



# **Agilent 1260 Infinity II High Temperature Viscometer**

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 covers the

- G7821B Agilent 1260 Infinity II High Temperature Viscometer Detector

### **1 Introduction to the High Temperature Viscometer**

This chapter gives an introduction to the Refractive Index Detector.

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

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

### **3 Troubleshooting and Diagnostics**

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

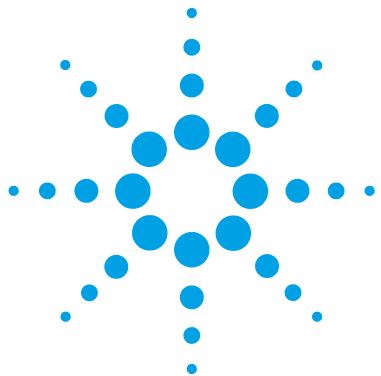
### **4 Maintenance and Repair**

This chapter provides general information on maintenance and repair of the detector.

### **5 Appendix**

This chapter provides safety and other general information





# 1

## Introduction to the High Temperature Viscometer

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## Introduction to the 1260 Infinity II High Temperature Viscometer

The Agilent High Temperature viscometer is based on the proven four-capillary design and is intended for online measurement of viscosity when integrated into the 1260 Infinity II High Temperature GPC system. The combination of refractive index (RI) and viscosity detection provides accurate molecular weight determination for all polymer types based on the universal principle, as well as valuable branching information not otherwise obtainable from a concentration detector alone.

Due to the four-capillary technology, the differential pressure (DP) signal is very stable against flow rate fluctuations. A continuous monitor of the pressure through the bridge network also provides a consistent reference of the flow system, the inlet pressure (IP). The instrument can be used in both a batch mode, which yields an average intrinsic viscosity, and a true gel permeation chromatography (GPC) mode, which yields a slice-by-slice intrinsic viscosity distribution. From the intrinsic viscosity and known retention volumes or known Mark-Houwink-Sakurada coefficients, the molecular weight as well as distribution of a polymer may be determined.

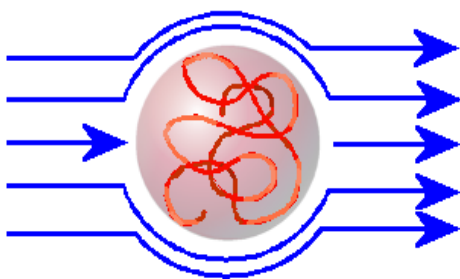
The Agilent high temperature viscometer consists of four components.

1. Precision-engineered 4-capillary bridge
2. High sensitivity pressure transducers
3. Electronic control module
4. Discrete 5V power supply module (PSU)

The viscometer bridge is located in the Agilent column oven. The pressure transducer assembly is housed in the temperature controlled solvent module of the Agilent High Temperature GPC system. The electronic control module, where the differential pressure (DP) and inlet pressure (IP) signals are obtained, is stand-alone and located alongside the GPC system.

## How the Detector Operates

When a polymer dissolves in a liquid, the interaction of the two components stimulates an increase in polymer dimensions over that of the unsolvated state. Due to the vast difference in size between solvent and solute, the frictional properties of the solvent in the mixture are drastically altered, and an increase in viscosity occurs which should reflect the size and shape of the dissolved solute, even in dilute solutions.



The dissolved polymer coil disturbs the linear flow of solvent, resulting in a resistance to flow, which is observed as an increase in viscosity.

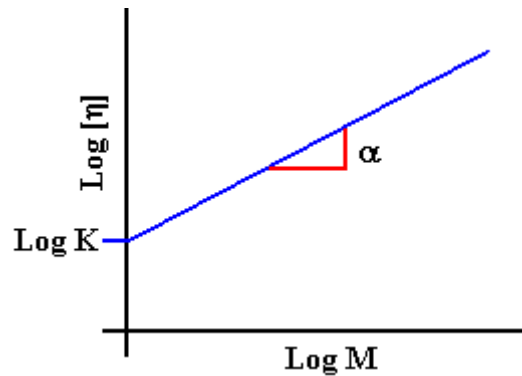
This was first recognized in 1930 by Staudinger, who found an empirical relation between relative magnitude of increase in viscosity and the molar mass of the polymer.

The Intrinsic viscosity  $[\eta]$  is a measure of the viscosity of a polymer solution, as the concentration tends to zero, i.e. at very low concentrations. It is this parameter, therefore that is a characteristic of isolated polymer chains in solution and can be considered to be proportional to the density of the polymer coil. For a given polymer and solvent system at a specified temperature,  $[\eta]$  can be related to molecular weight,  $M$ , through the Mark-Houwink-Sakurada equation.

$$[\eta] = KM^{\alpha}$$

Where  $K$  and  $\alpha$  are coefficients specific to the polymer, solvent system and temperature. These can be determined by calibrating with polymer standards of known molecular weights. A plot of  $\text{Log}(\eta)$  versus  $\text{Log}(M)$ , a Mark-Houwink-Sakurada plot, will be a straight line as long as the universal calibration is obeyed.

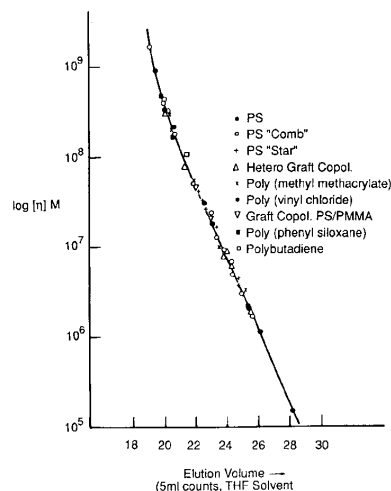
## Introduction to the High Temperature Viscometer



Values of  $\alpha$  reflect the size of the molecule in solution and for a random coil polymer, range between 0.5 for a polymer dissolved in a theta solvent to about 0.8 in a very good solvent.

## Universal Calibration

Benoit (1967) showed that polymers of different structure fall on the same calibration curve if the intrinsic viscosity is included as a calibration parameter. A calibration plot of the product of intrinsic viscosity and molecular weight ( $[\eta].M$ ) versus elution volume is a "universal calibration" as shown below in figure 3. This allows the system to be calibrated with polymer standards of one type and then analyze polymers of another type and still obtain accurate molecular weight distributions.



**Figure 3:** A universal Calibration plot

Therefore for an unknown polymer sample the universal calibration is used to convert the intrinsic viscosity, determined for each slice across the distribution from the viscometer, to molecular weight.

## Polymer Branching

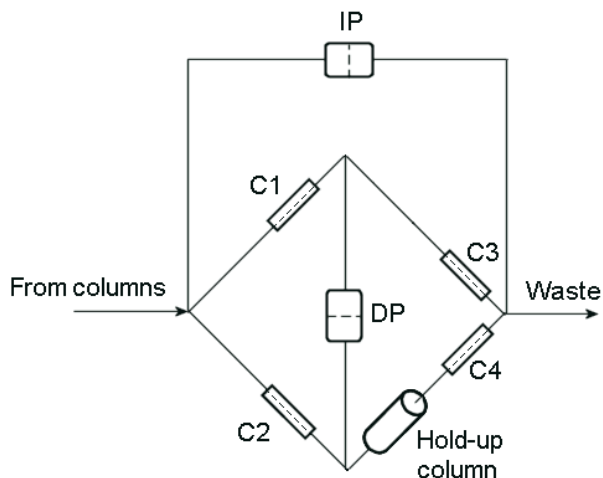
The determination of the degree of long chain branching has long occupied polymer chemists. In polymer solutions, the branching factor,  $g$ , is the starting point for many branching calculations

$$g = \left( \frac{[\eta_b]}{[\eta_l]} \right)^{1/\varepsilon}$$

Where  $\eta_b$  is the intrinsic viscosity of the branched polymer and  $\eta_l$  is the intrinsic viscosity of the linear polymer of the same molecular weight.  $\varepsilon$  is the structural model" parameter, which is user defined.

## Detection Principle

The Agilent 1260 High Temperature viscometer employs the fluid flow equivalent of the analogous wheatstone bridge electrical circuit. Solvent travels down a bridge of four capillaries of equal resistance arranged as shown in figure 4.



IP = Inlet pressure  
DP = Differential pressure

$$\text{Specific viscosity} = \frac{4DP}{IP - 2DP}$$

$$IV = \frac{\text{Specific viscosity}}{\text{Concentration}}$$

In the limit as conc. tends to zero

**Figure 4.** Plumbing Diagram of Agilent 1260 High Temperature Viscometer

The differential pressure transducer monitors the pressure drop across the bridge,  $\Delta P$ , and the inlet pressure transducer measures the pressure drop through the bridge,  $P_i$ . When the sample is introduced across capillary (C4) of the bridge, an imbalance is caused due to the hold-up columns. This change in pressure,  $\Delta P$  is proportional to the specific viscosity,  $\eta_{sp}$ , according to the following equation.

$$\eta_{sp} = \frac{4\Delta P}{P_i - 2\Delta P}$$

Where  $\Delta P$  is the differential pressure across the bridge and  $P_i$  is the pressure of the flow through the capillary bridge. The instrument makes a true differential measurement directly, making it very sensitive to dilute solution viscosity measurements. The intrinsic viscosity,  $[\eta]$  is ideally obtained by measuring the specific viscosity values at several finite concentrations and extrapolate to zero concentration.

$$[\eta] = \lim_{c \rightarrow 0} (\eta_{sp}/c)$$

However, the concentrations used in GPC are low enough for the equation to be valid over a typical chromatogram, and thus an extrapolation to the true intrinsic viscosity is not required, since the concentration is close enough to the limiting concentration.

All of the data acquisition and data processing are accomplished using the Agilent GPC-SEC software, which enables calculation of molecular weight and intrinsic viscosity distributions using algorithms for Universal Calibration.

Branching information can also be obtained.

## Using the Module

The 1260 High Temperature viscometer module is powered on and off using a mains power socket with the supplied 5V DC power supply unit and mains power cable. Switching this on provides power to the electronic control module. Confirmation of power on is provided when the output display on the module displays a value and one of the output display indicators is illuminated.

**NOTE**

Powering the control module off and on will reset the output offsets.

---

## Purging the Viscometer

To purge the inlet pressure (IP) and differential pressure (DP) transducers, ensure the solvent is flowing through the system. Then in the solvent module at the front right hand side of the compartment turn the knob labelled IP to *PURGE*.

The IP transducer and its connecting tubes will then be flushed through with solvent. After purging the IP transducer turn the IP knob to *RUN* and the knob labelled DP to *PURGE* this will switch the solvent flow so that the DP transducer and its connecting tubes are flushed with solvent.

After purging the DP transducer turn the DP knob to *RUN* this will switch the solvent flow back to normal operation, i.e. through the viscometer bridge.

**NOTE**

Purge the IP and DP transducers for at least 5 minutes, at a flow rate of 1.0 mL/min, or until the IP/DP meter shows a steady signal

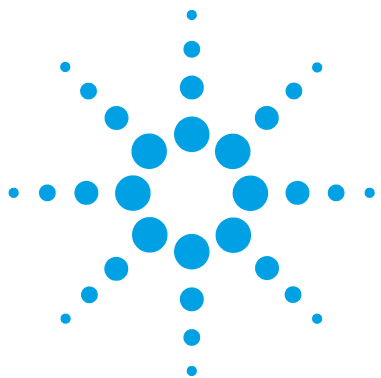
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**NOTE**

The waste line for the DP transducer is a permanent waste line found in the solvent module

---





## 2 Site Requirements and Specifications

|                            |    |
|----------------------------|----|
| Site Requirements          | 14 |
| Physical Specifications    | 17 |
| Performance Specifications | 18 |

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



## Site Requirements

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

### Power Considerations

The module power supply has wide ranging capability. It accepts any line voltage in the range described in [Table 1](#). Consequently there is no voltage selector in the rear of the module. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

#### **WARNING**

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

→ Connect your instrument to the specified line voltage only.

---

#### **WARNING**

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

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

→ Always unplug the power cable before opening the cover.

→ Do not connect the power cable to the instrument while the covers are removed.

---

#### **WARNING**

**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

Country-specific power cords are available for the module. The female end of all power cords is identical. It plugs into the power-input socket at the rear. The male end of each power cord is different and designed to match the wall socket of a particular country or region.

Agilent makes sure that your instrument is shipped with the power cord that is suitable for your particular country or region.

### **WARNING**

#### **Absence of ground connection**

**The absence of ground connection can lead to electric shock or short circuit.**

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

### **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 a power cord other than the one that Agilent shipped with this instrument.
- Never use the power cords that Agilent Technologies supplies with this instrument for any other equipment.
- Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

### **WARNING**

#### **Power cords**

**Solvents may damage electrical cables.**

- Prevent electrical cables from getting in contact with solvents.
- Exchange electrical cables after contact with solvents.

## Bench Space

The module dimensions and weight (see [Table 1](#)) allow you to place the module on a bench next to the 1260 Infinity II HT GPC System. It needs an additional 2.5 cm (1.0 inches) of space on either side and approximately 8 cm (3.1 inches) in the rear for air circulation and electric connections.

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

The module should be operated in a horizontal position.

## Environment

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

ASTM drift tests require a temperature less than 2 °C/hour (3.6 F/hour) over one hour period. Our published drift specification (refer also to “[Performance Specifications](#)” on page 18) is based on these conditions. Larger ambient temperature changes will result in larger drift.

Drift performance depends on control of the temperature environment fluctuations. To realize the highest performance, minimize the frequency and the amplitude of the temperature changes to below 1 °C/hour (1.8 F/hour).

### CAUTION

Condensation within the module

Condensation can 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.

### NOTE

This module is designed to operate in a typical electromagnetic environment, i.e. where RF transmitters such as mobile telephones may not be used in close proximity.

## Physical Specifications

**Table 1** Physical Specifications

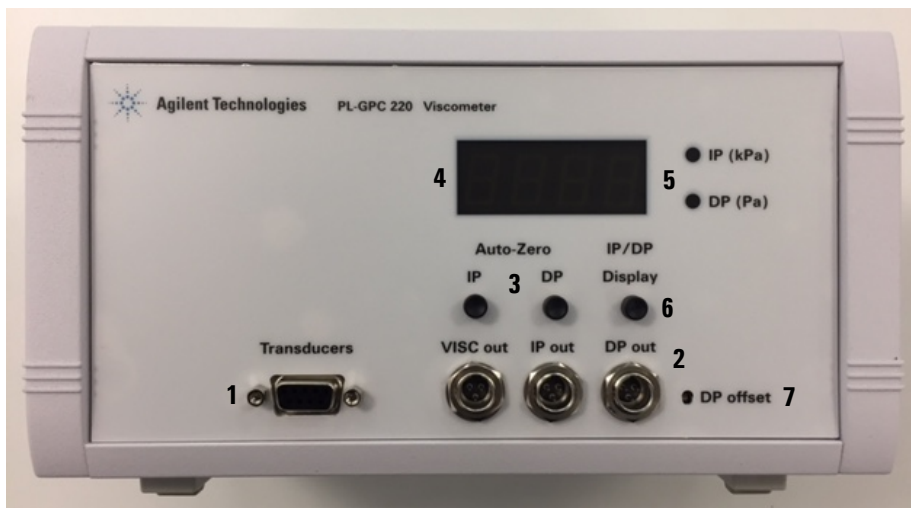
| Type                                   | Specification                                  | Comments               |
|----------------------------------------|------------------------------------------------|------------------------|
| Weight                                 | 7 kg (15.5 lbs)                                |                        |
| Dimensions<br>(height × width × depth) | 135 x 235 x 130 mm<br>(5.3 x 9.3 x 5.2 inches) |                        |
| Line voltage                           | 100 – 240 V~, ± 10<br>5V, (2.4A)               | Control unit<br>PSU    |
| Line frequency                         | 47 or 63 Hz, ± 5 %                             |                        |
| Power consumption                      | 70 W / 80 VA                                   |                        |
| Ambient operating<br>temperature       | 10–40 °C (50–104 °F)                           |                        |
| Ambient non-operating<br>temperature   | -40 – 70 °C (-40 – 158 °F)                     |                        |
| Humidity                               | < 80 % r.h. at 40 °C (104 °F)                  | Non-condensing         |
| Operating altitude                     | Up to 3000 m (9842 ft)                         |                        |
| Non-operating altitude                 | Up to 4600 m (15092 ft)                        | For storing the module |
| Safety standards:<br>IEC, EN, CSA, UL  | Installation category II, Pollution degree 2   | For indoor use only.   |
| ISM Classification                     | ISM Group 1 Class B                            | According to CISPR 11  |

# Performance Specifications

**Table 2** Agilent 1260 Infinity II High Temperature Viscometer (G7821B)  
Performance Specifications

| Type                         | Specification             | Comments  |
|------------------------------|---------------------------|-----------|
| Detection type               | Viscometer                |           |
| Linearity                    | 0.5% FS                   |           |
| Shear rate                   | $1 \cdot 10^{-5}$ Pa.s    |           |
| Baseline Noise               | <0.25mV                   | DP output |
| Baseline Drift               | <5mV                      |           |
| Capillary Dimensions         | 0.01 in. (id) x 24 in (l) |           |
| Output Differential Pressure | 1mV/Pa                    |           |
| Output Inlet Pressure        | 10mV/Pa                   |           |

## Installing the High Temperature Viscometer



**Figure 1.** Front View of the Electronic Control Module for the Agilent GPC220 Viscometer

1. Transducers cable connection port – Connects the DP and IP pressure transducers to the control module.
2. Viscometer analog outputs; 1V FSD – The viscometer analog outputs, DP, IP and Specific Viscosity (Visc).
3. DP and IP autozero buttons – Autozeros the DP and IP outputs. For the IP autozero button, the button needs to be pressed and held for a few seconds before the IP output is autozeroed.
4. DP/IP output display – Displays the DP/IP output.
5. DP/IP output display indicators – A red LED indicates which output is being displayed.
6. Toggle display button – Toggles the output display between the DP and IP outputs.
7. DP offset adjustment screw – Adjusts the DP zero offset by  $\pm 20$ Pa. To adjust the zero offset turn the screw.

## 2 Site Requirements and Specifications

The electronic control module for the Agilent High Temperature viscometer should be connected as follows.

1. Using the supplied transducer cable connect the 6 pin MIL-C connector end to the port on the right hand side panel of the Agilent GPC 220 instrument and the 9 pin D connector end to the port labelled "Transducers" on the control module.
2. Using the Detector output cables supplied, attach one end of the cables to the Ports labeled "DP out and IP out" on the front of the control module and the other ends to the Detector Input Channels (e.g. Channel 2 and 3) on the front of the 1260 Infinity II DataStream.

### NOTE

The Agilent Viscometer also has a Specific Viscosity output that is obtained from the "Visc out" port..

The specific Viscosity output cannot be used with Cirrus Multi

- 
3. Connect the supplied 5V DC power supply unit to the rear of the control module and connect the power supply unit to an earthed mains supply using the power cable provided.

### NOTE

Powering the control module off and on will reset the output offsets.

---

**NOTE**

The lengths of the inlet tubes are such as to obtain a flow split between the viscometer and RI of between 50-70%. See below for flow split ratio calculations.

## Flow Split Ratio Calculations

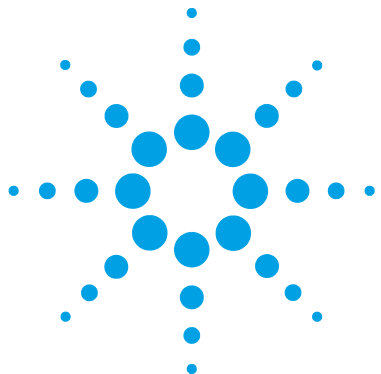
The flow split ratio is the ratio between the recorded inlet pressures (IP) from the viscometer with and without the RI detector connected in the system.

$$\text{Flow Split Ratio} = \frac{\text{IP}_{(\text{RI} + \text{Visc})}}{\text{IP}_{(\text{Visc Only})}} * 100$$

Therefore, if the flow split ratio were 60%, then 60% of the flow would be going through the viscometer, i.e. if running the system at 1ml/min then the flow through the viscometer would be 0.6ml/min.

## **2 Site Requirements and Specifications**

### **Installing the Detector**



## 3 Troubleshooting and Diagnostics

General Troubleshooting Guide [24](#)

This chapter gives an overview about troubleshooting the detector



## **General Troubleshooting Guide**

### **DP/IP Baseline Drift**

- Allow sufficient time for system to equilibrate.
- Ensure the instrument is located in a thermally stable environment.
- Degas solvent.
- Purge DP/IP transducers.
- Ensure laboratory temperature not changing dramatically.

### **DP/IP Baseline Noise**

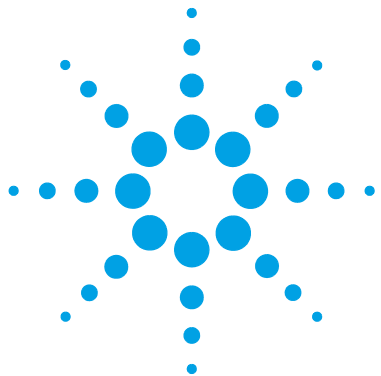
- Purge DP/IP transducers thoroughly to remove any air bubbles.
- Purge pump head to remove any air bubbles.
- Degas solvent.

### **Low Sensitivity**

- Purge DP/IP transducers. Check flow split.

### **Long Retention Times**

- Check pump flow rate. Check for leak on system.



## 4 Maintenance and Repair

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| Cleaning the Module           | 29  |
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This chapter provides general information on maintenance and repair of the detector.



## Introduction to Maintenance

The module is designed for easy maintenance. Maintenance can be done from the front with module in place in the system stack.

### NOTE

There are no serviceable parts inside.

Do not open the module.

---

## Warnings and Cautions

### WARNING

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

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

- Never perform any adjustment, maintenance or repair of the module with the top cover removed and with the power cord plugged in.
  - The security lever at the power input socket prevents that the module cover is taken off when line power is still connected. Never plug the power line back in when cover is removed.
- 

### WARNING

**Sharp metal edges**

**Sharp-edged parts of the equipment may cause injuries.**

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

### WARNING

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

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

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

#### CAUTION

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

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

#### 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 the Module

To keep the module case clean, use a soft cloth slightly dampened with water, or a solution of water and mild detergent.

### **WARNING**

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

- Do not use an excessively damp cloth during cleaning.
  - Drain all solvent lines before opening any connections in the flow path.
- 

## Storage of the Detector

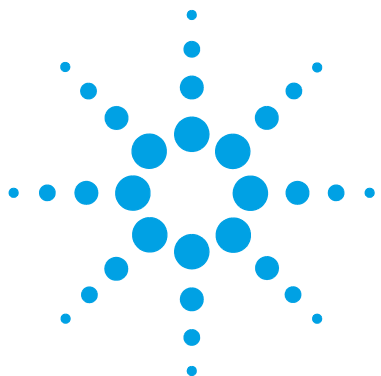
### **NOTE**

In case the detector is not used for some time (stored), then fill the flow cell (sample and reference side) with isopropanol.

---

## Overview of Maintenance Parts

| Part number | Description                  |
|-------------|------------------------------|
| PL0810-3076 | PL-GPC220 Delay Columns (x2) |



## 5 Appendix

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This chapter provides safety and other general information.



## General Safety Information

### General Safety Information

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

#### **WARNING**

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

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

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

---

### 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.

### General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

## Before Applying Power

### WARNING

#### Wrong voltage range, frequency or cabling

#### Personal injury or damage to the instrument

- Verify that the voltage range and frequency of your power distribution matches to the power specification of the individual instrument.
  - Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.
  - Make all connections to the unit before applying power.
- 

### NOTE

Note the instrument's external markings described under “[Safety Symbols](#)” on page 208.

---

## Ground the Instrument

### WARNING

#### Missing electrical ground

#### Electrical shock

- If your product is provided with a grounding type power plug, the instrument chassis and cover must be connected to an electrical ground to minimize shock hazard.
  - The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.
-

## Do Not Operate in an Explosive Atmosphere

### **WARNING**

**Presence of flammable gases or fumes**

**Explosion hazard**

- Do not operate the instrument in the presence of flammable gases or fumes.
- 

## Do Not Remove the Instrument Cover

### **WARNING**

**Instrument covers removed**

**Electrical shock**

- Do Not Remove the Instrument Cover
  - Only Agilent authorized personnel are allowed to remove instrument covers. Always disconnect the power cables and any external circuits before removing the instrument cover.
- 

## Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Sales and Service Office for service and repair to ensure that safety features are maintained.

## In Case of Damage

### **WARNING**

**Damage to the module**

**Personal injury (for example electrical shock, intoxication)**

- Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.
-

## Solvents

### 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.
- Never exceed the maximal permissible volume of solvents (6 L) in the solvent cabinet.
- Do not use bottles that exceed the maximum permissible volume as specified in the usage guideline for the Agilent 1200 Infinity Series Solvent Cabinets.
- Arrange the bottles as specified in the usage guideline for the solvent cabinet.
- A printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available on the Internet.
- Ground the waste container.
- The residual free volume in the appropriate waste container must be large enough to collect the waste liquid.
- Check the filling level of the waste container regularly.
- To achieve maximal safety, check the correct installation regularly.
- Do not use solvents with an auto-ignition temperature below 200 °C (392 °F).

## Safety Symbols

**Table 23** Symbols

|                                                                                     |                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | 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.                                                                                                                                                                                                                          |
|    | Cooling unit is designed as vapor-compression refrigeration system. Contains fluorinated greenhouse gas (refrigerant) according to the Kyoto protocol.<br>For specifications of refrigerant, charge capacity, carbon dioxide equivalent (CDE), and global warming potential (GWP) see instrument label.                                            |
|   | Confirms that a manufactured product complies with all applicable European Community directives. The European Declaration of Conformity is available at:<br><a href="http://regulations.corporate.agilent.com/DoC/search.htm">http://regulations.corporate.agilent.com/DoC/search.htm</a>                                                          |
|  | Manufacturing date.                                                                                                                                                                                                                                                                                                                                |
|  | Power symbol indicates On/Off.<br>The apparatus is not completely disconnected from the mains supply when the power switch is in the Off position                                                                                                                                                                                                  |
|  | Pacemaker<br>Magnets could affect the functioning of pacemakers and implanted heart defibrillators.<br>A pacemaker could switch into test mode and cause illness. A heart defibrillator may stop working. If you wear these devices keep at least 55 mm distance to magnets. Warn others who wear these devices from getting too close to magnets. |

Table 23 Symbols

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Magnetic field</p> <p>Magnets produce a far-reaching, strong magnetic field. They could damage TVs and laptops, computer hard drives, credit and ATM cards, data storage media, mechanical watches, hearing aids and speakers. Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.</p> |
|  | <p>Indicates a pinching or crushing hazard</p>                                                                                                                                                                                                                                                                                                   |
|  | <p>Indicates a piercing or cutting hazard.</p>                                                                                                                                                                                                                                                                                                   |

**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.

## Waste Electrical and Electronic Equipment (WEEE) 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.

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#### NOTE

Do not dispose of in domestic household waste

To return unwanted products, contact your local Agilent office, or see <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.

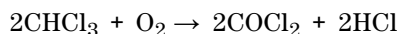
- Sound Pressure  $L_p < 70$  dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/1991 (Type Test)

## Solvent Information

### Use of Solvents

Observe the following recommendations on the use of solvents.

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



This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol,

- Chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, di-isopropyl ether) such ethers should be filtered through dry aluminium oxide which adsorbs the peroxides,
- Solvents containing strong complexing agents (e.g. EDTA),
- Mixtures of carbon tetrachloride with 2-propanol or THF.

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<http://www.agilent.com>

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## **In This Book**

This manual contains information on the Agilent 1260 Infinity II High-Temperature Viscometer (G7821B)

The manual describes the following:

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

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