



The PD2000 family of molecular characterization detectors measure absolute values of molecular weights, sizes, and shapes. Typical applications are polymers, proteins, antibodies, polysaccharides and other macromolecules used in the plastics, biotechnology, pharmaceutical and food industries. These laser light scattering detectors are easily added to any HPLC/GPC/SEC system and are ideal research, quality control and process monitoring tools. The PD2000 Series is available in single angle, dual angle and high temperature versions with or without dynamic light scattering (DLS) capabilities. Each unit can be upgraded to greater capabilities at any time. Also, DLS capability can be added to **any** manufacturer's light scattering detector for hydrodynamic radius (Rh) measurements.

The PD2010+ light scattering detector provides molecular weight and size data from the intensity of the scattered light at 90 degrees to the incident laser beam from molecules passing through its high sensitivity 10 ul flow cell. The high performance cell design provides exceptionally accurate measurements for a broad range of molecules from less than 1000 daltons, typically up to 10^6 daltons, even to 10^7 daltons for many proteins and polymers.

State-of-the-Science Software

PrecisionAcquire³² and Discovery³² are the companion 32 bit software packages running under Windows for controlling the PD2010+ and analyzing the data collected. With the addition of dynamic light scattering (DLS) capability, the hydrodynamic radius (Rh) can be obtained providing a clear picture of the molecular size in solution as the molecules elute from the SEC column. The data can be presented in real time across the chromatogram as the sample elutes and is useful for peak purity observations in research and quality control.



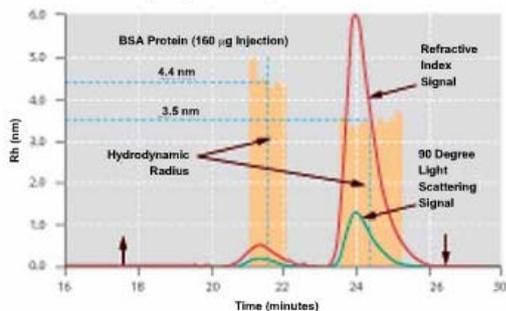
The PD2010 laser light scattering detector, Precision Acquire/Discovery software and dynamic light scattering plus (+) configuration.

The Precision Detectors Advantage

The PD2010+ incorporates high performance diode lasers, high speed digital signal processors and advanced avalanche photodiode detectors. This modern platform provides the most sensitive and stable light scattering detector available today. The cell volume of only 10 ul results in virtually no band-broadening, producing accurate results even at low molecular weight. The software automatically calculates an accurate value of inter-detector volume using cross-correlation techniques, made possible because of the negligible band-broadening. The superior optical design of the PD2010+ results in a very small scattering volume (0.01 ul), minimizing the effects of any stray particles when you must operate in less than ideal chromatographic situations. This feature along with the innovative solid axial design ensures the "bullet-proof" robustness in routine operation.

PD2010+ Performance Applications

Figure 1: Dynamic Light Scattering (DLS) Data for Bovine Serum Albumin (BSA) SEC Separation



The PD2010+ configuration provides real-time "on-the-fly" determination of hydrodynamic radius (Rh) from 1.0 to 1000 nm. The above BSA sample contains approximately 10% dimer having a Mw of 130 kD and an Rh of 4.4 nm. The monomer had a Mw of 65.6 kD and an Rh of 3.5 nm. Both size and molecular weight are determined in a single SEC run!

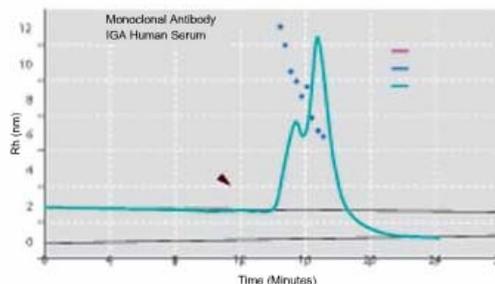


Figure 2: Dynamic Light Scattering (DLS) Data for Monoclonal Antibody Separation

This IgA sample contains several species that are characterized using a combined RI and PD2010/DLS detection. The early eluting high molecular weight region can only be "seen" by the laser light scattering detector as its concentration is below the percent level. Also, the descending Rh across the IgA peak areas indicates a non-homogeneous structure and presents a good "purity" check for the purification process.

The "PD2000 Inside" configuration couples the PD2010+ within the optical chamber of commercial refractometers.

The "PD2000 Inside" configuration offers improved long term stability, accuracy and reproducibility and a means of virtually eliminating any band-broadening effects by placing only a few centimeters of tubing between the two detectors.



PD2010 Specifications

The PD2010 is available in the following configurations:

- The PD2010+ is a benchtop unit designed to operate alongside other concentration detectors.
- The PD2010+ can be mounted in a differential refractometer providing zero band broadening between the two detectors and identical temperature conditions.
- The PD2010+ adds "dynamic light scattering" capabilities to the PD2000 for "on-the-fly", flow mode, determination of hydrodynamic radius (Rh).

Sample Cell Volume	10 ul
Light Scattering Volume	0.01ul
Simultaneous dual-angle detection	optional
Rayleigh scattering angles	90 (standard) and 15 (standard) degrees
Relative Mw precision	?%
Molecular weight range	«10 ³ to above 10 ⁷ daltons
DLS - Hydrodynamic Radius (Rh) option	1.0 to 1000 nm
Band-spreading specifications	t<1 second
Radius of Gyration (Wavelength 680/800)	10/12 to 180/200 nm
Raw data sample rate	up to 100 per second
Data sample rate	0.1 seconds to 1,000 seconds
Detector output signal	analog
Signal inputs	4 or 8 analog, 1 digital (auto-injector)
Signal preprocessing	selectable particle noise rejection
Signal smoothing	none or operator-selectable, controlled Fast Fourier Transform
Signal storage	raw signal, at data sample rate
Stand-alone size	8" x 17" x 4" - 21cm x 44cm x 11cm
Stand-alone weight	approx. 14 lbs., 6.4 kg
Light scattering platform weight	6.0 lbs., 2.8kg
Power requirement	100/240 V, 50/60 Hz

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