Agilent 1260 Infinity High Performance Autosampler Clinical ed.

Instructions for Use

For In Vitro Diagnostic Use.

Agilent Technologies

Notices

Manual Part Number

K1367-90014 Rev. B

Edition

08/2018

Printed in Germany

Agilent Technologies
Hewlett-Packard-Strasse 8
76337 Waldbronn

IVD

For In Vitro Diagnostic Use.

Warranty

The material contained in this document is provided "as is," and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as "Commercial computer software" as defined in DFAR 252.227-7014 (June 1995), or as a "commercial item" as defined in FAR 2.101(a) or as "Restricted computer software" as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies' standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Safety Notices

CAUTION

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

WARNING

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

About This Guide

The instructions for use cover the Agilent 1260 Infinity High Performance Autosampler Clinical ed. (K1367E). They are relevant for the following variants of the Agilent 1260 Infinity High Performance Autosampler Clinical ed.:

Description	Variant
1260 HiP Autosampler 600 bar Clinical ed.	Sampler without Multidraw Option

The previous version has been fundamentally revised and contains the following changes:

- the chapters have been restructured
- not relevant content and products have been removed
- maintenance procedures have been removed

1 General Safety Information

This chapter provides information on safety.

2 Product Description

This chapter gives an introduction to the autosampler.

3 Site Requirements and Specifications

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

4 Using the Module

This chapter provides information on how to set up the autosampler for an analysis and explains the basic settings.

5 Troubleshooting and Diagnostics

This chapter gives an overview about the troubleshooting and instrument diagnostics and the different user interfaces.

6 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.

7 Maintenance

This chapter shows the maintenance procedures of the module.

8 Parts for Maintenance

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

9 Hardware Information

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

10 Appendix

This chapter provides addition information on legal and web.

Contents

1 General Safety Information

This chapter provides information on safety.

General Safety Information

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

WARNING

Personal injury or damage to the product

➔ Use your Agilent products only in the manner described in the Agilent instructions for use.

Device shall be used in compliance with GLP/GCP requirements!

Do not remove instrument covers. Before the instrument is switched on, all protective earth terminals, extension cords, auto-transformers, and devices connected to it must be connected to a protective earth via a ground socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in serious personal injury. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any intended operation.

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

Do not operate the instrument in an explosive environment. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Do not install substitute parts or make any unauthorized modification to the instrument.

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

Safety Symbols

Table 1 Safety Symbols

Symbol	Description
	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.
	Indicates a protected ground terminal.
	The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.
	Indicates Biohazard
	Manufacturer
	Date of manufacture
	Serial number
	For In Vitro Diagnostic Use / In Vitro Diagnostic Medical Device
	Catalog number / Model number

WARNING

A WARNING

alerts you to situations that could cause physical injury or death.

➔ Do not proceed beyond a warning until you have fully understood and met the indicated conditions.

CAUTION

A CAUTION

alerts you to situations that could cause loss of data, or damage of equipment.

➔ Do not proceed beyond a caution until you have fully understood and met the indicated conditions.

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.

Chemical and Biological Safety

To operate the instrument safely:

- Observe all cautionary information printed on the original reagent containers prior to their use.
- Because leaks, spills, or loss of sample may generate aerosols, observe proper safety precautions.
- Handle body fluids with care because they can transmit disease – further emphasize the need for aerosol protection.
- Always follow local state and federal biohazard handling regulation when disposing of bio hazardous waste material.
- Handle all infectious samples according to good laboratory procedures and methods to prevent spread of disease.
- Dispose of all waste solutions and products according to appropriate environmental health and safety guideline.

Warnings and Cautions

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 solvents 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.
- ➔ The volume of substances should be reduced to the minimum required for the analysis.
- ➔ Do not operate the instrument in an explosive atmosphere.

WARNING

Pathogenic or toxic samples

Handling and use of pathogenic or toxic samples and of genetically modified organisms holds risks for health and environment.

- ➔ Ensure that all necessary safety regulations, guidelines, precautions and practices are adhered to accordingly.
- ➔ Let your laboratory safety officer advise you about the level of containment required for your application and about proper decontamination or sterilization.

WARNING

Harmful chemical and biological substances

Residues of clinical samples may contain chemicals and biological substances that are dangerous and harmful to persons working on the instrument.

- ➔ The module and its' accessories must be decontaminated before requesting service by an Agilent Field Service Representative and prior to shipping the module to Agilent for service or replacement.

---

2 Product Description

This chapter gives an introduction to the autosampler.

Intended Use

The intended use of the Agilent 1260 Infinity High Performance Autosampler Clinical Edition (K1367E) is to hold or store samples in containers such as vials or microplates, draw a specified sample volume, and inject it into the HPLC system. The Autosampler (K1367E) will be used in combination with other Agilent medical device HPLC and MS products to separate and identify inorganic or organic compounds in human specimens.

Intended User

This product is designed for professional laboratory users.

Features

The 1260 Infinity High Performance Autosampler Clinical ed. features an increased pressure range (up to 600 bar) enabling the use of today's column technology (sub-two-micron narrow bore columns) with the Agilent 1260 Infinity Binary LC System Clinical ed. Increased robustness is achieved by optimized new parts, high speed with lowest carry-over by flow through design, increased sample injection speed for high sample throughput, increased productivity by using overlapped injection mode, and flexible and convenient sample handling with different types of sample containers, such as vials and well plates. Using 384-well plates allows you to process up to 768 samples unattended.

For specifications, see "Specifications" on page 30.

Overview of the Module

The Autosampler transport mechanism uses an X-Z-theta robot to optimize the positioning of the sampling arm on the well plate. Once the sampling arm is positioned over the programmed sample position, the programmed sample volume is drawn by the metering device into the sampling needle. The sampling arm then moves to the injection position where the sample is flushed onto the column.

The Autosampler employ a 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 vial/plate pusher employs a sensor to detect the presence of a plate and to ensure accurate movement regardless of plate used.

All axes of the transport mechanism (x-,z-,theta-robot) are driven by stepper-motors. Optical encoders ensure the correct operation of the movement.

The standard metering device provides injection volumes from 0.1 – 100 µL. The entire flow path including the metering device is always flushed by the mobile phase after injection for minimum internal carry-over.

An additional needle flush station with a peristaltic pump is installed to wash the outside of the needle. This reduces the 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 (only 5 ports are used) injection valve unit is driven by a high-speed hybrid stepper motor. During the sampling sequence, the valve unit bypasses the autosampler, and connects flow from the pump to the column directly. During injection and analysis, the valve unit directs the flow through the autosampler which ensures that the entire sample is injected onto the column, and that the metering unit and needle are always free from sample residue before the next sampling sequence begins.

Control of the vial/plate temperature in the thermostatted autosampler is achieved using an additional module; the Agilent 1290 Infinity Series thermostat (K1330B). The thermostat contains Peltier-controlled heat-exchangers. A fan draws air from the area above the sample vial tray of the autosampler. It is then blown through the fins of the cooling/heating module. There it is cooled or heated according the temperature setting. The thermostatted air enters the autosampler through a recess underneath the special designed sample tray. The air is then distributed evenly through the sample tray ensuring effective temperature control, regardless of how many vials are in the tray. In cooling mode condensation is generated on the cooled side of the Peltier elements. This condensed water is safely guided into a waste bottle for condensed water.

Autosampler Principle

The movements of the autosampler components during the sampling sequence are monitored continuously by the autosampler 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 autosampler by the injection valve during the sampling sequence. The needle moves 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 is then raised again and moved 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 injection valve switches to the bypass position.
2. The plunger of the metering device moves to the initialization position.
3. The needle lock moves up.
4. The needle moves to the desired sample vial (or well plate) position.
5. The needle lowers into the sample vial (or well plate).
6. The metering device draws the preset sample volume.
7. The needle lifts out of the sample vial (or well plate).
8. The needle is then moved onto the seat to close the sample loop.
9. The needle lock moves down.
10. The injection cycle is completed when the injection valve switches to the mainpass position.

If needle wash is required it will be done between step 7 and 8.

Injection Sequence

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 autosampler metering device, sample loop, and needle, ensuring all parts in contact with sample are flushed during the run, thus minimizing carry-over.

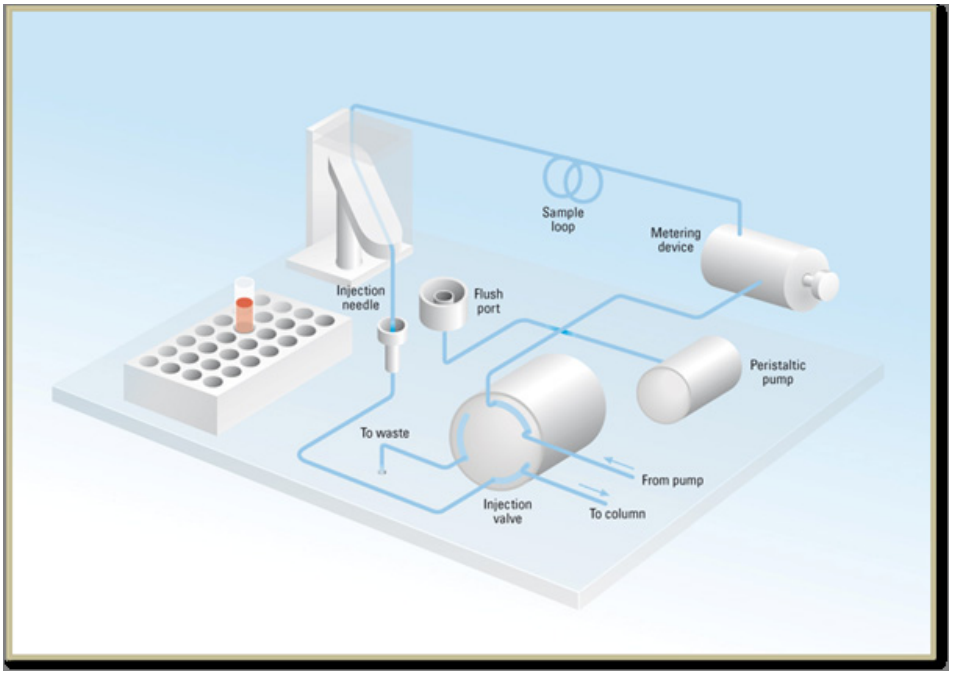


Figure 1 Mainpass Position

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.

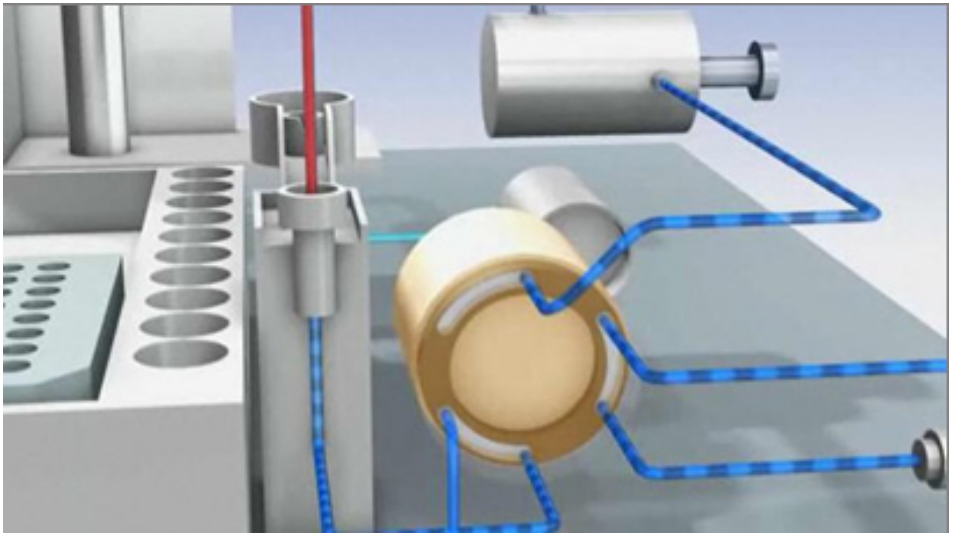


Figure 2 Bypass Position

The standard injection starts with *draw sample from vial*. In order to do this the needle moves 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 is then raised again and moved onto the seat to close the sample loop. In case of an injector program several steps are interspersed at this point.

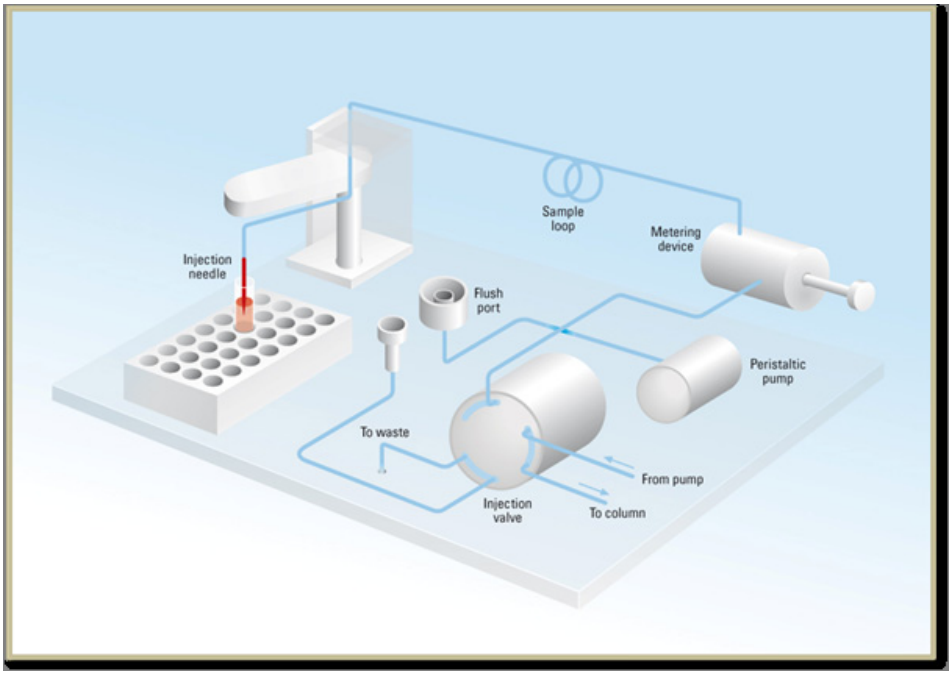


Figure 3 Drawing the Sample

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 on the sampling unit. As soon as the needle is on the flush port a peristaltic pump delivers some solvent during a defined time to clean the outside of the needle. At the end of this process the needle returns to the injection port.

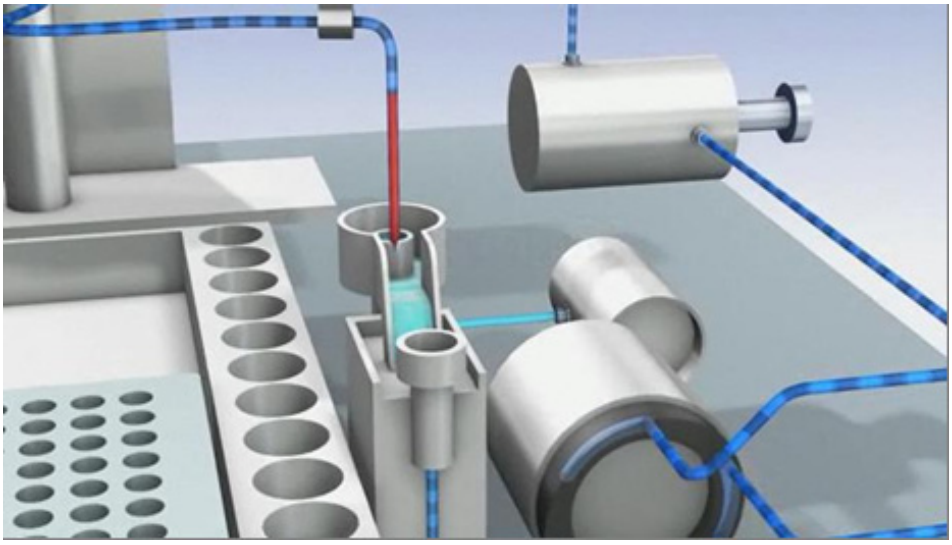


Figure 4 Flush the needle

Inject-and-Run The final step is the inject-and-run step. The six-port valve is switched to the main-pass 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.

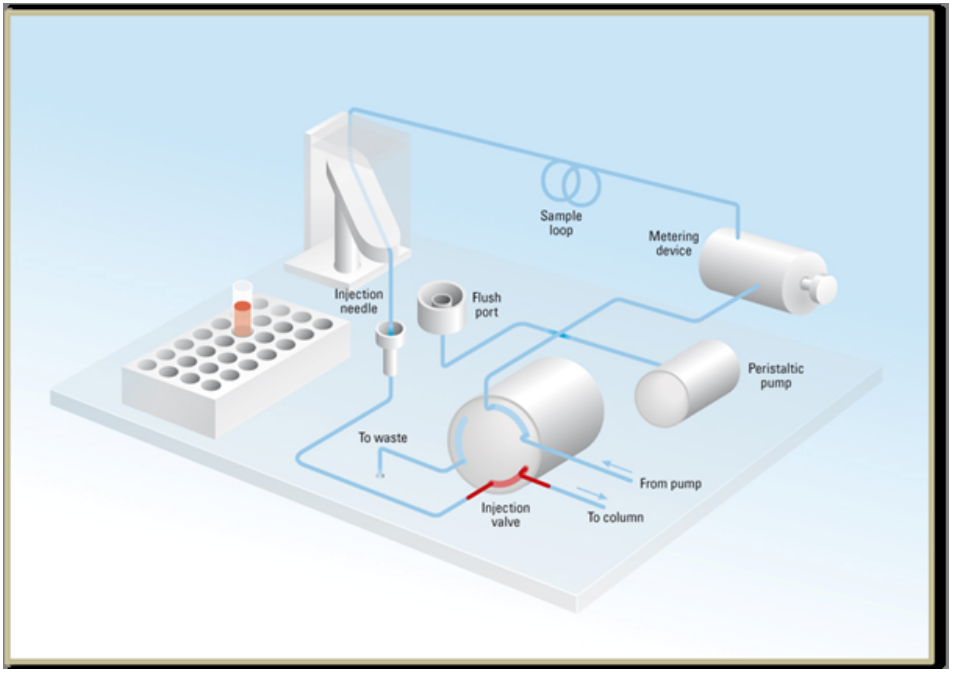


Figure 5 Inject and Run

3
Site Requirements and Specifications

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

Site Requirements

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

Power Consideration

The module power supply has wide ranging capabilities and accepts any line voltage in the range mentioned in "Physical Specifications" on page 29. 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

Inaccessible power plug.

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

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

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

Power Cords

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

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

WARNING

Unintended use of power cords

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

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

WARNING

Absence of ground connection

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

- ➔ Never operate your instrumentation from a power outlet that has no ground connection.

WARNING

Electrical shock hazard

Solvents may damage electrical cables.

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

Bench Space

The module dimensions and weight (see Table 2 on page 29) 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.

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 2 Physical Specifications

Type	Specification	Comments
Weight	15.5 kg (35 lbs)	
Dimensions (height × width × depth)	200 x 345 x 440 mm (8 x 13.5 x 17 inches)	
Line voltage	100 – 240 V~, ± 10 %	Wide-ranging capability
Line frequency	50 or 60 Hz, ± 5 %	
Power consumption	200 VA / 200 W / 683 BTU	Maximum
Ambient operating temperature	4–55 °C (39–131 °F)	
Ambient non-operating temperature	-40 – 70 °C (-40 – 158 °F)	
Humidity	< 95 % r.h. at 40 °C (104 °F)	Non-condensing
Operating altitude	Up to 2000 m (6562 ft)	
Non-operating altitude	Up to 4600 m (15092 ft)	For storing the module
Safety standards: IEC, CSA, UL	Installation category II, Pollution degree 2	For indoor use only.

Specifications

Table 3 Performance Specifications K1367E

Type	Specification	Comment
Injection range	0.1 – 100 µL in 0.1 µL increments. Up to 40 µL with reduced injection volume kit (hardware modification required). Up to 1500 µL with multiple draw (hardware modification required).	
Precision	<0.25 % from 5 – 40 µL <0.5 % from 2 – 5 µL <0.7 % from 1 – 2 µL <1.5 % from 0.5 – 1 µL	
Injection Accuracy	1 % (10 µL, n=10)	
Pressure range	Up to 600 bar (8700 psi)	
Sample viscosity range	0.2 – 5 cp	
Sample capacity	Capacity 2 x well plates (MTP) + 10 x 2 ml vials, 108 x 2 ml vials in 2 x 54 vial plate plus 10 additional 2 ml vials, 30 x 6 ml vials in 2 x 15 vial plate, 100 Micro vial tray, plus 10 additional 2 ml vials, 54 Eppendorf tubes (0.5/1.5/2 ml) in 2 x 27 Eppendorf tube plate.	
Injection cycle time	Typically <21 s using default conditions and injection volume of 5 µL	
Carry Over	Typically <0.004 %	
Communications	Controller-area network (CAN), RS-232C, APG Remote: ready, start, stop and shut-down signals, optional four external contact closures and BCD vial number out.	

Table 3 Performance Specifications K1367E

Type	Specification	Comment
Safety and maintenance	Safety-related features are leak detection, safe leak handling, leak output signal for shutdown of pumping system, and low voltages in major maintenance areas.	
GLP features	Early maintenance feedback (EMF) for continuous tracking of instrument usage with user-settable limits and feedback messages. Electronic records of maintenance and errors.	
Housing	All materials recyclable.	
Metering device	Metering pump in high pressure flow path	

4
Using the Module

This chapter provides information on how to set up the autosampler for an analysis and explains the basic settings.

Preparing the Autosampler

For best performance of the autosampler

- When using the 1260 Infinity High Performance Autosampler Clinical ed. (K1367E) in a system with an Agilent 1260 Infinity High Performance Degasser Clinical ed. (K4225A), shortly degas your samples before using them in the autosampler.
- Filter samples before use.
- When using buffer solutions, flush the module with water before switching it off.
- Check the autosampler pistons for scratches, grooves and dents when changing the piston seal. Damaged pistons cause micro leaks and will decrease the lifetime of the seal.
- Solvent Information - Observe recommendations on the use of solvents.
  - Always filter solvents through 0.4 µm filters. Small particles can permanently block the capillaries and valves. 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 and nitric acid, especially at higher temperatures (replace, if your chromatography method allows, by phosphoric acid or phosphate buffer which are less corrosive to stainless steel).
    - Halogenated solvents or mixtures which form radicals and/or acids, for example:

      $2CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$

      This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removed 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.
    - Solvents containing strong complexing agents (e.g. EDTA).
    - Mixtures of carbon tetrachloride with 2-propanol or THF dissolve stainless steel.

- 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 4 Choice of Priming Solvents for Different Purposes

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

Settings

Do not change the plate orientation settings in the software (see Figure 6 on page 36 and Figure 7 on page 36) and ensure correct orientation when introducing the plates.

If the option **Back to front orientation** is activated/deactivated and this does not match the expected configuration, there is the risk that samples are confused and the wrong results are reported for the samples.

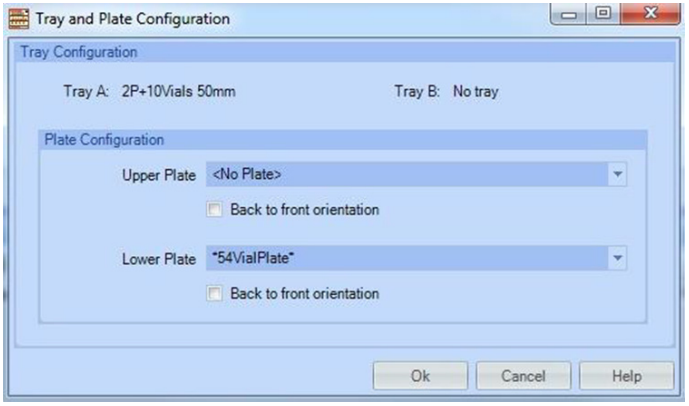


Figure 6 Tray and Plate Configuratin - **Back to front orientation** unchecked

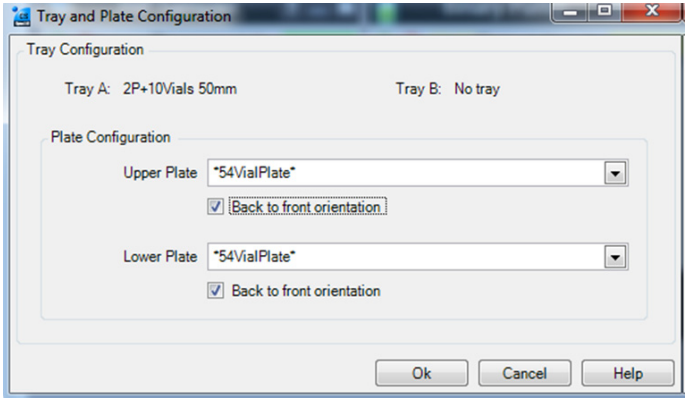


Figure 7 Tray and Plate Configuratin - **Back to front orientation** checked

5 Troubleshooting and Diagnostics

This chapter gives an overview about the troubleshooting and instrument diagnostics and the different user interfaces.

Overview of the Module's Indicators and Test Functions

Status Indicators

The module is provided with two status indicators which indicate the operational state of the module. The status indicators provide a quick visual check of the operation of the module.

Error Messages

In the event of an electronic, mechanical or hydraulic failure, the module generates an error message in the user interface. For each message, a short description of the failure, a list of probable causes of the problem, and a list of suggested actions to fix the problem are provided (see chapter Error Information).

Test Functions

A series of test functions are available for troubleshooting and operational verification after exchanging internal components (see Tests and Calibrations).

Status Indicators

Two status indicators are located on the front of the module. The lower left indicates the power supply status, the upper right indicates the module status.

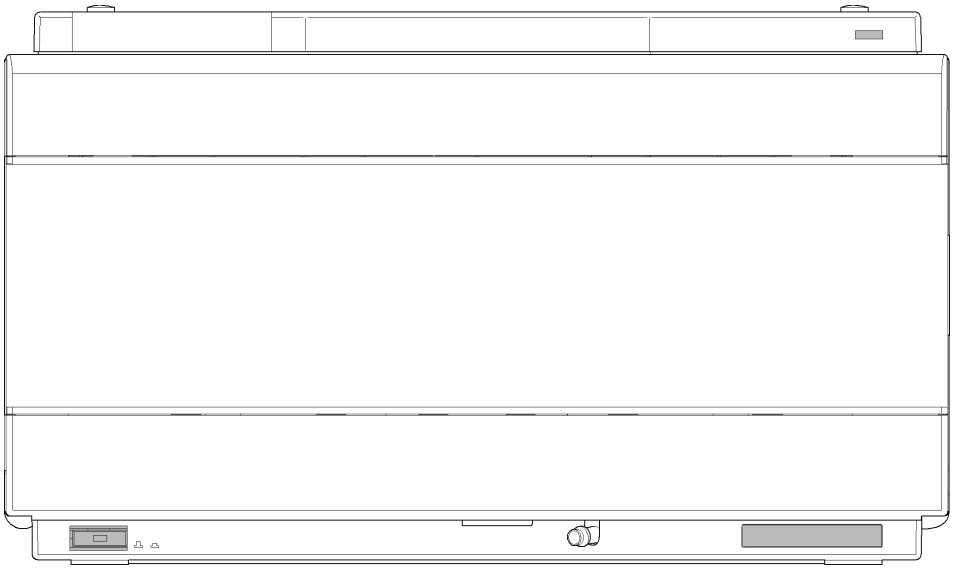


Figure 8 Location of Status Indicators

Power Supply Indicator

The power supply indicator is integrated into the main power switch. When the indicator is illuminated (*green*) the power is *ON*.

Module Status Indicator

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

- When the status indicator is *OFF* (and power switch light is on), the module is in a *prerun* condition, and is ready to begin an analysis.
- A *green* status indicator, indicates the module is performing an analysis (*run* mode).
- A *yellow* indicator indicates a *not-ready* condition. The module is in a not-ready state when it is waiting for a specific condition to be reached or completed (for example, immediately after changing a set point), or while a self-test procedure is running.
- An *error* condition is indicated when the status indicator is *red*. An error condition indicates the module has detected an internal problem which affects correct operation of the module. Usually, an error condition requires attention (e.g. leak, defective internal components). An error condition always interrupts the analysis.

  If the error occurs during analysis, it is propagated within the LC system, i.e. a red LED may indicate a problem of a different module. Use the status display of your user interface for finding the root cause/module of the error.
- A *blinking* indicator indicates that the module is in resident mode (e.g. during update of main firmware).
- A *fast blinking* indicator indicates that the module is in a low-level error mode. In such a case try to re-boot the module or try a cold-start.

6 Error Information

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

What are Error Messages

Error messages are displayed in the user interface when an electronic, mechanical, or hydraulic (flow path) failure occurs which requires attention before the analysis can be continued. 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.

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).

NOTE To contact your Agilent service representative in case of errors see "Agilent Technologies on Internet" on page 99.

General Error Messages

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

Timeout

Error ID: 0062

The timeout threshold was exceeded.

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

Shutdown

Error ID: 0063

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

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

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

Remote Timeout

Error ID: 0070

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

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

Lost CAN Partner

Error ID: 0071

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

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

Probable cause	Suggested actions
1 CAN cable disconnected.	• Ensure all the CAN cables are connected correctly. • Ensure all CAN cables are installed correctly.
2 Defective CAN cable.	Exchange the CAN cable.
3 Defective main board in another module.	Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.

Leak

Error ID: 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	Suggested actions
1 Loose fittings.	Ensure all fittings are tight.
2 Broken capillary.	Exchange defective capillaries.

Leak Sensor Open

Error ID: 0083

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

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

Probable cause	Suggested actions
1 Leak sensor not connected to the main board.	Please contact your Agilent service representative.
2 Defective leak sensor.	Please contact your Agilent service representative.
3 Leak sensor incorrectly routed, being pinched by a metal component.	Please contact your Agilent service representative.

Leak Sensor Short

Error ID: 0082

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

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

Probable cause	Suggested actions
1 Defective leak sensor.	Please contact your Agilent service representative.
2 Leak sensor incorrectly routed, being pinched by a metal component.	Please contact your Agilent service representative.

Compensation Sensor Open

Error ID: 0081

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

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

Probable cause	Suggested actions
1 Defective main board.	Please contact your Agilent service representative.

Compensation Sensor Short

Error ID: 0080

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

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

Probable cause	Suggested actions
1 Defective main board.	Please contact your Agilent service representative.

Fan Failed

Error ID: 0068

The cooling fan in the module 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.

Depending on the module, assemblies are turned off to assure that the module does not overheat inside.

Probable cause	Suggested actions
1 Fan cable disconnected.	Please contact your Agilent service representative.
2 Defective fan.	Please contact your Agilent service representative.
3 Defective main board.	Please contact your Agilent service representative.

Module Error Messages

These errors are autosampler specific.

Exhaust Fan Failed

Error ID: 4456, 4457

The exhaust fan in the module 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 value the error message is generated and the module shuts down.

Probable cause	Suggested actions
1 Fan cable disconnected.	Please contact your Agilent service representative.
2 Defective fan.	Please contact your Agilent service representative.
3 Defective main board.	Please contact your Agilent service representative.

Front Door Error

Error ID: 4350, 4352, 4458

The front door and/or the SLS board are damaged.

Probable cause	Suggested actions
1 The sensor on the SLS board is defective.	Please contact your Agilent service representative.
2 The door is bent or the magnet is misplaced/broken.	Please contact your Agilent service representative.

Side Door Error

Error ID: 4355, 4459

The side door and/or the main board are damaged.

Probable cause	Suggested actions
1 The door is bent or the magnet is misplaced/broken.	Please contact your Agilent service representative.
2 The sensor on the main board is defective.	Please contact your Agilent service representative.

Arm Movement Failed or Arm Movement Timeout

Error ID: 4002

The transport assembly was unable to complete a movement in one of the axes.

The processor defines a certain time window for the successful completion of a movement in any particular axis. The movement and position of the transport assembly is monitored by the encoders on the stepper motors. If the processor does not receive the correct position information from the encoders within the time window, the error message is generated.

Axes identification:

- Arm Movement 0 Failed: X-axis.
- Arm Movement 1 Failed: Z-axis.
- Arm Movement 2 Failed: Theta (needle carrier rotation).

Probable cause	Suggested actions
1 Mechanical obstruction.	Ensure unobstructed movement of the transport assembly.
2 High friction in the transport assembly.	Please contact your Agilent service representative.
3 Defective motor assembly.	Please contact your Agilent service representative.
4 Defective sample transport assembly flex board.	Please contact your Agilent service representative.
5 Defective main board.	Please contact your Agilent service representative.

Valve to Bypass Failed

Error ID: 4014, 4701

The injection valve failed to switch to the bypass position.

The switching of the injection valve is monitored by two microswitches on the valve assembly. The switches detect the successful completion of the valve movement. If the valve fails to reach the bypass position, or if the microswitch does not close, the error message is generated.

Probable cause	Suggested actions
1 Valve in an intermediate position between the bypass and mainpass positions.	Turn the Autosampler main power OFF and ON.
2 Defective injection valve.	Please contact your Agilent service representative.
3 Defective main board.	Please contact your Agilent service representative.

Valve to Mainpass Failed

Error ID: 4015

The injection valve failed to switch to the mainpass position.

The switching of the injection valve is monitored by two microswitches on the valve assembly. The switches detect the successful completion of the valve movement. If the valve fails to reach the mainpass position, or if the microswitch does not close, the error message is generated.

Probable cause	Suggested actions
1 Valve in an intermediate position between the bypass and mainpass positions.	Turn the Autosampler main power OFF and ON.
2 Defective injection valve.	Please contact your Agilent service representative.
3 Defective main board.	Please contact your Agilent service representative.

Needle Lock Failed

Error ID: 4702, 4703

The lock assembly on the sampling unit failed to move successfully.

The upper and lower positions of the needle lock are monitored by position sensors on the sampling unit flex board. The sensors detect the successful completion of the needle lock movement. If the needle lock fails to reach the end point, or if the sensors fail to recognize the needle lock movement, the error message is generated.

Probable cause	Suggested actions
1 Defective or dirty position sensor.	Clean the position sensor.
2 Sticking spindle assembly.	Please contact your Agilent service representative.
3 Defective needle drive motor	Please contact your Agilent service representative.
4 Defective main board.	Please contact your Agilent service representative.

Needle to Needle Seat Position

Error ID: 4510, 4511, 4714

The needle failed to reach the end position in the needle seat.

The position of the needle is monitored by a position encoder on the needle carrier. If the needle fails to reach the end point, or if the encoder fails to recognize the needle carrier movement, the error message is generated.

Probable cause		Suggested actions
1	Bad sample transport/sampling unit alignment	Do an auto-alignment
2	Bent needle.	Check and exchange the needle assembly if necessary.
3	Missing needle.	Exchange the needle carrier assembly.
4	Blocked seat.	Clean or change the needle seat assembly if necessary.
5	Defective position sensor in the needle carrier assembly.	Please contact your Agilent service representative.
6	Defective main board.	Please contact your Agilent service representative.

Needle Carrier Failed

The needle carrier on the Sample Transport Assembly failed to move correctly.

Probable cause		Suggested actions
1	Defective Z-motor.	Please contact your Agilent service representative.
2	Vial pusher blocked.	Please contact your Agilent service representative.
3	Bad needle carrier positioning in X or Theta.	Please contact your Agilent service representative.
4	Defective vial pusher sensor.	Please contact your Agilent service representative.
5	Defective main board.	Please contact your Agilent service representative.

Missing Vial or Missing Wash Vial

Error ID: 4019, 4034, 4035, 4541, 4542, 4706, 4707

No vial was found in the position defined in the method or sequence.

When the needle carrier moves to a vial and the needle goes into the vial, the position of the needle is monitored by an encoder behind the vial pusher. If no vial is present, the encoder detects an error and the message “missing vial” is generated.

	Probable cause	Suggested actions
1	No vial in the position defined in the method or sequence.	Install the sample vial in the correct position, or edit the method or sequence accordingly.
2	Defective needle carrier assembly.	Please contact your Agilent service representative.
3	Defective transport assembly flex board.	Please contact your Agilent service representative.
4	Defective main board.	Please contact your Agilent service representative.

Initialization Failed

Error ID: 4020

The autosampler failed to complete initialization correctly.

The autosampler initialization procedure moves the needle arm and transport assembly to their home positions in a predefined routine. During initialization, the processor monitors the position sensors and motor encoders to check for correct movement. If one or more of the movements is not successful, or is not detected, the error message is generated.

Probable cause	Suggested actions
1 Side door not installed correctly.	• Check if the side door is installed correctly. • Check if the magnet is in place in the side door.
2 Sample transport/sampling unit not aligned correctly.	Do an auto-alignment
3 Mechanical obstruction.	Ensure unobstructed movement of the transport assembly.
4 Defective sampling unit flex board.	Please contact your Agilent service representative.
5 Defective transport assembly flex board.	Please contact your Agilent service representative.
6 Defective sampling unit motor.	Please contact your Agilent service representative.
7 Defective main board.	Please contact your Agilent service representative.

Metering Home Failed

Error ID: 4054, 4704

The metering piston has failed to move back to the home position.

The home position sensor on the sampling unit flex board monitors the home position of the piston. If the piston fails to move to the home position, or if the sensor fails to recognize the piston position, the error message is generated.

Probable cause	Suggested actions
1 Defective sensor or main board.	Please contact your Agilent service representative.
2 Broken plunger.	Exchange the metering plunger and seal.
3 Defective metering-drive motor.	Please contact your Agilent service representative.
4 Defective main board.	Please contact your Agilent service representative.

Motor Temperature

Error ID: 4027, 4040, 4261, 4451

One of the motors of the transport assembly has drawn excessive current, causing the motor to become too hot. The processor has switched off the motor to prevent damage to the motor.

Motor identification:

- Motor 0 temperature: X-axis motor.
- Motor 1 temperature: Z-axis motor.
- Motor 2 temperature: Theta motor.

The processor monitors the current drawn by each motor and the time the motor is drawing current. The current drawn by the motors is dependent on the load on each motor (friction, mass of components etc.). If the current drawn is too high, or the time the motor draws current is too long, the error message is generated.

Probable cause	Suggested actions
1 Mechanical obstruction.	Ensure unobstructed movement of the transport assembly.
2 High friction in the transport assembly.	Please contact your Agilent service representative.
3 Motor belt tension too high.	Switch off the module at the power switch. Wait at least 10 minutes before switching on again.
4 Defective motor.	Please contact your Agilent service representative.
5 Defective transport assembly flex board.	Please contact your Agilent service representative.

Invalid Vial Position

Error ID: 4042

The vial position defined in the method or sequence does not exist.

The reflection sensors on the transport assembly flex board are used to automatically check which sample trays are installed (coding on tray). If the vial position does not exist in the current sample tray configuration, the error message is generated.

Probable cause	Suggested actions
1 Incorrect tray installed.	Install the correct trays, or edit the method or sequence accordingly.
2 Incorrect tray definition.	Install the correct trays, or edit the method or sequence accordingly.
3 Incorrect vial positions defined in the method or sequence.	Install the correct trays, or edit the method or sequence accordingly.
4 Tray recognition defective (dirty sample tray or defective transport assembly flex board).	• Ensure the coding surfaces of the sample tray are clean (located at the rear of the sample tray). • Please contact your Agilent service representative.

Peristaltic Pump Error

Error ID: 4514

The peristaltic pump motor in the autosampler has failed.

The current on the motor is used by the MTP board to monitor the speed of the peristaltic pump motor. If the current falls below a certain value, the error message is generated.

Probable cause	Suggested actions
1 Defective motor.	Please contact your Agilent service representative.
2 Defective SUD board.	Please contact your Agilent service representative.
3 Defective main board.	Please contact your Agilent service representative.

Vessel or Wash Vessel Error

Error ID: 4540, 4544, 4545, 4705, 4712

The needle does not reach the target position in the vial or in the vessel of the well plate.

The sensor behind the vial pusher in the needle carrier assembly detects the successful completion of the needle movement to the vessel. If the needle fails to reach the end point, the sensor fails to recognize the needle movement and the error message is generated.

Probable cause	Suggested actions
1 Bad vessel definition in the plate configuration.	Check the vessel definition in the plate configuration.
2 Closing mat to rigid/thick.	Check that the closing mat is not too thick.
3 Bad X or Theta positioning.	Please contact your Agilent service representative.
4 Defective encoder on the needle carrier assembly.	Please contact your Agilent service representative.

Vessel Stuck to Needle

Error ID: 4453

The vessel sticks to the needle when the needle moves up.

Probable cause	Suggested actions
1 Closing mat to rigid/thick.	Check that the closing mat is not too thick.
2 Bad X or Theta positioning and the needle sticks into the wall between two holes.	Please contact your Agilent service representative.
3 Defective encoder on the needle carrier assembly.	Please contact your Agilent service representative.

Rear Blind Seat Missing

Error ID: 4724

Rear blind seat is missing although claimed to exist by main board information – occurs during initialization or if the blind seat location has to be used.

Probable cause	Suggested actions
1 Blind seat is missing.	Install blind seat.

7 Maintenance

This chapter shows the maintenance procedures of the module.

Cleaning the module

To keep the module case clean, use a soft cloth slightly dampened with water, or a solution of water and mild detergent.

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.

Maintenance Procedures

To perform the procedures please contact your service representative.

NOTE For tecnical support please contact Agilent (see "Agilent Technologies on Internet" on page 99).

Table 5 Maintenance Procedures

Procedure	Typical Frequency	Notes
Change needle/needle seat	60.000 needle into seat Or when seat is visibly damaged, blocked or leaks.	Please contact your service representative!
Change metering seal	30.000 injections Or when poor injection volume reproducibility or when metering device / analytical head is leaking.	Please contact your service representative!
Replacing peristaltic pump cartridge	3000 hours on-time Or when tubing blocked or broken.	Please contact your service representative!
Change rotor seal	30.000 injections Or when poor injection volume reproducibility or when injection valve is leaking.	Please contact your service representative!
Change the needle assembly	When the limit in the needle into seat counter in the EMF is exceeded or when needle shows indications of damage, blockage or leaks.	Please contact your service representative!

Table 5 Maintenance Procedures

Procedure	Typical Frequency	Notes
Installing the Interface Board	At installation or when defective.	Please contact your service representative!
Replacing the Module Firmware	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.	Please contact your service representative!

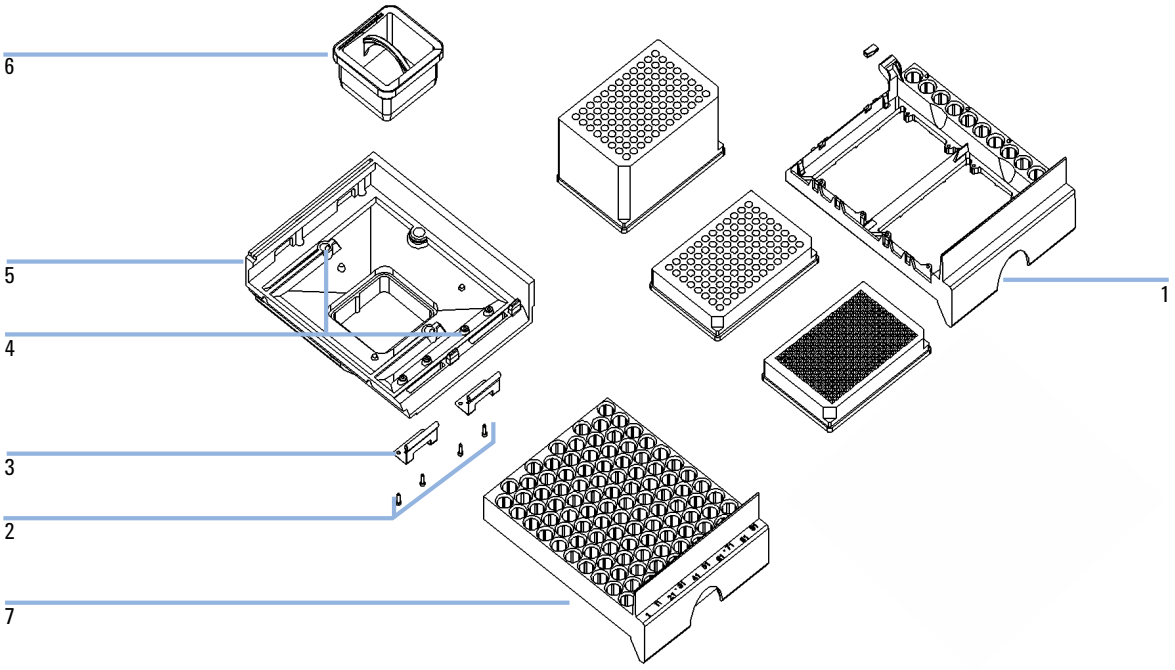
8
Parts for Maintenance

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

Overview of Maintenance Parts

Item	p/n	Description
1	0101-1416	Injection valve rotor seal
2	5063-6589	Metering seal (pack of 2) for 100 µL analytical head
3	G4226-87201	Needle assembly
4	G1367-87012	Needle seat
5	5067-4710	100 µL Flex Loop Kit
6	G1367-60003	Analytical head assembly (100 µL)

Vial Trays



Item	p/n	Description
1	G2258-60011	Tray for 2 plates + 10 x 2 mL vials
2	0515-0866	Screws for springs
3	G1313-09101	Spring
4	0570-1574	Spring stud
5	G4226-60000	Tray Support
6	G1329-43200	Adapter air channel
	G1367-47200	Plug channel
7	G4226-60021	Tray for 100 micro vials

Recommended Plates and Closing Mats

Table 6 Recommended plates and closing mat

Description (Part Number)	Rows	Columns	Plate height	Volume (µL)	Package
384Agilent (5042-1388)	16	24	14.4	80	30
96 well plate 0.5 ml, PP (pack of 10) (5042-1386) 96 well plate 0.5 ml, PP (pack of 120) (5042-1385)	8	12	14.3	500	10 120
96Agilent conical (5042-8502)	8	12	17.3	150	25
96CappedAgilent (5065-4402)	8	12	47.1	300	1
96DeepAgilent31mm (5042-6454)	8	12	31.5	1000	50
Closing mat for all 96 Agilent plates (5042-1389)	8	12			50

NOTE Using vessels higher than 41 mm, will result in needle not being able to reach bottom of vessel.

Recommended Vial Plates

p/n	Description
G2255-68700	Vial plate for 54 x 2 mL vials (6/pk)
5022-6539	Vial plate for 15 x 6 mL vials (1/pk)
5022-6538	Vial plate for 27 Eppendorf tubes (1/pk)

Kits

Accessory Kit

p/n	Description
G1367-68755	Accessory kit
5181-1519	CAN cable, Agilent module to module, 1 m
G1367-87304	Capillary ST 0.17 mm x 250 mm S/S
01090-87306	SS Capillary 380 mmx 0.17 mm
G1329-43200	Adapter air channel
5063-6527	Tubing assembly, i.d. 6 mm, o.d. 9 mm, 1.2 m (to waste)

Injection Ugrade Kit

1260 HiP Autosampler option for rapid resolution liquid chromatography (RRLC) configuration.

The kit includes 40 µL analytical head and flex-loop kit.

p/n	Description
G4215A	40 µL injection upgrade kit
5067-4703	40 µL Flex loop kit
G4226-60013	40 µL analytical head

Analytical Head Assembly

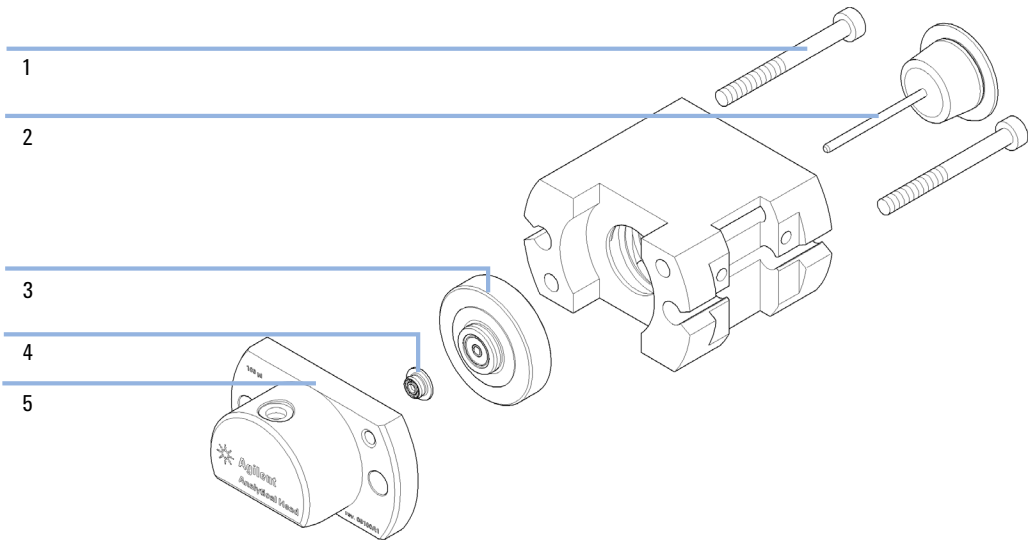
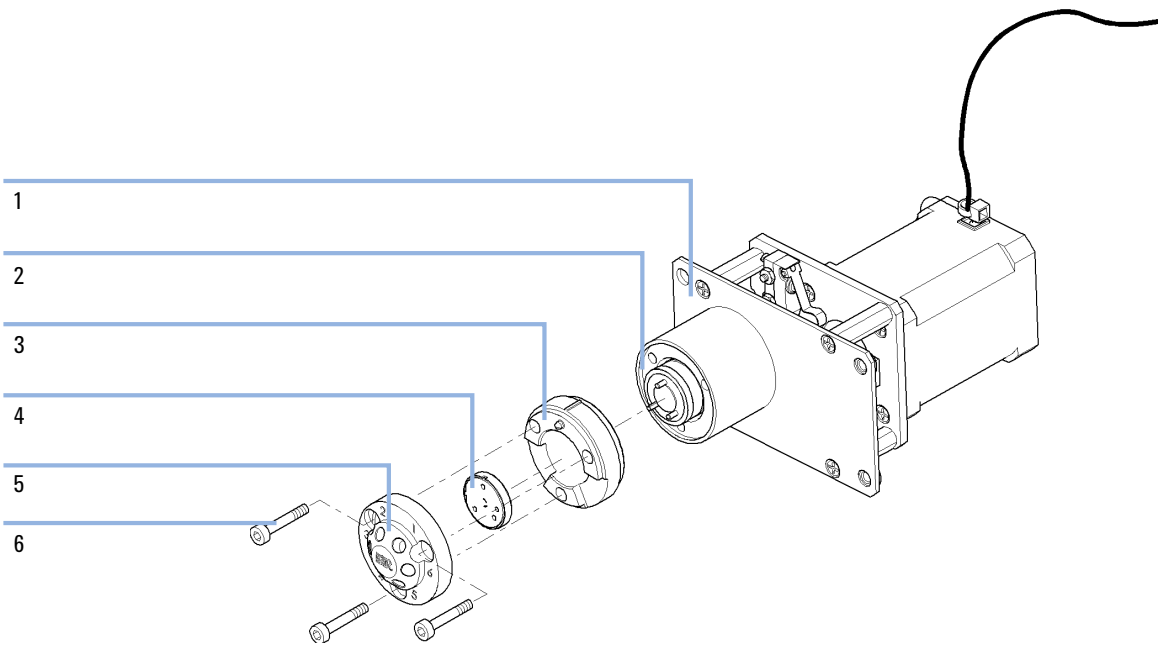


Figure 9 Analytical Head Assembly

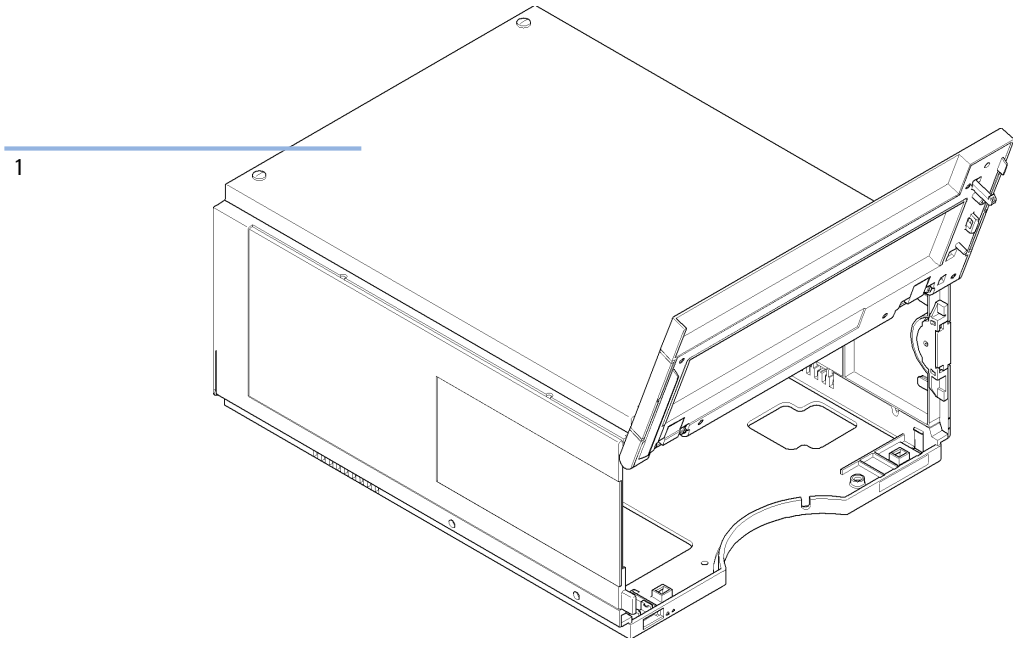
Item	p/n	Description
	G1367-60003	Analytical head assembly (100 µL)
1	0515-0850	Screws
2	5063-6586	Sapphire piston
3	5001-3739	Support Seal assembly
4	5063-6589	Metering seal (pack of 2) for 100 µL analytical head
5	01078-27710	Head body
6	G4226-60301	Metering capillary SST Cap. 0.17 mm i.d. 160 mm pre-swaged (not shown)

Injection Valve Assembly



Item	p/n	Description
1	0101-1422	Injection valve
2	1535-4045	Isolation seal
3	5068-0118	Stator ring
4	0101-1416	Rotor seal (PEEK)
5	0101-1417	Stator head
6	5068-0018	Stator screws

Cover Parts



Item	p/n	Description
1	5067-6848	Cabinet kit (base, sides and top)
	5043-0207	Name plate 1260
	G4226-67001	Door repair kit, includes the front door

Leak System Parts

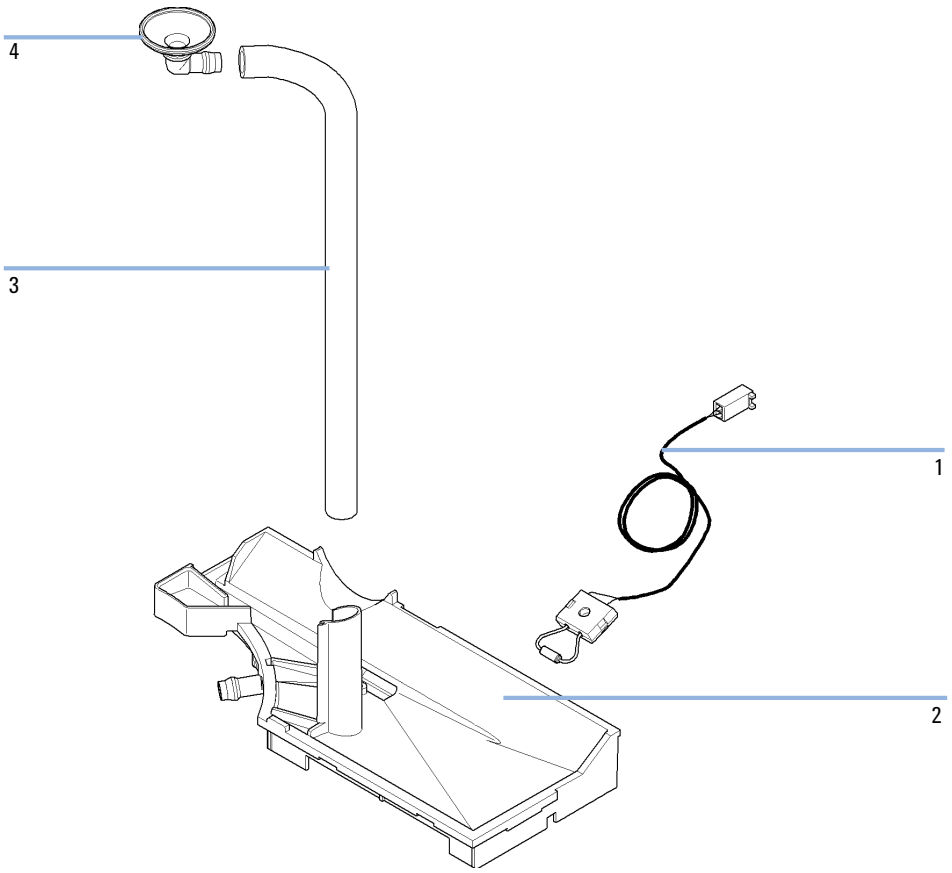


Figure 10 Leak system parts

Item	p/n	Description
1	5061-3356	Leak sensor
2	G4226-44511	Leak plane
3	0890-1711	Leak tubing 185 mm
4	5041-8388	Leak funnel

9 Hardware Information

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

Firmware Description

The firmware of the instrument consists of two independent sections:

- a non-instrument specific section, called *resident system*
- an instrument specific section, called *main system*

Resident System

Properties of the resident system 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 tool (latest version should be used):

- Firmware Update Tool with local files on the hard 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, 1312 for the K1312B Pump,

R the firmware revision, for example, A for K1312B,

VVV is the revision number, for example 650 is revision 6.50,

XXX is the build number of the firmware.

For instructions on firmware updates refer to section *Replacing Firmware* in chapter *"Maintenance"* or use the documentation provided with the *Firmware Update Tools*.

NOTE

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

Main and resident firmware must be from the same set.

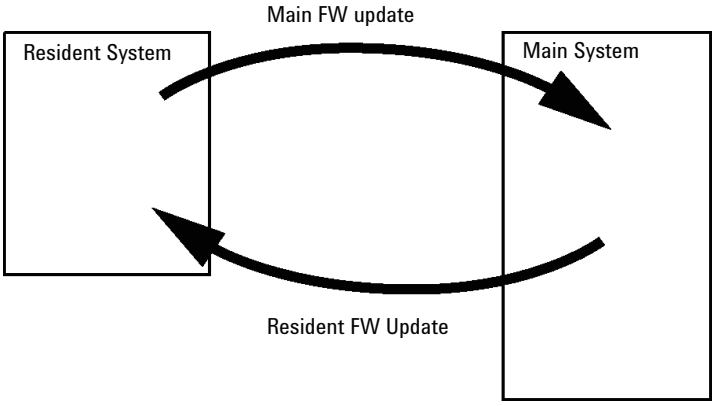


Figure 11 Firmware Update Mechanism

NOTE Specific information is described in the documentation provided with the firmware update tools.

The firmware update tools, firmware and documentation are available from the Agilent web.

- http://www.agilent.com/en-us/firmwareDownload?whid=69761

Boot-up and Initialization Process

CAUTION

Obstruction of transport unit

Any obstruction of the transport unit during the initialization process will result in a wrong transmission ratio and thus wrong needle positions.

➔ Make sure no vials or other material gets into the X-slide.

1 Firmware Boot Process.
   a Start Boot Loader.
   b Boot main firmware.

      OR

      Boot resident firmware (if set in VRAM, by DIP switch or if no/wrong main FW is found).
2 Initialize Transport Unit.
   a Switch injection valve to bypass position.
   b Find initial positions for X,Z and theta motors.
   c Check belt tension of theta motor.
   d Determine transmission ratio for X and theta axes.
      - Turn needle carrier fully counter-clockwise (= theta min).
      - Move X-slide into left end-stop (= X min).
      - Move X-slide into right end-stop (= X max).
      - Rotate needle carrier fully clockwise (= theta max, happens at the same time as step iii.).
3 Read RFID tag of Sampling Unit.
4 Read RFID tag of sample tray (if tray is different from last time).
5 Move needle into needle seat to determine the seat depth.
6 Move needle into seat (use depth value from step 5).
7 Lower the needle lock.
8 Switch the injection valve to mainpass.

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 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 shut down, prepare, and so on.
- With the appropriate software, the RS-232C connector may be used to control the module from a computer through a RS-232C connection. This connector is activated and can be configured with the configuration switch.
- 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

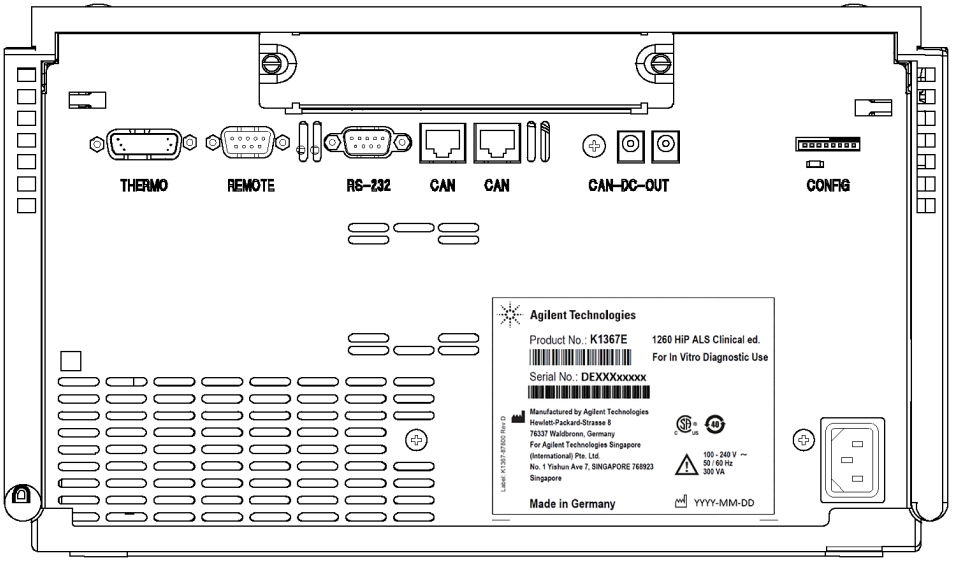


Figure 12 Rear view of the module

Interfaces

Table 7 Module Interfaces

Module	CAN	LAN/BCD (optional)	LAN (on-board)	RS-232	Analog	APG Remote	Special
K1367E HiP ALS Clinical Ed.	2	Yes	No	Yes	No	Yes	

- CAN connectors as interface to other modules
- LAN connector as interface to the control software
- RS-232C as interface to a computer
- REMOTE connector as interface to other Agilent products
- Analog output connector(s) for signal output

Overview Interfaces

CAN

The CAN is inter-module communication interface. It is a 2-wire serial bus system supporting high speed data communication and real-time requirement.

LAN

The modules have either an interface slot for an LAN card or they have an onboard LAN interface. This interface allows the control of the module/system via a PC with the appropriate control software.

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 8 RS-232C Connection Table

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

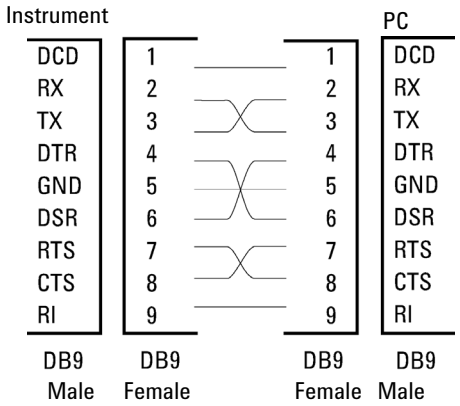


Figure 13 RS-232 Cable

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 9 Remote Signal Distribution

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

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.

10 Appendix

This chapter provides addition information on legal and web.

Lithium Batteries Information

WARNING

Lithium batteries may not be disposed-off into the domestic waste. Transportation of discharged Lithium batteries through carriers regulated by IATA/ICAO, ADR, RID, IMDG is not allowed.

Danger of explosion if battery is incorrectly replaced.

➔ Discharged Lithium batteries shall be disposed off locally according to national waste disposal regulations for batteries.

➔ Replace only with the same or equivalent type recommended by the equipment manufacturer.

The Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC)

Abstract

The Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC), adopted by EU Commission on 13 February 2003, is introducing producer responsibility on all Electric and Electronic appliances from 13 August 2005.

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.

Do not dispose off in domestic household waste

To return unwanted products, contact your local Agilent office, or see www.agilent.com for more information.

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)

Use of Solvents

Observe the following recommendations on the use of solvents.

- Brown glass ware can avoid growth of algae.
- Avoid the use of the following steel-corrosive solvents:
  - solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on),
  - high concentrations of inorganic acids like sulfuric acid and nitric acid, especially at higher temperatures (if your chromatography method allows, replace by phosphoric acid or phosphate buffer which are less corrosive against stainless steel),
  - halogenated solvents or mixtures which form radicals and/or acids, for example:

    $2CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$

    This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol,
  - chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, di-isopropyl ether) should be filtered through dry aluminium oxide which adsorbs the peroxides,
  - solvents containing strong complexing agents (e.g. EDTA),
  - mixtures of carbon tetrachloride with 2-propanol or THF.
- Avoid the use of dimethyl formamide (DMF). Polyvinylidene fluoride (PVDF), which is used in leak sensors, is not resistant to DMF.

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

Index

R

S

T

V

W

www.agilent.com

In This Book

This manual contains technical reference information about the Agilent 1260 Infinity High Performance Autosampler Clinical ed. K1367E.

- introduction and specifications,
- using,
- troubleshooting and diagnose,
- maintenance,
- parts identification,
- hardware information,
- safety and related information.

Manufactured by
Agilent Technologies
Hewlett-Packard-Strasse 8
76337 Waldbronn
Germany

For
Agilent Technologies Singapore
(International) Pte. Ltd.
No.1 Yishun Ave 7,
Singapore 768923
Singapore

Printed in Germany
08/2018

K1367-90014
Rev. B

Agilent Technologies