magnets produce a far-reaching, strong magnetic field. They could damage TVs and laptops, computer hard drives, credit and ATM cards, data storage media, mechanical watches, hearing aids and speakers. Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.
	Indicates a pinching or crushing hazard
	Indicates a piercing or cutting hazard.

WARNING

A WARNING

alerts you to situations that could cause physical injury or death.

✓ Do not proceed beyond a warning until you have fully understood and met the indicated conditions.

CAUTION

A CAUTION

alerts you to situations that could cause loss of data, or damage of equipment.

✓ Do not proceed beyond a caution until you have fully understood and met the indicated conditions.

Electrical and chemical Hazards specific to the System

Equipotential grounding

CAUTION

Different potential grounding of reactor and LC instrument

Electronic failure and damage to the instrument by melting capillaries

✓ Ensure the equipotential grounding of all instruments.

✓ Use capillaries made of nonconductive material.

Increased touch current

WARNING

Combination of Online LC system and external reactor installation

Personal injury by increased touch current

✓ Verify that the current range matches the specifications of the system.

✓ To ensure proper functionality and compliance with safety or EMC regulations, use the multiple socket outlet distributed by Agilent Technologies only.

Chemicals from Reactor stream

WARNING

Hazardous chemicals and vapors from reactor stream

Exposure with hazardous chemicals and vapors can hold health and safety risks

- ✓ Verify the correct installation of all components.
- ✓ Use a leak tray with leak sensor for the external valve.
- ✓ Locate the system in an appropriate safety area isolated from office facilities.
- ✓ Ensure that the leak handling system accounts for toxic samples and provides a separate waste container for the external valve.
- ✓ Do not exceed the pressure limits specified for the reactor stream.
- ✓ Consider the specifications for the samples to be collected to avoid blockage of the reactor stream flow path.

Vial Handling

WARNING

Hazardous chemicals and vapors from the reactor stream

Exposure with hazardous chemicals and vapors can hold health and safety risks

- ✓ Always insert correct vials into the module.
- ✓ Use the vial presence sensing technology.
- ✓ Ensure that the installed vials are appropriate for the volume of the collected sample.

Flammable Solvents from the Reactor stream

WARNING

Leak of flammable solvents

Explosive hazard and personal injury

- ✓ Verify the correct installation of all components.
- ✓ Use a leak tray with leak sensor for the external valve.
- ✓ Locate the system in an appropriate safety area.
- ✓ Ensure that the leak handling system accounts for toxic samples and provides a separate waste container for the external valve.
- ✓ Do not exceed the pressure limits specified for the reactor stream.
- ✓ Consider the specifications for the samples to be collected to avoid blockage of the reactor stream flow path.

Flammable Solvents in Vials

WARNING

Leak of flammable solvents

Explosive hazard and personal injury

- ✓ Always insert correct vials into the module.
- ✓ Use the vial presence sensing technology.
- ✓ Ensure that the installed vials are appropriate for the volume of the collected sample.

Waste Electrical and Electronic Equipment Directive

This product complies with the European WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

NOTE

Do not dispose of in domestic household waste

To return unwanted products, contact your local Agilent office, or see https://www.agilent.com for more information.

Radio Interference

Cables supplied by Agilent Technologies are screened to provide optimized protection against radio interference. All cables are in compliance with safety or EMC regulations.

Test and Measurement

If test and measurement equipment is operated with unscreened cables, or used for measurements on open set-ups, the user has to assure that under operating conditions the radio interference limits are still met within the premises.

RFID Statement

Brasil

Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados. Para mais informações, consulte o site da Anatel: https://www.gov.br/anatel/pt-br.

Este produto não é apropriado para uso em ambientes domésticos, pois poderá causar interferências eletromagnéticas que obrigam o usuário a tomar medidas necessárias para minimizar estas interferências.

Canada

Statement according to RSS GEN Issue 5:

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes:

1. Cet appareil ne doit pas causer d'interférences
2. Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.

Mexico

La operación de este equipo está sujeta a las siguientes dos condiciones:

1. es posible que este equipo o dispositivo no cause interferencia perjudicial y
2. este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

Thailand

This telecommuinication equipment conforms to NTC/NBTC technical requirement.

USA

1. User Information according to FCC 15.21:Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.
2. Part 15 Statement according to FCC 15.19:

   This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

   - This device may not cause interference.
   - This device must accept any interference, including interference that may cause undesired operation.

CAUTION

Do not change or modify the equipment.

Changes or modifications not expressly approved by Agilent could void your authority to operate the equipment.

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Table 19: Operating frequencies and maximum power levels

Technology	Operating Frequencies/ Bands	Maximum Transmit Power Level
RFID	125 kHz	26.8 dBm

Sound Emission

Sound pressure

Sound pressure Lp <70 db(A) according to DIN EN ISO 7779

Schalldruckpegel

Schalldruckpegel Lp <70 db(A) nach DIN EN ISO 7779

Solvent Information

Flow Cell

To protect optimal functionality of your flow-cell:

- Avoid the use of alkaline solutions (pH > 9.5) which can attack quartz and thus impair the optical properties of the flow cell.

Use of Solvents

Observe the following recommendations on the use of solvents.

- Brown glass ware can avoid growth of algae.
- Avoid the use of the following steel-corrosive solvents:
  - solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on),
  - high concentrations of inorganic acids like sulfuric acid and nitric acid, especially at higher temperatures (if your chromatography method allows, replace by phosphoric acid or phosphate buffer which are less corrosive against stainless steel),
  - halogenated solvents or mixtures which form radicals and/or acids, for example:

    $2CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$

    This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol,
  - chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, diisopropyl ether) should be filtered through dry aluminium oxide which adsorbs the peroxides,
  - solvents containing strong complexing agents (e.g. EDTA),
  - mixtures of carbon tetrachloride with 2-propanol or THF.
- Avoid the use of dimethyl formamide (DMF). Polyvinylidene fluoride (PVDF), which is used in leak sensors, is not resistant to DMF.

UV Radiation

Emissions of ultraviolet radiation (200 – 315 nm) from this product is limited such that radiant exposure incident upon the unprotected skin or eye of operator or service personnel is limited to the following TLVs (Threshold Limit Values) according to the American Conference of Governmental Industrial Hygienists:

Table 43 UV radiation limits

Exposure/day	Effective irradiance
8 h	0.1 $\mu W/cm^2$
10 min	5.0 $\mu W/cm^2$

Typically the radiation values are much smaller than these limits:

Table 44 UV radiation typical values

Position	Effective irradiance
Lamp installed, 50 cm distance	average 0.016 $\mu W/cm^2$
Lamp installed, 50 cm distance	maximum 0.14 $\mu W/cm^2$

Declaration of Conformity for HOX2 Filter

Declaration of Conformity

We herewith inform you that the

Holmium Oxide Glass Filter

used in Agilents absorbance detectors listed in the table below meets the requirements of National Institute of Standards and Technology (NIST) to be applied as certified wavelength standard.

According to the publication of NIST in J. Res. Natl. Inst. Stand. Technol. 112, 303-306 (2007) the holmium oxide glass filters are inherently stable with respect to the wavelength scale and need no recertification. The expanded uncertainty of the certified wavelength values is 0.2 nm.

Agilent Technologies guarantees, as required by NIST, that the material of the filters is holmium oxide glass representing the inherently existent holmium oxide absorption bands.

Test wavelengths:

Where "x" can be any alphanumeric character

Product Number	Series	Measured Wavelength *	Wavelength Accuracy	Optical Bandwidth
G1315x, G1365x	1100, 1200, 1260	361.0 nm 418.9 nm 453.7 nm 536.7 nm	+/- 1 nm	2 nm
G7115x, G7165x	1260			
G1600x, G7100x	CE			
G1314x	1100, 1200, 1260, 1290	360.8nm 418.5nm 536.4nm	+/- 1 nm	6 nm
G7114x	1260, 1290			
G4286x,...,94x	1120, 1220			

*) The variation in Measured Wavelength depends on the different Optical Bandwidth.

28-Oct-2014
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Revision: G
Effective by: 28-Oct-2014

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https://www.agilent.com

In This Book

This manual describes the Agilent InfinityLab Online LC Solution.

The manual describes the following:

- Introduction
- Site Requirements and Specifications
- Installing the Solution
- Scheduling Software Workflow Tasks
- Using the Solution Modules
- Optimizing Performance
- Maintenance and Repair
- Parts for Maintenance
- Test Functions and Calibration
- Error Information
- Identifying Cables
- Hardware Information
- Appendix

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Edition: 06/2024

Document No: D0006652 Rev. E

Agilent