



# 1260 Infinity II High Temperature GPC System

User Manual



**Agilent Technologies**

# Notices

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### WARNING

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

## In This Guide...

This manual contains information on the Agilent 1260 Infinity II High Temperature GPC System (G7820B)

### **1 Introduction to the 1260 Infinity II High Temperature GPC System**

This chapter gives an instrument overview and an introduction to the function of the 1260 Infinity II High Temperature GPC System.

### **2 Site Requirements and Specifications**

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

### **3 Installing the System**

This chapter gives information on how to install your 1260 High Temperature GPC System.

### **4 Using the Module**

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

### **5 Troubleshooting and Diagnostics**

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

### **6 Error Information**

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

### **7 Maintenance**

This chapter provides general information on maintenance of the system.

## **In This Guide...**

### **8 Parts for Maintenance**

This chapter provides information on parts for maintenance.

### **9 Appendix**

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

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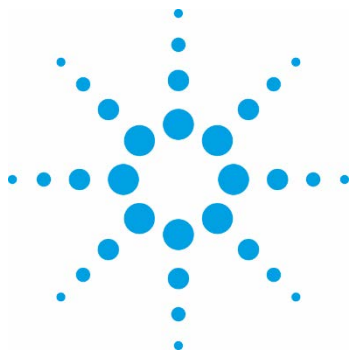
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**Agilent Technologies**

## Introduction

The Agilent 1260 Infinity II High Temperature GPC System is a fully automated chromatograph designed specifically for Gel Permeation Chromatography (GPC) / Size Exclusion Chromatography (SEC). The instrument features a 40-position carousel, high sensitivity refractive index detector and a reliable isocratic solvent delivery system. The open architecture of the column oven enables multi-detection options both inside and outside of the oven. Although the system was designed for prolonged high temperature operation, the system delivers an equal level of performance across the whole of its temperature operating range (30 – 220 °C).



**Figure 1** Front view of the 1260 Infinity II High Temperature GPC System



# System Description and General Operation

## Instrument Overview



1  
**Figure 2** Overview (modules)

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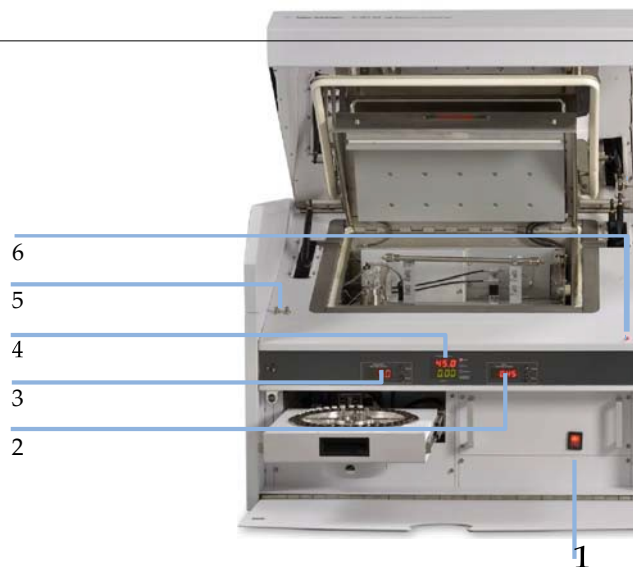
1	Control drawer
2	Autosampler
3	Main oven module
4	Flow in Compartment
5	Pump

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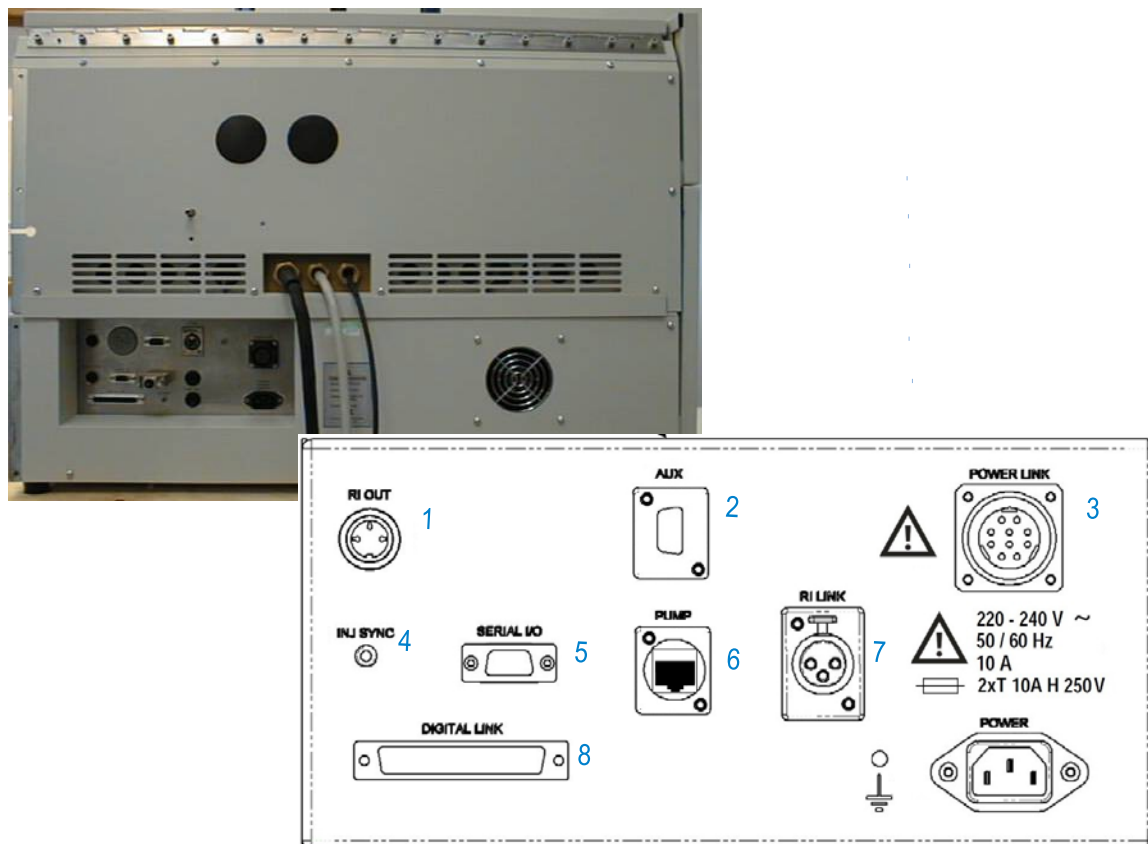
# 1 Introduction to the High Temperature GPC System

## System Description and General Operation

**Figure 3** Overview (display and control elements)



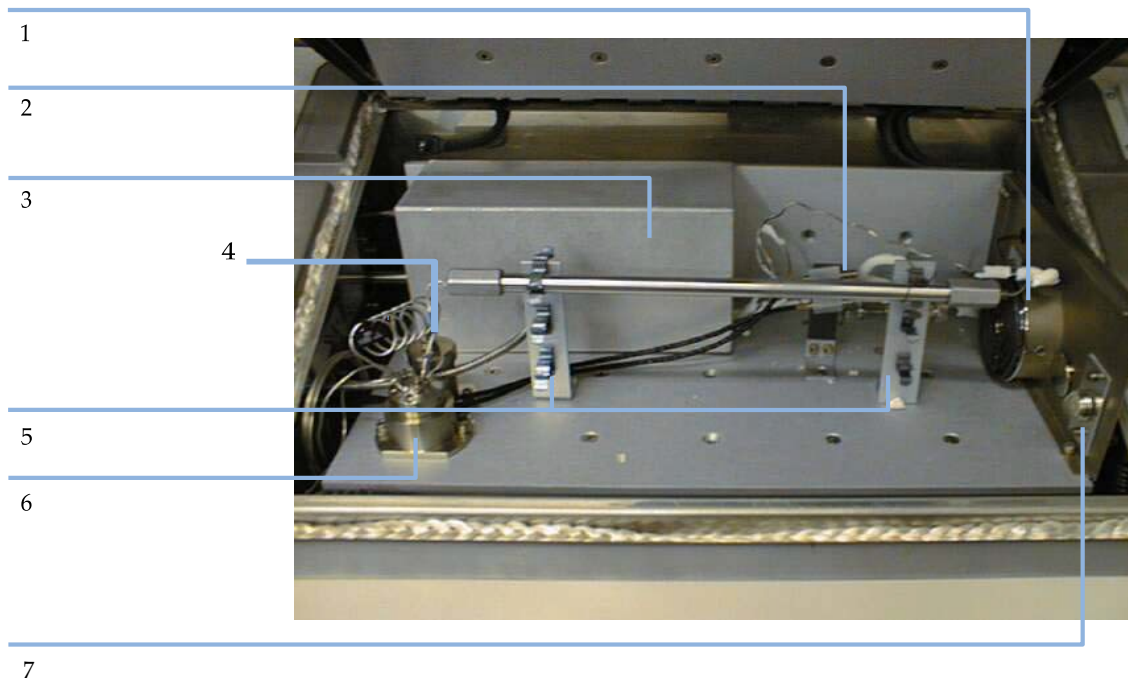
1. Power switch
2. Oven over-temperature display and control
3. Autosampler over-temperature display and control
4. Temperature and RI display
5. Oven and laser safety interlock switches
6. Power ON indicator



**Figure 4** Instrument rear view and connections

1	Refractive Index signal output $\pm 1V$ FSD
2	Auxiliary I/O - Pump stop
3	Oven Power Cable connector
4	Injection synchronisation to Agilent DataStream
5	Serial connection to PC (Instrument Control software)
6	LAN connection to Agilent pump
7	Oven RI link cable connector
8	Oven Digital link cable connector

## Column Oven



**Figure 5** Standard Oven Configuration

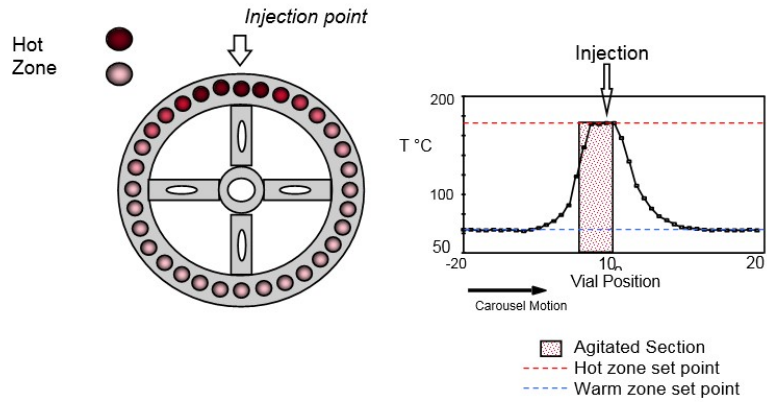
1	Oven Fan with Heater
2	Temperature Sensors
3	Differential Refractive Index Detector
4	Sample Needle Assembly
5	Column Mounts
6	Injection Valve
7	Vapour Sensor



## Autosampler



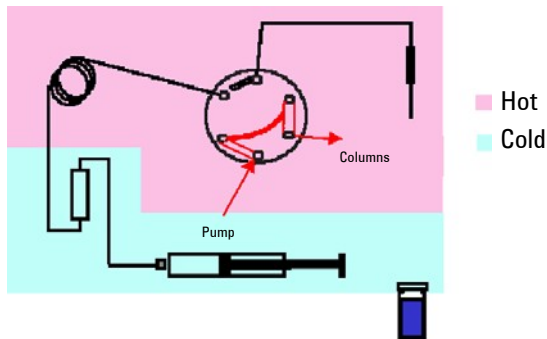
The carousel will accommodate 40 x 2 mL sample vials, 39 of these (positions 1 to 39) are used for sample injection. The 40<sup>th</sup> or zero vial is dedicated as the “index” vial and must remain on the carousel at all times. This index vial is used during the initialization process of the autosampler and is used as a waste container should an injection sequence malfunction. In this case, the contents of the loop and injection system will be emptied into this index vial to circumvent blockage due to precipitation of the polymer should the instrument cool down. It is therefore important to keep an empty vial fitted with a clean, shiny cap in the zero position of the carousel at all times. Each of the vials is contained in an individual brass cup that glides across the heated track of the carousel. Two heaters control the temperature of the carousel; each can be independently set providing two zones of heating on the carousel.



**Figure 7** Temperature controlled zones in the carousel

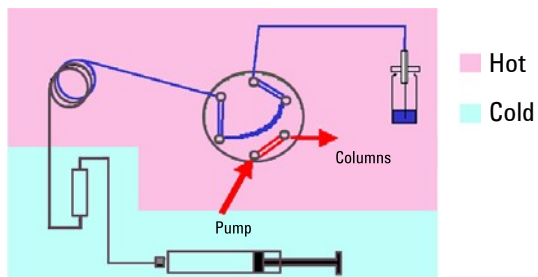
## Injection Sequence

1 Default condition prior to injection:



- Injection valve in the Inject position
- Vial in carousel
- Syringe at mid point

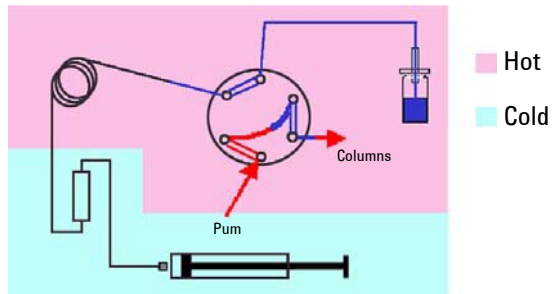
2 Sample loaded



- Valve switched to load position
- Vial lifted to needle
- Syringe sucks 800  $\mu\text{L}$  from the vial to fill the loop and partially fills the overflow loop



### 3 Sample injected



- Sample injected
- Excess sample from overflow loop returned to the vial
- Vial returned to the carousel

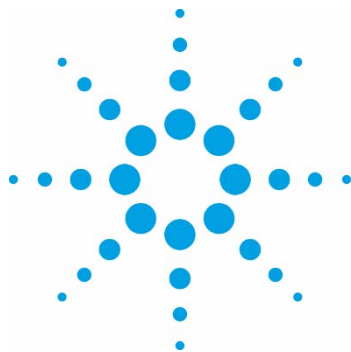
## Agilent DataStream

The Agilent 1260 Infinity II DataStream is a high-performance data acquisition unit. As part of a system, interfaced to Agilent GPC/SEC Software or Cirrus software it is designed to meet the exacting acquisition, display and analysis requirements of chromatography applications.



**Figure 8** Agilent 1260  
DataStream

No.	Description	No.	Description
1	Channel start button	6	PL-CAN connector (not used)
2	Status LEDs	7	Aux I/O connector
3	Channel analogue input	8	Power Switch
4	CTR connector	9	Voltage selector
5	RS232 connector	10	Power inlet



## 2 Site Requirements and Specifications

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Physical Specifications 24

Performance Specifications 25

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

## Site Requirements

### Power Considerations

The instrument power supply has wide ranging capability. It accepts any line voltage in the range described in Physical Specifications. Consequently, there is no voltage selector in the rear of the module.

For countries where 230 V will have to be installed the main power leads are provided with NEMA-15 type plugs.

The mains supply should be fitted with an RCCB (Residual Current operated Circuit-Breaker).

#### WARNING

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

→ **Connect your instrument to the specified line voltage only.**

---

#### CAUTION

Inaccessible power plug.

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

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

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

---

## Power Cords

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

### **WARNING**

#### **Absence of ground connection or use of unspecified power cord**

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

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

### **WARNING**

#### **Use of unsupplied cables**

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

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

### **WARNING**

#### **Unintended use of supplied power cords**

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

- Never use the power cords that Agilent Technologies supplies with this instrument for any other equipment.
-

## Bench Space

The standard instrument will require the following bench space:

- Width 90 cm (35.5 in)
- Depth 53 cm (21 in)
- Height 62 cm (24.5 in)

**NOTE**

**The oven opens upwards to a full height of 97 cm (38 in). Please be aware of overhead obstructions.**

---

If a G7821B 1260 Infinity II High Temperature Viscometer or G7822B Dual angle LSD is supplied

with the instrument, allow an additional 30 cm (12 in) for each of these detector control systems on the width of the bench space.

The instrument is heavy, weighing 136 kg (300 lbs.), and thus, it is advisable to locate the system on a sturdy bench, preferably fitted with wheels facilitating access to the rear of the unit should service be required.

## Environment

### CAUTION

Condensation within the Module

Condensation will damage the system electronics.

→ Do not store, ship or use your module under conditions where temperature fluctuations could cause condensation within the module.

→ If your module was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.

Avoid positioning in direct sunlight.

---

## Extraction Requirements

The instrument is equipped with a fan-forced exhausts (4 in diameter) at the rear, which must be routed to a fume extraction system or vented into a hood via the supplied hoses. The vent hose is 4 inches in diameter. The air flow of the extraction system should be <1.0 SLM.

Situate the instrument in a well-ventilated area.

## Physical Specifications

**Table 1 Physical Specifications 1260 Infinity II High Temperature GPC System**

Type	Specification	Comments
Line voltage	230 VAC ( $\pm 10\%$ )	Single phase with earth
Power consumption	3300 VA, 2310 W/7900 BTU	
Line frequency	50 or 60 Hz ( $\pm 5\%$ )	
Size (width $\times$ depth $\times$ height)	900 mm $\times$ 530 mm $\times$ 620 mm	
Packaged Size (width $\times$ depth $\times$ height)	930 mm $\times$ 760 mm $\times$ 860 mm	
Weight	136 kg (300 lbs.)	
Ambient operating temperature	15 – 30 °C (59 – 86 ° F)	At constant temperature
Ambient non-operating temperature	-40 – 70 °C (-4 – 158 ° F)	
Operating altitude	Up to 2000 m (6562 ft.)	
Non-operating altitude	Up to 4600 m (15091 ft.)	
Humidity	<80 % at 25 – 30 °C	
Safety standards: IEC, CSA, UL	Installation category II, Pollution degree 2 For indoor use only.	



## Performance Specifications

**Table 2** Performance Specifications of the 1260 Infinity II High Temperature GPC System

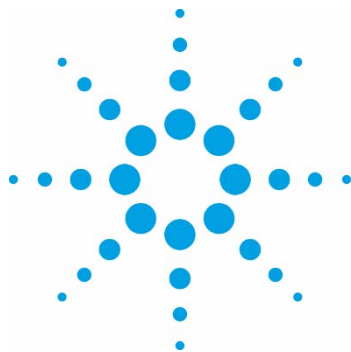
Unit	Type	Specification
<b>Pump<sup>1</sup></b>	Flow Range	0.0 – 5.0 mL/min (software controlled)
	Flow Rate Reproducibility <sup>1</sup>	≤0.07 % RSD, or ≤0.02 min SD whatever is greater, based on retention time at constant room temperature
<b>Oven</b>	Temperature Range	Ambient to 220
	°C Temperature Stability	<0.05 °C/h
	Column Capacity	6 x 30 cm columns
<b>Detector</b>	Differential Refractometer	Deflection
	Cell Volume	8 µL
	Noise <sup>2</sup>	≤100 µV
	Drift <sup>2</sup>	≤10 mV/h
	Wavelength	890 nm
	<b>Autosampler</b>	Carousel Capacity
	Injection Volume	flushed fixed loop; 5–500 µL
	Precision <sup>1</sup>	≤1 %
<b>Instrument Control</b>		Microprocessor
<b>Instrument Interface</b>		Windows 7 and 10, 64bit Advanced PC Control

<sup>1</sup> Refer to 1260 Infinity II Isocratic Pump User Manual for complete pump specifications

<sup>2</sup> The technical specifications have been determined by experimentation and reflect the total system performance. The values quoted have been calculated from analyses performed in THF at 40 °C and in TCB at 160 °C.

## **2 Site Requirements and Specifications**

### **Performance Specifications**



### 3

## Installing the System

- Unpacking the Instrument 28
- Unpacking the Main Module 29
- Installing the Pump 31
- Installing the System 34

This chapter gives information on how to unpack your 1260 Infinity II High Temperature GPC System.



## Unpacking the Instrument

### Damaged Packaging

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

#### CAUTION

"Defective on arrival" problems

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

- Notify your Agilent sales and service office about the damage.
  - An Agilent service representative will inspect the instrument at your site and initiate appropriate actions.
- 

### Delivery Checklist

Ensure all parts and materials have been delivered with the pump. For checking the completeness of your specific shipment, please use the list included in your shipment. To aid in parts identification, please refer to chapter *Parts and Materials for Maintenance*. Please report missing or damaged parts to your local Agilent Technologies sales and service office.

## Unpacking the Main Module

Tools required	Description
	Phillips screwdriver (medium)
	Flat screwdriver(medium)

### WARNING

**Very heavy weight. The instrument weighs 136 kg (300 lbs).**

- Lift the Instrument with at least four persons.
- Refer to local statutory Manual Lifting Regulations & Guidelines.

### WARNING

**Condensation in the instrument. The electrical safety of the instrument cannot be guaranteed until it has dried out.**

- Leave the instrument standing in a warm, dry, ventilated environment for 1 h to let condensation evaporate.
- Do not connect any electrical power until this period has expired.

**The instrument is shipped on a specialized pallet inside a wooden carton. The Agilent pump is shipped in a separate box.**

**Unpack as follows:**

- 1 Remove the screws (Phillips screws, typically 3 per side) around the top edge of the carton, securing the lid in position. Lift off the lid.
- 2 Lift and remove the sheet of foam beneath the lid packaging which protects the top of the unit.  
The top of the unit is revealed.
- 3 Remove the five sections of foam packaging surrounding the unit: one at each side, one piece at the front and two small sections behind the unit. The wires are tucked down between the two foam sections at the back.

### 3 Installing the System

#### Unpacking the Main Module

#### NOTE

The packaging is designed to be a tight fit around the unit, and it is sometimes easy to remove the screws described in step 4 on page 26 before lifting this packaging clear.

---

- 4 Remove the screws (Phillips screws, typically 3 per side) from around the base of the carton to enable the collapsible wooden sleeve, forming the side walls of the carton, to be lifted over and clear of the unit.

The instrument is now visible on its indented pallet - small indentations have been made to secure the unit's feet. The unit is firmly held down to the pallet by plastic bands which tie the instrument down to the sub-platform above the main pallet.

- 5 Cut the plastic bands to enable the unit to be lifted free from the pallet. The unit can now be lifted clear of the pallet.
- 6 Position the instrument on the laboratory bench.
- 7 Open the outer and inner oven lids to let condensation evaporate

After positioning the instrument on the laboratory bench it should be left to stand in a warm, dry, ventilated environment with the outer and inner oven lids opened to remove any condensation which may have formed during shipping.

## Installing the Pump

Parts required	#	Description
	1	Pump (G7110B)
	2	Solvent Cabinet (5067-5760)
	3	Power cord (country specific, supplied via LC)

- Preparations**
- Locate bench space.
  - Provide power connections.
  - Unpack the module.

### WARNING

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

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

- Make sure that it is always possible to access the power plug.
- Remove the power cable from the instrument before opening the cover.
- Do not connect the power cable to the Instrument while the covers are removed.

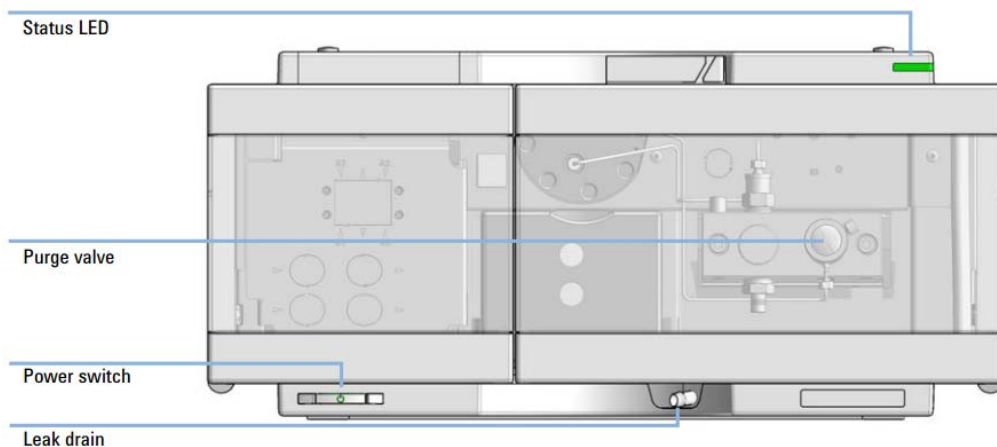
### CAUTION

"Defective on arrival" problems

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

- Notify your Agilent sales and service office about the damage.
- An Agilent service representative will inspect the instrument at your site and initiate appropriate actions.

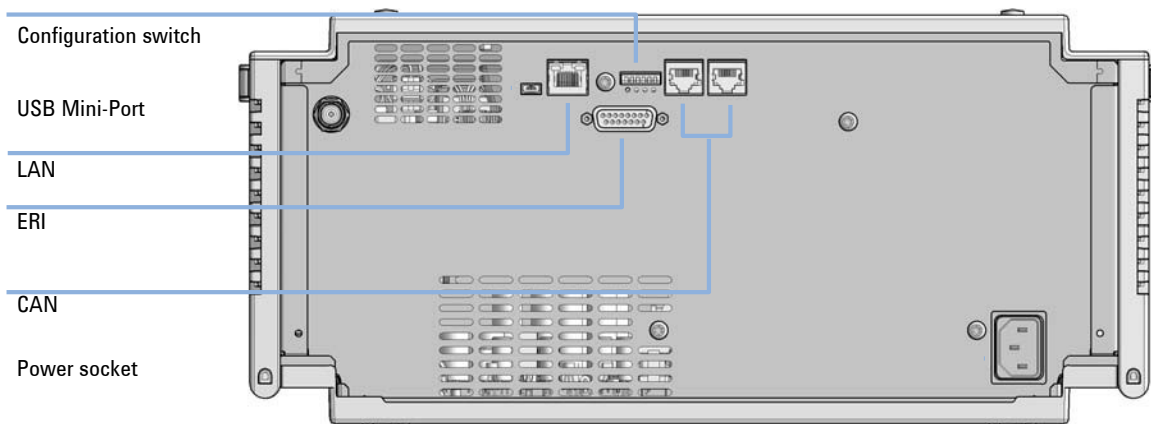
- 1 Place the module on the bench in a horizontal position.
- 2 Ensure the power switch on the front of the module is OFF (switch stands out).



**Figure 9** Overview of the pump

- 3 Connect the power cable to the power connector at the rear of the module.
- 4 Open the doors.
- 5 Place the solvent cabinet on top of the stack.
- 6 Put the bottle-head assemblies into empty solvent reservoirs and place the bottle in the solvent cabinet.
- 7 Connect the inlet tube from the bottle-head assembly to the inlet connector A at the right-hand side of the vacuum degasser. Fix the tubes in the tube clips of the pump.
- 8 Using a piece of sanding paper connect the waste tubing to the purge valve and place it into your waste system.
- 9 Connect the waste tube to the waste outlet of the pump leak handling system.
- 10 Connect the pump outlet capillary (pump to injection device) to the outlet of the purge valve.
- 11 Fill solvent reservoirs with your mobile phase.





**Figure 10** Rear view of the pump – electrical connections and label

**13** Connect all capillaries, solvent tubes and waste tubing

**14** Press the power switch to turn on the module.

**NOTE**

The power switch stays pressed in and a green indicator lamp in the power switch is on when the module is turned on. When the line power switch stands out and the green light is off, the module is turned off.

**15** Purge the pump (Please refer to “[Initial Priming](#)” on page 68 of the Agilent pump manual for further details).

**NOTE**

The pump was shipped with default configuration settings. To change these settings, see “[Setting the 6-bit Configuration Switch](#)” on page 315.

## Installing the System

### Connecting your GPC System

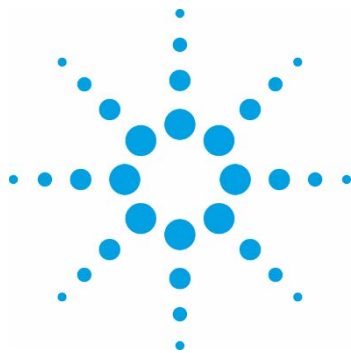
The 1260 Infinity II High-Temperature GPC system must be installed by an Agilent service representative.

Your Agilent service representative will:

- Remove all packing list items that are shipped with the instrument and present them to you for review.
  - Unpack the accessories supplied with the instrument and check that you have received everything on the packing lists.
  - Install your High Temperature GPC System
1. Place the Agilent HT-GPC instrument & DataStream on the bench
  2. Place the Agilent 1260 Infinity II Isocratic pump (G7110B) on the bench
  3. Connect the digital link cable from the oven to the *DIGITAL LINK* connector of the control drawer, at the rear of the unit
  4. Connect the power link cable from the oven to the *POWER LINK* connector of the control drawer, at the rear of the unit
  5. Connect the RI link cable, from the oven to the *RI LINK* connector of the control drawer at the rear of the unit
  6. Connect the *RI OUT*, of the control drawer, to the Agilent DataStream (channel 1) using the RI signal cable (SF1-24246)
  7. Connect the *INJ SYNC* of the control drawer, to the Agilent DataStream *AUX I/O* port using the HT GPC trigger cable (G7820-60005).
  8. Connect the *AUX* of the control drawer, to the Agilent 1260 Infinity pump *E-REMOTE* port using the HT GPC Pump Stop cable (G7820-60006)
  9. Connect the *SERIAL I/O* of the control drawer to the serial port of the PC using serial cable assembly (PL1-24950).
  10. Connect the *SERIAL I/O* of the Agilent DataStream to the other serial port using serial cable assembly (PL1-24950).
  11. Connect the LAN cable from the *PUMP* port of the HT-GPC system to the LAN port of the pump,
  11. Connect the supplied power cord to the IEC inlet at the rear of the pump
  12. Press the power switch to turn on the module.

#### NOTE

Always turn the Agilent 1260 Infinity II pump on before the HT GPC system



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

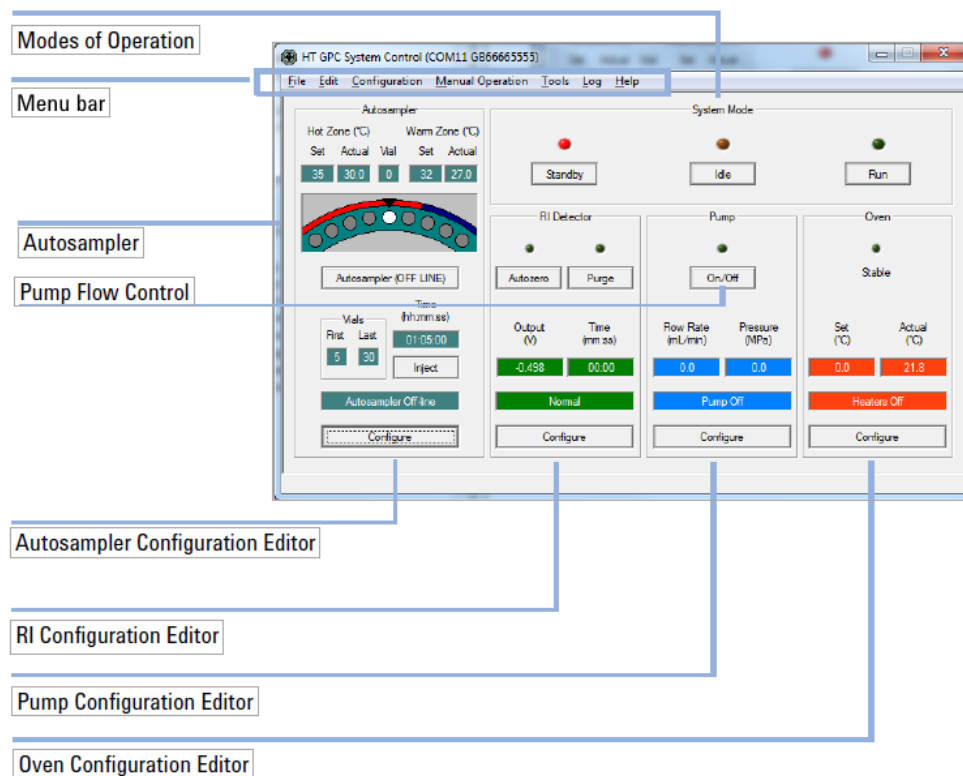
## The Graphical User Interface

A Windows-based Graphical User Interface (GUI) providing total instrument control is used to operate the system. An intuitive single control panel provides simplistic control as well as a comprehensive monitoring system.

The instrument status can be rapidly assessed for each of the instrument's modules.

### NOTE

Onscreen help, accessed directly from the software control, provides an interactive guide to the operation of the instrument and should be used in addition to this manual.



**Figure 11** Graphical User Interface

The interface is split into logical areas of operation that reflect the modules of the instrument. The modules are color-coded – the pump is blue, the oven red, the refractometer green and the autosampler turquoise. For each of the controlled modules, the key information is displayed together with a statement of current activity.

Consult the online help in the 1260 Infinity II HT GPC System Control Software for more details about the various data- and event-logging options available.

## Modes of Operation

The 1260 Infinity II HT GPC System can run in the following operational modes:

- **STANDBY** is indicated by a **RED LED**.  
In this mode, the oven and autosampler heaters and the pump are turned off. The pump can still be manually turned on by pressing the pump On/Off button.  
This mode of operation allows for routine maintenance, such as solvent or column exchange or in any circumstance when the oven needs to be opened.
- **IDLE** is indicated by an **AMBER LED**.  
In this mode, the oven heaters and pump are turned on and the autosampler heaters are turned off. The oven is maintained at the set Idle temperature, with the pump at the set Idle flow rate.
- **RUN** is indicated by a **GREEN LED**.  
In this mode, the oven and autosampler heaters and pump are turned on. The oven is maintained at the set Run temperature with the pump either at the set:
  - Low flow rate while the oven is stabilising.
  - Run flow rate once the oven is stable.The autosampler heaters are maintained at the set hot zone and warm zone temperatures. The system is ready to run samples.

On power cycle, once initialization is complete, the instrument will be left in the last used operational mode.

## Pump Flow Control

The pump flow can be manually switched on/off in two places: the first using the **on/off** selection button in the pump module box, and the second is in the **Manual Operation** menu. These options allow the pump flow to be stopped/started in all three modes of operation.

## RI Detector

- **Autozero** – This button is used to start and stop automatic zeroing of the RI. The LED indicates that the Autozero operation is in progress. This should be performed after a purge.
- **Purge** – This button is used to start or stop the purge operation. The purge valve will remain open based on the set purge duration in the RI configuration screen. The LED indicates that the purge valve is open.

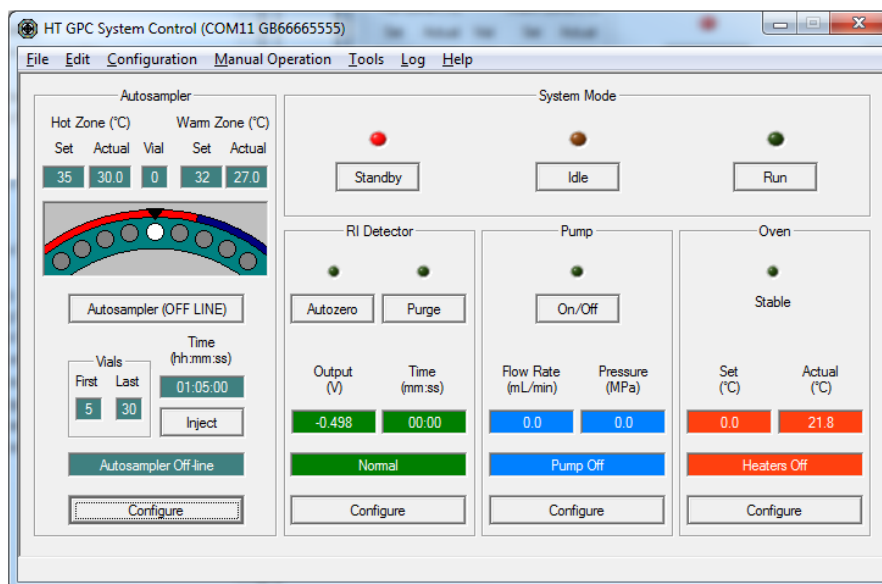
This procedure will de-stabilize the system; it is recommended that the baseline be monitored and if excessive drift is noticed then another purge should be performed. This procedure should be repeated until a stable baseline is observed.

## Autosampler

- **Autosampler (offline/online)** – This button is used to start and stop the autosampler.
- **Offline** – Indicates that the autosampler is not currently running an injection sequence.
- **Online** – Indicates that the autosampler is running an injection sequence using the parameters set up in the autosampler configuration screen.
- **Injection Valve (Inject/Load)** – This button is used to manually change the injection valve position, see “Injection Sequence” on page 17 for the description of positions. This button shows the position of the injection valve.

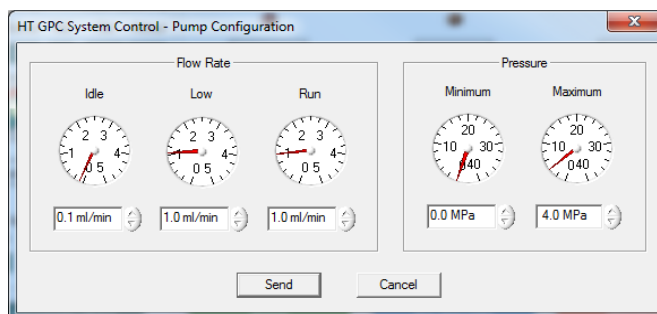
## Configuring the Controlled Modules - Configuration Editors

To change the set conditions, simply click on the Configure button for that module to open its configuration editor.





## Pump Configuration Editor



Three independent flow rates can be set:

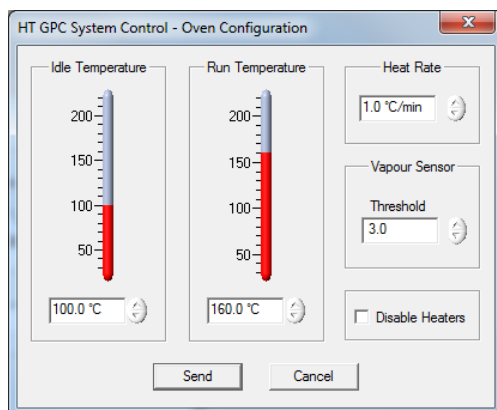
- **Idle** – the pump flow rate adopted while the system is operated in the IDLE/STANDBY mode.
- **Low** – the pump flow used in RUN mode when the oven is *unstable*.
- **Run** – the pump flow used in RUN mode when the oven is *stable*.

Valid values range from 0 – 5.0 mL/min.

Adjustment of the settings can be achieved by clicking and dragging the needles of the dials, using the up or down arrows or just simply typing the required values in the edit boxes. To download the new configuration to the system, click the **Send** button. Clicking the **Cancel** button will close the dialogue without making changes to the control parameters.

The pump has on-board handling when exceeding high or low pressure limit conditions. The minimum and maximum limits for this handling can be set using the pressure section of this screen.

## Oven Configuration Editor



The 1260 Infinity II HT GPC System oven can be controlled at two temperatures – one programmed for the IDLE mode and one for the RUN mode. Typically, these temperatures would be set to the same value, but if desired, a different IDLE temperature can be used in conjunction with the Idle After Sequence option in the Autosampler Configuration to automatically change the temperature of the oven following an injection sequence.

Temperatures can be set by clicking and dragging the thermometers, typing the value in the Edit box or using the up and down arrows adjacent to the Edit box.

For the Idle Temperature, valid values range from 25 to 220 °C, while for the Run Temperature, they range from 30 to 220 °C.

**Heat Rate** is the rate at which the oven will heat to the set temperature. The minimum programmable heat rate is 0.4 °C/min and the maximum is 2 °C/min.

To prevent excessive overshoot of the set temperature and prolonged stabilization time it is advisable to use a heat rate of 0.5 °C for operating temperatures below 100 °C and 1 °C/min for a set temperature above 100 °C.

### NOTE

For Idle and Run temperatures below 100 °C, the heat rate is limited to a maximum of 1 °C/min.

**Vapour Sensor Threshold** determines the relative sensitivity of the sensor to organic solvent vapour concentration. Valid values range from 0 (off) to 10 (maximum).

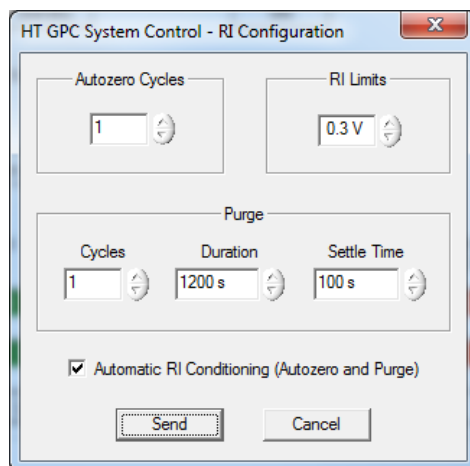
**NOTE**

For oven temperatures below 80 °C a value of 5.0 is recommended, increasing to 6.0 for temperatures between 80 °C and 120 °C, and 7.0 for temperatures above 120 °C or if using chlorinated solvents at any temperature.

---

**Disable Heaters** – if this box is checked, the oven heaters will be disabled and the instrument can be run with the oven temperature at ambient temperature.

## RI Configuration Editor



The **Autozero Cycles** can be used to program the RI detector to automatically autozero at regular intervals during an autosampler sequence. Setting the Autozero Cycles to  $n$  will cause the instrument to autozero at every  $n$ th sample vial, beginning with the  $n$ th sample vial in the sequence. Valid values range from 0 to 38. A value of zero disables this function.

The **RI Limits** is used by the Automatic RI Conditioning uses to determine whether the RI baseline is acceptable once the purge and autozero operations are complete. The RI output must remain within these limits for ten minutes. A value of 0.3 V would mean that the RI output must not drift outside of  $0 \pm 0.3$  V. Valid values range from 0.1 V to 1.0 V.

The **Purge Cycles** parameter is used to program the RI detector to automatically purge at regular intervals during an autosampler sequence. Setting the Purge cycles to  $n$  will cause the instrument to purge at every  $n$ th sample vial, beginning with the  $n$ th sample vial in the sequence. Valid values range from 0 to 38. A value of zero disables this function.

If both a purge and autozero are to be performed on a sample vial, the purge is performed first.

The suitability of this operation is application dependent and it may only be required in specific circumstances (e.g. using 1-Chloronaphthalene at 210 °C).

**NOTE**

If purge cycles are used and the oven temperature has become unstable, the purge will not be performed until the oven has become stable. The injection sequence will therefore remain paused until the purge can be performed.

The **Purge Duration** refers to the time in seconds that the purge valve will remain open for both manual and automatic purging. Valid values range from 0 to 3600 seconds.

The **Settle Time** is the time in seconds that the system waits after an automatic purge. This is used to allow the baseline to settle before the autozero is performed. This is used for both the automatic RI conditioning and when purge cycles are used. Valid values range from 0 to 600 seconds.

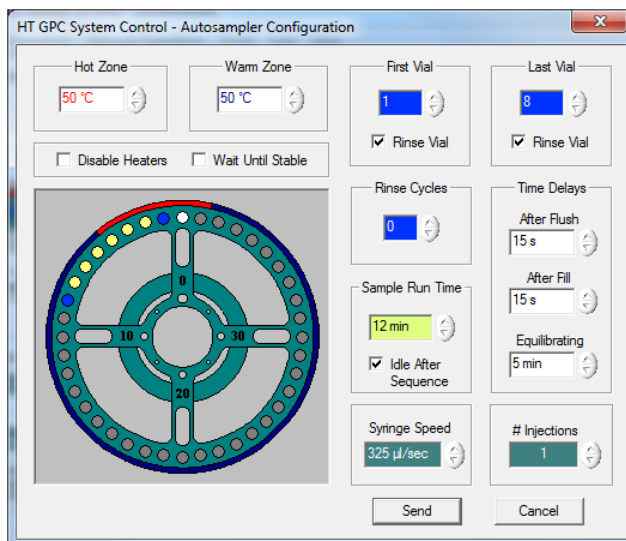
**Automatic RI Conditioning** – Purging and zeroing the refractometer are typically executed manually following stabilisation of the oven temperature when the temperature is changed or when the instrument is switched from Idle to Run.

By checking the Automatic RI Conditioning box the system can be programmed to automatically purge and autozero the RI once the oven is stable (after 10 minutes of being within  $\pm 1^\circ\text{C}$  of the setpoint) and the system is in Run mode. The system will purge, wait the specified Settle Time, perform an autozero, and then monitor the baseline for ten minutes to ensure it stays within the RI Limits. If the baseline drift does not exceed the Limits, the operation will complete, otherwise, the system will continuously repeat the purge-wait-autozero-monitor cycle until the baseline drift is within the limits.

**NOTE**

In order to abort the Automatic RI Conditioning once the operation has begun, open the RI Configuration, deselect the Automatic RI Conditioning option and press Send. Alternatively, the instrument mode can be changed to abort the operation. However, please note that changing modes will cause the Oven to lose temperature stability.

## Autosampler Configuration Editor



The Autosampler Configuration Editor dialog is available by clicking the Configure button in the Autosampler section, or by using the Autosampler option in the **Configuration** menu.

The editor displays an image of the autosampler carousel. Color coding is as follows:

- The vials are one of two colors – yellow refers to Sample vials, while blue indicates a Rinse vial.
- The band around the edge of the carousel indicates the heated zones. Red for Hot Zone and blue for Warm Zone.

### NOTE

The Hot Zone is also the area of the carousel that is magnetically stirred when the sample vial contains a magnetic flea.

**Hot Zone** refers to the set temperature of the hot zone. The actual value is measured at vial position 1. Valid values range from 30 to 220°C.

**Warm Zone** refers to the set temperature of the warm zone. The actual value is measured at vial position 19. Valid values range from 25 to 150°C.

**NOTE**

The autosampler heaters are only enabled in RUN mode.

Selecting the **Disable Heaters** checkbox disables the heaters in the carousel.

When the **Wait Until Stable** checkbox is unselected it allows an injection sequence to start while the oven is heating and the temperature is unstable.

**First Vial** refers to the location of the first vial in the injection sequence. Valid values range from 1 to 39.

Selecting the **First Vial – Rinse Vial** checkbox indicates that the first vial in the injection sequence is a rinse vial.

**Last Vial** refers to the location of the last vial in the injection sequence. Valid values range from 1 to 39.

Selecting the **Last Vial – Rinse Vial** checkbox indicates that the last vial in the injection sequence is a rinse vial.

**Rinse Cycles** – Normally, a rinse at the beginning and the end of the autosampler sequence (first and last vials only) is sufficient for most applications. However for some applications, rinsing at a regular interval is required. For a rinse cycle value of  $n$ , the rinse operation will be performed every  $(n + 1)$ th vial, starting on vial  $first\_vial + n$ , unless **First Vial – Rinse Vial** is ticked, where it will start on vial  $first\_vial$ .

Valid values range from 0 to 39.

## 4 Using the Module

### Configuring the Controlled Modules - Configuration Editors

#### NOTE

The rinse will not be performed on the first or last vial unless the respective **First Vial – Rinse Vial** or **Last Vial – Rinse Vial** checkbox is ticked.

**After Flush** is the time delay in seconds that the system waits after the syringe has flushed the sample from the injection system back into the vial. Valid values range from 0 to 100 seconds.

Longer delays ensure that more viscous solvents or solutions are completely flushed back into the the vial.

**After Fill** is the time delay in seconds that the system waits after the syringe has drawn the sample from the vial. Valid values range from 0 to 100 seconds.

Longer delays allow the more viscous solvents or solutions sufficient time to completely fill the injection loop, enabling more reproducible injections. At elevated temperatures, shorter delay times should be employed to prevent the vial being emptied.

**Equilibrating** is the time delay in minutes that the system waits once the vial has been lifted into the oven and before the sample is drawn into the injection loop. Valid values range from 0 to 60 minutes.

**Sample Run Time** is the time limit for analysis. Valid values range from 1 to 999 minutes.

Guideline run times for using 30 cm PLgel columns at 1 mL/min are as follows:

- 1 column – 12 min (35 min)
- 2 columns – 25 min (50 min)
- 3 columns – 36 min (65 min)
- 4 columns – 50 min (80 min)

The times shown in parentheses are for when an Agilent 1260 Infinity II High Temperature Viscometer (G7821B) is used. The additional run time allows for the delay peak to elute before injection of the next sample. Add an additional 5 minutes to the values above if a guard column is being used.



Selecting the **Idle After Sequence** checkbox will cause the system to switch to IDLE mode on completion of the sequence.

**Syringe Speed** is the speed that the sample is drawn from or flushed to the vial.

**NOTE**

The range of speeds available for selection is dependent upon the oven's set Run Temperature.

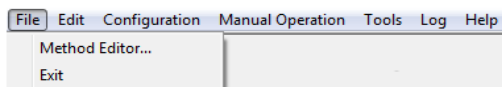
---

**# Injections** refers to the number of injections per sample vial. Valid values range from 1 to 10.

## Methods

As an alternative to editing each of the module configurations one by one, all the control parameters can be viewed, edited and saved as a named method by using the **Method Editor**.

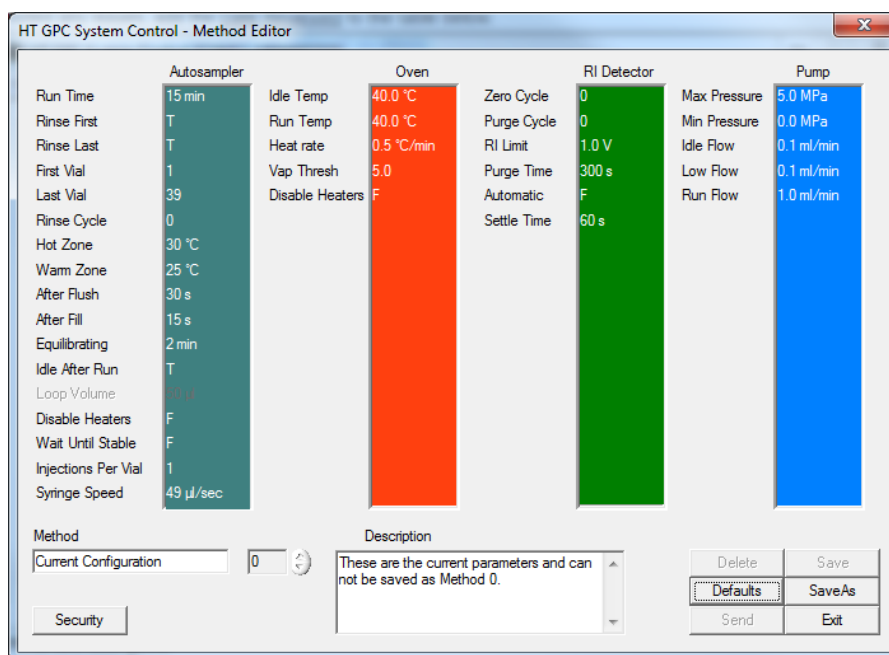
The Method Editor is accessed from the main **File Menu**.



**Figure 12** File Menu

[Figure 13](#) (below) shows the Method Editor view. This versatile editor gives the user access to all the instrument settings on one screen and allows new methods to be saved or stored methods to be recalled. To change any of the settings, simply highlight the parameter you wish to change and type in the new value. Some of the entries require a T (true) or F (false) indicating the status. To save a method, click on the **Save** button to overwrite the current method or **Save As** to define a new method. Each method is given a name (up to 30 characters long), a number and a description (up to 100 characters). To use any of the stored methods, select it and once it is displayed in the editor click on the **Send** button. The instrument parameters displayed in the editor will only be downloaded to the instrument when the **Send** button has been pressed.

The **Defaults** button restores the default conditions to the screen from which you may wish to start your custom method. The default method contains the typical conditions for Tetrahydrofuran at 40 °C with one PLgel 30 cm column.



**Figure 13** Method Editor

The **Security** button opens the Security dialog, which allows the user to change the level of security offered by the Control Software.

## Security

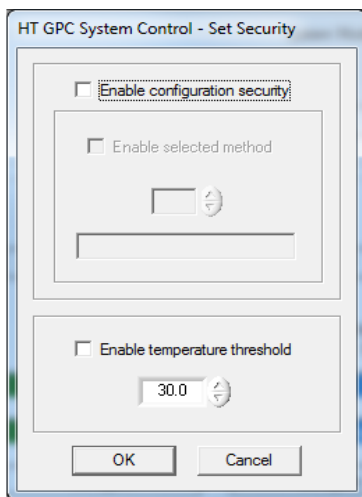
It is possible to enable or disable access rights to total instrument control or just a single operational method. The available security options offer a type of 'super user' approach to control over the configuration of system parameters. The level of security depends on the extent to which the 'super user' wishes to safeguard system integrity.

### NOTE

If the password has not yet been set, you must follow the steps outlined in [Changing the Password](#).

## 4 Using the Module Security

The security options can be accessed from the main control view by choosing **Security Options...** in the **Tools > Security** menu. Access to the dialog is password protected. Entering the correct password results in the following dialog:



Check **Enable Configuration Security** to disable the Send button in all Module Configuration Editors. This will prohibit any change to the instrument's operational parameters unless the Enable Selected Method option is used.

Check **Enable Selected Method** to enable access to a selected method. The selected method will be available to a user to update the instrument's configuration.

### NOTE

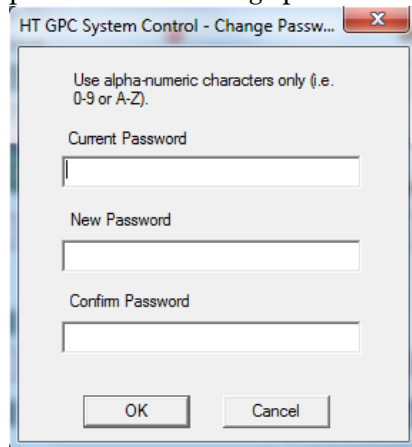
This option will be disabled unless a method has been created in the Method Editor.

To choose a method, click on the up/down button or enter your choice of method in the **Method Number** edit box. As you select the methods available to you, the name that was saved with that method will appear in the text box to assist in identification. Use the up and down arrows to select the method(s) to enable.

Check **Enable Temperature Threshold** to restrict the upper temperature of the oven. This is particularly useful when a UV cell is installed in the instrument since in this case the oven can not be operated above 150°C.

## Changing the Password

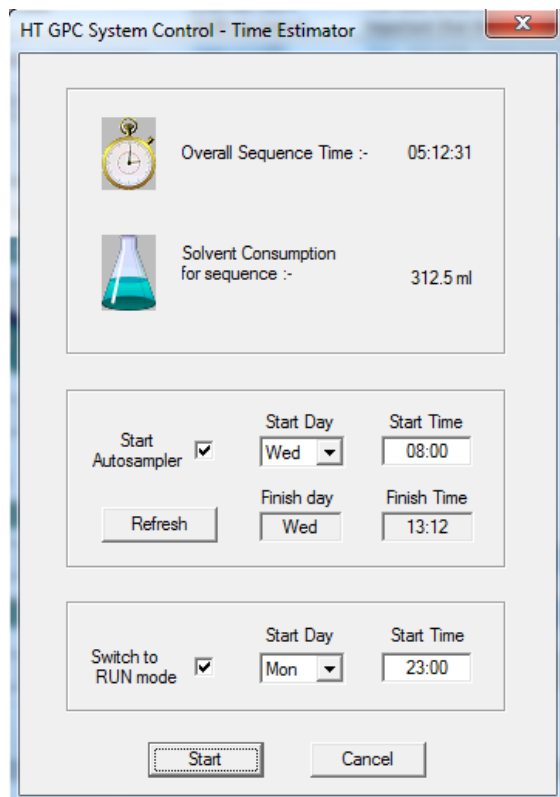
Under the **Tools > Security** menu you will find a **Change Password** option from which the default password can be replaced with a user's personal password. The change password dialog is shown below:

**NOTE**

The default password is "password" (without quotes).

## Time Estimator

The Time Estimator provides facilities for estimating times related to the configured injection sequence, as well as providing automation options.



The **Overall Sequence Time** displays an estimated duration of the injection sequence using the current system configuration. This calculation assumes that the autosampler sequence will commence immediately once the autosampler has been switched on-line.

The **Solvent Consumption** displays the estimated solvent consumption during the injection sequence. The solvent consumption assumes pump operation at Run Flow Rate for the entire autosampler sequence.

Checking the **Start Autosampler** checkbox will configure the Control Software to switch the autosampler on-line at the specified time.

**NOTE**

If the **Start Autosampler** checkbox is selected, the software will disable Automatic RI conditioning and enable Idle After Sequence. This is necessary to ensure correct operation of the autosampler's automatic start facility.

---

The **Start Autosampler's Start Day** refers to the day to start the injection sequence. Click the arrow button to choose a day.

The **Start Autosampler's Start Time** refers to the time to start the sample run on the specified **Start Day**. The time is entered according to the 24 hour format.

Pressing the **Refresh** button calculates an *estimated Finish Day* and **Finish Time** based on the current system configuration and the entered **Start Day** and **Start Time**.

Checking the **Switch to RUN mode** checkbox will configure the Control Software to switch the system to RUN mode from either STANDBY or IDLE mode at the specified **Start Time** on the **Start Day**.

The **Switch to RUN mode's Start Day** refers to the day to switch the system to RUN mode. Click the arrow button to choose a day.

The **Switch to RUN mode's Start Time** refers to the time at which the system will be switched to RUN mode on the specified **Start Day**. The time is entered according to the 24 hour format.

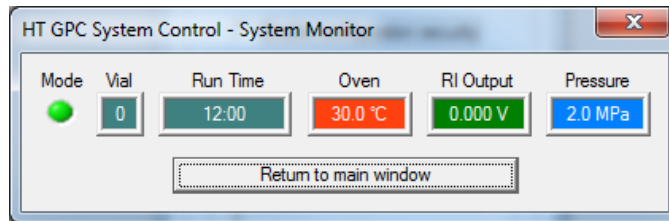
Press the **Start** button to start the automation. This minimises the main window, leaving the Time Estimator dialog displayed.

## 4 Using the Module

### System Monitor

# System Monitor

The System Monitor offers a minimised view of the Control Software – only displaying essential instrumentation. This allows the user to continue viewing the status of the HT GPC System while using another software package for data collection.





## Setting Up the System

### Starting the Instrument

- 1 Power on the Pump.
- 2 Ensure a capped vial is placed at position 0 in the carousel before powering up the instrument and the carousel is pushed fully in.
- 3 Switch on the main unit.

Wait for the system to boot up (~60 sec), before the system initializes. During the initialization process, the instrument will perform the following tests:

- Test the buzzer
- Initialize the pump
- Initialize the oven
- Initialize the autosampler
  - Find zero vial
  - Raise vial into the oven
  - Purge the syringe
  - Lower the vial
  - Reset the syringe to the mid position
- Toggle the injection valve 3-4 times

When the initialization process has completed, the instrument will be left in the last used operational mode.

- 4 Launch the Instrument Control software from the control PC.
- 5 Using the Control Software, switch the instrument to STANDBY mode
- 6 Replace the barrel connector with a restriction capillary.
- 7 Flush the entire system with the solvent required. See [“Introducing Solvent to the System”](#) on page 45.

#### NOTE

When changing between two immiscible solvents, intermediary solvent(s) should be used that are fully miscible with the chromatography solvents used.

## Introducing Solvent to the System

**Preparations** Instrument is running.

- 1 Place the solvent line fitted with sinter into the solvent reservoir.
- 2 Open the purge valve on the front of the pump (turn counter-clockwise) and allow the solvent to flow from the pump purge valve into the waste container.
- 3 To assist the flow through the pump switch the pump flow on at ~2.0 – 4.0 mL/min. This is achieved by setting the Idle flow to the flow required and selecting **PUMP ON** in the Manual Operation menu.
- 4 Continue pumping through the pump purge outlet until the lines from the solvent reservoir to the degasser, the degasser lines and the pump inlet line are all free of air and full of the new solvent.

### NOTE

The solvent is passed through the degasser, thus allow at least 20 – 25 mL of solvent needs to pass through the pump before the solvent delivery system is fully purged. It is recommended that the pump is purged for ~5 min at 4.0 mL/min to ensure that the online degasser and pump is totally flushed with the new solvent.

- 5 Turn off the pump to stop the flow through the system and adjust the Idle flow rate to 1.0 mL/min.
- 6 Close the purge valve on the pump head and again manually turn on the pump to flush solvent through the remainder of the instrument.

### NOTE

Ensure that the waste line is placed into the waste container.

- 7 Flush the system for ~20 min at 1.0 mL/min.
- 8 Using the Control software, open the DRI purge valve and set the PURGE time to 20 min (1200 sec).

### NOTE

If a purge column is installed ensure that the flow from the injection valve is capped while the system is in purge so that the flow is forced into the reference side of the RI cell.

- 9 If a viscometer is fitted, additional flushing of the viscometer pressure transducers is required - see the G7821B HT-Viscometer manual.
- 10 Once the system is totally flushed into the desired chromatography solvent:
  - a Turn off the pump.
  - b Close the DRI purge valve.
  - c Connect in the column set.

**NOTE**

Before turning on the pump to flush the columns ensure the IDLE flow is set at a rate <0.3 mL/min.

---

## Running the High Temperature GPC System

- 1 Using the Control software set following parameters as required:
  - Oven temperature
  - Vapor sensor threshold
  - Pump flow rateTypically, 1 mL/min is used for the RUN flow rate and 0.2 mL/min for the IDLE and LOW flow rates.

### WARNING

**Fire, explosion.**

**The oven temperature set point must be at least 10 °C lower than the solvent boiling point.**

---

- 2 Set the oven temperature cut-out on the front panel of the instrument to 5 °C above the set oven temperature.
- 3 In the oven, remove the barrel connector and install the columns.

### NOTE

If the columns are not already in the solvent that is to be used as eluent they need to be transferred as indicated by the manufacturer. Do not flush the columns through the detectors, simply flush the columns directly to waste.

---

- 4 After installing the columns in the required solvent, manually turn the pump on.  
Ensure there are no leaks from any connections.
- 5 Stop the flow and close both the inner and the outer oven lids.
- 6 Put the instrument into RUN mode.  
Wait for the oven to stabilize at the Run temperature and Run flow rate to be established.
- 7 Purge the DRI reference cell via the Control software for at least 20 min.  
Once the DRI baseline has settled after purging the instrument is ready to use.

## Changing Columns

### Preparations

System is in RUN mode.

- 1 Change the Idle and Low flow rates to 0.2 mL/min and the Idle temperature to 40 °C.
- 2 Put the instrument into IDLE mode and allow the oven cool. Oven temperature is at 40 °C.
- 3 Put the instrument into STANDBY mode and open the oven lids.
- 4 If the new columns are already in the required solvent, simply replace the old columns with the new columns.

OR

If a column solvent transfer is required, carry this out per the manufacturer's instructions.

- 5 Manually start the flow to check for leaks. Ensure that there are no leaks.
- 6 Close both the inner and outer oven lids and set the instrument to Run mode.

Wait until:

- The instrument is maintaining the oven temperature.
- The flow is at the Run flow rate.

- 7 Purge the DRI reference cell for at least 20 min using the Control software. Once the DRI baseline has settled after purging, the instrument is ready to use.

## Changing Solvents

### Preparations

System is in RUN mode.

- 1** Change the Idle and Low flow rates to 0.2 mL/min and the Idle temperature to 40 °C.
- 2** Put the instrument into IDLE mode and let the oven cool.  
Only continue if oven is at 40 °C.
- 3** Put the instrument into STANDBY mode and open the oven lids.
- 4** Remove the columns from the system and replace with a barrel connector.
- 5** Replace the solvent reservoir with the new solvent or if an intermediary solvent is required please use (Acetone).
- 6** Continue with following procedure: [“Introducing Solvent”](#) on page 45.

## Changing the Injection Loop

### Preparations

The column is in RUN mode.

- 1 Change the Idle and Low flow rates to 0.2 mL/min and the Idle temperature to 40 °C.
- 2 Put the instrument into IDLE mode and let the oven cool. Only continue if oven is at 40 °C.
- 3 Put the instrument into STANDBY mode and open the oven lids.
- 4 Replace the injection loop with the new loop size.
- 5 Continue with following procedure: [“Running the High Temperature GPC System”](#) on page 47.

## Running Samples

### Setting up the Autosampler Sequence

#### Preparations

- Start the log file to monitor the condition of the instrument during operation.
- Ensure that there is sufficient eluent to carry out the analysis (you can use the **time estimator** tool on the Control software once you have defined the autosampler sequence).
- Ensure that there is sufficient capacity in the waste container.

- 1 Open the Autosampler Configuration in the control software.
- 2 Set the first and last vials in the autosampler sequence.  
You will see the image of the carousel update with yellow sample vials.
- 3 Select any vial positions that you wish to be rinse vials.  
On the carousel image, you will see the rinse vials turn blue.

#### NOTE

Rinse vials contain only solvent and so can be used to *flush* the injection system.

- 4 Set an equilibration time as required.
- 5 Set the syringe speed. Typically, this is set at the second highest setting.
- 6 Set the **hot** and **warm** zone temperatures.
- 7 If you wish the instrument to go into IDLE mode after the autosampler sequence has finished, tick the **Idle after sequence** box (remember to check the Idle flow rates and Idle oven temperature settings).
- 8 Set the Run time, typically, the same as the data collection time.

#### NOTE

If you are using a viscometer, remember to add time to the Runtime to ensure that the negative DP peak arising from the flushing of the delay volume in the viscometer bridge elutes before data collection of the next sample in the sequence commences.

- 9 Click the **Send** button to update the instrument with the new autosampler settings.
- 10 Adjust the autosampler over temperature cut out to 10-20 °C above the hot zone temperature.
- 11 Wait 15 min to ensure that the autosampler has reached the required operating temperatures.



## Loading the Samples

### Preparations

- Start the log file to monitor the condition of the instrument during operation.
- Ensure that there is sufficient eluent to carry out the analysis (you can use the **time estimator** tool on the Control software once you have defined the autosampler sequence).
- Ensure that there is sufficient capacity in the waste container.

- 1** Pull out the autosampler carousel drawer.
- 2** Load the autosampler carousel with the sample and rinse vials in the appropriate vial positions.
- 3** Firmly push the autosampler carousel drawer back into position. You will hear an audible *click* as the autosampler fits into place.
- 4** Ensure that the data collection software you are using is ready to collect and the sequence run list has been defined (remember data will not be collected for rinse vials).
- 5** On the autosampler area of the Control software, click the **Autosampler Offline** button.  
This will now change to **Autosampler Online** and the sequence will begin. You can follow the status of the run sequence in the software.
- 6** At any time, you can stop the autosampler sequence by clicking the **Autosampler Online** button.  
The software will then prompt you to select a new start vial if the sequence is restarted.

## Solvent Recommendations

Any solvent that is intended for use with the High-Temperature GPC system should be thoroughly degassed, filtered (0.45  $\mu\text{m}$ ) and fully compatible with the column(s).

Only volatile mobile phase additives can be used with the G7826A HT-ELSD.

The ambient temperature must be above the melting point of the selected GPC solvent before operating the 1260 High Temperature GPC system. For example, the ambient temperature must exceed 19°C for 1,2,4-trichlorobenzene before the solvent can be pumped through the 1260 Infinity II HT GPC system

### WARNING

**Do not use solvents with auto-ignition temperatures <190°C with the HT GPC System**

**Table 7** Auto-ignition temperatures of common GPC solvents with ELS detection

Solvent	Auto-ignition Temperature (°C)
DMSO	215
Dibutoxymethane	220
Tetrahydrofuran	321
Dimethylformamide	445
Toluene	480
Acetone	465
1,2,4 Trichlorobenzene (TCB)	570
m-Cresol	558
Chloronaphthalene	558

## Sample Preparation

Samples containing particulate matter should be filtered through a 0.45  $\mu\text{m}$  filter prior to injection.

## Column Considerations

If an HT-ELS detector is connected to the HT GPC system, it will detect all non-volatile components in the mobile phase, which includes column-packing material. Column packing material will become chemically and mechanically broken down over the lifetime of the column, causing particles to enter the ELSD. This column “shedding” will lead to extremely high baseline.

## Leak and Waste Handling

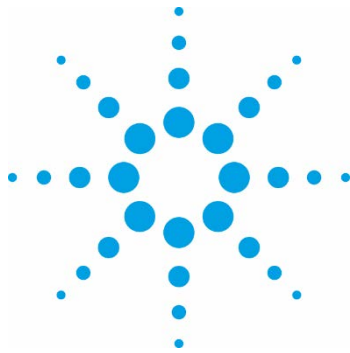
### WARNING

**Toxic, flammable and hazardous solvents, samples and reagents**  
**The handling of solvents, samples and reagents can hold health and safety risks.**

- When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.
- Do not use solvents with an auto-ignition temperature below 270 °C (518 °F). Do not use solvents with a boiling point below 56 °C (133 °F).
- Avoid high Vapor concentrations. Always keep the temperature in the sample compartment at least 25 K below the boiling point of the solvent used.
- Do not operate the instrument in an explosive atmosphere.
- Reduce the volume of substances to the minimum required for the analysis.
- Ground the waste container.
- Regularly check the filling level of the waste container. The residual free volume in the waste container must be large enough to collect the waste liquid.
- To achieve maximal safety, regularly check the tubing for correct installation.

### NOTE

For details on the usage guideline of solvent, refer to the Agilent Information Center or via the Internet.



## 5 Troubleshooting and Diagnostics

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    Oven Temperature Control Problems 75

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    Chromatography Problems 75

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



## Diagnostics

To enable the user to check the status of sensors while operating the instrument, the diagnostic screen is available from the **Tools > Utility** menu. The diagnostic utility consists of three tabbed views:

**AS General Status** displays the autosampler status

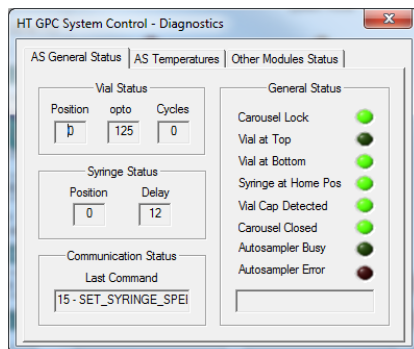


Figure 14 Autosampler General Status

**AS Temperatures** displays the autosampler temperatures

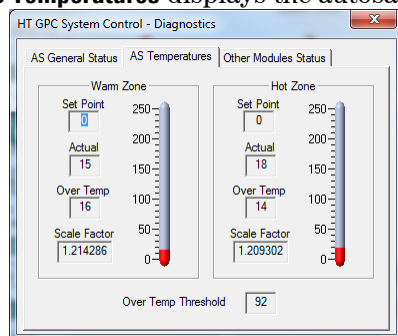


Figure 15 Autosampler Temperatures

- **Other Modules Status** displays the other instrument functions

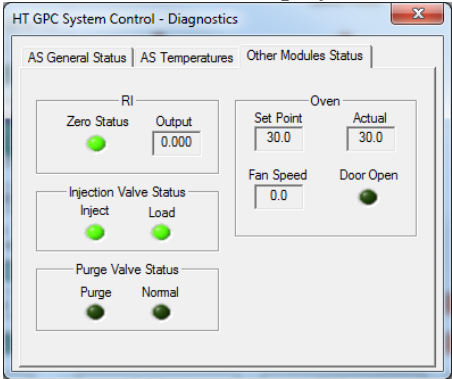
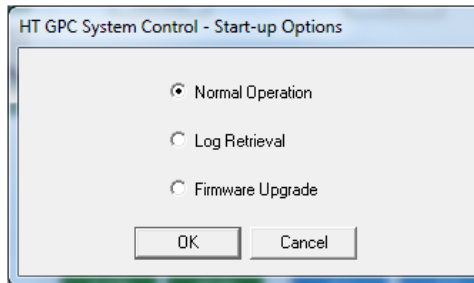


Figure 16 Other Modules Status

## Start-up Options

This dialog provides access to start-up options for retrieving logs or performing firmware upgrades. The HT GPC System will enter the selected mode on the next start-up.

Select the required option, then press OK.



Option	Function
Normal Operation	The system starts up normally.
Log Retrieval	The system starts up in a mode capable of retrieving system logs.
Firmware Upgrade	The system starts up in a mode capable of performing a firmware upgrade.

### NOTE

If the HT GPC System starts up in Log Retrieval or Firmware Upgrade mode, it will return to the Normal Operation mode once power cycled.



# General Troubleshooting Guide

## Boot Up Problems

- No power
  - If the power indicator, power switch or display panel are not illuminated, check the fuses at the rear of the control drawer.
- Fails to initialize pump
  - Check that the pump power switch is turned on.
  - Check the power cable is securely fitted to the rear of the pump.
  - Check the pump LAN and HT GPC Pump Stop Cable connected correctly to both the rear of the pump and the back of the Control drawer.
- Injection valve failure
  - Check that the Link cables on the rear of the Control drawer are connected correctly.
  - If problem persists, please contact your local Agilent service representative.
- Autosampler general error
  - Observe initialization sequence for autosampler:
    - Lower vial if lift not at bottom
    - Move syringe to position 1 (max suction)
    - Rotate carousel to Vial 0 position
    - Check that a vial is present
    - Raise vial
    - Move syringe to position 3 (max blow)
    - Wait 30 s
    - Lower vial
    - Move syringe to position 2 (middle)

### NOTE

If all steps appear to succeed, it is probably only a transient problem.  
**If not, note which step fails. See 60 for corrective actions.**

- If none of the above steps occur:
  - Ensure +5 V is present by observing the rotation of stirrer magnet.
  - Ensure +12 V is present by observing the rotation of ventilation fans in the baseplate.

## **Autosampler Problems**

Please contact your local Agilent service representative.

## **RI Problems**

- Fails to autozero correctly
  - Purge the RI thoroughly.
  - Check the purge column is not blocked (if fitted), by observing a significant decrease in system pressure when the purge valve opens.
- Low sensitivity
  - Clean the RI cell. Please contact your local Agilent service representative

## Oven Temperature Control Problems

- Fails to heat
  - Check the over temperature cut-out has not tripped. It should be set about 5 °C above operating temperature.
- Temperature unstable
  - Check that the oven fan is rotating at high speed. The speed of the fan is recorded in the Service Engineer mode. Please contact your local Agilent service representative.
  - Check that the oven lid is fully closed and seals properly.
  - Check that the power line voltage is not below 200 V. Please contact your local Agilent service representative
  - Check that the ambient temperature above 10 °C.
  - Ensure that the stability of power line voltage and ambient temperature. Please contact your local Agilent service representative
  - Protect the unit from draughts.

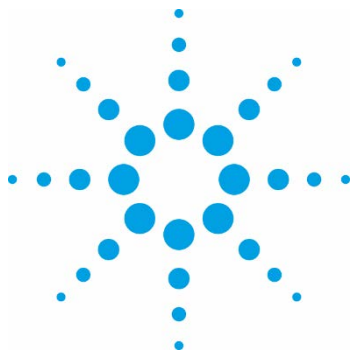
## Pump Problems

- High back pressure generated at pump
  - Replace the purge frit
- Low flow rate
  - Purge pump to remove air bubbles
  - Please contact your local Agilent service representative to check the valves

## Chromatography Problems

- RI baseline drift
  - Allow sufficient time for the system to equilibrate at temperature (8 hrs is usually enough).
  - Ensure that the oven temperature remains stable (see [“Oven Temperature Control Problems”](#) on page 61).
  - Check that the pump flow rate / back pressure is constant.
  - Check all plumbing connections between the Purge valve outlet and RI Reference inlet.

- Check that the RI cell is not cracked.
- RI baseline noise
  - Purge the Pump head to clear air from the Check Valves.
  - Purge the RI Reference thoroughly to remove any air bubbles.
  - Check for presence of pump noise. Clean or replace check valves if necessary. The pump pressure is continually monitored when the Logging is turned on and the pressure history can be viewed in the log table or plotted graphically – see the **Log** menu in the graphical user interface.
  - Replace inline filter element.
- Small or Non-Reproducible peaks
  - Check that the vials are filled to shoulder.
  - Inspect Valco valve seal for scoring and wear. May also see solvent drips on the outside of vials.
  - Check all autosampler tubing connections for leaks.
  - Check that the autosampler needle is not blocked. Please contact your local Agilent service representative
  - Check that the syringe peak nut adaptor not leaking.
- Long retention times
  - Check the pump flow rate.
  - Check for a leak on the Purge valve.
- Mirrored peaks
  - Ensure that the purge valve is closed.
  - Inspect the RI cell for cracks, particularly in partition. Please contact your local Agilent service representative



## 6 Error Information

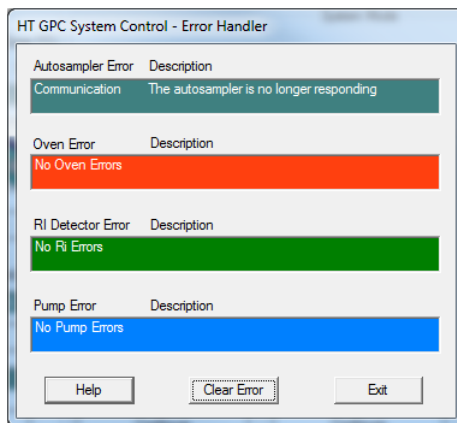
System Errors 78

Pump General Error Messages 82

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

## System Errors

If an error occurs on the system, the error handling will generate a dialog similar to that shown below with a description of the error.



**Figure 17** Error Handling Dialog

Errors can be categorized as two types:

- **Warnings**  
Warning messages simply display the appropriate dialog and the Error indicator on the front panel is flashed orange. Depending on the severity of the warning, in addition, the buzzer may be sounded.
- **Errors**  
Errors display the appropriate dialog the error indicator is flashed red and the beeper is sounded. The buzzer will sound and the depending on the severity, the system may also enter Standby mode to render the system safe.

When an error occurs, pressing the help button on the error dialog will open the help file at the troubleshooting section giving further instructions on how to overcome the error reported.

Details of the errors reported and the remedial actions are tabulated below.

The error will also be written to the error log file, which can be viewed by selecting the **View Error Log...** option from the **Log** menu.

**Table 3** Error overview

Type	GUI Error Message	Conditions	Response Time (Timeout, Retries)	LED	Beeper	Resulting Mode	Notes
<b>Oven</b>							
TEMPERATURE	"Oven temperature has become unstable"	Temperature setpoint reached, however subsequently increased to > 5 °C above setpoint	- (-,-)	Flash Red	NO	-	Not STBY
FAN	"The fan is no longer operating correctly"	Frequency < 10 kHz	5 s (5 s)	Flash Red	YES	STBY	
DOOR	"Illegal opening of the oven door has occurred"	I/O state change	- (-,-)	Flash Orange	YES	-	Heaters OFF while door open
V/F	"Temperature sensor is not responding correctly"	Temp = 0 °C	- (-,-)	Flash Red	YES	STBY	
SENSOR	"The vapour sensor is not responding correctly"	Open/Short circuit	5 s (5 s)	Flash Red	YES	STBY	
OVEN VAPOUR	"Spillage may have occurred within the oven"	Voltage < set threshold	- (-, -)	Flash Orange	YES	-	
			2 min (-, -)	Flash Red	YES	STBY	

## 6 Error Information

### System Errors

**Table 3** Error overview

Type	GUI Error Message	Conditions	Response Time (Timeout, Retries)	LED	Beeper	Resulting Mode	Notes
<b>RI</b>							
AZFAIL	"Attempts to autozero the RI failed"	Timeout or False haveZero	20 min (10 min, 2)	Flash Orange	NO	-	Not while initializing.  Injection sequence is aborted.
PURGE	"The purge valve is not functioning correctly"	Timeout	5 s (5 s)	Flash Orange	NO	-	Not while initializing.  Injection sequence is aborted.
<b>Autosampler</b>							
INITIALIZATION	"Failed to initialize autosampler"	Command failed (response from autosampler)	- (-, 0)	Flash Red	NO	-	
MOVE	"Failed to move carousel correctly"		- (-, 3)	Flash Red	NO	-	
VIALLOWER	"Failed to lower vial from the oven"		- (-, 0)	Flash Red	NO	-	
VIALLIFT	"Failed to lift vial from the carousel"		- (-, 0)	Flash Red	NO	-	
SYRINGE	"Failed to move syringe"		- (-, 0)	Flash Red	NO	-	
LOAD	"Failed to switch valve to load position"		- (-, 3)	Flash Red	NO	-	
INJ	"Failed to switch valve to inject position"		- (-, 3)	Flash Red	NO	-	



**Table 3** Error overview

Type	GUI Error Message	Conditions	Response Time (Timeout, Retries)	LED	Beeper	Resulting Mode	Notes
CAROUSEL LOCK	"Failed to lock carousel after being closed"	Command failed during autosampler run	- (-, 0)	Flash Red	NO	-	
AUTOCOMMS	"The autosampler is no longer responding"	Packet errors/ no ACK response from autosampler	1.5 s (500 ms, 3)	Flash Red	NO		
		no command success response	variable, (variable, 0)	Flash Red	NO		
<b>Pump</b>							
PUMPCOMMSERR	"The pump is no longer responding."	No response, or invalid response from pump.	~30s (~10s, 3)	Flash Red	YES	STANDBY	
PUMPBADTYPEID	"Pump has wrong type id"	Pump is not of the type G7110B.	- (-, -)	Flash Red	YES	STANDBY	
PUMPERRCODE	<i>An error code, along with an appropriate message. The message will vary based on the error code.</i>	Pump is in an error state.	- (-, -)	Flash Red	YES	STANDBY	See <a href="#">Pump General Error Messages</a> and <a href="#">Pump Module Error Messages</a>
SEQABORTPUMP RDY	"Pump became not ready. See error log."	Pump became not-ready while the autosampler was running an injection sequence.	- (-, -)	Flash Orange	YES		Injection sequence is aborted.

## Pump General Error Messages

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

### Timeout

**Error ID: 0062**

The timeout threshold was exceeded.

**Probable cause**

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

**Suggested actions**

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

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

## Shutdown

**Error ID: 0063**

An external instrument has generated a shutdown signal on the remote line. The module continually monitors the remote input connectors for status signals. A LOW signal input on pin 4 of the remote connector generates the error message.

**Probable cause**

**Suggested actions**

- |   |   |
|---|---|
| <p><b>1</b> Leak detected in another module with a CAN connection to the system.</p>            | Fix the leak in the external instrument before restarting the module.   |
| <p><b>2</b> Leak detected in an external instrument with a remote connection to the system.</p> | Fix the leak in the external instrument before restarting the module.   |
| <p><b>3</b> Shut-down in an external instrument with a remote connection to the system.</p>     | Check external instruments for a shut-down condition.   |
| <p><b>4</b> The degasser failed to generate sufficient vacuum for solvent degassing.</p>        | Check the vacuum degasser for an error condition. Refer to the <i>Service Manual</i> for the degasser or the pump that has the degasser built-in. |

## Remote Timeout

**Error ID: 0070**

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

**Probable cause**

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

**Suggested actions**

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

## Lost CAN Partner

**Error ID: 0071**

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

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

**Probable cause**

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

**Suggested actions**

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

## Leak

**Error ID: 0064**

A leak was detected in the module.

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

**Probable cause**

**Suggested actions**

- |   |  |
|---|--|
| 1 Loose fittings.   | Ensure all fittings are tight.   |
| 2 Broken capillary.   | Exchange defective capillaries.  |
| 3 Loose or leaking purge valve, inlet valve, or outlet valve. | Ensure pump components are seated correctly. If there are still signs of a leak, exchange the appropriate seal (purge valve, inlet valve, outlet valve). |
| 4 Defective pump seals.                                       | Exchange the pump seals.   |

## Leak Sensor Open

**Error ID: 0083**

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

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

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

## Leak Sensor Short

**Error ID: 0082**

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

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

<b>Probable cause</b>	<b>Suggested actions</b>
1 Defective leak sensor.	Please contact your Agilent service representative.
2 Leak sensor incorrectly routed, being pinched by a metal component.	Please contact your Agilent service representative.
3 Power switch assembly defective	Please contact your Agilent service representative.

## Compensation Sensor Open

**Error ID: 0081**

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

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

**Probable cause**

- 1 Loose connection between the power switch board and the main board
- 2 Defective power switch assembly

**Suggested actions**

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

## Compensation Sensor Short

**Error ID: 0080**

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

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

**Probable cause**

- 1 Defective power switch assembly
- 2 Loose connection between the power switch board and the main board

**Suggested actions**

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

## Fan Failed

**Error ID: 0068**

The cooling fan in the module has failed.

The hall sensor on the fan shaft is used by the main board to monitor the fan speed. If the fan speed falls below a certain limit for a certain length of time, the error message is generated.

This limit is given by 2 revolutions/second for longer than 5 seconds.

Depending on the module, assemblies (e.g. the lamp in the detector) are turned off to assure that the module does not overheat inside.

**Probable cause**

- 1 Fan cable disconnected
- 2 Defective fan.
- 3 Defective main board.

**Suggested actions**

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

## Open Cover

**Error ID: 0205**

The top foam has been removed.

The sensor on the main board detects when the top foam is in place. If the foam is removed, the fan is switched off, and the error message is generated.

**Probable cause**

- 1 The top foam was removed during operation.
- 2 Foam not activating the sensor.
- 3 Defective sensor or main board.
- 4 Rear of the module is exposed to strong direct sunlight.

**Suggested actions**

- Please contact your Agilent service representative.
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.
- Ensure that the rear of module is not directly exposed to strong sunlight.



## Cover Violation

**Error ID: 7461**

The top foam has been removed.

The sensor on the main board detects when the top foam is in place. If the foam is removed while the lamps are on (or if an attempt is made to switch on for example the lamps with the foam removed), the lamps are switched off, and the error message is generated.

**Probable cause**

- 1 The top foam was removed during operation.
- 2 Foam not activating the sensor.

**Suggested actions**

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

## ERI Messages

**Error ID: 11120 (+5 V) , 11121 (+25 V)**

The ERI (Enhanced Remote Interface) provides two error events related to over current situations on the +5 V and +24 V lines.

**Probable cause**

- 1 The load on the ERI is too high.

**Suggested actions**

- Reduce the load.

## Pump Module Error Messages

These errors are pump specific.

### Solvent Zero Counter

**Error ID: 2055, 2524**

Pump firmware version A.02.32 and higher allow to set solvent bottle fillings in the data system. If the volume level in the bottle falls below the specified value the error message appears when the feature is configured accordingly.

**Probable cause**

- 1 Volume in bottle below specified volume.
- 2 Incorrect setting.

**Suggested actions**

- Refill bottles and reset solvent counters.
- Make sure the limits are set correctly.

### Pressure Above Upper Limit

**Error ID: 2014, 2500**

The system pressure has exceeded the upper pressure limit.

**Probable cause**

- 1 Upper pressure limit set too low.
- 2 Blockage in the flowpath (after the damper).
- 3 Defective damper.
- 4 Defective main board.

**Suggested actions**

- Ensure the upper pressure limit is set to a value suitable for the analysis.
- Check for blockage in the flow path. The following components are particularly subject to blockage: inline filter frit, needle (autosampler), seat capillary (autosampler), sample loop (autosampler), column frits and capillaries with small internal diameters (e.g. 50  $\mu\text{m}$  ID).
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

## Pressure Below Lower Limit

**Error ID: 2015, 2501**

The system pressure has fallen below the lower pressure limit.

**Probable cause**

- 1 Lower pressure limit set too high.
- 2 Air bubbles in the mobile phase.
- 3 Leak.

**Suggested actions**

- Ensure the lower pressure limit is set to a value suitable for the analysis.
- Make sure that the degasser is in flow path and works correctly. Purge the module.
- Ensure solvent inlet filters are not blocked.
- Inspect the pump head, capillaries and fittings for signs of a leak.
- Purge the module. Run a pressure test to determine whether the seals or other module components are defective.

## Pressure Signal Missing

**Error ID: 2016**

The pressure signal of the damper is missing.

The pressure signal of the damper must be within a specific voltage range. If the pressure signal is missing, the processor detects a voltage of approximately -120 mV across the damper connector.

**Probable cause**

- 1 Damper disconnected.
- 2 Defective damper.

**Suggested actions**

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

## MCGV Fuse

**Error ID: 2043**

**Valve Fuse 0:** Channels A and B

**Valve Fuse 1:** Channels C and D

The gradient valve in the quaternary pump has drawn excessive current causing the electronic fuse to open.

### Probable cause

- 1 Defective gradient valve.
- 2 Defective connection cable (front panel to main board).
- 3 Defective main board.

### Suggested actions

- Restart the quaternary pump. If the error message appears again, exchange the gradient valve.
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

## AIV Fuse

**Error ID: 2044**

The active-inlet valve in the module has drawn excessive current causing the inlet-valve electronic fuse to open.

### Probable cause

- 1 Defective active inlet valve.
- 2 Defective connection cable (front panel to main board).
- 3 Defective main board

### Suggested actions

- Restart the module. If the error message appears again, exchange the active inlet valve
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

## Valve Failed (MCGV)

**Error ID:** 2040

**Valve 0 Failed:** valve A

**Valve 1 Failed:** valve B

**Valve 2 Failed:** valve C

**Valve 3 Failed:** valve D

One of the valves of the multi-channel gradient valve has failed to switch correctly.

The processor monitors the valve voltage before and after each switching cycle. If the voltages are outside expected limits, the error message is generated.

### Probable cause

### Suggested actions

- |   |  |
|---|--|
| <p><b>1</b> Gradient valve disconnected.</p>                        | <p>Ensure the gradient valve is connected correctly.</p>   |
| <p><b>2</b> Connection cable (inside instrument) not connected.</p> | <p>Please contact your Agilent service representative.</p> |
| <p><b>3</b> Connection cable (inside instrument) defective.</p>     | <p>Please contact your Agilent service representative.</p> |
| <p><b>4</b> Gradient valve defective.</p>                           | <p>Exchange the gradient valve.</p>                        |

## Motor-Drive Power

**Error ID: 2041, 2042**

The current drawn by the pump motor exceeded the maximum limit. Blockages in the flow path are usually detected by the pressure sensor in the damper, which result in the pump switching off when the upper pressure limit is exceeded. If a blockage occurs before the damper, the pressure increase cannot be detected by the pressure sensor and the module will continue to pump. As pressure increases, the pump drive draws more current. When the current reaches the maximum limit, the module is switched off, and the error message is generated.

<b>Probable cause</b>	<b>Suggested actions</b>
<b>1</b> Flow path blockage in front of the damper.	Ensure the capillaries and frits between the pump head and damper inlet are free from blockage.
<b>2</b> Blocked (passive or active) inlet valve.	Exchange the (passive or active) inlet valve.
<b>3</b> Blocked outlet valve.	Exchange the outlet valve.
<b>4</b> High friction (partial mechanical blockage) in the pump drive assembly.	Remove the pump-head assembly. Ensure there is no mechanical blockage of the pump-head assembly or pump drive assembly.
<b>5</b> Defective pump drive assembly.	Please contact your Agilent service representative.
<b>6</b> Defective main board.	Please contact your Agilent service representative.

## Temperature Limit Exceeded

**Error ID: 2517**

The temperature of one of the motor-drive circuits is too high. The processor continually monitors the temperature of the drive circuits on the main board. If excessive current is being drawn for long periods, the temperature of the circuits increases. If the temperature exceeds the upper limit, the error message is generated.

**Probable cause**

- 1 High friction (partial mechanical blockage) in the pump drive assembly.
- 2 Partial blockage of the flowpath in front of the damper.
- 3 Defective pump drive assembly.
- 4 Defective main board.

**Suggested actions**

- Remove the pump-head assembly. Ensure there is no mechanical blockage of the pump-head assembly or pump drive assembly.
- Ensure the outlet valve is not blocked.
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

## Servo Restart Failed

**Error ID: 2201, 2211**

The pump motor in the module was unable to move into the correct position for restarting.

When the module is switched on, the first step is to switch on the C phase of the variable reluctance motor. The rotor should move to one of the C positions. The C position is required for the servo to be able to take control of the phase sequencing with the commutator. If the rotor is unable to move, or if the C position cannot be reached, the error message is generated.

**Probable cause**

- 1 Disconnected or defective cable.

**Suggested actions**

- Please contact your Agilent service representative.

## 6 Error Information

### Pump Module Error Messages

2	Blocked (passive or active) inlet valve.	Exchange the (passive or active) inlet valve.
3	Mechanical blockage of the module.	Remove the pump-head assembly. Ensure there is no mechanical blockage of the pump-head assembly or pump drive assembly.
4	Defective pump drive assembly.	Please contact your Agilent service representative.
5	Defective main board.	Please contact your Agilent service representative.

## Pump Head Missing

### Error ID: 2202, 2212

The pump-head end stop in the pump was not found.

When the pump restarts, the metering drive moves forward to the mechanical end stop. Normally, the end stop is reached within 20 s, indicated by an increase in motor current. If the end point is not found within 20 s, the error message is generated.

### Probable cause

- 1 Pump head not installed correctly (screws not secured, or pump head not seated correctly).
- 2 Broken piston.

### Suggested actions

- 1 Install the pump head correctly. Ensure nothing (e.g. capillary) is trapped between the pump head and body.
- 2 Exchange the piston.



## Index Limit

**Error ID: 2203, 2213**

The time required by the piston to reach the encoder index position was too short (pump).

During initialization, the first piston is moved to the mechanical stop. After reaching the mechanical stop, the piston reverses direction until the encoder index position is reached. If the index position is reached too fast, the error message is generated.

**Probable cause**

- 1 Irregular or sticking drive movement.
- 2 Defective pump drive assembly.

**Suggested actions**

- Remove the pump head, and examine the seals, pistons, and internal components for signs of wear, contamination or damage. Exchange components as required.
- Please contact your Agilent service representative.

## Index Adjustment

**Error ID: 2204, 2214**

The encoder index position in the module is out of adjustment. During initialization, the first piston is moved to the mechanical stop. After reaching the mechanical stop, the piston reverses direction until the encoder index position is reached. If the time to reach the index position is too long, the error message is generated.

**Probable cause**

- 1 Irregular or sticking drive movement.
- 2 Defective pump drive assembly.

**Suggested actions**

Remove the pump head, and examine the seals, pistons, and internal components for signs of wear, contamination or damage. Exchange components as required.

Please contact your Agilent service representative.

## Index Missing

**Error ID: 2205, 2215, 2505**

The encoder index position in the module was not found during initialization. During initialization, the first piston is moved to the mechanical stop. After reaching the mechanical stop, the piston reverses direction until the encoder index position is reached. If the index position is not recognized within a defined time, the error message is generated.

**Probable cause**

- 1 Disconnected or defective encoder cable.
- 2 Defective pump drive assembly

**Suggested actions**

Please contact your Agilent service representative.

Please contact your Agilent service representative.

## Initialization Failed

**Error ID: 2207, 2217**

The module failed to initialize successfully within the maximum time window. A maximum time is assigned for the complete pump-initialization cycle. If the time is exceeded before initialization is complete, the error message is generated.

**Probable cause**

- 1 Blocked (passive or active) inlet valve.
- 2 Defective pump drive assembly.
- 3 Defective main board.

**Suggested actions**

- Exchange the (passive or active) inlet valve.
- Please contact your Agilent service representative.
- Please contact your Agilent service representative.

## Wait Timeout

### Error ID: 2053

When running certain tests in the diagnostics mode or other special applications, the pump must wait for the pistons to reach a specific position, or must wait for a certain pressure or flow to be reached. Each action or state must be completed within the timeout period, otherwise the error message is generated.

Possible Reasons for a Wait Timeout:

- Pressure not reached.
- Pump channel A did not reach the delivery phase.
- Pump channel B did not reach the delivery phase.
- Pump channel A did not reach the take-in phase.
- Pump channel B did not reach the take-in phase.
- Solvent volume not delivered within the specified time.

### Probable cause

### Suggested actions

- |   |  |
|---|--|
| <b>1</b> Purge valve open.  | Ensure that purge valve is closed.   |
| <b>2</b> Leak at fittings, purge valve, active inlet valve, outlet valve or piston seals. | <ul style="list-style-type: none"><li>○ Ensure pump components are seated correctly. If there are still signs of a leak, exchange the appropriate seal (purge valve, active inlet valve, outlet valve, piston seal).</li><li>○ Exchange defective capillaries.</li></ul> |
| <b>3</b> Flow changed after starting test.  | Ensure correct operating condition for the special application in use.   |
| Defective pump drive assembly.  | Please contact your Agilent service representative.  |

## Degasser: signal fail

**Error ID: 2243**

The pump board gets no or wrong pressure signals from the built-in degasser.

Parameters:

0: ADC failure

1: ADC cannot convert pressure signal

2: Measured pressure out of range (negative or higher than 1021 hPa)

**Probable cause**

**Suggested actions**

- |   |   |
|---|---|
| 1 Degasser board defect, missing or not connected to the pump main board.   | Please contact your Agilent service representative. |
| 2 Degasser sensor defect or not connected to degasser board   | Please contact your Agilent service representative. |
| 3 If parameter is 0 and the LED on the degasser board blinks, it is probably because of a defect pump main board. | Please contact your Agilent service representative. |

## Degasser: limit not reached

**Error ID: 2244**

This error is thrown, if the degasser does not become ready after 8 min, i.e. is higher than 180 mbar.

**Probable cause**

**Suggested actions**

- |                                       |   |
|---------------------------------------|---|
| 1 Liquid in degasser tubing.          | Please contact your Agilent service representative. |
| 2 Leak in degasser tubing or chamber. | Please contact your Agilent service representative. |
| 3 Degasser vacuum pump defect.        | Please contact your Agilent service representative. |

## SSV Protection circuit triggered

**Error ID: 2049**

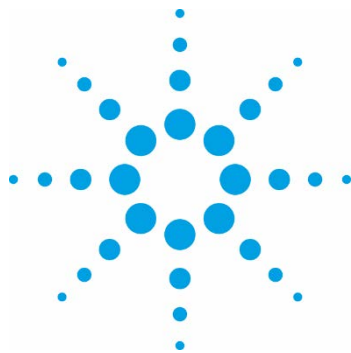
The protection circuit of SSV has switched OFF the valve. During initialization, the processor checks the presence of the SSV connector. If a defective valve or a wrong connection is detected the error message is generated.

**Probable cause**

- 1 Wrong valve connected.
- 2 Defective Solvent Selection Valve.
- 3 Defective main board

**Suggested actions**

- Check if the correct valve is connected to the correct port.
- Change the Solvent Selection Valve.
- Contact your Agilent service representative.



## 7 Maintenance

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This chapter provides general information on maintenance of the Agilent 1260 Infinity II HT GPC System.



## **Introduction**

To ensure long safe and trouble free operation of your instrument we recommend to inspect the system periodically. The instrument is designed to be a low maintenance instrument and does not generally require regular service. For your convenience, an annual inspection is offered as part of our preventative service contract. Please contact your local office or agent for information about purchasing the preventive service option.



## Warnings and Cautions

### WARNING

#### **Toxic, flammable and hazardous solvents, samples and reagents**

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

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

### WARNING

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

- Do not remove the instrument control drawer.
  - Only certified persons are authorized to carry out repairs inside the module.
- 

### WARNING

#### **Fire and damage to the module due to use of the wrong fuses**

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

**WARNING**

**Burns**  
**Touching hot parts may cause burns.**  
→ Allow any hot parts to cool.

---

**WARNING**

**Fire, electrical shock, burns and damage to the instrument**  
**Moisture inside the instrument or on connectors is an electrical safety hazard.**  
**Touching the connectors may bend the pins and therefore damage the instrument. Hot parts are accessible in maintenance area.**  
→ Switch instrument off, disconnect both power cords and allow any hot parts to cool before undertaking any cleaning or maintenance procedures.  
→ Ensure that no moisture enters the instrument.  
→ Do not attempt to clean any connectors.

---

**WARNING**

**Personal injury or damage to the product**  
**Agilent is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent product user guides, or use of the products in violation of applicable laws, rules or regulations.**  
→ Use your Agilent products only in the manner described in the Agilent product user guides.

---

**CAUTION**

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

---

## Cleaning

**WARNING**

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

- Do not use an excessively damp cloth during cleaning.
  - Allow the instrument to dry off completely before reconnecting power.
- 

- 1 Moisten a soft cloth with diluted detergent solution.
- 2 Wipe down the exterior of the instrument.
- 3 Moisten a soft cloth with deionized water.
- 4 Wipe down the exterior of the instrument.
- 5 Allow the instrument to dry off completely before reconnecting power.

## Decontamination

### WARNING

#### Intoxication

**Potentially hazardous liquid spilt in the instrument.**

→ Wear appropriate personal protective equipment (gloves, safety glasses, lab coat and respirator if the level of hazard has been risk-to-be sufficiently high).

---

### NOTE

To be carried out only by trained service personnel.

---

- 1 Excess quantities of solvent spilt on or inside the instrument should be mopped up using absorbent cloths, followed by repeated wiping down with soft cloths moistened with acetone until the last traces of the hazardous liquid have been removed.
- 2 Identify and, if possible, correct the source of the leak.
- 3 Inspect cabling, parts and surfaces to determine whether any damage has occurred.
- 4 Allow the instrument to dry completely before reconnecting power.
- 5 Dispose of contaminated waste appropriately.

## Testing Overtemperature Protection Systems

The oven and autosampler are fitted with independent over temperature protection systems to eliminate potential hazards due to failure of their respective temperature controllers. The limits of the oven and autosampler protection can be adjusted by the user

The overtemperature protection systems for the modules should be tested regularly:

- Oven
- Autosampler

## Oven Overtemperature Protection Test

### Preparations

This test can be carried out at any operating temperature above 40 °C.

If the instrument is at room temperature then it will be necessary to heat the oven. To heat the oven:

- 1 Set the oven temperature to 40 °C and the heat rate to 0.5 °C/min.
- 2 Disable the autosampler heaters.
- 3 Put the instrument into RUN mode or IDLE mode (using a suitable solvent e.g. acetone) and wait for the oven temperature to stabilize.

- 1 Use a trim pot adjuster to reduce the setting on the oven over temperature display (on the right hand side of the front panel) until the value is 5 °C less than the actual oven temperature (displayed on the center of the front panel).

A loud audible alarm will sound and the decimal points on the over temperature display will flash. The power to the oven heaters and any transfer line connected is now interrupted. Do not press the **reset** button until the test is completed.

### NOTE

If the alarm does not sound: first check that the above procedure has been followed correctly.

If the procedure has been carried out correctly but no alarm sounds, disconnect both power cords from the instrument and contact your local Agilent Service Department.

- 2 Wait until the displayed oven temperature falls in order to verify correct operation of the protection system.

### NOTE

If the displayed oven temperature shows no decrease after 30 min while the alarm is sounding then switch the instrument off, disconnect both power cords and call your local Agilent Service Department.

- 3 Once oven cooling has been verified, adjust the over temperature display to 5 °C above the oven set point and press the **reset** button to silence the alarm.

This concludes the oven over temperature protection system test.

## Autosampler Overtemperature Protection Test

### Preparations

If the instrument is at room temperature, it will be necessary to heat both zones of the autosampler to 50 °C. This test can be carried out at higher temperatures but the warm and hot zones must both be at the same temperature, between 50 °C and 130 °C, before commencing the test.

The 1260 Infinity II HT GPC System must be in RUN mode for this test. Remove all sample vials except Vial0 if necessary.

### Warm Zone

- 1 Adjust the autosampler over temperature display setting (located on the left hand side of the front panel) to 4 – 6 °C higher than the current warm zone set point (shown on the Control software screen)
- 2 Increase the warm zone set point by 20 °C.
- 3 Wait a few seconds for the warm zone to heat up.  
A loud audible alarm will sound. The power to the autosampler heaters is now interrupted.
- 4 Wait at least three minutes for the warm zone to cool before pressing and holding the **reset** button.
- 5 Note the initial value on the over temperature display while the **reset** button is held.  
This indicates the actual warm zone temperature, which should initially be at or below the over temperature set point before rising quickly.
- 6 If the initial value shown is close to the warm zone set point, then the protection system is not functioning correctly.

### NOTE

Disconnect both power cords from the instrument and call your local Agilent Service Department for assistance.

OR

Once warm zone cooling has been verified then adjust the over temperature display to 4 – 6 °C above the present warm zone set point and press the **reset** button to silence the alarm.

- 7 Wait a few minutes for the warm zone temperature to stabilize before proceeding with the hot zone over temperature test below.

**Hot Zone**

- 1 Ensure the over temperature display has been set to a value 4 – 6 °C above the warm zone set point.
- 2 Increase the hot zone set point to 20 °C above the warm zone set point.
- 3 Wait a little while for the hot zone to heat up.  
A loud audible alarm will sound. The power to the autosampler heaters is now interrupted.
- 4 Wait at least two minutes for the hot zone to cool before pressing and holding the **reset** button.
- 5 Note the initial value on the over temperature display while the **reset** button is held.  
This indicates the higher of the two zone temperatures, which should initially be at or below the over temperature set point before rising quickly.
- 6 If the initial value shown is close to the hot zone set point, then the protection system is not functioning correctly.

**NOTE**

Disconnect both power cords from the instrument and call your local Agilent Service Department for assistance.

OR

Once hot zone cooling has been verified then adjust the over temperature display to 4 – 6 °C above the present hot zone set point and press the **reset** button to silence the alarm.

This concludes the autosampler over temperature protection system test.



## Testing Vapor Sensors

The vapor sensors are tested by simulating a solvent leak or spillage within the System.

### Oven Vapor Sensor Test

#### Parts required

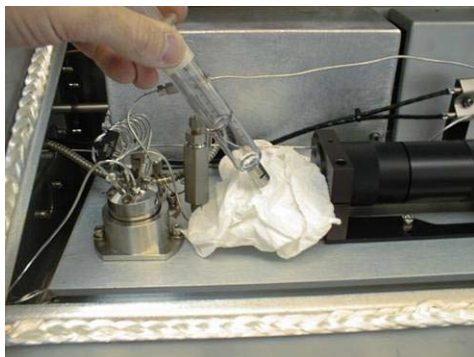
#### Description

Absorbent paper (crumpled into a loose ball)  
Acetone  
Syringe

#### Preparations

Switch ON the system and set it to IDLE mode with the oven temperature set to 40° C.

- 1 Heat the oven to 40 °C in IDLE or RUN mode with a pump flow rate of 0.5 mL/min.
- 2 Check the vapor sensor threshold is set to 5.0 (in the oven configuration window)
- 3 Set the instrument to STANDBY mode (click **OK** to confirm).
- 4 Open the outer and inner oven lids and place the paper on the floor of the oven near the RI, *far away from the spiral heater and fan.*
- 5 Squirt 5.0 mL of acetone onto the paper and immediately close both lids.



## 7 Maintenance

### Testing Vapor Sensors

- 6** Set the instrument to IDLE mode.  
After a short period, the oven module alarm will sound and a vapor error notification will appear in the Control software.
- 7** Wait for two minutes with the alarm sounding, then check that the solvent flow has stopped by watching for drips from the return tube.
- 8** If the alarm condition does not occur or if the pump flow has not stopped after three minutes, then switch off and disconnect the power cords from both units (oven and pump module).

#### NOTE

Contact your local Agilent Service Department for assistance.

---

- 9** Open the oven and remove the paper. Dispose of it appropriately.
  - 10** Leave the oven open for one minute to allow the acetone vapour to disperse.
  - 11** Close both oven lids.
  - 12** Clear the error on the Control Software
- This concludes the oven vapour sensor test.

## Testing Oven Door Interlock

A safety interlock switch is fitted to the outer oven door to disable the heaters if the door is opened while the instrument is running.

- 1 Set the instrument to IDLE or RUN mode.
- 2 Open the outer oven door.

An audible alarm should sound immediately and an error notification should be displayed by the Control software.

### NOTE

If the alarm condition does not occur then switch off and disconnect the power cords from both units (oven and pump module). Contact your local Agilent Service Department for assistance.

---

This concludes the oven door interlock test.

## Laser Interlock Switch

Adjacent to the oven door interlock is a safety interlock switch which will turn off the laser in the light scattering detector (when installed) when the oven door is opened.

- 1 Check the connection of cable from the safety interlock switch to the interlock connection at the rear of the light scattering control box.

## Degasser Test

The online degassing built in unit part of the pump, and is designed to remove dissolved gas from the solvent. The dissolved gas is removed from the solvent through a membrane (thin wall PTFE tubing) inside a vacuum chamber.

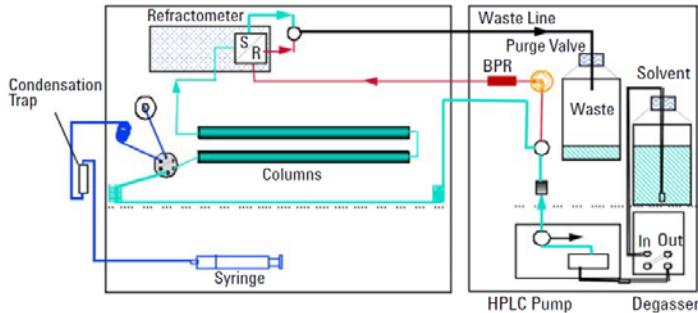
If there are any problems with the built-in Degasser, the pump will report an error code to the Control Software.

## Back Pressure Regulator (BPR)

### Replace the Back Pressure Regulator (BPR)

The BPR is located inside the flow inlet compartment and is designed to provide a small backpressure (75 psi) on the purge line, when the purge valve is open so that flow is maintained in the analytical columns during a purge. Therefore, when the purge valve is opened, the solvent flow is split between the chromatography columns and the reference side of the RI cell maintaining flow through the column during the purge cycle. To ensure optimum performance of the chromatography columns, it is important to maintain flow through the columns at all times when operating at high temperature.

The purge valve is operated from the software and can be opened either manually or automatically programmed as part of the instrument set-up routine. During PURGE mode, the backpressure displayed will be that of the BPR and at all times should be less than the NORMAL operating pressure.



**Figure 18** Purge Valve Purge Mode and Solvent Flow

- 1 Turn off the solvent flow.
- 2 Locate the BPR inside the flow inlet compartment and remove it.

## **7 Maintenance**

### **Back Pressure Regulator (BPR)**

- 3** Fit the replacement BPR with the arrow in the direction of the flow, for example from right to left.
- 4** Turn on the flow and open the PURGE valve. Check the system backpressure and check for leaks at the joints disturbed.

## Differential Refractive Index Detector

The differential refractive index detector (DRI) is designed specifically for high temperature chromatography giving an excellent signal to noise ratio even at temperatures up to 220 °C. The light source and detectors are both external to the oven and only the optical bench is heated and maintained at the oven temperature.

In normal operation, very few problems are usual encountered with the DRI, since the tubing and cell are continually washed with solvent. However, to prevent contamination of the cell during the times when the system is not operated, we recommend that the system is flushed and stored in acetone or methanol. If the cell does become dirty, which will be manifested by a reduction in the chromatography performance and typically small peaks, we recommend the following sequence of maintenance to be carried out in order:

- 1 Purging the DRI Cell
- 2 Flushing the DRI Cell with a Cleaning Agent

## Purge the DRI Cell

The following problems are usually indicative that the reference cell in the DRI detector requires purging with fresh solvent:

- Drift on the baseline
  - Excessive noise on the baseline
  - Lack of sensitivity
- 1 In RUN mode open the purge valve by pressing the **PURGE** button.
  - 2 While in PURGE mode, enter the Pump configuration and increase the flow to 2.0 mL/min (if using a purge column).
  - 3 Allow the system to purge at 2.0 mL/min for 15 min, during which time the baseline can be monitored and should give a flat noise free baseline. If the baseline is off scale, press the **Autozero** button on the front panel.

### NOTE

At this point the PURGE light will go out and the Purge button will have to be pressed again once the RI has zeroed.

- 4 After approximately 15 min, reduce the FLOW back to the required operating flow (for example 1.0 mL/min) and wait for the pump flow rate to reach the set value.
- 5 Press the **Purge** button to close the purge valve.
- 6 Allow the system adequate time to settle after the purge.  
For high temperature applications, this settling time can be up to 8 hours.



## Flush the DRI Cell with a Cleaning Agent

### When

- Purging the reference side of the DRI cell does not cure the baseline noise or lack of sensitivity.
- Back pressure across the DRI is determined to be higher than normal

If no flow is achieved through the DRI system, this exercise would prove ineffective and the problem should be reported to Agilent.

### NOTE

The back pressure across the DRI system in THF at ambient temperature and at 1.0 mL/min is typically  $\leq 3$  bar.

### NOTE

The wettable parts in the DRI system are stainless steel, Hastalloy and quartz and thus the most effective cleaning is achieved by pumping a dilute solution of nitric acid (20 %) through the system.

### CAUTION

#### Damage to the tubing

Some instruments contain nickel tubing in the DRI flow path.

→ Do not flush instrument tubing containing nickel with nitric acid.

#### Flush the sample side of the cell

- 1 Connect the inlet tubing of the DRI directly to the injection valve outlet using the wide bore Parker barrel connector provided.
- 2 Switch on the pump and set the flow rate at 1.0 mL/min.

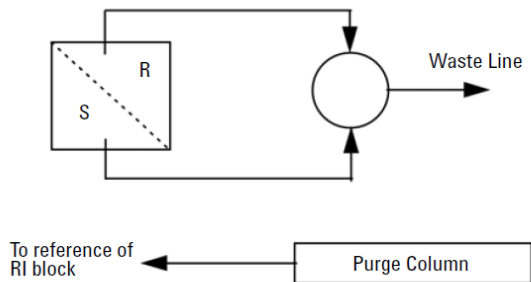
#### Flush the reference side of the cell

- 1 Remove the purge column and replace it with a wide bore barrel connector.
- 2 Blank off the outlet of the injection valve and open the purge valve.
- 3 Switch on the pump and set the flow rate at 1.0 mL/min.

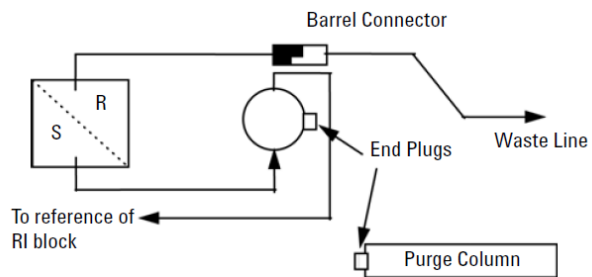
Alternatively both sides of the cell could be continually flushed by changing the plumbing from the conventional arrangement (Figure 19) to sample and reference in series (Figure 20).

## 7 Maintenance

### Differential Refractive Index Detector



**Figure 19** Conventional Plumbing



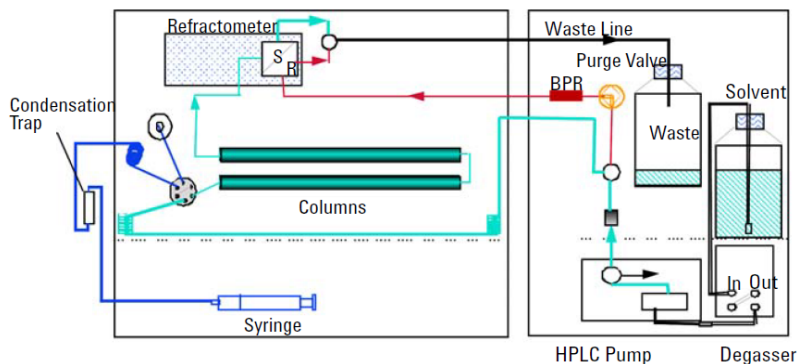
**Figure 20** Sample and Reference in Series for Continuous Flushing

## Autosampler

To ensure optimum performance of the autosampler system, it is recommended that the following important maintenance procedures be performed every 3 – 6 months depending on instrument usage.

### Cleaning the Condensing Chamber

The condensing chamber is located behind the front left hand panel of the unit, and is accessible once the side panel is removed. The condensing chamber is plumbed between the syringe and the needle (Figure 21 on page 99) and its purpose is to capture any solvent vapours extracted during injection and to prevent the condensed solvent from reaching the syringe.



**Figure 21** Plumbing diagram

- 1** Remove the left-hand side panel from the system main unit:
  - a** Lift the top section of the panel front and up and disconnect the earth cable from the panel.
  - b** Unscrew the clamping screw located at the rear and bottom of the lower panel, and the small x-head screw located in the Centre at the top.
  - c** Slide the panel forwards and tilt side ways to access the earth cable that should be disconnected from the panel.
- 2** Disconnect the condensing chamber from the attached tubing and remove from the instrument.
- 3** Wash the condensing chamber thoroughly with acetone and dry.
- 4** Replace the condensing chamber.
- 5** Replace the cable tie that holds the chamber in position.
- 6** Refit the side panel(s).

## Autosampler Track Lubrication

**Tools required**      **Description**

Tissue

Cotton bud (Q-tip®)

**Parts required**      **Description**

Acetone

Graphite powder

- 1** Pull out the carousel drawer and remove the carousel complete with all its vial holders.
- 2** With a piece of tissue paper moistened with acetone, wipe clean the entire track that the vial holders sit on.
- 3** Using a cotton bud (Q-tip®) sprinkle a small amount of graphite powder over the track.
- 4** Replace the carousel and return the drawer to its operating position.

## Autosampler Needle Removal, Cleaning and Replacement

The most common cause of poor, incomplete injection is blockage of the outer sheath of the A/S needle. Although injection needle design changes have largely removed this problem, it is still recommended that the needle is removed occasionally and checked and cleaned.

### Tools required

#### Description

1/4" - 5/16" wrench

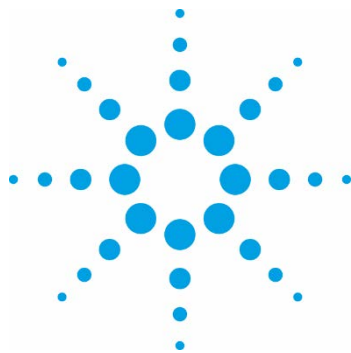
11 mm open-ended wrench

A hollow shaft 1/4 in nut spinner is preferable but not essential to remove and replace the needle

2 mm Allen key wrench

Allen wrench extender handle

- 1 Switch the system off and remove the mains lead from the back of the unit.
- 2 Open the oven compartment lid and locate the Autosampler needle assembly, positioned between the RI block and the Valco valve head assembly.
- 3 Using the 1/4 in wrench, undo the Valco nut connected to the top of the needle assembly. Prevent the needle assembly from rotating with an 11 mm wrench.
- 4 Remove the interconnecting capillary tubing and push to one side to ease access to the needle.
- 5 Unscrew the two M3 stainless steel socket cap head screws on the side and rear of the needle assembly.
- 6 Withdraw the A/S needle assembly vertically clear of the instrument.
- 7 Using a 1/4 in wrench (hollow open-ended nut spinner if available), unscrew the needle.
- 8 Inspect the outer sheath of the needle and remove any traces of septum blocking the orifice. If the needle is blocked or damaged replace with a new one.
- 9 Tighten the needle into the holder and carefully return the needle assembly in to the guide tube. Be careful not to bend the needle or get it caught up on the spring.
- 10 Holding the needle assembly firmly in position, tighten the two M3 stainless steel socket cap screws.
- 11 Reconnect the capillary tubing.
- 12 Reconnect the power lead(s) and the switch instrument ON



## 8 Parts for Maintenance

Accessory Kits 128

Parts List 129

Pump Spares 130

This chapter provides information on parts for maintenance.

## Accessory Kits

### Accessory Kit G7820-68050

The Accessory Kit contains the following items:

#	p/n	Description
1	IN4-32567	Ducting 4in Fibreflex
1	IN4-32620	Pot trim tool
1	IN4-32686	Jubilee Clip 120mm
1	IN4-32787	Grommet
1	SF1-24616	Injection Loop (200 $\mu$ L)
1	SF1-28164	Nema Mains Power Cord (10A)
1	G7820-60005	HT-GPC Trigger cable
1	G7820-60006	HT-GPC Pump Stop cable
1	PL1-24246	RID to DataStream Signal Cable



## Parts List

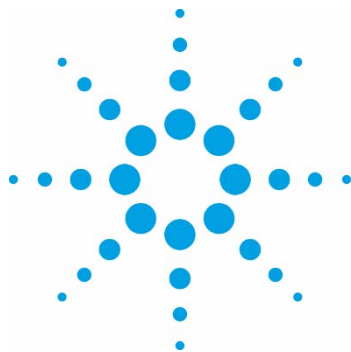
<b>p/n</b>	<b>Description</b>
PL0870-6110	Solvent reservoir filter
PL0800-0003	Injection valve rotor seal
PL4-32434	Replacement Inline filter cartridges
PL0810-0012	Autosampler needle (pk2)

## 8 Parts for Maintenance

### Pump Spares

# Pump Spares

<b>p/n</b>	<b>Description</b>
G1312-60061	Purge valve 1260
G4280-60036	Passive inlet valve
G1312-60025	Active inlet valve body, without cartridge
G1312-60020	Cartridge for active inlet valve 600 bar
G1312-60022	Outlet ball valve
5067-4728	Seal cap
5063-6586 (2x)	Sapphire piston
0905-1175 (2x)	Wash seal (PTFE)
01018-22707	PTFE frits (pack of 5)
5063-6589	Standard seals (pack of 2)
5001-3707	Gold seal, outlet
5062-8562	Active Inlet Valve Cartridge (400 bar)
5001-3708	AIV gold washer
01018-21207	AIV plastic cap
5062-2485 (2x)	Cap (pack of 4) 1 x pump outlet valve, 1 x pump purge valve



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

## General Safety Information

### Safety Symbols

**Table 4** Safety Symbols

Symbol	Description
	The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect risk of harm to the operator and to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.
	The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.

#### WARNING

##### A WARNING

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

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

#### CAUTION

##### A CAUTION

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

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

## General Safety Information

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

### **WARNING**

**Ensure the proper usage of the equipment.**

**The protection provided by the equipment may be impaired.**

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

---

## Safety Standards

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

## Operation

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

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

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

Some adjustments described in the manual, are made with power supplied to the instrument, and protective covers removed. Energy available at many points may, if contacted, result in personal injury. Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided whenever possible. When inevitable, this has to be carried out by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present. Do not replace components with power cable connected.

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

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

Capacitors inside the instrument may still be charged, even though the instrument has been disconnected from its source of supply. Dangerous voltages, capable of causing serious personal injury, are present in this instrument. Use extreme caution when handling, testing and adjusting. When working with solvents, observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet by the solvent vendor, especially when toxic or hazardous solvents are used.

## Precautions

### WARNING

#### **Fire, intoxication and damage to the instrument Hazardous material on or inside the instrument.**

- Do not use the instrument if material is spilt on or inside the instrument.
  - Carryout appropriate decontamination method recommended by Agilent Technologies.
  - If using methods not recommended by Agilent Technologies, check with Agilent Technologies that the method will not damage the instrument.
  - Perform periodic leak checks on all wetted components, tubing and joints.
  - Test the over temperature protection systems for the oven and
  - Do not allow flammable and/or toxic solvents to accumulate.
  - Follow recommended procedures and protocols for evacuation and disposal of flammable or toxic solvents. Never dispose of such products through municipal waste systems.
- 

The high-temperature GPC system is designed to control the temperature of the column oven and autosampler at temperatures up to 220 °C.

### WARNING

#### **Hot surfaces**

**The surface of the inner oven, autosampler and heated waste line will get extremely hot during normal operation (up to 220 °C).**

- Handle these components carefully.
  - Wear suitable protective gloves.
- 

Vapor sensors are used to alert the operator to solvent leaks.

**CAUTION**

Solvent vapors

Liberal use of organic solvents in close proximity to the instrument may activate the vapor sensors, causing the instrument to shutdown.

→ Exercise care when using solvents close to the instrument.

---

**CAUTION**

Insulation resistance test fails

The surge safe device causes the instrument to fail the insulation resistance test of the standard portable appliance test (PAT Test).

→ Unplug the surge safe device before the PAT test is performed.

---



# The Waste Electrical and Electronic Equipment Directive

## Abstract

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

### NOTE

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

Product Category:

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

---



### NOTE

Do not dispose off in domestic household waste  
To return unwanted products, contact your local Agilent office, or see [www.agilent.com](http://www.agilent.com) for more information.

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## Radio Interference

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

### Test and Measurement

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

## Sound Emission

### Manufacturer's Declaration

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

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

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

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## In This Book

This manual contains information on the Agilent 1260 Infinity II High-Temperature GPC System (G7820B)

The manual describes the following:

- General information,
- Introduction
- Site requirements
- Unpacking
- Using the module
- Troubleshooting and diagnostics
- Error information
- Maintenance
- Parts
- Safety information

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