

Agilent 440 Fraction Collector

User Manual

Notices

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WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

In This Book

This manual covers the Agilent 440 Fraction Collector (G9340A)

1 Introduction

This chapter gives a module overview.

2 Site Requirements and Specifications

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

3 Installation

This chapter gives information about the installation of your instrument.

4 Using

This chapter explains the operational parameters of the module.

5 Optimizing Performance

This chapter gives hints on how to optimize the performance or use additional devices.

6 Troubleshooting and Diagnostics

This chapter gives an overview about the troubleshooting and diagnostic features.

7 Error Information

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

8 Maintenance

This chapter describes the maintenance of the module.

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9 Parts

This chapter provides information on parts for the instrument.

10 Cables

This chapter provides information on cables used with the module.

11 Appendix

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

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1 Introduction

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This chapter gives a module overview.



Introduction to the Agilent 440 Fraction Collector

The Agilent 440 Fraction Collector is a random access, single probe fraction collector and can accommodate a variety of racks. It is designed to automate the sample collection process. This fraction collector is designed to meet the diverse requirements of high-throughput laboratories.

Three racks are included with the fraction collector and are made of polypropylene to resist most chemical spills. Up to three racks of many configurations can be placed on the fraction collector. Additional sample racks can be set up in sequence and manually changed during an analysis as each rack's analysis is completed.

The rack closest to the rear of the fraction collector (next to the pillar) is considered rack number one.



2 Site Requirements and Specifications

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



Site Requirements

Power Considerations

The instrument power supply has wide ranging capability. It accepts any line voltage in the range described in *Physical Specifications*.

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.

CAUTION

Inaccessible power plug.

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

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

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

Power Cords

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.
-

Area selected

WARNING

Explosion, damage and accuracy of the module

- Select an area free from drafts, corrosive atmospheres, and vibration.
 - Select a dust-free, low-humidity environment.
 - Use air-conditioning for control of the environment.
-

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.
-

Bench Space

The module dimensions and weight (see [Table 1](#) on page 13) allow you to place the module on almost any desk or laboratory bench.

It needs an additional 5 cm (2 in) of space on either side and approximately 15 cm (5.9 in) at the rear for air circulation and electric connections.

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

The module should be operated in a horizontal position.

Physical Specifications

Table 1 Physical specifications

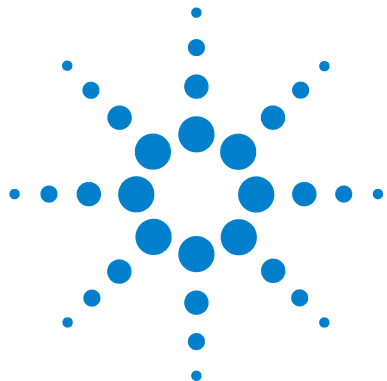
Type	Specification
Weight	18 kg (34 lb)
Dimensions (height x width x depth)	510 mm x 490 mm x 285 mm (21 in x 20 in x 12 in)
Line voltage	100 – 240 VAC (tested 90 – 264 VAC)
Line frequency	50 – 60 Hz ±1 Hz
Power consumption	75 W; 100 VA
Ambient operating temperature	10 – 35 °C (50 – 95 °F)
Operating humidity (%RH) non-condensing	8 – 80
Operating altitude	0 – 3050 m (0 – 10000 ft)
Safety standards (EN 61010-1): IEC, CSA, UL	<ul style="list-style-type: none"> • Installation category II • Pollution degree 2 • Equipment class I

Performance Specifications

Table 2 Performance specifications

Type	Specification
Number of fraction racks	1 – 3
Typical number of tubes/vial	21 – 200
Maximal tube height:	150 mm
Available rack types ¹	<ul style="list-style-type: none">• 21 x 30 mmOD tubes• 24 x 25 mm OD tubes• 40 x 20 mm OD tubes• 60 x 16 mm OD tubes• 90 x 13 mm OD tubes• 128 x 15 mm OD (4 mL vials)• 200 x 12 mm OD (2 mL vials)

¹ Optional overlays are available for the Type 40 and 60 racks. These allow smaller diameter tubes to be used in the racks. For example, the overlay for the Type 40 racks enables the same rack for 20 mm OD tubes to be used for 18 mm OD tubes. The overlays fit onto the top and center of the racks to hold the tubes securely in place. The rack overlays for the fraction collector are also numbered to ensure the correct location of samples in the rack. Note: The rack overlays are designed for use with tubes that do not fit snugly into the racks. If the fit of the tube is 'sloppy' the probe may not center over the tube properly. This can affect the accuracy of sample delivery and cause spills.



3 Installation

Installation 16

This chapter gives information about the installation of your instrument.



Installation

For details on installation of the module, refer to Agilent 218 Purification System – Setup and Installation Guide (p/n G9300-90300).



4 Using

Turning On the Instrument and Software 18

This chapter explains the operational parameters of the module.



Turning On the Instrument and Software

This procedure describes the basic steps to turn on the module and controlling software.

Preparations

- Ensure the module is connected via a three pin, earthed power cord to a three pin grounded power outlet.
- Module is setup and OpenLAB with drivers is installed on your computer (for details refer to Agilent 218 Purification System – Setup and Installation Guide (p/n G9300-90300)).

WARNING

Hand injury or damage to objects

The probe arm of the module can move without warning.

- Do not place your hands or objects near the probe arm, when the module is turned on.

-
- 1 Turn on the power using the switch on the connection panel), which is located on the rear of the control column.

The module will start up and perform an initialization sequence. The initialization sequence moves the probe arm through the extent of the range of movement and finishes with the probe repositioned at the back left of the fraction collector.

NOTE

If the module fails to initialize, refer to [“Introduction to Troubleshooting and Diagnostics”](#) on page 24.

- 2 Start your control software and navigate to the relevant sections (for details refer to Agilent 218 Purification System – Setup and Installation Guide (p/n G9300-90300) or the help of the control software).

NOTE

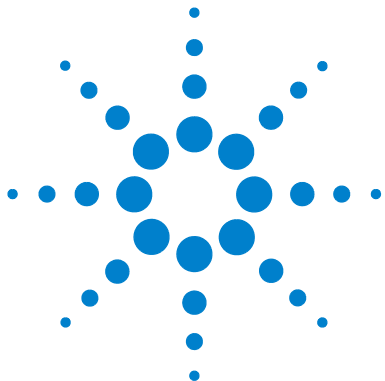
Following further items are constitutive to run the module:

- Creating methods,
- Setting up the fraction collector for sample collection,
- Information logs,
- Determining the volume delay, and
- Determining the correct probe depth.

For detailed information on these items, please refer to the help of the control software.

4 Using

Turning On the Instrument and Software



5 Optimizing Performance

Optimizing Performance [22](#)

This chapter gives hints on how to optimize the performance or use additional devices.



Optimizing Performance

Optimizing the performance involves following steps:

- Determining the volume delay
- Minimizing the volume delay
- Running a probe alignment (depending on the result of the check)

For details on these procedures, refer to the help of the control software.



6 Troubleshooting and Diagnostics

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Status Indicators 25

Quick Troubleshooting Guide 26

Reset Procedure 29

Self-Test Sequence 30

This chapter gives an overview about the troubleshooting and diagnostic features.



Introduction to Troubleshooting and Diagnostics

This is a quick guide to identifying and correcting possible problems with your fraction collector. The list of problems is not exhaustive, so if you cannot correct the problem using the information provided you should contact your Agilent representative.

Information is provided about:

- Fractions not correlating to the tick marks on the OpenLAB software
- Liquid is not delivered to the tubes
- Probe hits the top of the tubes or is not low enough
- The arm is not moving correctly in the X, theta or Z axes
- The fraction collector shows offline in Status Overview
- The green indicator on the front of the fraction collector is off
- The CPU activity LEDS on the rear of the fraction collector are off
- Fraction collector is not initializing
- Error status LEDs are showing an error

Status Indicators

The various indicator lights appearing on the Agilent 218 Purification Solution are color coded to represent the status of the instrument.

Table 3 Status indicator: color coding

Indicator color	Description
Green	The instrument is in normal/standby mode
Orange	A potential hazard is present
Blue	An operator intervention is required
Red	A danger or an emergency is present

Quick Troubleshooting Guide

Table 4 Troubleshooting Quick Guide

Symptom	Possible cause	Solution
Fractions not correlating to tick marks in OpenLAB software	Delay volume incorrect	Determine the correct delay volume and enter it into the System Parameters or software. For details refer to help of the control software.
Liquid not delivered to the tubes	Clogged tubing	Check the tubing for blockages and replace it if necessary. See “Replacing the Tubing” on page 53.
	Clogged probe	Clean the probe. See “Cleaning the Probe” on page 46. Replace the probe. See “Replacing the Probe and Probe Tubing” on page 50.
	Sticking valve	Replace the valve. Contact your Agilent representative.
Probe hits top of tubes or is not low enough	Probe depth not correctly set	Set the probe depth. For details refer to help of the control software.
	Wrong rack chosen	Choose the correct rack in System Parameters or the software (see the ChemStation help).
	Wrong tubes being used	Replace with the correct tubes.
Arm not moving correctly in the X, theta or Z axes	Motor not correctly operating	<ul style="list-style-type: none"> • Run the Reset procedure. See “Reset Procedure” on page 29. • Run the Self-test procedure. See “Self-Test Sequence” on page 30. • Contact your Agilent representative if a test fails.

Table 4 Troubleshooting Quick Guide

Symptom	Possible cause	Solution
Fraction collector shows offline in Status Overview	Fraction collector is turned off	<ul style="list-style-type: none"> • Turn on the fraction collector. • Check the power cable connections. • Check the fuses. If blown, contact your Agilent representative.
	Fraction collector is on but not communicating	<ul style="list-style-type: none"> • Check the RS232 cable connections. • Reboot the fraction collector. • Troubleshoot communication. See “Communications Error” on page 35. • Check the LEDs. See “Error Status Indicator Codes” on page 32
Green indicator on the front of the fraction collector is off	Indicator may be faulty	Turn off the fraction collector. Wait 10 seconds before turning the unit on again. If the unit initializes but the light does not come on then the indicator is faulty.
	Fuse has blown	Contact your Agilent representative.
	No mains power	Check the mains supply.
	Faulty internal power supply	Contact your Agilent representative.
CPU activity LEDs on the rear of the fraction collector are off	Faulty indicator	<p>Turn off the fraction collector. Wait 10 seconds before turning the unit on again. If the probe arm initializes but the light does not come on then the indicator is faulty.</p> <p>Further confirmation of a failure can be confirmed by observing the status of the other LED indicators, the communications, and by resetting the fraction collector by powering it off and, then on. If it does not perform the initialization sequence by driving the probe arm there is a fault.</p>
	Faulty main electronics board	Contact your Agilent representative.
	Faulty internal power supply	Contact your Agilent representative.

6 Troubleshooting and Diagnostics

Quick Troubleshooting Guide

Table 4 Troubleshooting Quick Guide

Symptom	Possible cause	Solution
Fraction collector is not initializing	Probe arm or probe unable to move to the correct positions	<ul style="list-style-type: none">• Turn the power off to the fraction collector.• Check for mechanical obstructions.• Turn the fraction collector on to allow it to attempt the reset procedure.• Watch where the fraction collector fails during the initialization procedure. See “Failure to Initialize” on page 36.• Contact your Agilent representative.
Error status LEDs show an error	See “Error Status Indicator Codes” on page 32.	

Reset Procedure

The reset procedure identifies problems with the movement of the autosampler in the X and Theta axes.

Tools required

Description

Small pointed device.

- 1 Depress the recessed button, see [Figure 4](#) on page 66.

If the unit successfully completes the reset procedure, then the motor's operation and the action of the carriages is correct.

Self-Test Sequence

The self-test sequence tests that the fraction collector functions in X, Theta, and Z axes by moving through the standard and sample positions for the currently loaded rack settings. It does not test the serial communications.

- 1 Turn off the power switch, wait 10 seconds and turn the power switch on.
The module runs the self-test automatically on starting up.

If the self-test sequence is successful, it is only necessary to check the serial port connection to the instrument computer.



7 Error Information

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Communications Error 35

Failure to Initialize 36

External DIP Switches 37

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



Error Status Indicator Codes

Error indicators have been provided to give a quick view of the status of the fraction collector and of the possible cause of incorrect functioning of the unit. Refer to [Figure 4](#) on page 66 for the location of the error indicator LEDs.

The error indicators are a line of blue LEDs on the connection panel of the fraction collector. They are used to provide a visual indicator of an error that has occurred with the fraction collector. Other more extensive error reporting is available via the software commands.

The error indicators illuminate to show the binary error code for the fault. E4 is the least significant bit in the binary code.

If an error occurs, the binary error code is indicated and an error message is sent to the OpenLAB software, for example Error 7 = 0111. (Theta-axis position error). Refer to the table below for the error indicator codes.

Table 5 Error status indicator codes

E_1	E_2	E_3	E_4	Error number	Error description	Solution
0	0	0	0	0	No Error	-
0	0	0	1	1	Reserved	-
0	0	1	0	2	Program memory check-sum error	Contact your Agilent representative.
0	0	1	1	3	Configuration memory check-sum error	Contact your Agilent representative.
0	1	0	0	4	RAM Test error	Contact your Agilent representative.
0	1	0	1	5	Reserved	-
0	1	1	0	6	X-axis position error. The X-axis motor was commanded to move, but did not reach the desired position.	Troubleshoot the probe arm
0	1	1	1	7	Theta-axis position error. The Theta-axis motor was commanded to move, but did not reach the desired position.	Troubleshoot the probe arm
1	0	0	0	8	Z-axis position error. The Z-axis motor was commanded to move, but did not reach the desired position.	Troubleshoot the probe arm
1	0	0	1	9	Reserved	-
1	0	1	0	10	Reserved	-
1	0	1	1	11	X-axis movement detected without the motor being commanded to move.	Probe arm moved. See "Probe Arm Error" on page 34
1	1	0	0	12	Theta-Axis movement detected without the motor being commanded to move.	Probe arm moved. See "Probe Arm Error" on page 34
1	1	0	1	13	Z-axis movement detected without the motor being commanded to move.	Probe arm moved. See "Probe Arm Error" on page 34
1	1	1	0	14	Reserved	-
1	1	1	1	15	Reserved	-

Probe Arm Error

A probe arm error is indicated when the fraction collector cannot complete its instructed move. This could be due to the:

- Probe arm hitting an obstacle while moving into position.
- Probe arm not reaching a position within the defined limits of the intended position. This causes the probe movement to cease. (Movement errors of less than 1 mm are enough to cause a probe jam.)
- Mechanical movement being abnormally stiff, making it difficult for the probe arm to move. The probe drive will cease.
- Arm being manually moved.

In all cases, if an error occurs, the error indicator LEDs will show the error code and an error message will be sent to the computer.

If the probe arm becomes jammed, the error control system will lock the motor drive and send an error message to the computer and to the error indicator LEDs.

If this happens, re-initialize the fraction collector (power off, wait 10 seconds, power on) and then watch for correct initialization.

If the probe line has been squashed as a result of the probe arm jam, the tubing should be replaced to prevent low sample flow or carryover. If there is no obvious cause for the jam, contact your Agilent representative.

Communications Error

The RS232 LED flashes when serial communications from the client computer are received. Refer to [Figure 4](#) on page 66 for the location of this LED. Use the computer to send software commands to the fraction collector. If the LED flashes, the internal computer is operating and it is receiving commands from the HPLC system computer, and its power supply is operational.

NOTE

The flashing only indicates that a character has been received. It does not indicate that the command is correct.

If the fraction collector shows offline in the Status Overview or won't connect to the Console software follow these steps to troubleshoot.

- 1 Check that the RS232 cable between the HPLC system or computer and fraction collector is firmly connected and screwed into place.
- 2 Initialize the fraction collector to ensure that it is in a working state. Turn off the power switch, wait 10 seconds and turn the power switch on.
- 3 When the software is started the software lights the RS232 LED linked to the RS232 connector.
- 4 Check that the RS232 LED flashes while commands are being sent to the fraction collector. If there are flashes, this indicates that the fraction collector has received a message from the instrument computer. It will always respond on receipt of the **Enter** key regardless of the success of the message (this will indicate the Baud Rate is correct).
- 5 If there are no flashes, confirm that the fraction collector is functioning by watching for the CPU Activity LED to flash. Refer to [Figure 4](#) on page 66 for the location of this LED. This should take about 10 – 15 s. If this does not occur, reset the fraction collector to ensure that it follows through the reset sequence and then wait until the CPU Activity LED flashes. If this is successful then retest from step 4 above.
- 6 If unsuccessful, contact your Agilent representative.

Failure to Initialize

The fraction collector initialization process is a powerful self diagnostic tool. The initialization procedure is as follows.

On power up, the autosampler runs through the initialization sequence and sets the probe position. The probe moves to all the physical limits of the working envelope of the fraction collector and then returns to the home position at the drain. This initialization sequence will be performed each time the fraction collector is switched on. The probe travels through the following sequence:

- Probe raises to the full extreme of the Z-axis
- Probe travels to the full extremes of the X-axis
- Probe travels to the full extremes of the Theta axis
- Probe positions itself at the back left of the fraction collector.

If the fraction collector fails to initialize, the probe arm has not travelled the required distance along one or all of the axes. One or more LEDs will light to indicate an error.

External DIP Switches

NOTE

All external DIP switches should be in the *OFF* position.

7 Error Information

External DIP Switches



8 Maintenance

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This chapter describes the maintenance of the module.



Introduction to Maintenance

This chapter includes the maintenance requirements that may be carried out by an operator.

NOTE

Any maintenance procedures not specifically mentioned in this chapter should be carried out only by Agilent-trained, Agilent qualified or Agilent-authorized representatives.

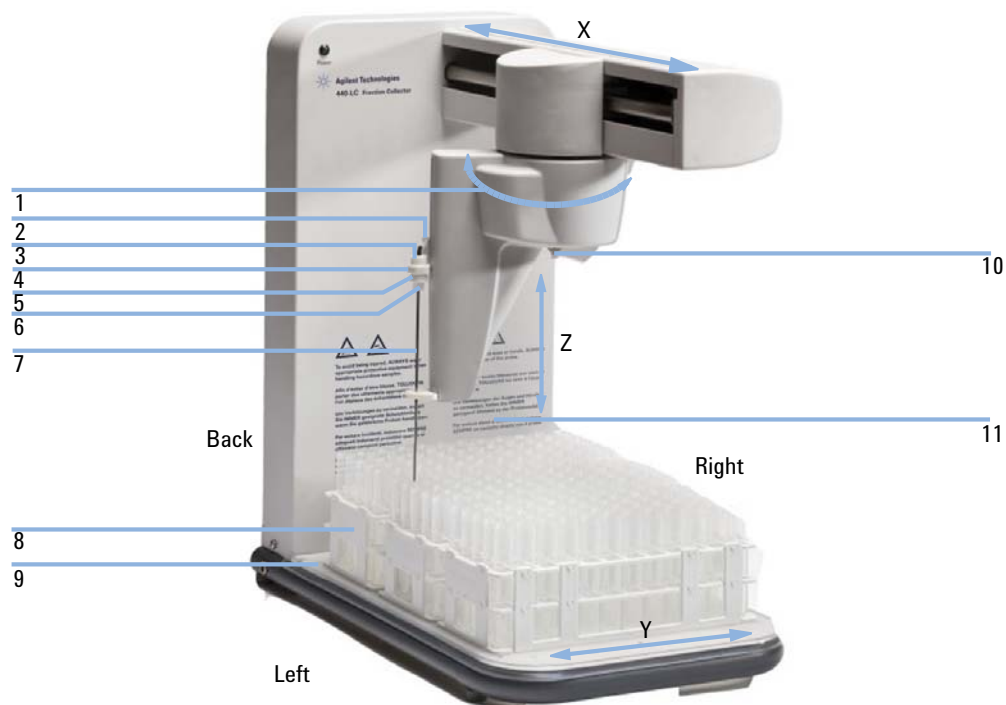


Figure 1 Fraction collector components

1	Theta axis
2	Z axis slide
3	Top knurled mount nut on the probe assembly
4	Probe mounting block
5	Lower knurled mount nut on the probe assembly
6	Nut holding the metal probe
7	Probe
8	Rack
9	Rack location mat
10	Split retaining ring
11	Fraction collector pillar (control column)

NOTE

If you have purchased Funnel Rack Kit (p/n 9910137700) or Funnel Rack, HiFlow Probe and Valve Kit (p/n 9910138200) or High Flow Probe Kit (p/n 9910142900) please see Instruction sheet (p/n 8510250500) that came with it for instructions on how to assemble and install the hardware onto your fraction collector.

Safety Information

Warnings and Cautions

WARNING

Toxic, flammable and hazardous solvents, samples and reagents

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

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

WARNING

Electrical shock

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

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

WARNING

Personal injury or damage to the product

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

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

CAUTION

Safety standards for external equipment

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

Moving Parts

WARNING

Hand injury

The probe arm of the module can move without warning posing a potential hazard due to its moving parts.

- Always switch off the power to the module before installing or removing parts.
 - Keep away from the probe while collecting samples or moving the probe arm.
-

Routine Maintenance

There are no parts that require frequent maintenance. However, always take the following cleaning measures.

- 1** Confirm that the tubing from the probe to the HPLC system is secure and kink-free.
- 2** Check the probe and tubing for blockages.
- 3** Clean any spills by removing, draining and rinsing the spill tray.

General Cleaning

Cleaning should be performed using warm water and a soft, lint free cloth. This will help preserve the plastic components and painted surfaces.

Tools required

Description

Soft, lint free cloth

Warm water

- 1 Wipe up any spills immediately.
- 2 Pump a rinse solution through the fraction collector at the end of a run. This avoids clogging the probe and tubing.
- 3 If necessary, remove the probe from the fraction collector and place it in an ultrasonic bath for cleaning.

Cleaning the Probe

Tools required

Description

Washing solution compatible with your HPLC system and current solvent
Ultrasonic bath

1 Run washing solution compatible with your HPLC system and current solvent through the fraction collector tubing.

OR

If it is completely blocked replace the tubing.

2 Sonicating the probe and tubing.

NOTE

Sonicating may help clean any particulates out of the tubing.

OR

If sonicating the probe and tubing assembly does not remove the blockage, replace it.

3 For information on how to remove and replace the probe, see [“Replacing the Probe and Probe Tubing”](#) on page 50.

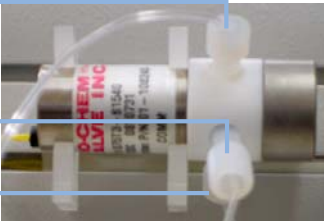
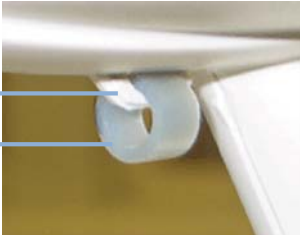
Cleaning the Spill Tray and Rack Mat

- 1 Turn off the fraction collector.
- 2 Remove the racks.
- 3 Lift up and remove the rack mat.
- 4 Carefully lift up and remove the spill tray.
- 5 Clean the spill tray and rack mat.
- 6 Dispose of any waste in the appropriate manner.

8 Maintenance

Removing the Probe from the Fraction Collector

Removing the Probe from the Fraction Collector

<p>1 Turn off the fraction collector.</p> <p>2 Slide the probe assembly to the top of the probe carriage.</p> <p>3 Manually rotate the probe arm so that it can be easily accessed.</p>	<p>4 Unscrew the tubing from the divert valve position 3.</p> <p>Port 1 to waste</p> <p>Port 2 from detector outlet or back pressure restrictor</p> <p>Port 3 to the probe</p> 
<p>5 Remove the tubing from the tube restraint.</p>	<p>6 Remove the tubing from the split retaining ring at the underside of the housing.</p> <p>Loop</p> <p>Split ring (retaining ring)</p> 

Removing the Probe from the Fraction Collector

- 7** Disassemble the probe by unscrewing the nut holding the metal probe from the bottom of the knurled mount and then remove the lower knurled mount nut that retains the knurled mount.



Top knurled mount on the probe assembly

Lower knurled mount nut on the probe assembly

Nut holding the metal probe

Next Steps:

- 8** Lift the probe and tubing out of the probe mounting block.
- 9** Slide the black piece of tubing completely onto the stainless steel probe tube. The black tubing secures the Teflon tubing into the metal probe tube.
- 10** If you are replacing the tubing, pull it out of the probe and save it. This tubing will be used as a guide for the new tubing length.

8 Maintenance

Replacing the Probe and Probe Tubing

Replacing the Probe and Probe Tubing

Follow this procedure to insert either the standard 0.020 in or low flow 0.010 in tubing into the probe and then install the assembly on the fraction collector.

If you are installing High Flow Probe Kit (p/n 9910142900) please see Instruction sheet (p/n 8510250500) that came with it to assemble and install the hardware.

Use the low delay volume tubing for operation of the fraction collector at or below 1 mL/min or collection of very narrow (<30 s wide) peaks for good results.

The Low delay volume tubing, Tefzel 1/16 in OD by 0.010 in ID comes with Probe kit with 0.050 cm (0.020 in) ID stainless steel probe includes 0.025 cm (0.010 in)ID tubing (p/n 9910130800).

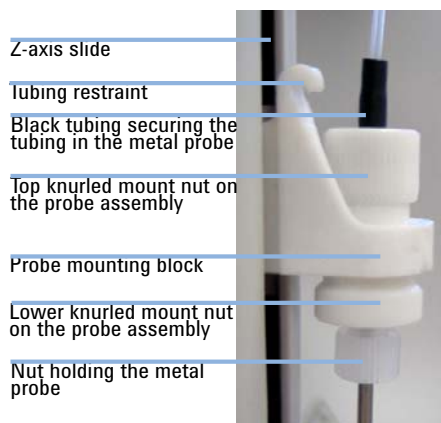


Figure 2 Probe details

Preparations

If already installed on the fraction collector, remove the probe assembly. See [“Removing the Probe from the Fraction Collector”](#) on page 48.

CAUTION

Damage to flow cell upstream

Back pressure may damage detector flow cell upstream.

Different flow ranges require different setup to avoid high back pressure.

- 0 – 50 mL/min: Standard probe and valve
- 50 – 400 mL/min: High flow probe (possible funnel rack)
- 400 – 800 mL/min: High flow probe, HiFlow valve and funnel rack.
- Do not use the 0.010 in tubing, when operating at flow rates ≥ 2 mL/min.

- 1 Remove the tubing from inside the probe.
 - a Slide the black piece of tubing completely onto the stainless steel probe tube.

The black tubing secures the Tefzel tubing into the metal probe tube.
 - b Pull the tubing out of the probe if you are replacing the tubing.

This tubing will be used as a guide for the new tubing length.
- 2 Cut the supplied (0.020 in, 0.50 mm ID) Tefzel or narrow bore tube (0.010 in ID, 0.25 mm ID) tubing to a length equal to the tubing previously removed from the probe
- 3 Slide a new Nut, short 1/16 in, flangeless ETFE (Tefzel®) and then a new Ferrule, 1/16 in flangeless natural ETFE (Tefzel®) onto one end of the tubing.
- 4 Slide the 0.020 in (0.50 mm) ID or the 0.010 in (0.25 mm) ID (low delay volume) Tefzel tubing into the stainless steel probe if you are replacing the tubing inside the probe.
- 5 Push the tubing down into the probe so that at least 0.5 cm tubing protrudes from the end of the probe.
- 6 Slide the black tubing so that half of the tubing is on the metal probe and half on the Tefzel tubing. This secures the tubing to the metal probe.
- 7 Slide the probe into the probe mounting block.
- 8 Fit and tighten the lower knurled nut holding the probe to the top knurled mount nut.
- 9 Fit and tighten the nut to the lower knurled mount.
- 10 Clip the tubing into the tube restraint in the Z-axis slider. Allow for a little extra length in the tubing to prevent kinking.

8 Maintenance

Replacing the Probe and Probe Tubing

11 Feed the tubing through the retaining ring at the underside of the housing. The retaining ring is split to allow you to slide the tubing into it.

12 Screw the tubing fitting into port 3 of the valve.

NOTE

The length of the tubing must allow the probe arm to move freely in all axes. If it is too tight, it will restrict movement and may cause movement failure. If it is too loose, the probe arm may become tangled in the tubing as it moves. It is also important to keep the tubing length to a minimum to avoid a large delay volume.

13 Move the probe arm to all four corners of the fraction collector while rotating the probe arm fully to check that the tube is completely free to move. It is also important to keep the minimum length of tubing to minimize the delay volume.

14 Manually position the probe arm at the midpoint along the X axis.

15 Rotate the probe arm through its full extent to check that the tubing is free to allow full movement in all directions.

16 If you are replacing the tubing from the divert valve to the back pressure regulator or detector:

- a** Remove the tubing from port 2 on the divert valve and the back pressure regulator or detector.
- b** Cut the supplied (0.020 in, 0.50 mm ID) Tefzel or narrow bore tube (0.010 in ID, 0.25 mm ID) tubing to a length equal to the tubing previously removed in step a on page 52. It is important to keep the length of tubing short as possible to minimize the volume delay.
- c** Slide a new Nut, short 1/16 in, flangeless ETFE (Tefzel®) and then a new Ferrule, 1/16 in flangeless natural ETFE (Tefzel®) (both also supplied with the probe kit) onto one end of the tubing. Screw the tubing fitting into port 2 of the valve.
- d** Slide the appropriate nut and ferrule for the back pressure regulator or detector output onto the other end. Screw the tubing fitting into the detector outlet or back pressure restrictor if one is present on your system.

17 Determine the volume delay and probe depth. For details refer to help of control software.

NOTE

You will need to reset the volume delay in software.

Replacing the Tubing

Use this procedure to replace the tubing from the divert valve to the detector or the divert valve to the waste.

- 1 Turn off the flow.
- 2 Open the purge valve to release any residual pressure.
- 3 Unscrew the fitting from the valve at port 1 or 2. See [Figure](#) on page 48.
- 4 Unscrew the fitting at the detector outlet (or back pressure restrictor) if applicable.
- 5 Replace the tubing and/or fittings as needed.
 - Tubing: 0.020 in or 0.010 in ID, 1/16 in. OD
 - Nut, short 1/16 in, flangeless ETFE (Tefzel®)
 - Ferrule, 1/16 in flangeless natural ETFE (Tefzel®)
- 6 Tighten the nuts to finger-tight.
- 7 Close the purge valve.
- 8 Turn on the flow and check for leaks.
- 9 Determine the volume delay. For details, refer to help of control software.

Replacing the Fuse

Replace a blown fuse with one of the same type and rating.

Parts required	Description
	Fuse, 250 V, 5 A, 5 x20 mm (M205)

NOTE

Always check the information printed on the back of the fraction collector for the correct fuse type, as this is the most up to date.

CAUTION

Wrong fuse
Damage to the module and loss of warranty.

- Set voltage properly.
 - Use only the correct fuses.
-

WARNING

Electrical shock

- Always disconnect power cord from the module before replacing a fuse.
-

1 Disconnect the module from the mains power supply.

2 Use a thin, flat blade screwdriver (or similar tool) to pry open the cover of the fuse compartment, which is located on the power supply unit near the bottom of the connection panel on the rear of the module.

Flat-blade screwdriver

Cover of fuse compartment

Correct fuse information



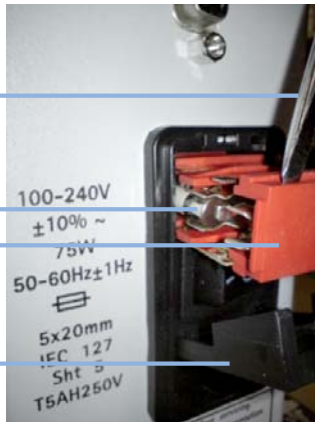
3 Slide out the fuse holder from the compartment.

Flat-blade screwdriver

Fuse

Fuse holder

Cover of fuse compartment



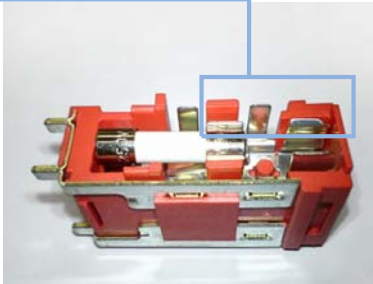
4 Check that each fuse is of the correct type and that it is not damaged. If necessary, replace the fuse(s) in the holder.

8 Maintenance

Replacing the Fuse

- 5 Ensure each fuse is held securely by the prongs inside the holder. If the contact is too loose, remove the fuse from the holder and then use a pair of pliers to compress the distance between the prongs, so as to tighten their grip on the fuse. Replace the fuse.

Prongs



Next Steps:

- 6 Slide the fuse compartment back into the compartment and clip the cover back into place, ensure that it clicks into the locked position.
- 7 Reconnect the power supply cable and switch on power to the unit.



9 Parts

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Tubing and Probes	60
Miscellaneous Spares	61
Fuses	62

This chapter provides information on parts for the instrument.



Sample Racks

p/n	Description
6610026600	Sample Rack Type 21 - Capacity no. tubes x OD: 21 x 30 mm
6610026500	Sample Rack Type 24 - Capacity no. tubes x OD: 24 x 25 mm
6610025500	Sample Rack Type 40 - Capacity no. tubes x OD: 40 x 20 mm
6610025400	Sample Rack Type 60 - Capacity no. tubes x OD: 60 x 16 mm
6610026400	Sample Rack Type 90 - Capacity no. tubes x OD: 90 x 13 mm
7910056000	Sample Rack Type 128 - Capacity no. tubes x OD: 128 x 15 mm (4 mL capacity)
7910060100	Sample Rack Type 200 - Capacity no. tubes x OD: 200 x 12 mm (2 mL capacity)

Rack Overlays

p/n	Description
6610026000	Rack Conversion for Type 40 rack, 18 mm OD holes
6610026100	Rack Conversion for Type 60 rack, 16 mm OD holes

Tubing and Probes

p/n	Description
9910130800	Probe kit with 0.050 cm (0.020 in) ID stainless steel probe includes 0.025 cm (0.010 in)ID tubing
9910142900	High Flow Probe Kit
9910137700	Funnel Rack Kit
9910138200	Funnel Rack, HiFlow Probe and Valve Kit

Miscellaneous Spares

p/n	Description
3710051100	Polypropylene tubes 16 mm OD x 125 mm height (bag of 125 tubes)
6610025100	Fraction collector spill tray
9910056300	Trolley (cart) for the fraction collector. Features lockable wheels and lower shelf for storage.
8010-0198	2 mL screw top wide opening clear glass vials, 12 x 32 mm, 9 mm red caps with PTFE/Silicone liners, 100 per pack
1910009100	Fuse 5 A 440-LC FC
1910010700	Fuse 3.15 A 440-LC FC
R007200141	3-wire LC interconnect cable for most connections
110744200	LC analog signal cable
210187590	325/335 Relay Interface Board
5140892700	210/218 Rear Back Panel Interface
7910062900	Approved USB to RS232 Converter

Fuses

NOTE

For safety reasons, any other internal fuse or circuit breaker is not operator accessible, and should only be replaced by Agilent authorized personnel.

Fuse information on the rear of the instrument is the most up to date.

p/n	Description
(2x)	Fuse, 250 V, 5 A, 5 x20 mm (M205)



10 Cables

Cable Overview [64](#)

Cable Connections [65](#)

Backpanel Overview [66](#)

This chapter provides information on cables used with the module.



Cable Overview

Necessary cables

p/n	Description
392612901	Ethernet cable (for use in a <i>network</i>)
5023-0203	Ethernet cable (cross-over, for <i>standalone</i> use)
392607969	Inject marker cable
392607975	Next injection cable
393546291	Serial communication ribbon
393597601	Converter RS232 to RS422
7910046300	Serial cable

Optional cables

p/n	Description
110743800	Relay interface cable (for relay interface board, one relay contact per cable)
110744200	Analog signal cable

Cable Connections

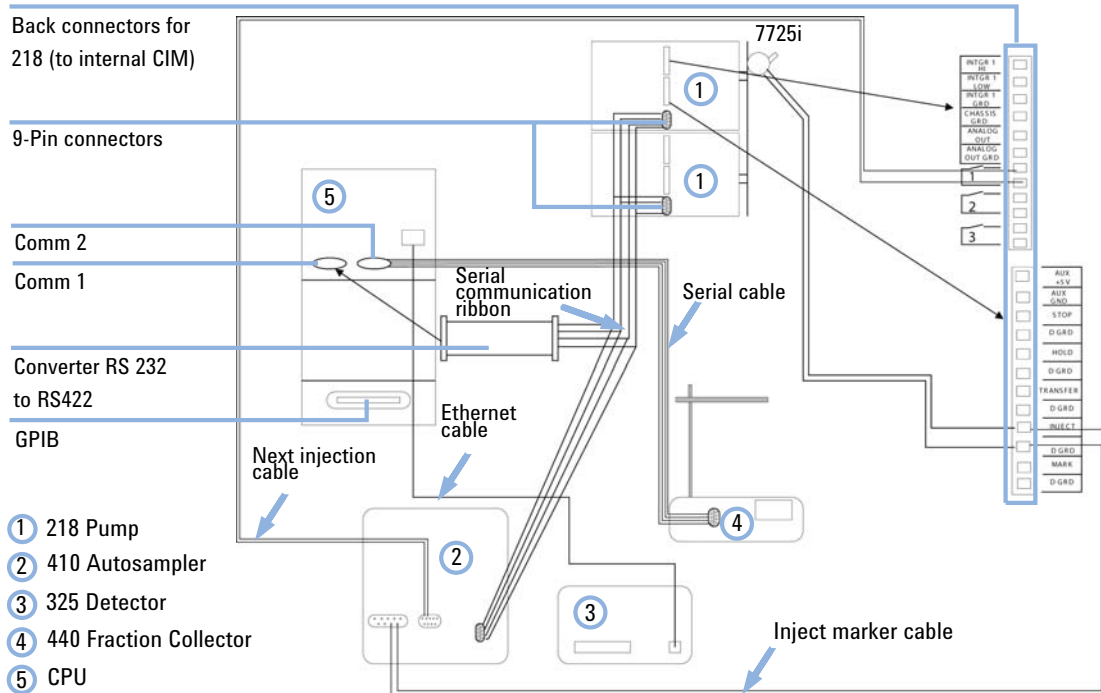


Figure 3 Cable connections for workstation control of Agilent 218 Pumps, Agilent 325 Detector, Agilent 410 Autosampler and Agilent 440 Fraction Collector

Backpanel Overview

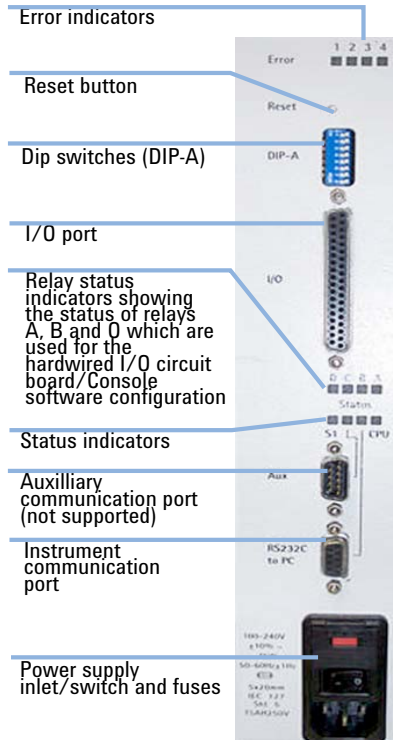


Figure 4 Connection panel



11 Appendix

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



General Safety Information

General Safety Information

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

WARNING

Ensure the proper usage of the equipment.

The protection provided by the equipment may be impaired.

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

Symbols

The following is a list of symbols that appear with warnings in this manual or on the liquid chromatograph. The hazard they describe is also shown.





A triangular symbol indicates a warning. The meanings of the symbols that may appear alongside warnings in the documentation or on the instrument itself are as follows:

Table 6 Warning symbols

		
Chemical hazard	Electrical shock	Fire hazard
		
Heavy weight (danger to feet)	Heavy weight (danger to hands)	Inhalation hazard
		
Moving parts	Warning label ¹	

¹ The following symbol may be used on warning labels attached to the instrument. When you see this symbol, refer to the relevant operation or service manual for the correct procedure referred to by that warning label.

Table 7 Information Symbols

Symbol	Description
I	Mains power on
0	Mains power off
	Fuse
	Single phase alternating current
	Direct current
	When attached to the rear of the instrument, indicates that the product complies with the requirements of one or more EU directives.

Solvent Hazards

WARNING

Explosion, fire, asphyxiation

This instrument is not explosion-proof.

Certain solvents may cause weakening and leaks of tubings or fittings with possible bursting.

Even small leaks in solvent supply systems can be dangerous.

- Only use solvents compatible with the HPLC system tubings and fittings.
 - Employ static measuring and static discharge devices to safeguard against the buildup of static electricity.
 - In unattended operation, do not use organic solvents having an ignition point below 70 °C.
 - Do not bring a heat or flame source near the instrument.
 - The area in which solvents are stored and the area surrounding the instrument must be adequately ventilated to prevent accumulations of gas.
 - Always check the condition of the instrument (leakage of solvent or waste solution, leakage of solvent inside the instrument). If an abnormality is found, stop operation immediately.
 - When using flammable chemicals, be careful about possible ignition due to static electricity. To prevent the build-up of static electricity, use a conductive container for waste.
 - Use only approved regulator and hose connectors (refer to the supplier's instructions).
 - Keep solvents cool and properly labeled. Ensure that you have the correct solvent before connecting it to the instrument.
-

WARNING

Inflammation or injury due to toxic, corrosive or stimulative solvent

- Do not contact toxic, corrosive or stimulative solvent.
 - For details of the properties of each solvent and how to handle it, refer to the relevant Material Safety Data Sheets (MSDS).
 - Be sure to handle each solvent properly.
 - Wear proper personal protective clothes (e.g., safety goggles) so that a solvent will not come into direct contact with the skin.
 - Ventilate the laboratory room adequately to prevent accidental inhalation of harmful solvent vapor.
-

WARNING

Cuts

- When working with glass or quartz parts take care to prevent breakage.
-

Other Precautions

Airflow to the cooling fans of the liquid chromatograph must be unobstructed. Do not block the ventilation grills on the liquid chromatograph and accessories.

Consult the manuals supplied with your PC, monitor and for their specific ventilation requirements.

Moving Parts Hazard

WARNING

Personal injury

The probe arm of the module can move without warning posing a potential hazard due to its moving parts.

- Always switch off the power to the module before installing or removing parts.
-

Flammable liquids

WARNING

Risk of fire

The module consumes power, produces heat, or conducts heat from other areas.

- Use only flammable liquids with a flash point > 25 °C above ambient temperature.
 - Do not allow flammable liquids to come near to any heat emitting part of the module.
 - Keep anything capable of igniting a flammable liquid well away from the module.
-

The Waste Electrical and Electronic Equipment Directive

Abstract

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

NOTE

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

Product Category:

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



NOTE

Do not dispose off in domestic household waste

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

Radio Interference

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

Test and Measurement

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

CE Compliance

Your Agilent 700 Series ICP-OES instrument has been designed to comply with the requirements of the Electromagnetic Compatibility (EMC) Directive and the Low Voltage (electrical safety) Directive (commonly referred to as the LVD) of the European Union. Agilent has confirmed that each product complies with the relevant Directives by testing a prototype against the prescribed EN (European Norm) standards.

Proof that a product complies with these directives is indicated by:

- the CE Marking appearing on the rear of the product, and
- the documentation package that accompanies the product containing a copy of the Declaration of Conformity. The Declaration of Conformity is the legal declaration by Agilent that the product complies with the directives listed above, and shows the EN standards to which the product was tested to demonstrate compliance.

Electromagnetic Compatibility

EN55011/CISPR11

Group 1 ISM equipment: group 1 contains all ISM equipment in which there is intentionally generated and/or used conductively coupled radio- frequency energy which is necessary for the internal functioning of the equipment itself.

Class A equipment is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

This device complies with the requirements of CISPR11, Group 1, Class A as radiation professional equipment. Therefore, there may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

- 1** Relocate the radio or antenna.
- 2** Move the device away from the radio or television.
- 3** Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
- 4** Make sure that all peripheral devices are also certified.
- 5** Make sure that appropriate cables are used to connect the device to peripheral equipment.
- 6** Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.
- 7** Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

ICES/NMB-001

This ISM device complies with Canadian ICES- 001. Cet appareil ISM est conforme à la norme NMB-001 du Canada.

Agilent Technologies on Internet

For the latest information on products and services visit our worldwide web site on the Internet at:

<http://www.agilent.com>

Select Products/Chemical Analysis

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

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In This Book

This manual covers the Agilent 440 Fraction Collector (G9340A).

The manual describes the following:

- Introduction
- Site requirements and specifications
- Installation
- Using
- Optimizing
- Troubleshooting
- Errors
- Maintenance
- Parts
- Safety and the web

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