Agilent

Agilent InfinityLab

Online LC Solutions

User Manual

Notices

Document Information

The information in this document also applies to 1260 Infinity II and 1290 Infinity II modules.

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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.

Contents

In This Book

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

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

1 Introduction

This chapter gives an introduction to the module and an instrument overview.

Overview of the Solution Modules

Product Structure

The Agilent InfinityLab Online LC Solution hardware consists of the following:

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

The Agilent 1260 Infinity III 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.

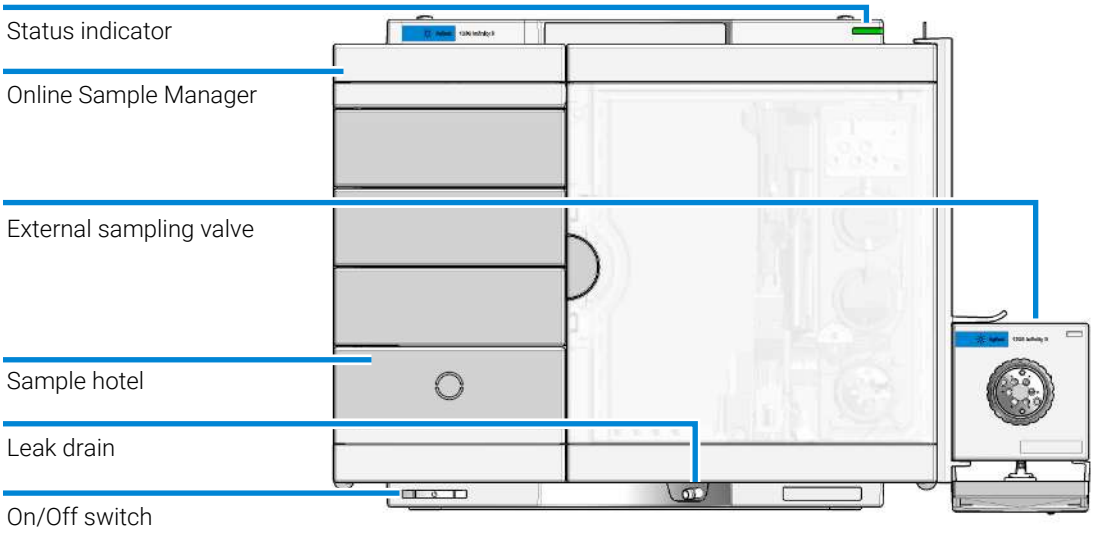


Figure 1: Overview of the Online Sample Manager Set modules

Features of the 1260 Infinity III 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.
- Equipped with InfinityLab Assist: Adds an Intuitive User Interface, Automated Workflows, Predictive Maintenance and Assisted Troubleshooting. It is not supported by the Online Monitoring Software!
- InfinityLab Level Sensing adds weight controlled level sensing and solvent prediction of the equipped HPLC solvents to avoid downtime by running out solvent. It is not supported by the Online Monitoring Software!
- InfinityLab Sample ID Reader adds a barcode reader to the 1260/1290 Infinity II and III Online Sample Manager to achieve conformation of the sample ID on the vial with the ID in the sequence of the CDS. Furthermore, it is a key part of the Agilent Advanced Sample Linking Workflow. It is not supported by the Online Monitoring Software!

Product Description of the 1290 Infinity III Bio Online Sample Manager (G3167B)

The Agilent 1290 Infinity III Bio Online Sample Manager combines the Agilent 1260 Infinity III Online Sample Manager and the Agilent 1290 Infinity III 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.

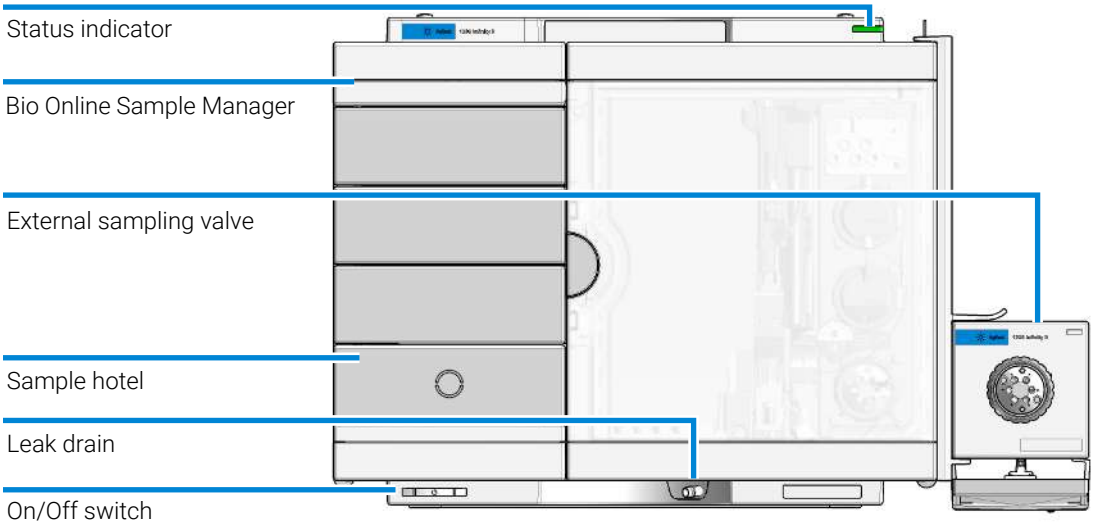


Figure 2: Overview of the Bio Online Sample Manager Set modules

Features of the 1290 Infinity III 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.
- Equipped with InfinityLab Assist: Adds an Intuitive User Interface, Automated Workflows, Predictive Maintenance and Assisted Troubleshooting. It is not supported by the Online Monitoring Software!
- InfinityLab Level Sensing adds weight controlled level sensing and solvent prediction of the equipped HPLC solvents to avoid downtime by running out solvent. It is not supported by the Online Monitoring Software!
- InfinityLab Sample ID Reader adds a barcode reader to the 1260/1290 Infinity II and III Online Sample Manager to achieve conformation of the sample ID on the vial with the ID in the sequence of the CDS. Furthermore, it is a key part of the Agilent Advanced Sample Linking Workflow. It is not supported by the Online Monitoring Software!

Universal Valve Drive (G1170A)

The Agilent 1290 Infinity III 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 III 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.

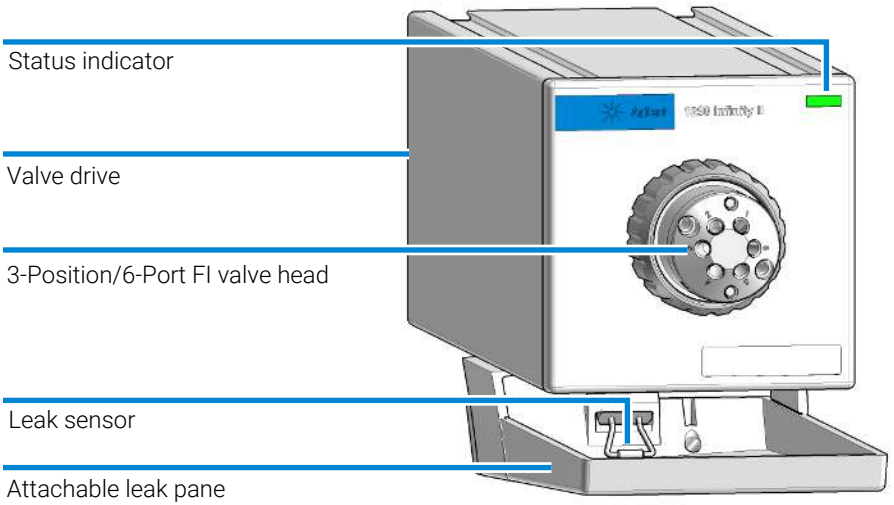


Figure 3: Overview of the External Sampling Valve

Hardware Concept

The Figure 4 on page 16 shows the overview of the main hardware components of the Agilent InfinityLab Online LC Solution.

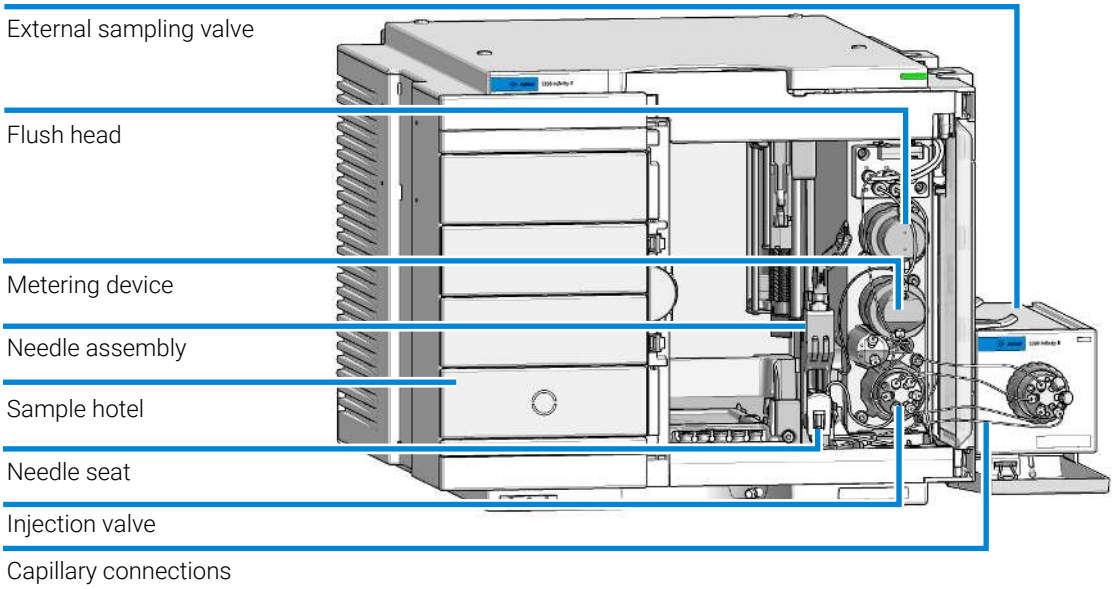


Figure 4: Overview of the hardware components of the Agilent InfinityLab Online LC Solution

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

- 1260 Infinity III Online Sample Manager (G3167A) / 1290 Infinity III Bio Online Sample Manager (G3167B)
- External Sampling Valve (Universal 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 Universal 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.

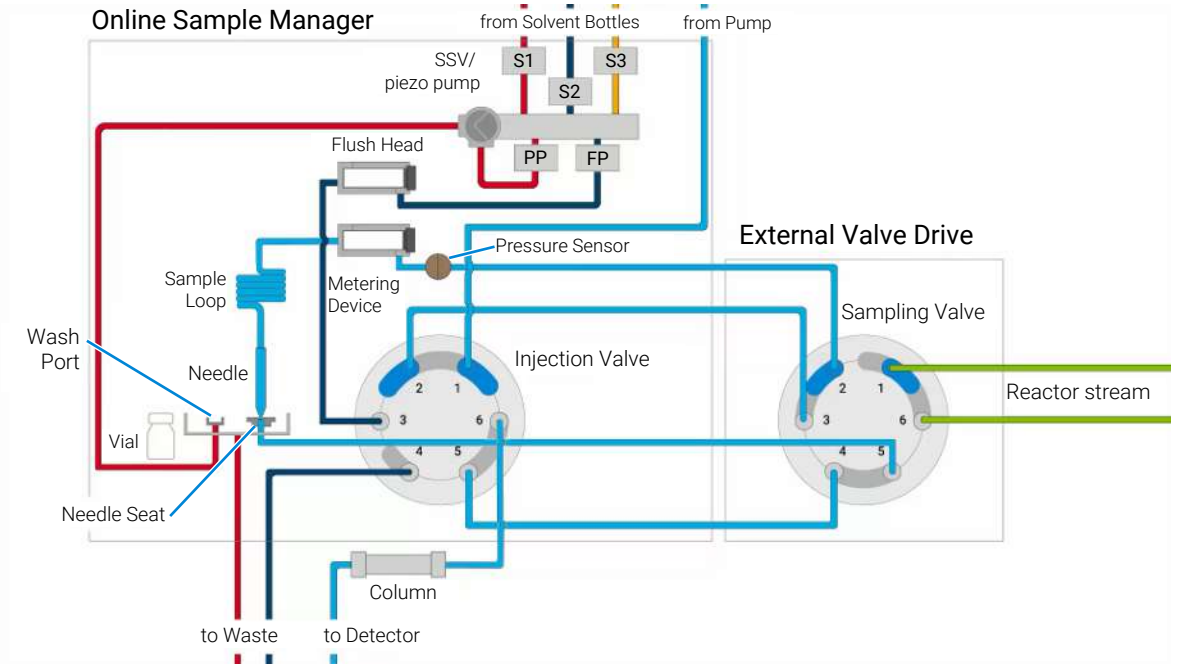


Figure 5: Flow scheme of the 1260 Infinity III Online Sample Manager Set (G3167AA) / 1290 Infinity III Bio Online Sample Manager Set (G3167BA)

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

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 19.

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 *Agilent Online LC Monitoring Software Application Programming Interface Reference Guide (G2954-Online-LC-Monitoring-API-Workstation-SW-RefMa-en-D0020920.pdf, 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 77.

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 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 the *Specifications* (see reference below). 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.

The specifications of the module are described in:

- Specifications of the 1260 Infinity III Online Sample Manager (G3167A) on page 32
- Specifications of the 1290 Infinity III Bio Online Sample Manager (G3167B) on page 35

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.**

WARNING **Incorrect line voltage at the module**

Shock hazard or damage of your instrument can result if the devices are connected to line voltage higher than specified.

- **Connect your module to the specified line voltage.**

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 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.**

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 (for specifications, see reference below) 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.

The module should be operated in a horizontal position, especially if a Sample Cooler or Sample Thermostat is installed. Use a bubble level to check the leveling of the sampler.

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 lab.

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.**

The specifications of the module are described in:

- Specifications of the 1260 Infinity III Online Sample Manager (G3167A) on page 32
- Specifications of the 1290 Infinity III Bio Online Sample Manager (G3167B) on page 35

Environment

Your module will work within specifications at ambient temperatures and relative humidity as described in:

- Specifications of the 1260 Infinity III Online Sample Manager (G3167A) on page 32
- Specifications of the 1290 Infinity III Bio Online Sample Manager (G3167B) on page 35

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

Specification Description	Details
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 of the 1260 Infinity III Online Sample Manager Set (G3167AA)

Table 4: Performance specifications of the 1260 Infinity III Online Sample Manager Set (G3167AA)

Type	Specification	Comments
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

Type	Specification	Comments
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

Specifications of the 1290 Infinity III Bio Online Sample Manager Set (G3167BA)

Table 5: Performance specifications of the 1290 Infinity III Bio Online Sample Manager Set (G3167BA)

Type	Specification	Comments
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

Specifications of the 1290 Infinity III Bio Online Sample Manager Set (G3167BA)

Type	Specification	Comments
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

Specifications of the 1260 Infinity III Online Sample Manager (G3167A)

Table 6: Physical specifications of the 1260 Infinity III Online Sample Manager (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.

Table 7: Performance specifications of the 1260 Infinity III Online Sample Manager (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)
	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 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 and CE Drivers 3.4 or above Lab Advisor 02.17 or above	For details about supported software versions refer to the compatibility matrix of your version of the LC & CE Drivers
Communication	Controller Area Network (CAN), Local Area Network (LAN), ERI: ready, start, stop and shut-down signals	

Type	Specification	Comments
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.	

Specifications of the 1290 Infinity III Bio Online Sample Manager (G3167B)

Table 8: Physical specifications of the 1290 Infinity III Bio Online Sample Manager (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.

Table 9: Performance specifications of the 1290 Infinity III Bio Online Sample Manager (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)
	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 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 and CE Drivers 3.4 or above Lab Advisor 02.17 or above	For details about supported software versions refer to the compatibility matrix of your version of the LC & CE Drivers
Communication	Controller Area Network (CAN), Local Area Network (LAN), ERI: ready, start, stop and shut-down signals	

Type	Specification	Comments
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.	

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 10: Physical specifications of the Sample Thermostat (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	24 VDC	
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 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 http://www.agilent.com for more info.

Table 11: Performance specifications of the Sample Thermostat (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 12: 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.

Physical Specifications (G1170A)

Table 13: Physical specifications of the 1290 Infinity III Valve Drive (G1170A)

Parameter Name	External Value	Comment
Weight	1.9 kg (4.3 lbs)	
Dimensions (height × width × depth)	90 x 90 x 300 mm (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 (9843 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

3 Installation

The installation of the module will be done by an Agilent service representative. In this chapter, only installation of user-installable options and accessories are described.

Hardware Installation

Installing Capillaries

This section provides information on how to install capillaries and fittings.

Connection Reference Tables

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

Table 14: 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 15: 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 16: 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

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

Table 17: 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

p/n	Description	From	To
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 18: 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 19: 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

p/n	Description	From	To
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

Install Capillary Connections

Capillaries and connections depend on which system is installed.

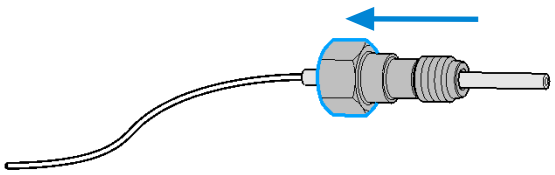
NOTE As you move to smaller-volume, high-efficiency columns, you will want to use narrow id tubing, as opposed to the wider id tubing used for conventional HPLC instruments.

NOTE Agilent capillaries are color-coded for quick identification, see At-a-Glance Details About Agilent Capillaries on page 538.

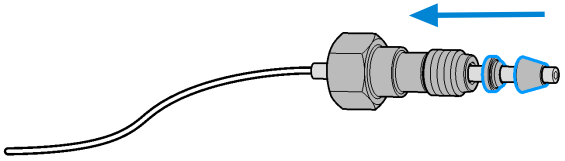
For correct installation of capillary connections it's important to choose the correct fittings, see Syntax for Capillary Description on page 538.

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.



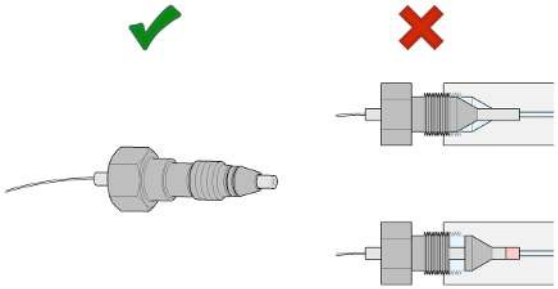
3 Carefully slide the ferrule components on after the nut and then finger-tighten the assembly while ensuring that the tubing is completely seated in the bottom of the end fitting.



4 Use a stable port installed to the module to gently tighten the fitting facing to the module. Or use the column to tighten the fitting facing to the column. This measure forces the ferrule to seat onto the tubing or capillary.

NOTE Do not overtighten. Over-tightening 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 Swagelok 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.

For Bio and Bio-Inert Systems, the Swagelok instructions do not apply.

Install Capillary Connections to the External Sampling Valve

BIO

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

When

- After completion of the first step of the checkout procedure.
- Before performing the second step of the checkout procedure.

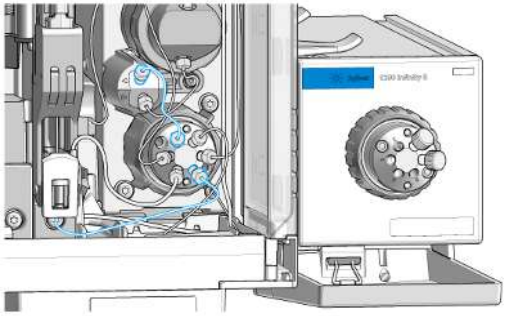
Parts required

Qty.	p/n	Description
1	G3167-68000	1260 Infinity II Online Sample Manager Accessory Kit (for G3167AA)
		or
1	G3167-68010	1290 Infinity II Bio Online Sample Manager Accessory Kit (for G3167BA)

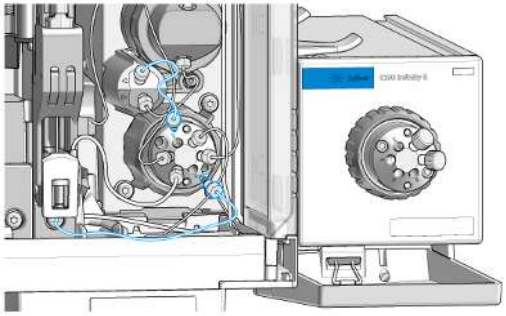
Prerequesites

- Configure the Online LC system in OpenLab CDS and perform the first step of the checkout procedure, see *Agilent InfinityLab LC Series Online Sample Manager Sets Installation Guide (G3167-Online-Sample-Manager-Set-install-TechPu-en-D0006686.pdf, D0006686)*.
- Remove the front door. For details, see Removal and Installation of the Front Door on page 345
- For reference about the capillary names, part numbers, and dimensions, see section Connection Reference Tables on page 42.

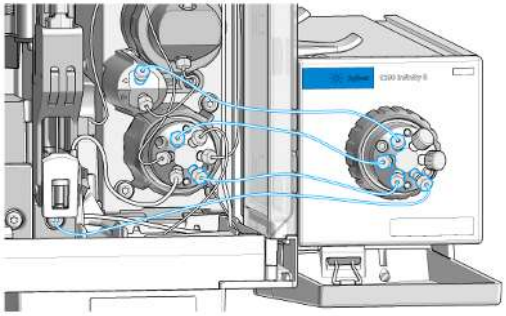
1 Locate the MD Capillary connected to the pressure sensor and port 2 of the injection valve and the Needle Seat Capillary connected to port 5 of the injection valve.



2 Disconnect the MD Capillary and Needle Seat Capillary from port 2 and 5 of the injection valve.



3 Connect the previously disconnected MD Capillary and Needle Seat Capillary to port 2 and 5 of the external sampling valve. Connect the Transfer Capillary I to port 5 of the injection valve and port 4 of the external sampling valve. Connect the Transfer Capillary II to port 2 of the injection valve and port 3 of the external sampling valve.



Flow Connections Specific for the Online Sample Manager Set

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

Prerequesites

- 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.

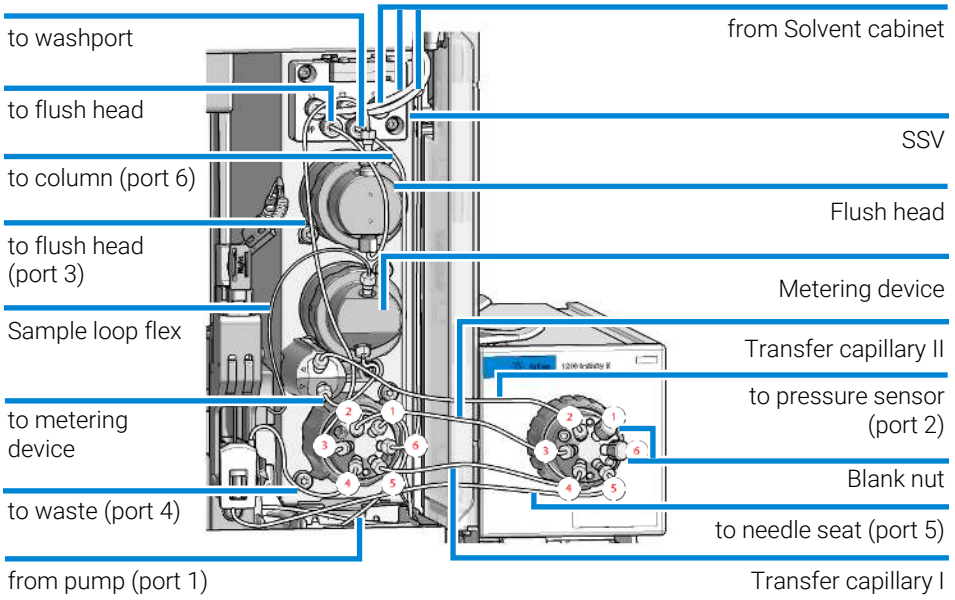


Figure 6: Flow Connection to the Online Sample Manager (SSV version 2.0)

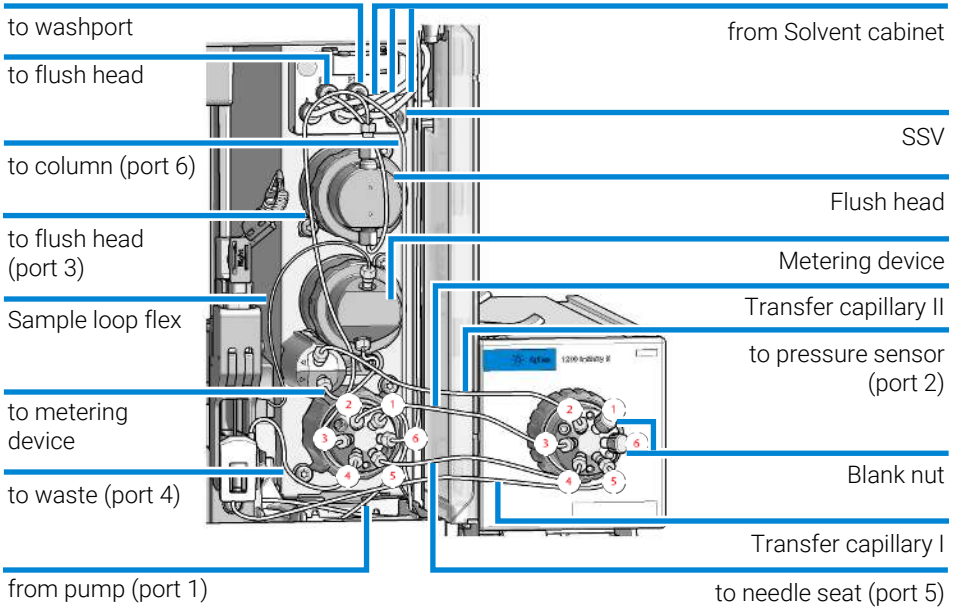


Figure 7: Flow Connection to the Online Sample Manager (SSV version 1.0)

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 465 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 465).

The type of most suitable connection depends on the customer's sample delivery device. The 1260 Infinity III Online Sample Manager Set and 1290 Infinity III 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 465.

To set up the ERI Interface in the Online LC Monitoring Software, see Set up the ERI Interface on page 111.

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.

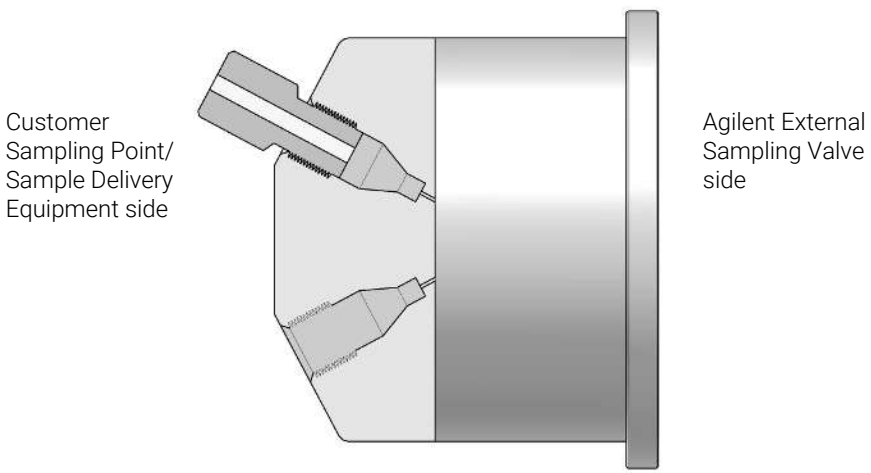


Figure 8: Example of Sample Line Connection in Valve Port (Cross section)

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).

Installing the Optional Sample 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.

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.

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 Upgrade Kit on page 454. Please report any missing or damaged parts to your local Agilent Technologies sales and service office.

Table 20: Delivery checklist for the Sample Thermostat

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

Install the Sample Thermostat

Tools required

Qty.	p/n	Description
1	5182-3466	Torx screwdriver T10 (for the Sample Thermostat)
		OR
1	5023-3089	Torx key set (part of the G7120-68708 InfinityLab LC Series Tool Kit)

Parts required

Qty.	p/n	Description
1		Sampler
1	G7167-60201	Sample Thermostat
1		Power cord
1	5067-6208	Condensate Drainage Kit

Prerequesites

- 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 38.

NOTE

Visit https://www.agilent.com/ for a video tutorial on installing the Agilent InfinityLab Sample Thermostat. Find the video by the following options:
Enter the link https://www.agilent.com/search/?Ntt=install-infinitylab-sample-thermostat.
Alternatively, the video is available on the landing page of any compatible sampler under the section **Videos**.

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.**

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 module

Damage to the electronics of the module

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

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 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.

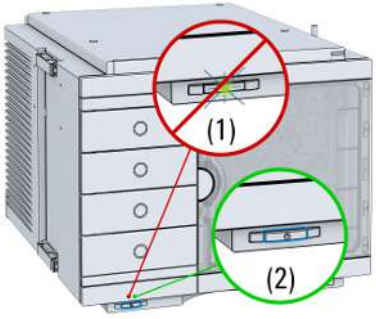
NOTE

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 *Installation of the Infinity II Cooler/Thermostat Condensate Drainage Tubing Kit Technical Note (G7167-CoolerCondensateDrainage-TechPu-en-SD-29000254.pdf, SD-29000254)* . 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/.

NOTE

The graphics shown in the following procedure are exemplarily and may look different depending on the module in use.

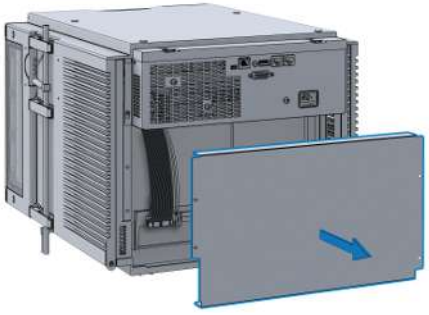
1 Ensure that the on/off switch on the front of the module is OFF (switch stands out).



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 Thermostat halfway into the sampler.

WARNING **Module is partially energized when switched off, as long as the power cord is plugged in.**

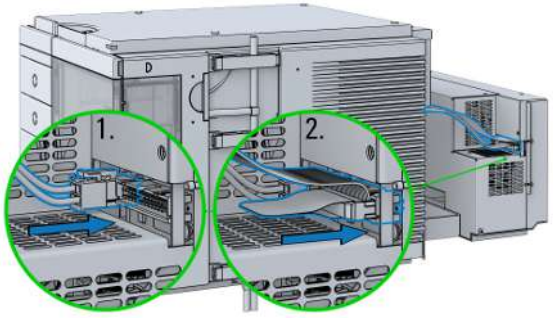
Repair work at the module can lead to personal injuries, e.g. shock hazard, when the cover is opened and the module is connected to power.

- **Make sure that it is always possible to access the power plug.**
- **Do not use the Sample 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 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 Thermostat cables.

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



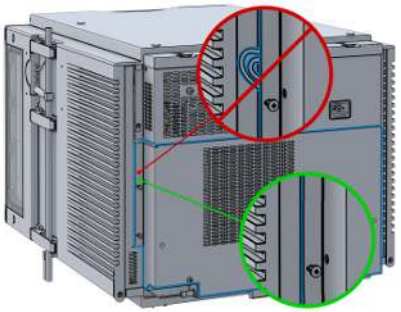
CAUTION

Damage to the cables

— Do not bend or pinch the cables.

— Make sure that the Sample Thermostat fits perfectly in the sampler.

7 Slide the Sample Thermostat all the way into the sampler.



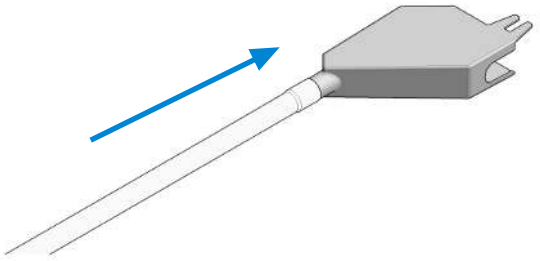
8 Fix the Sample Thermostat with the four screws.

9 Use a bubble level to check the leveling of the sampler.

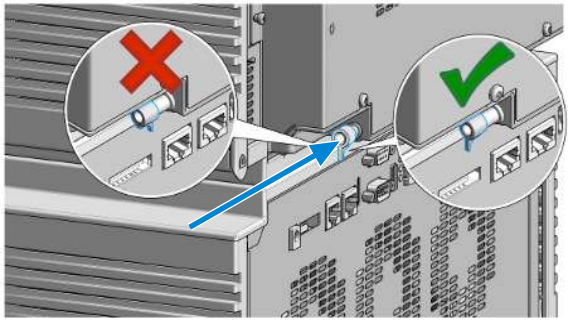
NOTE

To ensure adequate drainage for condensate, the module should be operated in a proper horizontal position.

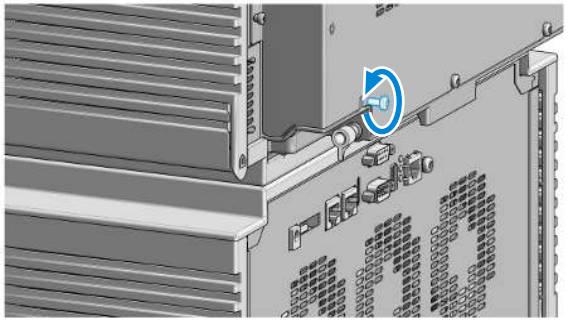
10 Attach the condensate tube to the outlet port of the condensate collector funnel.



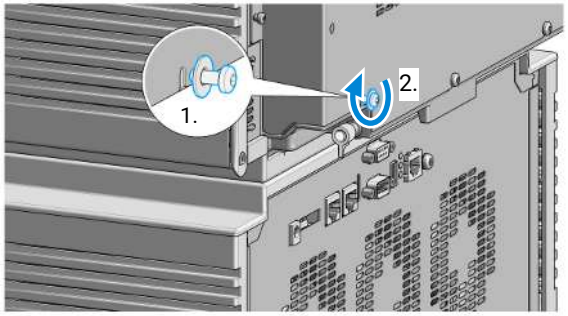
11 Mount the drain connector on the condensate drainage outlet tube. Ensure the correct orientation of the spout.



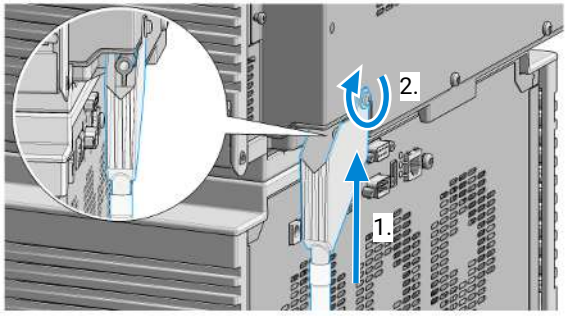
12 Remove the screw situated above the condensate drainage outlet tube.



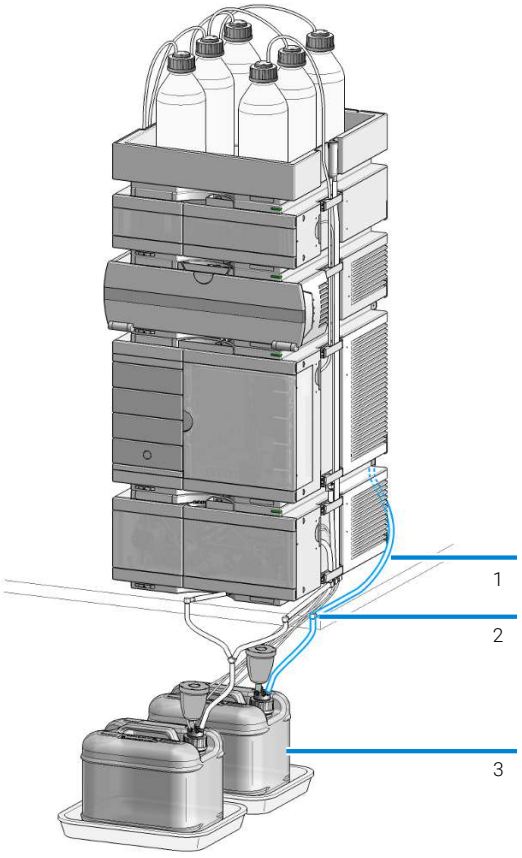
13 Place the washer over the thread of the screw (1). Screw the screw and washer halfway into the hole in the back of the thermostat (2).



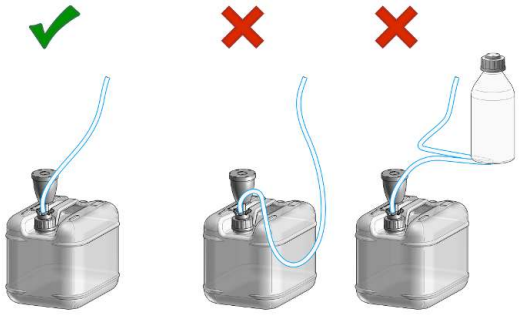
14 Position the condensate collector funnel underneath the condensate drainage outlet tube (1) and fix it to the back of the thermostat by tightening the screw (2). Ensure correct orientation and avoid overtightening the screw.



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 Handling Leak and Waste.

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 Thermostat

- Wait at least 30 min before switching on the compressor of the 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.

18 Configure the Sample Thermostat in the CDS.

Handling Leak and Waste

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 solvent cabinet (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 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

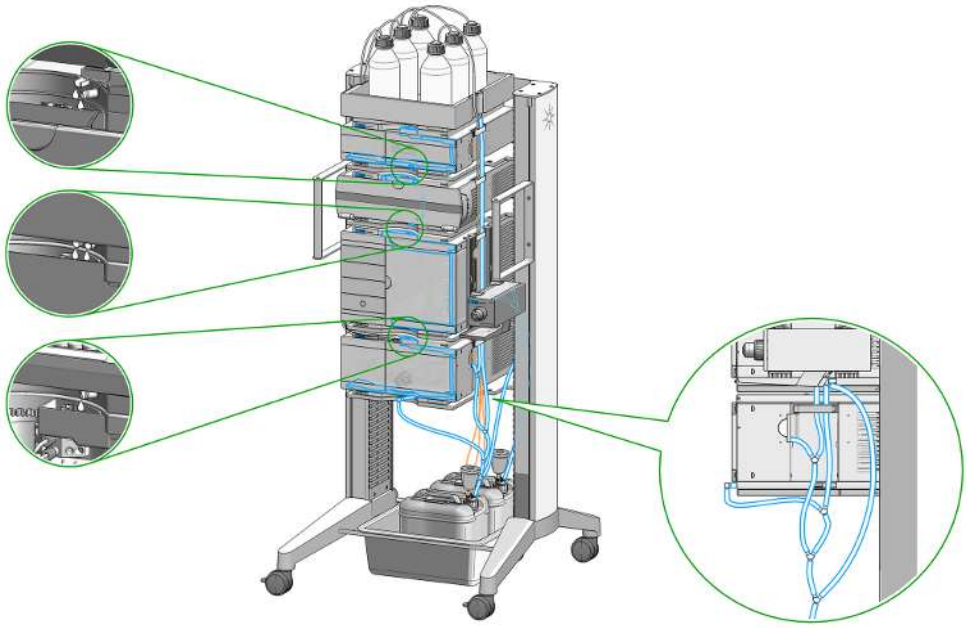


Figure 9: Online LC System Leak Waste Concept (Flex Bench installation)

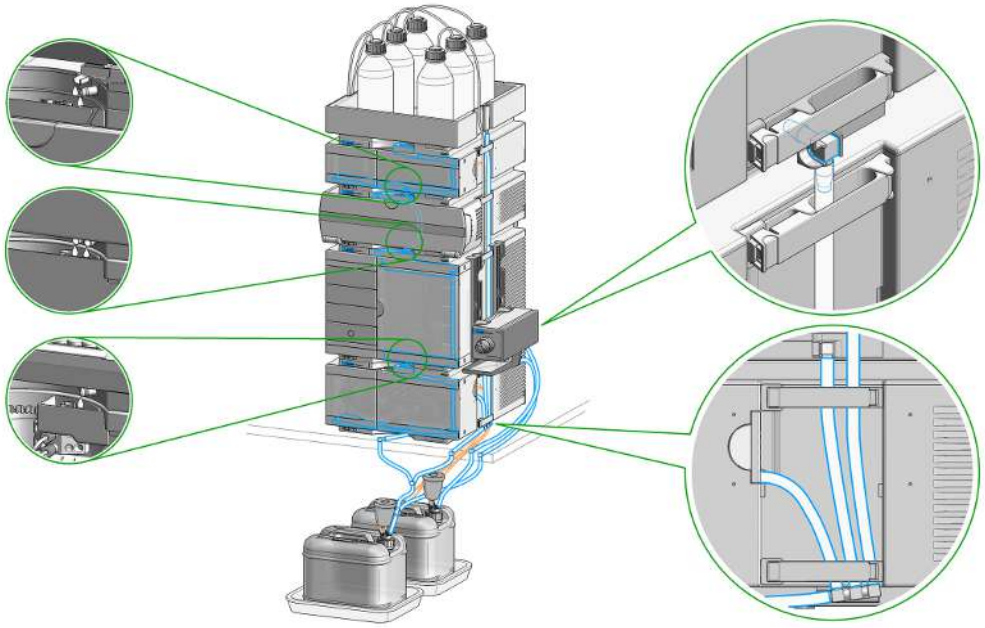


Figure 10: Online LC System One Stack Leak Waste Concept (bench installation)

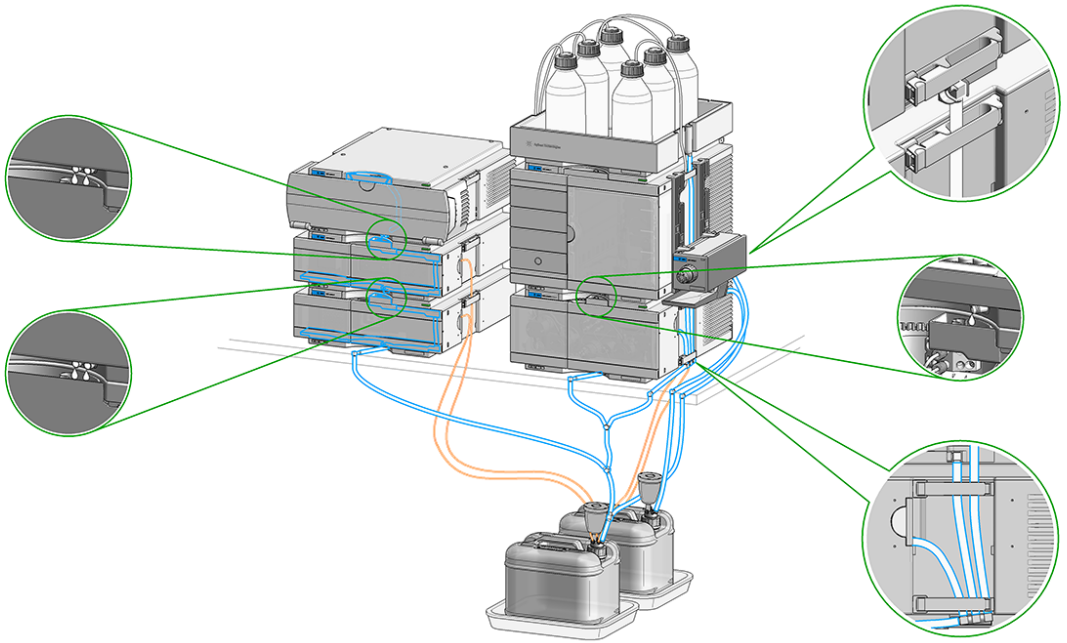


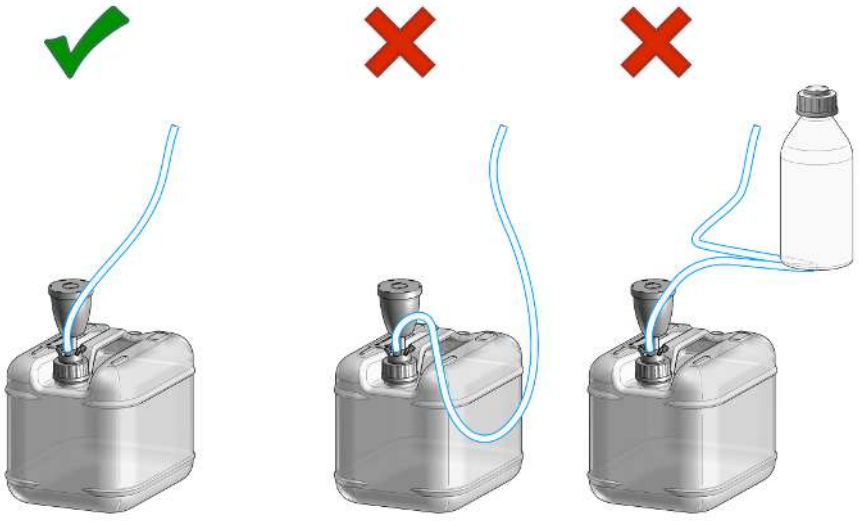
Figure 11: Online LC System Two Stack Leak Waste Concept (bench installation)

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

Waste Concept

Agilent recommends using the 5043-1221 (6 L waste can with 1 Stay Safe cap GL45 with 4 ports) 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.

Waste Guidance



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

Leak Sensor

CAUTION

Solvent incompatibility

The solvent DMF (dimethylformamide) leads to corrosion of the leak sensor. The material of the leak sensor, PVDF (polyvinylidene fluoride), is incompatible with DMF.

- Do not use DMF as mobile phase.
- Check the leak sensor regularly for corrosion.

Connecting Modules and Control Software

WARNING

Use of unsupplied cables

Using cables not supplied by Agilent Technologies can lead to damage of the electronic components or personal injury.

- **Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.**

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 (CDS_v2.8_WorkstationGuide_en.pdf, D0028022)* and *OpenLab CDS Workstation Plus Installation and Configuration (CDS_v2.8_WorkstationPlusGuide_en.pdf, D0028021)*.

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 in Main Installation Tasks on page 74.

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

Table 21: 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

7 **Optional**: If obsolete transport layer security (TLS) protocols were identified, decide if they should be disabled or not.

NOTE

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 78.

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 *Agilent Online LC Monitoring Software Application Programming Interface Reference Guide (G2954-Online-LC-Monitoring-API-Workstation-SW-RefMa-en-D0020920.pdf, D0020920)*.

Get a License

Obtain a License with SubscribeNet

Prerequesites

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).

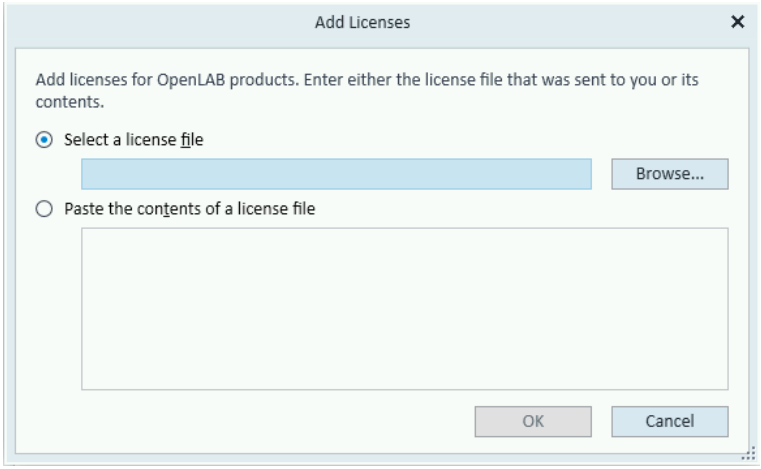
Install your license

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 apps** >) **Agilent Technologies** > **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 (CDS_v2.8_WorkstationGuide_en.pdf, D0028022)* 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 (CDS_v2.8_WorkstationGuide_en.pdf, D0028022)* 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.

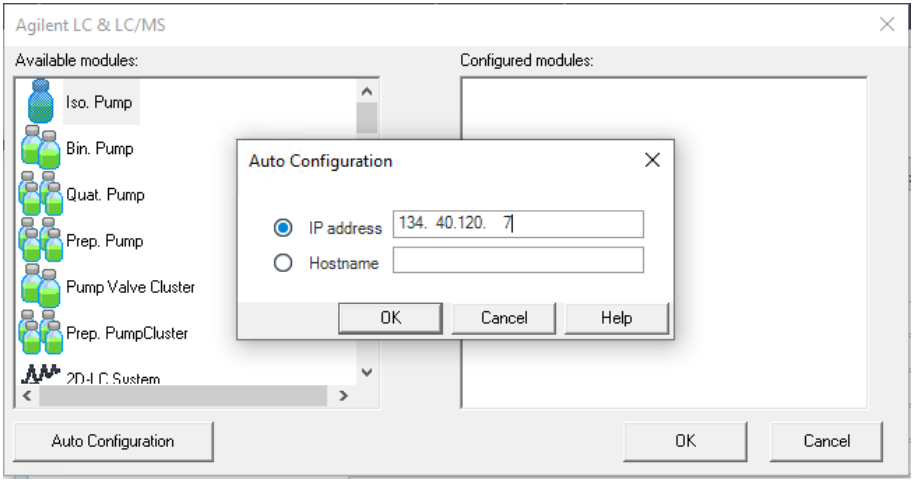
c Switch 5 UP and others DOWN: modules uses STORED address.

NOTE

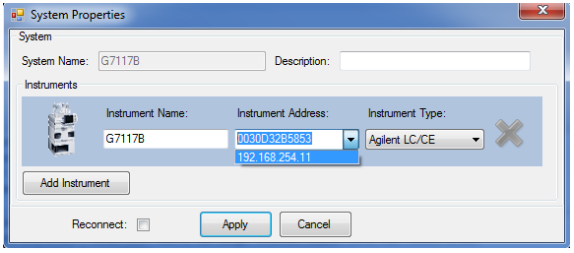
For more details about the configuration switch settings, see Setting the 6-bit Configuration Switch on page 496.

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

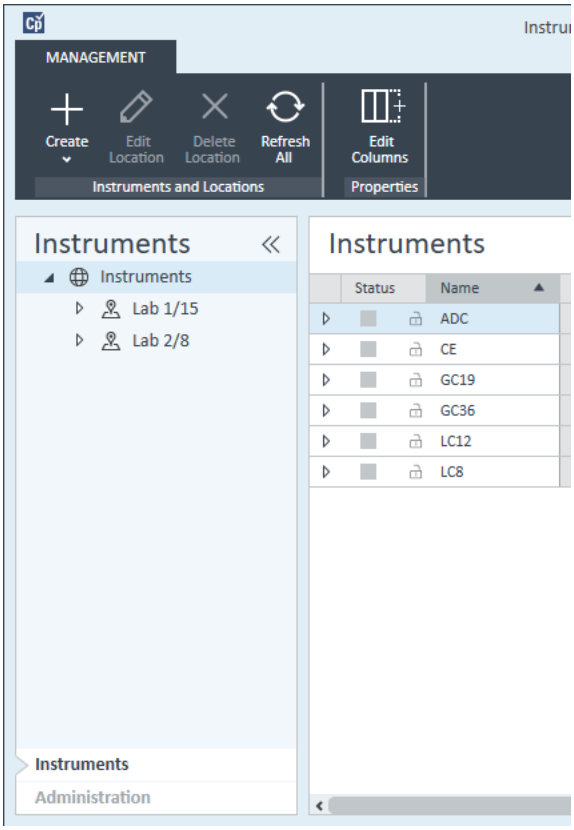
Configure the Online Sample Manager Set in OpenLab CDS

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.

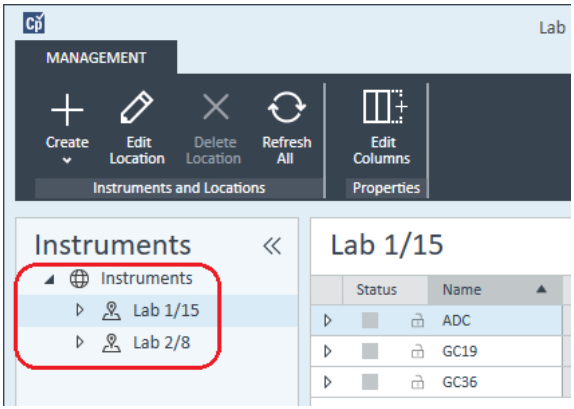
1 Open the Agilent OpenLab Control Panel:

2 Select the **Instruments** tab:



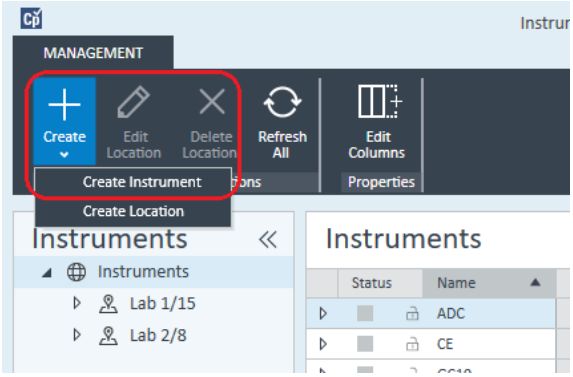
3 Select the location of the new instrument:

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



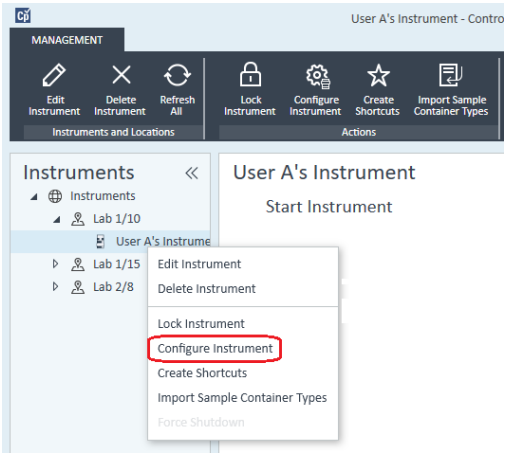
NOTE You can also add instruments directly in the **Instruments** node.

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**.

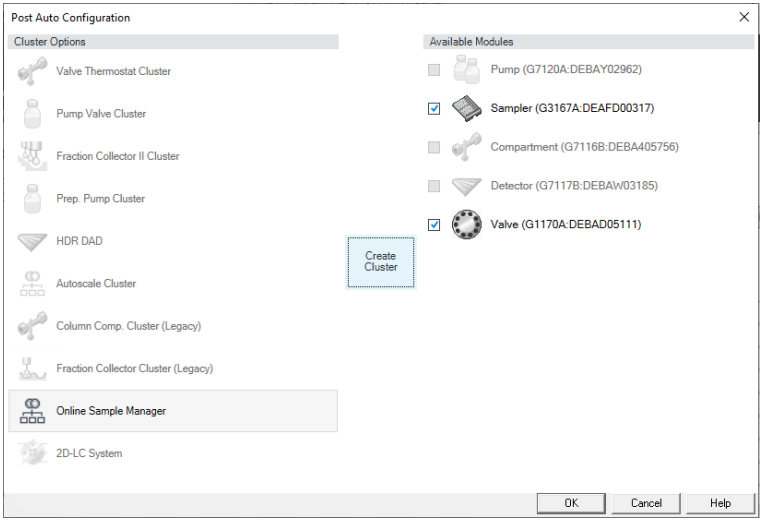


7 Use Autoconfiguration if possible.

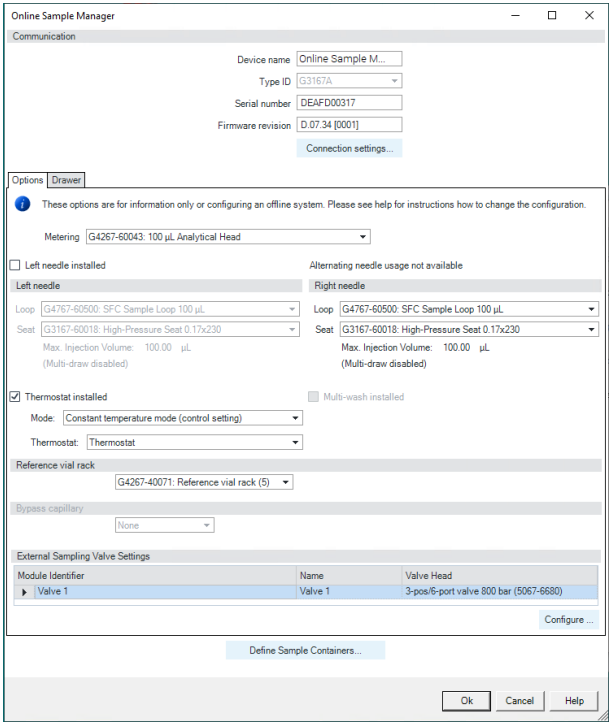
OR: Select the module(s) for the instrument configuration and click the **>** button.

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.

Define Sample Custom Parameters in the Control Panel:

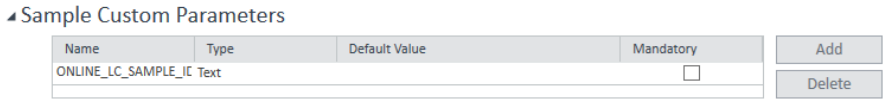
1 Launch Control Panel.

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.

Set Up the Online Sample Manager in OpenLab CDS

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.

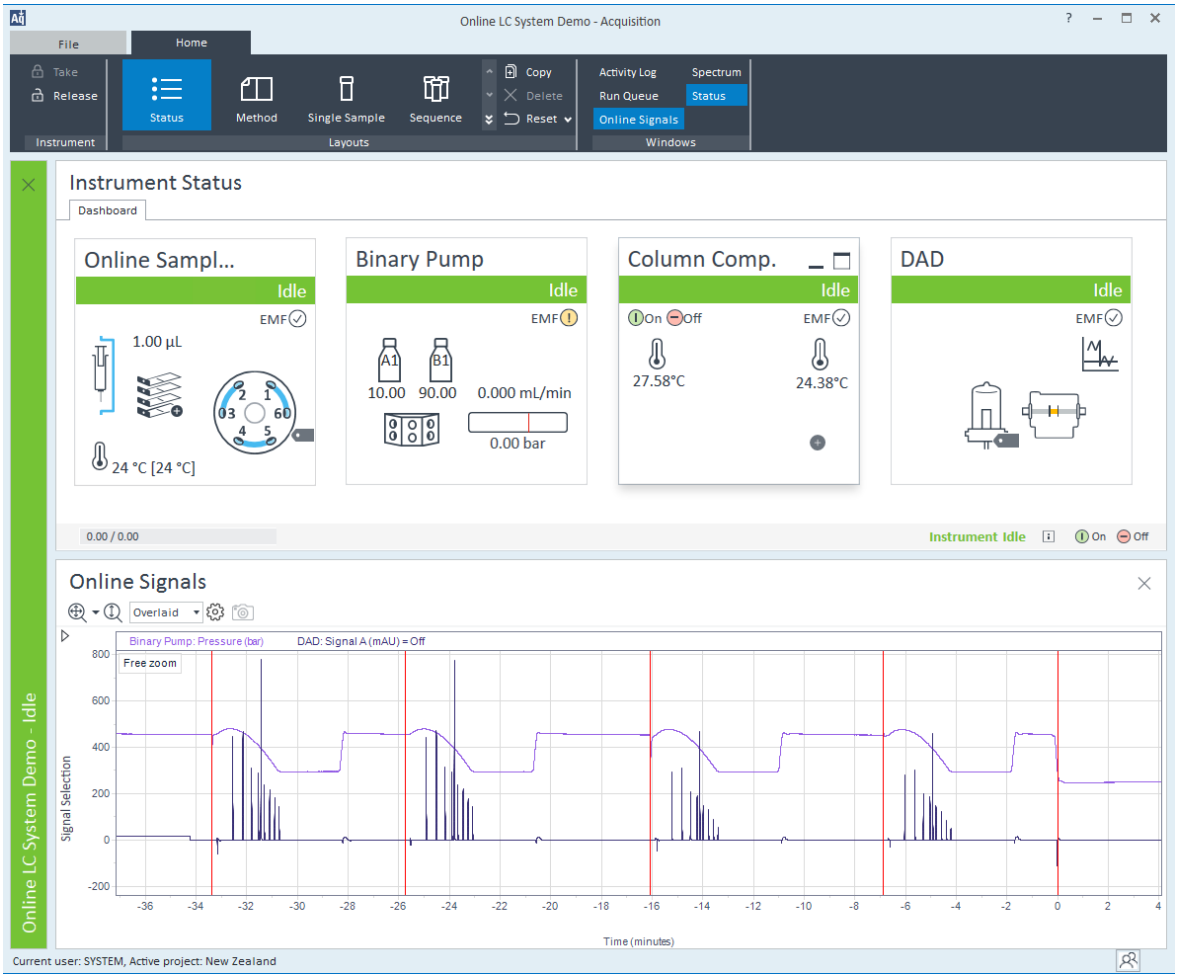
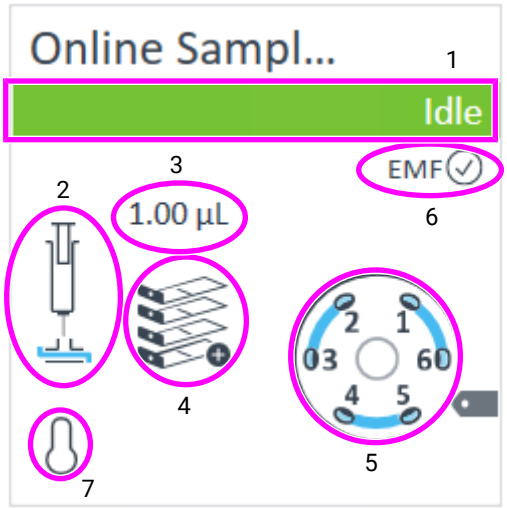


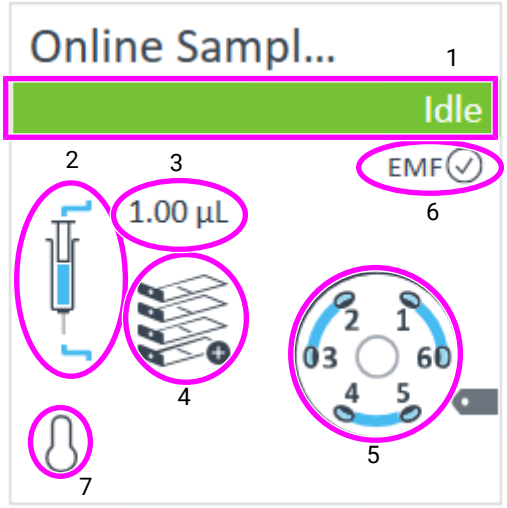
Figure 12: OpenLab method and run control

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 22: The Online Sample Manager User Interface



A: Feed Injection mode user interface



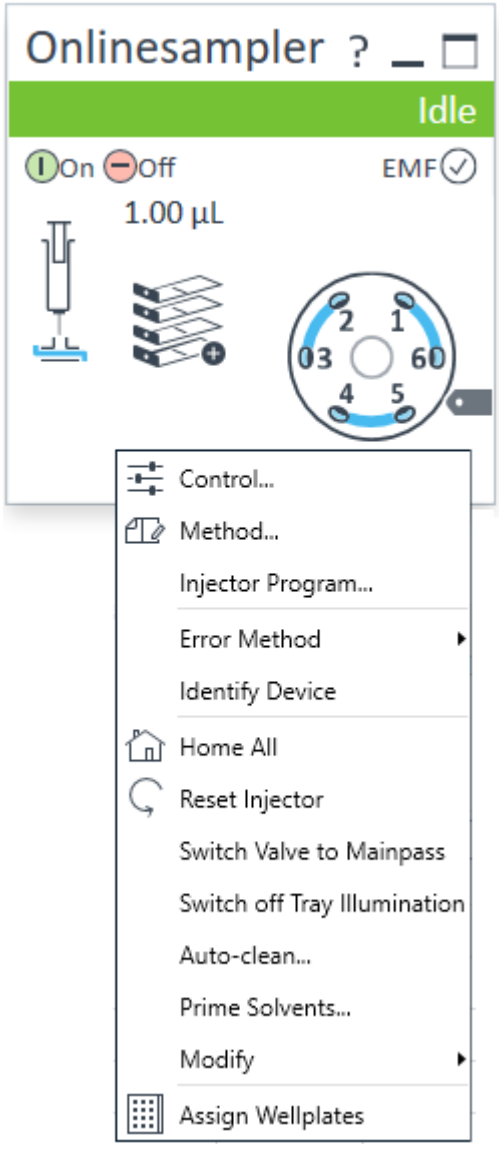
B: Flow-Through Injection user interface

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



Online Sample Manager drop-down menu

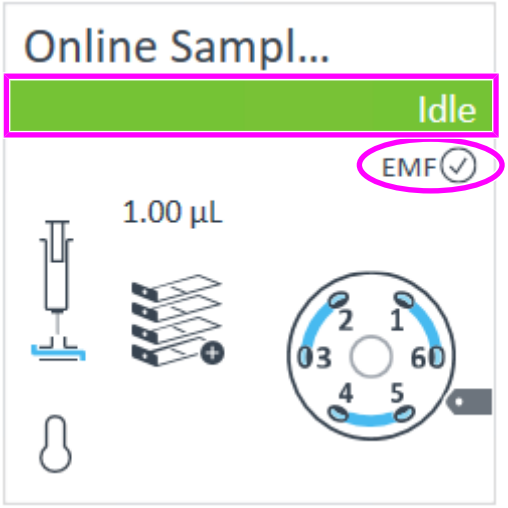
A right-click into the Active Area will open a menu to

- 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.



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"

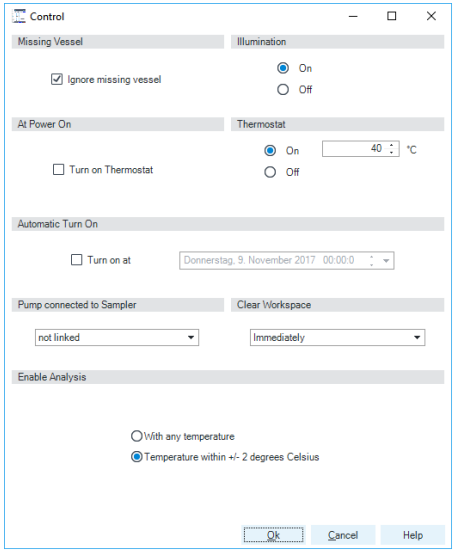
- Offline (gray)
- Ok
  No Maintenance required (green)
- EMF warning. Maintenance might be required (yellow)
- EMF warning. Maintenance required (red)

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 23: Control settings



Control settings

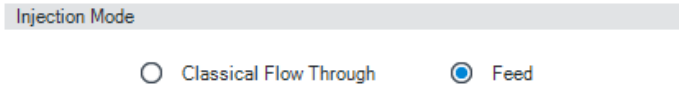
The Sampler control parameters are in the following sections:

- 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 thermostat is installed and configured. Mark the **Turn on Thermostat** check box to specify that the thermostat is switched on automatically when the instrument is switched on.
- Thermostat
  The section is available when a thermostat is installed and configured and the Constant temperature mode is selected.
  Select **On** to switch on the 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 thermostat.
- Automatic Turn On
  You can set a date and time at which the 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.

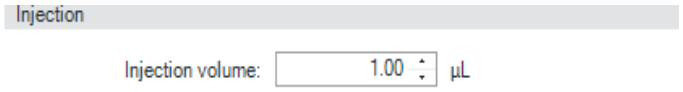
Method Parameter Settings

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



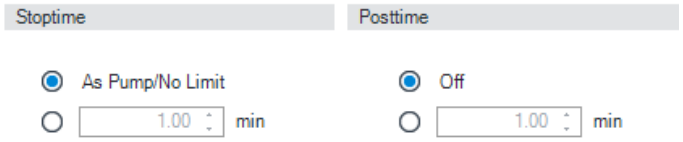
Injection Mode

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



Injection volume

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



Stoptime and Posttime

Stoptime/Posttime
An Online Sample Manager **Stoptime** can be set. For equilibration of the Online Sample Manager a **Posttime** can be set.

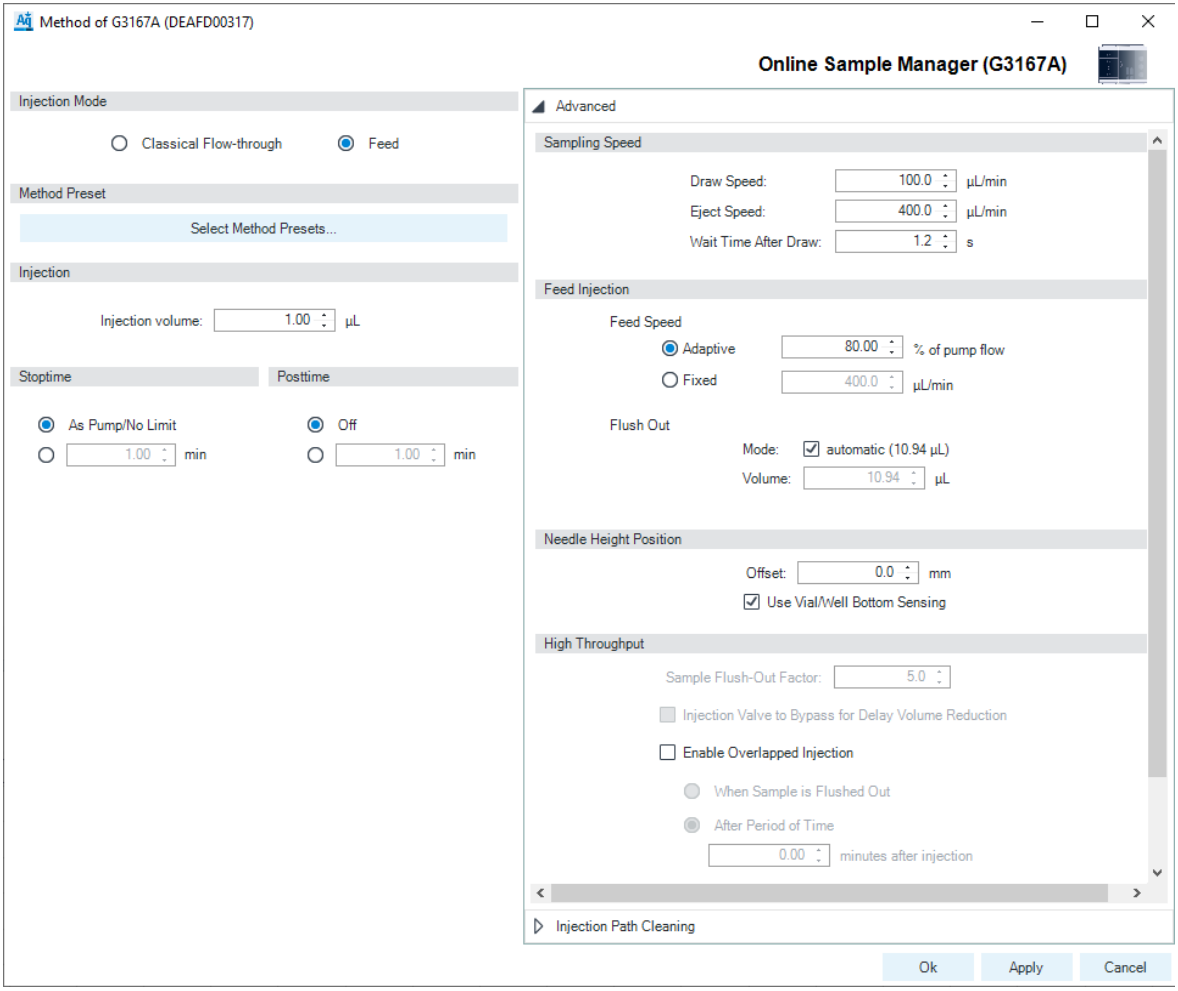
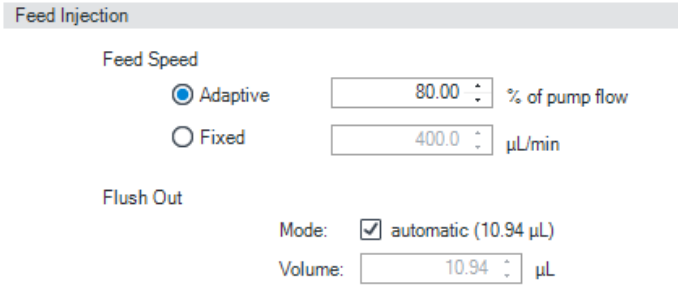


Figure 13: Online Sample Manager method parameters (example shows Feed Injection parameters)

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.



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 244.

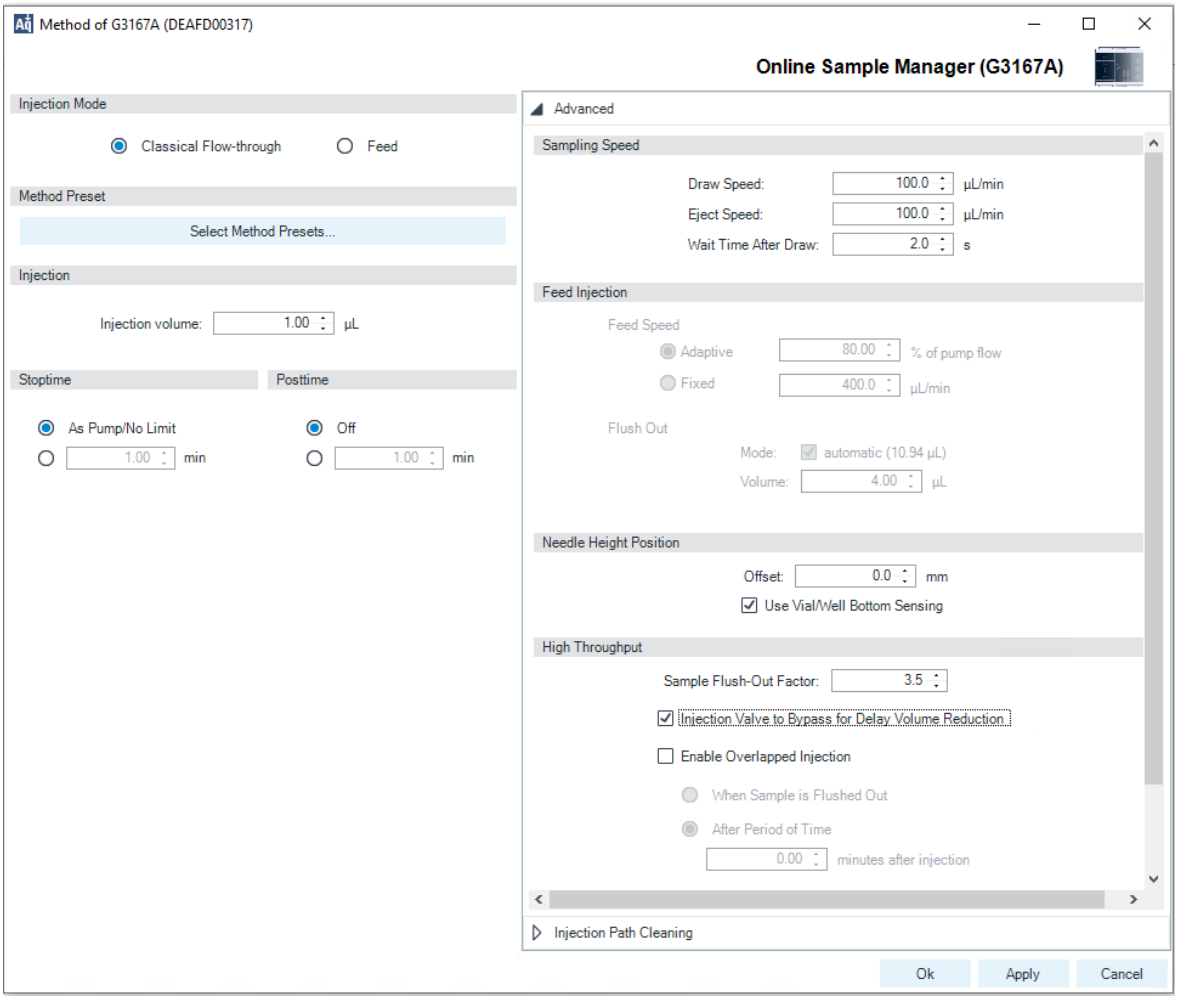
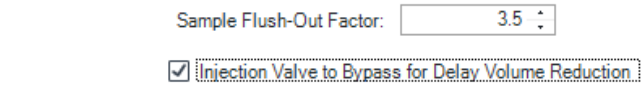


Figure 14: Online Sample Manager method parameters (example shows Flow-through Injection parameters)



Specific flow-through injection Parameter Details

Specific Flow-through Injection Parameter Details

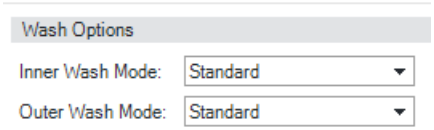
Injection Valve to Bypass for Delay Volume Reduction

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 sampler 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 244.



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.

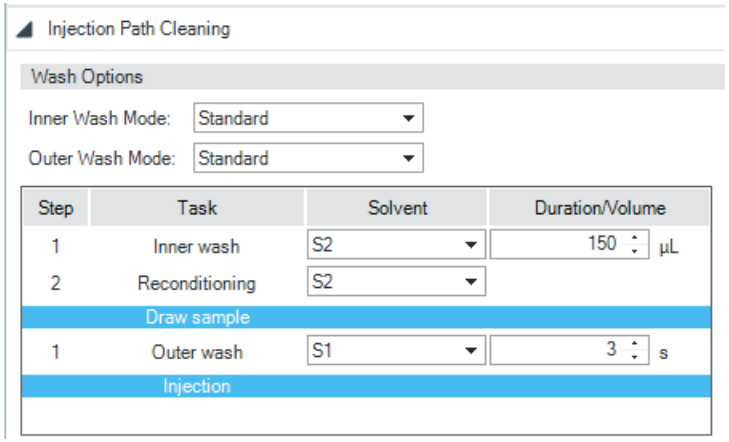
The **Reconditioning** happens:

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

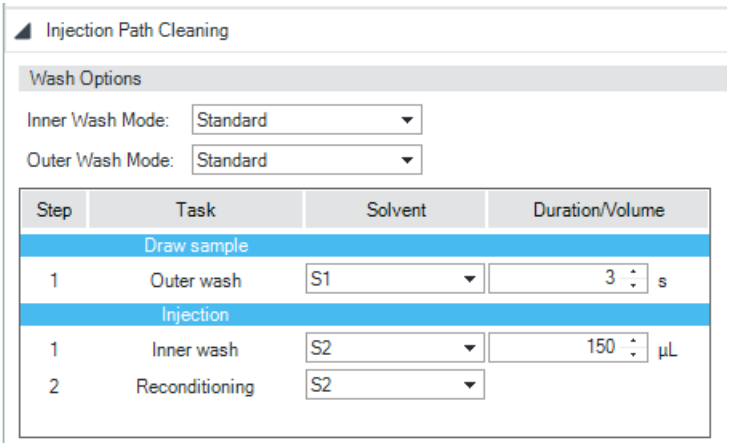
The **Inner wash** enables an additional wash step for the flow path. You can choose the solvent type, solvent volume, and duration of the step.
The **Outer wash** is a wash step for the outer Needle surface in the Wash port. You can choose the solvent type, solvent volume, and duration of the step.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



Feed Injection, standard wash option



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
  - **Inner wash** before **Draw sample**
  - **Reconditioning**
  - **Outer wash** before injection
- Feed Injection mode
  - **Outer wash** after **Draw sample**
  - **Inner wash** after injection
  - **Reconditioning**

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

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

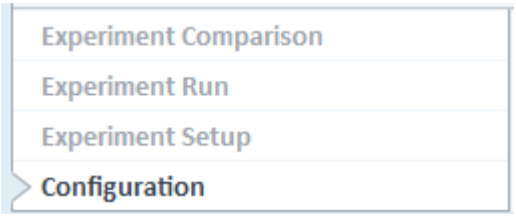
Configuration of the Online Monitoring System in the Online LC Monitoring Software

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.

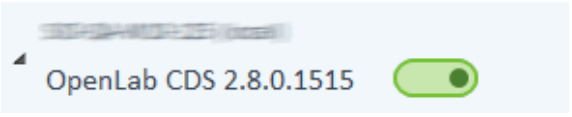
Synchronize the System

1 In the navigation pane, select **Configuration** view.

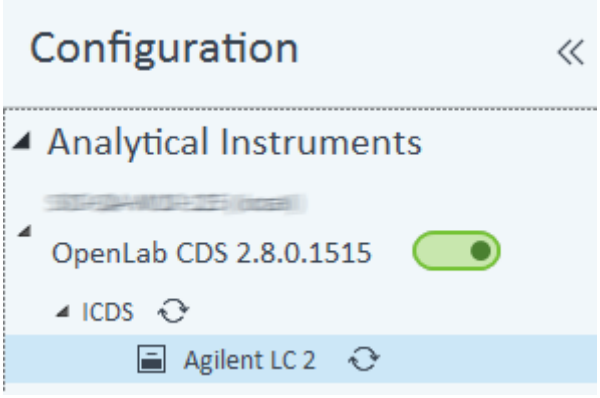


In the Navigation pane of the **Configuration** view, the **Online Monitoring System** and available analytical instinstruments are displayed. The Ribbon shows specific elements.

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.

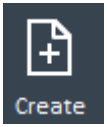


Update the project to query for available instruments and methods configured for this project.

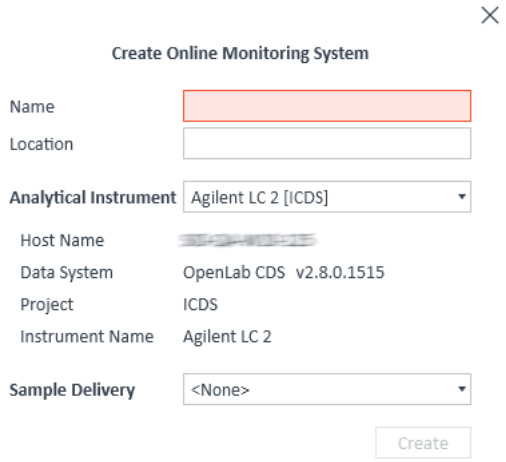
Update the instrument to establish a connection to this instrument and to retrieve the current configuration.

Create an Online Monitoring System

1 In the **Home** Ribbon 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

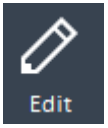
1 To save your configuration click **Create**.

For an example of a configured system, see Figure 15 on page 109.

Modify an Existing System

1 In the **Configuration** Navigation pane, select the Online Monitoring System.

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



The fields **Name** and **Location** are now editable.

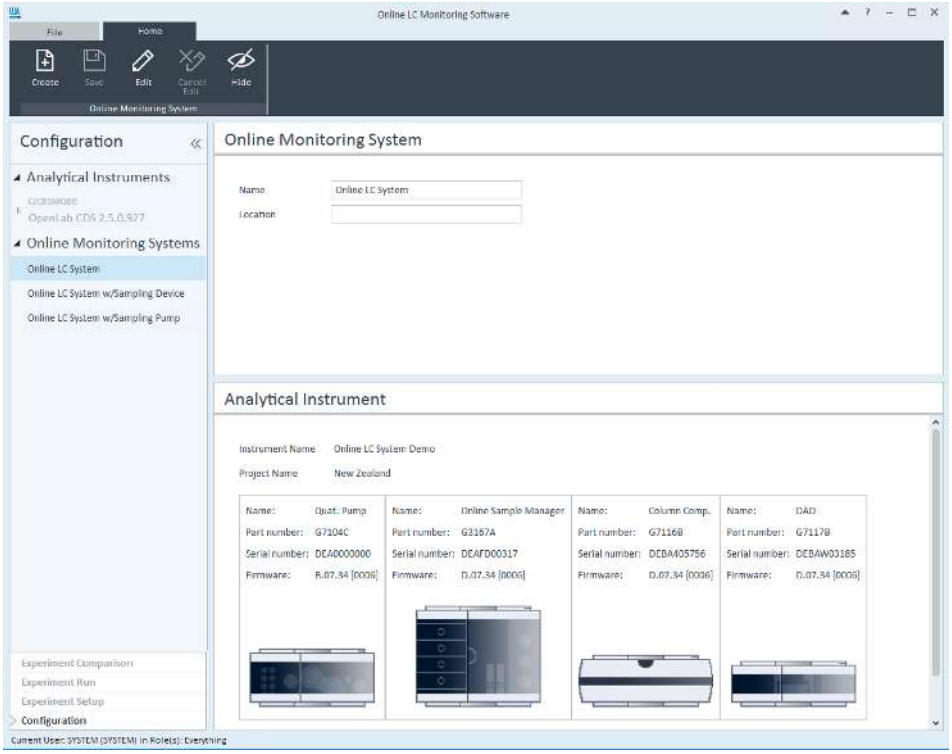
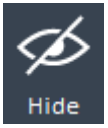


Figure 15: Configuration view of Online LC System without Sample Delivery Device

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.

Set up 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

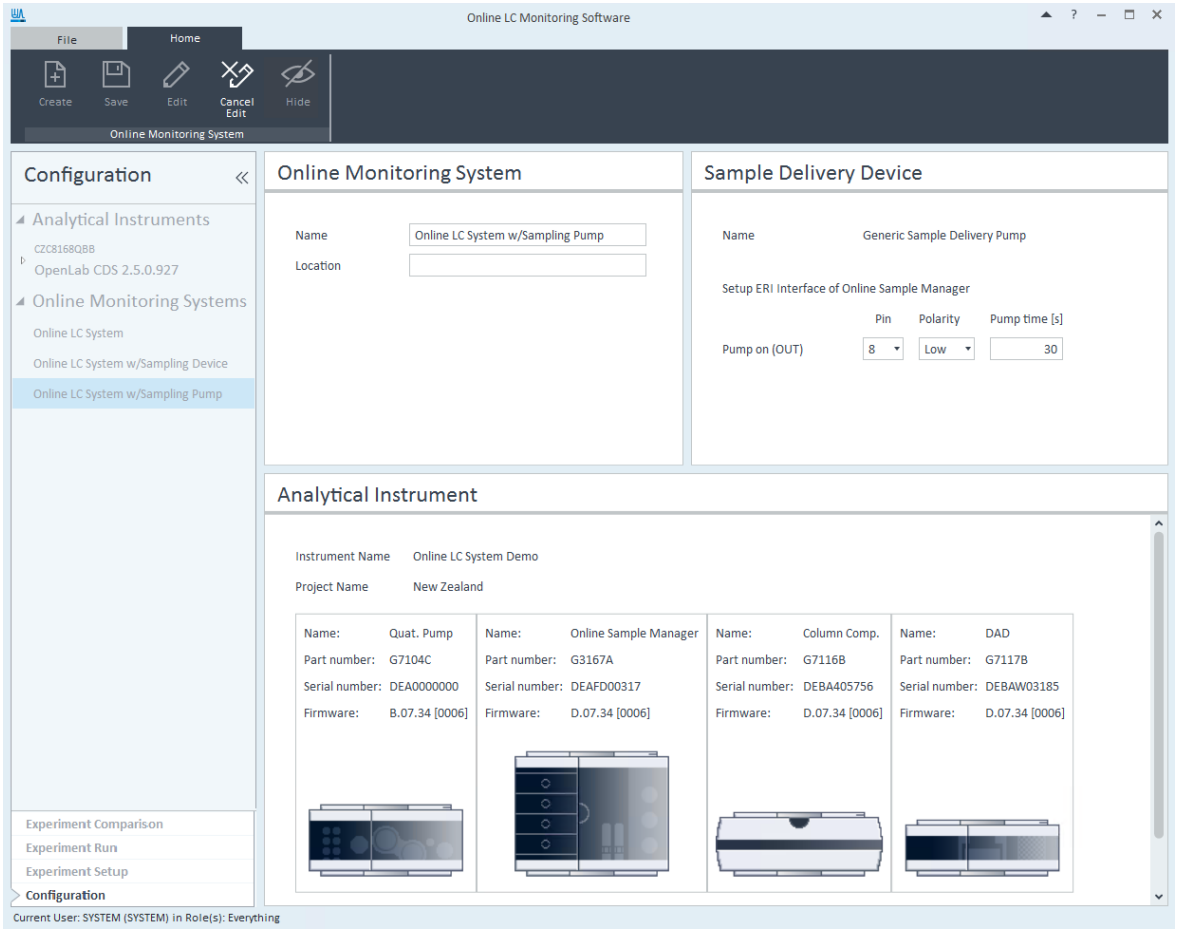


Figure 16: Configuration view of Online LC System with Generic Sample Delivery Pump

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 465. 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

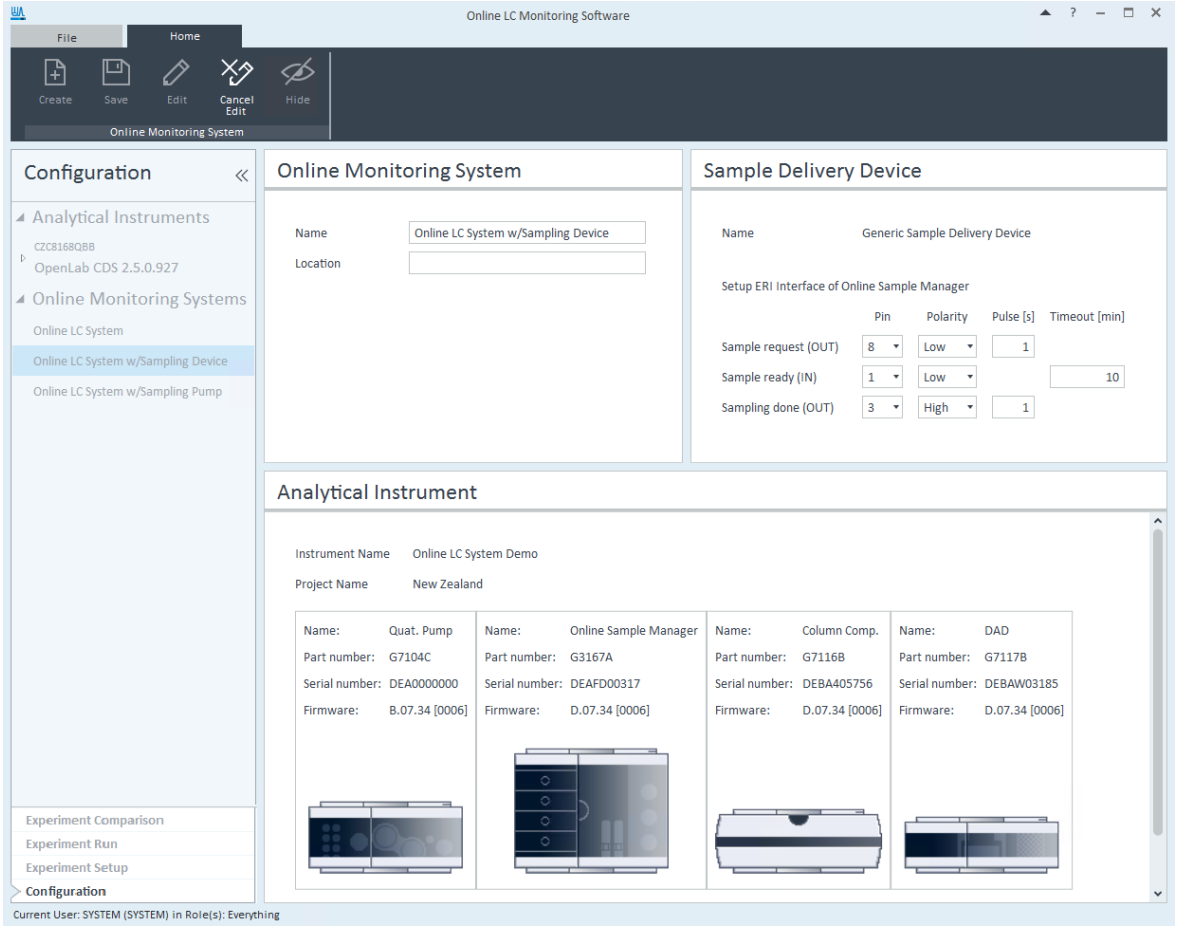


Figure 17: Configuration view of Online LC System with Generic Sample Delivery Device

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 465. 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 465.

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 465.

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 465 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.

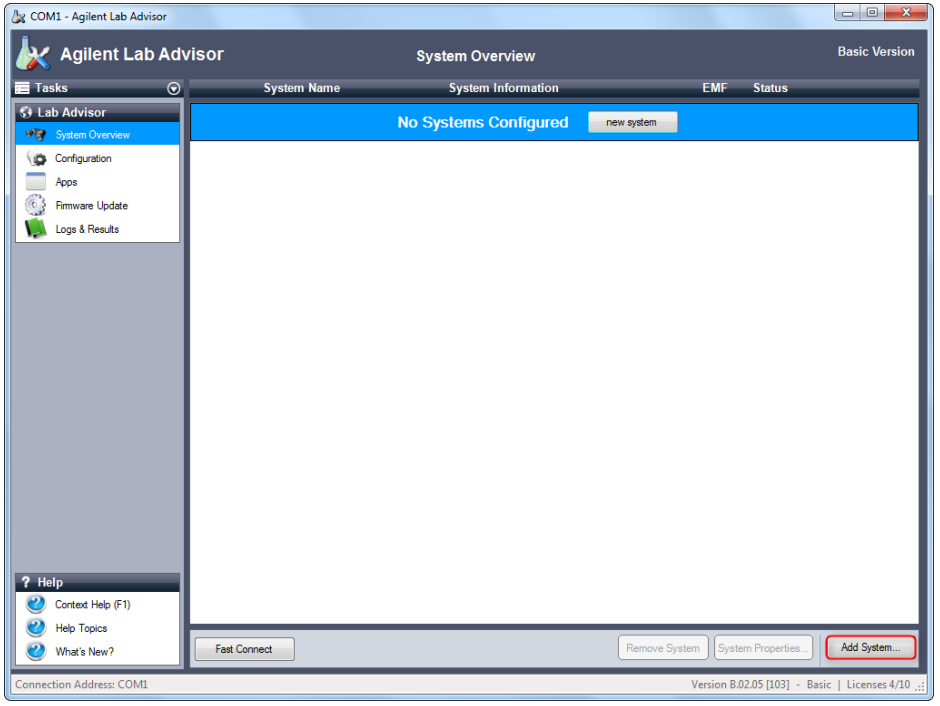
NOTE Unless stated otherwise by the manufacturer of the third-party equipment in use, the recommended **Pulse** duration is 1 s.

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.

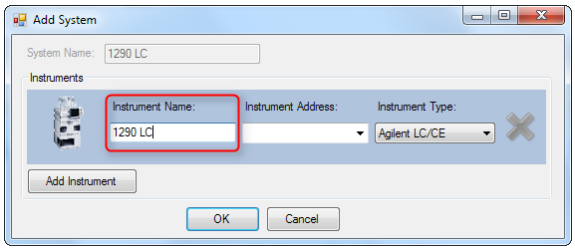
Lab Advisor Configuration Settings

Adding a New System

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



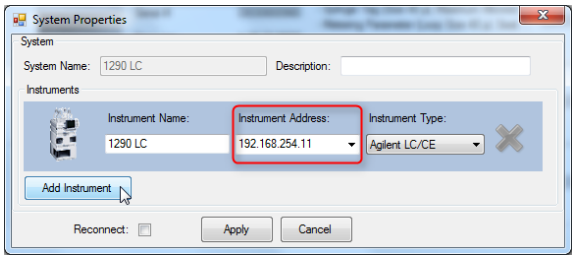
The **Add System** dialog box is displayed.



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

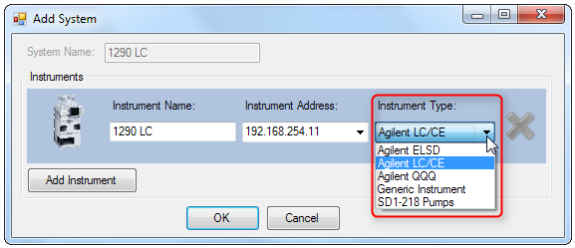
NOTE If your system comprises just one instrument, the **Instrument Name** is copied to the **System Name** field.

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



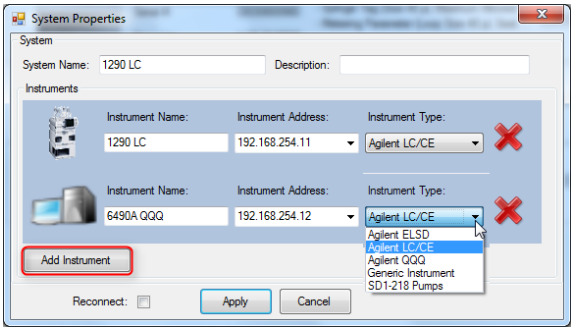
NOTE The **Instrument Address** can be an IP address, the host name or, if you are connecting using a serial cable, the COM port.

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 118).

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

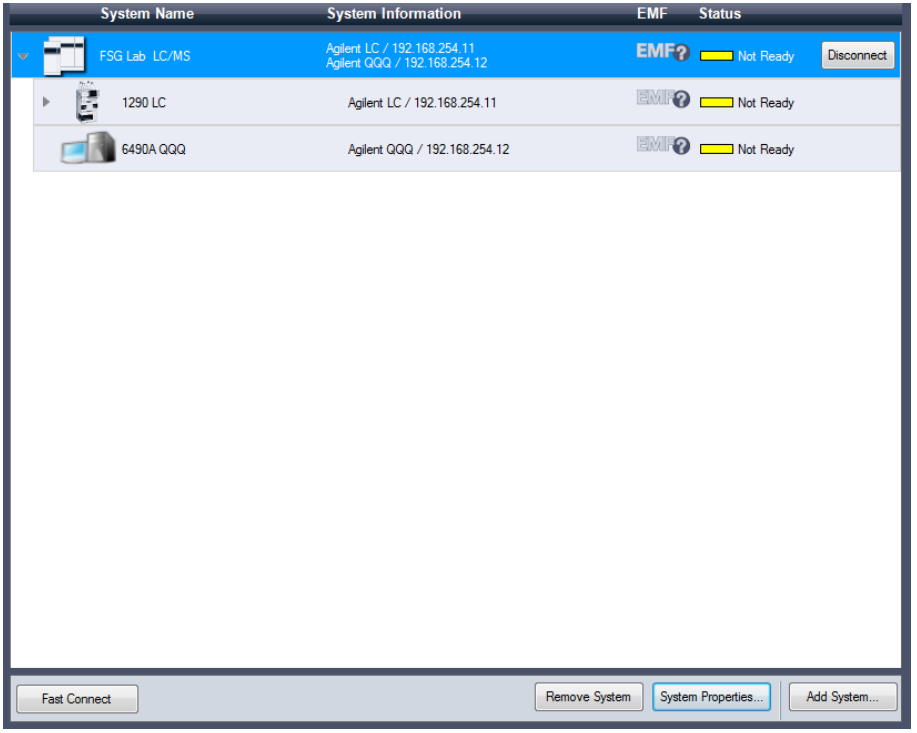


NOTE

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.

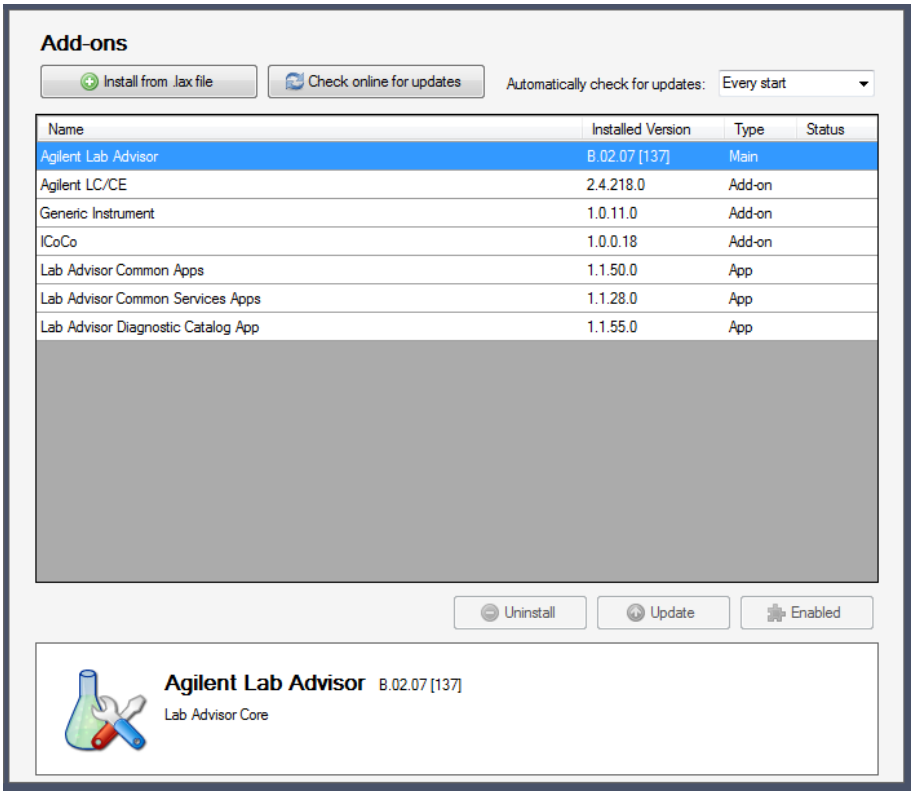


Figure 18: Add-ons in Configuration

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

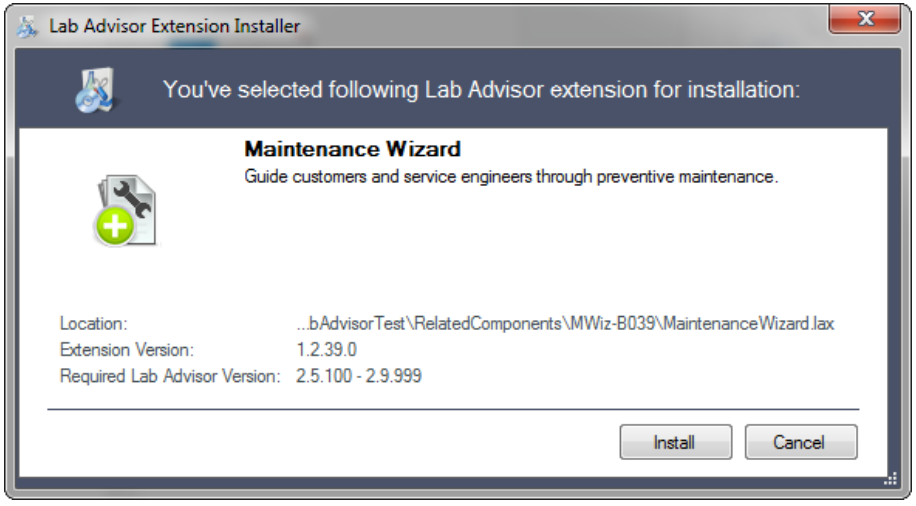
3 Click **Install from .lax file**.

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 Using the Software

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 125 of an HPLC instrument.
- Experiment Setup on page 126 for timing and technical planning of an experiment with which the reaction sequence is to be investigated.
- Experiment Run on page 138 for execution of the experiment.
- Experiment Comparison on page 142 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.

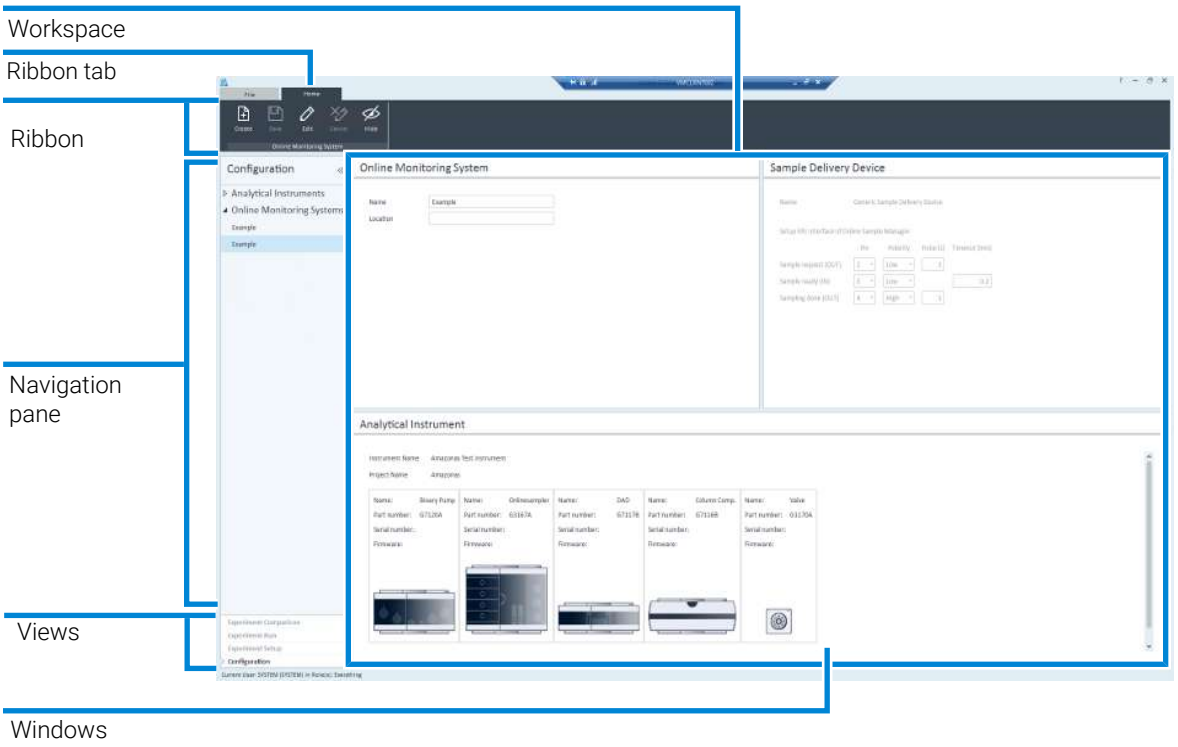


Figure 19: Overview of the Online LC Monitoring Software graphical user interface (GUI) - Configuration view

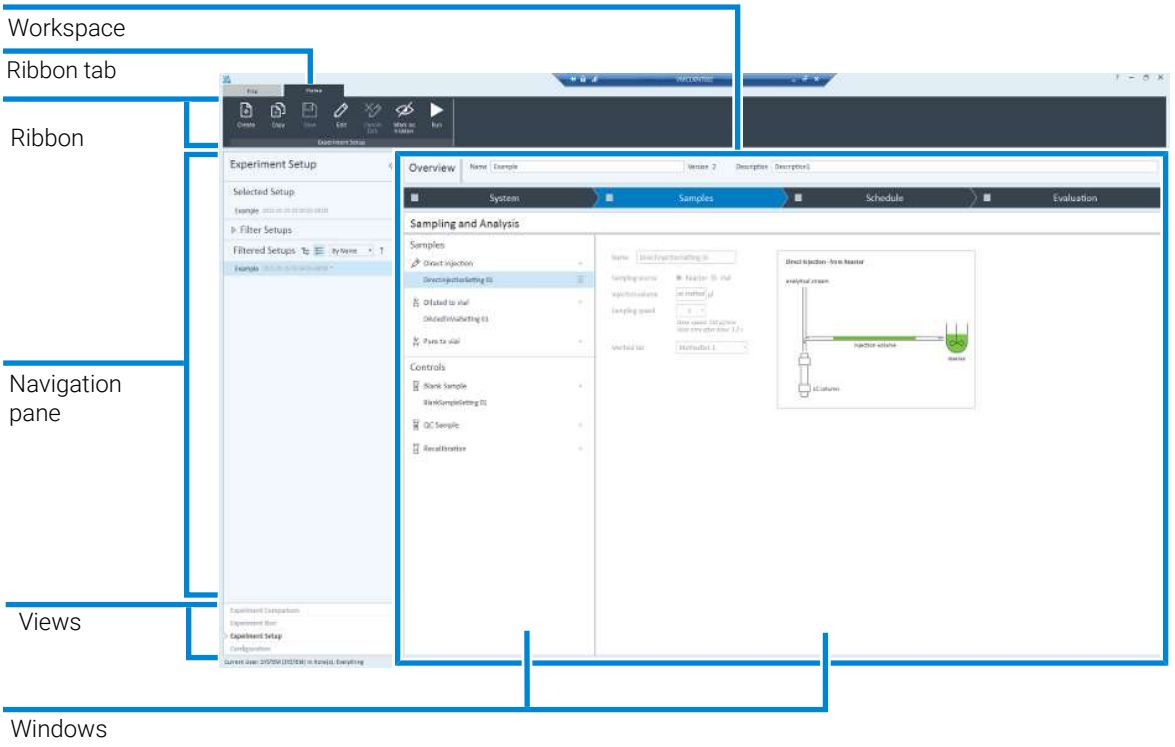


Figure 20: Overview of the Online LC Monitoring Software graphical user interface (GUI) - Experiment Setup view

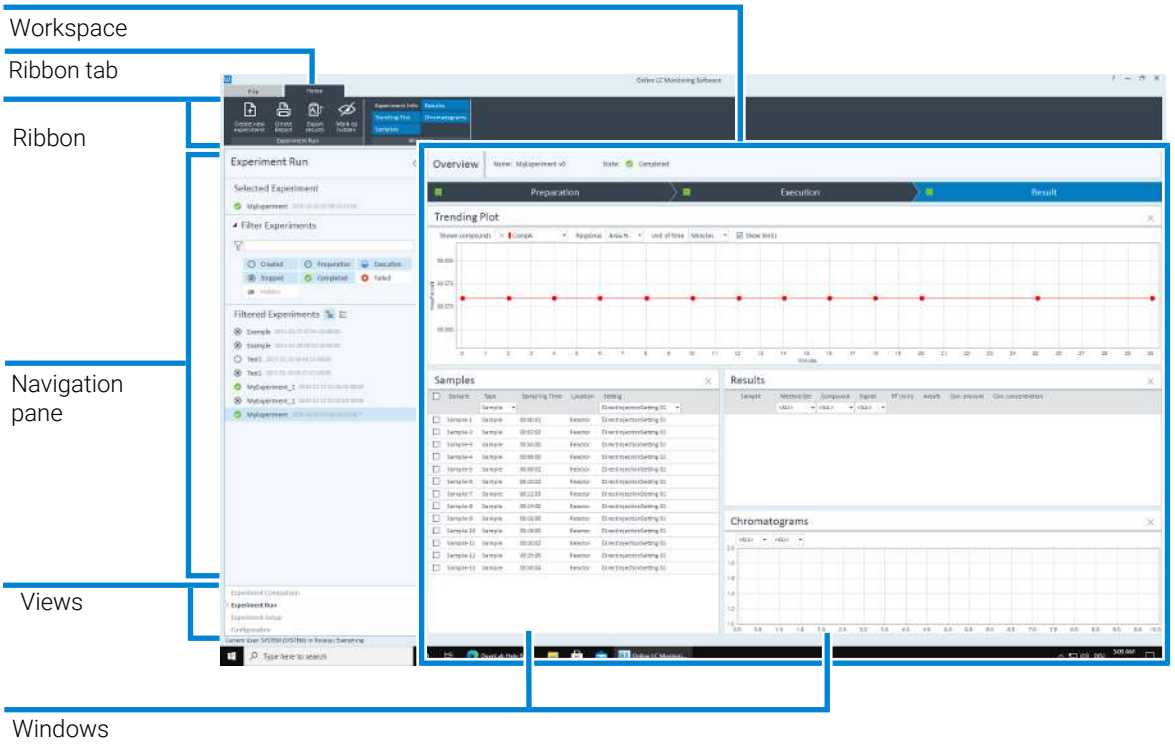


Figure 21: Overview of the Online LC Monitoring Software graphical user interface (GUI) - Experiment Run view

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 147
- Edit an Existing Experiment Setup on page 156

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 129.

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 **High Polarity** 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

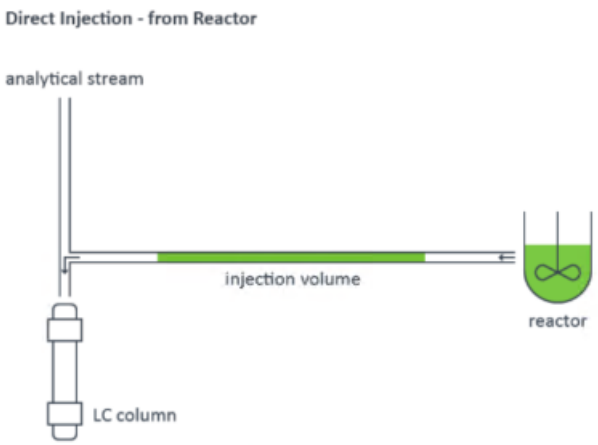
NOTE

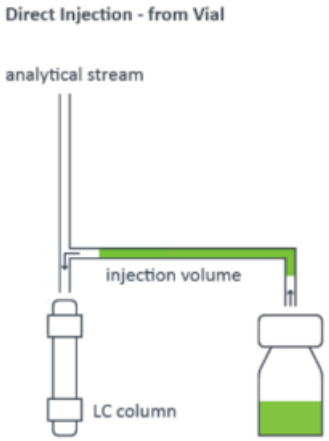
For each setting, a graphic illustrates the principle of the injection type.

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

Options for Direct Injection Settings

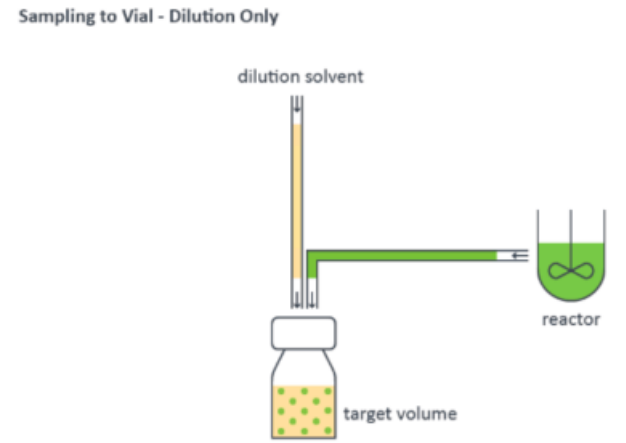
Name	In this field, you can specify the name of the injection.
Sampling source	You can select either Reactor or Vial as source of your sample injections. • If Reactor is selected, your sample will be pulled from the reactor. • If Vial is selected, your sample will be pulled from a vial.
Injection volume	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.





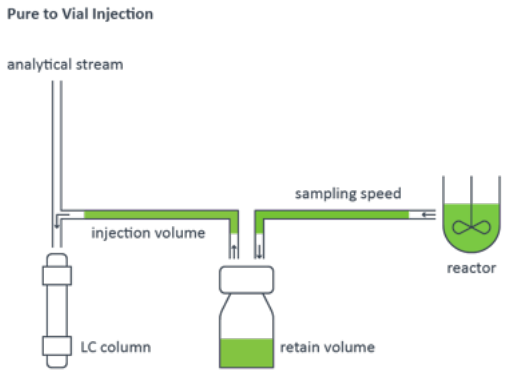
Options for Diluted to Vial Settings

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. **NOTE:** 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. **NOTE:** 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

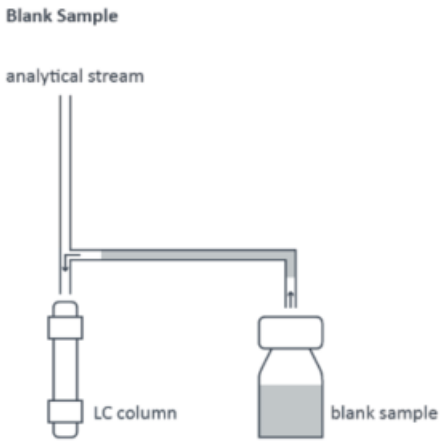
NOTE

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:

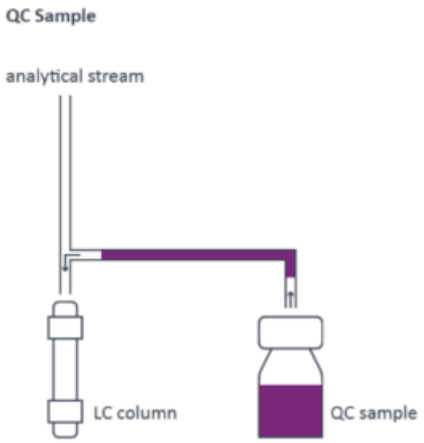
Options for Blank Sample Settings

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.



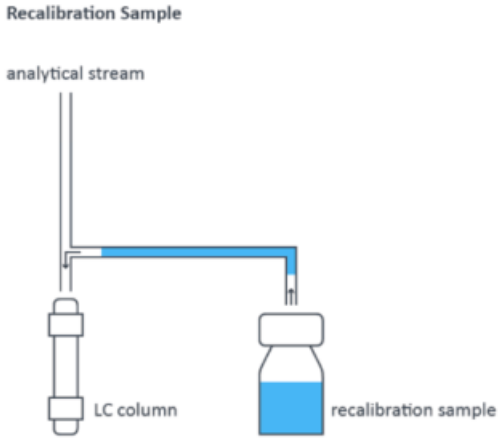
Options for QC Sample Settings

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. For details, see Functions of the Notification Settings Window on page 129.



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 **System Conditioning**, or step **Samples Controls** window.
Setting	Derives from definition in step **System Conditioning**, or step **Samples Controls** window.
Description	Derives from definition in step **System Conditioning**, or step **Samples Controls** 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 in-between 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 . For details, see Functions of the Notification Settings Window on page 129.

Experiment Run

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

Ribbon Tab

The **Experiment Run** Ribbon 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 169.

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.

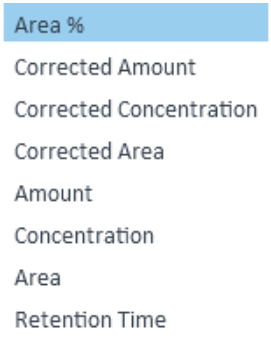
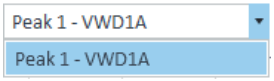
NOTE

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 to one X-axis 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 to one Y-axis 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 186.

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 200.

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 164.

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 24: 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. For further information about the API functionality, see *Agilent Online LC Monitoring Software Application Programming Interface Reference Guide (G2954-Online-LC-Monitoring-API-Workstation-SW-RefMa-en-D0020920.pdf, D0020920)*.

Configure a System

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

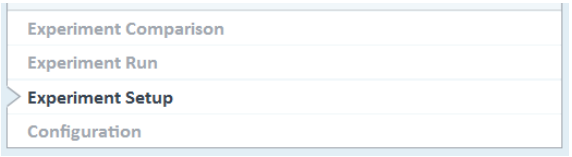
- Synchronize the System on page 106
- Create an Online Monitoring System on page 107
- Modify an Existing System on page 109
- Hide/Unhide an Existing System on page 110
- Set up the ERI Interface on page 111

Setup an Experiment

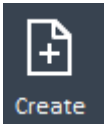
Create a new Experiment Setup

For detailed in information on the available GUI-elements, see Experiment Setup on page 126.

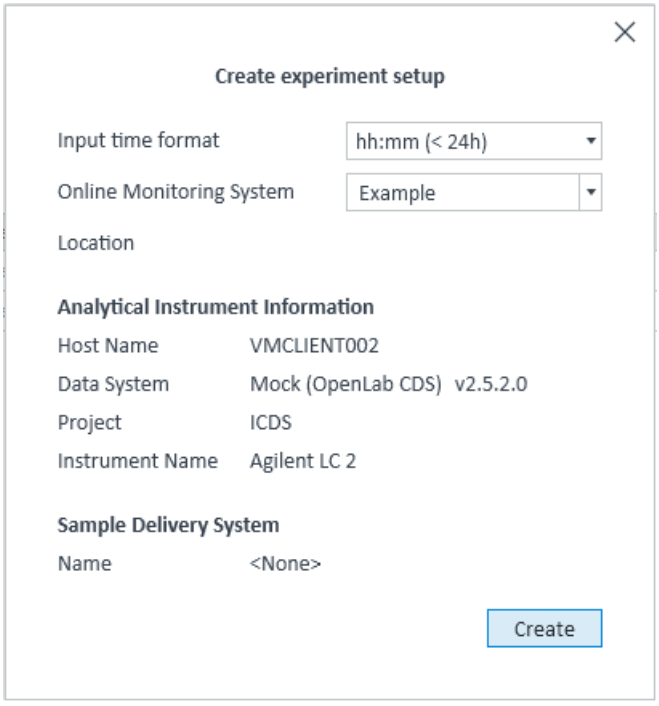
1 To enable setup of an experiment, in the Navigation pane, click Experiment Setup.



2 In the Home Ribbon tab, click Create.



The Create experiment setup window opens.



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

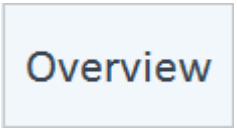
You can now set up an experiment, see

- Define and Describe an Experiment on page 149,
- Setup Method Sets on page 150,
- Add Sampling Settings on page 152,
- Define Experiment Schedule on page 153, and
- Define Compound Limits on page 155.

Define and Describe an Experiment

1 Go to the **Experiment Setup** of the Navigation pane.

2 Select the desired Experiment setup and go to the **Overview** Workspace:

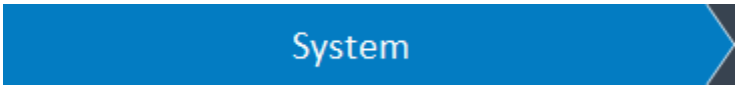


3 Define a **Name** and add a **Description**.
NOTE: You can change name and description of an experiment at any time.

4 Continue to set up the experiment.

Setup Method Sets

In the step **System**, you define the analytical methods to be used during the experiment:



Prerequesites

- The selected setup must be in **Edit** mode.

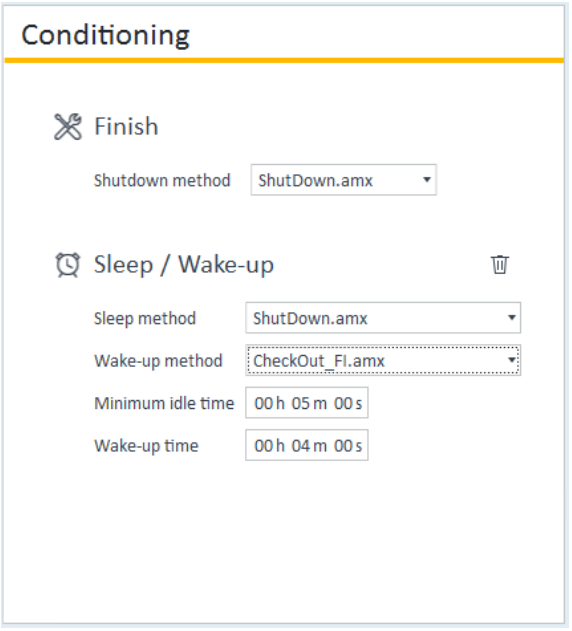
1 In the **Analytical Instrument** Workspace, click:

A method set is added to the **Definition of method sets** table.

2 In the table, select the desired methods from the drop-down lists.
NOTE: All in the drop-down 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**.

For details about the included methods, see Functions of the Analytical Instrument Window on page 127.

3 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 128.



The **System** is defined.

Add Sampling Settings

The step **Samples** allows you to setup multiple sampling modes.

Customize a Samples Injection

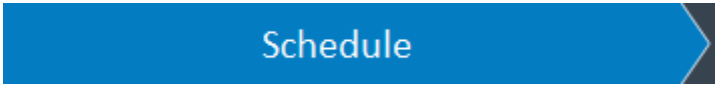
1 To add a **Samples** injection, in the **Samples** window click:

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 for defining rule-based or time-based sampling events.



Prerequesites

- The selected setup must be in **Edit** mode.

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

A window opens in which you can edit the settings.

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

a Select a **Setting** from the drop-down list.
NOTE: The settings shown in the list were defined in the step **Samples**.
Click  to see and edit the 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**.

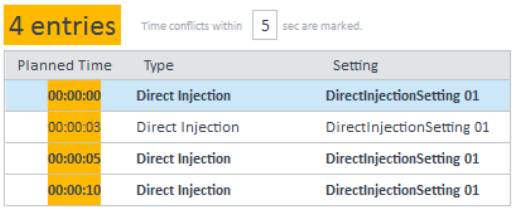
The software automatically calculates the missing parameter.

NOTE

To identify time conflicts, use the window **Preview**:
Problematic entries are marked orange.

Example for Conflicting Entries

Preview



Define Compound Limits

The step **Limits** allows you to set up warning limits for compound values. Here you define **Upper limits** and/or **Lower limits** at certain time points.

NOTE

To enable this option, the compound must be calibrated in the OpenLab CDS Data Analysis method. Furthermore, in the step **System**, you have selected the analytical methods to be used during the experiment (it must be selected in the table **Definition of Method Sets**).

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

2 To add a limit, click:

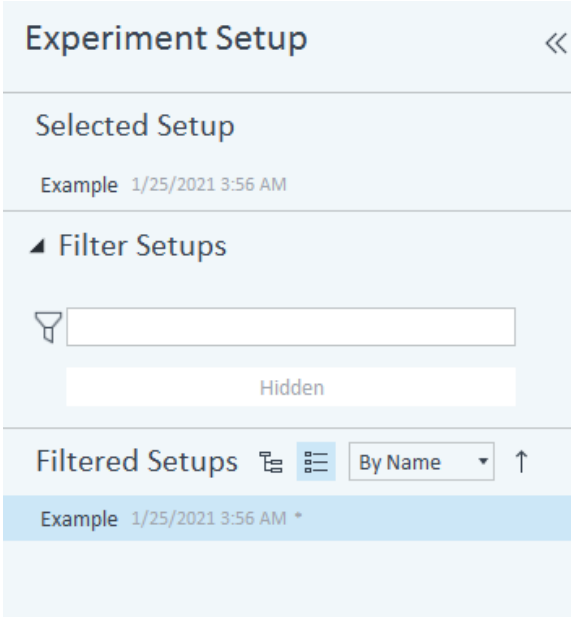
This adds a row to the **Compound Limit** table.

3 Enter a sampling time and set a lower and upper limit for it.
NOTE: Define at least two lower limits.

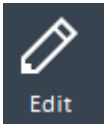
Edit an Existing Experiment Setup

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

Configure the SMTP Server

Prerequesites

- The required Experiment Setup is selected and in Edit mode.

1 In the File ribbon tab, select 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)

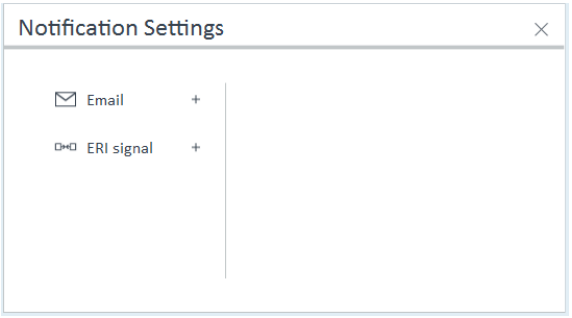
3 Click Save Settings.

Define Email Recipient Groups in the Step System

Prerequesites

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

1 Go to **Notification Settings** > **Email** and select +.

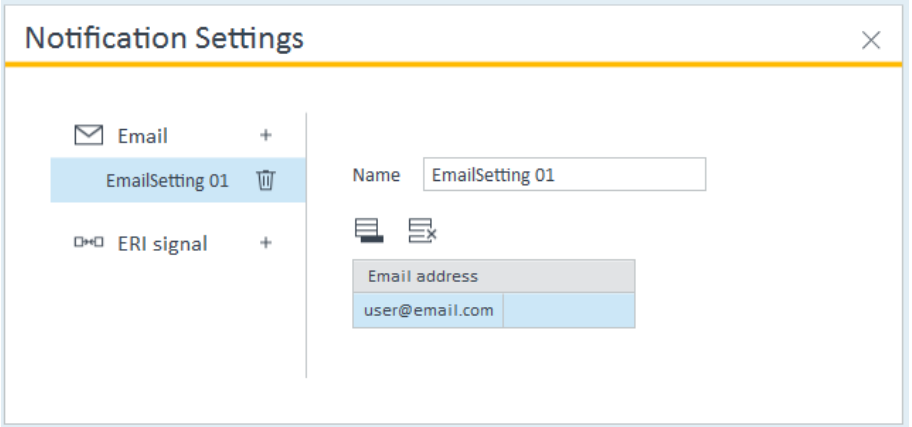


2 Define the target Email group:

a Enter a **Name**.

b To add Email recipients to the group, click and enter the email address of the recipient.
OR
To remove Email recipients from the group, click .

An Email recipient group is defined.



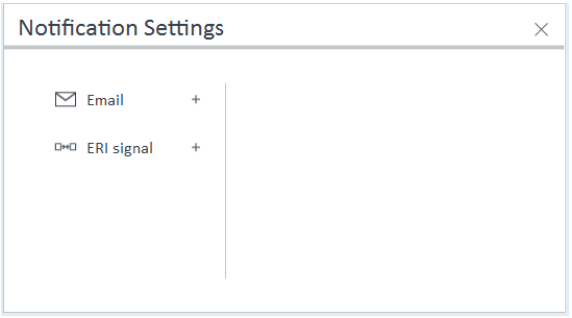
3 In the **Home** Ribbon tab, click **Save**.

Define ERI Signals for Automatic Notifications in the Step System

Prerequesites

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

1 Go to **Notification Settings** > **ERI signal** and select +.



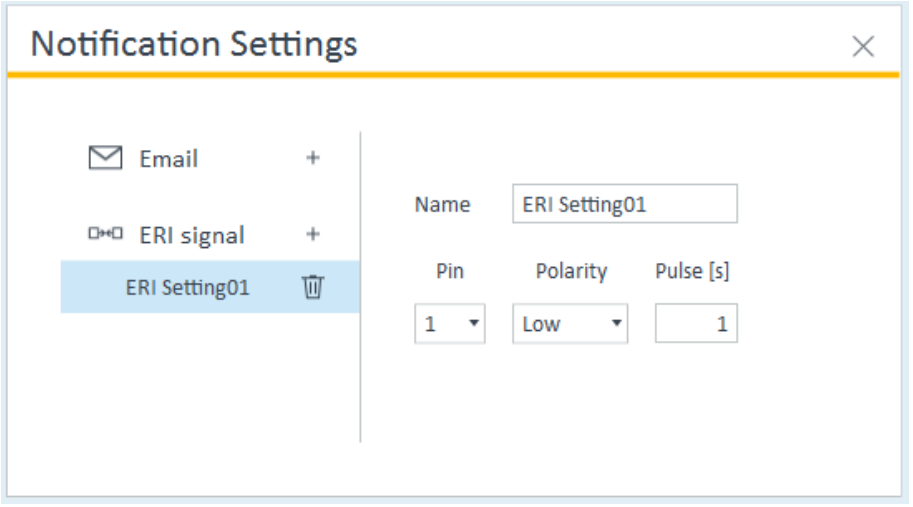
2 Define the ERI signal:

a Enter a **Name**.

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

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

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



3 In the **Home** Ribbon tab, click **Save**.

Remove Email Recipients or ERI Signals

Prerequesites

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

1. To remove Email recipients or ERI signals, go to **Notification Settings**.
2. To expand the list for the Email or ERI signal, select +.
3. Select for the entry you want to delete.
4. In the **Home** Ribbon tab, click **Save**.

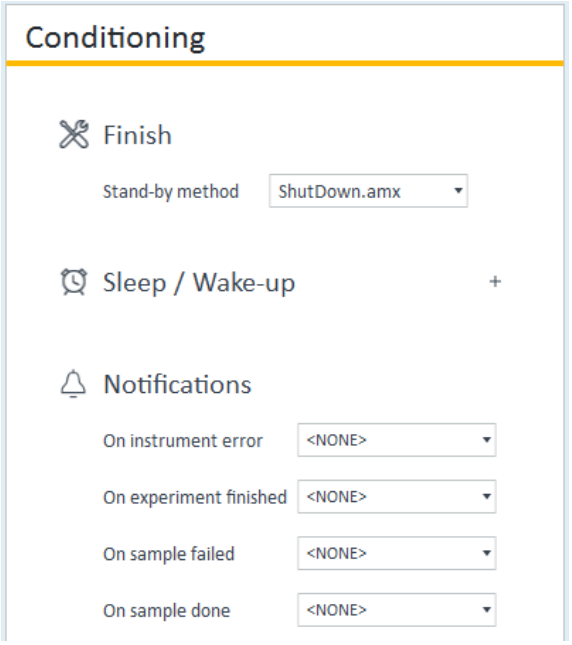
Define Recipients of Automatic Notifications Depending on Notification Events

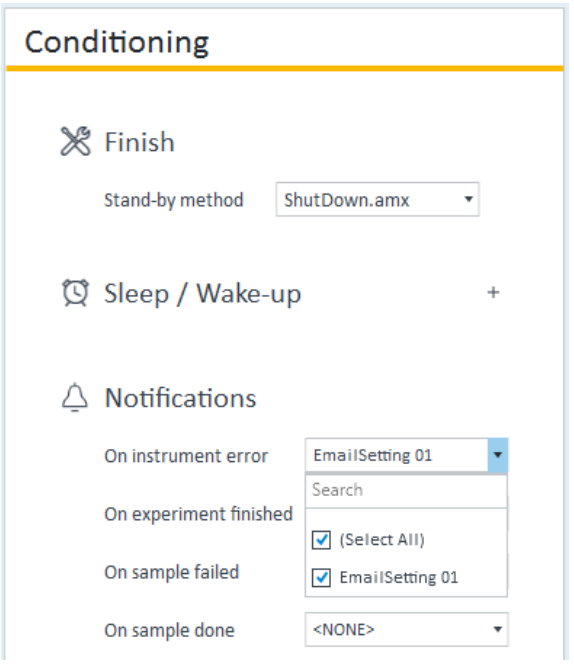
You can set up automatic notifications for certain events (instrument error, experiment finished, sample failed etc.) and specify the type of notification (e-mail recipent, ERI signal).

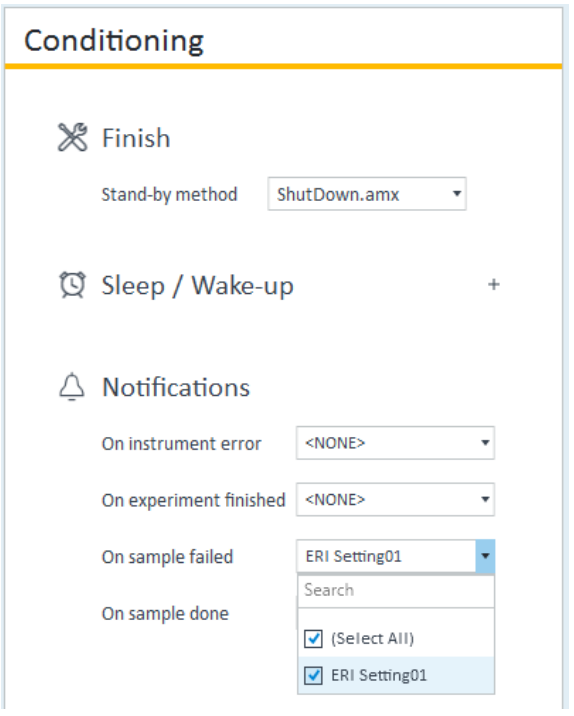
Prerequesites

- The required Experiment Setup is selected and in Edit mode.

1 Under Conditioning > Notifications, select a recipient for the respective event from the drop-down list.




Conditioning
Finish
Stand-by method
ShutDown.amx
Sleep / Wake-up
Notifications
On instrument error
EmailSetting 01
On experiment finished
On sample failed
On sample done
<NONE>
Search
(Select All)
EmailSetting 01


Conditioning
Finish
Stand-by method
ShutDown.amx
Sleep / Wake-up
Notifications
On instrument error
<NONE>
On experiment finished
<NONE>
On sample failed
ERI Setting01
On sample done
Search
(Select All)
ERI Setting01

2 In the Home Ribbon tab, click Save.

Send Compound Results to the API Client

The OPC server configuration on page 165 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.

For information on the API functionality and experiment run structure, see the *Agilent Online LC Monitoring Software Application Programming Interface Reference Guide (G2954-Online-LC-Monitoring-API-Workstation-SW-RefMa-en-D0020920.pdf, D0020920)*.

Configure the OPC Server

You can find the OPC Server configuration in the **File** ribbon tab.

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

Prerequesites

- 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.

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.

Edit the configuration settings as described in the following instructions:

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.

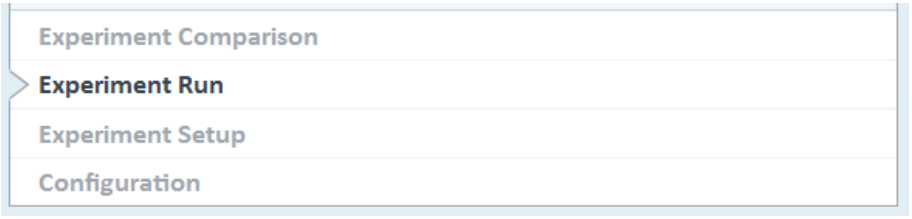
Remove a Compound from the Experiment Setup

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

Run an Experiment

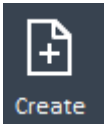
Start an Experiment

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

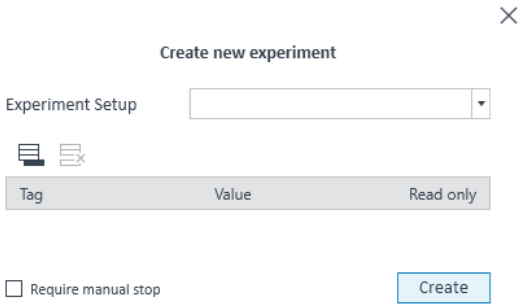


The experiments are displayed in the Navigation pane. Specific Ribbon tasks are displayed in the **Home** Ribbon tab.

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**.

4 **Optional**: Define a tag/value pair (e.g. customer-specific information to categorize the experiment).
NOTE: This information can be changed by default during the experiment run and is visible in the report and csv export. Enable the **Read only** option to prevent modification of the tag/value pair.

- To add a tag/value pair, use:

- To delete a tag/value pair, use:

5 **Optional**: Enable the **Require manual stop** option.
NOTE: If the option is enabled, the experiment will not finish automatically. You need to explicitly stop the experiment. The experiment can be edited in real time during an ongoing run.

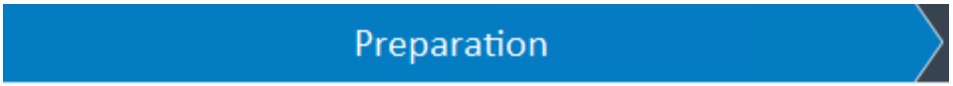
6 To start the experiment, click **Create**.

The experiment starts.
NOTE: To stop an experiment, select **Stop experiment** in the **Home** Ribbon tab. 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.

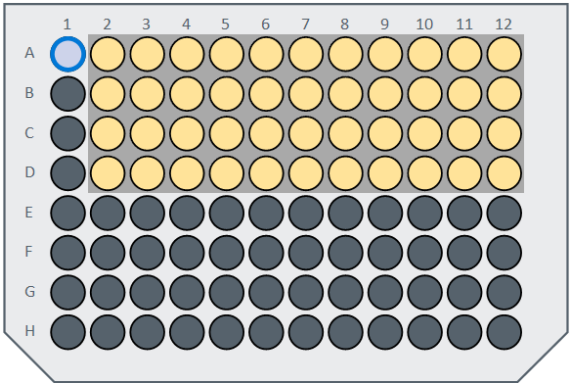
Prepare an Experiment

To successfully run an experiment, you must specify all source and/or target locations in the step **Preparation** of the **Experiment Run** workspace.



1 Select an action.

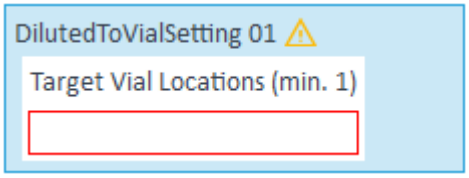
2 To specify the source/target location, use the graphical display.
NOTE: It is not possible to specify used locations.



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** of the **Experiment Run** workspace.

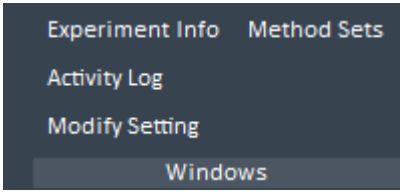
As long as the experiment runs, the following windows help to change or monitor valuable additional information:

- Experiment Info

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

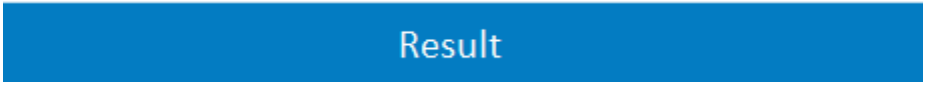
  Provides detailed information about the experiment.
- Modify Setting
- Method Sets

  Shows the Method Sets of the experiment in the run.



Review Experiments

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



In the **Results** step, several windows are available to review the results:

Review Compound Responses in the Trending Plot Window

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

Review Sample Injections Parameter in the Samples Window

1 Select the **Samples** window in the **Home** Ribbon tab.

The table shows your sample injections.

You can choose the columns that are shown in the table. The following columns are available:

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. For details, see Set Up Sample Custom Parameter in OpenLab CDS on page 92.
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 130 and Customization Options for Control Injections on page 133.

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. For details, see Set Up Sample Custom Parameter in OpenLab CDS on page 92.

Select the sample you want to display in the windows **Trending Plot**, **Samples**, and **Chromatograms**

Review Integration Results in the Results Window

1 Select the **Results** window in the **Home** Ribbon tab.

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. 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. For details, see Set Up Sample Custom Parameter in OpenLab CDS on page 92.
Open result in DA	Select to open the result set in OpenLab CDS Data Analysis.
Injection ID(s)	Unique identifier of the injection. It is configured as sample custom parameter. For details, see Set Up Sample Custom Parameter in OpenLab CDS on page 92.
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 127.
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.

Review Signals in the Chromatograms Window

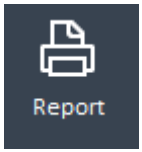
1 To review the signals, select the **Chromatograms** window in the **Home** Ribbon tab.

Report and Evaluate an Experiment

Report an Experiment

You will find different report templates under the **Home** Ribbon tab **Report Options**. You can choose between short and extended reports. The report will be saved as PDF file.

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



2 Select the desired storage location for the PDF file, and click **Save**.

The **Short report** contains the following information:

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

For the **Extended report**, the following information is included:

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

NOTE The type of report is defined under Report Options, see Experiment Run Ribbon tab on page 138.

Evaluate an Experiment

Evaluate Experiments in the Experiment Run Workspace

To evaluate an experiment in the Online LC Monitoring software, use the different **Windows** of the **Home** Ribbon tab (Experiment Run workspace):

- In the **Trending Plot** window, filter for compound, response, and time units.

- In the **Samples** window, filter for individual samples.

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

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

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

Evaluate Experiments with an External Program

Use the option **Export Results** of the **Home** Ribbon tab to export the results as a CSV file.

The CSV file contains the following information:

- Experiment Name
- Experiment Start
- Experiment End
- Analytical Instrument
- Keyvalue
- Peak Table, including the information about:
  - 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 126.

Export Parameters of an Experiment Setup for Use in a Different System

Prerequesites

- In the Navigation pane, the Experiment Setup is selected.

1. In section Filtered Setups, select the desired experiment setup.
2. In the Home Ribbon tab, select Export.
   The Export Experiment Setup dialog opens.
3. Select ..., to specify the import path. [Optional]
4. Enter a filename. [Optional]
5. Click Export.
   The setup parameters are saved as *.setup file.

Import Parameters of an Experiment Setup from a Different System

Prerequesites

- In the Navigation pane, the Experiment Setup is selected.

1. In the Home Ribbon tab, select Import.
   The Import Experiment Setup dialog opens.
2. Select ..., to navigate to the storage location with the *.setup file.
3. From the drop-down list, select the desired import file.
4. Add notes to the File Comment field. [Optional]
5. Enter the Experiment Setup Name.
6. Select the System Set from the drop-down list. [Optional]
7. Select Import.
   The parameters are imported and available in the selected system.

Export Experiment Locations

Prerequesites

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

1 Click Export Locations.

The Save As dialog opens.

2 Navigate to the storage location.

3 Enter the file name for *.locations. [Optional]

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 138.

Export Experiment Parameters

Prerequesites

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

1 In the Home Ribbon tab, select **Export**.

The **Export Experiment** dialog opens.

2 Select **...**, to specify the export path. [Optional]

3 Enter a filename. [Optional]
NOTE: It is 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

Prerequesites

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

1 In the **Home** Ribbon tab, select **Import**.

The **Import Experiment** dialog opens.

2 Select **...**, to navigate to the storage location with the *.experiment file. [Optional]

3 From the drop-down list, select the desired import file.

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

5 Click **Import**.

The Experiment is available in the system.

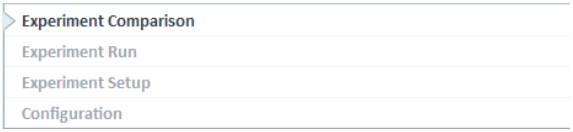
NOTE It is not possible to import an experiment twice. Each experiment contains a unique document identifier that enables the software to identify if it has been imported before. Exporting an experiment run and importing it again is prevented. It is not allowed to create copies of results. This restriction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



2 Under **Filtered Experiments** in the **Navigation pane**, select the experiments you want to compare.

3 In the **Compound Trending Comparison** workspace, configure the screen to your needs. For details, see Experiment Comparison on page 142.

Compliance

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.

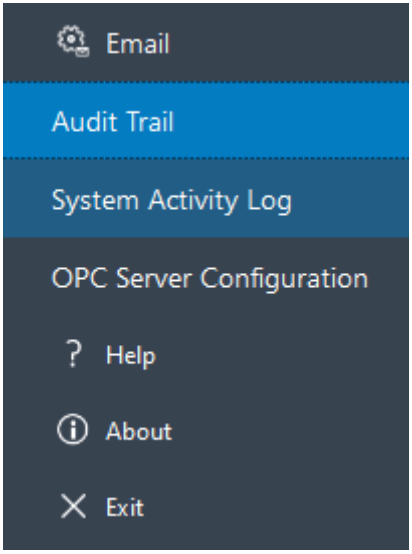


Figure 22: Audit Trail and System Activity Log in the File ribbon tab

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 189.

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:

State	User name	Date (yyyy-MM-dd)	Description	Host name	Version	Reviewed	Reason	Category
	admin (admin)	2023-03-24 15:19:05+01:00	This is a manual entry 2	Example host	5			Manual entry
	admin (admin)	2023-03-24 15:18:49+01:00	This is a manual entry	Example host	5			Manual entry
	admin (admin)	2023-03-24 15:17:44+01:00	Saved Experiment setup	Example host	5		This is an example 2	Setup
	admin (admin)	2023-03-24 15:17:44+01:00	'DocumentVersion' is modified from '4' to '5'	Example host	5		This is an example 2	Setup
	admin (admin)	2023-03-24 15:17:44+01:00	'Name' is modified from 'Example' to 'Example 2'	Example host	5		This is an example 2	Setup
	admin (admin)	2023-03-24 15:17:44+01:00	'Description' is modified from 'Example' to 'Example 2'	Example host	5		This is an example 2	Setup
	admin (admin)	2023-03-24 15:17:15+01:00	Reviewed by admin (admin)	Example host	4	admin (admin)		Audit trail review
	admin (admin)	2023-03-24 15:15:33+01:00	Saved Experiment setup	Example host	4	admin (admin)	This is an example	Setup
	admin (admin)	2023-03-24 15:15:33+01:00	'DocumentVersion' is modified from '3' to '4'	Example host	4	admin (admin)	This is an example	Setup

Figure 23: 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.

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

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.

Prerequesites

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

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

Prerequesites

- User has the permission Can Review Audit Trail.
- Audit trail is active, see Start Audit Trail on page 189.

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

Prerequesites

- User has the permission Can Review Audit Trail.
- Audit trail is active, see Start Audit Trail on page 189.

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

Prerequesites

- User has the permission Can Review Audit Trail.
- Audit trail is active, see Start Audit Trail on page 189.

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

Prerequesites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see Start Audit Trail on page 189.

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

Prerequesites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see Start Audit Trail on page 189.

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

Prerequesites

- User has the permission Can Review Audit Trail.
- Audit trail is active, see Start Audit Trail on page 189.

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).

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

Add a Manual Entry to the Audit Trail

Prerequesites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see Start Audit Trail on page 189.

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.

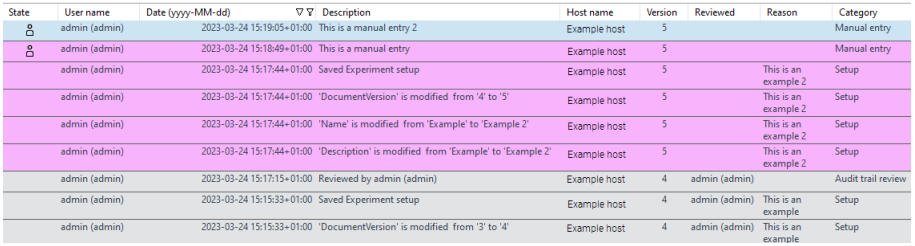
Review the Audit Trail

Prerequesites

- User has the permission **Can Review Audit Trail**.
- Audit trail is active, see Start Audit Trail on page 189.

1 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.



State	User name	Date (yyyy-MM-dd)	Description	Host name	Version	Reviewed	Reason	Category
	admin (admin)	2023-03-24 15:19:05+01:00	This is a manual entry 2	Example host	5			Manual entry
	admin (admin)	2023-03-24 15:18:49+01:00	This is a manual entry	Example host	5			Manual entry
	admin (admin)	2023-03-24 15:17:44+01:00	Saved Experiment setup	Example host	5		This is an example 2	Setup
	admin (admin)	2023-03-24 15:17:44+01:00	'DocumentVersion' is modified from '4' to '5'	Example host	5		This is an example 2	Setup
	admin (admin)	2023-03-24 15:17:44+01:00	'Name' is modified from 'Example' to 'Example 2'	Example host	5		This is an example 2	Setup
	admin (admin)	2023-03-24 15:17:44+01:00	'Description' is modified from 'Example' to 'Example 2'	Example host	5		This is an example 2	Setup
	admin (admin)	2023-03-24 15:17:15+01:00	Reviewed by admin (admin)	Example host	4	admin (admin)		Audit trail review
	admin (admin)	2023-03-24 15:15:33+01:00	Saved Experiment setup	Example host	4	admin (admin)	This is an example	Setup
	admin (admin)	2023-03-24 15:15:33+01:00	'DocumentVersion' is modified from '3' to '4'	Example host	4	admin (admin)	This is an example	Setup

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

3 Click **Review**.

NOTE

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

Prerequesites

- User has the permission Can Review Audit Trail.
- Audit trail is active, see Start Audit Trail on page 189.

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

Prerequesites

- User has the permission Can Review Audit Trail.
- Audit trail is active, see Start Audit Trail on page 189.

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 (CDS_v2.8_WorkstationGuide_en.pdf, D0028022)* .

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

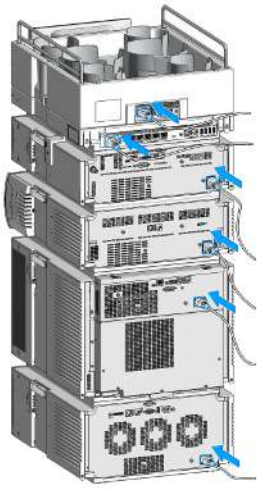
This chapter provides information on how to use the module.

General Information

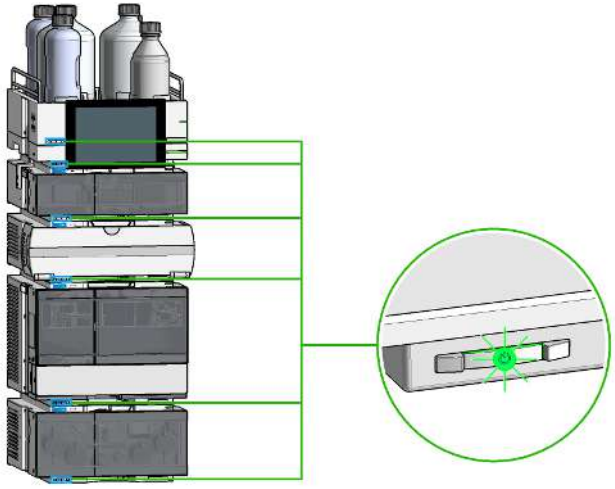
Turn On/Off

This procedure exemplarily shows an arbitrary LC stack configuration.

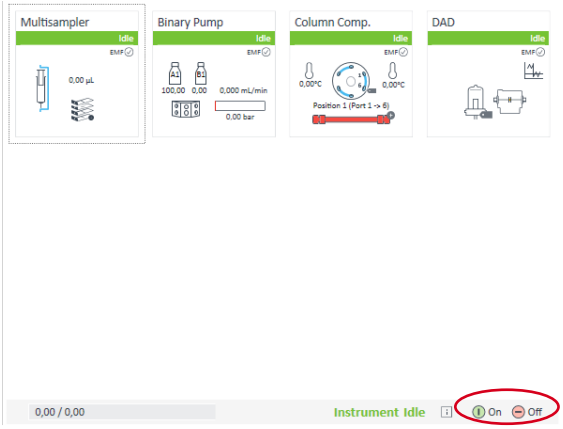
1



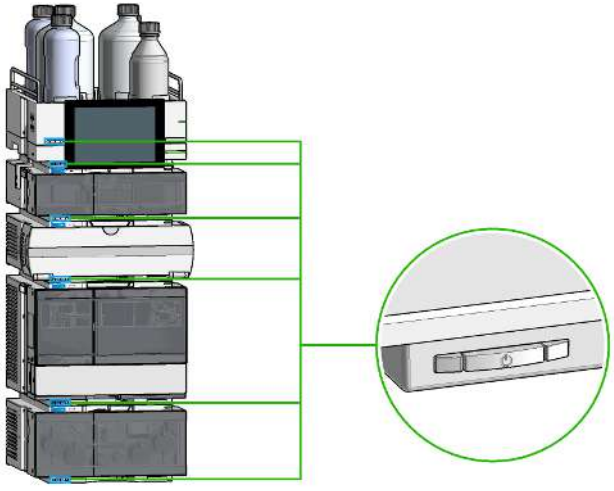
2 On/Off switch: On



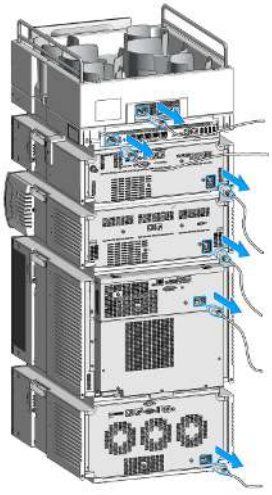
3 Turn instrument **On/Off** with the control software.



4 On/Off switch: Off



5



Status Indicators

The module status indicator indicates one of six possible module conditions.

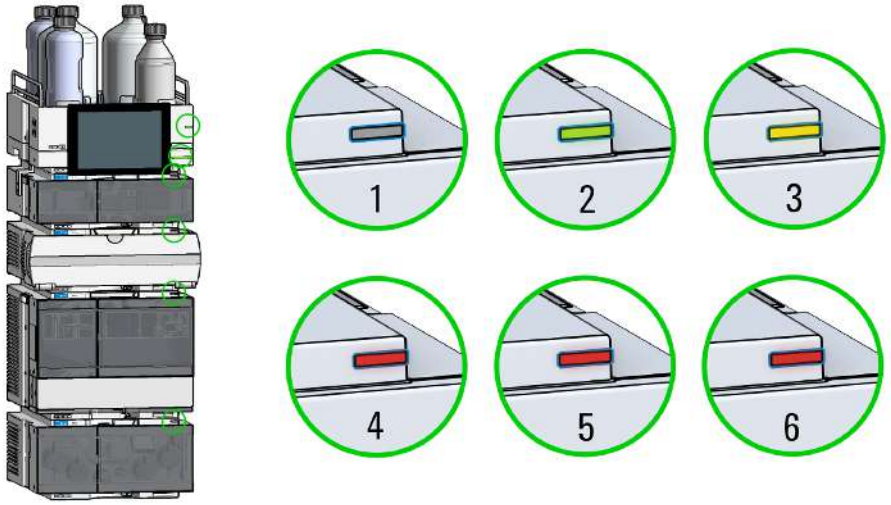


Figure 24: Arbitrary LC stack configuration (example)

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.

InfinityLab Assist Hub Status Indicator

The Assist Hub status indicator displays the status of the entire system. If a module in the system is not ready (yellow), the Assist Hub status indicator also shows not ready (yellow). The same applies for the module conditions **Idle**, **Run mode**, and **Error mode**.

Preparation of the System

Prepare a Run

This procedure exemplarily shows how to prepare a run. Parameters as shown in the screenshots may vary, depending on the system installed.

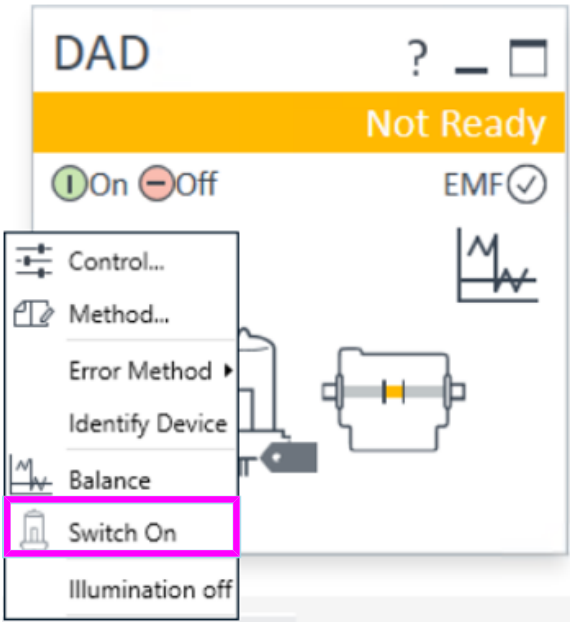
WARNING

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.**
- **Do not use bottles that exceed the maximum permissible volume (2.5 L) as specified in the usage guidelines.**
- **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.**

1 Switch on the detector.

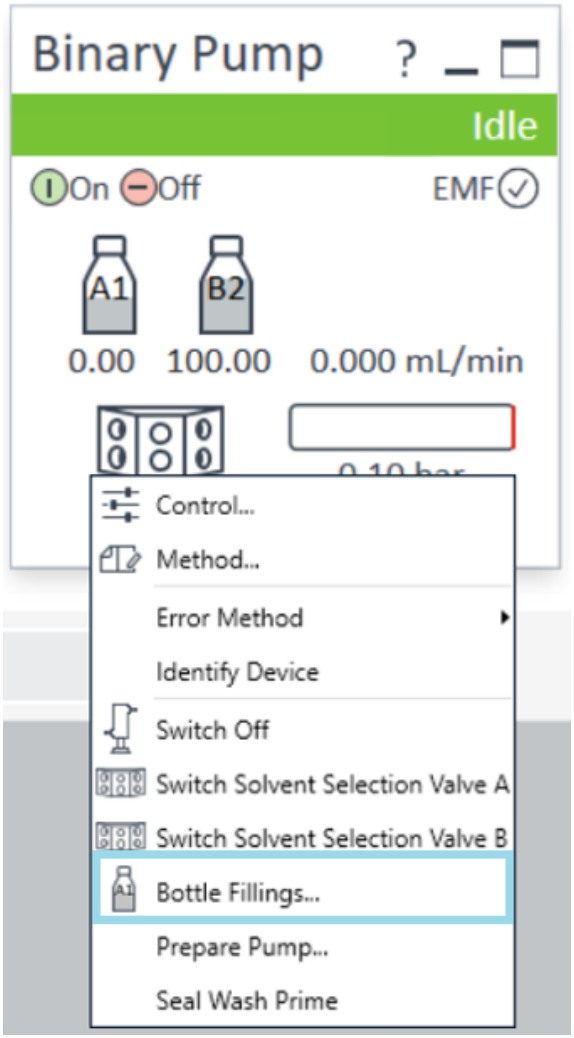


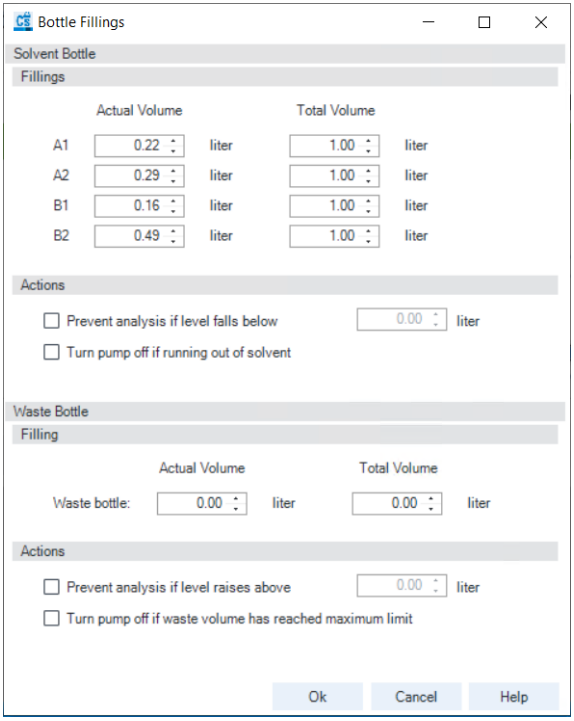
2 Fill the solvent bottles with adequate solvents for your application.

3 Place solvent tubings with bottle head assemblies into the solvent bottles.

4 Place solvent bottles into the solvent cabinet.

5 Solvent bottle filling dialog (in the software).





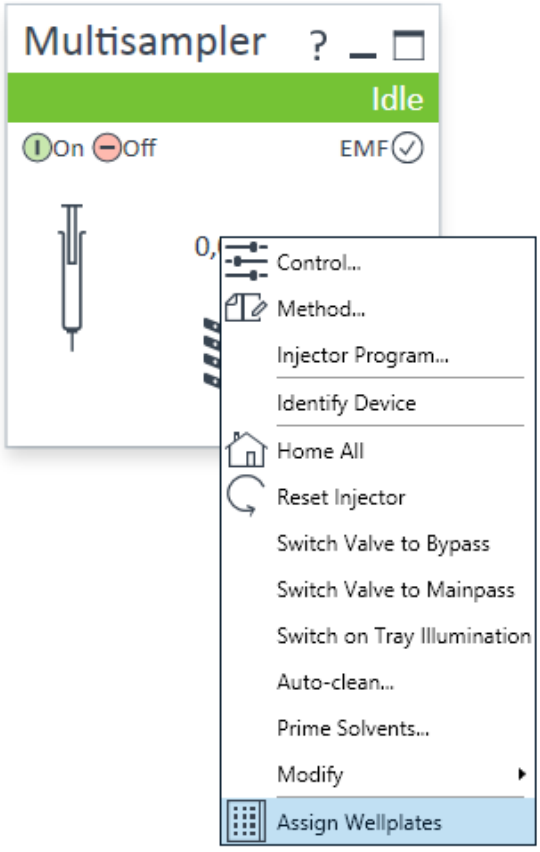
6 Purge the pump.

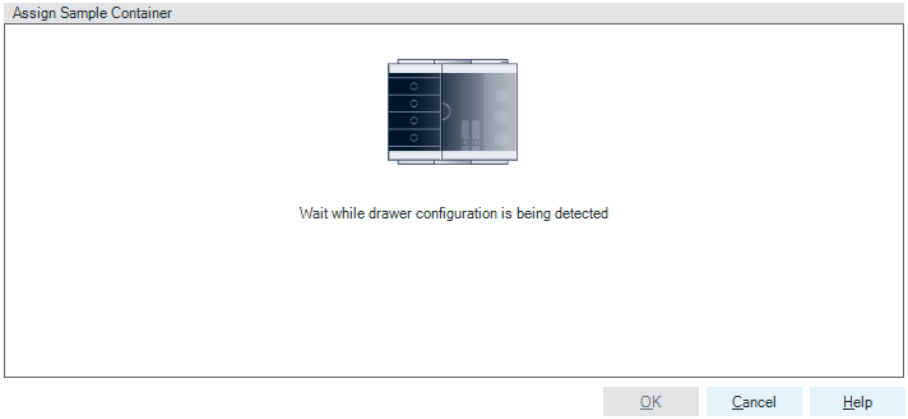
NOTE

For details on priming and purging, refer to the technical note *Best Practices for Using an Agilent LC System Technical Note (InfinityLab-BestPractice-en-SD-29000194.pdf, SD-29000194)*.

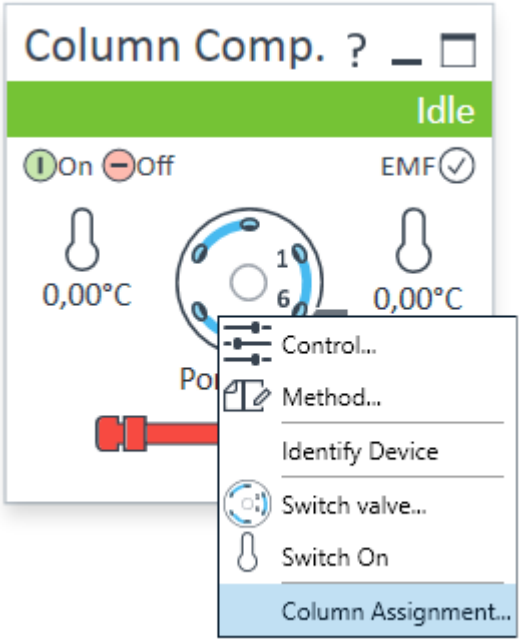
7 Change solvent type if necessary.

8 Choose the tray format of the sampler.

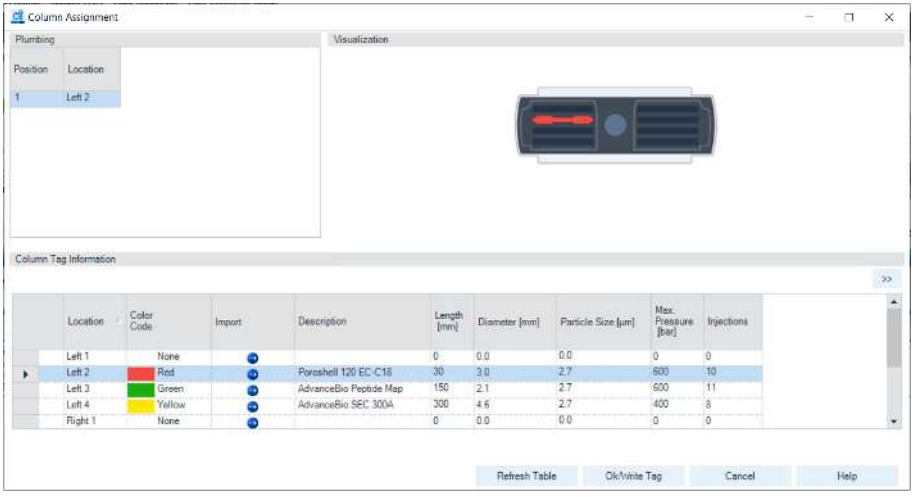




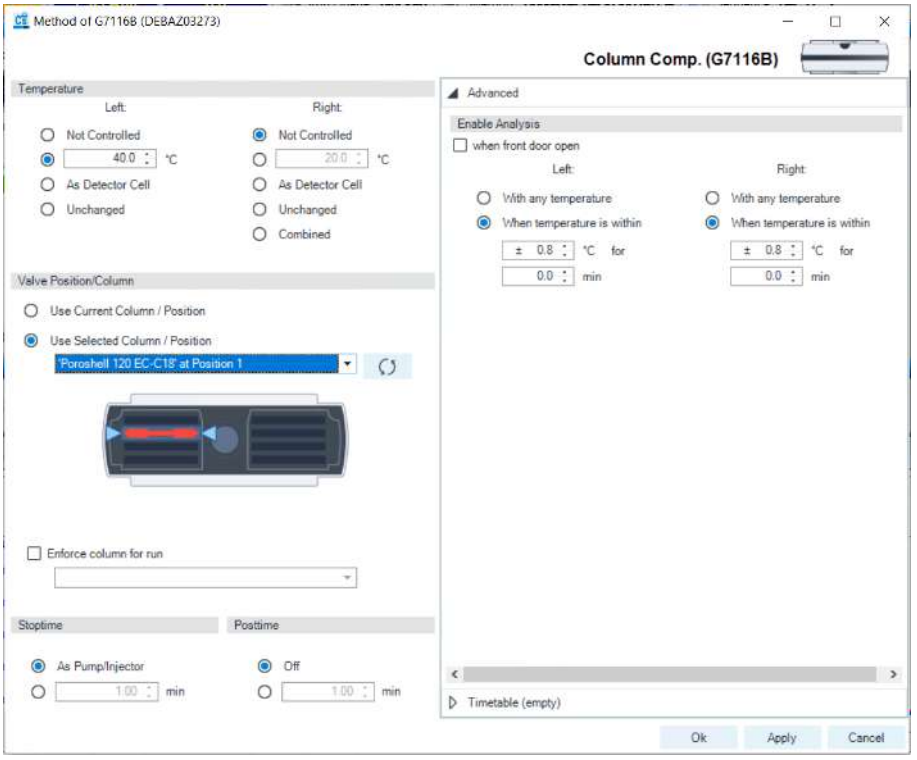
9 Add a new column.



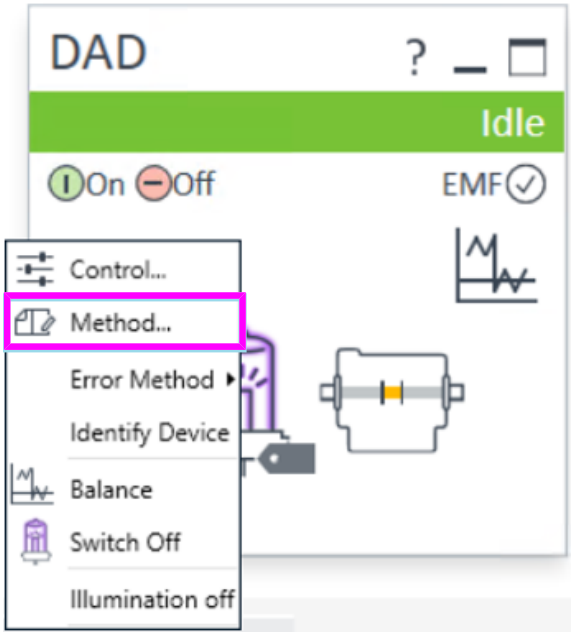
10 Enter the column information.



11 Select the column in the Method settings of the column compartment.



12 Set the detector parameters according to the needs of your method.


DAD
Idle
On
Off
EMF
Control...
Method...
Error Method
Identify Device
Balance
Switch Off
Illumination off

Prime and Purge the System

When the solvents have been exchanged or the pumping system has been turned off for a certain time (for example, overnight) oxygen will re-diffuse into the solvent channel between the solvent reservoir, vacuum degasser (when available in the system) and the pump. Solvents containing volatile ingredients will slightly lose these. Therefore priming of the pumping system is required before starting an application.

Table 25: 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
After the installation of normal phase seals (P/N 0905-1420)	Hexane + 5% Isopropanol	Good wetting properties

NOTE The pump should never be used for priming empty tubings (never let the pump run dry). Use a syringe to draw enough solvent for completely filling the tubings to the pump inlet before continuing to prime with the pump.

1 Open the purge valve of your pump (by turning it counterclockwise) and set flow rate to 3 – 5 mL/min.

2 Flush all tubes with at least 30 mL of solvent.

3 Set flow to required value of your application and close the purge valve.

NOTE Pump for approximately 10 minutes before starting your application.

Preparing the Module

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.

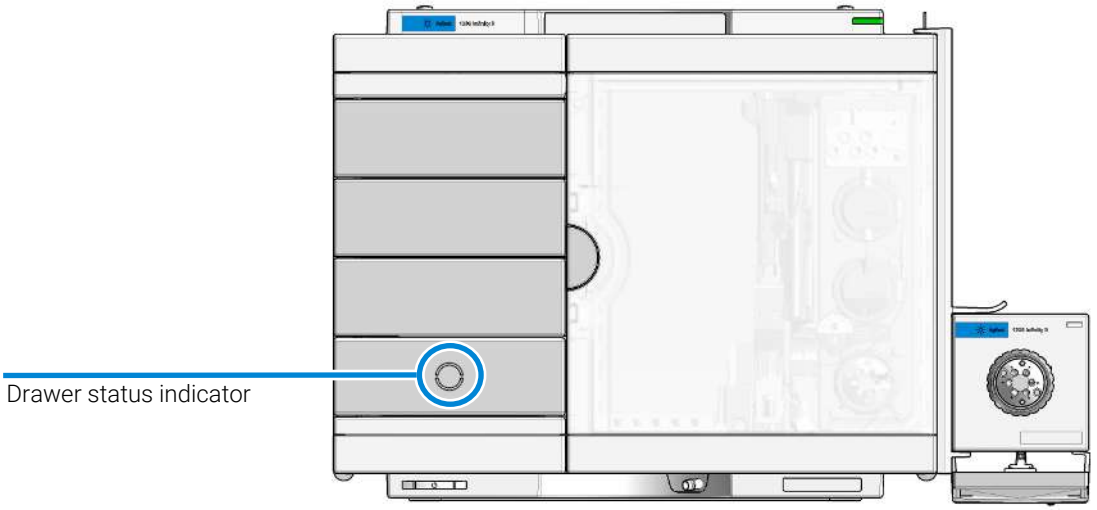
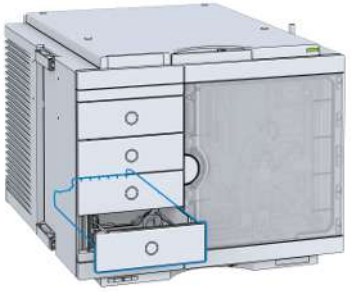


Figure 25: Drawer status indicator

Insert Vial Trays/Wellplates

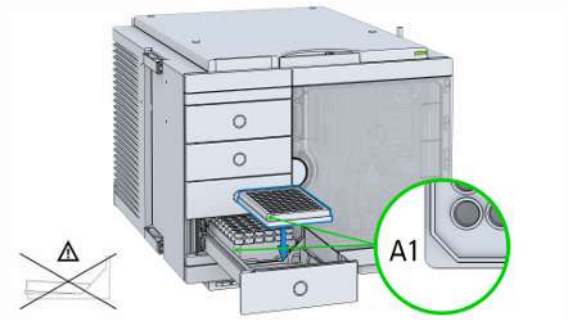
1

2

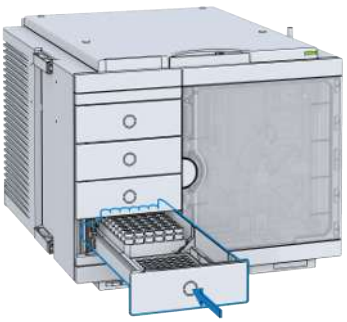


3

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 22 The Online Sample Manager User Interface on page 94).

Remove Vial Trays/Wellplates

1

2

3

4

5

6

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

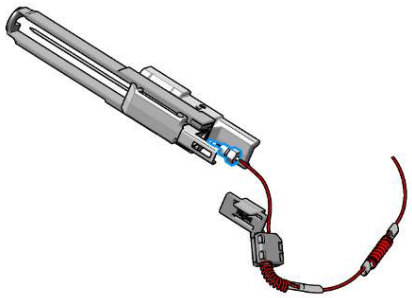
An uncovered needle is a risk of harm to the operator.

- **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 349 and Remove the Sample Loop-Flex on page 405.

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

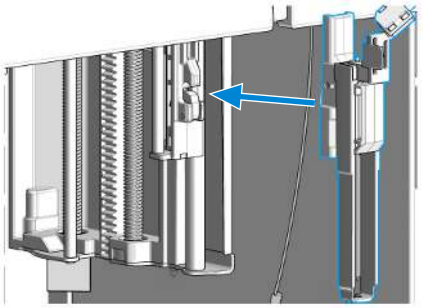
An uncovered needle is a risk of harm to the operator.

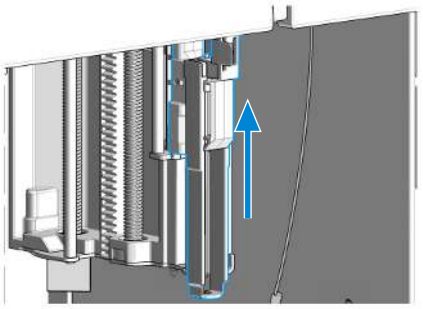
- **Open the safety lock of the needle assembly *only* on the sample handler and for this particular procedure.**
- **Be careful working at the z-robot.**
- **Wear safety gloves when removing the needle assembly.**

2 Unlock the needle.

NOTE

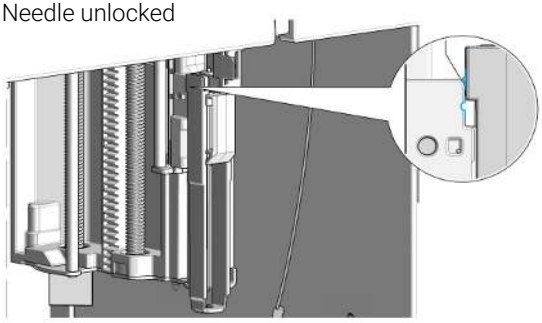
This procedure is completely different than the standard PM replacement of the needle assembly in Lab Advisor. The safety lock of the needle assembly has to be released by carefully sliding the pusher upwards.



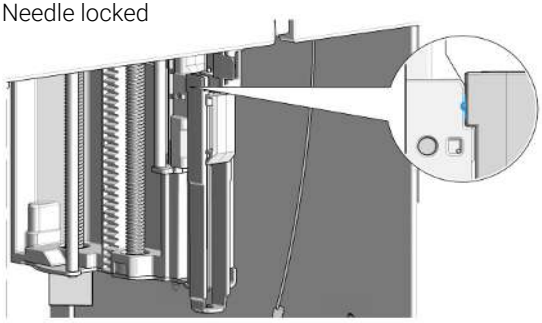


3 Verify that the needle assembly is unlocked after installation.

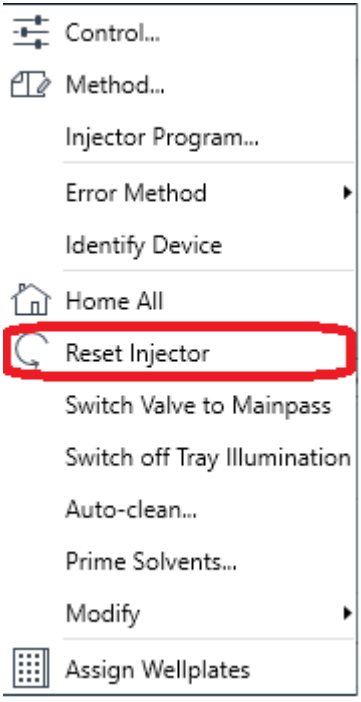
Needle unlocked



Needle locked



4 Reset the sampler (using the instrument control) or turn the instrument Off/ On again to start the initialization.



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.

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 5067-6189 (InfinityLab Inline Filter (0.3 µm)) for inline filtering.

Table 26: 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 523.
- 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 27: Recommended plates and closing mats

Part Number (Description)	Rows	Columns	Plate height (mm)	Volume (µL)	Package	Closing mat compatibility
384Corning (No Agilent PN)	16	24	14.4	80		
384Nunc (No Agilent PN)	16	24	14.4	80		
5042-8502 (96-well plate, box of 25 sample plates)	8	12	17.3	150	25	5042-1389 (Closing mat for all 96 Agilent plates)
5065-4402 (96CappedAgilent)	8	12	47.1	300	1	5042-1389 (Closing mat for all 96 Agilent plates)
96Corning (No Agilent PN)	8	12	14.3	300		
96CorningV (No Agilent PN)	8	12	14.3	300		
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		
5043-9300 (Well plate 96/2.2 mL, square wells, U shape, PP, 41 mm, 30/pk)	8	12	41	2200	30	5043-9319 (Mat 96 wells, square, pierceable, silicone 50/pk)
5043-9302 (Well plate 96/2.0 mL, round wells, U shape, PP, 45 mm, 30/pk)	8	12	45.3	2000	30	5043-9317 (Mat 96 wells, round, pierceable, silicone 50/pk), 5043-9318(Mat 96 wells, round, piercable, silicone 100/pk)
5043-9305 (Well plate 96/1.0 mL, round wells, U shape, PP, 32 mm, 50/pk)	8	12	32	1000	50	5043-9317 (Mat 96 wells, round, pierceable, silicone 50/pk), 5043-9318 (Mat 96 wells, round, piercable, silicone 100/pk)
5043-9308 (Well plate 96/1.2 mL, round wells, U shape, PP, 27 mm, 25/pk)	8	12	27	1200	25	5043-9317 (Mat 96 wells, round, pierceable, silicone 50/pk), 5043-9318(Mat 96 wells, round, piercable, silicone 100/pk)

Part Number (Description)	Rows	Columns	Plate height (mm)	Volume (µL)	Package	Closing mat compatibility
5043-9309 (Well plate 96/1.2 mL, round wells, U shape, PP, 27 mm, 50/pk)	8	12	27	1200	50	5043-9317 (Mat 96 wells, round, pierceable, silicone 50/pk), 5043-9318 (Mat 96 wells, round, piercable, silicone 100/pk)
5043-9310 (Well plate 96/0.5 mL, round wells, U shape, PP, 14 mm, 30/pk)	8	12	14	500	30	5043-9317 (Mat 96 wells, round, pierceable, silicone 50/pk), 5043-9318 (Mat 96 wells, round, piercable, silicone 100/pk)
5043-9311 (Well plate 96/0.5 mL0.5 mL, round wells, U shape, PP, 14 mm, 120/pk	8	12	14	500	120	5043-9317 (Mat 96 wells, round, pierceable, silicone 50/pk), 5043-9318 (Mat 96 wells, round, piercable, silicone 100/pk)
5043-9312 (Well plate 96/0.33 mL, round wells, V shape, PP, 14 mm, 25/pk)	8	12	14	330	25	5043-9317 (Mat 96 wells, round, pierceable, silicone 50/pk), 5043-9318 (Mat 96 wells, round, piercable, silicone 100/pk)
5043-9313 (Well plate 96/0.33 mL, round wells, V shape, PP, 14 mm, 50/pk)	8	12	14	330	50	5043-9317 (Mat 96 wells, round, pierceable, silicone 50/pk), 5043-9318 (Mat 96 wells, round, piercable, silicone 100/pk)
5043-9314 (Well plate 96/0.33 mL, round wells, V shape, PP, 14 mm, 100/pk)	8	12	14	330	100	5043-9317 (Mat 96 wells, round, pierceable, silicone 50/pk), 5043-9318 (Mat 96 wells, round, piercable, silicone 100/pk)
5043-9315 (Well plate 384/0.19 mL, square wells, V shape, PP, 22 mm, 25/pk)	16	24	22	190	25	5043-9320 (Mat 384 wells, square, pierceable, silicone 50/pk)

Table 28: Recommended vial plates

Description (part number)	Rows	Columns	Plate height (mm)	Volume (µL)	Package
G2255-68700 (Vial plate for 54 x 2 mL vials (6/pk))	6	9	36	2000	6
5023-2471 (Vial plate 40 x 2 mL vials)	5	8	43	2000	1
5022-6539 (Vial plate for 15 x 6 mL vials (1/pk)) only compatible with 3H drawers	3	5	42	6000	1
5022-6538 (Vial plate for 27 Eppendorf tubes (1/pk))	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 06644-001 (Pierceable aluminium foil) .

Configure Well Plate Types

If the plate you are using is not found on the Recommended Mats and Vials on page 226 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.

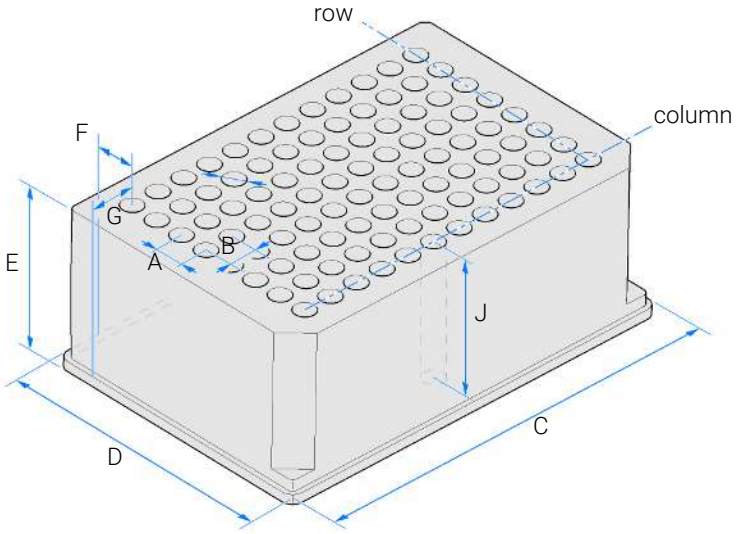


Figure 26: Well Plate Dimensions (straight)

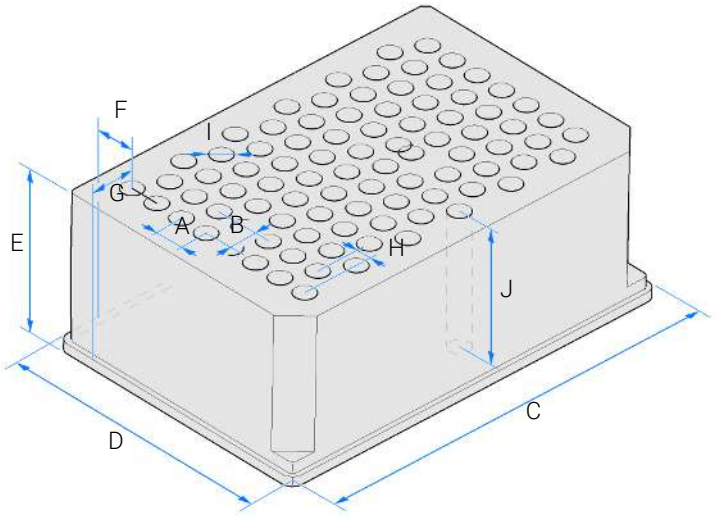


Figure 27: Well Plate Dimensions (staggered)

Table 29: 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)	

Location	Description	Definition	Limits
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.

Preparing the Optional Sample Thermostat

The following section describes how to operate 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.

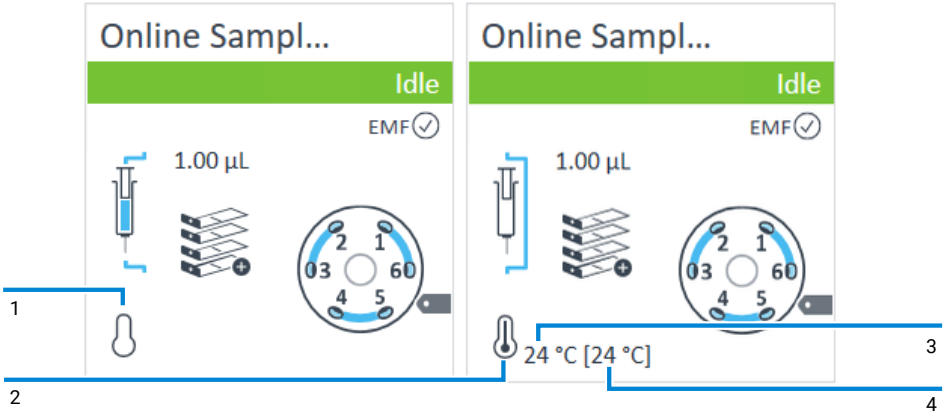


Figure 28: Online Sample Manager user interface

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.

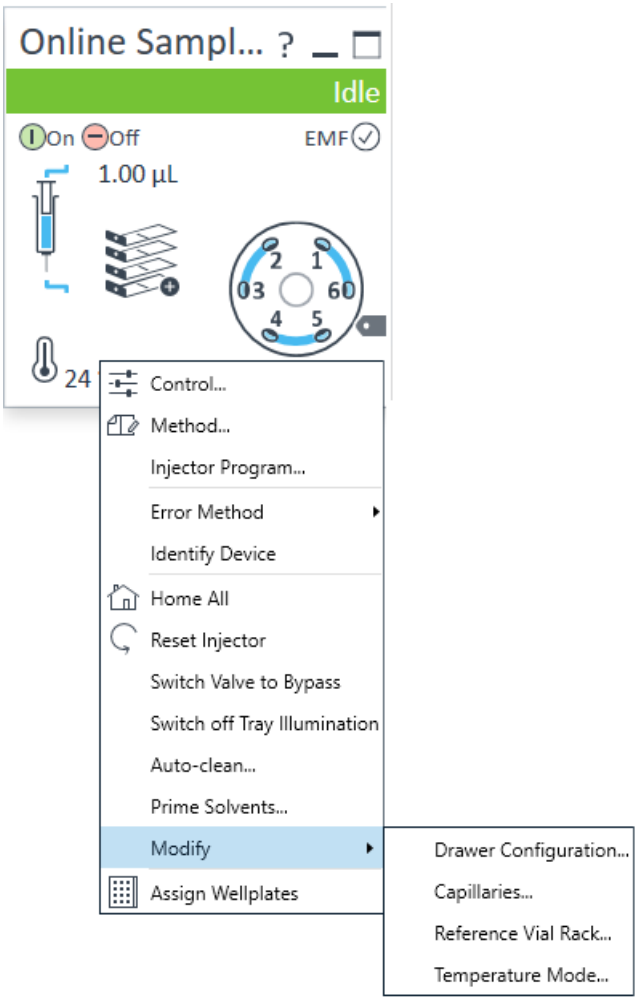


Figure 29: Online Sample Manager control interface

Control

With the Sample Thermostat installed, the Control dialog box of the hosting sampler will include the following thermostat-specific control options:

- At Power On:
  - Turn On Thermostat: The thermostat turns on automatically upon powering on the sampler.
- Thermostat:
  - On: The thermostat turns on and the system starts to regulate the temperature inside the sample space towards the setpoint.
  - Off: The 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.

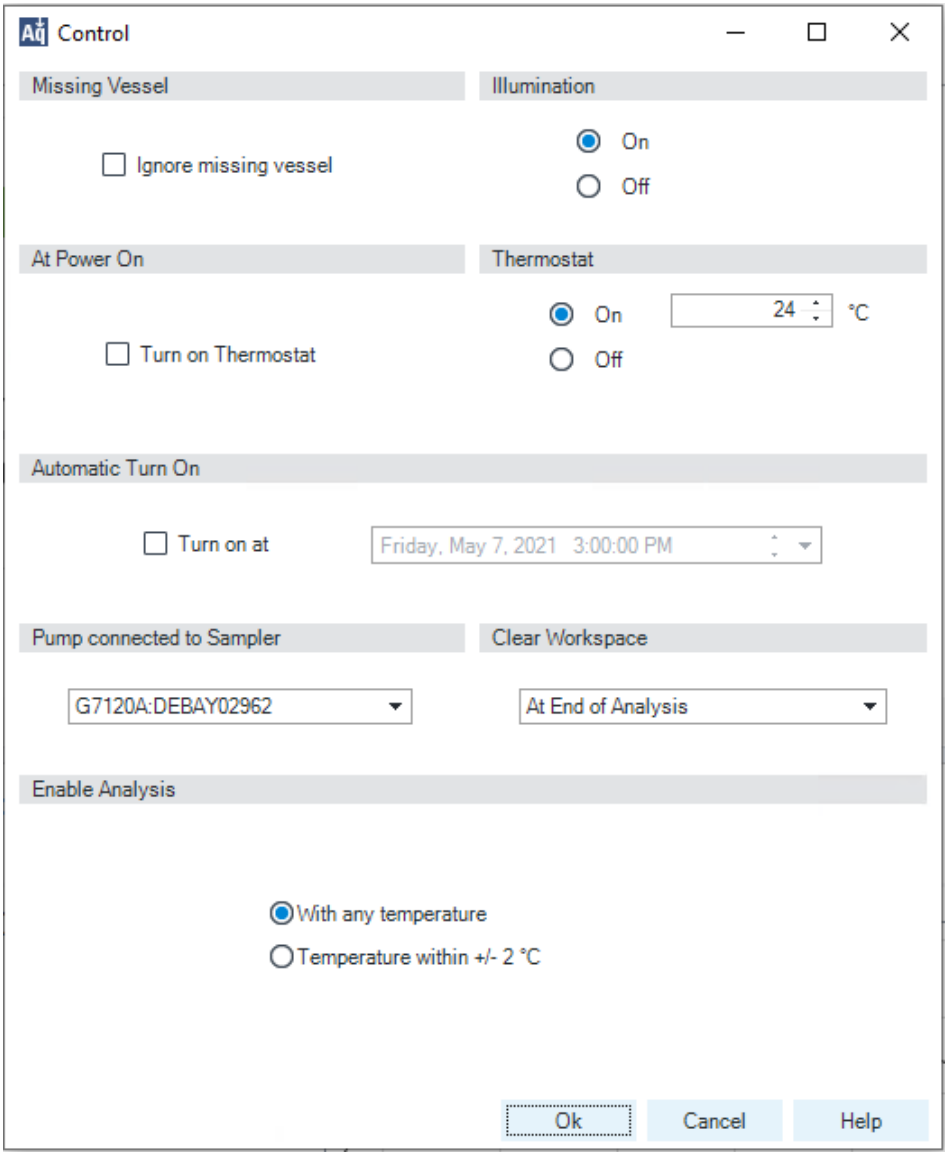


Figure 30: Control interface

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.

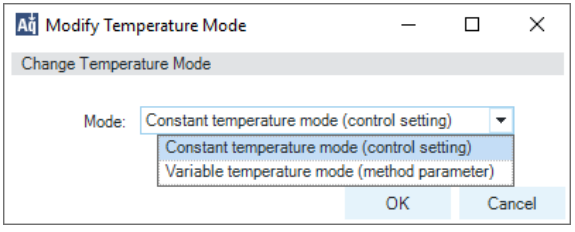


Figure 31: Modify Temperature Mode dialog box

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 Monitoring

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 32: 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.

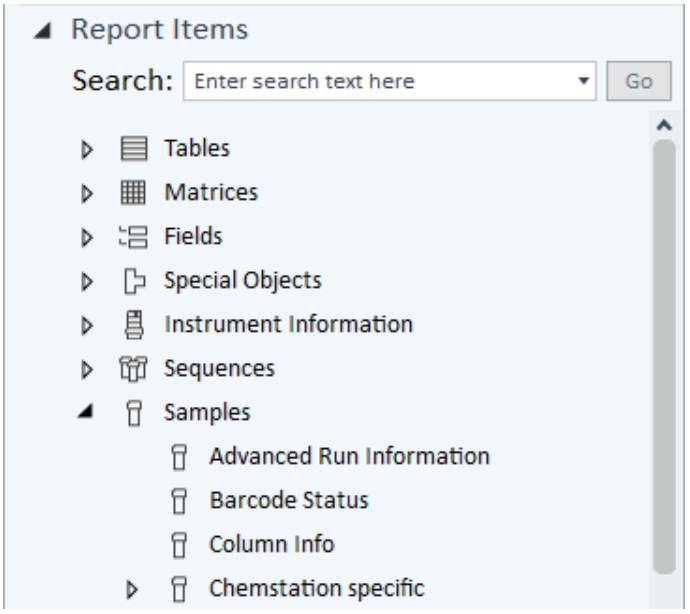


Figure 33: Finding the Advanced Run Information setting in OpenLab CDS 2.x

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 34: 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 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 thermostat at temperatures below ambient results in condensate formation. This condensed water is collected in the base plate of the 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 317).

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 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 Thermostat was designed to operate without the risk of icing. In an unlikely event of ice formation, turn off the 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 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 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

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.**

CAUTION Unsecured transportation

Mechanical damage

- Secure the transport assembly before transporting the sampler.

NOTE Transporting the sampler with a Sample Thermostat installed is only allowed for short distances. For longer distances, you must separate the units and send them independently.

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.

NOTE

There are magnets in the front area of the multisampler, see Magnets on page 526.

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.

6 Optimizing Performance

This chapter provides information on how to optimize the module.

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.

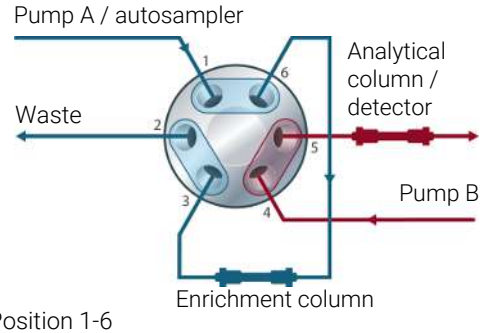
The ADVR function is unlikely to be suitable for applications involving compounds that are known to cause carryover problems. The best way to reduce the delay volume is to inject the sample in Feed Injection mode. To get the best results, it is also recommended to order the Low Dispersion Heat Exchanger and the micro flow cell for UV.

How to Achieve Higher Injection Volumes

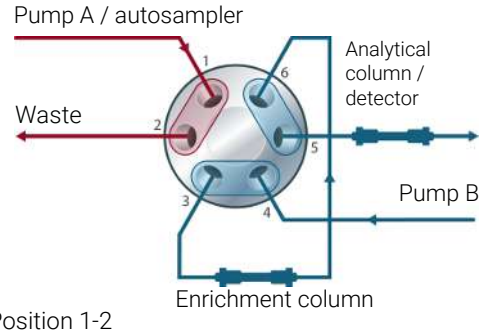
Whenever scaling a method down from a larger to a smaller column it is important that the method translation allows for reducing the injection volume in proportion to the volume of the column to maintain the performance of the method. This keeps the volume of the injection at the same percentage volume 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 249. 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 III Prime Online LC System was designed for 800 bar and the 1290 Infinity III 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 III 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.

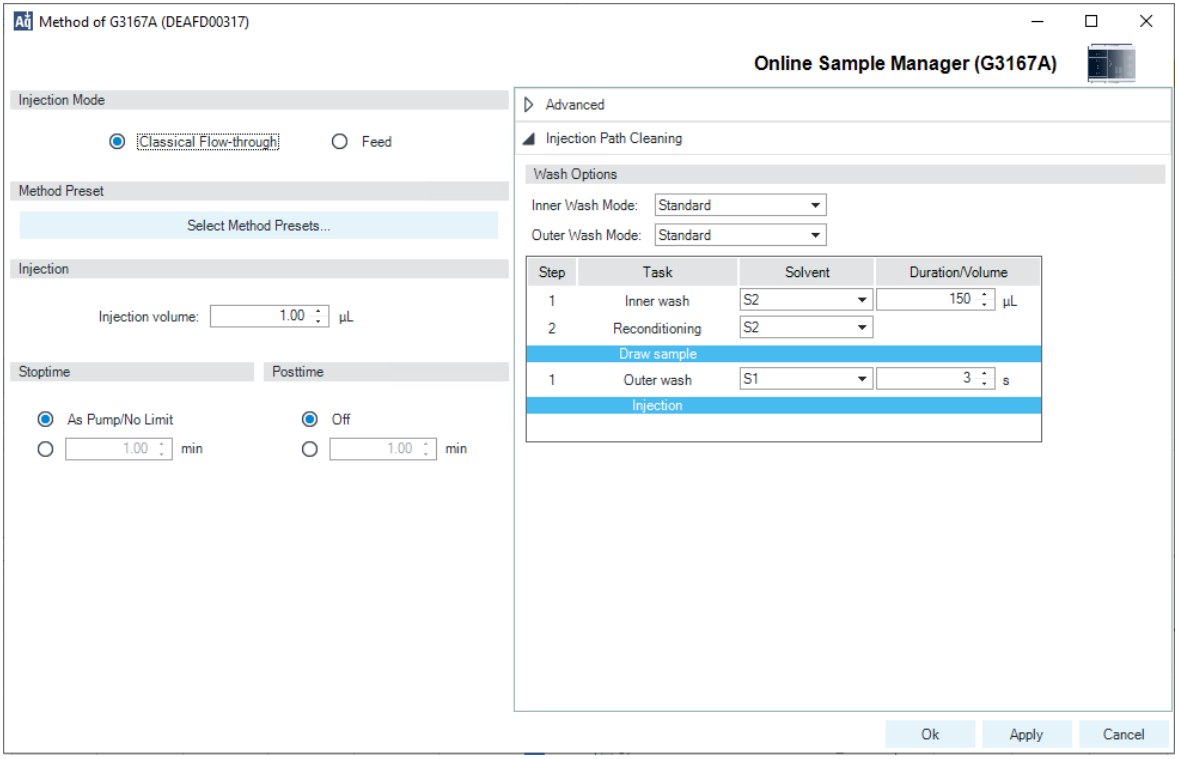


Figure 35: Definition of wash options (Flow-through Injection)

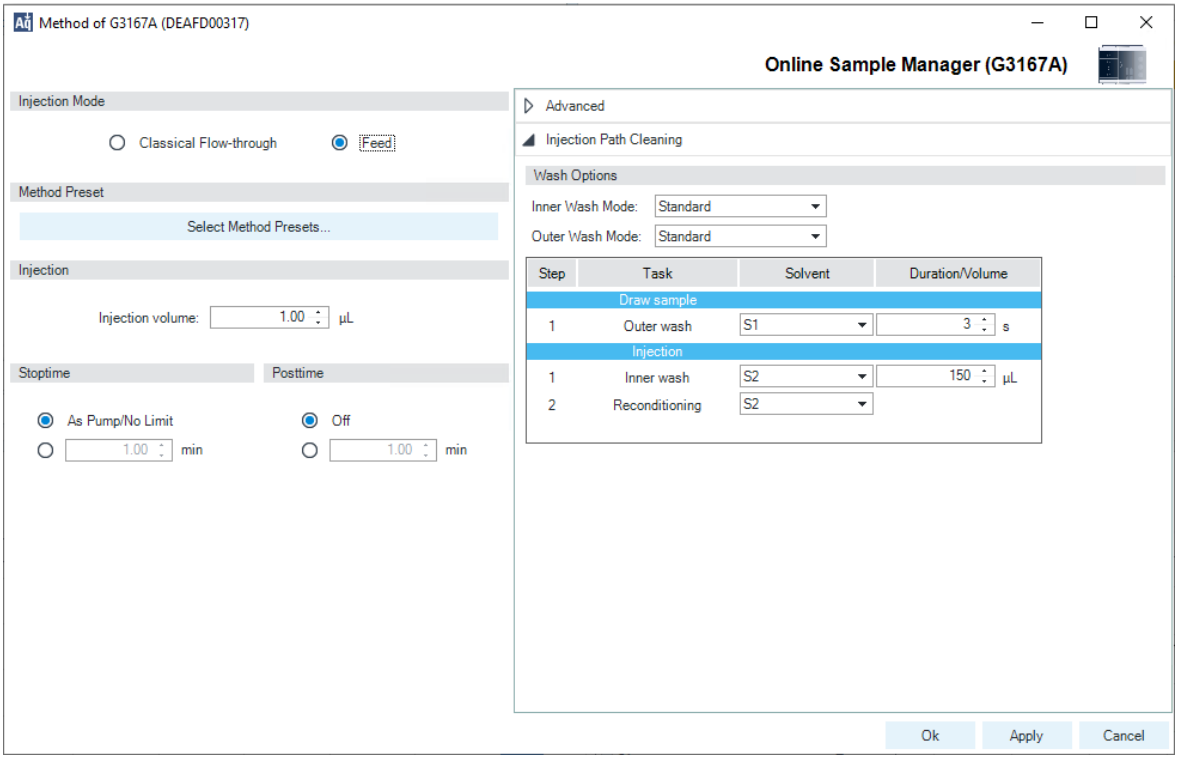


Figure 36: Definition of wash option (Feed Injection)

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 Diagnostics and Troubleshooting

This chapter gives an overview of the maintenance, troubleshooting, and diagnostic features available.

Diagnostic Features

This section gives an overview of the diagnostic features available.

User Interfaces

InfinityLab Assist

InfinityLab Assist provides you with assisted troubleshooting and maintenance at your instrument.

If the system in use supports the InfinityLab Assist, follow the instructions provided. Else, the preferred solution is to use Agilent Lab Advisor Software.

- 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 281.
- 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.

Troubleshooting With HPLC Advisor

Baseline, Peak Shape, Pressure, Retention related issues, can be solved using the HPLC Advisor App. For more information, see Troubleshooting Reversed-Phase Chromatographic Techniques With HPLC Advisor.

If using an InfinityLab Assist, navigate to **Health** > **Troubleshooting** to help solve baseline, peak shape, pressure, and retention related issues.

Troubleshooting Tools

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 30: Interfaces and available test functions

Interface	Comment	Available Function
Agilent Lab Advisor	All tests are available	• System Pressure test • Maintenance • Drawer Detection/Auto Referencing • Sample Cooler/Thermostat Function Test
	Adding of pressure to chromatographic signals possible	• 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.

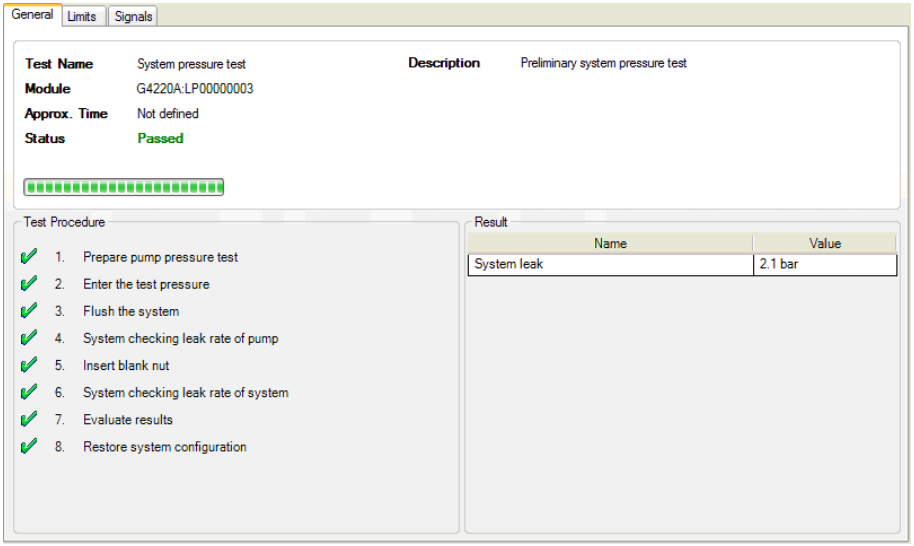
When

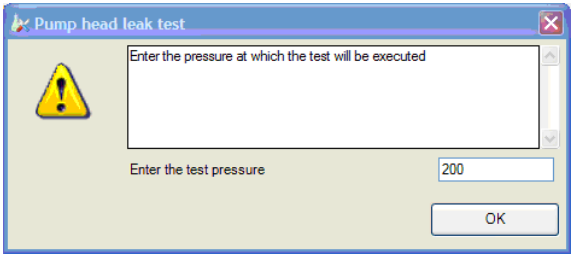
- In case of a suspected leak
- To verify successful execution of maintenance

Parts required

Qty.	p/n	Description
1	5067-6127	Blank nut SL For 1260 and 1290 Infinity II systems.
		OR
1	5043-0277	PEEK blank nut for bio-compatible devices 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

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.

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.

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.

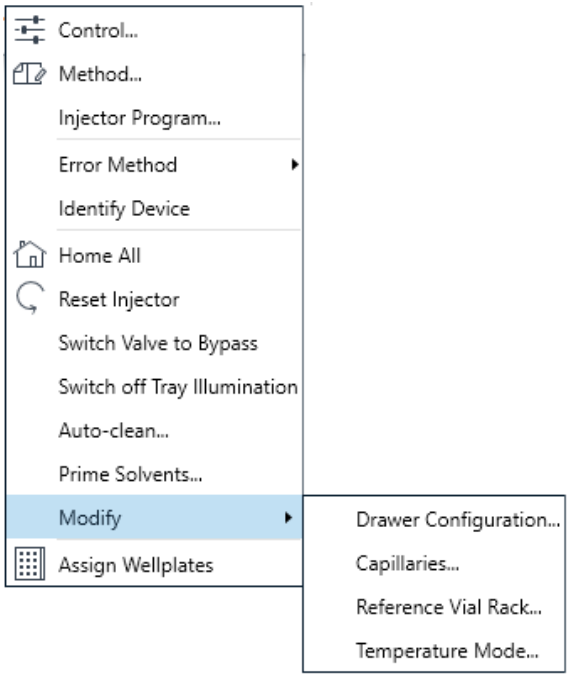
Prerequesites

- 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

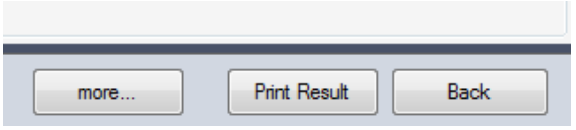
- drawer configuration
- capillaries
- Reference Vial Bar



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

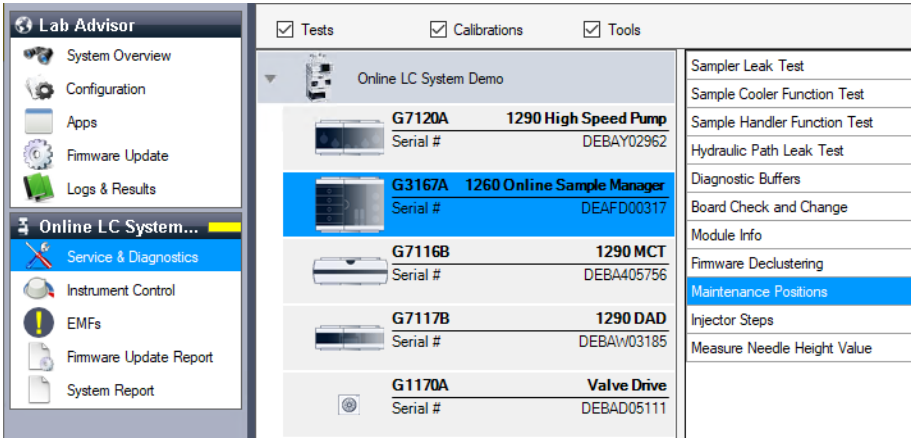
Some maintenance procedures require the needle assembly, the sample loop flex, the metering device and the needle seat to be moved to specific positions to enable easy access to components. The maintenance functions move these assemblies into the appropriate maintenance position. In the Agilent Lab Advisor Software the maintenance positions can be selected in the Service & Diagnostics view.

Run the Maintenance Positions

When

- Performing maintenance on the module.

1 Navigate to Agilent Lab Advisor > **Service & Diagnostics** and select **Maintenance Positions** (for further information, see Online-Help of user interface).



The dialog **Maintenance Positions** opens, in which you can now select the corresponding tasks:

- Change Needle Assembly on page 269
- Change Sample Loop Capillary on page 270
- Arm Position on page 271
- Change Metering Device on page 271

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 349 .

NOTE During normal operation the needle assembly has to be unlocked.

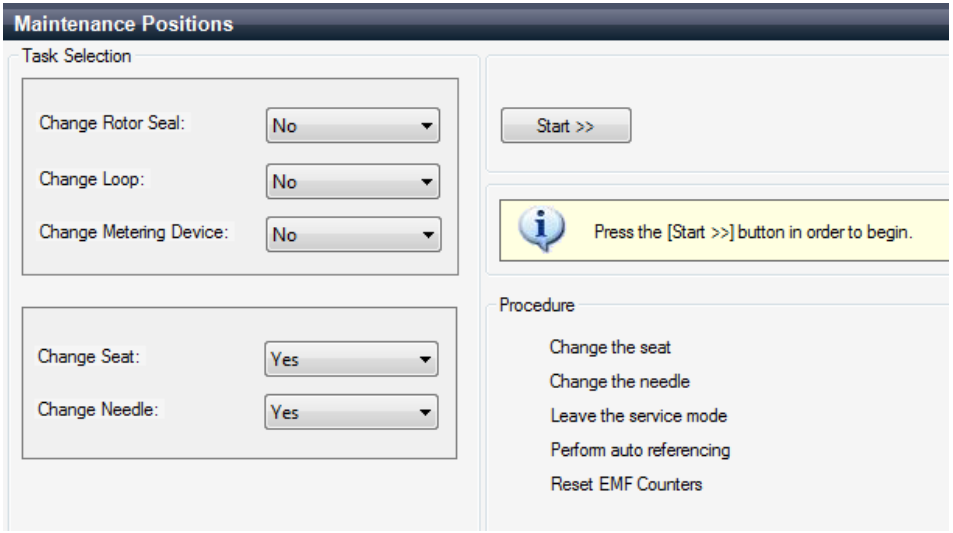


Figure 37: Change Needle Asssembly

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.

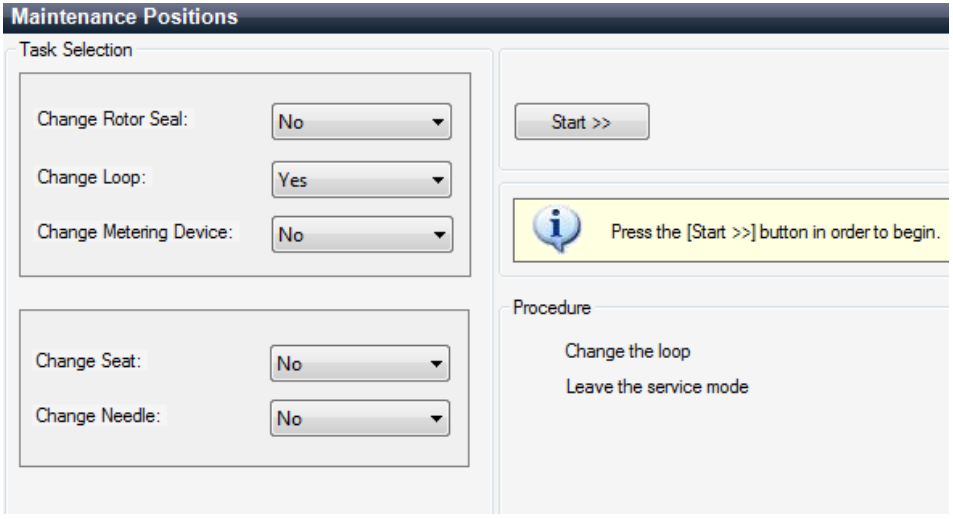


Figure 38: Change Sample Loop Capillary

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 39: 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.

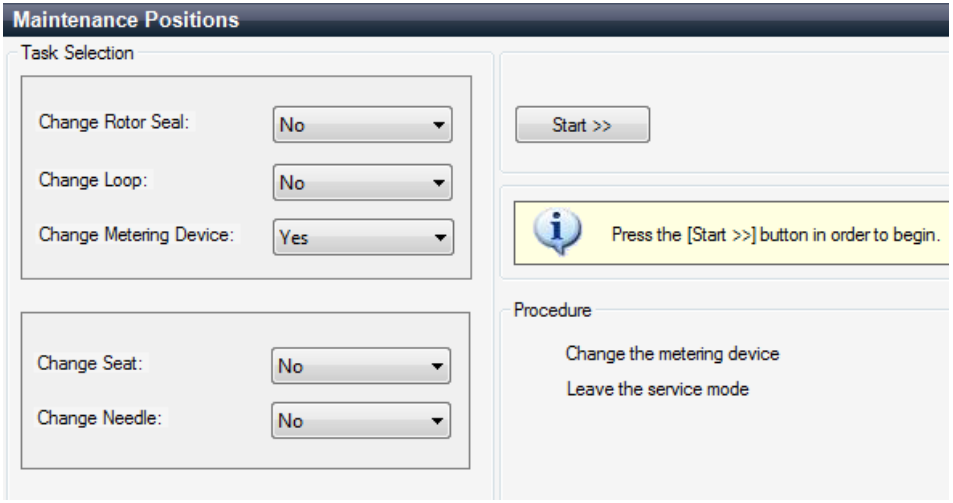
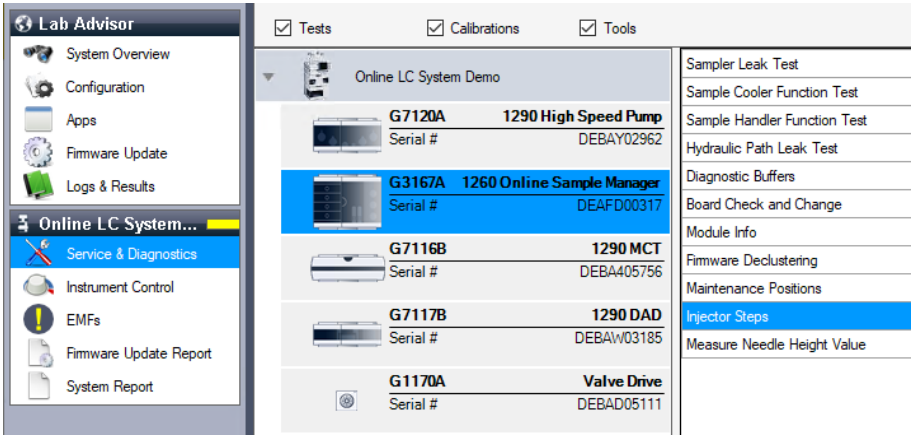


Figure 40: Change Metering Device

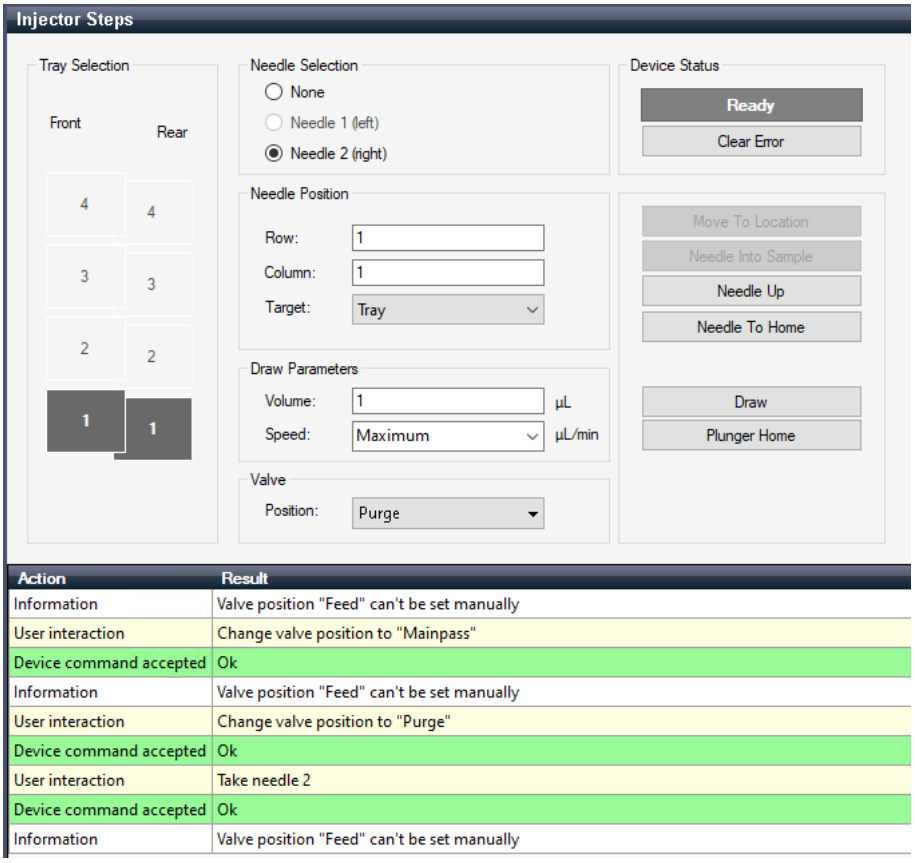
Injector Steps

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).



Action	Result
Information	Valve position "Feed" can't be set manually
User interaction	Change valve position to "Mainpass"
Device command accepted	Ok
Information	Valve position "Feed" can't be set manually
User interaction	Change valve position to "Purge"
Device command accepted	Ok
User interaction	Take needle 2
Device command accepted	Ok
Information	Valve position "Feed" can't be set manually

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 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 (ΔT < 0.5 °C), the compressor turns on and the temperature inside the 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 (ΔT < 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.

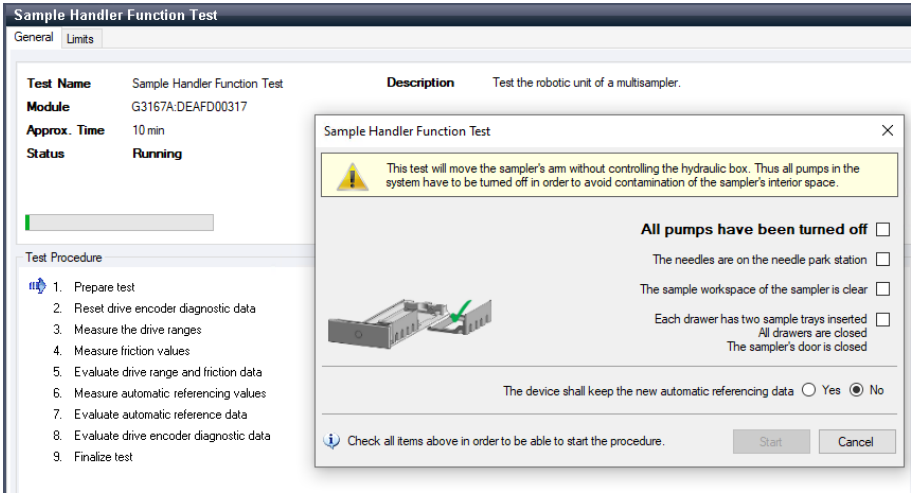
NOTE Lab Advisor 2.19 or higher is needed to execute the Sample Cooler Function Test for the G7167-60201 Sample Thermostat.

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

Qty.	p/n	Description
1	5067-6127	Blank nut SL
1	5043-0277	PEEK blank nut for bio-compatible devices
1	8710-0510	Open-end wrench 1/4-5/16 inch

Prerequesites

- 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.

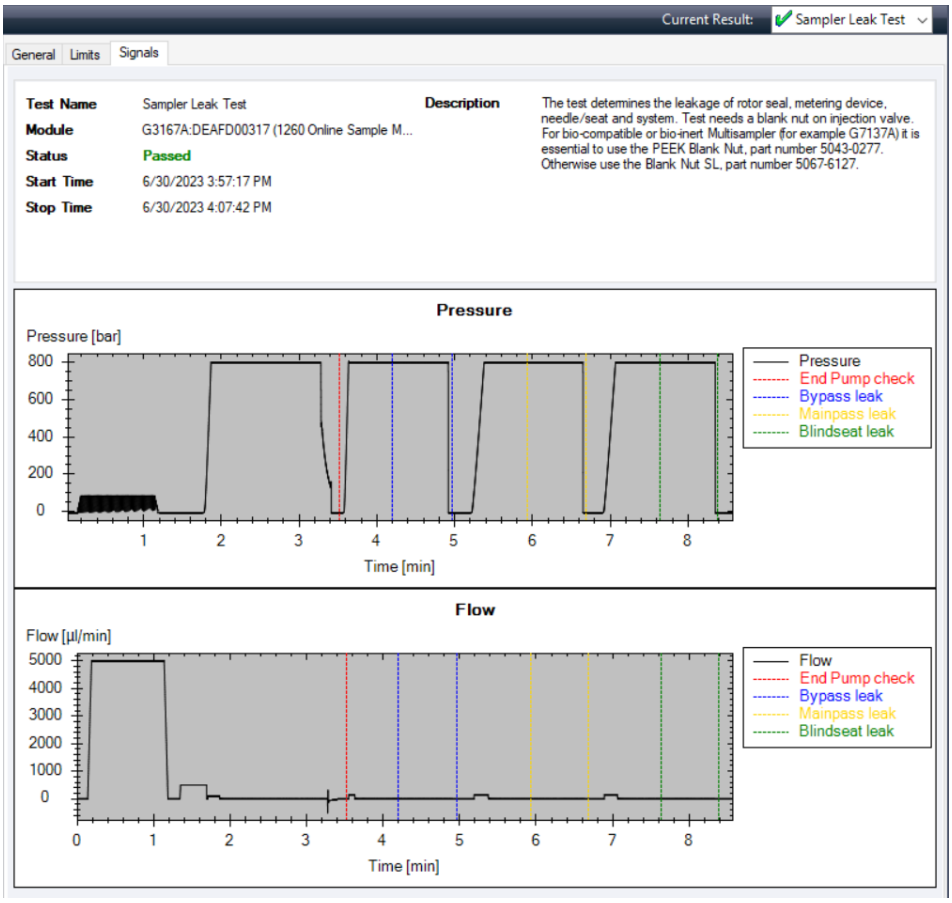


Figure 41: Sampler Leak Test passed

Hydraulic Path Leak Test

The 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

Prerequesites

- 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 Hydraulic Path Leak Test with the Agilent LabAdvisor and follow the provided instructions.

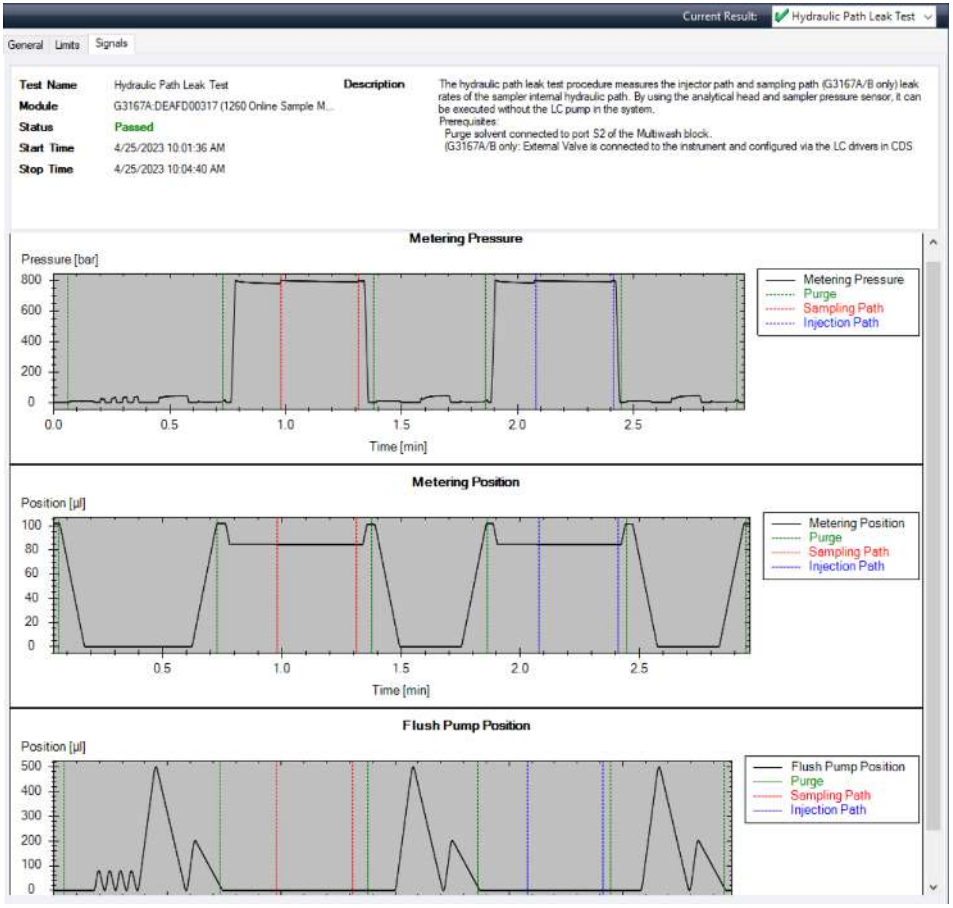


Figure 42: Hydraulic Path Leak Test passed

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 makes it possible 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.

8 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 that 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).

If using the InfinityLab Assist, instrument errors will generate a notification. To view the probable causes and recommended actions for this error, click on Help button displayed on the notification.

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: 62

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: 63

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 external vacuum degasser module (if installed) 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: 70

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: 71

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

Error ID: 64

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.*
5	Leaking peristaltic pump.	• Exchange the peristaltic pump.

Leak Sensor Open

Error ID: 83

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 on/off 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	On/Off switch assembly defective.	• Please contact your Agilent service representative.

Leak Sensor Short

Error ID: 82

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	On/Off switch assembly defective.	• Please contact your Agilent service representative.
4	Cable or contact problem.	• Please contact your Agilent service representative.

Compensation Sensor Open

Error ID: 81

The ambient-compensation sensor (NTC) on the on/off switch board in the module has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the on/off 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 on/off switch board and the mainboard.	• Please contact your Agilent service representative.
2	Defective on/off switch assembly.	• Please contact your Agilent service representative.

Compensation Sensor Short

Error ID: 80

The ambient-compensation sensor (NTC) on the on/off switch board in the module has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the on/off 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	Defective on/off switch assembly.	• Please contact your Agilent service representative.
2	Loose connection between the on/off switch board and the mainboard.	• Please contact your Agilent service representative.

Fan Failed

Error ID: 68

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 → Condenser fan defect
- Error ID: 68,2 → Evaporator 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.
7	Improperly positioned cables or wires obstructing fan blades.	• Please contact your Agilent service representative.

ERI Messages

Error ID: 11120, 11121

The ERI (Enhanced Remote Interface) provides two error events related to over current situations on the +5 V and +24 V lines.

Probable cause		Suggested actions
1	The load on the ERI is too high.	• Reduce the load.

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.	• Check if the sample handler can move freely. • 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	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 communication 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.	• Check if the sample handler can move freely. • 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.
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: 25049, 25051

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 (the 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 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.

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 autoreferencing (the 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/ communication board.	• Please contact your Agilent service representative.

Cleaning Procedure Failed

Error ID: 25400

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 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.

- Error ID: 30751,0 → Thermostat sensor defect
- Error ID: 30751,1 → Thermostat sensor defect - evaporator temperature sensor defect
- Error ID: 30751,2 → Thermostat sensor defect - condenser temperature sensor defect
- Error ID: 30751,3 → Thermostat sensor defect - external temperature sensor defect
- Error ID: 30751,4 → Thermostat sensor defect - evaporator superheat sensor defect

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.

This error event indicates that either the condenser fan or the evaporator fan is not working properly.

- Error ID: 30771,0 → Thermostat fan defect
- Error ID: 30771,1 → Thermostat fan defect – evaporator fan defect
- Error ID: 30771,2 → Thermostat fan defect – condenser fan defect

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. • Please 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. • Please 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. • Please 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. • Please 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.

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.

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.

Pressure Cluster Partner Missing

Error ID: 2523

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

Error ID: 4526

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.

9 Maintenance

This chapter provides general information on maintenance of the module.

Introduction to Maintenance

Figure 43 on page 339 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.

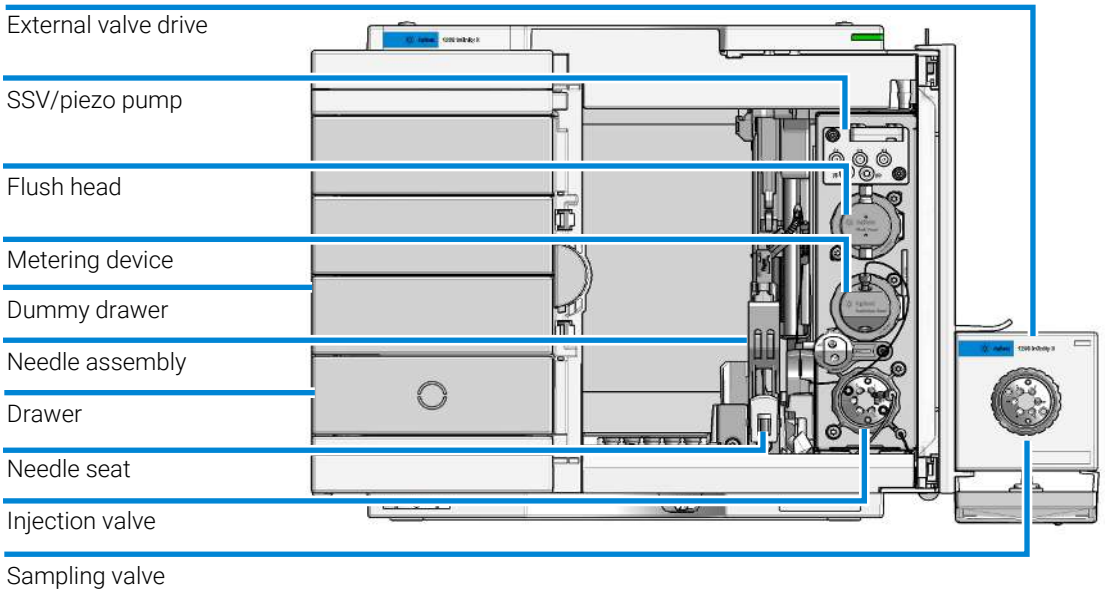


Figure 43: Main user accessible assemblies

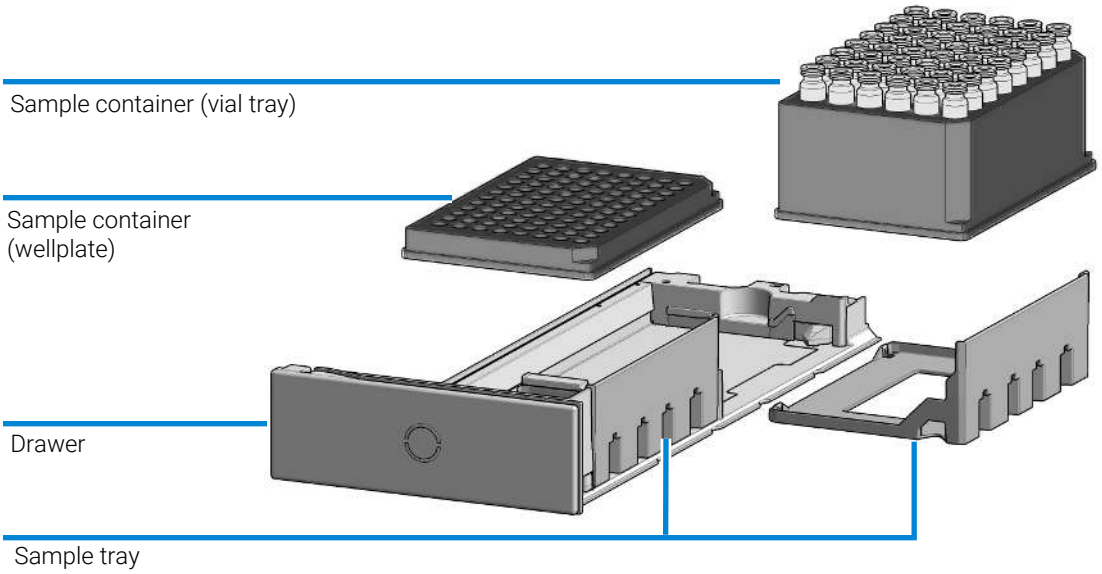


Figure 44: Overview of drawer, sample tray and sample container

Safety Information Related to Maintenance

WARNING Fire and damage to the module

Wrong fuses

- Make sure that only fuses with the required rated current and of the specified type (super-fast, fast, time delay etc) are used for replacement.
- The use of repaired fuses and the short-circuiting of fuse-holders must be avoided.

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 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.

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 31: 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

Cleaning 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

Qty.	p/n	Description
1		Flathead screwdriver

Parts required (Infinity III)

Qty.	p/n	Description
1	5360-0024	Door Multisampler

Parts required (Infinity II)

Qty.	p/n	Description
1	5067-5415	Door Assy
		OR
1	G7167-68718	Light Protection Kit

Prerequesites

- 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 526

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

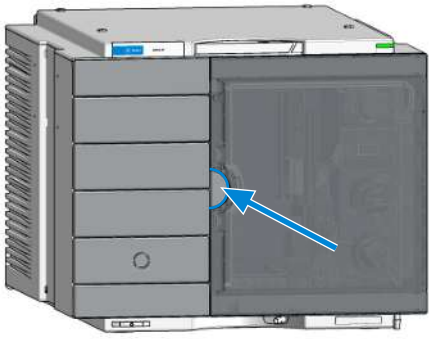
Magnets could affect the functioning of pacemakers and implanted heart defibrillators.

A pacemaker could switch into test mode and cause illness.

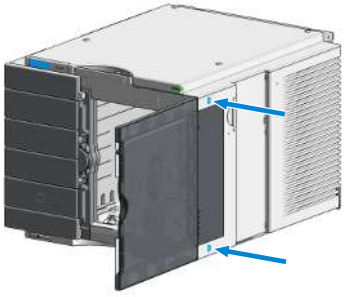
A heart defibrillator may stop working.

— Bearers of heart pacemakers or implanted defibrillators must stay off at least 55 mm from the magnets.

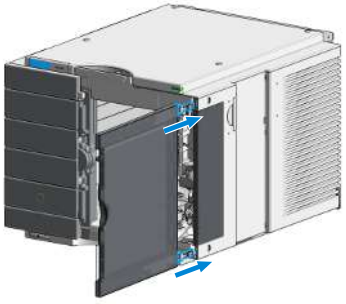
1 Open the front door.



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 biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

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

Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch

Parts required

Qty.	p/n	Description
1	G4267-87201	Needle Assembly (for G3167A)
		OR
1	G7137-87201	Needle Bio-compatible (for G3167B)

Prerequesites

- 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.

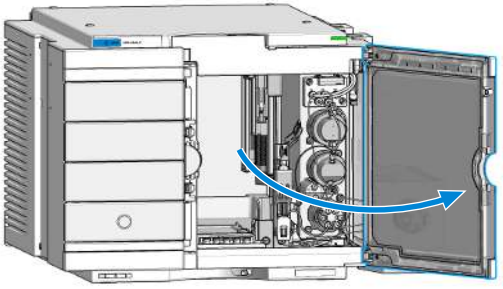
- **When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.**

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.

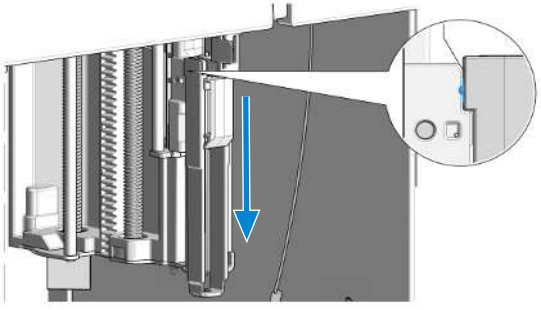
OR

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 module, the needle assembly has to be unlocked.

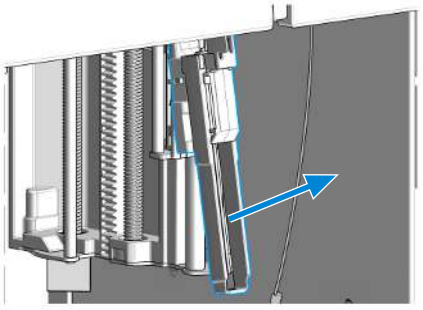
WARNING

Sharp needle

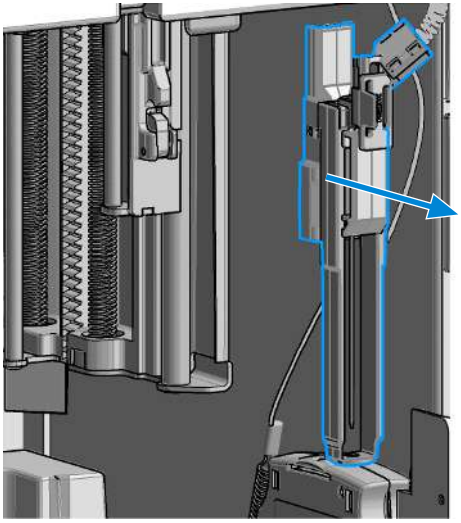
Uncovered needles may cause injuries

— **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.



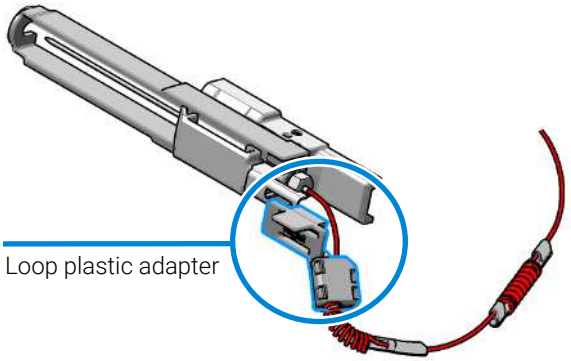
CAUTION

Damage of the loop

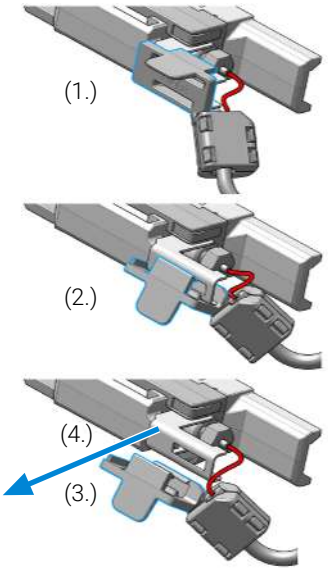
The loop shape may be damaged if the loop is stretched or bent too far.

- 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.



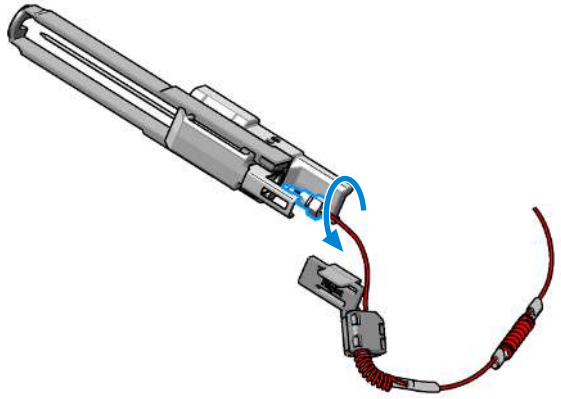
7 Remove the loop plastic adapter.



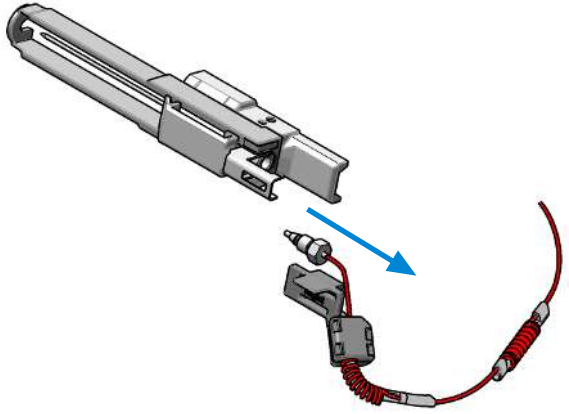
NOTE Do not open the rear plastic clamp.

NOTE If the plastic adapter is damaged the sample loop has to be replaced.

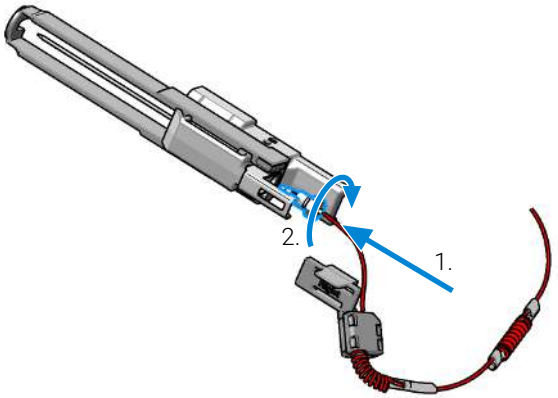
8 Use a 1/4 inch wrench to loosen the fitting of the loop capillary.



9 Remove the needle assembly.



10 Install the loop capillary on top of the needle cartridge (1.) and tighten the fitting hand tight (2.).



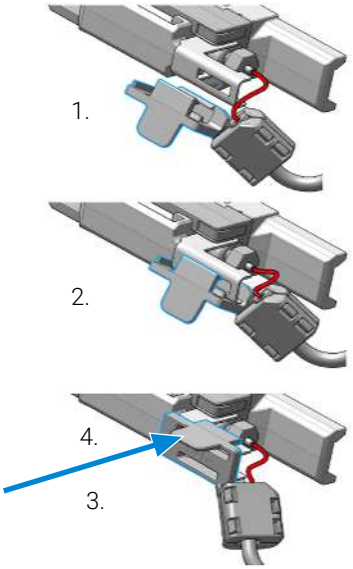
NOTE If the sample loop is changed, we recommend changing the needle as well.

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.

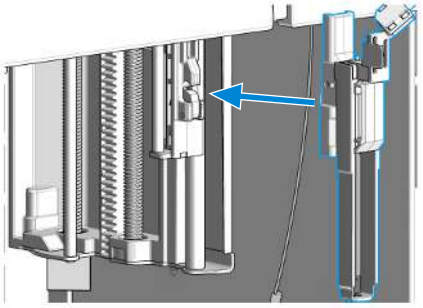


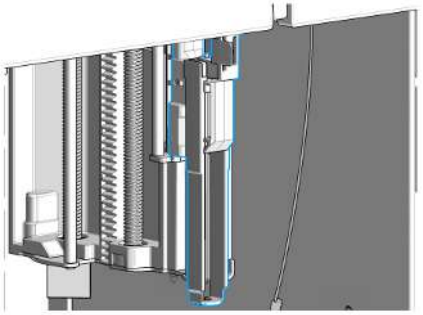
NOTE Verify the sample loop info on the plastic adapter. A left or a right sample loop must be installed in the correct slot of the needle parkstation. For single needle, the default position is on the right.

NOTE If the plastic adapter is damaged the sample loop has to be replaced.

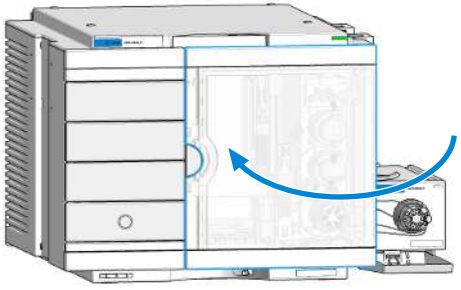
13 Pinch and reinsert the needle assembly and the connected loop capillary into the z-arm coupler.

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.



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 biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

When

- When seat is visibly damaged, blocked or leaks.

Tools required

Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch

Parts required

Qty.	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 Bio Capillary ST 0.17 x 230 SL/SL (for G3167B)

Prerequesites

- 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.

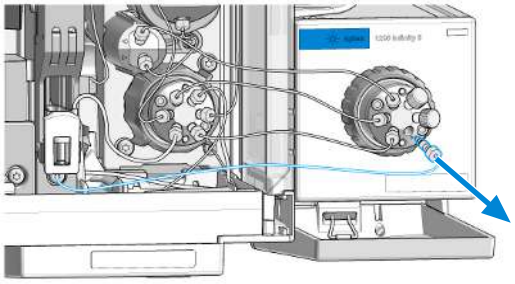
- **Do not open the safety lock of the needle assembly**
- **Be careful working at the z-robot.**
- **Wear safety goggles, when removing the needle assembly.**

1 In the Local Controller start the maintenance mode and select **Change needle/seat** function.

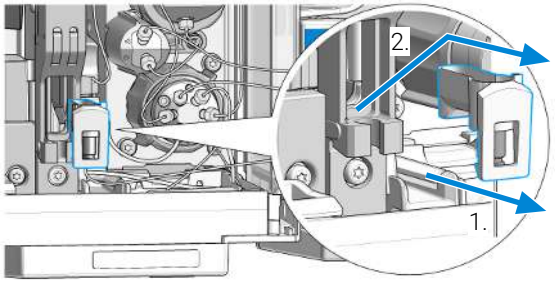
OR

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.



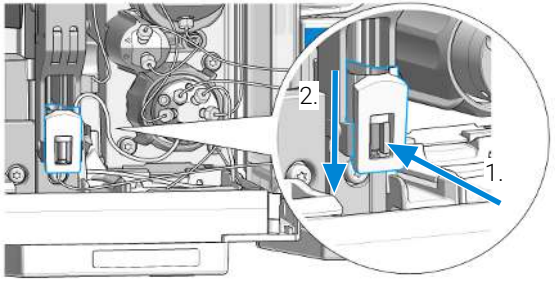
3 Slightly pull (1.) the front clip which holds the needle seat in position. Then carefully lift up (2.) the complete leak tube needle assembly from the holder.



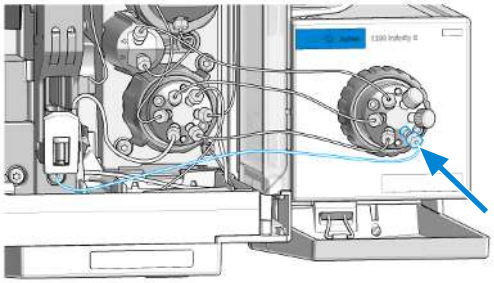
4 Insert the new Needle seat (1.). Press it firmly in position (2.).

NOTE

Verify that the needle seat clip is locked in the needle park station.



5 Reconnect the seat capillary to the external sampling valve.



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 biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

When

- Add new injection valve or replace defective injection valve.

Tools required

Qty.	p/n	Description
1		Wrench 9/64

Parts required

Qty.	p/n	Description
1	5067-6680	3-position/6-port FI valve 800 bar (for G3167A)
		OR
1	5320-0003	3-position/6-port bio valve 1300 bar (for G3167B)

Prerequesites

- Switch off the power of the Online Sample Manager.
- Remove the front door.

WARNING

Toxic, flammable and hazardous solvents, samples and reagents

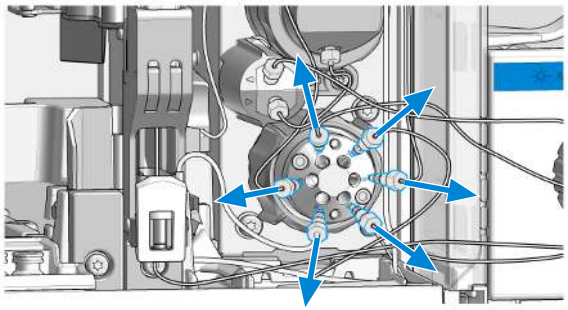
The handling of solvents, samples and reagents can hold health and safety risks.

- **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.**

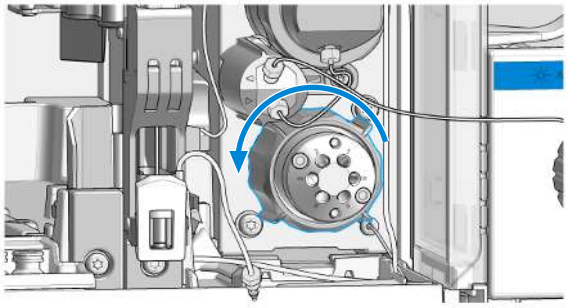
1 Remove all capillaries from the injection valve with a 1/4 inch wrench.

NOTE

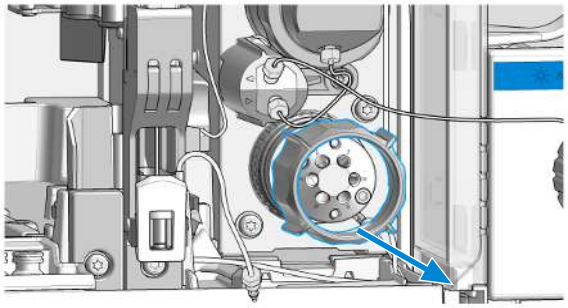
Remember the correct plumbing.
Check the drawing on the side cover of the hydraulic box for correct plumbing.



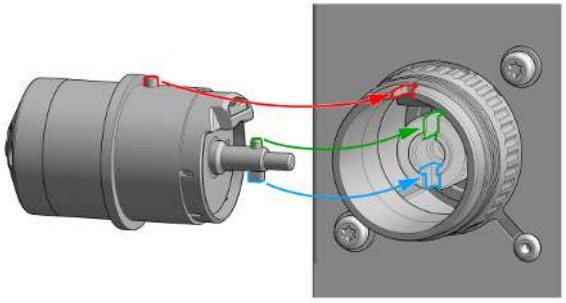
2 Turn the spanner nut counter clockwise until the injection valve head detaches from the hydraulic box (Do not use wrenches on the spanner nut).



3 Remove the spanner nut from the injection valve head.

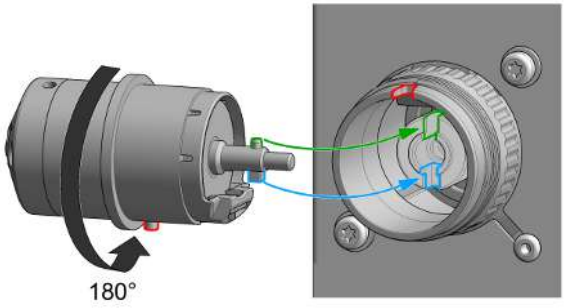


4 Take the replacement injection valve head and insert it into the open actuator slot of the hydraulic box. Rotate until the unions at the base of the replacement injection valve head and the valve actuator engage.



OR

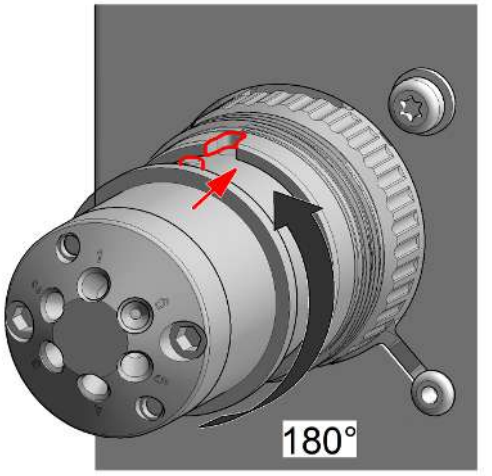
If the outside pin does not fit into the outside groove, you have to turn the valve head until you feel that the two pins snap into the grooves. Now you should feel additional resistance from the valve drive while continue turning the valve head until the pin fits into the groove.

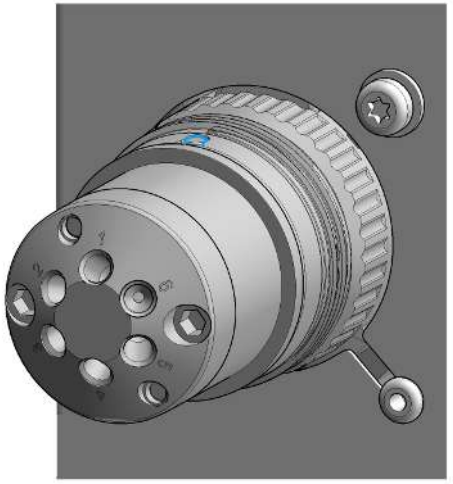


NOTE

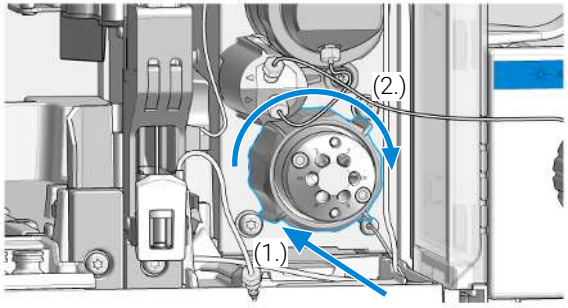
Check the orientation of the rear side.
Verify the correct position of the Valve TAG.

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.

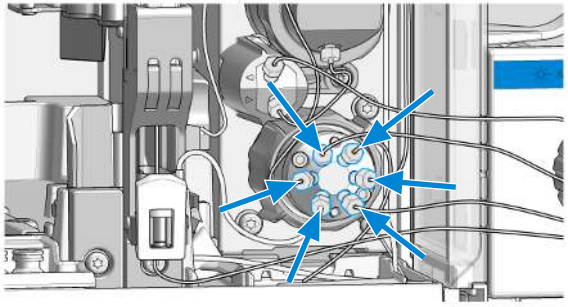




6 Replace the Spanner Nut (1.) and tighten clockwise (2.) (Hand tighten only, do not use wrenches on the Spanner Nut).



7 Reconnect all capillaries to the proper injection valve ports with a 1/4 inch wrench.



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 biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

When

- Add new External Sampling Valve or replace defective External Sampling Valve.

Tools required

Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch

Parts required

Qty.	p/n	Description
1	5067-6680	3-position/6-port FI valve 800 bar (for G3167AA)
		OR
1	5320-0003	3-position/6-port bio valve 1300 bar (for G3167BA)

Prerequesites

- 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 G1316-67001 (Transportation Lock Kit)) can be used instead of a functional valve. Do not touch parts inside the actuator.

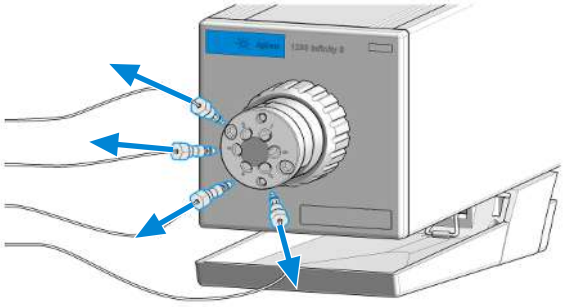
NOTE The tag reader reads the valve head properties from the valve head RFID tag during initialization of the module. If the valve head is replaced while the module is on, the valve properties will not be updated.
If the instrument does not know the properties of the installed valve, the selection of 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.

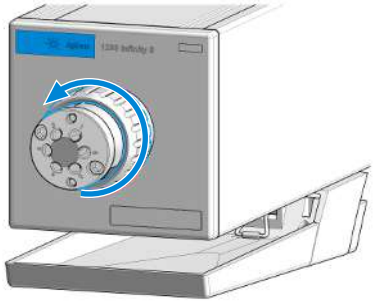
NOTE When there is any unusual behavior, the rotor seal will need to be cleaned, or replaced. You can clean this seal by wiping with a tissue, and then sonicating in isopropanol.

1 Remove all capillaries from the external sampling valve with a 1/4 inch wrench.

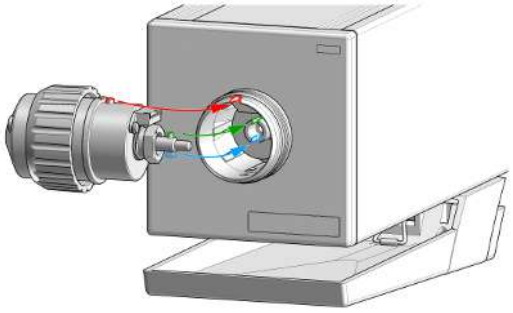
NOTE Remember the correct plumbing.



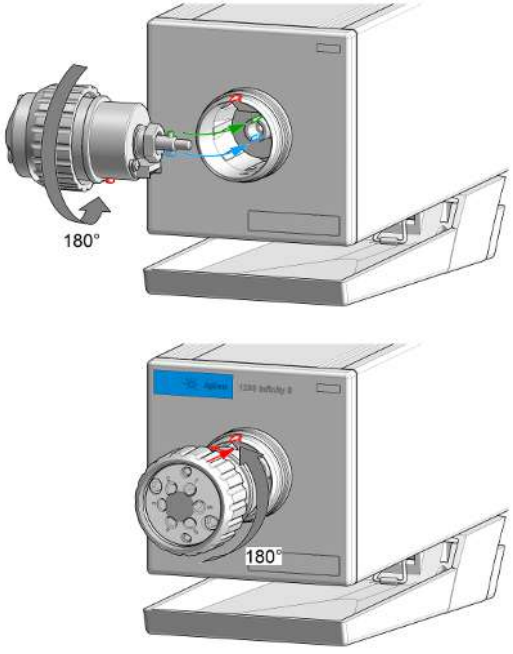
2 Unscrew the valve head.



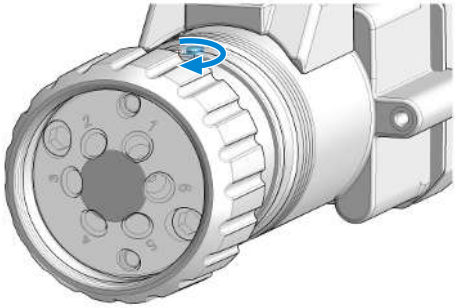
3 Insert the valve head into the valve shaft.



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.

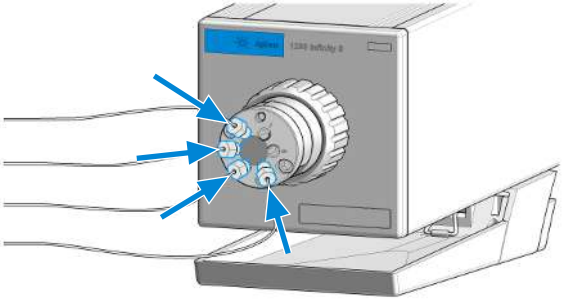


4 When the outer pin is locked into the groove, manually screw the nut onto the valve head.



NOTE Fasten the nut manually. Do not use any tools.

5 Reconnect all capillaries to the proper reactor valve ports with a 1/4 inch wrench.



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

BIO

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

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

Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch
1	8710-2394	Hex key 9/64 inch 15 cm long T-handle
1		Cleaning tissue and appropriate solvent like isopropanol or methanol

Parts required

Qty.	p/n	Description
1	5068-0279	Rotor Seal, 3-position/6-port FI Valve (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)
		OR
1	5320-0004	Stator, Bio (for G3167B), replacement only necessary in case of wear (optional)

Prerequesites

- 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.

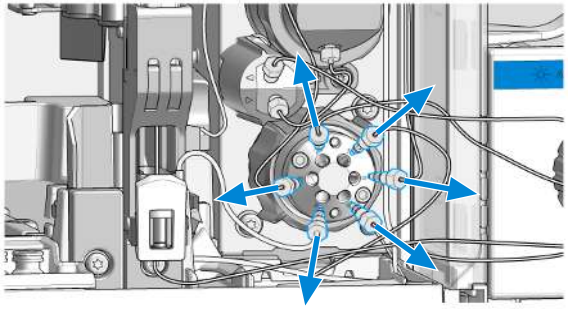
OR

In the Local Controller start the maintenance mode and select Change Rotor Seal function.

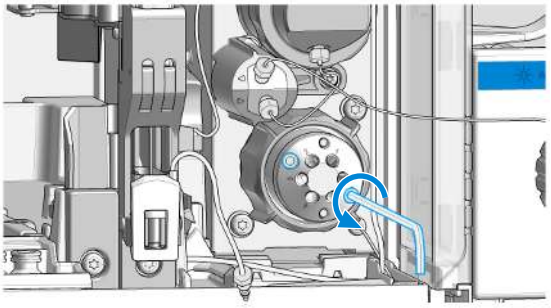
2 Remove all capillaries from the injection valve with a 1/4 inch wrench.

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

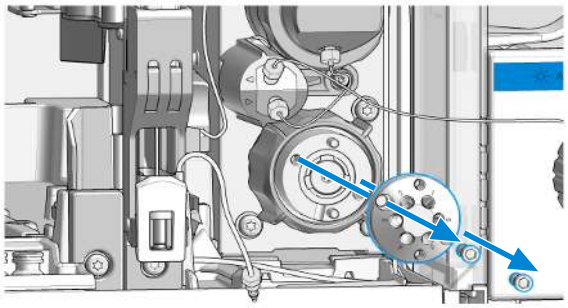
Damage to the stator head

The polished sealing surface of the stator head contains six ports that access handling can easily damage.

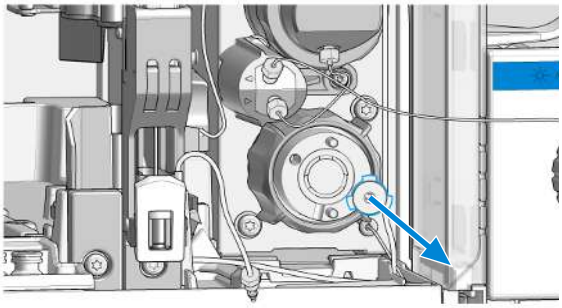
— Avoid touching the polished surface of the stator head.

— 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

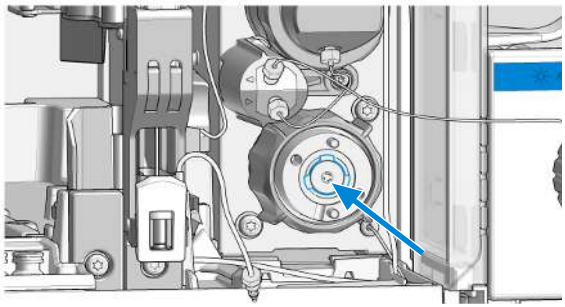
Remove the rotor seal with a small tool, gently pry the rotor seal away from the drive.
Examine the rotor sealing surface for scratches and nicks.
If scratches are visible the rotor seal must be replaced.
If no scratches are visible clean all the parts with an appropriate solvent, taking care that no surfaces get scratched.

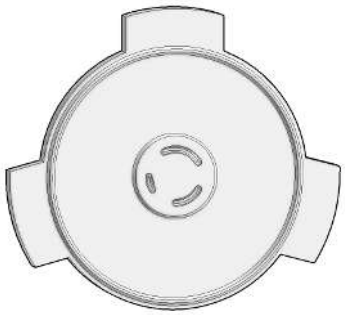
CAUTION

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.

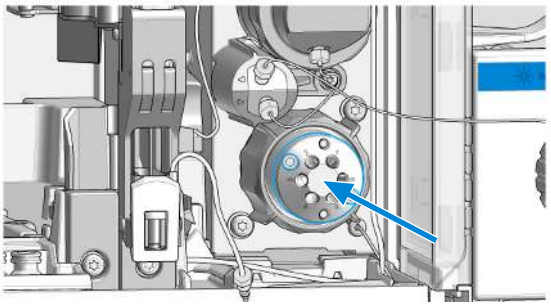




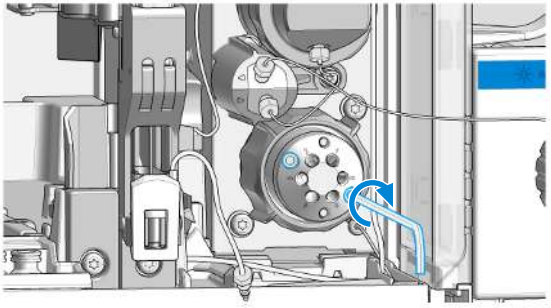
NOTE

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.

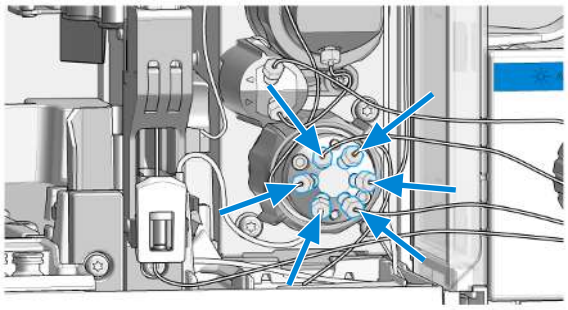


8 Using a 9/64 in. L-Hex wrench, tighten each screw gently until you feel resistance (approximately fingertight). Tighten each screw by 1/8 turn, and then tighten each screw again, until the stator is secured to the driver.



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.



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 biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

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

Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch
1	8710-2394	Hex key 9/64 inch 15 cm long T-handle
1		Cleaning tissue and appropriate solvent like isopropanol or methanol

Parts required

Qty.	p/n	Description
1	5068-0279	Rotor Seal, 3-position/6-port FI Valve (for G3167AA)
		OR
1	5320-0005	Rotor Seal, 3-position/6-port FI Valve, MP35N, 1300 bar (for G3167BA)
1	5068-0280	Stator (for G3167AA), replacement only necessary in case of wear (optional)
		OR
1	5320-0004	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.

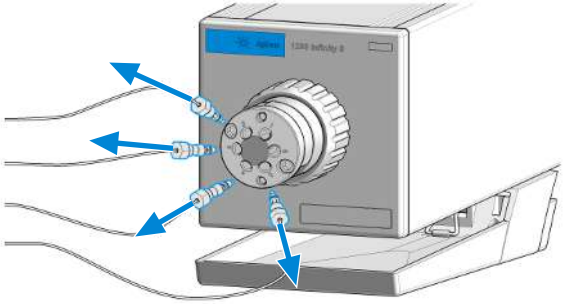
WARNING **Toxic, flammable and hazardous solvents, samples and reagents**

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

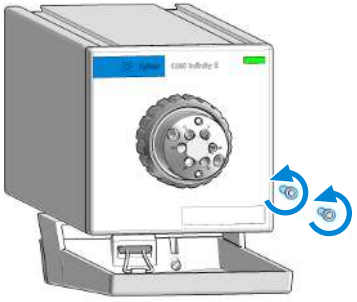
- **Be sure that no solvent can drop out of the solvent connections when removing them from your valve head.**
- **When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and 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

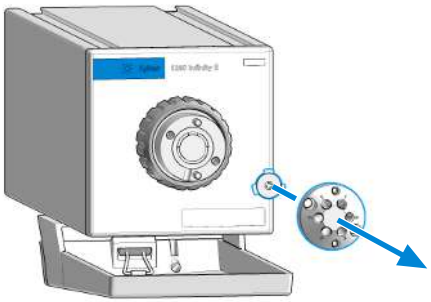
Damage to the stator head

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

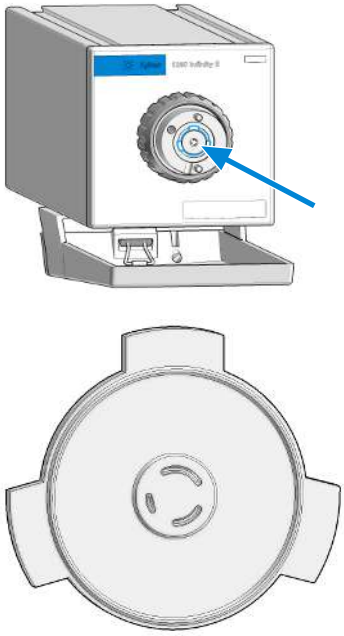
Remove the rotor seal with a small tool, gently pry the rotor seal away from the drive.
Examine the rotor sealing surface for scratches and nicks.
If scratches are visible the rotor seal must be replaced.
If no scratches are visible clean all the parts with an appropriate solvent, taking care that no 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.

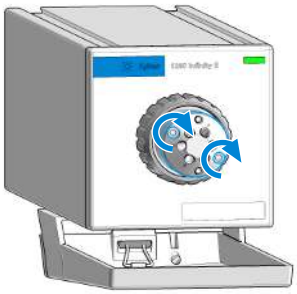
4 Install new rotor seal.



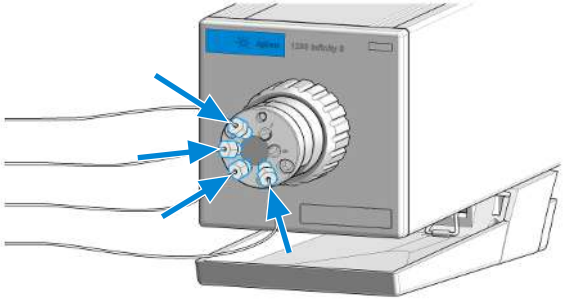
NOTE

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.



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

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

When

- Leaks or blockages are observed.

Tools required

Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch

Parts required

Qty.	p/n	Description
1	G3167-67000	G3167A Online Sample Manager Capillary Kit
		OR
1	G3167-67002	G3167B Online Sample Manager Capillary Kit

Prerequesites

- Remove the front door.
- For reference about the capillary names, part numbers, and dimensions, see tables in Connection Reference Tables on page 42.

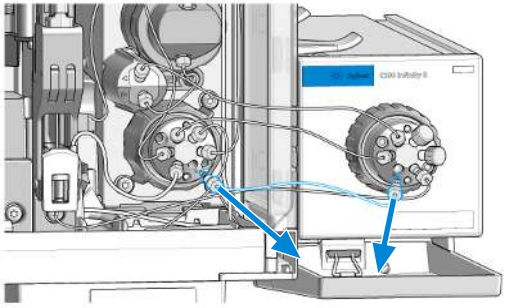
WARNING

Toxic, flammable and hazardous solvents, samples and reagents

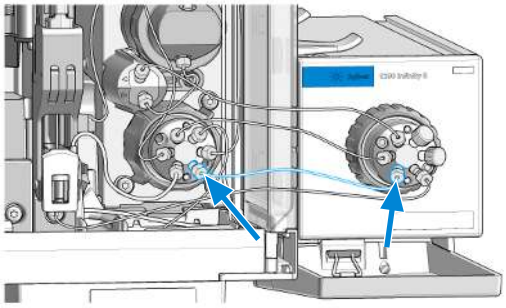
The handling of solvents, samples and reagents can hold health and safety risks.

- **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.**

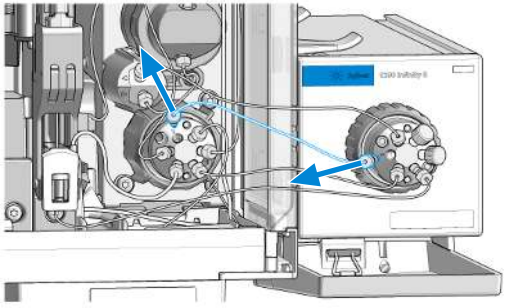
1 Remove the Transfer Capillary I from port 5 of the injection valve and port 4 of the external sampling valve using a 1/4-inch wrench.



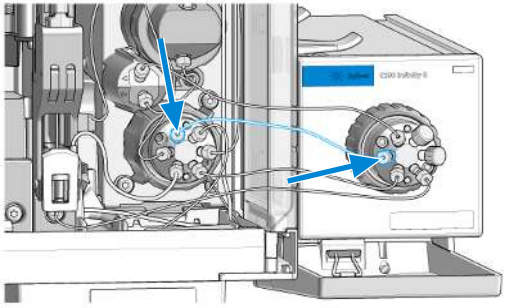
2 Connect new Transfer Capillary I to port 5 of the injection valve and port 4 of the external sampling valve with a 1/4-inch wrench.



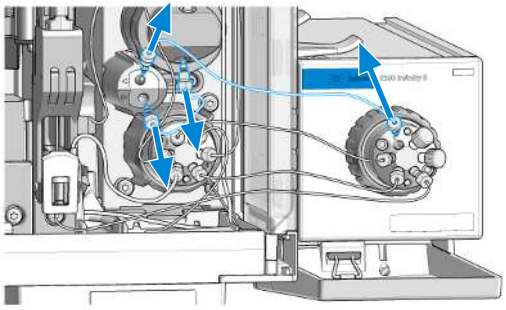
3 Remove the Transfer Capillary II from port 2 of the injection valve and port 3 of the external sampling valve using a 1/4-inch wrench.



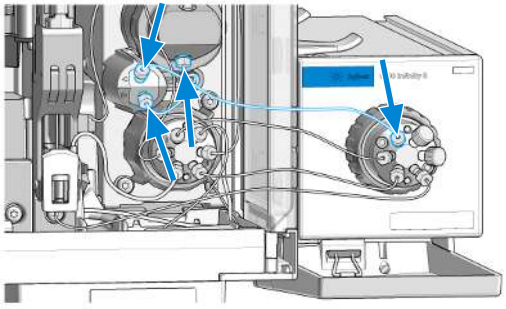
4 Connect new Transfer Capillary II to port 2 of the injection valve and port 3 of the external sampling valve with a 1/4-inch wrench.



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.



7 Perform Hydraulic Path Leak Test.

8 Perform Sampler Leak Test if needed for troubleshooting in case of Hydraulic Path Leak failure.

Remove the Metering Seal

When

- When poor injection volume reproducibility or when metering device / analytical head is leaking.

Tools required

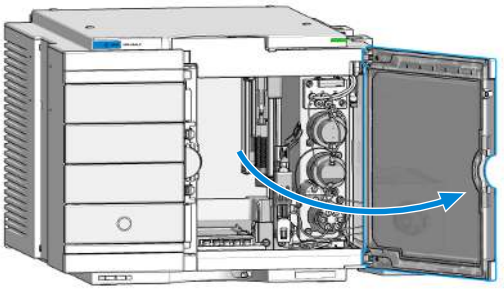
Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch
1	8710-2392	4 mm Hex key
1	01018-23702	Insert tool
		OR
1	G4226-43800	Seal insert tool

1 In the Local Controller start the maintenance mode and select Change Metering Device function.

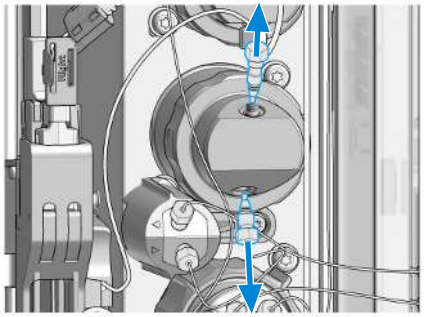
OR

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.

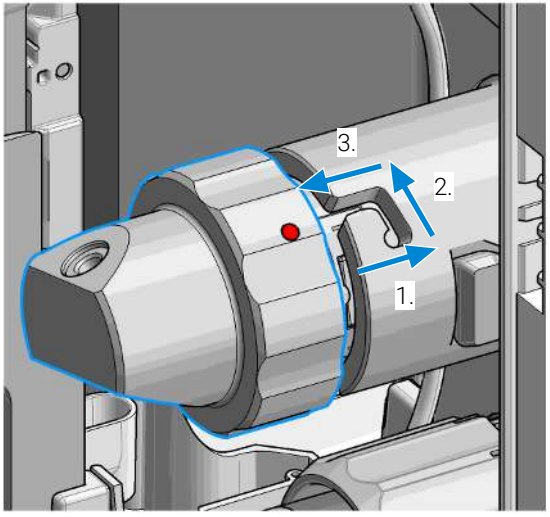
2 Open the front door.



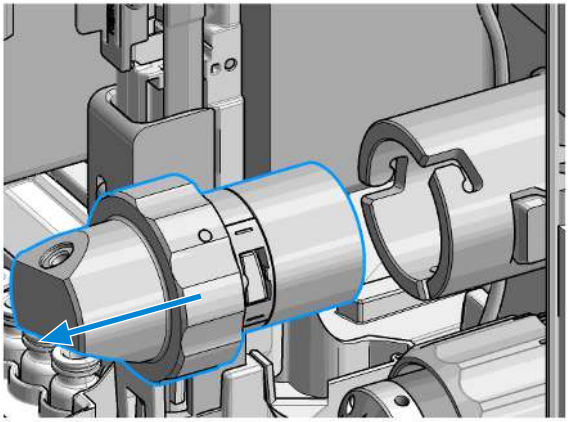
3 Disconnect all capillaries from the metering device.



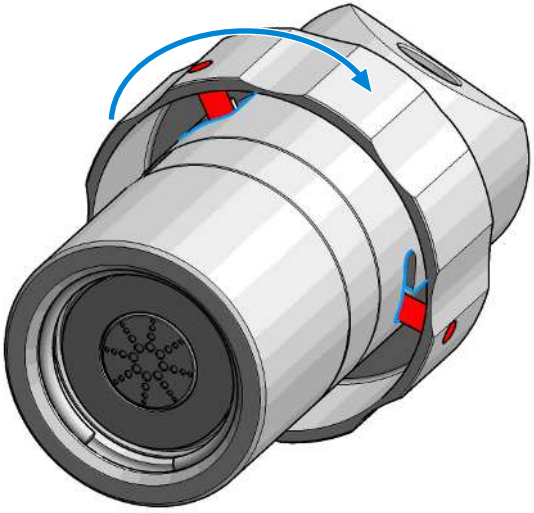
4 To release the bayonet lock, push (1.) and rotate (2.) the analytical head a quarter left. Then you can pull and detach the analytical head assembly from the actuator (3.).



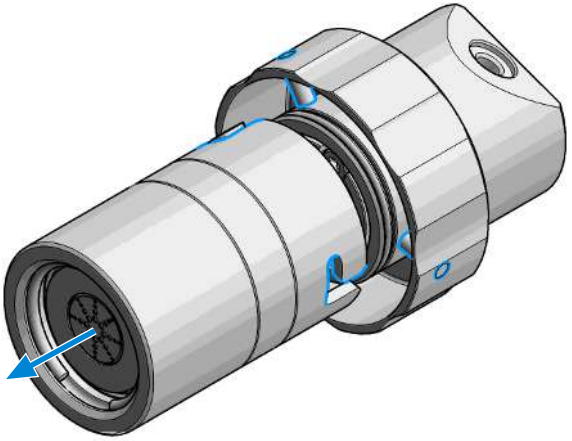
5 Remove the metering device.



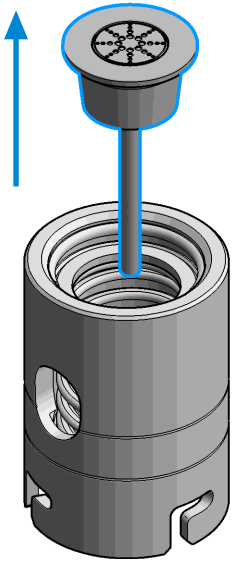
6 Take the metering device. Push against the rear side of the metering device and rotate a quarter left to release the bayonet lock.



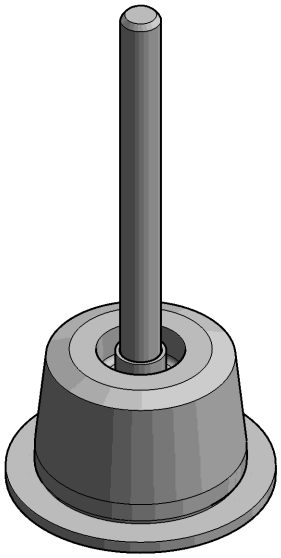
7 Now you can separate the analytical head and head body.



8 Remove the piston out of the head body.

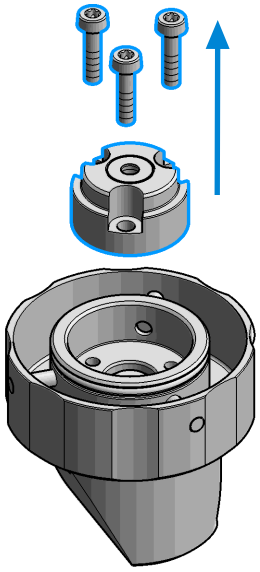


9 Inspect the piston for cleanliness and scratches.

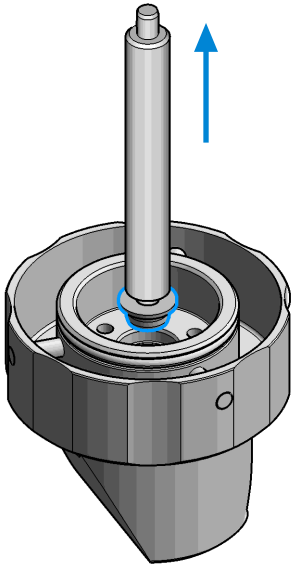


- If dirty:
  Clean the piston with an appropriate solvent.
- If scratched:
  Replace the piston by a new one.

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.



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

BIO

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

When

- After removing the metering seal.

Tools required

Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch
1	8710-2392	4 mm Hex key
1	01018-23702	Insert tool
		OR
1	G4226-43800	Seal insert tool
1		Cleaning tissue and appropriate solvent like isopropanol or methanol

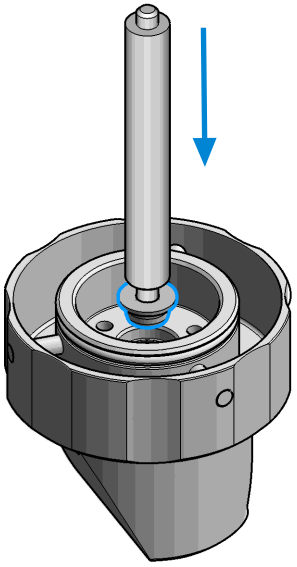
Parts required

Qty.	p/n	Description
1	0905-1719	PE Seal (for G3167A)
		OR
1	G7131-20009	Seal PTFE (Bio), 100 µL (for G3167B)
1	5067-5678	Piston, 100 µL, Zirconium oxide Replacement only necessary in case of wear (optional)

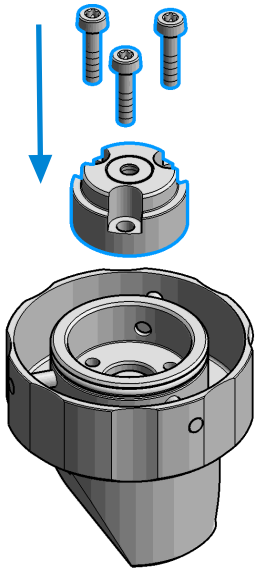
Prerequesites

- Remove the metering seal, see Remove the Metering Seal on page 386.

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.



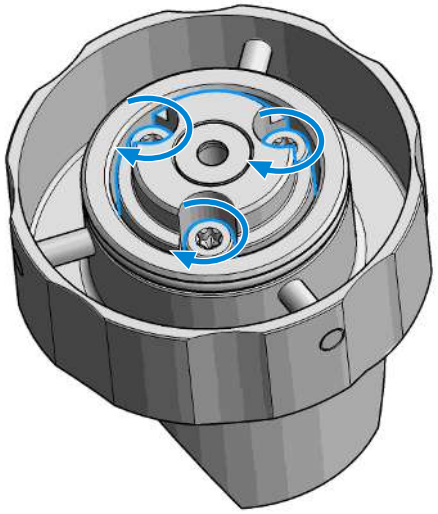
2 Reassemble the support ring.



3 Make sure to comply to the following order of actions:

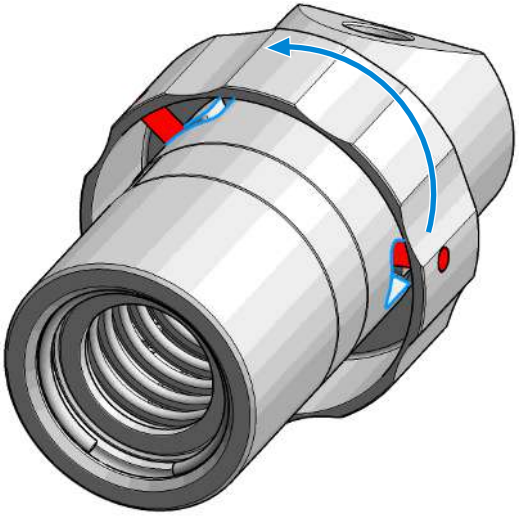
a Tighten the three screws fingertight, then

b Tighten the screws a little at a time to keep the support ring surface *parallel* (important!) to the surface of the analytical head.

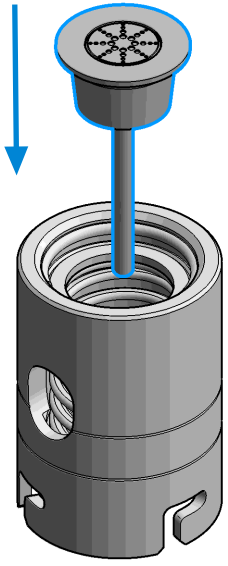


4 Use the twist and lock bayonet mechanism to reassemble the analytical head assembly. Push the two parts together to couple the head body with the analytical head. Once the pin reaches the bottom of the slot, one or both parts

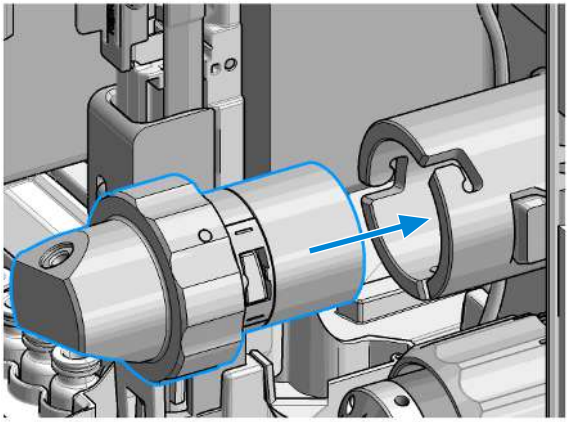
are rotated so that the pin slides along the horizontal arm of the L until it reaches the *serif*. The spring then pushes the male connector up into the *serif* to keep the pin locked into place.



5 Press the piston carefully into the housing of the head body and the seal.

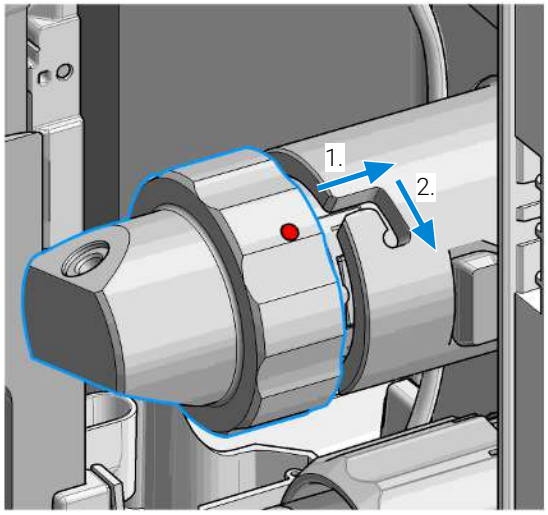


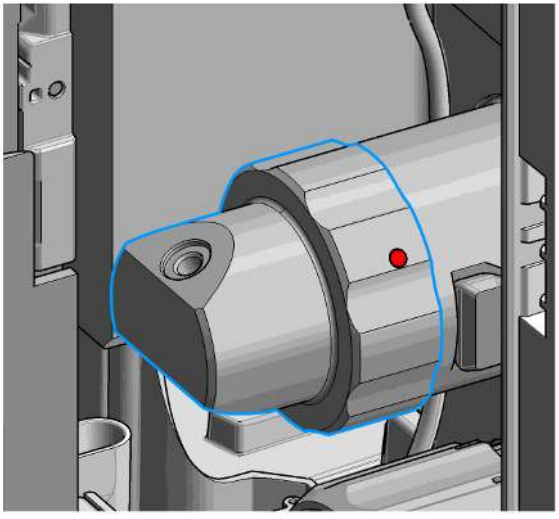
6 Reinstall the complete analytical head with the actuator housing



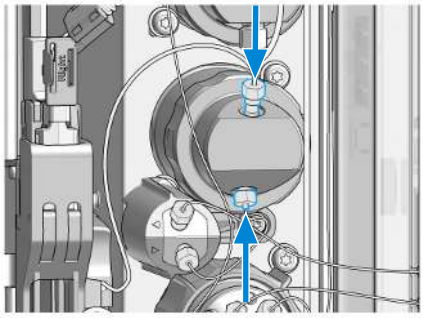
NOTE For proper installation, check the correct position of the tag.

7 Fix the analytical head by pushing (1.) and rotating (2.) via twist and lock bayonet mechanism.

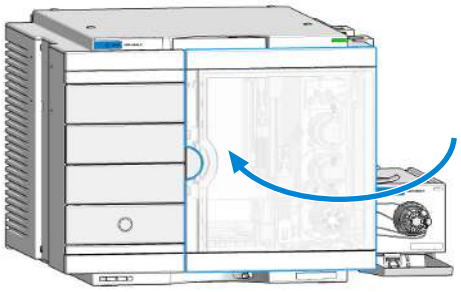




8 Reconnect the capillaries.



9 Close the front door.



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 biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

When

- The flush head is leaking.

Tools required

Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch
1	8710-2392	4 mm Hex key

Parts required

Qty.	p/n	Description
1	5067-5918	Flush Head Seal 500 µL (for G3167A)
		OR
1	G5668-60494	Seal 500 µL Bio-inert (for G3167B)

Prerequesites

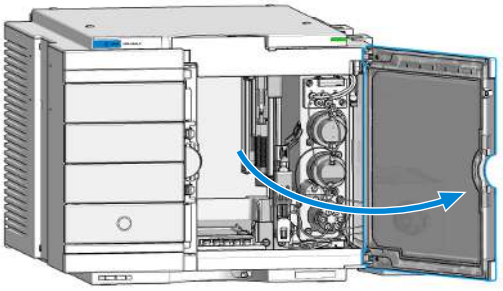
- Cleaning tissue
- Appropriate solvent like isopropanol or methanol

1 In the Local Controller start the maintenance mode and select **Change Metering Device** function.

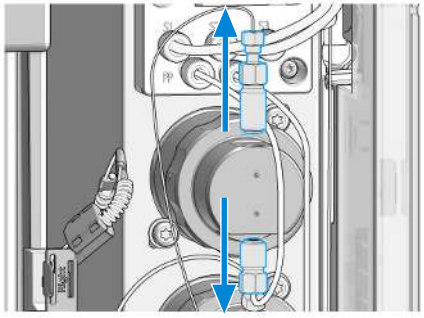
OR

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.

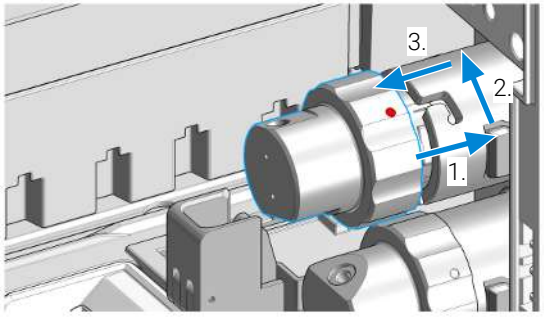
2 Open the front door.



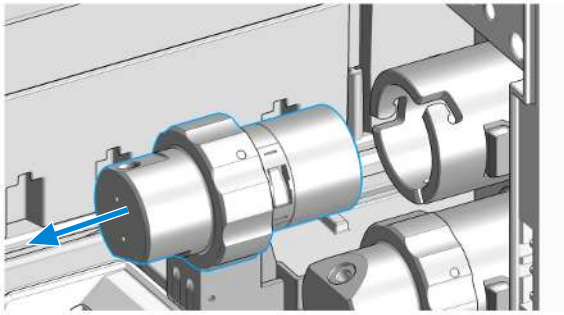
3 Remove capillaries and valves from the flush head.



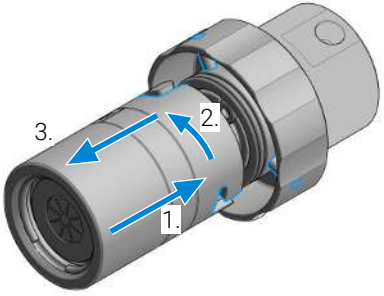
4 Press and turn the Flush Head a quarter left (bayonet fitting) and detach the metering device from the actuator.



5 Pull the flush head away from the hydraulic box.



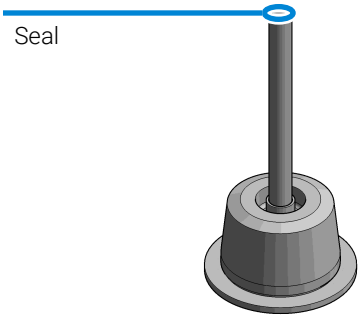
6 Press against the rear side of flush head and turn a quarter left (bayonet fitting) and separate the flush head, head body and the piston.



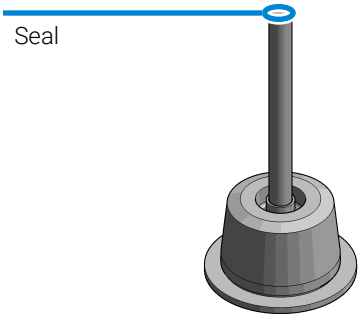
NOTE Be careful not to break the piston.

7 Remove the piston from the head body.

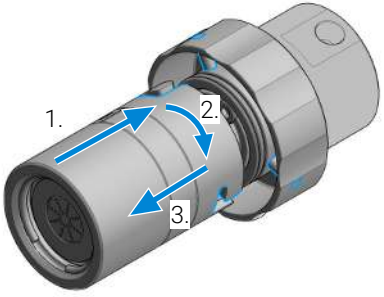
8 Carefully remove the seal from the tip of the piston.



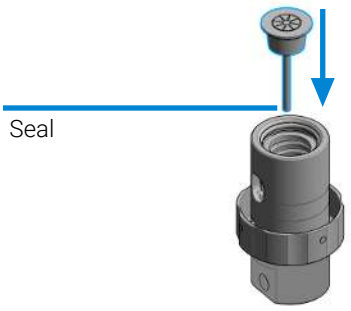
9 Place the new seal to the tip of the piston.



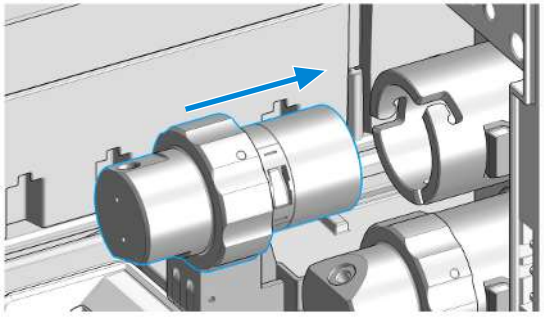
10 Reassemble the flush head and the head body (without piston).



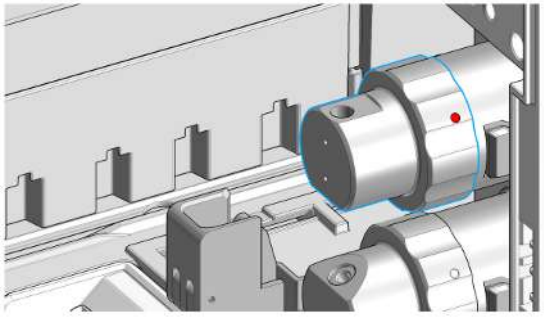
11 Carefully insert the piston with the new seal into the flush head assembly.



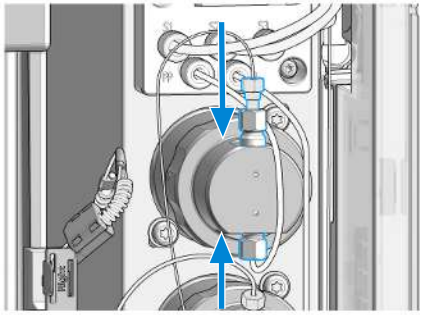
12 Reinstall the flush head to the actuator housing.



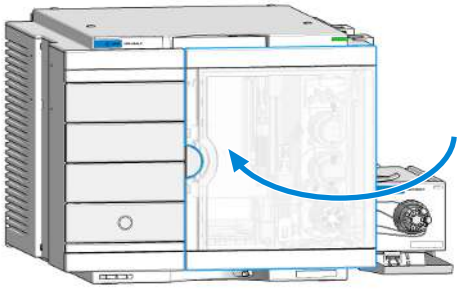
13 Fix the flush head.



14 Connect the capillaries.



15 Close the front door.



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

Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch

Prerequesites

- 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.

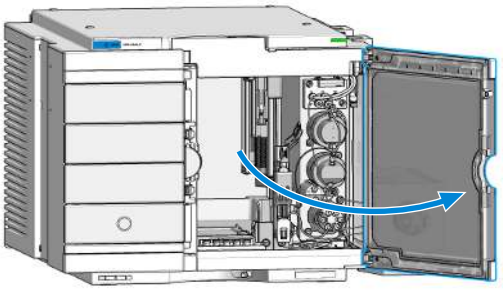
- **Do not open the safety lock of the needle assembly**
- **Be careful working at the z-robot.**
- **Wear safety goggles, when removing the needle assembly.**

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.

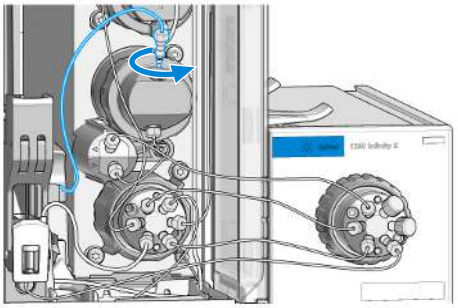
OR

In the Local Controller start the maintenance mode and select Change Loop function.

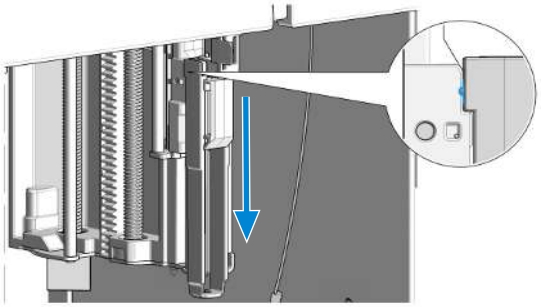
2 Open the front door.



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 module, 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.

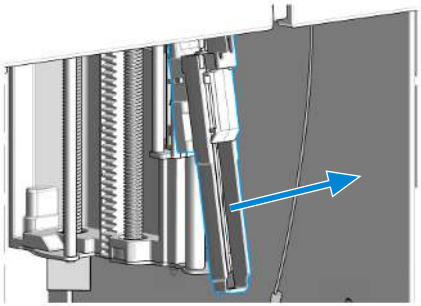
WARNING

Sharp needle

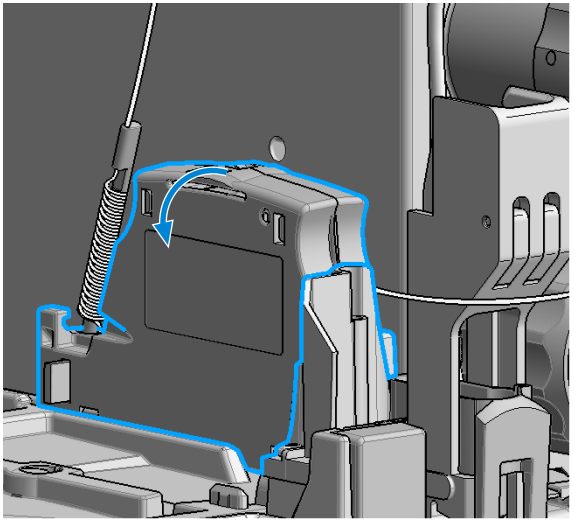
Uncovered needles may cause injuries

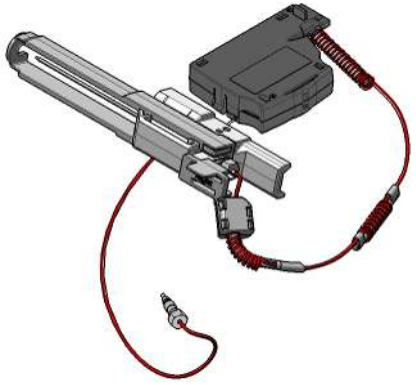
— **Make sure the needle is in the safety lock position.**

5 Remove the needle assembly by slightly pulling the needle cartridge.

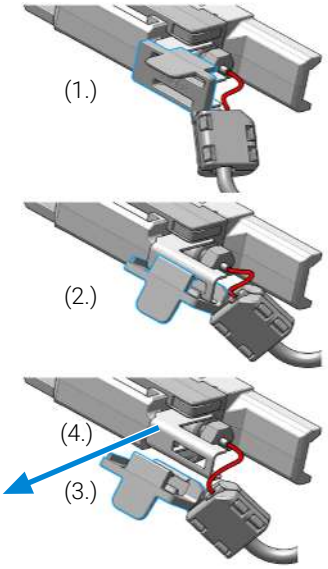


6 Remove the cartridge out of its proper position, by gently tilting and pulling it out of the work space of the sampler.





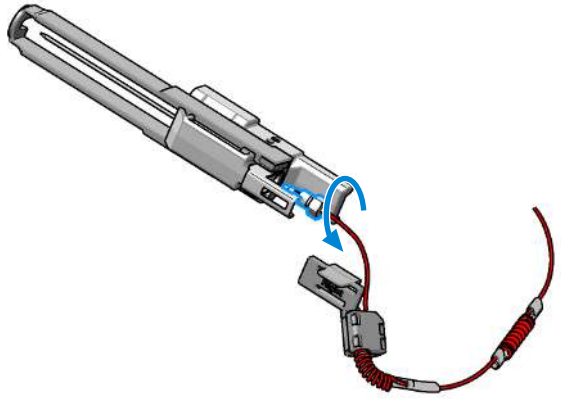
7 Remove the loop plastic adapter.



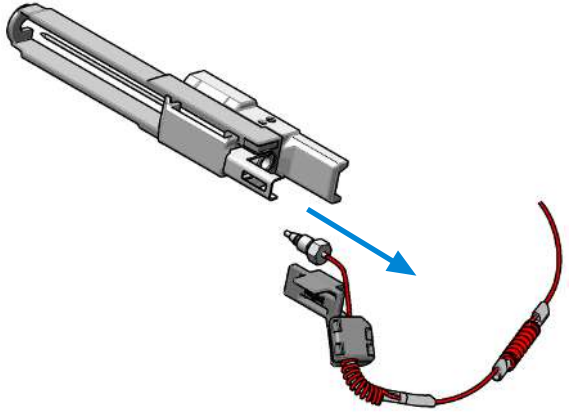
NOTE Do not open the rear plastic clamp.

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

BIO

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

When

- If the sample loop flex is defective, blocked, or damaged.

Tools required

Qty.	p/n	Description
1	8710-0510	Open-end wrench 1/4-5/16 inch

Parts required

Qty.	p/n	Description
1	G4767-60500	Calibrated Sample Loop, 100 µL, right (blue coded) (for G3167A)
		OR
1	G7137-60500	Sample Loop MP35N 100 µL, right (blue/ orange coded) (for G3167B)

Prerequesites

- 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.**

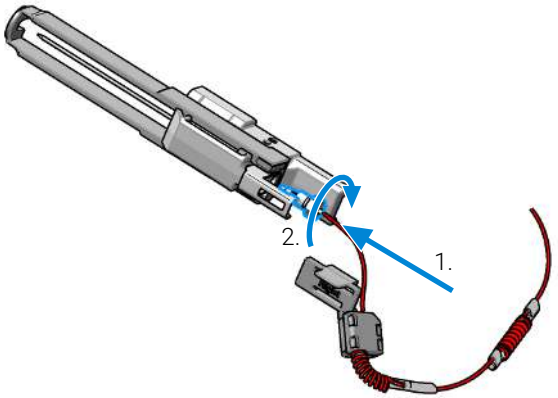
CAUTION

Mismatching sample loop configuration

Damage to the system

- Make sure, that the sample loop configuration matches to the hardware installed.

1 Install the loop capillary on top of the needle cartridge (1.) and tighten the fitting hand tight (2.).



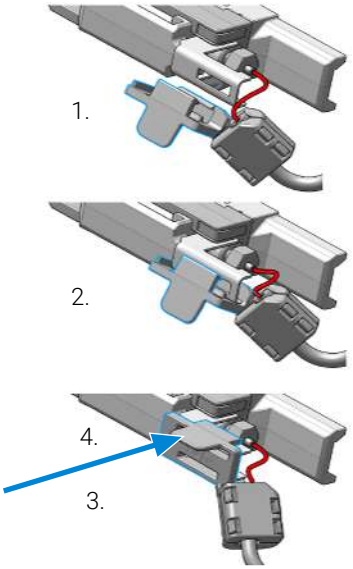
NOTE If the sample loop is changed, we recommend changing the needle as well.

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.

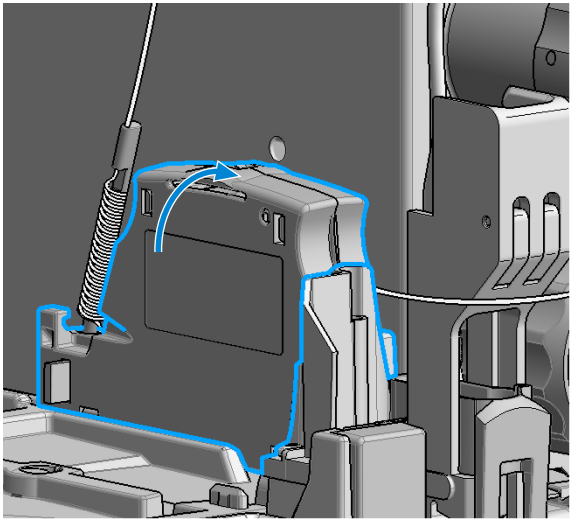
3 Install loop plastic adapter.



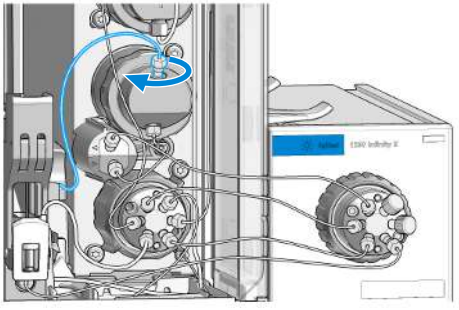
NOTE Verify the sample loop info on the plastic adapter. A left or a right sample loop must be installed in the correct slot of the needle parkstation. For single needle, the default position is on the right.

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.



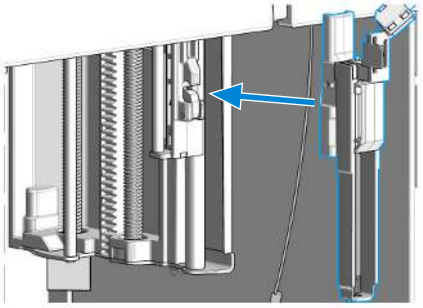
5 Install the shorter capillary of the sample loop cartridge to the analytical head.

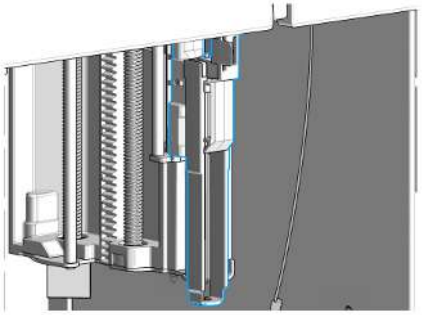


6 Pinch and reinsert the needle assembly and the connected loop capillary into the z-arm coupler.

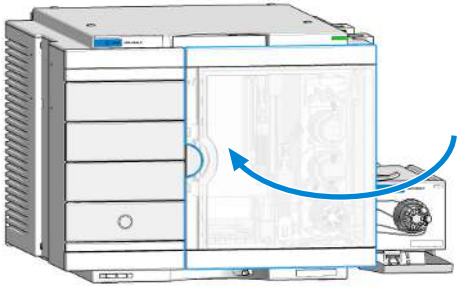
NOTE

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.





7 Close the front door.



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 (Set Up the Online Sample Manager in OpenLab CDS on page 92).

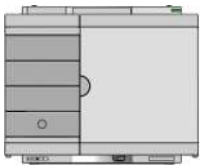
9 Perform **Hydraulic Path Leak Test**.

10 Perform **Sampler Leak Test** if needed for troubleshooting in case of Hydraulic Path Leak failure.

Replace the Dummy Drawer

Optional Configurations

Table 32: 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	Qty.	p/n	Description
	1		Screwdriver

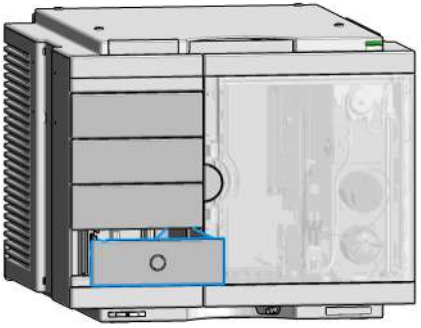
Parts required	Qty.	p/n	Description
	1	G7167-60020	Drawer 2H
	1	G7167-60021	Drawer 1H
	1	G7167-60022	Drawer 3H

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.

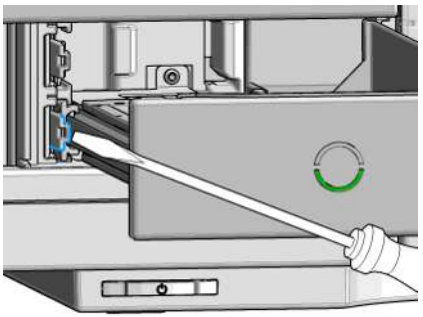
NOTE More detailed video information is available on the Agilent Information Center.

1 Open the drawer.

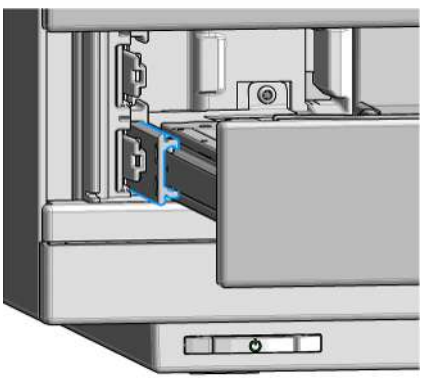


2 Pull the drawer completely out.

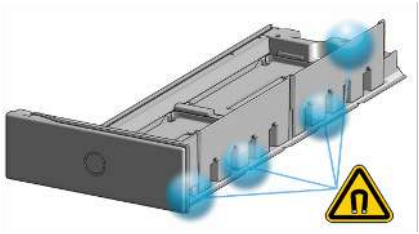
3 Unlatch the drawer: Use a screwdriver to press the clamping lever lightly to the left.



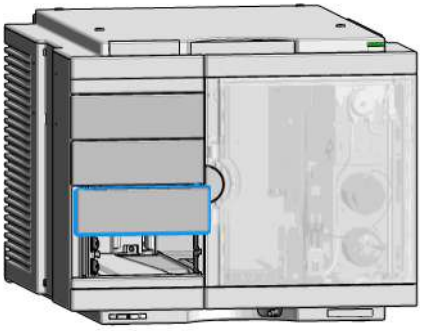
4 Remove the drawer from the rail guide.



The drawer is now out of the hotel.

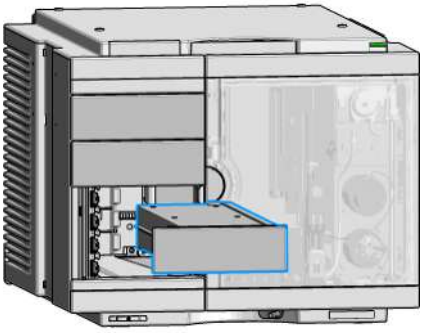


5 Grab in the recession below the dummy drawer front panel and lift the left side.

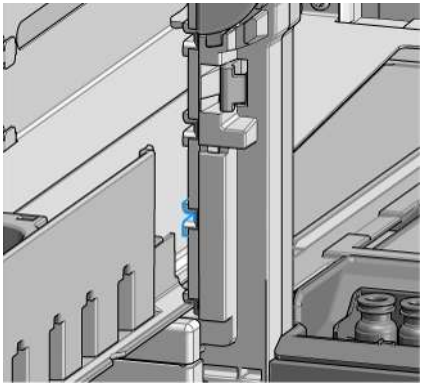


6 Remove the dummy drawer.

NOTE At this stage remove all other dummies that will be replaced by hotel drawers.

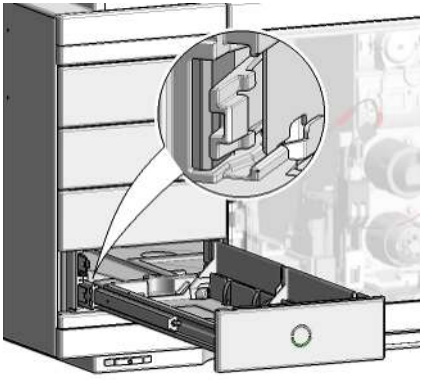


7 Place the new drawer horizontally into the sample hotel. Check that the drawer matches the middle bracket of the sample hotel.



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

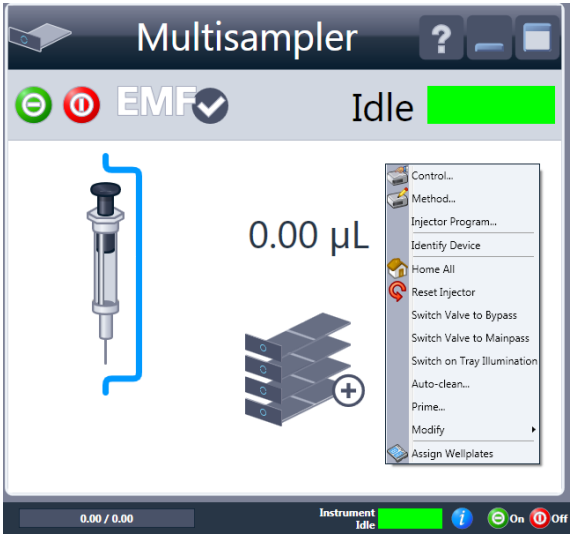
- M8500AALC driver (A.02.10 or above)
- OpenLab CDS (A.02.01 or above)

Prerequesites

- 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.

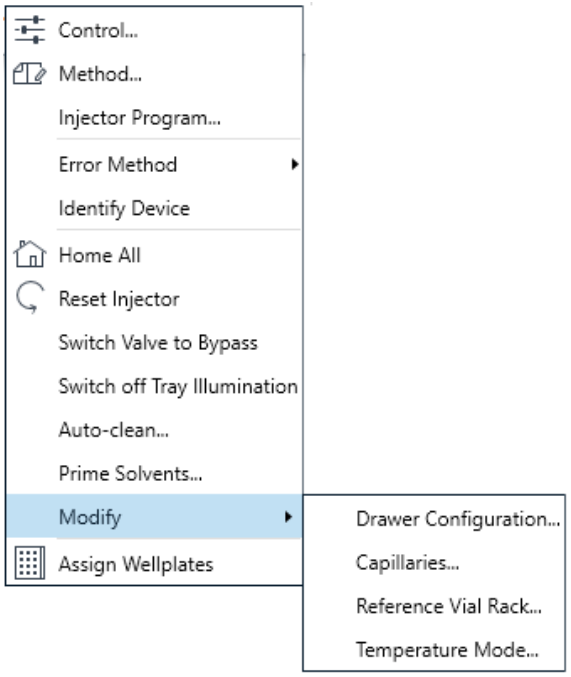
2 Right-click on the **Sampler** GUI (example shows a Multisampler).



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 266).

Configure the Hotel Drawers in Lab Advisor

Software required

- Agilent Lab Advisor software (B.02.05 or above)

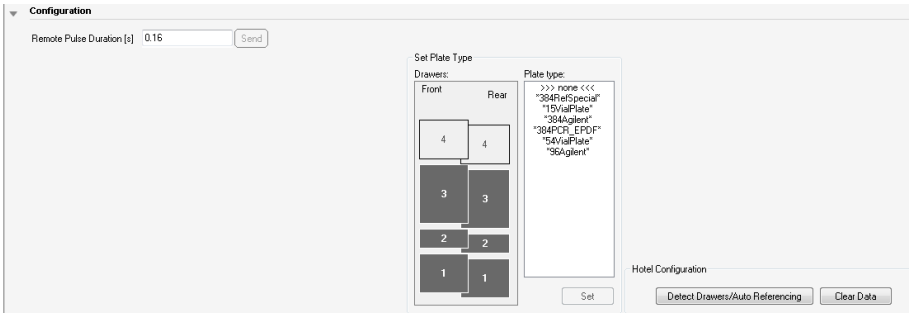
Prerequesites

- 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 Multisampler. 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 266).

Replace the Module Firmware

When

Install a newer firmware

- It fixes known problems of older versions, or
- It introduces new features, or
- It ensures keeping all systems at the same (validated) revision

When

Install an older firmware

- It ensures keeping all systems at the same (validated) revision, or
- It ensures compatibility after adding a new module to the system, or
- A third-party control software requires a special version

Software required

- Agilent Lab Advisor software

Tools required

Qty.	p/n	Description
1		Firmware, tools and documentation from Agilent web site

Prerequesites

- For further information about minimum firmware requirements, firmware compatibilities and emulation for backward compatibility with specific software environments, please check the latest Firmware Bulletin.

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.

Replace the Sample Thermostat

When

- The Sample Thermostat is damaged or defective.

Tools required

Qty.	p/n	Description
1	5182-3466	Torx screwdriver T10 (for the Sample Thermostat)
		OR
1	5023-3089	Torx key set (part of the G7120-68708 InfinityLab LC Series Tool Kit)

Parts required

Qty.	p/n	Description
1	G7167-60201	Sample Thermostat

Prerequesites

- 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 38.

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.

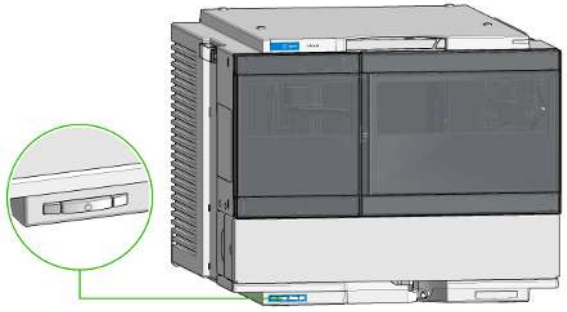
CAUTION

Condensate inside the module

Damage to the electronics of the module

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

1 Ensure that the on/off switch on the front of the module is OFF (switch stands out).

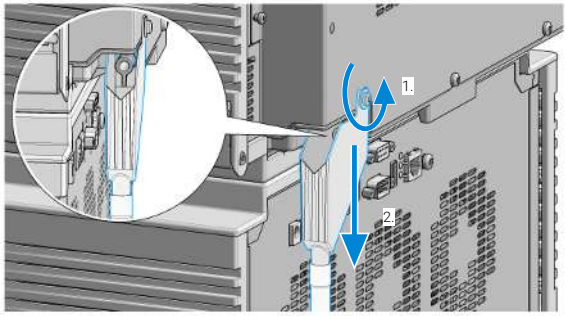


2 Disconnect the power cable from the sampler.

3 Ensure that no condensate remains inside the 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.

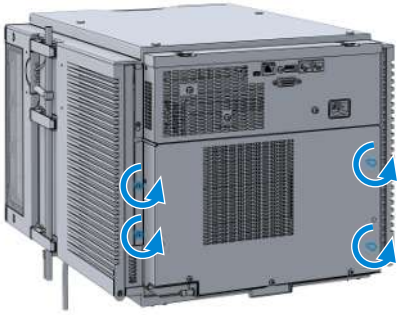
4 Loosen the screw (1) and remove the condensate funnel (2) from the back of the thermostat.



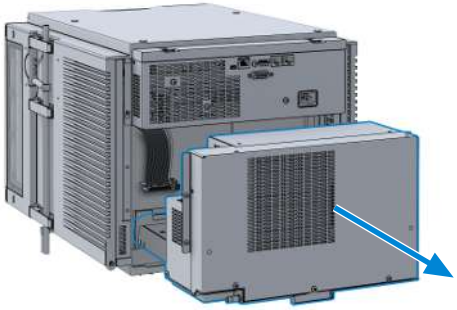
NOTE

If there is still some condensate inside the thermostat, place a suitable container underneath the outlet tube, and keep tapping on the sides of the sampler until no more water comes out.

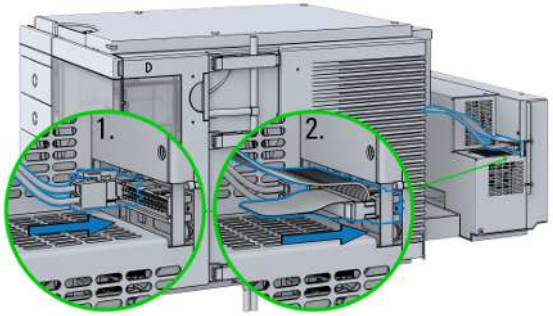
5 Remove the fixation screws on the back of Sample Thermostat.



6 Pull the thermostat halfway out, disconnect the power and the data cable and then remove the unit completely from the sampler.



7 Slide the new thermostat halfway into the sampler and connect the power and the data cable.



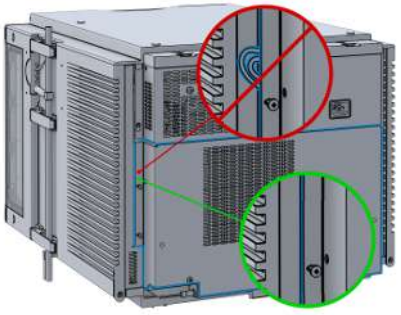
CAUTION

Damage to the cables

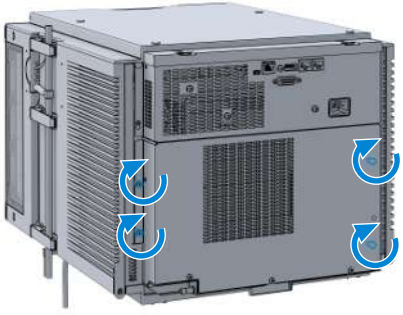
— Do not bend or pinch the cables.

— Make sure that the Sample Thermostat fits perfectly in the sampler.

8 Slide the Sample Thermostat all the way into the sampler.



9 Fix the unit with the four screws.



10 Connect the power cable to the power connector at the rear of the module.

CAUTION

Damage to the Sample Thermostat

— Wait at least 30 min before switching on the compressor of the thermostat.

— This allows the refrigerant and system lubrication to reach equilibrium.

11 Switch on the sampler and perform the **Sample Cooler Function Test** to verify the correct functioning of the new thermostat, see Sample Cooler Function Test on page 274.

10 Parts and Material for Maintenance

This chapter provides information on parts and materials for maintenance.

Standard Parts

Standard Parts Used in the 1260 Infinity III Online LC System

Qty.	p/n	Description
1	G4267-87201	Needle Assembly
1	G3167-60018	Needle Seat Capillary ST 0.17 mm x 230 mm SL/SL
1	5068-0279	Rotor Seal, 3-position/6-port FI Valve
1	5068-0280	Stator
1	G4767-60500	Calibrated Sample Loop, 100 µL, right (blue coded)
1	G4267-40033	Transport Protection

Standard Parts Used in the 1290 Infinity III Bio Online LC System

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

p/n	Description
G7137-87201	Needle Bio-compatible
G3167-60017	Needle Seat Bio Capillary ST 0.17 x 230 SL/SL
5320-0005	Rotor Seal, 3-position/6-port FI Valve, MP35N, 1300 bar
5320-0004	Stator, Bio
G7137-60500	Sample Loop MP35N 100 µL, right (blue/orange coded)
G4267-40033	Transport Protection

Hotel Drawer

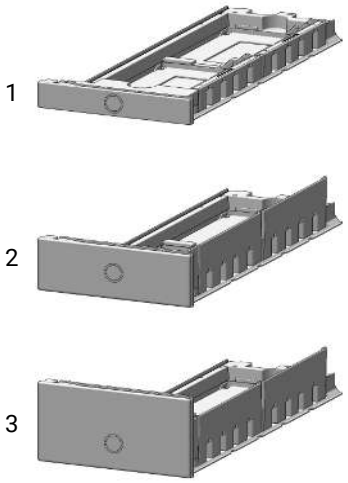


Figure 45: Hotel drawer

#	p/n	Description
1	G7167-60021	Drawer 1H (including 2*G4267-60206 Sample Tray (Palette))
2	G7167-60020	Drawer 2H (including 2*G4267-60205 Sample Tray (Palette))
3	G7167-60022	Drawer 3H (including 2*G4267-60205 Sample Tray (Palette))
	G4267-60024	Dummy Drawer (not shown)

Analytical Head Assembly 100 µL

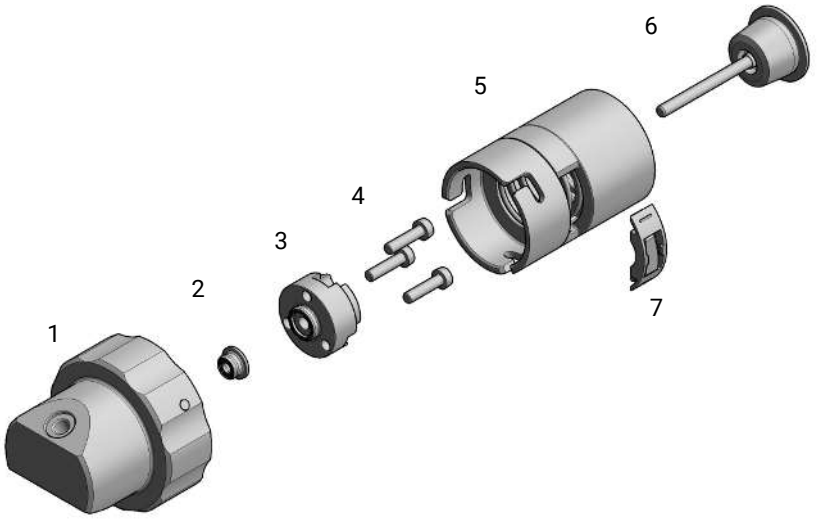


Figure 46: Analytical head assembly, 100 µL

#	Qty.	p/n	Description
	1	G4267-60043	Analytical Head, 100 µL (for G3167A)
1	1	G4267-60433	Head Assembly, 100 µL
2	1	0905-1719	PE Seal
3	1	G4267-60434	Seal Support Assembly, 100 µL
4	1	0515-1052	Screw M3 x 12 mm hex
5	1	G4267-60432	Spring Adapter Assembly
6	1	5067-5678	Piston, 100 µL, Zirconium oxide
7	1	G4267-40430	RFID Clamp
	1	5043-1000	O-Ring (not shown)
	1	5500-1159	Capillary ST 0.17 mm x 100 mm SX/S-2.3 Capillary from the metering device to the pressure sensor (not shown)

Biocompatible Analytical Head Assembly 100 µL

BIO

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

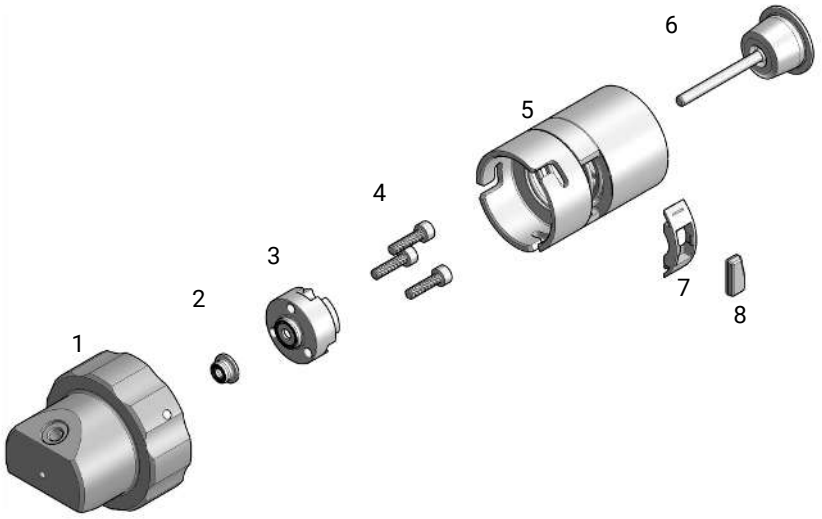


Figure 47: Biocompatible analytical head assembly, 100 µL

#	Qty.	p/n	Description
	1	G7137-60043	Bio-compatible Head 100 µL (for G3167B)
1	1	G7137-60001	Bio-compatible head assembly, 100 µL
2	1	G7131-20009	Seal PTFE (Bio), 100 µL
3	1	G4267-60434	Seal Support Assembly, 100 µL
4	1	0515-1052	Screw M3 x 12 mm hex
5	1	G4267-60432	Spring Adapter Assembly
6	1	5067-5678	Piston, 100 µL, Zirconium oxide
7	1	G4267-40430	RFID Clamp

#	Qty.	p/n	Description
	1	0960-2971	RF Transponder
	1	5043-1000	O-Ring (not shown)
	1	5500-1278	Capillary MP35N 0.17 mm x 100 mm SL/SL Capillary from the metering device to the injection valve (not shown)

Flush Head Assembly 500 µL

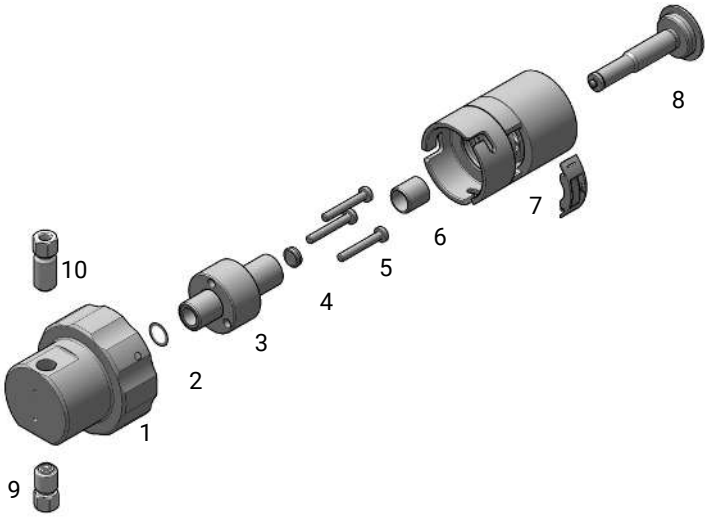


Figure 48: Flush head assembly, 500 µL

#	Qty.	p/n	Description
	1	G4267-60049	Flush head, 500 µL (for G3167A)
1	1	G4267-60491	Flush Head Assembly, 500 µL
2	1	5023-2473	Sealing Plate 500 µL
3	1	G4267-60482	Cylinder Assembly, 500 µL
4	1	5067-5918	Flush Head Seal 500 µL
5	1	0515-5167	Screw
6	1	1410-1881	Bearing-Sleeve 8 mm-ID 10 mm-OD 10 mm-LG Pl
7	1	G4267-60432	Spring Adapter Assembly
8	1	5067-5919	Piston Assembly 500 µL
9	1	G4267-60451	Pump Valve IN
10	1	G4267-60452	Pump Valve Out

#	Qty.	p/n	Description
	1	5043-1000	O-Ring (not shown)

Bio Flush Head Assembly 500 µL

BIO INERT

For bio-inert modules use bio-inert parts only!

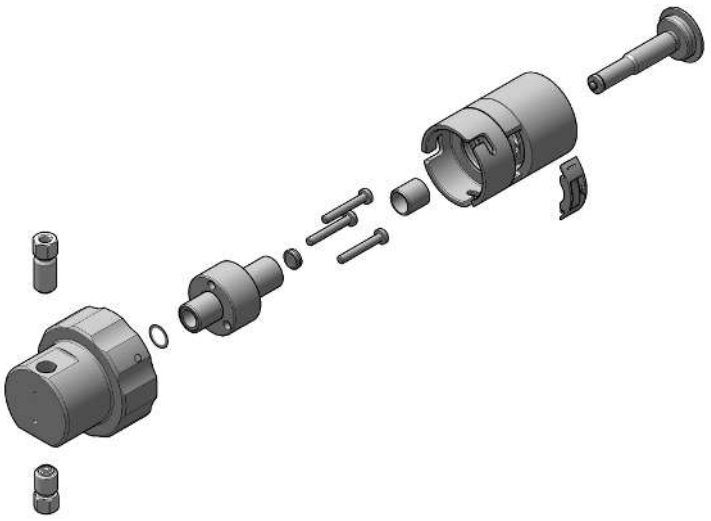


Figure 49: Bio flush head assembly, 500 µL

#	Qty.	p/n	Description
	1	G5668-60049	Flush Head Bio 500 µL (for G3167B)
1	1	G5668-60491	Flush Head Bio Assembly, 500 µL
2	1	5023-2473	Sealing Plate 500 µL
3	1	G4267-60482	Cylinder Assembly, 500 µL
4	1	G5668-60494	Seal 500 µL Bio-inert
5	1	0515-5167	Screw
6	1	1410-1881	Bearing-Sleeve 8 mm-ID 10 mm-OD 10 mm-LG Pl
7	1	G4267-60432	Spring Adapter Assembly

#	Qty.	p/n	Description
8	1	5067-5919	Piston Assembly 500 µL
9	1	G5668-60492	Pump Valve IN
10	1	G5668-60493	Pump Valve Out

3-Position/6-Port FI Valve

BIO

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

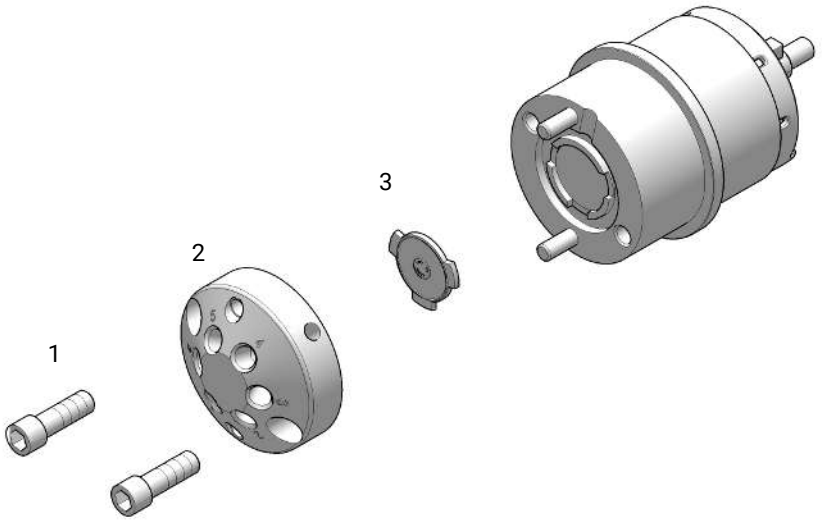


Figure 50: 3-Position/6-Port FI Valve Assembly

#	Qty.	p/n	Description
	1	5067-6680	3-position/6-port FI valve 800 bar (for G3167AA), **OR**
	1	5320-0003	3-position/6-port bio valve 1300 bar (for G3167BA)
1	1	5068-0210	Stator screws
2	1	5068-0280	Stator (for G3167AA), **OR**
	1	5320-0004	Stator, Bio (for G3167BA)
3	1	5068-0279	Rotor Seal, 3-position/6-port FI Valve (for G3167AA), **OR**

#	Qty.	p/n	Description
	1	5320-0005	Rotor Seal, 3-position/6-port FI Valve, MP35N, 1300 bar (for G3167BA)

Needle Port Assembly

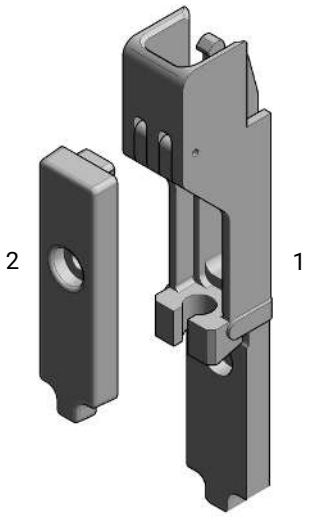


Figure 51: Needle port assembly

#	p/n	Description
1	G4267-60044	Needle Port Assembly Station
2	G4267-40045	Needle port Adapter

Door Assy

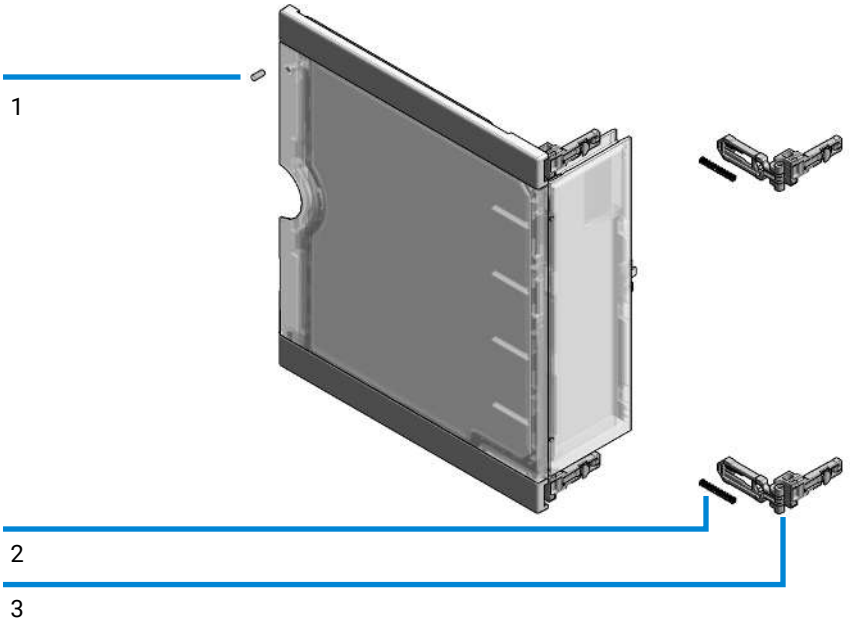


Figure 52: Door assy

#	Qty.	p/n	Description
	1	5067-5415	Door Assy
1	1	5021-1879	Permanent Magnet
2	1		Pressure Spring (not available)
3	2	5431-0016	Hinge Universal Latched

1260 Infinity II Online Sample Manager Accessory Kit

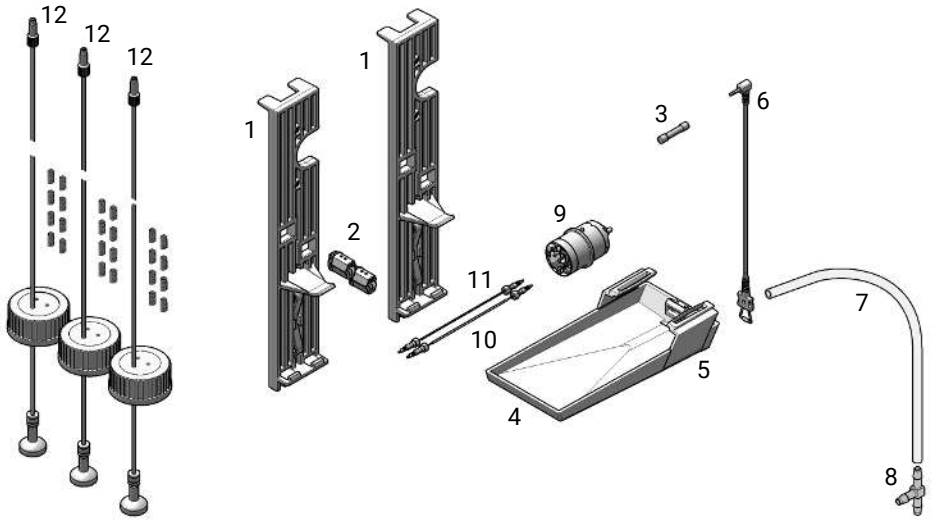


Figure 53: 1260 Infinity II Online Sample Manager Accessory Kit

#	Qty.	p/n	Description
	1	G3167-68000	1260 Infinity II Online Sample Manager Accessory Kit
1	2	G3167-42000	Single Holder UVD Multi Function
2	2	5043-1356	Column Holder Lamella
3	1	2110-1486	Fuse 2 AT250 V
4	1	5043-0270	Leak plane
5	1	5043-0271	Holder leak plane
6	1	5067-4792	Leak sensor assembly
7	1	5063-6527	Tubing, Silicon Rubber, 1.2 m, ID/OD 6 mm/9 mm
8	1	5500-1156	T-Tube Connector ID6.4
9	1	5067-6680	3-position/6-port FI valve 800 bar
10	1	5004-0011	Capillary ST 0.12 mm x 160 mm SL/SL

#	Qty.	p/n	Description
11	1	5005-0057	Capillary ST 0.17 mm x 160 mm SL/SL
12	3	G4220-60007	Bottle Head Assembly
	1	8121-3099	CAN Cable, 1 m, flat (not shown)
	4	0515-5869	Screw-Tapping Pan-HD Hexalobular-Recess (not shown)
	1	5004-0014	Capillary ST 0.17 mm x 500 mm SX/SL (not shown)
	1	5004-0015	Tubing PTFE 0.8 mm x 180 mm SL/no (not shown)
	3	5043-1013	Tubing Clip (not shown)
	1	5067-5967	Tubing Clip Tube Connector (not shown)

1290 Infinity II Bio Online Sample Manager Accessory Kit

BIO

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

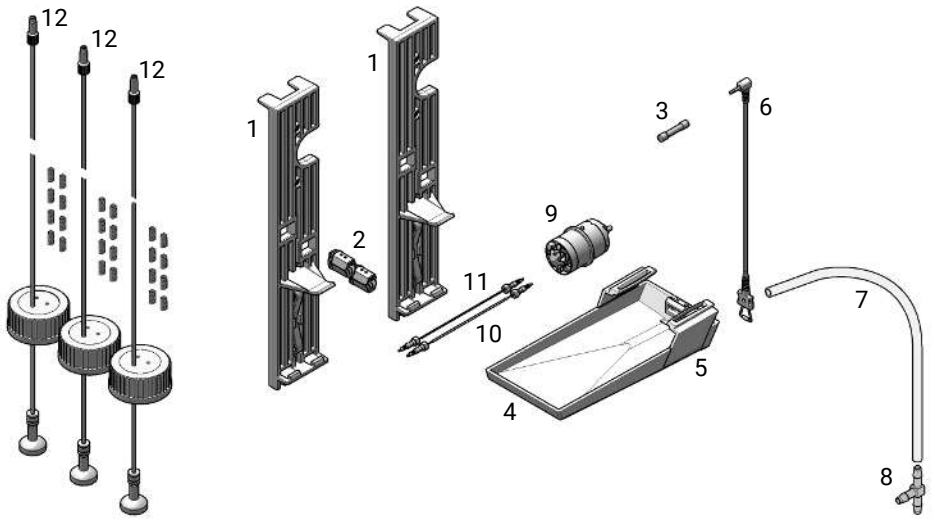


Figure 54: 1290 Infinity II Bio Online Sample Manager Accessory Kit

#	Qty.	p/n	Description
	1	G3167-68010	1290 Infinity II Bio Online Sample Manager Accessory Kit
1	2	G3167-42000	Single Holder UVD Multi Function
2	2	5043-1356	Column Holder Lamella
3	1	2110-1486	Fuse 2 AT250 V
4	1	5043-0270	Leak plane
5	1	5043-0271	Holder leak plane
6	1	5067-4792	Leak sensor assembly

#	Qty.	p/n	Description
7	1	5063-6527	Tubing, Silicon Rubber, 1.2 m, ID/OD 6 mm/9 mm
8	1	5500-1156	T-Tube Connector ID6.4
9	1	5320-0003	3-position/6-port bio valve 1300 bar
10	1	5005-0072	3-position/6-port FI valve, MP35N, 1300 bar
11	1	5005-0069	Capillary MP35N 0.17 mm x 160 mm SL/SL
12	3	G4220-60007	Bottle Head Assembly
	1	8121-3099	CAN Cable, 1 m, flat (not shown)
	4	0515-5869	Screw-Tapping Pan-HD Hexalobular-Recess (not shown)
	1	5005-0071	Capillary MP35N 0.17 mm x 500 mm SL/SL (not shown)
	1	G3167-68300	Waste Tube PTFE, 0.70 mm x 180 mm (not shown)
	3	5043-1013	Tubing Clip (not shown)
	1	5067-5967	Tubing Clip Tube Connector (not shown)

Multisampler Accessory Kit

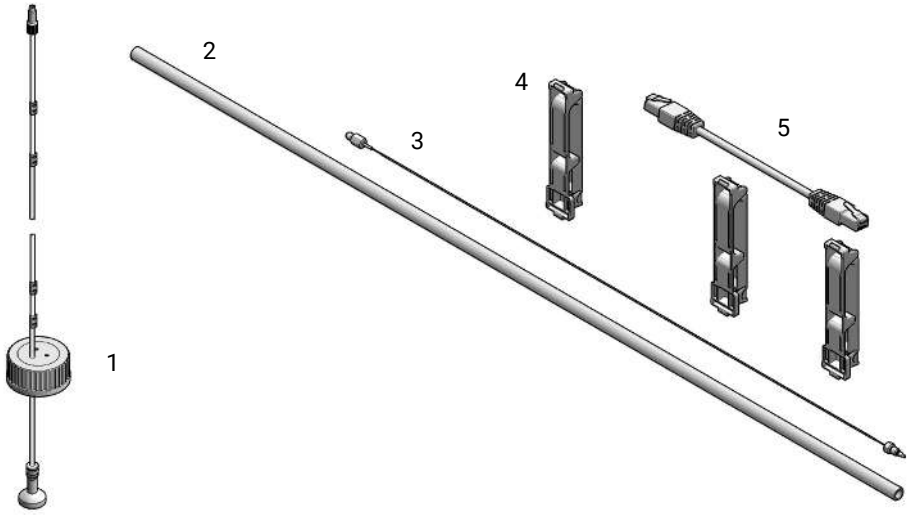


Figure 55: Accessory kit (standard)

#	Qty.	p/n	Description
	1	G7167-68715	Accessory Kit 1260 Infinity II Multisampler Accessory Kit, **OR**
	1	G7137-68705	Accessory Kit 1290 Infinity II Bio Multisampler Accessory Kit
1	1	G4220-60007	Bottle Head Assembly (not included in Accessory Kit, shipped separately)
2	1	5063-6527	Tubing, Silicon Rubber, 1.2 m, ID/OD 6 mm/9 mm
3	1	5500-1246	Capillary ST 0.17 mm x 500 mm SI/SI
4	1	5043-1013	Tubing Clip
5	1	5181-1519	CAN cable, Agilent module to module, 1 m
	1	5067-5967	Tubing Clip Tube Connector
	1	0100-1846	UNION-TEFZEL
	1	5182-0716	Screw Cap Vial, 2 ml, amber glass, write-on spot, 100/Pack

#	Qty.	p/n	Description
	1	5190-7024	Screw Cap, PTFE/silicone, 100/pk
	1	5043-1834	Single Drain Connector ID3.0-Long

Tools

p/n	Description
0100-1710	Mounting Tool for Tubing Connections
5023-2533	Mounting tool

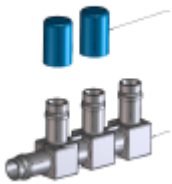


Figure 56: Tubing connector Leak Kit

Tubing Connector Leak Kit (5067-6137)

p/n	Description
5067-6137	Tubing Connector Leak Kit

Leak System Parts

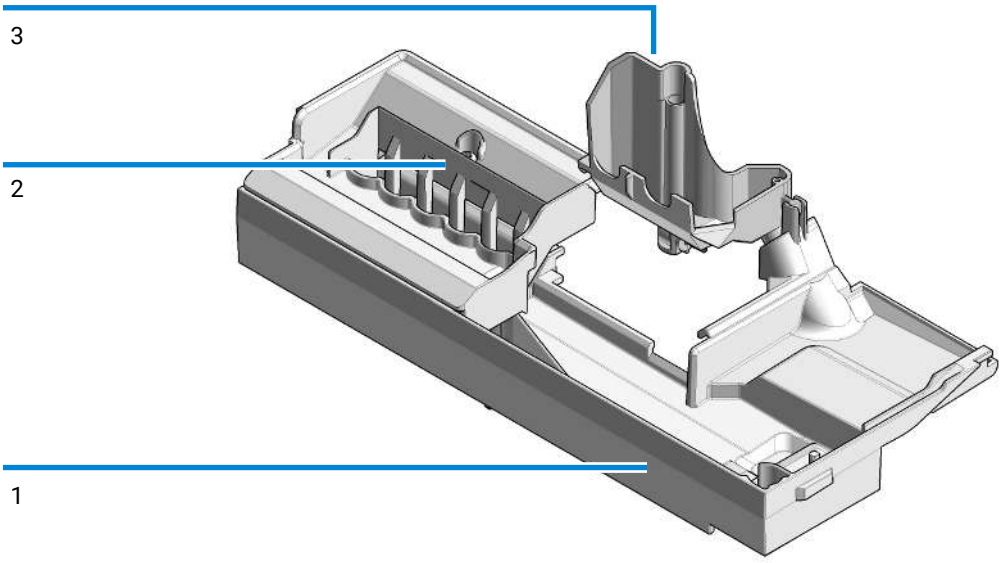


Figure 57: Drain management kit

#	p/n	Description
	G4267-68708	Drain Management Kit contains:
1		Leak Plane
2		Ref Vial Holder (not orderable as one part)
3		Wash Port Assembly (not orderable as one part)
	5043-1357	Seal silicone rubber (Washport; not shown)
	G4267-60060	Blind seat (not shown)
	5042-9974	Leak tubing (1.5 m, 120 mm required) (not shown)

Sample Thermostat Upgrade Kit

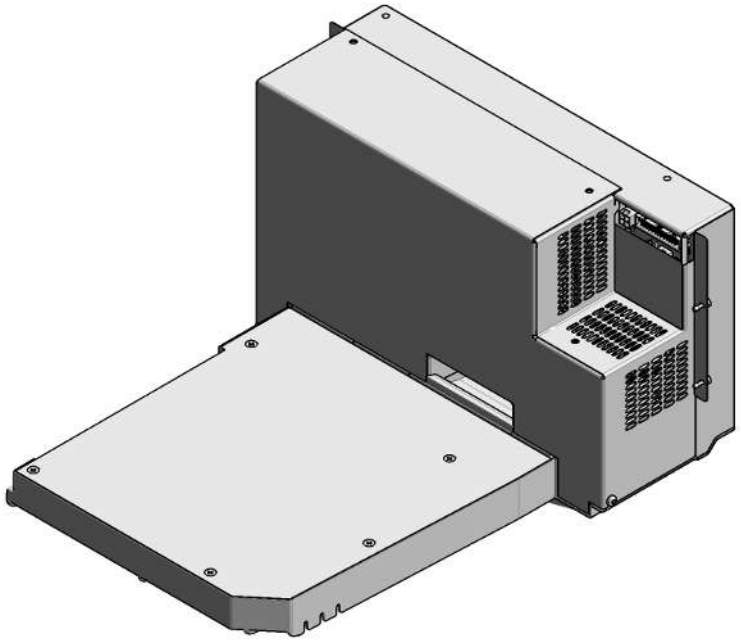


Figure 58: Sample Thermostat

p/n	Description
G4761A	InfinityLab Sample Thermostat Upgrade Kit contains:
G7167-60201	Sample Thermostat
5067-6208	Condensate Drainage Kit (not shown)

NOTE The Sample Thermostat contains flammable refrigerant R600a. Please check further details for installation.

1260 Infinity II Online Sample Manager Capillary Kit

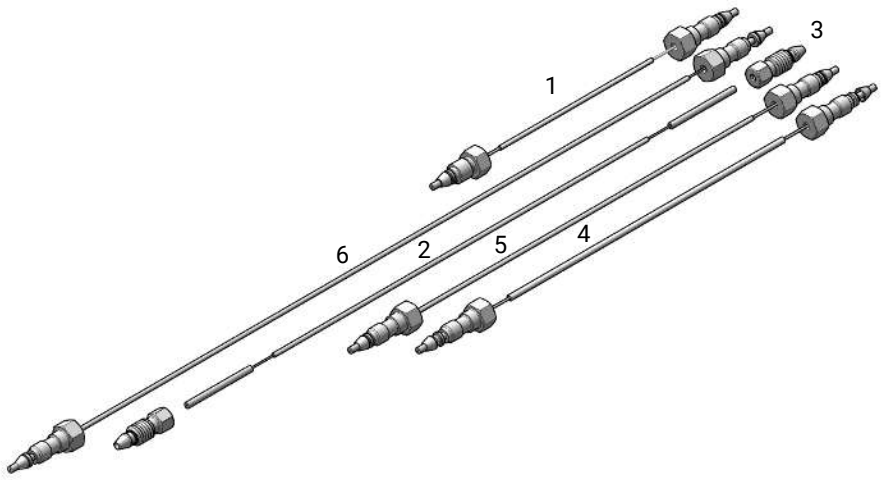


Figure 59: G3167A Online Sample Manager Capillary Kit

#	Qty.	p/n	Description
	1	G3167-67000	G3167A Online Sample Manager Capillary Kit
1	1	5500-1159	Capillary ST 0.17 mm x 100 mm SX/S-2.3 PS Capillary
2	1	5500-1234	Capillary ST 0.17 mm x 180 mm MD Capillary
3	2	5067-5403	UHP fitting
4	1	5004-0011	Capillary ST 0.12 mm x 160 mm SL/SL Transfer Capillary I
5	1	5005-0057	Capillary ST 0.17 mm x 160 mm SL/SL Transfer Capillary II
6	1	5067-5709	Capillary ST 0.25 mm x 250 mm S/S FH Capillary

1290 Infinity II Bio Online Sample Manager Capillary Kit

BIO

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

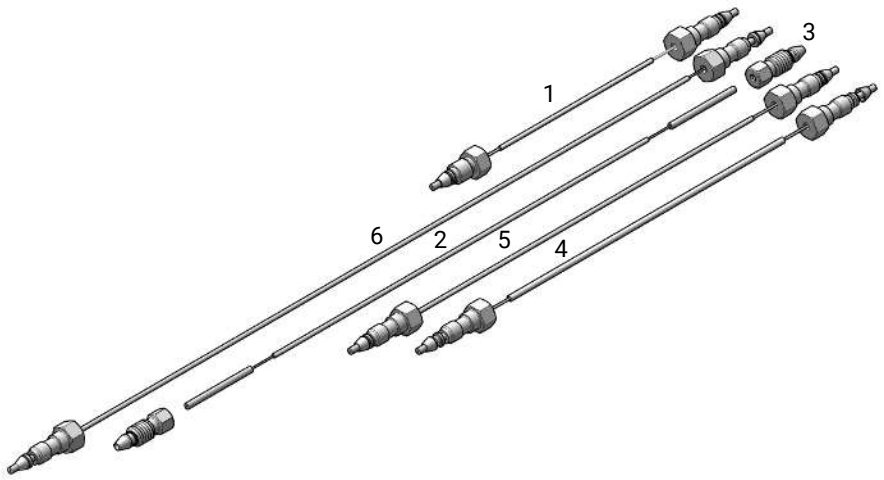


Figure 60: G3167B Online Sample Manager Capillary Kit

#	Qty.	p/n	Description
	1	G3167-67002	G3167B Online Sample Manager Capillary Kit
1	1	5500-1278	Capillary MP35N 0.17 mm x 100 mm SL/SL PS Capillary
2	1	5005-0073	Capillary MP35N 0.17 mm x 180 mm MD Capillary MD Capillary
3	2	5067-5403	UHP fitting
4	1	5005-0069	Capillary MP35N 0.17 mm x 160 mm SL/SL Transfer Capillary I

#	Qty.	p/n	Description
5	1	5005-0072	3-position/6-port FI valve, MP35N, 1300 bar Transfer Capillary II
6	1	5005-0074	Capillary MP35N 0.25 mm x 250 mm SL/SL FH Capillary

1260 Infinity II Online Sample Manager Set PM Kit

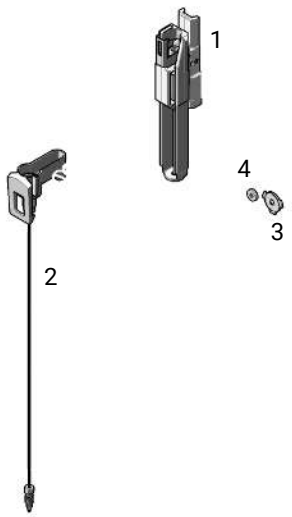


Figure 61: G3167AA Online Sample Manager Set PM Kit

#	Qty.	p/n	Description
	1	G3167-67001	G3167AA Online Sample Manager Set PM Kit
1	1	G4267-87201	Needle Assembly
2	1	G3167-60018	Needle Seat Capillary ST 0.17 mm x 230 mm SL/SL (5067-5403 UHP fitting is shown as pre-installed but included as a separate part)
3	2	5068-0279	Rotor Seal, 3-position/6-port FI Valve
4	1	5067-5918	Flush Head Seal 500 µL

1290 Infinity II Bio Online Sample Manager Set PM Kit

BIO

For biocompatible modules use bio / biocompatible parts only!

Do not mix with bio-inert parts.

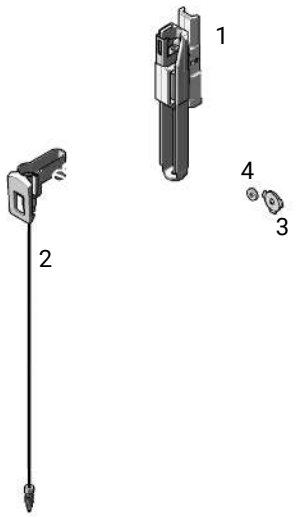


Figure 62: G3167BA Online Sample Manager Set PM Kit

#	Qty.	p/n	Description
	1	G3167-67003	G3167BA Online Sample Manager Set PM Kit
1	1	G7137-87201	Needle Bio-compatible
2	1	G3167-60017	Needle Seat Bio Capillary ST 0.17 x 230 SL/SL (5067-5403 UHP fitting is shown as pre-installed but included as a separate part)
3	2	5320-0005	Rotor Seal, 3-position/6-port FI Valve, MP35N, 1300 bar
4	1	G5668-60494	Seal 500 µL Bio-inert

11 Identifying Cables

This chapter provides information on cables used with the modules.

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	Agilent 35900A A/D converter
01046-60105	Analog cable (BNC to general purpose, spade lugs)

Remote cables

p/n	Description
5188-8029	ERI to general purpose
5188-8044	Remote Cable ERI – ERI
5188-8045	Remote Cable APG – ERI
5188-8059	ERI-Extension-Cable 1.2 m
5061-3378	Remote Cable to 35900 A/D converter
01046-60201	Agilent module to general purpose
5188-8057	Fraction Collection ERI remote Y-cable

CAN cables

p/n	Description
5181-1516	CAN cable, Agilent module to module, 0.5 m
5181-1519	CAN cable, Agilent module to module, 1 m

LAN cables

p/n	Description
5023-0203	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202	Twisted pair network cable, shielded, 7 m (for point to point connection)

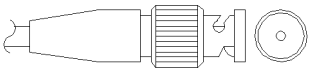
RS-232 cables

p/n	Description
RS232-61601	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	RS-232 cable, 8 m

USB cables

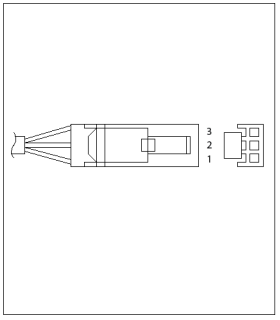
p/n	Description
5188-8050	USB A M-USB Mini B 3 m (PC-Module)
5188-8049	USB A F-USB Mini B M OTG (Module to Flash Drive)

Analog Cables

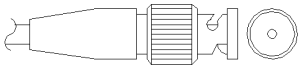


One end of these cables provides a BNC connector to be connected to Agilent modules. The other end depends on the instrument to which connection is being made.

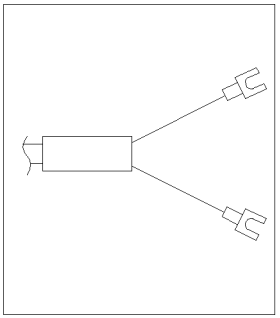
Agilent Module to 35900 A/D converters

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 +

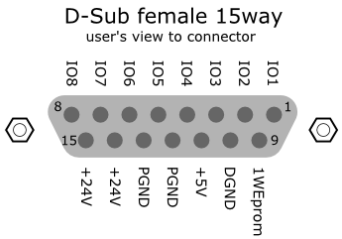
Agilent Module to General Purpose

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	

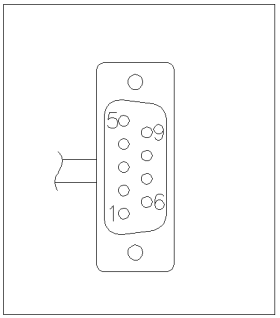
- 5188-8057 ERI to APG and RJ45 (Connector D_Subminiature 15 pin (ERI), Connector D_Subminiature 9 pin (APG), Connector plug Cat5e (RJ45))

Table 33: 5188-8057 ERI to APG and RJ45

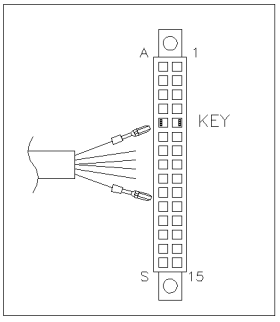
p/n 5188-8057	Pin (ERI)	Signal	Pin (APG)	Active (TTL)	Pin (RJ45)
					
	10	GND	1		5
	1	Start Request	9	High	
	2	Stop	8	High	
	3	Ready	7	High	
	4	Fraction Trigger	5	High	4
	5	Power on	6	High	
	6	Shut Down	4	High	
	7	Start	3	High	
	8	Prepare	2	High	
	Ground	Cable Shielding	NC		

One end of these cables provides an Agilent Technologies APG (Auxiliary Port Group) remote connector to be connected to Agilent modules. The other end depends on the instrument to be connected to.

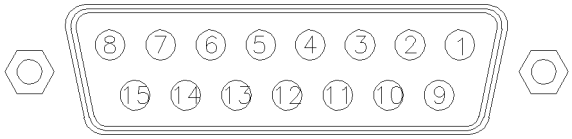
Agilent Module to Agilent 35900 A/D Converters

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

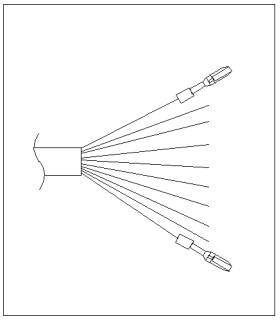
p/n 01046-60201	Wire Color	Pin Agilent module	Signal Name	Active (TTL)
	White	1	Digital ground	
	Brown	2	Prepare run	Low
	Gray	3	Start	Low
	Blue	4	Shut down	Low
	Pink	5	Not connected	
	Yellow	6	Power on	High
	Red	7	Ready	High
	Green	8	Stop	Low
	Black	9	Start request	Low

BCD Cables

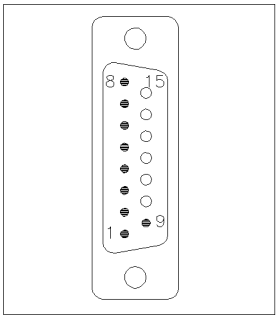


One end of these cables provides a 15-pin BCD connector to be connected to the Agilent modules. The other end depends on the instrument to be connected to

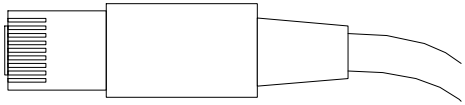
Agilent Module to General Purpose

p/n G1351-81600	Wire Color	Pin Agilent module	Signal Name	BCD Digit
	Green	1	BCD 5	20
	Violet	2	BCD 7	80
	Blue	3	BCD 6	40
	Yellow	4	BCD 4	10
	Black	5	BCD 0	1
	Orange	6	BCD 3	8
	Red	7	BCD 2	4
	Brown	8	BCD 1	2
	Gray	9	Digital ground	Gray
	Gray/pink	10	BCD 11	800
	Red/blue	11	BCD 10	400
	White/green	12	BCD 9	200
	Brown/green	13	BCD 8	100
	not connected	14		
	not connected	15	+ 5 V	Low

Agilent Module to 3396 Integrators

p/n 03396-60560	Pin 3396	Pin Agilent module	Signal Name	BCD Digit
	1	1	BCD 5	20
	2	2	BCD 7	80
	3	3	BCD 6	40
	4	4	BCD 4	10
	5	5	BCD0	1
	6	6	BCD 3	8
	7	7	BCD 2	4
	8	8	BCD 1	2
	9	9	Digital ground	
	NC	15	+ 5 V	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	CAN cable, Agilent module to module, 0.5 m
5181-1519	CAN cable, Agilent module to module, 1 m

LAN Cables

p/n	Description
5023-0203	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202	Twisted pair network cable, shielded, 7 m (for point to point connection)

RS-232 Cables

p/n	Description
RS232-61601	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	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	USB A M-USB Mini B 3 m (PC-Module)
5188-8049	USB A F-USB Mini B M OTG (Module to Flash Drive)

12 Hardware Information

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

General Hardware Information

This section provides detailed hardware information on firmware that is valid for this module.

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.

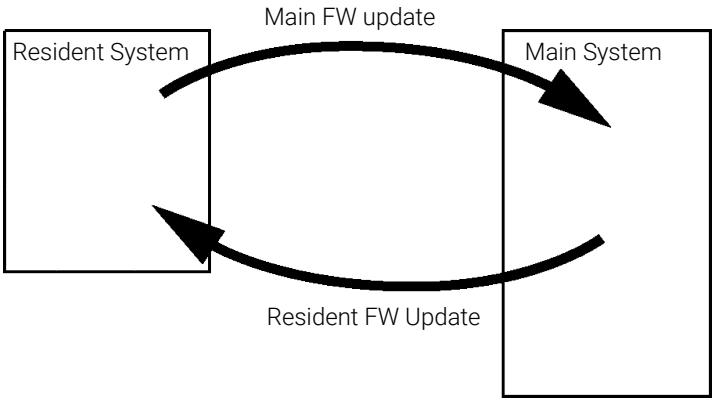


Figure 63: Firmware update mechanism

For further information about minimum firmware requirements, firmware compatibilities and emulation for backward compatibility with specific software environments, please check the latest Firmware Bulletin.

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 connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features such as start, stop, common shut down, 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.
- The USB connector may be used for service related workflows.
- 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.

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.**

NOTE Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

Rear View of the Module

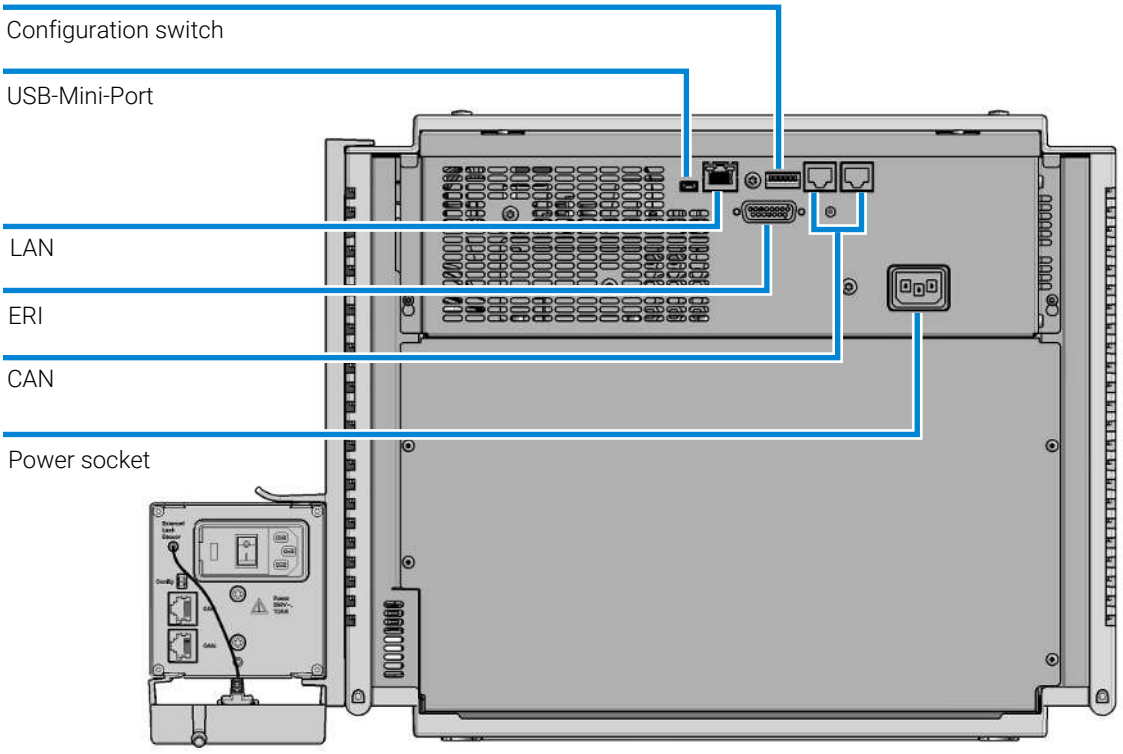


Figure 64: Rear view of the Online Sample Manager - electrical connections

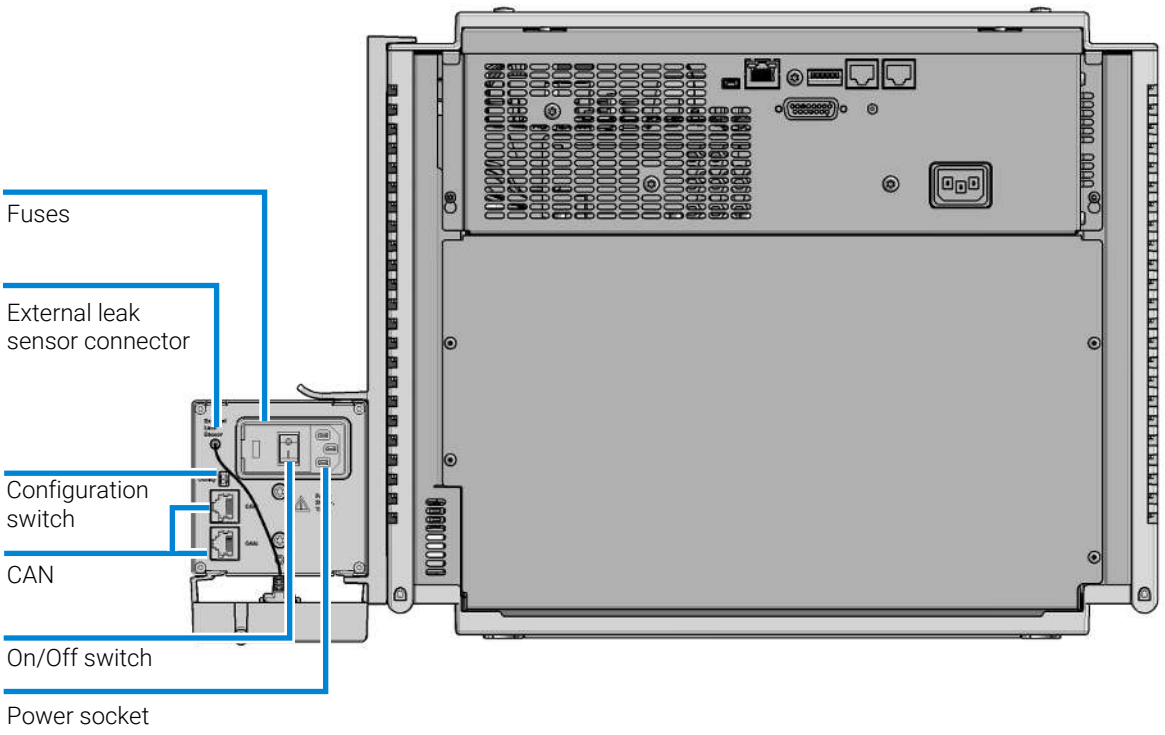


Figure 65: Rear view of the External Sampling Valve - electrical connections

Serial Number Information

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

Interfaces

The Agilent InfinityLab LC Series modules provide the following interfaces:

Table 34: 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/B, 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	
Fraction Collectors							
G7158B	2	Yes	Yes	No	No	E	
G7159B	2	Yes	Yes	No	No	E	

Module	CAN	USB	LAN (on-board)	RS-232	Analog	APG (A) / ERI (E)	Special
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	Requires a host module with on-board LAN or with additional G1369C LAN Card.
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
G7175A	2	No	No	No	No	No	Requires a host module with on-board LAN or with additional G1369C LAN Card.

NOTE

LAN connection is made between at least one of the Agilent modules and the Control PC.

- If an Assist Hub is installed, connect the LAN to the Lab LAN port of the Assist Hub.
- If an Assist Hub is NOT installed and a detector is installed, connect the LAN to this detector.
- If an Assist Hub is NOT installed and there are multiple detectors with spectral capabilities, consider using additional LAN connections for each detector.
- If an Assist Hub is installed, connect additional LAN connections from the detectors and pumps to the Assist Hub.

- 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) for service workflows
- REMOTE connector as interface to other Agilent products
- Analog output connector for signal output

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

LAN connection is made between at least one of the Agilent modules and the Control PC.

- If an Assist Hub is installed, connect the LAN to the Lab LAN port of the Assist Hub.
- If an Assist Hub is NOT installed and a detector is installed, connect the LAN to this detector.
- If an Assist Hub is NOT installed and there are multiple detectors with spectral capabilities, consider using additional LAN connections for each detector.
- If an Assist Hub is installed, connect additional LAN connections from the detectors and pumps to the Assist Hub.

RS-232C (Serial)

NOTE

There is no configuration possible on main boards with on-board LAN. These are pre-configured for
19200 baud,
8 data bit with no parity and
one start bit and one stop bit are always used (not selectable).

The RS-232C is designed as DCE (data communication equipment) with a 9-pin male SUB-D type connector. The pins are defined as:

Table 35: RS-232C Connection Table

Pin	Direction	Function
1	In	DCD
2	In	RxD
3	Out	TxD
4	Out	DTR
5		Ground
6	In	DSR
7	Out	RTS
8	In	CTS
9	In	RI

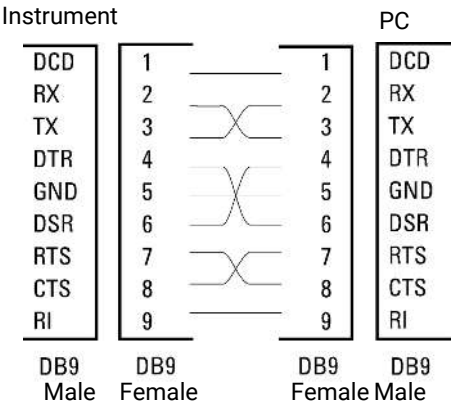


Figure 66: RS-232 Cable

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.

APG Remote

The APG Remote 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.

Remote control 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 36: Remote Signal Distribution

Pin	Signal	Description
1	DGND	Digital ground
2	PREPARE	(L) Request to prepare for analysis (for example, calibration, detector lamp on). Receiver is any module performing pre-analysis activities.

Pin	Signal	Description
3	START	(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.
4	SHUT DOWN	(L) System has serious problem (for example, leak: stops pump). Receiver is any module capable to reduce safety risk.
5		Not used
6	POWER ON	(H) All modules connected to system are switched on. Receiver is any module relying on operation of others.
7	READY	(H) System is ready for next analysis. Receiver is any sequence controller.
8	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.
9	START REQUEST	(L) Request to start injection cycle (for example, by start key on any module). Receiver is the autosampler.

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 communication board use ERI. This interface is already used in the Agilent Universal Interface Box 2 (UIB2)

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 37: 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.

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.

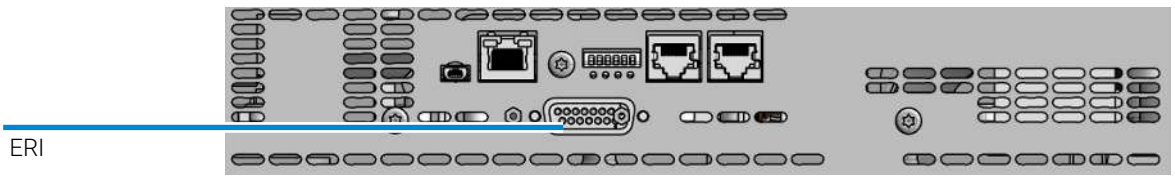
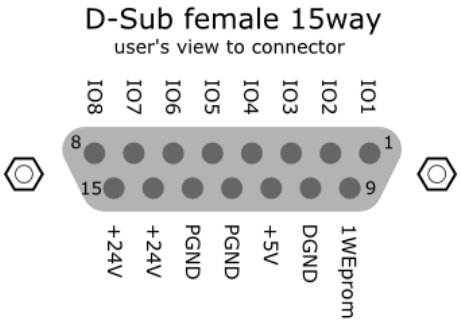


Figure 67: Location of the ERI interface



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)

The USB replaced the RS-232 and is used for service workflows, only.

For the InfinityLab Assist, the USB connector supports USB storage media of type FAT, FAT32, EXT4, vFAT. It can be used to perform perform software updates, data storage, or back up.

Special Interfaces

There is no special interface for this module.

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 (EMF)

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 needs 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.

Module-Specific Hardware Information

Setting the 6-bit Configuration Switch

The communication board provides the 6-bit configuration switch and is located at the rear of the module. Switch settings provide configuration parameters for LAN and instrument specific initialization procedures.

All modules with communication board:

- 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.

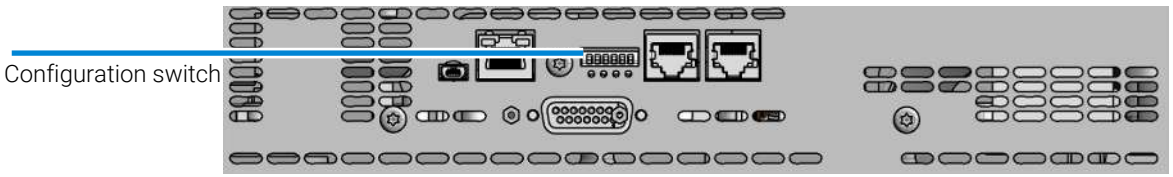


Figure 68: Location of configuration switch

Table 38: 6-bit configuration switch

SW1	SW2	SW3	SW4	SW5	SW6	Mode	Init Mode
0	0	0	0	0	0	COM	Use Default IP Address (192.168.254.11, Subnet mask: 255.255.255.0)
0	0	0	0	1	0	COM	Use Stored IP Address
0	0	0	1	0	0	COM	USE DHCP to request IP Address (Host name will be the MAC address)
1	0	0	0	0	0	Test	Boot Main System/Keep Data
1	1	0	0	0	0	Test	Boot Resident System/Keep Data
1	0	0	0	0	1	Test	Boot Main System/Revert to Default Data
1	1	0	0	0	1	Test	Boot Resident System/Revert to Default Data

Legend:

0 (switch down), 1 (switch up), SW (switch)

Special Settings

Boot-Resident/Main

Firmware update procedures may require this mode in case of firmware loading errors (main/resident firmware part).

If you use the following switch settings and power the instrument up again, the instrument firmware stays in the resident/main mode. In 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.

- Boot Main System / Revert to Default Data

  The instrument will boot to main mode and changes to the module's default parameter. May be also required to load resident firmware into the module.
- Boot Resident System / Revert to Default Data

  The instrument will boot to resident mode and changes to the module's default parameter. May be also required to load main firmware into the module.

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.**

Configuration Switch Settings of the Infinity Valve Drive

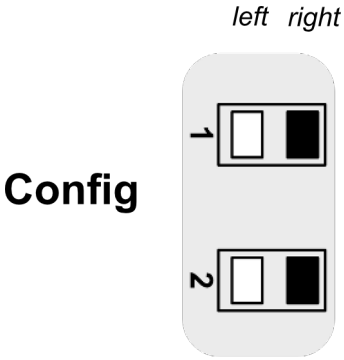


Figure 69: Config Switches

Table 39: Dip switches settings for G1170A

Mode select	1	2
Default	right	right
Coldstart	right	left
Boot resident	left	right
Not supported	left	left

13 LAN Configuration

This chapter provides information on connecting the module to the control software.

What You Have to Do First

The module has an on-board LAN communication interface.

NOTE

This chapter is generic and may show figures that differ from your module. The functionality is the same.

1 Note the MAC (Media Access Control) address for further reference. The MAC or hardware address of the LAN interfaces is a world wide unique identifier. No other network device will have the same hardware address. The MAC address can be found on a label at the rear of the module (see Figure 71 on page 502, or Figure 72 on page 502).

Part number of the mainboard
Revision Code, Vendor, Year and Week of assembly
MAC address
Country of Origin

Figure 70: MAC label (example)

2 Connect the instrument's LAN interface to

- the PC network card using a crossover network cable (point-to-point) or
- a hub or switch using a standard LAN cable.

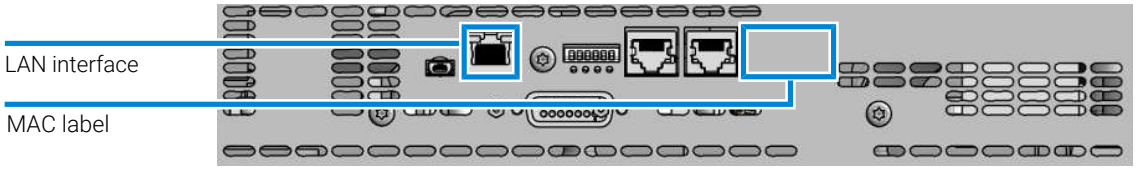


Figure 71: Location of LAN interfaces and MAC label (board with 6-bit configuration switch)

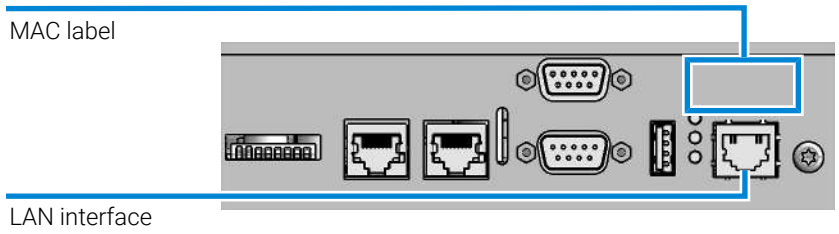


Figure 72: Location of LAN interfaces and MAC label (board with 8-bit configuration switch)

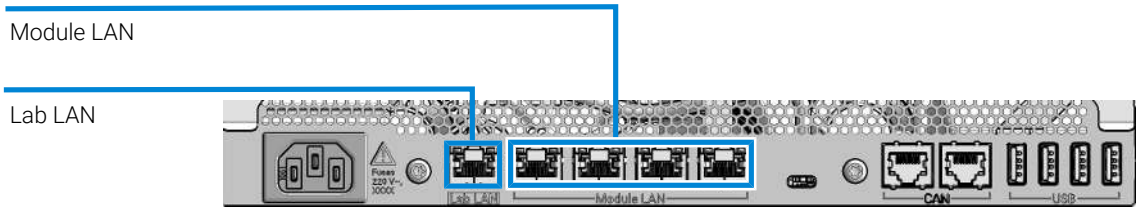


Figure 73: Location of LAN interfaces (InfinityLab Assist Hub)

TCP/IP Parameter Configuration

To operate properly in a network environment, the LAN interface must be configured with valid TCP/IP network parameters. These parameters are:

- IP address
- Subnet Mask
- Default Gateway

The TCP/IP parameters can be configured by the following methods:

- by automatically requesting the parameters from a network-based DHCP Server (using the so-called Dynamic Host Configuration Protocol). This mode requires a LAN-onboard Module or a G1369C LAN Interface card, see Setup (DHCP) on page 512
- by manually setting the parameters using the Local Controller

The LAN interface differentiates between several initialization modes. The initialization mode (short form 'init mode') defines how to determine the active TCP/IP parameters after power-on. The parameters may be derived non-volatile memory or initialized with known default values. The initialization mode is selected by the configuration switch, see on page 506.

Configuration Switch and Mode Selection

The module is shipped with all switches (SW) set to OFF.

NOTE To perform any LAN configuration, SW1 and SW2 must be set to OFF.

Configuration Switch (8-Bit)

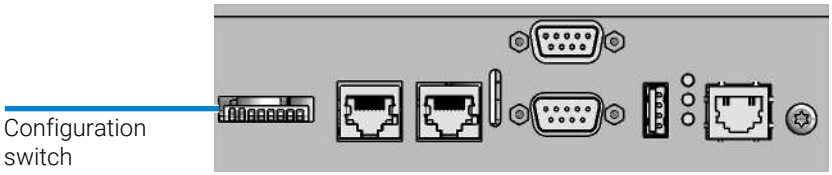


Figure 74: Location of configuration switch (8-bit) at the rear of the module

Table 40: Overview of 8-bit configuration switch settings

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	Mode	Init Mode
0	0	0	x	x	x	x	x	Link config	Speed and duplex mode determined by autonegotiation [1]
0	0	1	0	0	x	x	x	Link config	10 MBit, half-duplex [1]
0	0	1	0	1	x	x	x	Link config	10 MBit, full-duplex [1]
0	0	1	1	0	x	x	x	Link config	100 MBit, half-duplex [1]
0	0	1	1	1	x	x	x	Link config	100 MBit, full-duplex [1]
0	0	x	x	x	0	1	0	Init Mode Selection	Using stored
0	0	x	x	x	1	0	0	Init Mode Selection	USE DHCP to request IP Address (Host name will be the MAC address) [2]
0	0	x	x	x	0	1	1	Init Mode Selection	Use Default IP Address (192.168.254.11, Subnet mask: 255.255.255.0)
1	1	1	0	0	0	0	0	Test	Boot Resident System
1	1	0	0	0	0	0	1	Test	Revert to Default Data (Coldstart)

[1] The LAN interface supports 10 or 100 Mbps operation in full- or half-duplex modes. In most cases, full-duplex is supported when the connecting network device - such as a network switch or hub - supports IEEE 802.3u auto-negotiation specifications.
When connecting to network devices that do not support auto-negotiation, the LAN interface will configure itself for 10- or 100-Mbps half-duplex operation.
For example, when connected to a non-negotiating 10-Mbps hub, the LAN interface will be automatically set to operate at 10-Mbps half-duplex.
If the module is not able to connect to the network through auto-negotiation, you can manually set the link operating mode using link configuration switches on the module.

[2] Requires firmware B.06.40 or above. Modules without LAN on board, see G1369C LAN Interface Card

Legend:
- SW = switch
- 0 = off (SW down)
- 1 = on (SW up)
- x = optional setting

Configuration Switch (6-Bit)

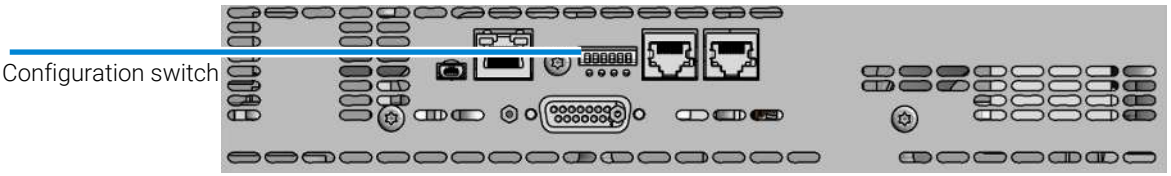
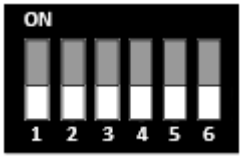


Figure 75: Location of configuration switch (6-bit) at the rear of the module

Table 41: Overview of 6-bit configuration switch settings

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	Mode	Init Mode
0	0	0	0	0	0	-	-	COM	Use Default IP Address (192.168.254.11, Subnet mask: 255.255.255.0)
0	0	0	0	1	0	-	-	COM	Use Stored IP Address
0	0	0	1	0	0	-	-	COM	USE DHCP to request IP Address (Host name will be the MAC address)
1	0	0	0	0	0	-	-	Test	Boot Main System/Keep Data
1	1	0	0	0	0	-	-	Test	Boot Resident System/Keep Data
1	0	0	0	0	1	-	-	Test	Boot Main System/Revert to Default Data
1	1	0	0	0	1	-	-	Test	Boot Resident System/Revert to Default Data



Legend:
- SW = switch
- - = not available
- 0 = off (SW down)
- 1 = on (SW up)

Configuration Switch (2-Bit)

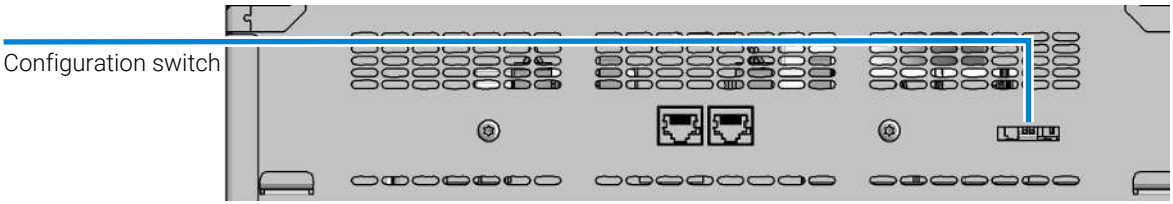


Figure 76: Location of configuration switch (2-bit) (G7116A/B) at the rear of the module

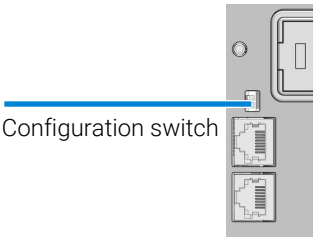


Figure 77: Location of configuration switch (2-bit) (G1170A, G7166A, G7170B) at the rear of the module

Table 42: Overview of 2-bit configuration switch settings (G1170A, G7116A/B, G7166A, G7170B)

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	Mode	Init Mode
0	0	-	-	-	-	-	-	COM	Default
0	1	-	-	-	-	-	-	Test	Coldstart
1	0	-	-	-	-	-	-	Test	Boot resident
1	1	-	-	-	-	-	-	Not supported	Not supported

Legend:
- SW = switch
- - = not available
- **G7116A/B:**
  - 0 = off (SW up)
  - 1 = on (SW down)
- **G1170A, G7166A, G7170B:**
  - 0 = off (SW right)
  - 1 = on (SW left)

Configuration Switch (1-Bit)

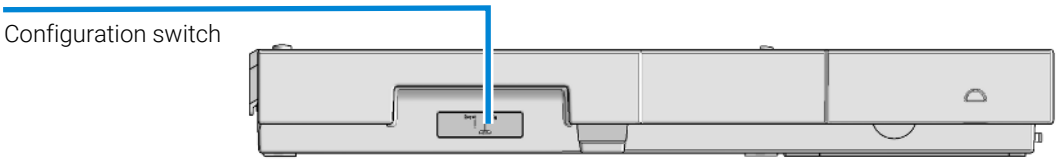


Figure 78: Location of configuration switch (InfinityLab Assist Hub) at the side of the module

Table 43: Overview of 1-bit configuration switch settings (G7180A)

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	Mode	Init Mode
0	-	-	-	-	-	-	-	Not supported	Configure the IP address (by using specific data or automatically with DHCP server)
1	-	-	-	-	-	-	-	Not supported	Configure default IP address (192.168.254.11

Legend:
- SW = switch
- - = not available
- 0 = off (SW front = right)
- 1 = on (SW back = left)

Using Stored

When initialization mode **Using Stored** is selected, the parameters are taken from the non-volatile memory of the module. The TCP/IP connection will be established using these parameters. The parameters were configured previously by one of the described methods.

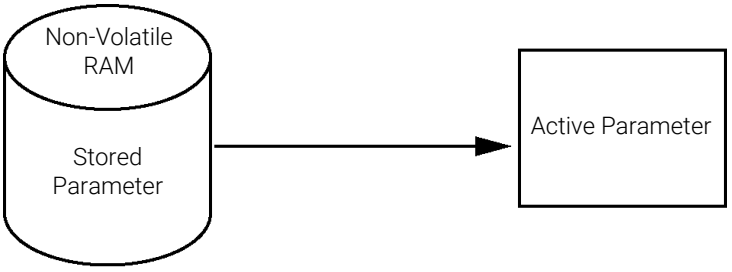


Figure 79: Using Stored (principle)

Using Default

When **Using Default** is selected, the factory default parameters are taken instead. These parameters enable a TCP/IP connection to the LAN interface without further configuration, see Table 44 Using default parameters on page 509.

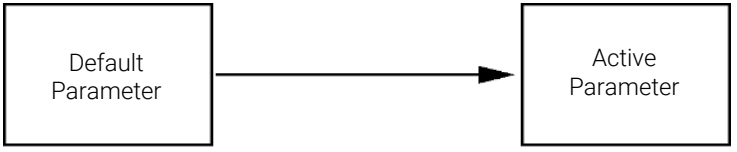


Figure 80: Using Default (principle)

NOTE

Using the default address in your local area network may result in network problems. Take care and change it to a valid address immediately.

Table 44: Using default parameters

IP address:	192.168.254.11
Subnet Mask:	255.255.255.0
Default Gateway	not specified

Since the default IP address is a so-called local address, it will not be routed by any network device. Thus, the PC and the module must reside in the same subnet.

The user may open a Telnet session using the default IP address and change the parameters stored in the non-volatile memory of the module. He may then close the session, select the initialization mode Using Stored, power-on again and establish the TCP/IP connection using the new parameters.

When the module is wired to the PC directly (e.g. using a cross-over cable or a local hub), separated from the local area network, the user may simply keep the default parameters to establish the TCP/IP connection.

NOTE

In the Using Default mode, the parameters stored in the memory of the module are not cleared automatically. If not changed by the user, they are still available, when switching back to the mode Using Stored.

Dynamic Host Configuration Protocol (DHCP)

General Information (DHCP)

The Dynamic Host Configuration Protocol (DHCP) is an auto configuration protocol used on IP networks. The DHCP functionality is available on all Agilent HPLC modules with on-board LAN Interface or LAN Interface Card G1369C, and “B”-firmware (B.06.40 or above) or modules with "D"-firmware. All modules should use latest firmware from the same set.

When the initialization mode “DHCP” is selected, the card tries to download the parameters from a DHCP Server. The parameters obtained become the active parameters immediately. They are not stored to the non-volatile memory of the card.

Besides requesting the network parameters, the card also submits its hostname to the DHCP Server. The hostname equals the MAC address of the card, e.g. *0030d3177321*. It is the DHCP server's responsibility to forward the hostname/address information to the Domain Name Server. The card does not offer any services for hostname resolution (e.g. NetBIOS).

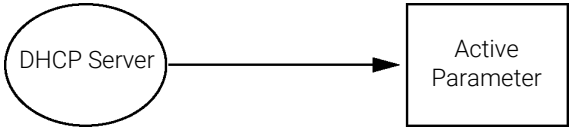


Figure 81: DHCP (principle)

NOTE

- It may take some time until the DHCP server has updated the DNS server with the hostname information.
- It may be necessary to fully qualify the hostname with the DNS suffix, e.g. *0030d3177321.country.company.com*.
- The DHCP server may reject the hostname proposed by the card and assign a name following local naming conventions.

Setup (DHCP)

The DHCP functionality is available on all Agilent HPLC modules with on-board LAN Interface or LAN Interface Card G1369C, and “B”-firmware (B.06.40 or above) or modules with "D"-firmware. All modules should use latest firmware from the same set.

1 Note the MAC address of the LAN interface (provided with G1369C LAN Interface Card or mainboard). This MAC address is on a label on the card or at the rear of the mainboard, for example, *0030d3177321*.

On the Local Controller the MAC address can be found under **Details** in the LAN section.

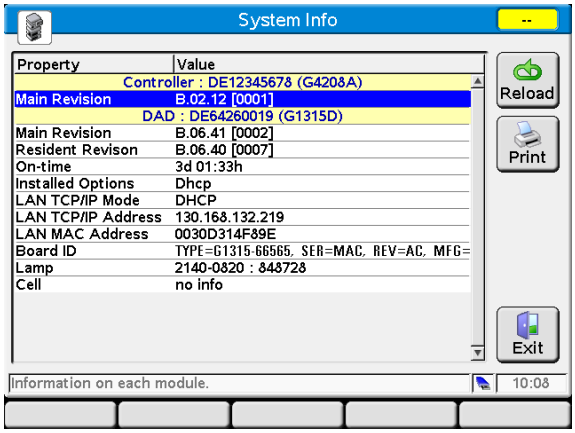


Figure 82: LAN setting on Instant Pilot

2 Set the configuration switch to DHCP either on the G1369C LAN Interface Card or the mainboard of above mentioned modules.

Table 45: G1369C LAN Interface Card (configuration switch on the card)

SW 4	SW 5	SW 6	SW 7	SW 8	Initialization Mode
ON	OFF	OFF	OFF	OFF	DHCP

3 Turn on the module that hosts the LAN interface.

4 Configure your Control Software (e.g. OpenLAB CDS ChemStation Edition, Lab Advisor) and use MAC address as host name, e.g. *0030d3177321*.

The LC system should become visible in the control software (see Note in section General Information (DHCP) on page 511).

Manual Configuration

Manual configuration only alters the set of parameters stored in the non-volatile memory of the module. It never affects the currently active parameters. Therefore, manual configuration can be done at any time. A power cycle is mandatory to make the stored parameters become the active parameters, given that the initialization mode selection switches are allowing it.

PC and User Interface Software Setup

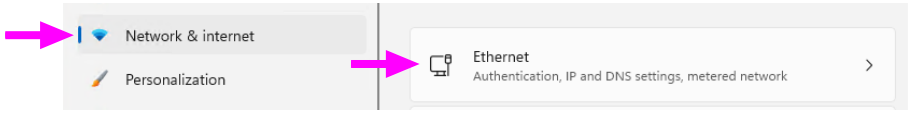
PC Setup for Local Configuration

This procedure describes the change of the TCP/IP settings on your PC to match the module's default parameters in a local configuration (see Table 44 Using default parameters on page 509).

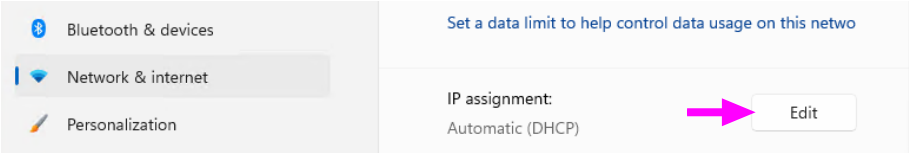
The individual steps may vary depending on the operating system. Below you can find the steps to set up a static IP address in Windows 11.

1 Navigate to the settings on your PC (Windows **Start** menu > **Settings**).

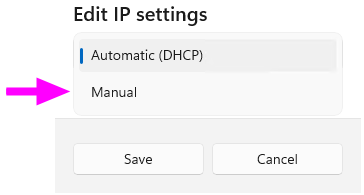
2 Under **Network and internet**, select **Ethernet**.



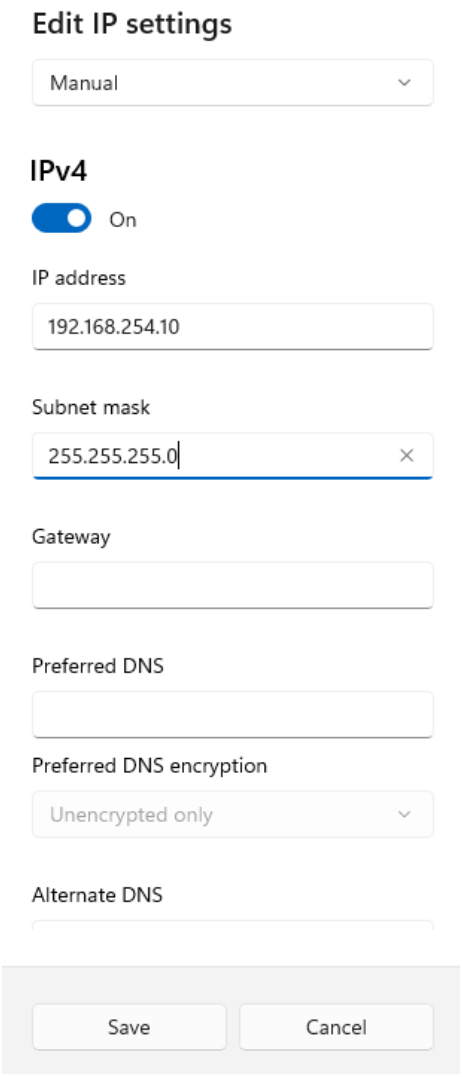
3 In section **IP assignment**, click **Edit**.



4 To edit the IP settings, select **Manual** from the drop-down list.



5 Enable (toggle) the **IPv4** connection and enter the following IP address settings:



6 Save your configuration settings.

14 Appendix

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

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.

WARNING Use of unsupplied cables

Using cables not supplied by Agilent Technologies can lead to damage of the electronic components or personal injury.

- Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

NOTE Note the instrument's external markings described under Safety Symbols on page 527.

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.**

Solvent Information

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.**
- **Do not use bottles that exceed the maximum permissible volume (2.5 L) as specified in the usage guidelines.**
- **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.

Recommendations on the Use of Solvents

Observe the following recommendations on the use of solvents.

- Brown glass ware can avoid growth of algae.
- 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.
- 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.

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.

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.

Refrigerant

Table 46: Physical properties of refrigerant R600a (isobutane)

Molecular weight	58.12
Critical temperature	134.98 °C
Critical pressure	36.6 bar
Boiling point	-11.7 °C

CAUTION General hazards and improper disposal

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

- The disposal or scrapping of 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 http://www.agilent.com for more info.

CAUTION

Risk of fire or explosion

- Dispose of properly in accordance with federal or local regulations. Flammable Refrigerant Used.
- Do not dispose of in domestic household waste.
- To return unwanted products, contact your local Agilent office, or see http://www.agilent.com for more information.

Magnets

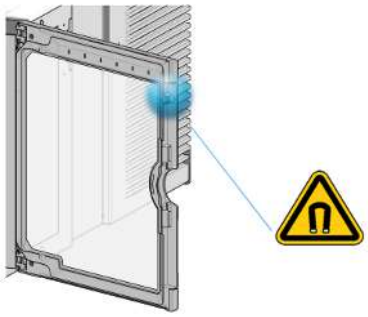


Figure 83: Magnet in door of the multisampler

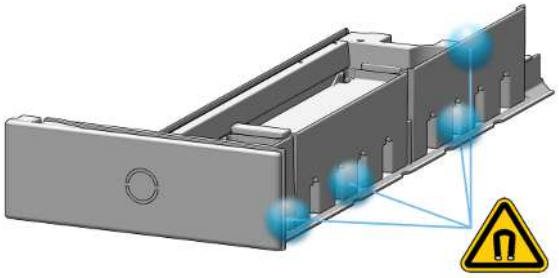
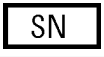


Figure 84: Magnets in drawers of the multisampler

Safety Symbols

Table 47: 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.
	Indicates flammable material used. Consult the Agilent Information Center / User Manual before attempting to install or service this equipment. Follow all safety precautions.
	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.
	Product Number
	Serial Number
	Power symbol indicates On/Off. The apparatus is not completely disconnected from the mains supply when the on/off 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.

	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

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.**

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.

Material Information

This section provides detailed information about materials used in the HPLC system and general information about solvent/material compatibility.

General Information About Solvent/Material Compatibility

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 pumps, the G7104C and for normal phase applications in 1260 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.

Prolonged exposure to hexafluoroisopropanol (HFIP) may reduce the lifespan of parts that come into contact with it. To ensure the longest possible lifespan of these parts, fittings must be leak-free. If a leak occurs, clean the surface as soon as possible.

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.

At-a-Glance Details About Agilent Capillaries

The following section provides useful information about Agilent capillaries and its characteristics.

Syntax for capillary description

Type - Material - Capillary dimensions - Fitting Left/Fitting right

Table 48: Example for a capillary description

Code provided with the part	Meaing of the code
Color code: 	Material of the product is MP35N, the inner diameter is 0.20 or 0.25 mm
Capillary	The part is a connection capillary
MP35N	Material of the part is MP35N
0.25 x 80 mm	The part has an inner diameter of 0.25 mm and a length of 80 mm
SI/SI	Left fitting: Swagelok + 1.6 mm Port id, Intermediate Right fitting: Swagelok + 1.6 mm Port id, Intermediate

To get an overview of the code in use, see

- Color: Table 49 Color-coding key for Agilent capillary tubing on page 539
- Type: Table 50 Type (gives some indication on the primary function, like a loop or a connection capillary) on page 539
- Material: Table 51 Material (indicates which raw material is used for the capillary) on page 540
- Dimension: Table 52 Capillary dimensions (indicates inner diameter (id), length, and volume of the capillary) on page 540
- Fittings: Table 53 Fitting left/fitting right (indicates which fitting is used on both ends of the capillary) on page 541

Color Coding Guide

Table 49: 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

NOTE

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.

Abbreviation Guide for Type

Table 50: Type (gives some indication on the primary function, like a loop or a connection capillary)

Key	Description
Capillary	Connection capillaries
Loop	Loop capillaries
Seat	Autosampler needle seats

Key	Description
Tube	Tubing
Heat exchanger	Heat exchanger

Abbreviation Guide for Material

Table 51: Material (indicates which raw material is used for the capillary)

Key	Description
ST	Stainless steel
Ti	Titanium
PK	PEEK
FS/PK	PEEK-coated fused silica [1]
PK/ST	Stainless steel-coated PEEK [2]
PFFE	PTFE
FS	Fused silica
MP35N	Nickel-cobalt-chromium-molybdenium alloy

[1] Fused silica in contact with solvent

[2] Stainless steel-coated PEEK

Abbreviation Guide for Capillary Dimensions

Table 52: Capillary dimensions (indicates inner diameter (id), length, and volume of the capillary)

Description
id (mm) x Length (mm)
Volume (µL)

Abbreviation Guide for Fitting Left/Fitting Right

Table 53: Fitting left/fitting right (indicates which fitting is used on both ends of the capillary)

Key	Description
W	Swagelok + 0.8 mm Port id
S	Swagelok + 1.6 mm Port id
M	Metric M4 + 0.8 mm Port id
E	Metric M3 + 1.6 mm Port id
U	Swagelok union
L	Long
X	Extra long
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

Waste Electrical and Electronic Equipment (WEEE) 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

เครื่องโทรคมนาคมและอุปกรณ์นี้มีความสอดคล้องตามมาตรฐานหรือข้อกำหนดทางเทคนิคของ กสทช.

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 54: 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

UV-Radiation

NOTE

This information is only valid for UV-lamps without cover (e.g. 2140-0590 and 2140-0813).

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 55: UV-Radiation Limits

Exposure/day	Effective Irradiance
8 hours	0.1 µW/cm2
10 minutes	5.0 µW/cm2

Typically the radiation values are much smaller than these limits:

Table 56: UV-Radiation Typical Values

Position	Effective Irradiance
Lamp installed, 50 cm distance	Average 0.016 µW/cm2
Lamp installed, 50 cm distance	Maximum 0.14 µW/cm2

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

(Date)

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Stephan Baumbach
(Quality Manager)

P/N 89550-90501

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Effective by: 28-Oct-2014

Agilent Technologies on Internet

For the latest information on products and services visit our worldwide web site on the Internet at:

https://www.agilent.com

In This Book

This manual contains technical reference information about the Agilent InfinityLab Online LC Solution.

The manual describes the following:

- introduction,
- site requirements and specifications,
- installation,
- using the solution modules,
- optimizing performance,
- troubleshooting and diagnostics,
- error information,
- maintenance,
- parts and materials,
- hardware information,
- LAN configuration,
- safety and related information.

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