



# Agilent 1100 Series Well-plate Sampler & Micro Well-plate Sampler



**Reference Manual**



**Agilent Technologies**

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This guide is valid for A.01.xx revisions of the Agilent 1100 Series Well-plate Sampler & Micro Well-plate Sampler software, where xx refers to minor revisions of the software that do not affect the technical accuracy of this guide.

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#### WARNING

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

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### Site Requirements

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

#### Power Consideration

The autosampler power supply has wide-ranging capability (see [Table 1](#) on page 16). Consequently there is no voltage selector in the rear of the autosampler. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

The thermostatted autosampler comprises two modules, the sampler (G1367A or G1377A) 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 sampler module. The thermostat power supply has two externally accessible fuses.

---

**WARNING**

**To disconnect the autosampler 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 autosampler from line power, unplug the power cord from the autosampler and the ALS 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 autosampler 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 autosampler dimensions and weight (see [Table 1](#) on page 16) 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 autosampler is installed in a horizontal position.

The thermostatted sampler dimensions and weight (see [Table 1](#) on page 16) 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 autosampler 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 sampler it is recommended to position the modules in two stacks, see "[Recommended Stack Configuration - Well-plate Sampler \(Front View\)](#)" on page 20. Make sure that in this configuration there is 25 cm (10 inches) space on either side of the thermostatted sampler for the circulation of air.

## 1 Installing the Sampler

### Environment

Your autosampler will work within specifications at ambient temperatures and relative humidity as described in [Table 1](#).

#### CAUTION

Do not store, ship or use your autosampler under conditions where temperature fluctuations may cause condensation within the autosampler. Condensation will damage the system electronics. If your autosampler 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 - sampler (G1367A / G1377A)

Type	Specification	Comments
Weight	15.5 kg (34.2 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)	300 VA	Maximum
Power consumption (active power)	200 W	Maximum
Ambient operating temperature	4 to 55 °C (41 to 131 °F)	
Ambient non-operating temperature	-40 to 70 °C (-4 to 158 °F)	
Humidity	< 95 %, at 25 to 40 °C (77 to 104 °F)	Non-condensing
Operating Altitude	Up to 2000 m (6500 ft)	
Non-operating altitude	Up to 4600 m (14950 ft)	For storing the autosampler
Safety standards: IEC, CSA, UL	Installation Category II, Pollution Degree 2	



## Unpacking the Sampler

**CAUTION**

If you need to ship the autosampler at a later date, always use the shipping protection foam parts (see ["Transporting the Sampler"](#) on page 41).

---

### Damaged Packaging

Upon receipt of your autosampler, 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 autosampler 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 autosampler, please do not attempt to install the autosampler.

---

### Delivery Checklist

Ensure all parts and materials have been delivered with the autosampler. 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.

## 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 (G1367-68705) shown in [Table 2](#) is shipped with the (G1367A) well-plate and the (G1368A) thermostatted well-plate samplers.
- The Accessory kit (G1377-68705) shown in [Table 3](#) on page 19 is shipped with the (G1377A) micro well-plate and the (G1378A) thermostatted micro well-plate samplers.

**Table 2** Well-plate Sampler Accessory Kit Contents G1367-68705

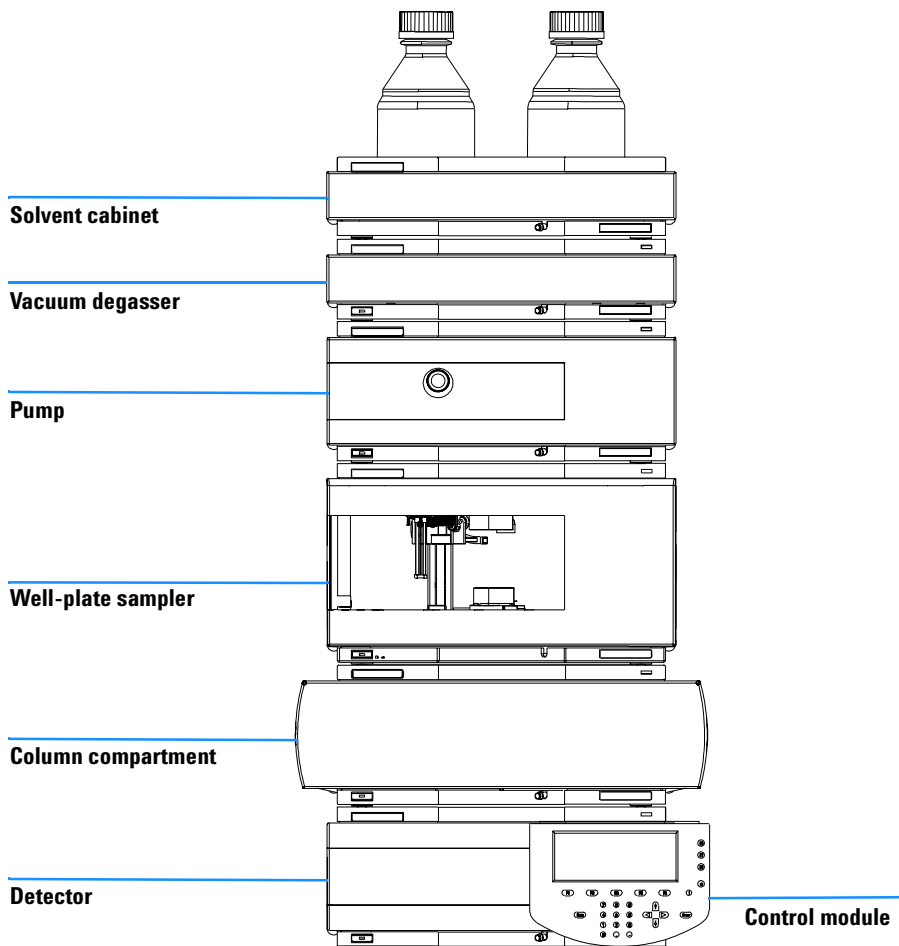
Description	Quantity	Part Number
Capillary sampler-column (380 mm, 0.17 mm ID)	1	01090-87306
96 well-plate 0.5 ml, PP (pack of 10)	1	5042-1386
Tubing assembly	1	5063-6527
Filter kit	1	5064-8240
CAN cable, 1 m	1	5181-1519
Vials, screw cap 100/pk	1	5182-0716
Blue screw caps 100/pk	1	5182-0717
Valve catalog	1	5988-2999
Hex key 9/64 inch (for injection-valve screws)	1	8710-0060
Wrenches 1/4 – 5/16 inch	2	8710-0510
Rheotool socket wrench 1/4 inch	1	8710-2391
Hex key 4.0 mm, 15 cm long, T-handle	1	8710-2392
Hex key 9/64 inch, 15 cm long, T-handle	1	8710-2394
Hex key 2.0 mm	1	8710-2438
ESD wrist strap	1	9300-1408
Air channel adapter	1	G1329-43200
Capillary pump-sampler (900 mm, 0.17 mm ID)	1	G1329-87300
WPS leak kit	1	G1367-60006

**Table 3** Micro well-plate Sampler Accessory Kit Contents G1377-68705

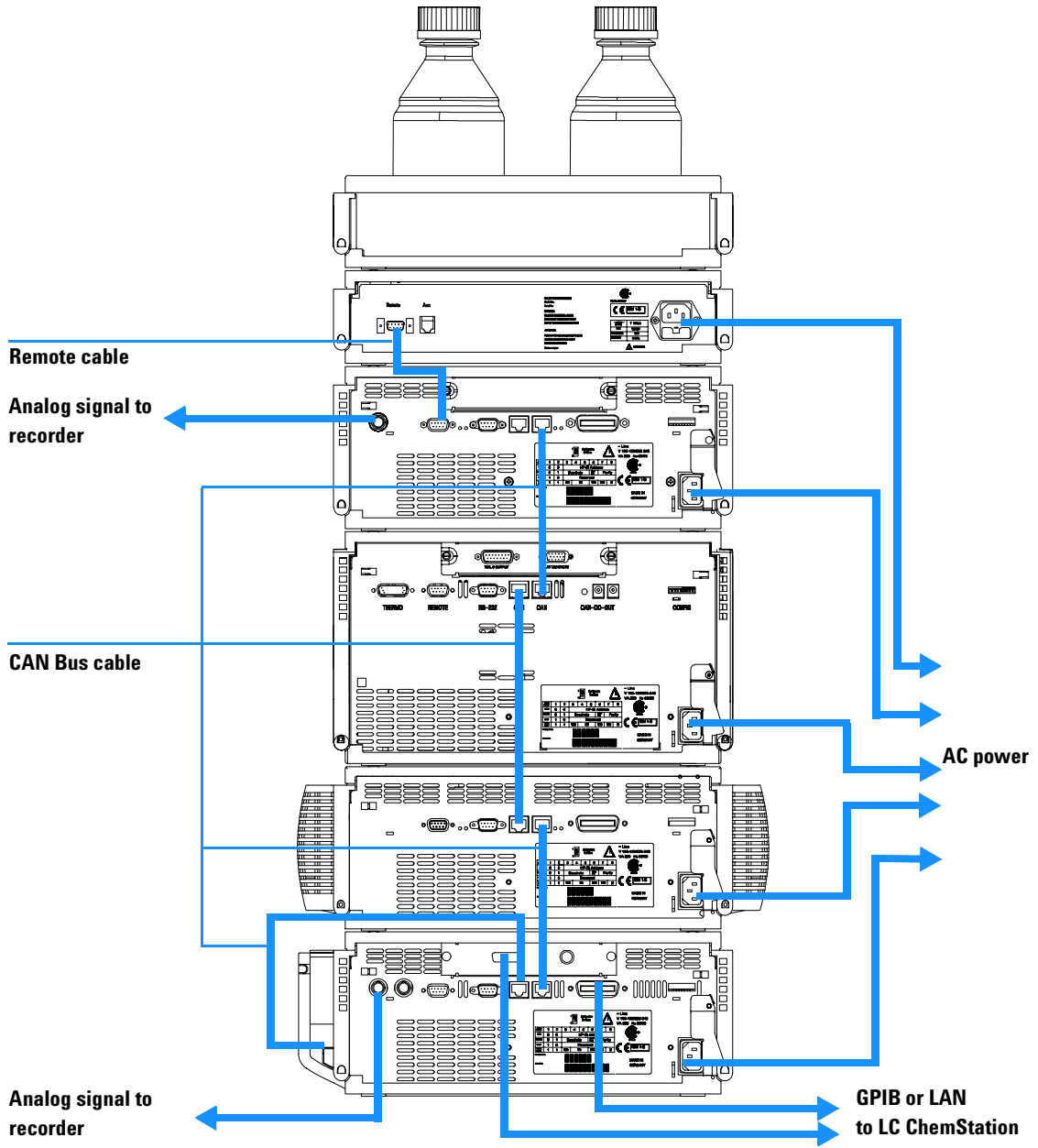
<b>Description</b>	<b>Quantity</b>	<b>Part Number</b>
96 well-plate 0.5 ml, PP (pack of 10)	1	5042-1386
Tubing assembly	1	5063-6527
Filter kit	1	5064-8240
CAN cable, 1 m	1	5181-1519
Vials, screw cap 100/pk	1	5182-0716
Blue screw caps 100/pk	1	5182-0717
Valve catalog	1	5988-2999
Hex key 9/64 inch (for injection-valve screws)	1	8710-0060
Wrenches 1/4 – 5/16 inch	2	8710-0510
Wrench 4.0 mm open end	1	8710-1534
Rheotool socket wrench 1/4 inch	1	8710-2391
Hex key 4.0 mm, 15 cm long, T-handle	1	8710-2392
Hex key 9/64 inch, 15 cm long, T-handle	1	8710-2394
Hex key 2.5 mm, 15 cm long, straight handle	1	8710-2412
Hex key 2.0 mm	1	8710-2438
ESD wrist strap	1	9300-1408
Torque adapter	1	G1315-45003
Air channel adapter	1	G1329-43200
Capillary sampler-column (500 mm, 0.05 mm ID)	1	G1375-87304
40 µl Loop capillary	1	G1377-87300
WPS leak kit	1	G1367-60006

## Optimizing the Stack Configuration

If your autosampler is part of a system, you can ensure optimum performance, ensuring minimum delay volume by installing the following configuration. [Figure 1](#) and [Figure 2](#) on page 21 show the configuration recommended for the sampler. [Figure 3](#) on page 22 and [Figure 4](#) on page 23 show the configuration recommended for the thermostatted sampler.

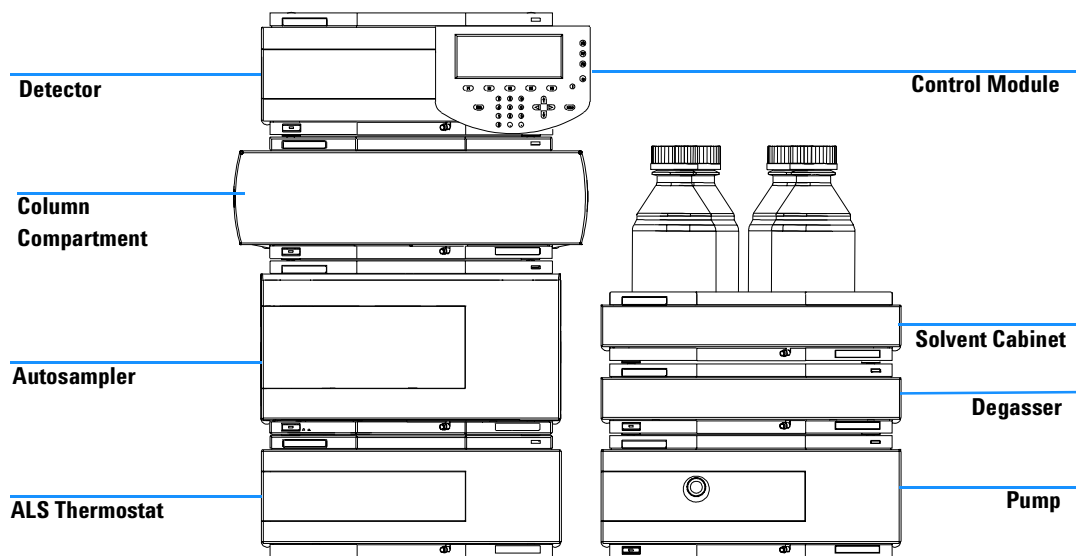


**Figure 1** Recommended Stack Configuration - Well-plate Sampler (Front View)

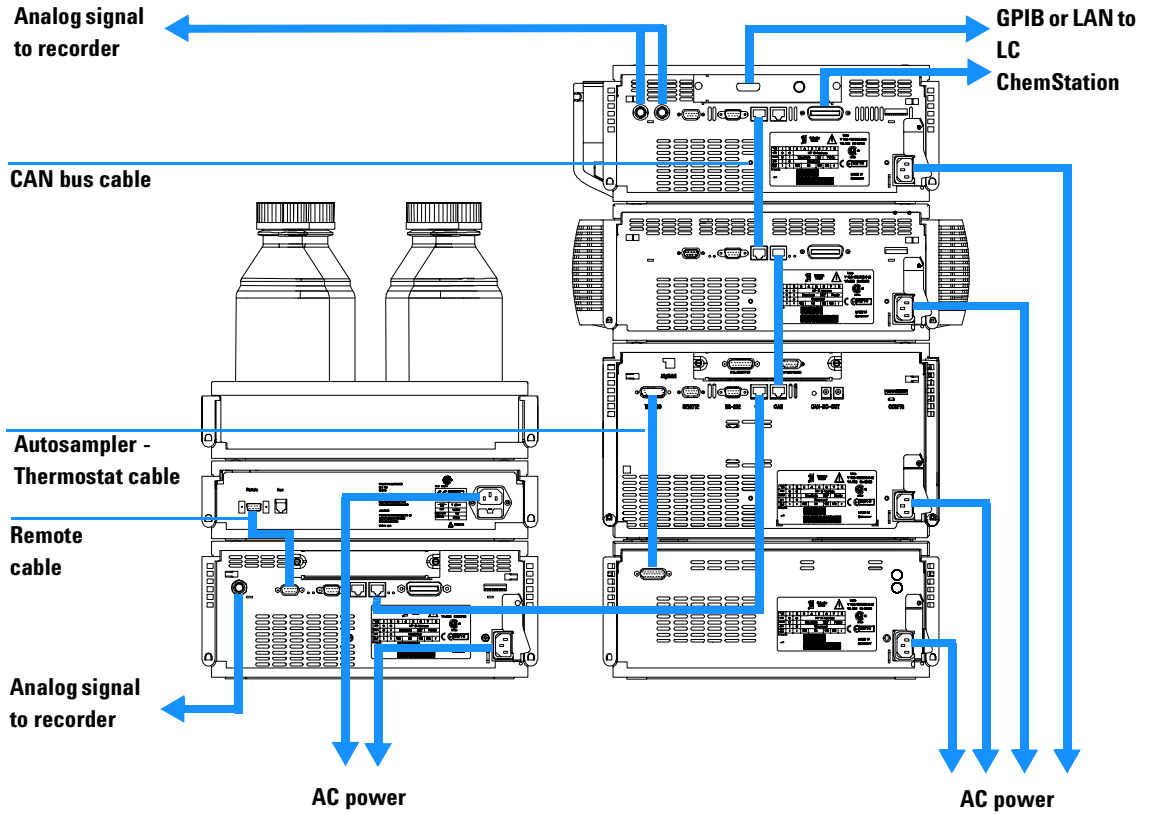


**Figure 2** Recommended Stack Configuration - Well-plate Sampler (Rear View)

## 1 Installing the Sampler



**Figure 3** Recommended Stack Configuration - Thermostatted Sampler (Front View)



**Figure 4** Recommended Stack Configuration - Thermostatted Sampler (Rear View)

# Installing the Sampler

<b>Preparation</b>	Locate bench space Provide power connections
<b>Parts required</b>	Unpack the sampler Sampler Power cord, for the other cables see below and " <a href="#">Cable Overview</a> " on page 178 Chemstation and/or Control Module G1323B

### WARNING

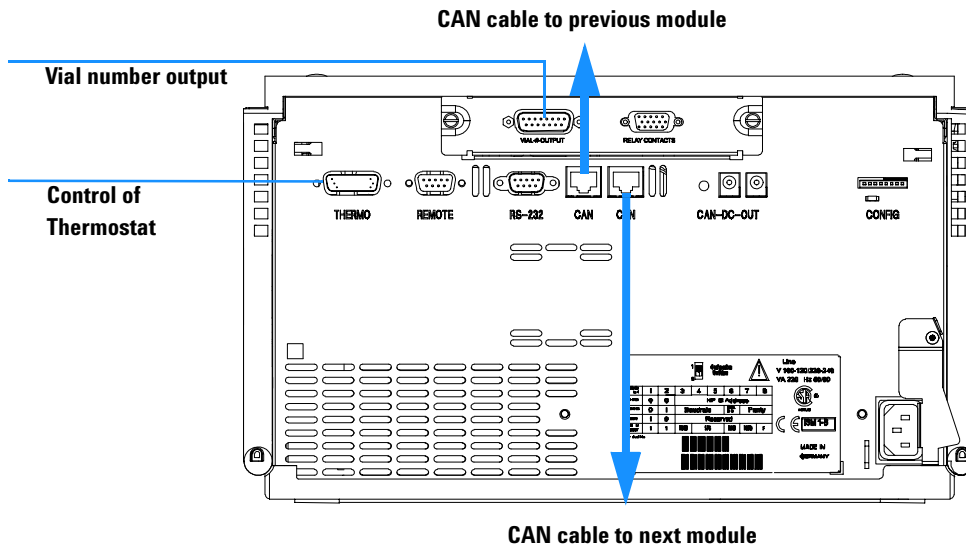
**To avoid personal injury, keep fingers away from the needle area during autosampler operation. Do not attempt to insert or remove a vial or a plate when the needle is positioned.**

---

- 1 Install the LAN interface board in the sampler (if required), see "[Interface Board](#)" on page 129.
- 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 Re-install the corrugated waste tube in the plastic port.
- 6 Re-install the left side door (take care of the magnet at the back).
- 7 Place the autosampler in the stack or on the bench in all horizontal position.
- 8 Ensure the power switch at the front of the sampler is OFF.
- 9 Connect the power cable to the power connector at the rear of the sampler.
- 10 Connect the CAN cable to the other Agilent 1100 modules.
- 11 If a Agilent ChemStation is the controller, connect either
  - the GPIB cable to the detector
  - the LAN connection to the LAN interface
- 12 Connect the APG remote cable (optional) for non Agilent 1100 Series instruments.
- 13 Ensure the side panel is correctly installed.



- 14 Turn ON power by pushing the button at the lower left hand side of the sampler.
- 15 Close the front door. The exhaust fan will turn ON and remove the vapor from the tray compartment. After 1-2 minutes the sampler will start the hardware initialisation process. At the end of this process the status LED should be green.



**Figure 5** Cable Connections

**NOTE**

The sampler 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 sampler from the line, unplug the power cord. The power will supply still uses some power, even switch at the front panel is turned OFF.

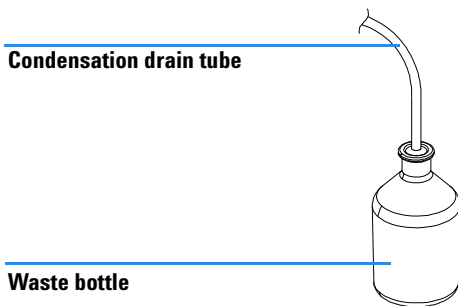
## Installing a Thermostatted Sampler

<b>Preparation</b>	Locate bench space Provide power connections
<b>Parts required</b>	Unpack the sampler and the thermostat Sampler and thermostat Power cord, for the other cables see below and, " <a href="#">Cable Overview</a> " on page 178 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 the waste bottle.

### WARNING

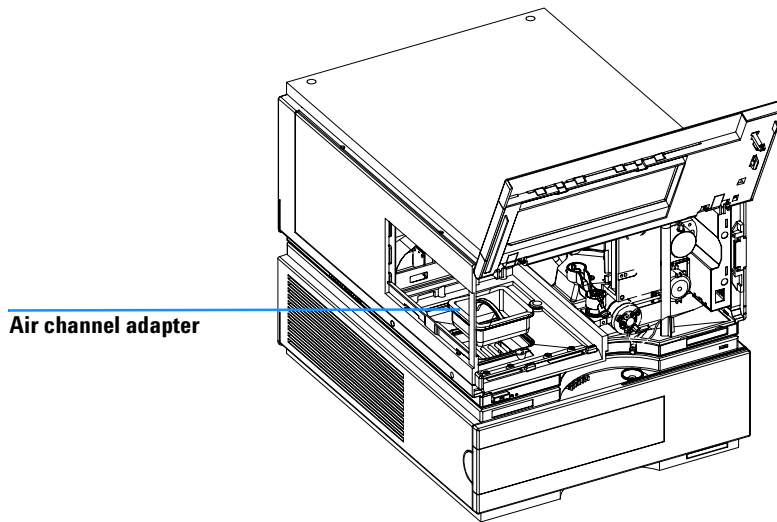
**Make sure that the condensation drain tube is always above the liquid level in the vessel. If the tube is located in liquid the condensed water cannot flow out of the tube and the outlet is blocked. Any further condensation will then remain in the instrument. This may damage the instruments electronics.**



**Figure 6** Condensation leak outlet

- 3 Install the LAN interface board in the sampler (if required), see "[Interface Board](#)" on page 129.
- 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 Re-install the corrugated waste tube in the plastic port.

- 8 Re-install the left side door (take care of the magnet at the back).
- 9 Place the sampler on top of the thermostat. Make sure that the sampler is correctly engaged in the thermostat locks.
- 10 Remove the tray and the plastic cover from the tray base, place the air channel adapter into the sampler 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 well-plate sampler.



**Figure 7** Installation of Thermostat and Sampler

- 11 Re-install the tray.
- 12 Ensure the power switch on the front of the sampler is OFF and the power cables are disconnected.
- 13 Connect the cable between the well-plate sampler and the thermostat, see [“Connection at the rear of thermostatted Sampler”](#) on page 29.

**WARNING**

**Do not disconnect or reconnect the well-plate sampler to thermostat cable when the power cords are connected to either of the two modules. This will damage the electronics of the modules.**

## 1 Installing the Sampler

- 14 Connect the power cables to the power connectors.
- 15 Connect the CAN cable to other Agilent 1100 series modules.
- 16 If a Agilent ChemStation is the controller, connect either
  - the GPIB cable to the detector
  - the LAN connection to the LAN interface
- 17 Connect the APG remote cable (optional) for non Agilent 1100 Series instruments.
- 18 Ensure the side panel is correctly installed.
- 19 Turn ON power by pushing the button at the lower left hand side of the sampler.
- 20 Close the front door. The exhaust fan will turn ON and remove the vapor from the tray compartment. After 1-2 minutes the sampler will start tile hardware initialisation process. At the end of this process the status LED should be green.

### NOTE

The sampler 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.

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### WARNING

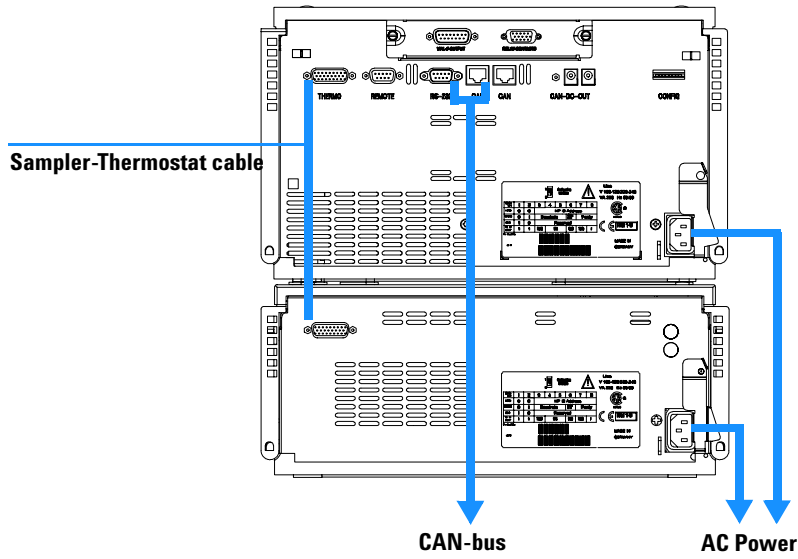
**To disconnect the sampler from the line, unplug the power cord. The power supply still uses some power, even if the power switch at the front panel is turned OFF.**

---

### WARNING

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

---



**Figure 8** Connection at the rear of thermostatted Sampler

### Flow Connections to the Sampler

Preparation  
Parts required

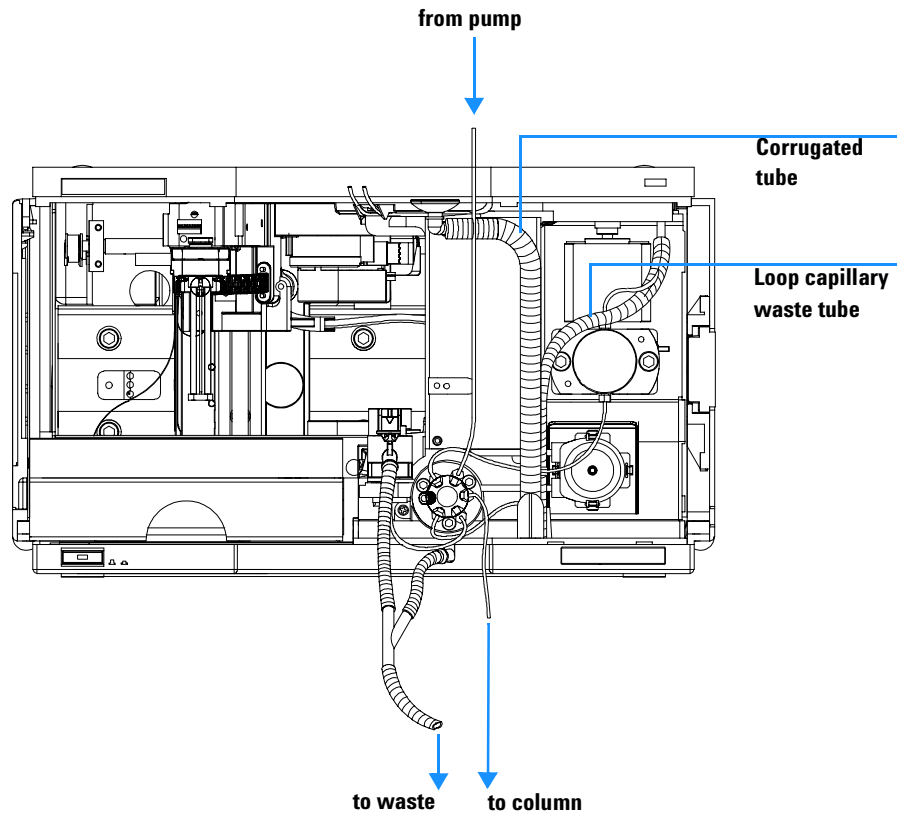
Sampler is installed in the LC system  
Parts form the accessory kits, see ["Accessory Kits"](#) on page 18

#### **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.**

---

- 1 Connect the pump outlet capillary to port 1 of the injection valve.
- 2 Connect column-compartment inlet capillary to port 6 of the injection valve.
- 3 Connect the corrugated waste tube to the seat adapter and the solvent waste from the leak plane.
- 4 Ensure that the waste tube is positioned inside the leak channel.
- 5 Drive the tube from the peristaltic flush pump to the solvent bottle in the solvent cabinet
- 6 Seat capillary: see recommendations in ["Choice of Seat Capillary"](#) on page 54



**Figure 9** Hydraulic Connections

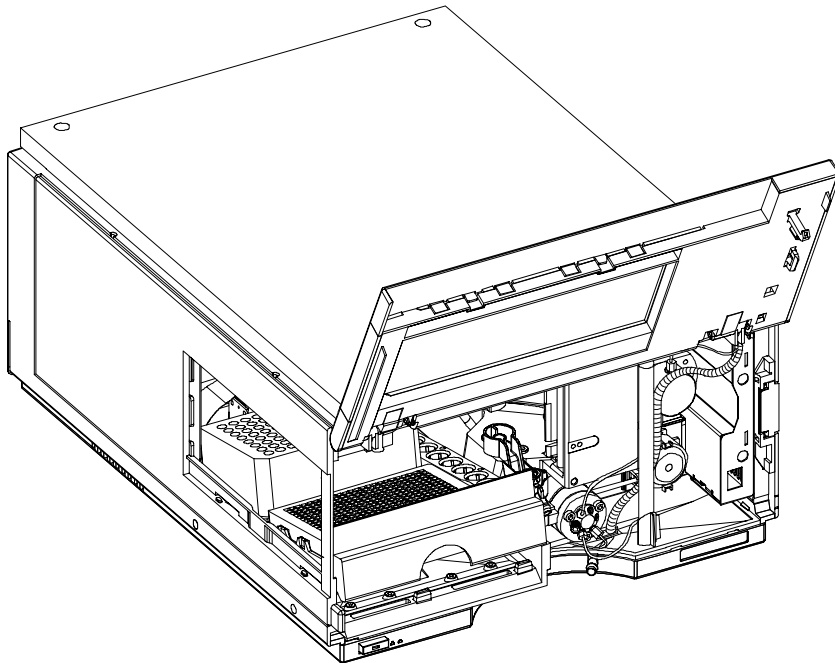
## Sample Trays

### Installing the Well-plate Sample Tray

- 1 Press the bottom on the right side to release the front door.
- 2 Lift the front door.
- 3 Load the sample tray with sample well-plates and vials as required.
- 4 Slide the sample tray into the autosampler so that the rear of the sample tray is seated firmly against the rear of the sample-tray area.
- 5 Press the front of the sample tray down to secure the tray in the autosampler.

**NOTE**

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



**Figure 10** Installing Well-plate Sample Trays



### Supported Trays for a Standard Sampler

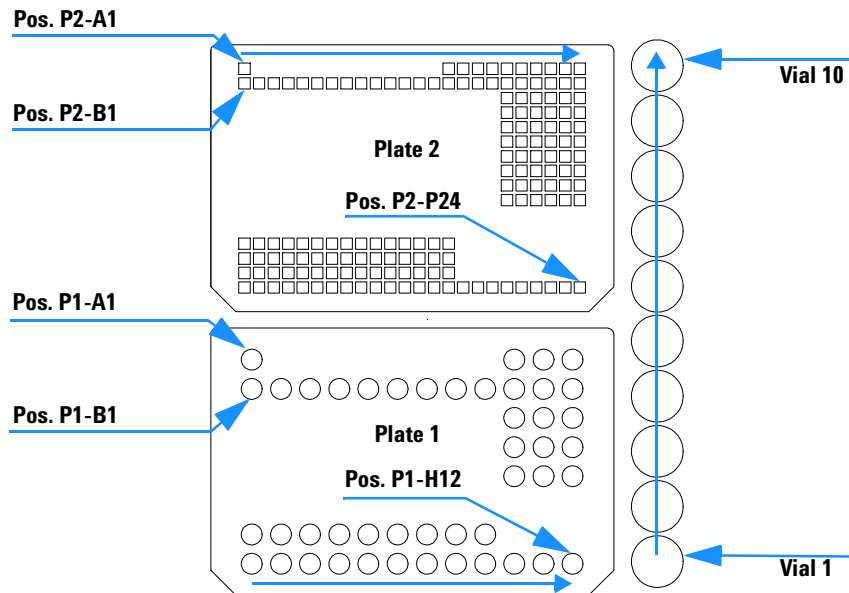
**Table 4** Trays for a standard samplers

G1367-60001	Tray for 2 plates and 10 x 2 ml vials
G1313-44500	Tray for 100 x 2 ml vials

### Supported Trays for a Thermostatted Sampler

**Table 5** Trays for a thermostatted samplers

G1367-60001	Tray for 2 plates and 10 x 2 ml vials
G1329-60001	Tray for 100 x 2 ml vials, thermostattable



**Figure 11** Numbering of vial and well plate position

## List of recommended Plates and Closing Mat

**Table 6** Recommended plates and closing mat

Description	Rows	Columns	Plate height	Volume (µl)	Part Number	Package
384Agilent	16	24	14.4	80	5042-1388	30
384Corning	16	24	14.4	80	No Agilent PN	
384Nunc	16	24	14.4	80	No Agilent PN	
96Agilent	8	12	14.3	400	5042-1386 5042-1385	10 120
96CappedAgilent	8	12	47.1	300	5065-4402	1
96Corning	8	12	14.3	300	No Agilent PN	
96CorningV	8	12	14.3	300	No Agilent PN	
96DeepAgilent31mm	8	12	31.5	1000	5042-6454	50
96DeepNunc31mm	8	12	31.5	1000	No Agilent PN	
96DeepRitter41mm	8	12	41.2	800	No Agilent PN	
96Greiner	8	12	14.3	300	No Agilent PN	
96GreinerV	8	12	14.3	250	No Agilent PN	
96Nunc	8	12	14.3	400	No Agilent PN	
Closing mat for all 96 Agilent plates	8	12			5042-1389	50

**WARNING**

If you are using flammable solvents, remove the plates from the sampler after turning it OFF. 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 sampler has no prepunch needle, therefore the adhesive will clog the needle after several injections.

---

## List of Recommended Vials and Caps

**Table 7** Crimp Top Vials

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 8** SnapTop Vials

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 9** Screw Top Vials

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 10** Crimp Caps

<b>Description</b>	<b>Septa</b>	<b>100/Pack</b>
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 11** Snap Caps

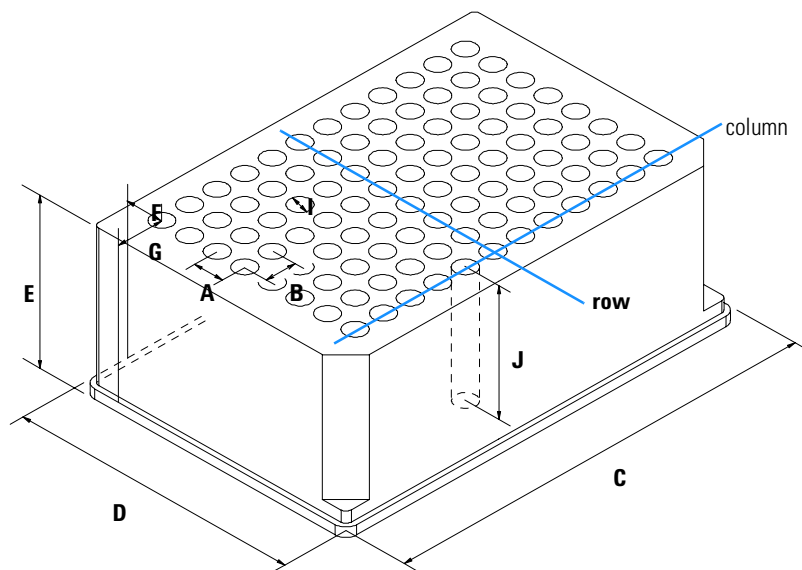
<b>Description</b>	<b>Septa</b>	<b>100/Pack</b>
Clear polypropylene	Clear PTFE/red rubber	5182-0550
Blue polypropylene	Clear PTFE/red rubber	5182-3458
Green polypropylene	Clear PTFE/red rubber	5182-3457
Red polypropylene	Clear PTFE/red rubber	5182-3459

**Table 12** Screw Caps

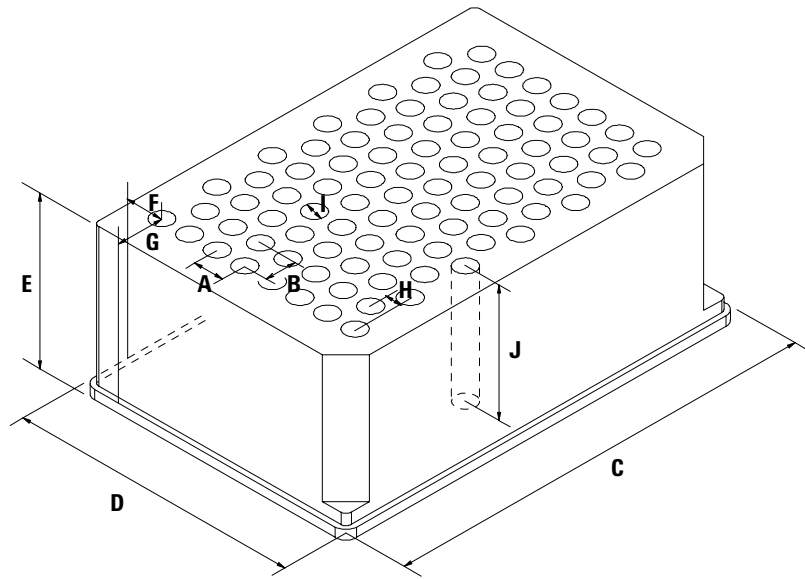
<b>Description</b>	<b>Septa</b>	<b>100/Pack</b>
Blue polypropylene	Clear PTFE/red rubber	5182-0717
Green polypropylene	Clear PTFE/red rubber	5182-0718
Red polypropylene	Clear PTFE/red rubber	5182-0719
Blue polypropylene	Clear PTFE/silicone	5182-0720
Green polypropylene	Clear PTFE/silicone	5182-0721
Red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

## Configure Well-plate Types

If the plate you are using is not found on the [“List of recommended Plates and Closing Mat”](#) on page 34 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 12** Well-plate Dimensions (straight)



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

**Table 13** Well Plate Dimensions

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 $\mu\text{l}$ ) 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

## 1 Installing the Sampler

**Table 13** Well Plate Dimensions (continued)

Location	Description	Definition	Limits
F	Row offset	Distance (in mm) from the back edge (bottom) to the center of the first hole (A1)	
G	Column offset	Distance (in mm) from the left 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 calipers.

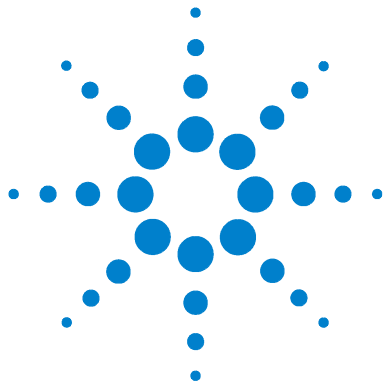


## Transporting the Sampler

When moving the autosampler inside the laboratory, no special precautions are needed. However, if the autosampler 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.

## **1 Installing the Sampler**



## 2 Optimizing Performance

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### Optimizing Performance

Autosamplers are more and more used in HPLC to improve the productivity in the laboratories and the consistency and accuracy of analytical results.

The informations below will help you on how to optimize some parameters to achieve best results for:

- lowest carry-over for reliable quantitative data
- Fast injection cycles for high throughput
- Low delay volume for fast gradient
- Precise injection volume

## Optimization for Lowest Carry-over

Several parts of an injection system can contribute to carry-over:

- needle outside
- needle inside
- needle seat
- sample loop
- seat capillary
- injection valve

The well plate sampler continuous flow-through design ensures that sample loop, needle inside, seat capillary, and the mainpass of the injection valve is always in the flow line. These parts are continuously flushed during an isocratic and also during a gradient analysis. The residual amount of sample remaining on the outside of the needle after injection may contribute to carry-over in some instances. When using small injection volumes or when injecting samples of low concentration immediately after samples of high concentration, carry-over may become noticeable. Cleaning the needle in the flush port or using the automated needle wash enables the carry-over to be minimized and prevents also contamination of the needle seat.

### Using the Automated Needle Wash

The automated needle wash can be programmed either as “injection with needle wash” or the needle wash can be included into the injector program. When the automated needle wash is used, the needle is moved into a wash vial after the sample is drawn. By washing the needle after drawing a sample, the sample is removed from the surface of the needle immediately.

#### Uncapped Wash Vial

For best results, the wash vial should contain solvent in which the sample components are soluble, and the vial should *not* be capped. If the wash vial is capped, small amounts of sample remain on the surface of the septum, which may be carried on the needle to the next sample.

### Injector Program with Needle Wash

The injector program includes the command NEEDLE WASH. When this command is included in the injector program, the needle is lowered once into the specified wash vial before injection.

For example:

```
1 DRAW 5 µl
2 NEEDLE WASH vial 7
3 INJECT
```

Line 1 draws 5 µl from the current sample vial. Line 2 moves the needle to vial 7. Line 3 injects the sample (valve switches to main pass).

### Using the Flush Port

During the injection process when the sample is in the loop and when the valve still is in Bypass, the outside of the needle can be washed in a flush port located behind the injection port on the sampling unit. As soon the needle is in the flush port a peristaltic pump fills the flush port with fresh solvent during a defined time. The volume of the flush port is about 680 µl and the pump delivers 6 ml/min. Setting the wash time to 10 seconds is sufficient to refill 2 times the flush port. In most cases this is enough to clean the needle outside. At the end of this flush process the needle return to the injection port, the valve is switched to the Mainpass position and directs the pump flow back through the sample loop.

Further reduction of carry-over can be obtained using an injector program with additional injection valve switching, see [“Using an Injector Program”](#) on page 47

### Recommended wash solvents

- water
- ethanol
- methanol
- water/acid
- water/acetonitrile

**NOTE**

The live time of the tubing in the peristaltic pump is shortened by the usage of organic solvents.

---

## Using an Injector Program

The process is based on a program that switches the bypass groove of the injection valve into the flow line for cleaning. This switching event is performed at the end of the equilibration time to ensure that the bypass groove is filled with the start concentration of the mobile phase. Otherwise the separation could be influenced, especially if microbore columns are used.

### For example:

Outside wash of needle before injection: 14 sec. using flush port

Injector program:

Draw x.x (y)  $\mu\text{l}$  from sample

Needle wash as method

Inject

Wait (equilibration time - see text above)

Valve bypass

Wait 0.2 min

Valve mainpass

Valve bypass

Valve mainpass

Using such an injector program in addition with the needle wash in the flush port can reduce the carry-over by a factor of about 10 compared with a standard needle wash in the flush port only.

**NOTE**

Overlapped injection together with additional injection valve switching is not possible.

---

### General Recommendation to Lowest Carry-over

- Prime flush pump daily for 3 minutes with appropriate solvent previous to the first run.
- Set needle wash in flush port to at least 10 seconds.
- Use previously described injector program ([page 47](#)) as injection mode if carry-over is significantly higher than 0.01 %.
- For samples where needle outside cannot be cleaned sufficiently with water or alcohol use wash vials with an appropriate solvent. Using an injector program and several wash vials can be used for cleaning.

In case the needle seat has got contaminated and carry-over is significantly higher than expected, the following procedure can be used to clean the needle seat:

- Go to MORE INJECTOR and set needle to home position.
- Pipette an appropriate solvent on to the needle seat. The solvent should be able to dissolve the contamination. If this is not known use 2 or 3 solvents of different polarity. Use several milliliters to clean the seat. The liquid leaves the seat via the drainage for the flush port.
- Clean the needle seat with a tissue and remove all liquid from it.
- RESET the injector.



## Fast Injection Cycle and Low Delay Volume

Short injection cycle times for high sample throughput is one of the main issues in analytical laboratories. Shortening cycle time starts with:

- shortening column length
- high flow rate
- steep gradient

Having optimized these parameters, further reduction of cycle times can be obtained using the overlapped injection mode.

### Overlapped Injection Mode

In this process, as soon as the sample has reached the column, the injection valve is switched back to bypass and the next injection cycle starts but waits with switching to mainpass until the actual run is finished. You gain the sample preparation time when using this process.

Switching the valve into the bypass position reduces the system delay volume by approximately 300  $\mu\text{l}$  (the mobile phase is directed to the column without passing sample loop, needle and needle seat capillary). This can help to have faster cycle times especially if low flow rates have to be used like it is mandatory in narrow bore and micro bore HPLC.

**NOTE**

Having the valve in bypass position can increase the carry-over in the system.

The injection cycle times also depend on the injection volume. In identically standard condition, injecting 100  $\mu\text{l}$  instead of 1  $\mu\text{l}$ , increase the injection time by approximately 8 sec. In this case and if the viscosity of the sample allows it, the draw and eject speed of the injection system has to be increased.

### NOTE

For the last injection of the sequence with overlapped injections it has to be considered that for this run the injection valve is not switched as for the previous runs and consequently the injector delay volume is not bypassed. This means the retention times are prolonged for the last run. Especially at low flow rates this can lead to retention time changes which are too big for the actual calibration table. To overcome this it is recommended to add an additional "blank" injection as last injection to the sequence.

---

### General Recommendations for Fast Injection Cycle Times

As described in this section, the first step to provide short cycle times are optimizing the chromatographic conditions. If this is done the well-plate sampler parameter should be set to:

- Overlapped injection mode
- Wash time for needle outside set to 10 seconds
- Increase of draw and eject speed for large injection volumes
- Add at last run a blank, if overlapped injection is used

To reduce the injection time, the detector balance has to be set to OFF.

## Precise Injection Volume

### Injection Volumes Less Than 2 $\mu\text{l}$

When the injection valve switches to the BYPASS position, the mobile phase in the sample loop is depressurized. When the syringe begins drawing sample, the mobile phase is further subjected to decreasing pressure. If the mobile phase is not adequately degassed, small gas bubbles may form in the sample loop during the injection sequence. When using injection volumes < 2  $\mu\text{l}$ , these gas bubbles may affect the injection-volume precision. For best injection-volume precision with injection volumes < 2  $\mu\text{l}$ , use of the Agilent 1100 Series degasser is recommended to ensure the mobile phase is adequately degassed. Also, using the automated needle wash (see ["Optimization for Lowest Carry-over"](#) on page 45) between injections reduces carry-over to a minimum, improving injection-volume precision further.

## Draw and Eject Speed

### Draw Speed

The speed at which the metering unit draws sample out of the vial may have an influence on the injection volume precision when using viscous samples. If the draw speed is too high, air bubbles may form in the sample plug, affecting precision. The default draw speed is suitable for the majority of applications, however, when using viscous samples, set the draw speed to lower speed for optimum results. A "DRAW" statement in an injector program also uses the draw speed setting which is configured for the well plate sampler.

### Eject Speed

The default draw speed is suitable for the majority of applications. When using large injection volumes, setting the eject speed to a higher value speeds up the injection cycle by shortening the time the metering unit requires to eject solvent at the beginning of the injection cycle (when the plunger returns to the home position).

An "EJECT" statement in an injector program also uses the eject speed setting which is configured for the well plate sampler. A faster eject speed shortens the time required to run the injector program. When using viscous samples, a high eject speed should be avoided.

## 2 Optimizing Performance

**Table 14** Draw and eject speed

	<b>Draw speed (μl)</b>	<b>Eject speed (μl)</b>
Well Plate Sampler		
Default value	200	200
Minimum	10	10
Maximum	1000	1000
Micro Well Plate Sampler with 8μl loop capillary		
Default value	4	10
Minimum	0.7	0.7
Maximum	20	100
Micro Well Plate Sampler with 40μl loop capillary		
Default value	4	10
Minimum	0.7	0.7
Maximum	250	250

## Choice of Rotor Seal

### Vespel™ Seal

The standard seal has sealing material made of Vespel. Vespel is suitable for applications using mobile phases within the pH range of 2.3 to 9.5, which is suitable for the majority of applications. However, for applications using mobile phases with pH below 2.3 or above 9.5, the Vespel seal may degrade faster, leading to reduced seal lifetime.

### Tefzel™ Seal

For mobile phases with pH below 2.3 or above 9.5, or for conditions where the lifetime of the Vespel seal is drastically reduced, a seal made of Tefzel is available (see [“Injection-Valve Assembly”](#) on page 167). Tefzel is more resistant than Vespel to extremes of pH, however, is a slightly *softer* material. Under normal conditions, the expected lifetime of the Tefzel seal is shorter than the Vespel seal, however, Tefzel may have the longer lifetime under more extreme mobile phase conditions.

### Choice of Seat Capillary

Different models of seat capillaries are available for the well-plate sampler and the micro well-plate sampler:

#### For the Well-plate Sampler

The needle seat assembly includes the needle seat and the seat capillary. The part number for this assembly is: G1367-87101.

#### For the Micro Well-plate Sampler

The needle seat assembly is made up of two parts:

- needle seat: G1377-87101.
- seat capillary  
choice of: G1375-87317 (100  $\mu\text{m}$  150 mm)  
G1375-87300 (50  $\mu\text{m}$  150 mm)

**G1375-87317 (100  $\mu\text{m}$ )** is the capillary preinstalled in micro well-plate and thermostatted micro well-plate samplers upon delivery.

This capillary is recommended for applications with a 0.3 mm column or higher. It provides less plugging of the capillary in general and especially with biological samples. For small K' this capillary can provide a higher peak width for isocratic analysis.

G1375-87300 (50  $\mu\text{m}$ ) is available as a spare part and is recommended for applications with a 0.3 mm column or smaller. This capillary gives full chromatographic performance.



## 3 Troubleshooting and Test Functions

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## Overview of the Sampler's Indicators and Test Functions

### Status Indicators

The sampler 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 sampler (see ["Status Indicators"](#) on page 58).

### 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 60).

### Maintenance Functions

The maintenance functions position the needle assembly, the needle carrier, the sample transport assembly and the metering device for easy access when doing maintenance (see ["Maintenance Functions"](#) on page 88).

### Sample Transport Self Alignment

The sample transport self alignment with the sampling unit and the well-plate tray is required to compensate for larger deviations in positioning the needle carrier.

The sample transport self alignment is required after disassembling the system or when you exchange the sample transport, the sampling unit, the tray 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 the standard well-plate tray (Part Number: G1367-60001) in place.**

---



**WARNING**

The sample transport self alignment must be done with an empty tray installed.

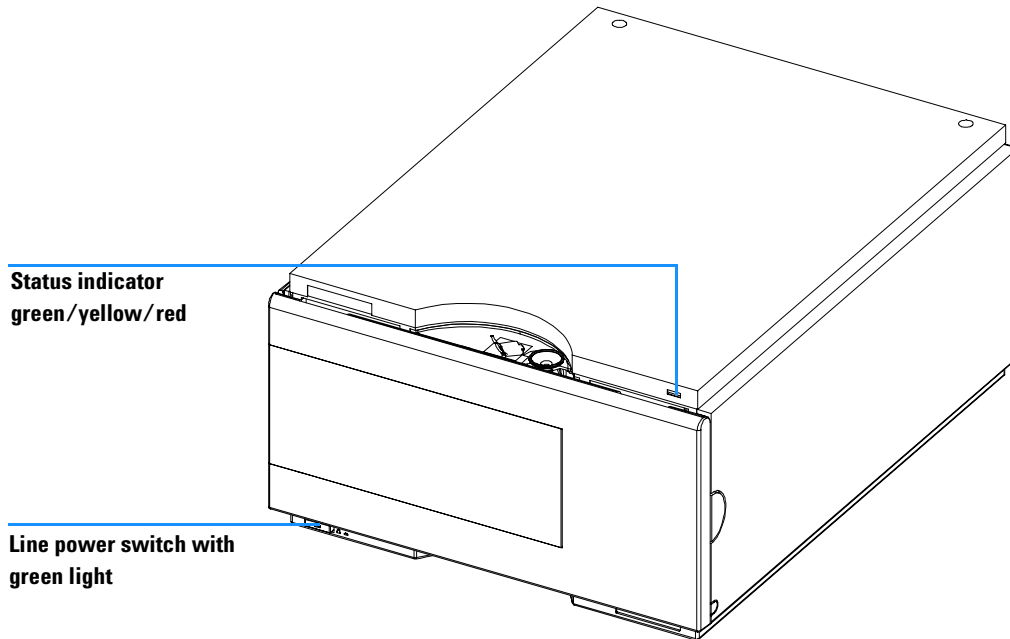
---

**Step Commands**

The step functions enable execution of each step of the sampling sequence individually. The step functions are used primarily for troubleshooting, and for verification of correct sampler operation after repair (see “[Step Commands](#)” on page 57).

## Status Indicators

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



**Figure 14** 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 sampler 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-injection run for a period longer than the timeout threshold.

### Suggested Actions

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

## Shutdown

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

The sampler 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).

### Synchronization Lost

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

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

#### Probable Causes

- CAN cable disconnected.
- Defective CAN cable.
- Defective main board in another module.

#### 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.
- ✓ Ensure all CAN cables are installed correctly.



## Leak

A leak was detected in the sampler.

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

- Loose fittings.
- Broken capillary.
- Leaking rotor seal or needle seat.
- Defective metering seal.

### Suggested Actions

- ✓ Ensure all fittings are tight.
- ✓ Exchange defective capillaries.
- ✓ Exchange the rotor seal or seat capillary.
- ✓ Exchange the metering seal.

#### NOTE

Make sure the leak sensor is thoroughly dry before restarting the well-plate sampler.

---

#### NOTE

Crossflow caused by a leaky rotor seal may cause a spill over of seat in bypass position of valve.

---

## Leak Sensor Open

The leak sensor in the sampler 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 MTP board.
- Defective leak sensor.

### Suggested Actions

- ✓ Ensure the leak sensor is connected correctly.
- ✓ Exchange the leak sensor.

## Leak Sensor Short

The leak sensor in the sampler 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 sampler 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 sampler 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 cooling fan in the sampler 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 well-plate sampler has failed.

The hall sensor on the fan shaft is used by the WPS board to monitor the fan speed. If the fan speed falls below a certain value the error message is generated and the well-plate sampler 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 SLS board are damaged.

#### Probable Causes

- The sensor on the SLS board is defective.
- The door is bent or the magnet is misplaced/broken.

#### Suggested Actions

- ✓ Exchange the door.
- ✓ Exchange the SLS board.
- ✓ Exchange the MTP board.



## Side Door Error

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

### Probable Causes

- The door is bent or the magnet is misplaced/broken.
- The sensor on the MTP board is defective.

### Suggested Actions

- ✓ 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 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.

## Valve to Bypass Failed

The injection valve failed to switch to the bypass position.

The switching of the injection valve is monitored by two microswitches on the valve assembly. The switches detect the successful completion of the valve movement. If the valve fails to reach the bypass position, or if the microswitch does not close, the error message is generated.

### Probable Causes

- Valve in an intermediate position between the By-and the Main position
- Defective injection valve.
- Defective MTP board.

### Suggested Actions

- ✓ Turn the WPS main power OFF and ON.
- ✓ Exchange the injection valve.
- ✓ Exchange the MTP board.

## Valve to Mainpass Failed

The injection valve failed to switch to the mainpass position.

The switching of the injection valve is monitored by two microswitches on the valve assembly. The switches detect the successful completion of the valve movement. If the valve fails to reach the mainpass position, or if the microswitch does not close, the error message is generated.

### Probable Causes

- Valve in an intermediate position between the bypass and mainpass positions.
- Defective injection valve.
- Defective MTP board.

### Suggested Actions

- ✓ Turn the WPS main power OFF and ON.
- ✓ Exchange the injection valve.
- ✓ Exchange the MTP board.

## Needle Lock Failed

The lock assembly on the sampling unit failed to move successfully.

The upper and lower positions of the needle lock are monitored by position sensors on the sampling unit flex board. The sensors detect the successful completion of the needle lock movement. If the needle lock fails to reach the end point, or if the sensors fail to recognize the needle lock movement, the error message is generated.

### Probable Causes

- Defective or dirty position sensors.
- Sticking spindle assembly.
- Defective needle drive motor
- Defective MTP board.

### Suggested Actions

- ✓ Clean the position sensor.
- ✓ Exchange the needle drive motor.
- ✓ Exchange the sampling unit assembly.
- ✓ Exchange MTP board.

## Needle to Needle Seat Position

The needle failed to reach the end position in the needle seat.

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/sampling unit alignment
- Bent needle.
- Missing needle.
- Blocked seat.
- Defective position sensor in the needle carrier assembly.
- Defective MTP board.

### Suggested Actions

- ✓ Do an auto-alignment
- ✓ Check and exchange the needle assembly if necessary.
- ✓ Clean or change the needle seat assembly if necessary.
- ✓ Exchange the needle carrier assembly.
- ✓ Exchange the sample transport assembly.
- ✓ Exchange the MTP board.

## Needle Carrier Failed

The needle carrier on the Sample Transport Assembly failed to move correctly.

### Probable Causes

- Defective Z-motor.
- Vial pusher blocked.
- Bad needle carrier positioning in X or Theta.
- Defective vial pusher sensor.
- Defective MTP main board.

### Possible Actions

- ✓ Exchange the needle carrier assembly.
- ✓ Exchange the sample transport assembly.
- ✓ Exchange the MTP main board.

## Missing Vial or Missing Wash Vial

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

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

### Probable Causes

- No vial in the position defined in the method or sequence.
- Defective needle carrier assembly.
- Defective transport 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 sampler failed to complete initialization correctly.

The sampler 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

- Side door not installed correctly.
- Sample transport/sampling unit not aligned correctly
- Mechanical obstruction.
- Defective sampling unit flex board.
- Defective transport assembly flex board.
- Defective sampling unit motor.
- Defective MTP board.

### Suggested Actions

- ✓ Check if the side door is installed correctly.
- ✓ Check if the magnet is in place in the side door.
- ✓ Do an auto-alignment
- ✓ Ensure unobstructed movement of the transport assembly.
- ✓ Exchange the defective sampling unit motor.
- ✓ Exchange the sample transport assembly.
- ✓ Exchange the MTP board.

## Metering Home Failed

The metering plunger has failed to move back to the home position.

The home position sensor on the sampling unit flex board monitors the home position of the plunger. If the plunger fails to move to the home position, or if the sensor fails to recognize the plunger position, the error message is generated.

### Probable Causes

- Dirty or defective sensor.
- Broken plunger.
- Defective metering-drive motor.
- Defective MTP board.

### Suggested Actions

- ✓ Exchange the sampling unit flex board.
- ✓ Exchange the metering plunger and seal.
- ✓ Exchange the metering-drive motor.
- ✓ Exchange the MTP board.

## Motor Temperature

One of the motors of the transport 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 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 assembly.
- Motor belt tension too high.
- Defective motor.
- Defective transport assembly flex board.

### Suggested Actions

- ✓ Switch off the sampler 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.

### Invalid Vial Position

The vial position defined in the method or sequence does not exist.

The reflection sensors on the transport assembly flex board are used to check automatically which sample trays are installed (coding on tray). If the vial position does not exist in the current sample tray configuration, the error message is generated.

#### Probable Causes

- Incorrect tray installed.
- Incorrect tray definition.
- Incorrect vial positions defined in the method or sequence.
- Tray recognition defective (dirty sample tray or defective transport assembly flex board).

#### Suggested Actions

- ✓ Install the correct trays, or edit the method or sequence accordingly.
- ✓ Ensure the coding surfaces of the sample tray are clean (located at the rear of the sample tray).
- ✓ Exchange the transport assembly.

## Peristaltic Pump Error

The peristaltic pump motor in the well-plate sampler has failed.

The current on the motor is used by the MTP board to monitor the speed of the peristaltic pump motor. If the current falls below a certain value, the error message is generated.

### Probable Causes

- Defective motor.
- Defective SUD board.
- Defective MTP main board.

### Suggested actions

- ✓ Exchange the peristaltic pump motor.
- ✓ Exchange the SUD board.
- ✓ Exchange the MTP main board.

#### Vessel or Wash Vessel Error

The needle does not reach the target position in the vial or in the vessel of the well-plate.

The sensor behind the vial pusher in the needle carrier assembly detects the successful completion of the needle movement to the vessel. If the needle fails to reach the end point, the sensor fails to recognize the needle movement and the error message is generated.

#### Probable Causes

- Bad vessel definition in the plate configuration.
- Closing mats too rigid/thick.
- Bad X or Theta positioning.
- Defective encoder on the needle carrier assembly.

#### Suggested Actions

- ✓ Check the vessel definition in the plate configuration.
- ✓ Check that the closing mats is not too thick.
- ✓ Exchange the needle carrier assembly.
- ✓ Change the sample transport assembly.
- ✓ Change the MTP main board

## Vessel Stuck to Needle

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

### Possible causes

- Closing mat too 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.

## 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.

### Maintenance functions

The maintenance functions moves the arm assembly in a specific position in order to enables easy access for maintenance operations

### Home Position

The “home position” function moves the arm to the right side for better access and exchange of the trays

### Park position

The “park position” function moves the arm to the left side of the tray. In this position it is possible to secure the sample transport mechanism with the protection foam. The sample transport is than ready for transporting.

### Change Piston

The “change-piston” function draws the piston away from the home position, relieving the tension on the spring. In this position, the analytical head assembly can be removed and reinstalled easily after maintenance. This position is also used to change the analytical head plunger and metering seal.



**Table 15** Maintenance positions

Function	Arm position in X	Arm position in Theta	Arm Position in Z	Note
Change Needle	Left side	Straight	Up	No current on Theta
Change Carrier assembly	Left side	Straight	Middle	No current on the ST
Change Loop capillary	Middle	Left	Up	
Home position	Right side	Left rear	Up	
Park arm	Left side	Right rear	Up	

### Sample Transport Self Alignment

The sample transport alignment with the sampling unit and the well-plate tray is required to compensate for larger deviations in positioning the needle carrier. This function is in the diagnose screen of the Chemstation or the Control Module.

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

- The sample transport.
- The sampling unit.
- The MTP main board.
- The well plate sampler tray

**WARNING**

The sample transport self alignment requires the standard well-plate tray (Part Number: G1367-60001)

**WARNING**

The sample transport self alignment must be done with an empty WPS tray

## Step Commands

Each movement of the sampling sequence can be done under manual control. This is useful during troubleshooting where close observation of each of the sampling steps 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 sampler 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 well-plate sampler “Test”.

**Table 16** Step Commands

Step	Action	Comments
Bypass	Switches injection valve to the bypass position.	
Plunger Home	Moves the plunger to the home position.	
Needle Up	Lifts the needle arm to the upper position.	Command also switches the valve to bypass if it is not already in that position.
Needle into Vial	Lowers the needle into the vial.	
Draw	Metering device draws the defined injection volume.	Command lifts the needle, and lowers the needle into vial. Command can be done more than once (maximum draw volume of 100µl cannot be exceeded). Use “Plunger Home” to reset the metering device.
Needle Up	Lifts the needle out of the vial.	Command also switches the valve to bypass if it is not already in that position.

**Table 16** Step Commands (continued)

Step	Action	Comments
Needle into Seat	Lowers the needle arm into the seat.	
Mainpass	Switches the injection valve to the mainpass position.	
Needle Up/Mainpass	Lifts the needle arm to the upper position and Switches the injection valve to the mainpass position.	

## Troubleshooting

If the well-plate sample 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 an injection sequence, and observe how the well-plate sampler responds to each command.

[Table 17](#) summarizes the step commands, and lists the error messages and probable causes associated with each possible failure.

**Table 17** Step Failures

Step Function	Probable Failure Modes
Bypass	Valve not connected. Defective injection valve.
Plunger Home	Defective or dirty sensor on the sampling-unit flex board. Defective metering-drive motor.
Needle	Defective or dirty sensor on the sampling-unit flex board. Sticking needle-arm assembly. Defective needle-drive motor.
Draw	Sum of all draw volumes exceeds 100 $\mu\text{l}$ (or 40 $\mu\text{l}$ ). Defective metering-drive motor.

### 3 Troubleshooting and Test Functions

**Table 17** Step Failures (continued)

<b>Step Function</b>	<b>Probable Failure Modes</b>
Needle	Defective or dirty sensor on the sampling-unit flex board. Sticking needle-arm assembly. Defective needle-drive motor.
Mainpass	Valve not connected. Defective injection valve.
Needle Up/Mainpass	Blockage in the sample loop or needle (no solvent flow). Defective or dirty sensor on the sampling-unit flex board. Sticking needle-arm assembly. Defective needle-drive motor. Valve not connected. Defective injection valve.

## Troubleshooting Guide for the Well Plate Sampler G1367A

The objective of this note is to give some guidance on troubleshooting the Agilent 1100 series well plate sampler.

Additional information will be added when available. The latest version of this document can be downloaded from the LSBU homepage.

(<http://lsbu.marketing.agilent.com/start/start.asp>)

Products - Injection system - G1367A - Technical note

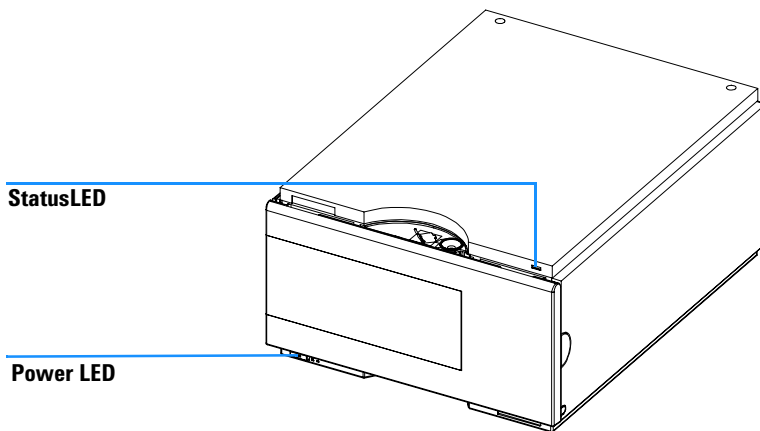
### Gather information about the problem

- Instrument serial number?
- Instrument firmware revision and user interface revision?
- When did the problem start?
- What was done/changed prior to the start of the problem?
- What errors or error codes are shown in the Chemstation GUI, and in the current logbook files? (check especially for errors around the start date of the problem)
- What errors or error codes are shown in the WPS error logbook?  
(Chemstation\HPCHEM\instrument\x\temp\lals.txt)

## Turn ON and initialization steps

A successful WPS turn-on/initialization takes about 3.5 minutes, and consists of five steps

- 1 WPS turn on, begins when the main power button is pushed ON. Power indicator turns green. Front cover latch activates immediately.
- 2 Main fan and exhaust fan turn-on immediately.
- 3 Main board self-test begins. Status indicator tests red, green and yellow, than goes to yellow. This takes about 20 seconds (from turn-on). The status indicator remains yellow until the initialization process is complete. The user interface indicates “initializing” during this period.
- 4 The vapor blowout period begins. This lasts for about 2 minutes.
- 5 WPS sample transport and sampling unit initialization begins at the 2-minutes mark (from turn-on), if the front cover is closed. If the front cover is open at the 2 minutes mark, initialization will start only when the front cover is closed. Initialization takes about 1.5 minutes. When initialization is complete the needle is in the needle seat, the needle lock is down, and the status indicator is off.



**Figure 15** Instrument LED indicator

## Errors which may occur during the turn ON and initialization process

### Step 1

#### Symptom *“Failure to turn ON”*

No activity when power button is pushed on. Power indicator stays off.

#### Possible causes

- Defective main board
- Power supply defective

#### Suggested actions

- ✓ Turn the WPS off. Disconnect the power supply from the main board, see if power indicator becomes green when the WPS is turned-on.
  - If yes, change the main board (G1367-69500)
  - If no, change the power supply (0905-2528 Rev G or higher)

### Step 2

#### Symptom *“Fan failure”*

Early during the turn-on/initialization process a main fan or an exhaust fan error occurs.

#### Possible causes

- Fan not connected to the main board
- Fan connector defective
- Fan defective
- Main board defective

### 3 Troubleshooting and Test Functions

#### **Suggested actions**

- ✓ Make sure the fan is connected to the main board correctly
- ✓ Examine the fan connector for irregularities. Correct if possible
- ✓ Replace the defective fan (main fan: 3160-1017, exhaust fan: 3160-4097)
- ✓ Replace the main board (G1367-69500)

#### **Step 3**

##### **Symptom 1** *“Main board initialization fails”*

Status indicator remains off, but the rest of the turn-on/initialization process is successful.

#### **Possible causes**

- The heel of the light pipe is not positioned correctly above the LED on the main board
- The main board is defective

#### **Suggested actions**

- ✓ Correctly position the light pipe
- ✓ Replace the main board (G1367-69500)

#### **Symptom 2**

Status indicator remains off, and the rest of the turn-on/initialization process fails as well.

#### **Suggested action**

- ✓ Refer to the possible causes and actions for **step 5** below



## Step 4

### Symptom *“Problem with the Vapor blowout period”*

The vapor blowout period does not end approximately 2 minutes after turn-on, initialization does not begin.

### Possible causes

- The front cover is not closed
- The front cover is closed, but the user interface displays a “front cover open” message
- The left side cover is removed
- The left side cover is installed, but the user interface displays a “side cover open” message

### Suggested actions

- ✓ Close the front cover. If the “front cover open” message is still displayed:
  - Make sure the front cover magnet is close enough to the magnet sensor
  - Check the ribbon cable from the SLS board to the main board
  - Replace the SLS board (G1367-66505)
  - replace the main board (G1367-69500)
- ✓ Install the side door. If the “side door open” message is still displayed:
  - Make sure the side cover magnet is present in the side door
  - Make sure the side cover magnet is oriented with the correct pole toward the magnet sensor on the main board and positioned in the side cover such that it is close enough to the magnet sensor
  - Replace the main board (G1367-69500)

### Step 5

#### Symptom *"Initialization fails"*

The initialization fails to complete its required movements, resulting in one or more of a variety of possible error messages. The error message produced depends on when the failure occurred during the initialization.

Gather the revisions information, user interface error and logbook information, and error code information as described on page 1. Also, consider anything which may have been done just before the initialization failure occurred.

To date, we have seen initialization errors occur for a variety of reasons. As an overall troubleshooting plan, follow the suggested actions described below.

If this does not help, take the information from the instrument logbook, refer to the appropriate section in the next chapter and follow the recommended actions step by step.

#### Suggested actions

- ✓ Turn the WPS off, manually change the X-position of the sample transport and rotate the needle carrier to a different position, turn-on the WPS again.
- ✓ If there is any weight on top of the WPS, remove that weight, turn-off the WPS and then turn it on again.

## Instrument logbook errors and step by step repair process

The errors in the instrument logbook can be classified in 8 groups. In this section you can find a general step by step troubleshooting process for each of them.

### 1. Fan error (Main fan or Exhaust fan)

- ✓ Make sure the fan is connected to the main board correctly
- ✓ Examine the fan connector for irregularities. Correct if possible
- ✓ Replace the defective fan (main fan: 3160-1017, exhaust fan: 3160-4097)
- ✓ Replace the main board (G1367-69500)

### 2. Initialization error

- ✓ Upgrade the firmware revision to A.04.14 or higher and the ChemStation revision to A.08.04 or higher
- ✓ Check the sample transport connectors on the main board/sample transport
- ✓ Check the connector on the bottom of the sample transport unit
- ✓ Check for mechanical obstruction on the sample transport (X, Theta, Z)
- ✓ Change sample transport unit (G1367-60019)
- ✓ Change main board (G1367-69500)

### 3. Metering sensor error

- ✓ Check the connectors on the SUD board
- ✓ Check the sampling unit connector on the main board
- ✓ Check the connector on the sampling unit
- ✓ Change the analytical head (G1367-60003)
- ✓ Change the sampling unit (G1367-60008)
- ✓ Change the main board (G1367-69500)

#### 4. Rheodyne valve error

- ✓ Turn the system off and on twice
- ✓ Check the connectors on the SUD board
- ✓ Check the sampling unit connector on the main board
- ✓ Check the connector on the sampling unit
- ✓ Change the rheodyne valve (0101-0921)
- ✓ Change the sampling unit (G1367-60008)
- ✓ Change the main board (G1367-69500)

#### 5. Needle lock error

- ✓ Check the connectors on the SUD board
- ✓ Check the sampling unit connector on the main board
- ✓ Check the connector on the sampling unit
- ✓ Change the sampling unit (G1367-60008)
- ✓ Change the main board (G1367-69500)

## 6. Needle into seat error

- ✓ Upgrade the firmware revision to A.04.14 or higher and the ChemStation revision to A.08.04 or higher
- ✓ Check needle position and correct alignment in the pusher
- ✓ Perform an auto-alignment

### NOTE

If the needle into seat error appears during the initialization of the Well Plate Sampler:

- 
- Turn-off the system
  - Perform a forced cold start (move the 8-bit configuration dip switches 1,2,8 at the rear of the instrument to position 1)
  - Turn-on the system
  - Perform an auto-alignment
  - Turn-off the system
  - Move the 8-bit configuration dip switches 1,2,8 at the rear of the instrument to position 0
  - Turn-on the system
  - ✓ Check the connector from needle carrier to the sample transport unit
  - ✓ Check the sample transport connectors on the main board/sample transport
  - ✓ Check the connector on the bottom of the sample transport unit
  - ✓ Change the needle carrier assembly (G1367-60010)
  - ✓ Change the sample transport unit (G1367-60019)
  - ✓ Change the main board (G1367-69500)

#### 7. Needle / Seat error

- ✓ Upgrade the firmware revision to A.04.14 or higher and the ChemStation revision to A.08.04 or higher
- ✓ Check if the needle is installed (the sample transport comes without needle)
- ✓ Check the needle position and correct alignment in the pusher
- ✓ Check if the seat is not blocked with any parts or material (crystals, glass)
- ✓ Perform an auto-alignment
- ✓ Check the connector from the needle carrier to the sample transport unit
- ✓ Check the sample transport connectors on the main board/sample transport
- ✓ Check the connector on the bottom of the sample transport
- ✓ Change the needle (G1367-87200) and the seat (G1367-87101)
- ✓ Change the needle carrier assembly (G1367-60010)
- ✓ Change the sample transport unit (G1367-60019)
- ✓ Change the main board (G1367-69500)

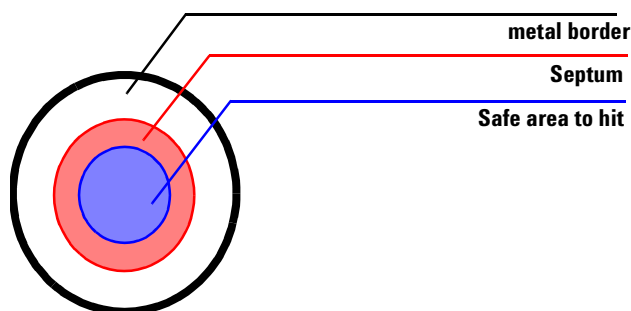
## 8. Sample location error

- ✓ Check the plate configuration in the user interface
- ✓ Ensure the right vials and plates are used
- ✓ Perform an auto-alignment
- ✓ Check the connector from the needle carrier to the sample transport unit
- ✓ Check the sample transport connectors on the main board/sample transport
- ✓ Check the connector on the bottom of the sample transport unit
- ✓ Change the needle (G1367-87200) and the seat (G1367-87101)
- ✓ Change the needle carrier assembly (G1367-60010)
- ✓ Change the sample transport unit (G1367-60019)
- ✓ Change the main board (G1367-69500)

## Needle centering over the vial or the well

#### NOTE

The positioning of the needle is very precise. You have to take no action if the needle hits in the safe area.



**Figure 16** Vial cap

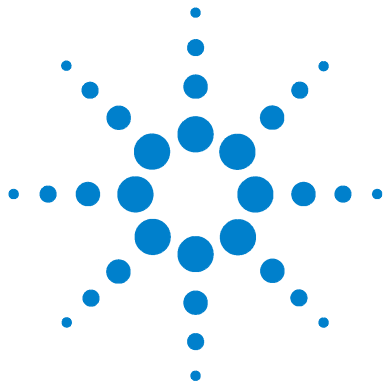
#### NOTE

If the diameter for the safe area is approximately **1mm smaller** than the diameter of the septum no corrective action is necessary.

#### Action to take if the needle does not hit in the safe area

- ✓ Check if the right vials or plates are used (see) or (see [“List of Recommended Vials and Caps”](#) on page 36).
- ✓ Make sure the needle is correctly installed. It should be pushed into the needle carrier as far forward as possible and centered in the vial pusher.
- ✓ Upgrade the firmware revision to A.04.14 or higher and the ChemStation revision to A.08.04 or higher
- ✓ Perform an auto-alignment (without any plates in place)
- ✓ Change the tray G1367-60001 (see service note G1367-007)





## 4 Repairing the Sampler

Introduction into Repairing the Sampler 106

Overview of Main Repair Procedures 108

Simple Repairs 109

Exchanging Internal Parts 130



# Introduction into Repairing the Sampler

### Simple Repairs

The sampler is designed for easy repair. The most frequent repairs such as changing a needle assembly 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 109.

### Exchanging Internal Parts

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

#### **WARNING**

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

---

### Cleaning the Autosampler

The sampler 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 sampler.

#### **WARNING**

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

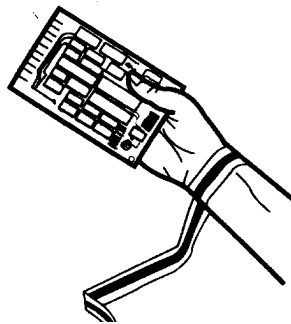
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## Using the ESD Strap

**CAUTION**

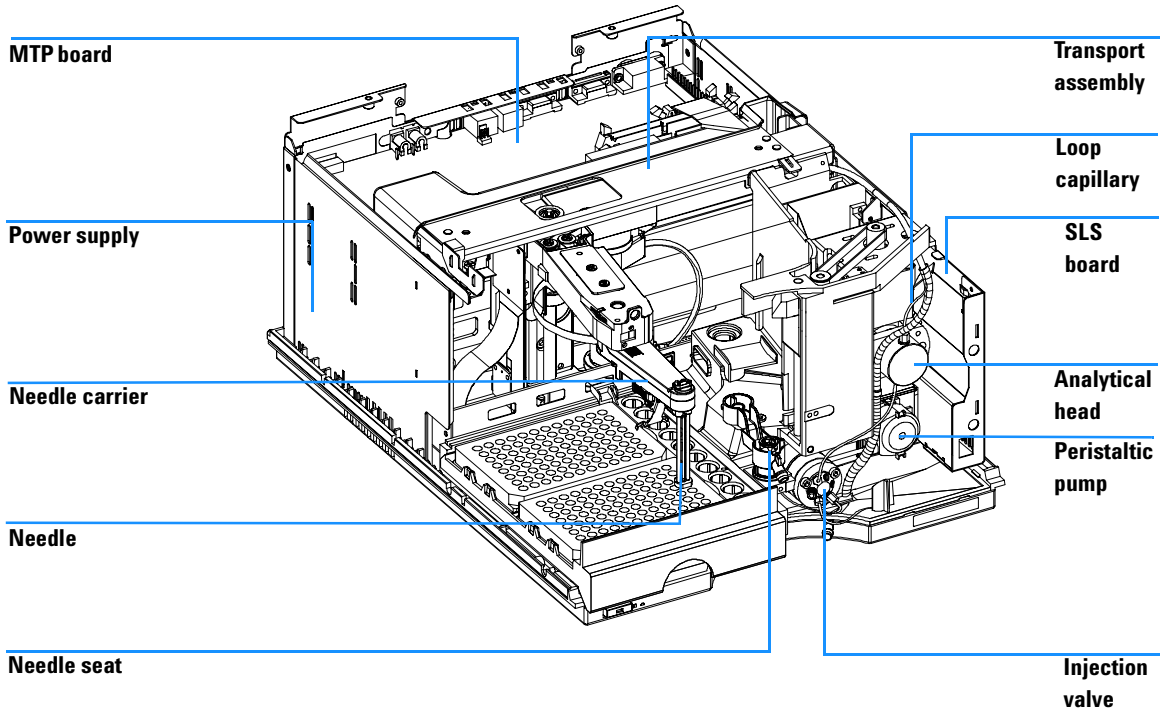
Electronic boards are sensitive to electrostatic discharge (ESD). In order to prevent damage, always use an ESD strap supplied in the accessory kit.

- 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 17** Using the ESD Strap

## Overview of Main Repair Procedures



**Figure 18** Main Assemblies

## Simple Repairs

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

**Table 18** Simple Repair Procedures

Procedure	Typical Frequency	Notes
Exchanging the needle assembly	When needle shows indication of damage or blockage	See <a href="#">"Removing the Needle Assembly"</a> on page 110
Exchanging the needle carrier assembly	When the needle carrier is defective	See <a href="#">"Removing the Needle Carrier Assembly"</a> on page 114
Exchanging the needle seat assembly	When the seat shows indication of damage or blockage	See <a href="#">"Exchange the Needle Seat Assembly (G1367-87101) on the G1367A/68A Samplers"</a> on page 116
Exchanging the stator face	When the valve performance shows indication of leakage or wear	See <a href="#">"Stator Face"</a> on page 119
Exchanging the rotor seal	After approximately 30000 to 40000 injections, or when the valve performance shows indication of leakage or wear	See <a href="#">"Rotor Seal"</a> on page 120
Exchanging the metering seal	When sampler reproducibility indicates seal wear	See <a href="#">"Metering Seal and Plunger"</a> on page 122
Exchanging the loop capillary	When loop capillary blocked or broken	See <a href="#">"Removing the Loop Capillary"</a> on page 124
Exchanging the peristaltic pump	When tubing broken	See <a href="#">"Peristaltic Pump"</a> on page 128

### Removing the Needle Assembly

<b>When required</b>	When the needle is visibly damaged When the needle is blocked
<b>Tools required</b>	Two 1/4 inch-5/16 inch wrenches 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit)
<b>Parts required</b>	G1367-87201 Needle assembly for G1367A/68A G1377-87201 Needle assembly for G1377A/78A

#### 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.**

---

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Open the front door and remove the side door.
- 3 Remove the plate tray from the tray base.
- 4 Push the silicon safety tube over the needle

#### CAUTION

An uncovered needle is a risk of harm to the operator.

---

- 5 Unlock the needle tighter lock system.
- 6 Loosen the loop capillary fitting on the analytical head side.
- 7 Remove the loop capillary corrugated waste tube.
- 8 Pinch the holder clamp, pull back and remove the needle assembly with the loop capillary from the needle carrier.

- 9 Attach the 5/16 inch wrench to hold position at the needle assembly. Use the 4 mm wrench to loosen the fitting of the loop capillary.

**NOTE**

Do not bend the sheet metal of the needle.

---

- 10 Pull the loop capillary out from the needle assembly.

### Installing the Needle Assembly

<b>When required</b>	When the needle is visibly damaged When the needle is blocked
<b>Tools required</b>	Two 1/4 inch-5/16 inch wrenches 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit)
<b>Parts required</b>	G1367-87201 Needle assembly for G1367A/68A G1377-87201 Needle assembly for G1377A/78A

#### 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.**

---

- 1 Pull the loop capillary in the new needle assembly (G1367-87201 or G1377-87201).
- 2 Attach the 5/16 inch wrench to hold position at the needle assembly. Use the 4 mm wrench to tighten the fitting of the loop capillary.

#### NOTE

Do not hold the needle during this step to avoid bending it.

---

- 3 Push the loop capillary into the loop capillary protection tube until it comes out on the sampling unit side.
- 4 Tighten the loop capillary fitting to the analytical head.
- 5 Install the loop capillary corrugated waste tube over the loop capillary
- 6 Pinch the holder clamp and reinsert the needle assembly into the needle carrier.
- 7 Lock the needle tighter lock system.
- 8 Push the black chain into the needle assy until the stop.
- 9 Check the alignment of the needle in the needle pusher of the needle carrier by viewing from several directions to see that it is aligned in the center of the needle pusher.



**NOTE**

The needle must be centered in the needle pusher as all alignment by the well-plate sampler is calculated from the needle pusher position.

---

- 10** Remove the silicon safety tube from the needle.
- 11** Replace the plate tray in the tray base. Re-install the side door and close the front door.
- 12** In the user interface close the “Change Needle/Seat” function and exit the maintenance mode.

### Removing the Needle Carrier Assembly

<b>When required</b>	When the needle carrier is defect
<b>Tools required</b>	2 mm hex key 8710-2438 (supplied in accessory kit)
<b>Parts required</b>	G1367-60010 Needle Carrier assembly

- 1 In the user interface start the maintenance mode and select the “Change Needle Carrier” function.
- 2 Open the front door and remove the side door.
- 3 Remove the plate tray from the tray base.
- 4 Push the silicon safety tube over the needle

#### CAUTION

An uncovered needle is a risk of harm to the operator.

- 
- 5 Pinch the holder clamp, pull back and remove the needle assembly from the needle carrier.
  - 6 Unplug the flex board on the sample transport.
  - 7 Unscrew the three holding hex screws with the 2 mm hex key.
  - 8 Remove the needle carrier assy.

## Installing the Needle Carrier Assembly

<b>When required</b>	When the needle carrier is defect
<b>Tools required</b>	2 mm hex key 8710-2438 (supplied in accessory kit)
<b>Parts required</b>	G1367-60010 Needle Carrier assembly

- 1 Install a new needle carrier (G1367-60010) on place
- 2 Install the three holding hex screws with the 2 mm hex key.
- 3 Plug in the flex board on the sample transport.
- 4 Pinch the holder clamp and reinsert the needle assembly into the needle carrier.
- 5 Check the alignment of the needle in the needle pusher of the needle carrier by viewing from several directions to see that it is aligned in the center of the needle pusher.

### NOTE

The needle must be centered in the needle pusher as all alignment by the well-plate sampler is calculated from the needle pusher position.

- 6 Remove the silicon safety tube from the needle.
- 7 Replace the plate tray in the tray base.
- 8 Re-install the side door and close the front door.
- 9 In the user interface close the “Change Needle Carrier” function and exit the maintenance mode. The instrument will reset.

### Exchange the Needle Seat Assembly (G1367-87101) on the G1367A/68A Samplers

<b>When required</b>	When the seat is visibly damaged
<b>Tools required</b>	When the seat capillary is blocked 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Flat screwdriver
<b>Parts required</b>	G1367-87101 Needle-Seat assy (0.17 mm ID 2.3 µl) <i>for G1367/68A</i> G1377-87101 Needle-Seat (without capillary) <i>for G1377/78A</i> G1375-87317 Seat Capillary (150 mm 0.10 mm ID) <i>for G1377-87101 Needle Seat</i> <i>or</i> G1375-87300 Seat Capillary (150 mm 0.05 mm ID) <i>for G1377-87101 Needle Seat</i>

#### 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.**

---

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Open the front door and remove the side door.
- 3 Remove the plate tray from the tray base.
- 4 Disconnect the seat capillary from the injection valve (port 5) with the 1/4 inch wrench.
- 5 Use the flat-head screwdriver to remove the needle seat.
- 6 Insert the new needle seat assembly (G1367-87101). Press it firmly in position.
- 7 Connect the seat capillary to the injection valve (port 5) with the 1/4 inch wrench.
- 8 Replace the plate tray in the tray base. Re-install the side door and close the front door.
- 9 In the user interface close the “Change Needle/Seat” function and exit the maintenance mode.

## Exchange the Needle Seat ( G1377-87101) on the G1377A/78A Samplers

<b>When required</b>	When the seat is visibly damaged
<b>Tools required</b>	When the seat capillary is blocked 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Flat screwdriver
<b>Parts required</b>	G1367-87101 Needle-Seat assy (0.17 mm ID 2.3 µl) <i>for G1367/68A</i> G1377-87101 Needle-Seat (without capillary) <i>for G1377/78A</i> G1375-87317 Seat Capillary (150 mm 0.10 mm ID) <i>for G1377-87101 Needle Seat</i> <i>or</i> G1375-87300 Seat Capillary (150 mm 0.05 mm ID) <i>for G1377-87101 Needle Seat</i>

### 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.**

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Open the front door and remove the side door.
- 3 Remove the plate tray from the tray base.
- 4 Disconnect the seat capillary from the needle seat with the 4 mm open wrench.
- 5 Use the flat-head screwdriver to remove the needle seat.
- 6 Insert the new needle seat (G1377-87101). Press it firmly in position.
- 7 Connect the seat capillary to the needle seat with the 4 mm open wrench.
- 8 Replace the plate tray in the tray base. Re-install the side door and close the front door.
- 9 In the user interface close the “Change Needle/Seat” function and exit the maintenance mode.

### NOTE

The seat capillary can be exchanged alone if the needle seat is not damaged.

### Exchange the Seat Capillary (G1375-87317/G1375-87300) on the G1377A/78A Samplers

<b>When required</b>	When the seat is visibly damaged
<b>Tools required</b>	When the seat capillary is blocked 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Flat screwdriver
<b>Parts required</b>	G1367-87101 Needle-Seat assy (0.17 mm ID 2.3 µl) <i>for G1367/68A</i> G1377-87101 Needle-Seat (without capillary) <i>for G1377/78A</i> G1375-87317 Seat Capillary (150 mm 0.10 mm ID) <i>for G1377-87101 Needle Seat</i> <i>or</i> G1375-87300 Seat Capillary (150 mm 0.05 mm ID) <i>for G1377-87101 Needle Seat</i>

#### 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.

---

- 1 Disconnect the seat capillary from the injection valve (port 5) with the 4 mm wrench.
- 2 Disconnect the seat capillary from the needle seat with the 4 mm wrench.
- 3 Connect the new seat capillary (G1375-87317 or G1375-87300) to the injection valve (port 5) and the needle seat with the 4 mm wrench.

#### NOTE

Choose the seat capillary diameter (50 µm or 100 µm), as function of the column and the application you run on the system. See, "[Choice of Seat Capillary](#)" on page 54.

---

## Stator Face

### NOTE

This procedure is only for the injection valve on the G1367A/68A samplers. The micro injection valve on the G1377A/78A samplers has no ceramic stator face.

<b>When required</b>	When poor injection-volume reproducibility When leaking injection valve
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
<b>Parts required</b>	9/64 inch 15 cm long, T-handle hex key 8710-2394 (supplied in accessory kit) 0100-1851 Stator Face

### 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.**

### CAUTION

The stator face is held in place by the stator head. When removing the stator head, ensure the stator face does not fall out of the valve.

- 1 Open the front door.
- 2 Remove all capillaries from the injection-valve ports with the 1/4 inch wrench.
- 3 Unscrew and remove the three stator screws from the stator head with the 9/64 inch wrench.
- 4 Remove the stator head and stator face.
- 5 Place the new stator face (0100-1851) on the stator head. The pins on the stator face must engage in the holes on the stator head.
- 6 Install this stator head/face assy on the injection valve. Tighten the screws alternately with the 9/64 inch wrench until the stator head is secure.
- 7 Reconnect all the capillaries to the injection valve ports with the 1/4 inch wrench.
- 8 Close the front cover.

### Rotor Seal

<b>When required</b>	When poor injection-volume reproducibility
<b>Tools required</b>	When leaking injection valve 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
<b>Parts required</b>	9/64 inch 15 cm long, T-handle hex key 8710-2394 (supplied in accessory kit) 0100-1853 Vespel Rotor Seal for 0101-0921 injection valve (G1367A/68A) or 0100-1849 Tefzel Rotor Seal for 0101-0921 injection valve (G1367A/68A) 0100-2088 Vespel Rotor Seal for 0101-1050 injection valve (G1377A/78A)

#### 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.**

---

#### NOTE

The micro injection valve, 0101-1050 has no stator face.

---

- 1 Open the front door.
- 2 Remove all capillaries from the injection-valve ports with the 1/4 inch wrench.
- 3 Unscrew and remove the three stator screws from the stator head with the 9/64 inch wrench.

#### CAUTION

Ensure the stator face does not fall out of the valve.

---

- 4 Remove the stator head, the stator face and the stator ring.
- 5 Remove the rotor seal (and isolation seal if required).
- 6 Install the new rotor seal and isolation seal (if required). The metal spring inside the isolation seal must face toward the valve body. In other words, the metal spring should not be visible when the isolation seal is installed.
- 7 Reinstall the stator ring.
- 8 Place the stator face on the stator head. The pins on the stator face must engage in the holes on the stator head.



- 9 Install this stator head/face assy on the injection valve. Tighten the screws alternately with the 9/64 inch wrench until the stator head is secure.
- 10 Reconnect all the capillaries to the injection valve ports with the 1/4 inch wrench.
- 11 Close the front cover.

### Metering Seal and Plunger

<b>When required</b>	When poor injection-volume reproducibility
<b>Tools required</b>	When leaking metering device 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) 4 mm, 15 cm long, T-handle hex key 8710-2392 (supplied in accessory kit) Small flat head screwdriver.
<b>Parts required</b>	5063-6589 Metering Seal (pack of 2) <i>for the G1367-60003 100 µl Analytical Head</i> 5063-6586 Metering Plunger <i>for the G1367-60003 100 µl Analytical Head</i> 5022-2175 Metering Seal (pack of 1) <i>for the G1377-60013 40 µl Analytical Head</i> 5064-8293 Metering Plunger <i>for the G1377-60013 40 µl Analytical Head</i>

#### 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.**

#### Removing the metering seal

- 1 In the user interface start the maintenance mode and select the “Change Piston” function.
- 2 Open the front door
- 3 Remove the corrugated leak tubing
- 4 Remove the two capillaries from the analytical head (Use a 1/4 inch wrench if you have a SST capillary or a 4 mm wrench if you have a fused silica capillary).
- 5 Unscrew alternately the two fixing screws with the 4 mm hex key and remove them.
- 6 Pull the analytical head away from the sampling unit.
- 7 Remove the two fixing screws from the base of the analytical head.
- 8 Remove the head body.
- 9 Using the piston, carefully remove the metering seal. Clean the chamber and ensure all particular matter is removed.

**Installing the  
metering seal**

- 1** Install the new metering seal. Press it firmly into position.
- 2** Reassemble the analytical head. Press the plunger assembly into the seal.
- 3** Put the two fixing screws in place and reinstall the analytical head to the sampling unit.
- 4** Tighten alternately the two fixing screws with the 4 mm hex key.
- 5** Connect the two capillaries to the analytical head (Use a 1/4 inch wrench if you have a SST capillary or a 4 mm wrench if you have a fused silica capillary).
- 6** Reinstall the corrugated leak tubing.
- 7** Close the front door.
- 8** In the user interface close the “Change Piston” function and exit the maintenance mode.

### Removing the Loop Capillary

<b>When required</b>	Capillary blocked Capillary broken
<b>Tools required</b>	Two 1/4 inch-5/16 inch wrenches 8710-0510 (supplied in accessory kit)
<b>Parts required</b>	G1367-87300 Loop capillary (injection volume up to 100 µl) <i>for the G1367A/68A</i> G1375-87315 Loop capillary (injection volume up to 8 µl) <i>for the G1377A/78A</i> G1377-87300 Loop capillary (injection volume up to 40 µl) <i>for the G1377A/78A</i>

#### 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.**

---

#### NOTE

If the loop capillary is not broken and no solvent has leaked into the loop capillary tube, the solvent draw up steps using the syringe can be skipped (steps 5, 6, 8).

---

- 1 In the user interface start the maintenance mode and select the “ChangeLoop Capillary” function.
- 2 Open the front door and remove the side door.
- 3 Remove the plate tray from the tray base.
- 4 Push the silicon safety tube over the needle

#### CAUTION

An uncovered needle is a risk of harm to the operator.

---

- 5 Remove the corrugated loop capillary waste tube and introduce the small tubing from the leak kit into the loop capillary protection tube.
- 6 Draw up the liquid with the syringe.
- 7 Unlock the needle tighter lock system.
- 8 Draw up the rest of the solvent from the loop capillary protection tube.
- 9 Loosen the loop capillary fitting on the analytical head side.

- 10** Pinch the holder clamp, pull back and remove the needle assembly with the loop capillary from the needle carrier.
- 11** Attach the 5/16 inch wrench to hold position at the needle assembly. Use the 4 mm wrench to loosen the fitting of the loop capillary.
- 12** Pull the loop capillary out from the needle assembly.

### Installing the Loop Capillary

<b>When required</b>	Capillary blocked Capillary broken
<b>Tools required</b>	Two 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
<b>Parts required</b>	G1367-87300 Loop capillary (injection volume up to 100 µl) <i>for the G1367A/68A</i> G1375-87315 Loop capillary (injection volume up to 8 µl) <i>for the G1377A/78A</i> G1377-87300 Loop capillary (injection volume up to 40 µl) <i>for the G1377A/78A</i>

#### 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.**

---

- 1 Pull the new loop capillary in the needle assembly.
- 2 Attach the 5/16 inch wrench to hold position at the needle assembly. Use the second wrench to tighten the loop capillary fitting.
- 3 Push the loop capillary into the loop capillary protection tube until it comes out on the sampling unit side.
- 4 Re install the loop capillary corrugated waste tube over the loop capillary.
- 5 Retighten the loop capillary fitting on the analytical head.
- 6 Pinch the holder clamp and reinsert the needle assembly into the needle carrier.
- 7 Push the black chain into the needle assy until the stop.
- 8 Lock the needle tighter lock system.
- 9 Check the alignment of the needle in the needle pusher of the needle carrier by viewing from several directions to see that it is aligned in the center of the needle pusher.

#### NOTE

The needle must be centered in the needle pusher as all alignment by the well-plate sampler is calculated from the needle pusher position.

---

- 10** Remove the silicon safety tube from the needle.
- 11** Replace the plate tray in the tray base. Re-install the side door and close the front door.
- 12** In the user interface close the "Change Loop Capillary" function and exit the maintenance mode.

### Peristaltic Pump

<b>When required</b>	Tubing blocked or broken.
<b>Tools required</b>	sand paper
<b>Parts required</b>	5065-4445 Peristaltic pump

#### NOTE

The peristaltic pump is a replaceable unit. The tubing inside the pump is not replaceable.

- 1 Remove the corrugated leak tubing.
- 2 Press the two clips on the front of the peristaltic pump.
- 3 Pull the pump forward off the motor shaft.
- 4 Disconnect the tubing leading to the wash port and the tubing coming from the solvent bottle.
- 5 Connect the wash port tubing to the upper tubing of the new pump (use sandpaper to get a good grip on the tubing).
- 6 Connect the tubing coming from the solvent bottle to the lower tubing of the new pump.
- 7 Push the pump onto the motor shaft until the clips click into place.
- 8 Reinstall the corrugated leak tubing.



## Interface Board

<b>When required</b>	For all repairs inside the sampler or for installation of the board.
<b>Tools required</b>	Flat-head screwdriver.
<b>Parts required</b>	Interface board, see " <a href="#">Optional Interface Boards</a> " on page 225

### CAUTION

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

---

- 1 Switch off the sampler at the main power switch.
- 2 Disconnect all cables from the existing interface board. Then loosen the interface board holding screws and slide the board out of its holding rails.
- 3 Identify the interface board slot cover. Loosen the two holding screws, and remove the cover.
- 4 Carefully insert the new interface board into the holding rails, and push the board into the slot. Make sure the board plugs into the socket correctly.
- 5 Reconnect all cables to the new interface board.
- 6 Switch on the sampler.

### Exchanging Internal Parts

**WARNING**

The following procedures require opening the main cover of the sampler. Always ensure the sampler 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 sampler 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.

---

**NOTE**

The electronics of the sampler 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 sampler. Always operate the sampler 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 107).

---

## Assembling the Main Cover

<b>When required</b>	
<b>Tools required</b>	
<b>Parts required</b>	5065-4446 Cabinet kit 5042-1381 Name plate

### NOTE

The cabinet kit contains all parts, but it is not assembled.

### CAUTION

Observe the assembly instructions carefully. The main cover cannot be disassembled once assembled incorrectly.

- 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 door hinge in place
- 4 Press the side panels into the slots in the top cover.
- 5 Press the front door into the slots in the top cover.

## Light protection kit installation

- 1 Remove the transparent front door and install the dark one.
- 2 Slide the transparent window out of the side panel.
- 3 Slide the dark window in the side panel.

## 4 Repairing the Sampler

### Top Cover and Foam

<b>When required</b>	When accessing internal parts.
<b>Tools required</b>	Pozidrive screwdriver Flat-head screwdriver (if interface board installed)
<b>Parts required</b>	5041-8395 Foam kit (includes top and bottom foam).

#### CAUTION

This procedure requires removal of the MIO-interface board. The board is sensitive to electrostatic discharge. Always use the ESD strap when handling electronic boards.

---

### Removing the Top Cover and Foam

- 1 Switch off the sampler at the main power switch. Remove the power cable.
- 2 If an interface board is installed, remove it (see [“Interface Board”](#) on page 129).
- 3 Move the safety lever to the left. Lift the clips on the top cover. Lift the cover away.
- 4 Unscrew the three screws on the top plate and remove it.
- 5 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.
- 5 Lower the cover into place. Ensure the clips close firmly.
- 6 Slide the safety lever to the right, and install the power cable.

## Transport Assembly

<b>When required</b>	Defective transport assembly/Defective flex board or sensors.
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver Flat-head screwdriver (if interface board installed)
<b>Parts required</b>	G1367-60019 Sample Transport assembly <i>for the G1367A/68A</i> G1377-60009 Sample Transport assembly <i>for the G1377A/78A</i>

## Removing the sample transport

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see “[Top Cover and Foam](#)” on page 132).
- 4 Remove the loop capillary corrugated waste tube.
- 5 Disconnect the loop capillary from the analytical head (Use a 1/4 inch wrench if you remove a SST capillary or a 4 mm wrench if you remove a fused silica capillary).
- 6 Lift out the transport assembly. This may require a flat head screwdriver to separate the sample transport assembly from the sampling unit.

## Installing the sample transport

- 1 Slide the new transport assembly into the sampler.
- 2 Ensure the transport assembly is seated firmly.
- 3 Reconnect the loop capillary to the analytical head (Use a 1/4 inch wrench if you reconnect a SST capillary or a 4 mm wrench if you reconnect a fused silica capillary).
- 4 Re install the loop capillary corrugated waste tube
- 5 Install the top cover, top plate, and foam (see “[Top Cover and Foam](#)” on page 132).
- 6 Turn ON the sampler, close the front door, the system will reset automatically.
- 7 In the user interface perform a “Sample Transport Self Alignment”.

### Sampling Unit

<b>When required</b>	When sampling unit defective.
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver Flat-head screwdriver (if interface board installed)
<b>Parts required</b>	G1367-60008 Sampling unit <i>for the G1367A/68A samplers</i> G1377-60008 Sampling unit <i>for the G1377A/78A samplers</i> (the assy comes without injection valve and analytical head)

### Removing the sampling unit

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see “[Top Cover and Foam](#)” on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see “[Removing the sample transport](#)” on page 133).
- 6 On the injection valve remove the capillaries coming from the pump (port 1) and going to the column compartment (port 6), (Use a 1/4 inch wrench if you remove a SST capillary or a 4 mm wrench if you remove a fused silica capillary).
- 7 Slide the sampling unit and tray base back to disengage the sampling-unit connector.
- 8 Lift the sampling unit and tray base approximately 10 cm. Slide the leak sensor out of the leak plane.
- 9 Lift the sampling unit and tray base out of the sampler.
- 10 Turn the tray-base locking screw 1/4-turn anti-clockwise.
- 11 Slide the tray base back to disengage the tray base from the sampling unit.

## Installing the sampling unit

**NOTE**

The replacement sampling unit is supplied without injection valve and analytical head assembly. If you are exchanging the complete sampling unit, remove the injection valve and the analytical head from the defective sampling unit. Install the valve and analytical head in the new sampling unit. See ["Injection-Valve Assembly"](#) on page 139 and ["Metering-Drive Motor and Belt"](#) on page 141

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- 1 Mount the tray base onto the sampling unit. Ensure the tray base is positioned flush against the sampling unit.
- 2 Tighten the locking screw 1/4-turn clockwise.
- 3 While holding the sampling unit and tray base, slide the leak sensor into the holder in the leak plane.
- 4 Place the sampling unit and tray base into the sampler.
- 5 Slide the sampling unit and tray base forwards. Ensure the sampling unit connector is seated correctly.
- 6 Install the sample transport assembly, (see ["Installing the sample transport"](#) on page 133).
- 7 Connect the capillary, coming from the pump on port 1 and the one going to the column compartment on port 6 of the injection valve (Use a 1/4 inch wrench if you reconnect a SST capillary or a 4 mm wrench if you reconnect a fused silica capillary).
- 8 Install the top cover, top plate, and foam (see ["Top Cover and Foam"](#) on page 132).
- 9 Replace the plate tray in the tray base.
- 10 Turn ON the sampler, close the front door.
- 11 The system will reset automatically.
- 12 In the user interface perform a "Sample Transport Self Alignment".

### Analytical head

<b>When required</b>	When defective.
<b>Tools required</b>	4.0 mm, 15 cm long, T-handle hex key 8710-2392 (supplied in accessory kit) 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit)
<b>Parts required</b>	Analytical Head assembly (100 µl) for <i>G1367/68A</i> Analytical Head assembly (40 µl) for <i>G1377/78A</i>

### Removing the analytical head

- 1 In the user interface start the maintenance mode and select the “Change Piston” function.
- 2 Remove the two capillaries from the analytical head (Use a 1/4 inch wrench if you have a SST capillary or a 4 mm wrench if you have a fused silica capillary).
- 3 Alternately unscrew the two hex screws which maintain the analytical head with the 4 mm hex key.
- 4 Remove the analytical head.

### Installing the analytical head

- 1 Install the new analytical head on the sampling unit
- 2 Install and tighten alternately the two hex keys which fix the injection valve assembly.
- 3 Alternately tighten the two fixing screws with the 4 mm hex key.
- 4 Connect the two capillaries on the analytical head (Use a 1/4 inch wrench if you have a SST capillary or a 4 mm wrench if you have a fused silica capillary).
- 5 Close the front door.
- 6 In the user interface close the “Change Piston” function and exit the maintenance mode.



## Peristaltic Pump Motor

<b>When required</b>	When defective.
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver Flat-head screwdriver (if interface board installed)
<b>Parts required</b>	Peristaltic pump motor, 5065-4409

### Removing the peristaltic pump motor

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see [“Removing the sample transport”](#) on page 133).
- 6 Remove the sampling unit, (see [“Removing the sampling unit”](#) on page 134).
- 7 Remove the air channel.
- 8 Remove the peristaltic pump, (see [“Peristaltic Pump”](#) on page 128).
- 9 Remove the base plate of the pump with a small flat-head screwdriver.
- 10 Disconnect the peristaltic pump motor from the SUD board (labelled “mixing M”).
- 11 Take out the motor and the holder.
- 12 Unscrew the 2 screws which hold the peristaltic pump motor.
- 13 Remove the peristaltic pump motor.

### Installing the peristaltic pump motor

- 1 Install the new motor and tighten the two holding screws.
- 2 Take in the new motor and holder.
- 3 Connect the pump motor to the SUD board.
- 4 Re-assemble the motor holder and the pump base plate.
- 5 Re-install the air channel.
- 6 Assemble the peristaltic pump, (see "[Peristaltic Pump](#)" on page 128).
- 7 Install the sampling unit, (see "[Installing the sampling unit](#)" on page 135)
- 8 Install the sample transport assembly, (see "[Installing the sample transport](#)" on page 133).
- 9 Install the top cover, top plate, and foam (see "[Top Cover and Foam](#)" on page 132).
- 10 Replace the plate tray in the tray base.
- 11 Turn ON the sampler, close the front door.
- 12 The system will reset automatically.
- 13 In the user interface perform a "Sample Transport Self Alignment".

## Injection-Valve Assembly

<b>When required</b>	When defective
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver
<b>Parts required</b>	0101-0921 Injection Valve assembly <i>for the G1367A/68A samplers</i> 0101-1050 Micro Injection valve assembly <i>for the G1377A/78A samplers</i>

## Removing the injection valve assembly

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see [“Removing the sample transport”](#) on page 133).
- 6 Remove the sampling unit, (see [“Removing the sampling unit”](#) on page 134).
- 7 Disconnect the valve-cable connector from the SUD board (Valve Assy).
- 8 Remove the three screws which fix the injection valve assembly.
- 9 Remove the injection valve assembly.

### Installing the injection valve assembly

- 1 Feed the cable of the new valve through to the SUD board.
- 2 Connect the valve cable to the connector labelled “valve assy”.
- 3 Install and tighten the three screws which fix the injection valve assembly.
- 4 Install the sampling unit, (see [“Installing the sampling unit”](#) on page 135).
- 5 Install the sample transport (see [“Installing the sample transport”](#) on page 133).
- 6 Install the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 7 Replace the plate tray in the tray base.
- 8 Turn ON the sampler, close the front door.
- 9 The system will reset automatically.
- 10 In the user interface perform a “Sample Transport Self Alignment”.

## Metering-Drive Motor and Belt

<b>When required</b>	When belt or motor defective
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver
<b>Parts required</b>	5062-8590 Metering-drive motor 1500-0697 Belt

### Removing the metering drive motor and belt

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see [“Removing the sample transport”](#) on page 133).
- 6 Remove the sampling unit, (see [“Removing the sampling unit”](#) on page 134).
- 7 Disconnect the motor connector from the SUD board (labelled “Metering M”).
- 8 Remove the four screws which fix the motor. Remove the motor.
- 9 Remove the belt and place it over the shaft.

### Installing the metering drive motor and belt

- 1 Feed the motor cable through to the SUD board. Connect the cable to (labelled "Metering M").
- 2 Install the motor with the four fixing screws.
- 3 Ensure the belt is seated correctly over the gear and motor shaft.
- 4 Install the sampling unit, (see ["Installing the sampling unit"](#) on page 135).
- 5 Install the sample transport, (see ["Installing the sample transport"](#) on page 133)
- 6 Install the top cover, top plate, and foam (see ["Top Cover and Foam"](#) on page 132).
- 7 Replace the plate tray in the tray base.
- 8 Turn ON the sampler, close the front door.
- 9 The system will reset automatically.
- 10 In the user interface perform a "Sample Transport Self Alignment".

## Needle-lock Motor and Belt

<b>When required</b>	When defective
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver
<b>Parts required</b>	5062-8590 Needle-drive motor 1500-0697 Belt

### Removing the needle lock motor and belt

- 1 Switch off the sampler at the main power switch. Remove the power cable.
- 2 Remove the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 3 Disconnect the motor connector from the SUD board (labelled “Metering M”).
- 4 Remove the analytical head assembly, (see [“Removing the analytical head”](#) on page 136).
- 5 Remove the belt, the four fixing screws, and remove the motor.

### Installing the needle lock motor and belt

- 1 Feed the motor cable through to the SUD board. Connect the cable to the connector, labelled “Needle M”.
- 2 Secure the motor in place with the four fixing screws, install the belt.
- 3 Install the analytical head assembly, (see [“Installing the analytical head”](#) on page 136).
- 4 Install the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 5 Turn ON the sampler, close the front door.

### Main Fan

<b>When required</b>	When defective.
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver
<b>Parts required</b>	3160-1017 Fan

#### CAUTION

The MTP board is sensitive to electrostatic discharge. Always use the ESD strap (see [“Using the ESD Strap”](#) on page 107) when handling electronic boards.

---

### Removing the main fan

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see [“Removing the sample transport”](#) on page 133).
- 6 Disconnect the fan connector from the MTP main board.
- 7 Lift the fan, and carefully pull the fan out of the foam.

### Installing the main fan

- 1 Install the new fan and connect the fan connector to the MTP main board.
- 2 Install the sample transport (see [“Installing the sample transport”](#) on page 133).
- 3 Install the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 4 Replace the plate tray in the tray base.
- 5 Turn ON the sampler, close the front door.
- 6 The system will reset automatically.



## Exhaust Fan

<b>When required</b>	When defective.
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver
<b>Parts required</b>	3160-4097 Fan

### Removing the exhaust fan

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see [“Removing the sample transport”](#) on page 133).
- 6 Remove the MTP main board, (see [“Removing the MTP main board”](#) on page 146).
- 7 Remove the exhaust fan.

### Installing the exhaust fan

- 1 Install the exhaust fan.
- 2 Install the MTP main board, (see [“Installing the MTP main board”](#) on page 147).
- 3 Connect the fan connector to the MTP main board.
- 4 Install the sample transport (see [“Installing the sample transport”](#) on page 133).
- 5 Install the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 6 Replace the plate tray in the tray base.
- 7 Turn ON the sampler, close the front door, the system will reset automatically.

### MTP Main Board

<b>When required</b>	When defective
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver
<b>Parts required</b>	G1367-66500 MTP main board G1367-69500 Exchange MTP main board

#### CAUTION

The MTP board is sensitive to electrostatic discharge. Always use the ESD strap (see [“Using the ESD Strap”](#) on page 107) when handling electronic boards.

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#### NOTE

This procedure requires reloading the sampler firmware and reprogramming the instrument serial number.

---

#### Removing the MTP main board

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see [“Removing the sample transport”](#) on page 133).
- 6 Remove the connector screws at the back of the module.
- 7 Remove the M4 screw at the back of the module.
- 8 Disconnect all connectors on the MTP board
- 9 Slide the MTP main board out of the sampler.

### Installing the MTP main board

- 1 Install the new board. Ensure the ribbon cables are positioned in the slot in the board.
- 2 Reconnect the connectors to the board.
- 3 Replace the connector screws in the back of the module.
- 4 Replace the M4 screw at the back of the module.
- 5 Install the sample transport, (see [“Installing the sample transport”](#) on page 133)
- 6 Install the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 7 Replace the plate tray in the tray base.
- 8 Turn ON the sampler, close the front door, the system will reset automatically.

#### NOTE

If a new sampler main board is installed, update the serial number information of the sampler in the user interface, see procedure below.

- 
- 9 Check the firmware revision of the sampler. If the firmware revision is older than the current firmware revision of the autosampler, update the firmware, see [“Replacing the Autosampler Firmware”](#) on page 155.
  - 10 Perform a “Sample Transport Self Alignment”.

### Entering the Serial Number using the Control Module

- 1 Connect the control module to the sampler. Turn on the sampler.
- 2 In the control module, press *System (F5)*, then *Records (F4)*. Using the up/down arrows, make sure that the autosampler 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. Into the box labeled *Serial#*, enter the 10-character serial number for the sampler. When the 10-character serial number is entered, press *Enter* to highlight the complete serial number. Then, press *Done (F6)*.
- 6 Turn the autosampler off, then on again. The *Records* screen should display the correct serial number for this module.

### 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$(lals, "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 sampler, 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.

## SUD Board

<b>When required</b>	When defective.
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver
<b>Parts required</b>	G1313-66503 SUD board

### CAUTION

Take care not to damage the flex board when removing the SUD board.

### Removing the SUD board

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see “[Top Cover and Foam](#)” on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see “[Removing the sample transport](#)” on page 133).
- 6 Remove the sampling unit, (see “[Removing the sampling unit](#)” on page 134).
- 7 Disconnect all connectors from the SUD board.
- 8 Remove the two fixing screws from the SUD board, and lift out the board.

### Installing the SUD board

- 1 Install the new board. Ensure the board is positioned between the board guide.
- 2 Secure the board in place with the two screws.
- 3 Reconnect all the connectors to the new board.
- 4 Install the sampling unit, (see [“Installing the sampling unit”](#) on page 135).
- 5 Install the sample transport, (see [“Installing the sample transport”](#) on page 133)
- 6 Install the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 7 Replace the plate tray in the tray base.
- 8 Turn ON the sampler, close the front door.
- 9 The system will reset automatically.
- 10 In the user interface perform a “Sample Transport Self Alignment”.

## SLS Board

<b>When required</b>	When defective.
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver
<b>Parts required</b>	G1367-66505 SLS board

### Removing the SLS board

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see “[Top Cover and Foam](#)” on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see “[Removing the sample transport](#)” on page 133).
- 6 Remove the sampling unit, (see “[Removing the sampling unit](#)” on page 134).
- 7 Remove the SLS board cover.
- 8 Disconnect the ribbon cable from the SLS-board and unscrew the 2 holding screws.
- 9 Remove the SLS board from the inside of the module.

### Installing the SLS board

- 1 Install the new SLS board and the SLS board cover.
- 2 Install the sampling unit, (see “[Installing the sampling unit](#)” on page 135).
- 3 Install the sample transport, (see “[Installing the sample transport](#)” on page 133)
- 4 Install the top cover, top plate, and foam (see “[Top Cover and Foam](#)” on page 132).
- 5 Replace the plate tray in the tray base.
- 6 Turn ON the sampler, close the front door, the system will reset automatically.
- 7 In the user interface perform a “Sample Transport Self Alignment”.

### Power Supply

<b>When required</b>	When defective
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver
<b>Parts required</b>	0950-2528 (rev. G and higher only) Power supply

#### CAUTION

The MTP board is sensitive to electrostatic discharge. Always use the ESD strap (see [“Using the ESD Strap”](#) on page 107) when handling electronic boards.

#### Removing the power supply

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see [“Removing the sample transport”](#) on page 133).
- 6 Remove the sampling unit, (see [“Removing the sampling unit”](#) on page 134).
- 7 Remove the MTP main board, (see [“Removing the MTP main board”](#) on page 146).
- 8 Remove the fan, (see [“Removing the main fan”](#) on page 144).
- 9 Remove the bottom foam.
- 10 Remove the exhaust fan, (see [“Removing the exhaust fan”](#) on page 145).
- 11 Remove the power switch light pipe from the coupler.
- 12 Remove the two screws which hold the power supply from the rear panel.
- 13 Lift the power supply out of the module.
- 14 Remove the coupler from the switch of the power supply.



**Installing the power supply**

- 1** Insert the coupler onto the switch of the new power supply.
- 2** Install the power supply in the module.
- 3** Connect the light pipe to the coupler.
- 4** Install the bottom foam. Ensure the cables are positioned properly.
- 5** Install the exhaust fan, (see [“Installing the exhaust fan”](#) on page 145).
- 6** Install the MTP board, (see [“Installing the MTP main board”](#) on page 147).
- 7** Install the main fan, (see [“Installing the main fan”](#) on page 144).
- 8** Install the sampling unit, (see [“Installing the sampling unit”](#) on page 135).
- 9** Install the sample transport, (see [“Installing the sample transport”](#) on page 133)
- 10** Install the top cover, top plate, and foam (see [“Top Cover and Foam”](#) on page 132).
- 11** Replace the plate tray in the tray base.
- 12** Turn ON the sampler, close the front door.
- 13** The system will reset automatically.
- 14** In the user interface perform a “Sample Transport Self Alignment”.

### Leak Sensor

<b>When required</b>	When defective
<b>Tools required</b>	1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit) 4 mm open end wrench 8710-1534 (supplied in accessory kit) Pozidrive screwdriver
<b>Parts required</b>	5061-3356 Leak sensor

#### Removing the leak sensor

- 1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function.
- 2 Switch off the sampler at the main power switch. Remove the power cable.
- 3 Remove the top cover, top plate, and foam (see “[Top Cover and Foam](#)” on page 132).
- 4 Remove the plate tray from the tray base.
- 5 Remove the transport assembly, (see “[Removing the sample transport](#)” on page 133).
- 6 Remove the sampling unit, (see “[Removing the sampling unit](#)” on page 134).
- 7 Disconnect the leak sensor from the SUD board (labelled “leak sensor”).
- 8 Remove the sensor.

#### Installing the leak sensor

- 1 Feed the cable of the new sensor through the base of the sampling unit to the SUD board.
- 2 Connect the connector to the connector (labelled “leak sensor”).
- 3 Install the sampling unit, (see “[Installing the sampling unit](#)” on page 135).
- 4 Install the sample transport, (see “[Installing the sample transport](#)” on page 133)
- 5 Install the top cover, top plate, and foam (see “[Top Cover and Foam](#)” on page 132).
- 6 Replace the plate tray in the tray base.
- 7 Turn ON the sampler, close the front door, the system will reset automatically.
- 8 In the user interface perform a “Sample Transport Self Alignment”.

## Replacing the Autosampler 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 autosampler firmware the following steps have to be performed:

- 1 Load the firmware into the autosampler, see the help system of your user interface.  
For control module see [“Firmware Update”](#) on page 269
- 2 If the sampler main board was replaced, re-enter the serial number information of the module through the user interface, see [“Entering the Serial Number using the Control Module”](#) on page 148 or [“Entering the Serial Number using the ChemStation”](#) on page 148.

## **4 Repairing the Sampler**

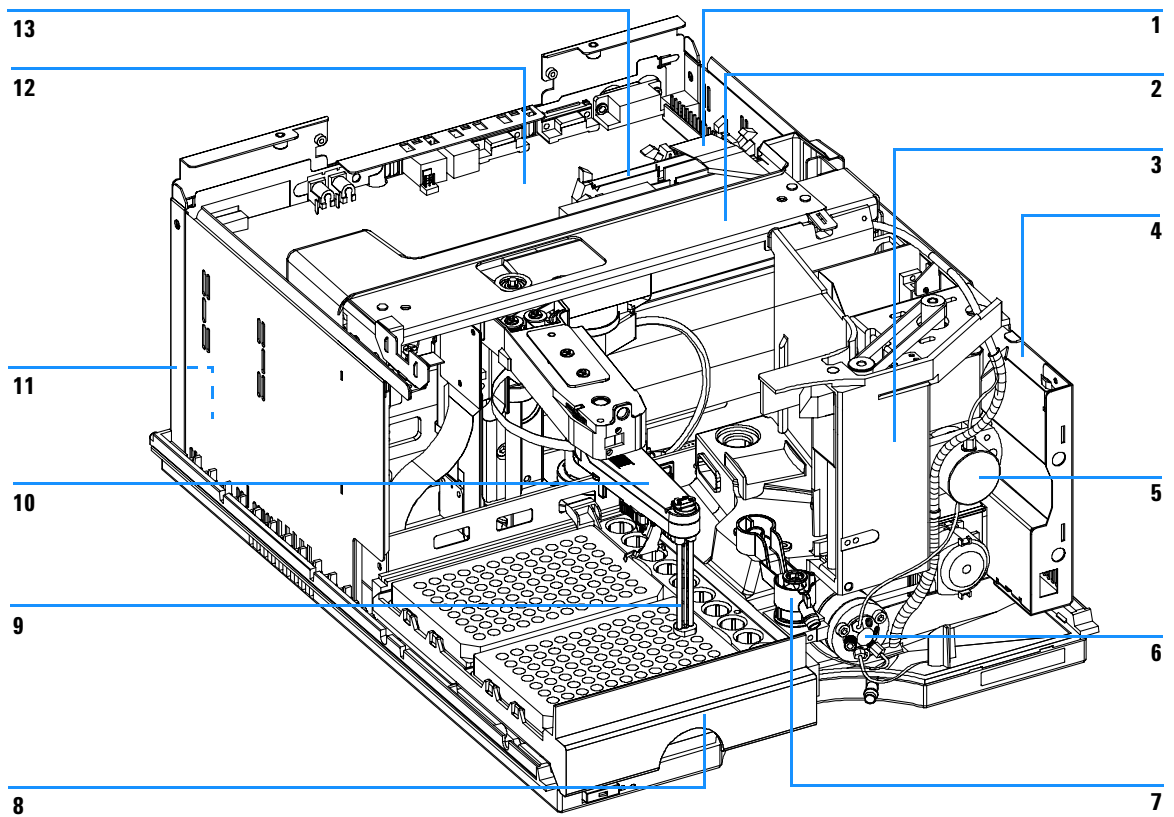


## 5 Parts and Materials

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## Sampler Main Assemblies



**Figure 19** Well-plate Sampler Main Assemblies

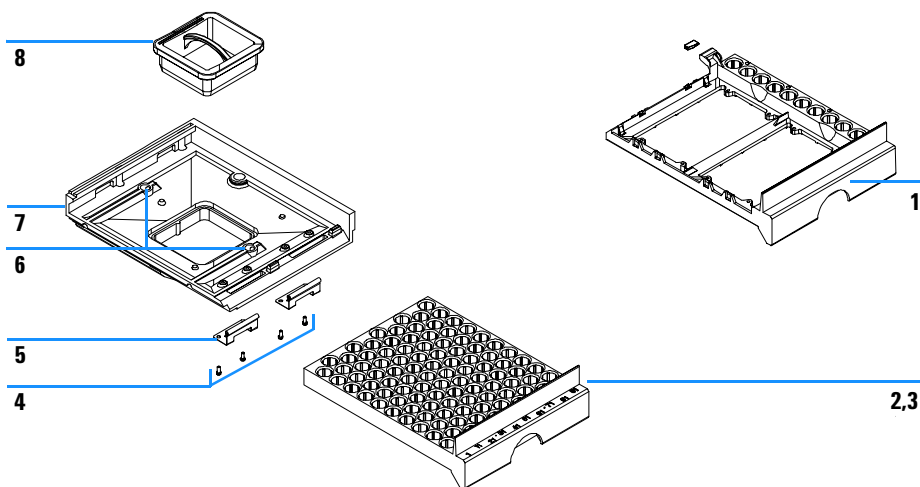
**Table 19** Well-plate Sampler Main Assemblies

Item	Description	Part Number
1	Ribbon Cable (from SU to MTP)	G1313-81602
2	Sample Transport assembly <i>for G1367A</i> Sample Transport assembly <i>for G1377A</i>	G1367-60019 G1377-60009
3	Sampling Unit assembly <i>for G1367/68A</i> Sampling Unit assembly <i>for G1377/78A</i> (The assy comes without injection valve and analytical head)	G1367-60008 G1377-60008
4	SLS board (not shown)	G1367-66505
5	Analytical Head assembly (100 µl) <i>for G1367/68A</i> Analytical Head assembly (40 µl) <i>for G1377/78A</i>	G1367-60003 G1377-60013
6	Injection Valve assembly <i>for G1367/68A</i> Micro Injection valve assembly <i>for G1377/78A</i>	0101-0921 0101-1050
7	Needle Seat assy <i>for G1367/68A</i> Needle Seat assy <i>for G1377/78A (without capillary)</i> Seat cap. (0.10 mm ID 1.2 µl) <i>for G1377-87101 Needle Seat</i> Seat cap. (0.05 mm ID 0.3 µl) <i>for G1377-87101 Needle Seat</i>	G1367-87101 G1377-87101 G1375-87317 G1375-87300
8	Plate Tray	G1367-60001
9	Needle assy <i>for G1367/68A</i> Needle assy <i>for G1377/78A</i>	G1367-87201 G1377-87201
10	Needle Carrier assembly	G1367-60010
11	Power supply assembly (not visible)	0950-2528
12	Well-Plate Sampler Main Board (MTP) Exchange Assembly - MTP board	G1367-66500 G1367-69500
13	Ribbon Cable (from ST to MTP)  Ribbon Cable (from SLS to MTP) (not visible)  Sampler-TCC cap. (380 mm, 0.17 mm id) <i>for G1367/68A</i> Sampler-TCC cap. (500 mm, 0.05 mm id) <i>for G1377/78A</i>  Fan (not visible)  Fan exhaust (not visible)  BCD board (not visible)	G1364-81601  G1367-81600  01090-87306 G1375-87304  3160-1017  3160-4097  G1351-68701

## Vial Trays

**Table 20** Well-plate Sampler Vial Trays and Tray Base

Item	Description	Part Number
1	Tray for 2 plates + 10 × 2-ml vials	G1367-60001
2	Tray for 100 × 2-ml vials, thermostattable	G1329-60001
3	Tray for 100 × 2-ml vials	G1313-44500
4	Screws for springs	0515-0866
5	Spring	G1313-09101
6	Spring stud	0570-1574
7	Tray base (includes items 4,5,6)	G1329-60000
8	Adapter air channel	G1329-43200
	Plug channel (not shown)	G1367-47200



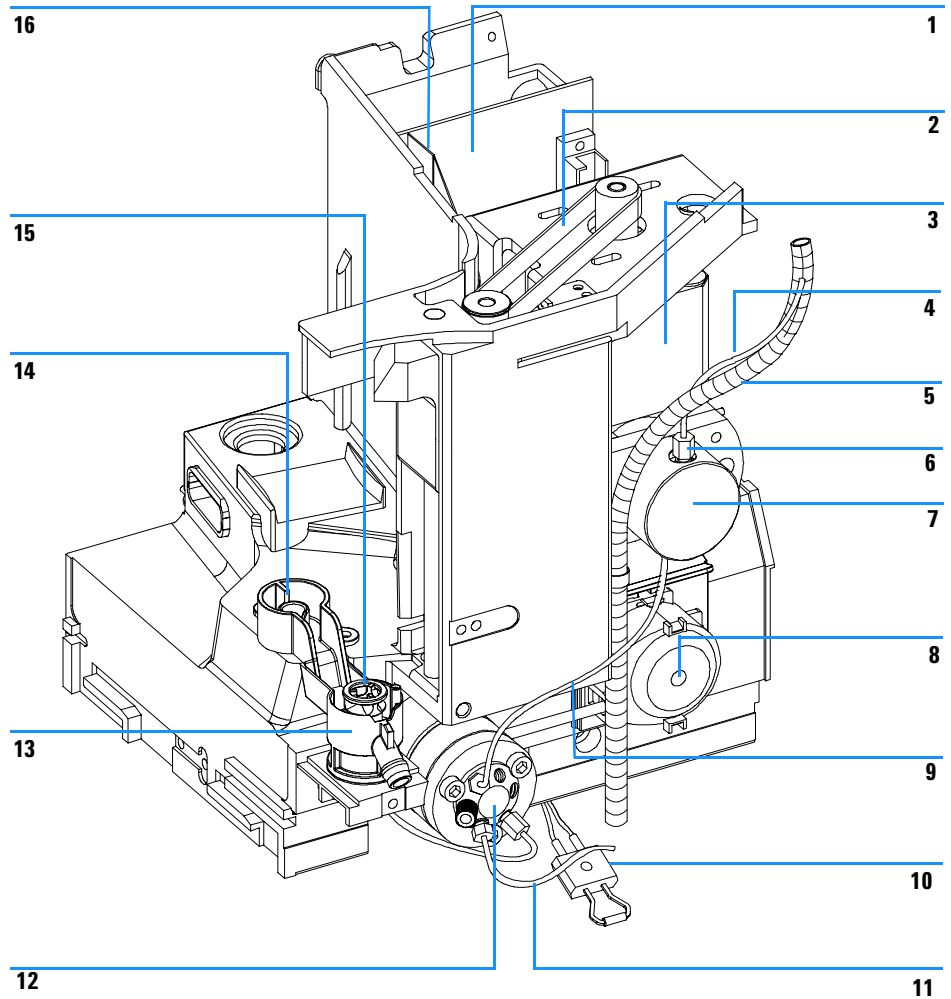
**Figure 20** Vial trays and Tray Base



**Table 21** Recommended plates and closing mat

Description	Rows	Columns	Plate height	Volume (µl)	Part Number	Package
384Agilent	16	24	14.4	80	5042-1388	30
384Corning	16	24	14.4	80	No Agilent PN	
384Nunc	16	24	14.4	80	No Agilent PN	
96Agilent	8	12	14.3	400	5042-1386 5042-1385	10 120
96CappedAgilent	8	12	47.1	300	5065-4402	1
96Corning	8	12	14.3	300	No Agilent PN	
96CorningV	8	12	14.3	300	No Agilent PN	
96DeepAgilent31mm	8	12	31.5	1000	5042-6454	50
96DeepNunc31mm	8	12	31.5	1000	No Agilent PN	
96DeepRitter41mm	8	12	41.2	800	No Agilent PN	
96Greiner	8	12	14.3	300	No Agilent PN	
96GreinerV	8	12	14.3	250	No Agilent PN	
96Nunc	8	12	14.3	400	No Agilent PN	
Closing mat for all 96 Agilent plates	8	12			5042-1389	50

## Sampling Unit Assembly



**Figure 21** Well-plate sampler sampling unit

**Table 22** Well-plate Sampler sampling unit

Item	Description	Part Number
	Sampling Unit assembly <i>for G1367/68A</i>	G1367-60008
	Sampling Unit assembly <i>for G1377/78A</i> (The assy comes without injection valve and analytical head)	G1377-60008
1	Sampling unit connector board (SUD)	G1313-66503
2	Belt gear <i>for metering unit and needle arm</i>	1500-0697
3	Stepper motor <i>for metering unit and needle arm</i>	5062-8590
4	Loop capillary, 100 µl <i>for G1367/68A</i>	G1367-87300
	Loop capillary, 40 µl <i>for G1377/78A</i>	G1377-87300
	Loop capillary, 8 µl <i>for G1377/78A</i>	G1375-87315
5	Loop capillary waste tube	G1367-60007
6	Seal tight nut <i>for G1367-87300 and G1377-87300 capillaries</i>	0100-2086
7	Analytical Head assembly 100 µl <i>for G1367/68A</i>	G1367-60003
	Analytical Head assembly 40 µl <i>for G1377/78A</i>	G1377-60013
8	Peristaltic pump, includes tubing	5065-4445
9	Inj-Valve-Anal Head cap (160 mm 0.25 mm ID) <i>for G1367/68A</i>	G1313-87301
	Inj-Valve-Anal Head cap (200 mm 0.10 mm ID) <i>for G1377/78A</i>	G1375-87312
10	Leak sensor	5061-3356
11	Waste tube <i>for G1367/68A</i>	G1313-87300
	Waste tube <i>for G1377/78A</i>	G1377-87301
12	Injection Valve assembly <i>for G1367/68A</i>	0101-0921
	Micro Injection Valve assembly <i>for G1377/78A</i>	0101-1050
13	Seat adapter	G1367-43200
14	Flush port	G1367-47700
15	Needle-Seat assy (0.17 mm ID 2.3 µl) <i>for G1367/68A</i>	G1367-87101
	Needle-Seat (without capillary) <i>for G1377/78A</i>	G1377-87101
	Seat capillary (150 mm 0.10 mm ID) <i>for G1377-87101 Needle Seat</i>	G1375-87317
	Seat capillary (150 mm 0.05 mm ID) <i>for G1377-87101 Needle Seat</i>	G1375-87300
16	Flex board	G1313-68715
	Air barrier (not visible)	G1367-44105

**Table 22** Well-plate Sampler sampling unit (continued)

<b>Item</b>	<b>Description</b>	<b>Part Number</b>
	Stepper motor peristaltic pump (not visible)	5065-4409
	Motor holder (not visible)	G1367-42304
	Plate peristaltic pump (not visible)	G1367-44100

## Analytical-Head Assembly

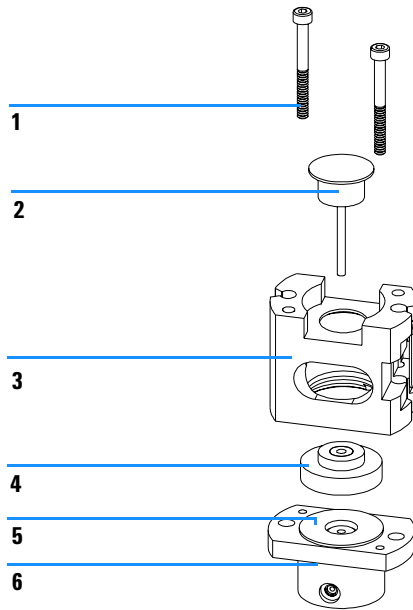
**Table 23** Analytical-Head Assembly 100 µl, for G1367/68A

Item	Description	Part Number
	Analytical head assembly 100 µl, <i>for G1367/68A</i> includes items 1 – 6	G1367-60003
1	Screws	0515-0850
2	Plunger assembly <i>for G1367/68A</i>	5063-6586
3	Adapter	01078-23202
4	Seal support assembly <i>for G1367/68A</i>	5001-3739
5	Metering seal (pack of 2) <i>for G1367/68A</i>	5063-6589
6	Head body	01078-27710
	Screw M5, 60 mm lg, for mounting of assembly	0515-2118

**Table 24** Micro analytical head assembly 40 µl, for G1377/78A

Item	Description	Part Number
	Micro Analytical head assembly 40 µl, <i>for G1377/78A</i> includes item 1 - 6	G1377-60013
1	Screws	0515-0850
2	Micro plunger assembly <i>for G1377/78A</i>	5064-8293
3	Adapter	01078-23202
4	Micro seal support assembly <i>for G1377/78A</i>	G1377-60002
5	Micro metering seal (pack of 1) <i>for G1377/78A</i>	5022-2175
6	Head body <i>for G1377/78A</i>	G1377-27700
	Screw M5, 60 mm lg, for mounting of assembly	0515-2118

## 5 Parts and Materials



**Figure 22** Analytical-Head Assembly (100 µl or 40 µl)

## Injection-Valve Assembly

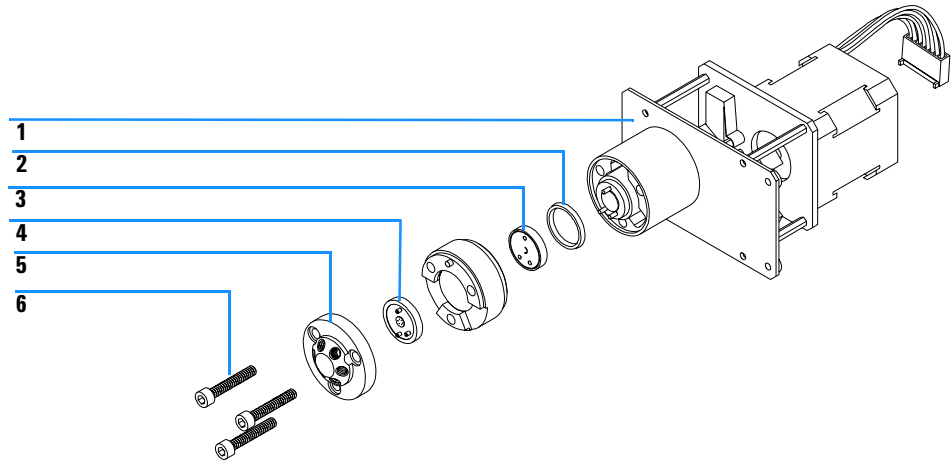
**Table 25** Injection-Valve Assembly

Item	Description	Part Number
1	Injection-valve assembly, includes items 1 – 6	0101-0921
2	Isolation seal	0100-1852
3	Rotor seal (Vespel)	0100-1853
3	Rotor seal (Tefzel)	0100-1849
4	Stator face	0100-1851
5	Stator head	0100-1850
6	Stator screws	1535-4857

**Table 26** Micro Injection-Valve Assembly

The Micro injection valve assembly has no ceramic stator face.

Item	Description	Part Number
1	Micro injection-valve assembly, incl. items 1 - 2- 3 - 5 - 6	0100-1050
2	Isolation seal	0100-1852
3	Micro Rotor seal (Vespel)	0100-2088
5	Micro stator head	0100-2089
6	Stator screws	1535-4857



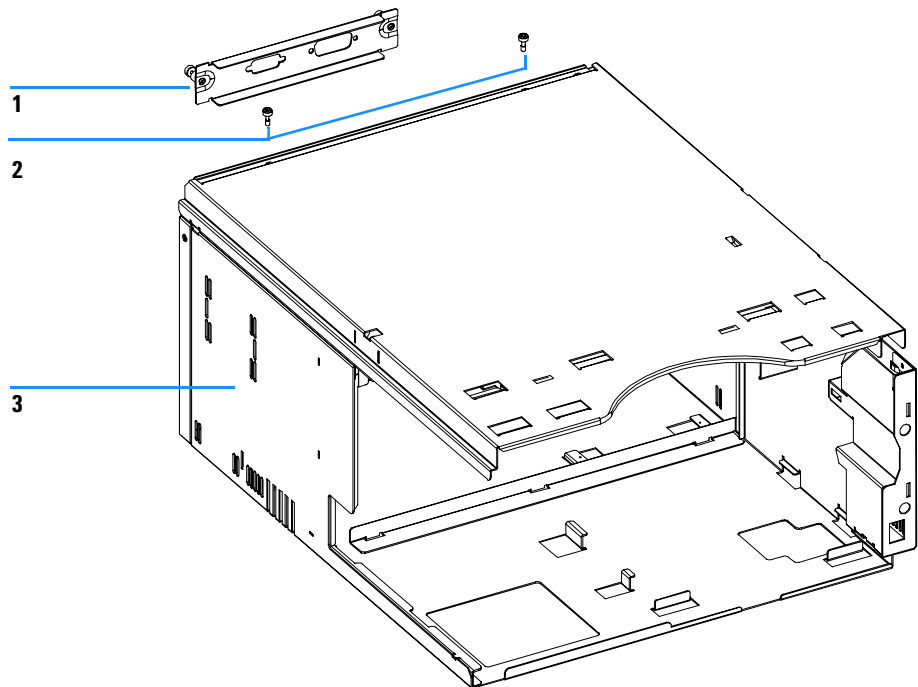
**Figure 23** Injection-Valve Assembly



## Sheet Metal Kit

**Table 27** Sheet Metal

Item	Description	Part Number
1	Slot cover	5001-3772
2	Screw cover	5022-2112
3	Well-plate sampler sheet metal kit	G1367-68701

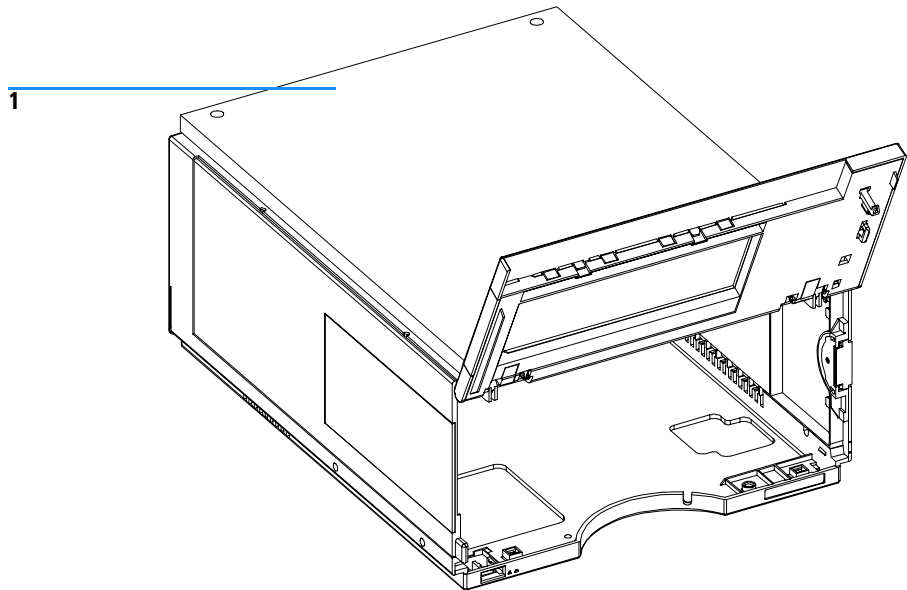


**Figure 24** Sheet Metal Kit

## Cover Parts

**Table 28** Covers

Item	Description	Part Number
1	Cabinet kit, includes base, side panels, top and front cover	5065-4446
	Name plate for Agilent 1100 Series	5042-1381
	Light protection kit, includes dark front cover and side window	5064-8272

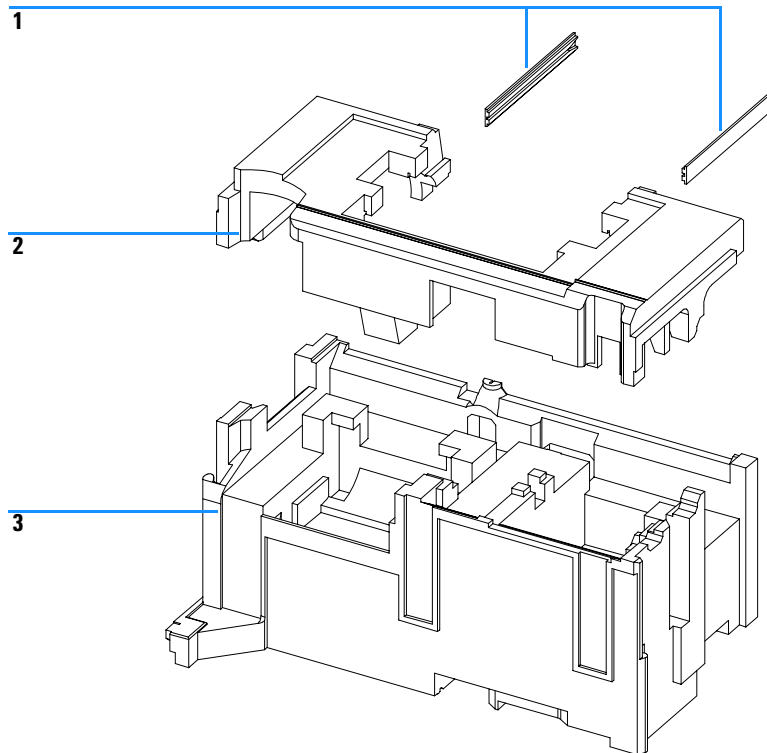


**Figure 25** Cover Parts

## Foam Parts

**Table 29** 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

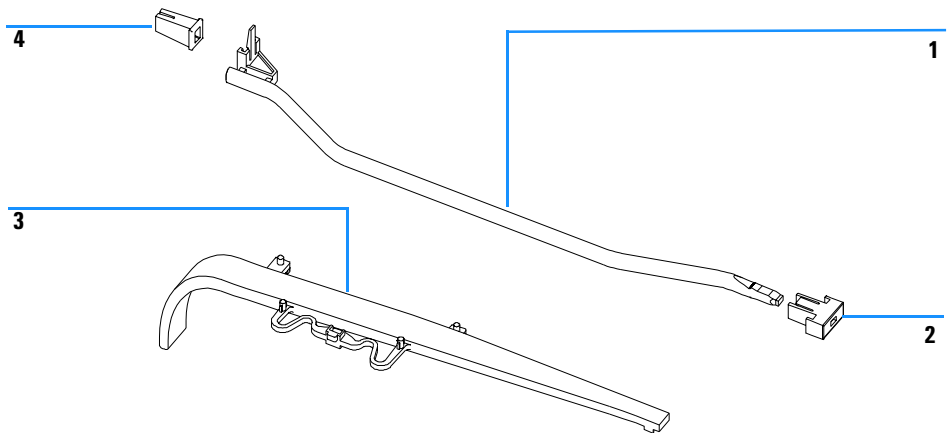


**Figure 26** Foam Parts

## Power and Status Light Pipes

**Table 30** Power and Status Light Pipes

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



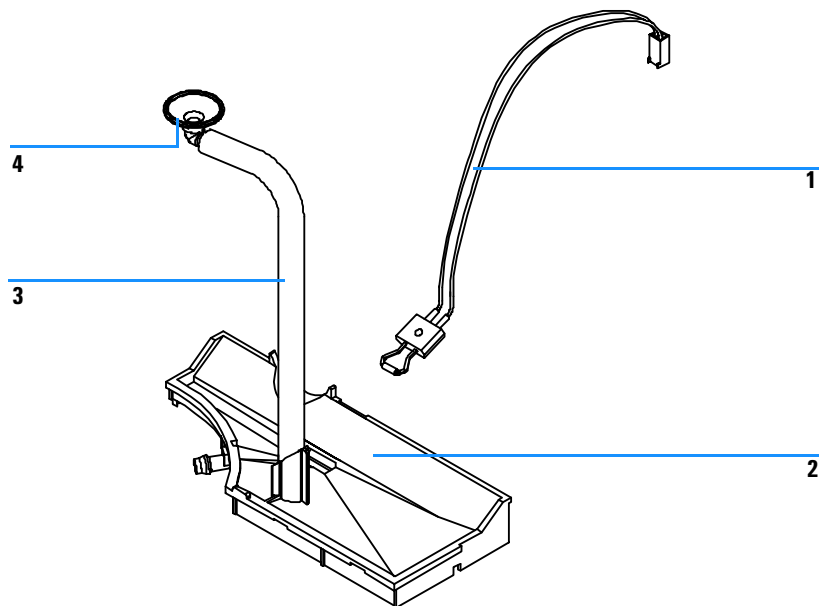
**Figure 27** Power and Status Light Pipes

## Leak System Parts

**Table 31** Leak System Parts

Item	Description	Part Number
1	Leak sensor	5061-3356
2	Leak plane	G1313-44501
3	Leak tubing 120 mm*	5062-2463
4	Leak funnel	5041-8388

\* reorder gives 5 m



**Figure 28** Leak System Parts

## Well-plate Sampler Accessory Kit **G1367-68705**

**Table 32** Well-plate Sampler Accessory Kit **G1367-68705**

Description	Quantity	Part Number
Capillary sampler-column (380 mm, 0.17 mm ID)	1	01090-87306
96 well-plate 0.5 ml, PP (pack of 10)	1	5042-1386
Tubing assembly	1	5063-6527
Filter kit	1	5064-8240
CAN cable, 1 m	1	5181-1519
Vials, screw cap 100/pk	1	5182-0716
Blue screw caps 100/pk	1	5182-0717
Valve catalog	1	5988-2999
Hex key 9/64 inch (for injection-valve screws)	1	8710-0060
Wrenches 1/4 – 5/16 inch	2	8710-0510
Rheotool socket wrench 1/4 inch	1	8710-2391
Hex key 4.0 mm, 15 cm long, T-handle	1	8710-2392
Hex key 9/64 inch, 15 cm long, T-handle	1	8710-2394
Hex key 2.0 mm	1	8710-2438
ESD wrist strap	1	9300-1408
Air channel adapter	1	G1329-43200
Capillary pump-sampler (900 mm, 0.17 mm ID)	1	G1329-87300
WPS leak kit	1	G1367-60006

## Micro Well-plate Sampler Accessory Kit **G1377-68705**

**Table 33** Micro Well-plate Sampler Accessory Kit Contents **G1377-68705**

Description	Quantity	Part Number
96 well-plate 0.5 ml, PP (pack of 10)	1	5042-1386
Tubing assembly	1	5063-6527
Filter kit	1	5064-8240
CAN cable, 1 m	1	5181-1519
Vials, screw cap 100/pk	1	5182-0716
Blue screw caps 100/pk	1	5182-0717
Valve catalog	1	5988-2999
Hex key 9/64 inch (for injection-valve screws)	1	8710-0060
Wrenches 1/4 – 5/16 inch	2	8710-0510
Wrench 4.0 mm open end	1	8710-1534
Rheotool socket wrench 1/4 inch	1	8710-2391
Hex key 4.0 mm, 15 cm long, T-handle	1	8710-2392
Hex key 9/64 inch, 15 cm long, T-handle	1	8710-2394
Hex key 2.5 mm, 15 cm long, straight handle	1	8710-2412
Hex key 2.0 mm	1	8710-2438
ESD wrist strap	1	9300-1408
Torque adapter	1	G1315-45003
Air channel adapter	1	G1329-43200
Capillary sampler-column (500 mm 0.05 mm ID)	1	G1375-87304
40 µl Loop capillary	1	G1377-87300
WPS leak kit	1	G1367-60006

## Multi-Draw Kit **G1313-68711** (only for G1367A/68A)

**Table 34** Multi-Draw Kit

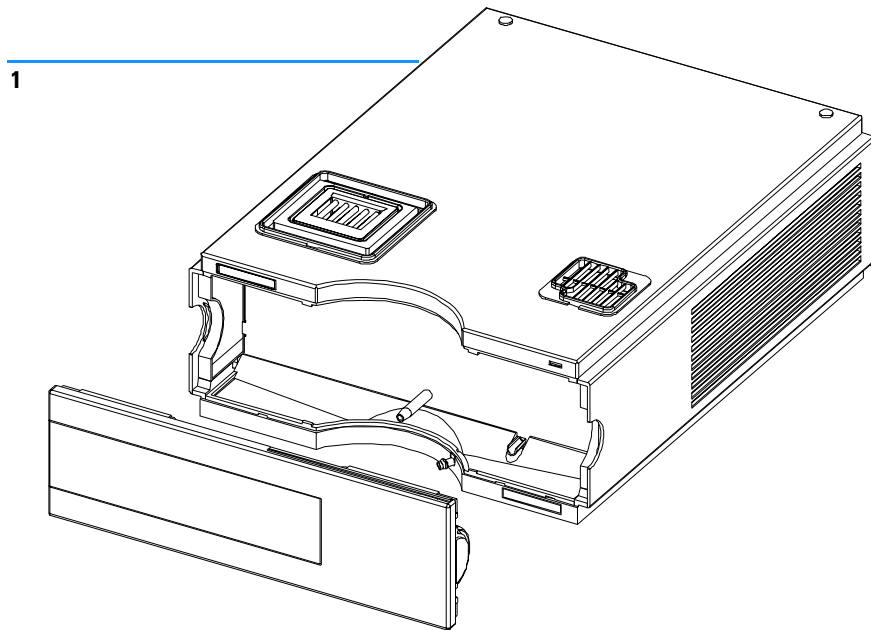
<b>Item</b>	<b>Description</b>	<b>Part Number</b>
1	Seat capillary, 500 $\mu$ l, 0.5 mm id	G1313-87307
2	Seat capillary, 1500 $\mu$ l, 0.9 mm id	G1313-87308
3	Union	0100-0900



## Well-plate Sampler Thermostat

**Table 35** WPS Thermostat

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



**Figure 29** WPS 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.

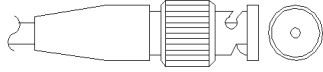
**Table 36** Cables Overview

Type	Description	Part Number
<b>Analog cables</b>	3390/2/3 integrators	01040-60101
	3394/6 integrators	35900-60750
	Agilent <a href="#">35900A</a> A/D converter	35900-60750
	General purpose (spade lugs)	01046-60105
<b>Remote cables</b>	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 <a href="#">page 185</a>	
	3396 Series III / 3395B integrator	03396-61010
	HP 1050 modules / HP 1046A FLD	5061-3378
	HP 1046A FLD	5061-3378
	Agilent <a href="#">35900A</a> A/D converter	5061-3378
	HP 1040 diode-array detector	01046-60202
	HP 1090 liquid chromatographs	01046-60202
Signal distribution module	01046-60202	
<b>BCD cables</b>	3392/3 integrators (not possible with the well plate samplers)	18594-60510
	3396 integrator (not possible with the well plate samplers)	03396-60560
	General purpose (spade Lugs)	G1351-81600

**Table 36** Cables Overview (continued)

<b>Type</b>	<b>Description</b>	<b>Part Number</b>
<b>Auxiliary</b>	Agilent 1100 Series vacuum degasser	G1322-61600
<b>CAN cables</b>	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
<b>External contacts</b>	Agilent 1100 Series interface board to general purpose	G1103-61611
<b>GPIB cable</b>	Agilent 1100 module to ChemStation, 1 m	10833A
	Agilent 1100 module to ChemStation, 2 m	10833B
<b>RS-232 cable</b>	Agilent 1100 module to a computer This kit includes a 9-pin female to 9-pin female Null Modem (printer) cable and one adapter.	34398A
<b>LAN cable</b>	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

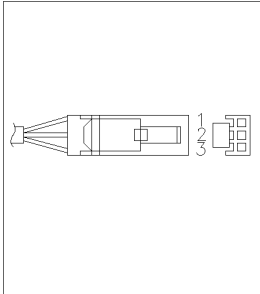


One end of these cables provides a BNC connector to be connected to Agilent 1100 Series modules. The other end depends on the instrument to which connection is being made.

**Table 37** Agilent 1100 to 3390/2/3 Integrators

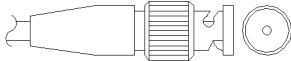
Connector	Pin	Pin	Signal Name
<b>01040-60101</b>	<b>3390/2/3</b>	<b>Agilent 1100</b>	
	1	Shield	Ground
	2		Not connected
	3	Center	Signal +
	4		Connected to pin 6
	5	Shield	Analog -
	6		Connected to pin 4
	7		Key
	8		Not connected

**Table 38** Agilent 1100 to 3394/6 Integrators

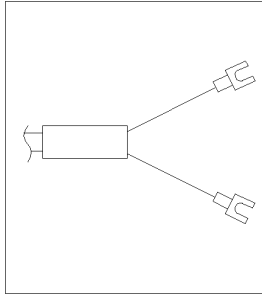
Connector <b>35900-60750</b>	Pin <b>3394/6</b>	Pin <b>Agilent 1100</b>	Signal Name
	1		Not connected
	2	Shield	Analog -
	3	Center	Analog +

**Table 39** Agilent 1100 to BNC Connector

Connector <b>8120-1840</b>	Pin <b>BNC</b>	Pin <b>Agilent 1100</b>	Signal Name
	Shield	Shield	Analog -
	Center	Center	Analog +

**Table 40** 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

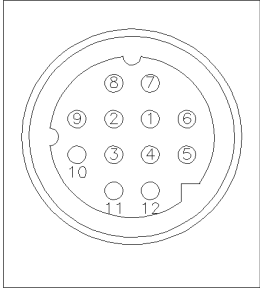


One end of these cables provides a Agilent Technologies APG (Analytical Products Group) remote connector to be connected to Agilent 1100 Series modules. The other end depends on the instrument to be connected to.

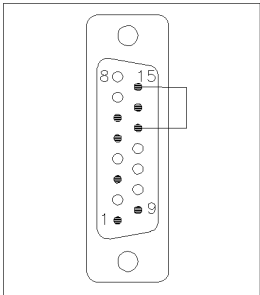
**Table 41** Agilent 1100 to 3390 Integrators

Connector <b>01046-60203</b>	Pin <b>3390</b>	Pin <b>Agilent 1100</b>	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

**Table 42** Agilent 1100 to 3392/3 Integrators

Connector <b>01046-60206</b>	Pin <b>3392/3</b>	Pin <b>Agilent 1100</b>	Signal Name	Active (TTL)
 <p>4 - Key</p>	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
	NC	9 - Black	Start request	Low

**Table 43** Agilent 1100 to 3394 Integrators

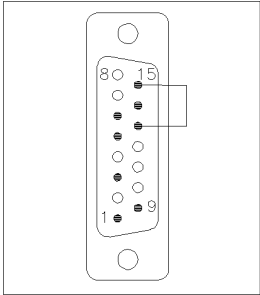
Connector <b>01046-60210</b>	Pin <b>3394</b>	Pin <b>Agilent 1100</b>	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	5,14	7 - Red	Ready	High
	6	8 - Green	Stop	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.

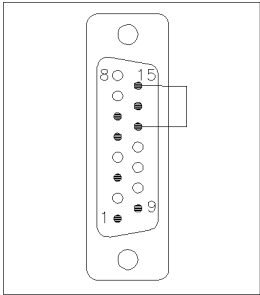
**Table 44** Agilent 1100 to 3396A Integrators

Connector <b>03394-60600</b>	Pin <b>3394</b>	Pin <b>Agilent 1100</b>	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	

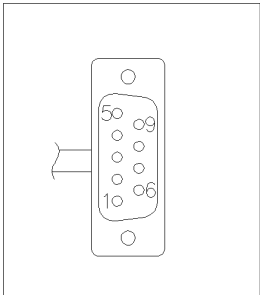
**Agilent 1100 to 3396 Series II / 3395A Integrators**

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

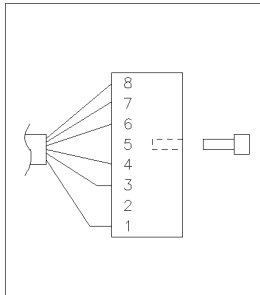
**Table 45** Agilent 1100 to 3396 Series III / 3395B Integrators

Connector <b>03396-61010</b>	Pin <b>33XX</b>	Pin <b>Agilent 1100</b>	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	

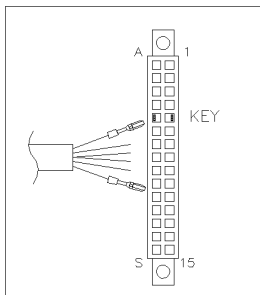
**Table 46** Agilent 1100 to HP 1050, HP 1046A or Agilent 35900 A/D Converters

Connector <b>5061-3378</b>	Pin <b>HP 1050/....</b>	Pin <b>Agilent 1100</b>	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

**Table 47** Agilent 1100 to HP 1090 LC, HP 1040 DAD or Signal Distribution Module

Connector <b>01046-60202</b>	Pin HP 1090	Pin Agilent 1100	Signal Name	Active (TTL)
 <p>5 - Key</p>	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

**Table 48** Agilent 1100 to General Purpose

Connector <b>01046-60201</b>	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.

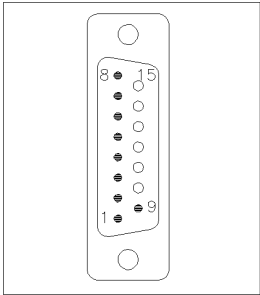
**NOTE**

The BCD output for the well plate sampler does not work with the integrators 3392/3/6.

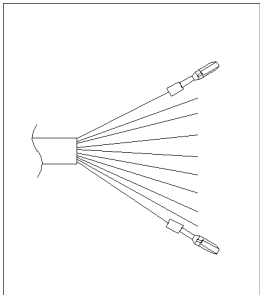
**Table 49** Agilent 1100 to 3392/3 Integrators

Connector <b>18584-60510</b>	Pin <b>3392/3</b>	Pin <b>Agilent 1100</b>	Signal Name	BCD Digit
<p>6 - Key</p>	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
	1	9	Digital ground	
	2	15	+ 5 V	Low

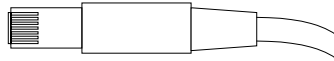
**Table 50** Agilent 1100 to 3396 Integrators

Connector <b>03396-60560</b>	Pin <b>3392/3</b>	Pin <b>Agilent 1100</b>	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

**Table 51** Agilent 1100 to General Purpose

Connector <b>G1351-81600</b>	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		
	Gray/Pink	10	BCD 11	100	
	Red/Blue	11	BCD 10	200	
	White/Green	12	BCD 9	400	
	Brown/Green	13	BCD 8	800	
			14	n/c	
			15	n/c	

## Auxiliary Cable

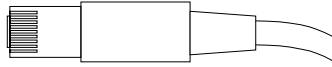


One end of this cable provides a modular plug to be connected to the Agilent 1100 Series vacuum degasser. The other end is for general purpose.

**Table 52** Agilent 1100 Series Degasser to general purposes

Connector <b>G1322-81600</b>	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



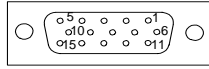
Both ends of this cable provide a modular plug to be connected to Agilent 1100 Series module's CAN-bus connectors.

**Table 53**

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

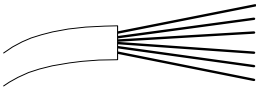


## External Contact Cable



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.

**Table 54** Agilent 1100 Series Interface Board to general purposes

Connector <b>G1103-61611</b>	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	15	Not connected

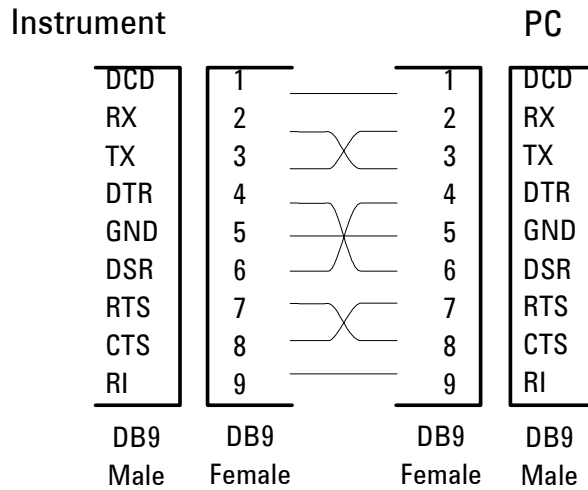
## RS-232 Cable Kit

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](#)

Table 55



## 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).

## **5 Parts and Materials**



## 6 Introduction to the Well-plate Sampler

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## Introduction to the Well-plate Sampler

Four models of Agilent 1100 Series well-plate sampler are available:

- G1367A Well-plate sampler
- G1368A Thermostatted well-plate sampler
- G1377A Micro well-plate sampler
- G1378A Thermostatted micro well-plate sampler

They are referred to in this introduction as the well-plate sampler and the thermostatted well-plate sampler. Unless otherwise stated all information in this section is valid for all models.

The Agilent 1100 Series well-plate samplers and Agilent 1100 Series thermostatted well-plate samplers are designed for use with other modules of the Agilent 1100 Series LC system, with the HP 1050 Series, or with other LC systems if adequate remote control inputs and outputs are available. The well-plate samplers are controlled from the Agilent 1100 Series control module or from the Agilent ChemStation for LC.

The special-designed thermostattable sample tray for this instrument holds 2 well-plates (shallow - or deepwell) and additional 10 x 2.0 ml vials. The format of the well-plates can be up to 384 wells per plate (on a footprint of 128x86 mm). The well-plate sampler can also handle 100 x 2 ml vials using the current trays for the Agilent G1313/29A autosampler. There are sensors to detect the presence of the tray.

The well-plate sampler transport mechanism uses an X-Z-theta robot to optimize the positioning of the sampling arm on the well-plate. Once the sampling arm is positioned over the programmed sample position, the programmed sample volume is drawn by the metering device into the sampling needle. The sampling arm then moves to the injection position where the sample is flushed onto the column.

The well-plate sampler employs a vial/plate pusher mechanism to hold down the vial or the plate while the needle is drawn back from the sample vessel (a must in the case a septum is used). This vial/plate pusher employs a sensor to detect the presence of a plate. All axes of the transport mechanism (x-z,theta-robot) are driven by stepper-motors. Optical encoders ensure the correct operation of the movement.

The standard metering device (for the G1367A/68A) provides injection volumes from 0.1–100  $\mu\text{l}$ . A multi-draw kit extends the range up to 1500  $\mu\text{l}$ . The micro metering device (for the G1377A/78A) provides injection volumes from 0.01 - 8  $\mu\text{l}$  with the standard loop capillary installed and from 0.01 - 40  $\mu\text{l}$  with the extended loop capillary. The metering device is always flushed by the mobile phase after injection for minimum internal carry-over.

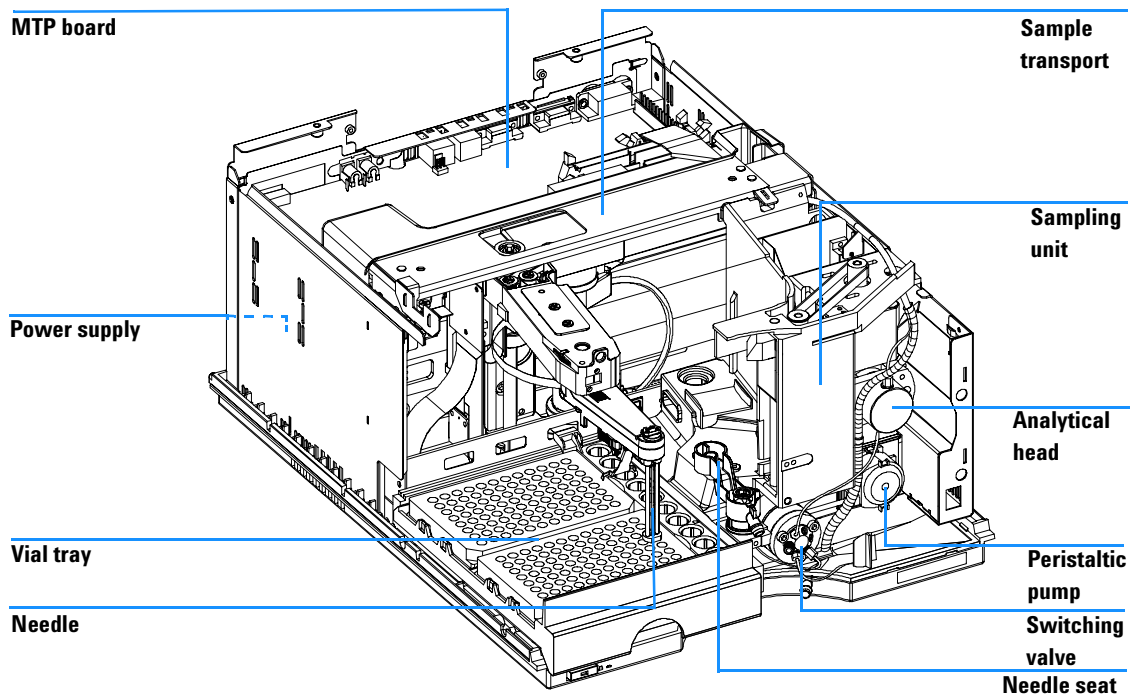
An additional needle flush station with a peristaltic pump is installed to wash the outside of the needle. This reduces the already low carry-over for very sensitive analysis. The bottle containing the mobile phase for the wash procedure will be located in the solvent bottle cabinet. Produced waste during this operation is channeled safely away through a waste drain.

The six-port (only 5 ports are used) injection valve unit is driven by a high-speed hybrid stepper motor. During the sampling sequence, the valve unit bypasses the autosampler, and connects flow from the pump to the column directly. During injection and analysis, the valve unit directs the flow through the well-plate sampler which ensures that all of the sample is injected onto the column, and that the metering unit and needle are always free from sample residue before the next sampling sequence begins. The injection valves from the G1367A/68A and the G1377A/78A have a different stator head and a different rotor seal. The volume of each valve is different.

Control of the vial/plate temperature in the thermostatted well-plate sampler is achieved using an additional Agilent 1100 Series module; the ALS thermostat.

The ALS thermostat contains Peltier-controlled heat-exchangers. A fan draws air from the area above the sample vial tray of the well-plate sampler. It is then blown through the fins of the cooling/heating module. There it is cooled or heated according the temperature setting. The thermostatted air enters the well-plate sampler through a recess underneath the special designed sample tray. The air is then distributed evenly through the sample tray ensuring effective temperature control, regardless of how many vials are in the tray. In cooling mode condensation is generated on the cooled side of the Peltier elements. This condensed water is safely guided into a waste bottle for condensed water.

## Sampling Sequence



**Figure 30** Overview of the well-plate sampler

The movements of the well-plate sampler components during the sampling sequence are monitored continuously by the well-plate sampler processor. The processor defines specific time windows and mechanical ranges for each movement. If a specific step of the sampling sequence is not completed successfully, an error message is generated. Solvent is bypassed from the well-plate sampler by the injection valve during the sampling sequence. The needle moves to the desired sample vial position and is lowered into the sample liquid in the vial to allow the metering device to draw up the desired volume by moving its plunger back a certain distance. The needle is then raised again and moved onto the seat to close the sample loop. Sample is applied to the column when the injection valve returns to the mainpass position at the end of the sampling sequence.



The standard sampling sequence occurs in the following order:

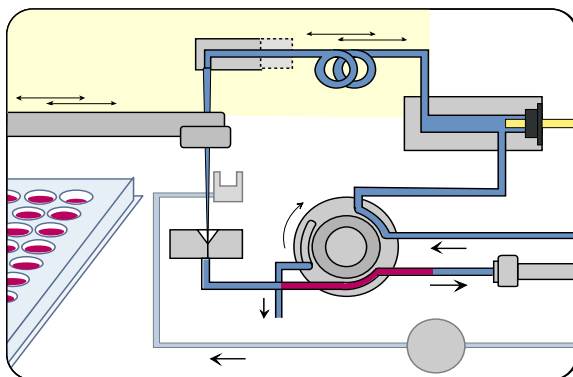
- 1** The injection valve switches to the bypass position.
- 2** The plunger of the metering device moves to the initialization position.
- 3** The needle lock moves up.
- 4** The needle moves to the desired sample vial position.
- 5** The needle lowers into the vial.
- 6** The metering device draws the preset sample volume.
- 7** The needle lifts out of the vial.
- 8** The needle is then moved onto the seat to close the sample loop.
- 9** The needle lock moves down.
- 10** The injection cycle is completed when the injection valve switches to the mainpass position.

When using an injector program the lines 3 to 6 are replaced by the contents of the injector program.

If needle wash is required it will be done between step 6 and 7.

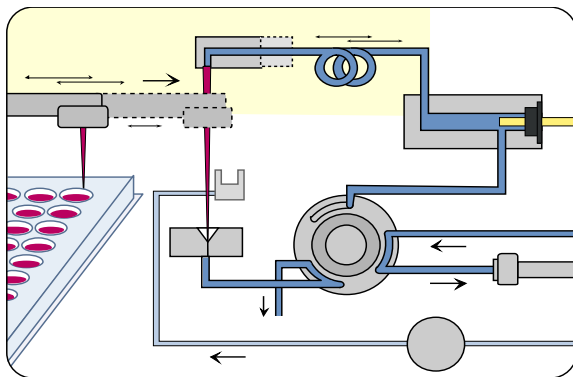
## Injection Sequence

Before the start of the injection sequence, and during an analysis, the injection valve is in the mainpass position (Figure 31). In this position, the mobile phase flows through the well-plate sampler metering device, sample loop, and needle, ensuring all parts in contact with sample are flushed during the run, thus minimizing carry-over



**Figure 31** Mainpass Position

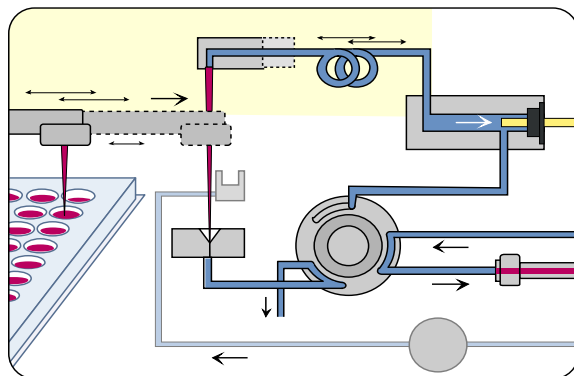
When the sample sequence begins, the valve unit switches to the bypass position (Figure 32). Solvent from the pump enters the valve unit at port 1, and flows directly to the column through port 6.



**Figure 32** Bypass Position

The standard injection starts with „draw sample from vial”. In order to do this the needle moves to the desired sample vial position and is lowered into the sample liquid in the vial to allow the metering device to draw up the desired volume by moving its plunger back a certain distance. The needle is then raised again and moved onto the seat to close the sample loop. In case of an injector program several steps are interspersed at this point.

### Flush the needle



**Figure 33** Drawing the Sample

Before injection and to reduce the carry-over for very sensitive analysis, the outside of the needle can be washed in a flush port located behind the injector port on the sampling unit. As soon the needle is on the flush port a peristaltic pump delivers some solvent during a defined time to clean the outside of the needle. At the end of this process the needle returns to the injection port.

### Inject-and-run

The final step is the inject-and-run step. The six-port valve is switched to the main-pass position, and directs the flow back through the sample loop, which now contains a certain amount of sample. The solvent flow transports the sample onto the column, and separation begins. This is the beginning of a „run” within an analysis. In this stage, all major performance-influencing hardware is flushed internally by the solvent flow. For standard applications no additional flushing procedure is required.

## **Sampling Unit**

The sampling unit consists of subsystems as well. The main carrier part is a die casting part which carries the following functional elements.

### **Analytical head**

The analytical head is driven by the stepper motor connected to the drive shaft by a toothed belt. The drive nut on the spindle converts the circular movement of the spindle to linear motion. The drive nut pushes the sapphire plunger against the tension of the spring into the analytical head. The base of the plunger sits on the large bearing of the drive nut, which ensures the plunger is always centered. A ceramic ring guides the movement of the plunger in the analytical head. The home position of the plunger is sensed by an infra-red sensor on the sampling unit flex board, while the sample volume is determined by counting the number of steps from the home position (7 nl/motor step). The backward movement of the plunger (driven by the spring) draws sample from the vial.

To reduce potential user mistakes different versions of analytical heads are recognized by RF-tags sitting on the exchangeable assembly.

## Injection-Valve

**Table 56** Analytical head Technical Data

	<b>Standard 100 <math>\mu</math>l (G1367-60003)</b>	<b>Micro 40 <math>\mu</math>l (G1377-60013)</b>
Number of steps	15000	60000
Volume resolution	7 nl/motor step	0.7 nl/motor step
Maximum stroke	100 $\mu$ l	40 $\mu$ l
Pressure limit	400 bars	400 bars
Plunger material	Sapphire	Sapphire

A high pressure 6-port/2-position-valve to direct streams of mobile phase and sample to different directions (e.g. via loop to column or directly to column).

The two-position 6-port injection valve is driven by a stepper motor. Only five of the six ports are used (port 3 is not used). A lever/slider mechanism transfers the movement of the stepper motor to the injection valve. Two microswitches monitor switching of the valve (bypass and mainpass end positions). The injection valve has a ceramic stator, Vespel rotor seal (Tefzel seal available), and stainless-steel head. Three screws hold the head and internal components in place. No valve adjustments are required after replacing internal components.

## Needle Flush Station

**Table 57** Injection-Valve Technical Data

	<b>Standard (0101-0921)</b>	<b>Micro (0101-1050)</b>
Motor type	4V, 1.2A stepper motor	4V, 1.2A stepper motor
Seal material	Vespe <sup>TM</sup> l or Tefze <sup>TM</sup> l	Vespe <sup>TM</sup> l
Stator material	Ceramic/PEEK	Head coated SST
Number of ports	6	6
Switching time	< 150 ms	< 150 ms

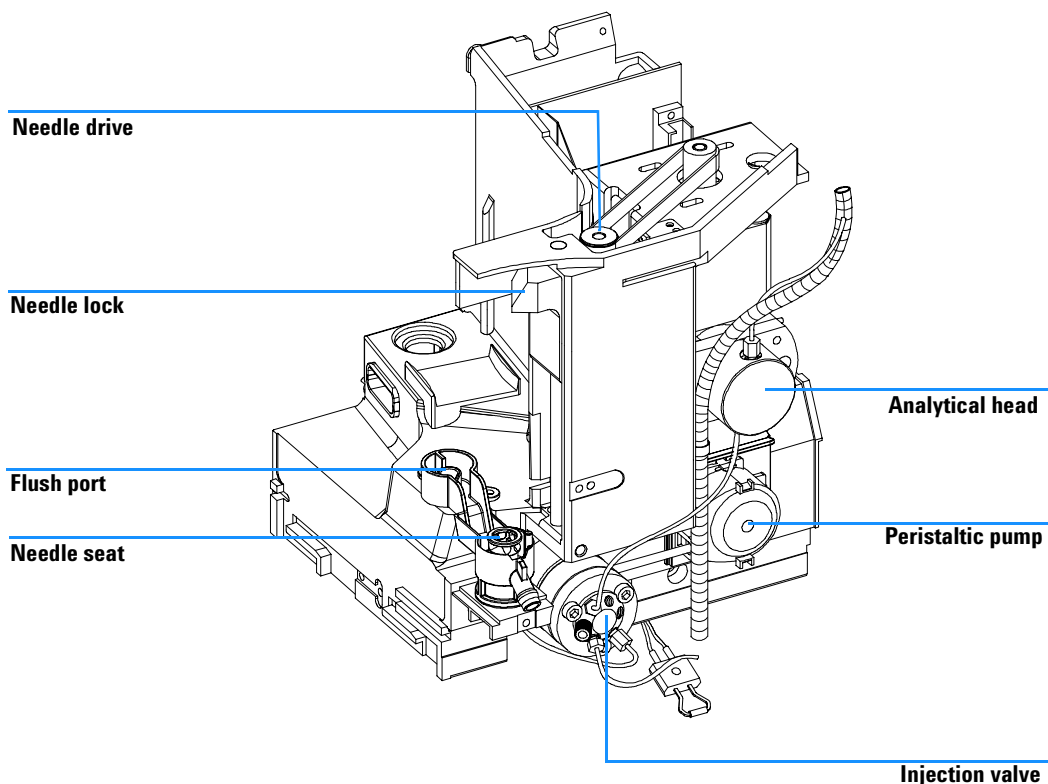
A needle flush station to wash the outer surface of the injection needle and a peristaltic pump to deliver fresh solvent to the wash station. (The reservoir for the solvent is located in the solvent cabinet, the waste is channeled by a separate flex tube to a waste bottle.

## Needle Lock

A needle lock is used to support the needle carrier in its function making a firm seal of the needle in its seat.

The needle lock arm is driven by a stepper motor connected to the spindle assembly by a toothed belt.

## Needle/Sample Transport Assembly



**Figure 34** Well-plate sampler Sampling Unit

The needle/sample transport is a multifunctional module capable of moving the needle into various positions (such as different wells in two different plates, different vials, needle wash position and the needle-seat position). The active movable axes are the X-axis, the Z-axis and the theta-axis, the vial-/plate pusher is an additional passive axis. 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.

Reflective light switches detect the presence and type of different trays. The X-slide carries the antenna and electronics of a RF-sensor. This device has multiple functions:

- It allows to read and write information from a tag, located in the new tray.
- It allows to increase the number of different trays.
- It allows to read the revision and other data tags of the needle/sample transport assembly and sampling unit.

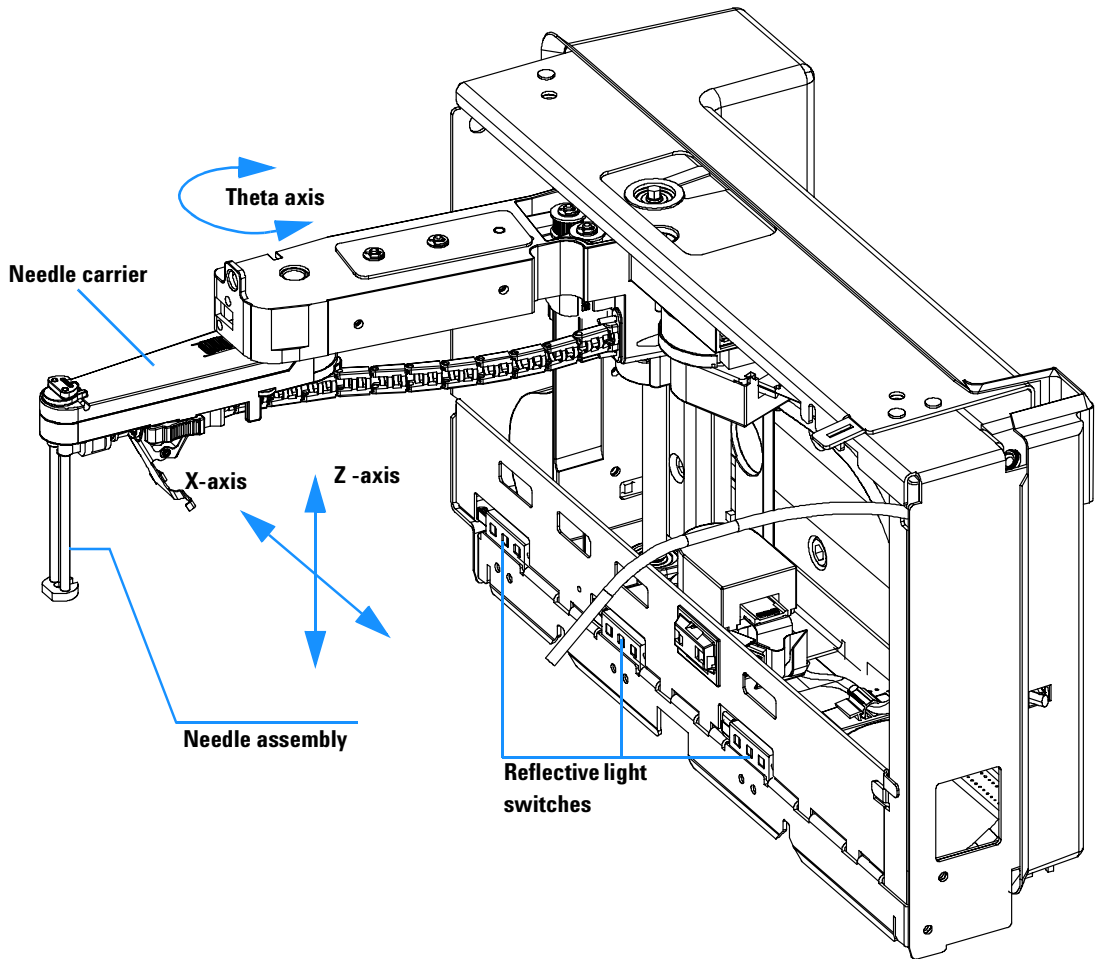
Complex flex boards make the electrical connection to the various motors, sensors and the MTP-board. The needle carrier has an integrated plate/vial pusher with an additional linear encoder to sense vials and the presence of plates.

The needle and the loop capillary are user-exchangeable.

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



## Advanced Operating Modes



**Figure 35** Needle/Sample Transport Assembly

### **Multi-draw mode (optional)**

The multi-draw mode provides injection volumes up to 1500 µl. In this case a capillary which holds the additional volume is assembled between seat and valve. Then the aspirated sample is pushed into the enlarged seat capillary before repetitive aspiration starts. After the last aspiration took place the injection valve switches and the mobile phase transports sample towards column.

### **Injector program**

A sequence of all available single sampling steps can be tailored to customer needs for special applications. Injector program capability is offered with the standard instrument

### **Active needle wash**

The active needle wash mode allows also the flushing of the outer surface of the needle. This results in an additional decrease of sample carry-over. Duration of the procedure is settable.

### **Overlap injection cycle**

Overlapped injection is the mode where the well-plate sampler runs the injector program for the next analysis during the current analysis (without injecting).

After the sample has reached the column the valve is switched back to bypass and the next injection cycle starts but waits with switching to main-pass until the actual run is finished. This mode allows it to increase the sample throughput.

### **Low delay volume mode**

This mode is especially interesting for gradient elution with small bore or capillary columns. The injection valve is switched back to bypass after the sample is eluted beyond the injection valve port # 6. This decreases the delay volume, because the gradient needs not to pass the metering device and the loop capillary.

## 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 autosampler provides four EMF counters. Each counter increments with autosampler use, and can be assigned a maximum limit which provides visual feedback in the user interface when the limit is exceeded. Each counter can be reset to zero after maintenance has been done. The well-plate sampler provides the following EMF counters:

#### Injection Valve Counter

This counter counts the number of valve switching EF4512, since the last reset of the counter.

#### Needle Assembly Counter

This counter counts the total number of needle into seat movements (used for the needle life time) EF4510, since the last reset of the counter.

#### Seat Assembly Counter

This counter counts the total number of needle into seat movements (used for the seat life time) EF4511, since the last reset of the counter.

#### Peristaltic Pump

This counter gives the accumulates active pump time in units seconds EF4513.

## **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 autosampler 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 injection valve and needle movements counters. Enter these values (or values slightly less than the displayed values) as EMF limits, and then reset the EMF counters to zero. The next time the EMF counters exceed the new EMF limits, the EMF flag will be displayed, providing a reminder that maintenance needs to be scheduled.

## 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.

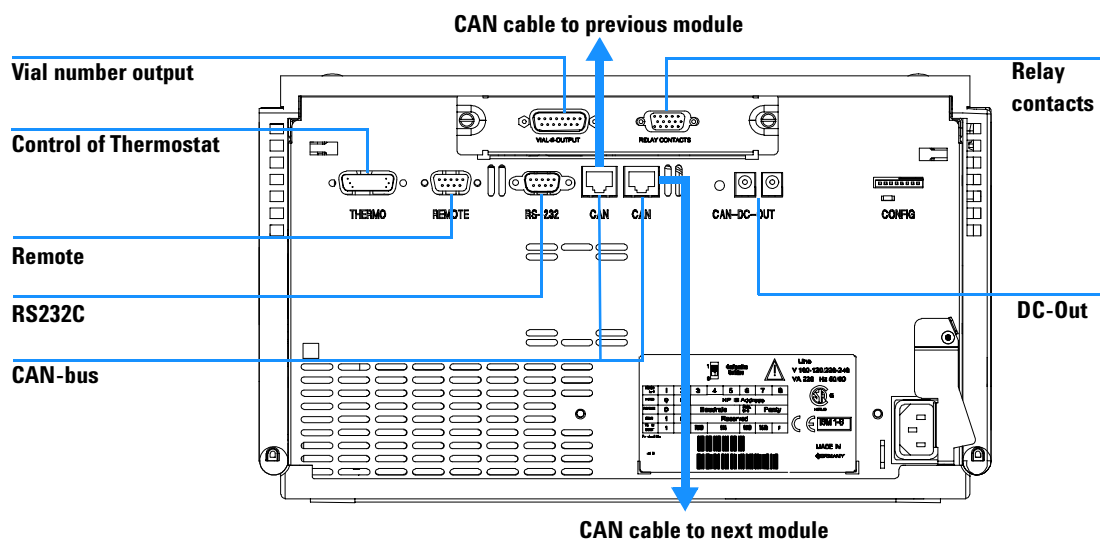


Figure 36 Well-plate Sampler Electrical Connections

### WARNING

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

## **6 Introduction to the Well-plate Sampler**



## 7 Theory of Operation

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Interfaces 228

Setting the 8-bit Configuration Switch 233

The Main Power Supply Assembly 238



### **Autosampler Control and Electronics**

The Microtiter Plate Board (MTP) controls the vial-transport mechanism, sampling needle, metering unit, and high-speed injection valve. These devices are controlled by a versatile electronics design based upon a 68000 family processor which also contains battery backup RAM, flash ROM, a real time clock, and several communications options.



## Position and Movement Sensors

Position sensing of movement of well-plate sampler components is done by sensors on the sample transport and sampling unit flex boards. The following sensors are used:

**Table 58** Sample Transport Flex Board

Sensor Type	Number of Sensors	Position/Movement Sensed
Reflection Sensor	9	Vial tray identification
Reflection Sensor	4	Transport assembly Initialization

**Table 59** Sampling Unit Flex Board

Sensor Type	Number of Sensors	Position/Movement Sensed
IR light sensor	1	Metering device home (reference) position
Reflection sensor	2	Needle end lock positions
Microswitch	2	Valve switching

**Table 60** SLS Board

Sensor Type	Number of Sensors	Position/Movement Sensed
Hall sensor	2	Front door closed

**Table 61** MTP Board

Sensor Type	Number of Sensors	Position/Movement Sensed
Hall sensor	2	Left side cover closed

## Microtiter Plate Board (MTP)

### Common Electronics

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

**Table 62** Common Electronics

Core-processor	MC68332
Core-memory	The core unit has 3 memory blocks:  2 MB SRAM 1 MB memory 128 KB NVRAM 24*8 serial NVRAM from the real time clock
Communication Interfaces	The core unit supports direct the following interfaces:  CAN bus RS232 Remote MIO (LAN)

### ASIC — Application-Specific Integrated Circuit

The application-specific integrated circuit (ASIC) provides interfacing to external devices through drivers, including CAN, APG Remote. It is directly connected to the four control LEDs located near the connectors on this board and the 8-bit configuration switch which is used to configure the address for the communication, baud rate for RS-232 transfer, and so on. Also, the ASIC controls and drives module specific functions and reads static status signals.

### Leak Converter

Solvent leaking from the autosampler cools down the PTC. This changes the resistance of the PTC causing the leak converter to generate a leak signal. 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.

### **Fan Drive**

The fan speed (two speeds are possible) is controlled by the main processor according to the internal heat distribution inside the module. The fan provides a PWM signal which is proportional to the revolution. This fan status signal is used for diagnostics.

### **Onboard Battery**

An onboard lithium battery buffers the electronic memories when the module is turned off. For safety information on lithium batteries see “” on page 278.

## **Autosampler-Specific Electronics**

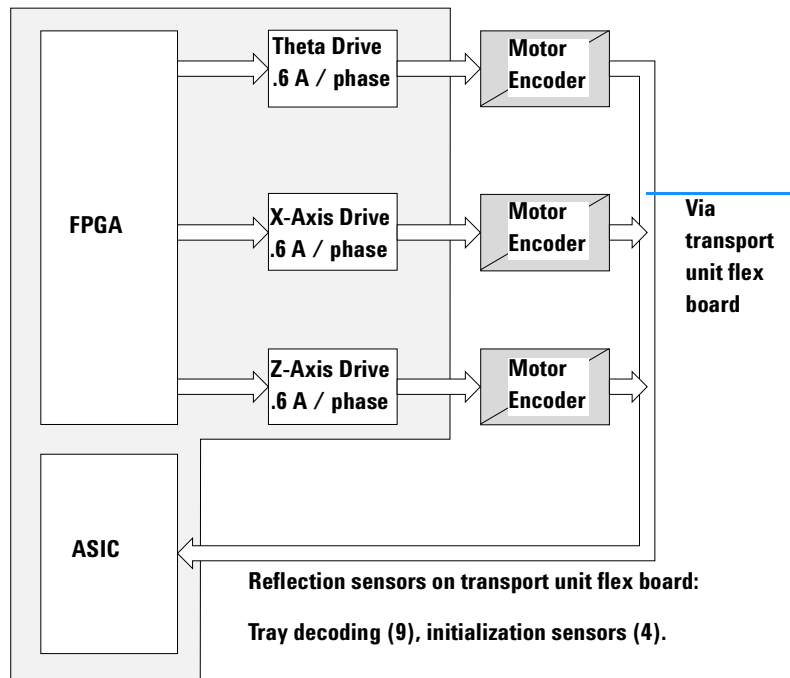
The autosampler specific functions provided by the electronics are:

- Closed loop control of three axis vial handling servos
- Electric valve control
- Needle unit control
- Metering device control
- Peristaltic pump control

### Transport Unit Control

The transport drive electronics use current-controlled pulse-width modulation (PWM) to drive the X, Z,  $\theta$  motors in closed-loop servo control mode. Dedicated electronics in the ST L6506 provide the current-control loop. Commutation is done in FPGA logic. The ST L6201 SMT output drivers are used for all three stepper motors. Motor encoder signals are connected to the ASIC where the encoder quadrature decoded clock and the up/down signal are used in the FPGA to provide instantaneous stepper motor commutation with respect to the motor rotor position.

Wiring between the well-plate sampler main board (ASM) and the motors and encoders uses a flat-band cable (64 pin) and a flex board on which 13 reflection light sensors are located. 9 light sensors are used for vial-tray identification and four for decoding of the initialization position.



**Figure 37** Transport unit control

## Sampling Unit Control

Needle lock, metering device valve and peristaltic pump motors are driven by controlled pulse-width modulation in the same way as the ST L6506 (see “Transport Unit Control” on page 220). The motors require fast speed but do not require precise position control. Therefore, a closed loop servo system is not required. Commutation is done in FPGA logic. The needle lock, metering device and valve motors use ST L6203 output drivers to deliver the higher currents required for fast movement or high torque. The peristaltic pump drive is built with a ST L6201 circuit.

The movement sensing of the valve motor is done by two microswitches. Two reflection light sensors are used to detect the end positions of the needle lock device. One photo sensor is required to detect the home position of the metering device. All the sensors are mounted on one flex board. The flex board and motors are connected to the sampling unit distribution board (SUD). The SUD board is connected to the Microtiter Plate Board (MTP) via a flat-band cable (64 pin).

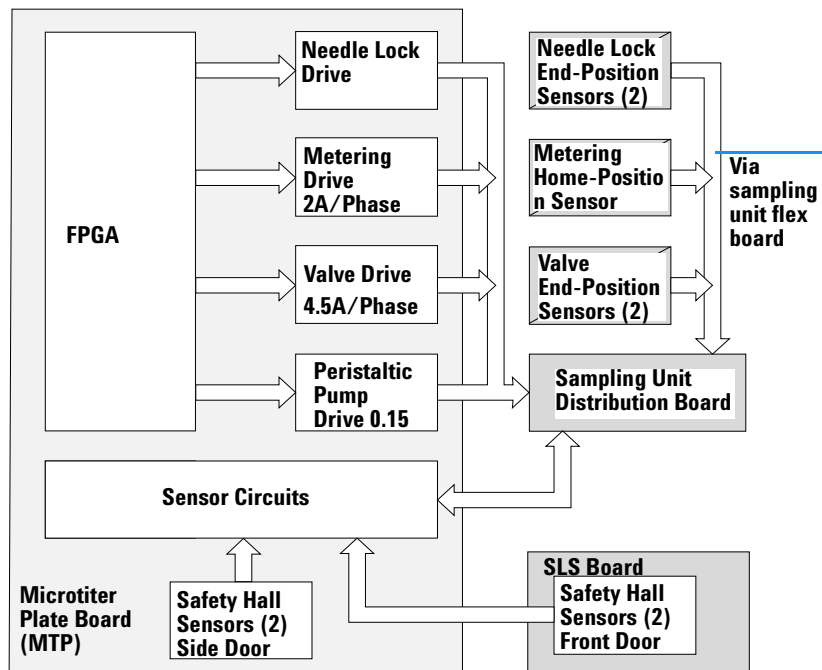


Figure 38 Sampling unit control

### Safety Lock Sensor Board (SLS)

Two hall sensors detect correct closure of the front door (needle arm movement is interrupted, if front door is open). The front door is locked by an electric magnet.

Unlocking the front door is done by pushing the button on the right side or switching the power off/on.

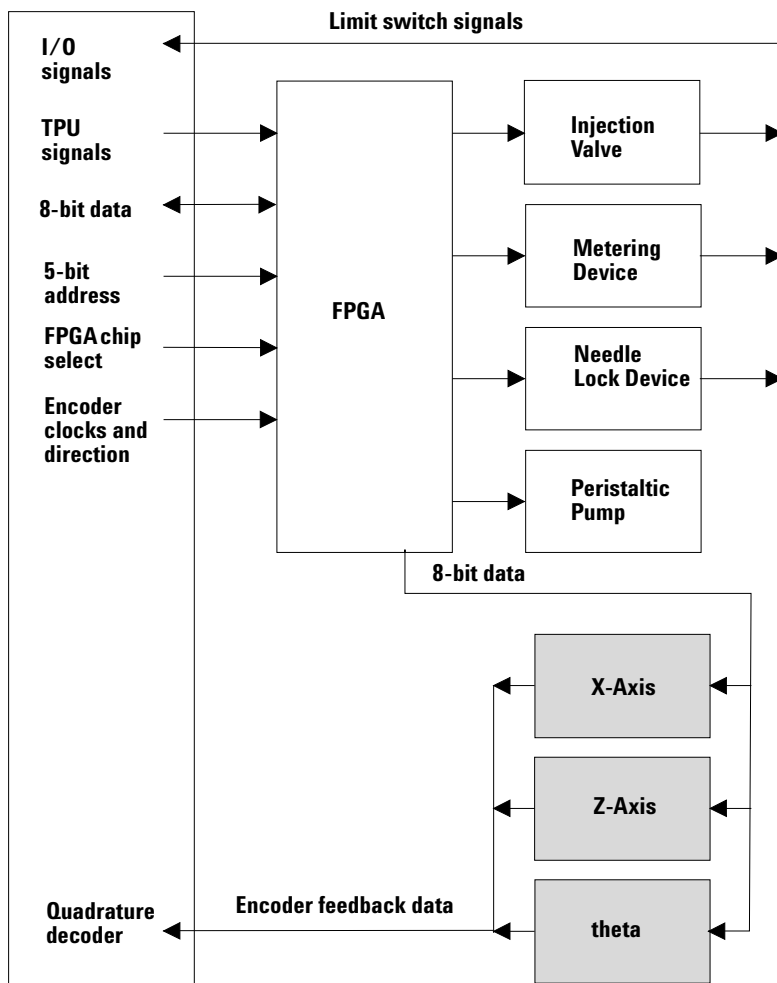


Figure 39 Well-plate sampler block diagram

## 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 metering device and needle movements,

## 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

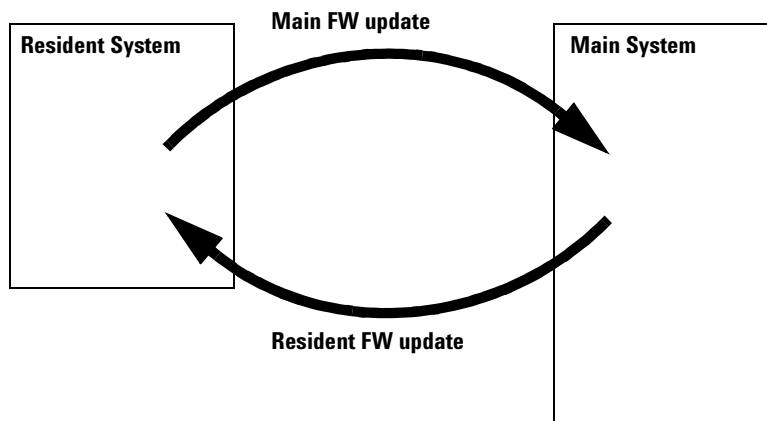
xxxx is the product number, e.g. 1367A for the well-plate sampler), and vvv is the revision number, for example 380 is revision 3.80

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 40** Firmware Update Mechanism



## Optional Interface Boards

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

**Table 63** 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 well-plate sampler and four external contacts. The external contact closure contacts are relay contacts. The maximum settings are: 30 V (AC/DC); 250 mA (fused). There is a general purpose cable available to connect the BCD output, see "[BCD Cables](#)" on page 188 and the external outputs, see "[External Contact Cable](#)" on page 193 to external devices.

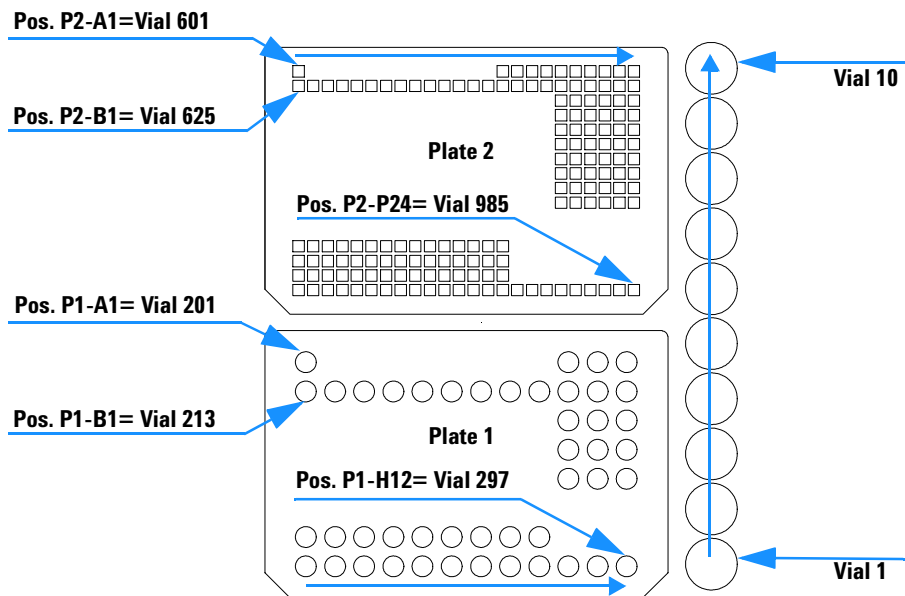


Figure 41 BCD output for the well plates

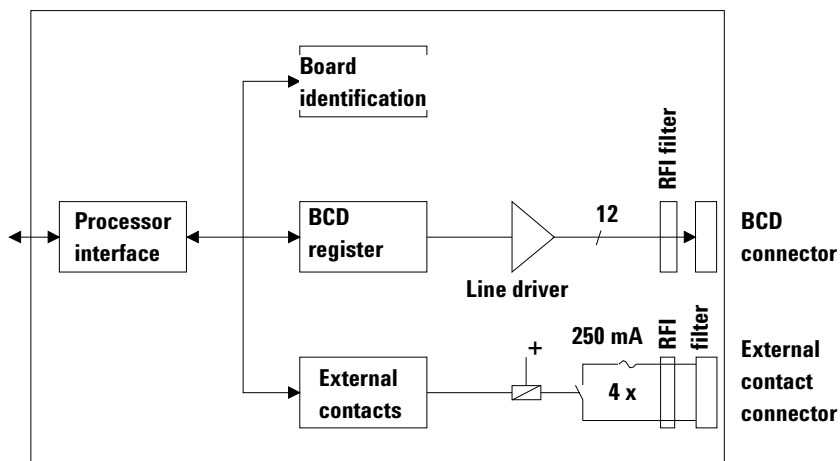


Figure 42 Block Diagram BCD Board

## 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 64** 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 65** Agilent 1100 Series Interfaces

Interface Type	Pumps	Autosampler	Well-plate Sampler	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	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 <sup>†</sup>
Interface board	Yes	Yes	Yes	Yes	Yes	No	No

\* The well-plate sampler 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.

- 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 [Figure 5](#) on page 25.

### 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 well-plate sampler by GPIB.

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 66** 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 intermodule 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).

**Table 67** 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

**Table 67** Remote Signal Distribution (continued)

Pin	Signal	Description
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.

## 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:

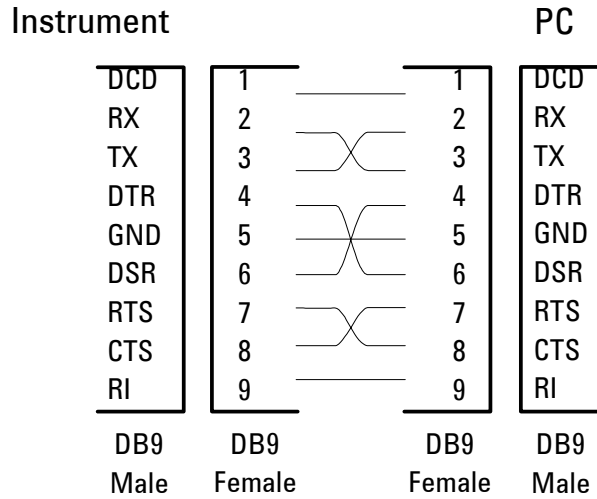
**Table 68** RS-232C Connection Table

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

## 7 Theory of Operation

**Table 68** RS-232C Connection Table (continued)

Pin	Direction	Function
9	In	RI

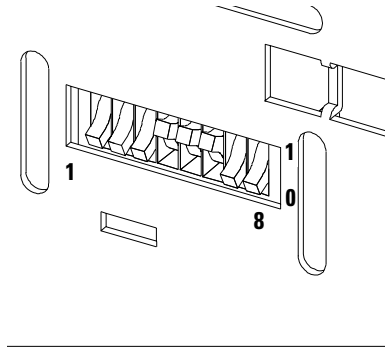


**Figure 43** RS-232 Cable



## 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 44** 8-bit Configuration Switch

**Table 69** 8-bit Configuration Switch

Mode Select	1	2	3	4	5	6	7	8
GPIB	0	0	GPIB Address					
RS-232C	0	1	Baud rate			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 70** 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	no address	0 0 0 0 0 0 0 0 0 0
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 71** 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 72** 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 73** Data Bit Settings

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

**Table 74** Parity Settings

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

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

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

### 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 75** 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 detector. It only uses basic functions of the operating system for example, for communication.

**Table 76** Stay Resident Settings

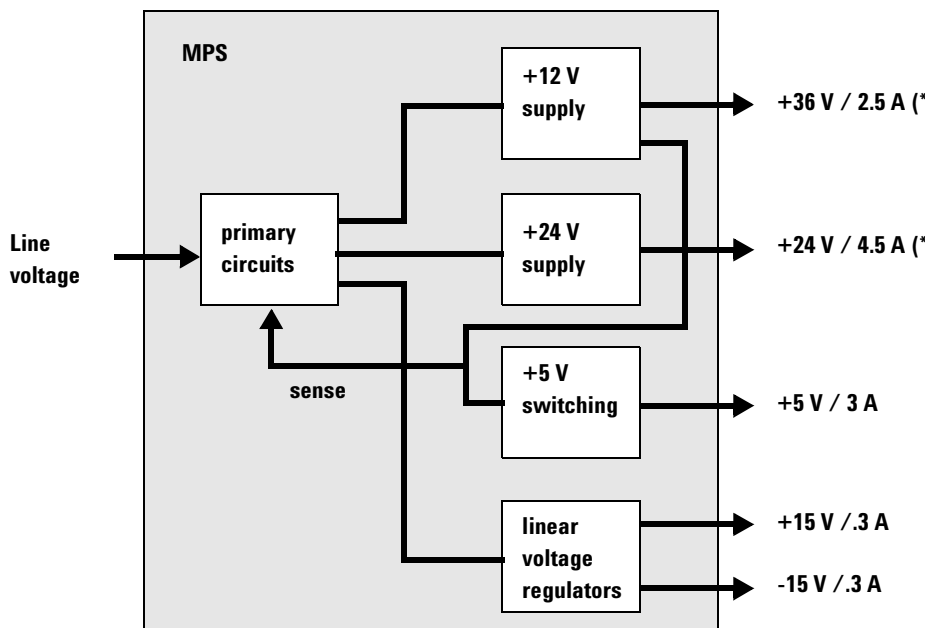
Mode Select	1	2	3	4	5	6	7	8
TEST/BOOT	1	1	0	0	1	0	0	0

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

## 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  $\pm 10\%$  and needs no manual setting.



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

**Figure 45** Main Power Supply (MPS) Blockdiagram

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.

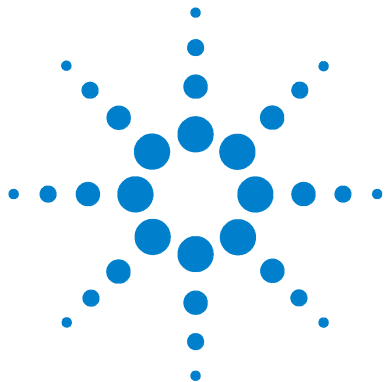
The following table gives the specifications of the main power supply.

**Table 77** Main Power Supply Specifications

Maximum power	300 VA / 200 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	

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## 8 Control Module Screens of the Well-plate Samplers

Major keys on the Agilent 1100 Control Module [242](#)

Screens available from the Analysis view [243](#)

Screens available from the System view [259](#)



### Major keys on the Agilent 1100 Control Module

**Table 78**

---

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.02.0x (G1323B)  
HPLC Module firmware revision 4.08

---

**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

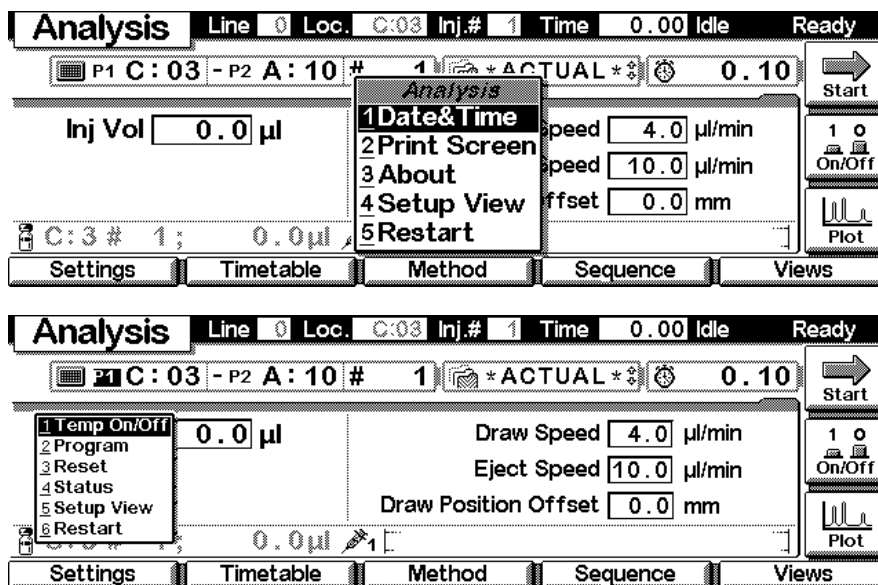
This is the wake-up screen, if the Agilent 1100 Series well-plate samplers or micro well-plate samplers are the only configured Agilent 1100 module. It is used to enter the most common WPS method parameters.

Analysis		Line	0	Loc.	C:03	Inj.#	1	Time	0.00	Idle	Ready
C:03 - P2 A:10 # 1		*ACTUAL*		0.10		Start					
Inj Vol		0.0 µl		Draw Speed		4.0 µl/min					
				Eject Speed		10.0 µl/min					
				Draw Position Offset		0.0 mm					
C:3 # 1; 0.0µl								Plot			
Settings		Timetable		Method		Sequence		Views			

Analysis		Line	0	Loc.	C:03	Inj.#	1	Time	0.00	Idle	Ready
C:03 - P2 A:10 # 1		*ACTUAL*		0.10		Start					
Inj Vol		20.0 µl		Draw Speed		4.0 µl/min					
Temp		4 °C		Eject Speed		10.0 µl/min					
		~ 17.5 °C		Draw Position Offset		0.0 mm					
C:3 # 1; 0.0µl								Plot			
Settings		Timetable		Method		Sequence		Views			

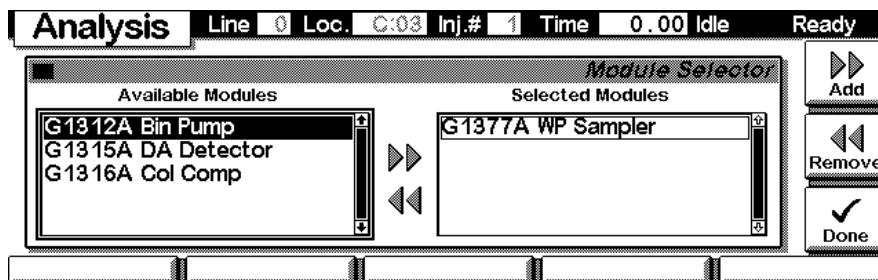
## 8 Control Module Screens of the Well-plate Samplers

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.

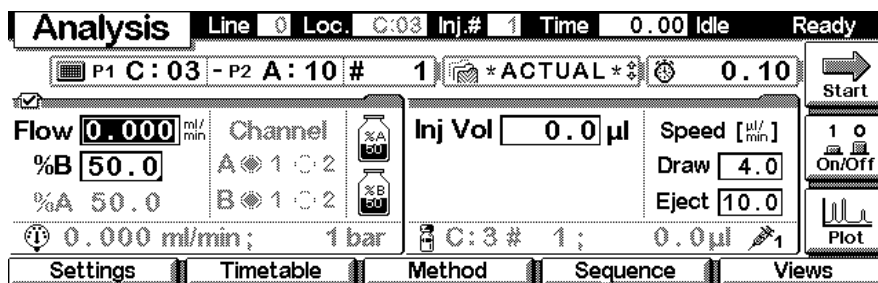


**Temp On/Off** allows you to turn on the Thermostat Module of the thermostatted versions of the WPS.

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)**.

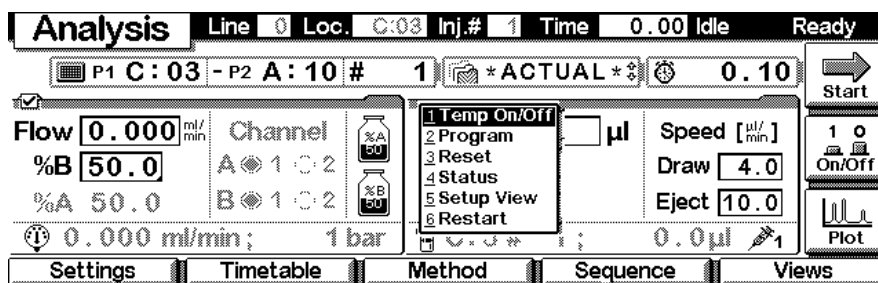


Here, e.g. the binary pump parameters are shown on the display as well. The number of parameters for each module is reduced as additional modules are added to the display. A maximum of 4 modules can be shown simultaneously. If more modules are connected to the system, you have to choose 4 of them in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

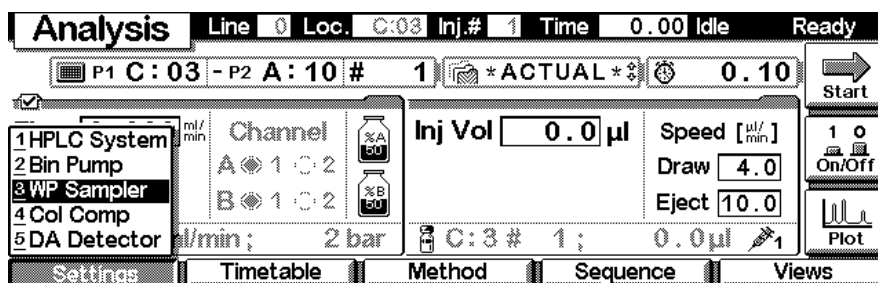


## 8 Control Module Screens of the Well-plate Samplers

The **m**-key gives access to a context sensitive menu (related to the module that is highlighted by the cursor, like in this case the WPS).

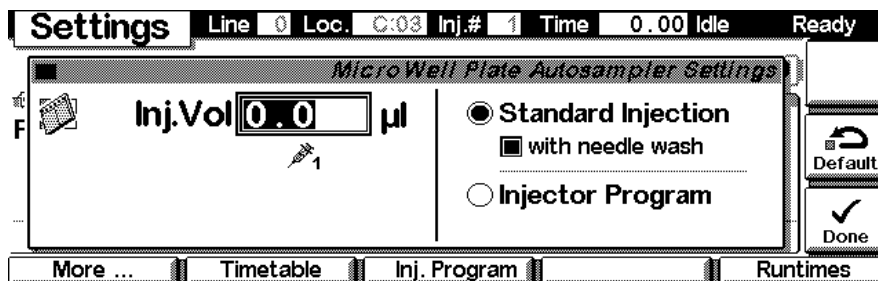


With the **F1**-key (**Settings**) you open a pull-down menu where you can select the WPS module.

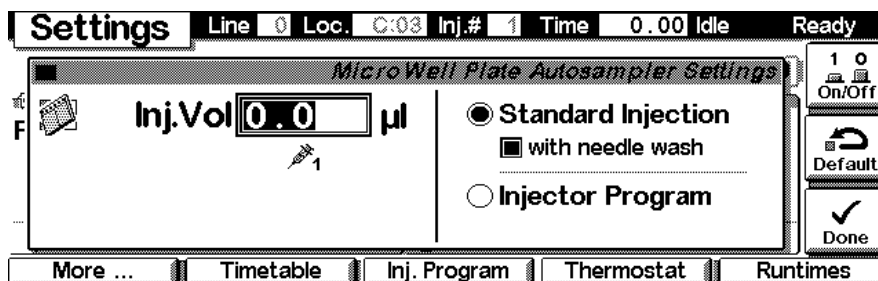


## Settings

Within **Settings** you can change the WPS parameters like the Injection Volume. You can toggle between Standard Injection (with/without needle wash) and Injector Program. There are different sets of parameters available through the **F1-5** navigation-keys for optimizing the operation of the WPS. **F7 (Reset)** resets the WPS to default values. **F8 (On/Off)** opens a window to turn on/off the thermostat. Changes must be acknowledged with **F6 (Done)**.

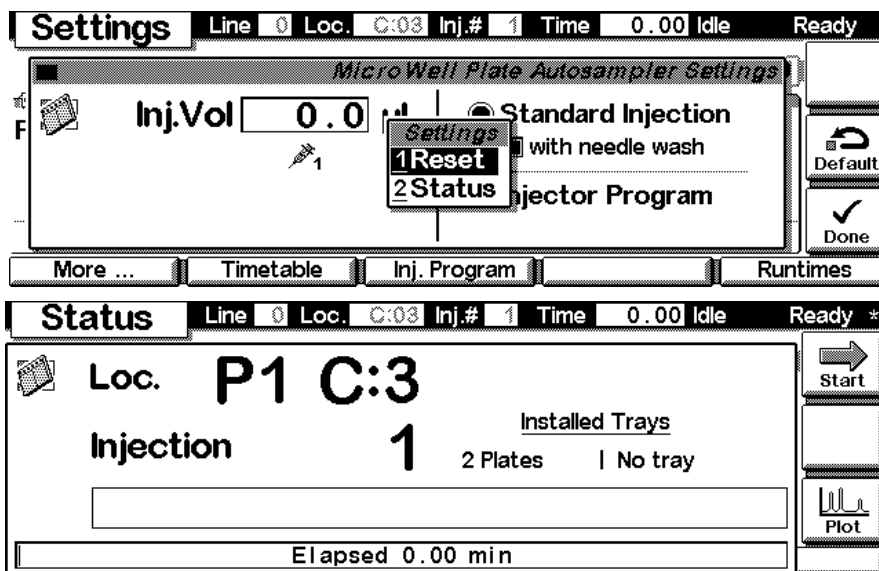


Settings screen with thermostat connected.

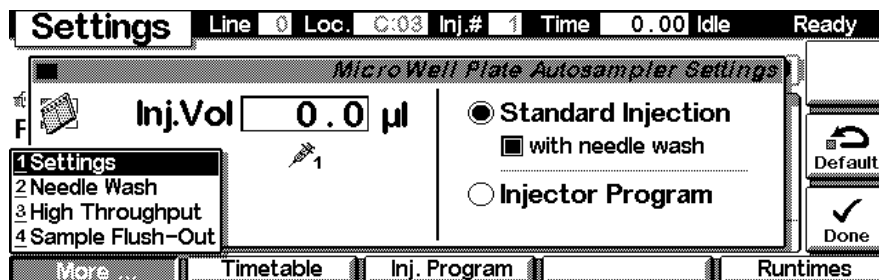


## 8 Control Module Screens of the Well-plate Samplers

Use the **m**-key for the context sensitive menu. The **Status** command pulls up a module specific screen displaying details of injections and the well-plate trays. **Reset** will initialize the well-plate sampler.



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





### Settings More...

By selecting **More...Settings** on the pull-down menu you can enter WPS set points for the Draw Speed, Eject Speed and Draw Position Offset. Changes must be acknowledged with **F6 (Done)**.

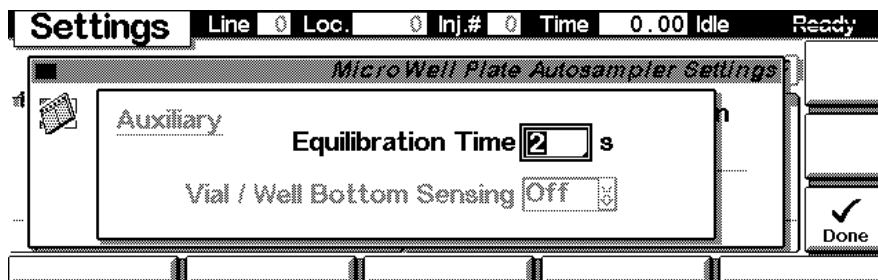
The screenshot shows the 'Settings More...' screen. At the top, a status bar displays 'Settings', 'Line 0', 'Loc. C:03', 'Inj.# 1', 'Time 0.00', 'Idle', and 'Ready'. Below this is a title bar for 'Micro Well Plate Autosampler Settings'. The main area contains three input fields: 'Draw Speed' with a value of 4.0 µl/min, 'Eject Speed' with a value of 10 µl/min, and 'Draw Position Offset' with a value of 0.0 mm. To the right of these fields are three stacked buttons, with the bottom one labeled 'Done' and containing a checkmark icon.

By selecting **More...Needle Wash** on the pull-down menu you can specify the time period for inserting the needle into the flush port or define how often the needle is dipped into a specified wash vial. Changes must be acknowledged with **F6 (Done)**.

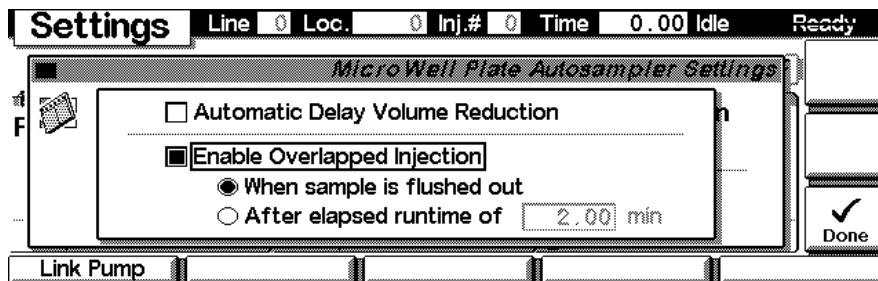
The screenshot shows the 'Settings Needle Wash' screen. At the top, a status bar displays 'Settings', 'Line 0', 'Loc. C:03', 'Inj.# 1', 'Time 0.00', 'Idle', and 'Ready'. Below this is a title bar for 'Micro Well Plate Autosampler Settings'. The main area contains a 'Needle Wash' section with two radio button options: 'Flushport' (selected) and 'Location'. The 'Flushport' option has a time field set to 10 sec. The 'Location' option has a dropdown menu showing 'v' and a field set to 1. Below these is a field set to 5 times. To the right of these fields are three stacked buttons, with the bottom one labeled 'Done' and containing a checkmark icon.

## 8 Control Module Screens of the Well-plate Samplers

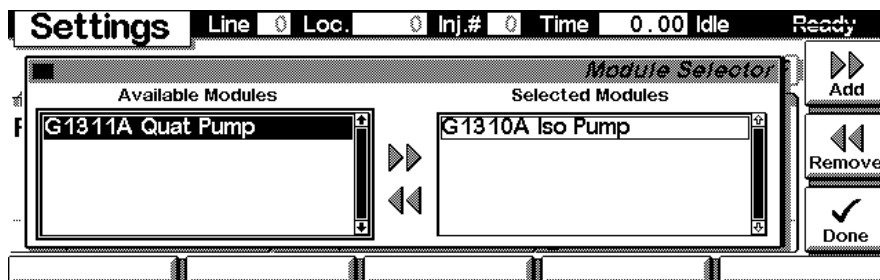
By selecting **More...Auxiliary** on the pull-down menu you can specify an **Equilibration Time** after drawing and before injecting and you can enable/disable the **Vial / Well Bottom Sensing**. Changes must be acknowledged with **F6 (Done)**.



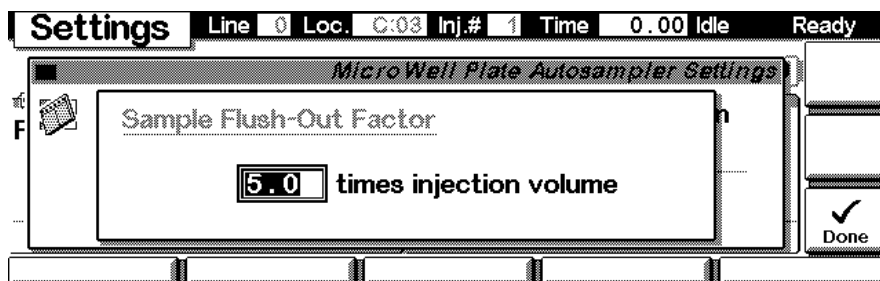
By selecting **More...High Throughput** on the pull-down menu you can enter different optimization modes like the 'Automatic Delay Volume Reduction' and 'Overlapped Injection'. Changes must be acknowledged with **F6 (Done)**.



Press '**F1**' (**Link Pump**) to get access the screen, that allows you to choose one of the pumps (if multiple pumps are configured), which will then be used for the calculation of the flushout time of the sampler (depending on flow rate and internal volume of the sampler).

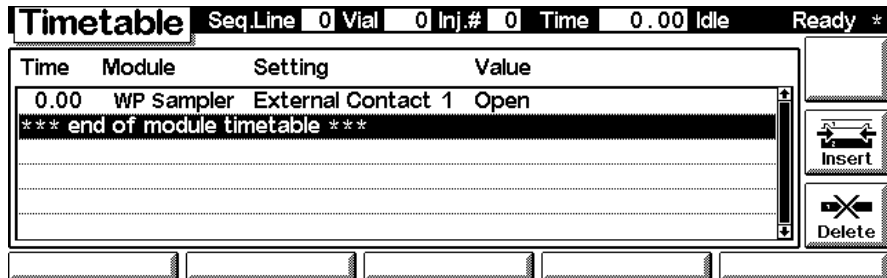


By selecting **More...Sample Flush-Out** on the pull-down menu you can enter the Sample Flush-Out Factor (specifies the (flush) volume of mobile phase pumped through the injector after each injection before performing the 'Automatic Delay Volume Reduction' or the 'Overlapped Injection'). Changes must be acknowledged with **F6** (**Done**).

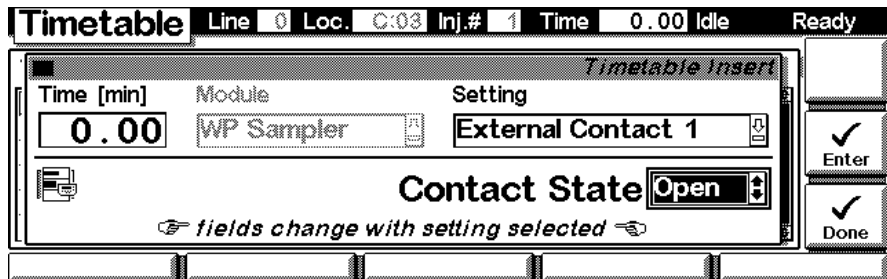


### Settings - Timetable

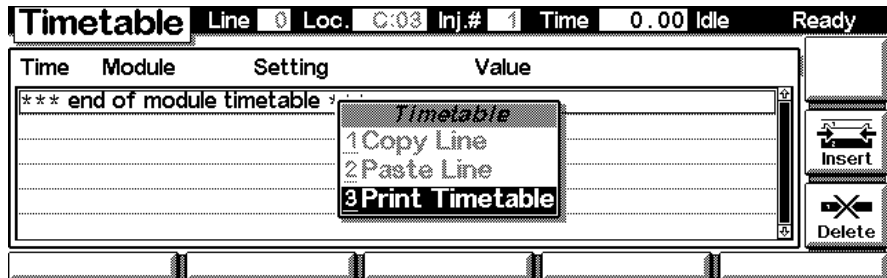
With the **F2**-key (**Timetable**) you can list the timetable for the WPS. Press **F7**-key (**Insert**) to edit the selected entry or **F6**-key (**Delete**) to remove the selected/highlighted entry.



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 - Injection Program

With the **F3**-key (**Inj. Program**) you can change the settings for the analog outputs. Press the **F7**-key (**Enter**) to add program events. Use the **F6**-key (**Done**) to view the entered lines of the timetable.

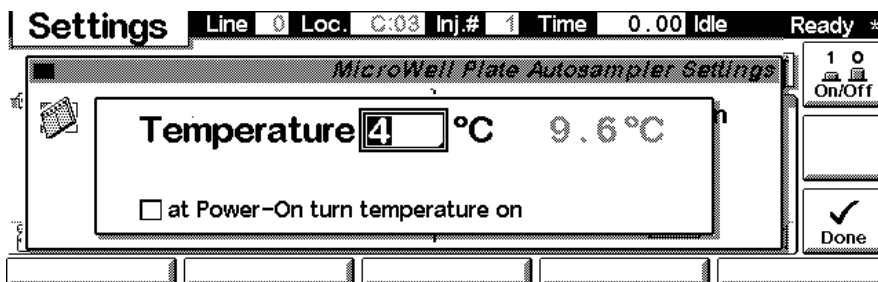
Program				Seq.Line	0	Vial	0	Inj.#	0	Time	0.00	Idle	Ready *			
<div style="text-align: right; font-style: italic;">Insert Line</div> <table border="1"> <thead> <tr> <th>Line</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>INJECT</td> </tr> </tbody> </table>													Line	Function	1	INJECT
Line	Function															
1	INJECT															
<input type="checkbox"/> <input checked="" type="checkbox"/> Enter <input checked="" type="checkbox"/> Done																

Use the **m**-key for the context sensitive menu. It gives you additional tools for the timetable. The **F8**-key (**Validate**) will check the injector program for logical errors.

Program				Seq.Line	0	Vial	0	Inj.#	0	Time	0.00	Idle	Ready *																				
<div style="text-align: right; font-style: italic;">press ENTER to edit line</div> <table border="1"> <thead> <tr> <th>Line</th> <th>Function</th> <th>Parameters</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>DRAW</td> <td>2.0 µl from</td> </tr> <tr> <td>2</td> <td>DRAW</td> <td>2.0 µl from</td> </tr> <tr> <td>3</td> <td>DRAW</td> <td>2.0 µl from</td> </tr> <tr> <td>4</td> <td>MIX</td> <td>12.0 µl in a</td> </tr> <tr> <td>5</td> <td>INJECT</td> <td></td> </tr> <tr> <td colspan="3">*** end of program ***</td> </tr> </tbody> </table>													Line	Function	Parameters	1	DRAW	2.0 µl from	2	DRAW	2.0 µl from	3	DRAW	2.0 µl from	4	MIX	12.0 µl in a	5	INJECT		*** end of program ***		
Line	Function	Parameters																															
1	DRAW	2.0 µl from																															
2	DRAW	2.0 µl from																															
3	DRAW	2.0 µl from																															
4	MIX	12.0 µl in a																															
5	INJECT																																
*** end of program ***																																	
<input checked="" type="checkbox"/> Validate <input checked="" type="checkbox"/> Insert <input checked="" type="checkbox"/> Delete																																	

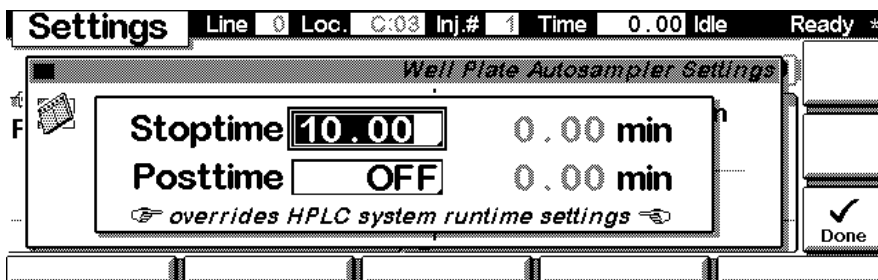
### Settings - Thermostat

With the **F4**-key (**Thermostat**) you can set the well-plate sampler thermostat temperature. Changes must be acknowledged with **F6** (**Done**).



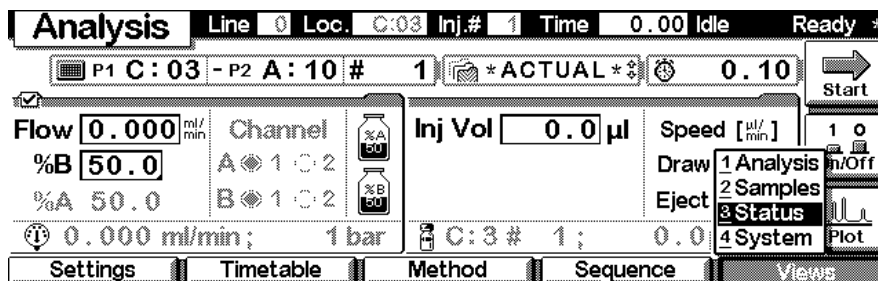
### Settings - Run times

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

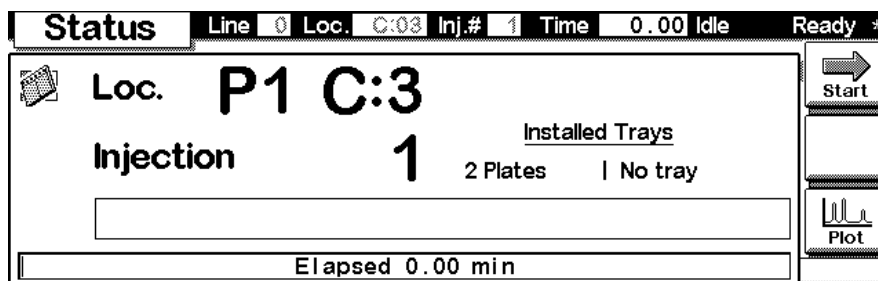


## Status

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

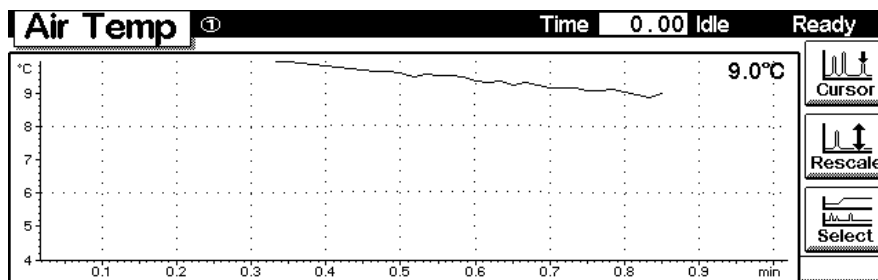


This is an example if an Agilent 1100 WPS is configured stand-alone.



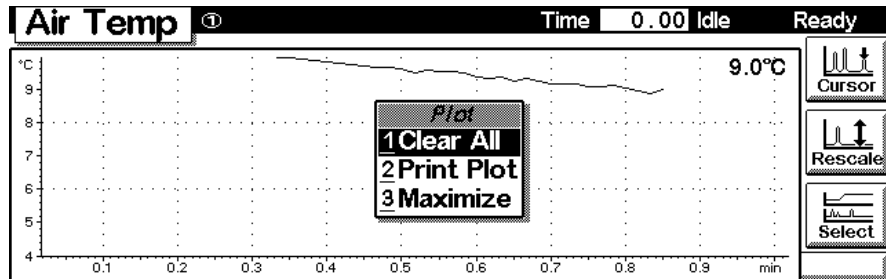
## Signal plot

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.

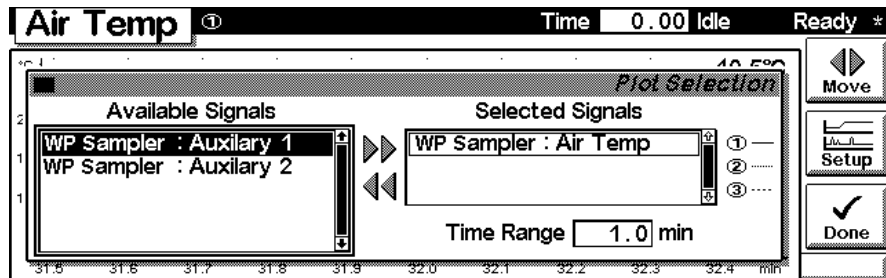


## 8 Control Module Screens of the Well-plate Samplers

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 angle for the highlighted/selected signal. Use **F6** (**Done**) to activate changes and to return to the Plot screen.





### 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.

#### NOTE

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

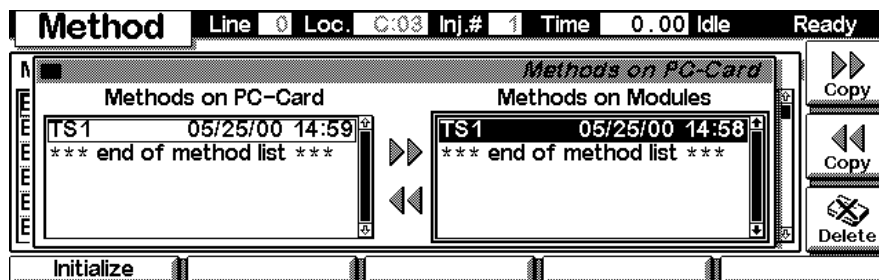
Method				Line	0	Loc.	C:03	Inj.#	1	Time	0.00	Idle	Ready *
Module	Setting	Value	*ACTUAL*										
WP Sampler	Draw Position Offset	0.0 mm											
WP Sampler	Overlap	After sample flushed out											
WP Sampler	Sample Flush-Out Factor	5.0											
WP Sampler	Valve To Bypass After Inj.	Disabled											
WP Sampler	Wait After Draw	1 sec											
WP Sampler	Needle Wash	Flush Port ,10.0 sec,5 x											
Module				PC-Card	Timetable								

Use **F2**-key (**PC-Card**) to save a method on a PCMCIA card.

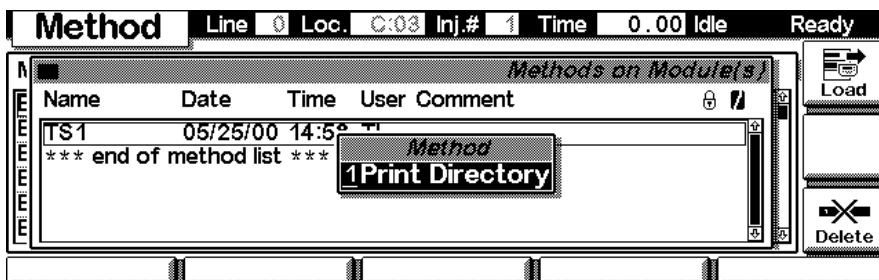
Method				Line	0	Loc.	C:03	Inj.#	1	Time	0.00	Idle	Ready
<i>Methods on Module(s)</i>													
Name	Date	Time	User	Comment									
TS1	05/25/00	14:58	TI										
*** end of method list ***													
Module				PC-Card	Timetable								

## 8 Control Module Screens of the Well-plate Samplers

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.



## 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.

**Analysis** Line 0 Loc. C:03 Inj.# 1 Time 0.00 Idle Ready

P1 C:03 - P2 A:10 # 1 \*ACTUAL\* 0.10 Start

Flow 0.000 ml/min Channel Inj Vol 0.0 µl Speed [µl/min]

%B 50.0 A 1 0 2 %A 50.0 B 1 0 2 Draw 1 Analysis On/Off

0.000 ml/min; 1 bar C:3 # 1; 0.0µl Eject 2 Samples On/Off

3 Status On/Off

4 System Plot

Settings Timetable Method Sequence Views

**System** Pump  Temp  Lamp  Time 0.00 Idle Ready

Thu 15:01 EMF Start

Module	Message	Id	Date	Time
Bin Pump	Module method saved	INFO	05/25	14:58:40
WP Sampler	Setpoint changed	INFO	05/25	14:54:27
WP Sampler	Setpoint changed	INFO	05/25	14:52:20
WP Sampler	Parameter rejected (752)	INFO	05/25	14:51:10
WP Sampler	Option not installed	ERROR	05/25	14:51:10

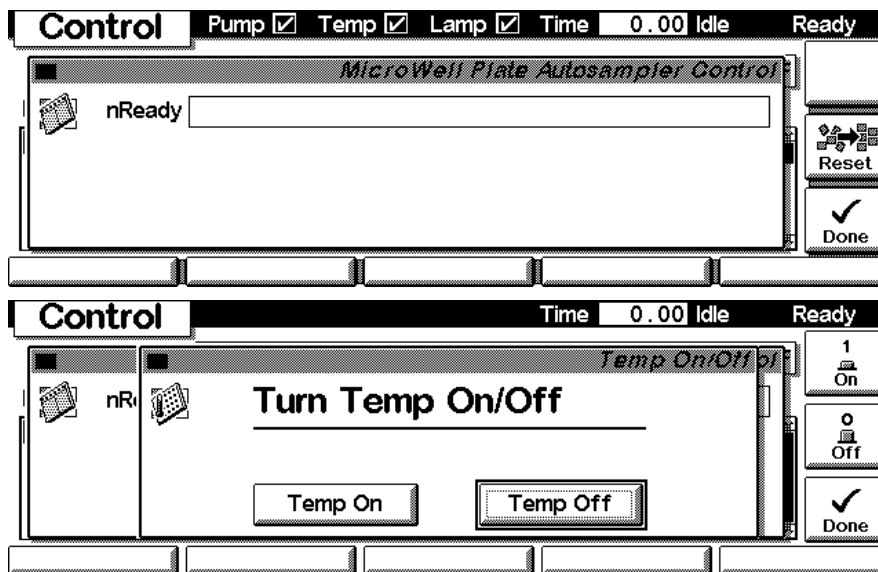
1 On/Off

Plot

Control Configure Tests Records Views

### System - Control

Use the **F1**-key (**Control**) to select the well-plate Sampler. Here you receive information about the not-Ready conditions, if needed. **F7** (**Reset**) does a re-initialization of the WPS. Use the **F8**-key (**On/Off**) to turn on the thermostat. Changes must be acknowledged with **F6** (**Done**).



## System - Configuration

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 WPS. Here you define further special set points for the WPS operation. Changes must be acknowledged with **F6** (**Done**).

**Config** Pump  Temp  Lamp  Time 0.00 Idle Ready

*Well Plate Autosampler Configuration*

Options

Multiple Draw Wait  s

On Missing Plate

Done

Interfaces Trays Volumes

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

**Config** Pump  Lamp  Time 0.00 Idle Ready

*Micro Well Plate Sampler Configuration*

Options

Missing Vessel

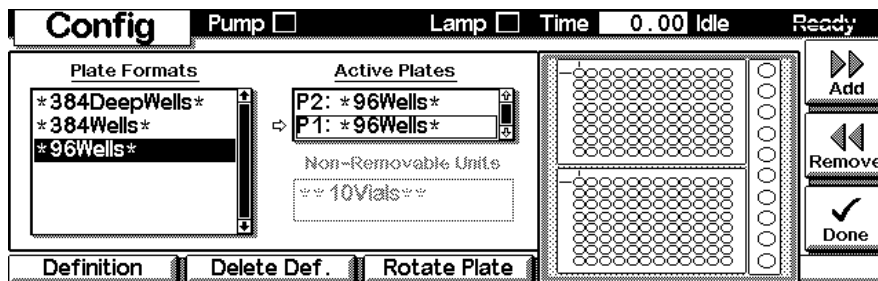
Done

1 Serial  
2 MIO  
3 BOD Output

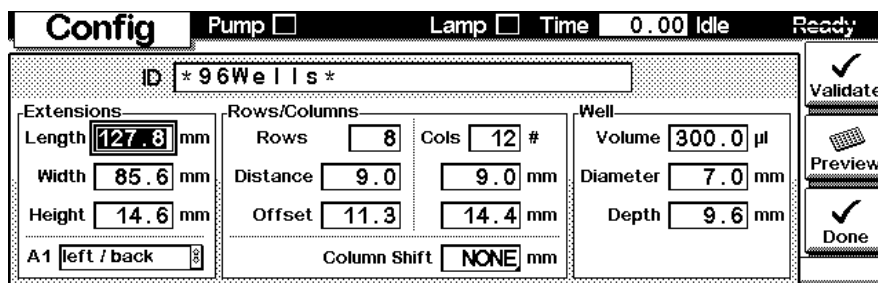
Interfaces Trays Volumes Link Pump

### Configure - Trays

Use the **F2**-key (**Trays**) to view and configure the detected sample trays. 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 selected definition. Press **F3** (**Rotate Plate**) to rotate the selected plate. Changes must be acknowledged with **F6** (**Done**).



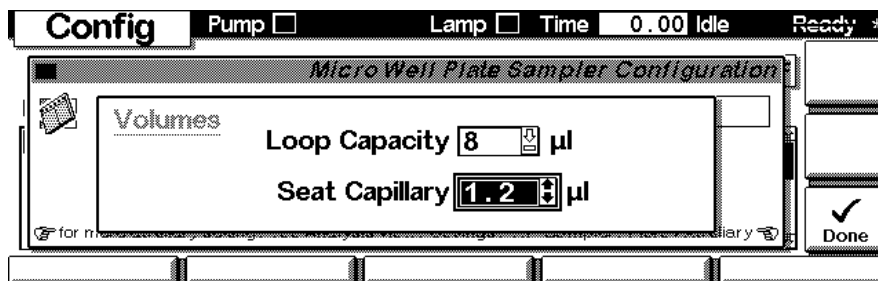
Use **F1** (**Definition**) to edit the definition of a well-plate. Changes must be acknowledged with **F6** (**Done**).



Preview gives you a view of the well-plate as it is currently defined.

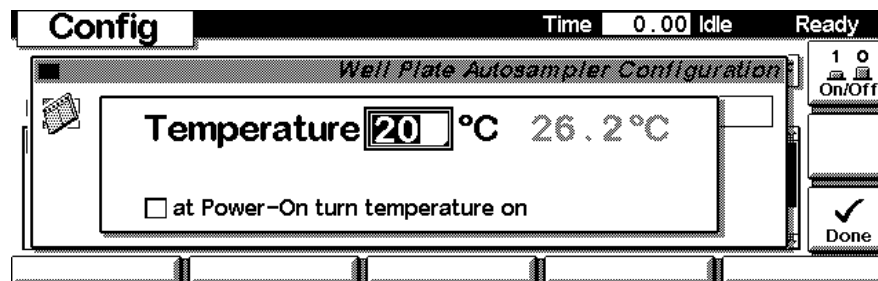
### Configure - Volumes

**F3 (Volumes)** in the main Configuration screen allows you to configure the volumes of the seat capillary and the loop capillary. Changes must be acknowledged with **F6 (Done)**.



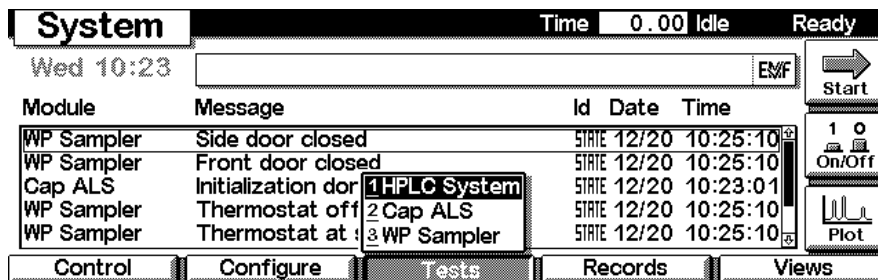
### Configure - Thermostat

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

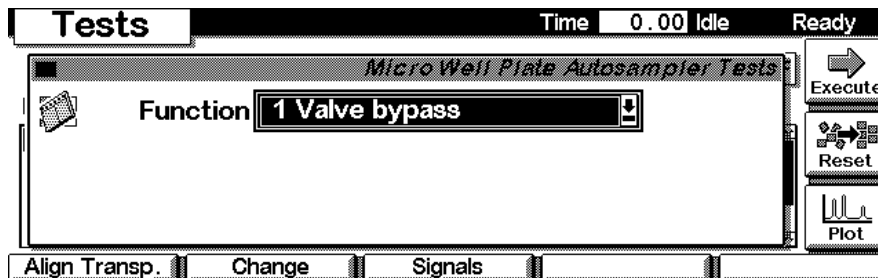


**System - Tests**

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



The Tests screen gives you access to multiple tests and features such as the automatic transport unit **Alignment** tool, maintenance procedures to **Change** parts on the WPS or additional test **Signals** to monitor various parameters during the WPS operation.



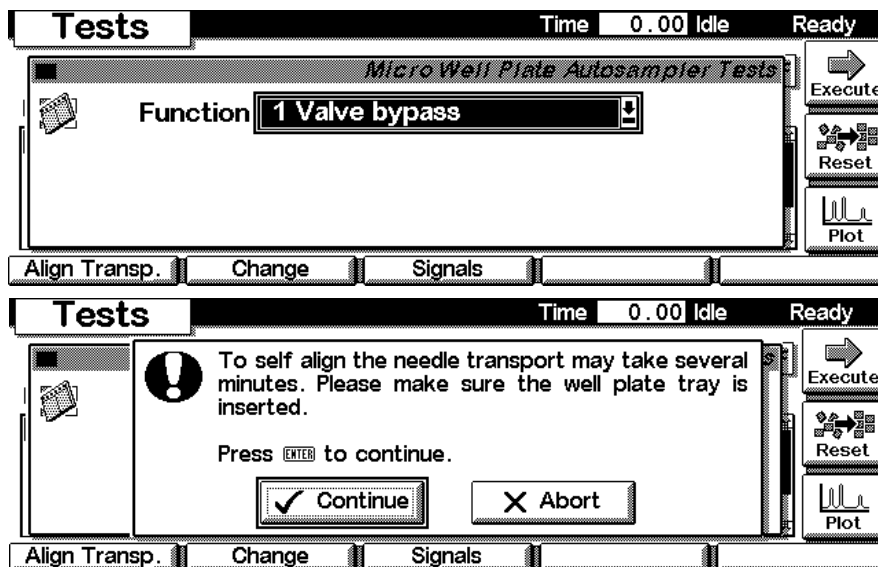
Use the **F1**-key (**Align Trans**) to perform an automatic alignment of the WPS transport unit.

**WARNING**

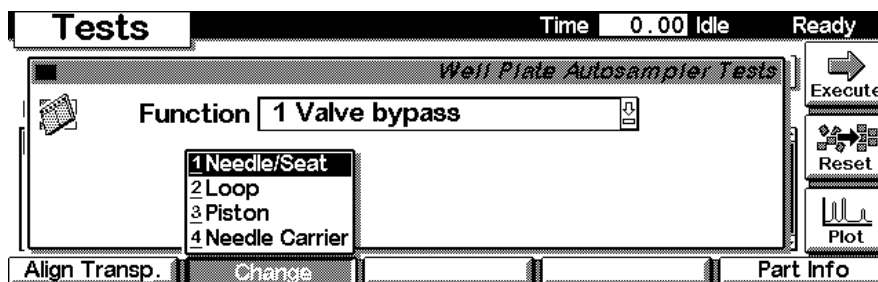
**Only the empty tray base should be installed, when performing the alignment. The wellplates must be removed from the WPS tray base before performing the transport unit alignment. If the wellplates are installed during the alignment procedure, the transport unit might get jammed or become defective.**



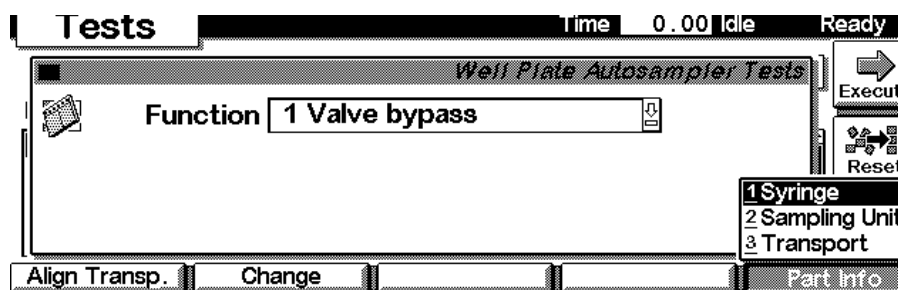
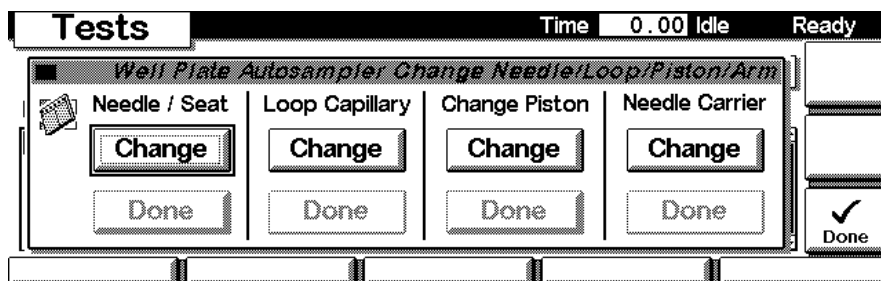
The alignment process may take several minutes. Changes must be acknowledged with F6 (Done).



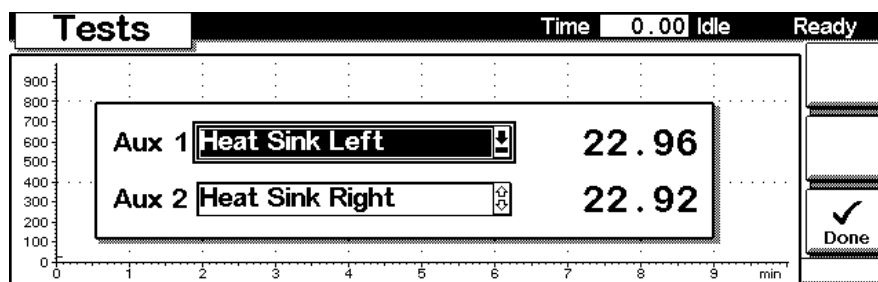
Use the **F2**-key (**Change**) to access maintenance positions for changing the **Needle** or sample **Loop**, the **Piston** of the metering drive or the transport unit **Arm**.



## 8 Control Module Screens of the Well-plate Samplers



Press **F3 (Signals)** in the Tests screen to access additional service signal for diagnosing and troubleshooting the WPS. Here you can monitor various temperatures inside the module



### 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**).

Records						Time	0.00	Idle	Ready
Module	Product#	Serial#	Version	On-Time					
Controller	G1323B	DE00000000	T.04.27	0d 00:05h					
WP Sampler	G1367A	DE00000000	T.04.56 [001]	0d 00:05h					
AF Collector	G1364A*	DE00000000	T.04.57 [002]	0d 05:48h					
Solvent Valve	G1160A	DE00000006	T.04.53 [001]	0d 00:00h					
UIB	G1390A	DE00000067	T.04.55 [001]	0d 00:00h					

Buttons: EMF, System Log, Error Log, Maint Log, FW Update

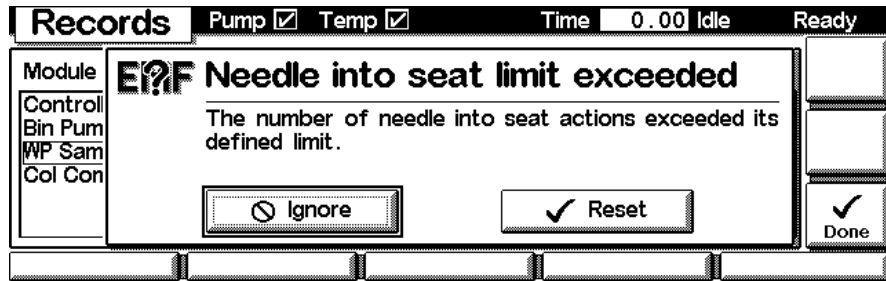
Records						Pump <input checked="" type="checkbox"/>	Temp <input checked="" type="checkbox"/>	Lamp <input checked="" type="checkbox"/>	Time	0.00	Idle	Ready
<i>Micro Well Plate Autosampler EMF Limits</i>												
	G1377A Well Plate Autosampler		Serial#		DE00000123							
# Valve Cycles	570		Limit	<input type="text" value="OFF"/>								
# Needle into Seat	278		Limit	<input type="text" value="OFF"/>								

Buttons: Reset, 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.

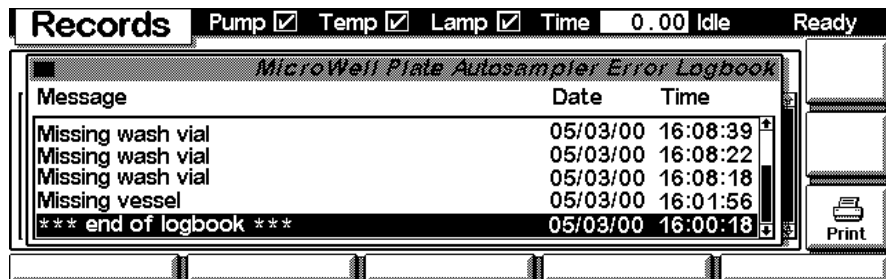
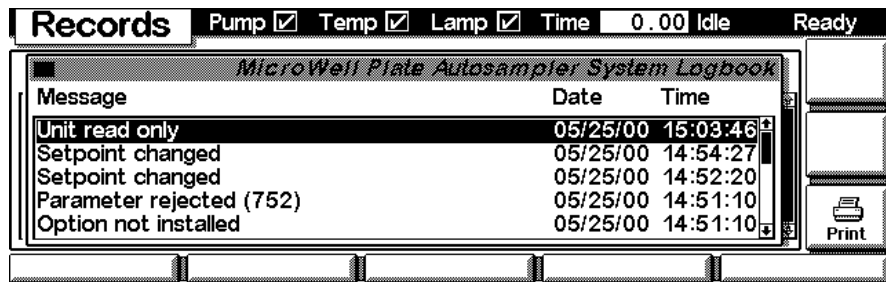
#### NOTE

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



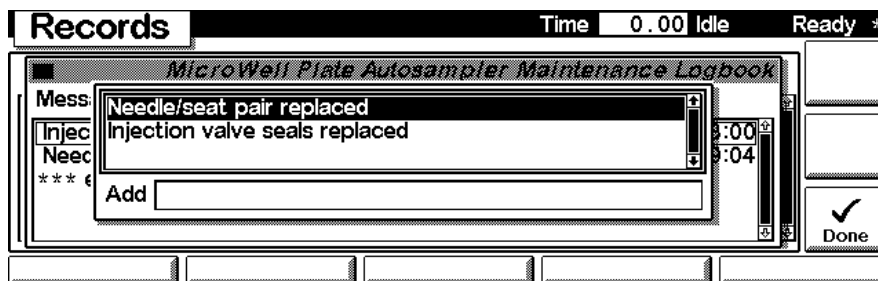
### System / Error Log

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



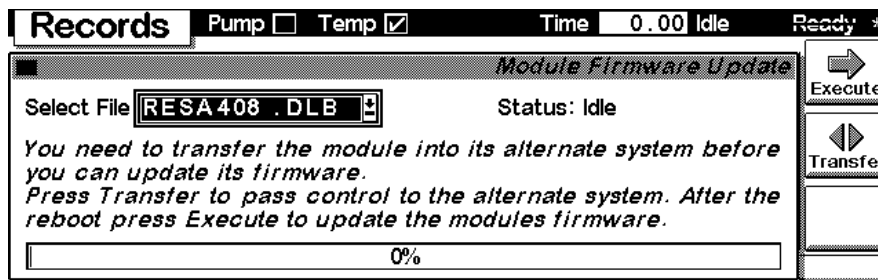
## Maintenance Log

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. Select the activity you have performed and press **Done** to create an entry in the logbook. For troubleshooting reasons this Logbook can be printed or saved to a file on the PCMCIA card (pressing the **m**-key).



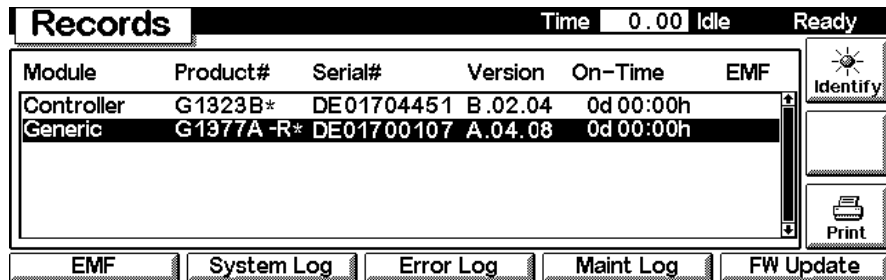
## Firmware Update

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 WPS. 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).



## 8 Control Module Screens of the Well-plate Samplers

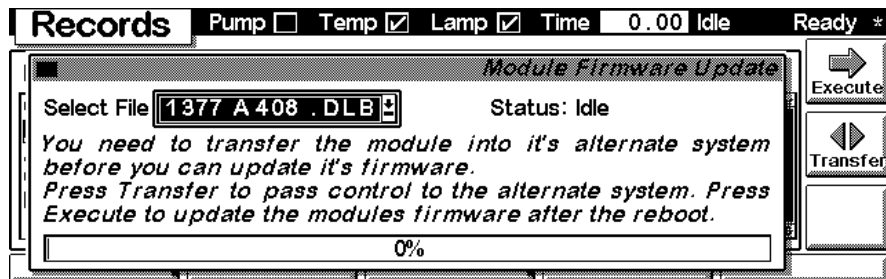
Use the **Esc**-key to receive **Views** on the **F5**-key. Choose **System** from the pull-down menu. Use the **F3**-key (**Records**) to select the WPS. Use the **F5**-key (**FW Update**) to enter the Update section. Select the a file from the PCMCIA card (1367nnnn.DLB for the non-thermostatted WPS or 1368nnnn.DLB for the thermostatted WPS, use 1377nnnn.DLB for the non-thermostatted micro WPS or 1378nnnn.DLB for the thermostatted micro WPS) 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 stays yellow).



The screenshot shows the 'Records' screen with a table of module data. The top bar includes 'Time 0.00 Idle Ready'. The table has columns for Module, Product#, Serial#, Version, On-Time, and EMF. Below the table are buttons for EMF, System Log, Error Log, Maint Log, and FW Update. On the right side, there are 'Identify' and 'Print' icons.

Module	Product#	Serial#	Version	On-Time	EMF
Controller	G1323B*	DE01704451	B.02.04	0d 00:00h	
Generic	G1377A -R*	DE01700107	A.04.08	0d 00:00h	

Use the **F5**-key (**FW Update**) to enter the Update section. Select the a file from the PCMCIA card (1367nnnn.DLB for the non-thermostatted WPS or 1368nnnn.DLB for the thermostatted WPS, use 1377nnnn.DLB for the non-thermostatted micro WPS or 1378nnnn.DLB for the thermostatted micro WPS) 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).



The screenshot shows the 'Module Firmware Update' screen. It includes a title bar with 'Records' and checkboxes for 'Pump', 'Temp', and 'Lamp'. The main area contains instructions for updating the firmware, a 'Select File' field with '1377 A 408 .DLB' selected, and a 'Status: Idle' indicator. A progress bar at the bottom shows '0%'. On the right side, there are 'Execute' and 'Transfer' buttons.

**Records** Pump  Temp  Lamp  Time 0.00 Idle Ready \*

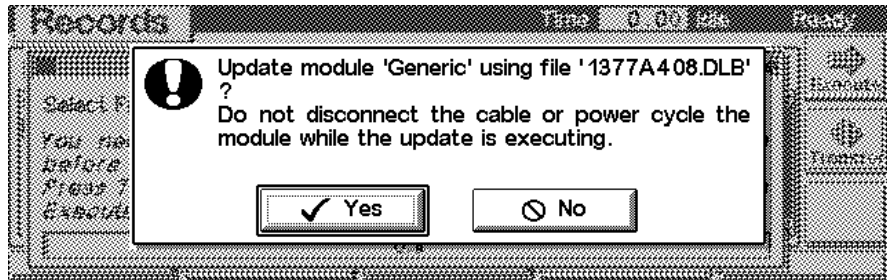
*Module Firmware Update*

Select File **1377 A 408 .DLB** Status: Idle

*You need to transfer the module into it's alternate system before you can update it's firmware.  
Press Transfer to pass control to the alternate system. Press Execute to update the modules firmware after the reboot.*

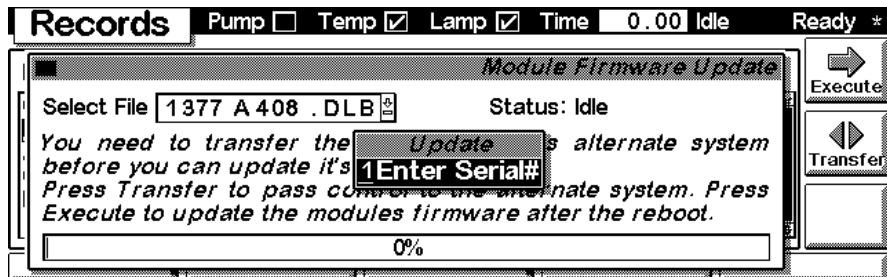
0%

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.

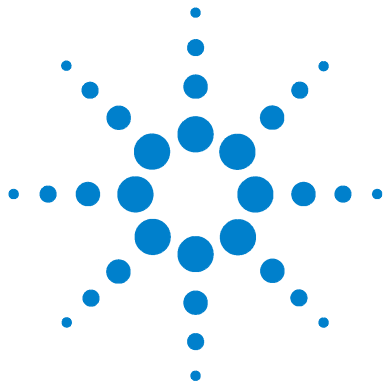


## 8 Control Module Screens of the Well-plate Samplers

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)**.

The screenshot shows a control module interface. At the top, a status bar displays 'Records', 'Pump' (with an unchecked checkbox), 'Temp' (with an unchecked checkbox), 'Lamp' (with an unchecked checkbox), 'Time 0.00', 'Idle', and 'Ready \*'. Below this, a dialog box titled 'Module Firmware Update' is active. It contains the following text: 'Select File [1310A381.DIB]', 'Status: Idle', 'Product# G1377A', and 'Serial# DE02100120'. Below the serial number, there is a prompt: 'restart the module to activate changes'. On the right side of the dialog, there is a 'Done' button with a checkmark icon. At the bottom of the dialog, a progress bar shows '0%'. On the left side of the dialog, there is a vertical stack of buttons: 'You n', 'you o', 'Press', and 'rebo'.





## 9 Specifications

Performance Specifications [274](#)



## Performance Specifications

**Table 79** Performance Specifications Agilent 1100 Series Well Plate Sampler

Type	Specification
GLP features	Early maintenance feedback (EMF), electronic records of maintenance and errors
Communications	Controller-area network (CAN). RS232C, APG-remote standard, optional four external contact closures and BCD vial number output
Safety features	Leak detection and safe leak handling, low voltages in maintenance areas, error detection and display
Injection range	0.1 – 100 $\mu$ l in 0.1 $\mu$ l increments Up to 1500 $\mu$ l with multiple draw (hardware modification required)
Precision	Typically < 0.5 % RSD of peak areas from 5 – 100 $\mu$ l, Typically < 1 % RSD from 1 – 5 $\mu$ l
Sample viscosity range	0.2 – 5 cp
Sample capacity	2 $\times$ well-plates (MTP) + 10 $\times$ 2 ml vials 100 $\times$ 2 ml in one tray 40 $\times$ 2 ml in half tray
Injection cycle time	Typically < 30 s using following standard conditions: Default draw speed: 200 $\mu$ l/min Default eject speed: 200 $\mu$ l/min Injection volume: 5 $\mu$ l
Carry-over	Typically < 0.01 % using the following conditions: Column: 125 $\times$ 4 mm Hypersil ODS, 5 $\mu$ m Mobile phase: Water/Acetonitrile = 80/20 Flow rate: 1 ml/min Injection volume: 1 $\mu$ l caffeine (1 mg/ml), 5 $\mu$ l water to test carryover Outside wash of needle before injection: 20 sec with water using flush port

**Table 80** Performance Specifications Agilent 1100 Series Micro Well Plate Sampler

Type	Specification
GLP features	Early maintenance feedback (EMF), electronic records of maintenance and errors
Communications	Controller-area network (CAN). RS232C, APG-remote standard, optional four external contact closures and BCD vial number output
Safety features	Leak detection and safe leak handling, low voltages in maintenance areas, error detection and display
Injection range	0.01 – 8 $\mu$ l in 0.01 $\mu$ l increments with the small loop capillary 0.01 – 40 $\mu$ l in 0.01 $\mu$ l increments with the extended loop capillary
Precision	Typically < 0.5 % RSD of peak areas from 5 – 40 $\mu$ l, Typically < 1 % RSD from 1 – 5 $\mu$ l Typically < 3 % RSD from 0.2 – 1 $\mu$ l
Sample viscosity range	0.2 – 5 cp
Sample capacity	2 $\times$ well-plates (MTP) + 10 $\times$ 2 ml vials 100 $\times$ 2 ml in one tray 40 $\times$ 2 ml in half tray
Injection cycle time	Typically < 30 s using following standard conditions: Default draw speed: 4 $\mu$ l/min Default eject speed: 10 $\mu$ l/min Injection volume: 0.1 $\mu$ l
Carry-over	Typically < 0.05 % using the following conditions: Column: 150 $\times$ 0.5 mm Hypersil ODS, 3 $\mu$ m Mobile phase: Water/Acetonitrile = 85/15 Column Flow rate: 13 $\mu$ l/min Injection volume: 1 $\mu$ l caffeine (=25ng caffeine), 1 $\mu$ l water to test carryover Outside wash of needle before injection: 20 sec with water using flush port





## **A** **Safety Information**

General Safety Information [278](#)



## General Safety Information

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

### 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.**

---

#### **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.**

---

**Table 81** 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.

**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.**

## A Safety Information

### WARNING

Lithiumbatteri - Eksplosionsfare ved fejlagtig handling. Udskiftning må kun ske med batteri af samme fabrikat og type. Lever det brugte batteri tilbage til leverandoren.

---

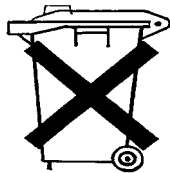
### WARNING

Lithiumbatteri - Eksplosionsfare. Ved udskiftning benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandoren.

---

### NOTE

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





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## **In This Book**

This manual contains technical reference information about the Agilent 1100 Series Well-plate Sampler & Micro Well-plate Sampler and micro well plate sampler. The manual describes the following:

- installing the sampler,
- optimizing performance,
- troubleshooting and test functions,
- repairing the sampler,
- parts and materials,
- introduction to the sampler,
- screens of the local control module,
- specifications,
- safety.

