Agilent 1260 Infinity Thermostatted Column Compartment

User Manual

Agilent Technologies

Notices

Manual Part Number

G1316-90013

Edition

06/2010

Printed in Germany

Agilent Technologies
Hewlett-Packard-Strasse 8
76337 Waldbronn

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In This Guide...

This manual covers the Agilent 1260 Infinity Thermostatted Column Compartments (G1316A TCC).

1 Introduction to the Column Compartment

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

2 Site Requirements and Specifications

This chapter provides information about site requirements and specifications for the module.

3 Installing the Column Compartment

This chapter describes the installation of the thermostatted column compartment.

4 How to optimize the Column Compartment

This chapter provides information on how to optimize the thermostatted column compartement.

5 Troubleshooting and Diagnostics

Overview about the troubleshooting and diagnostic features.

6 Error Information

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

7 Test Functions

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

8 Maintenance

This chapter describes the maintenance and repair of the TCC.

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10 Identifying Cables

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Contents

1 Introduction to the Column Compartment

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

Main Features

The Agilent 1260 Infinity Thermostatted Column Compartment is a stackable temperature-controlled column compartment for LC. It is used for heating and cooling to meet extreme requirements of retention time reproducibility.

The main features are:

- Peltier heating and cooling from 10 degrees below ambient up to 80 °C with high heating and cooling speeds for maximum application flexibility and stability.
- Holds up to three 30 cm columns and optimized design gives minimum dead volumes and maximum efficiency.
- Two independently programmable heat exchangers contribute volumes of only 3 µL and 6 µL.
- Electronic column-identification module as standard for GLP documentation of column type and major column parameters.
- Optional high-quality Rheodyne® column switching valves with ceramic stator-face assemblies for prolonged lifetime.

For specifications, see “Performance Specifications” on page 38.

System Overview

The Concept of Heating and Cooling

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

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

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

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

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

"Column Thermostat Temperature Calibration" on page 82 shows a setpoint temperature of 40 °C. Some time after entering the setpoint the heat exchanger has reached its temperature and the control activity starts. The **TEMPERATURE NOT READY** signal will be cancelled 20 seconds after the sensed temperature was within a range of ± 0.5 °C of the setpoint (other values can be set via the user interface). However this does not necessarily mean that the column has already reached the correct temperature. The equilibration of the column may take longer. Stability of the pressure signal is a good indication for equilibrium.

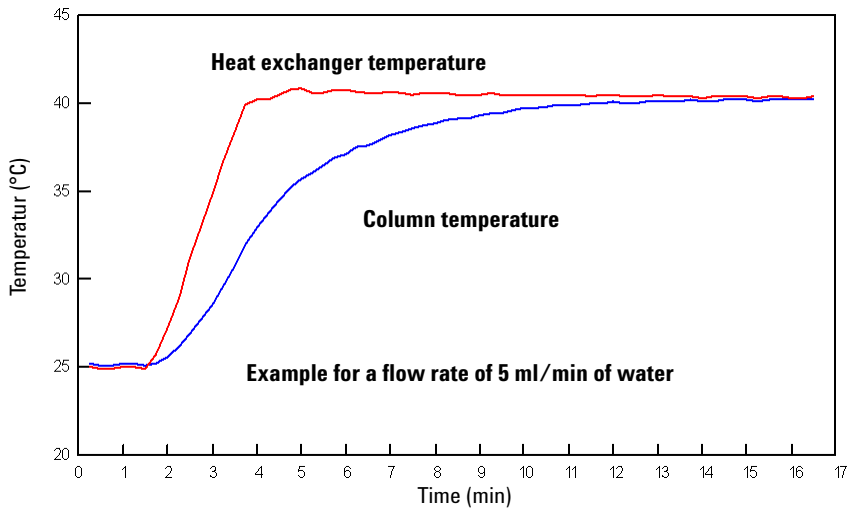

Figure 1 Equilibration of Heat Exchanger and Column Temperature

The temperature calibration and verification is described in the Service Manual.

Column-Identification System

The Agilent 1260 Infinity Thermostatted Column Compartment is equipped with a column-identification system. It allows to read and write column-specific information to and from the column-identification tag.

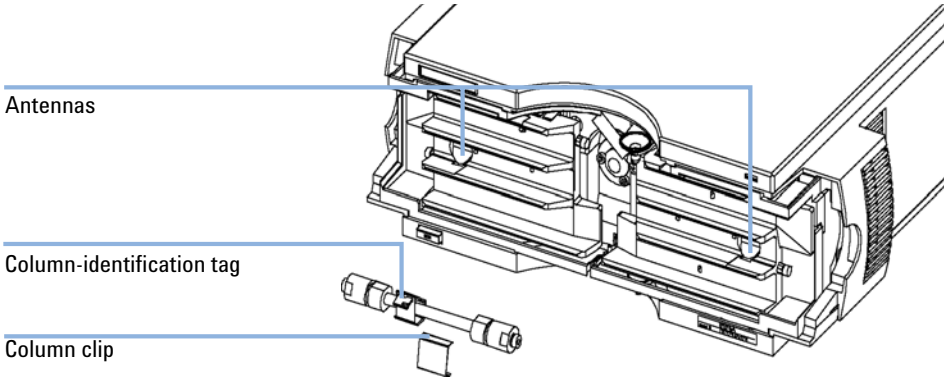

Figure 2 Column-Identification System

Table 1 on page 13 shows the information that can be stored. The information fields can be edited via the user interface.

Table 1 Column-Identification Module Information

Item	Example	Comment
Product number	79916OD-552	
Serial number	950522	Date of manufacturing
Batch number	1675	
Geometry	100 mm × 2.1 mm	
Stationary phase	ODS Hypersil	
Particle size	10 µm	
Number of injections	1267	See below.
Maximum pressure allowed	400 bar	

Table 1 Column-Identification Module Information

Item	Example	Comment
Maximum temperature recommended	70 °C	
Maximum pH recommended	12	
Column void volume		

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

NOTE

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

Column Switching Valve (Optional)

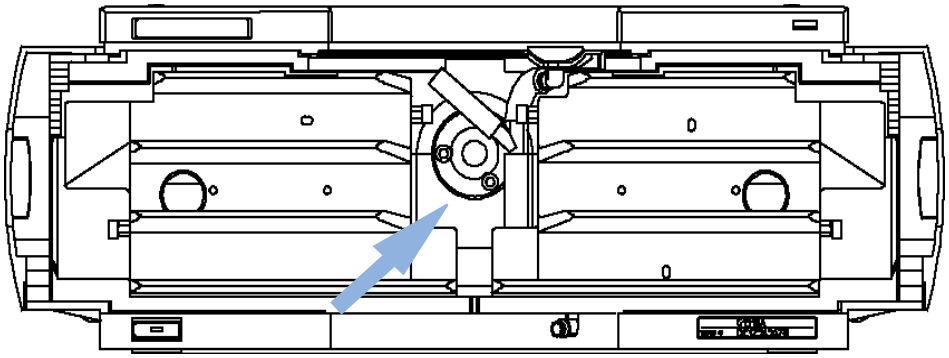

Figure 3 Location of Column Switching Valve

Two Column Selection

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

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

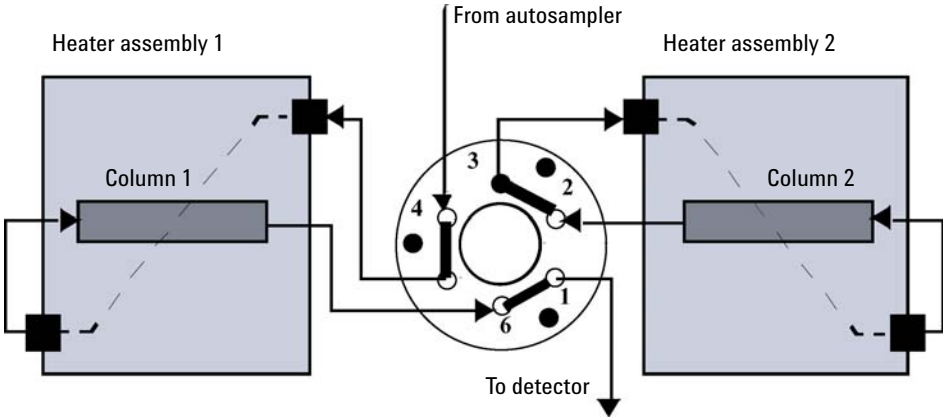

Figure 4 Column 1 Active

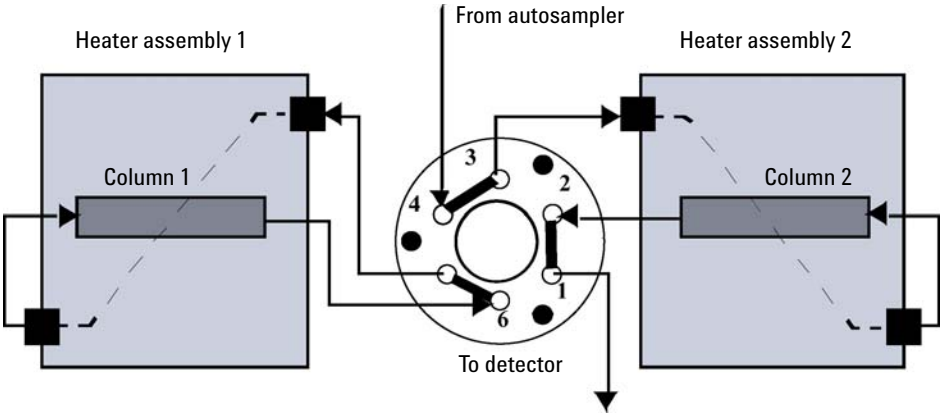

Figure 5 Column 2 Active

Precolumn Back-flushing

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

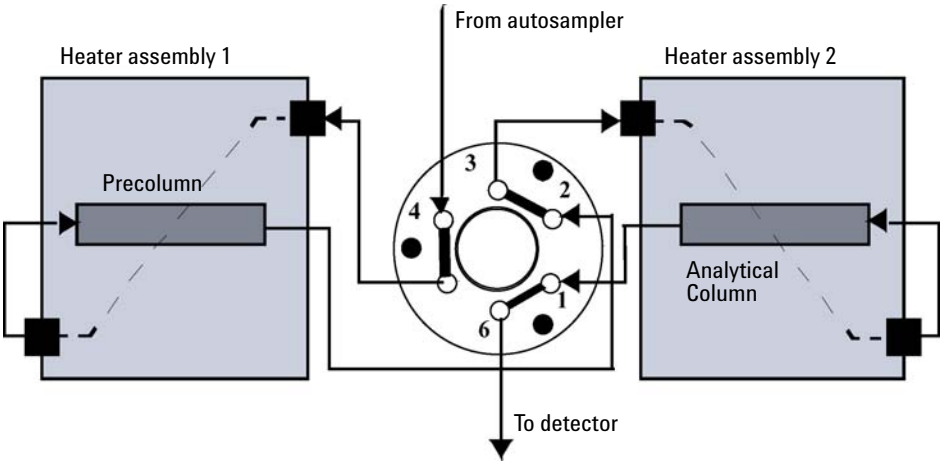

Figure 6 Precolumn Back-flushing

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.

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 REMOTE connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features such as start, stop, common shut down, prepare, and so on.
- With the appropriate software, the RS-232C connector may be used to control the module from a computer through a RS-232C connection. This connector is activated and can be configured with the configuration switch.
- The power input socket accepts a line voltage of 100 – 240 VAC ± 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.

Serial Number Information 1260 Infinity

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

CCXZZ00000	Format
CC	Country of manufacturing (DE Germany)
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

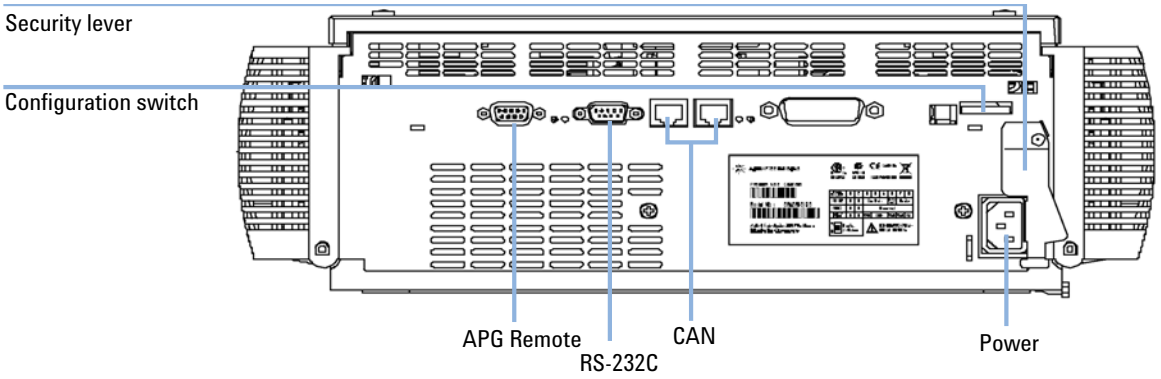

Figure 7 Rear View of the Thermostatted Column Compartment

NOTE The GPIB interface has been removed with the introduction of the 1260 Infinity modules.

Interfaces

The Agilent 1200 Infinity Series modules provide the following interfaces:

Table 2 Agilent 1200 Infinity Series Interfaces

Module	CAN	LAN/BCD (optional)	LAN (on-board)	RS-232	Analog	APG Remote	Special
Pumps							
G1310B Iso Pump G1311B Quat Pump G1311C Quat Pump VL G1312B Bin Pump G1312C Bin Pump VL 1376A Cap Pump G2226A Nano Pump	2	Yes	No	Yes	1	Yes	
G4220A/B Bin Pump	2	No	Yes	Yes	No	Yes	
G1361A Prep Pump	2	Yes	No	Yes	No	Yes	CAN-DC- OUT for CAN slaves
Samplers							
G1329B ALS G2260A Prep ALS	2	Yes	No	Yes	No	Yes	THERMOSTAT for G1330B
G1364B FC-PS G1364C FC-AS G1364D FC-µS G1367E HiP ALS G1377A HiP micro ALS G2258A DL ALS	2	Yes	No	Yes	No	Yes	THERMOSTAT for G1330B CAN-DC- OUT for CAN slaves
G4226A ALS	2	Yes	No	Yes	No	Yes	
Detectors							
G1314B VWD VL G1314C VWD VL+	2	Yes	No	Yes	1	Yes	
G1314E/F VWD	2	No	Yes	Yes	1	Yes	

Table 2 Agilent 1200 Infinity Series Interfaces

Module	CAN	LAN/BCD (optional)	LAN (on-board)	RS-232	Analog	APG Remote	Special
G4212A/B DAD	2	No	Yes	Yes	1	Yes	
G1315C DAD VL+ G1365C MWD G1315D DAD VL G1365D MWD VL	2	No	Yes	Yes	2	Yes	
G1321B FLD G1362A RID	2	Yes	No	Yes	1	Yes	
G4280A ELSD	No	No	No	Yes	Yes	Yes	EXT Contact AUTOZERO
Others							
G1316A/C TCC	2	No	No	Yes	No	Yes	
G1322A DEG	No	No	No	No	No	Yes	AUX
G1379B DEG	No	No	No	Yes	No	No	AUX
G4227A Flex Cube	2	No	No	No	No	No	
G4240A CHIP CUBE	2	Yes	No	Yes	No	Yes	CAN-DC- OUT for CAN slaves THERMOSTAT for G1330A/B (NOT USED)

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
- 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 G1369A/B 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 connected PC with the appropriate control software.

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.

RS-232C (Serial)

The RS-232C connector is used to control the module from a computer through RS-232C connection, using the appropriate software. This connector can be configured with the configuration switch module at the rear of the module. Refer to *Communication Settings for RS-232C*.

NOTE There is no configuration possible on main boards with on-board LAN. These are pre-configured for

- 19200 baud,
- 8 data bit with no parity and
- one start bit and one stop bit are always used (not selectable).

The RS-232C is designed as DCE (data communication equipment) with a 9-pin male SUB-D type connector. The pins are defined as:

Table 3 RS-232C Connection Table

Pin	Direction	Function
1	In	DCD
2	In	RxD
3	Out	TxD
4	Out	DTR
5		Ground
6	In	DSR
7	Out	RTS
8	In	CTS
9	In	RI

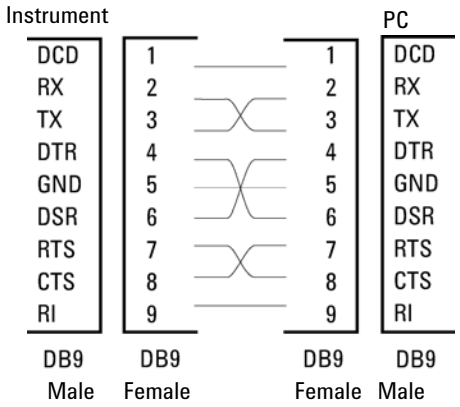

Figure 8 RS-232 Cable

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.

APG Remote

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

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

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

To provide maximum safety within a distributed analysis system, one line is dedicated to **SHUT DOWN** the system's critical parts in case any module detects a serious problem. To detect whether all participating modules are switched on or properly powered, one line is defined to summarize the **POWER ON** state of all connected modules. Control of analysis is maintained by signal readiness **READY** for next analysis, followed by **START** of run and optional **STOP** of run triggered on the respective lines. In addition **PREPARE** and **START REQUEST** may be issued. The signal 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 4 Remote Signal Distribution

Pin	Signal	Description
1	DGND	Digital ground
2	PREPARE	(L) Request to prepare for analysis (for example, calibration, detector lamp on). Receiver is any module performing pre-analysis activities.
3	START	(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.
4	SHUT DOWN	(L) System has serious problem (for example, leak: stops pump). Receiver is any module capable to reduce safety risk.

Table 4 Remote Signal Distribution

Pin	Signal	Description
5		Not used
6	POWER ON	(H) All modules connected to system are switched on. Receiver is any module relying on operation of others.
7	READY	(H) System is ready for next analysis. Receiver is any sequence controller.
8	STOP	(L) Request to reach system ready state as soon as possible (for example, stop run, abort or finish and stop injection). Receiver is any module performing run-time controlled activities.
9	START REQUEST	(L) Request to start injection cycle (for example, by start key on any module). Receiver is the autosampler.

Special Interfaces

Some modules have module specific interfaces/connectors. They are described in the module documentation.

Setting the 8-bit Configuration Switch (without On-Board LAN)

The 8-bit configuration switch is located at the rear of the module.

Modules that do not have their own LAN interface (e.g. the TCC) can be controlled through the LAN interface of another module and a CAN connection to that module.

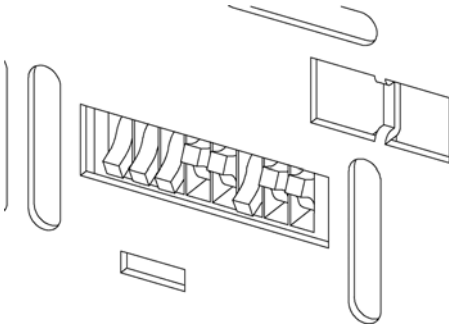

Figure 9 Configuration switch (settings depend on configured mode)

All modules without on-board LAN:

- default is ALL DIPS DOWN (best settings) - Bootp mode for LAN
- for boot/test modes DIPS 1+2 must be UP plus required mode

Switch settings provide configuration parameters for GPIB address, serial communication protocol and instrument specific initialization procedures.

NOTE With the introduction of the Agilent 1260 Infinity, all GPIB interfaces have been removed. The preferred communication is LAN.

NOTE The following tables represent the configuration switch settings for the modules without on-board LAN only.

Table 5 8-bit Configuration Switch (without on-board LAN)

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

NOTE The LAN settings are done on the LAN Interface Card G1369A/B. Refer to the documentation provided with the card.

Communication Settings for RS-232C

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

Switches 1 in down and 2 in up position define that the RS-232C parameters will be changed. Once the change has been completed, the column instrument must be powered up again in order to store the values in the non-volatile memory.

Table 6 Communication Settings for RS-232C Communication (without on-board LAN)

Mode Select	1	2	3	4	5	6	7	8
RS-232C	0	1	Baudrate			Data Bits	Parity	

Use the following tables for selecting the setting which you want to use for RS-232C communication. The number 0 means that the switch is down and 1 means that the switch is up.

Table 7 Baudrate Settings (without on-board LAN)

Switches			Baud Rate	Switches			Baud Rate
3	**4**	**5**		**3**	**4**	**5**	
0	0	0	9600	1	0	0	9600
0	0	1	1200	1	0	1	14400
0	1	0	2400	1	1	0	19200
0	1	1	4800	1	1	1	38400

Table 8 Data Bit Settings (without on-board LAN)

Switch 6	Data Word Size
0	7 Bit Communication
1	8 Bit Communication

Table 9 Parity Settings (without on-board LAN)

Switches		Parity
7	8	
0	0	No Parity
1	0	Odd Parity
1	1	Even Parity

One start bit and one stop bit are always used (not selectable).

Per default, the module will turn into 19200 baud, 8 data bit with no parity.

Special Settings

The special settings are required for specific actions (normally in a service case).

NOTE The tables include both settings for modules – with on-board LAN and without on-board LAN. They are identified as LAN and no LAN.

Boot-Resident

Firmware update procedures may require this mode in case of firmware loading errors (main firmware part).

If you use the following switch settings and power the instrument up again, the instrument firmware stays in the resident mode. It is not operable as a module. It only uses basic functions of the operating system for example, for communication. In this mode the main firmware can be loaded (using update utilities).

Table 10 Boot Resident Settings (without on-board LAN)

	Mode Select	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
LAN	TEST/BOOT	1	1	1	0	0	0	0	0
No LAN	TEST/BOOT	1	1	0	0	1	0	0	0

Forced Cold Start

A forced cold start can be used to bring the module into a defined mode with default parameter settings.

CAUTION Loss of data

Forced cold start erases all methods and data stored in the non-volatile memory. Exceptions are diagnosis and repair log books which will not be erased.

➔ Save your methods and data before executing a forced cold start.

If you use the following switch settings and power the instrument up again, a forced cold start has been completed.

Table 11 Forced Cold Start Settings (without on-board LAN)

	Mode Select	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
LAN	TEST/BOOT	1	1	0	0	0	0	0	1
No LAN	TEST/BOOT	1	1	0	0	1	0	0	1

2
Site Requirements and Specifications

This chapter provides information about site requirements and specifications for the module.

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 12 on page 37. 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

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.

CAUTION

Unaccessable power plug.

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

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

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

Power Cords

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

WARNING

Absence of ground connection or use of unspecified power cord

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

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

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

WARNING

Use of unsupplied cables

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

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

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 the power cords that Agilent Technologies supplies with this instrument for any other equipment.

Bench Space

The module dimensions and weight (see Table 12 on page 37) 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 should carry an Agilent system, make sure that the bench is designed to bear the weight of all modules.

The module should be operated in a horizontal position.

Condensation

CAUTION

Condensation within the module

Condensation will 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 12 Physical Specifications

Type	Specification	Comments
Weight	11.2 kg (22 lbs)	
Dimensions (height × width × depth)	140 x 345 x 435 mm (5.5 x 13.5 x 17 inches)	
Line voltage	100 – 240 VAC, ± 10%	Wide-ranging capability
Line frequency	50 or 60 Hz, ± 5%	
Power consumption	320 VA / 150W / 512 BTU	Maximum
Ambient operating temperature	0–55 °C (32–131 °F)	
Ambient non-operating temperature	-40–70 °C (-4–158 °F)	
Humidity	< 95%, at 25–40 °C (77–104 °F)	Non-condensing
Operating Altitude	Up to 2000 m (6562 ft)	
Non-operating altitude	Up to 4600 m (15091 ft)	For storing the module
Safety standards: IEC, CSA, UL	Installation Category II, Pollution Degree 2	For indoor use only.

Performance Specifications

Table 13 Performance Specifications Thermostatted Column Compartment

Type	Specification	Comments
Temperature range	10 degrees below ambient to 80 °C up to 80 °C: flow rates up to 5 mL/min	
Temperature stability	± 0.15 °C	
Temperature accuracy	± 0.8 °C ± 0.5 °C	 With calibration
Column capacity	Three 30 cm	
Warm-up/cool-down time	5 minutes from ambient to 40 °C 10 minutes from 40 – 20 °C	
Dead volume	3 µL left heat exchanger 6 µL right heat exchanger	
Communications	Controller-area network (CAN), RS-232C, APG Remote: ready, start, stop and shut-down signals, LAN via other 1260 Infinity module	
Safety and maintenance	Extensive diagnostics, error detection and display (through Instant Pilot and Agilent data system), leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in major maintenance areas.	
GLP features	Column-identification module for GLP documentation of column type, see "Column-Identification System" on page 13	
Housing	All materials recyclable	

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

3 Installing the Column Compartment

This chapter describes the installation of the thermostatted column compartment.

Unpacking the Column Compartment

If the delivery packaging shows signs of external damage, please call your Agilent Technologies sales and service office immediately. Inform your service representative that the instrument may have been damaged during shipment.

CAUTION

"Defective on arrival" problems

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

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

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

Delivery Checklist

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

Table 14 Column Compartment Delivery Checklist

Description	Quantity
Thermostatted column compartment	1
Power cable	1
CAN cable	1
Column switching valve	optional
User Manual (on User Documentation CD)	1
Accessory kit (see "Accessory Kits" on page 115)	1

Optimizing the Stack Configuration

One Stack Configuration

Ensure optimum performance by installing the modules of the Agilent 1260 Infinity LC in the following configuration (see Figure 10 on page 42 and Figure 11 on page 43). This configuration optimizes the flow path for minimum delay volume and minimizes the bench space required.

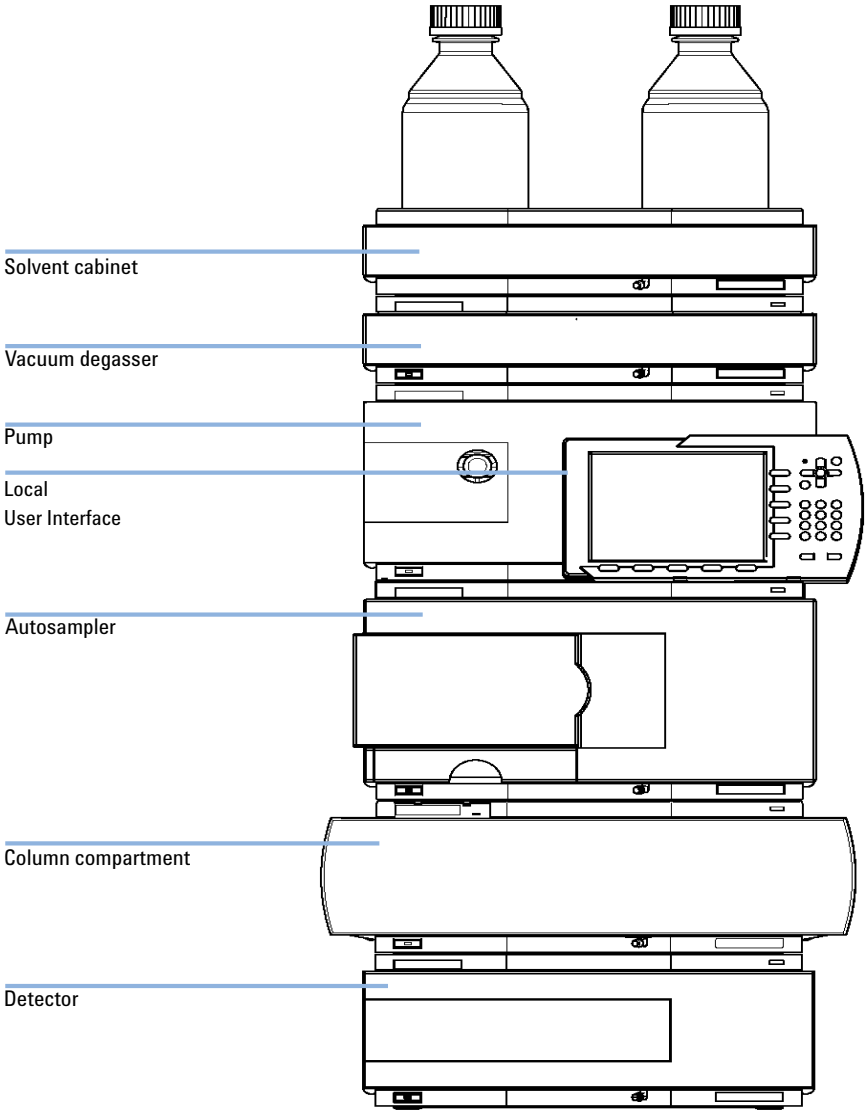

Figure 10 Recommended Stack Configuration (Front View)

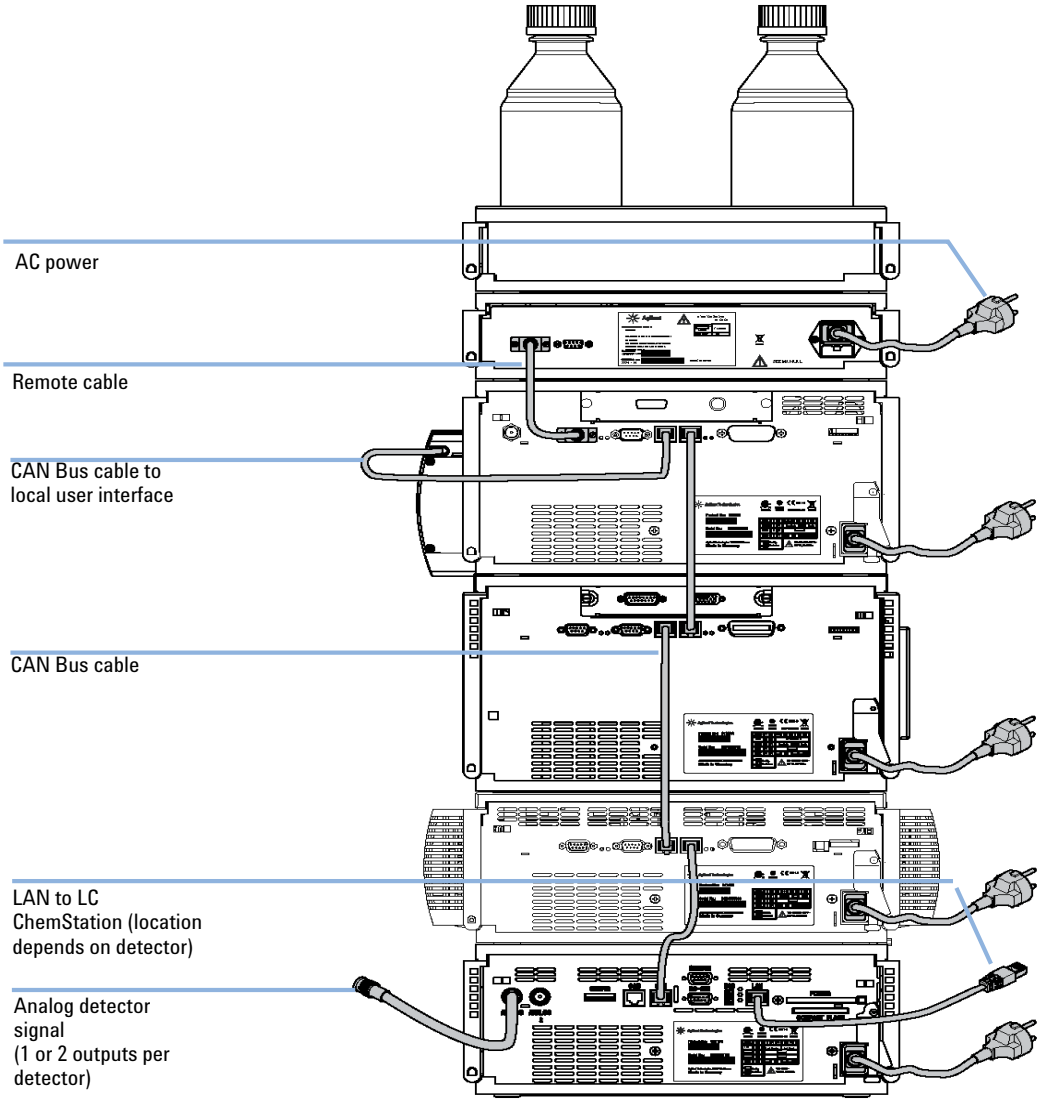

Figure 11 Recommended Stack Configuration (Rear View)

Two Stack Configuration

To avoid excessive height of the stack when the autosampler thermostat is added to the system it is recommended to form two stacks. Some users prefer the lower height of this arrangement even without the autosampler thermostat. A slightly longer capillary is required between the pump and autosampler. See Figure 12 on page 44 and Figure 13 on page 45.

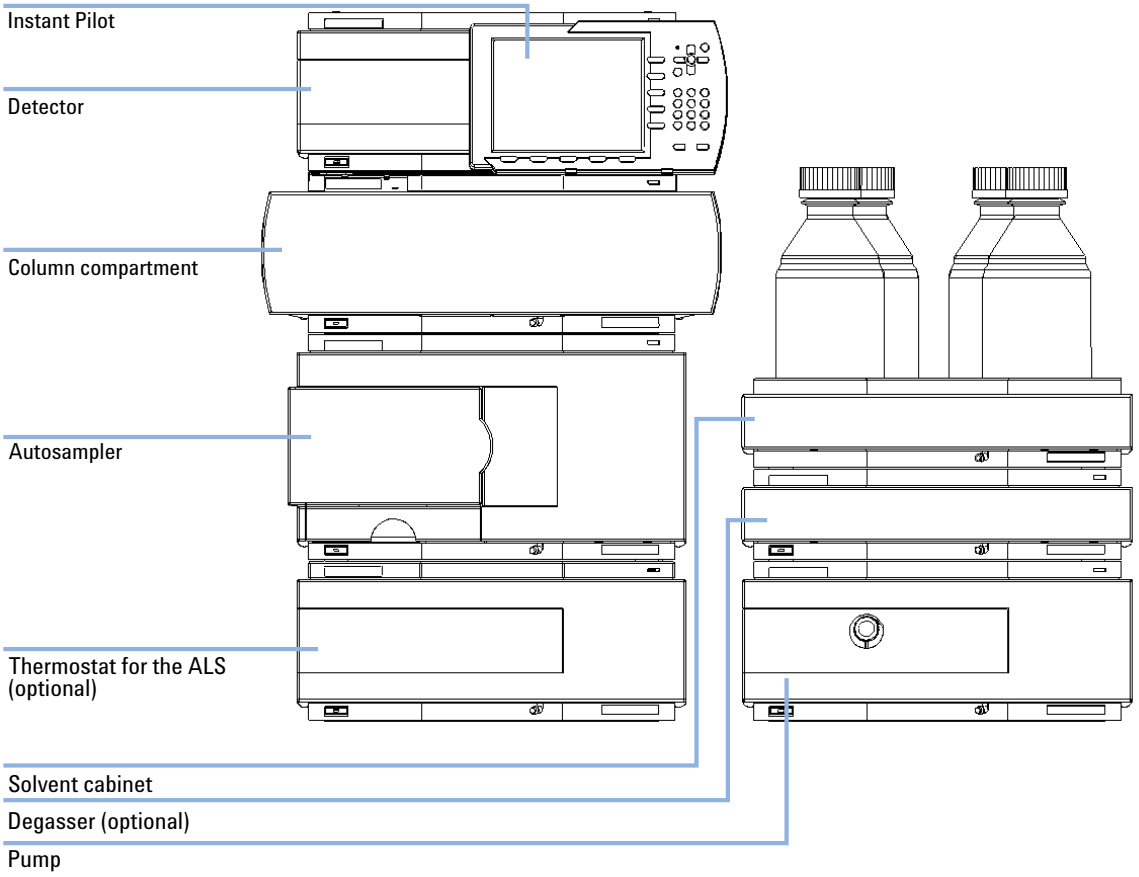

Figure 12 Two stack configuration (front view)

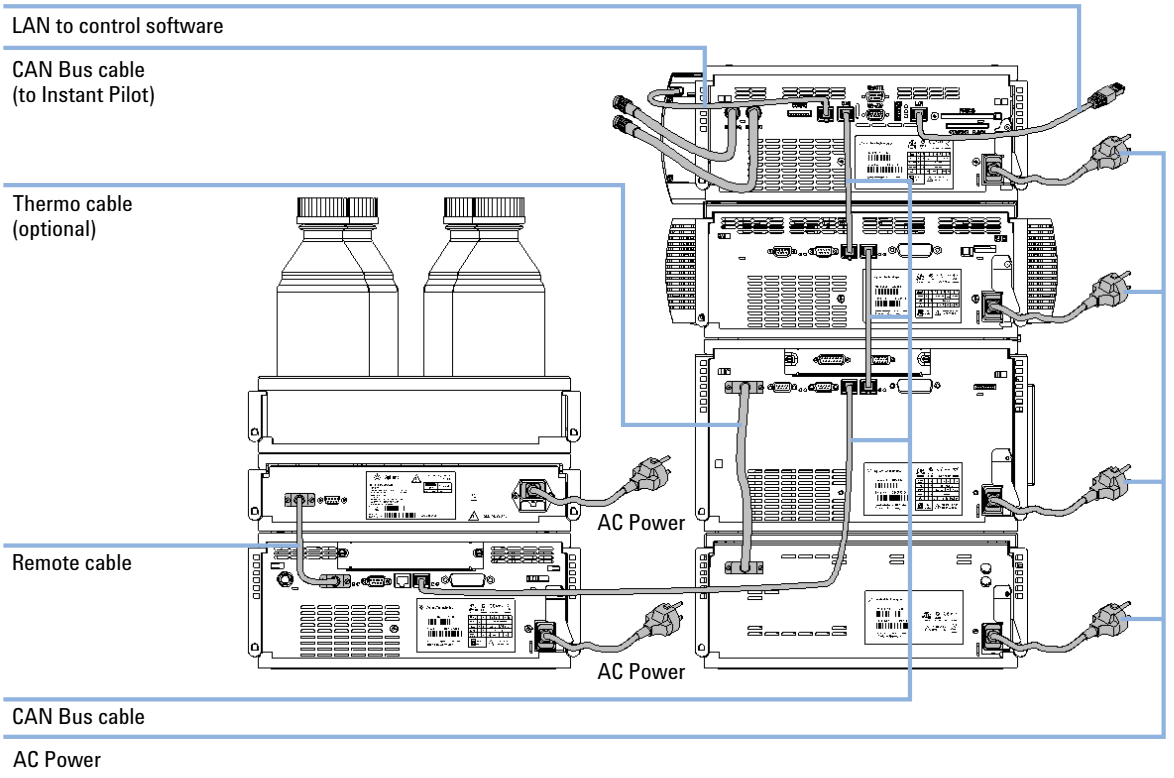

Figure 13 Two stack configuration (rear view)

Installing the Column Compartment

Parts required

#	Description
1	Column compartment
1	Power cord
1	For other cables see text below

Preparations

Locate bench space.

Provide power connections.

Unpack the Column compartment.

WARNING

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

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

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

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

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

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

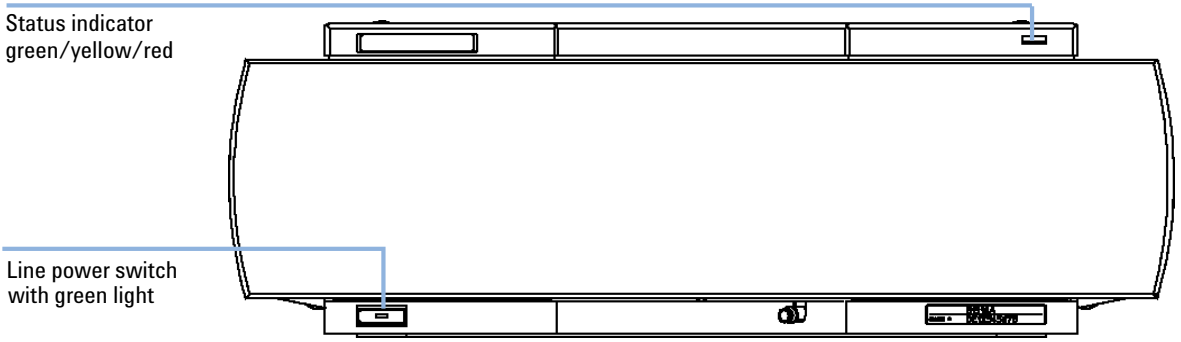


Figure 14 Front View of the Thermostatted Column Compartment

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

4 Connect the CAN cable to other Agilent 1260 Infinity modules.

5 If Agilent ChemStation is the controller, connect the LAN connection to the LAN interface board in the detector.

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

6 Connect the APG Remote cable (optional) for non-Agilent 1260 Infinity modules.

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

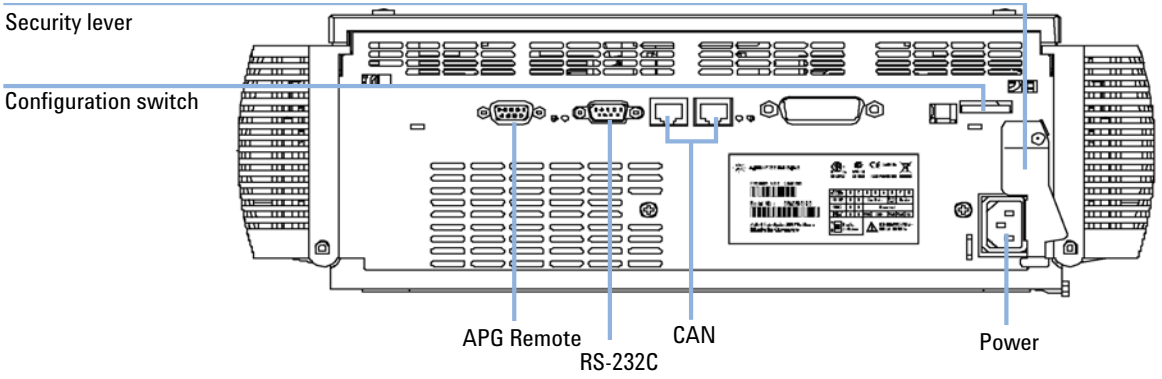


Figure 15 Rear View of the Thermostatted Column Compartment

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

Flow Connections of the Column Compartment

Parts required

#	Description
1	Other modules
1	Parts from Accessory Kit
1	Two wrenches 1/4 – 5/16 inch for capillary connections

Preparations Install the column compartment

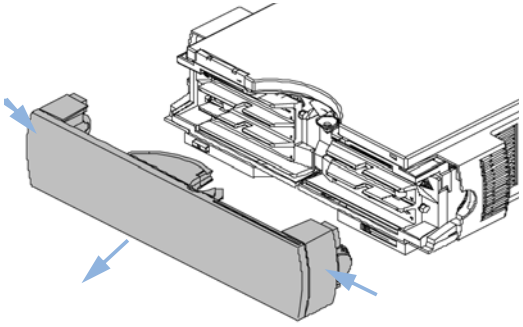
WARNING

Toxic, flammable and hazardous solvents, samples and reagents

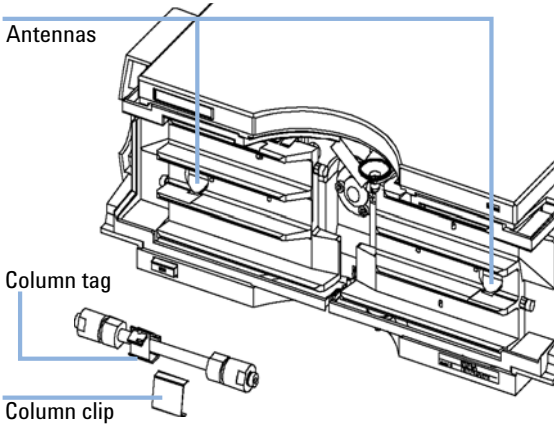
The handling of solvents, samples and reagents can hold health and safety risks.

- ➔ 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 amount of substances should be reduced to the minimal volume required for the analysis.
- ➔ Do not operate the instrument in an explosive atmosphere.

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



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



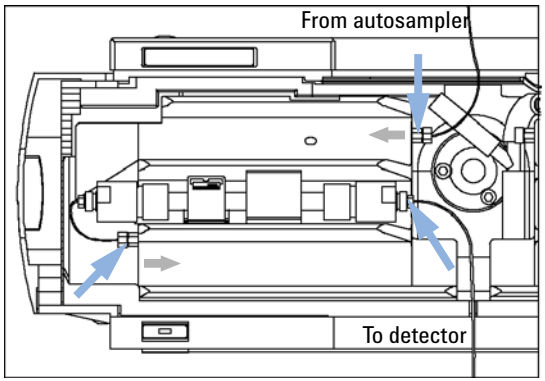
NOTE

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

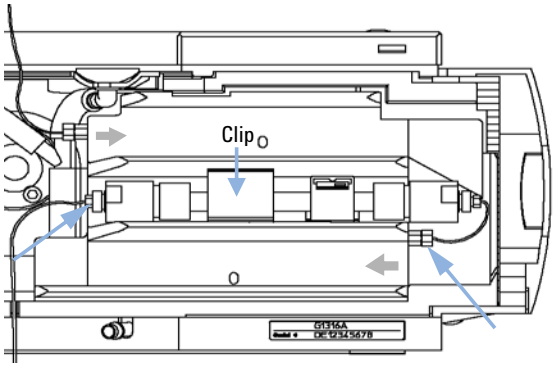
NOTE

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

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



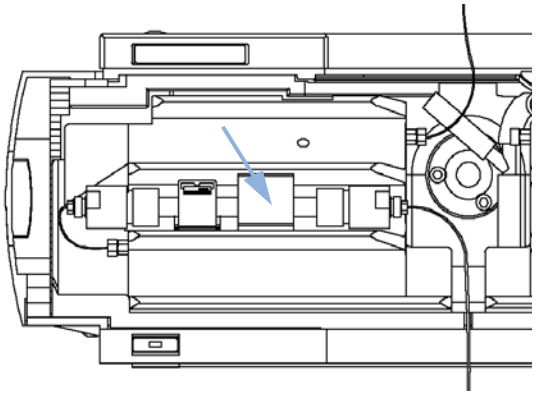
4 Or place the column on the right heat exchanger assembly and connect the capillaries to the column.



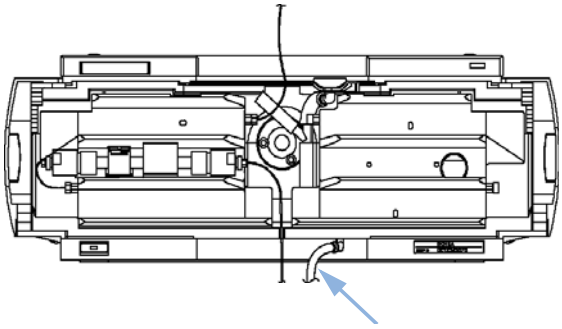
NOTE

See "Column Switching Valve (Optional)" on page 15 on how to connect the column selection valve.

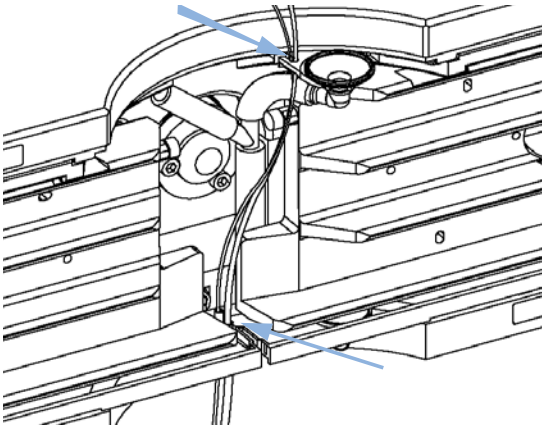
5 Fix the column with the column clip from the accessory kit.



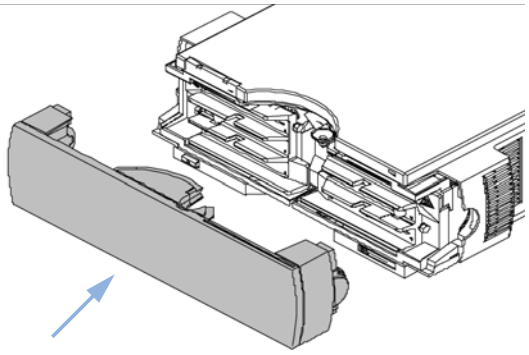
6 If the column compartment is not part of an Agilent 1200 Infinity Series system, or if an Agilent 1200 Infinity Series autosampler is located on top, connect the corrugated tubing to the waste outlet.



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



8 Put the front cover back in place.



The installation of the column compartment has now been completed.

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

Placing Columns

Column-Identification Tag

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

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

NOTE The tag needs to be placed differently, depending on whether the column is installed at the left or right heat exchanger, see Figure 16 on page 53 and Figure 17 on page 53. The Agilent logo should always be at front.

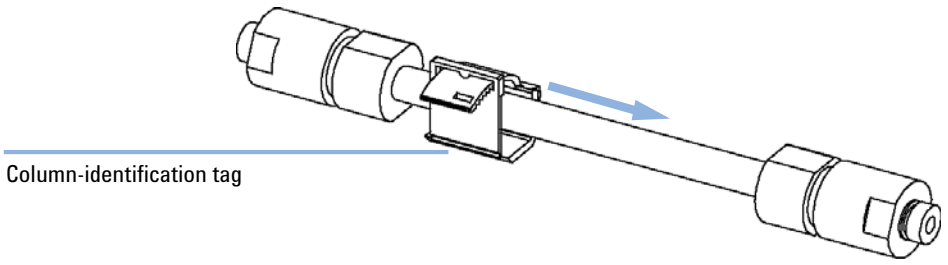


Figure 16 Column-Identification Tag for Left Heat Exchanger

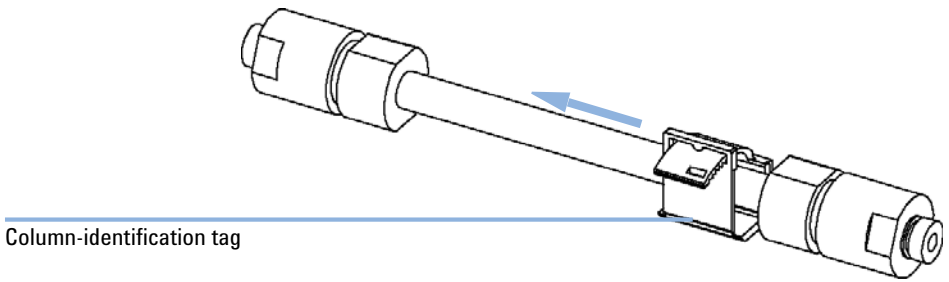


Figure 17 Column-Identification Tag for Right Heat Exchanger

Column Clip

For better positioning of the column on the heat exchanger a column clip is available (see “Accessory Kits” on page 115).

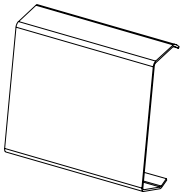


Figure 18 Column clip

4
How to optimize the Column Compartment

This chapter provides information on how to optimize the thermostatted column compartement.

Optimizing the Performance of your Column Compartment

For best performance results of the column compartment:

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

5 Troubleshooting and Diagnostics

Overview about the troubleshooting and diagnostic features.

Overview of the Module's Indicators and Test Functions

Status Indicators

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

Error Messages

In the event of an electronic, mechanical or hydraulic failure, the module generates an error message in the user interface. For each message, a short description of the failure, a list of probable causes of the problem, and a list of suggested actions to fix the problem are provided (see chapter Error Information).

Test Functions

A series of test functions are available for troubleshooting and operational verification after exchanging internal components (see Tests and Calibrations).

Thermostat Diagnostic Test

The **Thermostat Diagnostic Test** evaluates the heating and cooling efficiency of the two peltier elements.

Temperature Calibration and Verification

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

The following sections describe these functions in detail.

Status Indicators

Two status indicators are located on the front of the module. The lower left indicates the power supply status, the upper right indicates the module status.

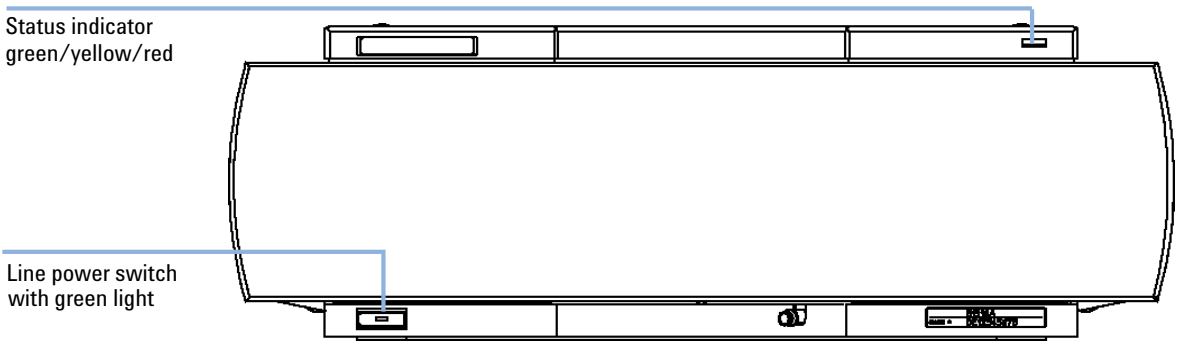


Figure 19 Location of Status indicators

Power Supply Indicator

The power supply indicator is integrated into the main power switch. When the indicator is illuminated (*green*) the power is *ON*.

Module Status Indicator

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

- When the status indicator is *OFF* (and power switch light is on), the module is in a *prerun* condition, and is ready to begin an analysis.
- A *green* status indicator, indicates the module is performing an analysis (*run* mode).
- A *yellow* indicator indicates a *not-ready* condition. The module is in a not-ready state when it is waiting for a specific condition to be reached or completed (for example, immediately after changing a set point), or while a self-test procedure is running.
- An *error* condition is indicated when the status indicator is *red*. An error condition indicates the module has detected an internal problem which affects correct operation of the module. Usually, an error condition requires attention (e.g. leak, defective internal components). An error condition always interrupts the analysis.
- A *red-blinking* (modules with on-board LAN) or *yellow-blinking* (modules without on-board LAN) indicator indicates that the module is in resident mode (e.g. during update of main firmware).
- A *fast red-blinking* (modules with on-board LAN) or *fast yellow-blinking* (modules without on-board LAN) indicator indicates that the module is in boot loader mode (e.g. during update of main firmware). In such a case try to re-boot the module or try a cold-start.

Available Tests depending on User Interfaces

NOTE Depending on the used interface, the available tests and the screens/reports may vary. Preferred tool should be the Agilent Lab Advisor Software, see "Agilent Lab Advisor Software" on page 62.

Table 15 Test Functions available vs. User Interface - TCC

Test	Lab Advisor Software	Agilent ChemStation	Instant Pilot G4208A
Thermostat Function Test	Yes	Yes	No
Temperature Calibration	Yes	Yes	Yes [1]

[1] section Maintenance

Agilent Lab Advisor Software

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

Agilent Lab Advisor software provides diagnostic capabilities for all Agilent 1200 Infinity Series modules. This includes diagnostic capabilities, calibration procedures and maintenance routines for all the maintenance routines.

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

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

6 Error Information

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

What Are Error Messages

Error messages are displayed in the user interface when an electronic, mechanical, or hydraulic (flow path) failure occurs which requires attention before the analysis can be continued (for example, repair, 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.

General Error Messages

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

General error messages are generic to all Agilent series HPLC modules and may show up on other modules as well.

Timeout

The timeout threshold was exceeded.

Probable cause	Suggested actions
1 The analysis was completed successfully, and the timeout function switched off the module as requested.	Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.
2 A not-ready condition was present during a sequence or multiple-injection run for a period longer than the timeout threshold.	Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.

Shut-Down

An external instrument has generated a shut-down signal on the remote line.

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

Probable cause	Suggested actions
1 Leak detected in another module with a CAN connection to the system.	Fix the leak in the external instrument before restarting the module.
2 Leak detected in an external instrument with a remote connection to the system.	Fix the leak in the external instrument before restarting the module.
3 Shut-down in an external instrument with a remote connection to the system.	Check external instruments for a shut-down condition.
4 The degasser failed to generate sufficient vacuum for solvent degassing.	Check the vacuum degasser for an error condition. Refer to the *Service Manual* for the degasser or the 1260 pump that has the degasser built-in.

Remote Timeout

A not-ready condition is still present on the remote input. When an analysis is started, the system expects all not-ready conditions (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	Suggested actions
1 Not-ready condition in one of the instruments connected to the remote line.	Ensure the instrument showing the not-ready condition is installed correctly, and is set up correctly for analysis.
2 Defective remote cable.	Exchange the remote cable.
3 Defective components in the instrument showing the not-ready condition.	Check the instrument for defects (refer to the instrument's documentation).

Synchronization Lost

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

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

Probable cause	Suggested actions
1 CAN cable disconnected.	• Ensure all the CAN cables are connected correctly. • Ensure all CAN cables are installed correctly.
2 Defective CAN cable.	Exchange the CAN cable.
3 Defective main board in another module.	Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.

Leak

A leak was detected in the column compartment module.

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

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

Leak Sensor Open

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

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

Probable cause	Suggested actions
1 Leak sensor not connected to the main board.	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.

Leak Sensor Short

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

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

Probable cause	Suggested actions
1 Defective flow sensor.	Please contact your Agilent service representative.
2 Leak sensor incorrectly routed, being pinched by a metal component.	Please contact your Agilent service representative.

Compensation Sensor Open

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

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

Probable cause	Suggested actions
1 Defective main board.	Please contact your Agilent service representative.

Compensation Sensor Short

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

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

Probable cause	Suggested actions
1 Defective main board.	Please contact your Agilent service representative.

TCC Error Messages

The following errors are TCC specific error messages.

Left Fan Failed

The left cooling fan in the column compartment has failed.

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

Probable cause	Suggested actions
1 Fan cable disconnected.	Please contact your Agilent service representative.
2 Defective fan.	Please contact your Agilent service representative.
3 Defective TCC board.	Please contact your Agilent service representative.

Right Fan Failed

The right cooling fan in the column compartment has failed.

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

Probable cause	Suggested actions
1 Fan cable disconnected.	Please contact your Agilent service representative.
2 Defective fan.	Please contact your Agilent service representative.
3 Defective TCC board.	Please contact your Agilent service representative.

Open Cover

The top foam has been removed.

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

Probable cause	Suggested actions
1 The top foam was removed during operation.	Please contact your Agilent service representative.
2 Foam not activating the sensor.	Please contact your Agilent service representative.

Cover Violation

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

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

Probable cause	Suggested actions
1 The column compartment was switched on with the top cover and foam removed.	Please contact your Agilent service representative.

Left Temperature Timeout

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

Probable cause	Suggested actions
1 Defective left heater assembly.	Please contact your Agilent service representative.
2 Defective TCC board.	Please contact your Agilent service representative.

Right Temperature Timeout

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

Probable cause	Suggested actions
1 Defective right heater assembly.	Please contact your Agilent service representative.
2 Defective TCC board.	Please contact your Agilent service representative.

Defective Temperature Sensor

One of the temperature sensors has failed.

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

Defective Temperature Sensor 0: left column.

Defective Temperature Sensor 1: left heat sink.

Defective Temperature Sensor 2: right column.

Defective Temperature Sensor 3: right heat sink.

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

Probable cause	Suggested actions
1 Flex board not connected (only if all left or right sensor error messages appear simultaneously).	Please contact your Agilent service representative.
2 Defective heater assembly.	Please contact your Agilent service representative.
3 Defective TCC board.	Please contact your Agilent service representative.

Heater Profile

Heater Profile 0: left heater.

Heater Profile 2: right heater.

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

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

Probable cause	Suggested actions
1 Defective heater assembly.	Please contact your Agilent service representative.
2 Defective TCC board.	Please contact your Agilent service representative.

Valve Failed

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

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

The column-switching valve failed to switch.

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

Probable cause	Suggested actions
1 Defective column-switching valve.	Please contact your Agilent service representative.
2 Defective TCC board.	Please contact your Agilent service representative.

Column Temperature

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

Column Temperature 0: left heater.

Column Temperature 2: right heater.

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

Probable cause	Suggested actions
1 Defective heater assembly.	Please contact your Agilent service representative.
2 Defective TCC board.	Please contact your Agilent service representative.

Heatsink Temperature

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

Heatsink Temperature 0: left heater.

Heatsink Temperature 2: right heater

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

Probable cause	Suggested actions
1 Defective heater assembly.	Please contact your Agilent service representative.
2 Defective TCC board.	Please contact your Agilent service representative.

Defective Heater Circuit

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

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

Probable cause	Suggested actions
1 Defective TCC board.	Please contact your Agilent service representative.

7
Test Functions

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

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.

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

Thermostat Function Test Result

A typical **Thermostat Function Test** profile is shown in Figure 20 on page 78.

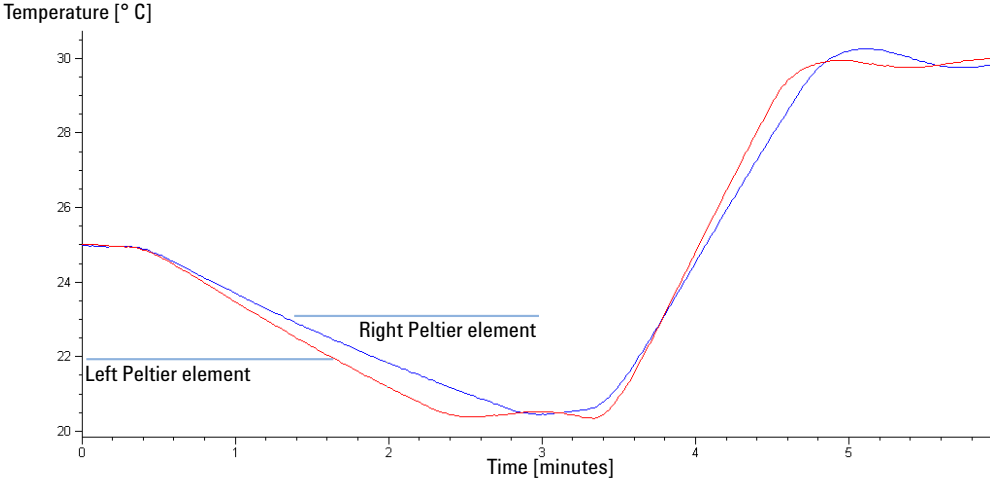


Figure 20 Typical **Thermostat Function Test** Profile

Thermostat Test with Agilent LabAdvisor

1 1. Select the **Thermostat Test** and start the test.

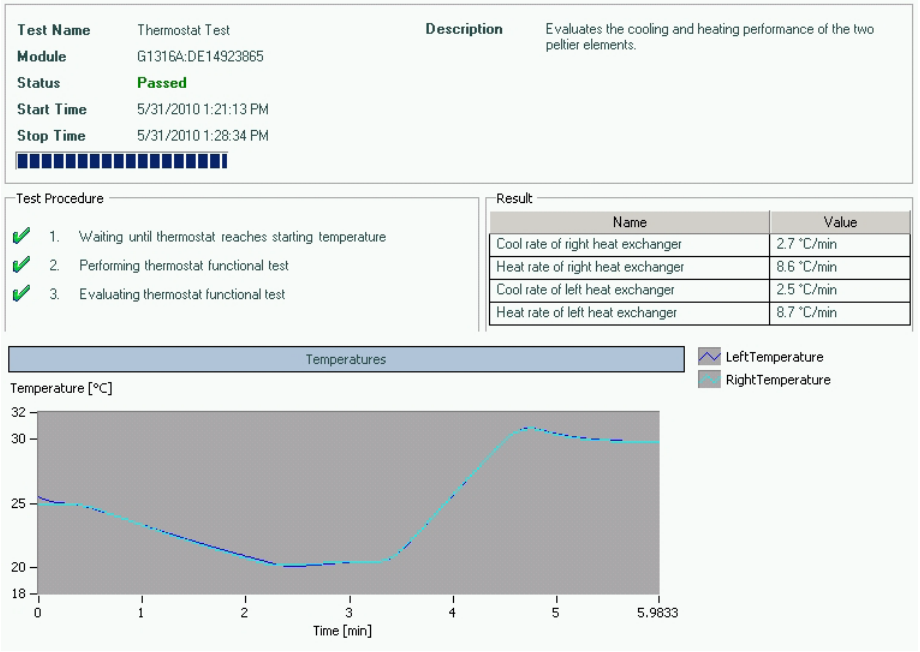


Figure 21 Thermostat Test width = 12.5 cm

Evaluating the Thermostat Function Test

Evaluating the Thermostat Function Test

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

Thermostat Function Test `Failed`

Probable cause	Suggested actions
1 Column compartment cover not installed correctly (bad insulation).	Ensure cover is installed correctly.
2 Air intake blocked (insufficient air flow for cooling).	Ensure sufficient space is available for air circulation see "Bench Space" on page 36.
3 Poor peltier efficiency (if setpoint temperatures can still be reached, and are stable, there is no requirement to exchange the heater assembly).	Exchange the heater assembly.
4 Defective sensors on flex board.	Exchange the heater assembly.
5 Defective heater assembly.	Exchange the heater assembly.

Pressure Test

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

CAUTION

Wrong use of **Pressure Test** may damage valve.

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

➔ Do not use the test for modules having a lower maximum pressure than the pump as this will damage the valve. For example do not use 400 bar valve in a TCC in combination with a 600 bar pump (G1312B Binary Pump SL).

Column Thermostat Temperature Calibration

Temperature Calibration Principle

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

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

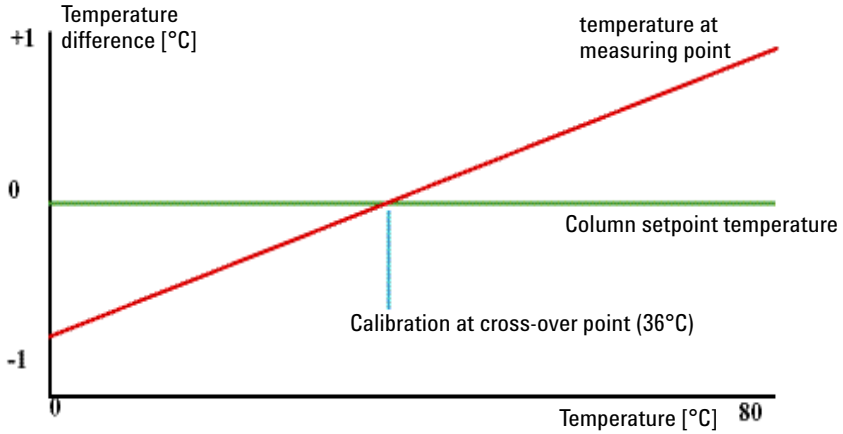


Figure 22 1-Point Calibration at the Temperature Cross-Over Point

The column thermostat is calibrated correctly when the measured temperature (using the external measuring device, "Temperature Calibration Procedure" on page 83) and the cross-over temperature (36 °C) of both heat exchangers (left and right) are within a range of ± 0.5 °C.

Temperature Calibration Procedure

Tools required Temperature measuring device (see note below)

Parts required

#	Description
1	Calibrated temperature measuring device

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

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

1 Install the temperature sensor (Installing the Temperature Sensor) ("Installing the Temperature Sensor" on page 90).

Temperature Calibration with Agilent LabAdvisor

This is the standard 1-point calibration. If a 2-point calibration is required, refer to "Two Point Calibration" on page 86

If only one sensor is available, the procedure has to be performed for both, the left and right heat exchanger separately.

1 Select the **Temperature Calibration** and start the calibration.

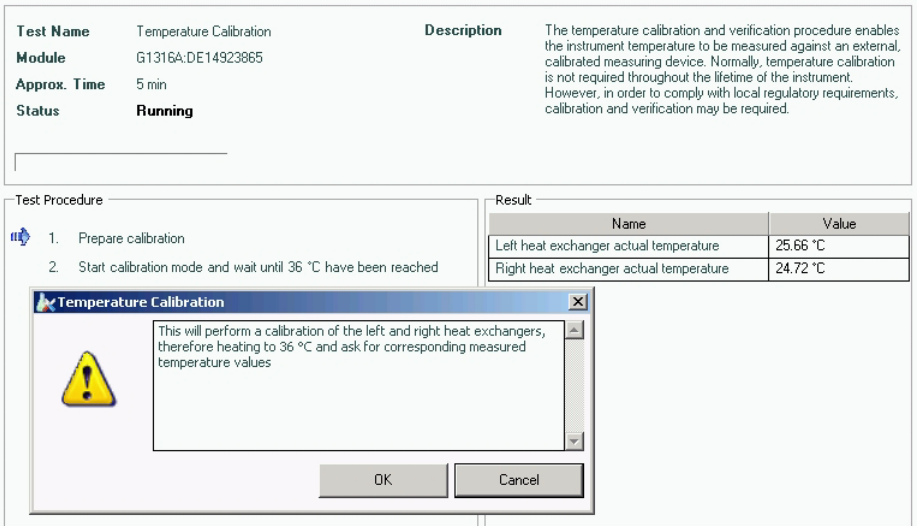


Figure 23 Temperature Calibration - Step 1 (Start) width=12.5 cm

2 Wait for the temperature to stabilize at the calibration temperature (36 °C).

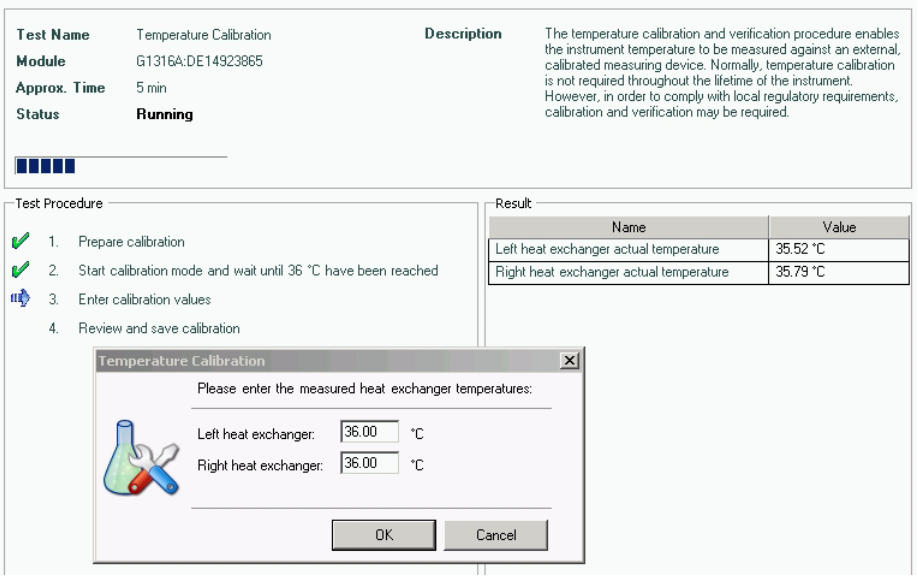


Figure 24 Temperature Calibration - Step 2 (Wait for stabilization) width=12.5 cm

3 Measure the temperature of the heat exchanger.

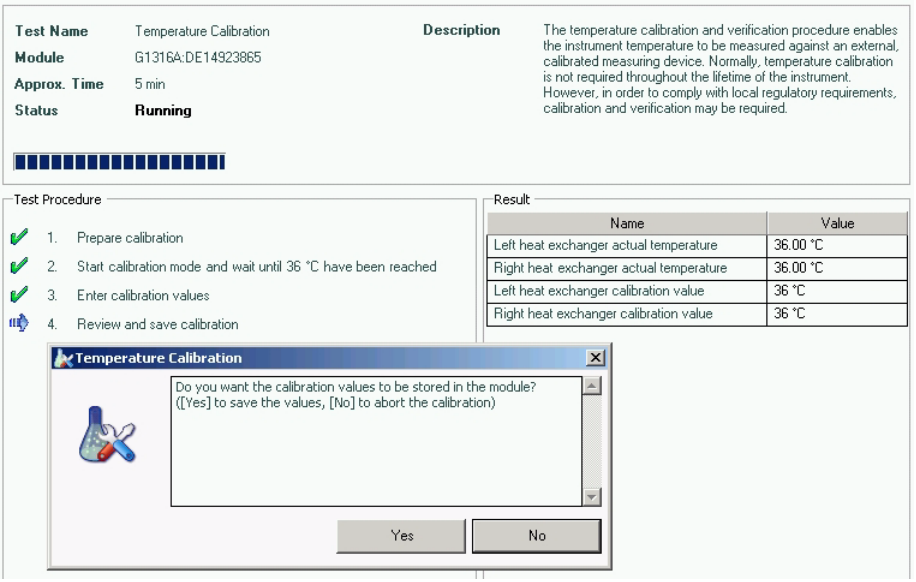


Figure 25 Temperature Calibration - Step 3 (Save new calibration values) width=12.5 cm

4 If the measured temperature deviates by more than ± 0.5 °C from the actual temperature, enter the measured value in the measured-temperature field for the left and/or right heat exchanger.

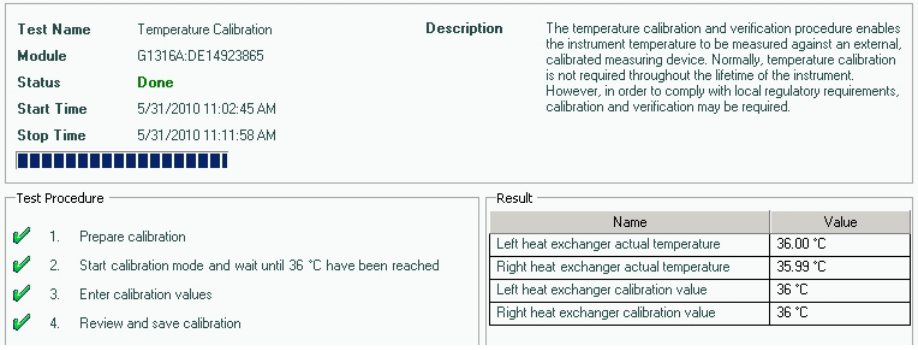


Figure 26 OnePoint Calibration - Step 4 (Calibration done) width=12.5 cm

5 Repeat the calibration procedure for the right heat exchanger.

NOTE

Limits

After calibration, the measured temperature and the calibration temperature should be within ± 0.5 °C. The maximum deviation which can be adjusted ± 1.6 °C. If the measured value and the calibration value differ by more than ± 1.6 °C, this is an indication that a problem exists, see "Column Thermostat Calibration Problems" on page 89

Two Point Calibration

In addition to the standard 1-point calibration, the 2-point calibration uses a second temperature point (both temperatures can be entered individually).

With this calibration it is possible to get the measured temperature in the column closer to the set temperature when working at higher temperature, e.g. above 60 degree (if required).

The 2-point temperature calibration will overlay on an existing 1-point calibration. The instrument will not know the 1-point temperature calibration anymore. The information stays in a specific memory area that is not overwritten by firmware updates.

In case the instrument must be converted back to standard 1-point calibration, a special command has to used, see "Turning off the 2-point calibration" on page 88.

The figures below show the calibration process with the Agilent LabAdvisor software. It is similar to the 1-Point Calibration.

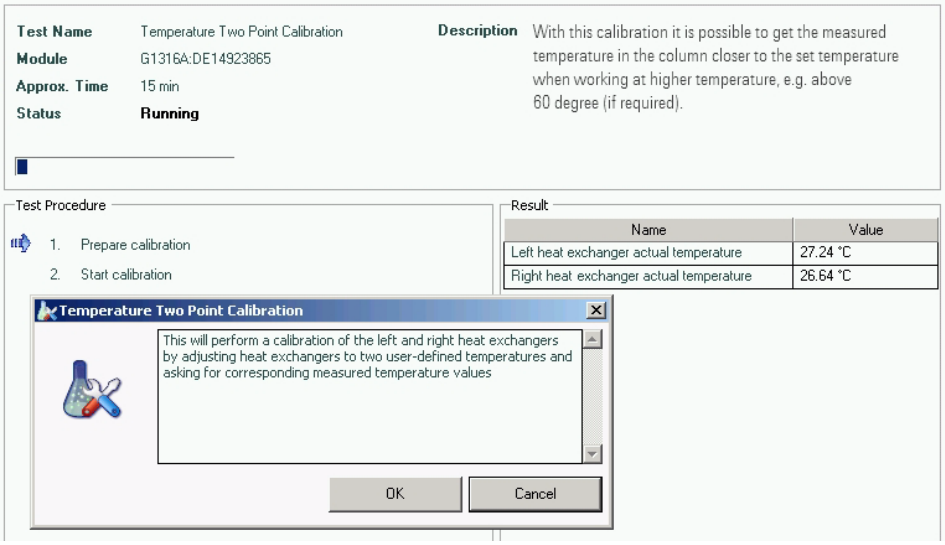


Figure 27 Two Point Calibration – Start width = 12.5 cm

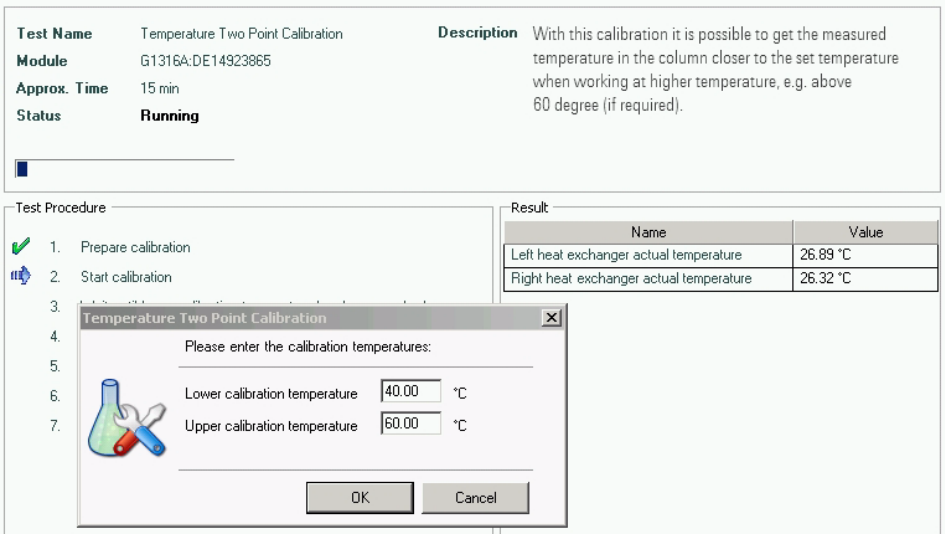


Figure 28 Two Point Calibration – Define the two temperatures width=12.5 cm

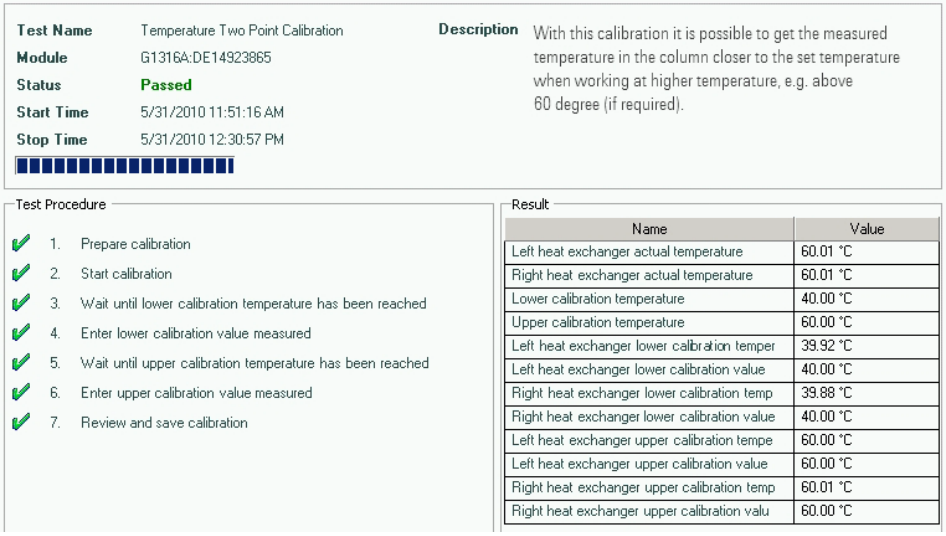


Figure 29 Two Point Calibration – Done width=12.5 cm

Turning off the 2-point calibration

Use the command line in the "Module Service Center" of the Agilent LabAdvisor software.

1 For left heat exchanger use the command **`E2PC 0,0`** and Execute.

  The user interface will reply with **RA 0000 E2PC 0,0** if command was entered correctly.

2 For right heat exchanger use the command **`E2PC 1,0`** and Execute.

  The user interface will reply with **RA 0000 E2PC 1,0** if command was entered correctly.

3 Perform the “Temperature Calibration” on page xx.

Column Thermostat Calibration Problems

If the temperature cannot be calibrated, check the following:

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

Hardware Failures

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

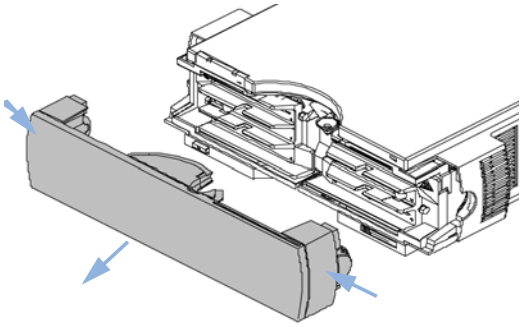
- Defective or wrongly calibrated measuring device.
- Defective heater assembly.
- Defective ambient-temperature sensor.
- Defective CCM board.

Installing the Temperature Sensor

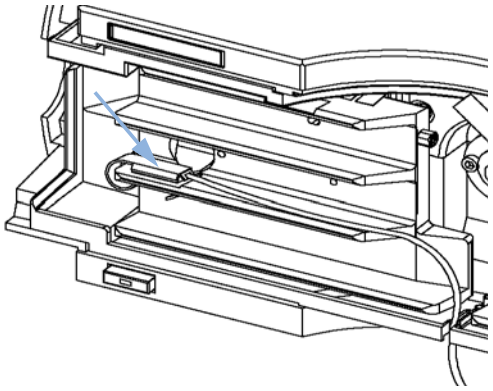
Installation of the temperature sensor is required for the temperature calibration and temperature verification procedures.

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

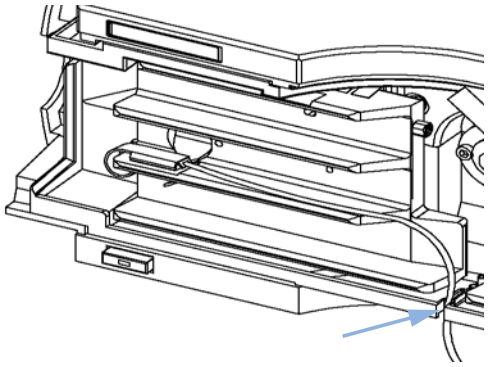
1 Remove the front cover.



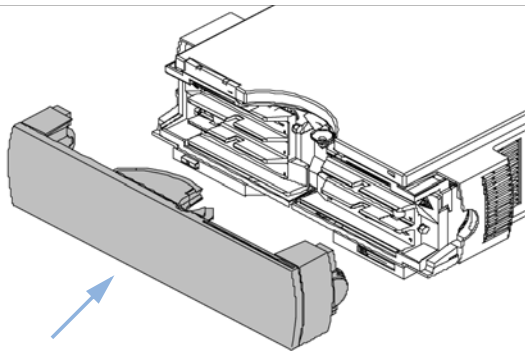
2 Install the temperature sensor at the measurement position on the left heat exchanger.



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



4 Re-install the front cover.



8 Maintenance

This chapter describes the maintenance and repair of the TCC.

Warnings and Cautions

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.

WARNING

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

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

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

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

WARNING

Sharp metal edges

Sharp-edged parts of the equipment may cause injuries.

➔ To prevent personal injury, be careful when getting in contact with sharp metal areas.

WARNING

Toxic, 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 amount of substances should be reduced to the minimal volume required for the analysis.

➔ Do not operate the instrument in an explosive atmosphere.

CAUTION

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

ESD can damage electronic boards and components.

➔ Be sure to hold the board by the edges and do not touch the electrical components. Always use an ESD protection (for example, an ESD wrist strap) when handling electronic boards and components.

CAUTION

Hot heat exchangers 

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

➔ Allow them to cool down before starting repairs.

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.

Introduction to Maintenance

shows the main user accessible assemblies of the Agilent 1260 Infinity Thermostatted Column Compartment. These parts can be accessed from the front (simple repairs) and don't require to remove the TCC from the system stack.

Overview of Maintenance

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

Table 16 Simple Repairs

Procedure	Typical Frequency	Notes
"Cleaning the Module" on page 96	If required	
"Changing Column Identification Tags" on page 97	When column performance or new application requires a change	
"Replacing Head Parts of Column Switching Valve" on page 99	If the valve performance shows indication of leakage or wear	
"Correcting Leaks" on page 102	If a leak has occurred	Check for leaks

Cleaning the Module

The module case should be kept clean. Cleaning should be done with a soft cloth slightly dampened with water or a solution of water and mild detergent. Do not use an excessively damp cloth as liquid may drip into the module.

WARNING

Liquid dripping into the electronic compartment of your module.

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

➔ Do not use an excessively damp cloth during cleaning.

➔ Drain all solvent lines before opening any fittings.

Changing Column Identification Tags

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

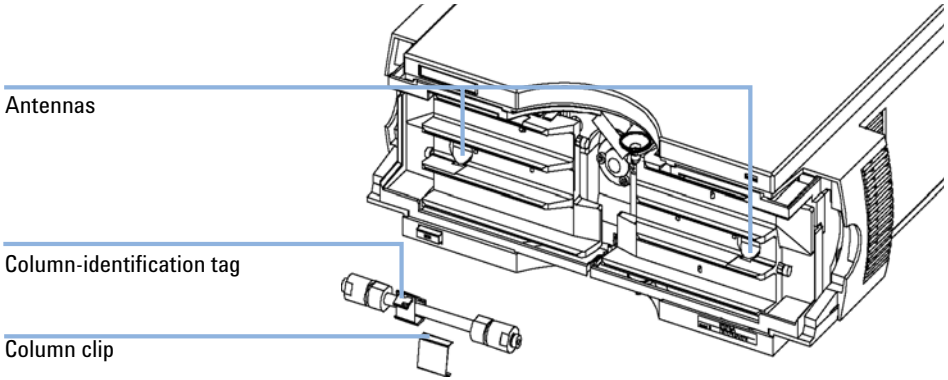


Figure 30 Column-Identification System

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

Parts required

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

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

2 The tag needs to be placed differently, depending on whether the column is installed at the left or right heat exchanger, see Figure 16 on page 53 and Figure 17 on page 53. The Agilent logo should always be at front.

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

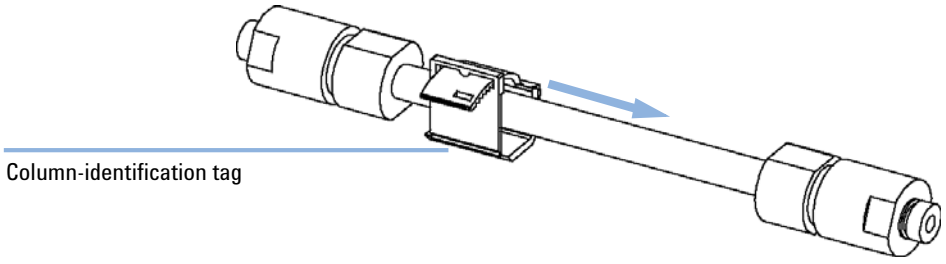


Figure 31 Column-Identification Tag for Left Heat Exchanger

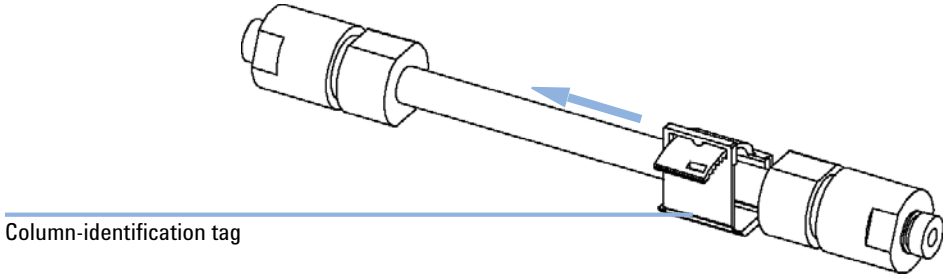


Figure 32 Column-Identification Tag for Right Heat Exchanger

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

Replacing Head Parts of Column Switching Valve

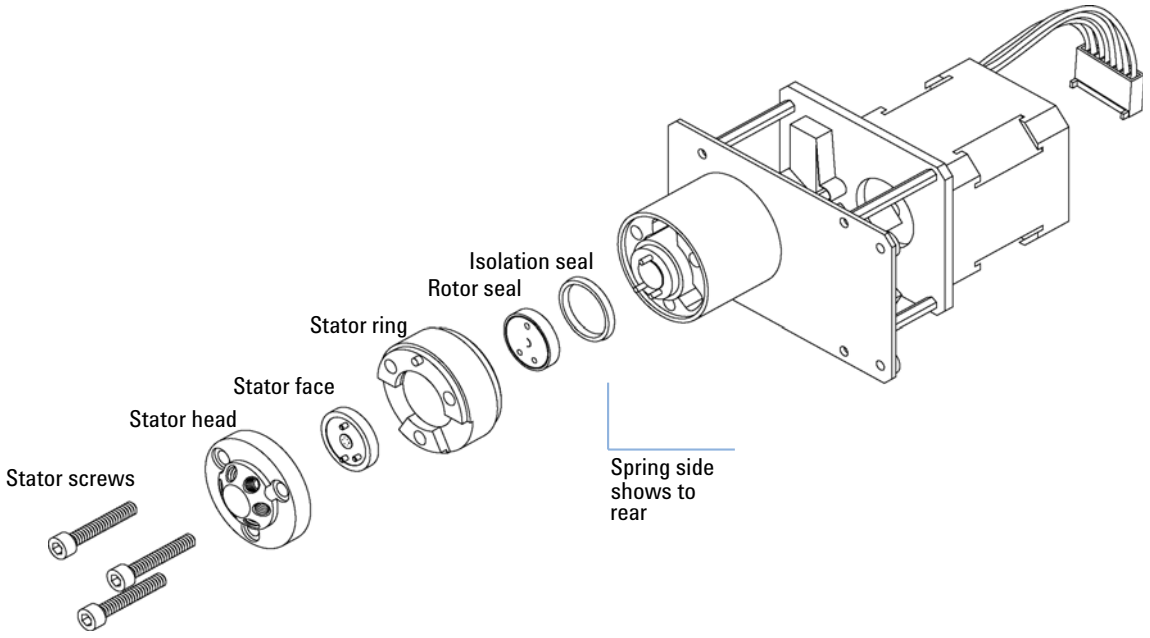


Figure 33 Column Switching Valve Parts

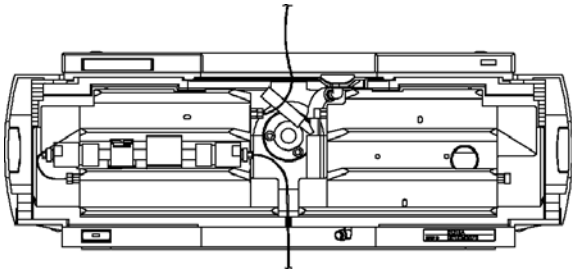
When If valve leaks.

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

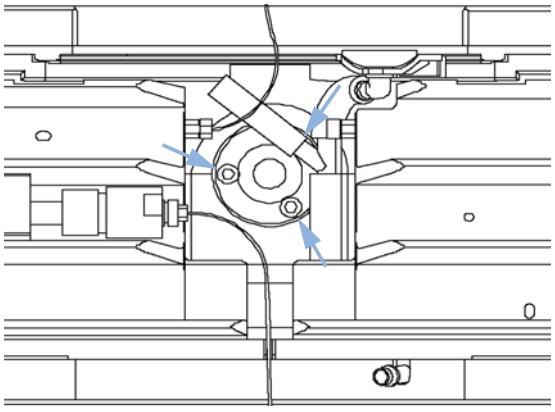
Parts required

#	Description
1	For parts refer to "Valve Options Overview" on page 106.

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



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



3 Remove the stator head and the ceramic stator face.

NOTE Valve head 8 position/9 port, high pressure (p/n 5067-4107) has no stator face.

4 Remove the stator ring.

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

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

7 Install the new rotor seal.

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

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

NOTE Valve head 8 position/9 port, high pressure (p/n 5067-4107) has no stator face.

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

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

CAUTION Wrong use of **Pressure Test** may damage valve.

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

➔ Do not use the test for modules having a lower maximum pressure than the pump as this will damage the valve. For example do not use 400 bar valve in a TCC in combination with a 600 bar pump (G1312B Binary Pump SL).

12 Perform a **Pressure Test** to ensure the valve is pressure tight to 400 bar.

Correcting Leaks

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

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

NOTE Depending on the column position or the use of additional heat-exchanger assemblies, the view of Figure 34 on page 102 may vary.

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

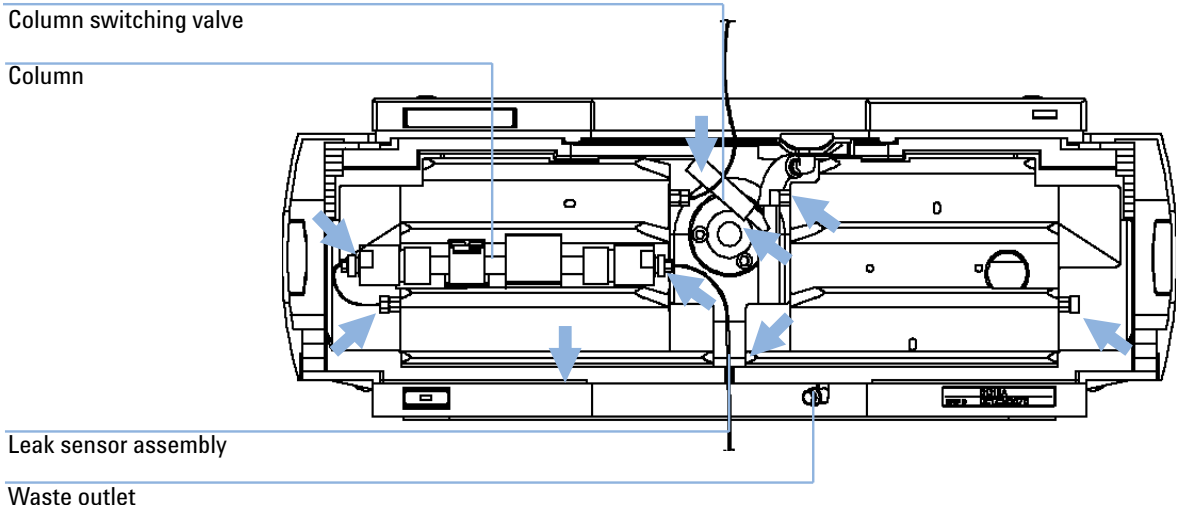


Figure 34 Possible Leak Areas

Replacing the Module's 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 part control software requires a special version.

Tools required

- LAN/RS-232 Firmware Update Tool or
- Agilent Diagnostic Software
- Instant Pilot G4208A (only if supported by module)

Parts required

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

Preparations

Read update documentation provided with the Firmware Update Tool.

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

1 Download the required module firmware, the latest LAN/RS-232 FW Update Tool and the documentation from the Agilent web.
   - http://www.chem.agilent.com/scripts/cag_firmware.asp.

2 To load the firmware into the module follow the instructions in the documentation.

Module Specific Information

Table 17 Module Specific Information (G1316A/B)

	G1316A
Initial firmware (main and resident)	Depends on main board revision. Newer versions (G1316-66530 and higher) allow A.05.05 and above only.

Table 17 Module Specific Information (G1316A/B)

	G1316A
Compatibility with 1100 / 1200 series modules	always
Conversion to / emulation	N/A

9 Parts for Maintenance

This chapter provides information on parts for maintenance.

Valve Options Overview

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

Table 18 Valves

Module	Valve description (part number)	Rotor Seal	Stator
G1316A (#055)	Valve Kit 2POS/6PORT 400 bar (p/n G1316-67005), [1]	Rotor seal (Vespel) (p/n 0100-1855) Rotor seal 3 grooves (Tefzel) (p/n 0100-1854) Rotor seal 3 grooves (PEEK) (p/n 0100-2233)	Stator Face (p/n 0100-1851) Stator head (p/n 0100-1850) Isolation seal (p/n 0100-1852)
G1316A (#056)	Valve Kit MICRO 2POS/6PORT 400 bar (p/n G1316-67006)	Rotor seal 3 grooves, Vespel (p/n 0100-2087)	Stator face (p/n 0100-2089) Isolation seal (p/n 1535-4045)
G1316A (#057)	Valve Kit MICRO 2POS/10PORT 400 bar (p/n G1316-67007)[2]	Rebuild kit, includes PEEK rotor seal, PEEK stator face, hex key (p/n 0101-1360)	Stator face (p/n 0101-1362) Isolation seal (p/n 0100-1852)
G1316A	Valve Kit 2POS/6PORT 600 bar (p/n G1316-67008)	Grove rotor seal (pack of 3) (p/n 0101-1409)	Stator head (p/n 0101-1417) Isolation seal (p/n 1535-4045)
G1316A	Valve Kit MICRO 2POS/10PORT 600 bar (p/n G1316-67009)	Rotor seal 5 grooves, 600 bar, PEEK (p/n 0101-1415)	Stator, 600 bar (p/n 0101-1421) Isolation seal (p/n 1535-4045)

[1] re-build kit Rhebuild kit for 7750-030 valve (p/n 0101-1258) includes 3-groove rotor seal, stator face assy, isolation seal, instructions.

[2] re-build kit Rebuild kit, includes PEEK rotor seal, PEEK stator face, hex key (p/n 0101-1360) includes PEEK rotor seal, PEEK stator face, hex key.

Column Switching Valve 2 Position/6 Port

NOTE Agilent 1260 Infinity and 1200 Series 1316A modules with serial numbers DE90373728 and above use parts from the G1316C TCC. For replacements use NEW part numbers below.

Item	p/n	Description
	G1353-68700	Column switching valve kit (includes capillaries and other materials for installation/operation)
	G1316-67005	Valve Kit 2POS/6PORT 400 bar (incudues valve, Valve Liner and Upgrade Note)
	G1316-44103	Valve Cover A/B (OLD) (when switching valve is not installed)
	G1316-44123	Valve cover C (NEW) (when switching valve is not installed)
	G1316-68708	Capillary Kit Column Switching includes two capillaries (0.17 mm i.d., 180 mm) and three capillaries (0.17 mm i.d., 90 mm)
	0101-1258	Rhebuild kit for 7750-030 valve
1	1535-4857	Stator screws
2	0100-1850	Stator head
3	0100-1851	Stator Face
4		Stator ring
5	0100-1854	Rotor seal 3 grooves (Tefzel)
5	0100-1855	Rotor seal (Vespel)
5	0100-2233	Rotor seal 3 grooves (PEEK)
6	0100-1852	Isolation seal

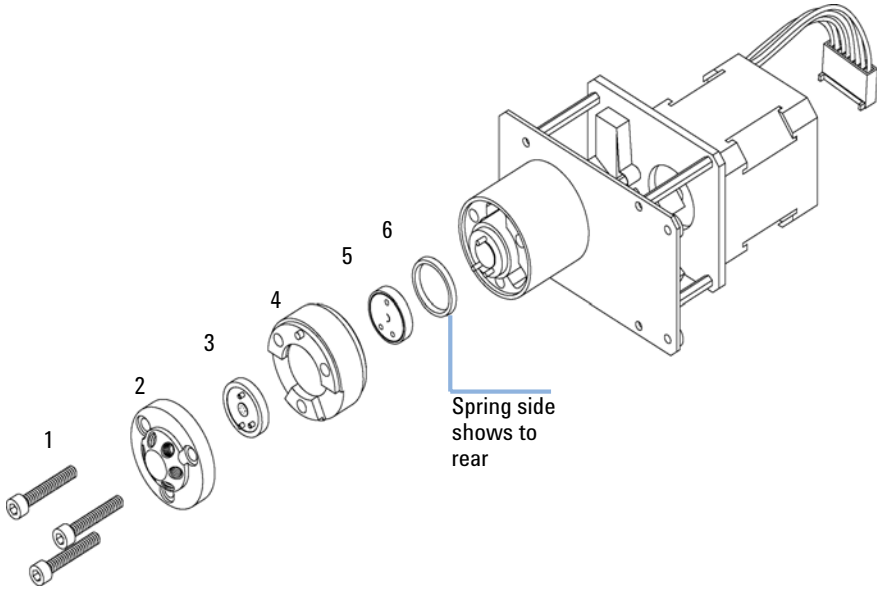


Figure 35 Column Switching Valve Parts

Micro Column Switching Valve 2 Position-6 Port

p/n	Description
G1316-67006	Valve Kit MICRO 2POS/6PORT 400 bar (incudues valve, Valve Liner and Upgrade Note)
0100-2089	Stator face
0100-2087	Rotor seal 3 grooves, Vespel
1535-4045	Bearing Ring, (Qty 1, replacement)

Micro Column Switching Valve 2 Position/10 Port

NOTE Technical details can be found in the technical note that is supplied with the kit.

p/n	Description
G1316-68709	Valve Kit MICRO 2POS/6PORT 600 bar (includes capillaries and other materials for installation/operation)
0101-1415	Rotor seal 5 grooves, 600 bar, PEEK
0101-1421	Stator, 600 bar
1535-4045	Bearing Ring, (Qty 1, replacement)
G1316-67007	Valve Kit MICRO 2POS/10PORT 400 bar (incudues valve, Valve Liner and Upgrade Note)
0101-1360	Rebuild kit, includes PEEK rotor seal, PEEK stator face, hex key
0100-1852	Isolation seal
0101-1362	Stator face
G1316-68711	Capillary kit

Capillary Kit Column Regeneration

Table 19 Capillary Kit Column Regeneration (G1316-68711)

Part number	From	To	I.d. (mm)	Length (mm)	Remark
Capillary (p/n 5065-9932)	ALS[1]	Valve (port 2)	0.17	700	
Capillary (p/n 5021-1816)	Valve (port 3)	TCC 3 µL (in)	0.17	105	
Capillary (p/n 5021-1816)	TCC[2]3 µL (out)	Column 1	0.17	105	
Capillary (p/n 5021-1816)	Column 1	Valve (port 6)	0.17	105	for long column
Capillary (p/n 5065-9931)	Column 1	Valve (port 6)	0.17	200	for short column
Capillary (p/n 5021-1818)	Valve (port 7)	Detector (in)	0.17	280	
Capillary (p/n 5021-1816)	Valve (port 1)	TCC 6 µL (in)	0.17	105	
Capillary (p/n 5021-1816)	TCC 6 µL (out)	Column 2	0.17	105	
Capillary (p/n 5021-1816)	Column 2	Valve (port 8)	0.17	105	for long column
Capillary (p/n 5065-9931)	Column 2	Valve (port 8)	0.17	200	for short column
Capillary (p/n 5021-1816)	Valve (port 5)	Valve (port 10)	0.17	105	

Table 19 Capillary Kit Column Regeneration (G1316-68711)

Part number	From	To	I.d. (mm)	Length (mm)	Remark
Capillary (p/n 5065-9930)	Regeneration pump	Valve (port 4)	0.25	800	
Corrugated tubing, PP, 6.5 mm id, 5 m (p/n 5062-2463)	Valve (port 9)	Waste	0.6	2000	PTFE

[1] ALS - Autosampler

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

Ferrules, Screws, Fittings, etc. (Part of Capillary kit (p/n G1316-68711))

p/n	Description
5062-2418	1/16" fittings and ferrules 10/pk
5062-8541	Fingertight fitting long 10/pk
5065-4454	Fitting screw long 10/pk
5065-9967	Fitting screw extra long 10/pk
5180-4108	Ferrule front 1/16" SST, qty=2, re-order pack of 10
5180-4114	Ferrule back 1/16" SST, qty=2, re-order pack of 10
0890-1763	PEEK tubing 1/16" i.d. 0.18 mm, 1500 mm lg
8710-1930	Plastic tubing cutter
8710-2462	Hex Key Driver 3/32 inch
8710-2391	Rheotool socket wrench ¼ inch

Column Regeneration Kit

Refer to Figure 36 on page 114 for connection diagram.

Table 20 Capillary Kit Micro Column Regeneration

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

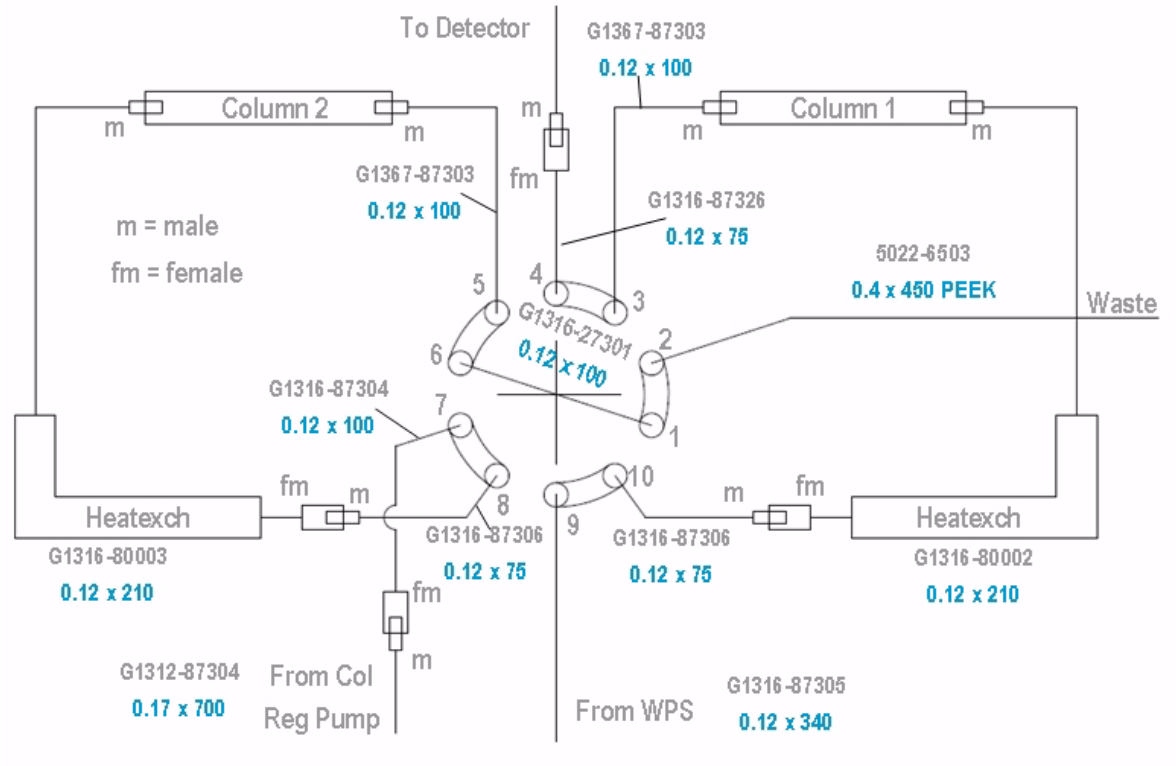


Figure 36 Connection Diagram for Column Regeneration

Accessory Kits

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

Accessory Kit

The Accessory kit (G1316-68755) contains some specific accessories and tools needed for the installation of the TCC.

p/n	Description
5063-6527	Tubing assembly, i.d. 6 mm, o.d. 9 mm, 1.2 m (to waste)
5063-6526 (2x)	Column clamp (for re-order 6/pk)
G1316-87300	Capillary, 0.17 x 90 mm 1/16 in male/male
5181-1516	CAN cable, Agilent module to module, 0.5 m

G1316A Accessory Kit (2PS/10PT modules)

p/n	Description
G1316-68725	G1316A Accessory kit 2PS/10PT
5062-8588	Column identification tag (1x), re-order (3/pk)
5063-6526	Column clamp (for re-order 6/pk)
5062-2463	Corrugated tubing, PP, 6.5 mm id, 5 m
8710-0510	1/4 inch X 5/16 inch wrench
8710-2409	Wrench open end, 5/16 – 3/8 inch
G1375-87309	Fused silica/PEEK capillary 50 µm, 280 mm (4x)
5181-1516	CAN cable, Agilent module to module, 0.5 m
5022-2186	Micro Valve Fitting (2x)
5001-3702	2 Column holders for µ-LC columns

10
Identifying Cables

This chapter provides information on cables used with the 1260 Infinity series of HPLC 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 module to 3394/6 integrators
35900-60750	Agilent 35900A A/D converter
01046-60105	Analog cable (BNC to general purpose, spade lugs)

Remote cables

p/n	Description
03394-60600	Agilent module to 3396A Series I integrators
	3396 Series II / 3395A integrator, see details in section "Remote Cables" on page 122
03396-61010	Agilent module to 3396 Series III / 3395B integrators
5061-3378	Agilent module to Agilent 35900 A/D converters (or HP 1050/1046A/1049A)
01046-60201	Agilent module to general purpose

BCD cables

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

CAN cables

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

LAN cables

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

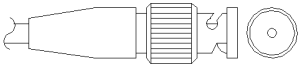
External Contact Cable

p/n	Description
G1103-61611	External contact cable - Agilent module interface board to general purposes

RS-232 cables

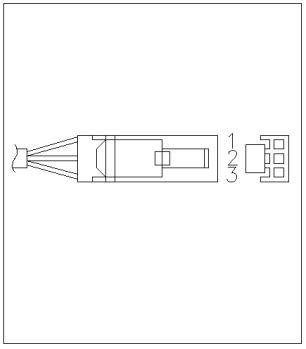
p/n	Description
G1530-60600	RS-232 cable, 2 m
RS232-61600	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It's also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561	RS-232 cable, 8 m

Analog Cables

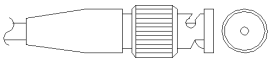


One end of these cables provides a BNC connector to be connected to Agilent modules. The other end depends on the instrument to which connection is being made.

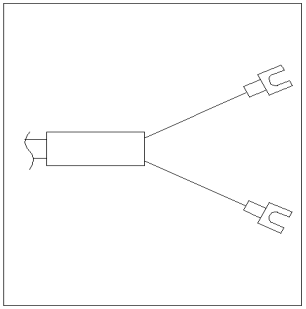
Agilent Module to 3394/6 Integrators

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

Agilent Module to BNC Connector

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

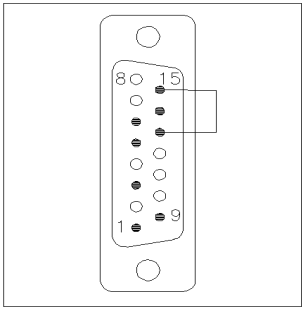
Agilent Module to General Purpose

p/n 01046-60105	Pin 3394/6	Pin Agilent module	Signal Name
	1		Not connected
	2	Black	Analog -
	3	Red	Analog +

Remote Cables

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

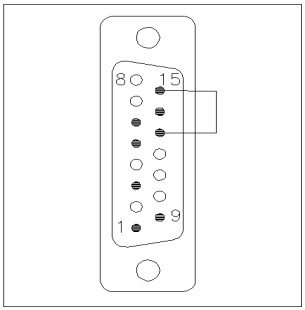
Agilent Module to 3396A Integrators

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

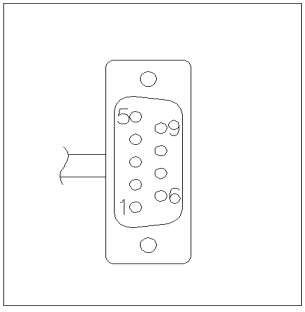
Agilent Module to 3396 Series II / 3395A Integrators

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

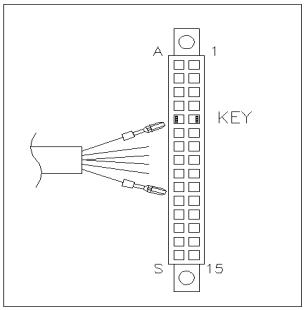
Agilent Module to 3396 Series III / 3395B Integrators

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

Agilent Module to Agilent 35900 A/D Converters

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

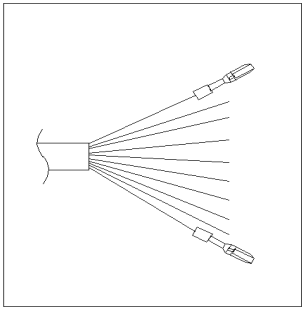
Agilent Module to General Purpose

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

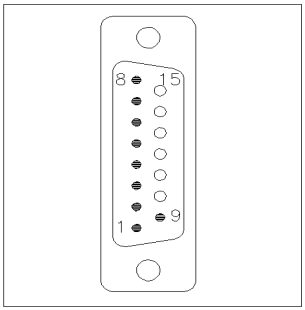
BCD Cables

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

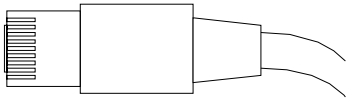
Agilent Module to General Purpose

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

Agilent Module to 3396 Integrators

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

CAN/LAN Cables



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

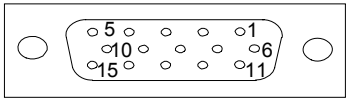
CAN Cables

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

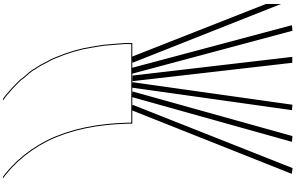
p/n	Description
5023-0203	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202	Twisted pair network cable, shielded, 7 m (for point to point connection)

External Contact Cable



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

Agilent Module Interface Board to general purposes

External contact cable - Agilent module interface board to general purposes (p/n G1103-61611)	Color	Pin Agilent module	Signal Name
	White	1	EXT 1
	Brown	2	EXT 1
	Green	3	EXT 2
	Yellow	4	EXT 2
	Grey	5	EXT 3
	Pink	6	EXT 3
	Blue	7	EXT 4
	Red	8	EXT 4
	Black	9	Not connected
	Violet	10	Not connected
	Grey/pink	11	Not connected
	Red/blue	12	Not connected
	White/green	13	Not connected
	Brown/green	14	Not connected
	White/yellow	15	Not connected

Agilent Module to PC

p/n	Description
G1530-60600	RS-232 cable, 2 m
RS232-61600	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It's also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561	RS-232 cable, 8 m

Agilent 1200 Module to Printer

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

11
Appendix

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

Safety Symbols

Table 21 Safety Symbols

Symbol	Description
	The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect risk of harm to the operator and to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.
	Indicates eye damage may result from directly viewing the light produced by the deuterium lamp used in this product.
	The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.

WARNING

A WARNING

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

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

CAUTION

A CAUTION

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

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

General Safety Information

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

WARNING

Ensure the proper usage of the equipment.

The protection provided by the equipment may be impaired.

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

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.

Operation

Before applying power, comply with the installation section. Additionally the following must be observed.

Do not remove instrument covers when operating. Before the instrument is switched on, all protective earth terminals, extension cords, auto-transformers, and devices connected to it must be connected to a protective earth via a ground socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in serious personal injury. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any intended operation.

Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, and so on) are used for replacement. The use of repaired fuses and the short-circuiting of fuse holders must be avoided.

Some adjustments described in the manual, are made with power supplied to the instrument, and protective covers removed. Energy available at many points may, if contacted, result in personal injury.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided whenever possible. When inevitable, this has to be carried out by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present. Do not replace components with power cable connected.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Do not install substitute parts or make any unauthorized modification to the instrument.

Capacitors inside the instrument may still be charged, even though the instrument has been disconnected from its source of supply. Dangerous voltages, capable of causing serious personal injury, are present in this instrument. Use extreme caution when handling, testing and adjusting.

When working with solvents please observe appropriate safety procedures (e.g. goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet by the solvent vendor, especially when toxic or hazardous solvents are used.

The Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC)

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 from 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.

Do not dispose off in domestic household waste

To return unwanted products, contact your local Agilent office, or see www.agilent.com for more information.

Lithium Batteries Information

WARNING

Lithium batteries may not be disposed-off into the domestic waste. Transportation of discharged Lithium batteries through carriers regulated by IATA/ICAO, ADR, RID, IMDG is not allowed.

Danger of explosion if battery is incorrectly replaced.

➔ Discharged Lithium batteries shall be disposed off locally according to national waste disposal regulations for batteries.

➔ Replace only with the same or equivalent type recommended by the equipment manufacturer.

WARNING

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.

Udskiftning må kun ske med batteri af samme fabrikat og type.

➔ Lever det brugte batteri tilbage til leverandøren.

WARNING

Lithiumbatteri - Eksplosionsfare.

Ved udskiftning benyttes kun batteri som anbefalt av apparatfabrikanten.

➔ Brukt batteri returneres appararleverandoren.

NOTE

Bij dit apparaat zijn batterijen geleverd. Wanneer deze leeg zijn, moet u ze niet weggooien maar inleveren als KCA.

Radio Interference

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

Test and Measurement

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

Sound Emission

Manufacturer's Declaration

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

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

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

Use of Solvents

Observe the following recommendations on the use of solvents.

- Brown glass ware can avoid growth of algae.
- Small particles can permanently block capillaries and valves. Therefore always filter solvents through 0.4 µm filters.
- Avoid the use of the following steel-corrosive solvents:
  - Solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on),
  - High concentrations of inorganic acids like sulfuric acid and nitric acid, especially at higher temperatures (if your chromatography method allows, replace by phosphoric acid or phosphate buffer which are less corrosive against stainless steel),
  - Halogenated solvents or mixtures which form radicals and/or acids, for example:

    $2CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$

    This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol,
  - Chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, di-isopropylether) such ethers should be filtered through dry aluminium oxide which adsorbs the peroxides,
  - Solvents containing strong complexing agents (e.g. EDTA),
  - Mixtures of carbon tetrachloride with 2-propanol or THF.

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It will provide also the latest firmware of the modules for download.

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In This Book

This manual contains technical reference information about the Agilent 1260 Infinity Thermostatted Column Compartment (G1316A TCC).

The manual describes the following:

- introduction and specifications,
- installation,
- using and optimizing,
- troubleshooting and diagnose,
- maintenance,
- parts identification,
- safety and related information.

Printed in Germany
06/2010

G1316-90013

Agilent Technologies