# Agilent 1200 Series Thermostatted Column Compartment G1316A/G1316B/G1316C

## Service Manual

Agilent Technologies

# Notices



## Manual Part Number

G1316-90111

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Hewlett-Packard-Strasse 8
76337 Waldbronn

## Research Use Only

**Not for use in Diagnostic Procedures.**

## Manual Structure

The *Service Manual G1316-90111* (English) contains the complete information about the Agilent 1200 Series Thermostatted Column Compartment. It is available as Adobe Reader file (PDF) only.

Latest versions of the manuals can be obtained from the Agilent web.

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## Safety Notices

**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 1200 Series Thermostatted Column Compartments (TCC)

- *G1316A* Agilent 1200 Series TCC
- *G1316B* Agilent 1200 Series TCC SL
- *G1316C* Agilent 1200 Series TCC SL Plus

## 1 Introduction to the Column Compartment

This chapter gives an introduction to the TCC, instrument overview and internal connectors.

## 3 Installing the Column Compartment

This chapter describes the installation of the Thermostatted Column Compartment.

## 4 How to optimize the Column Compartment

This chapter provides information on how to optimize the Thermostatted Column Compartement.

## 5 Troubleshooting and Diagnostics

Overview about the troubleshooting and diagnostic features.

## 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 Test Functions

This chapter describes the TCC's built in test functions.

### 8 Maintenance

This chapter describes the maintenance of the TCC.

### 9 Repair

This chapter gives instructions on how to repair the TCC.

### 10 Parts and Materials for Maintenance

This chapter provides information on parts for maintenance.

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This chapter provides information on parts for repair.

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### 14 Appendix

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# Contents

# 1 Introduction to the Column Compartment



This chapter gives an introduction to the TCC, instrument overview and internal connectors.

# Main Features

The Agilent 1200 Series thermostatted column compartments are stackable temperature-controlled column compartments for LC. They are available as standalone modules or as a component of a Agilent 1200 Series system. They are used for heating and cooling to meet extreme requirements of retention time reproducibility.

The main features are:

- Peltier heating and cooling from 10 degrees below ambient up to 80 °C(G1316A) or 100 °C (G1316B SL/G1316C SL Plus) with high heating and cooling speeds for maximum application flexibility and stability,
- holds up to three 30-cm columns and optimized design gives minimum dead volumes and maximum efficiency,
- two independently programmable heat exchangers contribute volumes of only 3 and 6 µl,
- G1316B SL features additional heating and cooling devices for low flow rates, which reduce the risk of additional dispersion,
- G1316B SL and G1316C SL Plus can be supplemented by a kit to install a small heat-exchanger with 1.6 µl delay volume to reduce the delay volume. In additon a cooling device with 1.5 µl is available,
- electronic column-identification module as standard for GLP documentation of column type, and major column parameters,
- optional high-quality Rheodyne® column switching valves with ceramic stator-face assemblies for prolonged lifetime.

For specifications, see “Performance Specifications” on page 28.

# System Overview

## The Concept of Heating and Cooling

The design of this thermostatted column compartment uses column heating and cooling devices with Peltier elements. The solvent entering the column compartment is heated up or cooled down to a settable temperature with two low-volume heat exchangers (3 µl on left side, 6 µl on right side), made of a short piece of capillary 0.17 mm i.d. leading through a heat exchanger. The heat exchanger is designed such that it can function simultaneously as an air heater. The shape of the heat exchanger surface allows the area around the column to be kept at a similar temperature level as the liquid running through the column. This is done by thermal convection and radiation between the heat exchanger fins. This design ensures that the column and the solvent flowing through it are almost at the same temperature.

Actual temperature control is accomplished at the heat exchanger. The solvent cools down or heats up on its transfer from the heating block to the column inlet. This depends on several factors: flow rate, setpoint temperature, ambient temperature and column dimensions.

In a flow-through temperature regulation system, there are necessarily slightly different temperatures at different positions. If, for example, the temperature set by the user is 40 °C, then the heat exchanger is regulated to a temperature 40.8 °C which is different by a certain offset (here. 0.8 °C). The solvent temperature at the column entry would be about 39 °C.

The actual temperature displayed on the user interface is always the derived temperature taken at the heat exchanger, corrected by the offset explained above.

Any type of heated column compartment brings one important consequence for column temperature equilibration. Before an equilibrium is reached, the whole mass of column, column packing, and solvent volume inside the column has to be brought to the selected temperature. This depends on several factors: flow rate, setpoint temperature, ambient temperature and column dimensions. The higher the flow rate, the faster the column equilibrates (due to thermostatted mobile phase).

"Column Thermostat Temperature Calibration" on page 80 shows a setpoint temperature of 40 °C. Some time after entering the setpoint the heat exchanger has reached its temperature and the control activity starts. The **TEMPERATURE NOT READY** signal will be cancelled 20 seconds after the sensed temperature was within a range of ± 0.5 °C of the setpoint (other values can be set via the user interface). However this does not necessarily mean that the column has already reached the correct temperature. The equilibration of the column may take longer. Stability of the pressure signal is a good indication for equilibrium.

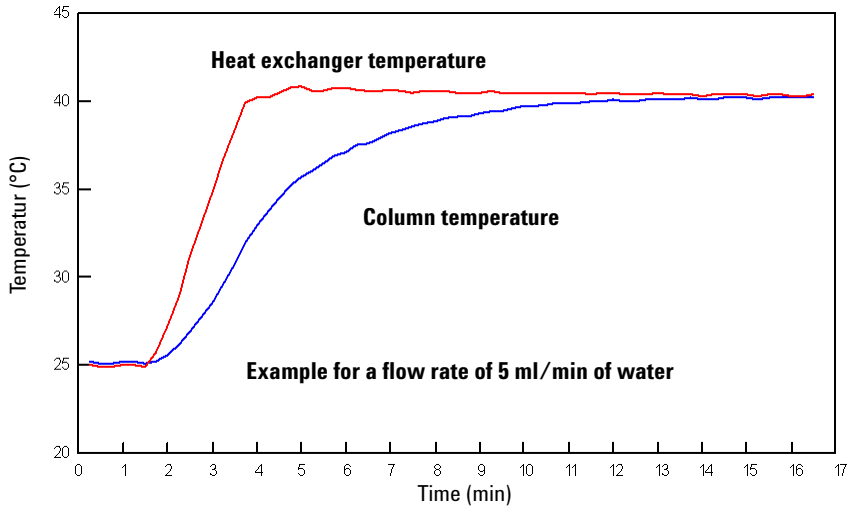



**Figure 1** Equilibration of Heat Exchanger and Column Temperature

The temperature calibration and verification is described in "Column Thermostat Temperature Calibration" on page 80.

# Column-Identification System

The Agilent 1200 Series thermostatted column compartment is equipped with a column-identification system. It allows to read and write column-specific information to and from the column-identification tag.

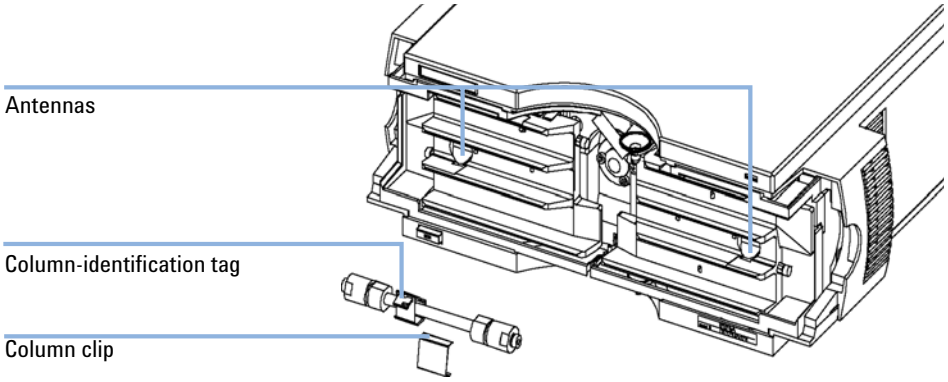



**Figure 2** Column-Identification System

Table 1 on page 14 shows the information that can be stored. The information fields can be edited via the user interface.

**Table 1** Column-Identification Module Information

| Item | Example | Comment |
|---|---|---|
| Product number | 79916OD-552 | |
| Serial number | 950522 | Date of manufacturing |
| Batch number | 1675 | |
| Geometry [mm] | 100 × 2.1 | |
| Stationary phase | ODS Hypersil | |
| Particle size | 10 µm | |
| Number of injections | 1267 | See Note below. |
| Maximum pressure allowed [bar] | 400 | |
| Maximum temperature recommended [°C] | 70 | |
| Maximum pH recommended | 12 | |
| Column void volume [ml] | | |

The number of injections will be updated each run to create a column lifecycle (history). The user interface allows to edit all information.

**NOTE**

If a column switching valve (see "Column Switching Valve (Optional for G1316A/G1316B SL)" on page 15) is installed in the module, the update of the number of injections depends on the position of the column switching valve. For example, if the left column is selected, the right column is not updated, and vice versa. If no column switching valve is installed both sides are updated at the same time.

# Column Switching Valve (Optional for G1316A/G1316B SL)

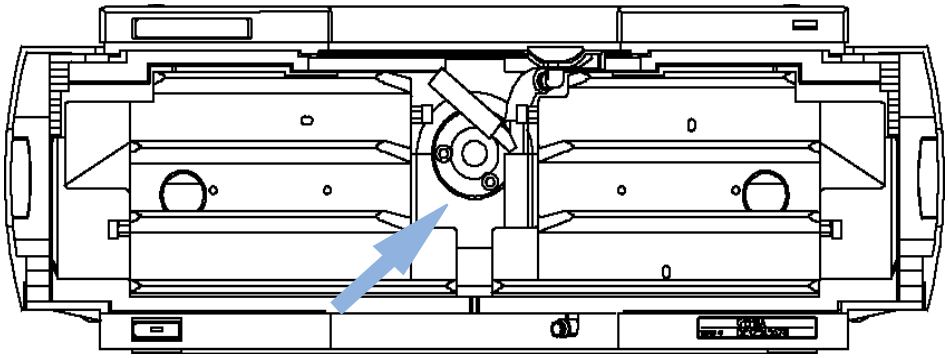


**Figure 3** Location of Column Switching Valve

## Two Column Selection

The valve can select either column 1 or column 2. The offline column is sealed by connecting head to tail. Switching should be done when the flow is off and the pressure is zero.

**NOTE** Before switching the valve, switch off the pump or set the flow to zero. Keeping the flow on while the valve is switched can cause exceeding the maximum pressure. This will stop method or sequence execution.

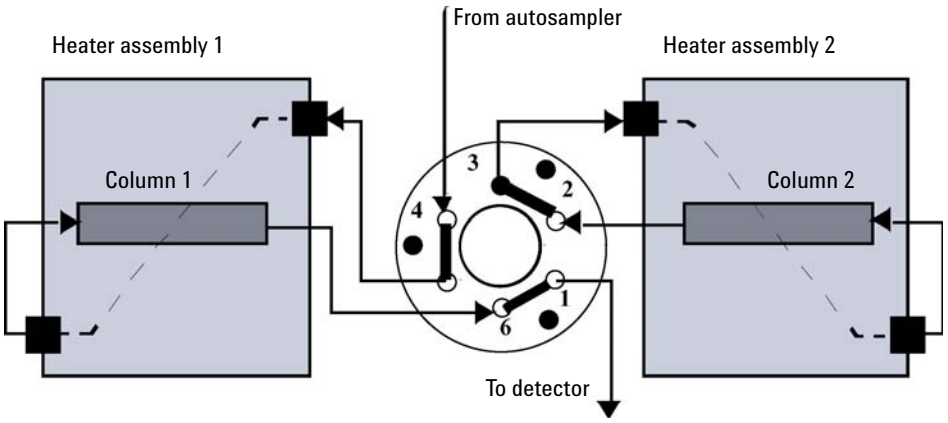



**Figure 4** Column 1 Active

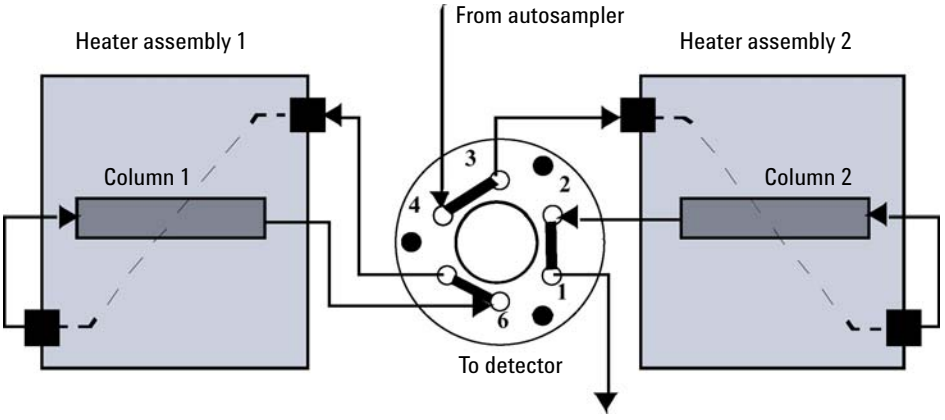



**Figure 5** Column 2 Active

## Precolumn Back-flushing

The sample is injected into series-connected precolumn and analytical column. After the valve has switched, the analytical column flow continues in normal direction. Only the precolumn is back-flushed, eluting highly retained peaks directly to the detector.

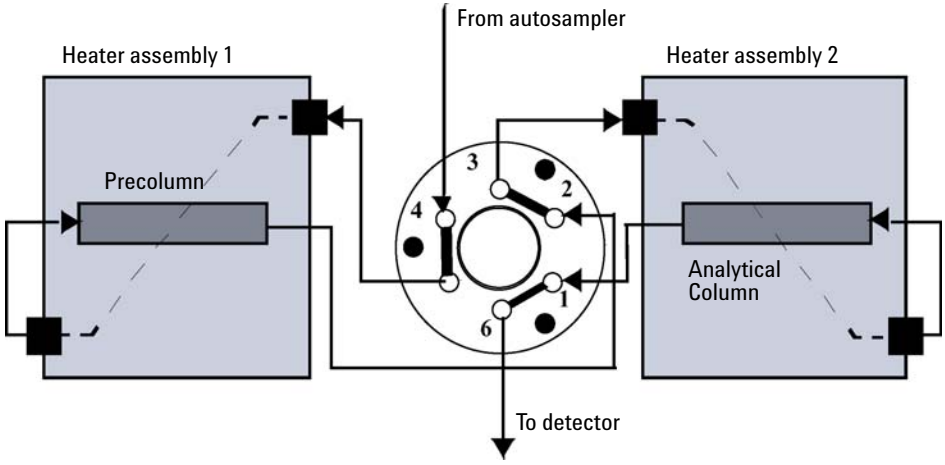



**Figure 6** Precolumn Back-flushing

# 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 Agilent 1200 Series 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. See your software documentation for further information.
- The power input socket accepts a line voltage of 100 – 240 volts AC ± 10% with a line frequency of 50 or 60 Hz. Maximum power consumption is 220 VA. 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. The security lever at the power input socket prevents the module cover from being taken off when line power is still connected.

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

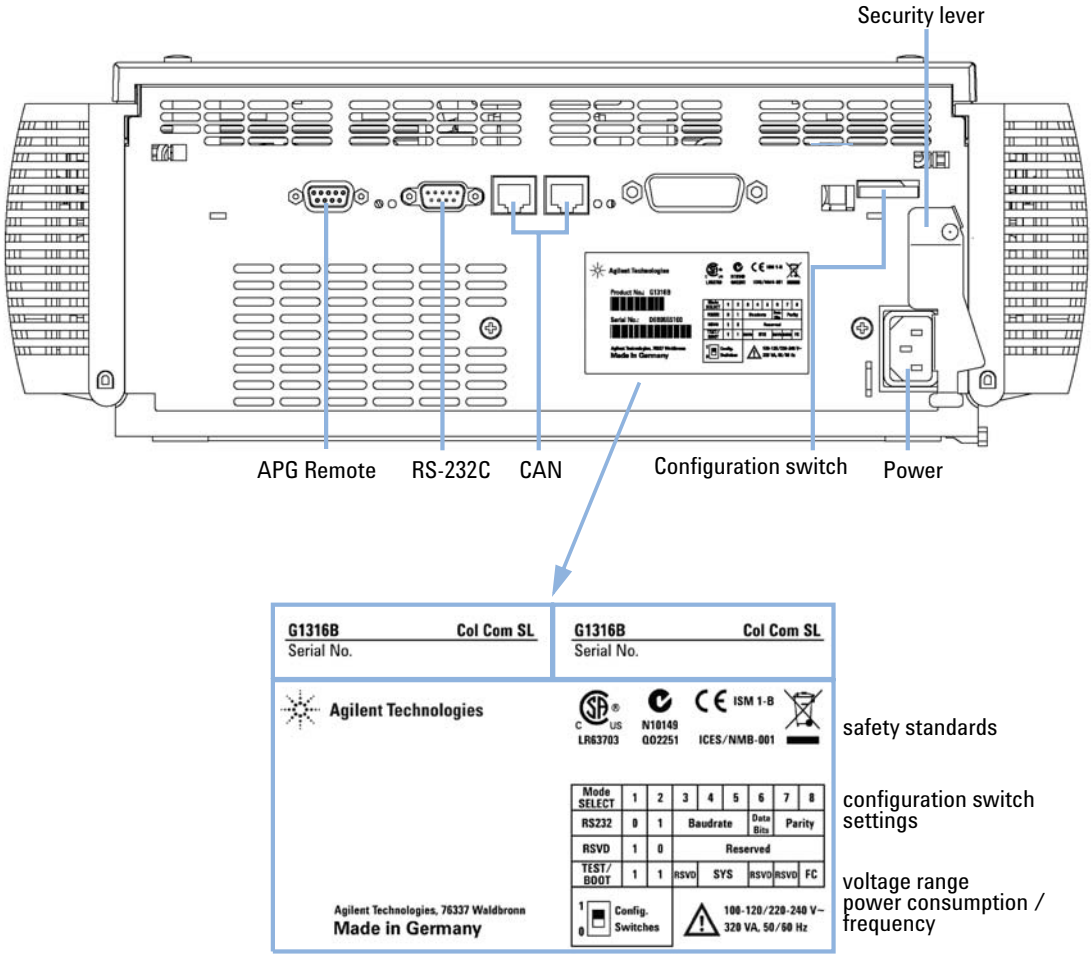



**Figure 7** Rear View of Oven - Electrical Connections and Label

# Serial Number Information

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

| CCYWWSSSSS | Format |
|---|---|
| CC | country of manufacturing<br>• DE = Germany<br>• JP = Japan<br>• CN = China |
| YWW | year and week of last major manufacturing change, e.g. 820 could be week 20 of 1998 or 2008 |
| SSSSS | real serial number |

# 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 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.

# Agilent Lab Advisor Software

The Agilent Lab Advisor Software is a standalone product that can be used with or without data system. Agilent Lab Advisor helps to manage the lab for high quality chromatographic results and can monitor in real time a single Agilent LC or all the Agilent GCs and LCs configured on the lab intranet.

Agilent Lab Advisor provides diagnostic capabilities for all Agilent 1200 Series HPLC modules. This includes tests and calibrations procedures as well as the different injector steps to perform all the maintenance routines.

Agilent Lab Advisor also allows users to monitor the status of their LC instruments. The Early Maintenance Feedback (EMF) feature helps to carry out preventive maintenance. In addition, users can generate a status report for each individual LC instrument. The tests and diagnostic features as provided by the Agilent Lab Advisor Software may differ from the descriptions in this manual. For details refer to the Agilent Lab Advisor help files.

This manual provides lists with the names of Error Messages, Not Ready messages, and other common issues.

# 2
# Site Requirements and Specifications

# Site Requirements and Specifications

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

## Power Consideration

The module power supply has wideranging capability (see Table 2 on page 27). It accepts any line voltage in the range described in the above mentioned table. 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**

**Incorrect line voltage at the instrument**

**Shock hazard 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.

**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.**

➔ Remove the power cable from the instrument before opening the cover.

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

**CAUTION**

Unaccessable 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

Different power cords are offered as options with the module. The female end of all power cords is identical. It plugs into the power-input socket at the rear of the module. The male end of each power cord is different and designed to match the wall socket of a particular country or region.

**WARNING**

**The absence of ground connection and the use of an unspecified power cord can lead to electric shock or short circuit.**

**Electric Shock**

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

➔ Never use a power cord other than the Agilent Technologies power cord designed for your region.

**WARNING**

**Use of unsupplied cables**

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

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

## Bench Space

The column compartment dimensions and weight (see “Physical Specifications” on page 27 ) allow to place this 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 the circulation of air and electric connections.

If the bench should carry a complete Agilent  Series system, make sure that the bench is designed to carry the weight of all the modules.

The module should be operated in a horizontal position.

## Environment

Your column compartment will work within specifications at ambient temperatures and relative humidity as described in “Physical Specifications” on page 27.

# Physical Specifications

**Table 2** Physical Specifications

| Type | Specification | Comments |
|---|---|---|
| Weight | 10.2 kg (22.5 lbs) | |
| Dimensions (width × depth × height) | 410 × 435 × 140 mm (16.1 × 17 × 5.5 inches) | |
| Line voltage | 100 – 240 VAC, ± 10% | Wide-ranging capability |
| Line frequency | 50 or 60 Hz, ± 5% | |
| Power consumption | 320 VA / 150 W / 512 BTU | Maximum |
| Ambient operating temperature | 0 – 55 °C (32 – 131 °F) | |
| Ambient non-operating temperature | -40–70 °C (-4–158 °F) | |
| Humidity | < 95%, at 25–40 °C (77–104 °F) | Non-condensing |
| Operating Altitude | Up to 2000 m (6500 ft) | |
| Non-operating altitude | Up to 4600 m (14950 ft) | For storing the module |
| Safety standards: IEC, CSA, UL | Installation Category II, Pollution Degree 2 | For indoor use only. Research Use Only. Not for use in Diagnostic Procedures. |

# Performance Specifications

**Table 3** Performance Specifications Thermostatted Column Compartment

| Type | Specification | Comments |
|---|---|---|
| Temperature range | 10 degrees below ambient to 80 °C<br>10 degrees below ambient to 100 °C | G1316A<br>G1316B SL/G1316C SL Plus |
| | up to 80 °C: flow rates up to 5 ml/min<br>up to 100 °C: flow rates up to 2.5 ml/min | G1316A/G1316B SL/G1316C SL Plus<br>G1316B SL/G1316C SL Plus |
| Temperature stability | ± 0.15 °C<br>± 0.05 °C | G1316A<br>G1316B SL/G1316C SL Plus |
| Temperature accuracy | ± 0.8 °C<br>± 0.5 °C | <br>With calibration |
| Column capacity | Three 30 cm | |
| Warm-up/ cool-down time | 5 minutes from ambient to 40 °C<br>10 minutes from 40 – 20 °C | |
| Dead volume | 3 µl left heat exchanger<br>6 µl right heat exchanger | i.d. 0.17 mm, see "Extended Specifications on G1316B SL/G1316C SL Plus" on page 30 |
| Communications | Controller-area network (CAN), GPIB, RS-232C, APG Remote: ready, start, stop and shut-down signals, LAN via other 1200 series module | no GPIB on G1316B SL/G1316C SL Plus |
| Safety and maintenance | Extensive diagnostics, error detection and display (through control module and Agilent ChemStation), leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in major maintenance areas. | |

**Table 3** Performance Specifications Thermostatted Column Compartment

| Type | Specification | Comments |
|---|---|---|
| GLP features | Column-identification module for GLP documentation of column type, see "Column-Identification System" on page 13 | |
| Housing | All materials recyclable. | |

**NOTE** All specifications are valid for distilled water at ambient temperature (25 °C), set point at 40 °C and a flow range from 0.2–5 ml/min.

# Extended Specifications on G1316B SL/G1316C SL Plus

The 1200 series G1316B SL/G1316C SL Plus thermostatted column compartment is usable from 10 °C below ambient up to 80 °C for flow ranges up to 5 ml/min and up to 100 °C for flow ranges up to 2.5 ml/min. Additional heating and cooling devices are available for the G1316B SL/G1316C SL Plus to reduce the risk of additional dispersion at low flow rates see Figure 8 on page 30. These devices can be installed in any position in the column compartment, see "Installation of Heater and Cooling Devices (G1316B SL)" on page 47.

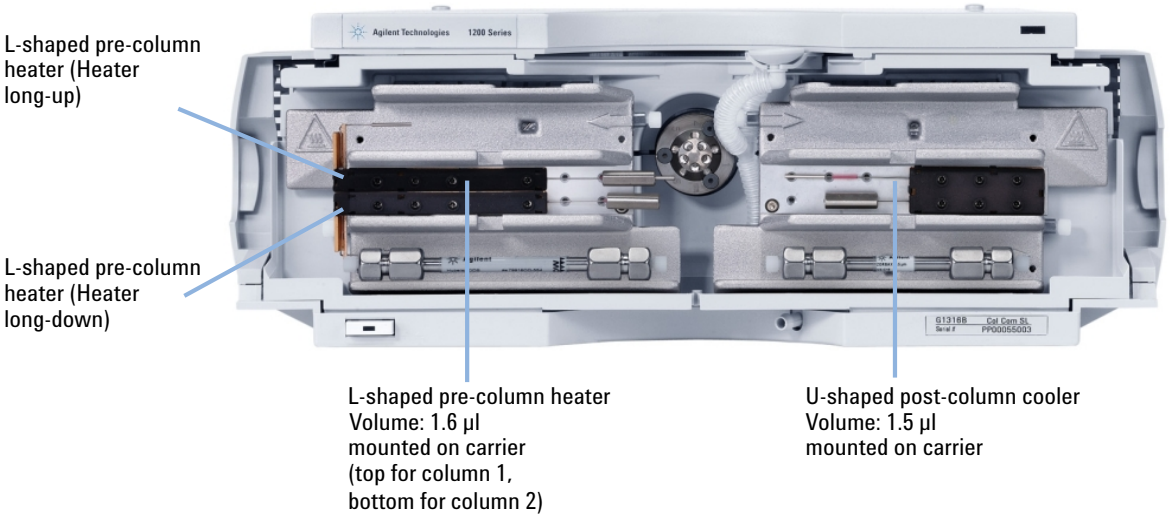



**Figure 8** New additional heater and cooling devices

The standard column compartment is equipped with a 3 µl and 6 µl heater or cooler. Both can be set at the same or different temperature. To reduce the delay volume, a kit ("G1316B SL/G1316C SL Plus Capillary System Kit" on page 190) has been set up for installing a small heaters with 1.6 µl internal delay volume and also a new cooling device with 1.5 µl internal volume is available.

**NOTE** If the additional heater and cooling devices are used as shown in Figure 8 on page 30, the column identification system cannot be used. If the column identification system is required, fix the heater and cooling devices in the upper or lower locations or fix them right/left of the current location.

# 3
# Installing the Column Compartment



This chapter describes the installation of the Thermostatted Column Compartment.

# Unpacking the Column Compartment

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 module may have been damaged during shipment.

**CAUTION**

"Defective on arrival" problems

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

➔ Notify your Agilent sales and service office about the damage.

➔ An Agilent service representative will inspect the instrument at your site and initiate appropriate actions.

## Delivery Checklist

Ensure all parts and materials have been delivered with the module. The delivery checklist is shown below. Please report missing or damaged parts to your local Agilent Technologies sales and service office.

**Table 4** Column Compartment Delivery Checklist

| Description | Quantity |
|---|---|
| Thermostatted column compartment | 1 |
| Power cable | 1 |
| CAN cable | 1 |
| Column switching valve | optional |
| User Manual | 1 |
| Accessory kit (see "Accessory Kits" on page 188) | 1 |

# Optimizing the Stack Configuration

If your column compartment is part of a Agilent 1200 Series system, you can ensure optimum performance by installing the following configuration. This configuration optimizes the system flow path and ensures minimum delay volume.

For installations of the G1316C SL Plus as part of the Method Development Solution, please refer to the Method Development Solution User and Installation Guide **part number: G4230-90000**.

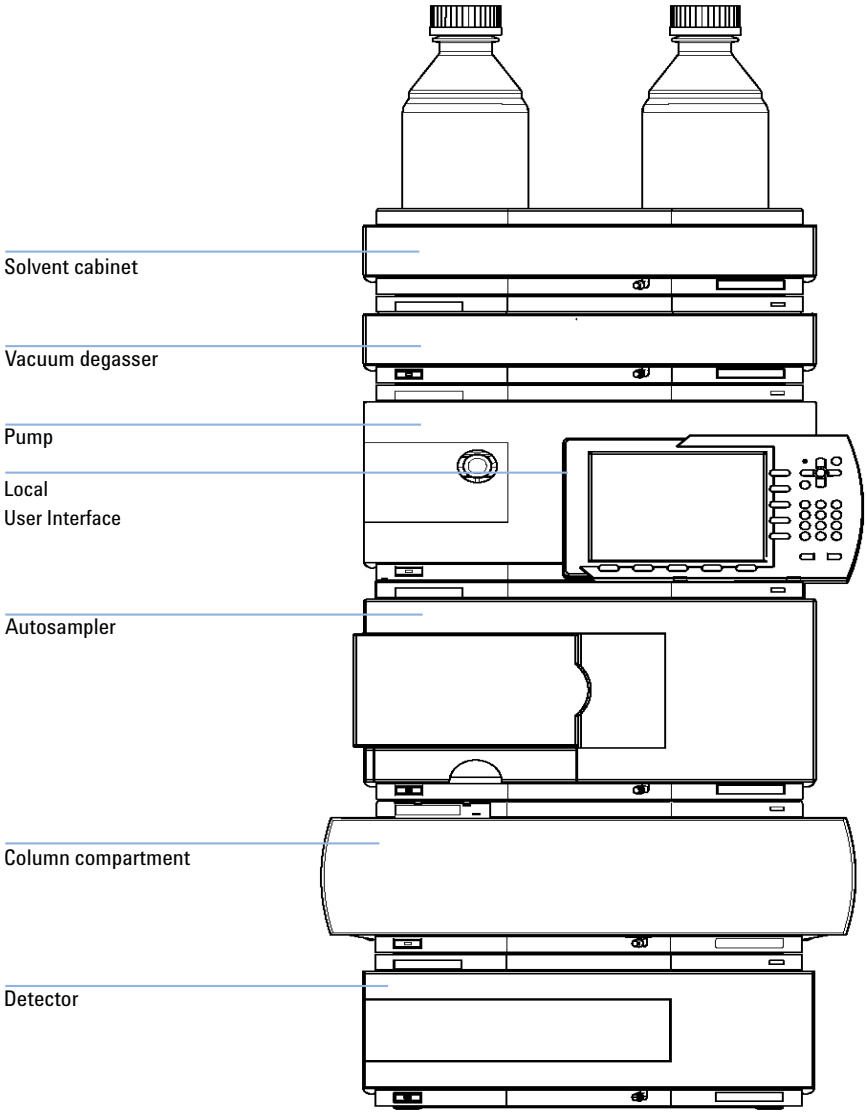



**Figure 9** Recommended Stack Configuration (Front View)

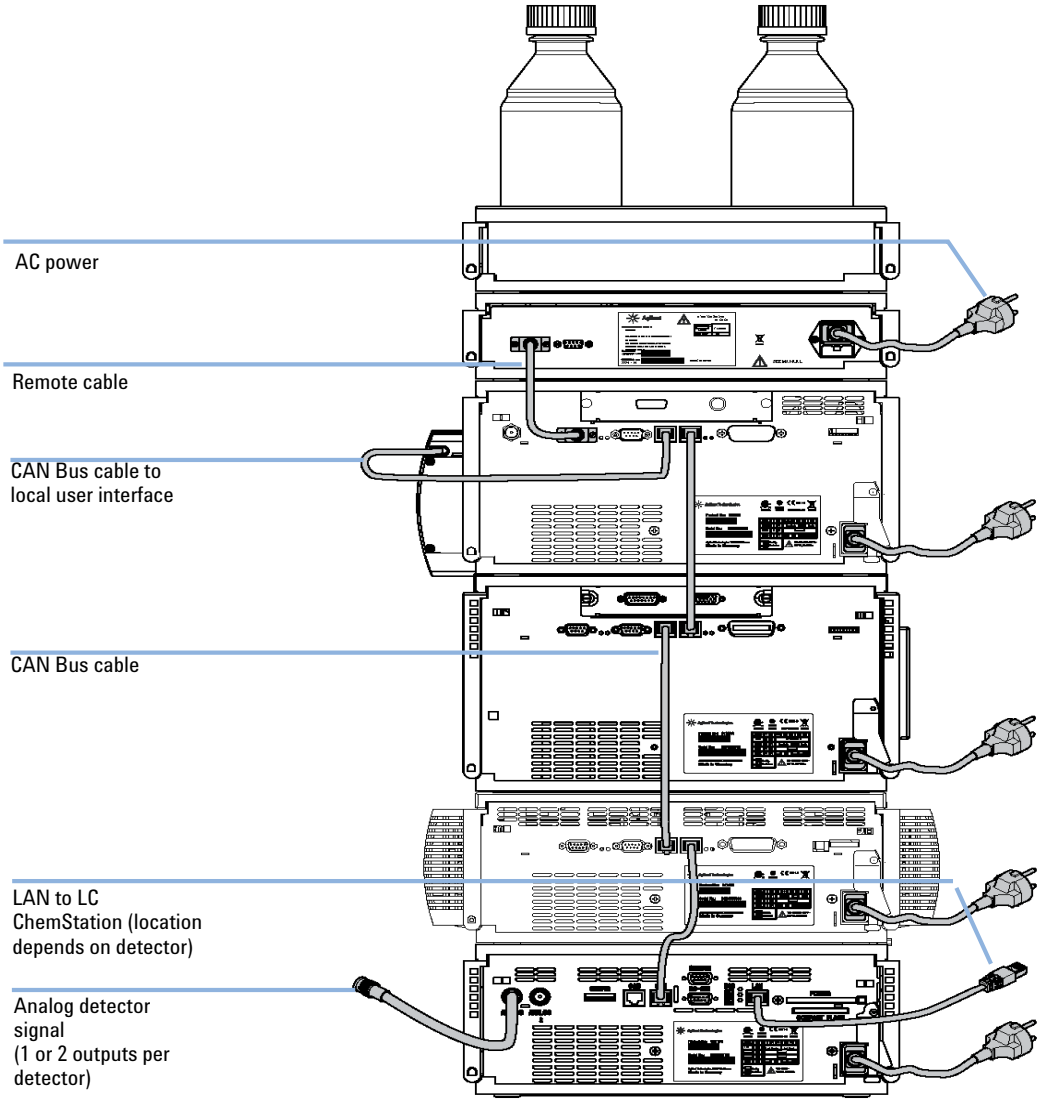



**Figure 10** Recommended Stack Configuration (Rear View)

# Installing the Column Compartment

**Parts required**

| # | Description |
|---|---|
| 1 | Column compartment |
| 1 | Power cord<br>For other cables see text below |

**Preparations**

Locate bench space.

Provide power connections.

Unpack the Column compartment.

**WARNING**

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

**Risk of stroke and other personal injury. Repair work at the module can lead to personal injuries, e. g. shock hazard, when the module cover is opened and the instrument is connected to power.**

➔ Never perform any adjustment, maintenance or repair of the module with the top cover removed and with the power cord plugged in.

➔ The security lever at the power input socket prevents that the module cover is taken off when line power is still connected. Never plug the power line back in when cover is removed.

**CAUTION**

Valve properties are read from the valve head RFID tag during initialization of the module. Valve properties will not be updated, if the valve head is replaced while the module is on.

Selection of valve port positions can fail, if the instrument does not know the properties of the installed valve.

➔ Always switch off the instrument when replacing the valve head.

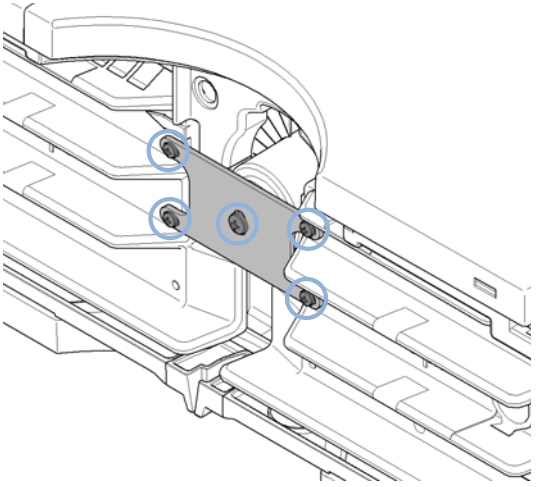
**CAUTION**

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

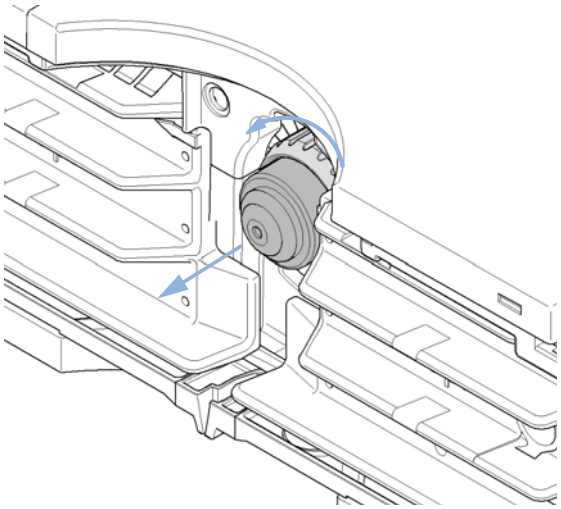
➔ Always install a valve head for operation and storage. For protecting the actuator, a dummy valve head (part of transportation lock kit **part number: G1316-67001**) can be used instead of a functional valve. Do not touch parts inside the actuator.

If the Thermostatted Column Compartment SL Plus (G1316C SL Plus only) includes the valve drive option, it is shipped with a transportation lock, which needs to be removed during installation.

1 Remove the 5 screws, which hold the lock in position (G1316C SL Plus only).



2 Remove the dummy valve head by unscrewing the cap nut and removing it from the valve drive (G1316C SL Plus only).



3 Place the column compartment in the stack or on the bench in a horizontal position.

4 Ensure the power switch at the front of the column compartment is OFF.

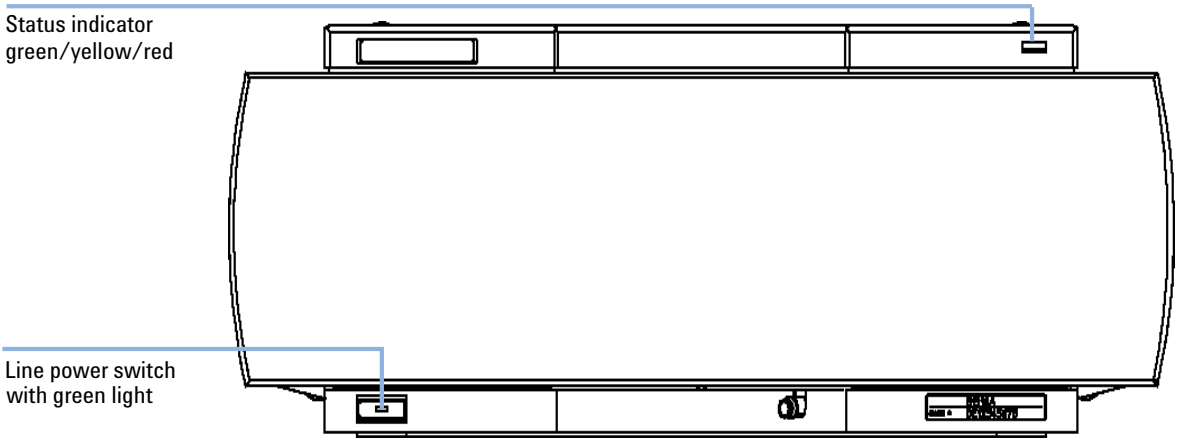



**Figure 11** Front View of the Thermostatted Column Compartment

5 Connect the power cable to the power connector at the rear of the column compartment.

6 Connect the CAN cable to other Agilent 1200 Series modules.

7 If Agilent ChemStation is the controller, connect either
- the LAN connection to the LAN interface board in the module or
- the GPIB cable to the module.

**NOTE** If a Agilent DAD/MWD/FLD is in the system, the LAN/GPIB should be connected to the DAD/MWD/FLD (due to higher data load).

8 Connect the APG Remote cable (optional) for non-Agilent 1200 Series instruments.

9 Turn ON power by pushing the button at the lower left side of the column compartment. The status LED should be green.

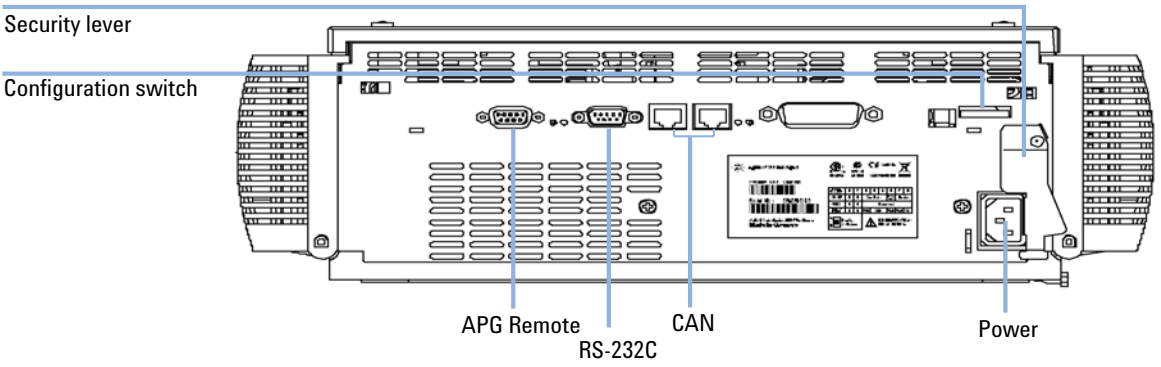



**Figure 12** Rear View of the Thermostatted Column Compartment

**NOTE** The column compartment is turned on when the line power switch is pressed and the green indicator lamp is illuminated. The column compartment is turned off when the line power switch is protruding and the green light is OFF.

# Installing Valve Heads (G1316C SL Plus)

Several optional valve heads are available for the G1316C SL Plus, which can be installed and exchanged easily.

**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | 5067-4107 | 8pos/9prt valve head high pressure and/or |
| 1 | 5067-4108 | 8pos/9prt valve head low pressure |

**CAUTION**

Valve Damage

Using a low pressure valve on the high pressure side can damage the valve.

➔ When using multiple column compartments as part of a method development solution, make sure that the high pressure valve head is connected to the autosampler and the low pressure valve head is connected to the detector.

➔ For details, please refer to the Method Development Solution User and Installation Guide (**part number: G4230-90000**).

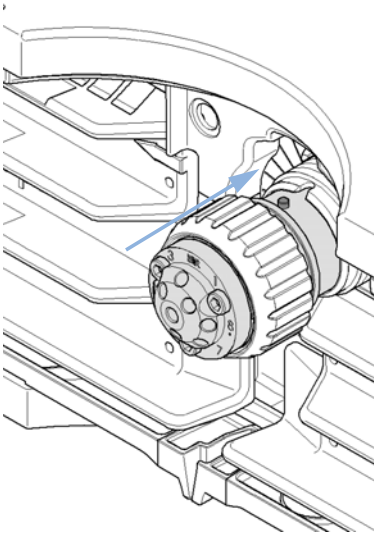
**CAUTION**

Column Damage or Bias Measurement Results

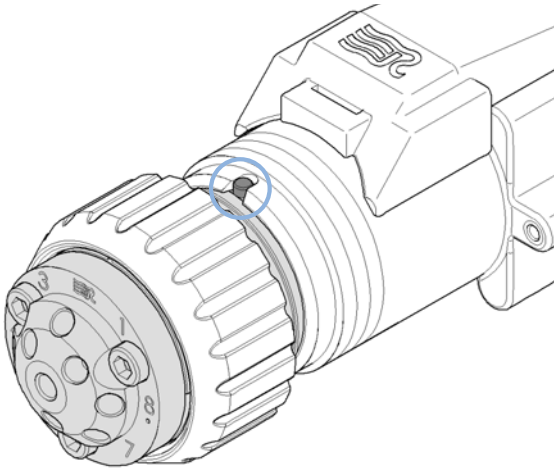
Switching the valve to a wrong position can damage the column or bias measurement results.

➔ Fitting the lobe to the groove is essential for making sure the valve is switched to the correct position.

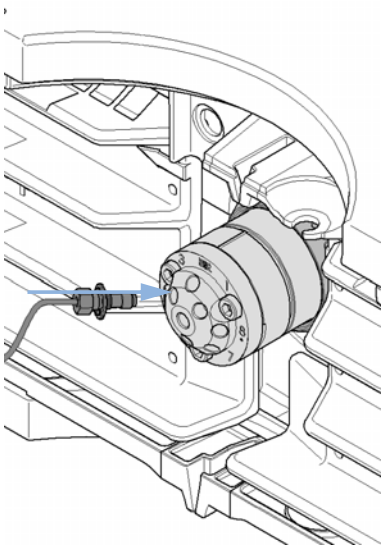
**1** Put the valve head onto the valve drive such that the lobe fits to the groove.



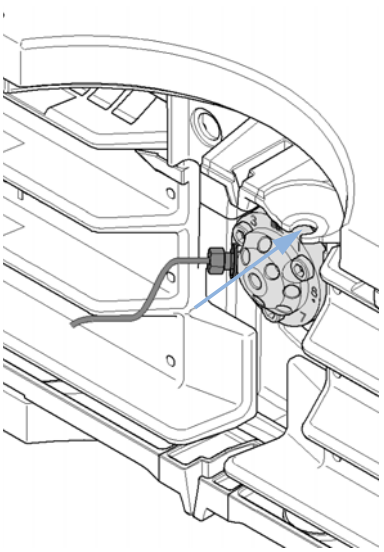
**2** Screw the valve head onto the valve drive using the union nut.



**3** Install all required capillary connections to the valve head.



**4** Push the valve head until it snaps in and stays in the rear position.



# Flow Connections of the Column Compartment

| Parts required | Description |
|---|---|
| | Other modules |
| | Parts from accessory kit, see "Accessory Kits" on page 188 |
| | Two wrenches 1/4 – 5/16 inch for capillary connections |

**Preparations** Install the column compartment

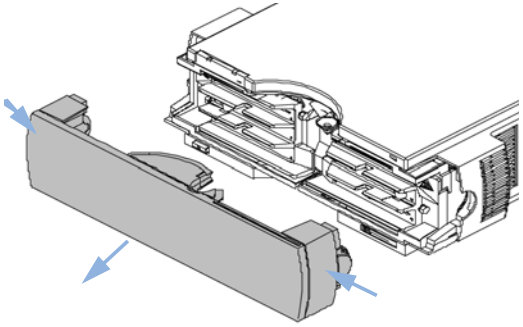
**WARNING**

**Toxic and hazardous solvents**

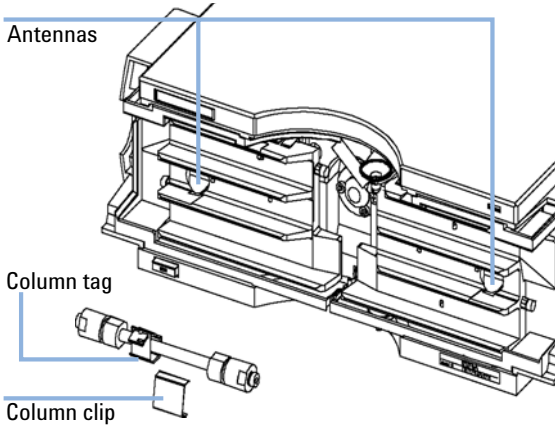
**The handling of solvents and reagents can hold health risks.**

➔ 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.

**1** Press release buttons and remove front cover to gain access to heater area.



**2** The column compartment is equipped with an column-identification system that can read column tags.



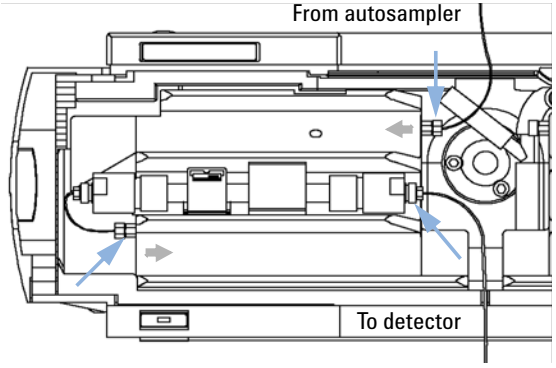
**NOTE**

For more information on column identification, see "Column-Identification System" on page 13 .

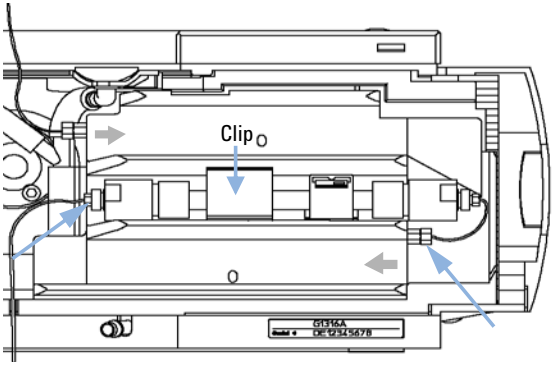
**NOTE**

The internal volumes of the heat exchanger assemblies comprise a volume of 3 µl (left) and 6 µl (right). The internal capillary diameter is 0.17 mm.

**3** Place the column on the left heat exchanger assembly and connect the capillaries to the column.



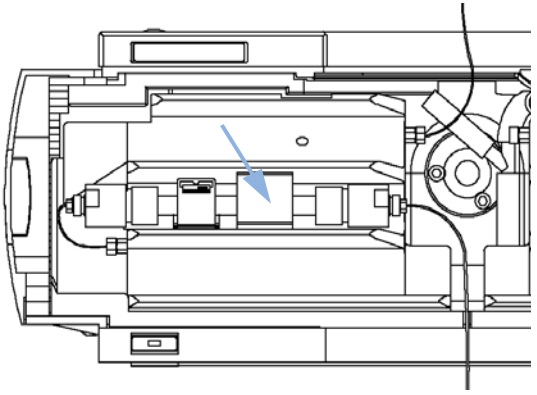

**4** Or place the column on the right heat exchanger assembly and connect the capillaries to the column.



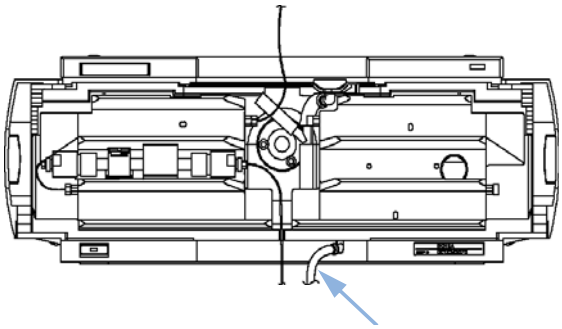

**NOTE**

See "Column Switching Valve (Optional for G1316A/G1316B SL)" on page 15.
on how to connect the column selection valve.

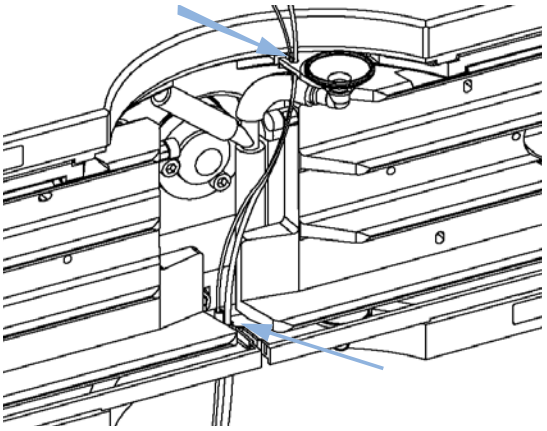
**5** Fix the column with the column clip from the accessory kit.



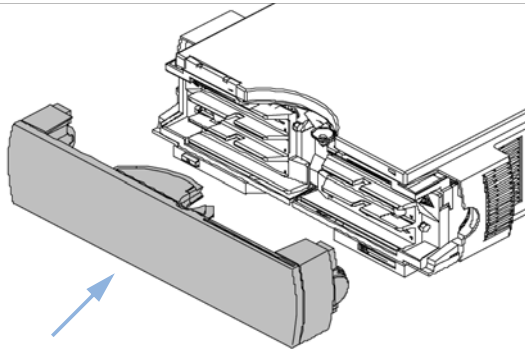
**6** If the column compartment is not part of a Agilent 1200 Series system, or if an Agilent 1200 Series Autosampler is located on top, connect the corrugated tubing to the waste outlet.



**7** Route tubings from modules above through the openings in the funnel holder (top) and the plastic bottom part. Remove small plastic plugs first.



**8** Put the front cover back in place.



The installation of the column compartment has now been completed.

**NOTE** Always operated the TCC with the front cover in place for proper thermostatting conditions and to protect the column area against strong drafts from the ouside.

# Installation of Heater and Cooling Devices

## Installation of Heater and Cooling Devices (G1316B SL)

With the introduction of the 1200 series TCC SL (G1316B SL), the heater elements were redesigned in order to allow the adding of small heater and cooling devices.

**NOTE** Depending on the application, these heater and cooling devices can be fixed at various places. Information about the usage of these heater and cooling devices can be found in Technical Notes or in the Agilent 1200 Series Rapid Resolution LC System manual (**part number: G1312-90300**).

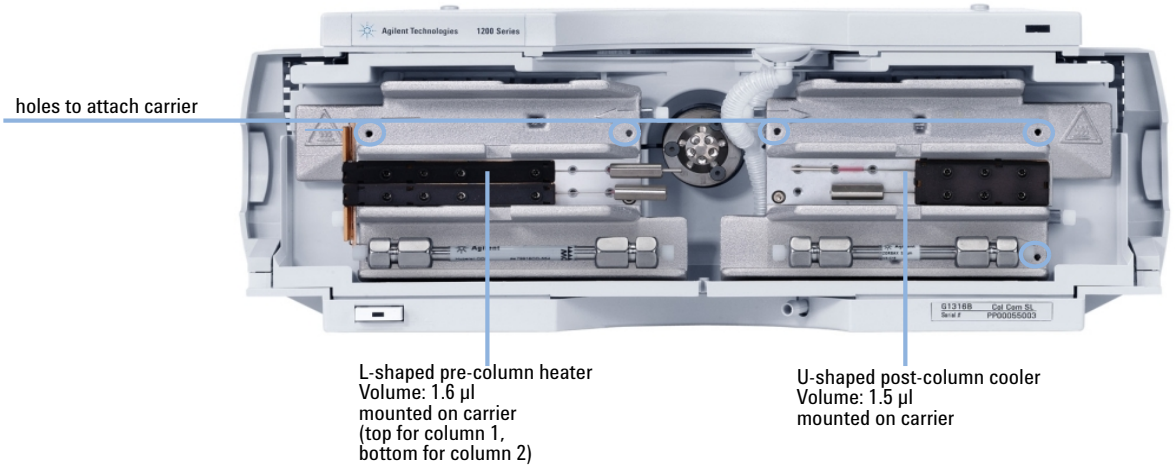



**Figure 13** Installation points for heat exchanger / cooling devices

**NOTE** If the additional heat exchanger and cooling devices are used as shown in this figure, the column identification system cannot be used. If the column identification system is required, fix the heater and cooling devices in the upper or lower locations or right/left of the current location.

# Installation of Heater and Cooling Devices (G1316C SL Plus)

For the G1316C SL Plus, additional heat exchanger and cooling devices can be installed on the carrier **part number: G1316-89200** using 3 screws (**part number: 0515-1052**, included to part number for carrier) as shown in figure below.

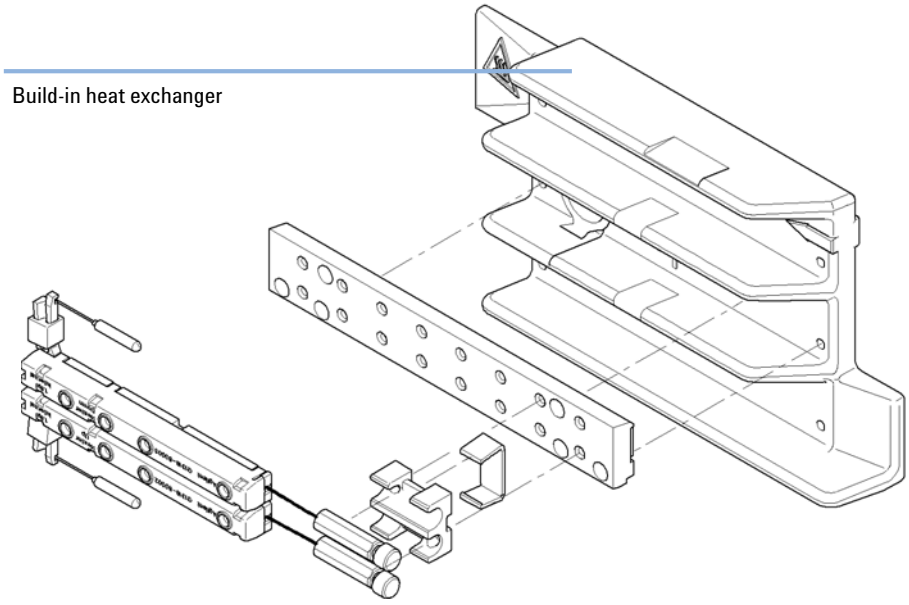



**Figure 14** Installing the low dispersion heat exchangers

# Placing Columns

## Column-Identification Tag

When correctly placed on the heat exchanger, the distance between the column-identification tag and antenna is 1–2 mm. This is the optimum distance for proper function. The identification tag can be easily removed from the column.

**NOTE** For columns with small diameter, a cable tie wrap should be used to fix the column identification tag to the column. Assure that the tie wrap does not block the front cover.

**NOTE** The tag needs to be placed differently, depending on whether the column is installed at the left or right heat exchanger, see Figure 15 on page 49 and Figure 16 on page 50. The Agilent logo should always be at front.

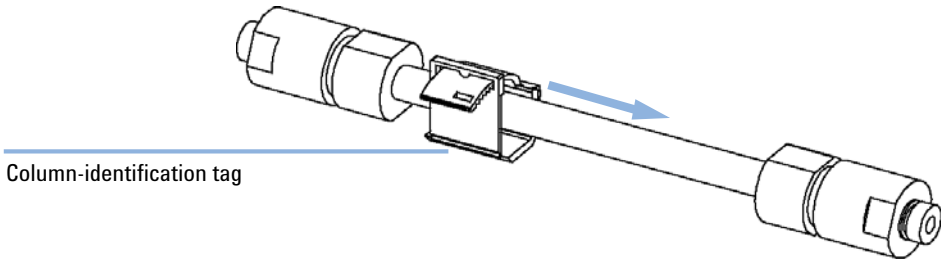



**Figure 15** Column-Identification Tag for Left Heat Exchanger

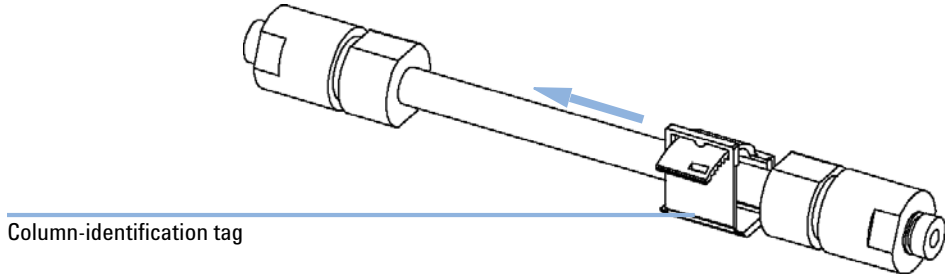



**Figure 16** Column-Identification Tag for Right Heat Exchanger

## Column Clip

For better positioning of the column on the heat exchanger a column clip is available (see “Accessory Kits” on page 188).

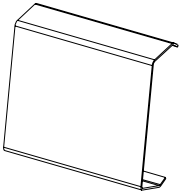


**Figure 17** Column Clip (part number 5063-6526, pack of 6)

# 4
# How to optimize the Column Compartment



This chapter provides information on how to optimize the Thermostatted Column Compartement.

# Optimizing the Performance of your Column Compartment

For best performance results of the column compartment:

- Use short connection capillaries and place them close to the heat exchanger. This will reduce heat dissipation and external band-broadening.
- Use the left heat exchanger for small volume columns, for example, 2–3 mm i.d. columns at flow rates of less than 200 µl/min.
- For even lower band-broadening, the heat exchanger can be by-passed and the column is placed well between the heat exchanger fins.
- Keep the left and right heat exchanger temperature the same unless you do specific applications.
- Assure that the front cover is always closed.

# Using Additional Heater and Cooling Devices

The optimization, installation, interconnection, and specific settings when using additional heating and cooling devices are described in the Agilent 1200 Series Rapid Resolution LC System manual (G1312-90300).

# 5
# Troubleshooting and Diagnostics



Overview about the troubleshooting and diagnostic features.

# Overview of the Column Department's Indicators and Test Functions

## Status Indicators

The instrument is provided with two status indicators which indicate the operational state (prerun, run, and error states) of the instrument. The status indicators provide a quick visual check of the operation of the instrument.

## Error Messages

In the event of an electronic, mechanical or hydraulic failure, the instrument generates an error message in the user interface. The following pages describe the meaning of the error messages. For each message, a short description of the failure, a list of probable causes, and a list of suggested actions to fix the problem are provided.

## Thermostat Diagnostic Test

The thermostat diagnostic test evaluates the heating and cooling efficiency of the two peltier elements.

## Temperature Calibration and Verification

The temperature calibration and verification procedure enables the instrument temperature to be measured against an external, calibrated measuring device. Normally, temperature calibration is not required throughout the lifetime of the instrument. However, in order to comply with local regulatory requirements, calibration and verification may be required.

The following sections describe these functions in detail.

# 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 instrument status.

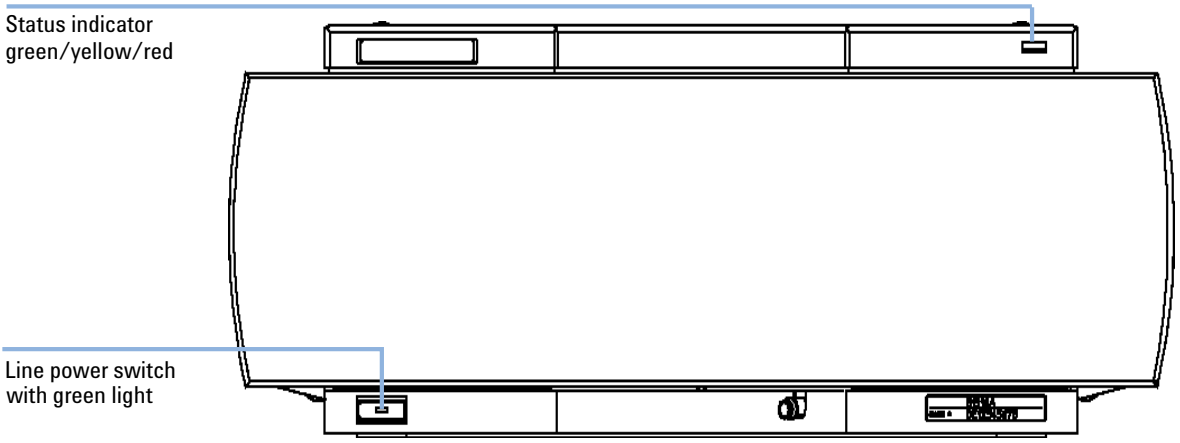



**Figure 18** Location of Status indicators

## 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 four possible instrument conditions:

- When the status indicator is OFF (and power switch indicator is on), the instrument 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 or action to be completed (for example, immediately after changing a setpoint), or while a self-test procedure is running.
- An **error** condition is indicated by a *red* status indicator. An error condition indicates the module has detected an internal problem which affects correct operation of the instrument. Usually, an error condition requires attention (for example, leak, defective internal components). The error state is propagated through the system to all connected modules, so the error might come from a different module. Check the error log of your user interface for the originating module. For safety reasons, an error condition always interrupts the analysis.

# Available Tests depending on User Interfaces

**NOTE**

Depending on the used interface, the available tests and the screens/reports may vary. Preferred tool should be the Agilent Lab Advisor Software, see "Agilent Lab Advisor Software" on page 22.

Screenshots used in this document are based on the Agilent ChemStation. In future, the user interface may not show the Diagnostics/Tests anymore. In this case use the Agilent Lab Monitor Diagnostic (LMD) Software.

The Agilent ChemStation may not include any maintenance/test functions.

**Table 5** Test Functions available vs. User Interface - TCC

| Test | Agilent ChemStation | Instant Pilot G4208A | LMD Software |
|---|---|---|---|
| Thermostat Function Test | Yes | No | Yes |
| Temperature Calibration | Yes | Yes [1] | Yes |

[1] section Maintenance

# Agilent Lab Advisor Software

The Agilent Lab Advisor Software is a standalone product that can be used with or without data system. Agilent Lab Advisor helps to manage the lab for high quality chromatographic results and can monitor in real time a single Agilent LC or all the Agilent GCs and LCs configured on the lab intranet.

Agilent Lab Advisor provides diagnostic capabilities for all Agilent 1200 Series HPLC modules. This includes tests and calibrations procedures as well as the different injector steps to perform all the maintenance routines.

Agilent Lab Advisor also allows users to monitor the status of their LC instruments. The Early Maintenance Feedback (EMF) feature helps to carry out preventive maintenance. In addition, users can generate a status report for each individual LC instrument. The tests and diagnostic features as provided by the Agilent Lab Advisor Software may differ from the descriptions in this manual. For details refer to the Agilent Lab Advisor help files.

This manual provides lists with the names of Error Messages, Not Ready messages, and other common issues.

# 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 (for example, repair, frit exchange, exchange of consumable is necessary). In the event of such a failure, the red status indicator at the front of the column compartment is switched on, and an entry is written into the instrument logbook.

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

# General Error Messages

General error messages are generic to all Agilent 1200 Series HPLC modules.

### Timeout

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. |

### Shut-Down

An external instrument has generated a shut-down 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 Agilent 1200 Series vacuum degasser. |

### Remote Timeout

A not-ready condition is still present on the remote input.

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

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

### Synchronization Lost

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.<br>• Ensure all CAN cables are installed correctly. |
| **2** Defective CAN cable. | Exchange the CAN cable. |
| **3** Defective main board in a different module. | Switch off the system. Restart the system, and determine which module or modules are not recognized by the system. |

### Leak

A leak was detected in the column compartment 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 TCC board.

| Probable cause | Suggested actions |
|---|---|
| **1** Condensation. | Use a higher temperature setpoint. |
| **2** Loose column fittings. | Ensure all fittings are tight. |
| **3** Broken capillary. | Exchange defective capillaries. |
| **4** Leaking column-switching valve seal. | Exchange the valve seal. |

### Leak Sensor Open

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. | Ensure the leak sensor is connected correctly. |
| **2** Defective leak sensor. | Exchange the leak sensor. |
| **3** Leak sensor incorrectly routed, being pinched by a metal component. | Exchange the leak sensor. |

### Leak Sensor Short

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. | Exchange the leak sensor. |
| **2** Leak sensor incorrectly routed, being pinched by a metal component. | Check routing of leak sensor "Replacing the Leak Sensor or Leak Base (G1316A/G1316B SL)" on page 156. |

# TCC Error Messages

The following errors are TCC specific error messages.

### Compensation Sensor Open

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. | Exchange the main board. |

### Compensation Sensor Short

The ambient-compensation sensor (NTC) on the main board in the module has failed (short 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. | Exchange the main board. |

### Left Fan Failed

The left cooling fan in the column compartment has failed.

The hall sensor on the fan shaft is used by the TCC board to monitor the fan speed. If the fan speed falls below 2 revolutions/second for longer than 5 seconds, the error message is generated.

| Probable cause | Suggested actions |
|---|---|
| **1** Fan cable disconnected. | Ensure the fan is connected correctly. |
| **2** Defective fan. | Exchange fan. |
| **3** Defective TCC board. | Exchange the TCC board. |

### Right Fan Failed

The right cooling fan in the column compartment has failed.

The hall sensor on the fan shaft is used by the TCC board to monitor the fan speed. If the fan speed falls below 2 revolutions/second for longer than 5 seconds, the error message is generated.

| Probable cause | Suggested actions |
|---|---|
| **1** Fan cable disconnected. | Ensure the fan is connected correctly. |
| **2** Defective fan. | Exchange the fan. |
| **3** Defective TCC board. | Exchange the TCC board. |

### Open Cover

The top foam has been removed.

The sensor on the TCC board detects when the top foam is in place. If the foam is removed, the fan is switched and peltier elements are switched OFF, and the error message is generated.

| Probable cause | Suggested actions |
|---|---|
| **1** The top foam was removed during operation. | Reinstall the top foam. |
| **2** Foam not activating the sensor. | Exchange the foam. |

### Cover Violation

The column compartment was switched on with the top cover and foam open.

The sensor on the CCM board detects if the top foam is in place. If the column compartment is switched on with the foam removed, the processor switches OFF the peltier elements after a short delay, and the error message is generated.

| Probable cause | Suggested actions |
|---|---|
| 1 The column compartment was switched on with the top cover and foam removed. | Reinstall the top cover and foam. |

### Left Temperature Timeout

The temperature of the left heat exchanger did not reach the temperature setpoint within the timeout threshold.

| Probable cause | Suggested actions |
|---|---|
| 1 Timeout threshold too short. | Increase the timeout threshold value. |
| 2 Defective left heater assembly. | Exchange the heater assembly. |
| 3 Defective TCC board. | Exchange the TCC board. |

### Right Temperature Timeout

The temperature of the right heat exchanger did not reach the temperature setpoint within the timeout threshold.

| Probable cause | Suggested actions |
|---|---|
| 1 Timeout threshold too short. | Increase the timeout threshold value. |
| 2 Defective right heater assembly. | Exchange the heater assembly. |
| 3 Defective TCC board. | Exchange the TCC board. |

### Defective Temperature Sensor

One of the temperature sensors has failed.

The TCC board monitors the signal from the sensor continually. If the signal is missing or out of range, the error message is generated.

**Defective Temperature Sensor 0:** left column.

**Defective Temperature Sensor 1**: left heat sink.

**Defective Temperature Sensor 2**: right column.

**Defective Temperature Sensor 3**: right heat sink.

**Defective Temperature Sensor 4**: ambient-correction sensor (located on left flex board).

| Probable cause | Suggested actions |
|---|---|
| **1** Flex board not connected (only if all left or right sensor error messages appear simultaneously). | Ensure the flex board is connected correctly. |
| **2** Defective heater assembly. | Exchange the heater assembly. |
| **3** Defective TCC board. | Exchange the TCC board. |

### Heater Profile

**Heater Profile 0**: left heater.

**Heater Profile 2**: right heater.

The temperature warm-up (or cooling) profile of the heater is incorrect.

When the temperature setpoint is changed, the heater begins heating (or cooling) the column heat exchanger. During this time, the processor monitors the temperature change, and checks if the temperature profile is changing in the correct direction. If the temperature is not changing as expected, the error message is generated.

| Probable cause | Suggested actions |
|---|---|
| 1 Defective heater assembly. | Exchange the heater assembly. |
| 2 Defective TCC board. | Exchange the TCC board. |

### Valve Failed

**Valve Failed 0**: failed to switch to the position where ports 1 and 2 are connected.

**Valve Failed 1**: failed to switch to the position where ports 1 and 6 are connected.

The column-switching valve failed to switch.

The switching of the column-switching valve is monitored by two micro switches on the valve assembly. The switches detect the successful completion of the valve movement within a predefined time window. If the valve fails to reach the end point, or fails to reach the end point within the time window, the error message is generated.

| Probable cause | Suggested actions |
|---|---|
| 1 Defective column-switching valve. | Exchange the column-switching valve. |
| 2 Defective TCC board. | Exchange the TCC board. |

### Column Temperature

The temperature of the column heat exchanger has exceeded the maximum limit.

**Column Temperature 0:** left heater.

**Column Temperature 2:** right heater.

For safety reasons, the maximum column heat-exchanger temperature is 105 °C. If an electronic failure occurs which causes the heater to heat continually, the current is switched off when the temperature exceeds 105 °C, and the error message is generated.

| Probable cause | Suggested actions |
|---|---|
| 1 Defective heater assembly. | Exchange the heater assembly. |
| 2 Defective TCC board. | Exchange the TCC board. |

### Heatsink Temperature

The temperature of the Peltier heatsink has exceeded the maximum limit.

**Heatsink Temperature 0:** left heater.

**Heatsink Temperature 2:** right heater

The maximum temperature of the Peltier heatsink is 70 °C. If an electronic failure occurs which causes the heatsink to reach 70 °C, the current is switched OFF and the error message is generated.

| Probable cause | Suggested actions |
|---|---|
| 1 Defective heater assembly. | Exchange the heater assembly. |
| 2 Defective TCC board. | Exchange the TCC board. |

### Defective Heater Circuit

The electronic circuit for control of the heater assemblies is defective.

The processor checks the function of the heater circuits continually. If a defect is detected in the control circuit, the processor switches OFF the heater (peltier) assemblies, and the error message is generated.

| Probable cause | Suggested actions |
|---|---|
| **1** Defective TCC board. | Exchange the TCC board. |

### Valve failed to initialize (2875)

During initialization, the valve actuator turns until the encoder reads the reference index position. An error is generated, if the reference index cannot be found within a given time.

| Probable cause | Suggested actions |
|---|---|
| **1** Defect in cable connection of valve drive control. | Check cable connection to valve drive control, replace cable. |
| **2** Defect in cable connection of valve actuator encoder reader. | Check cable connection to valve actuator encoder reader, replace cable. |
| **3** Defect of valve drive or valve actuator encoder reader. | Replace Actuator Valve **5067-4106**. |

### Unknown/Unsupported Valve detected (2872)

After powering on, the RFID tag of the valve head is read out. An error is generated, if the RFID tag does not contain valid information. The RFID can be damaged if the instrument is power cycled during a write access of the tag.

| Probable cause | Suggested actions |
|---|---|
| **1** RFID tag contains invalid information. | Replace valve head, see Table 11 on page 178 |

### Door sensor HW failure (2873)

This error is generated, if a front door is detected while the front door sensor has been disabled during the self-test.

| Probable cause | Suggested actions |
|---|---|
| **1** Defect in cable connection of door sensor to main board. | Check cable connection between door sensor and main board. |
| **2** Door sensor defective. | Replace door sensor G1316-81603, see "Replacing the Door Sensor (G1316C SL Plus)" on page 174. |

### Valve RFID access failure (2874)

The valve tag reader fails reading or writing the RFID tag of the valve head.

| Probable cause | Suggested actions |
|---|---|
| **1** Defect in cable connection of valve tag reader to main board. | Check cable connection between valve tag reader to main board. |
| **2** Valve head not installed correctly. | Review installation of valve head, see "Installing Valve Heads (G1316C SL Plus)" on page 42. |
| **3** RFID tag defective. | Replace valve head, see Table 11 on page 178. |
| **4** Valve tag reader is damaged. | Replace Actuator Valve **5067-4106**. |

# 7
# Test Functions



This chapter describes the TCC's built in test functions.

# Thermostat Function Test

## Heater Function Test Description

The heater function test is used to evaluate the cooling and heating performance of the two peltier elements.

When the test is started, both heat exchangers are cooled initially to 25 °C. This temperature is held for 12 seconds, and then the setpoint is changed to 20 °C. The time required to reach 20 °C is a measure of the cooling efficiency of the peltier elements. At 3.5 minutes, the setpoint is changed to 30 °C, and both elements begin heating. The time required to reach 30 °C is a measure of heating efficiency.

## Heater Function Test

### Thermostat Function Test Result

A typical thermostat function test profile is shown in Figure 19 on page 77.

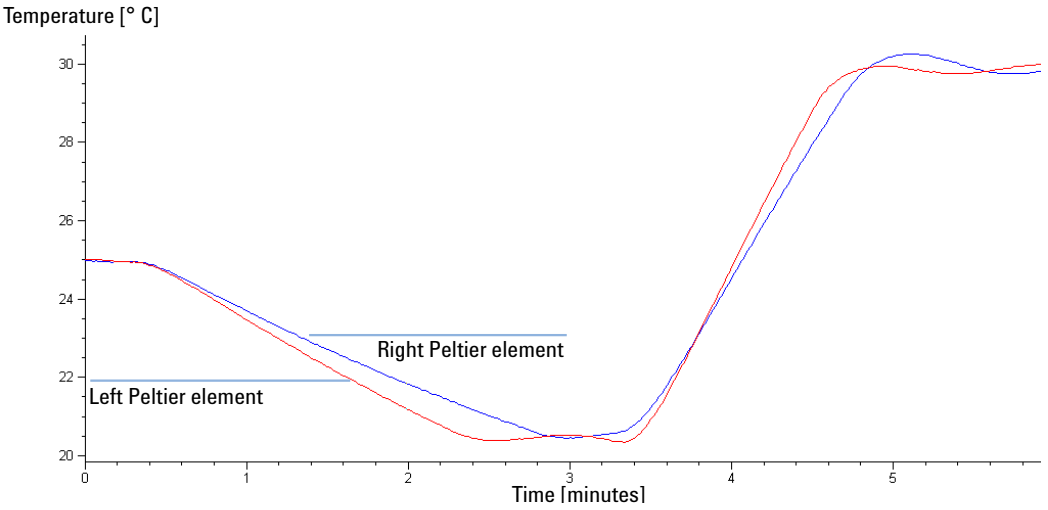



**Figure 19** Typical Thermostat Function Test Profile

## Evaluating the Thermostat Function Test

During the cooling phase, the Peltier elements should cool at a rate of >2 °C minute. During the heating phase, the temperature change should be >3 °C/minute. Defective thermostat components may cause cooling or heating rates to fall outside these limits.

## Function Test Failed

Probable Causes

- Column compartment cover not installed correctly (bad insulation).
- Air intake blocked (insufficient air flow for cooling).
- Poor peltier efficiency (if setpoint temperatures can still be reached, and are stable, there is no requirement to exchange the heater assembly).
- Defective sensors on flex board.
- Defective heater assembly.

## Suggested Actions

✔ Ensure cover is installed correctly.

✔ Ensure sufficient space is available for air circulation see "Bench Space" on page 26.

✔ Exchange the heater assembly.

# Pressure Test

For running a pressure test, please refer to the corresponding pump manual. The pressure test may be used for testing the tightness of a valve installed in the TCC.

**CAUTION**

Wrong use of pressure test may damage valve.

The current implementation of the pressure test automatically uses the maximum pressure generated by the pump used by that system.

➔ Do not use the test for modules having a lower maximum pressure than the pump as this will damage the valve. For example do not use 400 bar valve in a TCC in combination with a 600 bar pump.

# Column Thermostat Temperature Calibration

## Temperature Calibration Principle

The actual temperatures of the column heat exchangers (left and right) depend on the column setpoint temperature. For setpoint temperatures above (36 °C), the heat exchangers are heated to a temperature slightly above the setpoint temperature. Conversely, for setpoint temperatures below (36 °C), the heat exchangers are kept at a temperature slightly below the setpoint temperature. This fine temperature correction compensates for the small amount of heat exchange through the instrument housing, and ensures the column is always kept at the setpoint temperature.

At (36 °C), the column setpoint and heat-exchanger temperatures are equal (temperature cross-over point). This is the temperature at which a calibrated measuring device can be used to calibrate the column thermostat.

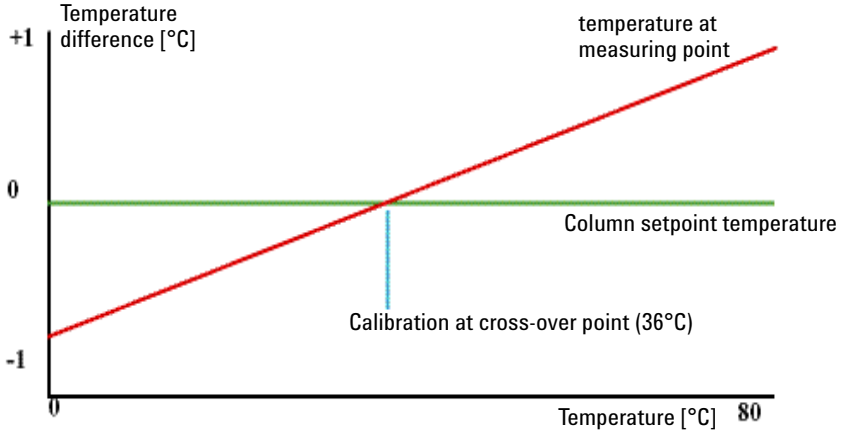



**Figure 20** 1-Point Calibration at the Temperature Cross-Over Point

The column thermostat is calibrated correctly when the measured temperature (using the external measuring device, “Column Thermostat Temperature Calibration Procedure” on page 82) and the cross-over temperature (36 °C) of both heat exchangers (left and right) are within a range of ± 0.5 °C.

# Column Thermostat Temperature Calibration Procedure

**Tools required** Temperature measuring device (see note below)

**Parts required** **Description**

Calibrated temperature measuring device

**NOTE** For the measuring and calibration process Agilent Technologies recommends a thermometer with 0.1 °C precision. Contact the local Agilent Technologies support representative for ordering information.

**NOTE** The figures in this procedure refer to a specific type of temperature sensor (Heraeus, Quat340, quartz surface-temperature measurement sensor). Other sensors may require a different fixing.

1. Install the temperature sensor ("Installing the Temperature Sensor" on page 83).
2. Select the column-compartment temperature calibration mode in the user interface.
3. Wait for the temperature to stabilize at the calibration temperature (36 °C).
4. Measure the temperature of the heat exchanger.
5. If the measured temperature deviates by more than ± 0.5 °C from the actual temperature, enter the measured value in the measured-temperature field for the left heat exchanger.
6. Install the sensor at the measurement point on the right heat exchanger. Repeat the calibration procedure for the right heat exchanger.

**NOTE** Limits

After calibration, the measured temperature and the calibration temperature should be within ± 0.5 °C. The maximum deviation which can be adjusted is ± 1.6 °C. If the measured value and the calibration value differ by more than ± 1.6 °C, this is an indication that a problem exists, "Column Thermostat Calibration Problems" on page 83.

## Column Thermostat Calibration Problems

If the temperature cannot be calibrated, check the following:

- Has the thermostat front cover been closed correctly?
- Is the measuring device functioning correctly, and is calibrated according to the manufacturers instructions.

### Hardware Failures

Probable hardware failures that can lead to a failed calibration procedure are:

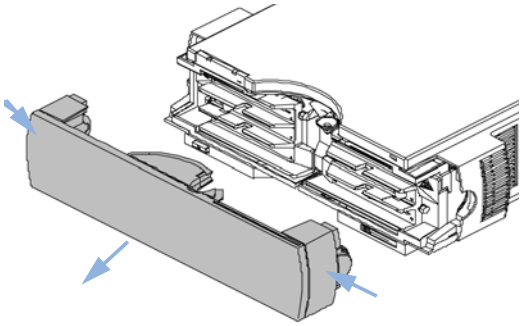
- Defective or wrongly calibrated measuring device.
- Defective heater assembly.
- Defective ambient-temperature sensor.
- Defective CCM board.

## Installing the Temperature Sensor

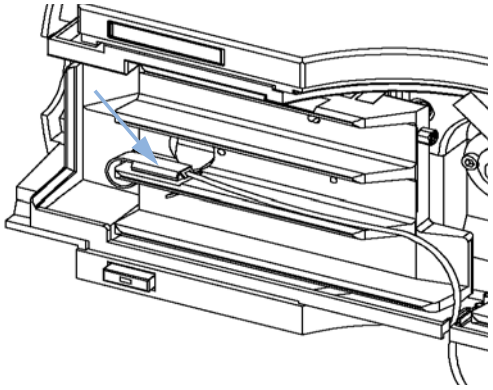
Installation of the temperature sensor is required for the temperature calibration and temperature verification procedures.

**NOTE** The figures below refer to a specific type of temperature sensor (Heraeus, Quat340, quartz surface-temperature measurement sensor). Other sensors may require a different fixing.

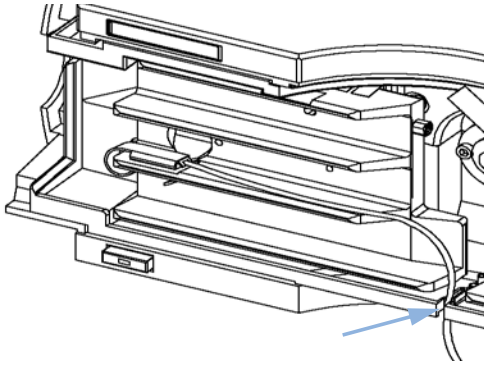
**1** Remove the front cover.



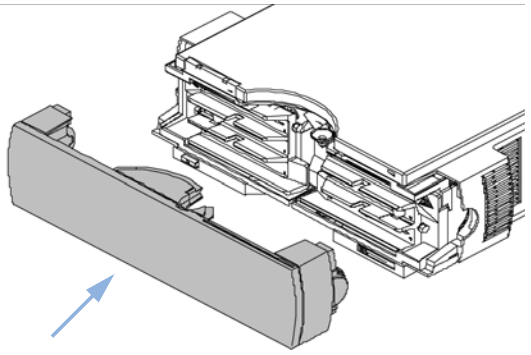
**2** Install the temperature sensor at the measurement position on the left heat exchanger.



**3** Route the sensor wire through the slit in the leak tray.



**4** Re-install the front cover.



# 8
# Maintenance



This chapter describes the maintenance of the TCC.

# Introduction to Maintenance and Repair

## Simple Repairs

The column compartment is designed for easy repair. The most frequent repairs such as change of column and column switching valve head parts can be done from the front of the column compartment without removing the TCC from the HPLC stack. These repairs are described in "Maintenance" on page 85.

## Exchanging Internal Parts

Some repairs may require exchange of defective internal parts. Exchange of these parts requires removing the column compartment from the stack, removing the covers, and disassembling the column compartment. The security lever at the power input socket prevents that the column compartment cover is taken off when line power is still connected.

These repairs are described in "Repair" on page 107.

# Warnings and Cautions

**WARNING**

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

**Risk of stroke and other personal injury. Repair work at the module can lead to personal injuries, e. g. shock hazard, when the module cover is opened and the instrument is connected to power.**

➔ Never perform any adjustment, maintenance or repair of the module with the top cover removed and with the power cord plugged in.

➔ The security lever at the power input socket prevents that the module cover is taken off when line power is still connected. Never plug the power line back in when cover is removed.

---

**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 and hazardous solvents**

**The handling of solvents and reagents can hold health 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.

---

**CAUTION**

Electronic boards and components are sensitive to electrostatic discharge (ESD).

ESD can damage electronic boards and components.

➔ In order to prevent damage always use ESD protection when handling electronic boards and components.

---

**CAUTION**

Hot heat exchangers 

The column compartment has two heat exchanger assemblies that might be hot.

➔ Allow them to cool down before starting repairs.

---

# Overview of Maintenance

The following pages describe maintenance procedures (simple repairs) that can be done without opening the main cover.

**Table 6** Simple Repairs

| Procedure | Typical Frequency | Notes |
|---|---|---|
| "Changing Column Identification Tags" on page 91 | When column performance or new application requires a change | |
| "Replacing Head Parts of Column Switching Valve (G1316A/G1316B SL)" on page 93 | If the valve performance shows indication of leakage or wear | |
| "Correcting Leaks" on page 99 | If a leak has occurred | Check for leaks |

# Cleaning the Column Compartment

The column compartment case should be kept clean. Cleaning should be done with a soft cloth slightly dampened with water or a solution of water and a mild detergent. Make sure not to let liquid drip into your module.

**WARNING**

**Liquid dripping into the electronic compartment of your module.**

**Liquid in the module electronics can cause shock hazard and damage the module.**

➔ Do not use an exessively damp cloth during cleaning.

➔ Drain all solvent lines before opening any fittings.

# Changing Column Identification Tags

The column compartment is equipped with an column-identification system, that stores column specific information. Two identification antennas are incorporated in the heat exchanger assemblies.

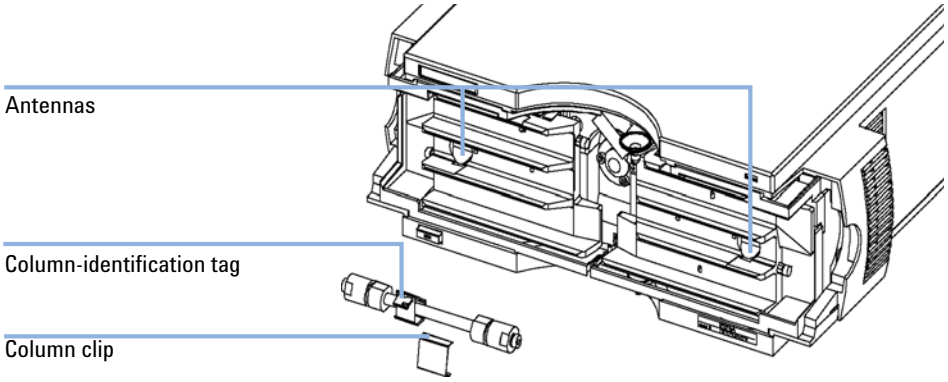



**Figure 21** Column-Identification System

**When** If column is used on the opposite heat exchanger or a tag is added to a new column.

**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | 5062-8588 | Column identification tag, pack of 3 |

1 The identification tag can be easily removed from the column.

2 The tag needs to be placed differently, depending on whether the column is installed at the left or right heat exchanger, see Figure 15 on page 49 and Figure 16 on page 50. The Agilent logo should always be at front.

When correctly placed on the heat exchanger, the distance between tag and antenna is 1–2 mm. This is the optimum distance for proper function.

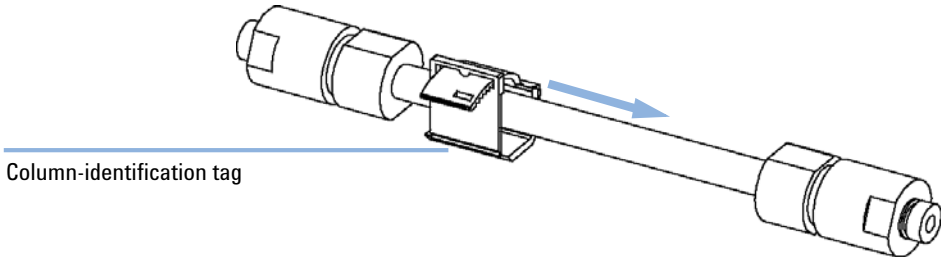



**Figure 22** Column-Identification Tag for Left Heat Exchanger

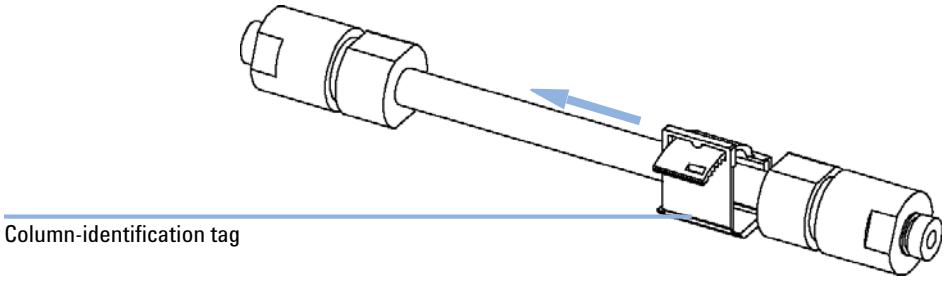



**Figure 23** Column-Identification Tag for Right Heat Exchanger

3 For columns with small diameter, a cable tie wrap should be used to fix the column identification tag to the column. Assure that the tie wrap does not block the front cover.

# Replacing Head Parts of Column Switching Valve (G1316A/G1316B SL)

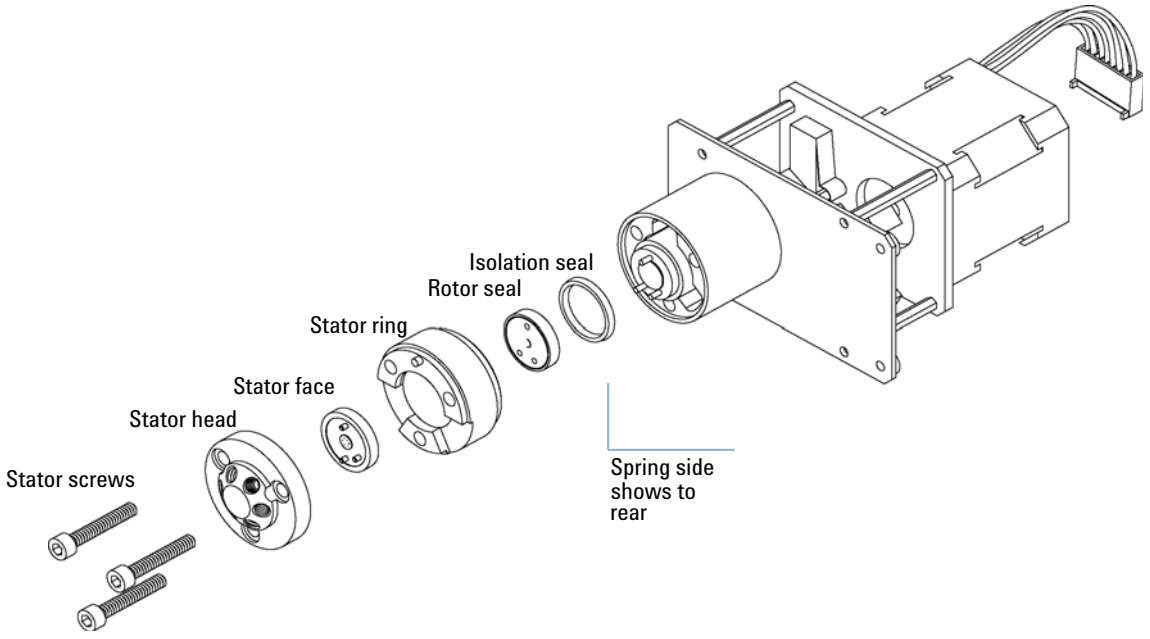


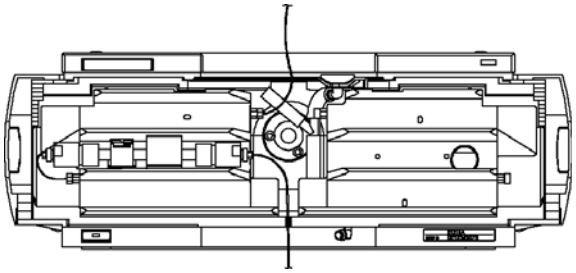

**Figure 24** Column Switching Valve Parts

**When** If valve leaks.

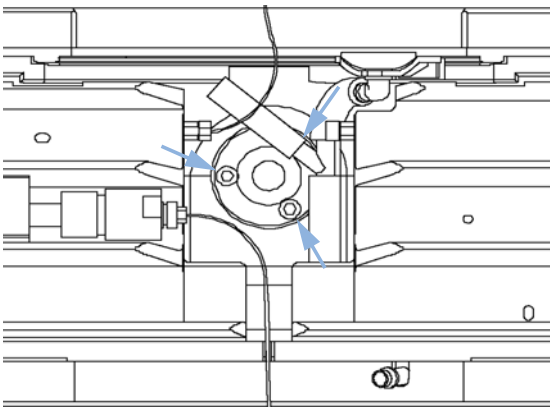
**Tools required** 1/4 inch wrench
9/64 inch hex key

**Parts required** **Description**
For parts refer to "Valve Options Overview" on page 178.

1 Remove capillaries from ports 1, 5, and 6.



2 Loosen each fixing stator screw two turns at a time. Remove bolts from head.



3 Remove the stator head and the ceramic stator face.

**NOTE** Valve Head, 8 Position/9 Port, High Pressure **part number: 5067-4107** has no stator face.

4 Remove the stator ring.

5 Remove the rotor seal (and isolation seal if damaged or contaminated).

6 Install the new isolation seal (if required). Ensure the metal spring inside the ring faces towards the valve body.

7 Install the new rotor seal.

8 Replace the stator ring. Ensure the stator ring is flush with the valve body.

9 Place the new (if required) ceramic stator face in place on the stator head. Reinstall the stator head.

**NOTE** Valve Head, 8 Position/9 Port, High Pressure **part number: 5067-4107** has no stator face.

10 Insert the stator screws in the stator head. Tighten the screws alternately two turns at a time until the stator head is secure.

11 Reconnect the pump capillaries to the valve ports. Slide the waste tube into the waste holder in the leak tray.

**CAUTION** Wrong use of pressure test may damage valve.

The current implementation of the pressure test automatically uses the maximum pressure generated by the pump used by that system.

➔ Do not use the test for modules having a lower maximum pressure than the pump as this will damage the valve. For example do not use 400 bar valve in a TCC in combination with a 600 bar pump.

12 Perform a pressure-tightness test to ensure the valve is pressure tight to 400 bar.

# Adding Heater and Cooling Devices (G1316B SL/G1316C SL Plus)

The addtional heater and cooling devices can be arranged in the G1316B SL/G1316C SL Plus in various locations depending on the application needs. Some examples are shown below.

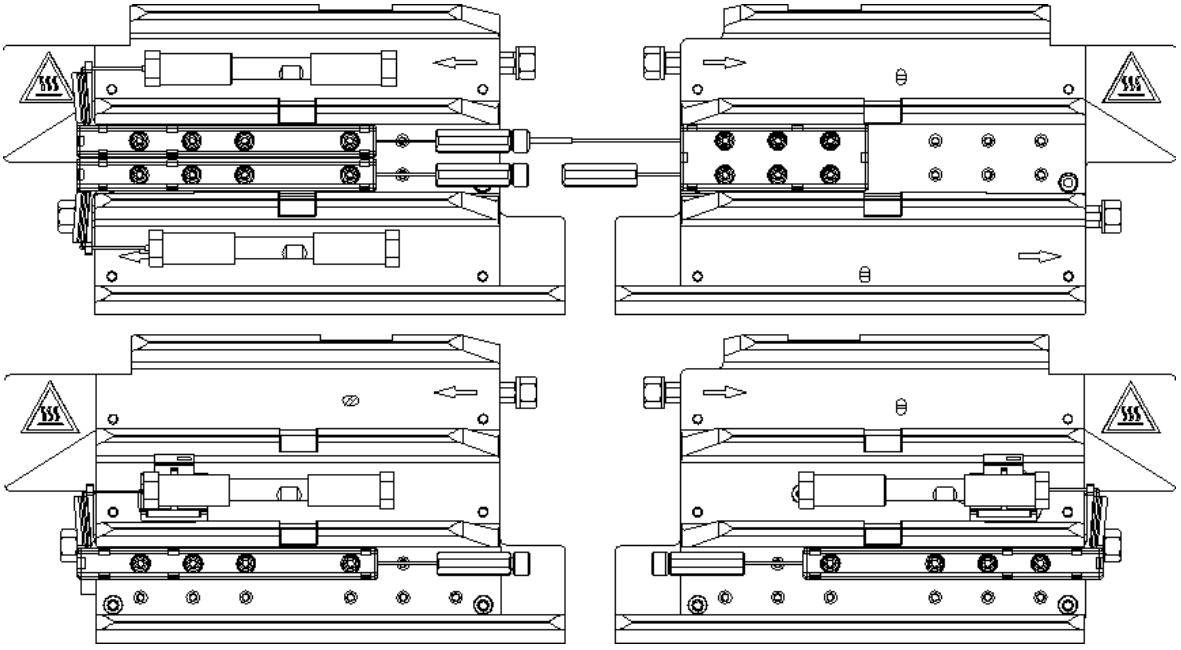


**Figure 25** Arrangements of Heater and Cooling Devices (G1316B SL/G1316C SL Plus)

**NOTE** If the additional heater and cooling devices are used as shown above, the column identification system cannot be used. If the column identification system is required, fix the heater and cooling devices in the upper or lower locations or fix them right/left of the current location.

The heater and cooling devices are mounted on a carrier that can be fitted to the left and/or right heat exchangers.

## Fixing Heater or Cooling Devices (G1316B SL)

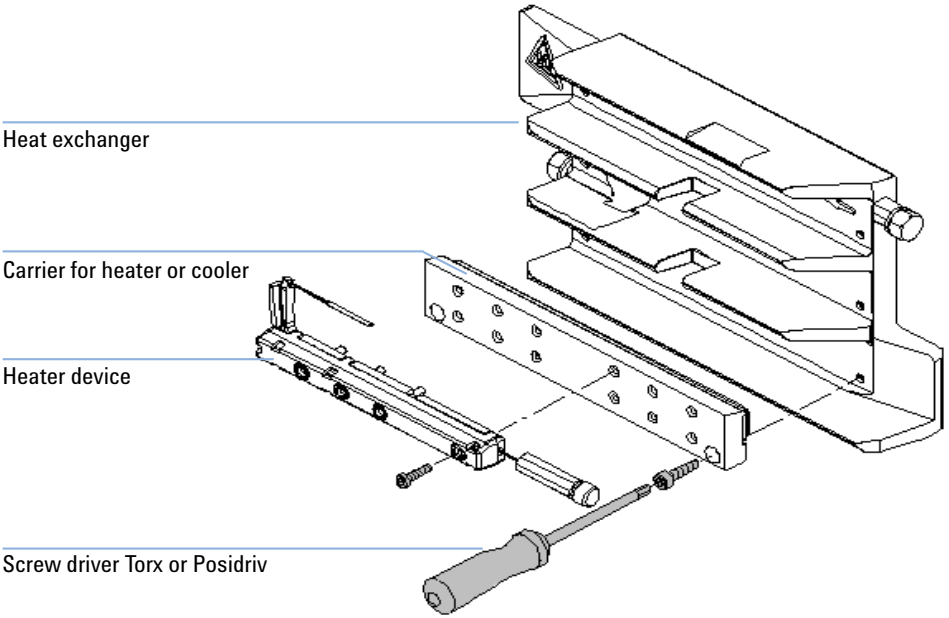



**Figure 26** Fixing Heater or Cooling Devices (G1316B SL)

## Fixing the Low Dispersion Heat Exchangers (G1316C SL Plus)

For the G1316C SL Plus, additional heat exchanger and cooling devices can be installed on the carrier **part number: G1316-89200** using 3 screws (**part number: 0515-1052**, included to part number for carrier) as shown in figure below.

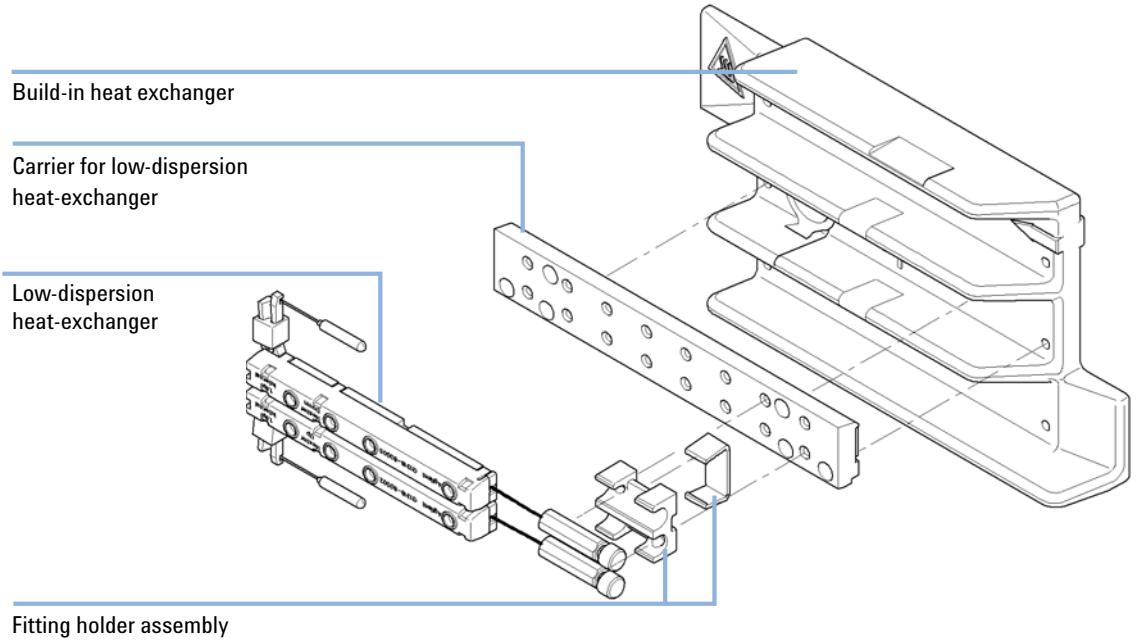
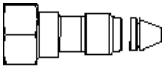



**Figure 27** Installing the low dispersion heat exchangers

## Choose Compatible Fittings

For the heater device inlet capillary choose fittings which are compatible to your column.

Swagelock compatible columns (5065-4454, pk of 10, with ferrules)



Fitting screw long

Swagelock compatible columns, removable (0100-2086)

Nut seal tight

**Figure 28** Fitting type depends on column type

# Correcting Leaks

**When** If a leakage has occurred at the heat exchanger or at the capillary connections or at the column switching valve.

**Tools required** Tissue, pipette
Wrench 1/4 – 5/16 inch for capillary connections

**NOTE** Depending on the column position or the use of additional heat-exchanger assemblies, the view of Figure 29 on page 99 may vary.

1. Remove the front cover.
2. Use a pipette and tissue to dry the leak sensor area.
3. Observe the capillary connections and the column switching valve for leaks and correct, if required.
4. Re-install the front cover.

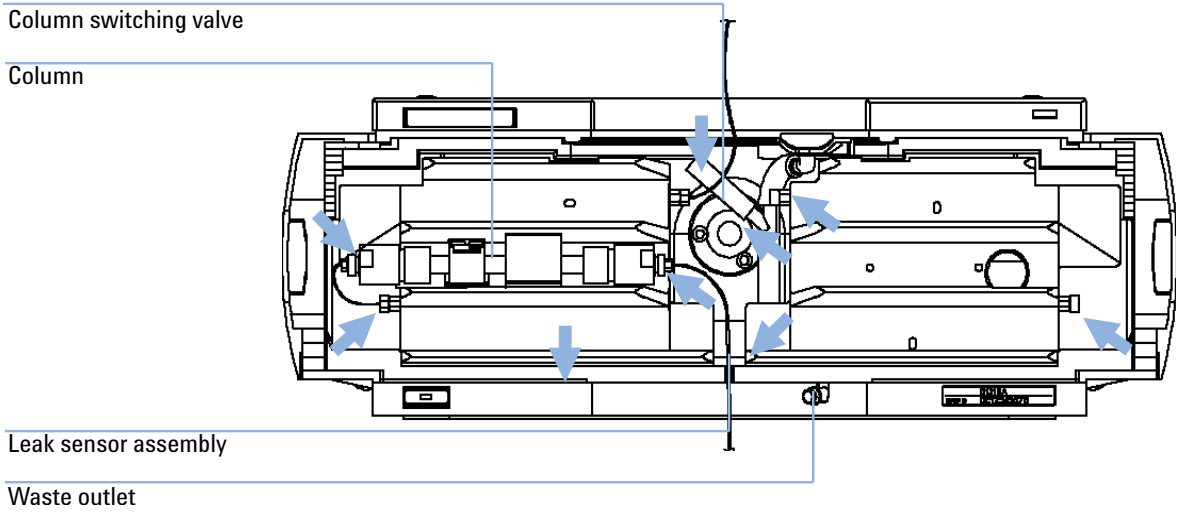



**Figure 29** Possible Leak Areas

# Replacing the Column Compartment's Firmware

The installation of *older* firmware might be necessary:

- to keep all systems on the same (validated) revision, or
- if third part control software requires a special version.

To upgrade/downgrade the TCC's firmware the following steps have to be performed:

**When**

If new version solves problems of currently installed version or after exchange of the TCC main board (CCM) the version on board is older than previous installed one.

**Tools required**

LAN/RS-232 Firmware Update Tool, or Instant Pilot G4208A or Control Module G1323B

**Parts required**

**Description**

Firmware, tools and documentation from Agilent web site

**Preparations**

Read update documentation provided with the Firmware Update Tool.

1 Download the module's firmware, the LAN/RS-232 FW Update Tool Version 2.10 or above and the documentation from the Agilent web http://www.chem.agilent.com/scripts/cag_firmware.asp.

2 Load the firmware into the TCC as described in the documentation.

**NOTE**

The G1316B SL requires firmware revision A.06.02 or higher (main and resident).

The G1316C SL Plus requires firmware revision A.06.10 or higher (main and resident).

# Replacing Valve Heads (G1316C SL Plus)

Several optional valve heads are available for the G1316C, which can be installed and exchanged easily.

**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | 5067-4107 | 8pos/9prt valve head high pressure and/or |
| 1 | 5067-4108 | 8pos/9prt valve head low pressure |

**CAUTION**

Valve Damage

Using a low pressure valve on the high pressure side can damage the valve.

➔ When using multiple column compartments as part of a method development solution, make sure that the high pressure valve head is connected to the autosampler and the low pressure valve head is connected to the detector.

➔ For details, please refer to the Method Development Solution User and Installation Guide (**part number: G4230-90000**).

**CAUTION**

Column Damage or Bias Measurement Results

Switching the valve to a wrong position can damage the column or bias measurement results.

➔ Fitting the lobe to the groove is essential for making sure the valve is switched to the correct position.

**CAUTION**

Valve properties are read from the valve head RFID tag during initialization of the module. Valve properties will not be updated, if the valve head is replaced while the module is on.

Selection of valve port positions can fail, if the instrument does not know the properties of the installed valve.

➔ Always switch off the instrument when replacing the valve head.

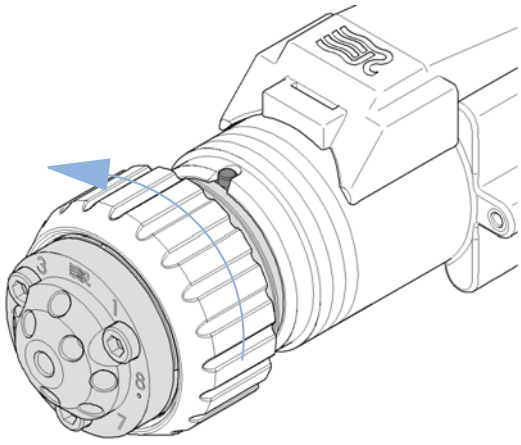
**CAUTION** The valve actuator contains sensitive optical parts, which need to be protected from dust and other pollutions. Pollution of these parts can impair the accurate selection of valve ports and therefore bias measurement results.

➔ Always install a valve head for operation and storage. For protecting the actuator, a dummy valve head (part of transportation lock kit **part number: G1316-67001**) can be used instead of a functional valve. Do not touch parts inside the actuator.

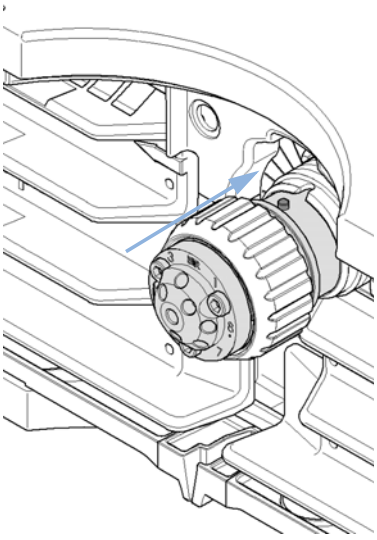
**1** Switch off the module.

**2** Push the valve head for bringing it to its outer position and unscrew all capillary connections from the valve head.

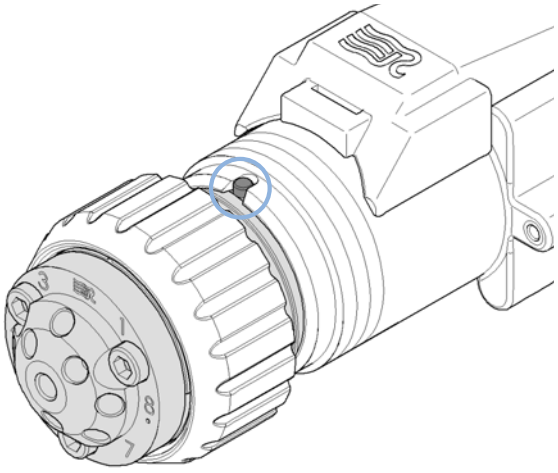
**3** Unscrew the valve head.



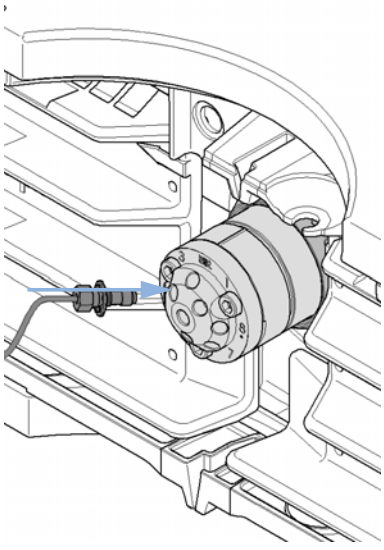
**4** Put the new valve head onto the valve drive such that the lobe fits to the groove.



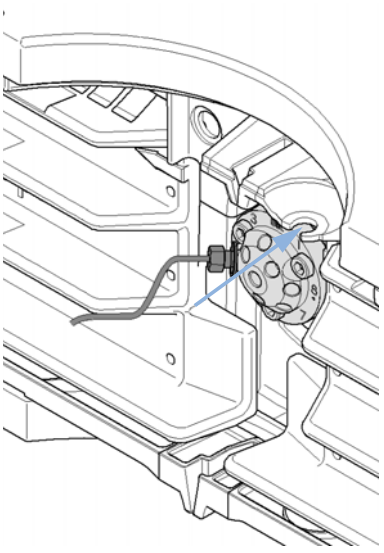
**5** Screw the valve head onto the valve drive using the union nut.



**6** Install all required capillary connections to the valve head



**7** Push the valve head until it snaps in and stays in the rear position.



**8** Switch on the module.

# Preparing the G1316C SL Plus for Transportation

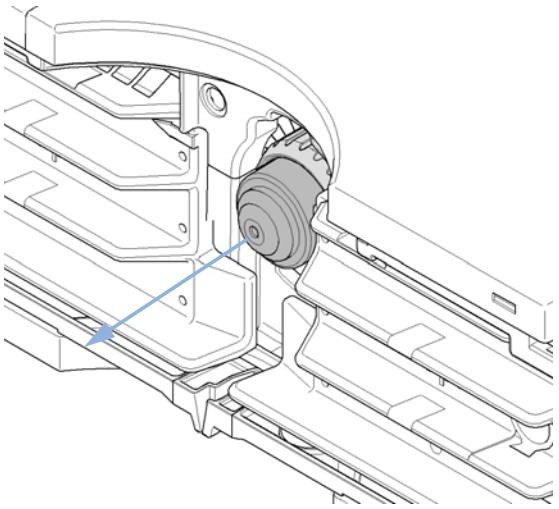
**When** If the Thermostatted Column Compartment SL Plus G1316C shall be transported

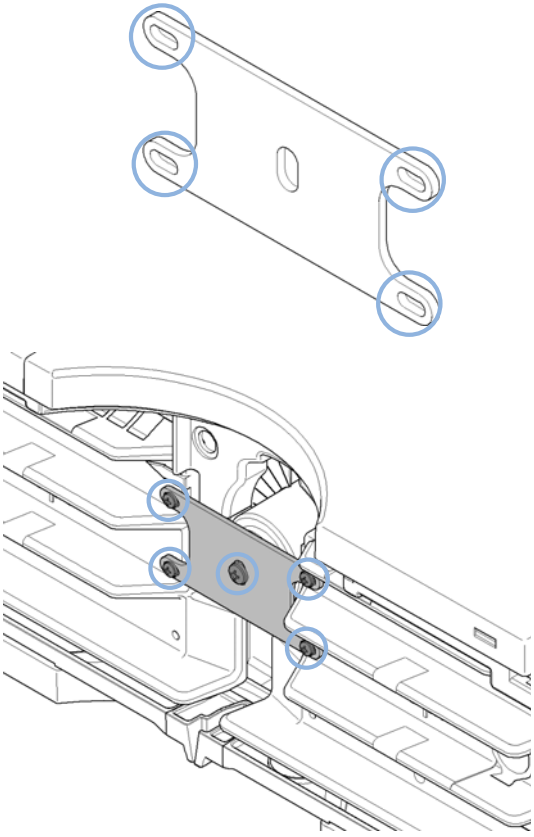
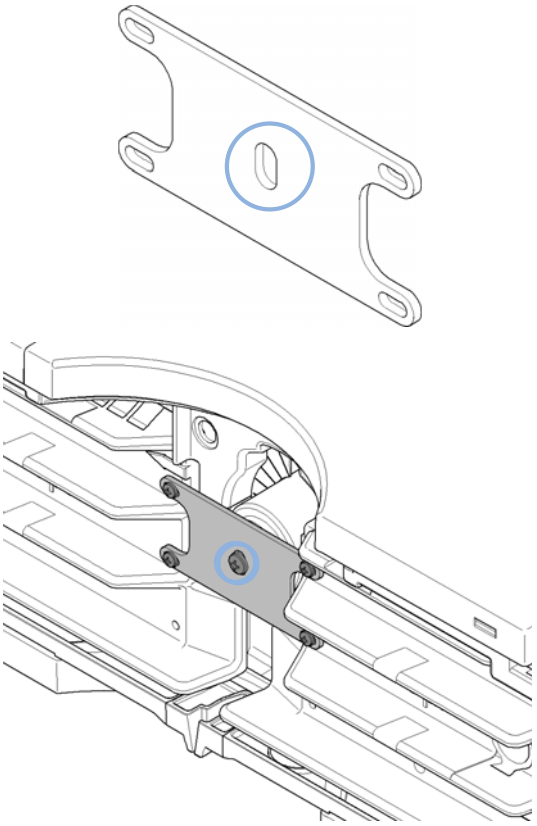
**Tools required** Screwdriver Pozidriv 1 PT3

**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | G1316-67001 | Transportation Lock Kit |

The module has been shipped with transportation locks, which must be used for transportation protection. A transportation lock kit can be re-ordered using

| | |
|---|---|
| **1** Remove the valve head as described in "Replacing Valve Heads (G1316C SL Plus)" on page 101. | **2** Replace the valve head by the transportation valve head. Bring the transportation valve head to the outer position.  |

| | |
|---|---|
| **3** Use 4 screws M3x8 (**0515-0897**) for fixing the lock plate (**G1316-03701**) to the heat exchangers in the outer positions of the plate.  | **4** Use a screw (**2680-0128**) for fixing the lock plate to the transportation valve head (**G1316-40002**) in the central position of the plate.  |

# 9 Repair



This chapter gives instructions on how to repair the TCC.

# Cautions and Warnings

**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**

**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.

---

**WARNING**

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

**Risk of stroke and other personal injury. Repair work at the module can lead to personal injuries, e. g. shock hazard, when the module cover is opened and the instrument is connected to power.**

➔ Never perform any adjustment, maintenance or repair of the module with the top cover removed and with the power cord plugged in.

➔ The security lever at the power input socket prevents that the module cover is taken off when line power is still connected. Never plug the power line back in when cover is removed.

---

**NOTE**

The electronics of the column compartment will not allow operation of the module when the top cover and the top foam are removed. A safety light switch on the main board will inhibit the operation of the fans immediately. Voltages for the other electronic components will be turned off after 30 seconds. The status lamp will light red and an error will be logged into the logbook of the user interface. Always operate the column compartment with the top covers in place.

**CAUTION**

Electronic boards and components are sensitive to electrostatic discharge (ESD).

ESD can damage electronic boards and components.

➔ In order to prevent damage always use ESD protection when handling electronic boards and components.

**CAUTION**

Hot heat exchangers 

The column compartment has two heat exchanger assemblies that might be hot.

➔ Allow them to cool down before starting repairs.

# Removing the Top Cover and Foam

**When** For all repairs inside the column compartment

**Tools required** Screwdriver Pozidriv 1 PT3

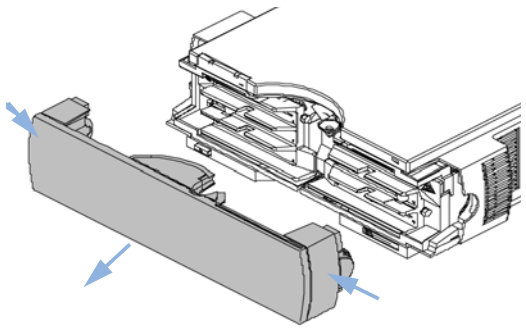
**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | G1316-68714 | Front cover G1316A |
| 1 | G1316-68724 | Front cover G1316B SL |
| 1 | G1316-68754 | Front Cover G1316C SL Plus |
| 1 | G1316-68713 | Plastic kit G1316A/G1316B SL |
| 1 | G1316-68723 | Plastik Cover Kit G1316C SL Plus |
| 1 | G1316-68702 | Foam parts G1316A/G1316B SL |
| 1 | G1316-68712 | Foam parts G1316C SL Plus |

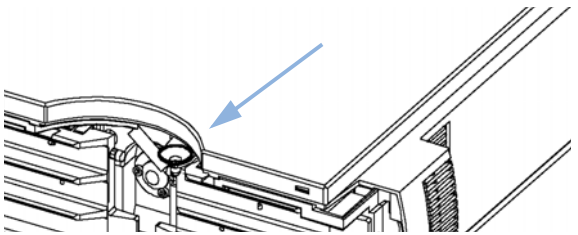
**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.

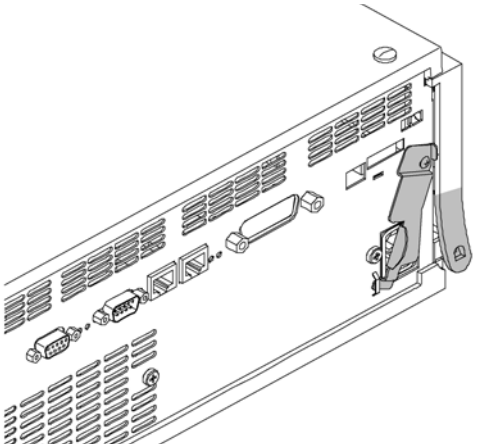
**1** Press the release buttons and remove the front cover.



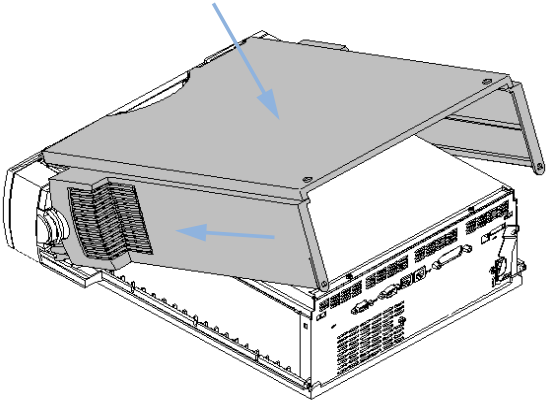
**2** Pull the leak funnel out of the leak funnel holder.



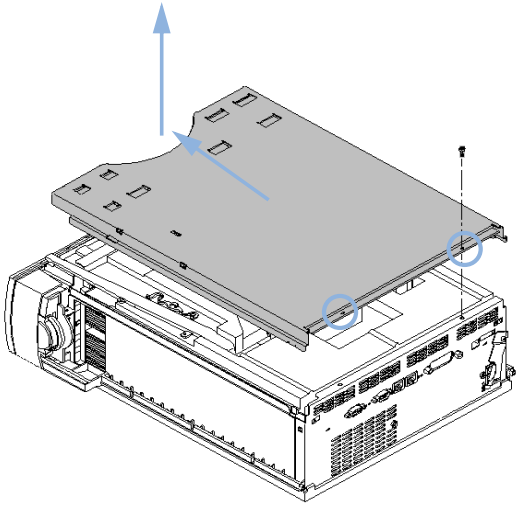
**3** Move the power lock across the power inlet and lift the clips on the rear of the cover.



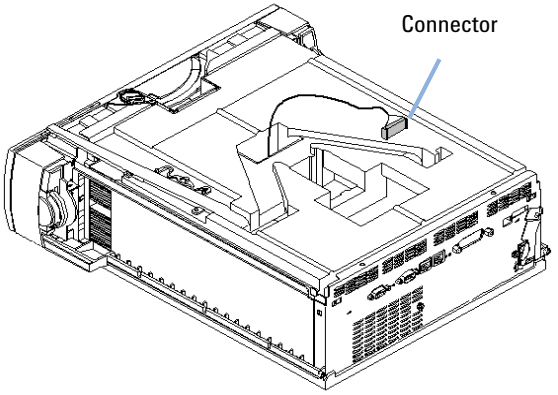
**4** Lift the cover up and slide it towards the rear.



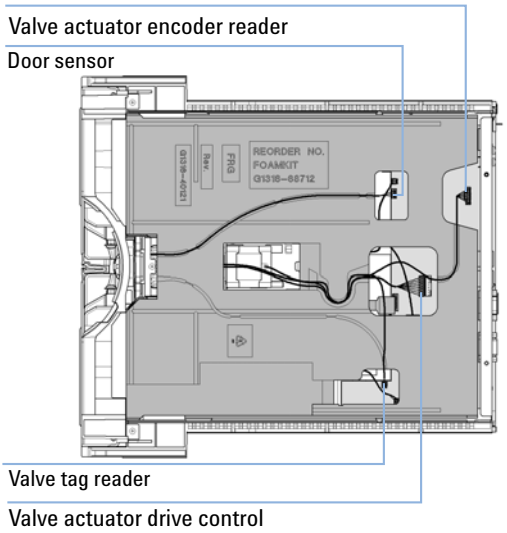
**5** Unscrew the screws at the rear of the top plate, slide the plate towards the front and remove it.



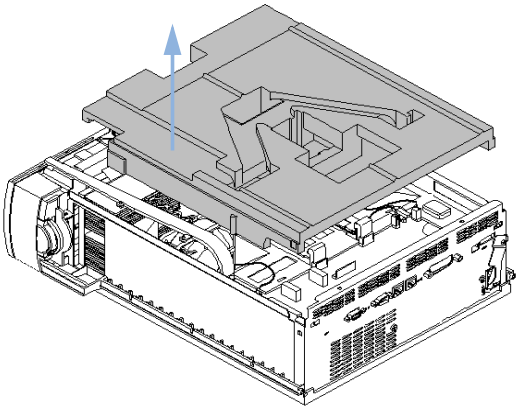
**6** If installed, disconnect the connector of the column switching valve from column compartment (G1316A/G1316B SL).



**7** For G1316C, remove the cables of the valve tag reader, valve actuator encoder reader, valve actuator drive control and door sensor.



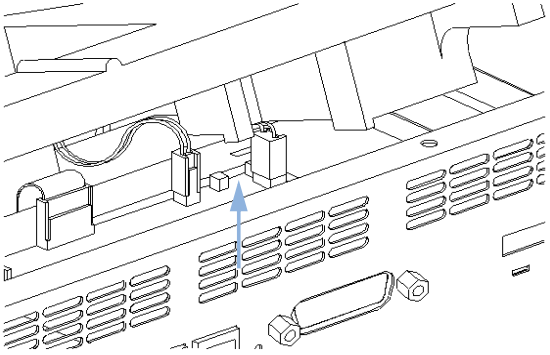

**8** Remove the top foam.



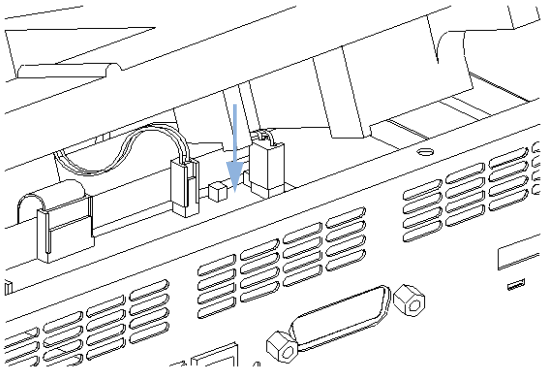
**NOTE**

Do not connect a power plug to the column compartment after removing the top covers.
A safety light switch on the main board will turn OFF fan (immediately) and electronics (after 30 seconds) to avoid the operation with removed covers. An error will be generated (status lamp lights red) and the logbook will show an error message

**9** Position of the foam in the safety light switch.



**10** Position of safety light switch on the main board when removing the foam.



# Removing a Valve

## Removing a Valve from the Thermostatted Column Compartment (G1316A/G1316B SL)

**When** If valve failed or bottom foam part has to be removed for other replacements

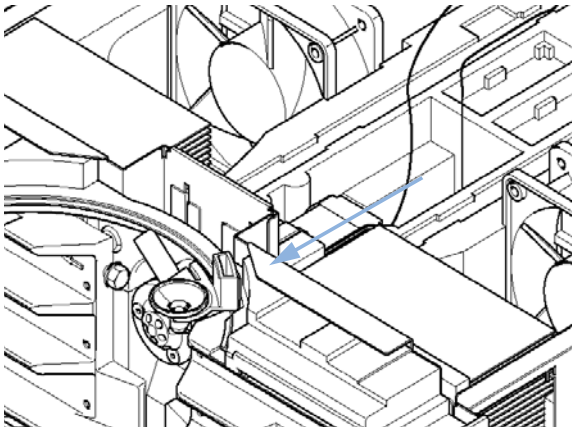
**Tools required** Screwdriver Pozidriv 1 PT3

Wrench 1/4 – 5/16 inch for capillary connections

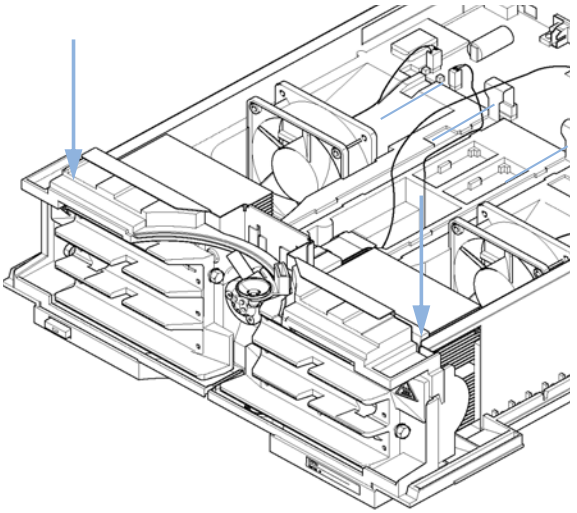
**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section, see "Removing the Top Cover and Foam" on page 110.

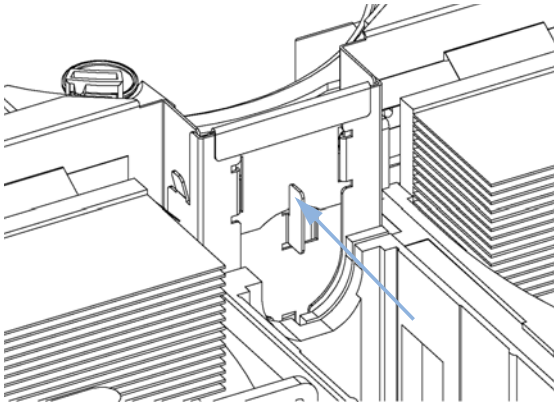
**1** Disconnect the grounding connection of the valve at the Z-panel.



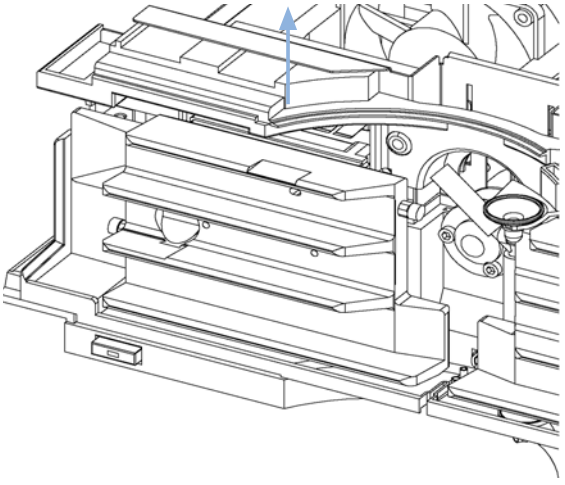
**2** Unscrew the Z-panel.



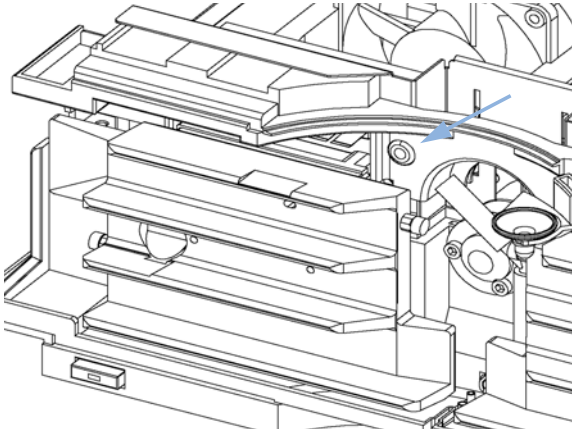
**3** Press against the rear of the Z-panel to release the metal plate from the guide and pull it carefully upwards.



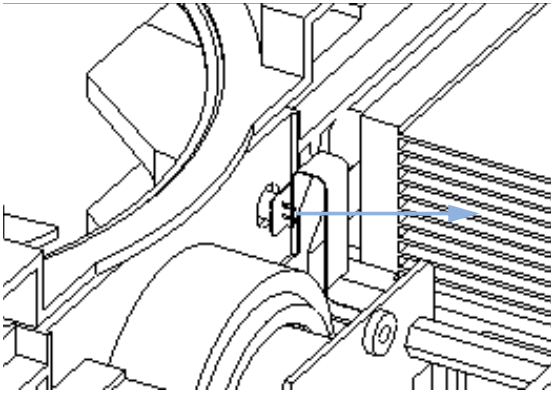
**4** Lift the Z-panel together with the top plastic panel several centimeters out of the guide, then ...



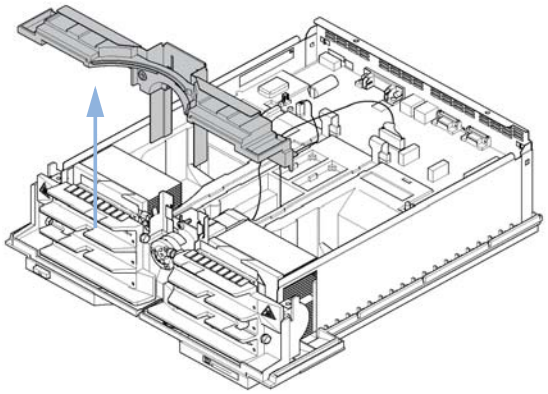
**5** ... locate the ambient temperature sensor in the top plastic part and push it towards the rear.



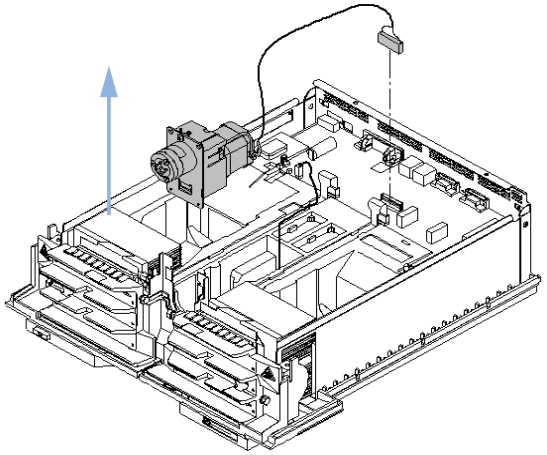
**6** Carefully remove the ambient temperature sensor plugged into the rear of the top plastic panel.



**7** Pull the top plastic panel together with the Z-panel completely out of the guide.



**8** Remove the Valve from its location.



**NOTE**

For the installation refer to "Installing a Valve (G1316A/G1316B SL)" on page 119.

# Removing the sliding unit (G1316C SL Plus)

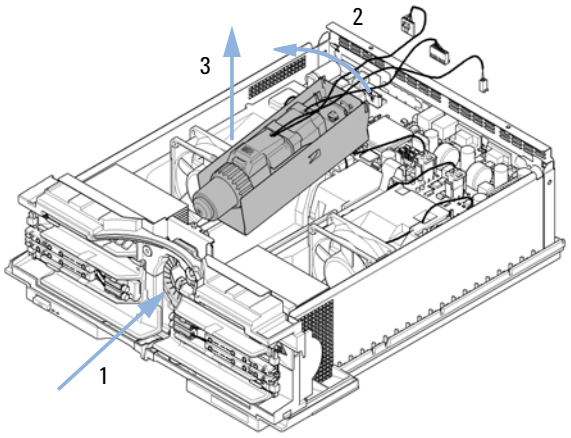
**When** If valve actuator or sliding unit need to be replaced.

**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section.

1 Push the valve head such that it snaps in at its rear position.

2 Lift up the sliding unit at the rear.




3 Carefully remove the sliding unit from the bottom foam part and pull it out of the valve liner.

**NOTE** If the thermostatted column compartment shall be operated without valve and sliding unit, the opening must be closed using an radio frequency shield and the valve cover in order to avoid radio frequency emission from the module, see "Installing the Radio Frequency Shield (G1316C SL Plus)" on page 170

# Replacing the Valve Actuator (G1316 C SL Plus)

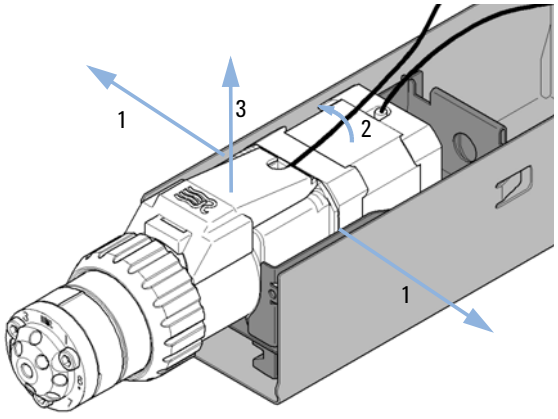
**When** If the valve actuator shall be replaced.

**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | 5067-4106 | Actuator Valve |

**Preparations** Remove the sliding unit from the bottom foam part ("Removing the sliding unit (G1316C SL Plus)" on page 117).

1 Slightly expand the metal housing of the sliding unit (1), twist out the valve actuator (2) and lift it out (3) of the sliding unit.



# Installing a Valve

## Installing a Valve (G1316A/G1316B SL)

**When** For first time installation or after it was removed

**Tools required** Screwdriver Pozidriv 1 PT3

Wrench 1/4 – 5/16 inch for capillary connections

**Preparations** Open the column compartment as described in "Removing a Valve from the Thermostatted Column Compartment (G1316A/G1316B SL)" on page 114.

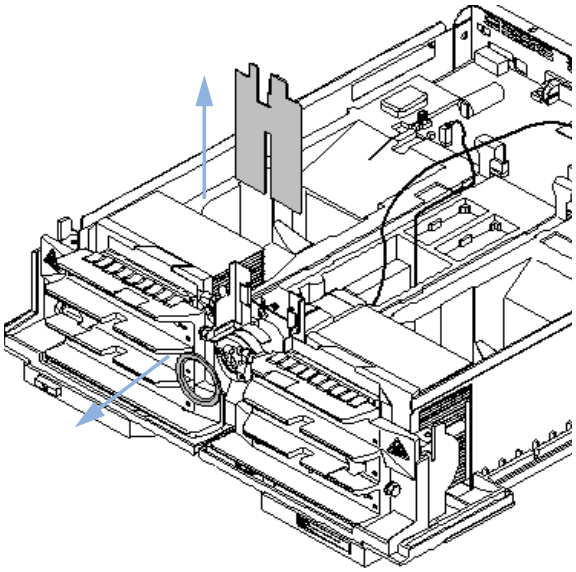
**CAUTION** The flexible cables close to the heat exchanger assemblies may be easily damaged.

➔ Be careful that the flexible cables close to the heat exchanger assemblies are not damaged, especially during steps 3 through 6.

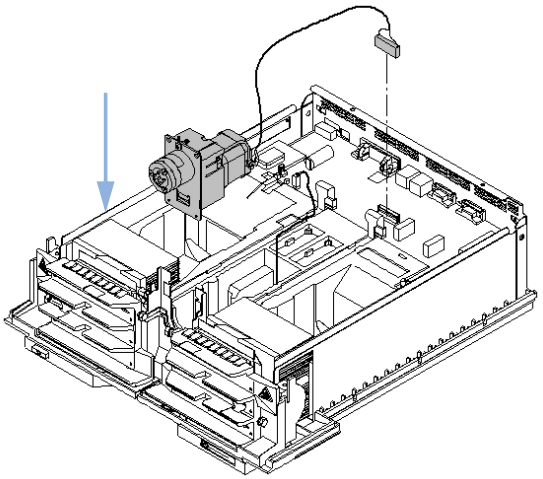
**CAUTION** The ambient temperature sensor may be damaged if incorrectly installed.

➔ Ensure that the ambient temperature sensor is completely plugged into the rear of the top plastic panel.

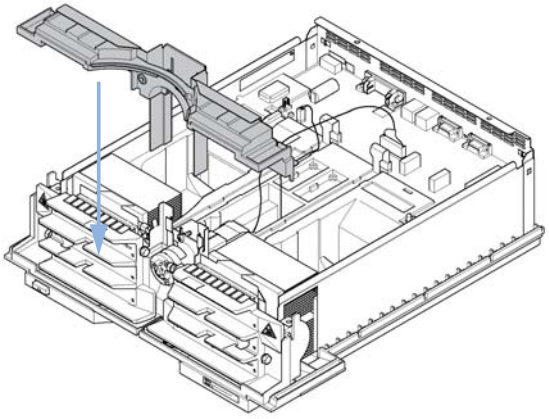
**1** If no column valve is installed, remove the RFI-shield and the plastic cover (no longer used).



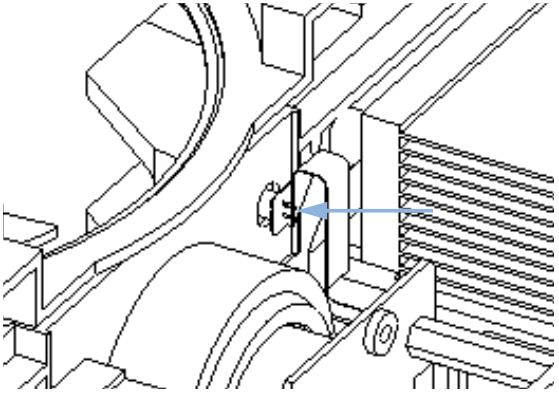
**2** Replace the valve into its location.



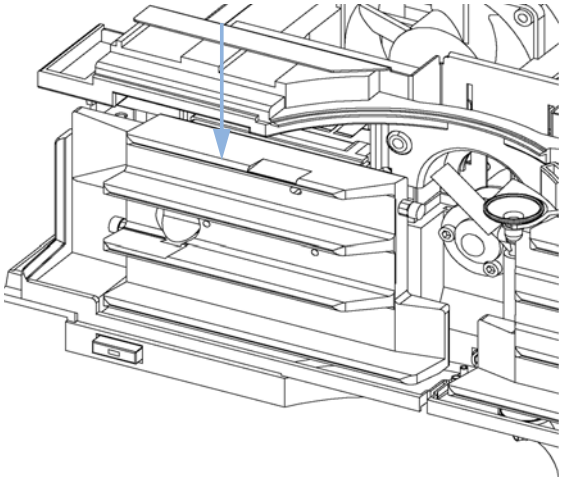
**3** Carefully insert the top plastic panel together with the Z-panel into the guide and press it half-way down.



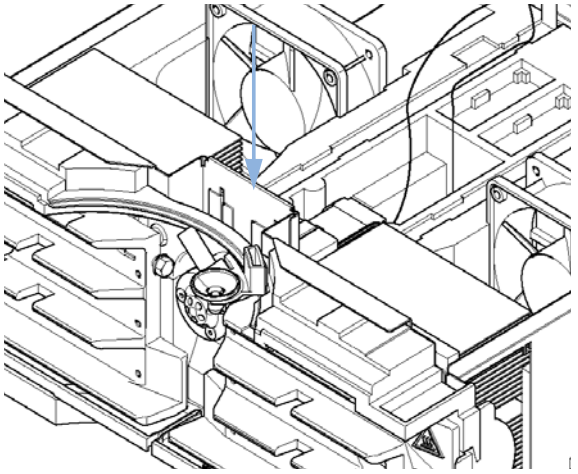
**4** Carefully plug the ambient temperature sensor into the rear of the top plastic panel.



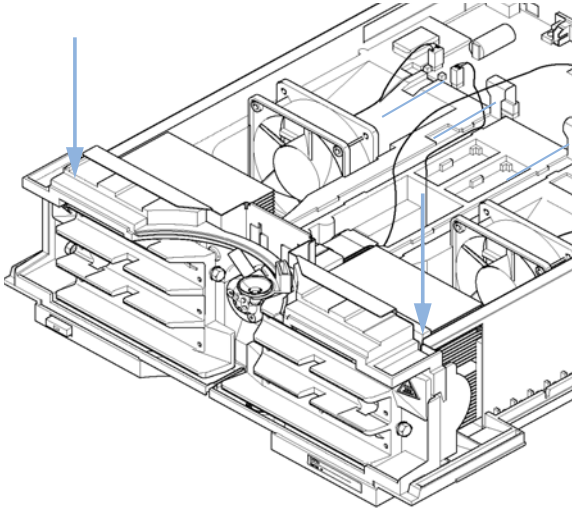
**5** Press the Z-panel together with the Top Plastic Panel completely down.



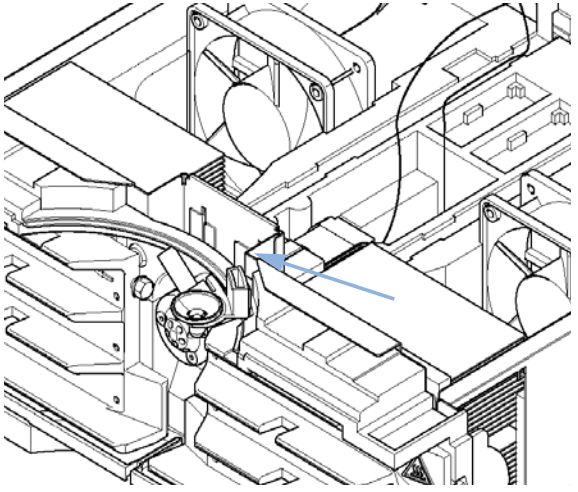
**6** Press down completely until it clicks into its holding position.



**7** Fix the Z-panel with the two screws.



**8** Reconnect the grounding connection of the valve at the Z-panel.



**Next Steps:**

9 Reinstall the foam section, the top cover and front cover, see "Installing the Foam and the Top Cover (G1316A/G1316B SL)" on page 162.

10 Place the column compartment back into stack and reconnect capillaries and the power cable.

11 Turn ON the column compartment.

# Installing the sliding unit (G1316C SL Plus)

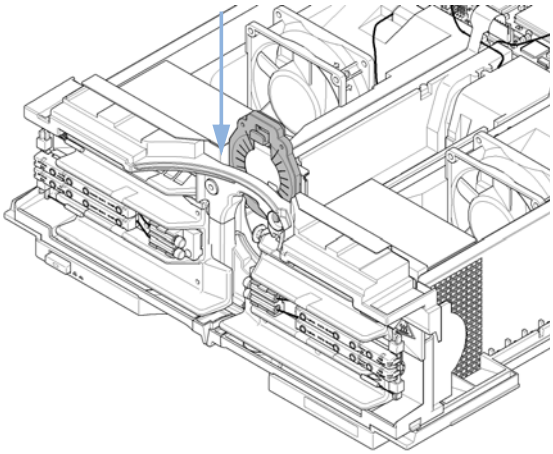
**When** If a new sliding unit or valve actuator shall be installed.

**Parts required**

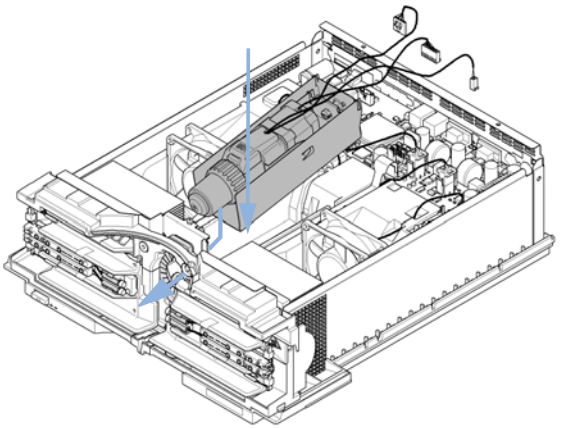
| # | Part number | Description |
|---|---|---|
| 1 | G1316-60000 | Sliding Unit |

**Preparations** Make sure, that the leak sensor has been installed correctly ("Installing the leak sensor (G1316C SL Plus)" on page 172).

**1** Insert the valve liner.



**2** Insert the sliding unit to the valve liner and push down the sliding unit such that it fits properly to the bottom foam part.



**NOTE**

Before connecting the valve actuator to the main board, install the top foam("Installing the Top Cover and Foam (G1316C SL Plus)" on page 165).

# Exchanging the Main Board

## Exchanging the Main Board (G1316A/G1316B SL)

**When** If board is defective or for repair of other assemblies

**Tools required** Screwdriver Pozidriv 1 PT3

Hexagonal wrench 5 mm

**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | G1316-69540 | Main board CCM (exchange assembly) for G1316A/G1316B SL for Series 1200. |

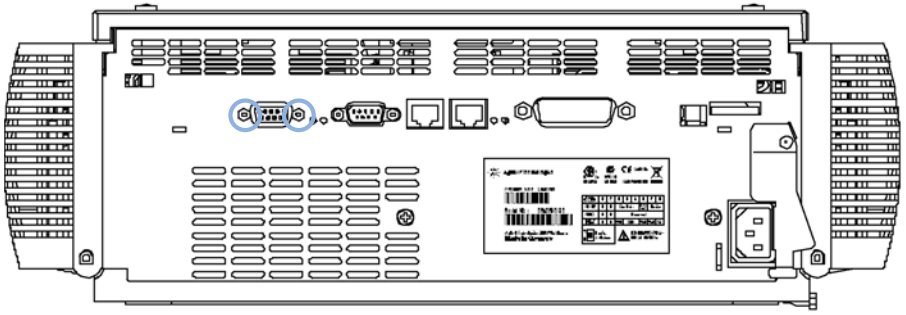
**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section, see "Removing the Top Cover and Foam" on page 110.

**NOTE** The Agilent 1200 Series G1316A/G1316B SL no longer has a GPIB connection

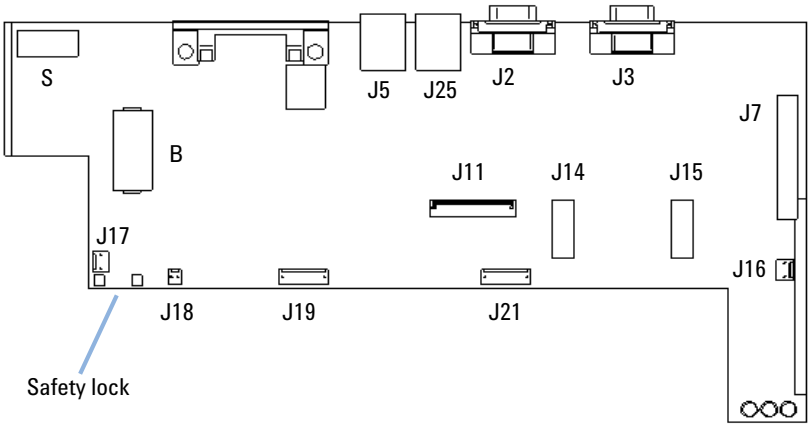
---

1 Use a 5 mm wrench to unscrew the REMOTE connector.



2 Disconnect all connectors from the processor board.

J2 - RS-232C
J3 - REMOTE
J5/25 - CAN
J7 - Power Supply
J11 - Column Switching Valve
J14 - Heat Exchanger Assembly (left)
J15 - Heat Exchanger Assembly (right)
J16 - Fan Assembly (right)
J17 - Fan Assembly (left)
J18 - Leak Sensor
J19 - Flexboard (left)
J21 - Flexboard (right)
B - Battery
S - Configuration Switch




3 Remove the processor board. Place the board on the ESD kit.

4 In some cases the RFI spring plate may remain on the interface connectors of the board. Carefully remove the spring plate and place it back into its position in the instrument before installing a new board.

5 On the new board check the switch setting of address switch S1, see "Setting the 8-bit Configuration Switch" on page 239.

**NOTE** An incorrect switch setting (e.g., TEST/BOOT) may cause the module to turn in a basic mode (yellow or red flashing status light). In such a case turn off the module, re-set the address switches, and turn on the module again.

6 Install the new processor board and reconnect the connectors.

7 Refit the screws at the REMOTE connectors.

8 Reinstall the foam section, the top cover and front cover, see "Installing the Foam and the Top Cover (G1316A/G1316B SL)" on page 162.

9 Reinstall the column compartment into the stack and reconnect the cables.

**NOTE** If a new CCM board is installed, update the serial number information of the column compartment in the user interface "Introduction" on page 129.

10 Check the firmware revision of the module. If the firmware revision is older than the current firmware revision of the module, update the firmware using the standard firmware update procedure, see "Replacing the Column Compartment's Firmware" on page 100.

## Exchanging the Main Board (G1316C SL Plus)

**When**

If board is defective or for repair of other assemblies

**Tools required**

Screwdriver Pozidriv 1 PT3

Hexagonal wrench 5 mm

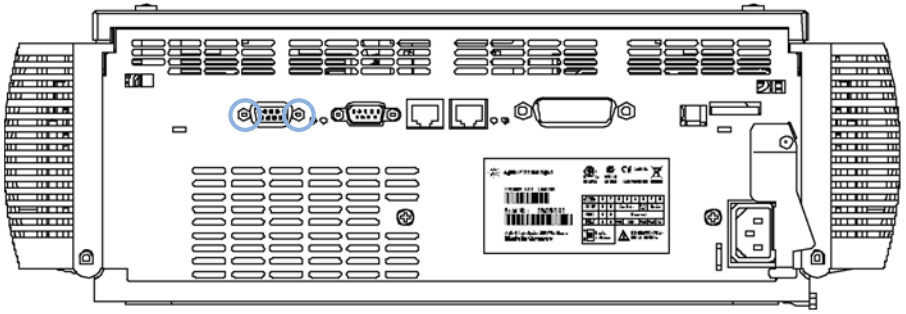
**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | G1316-61050 | Main board CCM for G1316C SL Plus. |

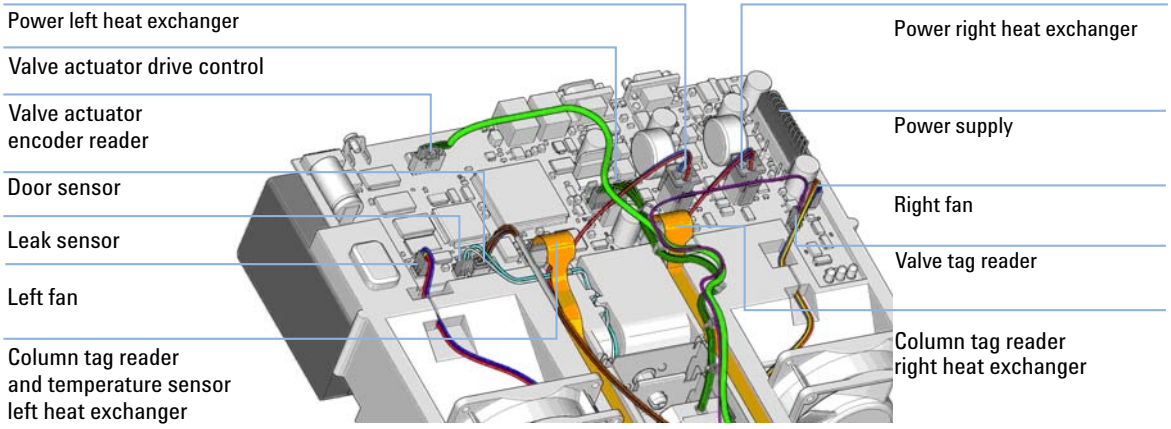
**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section, see "Removing the Top Cover and Foam" on page 110.

1 Use a 5 mm wrench to unscrew the REMOTE connector.



2 Disconnect all connectors from the processor board.




3 Remove the processor board. Place the board on the ESD kit.

4 In some cases the RFI spring plate may remain on the interface connectors of the board. Carefully remove the spring plate and place it back into its position in the instrument before installing a new board.

5 On the new board check the switch setting of address switch S1, see "Setting the 8-bit Configuration Switch" on page 239.

**NOTE** An incorrect switch setting (e.g., TEST/BOOT) may cause the module to turn in a basic mode (yellow or red flashing status light). In such a case turn off the module, re-set the address switches, and turn on the module again.

6 Install the new processor board and reconnect the connectors.

7 Refit the screws at the REMOTE connectors.

8 Reinstall the foam section, the top cover and front cover, see "Installing the Foam and the Top Cover (G1316A/G1316B SL)" on page 162.

9 Reinstall the column compartment into the stack and reconnect the cables.

**NOTE** If a new CCM board is installed, update the serial number information of the column compartment in the user interface "Introduction" on page 129.

10 Check the firmware revision of the module. If the firmware revision is older than the current firmware revision of the module, update the firmware using the standard firmware update procedure, see “Replacing the Column Compartment’s Firmware” on page 100.

# Changing the Type and Serial Number

## Introduction

When the main board has to be replaced, the new board does not have a serial number. For some modules (e.g. pumps or auto samplers) the type has to be changed (multiple usage boards). Use the information from the serial number plate of your module.

Keep in mind that

- the changes become active after a power cycle of the module.
- the information from the serial number plate of the module is used.
- the exact type (product number) is used.

**NOTE** If the type (product number) was entered incorrectly, the module may become unusable. Proceed to "Overview" on page 134.

**NOTE** With firmware A.06.02/B.01.02 and above a wrong type cannot be entered. The entry is checked against the board revision.

## Using the Agilent Diagnostic Software

The Agilent Diagnostic Software must be configured in Service Mode to have access to the function **Board Check and Change**.

Close other user interfaces.

1. Start the Diagnostic Software.
2. Select Tools on the left navigation panel.
3. Select in the Tools Selection box **Board Check and Change** and press the button **Start**.
4. Change the field Type and/or Serial as required.

**NOTE** Some Agilent 1100/1200 series modules require the correct main board version to match the type, for example the SL modules.

5 Press the button **Apply** to complete the action.

A message "The type was changed to XXXXXX. Close this application and switch off and on the changed LC module.

6 Close the Diagnostic Software.

7 Power cycle the module.

8 Restart the User Interface.

## Using the Agilent ChemStation

Module serial numbers are entered by typing specific commands on the command line at the bottom of the main user interface screen.

Turn the module on.

Start the Agilent ChemStation.

1 To enter a module serial number, type the following command into the command line:
**`print sendmodule$(Lxxx, "ser 'YYNNNNNNNN'")`**
or
**`print sendmodule$(Nxxx, "ser 'YYNNNNNNNN'")`**
where: xxx is the module type, YY is country code (in capital letters) and NNNNNNNN the 8-character serial number of the module in question.

**Table 7** ChemStation Command Format - Serial Number Change

| Modules with or without optional interface board | Modules with LAN on-board |
|---|---|
| PRINT SENDMODULE$(Lxxx,"SER 'YYNNNNNNNN'") | PRINT SENDMODULE$(Nxxx,"SER 'YYNNNNNNNN'") |
| module identifier = L<br>serial number embedded in single-quotes | module identifier = N<br>serial number embedded in single-quotes |
| PMP, ALS, THM, TCC, VWD, DAD, MWD, FLD, RID | DAD, MWD, VWD |

**NOTE** The first two characters are letters, which should be capitalized.

The reply line will respond with **RA 0000 SER** followed by the module serial number you just entered.

2 To change the type of the module use the following command:
**`print sendmodule$(Lxxx, "TYPE 'XXXXX'")`**
or
**`print sendmodule$(Nxxx, "TYPE 'XXXXX'")`**
where: xxx is the module type and XXXXX is the 5-character product number of the module (e.g. G1314B).

**Table 8** ChemStation Command Format - Type Change

| Modules with or without optional interface board | Modules with LAN on-board |
|---|---|
| PRINT SENDMODULE$(Lxxx,"TYPE 'XXXXX'") | PRINT SENDMODULE$(Nxxx,"TYPE 'XXXXX'") |
| module identifier = L<br>product number XXXXX embedded in single-quotes | module identifier = N<br>product number XXXXX embedded in single-quotes |
| PMP, ALS, THM, TCC, VWD, DAD, MWD, FLD, RID | DAD, MWD, VWD |

**NOTE** Some Agilent 1100/1200 series modules require the correct main board version to match the type, for example the SL modules.

3 Power cycle the module. Then, restart the Agilent ChemStation. If the serial number you have just entered is different than the original module serial number, you will be given the opportunity to edit the configure **1200 access** screen during the restart of the Agilent ChemStation.

4 After restart, the serial number/type you have just entered can be seen under the **Instrument** menu of the main user interface screen.

## Using the Instant Pilot G4208A

1 Connect the Instant Pilot to the module. Turn ON the module.

2 On the Instant Pilot's Welcome screen, press **More**, then select **Maintenance**. Using the **up/down arrows**, select the module where you have to change the product number or serial number.

3 Press **PN/SN**. This will display a screen where you can enter the product number and/or serial number.

4 Make your changes, using the information from the product label of your module.

**NOTE** Some Agilent 1100/1200 series modules require the correct main board version to match the type, for example the SL modules.

5 Press **OK** to highlight the complete command.

6 Press **Done** to transfer the information into the main board's memory. Press **Cancel** to quit the process.

7 Power cycle the module. The Maintenance screen should display the correct serial number for this module.

8 If an other User Interface is also connected, restart the User Interface as well.

## Using the Control Module G1323B

1 Connect the control module to the module. Turn ON the module.

2 On the control module, press **System** (**F5**), then **Records** (**F4**). Using the **up/down arrows**, make sure that the module is highlighted.

3 Press **FW Update** (**F5**), then **m.** This will display a box which says **Update Enter Serial#**.

4 Press **Enter**. This will display the box labeled **Serial#**.

5 Letters and numbers are created using the up and down arrows. Into the box labeled Serial#, enter the 10-character serial number for the module. When the 10-character serial number is entered, press **Enter** to highlight the complete serial number. Then, press **Done** (**F6**).

6 Turn the module OFF then ON again. The Records screen should display the correct serial number for this module.

7 If a Agilent ChemStation is also connected, restart the Agilent ChemStation now as well.

**NOTE** To change the product number go to the *System* screen.

8 Press **Tests** (F3) and select the module and press **Enter**.

9 While in the Tests screen, press **m.m** (m dot m).

10 From the box now displayed, select the *Command*, and press **Enter**.

11 Into the box labeled *Nester* (instruction), enter the command **TYPE 'XXXXXX'** where XXXXXX is embedded in single-quotes.

Letters and numbers are created using the up and down arrows. XXXXX is the 5-character product number of the module being changed. There must be a space between the word TYPE and the product number.

**NOTE** Some Agilent 1100/1200 series modules require the correct main board version to match the type, for example the SL modules.

12 Now, press the **Execute** key. Below the box, a reply line should then say:

**Reply RA 0000 TYPE "XXXXX" (XXXXX is what you just entered)**

13 Power cycle the module. Turn on should be normal. In the *Records* screen, the product# column should indicate the module you just entered. If an other User Interface is also connected, start it now.

# Recover Instructions

## Overview

The following situations may come up where the instrument is no longer usable due to

- an incorrect type (product number) entry after the replacement of a main board of the module.
- load of wrong firmware based on the wrong type.

**NOTE** With firmware A.06.02/B.01.02 and above a wrong type cannot be entered. The entry is checked against the board revision.

The wrong type (product number) could be

- incorrect, but a valid 1100/1200 series module number
- incorrect and invalid 1100/1200 series module number (any name)

Based on above, the User Interfaces react differently.

**Table 9** Recover From Wrong Type

| User Interface | incorrect but valid type | incorrect but valid type | incorrect and invalid type |
|---|---|---|---|
| Example Conditions | correct type = G1315B<br>entered type = G1314B | correct type = G1315B<br>entered type = G1314B<br>plus wrong firmware from G1314B | correct type = G1315B<br>entered type = G1319B |
| ChemStation<br>"Recover with Agilent Diagnostic Software (Type & Firmware)" on page 136 | shows the incorrect product number<br>Interface shows the settings of the G1314B<br>Type can be changed via command line as described under "Recover with Agilent ChemStation" on page 136 | does not show the module<br>NO access to the module is possible<br>Use "Recover with Agilent Diagnostic Software (Type & Firmware)" on page 136 | does not show the incorrect product number<br>NO access at all to the module is possible<br>Use "Recover with Agilent Diagnostic Software (Type & Firmware)" on page 136 |

**Table 9** Recover From Wrong Type

| User Interface | incorrect but valid type | incorrect but valid type | incorrect and invalid type |
|---|---|---|---|
| Instant Pilot G4208A | comes up with an error<br>access to the module is possible via Service Mode as described under "Recover with Instant Pilot" on page 136 | shows resident module G1314B-R<br>NO type change possible<br>Use "Recover with Agilent Diagnostic Software (Type & Firmware)" on page 136 | comes up with an error<br>unsupported module G1319B<br>access to the module is possible via Service Mode as described in "Recover with Instant Pilot" on page 136 |
| Control Module G1323 | comes up with an error<br>NO access to the module is possible<br>Use "Recover with Agilent Diagnostic Software (Type Only)" on page 135 | shows resident or unsupported module<br>NO type change possible<br>Use "Recover with Agilent Diagnostic Software (Type & Firmware)" on page 136 | shows resident or unsupported module<br>access to the module is possible via Tests as described in "Recover with Control Module" on page 137 |
| Agilent Diagnostic Software (preferred tool) | shows the incorrect product number<br>access to the module is possible as described in "Recover with Agilent Diagnostic Software (Type Only)" on page 135 | shows the incorrect product number<br>access to the module is possible as described in "Recover with Agilent Diagnostic Software (Type Only)" on page 135<br>If wrong firmware has been loaded in addition, only the LMD Software can revert to correct product number as described in "Recover with Agilent Diagnostic Software (Type & Firmware)" on page 136 | shows the incorrect product number<br>access to the module is possible as described in "Recover with Agilent Diagnostic Software (Type Only)" on page 135 |

### Recover with Agilent Diagnostic Software (Type Only)

The Diagnostic Softwares is used in CE mode.

If no LAN connection is possible use RS-232.

The example uses G1315B as correct type.

1 Open a connection to the module (or via system).

  The module will be listed with the wrong product number (type).

2 Select Board Check and Change and press **Start**.

3 In the type field enter G1315B and press **Apply**.

4 Close the Agilent Diagnostic Software.

5 After a power cycle the module should show up with the correct product number (type) in the user interface.

### Recover with Agilent Diagnostic Software (Type & Firmware)

Agilent Diagnostic Software in CE mode.

If no LAN connection is possible use RS-232.

The example uses G1315B as correct type.

The module must be configured to *"Stay Resident Mode"* (module boots in resident mode - flashing status LED).

1 Open a connection to the module (or via system).

2 Select Board Check and Change and press **Start**.

3 In the type field enter G1315B and press **Apply**.

4 After a power cycle the module should show up with the correct product number (type) in the user interface.

5 Load the correct main firmware into the module.

6 Turn the module OFF.

7 Set module's configuration switch back to normal mode.

8 Turn on the module.

9 If required, load final firmware into the module.

### Recover with Agilent ChemStation

1 Use the ChemStation command line to change to TYPE (product number) as described under "Using the Agilent ChemStation" on page 130.

After power cycle of module the correct TYPE shows up.

### Recover with Instant Pilot

USB Flash Drive with file CUSTINST.CMD and a PC with USB interface.

The example uses G1315B as correct type and G1319B as incorrect type.

1 Edit/create the file CUSTINST.CMD and add the following line
**XXXXX|Command from USB 'Type Change'|TYPE 'YYYYYY'**
where XXXXX is for example G1319 from the mis-typed G1319B and YYYYYY is the correct module type, e.g. G1315B.

2 Save and close the file.

3 Insert the USB Flash Drive into the Instant Pilot.

4 From the Welcome screen enter the Service Mode (7268312 or SERVICE).

5 Select the button G1319B (wrong module) and select
**XXXXX|Command from USB 'Type Change'**

6 Press the button **Send**.

This will give as reply:
**RA 0 TYPE "G1315B"**

7 After a power cycle the module should show up with the correct product number (type) in the user interface.

## Recover with Control Module

The example uses G1315B as correct type.

1 Select **Tests** - Generic.

2 Press keys **m.m** (m dot m).

This opens hidden functions.

3 Select Command.

4 In the instruction line enter the command
**TYPE G1315B**

This will give as reply:
**RA 0000 TYPE "G1315B"**

5 After a power cycle the module should show up with the correct product number (type) in the user interface.

# Exchanging the Fan

**When** If the fan is defective or noisy or for repair of other assemblies

**Tools required** Screwdriver Pozidriv 1 PT3

**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | 3160-1017 | Fan assembly |

**Preparations** Turn OFF the column compartment.

Disconnect the power cable.

Disconnect capillaries.

Remove column compartment from stack and place it on the working bench.

Remove the front cover, top cover and top foam section, see "Removing the Top Cover and Foam" on page 110.

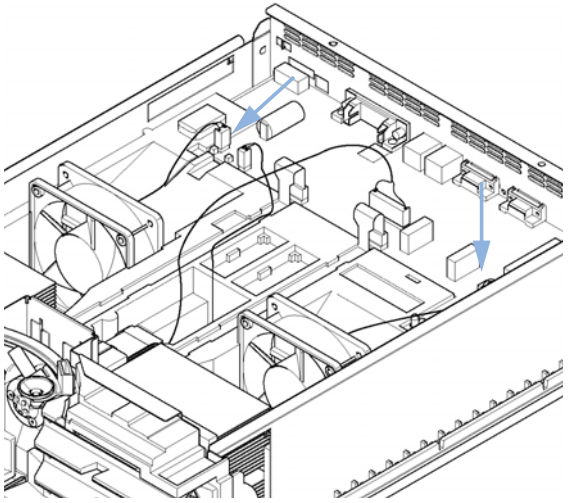
**CAUTION**

Incorrect positioning of fan might cause the thermostat to fail

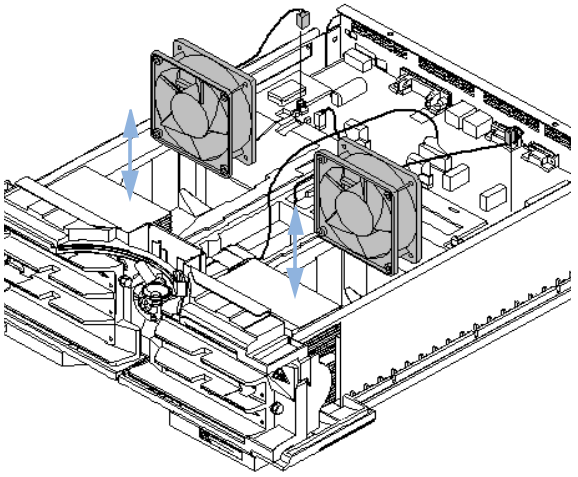
Column compartment is not thermostatted correctly. Samples can degrade or measurement results can be biased due to wrong temperature.

➔ Make sure the fan is installed in the correct orientation to ensure optimum cooling and operation of the column compartment.

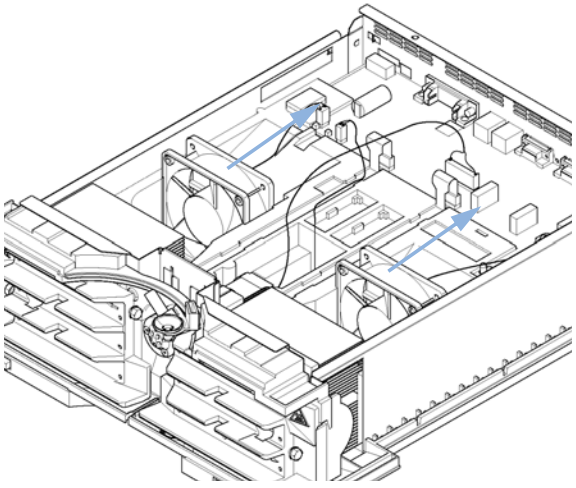
**1** Disconnect the fan assembly from the processor board.



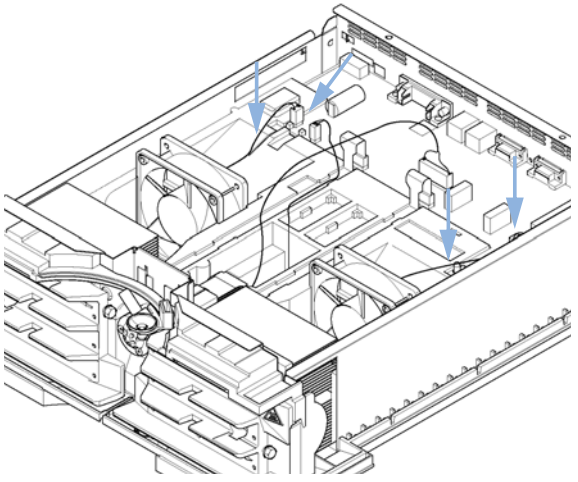
**2** Replace the fan assembly. Ensure correct fan orientation.



**3** The arrow on the fan should correspond with the direction of air flow which is from the front to the rear of the column compartment.



**4** Reconnect the fan assembly to the processor board and check that the cable of the left fan is correctly in the foam channel to assure correct closing of the foam parts.



**5** Replace the foam part, the top cover and front cover, see "Installing the Foam and the Top Cover (G1316A/G1316B SL)" on page 162.

# Removing the Heat Exchanger Assemblies

## Removing the Heat Exchanger Assemblies (G1316A/G1316B SL)

**When** If the heater is leaking, blocked, does not heat/cool or if other assemblies have to be removed

**Tools required** Screwdriver Pozidriv 1 PT3

Wrench 1/4 – 5/16 inch for capillary connections

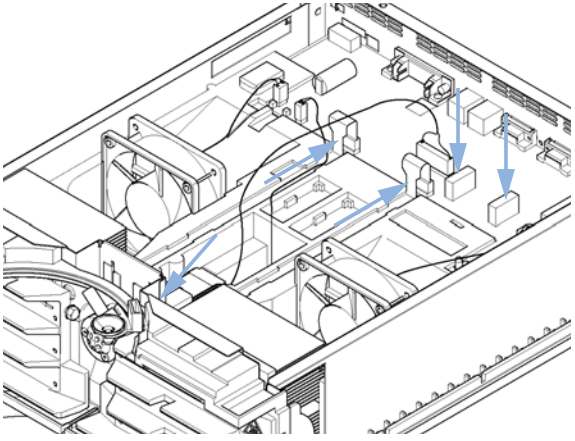
**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | G1316-60007 | Heat exchanger assembly (left), includes ambient temperature sensor |
| 1 | G1316-60006 | Heat exchanger assembly (right) |

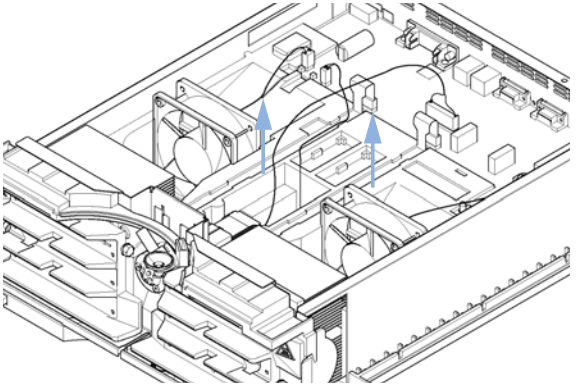
**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section, see "Removing the Top Cover and Foam" on page 110.

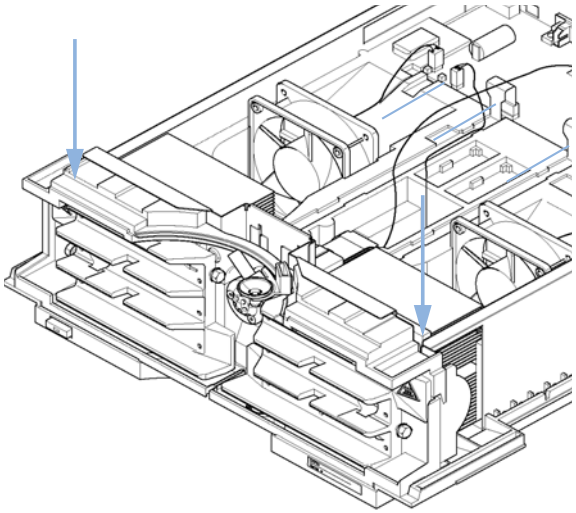
**1** Disconnect the heat exchanger cables from the processor board and the grounding connection of the column switching valve.



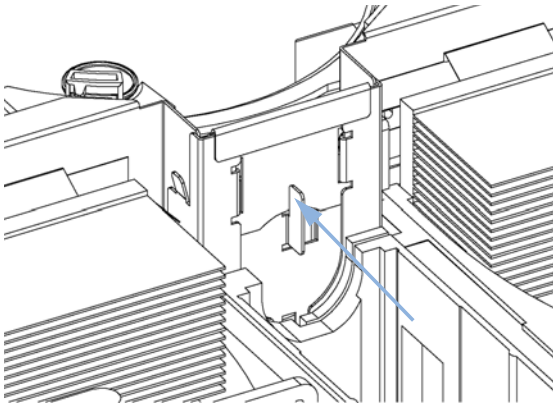
**2** Carefully pull out the heater cables out of the foam channels.



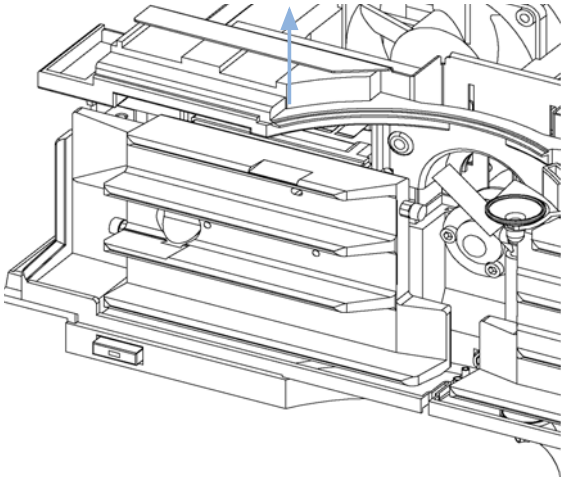
**3** Unscrew the Z-panel.



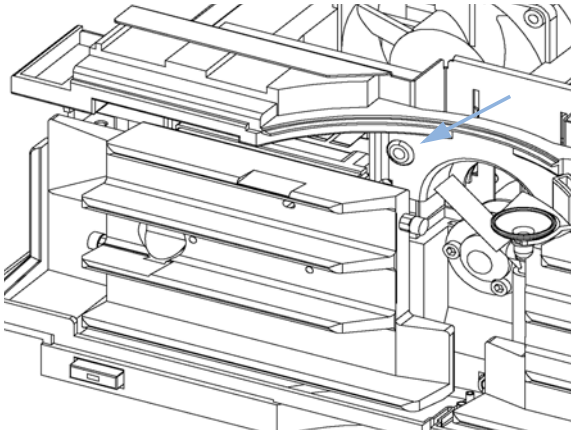
**4** Press against the rear of the Z-panel to release the metal plate from the guide and pull it carefully upwards.



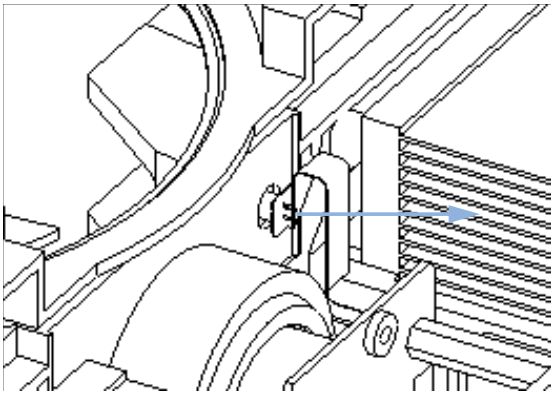
**5** Lift the Z-panel together with the top plastic panel half-way out of the guide.



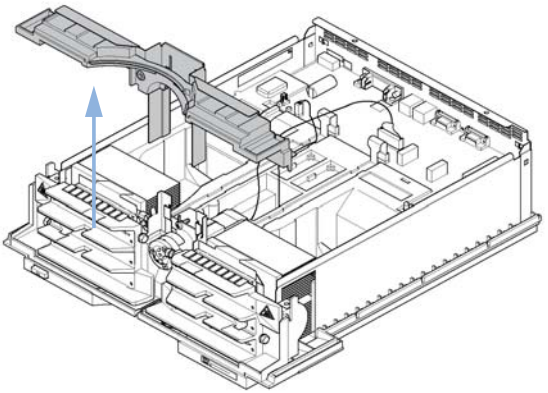
**6** Locate the ambient temperature sensor in the top plastic part.



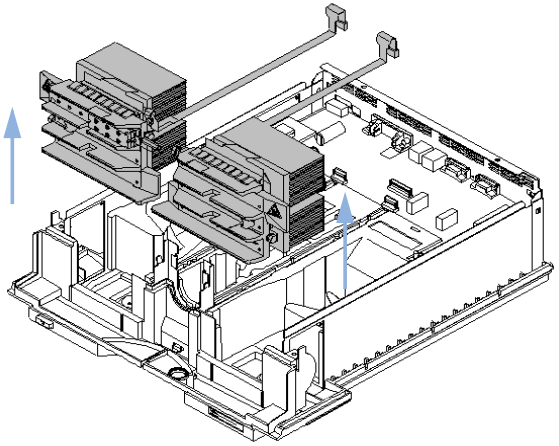
**7** Carefully remove the ambient temperature sensor plugged into the rear of the top plastic panel.



**8** Carefully pull out the top plastic panel together with the Z-panel completely.



**9** Remove the heat exchanger assembly.



**10** The repair level of the heat exchanger assemblies is the complete assembly.

# Removing the Heat Exchanger Assemblies (G1316C SL Plus)

**When** If the heater is leaking, blocked, does not heat/cool or if other assemblies have to be removed

**Tools required** Screwdriver Pozidriv 1 PT3

Wrench 1/4 – 5/16 inch for capillary connections

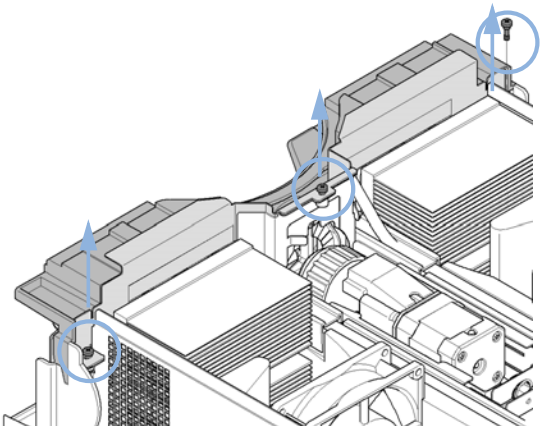
**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | G1316-60007 | Heat exchanger assembly (left), includes ambient temperature sensor |
| 1 | G1316-60006 | Heat exchanger assembly (right) |

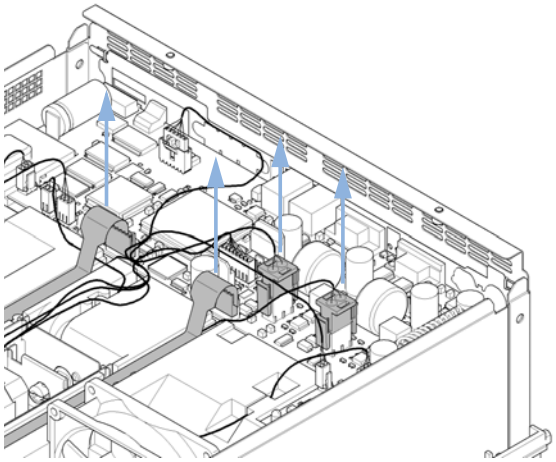
**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section, see "Removing the Top Cover and Foam" on page 110.

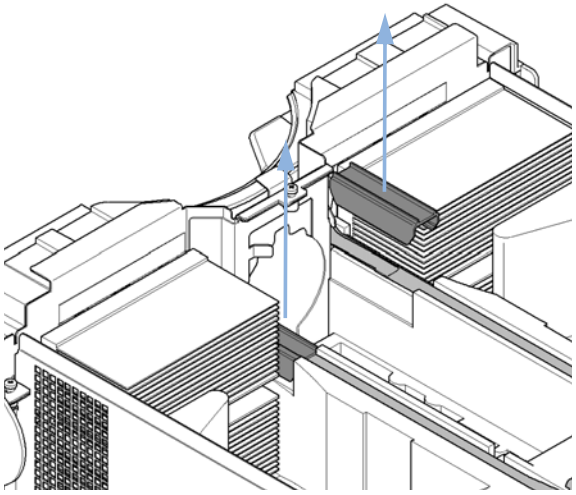
**1** Remove the Z-Panel by opening 3 screws.



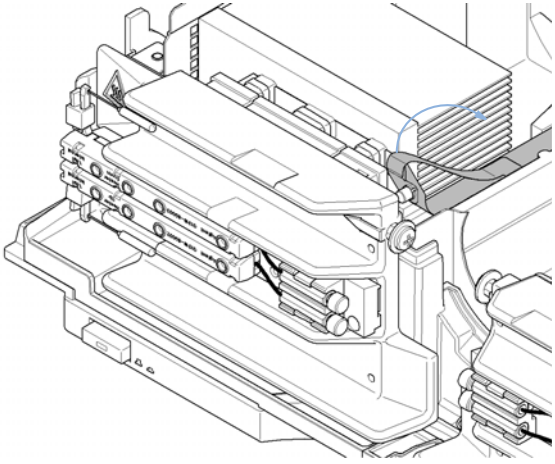
**2** Disconnect the 4 heat exchanger cables from the processor board, which are 2 flexible board cables for the column tag reader and heat sensor and 2 power cables (each pair red/black) located below these cables.



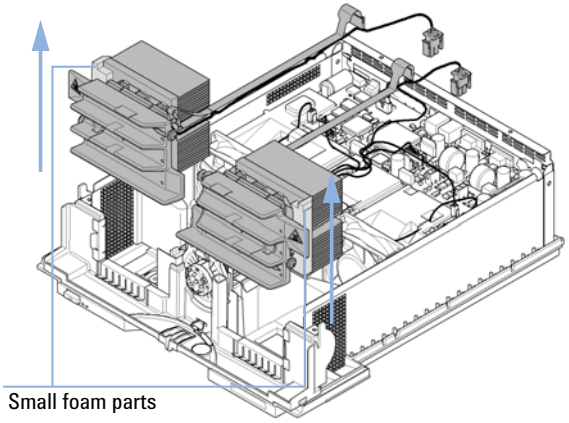
**3** On both sides of the valve actuator, there are fixation clips which keep the flexible boards of the heat exchanger assemblies in the correct position. Remove the fixation clip for the heat exchanger unit which shall be removed.



**4** For removing the left heat exchanger (view from front) carefully remove the temperature sensor from the heat exchanger unit.



**5** Lift up and remove the heat exchanger unit and the small foam part in the corner of the module.



# Installing the Heat Exchanger Assemblies

## Installing the Heat Exchanger Assemblies (G1316A/G1316B SL)

**When**

If the heat exchanger is leaking, blocked or does not heat/cool or other assemblies have to be removed

**Tools required**

Screwdriver Pozidriv 1 PT3

Wrench 1/4 – 5/16 inch for capillary connections

**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | G1316-60007 | Heat exchanger assembly (left), includes ambient temperature sensor |
| 1 | G1316-60006 | Heat exchanger assembly (right) |

**Preparations**

The heat exchanger(s) are removed as described in "Removing the Heat Exchanger Assemblies (G1316A/G1316B SL)" on page 140.

**CAUTION**

The flexible cables close to the heat exchanger assemblies may be easily damaged.

➔ Be careful that the flexible cables close to the heat exchanger assemblies are not damaged, especially during steps 3 through 6.

**CAUTION**

The ambient temperature sensor may get damaged if not installed correctly.

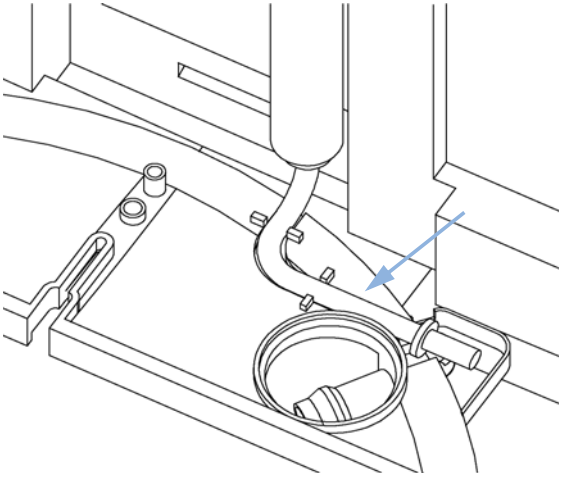
➔ Ensure that the ambient temperature sensor is completely plugged into the rear of the top plastic panel.

**CAUTION**

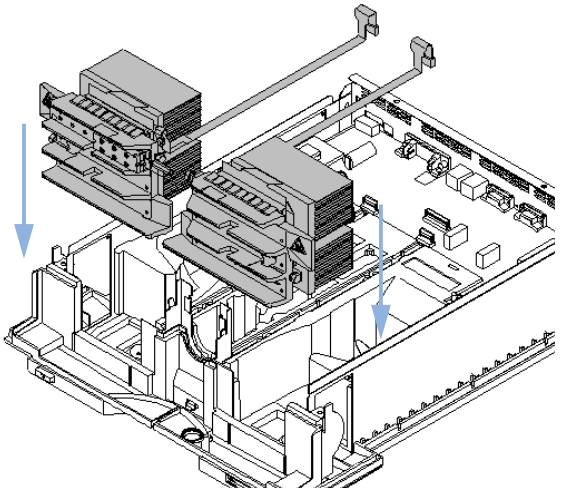
New foam parts have been introduced for enhanced performance of the G1316C SL Plus.

➔ However, using these foam parts for G1316A or G1316B SL may change thermal properties of these modules and bias measurement results.

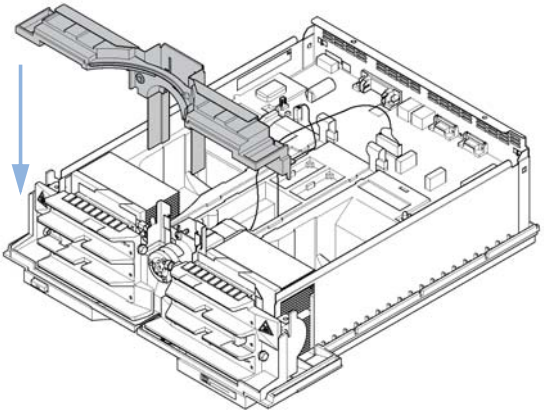
**1** Replace the leak tubing assembly into its location on leak base. Ensure that it keeps in this position during the next steps.



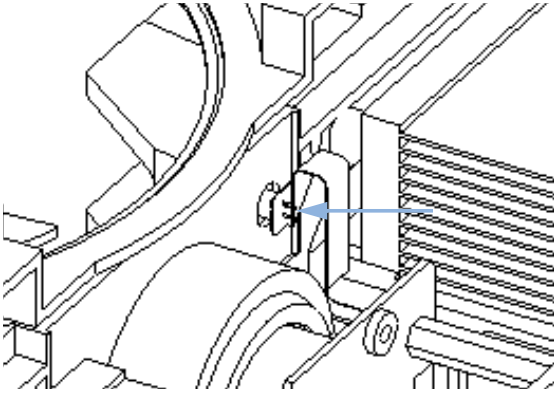
**2** Replace the heat exchanger assembly. A screwdriver might be helpful to insert the silicon isolation.



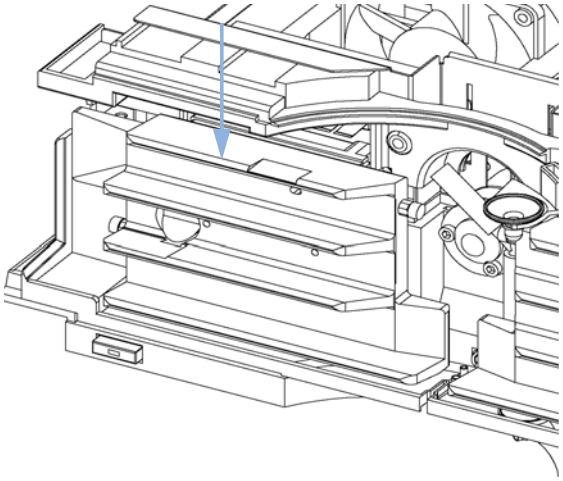
**3** Carefully insert the top plastic panel together with the Z-panel into the guide and press it half-way down.



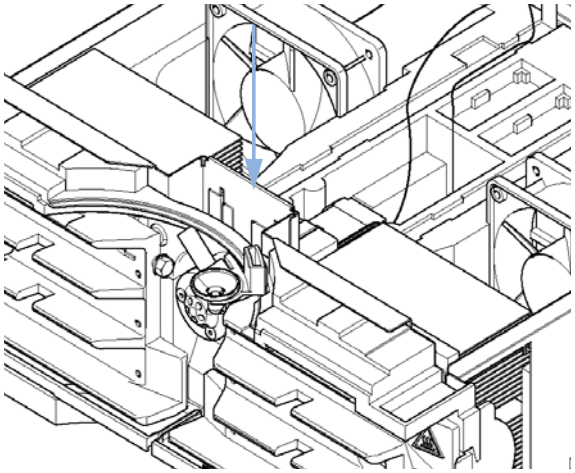
**4** Carefully plug the temperature sensor into the rear of the top plastic panel.



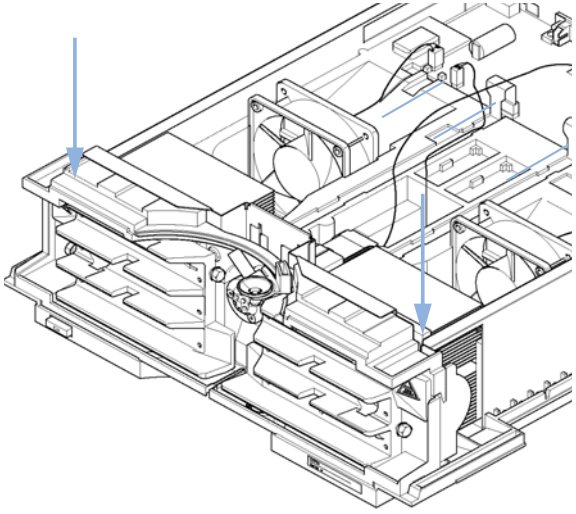
**5** Press the Z-panel together with the top plastic panel completely down.



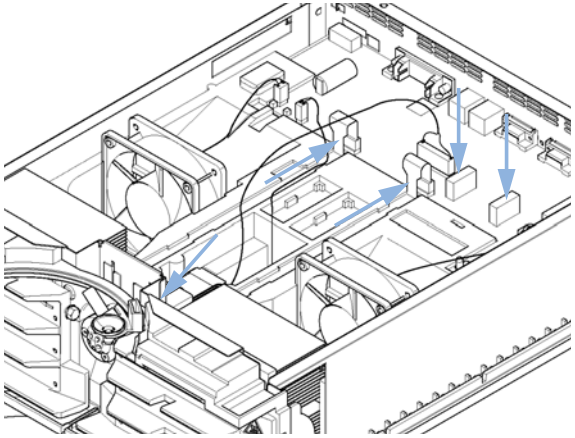
**6** Press down completely until it clicks into its holding position.



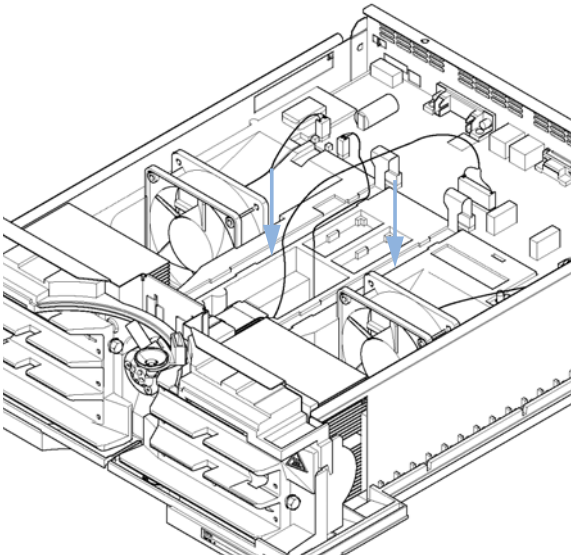
**7** Fix the Z-panel with the two screws.



**8** Reconnect the heat exchanger cables to the processor board and the grounding connection of the column switching valve.



**9** Carefully replace the heat exchanger cables into the foam channels.



**Next Steps:**

**10** Reinstall the foam section, the top cover and front cover, see "Installing the Foam and the Top Cover (G1316A/G1316B SL)" on page 162.

**11** Replace the column compartment into stack.

**12** Reconnect capillaries.

**13** Reconnect the power cable.

**14** Turn on the column compartment.

# Installing the Heat Exchanger Assembly (G1316C SL Plus)

**When**

If the heater is leaking, blocked or does not heat/cool or other assemblies have to be removed.

**Tools required**

Screwdriver Pozidriv 1 PT3

Wrench 1/4 – 5/16 inch for capillary connections

**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | G1316-60007 | Heat exchanger assembly (left), includes ambient temperature sensor |
| 1 | G1316-60006 | Heat exchanger assembly (right) |
| 1 | G1316-68712 | EPP Foam Part Kit |

**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section ("Removing the Top Cover and Foam" on page 110).

**CAUTION**

The flexible cables close to the heat exchanger assemblies may be easily damaged.

➔ Be careful that the flexible cables close to the heat exchanger assemblies are not damaged, especially during steps 3 through 6.

**CAUTION**

The ambient temperature sensor may get damaged if not installed correctly.

➔ Ensure that the ambient temperature sensor is completely plugged into the rear of the top plastic panel.

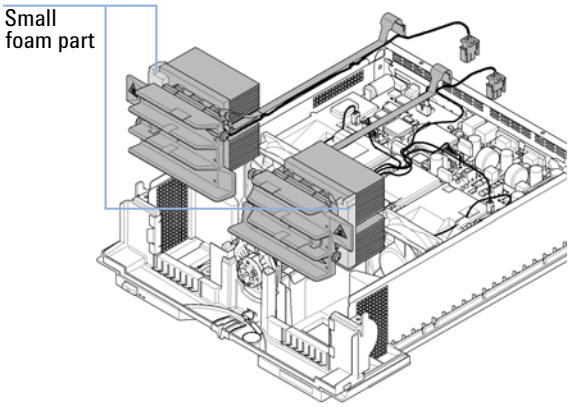
**CAUTION**

Bias measurement results.

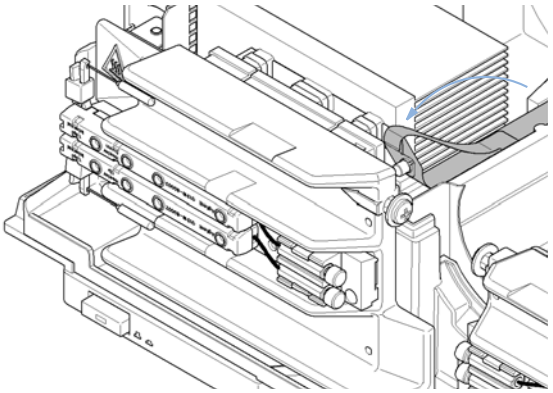
Foam parts have been introduced for improving the thermostat performance.

➔ Not using these parts for G1316C SL Plus can reduce thermostat performance and bias measurement results.

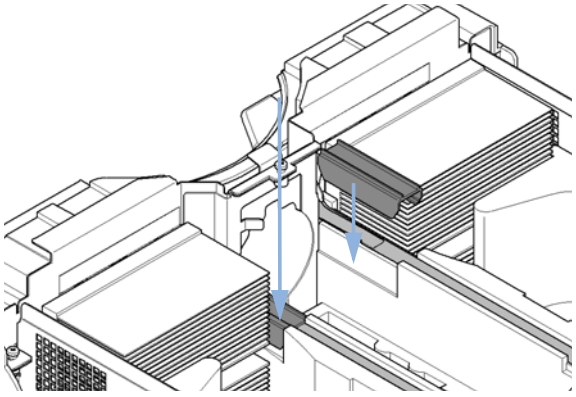
**1** Insert the heat exchanger unit and the small foam part in the corner of the module. This foam part is part of the Foam Part Kit **G1316-68712**.



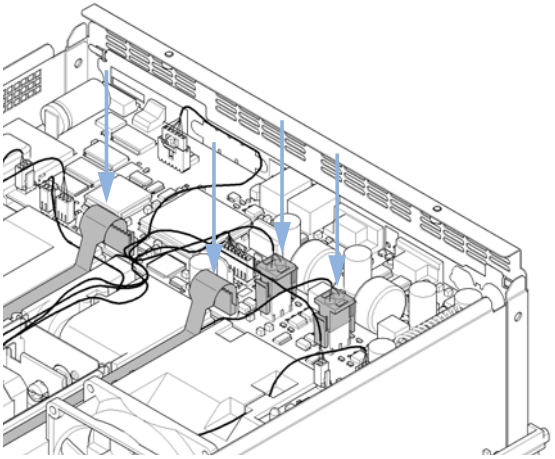

**2** For the left heat exchanger carefully reinstall the temperature sensor from the heat exchanger unit.



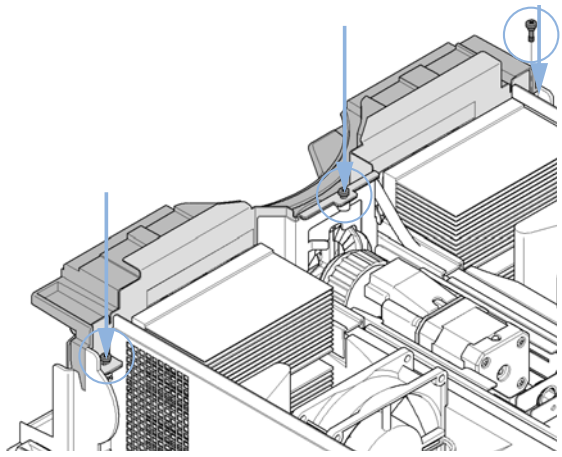
**3** On both sides of the valve actuator, fixation clips shall keep the flexible boards of the heat exchanger assemblies in the correct position. Install the fixation clip for the heat exchanger unit which has been installed.



**4** Connect the 4 heat exchanger cables from the processor board, which are 2 flexible board cables for the column tag reader and heat sensor and 2 power cables (each pair red/black) located below these cables.



**5** Install the Z-Panel by closing 3 screws



# Exchanging the Power Supply

Repair of the power supply assembly always involves exchange of the complete assembly. It has no serviceable parts inside.

**When**

If defective

**Tools required**

Screwdriver Pozidriv 1 PT3

Wrench 1/4 inch

Wrench 5 mm and 7 mm

**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | 0950-2528 | Power supply |

**Preparations**

Turn OFF the column compartment.

Disconnect the power cable.

Disconnect capillaries.

Remove column compartment from stack and place it on the working bench.

Remove the front cover, top cover and top foam section, see "Removing the Top Cover and Foam" on page 110.

Remove the column switching valve (if installed), see "Removing a Valve from the Thermostatted Column Compartment (G1316A/G1316B SL)" on page 114or "Removing the sliding unit (G1316C SL Plus)" on page 117.

Remove the processor board, see "Exchanging the Main Board (G1316A/G1316B SL)" on page 124.

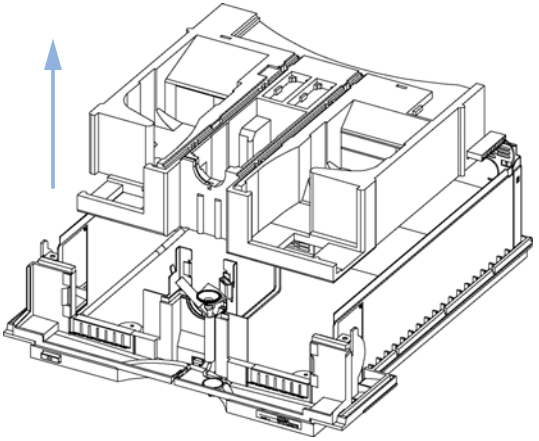
Remove the fan assemblies, see "Exchanging the Fan" on page 138.

Remove the heat exchanger assemblies, see "Removing the Heat Exchanger Assemblies (G1316A/G1316B SL)" on page 140.

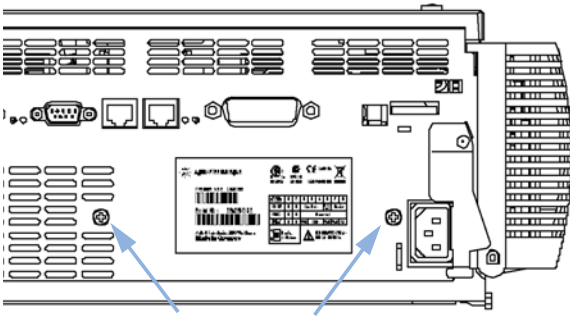
**NOTE**

The leak tubing assembly might fall out of its position.

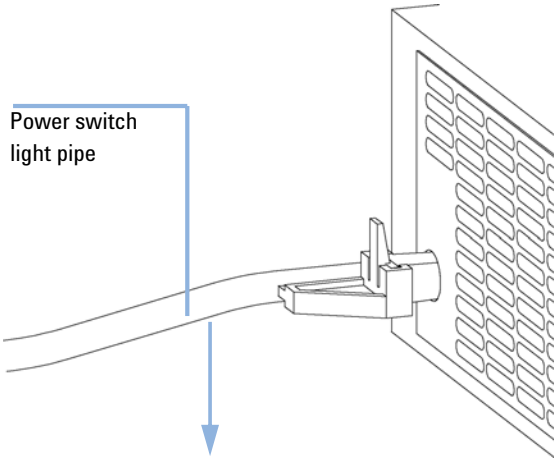
**1** Remove the leak sensor cable out of the foam channel. Carefully remove the bottom foam.



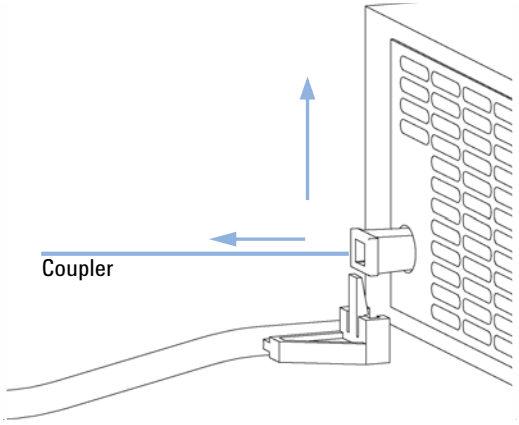
**2** Unscrew the power supply at the rear of the column compartment.



**3** Press down the power switch light pipe to remove it from the coupler.



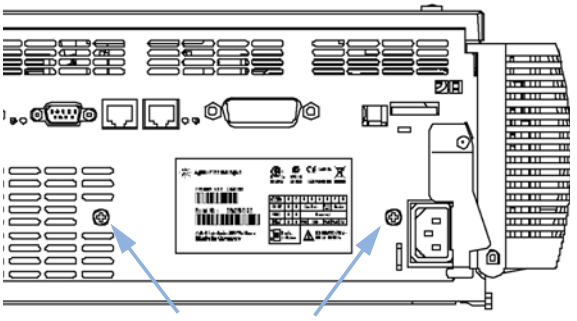

**4** Remove the power supply completely. Re-use the coupler on the new power supply.



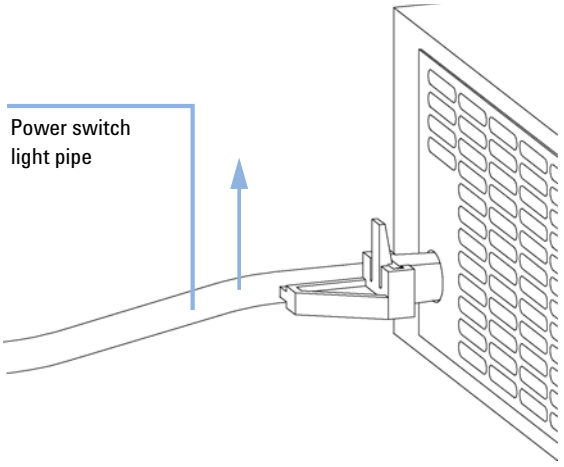
**NOTE**

The power supply can be replaced entirely if damaged. Do not disassemble the power supply, it does not contain serviceable parts.

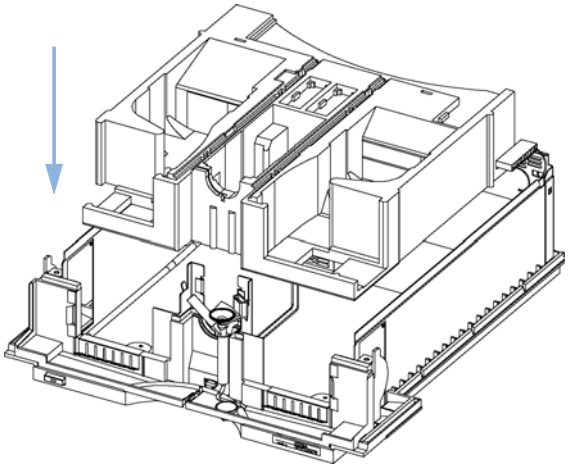
**5** Insert the power supply into its location and fix it with the screw at the rear panel.



**6** Press down and clip in the power switch light pipe into the power supply.




**7** Reinstall bottom foam part.



**Next Steps:**

**8** Reinstall the processor board, see "Exchanging the Main Board (G1316A/G1316B SL)" on page 124.

**9** Reinstall the fan assemblies, see "Exchanging the Fan" on page 138.

**10** Reinstall the heat exchanger assemblies, see "Installing the Heat Exchanger Assemblies (G1316A/G1316B SL)" on page 145.

**11** Replace the foam section, the top cover and front cover, see "Installing the Foam and the Top Cover (G1316A/G1316B SL)" on page 162.

**12** Replace column compartment into the stack.

**13** Reconnect the power cable.

**14** Turn on the column compartment.

# Replacing the Leak Sensor or Leak Base (G1316A/G1316B SL)

**When**

If leak sensor is defective or leak base is damaged

**Tools required**

Screwdriver Pozidriv 1 PT3

Screwdriver flat blade

Wrench 1/4 inch

Hexagonal wrench 3 mm

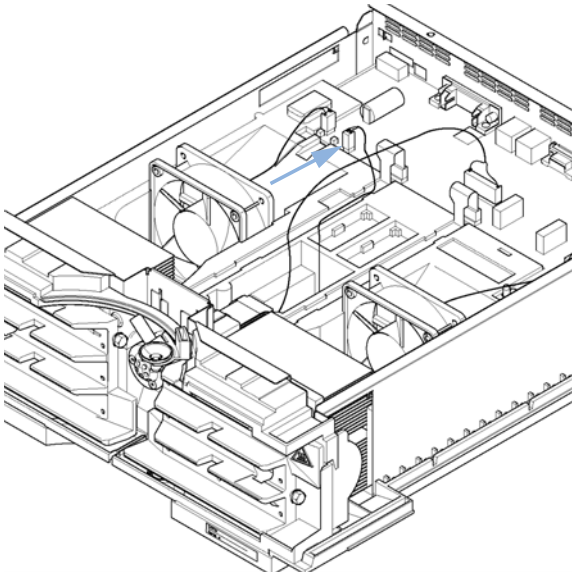
**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | 5061-3356 | Leak sensor assembly |
| 1 | G1316-43101 | Leak base (part of leak panel kit G1316-68700) |

**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section, see "Removing the Top Cover and Foam" on page 110.

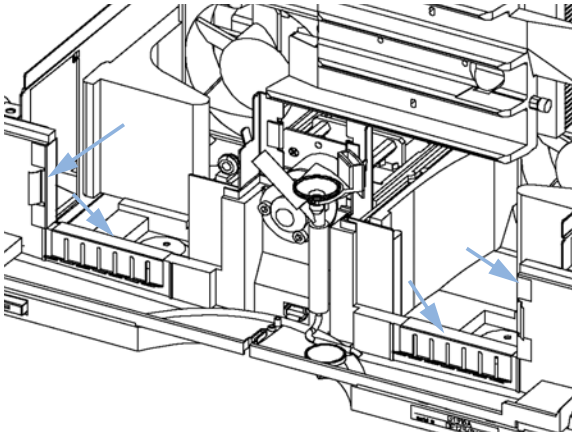
**1** Disconnect the leak sensor assembly from the processor board and pull the cable out of the foam channel.



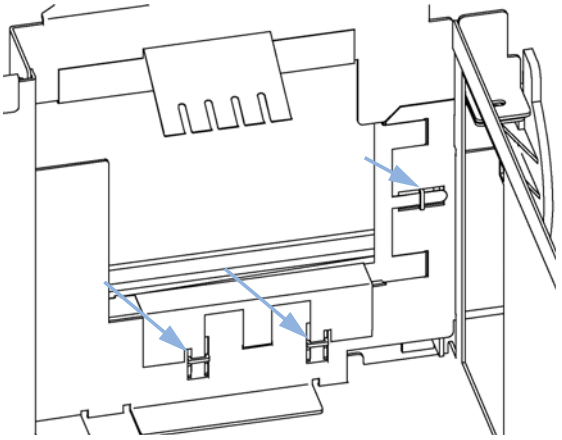
**2** Remove the column switching valve (if installed), see "Removing a Valve from the Thermostatted Column Compartment (G1316A/G1316B SL)" on page 114 or "Removing the sliding unit (G1316C SL Plus)" on page 117.

**3** Remove the heat exchanger assemblies, see "Removing the Heat Exchanger Assemblies (G1316A/G1316B SL)" on page 140.

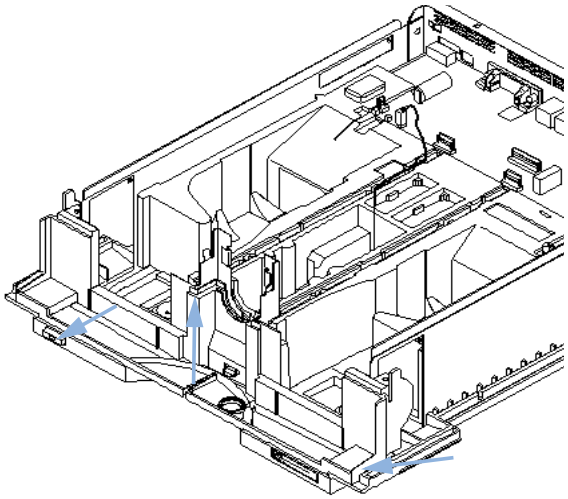
**4** Locate the clips.



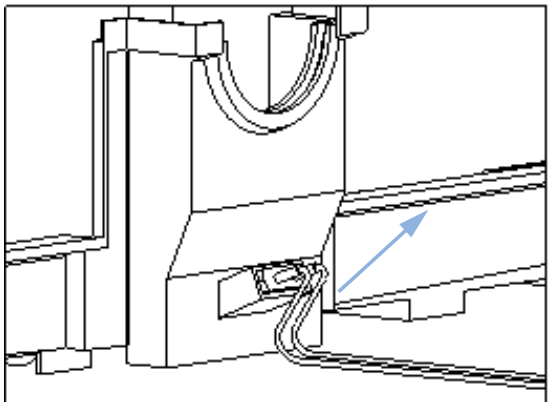
**5** Remove the clips (shown from the inside of the column compartment) on both sides using a flat screwdriver.



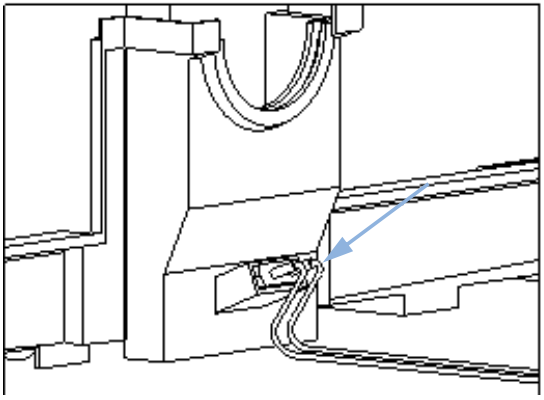
**6** Remove the leak base from the cabinet by unlocking it with a flat blade on the right and left side of the leak base.



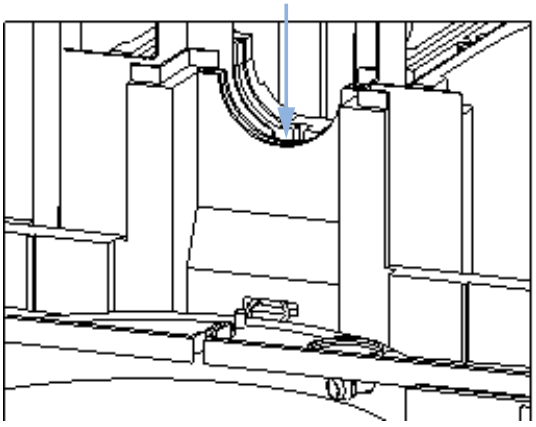
**7** Remove the leak sensor assembly from the rear of the leak base.



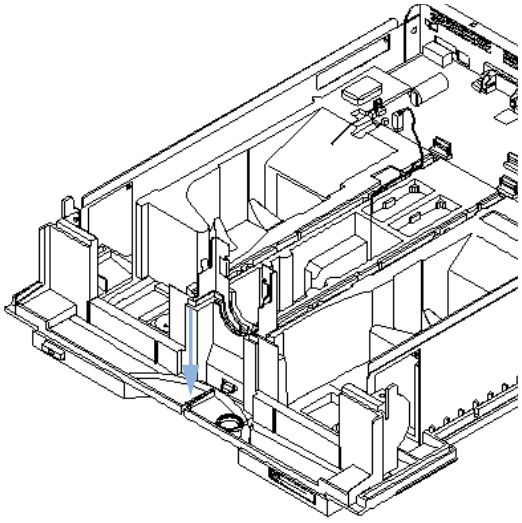
**8** Replace the leak sensor assembly into the leak base.



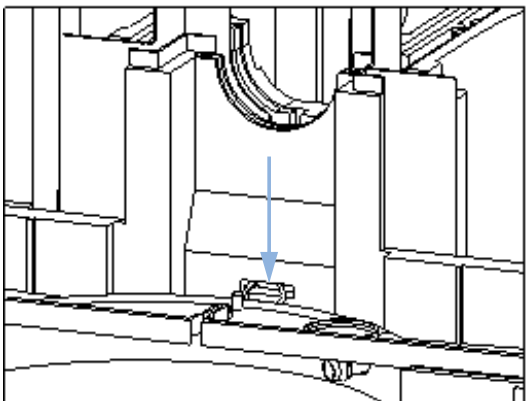
**9** Route the leak sensor cable through the z-panel into the left foam channel.



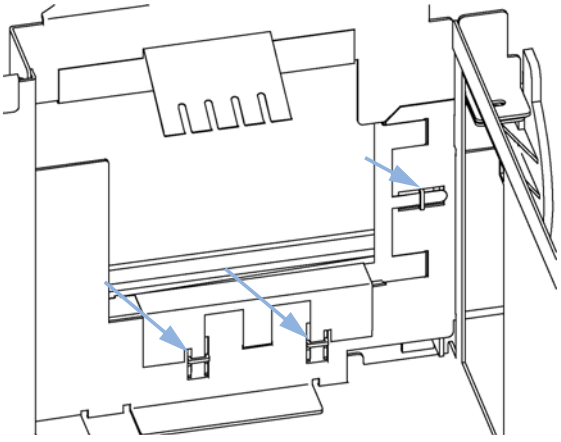
**10** Replace the leak base into the cabinet until it clicks into the cabinet. Insert the right side first.



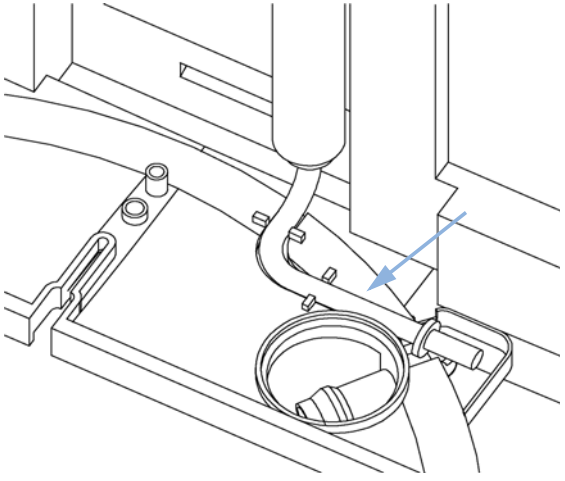
**11** Position the leak sensor so that it does not touch the bottom of the leak base.



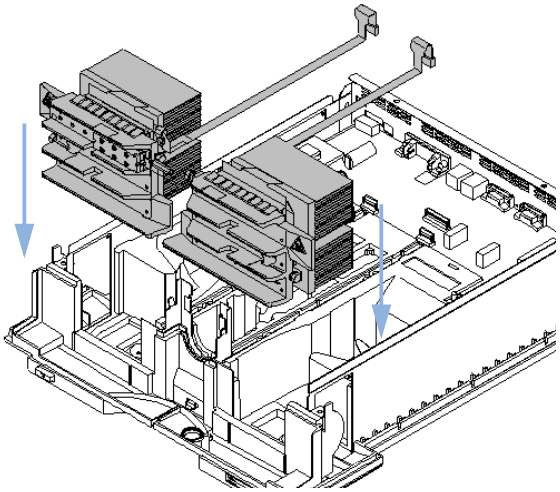
**12** Replace the clips (shown from the inside of the column compartment) on both sides using a flat screwdriver.



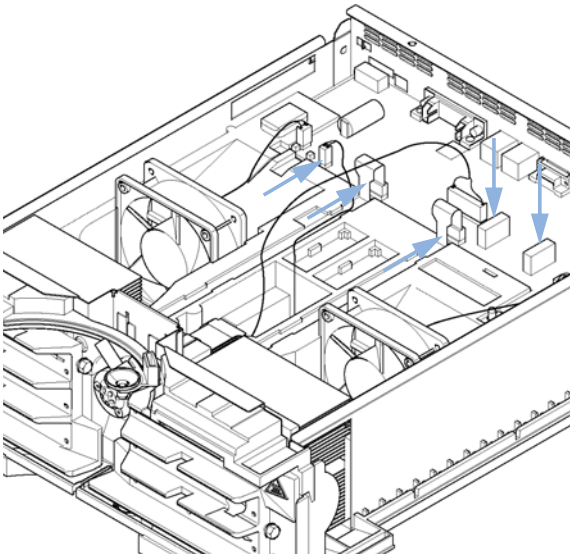
**13** Place the leak tubing assembly back into its location on leak base. Ensure that it keeps in this position during the next steps.



**14** Reinstall the heat exchanger assemblies, see "Installing the Heat Exchanger Assemblies (G1316A/G1316B SL)" on page 145.



**15** Reconnect the leak sensor and heat exchanger cables to the processor board and place the cables in the foam channel.



**Next Steps:**

**16** Reinstall the foam section, the top cover and front cover, see "Installing the Foam and the Top Cover (G1316A/G1316B SL)" on page 162.

**17** Place the column compartment back into the stack.

**18** Reconnect the cables.

**19** Turn on the column compartment.

# Replacing Status Light Pipe

**When** When part is broken

**Tools required** Screwdriver Pozidriv 1 PT3

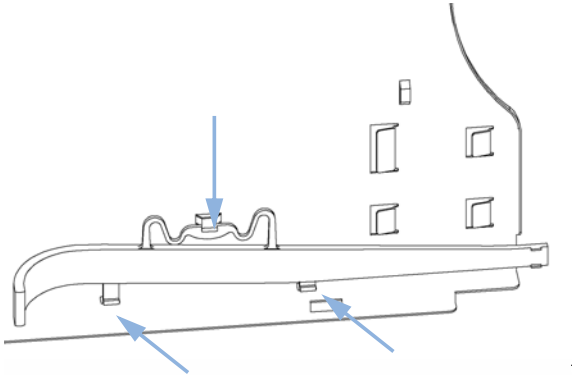
**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | 5041-8384 | Status light pipe |

**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section, see "Removing the Top Cover and Foam" on page 110.

**1** The status light pipe is clipped into the top cover.



**Next Steps:**

**2** Reinstall the foam section, the top cover and front cover, see "Installing the Foam and the Top Cover (G1316A/G1316B SL)" on page 162.

**3** Place the column compartment back into the stack.

**4** Reconnect the cables.

**5** Reconnect the capillaries.

**6** Turn on the column compartment.

# Installing the Foam and the Top Cover

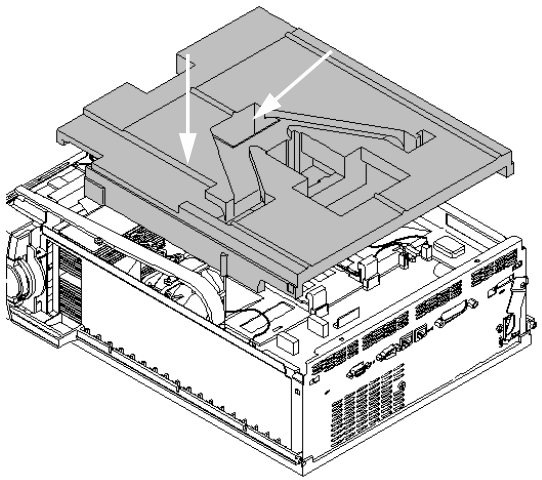
## Installing the Foam and the Top Cover (G1316A/G1316B SL)

**When** After all repairs have been completed

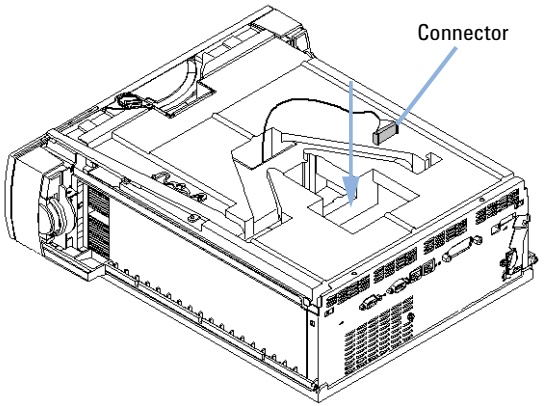
**Tools required** Screwdriver Pozidriv 1 PT3

**Preparations** The column compartment is open and other procedures have been carried out

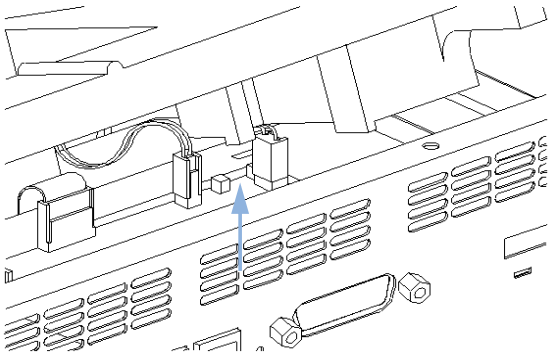
**1** Route the valve connector through the top foam and carefully fit the top foam into the column compartment.



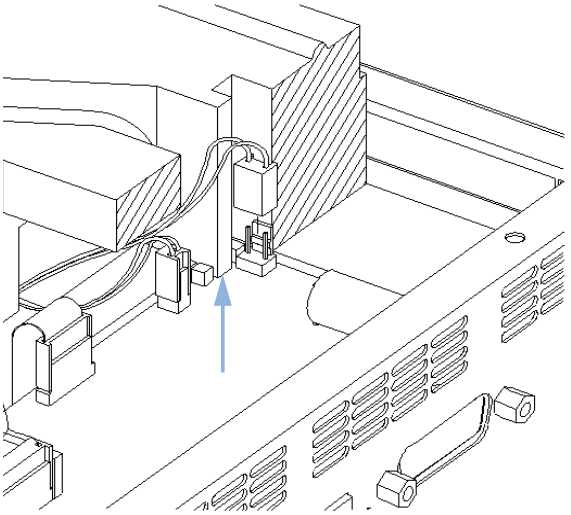
**2** Reconnect the valve connector to the main board.



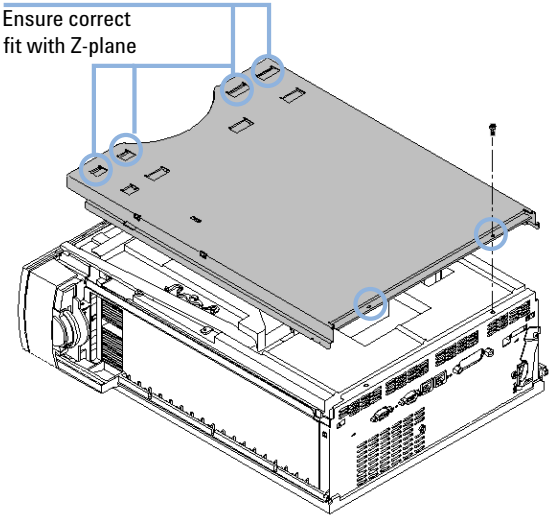
**3** Make sure that the foam is installed correctly and is located in the safety light switch.



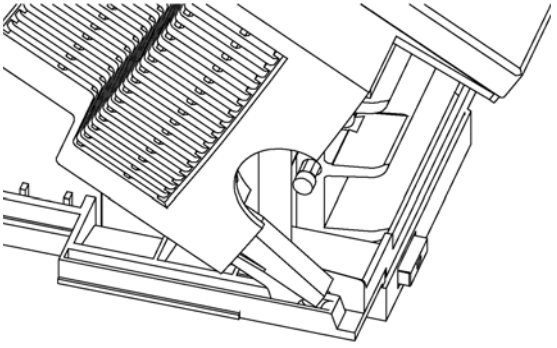
**4** Position of the foam in the safety light switch.



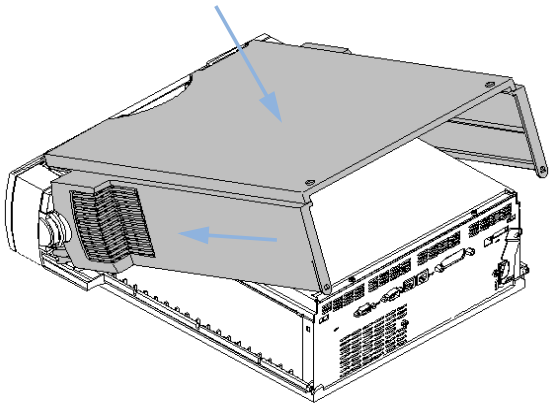
**5** Place the top plate on the foam and slide it towards the rear and fix the screws at the rear of the top plate.



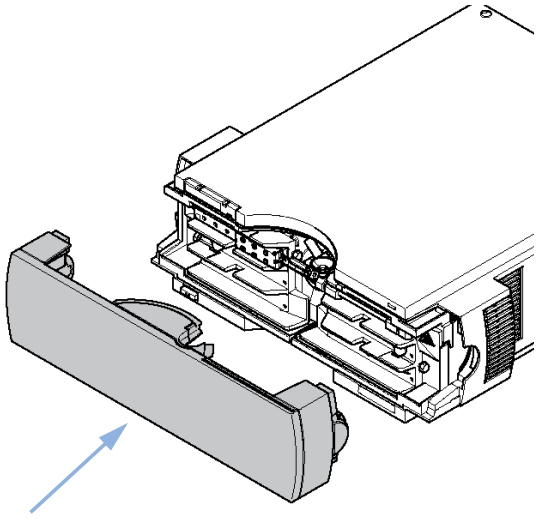

**6** Place the top cover into the guides.



**7** Reinstall the cover.



**8** Close the front panel.



**Next Steps:**

**9** Place the column compartment back into the stack.

**10** Reconnect the cables.

**11** Turn on the column compartment.

# Installing the Top Cover and Foam (G1316C SL Plus)

**When** After repairs of internal parts have been completed

**Tools required** Screwdriver Pozidriv 1 PT3

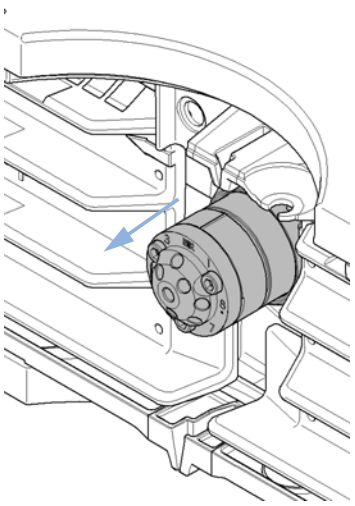
**Preparations** The column compartment is open and other procedures have been completed

**CAUTION**

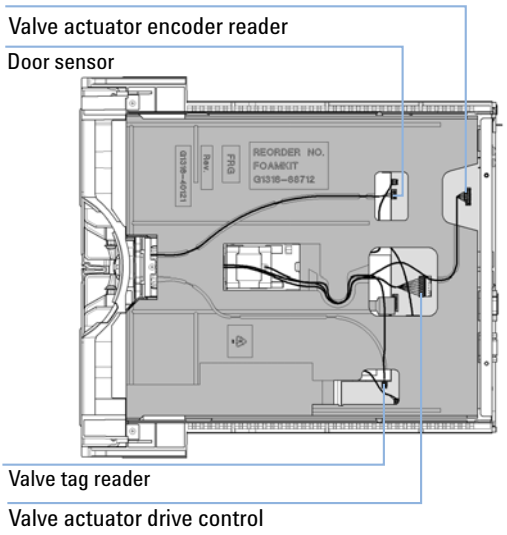
Blocked valve

Not bringing the valve head to the outer position will cause the valve to stay permanently in the inner position due to a blockage of the cables.

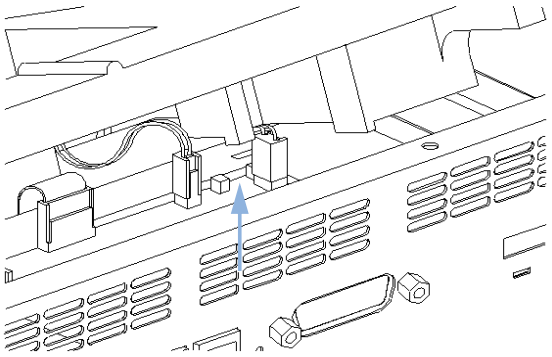
➔ Move the valve head to the outer position.

| | |
|---|---|
| **1** If a valve actuator unit is installed, route the cables of the valve tag reader, valve actuator encoder reader and valve actuator drive control through the large central hole of the top foam part. | **2** Move the valve head to the outer position.<br>  |

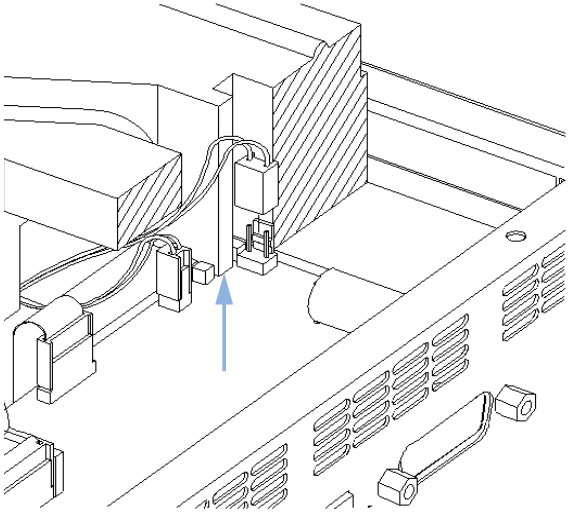
**3** Route cables through the top foam part and connect them to the main board.



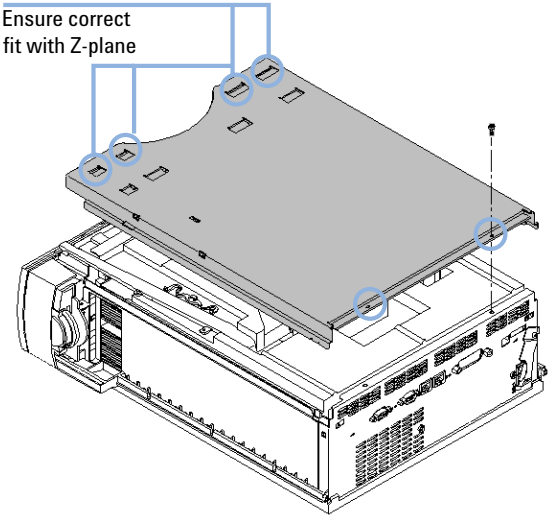

**4** Make sure that the foam is installed correctly and is located in the safety light switch.



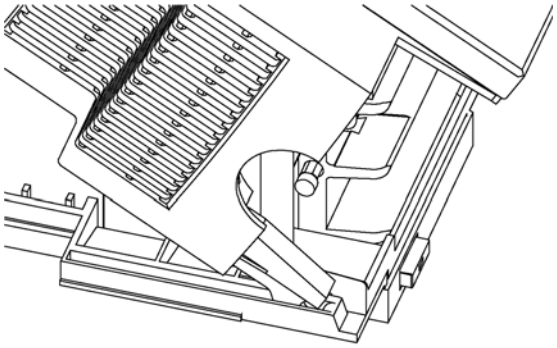
**5** Position of the foam in the safety light switch.



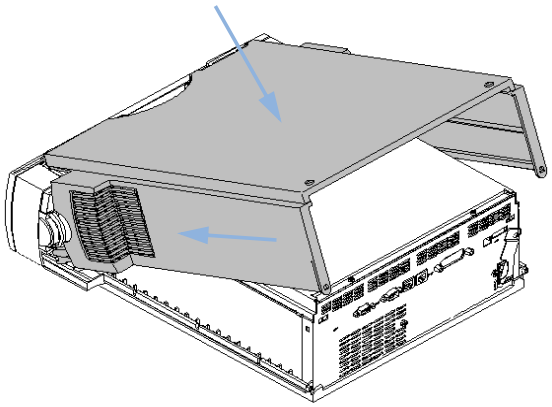
**6** Place the top plate on the foam and slide it towards the rear and fix the screws at the rear of the top plate.



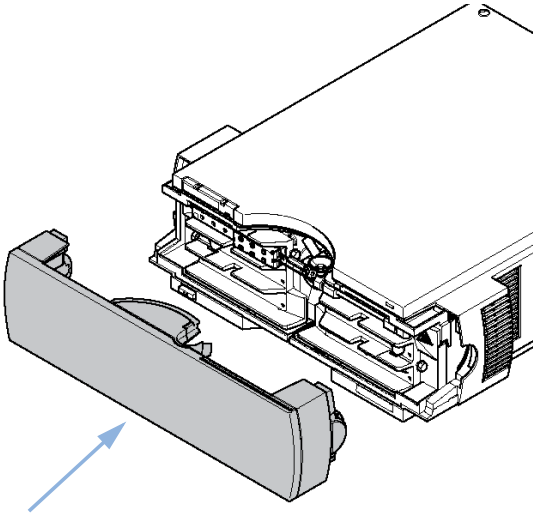
**7** Place the top cover into the guides.



**8** Reinstall the cover.



**9** Close the front panel.



**Next Steps:**

**10** Place the column compartment back into the stack.

**11** Reconnect the cables.

**12** Turn on the column compartment.

# Assembling the Main Cover

**When** If cover was broken

**Tools required** None

**Parts required**

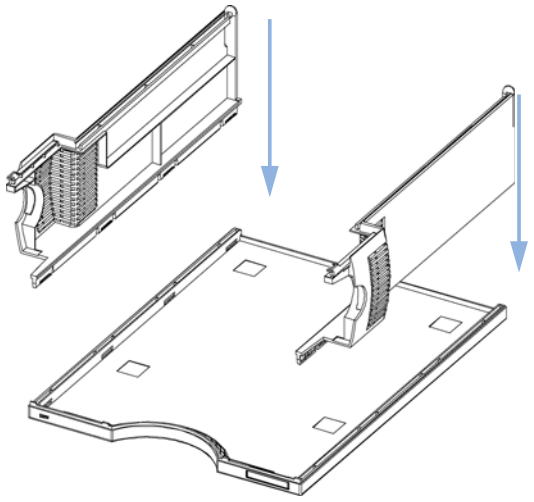
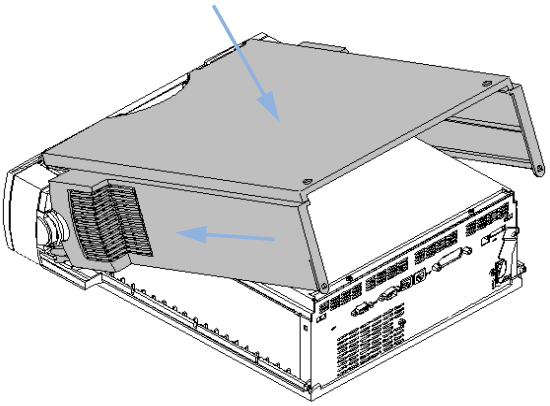
| # | Part number | Description |
|---|---|---|
| 1 | G1316-68713 | Plastics kit (includes base, top, left and right) |

**NOTE** The plastics kit contains all parts, but it is not assembled.

**CAUTION** Wrong assembled

In case you insert the left or right side in the opposite position, you may not be able to remove the side from the top part.

➔ Take care not to mix up left and right side.

| | |
|---|---|
| **1** Place the top part on the bench and insert the left and right side into the top part.<br>  | **2** Replace the cover.<br>  |

# Installing the Radio Frequency Shield (G1316C SL Plus)

**When**

If the Thermostatted Column Compartment SL Plus shall be operated without valve and sliding unit, the radio frequency shield is mandatory.

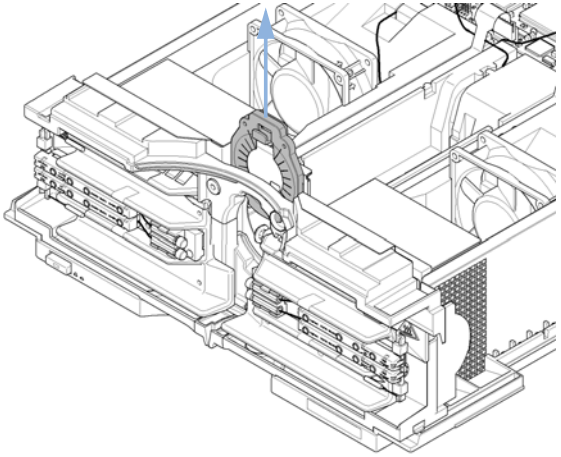
**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | G1316-67002 | Valve Cover Kit |

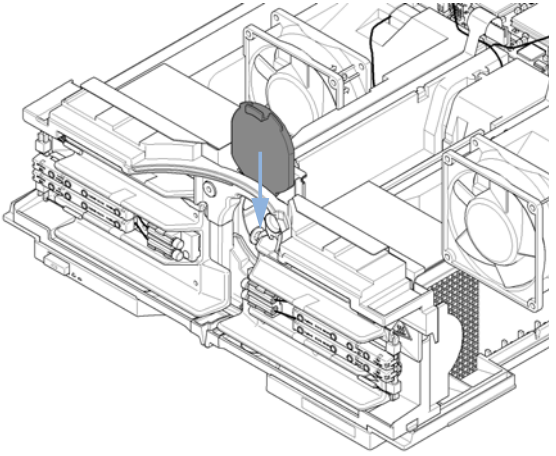
**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section ("Removing the Top Cover and Foam" on page 110).

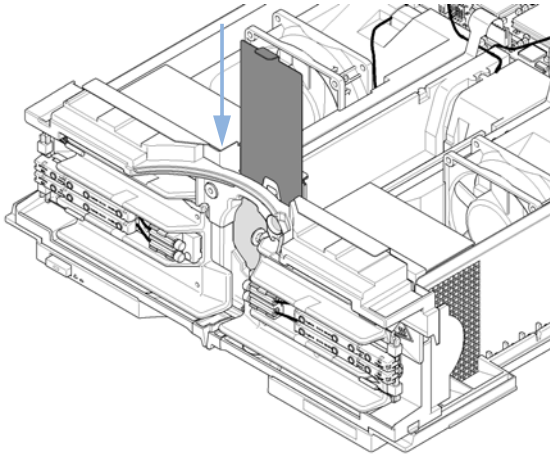
**1** Remove the valve liner.



**2** Replace the valve liner by a valve cover **G1316-44123**, which fits to the same position and clip it in at its top.



**3** Insert the radio frequency shield between the Z-panel and valve cover.



# Installing the leak sensor (G1316C SL Plus)

This section describes how to install the leak sensor for the Thermostatted Column Compartment SL Plus (G1316C SL Plus). New modules of the G1316A and G1316B SL versions use the same design. For existing G1316A and G1316B SL modules, please refer to "Replacing the Leak Sensor or Leak Base (G1316A/G1316B SL)" on page 156.

**When**

If leak sensor is defective or leak base is damaged

**Tools required**

Screwdriver Pozidriv 1 PT3

Screwdriver flat blade

Wrench 1/4 inch

Hexagonal wrench 3 mm

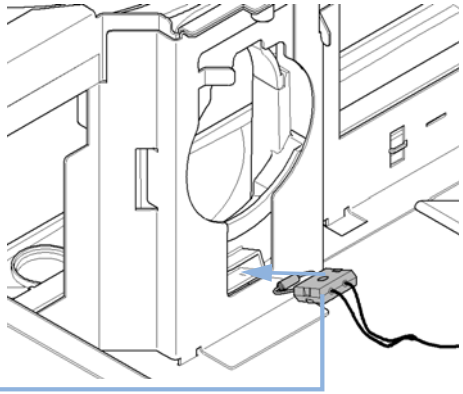
**Parts required**

| # | Part number | Description |
|---|---|---|
| 1 | 5061-3356 | Leak sensor assembly |
| 1 | G1316-43101 | Leak base (part of leak panel kit G1316-68700) |

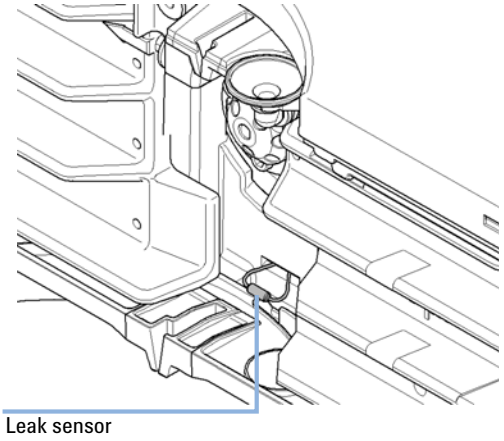
**Preparations**

- Turn OFF the column compartment.
- Disconnect the power cable.
- Disconnect capillaries.
- Remove column compartment from stack and place it on the working bench.
- Remove the front cover, top cover and top foam section, see "Removing the Top Cover and Foam" on page 110.
- Remove the sliding unit, see "Removing the sliding unit (G1316C SL Plus)" on page 117

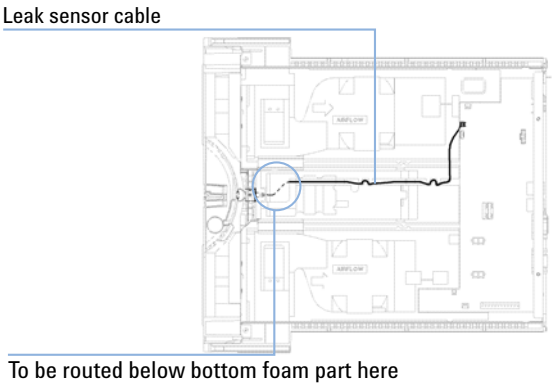
**1** Insert the leak sensor to the hole below the valve liner (rear view).




**2** Insert the leak sensor to the hole below the valve liner (front view).




**3** Route the leak sensor cable below the overhang and through the channel in the bottom foam part. Connect the leak sensor to the main board.



# Replacing the Door Sensor (G1316C SL Plus)

**When** If the door sensor is defective.

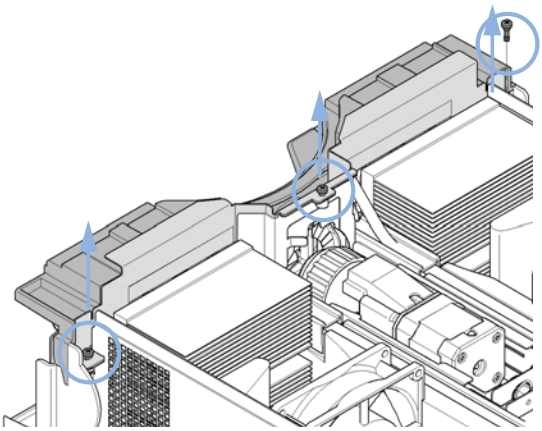
**Tools required**
- Screwdriver Pozidriv 1 PT3
- Screwdriver flat blade
- Wrench 1/4 inch
- Hexagonal wrench 3 mm

**Parts required**

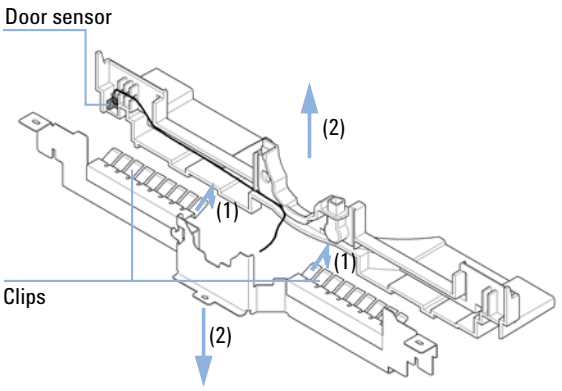
| # | Part number | Description |
|---|---|---|
| 1 | G1316-81603 | Door Sensor |

**Preparations**
- Turn OFF the column compartment
- Disconnect the power cable
- Disconnect capillaries
- Remove column compartment from stack and place it on the working bench

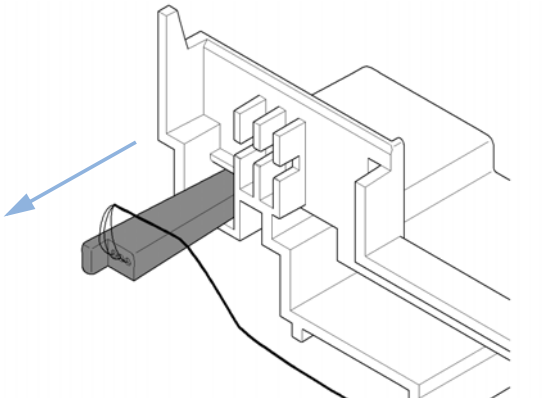
**1** Remove the Z-Panel and upper leak panel by opening 3 screws.



**2** Remove the RF shield by carefully pulling down (1) the clips.



**3** Pull the door sensor out of the leak panel.



**NOTE** For installing a new door sensor, route the sensor cable through the leak panel as shown in figure above (step 2), clip in the RF shield and fix the panel to the module frame.

# 10
# Parts and Materials for Maintenance



This chapter provides information on parts for maintenance.

# Valve Options Overview

This overview gives a summary of the main parts and assemblies. More details are available with each valve option in this chapter.

**Table 10** Valves for G1316A and G1316B SL

| Module | Valve Description | Valve | Rotor Seal | Stator |
|---|---|---|---|---|
| *G1316A* (#055)<br>G1316-68700 | "Column Switching Valve 2 Position/6 Port (G1316A/G1316B SL)" on page 181 | 0101-0920 [1] | 0100-1855 (Vespel)<br>0100-1854 (Tefzel)<br>0100-2233 (PEEK) | 0100-1851 (Face)<br>0100-1850 (Head)<br>0100-1852 (Seal) |
| *G1316A* (#056) | "Micro Column Switching Valve 2 Postion/6 Port (G1316A/G1316B SL)" on page 185 | 0101-1051 | 0100-2087 (Vespel) | 0101-2089 |
| *G1316A* (#057)<br>G1316-68709 | "Micro Column Switching Valve 2 Position/10 Port (G1316A/G1316B SL)" on page 186 | 0101-1343 [2] | 0101-1360 | 0101-1362 |
| *G1316B* (#055) | "Column Switching Valve 2 Position/6 Port (G1316A/G1316B SL)" on page 181 (600 bar) | 0101-1420 | 0101-1409 | 0101-1417 |
| *G1316B* (#057) | "Micro Column Switching Valve 2 Position/10 Port (G1316A/G1316B SL)" on page 186 (600 bar) | 0101-1419 | 0101-1415 | 0101-1421 |

[1] re-build kit 0101-1258 includes 3-groove rotor seal, stator face assy, isolation seal, instructions.

[2] re-build kit 0101-1360 includes PEEK rotor seal, PEEK stator face, hex key.

**Table 11** Valves for G1316C SL Plus

| Kit | Kit Description | Valve Head | Rotor Seal | Stator |
|---|---|---|---|---|
| G4230A | Method Development Valve Kit, low pressure, includes 8pos/9port valve | 5067-4108 | 5067-4113[1] | 5067-4112 |
| G4230B | Method Development Valve Kit, high pressure, includes 8pos/9port valve | 5067-4107 | 5067-4111 | 5067-4110 |

[1] kit with stator face and rotor seal

# Heater and Cooling Devices for G1316B SL/G1316C SL Plus

The use of these heater and cooling devices is described in Technical Notes or in the Agilent 1200 Series Rapid Resolution LC System (1200 RRLC System) manual.

**Table 12** Heater and Cooling Devices for G1316B SL/G1316C SL Plus

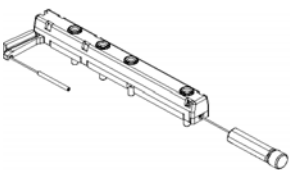
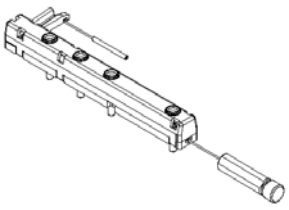
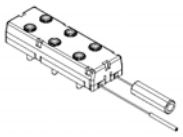
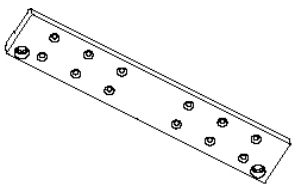
| Item | Description | Part Number |
|---|---|---|
|  | Heater long-up (0.12 mm i.d., 1.6 µl internal volume) (G1316B SL/G1316C SL Plus)<br><br>Part of "G1316B SL/G1316C SL Plus Capillary System Kit" on page 190. | **G1316-80002** |
|  | Heater long-down (0.12 mm i.d., 1.6 µl internal volume) (G1316B SL/G1316C SL Plus)<br><br>Part of "G1316B SL/G1316C SL Plus Capillary System Kit" on page 190. | **G1316-80003** |
|  | Post-column cooler, (0.12 mm i.d., 1.5 µl internal volume) (G1316B SL/G1316C SL Plus)<br><br>Part of "G1316B SL/G1316C SL Plus Capillary System Kit" on page 190. | **G1316-80004** |
|  | Carrier for Heater and Cooler (G1316B SL),<br><br>includes 3 screws SKT-HD-CAP, M3 x 0.5, 12 mm long<br><br>Part of "G1316B SL/G1316C SL Plus Capillary System Kit" on page 190. | **G1316-83200**<br><br>**0515-1052** |

**Table 13** Consumables (G1316C SL Plus)

| Description | Part Number |
|---|---|
| Column Clip Set, 8 Colors | **5042-9918** |
| Carrier for Heat Exchanger G1316C SL Plus | **G1316-89200** |
| Fitting Holder Assy, includes following items:<br>• Fitting Fork<br>• Fitting Clip<br>• Screws (Pack of 4) | **G1316-68706** |

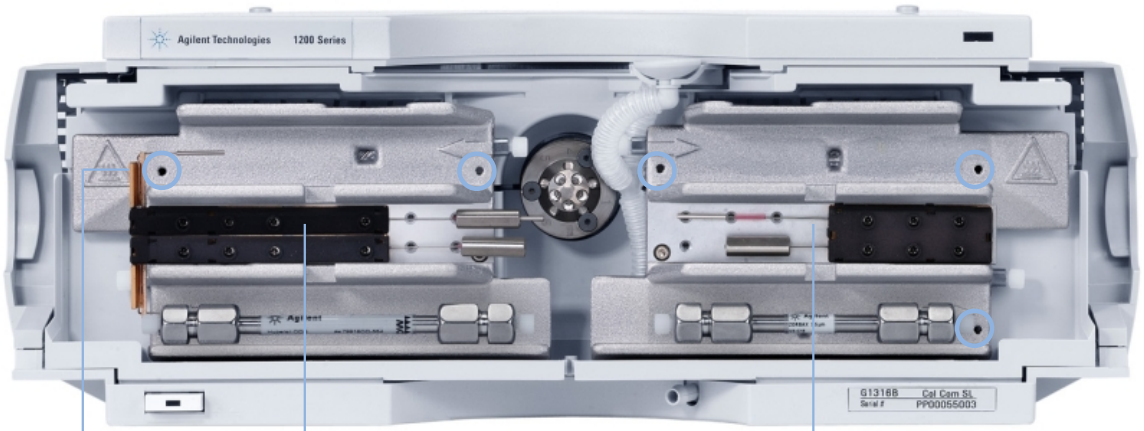



**Figure 30** Heater and Cooling Devices for G1316B SL

# Column Switching Valve 2 Position/6 Port (G1316A/G1316B SL)

**Table 14** Column Switching Valve 2PS/6PT for G1316A/G1316B SL

| Item | Description | Part Number |
|---|---|---|
| | Column switching valve kit, includes all parts required for installation | **G1353-68700** |
| | Column switching valve (complete assembly) | **0101-0920** |
| | Cover plate (when switching valve is not installed) | **G1316-44103** |
| | Capillary Kit Column Switching includes two capillaries (0.17mm i.d., 180 mm) and three capillaries (0.17 mm i.d., 90 mm) | **G1316-68708**<br>**G1313-87305**<br>**G1316-87300** |
| | Rhebuild kit for 7750-030 valve, includes: 3-groove rotor seal, stator face assy, isolation seal, instructions | **0101-1258** |
| 1 | Stator screws | **1535-4857** |
| 2 | Stator Head | **0100-1850** |
| 3 | Stator face | **0100-1851** |
| 4 | Stator ring | |
| 5 | Rotor seal 3 grooves (Tefzel)<br>Rotor seal 3 grooves (Vespel)<br>Rotor seal 3 grooves (PEEK) | **0100-1854**<br>**0100-1855**<br>**0100-2233** |
| 6 | Isolation seal | **0100-1852** |

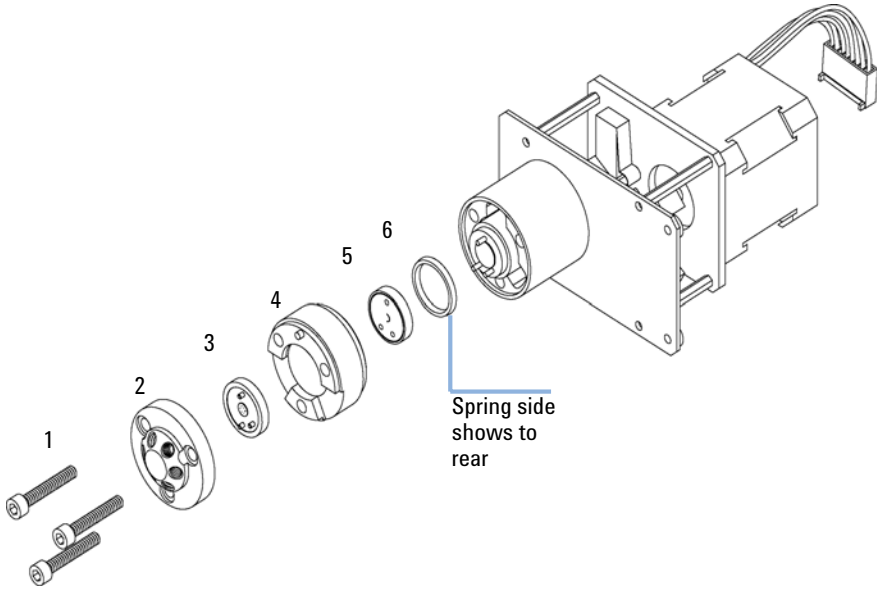



**Figure 31** Column Switching Valve Parts

# Column Switching Valve 8 Position/9 Port (G1316C SL Plus)

## Column Switching Valve Parts High Pressure (G1316C SL Plus)

**Table 15** Valve 8 Postion/9 Port, High Pressure (G1316C SL Plus)

| Item | Description | Part Number |
|---|---|---|
| | Valve Head, 8 Position/9 Port, High Pressure | **5067-4107** |
| 1 | Stator Screws | **1535-4857** |
| 2 | Stator Head | **5067-4110** |
| 3 | Rotor Seal High Pressure | **5067-4111** |
| 4 | Isolation Seal | **0100-1852** |

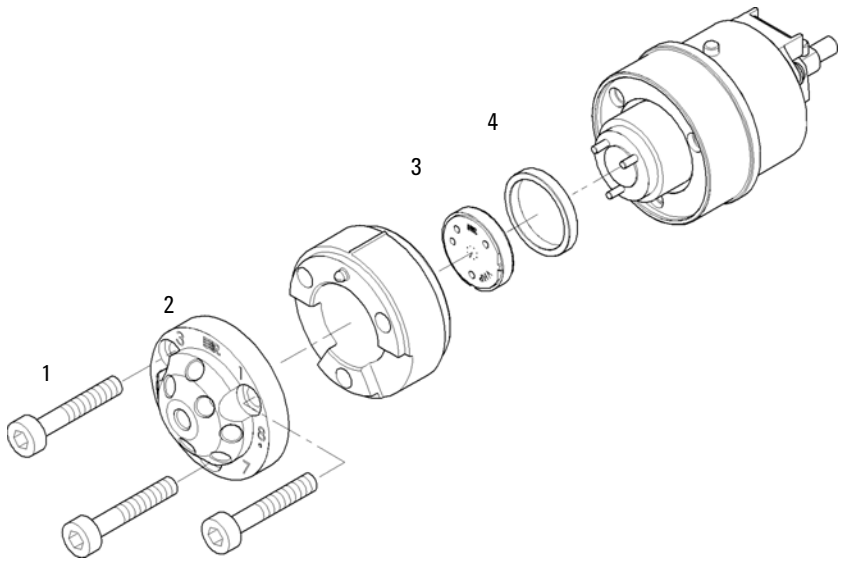



**Figure 32** Column Switching Valve Parts (5067-4107)

## Column Switching Valve Parts 400 bar (G1316C SL Plus)

**Table 16** Valve 8 Postion/9 Port, 400 bar (G1316C SL Plus)

| Item | Description | Part Number |
|---|---|---|
| | Valve Head, 8 Position/9 Port, 400 bar | **5067-4108** |
| 1 | Stator Screws | **1535-4857** |
| 2 | Stator Head | **5067-4112** |
| 3, 4 | Stator Face/Rotor Seal 400 bar | **5067-4113** |
| 5 | Isolation Seal | **0100-1852** |

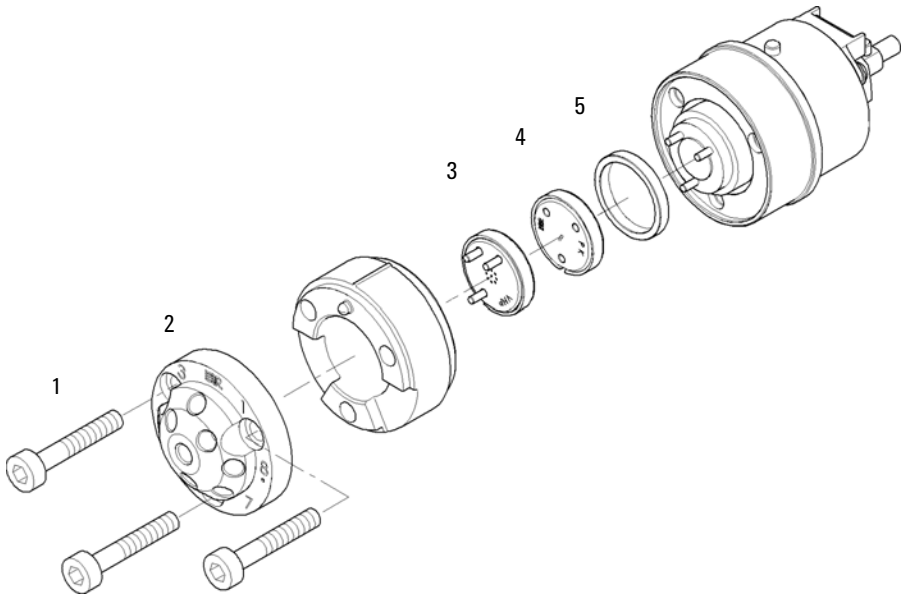



**Figure 33** Column Switching Valve Parts (5067-4108)

# Micro Column Switching Valve 2 Postion/6 Port (G1316A/G1316B SL)

**Table 17** Micro Column Switching Valve 2PS/6PT for G1316A/G1316B SL, 400 bar

| Item | Description | Part Number |
|---|---|---|
| | Micro Column Switching Valve 2PS/6PT, 400 bar | **0101-1051** |
| | Stator face | **0100-2089** |
| | Rotor seal 3 grooves | **0100-2087** |

**Table 18** Micro Column Switching Valve 2PS/6PT for G1316B SL, 600 bar

| Item | Description | Part Number |
|---|---|---|
| | Micro Column Switching Valve 2PS/6PT, 600 bar | **0101-1420** |
| | Stator, 600 bar | **0101-1417** |
| | Rotor seal 3 grooves, 600 bar | **0101-1409** |

# Micro Column Switching Valve 2 Position/10 Port (G1316A/G1316B SL)

**NOTE** Technical details can be found in the Technical Note that is supplied with the kit.

**Table 19** Micro Column Switching Valve 2PS/10PT for G1316A/G1316B SL, 400 bar

| Item | Description | Part Number |
|---|---|---|
| | 2PS/10 PT Valve kit, includes all parts required for installation | **G1316-68709** |
| | Rebuild kit, includes PEEK rotor seal, PEEK stator face, hex key | **0101-1360** |
| | 2PS/10 PT valve | **0101-1343** |
| | Rotor seal (Vespel) | **0101-1361** |
| | Stator face | **0101-1362** |
| | Capillary kit, see Table 21 on page 186 | **G1316-68711** |

**Table 20** Micro Column Switching Valve 2PS/10PT 600 bar for G1316B SL, 600 bar

| Item | Description | Part Number |
|---|---|---|
| | Column Switching Valve 2PS/10PT for µ-LC System, 600 bar | **0101-1419** |
| | Stator, 600 bar | **0101-1421** |
| | Rotor seal 5 grooves, 600 bar | **0101-1415** |

**Table 21** Capillary Kit (G1316-68711)

| From | To | ID [mm] | Length [mm] | Qty | Part number | Remark |
|---|---|---|---|---|---|---|
| Capillaries | | | | | | |
| ALS [1] | Valve (port 2) | 0.17 | 700 | 1 | **5065-9932** | |

**Table 21** Capillary Kit (G1316-68711)

| From | To | ID [mm] | Length [mm] | Qty | Part number | Remark |
|---|---|---|---|---|---|---|
| Valve (port 3) | TCC 3 µl (In) | 0.17 | 105 | 1 | **5021-1816** | |
| TCC [2] 3 µl (Out) | Column 1 | 0.17 | 105 | 1 | **5021-1816** | |
| Column 1 | Valve (port 6) | 0.17 | 105 | 1 | **5021-1816** | for long column |
| Column 1 | Valve (port 6) | 0.17 | 200 | 1 | **5065-9931** | for short column |
| Valve (port 7) | Detector (In) | 0.17 | 280 | 1 | **5021-1818** | |
| Valve (port 1) | TCC 6 µl (In) | 0.17 | 105 | 1 | **5021-1816** | |
| TCC ** 6 µl (Out) | Column 2 | 0.17 | 105 | 1 | **5021-1816** | |
| Column 2 | Valve (port 8) | 0.17 | 105 | 1 | **5021-1816** | for long column |
| Column 2 | Valve (port 8) | 0.17 | 200 | 1 | **5065-9931** | for short column |
| Valve (port 5) | Valve (port 10) | 0.17 | 105 | 1 | **5021-1816** | |
| Regeneration pump | Valve (port 4) | 0.25 | 800 | 1 | **5065-9930** | |
| Valve (port 9) | Waste | 0.6 | 2000 | | **5062-2463** | PTFE |
| Ferrules, screws, fingertight fittings, etc. | | | | | | |
| 1/16” fittings and ferrules | | | | 2 | **5062-2418** | 10/pk |
| fingertight fitting long | | | | 1 | **5062-8541** | 10/pk |
| fitting screw long | | | | 10 | **5065-4454** | 10/pk |
| fitting screw extra long | | | | 10 | **5065-9967** | 10/pk |
| front ferrule | | | | 1 | **5180-4108** | 10/pk |
| back ferrule | | | | 1 | **5180-4114** | 10/pk |
| Peek tubing 1/16” | | 0.18 | 1500 | 1 | **0890-1763** | |
| Plastic tubing cutter | | | | 1 | **8710-1930** | |
| Hex key 3/32” | | | | 1 | **8710-2462** | |
| Rheotool Socket wrench 2 x 1/4” | | | | 1 | **8710-2391** | |

[1] ALS - Autosampler

[2] TCC - Thermostatted Column Compartment (heat exchanger: 3 µl left or 6 µl right)

# Accessory Kits

The accessory kits (for G1316A, G1316B SL or G1316C SL Plus) contain accessories and tools needed for the installation and maintenance.

## G1316A Accessory Kit (Standard)

**Table 22** G1316A Accessory Kit (Standard)

| Item | Description | Part Number |
|---|---|---|
| | G1316A Accessory Kit (Standard) | **G1316-68705** |
| | Column identification tag (blank)<br>for re-ordering use (pack of 3) | **5062-8588** |
| | Column clip, for re-order use (pack of 6) | **5063-6526** |
| | Corrugated tubing (to waste), re-order 5 m | **5062-2463** |
| | CAN cable 0.5 m | **5181-1516** |
| | Wrench open end 1/4 – 5/16 inch | **8710-0510** |
| | Wrench open end, 5/16 – 3/8 inch | **8710-2409** |
| | Capillary column-heat exchanger 90 mm lg, 0.17 i.d. (not assembled) contains items 2, 3 and 4 | **G1316-87300** |
| | Ferrule front SST (pack of 2) | [1] |
| | Ferrule back SST (pack of 2) | * |
| | Fitting SST (pack of 2) | * |

[1] re-order 5062-2418, pack of 10 each of fittings, front- and back ferrule

# G1316A Accessory Kit (2PS/10PT modules)

**Table 23** G1316A Accessory Kit (2PS/10PT modules)

| Item | Description | Part Number |
|---|---|---|
| | G1316A Accessory Kit 2PS/10PT | **G1316-68725** |
| | Column identification tag (blank)<br>for re-ordering use (pack of 3) | **5062-8588** |
| | Column clip, for re-order use (pack of 6) | **5063-6526** |
| | Corrugated tubing (to waste), re-order 5 m | **5062-2463** |
| | CAN cable 0.5 m | **5181-1516** |
| | Wrench open end 1/4 – 5/16 inch | **8710-0510** |
| | Wrench open end, 5/16 – 3/8 inch | **8710-2409** |
| | PEEK Capillary 280 mm lg, 50 µ i.d. (pack of 4) | **G1316-87309** |
| | MIC Valve Fitting (pack of 2) | **5022-2186** |
| | Column holder for µ-LC columns (pack of 2) | **5001-3702** |

# G1316B SL/G1316C SL Plus Accessory Kit (Standard)

**Table 24** Accessory Kit (Standard) G1316B SL and G1316C SL Plus

| Item | Description | Part Number |
|---|---|---|
| | G1316B SL/G1316C SL Plus Accessory Kit (Standard) | **G1316-68735** |
| | Column identification tag (blank)<br>for re-ordering use (pack of 3) | **5062-8588** |
| | Column clip, qty=2, for re-order use (pack of 6) | **5063-6526** |
| | Corrugated tubing (to waste), re-order 5 m | **5062-2463** |
| | CAN cable 0.5 m | **5181-1516** |
| | Wrench open end 1/4 – 5/16 inch | **8710-0510** |
| | Wrench open end, 5/16 – 3/8 inch | **8710-2409** |

**Table 24** Accessory Kit (Standard) G1316B SL and G1316C SL Plus

| Item | Description | Part Number |
|---|---|---|
| | Screwdriver Torx TX8 | **8710-2509** |
| | Screwdriver Hexagonal 2.5 mm | **5965-0028** |
| | Capillary column-heat exchanger 90 mm lg, 0.17 i.d. (not assembled) contains items 2, 3 and 4 | **G1316-87300** |
| | Capillary column-heat exchanger 115 mm lg, 0.17 i.d. (not assembled) contains items 2, 3 and 4 | **G1316-87321** |
| | Capillary column-heat exchanger 170 mm lg, 0.17 i.d. (not assembled) contains items 2, 3 and 4 | **G1316-87323** |
| | Ferrule front SST (pack of 2) | [1] |
| | Ferrule back SST (pack of 2) | * |
| | Fitting SST (pack of 2) | * |

[1] re-order 5062-2418, pack of 10 each of fittings, front- and back ferrule

# G1316B SL/G1316C SL Plus Capillary System Kit

## G1316B SL/G1316C SL Plus Capillary System Kit

**Table 25** G1316B SL Capillary System Kit G1316-68744 (G1316B#060)

| Item | Description | Part Number |
|---|---|---|
| * | 2 Carriers for Heater or Cooling Devices | **G1316-83200** |
| * | Heater long-up (0.12 mm i.d., 1.6 µl internal volume) | **G1316-80002** |
| * | Heater long-down (0.12 mm i.d., 1.6 µl internal volume) | **G1316-80003** |
| * | Post-column cooler (0.12 mm i.d., 1.5 µl internal volume) | **G1316-80004** |
| | Capillary System Kit, see Table 26 on page 191 for details | **G1316-68716** |

For items * see also "Heater and Cooling Devices for G1316B SL/G1316C SL Plus" on page 179.

**Table 26** Capillary System Kit G1316-68716

| Item | Description | Part Number |
|---|---|---|
| | Seat Capillary 100 mm x 0.12 mm, 0.8 OD | **G1367-87303** |
| | DAD Heat Exchanger Capillary 310 mm x 0.12 mm | **G1315-87339** |
| | SST Capillary 340 mm x 0.12 mm, m/m | **G1316-87319** |
| | SST Capillary 300 mm x 0.12 mm, m/m | **G1316-87318** |
| | SST Capillary 210 mm x 0.12 mm, m/m | **G1316-87317** |
| | SST Capillary 170 mm x 0.12 mm, m/m | **G1316-87316** |
| | SST Capillary 130 mm x 0.12 mm, m/f | **G1316-87315** |
| | SST Capillary 90 mm x 0.12 mm, m/f | **G1316-87314** |
| | SST Capillary 70 mm x 0.12 mm, m/f | **G1316-87313** |
| | SST Capillary 50 mm x 0.12 mm, m/f | **G1316-87312** |
| | SST Capillary 170 mm x 0.12 mm, m/f | **G1316-87327** |
| | SST Capillary 500 mm x 0.12 mm, m/m | **G1316-87309** |
| | SST Capillary 500 mm x 0.12 mm, m/m | **G1315-87307** |

## G1316C SL Plus Capillary System Kits

**Table 27** G1316C Capillary System Kits

| Description[1] | Part Number |
|---|---|
| Solvent selection tubing kit, 4 solvents | **5067-4601** |
| Method Development Capillary Kit, low dispersion, short column | **5067-1595** |
| Method Development Capillary Kit, low dispersion, long column | **5067-1596** |
| Method Development Capillary Kit, general purpose | **5067-1597** |
| RRHT Selectivity Method Development Kit, 2.1 mm ID | **5190-1431** |
| RRHT pH Method Development Kit, 2.1 mm ID | **5190-1432** |
| RRHT Selectivity Method Development Kit, 4.6 mm ID | **5190-1433** |
| RRHT pH Method Development Kit, 4.6 mm ID | **5190-1434** |

**Table 27** G1316C Capillary System Kits

| Description[1] | Part Number |
|---|---|
| Rapid Resolution Selectivity Method Development Kit | **5190-1435** |
| Rapid Resolution pH Method Development Kit | **5190-1436** |

[1] for capillary kit contents, please refer to the Method Development Solution User and Installation Guide (**G4230-90000**)

# G1316B SL Micro Valve Kit 2 Position/10 Port

**Table 28** G1316B SL Micro Valve Kit 2PS/10PT

| Item | Description | Part Number |
|---|---|---|
| | G1316B SL Micro Valve Kit 2PS/10PT | **G1316-68745** |
| | Column identification tag (blank) for re-ordering use (pack of 3) | **5062-8588** |
| | Column clip, for re-order use (is pack of 6) | **5063-6526** |
| | Corrugated tubing (to waste), re-order 5 m | **5062-2463** |
| | Wrench open end 1/4 – 5/16 inch | **8710-0510** |
| | Wrench open end, 5/16 – 3/8 inch | **8710-2409** |
| | Screwdriver Torx TX8 | **8710-2509** |
| | Screwdriver Hexagonal 2.5 mm | **5965-0028** |
| | 2 Column holders for µ-LC columns | **5001-3702** |
| | Column Regeneration Kit for µ-LC columns, see Table 29 on page 193 | **G1316-68721** |
| | Capillary column-heat exchanger 90 mm lg, 0.17 i.d. (not assembled) contains items 2, 3 and 4 | **G1316-87300** |
| | Capillary column-heat exchanger 115 mm lg, 0.17 i.d. (not assembled) contains items 2, 3 and 4 | **G1316-87321** |
| | Capillary column-heat exchanger 170 mm lg, 0.17 i.d. (not assembled) contains items 2, 3 and 4 | **G1316-87323** |

# Column Regeneration Kit (G1316A/G1316B SL)

Refer to Figure 34 on page 194 for connection diagram.

**Table 29** Column Regeneration Kit

| Description | where used | Part Number |
|---|---|---|
| Column Regeneration Kit | | **G1316-68721** |
| SST Capillary, 700 mm x 0.17 mm, 1/32 - 1/32 | column to cell | **G1312-87304** |
| SST Capillary, 100 mm x 0.12 mm, 1/32 - 1/32 | switching capillary | **G1316-27301** |
| SST Capillary, 100 mm x 0.12 mm, male/female 1/32 - 1/16 | adapter capillary | **G1316-87304** |
| SST Capillary, 340 mm x 0.12 mm, male/female 1/32 - 1/16 | WPS to valve | **G1316-87305** |
| SST Capillary, 70 mm x 0.12 mm, male/female 1/32 - 1/16 (pack of 2) | valve to heatexchanger | **G1316-87306** |
| SST Capillary 50 mm x 0.12 mm, male/female | column to cell | **G1316-87312** |
| SST Capillary 70 mm x 0.12 mm, male/female | column to cell | **G1316-87313** |
| SST Capillary, 75 mm x 0.12 mm, male/female 1/32 - 1/16 | valve to detector | **G1316-87326** |
| Seat Capillary, 100 mm x 0.12 mm (pack of 2) | | **G1367-87303** |
| PEEK fitting, special for Chip-LC | | **G4240-43200** |
| Flexible PEEK Tubing, 450 mm x 0.4 mm | valve to waste | **5022-6503** |

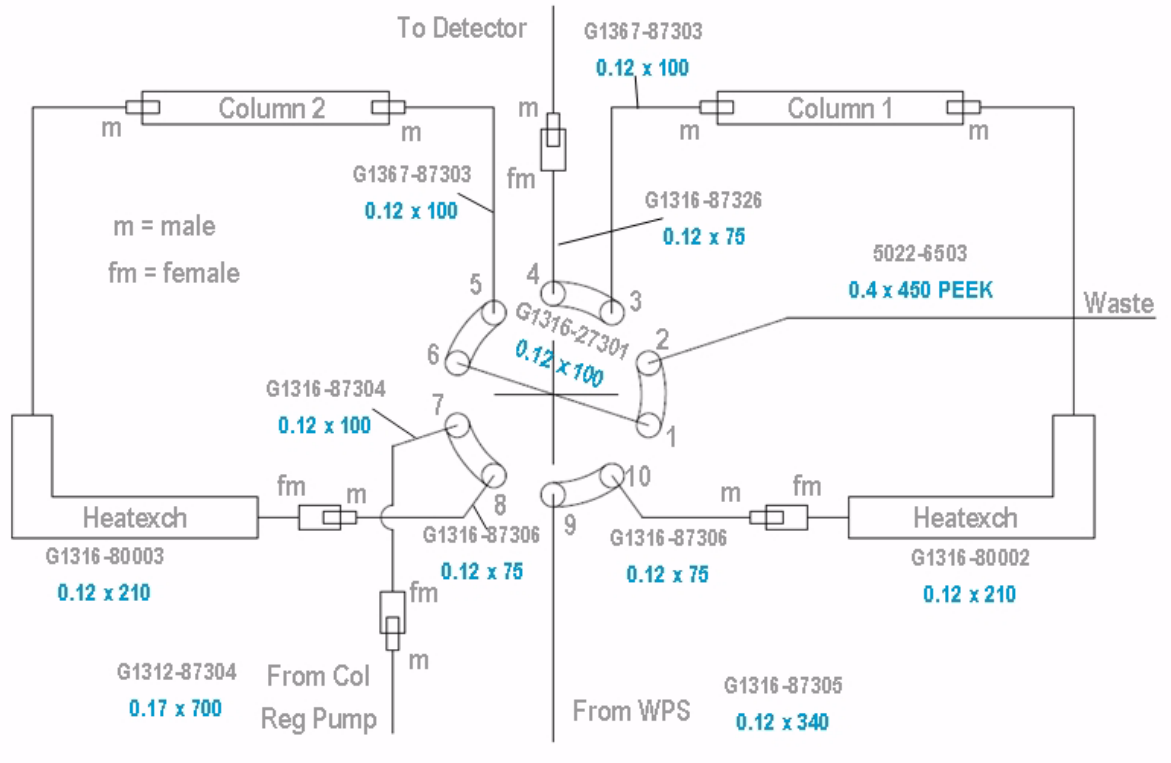



**Figure 34** Connection Diagram for Column Regeneration

## Accessories (G1316C SL Plus)

**Table 30** Accessories (G1316C SL Plus)

| Description | Part Number |
|---|---|
| Transportation Lock Kit G1316C SL Plus, includes following items:<br>• Lock Plate<br>• Screw M4<br>• Screw M3x8 (pack of 4)<br>• Spring Washer<br>• Transportation Valve Head | **G1316-67001** |

# Plastic Parts

**Table 31** Plastic Parts

| Item | Description | Part Number |
|---|---|---|
| 2 | Front cover G1316A (1200 Series) | **G1316-68714** |
| 2 | Front cover G1316B SL (1200 Series) | **G1316-68724** |
| 2 | Front cover G1316C SL Plus (1200 Series) | **G1316-68754** |
| 3 | Name plate Agilent (1200 Series) | **5042-8901** |

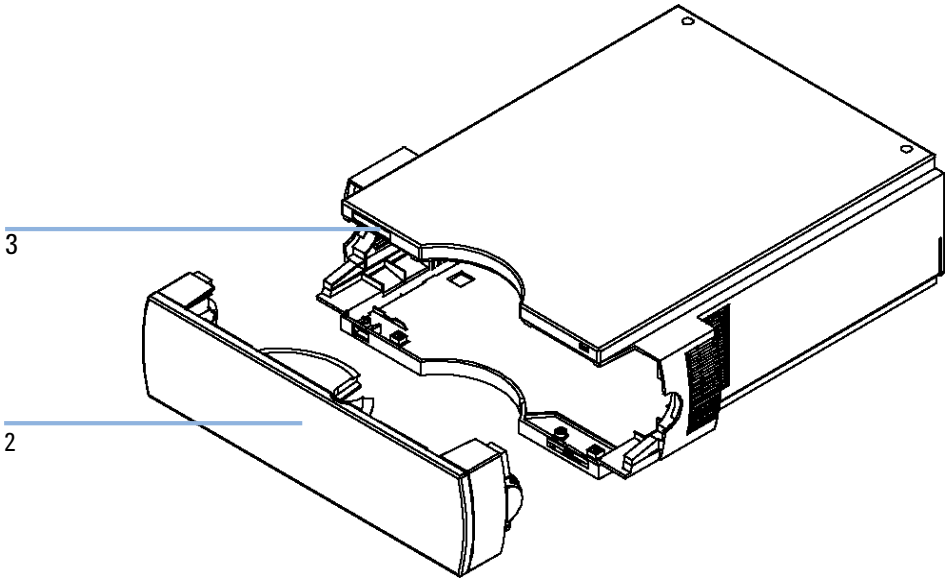



**Figure 35** Plastic Parts

# Leak Parts

**Table 32** Leak Parts G1316A/G1316B SL

| Item | Description | Part Number |
|---|---|---|
| 1 | Leak funnel | **5041-8388** |
| 2 | Leak funnel holder | **G1316-42300** |
| 3 | Waste assembly, includes complete Y-tubing assembly with leak funnel | **G1316-60002** |
| | Corrugated waste tube (reorder pack), 5 m | **5062-2463** |

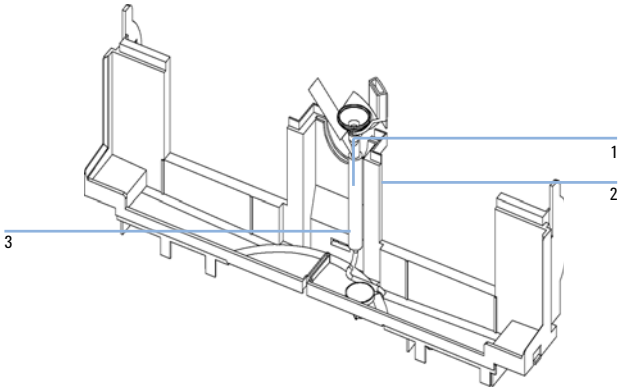



**Figure 36** Leak Parts

**Table 33** Leak Parts G1316C SL Plus

| Item | Desription | Part Number |
|---|---|---|
| | Leak Panel Kit, includes following items:<br>• Leak Panel Top<br>• Leak Panel Base | **G1316-68722** |
| | Leak Tube Kit, includes following items:<br>• Funnel Holder G1316C SL Plus<br>• Tubing-flex polyethylene<br>• Leak Funnel | **G1316-67000** |
| 1 | Capillary Guide | **G1316-42303** |

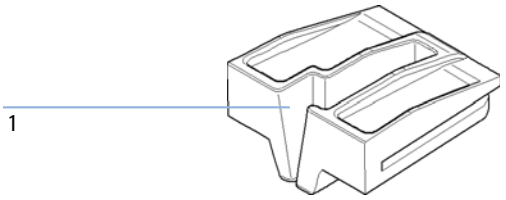



**Figure 37** Capillary Guide

# 11
# Parts for Repairs



This chapter provides information on parts for repair.

# Overview of Main Assemblies

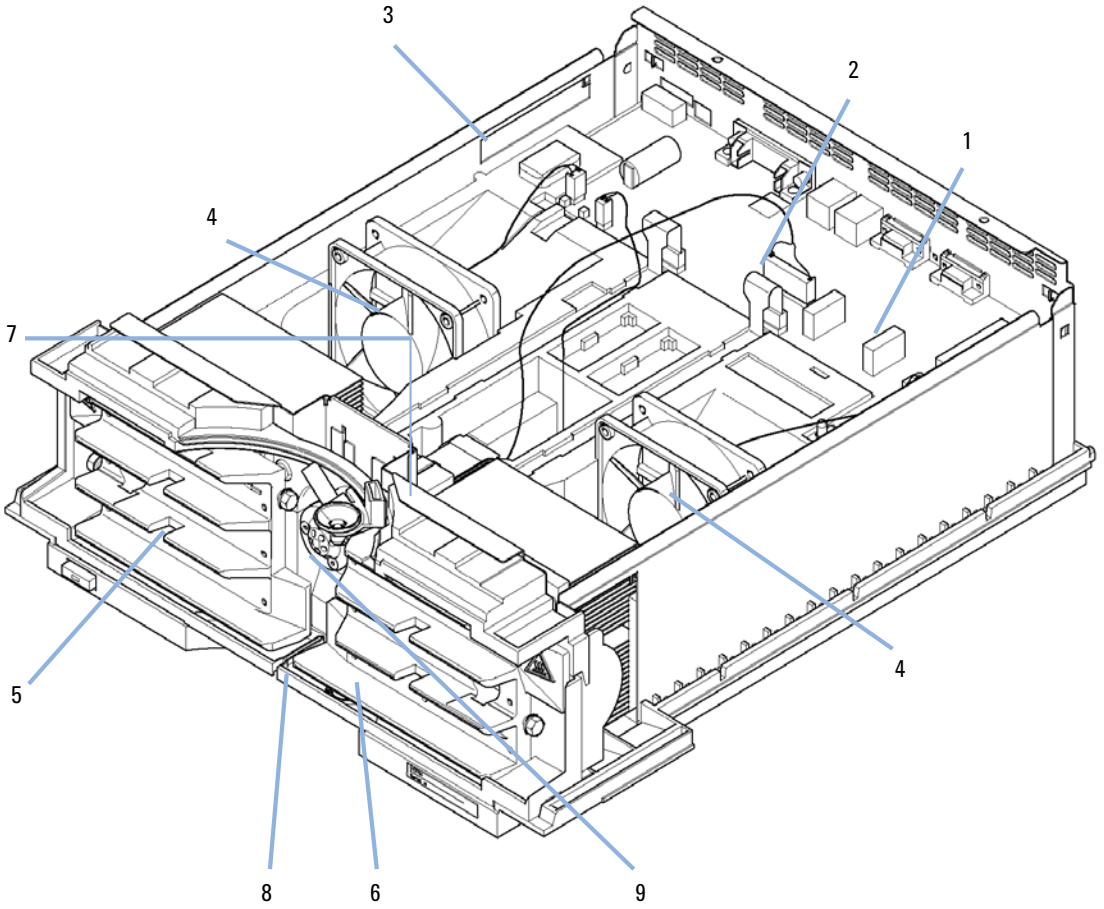



**Figure 38** Main Assemblies

**Table 34** Overview of Main Assemblies

| Item | Description | Part Number |
|---|---|---|
| 1 | Column compartment main board CCM for G1316A, requires minimum firmware A.05.05 (exchange part) | **G1316-66530** **G1316-69530** |
| 1 | Column compartment main board CCM for G1316B SL, requires minimum firmware A.06.02 (exchange part) | **G1316-66540** **G1316-69540** |
| 1 | Column compartment main board CCM for G1316C SL Plus, requires minimum firmware A.06.10 | **G1316-61050** |
| | Hexagonal nut for GPIB connector | **0380-0643** |
| | Hexagonal nut for RS-232 connector | **1251-7788** |
| | Cable CAN to Agilent 1200 Series modules 0.5 m | **5181-1516** |
| | Cable CAN to Agilent 1200 Series modules 1 m | **5181-1519** |
| 3 | Power supply assembly, additional power and status light parts, see"The Main Power Supply Assembly" on page 244 | **0950-2528** |
| 4 | Fan assembly | **3160-1017** |
| 5 | Heatexchanger (left), 3 µl for G1316A | **G1316-60007** |
| 5 | High Temp Heatexchanger (left), 3 µl for G1316B | **G1316-60017** |
| 6 | Heatexchanger (right) , 6 µl for G1316A | **G1316-60006** |
| 6 | High Temp Heatexchanger (right) , 6 µl for G1316B | **G1316-60016** |
| 7 | Valve (optional), see "Column Switching Valve 2 Position/6 Port (G1316A/G1316B SL)" on page 181, or"Micro Column Switching Valve 2 Postion/6 Port (G1316A/G1316B SL)" on page 185 or"Micro Column Switching Valve 2 Position/10 Port (G1316A/G1316B SL)" on page 186 | |
| 8 | Leak sensor assembly | **5061-3356** |
| 9 | Leak handling parts | See"Leak Parts" on page 210 |
| | Cover plate (when switching valve is not installed) | **G1316-44103** |
| | Front cover and plastic parts (housing) | See "Plastic Parts" on page 205 |

**Table 34** Overview of Main Assemblies

| Item | Description | Part Number |
|---|---|---|
| | Sheet metal parts | See "Sheet Metal Kit" on page 203 |
| | Foam parts | See "Foam Parts" on page 207 |
| | Screw and Washer Kit Rear Panel, includes following items:<br>• Screw M4<br>• Washer<br>• Hexagonal nut for RS-232 connector | **G1316-67004** |

# Sheet Metal Kit

**Table 35** Sheet Metal Kit Parts G1316A/G1316B SL

| Item | Description | Part Number |
|---|---|---|
| | Sheet metal kit includes items 1, 2 and 3 | **G1316-68701** |
| 4 | RFI shield | **G1316-00600** |
| 5 | RFI spring side | **G1316-09100** |
| 6 | RFI spring bottom | **G1316-09102** |

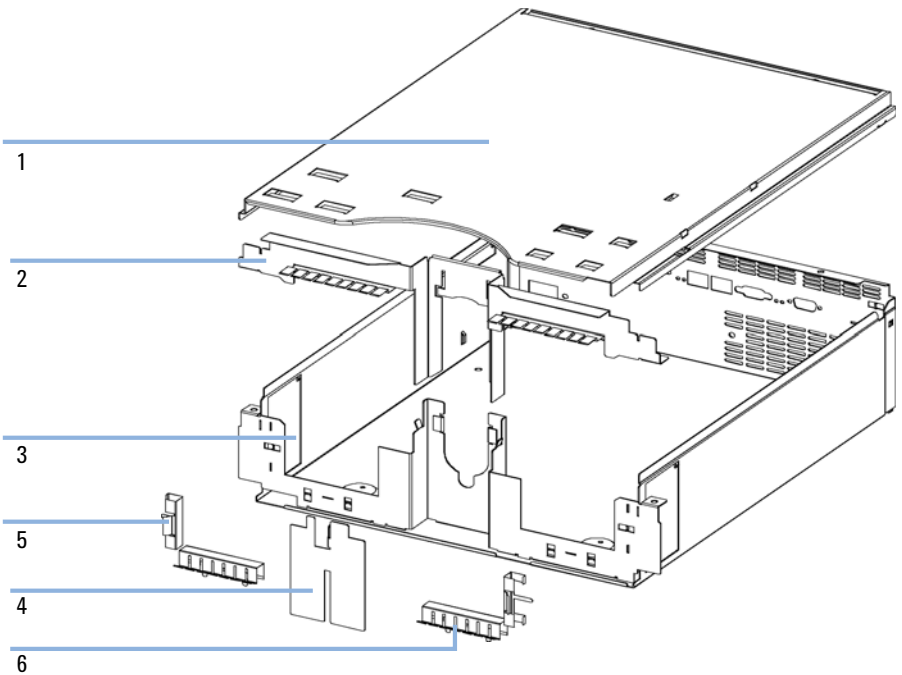



**Figure 39** Sheet Metal Kit

**Table 36** Sheet Metal Kit (G1316C SL Plus)

| Item | Description | Part Number |
|---|---|---|
| | Sheet Metal Kit G1316C SL Plus | **G1316-68731** |

# Plastic Parts

**Table 37** Plastic Parts G1316A/G1316B SL

| Item | Description | Part Number |
|---|---|---|
| 1 | Plastic kit, includes base, sides and top (1200 Series) | **G1316-68713** |
| 2 | Front cover G1316A (1200 Series) | **G1316-68714** |
| 2 | Front cover G1316B SL (1200 Series) | **G1316-68724** |
| 3 | Name plate Agilent (1200 Series) | **5042-1381** |

**Table 38** Plastic Parts G1316C SL Plus

| Item | Description | Part Number |
|---|---|---|
| | Front Cover G1316C SL Plus | **G1316-68754** |
| | Plastik Cover Kit G1316C SL Plus, includes following items:<br>• Top Cover Kit<br>• Left Side Cover G1316C SL Plus<br>• Right Side Cover G1316C SL Plus<br>• Base Cover G1316C SL Plus | **G1316-68723** |
| | Sensor Assy Front Cover | **G1316-81603** |

**NOTE** For correct assembling of the top and sides, see "Assembling the Main Cover" on page 168.

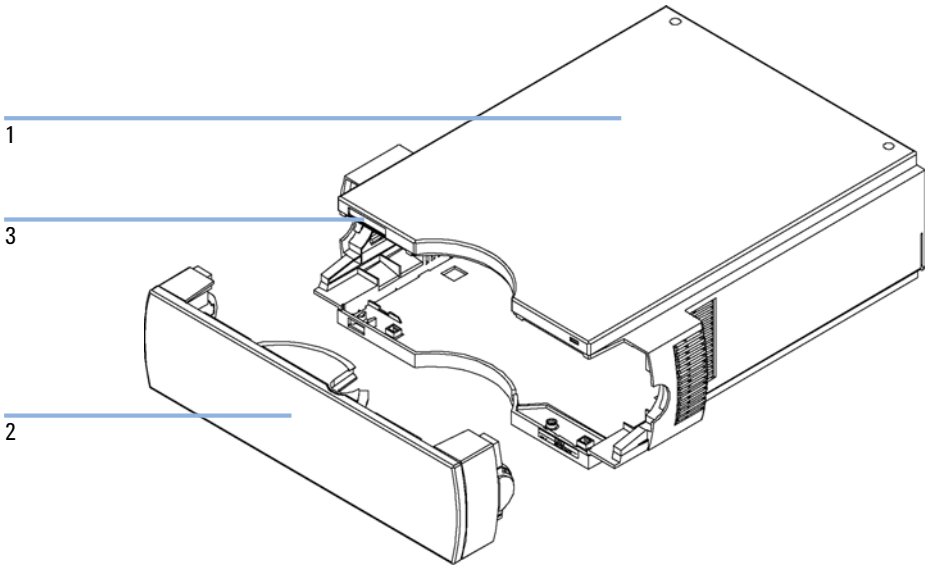



**Figure 40** Plastic Parts

# Foam Parts

**Table 39** Foam Parts G1316A/G1316B SL

| Item | Description | Part Number |
|---|---|---|
| 1,2 | EPP foam kit , includes 1 and 2 | **G1316-68702** |
| 1 | Top | |
| 2 | Base | |

**NOTE** Part numbers printed on the foam parts are not orderable.

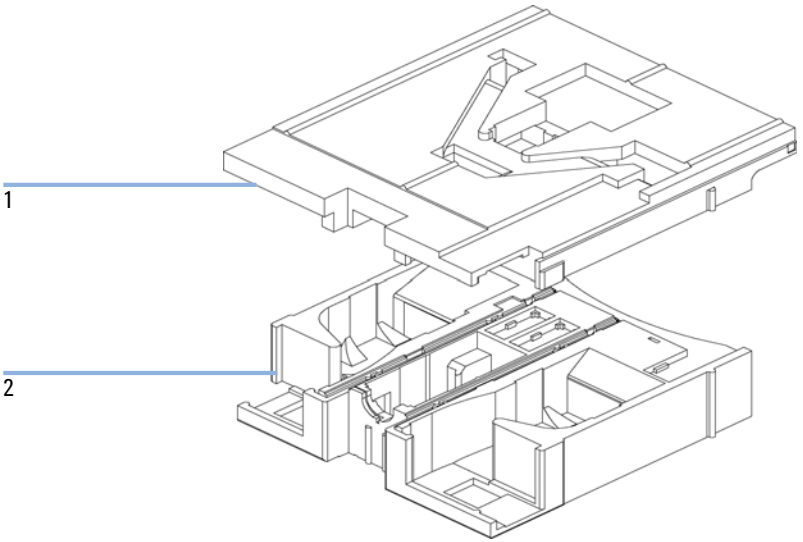



**Figure 41** Foam Parts

**Table 40** Foam Parts G1316C SL Plus

| Item | Description | Part Number |
|---|---|---|
| | EPP Foam Kit G1316A/G1316B SL/G1316C SL Plus | **G1316-68712** |
| 1 | Fixation Clip Kit, 5 clips, includes following items:<br>• Fixation Clip for Heat Exchanger Flex. Board | **G1316-67003** |

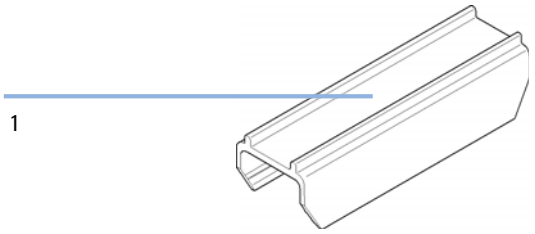



**Figure 42** Fixation Clip for Heat Exchanger Flex  Board

# Power and Status Light Pipes

**Table 41** Power and Status Light Pipes

| Item | Description | Part Number |
|---|---|---|
| | Power supply assembly | **0950-2528** |
| 1 | Power light pipe | **5041-8382** |
| 2 | Status light pipe | **5041-8384** |
| 3 | Power switch button | **5041-8381** |
| 4 | Coupler for power supply actuator | **5041-8383** |

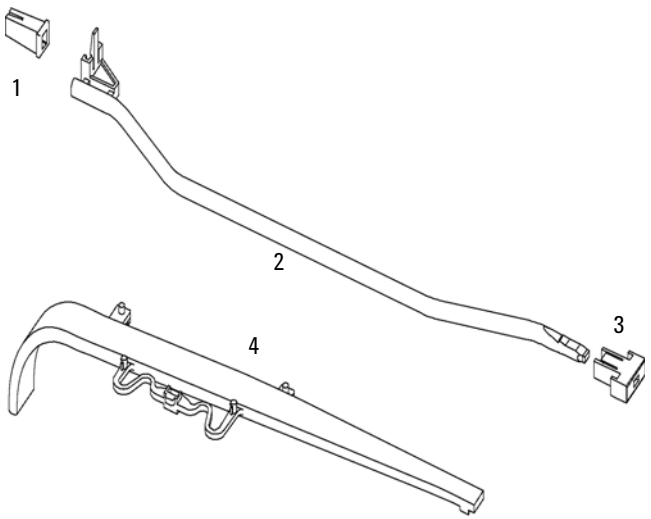



**Figure 43** Power and Status Light Pipes

# Leak Parts

**Table 42** Leak Parts

| Item | Description | Part Number |
|---|---|---|
| 1 | Leak sensor | **5061-3356** |
| 2 | O-ring for ambient temperature sensor | **0400-0002** |
| 3, 4 | Leak Kit, includes leak top and leak base (1200 Series) G1316A/G1316B SL | **G1316-68720** |
| 5 | Leak funnel G1316A/G1316B SL | **5041-8388** |
| 6 | Leak funnel holder G1316A/G1316B SL | **G1316-42300** |
| 7 | Waste assembly, includes complete Y-tubing assembly with leak funnel G1316A/G1316B SL | **G1316-60002** |
| | Waste tubing 1200 mm long (part of accessory kit) | **0890-1711** |
| | Leak Panel Kit, includes following items:<br>• Leak Panel Top<br>• Leak Panel Base | **G1316-68722** |
| | Leak Tube Kit, includes following items:<br>• Funnel Holder G1316C SL Plus<br>• Tubing-flex polyethylene<br>• Leak Funnel | **G1316-67000** |

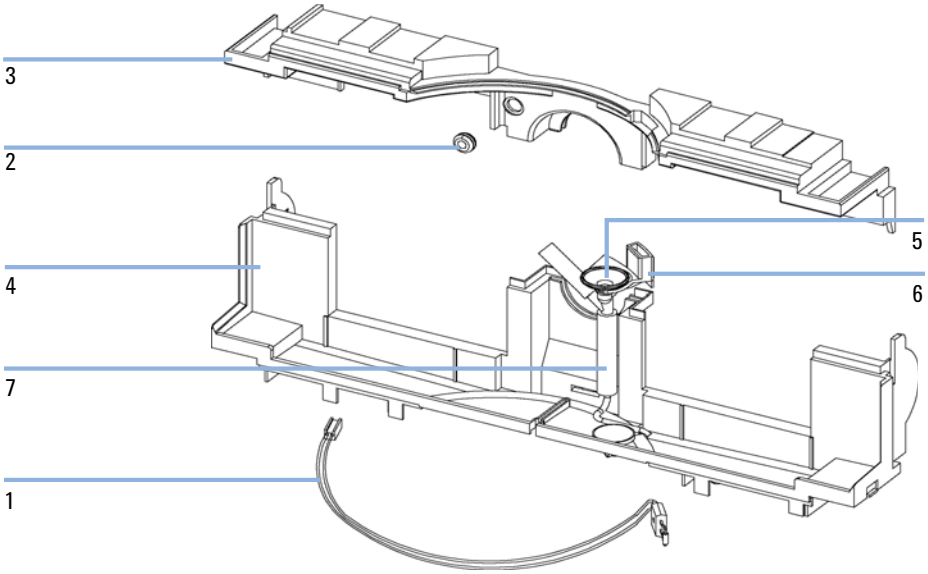
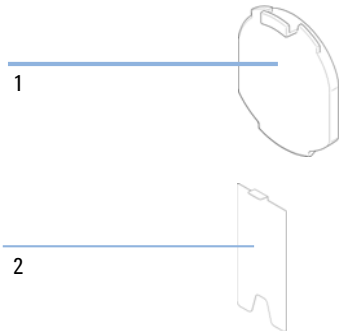



**Figure 44** Leak Parts G1316A/G1316B SL

# Internal Valve Drive Parts (G1316C SL Plus)

**Table 43** Internal Valve Drive Parts (G1316C SL Plus)

| Item | Description | Part Number |
|---|---|---|
| | Actuator Valve | **5067-4106** |
| | Sliding Unit G1316C SL Plus | **G1316-60000** |
| | Valve Liner | **G1316-40501** |
| | Valve Cover Kit, includes following items: | **G1316-67002** |
| 1 | • Valve Cover | |
| 2 | • Radio Frequency Shield | |



# 12
# Identifying Cables



This chapter summarizes information on all cables.

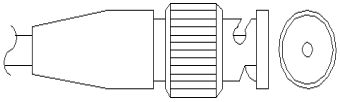
# Cable Overview

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

| Type | Description | Part Number |
|---|---|---|
| Analog cables | 3390/2/3 integrators | **01040-60101** |
| | 3394/6 integrators | **35900-60750** |
| | Agilent **35900A** A/D converter | **35900-60750** |
| | General purpose (spade lugs) | **01046-60105** |
| Remote cables | 3390 integrator | **01046-60203** |
| | 3392/3 integrators | **01046-60206** |
| | 3394 integrator | **01046-60210** |
| | 3396A (Series I) integrator | **03394-60600** |
| | 3396 Series II / 3395A integrator, see details in section "Remote Cables" on page 219 | |
| | 3396 Series III / 3395B integrator | **03396-61010** |
| | HP 1050 modules / HP 1046A FLD | **5061-3378** |
| | HP 1046A FLD | **5061-3378** |
| | Agilent **35900A** A/D converter | **5061-3378** |
| | HP 1040 diode-array detector | **01046-60202** |
| | HP 1090 liquid chromatographs | **01046-60202** |
| | Signal distribution module | **01046-60202** |
| *BCD cables* | 3396 integrator | **03396-60560** |
| | General purpose (spade Lugs) | **G1351-81600** |
| *Auxiliary* | Agilent 1100 Series vacuum degasser | **G1322-61600** |

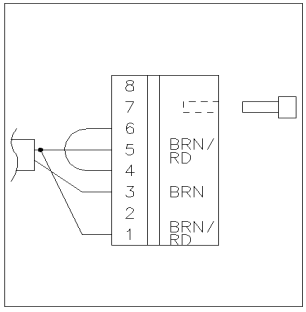
| Type | Description | Part Number |
|---|---|---|
| *CAN cables* | Agilent 1100/1200 module to module,0.5m lg<br>Agilent 1100/1200 module to module, 1m lg | **5181-1516**<br>**5181-1519** |
| *External contacts* | Agilent 1100/1200 Series interface board to general purpose | **G1103-61611** |
| *GPIB cable* | Agilent 1100/1200 module to ChemStation, 1 m<br>Agilent 1100/1200 module to ChemStation, 2 m | **10833A**<br>**10833B** |
| *RS-232 cable* | Agilent 1100/1200 module to a computer<br>This kit contains a 9-pin female to 9-pin female Null Modem (printer) cable and one adapter. | **34398A** |
| *LAN cable* | Twisted pair cross over LAN cable, (shielded 3m long) (for point to point connection) | **5023-0203** |
| | Twisted pair cross over LAN cable, (shielded 7m long) (for point to point connection) | **5023-0202** |

# Analog Cables

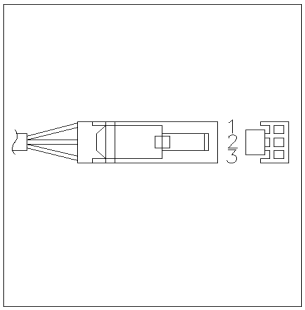


One end of these cables provides a BNC connector to be connected to Agilent 1100/1200 Series modules. The other end depends on the instrument to which connection is being made.

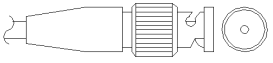
## Agilent 1100/1200 to 3390/2/3 Integrators

| Connector 01040-60101 | Pin 3390/2/3 | Pin Agilent 1100/1200 | Signal Name |
|---|---|---|---|
|  | 1 | Shield | Ground |
| | 2 | | Not connected |
| | 3 | Center | Signal + |
| | 4 | | Connected to pin 6 |
| | 5 | Shield | Analog - |
| | 6 | | Connected to pin 4 |
| | 7 | | Key |
| | 8 | | Not connected |

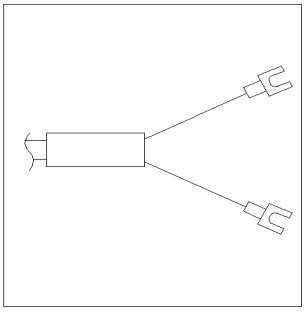
## Agilent 1100/1200 to 3394/6 Integrators

| Connector 35900-60750 | Pin 3394/6 | Pin Agilent 1100/1200 | Signal Name |
|---|---|---|---|
|  | 1 | | Not connected |
| | 2 | Shield | Analog - |
| | 3 | Center | Analog + |

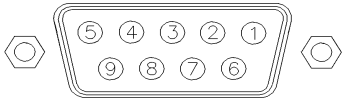
## Agilent 1100/1200 to BNC Connector

| Connector 8120-1840 | Pin BNC | Pin Agilent 1100/1200 | Signal Name |
|---|---|---|---|
|  | Shield | Shield | Analog - |
| | Center | Center | Analog + |

## Agilent 1100/1200 to General Purpose

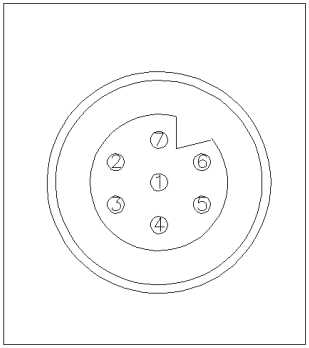
| Connector 01046-60105 | Pin 3394/6 | Pin Agilent 1100/1200 | Signal Name |
|---|---|---|---|
|  | 1 | | Not connected |
| | 2 | Black | Analog - |
| | 3 | Red | Analog + |
| | | | |
| | | | |
| | | | |
| | | | |

# Remote Cables

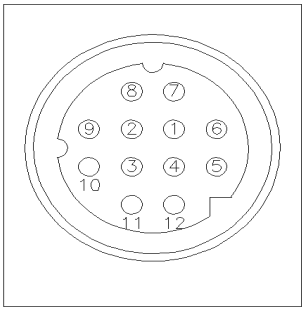



One end of these cables provides a Agilent Technologies APG (Analytical Products Group) remote connector to be connected to Agilent 1100/1200 Series modules. The other end depends on the instrument to be connected to.

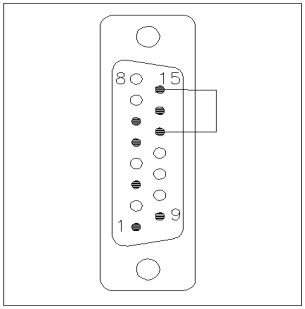
## Agilent 1100/1200 to 3390 Integrators

| Connector 01046-60203 | Pin 3390 | Pin Agilent 1100/1200 | Signal Name | Active (TTL) |
|---|---|---|---|---|
|  | 2 | 1 - White | Digital ground | |
| | NC | 2 - Brown | Prepare run | Low |
| | 7 | 3 - Gray | Start | Low |
| | NC | 4 - Blue | Shut down | Low |
| | NC | 5 - Pink | Not connected | |
| | NC | 6 - Yellow | Power on | High |
| | NC | 7 - Red | Ready | High |
| | NC | 8 - Green | Stop | Low |
| | NC | 9 - Black | Start request | Low |

## Agilent 1100/1200 to 3392/3 Integrators

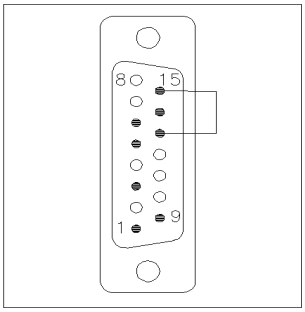
| Connector 01046-60206 | Pin 3392/3 | Pin Agilent 1100/1200 | Signal Name | Active (TTL) |
|---|---|---|---|---|
|  | 3 | 1 - White | Digital ground | |
| | NC | 2 - Brown | Prepare run | Low |
| | 11 | 3 - Gray | Start | Low |
| | NC | 4 - Blue | Shut down | Low |
| | NC | 5 - Pink | Not connected | |
| | NC | 6 - Yellow | Power on | High |
| | 9 | 7 - Red | Ready | High |
| | 1 | 8 - Green | Stop | Low |
| | NC | 9 - Black | Start request | Low |

## Agilent 1100/1200 to 3394 Integrators

| Connector 01046-60210 | Pin 3394 | Pin Agilent 1100/1200 | Signal Name | Active (TTL) |
|---|---|---|---|---|
|  | 9 | 1 - White | Digital ground | |
| | NC | 2 - Brown | Prepare run | Low |
| | 3 | 3 - Gray | Start | Low |
| | NC | 4 - Blue | Shut down | Low |
| | NC | 5 - Pink | Not connected | |
| | NC | 6 - Yellow | Power on | High |
| | 5,14 | 7 - Red | Ready | High |
| | 6 | 8 - Green | Stop | Low |
| | 1 | 9 - Black | Start request | Low |
| | 13, 15 | | Not connected | |

**NOTE** START and STOP are connected via diodes to pin 3 of the 3394 connector.

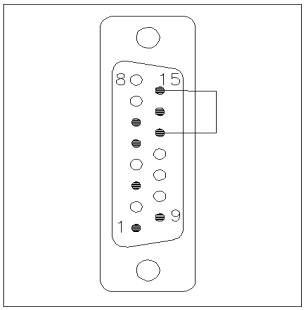
## Agilent 1100/1200 to 3396A Integrators

| Connector 03394-60600 | Pin 3394 | Pin Agilent 1100/1200 | Signal Name | Active (TTL) |
|---|---|---|---|---|
|  | 9 | 1 - White | Digital ground | |
| | NC | 2 - Brown | Prepare run | Low |
| | 3 | 3 - Gray | Start | Low |
| | NC | 4 - Blue | Shut down | Low |
| | NC | 5 - Pink | Not connected | |
| | NC | 6 - Yellow | Power on | High |
| | 5,14 | 7 - Red | Ready | High |
| | 1 | 8 - Green | Stop | Low |
| | NC | 9 - Black | Start request | Low |
| | 13, 15 | | Not connected | |

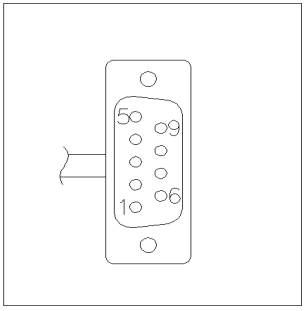
## Agilent 1100/1200 to 3396 Series II / 3395A Integrators

Use the cable **part number: 03394-60600** and cut pin #5 on the integrator side. Otherwise the integrator prints START; not ready.

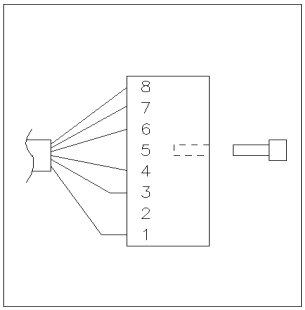
## Agilent 1100/1200 to 3396 Series III / 3395B Integrators

| Connector 03396-61010 | Pin 33XX | Pin Agilent 1100/1200 | Signal Name | Active (TTL) |
|---|---|---|---|---|
|  | 9 | 1 - White | Digital ground | |
| | NC | 2 - Brown | Prepare run | Low |
| | 3 | 3 - Gray | Start | Low |
| | NC | 4 - Blue | Shut down | Low |
| | NC | 5 - Pink | Not connected | |
| | NC | 6 - Yellow | Power on | High |
| | 14 | 7 - Red | Ready | High |
| | 4 | 8 - Green | Stop | Low |
| | NC | 9 - Black | Start request | Low |
| | 13, 15 | | Not connected | |

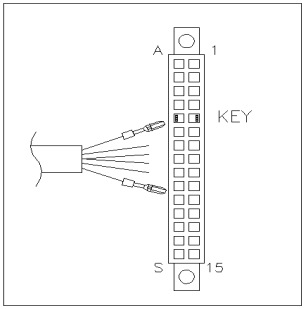
## Agilent 1100/1200 to HP 1050, HP 1046A or Agilent 35900 A/D Converters

| Connector 5061-3378 | Pin HP 1050/.... | Pin Agilent 1100/1200 | Signal Name | Active (TTL) |
|---|---|---|---|---|
|  | 1 - White | 1 - White | Digital ground | |
| | 2 - Brown | 2 - Brown | Prepare run | Low |
| | 3 - Gray | 3 - Gray | Start | Low |
| | 4 - Blue | 4 - Blue | Shut down | Low |
| | 5 - Pink | 5 - Pink | Not connected | |
| | 6 - Yellow | 6 - Yellow | Power on | High |
| | 7 - Red | 7 - Red | Ready | High |
| | 8 - Green | 8 - Green | Stop | Low |
| | 9 - Black | 9 - Black | Start request | Low |

## Agilent 1100/1200 to HP 1090 LC or Signal Distribution Module

| Connector 01046-60202 | Pin HP 1090 | Pin Agilent 1100/1200 | Signal Name | Active (TTL) |
|---|---|---|---|---|
|  | 1 | 1 - White | Digital ground | |
| | NC | 2 - Brown | Prepare run | Low |
| | 4 | 3 - Gray | Start | Low |
| | 7 | 4 - Blue | Shut down | Low |
| | 8 | 5 - Pink | Not connected | |
| | NC | 6 - Yellow | Power on | High |
| | 3 | 7 - Red | Ready | High |
| | 6 | 8 - Green | Stop | Low |
| | NC | 9 - Black | Start request | Low |

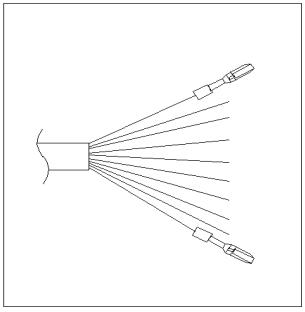
## Agilent 1100/1200 to General Purpose

| Connector 01046-60201 | Pin Universal | Pin Agilent 1100/1200 | Signal Name | Active (TTL) |
|---|---|---|---|---|
|  | | 1 - White | Digital ground | |
| | | 2 - Brown | Prepare run | Low |
| | | 3 - Gray | Start | Low |
| | | 4 - Blue | Shut down | Low |
| | | 5 - Pink | Not connected | |
| | | 6 - Yellow | Power on | High |
| | | 7 - Red | Ready | High |
| | | 8 - Green | Stop | Low |
| | | 9 - Black | Start request | Low |

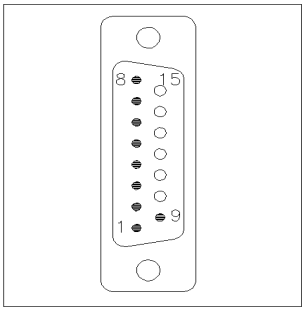
# BCD Cables


One end of these cables provides a 15-pin BCD connector to be connected to the Agilent 1200 Series modules. The other end depends on the instrument to be connected to

## Agilent 1200 to General Purpose

| Connector G1351-81600 | Wire Color | Pin Agilent 1200 | Signal Name | BCD Digit |
|---|---|---|---|---|
|  | Green | 1 | BCD 5 | 20 |
| | Violet | 2 | BCD 7 | 80 |
| | Blue | 3 | BCD 6 | 40 |
| | Yellow | 4 | BCD 4 | 10 |
| | Black | 5 | BCD 0 | 1 |
| | Orange | 6 | BCD 3 | 8 |
| | Red | 7 | BCD 2 | 4 |
| | Brown | 8 | BCD 1 | 2 |
| | Gray | 9 | Digital ground | Gray |
| | Gray/pink | 10 | BCD 11 | 800 |
| | Red/blue | 11 | BCD 10 | 400 |
| | White/green | 12 | BCD 9 | 200 |
| | Brown/green | 13 | BCD 8 | 100 |
| | not connected | 14 | | |
| | not connected | 15 | + 5 V | Low |

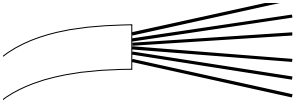
## Agilent 1200 to 3396 Integrators

| Connector 03396-60560 | Pin 3392/3 | Pin Agilent 1200 | Signal Name | BCD Digit |
|---|---|---|---|---|
|  | 1 | 1 | BCD 5 | 20 |
| | 2 | 2 | BCD 7 | 80 |
| | 3 | 3 | BCD 6 | 40 |
| | 4 | 4 | BCD 4 | 10 |
| | 5 | 5 | BCD0 | 1 |
| | 6 | 6 | BCD 3 | 8 |
| | 7 | 7 | BCD 2 | 4 |
| | 8 | 8 | BCD 1 | 2 |
| | 9 | 9 | Digital ground | |
| | NC | 15 | + 5 V | Low |

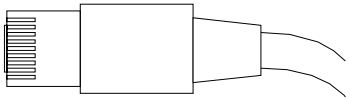
# Auxiliary Cable

One end of this cable provides a modular plug to be connected to the Agilent 1100 Series vacuum degasser. The other end is for general purpose.

### Agilent 1100 Series Degasser to general purposes

| Connector G1322-81600 | Color | Pin Agilent 1100 | Signal Name |
|---|---|---|---|
|  | White | 1 | Ground |
| | Brown | 2 | Pressure signal |
| | Green | 3 | |
| | Yellow | 4 | |
| | Grey | 5 | DC + 5 V IN |
| | Pink | 6 | Vent |

# CAN/LAN Cables



Both ends of this cable provide a modular plug to be connected to Agilent 1200 Series module's CAN or LAN connectors.

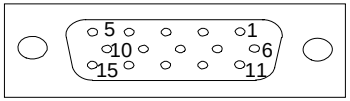
## CAN Cables

| | |
|---|---|
| Agilent 1200 module to module, 0.5 m | **5181-1516** |
| Agilent 1200 module to module, 1 m | **5181-1519** |
| Agilent 1200 module to control module | **G1323-81600** |

## LAN Cables

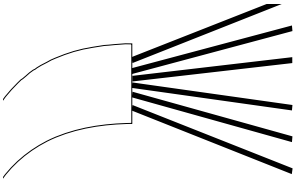
| Description | Part number |
|---|---|
| Cross-over network cable (shielded, 3 m long), (for point to point connection) | **5023-0203** |
| Twisted pair network cable (shielded, 7 m long) (for hub connections) | **5023-0202** |

# External Contact Cable




One end of this cable provides a 15-pin plug to be connected to Agilent 1200 Series module's interface board. The other end is for general purpose.

### Agilent 1200 Series Interface Board to general purposes

| Connector G1103-61611 | Color | Pin Agilent 1200 | Signal Name |
|---|---|---|---|
|  | White | 1 | EXT 1 |
| | Brown | 2 | EXT 1 |
| | Green | 3 | EXT 2 |
| | Yellow | 4 | EXT 2 |
| | Grey | 5 | EXT 3 |
| | Pink | 6 | EXT 3 |
| | Blue | 7 | EXT 4 |
| | Red | 8 | EXT 4 |
| | Black | 9 | Not connected |
| | Violet | 10 | Not connected |
| | Grey/pink | 11 | Not connected |
| | Red/blue | 12 | Not connected |
| | White/green | 13 | Not connected |
| | Brown/green | 14 | Not connected |
| | White/yellow | 15 | Not connected |

# RS-232 Cables

| Description | Part number |
|---|---|
| RS-232 cable, instrument to PC, 9-to-9 pin (female) This cable has special pin-out, and is not compatible with connecting printers and plotters. | **24542U**<br>**G1530-60600** |
| RS-232 cable kit, 9-to-9 pin (female) and one adapter 9-pin (male) 25-pin female. Suited for instrument to PC. | **34398A** |
| Cable Printer Serial & Parallel, is a SUB-D 9 pin female vs. Centronics connector on the other end (NOT FOR FW UPDATE). | **5181-1529** |
| This kit contains a 9-pin female to 9-pin female Null Modem (printer) cable and one adapter. Use the cable and adapter to connect Agilent Technologies instruments with 9-pin male RS-232 connectors to most PCs or printers. | **34398A** |

# 13
# Hardware Information



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

# The Electronics

The electronics are comprised of four main components:

- column compartment main board (CCM).
- column identification board (CID), see “Column-Identification System” on page 13
- power supply, see “The Main Power Supply Assembly” on page 244.

# Firmware Description

The firmware of the instrument consists of two independent sections:

- a non-instrument specific section, called ‘resident system’,
- an instrument specific section, called ‘main system’.

## Resident System

This resident section of the firmware is identical for all Agilent 1200 series modules. Its properties are:

- the complete communication capabilities (GPIB, 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 (GPIB, 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 via APG remote
- error handling,
- diagnostic functions and so on,

or module specific functions like

- internal events such as heater control, column identification,
- and so on.

## Firmware Updates

Firmware updates can be done using your user interface:

- hand-held control module with files from a PC-card or
- Agilent ChemStation with files from floppy disk

The file naming conventions are:

1316A_A601_12.dlb

xxxx is the product number, e.g. 1316 for the G1316A TCC, and vvv is the revision number, for example A601 is revision A.06.01, and zz is the build number

For instructions refer to your user interface.

**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.

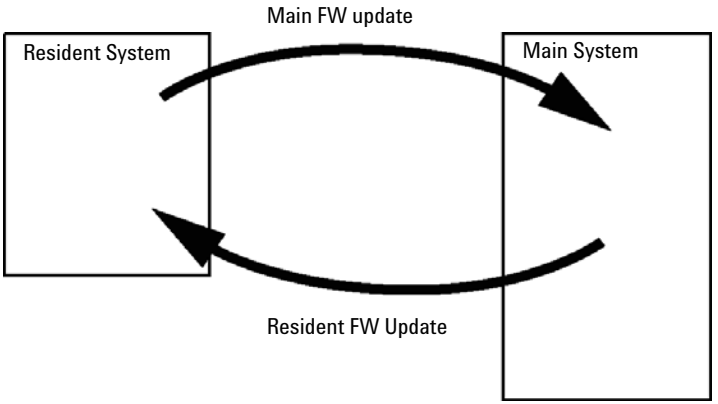



**Figure 45** Firmware Update Mechanism

# Agilent 1200 Series Interfaces

The Agilent 1200 Series modules provide the following interfaces:

| Interface Type | Pumps | Autosampler | DA Detector MW Detector FL Detector | DA Detector MW Detector (G1315C/G1365C) | VW Detector RI Detector | Thermostatted Column Compartment | Vacuum Degasser |
|---|---|---|---|---|---|---|---|
| CAN | Yes | Yes | Yes | Yes | Yes | Yes | No |
| LAN (on-board) | No | No | No | Yes | No | No | No |
| GPIB | Yes | Yes | Yes | No | Yes | No | No |
| RS-232C | Yes | Yes | Yes | Yes | Yes | Yes | No |
| Remote | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Analog | Yes | No | 2 × | 2 × | 1 × | No | Yes[1] |
| Interface board (LAN/BCD/Ext) | Yes | Yes | Yes | No | Yes | No | No |

[1] The vacuum degasser will have a special connector for specific use. For details see description of main board.

- CAN connectors as interface to other Agilent 1200 Series modules,
- GPIB connector as interface to the Agilent ChemStation,
- RS-232C as interface to a computer,
- REMOTE connector as interface to other Agilent products,
- analog output connector(s) for signal output, and
- interface slot for specific interfacing (external contacts, BCD, LAN and so on).

For identification and location of the connectors see Figure 12 on page 41.

**NOTE** Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations, see "Cable Overview" on page 214.

## GPIB Interface

The GPIB connector is used to connect the module with a computer. The address and control switches next to the GPIB connector determine the GPIB address of your module. The switches are preset to a default address and recognized by the operating software from Agilent Technologies.

**Table 44** Default Addresses

| | | | |
|---|---|---|---|
| Autosampler | 28 | Autosampler | 28 |
| Pump | 22 | RID | 29 |
| FLD | 23 | | |
| VWD | 24 | Autosampler (HP 1050) | 11 |
| Agilent 8453A | 25 | Pump (HP 1050) | 12 |
| DAD/MWD | 26 | VWD (HP 1050) | 10 |
| Column Compartment | 27 | DAD (HP 1050) | 17 |

## CAN Interface

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

## Remote Interface

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 level are defined as:

- standard TTL levels (0 V is logic true, + 5 V is false)
- fan-out is 10,
- input load is 2.2 kOhm against + 5 V, and
- output are open collector type, inputs/outputs (wired-or technique).

**Table 45** Remote Signal Distribution

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

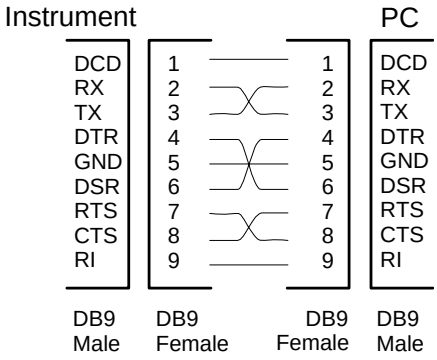
# RS-232C

The RS-232C connector is used to control the column module from a computer through RS-232C connection, using the appropriate software. This connector can be configured with the configuration switch module next to the GPIB connector.

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 46** 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 |



# Setting the 8-bit Configuration Switch

The 8-bit configuration switch is located next to the GPIB connector. Switch settings provide configuration parameters for GPIB address, serial communication protocol and instrument specific initialization procedures.

Factory setting is shown for column compartment

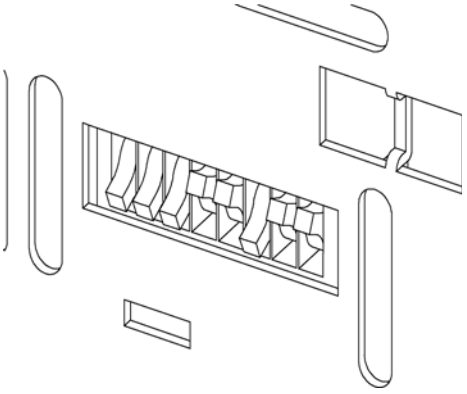


**Table 47** 8-bit Configuration Switch

| Mode Select | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| GPIB | 0 | 0 | | GPIB Address | | | | |
| RS-232C | 0 | 1 | Baudrate | | | Data Bits | Parity | |
| Reserved | 1 | 0 | Reserved | | | | | |
| TEST/BOOT | 1 | 1 | RSVD | SYS | | RSVD | RSVD | FC |

Switches 1 and 2 define which set of parameters (for example, for GPIB, RS-232C, and so on) will be changed. Once the change has been completed, the instrument must be powered up again in order to store the values in the non-volatile memory.

Here the parameters are kept, independently if you turn the column compartment off and on again. They will be kept until the same set of parameters is subsequently changed and power is reset. All other previously stored configuration settings are still being kept in non-volatile memory.

In this manner you can store more than one set of parameters, for example, for GPIB and RS-232C, using the same 8-bit configuration switch twice.

## GPIB Default Addresses

If you just want to change the GPIB address and need a detailed procedure, refer to the *Installing Your* Agilent *ChemStation System* handbook. Default GPIB address is set to the following addresses:

**Table 48** Default Addresses for Agilent 1200 Series Modules

| Module | Address | Binary Address |
|---|---|---|
| Pump | 22 | 0 0 0 1 0 1 1 0 |
| FLD | 23 | 0 0 0 1 0 1 1 1 |
| VWD | 24 | 0 0 0 1 1 0 0 0 |
| Agilent 8453A | 25 | 0 0 0 1 1 1 0 1 |
| DAD/MWD | 26 | 0 0 0 1 1 0 1 0 |
| Column compartment | 27 | 0 0 0 1 1 0 1 1 |
| Autosampler | 28 | 0 0 0 1 1 1 0 0 |
| RID | 29 | 0 0 0 1 1 1 0 1 |

where 0 means that the switch is down and 1 means that the switch is up.

## Communication Settings for RS-232C Communication

The communication protocol used in the column compartment supports only hardware handshake (CTS/RTR).

Switches 1 in down and 2 in up position define that the RS-232C parameters will be changed. Once the change has been completed, the column instrument must be powered up again in order to store the values in the non-volatile memory.

**Table 49** Communication Settings for RS-232C Communication

| Mode Select | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| RS-232C | 0 | 1 | Baudrate | | | Data Bits | Parity | |

Use the following tables for selecting the setting which you want to use for RS-232C communication. The number 0 means that the switch is down and 1 means that the switch is up.

**Table 50** Baudrate Settings

| **Switches** | | | **Baud Rate** | **Switches** | | | **Baud Rate** |
|---|---|---|---|---|---|---|---|
| **3** | **4** | **5** | | **3** | **4** | **5** | |
| 0 | 0 | 0 | 9600 | 1 | 0 | 0 | 9600 |
| 0 | 0 | 1 | 1200 | 1 | 0 | 1 | 14400 |
| 0 | 1 | 0 | 2400 | 1 | 1 | 0 | 19200 |
| 0 | 1 | 1 | 4800 | 1 | 1 | 1 | 38400 |

**Table 51** Data Bit Settings

| Switch 6 | Data Word Size |
|---|---|
| 0 | 7 Bit Communication |
| 1 | 8 Bit Communication |

**Table 52** Parity Settings

| Switches | | Parity |
|---|---|---|
| 7 | 8 | |
| 0 | 0 | No Parity |

**Table 52** Parity Settings

| | | |
|---|---|---|
| 1 | 0 | Odd Parity |
| 1 | 1 | Even Parity |

One start bit and one stop bit are always used (not selectable).

Per default, the module will turn into 19200 baud, 8 data bit with no parity.

## Forced Cold-Start Settings

Switches 1 and 2 do not force storage of this set of parameters in non-volatile memory. Returning the switches 1 and 2 to other positions (other than being both up) will allow for normal operation.

**CAUTION**

Forced cold start erases all methods and data stored in the non-volatile memory.

Except the diagnose and repair log books all methods and data will be erased.

➔ Make sure that all important methods and data are stored before you enforce a cold start

If you use the following switch settings and power the instrument up again, a forced cold start has been completed.

**Table 53** Forced Cold Start Settings

| Mode Select | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| TEST/BOOT | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |

To return to normal operation, set switches back to your GPIB or RS 232C configuration settings.

## Stay Resident Settings

Firmware update procedures may require this mode in case of firmware loading errors.

Switches 1 and 2 do not force storage of this set of parameters in non-volatile memory. Returning the switches 1 and 2 to other positions (other than being both up) will allow for normal operation.

If you use the following switch settings and power the instrument up again, the instrument firmware stays in the resident part, that is, it is not operable as a column compartment. It only uses basic functions of the operating system, for example, for communication.

**Table 54** Stay Resident Settings

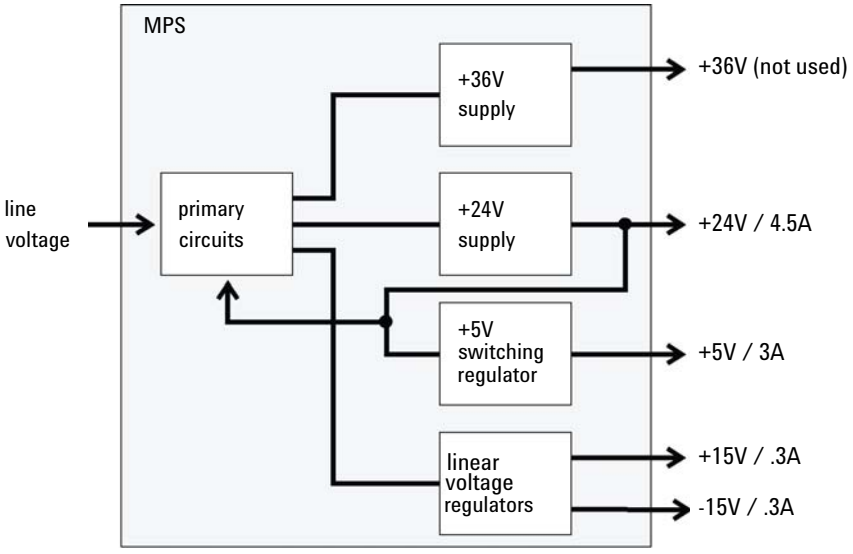
| Mode Select | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| TEST/BOOT | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |

To return to normal operation, set switches back to your GPIB or RS 232C configuration settings.

# The Main Power Supply Assembly

The main power supply comprises a closed assembly and must not be disassembled further for safety reasons. In case of a defect, the entire power supply needs to be replaced.

The power supply provides all DC voltages used in the module. The line voltage can vary in a range from 100 – 240 volts AC ± 10 % and needs no manual setting.




**NOTE** To disconnect the instrument from line, unplug the power cord. The power supply still uses some power, even if the power switch on the front panel is turned off.

No accessible hardware fuse is needed because the main power supply is safe against any short circuits or overload conditions on the output lines. When overload conditions occur, the power supply turns off all output voltages. Turning the line power off and on again resets the power supply to normal operation if the cause of the overload condition has been removed.

An over-temperature sensor in the main power supply is used to turn off output voltages if the temperature exceeds the acceptable limit (for example, if the cooling fan of the instrument fails). To reset the main power supply to normal operating conditions, turn the instrument off, wait until it is approximately at ambient temperature and turn the instrument on again.

The following table gives the specifications of the main power supply.

**Table 55** Power Supply Specifications (Standard)

| | | |
|---|---|---|
| Maximum power | 160 VA / 130 W | Continuous output |
| Line Input | 100 – 240 volts AC ± 10 %, line frequency of 50/60 Hz | Wide ranging |
| | | |
| Pin 1 | Power Fail | error message |
| Pin 2 | AGND | |
| Pin 3 | -15 VDC | |
| Pin 4 | +15 VDC | |
| Pin 5 | PGND | |
| Pin 6 | PGND | |
| Pin 7 | +24 VDC | |
| Pin 8 | +24 VDC | |
| Pin 9 | +36 VDC | not used |
| Pin 10 | +36 VDC | not used |
| Pin 11 | DGND | |
| Pin 12 | + 5 VDC | |

# 14
# Appendix



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

# Safety Symbols

## Safety Symbols

**Table 56** 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 dangerous voltages. |
|  | Indicates a protected ground terminal. |
|  | Indicates eye damage may result from directly viewing the light produced by the deuterium lamp used in this product. |
|  | The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up. |

**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.

## 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.

## General

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

## Operation

Before applying power, comply with the installation section. Additionally the following must be observed.

Do not remove instrument covers when operating. 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.

Some adjustments described in the manual, are made with power supplied to the instrument, and protective covers removed. Energy available at many points may, if contacted, result in personal injury.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided whenever possible. When inevitable, this has to be carried out by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present. Do not replace components with power cable connected.

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

Capacitors inside the instrument may still be charged, even though the instrument has been disconnected from its source of supply. Dangerous voltages, capable of causing serious personal injury, are present in this instrument. Use extreme caution when handling, testing and adjusting.

When working with solvents please observe appropriate safety procedures (e.g. 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.

# The Waste Electrical and Electronic Equipment Directive

## 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 starting with 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.

**NOTE**

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.

# 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.

---

**WARNING**

**Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.**

**Udskiftning må kun ske med batteri af samme fabrikat og type.**

➔ Lever det brugte batteri tilbage til leverandøren.

---

**WARNING**

**Lithiumbatteri - Eksplosionsfare.**

**Ved udskiftning benyttes kun batteri som anbefalt av apparatfabrikanten.**

➔ Brukt batteri returneres appararleverandoren.

---

**NOTE**

Bij dit apparaat zijn batterijen geleverd. Wanneer deze leeg zijn, moet u ze niet weggooien maar inleveren als KCA.

---

# Radio Interference

Cables supplied by Agilent Technoligies are screened to provide opitimized protection against radio interference. All cables are in compliance with safety or EMC regulations.

## Test and Measurement

If test and measurement equipment is operated with unscreened cables, or used for measurements on open set-ups, the user has to assure that under operating conditions the radio interference limits are still met within the premises.

# Sound Emission

## 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

## Flow Cell

To protect optimal functionality of your flow-cell:

- Avoid the use of alkaline solutions (pH > 9.5) which can attack quartz and thus impair the optical properties of the flow cell.
- If the flow cell is transported while temperatures are below 5 degree C, it must be assured that the cell is filled with alcohol.
- Aqueous solvents in the flow cell can built up algae. Therefore do not leave aqueous solvents sitting in the flow cell. Add a small % of organic solvents (e.g. acetonitrile or methanol ~5%).

## Use of Solvents

Observe the following recommendations on the use of solvents.

- Brown glass ware can avoid growth of algae.
- Small particles can permanently block capillaries and valves. Therefore always filter solvents through 0.4 µm filters.
- 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-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.

# 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

Select Products/Chemical Analysis

It will provide also the latest firmware of the Agilent 1200 Series modules for download.

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## V



## W

www.agilent.com

# In This Book

This manual contains technical reference information about the Agilent 1200 Series thermostatted column compartment.

The manual describes the following:

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



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