



Agilent 1260 Infinity II High Temperature Viscometer

User Manual



Agilent Technologies

Notices

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A **CAUTION** 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 damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

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

1 Introduction to the High Temperature Viscometer

This chapter gives an introduction to the High Temperature Viscometer.

2 Site Requirements and Specifications

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

3 Installing the High Temperature Viscometer

This chapter explains the installation of the High Temperature Viscometer.

4 Using the Module

This chapter provides information on how to use the module.

5 Troubleshooting and Diagnostics

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

6 Maintenance and Repair

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

7 Appendix

This chapter provides safety and other general information.

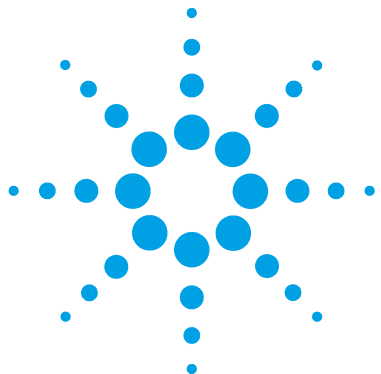
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This chapter gives an introduction to the High Temperature Viscometer.



Introduction to the 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:

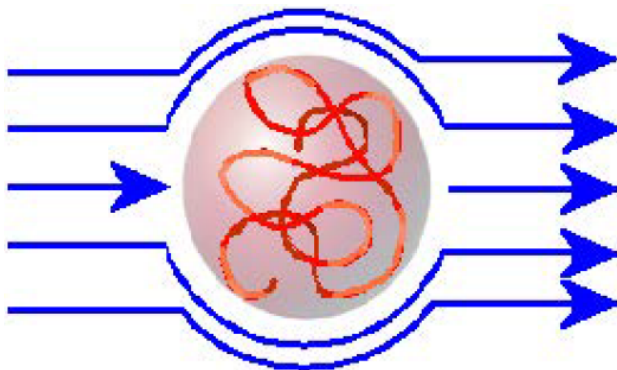
- 1** Precision-engineered 4-capillary bridge
- 2** High sensitivity pressure transducers
- 3** Electronic control module
- 4** Discrete 5 V power supply module (PSU)

The viscometer bridge is located in the Agilent column oven. The pressure transducer assembly is housed in the side panel 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, that is 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 α 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.

1 Introduction to the High Temperature Viscometer

How the Detector Operates

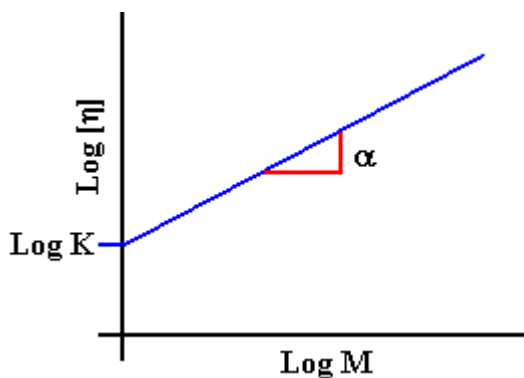


Figure 1 Mark-Houwink-Sakurada plot

Values of α 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 ($[\eta] \cdot M$) versus elution volume is a "universal calibration" as shown in [Figure 2](#) on page 12. 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.

1 Introduction to the High Temperature Viscometer Universal Calibration

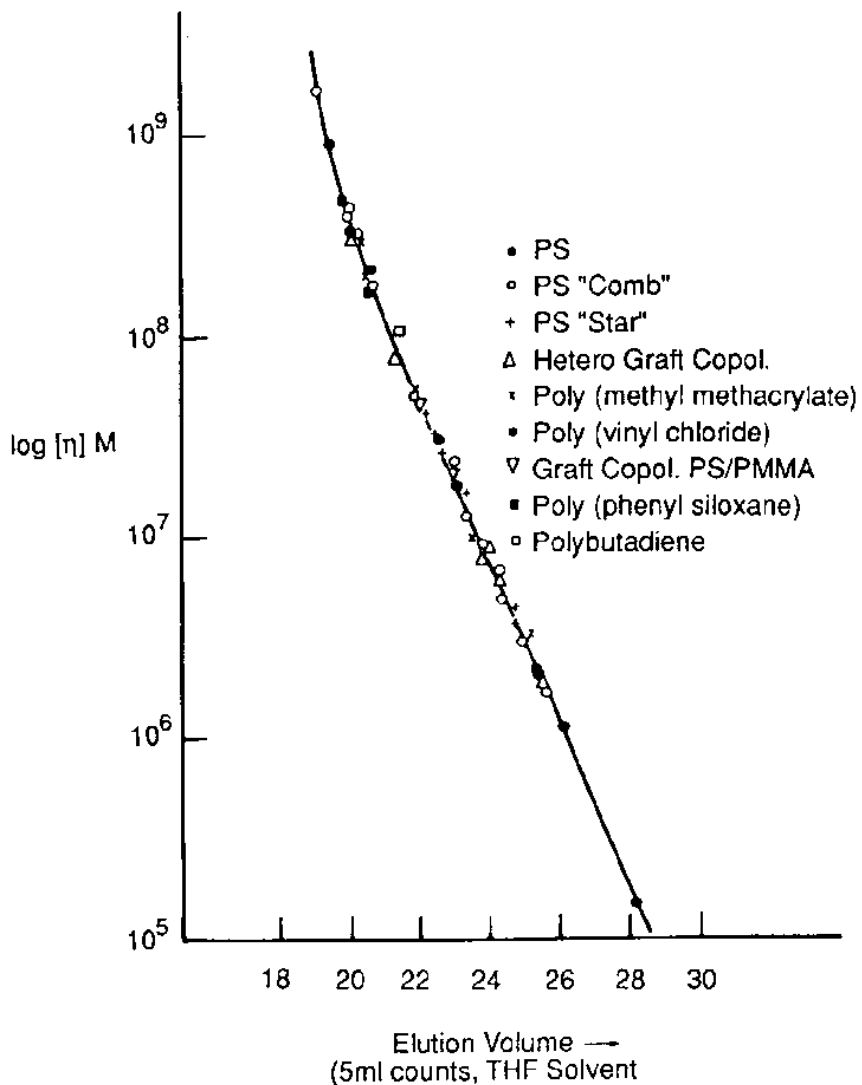


Figure 2 A universal calibration plot

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

η_b	Intrinsic viscosity of the branched polymer
η_l	Intrinsic viscosity of the linear polymer of the same molecular weight
ε	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 3 on page 14.

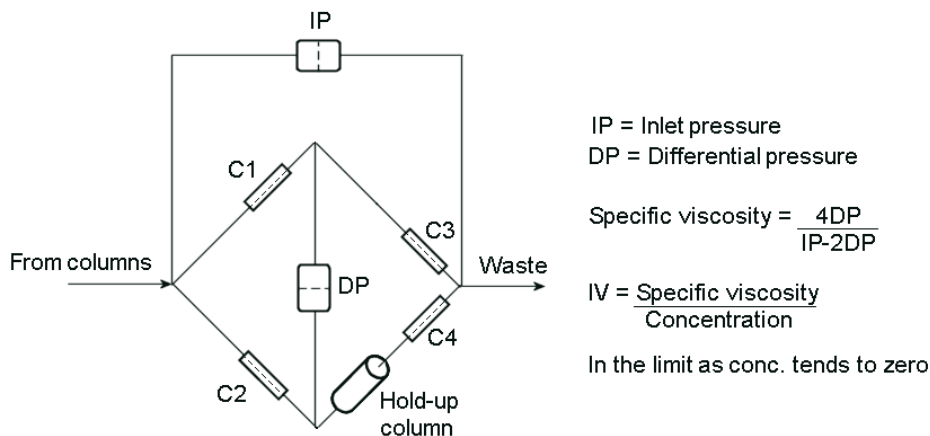


Figure 3 Plumbing Diagram of Agilent 1260 High Temperature Viscometer

The differential pressure transducer monitors the pressure drop across the bridge, ΔP , 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, ΔP , is proportional to the specific viscosity, η_{sp} , according to the following equation:

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

where

ΔP differential pressure across the bridge

P_i 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.

$$[\eta] = \lim_{c \rightarrow 0} \left(\frac{\eta_{SP}}{c} \right)$$

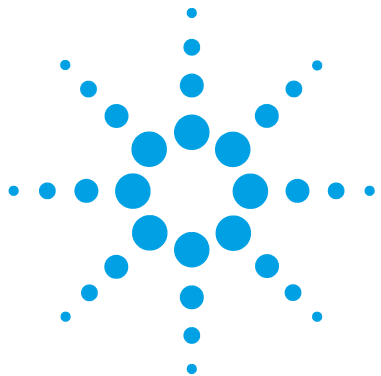
However, the concentrations used in GPC are low enough for the equation to be valid over a typical chromatogram, and thus an extrapolation to the true intrinsic viscosity is not required, since the concentration is close enough to the limiting concentration.

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.

1 Introduction to the High Temperature Viscometer

Detection Principle



2 Site Requirements and Specifications

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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](#) on page 21. 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](#) on page 21) 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](#) on page 21.

ASTM drift tests require a temperature less than 2 °C/h (3.6 °F/h) over one hour period. Our published drift specification (refer also to [Table 2](#) on page 22) 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/h (1.8 °F/h).

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, that is where RF transmitters such as mobile telephones may not be used in close proximity.

Physical Specifications

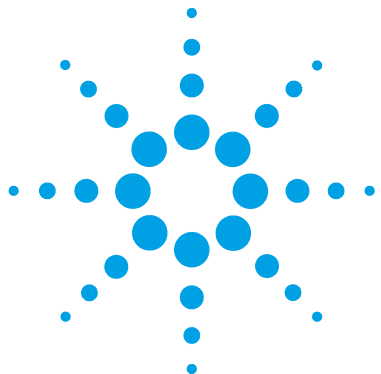
Table 1 Physical Specifications

Type	Specification	Comments
Weight	7 kg (15.5 lbs)	
Dimensions (height × width × depth)	135 x 235 x 130 mm (5.3 x 9.3 x 5.2 inches)	
Line voltage	100 – 240 V~, ± 10	Control unit
Fuses	5 V (2.4 A)	PSU
Line frequency	47 or 63 Hz, ± 5 %	
Power consumption	70 W / 80 VA	
Ambient operating temperature	10 – 40 °C (50 – 104 °F)	
Ambient non-operating 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: IEC, EN, CSA, UL	Installation category II, Pollution degree 2	For indoor use only.
ISM Classification	ISM Group 1 Class A	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	<0.25 mV	DP output
Baseline Drift	<5 mV	
Capillary Dimensions	0.01 in (id) x 24 in (l)	
Output Differential Pressure	1 mV/Pa	
Output Inlet Pressure	10 mV/Pa	



3 Installing the High Temperature Viscometer

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Flow Split Ratio Calculations 26

This chapter explains the installation of the High Temperature Viscometer.



Installing the High Temperature Viscometer



Figure 4 Front View of the Electronic Control Module for the Agilent GPC220 Viscometer

-
- | | |
|---|--|
| 1 | Viscometer analog outputs; 1V FSD – The viscometer analog outputs, DP, IP and Specific Viscosity (Visc). |
|---|--|
-
- | | |
|---|--|
| 2 | Transducers cable connection port – Connects the DP and IP pressure transducers to the control module. |
|---|--|
-
- | | |
|---|---|
| 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 ± 20 Pa. To adjust the zero offset turn the screw. |
|---|---|
-

Connect the electronic control module for the Agilent High Temperature viscometer 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 (for example, Channels 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 5 V 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 NOTE and RI of between 50 and 70 %. For flow split ratio calculations, see “[Flow Split Ratio Calculations](#)” on page 26.

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.

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

Therefore, if the flow split ratio is 60 %, then 60 % of the flow are going through the viscometer, that is, if running the system at 1 mL/min then the flow through the viscometer is 0.6 mL/min.



4 Using the Module

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Purging the Viscometer 29

This chapter provides information on how to use the module.



Using the Module

The 1260 Infinity II High Temperature Viscometer module is powered on and off using a mains power socket with the supplied 5 V 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

This procedure describes how to purge the inlet pressure (IP) and differential pressure (DP) transducers.

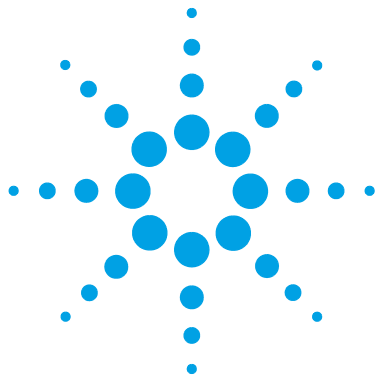
- 1 Ensure the solvent is flowing through the system.
- 2 Turn the knob labelled IP on the front RHS panel to PURGE.
The IP transducer and its connecting tubes are flushed through with solvent.
- 3 Turn the IP knob to RUN and the knob labelled DP to PURGE.
The solvent flow is switched and the DP transducer and its connecting tubes are flushed with solvent.
- 4 Turn the DP knob to RUN.
The solvent flow is switched back to normal operation, that is through the viscometer bridge.
- 5 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.

NOTE

The waste line for the DP transducer is a permanent waste line.

4 Using the Module

Purging the Viscometer



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



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

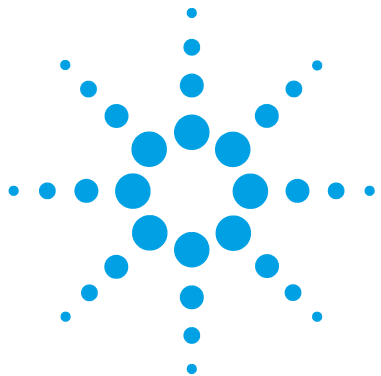
- Purge DP/IP transducers thoroughly to remove any air bubbles.
- Purge pump head to remove any air bubbles.
- Degas solvent.

Low Sensitivity

- Purge DP/IP transducers.
- Check flow split.

Long Retention Times

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



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



Introduction to Maintenance

The module is designed for easy maintenance. Maintenance can be done from the front with the module in place at the back of the Agilent 1260 Infinity II High Temperature System.

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 cover removed and with the power cord plugged in.
-

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.
-

6 Maintenance and Repair

Warnings and Cautions

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

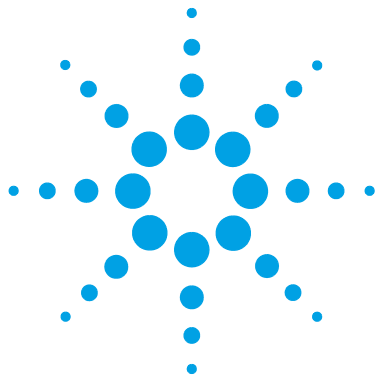
In case the detector is not used for some time (stored), fill the bridge (be sure to purge both IP and DP) with Tetrahydrofuran (THF).

Overview of Maintenance Parts

Item	p/n	Description
1	PL0810-3076	PL-GPC220 Delay Columns (x2)

6 Maintenance and Repair

Overview of Maintenance Parts



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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 “[Symbols](#)” on page 44.

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.
 - Do not use solvents with an auto-ignition temperature below 200 °C (392 °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.
 - Do not use solvents of ignition Class IIC according IEC 60079-20-1 (for example, carbon disulfide).
 - Reduce the volume of substances to the minimum required for the analysis.
 - Never exceed the maximum permissible volume of solvents (8 L) in the solvent cabinet. Do not use bottles that exceed the maximum permissible volume as specified in the usage guideline for solvent cabinet.
 - 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.
-

Symbols

Table 3 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.
	Sample Cooler unit is designed as vapor-compression refrigeration system. Contains fluorinated greenhouse gas (refrigerant) according to the Kyoto protocol. For specifications of refrigerant, charge capacity, carbon dioxide equivalent (CDE), and global warming potential (GWP) see instrument label.
	Flammable Material For Sample Thermostat which uses flammable refrigerant consult Agilent Information Center / User Manual before attempting to install or service this equipment. All safety precautions must be followed.
	Confirms that a manufactured product complies with all applicable European Community directives. The European Declaration of Conformity is available at: http://regulations.corporate.agilent.com/DoC/search.htm
	Manufacturing date.
	Power symbol indicates On/Off. The apparatus is not completely disconnected from the mains supply when the power switch is in the Off position

Table 3 Symbols

	<p>Pacemaker Magnets could affect the functioning of pacemakers and implanted heart defibrillators. 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.</p>
	<p>Magnetic field 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 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 of in domestic household waste

To return unwanted products, contact your local Agilent office, or see <http://www.agilent.com> for more information.

Radio Interference

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

Test and Measurement

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

Sound Emission

Manufacturer's Declaration

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

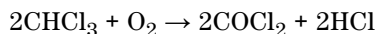
This product has a sound pressure emission (at the operator position) < 70 dB.

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

Solvent Information

Observe the following recommendations on the use of solvents.

- Brown glass ware can avoid growth of algae.
- 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) 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.
- Avoid the use of dimethyl formamide (DMF). Polyvinylidene fluoride (PVDF), which is used in leak sensors, is not resistant to DMF.

Agilent Technologies on Internet

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<http://www.agilent.com>

www.agilent.com

In This Book

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

The manual describes the following:

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

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