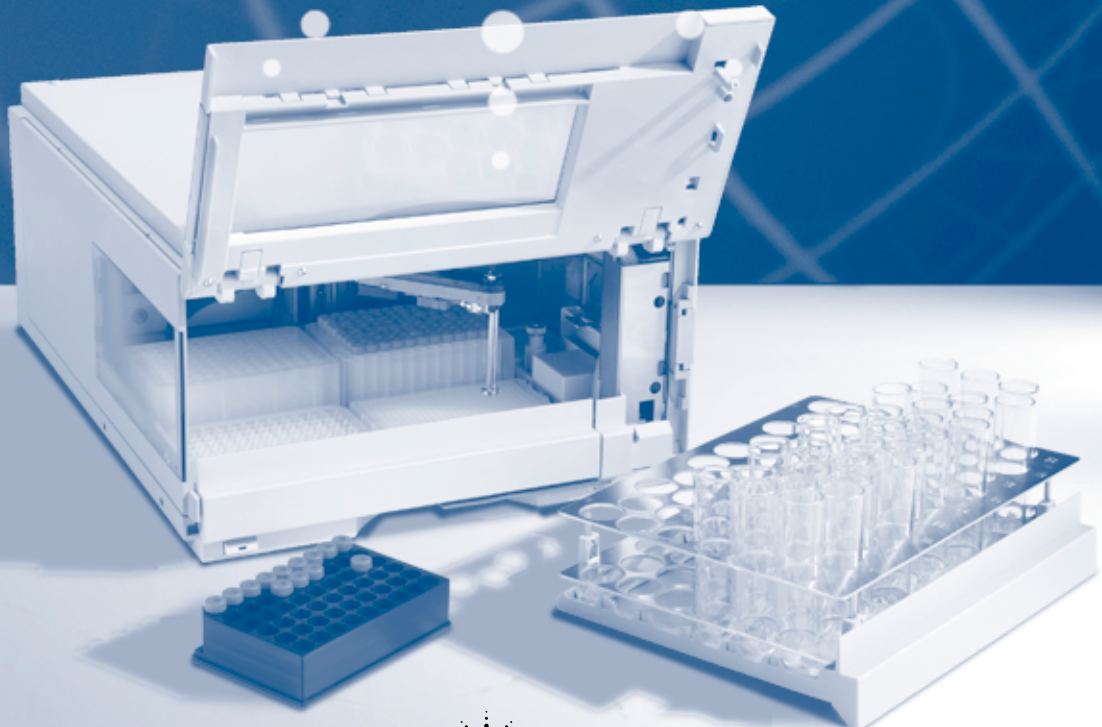
Agilent 1100 Series Fraction Collectors

Reference Manual



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WARNING

For details of safety, see Warranty Statement on page 246.

Warning Symbols Used In This Book

The apparatus is marked with this symbol when the user should refer to the instruction manual in order to prevent risk of harm to the operator and to protect the apparatus against damage.

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Reference Manual

In This Book

This manual contains technical reference information about the Agilent 1100 Series fraction collectors. The manual describes the following:

- installing the fraction collector,
- modes of operation,
- troubleshooting and test functions,
- repairing the fraction collector,
- parts and materials,
- introduction to the fraction collector and theory of operation,
- control module screens,
- specifications,
- legal, safety and warranty information.

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Installing the Fraction Collector

Site requirements and installation of the fraction collector

Installing the Fraction Collector

Site Requirements

A suitable site environment is important to ensure optimum performance of the fraction collector.

Power Consideration

The fraction collector power supply has wide-ranging capability (see Table 1 on page 4). Consequently there is no voltage selector in the rear of the fraction collector. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

The thermostatted fraction collector comprises two modules, the fraction collector (G1364A) and the thermostat (G1330A). Both modules have a separate power supply and a power plug for the line connections. The two modules are connected by a control cable and both are turned on by the fraction collector module. The thermostat power supply has two externally accessible fuses.

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

WARNING **To disconnect the thermostatted fraction collector from line power, unplug the power cord from the fraction collector and the thermostat. The power supplies still use some power, even if the power switch on the front panel is turned off. Please make sure that it is always possible to access the power plug.**

WARNING **Shock hazard or damage of your instrumentation can result if the devices are connected to a line voltage higher than specified.**

Power Cords

Your fraction collector is delivered with a power cord which matches the wall socket of your particular country or region. The plug on the power cord which connects to the rear of the instrument is identical for all types of power cord.

WARNING **Never operate your instrumentation from a power outlet that has no ground connection. Never use a power cord other than the power cord designed for your region.**

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

Bench Space

The fraction collector dimensions and weight (see Table 1) allow the instrument to be placed on almost any laboratory bench. The instrument requires an additional 2.5 cm (1.0 inch) of space on either side, and approximately 8 cm (3.1 inches) at the rear for the circulation of air, and room for electrical connections. Ensure the fraction collector is installed in a horizontal position.

The thermostatted fraction collector dimensions and weight (see Table 2) allow the instrument to be placed on almost any laboratory bench. The instrument requires an additional 25 cm (10 inches) of space on either side for the circulation of air, and approximately 8 cm (3.1 inches) at the rear for electrical connections. Ensure the fraction collector is installed in a horizontal position.

If a complete Agilent 1100 Series system is to be installed on the bench, make sure that the bench is designed to carry the weight of all the modules. For a complete system including the thermostatted fraction collector it is recommended to position the modules in two stacks, see “Recommended Stack Configuration - Fraction Collector in an Analytical System (Front View)” on page 9. Make sure that in this configuration there is 25 cm (10 inches) space on either side of the thermostatted fraction collector for the circulation of air.

Environment

Your fraction collector will work within specifications at ambient temperatures and relative humidity as described in Table 1 and Table 2.

CAUTION

Do not store, ship or use your fraction collector under conditions where temperature fluctuations may cause condensation within the fraction collector. Condensation will damage the system electronics. If your fraction collector was shipped in cold weather, leave it in its box, and allow it to warm up slowly to room temperature to avoid condensation.

Table 1 **Physical Specifications - Fraction Collector (G1364A)**

Type	Specification	Comments
Weight	13.5 kg (29.8 lbs)	
Dimensions (height × width × depth)	200 × 345 × 440 mm (8 × 13.5 × 17 inches)	
Line voltage	100 – 240 VAC, ±10 %	Wide-ranging capability
Line frequency	50 or 60 Hz, ±5 %	
Power consumption (apparent power)	200 VA	Maximum
Power consumption (active power)	180 W	Maximum
Ambient operating temperature	4 – 55 °C (41 – 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 (6500 ft)	
Non-operating altitude	Up to 4600 m (14950 ft)	For storing the fraction collector
Safety standards: IEC, CSA, UL	Installation Category II, Pollution Degree 2	

Table 2 **Physical Specifications - Thermostat (G1330A)**

Type	Specification	Comments
Weight	18.5 kg (40.7 lbs)	
Dimensions (height × width × depth)	140 × 345 × 435 mm (5.5 × 13.5 × 17 inches)	
Line voltage	100 – 120 or 220 – 240 VAC, ± 10 %	Wide-ranging capability
Line frequency	50 or 60 Hz, ± 5 %	
Power consumption (active power)	210 W	Maximum
Power consumption (apparent power)	260 VA	Maximum
Ambient operating temperature	4 – 40 °C (41 – 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 (6500 ft)	
Non-operating altitude	Up to 4600 m (14950 ft)	For storing the fraction collector
Safety standards: IEC, CSA, UL, EN	Installation Category II, Pollution Degree 2	

Unpacking the Fraction Collector

CAUTION

If you need to ship the fraction collector at a later date, always use the shipping protection foam parts (see “Transporting the Fraction Collector” on page 29).

Damaged Packaging

Upon receipt of your fraction collector, inspect the shipping containers for any signs of damage. If the containers or cushioning material are damaged, save them until the contents have been checked for completeness and the fraction collector has been mechanically and electrically checked. If the shipping container or cushioning material is damaged, notify the carrier and save the shipping material for the carrier‘s inspection.

CAUTION

If there are signs of damage to the fraction collector, please do not attempt to install the fraction collector.

Delivery Checklist

Ensure all parts and materials have been delivered with the fraction collector. For this compare the shipment content with the checklist included in each instrument box. Please report missing or damaged parts to your local Agilent Technologies sales and service office.

Four models of Agilent 1100 Series fraction collector are available:

- **G1364A** Fraction Collector**, preparative scale,** designed for flow rates up to 100 ml / min. and for the use with vials, deep well plates and test tubes (up to 100 mm height) (short needle, low flow restriction)
- **G1364A Thermostatted** Fraction Collector**, preparative scale,** can be created by additionally ordering and installing a G1330A Fraction Collector Thermostat
- **G1364A #50** Fraction Collector**, analytical scale,** designed for flow rates below 10 ml / min. and for the use with vials, test tubes of up to 48 mm height, well-plates and a 10-funnel tray connecting to external locations of any size (long needle, low internal volume, internal tray for fraction delay sensing and rinsing)

- **G1364A #50 Thermostatted** Fraction Collector**, analytical scale,** can be created by additionally ordering and installing a G1330A Fraction Collector Thermostat

These modules are referred to in this introduction as the (thermostatted) **analytical scale** fraction collector and the (thermostatted) **preparative scale** fraction collector. Unless otherwise stated all information in this section is valid for all models.

Table 3 **Delivery Checklist for the G1364A (preparative scale) or G1364A #050 (analytical scale) Fraction Collector**

Description	Quantity
Fraction collector module with inlet / waste tubing assembly	1
Power cord, local (Matching the sockets in your country or region)	1
Accessory kit (see below)	1
Fraction Collector Reference Manual	1

Table 4 **Delivery Checklist for the G1330A Thermostat Module (optional)**

Description	Quantity
Thermostat Module	1
Power cord, local (Matching the sockets in your country or region)	1
Accessory kit thermostat module (see below)	1
Fraction Collector Reference Manual	1

Accessory Kits

Each shipment contents an Accessory kit with the necessary tools to install the system and to have an operating system.

- The Accessory kit (G1364-68705) shown in Table 5 is shipped with the (G1364A) fraction collector.

Table 5 **Fraction Collector Accessory Kit Contents G1364-68705**

Description	Quantity	Part Number
Wrench, open end, 4mm	1	8710-1534
Hex key 2.0 mm	1	8710-2438
Wrench, open end, 1/4 – 5/16 inch	1	8710-0510
Finger tight fittings, 1/16" f-120*	3	0100-1516
Waste tubing (1.2 m)**	1	5062-2463
CAN cable, 1 m	1	5181-1519
Air channel adapter	1	G1329-43200
Sticking clamp for corrugated waste tubing (large)	3	no PN
Sticking clamp for waste tubing (small)	2	no PN
Delay Calibrant	4 x 0.5 ml	G1946-85020
ESD wrist strap	1	9300-1408

* Reorder gives pack of 2
** Reorder gives 5 m

- The Accessory kit (G1330-68705) shown in Table 6 is shipped with the (G1330A) thermostat module if the thermostat module was ordered.

Table 6 **(Optional) Thermostat Module Accessory Kit Contents G1330-68705**

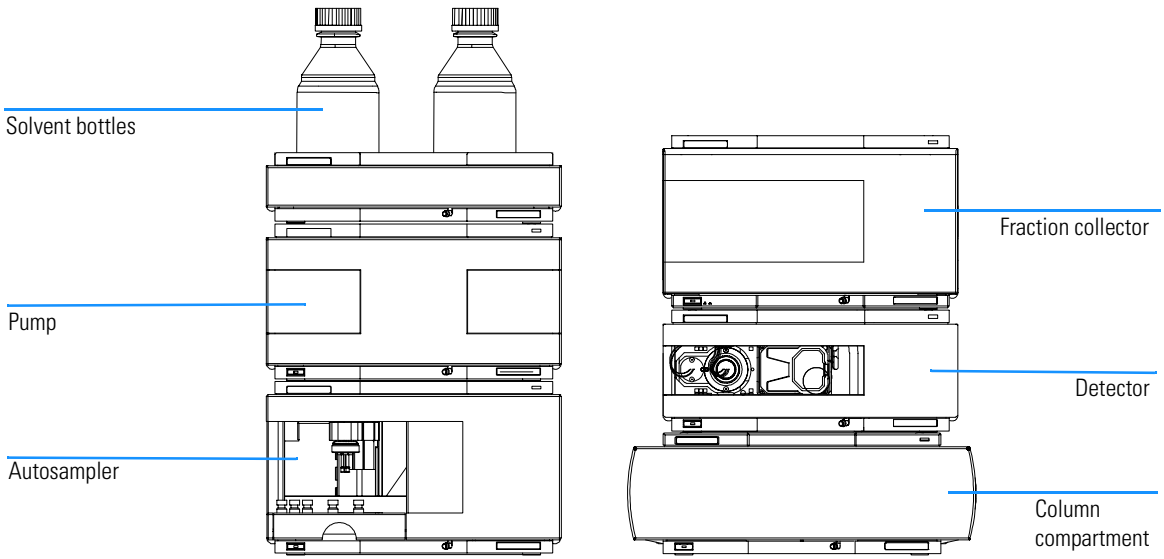
Description	Quantity	Part Number
Waste tubing (1.2 m)*	1	5062-2463
Cable thermostat module to fraction collector	1	G1330-81600

* Reorder gives 5 m

Optimizing the Stack Configuration

If your fraction collector is part of a system, you can ensure optimum performance and minimum delay volume by installing the following configuration. Figure 1 and Figure 2 show the configuration recommended for the fraction collector in an analytical scale system. Figure 3 and Figure 4 show the configuration recommended for the fraction collector with a preparative scale system.

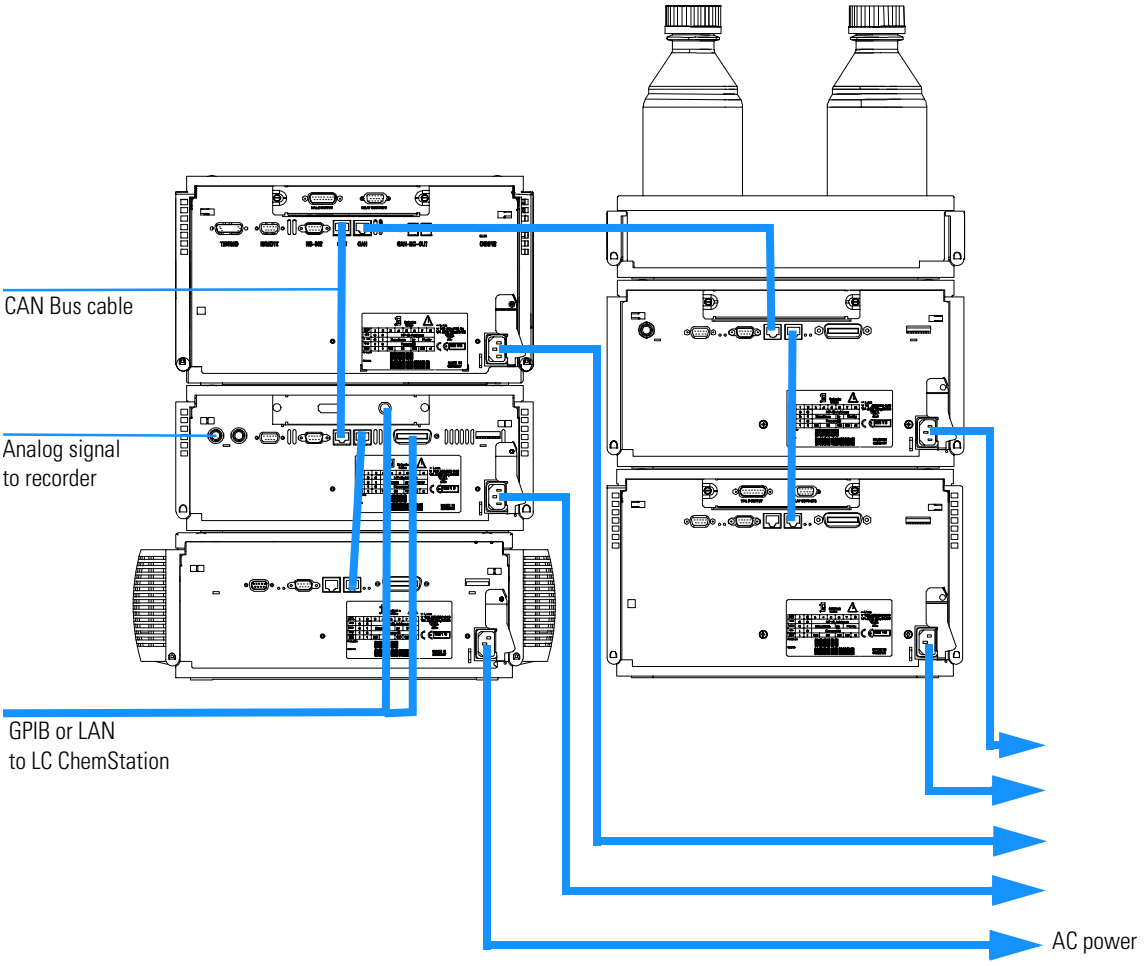
Figure 1 **Recommended Stack Configuration - Fraction Collector in an Analytical System (Front View)**



NOTE

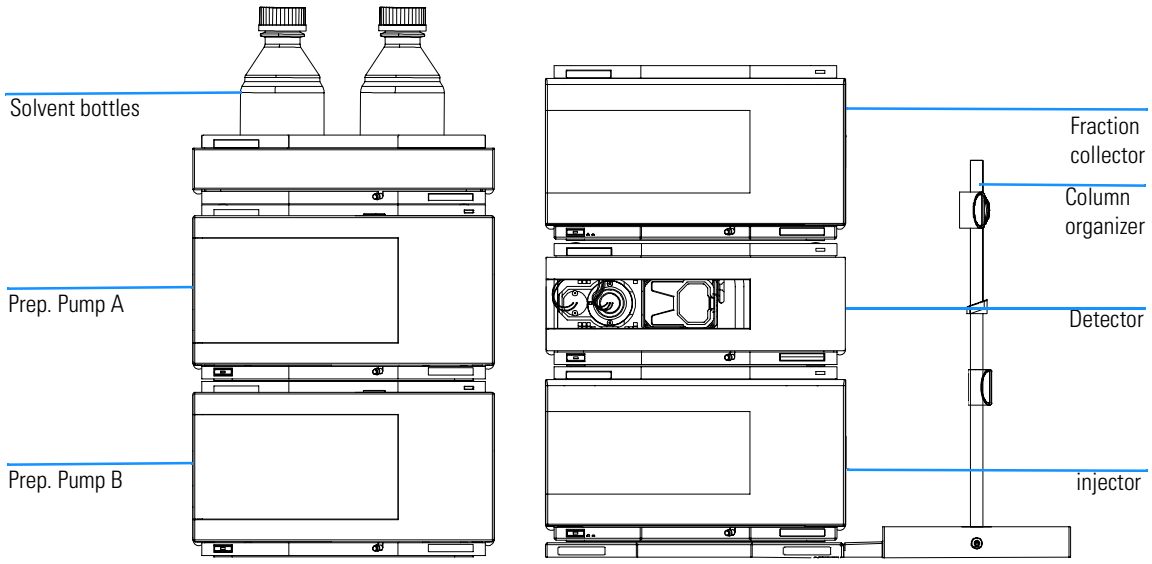
For information about connecting a G1946C/D LC-MSD or a Non-1100 or Non-UV-Vis detector to the system, please refer to the “User’s Guide for Purification / High Throughput System”, PN G2262-90001

Figure 2 **Recommended Stack Configuration - Fraction Collector in an Analytical System (Rear View)**



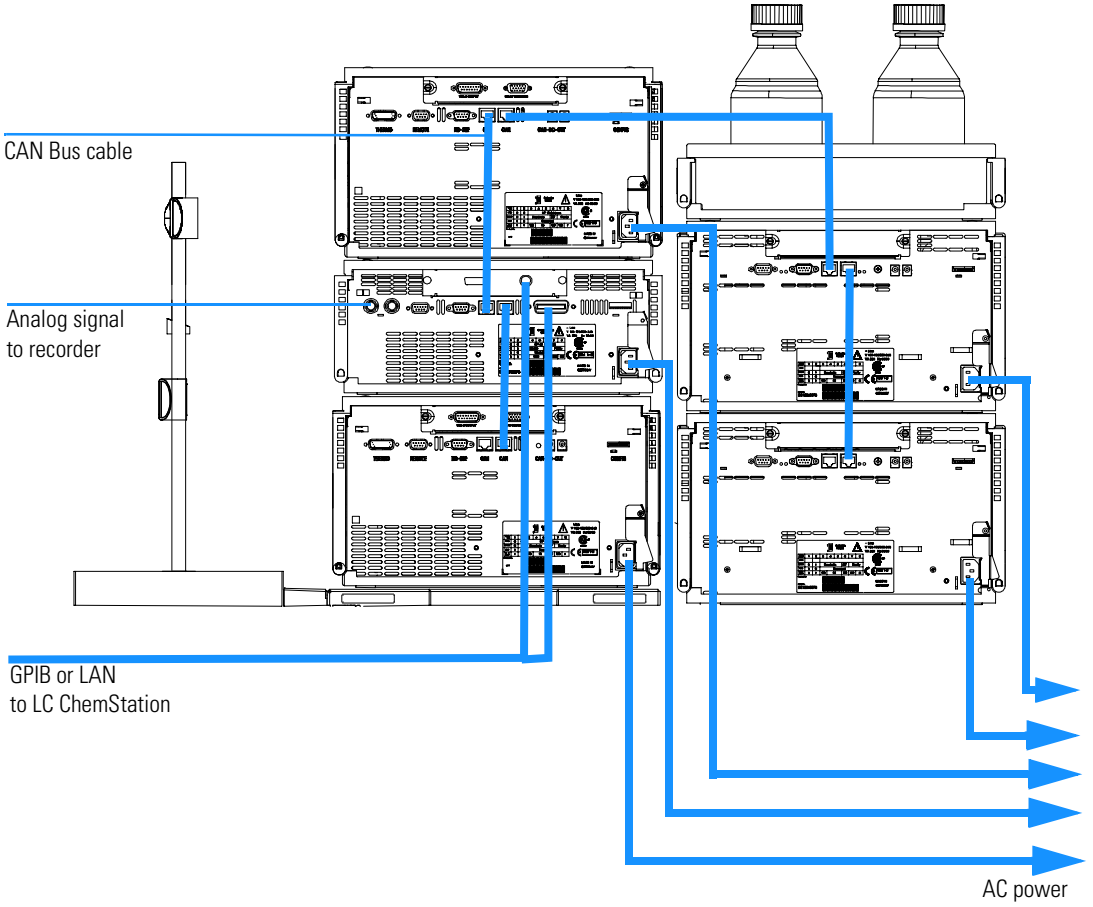
NOTE If a G1330A ALS thermostat is part of the system it must always be installed underneath the module, that it is supposed to thermostat (injector or fraction collector (see “Installing a Thermostatted Fraction Collector” on page 17).

Figure 3 **Recommended Stack Configuration - Fraction Collector in a Preparative System (Front View)**



NOTE For information about connecting a G1946C/D LC-MSD or a Non-1100 or Non-UV-Vis detector to the system, please refer to the “User’s Guide for Purification / High Throughput System”, PN G2262-90001

Figure 4 **Recommended Stack Configuration - Fraction Collector in a Preparative System (Rear View)**



NOTE If a G1330A ALS thermostat is part of the system it must always be installed underneath the module, that it is supposed to thermostat (injector or fraction collector (see “Installing a Thermostatted Fraction Collector” on page 17).

Installing the Fraction Collector

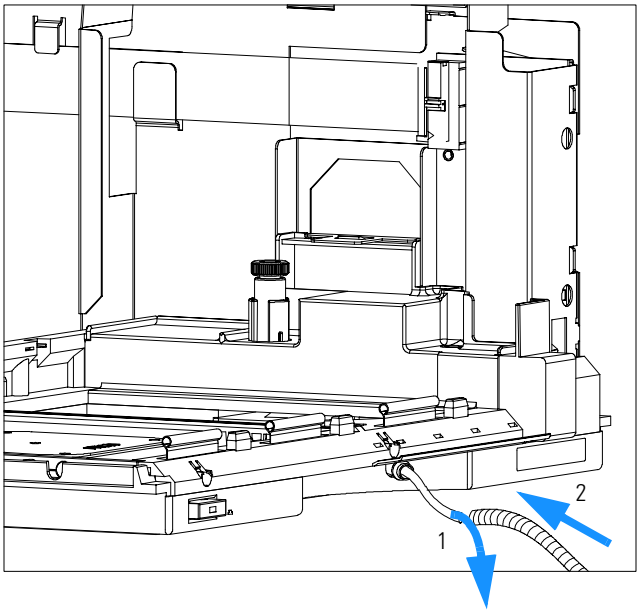
Preparation	Locate bench space Provide power connections Unpack the fraction collector
Parts required	Fraction Collector Power cord, for the other cables see below and "Cable Overview" on page 160 Chemstation and/or Control Module G1323B

WARNING **When opening capillary or tube fittings solvents may leak out. Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.**

WARNING **To avoid personal injury, keep fingers away from the needle area during fraction collector operation. Do not attempt to insert or remove a vial or a plate when the needle is positioned.**

1. Install the LAN interface board in the fraction collector (if required), see "Exchanging or Installing the (Optional Interface) BCD Board" on page 106.
2. Remove the adhesive tape which covers the side and front doors.
3. Open the front door and remove the left side door.
4. Remove the transport protection foam.
5. Install the corrugated waste tube in the plastic port at the front bottom center of the instrument. Slide the waste tubing coming from the internal tray (if present) through the plastic port and the corrugated waste tube (see "Installing the Corrugated Waste Tubing in the Plastic Port" on page 14). Route the corrugated waste tubing into a waste container.

Figure 5 **Installing the Corrugated Waste Tubing in the Plastic Port**



6 Re-install the left side door (take care of the magnet at the back). Ensure the side door is correctly installed (its presence is sensed by a hall sensor, a missing side door will result in a NOT-READY state of the instrument).

7 Place the fraction collector in the stack or on the bench in all horizontal position.

8 Ensure the power switch at the front of the fraction collector is OFF.

9 Connect the power cable to the power connector at the rear of the fraction collector.

10 Connect the CAN cable to the other Agilent 1100 modules.

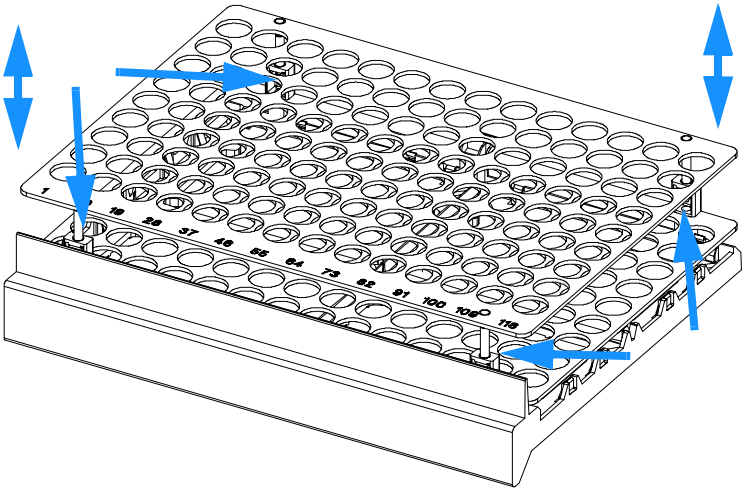
11 If an Agilent ChemStation is the controller, connect either

- ❏ the GPIB cable to the detector
- ❏ the LAN connection to the LAN interface (should be installed to the detector)

12 Connect the APG remote cable (optional) for non Agilent 1100 Series instruments.

13 Install the tray you have ordered for your fraction collector. The test tube trays can be adjusted in height, depending on the height of the used test tubes. To adjust the height of the trays, press against the snappers at the guides in the 4 corners of a tray and move the top plate of the tray up or down (see “Adjusting the Height of the (Full) Test Tube Trays.” on page 15).

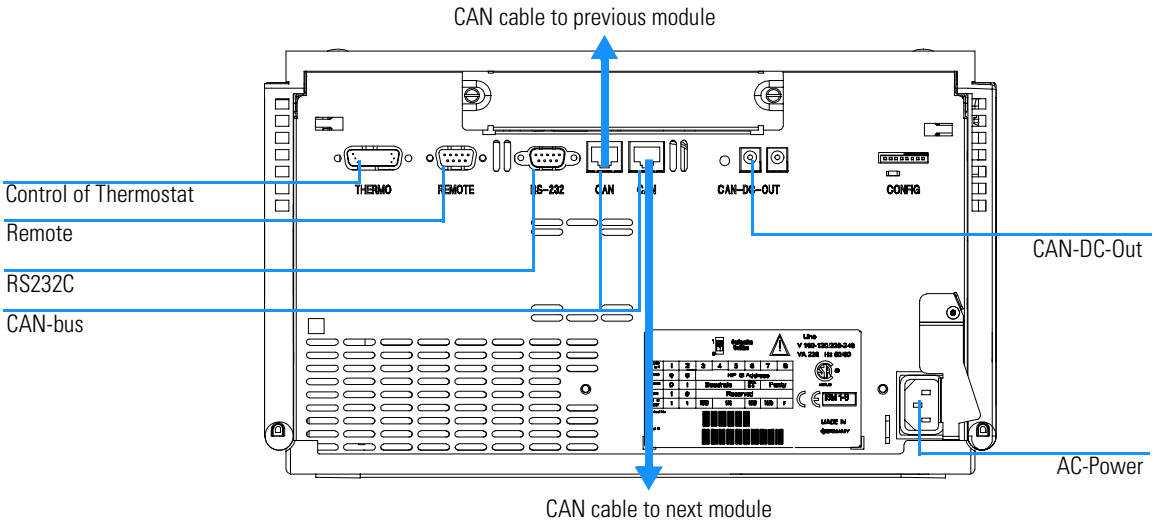
Figure 6 **Adjusting the Height of the (Full) Test Tube Trays.**



14 Turn ON power by pushing the button at the lower left hand side of the fraction collector.

15 Close the front door. The exhaust fan will turn ON and remove potential solvent vapor from the inside of the instrument. After 2 minutes the fraction collector will start the hardware initialisation process. At the end of this process the status LED should be green.

Figure 7 **Cable Connections**



NOTE The fraction collector is turned ON when the line power switch is pressed and the green indicator lamp is illuminated. The detector is turned OFF when the line power switch is protruding and the green light is OFF.

WARNING **To disconnect the fraction collector from the line, unplug the power cord. The power will supply still uses some power, even switch at the front panel is turned OFF.**

Installing a Thermostatted Fraction Collector

Preparation

Locate bench space
Provide power connections
Unpack the fraction collector and the thermostat

Parts required

Fraction Collector and thermostat
Power cords, for the other cables see below and,"Cable Overview" on page 160 ChemStation and/or Control Module G1323B

1 Place the thermostat on the bench.

2 Remove the front cover and route the condensation drain tube to a waste container.

WARNING

Make sure the condensation drain tube runs down into a waste container without any (upwards) bends or curves. Free and unrestricted flow of the condensation into a waste container must be guaranteed. Make sure that the condensation drain tube is always above the liquid level in the container. If the tube is located in liquid the condensed water cannot flow out of the tube and the outlet is blocked. Any further condensation will then remain in the instrument. This may damage the instruments electronics.

3 Install the LAN interface board in the fraction collector (if required), see "Exchanging or Installing the (Optional Interface) BCD Board" on page 106.

4 Remove the adhesive tape which covers the side and front doors.

5 Open the front door and remove the left side door.

6 Remove the transport protection foam.

7 Install the corrugated waste tube in the plastic port at the front bottom center of the fraction collector and route down into a waste container. Slide the waste tubing coming from the internal tray (if present) through the plastic

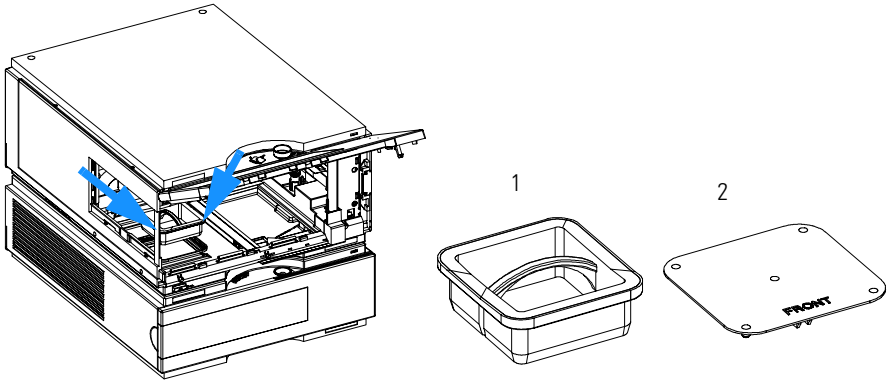
port and the corrugated waste tube (see “Installing the Corrugated Waste Tubing in the Plastic Port” on page 14). Route the corrugated waste tubing into a waste container.

8 Re-install the left side door (take care of the magnet at the back). Ensure the side door is correctly installed (its presence is sensed by a hall sensor, a missing side door will result in a NOT-READY state of the instrument).

9 Place the fraction collector on top of the thermostat. Make sure that the fraction collector is correctly engaged in the thermostat locks.

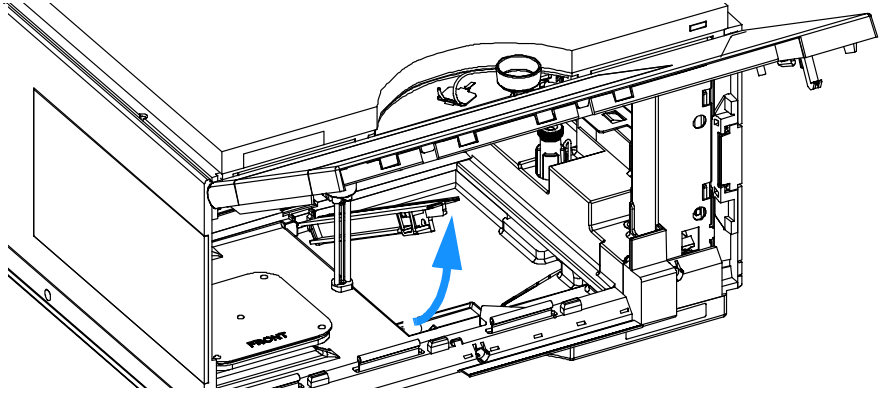
10 Remove the plastic cover from the tray base, place the air channel adapter (1) into the fraction collector tray base. Make sure the adapter is fully pressed down. This assures that the cold airstream from the thermostat is correctly guided to the tray area of the fraction collector. Place the plug channel (2) on top of the air channel adapter. Both devices must be installed correctly, to assure proper operation of the instrument.

Figure 8 **Installation of Thermostat and Fraction Collector**



11 The **analytical scale** fraction collector is delivered with a pre-installed tray compartment divider. This divider should only be used with the thermostatted fraction collector, if a (half or std.) tray is installed into the left and center positions of the instrument. If any tray is installed to the right side of the instrument, remove the tray compartment divider. The tray compartment divider optimizes the cooling performance of the instrument, if only the left and center position of the fraction collector are in use.

Figure 9 **Removing the Tray Compartment Divider**



12 Install the tray you have ordered for your fraction collector. The test tube trays can be adjusted in height, depending on the height of the used test tubes. To adjust the height of the trays, press against the snappers at the guides in the 4 corners of a tray and move the top plate of the tray up or down (see "Adjusting the Height of the (Full) Test Tube Trays." on page 15).

13 Ensure the power switch on the front of the fraction collector is 0FF and the power cables are disconnected.

14 Connect the cable between the fraction collector and the thermostat, see "Connections at the Rear of the Thermostatted Fraction Collector" on page 20.

WARNING **Do not disconnect or reconnect the fraction collector to thermostat cable when the power cords are connected to either of the two modules. This will damage the electronics of the modules.**

15 Connect the power cables to the power connectors.

16 Connect the CAN cable to other Agilent 1100 series modules.

17 If an Agilent ChemStation is the controller, connect either

- ❏ the GPIB cable to the detector
- ❏ the LAN connection to the LAN interface

18 Connect the APG remote cable (optional) for non Agilent 1100 Series instruments.

19 Turn ON power by pushing the button at the lower left hand side of the fraction collector.

20 Close the front door. The exhaust fan will turn ON and remove potential solvent vapor from the inside of the instrument. After 2 minutes the fraction collector will start the hardware initialisation process. At the end of this process the status LED should be green.

The fraction collector is turned ON when the line power switch is pressed and the green indicator lamp is illuminated. The detector is turned 0FF when the line power switch is protruding and the green light is 0FF.

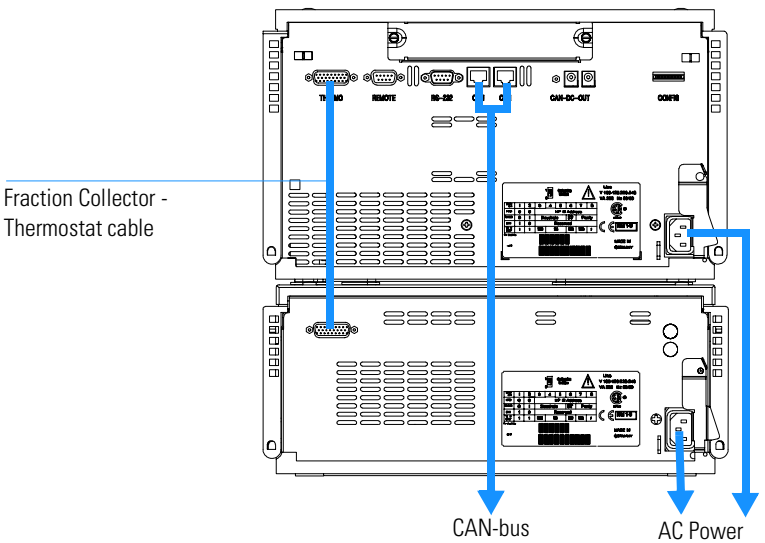
WA

To disconnect the fraction collector from the line, unplug the power cord. The power supply still uses some power, even if the power switch at the front panel is turned 0FF.

WARNING

To avoid personal injury, keep fingers away from the needle area during fraction collector operation. Do not attempt to insert or remove a vial or a plate when the needle is positioned.

Figure 10 **Connections at the Rear of the Thermostatted Fraction Collector**



Flow Connections to the Fraction Collector

Preparation	Fraction Collector is installed in the LC system
Parts required	Parts from the accessory kit, see "Fraction Collector Accessory Kit Contents G1364-68705" on page 8

WARNING **When opening capillary or tube fittings, solvents may leak out. Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.**

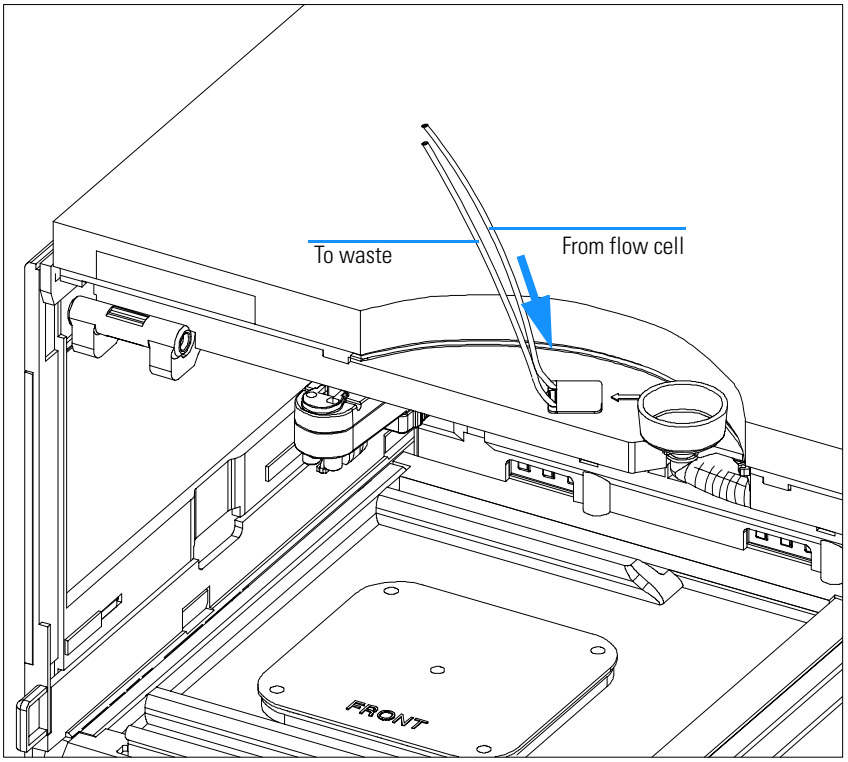
WARNING **Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.**

WARNING **Thoroughly follow the described installation procedures to maximize the lifetime of inlet / waste tubing assembly the valve to needle tubing and to avoid potential spills or fraction losses. Regularly inspect the tubings and exchange them if they are worn out or show visible signs of damage.**

WARNING **This instrument should only be used with solvents that have an ignition temperature higher than 200°C!**

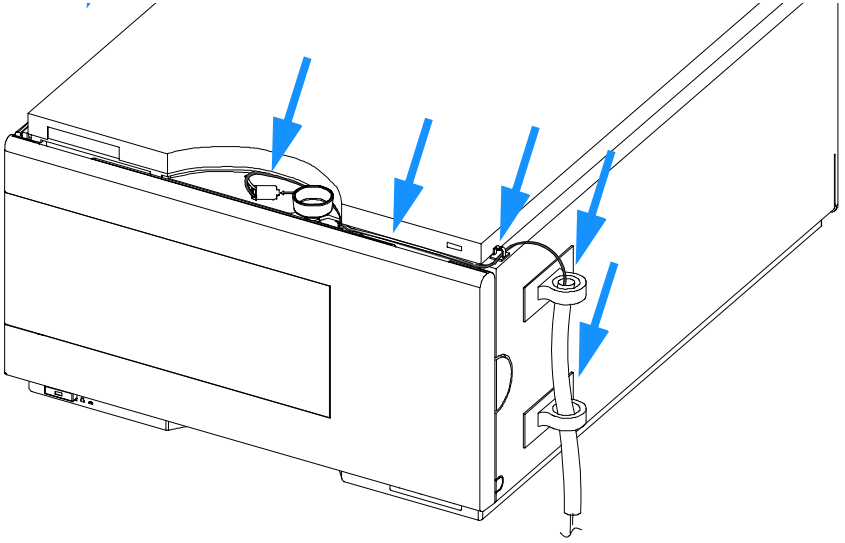
1 Cut the rear tubing (see label with arrow on the tubing) of the two tubings at the top front center of the fraction collector to the correct length needed for connecting to the detector flow cell (minimize delay volume). Connect the tubing to the outlet of the detector flow cell with a finger tight fitting. Be careful that the tubing is not strongly bent or pinched.

Figure 11 **Flow Connections to and from the Fraction Collector.**



2 Route the waste outlet around the instrument as shown below and into a corrugated waste tubing. Fix the waste outlet tubing and the corrugated waste tubing to the instrument with the sticking holders (part of the G1364-68705 accessory kit) as shown below. Route the corrugated waste tubing into a waste container.

Figure 12 **Fixing and Routing the Waste Tubings**



Fraction Collector Trays

Installing the Fraction Collector Trays

1. Press the bottom on the right side to release the front door.
2. Lift the front door.
3. Load the fraction collector tray with fraction collector well-plates, test tubes or vials as required.
4. Slide the fraction collector tray into the fraction collector so that the rear of the tray is seated firmly against the rear of the tray area.

NOTE Installed trays are automatically detected and identified.

5. Press the front of the fraction collector tray down to secure the tray in the fraction collector.
6. Close the front door.

NOTE If the tray pops out of position the air channel adapter is not correctly inserted.

NOTE Before starting a run, the instrument has to be correctly configured in the user interface.

Numbering of Vial, Test Tube and Well-plate Positions

With the 4 plates full tray

Plate in the left front position: P1

Plate in the left back position: P2

Plate in the right front position: P3

Plate in the right back position: P4

Vessel: A1; A2;... B1; B2;

With the 2 plates / 10 x 2ml vials or 10 funnels std. trays

Plate in the front position: P1

Plate in the back position: P2

Vessel: A1; A2;... B1; B2;...

Vials / funnels: 1 - 10

With the 100 vials std. tray

Vial: 1 - 100

With the half-trays

Left-hand 40-position tray: 1 - 40

Center 40-position tray: 101-140

Right-hand 40-position tray: 201 - 240

or

Left-hand 15-position tray: 1 - 15

Center 15-position tray: 101-115

Right-hand 15-position tray: 201 - 215

With the 40, 60, 125 or 215 position test tube full trays

Numbering starts in front left corner in columns to the back and then to the right.

WARNING **If you are using flammable solvents, remove the plates from the fraction collector after turning it 0FF. You avoid the risk of building explosive gas mixtures in the instrument.**

WARNING **If you are using flammable solvents, cover the plates. You avoid the risk of building explosive gas mixtures in the instrument.**

WARNING **Closing mats with adhesive can give some contamination in the system. The adhesive is soluble in most of the solvents used in HPLC.**

WARNING **In general do not use closing mats with adhesive. The fraction collector has no prepunch needle, therefore the adhesive will clog the needle after several injections.**

Configure Well-plate Types

If the plate you are using is not found on the “List of Recommended Plates and Closing Mats” on page 144 you may configure a custom plate. Measure the exact dimensions of the plate as marked below and enter the values in the plate configuration table of the ChemStation or the Control Module.

Figure 13 **Well-plate Dimensions (straight)**

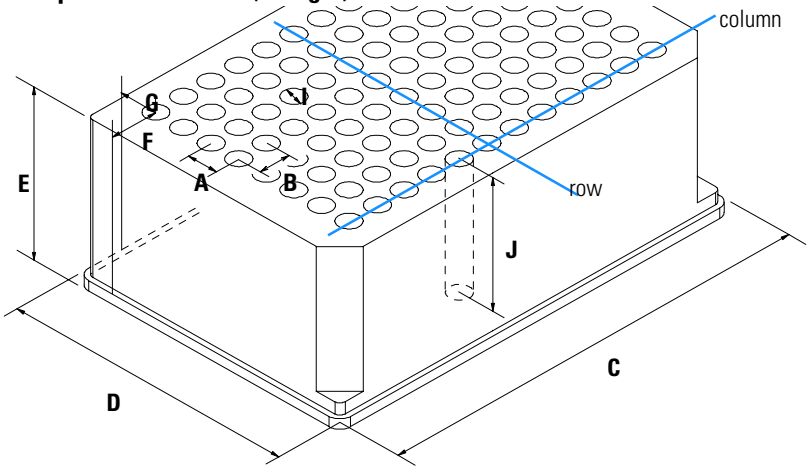


Figure 14 **Well-plate Dimensions (staggered)**

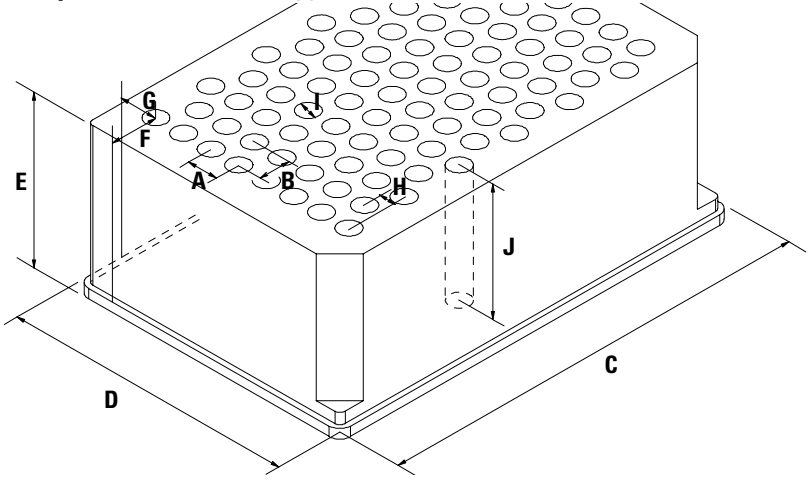


Table 7 **Configuring Well-plate Types**

Location	Description	Definition	Limits
	Rows	Number of rows on the plate	up to 16
	Columns	Number of columns on the plate	up to 24
	Volume	Volume (in µl) of a sample vessel	
A	Row distance	Distance (in mm) between the center of two rows	
B	Column distance	Distance (in mm) between the center of two columns	
C	Plate length	X size (in mm) at the bottom of the plate	127.75+/- 0.25 mm (SBS Standard)
D	Plate width	Y size (in mm) at the bottom of the plate	85.50+/-0.25 mm (SBS Standard)
E	Plate height	Size (in mm) from the bottom to the top of the plate	up to 47 mm
F	Column offset	Distance (in mm) from the left edge (bottom) to the center of the first hole (A1)	
G	Row offset	Distance (in mm) from the back edge (bottom) to the center of the first hole (A1)	
H	Column shift	Offset (in mm) to Y when the rows are not straight but staggered	
I	Well diameter	Diameter (in mm) of the well	at least 4 mm
J	Well depth	Distance (in mm) from the top of the plate to the bottom of the well	up to 45 mm

NOTE The distances need to be measured with high precision. It is recommended to use a calipers.

Transporting the Fraction Collector

When moving the fraction collector inside the laboratory, no special precautions are needed. However, if the fraction collector needs to be shipped to another location via carrier, ensure:

- ❏ The transport assembly is in the park position. Use the ChemStation or the Control Module for this command.
- ❏ The vial tray and the sample transport mechanism is secured with the transport protection foam.

2

Modes of Operation

Modes of operation of the fraction collector

Modes of Operation

Trigger Modes

For details about the setup and operation of the different modes, please refer to the Manual: “User’s Guide for Purification / High Throughput System”, PN G2262-90001, or the ChemStation Online-Help (only with the G2262AA Add-on-SW installed) or “Control Module Screens of the Fraction Collector” on page 209.

The delay volume between the used detector and the fraction collector should be determined with the help of the delay sensor (see “Delay Calibration with the Flow Delay Sensor (FDS):” on page 35) or manually entered.

Agilent 1100 UV-Vis detectors (G1314A (**analytical scale**, only), G1315A/B, G1365 A/B and the Agilent G1946C/D LC-MSD are fully supported other detectors can be used but are not supported for fraction collection. An additional universal interface box (UIB, PN G1390A) must be used as interface between the detector and the fraction collector for fraction triggering with the G1946 LC-MSD or other 1100 detectors (Non-UV-Vis detectors e.g. G1362A RID or G1321A FLD) or non-1100 detectors. The UIB therefore supports an analog input and a digital trigger input.

WARNING

The G1321A FLD has a backpressure rating of 20 bar for its flow cell. The G1362A RID has a back pressure rating of only 5 bar for its flow cell. If the G1364A fraction collector is used in combination with the G1362A RID (connected to the outlet of the detector) this must only be done with special care to avoid a potential blockage of the flow path or excessive back pressure downstream of the G1362A RID. Any back pressure higher than 5 bar will damage the flow cell of the G1362A RID, which will then require the replacement of the detector’s complete optical unit as a repair.

Depending on the choice of fraction collector (**analytical scale** or **preparative scale**) and flow rates (pumps) the rest of the system has to be chosen or modified accordingly (different types of connecting capillaries, samplers, columns, detector flow cells).

Time Slices

The time slices operating mode divides each run of a study in the specified number of equidistant time slices. The runtime should be defined in a way that also allows the last peak of interest to reach not only the detector, but also the fraction collector (additional delay time should be considered).

Peak based

Collects fractions whenever a peak is detected in the specified detector depending on set threshold and up- and downslope.

Timetable

The timetable allows to freely program a combination of time intervals and peak based fraction collections.

Manual Trigger Mode

The manual trigger mode is supported only with G1323B Control Module. It allows to manually determine the start and stop time for the collection of fractions.

Operating Modes

For details about the setup and operation of the different modes, please refer to the Manual: “User’s Guide for Purification / High Throughput System”, PN G2262-90001, or the ChemStation Online-Help (only with the G2262AA Add-on-SW installed) or “Control Module Screens of the Fraction Collector” on page 209.

Discrete Fractions

The discrete fractions operating mode is the default mode for all vessels. The flow is diverted to waste, while moving the needle from one vessel position to the next vessel position.

Continuous Flow

The continuous flow mode is optional, available only when using the deep well plates with the **preparative scale** fraction collector or any of the well plates with the **analytical scale** fraction collector. It is possible to move from one well plate position to the next one without diverting the flow into the well plate to waste.

Needle into Location

This mode is only available with the **analytical scale** fraction collector. It lowers the needle down into the vessel as deep as specified. It is intended for the use with capped vials and test tubes and well plates with closing mats. With the help of the fraction collector's needle pusher it can also be used to detect the presence of an installed vial or well plate.

Pooling

The pooling mode allows you to specify the number of injections from one same location (same sample) in the sampler that are then collected into the same locations (same peaks in same location) in the fraction collector.

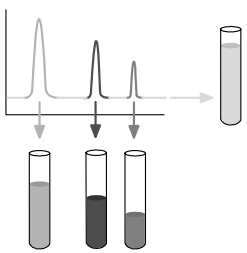
Reserved Locations

Reserved locations allows you to specify reserved locations by rows, columns or single locations, that are not used (filled) during fraction collection. These locations can then be used for special tasks.

Recovery Locations

The recovery location allows you to specify a location for the collection of sample waste that is not collected with the specified fractions during the study.

Figure 15 **Recovery Locations**



Rinse Valve to Needle Tubing and Needle

In this mode you can specify when the needle is rinsed. Settings can be off, on at start of analysis or on between fractions.

This mode is only available with the **analytical scale** fraction collector. This mode is not active, when fraction collection is performed in time slices.

Delay Calibration with the Flow Delay Sensor (FDS):

The FDS is a single wavelength absorbance detector that works at 654 nm, it consists of a LED and a photo diode. It is used to determine the fraction delay time of the system.

The delay time is the time between the propagation of the detector signal on the detector output and the time, where the diverter valve must be switched for the collection of the fraction.

The measurement of the system delay will be done in the maintenance mode. Agilent provides different measurement methods.

The FDS signal can be monitored and compared with the detector signal on the ChemStation and the local user interface.

Special Maintenance Positions for the Transport Unit of the Fraction Collector

This section contains some information about special maintenance positions of the fraction collector's transport unit, that should be used for special tasks, like maintenance, transporting the unit, changing parts or performing a peak delay calibration.

Park Position (for Transporting the instrument)

The park position of the carrier (also requires a protective foam and cardboard holder to avoid damage to the transport unit during transportation) moves the transport unit and needle carrier assembly into the upper rear left corner of the tray compartment.

Home Position (for Tray Change)

The home position is the default position of the transport unit, if the instrument is in standby mode. It can be used e.g. for replacing trays. The transport unit and needle carrier assembly are moved to the top left rear of the tray compartment.

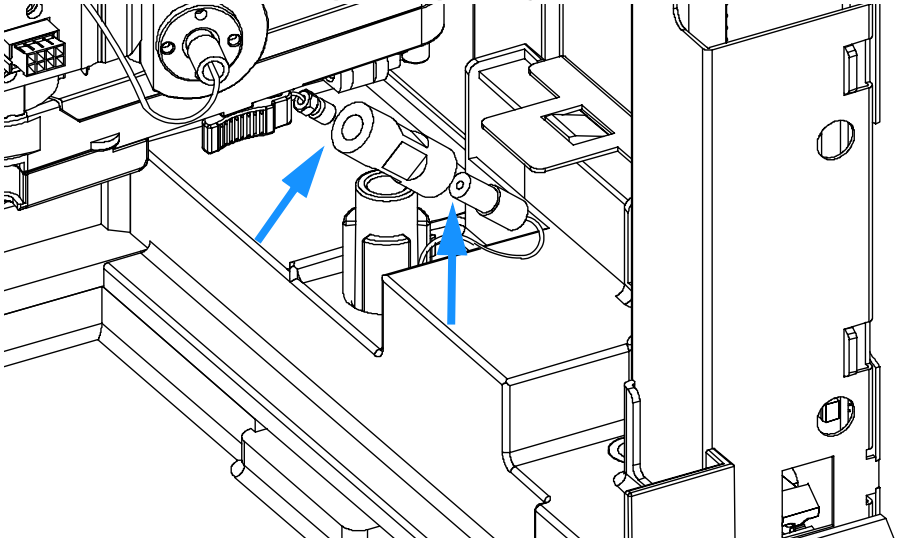
Exchange Parts Position

Can be used for the exchange and maintenance of multiple parts, such as the needle, the valve to needle and inlet / waste tubing assemblies, the needle carrier or the diverter valve. The transport unit and needle carrier assemble are moved to the half height front center of the tray compartment for easy access. The needle carrier assembly can be freely rotated in this position.

Peak Delay Sensing Position (for Delay Calibration)

Moves the needle into the flush port of the internal tray with the flow delay sensor (for the analytical scale fraction collector) or into a position next to the internal tray for the preparative scale fraction collector (the flow delay sensor is an option) to allow a direct connection (screw the tubing to the union of the internal tray) of the valve to needle tubing with the internal tray (see "Connection of the Valve to Needle Tubing of the Preparative Scale Fraction Collector with the Internal Tray for Delay sensing" on page 37).

Figure 16 **Connection of the Valve to Needle Tubing of the Preparative Scale Fraction Collector with the Internal Tray for Delay sensing**



Compatibility Matrix for Fraction Collectors and Different Types of Trays

Table 8 **Fraction Capacities and Trays for the Preparative Scale Fraction Collector**

Trays	Vessels*	Outer Diameter OD [mm]
4 x well-plates full tray	4 x deep well plates*	N/A
2 × well-plates std. tray	2 x deep well plates and 10 × 2 ml vials*	N/A
100 x 2 ml in std. tray	100 x 2 ml vials*	N/A
40 x 2 ml half tray	40 x 2 ml vials*	N/A
15 x 6 ml half tray	15 x 6 ml vials*	N/A
Full tray for 40 test tubes	40 test tubes*	30
Full tray for 60 test tubes	60 test tube*	25
Full tray for 126 test tubes	126 test tubes*	16
Full tray for 215 test tubes	215 test tubes*	12

* The preparative scale fraction collector can be used with uncapped vessels, only.

- The minimum height of test tubes and well plates should be 48 mm, the maximum height can be 100 mm.
- A full tray covers the entire tray compartment.
- A std. tray covers the left and center position of the tray compartment (one additional half tray can be installed on the right side of a std. tray.
- A half tray can be installed on the left, center and right positions of the tray compartment (maximum of 3 altogether).
- For a list of recommended vials, test tubes and deep well plates, please refer to “Parts and Materials” on page 135.

NOTE Only one type of well-plates can be used at a time in one tray.

Table 9 **Fraction Capacities and Trays for the Analytical Scale Fraction Collector**

Trays	Vessels	Outer Diameter OD [mm]
4 x well-plates full tray	4 x well plates	N/A
2 × well-plates std. tray	2 x well plates and 10 × 2 ml vials	N/A
100 x 2 ml in std. tray	100 x 2 ml vials	N/A
40 x 2 ml half tray	40 x 2 ml	N/A
15 x 6 ml half tray	15 x 6 ml vials	N/A
Full tray for 40 test tubes	40 test tubes	30
Full tray for 60 test tubes	60 test tubes	25
Full tray for 125 test tubes	125 test tubes	16
Full tray for 216 test tubes	216 test tubes	12

- The maximum height of test tubes can be 48 mm.
- A full tray covers the entire tray compartment.
- A std. tray covers the left and center position of the tray compartment (one additional half tray can be installed on the right side of a std. tray.
- A half tray can be installed on the left, center and right positions of the tray compartment (maximum of 3 altogether).
- For a list of recommended vials and caps, test tubes and well plates (and closing mats), please refer to “Parts and Materials” on page 135.

NOTE Only one type of well-plates can be used at a time in one tray.

3

Troubleshooting and Test Functions

The modules built-in troubleshooting and test functions

3

Status Indicators

The fraction collector is provided with two status indicators which indicate the operational state (prerun, not ready, run, and error states) of the instrument. The status indicators provide a quick visual check of the operation of the fraction collector (see “Status Indicators” on page 44).

Error Messages

In the event of an electronic, mechanical or hydraulic failure, the instrument 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 “Error Messages” on page 46).

Maintenance Functions

The maintenance functions position the transport unit and needle carrier assembly on certain positions for maintenance, homing, parking or delay calibration (see “Maintenance Functions” on page 70).

Transport Unit Self Alignment

The transport unit alignment with the transport unit and the well-plate tray is required to compensate for larger deviations in positioning the needle carrier assembly (for the **analytical scale** fraction collector, only!).

The transport unit self alignment is required after disassembling the system or when you exchange the transport unit, the needle carrier assembly or the MTP main board.

This function is in the diagnose screen of the ChemStation or the Control Module.

WARNING

The sample transport self alignment requires one of the 4-well-plate trays (Part Number: G1364-84501), but well plates MUST NOT be installed!

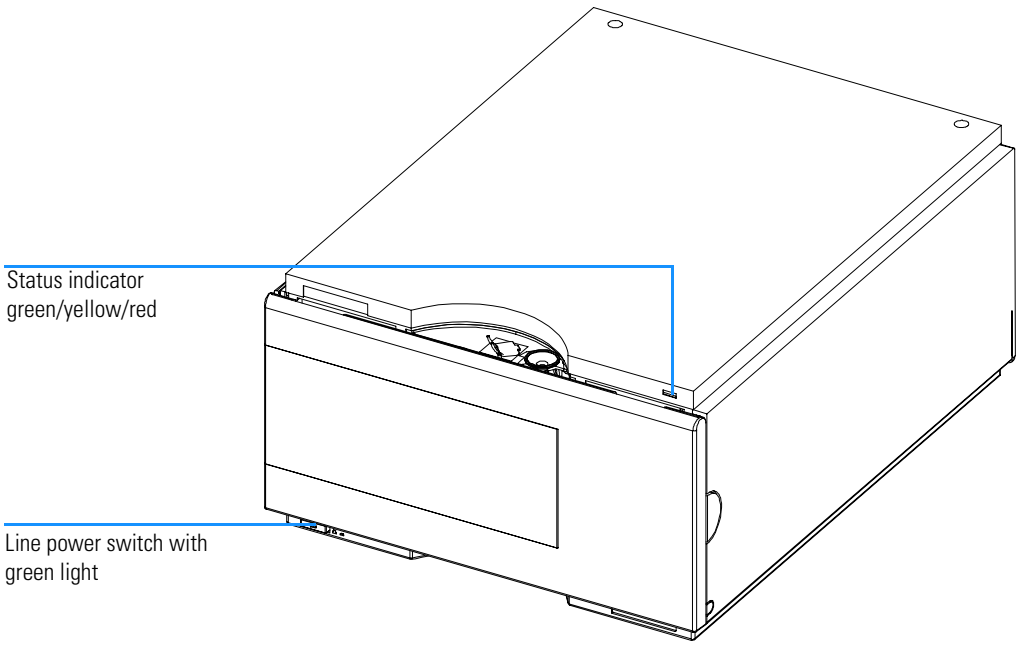
Step Commands

The step functions enable execution of some steps of the fraction collection sequence individually. The step functions are used primarily for troubleshooting, and for verification of correct fraction collector operation after repair (see “Step Commands” on page 72).

Status Indicators

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

Figure 17 **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.

Instrument Status Indicator

The instrument status indicator indicates one of four possible instrument conditions:

- When the status indicator is *OFF* (and power switch light is on), the instrument is in a *prerun* condition, and is ready to begin an analysis.
- A *green* status indicator indicates the instrument is performing an analysis (*run* mode).
- A *yellow* status indicator indicates a *not-ready* condition. The instrument is in a not-ready state when it is waiting for a specific condition to be reached or completed (for example, front door not closed), or while a self-test procedure is running.
- An *error* condition is indicated when the status indicator is *red*. An error condition indicates the instrument has detected an internal problem which affects correct operation of the instrument. Usually, an error condition requires attention (for example, leak, defective internal components). An error condition always interrupts the analysis.

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, 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 instrument log book.

This section explains the fraction collector error messages, and provides information on probable causes and suggested actions to recover from error conditions.

Timeout

The timeout threshold was exceeded.

Probable Causes

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

Suggested Actions

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

Shutdown

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

The fraction collector 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 Causes

- Leak detected in another Agilent 1100 module with a CAN connection to the system.
- Error detected in an external instrument with a remote connection to the system.
- The degasser failed to generate sufficient vacuum for solvent degassing.

Suggested Actions

❏ Determine which Agilent 1100 module has the leak. Fix the leak before restarting the well-plate sampler.

❏ Check external instruments for an error condition.

❏ Check the degasser for an error condition. Refer to the *Reference Manual* for the Agilent 1100 Series degasser.

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 (e.g. 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 Causes

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

Suggested Actions

❏ Ensure the instrument showing the not-ready condition is installed correctly, and is set up correctly for analysis.

❏ Exchange the remote cable.

❏ Check the instrument for defects (refer to the instrument's reference documentation).

Sychronization 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 Causes

- CAN cable disconnected.
- Defective CAN cable.
- Defective MTP main board in the fraction collector or other module.
- Defective UIB or valve.

Suggested Actions

❏ Ensure all the CAN cables are connected correctly.

❏ Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.

❏ Exchange potentially defective main boards, UIB or external valve.

Leak

A leak was detected in the fraction collector.

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 MTP board.

Probable Causes

- Missing vessels in specified fraction positions.
- Full vessels in specified fraction positions.
- Loose fittings.
- Broken capillary or tubing.
- Leaking needle / funnel.
- Defective diverter valve.

Suggested Actions

- ❏ Fill tray with empty vessels as required.
- ❏ Ensure all fittings are tight.
- ❏ Exchange defective capillaries or tubing.
- ❏ Exchange the needle of funnel seal.
- ❏ Exchange the diverter valve.

NOTE

Make sure the leak sensor and leak plane are completely dry before restarting the fraction collector.

Leak Sensor Open

The leak sensor in the fraction collector 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 Causes

- Leak sensor not connected to the SLF board.
- Defective leak sensor.
- Defective SLF or MTP board.

Suggested Actions

❏ Ensure the leak sensor is connected correctly.

❏ Exchange the leak sensor.

❏ Change SLF and / or MTP board.

Leak Sensor Short

The leak sensor in the fraction collector 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 Causes

- Defective leak sensor.

Suggested Actions

❏ Exchange the leak sensor.

Compensation Sensor Open

The ambient-compensation sensor (NTC) on the MTP board in the fraction collector has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the MTP 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 Causes

- Defective MTP board.

Suggested Actions

❏ Exchange the MTP board.

Compensation Sensor Short

The ambient-compensation sensor (NTC) on the MTP board in the fraction collector has failed (short circuit).

The resistance across the temperature compensation sensor (NTC) on the MTP 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 Causes

- Defective MTP board.

Suggested Actions

❏ Exchange the MTP board.

Fan Failed

The main cooling fan in the fraction collector has failed.

The hall sensor on the fan shaft is used by the MTP 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 Causes

- Fan cable disconnected.
- Defective fan.
- Defective MTP board.

Suggested Actions

❏ Ensure the fan is connected correctly.

❏ Exchange fan.

❏ Exchange the MTP board.

Exhaust Fan Failed

The exhaust fan in the fraction collector has failed.

The hall sensor on the fan shaft is used by the MTP board to monitor the fan speed. If the fan speed falls below a certain value the error message is generated and the fraction collector shuts down.

Probable Causes

- Fan cable disconnected.
- Defective fan.
- Defective MTP board.

Suggested Actions

❏ Ensure the fan is connected correctly.

❏ Exchange fan.

❏ Exchange the MTP board.

Front Door Error

The front door and/or the SLF board are damaged.

Probable Causes

- The flat ribbon cable from MTP main board to the SLF board is not connected correctly.
- The sensor on the SLF board is defective.
- The door is bent or the magnet is misplaced/broken.
- Defective MTP board.

Suggested Actions

- ❏ Assure that the flat ribbon cable from MTP main board to the SLF board is connected correctly.
- ❏ Exchange the SLS board.
- ❏ Exchange the door.
- ❏ Exchange the MTP board.

Side Door Error

The side door and/or the MTP board are damaged.

Probable Causes

- The side door is not installed.
- The door is bent or the magnet is misplaced/broken.
- The sensor on the MTP board is defective.

Suggested Actions

❏ Install the side door.

❏ Change the side door.

❏ Exchange the MTP board.

Arm Movement Failed or Arm Movement Timeout

The transport assembly was unable to complete a movement in one of the axes.

The processor defines a certain time window for the successful completion of a movement in any particular axis. The movement and position of the transport assembly is monitored by the encoders on the stepper motors. If the processor does not receive the correct position information from the encoders within the time window, the error message is generated.

See figure “Transport Unit Assembly” on page 182 for axes identification.

Arm Movement 0 Failed: X-axis.

Arm Movement 1 Failed: Z-axis.

Arm Movement 2 Failed: Theta (needle carrier rotation).

Probable Causes

- Mechanical obstruction.
- High friction in transport assembly.
- Defective motor assembly.
- Defective sample transport assembly flex board.
- Defective MTP board.

Suggested Actions

❏ Ensure unobstructed movement of the transport assembly.

❏ Exchange the sample transport assembly.

❏ Exchange the MTP board.

Needle to Needle Rinse / Funnel Position Failed

Only for the **analytical scale** fraction collector!

The needle failed to reach the needle rinse / funnel position.

The position of the needle is monitored by a position encoder on the needle carrier. If the needle fails to reach the end point, or if the encoder fails to recognize the needle carrier movement, the error message is generated.

Probable Causes

- Bad sample transport unit alignment
- Bent needle.
- Missing needle.
- Blocked rinse or funnel position.
- Defective needle carrier assembly.
- Disconnected needle carrier connector.
- Defective MTP board.

Suggested Actions

- ❏ Do a self-alignment
- ❏ Check and exchange the needle assembly if necessary.
- ❏ Clean or change the funnel or rinse port assembly if necessary.
- ❏ Exchange the needle carrier assembly.
- ❏ Exchange the transport unit assembly.
- ❏ Connect needle carrier connector correctly.
- ❏ Exchange the MTP board.

Needle Carrier Failed

The needle carrier on the transport unit assembly failed to move correctly.

Probable Causes

- Defective position sensor in the needle carrier assembly.
- Bad needle carrier positioning in X or Theta.
- Disconnected needle carrier connector.
- Defective MTP main board.
- Defective Z-motor.

Possible Actions

❏ Exchange the needle carrier assembly.

❏ Perform a self-alignment.

❏ Exchange the MTP main board.

❏ Connect needle carrier connector correctly.

❏ Exchange the sample transport assembly.

Missing Vial or Missing Well-plate

No vial or well-plate was found in the position defined in the method or sequence.

When the needle carrier moves to a vial or well-plate and the needle is lowered into the vial or well-plate, the position of the needle is monitored by an encoder behind the vial pusher. If no vial or well-plate is present, the encoder detects an error and the message “missing vial or well plate” is generated.

Probable Causes

- No vial in the position defined in the method or sequence.
- Defective needle carrier assembly.
- Defective transport unit assembly flex board.
- Defective MTP board.

Suggested Actions

- ❏ Install the sample vial in the correct position, or edit the method or sequence accordingly.
- ❏ Exchange the needle carrier assembly.
- ❏ Exchange the sample transport assembly.
- ❏ Exchange the MTP main board.

Initialization Failed

The fraction collector failed to complete initialization correctly.

The fraction collector initialization procedure moves the needle arm and transport assembly to their home positions in a predefined routine. During initialization, the processor monitors the position sensors and motor encoders to check for correct movement. If one or more of the movements is not successful, or is not detected, the error message is generated.

Probable Causes

- Transport unit not aligned correctly
- Mechanical obstruction.
- Defective transport assembly flex board.
- Defective MTP board.

Suggested Actions

- ❏ Do an auto-alignment
- ❏ Ensure unobstructed movement of the transport assembly.
- ❏ Exchange the transport unit assembly.
- ❏ Exchange the MTP board.

Motor Temperature

One of the motors of the transport unit assembly has drawn excessive current, causing the motor to become too hot. The processor has switched off the motor to prevent damage to the motor.

See figure “Transport Unit Assembly” on page 182 for motor identification.

Motor 0 temperature: X-axis motor.

Motor 1 temperature: Z-axis motor.

Motor 2 temperature: Theta (gripper rotation) motor.

The processor monitors the current drawn by each motor and the time the motor is drawing current. The current drawn by the motors is dependent on the load on each motor (friction, mass of components etc.). If the current drawn is too high, or the time the motor draws current is too long, the error message is generated.

Probable Causes

- Mechanical obstruction.
- High friction in the transport unit assembly.
- Motor belt tension too high.
- Defective motor or defective transport unit assembly flex board.
- Defective MTP board.

Suggested Actions

❏ Switch off the fraction collector at the power switch. Wait at least 10 minutes before switching on again.

❏ Ensure unobstructed movement of the transport assembly.

❏ Exchange the sample transport assembly.

❏ Exchange the MTP main board.

Vessel Stuck to Needle

The vessel sticks to the needle when the needle moves up.

Possible causes

- Closing mat to rigid/thick.
- Bad X or Theta positioning and the needle sticks into the wall between two holes.
- Defective encoder on the needle carrier assembly.

Suggested Actions

❏ Check that the closing mat is not too thick.

❏ Exchange the needle carrier assembly.

❏ Change the sample transport assembly.

❏ Change the MTP main board.

Cluster Partner Lost during Analysis

There was a problem with the inter module communication.

Probable Causes:

- Disconnected or defective CAN cable.
- Disconnected or defective 24V-CAN-DC-OUT cable for an external valve.
- Defective UIB, external Valve or MTP board.

Suggested Actions:

❏ Check the interconnection between the modules.

❏ Reconnect the UIB / Valve. Start a test analysis/run.

❏ Switch power off / on (complete system off, then on). Start a test analysis / run.

❏ Exchange the UIB / valve or MTP-board.

Movement to next Position Failed

The transport mechanism detected an unexpected situation during the movement to the next fraction position.

Probable Causes:

- ❏ Mismatch between tray configuration and the loading od the trays, e.g. 4 well plates are configured in the UI, but only three are loaded, or shallow plates are configured, but deep well-plates are used, or tube height doesn't match the configuration.

Suggested Actions:

- ❏ Check the configuration and the loading of the Tray

Could not Find a Valid next Position

There has been more fraction than fraction positions.

Probable Causes:

- Unexpected number of fractions.
- Start of an analysis / sequence / run without changing of the tray of the previous run.

Suggested Actions:

❏ Ensure that there are enough fraction positions for the complete analysis / sequence / run.

❏ If possible use a tray with more positions.

❏ Add an additional G1364A to the system.

Maintenance Functions

Some maintenance procedures require the needle arm, metering device, and needle carrier to be moved to specific positions to enable easy access to components. The maintenance functions move these assemblies into the appropriate maintenance position. In the ChemStation the sampler maintenance positions can be selected from the Maintenance menu in the Diagnosis display. In the Control Module the functions can be selected in the Test screens of the well-plate sampler.

User Interface

The functions for the ChemStation and Control Module are:

Parts Exchange Position.

This maintenance position move the transport unit upwards and the needle carrier assembly to the front center and then turns off the theta motor to allow free rotation of the theta arm. This position enables easy access to the transport unit to change:

- The needle assembly.
- The needle carrier assembly.
- The valve to needle tubing.
- The diverter valve.

Home Position

This maintenance function moves the arm up and to the right rear for better access and exchange of the trays.

Park Arm

This maintenance position moves the arm to the park position at the upper rear left side of the tray for transporting or shipping the fraction collector.

Transport Unit Self Alignment

The transport unit alignment with the transport unit and the well-plate tray is required to compensate for larger deviations in positioning the needle carrier assembly (for the **analytical scale** fraction collector, only!).

The transport unit self alignment is required after disassembling the system or when you exchange the transport unit, the needle carrier assembly or the MTP main board.

This function is in the diagnose screen of the ChemStation or the Control Module.

WARNING **The sample transport self alignment requires one of the 4-well-plate trays (Part Number: G1364-84501), but well plates MUST NOT be installed!**

When is a Transport Unit Self Alignment Necessary?

The sample transport self alignment is required after disassembling the module or when you exchange:

- The transport unit.
- The needle carrier assembly.
- The MTP main board.

Step Commands

Some movements of the fraction collection sequence can be done under manual control. This is useful during troubleshooting where close observation of each of the fraction collection step is required to confirm a specific failure mode or verify successful completion of a repair.

Each step command actually consists of a series of individual commands which move the fraction collector components to predefined positions enabling the specific step to be done.

In the ChemStation the step commands can be selected from the “Test Selection Box” in the Diagnosis display. In the Control Module the step commands can be accessed from the pull-down menu in the fraction collector “Test”.

Table 10 **Step Commands**

Step	Action	Comments
Needle Up	Lifts the needle arm to the upper position.	Command also switches the diverter valve to waste if it is not already in that position.
Needle into vessel	Lowers the needle into the specified vessel.	
Needle to rinse / flush port	Moves the needle to the rinse / flush port.	
Switch valve to needle	Switches the diverter valve to the needle.	
Switch valve to waste	Switches the diverter valve from needle to waste.	

Troubleshooting

If the fraction collector is unable to perform a specific step due to a hardware failure, an error message is generated. You can use the step commands to perform a fraction collection sequence, and observe how the fraction collector responds to each command.

4

Repairing the Fraction Collector

Instructions on simple, routine repair procedures as well as more extensive repairs requiring exchange of internal parts

4

Simple Repairs

The fraction collector is designed for easy repair. The most frequent repairs such as changing a needle assembly or tubings can be done from the front of the instrument with the instrument in place in the system stack. These repairs are described in “Simple Repairs” on page 79.

WARNING **When opening capillary or tube fittings solvents may leak out. Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.**

WARNING **To avoid personal injury, keep fingers away from the needle area during fraction collector operation. Do not bend the safety flap away from its position, or attempt to insert or remove a vial from the gripper when the gripper is positioned below the needle.**

WARNING **Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.**

Exchanging Internal Parts

Some repairs may require exchange of defective internal parts. Exchange of these parts requires removing the fraction collector from the stack, removing the covers, and disassembling the fraction collector.

WARNING **To prevent personal injury, the power cable must be removed from the instrument before opening the fraction collector cover. Do not connect the power cable to the fraction collector while the cover is removed.**

Cleaning the Fraction Collector

The fraction collector covers should be kept clean. Cleaning should be done with a soft cloth slightly dampened with water or a solution of water and a mild detergent. Do not use an excessively damp cloth from which liquid could drip into the fraction collector.

WARNING **Do not let liquid drip into the fraction collector. It could cause a shock hazard or damage to the fraction collector.**

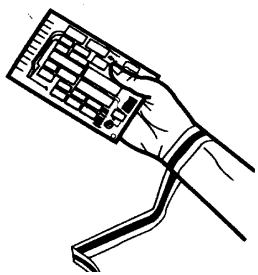
Using the ESD Strap

CAUTION Electronic boards are sensitive to electrostatic discharge (ESD). In order to prevent damage, always use an ESD strap supplied in the accessory kit.

Using the ESD Strap

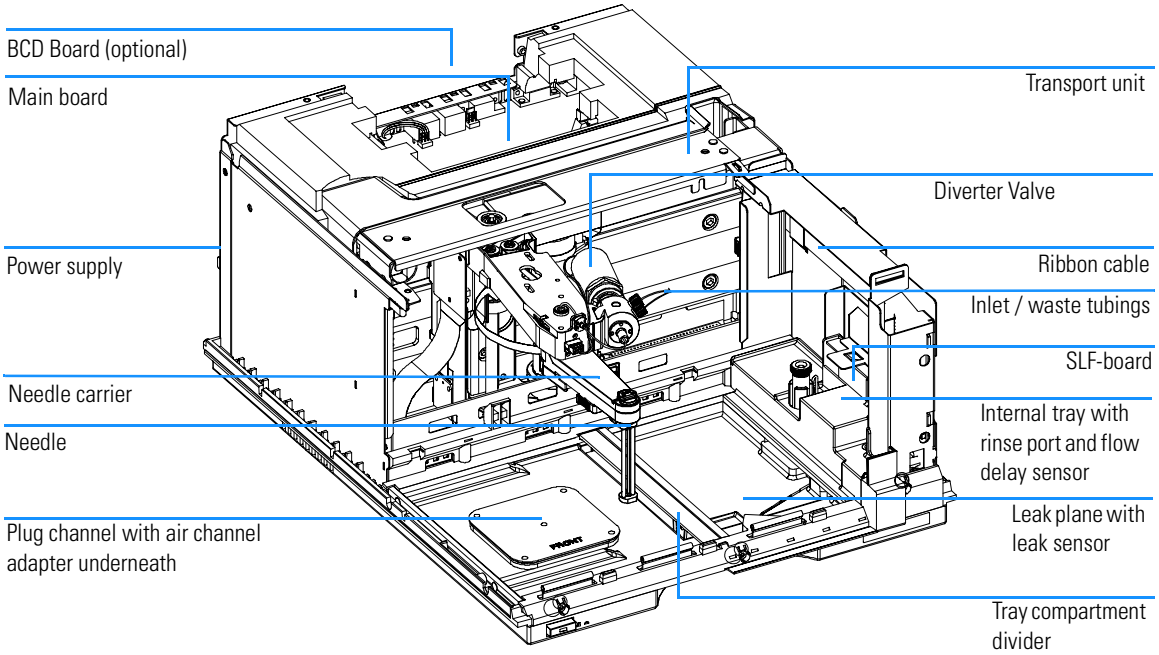
1. Unwrap the first two folds of the band and wrap the exposed adhesive side firmly around your wrist.
2. Unroll the rest of the band and peel the liner from the copper foil at the opposite end.
3. Attach the copper foil to a convenient and exposed electrical ground.

Figure 18 **Using the ESD Strap**



Overview of Main Repair Procedures

Figure 19 **Main Assemblies**



Simple Repairs

The procedures described in this section can be done with the fraction collector in place in the stack. These procedures can be done on a more frequent basis.

Table 11 **Simple Repair Procedures**

Procedure	Typical Frequency	Notes
Replacing the Inlet / waste tubings	When worn out, when showing visual signs of damage, typically once per year!	See "Replacing the Inlet / Waste Tubings" on page 81
Replacing the valve to needle tubings	When worn out, when showing visual signs of damage, typically once per year!	See "Replacing the Valve to Needle Tubings" on page 84
Exchanging the **preparative** needle assembly	When needle shows indication of damage or blockage	See "Exchanging the Preparative Needle Assembly" on page 87
Exchanging the **analytical** needle assembly	When needle shows indication of damage or blockage	See "Exchanging the Analytical Needle Assembly" on page 89
Exchanging the needle carrier assembly	When the needle carrier is defective	See "Exchanging the Needle-Carrier Assembly" on page 91
Exchanging the diverter valve	When defective (internal / external leak, valve not switching any more)	See "Exchanging the Diverter Valve" on page 96
Exchanging the internal tray	When flow delay sensor defective	See "Exchanging the Internal Tray" on page 99
Repairing or exchanging a funnel of the internal tray or funnel tray	When defective (leaky, blocked or contaminated)	See "Repairing or Exchanging a Funnel of the Internal Tray" on page 101

Table 11 **Simple Repair Procedures**

Procedure	Typical Frequency	Notes
Exchanging the leak sensor	When defective	See "Exchanging the Leak Sensor" on page 104
Exchanging or installing the (optional) BCD board	When defective or new board installed	See "Exchanging or Installing the (Optional Interface) BCD Board" on page 106

Replacing the Inlet / Waste Tubings

Frequency	When contaminated, worn out or visibly damaged Typically once every year
Tools required	None
Parts Required	Inlet / waste tubing assembly included in tubing kit **preparative scale 0.8 mm ID,** PN G1364-68711 **or** Inlet / waste tubing assembly included in tubing kit **analytical scale 0.25 mm ID,** PN G1364-68712

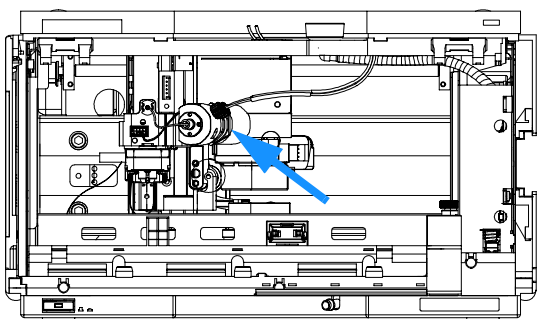
WARNING **To avoid personal injury, keep fingers away from the needle area during fraction collector operation. Do not bend the safety flap away from its position, or attempt to insert or remove a vial from the gripper when the gripper is positioned below the needle.**

WARNING **Thoroughly follow the described installation procedures to maximize the lifetime of the inlet / waste tubings and to avoid potential spills or fraction losses. Regularly inspect the tubings and exchange them if they are worn out or show visible signs of damage.**

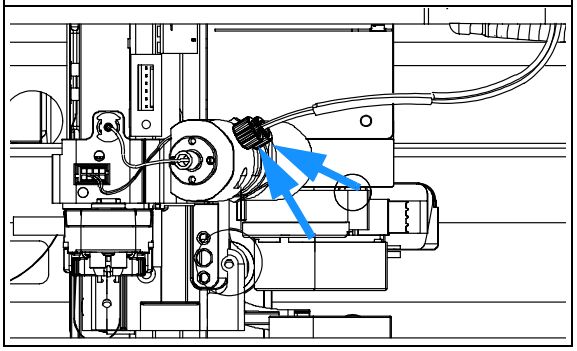
Before beginning this procedure:

- ❏ Position the transport unit of the fraction collector in the “Home Position” (see “Maintenance Functions” on page 70).
- ❏ Remove all installed trays from the tray base.
- ❏ Position the transport unit of the fraction collector in the “Exchange Parts Position” (see “Maintenance Functions” on page 70).
- ❏ Turn off the instrument.
- ❏ Remove the rear end of the fraction collector’s waste tubing from the waste container, unscrew the front end of the fraction collector’s inlet tubing from the flow cell of the detector.

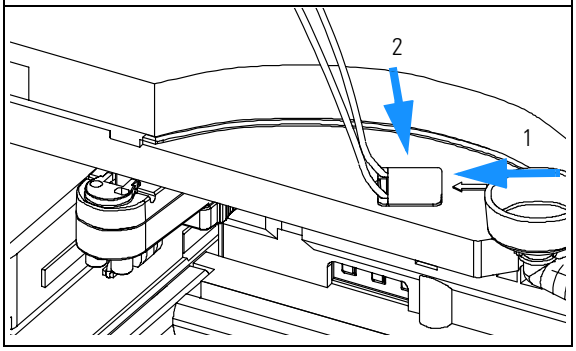
1 Locate the diverter valve with the finger-tight fittings of the inlet / waste tubing assembly (the figure shows the open fraction collector seen from the front).



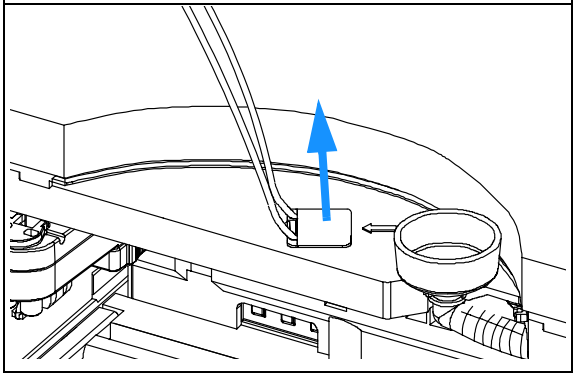
2 Unscrew the 2 finger-tight fittings of the inlet / waste tubing assembly at the diverter valve.



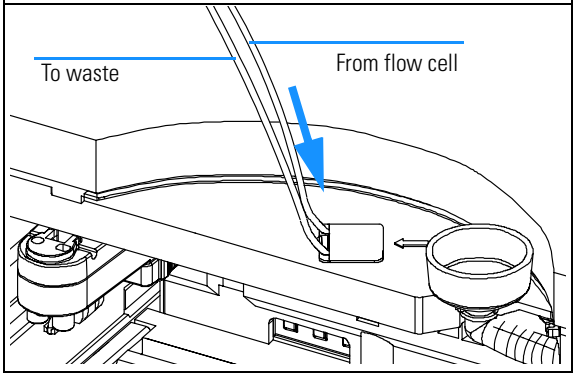
3 Unplug the inlet / waste tubing assembly from the bolt carrier (located on the top center of the front cover) by moving the snapper as indicated by the arrows. Slide the tubings out to the bottom.



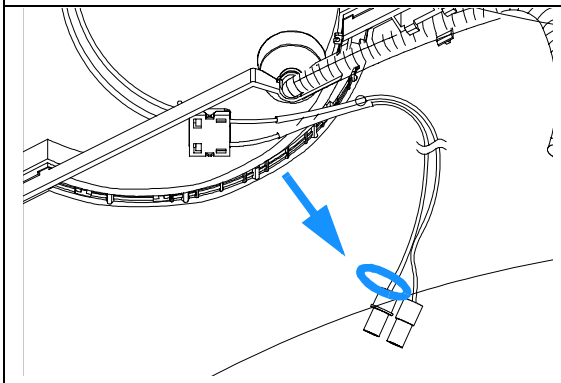
4 Install the new inlet / waste tubing assembly into the bolt carrier as shown below. Slide in the long ends of the tubings from bottom to top and let the snapper click into position.



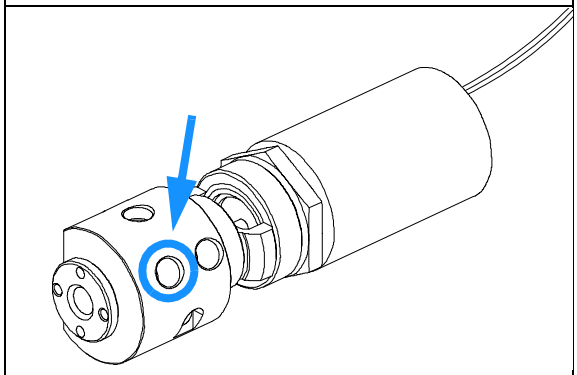
5 The rear tubing (with the label with the arrow) must be connected to the flow cell of the detector. The front tubing must be inserted into the waste container.



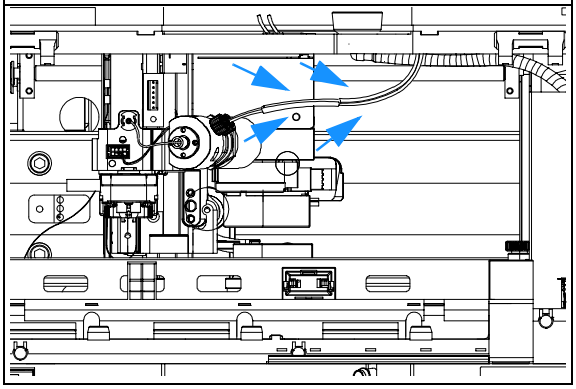
6 Connect the finger-tight fittings of the inlet / waste tubing assembly to the ports of the diverter valve.
IMPORTANT: The tubings must not be bent up- or downwards. The cables must not be twisted.
(View from the bottom)



7 A color coded ring on one of the tubings and the valve body indicates, which cable belongs to which port.
IMPORTANT: It is absolutely vital to connect these tubings as described, in order to maximize their lifetime and operating security.



8 IMPORTANT: The cables must run into the ports of the diverter valve in lines parallel to the horizon.



On completion of this procedure:

- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

Replacing the Valve to Needle Tubings

Frequency	When contaminated, worn out or visibly damaged Typically once every year
Tools required	Wrench, open end, 4mm, PN 8710-1534 (supplied in accessory kit) Wrench, open end, 1/4 – 5/16 inch, PN 8710-0510 (supplied in accessory kit)
Parts Required	Valve to needle tubing assembly included in tubing kit **preparative scale 0.8 mm ID,** PN G1364-68711 **or** valve to needle tubing assembly included in tubing kit **analytical scale 0.25 mm ID,** PN G1364-68712

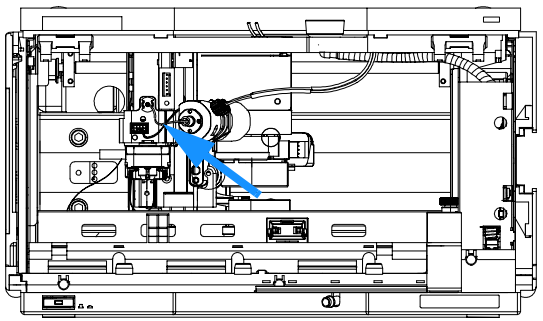
WARNING **To avoid personal injury, keep fingers away from the needle area during fraction collector operation. Do not bend the safety flap away from its position, or attempt to insert or remove a vial from the gripper when the gripper is positioned below the needle.**

WARNING **Thoroughly follow the described installation procedures to maximize the lifetime of the valve to needle tubing and to avoid potential spills or fraction losses. Regularly inspect the tubings and exchange them if they are worn out or show visible signs of damage.**

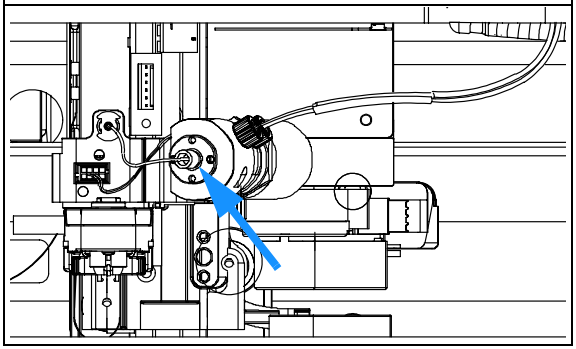
Before beginning this procedure:

- ❏ Position the transport unit of the fraction collector in the “Home Position” (see “Maintenance Functions” on page 70).
- ❏ Remove all installed trays from the tray base.
- ❏ Position the transport unit of the fraction collector in the “Exchange Parts Position” (see “Maintenance Functions” on page 70) and turn off the instrument.
- ❏ It might be more convenient to remove the needle from its carrier before unscrewing the needle tubing.

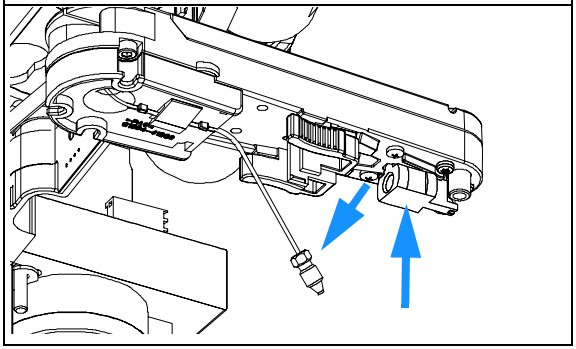
1 Locate the diverter valve with the finger-tight fittings of the valve to needle tubing assembly (the figure shows the open fraction collector seen from the front).



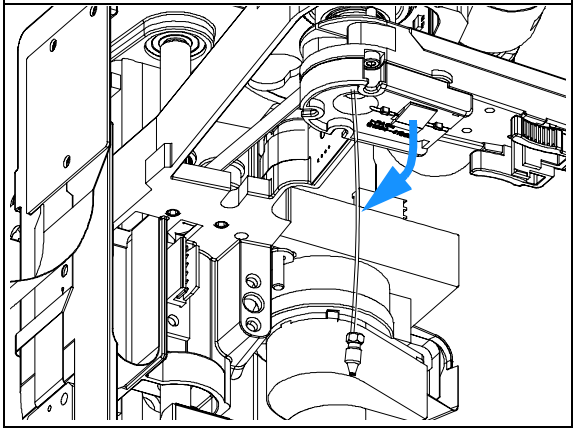
2 Unscrew the finger-tight fitting of the valve to needle tubing assembly at the diverter valve.



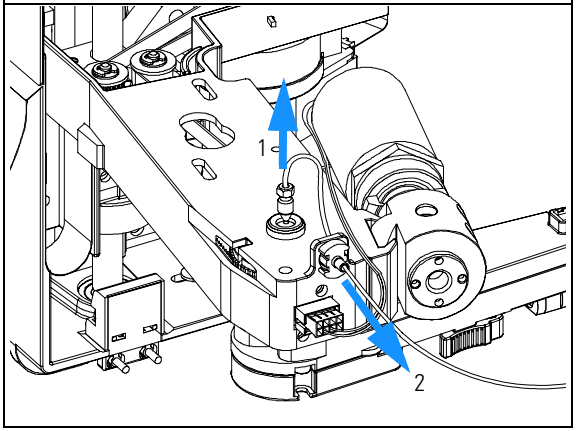
3 Using the 4 mm wrench and the 5/16“ wrench for counter-holding unscrew the valve to needle tubing from the needle. (Viewed from the bottom)



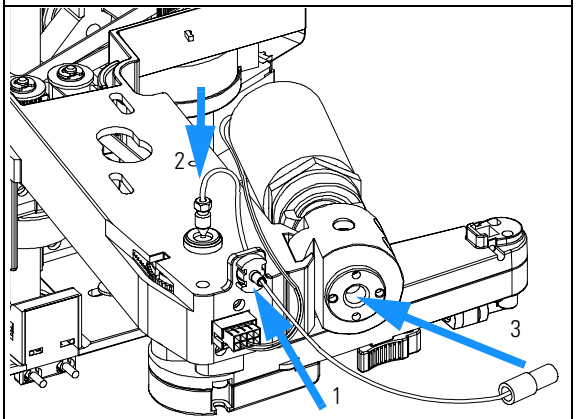
4 Un-clip the tubing from the bottom of the needle carrier assembly.



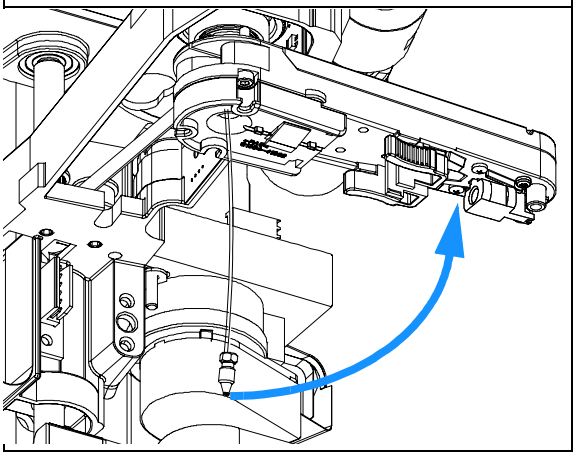
5 Slide the tubing through the hole in the needle carrier assembly (from bottom to top) and out of the holder in the z-arm assembly.



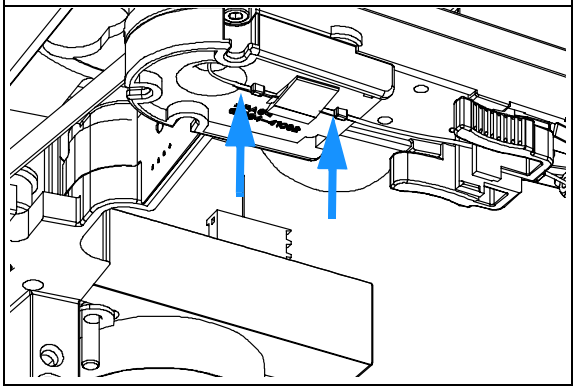
6 Install the new valve to needle tubing assembly by clipping it in to the holder in the z-arm assembly **(1), Important!!!)** and slide it through the hole in the z-arm (2) and out on the bottom of the needle carrier assembly (top to bottom). Screw the finger-tight fitting into the port of the diverter valve (3).



7 Using the 4 mm wrench and the 5/16“ wrench for counter-holding connect the valve to needle tubing to the needle. (Viewed from the bottom)



8 IMPORTANT: After fixing the screw clip the tubing into the guide on the bottom of the needle carrier assembly.
It is absolutely vital that the tubing is installed as described, to maximize the lifetime of the tubing.



On completion of this procedure:

- ❏ Re-install the needle to the needle carrier assembly, if you previously removed it. Make sure to slide the needle all the way to the front of the needle carrier assembly (clicks into position).
- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

Exchanging the Preparative Needle Assembly

Frequency	When the needle is leaky or visibly damaged When the needle is blocked or contaminated
Tools required	Wrench, open end, 4mm, PN 8710-1534 (supplied in accessory kit) Wrench, open end, 1/4 – 5/16 inch, PN 8710-0510 (supplied in accessory kit)
Parts required	Preparative needle assembly, G1364-87201

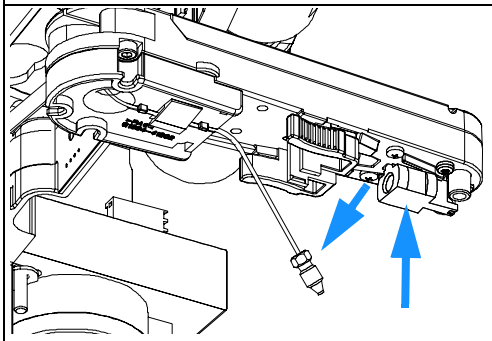
WARNING **To avoid personal injury, keep fingers away from the needle area during fraction collector operation. Do not bend the safety flap away from its position, or attempt to insert or remove a vial from the gripper when the gripper is positioned below the needle.**

CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

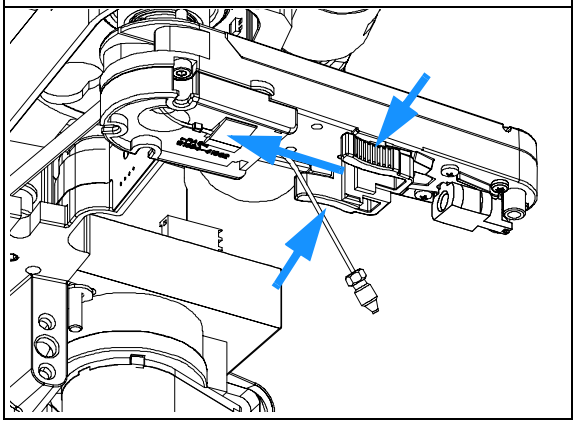
Before beginning this procedure:

- ❏ Position the transport unit of the fraction collector in the “Home Position” (see “Maintenance Functions” on page 70).
- ❏ Remove all installed trays from the tray base.
- ❏ Position the transport unit of the fraction collector in the “Exchange Parts Position” (see “Maintenance Functions” on page 70).
- ❏ Turn off the instrument.
- ❏ It might be more convenient to remove the needle from its carrier before unscrewing the needle tubing.

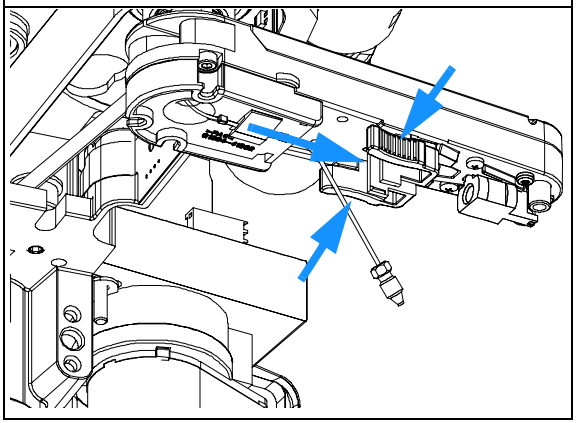
1 Using the 4 mm wrench and the 5/16“ wrench for counter-holding unscrew the valve to needle tubing from the needle. (Viewed from the bottom)



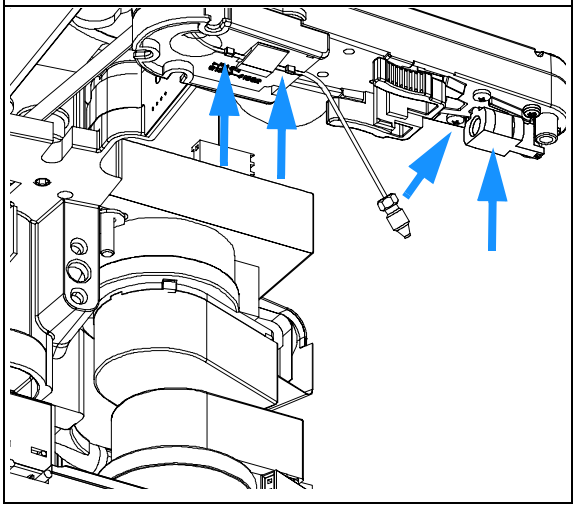
2 Holding the needle assembly between your thumb and forefinger, slide out the assembly towards the rear of the needle carrier assembly.



3 Insert the new needle assembly into the holder of the needle carrier assembly. Make sure to push it all the way to the front.



4 Using the 4 mm wrench and the 5/16“ wrench for counter-holding connect the valve to needle tubing to the needle. (Viewed from the bottom)



On completion of this procedure:

- ❏ Re-install the needle to the needle carrier assembly, if you previously removed it. Make sure to slide the needle all the way to the front of the needle carrier assembly (clicks into position).
- ❏ **IMPORTANT:** After fixing the needle in the needle carrier clip the tubing into the guide on the bottom of the needle carrier assembly in case it slipped out of this guide (see 2 left arrows on the figure to the left). **It is absolutely vital that the tubing is installed as described, to maximize the lifetime of the tubing.**
- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

Exchanging the Analytical Needle Assembly

Frequency	When the needle is visibly damaged When the needle is blocked or contaminated
Tools required	Wrench, open end, 4mm, PN 8710-1534 (supplied in accessory kit) Wrench, open end, 1/4 – 5/16 inch, PN 8710-0510 (supplied in accessory kit)
Parts required	Analytical needle assembly, G1364-87203

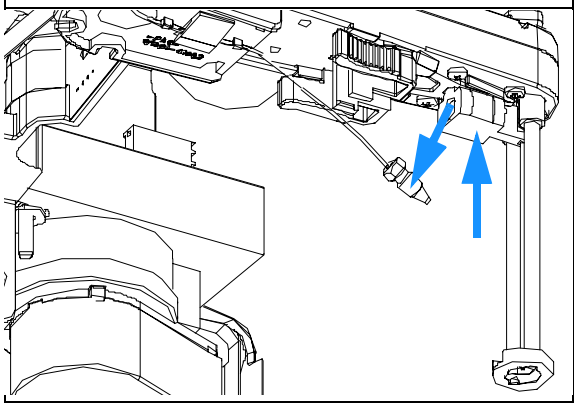
WARNING **To avoid personal injury, keep fingers away from the needle area during fraction collector operation. Do not bend the safety flap away from its position, or attempt to insert or remove a vial from the gripper when the gripper is positioned below the needle.**

CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

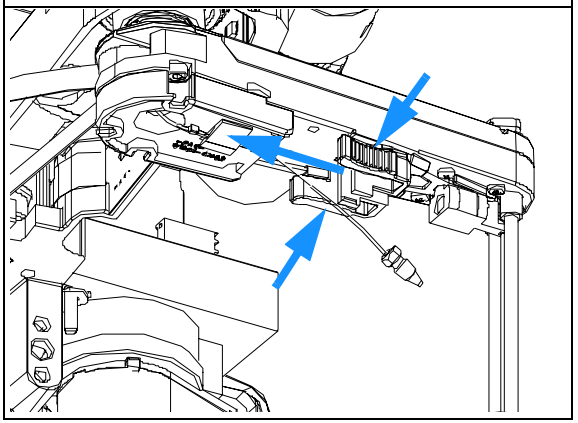
Before beginning this procedure:

- ❏ Position the transport unit of the fraction collector in the “Home Position” (see “Maintenance Functions” on page 70).
- ❏ Remove all installed trays from the tray base.
- ❏ Position the transport unit of the fraction collector in the “Exchange Parts Position” (see “Maintenance Functions” on page 70).
- ❏ Turn off the instrument.
- ❏ It might be more convenient to remove the needle from its carrier before unscrewing the needle tubing.

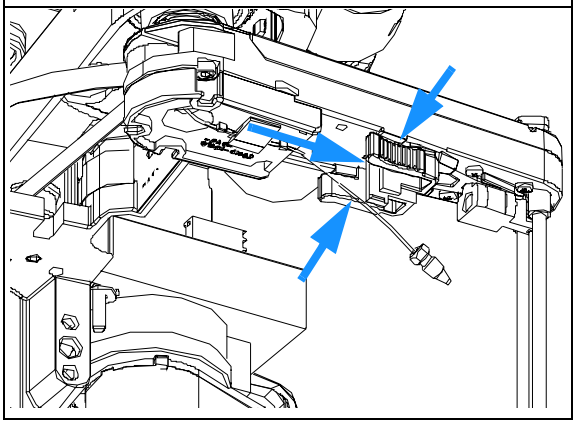
1 Using the 4 mm wrench and the 5/16“ wrench for counter-holding unscrew the valve to needle tubing from the needle. (Viewed from the bottom)



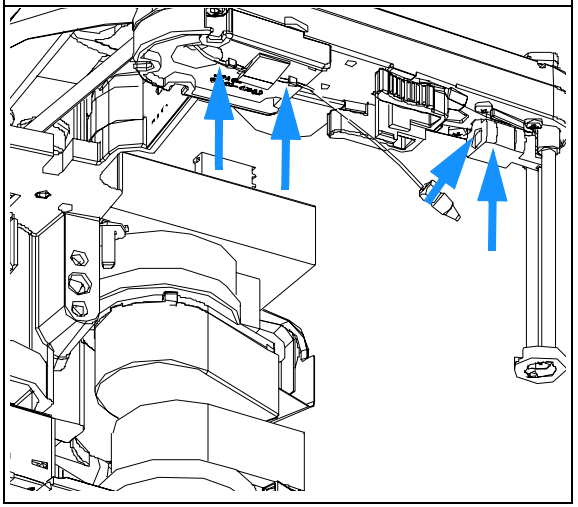
2 Holding the needle assembly between your thumb and forefinger, slide out the assembly towards the rear of the needle carrier assembly.



3 Insert the new needle assembly into the holder of the needle carrier assembly. Make sure to push it all the way to the front.



4 Using the 4 mm wrench and the 5/16“ wrench for counter-holding connect the valve to needle tubing to the needle. (Viewed from the bottom)



On completion of this procedure:

- ❏ Re-install the needle to the needle carrier assembly, if you previously removed it. Make sure to slide the needle all the way to the front of the needle carrier assembly (clicks into position).
- ❏ **IMPORTANT:** After fixing the needle in the needle carrier clip the tubing into the guide on the bottom of the needle carrier assembly in case it slipped out of this guide (see 2 left arrows on the figure to the left). **It is absolutely vital that the tubing is installed as described, to maximize the lifetime of the tubing.**
- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

Exchanging the Needle-Carrier Assembly

Frequency	When defective
Tools required	Hex key 2.0 mm, PN 8710-2438 (supplied in accessory kit)
Parts required	Needle carrier assembly, **preparative scale**, G1364-60011 **or** Needle carrier assembly, **analytical scale**, G1364-60010

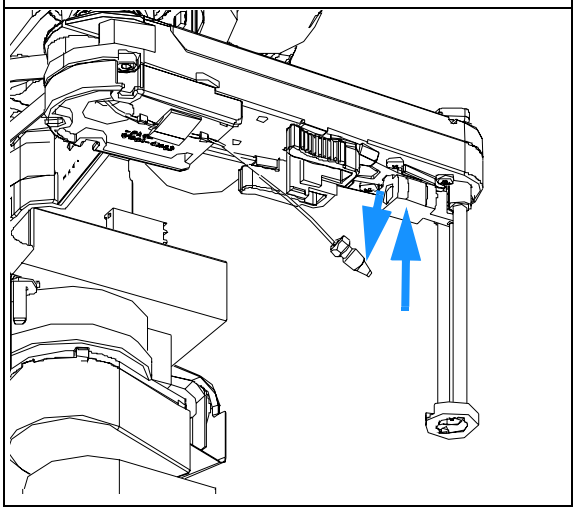
WARNING **To avoid personal injury, keep fingers away from the needle area during fraction collector operation. Do not bend the safety flap away from its position, or attempt to insert or remove a vial from the gripper when the gripper is positioned below the needle.**

CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

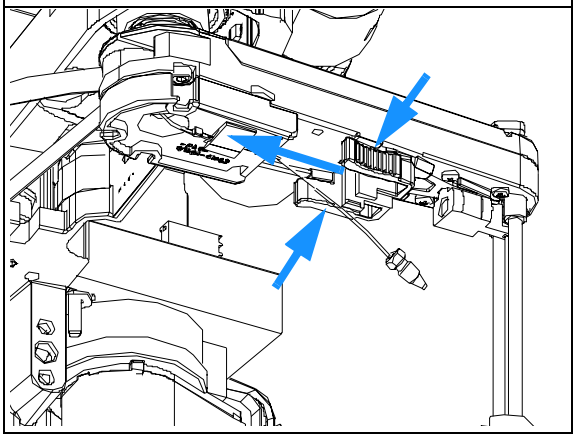
Before beginning this procedure:

- ❏ Position the transport unit of the fraction collector in the “Home Position” (see “Maintenance Functions” on page 70).
- ❏ Remove all installed trays from the tray base.
- ❏ Position the transport unit of the fraction collector in the “Exchange Parts Position” (see “Maintenance Functions” on page 70) and turn off the instrument.
- ❏ It might be more convenient to remove the needle from its carrier before unscrewing the needle tubing.
- ❏ The procedure is almost identical for both, the **preparative** and the **analytical** scale fraction collector, but requires different repair parts.

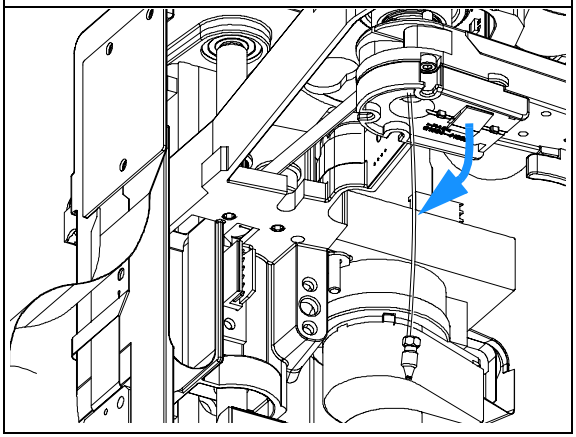
1 Using the 4 mm wrench and the 5/16“ wrench for counter-holding unscrew the valve to needle tubing from the needle. (Viewed from the bottom)



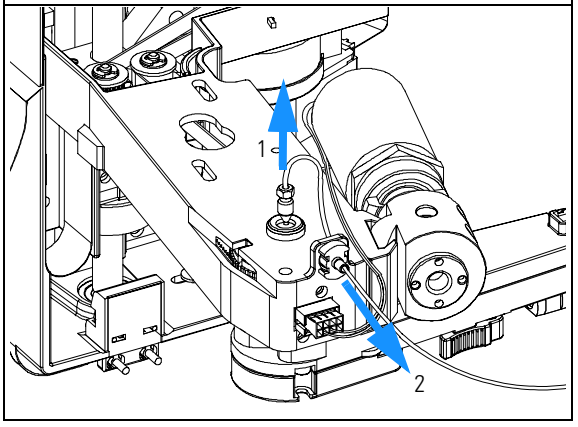
2 Holding the needle assembly between your thumb and forefinger, slide out the assembly towards the rear of the needle carrier assembly.



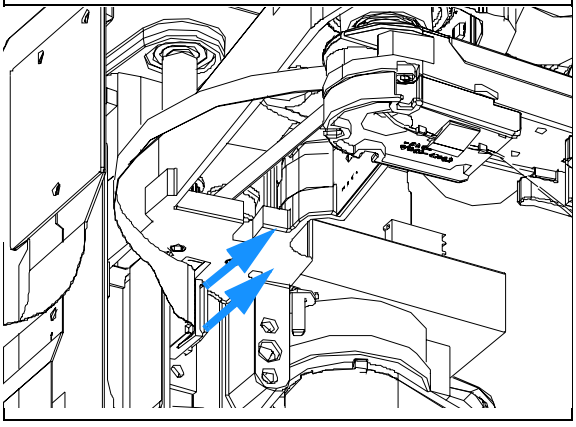
3 Un-clip the tubing from the bottom of the needle carrier assembly.



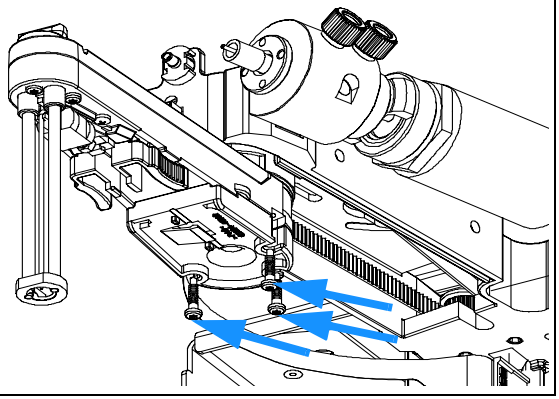
4 Slide the tubing through the hole in the needle carrier assembly (from bottom to top) and out of the holder in the z-arm assembly.



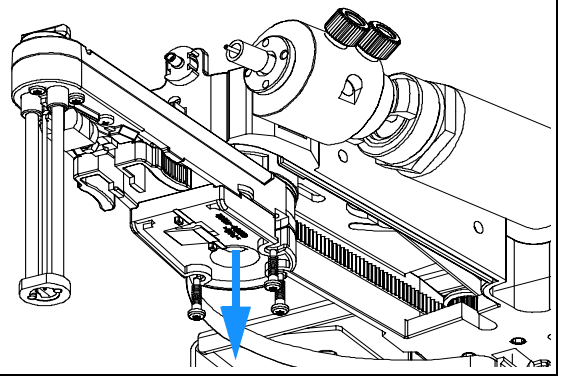
5 Unplug the blue connector of the brown flat band cable of the needle carrier assembly **(exists only on analytical scale assembly)** from its plug at the z-arm.



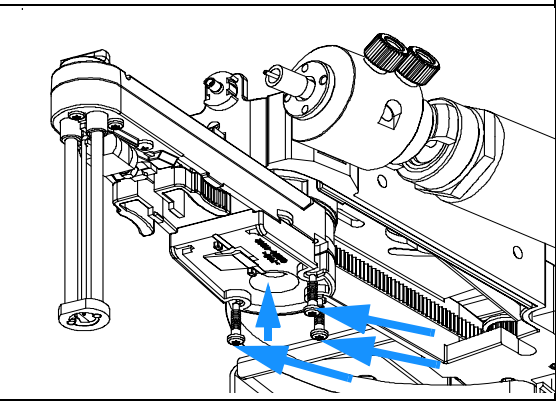
6 Locate the 3 holding screws of the needle carrier assembly and unscrew them (viewed from the bottom).



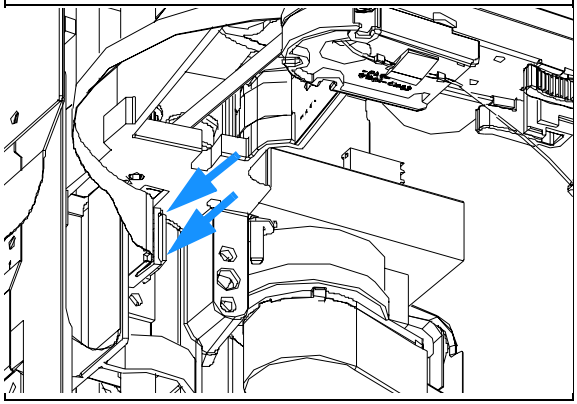
7 Slide out the (old) needle carrier assembly to the bottom.



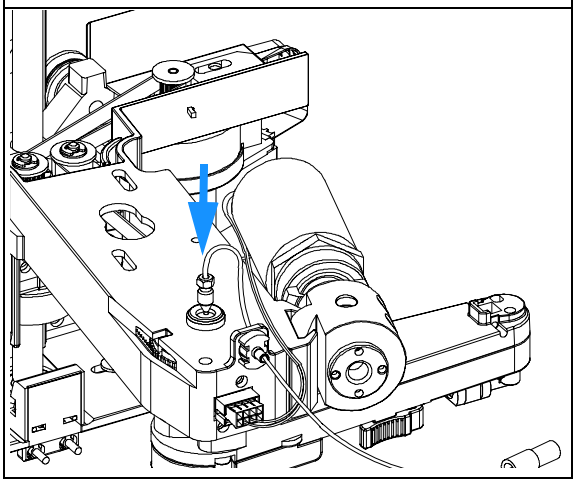
8 Install the new needle carrier assembly and secure it with its three holding screws. The carrier is held in position with a pin / slot - fit. It is only oriented and installed correctly, when pushed all the way up to the top.



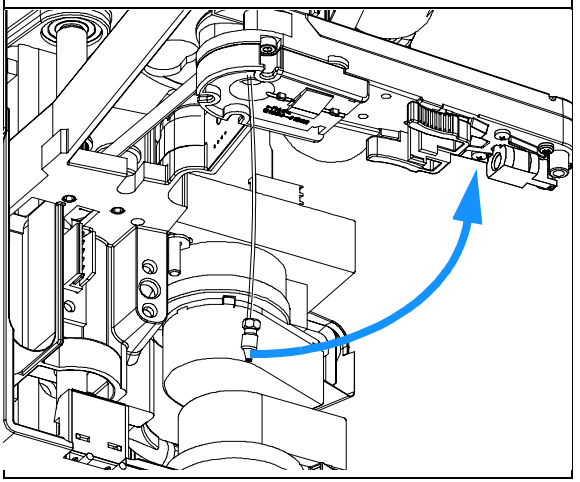
9 Plug in the blue connector of the brown flat band cable of the needle carrier assembly (exists only on analytical scale assembly) to its plug at the z-arm.



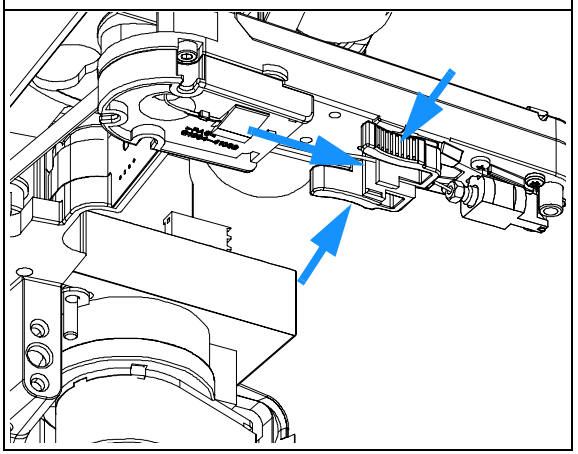
10 Slide the valve to needle tubing assembly through the hole in the z-arm and out on the bottom of the needle carrier assembly (top to bottom).



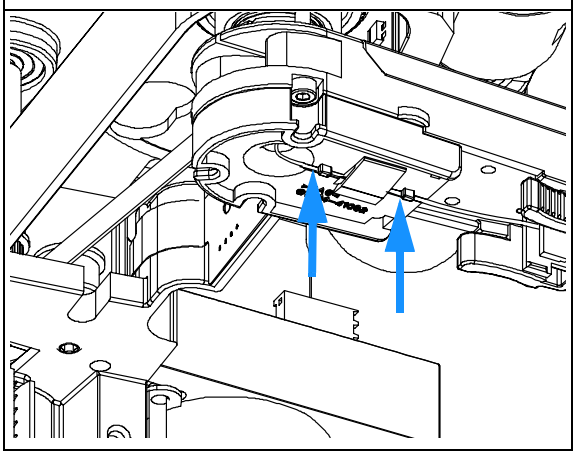
11 With the needle held underneath the needle carrier assembly and using the 4 mm wrench and the 5/16“ wrench for counter-holding connect the valve to needle tubing to the needle. (Viewed from the bottom)



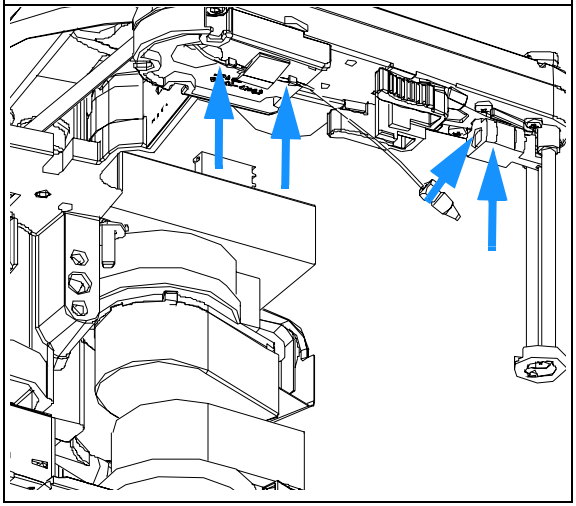
12 Insert the needle assembly into the holder of the new needle carrier assembly. Make sure to push it all the way to the front (Clicks into position).



13 IMPORTANT: Clip the tubing into the guide on the bottom of the needle carrier assembly. **It is absolutely vital that the tubing is installed as described, to maximize the lifetime of the tubing.**\



14 Using the 4 mm wrench and the 5/16“ wrench for counter-holding connect the valve to needle tubing to the needle. (Viewed from the bottom)



On completion of this procedure:

- ❏ Re-install the needle to the needle carrier assembly, if you previously removed it. Make sure to slide the needle all the way to the front of the needle carrier assembly (clicks into position).
- ❏ **IMPORTANT:** After fixing the needle in the needle carrier clip the tubing into the guide on the bottom of the needle carrier assembly in case it slipped out of this guide (see 2 left arrows on the figure to the left). **It is absolutely vital that the tubing is installed as described, to maximize the lifetime of the tubing.**
- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

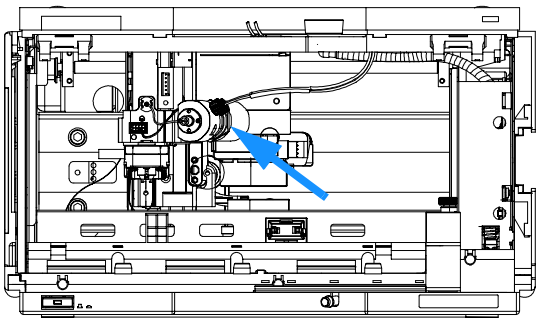
Exchanging the Diverter Valve

Frequency	When leaky or defective
Tools required	Hex key 2.0 mm, PN 8710-2438 (supplied in accessory kit)
Parts required	Diverter Valve, PN G1364-61901

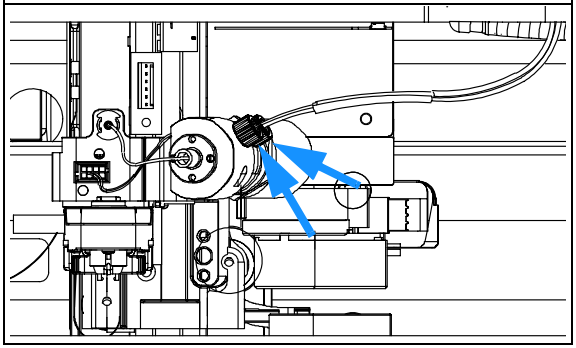
Before beginning this procedure:

- ❏ Position the transport unit of the fraction collector in the “Home Position” (see “Maintenance Functions” on page 70).
- ❏ Remove all installed trays from the tray base.
- ❏ Position the transport unit of the fraction collector in the “Exchange Parts Position” (see “Maintenance Functions” on page 70).
- ❏ Turn off the instrument.

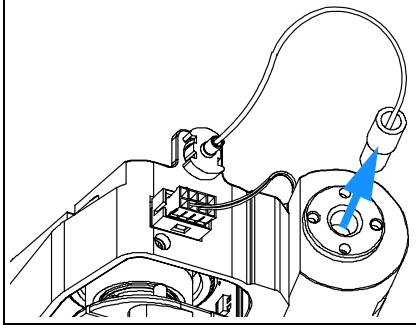
1 Locate the diverter valve with the finger tight fittings of the inlet / waste tubing assembly (the figure shows the open fraction collector seen from the front).



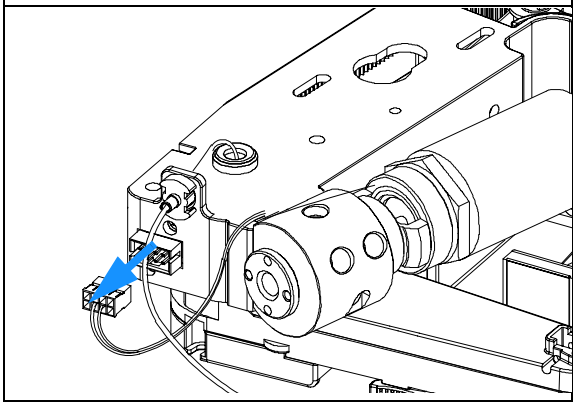
2 Unscrew the 2 finger tight fittings of the inlet / waste tubing assembly at the diverter valve.



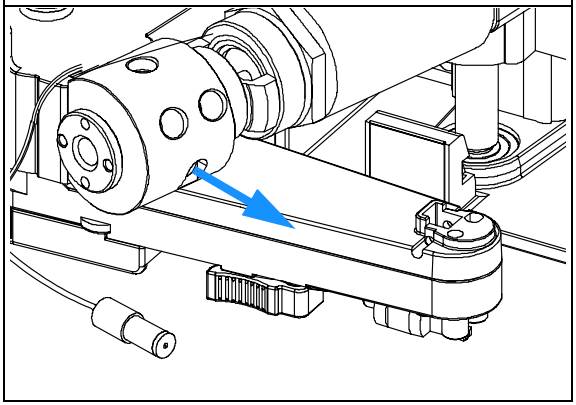
3 Unscrew the finger tight fitting of the valve to needle tubing assembly at the diverter valve.



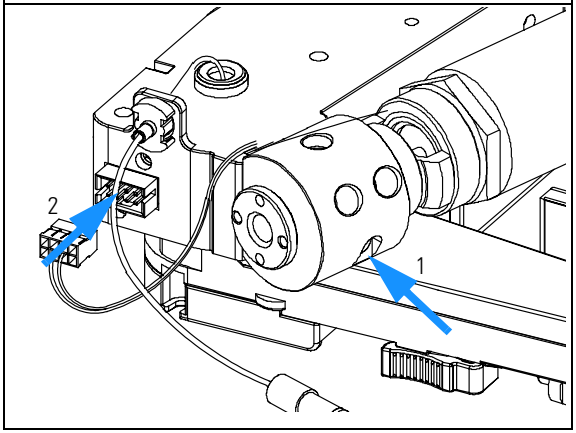
4 Disconnect the power cable of the diverter valve from the connector on the front of the z-arm.



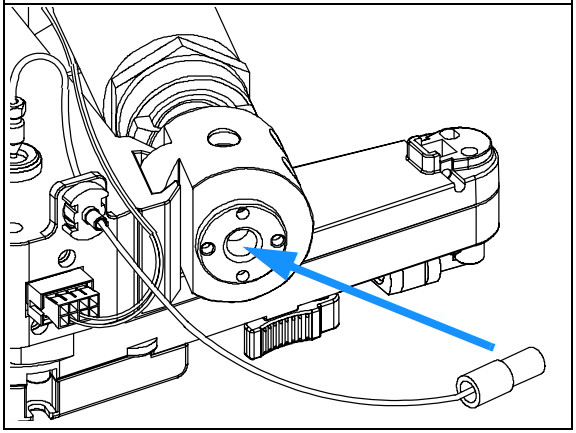
5 Using the 2 mm hex key loosen the holding screw of the diverter valve and remove the diverter valve from the z-arm.



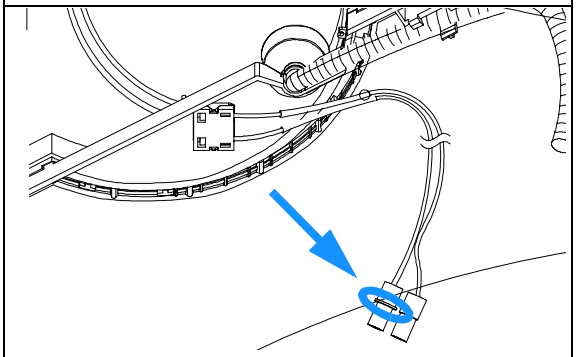
6 Install the new diverter valve to the z-arm with its holding screw. Plug in the new diverter valve power cable to the z-arm.



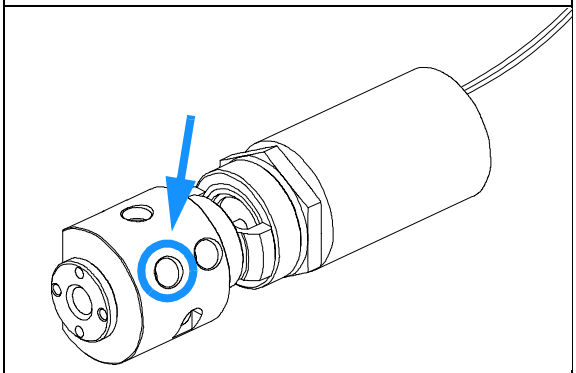
7 Install the valve to needle tubing at the new diverter valve.



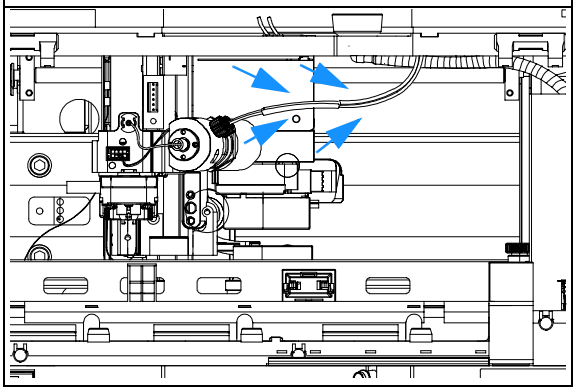
8 Connect the finger tight fittings of the inlet / waste tubing assembly to the ports of the diverter valve.
IMPORTANT: The tubings must not be bent up- or downwards. The cables must not be twisted.
(View from the bottom)



9 A color coded ring on one of the tubings and the valve body indicates, which cable belongs to which port.
IMPORTANT: It is absolutely vital to connect these tubings as described, in order to maximize their lifetime and operating security.



10 IMPORTANT: The cables must run into the ports of the diverter valve in lines parallel to the horizon.



On completion of this procedure:

- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

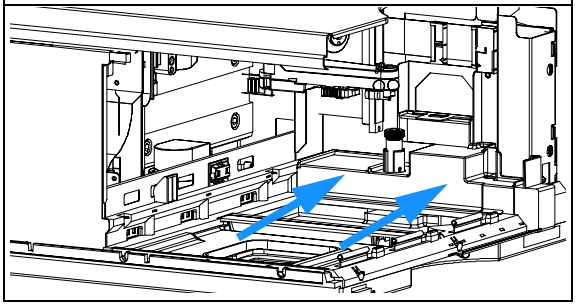
Exchanging the Internal Tray

Frequency	When defective
Tools required	None
Parts required	Internal tray **analytical scale**, PN G1364-63103 **or** Internal tray **preparative scale**, PN G1364-63104

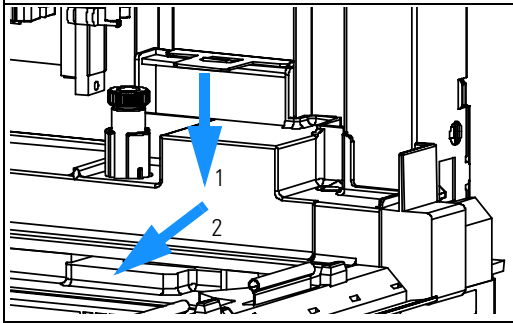
Before beginning this procedure:

- ❏ Position the transport unit of the fraction collector in the “Home Position” (see “Maintenance Functions” on page 70).
- ❏ Remove all installed trays from the tray base.
- ❏ Turn off the instrument.

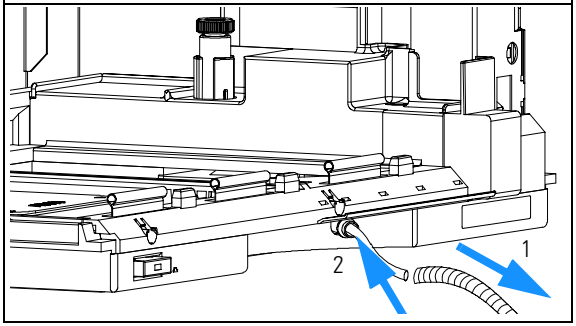
1 Locate the internal tray assembly with the rinse funnel and flow delay sensor in the bottom of the right front corner of the instrument.



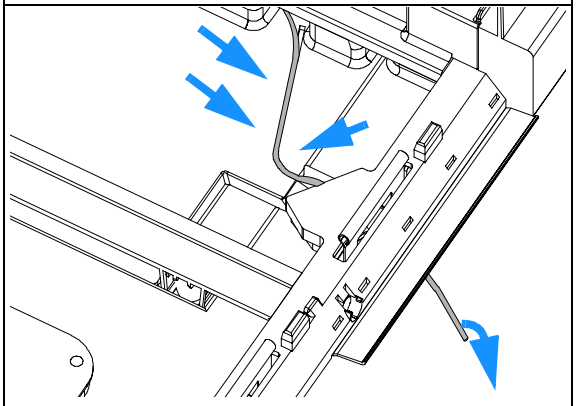
2 Remove the internal tray by pushing down the plastic holder that holds it in position underneath the metal leash (1) and sliding the tray to the left at the same time (2).



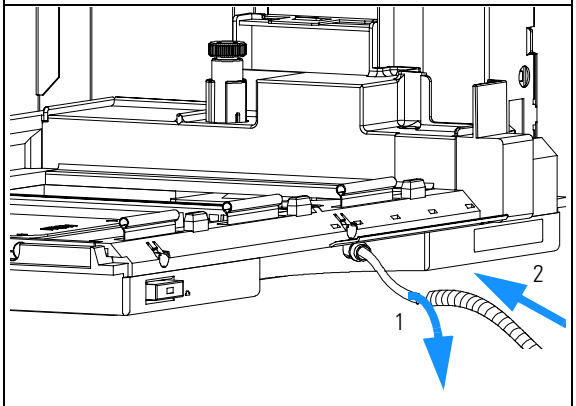
3 Remove the corrugated waste tubing from the front of the instrument (1) and slide the internal tray’s waste tubing to the rear of the outlet (2) the before sliding the tray out.



4 Install the new tray by sliding it into position underneath the metal leash that holds it. The waste tubing from the internal tray should be guided as shown.



5 Make sure that the waste tubing is slid all the way through the outlet (1). Its end should be over the edge and below the level of the laboratory desk that the system stands on to avoid any back flow of solvent. Re-install the corrugated waste tubing (2).



On completion of this procedure:

- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

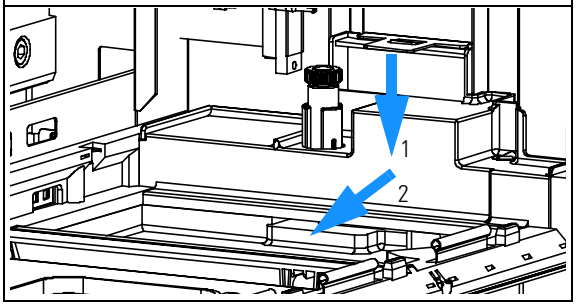
Repairing or Exchanging a Funnel of the Internal Tray

Frequency	When leaky or contaminated
Tools required	None
Parts required	Funnel assembly, waste tubing assembly, seals (for PNs see "Internal Tray Assembly (Preparative Scale)" on page 151 or "Internal Tray Assembly (Analytical Scale)" on page 152)

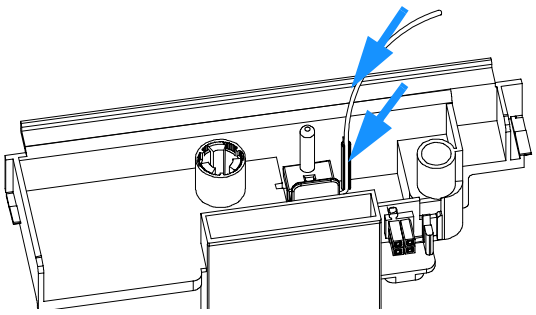
Before beginning this procedure:

- ❏ Position the transport unit of the fraction collector in the "Home Position" (see "Maintenance Functions" on page 70) and remove all installed trays from the tray base.
- ❏ Turn off the instrument.
- ❏ The procedure is almost identical for both, the preparative and the analytical scale internal tray, but it requires different parts.

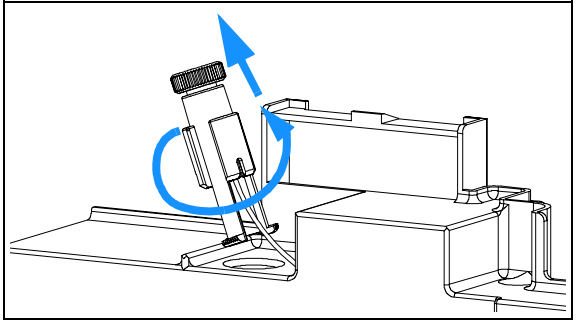
1 Remove the internal tray from the instrument, see "Exchanging the Internal Tray" on page 99.



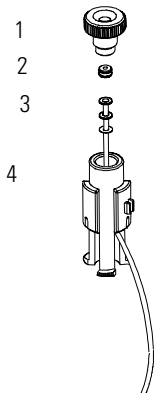
2 Turn the internal tray upside down and remove the funnel's waste tubing through the flow delay sensor.



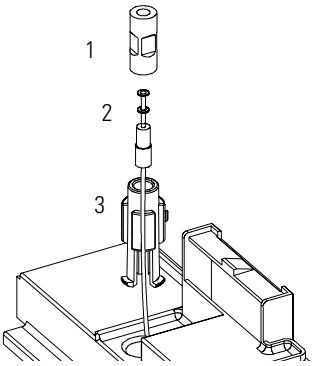
3 Remove the funnel assembly from the internal tray by screwing it counter clockwise and lifting it out.



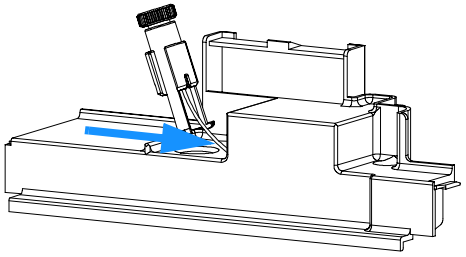
4 Exploded view for the parts of the **analytical scale** internal tray. Once the funnel has been removed from the internal tray, it can be disassembled and defective parts can be replaced (funnel screw (1), seals (2), tubing (3)or funnel holder (4)).



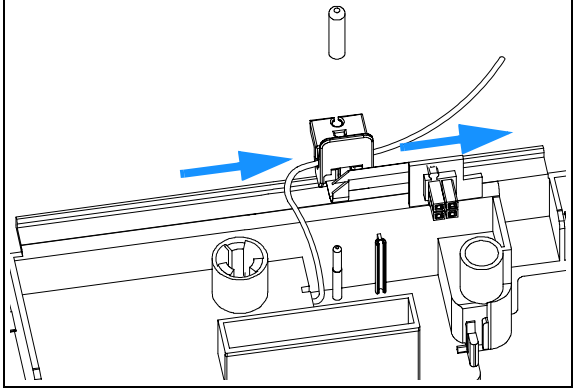
5 Exploded view for the parts of the **preparative scale** internal tray.Once the funnel has been removed from the internal tray, it can be disassembled and defective parts van be replaced (funnel union (1), tubing with screw (2) or funnel holder (3)).



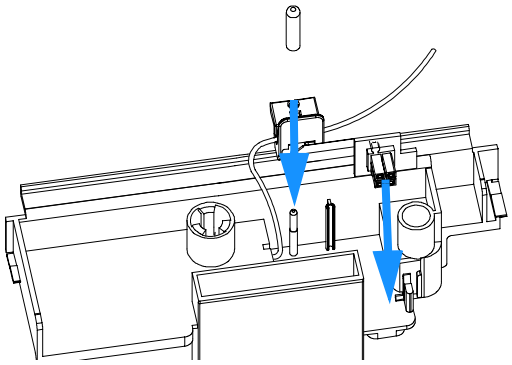
6 Slide the waste tubing of the newly assembled funnel assembly through the slit beside the funnel in the internal tray.



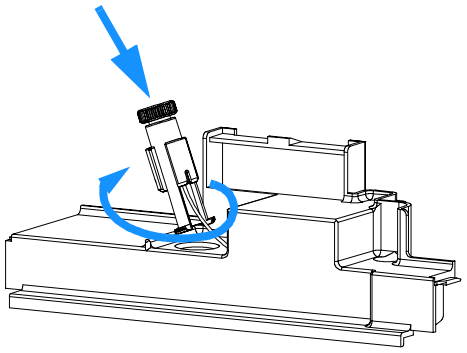
7 Turn the internal tray upside down.Slide the funnel's waste tubing through the flow delay sensor.



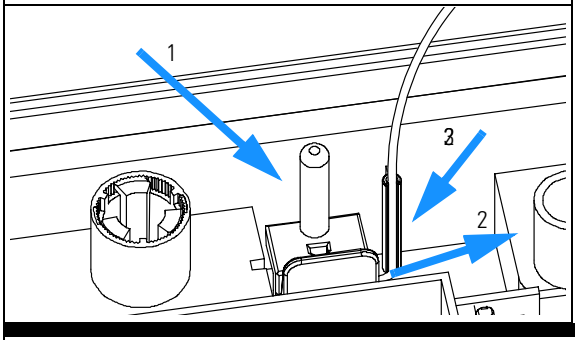
8 Re-insert the flow delay sensor.



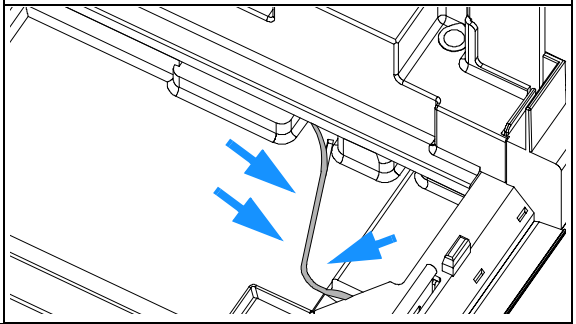
9 Insert the funnel into the tray and screw it tight (clockwise).



10 Re-install the plug that holds the flow delay sensor (1), pull the waste tubing tight through the flow delay sensor (2) and mount the waste tubing (3).



11 Re-install the internal tray and make sure to route the waste tubing out through the outlet of the instrument, correctly (see “Exchanging the Internal Tray” on page 99).



On completion of this procedure:

- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

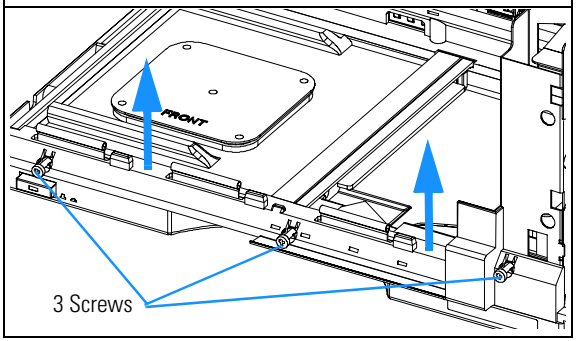
Exchanging the Leak Sensor

Frequency	When defective
Tools required	Screwdriver Pozidrive No. 1
Parts required	Leak sensor, 5061-3356

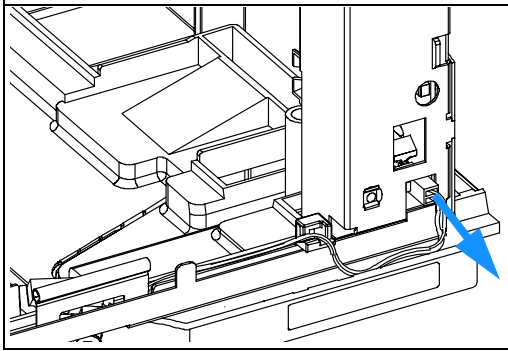
Before beginning this procedure:

- ❏ Position the transport unit of the fraction collector in the "Home Position" (see "Maintenance Functions" on page 70).
- ❏ Remove all installed trays from the tray base.
- ❏ Turn off the instrument.

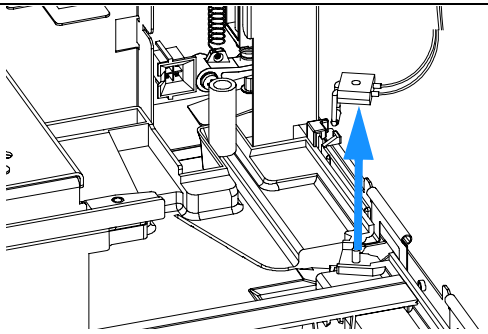
1 Unscrew the front tray guide (3 screws).



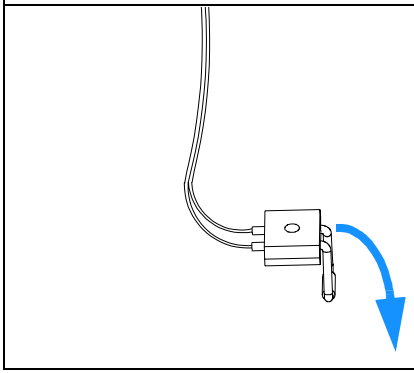
2 Unplug the leak sensor from the SLF board.



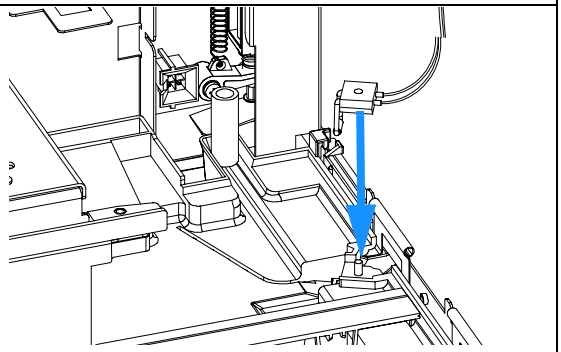
3 Notice the position of the leak sensor and pull out the old leak sensor and its cable from the instrument.



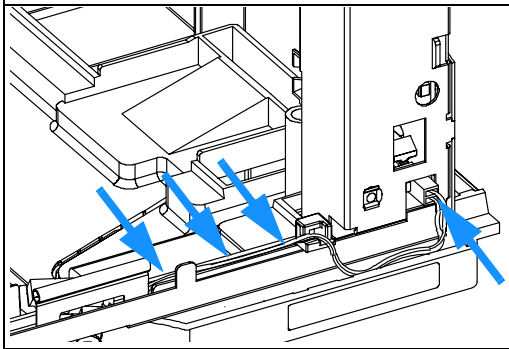
4 Bend the new leak sensor, so that it has a 90 degree angle to its plastic holder (as shown). The bend must be sharp enough that the sensor reaches all the way down to the bottom of the leak plane, but the cables must not be damaged!



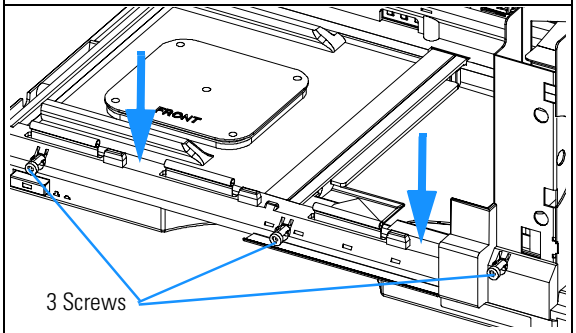
5 Install the new leak sensor into its position in the leak plane.



6 Route the leak sensor cable nicely into the recess at the from of the instrument. Plug the leak sensor into its connector on the SLF board.



7 Re-install the front tray guide (3 screws). Be careful not to pinch the new leak sensor's cable.



On completion of this procedure:

- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

Exchanging or Installing the (Optional Interface) BCD Board

Frequency	At installation, when defective or for all repairs inside the fraction collector
Tools required	Flat-head screwdriver
Parts required	(Optional) interface board

CAUTION The interface board is sensitive to electrostatic discharge. Always use the ESD strap when handling electronic boards.

1 Switch off the fraction collector at the main power switch.

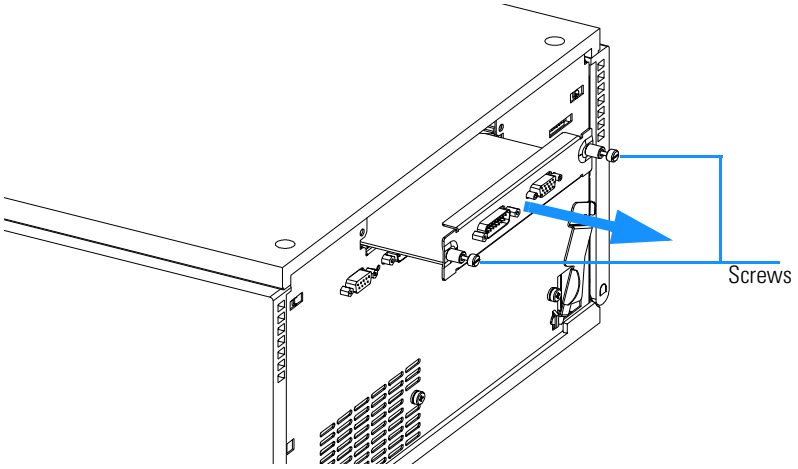
2 Disconnect cables from the interface board connectors.

3 Loosen the screws. Slide out the interface board from the fraction collector.

4 Install the interface board. Secure the screws.

5 Reconnect the cables to the board connectors

Figure 20 **Exchanging the Interface Board**



Exchanging Internal Parts

WARNING **The following procedures require opening the main cover of the fraction collector. Always ensure the fraction collector is disconnected from the line power when the main cover is removed. The security lever at the power input socket prevents the autosampler cover from being taken off when line power is still connected.**

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

WARNING **When opening capillary or tube fittings solvents may leak out. Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.**

WARNING **To avoid personal injury, keep fingers away from the needle area during fraction collector operation. Do not bend the safety flap away from its position, or attempt to insert or remove a vial from the gripper when the gripper is positioned below the needle.**

CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

NOTE The electronics of the autosampler will not allow operation when the top cover and the top foam are removed. A safety light switch on the main board will inhibit the operation of the autosampler. Always operate the autosampler with the top foam and top covers in place.

CAUTION

Internal components may be sensitive to electrostatic discharge (ESD). Always use an ESD strap when handling internal components (see "Using the ESD Strap" on page 77).

The procedures in this section describe how to exchange defective internal parts. You must remove the fraction collector from the stack in order to open the main cover.

Table 12 **Exchanging Internal Parts**

Procedure	Typical Frequency	Notes
Assembling the main cover	When installing a new one	See "Assembling the Main Cover or Installing the Light Protection Kit" on page 109
Removing / Reinstalling the top covers (plastic, metal and foam)	When accessing internal parts	See "Removing and Reinstalling Top Cover and Foam" on page 111
Exchanging the transport unit	When defective	See "Replacing the Transport Unit Assembly" on page 115
Exchanging the fraction collector main board	When defective	See "Exchanging the Fraction Collector Main Board (MTP board)" on page 117
Exchanging the fraction collector flow delay sensor board (SLF board)	When defective	See "Exchanging the Fraction Collector Safety Lock Board (SLF-Board)" on page 123
Exchanging the main fan	When defective	See "Exchanging the Main Fan" on page 127
Exchanging the exhaust fan	When defective	See "Exchanging the Exhaust Fan" on page 129
Exchanging the power supply	When defective	See "Exchanging the Power Supply" on page 131
Replacing the sheet metal kit with leak plane and tray guide	When defective, contaminated or corroded	See "Replacing the Sheet Metal Kit, with Leak Plane and Tray Guide (rear)" on page 134

Assembling the Main Cover or Installing the Light Protection Kit

Tools required	None
Parts required	Cover kit, 5064-82411, bolt carrier G1364-45100, name plate 5042-1381 ***or*** Light Protection kit, 5064-8272, includes dark front cover and dark side window

NOTE The bolt carrier has to be ordered separately. The plastics kit contains all other parts, but it is not assembled.

CAUTION Observe the assembly instructions carefully. The main cover cannot be disassembled any more once assembled incorrectly. Pay special attention to the orientation of the panel: the front side must be installed to the front side of the top cover. Do not reverse left and right side.

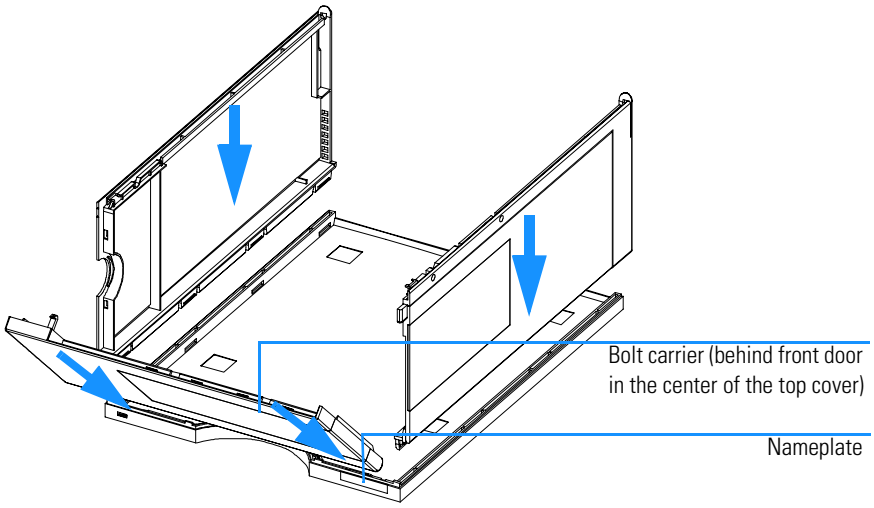
Assembling the Main Cover

1. Insert the “Agilent Technologies 1100 Series” nameplate into the recess in the top cover.
2. Place the top cover on the bench.
3. Press the bolt carrier into place (in the front center of the top cover).
4. Press the side panels into the slots in the top cover.
5. Press the front door into the slots of the top cover.

Installing the Light Protection Kit

1. Remove the transparent front door and replace it by the dark one.
2. Remove the transparent side panel and replace it by the dark one.

Figure 21 **Assembling the Main Cover**



Removing and Reinstalling Top Cover and Foam

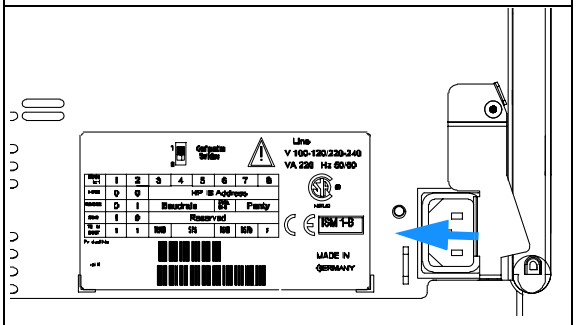
Frequency	When accessing internal parts
Tools required	Screwdriver Pozidrive No. 1 If interface board is installed: Flat-head screwdriver
Parts required	None

CAUTION Before starting this procedure, remove all inlet and waste tubings and make sure that they are not damaged by stretching or pinching them.

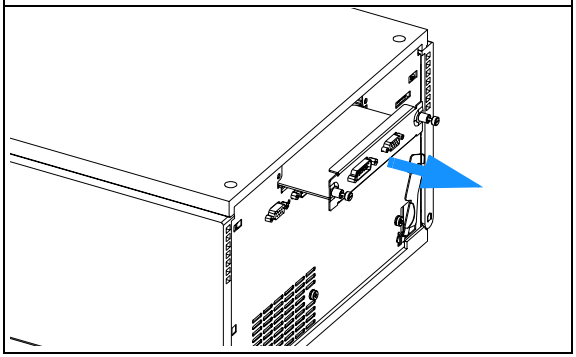
CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

CAUTION This procedure requires removal of the (optional) BCD-board (if previously installed). The board is sensitive to electrostatic discharge. Always use the ESD strap when handling electronic boards.

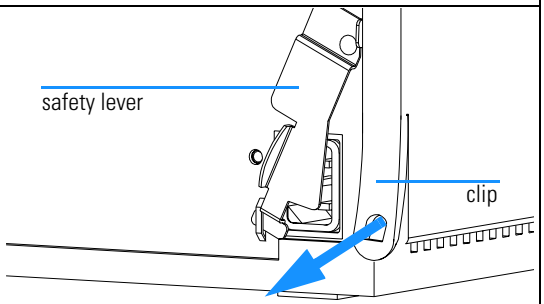
1 Switch off the fraction collector at the main power switch. Remove the power cable and slide the safety lever to the left.



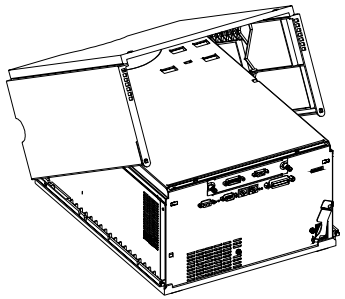
2 If installed, remove the BCD- board.



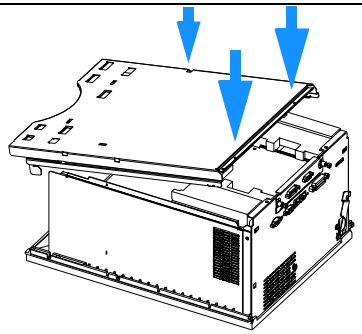
3 Remove the top plastic cover by lifting the two clips on either side of the instrument at its rear bottom corners.



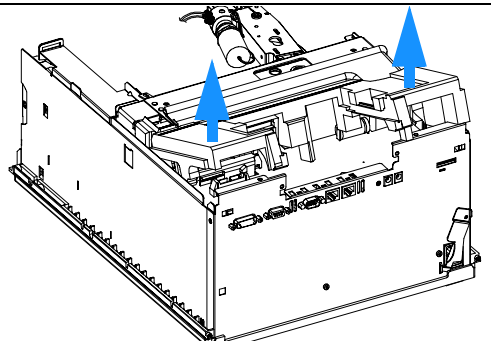
4 Lift away the cover.



5 Unscrew the three screws on the top plate. Remove the top plate by lifting its back and sliding it out to the front.

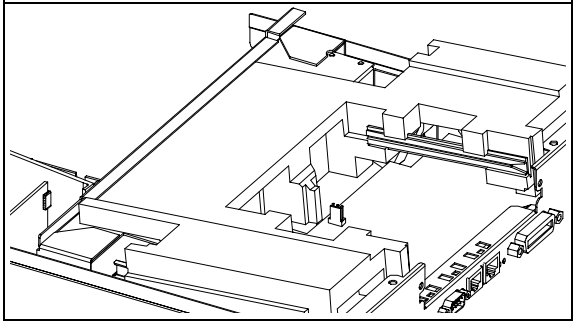


6 Carefully remove the top foam.

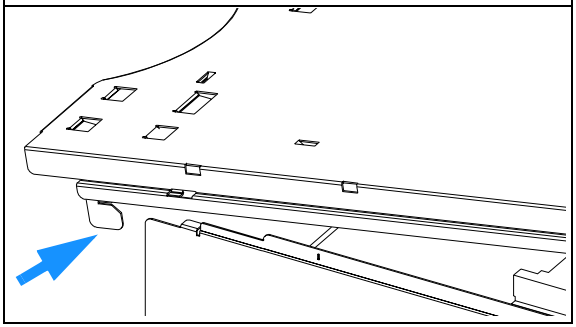


Installing the Top Cover and Foam

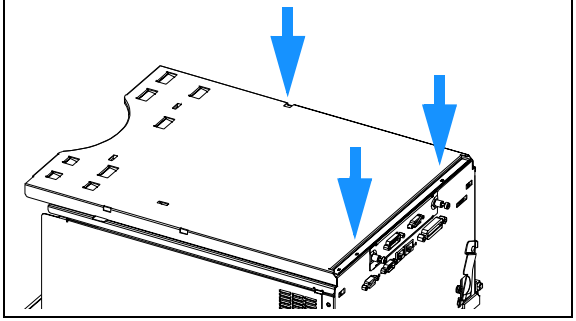
1 Install the top foam. Press the foam firmly into place.



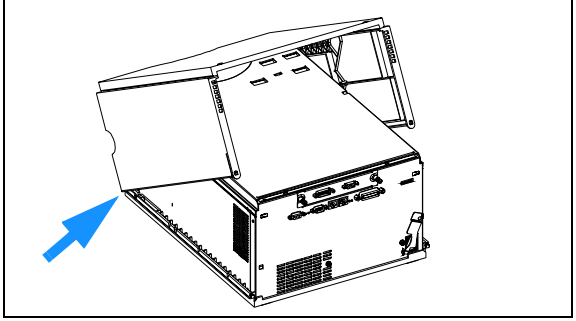
2 Engage the slot on the top plate onto the side plate.



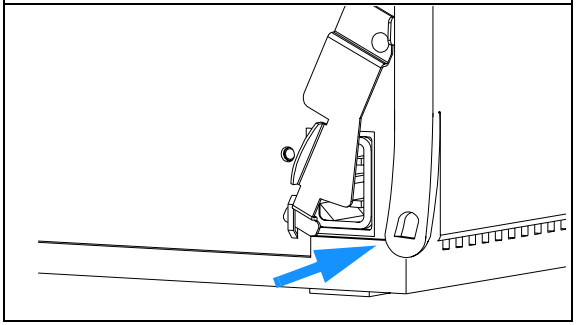
3 Fix the top plate in place with the three screws.



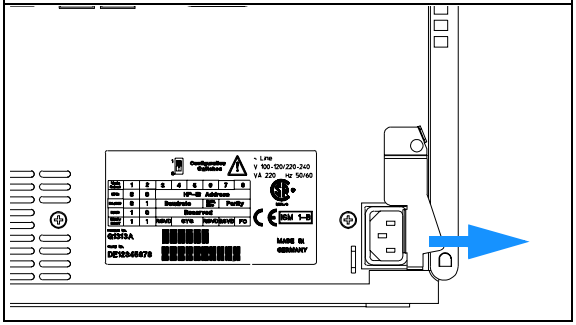
4 Engage the top cover into the bottom cover. Install all inlet and waste tubings.



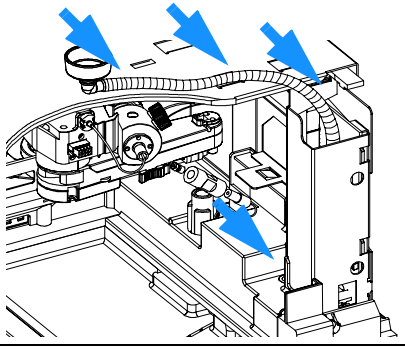
5 Lower the cover into place. Ensure the clips close firmly.



6 Slide the power lock to the right, and install the power cable.



7 Do not forget to route the corrugated waste tubing from the top cover through the instrument as shown below (figure without covers installed). The bottom end of the waste tube must be installed in the hole in the internal tray.



On completion of this procedure:

- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

Replacing the Transport Unit Assembly

Frequency	When defective
Tools required	Screwdriver Pozidrive No. 1 If interface board is installed: Flat-head screwdriver
Parts required	Transport unit assembly **preparative scale**, G1364-60009, **or** Transport unit assembly **analytical scale**, G1364-60009

CAUTION Before starting this procedure, remove all inlet and waste tubings and make sure that they are not damaged by stretching or pinching them.

CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

1 Turn off the instrument.

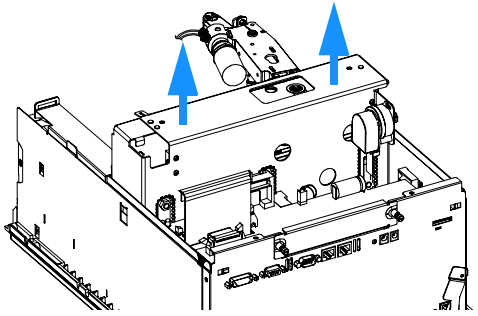
2 Remove all installed trays from the tray base.

3 Remove the top cover, top plate, and foam (see “Removing and Reinstalling Top Cover and Foam” on page 111).

4 Remove the inlet / waste tubing assembly from the diverter valve (see “Replacing the Inlet / Waste Tubings” on page 81).

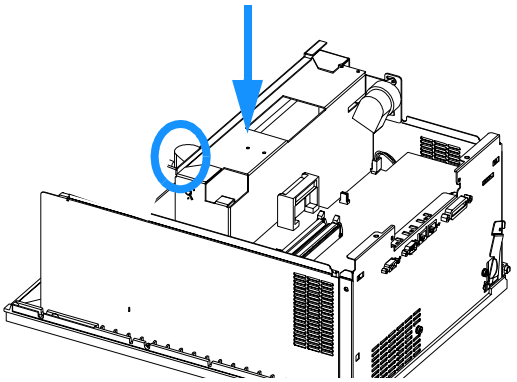
5 Lift out the transport unit assembly.

Figure 22 **Removing the Transport Unit Assembly**



Installing the Transport Assembly

1 Slide the transport assembly into the fraction collector. Ensure that the transport unit is well aligned and seated at the very bottom of the sheet metal kit with the help of the metal leash on the transport unit and its counterpart on the housing (indicated by the circle in the figure below).



On completion of this procedure:

- ❏ Install the top cover and foam (see "Removing and Reinstalling Top Cover and Foam" on page 111).
- ❏ Re-install the inlet / waste tubing assembly to the diverter valve (see "Replacing the Inlet / Waste Tubings" on page 81) and other waste tubings.
- ❏ The internal waste tube from the top center funnel through the right front corner of the metal housing must be inserted into hole in the internal tray.
- ❏ Re-install all trays.
- ❏ Start the instrument.
- ❏ Close the front cover.
- ❏ Verify the transport unit assembly alignment (see "Transport Unit Self Alignment" on page 71).

Exchanging the Fraction Collector Main Board (MTP board)

Frequency	When defective
Tools required	5 mm wrench (for remote-connector screws) Screwdriver Pozidrive No. 1 If interface board is installed: Flat-head screwdriver
Parts required	MTP board, G1364-66500, exchange part number G1364-69500

CAUTION Before starting this procedure, remove all inlet and waste tubings and make sure that they are not damaged by stretching or pinching them.

CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

CAUTION The MTP board is sensitive to electrostatic discharge. Always use the ESD strap (see “Using the ESD Strap” on page 77) when handling electronic boards.

NOTE This procedure requires reloading the fraction collector firmware, reprogramming of the instrument serial number, and realignment of the transport unit assembly.

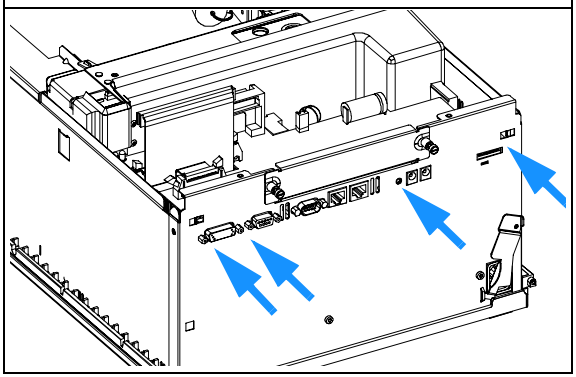
Before beginning this procedure:

1 Turn off the instrument.

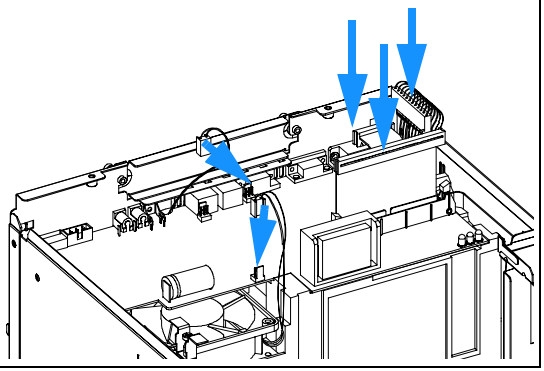
2 Remove the top cover, top plate, and foam (see “Removing and Reinstalling Top Cover and Foam” on page 111).

3 It is easier to remove and replace the mainboard, if you also remove the transport unit assembly, first (see “Replacing the Transport Unit Assembly” on page 115).

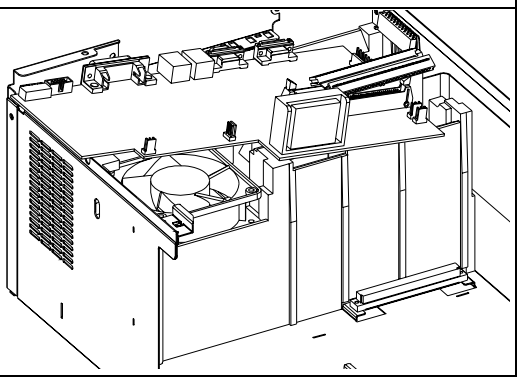
1 Remove the connector screws from the RS232 connector and the 2 holding screws.



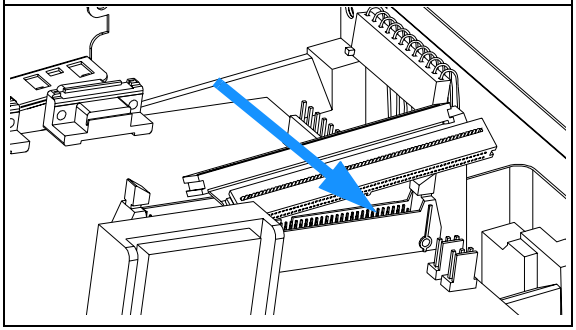
2 Disconnect all connectors on MTP board.



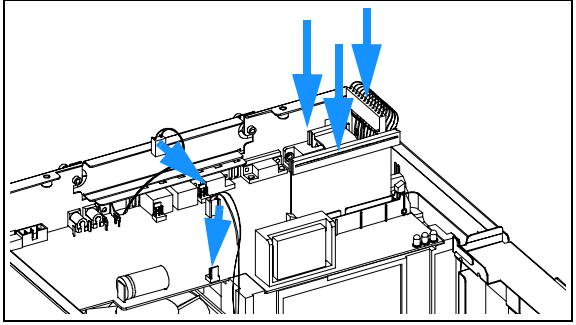
3 Slide MTP board out of the fraction collector.



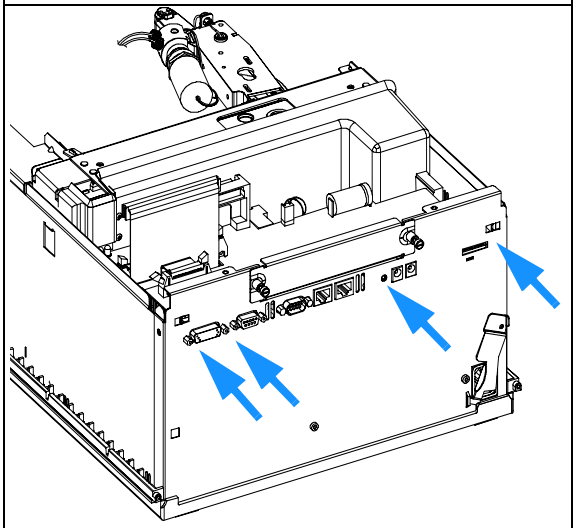
4 Install new board. Ensure ribbon cables are positioned in the slot in the board.



5 Reconnect the connectors to the board.



6 Replace the connector screws to the RS232 connector and the 2 holding screws.



On completion of this procedure:

- ❏ Re-install the transport unit assembly (see "Replacing the Transport Unit Assembly" on page 115).
- ❏ Install the top cover and foam (see "Removing and Reinstalling Top Cover and Foam" on page 111) and all inlet and waste tubings.
- ❏ The internal waste tube from the top center funnel through the right front corner of the metal housing must be inserted into hole in the internal tray.
- ❏ Check the switch setting of the address switch S1 on the new board, see "GPIB Default Addresses" on page 203.
- ❏ Note:
  An incorrect switch setting (e.g., TEST/BOOT) may cause the fraction collector to turn in a basic mode (yellow or red flashing status light). In such a case turn

Entering the Serial Number

1 Turn on the fraction collector.

2 Enter the 10-digit serial number of the fraction collector. The serial number can be entered using either the control module or the ChemStation, see “Entering the Serial Number using the Control Module” on page 120 or see“Entering the Serial Number using the ChemStation” on page 121.

3 Check the firmware revision of the fraction collector. If the firmware revision is older than the current firmware revision of the fraction collector, update the firmware, see “Replacing the Fraction Collector Firmware” on page 122

Entering the Serial Number using the Control Module

1 Connect the control module to the fraction collector. Turn on the fraction collector.

2 In the control module, press *System (F5)*, then *Records (F4)*. Using the up/down arrows, make sure that the fraction collector is highlighted.

3 Press *FW Update (F5)*. Now, press the *m* key. This will display a box which says ‘*Update Enter Serial#*’.

4 Press *Enter*. This will display the box labeled *Serial#*.

5 Letters and numbers are created using the up and down arrows. Enter the 10-digit serial number of the fraction collector into the box labeled *Serial#*. When the 10-digit serial number is entered, press *Enter* to highlight the complete serial number. Then, press *Done (F6)*.

6 Turn the fraction collector off, then on again. The *Records* screen should display the correct serial number for this module.

7 If a ChemStation is also connected, re-boot the ChemStation as well.

Entering the Serial Number using the ChemStation

Module serial numbers are entered by typing specific commands into the command line at the bottom of the main user interface screen.

1 To enter a module serial number, type the following command into the command line:

print sendmodule$(lafc, "ser YYYYYYYYYY")

Where: YYYYYYYYYY is the 10-character serial number of the module in question.

NOTE The first two characters are letters, which should be capitalized.

The reply line will respond with RA 0000 SER followed by the module serial number you just entered.

2 Turn off the fraction collector, then on again. Then, re-boot the ChemStation. If the serial number you have just entered is different than the original module serial number, you will be given the opportunity to edit the configure Agilent 1100 access screen during the re-boot of the ChemStation.

3 After boot-up, the serial number you have just entered can be seen under the *Instrument menu* of the main user interface screen. The serial number of the autosampler can also be seen by typing the following command into the command line:

print sendmodule$(lafc, "ser?")

The reply line will give the module serial number.

Replacing the Fraction Collector Firmware

The installation of new firmware is required:

- If new version solves problems of currently installed version.
- If after exchange of the mainboard (MTP) the version on board is older than previous installed one.

To upgrade the fraction collector firmware follow the procedures and instructions given on the Internet at:

http://www.agilent.com/chem

To download and install always the newest available version of the firmware on your system call your local service provider for assistance.

Exchanging the Fraction Collector Safety Lock Board (SLF-Board)

Frequency	When defective
Tools required	Pozidrive No. 1 screwdriver
Parts required	SLF board, G1364-66505

CAUTION Before starting this procedure, remove all inlet and waste tubings and make sure that they are not damaged by stretching or pinching them.

CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

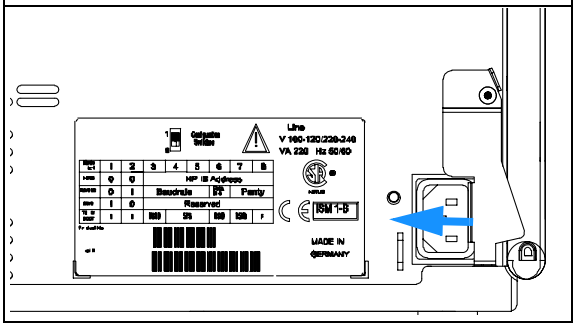
CAUTION The electronic boards are sensitive to electrostatic discharge. Always use the ESD strap (see “Using the ESD Strap” on page 77) when handling electronic boards.

CAUTION Take care not to damage the ribbon cable when removing the SLF board.

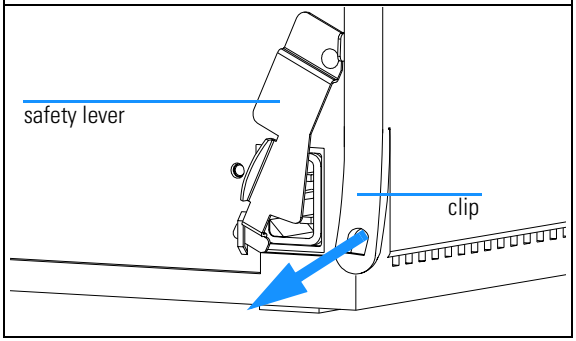
Before beginning this procedure:

- ❏ Turn off the instrument.
- ❏ Remove all installed trays from the tray base.
- ❏ Position the transport unit of the fraction collector in the “Exchange Parts Position” (see “Maintenance Functions” on page 70).
- ❏ Remove the internal tray (see “Exchanging the Internal Tray” on page 99).

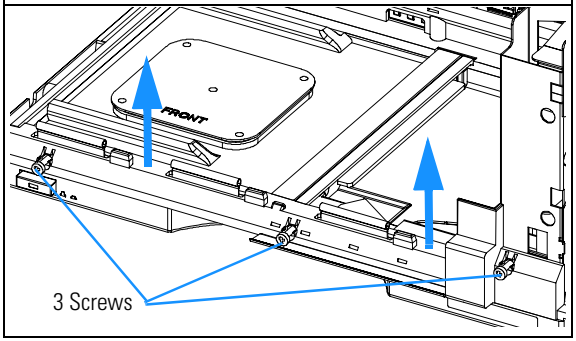
1 Unplug the main power cable at the rear of the instrument and slide the safety lever to the left.



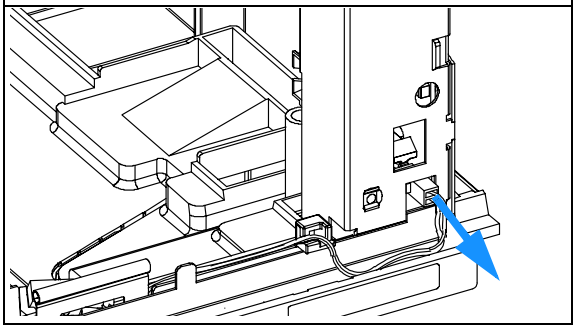
2 Remove the top plastic cover by lifting the two clips on either side of the instrument at its rear bottom corners.



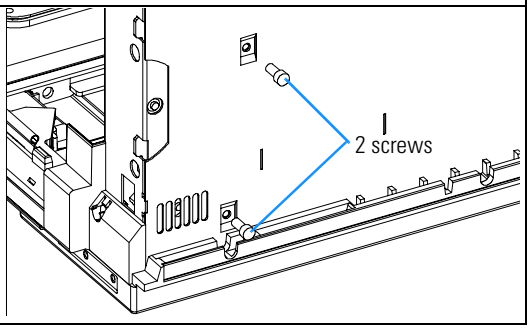
3 Remove the front tray guide (3 screws).



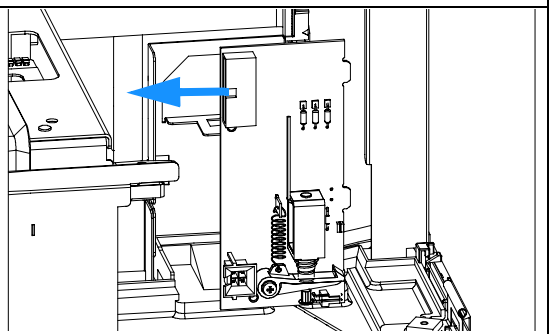
4 Unplug the leak sensor from the SLF board.



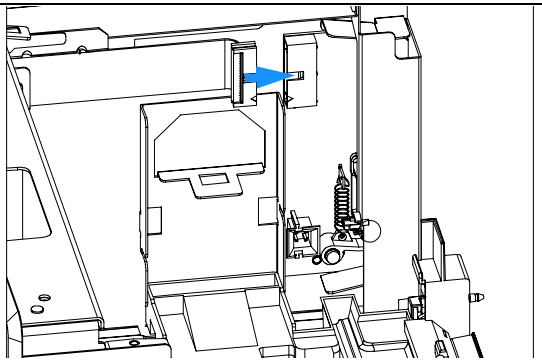
5 Unscrew the 2 holding screws of the SLF board on the outer right front corner of the fraction collector's metal housing.



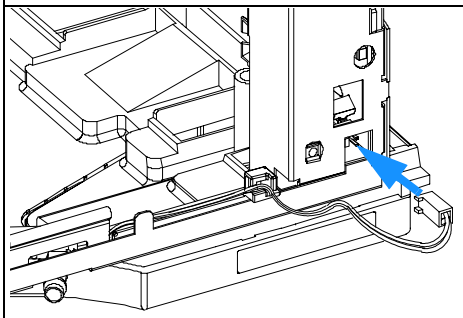
6 Unplug the ribbon cable from the top left corner of the SLF board and slide out the SLF board.



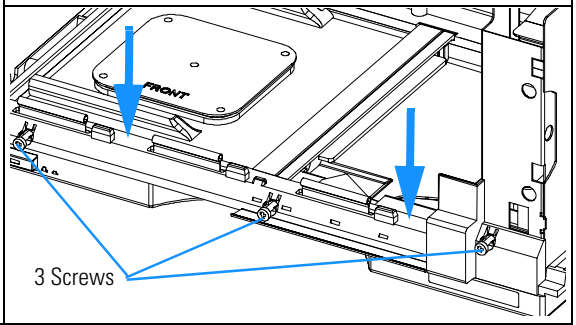
7 Slide in the new SLF board and secure it with the 2 holding screws on the outer right front corner of the fraction collector's metal housing. Plug the ribbon cable to the top left corner of the SLF board.



8 Plug the leak sensor to the new SLF board.



9 Re-install the front tray guide (3 screws).



On completion of this procedure:

- ❏ Re-install the internal tray (see “Exchanging the Internal Tray” on page 99).
- ❏ Re-install the top plastic cover (see “Removing and Reinstalling Top Cover and Foam” on page 111), all inlet and waste tubings and main power cord.
- ❏ The internal waste tube from the top center funnel through the right front corner of the metal housing must be inserted into hole in the internal tray.
- ❏ Re-install the tray(s) in the tray base.
- ❏ Start the instrument.
- ❏ Close the front cover.

Exchanging the Main Fan

Frequency	When defective
Tools required	5 mm wrench (for remote-connector screws) Screwdriver Pozidrive No. 1 If interface board is installed: Flat-head screwdriver
Parts required	Main fan, 3160-1017

CAUTION Before starting this procedure, remove all inlet and waste tubings and make sure that they are not damaged by stretching or pinching them.

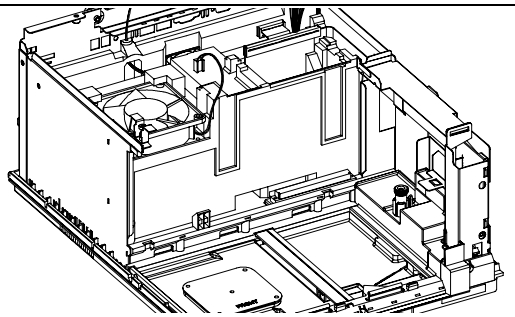
CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

CAUTION The MTP board is sensitive to electrostatic discharge. Always use the ESD strap (see "Using the ESD Strap" on page 77) when handling electronic boards.

Before beginning this procedure:

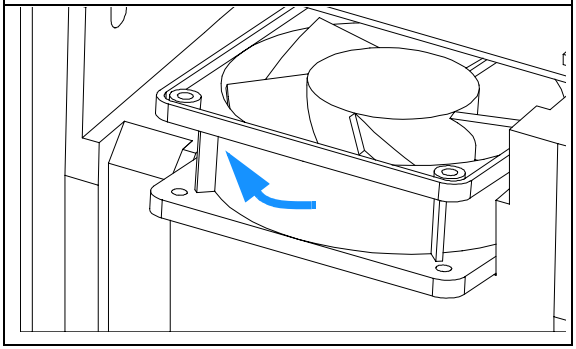
- ❏ Remove the top cover and foam (see "Removing and Reinstalling Top Cover and Foam" on page 111).
- ❏ Remove the transport unit assembly (see "Replacing the Transport Unit Assembly" on page 115).
- ❏ Remove the MTP main board (see "Exchanging the Fraction Collector Main Board (MTP board)" on page 117).

1 Notice the position of the fan cable and the air flow direction before removing the old fan. Then slide out the fan from its position in the foam.

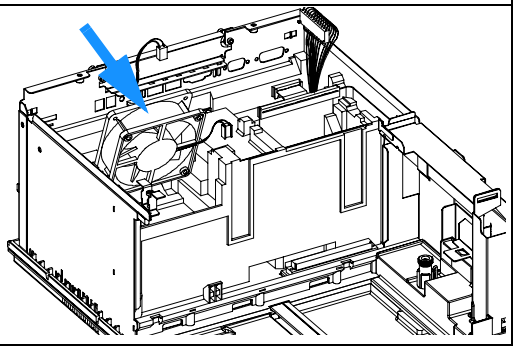


2 Lift the fan, and carefully pull the fan out of the foam.

.



3 Install the new fan. Ensure that the cable is positioned to the left (seen from the front) air flow should be from bottom to top (see arrow on the housing of the fan).



On completion of this procedure:

- ❏ Install the main board (see “Exchanging the Fraction Collector Main Board (MTP board)” on page 117).
- ❏ Install the transport unit assembly (see “Replacing the Transport Unit Assembly” on page 115).
- ❏ Install the top cover and foam (see “Removing and Reinstalling Top Cover and Foam” on page 111) and all inlet and waste tubings.
- ❏ Verify the transport assembly alignment (see “Transport Unit Self Alignment” on page 71).

Exchanging the Exhaust Fan

Frequency	When defective
Tools required	5 mm wrench (for remote-connector screws) Screwdriver Pozidrive No. 1 If interface board is installed: Flat-head screwdriver
Parts required	Exhaust fan, 3160-4097

CAUTION Before starting this procedure, remove all inlet and waste tubings and make sure that they are not damaged by stretching or pinching them.

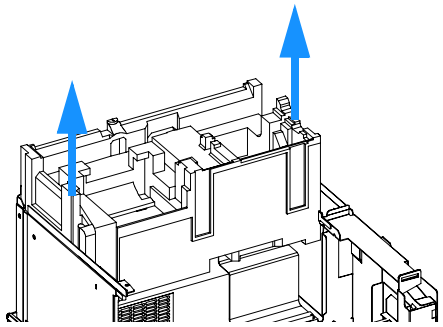
CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

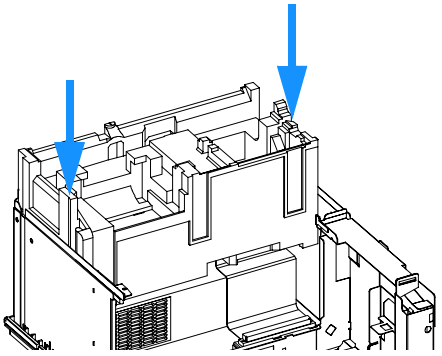
CAUTION The MTP board is sensitive to electrostatic discharge. Always use the ESD strap (see "Using the ESD Strap" on page 77) when handling electronic boards.

Before beginning this procedure:

- ❏ Remove the top cover and foam (see "Removing and Reinstalling Top Cover and Foam" on page 111).
- ❏ Remove the transport unit assembly (see "Replacing the Transport Unit Assembly" on page 115).
- ❏ Remove the MTP main board (see "Exchanging the Fraction Collector Main Board (MTP board)" on page 117).

1 Slide out the bottom foam from the instrument.



2 The fan is located at the rear of the foam. Notice the position of the fan cable and the air flow direction before removing the old fan. Then slide out the old fan to the rear from its position in the foam.	**3** Install the new fan. Ensure that the cable is positioned to the top, air flow should be from the inside out to the rear (see arrow on the housing of the fan). Slide the foam back into the instrument.
	

On completion of this procedure:

- ❏ Install the main board (see “Exchanging the Fraction Collector Main Board (MTP board)” on page 117).
- ❏ Install the transport unit assembly (see “Replacing the Transport Unit Assembly” on page 115).
- ❏ Install the top cover and foam (see “Removing and Reinstalling Top Cover and Foam” on page 111) and all inlet and waste tubings.
- ❏ The internal waste tube from the top center funnel through the right front corner of the metal housing must be inserted into hole in the internal tray.
- ❏ Verify the transport assembly alignment (see “Transport Unit Self Alignment” on page 71).

Exchanging the Power Supply

Frequency	When defective
Tools required	5 mm wrench (for remote-connector screws) Screwdriver Pozidrive No. 1 If interface board is installed: Flat-head screwdriver
Parts required	Power supply, 0950-2528

CAUTION Before starting this procedure, remove all inlet and waste tubings and make sure that they are not damaged by stretching or pinching them.

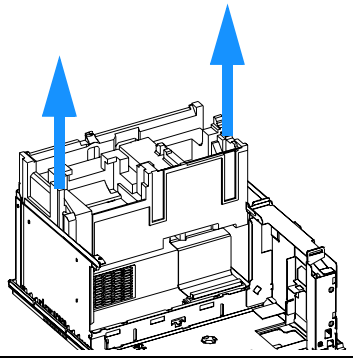
CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

CAUTION The MTP board is sensitive to electrostatic discharge. Always use the ESD strap (see “Using the ESD Strap” on page 77) when handling electronic boards.

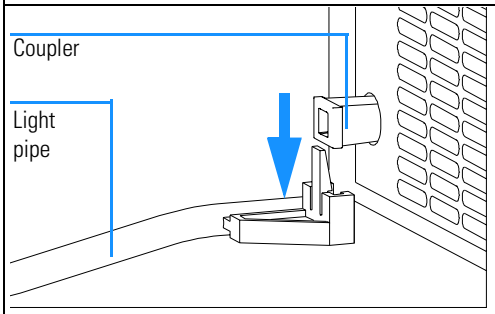
Before beginning this procedure:

- ❏ Remove the top covers (see “Removing and Reinstalling Top Cover and Foam” on page 111).
- ❏ Remove the transport unit assembly (see “Replacing the Transport Unit Assembly” on page 115).
- ❏ Remove the MTP board (see “Exchanging the Fraction Collector Main Board (MTP board)” on page 117).

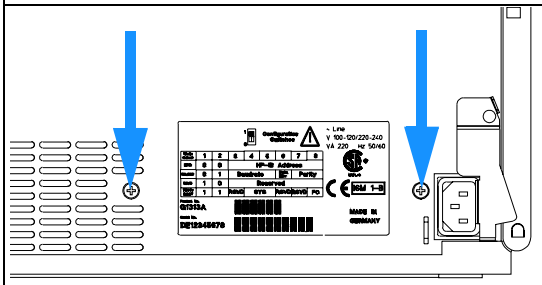
1 Remove the bottom foam.



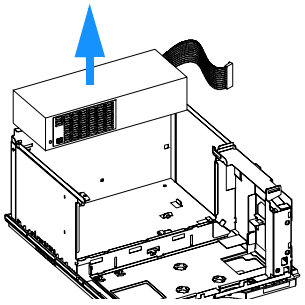
2 Remove the power switch light pipe from the coupler.



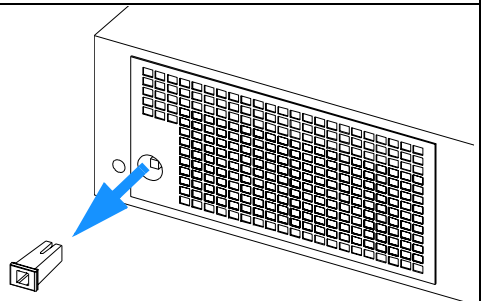
3 Remove the two screws from the rear panel.



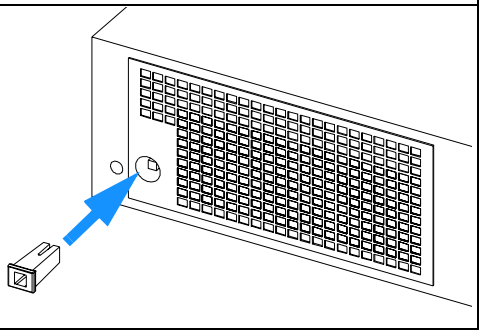
4 Lift the power supply out of the module.



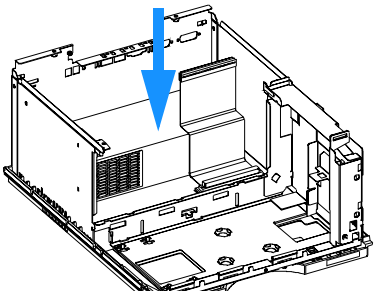
5 Remove the coupler from the switch of the power supply.



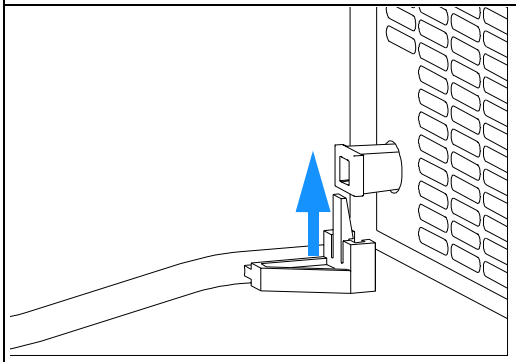
6 Insert the coupler onto the switch of the new power supply.



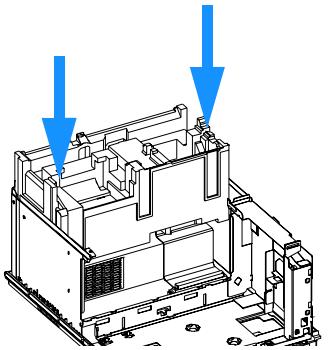
7 Install the power supply in the module.



8 Connect the light pipe to the coupler.



9 Install the bottom foam. Ensure the cables are positioned correctly.



On completion of this procedure:

- ❏ Re-install the MTP board (see “Exchanging the Fraction Collector Main Board (MTP board)” on page 117).
- ❏ Re-install the transport unit assembly (see “Replacing the Transport Unit Assembly” on page 115).
- ❏ Re-install the top covers (see “Removing and Reinstalling Top Cover and Foam” on page 111) and all inlet and waste tubings.
- ❏ The internal waste tube from the top center funnel through the right front corner of the metal housing must be inserted into hole in the internal tray.

Replacing the Sheet Metal Kit, with Leak Plane and Tray Guide (rear)

Frequency	When defective, contaminated or corroded
Tools required	5 mm wrench (for remote-connector screws). Screwdriver Pozidrive No. 1 If interface board installed: Flat-head screwdriver.
Parts required	Sheet metal parts without official part numbers. Parts are only available on demand. Ask for sheet metal kit, leak plane and tray guide (rear).

CAUTION Before starting this procedure, remove all inlet and waste tubings and make sure that they are not damaged by stretching or pinching them.

CAUTION Regularly inspect the inlet / waste tubing assembly and the valve to needle tubing and exchange them if they are worn out or show visible signs of damage.

CAUTION The MTP board is sensitive to electrostatic discharge. Always use the ESD strap (see “Using the ESD Strap” on page 77) when handling electronic boards.

For performing this procedure:

- ❏ Turn off the instrument.
- ❏ Disconnect all cables.
- ❏ Open the front door and remove all installed trays.
- ❏ Remove the internal tray and SLF board (see “Exchanging the Fraction Collector Safety Lock Board (SLF-Board)” on page 123).
- ❏ The instrument has to be completely disassembled. Follow the procedure described for replacing the power supply (see “Exchanging the Power Supply” on page 131).
- ❏ Re-assemble the instrument with the new sheet metal by performing the re-assembly steps in the reverse order of the disassembly steps, described above.

5

Parts and Materials

Detailed illustrations and lists for identification of parts and materials

Fraction Collector Main Assemblies

Figure 23 **Fraction Collector Main Assemblies**

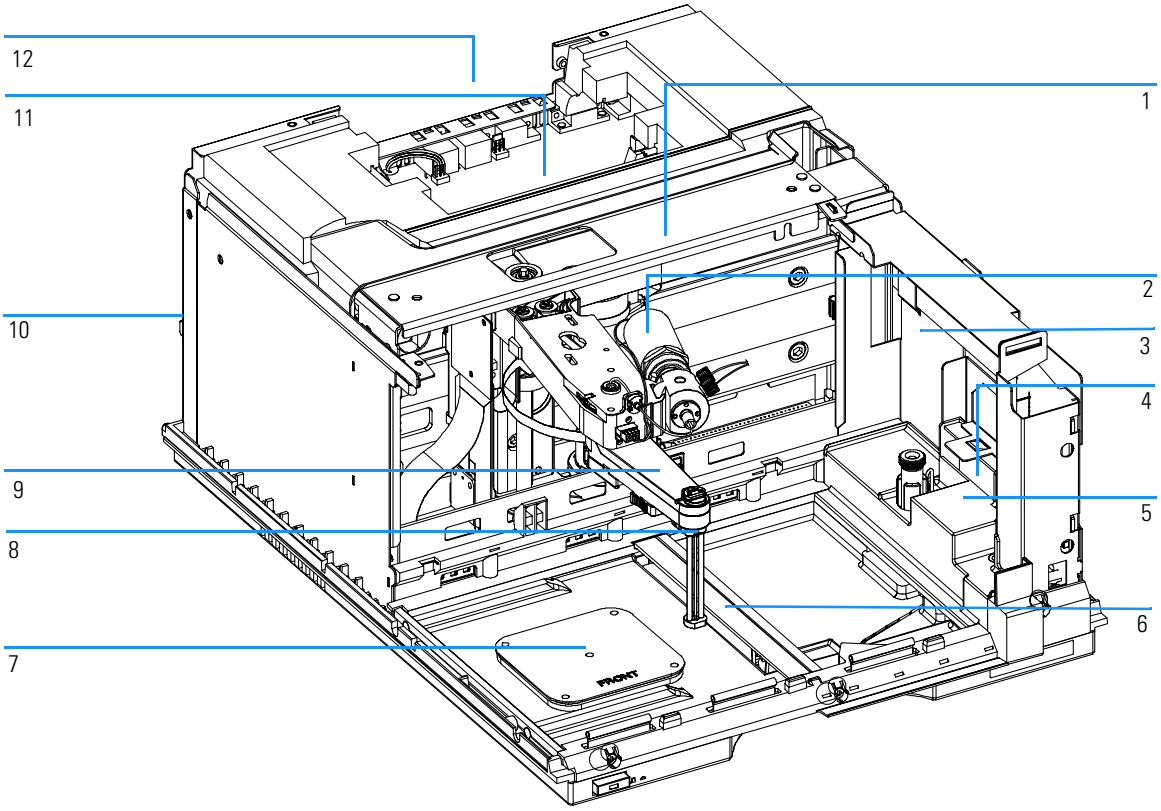


Table 13 **Fraction Collector Main Assemblies**

Item	Description	Part Number
1	Sample Transport assembly, **preparative scale *or*** Sample Transport assembly, **analytical scale**	G1364-60008 G1364-60009
2	Diverter valve assembly	G1364-61901
3	Ribbon cable, SLF board	G1367-81600
4	SLF board (for front door, for leak and delay sensing)	G1364-66505
5	Internal tray assembly (for delay sensing, **analytical scale**, only) Internal tray assembly (for delay sensing, **preparative scale**, only)	G1364-63103 G1364-63104
6	Tray compartment divider (**analytical scale**, only)	G1364-43701
7	Plug channel Adapter air channel (installed underneath plug channel, if the fraction collector is used with the thermostat)	G1367-47200 G1329-43200
8	Needle assembly **preparative scale (short needle)** Needle assembly **analytical scale (long needle)**	G1364-87201 G1364-87203
9	Needle carrier assembly **preparative scale** Needle carrier assembly **analytical scale**	G1364-60011 G1364-60010
10	Power supply assembly (not shown)	0950-2528
11	Fraction Collector main board (MTP) Exchange Assembly - MTP board	G1364-66500 G1364-69500
12	BCD board (not shown)	G1351-68701
13	Fan main (not shown, underneath main board)	3160-1017
14	Fan exhaust (not shown, on top of power supply)	3160-4097

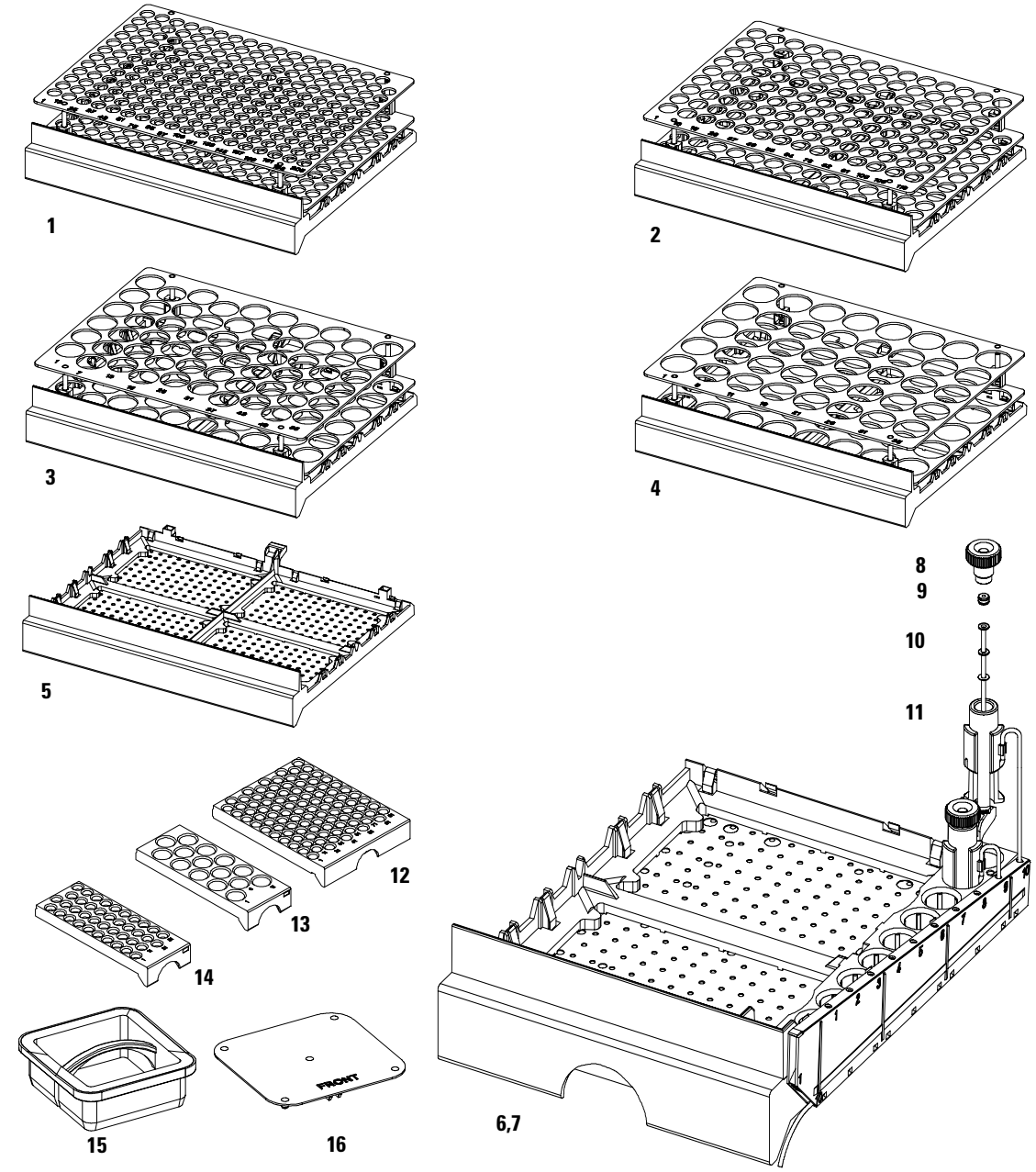
Supported Trays for a Fraction Collector

Table 14 **Trays for the Fraction Collector**

Item	Description	Part Number
1	Full tray for 215 test tubes, 12x100 mm	G1364-84506
2	Full tray for 126 test tubes, 16x100 mm	G1364-84505
3	Full tray for 60 round bottom tubes, 25x100 mm	G1364-84504
4	Full tray for 40 round bottom tubes, 30x100 mm	G1364-84503
5	Full tray for 4 well plates	G1364-84501
6	Std. tray for 2 well plates + 10 2ml vials	G1367-60001
7	Std. tray for 2 well plates + 10 collecting funnels	G1364-84502
8	Funnel for item 7	5022-2200
9	Funnel seal kit for item 7 (pack. of 10)	G1364-68730
10	Tubing kit 10T for item 7 (pack of 10)	G1364-86707
11	Funnel coupler for item 7	G1364-43201
12	Std. tray for 100 x 2 ml vials Std. tray for 100 x 2 ml vials, thermostattable	G1313-44500 G1329-60001
13	Half tray for 15 x 6 ml vials	G1313-44503
14	Half tray for 40 x 2 ml vials	G1313-44502
15	Adapter air channel (installed underneath plug channel, if the fraction collector is used with the thermostat)	G1329-43200
16	Plug channel	G1367-47200

NOTE Only one type of well-plates can be used at a time in one tray.

Figure 24 **Trays**



The items in this figure are displayed in different scaling factors!

List of Recommended Test Tubes

Table 15 **Round Bottom Test Tubes**

Description	Volume (ml)	100/Pack
25 x 100 mm, clear glass	35	5042-6459
30 x 100 mm, clear glass	45	5042-6458
30 x 48 mm	20	5042-6470

List of Recommended Vials and Caps

Table 16 **Crimp Top Vials (Caps for Use with the Analytical Scale Fraction Collector, only!)**

Description	Volume (ml)	100/Pack	1000/Pack	100/Pack (silanized)
Clear glass	2	5181-3375	5183-4491	
Clear glass, write-on spot	2	5182-0543	5183-4492	5183-4494
Amber glass, write-on spot	2	5182-3376	5183-4493	5183-4495

Table 17 **SnapTop Vials (Caps for Use with the Analytical Scale Fraction Collector, only!)**

Description	Volume (ml)	100/Pack	1000/Pack	100/Pack (silanized)
Clear glass	2	5182-0544	5183-4504	5183-4507
Clear glass, write-on spot	2	5182-0546	5183-4505	5183-4508
Amber glass, write-on spot	2	5182-0545	5183-4506	5183-4509

Table 18 **Screw Top Vials (Caps for Use with the Analytical Scale Fraction Collector, only!)**

Description	Volume (ml)	100/Pack	1000/Pack	100/Pack (silanized)
Clear glass	2	5182-0714	5183-2067	5183-2070
Clear glass, write-on spot	2	5182-0715	5183-2068	5183-2071
Amber glass, write-on spot	2	5182-0716	5183-2069	5183-2072

Table 19 **Crimp Caps (Caps for Use with the Analytical Scale Fraction Collector, only!)**

Description	Septa	100/Pack
Silver aluminum	Clear PTFE/red rubber	5181-1210
Silver aluminum	Clear PTFE/red rubber	5183-4498 (1000/Pack)
Blue aluminum	Clear PTFE/red rubber	5181-1215
Green aluminum	Clear PTFE/red rubber	5181-1216
Red aluminum	Clear PTFE/red rubber	5181-1217

Table 20 **Snap Caps (Caps for Use with the Analytical Scale Fraction Collector, only!)**

Description	Septa	100/Pack
Clear polypropylene	Clear PTFE/red rubber	5182-0550
Blue polypropylene	Clear PTFE/red rubber	5182-3458
Green polypropylene	Clear PTFE/red rubber	5182-3457
Red polypropylene	Clear PTFE/red rubber	5182-3459

Table 21 **Screw Caps (Caps for Use with the Analytical Scale Fraction Collector, only!)**

Description	Septa	100/Pack
Blue polypropylene	Clear PTFE/red rubber	5182-0717
Green polypropylene	Clear PTFE/red rubber	5182-0718
Red polypropylene	Clear PTFE/red rubber	5182-0719
Blue polypropylene	Clear PTFE/silicone	5182-0720
Green polypropylene	Clear PTFE/silicone	5182-0721
Red polypropylene	Clear PTFE/silicone	5182-0722

List of Recommended Plates and Closing Mats

Table 22 **Recommended Plates and Closing Mats (Std. Well Plates and Closing Mats for Use with the Analytical Scale Fraction Collector, only!)**

Item	Description	Volume (ml)	Package	Part Number
1	96 polypropylene well-plate*	0.5	10	5042-1386
2	96 polypropylene well-plate*	0.5	120	5042-1385
3	96 polypropylene deep well pate	1.0	32	5042-1387
4	96 polypropylene deep well-plate with glass inserts, caps and septa pre assembled	0.35	1	5065-4402
5	384 polypropylene well-plate*	0.1	30	5042-1388
	Silicon Closing mats for 96 well-plate*		50	5042-1389

* For use with the **analytical scale** fraction collector, only!

NOTE Only one type of well-plates can be used at a time in one tray.

WARNING **If you are using flammable solvents, remove the plates from the fraction collector after turning it 0FF. You avoid the risk of building explosive gas mixtures in the instrument.**

WARNING **If you are using flammable solvents, cover the plates. You avoid the risk of building explosive gas mixtures in the instrument.**

WARNING **Closing mats with adhesive can give some contamination in the system. The adhesive is soluble in most of the solvents used in HPLC.**

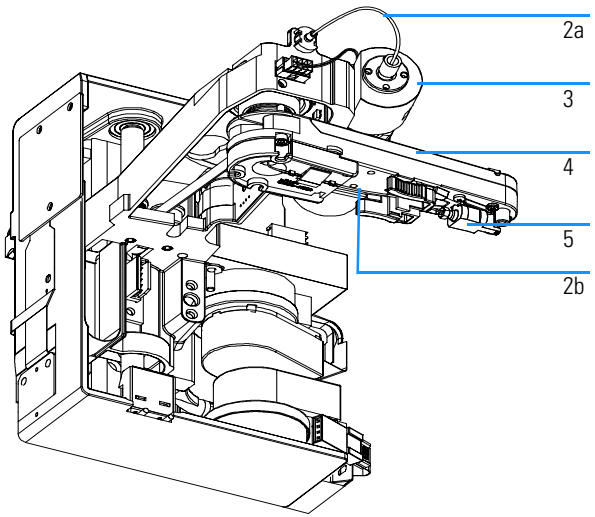
WARNING **In general do not use closing mats with adhesive. The fraction collector has no prepunch needle, therefore the adhesive will clog the needle after several injections.**

Transport Unit Assembly (Preparative Scale)

Table 23 **Transport Unit Assembly (Preparative Scale)**

Item	Description	Part Number
1	Transport Unit Assembly **(Preparative Scale)**, includes items 2 – 5	G1364-60008
2a, b	Tubing - diverter valve to needle, 0.8 mm ID	G1364-86711
3	Diverter valve assembly	G1364-61901
4	Needle carrier assembly **preparative scale**	G1364-60011
5	Needle assembly **preparative scale (short needle)**	G1364-87201

Figure 25 **Transport Unit Assembly (Preparative Scale), partly displayed**

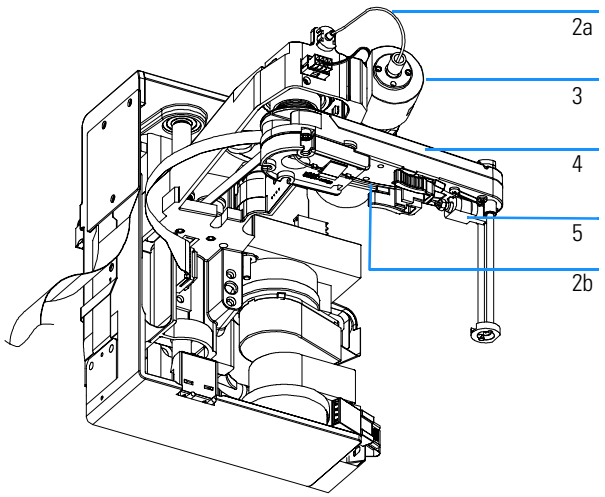


Transport Unit Assembly (Analytical Scale)

Table 24 **Transport Unit Assembly (Analytical Scale)**

Item	Description	Part Number
1	Transport unit assembly **(analytical scale)**, includes items 2 – 5	G1364-60009
2a, b	Tubing - diverter valve to needle, 0.25 mm ID	G1364-86712
3	Diverter valve assembly	G1364-61901
4	Needle carrier assembly **analytical scale**	G1367-60010
5	Needle assembly **analytical scale (long needle)**	G1364-87203

Figure 26 **Transport Unit Assembly (Analytical Scale), partly displayed**

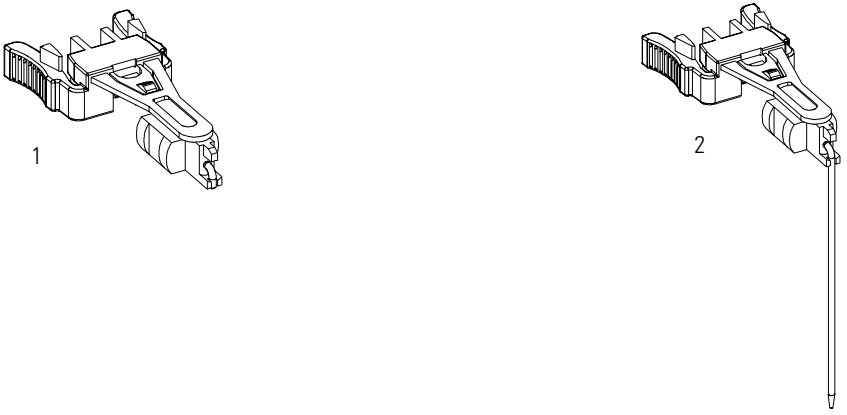


Needle Assemblies

Table 25 **Needle Assemblies**

Item	Description	Part Number
1	Needle assembly **preparative scale (short needle)**	G1364-87201
2	Needle assembly **analytical scale (long needle)**	G1364-87203

Figure 27 **Needle Assemblies**

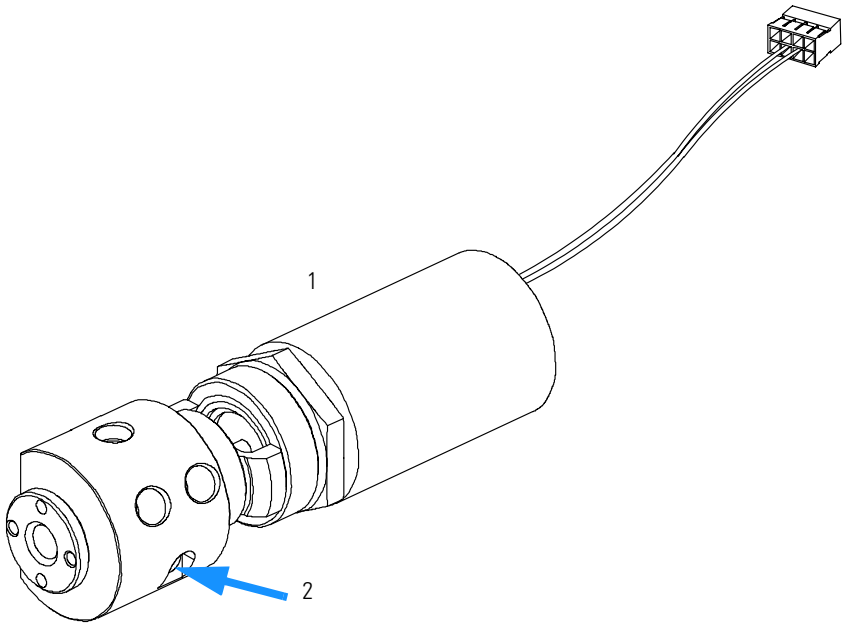


Diverter-Valve Assembly

Table 26 **Diverter-Valve Assembly**

Item	Description	Part Number
1	Diverter-valve assembly	G1364-61901
2	PIN screw	0515-1211

Figure 28 **Diverter-Valve Assembly**

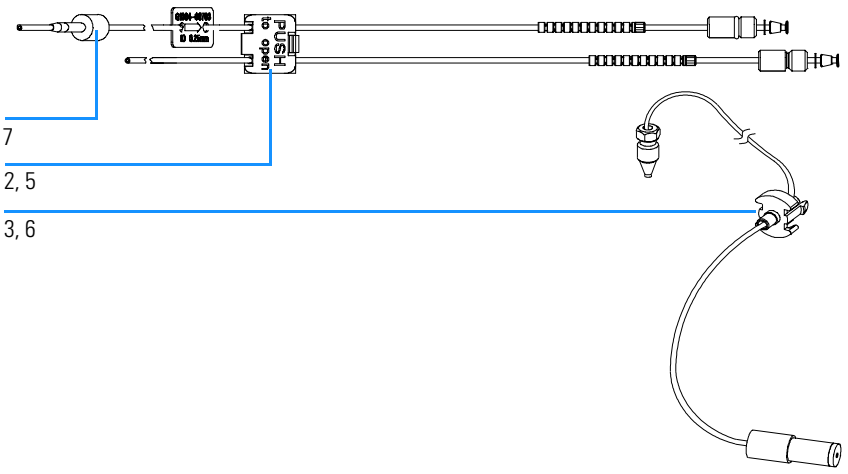


Tubing Kits

Table 27 **Tubing Kits**

Item	Description	Part Number
1	Tubing kit **preparative scale 0.8 mm ID** (consists of items 2,and 3)	G1364-68711
2	Inlet/waste tubing assembly **preparative scale 0.8 mm ID**	Order Item 1
3	Diverter valve to needle tubing **preparative scale 0.8 mm ID**	Order Item 1
4	Tubing kit **analytical scale 0.25 mm ID** (consists of items 5,and 6)	G1364-68712
5	Inlet/waste tubing assembly **analytical scale 0.25 mm ID**	Order Item 4
6	Injection valve to needle tubing **analytical scale 0.25 mm ID**	Order Item 4
7	Finger tight fitting (pack of 2)	0100-1516

Figure 29 **Tubing Kits**

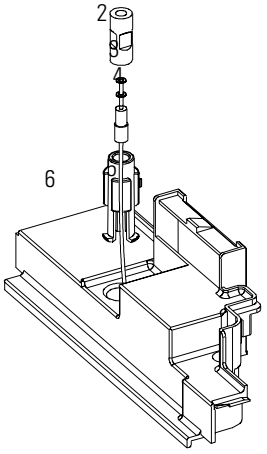


Internal Tray Assembly (Preparative Scale)

Table 28 **Internal Tray Assembly (Preparative Scale)**

Item	Description	Part Number
1	Internal tray assembly, includes items 2 – 7	G1364-63104
2	Union (Upchurch P627-01)	Order Item 1
3	Seal funnel (reorder No., pack. of 10)	G1364-68730
4	Waste Tubing Kit 0.8T	G1364-86709
5	Union coupler	G1364-23202
6	Tray internal	Order Item 1
7	Flow delay sensor (not shown)	Order Item 1

Figure 30 **Internal Tray Assembly (Preparative Scale)**



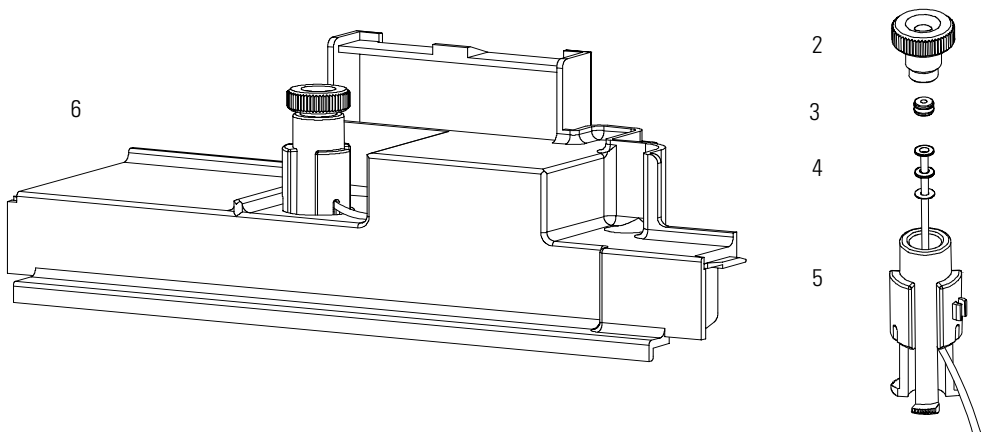
Internal Tray Assembly

(Analytical Scale)

Table 29 **Internal Tray Assembly (Analytical Scale)**

Item	Description	Part Number
1	Internal tray assembly, includes items 2 – 7	G1364-63103
2	Screw-seat-adapter	5022-2200
3	Seal funnel (reorder No., pack. of 10)	G1364-68730
4	Waste Tubing Kit 0.5T	G1364-86708
5	Funnel coupler	G1364-43201
6	Tray internal	Order Item 1
7	Flow delay sensor (not shown)	Order Item 1

Figure 31 **Internal Tray Assembly (Analytical Scale)**



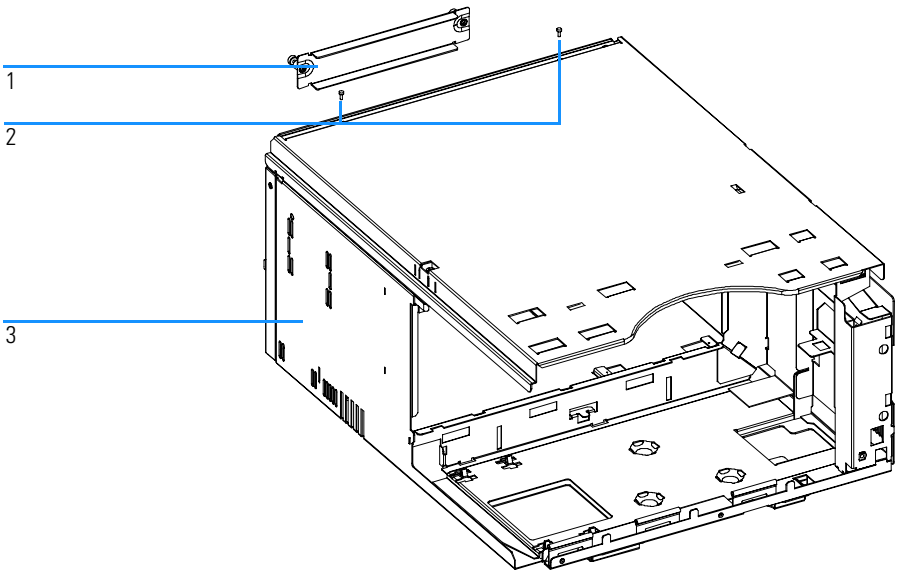
Sheet Metal Kit

Table 30 **Sheet Metal**

Item	Description	Part Number
1	Slot cover	5001-3772
2	Screw cover	5022-2112
3	Fraction Collector sheet metal kit	G1364-68701

NOTE When the bottom metal housing of an instrument has to be replaced (part of the G1364-68701 sheet metal kit, this will also require a pre-installed leak plane and rear tray guide. This kit is only available on demand.

Figure 32 **Sheet Metal Kit**

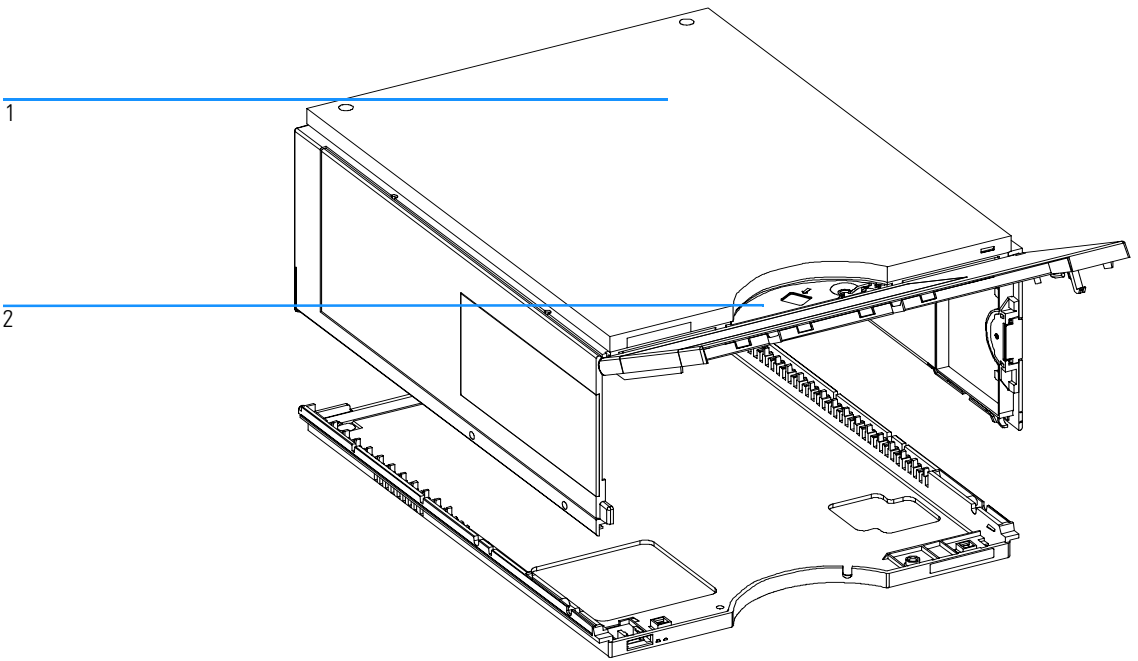


Cover Parts

Table 31 **Covers**

Item	Description	Part Number
1	Cabinet kit, includes base, side panels, top and front cover	5065-8342
2	Bolt carrier, **needed for holding the inlet / waste tubing assembly, DOES NOT come with item 1!!!**	G1364-45100
	Name plate for Agilent 1100 Series	5042-1381
	Light protection kit, includes dark front cover and side window	5064-8272

Figure 33 **Cover Parts**

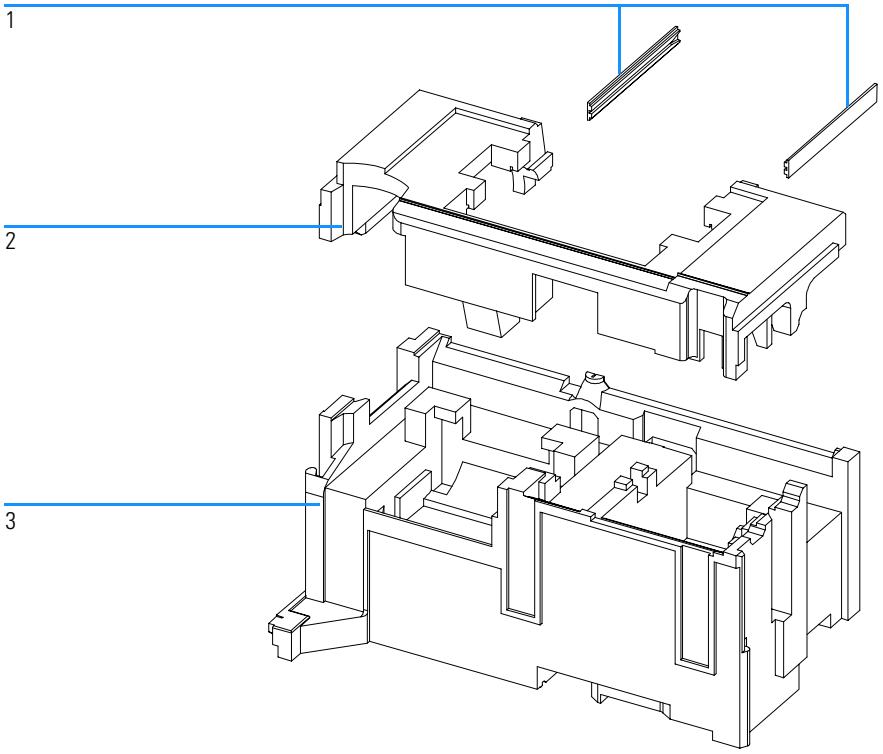


Foam Parts

Table 32 **Foam Parts**

Item	Description	Part Number
	Foam kit, includes items 2 and 3	5064-8248
1	Board guides	5041-8395
2	Top foam	Order foam kit
3	Bottom foam	Order foam kit

Figure 34 **Foam Parts**

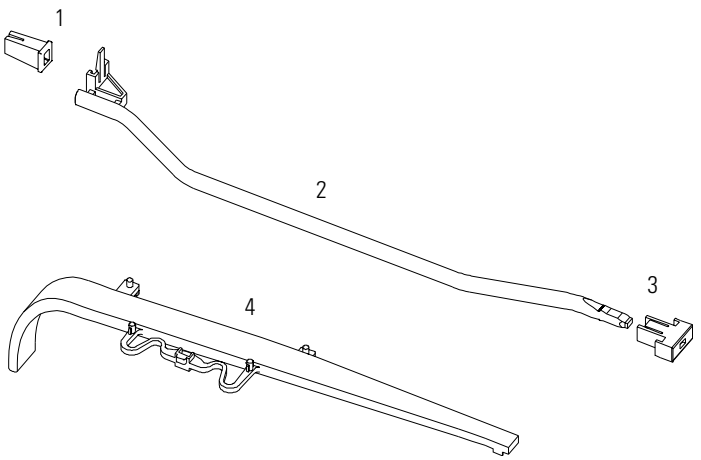


Power and Status Light Pipes

Table 33 **Power and Status Light Pipes**

Item	Description	Part Number
1	Power switch coupler	5041-8383
2	Light pipe — power switch	5041-8382
3	Power switch button	5041-8381
4	Light pipe — status lamp	5041-8384

Figure 35 **Power and Status Light Pipes**



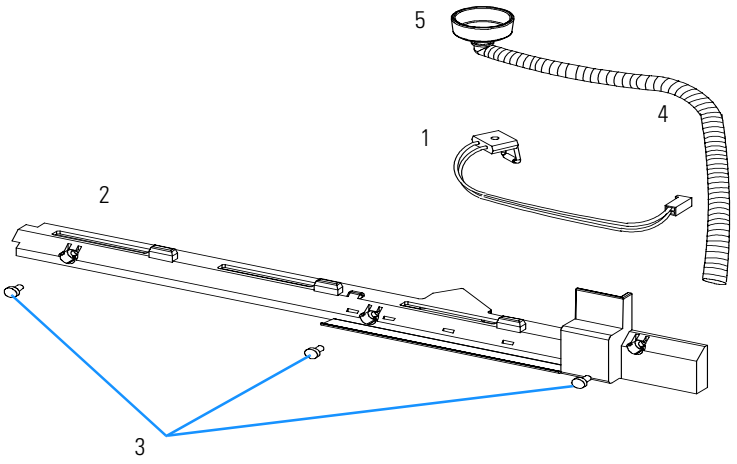
Leak System Parts

Table 34 **Leak System Parts**

Item	Description	Part Number
1	Leak sensor	5061-3356
2	Tray guide front	G1364-63101
3	Screw	0510-0886
4	Leak tubing 120 mm*	5062-2463
5	Leak funnel prep	5041-8388
6	Tray compartment divider (not shown)	G1364-43701

* reorder gives 5 m

Figure 36 **Leak System Parts**



Fraction Collector Accessory Kit G1364-68705

Table 35 **Fraction Collector Accessory Kit Contents G1364-68705**

Description	Quantity	Part Number
Wrench, open end, 4mm	1	8710-1534
Hex key 2.0 mm	1	8710-2438
Wrench, open end, 1/4 – 5/16 inch	1	8710-0510
Finger tight fittings, 1/16" f-120*	3	0100-1516
Waste tubing (1.2 m)**	1	5062-2463
CAN cable, 1 m	1	5181-1519
Air channel adapter	1	G1329-43200
Sticking clamp for corrugated waste tubing (large)	3	no PN
Sticking clamp for waste tubing (small)	2	no PN
Delay Calibrant	4 x 0.5 ml	G1946-85020
ESD wrist strap	1	9300-1408

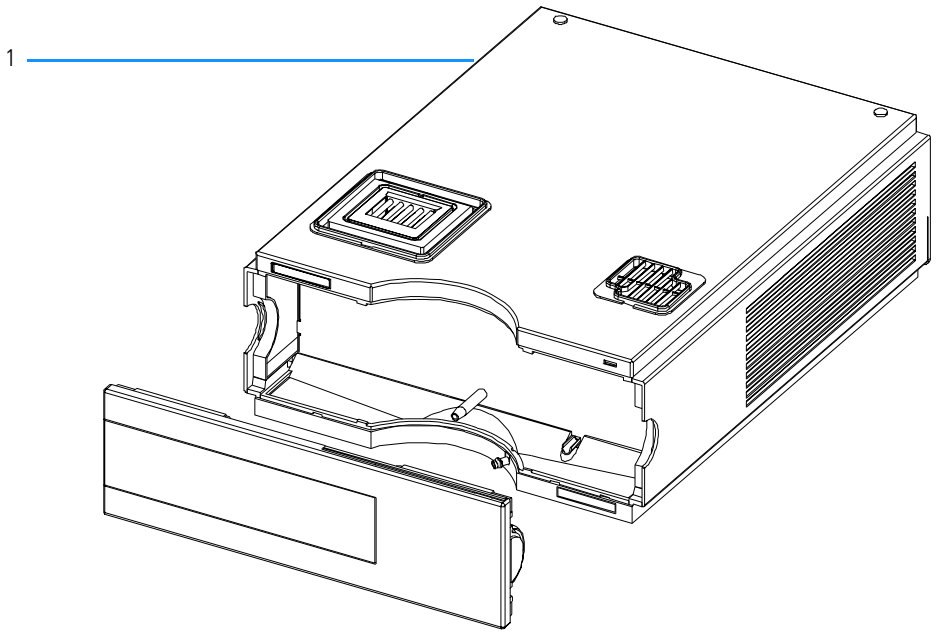
* Reorder gives pack of 2
** Reorder gives 5 m

Fraction Collector Thermostat

Table 36 **Fraction Collector Thermostat**

Item	Description	Part Number
1	FRC thermostat, exchange assembly	G1330-69020

Figure 37 **Fraction Collector Thermostat**



Cable Overview

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

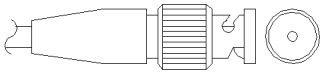
Table 37 **Cables Overview**

Type	Description	Part Number
Analog cables	3390/2/3 integrators	01040-60101
	3394/6 integrators	35900-60750
	Agilent 35900A A/D converter	35900-60750
	General purpose (spade lugs)	01046-60105
Remote cables	3390 integrator	01046-60203
	3392/3 integrators	01046-60206
	3394 integrator	01046-60210
	3396A (Series I) integrator	03394-60600
	3396 Series II / 3395A integrator, see page 166	
	3396 Series III / 3395B integrator	03396-61010
	HP 1050 modules / HP 1046A FLD	5061-3378
	HP 1046A FLD	5061-3378
	Agilent 35900A A/D converter	5061-3378

Table 37 **Cables Overview, continued**

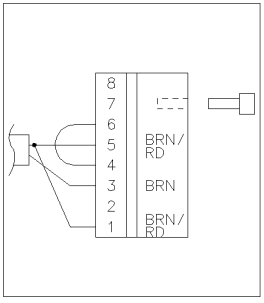
Type	Description	Part Number
	HP 1040 diode-array detector	01046-60202
	HP 1090 liquid chromatographs	01046-60202
	Signal distribution module	01046-60202
BCD cables	3392/3 integrators	18594-60510
	3396 integrator	03396-60560
	General purpose (spade Lugs)	18594-60520
Auxiliary	Agilent 1100 Series vacuum degasser	G1322-61600
CAN cables	Agilent 1100 module to module,0.5m lg Agilent 1100 module to module, 1m lg	5181-1516 5181-1519
	Agilent 1100 module to control module	G1323-81600
External contacts	Agilent 1100 Series interface board to general purpose	G1103-61611
GPIB cable	Agilent 1100 module to ChemStation, 1 m	10833A
	Agilent 1100 module to ChemStation, 2 m	10833B
RS-232 cable	Agilent 1100 module to a computer This kit contains a 9-pin female to 9-pin female Null Modem (printer) cable and one adapter.	34398A
LAN cable	Twisted pair cross over LAN cable, 10 feet long (for point to point connection)	5183-4649
	Category 5 UTP cable, 8 m long (for hub connections)	G1530-61480

Analog Cables

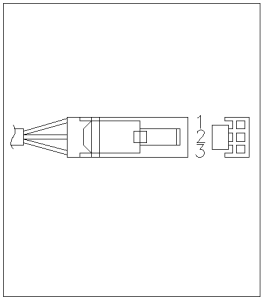


One end of these cables provides a BNC connector to be connected to Agilent 1100 Series modules. The other end depends on the instrument to which connection is being made.

Agilent 1100 to 3390/2/3 Integrators

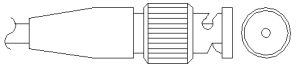
Connector 01040-60101	Pin 3390/2/3	Pin Agilent 1100	Signal Name
	1	Shield	Ground
	2		Not connected
	3	Center	Signal +
	4		Connected to pin 6
	5	Shield	Analog -
	6		Connected to pin 4
	7		Key
	8		Not connected

Agilent 1100 to 3394/6 Integrators

Connector 35900-60750	Pin 3394/6	Pin Agilent 1100	Signal Name
	1		Not connected
	2	Shield	Analog -
	3	Center	Analog +

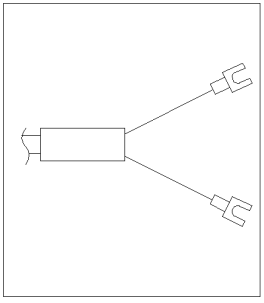
Agilent 1100 to BNC Connector

Connector 8120-1840	Pin BNC	Pin Agilent 1100	Signal Name
	Shield	Shield	Analog -
	Center	Center	Analog +



Agilent 1100 to General Purpose

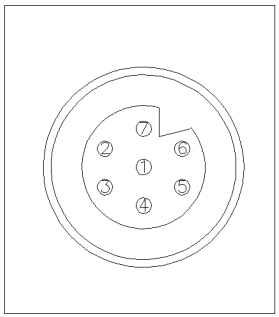
Connector 01046-60105	Pin 3394/6	Pin Agilent 1100	Signal Name
	1		Not connected
	2	Black	Analog -
	3	Red	Analog +



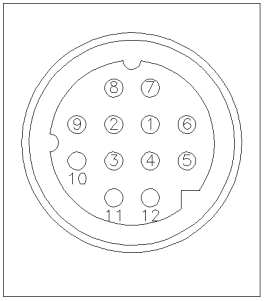
Remote Cables

One end of these cables provides a Agilent Technologies APG (Analytical Products Group) remote connector to be connected to Agilent 1100 Series modules. The other end depends on the instrument to be connected to.

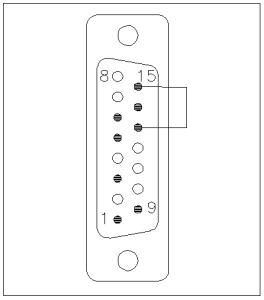
Agilent 1100 to 3390 Integrators

Connector 01046-60203	Pin 3390	Pin Agilent 1100	Signal Name	Active (TTL)
	2	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	7	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	NC	7 - Red	Ready	High
	NC	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low

Agilent 1100 to 3392/3 Integrators

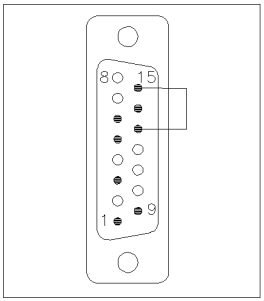
Connector 01046-60206	Pin 3392/3	Pin Agilent 1100	Signal Name	Active (TTL)
	3	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	11	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	9	7 - Red	Ready	High
	1	8 - Green	Stop	Low
4 - Key	NC	9 - Black	Start request	Low

Agilent 1100 to 3394 Integrators

Connector 01046-60210	Pin 3394	Pin Agilent 1100	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
	6	8 - Green	Stop	Low
	1	9 - Black	Start request	Low
	13, 15		Not connected	

NOTE START and STOP are connected via diodes to pin 3 of the 3394 connector.

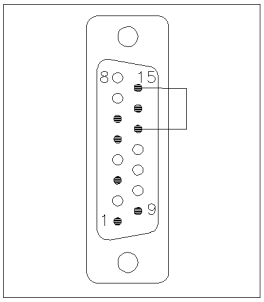
Agilent 1100 to 3396A Integrators

Connector 03394-60600	Pin 3394	Pin Agilent 1100	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	

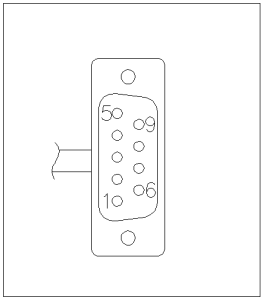
Agilent 1100 to 3396 Series II / 3395A Integrators

Use the cable 03394-60600 and cut pin #5 on the integrator side. Otherwise the integrator prints START; not ready.

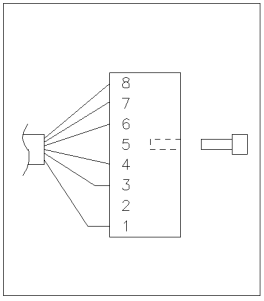
Agilent 1100 to 3396 Series III / 3395B Integrators

Connector 03396-61010	Pin 33XX	Pin Agilent 1100	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	

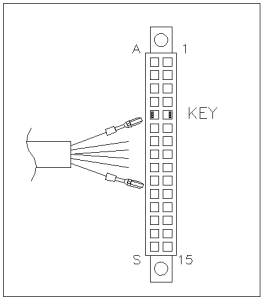
Agilent 1100 to HP 1050, HP 1046A or Agilent 35900 A/D Converters

Connector 5061-3378	Pin HP 1050/....	Pin Agilent 1100	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 1100 to HP 1090 LC, HP 1040 DAD or Signal Distribution Module

Connector 01046-60202	Pin HP 1090	Pin Agilent 1100	Signal Name	Active (TTL)
 5 - Key	1	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	4	3 - Gray	Start	Low
	7	4 - Blue	Shut down	Low
	8	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	3	7 - Red	Ready	High
	6	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low

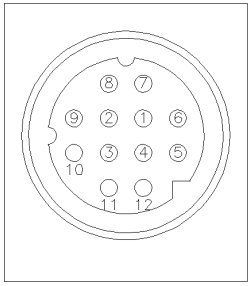
Agilent 1100 to General Purpose

Connector 01046-60201	Pin Universal	Pin Agilent 1100	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

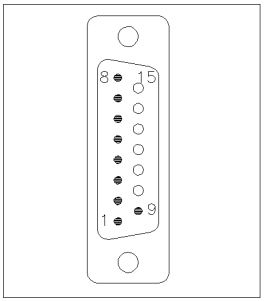
BCD Cables

One end of these cables provides a 15-pin BCD connector to be connected to the Agilent 1100 Series modules. The other end depends on the instrument to be connected to.

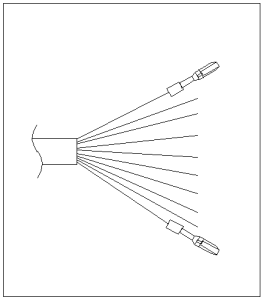
Agilent 1100 to 3392/3 Integrators

Connector 18584-60510	Pin 3392/3	Pin Agilent 1100	Signal Name	BCD Digit
	10	1	BCD 5	20
	11	2	BCD 7	80
	3	3	BCD 6	40
	9	4	BCD 4	10
	7	5	BCD 0\	1
	5	6	BCD 3	8
	12	7	BCD 2	4
	4	8	BCD 1	2
6 - Key	1	9	Digital ground	
	2	15	+ 5 V	Low

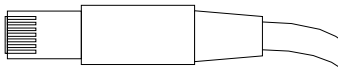
Agilent 1100 to 3396 Integrators

Connector 03396-60560	Pin 3392/3	Pin Agilent 1100	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	BCD 0\	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

Agilent 1100 to General Purpose

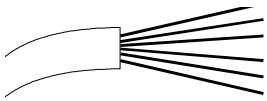
Connector 18594-60520	Wire Color	Pin Agilent 1100	Signal Name	BCD Digit
	Green	1	BCD 5	20
	Violet	2	BCD 7	80
	Blue	3	BCD 6	40
	Yellow	4	BCD 4	10
	Black	5	BCD 0\	1
	Orange	6	BCD 3	8
	Red	7	BCD 2	4
	Brown	8	BCD 1	2
	Gray	9	Digital ground	
	White	15	+5 Vt	Low

Auxiliary Cable

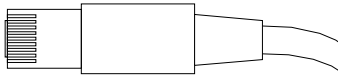


One end of this cable provides a modular plug to be connected to the Agilent 1100 Series vacuum degasser. The other end is for general purpose.

Agilent 1100 Series Degasser to general purposes

Connector G1322-81600	Color	Pin Agilent 1100	Signal Name
	White	1	Ground
	Brown	2	Pressure signal
	Green	3	
	Yellow	4	
	Grey	5	DC + 5 V IN
	Pink	6	Vent

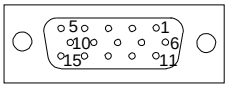
CAN Cable



Both ends of this cable provide a modular plug to be connected to Agilent 1100 Series module's CAN-bus connectors.

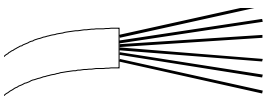
Agilent 1100 module to module, 0.5m lg	5181-1516
Agilent 1100 module to module, 1m lg	5181-1519
Agilent 1100 module to control module	G1323-81600

External Contact Cable



One end of this cable provides a 15-pin plug to be connected to Agilent 1100 Series module's interface board. The other end is for general purpose.

Agilent 1100 Series Interface Board to general purposes

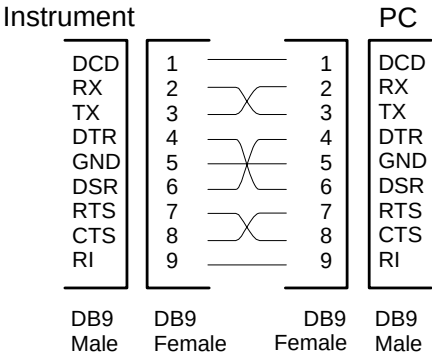
Connector G1103-61611	Color	Pin Agilent 1100	Signal Name
	White	1	EXT 1
	Brown	2	EXT 1
	Green	3	EXT 2
	Yellow	4	EXT 2
	Grey	5	EXT 3
	Pink	6	EXT 3
	Blue	7	EXT 4
	Red	8	EXT 4
	Black	9	Not connected
	Violet	10	Not connected
	Grey/pink	11	Not connected
	Red/blue	12	Not connected
	White/green	13	Not connected
	Brown/green	14	Not connected
	White/yellow	156	Not connected

RS-232 Cable Kit

This kit contains a 9-pin female to 9-pin female Null Modem (printer) cable and one adapter. Use the cable and adapter to connect Agilent Technologies instruments with 9-pin male RS-232 connectors to most PCs or printers.

Agilent 1100 module to PC

RS-232 Cable Kit 34398A



LAN Cables

Recommended Cables

For point to point connection (not using a network hub) use a twisted pair cross over LAN cable (P/N 5183-4649, 10 feet long).

For standard network connections using a hub use category 5 UTP cables, (P/N G1530-61480, 8 m long).

6

Theory of Operation and Introduction to the Fraction Collector

An introduction to the fraction collector and thermostatted fraction collector

Introduction to the Fraction Collector

Four models of Agilent 1100 Series fraction collector are available:

Four models of Agilent 1100 Series fraction collector are available:

- **G1364A** Fraction Collector**, preparative scale,** designed for flow rates up to 100 ml / min. and for the use with vials, deep well plates and test tubes (up to 100 mm height) (short needle, low flow restriction)
- **G1364A Thermostatted** Fraction Collector**, preparative scale,** can be created by additionally ordering and installing a G1330A Fraction Collector Thermostat
- **G1364A #50** Fraction Collector**, analytical scale,** designed for flow rates below 10 ml / min. and for the use with vials, test tubes of up to 48 mm height, well-plates and a 10-funnel tray connecting to external locations of any size (long needle, low internal volume, internal tray for fraction delay sensing and rinsing)
- **G1364A #50 Thermostatted** Fraction Collector**, analytical scale,** can be created by additionally ordering and installing a G1330A Fraction Collector Thermostat

These modules are referred to in this introduction as the (thermostatted) **analytical scale** fraction collector and the (thermostatted) **preparative scale** fraction collector. Unless otherwise stated all information in this section is valid for all models.

The Agilent 1100 Series fraction collectors are designed for the use with other modules of the Agilent 1100 Series LC system. The inter-module communication and the CAN bus of the 1100 series allow a very easy system integration which minimizes the installation effort and the electrical interconnection of the modules. The 1100 UV-Vis detectors (G1315A/B DAD, G1365A/B MWD and G1314A VWD **for analytical scale flow rates**, only) for are fully all the features implemented in the fraction collectors.

The G1946 LC-MS-Detector requires the use of a flow splitter for distributing the flow between detector and LC-MSD.

An additional universal interface box (UIB, PN G1390A) must be used as interface between the detector and the fraction collector for fraction triggering with the G1946 LC-MSD or other 1100 detectors (Non-UV-Vis

detectors e.g. G1362A RID or G1321A FLD) or non-1100 detectors. The UIB therefore supports an analog input and a digital trigger input.

WARNING

The G1321A FLD has a backpressure rating of 20 bar for its flow cell. The G1362A RID has a back pressure rating of only 5 bar for its flow cell. If the G1364A fraction collector is used in combination with the G1362A RID (connected to the outlet of the detector) this must only be done with special care to avoid a potential blockage of the flow path or excessive back pressure downstream of the G1362A RID. Any back pressure higher than 5 bar will damage the flow cell of the G1362A RID, which will then require the replacement of the detector's complete optical unit as a repair.

With the help of a 12-Position, 13-Port Selector valve (PN G1160A), it is possible to operate up to 3 different fraction collectors in parallel in one system.

The purification systems are controlled either from the Agilent 1100 Series control module with Firmware Rev. B.03.01 or higher or from the Agilent ChemStation for LC Rev. A.09.01 or higher and with the ChemStation Purify Add-on-SW for fraction collection.

Table 38 **Software Compatibility Matrix for the Fraction Collector**

Product Number	Product Description	Required Software
G2262AA	Purification/Hi Throughput SW Module	G2170AA (LC 2D ChemStation SW),G2180AA (LC ChemStation Spectral Evaluation Module), G2710AA (LC/MSD ChemStation Software), G2715AA (LC/MSD ChemStation Add-on Module) all Rev. A.09.01
G2263AA	Mass Based Fraction Collection add on SW	G2262AA
G2264AA	Purity Calculation for MS data add on SW	G2262AA
G2265AA	Standalone Purification/Hi Throughput DA SW	G2170AA (LC 2D ChemStation SW),G2180AA (LC ChemStation Spectral Evaluation Module), G2710AA (LC/MSD ChemStation Software), G2715AA (LC/MSD ChemStation Add-on Module) all Rev. A.09.01

Trays

The fraction collector can handle a number of different trays for wellplates, vials and test tubes (see “Compatibility Matrix for Fraction Collectors and Different Types of Trays” on page 38). Fraction volumes can be up to 45 ml internally or with unlimited size external fraction collection bottles through a 10-funnel tray that leads the fractions into external bottles. There are radio frequency tags and light switches to automatically detect the presence and types of the installed trays.

NOTE

The operator has to define the type and height of the plate and also the height of the installed tubes in the ChemStation or the 1100 Series Control Module (G1323B).

Available Options

Fraction Collector, preparative scale

This instrument is designed for flow rates of up to 100 ml / min. and for the use with test tubes (see compatibility matrix in “Compatibility Matrix for Fraction Collectors and Different Types of Trays” on page 38)

- Short needle for maximizing the height and volume of usable tubes
- Designed for the use with open test tubes, vials and deep well plates
- Maximized possible flow rates with low back pressure because of minimum flow restriction due to the use of 0.8 mm ID tubings
- Integrated **fraction delay sensor (FDS)** for determining internal delay volumes in an automated process **available as an additional part (also delivered with every LC/MSD fraction collection kit, PN G1968C)**

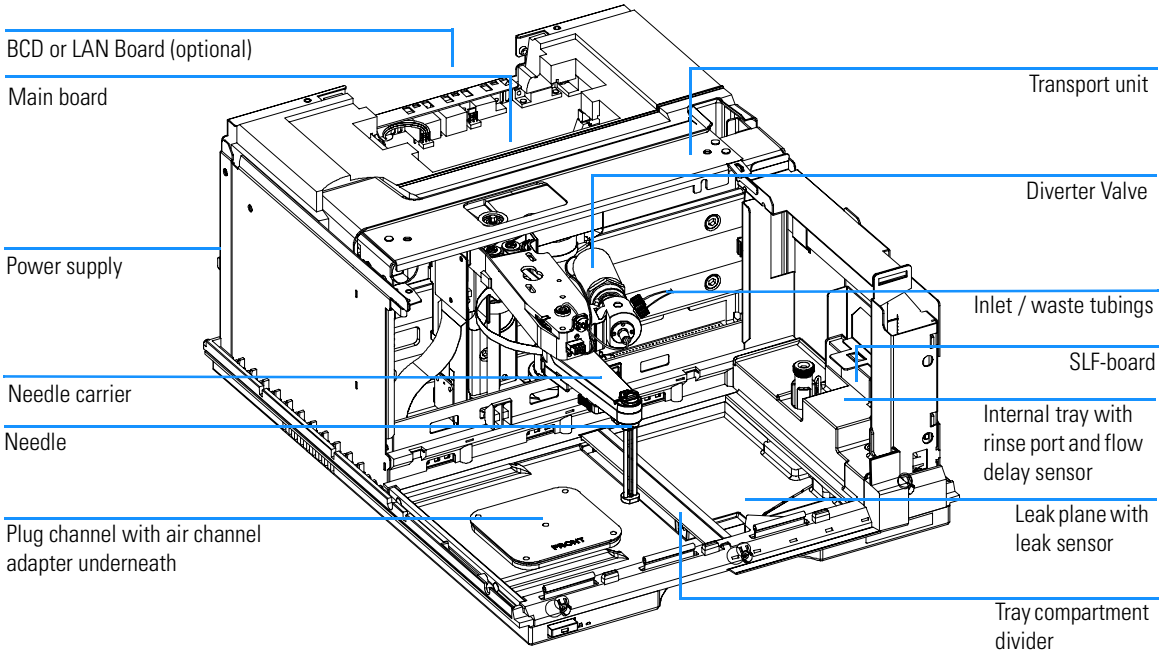
Fraction Collector, analytical scale

This instrument is designed for flow rates below 10 ml / min.

- Long needle with pusher for the use with (capped) vials, plates (with closing mats), small tubes (see compatibility matrix in “Compatibility Matrix for Fraction Collectors and Different Types of Trays” on page 38)
- Offers a tray with 10 funnels for fractionation into 10 external locations of any size
- Minimum delay volume and peak dispersion due to the use of 0.25 mm ID tubings

- Low internal volume between the valve and the needle tip to minimize carry-over
- The **fraction delay sensor (FDS)** for determining internal delay volumes in an automated process **is standard**
- The rinse port is part of the internal tray. It can be used to flush out unwanted remaining sample between the diverter valve and the tip of the needle

Figure 38 **Overview of the Fraction Collector**



The Transport Unit Assembly:

The fraction collector employs a high precision transport mechanism which supports even 384-well plates, but also standard vials and large tubes.

The fraction collector transport mechanism uses an X-Z-theta robot to position the needle on top of the vials, well-plate, tubes and ports and on special positions such as home-, maintenance-, park-, rinse- and flow-delay-sensing-position (see “Special Maintenance Positions for the Transport Unit of the Fraction Collector” on page 36).

Reflective light switches detect the presence and type of different trays. The X-slide carries the antenna and electronic interface to the RF-transponders. This has multiple functions:

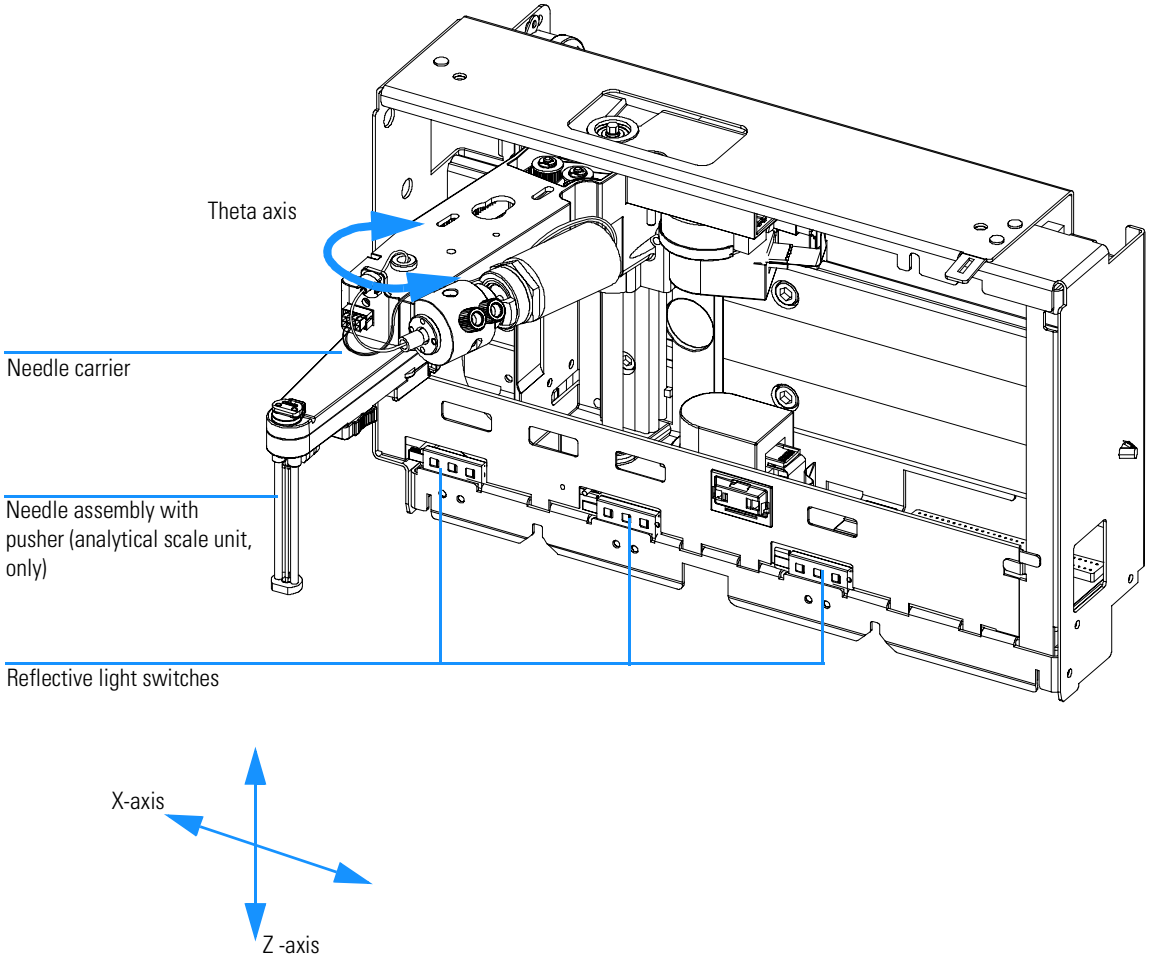
- It allows to read and write information from a tag, located in the tray.
- It allows to increase the number of different trays.
- It allows to read the revision of the transport unit assembly.

The needle, diverter valve and the connecting capillaries are user-exchangeable.

The back of the needle/sample transport assembly has a cover to protect the electronics from potential solvent vapor.

Once the needle is positioned over the programmed fraction position, the programmed peak volume is ejected into the specified vial, well-plate, tube or port. The active movable axes of the transport unit are the X-axis, the Z-axis and the theta-axis, the vial- / plate pusher (analytical scale, only) is an additional passive axis. The analytical scale fraction collector employs a vial/plate pusher mechanism to hold down the vial or the plate while the needle is drawn back from the fraction position (a must in the case a septum or closing mat is used). All axes are stepper motor driven and encoder controlled in order to have tight feedback for the axes position. The theta and Z axes have spring loaded belt-tensioner.

Figure 39 **Transport Unit Assembly**



Needles

The **preparative scale needle** is a very short needle with low internal volume (~5 µl), high flow rates (up to 100 ml / min, depending on the generated back pressure, maximum of 6 bar allowed at the diverter valve) and the use with maximum height of test tubes (up to 100 mm). It is intended for the use with uncapped vials, test tubes and deep well plates without closing mats, only.

The **analytical scale needle** is a long needle with low internal volume (4 µl), flow rates up to 10 ml / min (depending on the generated back pressure, maximum of 6 bar allowed at the diverter valve) and the use with test tubes of a maximum height of (48 mm). It is also intended for the use with capped vials and test tubes and well plates with closing mats. It employs a pusher for detecting the presence of installed vial, test tubes and wellplates and for pushing the needle trough caps of vials or test tubes closing mats of wellplates.

The Diverter Valve:

The valve is optimized to a minimum internal delay volume for reducing carry-over. The diverter valve switches between location that the needle is positioned above and the waste path.

There are two different operating modes of the diverter valve, depending on the type of trays fraction collection containers that are used:

1. The discrete fractions mode: the diverter valve switches to waste, while the needle is moved (default mode of operation).
2. The continuous flow mode: the needle is moved from one fraction collection position to the next one without switching off the valve (optional, this is possible only with wellplates)

NOTE This mode allows to operate the instrument without any loss of sample!

The valve was designed to show maximum lifetime, robustness and highest possible operating security. It consists of a solenoid on a ball head with a double seat.

A passage in the valve body guarantees, that the flow path is never blocked during the switching cycle of the valve. This avoids pressure pulses and potential damage to columns or detector flow cells.

Table 39 **Fraction Collection-Valve Technical Data**

Description	PN G1364-61901
Internal volume	15 µl
Maximum operating pressure	6 bar
Pressure overload (short time)	100 bar
Materials in contact with mobile phase	Ceramic / PTFE / SST
Number of ports	2 (from detector and to waste)
Switching time	< 100 ms

The Internal Tray with Rinse Port and Fraction Delay Sensor:

The internal tray contains the rinse port and the fraction delay sensor (FDS).

Description of the rinse mode:

The rinse port is part of the internal tray. It can be used to flush out unwanted remaining sample between the diverter valve and the tip of the needle.

Description of the flow delay sensor (FDS):

The FDS is a single wavelength absorbance detector that works at 654 nm, it consists of a LED and a photo diode. It is used to determine the fraction delay time of the system.

The measurement of the system delay has to be done in the maintenance mode. Agilent provides different measurement methods.

The FDS signal can be monitored and compared with the detector signal on the ChemStation and the local user interface. The operator can use the information also to see the peak dispersion and for optimization steps.

Exhaust Fan:

The exhaust fan is used to suck out the evaporating gases of the fraction vessels. The speed of the fan is controlled by the processor on the MTP (main) board. This parameter is also used for diagnostics.

Main Fan:

This Fan is used for cooling the fraction collector - main board and the power supply. The speed of the fan is controlled by the processor on the MTP (main) board. This parameter is also used for diagnostics.

Leak Plane and Leak Sensor:

Below of the fraction area is a leak plane with a leak sensor. If a leak is detected the system will automatically be switched off.

The leak converter consists of a PTC (for leak sensing) and an NTC (for ambient-temperature compensation). This configuration ensures ambient temperature changes do not affect the leak-sensing circuit. Solvent leaking from the fraction collector cools down the PTC. This changes the resistance of the PTC causing the leak converter to generate a leak signal.

WARNING

The automatic shut-down of a pump works for all 1100-Series pumps that are integrated into one system via the inter-module communication path (CAN). For all other pumps in the system there must be a remote connection from the fraction collector to the foreign pump in order to allow an automatic shut-down of the flow. This is necessary to avoid major spills that can potentially lead to a contamination of the laboratory, electric shock or fires / explosions.

Microtiter Plate Board (MTP) or Fraction Collector Main Board

The main board is the control board of the complete module. It contains the processing system, the real time clock, the communication interfaces and the control circuits and drivers for the sample transport mechanism, the diverter valve, leak sensor, etc.

A common electronics and firmware design is used for all Agilent 1100 series LC modules. This core design provides a basic set of functions for each module.

Table 40 **Common Electronics**

Core-processor	MC68332
Core-memory	The core unit has 3 memory blocks: 2 MB SRAM 1 MB memory 128 KB NVRAM
Real time clock	
Communication Interfaces	The core unit supports direct the following interfaces: CAN bus RS232 Remote MIO (LAN)

On board Battery:

An on board lithium battery supplies the real time clock and buffers the electronic memories, when the module is turned off. For safety information on lithium batteries see “Lithium Batteries Information” on page 252.

The Safety Lock Fraction Collector Board (SLF-board)

The SLF board contains the door lock mechanism and the connectors to the flow delay sensor and the leak sensor. The front door is controlled by the

processing system of the main board (MTP). The door can be opened with the switch on the right front edge of the instrument. The electronic control of the door was implemented for safety reasons:

- The system locks the front door during a run and a sequence. The door can be opened during a sequence, if the fraction collector is in a not ready condition and between to runs. An open door causes a not ready condition of the fraction collector and interrupts the sequence.
- In case of an error condition or power off, the door opens automatically.

NOTE Any movement of the transport mechanism will be immediately stopped, if the door is opened.

After power cycling the module it takes 120 seconds before the instrument starts its initialization cycle. This is to assure the any dangerous vapors will be exhausted out of the instrument by the exhaust fan before the instrument starts to operate.

The G1330A Thermostat Module:

The G1330A Thermostat Module is available for both, the preparative and the analytical scale version of the fraction collector. The fraction collector has an interface for the G1330A thermostat module. The cooling performance depends on the used tray / well plates, vials or tubes and the fraction volume/min that is collected with the fraction collector.

NOTE The thermostatted preparative scale fraction collector's cooling performance may suffer at high flow rates with large volumes of collected fractions. The preparative scale fraction collector is not recommended for the use with the G1330A thermostat at high flow rates with large fraction volumes.

A tray compartment divider can be inserted into the leak plane to optimize the cooling performance. This is required, if the right side of the fraction area is un-used, for example when the 2-plate tray is installed. The installation of the plug channel and the air channel adapter generates an air tight connecting channel between thermostat module and the fraction collector and thus avoids any loss of thermostatted air between the modules.

The thermostat unit contains Peltier-controlled heat-exchangers. A fan draws air from the area above the fraction tray of the fraction collector. The air is then circulated through the fins of the cooling/heating module, where it is cooled or heated depending on the temperature setting. The thermostatted

air re-enters the fraction collector through a recess underneath the fraction tray. The air is then distributed evenly through the fraction tray ensuring effective temperature control. In the cooling mode condensation is generated on the cool side of the Peltier elements. This condensed water must be safely guided away into a waste bottle for condensed water below the instrument.

The Main Power Supply Assembly

The main power supply comprises a closed assembly (no on site repair possibility).

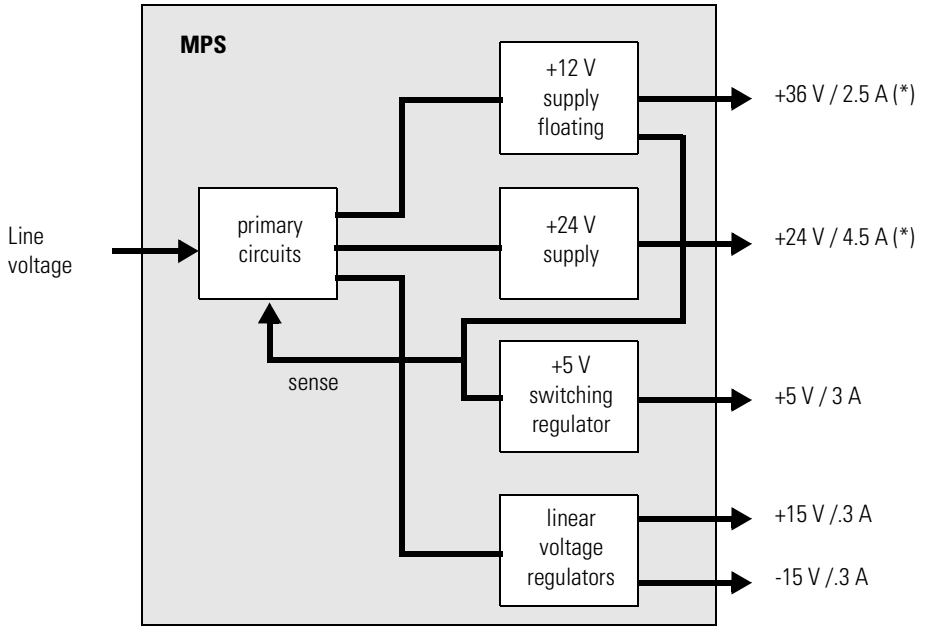
The power supply provides all DC voltages used in the module except for the voltages supplied by the lamp power supply to the deuterium and tungsten lamps in the detectors. The line voltage can vary in a range from 100 240 volts AC ± 10 % and needs no manual setting.

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

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

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

Figure 40 **Main Power Supply (MPS) Diagram**



(*) total power consumption on +36 V and +24 V must not exceed 107 watts.

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

Table 41 **Main Power Supply Specifications**

Maximum power	200 VA / 180 W	Continuous output
Line Input	100 – 240 volts AC ± 10 %, line frequency of 50/60 Hz	Wide ranging
Output 1	+ 24 V / 4.5 A (maximum)	total power consumption of + 24 V and + 36 V must not exceed 107 W.
Output 2	+ 36 V / 2.5 A (maximum)	
Output 3	+ 5 V / 3 A	
Output 4	+ 15 V / 0.3 A	
Output 5	- 15 V / 0.3 A	

Firmware Description

The firmware of the instrument consists of two independent sections:

- a non-instrument specific section, called ‘resident system’,
- an instrument specific section, called ‘main system’.

Resident System

This resident section of the firmware is identical for all Agilent 1100 series modules. Its properties are:

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

Main System

Its properties are:

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

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

- run synchronization via APG remote
- error handling,
- diagnostic functions and so on,

or module specific functions like

- internal events such as valve switches.

Firmware Updates

Firmware updates can be done using your user interface:

- handheld control module with files from a PC-card or
- Agilent ChemStation with files from floppy disk

The file naming conventions are:

xxxx-vvv.DLB, where

xxxx is the product number, e.g. 1364A for the fraction collector), and vvv is the revision number, for example 380 is revision 3.80

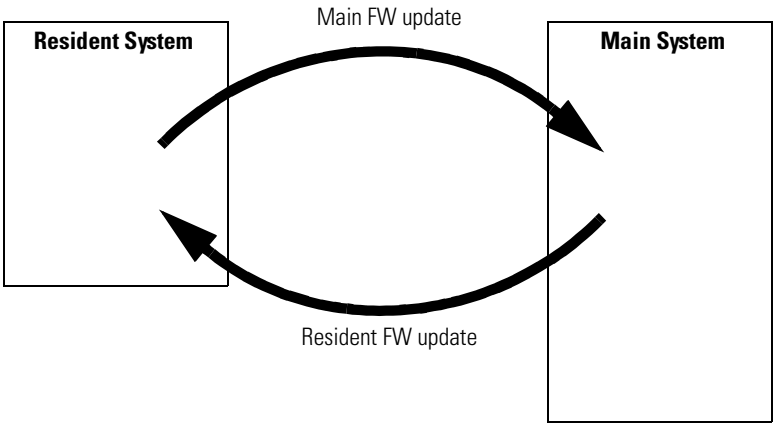
For instructions refer to your user interface.

NOTE

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

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

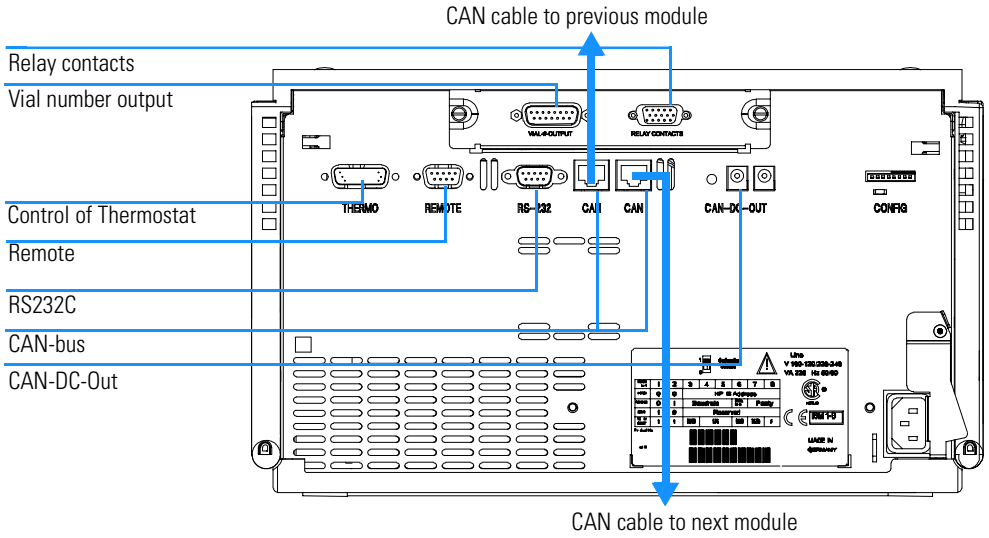
Figure 41 **Firmware Update Mechanism**



Electrical Connections

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

Figure 42 **Fraction Collector Electrical Connections**



- The interface board slot is used for external contacts, BCD output, LAN card and for future use.
- The LAN connector is used to connect the fraction collector with a computer.
- The Thermostat connection (only for the thermostatted fraction collector) is used for control signal transfer and synchronization of the two modules. The cable must be installed for operation of the thermostat.

WARNING **DO NOT disconnect or reconnect the fraction collector to thermostat cable when the power cords are connected to either of the two modules. This will damage the electronics of the modules.**

- The REMOTE connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features such as common shut down, prepare, and so on.
- The RS-232 connector may be used to control the fraction collector from a computer through an RS-232 connection, using appropriate software. This connector needs to be activated by the configuration switch on the right rear of the module. The software needs the appropriate drivers to support this communication. See your software documentation for further information.
- The CAN bus is a serial bus with high-speed data transfer. The two connectors for the CAN bus are used for internal Agilent 1100 Series module data transfer and synchronization.
- The CAN-DC-OUT provides 24 Volts DC power for external devices like a switch valve. Maximum permanent power consumption is 1A permanent current for both connectors altogether.
- The address and control switch module next to the CAN-DC-OUT connector determines the RS-232 settings of your fraction collector or enables the “Cold Start” or “Stay Resident” modes. The switches are preset to a default address (see Table 45 on page 198 and Table 49 on page 203) and is recognized once after power on.
- The power input socket accepts a line voltage of 100–240 volts AC ± 10 % with a line frequency of 50 or 60 Hz. Maximum power consumption is 200 Watts (or 300 VA apparent power). There is no voltage selector on your fraction collector because the power supply has wide-ranging capability. There are no externally accessible fuses, because automatic electronic fuses are implemented in the power supply. The security lever at the power input socket prevents that the fraction collector cover is taken off when line power is still connected.

Optional Interface Boards

The Agilent 1100 Series modules have one optional board slot that allows addition of an interface board to the modules.

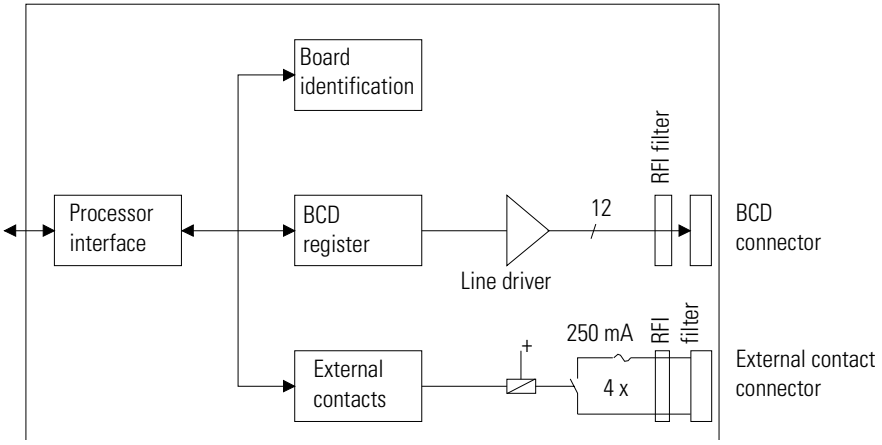
Table 42 **Optional Interface Boards**

Description	Part Number
BCD Board	G1351-68701
Fuse 250 mA (four are on the board)	2110-0004
LAN Board (see next page for details)	

BCD Board

The BCD board provides a BCD output for the bottle number of the Agilent 1100 Series fraction collector and four external contacts. The external contact closure contacts are relay contacts. The maximum settings are: 30 V (AC/DC); 250 mA (fused). There are general purpose cables available to connect the BCD output, see “BCD Cables” on page 169 and the external outputs, see “External Contact Cable” on page 172 to external devices.

Figure 43 **Block Diagram BCD Board**



LAN Board

The HP JetDirect cards are network interface cards used in HP printers.

NOTE One board is required per Agilent 1100 stack. It is recommended to add the LAN board to the detector with highest data rate.

NOTE The LAN board can only be used together with:

a main board version G13XX-66520 (DAD/MWD/VWD/Pump/ALS) or G13XX-66500 (FLD/RID) and above.

an Agilent-ChemStation software revision A.06.01 or above.

The following cards can be used with the Agilent 1100 modules.

Table 43 **LAN Boards**

Agilent Order Number	Supported networks
J4106A	Ethernet/802.3, RJ-45 (10Base-T(
J4105A	Token Ring/802.5, DB9, RJ-45 (10Base-T)
J4100A	Fast Ethernet, Ethernet/802.3, RJ-45 (10/100Base-TX) + BNC (10Base2)

NOTE Minimum firmware of the JetDirect cards is A.05.05.

Recommended Cables

For point to point connection (not using a network hub) use a twisted pair cross over LAN cable (P/N 5183-4649, 10 feet long).

For standard network connections using a hub use category 5 UTP cables, (P/N G1530-61480, 8 m long).

Interfaces

The Agilent 1100 Series modules provide the following interfaces:

Table 44 Agilent 1100 Series Interfaces

Interface Type	Pumps	Autosampler	Well-plate Sampler, Fraction Collector	DA Detector MW Detector FL Detector	VW Detector RI Detector	Thermostatted Column Compartment	Vacuum Degasser
CAN	Yes	Yes	Yes	Yes	Yes	Yes	No
GPIB	Yes/No*	Yes	No**	Yes	Yes	Yes	No
RS-232C	Yes	Yes	Yes	Yes	Yes	Yes	No
Remote	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Analog	Yes	No	No	2 ×	1 ×	No	Yes***
Interface board	Yes	Yes	Yes	Yes	Yes	No	No
CAN-DC-OUT	Yes/No****	No	Yes	No	No	No	No

* The preparative pump can be controlled through CAN via a detector that is connected via GPIB to a ChemStation.
** The well-plate sampler and the fraction collector can be controlled through CAN via a detector that is connected via GPIB to a ChemStation.
*** The vacuum degasser will have a special connector for specific use. For details see description of main board.
**** The preparative pump supplies a CAN-DC-OUT connector.

- CAN connectors as interface to other Agilent 1100 Series modules,
- GPIB connector as interface to the Agilent ChemStation,
- RS-232C as interface to a computer,
- REMOTE connector as interface to other Agilent products,
- Analog Output connector(s) for signal output, and
- Interface slot for specific interfacing (external contacts, BCD, LAN and so on).

For identification and location of the connectors see Figure 7 on page 16.

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

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.

GPIB Interface

NOTE A chemstation cannot be connected directly to the fraction collector by GPIB, because the fraction collector has no GPIB port.

The GPIB connector is used to connect the module with a computer. The address and control switches next to the GPIB connector determine the GPIB address of your module. The switches are preset to a default address and recognized by the operating software from Agilent Technologies.

Table 45 **Default Addresses**

Autosampler	28	RID	29
Pump	22		
FLD	23		
VWD	24	Autosampler (HP 1050)	18
Agilent 8453A	25	Pump (HP 1050)	16
DAD / MWD	26	VWD (HP 1050)	10
Column Compartment	27	DAD (HP 1050)	17

CAN Interface

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

Remote Interface

The APG remote connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features such 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 level is defined as:

- standard TTL levels (0 V is logic true, + 5 V is false),
- fan-out is 10,
- input load is 2.2 kOhm against + 5 V, and
- outputs are open collector type, inputs/outputs (wired-or technique).

CAN-DC-OUT

The CAN-DC-OUT provides the supply voltage for the 1100 series valves and other 1100 series accessory. The voltage range is from 22 - 24 Volts. The output voltage can be switch on or off, depending on the instrument status. Maximum permanent power consumption is 1A permanent current for both connectors altogether.

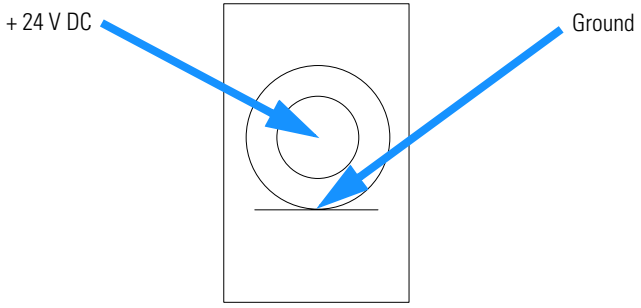
CAUTION

The CAN-DC-OUT is only intended for the use with Agilent Technologies devices or devices that are approved by Agilent Technologies.

Table 46 **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.
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.

Figure 44 **CAN-DC-OUT**



RS-232C

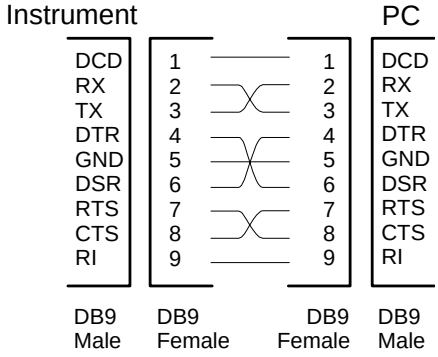
The RS-232C connector is used to control the instrument from a computer through RS-232C connection, using the appropriate software. This connector can be activated by the configuration switch module next to the GPIB connector.

The RS-232C is designed as DCE (Data Communication Equipment) with a 9-pin male SUB-D type connector. The pins are defined as follows:

Table 47 **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

RS-232 Cable



Setting the 8-bit Configuration Switch

The 8-bit configuration switch is located next to the GPIB connector. Switch settings provide configuration parameters for GPIB address, serial communication protocol and instrument specific initialization procedures.

Figure 45 **8-bit Configuration Switch**

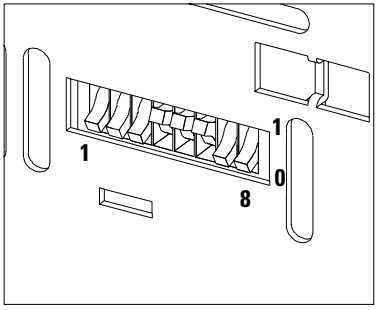


Table 48 **8-bit Configuration Switch**

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

Switches 1 and 2 define which set of parameters (for example, for GPIB, RS-232C, and so on) will be changed. Once the change has been completed, the instrument must be powered up again in order to store the values in the non-volatile memory.

In the non-volatile memory the parameters are kept, regardless of whether you turn the instrument off and on again. They will be kept until the same set of parameters is subsequently changed and power is reset. All other previously stored configuration settings will still remain in the non-volatile memory.

In this way you can store more than one set of parameters using the same 8-bit configuration switch twice, for example, for both GPIB and RS-232C.

GPIB Default Addresses

If you just want to change the GPIB address and need a detailed procedure, refer to the *Installing Your Agilent ChemStation System* handbook.

Default GPIB address is set to the following addresses:

Table 49 **Default Addresses for Agilent Series 1100 Modules**

Module	Address	Binary Address
Pump	22	0 0 0 1 0 1 1 0
FLD	23	0 0 0 1 0 1 1 1
VWD	24	0 0 0 1 1 0 0 0
Agilent 8453A	25	0 0 0 1 1 1 0 1
DAD / MWD	26	0 0 0 1 1 0 1 0
Column compartment	27	0 0 0 1 1 0 1 1
Autosampler	28	0 0 0 1 1 1 0 0
Well-plate sampler and Fraction Collector	no address	000000000000
RID	29	0 0 0 1 1 1 0 1

where 0 means that the switch is down and 1 means that the switch is up.

Communication Settings for RS-232C Communication

The communication protocol used in this instrument supports only hardware handshake (CTS/RTS).

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 instrument must be powered up again in order to store the values in the non-volatile memory.

Table 50 **Communication Settings for RS-232C Communication**

Mode Select	1	2	3	4	5	6	7	8
RS-232C	0	1	Baud rate			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 51 **Baud Rate Settings**

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 52 **Data Bit Settings**

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

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.

Table 53 **Parity Settings**

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

Forced Cold Start Settings

Switches 1 and 2 do not force storage of this set of parameters in non-volatile memory. Returning switches 1 and 2 to other positions (other than being both up) will allow for normal operation.

CAUTION

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

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

Table 54 **Forced Cold Start Settings**

Mode Select	1	2	3	4	5	6	7	8
TEST/BOOT	1	1	0	0	0	0	0	1

To return to normal operation, set switches back to your GPIB or RS 232 configuration settings.

Stay-Resident Settings

Firmware update procedures may require this mode in case of firmware loading errors.

Switches 1 and 2 do not force storage of this set of parameters in non-volatile memory. Returning switches 1 and 2 to other positions (other than being both up) will allow for normal operation.

If you use the following switch settings and power the instrument up again, the instrument firmware stays in the resident part, that is, it is not operable as a fraction collector. It only uses basic functions of the operating system for example, for communication.

Table 55 **Stay Resident Settings**

Mode Select	1	2	3	4	5	6	7	8
TEST/BOOT	1	1	0	0	1	0	0	0

To return to normal operation, set switches back to your GPIB or RS-232C configuration settings.

Early Maintenance Feedback (EMF)

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

EMF Counters

The fraction collector provides one EMF counter. The counter increments with fraction collector use, and it can be assigned a maximum limit which provides visual feedback in the user interface when the limit is exceeded. The counter can be reset to zero after maintenance has been done. The fraction collector provides the following EMF counter:

Fraction Collection Needle into Seat

This counter counts the number of times the needle has been pushed into a funnel or the rinse port, since the last reset of the counter. This is an indicator for the wear of the needle tip and the seals in the funnels or the flush port.

Using the EMF Counters

The user-setable EMF limits for the EMF counters enable the early maintenance feedback to be adapted to specific user requirements. The wear of fraction collector components is dependent on the analytical conditions, therefore, the definition of the maximum limits need to be determined based on the specific operating conditions of the instrument.

Setting the EMF Limits

The setting of the EMF limits must be optimized over one or two maintenance cycles. Initially, no EMF limit should be set. When instrument performance indicates maintenance is necessary, make note of the values displayed by the fraction collection needle into seat counter. Enter these

values (or values slightly less than the displayed values) as EMF limits, and then reset the EMF counters to zero. The next time the EMF counters exceed the new EMF limits, the EMF flag will be displayed, providing a reminder that maintenance needs to be scheduled.

7

Control Module Screens of the Fraction Collector

Introduction to the screens available for operation of the Agilent 1100 Series fraction collector with the control module

7

This chapter is intended to introduce an operator to the functionality available for operation of the Agilent 1100 Series fraction collectors (G1364A **preparative scale** and G1364A #050 **analytical scale**) with the Agilent 1100 Series control module.

Please use the manual of Control module for further detailed reference.

Major keys on the Agilent 1100 Control Module

ESC	Return to previous screen, abort any change of parameters and toggle between the last two top layer views
m	Open context sensitive menus
i	Information/Help
Enter	Store changed parameters or execute a choice
Done	(If available) Activate settings of current screen
On/Off	Switch on individual Instrument(s) or complete System
Start	Start a location range or sequence
Plot	View online signals
Views	Change between analysis - (samples)- status - system views

NOTE

The screens shown on the next pages are based on:
Control Module firmware revision B.03.0x (G1323B)
HPLC Module firmware revision A.04.4x

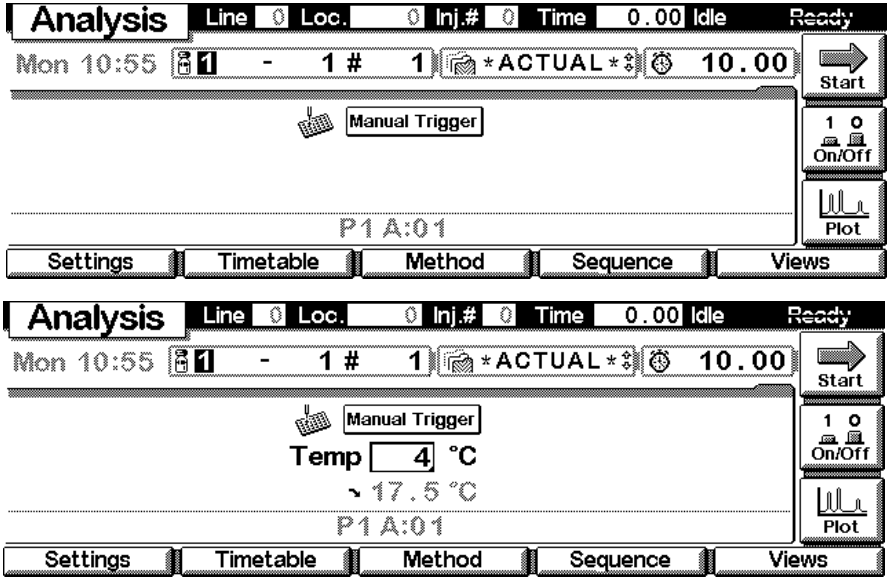
NOTE

In case the control module's display seems to be frozen (hang-up due to a communication problem on the CAN bus), unplug the control module from the HPLC module and reconnect.

Screens available from the Analysis view

Analysis view

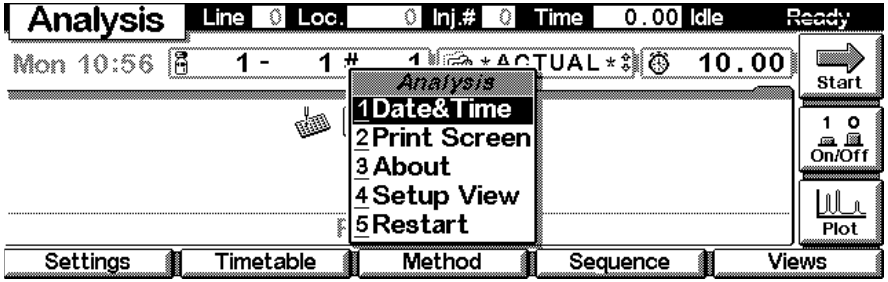
This is the wake-up screen, if the Agilent 1100 Series fraction collector or thermostatted fraction collector is the only configured Agilent 1100 module.



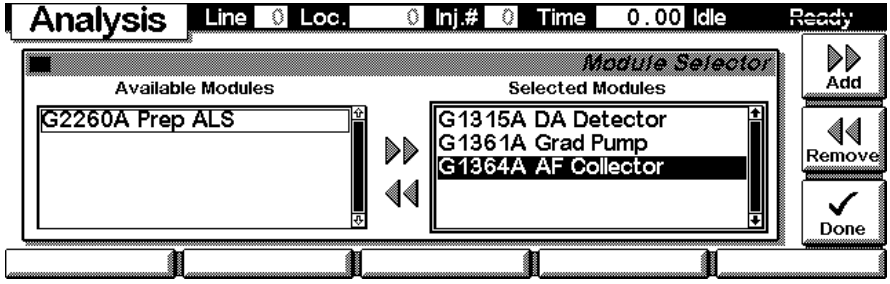
On/Off (F7) allows you to turn on the Thermostat Module of the thermostatted versions of the fraction collector.

The **m**-key allows access to the context sensitive menus. **Date&Time** allows you to change time settings. **Print Screen** gives access to the print screen. **About** tells you the current firmware revision and the serial# of your control module. **Setup view** leads you to analysis view configuration for additional Agilent 1100 modules. **Restart** re-boots the control module. If multiple instruments are configured in the Analysis screen the context menu contents

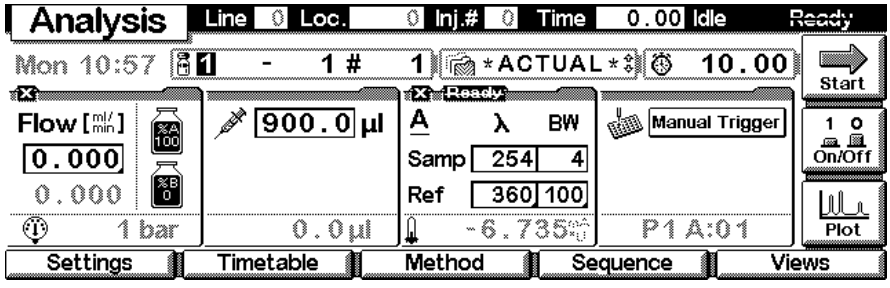
will vary, depending on the cursor position, when the m-key is pressed (depending on highlighted module).



In the Setup view, modules can be added or removed to the analysis view. Select a module, you want to move, with the help of the **selection**-keys. Use function keys **F7/F8** (**Remove/Add**) to move the highlighted module. Changes must be activated with **Done** (**F6**).

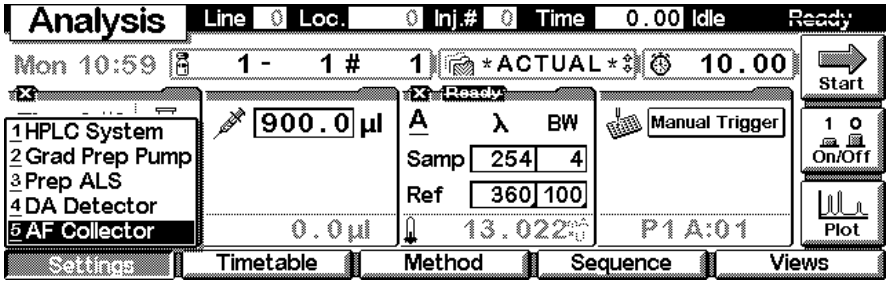


Here, e.g. the binary pump, the injector and the detector parameters are shown on the display as well. The number of parameters for each module is reduced as additional modules are added to the display. A maximum of 4 modules can be shown simultaneously. If more modules are connected to the system, you have to choose 4 of them in **Setup view**.

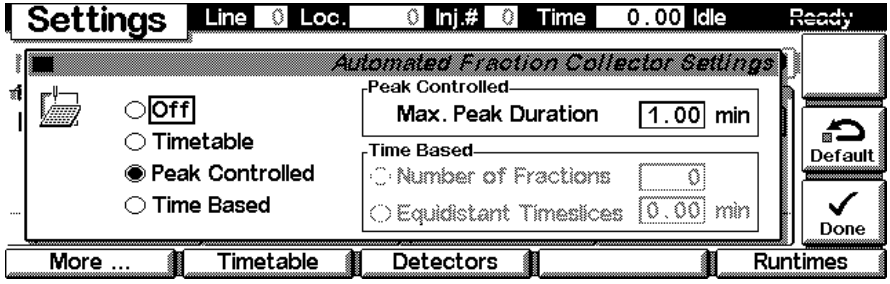


Settings

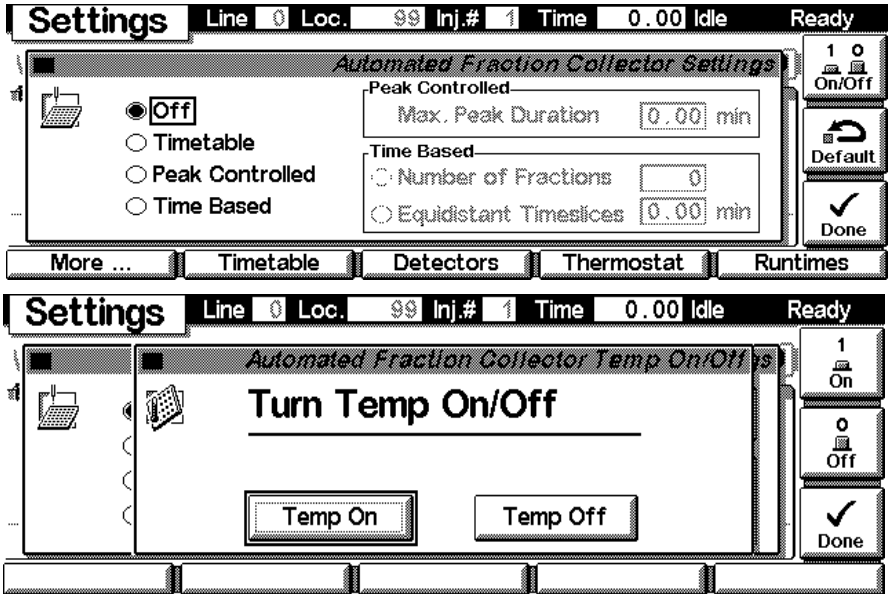
With the **F1**-key (**Settings)** you open a pull-down menu where you can select the fraction collector module.



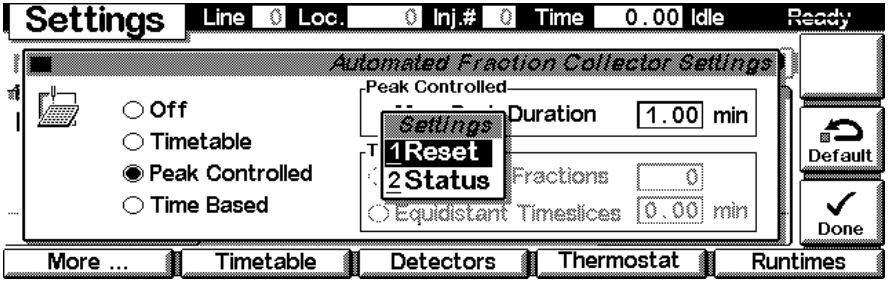
Within **Settings** you can change the fraction collector parameters like the the type of fraction collection (**Off, Timetable, Peak Controlled or Time based**). There are different sets of parameters available through the **F1-5** navigation-keys for setting path operation of the fraction collector. **F7** (**Default**) resets the fraction collector to default values. Changes must be acknowledged with **F6** (**Done**).



Settings screen with thermostat connected. **On/Off (F8)** allows you to switch the thermostat on or off.

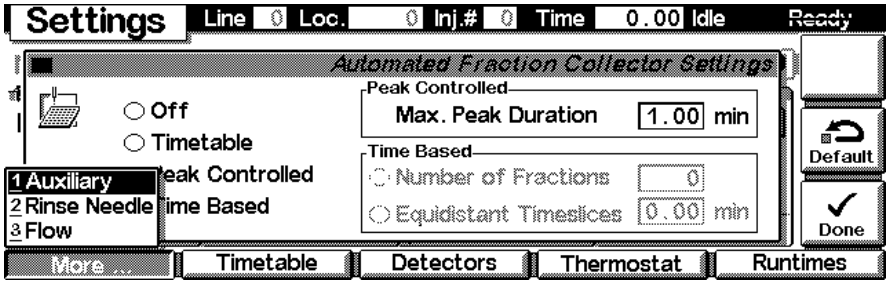


Use the **m**-key for the context sensitive menu. The **Status** command pulls up a module specific screen displaying details of configured trays. **Reset** will initialize the fraction collector.

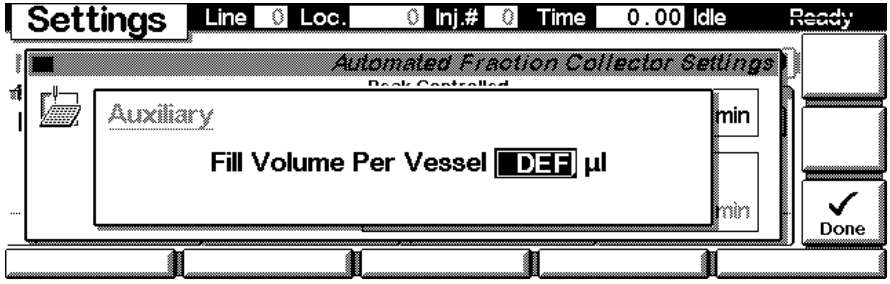


Settings More...

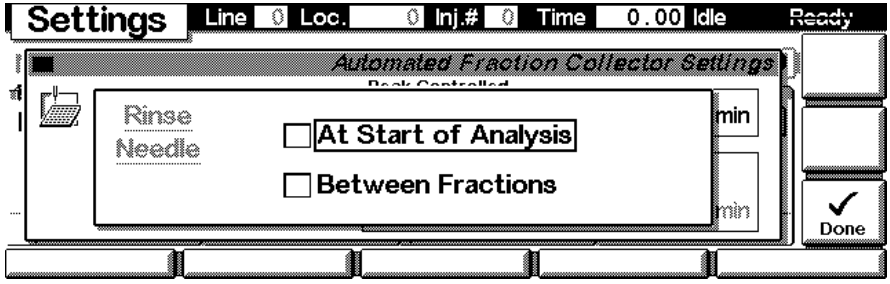
The **F1**-key (**More**) opens a pull-down menu.



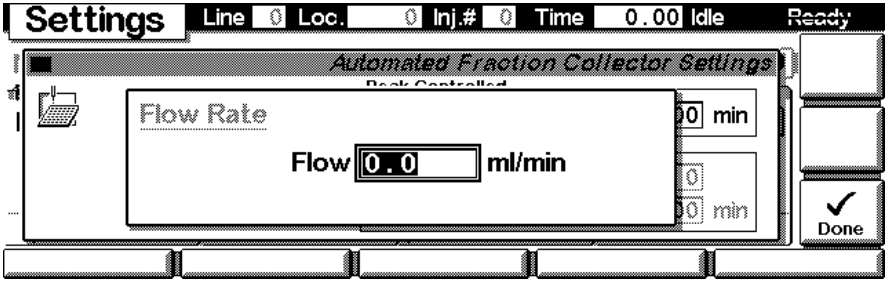
By selecting **More...Auxiliary** on the pull-down menu you can enter the fraction collector **Fill Volume Per Vessel** for the currently installed trays and vessels. Leaving this value at the **"DEF"** value will completely fill the vessels according to their specified size. Changes must be acknowledged with **F6** (**Done**).



By selecting **More...Rinse Needle** on the pull-down menu you can specify when the needle is rinsed. Settings can be **Off** (both tick marks not selected), **At Start of Analysis** or **Between Fractions**. Rinsing the needle between fractions is not possible, when doing time based fraction collection. Changes must be acknowledged with **F6** (**Done**).

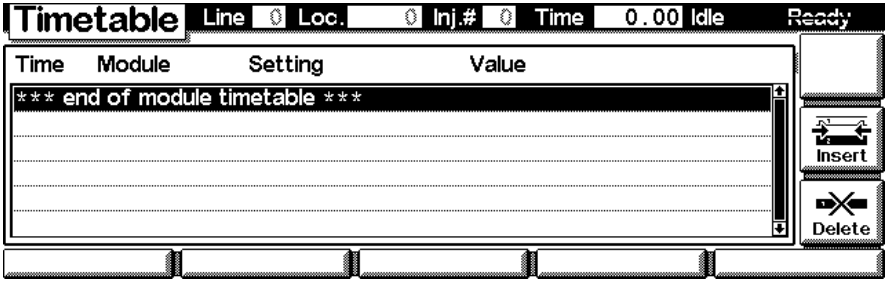


By selecting **More...Flow** on the pull-down menu you can specify the flow rate of the connected pump, in case the pump is a non-1100 pump or if the pump is not connected to the fraction collector via CAN.

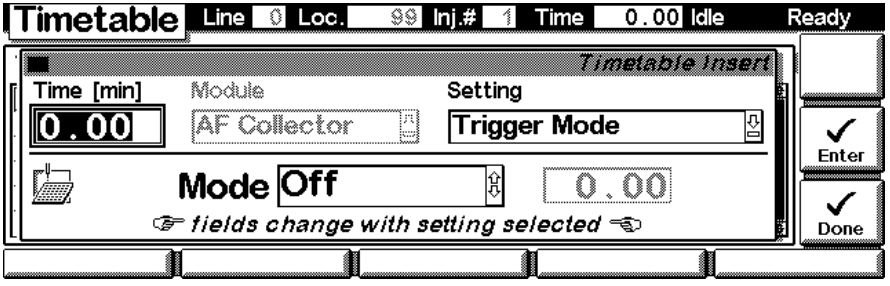


Settings - Timetable

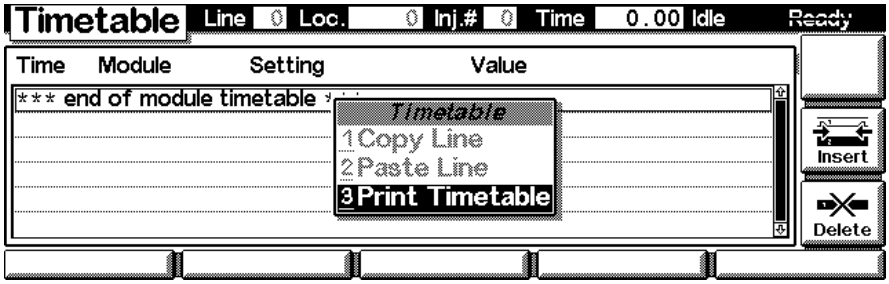
With the **F2**-key (**Timetable**) in the **Settings** screen you can list the timetable for the fraction collector. Press **F7**-key (**Insert**) to edit the selected entry or **F6**-key (**Delete**) to remove the selected/highlighted entry.



Edit each entry line according to your needs, by entering a time for a Setting and by selecting a Setting with the help of the pull-down menu. Use **F7** (**Enter**) to insert the current settings. Changes must be acknowledged with **F6** (**Done**).

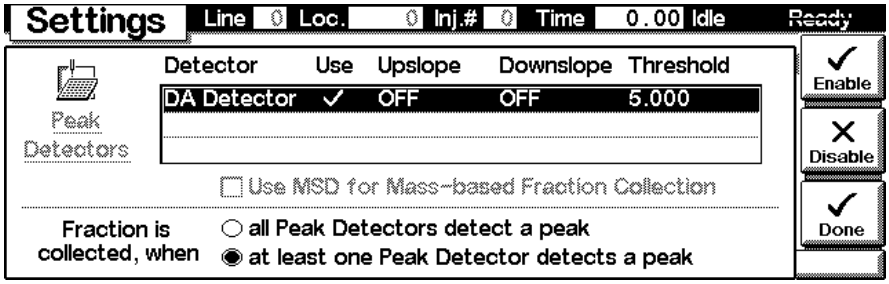


Use the **m**-key for the context sensitive menu. It gives you additional tools for the timetable.



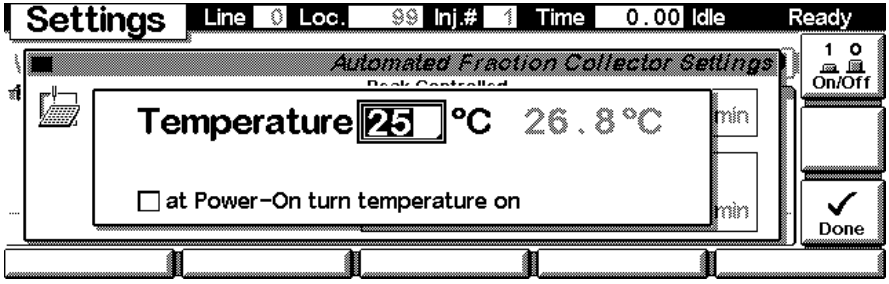
Settings - Detectors

With the **F3**-key (**Detectors**) in the **Settings** screen you can configure and **Enable (F8)** or **Disable (F7)** any detector that is part of a system for peak detection. Changes must be acknowledged with **F6** (**Done**).



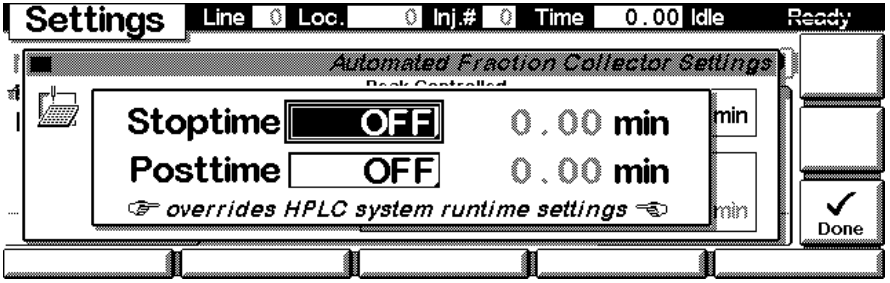
Settings - Thermostat

With the **F4**-key (**Thermostat**) in the **Settings** screen you can set the fraction collector thermostat temperature. Changes must be acknowledged with **F6** (**Done**).



Settings - Run times

With the **F5**-key (**Runtimes**) in the **Settings** screen you can change the stop time and the post-run time for the selected module individually. Changes must be acknowledged with **F6** (**Done**).

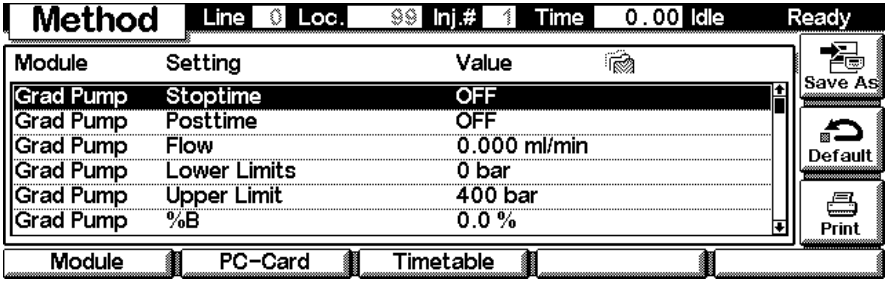


Method screens

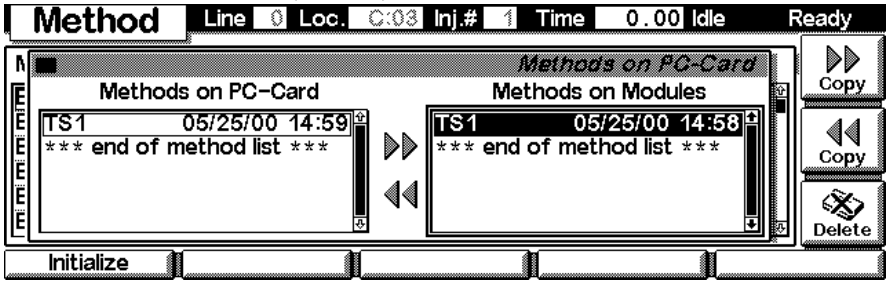
Use **Esc** to return to the **Analysis** screen. Use the **F3**-key (**Method**) to view the parameters in a method. Use the **F8**-key (**Save As**) to save the method in the module(s). The PC-Card-key is only active when a PCMCIA card is inserted in the control module. **Module (F1)** and **Method (F2)** give access to methods stored on the 1100 module or the PC-Card. **Timetable (F3)** gives access to the timetable of a method (if specified).

NOTE

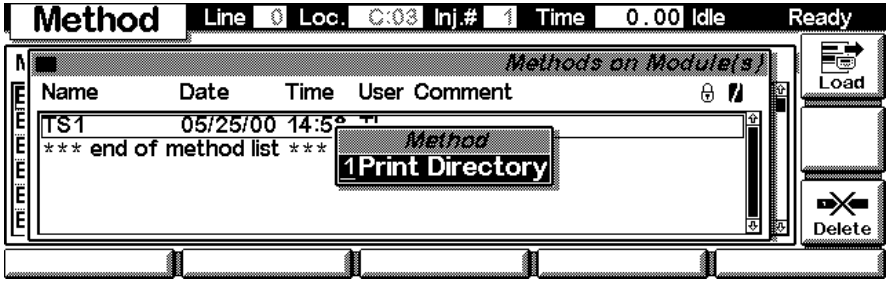
The PCMCIA card must have been inserted into the control module prior to the last start-up in order to be recognized.



After pressing **F1** or **F2** use the **Right/Left** selection keys to switch between PC-Card and Instrument window.Use the **Up/Down** selection keys to select the method. Use **F7/F8** (**Copy**) to copy a selected method from one window to the other one. Use **F6** (**Delete**) to delete a selected method.

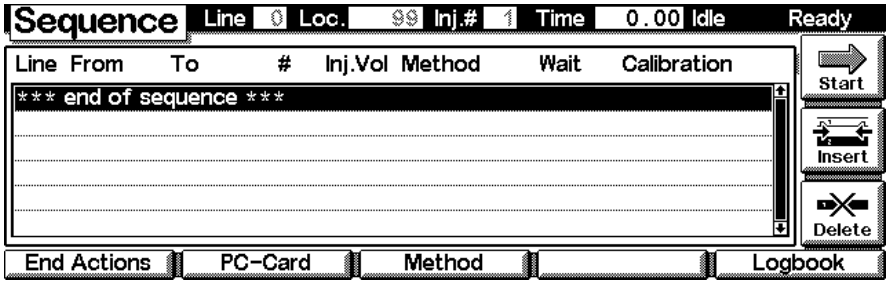


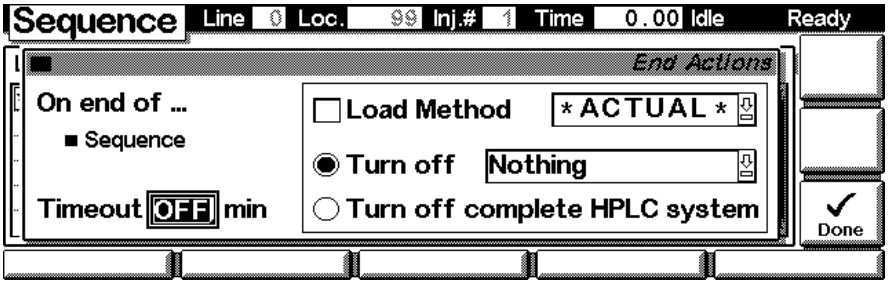
Press the **m**-key to open the context sensitive menu for printing the method directory.



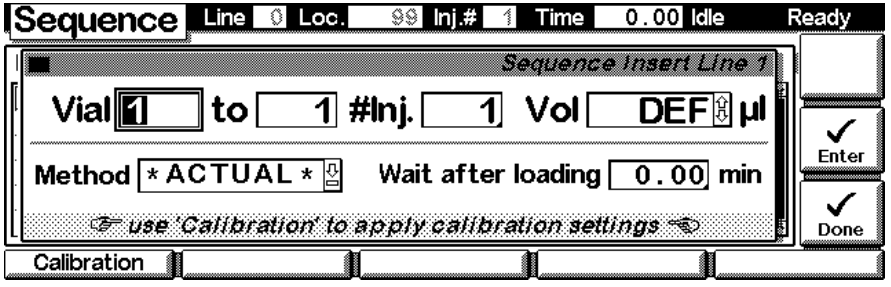
sequence

In the sequence view (**F4** from the **Analysis Screen**) you can specify the sequence's **End Actions (F1)**, load sequences from **PC-Card (F2)** (if present) or proceed to a **method** table **(F3)**. **F6 (Delete)** and **F7 (Insert)** allow you to edit lines in the sequence table.



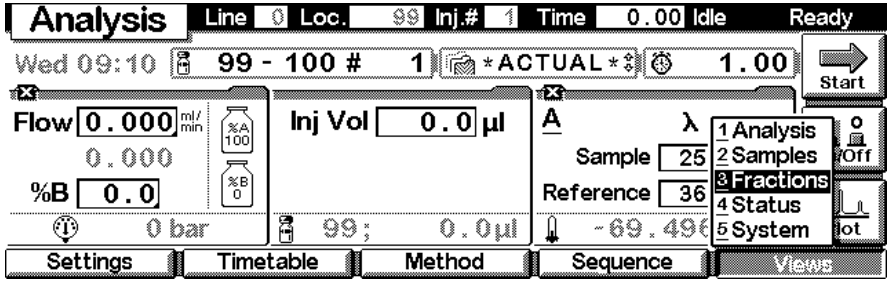


Parameters that can be entered into a line in the sequence table.

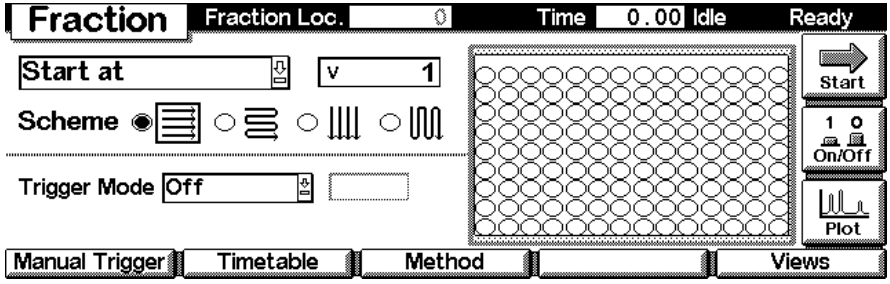


Fractions

From the Analysis View press the **F5**-key (**Views**) and select **Fractions**.

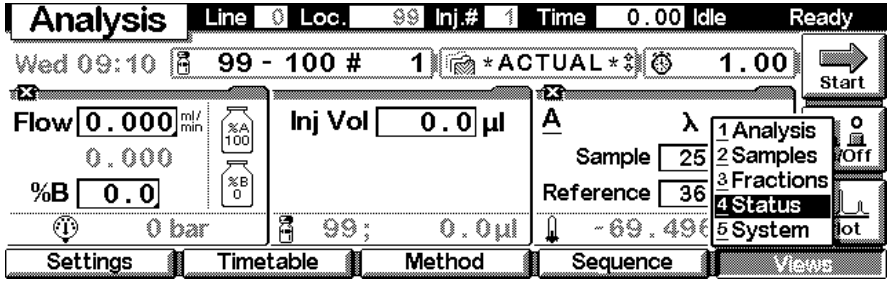


This is an example if an Agilent 1100 fraction collector is configured stand-alone. Here you can define a **Start** position for a fraction, select a collection **Scheme**, choose a **Trigger Mode** etc.

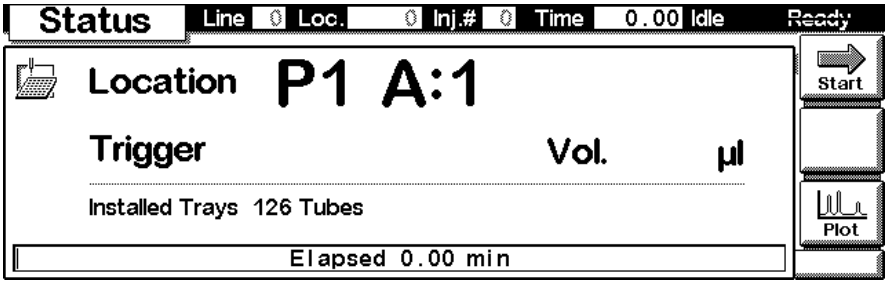


status

From the Analysis View press the **F5**-key (**Views**) and select **Status**.

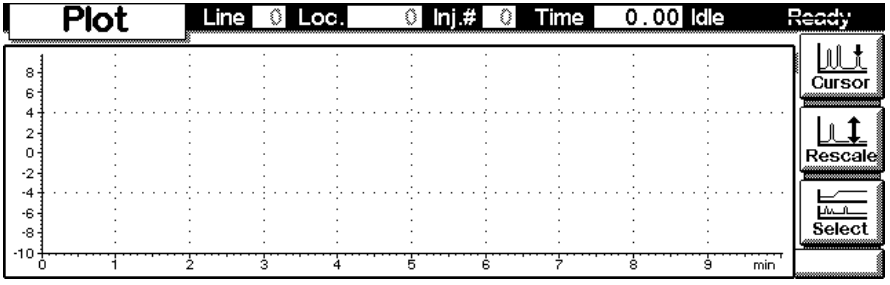


This is an example if an Agilent 1100 fraction collector is configured stand-alone.

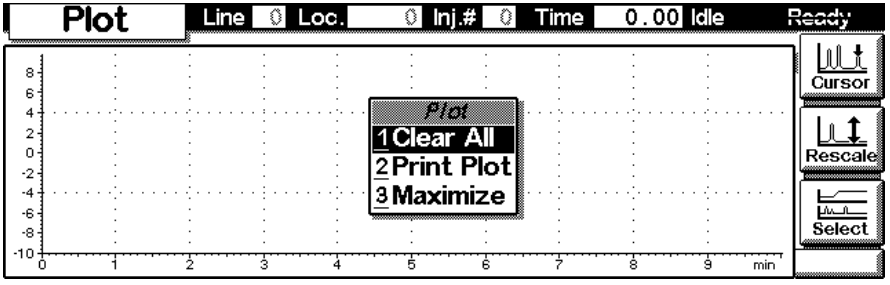


Signal plot

Press **F6**-key (**Plot**) to enter the plot screen (available also from all other screens). Here you can observe the on-line signal(s). If more than one signal is configured, use the 1-2-3 alphanumeric keys to switch between the signals.

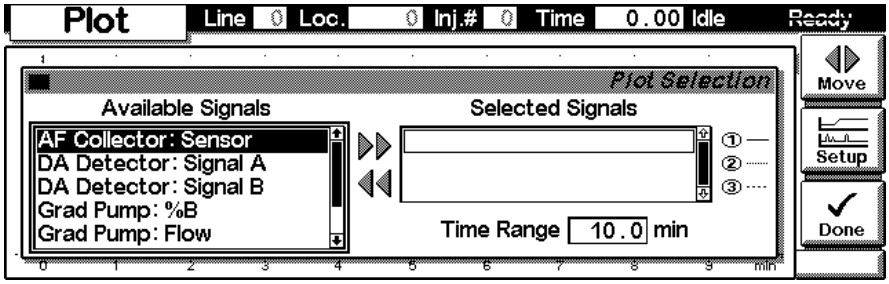


Press the **m**-key to open the context sensitive menu.



Press **F6**-key (**Select**). Here you can add additional on-line signals (maximum are 3). Additional signals could be also pressure or temperature signals from other modules. Use the **Right/Left** selection keys to switch between 'Available Signals' and 'Selected Signals'. Use the **F8**-key (**Move**) to enter available signals into the box for selected signals or vice versa. Use the

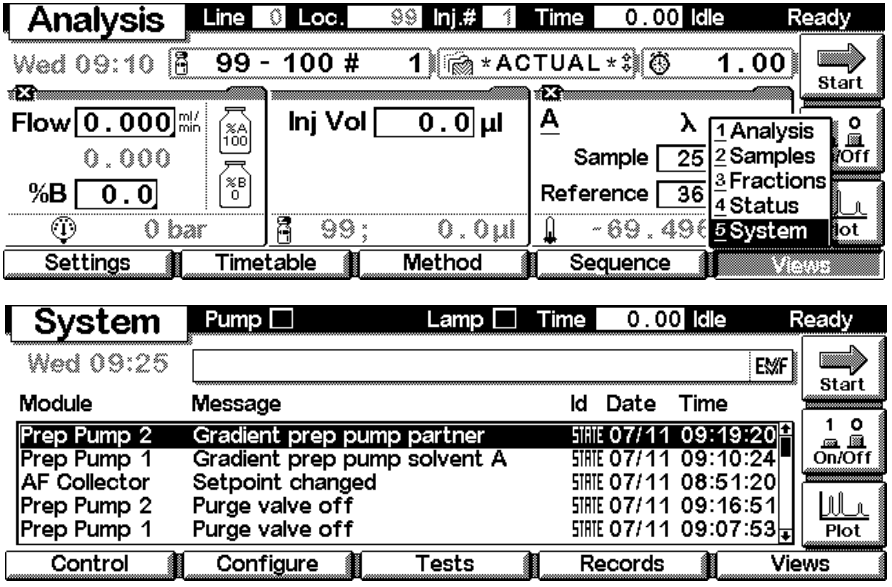
F7-key (**Setup**) to enter the display range for the highlighted/selected signal. Use **F6** (**Done**) to activate changes and to return to the Plot screen.



Screens available from the System view

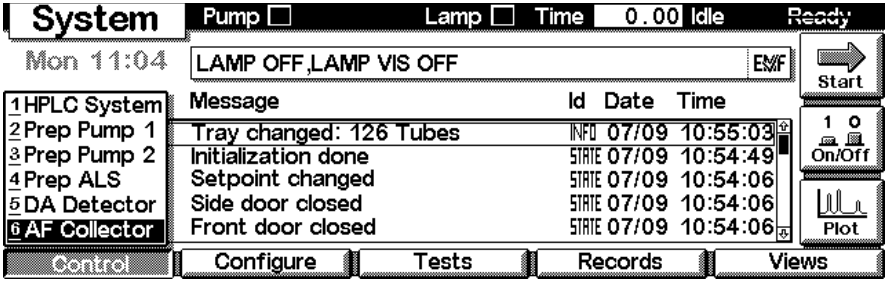
System view

Use the **Esc**-key until you receive **Views** on the **F5**-key. Choose **System** from the pull-down menu. This screen shows the last activities in the system.



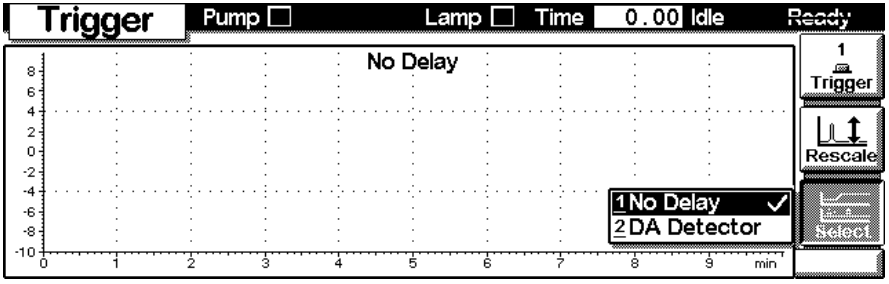
System - Control

Use the **F1**-key (**Control**) to select the fraction collector. Here you receive information about the not-Ready conditions, if needed. Press **F2** to **Home** the transport unit (e.g. for replacing trays), press **F3** to **Park** the carrier for transportation (also requires a protective foam and cardboard holder to avoid damage to the transport unit during transportation). **F7** (**Reset**) does a re-initialization of the fraction collector. Use the **F8**-key (**On/Off**) to turn on the thermostat (if present). Changes must be acknowledged with **F6** (**Done**).



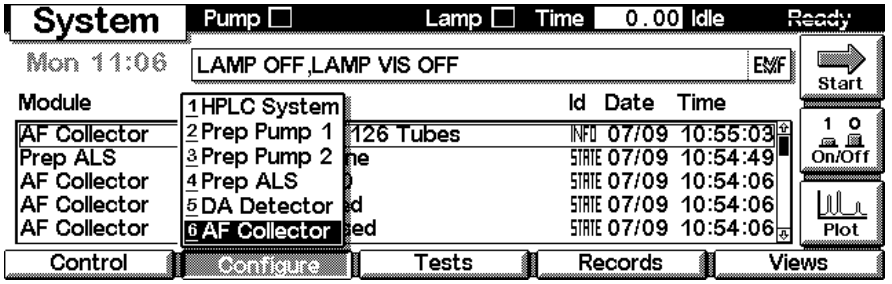
Manual Trigger

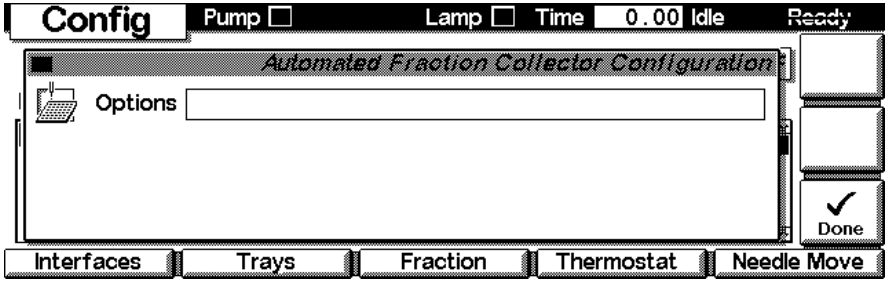
In this screen you can view the online signal of any connected detector. Press **F6 (Select)** to choose, which detector signal will be displayed for identifying the starting point and the end point of a fraction. The Manual Trigger Mode allows to manually start a fraction collection by pressing 1-Trigger (F8). Pressing 0-Trigger, again, will then stop the collection of a fraction. The fraction collector will wait for the delay-time, specified for the chosen detector, before it starts or stops the collection of a fraction.



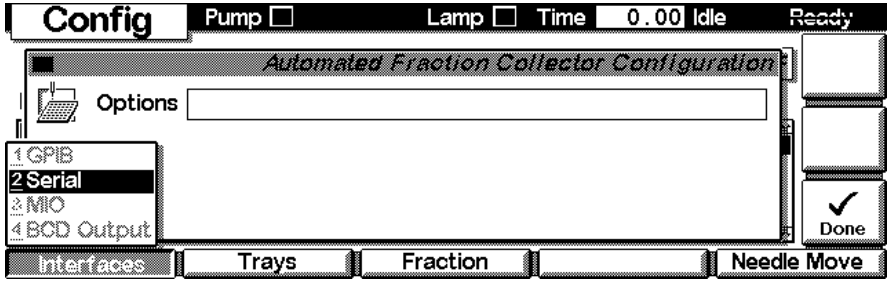
System - Configure

Use the **Esc**-key to receive **Views** on the **F5**-key in the Analysis Screen. Choose **System** from the pull-down menu. Use the **F2**-key (**Configure**) to select the fraction collector. Here you define further special set points for the fraction collector operation. Changes must be acknowledged with **F6** (**Done**).



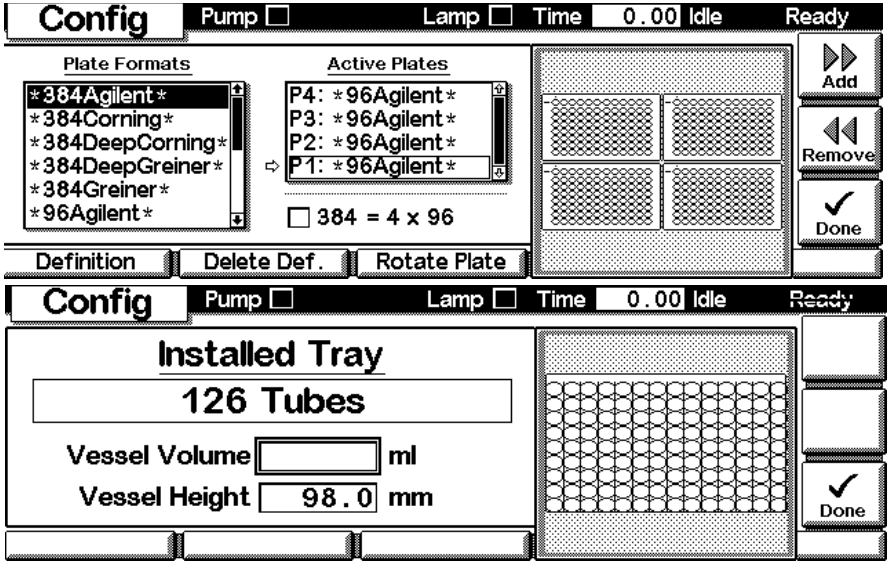


Use the **F1**-key (**Interfaces**) to access the interface settings (if required). Changes must be acknowledged with **F6** (**Done**).



Configure - trays

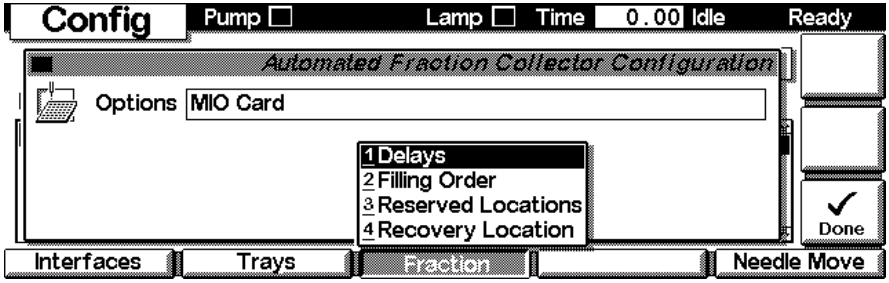
Use the **F2**-key (**Trays**) to view and configure the (automatically) detected sample trays. Different views will come up depending on the installed trays. Enter the **Vessel Volume** and the **Vessel Height** for the vessels used with your installed tray(s). Changes must be acknowledged with **F6** (**Done**).



Select/highlight a tray configuration with the help of the selection keys. **F7/F8** (**Add/Remove**) allows you to move configurations from available Plate Formats to the Active Plates and vice versa. Press **F2** (**Delete Def.**) to delete a user defined definition. Press **F3** (**Rotate Plate**) to rotate the selected plate. Use **F1** (**Definition**) to edit the user defined definition of a well-plate. Changes must be acknowledged with **F6** (**Done**).

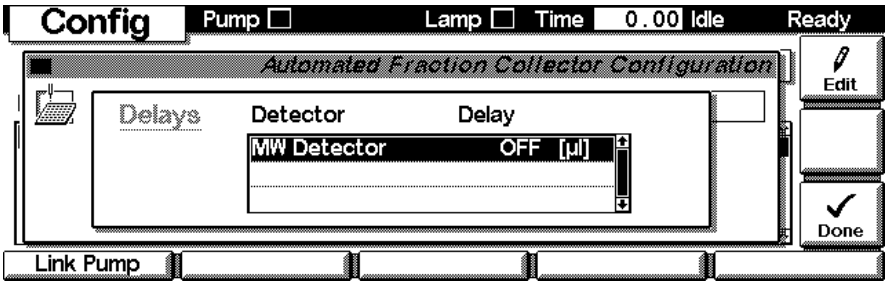
Configure - fraction

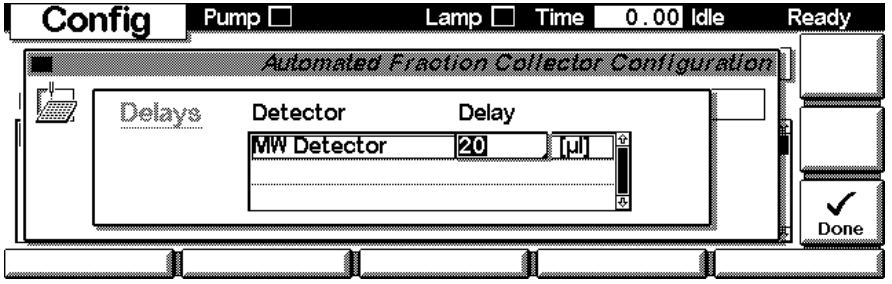
F3 (**Fraction**) in the main Configuration screen allows you to access the **Delay** volume definition screen, to specify **Filling Order** and **Reserved** or **Recovery Locations**.



Configure - fraction - delays

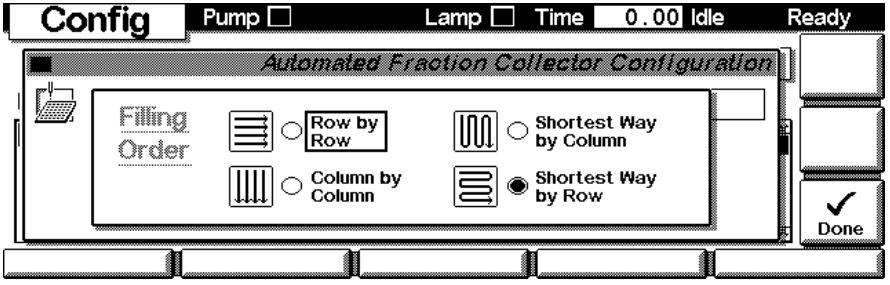
Delays in the Fraction Configuration screen allows you to configure the delay volume between each connected detector and the fraction collector. **Edit (F8)** allows to enter new values for the selected detector. Changes must be acknowledged with **F6** (**Done**).





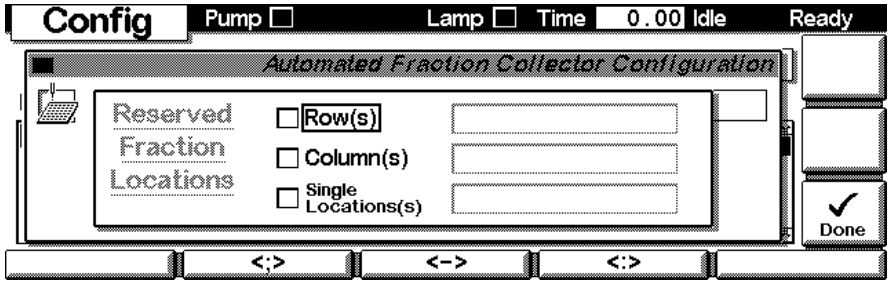
Configure - fraction - filling order

Filling Order in the Fraction Configuration screen allows you to configure the filling order of the trays in the fraction collector. **Edit (F8)** allows to enter new values for the selected detector. Changes must be acknowledged with **F6** (**Done**)



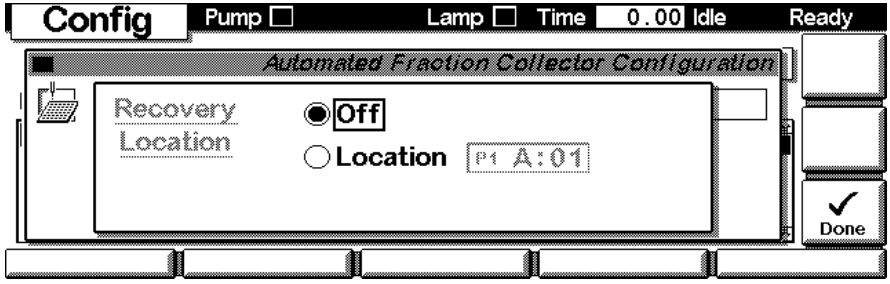
Configure - reserved locations

Reserved Locations allows you to specify reserved locations by **Rows, Columns** or **Single Locations**, that are not used (filled) during the collection. Changes must be acknowledged with **Done (F6)**.



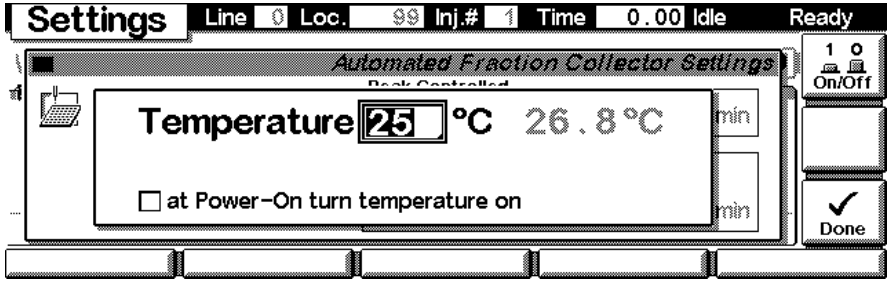
Configure - recovery location

The **Recovery Location** allows you to specify a location for the collection of any mobile phase or sample that are not collected with the fractions during the study. Changes must be acknowledged with **Done (F6)**.



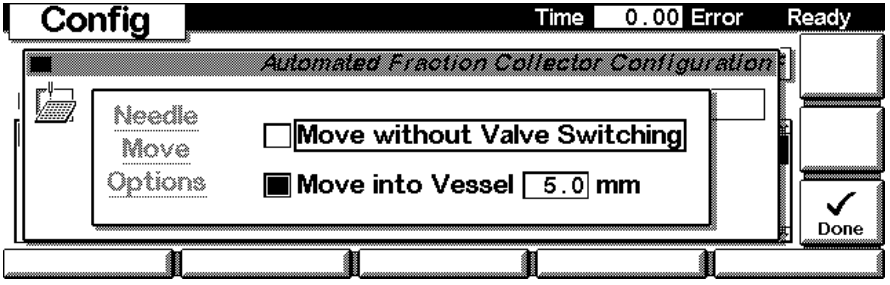
Configure - Thermostat

F4 (**Therm**) in the main Configuration screen allows you to configure the temperature and turn on conditions of the thermostatted fraction collector. Changes must be acknowledged with **F6** (**Done**).



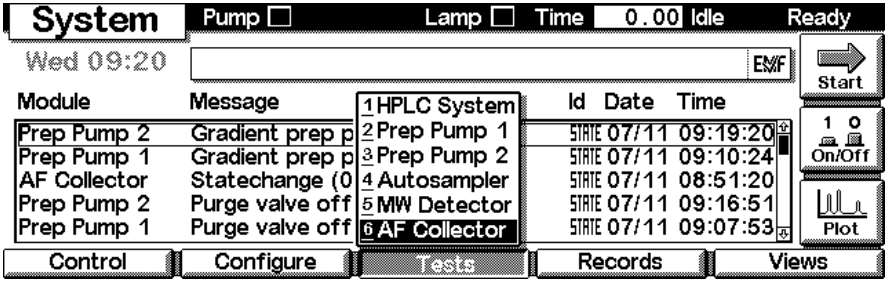
Configure - Needle move

Press **F5** from the **Configure** Screen and choose how the fraction collector's needle carrier arm moves from one location to the next one. This can either be with diverting the flow to waste **(with valve switching)** while moving (default) or without diverting the flow **(without valve switching**, optional only when neighbored well plate positions are used). With the **analytical scale** fraction collector it is also possible to insert the needle into a capped vial or through a closing mat of a well plate with a specified depth **(Move into vessel)**.



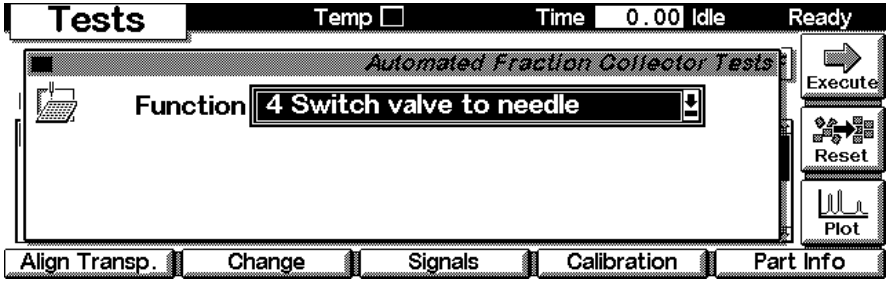
System - tests

Press **F3** from the **System** View and choose the fraction collector to access the fraction collector **Tests** screen.



The Tests screen gives you access to multiple tests and features such as the automatic transport unit **Alignment (F1)** tool, maintenance procedures to **Change (F2)** parts on the fraction collector or additional test **Signals (F3)** to monitor various parameters during the fraction collector operation. **Calibration (F4)** gives you access to the delay calibration procedure. **Parts Info (F5)** gives you information about the type and revision of the installed

transport unit assembly. The pull-down menu in the center of the screen gives you access to various step commands.



Use the **F1**-key (**Align Trans**) to perform an automatic alignment of the fraction collector transport unit.

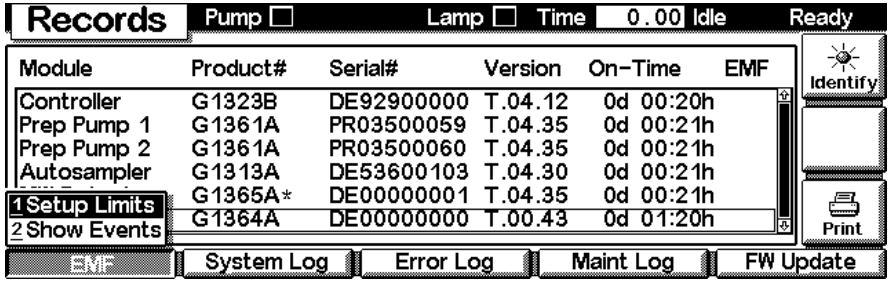
WARNING

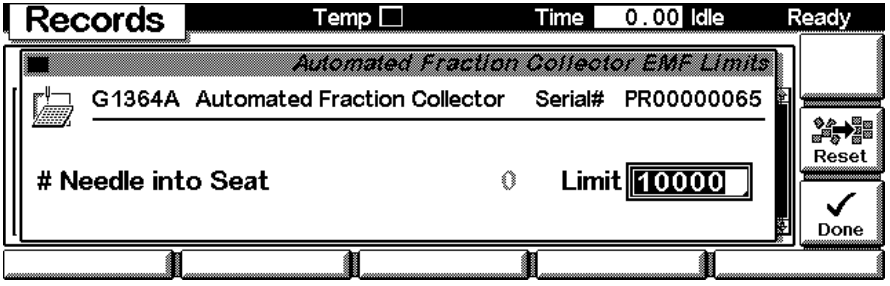
Only the empty 4-plate tray base (G1364-84501) should be installed, when performing the alignment. The well plates must be removed from the fraction collector tray base before performing the transport unit alignment. If the well plates are installed during the alignment procedure, the transport unit might be damaged.

The alignment process may take several minutes. Changes must be acknowledged with **F6 (Done)**.

EMF (Early Maintenance Feedback)

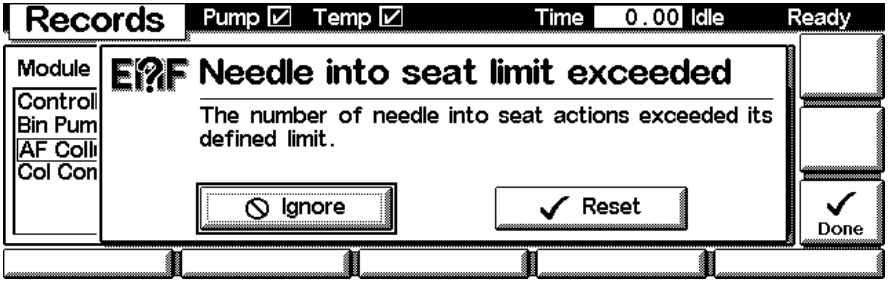
Use the **F1**-key (**EMF**) to set EMF limits. Choose **Setup limits** to select the number of injection valve cycles or number of needle movements into the needle seat at which you want to receive a warning. Changes must be acknowledged with **F6** (**Done**).





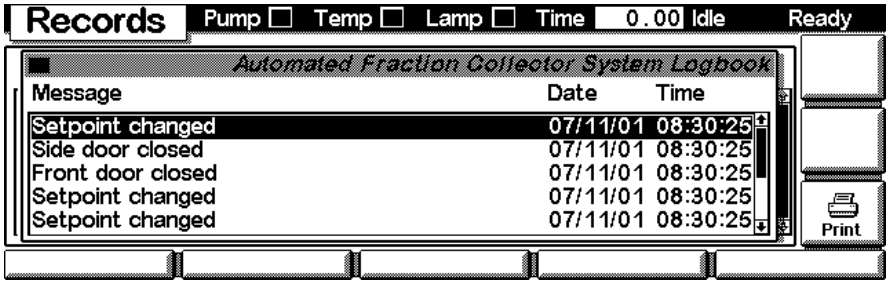
If a set limit has been exceeded, a message box will pop up. If you press **Reset**, the limits will be removed. **Ignore** will continue to keep the EMF flag set.

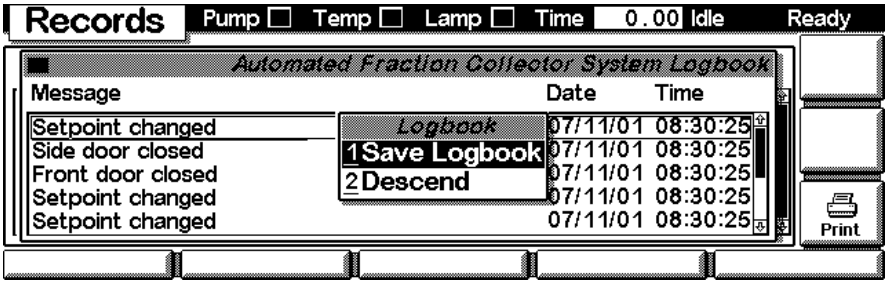
NOTE An exceeded limit will not stop a sequence or run (information only, to plan maintenance activities).

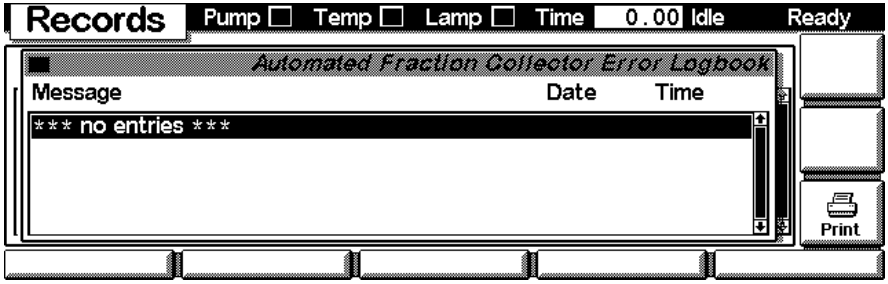


System / Error Log

Use the **F2**-key (**System Log**) or **F3**-key (**Error Log**) to look for errors. For troubleshooting reasons these Logbooks can be **printed (F6)** or saved to a file on the PCMCIA card (pressing the **m**-key).

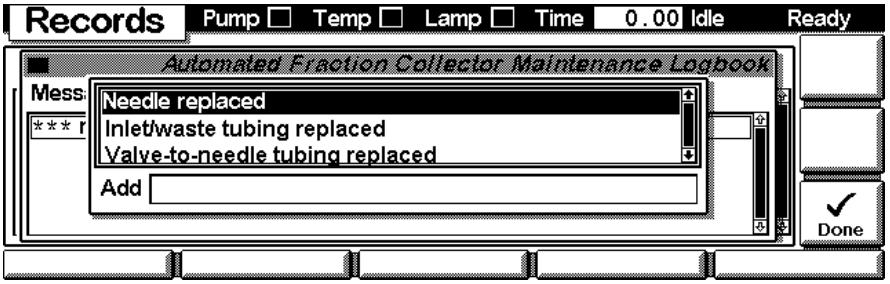






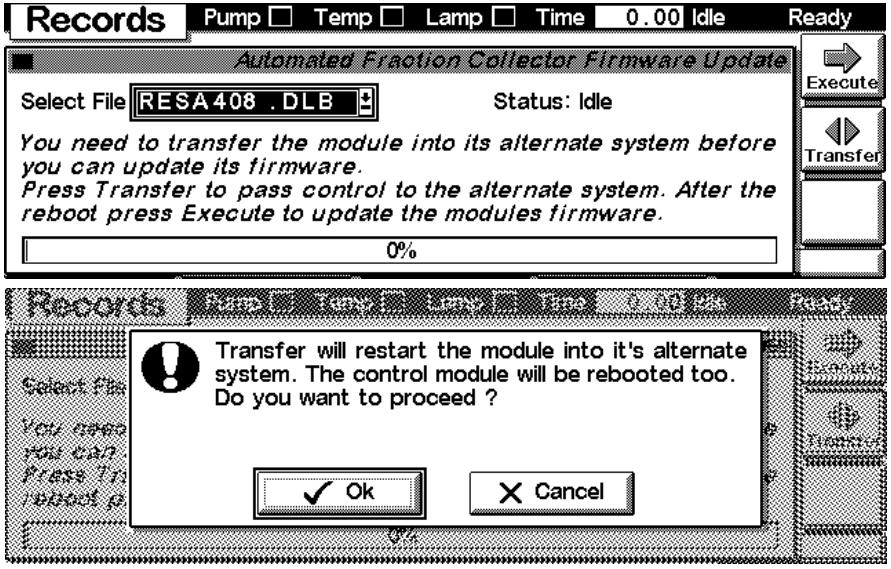
Maintenance Log

Use the **F4**-key (**Maintenance Log**) to look for maintenance activities performed on the instrument. A list of possible events are listed in the scroll screen **(Needle replaced, Inlet/waste tubing replaced, Valve-to-needle tubing replaced, Funnel seals replaced, Rinse port seal replaced)**. Select the activity you have performed and press **Done** to create an entry in the logbook. Editing the add line with the help of the alphanumeric keys allows you to enter your own maintenance function. For troubleshooting reasons this Logbook can be printed or saved to a file on the PCMCIA card (pressing the **m**-key). Changes must be acknowledged with **Done (F6)**.

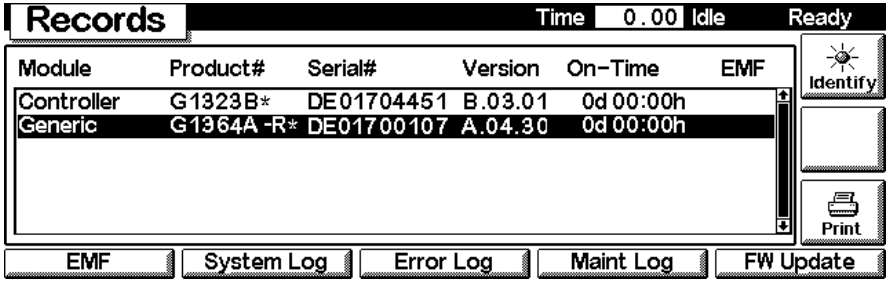


Firmware Update

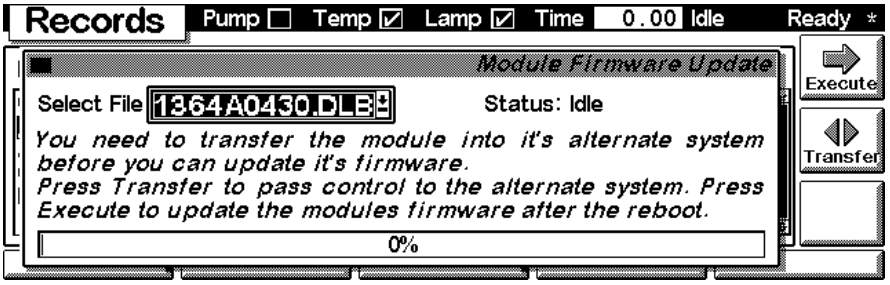
Use the **Esc**-key to receive **Views** on the **F5**-key. Choose **System** from the pull-down menu. Use the **F3**-key (**Records**) to select the fraction collector. Use the **F5**-key (**FW Update**) to enter the Update section. If you want to update the resident firmware (together with specific main firmware revisions), select the a file from the PCMCIA card (RESnnnn.DLB) and press execute. If you want to update the main firmware, press **F7**-key (**Transfer**) to turn the module into the resident mode (LED on module should blink yellow).



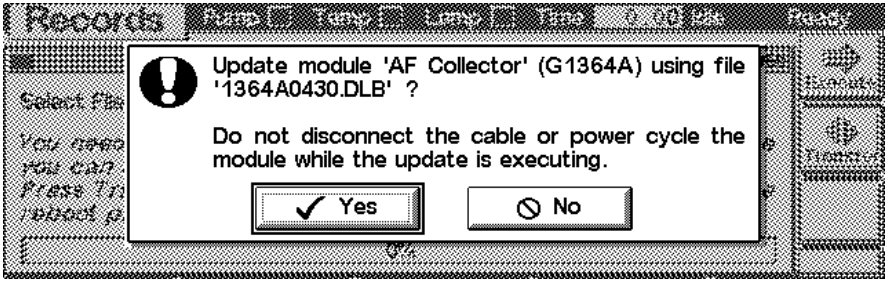
Use the **Esc**-key to receive **Views** on the **F5**-key. Choose **System** from the pull-down menu. Use the **F3**-key (**Records**) to select the fraction collector. Use the **F5**-key (**FW Update**) to enter the Update section. Select the a file from the PCMCIA card (1364nnnn.DLB for the fraction collector) and press execute. When the update has finished the update, press **F8**-key (**Transfer**) to return the module into the normal mode (LED on module should stay yellow).

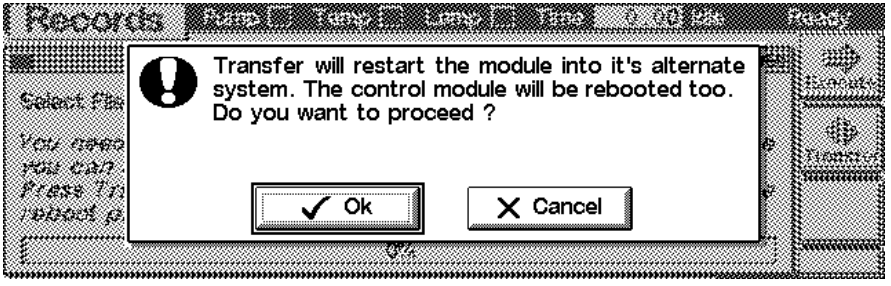


Use the **F5**-key (**FW Update**) to enter the Update section. Select the a file from the PCMCIA card (1364nnnn.DLB for the fraction collector) and press execute. When the update has finished, press **F7**-key (**Transfer**) to return the module into the normal mode (LED on module should stay yellow).



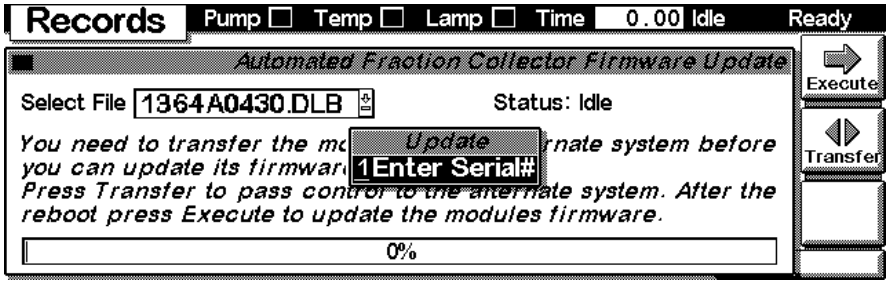
If you have not saved your methods, please do it before continuing. Otherwise they will be overwritten during the update process.



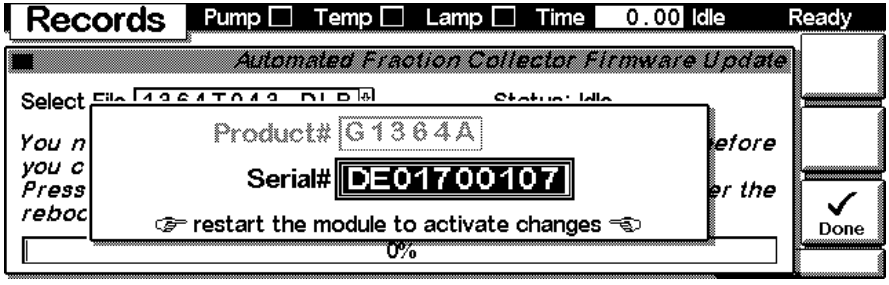


Changing the serial number

In case the serial number of the module has to be added, use the **m**-key to open the menu **Enter Serial#**. The serial number becomes active after restart of the module.



Type in the module's Serial# as indicated on the front or rear label of the module using the alphanumeric keys. Changes must be acknowledged with **F6** (**Done**).



8

Specifications

Performance specifications of the fraction collectors

Performance Specifications for the Preparative Scale (Table 56) or Analytical Scale (Table 57) Fraction Collector

Table 56 **performance Specifications Agilent 1100 Series PREPARATIVE SCALE Fraction Collector (G1364A)**

Type	Specification
trigger modes	**Time slices,** **Peak** (threshold, up- / downslope), **Timetable** (combination of time intervals and peak) and **Manual trigger** (supported only with G1323B Control Module) Agilent 1100 DAD/MWD detectors (G1315A/B, G1365 A/B and the Agilent G1946C/D LC-MSD are fully supported other detectors can be used but are not supported for fraction collection.
operating modes	Discrete fractions: default mode for all vessels. The flow is diverted to waste, while moving from one vessel position to the next vessel position Continuous flow: optional, available only when using well plates. It is possible to move from one well plate position to the next one without diverting the flow into the well plate to waste
Fraction capacities and trays	4 x well-plates full tray (MTP)* (for use with deep well plates, only) 2 × well-plates std. tray (MTP) (for use with deep well plates, only) + 10 × 2 ml vials* (+ 1 half tray) 100 x 2 ml in std. tray (+ 1 half tray)* 3 x 40 x 2 ml in half tray* 3 x 15 x 6 ml in half tray* Full tray with 40 test tubes (30 mm OD, max. height 100 mm, ~45 ml / tube) Full tray with 60 test tubes (25 mm OD, max. height 100 mm, ~25 ml / tube) Full tray with 126 test tubes (16 mm OD, max. height 100 mm, ~12 ml / tube) Full tray with 215 test tubes (12 mm OD, max. height 100 mm, ~7 ml / tube) Installed trays are automatically detected and identified. **For the with uncapped vials, tests tubes and well plates, only!**
test tube / plate sizes	Minimum 48 mm to 100 mm maximum
Maximum tube volume	ca. 45 ml

Table 56 **performance Specifications Agilent 1100 Series PREPARATIVE SCALE Fraction Collector (G1364A)**

Type	Specification
Maximum flow rate	100 ml / min (depending on viscosity and generated back pressure, max. 6 bar at the diverter valve)
Delay volumes [µl]	Fraction collector inlet to diverter valve: ~80 Diverter valve: ~15 Diverter valve to needle: ~110 Needle: ~5
Delay calibration sensor	**Available as an extra part:** single wavelength absorbance detector working at 654 nm, consisting of a LED and a photo diode (also delivered with the mass based fraction collection kit, PN G1968C)
Diverter valve	3/2 Diverter valve with low internal volume (15 µl), switching time < 100 ms, maximum operating pressure 6 bar
cooling	Optional (with additional G1330A), performance depending on ambient conditions and the volume of collected fractions
maximum capacity	3 fraction collectors in parallel connected via 12-Position, 13-Port Selector valve (PN G1160A)
GLP features	Early maintenance feedback (EMF), electronic records of maintenance and errors
Interfaces	- Controller-area network (CAN). - optional; LAN or external contacts interface - RS232C, - APG-remote (for remote start / stop signals to / from other modules) - Interface to G1330A Thermostat - CAN-DC-out for operation of Agilent approved external devices like valves
Safety features	Leak detection and safe leak handling, error detection and display, exhaust fan for fume extraction of hazardous vapors

* Vials can be used as recommended by Agilent Technologies (see "List of Recommended Vials and Caps" on page 141 and "List of Recommended Plates and Closing Mats" on page 144) **but must be uncapped**. Only the 96 deep well-plates can be used (**without closing mats**, see "List of Recommended Plates and Closing Mats" on page 144)

NOTE Only one type of well-plates can be used at a time in one tray.

Table 57 **Performance Specifications Agilent 1100 Series ANALYTICAL SCALE Fraction Collector (G1364A #050)**

Type	Specification
trigger modes	**Time slices,** **Peak** (threshold, up- / downslope), **Timetable** (combination of time intervals and peak) and **Manual trigger** (supported only with G1323B Control Module) Agilent 1100 UV-Vis detectors (G1314A, G1315A/B, G1365 A/B and the Agilent G1946C/D LC-MSD are fully supported other detectors can be used but are not supported for fraction collection
operating modes	Discrete fractions: default mode for all vessels. The flow is diverted to waste, while moving from one vessel position to the next vessel position Continuous flow: optional, available only when using the deep well plates. It is possible to move from one well plate position to the next one without diverting the flow into the well plate to waste Needle into location: Needle pushes into the vessel as deep as specified, for the use with capped vials and test tubes and well plates with closing mats
fraction vessel capacities and trays	4 x well-plates full tray (MTP)* 2 x well-plates std. tray + 10 funnels with external containers* (+ 1 half tray) 2 × well-plates std. tray (MTP) + 10 × 2 ml vials* (+ 1 half tray) 100 x 2 ml in std. tray (+ 1 half tray)* 3 x 40 x 2 ml in half tray* 3 x 15 x 6 ml in half tray* Full tray with 40 test tubes (30 mm OD, max. height 48 mm, ~20 ml vol.) Full tray with 60 test tubes (25 mm OD, max. height 48 mm) Full tray with 126 test tubes (16 mm OD, max. height 48 mm) Full tray with 215 test tubes (12 mm OD, max. height 48 mm) Installed trays are automatically detected and identified. Installed plates and vials can be detected when operating in the needle into location mode
maximum tube / plate height	48 mm

Table 57 **Performance Specifications Agilent 1100 Series ANALYTICAL SCALE Fraction Collector (G1364A #050)**

Type	Specification
Maximum tube volume	ca. 20 ml or unlimited, if funnels are used with external containers
Maximum flow rate	10 ml / min (depending on viscosity and generated back pressure, max. 6 bar at the diverter valve)
delay volumes [µl]	Fraction collector inlet to diverter valve: ~8 Diverter valve: ~15 Diverter valve to needle: ~10 Needle: ~4
delay calibration sensor	Single wavelength absorbance detector working at 654 nm, consisting of a LED and a photo diode
diverter valve	3/2 Diverter valve with low internal volume (15 µl), switching time < 100 ms, maximum operating pressure 6 bar
cooling	Optional (with additional G1330A), performance depending on ambient conditions and the volume of collected fractions
maximum capacity	3 fraction collectors in parallel connected via 12-Position, 13-Port Selector valve (PN G1160A)
GLP features	Early maintenance feedback (EMF), electronic records of maintenance and errors
interfaces	- Controller-area network (CAN). - optional; LAN or external contacts interface - RS232C, - APG-remote (for remote start / stop signals to / from other modules) - Interface to G1330A Thermostat - CAN-DC-out for operation of Agilent approved external devices like valves
safety features	Leak detection and safe leak handling, error detection and display, exhaust fan for fume extraction of hazardous vapors

* Vials and well-plates and capped vials and well plates with closing mats can be used as recommended by Agilent Technologies (see “List of Recommended Vials and Caps” on page 141 and “List of Recommended Plates and Closing Mats” on page 144)

NOTE Only one type of well-plates can be used at a time in one tray.

Performance Specifications for the Preparative Scale (Table 56) or Analytical Scale (Table 57) Fraction Collector

Legal, Safety and Warranty Information

Warranty Statement

All Chemical Analysis Products

Agilent Technologies warrants its chemical analysis products against defects in materials and workmanship. For details of the warranty period in your country, call Agilent. During the warranty period, Agilent will, at its option, repair or replace products which prove to be defective. Products that are installed by Agilent are warranted from the installation date, all others from the ship date.

If buyer schedules or delays installation more than 30 days after delivery, then warranty period starts on 31st day from date of shipment (60 and 61 days, respectively for products shipped internationally).

Agilent warrants that its software and firmware designed by Agilent for use with a CPU will execute its programming instructions when properly installed on that CPU. Agilent does not warrant that the operation of the CPU, or software, or firmware will be uninterrupted or error-free.

Limitation of Warranty

Onsite warranty services are provided at the initial installation point. Installation and onsite warranty services are available only in Agilent service travel areas, and only in the country of initial purchase unless buyer pays Agilent international prices for the product and services. Warranties requiring return to Agilent are not limited to the country of purchase.

For installation and warranty services outside of Agilent's service travel area, Agilent will provide a quotation for the applicable additional services.

If products eligible for installation and onsite warranty services are moved from the initial installation point, the warranty will remain in effect only if the customer purchases additional inspection or installation services, at the new site.

The foregoing warranty shall not apply to defects resulting from:

1 improper or inadequate maintenance, adjustment, calibration, usage of corrosive solvent as described in the solvent information note later in this chapter or operation by buyer,

2 buyer-supplied software, hardware, interfacing or consumables,

3 unauthorized modification or misuse,

4 operation outside of the environmental and electrical specifications for the product,

5 improper site preparation and maintenance, or

6 customer induced contamination or leaks.

THE WARANTY SET FORTH IS EXCLUSIVE AND NO OTHER WARRANTY, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED. AGILENT SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitation of Remedies and Liability

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL AGILENT BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFITS) WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

Responsibilities of the Customer

The customer shall provide:

1 access to the products during the specified periods of coverage to perform maintenance,

2 adequate working space around the products for servicing by Agilent personnel,

3 access to and use of all information and facilities determined necessary by Agilent to service and/or maintain the products (insofar as these items may contain proprietary or classified information, the customer shall assume full responsibility for safeguarding and protection from wrongful use),

4 routine operator maintenance and cleaning as specified in the Agilent operating and service manuals, and

5 consumables such as paper, disks, magnetic tapes, ribbons, inks, pens, gases, solvents, columns, syringes, lamps, septa, needles, filters, frits, fuses, seals, detector flow cell windows, and so on.

Responsibilities of Agilent Technologies

Agilent Technologies will provide warranty services as described in Table 58.

Table 58 **Warranty Services**

Services During Warranty*	Warranty Period**	Type
Agilent 1100 Series of Modules	1 Year	Onsite
GC, LC, UV-Visible, and LAS supplies and accessories	90 Days	Onsite
Columns and Consumables***	90 Days	Return to Agilent
Gas Discharge and Tungsten Lamps	30 Days	Return to Agilent
Repairs performed on-site by Agilent****	90 Days	Onsite

* This warranty may be modified in accordance with the law of your country. Please consult your local Agilent office for the period of the warranty, for shipping instructions and for the applicable wording of the local warranty.

** Warranty services are included as specified for Analytical products and options purchased concurrently provided customer is located within a Agilent defined travel area. Agilent warranty service provides for 8 a.m. to 5 p.m. on-site coverage Monday through Friday, exclusive of Agilent holidays.

*** Columns and Consumables are warranted to be free from defects for a period of 90 days after shipment and will be replaced on a return-to-Agilent basis if unused.

**** Agilent repair warranty is limited to only the item repaired or replaced.

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.

General

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

WARNING **If you are using flammable solvents, remove the well-plates from the tray when you turn off the sampler. You avoid the risk of building explosive gas mixtures in the tray compartment.**

WARNING **If you are using flammable solvents, cover the well-plates with closing mats to avoid the risk of building explosive gas mixtures.**

WARNING **After a leak in the sampler, make sure the leak plane is cleaned and dry.**

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 fuseholders must be avoided.

WARNING **Any adjustment, maintenance, and repair of the opened instrument under voltage is forbidden.**

WARNING **Disconnect the instrument from the line and unplug the power cord before maintenance.**

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.

Safety Symbols

Table 59 shows safety symbols used on the instrument and in the manuals.

Table 59 **Safety Symbols**

Symbol	Description
	The apparatus is marked with this symbol when the user should refer to the instruction manual in order to prevent risk of harm to the operator and to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected conductor terminal.
	Eye damage may result from directly viewing the light produced by the Xenon flash lamp used in this product. Always turn the xenon flash lamp off before removing it.

WARNING **A warning alerts you to situations that could cause physical injury or damage to the equipment. 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 a possible loss of data. Do not proceed beyond a caution until you have fully understood and met the indicated conditions.

Lithium Batteries Information

WARNING

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. 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. Discharged Lithium batteries shall be disposed off locally according to national waste disposal regulations for batteries.

ADVARSEL

Lithiumbatteri - Eksplosionsfare ved fejlagtic handtering. Udskiftning ma kun ske med batteri af samme fabrikat og type. Lever det brugte batteri tilbage til leverandoren.

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 Agilent 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)

Solvent Information

Observe the following recommendations on the use of solvents.

WARNING **This instrument should only be used with solvents that have an ignition temperature higher than 200°C!**

Solvents

Brown glass ware can avoid growth of algae.

Always filter solvents, small particles can permanently block the capillaries. 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 nitric acid, sulfuric acid especially at higher temperatures (replace, if your chromatography method allows, by phosphoric acid or phosphate buffer which are less corrosive against stainless steel).
- Halogenated solvents or mixtures which form radicals and/or acids, for example:

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

  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.
- Solutions of organic acids (acetic acid, formic acid, and so on) in organic solvents. For example, a 1-% solution of acetic acid in methanol will attack steel.
- Solutions containing strong complexing agents (for example, EDTA, ethylene diamine tetra-acetic acid).
- Mixtures of carbon tetrachloride with 2-propanol or THF.

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 Agilent 1100 series modules for download.

Index

Agilent Technologies

In This Book

This manual contains technical reference information about the Agilent 1100 Series fraction collectors. The manual describes the following:

- installing the fraction collector,
- modes of operation,
- troubleshooting and test functions,
- repairing the fraction collector,
- parts and materials,
- introduction to the fraction collector and theory of operation,
- control module screens,
- specifications,
- legal, safety and warranty information.

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