Notices

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

This document is for the Agilent InfinityLab Online LC Solution including Agilent InfinityLab 1260 Infinity II Online Sample Manager module (G3167A).

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

2 Site Requirements and Specifications
This chapter provides information on environmental, hardware and software requirements, physical and performance specifications.

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

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

5 Using the Solution Modules
This chapter explains the essential operational parameters of the solution modules.

6 Maintenance and Repair
This chapter describes the maintenance and repair of the InfinityLab Online LC Solution modules.

7 Parts for Maintenance and Repair
This chapter provides information on parts material required for the solution modules.
8 Test Functions and Calibration
This chapter describes the built in test functions.

9 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.

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

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

12 Appendix
This chapter provides additional information on safety, legal, and web.
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1 Introduction

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

Product Structure

The Agilent InfinityLab Online LC Solution hardware consists of the Agilent 1260 Infinity II Online Sample Manager module (G3167A) and the Agilent 1290 Infinity II Valve Drive (G1170A) equipped with a 3-position/6-port FI valve, used together as the Agilent 1260 Online Sample Manager Set (G3167AA). This set 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.

Figure 1  InfinityLab Online LC Solution Product Structure
Product Description

Online Sample Manager

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

The Online Sample Manager supports both classical flow-through injection and Agilent 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.
External Sampling Valve

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

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

![Overview of the External Sampling Valve](image)

**Figure 3** Overview of the External Sampling Valve
Product Features

- 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 Agilent Feed Injection to mediate strong sample diluent effects.
Hardware Concept

The Figure 4 on page 14 shows the overview of the main hardware components of the Agilent InfinityLab Online LC Solution.

The following components of the 1260 Online Sample Manager Set are shown schematically:

- Infinity II 1260 Online Sample Manager (G3167A)
- External Sampling Interface (External Valve Drive (G1170A) equipped with 3-position/6-port FI Valve)
- Capillary connections

The Injection Valve is part of the Online Sample Manager (3167A). It has capillary connections to the Flush Head, the Flexible Pump (G7104C), the column, and the outlet. Two transfer capillaries connect the Injection Valve with the External Sampling Valve on the External Valve Drive (G1170A). With the External Sampling Valve, samples can be taken from the reaction stream. Therefore, the External Sampling Valve is connected to the Metering Device and the Needle Seat. Depending on the injection mode, the drawn sample can be directly analyzed via Flow Through or Agilent Feed Injection, diluted or stored in a vial.
The detailed flow scheme of the Online Sample Manager Set is shown in Figure 5 on page 15.

![Flow scheme of the 1260 Infinity II Online Sample Manager Set (G3167AA)](image-url)

**Figure 5** Flow scheme of the 1260 Infinity II Online Sample Manager Set (G3167AA)
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 Workstation Plus 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.

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.

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.
2 Site Requirements and Specifications

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

Power Considerations

The module power supply has wide ranging capability. It accepts any line voltage in the range described in Table 5 on page 26. Consequently there is no voltage selector in the rear of the module. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

**WARNING**
Hazard of electrical shock or damage of your instrumentation can result, if the devices are connected to a line voltage higher than specified.

- Connect your instrument to the specified line voltage only.

**WARNING**
Electrical shock hazard
The module is partially energized when switched off, as long as the power cord is plugged in.

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

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

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

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

Site Requirements

Power Cords

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

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

**WARNING**

*Unintended use of power cords*

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

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

**WARNING**

*Absence of ground connection*

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

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

Site Requirements

InfinityLab Online LC Solution User Manual

Bench Space

The module dimensions and weight (see Table 5 on page 26) 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.

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

WARNING

Electrical shock hazard
Solvents may damage electrical cables.

- Prevent electrical cables from getting in contact with solvents.
- Exchange electrical cables after contact with solvents.

NOTE

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

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 m³ (1 m³ for every 8 g of R600a refrigerant inside of the Sample Thermostat).
- Ensure adequate ventilation: typical air exchange of 25 m³/h per m² 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

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

Condensation

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.

Table 1  PC Workstation Hardware Requirements

<table>
<thead>
<tr>
<th>Specification Description</th>
<th>Workstation Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor type and speed</td>
<td>Intel® i5, i7, or Xeon E3 or equivalent 3.0 GHz or greater 4 Core</td>
</tr>
<tr>
<td>Memory</td>
<td>Ensure that at least 4 GB is reserved for the Windows operating system.</td>
</tr>
<tr>
<td>USB Port</td>
<td>USB 2 required for installation via provided media</td>
</tr>
<tr>
<td>Video devices</td>
<td>Graphic resolution: 1600 x 900 minimum 1920 x 1080 recommended</td>
</tr>
</tbody>
</table>

Table 2  Software Requirements

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

### Workstation Requirements

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

System Specifications

Table 4  Performance Specifications (G3167AA)

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

**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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
</table>
## Physical Specifications (G3167A)

### Table 5  Physical Specifications G3167A

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

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.
## Site Requirements and Specifications

### Specifications

#### Performance Specifications (G3167A)

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection mode</td>
<td>Classical Flow Through or Agilent Feed Injection</td>
<td></td>
</tr>
<tr>
<td>Injection range</td>
<td>Default 0.1 – 100 µL in 0.1 µL increments (0.1 – 40 µL with Agilent Feed Injection)</td>
<td>Up to 800 bar</td>
</tr>
<tr>
<td>Injection precision</td>
<td>&lt;0.15 % RSD or SD ≤ 30 nL, whatever is greater</td>
<td>Measured caffeine</td>
</tr>
<tr>
<td>Injection linearity</td>
<td>0.9999 in the range of 0.1 – 40 µL</td>
<td>Measured caffeine</td>
</tr>
<tr>
<td>Pressure range</td>
<td>Up to 800 bar</td>
<td></td>
</tr>
<tr>
<td>Sample capacity</td>
<td>1H Drawer up to 8 drawers and 16 positions shallow well plates (MTP)</td>
<td>Max. 6144/1536 samples (384 MTP/96)</td>
</tr>
<tr>
<td></td>
<td>2H Drawer up to 4 drawers and 8 positions MTP, deep well plates, vials, Eppendorf</td>
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<td>1536 samples, 60 vials (6 mL), 384 vials (1 mL), 216 vials (2 mL)</td>
</tr>
<tr>
<td>Injection cycle time</td>
<td>&lt;10 s using following standard conditions:</td>
<td>Time between 2 injections is not mechanically limited, time delay depends on communication speed of software, OS or network connections</td>
</tr>
<tr>
<td>vial injections</td>
<td>Default draw speed: 100 µL/min Default eject speed: 400 µL/min Injection volume: 1 µL</td>
<td></td>
</tr>
<tr>
<td>Carrying over</td>
<td>&lt;0.003 % (30 ppm)</td>
<td>Sample: Chlorhexidine</td>
</tr>
<tr>
<td>Instrument control</td>
<td>LC &amp; CE Drivers 3.4 or above Lab Advisor 2.17 or above</td>
<td>For details about supported software versions refer to the compatibility matrix of your version of the LC &amp; CE Drivers</td>
</tr>
<tr>
<td>Communication</td>
<td>Controller Area Network (CAN), Local Area Network (LAN), ERI: ready, start, stop and shut-down signals</td>
<td></td>
</tr>
</tbody>
</table>
### Site Requirements and Specifications

#### Specifications

- **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

#### Table 6  Performance Specifications (G3167A)

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance and safety-related features</td>
<td>Extensive diagnostics, error detection and display with Agilent Lab Advisor software</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leak detection, safe leak handling, leak output signal for shutdown of pumping system, and low voltages in major maintenance areas</td>
<td></td>
</tr>
<tr>
<td>GLP features</td>
<td>Early maintenance feedback (EMF) for continuous tracking of instrument usage with user-settable limits and feedback messages. Electronic records of maintenance and errors</td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td>All materials recyclable</td>
<td></td>
</tr>
</tbody>
</table>
## Physical Specifications (G1170A)

### Table 7  Physical Specifications G1170A

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>1.9 kg (4.3 lbs)</td>
<td></td>
</tr>
<tr>
<td>Dimensions (height x width x depth)</td>
<td>90 x 90 x 300 m (3.54 x 3.54 x 11.8 inches)</td>
<td></td>
</tr>
<tr>
<td>Line voltage</td>
<td>100 – 240 V~, ± 10 %</td>
<td>Wide-ranging capability</td>
</tr>
<tr>
<td>Line frequency</td>
<td>50 or 60 Hz, ± 5 %</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>20 VA, 4 W</td>
<td></td>
</tr>
<tr>
<td>Ambient operating temperature</td>
<td>4 - 55 °C (39 - 131 °F)</td>
<td></td>
</tr>
<tr>
<td>Ambient non-operating temperature</td>
<td>-40 – 70 °C (-40 – 158 °F)</td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>&lt; 95 % r.h. at 40 °C (104 °F)</td>
<td>Non-condensing</td>
</tr>
<tr>
<td>Operating altitude</td>
<td>Up to 3000 m (9842 ft)</td>
<td></td>
</tr>
<tr>
<td>Safety standards:</td>
<td>Overvoltage category II, Pollution degree 2</td>
<td>For indoor use only.</td>
</tr>
<tr>
<td>IEC, EN, CSA, UL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISM Classification</td>
<td>ISM Group 1 Class B</td>
<td>According to CISPR 11</td>
</tr>
</tbody>
</table>
Chapter 3

Installing the Solution

Hardware Installation 31
Leak and Waste Handling 31
Preparing the Solution Modules 37
External Devices 52
Software Installation 57
Installation 57
Licensing 58
Software Maintenance 64
Configuring the System 65
Hardware Configuration Settings 65
Control Software Configuration Settings 67
Lab Advisor Configuration Settings 80

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

Leak and Waste Handling

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

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

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

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

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

- from the detector’s flow cell outlet
- from the Online Sample Manager needle wash port
- from the Sample Cooler or Sample Thermostat (condensate)
- from the pump’s Seal Wash Sensor (if applicable)
- from the pump’s Purge Valve or Multipurpose Valve
- from the External Sampling Valve’s leak pane
Figure 6  Infinity II Prime Online LC System Leak Waste Concept (Flex Bench installation)
Figure 7  Infinity II Prime Online LC System One Stack Leak Waste Concept (bench installation)
3 Installing the Solution

Hardware Installation

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

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

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

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

Leak and Waste Handling

**WARNING**

Toxic, flammable and hazardous solvents, samples and reagents

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

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

**NOTE**

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

For details on correct installation, see separate installation documentation.
Preparing the Online Sample Manager

For best performance of the Online Sample Manager:

- When using the Online Sample Manager in a system with a vacuum degassing unit, shortly degas your samples before using them in the Online Sample Manager.

- Filter samples before use in an InfinityLab LC Series system. Use 1290 Infinity II inline filter (0.3 µm) (5067-6189) for inline filtering.

- 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 156.

- 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.

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

NOTE

This inline filter contains stainless steel and is not indicated for use in bio-inert or bio-compatible systems.
## Recommended Mats and Vials

Table 9  Recommended plates and closing mats

<table>
<thead>
<tr>
<th>Description (Part Number)</th>
<th>Rows</th>
<th>Columns</th>
<th>Plate height (mm)</th>
<th>Volume (µL)</th>
<th>Package</th>
<th>Closing mat compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>384Agilent (5042-1388)</td>
<td>16</td>
<td>24</td>
<td>14.4</td>
<td>80</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>384Corning (No Agilent PN)</td>
<td>16</td>
<td>24</td>
<td>14.4</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>384Nunc (No Agilent PN)</td>
<td>16</td>
<td>24</td>
<td>14.4</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96 well plate 0.5 ml, PP (pack of 10) (5042-1386)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>500</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>96 well plate 0.5 ml, PP (pack of 120) (5042-1385)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>500</td>
<td>120</td>
<td>1</td>
</tr>
<tr>
<td>96 well plate 0.5 ml, PP (pack of 10) (5042-1386)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>500</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>96 well plate 0.5 ml, PP (pack of 120) (5042-1385)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>500</td>
<td>120</td>
<td>1</td>
</tr>
<tr>
<td>96 well plate 0.5 ml, PP (pack of 10) (5042-1386)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>500</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>96 well plate 0.5 ml, PP (pack of 120) (5042-1385)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>500</td>
<td>120</td>
<td>1</td>
</tr>
<tr>
<td>96 well plate, square wells, U shape, PP (5043-9300)</td>
<td>8</td>
<td>12</td>
<td>41</td>
<td>2200</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>96 well plate, round wells, U shape, PP (5043-9302)</td>
<td>8</td>
<td>12</td>
<td>45.3</td>
<td>2000</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>96 well plate, round wells, U shape, PP (5043-9305)</td>
<td>8</td>
<td>12</td>
<td>32</td>
<td>1000</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>96 well plate, round wells, U shape, PP (5043-9308)</td>
<td>8</td>
<td>12</td>
<td>27</td>
<td>1200</td>
<td>25</td>
<td>3</td>
</tr>
<tr>
<td>96 well plate, round wells, U shape, PP (5043-9309)</td>
<td>8</td>
<td>12</td>
<td>27</td>
<td>1200</td>
<td>50</td>
<td>3</td>
</tr>
</tbody>
</table>
## Table 9  Recommended plates and closing mats

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

1  Closing mat for all 96 Agilent plates (5042-1389)
2  Mat 96 wells, square, pierceable, silicone 50/pk (5043-9319)
3  Mat 96 wells, round, pierceable, silicone 50/pk (5043-9317), Mat 96 wells, round, piercable, silicone 100/pk (5043-9318)
4  Mat 384 wells, square, pierceable, silicone 50/pk (5043-9320)
Table 10  Recommended vial plates

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

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

**NOTE**  Agilent Technologies recommends to use preslit septa.

**NOTE**  Bottom sensing is a feature to detect the depth of vials or plates via the software. If the bottom sensing feature is used, the bottom of the plates and vials must resist the needle. Make sure that the material supports this feature. Inserts with flexible support should not be used.

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

**NOTE**  In case of custom-made wellplates or vials, please keep in mind the physical limitations of each drawer. The maximum total height allowed (including sample container and vial caps, if present) is:

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

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

If the plate you are using is not found on the “Recommended Mats and Vials” on page 39 you may configure a custom plate. Measure the exact dimensions of the plate as marked below and enter the values in the plate configuration table of the chromatographic data system.

Figure 9  Well Plate Dimensions (straight)
Figure 10  Well Plate Dimensions (staggered)
### Table 11  Well Plate Dimensions

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

**NOTE**
The distances need to be measured with high precision. It is recommended to use calipers.
## Capillary Color Coding Guide

### Syntax for Capillary Description

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

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Material</th>
<th>Fitting left/fitting right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capillary</td>
<td>Connection capillaries</td>
<td>ST Stainless steel</td>
<td>W Swagelok + 0.8 mm Port id</td>
</tr>
<tr>
<td>Loop</td>
<td>Loop capillaries</td>
<td>Ti Titanium</td>
<td>S Swagelok + 1.6 mm Port id</td>
</tr>
<tr>
<td>Seat</td>
<td>Autosampler needle seats</td>
<td>PK PEEK</td>
<td>M Metric M4 + 0.8 mm Port id</td>
</tr>
<tr>
<td>Tube</td>
<td>Tubing</td>
<td>FS/PK PEEK-coated fused silica¹</td>
<td>E Metric M3 + 1.6 mm Port id</td>
</tr>
<tr>
<td>Heat exchanger</td>
<td>Heat exchanger</td>
<td>PK/ST Stainless steel-coated PEEK²</td>
<td>U Swagelok union</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key/Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ST</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Ti</td>
<td>Titanium</td>
</tr>
<tr>
<td>PK</td>
<td>PEEK</td>
</tr>
<tr>
<td>FS/PK</td>
<td>PEEK-coated fused silica¹</td>
</tr>
<tr>
<td>PK/ST</td>
<td>Stainless steel-coated PEEK²</td>
</tr>
<tr>
<td>PFFE</td>
<td>PTFE</td>
</tr>
<tr>
<td>FS</td>
<td>Fused silica</td>
</tr>
<tr>
<td>MP35N</td>
<td>Nickel-cobalt-chromium-molybdenium alloy</td>
</tr>
<tr>
<td>G</td>
<td>Small head SW 4</td>
</tr>
<tr>
<td>N</td>
<td>Small head SW 5</td>
</tr>
<tr>
<td>F</td>
<td>Finger-tight</td>
</tr>
<tr>
<td>V</td>
<td>1200 bar</td>
</tr>
<tr>
<td>B</td>
<td>Bio</td>
</tr>
<tr>
<td>P</td>
<td>PEEK</td>
</tr>
<tr>
<td>I</td>
<td>Intermediate</td>
</tr>
</tbody>
</table>

¹ Fused silica in contact with solvent

² Stainless steel-coated PEEK
At-a-Glance Color-Coding Keys

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

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

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

Install Capillary Connections

For correct installation of capillary connections it's important to choose the correct fittings, see “Syntax for Capillary Description” on page 45.

1. Select a nut that is long enough for the fitting you'll be using.

2. Slide the nut over the end of the tubing or capillary.

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

4. Use a column or injection valve to gently tighten the fitting which forces the ferrule to seat onto the tubing or capillary.

**NOTE**
Don't overtighten. Overtightening will shorten the lifetime of the fitting.
5 Loosen the nut and verify that the ferrule is correctly positioned on the tubing or capillary.

![Correct positioning](image)

![Incorrect positioning](image)

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

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

### Table 14  Capillary Connections of the Injection Valve

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>5500-1246</td>
<td>Capillary ST 0.17 mm x 500 mm SI/SI</td>
<td>Injection Valve Port 1</td>
<td>Pump</td>
</tr>
<tr>
<td>5005-0057</td>
<td>Transfer Capillary II, ST 0.17 mm x 160 mm SL/SL</td>
<td>Injection Valve Port 2</td>
<td>External Sampling Valve Port 3</td>
</tr>
<tr>
<td>5067-5709</td>
<td>Capillary ST 0.25 mm x 250 mm S/S</td>
<td>Injection Valve Port 3</td>
<td>Flush Head</td>
</tr>
<tr>
<td>5004-0015</td>
<td>PTFE Tubing 0.8 mm x 180 mm</td>
<td>Injection Valve Port 4</td>
<td>Waste</td>
</tr>
<tr>
<td>5004-0011</td>
<td>Transfer Capillary I, ST 0.12 mm x 150 mm SL/SL</td>
<td>Injection Valve Port 5</td>
<td>External Sampling Valve Port 4</td>
</tr>
<tr>
<td>5500-1246</td>
<td>Capillary ST 0.17 mm x 500 mm SI/SI</td>
<td>Injection Valve Port 6</td>
<td>Column</td>
</tr>
<tr>
<td>5500-1217</td>
<td>Capillary ST 0.17 mm x 900 mm SI/SX</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. one stack configuration
2. two stack configuration

### Table 15  Capillary Connections of the External Sampling Valve

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depending on external equipment</td>
<td>External Sampling Valve Port 1</td>
<td>Reactor Waste</td>
<td></td>
</tr>
<tr>
<td>5500-1234</td>
<td>Capillary ST 0.17 mm x 180 mm, long socket</td>
<td>External Sampling Valve Port 2</td>
<td>Pressure Sensor</td>
</tr>
<tr>
<td>5005-0057</td>
<td>Transfer Capillary II, ST 0.17 mm x 160 mm SL/SL</td>
<td>External Sampling Valve Port 3</td>
<td>Injection Valve Port 2</td>
</tr>
<tr>
<td>5004-0011</td>
<td>Transfer Capillary I, ST 0.12 mm x 150 mm SL/SL</td>
<td>External Sampling Valve Port 4</td>
<td>Injection Valve Port 5</td>
</tr>
<tr>
<td>G3167-60018</td>
<td>Needle Seat Capillary ST 0.17 mm x 230 mm SL/SL</td>
<td>External Sampling Valve Port 5</td>
<td>Needle Seat</td>
</tr>
<tr>
<td>Depending on external equipment</td>
<td>External Sampling Valve Port 6</td>
<td>Reactor Inlet</td>
<td></td>
</tr>
</tbody>
</table>
3 Installing the Solution

Hardware Installation

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

Preparations

Module is installed in the system.

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

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

NOTE

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

4 Route the drainage of the washport 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.
Figure 11  Flow Connection to the Online Sample Manager (G3167A)

**NOTE**

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

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

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).

When connecting to a non-Agilent product, corresponding pin assignment must be considered.

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).
Installing the Solution
Hardware Installation

Table 16  ERI signal distribution

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>START REQUEST</td>
<td>(L) Request to start injection cycle (for example, by start key on any module). Receiver is the autosampler.</td>
</tr>
<tr>
<td>2</td>
<td>STOP</td>
<td>(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.</td>
</tr>
<tr>
<td>3</td>
<td>READY</td>
<td>(H) System is ready for next analysis. Receiver is any sequence controller.</td>
</tr>
<tr>
<td>4</td>
<td>POWER ON</td>
<td>(H) All modules connected to system are switched on. Receiver is any module relying on operation of others.</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>6</td>
<td>SHUT DOWN</td>
<td>(L) System has serious problem (for example, leak: stops pump). Receiver is any module capable to reduce safety risk.</td>
</tr>
<tr>
<td>7</td>
<td>START</td>
<td>(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.</td>
</tr>
<tr>
<td>8</td>
<td>PREPARE</td>
<td>(L) Request to prepare for analysis (for example, calibration, detector lamp on). Receiver is any module performing pre-analysis activities.</td>
</tr>
</tbody>
</table>

ERI (Enhanced Remote Interface)

The type of connection most suitable depends on the customer’s sample delivery device. The Agilent 1260 Infinity II Online Sample Manager Set is equipped with an ERI interface. Depending on the sample delivery device, ERI-ERI, ERI-APG or ERI-general purpose connection to the Online LC System are possible.

- p/n 5188-8029: ERI to general purpose (D_Sub 15 pin male - Agilent side, open end wires - customer side).
- p/n 5188-8044: ERI to ERI (D_Sub 15 pin male - Agilent side, D_Sub 15 pin male - customer side).
  - p/n 5188-8059: ERI - Extension cable (1.2 m D_Sub 15 pin female - male), if necessary.
- p/n 5188-8045: ERI to APG (D_Sub 15 pin male - Agilent side, D_sub 9 pin male - customer side).
### ERI socket pins layout

<table>
<thead>
<tr>
<th>pin</th>
<th>Color code</th>
<th>Enhanced Remote</th>
<th>Classic Remote</th>
<th>Active (TTL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>white</td>
<td>IO1</td>
<td>START REQUEST</td>
<td>Low</td>
</tr>
<tr>
<td>2</td>
<td>brown</td>
<td>IO2</td>
<td>STOP</td>
<td>Low</td>
</tr>
<tr>
<td>3</td>
<td>green</td>
<td>IO3</td>
<td>READY</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>yellow</td>
<td>IO4</td>
<td>POWER ON</td>
<td>High</td>
</tr>
<tr>
<td>5</td>
<td>grey</td>
<td>IO5</td>
<td>NOT USED</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>pink</td>
<td>IO6</td>
<td>SHUT DOWN</td>
<td>Low</td>
</tr>
<tr>
<td>7</td>
<td>blue</td>
<td>IO7</td>
<td>START</td>
<td>Low</td>
</tr>
<tr>
<td>8</td>
<td>red</td>
<td>IO8</td>
<td>PREPARE</td>
<td>Low</td>
</tr>
<tr>
<td>9</td>
<td>black</td>
<td>1wire DATA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>violet</td>
<td>DGND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>grey-pink</td>
<td>+5V ERI out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>red-blue</td>
<td>PGND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>white-green</td>
<td>PGND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>brown-green</td>
<td>+24V ERI out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>white-yellow</td>
<td>+24V ERI out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC</td>
<td>yellow-brown</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To set up the ERI Interface in the Online LC Monitoring Software, see Setup the ERI interface (“Setup the ERI Interface” on page 113).
### APG socket pins layout

<table>
<thead>
<tr>
<th>Signal</th>
<th>Pin (APG)</th>
<th>Active (TTL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Start Request</td>
<td>9</td>
<td>Low</td>
</tr>
<tr>
<td>Stop</td>
<td>8</td>
<td>Low</td>
</tr>
<tr>
<td>Ready</td>
<td>7</td>
<td>High</td>
</tr>
<tr>
<td>Power on</td>
<td>6</td>
<td>High</td>
</tr>
<tr>
<td>Future</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Shut Down</td>
<td>4</td>
<td>Low</td>
</tr>
<tr>
<td>Start</td>
<td>3</td>
<td>Low</td>
</tr>
<tr>
<td>Prepare</td>
<td>2</td>
<td>Low</td>
</tr>
<tr>
<td>Cable Shielding</td>
<td>NC</td>
<td></td>
</tr>
</tbody>
</table>
Installing the Solution
Hardware Installation

Sample Delivery Device

Fittings:
- Type: Swagelok 1/16” OD:

  Female on Agilent Sampling Valve.

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

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).

Figure 12  Example of Sample Line Connection in Valve Port (Cross section)
Software Installation

The Online LC Monitoring Software relies on an OpenLab CDS v2.6, or higher, workstation installation. For guidance, see OpenLab CDS Workstation Plus (with Content Management) Installation and Configuration.

Installation

Software Installation

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

Main Installation Tasks

1. Log into Windows as a Domain user who is a local administrator.
2. Run OnlineMonitoringSetup.exe as administrator.
3. On the License Agreement tab, agree with Agilent Software terms and conditions.
4. On the Prerequisite: Data Repository tab,
   a. Provide Data Repository Parameters.
   b. Create and confirm the App Module Password.
   c. Make sure you can successfully connect.
5. On the Prerequisite: Shared Services tab,
   a. Select the authentication method.
   b. Fill out necessary fields for authentication method.
   c. Make sure you can successfully connect.
6. On the Review tab, review the Installation Overview and click install.
7. The Install tab shows the progress of the installation.
8. On the Finish tab,
   a. Click Run Software Verification, address any noted issues from the reports.
   b. Click Finish.
9. Make sure to reboot the computer if you are prompted so.
Licensing

The Online LC Monitoring Software 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.
Get a License

Obtain a license with SubscribeNet

Prerequisites

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

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

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

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

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

**NOTE** If the network adapter that provides the MAC address used during license creation is removed from the machine, your license will no longer be valid. A new license will need to be generated with a currently available MAC on the license server.
1 Go to https://agilent.subscribenet.com/control/agil/AgilRegisterToAccount to register the product with SubscribeNet.

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

   The email address you enter will become your login ID.

3 Click Submit. The system will generate and display an account name for you. SubscribeNet will send a welcome email with your login ID and password.

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

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

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

6 Follow the prompts to generate your new license.

   You will be prompted for the HOST NAME of the computer. The host name you enter must match with the network name of the computer where the Control Panel is running. 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 Chromatography Data System(s).
Install Your License

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

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

2. Navigate to Administration > Licenses.

3. In the ribbon, click Add License.

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

5. Click OK.

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

NOTE

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

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

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 346.
2 Enter the setup information (MAC¹ / IP address and/or Instrument Name) in the Control or Diagnostic software.

   a Agilent OpenLab CDS (Configure Instrument):

   b Lab Advisor (Instrument Overview - Add Instrument):

¹ MAC address can only be used in DHCP DIP-switch configuration.
Control Software Configuration Settings

Configuration of the Online Sample Manager Set in OpenLab CDS

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

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

1. Open the Agilent OpenLab Control Panel:

2. Select the Instruments tab:

![Control Panel, Instruments Tab](image)
3  Select the location of the new instrument:

   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**

   ![Figure 14 Control Panel, Create Instrument](image)

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**.

![Configure Instrument](image)

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.

![Clustering Options](image)
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.

**NOTE** Changes in the sampler configuration can only be done in the online view of the CDS system, see Table 17 on page 72.
Installing the Solution
Configuring the System

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 15 OpenLab Method an Run Control](image.png)
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 17  The Online Sample Manager User Interface

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| **A.** | Within the Online Sample Manager user interface, there are active areas. If you move the mouse cursor across the icons (tray, EMF button), the cursor will change and you may click on the icon to:  
1. Configure the sample hotel  
2. Get the status of the **EMF** (Early Maintenance Feature)  
3. Sample Cooler/Thermostat Temperature  
Depending on selected injection mode, the graphics vary.  
A. Agilent Feed Injection  
B. Flow Through Injection |

<table>
<thead>
<tr>
<th><strong>B.</strong></th>
<th></th>
</tr>
</thead>
</table>
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.
Installing the Solution
Configuring the System

Table 17  The Online Sample Manager User Interface

<table>
<thead>
<tr>
<th>A.</th>
<th>Module Status shows Run / Ready / Error state and &quot;Not Ready text&quot; or &quot;Error text&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• <strong>Error</strong> (Red)</td>
</tr>
<tr>
<td></td>
<td>• <strong>Not ready</strong> (yellow)</td>
</tr>
<tr>
<td></td>
<td>• <strong>Ready</strong> (green)</td>
</tr>
<tr>
<td></td>
<td>• <strong>Pre run, Post run</strong> (purple)</td>
</tr>
<tr>
<td></td>
<td>• <strong>Run</strong> (blue)</td>
</tr>
<tr>
<td></td>
<td>• <strong>Idle</strong> (green)</td>
</tr>
<tr>
<td></td>
<td>• <strong>Offline</strong> (dark gray)</td>
</tr>
<tr>
<td></td>
<td>• <strong>Standby</strong> (light gray)</td>
</tr>
</tbody>
</table>

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.
3 Installing the Solution
Configuring the System

Table 18 Control settings

The Sampler control parameters are in the following sections:

- **Missing Vial**
  Mark the *Ignore missing vial* check box to specify that, if a vial is missing, the injector ignores it and continues with a 6-second dummy run. The message “Missing vial <x>” is logged, and the system continues with the next injection.

- **Illumination**
  Toggles the illumination of the sample area, On or Off.

- **At Power On**
  The section is available when a cooler/thermostat is installed and configured. Mark the *Turn on Thermostat* check box to specify that the cooler/thermostat is switched on automatically when the instrument is switched on.

- **Thermostat**
  The section is available when a cooler/thermostat is installed and configured and the Constant temperature mode is selected. Select *On* to switch on the cooler/thermostat. Specify the required temperature in the adjacent field. The specified temperature must be at least 5 °C below ambient for proper temperature control. Select *Off* to switch off the cooler/thermostat.

- **Automatic Turn On**
  You can set a date and time at which the cooler/thermostat switches on automatically.

- **Pump connected to Sampler**
  Use this section to specify the pump that is used with the Sampler. If more than one pump is configured, display the drop-down list and select the appropriate pump from the list.

- **Clear Workspace**
  - **Immediately** Returns the sample container on the workspace to its position in the sample hotel immediately after the injection has been completed. This allows you to quickly retrieve the sample container for further processing.
  - **At End of Analysis** Returns the sample container on the workspace to its position in the sample hotel after the current run or sequence/worklist has been completed. This is the default setting.
  - **Never** Leaves the sample container on the workspace until a different sample container is required to replace it.

- **Enable Analysis**
  This feature requires LC & CE Drivers A.02.19 or newer and is only available for the Sample Thermostat. With this function, you can specify if the analyses should start *With any temperature* or only when the *Temperature is within ± 2 °C* range of the setpoint temperature.

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

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

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

![Method Parameter Settings](image)

Figure 17  Online Sample Manager method parameters (example shows Flow-through 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.
3 Installing the Solution
Configuring the System

### Injection Mode Flow Through/Feed
It is possible to select between **Classical Flow Through** and Agilent **Feed** injection mode.

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

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

---

**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.
3 Installing the Solution
Configuring the System

Table 19

<table>
<thead>
<tr>
<th>Wash Options</th>
<th>Inner Wash Mode:</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Outer Wash Mode:</td>
<td>Standard</td>
</tr>
</tbody>
</table>

**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 flowpath 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
- Agilent 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.
Flow Through 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
  - a. Inner wash before Draw sample
  - b. Reconditioning
  - c. Outer wash before injection
- Agilent Feed Injection mode
  - a. Outer wash after Draw sample
  - b. Inner wash after injection
  - c. Reconditioning

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

- Flow Through Injection mode
  - a. Inner wash before Draw sample
  - b. Seat wash before Draw sample
  - c. Reconditioning before Draw sample
  - d. Outer wash before injection
- Agilent Feed Injection mode
  - a. Outer wash after Draw sample
  - b. Inner wash after injection
  - c. Seat wash after injection
  - d. Reconditioning
Lab Advisor Configuration Settings

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

   ![Add System dialog box is displayed.](image)

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

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

   ![NOTE](image)

   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.

![System Properties](image)

**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.

![Add System](image)

**NOTE**

By default, the **Instrument Type** drop-down list contains only the entry **Agilent LC/CE**. Additional instrument types can be added by installing the respective add-ons (see “Installing Add-ons” on page 83).
5 If your system comprises more than one instrument, click **Add Instrument** and complete the details as above.

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 .LAX extension.

**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.

![Add-ons in Configuration](image)

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.

![Lab Advisor Extension Installer](image)

When the installation is finished, the newly installed Add-on is included in the table in the **Configuration - Add-ons** screen.
4 Scheduling Software Workflow Tasks

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

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

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

- “Configuration” on page 90 of an HPLC instrument.
- “Experiment Setup” on page 91 for timing and technical planning of an experiment with which the reaction sequence is to be investigated.
- “Experiment Run” on page 106 for execution of the experiment.

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.

![Overview of the Online LC Monitoring Software graphical user interface (GUI) - Configuration view](image-url)
Figure 20  Overview of the Online LC Monitoring Software graphical user interface (GUI) - Experiment Setup view
Workspace

Ribbon tab

Ribbon

Navigation pane

Views

Windows

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.
- **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**
  - This button initiates the creation of an experiment setup.

- **Copy**
  - This button copies an experiment setup.

- **Save**
  - This button 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**
  - This button enables the modification of a chosen experiment setup.

- **Cancel Edit**
  - This button cancels the edit mode.

- **Mark as hidden**
  - This button hides a chosen experiment setup.

- **Create new experiment**
  - This button starts an experiment run using the currently selected setup.

- **Create Report**
  - This button prints the selected experiment setup.
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 114
- “Edit an Existing Experiment Setup” on page 119

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/Wake up parameters.
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.

<table>
<thead>
<tr>
<th>Method Type</th>
<th>Method Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-run Method</td>
<td>Method Set (Pre-run Method)</td>
</tr>
<tr>
<td>(Optional)</td>
<td></td>
</tr>
<tr>
<td>Acquisition Method</td>
<td>Method Set (Acquisition Method)</td>
</tr>
<tr>
<td>Processing Method</td>
<td></td>
</tr>
<tr>
<td>Post-run Method</td>
<td>Sample Prep Methods (aka Injector program) can be setup in OpenLab CDS independent from the acquisition method. Setup of Sample Prep Method is optional.</td>
</tr>
<tr>
<td>(Optional)</td>
<td></td>
</tr>
</tbody>
</table>

**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)

**Sleep/WakeUp**
(Optional)

Offers a drop-down list to select the **Stand-by Method**.

To create a **Sleep/WakeUp** method, click **+**:

- Select **Sleep Method** and **WakeUp Method** from a drop-down list, and
- Define **Minimum Idle time** (> 0) and **WakeUp 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**.
Samples

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

<table>
<thead>
<tr>
<th>Samples</th>
<th>Possible options are:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Direct Injection</td>
</tr>
<tr>
<td></td>
<td>• Diluted to Vial</td>
</tr>
<tr>
<td></td>
<td>• Pure to Vial</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Controls</th>
<th>Possible options are:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Blank Sample</td>
</tr>
<tr>
<td></td>
<td>• QC Sample</td>
</tr>
<tr>
<td></td>
<td>• Recalibration</td>
</tr>
</tbody>
</table>
Customization Options for Sample Injections

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.
Direct Injection - from Vial

analytical stream

injection volume

LC column
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

**Dilution factor**
In this field, you can specify the dilution factor.

**Sampling volume**
This field shows the calculated sampling volume.
Sampling volume = Target volume/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.

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

**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.
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.

---

**Pure to Vial Injection**

[Diagram of Pure to Vial Injection process]

- **analytical stream**

- **injection volume**

- **sampling speed**

- **LC column**

- **retain volume**

- **reactor**
Customization Options for Control Injections

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>In this field, you can specify the name of the injection.</td>
</tr>
<tr>
<td><strong>Method Set</strong></td>
<td>Dropdown list with Method Set options, as defined under System.</td>
</tr>
</tbody>
</table>
| **Radio buttons** | • Run without injection  
 | | • Run with injection from vial  
 | | Injection volume can be defined (default: as method)                      |
| **Checkbox**   | 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**
- Dropdown 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.

**Checkbox**
- 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 dropdown list.

**Limit table**
- You can define **Lower limit** and **Upper limit** for the QC compound.
Options for **Recalibration** Settings

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

**Method Set**
Dropdown list with Method Set options, as defined under **System**.

**Calibration levels**
Defined setting: 3
The number of levels is defined by the chosen processing method (as part of the chosen method set) and cannot be changed here.
Schedule

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

- **Rule based**
  - Rules for the experiment.

- **Time based**
  - Table to define the timeline of the experiment.

- **Preview**
  - Option that helps to identify and eliminate time conflicts in an experiment.

Rule Based Schedule

Table with information on rules

- **Type**
  - Derives from definition in step **SystemConditioning**, or step **SamplesControls** window.

- **Setting**
  - Derives from definition in step **SystemConditioning**, or step **SamplesControls** window.

- **Description**
  - Derives from definition in step **SystemConditioning**, or step **SamplesControls** window.

- **Button**
  - Button to navigate to the source of setting in the given row.
4 Scheduling Software Workflow Tasks
User Interface Reference

Time Based Schedule

This table helps to plan and schedule experiments.

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

Preview Schedule

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

- Planned Time: Shows the planned time of an action.
- Type: Shows type of the action.
- Setting: Shows the selected method of the action.
**Evaluation**

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.

**Compound Limits**

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

- **Compound Name**
  Dropdown list to select a compound.

- **Response**
  Dropdown 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.
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:

- **Create new experiment**: Starts an experiment run.
- **Create Report**: Creates a detailed report in PDF format.
- **Export results**: Creates a detailed results sheet in CSV format.
- **Mark as hidden**: Hides an experiment.
- **Windows**: Enables the user to view/hide following windows:
  - Trending plot
  - Chromatograms
  - Samples
  - Results
  - Experiment Info
- **Report Options**: Opens a dialog where the user selects, which report type is used when printing a result report.
  
  Available report types:
  - **Short report (Concentration)**
  - **Short report (Amount)**
  - **Extended report (Amount)**
  - **Extended report (Concentration)**
Navigation Pane

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

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

For instructions on how to run an experiment, see “Start an Experiment” on page 120.

The Experiment Run Workspace provides the following functions:

Preparation
Step Preparation with window:

System Preparation Optional

Execution
Step Execution with windows:

<table>
<thead>
<tr>
<th>Window</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Shows status of the Experiment Run.</td>
</tr>
<tr>
<td>Experiment Info</td>
<td>Optional window to view and edit information on the experiment.</td>
</tr>
<tr>
<td>Activity Log</td>
<td>Optional window to see details of the experiment run.</td>
</tr>
<tr>
<td>Modify Setting</td>
<td>Optional window to see details of the experiment settings (read-only).</td>
</tr>
<tr>
<td>Method Sets</td>
<td>Optional window to see details of the method sets (read-only).</td>
</tr>
<tr>
<td>Status</td>
<td>Table that displays the status of the experiment run.</td>
</tr>
</tbody>
</table>
Result

Step Result with windows:

**Trending Plot**
Plots the results over time.
Offers options to do the following:
- Select **Shown compounds** from a dropdown list,
- Select **Response** type from a dropdown list,
- Select **Unit of time** from a dropdown list, and
- Checkbox to show/hide limits.

**Samples**
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 dropdown list,
- Filter **Setting** from a dropdown list.
- Select **Sample**.
  Data of selected samples are synchronized and shown in the other windows.

**Results**
Shows the results of the samples selected under **Samples**.
Offers options to do the following:
- Filter **MethodSet** from a dropdown list,
- Filter **Signal Name** from a dropdown list.
- Icon 🍃 to highlight the corresponding peak in the window **Chromatogram**.
- Filter **Compound** from a dropdown list.

**Chromatograms**
Chromatograms of selected **Samples**.
Offers options to do the following:
- Filter **MethodSet** from a dropdown list,
- Filter detector signal from a dropdown list.

**Experiment Info**
Pop up window that shows additional information of the experiment.
How to Work with the Online LC Monitoring Software

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

Configure a System

For detailed in information on the available GUI-elements, see:
- “Configuration” on page 90
- “Navigation Pane” on page 90
- “Workspace” on page 90

Create the System

1. In the navigation pane select Configuration view.

   The Online Monitoring System specific Ribbon and Configuration in the Navigation pane are visible ( ).

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

   The available analytical instruments are listed in the project and can be updated.

3. In the Home Ribbon tab click Create.

   The Create Online Monitoring System window opens.
Configure the System

In Create Online Monitoring System:

1. To name your system appropriately, fill in the field **Name**.
2. Specify the system **Location** (optional).
3. Select an **Analytical Instrument** from the dropdown list.
4. Select a **Sample Delivery** option from the dropdown list.

Save the Configuration

1. To save your configuration click **Create**.
Modify an Existing System

1. In the Online Monitoring Systems selector, select the system.
2. In the **Home**Ribbon tab, click **Edit**.

   ![Edit](image)

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

Hide/Unhide an Existing System

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

   ![Hide](image)

   The system is inactive.

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

   ![Unhide](image)

   The system is active.
Setup the ERI Interface

The Online Monitoring System consists 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 enables the following functions:

- Trigger a sample delivery pump (Generic Sample Delivery Pump)
- Communicate with a Process Sampler (Generic Sample Delivery Device)

Set up the ERI interface for a Generic Sample Delivery Pump

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

1. Define parameters for Sample request (OUT):
   a. Select correct Pin from drop-down list.
   b. Select correct Polarity from drop-down list.
   c. Define Pulse [s] in the field.
2. Define Sample ready (IN):
   a. Select correct Pin from drop-down list.
   b. Select correct Polarity from 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.
   b. Select correct Polarity from drop-down list.
   c. Define Pulse [s] in the field.

The correct Pin depends on the hardware cabling. For Pin assignment, see the remote cable details in the corresponding chapter of the manual.

The correct Polarity depends on the sample delivery hardware.

The Timeout [min] value defines the time, how long the software waits for an answer from the sample delivery device.

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

Create a new Experiment Setup

For detailed information on the available GUI-elements, see “Experiment Setup” on page 91.

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 115,
- “Setup Method Sets” on page 116,
- “Define Experiment SCHEDULE” on page 117, and
- “Define Compound Limits” on page 118.

**Define and Describe an Experiment**

In the **Overview** Workspace:

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

**NOTE**

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

Continue to set up the experiment.
Setup Method Sets

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

In the step **System**:

1. **System**

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

   ![Analytical Instrument Workspace](image)

   This action adds a method set to the **Definition of method sets** table. You can select the desired method from a dropdown list.

   **NOTE**

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

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

2. **Conditioning**

   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 94.

   ![Conditioning Workspace](image)

   The **System** is defined.
Add Sampling Settings

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

Customize a Samples injection

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

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

Define Experiment SCHEDULE

The 1260 Online Sample Manager Set and the Online LC Monitoring software are designed to monitor chemical reactions.

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

1. To change Rule based settings, click:

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

2. To add a Time based sampling event to the schedule, click:
   a. Select Setting from a dropdown list.

   These settings were defined in the step Samples.

   You can click to see and change these settings.
b Fill in **Start time**, and optionally two of the following parameters:
- To calculate **End time**, fill in **Interval** and **Count**.
- To calculate **Count**, fill in **Interval** and **Start last action**.
- To calculate **Interval**, fill in **Count** and **Start last action**.

The software automatically calculates the missing parameter.

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

**Example for conflicting entries**

![Preview window with 4 entries showing time conflicts](image)

**Define Compound Limits**

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

**Limits**

**Definition of Compound Limits in step Limits**

1. Select **Compound Name** and **Response** from drop-down lists.
2. To add a limit, click:
This adds a row to the **Compound Limit** table.

**NOTE**

Define at least two lower limits.

**NOTE**

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

### Edit an Existing Experiment Setup

It is possible to edit an existing experiment setup.

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

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

You can now edit the settings.
Run an Experiment

Start an Experiment

1. In the navigation pane select Experiment Run view.

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

2. In the Home Ribbon tab click Create new experiment.

The window Create new experiment opens.

3. Select an Experiment Setup from the dropdown list.
4 **Scheduling Software Workflow Tasks**  
How to Work with the Online LC Monitoring Software

NOTE

The dropdown list contains the options, that were created under **Experiment Setup**.

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

- To add a tag/value pair, use:

- To delete a tag/value pair, use:

NOTE

This information can be modified during the experiment run, and is visible in report, and csv export.

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

If selected, the experiment will not finish automatically and needs to be explicitly stopped by the user. By selecting the checkbox, the experiment can be edited in real-time during an ongoing run.

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

Create

Experiment starts.

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

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

NOTE

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

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

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

**NOTE**
It is not possible to specify used locations.

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

**NOTE**
An incomplete setting prevents the start of the experiment.
3  Monitor the experiment run in the step **Execution**.

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

- **Experiment Info**
  It is possible to edit informations about the experiment.

- **Activity Log**
  Provides detailed information about the experiment.

- **Modify Setting**

- **Method Sets**
  Shows the Method Sets of the experiment in the run.
Review Experiments

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

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

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

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

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

The Online LC Monitoring software provides several options in the Results window.
Report and Evaluate an Experiment

Report an Experiment

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

   ![Create Report](image)

   Dialogue to save a PDF file opens.

2. Save the PDF file.

   The Experiment Report with the following information is available:
   - Information on the System
     - Name
     - Creation Date
     - Version
     - Tag and Value
     - System Name
     - Location
     - Analytical Instrument
     - Sample Delivery System
   - Trending Plot
   - Sample List
   - Analytical Results
   - Sampling Methods
   - Analytical Methods
   - Configuration
   - Experiment Setup
Evaluate an Experiment

1. To evaluate an experiment in the Online LC Monitoring software, use the functions of the **Experiment Run** workspace.
   a. Filter the **Trending Plot** window for compound, response, and time units.
   b. In the **Samples** window select individual samples.
     Selection in this window is automatically reflected in the **Results** and **Chromatograms** windows.
   c. In the **Results** window filter for **MethodSet**, **Compound**, or **Signal**.
   d. In the **Chromatograms** window, filter for MethodSet or Detector.

2. To evaluate an experiment in an external program, in the **Home** Ribbon tab, click **Export results**.
Dialogue opens to save the results in a CSV file for further investigation in an external program.

CSV file contains information on the following:

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

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

1. Magnets in doors of pumps, autosamplers, detectors, and fraction collectors.
Turn on/off

This procedure exemplarily shows an arbitrary LC stack configuration.

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

4 Power switch: Off
Status indicators

This procedure exemplarily shows an arbitrary LC stack configuration.

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

   1. Idle
   2. Run mode
   3. Not-ready. Waiting for a specific pre-run condition to be reached or completed.
   4. Error mode - interrupts the analysis and requires attention (for example, a leak or defective internal components).
   5. Resident mode (blinking) - for example, during update of main firmware.
   6. Bootloader mode (fast blinking). Try to re-boot the module or try a cold-start. Then try a firmware update.
Drawer Status Indicator

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

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

**NOTE**

Do not open the drawers when the drawer status indicator is blinking.
Insert vial trays/wellplates

1. Insert the vial tray/wellplate into the device.

2. 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.

3. Configure the vial tray/wellplate type in the chromatographic data system (see Table 17 on page 72).
Remove vial trays/wellplates

1. 
2. 
3. 
4. 
5. 
6.
Installing the Optional Sample Cooler/Thermostat

Unpacking the Unit

Damaged Packaging

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

**CAUTION**

"Defective on arrival" problems

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

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

Delivery Checklist

Ensure that all parts and materials have been delivered with your module. The delivery checklist is shown below. For parts identification, please check the illustrated parts breakdown in "Sample Thermostat" on page 268. Please report any missing or damaged parts to your local Agilent Technologies sales and service office.

**Table 20** Delivery checklist for the Sample Thermostat

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Thermostat (G7167-60101)</td>
<td>1</td>
</tr>
<tr>
<td>Condensate Drainage Kit (5067-6208)</td>
<td>1</td>
</tr>
<tr>
<td>Declaration of Conformity</td>
<td>1</td>
</tr>
<tr>
<td>Customer Letter</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE**

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

<table>
<thead>
<tr>
<th>Tools required</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8710-0899</td>
<td>Screwdriver Pozidrive Shaft (for the Sample Cooler)</td>
</tr>
<tr>
<td></td>
<td>5182-3466</td>
<td>Torx screwdriver T10 (for the Sample Thermostat)</td>
</tr>
<tr>
<td>OR</td>
<td>5023-3089</td>
<td>Torx key set</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parts required</th>
<th>#</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>G7167-60005</td>
<td>Sample Cooler</td>
</tr>
<tr>
<td>OR</td>
<td>1</td>
<td>G7167-60101</td>
<td>Sample Thermostat</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Power cord</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>G7167-90171</td>
<td>Installation of the Infinity II Cooler/Thermostat Condensate Drainage Tubing Kit</td>
</tr>
</tbody>
</table>

Preparations

Sampler is installed in the stack.

**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 m³ (1 m³ for every 8 g of R600a refrigerant inside of the Sample Thermostat).

✓ Ensure adequate ventilation: typical air exchange of 25 m³/h per m² 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.
Condensate inside the Sample Cooler/Sample Thermostat

**CAUTION**

*Damage to the electronics of the module*

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

**WARNING**

*In the event of a damage*

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

**NOTE**

Do not open the Sample Thermostat. There are no serviceable parts inside.

**NOTE**

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

**NOTE**

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

**NOTE**

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

**NOTE**

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

**NOTE**

Depending on the ambient conditions in the lab, the amount of condensate can vary from 200 mL to 2 L per day. Do not fill waste containers for the condensate to the top. Regularly empty the waste container.
1. Ensure that the power switch on the front of the module is OFF (switch stands out).

2. Disconnect the power cable from the sampler.

3. Loosen the four screws on the rear of the module.

4. Remove the sheet metal back cover of the sampler.
5 Slide the Sample Cooler/Sample Thermostat halfway into the sampler.

**WARNING**

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

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

**CAUTION**

Damaged electronics

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

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

Damage to the cables

- Do not bend or pinch the cables.
- Make sure that the Sample Cooler/Sample Thermostat fits perfectly in the sampler.

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

8. Fix the Sample Cooler/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. Adhere a tubing holder clip to the side of the cooler/thermostat where the condensate drainage outlet tube is situated. Ensure a distance of 20 mm from the bottom edge.
11 Mount the shortest tube (60 mm) of the condensate tubing with the Y-piece on the condensate drainage outlet tube and fix the venting tube (100 mm) in the tubing holder clip.

12 Ensure that the tubing runs straight into the waste canister without any bends or joints and it is not hindered by any mechanical obstacle. Agilent recommends using a 6 L waste canister equipped with a suitable InfinityLab Stay Safe cap for optimal condensate handling. If you decide to use your own waste solution, make sure that the tubes don’t immerse in the liquid.

**NOTE**
For more information, see “Leak and Waste Handling” on page 31.

**NOTE**
Depending on the ambient conditions in the lab, the amount of condensate can vary from 200 mL to 2 L per day. Do not fill the waste container for the condensate to the top. Regularly empty the waste container.
**CAUTION**
Damage to the Sample Cooler/Sample Thermostat

☑ Wait at least 30 min before switching on the compressor of the cooler/thermostat.

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

**13** Connect the power cable to the power connector at the rear of the module.

**Next Steps:**

**14** Configure the Sample Cooler/Sample Thermostat in the CDS.

**NOTE**
Graphics shown are exemplarily and may look different depending on the module in use.
Using the Optional Sample Cooler/Sample Thermostat

The following section describes how to operate the Agilent Infinity II Sample Cooler and the Agilent InfinityLab Sample Thermostat using the Online Sample Manager as an example for the hosting sampler.

Dashboard

The status indicator of the Sample Cooler/Sample Thermostat is incorporated in the graphical user interface (GUI) of the hosting sampler, which appears automatically when the unit is configured in the chromatography data system (CDS). When the cooler/thermostat is turned on, the set temperature and the actual temperature are also displayed.
Using the Solution Modules

Using the Solution Modules

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sampler: Injection volume</td>
</tr>
<tr>
<td>2</td>
<td>Sampler: Injection type (Flow Through or Feed)</td>
</tr>
<tr>
<td>3</td>
<td>Sampler: Hotel configuration</td>
</tr>
<tr>
<td>4</td>
<td>Sampler: Status indicator</td>
</tr>
<tr>
<td>5</td>
<td>Sampler: Early Maintenance Feedback (EMF) status</td>
</tr>
<tr>
<td>6</td>
<td>Sampler: External sampling valve status</td>
</tr>
<tr>
<td>7</td>
<td>Cooler/Thermostat: Status indicator (Off)</td>
</tr>
<tr>
<td>8</td>
<td>Cooler/Thermostat: Status indicator (On)</td>
</tr>
<tr>
<td>9</td>
<td>Cooler/Thermostat: Set temperature</td>
</tr>
<tr>
<td>10</td>
<td>Cooler/Thermostat: Actual temperature</td>
</tr>
</tbody>
</table>

**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.
Using the Solution Modules

Control

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

- **At Power On**:
  - **Turn On Thermostat**: The cooler/thermostat turns on automatically upon powering on the sampler.

- **Thermostat**:
  - **On**: The cooler/thermostat turns on and the system starts to regulate the temperature inside the sample space towards the setpoint.
  - **Off**: The cooler/thermostat turns off.

- **Pump connected to Sampler**

  For the Online Sample Manager, the selection of the pump is mandatory.

- **Enable Analysis**

  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.

  The Temperature within +/- 2 °C option is only available for the Sample Thermostat.

  For the Sample Cooler, the set temperature must be at least 5 °C below ambient for proper temperature control.
### Using the Solution Modules

#### Control

<table>
<thead>
<tr>
<th>Missing Vessel</th>
<th>Illumination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignore missing vessel</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>Off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>At Power On</th>
<th>Thermostat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn on Thermostat</td>
<td>On 24 °C</td>
</tr>
<tr>
<td></td>
<td>Off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Automatic Turn On</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn on at Friday, May 7, 2021 3:00:00 PM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump connected to Sampler</th>
<th>Clear Workspace</th>
</tr>
</thead>
<tbody>
<tr>
<td>G7120A:DEBAY02962</td>
<td>At End of Analysis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enable Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>With any temperature</td>
</tr>
<tr>
<td>Temperature within +/- 2 °C</td>
</tr>
</tbody>
</table>

[Ok] [Cancel] [Help]
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.

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.

**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.
Online Signal Monitor

In the Online Signals tab of the CDS, the actual temperature of the sample space can be configured and plotted together with the other instrument actuals. This enables the user to have a better overview of how the temperature changes over time.
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.

![Diagram showing how to find the Advanced Run Information setting in OpenLab CDS 2.x](image)

**Figure 22** Finding the Advanced Run Information setting in OpenLab CDS 2.x

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampler</td>
<td>Run start - Temperature</td>
<td>5 °C</td>
</tr>
<tr>
<td>Sampler</td>
<td>Run start - Temperature setpoint</td>
<td>4 °C</td>
</tr>
<tr>
<td>Sampler</td>
<td>Run stop - Temperature</td>
<td>5 °C</td>
</tr>
<tr>
<td>Sampler</td>
<td>Run stop - Temperature setpoint</td>
<td>4 °C</td>
</tr>
</tbody>
</table>

**Figure 23** 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.

Reaching the 4 °C setpoint from an ambient temperature of 22 °C takes about 45 min for the Online Sample Manager (G3167A), 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.

This relatively slow ramping down of the temperature is necessary to avoid ice formation.

For the best performance of the Sample Cooler/Sample Thermostat, all drawers must be installed in the sampler. For the Online Sample Manager, use dummy drawers if no full hotel configuration is needed.

Condensate Formation

Operating the cooler/thermostat at temperatures below ambient results in condensate formation. This condensed water is collected in the base plate of the cooler/thermostat and drained through the drainpipe at the back of the unit. The container for condensate collection should be regularly emptied to ensure the proper functioning of the system.

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 310).

Depending on the ambient conditions in the lab, the amount of condensate can vary from 200 mL to 2 L per day. Waste containers for the condensate should not be filled to the top. The waste container must be emptied regularly.

Dew Formation

Setting the cooler/thermostat from a lower to a higher temperature setpoint, or just simply turning it off, can result in dew formation on the internal surfaces of the sampler. This is normal and should cease after a couple of hours at the most.
Frequent Door/Drawer Opening

Opening the door(s) and/or the sample drawers frequently can compromise the temperature stability, as fresh warm and humid air will enter each time. In a highly humid environment, this could also lead to the formation of significant amounts of condensate on the internal surfaces of the sampler.

Ice Formation

The Sample Cooler/Sample Thermostat was designed to operate without the risk of icing. In an unlikely event of ice formation, turn off the cooler/thermostat and wait until it defrosts.

Do not use mechanical devices or other means to accelerate the defrosting process.

Shutting Down

When the Sample Cooler/Sample Thermostat needs to be turned off for the night or a longer period, the following best practices are recommended:

- Remove all sample containers and/or vials from the sampler.
- Let the system reach the ambient temperature. Opening the door(s) of the sampler facilitates this process.
- Remove any condensate that might appear on the sample drawers or the internal surfaces of the sampler.
- Make sure that all condensate is removed from the cooler/thermostat.

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

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**

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

**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 m³ (1 m³ for every 8 g of R600a refrigerant inside of the Sample Thermostat).
- Ensure adequate ventilation: typical air exchange of 25 m³/h per m² 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.
Unsecured transportation

Mechanical damage

✓ Secure the transport assembly before transporting the sampler.

If the sampler with a Sample Cooler/Sample Thermostat needs to be shipped to another location via carrier, ensure:

• The two modules are shipped in separate boxes.
• Install the transport protection.
• The condensed water inside of the Sample Cooler/Sample Thermostat is removed.
Solvent Information

Observe the following recommendations on the use of solvents.

• Follow the recommendations for avoiding the growth of algae, see the pump manuals.

• Small particles can permanently block capillaries and valves. Therefore, always filter solvents through 0.22 µm filters.

• Avoid or minimize the use of solvents that may corrode parts in the flow path. Consider specifications for the pH range given for different materials such as flow cells, valve materials etc. and recommendations in subsequent sections.

Recommended Wash Solvents

• water
• ethanol
• methanol
• water/acid (especially for basic compounds)
• water/base (especially for acidic compounds)
• water/acetonitrile

NOTE
For different wash solvents as mentioned above, verify that the wash solvent is suitable for the silicone wash tubing.
Material Information

Materials in the flow path are carefully selected based on Agilent’s experiences in developing highest-quality instruments for HPLC analysis over several decades. These materials exhibit excellent robustness under typical HPLC conditions. For any special condition, please consult the material information section or contact Agilent.

Disclaimer

Subsequent data was collected from external resources and is meant as a reference. Agilent cannot guarantee the correctness and completeness of such information. Data is based on compatibility libraries, which are not specific for estimating the long-term life time under specific but highly variable conditions of UHPLC systems, solvents, solvent mixtures and samples. Information can also not 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 non-conductive 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 is still a number of 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 cladded PEEK capillaries in bio-inert systems. The use of stainless steel cladded PEEK capillaries keeps the flow path free of steel and ensures pressure stability up to 600 bar. If in doubt, consult the available literature about the chemical compatibility of PEEK.
Polyimide

Agilent uses semi-crystalline polyimide for rotor seals in valves and needle seats in autosamplers. One supplier of polyimide is DuPont, which brands polyimide as Vespel, which is also used by Agilent.

Polyimide is stable in a pH range between 1 and 10 and in most organic solvents. It is incompatible with concentrated mineral acids (e.g. sulphuric acid), glacial acetic acid, DMSO and THF. It is also degraded by nucleophilic substances like ammonia (e.g. ammonium salts in basic conditions) or acetates.

Polyethylene (PE)

Agilent uses UHMW (ultra-high molecular weight)-PE/PTFE blends for yellow piston and wash seals, which are used in 1290 Infinity pumps, 1290 Infinity II pumps, the G7104C and for normal phase applications in 1260 Infinity pumps.

Polyethylene has a good stability for most common inorganic solvents including acids and bases in a pH range of 1 to 12.5. It is compatible with many organic solvents used in chromatographic systems like methanol, acetonitrile and isopropanol. It has limited stability with aliphatic, aromatic and halogenated hydrocarbons, THF, phenol and derivatives, concentrated acids and bases. For normal phase applications, the maximum pressure should be limited to 200 bar.

Tantalum (Ta)

Tantalum is inert to most common HPLC solvents and almost all acids except fluoric acid and acids with free sulfur trioxide. It can be corroded by strong bases (e.g. hydroxide solutions > 10 %, diethylamine). It is not recommended for the use with fluoric acid and fluorides.
Stainless Steel (SST)

Stainless steel is inert against many common solvents. It is stable in the presence of acids and bases in a pH range of 1 to 12.5. It can be corroded by acids below pH 2.3. It can also corrode in following solvents:

- Solutions of alkali halides, their respective acids (for example, lithium iodide, potassium chloride, and so on) 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:
  \[ 2 \text{CHCl}_3 + \text{O}_2 \rightarrow 2 \text{COCl}_2 + 2 \text{HCl} \]
  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, diisopropylether). Such ethers should be filtered through dry aluminium 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, ethylene diamine tetra-acetic 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 FeCl₃ or CuCl₂. 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 (SiO₂)

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 (ZrO₂)

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 (polytetrafluoroethylene), 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 hexafluorisopropanol (HFIP). To ensure the longest possible life with HFIP, it is best to dedicate a particular chamber to this solvent, not to switch solvents, and not to let dry out the chamber. For optimizing the life of the pressure sensor, do not leave HFIP in the chamber when the unit is off.

The tubing of the leak sensor is made of PVDF (polyvinylidene fluoride), which is incompatible with the solvent DMF (dimethyl formamide).

Sapphire, Ruby and Al₂O₃-based ceramics

Sapphire, ruby and ceramics based on aluminum oxide Al₂O₃ are inert to almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.
Reset the Online Sample Manager in Case of an Error

When

In some cases the sampler has to be reset by the user in order for the system to resume working in normal operation mode.

**WARNING**

Risk of injury by uncovered needle

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

- Open the safety lock of the needle assembly *only* on the sample handler and for this particular procedure.
- Be careful working at the z-robot.
- Wear safety gloves when removing the needle assembly.
1 Check the condition of the needle assembly and the sample loop. Replace them if necessary, see “Exchange the Needle Assembly” on page 190 and “Remove the Sample Loop-Flex” on page 233.

**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.

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

<table>
<thead>
<tr>
<th>Next Steps:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Close the front door.</td>
</tr>
<tr>
<td>6 Wait until the initialization of the sampler is completed.</td>
</tr>
<tr>
<td>7 If the error persists, contact your local service representative.</td>
</tr>
</tbody>
</table>
Optimizing Performance

Delayed Volume and Extra-Column 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 extra-column 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 Agilent 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 Valve 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 main pass (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 Agilent Feed Injection mode. During Agilent 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 Agilent 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 169. The valve can be conveniently located in the Multicolumn Thermostat.
Sample Enrichment

**Position 1-6**

- Pump A / autosampler
- Waste
- Enrichment column
- Analytical column / detector
- Pump B

**Position 1-2**

- Pump A / autosampler
- Waste
- Enrichment column
- Analytical column / detector
- Pump B
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:

$$Rs = \frac{1}{4} \sqrt{N} \left( \frac{\alpha - 1}{\alpha} \right) \left( \frac{k_2 + 1}{k_2} \right)$$

where

- $Rs$=resolution,
- $N$=plate count (measure of column efficiency),
- $\alpha$=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, $\alpha$. In practice, varying this term involves changing the type of stationary phase (C18, C8, phenyl, nitrile etc.), mobile phase, and temperature to maximize the selectivity differences between the solutes to be separated. This is a substantial piece of work that is best done with an automated method development system. The method development system allows the assessment of a wide range of conditions on different columns and mobile phases in an ordered scouting protocol. This section considers how to get higher resolution with any chosen stationary and mobile phases. If an automated method development system was used in the decision on phases, it is likely that short columns were used for fast analysis in each step of the scouting.
The resolution equation shows that the next most significant term is the plate count or efficiency, N, which can be optimized in several ways. N is inversely proportional to the particle size and directly proportional to the length of a column. Smaller particle size and a longer column thus result in a higher plate number. The pressure rises with the inverse square of the particle size and proportionally with the length of the column. This is the reason that the 1260 Infinity II Prime Online LC System was designed for 800 bar so that it 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,
- $\Delta%B$ = change in fraction of solvent B during the gradient,
- $S$ = constant (ca. 4 – 5 for small molecules).

This shows that k and hence resolution can be increased by having a:

- Shallower gradient (2 – 5 %/min change is a guideline).
- Higher flow rate.
- Smaller column volume.

This equation also shows how to speed up an existing gradient. If the flow is doubled but the gradient time is halved, $k^*$ remains constant, and the separation looks the same but happens in half the time. Recently published research has shown how a shorter STM column (at temperatures above 40 °C) can generate higher peak capacity than a longer STM column by virtue of running it faster. (See Petersson et al., J.Sep.Sci, 31, 2346-2357, 2008, Maximizing peak capacity and separation speed in liquid chromatography.)
How to Reduce Sample Solvent Effects

The 1260 Infinity II Prime Online LC System enables both Flowthrough and Agilent Feed Injection. This provides more parameters and flexibility for further resolution optimization.

During classical Flowthrough Injection, the sample is transported to the column as 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 Flowthrough Injection, the easiest way to reduce the solvent effect is to minimize the sample injection volume.

During Agilent 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 Flowthrough 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 Carry Over

Carry over is measured when residual peaks from a previous active-containing injection appear in a subsequent blank solvent injection. There will be carry over between active injections, which may lead to erroneous results. The level of carry over 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 carry over by careful design of the flow path and use of materials in which sample adsorption is minimized. A carry over figure of 0.001 % 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 carry over in any application involving compounds liable to stick in the system. The following functions of the Online Sample Manager can be used to minimize carry over:

- Inner needle wash
- Outer needle wash
- Injection valve cleaning

The flow path, including the inside of the needle, is continuously flushed in flowthrough injection mode, providing good elimination of carry over 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 Agilent Feed Injection, the flow path, including the inside of 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.
5 Using the Solution Modules
Optimizing Performance

Figure 24  Definition of wash options (Flowthrough Injection)

Figure 25  Definition of wash option (Agilent Feed Injection)
Using the Solution Modules
Optimizing Performance

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 carry over, 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 carry over 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 carry over. 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 carry over, 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 carry over 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 carry over performance of the sampler depends on the integrity of these consumable parts.
If operated in Agilent Feed Injection mode, there are more parameters available to reach the goal of a low carry over.
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.
This chapter describes the maintenance and repair of the InfinityLab Online LC Solution modules.
Introduction to Maintenance

Figure 26 on page 181 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 27  Overview of drawer, sample tray and sample container
Warnings and Cautions

**WARNING**

Personal injury or damage to the product

Agilent is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent product user guides, or use of the products in violation of applicable laws, rules or regulations.

✓ Use your Agilent products only in the manner described in the Agilent product user guides.

---

**WARNING**

Electrical shock

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

✓ Do not remove the cover of the module.

✓ Only certified persons are authorized to carry out repairs inside the module.

---

**WARNING**

Sharp metal edges

Sharp-edged parts of the equipment may cause injuries.

✓ To prevent personal injury, be careful when getting in contact with sharp metal areas.
**WARNING**

Toxic, flammable and hazardous solvents, samples and reagents

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

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

- The volume of substances should be reduced to the minimum required for the analysis.

- Do not operate the instrument in an explosive atmosphere.

---

**CAUTION**

Safety standards for external equipment

- If you connect external equipment to the instrument, make sure that you only use accessory units tested and approved according to the safety standards appropriate for the type of external equipment.

---

**WARNING**

Heavy weight

The module is heavy.

- Carry the module at least with 2 people.

- Avoid back strain or injury by following all precautions for lifting heavy objects.

- Ensure that the load is as close to your body as possible.

- Ensure that you can cope with the weight of your load.
Overview of Maintenance

It is necessary to perform periodic inspection of this instrument to ensure its safe use. It is possible to have these periodic inspections performed by Agilent service representatives on a contractual basis. For information regarding the maintenance inspection contract, contact your Agilent representative.

The following pages describe the maintenance (simple repairs) of the module that can be carried out without opening the main cover.

Table 21  Overview of maintenance

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Typical interval (minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change needle/needle seat</td>
<td>60000 needle into seat movements</td>
</tr>
<tr>
<td>Change rotor seal</td>
<td>As needed</td>
</tr>
<tr>
<td>Change metering seal</td>
<td>30000 injections</td>
</tr>
</tbody>
</table>
Clean the Module

To keep the module case clean, use a soft cloth slightly dampened with water, or a solution of water and mild detergent. Avoid using organic solvents for cleaning purposes. They can cause damage to plastic parts.

**WARNING**

Liquid dripping into the electronic compartment of your module can cause shock hazard and damage the module

- Do not use an excessively damp cloth during cleaning.
- Drain all solvent lines before opening any connections in the flow path.

**NOTE**

A solution of 70 % isopropanol and 30 % water might be used if the surface of the module needs to be disinfected.
Removal and Installation of the Front Door

When
The instrument doors or the hinges are broken.

Tools required

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat screwdriver</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>#</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5067-5415</td>
<td>Door Assy</td>
</tr>
<tr>
<td>OR</td>
<td>G7167-68718</td>
<td>Light Protection Kit</td>
</tr>
</tbody>
</table>

Preparations
Finish any pending acquisition job and return any plate on the workspace back to the hotel.

NOTE
For detailed information on position of the magnets, refer to “Magnets” on page 129

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.
### Maintenance and Repair

#### Removal and Installation of the Front Door

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open the front door.</td>
</tr>
<tr>
<td>2</td>
<td>Press the release buttons and pull the front door out.</td>
</tr>
</tbody>
</table>
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

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

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 – 5/16 inch</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G4267-87201</td>
<td>Needle Assembly</td>
</tr>
</tbody>
</table>

Preparations

- Finish any pending acquisition job.
- Stop the flow at the pump and remove the solvent lines from the eluent bottles to avoid spilling solvent.
- Close the shutoff valves at the pump if available.

**WARNING**

Risk of injury by uncovered needle

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

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

**WARNING**

Toxic, flammable and hazardous solvents, samples and reagents

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

- When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.
<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>In the Agilent Lab Advisor software select <strong>Service &amp; Diagnostics &gt; Maintenance Positions &gt; Change Needle</strong>, click <strong>Start</strong> and wait until the needle assembly is in maintenance position. OR In the Local Controller start the maintenance mode and select <strong>Change Needle</strong> function.</td>
</tr>
<tr>
<td>2</td>
<td>Open the front door</td>
</tr>
<tr>
<td>3</td>
<td>Lock the needle in the safety position.</td>
</tr>
<tr>
<td>4</td>
<td>Remove the needle assembly by slightly pulling the needle cartridge.</td>
</tr>
</tbody>
</table>

**NOTE**
During normal operation of the Online Sample Manager the needle assembly has to be unlocked.

**WARNING**
Sharpened 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.
6 Maintenance and Repair
Exchange the Needle Assembly

7 Remove the loop plastic adapter.

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

NOTE
Do not open the rear plastic clamp.

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

**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.

12 Install loop plastic adapter.
### 13 Pinch and reinsert the needle assembly and the connected loop capillary into the z-arm coupler.

**NOTE**

Check the tension of the loop capillary. This must be forced and guided to the hydraulic box to prevent it from being caught by the Z-drive.

### 14 Close the front door.

Next Steps:

15  In the Local Controller close **Change Needle**.

OR

In the Agilent Lab Advisor software **Change Needle**, click **Back** and wait until the needle assembly is in the needle park station.

16  Perform a **Sampler Leak Test** and **Hydraulic Path Leak Test**.
Exchange the Needle Seat

When

When seat is visibly damaged, blocked or leaks.

Tools required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 — 5/16 inch</td>
</tr>
<tr>
<td></td>
<td>Flat head screwdriver</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G3167-60018</td>
<td>Needle Seat Capillary ST 0.17 mm x 230 mm SL/SL</td>
</tr>
</tbody>
</table>

Preparations

- Finish any pending acquisition job.
- Stop the flow at the pump and remove the solvent lines from the eluent bottles to avoid spilling solvent.
- Close the shutoff valves at the pump if available.
- Remove the front door.

**WARNING**

Risk of injury by uncovered needle

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

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

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

   In the Agilent Lab Advisor software select **Service & Diagnostics** in the system screen **Maintenance Positions > Change Seat**, click **Start** and wait until the needle assembly is in maintenance position.

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

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

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

5  Reconnect the seat capillary to the external sampling valve.

**Next Steps:**

6  In the Local Controller close **Change needle /seat**.

   OR

   In the Agilent Lab Advisor software **Change Seat** click **Back** and wait until the needle assembly is in the needle park position.

7  Perform a **Sampler Leak Test** and **Hydraulic Path Leak Test**.
Replace the Injection Valve

When

Add new injection valve or replace defective injection valve.

Tools required

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrench 9/64</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5067-6680</td>
<td>3-position/6-port FI Valve</td>
</tr>
</tbody>
</table>

Preparations

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

**WARNING**

Toxic, flammable and hazardous solvents, samples and reagents

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

✔ Be sure that no solvent can drop out of the solvent connections when removing them from your valve head.

✔ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.
1. Remove all capillaries from the injection valve with a 1/4 inch wrench.

**NOTE**

Remember the correct plumbing.

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

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

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

OR

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

NOTE

Check the orientation of the rear side.
Verify the correct position of the Valve TAG.
5 Continue to rotate until the clocking pin in the injection valve head align with the notch in the housing and press the replacement injection valve head into the actuator.

6 Replace the Spanner Nut (1.) and tighten clockwise (2.) (Hand tighten only, do not use wrenches on the Spanner Nut).
<table>
<thead>
<tr>
<th><strong>7</strong></th>
<th><strong>8</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconnect all capillaries to the proper injection valve ports with a 1/4 inch wrench.</td>
<td>Perform a <strong>Sampler Leak Test</strong> and <strong>Hydraulic Path Leak Test</strong>.</td>
</tr>
</tbody>
</table>
Replace the External Sampling Valve

**When**
Add new External Sampling Valve or replace defective External Sampling Valve.

**Tools required**
- **Description**
- Wrench 9/64

**Parts required**
- **p/n**
- **Description**
  - 5067-6680 3-position/6-port FI Valve

**Preparations**
Switch off the power of the module.

**WARNING**
Toxic, flammable and hazardous solvents, samples and reagents
The handling of solvents, samples and reagents can hold health and safety risks.

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

**CAUTION**
The valve actuator contains sensitive optical parts, which need to be protected from dust and other pollution. Pollution of these parts can impair the accurate selection of valve ports and therefore bias measurement results.

- Always install a valve head for operation and storage. For protecting the actuator, a dummy valve head (part of Transportation Lock Kit (G1316-67001 )) can be used instead of a functional valve. Do not touch parts inside the actuator.
NOTE
The tag reader reads the valve head properties from the valve head RFID tag during initialization of the module. If the valve head is replaced while the module is on, the valve properties will not be updated.

If the instrument does not know the properties of the installed valve, the selection of valve port positions can fail.

NOTE
To have the valve correctly recognized by the module, you must have the module powered off for at least 10 seconds.

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

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

NOTE
Remember the correct plumbing.

2 Unscrew the valve head.
3 Insert the 3-position/6-port FI 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 3-position/6-port FI valve head.

NOTE
Fasten the nut manually. Do not use any tools.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5</strong></td>
<td>Reconnect all capillaries to the proper reactor valve ports with a 1/4 inch wrench.</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Perform a <strong>Sampler Leak Test</strong> and <strong>Hydraulic Path Leak Test</strong>.</td>
</tr>
</tbody>
</table>
Replace the Rotor Seal of the Injection Valve

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

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 – 5/16 inch</td>
</tr>
<tr>
<td>8710-2394</td>
<td>Hex key 9/64 inch 15 cm long T-handle</td>
</tr>
<tr>
<td></td>
<td>Cleaning tissue and appropriate solvent like isopropanol or methanol</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>#</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5068-0279</td>
<td>Rotor Seal, 3-position/6-port FI Valve</td>
</tr>
<tr>
<td>1</td>
<td>5068-0280</td>
<td>Stator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replacement only necessary in case of wear (OPTIONAL)</td>
</tr>
</tbody>
</table>

Preparations

- Remove the front door.

CAUTION
Reduced life time of the injection valve
Component cleanliness is crucial for the life time of the injection valve.

✔ Replace the rotor seal in a clean environment.

WARNING
Toxic, flammable and hazardous solvents, samples and reagents
The handling of solvents, samples and reagents can hold health and safety risks.

✔ Be sure that no solvent can drop out of the solvent connections when removing them from your valve head.

✔ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.
### Replace the Rotor Seal of the Injection Valve

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| **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.
### Replace the Rotor Seal of the Injection Valve

<table>
<thead>
<tr>
<th>Step</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>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.</td>
</tr>
<tr>
<td>8</td>
<td>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.</td>
</tr>
<tr>
<td>9</td>
<td>Reconnect all capillaries to the proper injection valve ports with a 1/4 inch wrench.</td>
</tr>
</tbody>
</table>

**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.

**Next Steps:**

10. In the Local Controller close **Change Rotor Seal**.  
OR  
In the Agilent Lab Advisor software **Change Rotor Seal**, click **Back**.  
11. Perform a **Sampler Leak Test** and **Hydraulic Path Leak Test**.
Replace the Rotor Seal of the External Sampling Valve

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

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
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</tr>
<tr>
<td></td>
<td>Cleaning tissue and appropriate solvent like isopropanol or methanol</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5068-0279</td>
<td>Rotor Seal, 3-position/6-port FI Valve</td>
</tr>
<tr>
<td>5068-0280</td>
<td>Stator</td>
</tr>
<tr>
<td></td>
<td>Replacement only necessary in case of wear</td>
</tr>
</tbody>
</table>

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.
6 Maintenance and Repair
Replace the Rotor Seal of the External Sampling Valve

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 a Sampler Leak Test and Hydraulic Path Leak Test.
Replace the Transfer Capillaries between Injection and External Sampling Valve

When

- Leaks or blockages are observed.

Tools required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 — 5/16 inch</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G3167-67000</td>
<td>Online Sample Manager Capillary Kit</td>
</tr>
</tbody>
</table>

Preparations

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 the Capillary ST 0.12 mm x 150 mm SL/SF (5004-0011) 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 (Capillary ST 0.12 mm x 150 mm SL/SF (5004-0011)) to port 5 of the injection valve and port 4 of the external sampling valve with a 1/4-inch wrench.
### Maintenance and Repair

#### Replace the Transfer Capillaries between Injection and External Sampling Valve

<table>
<thead>
<tr>
<th>Step</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Remove the Capillary ST 0.17 mm x 160 mm SL/SL (5005-0057) from port 2 of the injection valve and port 3 of the external sampling valve using a 1/4-inch wrench.</td>
</tr>
<tr>
<td>4</td>
<td>Connect new Capillary ST 0.17 mm x 160 mm SL/SL (5005-0057) to port 2 of the injection valve and port 3 of the external sampling valve with a 1/4-inch wrench.</td>
</tr>
<tr>
<td>5</td>
<td>Remove the Capillary ST 0.17 mm x 180 mm, long socket (5500-1234) from port 2 of the external sampling valve and the pressure sensor using a 1/4-inch wrench. Remove the Capillary ST 0.17 mm x 100 mm SX/S-2.3 (5500-1159) from the pressure sensor and the metering device using a 1/4-inch wrench.</td>
</tr>
<tr>
<td>6</td>
<td>Connect new Capillary ST 0.17 mm x 180 mm, long socket (5500-1234) to port 2 of the external sampling valve and the pressure sensor with a 1/4-inch wrench. Connect new Capillary ST 0.17 mm x 100 mm SX/S-2.3 (5500-1159) to the pressure sensor and the metering device with a 1/4-inch wrench.</td>
</tr>
<tr>
<td>7</td>
<td>Perform a <strong>Sampler Leak Test</strong> and <strong>Hydraulic Path Leak Test</strong>.</td>
</tr>
</tbody>
</table>
Replace Analytical Heads/Metering Device

Tools required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 — 5/16 inch</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>#</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G4267-60043</td>
<td>Analytical Head, 100 µL</td>
</tr>
<tr>
<td>OR</td>
<td>G4267-60049</td>
<td>Flush head, 500 µL</td>
</tr>
</tbody>
</table>

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

OR

In the Agilent Lab Advisor software select *Service & Diagnostics* in the system screen *Maintenance Positions* > *Change Metering Device*, click *Start* and wait until the metering device is in maintenance position.

2. Open the front door

3. Disconnect all capillaries from the metering device.

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

6 Reinstall the complete analytical head with the actuator housing.

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

7 Reconnect the capillaries.

8 Close the front door.

Next Steps:

9 In the Local Controller close Change Metering Device.
   OR
   In the Agilent Lab Advisor software Change Metering Device click Back.

10 Perform a Sampler Leak Test and Hydraulic Path Leak Test.
Remove the Metering Seal

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

Tools required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 — 5/16 inch</td>
</tr>
<tr>
<td>8710-2392</td>
<td>4 mm Hex key</td>
</tr>
<tr>
<td>01018-23702</td>
<td>Insert tool</td>
</tr>
<tr>
<td>OR</td>
<td>G4226-43800 Seal insert tool for 100 µL or 40 µL</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0905-1719</td>
<td>PE Seal</td>
</tr>
<tr>
<td>5067-5678</td>
<td>Piston, 100 µL, Zirconium oxide</td>
</tr>
</tbody>
</table>

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.
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

When

After removing the metering seal.

Tools required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 — 5/16 inch</td>
</tr>
<tr>
<td>8710-2392</td>
<td>4 mm Hex key</td>
</tr>
<tr>
<td>01018-23702</td>
<td>Insert tool</td>
</tr>
<tr>
<td></td>
<td>(for 100 µL seals)</td>
</tr>
<tr>
<td>OR</td>
<td>G4226-43800 Seal insert tool</td>
</tr>
<tr>
<td></td>
<td>(for 40 µL seals)</td>
</tr>
<tr>
<td></td>
<td>Cleaning tissue and appropriate solvent like isopropanol or methanol</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0905-1719</td>
<td>PE Seal</td>
</tr>
<tr>
<td>5067-5678</td>
<td>Piston, 100 µL, Zirconium oxide</td>
</tr>
<tr>
<td></td>
<td>Replacement only necessary in case of wear</td>
</tr>
</tbody>
</table>

Preparations

Removing the metering seal, see “Remove the Metering Seal” on page 220.
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. Install the Metering Seal

- **Make sure to comply to the following order of actions:**
  - **a** Tighten the three screws finger tight, 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 Mechanisms

- **Use the twist and lock bayonet mechanisms 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.
<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Close the front door.</td>
</tr>
<tr>
<td></td>
<td><strong>Next Steps:</strong></td>
</tr>
<tr>
<td>10</td>
<td>In the Local Controller close Change Metering Device. OR In the Agilent Lab Advisor software Change Metering Device click Back.</td>
</tr>
<tr>
<td>11</td>
<td>Perform a <strong>Sampler Leak Test</strong> and <strong>Hydraulic Path Leak Test</strong>.</td>
</tr>
</tbody>
</table>
6 Maintenance and Repair

Replace the Flushhead Seal

Replace the Flushhead Seal

**When**

Flush head is leaking

**Tools required**

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 — 5/16 inch</td>
</tr>
<tr>
<td>8710-2392</td>
<td>Hex key 4 mm15 cm long T-handle</td>
</tr>
</tbody>
</table>

**Parts required**

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5067-5918</td>
<td>Flush Head Seal 500 µL</td>
</tr>
</tbody>
</table>

**Preparations**

• Cleaning tissue
• Appropriate solvent like isopropanol or methanol

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

OR

In the Agilent Lab Advisor software select **Service & Diagnostics** in the system screen **Maintenance Positions > Change Metering Device**, click **Start** and wait until the metering device is in maintenance position.

2. Open the front door

3. Remove capillaries and valves from the flush head.

4. Press and turn the Flush Head a quarter left (bayonet fitting) and detach the metering device from the actuator.
5. Pull the flush head away from the hydraulic box.

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

**NOTE**

Be careful not to break the piston.

7. Remove the piston from the head body.

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

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

10. Carefully insert the piston with the new seal into the flush head assembly.
### 6 Maintenance and Repair

#### Replace the Flushhead Seal

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Reinstall the flush head to the actuator housing.</td>
</tr>
<tr>
<td>12</td>
<td>Fix the flush head.</td>
</tr>
<tr>
<td>13</td>
<td>Connect the capillaries.</td>
</tr>
<tr>
<td>14</td>
<td>Close the front door.</td>
</tr>
</tbody>
</table>

**Next Steps:**

15 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

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 — 5/16 inch</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G4267-60500</td>
<td>Sample Loop Flex 100 µL, right (blue coded)</td>
</tr>
</tbody>
</table>

Preparations
Finish any pending acquisition job and 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

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

   Open the front door
3 The needle assembly is still connected to the loop capillary. Use a 1/4 inch wrench to loosen the fitting of the loop capillary connected to the analytical head.

4 Lock the needle in the safety position.

**NOTE**

During normal operation of the Online Sample Manager the needle assembly has to be unlocked.
6 Remove the cartridge out of its proper position. By gently tilting and pulling it out of the work space of the sampler.

**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 Maintenance and Repair

Remove the Sample Loop-Flex

7 Remove the loop plastic adapter.

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

NOTE
Do not open the rear plastic clamp.

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

9 Remove the needle assembly.
Installing the Sample Loop-Flex

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

Tools required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 — 5/16 inch</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G4267-60500</td>
<td>Sample Loop Flex 100 µL, right (blue coded)</td>
</tr>
</tbody>
</table>

Preparations
Finish any pending acquisition job and 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. Then use a 1/4 inch wrench to tighten the fitting of the loop capillary.
3 Install loop plastic adapter.

4 Click the sample loop cartridge in the designated location and keep the right orientation.

**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.
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.
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Close the front door.</td>
</tr>
</tbody>
</table>

**Next Steps:**

8. In the Local Controller close **Change loop**.

   OR

   In the Agilent Lab Advisor software **Change Loop**, click **Back** and wait until the needle is in the needle park station.

**NOTE**

If you need an autoreferencing step included you must choose the change needle procedure.

**NOTE**

If you have changed the sample loop, verify that the correct sample loop is configured in the CDS (see step 10 on page 70).

9. Perform a **Sampler Leak Test** and **Hydraulic Path Leak Test**.
## Optional Configurations

### Table 22  Overview on optional configurations (examples for uniform types)

<table>
<thead>
<tr>
<th></th>
<th>1H</th>
<th>2H</th>
<th>3H</th>
<th>Dummy-Drawer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delivery Status</strong></td>
<td>-</td>
<td>G7167-60020 1x</td>
<td>-</td>
<td>G4267-60024 3x</td>
</tr>
<tr>
<td><strong>Up to 8 single height drawers</strong></td>
<td>G7167-60021 8x</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>16 positions Shallow wellplates and MTP</td>
<td>Max Sample capacity 1536 / 6144 samples (96 Shallow Wellplates / 384 MTP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Up to 4 Dual Height drawers</strong></td>
<td>-</td>
<td>G7167-60020 4x</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8 positions Vials (2 mL), deep well plates, MTP, Eppendorf</td>
<td>Max Sample capacity 432 / 3072 samples (2 mL Vials/ 384 MTP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Up to 2 Drawers Triple Height</strong></td>
<td>-</td>
<td>G7167-60020 1x</td>
<td>G7167-60022 2x</td>
<td>-</td>
</tr>
<tr>
<td>4 positions (2H or 2*1H option left over) Vials (6 mL), deep well plates, MTP, Eppendorf</td>
<td>Max Sample capacity 60 / 216 / 1536 samples (6 mL Vials/ 2 mL Vials/ 384 MTP)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### NOTE

Mixed configurations are possible (for example 1x3H- with 1x2H- and 3x1H-drawer).

All positions in the Sample Hotel must be filled either with dummies or drawers. The drawers must be installed from bottom to top.
Installing and Replacing of Drawers (Upgrade Drawer Kit)

### Tools required

| Description | Screwdriver |

### Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G7167-60020</td>
<td>Drawer 2H</td>
</tr>
<tr>
<td>G7167-60021</td>
<td>Drawer 1H</td>
</tr>
<tr>
<td>G7167-60022</td>
<td>Drawer 3H</td>
</tr>
</tbody>
</table>

**NOTE**

Before you start the new drawer installation you have to remove the lower drawer (2H drawer = default configuration) from the Sample Hotel.

**NOTE**

For best cooling performance the 2H drawer must be installed in the lowest position.

**NOTE**

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

1. Open the drawer.
2. Pull the drawer completely out.
3 Unlatch the drawer. Use a screwdriver to press the clamping lever lightly to the left.

4 Remove the drawer from the rail guide.

The drawer is now out of the hotel.
5. Grab in the recession below the dummy drawer front panel (1.) and lift the left side (2.).

6. Remove the dummy drawer.

**NOTE**
At this stage remove all other dummies that will be replaced by hotel drawers.
7 Place the new drawer horizontally into the sample hotel. Check that the drawer matches the middle bracket of the sample hotel.

8 Push until the complete drawer locks in place.

**NOTE**
Take care that the clamping lever locks.

**NOTE**
Always fill sample hotel completely (no empty drawer slots). Otherwise the drawers can't be configured in the software.

9 Configure the hotel drawers in the controller software (see the Online Help of the software for details).
Configuration of the Hotel Drawers

The configuration of your drawers is necessary to detect the new drawer configuration for your CDS system. When a wrong configuration is detected there will be a mismatch in your CDS system and you are not able to use the new drawers. The new drawer configuration is active and stored after you have done the Drawer Configuration.

Configure the Hotel Drawers in the Control Software

Software required
OpenLAB (A.02.01 or above)
LC driver (A.02.10 or above)

Preparations
• Stop the acquisition run.
• Remove the sample containers (trays and well plates) from workspace.
• Complete the drawer installation.
• Remove the sample containers (trays and well plates) from the drawers.
• Verify that all sample trays (palettes) are installed in their drawers.
• All open drawers and dummies have to be closed and installed properly.

1 Start the CDS.
2 Right-click on the Sampler GUI (example shows a Multisampler).
Replace the Dummy Drawer

3 Select **Modify > Drawer Configuration** in the GUI screen.

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 278).
Configure the Hotel Drawers in Lab Advisor

Software required  Lab Advisor (B.02.05 or above)

Preparations
- Stop the acquisition run.
- Remove the sample containers (trays and well plates) from workspace.
- Complete the drawer installation.
- Remove the sample containers (trays and well plates) from the drawers.
- Verify that all sample trays (palettes) are installed in their drawers.
- All open drawers and dummies have to be closed and installed properly.

1. Start the Lab Advisor Software.
2. Connect the instrument and select Instrument Control in the system screen.
3. Switch In the Configuration menu of the Online Sample Manager. Select Detect Drawers in the Hotel Configuration.

4. Follow the Detect Hotel Configuration screen to detect the physically available drawers.

**NOTE**
For correct detection, it is necessary to remove all sample containers (for example 54 vial tray or well plates).

5. System is ready after the robot has done Auto Referencing (see “Auto Referencing” on page 278).
Replace the Sample Cooler/Sample Thermostat

**When**
If the Sample Cooler/Sample Thermostat is damaged or defective.

**Tools required**

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0899</td>
<td>Screwdriver Pozidrive Shaft (for the Sample Cooler)</td>
</tr>
<tr>
<td>5182-3466</td>
<td>Torx screwdriver T10 (for the Sample Thermostat)</td>
</tr>
<tr>
<td>OR 5023-3089</td>
<td>Torx key set</td>
</tr>
</tbody>
</table>

**Parts required**

<table>
<thead>
<tr>
<th>#</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G7167-60005</td>
<td>Sample Cooler</td>
</tr>
<tr>
<td>OR</td>
<td>G7167-60101</td>
<td>Sample Thermostat</td>
</tr>
</tbody>
</table>

**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 m³ (1 m³ for every 8 g of R600a refrigerant inside of the Sample Thermostat).

✓ Ensure adequate ventilation: typical air exchange of 25 m³/h per m² 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.
In the event of a damage
- Keep open fire or sources of ignition away from the device.
- Ventilate the room for several minutes.
- Do not use the Sample Thermostat any more.

**WARNING**

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

**CAUTION**

Routing of the condensation tubing
Proper routing of the condensation tubing is critical for correct condensate drainage.
- Do not place the sampler directly on the bench.

**CAUTION**

Condensate inside the cooler or thermostat
Damage to the electronics
- Unplug the power cords.
- Drain off all condensate before dismounting the sample cooler or thermostat.
- Make sure that there is no condensate left.
### Replace the Sample Cooler/Sample Thermostat

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

2. **Disconnect the power cable from the sampler.**

3. **Ensure that no condensate remains inside the cooler/thermostat before proceeding forward.**

   **NOTE**
   
   Gently tapping on the sides of the sampler can help to remove the last traces of condensate from the system.

4. **Remove the condensate tubing.**

   **NOTE**
   
   If there is still some condensate inside the cooler/thermostat, place a suitable container underneath the outlet pipe and keep tapping on the sides of the sampler until no water is coming out.

5. **Remove the fixation screws on the back of Sample Cooler/Sample Thermostat.**

6. **Pull the cooler/thermostat halfway out, disconnect the power and the data cable and then remove the unit completely from the sampler.**
Replace the Sample Cooler/Sample Thermostat

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

**CAUTION**

**Damage to the cables**

- Do not bend or pinch the cables.
- Make sure that the Sample Cooler/Sample Thermostat fits perfectly in the sampler.

8 Slide the cooler/thermostat all the way into the sampler, making sure that the cables don’t get jammed between the metal parts.

9 Fix the unit with the four screws.

10 Reconnect the condensate tubing.
11 Connect the power cable to the power connector at the rear of the module.

**CAUTION**

Damage to the Sample Cooler/Sample Thermostat

- Wait at least 30 min before switching on the compressor of the cooler/thermostat.
- This allows the refrigerant and system lubrication to reach equilibrium.

12 Switch on the sampler and perform the **Sample Cooler Function Test** to verify the correct functioning of the new cooler/thermostat (see "Sample Cooler Function Test" on page 286).
Replace the Module Firmware

When

The installation of newer firmware might be necessary
• if a newer version solves problems of older versions or
• to keep all systems on the same (validated) revision.

The installation of older firmware might be necessary
• to keep all systems on the same (validated) revision or
• if a new module with newer firmware is added to a system or
• if third party control software requires a special version.

Tools required

Description
Agilent Lab Advisor software

Parts required

#  Description
1  Firmware, tools and documentation from Agilent web site

Preparations

Read update documentation provided with the Firmware Update Tool.

To upgrade/downgrade the module’s firmware carry out the following steps:

1  Download the required module firmware, the latest FW Update Tool and the documentation from the Agilent web.

2  For loading the firmware into the module follow the instructions in the documentation.

Module Specific Information

There is no specific information for this module.
This chapter provides information on parts material required for the solution modules.
### Standard Parts

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G4267-87201</td>
<td>Needle Assembly</td>
</tr>
<tr>
<td>G3167-60018</td>
<td>Needle Seat Capillary ST 0.17 mm x 230 mm SL/SL</td>
</tr>
<tr>
<td>5068-0279</td>
<td>Rotor Seal, 3-position/6-port FI Valve</td>
</tr>
<tr>
<td>5068-0280</td>
<td>Stator</td>
</tr>
<tr>
<td>G4267-60500</td>
<td>Sample Loop Flex 100 µL, right (blue coded)</td>
</tr>
<tr>
<td>G4267-40033</td>
<td>Transport Protection</td>
</tr>
</tbody>
</table>
Parts for Maintenance and Repair
Hotel Drawer

Hotel Drawer

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G7167-60021</td>
<td>Drawer 1H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(including 2*G4267-60206 Sample Tray (Palette))</td>
</tr>
<tr>
<td>2</td>
<td>G7167-60020</td>
<td>Drawer 2H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(including 2*G4267-60205 Sample Tray (Palette))</td>
</tr>
<tr>
<td>3</td>
<td>G7167-60022</td>
<td>Drawer 3H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(including 2*G4267-60205 Sample Tray (Palette))</td>
</tr>
<tr>
<td></td>
<td>G4267-60024</td>
<td>Dummy Drawer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(not shown)</td>
</tr>
</tbody>
</table>

Note: This part number should only be used for repairs. For increasing the capacity in the Sample Hotel please order a pair of drawers via ELSA http://wadnts02.germany.agilent.com/csc/tools/web_elsa/elsa.htm.

Figure 28 Hotel drawer
## Analytical Head Assembly 100 µL

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G4267-60433</td>
<td>Head Assembly, 100 µL</td>
</tr>
<tr>
<td>2</td>
<td>0905-1719</td>
<td>Metering Seal, 100 µL</td>
</tr>
<tr>
<td>3</td>
<td>G4267-60434</td>
<td>Seal Support Assembly, 100 µL</td>
</tr>
<tr>
<td>4</td>
<td>0515-1052</td>
<td>Screw, ST, M3x0.5, Hex 2.5 mm</td>
</tr>
<tr>
<td>5</td>
<td>G4267-60432</td>
<td>Spring Adapter Assembly</td>
</tr>
<tr>
<td>6</td>
<td>5067-5678</td>
<td>Piston, 100 µL, Zirconium oxide</td>
</tr>
<tr>
<td>7</td>
<td>G4267-40430</td>
<td>RFID Clamp (not including the RFID Tag)</td>
</tr>
<tr>
<td></td>
<td>5043-1000</td>
<td>O-Ring (not shown)</td>
</tr>
<tr>
<td></td>
<td>5500-1159</td>
<td>Capillary ST 0.17 mmx100 mm SX/S-2.3 Capillary from the metering device to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the injection valve (not shown)</td>
</tr>
</tbody>
</table>

![Analytical head assembly, 100 µL](image)
Flush Head Assembly 500 μL

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G4267-60491</td>
<td>Flush Head Assembly, 500 μL</td>
</tr>
<tr>
<td>2</td>
<td>5023-2473</td>
<td>Sealing Plate 500 μL</td>
</tr>
<tr>
<td>3</td>
<td>G4267-60482</td>
<td>Cylinder Assembly, 500 μL</td>
</tr>
<tr>
<td>4</td>
<td>5067-5918</td>
<td>Flush Head Seal 500 μL</td>
</tr>
<tr>
<td>5</td>
<td>0515-5167</td>
<td>Screw</td>
</tr>
<tr>
<td>6</td>
<td>1410-1881</td>
<td>Bearing-Sleeve 8 mm-ID 10 mm-OD 10 mm-LG Pl</td>
</tr>
<tr>
<td>7</td>
<td>G4267-60432</td>
<td>Spring Adapter Assembly</td>
</tr>
<tr>
<td>8</td>
<td>5067-5919</td>
<td>Piston Assembly 500 μL</td>
</tr>
<tr>
<td>9</td>
<td>G4267-60451</td>
<td>Pump Valve IN</td>
</tr>
<tr>
<td>10</td>
<td>G4267-60452</td>
<td>Pump Valve Out</td>
</tr>
<tr>
<td></td>
<td>5043-1000</td>
<td>O-Ring (not shown)</td>
</tr>
<tr>
<td></td>
<td>5500-1167</td>
<td>Capillary ST 0.17 mm x 250 mm SL-SL</td>
</tr>
</tbody>
</table>

Capillary from the flush head to the injection valve (not shown)

Figure 30  Flush head assembly, 500 μL
# 3-Position/6-Port FI Valve

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5068-0210</td>
<td>Stator screws</td>
</tr>
<tr>
<td>2</td>
<td>5068-0280</td>
<td>Stator</td>
</tr>
<tr>
<td>3</td>
<td>5068-0279</td>
<td>Rotor Seal, 3-position/6-port FI Valve</td>
</tr>
<tr>
<td></td>
<td>5500-1159</td>
<td>Capillary ST 0.17x100 SX/S·2.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metering Device to Injection Valve</td>
</tr>
<tr>
<td></td>
<td>5067-4650</td>
<td>Capillary ST 0.12 mm x 150 mm SL/SX</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pump to sampler</td>
</tr>
<tr>
<td></td>
<td>5500-1157</td>
<td>Capillary ST 0.12 mm x 500 mm SL/S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sampler to column compartment</td>
</tr>
<tr>
<td></td>
<td>5067-6127</td>
<td>Blank Nut SL</td>
</tr>
</tbody>
</table>

![3-Position/6-Port FI Valve Assembly Diagram](image)

Figure 31  3-Position/6-Port FI Valve Assembly
Needle Port Assembly

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G4267-60044</td>
<td>Needle Port Assembly Station</td>
</tr>
<tr>
<td>2</td>
<td>G4267-40045</td>
<td>Needle port Adapter</td>
</tr>
</tbody>
</table>

Figure 32  Needle port assembly
### Door Assy

<table>
<thead>
<tr>
<th>Item</th>
<th>#</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5067-5415</td>
<td>Door Assy</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5021-1879</td>
<td>Permanent Magnet</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5067-5412</td>
<td>Pressure Spring (not available)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5067-5412</td>
<td>Hinge for Infinity II Instrument Doors</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>G7167-68718</td>
<td>Light Protection Kit (not shown)</td>
<td></td>
</tr>
</tbody>
</table>

![Figure 33 Door assy](image-url)
## Online Sample Manager Accessory Kit

<table>
<thead>
<tr>
<th>Item</th>
<th>#</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>G3167-68000</td>
<td>1260 Infinity II Online Sample Manager Accessory Kit</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>8121-3099</td>
<td>CAN Cable, 1 m, flat (not shown)</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>G3167-42000</td>
<td>Single Holder UVD Multi Function</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>0515-5869</td>
<td>Screw-Tapping Pan-HD Hexalobular-Recess (not shown)</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>5043-1356</td>
<td>Column Holder Lamella</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>2110-1486</td>
<td>Fuse 2 AT250 V</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>5043-0270</td>
<td>Leak plane</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>5043-0271</td>
<td>Holder leak plane</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>5067-4792</td>
<td>Leak sensor assembly</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>5063-6527</td>
<td>Tubing, Silicon Rubber, 1.2 m, ID/OD 6/9 mm</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>5500-1156</td>
<td>T-Tube Connector ID6.4</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>5067-6680</td>
<td>3-position/6-port FI Valve</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>5500-0057</td>
<td>Capillary ST 160 mm x 0.17 mm SL/SL</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>5004-0011</td>
<td>Capillary ST 0.12 mm x 150 mm SL/SL</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>5005-0057</td>
<td>Capillary ST 0.17 mm x 160 mm SL/SL</td>
</tr>
<tr>
<td>15</td>
<td>3</td>
<td>G4220-60007</td>
<td>Bottle Head Assembly</td>
</tr>
</tbody>
</table>

![Diagram of Online Sample Manager Accessory Kit](image)

**Figure 34** 1260 Infinity II Online Sample Manager Accessory Kit
Multisampler Accessory Kit

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G7167-68715</td>
<td>Accessory Kit</td>
</tr>
<tr>
<td>1</td>
<td>G4220-60007</td>
<td>1260 Infinity II Multisampler Accessory Kit</td>
</tr>
<tr>
<td>2</td>
<td>5063-6527</td>
<td>Bottle Head Assembly</td>
</tr>
<tr>
<td>3</td>
<td>5067-5967</td>
<td>Tubing, Silicon Rubber, 1.2 m, ID/OD 6/9 mm</td>
</tr>
<tr>
<td>3</td>
<td>5500-1157</td>
<td>Capillary ST 0.12 mm x 500 mm SL/S</td>
</tr>
<tr>
<td>OR</td>
<td>5500-1246</td>
<td>Capillary ST 0.17 mm x 500 mm SI/S</td>
</tr>
<tr>
<td>OR</td>
<td>5500-1279</td>
<td>Capillary MP35N 0.12 mm x 500 mm SI/S</td>
</tr>
<tr>
<td>OR</td>
<td>G5667-81005</td>
<td>Capillary PK/ST 0.17 mm x 500 mm, RLO/RLO (Bio-inert)</td>
</tr>
<tr>
<td>4</td>
<td>5043-1013</td>
<td>Tubing Clip</td>
</tr>
<tr>
<td>5</td>
<td>5181-1519</td>
<td>CAN cable, Agilent module to module, 1 m</td>
</tr>
<tr>
<td>6</td>
<td>5067-5967</td>
<td>Tubing Clip Tube Connector</td>
</tr>
<tr>
<td>0100-1846</td>
<td>UNION-TEFZEL</td>
<td></td>
</tr>
<tr>
<td>5182-0716</td>
<td>Screw Cap Vial, 2 mL, amber glass, write-on spot, 100/Pack</td>
<td></td>
</tr>
<tr>
<td>5190-7024</td>
<td>Screw Cap, PTFE/silicone, 100/pk</td>
<td></td>
</tr>
</tbody>
</table>

**Tools**

**Figure 35** Accessory kit (standard)
### Parts for Maintenance and Repair

#### Multisampler Accessory Kit

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0100-1710</td>
<td>Mounting Tool for Tubing Connections</td>
</tr>
<tr>
<td>5023-2533</td>
<td>Mounting tool</td>
</tr>
</tbody>
</table>

**Tubing Connector Leak Kit (5067-6137)**

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5067-6137</td>
<td>Tubing Connector Leak Kit</td>
</tr>
</tbody>
</table>

![Figure 36 Tubing connector Leak Kit](image)
## Leak System Parts

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G4267-68708</td>
<td>Drain management contains:</td>
</tr>
<tr>
<td>1</td>
<td>G4267-40013</td>
<td>Leak Plane</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Ref Vial Holder (not orderable as one part)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Wash Port Assembly (not orderable as one part)</td>
</tr>
<tr>
<td></td>
<td>5043-1357</td>
<td>Seal silicone rubber (Washport; not shown)</td>
</tr>
<tr>
<td></td>
<td>G4267-60060</td>
<td>Blind seat (not shown)</td>
</tr>
<tr>
<td></td>
<td>5042-9974</td>
<td>Tubing, PE, 1.5 m (not shown)</td>
</tr>
</tbody>
</table>

![Figure 37 Drain management kit](image)

---

*InfinityLab Online LC Solution User Manual*
Sample Thermostat

InfinityLab Sample Thermostat Upgrade Kit (G4761A) contains:

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G7167-60101</td>
<td>Sample Thermostat</td>
</tr>
<tr>
<td>5067-6208</td>
<td>Condensate Drainage Kit</td>
</tr>
</tbody>
</table>

(Not shown)

NOTE

The Sample Thermostat contains flammable refrigerant R600a. Please check further details for installation.
# Online Sample Manager Capillary Kit

<table>
<thead>
<tr>
<th>Item</th>
<th>#</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>G3167-67000</td>
<td>Online Sample Manager Capillary Kit</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>5500-1159</td>
<td>Capillary ST 0.17 mm x 100 mm SX/S-2.3 PS-Capillary</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>5500-1234</td>
<td>Capillary ST 0.17 mm x 180 mm MD-Capillary</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5067-5403</td>
<td>UHP fitting</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>5004-0011</td>
<td>Capillary ST 0.12 mm x 150 mm SL/SL</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>5005-0057</td>
<td>Capillary ST 0.17 mm x 160 mm SL/SL</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>5067-5709</td>
<td>Capillary ST 0.25 mm x 250 mm S/S</td>
</tr>
</tbody>
</table>

![Online Sample Manager Capillary Kit](image)

**Figure 39** Online Sample Manager Capillary Kit
## Online Sample Manager Set PM Kit

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

![Figure 40](image)

Figure 40  Online Sample Manager Set PM Kit
This chapter describes the built in test functions.
User Interfaces

- Depending on the user interface, the available tests and the screens/reports may vary.
- The preferred tool for troubleshooting and diagnostics should be Agilent Lab Advisor Software, see “Agilent Lab Advisor Software” on page 273.
- The current Agilent OpenLab ChemStation, Agilent OpenLab CDS and Agilent MassHunter software do not include any maintenance/test functions.
- Screenshots used within these procedures are based on the Agilent Lab Advisor Software.
- The Online LC Monitoring Software does not include any maintenance/test functions.
Agilent Lab Advisor Software

The Agilent Lab Advisor Software (basic license, shipped with an Agilent LC pump) is a standalone product that can be used with or without a chromatographic data system. Agilent Lab Advisor helps to manage the lab for high-quality chromatographic results by providing a detailed system overview of all connected analytical instruments with instrument status, Early Maintenance Feedback counters (EMF), instrument configuration information, and diagnostic tests. With the push of a button, a detailed diagnostic report can be generated. Upon request, the user can send this report to Agilent for a significantly improved troubleshooting and repair process.

The Agilent Lab Advisor software is available in two versions:

- Lab Advisor Basic
- Lab Advisor Advanced

Lab Advisor Basic is included with every Agilent 1200 Infinity Series and Agilent InfinityLab LC Series instrument.

The Lab Advisor Advanced features can be unlocked by purchasing a license key, and include real-time monitoring of instrument actuals, all various instrument signals, and state machines. In addition, all diagnostic test results, calibration results, and acquired signal data can be uploaded to a shared network folder. The Review Client included in Lab Advisor Advanced allows to load and examine the uploaded data no matter on which instrument it was generated. This makes Data Sharing an ideal tool for internal support groups and users who want to track the instrument history of their analytical systems.

The optional Agilent Maintenance Wizard Add-on provides an easy-to-use, step-by-step multimedia guide for performing preventive maintenance on Agilent 1200 Infinity LC Series instrument.

The tests and diagnostic features that are provided by the Agilent Lab Advisor software may differ from the descriptions in this manual. For details, refer to the Agilent Lab Advisor software help files.
Introduction

All tests are described based on the Agilent Lab Advisor Software B.02.06 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 23 Interfaces and available test functions**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Comment</th>
<th>Available Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agilent Lab Advisor</td>
<td>All tests are available</td>
<td>• System Pressure test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Drawer Detection/Auto Referencing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sample Cooler/Thermostat Function Test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sampler Leak Test</td>
</tr>
<tr>
<td></td>
<td>Adding of pressure to chromatographic signals possible</td>
<td>• Hydraulic Path Leak Test</td>
</tr>
<tr>
<td>Agilent ChemStation</td>
<td>No tests available</td>
<td>• Drawer Detection/Auto Referencing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Temperature mainboard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Pressure/Pressure ripple</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Parts required</th>
<th>#</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>5067-6127</td>
<td>Blank Nut SL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For 1260 and 1290 Infinity II systems.</td>
</tr>
<tr>
<td>OR</td>
<td>1</td>
<td>5043-0277</td>
<td>Blank nut long 10-32, PEEK with stainless steel core</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For Bio-inert or 1290 Bio systems.</td>
</tr>
</tbody>
</table>
1 Run the System pressure test with the Agilent Lab Advisor (for further information see Online-Help of user interface).

Figure 41  System Pressure Test – Result

Figure 42  System Pressure Test – Dynamic pressure input
System Pressure Test Evaluation

Test Failed

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Damaged blank nut (poorly shaped from over tightening)</td>
<td>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.</td>
</tr>
<tr>
<td>2  Pump leakages</td>
<td>Perform the Pump Head Leak test.</td>
</tr>
<tr>
<td>3  Loose or leaky fittings</td>
<td>Tighten the fittings or replace capillaries.</td>
</tr>
<tr>
<td>4  Autosampler leakages</td>
<td>Perform the Autosampler Leak test.</td>
</tr>
<tr>
<td>5  Themostatted Column Compartment valve leakages</td>
<td>Replace the TCC valve rotor seal.</td>
</tr>
</tbody>
</table>

NOTE

Notice the difference between error in the test and a failed result! An error is caused by an abnormal termination during the operation of the test, whereas a failed result indicates that the test result were not within the specified limits.
Auto Referencing

The sampler auto referencing uses predefined positions on the base plate and the sample hotel to calibrate the positioning of the needle parkstation and the sample hotel. The auto referencing is required to compensate deviations in positioning the needle assembly and the sample tray. The auto referencing is required after disassembling the system or when you exchange the sample handler, the sample hotel, the needle parkstation, the needle assembly or one of the main boards. This function is implemented in the drawer detection and in the needle exchange routine.

When

After disassembling the module or an exchange of the needle assembly.

Preparations

- Workspace of the sampler is empty
- All drawers are closed properly
- All drawers have two sample trays installed, but no sample containers
- All drawers have been properly configured
- Needle assembly is installed in the needle parkstation

1. Open the CDS 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

![Menu Screenshot]
2 Use drawer configuration and follow the software instructions. Auto referencing is done.

3 Click the Back button to leave the Service & Diagnosis menu.

NOTE For auto referencing, you can alternatively use the Local Controller.
Maintenance Positions

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

When

1. Run the Maintenance Positions in the Service & Diagnostics View in the Agilent Lab Advisor (for further information see Online-Help of user interface).

Figure 43 Maintenance Positions
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.

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 190.

During normal operation the needle assembly has to be unlocked.

Figure 44  Change Needle Assembly
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.

![Change Sample Loop Capillary](image)

**Figure 45  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.

![Park Position Button](image)

**Figure 46  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.

![Change Metering Device](image)

Figure 47  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).

Follow a logical order to use the injector steps function.
Sample Cooler Function Test

The Sample Cooler Function Test is a diagnostic test to verify the correct functioning of the Sample Cooler/Sample Thermostat. The test takes up to 15 min to complete and returns a pass/fail type result. If the test failed or was aborted by the system, the final report will include some information on the possible root causes.

Before the test starts, the compressor is turned off to allow the system to reach the initial conditions. The test starts with acquiring data from the evaporator temperature sensor. If the reading is stable for at least 10 s ($\Delta T < 0.5 \, ^\circ C$), the compressor turns on and the temperature inside the cooler/thermostat starts to drop.

For the test to succeed, the system must pass three temperature checkpoints in a timely manner. These checkpoints are the following:

- **Checkpoint 1:** The temperature drops by 1/3 of the difference between the starting temperature and 5 °C.
- **Checkpoint 2:** The temperature drops below 5 °C.
- **Checkpoint 3:** The temperature stabilizes at a value below 5 °C and stays stable for at least 60 s ($\Delta T < 1.0 \, ^\circ C$).

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**

For testing the heater resistance of the Sample Thermostat, Lab Advisor version B.02.11 or higher is needed.
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.
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

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5067-6127</td>
<td>Blank Nut SL</td>
</tr>
<tr>
<td>5043-0277</td>
<td>Blank nut long 10-32, PEEK with stainless steel core</td>
</tr>
<tr>
<td>8710-0510</td>
<td>Open-end wrench 1/4 – 5/16 inch</td>
</tr>
</tbody>
</table>

### Preparations

Place a bottle of solvent in the channel that shall be tested. The type of solvent is not important.

1. Run the **Sampler Leak Test** with the Agilent LabAdvisor and follow the provided instructions.
Hydraulic Path Leak Test

The **Sampler Hydraulic Path Leak Test** determines the reactor and feed 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 injection path.
4. The flow path is purged.
5. A leak measurement is performed for the sampling path.
6. The flow path is purged.

**When**

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

**Preparations**

- Connect the Purge solvent (water) to port S2 of the Solvent Selection Valve.
- External Sampling Valve must be connected to the instrument and configured via the LC drivers.

1. Run the **Sampler Hydraulic Path Leak Test** with the Agilent LabAdvisor and follow the provided instructions.
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This chapter describes the meaning of error messages, and provides information on probable causes and suggested actions how to recover from error conditions.
What Are Error Messages

Error messages are displayed in the user interface when an electronic, mechanical, or hydraulic (flow path) failure occurs which requires attention before the analysis can be continued (for example, repair, or exchange of consumables is necessary). In the event of such a failure, the red status indicator at the front of the module is switched on, and an entry is written into the module logbook.

If an error occurs outside a method run, other modules will not be informed about this error. If it occurs within a method run, all connected modules will get a notification, all LEDs get red and the run will be stopped. Depending on the module type, this stop is implemented differently. For example, for a pump the flow will be stopped for safety reasons. For a detector, the lamp will stay on in order to avoid equilibration time. Depending on the error type, the next run can only be started, if the error has been resolved, for example liquid from a leak has been dried. Errors for presumably single time events can be recovered by switching on the system in the user interface.

Special handling is done in case of a leak. As a leak is a potential safety issue and may have occurred at a different module from where it has been observed, a leak always causes a shutdown of all modules, even outside a method run.

In all cases, error propagation is done via the CAN bus or via an APG/ERI remote cable (see documentation for the APG/ERI interface).
General Error Messages

General error messages are generic to all Agilent series HPLC modules and may show up on other modules as well.

**Timeout**

**Error ID: 0062**

The timeout threshold was exceeded.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The analysis was completed successfully, and the timeout function switched off the module as requested.</td>
<td>Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.</td>
</tr>
<tr>
<td>2 A not-ready condition was present during a sequence or multiple-injection run for a period longer than the timeout threshold.</td>
<td>Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.</td>
</tr>
</tbody>
</table>
## Shutdown

**Error ID: 0063**

An external instrument has generated a shutdown signal on the remote line.

The module continually monitors the remote input connectors for status signals. A LOW signal input on pin 4 of the remote connector generates the error message.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Leak detected in another module with a CAN connection to the system.</td>
<td>Fix the leak in the external instrument before restarting the module.</td>
</tr>
<tr>
<td>2  Leak detected in an external instrument with a remote connection to the system.</td>
<td>Fix the leak in the external instrument before restarting the module.</td>
</tr>
<tr>
<td>3  Shut-down in an external instrument with a remote connection to the system.</td>
<td>Check external instruments for a shut-down condition.</td>
</tr>
<tr>
<td>4  The degasser failed to generate sufficient vacuum for solvent degassing.</td>
<td>Check the vacuum degasser for an error condition. Refer to the <em>Service Manual</em> for the degasser or the pump that has the degasser built-in.</td>
</tr>
</tbody>
</table>
Remote Timeout

Error ID: 0070

A not-ready condition is still present on the remote input. When an analysis is started, the system expects all not-ready conditions (for example, a not-ready condition during detector balance) to switch to run conditions within one minute of starting the analysis. If a not-ready condition is still present on the remote line after one minute the error message is generated.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Not-ready condition in one of the instruments connected to the remote line.</td>
<td>Ensure the instrument showing the not-ready condition is installed correctly, and is set up correctly for analysis.</td>
</tr>
<tr>
<td>2 Defective remote cable.</td>
<td>Exchange the remote cable.</td>
</tr>
<tr>
<td>3 Defective components in the instrument showing the not-ready condition.</td>
<td>Check the instrument for defects (refer to the instrument's documentation).</td>
</tr>
</tbody>
</table>

Lost CAN Partner

Error ID: 0071

During an analysis, the internal synchronization or communication between one or more of the modules in the system has failed.

The system processors continually monitor the system configuration. If one or more of the modules is no longer recognized as being connected to the system, the error message is generated.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CAN cable disconnected.</td>
<td>• Ensure all the CAN cables are connected correctly. • Ensure all CAN cables are installed correctly.</td>
</tr>
<tr>
<td>2 Defective CAN cable.</td>
<td>Exchange the CAN cable.</td>
</tr>
<tr>
<td>3 Defective mainboard in another module.</td>
<td>Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.</td>
</tr>
</tbody>
</table>
Error Information
General Error Messages

Leak Sensor Short

Error ID: 0082

The leak sensor in the module has failed (short circuit).

The current through the leak sensor is dependent on temperature. A leak is
detected when solvent cools the leak sensor, causing the leak sensor current to
change within defined limits. If the current increases above the upper limit, the
error message is generated.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Defective leak sensor.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2 Leak sensor incorrectly routed, being</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>pinched by a metal component.</td>
<td></td>
</tr>
</tbody>
</table>

Leak Sensor Open

Error ID: 0083

The leak sensor in the module has failed (open circuit).

The current through the leak sensor is dependent on temperature. A leak is
detected when solvent cools the leak sensor, causing the leak sensor current to
change within defined limits. If the current falls outside the lower limit, the error
message is generated.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Leak sensor not connected to the mainboard.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2 Defective leak sensor.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>3 Leak sensor incorrectly routed, being</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>pinched by a metal component.</td>
<td></td>
</tr>
</tbody>
</table>
Compensation Sensor Open

Error ID: 0081

The ambient-compensation sensor (NTC) on the mainboard in the module has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the mainboard 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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Defective mainboard.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

Compensation Sensor Short

Error ID: 0080

The ambient-compensation sensor (NTC) on the mainboard in the module has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the mainboard is dependent on ambient temperature. The change in resistance is used by the leak circuit to compensate for ambient temperature changes. If the resistance across the sensor falls below the lower limit, the error message is generated.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Defective mainboard.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
Fan Failed

Error ID: 0068

The cooling fan in the module has failed.

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.

Depending on the module, assemblies (e.g. the lamp in the detector) are turned off to assure that the module does not overheat inside.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Fan cable disconnected.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2  Defective fan.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>3  Defective mainboard.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

Leak

Error ID: 0064

A leak was detected in the module.

The signals from the two temperature sensors (leak sensor and board-mounted temperature-compensation sensor) are used by the leak algorithm to determine whether a leak is present. When a leak occurs, the leak sensor is cooled by the solvent. This changes the resistance of the leak sensor which is sensed by the leak sensor circuit on the main board.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Loose fittings.</td>
<td>Ensure all fittings are tight.</td>
</tr>
<tr>
<td>2  Broken capillary.</td>
<td>Exchange defective capillaries.</td>
</tr>
</tbody>
</table>
Sampler Error Messages

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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Missing vessel</td>
<td>Check if the sample vial is installed in the correct position, or edit the method or sequence accordingly.</td>
</tr>
<tr>
<td>2 Needle command failed</td>
<td>Check the status of the needle assembly. Perform an autoreferencing.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 No vial in the position defined in the method</td>
<td>• Install the sample vial in the correct position.</td>
</tr>
<tr>
<td></td>
<td>• Edit the method or sequence accordingly.</td>
</tr>
<tr>
<td>2 Defective needle assembly</td>
<td>Exchange the needle assembly.</td>
</tr>
<tr>
<td>3 Sample container missing or not correctly installed</td>
<td>Install the sample container correctly on the tray.</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Front door not installed correctly.</td>
<td>• Check if the front door is installed correctly.</td>
</tr>
<tr>
<td></td>
<td>• Check if the magnet is in place in the front door.</td>
</tr>
<tr>
<td>2 Sample handler not aligned correctly.</td>
<td>Do an autoreferencing.</td>
</tr>
<tr>
<td>3 Mechanical obstruction of the sample handler.</td>
<td>Ensure unobstructed movement</td>
</tr>
<tr>
<td>4 Defective sample handler motors.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>5 Loose connection between hydraulic box and adapter board</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>6 Defective sample hotel electronic</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>7 Defective specific main board or fusion board</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Injection valve not installed correctly.</td>
<td>Check if the injection valve is installed correctly.</td>
</tr>
<tr>
<td>2 TAG and TAG reader not aligned correctly.</td>
<td>Check if the TAG or the TAG Reader are aligned correctly.</td>
</tr>
<tr>
<td>3 Electrical connection or components are defective.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

Sampler alignment procedure command failed

Error ID: 25034

The autosampler failed to complete the alignment correctly.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mechanical obstruction of the sample handler.</td>
<td>Ensure unobstructed movement.</td>
</tr>
<tr>
<td>2 Defective sample handler motors.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
Sampler transport initialization failed

Error ID: 25121

The autosampler failed to complete initialization correctly. The autosampler initialization procedure moves the robot to its reference positions in a predefined routine. During initialization, the processor monitors the position sensors and motor encoders to check for correct movement. During initialization, the processor monitors the position sensor, tag sensors, and actuator motor to check for correct movement. If one or more of the movements or the status information of the subparts is not read out successfully, the error message is generated.

### Probable cause | Suggested actions
--- | ---
1. Sample handler not aligned correctly. | Switch off the instrument and do an autoreferencing.
3. Defective sample handler motors. | Please contact your Agilent service representative.

Front door error

Error ID: 25051, 25049

During initialization, the autosampler recognizes the position of the front door. If the front door is open, this error message is displayed.

### Probable cause | Suggested actions
--- | ---
1. Front door is not closed properly. | Check if the front door is closed or if the magnet is missing.
Alignment procedure: needle command failed

Error ID: 25095

During the parking or movements of the needle assembly, the status information of the subparts is not read out successfully and the error message is generated.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  The sample loop capillary was squeezed in the needle parkstation.</td>
<td>• Check if the sample loop is installed correctly.</td>
</tr>
<tr>
<td></td>
<td>• Do an autoreferencing afterwards (needle assembly must be installed in the needle parkstation during this procedure).</td>
</tr>
<tr>
<td>2  The needle assembly was not installed correctly in the needle parkstation.</td>
<td>• Check if the needle assembly is installed correctly.</td>
</tr>
<tr>
<td></td>
<td>• Install the needle assembly on the sample handler.</td>
</tr>
<tr>
<td></td>
<td>• Do a reset of the sample handler.</td>
</tr>
<tr>
<td></td>
<td>• Do an autoreferencing (the needle assembly must be installed in the needle parkstation during this procedure).</td>
</tr>
<tr>
<td></td>
<td>• If this will not help: Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>3  Needle parkstation is loose.</td>
<td>Carefully tighten the needle parkstation.</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Sample container is not installed correctly in the pallet.</td>
<td>Check if the sample container is installed correctly.</td>
</tr>
</tbody>
</table>
| 2 Sample container definition in the CDS is not correct. | • Check if the correct sample container is selected in the CDS.  
• Verify if the dimension of the sample container match the database of your CDS. |
| 3 Sample handler not aligned correctly. | • Check if the sample handler can move freely.  
• Do an auto referencing (needle assembly must be installed in the needle parkstation during this procedure).  
• If this will not help: Please contact your Agilent service representative. |
**Robot drive current too high**

**Error ID: 25409**

The autosampler failed to complete initialization correctly. The autosampler initialization procedure can not move the motors inside of the sample handler to their reference positions in a predefined routine. During initialization, the processor monitors the position sensor and encoders to check for correct movement. If one or more of the movements or the status information of the subparts is not read out successfully, the error message is generated.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1   Sample handler is blocked.</td>
<td>• Check if the sample handler can move freely.</td>
</tr>
<tr>
<td></td>
<td>• Switch off the instrument.</td>
</tr>
<tr>
<td></td>
<td>• Do an auto referencing (needle assembly must be installed in the needle parkstation during this procedure).</td>
</tr>
<tr>
<td>2   Defective sample handler motors.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1   Bad electronic connections</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2   Defective mainboard/fusion board</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
Cleaning Procedure Failed

Error ID: 25400, 1-4

Cleaning procedure failed. Parameter shows what kind of cleaning procedure has failed: 1 = Wash, 2 = Prime, 3 = Autoclean, 4 = Clogged seat

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Solvent lines not installed correctly (valve block or flushpump)</td>
<td>Check status of the solvent lines. Use isopropanol for verification.</td>
</tr>
<tr>
<td>2 Clogged needle seat</td>
<td>Replace the needle seat</td>
</tr>
</tbody>
</table>

Metering Device Initialization Failed

Error ID: 25122

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Hydraulic box not in place.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2 Metering device not properly installed.</td>
<td>Check the correct positioning of RFID tag and tag reader.</td>
</tr>
</tbody>
</table>

Flush Pump Device Initialization Failed

Error ID: 25124

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Hydraulic box not in place.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2 Flush pump not properly installed.</td>
<td>Check the correct positioning of RFID tag and tag reader.</td>
</tr>
</tbody>
</table>
Peripheral Valve Initialization Failed

Error ID: 25125

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Hydraulic box not in place.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2  Valve not properly installed.</td>
<td>Check the correct positioning of RFID tag and tag reader.</td>
</tr>
</tbody>
</table>

Seat Back Flushing Failed

Error ID: 25119

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Clogged needle seat.</td>
<td>Replace the needle seat.</td>
</tr>
</tbody>
</table>

Move Needle to Parkstation Failed

Error ID: 25106

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Autoreferencing values missing or outdated.</td>
<td>Manually install the needle into the parkstation, clear current autoreferencing values (use Clear data on Lab Advisor), power cycle the module and perform autoreferencing.</td>
</tr>
</tbody>
</table>
Taking Needle from Parkstation Failed

Error ID: 25105

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Parkstation is loose.</td>
<td>Carefully tighten the parkstation. Avoid overtightening, as this could damage the baseplate of the module.</td>
</tr>
<tr>
<td>2 Needle assembly is defective.</td>
<td>Replace the needle assembly.</td>
</tr>
<tr>
<td>3 Autoreferencing needed.</td>
<td>Manually install the needle into the parkstation, clear current autoreferencing values (use Clear data on Lab Advisor), power cycle the module and perform autoreferencing.</td>
</tr>
</tbody>
</table>

Taking sample tray from hotel position failed

Error ID: 25104

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mechanical obstruction of the sample handler by reference vial holder.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
## Error Information

**Sampler Error Messages**

### 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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Defective fuse.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2  Defective mainboard.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  One of the sample handler cables is not properly connected.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2  One of the sample handler cables is damaged (corroded or chipped off).</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>3  Defective mainboard.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
Sample Cooler/Sample Thermostat Error Messages

Sample temperature control voltage too low, check fuses and wires

Error ID: 30713
The compressor voltage is below the lower threshold value.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

Sample temperature control switched off due to condensate

Error ID: 30715
The cooler/thermostat was switched off due to a condensate event.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Overfilled container</td>
<td>Empty the condensate container. Verify that the open end of the tubing doesn't immerse in the liquid.</td>
</tr>
</tbody>
</table>
| 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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Overheated condenser</td>
<td>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.</td>
</tr>
<tr>
<td>2  Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

Sample temperature control sensor electronics calibration failed

Error ID: 30717

The system is in the error state because the calibration of the analog temperature sensor has failed.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Sampler incompatibility</td>
<td>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.</td>
</tr>
<tr>
<td>2  Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

Cooler condensate sensor defect

Error ID: 30719

The condensate sensor of the cooler/thermostat is not working properly.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

Cooler PCB is in error mode

Error ID: 30275

The system is in the error state because the compressor control board has encountered an unexpected error.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
## Error Information

### Sample Cooler/Sample Thermostat Error Messages

### Cooler condenser fan failed

**Error ID: 30726**

The condenser fan of the cooler/thermostat is not working properly.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

### Thermostat communication error

**Error ID: 30738**

The system is in the error state because the communication between the sampler and the thermostat has failed.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

### Heater defect

**Error ID: 30739**

The heating function of the thermostat is not working properly.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
Heater in operating error

Error ID: 30744

The system is in the error state because the thermostat heater has encountered an unexpected error.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

Thermostat sensor defect

Error ID: 30751

One of the digital temperature sensors of the cooler/thermostat is not working properly.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

Compressor has error

Error ID: 30756

The system is in the error state because the control board of the compressor has encountered an unexpected error.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
## Sample Thermostat unknown

**Error ID: 30768**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

## Thermostat fan defect

**Error ID: 30771**

One of the cooling fans of the cooler/thermostat is not working properly.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential hardware error</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mechanical problems. Friction too high or blockages on the valve drive’s motor or on the valve head.</td>
<td>- Check valve head for correct installation</td>
</tr>
<tr>
<td></td>
<td>- Try to identify the source of trouble by installing a different valve head if possible.</td>
</tr>
<tr>
<td></td>
<td>- Contact your Agilent Service representative.</td>
</tr>
<tr>
<td>2 Defect Sensor on the Valve Drive Motor</td>
<td>- Check valve head for correct installation</td>
</tr>
<tr>
<td></td>
<td>- Try to identify the source of trouble by installing a different valve head if possible.</td>
</tr>
<tr>
<td></td>
<td>- Contact your Agilent Service representative.</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
</table>
| 1 Mechanical problems. Friction too high or blockages on the valve drive’s motor or on the valve head. | • Check valve head for correct installation  
• Try to identify the source of trouble by installing a different valve head if possible.  
• Contact your Agilent Service representative. |
| 2 Defect Sensor on the Valve Drive Motor             | • Check valve head for correct installation  
• Try to identify the source of trouble by installing a different valve head if possible.  
• Contact your Agilent Service representative. |

Valve Tag Violation

Error ID: 24006

The valve drive identified a different valve head than it had identified during the last initialization.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A valve head has been exchanged (hot-plugged) while the valve drive was still powered on.</td>
<td>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.</td>
</tr>
</tbody>
</table>

NOTE

Soft power-down power supply of the valve drive.
Whenever you want to power cycle the valve drive for a re-boot, it needs to be powered off for at least 10 seconds.
Pressure Cluster Partner Missing

The connection from the valve drive to a defined pressure cluster partner is lost.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Communication issues</td>
<td>Check the CAN cable connections of the modules.</td>
</tr>
<tr>
<td>2 Configuration mismatch</td>
<td>Check and correct if necessary the valve configuration and presence of defined pressure cluster partner.</td>
</tr>
</tbody>
</table>

Position Cluster Partner Missing

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Communication issues</td>
<td>Check the CAN cable connections of the modules.</td>
</tr>
<tr>
<td>2 Configuration mismatch</td>
<td>• Check and correct if necessary the valve configuration and presence of defined position cluster partner.</td>
</tr>
<tr>
<td></td>
<td>• If the module was moved to another LC stack, perform Firmware Declustering in Service &amp; Diagnostic section of Lab Advisor.</td>
</tr>
</tbody>
</table>
10 Identifying Cables

Cable Overview 320
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Agilent Module to PC 329
USB 329

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

**NOTE**

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

### Analog cables

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35900-60750</td>
<td>Agilent 35900A A/D converter</td>
</tr>
<tr>
<td>01046-60105</td>
<td>Analog cable (BNC to general purpose, spade lugs)</td>
</tr>
</tbody>
</table>

### Remote cables

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

### CAN cables

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5181-1516</td>
<td>CAN cable, Agilent module to module, 0.5 m</td>
</tr>
<tr>
<td>5181-1519</td>
<td>CAN cable, Agilent module to module, 1 m</td>
</tr>
</tbody>
</table>
### Identifying Cables

#### Cable Overview

- **LAN cables**

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5023-0203</td>
<td>Cross-over network cable, shielded, 3 m (for point to point connection)</td>
</tr>
<tr>
<td>5023-0202</td>
<td>Twisted pair network cable, shielded, 7 m (for point to point connection)</td>
</tr>
</tbody>
</table>

- **RS-232 cables** (not for FUSION board)

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS232-61601</td>
<td>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 &quot;Null Modem Cable&quot; 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.</td>
</tr>
<tr>
<td>5181-1561</td>
<td>RS-232 cable, 8 m</td>
</tr>
</tbody>
</table>

- **USB cables**

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5188-8050</td>
<td>USB A M-USB Mini B 3 m (PC-Module)</td>
</tr>
<tr>
<td>5188-8049</td>
<td>USB A F-USB Mini B M OTG (Module to Flash Drive)</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>p/n 35900-60750</th>
<th>35900</th>
<th>Pin Agilent module</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Shield</td>
<td>Analog -</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Center</td>
<td>Analog +</td>
</tr>
</tbody>
</table>
### Agilent Module to BNC Connector

<table>
<thead>
<tr>
<th>p/n 8120-1840</th>
<th>Pin BNC</th>
<th>Pin Agilent module</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shield</td>
<td>Shield</td>
<td>Analog -</td>
</tr>
<tr>
<td></td>
<td>Center</td>
<td>Center</td>
<td>Analog +</td>
</tr>
</tbody>
</table>

### Agilent Module to General Purpose

<table>
<thead>
<tr>
<th>p/n 01046-60105</th>
<th>Pin</th>
<th>Pin Agilent module</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
<td></td>
<td>Analog -</td>
</tr>
<tr>
<td>3</td>
<td>Red</td>
<td></td>
<td>Analog +</td>
</tr>
</tbody>
</table>
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)

<table>
<thead>
<tr>
<th>p/n 5188-8029</th>
<th>pin</th>
<th>Color code</th>
<th>Enhanced Remote</th>
<th>Classic Remote</th>
<th>Active (TTL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 white</td>
<td>IO1</td>
<td>START</td>
<td>I01</td>
<td>START REQUEST</td>
<td>Low</td>
</tr>
<tr>
<td>2 brown</td>
<td>IO2</td>
<td>STOP</td>
<td>I02</td>
<td>STOP</td>
<td>Low</td>
</tr>
<tr>
<td>3 green</td>
<td>IO3</td>
<td>READY</td>
<td>I03</td>
<td>READY</td>
<td>High</td>
</tr>
<tr>
<td>4 yellow</td>
<td>IO4</td>
<td>POWER ON</td>
<td>I04</td>
<td>POWER ON</td>
<td>High</td>
</tr>
<tr>
<td>5 grey</td>
<td>IO5</td>
<td>NOT USED</td>
<td>I05</td>
<td>NOT USED</td>
<td>Low</td>
</tr>
<tr>
<td>6 pink</td>
<td>IO6</td>
<td>SHUT DOWN</td>
<td>I06</td>
<td>SHUT DOWN</td>
<td>Low</td>
</tr>
<tr>
<td>7 blue</td>
<td>IO7</td>
<td>START</td>
<td>I07</td>
<td>START</td>
<td>Low</td>
</tr>
<tr>
<td>8 red</td>
<td>IO8</td>
<td>PREPARE</td>
<td>I08</td>
<td>PREPARE</td>
<td>Low</td>
</tr>
<tr>
<td>9 black</td>
<td></td>
<td>1wire DATA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 violet</td>
<td></td>
<td>DGND</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 grey-pink</td>
<td></td>
<td>+5V ERI out</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 red-blue</td>
<td></td>
<td>PGND</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 white-green</td>
<td></td>
<td>PGND</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 brown-green</td>
<td></td>
<td>+24V ERI out</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 white-yellow</td>
<td></td>
<td>+24V ERI out</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC yellow-brown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 5188-8045 ERI to APG (Connector D_Subminiature 15 pin (ERI), Connector D_Subminiature 9 pin (APG))
## Remote Cables

<table>
<thead>
<tr>
<th>p/n 5188-8045</th>
<th>Pin (ERI)</th>
<th>Signal</th>
<th>Pin (APG)</th>
<th>Active (TTL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>GND</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Start Request</td>
<td>9</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Stop</td>
<td>8</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ready</td>
<td>7</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Power on</td>
<td>6</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Future</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Shut Down</td>
<td>4</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Start</td>
<td>3</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Prepare</td>
<td>2</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Ground</td>
<td>Cable Shielding</td>
<td>NC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• 5188-8057 ERI to APG and RJ45 (Connector D_Subminiature 15 pin (ERI), Connector D_Subminiature 9 pin (APG), Connector plug Cat5e (RJ45))

Table 24  5188-8057 ERI to APG and RJ45

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

One end of these cables provides a Agilent Technologies APG (Analytical Products Group) remote connector to be connected to Agilent modules. The other end depends on the instrument to be connected to.
### Agilent Module to Agilent 35900 A/D Converters

<table>
<thead>
<tr>
<th>p/n 5061-3378</th>
<th>Pin 35900 A/D</th>
<th>Pin Agilent module</th>
<th>Signal Name (TTL)</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - White</td>
<td>1 - White</td>
<td>Digital ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - Brown</td>
<td>2 - Brown</td>
<td>Prepare run</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>3 - Gray</td>
<td>3 - Gray</td>
<td>Start</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>4 - Blue</td>
<td>4 - Blue</td>
<td>Shut down</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>5 - Pink</td>
<td>5 - Pink</td>
<td>Not connected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 - Yellow</td>
<td>6 - Yellow</td>
<td>Power on</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>7 - Red</td>
<td>7 - Red</td>
<td>Ready</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>8 - Green</td>
<td>8 - Green</td>
<td>Stop</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>9 - Black</td>
<td>9 - Black</td>
<td>Start request</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

### Agilent Module to General Purpose

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

CAN/LAN Cables

Both ends of this cable provide a modular plug to be connected to Agilent modules CAN or LAN connectors.

**CAN Cables**

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5181-1516</td>
<td>CAN cable, Agilent module to module, 0.5 m</td>
</tr>
<tr>
<td>5181-1519</td>
<td>CAN cable, Agilent module to module, 1 m</td>
</tr>
</tbody>
</table>

**LAN Cables**

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5023-0203</td>
<td>Cross-over network cable, shielded, 3 m (for point to point connection)</td>
</tr>
<tr>
<td>5023-0202</td>
<td>Twisted pair network cable, shielded, 7 m (for point to point connection)</td>
</tr>
</tbody>
</table>
Identifying Cables
Agilent Module to PC

Agilent Module to PC

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS232-61601</td>
<td>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 &quot;Null Modem Cable&quot; 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.</td>
</tr>
<tr>
<td>5181-1561</td>
<td>RS-232 cable, 8 m</td>
</tr>
</tbody>
</table>

USB

To connect a USB Flash Drive use a USB OTG cable with Mini-B plug and A socket.

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5188-8050</td>
<td>USB A M-USB Mini B 3 m (PC-Module)</td>
</tr>
<tr>
<td>5188-8049</td>
<td>USB A F-USB Mini B M OTG (Module to Flash Drive)</td>
</tr>
</tbody>
</table>
11 Hardware Information

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

The firmware of the instrument consists of two independent sections:
- a non-instrument specific section, called resident system
- an instrument specific section, called main system

Resident System

This resident section of the firmware is identical for all Agilent 1100/1200/1220/1260/1290 series modules. Its properties are:
- the complete communication capabilities (CAN, LAN, USB and RS-232)
- memory management
- ability to update the firmware of the 'main system'

Main System

Its properties are:
- the complete communication capabilities (CAN, LAN, USB and RS-232)
- memory management
- ability to update the firmware of the 'resident system'

In addition the main system comprises the instrument functions that are divided into common functions like
- run synchronization through APG/ERI remote,
- error handling,
- diagnostic functions,
- or module specific functions like
  - internal events such as lamp control, filter movements,
  - raw data collection and conversion to absorbance.
Firmware Updates

Firmware updates can be done with the Agilent Lab Advisor software with files on the hard disk (latest version should be used).

Required tools, firmware and documentation are available from the Agilent web: http://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.

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 48 Firmware Update Mechanism](image-url)
Some modules are limited in downgrading due to their mainboard version or their initial firmware revision. For example, a G1315C DAD SL cannot be downgraded below firmware revision B.01.02 or to a A.xx.xx.

Some modules can be re-branded (e.g. G1314C to G1314B) to allow operation in specific control software environments. In this case, the feature set of the target type is used and the feature set of the original one is lost. After re-branding (e.g. from G1314B to G1314C), the original feature set is available again.

All this specific information is described in the documentation provided with the firmware update tools.

The firmware update tools, firmware and documentation are available from the Agilent web.

Electrical Connections

- The CAN bus is a serial bus with high-speed data transfer. The two connectors for the CAN bus are used for internal module data transfer and synchronization.
- The ERI/REMOTE connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features such as start, stop, common shutdown, prepare, and so on.
- With the appropriate software, the LAN connector may be used to control the module from a computer through a LAN connection. This connector is activated and can be configured with the configuration switch.
- With the appropriate software, the USB connector may be used to control the module from a computer through a USB connection.
- The power input socket accepts a line voltage of 100 – 240 VAC ± 10 % with a line frequency of 50 or 60 Hz. Maximum power consumption varies by module. There is no voltage selector on your module because the power supply has wide-ranging capability. There are no externally accessible fuses because automatic electronic fuses are implemented in the power supply.

**NOTE**

Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.
Rear view of the solution modules

Figure 49 Rear view of the Online Sample Manager - electrical connections
Figure 50  Rear view of the External Sampling Valve - electrical connections
Information on Instrument Serial Number

Serial Number Information 1260/1290 Infinity

The serial number information on the instrument labels provide the following information:

CCXZZ00000 Format

CC     Country of manufacturing
     • DE = Germany
     • JP = Japan
     • CN = China

X     Alphabetic character A-Z (used by manufacturing)

ZZ     Alpha-numeric code 0-9, A-Z, where each combination
      unambiguously denotes a module (there can be more than one
      code for the same module)

00000     Serial number

Serial Number Information 1200 Series and 1290 Infinity

The serial number information on the instrument labels provide the following information:

CCYWWSSSSS Format

CC     country of manufacturing
     • DE = Germany
     • JP = Japan
     • CN = China

YWW     year and week of last major manufacturing change, e.g. 820
      could be week 20 of 1998 or 2008

SSSSS     real serial number
The Agilent InfinityLab LC Series modules provide the following interfaces:

### Table 25 Agilent InfinityLab LC Series Interfaces

<table>
<thead>
<tr>
<th>Module</th>
<th>CAN</th>
<th>USB</th>
<th>LAN (on-board)</th>
<th>RS-232</th>
<th>Analog</th>
<th>APG (A) / ERI (E)</th>
<th>Special</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pumps</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G7104A/C</td>
<td>2</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>1</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>G7110B</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>G7111A/B, G5654A</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>G7112B</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>G7120A, G7132A</td>
<td>2</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>1</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>G7161A/B</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td><strong>Samplers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G7129A/B/C</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>G7167A/B, G7137A, G5668A, G3167A</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>G7157A</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td><strong>Detectors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G7114A/B</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>1</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>G7115A</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>1</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>G7117A/B/C</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>1</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>G7121A/B</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>1</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>G7162A/B</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>1</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>G7165A</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>1</td>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>
## Interfaces

### Table 25 Agilent InfinityLab LC Series Interfaces

<table>
<thead>
<tr>
<th>Module</th>
<th>CAN</th>
<th>USB</th>
<th>LAN (on-board)</th>
<th>RS-232</th>
<th>Analog</th>
<th>APG (A) / ERI (E)</th>
<th>Special</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fraction Collectors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G7158B</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>E</td>
</tr>
<tr>
<td>G7159B</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>E</td>
</tr>
<tr>
<td>G7166A</td>
<td>2</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Requires a host module with on-board LAN with minimum FW B.06.40 or C.06.40, or with additional G1369C LAN Card.</td>
</tr>
<tr>
<td>G1364E/F, G5664B</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>E</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1170A</td>
<td>2</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Requires a host module with on-board LAN or with additional G1369C LAN Card.</td>
</tr>
<tr>
<td>G7116A/B</td>
<td>2</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Requires a host module with on-board LAN or with additional G1369C LAN Card.</td>
</tr>
<tr>
<td>G7122A</td>
<td></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>A</td>
<td>Requires a host module with on-board LAN with minimum FW B.06.40 or C.06.40, or with additional G1369C LAN Card.</td>
</tr>
<tr>
<td>G7170B</td>
<td>2</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Requires a host module with on-board LAN with minimum FW B.06.40 or C.06.40, or with additional G1369C LAN Card.</td>
</tr>
</tbody>
</table>

**NOTE** The detector (DAD/MWD/FLD/VWD/RID) is the preferred access point for control via LAN. The inter-module communication is done via CAN.

- CAN connectors as interface to other modules
- LAN connector as interface to the control software
- RS-232C as interface to a computer
- USB (Universal Series Bus) as interface to a computer
- REMOTE connector as interface to other Agilent products
- Analog output connector(s) for signal output
Overview Interfaces

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.

If an Agilent detector (DAD/MWD/FLD/VWD/RID) is in the system, the LAN should be connected to the DAD/MWD/FLD/VWD/RID (due to higher data load). If no Agilent detector is part of the system, the LAN interface should be installed in the pump or autosampler.

NOTE

USB
The USB interface replaces the RS-232 Serial interface in new FUSION generation modules. For details on USB refer to “USB (Universal Serial Bus)” on page 345.

Analog Signal Output
The analog signal output can be distributed to a recording device. For details refer to the description of the module’s mainboard.
Remote (ERI)

The ERI (Enhanced Remote Interface) connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features as common shut down, prepare, and so on.

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

The subminiature D connector is used. The module provides one remote connector which is inputs/outputs (wired- or technique).

To provide maximum safety within a distributed analysis system, one line is dedicated to **SHUT DOWN** the system’s critical parts in case any module detects a serious problem. To detect whether all participating modules are switched on or properly powered, one line is defined to summarize the **POWER ON** state of all connected modules. Control of analysis is maintained by signal readiness **READY** for next analysis, followed by **START** of run and optional **STOP** of run triggered on the respective lines. In addition **PREPARE** and **START REQUEST** may be issued. The signal levels are defined as:

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

**NOTE**

All common TTL circuits operate with a 5 V power supply. A TTL signal is defined as "low" or L when between 0 V and 0.8 V and "high" or H when between 2.0 V and 5.0 V (with respect to the ground terminal).
## Hardware Information

### Interfaces

#### Table 26  ERI signal distribution

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>START REQUEST</td>
<td>(L) Request to start injection cycle (for example, by start key on any module). Receiver is the autosampler.</td>
</tr>
<tr>
<td>2</td>
<td>STOP</td>
<td>(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.</td>
</tr>
<tr>
<td>3</td>
<td>READY</td>
<td>(H) System is ready for next analysis. Receiver is any sequence controller.</td>
</tr>
<tr>
<td>4</td>
<td>POWER ON</td>
<td>(H) All modules connected to system are switched on. Receiver is any module relying on operation of others.</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>6</td>
<td>SHUT DOWN</td>
<td>(L) System has serious problem (for example, leak: stops pump). Receiver is any module capable to reduce safety risk.</td>
</tr>
<tr>
<td>7</td>
<td>START</td>
<td>(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.</td>
</tr>
<tr>
<td>8</td>
<td>PREPARE</td>
<td>(L) Request to prepare for analysis (for example, calibration, detector lamp on). Receiver is any module performing pre-analysis activities.</td>
</tr>
</tbody>
</table>

### Special Interfaces

There is no special interface for this module.
ERI (Enhanced Remote Interface)

ERI replaces the AGP Remote Interface that is used in the HP 1090/1040/1050/1100 HPLC systems and Agilent 1100/1200/1200 Infinity HPLC modules. All new InfinityLab LC Series products using the FUSION core electronics use ERI. This interface is already used in the Agilent Universal Interface Box 2 (UIB2).

ERI Description

The ERI interface contains eight individual programmable input/output pins. In addition, it provides 24 V power and 5 V power and a serial data line to detect and recognize further add-ons that could be connected to this interface. This way the interface can support various additional devices like sensors, triggers (in and out) and small controllers, etc.

Figure 51  Location of the ERI interface (example shows a G7114A/B VWD)
Hardware Information
Interfaces

**IO (Input/Output) Lines**
- Eight generic bi-directional channels (input or output).
- Same as the APG Remote.
- Devices like valves, relays, ADCs, DACs, controllers can be supported/controlled.

**1-Wire Data (Future Use)**

This serial line can be used to read out an EPROM or write into an EPROM of a connected ERI-device. The firmware can detect the connected type of device automatically and update information in the device (if required).
5V Distribution (Future Use)
- Available directly after turning on the hosting module (assures that the firmware can detect certain basic functionality of the device).
- For digital circuits or similar.
- Provides 500 mA maximum.
- Short-circuit proof with automatic switch off (by firmware).

24V Distribution (Future Use)
- Available by firmware command (defined turn on/off).
- For devices that need higher power
  - Class 0: 0.5 A maximum (12 W)
  - Class 1: 1.0 A maximum (24 W)
  - Class 2: 2.0 A maximum (48 W)
- Class depends on hosting module’s internal power overhead.
- If a connected device requires more power the firmware detects this (overcurrent detection) and provides the information to the user interface.
- Fuse used for safety protection (on board).
- Short circuit will be detected through hardware.

USB (Universal Serial Bus)
USB (Universal Serial Bus) - replaces RS232, supports:
- a PC with control software (for example Agilent Lab Advisor)
- USB Flash Disk
Setting the 6-bit Configuration Switch

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

All modules with FUSION electronics:

- Default is ALL switches DOWN (best settings).
  - Default IP address for LAN 192.168.254.11
- For specific LAN modes switches 4-5 must be set as required.
- For boot resident/cold start modes switches 1+2 or 6 must be UP.

Figure 52 Location of Configuration switch (example shows a G7114A/B VWD)
### 6-bit Configuration Switch

<table>
<thead>
<tr>
<th>Mode</th>
<th>Switch 1</th>
<th>Switch 2</th>
<th>Switch 3</th>
<th>Switch 4</th>
<th>Switch 5</th>
<th>Switch 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM¹</td>
<td>0</td>
<td>n.a.²</td>
<td>n.a.</td>
<td>LAN Init Mode</td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>Use Default IP Address³</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Use Stored IP Address</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Use DHCP to request IP Address⁴</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Test</td>
<td>1</td>
<td>System</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>ColdStart</td>
</tr>
<tr>
<td>Boot Main System / Keep Data</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Boot Resident System / Keep Data</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Boot Main System / Revert to Default Data</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Boot Resident System / Revert to Default Data</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

---

¹ When selecting mode COM, settings are stored to non-volatile memory. When selecting mode TEST, COM settings are taken from non-volatile memory.

² not assigned - Always keep these switches on position '0' (off)

³ Default IP Address is 192.168.254.11

⁴ Host Name will be the MAC address.
Config Switch Settings of the Infinity Valve Drive

Configuration Switch Settings

![Diagram of Config Switches]

Table 28  Dip switches settings for G1170A

<table>
<thead>
<tr>
<th>Mode select</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>right</td>
<td>right</td>
</tr>
<tr>
<td>Coldstart</td>
<td>right</td>
<td>left</td>
</tr>
<tr>
<td>Boot resident</td>
<td>left</td>
<td>right</td>
</tr>
<tr>
<td>Not supported</td>
<td>left</td>
<td>left</td>
</tr>
</tbody>
</table>
Special Settings

Boot-Resident

Firmware update procedures may require this mode in case of firmware loading errors (main firmware part). If you use the following switch settings and power the instrument up again, the instrument firmware stays in the resident mode. It is not operable as a module. It only uses basic functions of the operating system for example, for communication. In this mode the main firmware can be loaded (using update utilities).

Forced Cold Start

A forced cold start can be used to bring the module into a defined mode with default parameter settings.

**CAUTION**

**Loss of data**

Forced cold start erases all methods and data stored in the non-volatile memory. Exceptions are calibration settings, diagnosis and repair log books which will not be erased.

✓ Save your methods and data before executing a forced cold start.
Instrument Layout

The industrial design of the module incorporates several innovative features. It uses Agilent’s E-PAC concept for the packaging of electronics and mechanical assemblies. This concept is based upon the use of expanded polypropylene (EPP) layers of foam plastic spacers in which the mechanical and electronic boards components of the module are placed. This pack is then housed in a metal inner cabinet which is enclosed by a plastic external cabinet. The advantages of this packaging technology are:

• virtual elimination of fixing screws, bolts or ties, reducing the number of components and increasing the speed of assembly/disassembly,

• the plastic layers have air channels molded into them so that cooling air can be guided exactly to the required locations,

• the plastic layers help cushion the electronic and mechanical parts from physical shock, and

• the metal inner cabinet shields the internal electronics from electromagnetic interference and also helps to reduce or eliminate radio frequency emissions from the instrument itself.
Early Maintenance Feedback

Maintenance requires the exchange of components that are subject to wear or stress. Ideally, the frequency at which components are exchanged should be based on the intensity of use of the module and the analytical conditions, and not on a predefined time interval. The early maintenance feedback (EMF) feature monitors the use of specific components in the instrument, and provides feedback when the user-selectable limits have been exceeded. The visual feedback in the user interface provides an indication that maintenance procedures should be scheduled.

**EMF Counters**

**EMF counters** increment with use and can be assigned a maximum limit which provides visual feedback in the user interface when the limit is exceeded. Some counters can be reset to zero after the required maintenance procedure.

**Using the EMF Counters**

The user-settable **EMF limits** for the **EMF Counters** enable the early maintenance feedback to be adapted to specific user requirements. The useful maintenance cycle is dependent on the requirements for use. Therefore, the definition of the maximum limits need to be determined based on the specific operating conditions of the instrument.

**Setting the EMF Limits**

The setting of the **EMF limits** must be optimized over one or two maintenance cycles. Initially the default **EMF limits** should be set. When instrument performance indicates maintenance is necessary, take note of the values displayed by the **EMF counters**. Enter these values (or values slightly less than the displayed values) as **EMF limits**, and then reset the **EMF counters** to zero. The next time the **EMF counters** exceed the new **EMF limits**, the **EMF flag** will be displayed, providing a reminder that maintenance needs to be scheduled.
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   Agilent Technologies on Internet  369

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

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.

Ensure the proper usage of the equipment.
The protection provided by the equipment may be impaired.
✔ The operator of this instrument is advised to use the equipment in a manner as specified in this manual.

Safety Standards

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.
Before Applying Power

**WARNING**

Wrong voltage range, frequency or cabling
Personal injury or damage to the instrument

- Verify that the voltage range and frequency of your power distribution matches to the power specification of the individual instrument.
- Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.
- Make all connections to the unit before applying power.

**NOTE**

Note the instrument’s external markings described under “Symbols” on page 358.
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 inoperable and secured against unintended operation until they can be repaired by qualified service personnel.
Solvents

**WARNING**

Toxic, flammable and hazardous solvents, samples and reagents

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

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

- Do not use solvents with an auto-ignition temperature below 200 °C (392 °F). Do not use solvents with a boiling point below 56 °C (133 °F).

- Avoid high vapor concentrations. Keep the solvent temperature at least 40 °C (72 °F) below the boiling point of the solvent used. This includes the solvent temperature in the sample compartment. For the solvents methanol and ethanol keep the solvent temperature at least 25 °C (45 °F) below the boiling point.

- Do not operate the instrument in an explosive atmosphere.

- Do not use solvents of ignition Class IIC according IEC 60079-20-1 (for example, carbon disulfide).

- Reduce the volume of substances to the minimum required for the analysis.

- Never exceed the maximum permissible volume of solvents (8 L) in the solvent cabinet. Do not use bottles that exceed the maximum permissible volume as specified in the usage guideline for solvent cabinet.

- Ground the waste container.

- Regularly check the filling level of the waste container. The residual free volume in the waste container must be large enough to collect the waste liquid.

- To achieve maximal safety, regularly check the tubing for correct installation.

**NOTE**

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

<table>
<thead>
<tr>
<th>Table 29</th>
<th>Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Exclamation Mark" /></td>
<td>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.</td>
</tr>
<tr>
<td><img src="image" alt="Triangle with Exclamation Mark" /></td>
<td>Indicates dangerous voltages.</td>
</tr>
<tr>
<td><img src="image" alt="Triangle with Ground Symbol" /></td>
<td>Indicates a protected ground terminal.</td>
</tr>
<tr>
<td><img src="image" alt="Triangle with Hot Surface" /></td>
<td>The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.</td>
</tr>
<tr>
<td><img src="image" alt="Snowflake" /></td>
<td>Sample Cooler unit is designed as vapor-compression refrigeration system. Contains fluorinated greenhouse gas (refrigerant) according to the Kyoto protocol. For specifications of refrigerant, charge capacity, carbon dioxide equivalent (CDE), and global warming potential (GWP) see instrument label.</td>
</tr>
<tr>
<td><img src="image" alt="Flammable Material" /></td>
<td>Flammable Material For Sample Thermostat which uses flammable refrigerant consult Agilent Information Center / User Manual before attempting to install or service this equipment. All safety precautions must be followed.</td>
</tr>
<tr>
<td><img src="image" alt="CE Mark" /></td>
<td>Confirms that a manufactured product complies with all applicable European Community directives. The European Declaration of Conformity is available at: <a href="http://regulations.corporate.agilent.com/DoC/search.htm">http://regulations.corporate.agilent.com/DoC/search.htm</a></td>
</tr>
<tr>
<td><img src="image" alt="Manufacturing Date" /></td>
<td>Manufacturing date.</td>
</tr>
<tr>
<td><img src="image" alt="Power Symbol" /></td>
<td>Power symbol indicates On/Off. The apparatus is not completely disconnected from the mains supply when the power switch is in the Off position.</td>
</tr>
<tr>
<td><img src="image" alt="Heart with Exclamation Mark" /></td>
<td>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.</td>
</tr>
</tbody>
</table>
### Safety

#### 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.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Symbol" /></td>
<td>Indicates a pinching or crushing hazard</td>
</tr>
<tr>
<td><img src="image2" alt="Symbol" /></td>
<td>Indicates a piercing or cutting hazard</td>
</tr>
</tbody>
</table>

---

**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**

alerts you to situations that could cause loss of data, or damage of equipment.

- ✔️ Do not proceed beyond a caution until you have fully understood and met the indicated conditions.
Electrical and chemical Hazards specific to the System

Equipotential grounding

**CAUTION**
Different potential grounding of reactor and LC instrument
Electronic failure and damage to the instrument by melting capillaries
- Ensure the equipotential grounding of all instruments.
- Use capillaries made of nonconductive material.

Increased touch current

**WARNING**
Combination of Online LC system and external reactor installation
Personal injury by increased touch current
- Verify that the current range matches the specifications of the system.
- To ensure proper functionality and compliance with safety or EMC regulations, use the multiple socket outlet distributed by Agilent Technologies only.
Chemicals from Reactor stream

**WARNING**

Hazardous chemicals and vapors from reactor stream

Exposure with hazardous chemicals and vapors can hold health and safety risks

- Verify the correct installation of all components.
- Use a leak tray with leak sensor for the external valve.
- Locate the system in an appropriate safety area isolated from office facilities.
- Ensure that the leak handling system accounts for toxic samples and provides a separate waste container for the external valve.
- Do not exceed the pressure limits specified for the reactor stream.
- Consider the specifications for the samples to be collected to avoid blockage of the reactor stream flow path.

Vial Handling

**WARNING**

Hazardous chemicals and vapors from the reactor stream

Exposure with hazardous chemicals and vapors can hold health and safety risks

- Always insert correct vials into the module.
- Use the vial presence sensing technology.
- Ensure that the installed vials are appropriate for the volume of the collected sample.
Flammable Solvents from the Reactor stream

**WARNING**
Leak of flammable solvents
Explosive hazard and personal injury

- Verify the correct installation of all components.
- Use a leak tray with leak sensor for the external valve.
- Locate the system in an appropriate safety area.
- Ensure that the leak handling system accounts for toxic samples and provides a separate waste container for the external valve.
- Do not exceed the pressure limits specified for the reactor stream.
- Consider the specifications for the samples to be collected to avoid blockage of the reactor stream flow path.

Flammable Solvents in Vials

**WARNING**
Leak of flammable solvents
Explosive hazard and personal injury

- Always insert correct vials into the module.
- Use the vial presence sensing technology.
- Ensure that the installed vials are appropriate for the volume of the collected sample.
Waste Electrical and Electronic Equipment Directive

This product complies with the European WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

NOTE
Do not dispose of in domestic household waste

To return unwanted products, contact your local Agilent office, or see http://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.
Sound Emission

Sound pressure
Sound pressure $L_p < 70 \text{ db(A)}$ according to DIN EN ISO 7779

Schalldruckpegel
Schalldruckpegel $L_p < 70 \text{ db(A)}$ nach DIN EN ISO 7779
Solvent Information

Flow Cell

To protect optimal functionality of your flow-cell:

- Avoid the use of alkaline solutions (pH > 9.5) which can attack quartz and thus impair the optical properties of the flow cell.

Use of Solvents

Observe the following recommendations on the use of solvents.

- Brown glassware can avoid growth of algae.
- Avoid the use of the following steel-corrosive solvents:
  - solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on),
  - high concentrations of inorganic acids like sulfuric acid and nitric acid, especially at higher temperatures (if your chromatography method allows, replace by phosphoric acid or phosphate buffer which are less corrosive against stainless steel),
  - halogenated solvents or mixtures which form radicals and/or acids, for example:
    \[ 2\text{CHCl}_3 + \text{O}_2 \rightarrow 2\text{COCl}_2 + 2\text{HCl} \]
    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) should be filtered through dry aluminium oxide which adsorbs the peroxides,
  - solvents containing strong complexing agents (e.g. EDTA),
  - mixtures of carbon tetrachloride with 2-propanol or THF.
- Avoid the use of dimethyl formamide (DMF). Polyvinylidene fluoride (PVDF), which is used in leak sensors, is not resistant to DMF.
UV Radiation

Emissions of ultraviolet radiation (200 – 315 nm) from this product is limited such that radiant exposure incident upon the unprotected skin or eye of operator or service personnel is limited to the following TLVs (Threshold Limit Values) according to the American Conference of Governmental Industrial Hygienists:

Table 30  UV radiation limits

<table>
<thead>
<tr>
<th>Exposure/day</th>
<th>Effective irradiance</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 h</td>
<td>0.1 µW/cm²</td>
</tr>
<tr>
<td>10 min</td>
<td>5.0 µW/cm²</td>
</tr>
</tbody>
</table>

Typically the radiation values are much smaller than these limits:

Table 31  UV radiation typical values

<table>
<thead>
<tr>
<th>Position</th>
<th>Effective irradiance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamp installed, 50 cm distance</td>
<td>average 0.016 µW/cm²</td>
</tr>
<tr>
<td>Lamp installed, 50 cm distance</td>
<td>maximum 0.14 µW/cm²</td>
</tr>
</tbody>
</table>
Appendix
Declaration of Conformity for HOX2 Filter

Declaration of Conformity

We herewith inform you that the

Holmium Oxide Glass Filter

used in Agilent's 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 "s" can be any alphanumeric character

<table>
<thead>
<tr>
<th>Product Number</th>
<th>Series</th>
<th>Measured Wavelength</th>
<th>Wavelength Accuracy</th>
<th>Optical Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1315x, G1365x</td>
<td>1100, 1200, 1260</td>
<td>561.0 nm 418.9 nm 453.7 nm 536.7 nm</td>
<td>+/- 1 nm</td>
<td>2 mm</td>
</tr>
<tr>
<td>G7115x, G7165x</td>
<td>1260</td>
<td>418.5 nm 536.4 nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1600x, G7100x</td>
<td>CE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1314x</td>
<td>1100, 1200, 1260, 1290</td>
<td>360.8 nm 418.5 nm 536.4 nm</td>
<td>+/- 1 mm</td>
<td>6 mm</td>
</tr>
<tr>
<td>G7114x</td>
<td>1260, 1290</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4286x,..., 94x</td>
<td>1120, 1220</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*) The variation in Measured Wavelength depends on the different Optical Bandwidth.

28-Oct-2014
(Date)

Thomas J. [Signature]
(R&D Manager)

Stephen B. [Signature]
(Quality Manager)

P/N 89550-90501
Revision: G
Effective by: 28-Oct-2014
Agilent Technologies on Internet

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http://www.agilent.com
In This Book

This manual describes the Agilent InfinityLab Online LC Solution.

The manual describes the following:

- Introduction
- Site Requirements and Specifications
- Installing the Solution
- Scheduling Software Workflow Tasks
- Using the Solution Modules
- Maintenance and Repair
- Parts for Maintenance
- Test Functions and Calibration
- Error Information
- Identifying Cables
- Hardware Information
- Appendix