C190-E092B

SHIMADZU
Excellence in Science

Prominence Gel Permeation Chromatography System

Prominence GPC System

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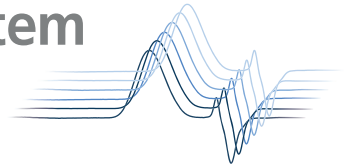


Highly Reliable Analytical Results in Every Field

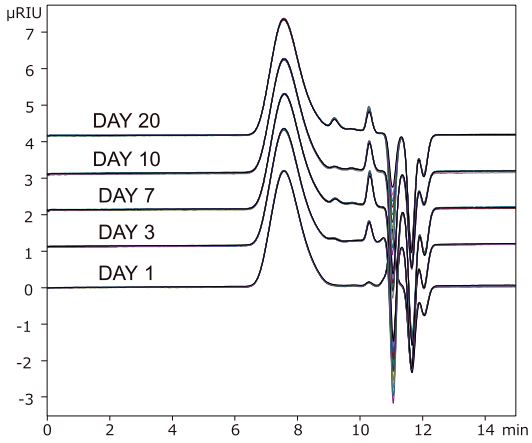
The Prominence GPC System provides highly reliable and highly extensible performance in a wide variety of applications. Hardware that provides rapid instrument stabilization and excellent reproducibility of analytical results, and software that includes analytical workflow automation and overlap injection functions and features a user-friendly analysis screen view contribute to improving productivity. Shimadzu has worked hard on every individual element influencing the basic performance of the Prominence GPC System to provide highly reliable analytical results for all customers.

Assembling Elements Demanded in GPC Analysis

Excellent Reproducibility in Molecular Weight Distribution Analysis

For the analysis of molecular weight distribution, since the molecular weight of compounds eluted between the exclusion limit and permeation limit are considered an exponential function of elution time (calibration curve), even a small variation in elution time causes a substantial change in the result.

The Prominence GPC System utilizes high-speed micro-plunger actuation and automatic pulse compensation to provide pulse-free solvent delivery and excellent elution time reproducibility.

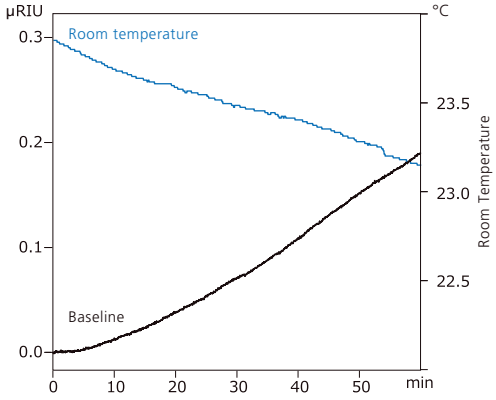


	RT (min)	CV
DAY 1	7.575	0.023
DAY 3	7.577	0.020
DAY 7	7.576	0.029
DAY 10	7.593	0.041
DAY 20	7.587	0.041
Ave.	7.582	0.031

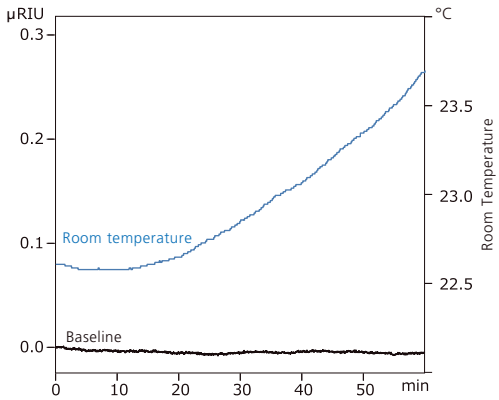
The analysis of polystyrene (N=20 / day), interval difference in a day was very small.

Excellent Stability Maintained Even During Subtle Changes in Room Temperature

Because of a temperature control function to suppress the effects of room temperature fluctuations, Prominence detectors achieve excellent baseline stability and reproducibility. Generally speaking, differential refractive index detectors tend to be easily affected by changes in room temperature. The optical system of the RID-20A, however, has a dual temperature control function that absorbs the effects of changes in room temperature, which ensures excellent stability.



RID-20A Without Cell-Temperature Control



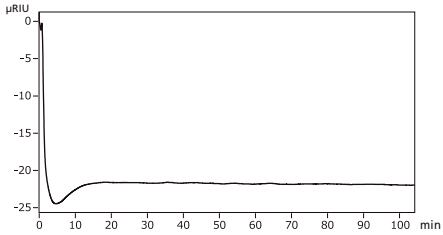
RID-20A Cell Temperature Controlled at 40°C

The RID-20A Differential Refractive Index Detector Allows Productivity Improvements in GPC Analysis

Inheriting the stability and extensibility that are the strengths of the Prominence series, the new RID-20A model of differential refractive index detector is designed with a new reference-cell auto-purge feature and validation support function that dramatically improve GPC analysis productivity.

Reduced Stabilization Time and Improved Baseline Stability: After 30 Minutes Power on

The RID-20A achieves shorter baseline stabilization time after turning ON the power through improved dual-temperature control of the optical system and superior lamp performance. The stable baseline ensures reliable molecular weight distribution analysis.



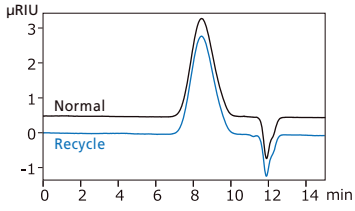
Elapsed time after power ON

30%* Savings in Solvent Usage over Conventional Performance and Reduced Environmental Burden

The amount of mobile phase consumed can be saved by returning column eluate to the mobile phase bottle during intervals when no component peaks are eluted. Cost of analysis per sample is reduced and burden placed on the environment is mitigated. The recycle valve kit can be attached to the RID-20A and the SPD-20A/20AV.

When performing a 15-minute analysis 50 times (flow rate: 1 mL/min)

Without recycle valve kit ... **750 mL**
With recycle valve kit ... **500 mL**
→ **Mobile phase usage reduced by approx. 30%*** (* under specified conditions)

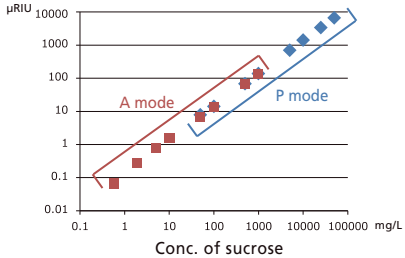


The use of the recycling valve cannot affect the baseline and the peak shape.

Shimadzu's Proprietary Technology Supports Highly Sensitive Analysis to Preparative Analysis Applications

The four-partition photodetector in the RID-20A allows a wide refractive index range (0.01 to 5000 μRIU). The single detector supports all applications from highly sensitive measurements to preparative measurements using the three operation modes shown below.

A (Analytical) Mode	High-sensitivity to general-purpose analysis
P (Preparative) Mode	High-concentration analysis, semi-preparative analysis (up to 20 mL/min)
L (Large-scale prep.) Mode	Flow selection block allows large-volume preparative analysis. (up to 150 mL/min)

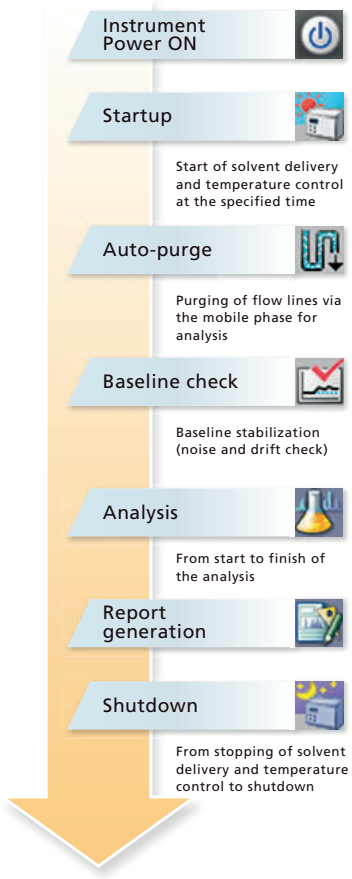


Conc. of sucrose

Supports Work Optimization

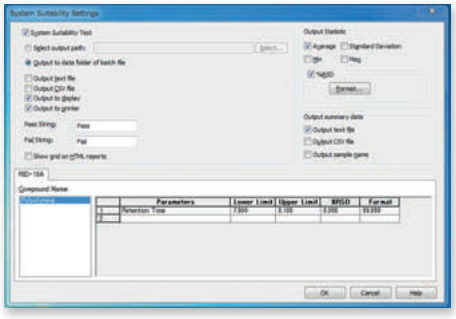
Automation of Workflow

Numerous functions supporting the analysis process sequence, from instrument startup to shutdown, significantly improve procedural efficiency. In addition, baseline drift checks can be performed automatically, eliminating the need to wait by the instrument for detector stabilization.



Automated and Easy System Suitability Testing (SST)

The LabSolutions software is designed with a function to use a control sample or standard sample to check system compatibility prior to measurement of an unknown sample.
This function can be included in batch analysis to allow the actual sample to be measured only when a positive test result is obtained. The software can also output test results in text format or CSV format.

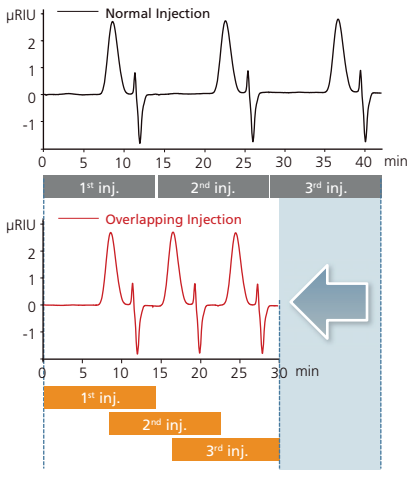


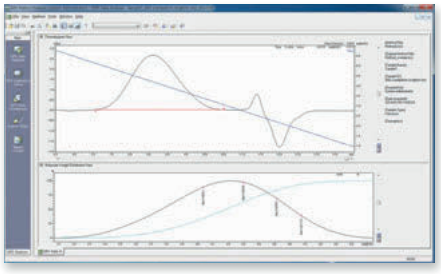
Short analysis time — Overlap Injection Function

Overlapping injections combined with the SIL-30AC Nexera X2 autosampler can significantly save analytical time for multiple cycles and enable higher throughput.

10 injection cycles of a 15-minute analysis

Normal Injection cycles ... 2 h 30 min
With Overlapping Injection ... 1 h 40 min
→ **Save approximately 35% on total analysis time**



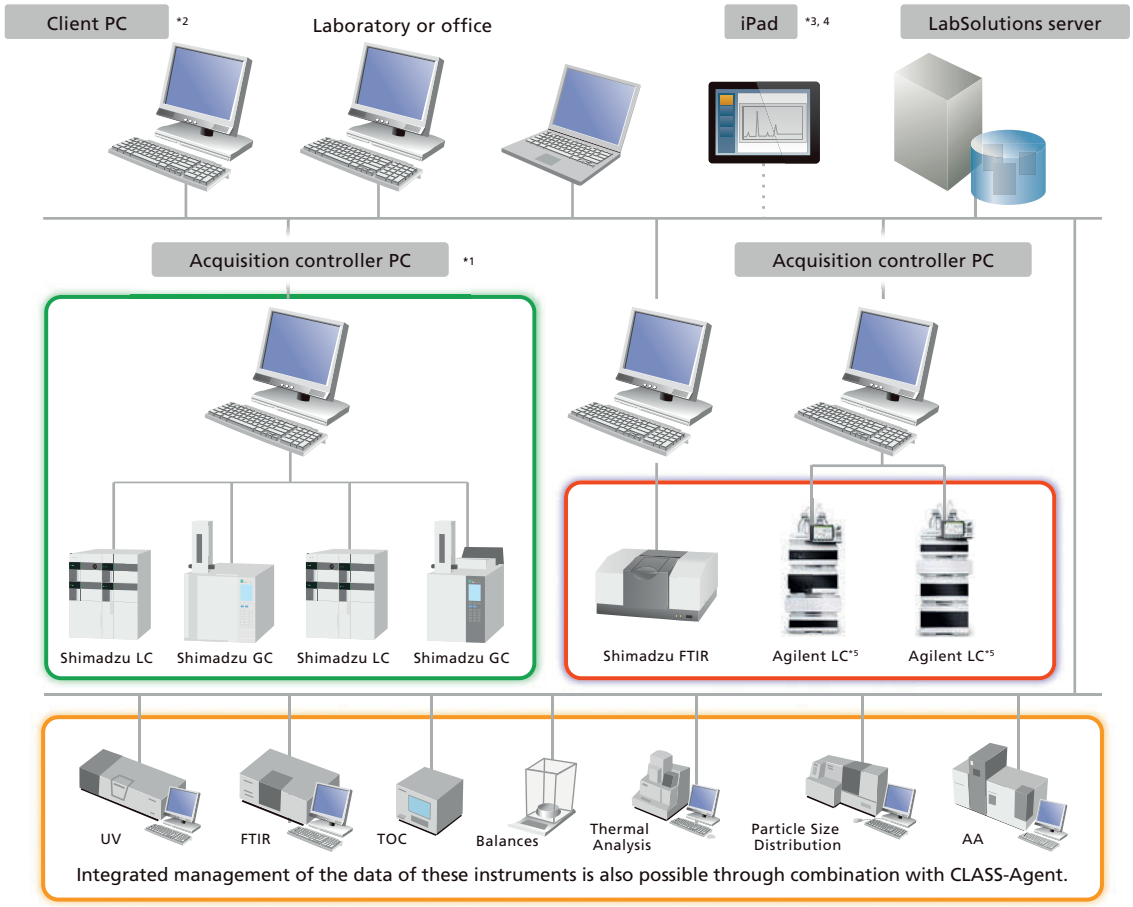


As with normal analysis, molecular weight can be calculated from the analysis window.

Supports Smart Data Management

Using LabSolutions for integrated management of data from various locations ensures analytical reliability and improved efficiency of analysis. Control and analysis using GC and HPLC systems, including the GPC system, are also possible from a single graphical interface.
LabSolutions includes a wide range of functions that meet the requirements of guidelines such as GLP/GMP and FDA 21 CFR Part 11, and provides secure data management.

〈Network Compatibility: LabSolutions CS〉



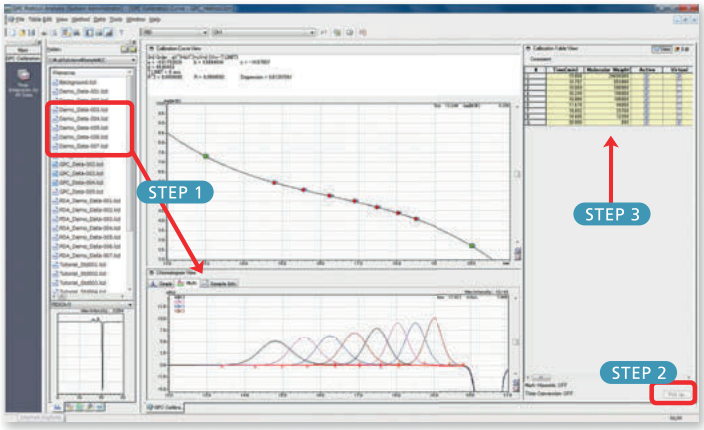
*1 The acquisition controller PC controls the analytical instruments.
Analysis directions and re-analysis of data can be performed using a client PC.
*2 It is not necessary to install LabSolutions software on the client PC for terminal service.
*3 iPad is a registered trademark of Apple Inc.
*4 When using an iPad, the installation of Citrix's XenApp is required.
*5 Agilent's LC instruments can be controlled. Agilent's GC instruments will be supported in the future.

Supports Whole-System Instrument Management

The Prominence GPC System checks a history of maintenance and operation for each module, which enables quick and easy inspection and maintenance of the instrument.
An optional column management device also makes it possible to identify column names and serial numbers and to create a usage history that includes the amount of mobile phase that has passed through the column and number of sample injections.

LabSolutions GPC Software
Easy Analysis of Molecular Weight Distribution via Graphical Interface

Create a Calibration Curve in Just Three Steps



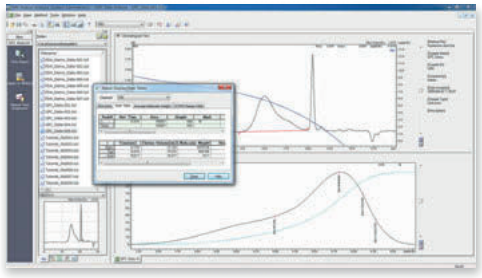
STEP 1 Drag and drop standard-sample data into the window.
STEP 2 Load the retention times.
STEP 3 Enter the molecular weight of the standard sample.

A maximum of 64 data points are available. Virtual points are also easy to set, and calibration curve appropriateness can be checked visually while choosing from a wide variety of approximation equations. Calibration curves can be corrected using the Mark-Houwink equation, and other correction methods based on Q-factors or degree of polymerization are available.

Graphical GPC Data Analysis Window

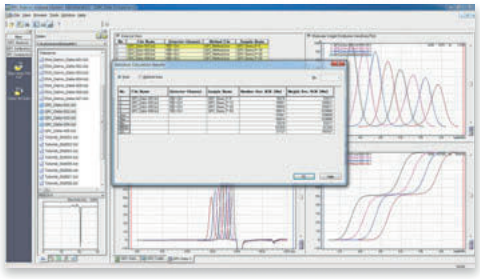
- Manipulation of peak integration possible by means of the graphical interface
- Management of data from multiple detectors within a single file

Because the molecular weight distribution curve is updated whenever peak integration is performed, results for mean molecular weight, intrinsic viscosity, polydispersity, and other parameters can be confirmed immediately.
Time and detector sensitivity can also be corrected based on an internal standard peak or control sample.



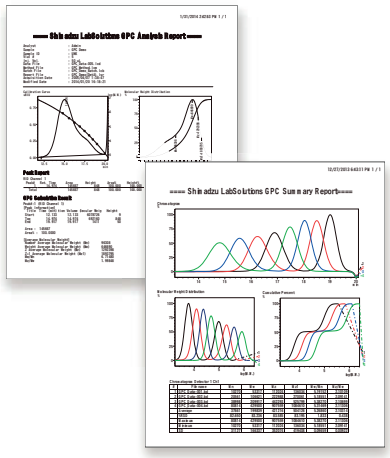
The Data Comparison Window Allows Simultaneous Evaluation of Multiple Samples

- The elution curves and derivative and integrated molecular weight distribution curves for up to 10 samples can be overlaid on a graph.
- Statistical results can be displayed for mean molecular weight, intrinsic viscosity, and polydispersity.



Diverse Range of Report Formats

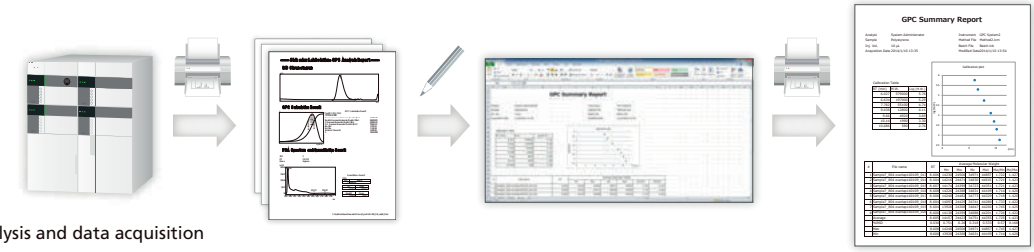
LabSolutions is equipped with report templates for a variety of analysis results. The software can accommodate a diverse range of reports thanks to a wealth of report items and a highly flexible layout.
In addition, a PDF output function is included as standard, so analysis results reports can be managed by automatic import to a database, helping your laboratory to go paperless, and promoting an eco-friendly analysis process.



Reduce the Work Involved in Creating a Final Report

Do you move your analytical results to a spreadsheet program (e.g., Excel) to create a final report?
LabSolutions includes a multi-data report feature, which reduces the work involved in report creation. Analytical results are automatically entered into a spreadsheet equivalent to the one used in Excel, eliminating the need to move the data.

〈Conventional Workflow for Report Creation〉

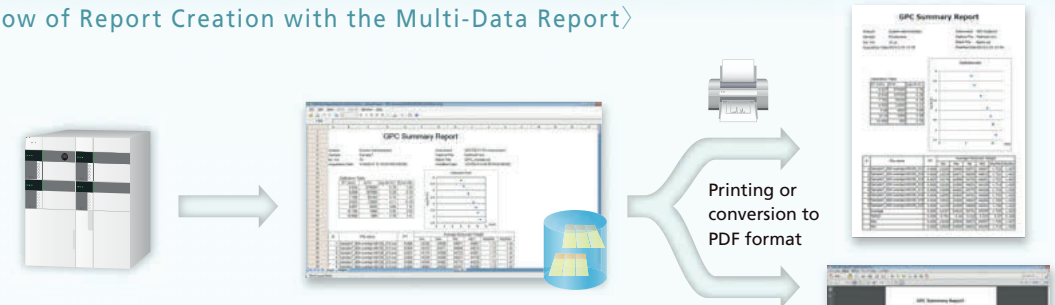


Analysis and data acquisition

Transfer of results reports to a spreadsheet program

- Time and effort associated with transfer tasks, entry errors, and double checking
- Problems of paper/file management
- Time and effort associated with regular verification work

〈Workflow of Report Creation with the Multi-Data Report〉



Analysis and data acquisition

Automatic report creation → Automatically saved to the database

Transfer of results is unnecessary

- Elimination of transfer errors
- Easy management of reports via the database
- Appropriate file protection provided by an audit trail feature

Note: Excel is a registered trademark of Microsoft Corporation.

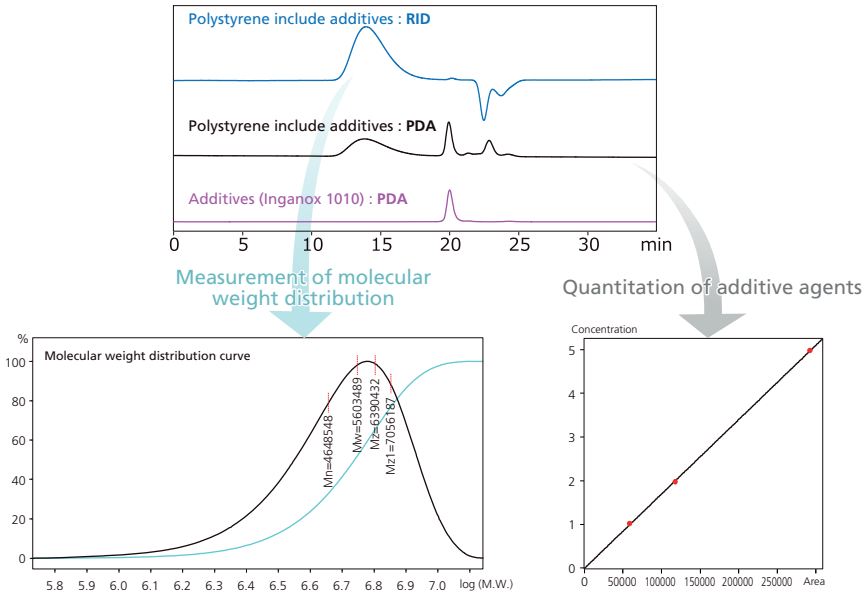
Superior Extensibility of the Prominence Series

Choose a Detector Designed to Your Objectives

A lineup of detectors is available, comprising the RID-20A differential refractive index detector, photodiode array detectors, UV-VIS detectors, and evaporative light-scattering detectors. Select from a variety of detectors according to application, from organic solvent-based GPC applications for analysis of industrial polymers to water-based GPC applications for analysis of biopolymers. Also, using AccuSpot allows you to construct an automated analysis system capable of easy online processing—everything from GPC separation to MALDI-TOF MS measurement.

Perform Diverse Analyses Within a Single Measurement

Using a differential refractive index detector together with a photodiode array detector enables high-sensitivity detection of peaks that are indistinct when analyzed with the differential refractive index detector alone. This makes it possible not only to measure molecular weight distribution, but also to identify and quantitate additive agents and impurities contained in polymers, all in a single analysis.



Shim-pack GPC Series Columns for GPC Measurement

Because each Shim-pack GPC series column is packed with polystyrene-based polymers with different degrees of crosslinking, the optimal column can be chosen according to intended use with anything from polymers to oligomers.

Shim-pack GPC-800 Series High-Performance GPC Columns

For use with tetrahydrofuran (800 Series)

P/N	Product Name	Exclusion Limit Molecular Weight (polystyrene)	Size (length × inner diameter, mm)
228-20803-91	Shim-pack GPC-801	1.5×10^3	300 × 8.0
228-20804-91	Shim-pack GPC-802	5×10^3	300 × 8.0
228-20805-91	Shim-pack GPC-8025	2×10^4	300 × 8.0
228-20806-91	Shim-pack GPC-803	7×10^4	300 × 8.0
228-20807-91	Shim-pack GPC-804	4×10^5	300 × 8.0
228-20808-91	Shim-pack GPC-805	4×10^6	300 × 8.0
228-20809-91	Shim-pack GPC-806	4×10^7	300 × 8.0
228-20810-91	Shim-pack GPC-80M	4×10^7	Mixed gel 300 × 8.0
228-20811-91	Shim-pack GPC-807	2×10^8	300 × 8.0

For use with chloroform (800C Series)

P/N	Product Name	Exclusion Limit Molecular Weight (polystyrene)	Size (length × inner diameter, mm)
228-20803-92	Shim-pack GPC-801C	1.5×10^3	300 × 8.0
228-20804-92	Shim-pack GPC-802C	5×10^3	300 × 8.0
228-20805-92	Shim-pack GPC-8025C	2×10^4	300 × 8.0
228-20806-92	Shim-pack GPC-803C	7×10^4	300 × 8.0
228-20807-92	Shim-pack GPC-804C	4×10^5	300 × 8.0
228-20808-92	Shim-pack GPC-805C	4×10^6	300 × 8.0
228-20809-92	Shim-pack GPC-806C	4×10^7	300 × 8.0
228-20810-92	Shim-pack GPC-80MC	4×10^7	Mixed gel 300 × 8.0
228-20811-92	Shim-pack GPC-807C	2×10^8	300 × 8.0

For use with dimethylformamide (800D Series)

P/N	Product Name	Exclusion Limit Molecular Weight (polystyrene)	Size (length × inner diameter, mm)
228-20803-93	Shim-pack GPC-801D	1.5×10^3	300 × 8.0
228-20804-93	Shim-pack GPC-802D	5×10^3	300 × 8.0
228-20805-93	Shim-pack GPC-8025D	2×10^4	300 × 8.0
228-20806-93	Shim-pack GPC-803D	7×10^4	300 × 8.0
228-20807-93	Shim-pack GPC-804D	4×10^5	300 × 8.0
228-20808-93	Shim-pack GPC-805D	4×10^6	300 × 8.0
228-20809-93	Shim-pack GPC-806D	4×10^7	300 × 8.0
228-20810-93	Shim-pack GPC-80MD	4×10^7	Mixed gel 300 × 8.0
228-20811-93	Shim-pack GPC-807D	2×10^8	300 × 8.0

GPC-80M Mixed Gel Columns (80MC, 80MD)

Mixed gel columns that produce linear calibration curves over a wide range of molecular weights.

Shim-pack GPC-2000 Series Preparative Columns

Preparative columns for use with chloroform and tetrahydrofuran.
These columns have substantial sample processing power as well as separation power comparable to that of columns for analytical use.

Prominence GPC System Standard Configuration

P/N	Description	Model	Qty
228-45012-XX	System Controller	CBM-20A*1	1
228-45000-XX	Solvent Delivery Unit	LC-20AD*2	1
228-45018-XX	Degassing Unit	DGU-20A3R*2	1
228-45041-91	Reservoir Tray		1
228-45119-XX	Autosampler	SIL-20AHT*2	1
228-48258-91	Vespel Needle Seal		1
228-15652-92	Vial 1.5 mL		1
228-45009-XX	Column Oven	CTO-20A	1
228-45104-XX	Refractive Index Detector	RID-20A	1
—	Analysis column	Shim-pack GPC Series*3	—
—	LC Workstation	LabSolutions*4	1
223-07738-92	GPC Software	LabSolutions GPC Software*5	1

*1 : The CBM-20Alite (228-45011-XX) can also be chosen.
*2 : If the mobile phase includes HFIP, an HFIP-compatible degassing unit and HFIP-compatible kit are required.
*3 : Choose according to the range of molecular weights to be measured.
*4 : A printer and cable are required separately.
*5 : LabSolutions DB GPC software (223-13812-92) and LabSolutions CS GPC software (223-18995-92) can also be chosen.

Prominence GPC System Standard Specifications

Item	Specifications
System configuration	Modular
Measurement method	Single Flow
Mobile phase delivery method	Parallel Double Plunger
Mobile phase flow rate setting range	0.0001 to 10.0000 mL/min
Mobile phase flow rate accuracy	No more than 1% or 2 µL/min, whichever is greater (0.01 to 2 mL/min)
Mobile phase flow rate precision	No more than 0.06% RSD or 0.02 min SD, whichever is greater
Mobile phase degassing method	Vacuum membrane
Degassing line flow rate	380 µL
Sample injection method	Variable loop weighing
Sample injection volume setting range	0.1 to 100 µL (standard)
Number of samples processed	105 + 10 (1.5 mL vials)
Column temperature control method	Forced Air Circulation
Column temperature control range	(room temperature + 10°C) to 85°C
Detector noise	2.5×10^{-9} RIU max.
Detector drift	1×10^{-7} RIU/h max.
Detector cell volume	9 µL
Detector cell temperature control range	30 to 60°C

Item	Specifications
Calibration curve approximation formulae	Linear, 3rd-order, 3rd-order + hyperbolic curve, 5th-order, 5th-order + hyperbolic curve, 7th-order, 7th-order + hyperbolic curve, or broken line
Calibration curve correction functions	Internal standard correction, Q-factor, RID sensitivity correction
Peak Integration	Automatic processing according to parameter settings. (Manipulation possible)
Molecular weight calculations	Mn, Mw, Mz, Mz1, Mv, Mw/Mn, Mv/Mn, Mz/Mw, and intrinsic viscosity
Data output	ASCII format

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