Agilent PL-GPC 220 System

Powerful polymer characterization up to 220 °C

Data Sheet



Introduction

The Agilent PL-GPC 220 is an integrated GPC/SEC system that features unbeatable reproducibility for any application, across the entire operating range. An extremely powerful platform, the PL-GPC 220 runs almost all polymer, solvent and temperature combinations, with full automation and advanced detection, from ambient up to 220 °C.

Key benefits

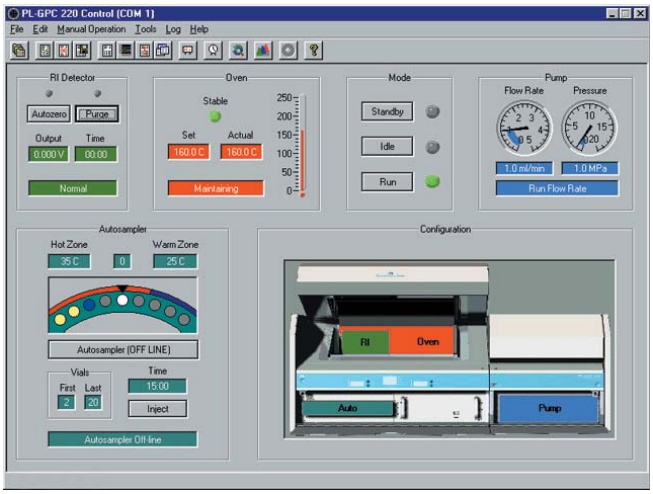
- **Maintains sample solubility** – all sample carrying components thermostated up to 220 °C
- **Proven industry standard** – market-leading in high-temperature GPC
- **Excellent performance** – High quality detectors fitted with low dispersion flow cells for excellent signal-noise ratios with minimal baseline drift and maximum sensitivity
- **Spacious and easy-access oven** – Holds up to six 300 mm columns, easily accessible for comfortable and safe operation
- **Flexible multi-detector capability** –The oven accommodates refractive index, light scattering and viscometry detectors. A flow cell interface for FTIR via heated transfer line is also available for complete polymer characterization
- **Safe solvent module** – Solvent handling is fully integrated, with leak detection and automated shut down for operator safety
- **Easy to program, easy to use** – Sophisticated software manages all aspects of instrument control and data analysis, with on-screen help always available
- **Dual-zone heated autosampler** – Minimizes baseline disturbance and eliminates the risk of sample precipitation or degradation during a run
- **Sample preparation option** – Efficient dissolution and filtration of samples prior to analysis.
- **High precision, extremely robust** – High performance pump for reproducible molecular weights

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System details

The PL-GPC 220 system for polymer characterization up to 220 °C features intuitive, comprehensive PC software control for fully flexible system management. With safety a pre-requisite, our instrument control allows location of your PC outside of the laboratory.

The interface uses interactive, color-coded graphics for ease-of-use. Click on the modules via the main screen to alter any run parameters. Flow rate, temperature and autosampler sequence are quickly and easily updated.



Interactive graphics for easy control of the PL-GPC 220.

The time estimator calculates the amount of solvent required to run your samples. Input the day and time you want the system to start, then load the autosampler carousel and let the PL-GPC 220 take care of the analysis for you.

Free up operator time and reduce running costs

Agilent has designed the PL-GPC 220 for truly unattended operation. The system gradually heats to the analysis temperature while the pump maintains a low flow of solvent through the column. Once the set temperature is reached and stable, the pump ramps gradually to the full analysis flow rate. at which point the PL-GPC 220 automatically purges and zeros the RI detector. Detector output is monitored and, when stable, the autosampler loads and injects the first sample. Once the run sequence is complete, the flow rate can be automatically reduced to conserve solvent.

Integrated solvent delivery – safety by design

The solvent module incorporated within the PL-GPC 220 provides a safe, controlled environment to manage solvent and waste. Solvent handling is fully integrated and vented for operator safety, so the system does not need to be used in a fume hood.

The PL-GPC 220 solvent delivery module houses the Agilent 1260 Infinity Pump with integral degasser. The solvent delivery module is temperature-controlled to 30 °C, which ensures efficient, continuous and reproducible solvent delivery, even if the solvent is viscous or solid at near-ambient temperature.

Precise temperature control

The multi-heater, forced-air oven within the PL-GPC 220 is extremely stable, and accurately controls the temperature to less than 0.05 °C per hour. This minimizes detector baseline drift, ensuring the reproducible retention times so important in GPC. All detectors situated within the oven environment benefit from the temperature range and stability of the oven.



Accurately controlled column oven with integrated injection system, columns and detectors

Dual temperature zone autosampler prevents sample degradation

Temperature controlled solvent delivery module with solvent reservoirs, pump and degasser

The 1260 Infinity pump with integrated degasser delivers precise flow for reproducible retention times – even with highly viscous solvents

Easy-acccess oven – changing columns and routine maintenance made simple

The oven in the PL-GPC 220 comfortably holds six, standard 300 mm, GPC columns. The oven opens at a convenient angle to provide easy access for changing columns and the injector loop, delivering comfortable and safe operation.

Uniquely, the oven is spacious enough to permit multi-detector upgrading. Agilent's ovens allow a combination of up to three detectors, for example, integrated RI, viscometry and light scattering with external coupling to FT-IR, for complete polymer characterization.

Enhanced RI sensitivity and stability

The improved Refractive Index (RI) detector includes an enhanced photodiode and uses fiber optic technology to maximize sensitivity while minimizing baseline drift and noise, vital for good GPC/SEC. This RI detector delivers outstanding signal-to-noise ratios, even at 220 °C.

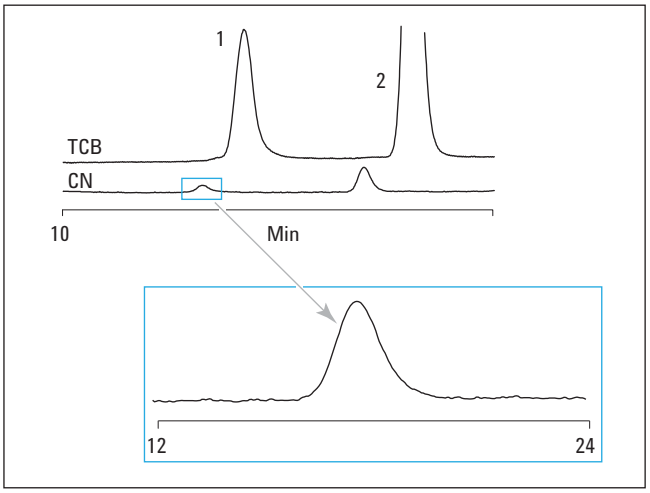
Dual-zone heated autosampler

Agilent's innovative autosampler accommodates 39 samples in industry-standard 2 mL vials. Injection precision is better than 1% RSD with no cross contamination between samples, and without the need for rinse vials. The PL-GPC 220 autosampler design features dual-zone heating to minimize thermal degradation. The hot and warm zones are independently programmable from ambient to 220 °C. Samples in the carousel waiting for injection are maintained at a lower holding temperature, then heated to analysis temperature prior to injection.

The vial is transferred to the column oven where the sample thermally equilibrates prior to injection. This minimizes baseline disturbance and completely eliminates the risk of sample precipitation.

High-precision isocratic pump – unrivalled reproducibility for precise results

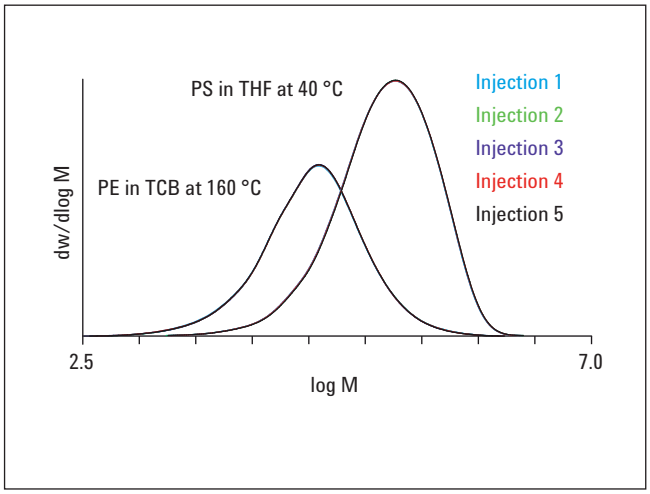
The PL-GPC 220 has a high precision pump for the best pump performance available. Unbeatable flow reproducibility < 0.1% is achieved, not only in THF at near ambient temperature, but also in TCB at temperatures above 140 °C.



Excellent signal-to-noise ratio for polystyrene at 160 °C, even in solvents with low dn/dc values like chloronaphthalene.

Columns:	3 x Agilent PLgel 10 µm MIXED-B, 300 × 7.5 mm (p/n PL1110-6100)
Flow rate:	1.0 mL/min
Injection volume:	200 µL
System:	PL-GPC 220 (RI)

Peak identification:
1. Mp = 1 460 000 (conc. = 0.62 mg/mL)
2. Mp = 9 680 (conc. = 1.08 mg/mL)



Excellent reproducibility of the PL-GPC 220.

Parameter	PS in THF at 40 °C (%)	PE in TCB at 160 °C (%)
RT of marker	0.06	0.04
Mn	0.61	0.62
Mw	0.45	0.16
Mz	0.49	0.45
Area	0.79	0.24

Safety first – solvent leak detection and automated shutdown

Agilent's GPC instruments incorporate integral sensors that constantly monitor the system. Vapor sensors are fitted in both the solvent module and column oven. The sensors can be programmed for sensitivity according to the solvent in use. In the case of an unattended error, the system selects and activates the appropriate shut-down sequence depending on the nature of the error. Low-solvent flow will be maintained, where possible, to avoid damage to valuable GPC columns. An audit trail feature offers full status and errorlogging facility for system traceability.

Agilent PL-SP 260VS Sample Preparation System

The PL-SP 260VS is designed for the dissolution and filtration of samples prior to GPC analysis. The unit combines controlled heating across a temperature range of 30-260 °C with gentle agitation, user-selectable from speeds of between 85–230 rpm. With its wide temperature range and speed capabilities, the PL-SP 260VS is ideal for a wide range of polymer types.



Efficient filtration for every sample

Two filtration media are available. Porous stainless steel (nominal porosity 0.5 µm, 2 µm, 5 µm or 10 µm) or glass fiber for more demanding situations (1 µm). A unique pipettor device efficiently dispenses hot filtered sample solution from the sample preparation vial directly into destination (autosampler) vials, with minimal handling.

Ordering Information

Part Number	Description
G7820A	Agilent PL-GPC 220 Integrated HT-GPC System
G7821A	Agilent PL-GPC 220 Viscometer
G7822A	Agilent PL-GPC 220 Dual Angle LSD
G7825A	Agilent PL DataStream
G7850AA	Agilent GPC/SEC Software
G7852AA	Agilent GPC/SEC Multi-Detector Upgrade
G7823A	Agilent PL-SP 260VS Sample Preparation System

Specifications

Component	Parameter	Description
Pump	Flow range	0.1 - 5.0 mL/min software controlled
	Flow rate precision	≤ 0.07 % RSD, or ≤ 0.02 min SD whatever is greater, based on retention time at constant room temperature
Oven	Temperature range	Ambient to 220 °C
	Temperature stability	< 0.05 °C/h
	Column capacity	Up to six 300 x 7.8 mm columns
Refractive Index Detector	Differential refractometer	Deflection
	Cell volume	8 µL
	Noise*	≤ 80 µV
	Drift*	≤ 10 mV/h
	Wavelength	890 nm
Autosampler	Carousel	40 × 2 mL vials
	Injection volume	Flushed fixed loop, 5 - 500 µL
	Precision*	≤ 1%
PL-GPC 220 Viscometer	Linearity	0.5% FS
	Shear rate (typical)	3000 s^{-1}
	Sensitivity ηsp	$1x10^{-5}$ Pa.s
	Baseline noise for DP output)	<0.25 mV
	Baseline drift (for DP output)	<5 mV
PL-GPC 220 Light Scattering Detector	Sample cell volume	10 µL
	Light scattering vol.	0.01 µL
	Laser wavelength/ power	658 nm/30 mW (continuous)
	Rayleigh scattering angles	15 ° and 90 ° (dual)
Instrument Interface Control		Windows 7 Advanced PC control
General	Power requirements	230 V AC (± 10%), 50/60 Hz, 15 A
Size (w × d × h)		1260 × 540 × 580 mm
Packaged size (w × d × h)		2 boxes 965 × 665 × 820 mm
Weight		185 kg; 408 lbs

* These technical specifications were determined by experimentation and reflect the total system performance. The values quoted were calculated from analyses performed in THF at 40 °C and in TCB at 160 °C.

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This information is subject to change without notice.

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