Notices

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Manual Part Number
G4767-90000

Edition
02/2017

Printed in Germany
Agilent Technologies
Hewlett-Packard-Strasse 8
76337 Waldbronn

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CAUTION

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WARNING

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

This manual covers the Agilent InfinityLab LC Series 1260 Infinity II SFC Multisampler (G4767A).

1 Introduction

This chapter gives an introduction to the Multisampler.

2 Site Requirements and Specifications

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

3 Using the Module

This chapter explains the essential operational parameters of the module.

4 Preparing the Module

This chapter explains the operational parameters of the module.

5 Optimizing Performance

This chapter gives hints on how to optimize the performance or use additional devices.

6 Troubleshooting and Diagnostics

This chapter gives an overview about the troubleshooting and diagnostic features and the different user interfaces.

7 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.
8 Test Functions and Calibration
This chapter describes the built in test functions.

9 Maintenance
This chapter describes the maintenance of the Multisampler.

10 Parts for Maintenance
This chapter provides information on parts material required for the module.

11 Identifying Cables
This chapter provides information on cables used with the modules.

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

13 LAN Configuration
This chapter provides information on connecting the detector to the Agilent ChemStation PC.

14 Appendix
This chapter provides addition information on safety, legal and web.
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Introduction

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This chapter gives an introduction to the Multisampler.
In SFC, the complete solvent flow path needs to be pressurized under all conditions to avoid expansion of the supercritical fluid. With the Feed Injection Technology the sample volume is drawn under atmospheric pressure conditions, pressurized to system pressure, and injected by an ultrafast syringing process. This enables the injection of flexible sample volumes from 0.1 – 90 μL with highest precision, and excellent linearity over a broad volume range.
Features

- **Unmatched flexibility** – You can choose how you want to introduce samples for injection, whether you prefer vials, microtiter plates, or any combination of formats. Sample drawers are available in three heights, and you can mix shallow drawers with deeper ones to accommodate different sample sizes.

- **High capacity** – Using shallow well-plate drawers, the 1260 Infinity II SFC Multisampler takes a maximum load of 16 microtiter plates and up to 6144 samples—the most of any single system.

- **Seamless automation** – Internal robotics move microtiter plates and other sample containers from the sample hotel to the central workspace for sample processing steps and injections.

- **Efficient temperature control** – For temperature-sensitive samples, add Agilent’s compressor-based cooling system. It maintains temperature control on all vials and plates inserted into the 1260 Infinity II SFC Multisampler.

- **Instant information** – Lights on each drawer tell you about loading status, current activity, and accessibility.
The Multisampler transport mechanism uses a Cartesian robot. The X-Y drive together with the Z drive optimize the grabbing and positioning for the sample trays and the needle handling inside of the Multisampler. The sample coupler moves the sample container from the sample hotel which stores all the samples and places it on the central workspace. Then the needle coupler of the Z drive takes over and grabs the needle assembly from the needle station and performs the analytical procedures inside of the Multisampler. Due to the uncoupled needle design, the robot can do other liquid handling jobs during the analysis.

The Multisampler employs an active vial/plate pusher mechanism to hold down the vial or the plate while the needle is drawn back from the sample vessel (a must in the case a septum is used). This active vial/plate pusher employs a sensor to detect the presence of a plate and to ensure accurate movement regardless of the plate used. All axes of the transport mechanism are driven by very fast BLCD motors. Optical encoders ensure the correct operation of the movement.

The Multisampler has a 100 μL metering device. With this instrument setup, it is possible to inject a maximum volume of 100 μL. For minimum internal carry-over, the entire injection flowpath is always flushed by the mobile phase.

In addition, you have two different possibilities to reduce the carry-over. First the external needle wash. In the Standard configuration, the needle flush station is equipped with a peristaltic pump to wash the outside of the needle. This reduces already low carry-over for very sensitive analysis. The bottle containing the mobile phase for the wash procedure will be located in the solvent bottle cabinet. Produced waste during this operation is channeled safely away through a waste drain.
The six-port injection valve unit is driven by a high-speed hybrid stepper motor. In the sampling sequence the valve unit bypasses the Multisampler, and connects flow from the pump to the column directly. For analysis it is crucial that all of the sample is injected onto the column and that the flow path is clean. Depending on the method, different mechanisms ensure this:

- In HPLC mode the valve unit directs the flow through the Multisampler
- In SFC mode the flushpump rinses metering device, loop, needle and needle seat

The Cooling Control of the vial/plate temperature in the Multisampler is achieved by using an additional Agilent Sample Cooler module. The sample cooler is a micro compressor-based refrigerator. A fan draws air from the central workstation above the sample container of the Multisampler. It is then blown through the fins of the cooling module, where it is cooled according to the temperature setting. The cooled air enters the Sampler Hotel through a recess underneath the special designed base plate. The air is then distributed evenly through the Sample Hotel ensuring effective temperature control, regardless of how many sample containers are in the drawer. In cooling mode, condensation is generated on the cooled side of the Sample Cooler. This condensed water is safely guided into a waste bottle for condensed water that is located underneath the working bench.
Standard Single Needle Setup

The movements of the Multisampler components during the sampling sequence are monitored continuously by the Multisampler processor. The processor defines specific time windows and mechanical ranges for each movement. If a specific step of the sampling sequence is not completed successfully, an error message is generated. Solvent is bypassed from the Multisampler by the injection valve during the sampling sequence. After the required sample container was automatically loaded from the sample hotel and placed on the central workspace. The Needle assembly moves via robot to the desired sample position and is lowered into the sample liquid in the sample to allow the metering device to draw up the desired volume by moving its plunger back a certain distance. The needle assembly is then raised again and moved to the needle park station onto the seat to close the sample loop. Sample is applied to the column when the injection valve returns to the mainpass position at the end of the sampling sequence.

The standard sampling sequence occurs in the following order:

1. The robot loads the required sample container on the central workspace
2. The injection valve switches to the bypass position.
3. The plunger of the metering device moves to the initialization position.
4. The robot couples into the needle assembly from the needle park station.
5. The robot unlocks the needle assembly and moves up.
6. The coupled needle assembly/robot moves to the desired sample vial (or well plate) position on the central workstation.
7. The needle lowers into the sample vial (or well plate).
8. The metering device draws the preset sample volume.
9. The needle lifts out of the sample vial (or well plate).
10. The coupled needle assembly/robot is then moved to the park station onto the seat to close the sample loop.
11. The needle assembly is locked into the park station and moves down.
12. The injection cycle is completed when the injection valve switches to the mainpass position.
13. The robot moves the sample container back into the sample hotel if the sampling sequence is done. If needle wash is required it will be done between step 9 and 10.
Injection Sequences

Injection Sequence for single needle in HPLC mode (flow through)

Before the start of the injection sequence, and during an analysis, the injection valve is in the mainpass position. In this position, the mobile phase flows through the Multisampler metering device, sample loop, and needle, ensuring all parts in contact with sample are flushed during the run, thus minimizing carry-over.

![Flow Diagram](image)

**Figure 2**   Valve in mainpass, flow through

When the sample sequence begins, the valve unit switches to the bypass position. Solvent from the pump enters the valve unit at port 1, and flows directly to the column through port 6.
The standard injection starts with draw sample from vial/wellplate from the central workstation. In order to do this the needle assembly moves via robot to the desired sample position and is lowered into the sample liquid in the sample to allow the metering device to draw up the desired volume by moving its plunger back a certain distance. The needle assembly is then raised again and moved to the needle park station onto the seat to close the sample loop. In case of an injector program several steps are interspersed at this point.

**Figure 3**   Valve in bypass, drawing sample
Flush the Needle

Before injection and to reduce the carry-over for very sensitive analysis, the outside of the needle can be washed in a flush port located behind the injector port. As soon as the needle is on the flush port a wash pump delivers some solvent during a defined time to clean the outside of the needle. At the end of this process the needle assembly returns to the needle port.

Figure 4   Valve in bypass, washing needle
Inject-and-Run

The final step is the inject- and run-step. The six-port valve is switched to the mainpass position, and directs the flow back through the sample loop, which now contains a certain amount of sample. The solvent flow transports the sample onto the column, and separation begins. This is the beginning of a run within an analysis. In this stage, all major performance-influencing hardware is flushed internally by the solvent flow. For standard applications no additional flushing procedure is required.

**Figure 5**  
Valve in mainpass, sample injected
Injection Sequence for single needle in SFC mode (feed injection)

The injection sequence for single needle in SFC mode (feed injection) is as follows:

1. Draw sample
2. Move needle into seat
3. Precompress to system pressure

![Diagram of injection sequence](image)

**Figure 6** Valve in bypass, sample precompressed
1 Introduction

Injection Sequences

4 Switch to feed position

5 Feed sample into pumpflow
6 Switch to bypass position

7 Decompress to 10 bar
8 Switch to purge position

Figure 9 Valve in purge position

9 Purge
10 Switch to bypass position

Figure 10  Valve in bypass
System Overview

Leak and Waste Handling

The Agilent InfinityLab LC Series 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 1200 Infinity Series 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 Multisampler needle wash port
- from the Sample Cooler (condensate)
- from the Seal Wash Sensor
- from the pump's Purge Valve or Multipurpose Valve
Figure 11  Infinity II Leak Waste Concept (flexible rack installation)
**Figure 12**  Infinity II Single Stack Leak Waste Concept (bench installation)
Figure 13  Infinity II Two Stack Leak Waste Concept (bench installation)

The waste tube connected to the leak pan 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

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.
2 Site Requirements and Specifications

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Physical Specifications 33
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Physical Specifications of the Sample Cooler 36

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

A suitable environment is important to ensure optimal performance of the instrument.

Power Considerations

The module power supply has wide ranging capability. It accepts any line voltage in the range described in Table 1 on page 33. Consequently there is no voltage selector in the rear of the module. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

**WARNING**

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

➔ Connect your instrument to the specified line voltage only.

**WARNING**

The 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. electrical shock, when the cover is opened and the module is connected to power.

➔ Always unplug the power cable before opening the cover.

➔ Do not connect the power cable to the instrument while the covers are removed.

**WARNING**

Inaccessible power plug.

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

➔ Make sure the power connector of the instrument can be easily reached and unplugged.

➔ Provide sufficient space behind the power socket of the instrument to unplug the cable.
Power Cords

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

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

**WARNING**
**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.

**WARNING**
**Unintended use of supplied 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**
**Power cords**
Solvents may damage electrical cables.

➔ Prevent electrical cables from getting in contact with solvents.

➔ Exchange electrical cables after contact with solvents.
Site Requirements and Specifications

Site Requirements

Bench Space

The module dimensions and weight (see Table 1 on page 33) allow you to place the module on almost any desk or laboratory bench. It needs an additional 2.5 cm (1.0 inches) of space on either side and approximately 8 cm (3.1 inches) in the rear for air circulation and electric connections.

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

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

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

WARNING
Heavy weight

The module is heavy.

➔ Carry the module at least with 2 people.

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

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

➔ Ensure that you can cope with the weight of your load.

Condensation

CAUTION
Condensation within the module

Condensation can damage the system electronics.

➔ Do not store, ship or use your module under conditions where temperature fluctuations could cause condensation within the module.

➔ If your module was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.
# Physical Specifications

<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 cooler</td>
</tr>
<tr>
<td>Dimensions</td>
<td>320 x 396 x 468 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(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</td>
<td>4 – 40 °C (39 – 104 °F)</td>
<td></td>
</tr>
<tr>
<td>temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient non-operating</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>Non-operating altitude</td>
<td>Up to 4600 m (15092 ft)</td>
<td>For storing the module</td>
</tr>
<tr>
<td>Safety standards:</td>
<td>Installation 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>
<tr>
<td>Permitted solvents</td>
<td>Boiling point ≥56 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auto-ignition temperature ≥200 °C</td>
<td></td>
</tr>
</tbody>
</table>

1 If a sample cooler 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

### Performance Specifications

Table 2  Performance Specifications Agilent 1260 Infinity II SFC Multisampler (G4767A)

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection range</td>
<td>Default 0.1 – 90 µL in 0.1 µL increments</td>
<td>Up to 600 bar using 100 µL analytical head</td>
</tr>
<tr>
<td>Injection precision in LC mode</td>
<td>&lt;0.15 % RSD or SD &lt;10 nL, whatever is greater</td>
<td>Measured caffeine</td>
</tr>
<tr>
<td>Injection precision in SFC mode</td>
<td>0.1 – 10 µl: &lt;0.3 % RSD or 10 nL whatever is greater at 10 µl: &lt;0.25 % RSD</td>
<td>Measured caffeine</td>
</tr>
<tr>
<td>Injection linearity in SFC mode</td>
<td>0.9999 in the range of 0.1 – 10 µl</td>
<td>Measured caffeine</td>
</tr>
<tr>
<td>Injection linearity in LC mode</td>
<td>0.9999 in the range of 0.1 – 100 µl</td>
<td>Measured caffeine</td>
</tr>
<tr>
<td>Pressure range</td>
<td>Up to 600 bar (G7167A)</td>
<td>Max pressure for basic instrument</td>
</tr>
<tr>
<td>Sample viscosity range</td>
<td>0.2 – 5 cp</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 (384MTP/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>LC Injection cycle time</td>
<td>&lt;10 s using following standard conditions: Default draw speed: 100 µL/min</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></td>
<td>Default eject speed: 400 µL/min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Injection volume: 1 µL</td>
<td></td>
</tr>
<tr>
<td>SFC Injection cycle time</td>
<td>&lt;13 s using following conditions: Default draw speed: 100 µL/min</td>
<td>With additional 4 s purge within run.</td>
</tr>
<tr>
<td></td>
<td>Feed Speed: 1000 µL/min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Injection volume: 1 µL</td>
<td></td>
</tr>
</tbody>
</table>
Table 2  Performance Specifications Agilent 1260 Infinity II SFC Multisampler (G4767A)

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carry over in LC mode</td>
<td>&lt;0.003 % (30 ppm)</td>
<td>Based on injections using the standard LC injection principle</td>
</tr>
<tr>
<td>Carry over in SFC mode</td>
<td>&lt;0.002 % (20 ppm)</td>
<td>Based on injections using the SFC feed injection principle</td>
</tr>
<tr>
<td>Instrument Control</td>
<td>Lab Advisor B.02.09 or above</td>
<td>For details about supported software versions refer to the compatibility matrix of your version of the LC and CE Drivers</td>
</tr>
<tr>
<td></td>
<td>LC and CE Drivers A.02.16 or above</td>
<td></td>
</tr>
<tr>
<td>Local control</td>
<td>Agilent Instant Pilot (G4208A)</td>
<td>B.02.19 or above</td>
</tr>
<tr>
<td>Communications</td>
<td>Controller-area network (CAN), Local Area Network (LAN) ERI: ready, start, stop and shut-down signals</td>
<td></td>
</tr>
<tr>
<td>Safety and maintenance</td>
<td>Extensive support for troubleshooting and maintenance is provided by the Instant Pilot, Agilent Lab Advisor, and the Chromatography Data System. Safety-related features are 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 of the Sample Cooler

Cooling 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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>&lt; 6 kg</td>
<td></td>
</tr>
<tr>
<td>Dimensions (height × width × depth)</td>
<td>205 mm x 340 mm x 370 mm</td>
<td></td>
</tr>
<tr>
<td>Refrigerant gas</td>
<td>HFC-134a (0.042 kg)</td>
<td>Ozone depletion potential (ODP) = 0</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>24 VDC (nominal)</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>10 A max.</td>
<td></td>
</tr>
<tr>
<td>Ambient operating temperature</td>
<td>4 – 40 °C (39.2 – 104 °F)</td>
<td></td>
</tr>
<tr>
<td>Ambient non-operating temperature</td>
<td>-40 – 70 °C (-20 – 158 °F)</td>
<td></td>
</tr>
<tr>
<td>Operating altitude</td>
<td>Up to 3000 m (9842 ft)</td>
<td></td>
</tr>
<tr>
<td>Non-operating altitude</td>
<td>Up to 4600 m (15091 ft)</td>
<td></td>
</tr>
<tr>
<td>Safety standards:</td>
<td>Installation 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>
General hazards and improper disposal

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

➔ The breakdown of the sample cooler unit must be carried out by specialist refrigeration company.

➔ All media must be disposed of in accordance with national and local regulations.

➔ Please contact your local Agilent Service Center in regard to safe environmental disposal of the appliance or check www.agilent.com for more info.

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Performance Specifications Agilent 1290 Sample Cooler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Specifications</td>
</tr>
<tr>
<td>Operating principle</td>
<td>High performance, low-energy consumption micro-compressor based cooler with ozone-friendly HFC-134a coolant (42 g), user-upgradable.</td>
</tr>
<tr>
<td>Temperature range</td>
<td>from 4 °C to 5 °C below ambient</td>
</tr>
<tr>
<td>Temperature settable</td>
<td>from 4 – 40 °C in 1 ° increments</td>
</tr>
<tr>
<td>Temperature accuracy (&lt;25 °C, &lt;50 % r.H.)</td>
<td>2 °C to 6 °C at a setpoint of 4 °C</td>
</tr>
</tbody>
</table>
2 Site Requirements and Specifications

Physical Specifications of the Sample Cooler
3 Using the Module

Magnets 40
Turn on/off 41
Status indicators 42
Drawer Status Indicator 43
Insert vial trays/wellplates 44
Remove vial trays/wellplates 45
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  Damaged Packaging 46
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This chapter explains the essential operational parameters of the module.
Magnets

1 This stack exemplarily shows the magnets' positions in the modules.
Turn on/off

1

2

Power switch

(1) On

(2) Off

3
Status indicators

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

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

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

**NOTE**

During blinking of the drawer status indicator. Do not try to open the drawer at this point.
3 Using the Module
Insert vial trays/wellplates

Insert vial trays/wellplates

1 Insert vial trays/wellplates

2

3 Ensure correct seat and orientation of vial trays/wellplates

4

5 Configure vial trays/wellplates

6

7 Configure vial trays/wellplates
Remove vial trays/wellplates
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.
Install the Sample Cooler

<table>
<thead>
<tr>
<th>Parts required</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampler</td>
<td>G7167-60005</td>
<td>Sample cooler</td>
</tr>
<tr>
<td>Sampler</td>
<td>5067-6208</td>
<td>Condensate Drainage Kit</td>
</tr>
<tr>
<td>Sampler</td>
<td>G7167-90170</td>
<td>Technical Note - Installation of the Infinity II Cooler Condensate Drainage tubing Kit</td>
</tr>
</tbody>
</table>

Preparations

Sampler is installed in the stack.

**NOTE**
If the sample cooler 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 the 2H drawer must be installed in the lowest position.

**CAUTION**
Condensate inside the sample cooler
Damage to the electronics of the module

➔ Before dismounting the sample cooler: For new installation, wait at least 30 min before switching on the compressor of the sample cooler.

➔ Make sure the power cords are disconnected

➔ Make sure there is no condensate inside the module
3 Using the Module
Installing the Sample Cooler

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

2 Ensure that the power cable is removed from the instrument.

3 Open the 4 screws on the rear of the module.

4 Remove the sample cooler mainframe cover.
Slide in the sample cooler the halfway.

**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 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 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 cables.

6 Connect power cable and signal/data cable.
3 Using the Module
Installing the Sample Cooler

**CAUTION**

Damage to the cables

➔ Do not bend or pinch the cables.
➔ Fit in the sample cooler perfectly.

7 Slide in the whole unit.

8 Tighten the 4 screws which holds the sample cooler unit in place.

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

**NOTE**

The sample cooler should be operated in a proper horizontal position.
NOTE
Check leak waste handling for further info.

**CAUTION**

Damage to the sample cooler

➔ Wait at least 30 min before switching on the compressor of the sample cooler.

➔ 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.
3  Using the Module

Transporting the Multisampler with a Sample Cooler Installed

Transporting the Multisampler with a Sample Cooler Installed

**NOTE**

There are magnets in the front area of the multisampler, see “Magnets” on page 40.

**NOTE**

When moving the sampler around the laboratory, make sure that any condensed water inside the thermostat is removed.

- Remove the drainage and place a beaker underneath the drain outlet of the sample cooler. Then carefully tilt the module to the back so that the water inside the thermostat can safely flow into the leak funnel. If condensate removal is done improperly, you can harm the electronic of the module.
- Otherwise no special precautions are needed for the modules.

**WARNING**

Heavy weight

The module is heavy.

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

**NOTE**

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

If the sampler with a sample cooler needs to be shipped to another location via carrier, ensure:

• The two modules are shipped in separate boxes.
• The Sample handler of the multisampler is parked, see Park Robot in Agilent Lab Advisor online help for more information.
• The sample containers (vial trays) are removed from the sample hotel.
• Install the transport protection.
• The condensed water inside of the sample cooler is removed.

CAUTION

Mechanical damage of the module

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.

➔ Always park the transport assembly before shipment.
➔ Protect the instrument by Transport-Protection (G4267-40033).
➔ Store the installation foam in a safe place, to use it for later transport of the module.
Solvent Information

Observe the following recommendations on the use of solvents.

- Follow recommendations for avoiding the growth of algae, see 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 like 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.
# Materials in Flow Path

Following materials are used in the flow path of this module:

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Materials in flow path (G7110B, G7111A, G7111B)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part</strong></td>
<td><strong>Materials</strong></td>
</tr>
<tr>
<td>Degasser chamber</td>
<td>TFE/PDD Copolymer, PFA (internal tubings), PEEK (inlets), FEP (tubings), ETFE (fittings)</td>
</tr>
<tr>
<td>MCGV</td>
<td>SST, PTFE</td>
</tr>
<tr>
<td>Passive inlet valve</td>
<td>SST, gold, sapphire, ruby, ceramic, PTFE</td>
</tr>
<tr>
<td>Active inlet valve</td>
<td>SST, gold, sapphire, ruby, ceramic, PTFE</td>
</tr>
<tr>
<td>Outlet valve</td>
<td>SST, gold, ruby, ZrO₂-based ceramic, tantalum</td>
</tr>
<tr>
<td>Adapter</td>
<td>SST, gold</td>
</tr>
<tr>
<td>Pump head (body)</td>
<td>SST</td>
</tr>
<tr>
<td>Pistons</td>
<td>Sapphire</td>
</tr>
<tr>
<td>Piston seals/wash seals</td>
<td>PTFE, SST (reversed phase) or UHMW-PE, SST (normal phase)</td>
</tr>
<tr>
<td>Pressure sensor</td>
<td>SST</td>
</tr>
<tr>
<td>Purge valve</td>
<td>SST, gold, PTFE, ceramic</td>
</tr>
<tr>
<td>Damping unit</td>
<td>SST, gold</td>
</tr>
<tr>
<td>Capillaries/fittings</td>
<td>SST</td>
</tr>
<tr>
<td>Tubings</td>
<td>PTFE</td>
</tr>
</tbody>
</table>
### Solvent Information

#### Table 6  Materials in flow path (G5654A)

<table>
<thead>
<tr>
<th>Part</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degasser chamber</td>
<td>TFE/PDD Copolymer, PFA (internal tubings), PEEK (inlets), FEP (tubings), ETFE (fittings)</td>
</tr>
<tr>
<td>MCGV</td>
<td>Platinum-iridium, titanium, PTFE</td>
</tr>
<tr>
<td>Active inlet valve</td>
<td>Platinum-iridium, titanium, gold, sapphire, ruby, ceramic, PTFE</td>
</tr>
<tr>
<td>Outlet valve</td>
<td>Titanium, gold, ruby, ZrO$_2$-based ceramic, tantalum</td>
</tr>
<tr>
<td>Adapter</td>
<td>Titanium, gold</td>
</tr>
<tr>
<td>Pump head (body)</td>
<td>Titanium</td>
</tr>
<tr>
<td>Pistons</td>
<td>Sapphire</td>
</tr>
<tr>
<td>Piston seals/wash seals</td>
<td>PTFE, gold</td>
</tr>
<tr>
<td>Pressure sensor</td>
<td>Titanium</td>
</tr>
<tr>
<td>Purge valve</td>
<td>Titanium, gold, PTFE, ceramic</td>
</tr>
<tr>
<td>Damping unit</td>
<td>Titanium, gold</td>
</tr>
<tr>
<td>Capillaries/fittings</td>
<td>Titanium</td>
</tr>
<tr>
<td>Tubings</td>
<td>PTFE</td>
</tr>
</tbody>
</table>
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 were collected from external resources and are 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.

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 %, sulphuric acid > 10 %, sulfonic acids, trichloroacetic acid), halogenes or aqueous halogene solutions, phenol and derivatives (cresols, salicylic acid etc.).

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 very 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 to at least 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 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 to 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 (ST)**

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, di-isopropylether). 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 2-propanol 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 1290 Infinity Flow Cells and capillaries. 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)

Fluorinated polymers like PTFE (polytetrafluorethylene), PFA (perfluoroalkoxy) and FEP (fluorinated ethylene propylene) are inert to almost all common acids, bases, and solvents. FFKM is perfluorinated rubber, which is also resistant to most chemicals. As an elastomer, it may swell in some organic solvents like halogenated hydrocarbons.

TFE/PDD copolymer tubings, which are used in all Agilent degassers except 1322A, are not compatible with fluorinated solvents like Freon, Fluorinert, or Vertrel. They have limited life time in the presence of Hexafluoroisopropanol (HFIP). To ensure the longest possible life with HFIP, it is best to dedicate a particular chamber to this solvent, not to switch solvents, and not to let dry out the chamber. For optimizing the life of the pressure sensor, do not leave HFIP in the chamber when the unit is off.

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 Multisampler in Case of an Error

When

In some cases the multisampler 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.
Resetting the Multisampler

1. Check the condition of the needle assembly and the sample loop. Replace them if necessary, see “Remove the Needle Assembly” on page 155 and “Remove the Sample Loop-Flex” on page 198.

**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 LabAdvisor. The safety lock of the needle assembly has to be released by carefully sliding the pusher upwards.
3 Using the Module
Reset the Multisampler in Case of an Error

3 Verify that the needle assembly is unlocked after installation.

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

Next Steps:

5 Close the front door.
6 Wait until the initialization of the multisampler is completed.
7 If the error persists, contact your local service representative.
Using the Sample Cooler in an Infinity II Autosampler

After successfully loading the Agilent CDS, the module should appear as an active item in the graphical user interface (GUI).

Within the autosampler GUI, there are active areas. If the mouse cursor is moved across the icons the cursor will change, see the following figure.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ALS: turn on and off</td>
</tr>
<tr>
<td>2</td>
<td>ALS configuration</td>
</tr>
<tr>
<td>3</td>
<td>ALS Status</td>
</tr>
<tr>
<td>4</td>
<td>Chiller Status (on/off)</td>
</tr>
<tr>
<td>5</td>
<td>Injection Volume</td>
</tr>
<tr>
<td>6</td>
<td>Drawer Configuration</td>
</tr>
<tr>
<td>7</td>
<td>EMF Status</td>
</tr>
</tbody>
</table>
ALS configuration is displayed when moving with the mouse cursor over the syringe. The information provides ALS related information like

- Part number
- ALS setup

and other details.

Control Interface

A right-click into the active area will open a menu to show the Control Interface.
Control

The Cooler section of the Control dialog box is available when you have a cooler installed. It allows you to switch the cooler on and off manually.

Select On to switch on the cooler. Specify the required temperature in the adjacent field. Note that the specified temperature must be at least 5 °C below ambient for proper temperature control.

Select Off to switch off the cooler.
Temperature Mode

Temperature control for autosampler thermostats.

Since driver A.02.04, users could decide whether the temperature of the thermostats should be a control setting or a method parameter. With the introduction of Multisamplers, it has been decided that the thermostat should not be a method parameter for the following reasons:

- Changing the temperature from method to method changes the ALS temperature for ALL samples, not only for the one in the current method.
- The sample temperature can not be directly controlled, only the temperature of the air stream from the thermostat. If the air stream has the correct temperature during method execution, it may have been stored at higher temperatures with previous methods.

As a result, we are now introducing two modes which can be configured in the dashboard:

- **Constant temperature mode**: this mode uses the control setting for keeping samples at a fixed temperature. This is the default and recommended for most customers.
- **Variable temperature mode**: this mode allows changing the temperature as a method parameter. This mode may be used for degradation experiments (this solution is not officially recommended by Agilent) or as a workaround for reporting. Reporting of control parameters will become available with the CDS and ICF.
Online Signal Monitor

The online signal monitor for the chiller is also available and allows you to monitor the WPS1A temperature signals.

The Online Plot Window should look like this:

![Online Plot Window](image)

If the change button is pressed you can select the Chiller signal WPS1A in the online plot.
3  Using the Module
Using the Sample Cooler in an Infinity II Autosampler
**Operation information**

Initial start-up: When the sample cooler starts back up after being shut down for a while (installation, moving, etc.), moisture can build up inside. This is normal and should disappear after about 24 hours or once the chiller has stabilized at a specific temperature.

Frequent opening of door/drawers: If the doors are opened frequently, warm and/or humid air enters the workspace of the autosampler. Try to limit opening the door/drawers in extremely hot or humid weather.

Temperature rise: Due to the warm air temperatures generated during heating from a cold to a warm chiller set point, it is possible to see moisture forming on the shelves and the vials. This moisture is caused by the warm air coming into contact with the colder temperatures in the workspace or the sample hotel. This will disappear after the unit comes out of the heating cycle and goes back into normal operation.

Shut down of the sample cooler at low temperatures will build up some condensate inside the autosampler.
### Important Information

- If the temperature is too warm or too cold in the chiller, check the air vents first to make sure they are not blocked.

- If frost and ice build up inside the sample cooler, defrost the chiller. This is best done overnight. After defrosting, first check the drainages of the sample cooler to make sure they are not blocked.

- Waiting for the autosampler to cool down can take 30 min - 45 min or more. This slow ramping behavior is necessary to avoid icing inside the chiller.

- If you turn the sample cooler off:
  - a Remove all sample containers or vials from the autosampler.
  - b Let the autosampler temperature stabilize to ambient temperature (open the door far enough for air to get in).
  - c Clean the drawers of the sample hotel or the cold reservoir (underneath the drawers) in the vialsampler, wipe them down, and dry them well.

- Drawer Alarm (only for the Multisampler): The Drawer Alarm feature sounds an alarm when the sample hotel drawer stays open for 2 min and the cooling is turned on. The alarm will repeat constantly until the drawers are closed. The feature will reactivate when the drawers stay open again for 2 min.

**NOTE** If the alarm sound is audible while the drawers are closed, most likely the front door is open while the robot is moving or a wrong drawer configuration has been detected.

**NOTE** Adjusting the set points from a colder to a warmer set point will result in some condensation.
4 Preparing the Module

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This chapter explains the operational parameters of the module.
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. Always keep the temperature in the sample compartment at least 25 K below the boiling point of the solvent used.

➔ Do not operate the instrument in an explosive atmosphere.

➔ 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 Multisampler

For best performance of the multisampler

- When using the multisampler in a system with a vacuum degassing unit, shortly degas your samples before using them in the multisampler.
- Filter samples before use in a 1200 Infinity Series system. Use High pressure filter kit (5067-4638) for inline filtering.
- When using buffer solutions, flush the system with water before switching it off.
- Check the multisampler 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 54.
- 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>
## Recommended Mats and Vials

### Table 8  
Recommended plates and closing mat

<table>
<thead>
<tr>
<th>Description (Part Number)</th>
<th>Rows</th>
<th>Columns</th>
<th>Plate height</th>
<th>Volume (μL)</th>
<th>Package</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>
</tr>
<tr>
<td>384Corning (No Agilent PN)</td>
<td>16</td>
<td>24</td>
<td>14.4</td>
<td>80</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>
</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>
</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>
</tr>
<tr>
<td>96Agilent conical (5042-8502)</td>
<td>8</td>
<td>12</td>
<td>17.3</td>
<td>150</td>
<td>25</td>
</tr>
<tr>
<td>96CappedAgilent (5065-4402)</td>
<td>8</td>
<td>12</td>
<td>47.1</td>
<td>300</td>
<td>1</td>
</tr>
<tr>
<td>96Corning (No Agilent PN)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>96CorningV (No Agilent PN)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>96DeepAgilent31mm (5042-6454)</td>
<td>8</td>
<td>12</td>
<td>31.5</td>
<td>1000</td>
<td>50</td>
</tr>
<tr>
<td>96DeepNunc31mm (No Agilent PN)</td>
<td>8</td>
<td>12</td>
<td>31.5</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>96DeepRitter41mm (No Agilent PN)</td>
<td>8</td>
<td>12</td>
<td>41.2</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>96Greiner (No Agilent PN)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>96GreinerV (No Agilent PN)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>96Nunc (No Agilent PN)</td>
<td>8</td>
<td>12</td>
<td>14.3</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Closing mat for all 96 Agilent plates (5042-1389)</td>
<td>8</td>
<td>12</td>
<td></td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>
### Recommended Vial Plates

<table>
<thead>
<tr>
<th>P/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G2255-68700</td>
<td>Vial plate for 54 x 2 mL vials (6/pk)</td>
</tr>
<tr>
<td>5022-6539</td>
<td>Vial plate for 15 x 6 mL vials (1/pk)</td>
</tr>
<tr>
<td>5022-6538</td>
<td>Vial plate for 27 Eppendorf tubes (1/pk)</td>
</tr>
<tr>
<td>5023-2471</td>
<td>Vial plate 40 x 2 mL vials</td>
</tr>
</tbody>
</table>

**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.

**NOTE**
For the Needle height position, an offset of 0 equates to 2 mm above the wellplate bottom.
**Configure Well Plate Types**

If the plate you are using is not found on the “Recommended Mats and Vials” on page 76 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 ChemStation.

![Well Plate Dimensions (straight)](image)

**Figure 14**  Well Plate Dimensions (straight)
**Figure 15**  Well Plate Dimensions (staggered)

**Table 9**  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>
</tbody>
</table>
## Table 9  Well Plate Dimensions

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Definition</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<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

Figure 16  Syntax for capillary description
Installing Capillaries

For correct installation of capillary connections of the sampler it's important to choose the correct fittings, see “Capillary Color Coding Guide” on page 81.

<table>
<thead>
<tr>
<th>Parts required</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5067-4650</td>
<td>Capillary ST 0.12 mm x 150 mm SL/SX</td>
<td></td>
</tr>
<tr>
<td>5067-4651</td>
<td>Capillary ST 0.12 mm x 280 mm SL/SX</td>
<td></td>
</tr>
<tr>
<td>5067-4720</td>
<td>Capillary ST 0.17 mm x 150 mm SL/SX</td>
<td></td>
</tr>
<tr>
<td>5067-4722</td>
<td>Capillary ST 0.17 mm x 280 mm SL/SX</td>
<td></td>
</tr>
<tr>
<td>5065-4454</td>
<td>Fitting screw long 10/pk Quantity depends on configuration of the module (number of connections to the multisampler).</td>
<td></td>
</tr>
</tbody>
</table>

The capillaries mentioned above are examples only.

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.
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.

**NOTE**
Don’t overtighten. Overtightening will shorten the lifetime of the fitting.
Preparing the Module

Example of a perfect fitting

5 Once you believe you have the fitting complete, loosen the nut, and inspect the ferrule for the correct position on the tubing.

Example of a perfect fitting

Examples of incorrect fittings

Ferrule cannot seat properly

Mixing chamber

If dimension X is too long, leaks will occur

If dimension X is too short, a dead volume or mixing chamber will occur

Figure 17 Examples of incorrect fittings

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.
Preparing the Module
Flow Connections to the Washport

Flow Connections to the Washport

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 a needle wash solvent reservoir into the solvent cabinet.
2 Connect the Needle Wash Bottle Head Assembly to the solvent reservoir and
   close the bottle.
3 Guide the tube of the Needle Wash Bottle Head Assembly through the cover
   opening and connect it to the peristaltic pump.
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 autosampler with OpenLAB Chemstation.

Flow Connections to the Multisampler
Preparing the Module
Flow Connections to the Washport

- From solvent bottle to washport
- Peristaltic pump
- Sample loop flex to pressure sensor
- Pressure sensor to column and to waste
- Flush pump to column
- Metering device to needle seat
- From pump to pressure sensor
- To pressure sensor
- To needle seat
- To waste
Setting up the Autosampler with Agilent Open Lab ChemStation

The setup of the Multisampler is shown with the Agilent OpenLab ChemStation C.01.06. Depending on the controller (e.g. Agilent Instant Pilot, OpenLab EZChrom, Masshunter) the screens look different.

**NOTE**
This section describes the autosampler settings only. For information on the Agilent OpenLab ChemStation or other 1290 Infinity modules refer to the corresponding documentation.

![Figure 18 ChemStation Method and Run Control](image)

After successful load of the OpenLab ChemStation, you should see the module as an active item in the graphical user interface (GUI).
Preparing the Module
Setting up the Autosampler with Agilent Open Lab ChemStation

Table 10 The Autosampler User Interface

Within the Multisampler 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. Turn on/off the autosampler
2. Configure the sample hotel
3. Get the status of the EMF (Early Maintenance Feature)
4. Cooling Temperature

Current instrument information on:
- Injection volume
- Sample location

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 (same as via menu Instrument > Set up Instrument Method > Setup G7167B)
- Injector Program
  - When you activate a pretreatment/injector program, it replaces the standard injection cycle.
- Identify Device
- Home All
- Switch on Tray Illumination
- Auto Clean
- Prime
- Modify
  - Drawer Configuration
    - Changing the load capacity of the Sample Hotel
  - Capillaries
    - Changing Sample Loop and Needle Seat configuration
  - Reference Vial Rack
  - Assign Wellplates
    - Wellplate Configuration (same as click on the Tray icon)
Preparing the Module

Setting up the Autosampler with Agilent Open Lab ChemStation

Table 10  The Autosampler User Interface

<table>
<thead>
<tr>
<th>Module Status</th>
<th>Shows Run / Ready / Error state and “Not Ready text” or “Error text”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error (Red)</td>
<td></td>
</tr>
<tr>
<td>Not ready (yellow)</td>
<td></td>
</tr>
<tr>
<td>Ready (green)</td>
<td></td>
</tr>
<tr>
<td>Pre run, Post run (purple)</td>
<td></td>
</tr>
<tr>
<td>Run (blue)</td>
<td></td>
</tr>
<tr>
<td>Idle (green)</td>
<td></td>
</tr>
<tr>
<td>Offline (dark gray)</td>
<td></td>
</tr>
<tr>
<td>Standby (light gray)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMF Status</th>
<th>Shows Run / Ready / Error state and “Not Ready text” or “Error text”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offline (gray)</td>
<td></td>
</tr>
<tr>
<td>Ok</td>
<td></td>
</tr>
<tr>
<td>No Maintenance required (green)</td>
<td></td>
</tr>
<tr>
<td>EMF warning. Maintenance might be required (yellow)</td>
<td></td>
</tr>
<tr>
<td>EMF warning. Maintenance required (red)</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**
The multisampler configuration is done in the module dashboard context menu, not in the instrument configuration.
4 Preparing the Module
Setting up the Autosampler with Agilent Open Lab ChemStation

Control Settings

These settings are available via right click on the Active Area of the ALS GUI.

Table 11  Control settings

<table>
<thead>
<tr>
<th>Control</th>
<th></th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing Vessel:</td>
<td></td>
<td>The handling of missing vessels can be configured.</td>
</tr>
<tr>
<td>Illumination:</td>
<td></td>
<td>Switch on/off the internal illumination</td>
</tr>
<tr>
<td>Pump connected to sampler:</td>
<td></td>
<td>To configure which pump delivers flow to the Autosampler</td>
</tr>
<tr>
<td>Work space:</td>
<td></td>
<td>Clear Workspace &gt; Immediately (after each rund), At End of Analysis (for instance after a sequence) and Never (the sample tray (palette) with the sample container stays on the work space)</td>
</tr>
</tbody>
</table>
**Method Parameter Settings**

These settings are available via **Menu > Instrument > Set up Instrument Method Multisampler** or via right click on the Active area.

*Figure 19*  SFC Sampler method parameters

**NOTE**

Usually default draw offset = 0 equates to 2 mm above the wellplate bottom.
4 Preparing the Module
Setting up the Autosampler with Agilent Open Lab ChemStation

**NOTE** For additional 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.

---

**Operation Mode SFC/LC**
It is possible to select between SFC and LC operation mode.

**Injection Mode/Needle Wash**
The settable Injection volume is depending on what kind of configuration is installed. Default configuration 0.1 – 20 µL.
It is possible to select between using the Standard Wash or Standard Wash off. Using needle wash is one option to obtain minimum carry-over.

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

---

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

Additionally it is strongly recommended to use Auto-Clean function to flush the module regularly with all installed solvents.
Module Configuration View for Single Needle

The settings are available via menu Instrument > Instrument Configuration > Multisampler Configuration.

- **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.

**Figure 20** Configuration view (single needle)

**NOTE** Changes in the sampler configuration can only be done in the online view of the CDS system, see Table 10 on page 88.
4 Preparing the Module
Setting up the Autosampler with Agilent Open Lab ChemStation
5
Optimizing Performance

Delay Volume and Extra-Column Volume  96
Delay Volume  96
How to Configure the Optimum Delay Volume  97
How to Achieve High Throughput  101
How to Achieve Higher Resolution  102
How to Achieve Higher Sensitivity  105
How to Achieve Lowest Carry Over  106

This chapter gives hints on how to optimize the performance or use additional devices.
Delay Volume and Extra-Column Volume

The delay volume is defined as the system volume between the point of mixing in the pump and the top 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 Configure the Optimum Delay Volume

For very fast gradients over 0.5 min the delay volume of the system can be easily reduced without changing the physical configuration of the system. The change is achieved by changing the behavior of the multisampler. The delay volume of the autosampler is due to the flow path from the injection valve through the metering device, needle, needle seat and connecting capillaries back to the injection valve (see Table 12 on page 98). For a 1290/1260 Infinity II Multisampler the delay volume equates approximately to 78 μL (G7167B) or 265 μL (G7167A). To make an injection the valve switches from mainpass to bypass so that the metering device can draw the sample into the needle capillary. The injection is made when the valve switches back to mainpass and the sample is flushed onto the column. The valve remains in this position during analysis so that the autosampler is continually flushed and hence the gradient has to flow through this delay volume to reach the column. This can be eliminated by switching the injection valve from mainpass 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 and is activated by selecting the Automatic Delay Volume Reduction (ADVR) function in the autosampler setup menu. The Flush-out Factor (typically 5 times injection volume) ensures that enough time is allowed to flush the sample out of the injector before switching to bypass. For instance a 1 μL injection under standard conditions effectively reduces the system delay volume by approximately 50 μL or 240 μL, depending on the installed Multisampler.

NOTE Configuring the optimum delay volume works in LC mode only.
## 5 Optimizing Performance

How to Configure the Optimum Delay Volume

### Table 12 Schematic of injection steps in the Multisampler (Single needle)

**Figure 21** Valve in mainpass, flow through

**Figure 22** Valve in bypass, drawing sample
### Table 12  Schematic of injection steps in the Multisampler (Single needle)

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wash port in, needle seat in, waste open, solvent pump open, metering device open, sampling loop open, column closed.</td>
</tr>
<tr>
<td>2</td>
<td>Wash port open, needle seat in, waste open, solvent pump open, metering device open, sampling loop closed, column open.</td>
</tr>
<tr>
<td>3</td>
<td>Wash port open, needle seat in, waste open, solvent pump open, metering device closed, sampling loop closed, column closed.</td>
</tr>
<tr>
<td>4</td>
<td>Wash port in, needle seat in, waste open, solvent pump closed, metering device open, sampling loop closed, column closed.</td>
</tr>
<tr>
<td>5</td>
<td>Wash port in, needle seat in, waste open, solvent pump closed, metering device closed, sampling loop closed, column closed.</td>
</tr>
<tr>
<td>6</td>
<td>Wash port in, needle seat in, waste closed, solvent pump closed, metering device closed, sampling loop closed, column open.</td>
</tr>
<tr>
<td>7</td>
<td>Wash port in, needle seat in, waste closed, solvent pump closed, metering device closed, sampling loop open, column closed.</td>
</tr>
<tr>
<td>8</td>
<td>Wash port in, needle seat in, waste closed, solvent pump closed, metering device closed, sampling loop closed, column closed.</td>
</tr>
</tbody>
</table>

**Figure 23**  Valve in bypass, washing needle

**Figure 24**  Valve in mainpass, sample injected
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 will result. 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. With a flush-out factor of 5 and an injection volume of 10 μl, the autosampler will allow 50 μl to pass through before switching to bypass which, with a delay volume of 50 μl, means the gradient just reached the injection valve. Smaller injection volumes will have no effect but for larger injection volumes this will introduce a small step in the gradient. The flow rate in use will also have an impact on the decision to use ADVR or not. At 0.2 ml/min the delay time saved is 21 seconds while at 1.0 ml/min it is 4 seconds.

The ADVR function is unlikely to be suitable for applications involving compounds which are known to cause carry-over problems. The best solution to reduce the delay volume is to install the 40 μL Analytical Head and the 20 μL Loop. To get the best results it is also recommended to order the Low dispersion heat exchanger and the micro flow cell for UV. This will reduce the delay volume by 60 μL or 250 μL.
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 Multisampler setup screen in the control software. The Multisampler can be told to switch the flow through the Multisampler to bypass after the injection has been made and then after, for example, 3 minutes into a 4 minutes run to start the process of 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:

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

where

- $R_s$ = 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, $\alpha$, and practically varying this term involves changing the type of stationary phase (C18, C8, phenyl, nitrile etc.), the mobile phase and temperature to maximize the selectivity differences between the solutes to be separated. This is a substantial piece of work which is best done with an automated method development system which allows a wide range of conditions on different columns and mobile phases to be assessed 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, \( N \), and this can be optimized in a number of ways. \( N \) is inversely proportional to the particle size and directly proportional to the length of a column and so smaller particle size and a longer column will give 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 1290 Infinity II LC system was designed to go to 1300 bar so that it can run sub-two-micron particles and column length can be increased to 100 mm or 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 back pressure 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. Experiment will show if this leads to increase or decrease in selectivity. As flow and pressure are increased it should be remembered that frictional heating inside the column will increase and that 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 again 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:

\[
k^* = \frac{t_G \cdot F \cdot 100}{\Delta \%B \cdot V_m \cdot S}
\]

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 to 5 \%/min change is a guideline), higher flow rate and a smaller volume column. 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. (Refer to Petersson et al., J.Sep.Sci, 31, 2346-2357, 2008, Maximizing peak capacity and separation speed in liquid chromatography).
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

Carryover is measured when residual peaks from a previous active-containing injection appear in a subsequent blank solvent injection. There will be carryover between active injections which may lead to erroneous results. The level of carryover is reported as the area of the peak in the blank solution expressed as a percentage of the area in the previous active injection. The Multisampler is optimized for lowest carryover by careful design of the flow path and use of materials in which sample adsorption is minimized. A carryover figure of 0.001% should be achievable even when a triple quadrupole mass spectrometer is the detector. Operating settings of the Multisampler allow the user to set appropriate parameters to minimize carryover in any application involving compounds liable to stick in the system. The following functions of the Multisampler can be used to minimize carryover:

- Internal needle wash
- External needle wash
- Injection valve cleaning

The flow path, including the inside of the needle, is continuously flushed in normal operation, providing good elimination of carryover for most situations. Automated delay volume reduction (ADVR) will reduce the delay volume but will also reduce the flushing of the Standard Multisampler and should not be used with analytes where carryover might be a problem.

The outside of the needle can be washed using a wash vial in a specific location or the needle can be washed using the flush port. If a wash vial in a tray location specified by the user is chosen then this vial should have no septum and should contain a solvent suitable for washing the sample from the needle. The septum is not used to avoid wiping contamination off the needle on the downstream only to re-apply it on the upstroke. The needle can be dipped into the vial multiple times. This will be effective in removing a small degree of carryover but for more effective washing of the outside of the needle use the flushport.

The flush port is located above and behind the needle seat and in the standard hardware configuration a peristaltic pump delivers the wash solvent. It has a volume of 0.68 mL and the peristaltic pump delivers 5 mL/min, which means the flush port volume is completely refilled with fresh solvent in 7 s.
If the flush port is selected, the user can set how long the outside of the needle is to be washed with fresh solvent. This can last two or three seconds in routine situations where carryover is less of a problem and 10 – 20 s for more complete washing.

It is recommended that washing the outside of the needle in the flush port should be standard procedure to avoid contaminating the needle seat. If the needle seat becomes contaminated it will have to be back-flushed. In the SFC Multisampler this must be done by manually changing the flow connections to clean it, or automated by using the Flexible Cube module.

The flush port and its solvent delivery pump and tubing should be regularly flushed to ensure the lowest carryover. For example, before using the system each day, prime the flush pump for three minutes with appropriate solvent.

When other measures have failed to eliminate carryover it might be that analyte is sticking inside the injector valve. With auto clean feature in the CDS system the injector valve can be set to make additional switching movements to clean out the flow path in the valve if problems occur here with carryover. If the problem compounds need a high percentage of organic phase for elution, it is recommended to switch the injection valve at the high percentage of organic phase after the last peak has eluted. It is also recommended to switch the injection valve again after the initial conditions for the mobile phase have stabilized. This ensures that the bypass groove in the rotor seal of the valve 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 Multisampler 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. After this period, we recommend back-flushing the needle seat in order to get the sealing areas between needle and needle seat clean. Regular Preventive Maintenance service is recommended as the carry-over performance of the Autosampler depends on the integrity of these consumable parts.
5 Optimizing Performance
How to Achieve Lowest Carry Over
6 Troubleshooting and Diagnostics

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Agilent Lab Advisor Software  111

This chapter gives an overview about the troubleshooting and diagnostic features and the different user interfaces.
User Interfaces

- Depending on the user interface, the available tests and the screens/reports may vary.
- Preferred tool should be Agilent Lab Advisor Software, see “Agilent Lab Advisor Software” on page 111.
- The Agilent OpenLab ChemStation C.01.03 and above do not include any maintenance/test functions.
- Screenshots used within these procedures are based on the Agilent Lab Advisor Software.
Agilent Lab Advisor Software

The Agilent Lab Advisor Software 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. By 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 and Agilent InfinityLab 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.
6 Troubleshooting and Diagnostics
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7

Error Information

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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.

Probable cause

1  Not-ready condition in one of the instruments connected to the remote line.
2  Defective remote cable.
3  Defective components in the instrument showing the not-ready condition.

Suggested actions

1  Ensure the instrument showing the not-ready condition is installed correctly, and is set up correctly for analysis.
2  Exchange the remote cable.
3  Check the instrument for defects (refer to the instrument’s documentation).

Lost CAN Partner

Error ID: 0071

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

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

Probable cause

1  CAN cable disconnected.
2  Defective CAN cable.
3  Defective main board in another module.

Suggested actions

1  Ensure all the CAN cables are connected correctly.
   • Ensure all CAN cables are installed correctly.
2  Exchange the CAN cable.
3  Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.
Leak Sensor Short

**Error ID: 0082**

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

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

<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 pinched by a metal component.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>3 Power switch assembly defective</td>
<td>Please contact your Agilent service representative.</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 Power Switch board.</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 pinched by a metal component.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>4 Power switch assembly defective</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
Compensation Sensor Open

Error ID: 0081

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

The resistance across the temperature compensation sensor (NTC) on the power switch board is dependent on ambient temperature. The change in resistance is used by the leak circuit to compensate for ambient temperature changes. If the resistance across the sensor increases above the upper limit, the error message is generated.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Loose connection between the power switch board and the main board</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2 Defective power switch assembly</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 power switch board in the module has failed (open circuit).

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

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Defective power switch assembly</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>2 Loose connection between the power switch board and the main board</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>
Fan Failed

Error ID: 0068

The fan in the autosampler module or in the sample cooler has failed.

The hall sensor on the fan shaft is used by the main board to monitor the fan speed. If the fan speed falls below a certain limit for a certain length of time, the error message is generated.

This limit is given by 2 revolutions/second for longer than 5 seconds.

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

<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 sample cooler fan</td>
<td>Replace the sample cooler.</td>
</tr>
<tr>
<td>4 Defective main board.</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.

**Probable cause**

1. Loose fittings.
2. Broken capillary.
3. Leaking rotor seal or needle seat.
4. Defective metering seal.

**Suggested actions**

- Ensure all fittings are tight.
- Exchange defective capillaries.
- Exchange the rotor seal or seat capillary.
  - Exchange the metering seal.
  - *Make sure the leak sensor is thoroughly dry before restarting the autosampler.*
7 Error Information
Sampler Error Messages

Sampler Error Messages

NOTE Please verify the first errors in the list. The last error message could be a subsequent error.

Draw command aborted

Error ID: 25478

The robot (sample handler) failed to move correctly during injection sequence.

<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>

Missing vessel

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 Defective sample handler</td>
<td>Exchange the sample handler.</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</td>
<td>Ensure unobstructed movement of the sample handler. Please contact your Agilent service representative.</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. 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 Sample handler not aligned correctly.</td>
<td>Switch off the instrument and do an autoreferencing.</td>
</tr>
<tr>
<td>2 Mechanical obstruction of the sample handler.</td>
<td>Ensure unobstructed movement.</td>
</tr>
<tr>
<td>3 Defective sample handler motors.</td>
<td>Replace the sample handler motors.</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.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Sample handler not aligned correctly.</td>
<td>Switch off the instrument and do an autoreferencing.</td>
</tr>
<tr>
<td>2 Mechanical obstruction of the sample handler.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
<tr>
<td>3 Defective sample handler motors.</td>
<td>Please contact your Agilent service representative.</td>
</tr>
</tbody>
</table>

Front door error

**Error ID: 25051,25049 and 25048**

The autosampler failed to complete initialization correctly. The autosampler initialization procedure can recognize that the front door is closed. During initialization, the processor monitors the door sensor and generates this error message.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Front door is not closed properly.</td>
<td>Check if the front door is closed or if the magnet is missing.</td>
</tr>
</tbody>
</table>
Alignment procedure: needle command failed

Error ID: 25095

The autosampler failed to complete initialization or injection sequence correctly. The autosampler initialization procedure or injection sequence cannot move and position the needle assembly correctly in the needle park station. During the parking or movements of the needle assembly, the status information of the subparts is not read out successfully and the error message is generated.

Probable cause

1  The sample loop capillary was squeezed in the needle parkstation.

2  The needle assembly was not installed correctly in the needle parkstation.

Suggested actions

- Check if the sample loop is installed correctly.
- Do an autoreferencing afterwards (needle assembly must be installed in the needle parkstation during this procedure).
- Check if the needle assembly is installed correctly.
- Install the needle assembly on the sample handler.
- Do a reset of the sample handler.
- Do an autoreferencing (the needle assembly must be installed in the needle parkstation during this procedure).
- If this will not help: Please contact your Agilent service representative.
# 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 correctly. | • 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 hardware overcurrent

Error ID: 25411

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>
Sample Cooler Error Messages

Cooler Voltage Failure

Error ID: 30722

The sample cooler board has detected a voltage failure.

Probable cause | Suggested actions
--- | ---
1 Blown fuses, defective cable | 
| • Check the power cable from the ALS to the sample cooler. 
| • Please contact your Agilent service representative. 

2 Voltage issue in the sample cooler

Cooler PCB Error State

Error ID: 30724

The sample cooler PCB board seems to be defective.

Probable cause | Suggested actions
--- | ---
1 Blown fuses, defective cable | 
| • Check the power cable from the ALS to the sample cooler. 
| • Please contact your Agilent service representative. 

2 Defective PCB boards

Replace the sample cooler.
7 Error Information
Sample Cooler Error Messages

Cooler temperature below or above target temperature.

Error ID: 30705, 30706

The sample cooler temperature is above or below the target temperature.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Condensate inside of the chiller</td>
<td>Check if the drainage is ok.</td>
</tr>
<tr>
<td>2 Defective cable</td>
<td>Check the signal cable from the ALS to the sample cooler.</td>
</tr>
<tr>
<td>3 Defective temperature sensor</td>
<td>Replace the sample cooler.</td>
</tr>
</tbody>
</table>

Cooler Overpressure Failure

Error ID: 30712

The sample cooler pressure sensor has detected an overpressure.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Overpressure in the chiller</td>
<td>Switch off the instrument and wait for 15 min. Restart the instrument and check the signals in LabAdvisor.</td>
</tr>
<tr>
<td>2 Defective compressor</td>
<td>Replace the sample cooler.</td>
</tr>
</tbody>
</table>

Cooler Condensate Error

Error ID: 30702, 30709, 30710

The sample cooler has detected condensate inside of the leak pane.

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Suggested actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Blocked drainage</td>
<td>Switch off the instrument and remove the condensate tubings. Place a beaker underneath the waste outlet. Check the waste container. There should be no kinked and sealed tubing.</td>
</tr>
<tr>
<td>2 Defective leak sensor</td>
<td>Replace the sample cooler.</td>
</tr>
</tbody>
</table>
This chapter describes the built in test functions.
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 13 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 Test</td>
</tr>
<tr>
<td></td>
<td>Adding of pressure to chromatographic signals possible</td>
<td></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>
<tr>
<td></td>
<td>Adding of pressure to chromatographic signals possible</td>
<td></td>
</tr>
</tbody>
</table>

For details on the use of the interface refer to the interface documentation.
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>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5067-6127</td>
<td>Blank Nut SL</td>
</tr>
</tbody>
</table>

For 1290 Infinity II Multisampler you have to use the BlankNut SL which only fits for the special port size of the VICI valve. This BlankNut is backward compatible and can be used for the 1260 Infinity II Multisampler as well.
1. Run the System pressure test with the Agilent Lab Advisor (for further information see Online-Help of user interface).

![System Pressure Test – Result](image1)

**Figure 25**  System Pressure Test – Result

![System Pressure Test – Dynamic pressure input](image2)

**Figure 26**  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 multisampler 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 multisampler is empty
- All drawers are closed properly

1. Open the CDS of the instrument.
   A right-click into the Active Area of the Multisampler will open a menu to modify
   - drawer configuration
   - capillaries
   - Reference Vial Bar
2 Use drawer configuration and follow the software instructions. Auto referencing is done.

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

**NOTE**
For auto referencing, you can alternatively use the instant pilot.

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

**When**

Performing maintenance on the module

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

The Sample handler is positioning the needle assembly so that there is easy access for changing needle assembly or needle seat. The position is far to the left of the needle parkstation, and the current to the motors are off, so that the Z-drive of the robot can be moved while servicing the module.

**NOTE**
For safety reason you have to lock the needle assembly before you detach the needle from the robot. Refer to “Remove the Needle Assembly” on page 155 and “Install the Needle Assembly” on page 159.

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

![Figure 28 Change Needle Assembly](image)
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.

![Image of Maintenance Positions](image)

**Figure 29** Change Sample Loop Capillary

Arm Position

The home position of the multisampler 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.

![Image of Special Commands](image)

**Figure 30** Park Position Button

**NOTE** If the transport assembly is not parked and not protected by the transport foam, the module could be damaged due to excessive shock of the shipping container during transport.
Change Metering Device

When removing the metering device is necessary (by exchanging the metering seal for instance), the metering drive needs to be moved to a position at the far back, in order to prevent seal and/or piston damage.

Figure 31  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 multisampler 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).

<table>
<thead>
<tr>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>User interaction</td>
<td>Take tray from drawer 1 (Front)</td>
</tr>
<tr>
<td>Device command accepted</td>
<td>OK</td>
</tr>
<tr>
<td>User interaction</td>
<td>Take needle 2</td>
</tr>
<tr>
<td>Device command accepted</td>
<td>OK</td>
</tr>
<tr>
<td>User interaction</td>
<td>Needle Into Sample</td>
</tr>
<tr>
<td>Device command accepted</td>
<td>OK</td>
</tr>
<tr>
<td>User interaction</td>
<td>Draw (Volume 1 µl)</td>
</tr>
<tr>
<td>Device command accepted</td>
<td>OK</td>
</tr>
<tr>
<td>User interaction</td>
<td>Needle To Home</td>
</tr>
<tr>
<td>Device command accepted</td>
<td>OK</td>
</tr>
<tr>
<td>User interaction</td>
<td>Move tray back into drawer</td>
</tr>
<tr>
<td>Device command accepted</td>
<td>OK</td>
</tr>
<tr>
<td>User interaction</td>
<td>Manual</td>
</tr>
<tr>
<td>Device command accepted</td>
<td>OK</td>
</tr>
</tbody>
</table>

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

The Sample Cooler Function Test can be used as a simple verification that the sample cooler is functioning.

After the test has been started, it begins to acquire data from the cooler's PT1000 temperature sensor. As soon as the temperature has equilibrated (that is, the temperature does not change by more than 0.5 °C over a 10 s period) the cooler is turned on and measurement is started.

For the test to succeed, three temperature checkpoints must be reached within a specified time.
This chapter describes the maintenance of the Multisampler
Introduction to Maintenance

Figure on page 146 shows the main user accessible assemblies of the multisampler. These parts can be accessed from the front (simple repairs) and don't require to remove the multisampler from the system stack.
Figure 32  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.
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 14  Overview of maintenance

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Typical interval (minimum)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change needle/needle seat</td>
<td>60000 needle into seat</td>
<td></td>
</tr>
<tr>
<td>Change peristaltic pump cartridge</td>
<td>3000 min on time</td>
<td></td>
</tr>
<tr>
<td>Change rotor seal</td>
<td>30000 injections</td>
<td></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.

**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.
Removal and Installation of the Front Door

When
If the front door is defective or the hinge are damaged.

Tools required
Description
Flat screwdriver

Parts required
# p/n Description
1 5067-5415 Door Assy
OR 1 G7167-68718 Light Protection Kit

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

NOTE
For detailed information on position of the magnets, refer to “Magnets” on page 40

CAUTION
Magnetic fields
Magnets produce a far-reaching, strong magnetic field.
You can damage for example televisions, laptops, computer harddisks, credit cards, magnetic cards may be damaged as well.
➔ Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.

WARNING
Heart pacemakers
Magnets could affect the functioning of pacemakers and implanted heart defibrillators.
A pacemaker could switch into test mode and cause illness.
A heart defibrillator may stop working.
➔ Bearers of heart pacemakers or implanted defibrillators must stay off at least 55 mm from the magnets.
1 Open the front door.

2 Press the release buttons and pull the front door out.
9 Maintenance
Removal and Installation of the Front Door

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.
Remove the Needle Assembly

When

When the limit in the needle into seat counter in the EMF is exceeded or when needle shows indications of damage, blockage or leaks.

Tools required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Wrench open 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>G4267-87201</td>
<td>Needle Assembly</td>
</tr>
<tr>
<td>OR</td>
<td>G4267-87210</td>
<td>Needle Assembly (slotted) for high injection volumes</td>
</tr>
</tbody>
</table>

Preparations

In order to avoid leaks, stop the pump running and remove the tubings from the solvent bottles. If available close the shutoff valves.

**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.

**NOTE**

It is recommended to always exchange the needle assembly and the needle seat at the same time to prevent premature leakage.
1 In the Instant Pilot start the maintenance mode and select Change needle/seat function.
OR
In the Agilent Lab Advisor software select Service & Diagnostics in the system screen (Tools) Maintenance Positions > Change Needle/Loop, click Start and wait until the needle assembly is in maintenance position.

2 Open the front door.

3 Lock the needle in the safety position.

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

WARNING
Sharp needle
Uncovered needles may cause injuries
→ Make sure the needle is in the safety lock position.

4 Remove the needle assembly by slightly pulling the needle cartridge.
5  Z-Robot (Z-arm coupler) without the needle assembly.

**CAUTION**

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

➔ Avoid to change the loop shape.

➔ Do not pull or bend the loop too far.

6  The needle assembly is still connected to the loop capillary.

Loop plastic adapter
9 Maintenance
Remove 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.


Install the Needle Assembly

When
When the limit in the needle into seat counter in the EMF is exceeded or when needle shows indications of damage, blockage or leaks.

Tools required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Wrench open 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>G4267-87201</td>
<td>Needle Assembly</td>
</tr>
<tr>
<td>OR</td>
<td>1 G4267-87210</td>
<td>Needle Assembly (slotted) for high injection volumes</td>
</tr>
</tbody>
</table>

Preparations
In order to avoid leaks, stop the pump running and remove the tubings from the solvent bottles. If available close the shutoff valves.

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.

NOTE
It is recommended to always exchange the needle assembly and the needle seat at the same time to prevent premature leakage.
9 Maintenance
Install the Needle Assembly

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

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

CAUTION
Blockages inside of the needle assembly union
➔ Do not overtighten the fitting. A quarter turn should be sufficient.

2 Use a 1/4 inch wrench to tighten the fitting of the loop capillary.
3 Install loop plastic adapter.

4 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.

**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.
Install the Needle Assembly

5 Close the front door.

Next Steps:

6 In the Instant Pilot close Change needle / seat.
   OR
   In the Agilent Lab Advisor software Change needle/loop
   > End, click End and wait until the needle assembly is in
   the needle park station.

7 Perform a pressure 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>Wrench open 1/4 — 5/16 inch</td>
</tr>
<tr>
<td></td>
<td>Flat head 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>G4267-87012</td>
<td>High Pressure Needle Seat, 0.12 mm (PEEK)</td>
</tr>
<tr>
<td>OR</td>
<td>G4267-87020</td>
<td>High Pressure Seat Assembly 0.075 mm (PEEK)</td>
</tr>
</tbody>
</table>

Preparations
In order to avoid leaks, stop the pump running and remove the tubings from the solvent bottles. If available close the shutoff valves.

**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.

**NOTE**
Refer to the Agilent 1290 Infinity II Ultra Low Dispersion Kit Technical Note (p/n 01200-90105) for further details.
9 Maintenance

Exchange the Needle Seat

1 In the Instant Pilot 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 Needle**, click **Start** and wait until the needle assembly is in maintenance position.

2 Open the front door.

3 Disconnect the seat capillary from the Injection valve.

4 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.
5 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.

6 Reconnect the seat capillary to the injection valve.

7 Close the front door.

**Next Steps:**

8 In the Instant Pilot close *Change needle /seat*.
   OR
   In the Agilent Lab Advisor software *Change needle* click *End* and wait until the needle assembly is in the needle park position.

9 Perform a pressure test.
Replace the Rotor Seal

When
When poor injection volume reproducibility or when injection valve is leaking.

Tools required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Wrench open 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>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5068-0279</td>
<td>Rotor seal</td>
</tr>
<tr>
<td>5068-0280</td>
<td>Stator</td>
</tr>
</tbody>
</table>

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.

NOTE
Please bear in mind that depending on which valve you have installed the images may slightly differ from the actual item.
1 Open the front door.

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 the valve.

6 Install new rotor seal.

NOTE
Make sure that the rotor sealing surface with its engraved flow passages is facing out. The pattern is asymmetrical to prevent improper placement.
7 Reinstall the stator head. The index pins on the drive and the stator head must engage in the corresponding holes. Insert the two socket head screws.

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

**NOTE**

Do not over-tighten the screws. The screws hold the assembly together and do not affect the sealing force. The sealing force is automatically set as the screws close the stator head against the valve body.
9. Reconnect all capillaries to the proper injection valve ports with a 1/4 inch wrench.

10. Close the front door.

11. Perform a pressure 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>3pos/6port FI Valve</td>
</tr>
</tbody>
</table>

Preparations
Switch off the power of the Multisampler

**NOTE** Please bear in mind that depending on which valve you have installed the images may slightly differ from the actual item.
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 replacment 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).
### 9 Maintenance

**Replace the Injection Valve**

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

![Image showing the reconnect process of capillaries to the injection valve ports.](image-url)
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>Wrench open 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 1</td>
<td>G4267-60049</td>
<td>Flush head, 500 µL</td>
</tr>
</tbody>
</table>

1 System must be in Service Mode (LabAdvisor) before you can remove the analytical heads or metering device.

   OR

   1 In the Instant Pilot start the maintenance mode and select **Change Metering Device** function.

   OR

2 In the Agilent Lab Advisor software select **Service & Diagnostics** in the system screen (Tools) > **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.).
### Replace Analytical Heads / Metering Device

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Remove the metering device.</td>
</tr>
<tr>
<td>6</td>
<td>Reinstall the complete analytical head with the actuator housing</td>
</tr>
</tbody>
</table>

**NOTE**

For proper installation, check the correct position of the tag.
9 Maintenance
Replace Analytical Heads/Metering Device

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

8 Reconnect the capillaries.
Replace Analytical Heads/Metering Device

9 Close the front door.

Next Steps:

10 In the Instant Pilot exit the maintenance mode and select **Change metering device** function.

   OR

   In Agilent Lab Advisor software system screen exit **Service & Diagnostics (Tools) > Maintenance Positions** > **Change Metering Device** click **End** and wait until the metering device is in **Home** position.

11 Perform a pressure 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>Wrench open 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></td>
</tr>
<tr>
<td>G4226-43800</td>
<td>Seal insert tool</td>
</tr>
<tr>
<td></td>
<td>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>Metering seal 100 µL</td>
</tr>
<tr>
<td>5067-5678</td>
<td>Piston ceramic 100 µL</td>
</tr>
</tbody>
</table>

1 In the Instant Pilot start the maintenance mode and select Change metering device function.
   OR
   In the Agilent Lab Advisor software select Service & Diagnostics in the system screen (Tools) > 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.
9 Maintenance
Remove the Metering Seal

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.
Remove the Metering Seal

11 Carefully remove the metering seal using the steel side of the insert tool. Clean the chamber with an appropriate solvent and ensure that all particulate matter is removed.
Install the Metering Seal

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>
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<tr>
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<td>4 mm Hex key</td>
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<td>Insert tool</td>
</tr>
<tr>
<td>OR</td>
<td>G4226-43800 Seal insert tool</td>
</tr>
<tr>
<td></td>
<td>for 100 µL or 40 µL</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>Metering seal 100 µL</td>
</tr>
<tr>
<td>5067-5678</td>
<td>Piston ceramic 100 µL</td>
</tr>
</tbody>
</table>

Preparations
Removing the metering seal, see “Remove the Metering Seal” on page 182.

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.

![Diagram of installation process]
3 Make sure to comply to the following order of actions:
   a  Tighten the three screws fingerthight, then
   b  Tighten the screws a little at a time to keep the support ring surface parallel (important!) to the surface of the analytical head.

4 Use the twist and lock bayonet 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.
9 Maintenance
Install the Metering Seal

9 Close the front door.

Next Steps:

10 In the Instant Pilot exit the maintenance mode and select **Change metering device** function.

OR

In Agilent Lab Advisor software system screen exit **Service & Diagnostics (Tools) > Maintenance Positions > Change Metering Device** click **End** and wait until the metering device is in **Home** position.

11 Perform a pressure test.
Replace the Peristaltic Pump Cartridge

When

Tubing blocked or broken

<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>5065-4445</td>
<td>Peristaltic pump with Pharmed tubing (default)</td>
</tr>
<tr>
<td>OR</td>
<td>1</td>
<td>5042-8507</td>
<td>Peristaltic pump cartridge, silicone tubing</td>
</tr>
<tr>
<td>OR</td>
<td>1</td>
<td>5042-9952</td>
<td>Peristaltic pump with Chemsure tubing</td>
</tr>
</tbody>
</table>

Preparations

Remove the inlet filter of the solvent bottle which guides the solvent to the peristaltic pump to avoid syphoning effects.

WARNING

When opening capillary or tube fittings solvents may leak out.
The handling of toxic and hazardous solvents and reagents can hold health risks.

➤ Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.

NOTE

The peristaltic pump cartridge is a replaceable unit. The tubing inside the pump is not replaceable.
9 Maintenance
Replace the Peristaltic Pump Cartridge

1. Open the front door.

2. Press the two clips on the front of the peristaltic pump cartridge.

3. Pull the cartridge forward off the motor shaft.

4. Disconnect the tubing coupler leading to the wash port and the tubing coupler coming from the solvent bottle.

5. Push the new cartridge onto the motor shaft until the clips click into place.

6. Connect the wash port tubing to the upper tubing of the new cartridge (use sand paper to get a good grip on the tubing).
7 Connect the inlet filter of the solvent bottle again. Use the syringe to draw enough solvent for completely filling of the peristaltic pump tubing before continuing to prime the peristaltic pump.

8 Close the front door.
9 Maintenance
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>Wrench open 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>Seal 500 µL</td>
</tr>
</tbody>
</table>

Preparations

- Cleaning tissue
- Appropriate solvent like isopropanol or methanol

1 In the Instant Pilot start the maintenance mode and select **Change metering device** function.

OR

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

2 Open the front door.
Replace the Flushhead Seal

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.
9 Maintenance
Replace the Flushhead Seal

7 Remove the piston from the head body.

8 Carefully remove the metering 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 metering seal into the flush head assembly.
11 Reinstall the flush head to the actuator housing.

12 Fix the flush head.

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

13 Connect the capillaries.

14 Close the front door.
Remove the Sample Loop-Flex

When
If the sample loop flex is defective or damaged.

Tools required
<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8710-0510</td>
<td>Wrench open 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 Instant Pilot start the maintenance mode and select Change needle/seat function.

OR
In the Agilent Lab Advisor software select Service & Diagnostics in the system screen (Tools) Maintenance Positions > Change Needle/Loop, click Start and wait until the needle assembly is in maintenance position.

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

4 Lock the needle in the safety position.

**NOTE**
During normal operation of the Multisampler the needle assembly has to be unlocked.
**CAUTION**
Damage of the loop
The loop shape may be damaged if the loop is stretched or bent too far.

➔ Avoid to change the loop shape.
➔ Do not pull or bend the loop too far.

**WARNING**
Sharp needle
Uncovered needles may cause injuries

➔ Make sure the needle is in the safety lock position.

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

6 Remove the cartridge out of its proper position. By gently tilting and pulling it out of the work space of the multisampler.
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 or damaged.

Tools required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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Parts required

<table>
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<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.

**NOTE**
If you have changed the sample loop, verify that the correct sample loop is configured in the CDS (see “Setting up the Autosampler with Agilent Open Lab ChemStation” on page 87).
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.**

1. Install loop plastic adapter.
2. 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.
3. If the plastic adapter is damaged the sample loop has to be replaced.

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

4. Click the sample loop cartridge in the designated location and keep the right orientation.
5 Install the shorter capillary of the sample loop cartridge to the analytical head.

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

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

**Next Steps:**

8 In the Instant Pilot close **Change needle / seat**.

OR

In Agilent Lab Advisor software **Change needle/loop**. Click **NEXT** and wait until the needle is in the needle park station.

Click **Back** to leave the Maintenance window.

**NOTE**

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

**NOTE**

If you have changed the sample loop, verify that the correct sample loop is configured in the CDS (see “Setting up the Autosampler with Agilent Open Lab ChemStation” on page 87).
## Replace the Dummy Drawer

### Optional Configurations

<table>
<thead>
<tr>
<th>Table 15</th>
<th>Overview on optional configurations (examples for uniform types)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1H</td>
</tr>
<tr>
<td><strong>Delivery Status</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Up to 8 single height drawers</strong></td>
<td>G7167-60021</td>
</tr>
<tr>
<td>16 positions Shallow wellplates and MTP</td>
<td>G7167-60020</td>
</tr>
<tr>
<td>Max Sample capacity 1536 / 6144 samples (96 Shallow Wellplates / 384 MTP)</td>
<td>G7167-60024</td>
</tr>
<tr>
<td><strong>Up to 4 Dual Height drawers</strong></td>
<td>-</td>
</tr>
<tr>
<td>8 positions Vials (2 mL), deep well plates, MTP, Eppendorf</td>
<td>-</td>
</tr>
<tr>
<td>Max Sample capacity 432 / 3072 samples (2 mL Vials/ 384 MTP)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Up to 2 Drawers Triple Height</strong></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>-</td>
</tr>
<tr>
<td>Max Sample capacity 60 / 216 / 1536 samples (6 mL Vials / 2 mL Vials / 384 MTP)</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

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screwdriver</td>
</tr>
</tbody>
</table>

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 CD.

1. Open the drawer.
2. Pull the drawer completely out.
Replace the Dummy Drawer

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.
9  Maintenance
   Replace the Dummy Drawer

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.

2. Right-click on the **Multisampler** GUI.

![Multisampler GUI](image)
3 Select **Modify > Drawer Configuration** in the GUI screen.

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

4 Follow the Setup or Change configuration screen.

5 System is ready after the robot has done Auto Referencing (see “Auto Referencing” on page 136).
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 Multisampler. Select **Detect Drawers** in the **Hotel Configuration**.

![Configuration screen](image)

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 136).
Remove the Sample Cooler

When
If the cooler is damaged or defective

Tools required
Description
Screwdriver, Pozidriv #1 PT3

Preparations

• Drain off all condensate before dismounting the sample cooler.
• Make sure that there is no condensate left.

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
Damage to the electronics

➔ Unplug the power cords.
➔ Drain off all condensate before dismounting the sample cooler.
➔ Make sure that there is no condensate left.
9 Maintenance
Remove the Sample Cooler

Next Steps:

1. Remove the power cable from the module.
2. Open the four screws on cooler cover.
3. Slide the sample cooler the half way out.
4. Remove power and the signal cable.
5. Slide the cooler completely out.
6. Place the sample cooler on the bench.

NOTE
If the sampler with a sample cooler needs to be shipped to another location via carrier, ensure:

- The two modules are shipped in separate boxes.
- The Sample handler of the multisampler is parked properly, see Park Robot in Agilent Lab Advisor online help for more information.
- The sample containers (vial trays) are removed from the sample hotel.
- The condensed water inside of the sample cooler is removed.
Install the Sample Cooler

When
If the cooler is damaged or defective.

Tools required
Description
Screwdriver, Pozidriv #1 PT3

Parts required

<table>
<thead>
<tr>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G7167-60005</td>
<td>Sample cooler</td>
</tr>
</tbody>
</table>

**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
Damage to the electronics

➔ Unplug the power cords.
➔ Drain off all condensate before dismounting the sample cooler.
➔ Make sure that there is no condensate left.

1. Slide in halfway
2.
CAUTION
Damage to the cables

➔ Do not bend or pinch the cables.
➔ Fit in the cooler perfectly.
**NOTE**
Check leak waste handling for further info.

**CAUTION**
Damage to the sample cooler

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

### Power switch

1. On
2. Off
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

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agilent Lab Advisor software</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>Instant Pilot G4208A</td>
</tr>
<tr>
<td>(only if supported by module)</td>
</tr>
</tbody>
</table>

Parts required

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Firmware, tools and documentation from Agilent web site</td>
</tr>
</tbody>
</table>

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 module.
## 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>G4267-87210</td>
<td>Needle Assembly (slotted) for high injection volumes</td>
</tr>
<tr>
<td>G4267-87012</td>
<td>High Pressure Needle Seat, 0.12 mm (PEEK)</td>
</tr>
<tr>
<td>5068-0279</td>
<td>Rotor seal</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>
### 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 Container)(^1)</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 Container)(^1)</td>
</tr>
<tr>
<td>3</td>
<td>G7167-60022</td>
<td>Drawer 3H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 p/k (including 2*G4267-60205 Sample Container)(^1)</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>

\(^1\) Note: This partnumber should only be used for repairs. For increasing the capacity in the Sample Hotel please order a pair of drawers via ELSA [http://wadnts02.germany.agilent.com/csc/tools/web_elsa/elsa.htm](http://wadnts02.germany.agilent.com/csc/tools/web_elsa/elsa.htm).

**Figure 33** Hotel drawer

![Hotel Drawer Diagram](image-url)
### 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>PE Seal</td>
</tr>
<tr>
<td></td>
<td>G4267-60434</td>
<td>Seal Support Assembly, 100 µL</td>
</tr>
<tr>
<td>4</td>
<td>0515-1052</td>
<td>Screw 2.5 mm hex</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 ceramic 100 µL</td>
</tr>
<tr>
<td></td>
<td>5043-1000</td>
<td>O-Ring</td>
</tr>
<tr>
<td></td>
<td>(not shown)</td>
<td></td>
</tr>
<tr>
<td>5500-1159</td>
<td>Capillary ST 0.17 mmx100 mm SX/S-2.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capillary from the metering device to the injection valve (not shown)</td>
</tr>
</tbody>
</table>
Figure 34  Analytical head assembly, 100 µL
## Flush Head Assembly 500 µL

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G4267-60049</td>
<td>Flush head, 500 µL</td>
</tr>
<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>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 (not shown)</td>
</tr>
</tbody>
</table>
Figure 35  Flush head assembly, 500 µL
### 3pos/6port Injection Valve FI

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

**Figure 36**  Injection valve assembly
## Injection Valve with Actuator

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5067-6680</td>
<td>3pos/6port FI Valve</td>
</tr>
<tr>
<td>2</td>
<td>5043-0291</td>
<td>Lock Nut</td>
</tr>
<tr>
<td>3</td>
<td>5188-8030</td>
<td>Tag Reader</td>
</tr>
<tr>
<td>4</td>
<td>5067-4162</td>
<td>Direct-Actuator-50 Assembly</td>
</tr>
</tbody>
</table>

Figure 37 Injection valve with actuator
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 38  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>1</td>
<td>5067-5415</td>
<td>Door Assy</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>5021-1879</td>
<td>Permanent Magnet</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td></td>
<td>Pressure Spring (not available)</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5067-5412</td>
<td>Hinge Universal</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>G7167-68718</td>
<td>Light Protection Kit (not shown)</td>
</tr>
</tbody>
</table>

**Figure 39**  Door Assy
## Accessory Kit

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G4267-68705</td>
<td>Accessory Kit</td>
</tr>
<tr>
<td></td>
<td>G7167-68715</td>
<td>Accessory Kit</td>
</tr>
<tr>
<td>1</td>
<td>G4220-60007</td>
<td>Bottle Head Assembly (not included in the accessory kit)</td>
</tr>
<tr>
<td>2</td>
<td>5063-6527</td>
<td>Tubing assembly, i.d. 6 mm, o.d. 9 mm, 1.2 m (to waste)</td>
</tr>
<tr>
<td>3</td>
<td>5500-1157</td>
<td>Capillary, ST, 0.12 mm x 500 mm (1290 module)</td>
</tr>
<tr>
<td>OR</td>
<td>5500-1246</td>
<td>Capillary ST 0.17 mm x 500 mm SI/SI (1260 module)</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></td>
<td>5067-5967</td>
<td>Tubing Clip Tube Connector</td>
</tr>
</tbody>
</table>

![Diagram of Accessory Kit components]
## Tools

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0100-1710</td>
<td>Mounting Tool for Tubing Connections</td>
</tr>
<tr>
<td>2</td>
<td>5023-2533</td>
<td>Mounting tool</td>
</tr>
</tbody>
</table>

<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 40**  Tubing connector Leak Kit
### Tubing Kit Sampler Standard

<table>
<thead>
<tr>
<th>Item</th>
<th>p/n</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G4267-60061</td>
<td>Tubing-Kit-Sampler-Standard contains:</td>
</tr>
<tr>
<td>1</td>
<td>5042-9974</td>
<td>Tubing Flex (1.5 m)</td>
</tr>
<tr>
<td>2</td>
<td>5500-1155</td>
<td>Tube Connector, 90 degree, ID 6.4</td>
</tr>
<tr>
<td>3</td>
<td>0890-1760</td>
<td>Tubing Flexible 1 ea / 1 meter</td>
</tr>
<tr>
<td>4</td>
<td>5042-6422</td>
<td>Tubing connector, 1 mm o.d.</td>
</tr>
<tr>
<td>5</td>
<td>0100-1708</td>
<td>Nut 1/8 PPS</td>
</tr>
<tr>
<td>6</td>
<td>0100-1700</td>
<td>FERRULE-A18IN</td>
</tr>
<tr>
<td>7</td>
<td>0100-1846</td>
<td>UNION-TEFZEL</td>
</tr>
<tr>
<td></td>
<td>5067-5967</td>
<td>Tubing Clip Tube Connector</td>
</tr>
</tbody>
</table>

**Figure 41** Tubing kit sampler standard
# 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>G4267-60060</td>
<td>Blind seat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>not shown</td>
</tr>
</tbody>
</table>

![Figure 42] Drain management kit
# Sample Cooler

The Sample Cooler Upgrade (G4760A) contains:

<table>
<thead>
<tr>
<th>Item</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></td>
<td>G4267-81015</td>
<td>Cable Power Sample Cooler</td>
</tr>
<tr>
<td></td>
<td>G4267-81014</td>
<td>Cable-Ribbon Sample Cooler</td>
</tr>
<tr>
<td></td>
<td>2110-1519</td>
<td>Fuse 3.50 A125 V</td>
</tr>
<tr>
<td></td>
<td>5067-6208</td>
<td>Condensate Drainage Kit</td>
</tr>
</tbody>
</table>

![Sample Cooler](image)

**Figure 43** Sample cooler
11 Identifying Cables

Cable Overview  238
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Remote Cables  242
CAN/LAN Cables  246
Agilent Module to PC  247
USB  248

This chapter provides information on cables used with the modules.
## Cable Overview

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

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

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

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

### 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's 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>1</td>
<td></td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Shield</td>
<td>Analog -</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Center</td>
<td>Analog +</td>
<td></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></td>
<td>Not connected</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

<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>
### 5188-8044 ERI to ERI (Connector D_Subminiature 15 pin)

<table>
<thead>
<tr>
<th>p/n 5188-8044</th>
<th>Pin (ERI)</th>
<th>Signal</th>
<th>Pin (ERI)</th>
<th>Active (TTL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>GND</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Start Request</td>
<td>1</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Stop</td>
<td>2</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ready</td>
<td>3</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Power on</td>
<td>5</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Future</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Shut Down</td>
<td>6</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Start</td>
<td>7</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Prepare</td>
<td>8</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>

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

<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>
Identifying Cables
Remote Cables

5188-8057 ERI to APG and RJ45 (Connector D_Subminiature 15 pin (ERI), Connector D_Subminiature 9 pin (APG), Connector plug Cat5e (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></td>
<td>10</td>
<td>GND</td>
<td>1</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Start Request</td>
<td>9</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Stop</td>
<td>8</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Ready</td>
<td>7</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Fraction Trigger</td>
<td>5</td>
<td>High</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Power on</td>
<td>6</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Shut Down</td>
<td>4</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Start</td>
<td>3</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Prepare</td>
<td>2</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ground</td>
<td>Cable Shielding</td>
<td>NC</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></td>
<td>1 - White</td>
<td>1 - White</td>
<td>Digital ground</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 - Brown</td>
<td>2 - Brown</td>
<td>Prepare run</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>3 - Gray</td>
<td>3 - Gray</td>
<td>Start</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>4 - Blue</td>
<td>4 - Blue</td>
<td>Shut down</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>5 - Pink</td>
<td>5 - Pink</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 - Yellow</td>
<td>6 - Yellow</td>
<td>Power on</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>7 - Red</td>
<td>7 - Red</td>
<td>Ready</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>8 - Green</td>
<td>8 - Green</td>
<td>Stop</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>9 - Black</td>
<td>9 - Black</td>
<td>Start request</td>
<td>Low</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></td>
<td>White</td>
<td>1</td>
<td>Digital ground</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brown</td>
<td>2</td>
<td>Prepare run</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Gray</td>
<td>3</td>
<td>Start</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>4</td>
<td>Shut down</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Pink</td>
<td>5</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yellow</td>
<td>6</td>
<td>Power on</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>7</td>
<td>Ready</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>8</td>
<td>Stop</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>9</td>
<td>Start request</td>
<td>Low</td>
</tr>
</tbody>
</table>
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>
## 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’s 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>
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>
12

Hardware Information

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This chapter describes the module in more detail on hardware and electronics.
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 and RS-232C)
- memory management
- ability to update the firmware of the 'main system'

**Main System**

Its properties are:

- the complete communication capabilities (CAN, LAN and RS-232C)
- 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 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 using the following tools (latest version should be used):

- Agilent Lab Advisor software with files on the hard disk (*)
- Firmware Update Tool with local files on the hard disk (*)
- Instant Pilot (G4208A) with files on a USB Flash Disk

(*) 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.

NOTE

Update of main system can be done in the resident system only. Update of the resident system can be done in the main system only.

Main and resident firmware must be from the same set.
Some modules are limited in downgrading due to their main board 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 are use and the feature set of the original are lost. After re-branding (e.g. from G1314B to G1314C), the original feature set is available again.

All these specific informations are 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.
- One analog output provides signals for integrators or data handling systems.
- 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 module

Figure 45  Rear view of multisampler - electrical connections and label
# Information on Instrument Serial Number

## Serial Number Information 1200 Series and 1290 Infinity

The serial number information on the instrument labels provide the following information:

<table>
<thead>
<tr>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCYWWSSSSSS</td>
<td>Country of manufacturing</td>
</tr>
<tr>
<td>CC</td>
<td>• DE = Germany</td>
</tr>
<tr>
<td></td>
<td>• JP = Japan</td>
</tr>
<tr>
<td></td>
<td>• CN = China</td>
</tr>
<tr>
<td>YWWW</td>
<td>Year and week of last major manufacturing change, e.g. 820 could be week 20 of 1998 or 2008</td>
</tr>
<tr>
<td>SSSSS</td>
<td>Real serial number</td>
</tr>
</tbody>
</table>

## Serial Number Information 1260/1290 Infinity

The serial number information on the instrument labels provide the following information:

<table>
<thead>
<tr>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCXZZ00000</td>
<td>Country of manufacturing</td>
</tr>
<tr>
<td>CC</td>
<td>• DE = Germany</td>
</tr>
<tr>
<td></td>
<td>• JP = Japan</td>
</tr>
<tr>
<td></td>
<td>• CN = China</td>
</tr>
<tr>
<td>X</td>
<td>Alphabetic character A-Z (used by manufacturing)</td>
</tr>
<tr>
<td>ZZ</td>
<td>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)</td>
</tr>
<tr>
<td>00000</td>
<td>Serial number</td>
</tr>
</tbody>
</table>
The Agilent InfinityLab LC Series modules provide the following interfaces:

### Table 18  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 Flexible Pump</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 Isocratic Pump</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>G7111A/B Quaternary Pump</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 Binary Pump</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 High Speed Pump</td>
<td>2</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>1</td>
<td>A</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 Vialsampler</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>G7167A/B Multisampler</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 VWD</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 DAD</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 DAD</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 FLD</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 RID</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 MWD</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>1</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td><strong>Fraction Collectors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G7159B FC</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>
## Interfaces

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

### Table 18  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>G7166A VFC</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>G7116A/B MCT</td>
<td>2</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Requires a HOST module via CAN</td>
</tr>
<tr>
<td>G7122A Degasser</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**
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 an 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 Flex Cube). These are hosted modules and require a Host module with firmware B.06.40 or later or with additional G1369C LAN Card.

NOTE

If an Agilent detector (DAD/MWD/FLD/VWD/RID) is in the system, the LAN should be connected to the DAD/MWD/FLD/VWD/RID (due to higher data load). If no Agilent detector is part of the system, the LAN interface should be installed in the pump or autosampler.

RS-232C (Serial)

The RS-232C connector is used to control the module from a computer through RS-232C connection, using the appropriate software. This connector can be configured with the configuration switch module at the rear of the module. Refer to Communication Settings for RS-232C.

NOTE

There is no configuration possible on main boards with on-board LAN. These are pre-configured for

- 19200 baud,
- 8 data bit with no parity and
- one start bit and one stop bit are always used (not selectable).
The RS-232C is designed as DCE (data communication equipment) with a 9-pin male SUB-D type connector. The pins are defined as:

**Table 19  RS-232C Connection Table**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Direction</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>In</td>
<td>DCD</td>
</tr>
<tr>
<td>2</td>
<td>In</td>
<td>RxD</td>
</tr>
<tr>
<td>3</td>
<td>Out</td>
<td>TxD</td>
</tr>
<tr>
<td>4</td>
<td>Out</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>In</td>
<td>DSR</td>
</tr>
<tr>
<td>7</td>
<td>Out</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>In</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>In</td>
<td>RI</td>
</tr>
</tbody>
</table>

**Figure 46  RS-232 Cable**

**Analog Signal Output**

The analog signal output can be distributed to a recording device. For details refer to the description of the module’s main board.
APG Remote

The APG Remote connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features as common shut down, prepare, and so on.

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

The subminiature D connector is used. The module provides one remote connector which is inputs/outputs (wired- or technique).

To provide maximum safety within a distributed analysis system, one line is dedicated to **SHUT DOWN** the system’s critical parts in case any module detects a serious problem. To detect whether all participating modules are switched on or properly powered, one line is defined to summarize the **POWER ON** state of all connected modules. Control of analysis is maintained by signal readiness **READY** for next analysis, followed by **START** of run and optional **STOP** of run triggered on the respective lines. In addition **PREPARE** and **START REQUEST** may be issued. The signal levels are defined as:

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

**NOTE**

All common TTL circuits operate with a 5 V power supply. A TTL signal is defined as "low" or L when between 0 V and 0.8 V and "high" or H when between 2.0 V and 5.0 V (with respect to the ground terminal).
Table 20  Remote Signal Distribution

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DGND</td>
<td>Digital ground</td>
</tr>
<tr>
<td>2</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>
<tr>
<td>3</td>
<td>START</td>
<td>(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.</td>
</tr>
<tr>
<td>4</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>5</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>6</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>7</td>
<td>READY</td>
<td>(H) System is ready for next analysis. Receiver is any sequence controller.</td>
</tr>
<tr>
<td>8</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>9</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>
</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 1200 Infinity II 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 47  Location of the ERI interface (example shows a G7114A/B VWD)
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 turn on/off the hosting module (assures that certain base functionality of the device can be detected by firmware).
- For digital circuits or similar.
- Provided 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.
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 48](Location of Configuration switch (example shows a G7114A/B VWD))
## Hardware Information

### Setting the 6-bit Configuration Switch

**Table 21  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><strong>COM</strong></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 Address</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>0</td>
</tr>
<tr>
<td>Use DHCP to request IP Address</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Test</strong></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>1</td>
<td></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>1</td>
<td></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.
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 which are subject to wear or stress. Ideally, the frequency at which components are exchanged should be based on the intensity of usage of the module and the analytical conditions, and not on a predefined time interval. The early maintenance feedback (EMF) feature monitors the usage 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.
This chapter provides information on connecting the detector to the Agilent ChemStation PC.
Setting up the module in a LAN environment

It is not recommended to connect a system via an autosampler. The detector is producing the most data in the stack, followed by the pump, and it is therefore highly recommended to use either of these modules for the LAN connection.
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This chapter provides addition information on safety, legal and web.
General Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer’s failure to comply with these requirements.

**WARNING**

Ensure the proper usage of the equipment.

The protection provided by the equipment may be impaired.

➔ The operator of this instrument is advised to use the equipment in a manner as specified in this manual.

**Safety Standards**

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

**General**

Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.
Before Applying Power

**WARNING** Wrong voltage range, frequency or cabling
Personal injury or damage to the instrument

➔ Verify that the voltage range and frequency of your power distribution matches to the power specification of the individual instrument.

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

➔ Make all connections to the unit before applying power.

---

**NOTE**

Note the instrument’s external markings described under “Symbols” on page 276.

---

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 Operate in an Explosive Atmosphere

**WARNING**
Presence of flammable gases or fumes
Explosion hazard

→ Do not operate the instrument in the presence of flammable gases or fumes.

Do Not Remove the Instrument Cover

**WARNING**
Instrument covers removed
Electrical shock

→ Do Not Remove the Instrument Cover

→ Only Agilent authorized personnel are allowed to remove instrument covers. Always disconnect the power cables and any external circuits before removing the instrument cover.

Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Sales and Service Office for service and repair to ensure that safety features are maintained.

In Case of Damage

**WARNING**
Damage to the module
Personal injury (for example electrical shock, intoxication)

→ Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.
Solvents

**WARNING**

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

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

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

➔ Do not use solvents with an auto-ignition temperature below 200 °C (392 °F). Do not use solvents with a boiling point below 56 °C (133 °F).

➔ Avoid high vapor concentrations. Always keep the temperature in the sample compartment at least 25 K below the boiling point of the solvent used.

➔ Do not operate the instrument in an explosive atmosphere.

➔ 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.
## General Safety Information

### Symbols

<table>
<thead>
<tr>
<th>Table 22</th>
<th>Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Symbol" /></td>
<td>The apparatus is marked with this symbol when the user should 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="Symbol" /></td>
<td>Indicates dangerous voltages.</td>
</tr>
<tr>
<td><img src="image" alt="Symbol" /></td>
<td>Indicates a protected ground terminal.</td>
</tr>
<tr>
<td><img src="image" alt="Symbol" /></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="Symbol" /></td>
<td>Cooling 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="Symbol" /></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="Symbol" /></td>
<td>Manufacturing date.</td>
</tr>
<tr>
<td><img src="image" alt="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="Symbol" /></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>
Magnetic field
Magnets produce a far-reaching, strong magnetic field. They could damage TVs and laptops, computer hard drives, credit and ATM cards, data storage media, mechanical watches, hearing aids and speakers. Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.

Indicates a pinching or crushing hazard

Indicates a piercing or cutting hazard.

Table 22  Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Magnet symbol]</td>
<td>Magnetic field</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.
Waste Electrical and Electronic Equipment Directive

Abstract


NOTE

This product complies with the WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category:

With reference to the equipment types in the WEEE Directive Annex I, this product is classed as a Monitoring and Control Instrumentation product.

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.
Refrigerant

The refrigerant HFC-134a is used only in the Agilent Infinity II Sample Cooler.

**Table 23  Physical properties of refrigerant HFC-134a**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular weight</td>
<td>102</td>
</tr>
<tr>
<td>Critical temperature</td>
<td>101.1 °C</td>
</tr>
<tr>
<td>Critical pressure</td>
<td>40.6 bar</td>
</tr>
<tr>
<td>Boiling point</td>
<td>-26.5 °C</td>
</tr>
</tbody>
</table>
Refrigerant

**WARNING**

Refrigerant HFC-134a is known as a safe refrigerant, however accidents can occur if it is handled incorrectly. For this reason, the following instructions must be observed:

➔ Avoid contact with liquid refrigerant HFC-134a. At atmospheric pressure HFC-134a evaporates at approximately -26 °C and causes frost bite.

➔ After skin contact, rinse the affected area with water.

➔ After eye contact, rinse the eye(s) with plenty of water for at least 15 minutes and consult a doctor.

➔ HFC-134a must not be allowed to escape in enclosed areas. Although HFC-134a is not toxic, there is a danger of suffocation as gaseous refrigerant is heavier than air.

➔ Please observe the following first aid instructions. After inhalation, move the affected person to fresh air, keep him warm and allow him to rest. If necessary, he should be supplied with oxygen. If he has stopped breathing or is breathing erratically, he should be given artificial respiration. In the case of cardiac arrest, carry out heart massage. Send for a doctor immediately.

➔ Moreover, it must be noted that HFC-134a must always be extracted from the system and collected. It must never be discharged into the atmosphere on environmental grounds (greenhouse effect).

---

**CAUTION**

General hazards and improper disposal

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

➔ The breakdown of the sample cooler unit must be carried out by specialist refrigeration company.

➔ All media must be disposed of in accordance with national and local regulations.

➔ Please contact your local Agilent Service Center in regard to safe environmental disposal of the appliance or check www.agilent.com for more info.
Radio Interference

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

Test and Measurement

If test and measurement equipment is operated with equipment unscreened cables and/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

Manufacturer’s Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive of 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB.

- Sound Pressure Lp < 70 dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/1991 (Type Test)
Solvent Information

Observe the following recommendations on the use of solvents.

- Brown glass ware can avoid growth of algae.
- Avoid the use of the following steel-corrosive solvents:
  - Solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on),
  - High concentrations of inorganic acids like sulfuric acid and nitric acid, especially at higher temperatures (if your chromatography method allows, replace by phosphoric acid or phosphate buffer which are less corrosive against stainless steel),
  - Halogenated solvents or mixtures which form radicals and/or acids, for example:
    \[ 2\text{CHCl}_3 + \text{O}_2 \rightarrow 2\text{COCl}_2 + 2\text{HCl} \]
    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, di-isopropyl ether) such ethers 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.
Agilent Technologies on Internet

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

http://www.agilent.com
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In This Book

This manual contains technical reference information about the Agilent 1260 Infinity II SFC Multisampler (G4767A).

The manual describes the following:

• Introduction
• Site requirements and specifications,
• Using the module,
• Preparing the module,
• Optimizing performance,
• Troubleshooting and diagnostics,
• Error information,
• Test functions,
• Maintenance,
• Parts,
• Hardware information,
• LAN configuration,
• Safety and related information.