miniDAWN

Multi-angle light scattering for absolute characterization of proteins, polymers and nanoparticles by SEC-MALS

WYATT TECHNOLOGY

miniDAWN®

Multi-Angle Light Scattering (MALS) Detector

Determine absolute molar mass and size in solution

The miniDAWN offers the level of performance and capability you have come to expect from our award-winning instruments. Couple the miniDAWN to your favorite HPLC or FPLC to determine the absolute molar masses and sizes of macromolecules and nanoparticles in solution from hundreds to millions of Daltons—without the need for column calibration standards.

Characterize:

- Proteins, peptides and oligonucleotides
- Synthetic and natural polymers
- Nanoparticles, virus-like particles and vesicles

Superior technology and productivity

Outstanding sensitivity Use as little as 25 ng injected sample (100 kDa polystyrene in THF; varies for other samples and solvents).

Field serviceable The miniDAWN is engineered with self-contained modules that are easily replaced.

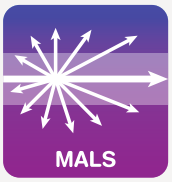
System-ready monitor Noise levels are monitored in real-time. An all-green status indicator lets you know when your system is ready for data collection.

DLS module The WyattQELS™ module fits inside the miniDAWN to provide you with on-line dynamic light scattering for determining radii down to 0.5 nm.

Self-cleaning All light scattering cells are subject to contamination by particles. Press a button to activate the embedded COMET™ ultrasonic module. For maximum reliability and uptime, program the miniDAWN to automatically clean the cell after every run.

Knowledge without assumptions

Multi-Angle Light Scattering



Using first principles, MALS is a well-established technique in the field of macromolecule and nanoparticle characterization. By eliminating common assumptions that are necessary in size exclusion column calibration, you can be more precise and confident in your results.

Not all multi-angle light scattering instruments are designed the same! The miniDAWN is based on the same industry-leading optical and electronic design as the DAWN and provides superior performance over other basic MALS instruments. The miniDAWN incorporates three angles of detection for greater sensitivity and repeatability.

- Determine with absolute confidence molar masses and sizes without the need for size-exclusion column calibration or reference standards
- Identify column interactions, aggregation or other non-ideal characteristics that chromatography alone cannot determine
- Light scattering instruments with only one or two angles (LALLS, RALLS) are notoriously susceptible to poor data quality due to dust particles—but not the miniDAWN

miniDAWN Advantages

Superior MW determination for small molecules down to 200 g/mol

Wide measurement range for particles 10 to 150 nm in radius

System-ready monitor simplifies data collection

Highest sensitivity in class: 25 ng of 100 kDa polystyrene in THF

Corrects for absorbing samples via the Forward Laser Monitor

Extended Field Serviceablity

Integrated COMET ultrasonic device automates in-situ cell cleaning

21 CFR Part 11 compliant software

Optional Module

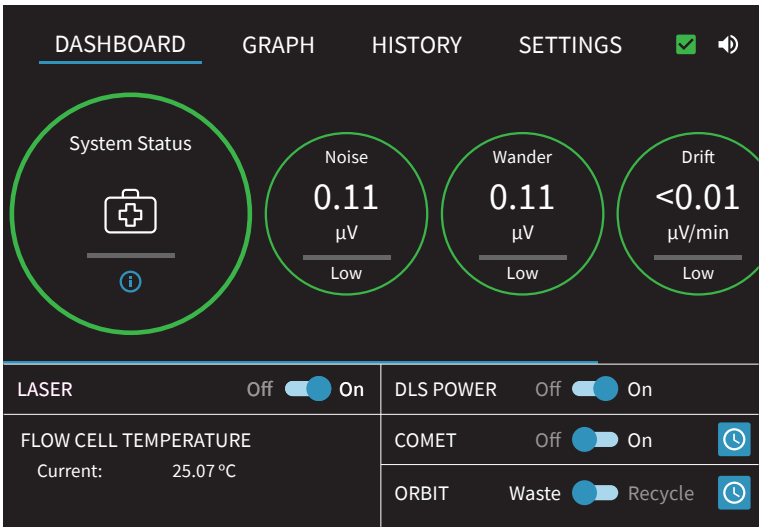
WyattQELS dynamic light scattering detector

New User Interface

The larger responsive display is the starting point of our Smart Services™ platform and designed to give the user a simple to use, all-in-one system view

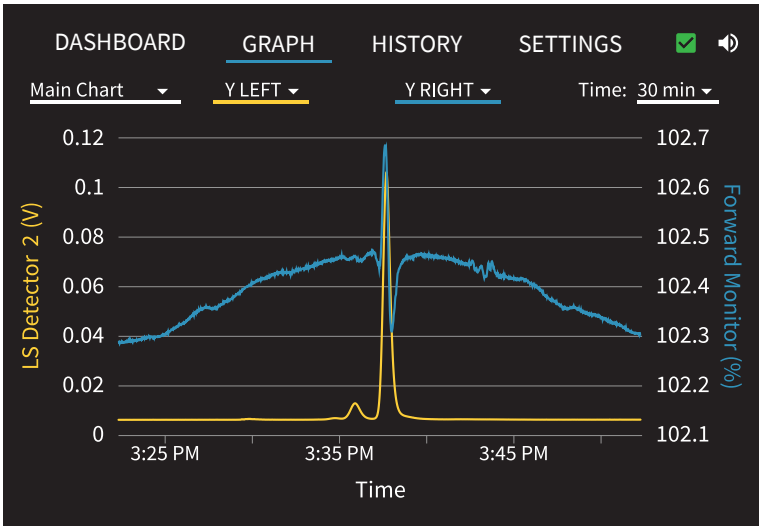
Customizable User Preferences

SEC-MALS System Readiness Monitor



Real-time Instrument Health Indicators

System Control Panel



Customizable Graphing

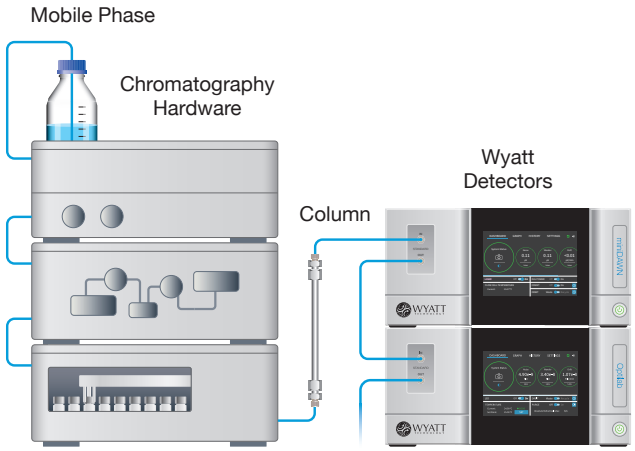
Zoom, Pinch, Swipe Functionality

Smart Services Platform

A series of user experience enhancements delivering greater ease-of-use and improved workflow

System Ready Monitor

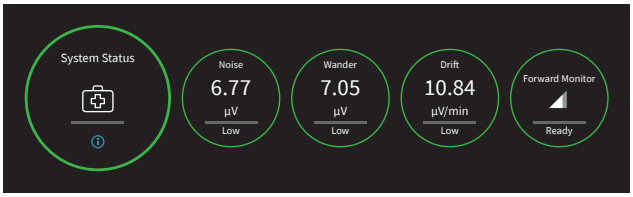
Never waste a run due to incomplete equilibration, excessive mobile-phase noise or sub-optimal detector state. The System Ready Monitor simply does that for you and continuously reports if all systems are optimal right from the front panel. If problems do arise, the System Ready Monitor alerts you by changing from green to yellow to red depending on the severity and provides actionable, real-time guidance on what needs to be done to bring the system back to peak health.



Real-Time Health Indicators

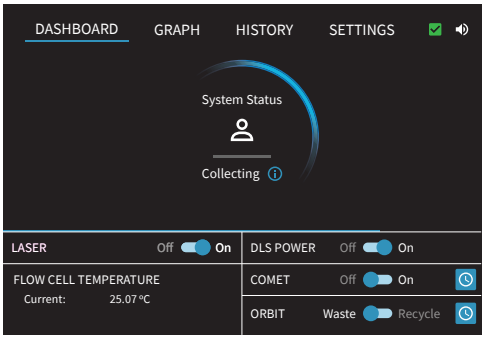
System Ready Monitor indicating that not all is well? For more detailed information on what's holding you back, review the Real-Time Health indicators. Perhaps the Forward Monitor indicator is triggered by a bubble or the Drift indicator by insufficient column equilibration.

Specific indicators can be customized for more or less stringent requirements. For example, the Noise indicator can be set to have a wider acceptable range for aqueous buffers, which typically exhibit more noise than organic solvents.



Collection Mode

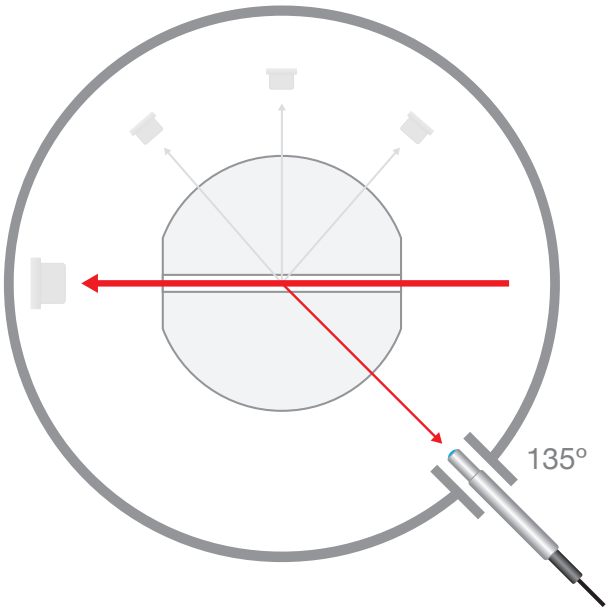
Never again worry about a colleague disrupting your experiments. Our dynamic Collection Mode indicator provides a spinning, system status wheel right from the front panel that can't be missed. Want to know whose is operating the instrument? Simply click on the collection icon to determine who is logged in and from what computer they are connected.



WyattQELS – Inline DLS

A unique benefit of Wyatt MALS instruments is their ability to accept an optional embedded dynamic light scattering (DLS) module for inline measurements of hydrodynamic radius. The WyattQELS connects via optical fiber to the miniDAWN flow cell and collects light scattered from particles in the beam, simultaneously with MALS acquisition.

For the miniDAWN, the fiber is placed at 135° to optimize maximal size range along with minimal stray light.



CheckPlus™

If concerns about the status of your instrument arise, an expert opinion is just a click away. With CheckPlus, our integrated service application, a complete instrument and system history report can be auto-generated at any time and sent to a Wyatt Service Engineer or Application Scientist for further analysis. This is just another example of how our Smart Services Platform is designed to deliver important customer-facing benefits and simplified use.

Molar mass in a single click? Absolutely!

Quick Setup:

The miniDAWN is controlled by ASTRA®, the leading software for SEC-MALS. ASTRA’s Method Builder lets you set up a default method optimized for your sample type in three easy steps:

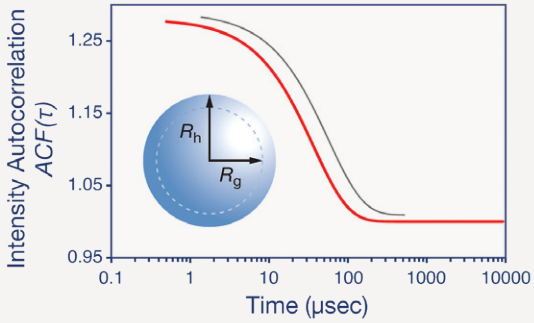
1. Select experiment type
2. Input parameters
3. Click ‘Run’

ASTRA will:

- Synchronize data collection with your HPLC
- Autoset parameters to determine MW and R_g
- Generate custom reports and graphs
- Prepare for the next run

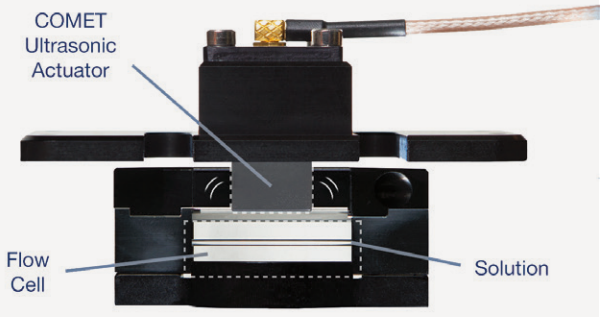
WyattQELS module

Measure the hydrodynamic radius of your sample with Wyatt QELS module installed or DynaPro® NanoStar® and optical fiber adapter.



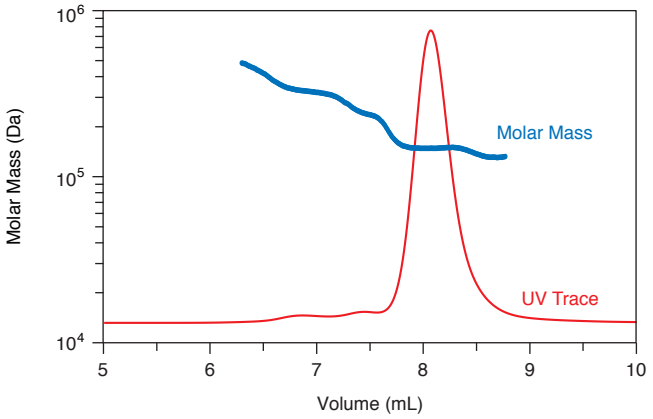
COMET module

The proprietary COMET module uses ultrasonic vibrations to clean the flow cell of particles.



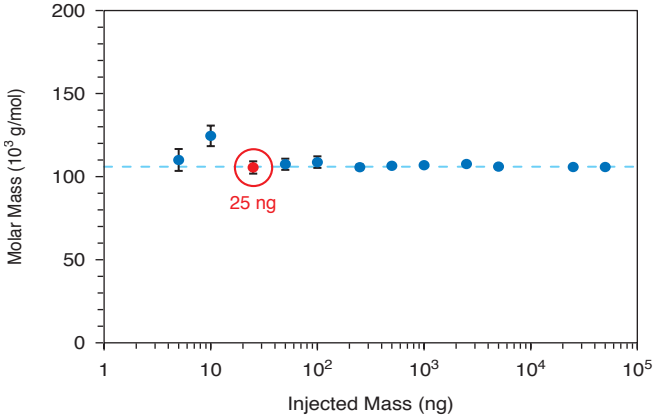

Laser Module
COMET Ultrasonic Actuator
Photo Detectors
Forward Monitor
WyattQELS Module
USB
FIBER
WyattQELS Optical Fiber
COMET Module
DASHBOARD
GRAPH
HISTORY
SETTINGS
WYATT
TECHNOLOGY
miniDAWN

Absolute molar mass analysis



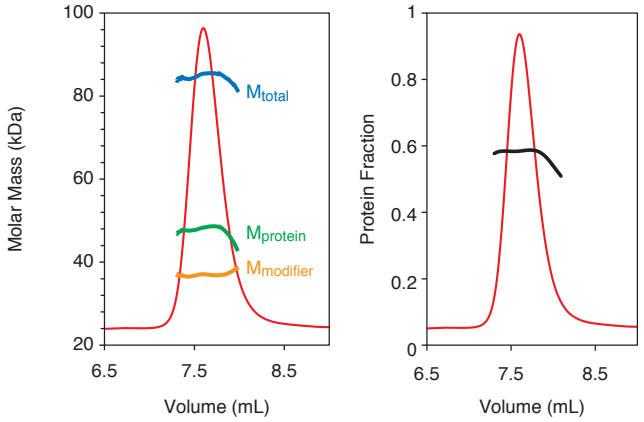
The miniDAWN is a perfect MALS detector for size-exclusion chromatography (SEC) in order to determine absolute molar masses and sizes of proteins or polymers eluting from the SEC column (IgG and oligomers shown here as an example). Its superior solvent compatibility and minimal maintenance requirement make it a robust tool for SEC-MALS. Furthermore, it can be augmented with an online DLS option and/or the ViscoStar® viscometer.

Sensitivity, precision and accuracy



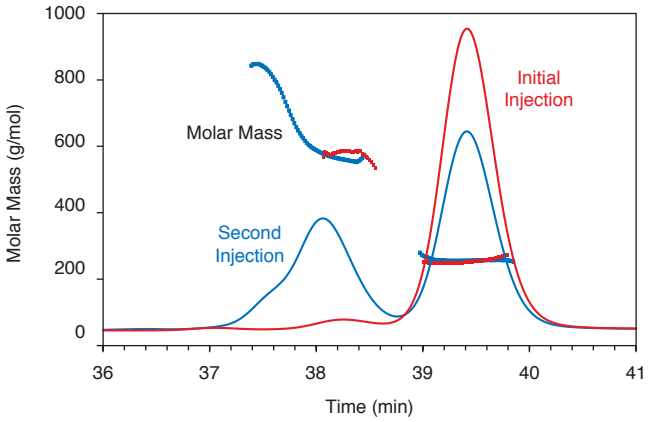
The miniDAWN provides sensitive, precise, and accurate measurements of the molar masses (MM) of polymers as demonstrated by the graph of MM vs. Injected Mass from a 1.05 x 10^5 g/mol polystyrene. The results were obtained from a 7.8 x 300 mm SEC column using THF as the mobile phase. Each data point is the average from three runs. The graph shows that accurate and precise MM is readily achieved with an injected mass of 25 ng and above.

Protein conjugates and block copolymers



The ASTRA workspace has rich features for characterizing modified proteins using the Protein Conjugate Analysis algorithm which uses simultaneous signals from UV, RI and MALS. The characterization results includes molecular weight, protein and modifier mass fractions, extinction coefficient and composition analysis. The same analysis works or copolymers as well.

Small polymers and peptides



Methylene diphenyl 4,4'-diisocyanate (MDI) has a molar mass of 250 Da and will readily form oligomers in THF. The superior sensitivity of the miniDAWN permits accurate characterization of low molar mass molecules like MDI, without reference to standards or column calibration of any kind. Over time, the sample aggregated and shows more oligomers (blue curve) compared to the initial injection (red curve).

Specifications

Measurements	
Molar Mass Range	200 Da to 10 MDa (proteins) or 1 MDa (linear polymers)*
Molecular Size Range (R_g)	≈ 10 nm to 50 nm, up to 150 nm with shape-specific models
Molecular Size Range (R_h)	In flow mode, 0.5 nm to 50 nm†; batch mode 0.5 nm to 1 µm (requires WyattQELS DLS module or DynaPro® NanoStar® + fiber optic connection)
Sensitivity	25 ng of 100 kDa polystyrene in THF or 500 ng of BSA in PBS, assuming standard 7.8 mm x 300 mm SEC column
Fluidics	
Mobile Phase Compatibility	All-solvent compatible (aqueous and organic); Wetted materials are 316 stainless steel, fused silica, and Kalrez
Optics	
Detectors	
MALS Detectors	High-gain, high dynamic range photodiodes at 3 detection angles
Auxiliary Detectors	Laser monitor for stabilization feedback; forward transmission monitor to correct signals for absorbing samples and to assess data quality
Dynamic Range	3,300,000:1
DLS Detector (optional)	WyattQELS dynamic light scattering module installs directly inside the miniDAWN chassis. Alternatively, the optical fiber pickup of the DynaPro NanoStar cuvette-based DLS instrument may be installed in the miniDAWN.
Laser Properties	
Laser Wavelength	658 nm ± 4 nm
Laser Power Control	Programmable 10% to 100%
Sample Temperature Control	Ambient
Electronics	
Analog Inputs	2 differential analog inputs with 24 bit resolution; Input range -10 V to +10 V
Analog Outputs	1 analog output from user selectable measurements channels -10 V to +10 V
Other Inputs/Outputs	Alarm in, Alarm out/retransmit, Auto-inject in, Auto inject contact closure retransmit, Recycle In/Out (operates Orbit™ recycle valve)
Computer Interface	Ethernet
Data Rate	Up to 36.6 Hz
Front Panel Display	162.5 mm, 16-bit, high resolution touch screen displays signal graphs, instrument settings, and diagnostics
Dimensions	58 cm (L) x 36 cm (W) x 18 cm (H)

* Depending on *dn/dc*, the sample concentration and chromatography conditions, this is typical.
† Assuming a flow rate of 0.5 mL/min.
Wyatt Technology is committed to continual improvement. Specifications are subject to change without notice.

Warranty: All Wyatt instruments are guaranteed against manufacturing defects for 1 year.

Left to Right
Geofrey K. Wyatt, Chief Executive Officer
Dr. Philip J. Wyatt, Chairman of the Board
Clifford D. Wyatt, President

For more than 35 years, we've operated as one of the very few remaining family-owned businesses in the analytical instrument industry. With installations in more than 65 countries, over 15,000 refereed journal publications citing our instruments and more than 25 PhD scientists on staff, we take great pride in the worldwide recognition that Wyatt Technology has received as a leading manufacturer of instruments and software for absolute macromolecular and nanoparticle characterization. Our dedication to providing customers with comprehensive training and personal support has made us the gold standard in this field.

The miniDAWN is one of many tools in Wyatt's Light Scattering Toolkit for Essential Macromolecular and Nanoparticle Characterization.

Learn more at www.wyatt.com

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