

Agilent InfinityLab Quick Change Valve G5641A

Instructions

This technical note describes the installation and application of the Agilent InfinityLab Quick Change 2-position/10-port Bio Valve G5641A in a 1290 Infinity II Multicolumn Thermostat (MCT).

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Typical Applications

NOTE

The interconnection of ports at particular valve position strongly depends on the combination of valve and module. The software user interface always displays the correct situation. A method modification or re-plumbing of the connections is typically required if transferring methods from G1316A/B/C to G7116A/B, G1170A or G4227A.

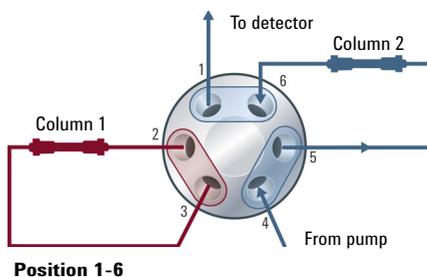
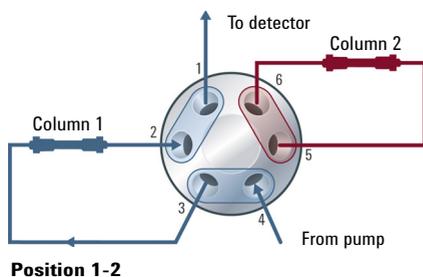
Refer to the table below for further information on which ports are connected to which position.

| Modules | Valve | Position 1 | Position 2 |
|--------------------------|--------------------|------------|------------|
| G1316A/B/C | 2-position/6-port | 1-2 | 1-6 |
| G7116A/B, G1170A, G4227A | 2-position/6-port | 1-6 | 1-2 |
| G1316A/B/C | 2-position/10-port | 1-2 | 1-10 |
| G7116A/B, G1170A, G4227A | 2-position/10-port | 1-10 | 1-2 |

Dual column selection (2-position/6-port or 2-position/10-port valve heads)

Advantages:

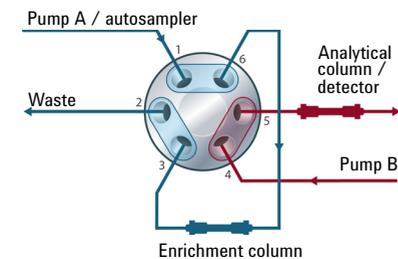
- Increase productivity
- Higher instrument up-time



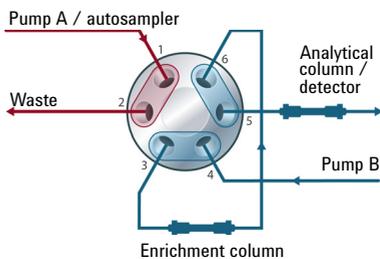
The valve can select either column 1 or column 2, allowing quick changes between two different stationary phases for separation selectivity, or immediate availability of a second and identical stationary phase in case the first column loses efficiency, when dealing with complex matrices for instance.

Sample enrichment and sample cleanup (2-position/6-port or 2-position/10-port valve heads)

Sample Enrichment

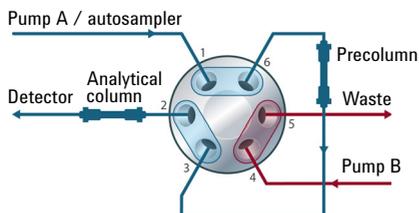


Position 1-6

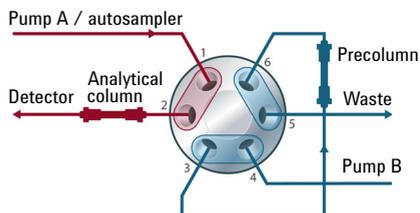


Position 1-2

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 techniques 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 precolumn, while the sample matrix is passed to waste. After the valve switch, a second pump backflushes the analytes out of the precolumn onto the separation column. This allows injection of large volumes onto the precolumn, significantly expanding sensitivity in the range of ten to several thousands.

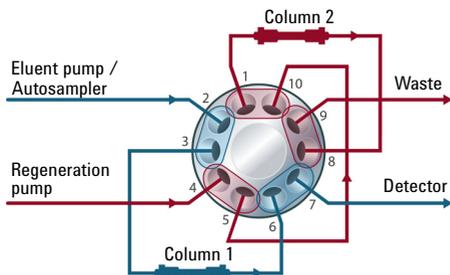
Sample cleanup

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

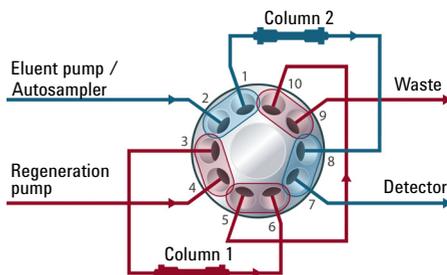
Alternating Column Regeneration (2-position/10-port valve heads only)

Advantages:

- High sample throughput
- Increased productivity
- High efficiency



Position 1-10



Position 1-2

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 InfinityLab Quick Change 2-position/10-port valve enables the simultaneous analysis of one sample on one LC column while an extra regeneration pump flushes and equilibrates a second, identical column. 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. Meanwhile, the regeneration pump flushes and equilibrates the first column. 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:

G5641A:

| p/n | Description |
|------------|---|
| 5067-6682 | 2-position/10-port bio valve head, 1300 bar |
| 5013-0002 | Bio 2/10 Capillary Kit |

Capillary Kits

Table 1 Capillary kit PN 5013-0002

| p/n | Description | Connection | Quantity | Unit |
|-------------|---|---|----------|------|
| G7116-60071 | Quick Connect Bio Heat Exchanger Standard | | 1 | ea |
| 5500-1578 | Quick Connect Capillary MP35N 0.12 x 105 mm | Heat Exchanger to column | 1 | ea |
| 5067-5965 | Quick Connect LC fitting | Heat Exchanger to column | 1 | ea |
| 5500-1594 | Quick Turn Capillary MP35N 0.12 x 150 mm, long socket | Column (short) to valve | 2 | ea |
| 5500-1596 | Quick Turn Capillary MP35N 0.12 x 280 mm, long socket | Column (long) to valve | 2 | ea |
| 5067-5966 | Quick Turn LC Fitting | Column to valve (above capillaries) | 2 | ea |
| 5004-0016 | Capillary MP35N 0.12 x 120 mm SX/SX NS/NS | Valve to valve bypass line | 1 | ea |
| 5004-0017 | Capillary MP35N 0.12 x 200 mm SX/SI | Valve to detector | 1 | ea |
| 5500-1279 | Capillary MP35N 0.12 x 500 mm SI/SI | ALS to valve | 1 | ea |
| 5004-0019 | Capillary MP35N 0.17 x 700 mm SX/SI | Pump to valve (Alternate Column Regeneration setup only) | 1 | ea |
| 5004-0018 | Capillary MP35N 0.12 x 90 mm SI/SX NS/NS | Valve to Heat Exchanger, (long screw fitting used at valve) | 2 | ea |
| 0100-1516 | PEEK fittings (2/Pk) | Waste line connector | 1 | ea |
| 0890-1713 | Tube PTFE, 2 m | Waste line | 1 | ea |
| G7116-68003 | Column Holder Lamella (2/pk) delivered as a part of G7116-60071 | | 1 | ea |
| G7116-68004 | Column Holder Clips (2/Pk) | | 1 | ea |
| 5067-6654 | Number Kit 1-8 colored | | 1 | ea |

Specifications

Table 2 G5641A 5067-6682, 2-position/10-port Bio valve head 1300 bar

| Type | Specification |
|---------------------|--|
| Maximum pressure | 1300 bar |
| Typical application | Anything a 2-position/6-port valve can do plus alternating column regeneration |
| Port size | Accepts 10-32 male threaded fittings |
| Liquid contacts | PEEK, MP35N |
| pH range | 0 – 14* |

* incompatible with some mineral acids. For more information see Solvent Information.

Installation

Installation of the Valve Heads

If ordered, the valve drives are factory-installed in the 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 10. 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.

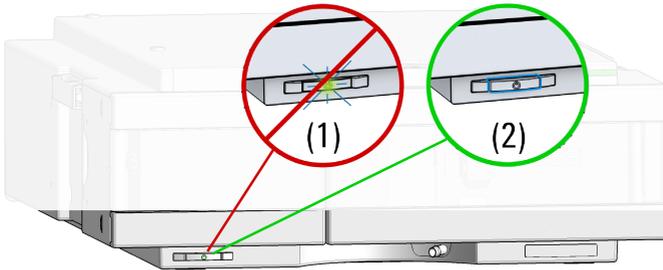
When all capillaries are installed, push the valve back into its housing, see [“Install the Valve Head and Connect Capillaries”](#) on page 12.

Remove the Transportation Lock and the Valve Dummy

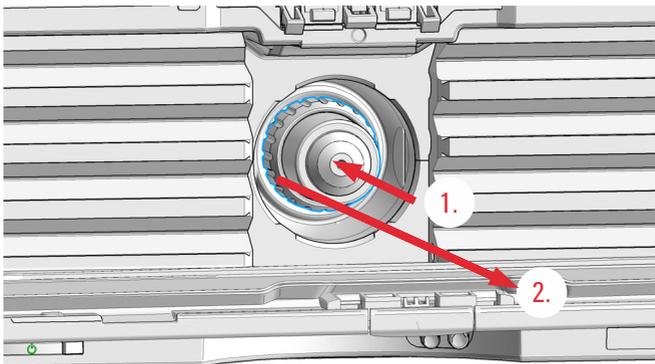
The following procedure demonstrates the necessary steps for installing the valve head to the valve drive of a Multicolumn Thermostat (MCT).

For the installation of a valve head to a G11 70A Valve Drive you can ignore the steps that describe the MCT features of the transportation lock and spring loaded valve drive.

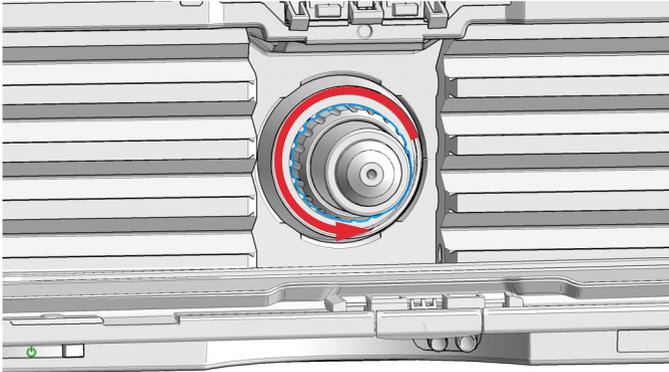
- 1 Switch off the module.



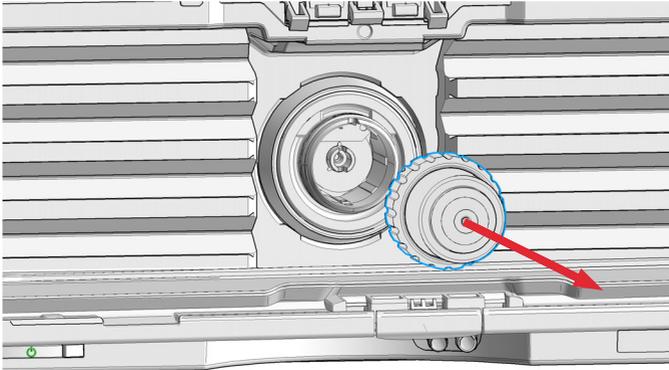
- 2 When unscrewing the transportation lock, push it back until the last screw is removed - the valve rail is spring-loaded.
- 3 Press on the valve dummy (1.) to release it (2.) (spring-loaded valve rail).



4 Unscrew the valve dummy.



5 Remove the valve dummy from the valve drive.



Install the Valve Head and Connect Capillaries



For 1290 Infinity II Bio LC modules, use bio / bio-compatible parts only. Do not mix parts between 1260 Infinity II Bio-Inert LC modules and 1290 Infinity II Bio LC modules.

CAUTION

The valve actuator contains sensitive optical parts, which need to be protected from dust and other pollution. 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.

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 applications, always use dedicated bio parts, which can be identified by the bio-inert symbol or other markers described in this manual.

Do not mix bio, and non-bio modules or parts in a bio system.

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.

NOTE

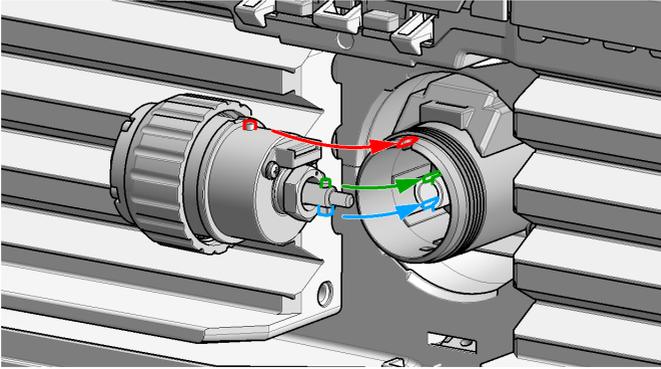
The tag reader reads the valve head properties from the valve head RFID tag during initialization of the module. Valve properties will not be updated, if the valve head is replaced while the module is on. Selection of valve port positions can fail, if the instrument does not know the properties of the installed valve.

NOTE

To allow correct valve identification, power off the valve drive for at least 10 s.

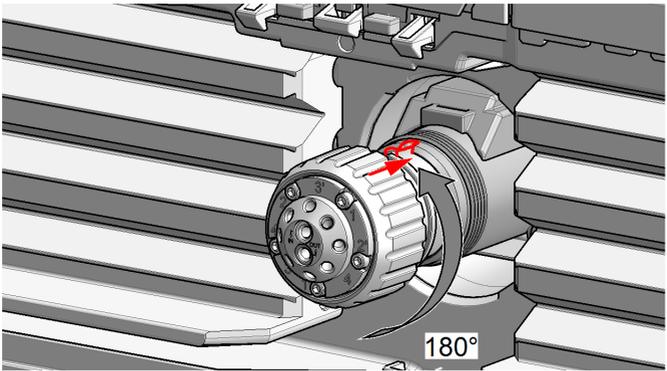
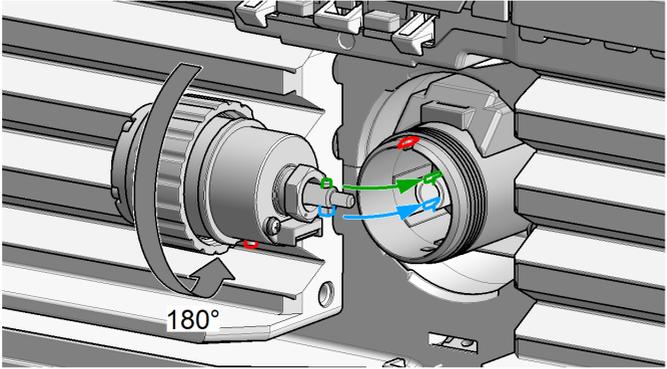
The following procedure shows the valve head installation with an G7116B (MCT) module as an example. For other modules it is similar.

- 1** Insert the valve head into the valve shaft.

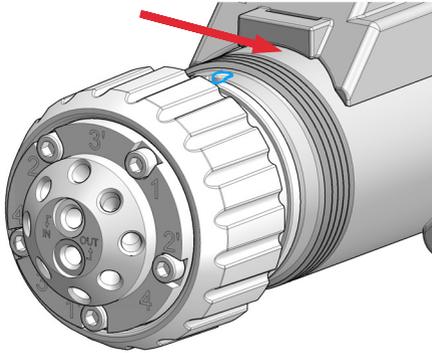


OR

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 continuously turning the valve head until the pin fits into the groove.



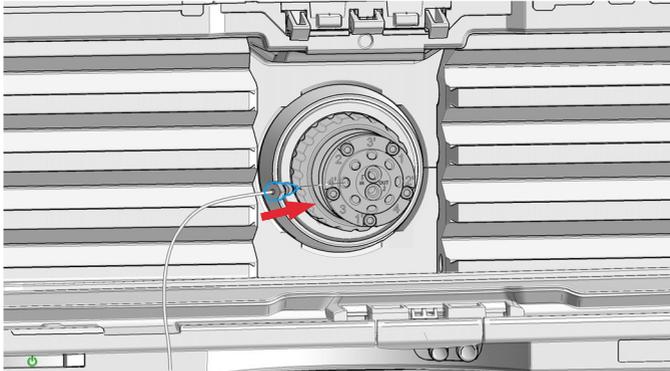
2 When the outer pin is locked into the groove, manually screw the nut onto the valve head.



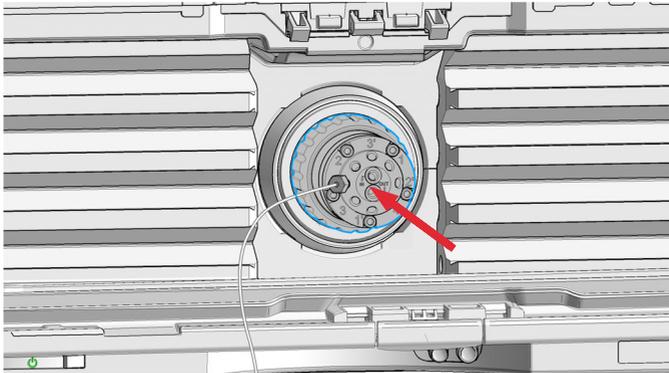
NOTE

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 Heat Exchanger

| Tools required | p/n | Description |
|-----------------------|-------------|---|
| | 5043-0915 | Fitting mounting tool |
| | 5023-2502 | Hex driver SW-6.35, slitted |
| | 8710-0510 | Open-end wrench 1/4 — 5/16 inch |
| | | |
| Parts required | p/n | Description |
| | G7116-60071 | Quick Connect Bio Heat Exchanger Standard Flow |
| | G7116-60081 | Quick Connect Bio Heat Exchanger High Flow |
| | G7116-68003 | Column Holder Lamella, 2/pk delivered as a part of G7116-60071 and G7116-60081 |
| | 5500-1596 | Quick Turn Capillary MP35N 0.12 mm x 280 mm |
| | 5067-5966 | InfinityLab Quick Turn Fitting |
| | 5500-1578 | Quick Connect Capillary MP35N 0.12 mm x 105 mm |
| | 5067-5965 | InfinityLab Quick Connect LC fitting |

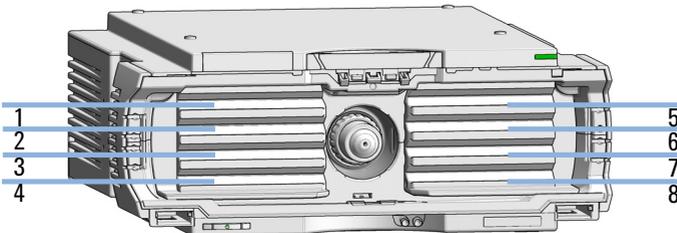
CAUTION

Excessive torque applied to the port of the Quick Connect Heat Exchanger can damage it.

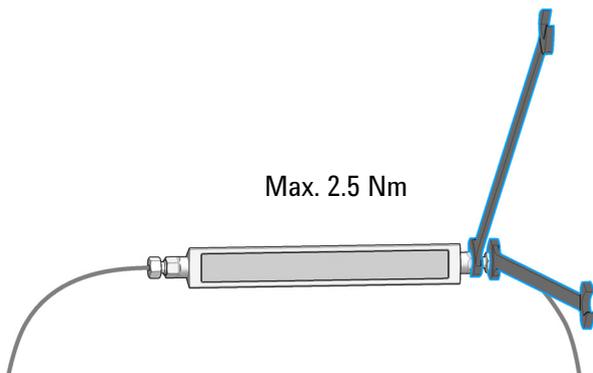
Do not apply excessive torque to the heat exchanger port.

Always use a wrench to counter the heat exchanger port while tightening the capillary fitting.

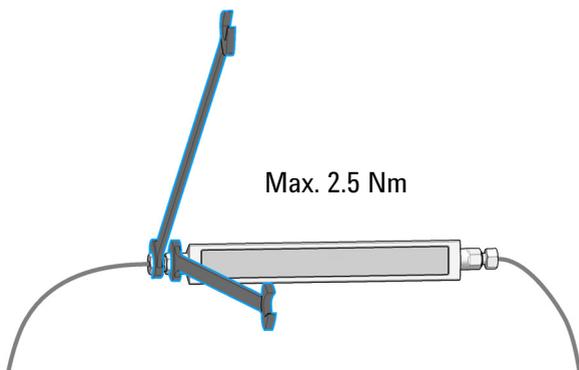
- 1 Possible positions for heat exchangers. If only one column is used, the preferred positions are 2, 3, 6, or 7.



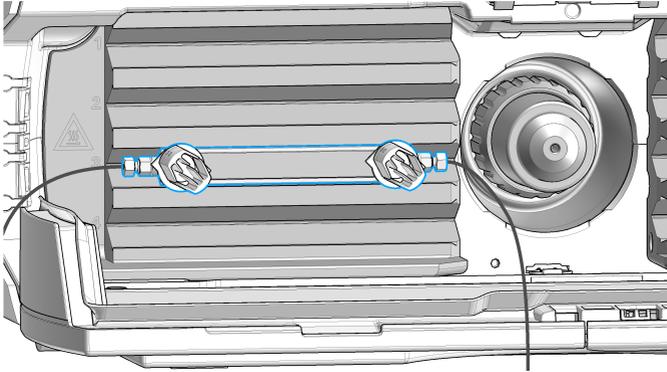
- 2** Connect the sampler outlet capillary (or the capillary from the column selection valve) to the inlet port of the heat exchanger.



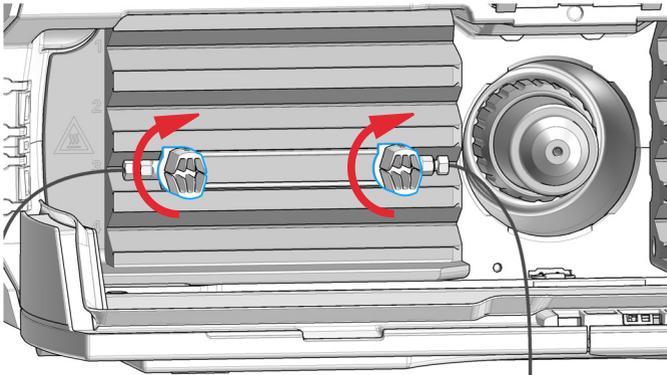
- 3** Connect the column connection capillary to the outlet of the Quick Connect Heat Exchanger.



- 4 Position the heat exchanger in the groove of the MCT heater block and prepare column holders to fix the heat exchanger.



- 5 Turn column holders to fix the Quick Connect Heat Exchanger in the MCT.



NOTE

The column holder clip can be mounted at any free spot on top of the heat exchanger.

Install the Capillaries

The 2-position/10-port valve can be used here in the same way as a 2-position/6-port valve, just follow the rerouting diagram below.

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

Connect port 1 and port 8 with a 120 mm length capillary. Plug plastic fittings into ports 9 and 10.

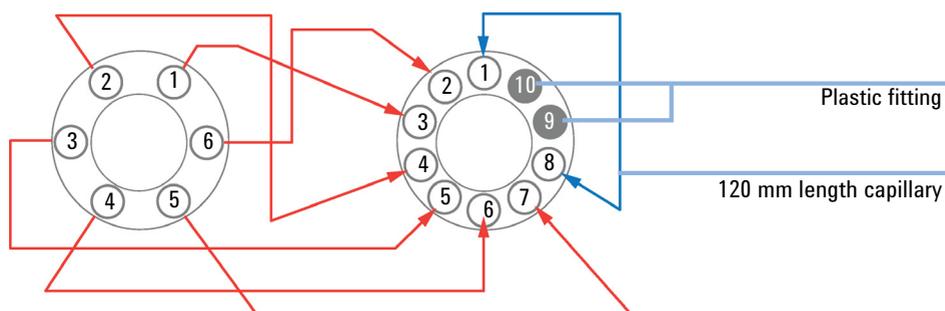


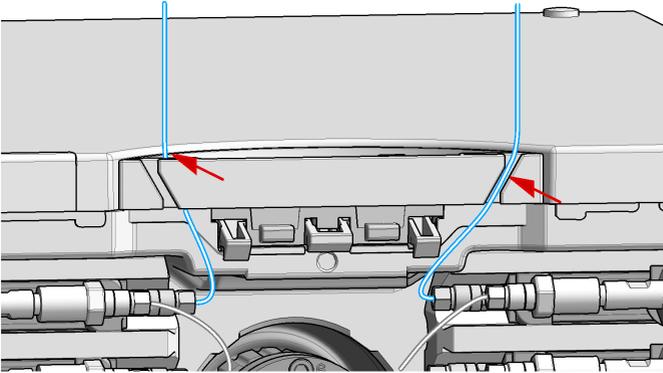
Figure 1 Rerouting of 2-position/10-port valve to match 2-position/6-port valve

NOTE

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

- 1 Connect the capillaries going to a valve and fasten them immediately with a spanner.
- 2 Starting from position one through six (ten, respectively), connect respective capillaries to the heat exchangers. First, finger-tighten and then use a spanner.
- 3 Finger-tighten the capillaries going from heat exchangers to columns on the heat exchanger side, then fasten all fittings with a spanner.
- 4 Mount heat exchangers into the MCT.
- 5 Connect column inlet capillaries to the columns.
- 6 Connect column outlet capillaries to the columns.
- 7 Fasten all fittings on attached modules (autosampler, detector, additional pumps). Fit all unused valve ports with blank nuts.
- 8 Push the valve into the rear position.

- 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.

Valve Parts

Replacement Parts

Table 3 Replacement Parts

| Valve | Rotor Seal | Stator Head | Bearing Ring | Stator Screws(Pack of 10) | Stator Ring |
|--|-------------------|--------------------|---------------------|----------------------------------|--------------------|
| G5641A 5067-6682 2-position/10-port, 1300 bar | 5068-0205 | 5068-0286 | 1535-4045 | 5068-0019 | n.a. |

Valve Head Parts

NOTE

The figure below illustrates replacement parts for the valve heads, with the 12-position/13-port 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.

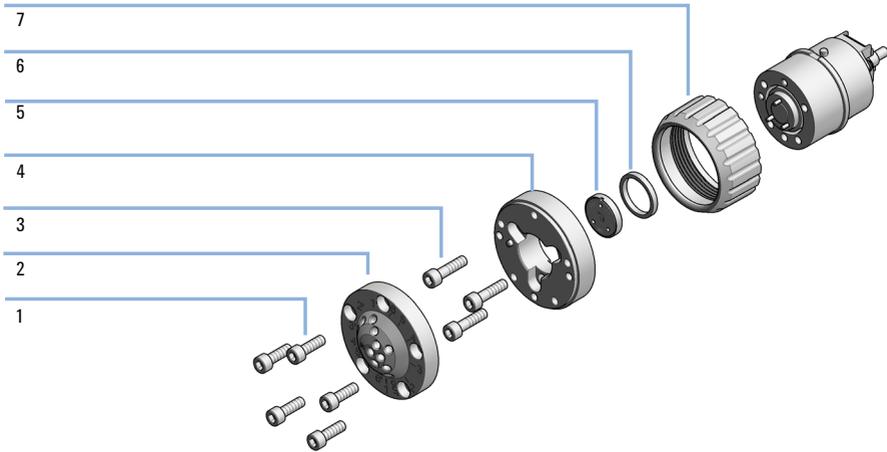


Figure 2 Valve Head Parts (example)

| | |
|---|--|
| 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) |

