Agilent Valve Kit G4231B and G4232B

Instructions

This Technical Note describes the installation of the Agilent G4231B and G4232B Valve Kits.

Contents

Typical Applications

NOTE

Which ports are interconnected at which valve position strongly depends on the module the valve is installed to. The software user interface will always display the correct situation. A method modification or re-plumbing of the connections is typically required if transferring methods from a G1316A/B/C to a G7116B, G1170A or G4227A.

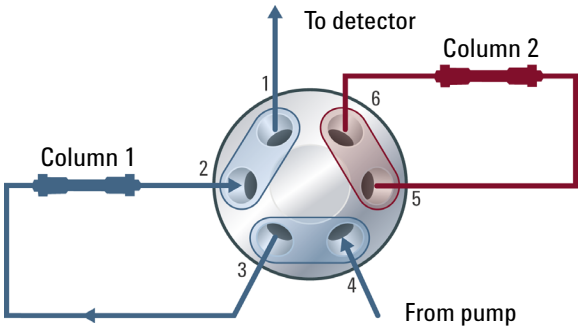
Refer to the table below for further information on which ports are connected at which position.

Modules	Valve	Position 1	Position 2
G1316A/B/C	2pos/6port	1-2	1-6
G7116B, G1170A, G4227A	2pos/6port	1-6	1-2
G1316A/B/C	2pos/10port	1-2	1-10
G7116B, G1170A, G4227A	2pos/10port	1-10	1-2

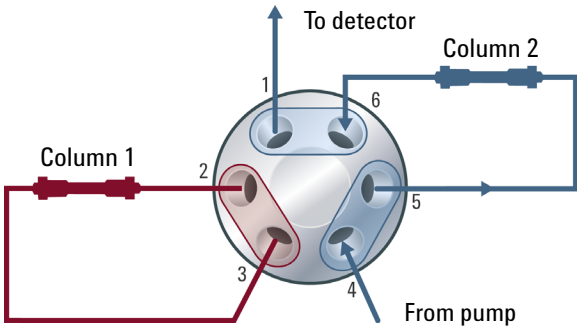
Dual column selection (2pos/6port or 2pos/10port valves)

Advantages:

- Increase productivity
- Higher instrument up-time



Position 1-2

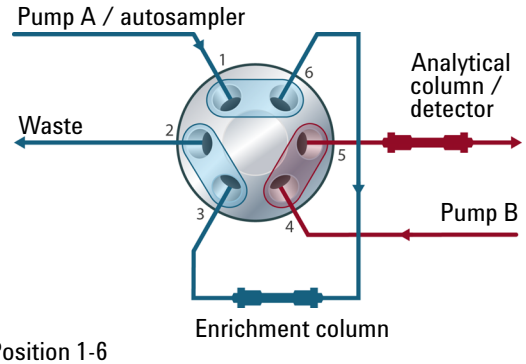


Position 1-6

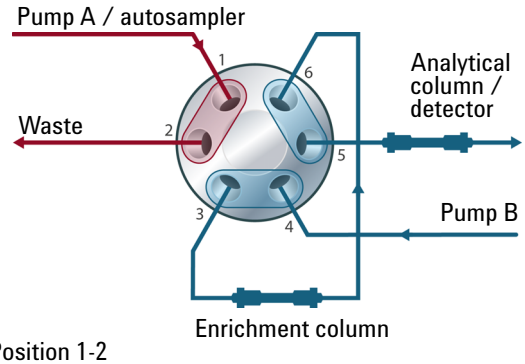
Quickly change between two different stationary phases to check your separation selectivity, or use two identical stationary phases to have the second column immediately available after the first one loses efficiency, for example with complex matrices.

Sample enrichment and sample cleanup (2pos/6port or 2pos/10port valves)

Sample Enrichment

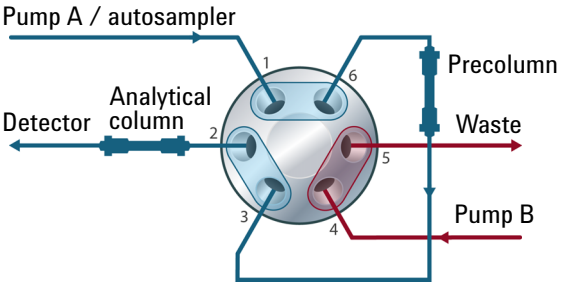


Position 1-6

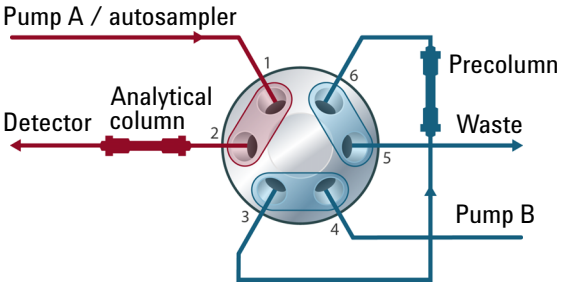


Position 1-2

Sample Cleanup



Position 1-6



Position 1-2

Advantages:

- Easy automation of sample preparation
- Higher reproducibility
- Increased productivity and sensitivity

Sample cleanup is essential for samples with complex matrices, such as biological fluids, food extracts and waste water. Before injection into a LC or LC/MS system, the sample matrix must be separated from the analytes of interest. Otherwise, contaminants can disrupt separation and detection or even damage the analytical column.

Enrichment methods

Enrichment methods are the technique of choice to obtain highest sensitivity and to remove the sample matrix in such applications as proteomics, drug metabolism and environmental trace analysis. The analytes are retained and concentrated onto the pre-column, while the sample matrix is passed to waste. After the valve switch, a second pump backflushes the analytes out of the pre-column onto the separation column. This allows injection of large volumes onto the pre-column, significantly expanding sensitivity in the range of ten to several thousands.

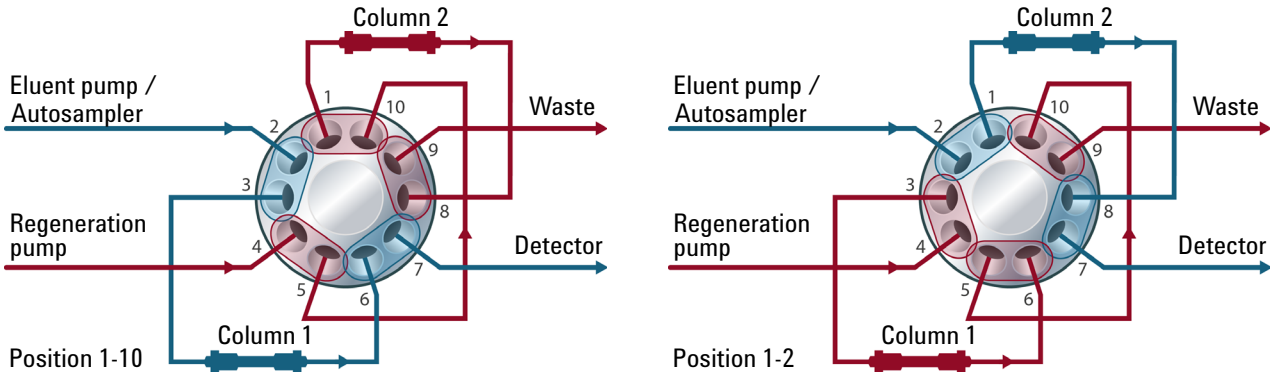
Stripping methods

Stripping methods handle analytes and matrices in the opposite way to enrichment methods. Matrix components are retained on the pre-column while the analytes pass through to the separation column. After the valve switches, an additional pump backflushes the matrix components out of the pre-column to waste, while the analytes are separated on the main column. Backflushing prepares the pre-column for the next injection.

Alternating Column Regeneration (2pos/10port valves only)

Advantages:

- High sample throughput
- Increased productivity
- High efficiency



Gradient elution is frequently used for fast separation of complex samples in LC. Since the gradient elution requires the column to regenerate before subsequent runs, an automated column regeneration system saves valuable analysis time. Agilent's 2-position/10-port valve for the 1290 Infinity TCC enable the simultaneous analysis of one sample on one LC column while a second, identical column is flushed and equilibrated by an additional regeneration pump. At the end of the run, the valve switches to the second position and the next sample is separated on the previously flushed and equilibrated column, while the first column is now flushed and equilibrated by the regeneration pump. Up to 50 % of analysis time is often required to equilibrate columns. Using alternating column regeneration saves time and provides higher sample throughput.

Delivery Checklist

Check the content of the delivery. You should have received the following:

G4231B

p/n	Description
5067-4117	2 pos/6 port ultra high pressure (1200 bar) valve head
5067-4249	2port/6pos capillary kit 0.12 mm ID for MCT G7116B

G4232B

p/n	Description
5067-4118	2 pos/10 port ultra high pressure (1200 bar) valve head
5067-4251	2port/10pos capillary kit for MCT G7116B

Capillary kit PN 5067-4249

(for G4231B)

The capillary kit PN 5067-4249 contains the following parts:

#	p/n	Description
1	G7116-60015	Heat Exchanger Assembly 1.6 µL-Z Quick Connect Heatexchanger Standard Flow Use heat exchanger assy delivered with the MCT`s Accessory Kit for 2nd column
1	5067-5957	A-Line Quick Connect Assy ST 0.12 x 105 mm Heat exchanger to column, use A-Line Quick Connect Fitting delivered with the MCT`s Accessory Kit for 2nd Column
2	5067-4649	Capillary ST 0.12 mm x 90 mm S/SX Valve to heat exchanger
2	5500-1189	Capillary ST 0.12 x 150 mm, long socket Column (short) to valve, use the A-Line Quick Turn Fittings delivered with the MCT`s Accessory Kit for connecting this capillary to the column outlet
2	5500-1191	Capillary ST 0.12 x 280 mm, long socket column (long) to valve, use the A-Line Quick Turn Fittings delivered with the MCT`s Accessory Kit for connecting this capillary to the column outlet
2	G1314-68703	Cap fitting kit special Column to valve (above capillaries), use at valve port
1	5500-1209	Capillary ST 0.12 x 200 mm SX/S Valve to detector
2	0890-1713	Tube PTFE, 2 m Valve to waste
1	0100-1516	Fitting, PK, 1/16'' x 10-32, SH, male nut, 2/pk For waste line
2	G7116-68003	Column Holder Clips (2/Pk) for G7116B

Capillary kit PN 5067-4251

(for G4232B)

The capillary kit PN 5067-4251 contains the following parts:

#	p/n	Description
1	G7116-60015	Heat Exchanger Assembly 1.6 µL-Z Quick Connect Heatexchanger Standard Flow Use heat exchanger assy delivered with MCT Accessory Kit for 2nd column
1	5067-5957	A-Line Quick Connect Assy ST 0.12 x 105 mm Heat Exchanger to column, use A-Line Quick Connect Fitting delivered with the MCT`s Accessory Kit for 2nd Column
2	5500-1189	Capillary ST 0.12 x 150 mm, long socket Column (short) to valve, use the A-Line Quick Turn Fittingsdelivered with the MCT`s Accessory Kit for connecting this capillary to the column outlet
2	5500-1191	Capillary ST 0.12 x 280 mm, long socket Column (long) to valve, use the two A-Line Quick Turn Fittings delivered with the MCT`s Accessory Kit for connecting both column outlets
2	G1314-68703	Cap fitting kit special Column to valve (above capillaries), use at valve port
1	5067-4688	Capillary ST 0.12 mm x 120 mm SX/SX Valve to valve bypass line
1	5500-1209	Capillary ST 0.12 x 200 mm SX/S Valve to detector
1	5500-1210	Capillary ST 0.12 x 500 mm SX/SX ALS to valve
1	5067-4648	Capillary ST 0.17 mm x 700 mm S/SX Pump to valve (Alternate Column Regeneration setup only)
2	5067-4685	Capillary ST 0.12 mm x 90 mm S/SX Valve to Heat Exchanger, (long screw fitting used at valve)
1	0100-1516	Fitting, PK, 1/16'' x 10-32, SH, male nut, 2/pk Waste line connector
1	0890-1713	Tube PTFE, 2 m Waste line
2	G7116-68003	Column Holder Clips (2/Pk) for G7116B

Specifications

Table 1 G4231A, 2-position/6-port valve head, 600bar

Type	Specification
Liquid contacts	PEEK, Stainless Steel
Port size	Accepts 10-32 male threaded fittings
Flow passage diameters	Stator - 0.38 mm (0.015 in), Rotor Seal - 0.30 mm (0.012 in)
Port to Port Volume	0.51 µL
Maximum pressure	600 bar

Table 2 G4231B, 2-position/6-port valve head, 1200bar

Type	Specification
Liquid contacts	Vespel, Stainless Steel
Port size	Accepts 10-32 male threaded fittings
Flow passage diameters	Stator - 0.38 mm (0.015 in), Rotor Seal- 0.30 mm (0.012 in)
Port to Port Volume	0.51 µL
Maximum pressure	1200 bar

Table 3 G4232A, 2-position/10-port micro valve head , 600bar

Type	Specification
Liquid contacts	PEEK, Stainless Steel
Port size	Accepts M4 male threaded fittings
Flow passage diameters	-0.20 mm (0.0108 in)
Port to Port Volume	89 nL
Maximum pressure	600 bar

Table 4 G4232B, 2-position/10-port valve head, 1200bar

Type	Specification
Liquid contacts	Vespel, Stainless Steel
Port size	Accepts 10-32 male threaded fittings
Flow passage diameters	Stator - 0.15 mm (0.006 in), Rotor Seal - 0.20 mm (0.008 in)
Port to Port Volume	0.22 µL
Maximum pressure	1200 bar

Table 5 G4232C, 2-position/10-port valve head , 600bar

Type	Specification
Liquid contacts	PEEK, Stainless Steel
Port size	Accepts 10-32 male threaded fittings
Flow passage diameters	Stator - 0.15 mm (0.006 in), Rotor Seal- 0.20 mm (0.008 in)
Port to Port Volume	0.16 µL
Maximum pressure	600 bar

Installation

Installation of the Valve Heads

The valve drives are factory-installed in the 1290 Infinity II Multicolumn Thermostat. The valve heads are interchangeable and can be easily mounted.

At the first installation, the transportation lock and the dummy valve have to be removed, see "Remove the Transportation Lock and the Valve Dummy" on page 9. The valve heads can be installed by mounting the valve heads onto the valve drives and fastening the nut manually (do not use any tools).

Be sure that the guide pin snaps into the groove of the valve drive thread.

NOTE

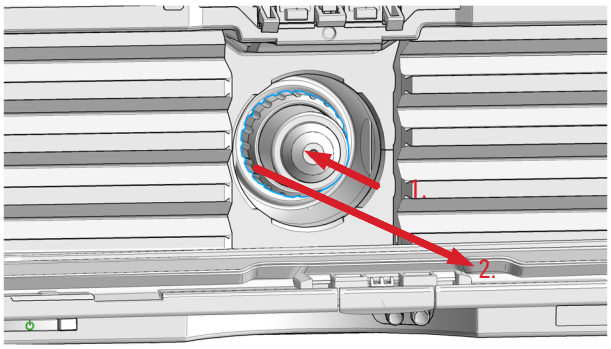
The valves are mounted on pull-out rails to allow easy installation of capillaries. Push the valve gently into its housing until it snaps into the inner position, push it again and it slides out.

When all capillaries are installed, push the valve back into its housing, see "Install the Valve Head and Connect Capillaries" on page 10.

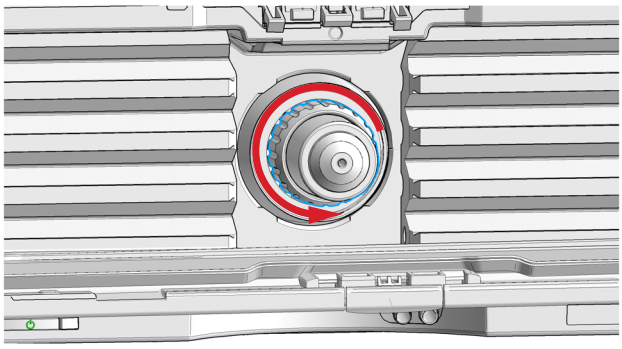
Remove the Transportation Lock and the Valve Dummy

1 When unscrewing the transportation lock, push it back until the last screw is removed - the valve rail is spring-loaded.

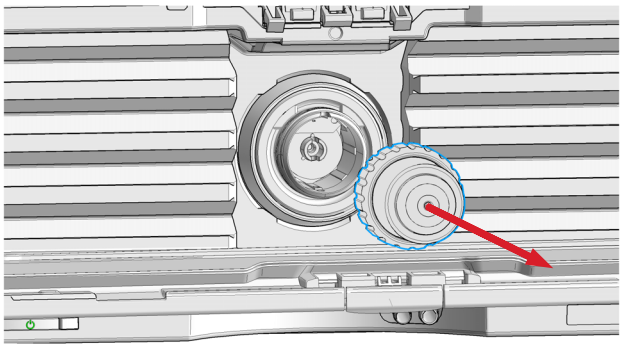
2 Press on the valve dummy to release it (spring-loaded valve rail).



3



4



Install the Valve Head and Connect Capillaries

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 can be used instead of a functional valve. Do not touch parts inside the actuator.

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

Valve Damage

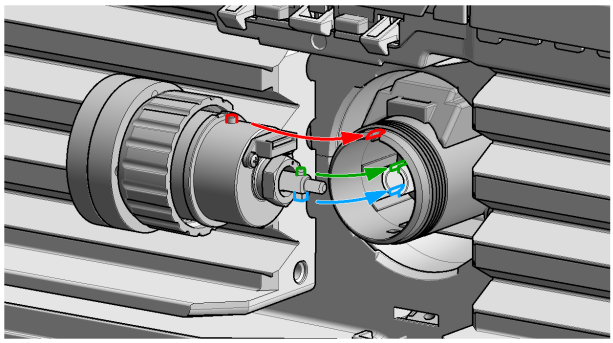
Using a low pressure valve on the high pressure side can damage the valve.

➔ 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

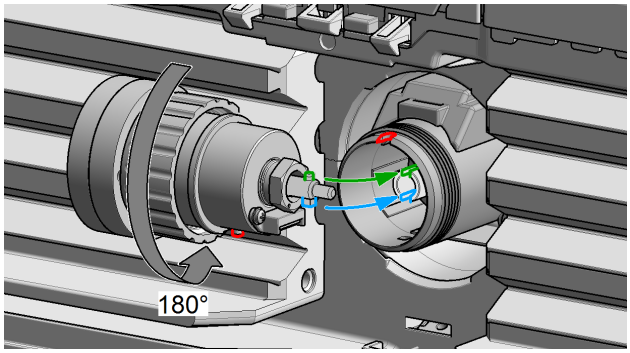
For a correct installation of the valve head, the outside pin (red) must completely fit into the outside groove on the valve drive's shaft (red). A correct installation is only possible if the two pins (green and blue) on the valve head fit into their corresponding grooves on the valve drive's actuator axis. Their match depends on the diameter of the pin and groove.

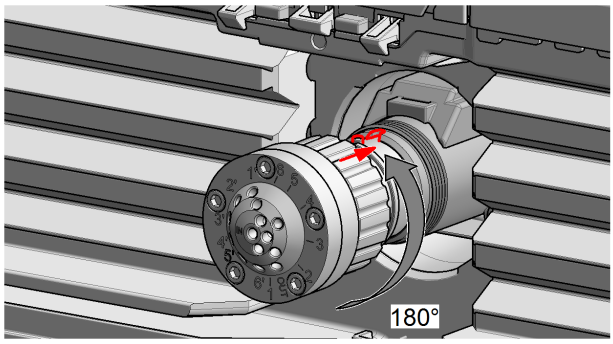
1 Insert the valve head into the valve shaft.



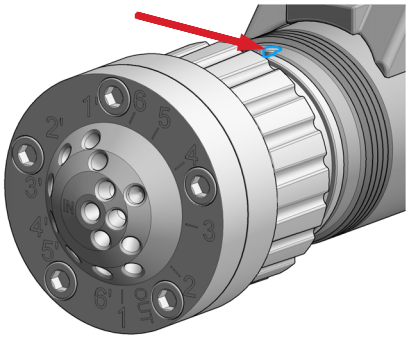
OR

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





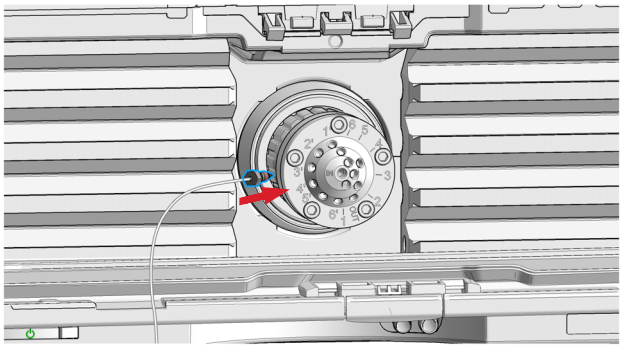
2 When the outer pin is locked into the groove, manually screw the nut onto the valve head.



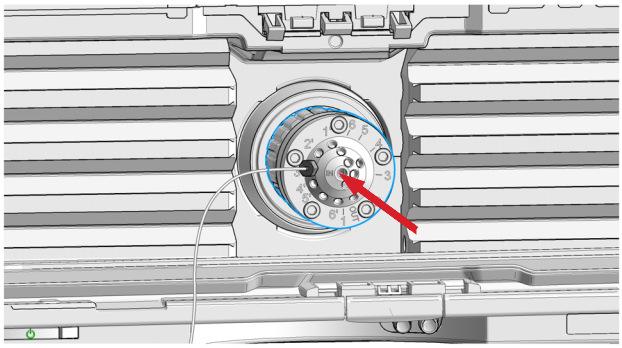
NOTE

Fasten the nut manually. Do not use any tools.

3 Install all required capillary connections to the valve.



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



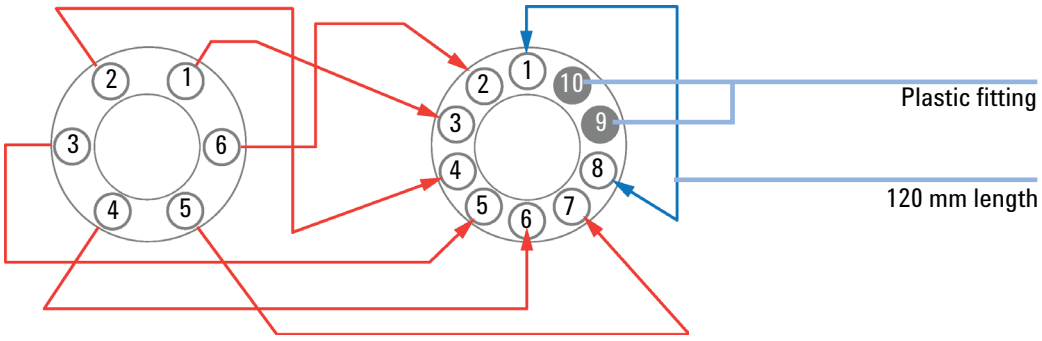
5 Power on or power-cycle your module, so the valve head gets recognized during module initialization.

Install 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. Plug plastic fittings into ports 9 and 10.



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

1 Install the capillaries.

NOTE Use outmost 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.

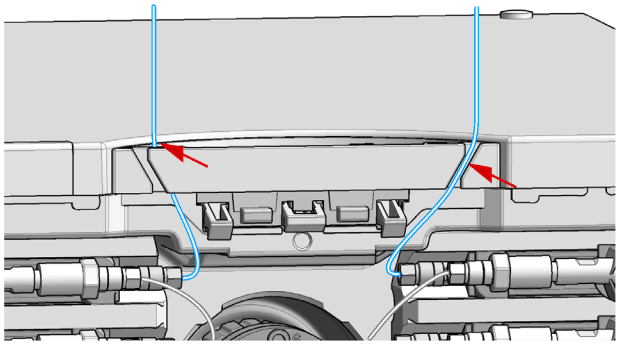
5 Fasten all fittings with a spanner.

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.

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

NOTE The following schemata show the setup of the different applications respectively to the G1316C but will also help installing the kits to the G7116B.

Configuration for dual-column selection

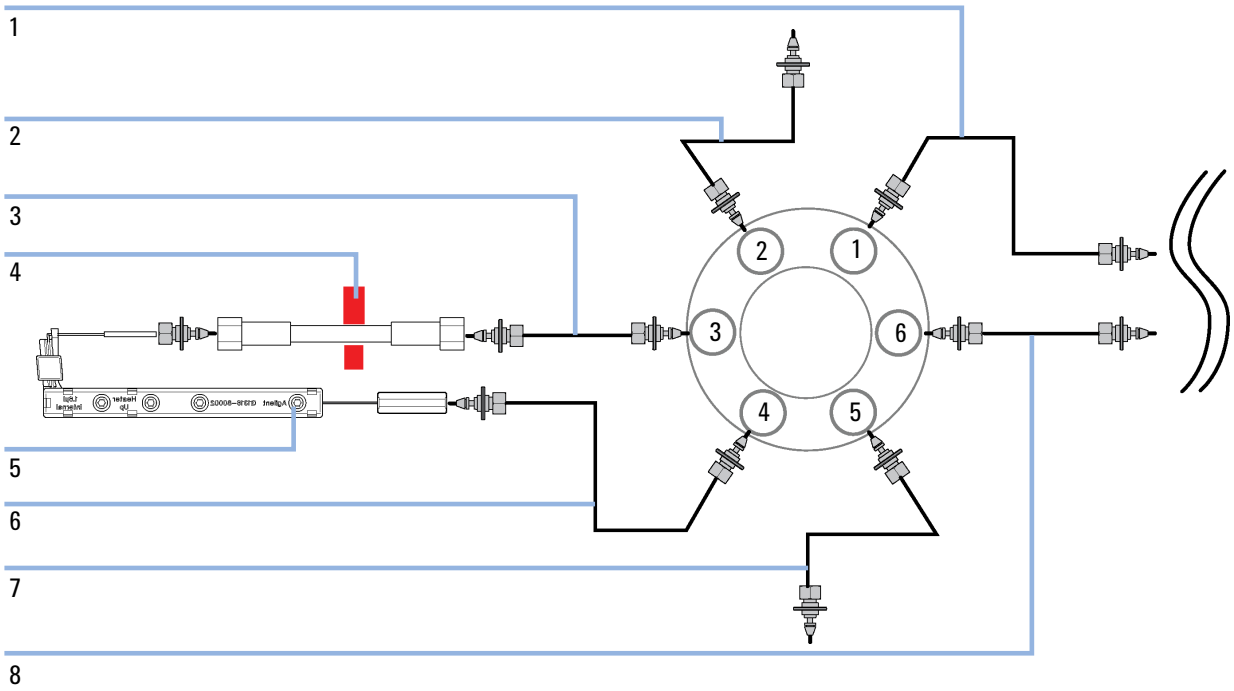


Figure 1 Installing the capillaries for a dual-column selection set-up (column and heat exchanger of the second position are omitted)

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 column holder clip
5	Heat Exchanger Assembly 1.6-Z Quick Connect Heat exchanger Standard Flow
6	90 mm length to heat exchanger
7	From sampler
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

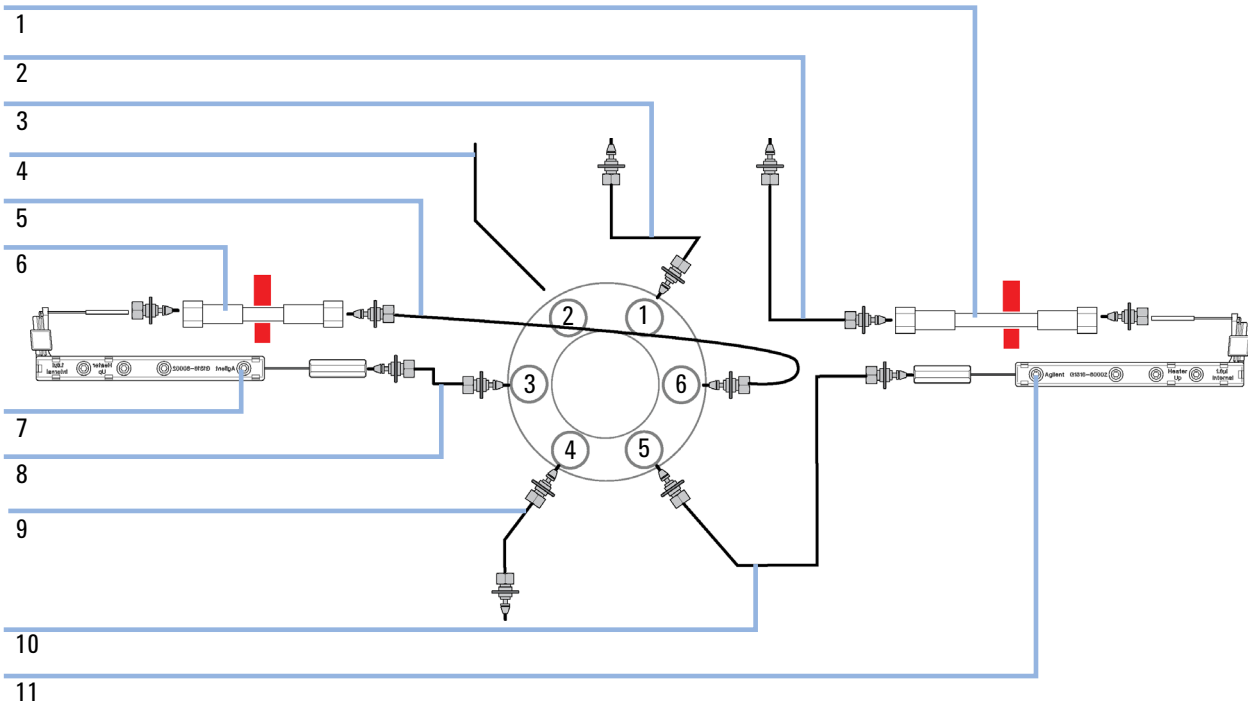


Figure 2 Installing the capillaries for a sample enrichment set-up

1	**Analytical column** with column holder clip
2	280 mm length (column length > 100 mm) from analytical column to detector Not pre-swaged on column-side!
3	From sampler
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	**Enrichment column** with column holder clip
7	Heat Exchanger Assembly 1.6-Z Quick Connect Heat exchanger Standard Flow
8	90 mm length to heat exchanger
9	From analytical pump
10	90 mm length to heat exchanger
11	Heat Exchanger Assembly 1.6-Z Quick Connect Heat exchanger Standard Flow
	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 colum)

Configuration for sample clean-up

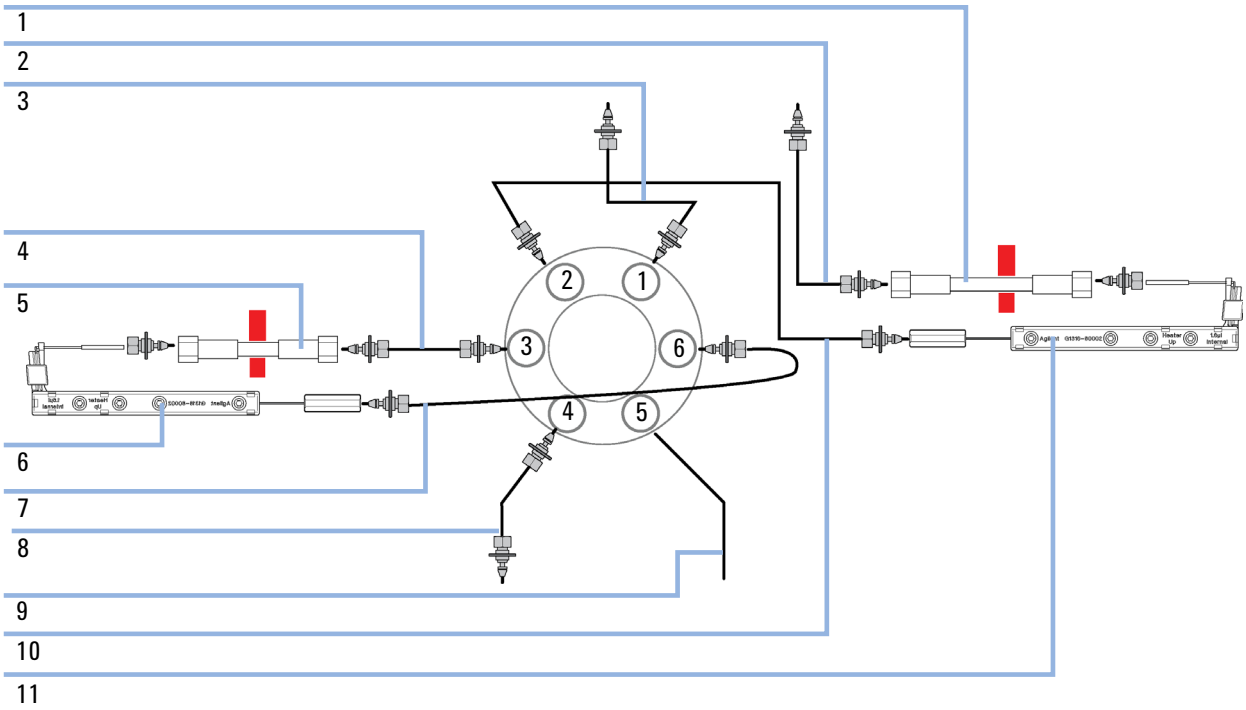


Figure 3 Installing the capillaries for a sample clean-up set-up

1	**Analytical column** with column holder clip
2	280 mm length (column length > 100 mm) from analytical column to detector Not pre-swaged on column-side!
3	From sampler
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	**Pre-column** with column holder clip
6	Heat Exchanger Assembly 1.6-Z Quick Connect Heat exchanger Standard Flow
7	90 mm length to heat exchanger
8	From analytical pump
9	To waste
10	90 mm length to heat exchanger
11	Heat Exchanger Assembly 1.6-Z Quick Connect Heat exchanger Standard Flow
	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

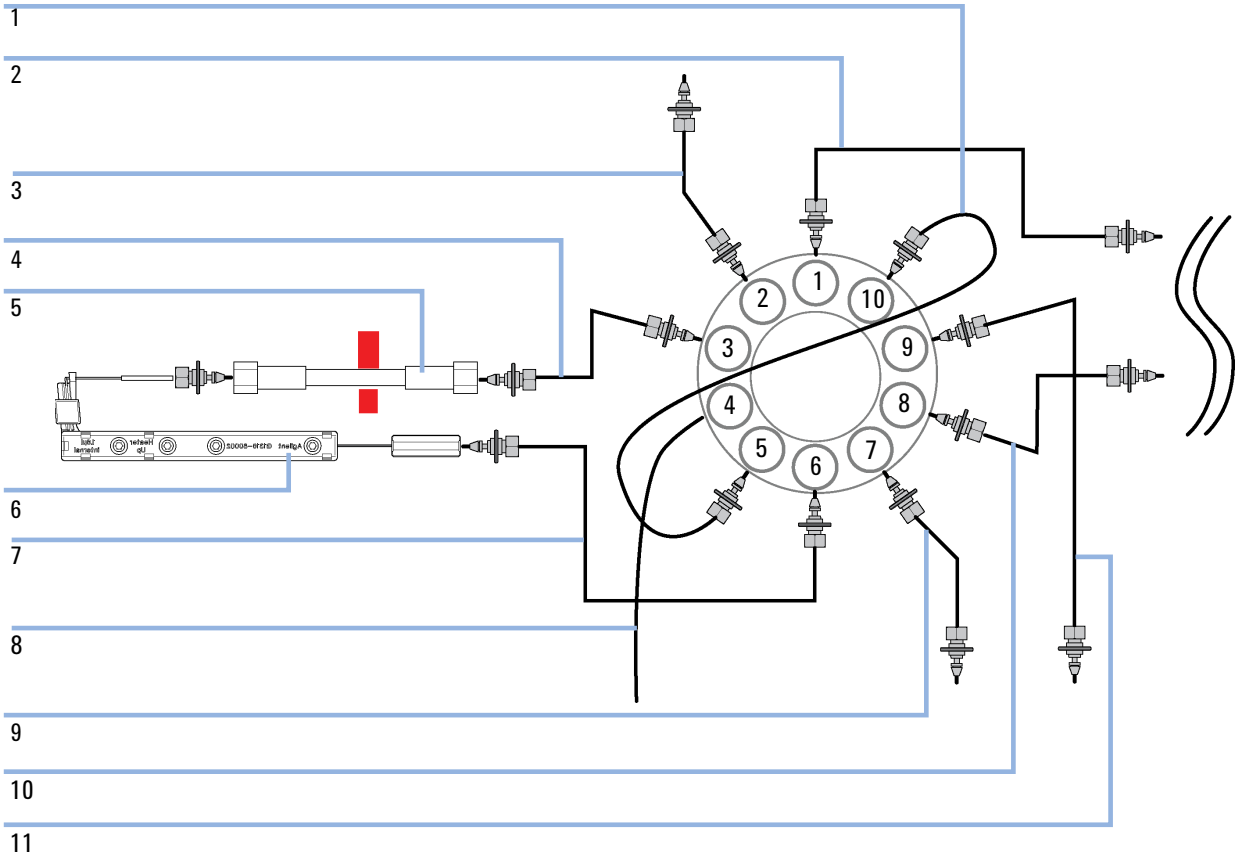


Figure 4 Installing the capillaries for alternating column regeneration (column and heat exchanger of the second position are omitted)

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 column holder clip
6	Heat Exchanger Assembly 1.6-Z Quick Connect Heat exchanger Standard Flow
7	90 mm length to heat exchanger
8	To waste
9	From sampler
10	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

Replacement Parts

Table 6 Replacement Parts

Valve	Rotor Seal	Stator Head	Bearing Ring	Stator Screws(Pack of 10)	Stator Ring
5067-4137 2 Pos/6 Port, 600 bar	0101-1409	0101-1417	1535-4045	1535-4857	5068-0120
5067-4117 2 Pos/6 Port, 1200 bar	5068-0008	5068-0006	1535-4045	1535-4857	5068-0120
5067-4144 2 Pos/10 Port, 600 bar micro	0101-1415	0101-1421	1535-4045	5068-0054	5068-0120
5067-4118 2 Pos/10 Port, 1200 bar	5068-0012	5068-0011	1534-4045	5068-0019	n.a.
5067-4145 2 Pos/10 Port, 600 bar	0101-1415	5068-0165	1535-4045	5068-0019	n.a.

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.

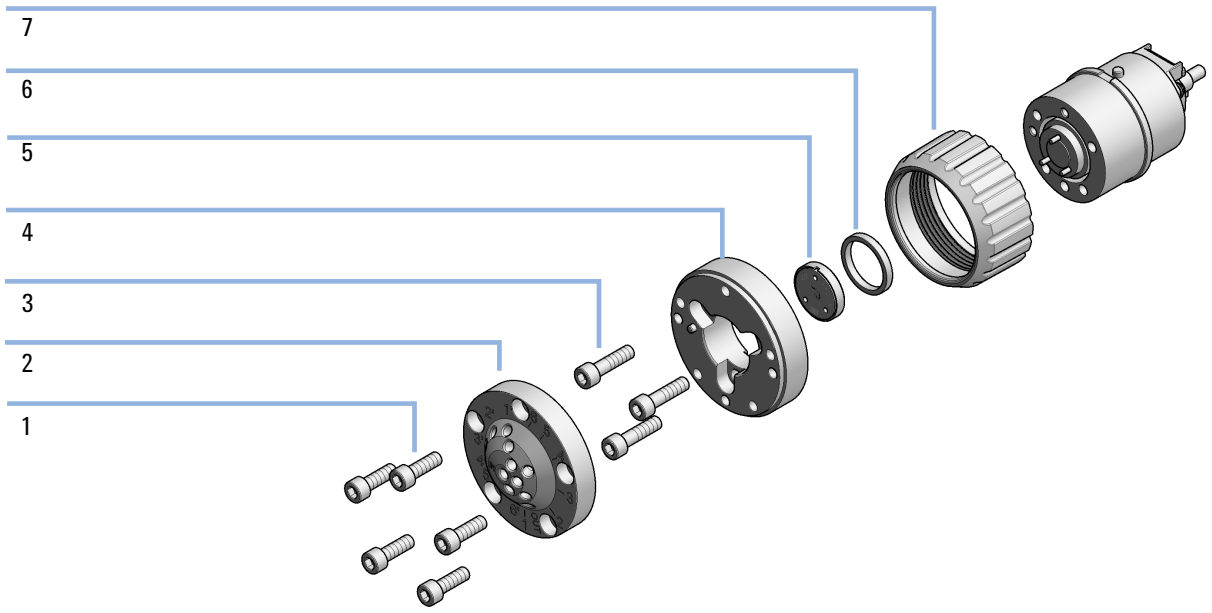


Figure 5 Valve Head Parts (example)

1	Stator screws
2	Stator head assembly
3	Stator ring screws (not available)
4	Stator ring (available for service only)
5	Rotor seal
6	Bearing ring
7	Spanner nut (available for service only)

G4232-90007

Part Number: G4232-90007

Edition: 06/2015
Printed in Germany

Agilent Technologies, Inc
Hewlett-Packard-Strasse 8
76337 Waldbronn
Germany