



## 8 Maintenance

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This chapter describes the maintenance tasks for the TCC. If the instrument needs repair please contact your Agilent service representative.



## Introduction to Maintenance and Repair

The module is designed for easy maintenance. The most frequent maintenances such as maintaining valve heads (if optional valve drive is installed) or replacing low dispersion heat exchangers can be done from the front with module in place in the system stack.

**NOTE**

There are no serviceable parts inside.

Do not open the module.

---

## Cautions and Warnings


### WARNING

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

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

- When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.
  - The volume of substances should be reduced to the minimum required for the analysis.
  - Do not operate the instrument in an explosive atmosphere.
- 

### CAUTION

Hot heat exchangers 

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

- Allow them to cool down before starting repairs.
- 

### WARNING

**Electrical shock**

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

- Do not remove the cover of the module.
  - Only certified persons are authorized to carry out repairs inside the module.
-

**WARNING**

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

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

- Always unplug the power cable before opening the cover.
  - Do not connect the power cable to the instrument while the covers are removed.
- 

**WARNING**

**Personal injury or damage to the product**

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

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

**CAUTION**

**Safety standards for external equipment**

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

**CAUTION**

**Sample degradation and contamination of the instrument**

**Metal parts in the flow path can interact with the bio-molecules in the sample leading to sample degradation and contamination.**

- For bio-inert applications, always use dedicated bio-inert parts, which can be identified by the bio-inert symbol or other markers described in this manual.
  - Do not mix bio-inert and non-inert modules or parts in a bio-inert system.
-

# Overview of Maintenance

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

**Table 20** Maintenance Procedures

Procedure	Typical Frequency	Notes
"Cleaning the Column Compartment" on page 116	If required	
"Changing Column Identification Tags" on page 117	When column performance or new application requires a change	
"Adding Heater Devices" on page 119	When new application requires a change	
"Installing the capillaries" on page 124	When new application requires a change	
"Correcting Leaks" on page 131	If a leak has occurred	Check for leaks
"Replacing Valve Heads" on page 136	If the valve performance shows indication of leakage or wear	
"Preparing the Column Compartment for Transportation" on page 140	If the TCC shall be transported	
"Replacing the Module Firmware" on page 143	If required	

## Cleaning the Column Compartment

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

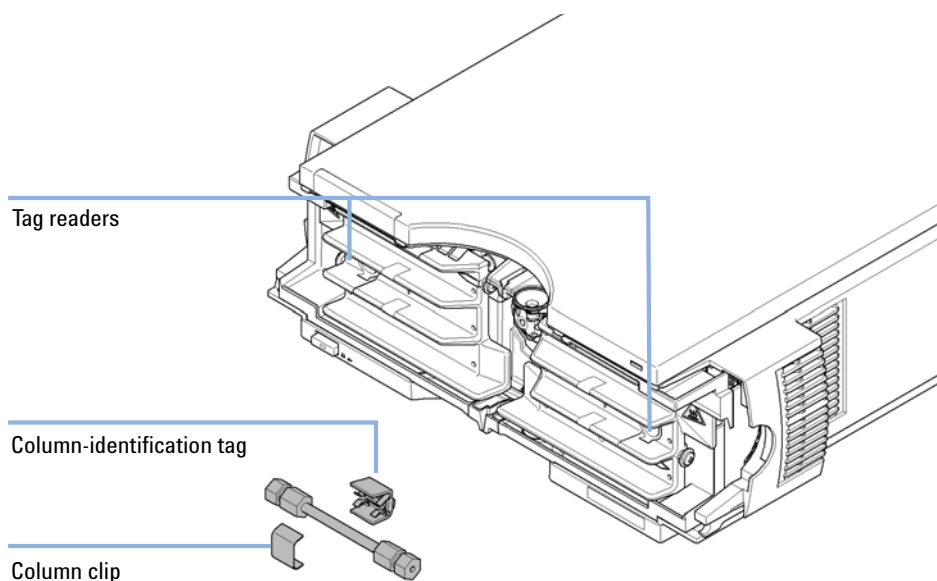
### **WARNING**

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

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

## Changing Column Identification Tags

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



**Figure 25** Column-Identification System

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

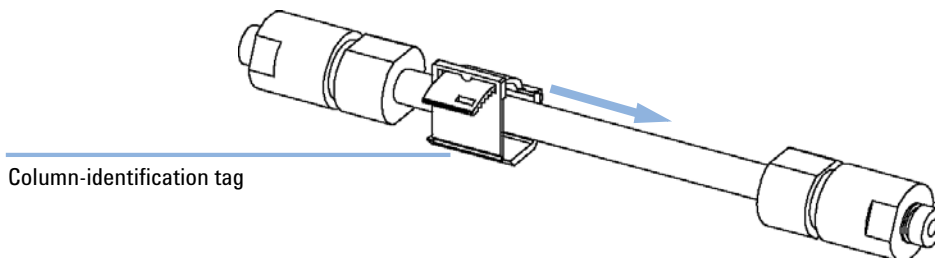
Parts required	#	p/n	Description
	1	5062-8588	Column identification tag (1x), re-order (3/pk)

- 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 26](#) on page 118 and [Figure 27](#) on page 118. The Agilent logo should always be at front.

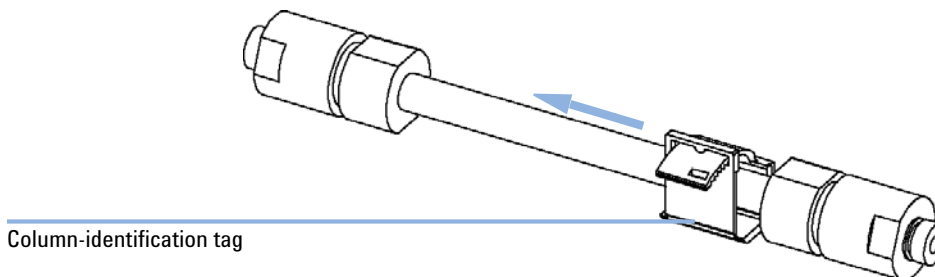
## 8 Maintenance

### Changing Column Identification Tags

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



**Figure 26** Column-Identification Tag for Left Heat Exchanger



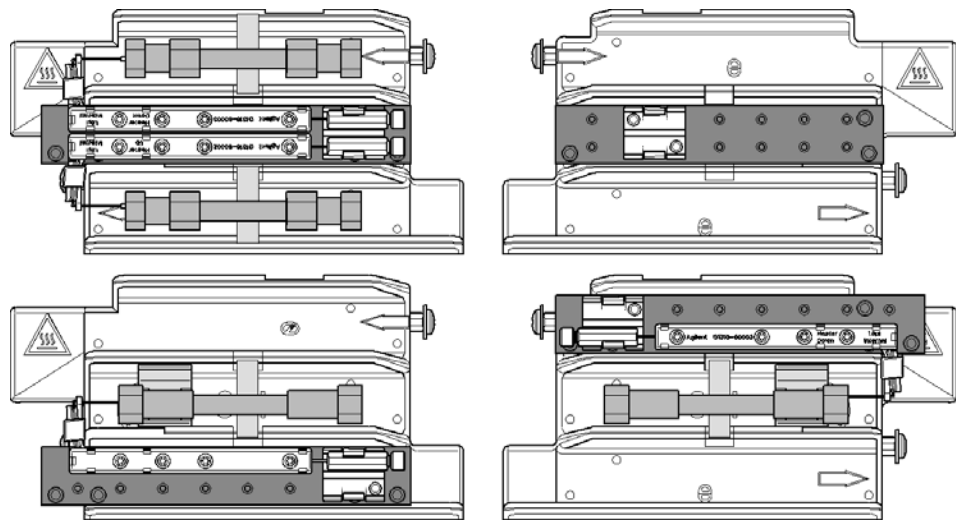
**Figure 27** Column-Identification Tag for Right Heat Exchanger

- 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.

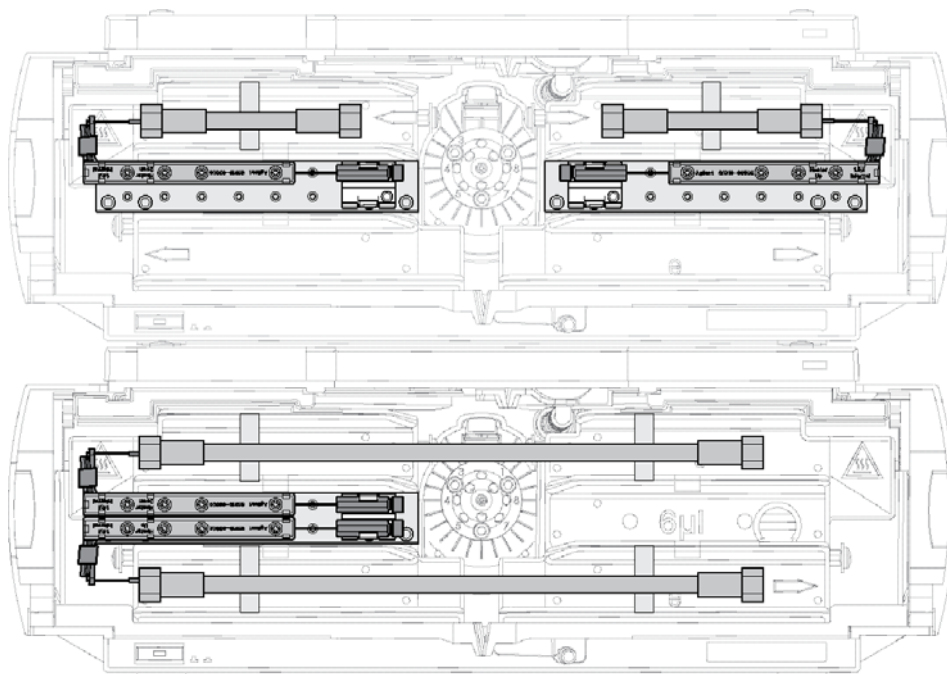


## Adding Heater Devices

The additional heater devices can be arranged in the G1316C in various locations depending on the application needs. Some examples are shown below.



**Figure 28** Arrangements of Heater and Cooling Devices



**Figure 29** Typical positions of the low dispersion heat exchangers

**NOTE**

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

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

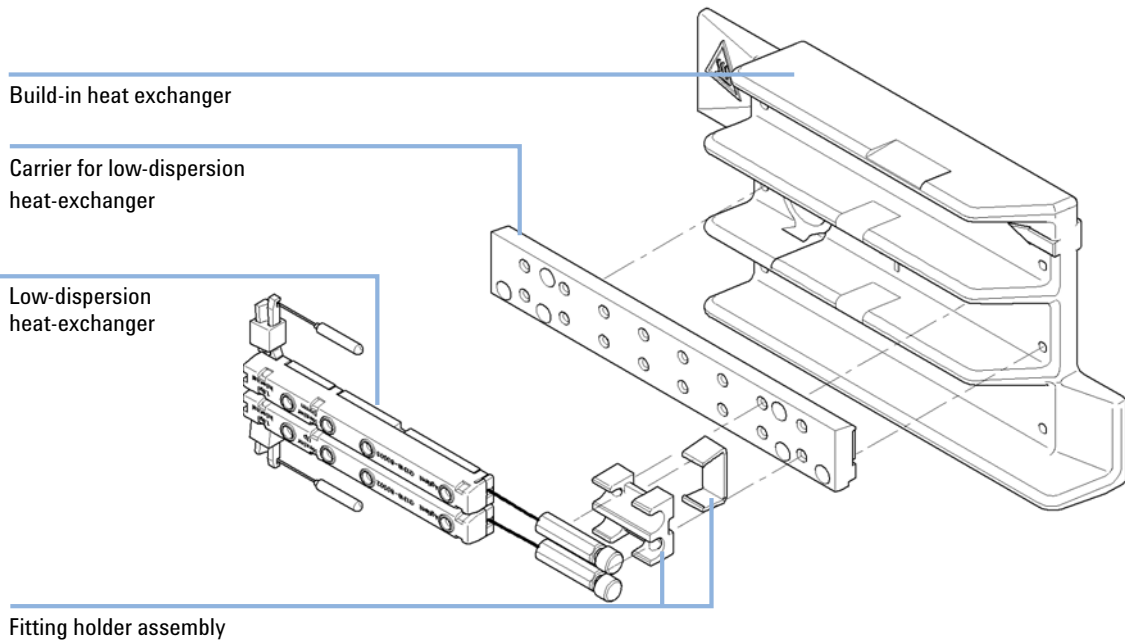
## Installing the Low Dispersion Heat Exchangers

The positions of the low dispersion heat exchangers ( Heater long-up ( 0.12 mm i.d., 1.6  $\mu$ L internal volume) (G1316-80002) or Heater long-down ( 0.12 mm i.d., 1.6  $\mu$ L internal volume) (G1316-80003)) depend very much on the desired application and columns you want to use with your system. For two long columns (> 100 mm) the carrier ( Carrier for heat exchanger (G1316-89200)) and the heat exchangers must be installed in a middle position. In case you are going to use columns of maximum 100 mm length it is advised to place two carriers with one heat exchanger each at the left and the right side of the column compartment (see [Figure 29](#) on page 120). To use the column tag readers the carriers must be installed either in the top or bottom positions.

The carriers for the low-dispersion heat exchangers must be attached to the standard built-in heat exchangers of the TCC (see [Figure 30](#) on page 122). Remove the protective foil from the gray thermal conductive foil of the carrier and fasten the three screws. Mount the fitting holder assembly ( Fitting holder assy, includes following items: Fitting fork, fitting clip, screws (pack of 4) (G1316-68706)) on the carrier. The fitting clips hold the capillary unions from the low dispersion heat exchangers and make plumbing of capillaries much easier. Finally, attach the low dispersion heat exchanger. It is important to fix them tightly so that a good thermal conductivity is achieved. The columns are held by color-coded clips ( Column clip set, 8 colors (5042-9918)) for more convenient installation; mark the nuts of the capillaries attached to the columns as well with color code tags (small rings) to easily follow the flow paths in your system.

### Fixing the Low Dispersion Heat Exchangers

For the G1316C, additional heat exchanger devices can be installed on the carrier Carrier for heat exchanger (G1316-89200) using 3 screws ( Screw 2.5 mm hex (0515-1052), included to part number for carrier) as shown in figure below.



**Figure 30**    Installing the low dispersion heat exchangers

## Choose Compatible Fittings

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

### NOTE

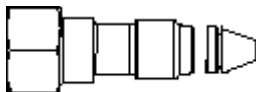
The Very High Pressure Fitting is pressure tight up to 1200bar.

Do not overtighten the fitting at installation. Finger tighten the nut into the port until snug. Then use the wrench and apply about 1/4 of a revolution. (Torque ~ 1.0 – 1.2 Nm)

Very High Pressure Fitting, removable (5067-4738) for swagelock compatible columns



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



Fitting screw long

**Figure 31** Fitting type depends on column type

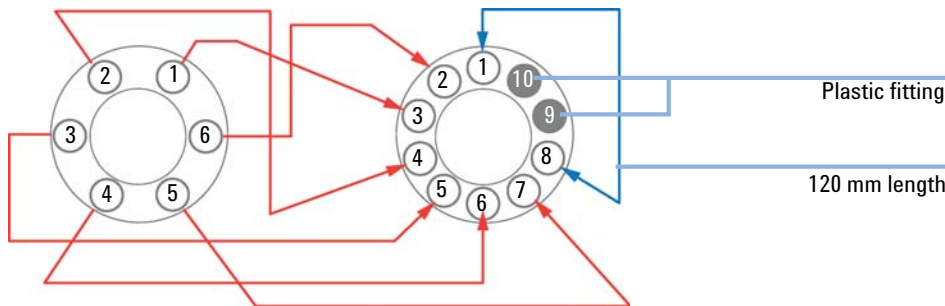
# Installing the capillaries

## Installing the capillaries

The 2pos/10port valve can be used here in the same way as a 2pos/6port valve; just follow the re-routing diagram below.

Map the ports from the 2pos/6port valve to the corresponding ports of the 2pos/10port valve according to the red arrows. For example, mount the capillary connected to port 6 (2pos/6port) at port 2 instead.

Connect port 1 and port 8 with a 120 mm length capillary ( 0.12 mm i.d. or 0.17 mm i.d. depending on the capillary kit) (5067-4652). Plug Plastic fittings (0100-1259) into ports 9 and 10.



Parts required	#	p/n	Description
	1	5067-4646	Capillary kit
	1	G4231B	2pos/6port valve
	1	G4232B	2pos/10port valve

**Preparations** Identify the required capillaries in your capillary kits ("[Capillary kit PN 5067-4646](#)" on page 158)

### NOTE

Use outmost care to avoid any void volumes caused by poor connections.

- 1** Install the capillaries depending on your application:
  - Dual column selection, see “[Configuration for dual-column selection](#)” on page 127
  - Sample Enrichment, see “[Configuration for sample enrichment](#)” on page 128
  - Sample Clean-up, see “[Configuration for sample clean-up](#)” on page 129
  - Alternating Column Regeneration (only 2pos/10port valve), see “[Configuration for alternating column regeneration](#)” on page 130

**NOTE**

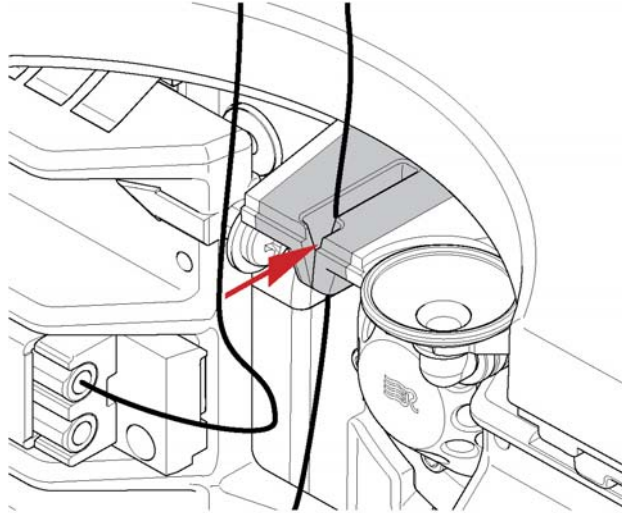
Use utmost care to avoid any void volumes caused by poor connections.

- 2** Connect the capillaries connected directly to a column and fasten them immediately with a spanner.
- 3** Finger-tighten all remaining capillaries.
- 4** Clip the unions into the corresponding clips of the low dispersion heat exchangers.
- 5** Fasten all fittings with a spanner.
- 6** Starting from position one through six (ten, respectively), fasten the fittings on the heat exchanger.
- 7** Fasten all fittings on attached modules (autosampler, detector, additional pumps). Fit all unused valve ports with a plastic plug.
- 8** Push the valves into the rear positions.

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### Installing the capillaries

- 9 Place the capillaries that go to another module or waste into the capillary guides to prevent squeezing them when closing the front cover.

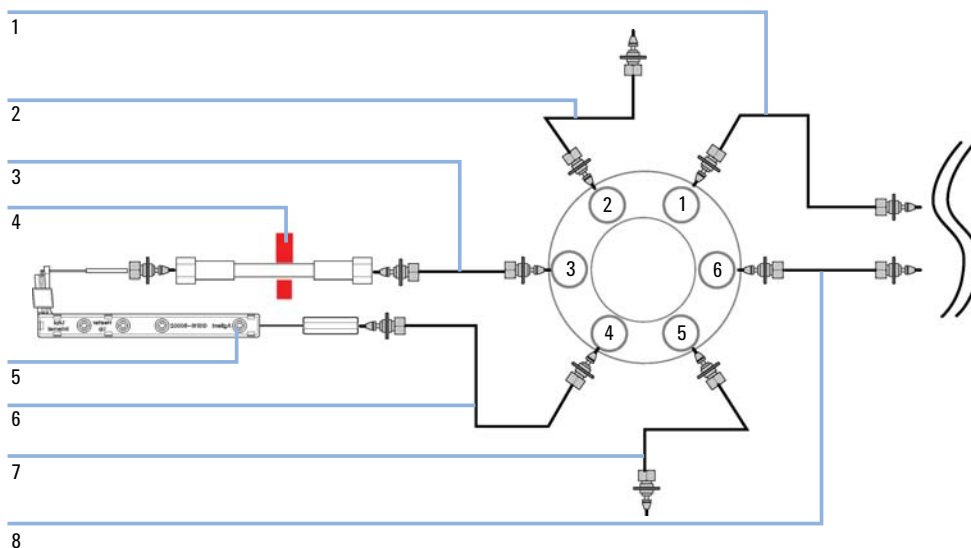


- 10 Stow any excess lengths of the capillaries.
- 11 Perform a final leak-check.



## Configurations and Capillary Set-up

### Configuration for dual-column selection



**Figure 32** Installing the capillaries for a dual-column selection set-up (column and heat exchanger of the second position are omitted)

1	150 mm length (column length up to 100 mm), 280 mm length (column length > 100 mm) From column Not pre-swaged on column-side!
2	200 mm length to detector
3	150 mm length (column length up to 100 mm), 280 mm length (column length > 100 mm) From column Not pre-swaged on column-side!
4	Column with color code clip
5	Low dispersion heat exchanger or built-in 3 $\mu$ L/6 $\mu$ L heat exchanger and 90 mm length capillary to column
6	90 mm length to heat exchanger
7	Built-in 3 $\mu$ L/6 $\mu$ L heat exchanger and 90 mm length capillary to column
8	90 mm length to heat exchanger

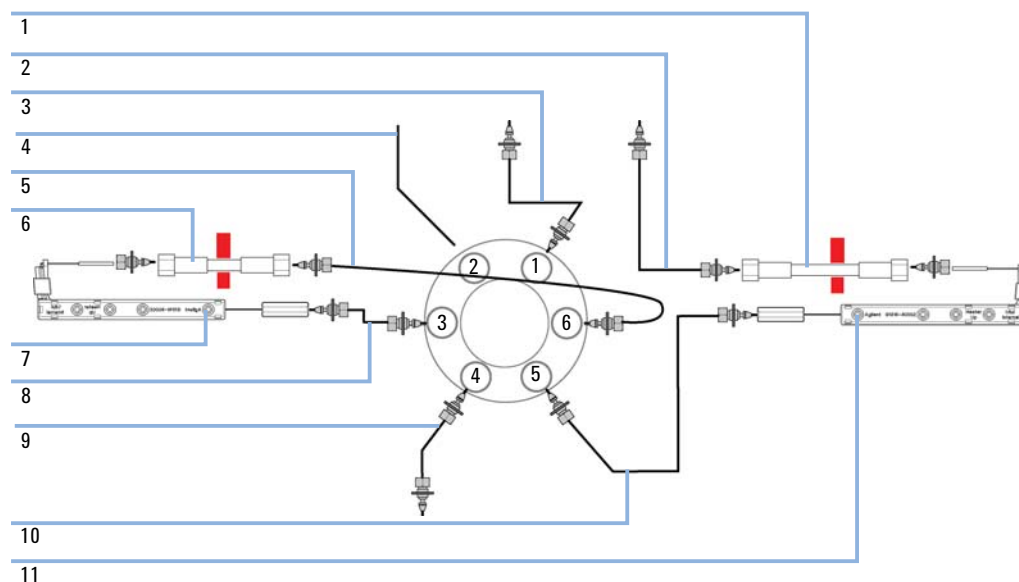
Pos.1: Connection between Ports 1-6 , 4-5, 2-3 , active Column 1 = left

Pos. 2: Connection between Ports 1-2, 3-4, 5-6 active Column 2 = right

Example shows setup with flow directed 1290 typical from bottom to top.

Flow direction from top to bottom needs switch of connected capillaries at ports 5 and 2. Also column inlet connections needed to be switched with outlet connections. Port 4 to 3 and 6 to 1.)

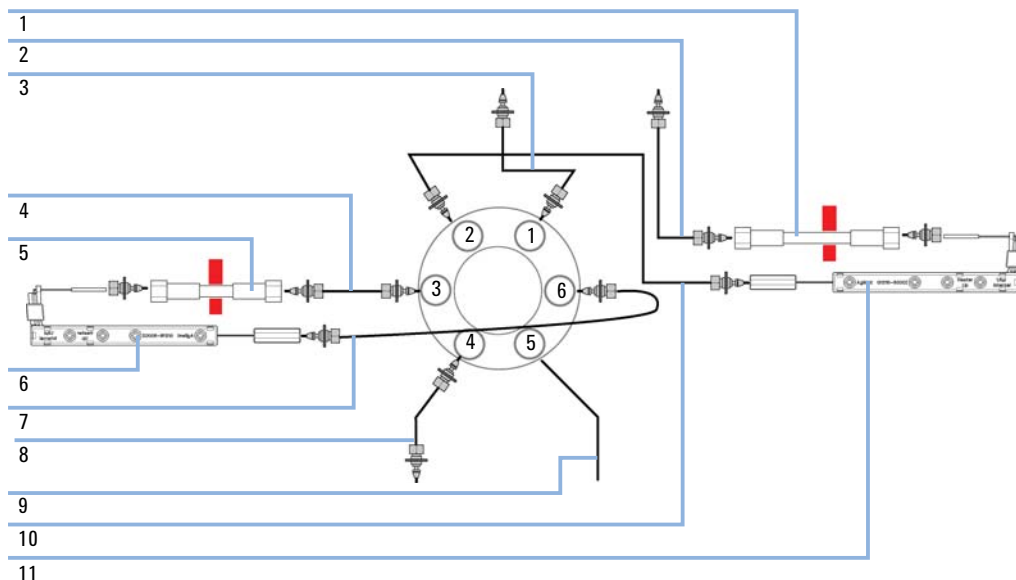
### Configuration for sample enrichment



**Figure 33** Installing the capillaries for a sample enrichment set-up

1	<b>Analytical column</b> with color code clip
2	280 mm length (column length > 100 mm) from analytical column to detector Not pre-swaged on column-side!
3	340 mm length from autosampler and loading pump
4	To waste
5	150 mm length (column length up to 100 mm), 280 mm length (column length > 100 mm) From column Not pre-swaged on column-side!
6	<b>Enrichment column</b> with color code clip
7	Low dispersion heat exchanger or build-in 3 $\mu$ L/6 $\mu$ L heat exchanger and 90 mm length capillary to column
8	90 mm length to heat exchanger
9	700 mm length (0.17 mm ID) from analytical pump
10	90 mm length to heat exchanger
11	Low dispersion heat exchanger or build-in 3 $\mu$ L/6 $\mu$ L heat exchanger and 90 mm length capillary to column
Pos.1: Connection between ports 1-6, 4-5, 2-3, active column 1 = left (enrichment column)	
Pos. 2: Connection between ports 1-2, 3-4, 5-6 active column 2 = right (analytical column)	

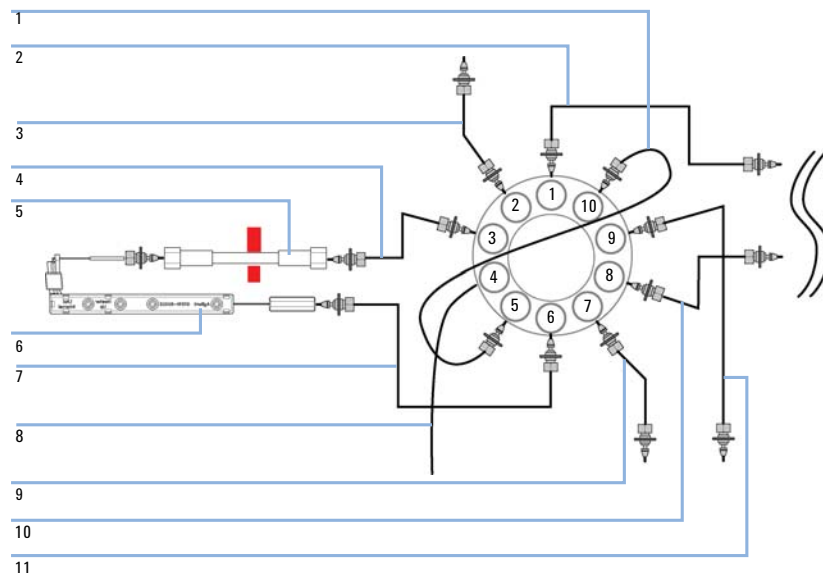
## Configuration for sample clean-up



**Figure 34** Installing the capillaries for a sample clean-up set-up

1	<b>Analytical column</b> with color code clip
2	280 mm length (column length > 100 mm) from analytical column to detector Not pre-swaged on column-side!
3	340 mm length from autosampler and loading pump
4	150 mm length (column length up to 100 mm), 280 mm length (column length > 100 mm) From column Not pre-swaged on column-side!
5	<b>Pre-column</b> with color code clip
6	Low dispersion heat exchanger or build-in 3 µL/6 µL heat exchanger and 90 mm length capillary to column
7	90 mm length to heat exchanger
8	700 mm length (0.17 mm ID) from analytical pump
9	To waste
10	90 mm length to heat exchanger
11	Low dispersion heat exchanger or build-in 3 µL/6 µL heat exchanger and 90 mm length capillary to column
Pos.1: Connection between ports 1-6 , 4-5, 2-3 , active column 1 = left (Pre-column)	
Pos. 2: Connection between Ports 1-2, 3-4, 5-6 active column 2 = right (analytical column)	

### Configuration for alternating column regeneration



**Figure 35** Installing the capillaries for alternating column regeneration (column and heat exchanger of the second position are omitted)

1	Valve-Valve connector, 120 mm length
2	150 mm length (column length up to 100 mm), 280 mm length (column length > 100 mm) From column Not pre-swaged on column-side!
3	200 mm length to detector
4	150 mm length (column length up to 100 mm), 280 mm length (column length > 100 mm) From column Not pre-swaged on column-side!
5	Column with color code clip
6	Low dispersion heat exchanger or build-in 3µL/6µL heat exchanger and 90 mm length capillary to column
7	90 mm length to heat exchanger
8	To waste
9	From autosampler
10	700 mm length (0.17 mm ID) from regeneration pump
11	90 mm length to heat exchanger
Pos.1: Connection between ports 1-10 , 2-3, 4-5, 6-7, 8-9 active column 1 = left / regenerating column = right	
Pos. 2: Connection between ports 1-2, 3-4, 5-6, 7-8, 9-10 active column 2 = right / regenerating column = left	

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	<div>Description</div> <div>Tissue</div> <div>Pipette</div> <div>Wrench, 1/4 – 5/16 inch (for capillary connections)</div>
NOTE	Depending on the column position or the use of additional heat-exchanger assemblies, the view of <a href="#">Figure 36</a> on page 132 may vary.

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1

Remove the front cover.

2

Use a pipette and tissue to dry the leak sensor area.

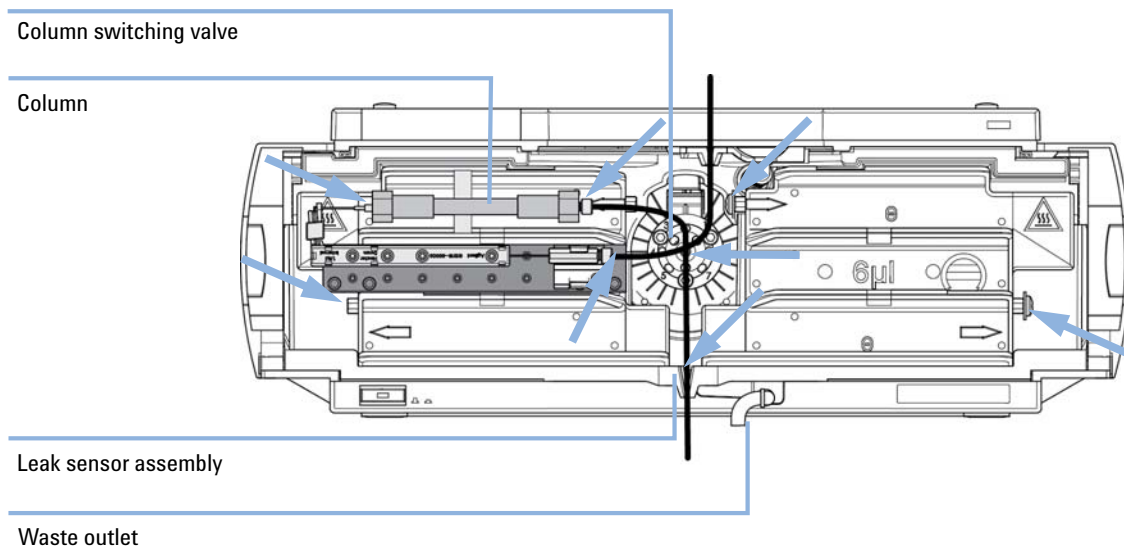
3

Observe the capillary connections and the column switching valve for leaks and correct, if required.

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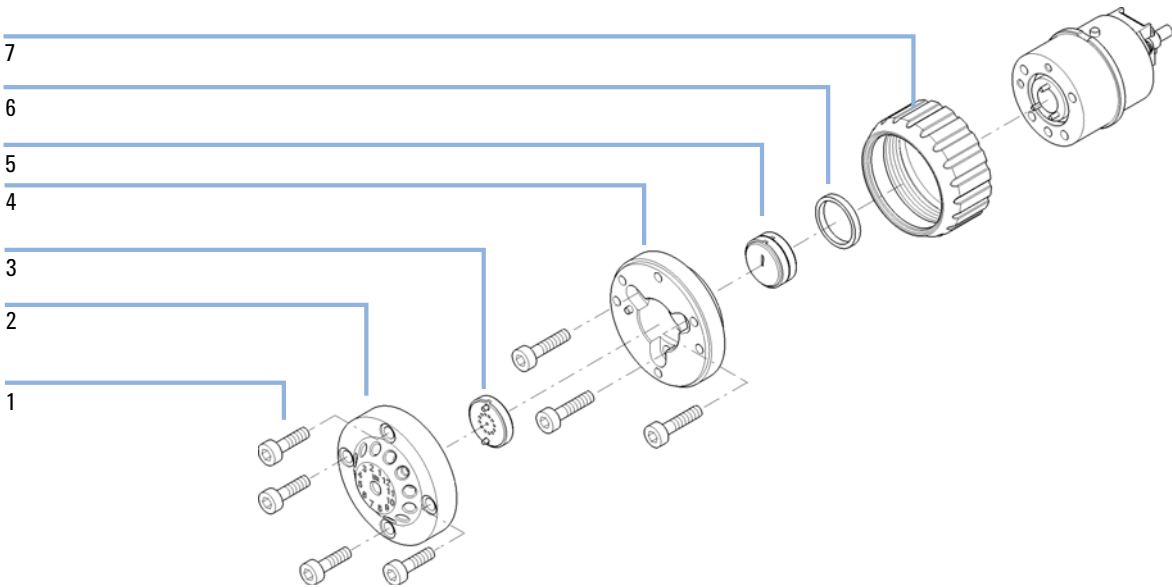
### Correcting Leaks

- 4 Re-install the front cover.



**Figure 36** Possible Leak Areas

# Replacing Head Parts of Column Switching Valve



**Figure 37** Valve Head Parts (example shows a 5067-4159 valve head)

1	Stator screws
2	Stator head assembly
3	Stator face assembly
4	Stator ring (available for service only)
5	Rotor seal
6	Bearing ring (P/N 1534-4045)
7	Spanner nut (P/N 5068-0106, available for service only)

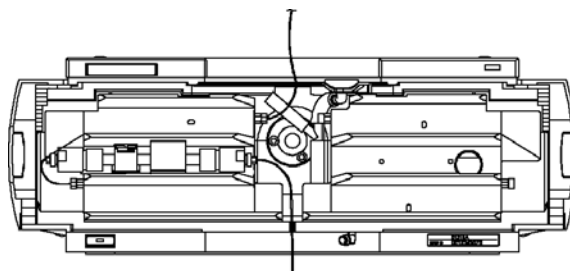
<b>When</b>	If valve leaks.
<b>Tools required</b>	<b>Description</b> Wrench, 1/4 inch Hexagonal key, 9/64 inch

**NOTE**

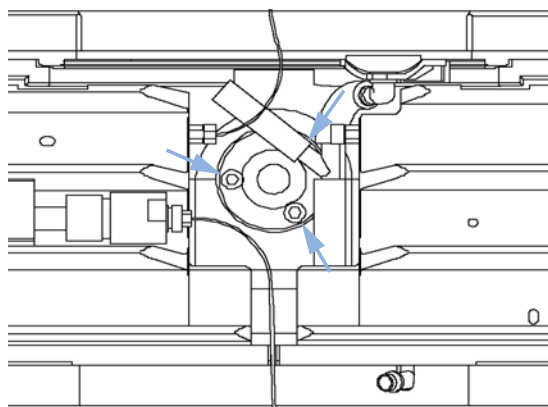
Figure 37 on page 133 illustrates replacement parts for the valve heads, with the 12Pos/13Port Selector valve as an example. The valves can vary in their appearance and do not necessarily include all of the illustrated parts. Neither, every spare part is available for each flavor of the valve.

Use the tables (Table 24 on page 153/Table 25 on page 154) for identification of the required part numbers.

- 1 Remove capillaries from ports.



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



- 3 Remove the stator head (and stator face if applicable).
- 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) stator face in place on the stator head. Reinstall the stator head.
- 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 in the 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 or Flex Cube in combination with a 600 bar pump.
- 

- 12 Perform a **Pressure Test** to ensure the valve is pressure tight.

## Replacing Valve Heads

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

Micro valves offer small internal volumes for minimum peak broadening, ideal for low flow rates in the nl/min and µl/min range.



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

### Parts required

#### Description

Any Agilent Quick Change Valve Head.  
For details, see [“Valve Options Overview”](#) on page 153

### WARNING

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

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

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

### CAUTION

#### 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.

**NOTE**

For details, please refer to the Agilent 1200 Infinity Series Method Development System - System Manual (G4230-90002).

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**CAUTION**

**Column Damage or Bias Measurement Results**

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

→ Fit the lobe to the groove to make sure the valve is switched to the correct position.

---

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

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**NOTE**

The tag reader reads the valve head properties 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.

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**NOTE**

To have the valve correctly recognized by the Agilent Infinity Valve Drive you must have the valve drive powered off for at least 10 seconds.

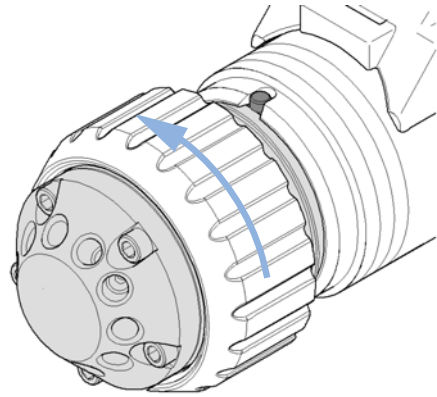
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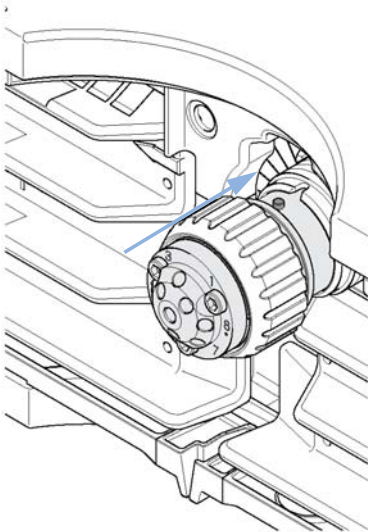
### Replacing Valve Heads

- 1 Switch off the module.
- 2 Push the valve head for bringing it to its outer position (TCC only).
- 3 Remove all capillary connections from the valve head

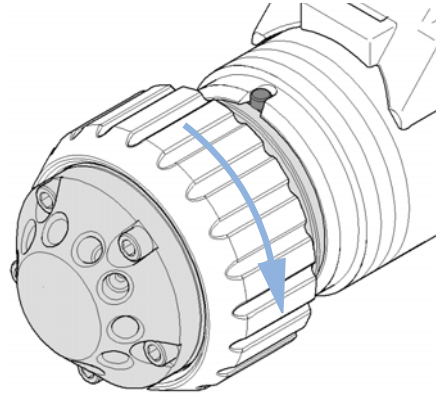
- 4 Unscrew the valve head.



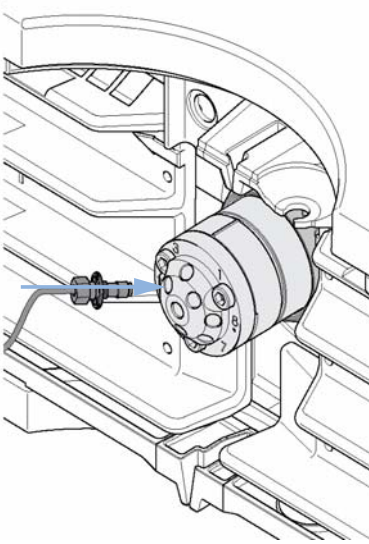
- 5 Put the new valve head onto the valve drive such that the lobe fits to the groove (see also "Installing the Valve Heads" on page 50).



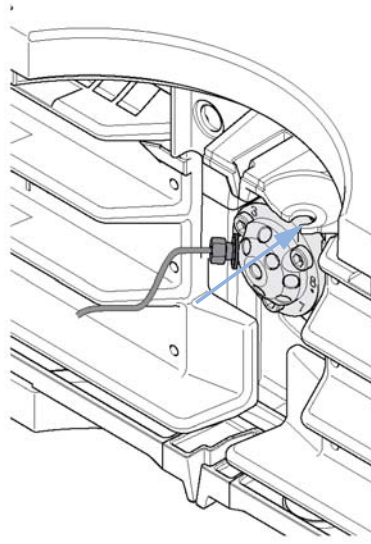
- 6 Screw the valve head onto the valve drive using the union nut (see also "Installing the Valve Heads" on page 50).



- 7** Install all required capillary connections to the valve head.



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



- 9** Switch on the module.

# Preparing the Column Compartment for Transportation

When

If a Thermostatted Column Compartment including the Valve Drive Option shall be transported

Tools required

Description

Screwdriver, Pozidriv #1 PT3

Parts required	#	p/n	Description
	1	G1316-67001	Transportation Lock Kit

NOTE

The module has been shipped with transportation locks, which must be used for transportation protection. Transportation Lock Kit (G1316-67001 ) can be re-ordered.

CAUTION

Damage to Internal Parts

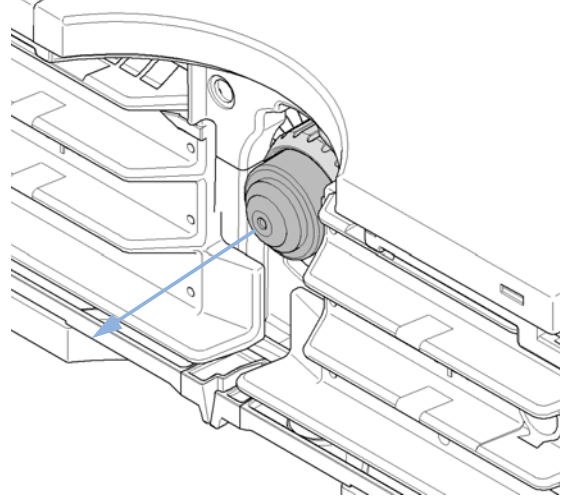
Mechanical shocks for example when being transported by car or shipped by post.

→ Install a lock (Transportation Lock Kit).

## Preparing the Column Compartment for Transportation

**1** Remove the valve head as described in “Replacing Valve Heads” on page 136.

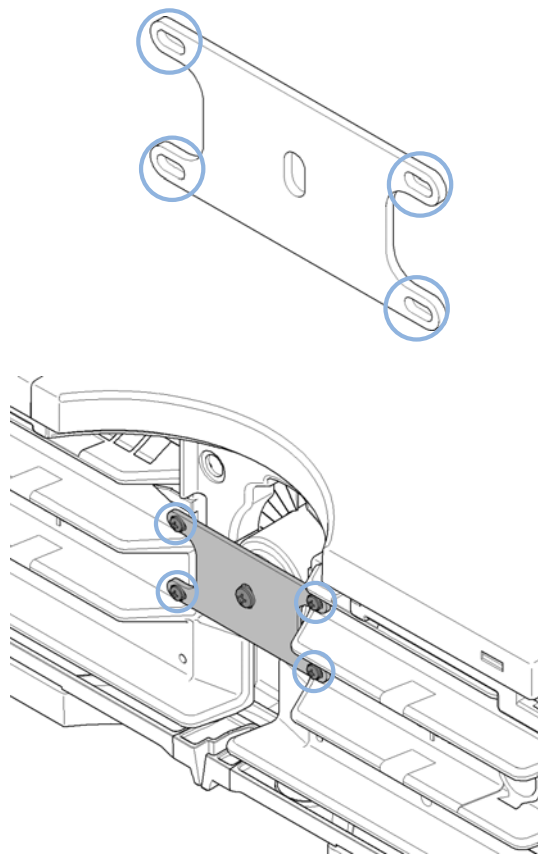
**2** Replace the valve head by the transportation valve head. Bring the transportation valve head to the outer position.



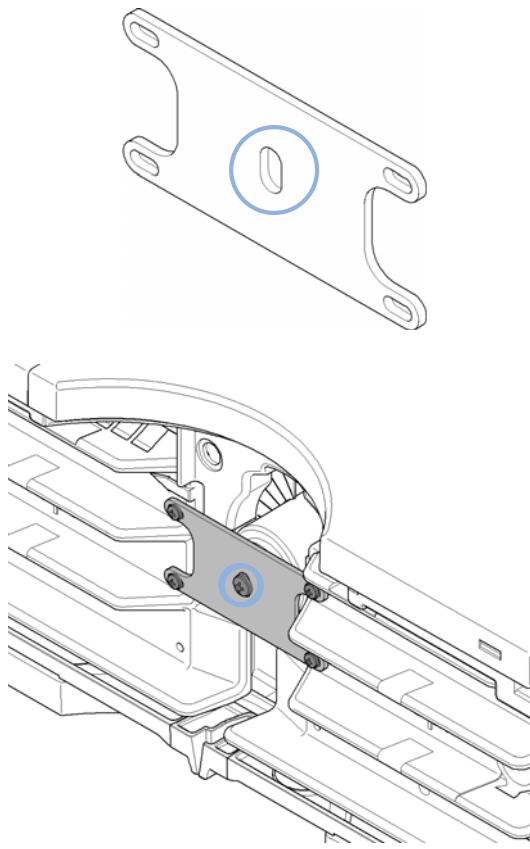
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### Preparing the Column Compartment for Transportation

- 3** Use Screw M3x8 (pack of 4) (0515-0897) for fixing the Lock plate (G1316-03701) to the heat exchangers in the outer positions of the plate.



- 4** Use a Screw M4 (2680-0128) for fixing the lock plate to the Transportation valve head (G1316-40002) in the central position of the plate. Put the spring washer (not shown) between the screw and the lock plate.





## Replacing the Module Firmware

### When

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

### Tools required

#### Description

- LAN/RS-232 Firmware Update Tool
- OR
- Agilent Lab Advisor software
- OR
- Instant Pilot G4208A  
(only if supported by module)

### Parts required

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

### Preparations

Read update documentation provided with the Firmware Update Tool.

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

- 1 Download the required module firmware, the latest LAN/RS-232 FW Update Tool and the documentation from the Agilent web.
  - [http://www.chem.agilent.com/\\_layouts/agilent/downloadFirmware.aspx?whid=69761](http://www.chem.agilent.com/_layouts/agilent/downloadFirmware.aspx?whid=69761)
- 2 For loading the firmware into the module follow the instructions in the documentation.

**Table 21** Module Specific Information (G1316C)

Initial firmware (main and resident)	A.06.10
Compatible with 1100/1200 series modules	All other modules must have firmware revision A.06.1x or B.06.1x or above (main and resident). Otherwise the communication will not work.
Conversion to / emulation	N/A

## **8 Maintenance**

### **Replacing the Module Firmware**



## 9

# Parts and Materials for Maintenance

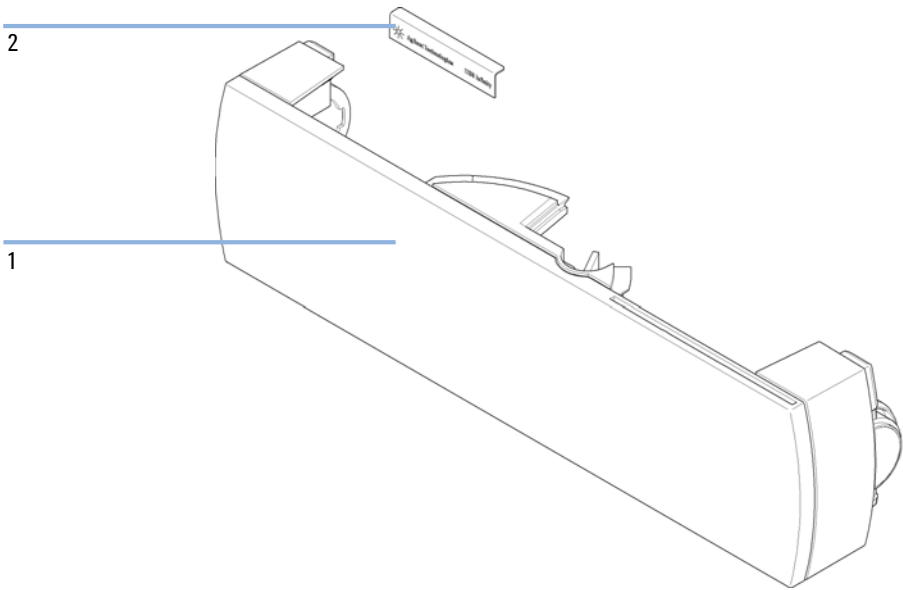
Plastic Parts	146
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Accessory Kits	155
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This chapter provides information on parts for maintenance.



# Plastic Parts

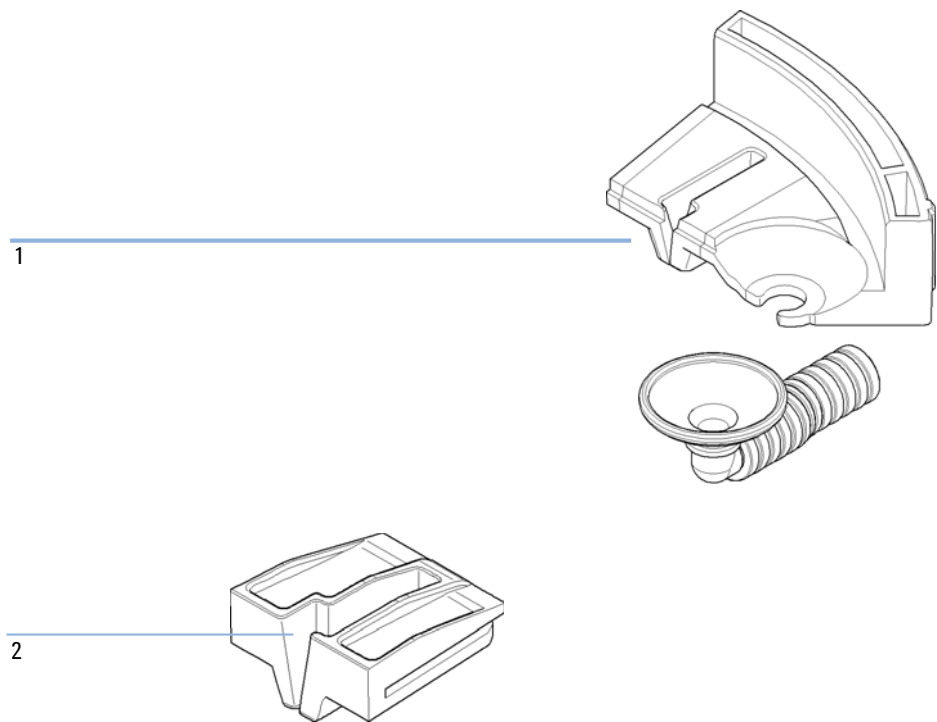
Item	p/n	Description
1	G1316-68754	Front cover
2	5042-9964	Name plate for Agilent 1290 series



**Figure 38**   Plastic Parts

# Leak Parts

Item	p/n	Description
1	G1316-67000	Leak tube kit includes following items: Funnel holder G1316C, tubing-flex polyethylene, leak funnel
2	G1316-42303	Capillary guide

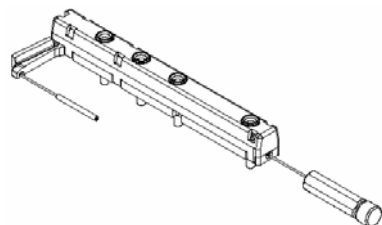
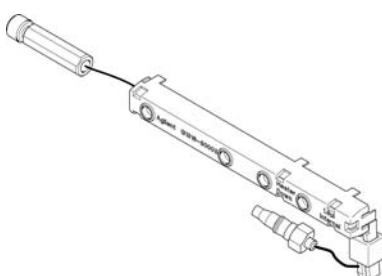
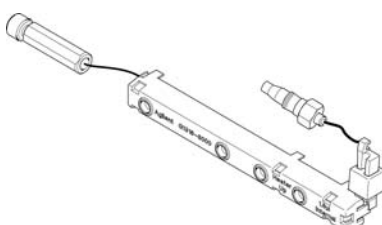


**Figure 39** Leak Parts

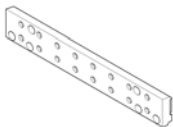
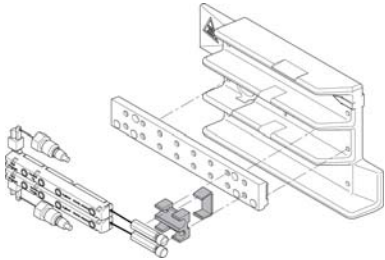
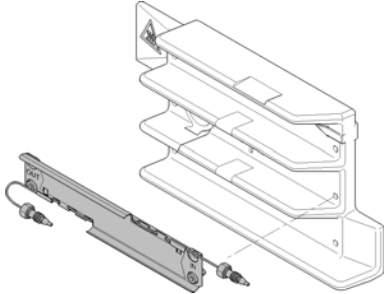
# Heater and Cooling Devices

The use of these heater devices is described in Agilent 1200 Series Multi-Method and Method Development System - System Manual (G4230-90001), and in the Agilent G4231B and G4232B Valve Kit - Instructions (G4232-90003).

**Table 22**    Heater Devices

Item	Description
	Heater long-up ( 0.12 mm i.d., 1.6 µL internal volume) (G1316-80002) Part of Capillary kit (5067-4646). For fittings see <a href="#">Table 23</a> on page 150.
	Heat Exchanger Long Up 0.075 mm, nom. Volume 1.0 µL (G1316-80012)
	Heater long-down ( 0.12 mm i.d., 1.6 µL internal volume) (G1316-80003) Part of Capillary kit (5067-4646). For fittings see <a href="#">Table 23</a> on page 150.
	Heat Exchanger Long Down 0.075 mm (nom. 1.0 µL) (G1316-80013)
	Column clip set, 8 colors (5042-9918)

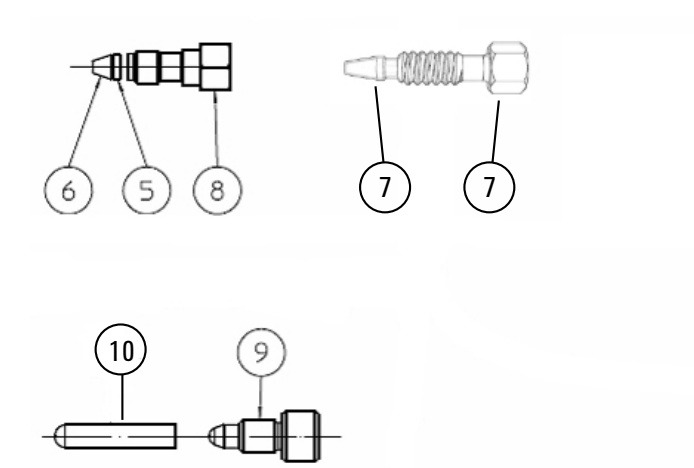
**Table 22** Heater Devices

Item	Description
	Carrier for heat exchanger TCC SL Plus (G1316-89200)
	Fitting holder assembly (G1316-68706)
	Bio-Inert Solvent Heating Devices ( 9 µL internal volume, 600 bar max pressure) (G5616-60050)

**Table 23**    TCC Heater Fittings

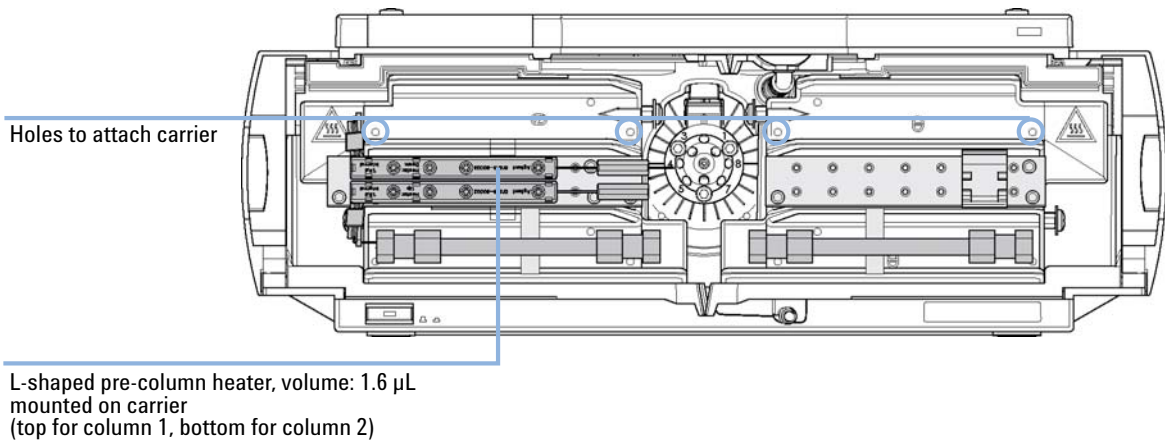
Item	Description
9	Plastic fittings (0100-1259)
7	Very high pressure removable fitting (5067-4738)
8	Fitting screw long <sup>1</sup>
5	Ferrule back <sup>1</sup>
6	Ferrule front <sup>1</sup>

<sup>1</sup> included in kit Fitting screw long (5065-4454)



**Figure 40**    TCC Heater Fittings





**Figure 41** Heater Devices for G1316C

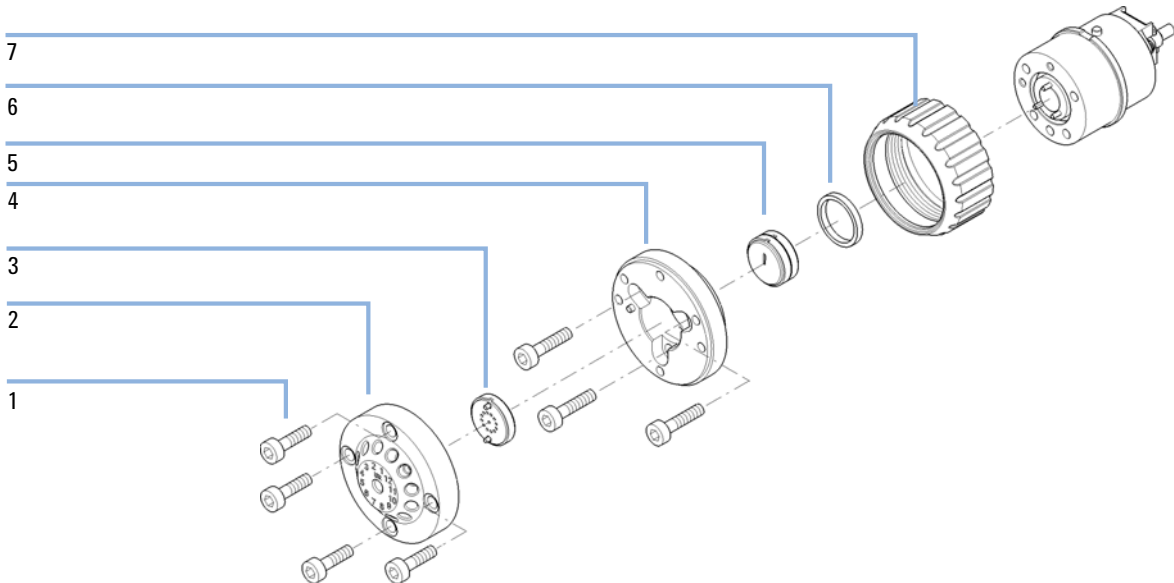
# Valve Options Overview

## Valve Head Parts

**NOTE**

The figure below illustrates replacement parts for the valve heads, with the 12Pos/13Port Selector valve as an example. The valves can vary in their appearance and do not necessarily include all of the illustrated parts. Neither, every spare part is available for each flavor of the valve.

Use the tables ( [Table 24](#) on page 153/[Table 25](#) on page 154) for identification of the required part numbers.



**Figure 42**    Valve Head Parts (example shows a 5067-4159 valve head)

1	Stator screws
2	Stator head assembly
3	Stator face assembly
4	Stator ring (available for service only)
5	Rotor seal
6	Bearing ring (P/N 1534-4045)
7	Spanner nut (P/N 5068-0106, available for service only)

## 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 24** Replacement Parts Standard Valve Heads

Valve Head	Rotor Seal	Stator Head	Stator Screws (10/Pack)	Stator Ring
<b>5067-4107</b> 8 Pos/ 9 Port, 600 bar	5067-4111 (PEEK)	5068-0001	1535-4857	5068-0120
<b>5067-4121</b> 8 Pos/ 9 Port, 1200 bar	5068-0002 (Vespel)	5068-0001	1535-4857	5068-0120
<b>5067-4137</b> 2 Pos/6 Port, 600 bar	0101-1409 (PEEK)	0101-1417	1535-4857	5068-0120
<b>5067-4117</b> 2 Pos/6 Port, 1200 bar	5068-0008 (Vespel)	5068-0006	1535-4857	5068-0120
<b>5067-4144</b> 2 Pos/10Port, 600 bar, micro	0101-1415 (PEEK)	0101-1421	5068-0054	n.a.
<b>5067-4118</b> 2 Pos/10 Port, 1200 bar	5068-0012 (Vespel)	5068-0011	5068-0019	n.a
<b>5067-4145</b> 2 Pos/10Port, 600 bar	0101-1415 (PEEK)	5068-0165	5068-0019	n.a
<b>5067-4146</b> 6 Column Selector, 600 bar	5068-0076 (PEEK)	5068-0077	5068-0089	n.a
<b>5067-4142</b> 6 Column Selector, 1200 bar	5068-0067 (Vespel)	5067-0077	5068-0089	n.a

**Table 25**    Replacement Parts Bio-Inert Valve Heads

Valve Head	Rotor Seal	Stator Head	Stator Face	Stator Screws (10/Pack)	Stator Ring
<b>5067-4148</b> 2 Pos/6 Port, 600 bar, bio-inert	0101-1409 (PEEK)	5068-0060	0100-1851	5068-0020	5068-0020
<b>5067-4132</b> 2 Pos/10Port, 600 bar, bio-inert	5068-0041 (PEEK)	5068-0040	5068-0095	5068-0059	n.a.
<b>5067-4134</b> 4 Column Selector, 600 bar, bio-inert	5068-0045 (PEEK)	5068-0044	5068-0093	5068-0059	n.a.
<b>5067-4159</b> 12 Pos/13Port, Selector, 200 bar, bio-inert	0101-1288 (PEEK)	5068-0097	0101-1288	5068-0059	n.a.

## Accessory Kits

The accessory kits contain accessories and tools needed for installation and maintenance.

### Standard Accessory Kit

The standard accessory kit is always delivered with the instrument. You might want to order one of the following items if you choose to re-install the instrument at a later time.

Accessory kit (G1316-68765 )

p/n	Description
5063-6527	Tubing assembly, i.d. 6 mm, o.d. 9 mm, 1.2 m (to waste)
5181-1516	CAN cable, Agilent module to module, 0.5 m
G1316-01202 (2x)	Column clamp
G1316-87300	Capillary, 0.17 x 90 mm 1/16 in male/male
G1316-87321	Capillary column-heat exchanger 105 mm lg, 0.17 mm i.d.
G1316-87323	Capillary column-heat exchanger 170 mm lg, 0.17 mm i.d.

## Low Dispersion Capillary Kit for G1316C

### Capillary Kit 5067-4633

p/n	Description
0100-0043	ST front ferrule
0100-0044	ST back ferrule
0100-2086	Nut seal-tight (pack of 2)
5021-1822	Flexible tubing, 280 mm
G1156-22401	Fitting Screw long
G1316-68706	Fitting holder assy, includes following items: Fitting fork, fitting clip, screws (pack of 4)
G1316-89200	Carrier for heat exchanger
G1316-80003	Heater long-down (0.12 mm i.d., 1.6 µL internal volume)

## List of Capillary and Column Kits for Method Development Systems

The following kits are available for method development. For more detailed information refer to Agilent 1200 Series Multi-Method and Method Development System - System Manual (G4230-90001).

p/n	Description
5067-4601	Solvent selection tubing kit, 4 solvents
5067-1595	Method development capillary kit, low dispersion, short column
5067-1596	Method development capillary kit, low dispersion, long column
5067-1597	Method development capillary kit, general purpose
5190-1431	RRHT Selectivity Method Development Kit, 2.1 mm i.d.
5190-1432	RRHT pH Method Development Kit, 2.1 mm i.d.
5190-1433	RRHT Selectivity Method Development Kit, 4.6 mm i.d.
5190-1434	RRHT pH Method Development Kit, 4.6 mm i.d.
5190-1435	Rapid Resolution Selectivity Method Development Kit
5190-1436	Rapid Resolution pH Method Development Kit

### Capillary kit PN 5067-4646

The capillary kit PN 5067-4646 contains the following parts:

<b>p/n</b>	<b>Description</b>
5067-4647	Capillary ST 0.12 mm x 340 mm S/SX Autosampler to Valve
5067-4648	Capillary ST 0.17 mm x 700 mm S/SX Pump to valve (ACR only)
5067-4649 (2x)	Capillary ST 0.12 mm x 90 mm S/SX Valve to heat exchanger
5067-4650 (2x)	Capillary ST 0.12 mm x 150 mm SL/SX short column to valve
5067-4651 (2x)	Capillary ST 0.12 mm x 280 mm SL/SX Long Column to Valve
5067-4652	Capillary ST 0.12 mm x 120 mm SX/SX Valve to Valve (bypass)
5067-4653	Capillary ST 0.12 mm x 200 mm S/SX Valve to Detector
0890-1713	Tube PTFE, 2 m Valve to Waste
G1316-80002	Heat Exchanger Long-Up, 1.6 µL
G1316-80003	Heat Exchanger Long-Down, 1.6 µL
G1316-89200 (2x)	Carrier for heat exchanger TCC SL Plus
G1316-68706 (2x)	Fitting holder assembly
5042-9918	Column clip set, eight colors
0100-1259 (4x)	Plastic fitting



## Capillary kit PN 5067-4682

The capillary kit PN 5067-4682 contains the following parts:

p/n	Description
5067-4684	Capillary ST 0.12 mm x 340 mm S/SX Autosampler to Valve
5067-4648	Capillary ST 0.17 mm x 700 mm S/SX Pump to valve (ACR only)
5067-4685 (2x)	Capillary ST 0.12 mm x 90 mm S/SX Valve to heat exchanger
5067-4686 (2x)	Capillary ST 0.12 mm x 150 mm SX/SX short column to valve
5067-4687	Capillary ST 0.12 mm x 280 mm SX/SX long column to valve
5067-4688	Capillary ST 0.12 mm x 120 mm SX/SX valve to valve (bypass)
5067-4689	Capillary ST 0.12 mm x 200 mm S/SX valve to detector
0890-1713	Tube PTFE, 2 m valve to waste
G1316-80002	Heat Exchanger Long-Up, 1.6 µL
G1316-80003	Heat Exchanger Long-Down, 1.6 µL
G1316-89200 (2x)	Carrier for heat exchanger TCC SL Plus
G1316-68706 (2x)	Fitting holder assembly
0100-1259 (4x)	Plastic fitting
5042-9918	Column clip set, eight colors

### **Capillary kit PN 5067-4730**

The capillary kit PN 5067-4730 contains the following parts:

<b>p/n</b>	<b>Description</b>
5067-4723	Capillary ST 0.17 mm x 340 mm S/SX Autosampler to Valve
5067-4648	Capillary ST 0.17 mm x 700 mm S/SX Pump to valve (ACR only)
5067-4724 (4x)	Capillary ST 0.17 mm x 90 mm S/SX Valve to heat exchanger and heat exchanger to column
5067-4720 (2x)	Capillary ST 0.17 mm x 150 mm SL/SX short column to valve
5067-4722 (2x)	Capillary ST 0.17 mm x 280 mm SL/SX long column to valve
5067-4719	Capillary ST 0.17 mm x 120 mm SX/SX valve to valve (bypass)
5067-4721	Capillary ST 0.17 mm x 200 mm S/SX valve to detector
0890-1713	Tube PTFE, 2 m valve to waste
5042-9918	Column clip set, eight colors

## Capillary kit PN 5067-4729

The capillary kit PN 5067-4729 contains the following parts:

p/n	Description
5067-4744	Capillary ST 0.12 mm x 340 mm SL/M Autosampler to Valve
5067-4745	Capillary ST 0.11 mm x 500 mm S/M Sampler (dual stack) to Valve
5067-4735 (8x)	Capillary ST 0.11 mm x 130 mm LS/M Valve to heat exchanger and column to valve
5067-4737	Capillary ST 0.17 mm x 150 mm M/M Valve to Valve (bypass)
5067-4746	Capillary ST 0.12 mm x 250 mm SV/M Valve to Detector
8710-1534	Wrench, 4 mm both ends, open end
5022-6503	Flexible PEEK tubing 450 mm, 0.4 mm i.d. Valve to Waste
G4240-43200	PEEK fitting special for Chip-LC
G1316-80002 (2x)	Heat Exchanger Long-Up, 1.6 µL
G1316-80003 (2x)	Heat Exchanger Long-Down, 1.6 µL
G1316-89200 (2x)	Carrier for heat exchanger TCC SL Plus
G1316-68706	Fitting holder assembly
5042-9918	Column clip set, eight colors

# Accessories

The Transportation Lock Kit (G1316-67001 ) has been delivered with the instrument. You will need this kit to prepare the TCC for transportation.

Transportation Lock Kit (G1316-67001 )

p/n	Description
G1316-03701	Lock plate
2680-0128	Screw M4
0515-0897	Screw M3x8 (pack of 4)
	Spring Washer
G1316-40002	Transportation valve head



## 10 Identifying Cables

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BCD Cables	171
CAN Cable	173
RS-232 Cable Kit	174
Agilent Module to Printer	175

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.

**Analog cables**

p/n	Description
35900-60750	Agilent module to 3394/6 integrators
35900-60750	Agilent 35900A A/D converter
01046-60105	Analog cable (BNC to general purpose, spade lugs)

**Remote cables**

p/n	Description
03394-60600	Agilent module to 3396A Series I integrators  3396 Series II / 3395A integrator, see details in section " <a href="#">Remote Cables</a> " on page 168
03396-61010	Agilent module to 3396 Series III / 3395B integrators
5061-3378	Remote Cable
01046-60201	Agilent module to general purpose

**BCD cables**

p/n	Description
03396-60560	Agilent module to 3396 integrators
G1351-81600	Agilent module to general purpose

### CAN cables

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

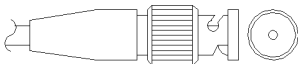
### LAN cables

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

### RS-232 cables

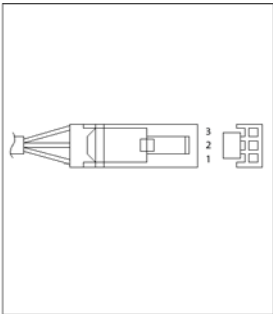
p/n	Description
G1530-60600	RS-232 cable, 2 m
RS232-61601	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It's also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561	RS-232 cable, 8 m

# Analog cables

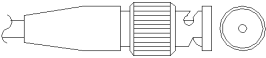


One end of these cables provides a BNC connector to be connected to Agilent modules. The other end depends on the instrument to which connection is being made.

## Agilent Module to 3394/6 Integrators

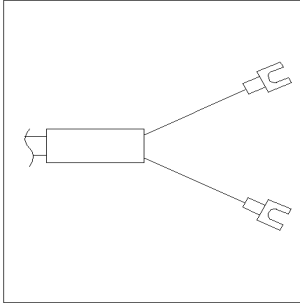
p/n 35900-60750	Pin 3394/6	Pin Agilent module	Signal Name
	1		Not connected
	2	Shield	Analog -
	3	Center	Analog +

## Agilent Module to BNC Connector

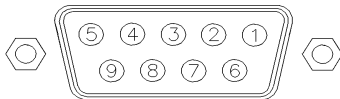
p/n 8120-1840	Pin BNC	Pin Agilent module	Signal Name
	Shield	Shield	Analog -
	Center	Center	Analog +



Agilent Module to General Purpose

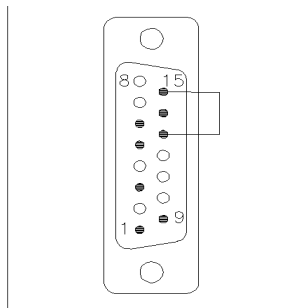
p/n 01046-60105	Pin	Pin Agilent module	Signal Name
	1		Not connected
	2	Black	Analog -
	3	Red	Analog +

# Remote Cables



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

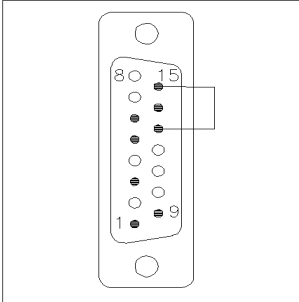
## Agilent Module to 3396A Integrators

p/n 03394-60600	Pin 3396A	Pin Agilent module	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	

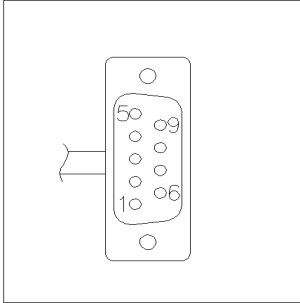
## Agilent Module to 3396 Series II / 3395A Integrators

Use the cable Agilent module to 3396A Series I integrators (03394-60600) and cut pin #5 on the integrator side. Otherwise the integrator prints START; not ready.

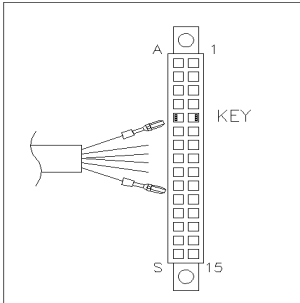
Agilent Module to 3396 Series III / 3395B Integrators

p/n 03396-61010	Pin 33XX	Pin Agilent module	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 Module to Agilent 35900 A/D Converters

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

### Agilent Module to General Purpose

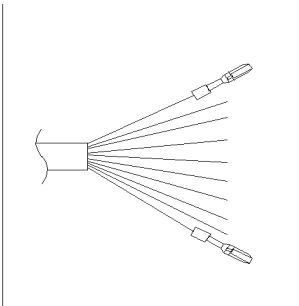
p/n 01046-60201	Wire Color	Pin Agilent module	Signal Name	Active (TTL)
	White	1	Digital ground	
	Brown	2	Prepare run	Low
	Gray	3	Start	Low
	Blue	4	Shut down	Low
	Pink	5	Not connected	
	Yellow	6	Power on	High
	Red	7	Ready	High
	Green	8	Stop	Low
	Black	9	Start request	Low

# BCD Cables

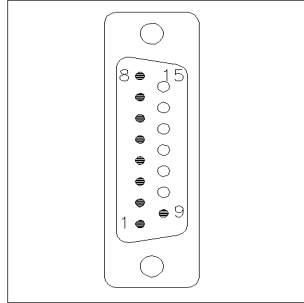


One end of these cables provides a 15-pin BCD connector to be connected to the Agilent modules. The other end depends on the instrument to be connected to

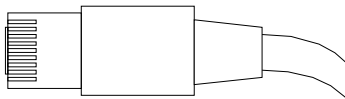
## Agilent Module to General Purpose

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

Agilent Module to 3396 Integrators

p/n 03396-60560	Pin 3396	Pin Agilent module	Signal Name	BCD Digit
	1	1	BCD 5	20
	2	2	BCD 7	80
	3	3	BCD 6	40
	4	4	BCD 4	10
	5	5	BCD0	1
	6	6	BCD 3	8
	7	7	BCD 2	4
	8	8	BCD 1	2
	9	9	Digital ground	
	NC	15	+ 5 V	Low

# CAN Cable



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

## CAN Cables

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

## LAN Cables

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

# RS-232 Cable Kit

p/n	Description
G1530-60600	RS-232 cable, 2 m
RS232-61601	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It's also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561	RS-232 cable, 8 m



## Agilent Module to Printer

p/n	Description
5181-1529	Cable Printer Serial & Parallel, is a SUB-D 9 pin female vs. Centronics connector on the other end (NOT FOR FW UPDATE). For use with G1323 Control Module.

## **10 Identifying Cables**

### **Agilent Module to Printer**