



Agilent InfinityLab LC Series 1260 Infinity II Multicolumn Thermostat

User Manual



Agilent Technologies

Notices

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In This Book

This manual covers the Agilent 1260 Infinity II Multicolumn Thermostat (G7116A).

1 Introduction to the Multicolumn Thermostat

This chapter gives an introduction to the MCT and an instrument overview.

2 Site Requirements and Specifications

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

3 Using the Module

This chapter gives instructions on how to use the module.

4 Preparing the Module

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

5 Optimization

This chapter provides information on how to optimize the Multi Column Thermostat.

6 Troubleshooting and Diagnostics

Overview about the troubleshooting and diagnostic features.

7 Error Information

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

8 Test Functions and Calibrations

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

9 Maintenance

This chapter describes the maintenance of the MCT.

10 Parts and Materials for Maintenance

This chapter provides information on parts for maintenance.

11 Identifying Cables

This chapter provides information on cables used with the Agilent 1200 Infinity Series modules.

12 Hardware Information

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

13 Appendix

This chapter provides addition information on safety, legal and web.

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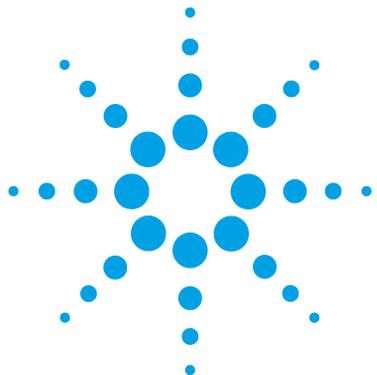
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This chapter gives an introduction to the MCT and an instrument overview.



Product Description (G7116A)

The Agilent 1260 Infinity II Multicolumn Thermostat (MCT) allows precise column thermostating over a broad temperature range: from cooling down to 10 degrees below ambient temperature up to 85 °C, providing high flexibility for optimized speed and selectivity of LC separation.

Ultrahigh pressure valves enable a wide range of applications such as column selection from 4 columns in a single MCT, sample preparation for analyte enrichment or matrix removal, alternating column regeneration, etc.

For bio-inert applications bio-inert heat exchangers and a selection of bio-inert valves are offered.

The MCT fits with all 1260 Infinity II modules and can also be combined with modules of the Agilent 1260 and 1290 Infinity Series.

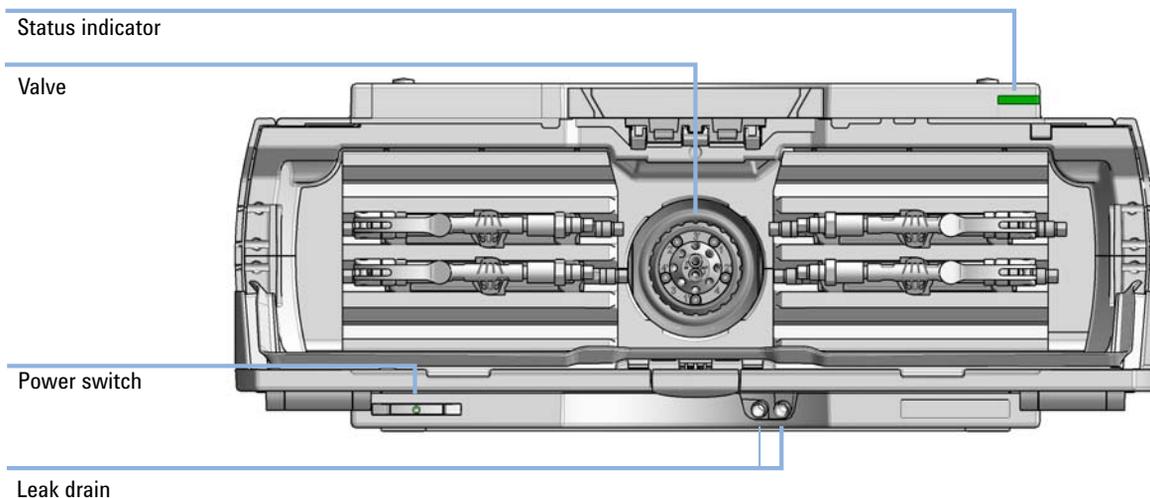


Figure 1 Overview of the Multicolumn Thermostat

Features (G7116A)

- Superior usability with flexible flap positions: open door to 90° (desk function), 180° or even remove door for accessibility.
- Efficient, fast and convenient column exchange through new quick-connect fittings.
- Advanced column capacity for up to 4 columns in a single MCT.
- New Quick-Connect Heat Exchanger for pre-column solvent thermostating – easily mounted for each of up to 4 columns and optimized for low internal volume contribution.
- High application flexibility through Peltier cooling and heating with two independent temperature zones from 10 ° below ambient up to 85 °C.
- Optional valve drive for use of 1200 Infinity Series Quick-Change high pressure valves.
- High temperature precision for reproducible retention times and peak areas.

Column Switching Valve (Optional)

Multicolumn Selection (G7116A with G4237A)

Advantages

- Increase productivity
- Higher instrument up-time

The valve facilitating quick changes allows the selection between up to four different stationary phases for a variety of applications, or the usage of identical stationary phases in columns with different dimensions for either faster run-times (short columns) or higher resolution (long columns) or for loading studies with different internal diameters.

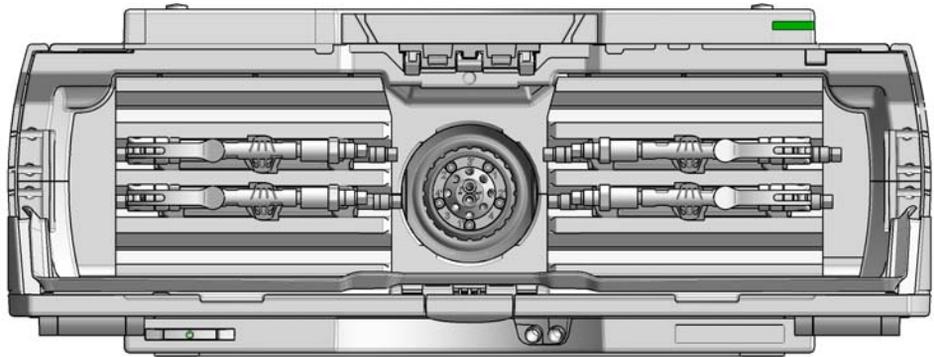


Figure 2 The G7116A 1260 Infinity II Series Multiple Column Thermostat equipped with a Quick-Change 4 Column Selector Valve

Method Development

Advantages:

- Faster method development
- Automated method development possible

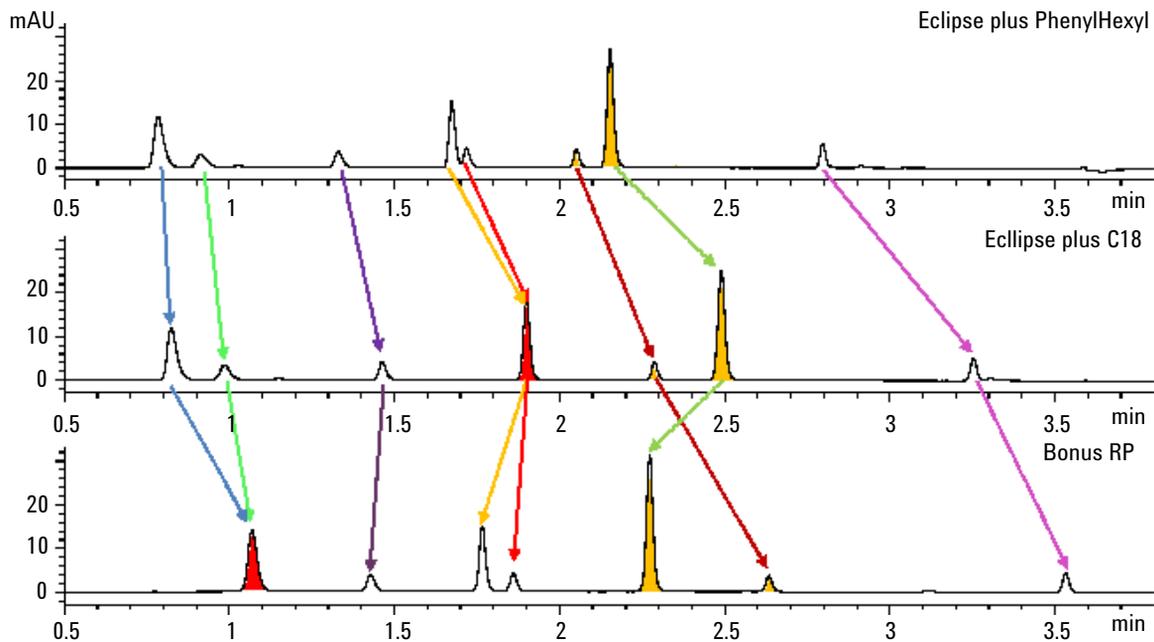


Figure 3 Totally different chromatographic results by using the same sample but three different stationary phases

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.

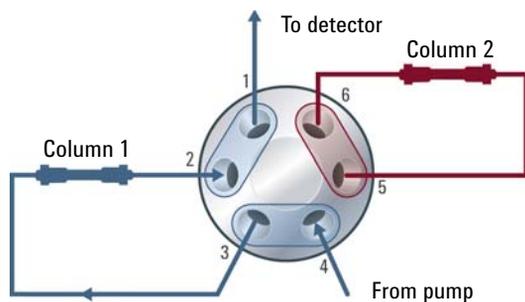
Refer to the table below for further information on which ports are connected to which position.

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

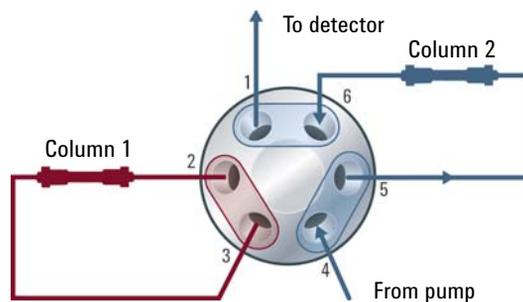
Dual column selection (2pos/6port or 2pos/10port valves)

Advantages:

- Increase productivity
- Higher instrument up-time



Position 1-2

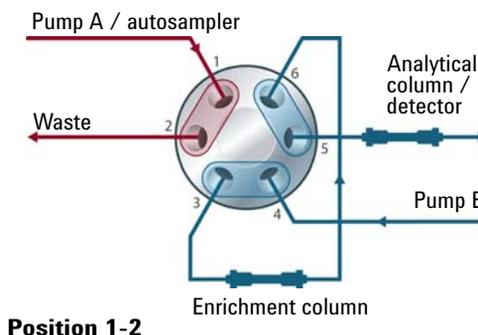
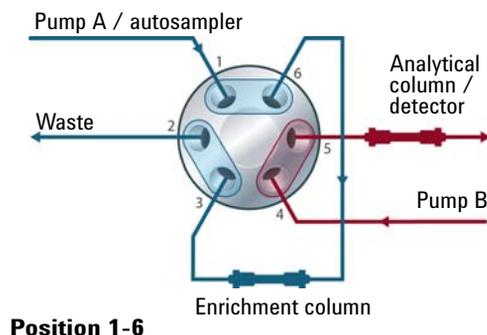


Position 1-6

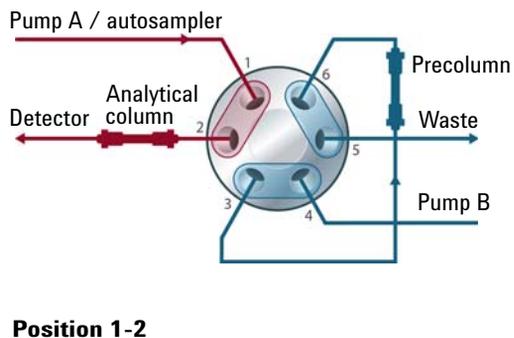
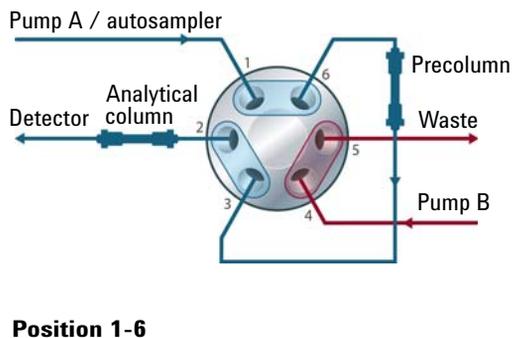
The valve can select either column 1 or column 2, allowing quick changes between two different stationary phases for separation selectivity, or immediate availability of a second and identical stationary phase in case the first column loses efficiency, when dealing with complex matrices for instance.

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

Sample Enrichment



Sample Cleanup



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.

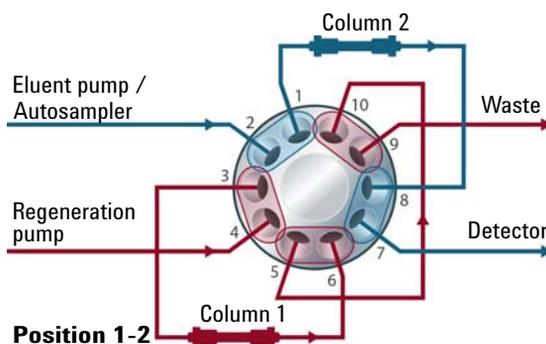
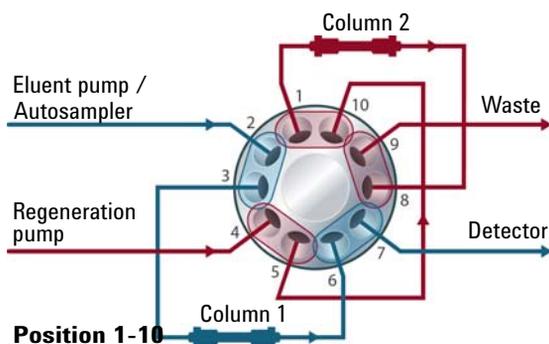
Stripping methods

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 1200 Infinity Quick-Change 2-position/10-port valve enables 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.

Leak and Waste Handling

The Agilent InfinityLab LC Series has been designed for safe leak and waste handling. It is important that all security concepts are understood and instructions are carefully followed.

The solvent cabinet is designed to store a maximum volume of 8 L solvent. The maximum volume for an individual bottle stored in the solvent cabinet should not exceed 2 L. For details, see the usage guideline for the Agilent 1200 Infinity Series Solvent Cabinets (a printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available on the Internet).

All leak plane outlets are situated in a consistent position so that all Infinity and Infinity II modules can be stacked on top of each other. Waste tubes are guided through a channel on the right hand side of the instrument, keeping the front access clear from tubes.

The leak plane provides leak management by catching all internal liquid leaks, guiding them to the leak sensor for leak detection, and passing them on to the next module below, if the leak sensor fails. The leak sensor in the leak plane stops the running system as soon as the leak detection level is reached.

Solvent and condensate is guided through the waste channel into the waste container:

- from the detector's flow cell outlet
- from the Multisampler needle wash port
- from the Sample Cooler (condensate)
- from the Seal Wash Sensor
- from the pump's Purge Valve or Multipurpose Valve

1 Introduction to the Multicolumn Thermostat Leak and Waste Handling

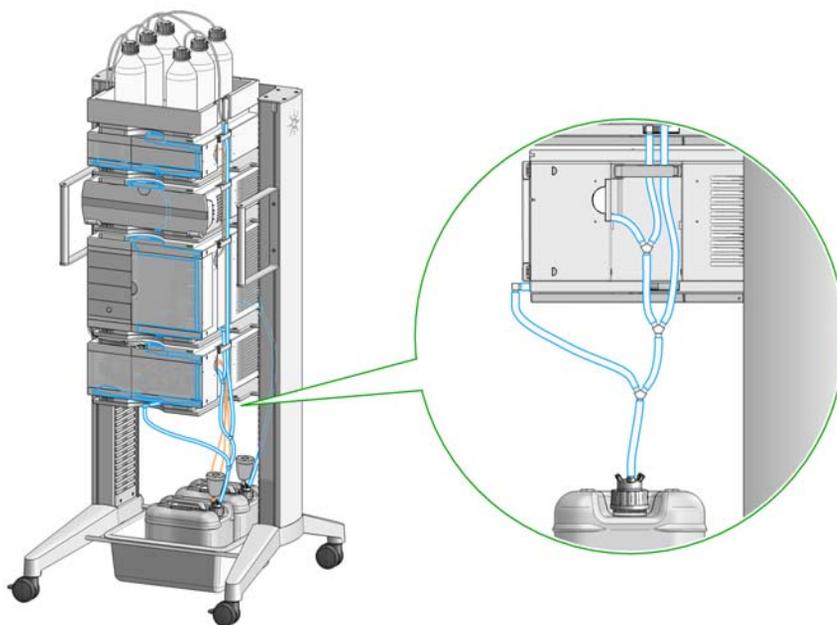


Figure 4 Infinity II Leak Waste Concept (flexible rack installation)

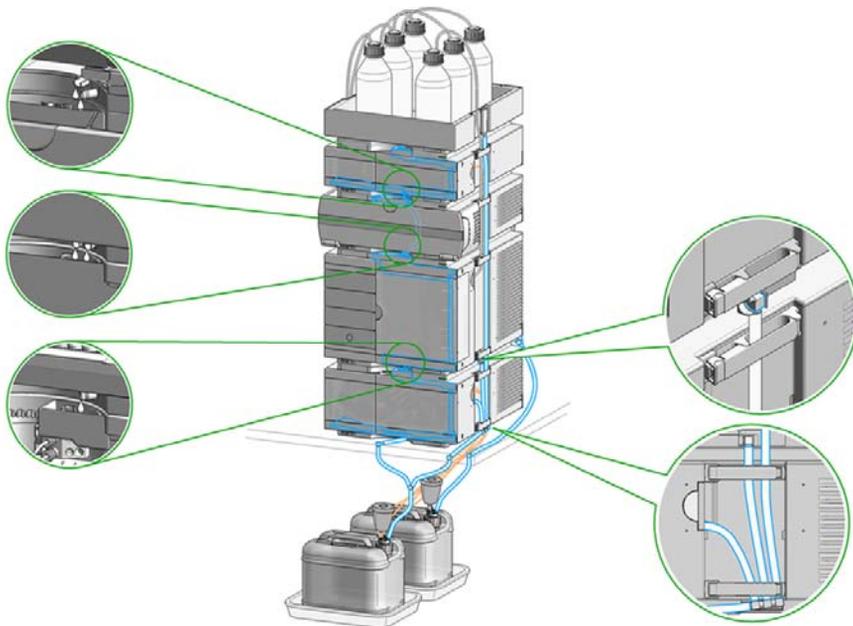


Figure 5 Infinity II Single Stack Leak Waste Concept (bench installation)

1 Introduction to the Multicolumn Thermostat Leak and Waste Handling

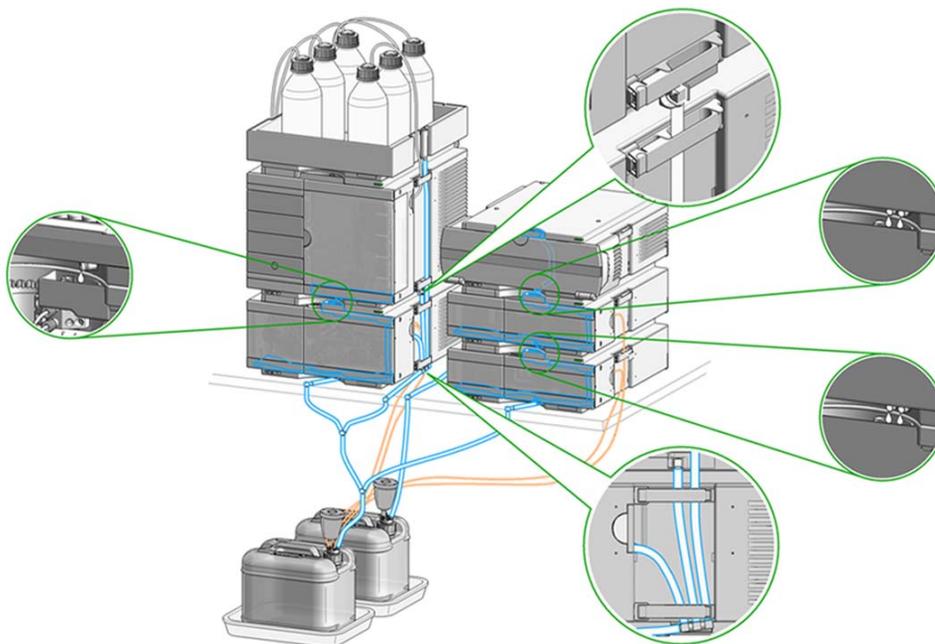


Figure 6 Infinity II Two Stack Leak Waste Concept (bench installation)

The waste tube connected to the leak pan outlet on each of the bottom instruments guides the solvent to a suitable waste container.

Waste Concept

- 1 Agilent recommends using the 6 L waste can with 1 Stay Safe cap GL45 with 4 ports (5043-1221) for optimal and safe waste disposal. If you decide to use your own waste solution, make sure that the tubes don't immerse in the liquid.



Operating Principle

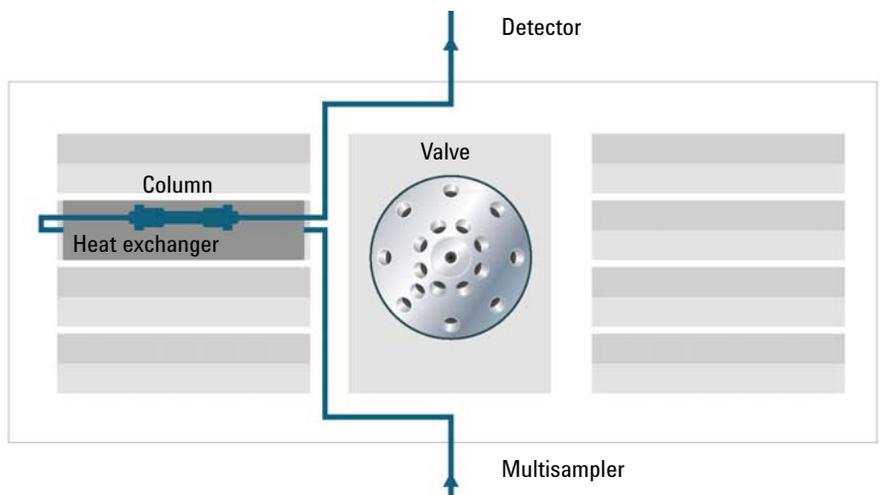


Figure 7 Hydraulic path

The Concept of Heating and Cooling

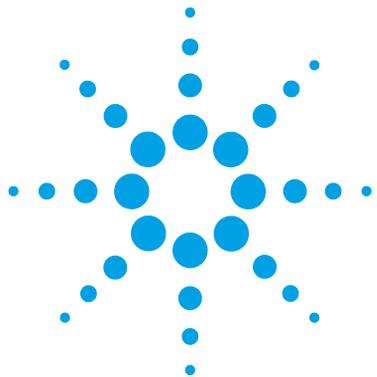
The design of the multi-column thermostat (MCT) uses Quick-Connect Heat Exchangers that are mounted on to the heating and cooling devices with peltier-elements. The solvent entering the Quick-Connect Heat Exchangers is heated up or cooled down to a settable temperature before entering the column. A triangular shape of the Quick-Connect Heat Exchangers avoids incorrect placement and verifies optimum temperature exchange of the column. Optimum isolation of the heater room offers best temperature stability for the column. This ensures that the column and the solvent flowing through it are almost at the same temperature. The solvent cools down or heats up on its transfer from the Quick-Connect Heat Exchangers to the column inlet. This depends on several factors: flow rate, setpoint temperature, ambient temperature and column dimensions. Any type of heated column compartment brings one important consequence for column temperature equilibration. Before an equilibrium is reached, the whole mass of column, column packing, and solvent volume inside the column has to be brought to the selected temperature. This depends on several factors: flow rate, setpoint

temperature, ambient temperature and column dimensions. The higher the flow rate, the faster the column equilibrates (due to thermostatted mobile phase). In a flow-through temperature regulation system, there are necessarily slightly different temperatures at different positions. The actual temperature displayed on the user interface is always the temperature taken at the heating and cooling device.

The equilibration of the column may take a while. Stability of the pressure signal is a good indication for temperature equilibrium of the column.

1 Introduction to the Multicolumn Thermostat

Operating Principle



2 Site Requirements and Specifications

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



Site Requirements

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

Power Considerations

The module power supply has wide ranging capability. It accepts any line voltage in the range described in [Table 1](#) on page 31. Consequently there is no voltage selector in the rear of the module. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

WARNING

Hazard of electrical shock or damage of your instrumentation can result, if the devices are connected to a line voltage higher than specified.

→ Connect your instrument to the specified line voltage only.

WARNING

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

Inaccessible power plug.

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

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

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

Power Cords

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

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

WARNING

Absence of ground connection

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

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

WARNING

Unintended use of supplied power cords

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

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

WARNING

Power cords

Solvents may damage electrical cables.

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

Bench Space

The module dimensions and weight (see [Table 1](#) on page 31) allow you to place the module on almost any desk or laboratory bench. It needs an additional 2.5 cm (1.0 inches) of space on either side and approximately 8 cm (3.1 inches) in the rear for air circulation and electric connections.

If the bench shall carry a complete HPLC system, make sure that the bench is designed to bear the weight of all modules.

The module should be operated in a horizontal position.

NOTE

Agilent recommends that you install the HPLC instrument in the A-Line Flex Bench rack. This option helps to save bench space as all modules can be placed into one single stack. It also allows to easily relocate the instrument to another Lab.

Condensation

CAUTION

Condensation within the module

Condensation can damage the system electronics.

- Do not store, ship or use your module under conditions where temperature fluctuations could cause condensation within the module.
 - If your module was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.
-

Physical Specifications

Table 1 Physical Specifications

Type	Specification	Comments
Weight	12.5 kg (27.6 lbs)	
Dimensions (height × width × depth)	160 x 435 (472*) x 436 mm (6.3 x 17.1 (18.6*) x 17.2 inches) *with column ID kit	
Line voltage	100 – 240 V~, ± 10 %	Wide-ranging capability
Line frequency	50 or 60 Hz, ± 5 %	
Power consumption	150 VA, 150 W	
Ambient operating temperature	4–55 °C (39–131 °F)	
Ambient non-operating temperature	-40 – 70 °C (-40 – 158 °F)	
Humidity	< 95 % r.h. at 40 °C (104 °F)	Non-condensing
Operating altitude	Up to 3000 m (9842 ft)	
Non-operating altitude	Up to 4600 m (15092 ft)	For storing the module
Safety standards: IEC, EN, CSA, UL	Installation category II, Pollution degree 2	For indoor use only.
ISM Classification	ISM Group 1 Class B	According to CISPR 11

Performance Specifications

Table 2 Agilent 1260 Infinity II Multicolumn Thermostat (G7116A) Performance Specifications

Feature	Specification ¹
Operating principle	Thermostatted column compartment with dual, independent Peltier-element. Solvent pre-heating and still-air operation for reduction of chromatographic band-broadening under UHPLC-conditions.
Temperature range	10 °C below ambient (minimum 4 °C) to 85 °C settable in steps of 0.1 K
Temperature stability	±0.1 °C
Temperature accuracy	±0.5 °C (with calibration for 40 °C)
Temperature precision	0.05 °C
Independent Temperature zones	2 in single device
Column capacity	4 columns of up to 300 mm length plus A-Line Quick-Connect fittings or pre-column Number of pre column Quick-Connect Heat Exchangers is scalable – each column can be equipped with individual heat exchanger for best performance 4-column selector valve is available to access each column without replumbing
Heat-up/cool-down time	5 min from ambient to 40 °C 10 min from 40 °C to 20 °C <25 min from 25 °C to 85 °C
Solvent heat exchangers	For pre-column solvent heating, G7116A is equipped with a Quick-Connect Heat Exchanger Large ID (0.17 mm capillary, 3 µL internal volume) as default. Other dimensions of Quick-Connect Heat Exchangers are optionally available as well as heat exchangers made out of bio-inert materials (metal-free).

Table 2 Agilent 1260 Infinity II Multicolumn Thermostat (G7116A) Performance Specifications

Feature	Specification ¹
Valve options	1 x integrated valve drive as option to host user-exchangeable Quick-Change valve heads (up to 600 bar) of different formats: 2-position/6-port, 2-position/10-port, 4-column selection. Also available in bio-inert materials. Valve heads are automatically identified by their tag.
Column identification	Optionally, column identification kit to track history of up to four columns. Mounted left hand-side of module.
Communications	Controller-area network (CAN). G7116A is a hosted module (LC stack needs to contain a LAN communication and control card)
Software compatibility	Requires OpenLAB CDS A.01.03 - A.02.02 (with LC & CE Drivers A.02.14) <ul style="list-style-type: none"> • OpenLAB CDS ChemStation ed. C.01.03 -C.01.07 SR2 or higher • OpenLAB CDS EZChrom ed. A.04.05 - A.04.07 SR2 or higher MassHunter (LC Drivers A.02.14) <ul style="list-style-type: none"> • MassHunter B.07.01 or higher for (Q)-TOF • MassHunter B.08.02 or higher for QQQ
Safety and maintenance	Extensive diagnostics, error detection and display (through Instant Pilot control module and Agilent LabAdvisor), leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in main maintenance areas.
GLP	Valve heads carrying tags with serial number, pressure rating, number of switches and valve type. Concept of column identification.

¹ All specifications are valid for distilled water at ambient temperature (25 °C), set point at 40 °C and a stable flow range from 0.2 – 5 mL/min. Equilibration Time: 10 min.

Valve Specifications

Table 3 G4237A, 4-column selection valve kit, 600 bar

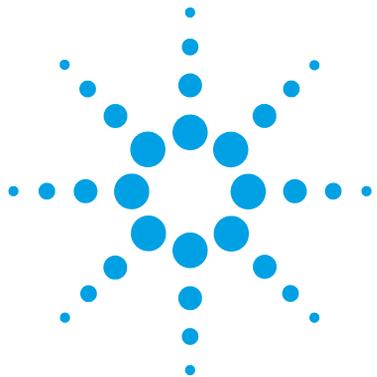
Type	Specification
Liquid contacts	PEEK, Stainless Steel
Port size	Accepts M4 male threaded fittings
Flow passage diameters	Stator: 0.38 mm (0.015 in) Rotor Seal: 0.43 mm (0.017 in)
Port to Port Volume	0.73 μ L Pre-Column (inlet side of the valve) 1.18 μ L Post-Column (outlet side of the valve)
Maximum Pressure	600 bar
Comments	Kits contains 1 x 4 Column Selector Valve Head and capillary kit

Extended Specifications

The G7116A MCT is delivered with Quick-Connect Heat Exchanger large ID (0.17 mm with 3 μ L delay volume) that is suitable for standard applications.

2 Site Requirements and Specifications

Extended Specifications



3 Using the Module

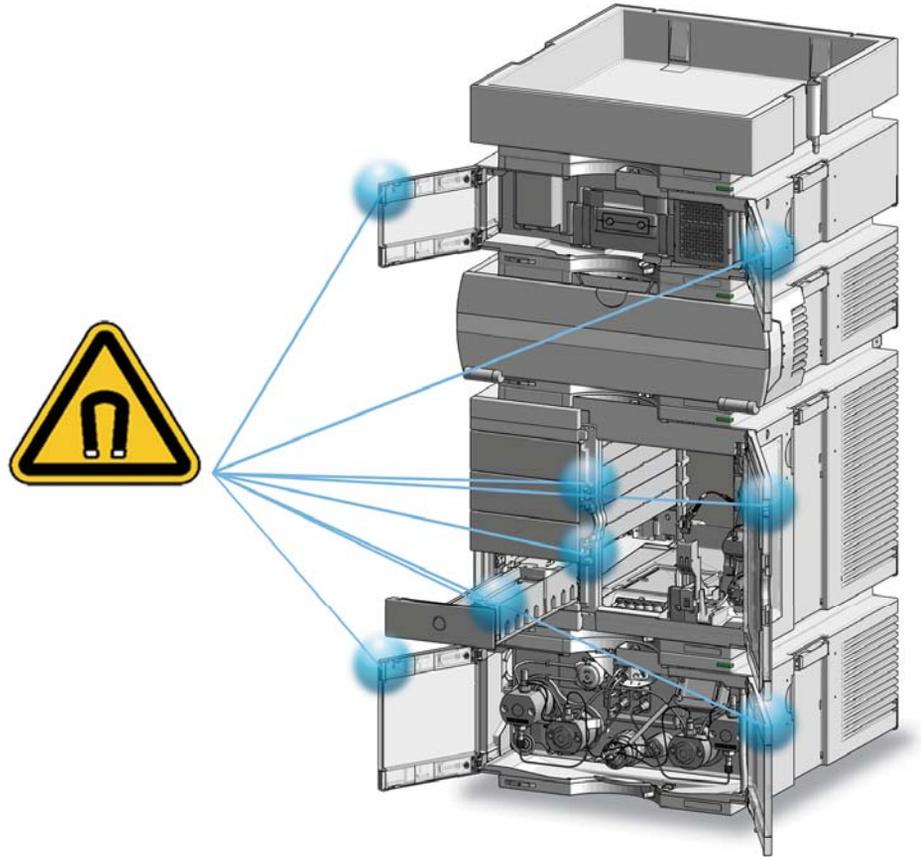
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Turn on/off	39
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This chapter gives instructions on how to use the module.

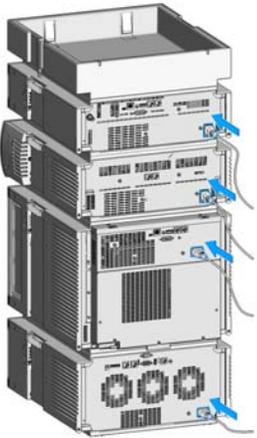
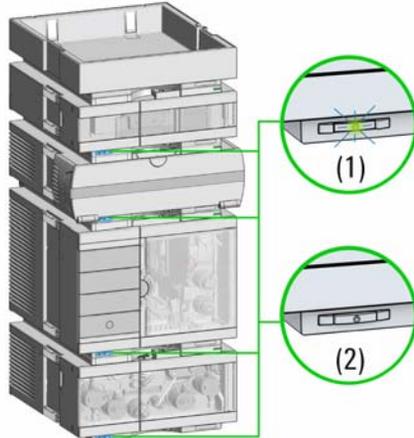
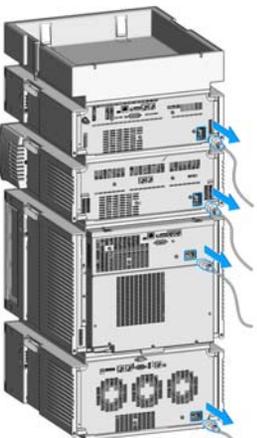


Magnets

- 1 This stack exemplarily shows the magnets' positions in the modules.

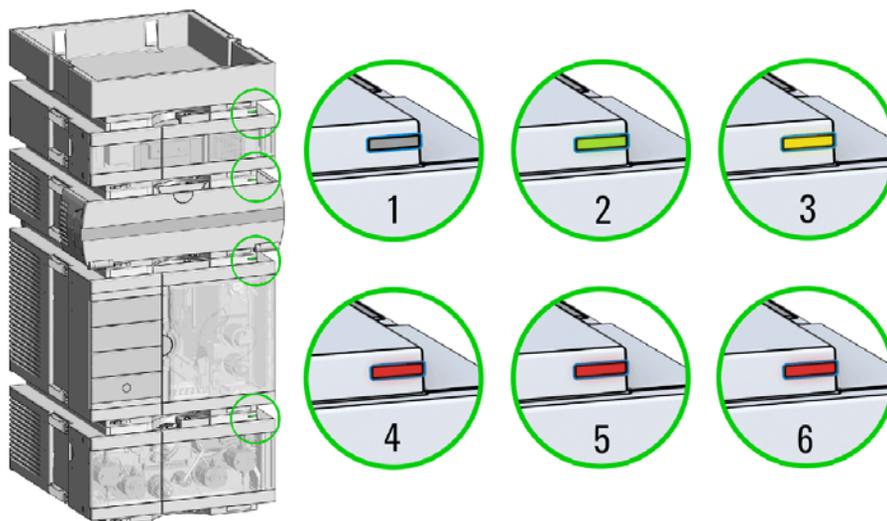


Turn on/off

<p>1</p> 	<p>2</p>  <p>Power switch (1) On (2) Off</p>
<p>3</p> 	

Status Indicators

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



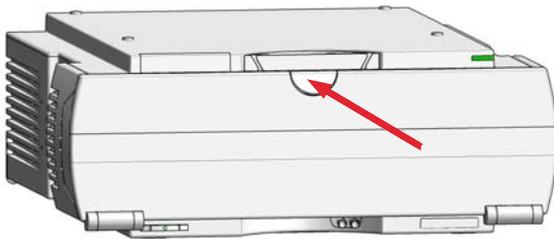
Status indicators

1. Idle
2. Run mode
3. Not-ready. Waiting for a specific pre-run condition to be reached or completed.
4. Error mode - interrupts the analysis and requires attention (for example a leak or defective internal components).
5. Resident mode (blinking) - for example during update of main firmware.
6. Bootloader mode (fast blinking). Try to re-boot the module or try a cold-start. Then try a firmware update.

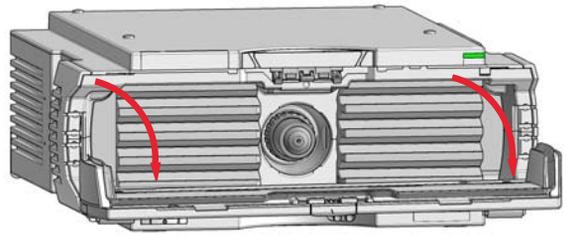
Open the Front Door

The front door opens in two angles: 90° and 180°. In the 90° position it can be used as a tray.

1 Press the release button to open the front door.



2 Open the door in a 90° angle to use it as a tray.



3 Using the Module

Install Heat Exchanger

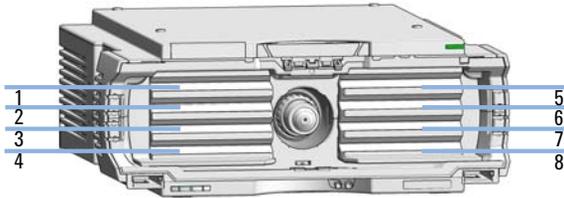
Install Heat Exchanger



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

Tools required	p/n	Description
	5043-0915	Fitting mounting tool for bio-inert capillaries
OR	5023-2502	Hex driver SW-6.35, slitted
	8710-0510	Wrench open 1/4 — 5/16 inch
Parts required	p/n	Description
	G7116-60015	Heat Exchanger Assembly 1.6 μ L-Z Quick Connect Heatexchanger Standard Flow
	G7116-60021	Heat Exchanger 1 μ L Quick Connect Heatexchanger Ultra Low Dispersion
	G7116-60031	Heat Exchanger 3 μ L Quick Connect Heatexchanger High Flow
	G7116-60051	Quick-Connect Heat Exchanger Large ID, Standard Flow
	5067-5957	A-Line Quick Connect Assy ST 0.12 mm x 105 mm
	G7116-68003	Column Holder Clips (2/Pk) for G7116B

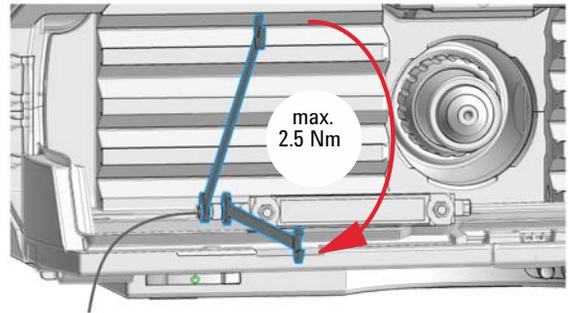
- 1 Possible positions for heat exchangers. If only one column is used, the preferred positions are 2,3,6, or 7.



- 2 Connect the column connection capillary of the A-Line Quick Connect Fitting to the outlet port of the heat exchanger.

NOTE

The Pre-Column Heat Exchanger can be damaged if excessive torque is applied to the port. Always use a wrench to counter the Pre-Column Heat Exchanger port while tightening the capillary fitting.



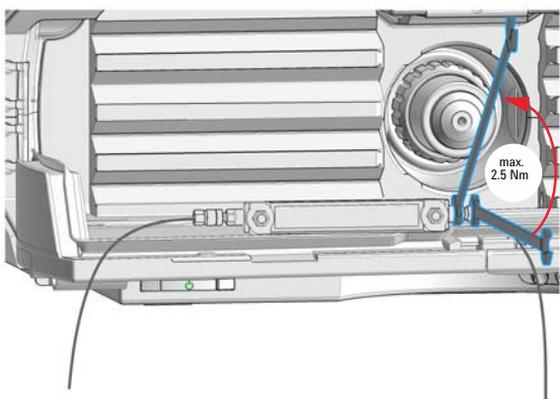
3 Using the Module

Install Heat Exchanger

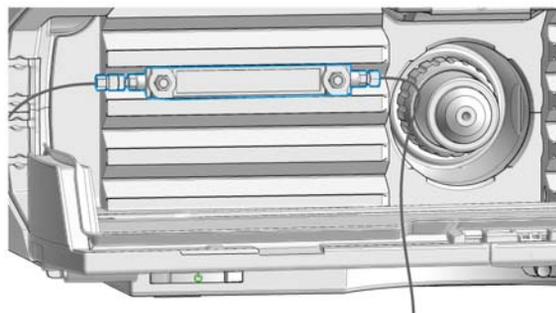
3 Connect the sampler outlet capillary to the inlet port of the heat exchanger.

NOTE

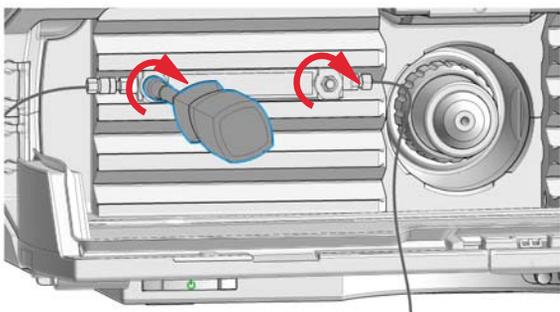
The Pre-Column Heat Exchanger can be damaged if excessive torque is applied to the port. Always use a wrench to counter the Pre-Column Heat Exchanger port while tightening the capillary fitting.



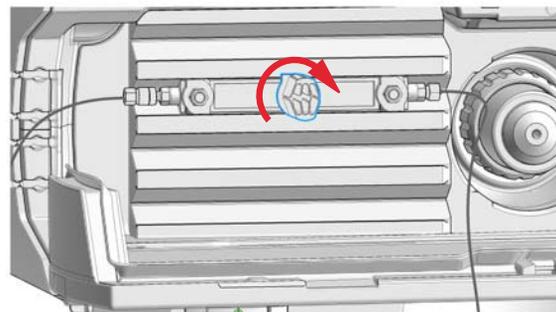
4 Position the heat exchanger as shown.



5



6



NOTE

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

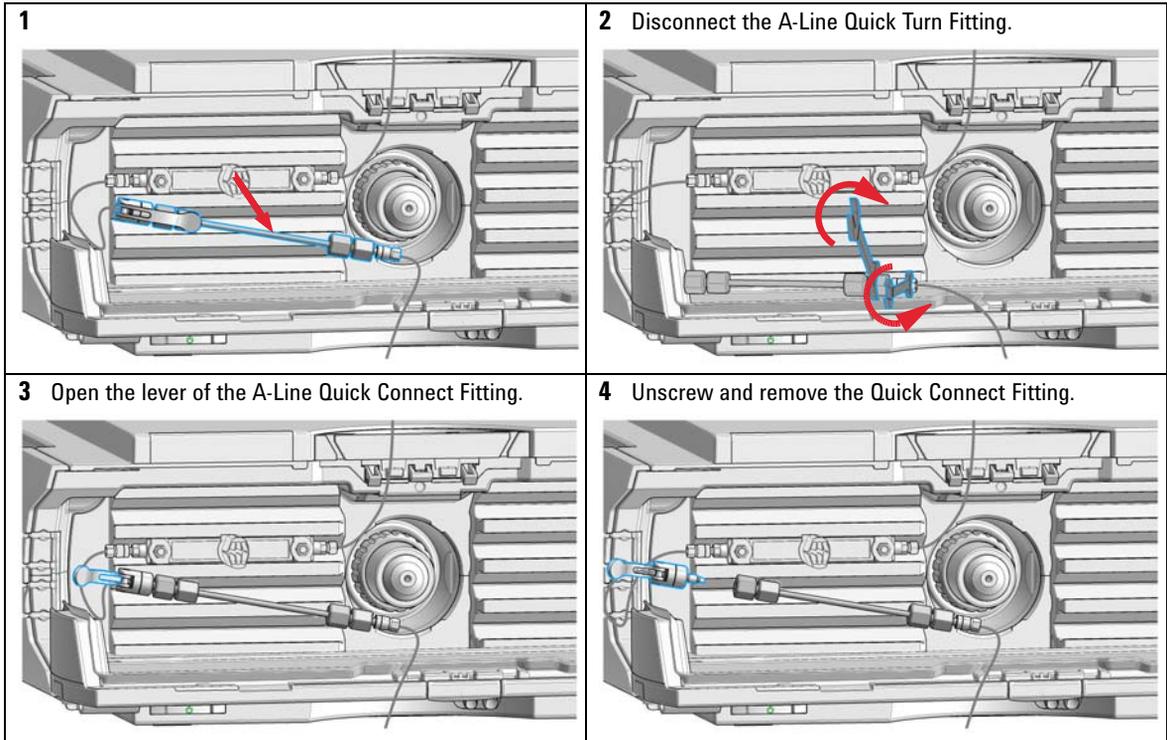
Exchange a Column

Tools required	p/n	Description	
	5043-0915	Fitting mounting tool for bio-inert capillaries	
	OR		
	5023-0240	Hex driver, ¼", slitted	
	8710-0510	Wrench open 1/4 — 5/16 inch	
Parts required	#	p/n	Description
	1	5067-5957	A-Line Quick Connect Assy ST 0.12 mm x 105 mm (from heat exchanger to column inlet)
	1	5500-1191	Capillary ST 0.12 mm x 280 mm, long socket (from column outlet to detector flow cell inlet)
	2	5067-5966	A-Line Quick Turn fitting
Preparations	<ul style="list-style-type: none"> • Heat exchanger(s) installed in MCT • Column holder clip(s) installed to heater block on top of Heat exchanger(s) • Column inlet capillary connected to heat exchanger outlet 		

3 Using the Module

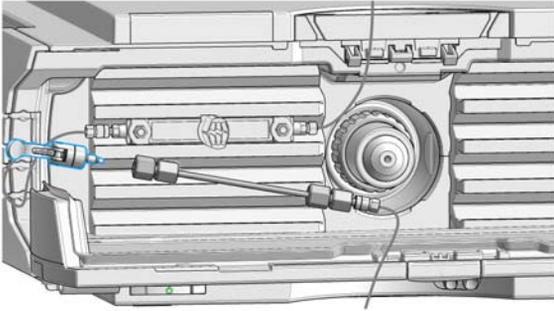
Exchange a Column

Remove a column

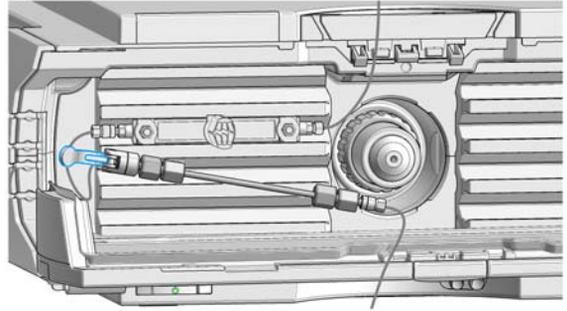


Install a column

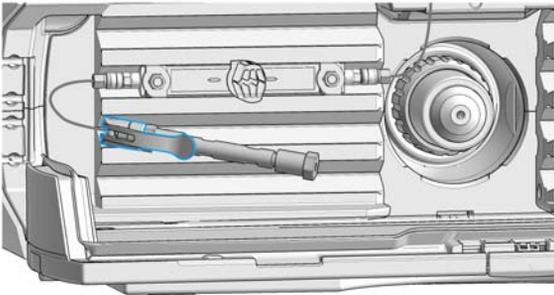
- 1** Connect the Column Inlet Capillary using the A-Line Quick Connect Fitting.



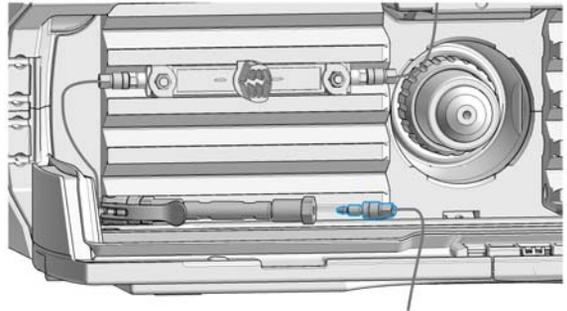
- 2** Turn the Column onto the Quick Connect Fitting until it is finger tight.



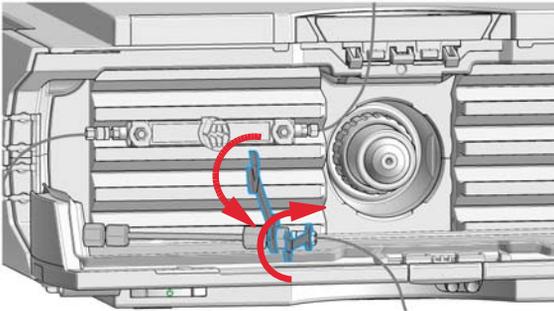
- 3** Close the lever to make a pressure tight connection.



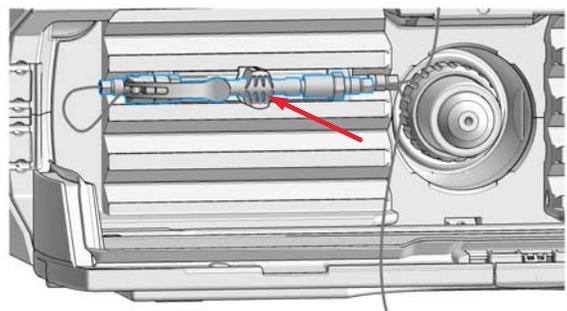
- 4** Connect the Capillary to detector to the Column Outlet using the A-Line Quick Turn Fitting.



- 5** Use a wrench to counter the column while tightening the capillary fitting.



- 6** Position the Column into the Column Holder Clip(s).



- 7** Configure the column. For further information see Agilent Information Center or the online help of your CDS.

Installing Valve Heads

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 48. 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.

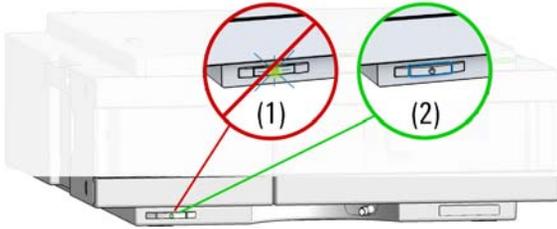
When all capillaries are installed, push the valve back into its housing, see [“Install the Valve Head and Connect Capillaries”](#) on page 50.

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).

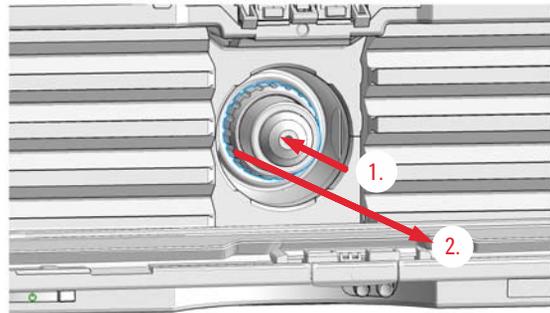
For the installation of a valve head to a G1170A Infinity Valve Drive you can ignore the steps that describe the MCT features of the transportation lock and spring loaded valve drive.

1 Switch off the module.

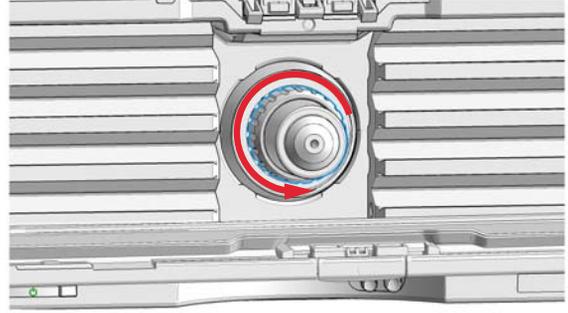


2 When unscrewing the transportation lock, push it back until the last screw is removed - the valve rail is spring-loaded.

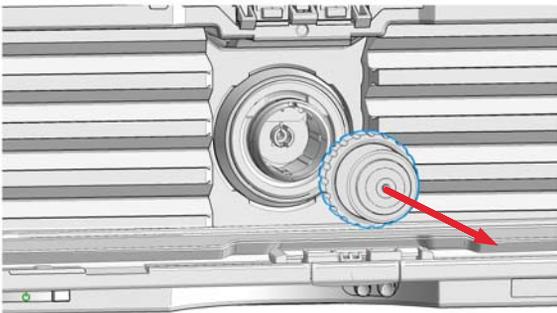
3 Press on the valve dummy (1.) to release it (2.) (spring-loaded valve rail).



4



5



Install the Valve Head and Connect Capillaries



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

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.
-

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.
-

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.

NOTE

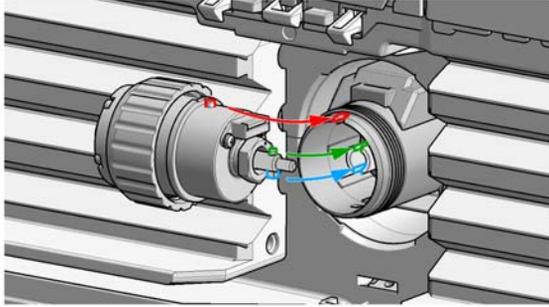
For firmware requirements see Information on new RFID Tag Assembly Version Technical Note (01200-90130) which is included to each valve head.

3 Using the Module

Installing Valve Heads

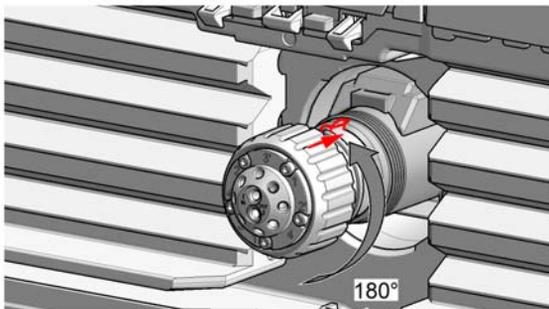
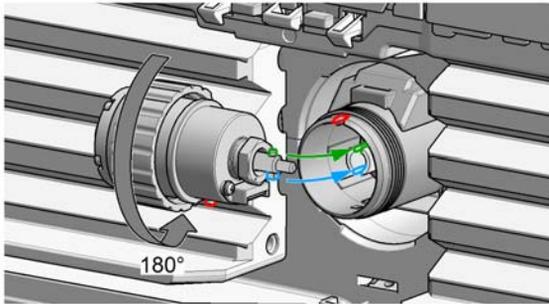
The following procedure shows the valve head installation with an G7116 (MCT) module as an example. For other modules it is similar.

- 1 Insert the valve head into the valve shaft.

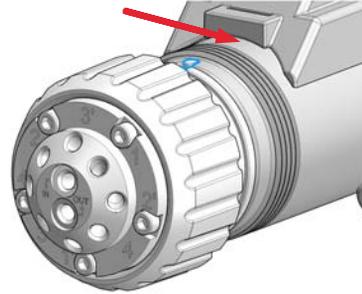


OR

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.



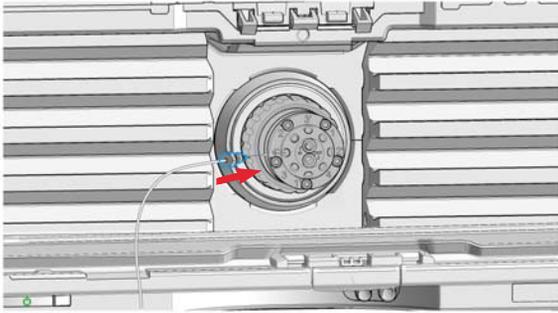
- 2 When the outer pin is locked into the groove, manually screw the nut onto the valve head.



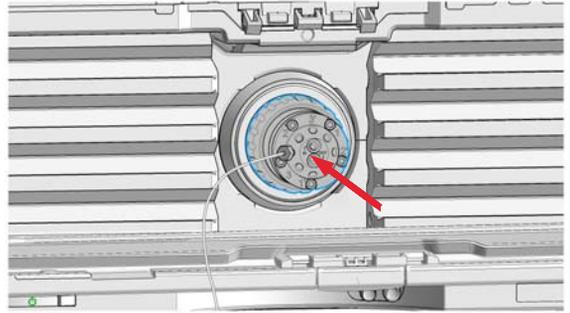
NOTE

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.



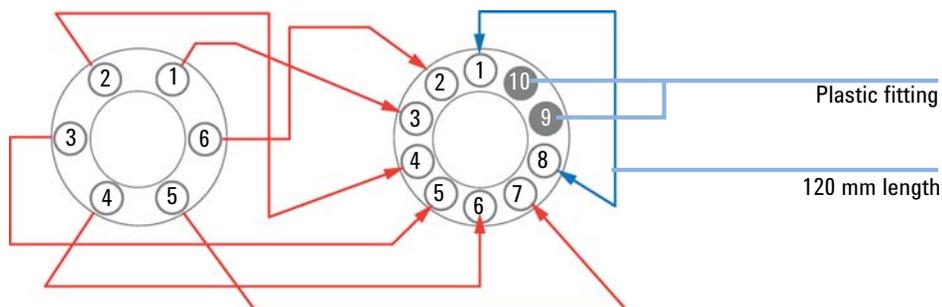
5 Power on or power-cycle your module, so the valve head gets recognized during module initialization.

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. Plug plastic fittings into ports 9 and 10.



NOTE

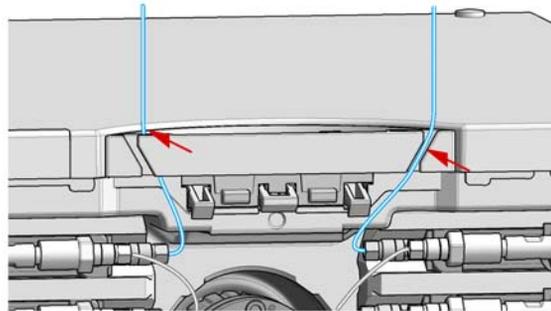
Use utmost care to avoid any void volumes caused by poor connections.

- 1 Install the capillaries.

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.
- 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.

3 Using the Module

Install the Divider Assembly

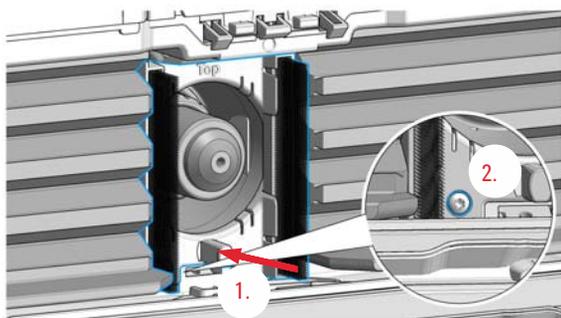
Install the Divider Assembly

Parts required	p/n	Description
	G7116-60006	Divider Assembly MCT

NOTE

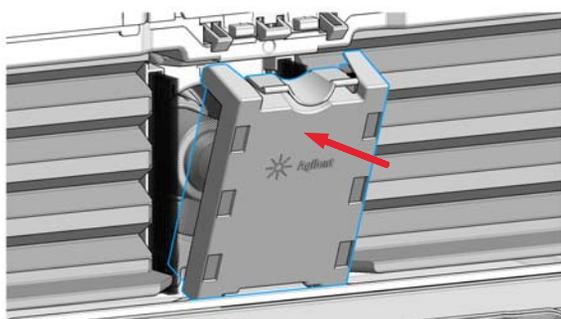
The Divider Assembly must be installed if different temperatures are used on the right and the left heater element to separate these two temperature zones.

- 1** Push the rear part of the Divider Assembly into position (1.) and fix it with the screw (2.).

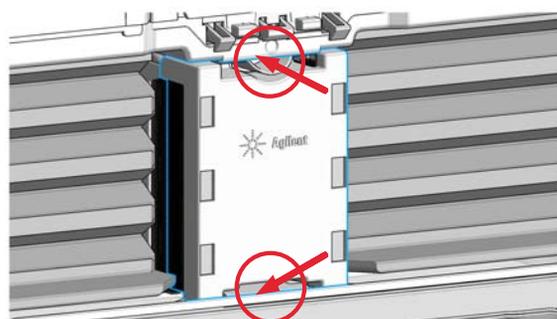


- 2** Install the valve head if used.
See “[Replace Valve Heads](#)” on page 105.
- 3** Install all capillaries and heat exchangers required. For details refer to [Install Heat Exchanger](#), and [Exchange a Column](#) (“[Install Heat Exchanger](#)” on page 42, “[Exchange a Column](#)” on page 45).

- 4** Install the front part of the Divider Assembly by putting it on top.



- 5** The front plate should be flush with the top and the bottom edge of the MCT housing.



Installing and Using Column ID Tags

Install the Column Identification Option

Parts required	p/n	Description
	5067-5915	Column ID Kit Left
	5067-5916	Column ID Kit Right
	5067-5917	Column ID TAG Assembly

Preparations Power off the instrument.

CAUTION

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

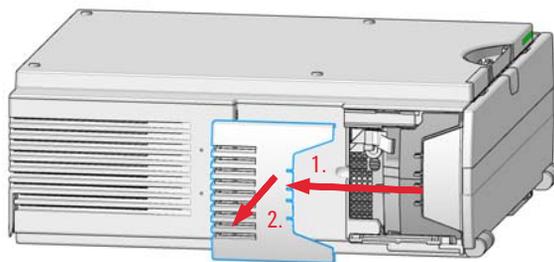
→ Be sure to hold the column ID modules by the plastic parts, and do not touch the electrical components. Do not touch the pins of the flex-board connector.

NOTE

In the Agilent 1260 Infinity II Multicolumn Thermostat (G7116A) the Column ID is installed on the left side of the module only.

1 Remove any tube guides and tube clip holders that may already be installed on the sides of the MCT cover.

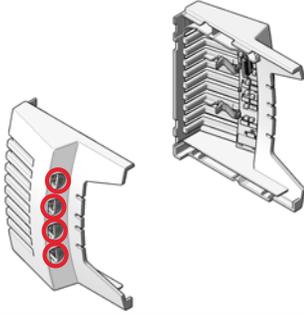
2 Unlock the left and right (G7116B only) side cover inserts by pushing them to the rear and put them aside.



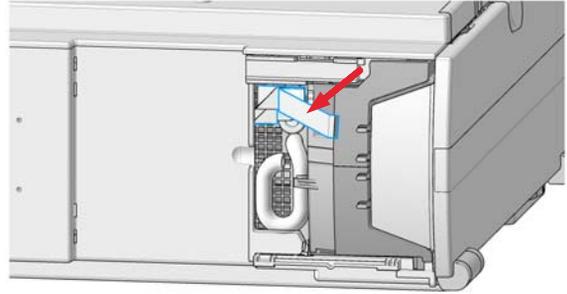
3 Using the Module

Installing and Using Column ID Tags

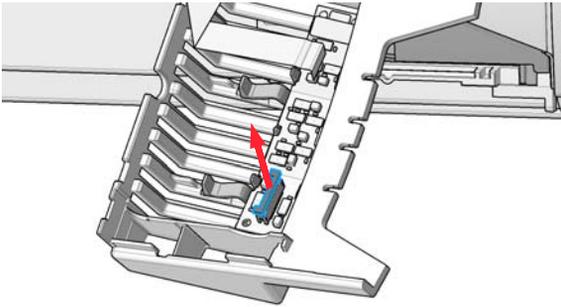
3 Identify the left and right (G7116B only) column ID module. The ID sockets 1 to 4 are numbered from top to bottom.



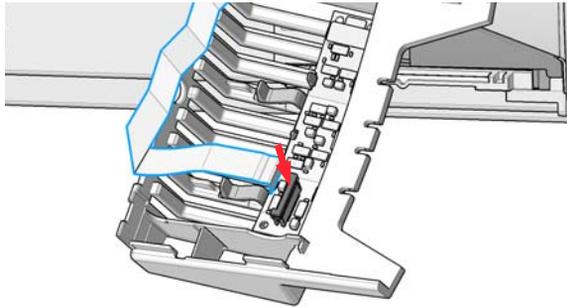
4 Take the end of the pre-installed flex-board connector out of the holder.



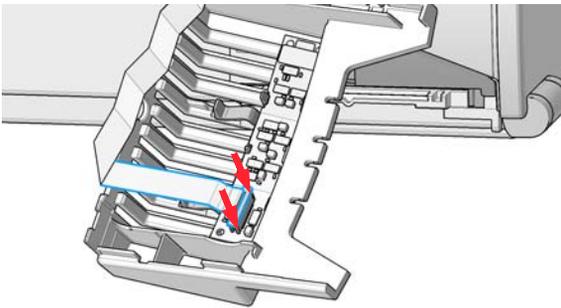
5 Open the locking mechanism of the connector by lifting up the frame.



6 Push in the cable with the contacts facing to the rear.

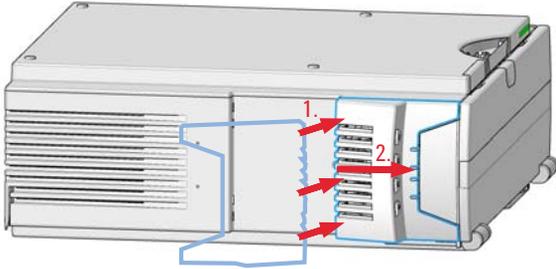


7 Close the locking mechanism.



8 Verify that the cable is properly attached to the connector without visible offset. Repeat steps 5 to 7 if necessary.

9 Attach the column ID module to the MCT cover.



10 Repeat steps 4 to 9 for the column ID module on the other side (if applicable).

11 Install the waste tube clip holder (example shows a G7116B).

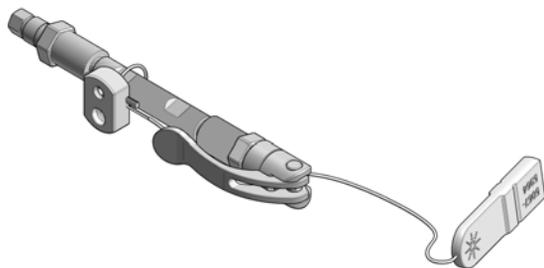


3 Using the Module

Installing and Using Column ID Tags

Connecting the Column ID Tags

- 1 If the column has no Column ID Tag, fit a tag by slipping the loop over one end of the column and pulling it tight through the plastic holder.



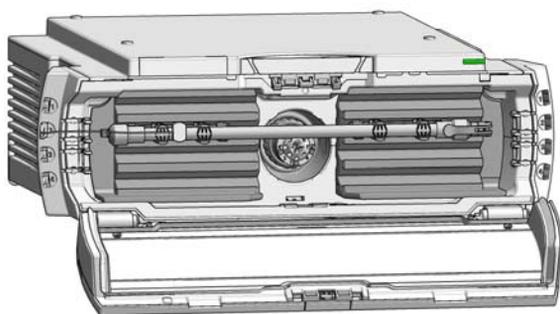
Once the loop has been pulled tight, the tag can no longer be removed from the column.

- 2 Install the column in the module.

- 3 Plug the free end of the Column ID Tag into the adjacent socket in the column tag reader unit.

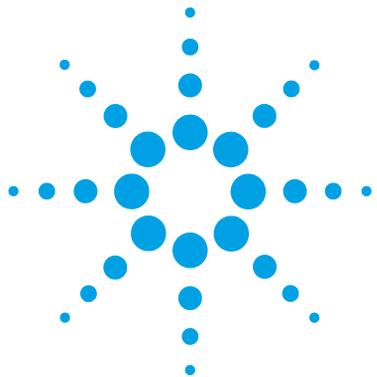
NOTE

It is essential that the Column ID Tag is plugged into the correct socket. Otherwise, the column tag information will not be correctly updated.



NOTE

If you have a full-length column, we recommend that you use the adjacent socket on the left column tag reader.



4 Preparing the Module

Leak and Waste Handling	62
Waste Concept	63
Solvent Information	64

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



Leak and Waste Handling

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.
- Do not use solvents with an auto-ignition temperature below 200 °C (392 °F). Do not use solvents with a boiling point below 56 °C (133 °F).
- Avoid high vapor concentrations. Always keep the temperature in the sample compartment at least 25 K below the boiling point of the solvent used.
- Do not operate the instrument in an explosive atmosphere.
- Reduce the volume of substances to the minimum required for the analysis.
- Never exceed the maximum permissible volume of solvents (8 L) in the solvent cabinet. Do not use bottles that exceed the maximum permissible volume as specified in the usage guideline for solvent cabinet.
- Ground the waste container.
- Regularly check the filling level of the waste container. The residual free volume in the waste container must be large enough to collect the waste liquid.
- To achieve maximal safety, regularly check the tubing for correct installation.

NOTE

For details, see the usage guideline for the solvent cabinet. A printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available in the Agilent Information Center or via the Internet.

For details on correct installation, see separate installation documentation.

Waste Concept

- 1 Agilent recommends using the 6 L waste can with 1 Stay Safe cap GL45 with 4 ports (5043-1221) for optimal and safe waste disposal. If you decide to use your own waste solution, make sure that the tubes don't immerse in the liquid.



Solvent Information

Observe the following recommendations on the use of solvents.

- Follow recommendations for avoiding the growth of algae, see pump manuals.
- Small particles can permanently block capillaries and valves. Therefore, always filter solvents through 0.22 µm filters.
- Avoid or minimize the use of solvents that may corrode parts in the flow path. Consider specifications for the pH range given for different materials like flow cells, valve materials etc. and recommendations in subsequent sections.

Material Information

Materials in the flow path are carefully selected based on Agilent's experiences in developing highest quality instruments for HPLC analysis over several decades. These materials exhibit excellent robustness under typical HPLC conditions. For any special condition, please consult the material information section or contact Agilent.

Disclaimer

Subsequent data were collected from external resources and are meant as a reference. Agilent cannot guarantee the correctness and completeness of such information. Data is based on compatibility libraries, which are not specific for estimating the long-term life time under specific but highly variable conditions of UHPLC systems, solvents, solvent mixtures and samples. Information can also not be generalized due to catalytic effects of impurities like metal ions, complexing agents, oxygen etc. Apart from pure chemical corrosion, other effects like electro corrosion, electrostatic charging (especially for non-conductive organic solvents), swelling of polymer parts etc. need to be considered. Most data available refers to room temperature (typically 20 – 25 °C, 68 – 77 °F). If corrosion is possible, it usually accelerates at higher temperatures. If in doubt, please consult technical literature on chemical compatibility of materials.

PEEK

PEEK (Polyether-Ether Ketones) combines excellent properties regarding biocompatibility, chemical resistance, mechanical and thermal stability. PEEK is therefore the material of choice for UHPLC and biochemical instrumentation.

It is stable in the specified pH range (for the Bio-inert LC system: pH 1 – 13, see bio-inert module manuals for details), and inert to many common solvents.

There is still a number of known incompatibilities with chemicals such as chloroform, methylene chloride, THF, DMSO, strong acids (nitric acid > 10 %, sulphuric acid > 10 %, sulfonic acids, trichloroacetic acid), halogenes or aqueous halogene solutions, phenol and derivatives (cresols, salicylic acid etc.).

When used above room temperature, PEEK is sensitive to bases and various organic solvents, which can cause it to swell. Under such conditions normal PEEK capillaries are very sensitive to high pressure. Therefore Agilent uses stainless-steel clad PEEK capillaries in bio-inert systems. The use of stainless steel clad PEEK capillaries keeps the flow path free of steel and ensures pressure stability to at least 600 bar. If in doubt, consult the available literature about the chemical compatibility of PEEK.

Polyimide

Agilent uses semi-crystalline polyimide for rotor seals in valves and needle seats in autosamplers. One supplier of polyimide is DuPont, which brands polyimide as Vespel, which is also used by Agilent.

Polyimide is stable in a pH range between 1 and 10 and in most organic solvents. It is incompatible with concentrated mineral acids (e.g. sulphuric acid), glacial acetic acid, DMSO and THF. It is also degraded by nucleophilic substances like ammonia (e.g. ammonium salts in basic conditions) or acetates.

Polyethylene (PE)

Agilent uses UHMW (ultra-high molecular weight)-PE/PTFE blends for yellow piston and wash seals, which are used in 1290 Infinity pumps and for normal phase applications in 1260 Infinity pumps.

Polyethylene has a good stability for most common inorganic solvents including acids and bases in a pH range of 1 to 12.5. It is compatible to many

organic solvents used in chromatographic systems like methanol, acetonitrile and isopropanol. It has limited stability with aliphatic, aromatic and halogenated hydrocarbons, THF, phenol and derivatives, concentrated acids and bases. For normal phase applications, the maximum pressure should be limited to 200 bar.

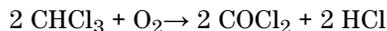
Tantalum (Ta)

Tantalum is inert to most common HPLC solvents and almost all acids except fluoric acid and acids with free sulfur trioxide. It can be corroded by strong bases (e.g. hydroxide solutions > 10 %, diethylamine). It is not recommended for the use with fluoric acid and fluorides.

Stainless Steel (ST)

Stainless steel is inert against many common solvents. It is stable in the presence of acids and bases in a pH range of 1 to 12.5. It can be corroded by acids below pH 2.3. It can also corrode in following solvents:

- Solutions of alkali halides, their respective acids (for example, lithium iodide, potassium chloride, and so on) and aqueous solutions of halogens.
- High concentrations of inorganic acids like nitric acid, sulfuric acid and organic solvents especially at higher temperatures (replace, if your chromatography method allows, by phosphoric acid or phosphate buffer which are less corrosive against stainless steel).
- Halogenated solvents or mixtures which form radicals and/or acids, for example:



This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol.

- Chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, di-isopropylether). Such ethers should be filtered through dry aluminium oxide which adsorbs the peroxides.
- Solutions of organic acids (acetic acid, formic acid, and so on) in organic solvents. For example, a 1 % solution of acetic acid in methanol will attack steel.
- Solutions containing strong complexing agents (for example, EDTA, ethylene diamine tetra-acetic acid).
- Mixtures of carbon tetrachloride with 2-propanol or THF.

Titanium (Ti)

Titanium is highly resistant to oxidizing acids (for example, nitric, perchloric and hypochlorous acid) over a wide range of concentrations and temperatures. This is due to a thin oxide layer on the surface, which is stabilized by oxidizing compounds. Non-oxidizing acids (for example, hydrochloric, sulfuric and phosphoric acid) can cause slight corrosion, which increases with acid concentration and temperature. For example, the corrosion rate with 3 % HCl (about pH 0.1) at room temperature is about 13 $\mu\text{m}/\text{year}$. At room temperature, titanium is resistant to concentrations of about 5 % sulfuric acid (about pH 0.3). Addition of nitric acid to hydrochloric or sulfuric acids significantly reduces corrosion rates. Titanium is sensitive to acidic metal chlorides like FeCl_3 or CuCl_2 . Titanium is subject to corrosion in anhydrous methanol, which can be avoided by adding a small amount of water (about 3 %). Slight corrosion is possible with ammonia > 10 %.

Diamond-Like Carbon (DLC)

Diamond-Like Carbon is inert to almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

Fused silica and Quartz (SiO_2)

Fused silica is used in 1290 Infinity Flow Cells and capillaries. Quartz is used for classical flow cell windows. It is inert against all common solvents and acids except hydrofluoric acid and acidic solvents containing fluorides. It is corroded by strong bases and should not be used above pH 12 at room temperature. The corrosion of flow cell windows can negatively affect measurement results. For a pH greater than 12, the use of flow cells with sapphire windows is recommended.

Gold

Gold is inert to all common HPLC solvents, acids and bases within the specified pH range. It can be corroded by complexing cyanides and concentrated acids like aqua regia.

Zirconium Oxide (ZrO_2)

Zirconium Oxide is inert to almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

Platinum/Iridium

Platinum/Iridium is inert to almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

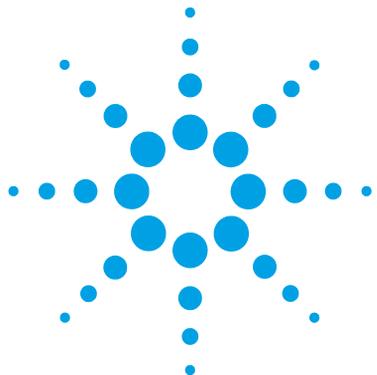
Fluorinated polymers (PTFE, PFA, FEP, FFKM)

Fluorinated polymers like PTFE (polytetrafluorethylene), PFA (perfluoroalkoxy) and FEP (fluorinated ethylene propylene) are inert to almost all common acids, bases, and solvents. FFKM is perfluorinated rubber, which is also resistant to most chemicals. As an elastomer, it may swell in some organic solvents like halogenated hydrocarbons.

TFE/PDD copolymer tubings, which are used in all Agilent degassers except 1322A, are not compatible with fluorinated solvents like Freon, Fluorinert, or Vertrel. They have limited life time in the presence of Hexafluoroisopropanol (HFIP). To ensure the longest possible life with HFIP, it is best to dedicate a particular chamber to this solvent, not to switch solvents, and not to let dry out the chamber. For optimizing the life of the pressure sensor, do not leave HFIP in the chamber when the unit is off.

Sapphire, Ruby and Al₂O₃-based ceramics

Sapphire, ruby and ceramics based on aluminum oxide Al₂O₃ are inert to almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.



5 Optimization

Optimizing the Column Compartment [70](#)

This chapter provides information on how to optimize the Multi Column Thermostat.



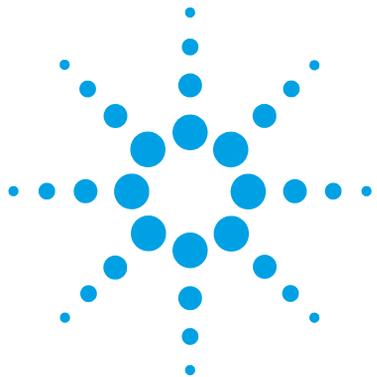
Optimizing the Column Compartment

For best performance results of the multi column compartment:

- Use short connection capillaries and place them close to the heatexchanger. This will reduce heat dissipation and external band-broadening.
- See the *Consumables* sections for additional available heat exchangers with various internal volume to address certain applications in terms of flow rates and dispersion volume optimization.
- Keep the left and right heat exchanger temperature the same unless you do specific applications.

Use the Divider Assy which is part of the *Accessory Kit* whenever you work with different temperatures on the left and right heater element to verify an optimized separation of both temperature zones. See also “[Install the Divider Assembly](#)” on page 56

- Keep the front cover closed during analysis.



6 Troubleshooting and Diagnostics

Available Tests vs User Interfaces [72](#)

Agilent Lab Advisor Software [73](#)

Overview about the troubleshooting and diagnostic features.



Available Tests vs User Interfaces

- Depending on the user interface, the available tests and the screens/reports may vary (see chapter "*Test Functions and Calibrations*").
- Preferred tool should be the Agilent Lab Advisor software, see "[Agilent Lab Advisor Software](#)" on page 73.
- The Agilent ChemStation may not include any maintenance/test functions.
- Screenshots used within these procedures are based on the Agilent Lab Advisor software.

Agilent Lab Advisor Software

The Agilent Lab Advisor Software is a standalone product that can be used with or without a chromatographic data system. Agilent Lab Advisor helps to manage the lab for high-quality chromatographic results by providing a detailed system overview of all connected analytical instruments with instrument status, Early Maintenance Feedback counters (EMF), instrument configuration information, and diagnostic tests. By the push of a button, a detailed diagnostic report can be generated. Upon request, the user can send this report to Agilent for a significantly improved troubleshooting and repair process.

The Agilent Lab Advisor software is available in two versions:

- Lab Advisor Basic
- Lab Advisor Advanced

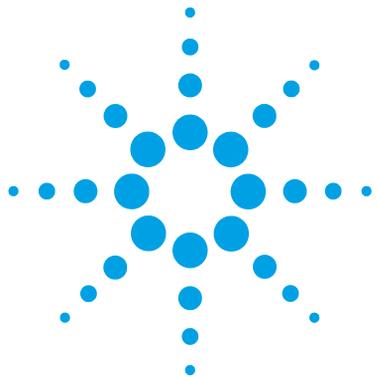
Lab Advisor Basic is included with every Agilent 1200 Infinity Series and Agilent InfinityLab LC Series instruments.

The Lab Advisor Advanced features can be unlocked by purchasing a license key, and include real-time monitoring of instrument actuals, all various instrument signals, and state machines. In addition, all diagnostic test results, calibration results, and acquired signal data can be uploaded to a shared network folder. The Review Client included in Lab Advisor Advanced allows to load and examine the uploaded data no matter on which instrument it was generated. This makes Data Sharing an ideal tool for internal support groups and users who want to track the instrument history of their analytical systems.

The optional Agilent Maintenance Wizard Add-on provides an easy-to-use, step-by-step multimedia guide for performing preventive maintenance on Agilent 1200 Infinity and Agilent InfinityLab LC Series instruments.

The tests and diagnostic features that are provided by the Agilent Lab Advisor software may differ from the descriptions in this manual. For details, refer to the Agilent Lab Advisor software help files.

6 Troubleshooting and Diagnostics
Agilent Lab Advisor Software



7 Error Information

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



What Are Error Messages

Error messages are displayed in the user interface when an electronic, mechanical, or hydraulic (flow path) failure occurs which requires attention before the analysis can be continued (for example, repair, or exchange of consumables is necessary). In the event of such a failure, the red status indicator at the front of the module is switched on, and an entry is written into the module logbook.

If an error occurs outside a method run, other modules will not be informed about this error. If it occurs within a method run, all connected modules will get a notification, all LEDs get red and the run will be stopped. Depending on the module type, this stop is implemented differently. For example, for a pump the flow will be stopped for safety reasons. For a detector, the lamp will stay on in order to avoid equilibration time. Depending on the error type, the next run can only be started, if the error has been resolved, for example liquid from a leak has been dried. Errors for presumably single time events can be recovered by switching on the system in the user interface.

Special handling is done in case of a leak. As a leak is a potential safety issue and may have occurred at a different module from where it has been observed, a leak always causes a shutdown of all modules, even outside a method run.

In all cases, error propagation is done via the CAN bus or via an APG/ERI remote cable (see documentation for the APG/ERI interface).

General Error Messages

General error messages are generic to all HPLC modules.

Timeout

Error ID: 0062

The timeout threshold was exceeded.

Probable cause

- 1 The analysis was completed successfully, and the timeout function switched off the module as requested.
- 2 A not-ready condition was present during a sequence or multiple-injection run for a period longer than the timeout threshold.

Suggested actions

- Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.
- Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.

Shutdown

Error ID: 0063

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

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

Probable cause

- 1 Leak detected in another module with a CAN connection to the system.
- 2 Leak detected in an external instrument with a remote connection to the system.
- 3 Shut-down in an external instrument with a remote connection to the system.
- 4 The degasser failed to generate sufficient vacuum for solvent degassing.

Suggested actions

- Fix the leak in the external instrument before restarting the module.
- Fix the leak in the external instrument before restarting the module.
- Check external instruments for a shut-down condition.
- Check the vacuum degasser for an error condition. Refer to the *Service Manual* for the degasser or the pump that has the degasser built-in.

Remote Timeout

Error ID: 0070

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

Probable cause

- 1 Not-ready condition in one of the instruments connected to the remote line.
- 2 Defective remote cable.
- 3 Defective components in the instrument showing the not-ready condition.

Suggested actions

- Ensure the instrument showing the not-ready condition is installed correctly, and is set up correctly for analysis.
- Exchange the remote cable.
- Check the instrument for defects (refer to the instrument's documentation).

Lost CAN Partner

Error ID: 0071

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

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

Probable cause

- 1 CAN cable disconnected.
- 2 Defective CAN cable.
- 3 Defective main board in another module.

Suggested actions

- Ensure all the CAN cables are connected correctly.
 - Ensure all CAN cables are installed correctly.
- Exchange the CAN cable.
- Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.

Leak

Error ID: 0064

A leak was detected in the module.

The signals from the two temperature sensors (leak sensor and board-mounted temperature-compensation sensor) are used by the leak algorithm to determine whether a leak is present. When a leak occurs, the leak sensor is cooled by the solvent. This changes the resistance of the leak sensor which is sensed by the leak-sensor circuit on the main board.

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

Leak Sensor Open

Error ID: 0083

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

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

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

Leak Sensor Short

Error ID: 0082

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

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

Probable cause

- 1 Defective leak sensor.
- 2 Leak sensor incorrectly routed, being pinched by a metal component.

Suggested actions

Please contact your Agilent service representative.

Compensation Sensor Open

Error ID: 0081

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

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

Probable cause

- 1 Defective main board.

Suggested actions

Please contact your Agilent service representative.

Compensation Sensor Short

Error ID: 0080

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

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

Probable cause

- 1 Defective main board.

Suggested actions

Please contact your Agilent service representative.

MCT Error Messages

These errors are module specific.

VALVE INIT FAILED

Error ID: 32030

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

Probable cause

- 1 Defect in cable connection of valve drive control.
- 2 Defect in cable connection of valve actuator encoder reader.
- 3 Defect of valve drive or valve actuator encoder reader.

Suggested actions

- Please contact your Agilent service representative.
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

VALVE_FAILED

Error ID: 32031

Switching of the valve failed.

Probable cause

- 1 Mechanical problems. Friction too high or blockages on the valve drive's motor or on the valve head.
- 2 Defective sensor on the valve drive motor

Suggested actions

- Check valve head for correct installation
- Try to identify the source of trouble by installing a different valve head if possible
- Contact your Agilent service representative.
- Check valve head for correct installation
- Try to identify the source of trouble (valve head or drive) by installing a different valve head if possible.
- Contact your Agilent service representative.

VALVE TAG VIOLATION

Error ID: 32032

Reading the valve tag failed

Probable cause

- 1 A valve head has been exchanged (hot-plugged) while the valve drive was still powered on.

Suggested actions

- For changing the valve head follow the instructions "Replace Valve Heads." It is important to have the MCT switched off for at least 10 s after a new valve head has been installed.
- Contact your Agilent service representative.

WRONG VALVE

Error ID: 32130

Valve not supported in this module.

Probable cause

- 1 A valve head has been installed which is not usable with G7116A.

Suggested actions

Only valve heads up to 600 bar or with up to four positions can be used in G7116A. Exchange the valve head with a suitable one. For changing the valve head follow the instructions *Replace Valve Heads*.

NOTE

For G7116B:

- 5067-4233 (8 Column Selector 1300 bar)
- 5067-4241 (2 Pos / 6 Port Valve 1300 bar)
- 5067-4240 (2 Pos / 10 Port Valve 1300 bar)
- 5067-4273 (6 Column Selector 1300 bar)

For G7116A

- 5067-4287 (4 Column Selector 600 bar)
 - 5067-4137 (2 Pos / 6 Port Valve 600 bar)
 - 5067-4145 (2 Pos / 10 Port Valve 600 bar)
-

WAIT TIMEOUT

Error ID: 32044 (left), 32045 (right)

Wait operation for temperature timed out.

Probable cause

- 1 Defective heater
- 2 Defective main board

Suggested actions

- Contact your Agilent service representative.
- Contact your Agilent service representative.

HEATEX OVERTEMP

Error ID: 32080 (left), 32081 (right)

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

Probable cause

- 1 Defective heater assembly
- 2 Defective main board

Suggested actions

- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

UHX SENSOR ERROR

Error ID: 32090 (left), 32091 (right)

Upper heat exchanger sensor has an error.

Probable cause

- 1 Defective sensor
- 2 Defective cable
- 3 Defective main board

Suggested actions

- Please contact your Agilent service representative.
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

LHX SENSOR ERROR

Error ID: 32092 (left), 32093 (right)

Lower heat exchanger sensor has an error.

Probable cause

- 1 Defective sensor
- 2 Defective cable
- 3 Defective main board

Suggested actions

- Please contact your Agilent service representative.
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

LHS_SENSOR_ERROR

Error ID: 32094 (left), 32095 (right)

Heat sink sensor has an error.

Probable cause

- 1 Defective sensor
- 2 Defective cable
- 3 Defective main board

Suggested actions

- Please contact your Agilent service representative.
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

PELTIER OVERCURRENT

Error ID: 32098 (left), 32099 (right)

Probable cause

- 1 Defective sensor
- 2 Defective main board
- 3 Defective cable

Suggested actions

- Please contact your Agilent service representative.
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

LEFT PELTIER ERROR

Error ID: 32096

Left peltier hardware is not operational.

Probable cause

- 1 Defect heater element
- 2 Defective main board

Suggested actions

- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

RIGHT PELTIER ERROR

Error ID: 32097

Right peltier hardware is not operational.

Probable cause

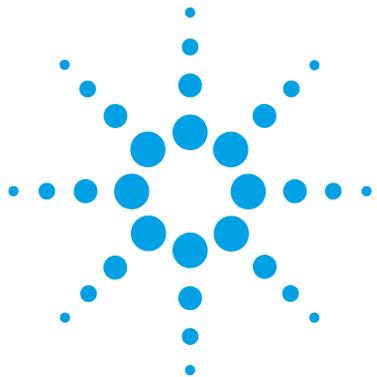
- 1 Defect heater element
- 2 Defective main board

Suggested actions

- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

7 Error Information

MCT Error Messages



8 Test Functions and Calibrations

Tests and Calibrations in Agilent Lab Advisor 90

Thermostat Function Test 91

System Pressure Test 92

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



Tests and Calibrations in Agilent Lab Advisor

Use the tests and diagnostic features provided in the Agilent Lab Advisor software to check if your module is working correctly.

For further details, refer to the Agilent Lab Advisor software help files.

Thermostat Function Test

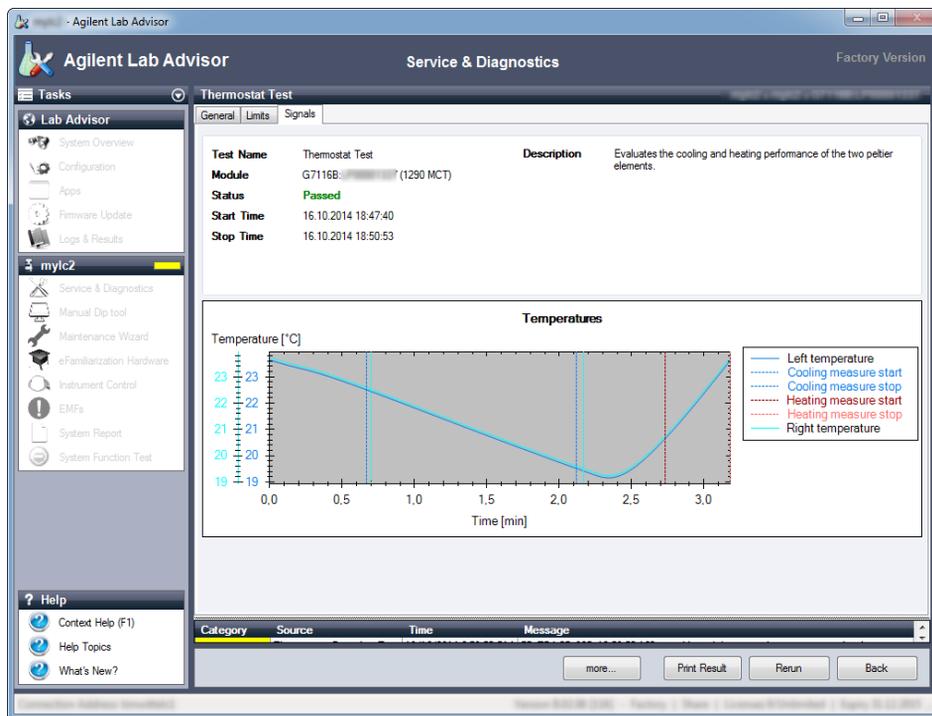
Thermostat Function Test Description

The Thermostat Function Test is used to evaluate the cooling and heating performance of the two peltier elements.

The instrument starts the test as soon as the heater temperature is within 5 °C of the current measured ambient temperature. After the start the instrument is cooling down to 4°C below the starting temperature. The cool-down time is used to determine the cooling performance. In the next step the heating performance is calculated by heating up to the test starting temperature.

Thermostat Function Test Result

A typical Thermostat Function Test profile is shown below.



System Pressure Test

For running a **System Pressure Test**, please refer to the corresponding pump manual. The **System Pressure Test** may be used for testing the tightness of a valve installed in the MCT.

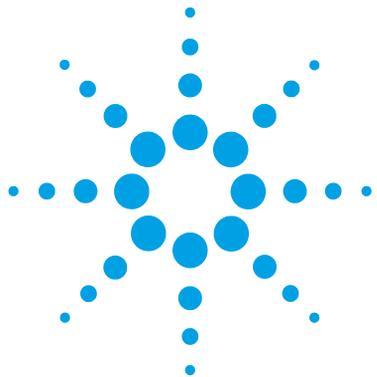
CAUTION

Wrong use of System Pressure Test may damage components.

→ Do not use higher test max. pressure settings as the lowest rated pressure component in the tests flow path.

NOTE

M4 Blank nut (5067-6141) can be used for plugging ports on column selection valves.



9 Maintenance

Introduction to Maintenance	94
Cautions and Warnings	95
Overview of Maintenance	97
Cleaning the Module	98
Install the Column Identification Option	99
Correcting Leaks	102
Maintain the Column Switching Valve	103
Replace Valve Heads	105
Prepare the MCT for Transportation	109
Replace the Module Firmware	110

This chapter describes the maintenance of the MCT.



Introduction to Maintenance

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

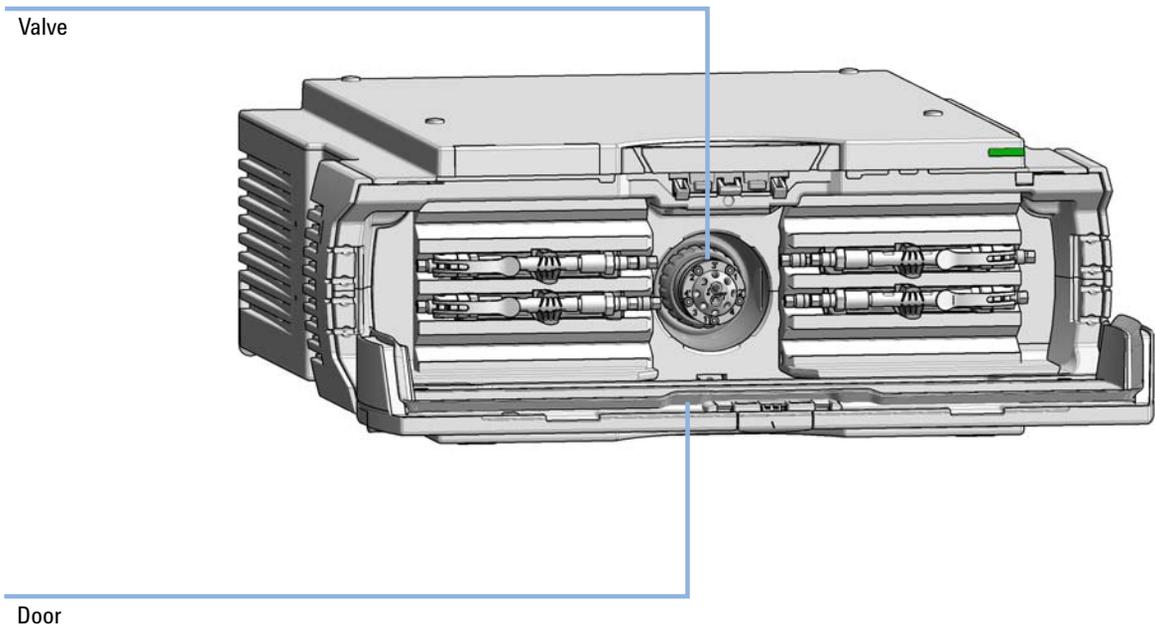


Figure 8 Overview of maintenance parts (G7116A)

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 4 Maintenance procedures

Procedure	Typical Frequency	Notes
“Cleaning the Module” on page 98	If required	
Changing Column Identification Tags	When column performance or new application requires a change	
“Install Heat Exchanger” on page 42	When new application requires a change	
Installing the capillaries	When new application requires a change	
Correcting Leaks	If a leak has occurred	Check for leaks
Replacing Valve Heads	If the valve performance shows indication of leakage or wear	
Preparing the MCT for Transportation	If the MCT shall be transported	
“Replace the Module Firmware” on page 110	If required	

Cleaning the Module

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

WARNING

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

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

Install the Column Identification Option

Parts required	p/n	Description
	5067-5915	Column ID Kit Left
	5067-5916	Column ID Kit Right
	5067-5917	Column ID TAG Assembly

Preparations Power off the instrument.

CAUTION

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

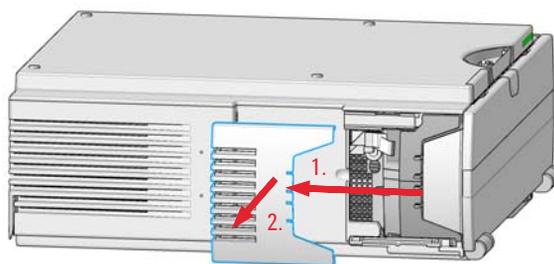
→ Be sure to hold the column ID modules by the plastic parts, and do not touch the electrical components. Do not touch the pins of the flex-board connector.

NOTE

In the Agilent 1260 Infinity II Multicolumn Thermostat (G7116A) the Column ID is installed on the left side of the module only.

1 Remove any tube guides and tube clip holders that may already be installed on the sides of the MCT cover.

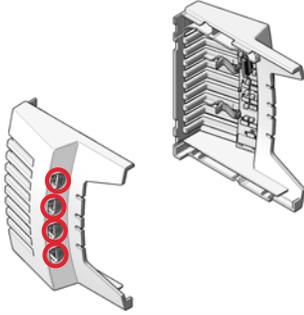
2 Unlock the left and right (G7116B only) side cover inserts by pushing them to the rear and put them aside.



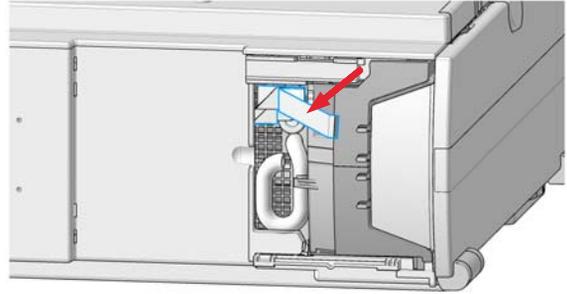
9 Maintenance

Install the Column Identification Option

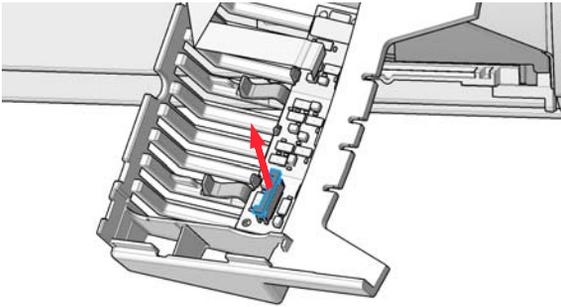
- 3** Identify the left and right (G7116B only) column ID module. The ID sockets 1 to 4 are numbered from top to bottom.



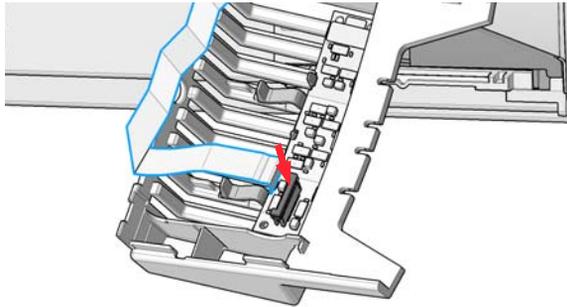
- 4** Take the end of the pre-installed flex-board connector out of the holder.



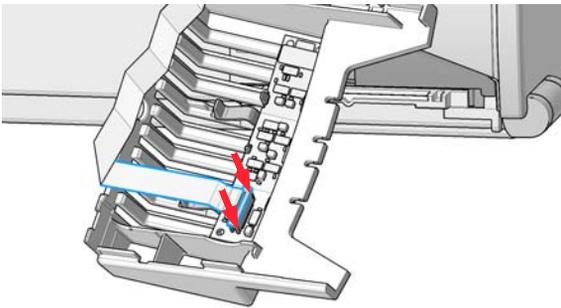
- 5** Open the locking mechanism of the connector by lifting up the frame.



- 6** Push in the cable with the contacts facing to the rear.

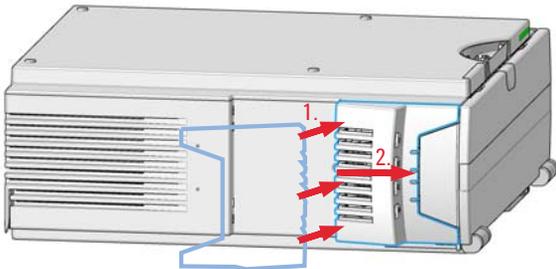


- 7** Close the locking mechanism.



- 8** Verify that the cable is properly attached to the connector without visible offset. Repeat steps 5 to 7 if necessary.

9 Attach the column ID module to the MCT cover.



10 Repeat steps 4 to 9 for the column ID module on the other side (if applicable).

11 Install the waste tube clip holder (example shows a G7116B).



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	Description
	Tissue
	Pipette
	Wrench, 1/4 – 5/16 inch (for capillary connections)
	<ol style="list-style-type: none">1 Remove the door.2 Use a pipette and tissue to dry the leak sensor area.3 Observe the capillary connections and the column switching valve for leaks and correct, if required.4 Re-install the door.

Maintain the Column Switching Valve

When If valve leaks.

Tools required

Description

Wrench, 1/4 inch (supplied in HPLC Tool-Kit)

Hexagonal key, 9/64 inch (supplied in HPLC Tool-Kit)

- 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.

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.

9 Maintenance

Maintain the Column Switching Valve

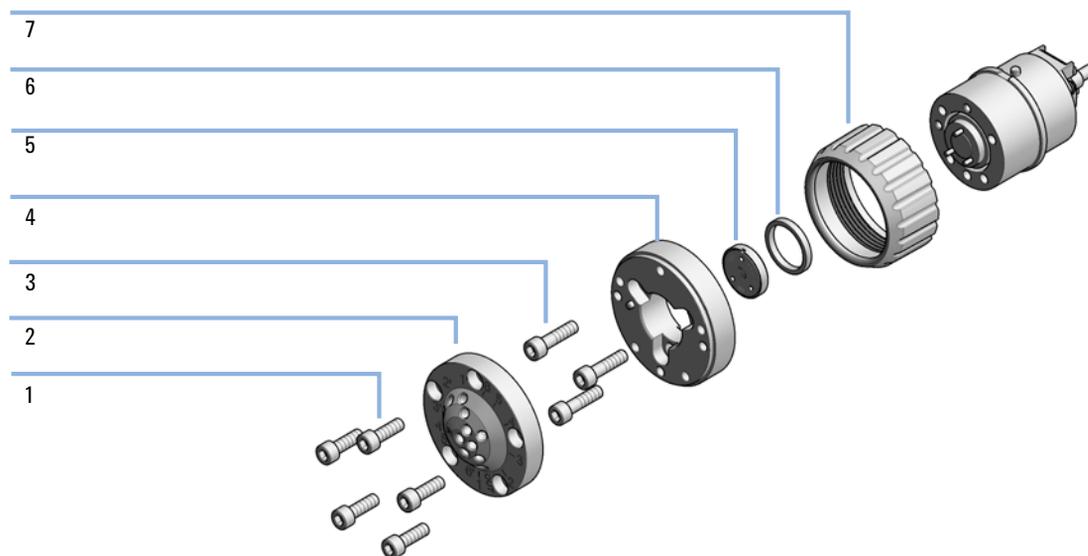


Figure 9 Valve Head Parts (example)

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)

NOTE

Figure 9 on page 104 illustrates replacement parts for the valve heads, with the 6-column 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 “[Valve Options Overview](#)” on page 116 for identification of the required part numbers.

Replace 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 μ l/min range.

Parts required

Description

Any Agilent Quick Change Valve Head.

For details, see “[Valve Options Overview](#)” on page 116

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 1290 Infinity II Method Development Solution User Guide*.

9 Maintenance

Replace Valve Heads

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.

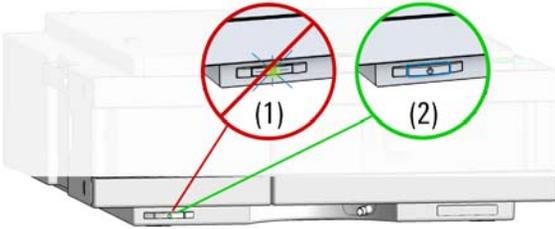
NOTE

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.

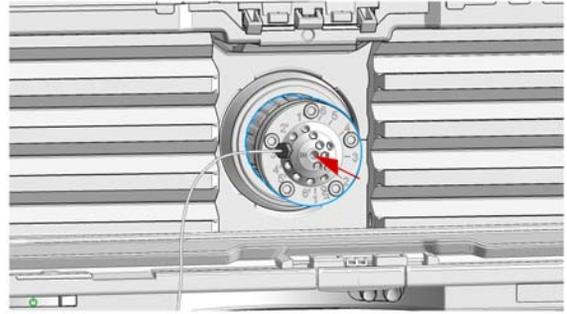
NOTE

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

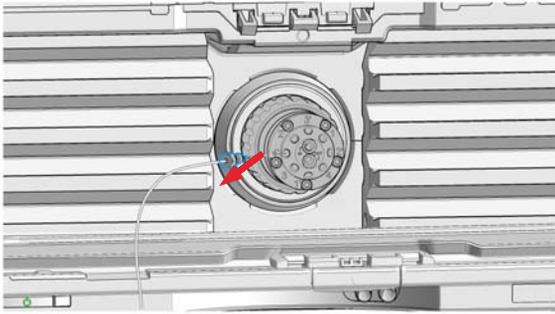
1 Switch off the module.



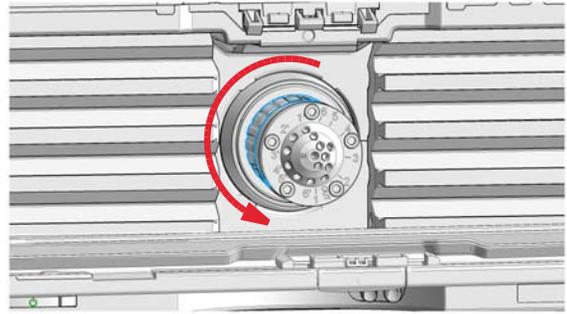
2 Push the valve head for bringing it to its outer position.



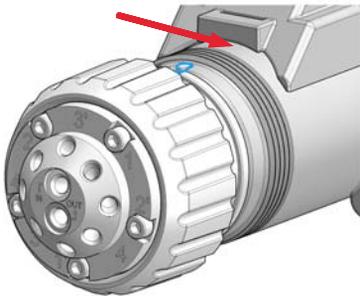
3 Remove all capillary connections from the valve head.



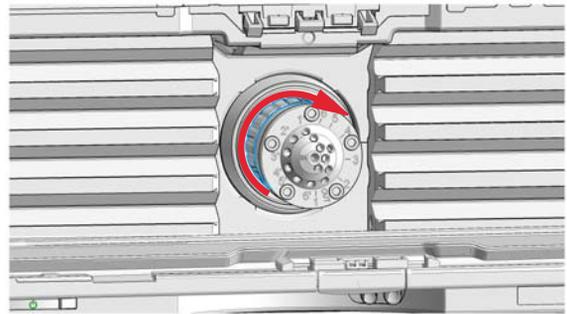
4 Unscrew the valve head.



5 Put the new valve head onto the valve drive such that the lobe fits to the groove (see also "Installing Valve Heads" on page 48).



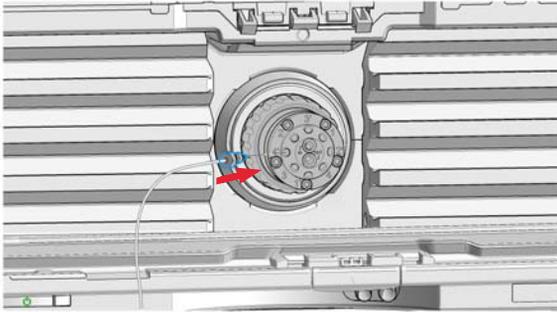
6 Screw the valve head onto the valve drive using the union nut (see also "Installing Valve Heads" on page 48).



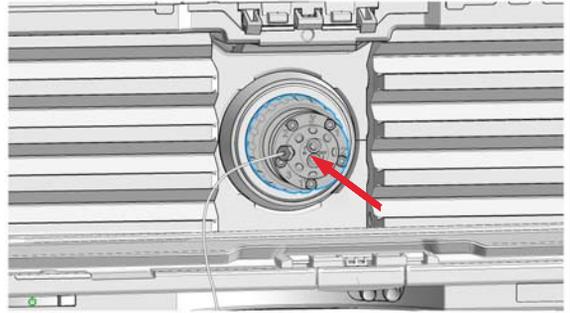
9 Maintenance

Replace Valve Heads

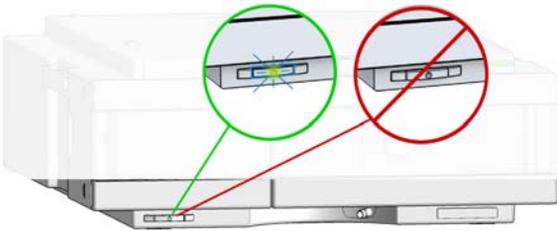
7 Install all required capillary connections to the valve.



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



9 Switch on the module.



Prepare the MCT for Transportation

When If an MCT including the Valve Drive Option shall be transported

NOTE

The module has been shipped with transportation locks, which must be used for transportation protection.

CAUTION

Damage to Internal Parts

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

→ Install a lock (Transportation Lock Kit).

- 1 Remove the valve head as described in [“Replace Valve Heads”](#) on page 105.
- 2 Replace the valve head by the transportation valve head. Bring the transportation valve head to the outer position.
- 3 Fix the Transportation Lock to the MCT.

Replace 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

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

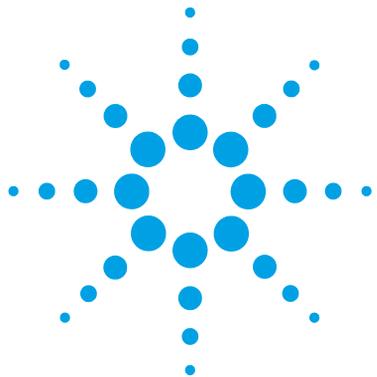
Read update documentation provided with the Firmware Update Tool.

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

- 1 Download the required module firmware, the latest FW Update Tool and the documentation from the Agilent web.
<http://www.agilent.com/en-us/firmwareDownload?whid=69761>
- 2 For loading the firmware into the module follow the instructions in the documentation.

Module Specific Information

Module is a hosted module and always needs to be connected to a host with matching firmware of same revision.



10 Parts and Materials for Maintenance

Plastic Parts	112
Leak Parts	113
Valve Options and Parts	114
Column ID Parts	117
Accessories and Consumables	118
Additional Heater Devices	119
A-Line Quick Connect and Quick Turn Fittings	121

This chapter provides information on parts for maintenance.



Plastic Parts

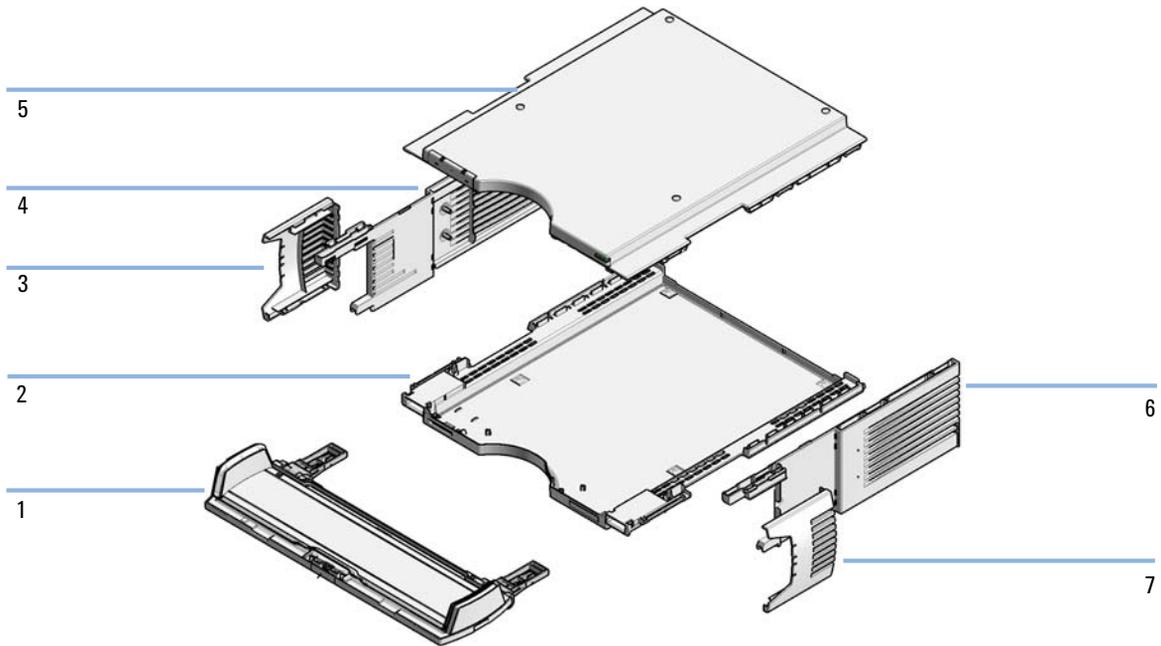


Figure 10 Plastic parts

Item	p/n	Description
	G7116-68713	Cabinet Kit Infinity II MCT
1	G7116-60004	Door Kit IF-II-MCT-HE
2	G7116-40100	Base Cover IF-II-MCT
3	G7116-40103	Side Cover Left Insert IF-II-MCT
4	G7116-40102	Side Cover Left IF-II-MCT
5	5067-5908	Top Cover
6	G7116-40105	Side Cover Right IF-II-MCT
7	G7116-40106	Side Cover Right Insert IF-II-MCT

Leak Parts

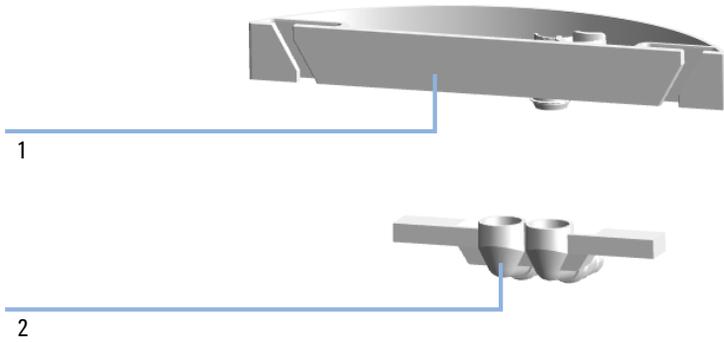


Figure 11 Plastic parts

Item	p/n	Description
1	G7116-40043	Leak Adapter Top MCT 2K
2	G7116-40013	Leak Adapter HITCH MCT

10 Parts and Materials for Maintenance

Valve Options and Parts

Valve Options and Parts

p/n	Description
G1353D	Valve drive upgrade kit for MCT
	Mounting clips for External Valve drive

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 table (“[Valve Options Overview](#)” on page 116) for identification of the required part numbers.

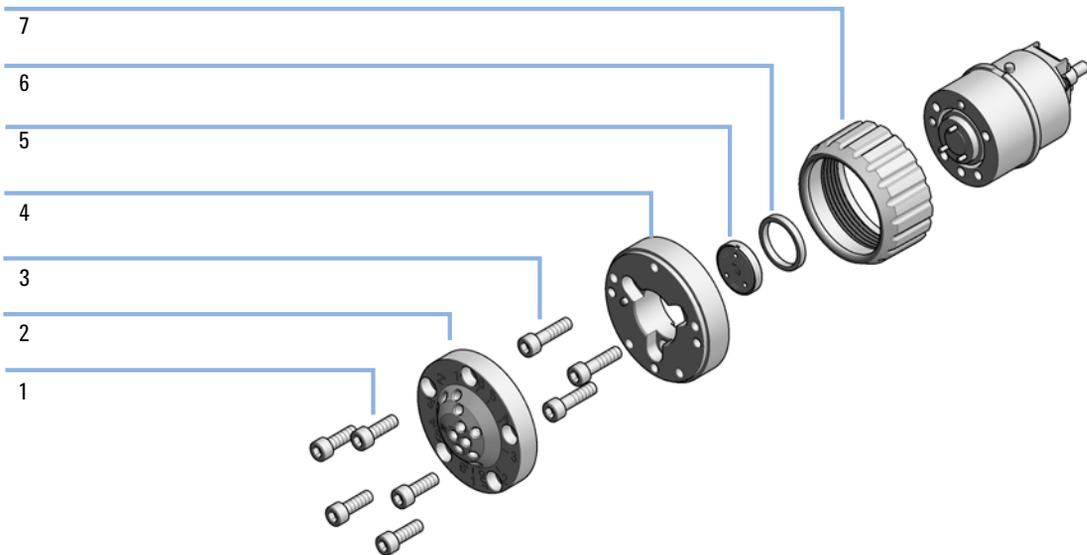


Figure 12 Valve Head Parts (example)

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)

Valve Options Overview

Table 5 Replacement parts standard valve heads for G7116A

Valve Head	Rotor Seal	Stator Head	Stator Screws	Stator Ring
5067-4287 600 bar	5068-0264 (PEEK)	5068-0263	5068-0089	n.a.
5067-4137 2 Pos / 6 Port Valve 600 bar	0101-1409 (PEEK)	0101-1417	1535-4857	5068-0120
5067-4145 2 Pos / 10 Port Valve 600 bar	0101-1415 (PEEK)	5068-0165	5068-0019	n.a.

Column ID Parts

p/n	Description
G7116-81002	Flex board connection MB-Column ID module left
5067-5915	Column ID Kit Left
5067-5917	Column ID TAG Assembly

10 Parts and Materials for Maintenance

Accessories and Consumables

Accessories and Consumables

p/n	Description
G7116-68003	Column Holder Clips (2/Pk) for G7116B
G7116-68004	Column Holder Clamp (2/PK) for Infinity II
5500-1191	Capillary ST 0.12 mm x 280 mm, long socket Column to detector
G7116-60006	Divider Assembly MCT For separating different temperature zones between left and right heater elements.
5067-5917	Column ID TAG Assembly Blank column ID TAG (Column ID Kit required)
5043-1356	Column Holder Lamella
5043-1375	Column holder clamp

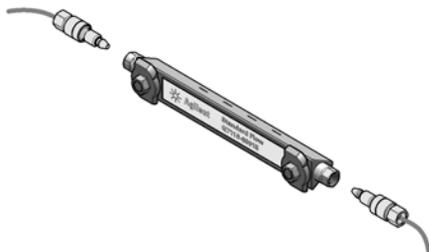
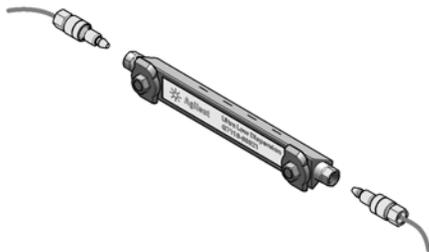
Additional Heater Devices

Blank heater assemblies without capillaries and fittings:



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

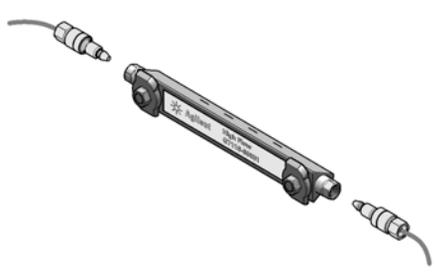
Table 6 Heater devices

Item	Description
	<p>Heat Exchanger Assembly 1.6 µL-Z Quick Connect Heatexchanger Standard Flow (G7116-60015) for G7116B</p>
	<p>Heat Exchanger 1 µL Quick Connect Heatexchanger Ultra Low Dispersion (G7116-60021)</p> <p>NOTE</p> <p>Use A-Line Quick turn fittings to connect to the Quick Connect Heat Exchanger Ultra Low Dispersion.</p>

10 Parts and Materials for Maintenance

Accessories and Consumables

Table 6 Heater devices

Item	Description
	Heat Exchanger 3 µL Quick Connect Heatexchanger High Flow (G7116-60031) for G7116B
	Quick-Connect Heat Exchanger Large ID, Standard Flow (G7116-60051) for G7116A

A-Line Quick Connect and Quick Turn Fittings

A-Line Quick Connect Fittings

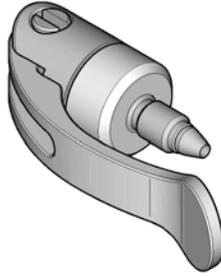


Figure 13 A-Line Quick Connect Fitting

p/n	Description
5067-5965	A-Line Quick Connect LC fitting (fitting without pre-installed capillary)
5067-5961	A-Line Quick Connect Assy ST 0.075 mm x 105 mm
5067-6163	A-Line Quick Connect Assy ST 0.075 mm x 150 mm
5067-6164	A-Line Quick Connect Assy ST 0.075 mm x 220 mm
5067-6165	A-Line Quick Connect Assy ST 0.075 mm x 280 mm (fitting without pre-installed capillary)
5067-5957	A-Line Quick Connect Assy ST 0.12 mm x 105 mm
5067-5958	A-Line Quick Connect Assy ST 0.12 mm x 150 mm
5067-5959	A-Line Quick Connect Assy ST 0.12 mm x 220 mm
5067-5960	A-Line Quick Connect Assy ST 0.12 mm x 280 mm
5067-6166	A-Line Quick Connect Assy ST 0.17 mm x 105 mm
5067-6167	A-Line Quick Connect Assy ST 0.17 mm x 150 mm
5067-6168	A-Line Quick Connect Assy ST 0.17 mm x 220 mm
5067-6169	A-Line Quick Connect Assy ST 0.17 mm x 280 mm

10 Parts and Materials for Maintenance

Accessories and Consumables

A-Line Quick Connect Fitting Replacement Capillaries

p/n	Description
5500-1174	A-Line Capillary ST 0.075 mm x 105 mm
5500-1175	A-Line Capillary ST 0.075 mm x 150 mm
5500-1176	A-Line Capillary ST 0.075 mm x 220 mm
5500-1177	A-Line Capillary ST 0.075 mm x 250 mm
5500-1178	A-Line Capillary ST 0.075 mm x 280 mm
5500-1173	A-Line Capillary ST 0.12 mm x 105 mm
5500-1172	A-Line Capillary ST 0.12 mm x 150 mm
5500-1171	A-Line Capillary ST 0.12 mm x 220 mm
5500-1170	A-Line Capillary ST 0.12 mm x 280 mm
5500-1179	A-Line Capillary ST 0.12 mm x 400 mm
5500-1180	A-Line Capillary ST 0.12 mm x 500 mm
5500-1181	A-Line Capillary ST 0.17 mm x 105 mm
5500-1182	A-Line Capillary ST 0.17 mm x 150 mm
5500-1183	A-Line Capillary ST 0.17 mm x 220 mm
5500-1230	A-Line Capillary ST 0.17 mm x 280 mm
5500-1231	A-Line Capillary ST 0.17 mm x 500 mm

A-Line Quick Turn Fitting



Figure 14 A-Line Quick Turn Fitting

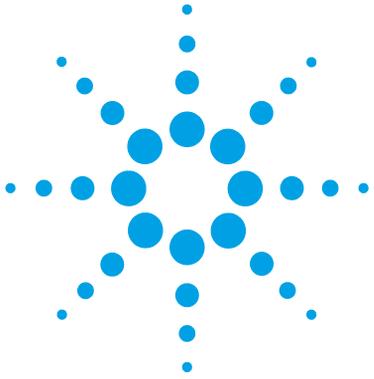
p/n	Description
5067-5966	A-Line Quick Turn fitting

Capillaries for use with the A-Line Quick Turn Fitting

p/n	Description
5500-1198	Capillary ST 0.075 mm x 105 mm, long socket
5500-1232	Capillary ST 0.075 mm x 150 mm, long socket
5500-1188	Capillary ST 0.12 mm x 105 mm, long socket
5500-1189	Capillary ST 0.12 x 150 mm, long socket
5500-1233	Capillary ST 0.12 mm x 180 mm, long socket
5500-1190	Capillary ST 0.12 mm x 200 mm, long socket
5500-1191	Capillary ST 0.12 mm x 280 mm, long socket
5500-1192	Capillary ST 0.12 mm x 500 mm, long socket
5500-1193	Capillary ST 0.17 mm x 105 mm, long socket
5500-1194	Capillary ST 0.17 mm x 150 mm, long socket
5500-1234	Capillary ST 0.17 mm x 180 mm, long socket
5500-1195	Capillary ST 0.17 mm x 200 mm, long socket
5500-1196	Capillary ST 0.17 mm x 280 mm, long socket
5500-1235	Capillary ST 0.17 mm x 380 mm, long socket
5500-1236	Capillary ST 0.17 mm x 400 mm, long socket
5500-1197	Capillary ST 0.17 mm x 500 mm, long socket

10 Parts and Materials for Maintenance

Accessories and Consumables



11 Identifying Cables

Cable Overview	126
Analog Cables	128
Remote Cables	130
CAN/LAN Cables	134
RS-232 Cables	135
USB	136

This chapter provides information on cables used with the Agilent 1200 Infinity Series modules.



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 35900A A/D converter
01046-60105	Analog cable (BNC to general purpose, spade lugs)

Remote cables

p/n	Description
5188-8029	ERI to general purpose
5188-8044	Remote Cable ERI – ERI
5188-8045	Remote Cable APG – ERI
5061-3378	Remote Cable to 35900 A/D converter
01046-60201	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
(not for FUSION
board)**

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

USB cables

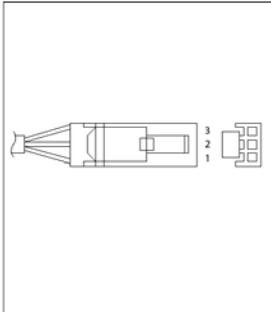
p/n	Description
5188-8050	USB A M-USB Mini B 3 m (PC-Module)
5188-8049	USB A F-USB Mini B M OTG (Module to Flash Drive)

Analog Cables

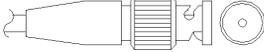


One end of these cables provides a BNC connector to be connected to Agilent modules. The other end depends on the instrument to which connection is being made.

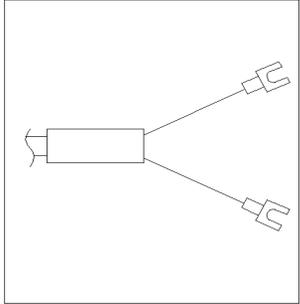
Agilent Module to 35900 A/D converters

p/n 35900-60750	35900	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 +

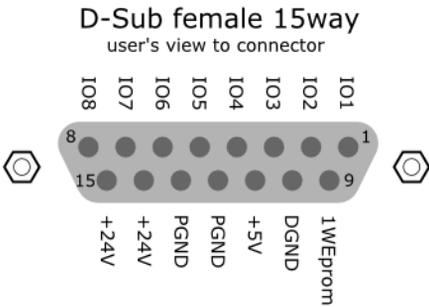
11 Identifying Cables

Remote Cables

Remote Cables

ERI (Enhanced Remote Interface)

5188-8029 ERI to general purpose

p/n 5188-8029	pin	Color code	Enhanced Remote	Classic Remote	Active (TTL)
 <p>D-Sub female 15way user's view to connector</p> <p>108 107 106 105 104 103 102 101 8 15 9</p> <p>+24V +24V PGND PGND +5V DGND 1WEprom</p>	1	white	I01	START REQUEST	Low
	2	brown	I02	STOP	Low
	3	green	I03	READY	High
	4	yellow	I04	POWER ON	High
	5	grey	I05	NOT USED	
	6	pink	I06	SHUT DOWN	Low
	7	blue	I07	START	Low
	8	red	I08	PREPARE	Low
	9	black	1wire DATA		
	10	violet	DGND		
	11	grey-pink	+5V ERI out		
	12	red-blue	PGND		
	13	white-green	PGND		
	14	brown-green	+24V ERI out		
	15	white-yellow	+24V ERI out		
NC	yellow-brown				

5188-8044 ERI to ERI (Connector D_Subminiature 15 pin)

Table 7 5188-8044 ERI to ERI

p/n 5188-8044	Pin (ERI)	Signal	Pin (ERI)	Active (TTL)
	10	GND	10	
	1	Start Request	1	Low
	2	Stop	2	Low
	3	Ready	3	High
	5	Power on	5	High
	4	Future	4	
	6	Shut Down	6	Low
	7	Start	7	Low
	8	Prepare	8	Low
	Ground	Cable Shielding	NC	

5188-8045 ERI to APG (Connector D_Subminiature 15 pin (ERI), Connector D_Subminiature 9 pin (APG))

p/n 5188-8045	Pin (ERI)	Signal	Pin (APG)	Active (TTL)
	10	GND	1	
	1	Start Request	9	Low
	2	Stop	8	Low
	3	Ready	7	High
	5	Power on	6	High
	4	Future	5	
	6	Shut Down	4	Low
	7	Start	3	Low
	8	Prepare	2	Low
	Ground	Cable Shielding	NC	

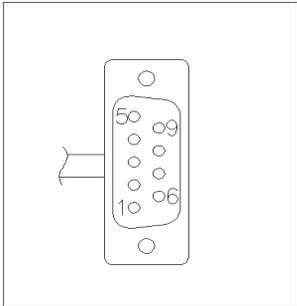
11 Identifying Cables

Remote Cables

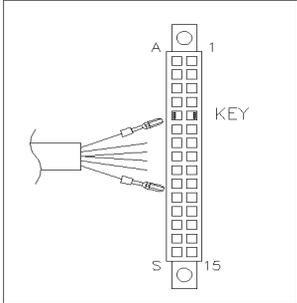


One end of these cables provides a Agilent Technologies APG (Analytical Products Group) remote connector to be connected to Agilent modules. The other end depends on the instrument to be connected to.

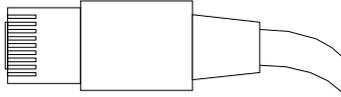
Agilent Module to Agilent 35900 A/D Converters

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

CAN/LAN Cables



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 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

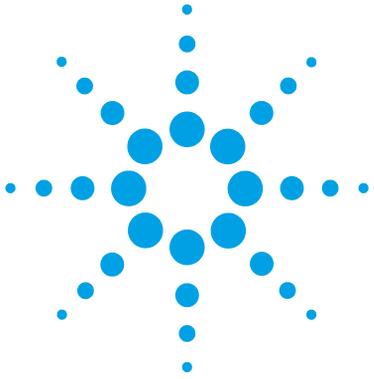
11 Identifying Cables

USB

USB

To connect a USB Flash Drive use a USB OTG cable with Mini-B plug and A socket.

p/n	Description
5188-8050	USB A M-USB Mini B 3 m (PC-Module)
5188-8049	USB A F-USB Mini B M OTG (Module to Flash Drive)



12 Hardware Information

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



Firmware Description

The firmware of the instrument consists of two independent sections:

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

Resident System

This resident section of the firmware is identical for all Agilent 1100/1200/1220/1260/1290 series modules. Its properties are:

- the complete communication capabilities (CAN, LAN, USB and RS- 232C)
- memory management
- ability to update the firmware of the 'main system'

Main System

Its properties are:

- the complete communication capabilities (CAN, LAN, USB and RS- 232C)
- memory management
- ability to update the firmware of the 'resident system'

In addition the main system comprises the instrument functions that are divided into common functions like

- run synchronization through APG remote,
- error handling,
- diagnostic functions,
- or module specific functions like
 - internal events such as lamp control, filter movements,
 - raw data collection and conversion to absorbance.

Firmware Updates

Firmware updates can be done using the following tools (latest version should be used):

- Agilent Lab Advisor software with files on the hard disk (*)
- Firmware Update Tool with local files on the hard disk (*)
- Instant Pilot (G4208A) with files on a USB Flash Disk

(*) Required tools, firmware and documentation are available from the Agilent web: <http://www.agilent.com/en-us/firmwareDownload?whid=69761>

The file naming conventions are:

PPPP_RVVV_XXX.dlb, where

PPPP is the product number, for example, 1315B for the G1315B DAD,

R the firmware revision, for example, A for G1315B or B for the G1315C DAD,

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

XXX is the build number of the firmware.

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

NOTE

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

Main and resident firmware must be from the same set.

12 Hardware Information

Firmware Description

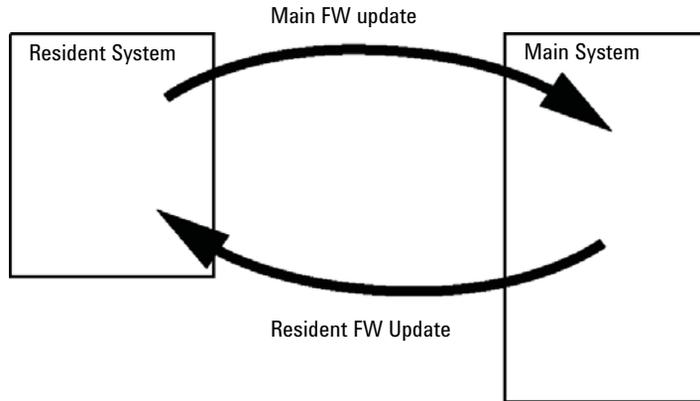


Figure 15 Firmware Update Mechanism

NOTE

Some modules are limited in downgrading due to their main board version or their initial firmware revision. For example, a G1315C DAD SL cannot be downgraded below firmware revision B.01.02 or to a A.xx.xx.

Some modules can be re-branded (e.g. G1314C to G1314B) to allow operation in specific control software environments. In this case the feature set of the target type are use and the feature set of the original are lost. After re-branding (e.g. from G1314B to G1314C), the original feature set is available again.

All these specific informations are described in the documentation provided with the firmware update tools.

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

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

Main Power Supply

The main power supply comprises a closed assembly and must not be disassembled further for safety reasons. In case of a defect, the entire power supply needs to be replaced.

The power supply provides all DC voltages used in the module. The line voltage can vary in a range from 100 – 240 volts AC \pm 10 % and needs no manual setting.

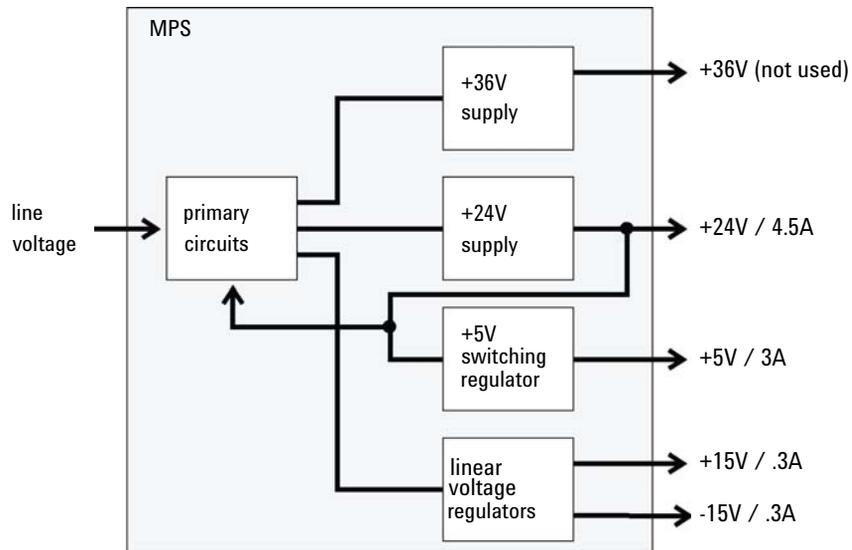


Figure 16 Block Diagram of Standard Power Supply

NOTE

To disconnect the instrument from line, unplug the power cord. The power supply still uses some power, even if the power switch on the front panel is turned off.

12 Hardware Information

Main Power Supply

No accessible hardware fuse is needed because the main power supply is safe against any short circuits or overload conditions on the output lines. When overload conditions occur, the power supply turns off all output voltages. Turning the line power off and on again resets the power supply to normal operation if the cause of the overload condition has been removed.

An over-temperature sensor in the main power supply is used to turn off output voltages if the temperature exceeds the acceptable limit (for example, if the cooling fan of the instrument fails). To reset the main power supply to normal operating conditions, turn the instrument off, wait until it is approximately at ambient temperature and turn the instrument on again.

The following table gives the specifications of the main power supply.

Table 8 Power Supply Specifications (Standard)

Maximum power	160 VA / 130 W	Continuous output
Line Input	100 – 240 volts AC \pm 10 %, line frequency of 50/60 Hz	Wide ranging
Pin 1	Power Fail	error message
Pin 2	AGND	
Pin 3	-15 VDC	
Pin 4	+15 VDC	
Pin 5	PGND	
Pin 6	PGND	
Pin 7	+24 VDC	
Pin 8	+24 VDC	
Pin 9	+36 VDC	
Pin 10	+36 VDC	
Pin 11	DGND	
Pin 12	+ 5 VDC	

Electrical Connections

- The CAN bus is a serial bus with high-speed data transfer. The two connectors for the CAN bus are used for internal module data transfer and synchronization.
- One analog output provides signals for integrators or data handling systems.
- The ERI/REMOTE connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features such as start, stop, common shutdown, prepare, and so on.
- With the appropriate software, the LAN connector may be used to control the module from a computer through a LAN connection. This connector is activated and can be configured with the configuration switch.
- With the appropriate software, the USB connector may be used to control the module from a computer through a USB connection.
- The power input socket accepts a line voltage of 100 – 240 VAC \pm 10 % with a line frequency of 50 or 60 Hz. Maximum power consumption varies by module. There is no voltage selector on your module because the power supply has wide-ranging capability. There are no externally accessible fuses because automatic electronic fuses are implemented in the power supply.

NOTE

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

Rear View of the Module

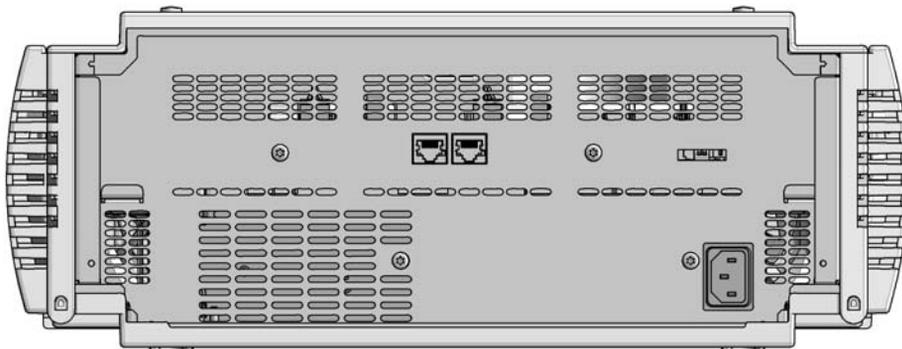


Figure 17 Rear view of the Multicolumn Thermostat G7116A/B

Information on Instrument Serial Number

Serial Number Information 1200 Series and 1290 Infinity

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

CCYWWSSSSS	Format
CC	country of manufacturing <ul style="list-style-type: none"> • DE = Germany • JP = Japan • CN = China
YWW	year and week of last major manufacturing change, e.g. 820 could be week 20 of 1998 or 2008
SSSSS	real serial number

Serial Number Information 1260/1290 Infinity

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

CCXZZ00000	Format
CC	Country of manufacturing <ul style="list-style-type: none"> • DE = Germany • JP = Japan • CN = China
X	Alphabetic character A-Z (used by manufacturing)
ZZ	Alpha-numeric code 0-9, A-Z, where each combination unambiguously denotes a module (there can be more than one code for the same module)
00000	Serial number

Interfaces

The Agilent 1200 Infinity Series II modules provide the following interfaces:

Table 9 Agilent 1200 Infinity II Series Interfaces

Module	CAN	USB	LAN (on-board)	RS-232	Analog	APG (A) / ERI (E)	Special
Pumps							
G7104A Flexible Pump	2	No	Yes	Yes	1	A	
G7110B Isocratic Pump	2	Yes	Yes	No	No	E	
G7111A/B Quaternary Pump	2	Yes	Yes	No	No	E	
G7120A High Speed Pump	2	No	Yes	Yes	1	A	
Samplers							
G7129A/B Vialsampler	2	Yes	Yes	No	No	E	
G7167A/B Multisampler	2	Yes	Yes	No	No	E	
Detectors							
G7114A/B VWD	2	Yes	Yes	No	1	E	
G7115A DAD	2	Yes	Yes	No	1	E	
G7117A/B/C DAD	2	Yes	Yes	No	1	E	
G7121A/B FLD	2	Yes	Yes	No	1	E	
G7162A/B RID	2	Yes	Yes	No	1	E	
G7165A MWD	2	Yes	Yes	No	1	E	
Others							
G7116A/B MCT	2	No	No	No	No	No	Requires a HOST module via CAN

NOTE

The detector (DAD/MWD/FLD/VWD/RID) is the preferred access point for control via LAN. The inter-module communication is done via CAN.

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

Overview Interfaces

CAN

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

LAN

The modules have either an interface slot for an LAN card (e.g. Agilent G1369B/C LAN Interface) or they have an on-board LAN interface (e.g. detectors G1315C/D DAD and G1365C/D MWD). This interface allows the control of the module/system via a PC with the appropriate control software. Some modules have neither on-board LAN nor an interface slot for a LAN card (e.g. G1170A Valve Drive or G4227A Flex Cube). These are hosted modules and require a Host module with firmware B.06.40 or later or with additional G1369C LAN Card.

NOTE

If an Agilent detector (DAD/MWD/FLD/VWD/RID) is in the system, the LAN should be connected to the DAD/MWD/FLD/VWD/RID (due to higher data load). If no Agilent detector is part of the system, the LAN interface should be installed in the pump or autosampler.

USB

The USB interface replaces the RS-232 Serial interface in new FUSION generation modules. For details on USB refer to “[USB \(Universal Serial Bus\)](#)” on page 152.

Analog Signal Output

The analog signal output can be distributed to a recording device. For details refer to the description of the module’s main board.

Remote (ERI)

The ERI (Enhanced Remote Interface) connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features as common shut down, prepare, and so on.

It allows easy connection between single instruments or systems to ensure coordinated analysis with simple coupling requirements.

The subminiature D connector is used. The module provides one remote connector which is inputs/outputs (wired- or technique).

To provide maximum safety within a distributed analysis system, one line is dedicated to **SHUT DOWN** the system’s critical parts in case any module detects a serious problem. To detect whether all participating modules are switched on or properly powered, one line is defined to summarize the **POWER ON** state of all connected modules. Control of analysis is maintained by signal readiness **READY** for next analysis, followed by **START** of run and optional **STOP** of run triggered on the respective lines. In addition **PREPARE** and **START REQUEST** may be issued. The signal levels are defined as:

- standard TTL levels (0 V is logic true, + 5.0 V is false),
- fan-out is 10,
- input load is 2.2 kOhm against + 5.0 V, and
- output are open collector type, inputs/outputs (wired- or technique).

NOTE

All common TTL circuits operate with a 5 V power supply. A TTL signal is defined as "low" or L when between 0 V and 0.8 V and "high" or H when between 2.0 V and 5.0 V (with respect to the ground terminal).

Table 10 ERI signal distribution

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

Special Interfaces

There is no special interface for this module.

ERI (Enhanced Remote Interface)

ERI replaces the AGP Remote Interface that is used in the HP 1090/1040/1050/1100 HPLC systems and Agilent 1100/1200/1200 Infinity HPLC modules. All new 1200 Infinity II products using the FUSION core electronics use ERI. This interface is already used in the Agilent Universal Interface Box 2 (UIB2)

ERI Description

The ERI interface contains eight individual programmable input/output pins. In addition, it provides 24 V power and 5 V power and a serial data line to detect and recognize further add-ons that could be connected to this interface. This way the interface can support various additional devices like sensors, triggers (in and out) and small controllers, etc.

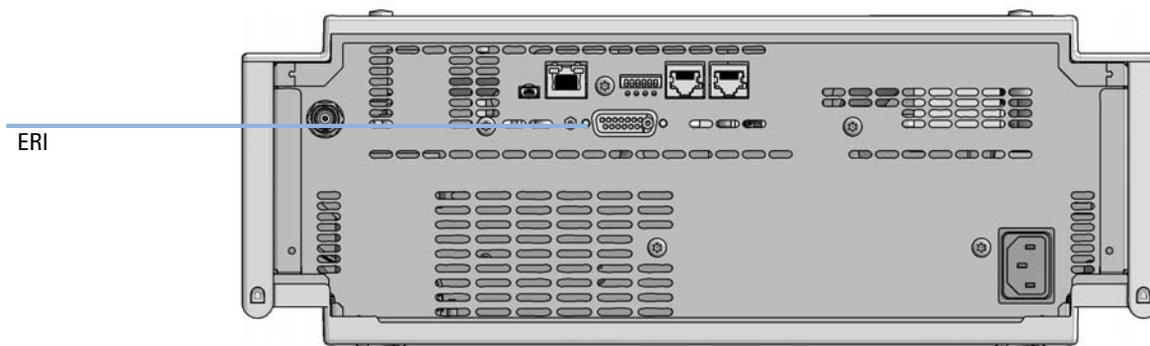


Figure 18 Location of the ERI interface (example shows a G7114A/B VWD)

	Pin	Enhanced Remote
<p>D-Sub female 15way user's view to connector</p> <p>IO 1 IO 2 IO 3 IO 4 IO 5 IO 6 IO 7 IO 8</p> <p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15</p> <p>1WEprom DGND +5V PGND PGND +24V +24V</p>	1	IO 1 (START REQUEST)
	2	IO 2 (STOP)
	3	IO 3 (READY)
	4	IO 4 (POWER ON)
	5	IO 5 (NOT USED)
	6	IO 6 (SHUT DOWN)
	7	IO 7 (START)
	8	IO 8 (PREPARE)
	9	1 wire DATA
	10	DGND
	11	+5 V ERI out
	12	PGND
	13	PGND
	14	+24 V ERI out
	15	+24 V ERI out

IO (Input/Output) Lines

- Eight generic bi-directional channels (input or output).
- Same as the APG Remote.
- Devices like valves, relays, ADCs, DACs, controllers can be supported/controlled.

1-Wire Data (Future Use)

This serial line can be used to read out an EPROM or write into an EPROM of a connected ERI-device. The firmware can detect the connected type of device automatically and update information in the device (if required).

5V Distribution (Future Use)

- Available directly after turn on of the hosting module (assures that certain base functionality of the device can be detected by firmware).
- For digital circuits or similar.
- Provided 500 mA maximum.
- Short-circuit proof with automatic switch off (by firmware).

24V Distribution (Future Use)

- Available by firmware command (defined turn on/off).
- For devices that need higher power
 - Class 0: 0.5 A maximum (12 W)
 - Class 1: 1.0 A maximum (24 W)
 - Class 2: 2.0 A maximum (48 W)
- Class depends on hosting module's internal power overhead.
- If a connected device requires more power the firmware detects this (overcurrent detection) and provides the information to the user interface.
- Fuse used for safety protection (on board).
- Short circuit will be detected through hardware.

USB (Universal Serial Bus)

USB (Universal Serial Bus) - replaces RS232, supports:

- a PC with control software (for example Agilent Lab Advisor)
- USB Flash Disk

2-bit Configuration Switch

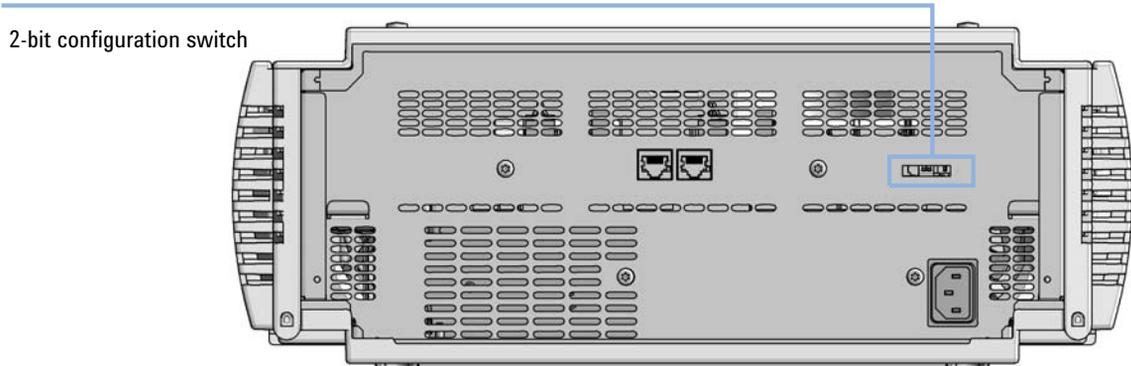


Figure 19 Location of Configuration Switch

Table 11 2 Switch Dip Settings for G7116A/B

Mode Select	1	2
Default	0	0
Coldstart	0	1
Boot resident	1	0
Not supported	1	1

(0 = up, 1 = down)

Instrument Layout

The industrial design of the module incorporates several innovative features. It uses Agilent's E-PAC concept for the packaging of electronics and mechanical assemblies. This concept is based upon the use of expanded polypropylene (EPP) layers of foam plastic spacers in which the mechanical and electronic boards components of the module are placed. This pack is then housed in a metal inner cabinet which is enclosed by a plastic external cabinet. The advantages of this packaging technology are:

- virtual elimination of fixing screws, bolts or ties, reducing the number of components and increasing the speed of assembly/disassembly,
- the plastic layers have air channels molded into them so that cooling air can be guided exactly to the required locations,
- the plastic layers help cushion the electronic and mechanical parts from physical shock, and
- the metal inner cabinet shields the internal electronics from electromagnetic interference and also helps to reduce or eliminate radio frequency emissions from the instrument itself.

Early Maintenance Feedback

Maintenance requires the exchange of components which are subject to wear or stress. Ideally, the frequency at which components are exchanged should be based on the intensity of usage of the module and the analytical conditions, and not on a predefined time interval. The early maintenance feedback (**EMF**) feature monitors the usage of specific components in the instrument, and provides feedback when the user-selectable limits have been exceeded. The visual feedback in the user interface provides an indication that maintenance procedures should be scheduled.

EMF Counters

EMF counters increment with use and can be assigned a maximum limit which provides visual feedback in the user interface when the limit is exceeded. Some counters can be reset to zero after the required maintenance procedure.

Lamp Type	Counter Reset	Comment
lamp with RFID tag	NO	
lamp without RFID tag	YES	via Lab Advisor or Instant Pilot

The detector provides the following EMF counters:

- Deuterium Lamp On-Time
- Number of UV lamp ignitions

Using the EMF Counters

The user-settable **EMF** limits for the **EMF Counters** enable the early maintenance feedback to be adapted to specific user requirements. The useful maintenance cycle is dependent on the requirements for use. Therefore, the definition of the maximum limits need to be determined based on the specific operating conditions of the instrument.

12 Hardware Information

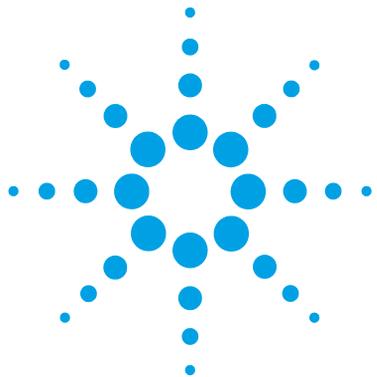
Early Maintenance Feedback

Setting the EMF Limits

The setting of the **EMF** limits must be optimized over one or two maintenance cycles. Initially the default **EMF** limits should be set. When instrument performance indicates maintenance is necessary, take note of the values displayed by the **EMF counters**. Enter these values (or values slightly less than the displayed values) as **EMF** limits, and then reset the **EMF counters** to zero. The next time the **EMF counters** exceed the new **EMF** limits, the **EMF** flag will be displayed, providing a reminder that maintenance needs to be scheduled.

NOTE

This function is only available via Agilent Lab Advisor or Instant Pilot.



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This chapter provides addition information on safety, legal and web.



General Safety Information

General Safety Information

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

WARNING

Ensure the proper usage of the equipment.

The protection provided by the equipment may be impaired.

→ The operator of this instrument is advised to use the equipment in a manner as specified in this manual.

Safety Standards

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

Before Applying Power

WARNING

Wrong voltage range, frequency or cabling

Personal injury or damage to the instrument

- Verify that the voltage range and frequency of your power distribution matches to the power specification of the individual instrument.
 - Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.
 - Make all connections to the unit before applying power.
-

NOTE

Note the instrument's external markings described under “[Safety Symbols](#)” on page 162.

Ground the Instrument

WARNING

Missing electrical ground

Electrical shock

- If your product is provided with a grounding type power plug, the instrument chassis and cover must be connected to an electrical ground to minimize shock hazard.
 - The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.
-

Do Not Operate in an Explosive Atmosphere

WARNING

Presence of flammable gases or fumes

Explosion hazard

→ Do not operate the instrument in the presence of flammable gases or fumes.

Do Not Remove the Instrument Cover

WARNING

Instrument covers removed

Electrical shock

→ Do Not Remove the Instrument Cover

→ Only Agilent authorized personnel are allowed to remove instrument covers. Always disconnect the power cables and any external circuits before removing the instrument cover.

Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Sales and Service Office for service and repair to ensure that safety features are maintained.

In Case of Damage

WARNING

Damage to the module

Personal injury (for example electrical shock, intoxication)

→ Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

Solvents

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.
- Do not use solvents with an auto-ignition temperature below 200 °C (392 °F). Do not use solvents with a boiling point below 56 °C (133 °F).
- Avoid high vapor concentrations. Always keep the temperature in the sample compartment at least 25 K below the boiling point of the solvent used.
- Do not operate the instrument in an explosive atmosphere.
- Reduce the volume of substances to the minimum required for the analysis.
- Never exceed the maximum permissible volume of solvents (8 L) in the solvent cabinet. Do not use bottles that exceed the maximum permissible volume as specified in the usage guideline for solvent cabinet.
- Ground the waste container.
- Regularly check the filling level of the waste container. The residual free volume in the waste container must be large enough to collect the waste liquid.
- To achieve maximal safety, regularly check the tubing for correct installation.

NOTE

For details, see the usage guideline for the solvent cabinet. A printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available in the Agilent Information Center or via the Internet.

Safety Symbols

Table 12 Symbols

	The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect risk of harm to the operator and to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.
	The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.
	Cooling unit is designed as vapor-compression refrigeration system. Contains fluorinated greenhouse gas (refrigerant) according to the Kyoto protocol. For specifications of refrigerant, charge capacity, carbon dioxide equivalent (CDE), and global warming potential (GWP) see instrument label.
	Confirms that a manufactured product complies with all applicable European Community directives. The European Declaration of Conformity is available at: http://regulations.corporate.agilent.com/DoC/search.htm
	Manufacturing date.
	Power symbol indicates On/Off. The apparatus is not completely disconnected from the mains supply when the power switch is in the Off position
	Pacemaker Magnets could affect the functioning of pacemakers and implanted heart defibrillators. A pacemaker could switch into test mode and cause illness. A heart defibrillator may stop working. If you wear these devices keep at least 55 mm distance to magnets. Warn others who wear these devices from getting too close to magnets.

Table 12 Symbols

	<p>Magnetic field Magnets produce a far-reaching, strong magnetic field. They could damage TVs and laptops, computer hard drives, credit and ATM cards, data storage media, mechanical watches, hearing aids and speakers. Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.</p>
	<p>Indicates a pinching or crushing hazard</p>
	<p>Indicates a piercing or cutting hazard.</p>

WARNING

A WARNING

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

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

CAUTION

A CAUTION

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

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

Refrigerant

The refrigerant HFC-134a is used only in the Agilent Infinity II Sample Cooler.

Table 13 Physical properties of refrigerant HFC-134a

Molecular weight	102
Critical temperature	101.1 °C
Critical pressure	40.6 bar
Boiling point	-26.5 °C

WARNING

Refrigerant



Refrigerant HFC-134a is known as a safe refrigerant, however accidents can occur if it is handled incorrectly. For this reason, the following instructions must be observed:

- Avoid contact with liquid refrigerant HFC-134a. At atmospheric pressure HFC-134a evaporates at approximately -26 °C and causes frost bite.
 - After skin contact, rinse the affected area with water.
 - After eye contact, rinse the eye(s) with plenty of water for at least 15 minutes and consult a doctor.
 - HFC-134a must not be allowed to escape in enclosed areas. Although HFC-134a is not toxic, there is a danger of suffocation as gaseous refrigerant is heavier than air.
 - Please observe the following first aid instructions. After inhalation, move the affected person to fresh air, keep him warm and allow him to rest. If necessary, he should be supplied with oxygen. If he has stopped breathing or is breathing erratically, he should be given artificial respiration. In the case of cardiac arrest, carry out heart massage. Send for a doctor immediately.
 - Moreover, it must be noted that HFC-134a must always be extracted from the system and collected. It must never be discharged into the atmosphere on environmental grounds (greenhouse effect).
-

CAUTION

General hazards and improper disposal

Improper disposal of the media and components used pollutes the environment.

- The breakdown of the sample cooler unit must be carried out by specialist refrigeration company.
 - All media must be disposed of in accordance with national and local regulations.
 - Please contact your local Agilent Service Center in regard to safe environmental disposal of the appliance or check www.agilent.com for more info.
-

Waste Electrical and Electronic Equipment Directive

Abstract

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

NOTE

This product complies with the WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category:

With reference to the equipment types in the WEEE Directive Annex I, this product is classed as a Monitoring and Control Instrumentation product.



NOTE

Do not dispose of in domestic household waste

To return unwanted products, contact your local Agilent office, or see <http://www.agilent.com> for more information.

Radio Interference

Cables supplied by Agilent Technologies are screened to provide optimized protection against radio interference. All cables are in compliance with safety or EMC regulations.

Test and Measurement

If test and measurement equipment is operated with unscreened cables, or used for measurements on open set-ups, the user has to assure that under operating conditions the radio interference limits are still met within the premises.

Sound Emission

Manufacturer's Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive of 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB.

- Sound Pressure $L_p < 70$ dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/1991 (Type Test)

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<http://www.agilent.com>

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In This Book

This manual contains technical reference information about the Agilent 1260 Infinity II Multicolumn Thermostat (G7116A).

The manual describes the following:

- Introduction,
- requirements and specifications,
- using and optimizing,
- troubleshooting and diagnose,
- maintenance,
- parts identification,
- hardware information,
- safety and related information.

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