Malvern Panalytical

Zetasizer Core

Complete stability. One platform.



Next-generation biophysical screening, at scale

Early stability decisions shape the future of a biologics pipeline. Yet fragmented workflows, isolated measurements, and misaligned data slow progress—making late-stage aggregation and stability issues exceptionally costly.

A new era in biologics characterization is here

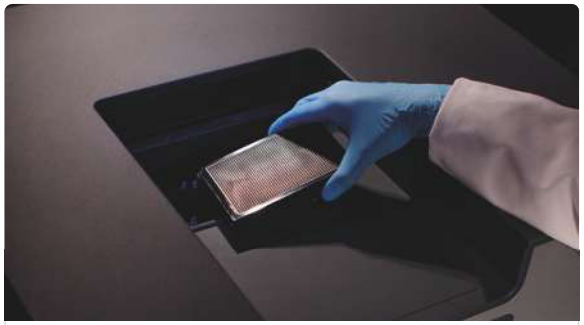
Accelerate your biologics discovery and development with the Zetasizer Core – an all-in-one platform engineered for high-throughput biophysical stability screening, with no compromise between throughput and data quality.

As the first system to combine dynamic light scattering (DLS), static light scattering (SLS), and differential scanning fluorimetry (DSF) into a single microwell plate workflow, Zetasizer Core delivers complete colloidal and structural stability data at scale. Screen candidates faster and get the insights you need to de-risk development with total confidence, across every stage of the biologics workflow.

With Zetasizer Core, you can:

- Use **zero proprietary consumables**, needing standard well plates only
- Measure up to **192 samples** per minute
- Generate **complete colloidal and structural stability data**
- Move from setup to results in **5 clicks**
- Trust **35+ years** of Zetasizer expertise

Measure up to
192 samples
per minute



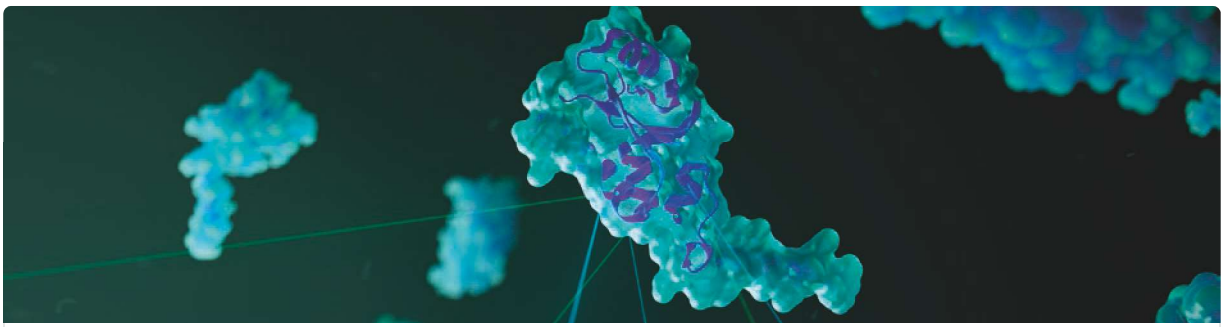
Consumable freedom

Full compatibility with standard microwell plates—zero proprietary lock-in or high consumable costs.



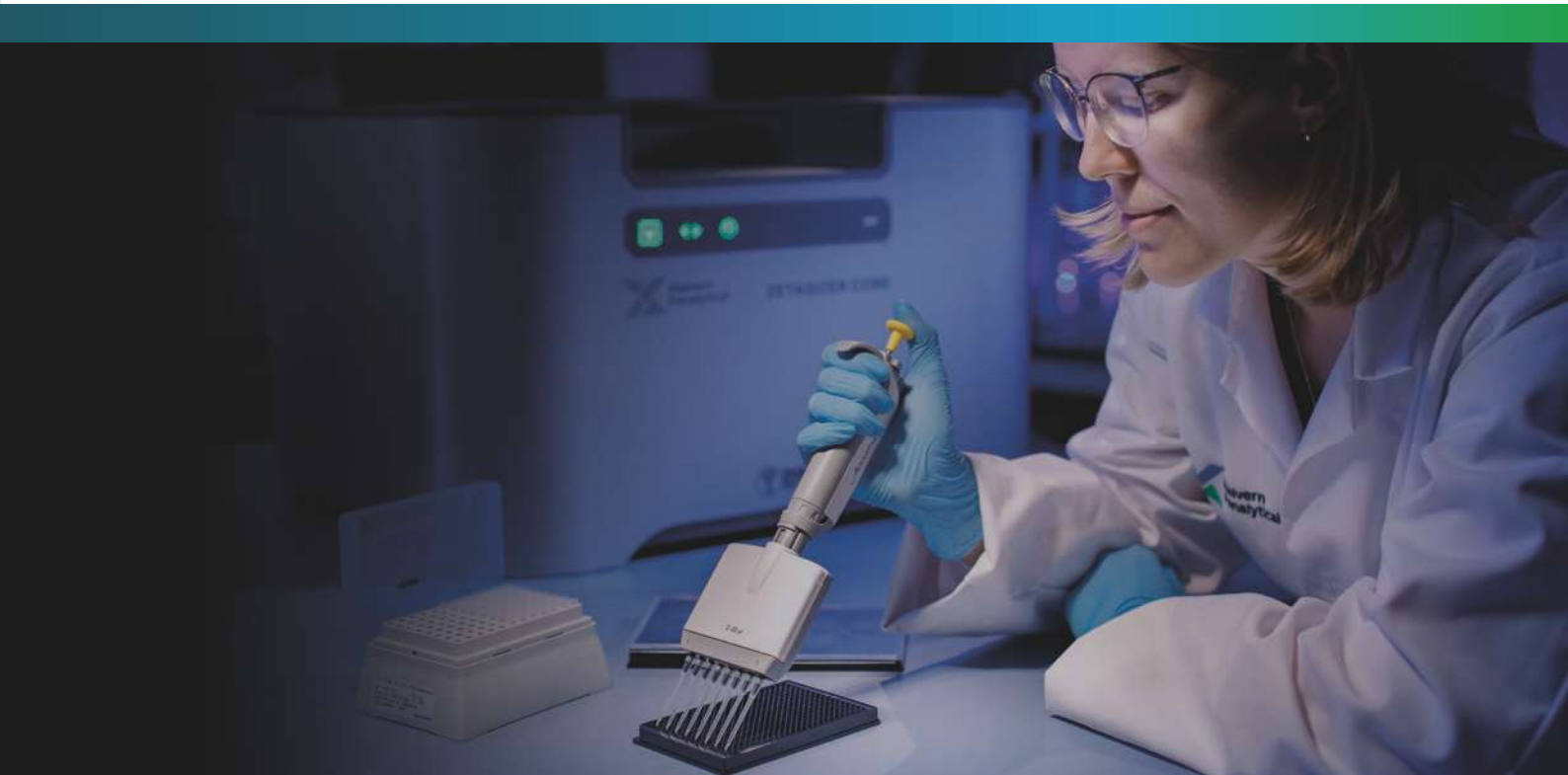
Rapid structural stability

Screen structural stability across 192 samples simultaneously at 1 °C per minute temperature ramps.



Unprecedented colloidal stability insights

Dedicated SLS optical path for precise quantification of protein self-association and repulsion (A_2 / B_{22}).



Inside the Zetasizer Core

Zetasizer Core accelerates stability screening by combining structural, colloidal and aggregation analysis in a single workflow—turning screening complexity into confident decisions.



1. **Exceptional data quality at scale:** Industry-leading precision for confident, high-throughput decision-making
2. **Multi-parameter stability insights:** Simultaneous measurement of size, colloidal stability, and structural stability
3. **Advanced thermal control:** Precise knowledge of the plate's thermal profile ensures absolute data reproducibility
4. **Microwell plate compatibility:** Seamless integration with 96-, 384-, and 1536-microwell plates
5. **Dedicated SLS detector:** Transforms B_{22}/second virial coefficient analysis from an expert-only measurement into a routine screening tool
6. **Impeccable heritage:** High-throughput DLS powered by the same trusted algorithms and Adaptive Correlation technology as the market-leading Zetasizer Advance
7. **Automation ready:** Designed for effortless integration into automated robotic workflows, including barcode reader compatibility
8. **ZS Discover software:** Intuitive interface lets users go from sample setup to results in just 5 clicks

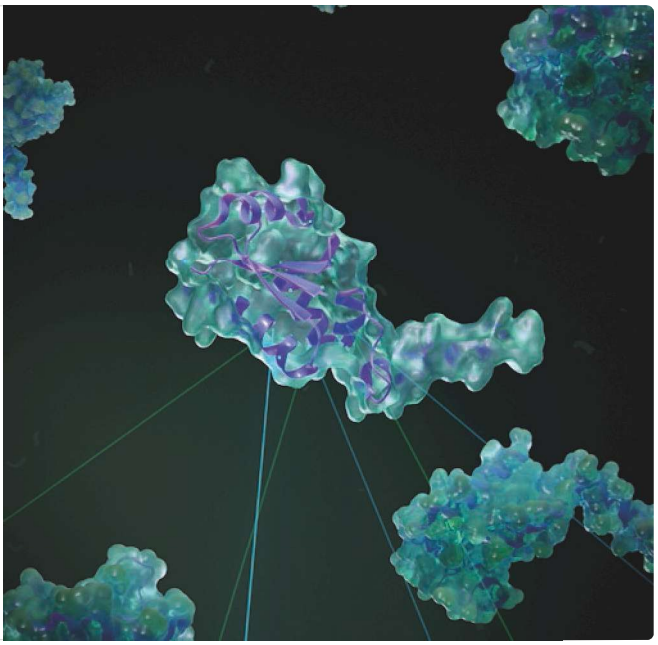

DSF
Malvern
Panalytical
ZETASIZER CORE
DIMER
INSTRUMENTS

Scale with confidence

Comprehensive stability insights, all on one platform

Assess structural and colloidal stability, aggregation risk, and formulation robustness—all in a single run.

- DSF capabilities for label-free thermal unfolding analysis, tracked via native fluorescence with no added reagents
- Dedicated SLS optical path for precise quantification of protein self-association and repulsion (B_{22} / A_2), transforming what was once an expert-only measurement into a routine screening tool
- DLS for hydrodynamic size, polydispersity, and early aggregation detection





Exceptional data quality you can rely on

Industry-leading precision, delivered run after run

- Advanced thermal control: precise plate thermal profiling ensures absolute data reproducibility
- Highly reliable light scattering analysis with trusted Zetasizer Advance algorithms and Adaptive Correlation technology
- Built on 35+ years of Zetasizer heritage, with full analysis continuity for existing users

Streamlined, open-architecture design

Full compatibility with standard well plates, with zero proprietary lock-in or high consumable costs.

- Low cost per data point (no proprietary consumables required)
- Built-in fitting methods remove guesswork from analysis
- From sample setup to results in just five clicks with ZS Discover software guided workflows
- Smart Manager delivers proactive remote service support
- Coupled with OmniTrust for 21 CFR Part 11 compliance (coming soon)





Rapid, high-throughput stability data at scale

Scalable screening and seamless automation integration for whatever your lab demands.

- Compatible with 96-, 384-, and 1536-well standard plates for a range of throughput needs
- Screen structural stability across 192 samples simultaneously at 1 °C per minute temperature ramps
- Use as little as 4 µL per well at 1536-well scale, protecting your precious sample
- Automation-ready capabilities coming soon: full compatibility with standard laboratory robots via open API and barcode reader

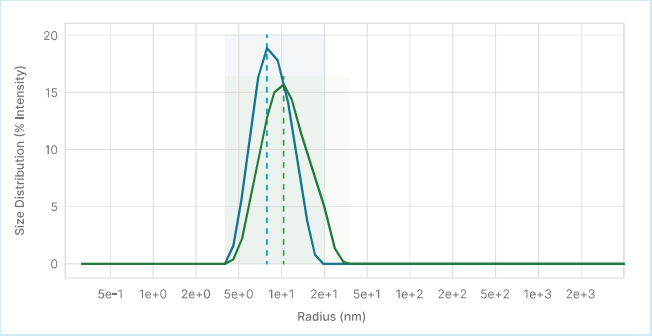
Gold-standard stability screening across every stage of biologics development

High-throughput dynamic light scattering (DLS): Aggregation and size screening

Track hydrodynamic size and early self-association using high-throughput DLS. Zetasizer Core monitors scattered light fluctuations to map particle size distributions and detect aggregation, verifying that proteins remain stable in solution before developability risks escalate.

Key applications

- **Polydispersity & quality control:** Confirm sample monodispersity and track hydrodynamic size to ensure absolute structural uniformity across batches.
- **High-concentration screening:** Quantify the diffusion interaction parameter (k_D) to predict colloidal stability at therapeutic levels, tracking early self-association and molecular crowding as concentrations scale.
- **Formulation & storage stability:** Evaluate particle stability across diverse buffer matrices over time or under physical stress to predict shelf life and avoid precipitation.

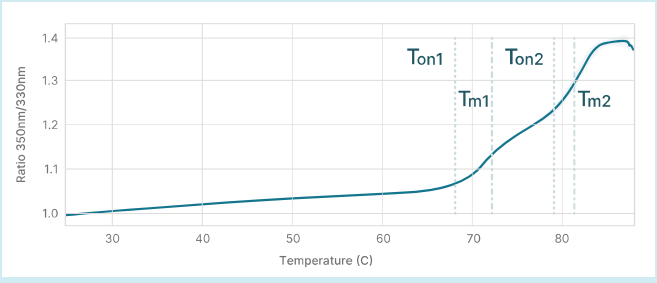


Intrinsic differential scanning fluorimetry (DSF): Fast, label-free thermal stability screening

Measure thermal unfolding under native conditions using intrinsic DSF. The Zetasizer Core DSF tracks a protein's natural fluorescence during a controlled temperature ramp. By plotting the 350/330 nm ratio, it pinpoints the melting temperature (T_m) and maps conformational stability – without extrinsic dyes or labeling steps.

Key applications

- **Protein purification:** Check sample quality and structural integrity immediately post-isolation.
- **Target-ligand screening:** Verify binding and structural shifts before committing to downstream affinity screens.
- **Formulation & developability:** Benchmark thermal thresholds to optimize matrices and de-risk the pipeline.

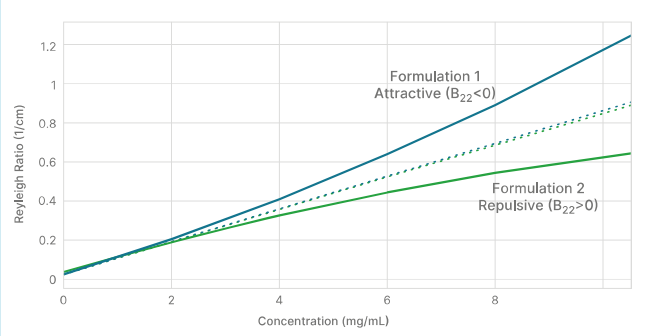


Static light scattering (SLS): Colloidal stability and thermal aggregation

Identify thermal aggregation, quantify absolute molecular weight, and map self-association behavior using SLS. The system measures average scattered light intensity to deliver clear, direct insights into colloidal stability, helping you confidently de-risk formulation development and candidate selection.

Key applications

- **Thermal aggregation (T_{agg}):** Monitor the exact temperature where a protein begins to self-associate during a controlled thermal ramp, capturing the precise onset of physical aggregation.
- **Intermolecular interaction mapping (B_{22}):** Quantify the second virial coefficient to directly measure non-specific protein-protein interactions, allowing you to rank formulation buffers based on their ability to prevent long-term aggregation.
- **Excipient & buffer screening:** Evaluate exactly how changes in pH, salt concentrations, or protective excipients impact a protein's molecular weight and physical stability, ensuring optimal structural integrity before scale-up.



Built on Zetasizer expertise

The Zetasizer Core builds on decades of Malvern Panalytical experience in light scattering and protein characterization. It extends trusted Zetasizer technology into a high-throughput, plate-based workflow designed for biologics discovery, formulation, and development.



Why you can trust us:

- 35+ years of Zetasizer DLS expertise
- Trusted algorithms for reliable light scattering analysis
- Analysis continuity for existing Zetasizer users
- Designed to support standardization across laboratories
- Developed for high-quality data at scale
- 21 CFR Part 11 functionality **coming soon**: Malvern Panalytical's new solution for 21 CFR Part 11 and GMP Annex 11 compliance will provide flexible configuration of roles and permissions to fit your workflow, supporting electronic records and signatures.

Engineered for confidence at every stage

Zetasizer Core comes in two models:

Zetasizer Core DSF

High-throughput conformational and colloidal stability screening

Total stability analysis (DLS + SLS + DSF):

Our flagship model combines the colloidal insights of DLS and SLS with the powerful structural data of DSF. Sizing and aggregate measurements are enabled seamlessly across automated thermal ramps, mapping physical particle changes directly to structural unfolding events from DSF.

Dual-stability insight

Measure both physical aggregation and thermal stability (unfolding) in a single run.

Best for

Biotherapeutic pre-formulation screening, early-stage candidate selection, structural biology R&D, and high-throughput profiling where tracking thermal denaturation (T_m) is critical to predicting long-term product stability.

Zetasizer Core

High-throughput size and colloidal characterization

Size & aggregation screening (DLS + SLS)

The ideal solution for labs focused strictly on physical stability, colloidal stability screening, and routine quality checks. This high-performance instrument delivers identical high-throughput DLS and SLS performance.

Precision sizing

Fast, accurate determination of hydrodynamic size, polydispersity, and aggregation states.

Colloidal stability

SLS and DLS capabilities for reliable k_D and B_{22} interaction parameter assessment.

Best For

Routine formulation testing, quality control, scale-up monitoring, and robust colloidal screening workflows where thermal unfolding data is not required.



Parameter	Zetasizer Core DSF	Zetasizer Core
Primary focus	High-throughput conformational and colloidal stability screening	High-throughput size and colloidal characterization
Analytical capabilities	DLS / SLS / DSF	DLS / SLS
Thermal unfolding (T_m, T_{onset})	✓	✗
Aggregation mapped to structural unfolding (T_{agg})	✓	✗
Ligand binding (EC_{50})	✓	✗
Chemical denatuaration (C_m)	✓	✗
Sizing and aggregation (d_H, PI)	✓	✓
Colloidal stability (k_D, B_{22})	✓	✓

Which instrument is right for you?

If your workflows only require monitoring particle size, aggregation, and physical shelf-life, the Zetasizer Core is your high-throughput workhorse.

If you are working with proteins, antibodies, or delicate biomolecules where thermal shifts cause structural unfolding before visible aggregation occurs, choose the Zetasizer Core DSF for total pipeline security.



Key application areas

Proteins

Accelerate therapeutic protein developability and formulation decisions.

For therapeutic proteins, the Zetasizer Core supports early and confident evaluation of stability, aggregation, and formulation robustness. By screening multiple candidates, buffers, and stress conditions in a scalable, high-throughput plate-based format, scientists can identify promising molecules earlier and significantly reduce the risk of late-stage instability.

Key applications

- **Candidate selection & lead optimization:** Rank variants early based on robust physical stability profiles.
- **Early developability assessment:** Flag problematic or unstable molecules before they advance down the pipeline.
- **Aggregation & self-association screening:** Monitor physical particle behaviour under varying concentrations and environmental conditions.
- **Formulation & buffer screening:** Rapidly optimize excipients, pH matrices, and salt conditions.
- **Long-term stability studies:** Generate highly reproducible baseline data for shelf-life and degradation tracking.

Antibodies

Screen antibody stability with confidence and high throughput.

Antibody development programs require the simultaneous comparison of dozens of variants, formulations, and stress conditions. The Zetasizer Core enables comprehensive, multi-parameter assessment of antibody stability by combining size, aggregation, self-association, and thermal stability readouts into a single, automated workflow—helping teams make faster, better-informed decisions.

Key applications

- **Antibody Candidate Ranking:** Drive faster "go/no-go" decisions when managing large candidate pools.
- **Thermal Stability Comparison:** Evaluate structural unfolding profiles and thermal melting temperatures (T_m) in a single run.
- **Aggregation Monitoring:** Detect trace aggregates and monitor physical stability under stress conditions (thermal, mechanical, or chemical).
- **Formulation Optimization:** Rapidly map out the ideal chemical space to maintain antibody structural integrity.
- **Comparability & Robustness Studies:** Ensure structural and colloidal consistency across batches or process changes.

Automation-ready

The Zetasizer Core is designed for effortless integration into automated biologics workflows. A standard robotic API and integrated barcode reader are coming soon, and will enable full walk-away operation with standard lab robots, with no custom hardware or proprietary adapters required.

ZS Discover software

ZS Discover is purpose-built for high-throughput biologics stability screening – powerful enough for experts, intuitive enough for any user. Go from sample setup to results in only five clicks, with guided workflows, automatic multi-transition fitting, and built-in analysis tools that remove subjectivity from data interpretation.

Lipid nanoparticles (LNPs) & viral vectors

Ensure product consistency with high-throughput sizing and aggregate detection.

For advanced drug delivery systems and gene therapy vectors, maintaining precise particle size and sample homogeneity is critical for therapeutic efficacy and safety. The Zetasizer Core provides high-throughput, plate-based analysis to rapidly monitor size, polydispersity, and trace aggregation. This enables development and manufacturing teams to seamlessly evaluate formulation stability, assess stability across storage conditions, and maintain strict quality control.

Key applications

- **Precision sizing & PDI monitoring:** Accurately measure hydrodynamic diameter and polydispersity index (PDI) to ensure optimal delivery and encapsulation efficiency.
- **Trace aggregate detection:** Rapidly screen for early-stage aggregation or sample degradation that could impact product safety and immunogenicity.
- **Batch-to-batch variability tracking:** Establish stringent reproducibility and structural consistency across multiple production lots or scale-up batches.
- **Quality control (QC) & process development:** Monitor sample stability and size distribution changes throughout downstream purification and manufacturing workflows.
- **Formulation Stability Screening:** Evaluate how different buffer matrices, lipid compositions, or concentration levels impact physical particle integrity over time.



Proactive remote support with Smart Manager

Smart Manager connects the Zetasizer Core to Malvern Panalytical's Tech Support Center 24/7, proactively monitoring instrument health and alerting engineers before issues arise. Reduce downtime, maximize uptime, and get expert guidance wherever you are.

Specifications

Section	Specification	Comment
Dynamic Light Scattering (DLS)		
	Min volume	4 uL (1536-well plate)
	Min conc, 14 kDa	0.125 mg/mL
	Range, average d_H	0.6 nm – 2000 nm
	Min acquisition time	1 sec
	Fitting method	Malvern Panalytical Zetasizer cumulants & multimodal regularization
	Advanced acquisition method	Malvern Panalytical Zetasizer Adaptive Correlation
Static Light Scattering (SLS)		
	Molar mass range	<1000 Da to 1 MDa
	SLS resolution	5% or 5 kDa, whichever is larger
	Sample concentration	0.05mg/mL - 200mg/mL (protein dependent)
Fluorescence		
	Excitation	280 nm
	Detection	330 & 350 nm
	Sample concentration	0.005mg/mL - 200mg/mL (protein dependent)
Minimum Sample Volumes		
	Sample format	96, 384, 1536 plates
	Ultra-low volume (1536)	4 uL sample
	Low volume (384 round)	10 uL sample
	High-quality (384 square)	40 uL sample
	High-volume (96)	100 uL sample
Instrument Parameters		
	Light scattering wavelength	830 nm
	Attenuation range	1 to 10^5
	Temperature range	4 to 95 °C
	Max temp ramp	3 °C/min
	Power	100-240 V AC, 50-60 Hz, Max Power 600 W
	Laser Classification	Class 1
	Condensation Control	Purge facility using dry air
Measurement Throughput		
	Max samples per minute DSF/SLS	192 samples per minute

Section	Specification	Comment
Data		
	Thermal stability outputs	T_m, T_{onset}, T_{agg}-SLS, T_{agg}-DLS
	Fitting method	Auto-fit with multi-transition support
Applications		
	Thermal stability (T_m, T_{agg}-SLS, T_{agg}-DLS)	
	Long term stability	
	Chemical stability (C_{50})	
	Thermal shift assay (EC_{50})	
	Colloidal stability (k_D, A_2/B_{22})	
	Aggregation state / sizing (diam, PI) – Plus full distribution analysis	
Software & Data Management		
Software	Multi run workbooks	
	Sample and dispersent databases	
	Acquisition-level data review	
	5-clicks software workflow	
Hardware	Barcode reader integration	
	Plate presence sensor	
Options & Integration		
	Robotic handling API*	
	OmniTrust (21CFR part 11) compliance package*	
Serviceability		
	Modular field replaceable units for minimized downtime	
	System self-diagnostic	
	HW & SW error and use logging	
	Smart Manager (Malvern Panalytical remote support)	
Instrument Dimensions		
	Width	620 mm
	Depth	542 mm
	Height	375 mm
	Weight	29 kg

About Malvern Panalytical

Malvern Panalytical provides market-leading, material characterization technologies for the world's most innovative companies, academic institutions, and government laboratories to optimize and accelerate the development of advanced materials.

We support our customers through their biggest challenges by uncovering critical insights in material properties. From developing lifesaving vaccines and next-generation therapeutics to advancing clean energy solutions and sustainable industrial processes, we give scientists the confidence to make important decisions that shape the world we live in.

We wake up every day to delight our customers and help them solve the problems that matter. Through innovation, high-quality solutions and workflows, and excellence in customer satisfaction, we help reduce lead times, increase repeatability, and deliver data that is actionable and easily understood.

Our vision is to continue to be a trusted and recognized leader for quality and insights in material characterization, helping our customers navigate complex scientific topics with accuracy and ease.

We win customers with performance and keep them with service and insights. We are the 'Best together.' Our people are experts in their fields, delivering value and innovation for each other and for our customers. With diversity in experience and customer-centric thinking, we are the best choice for researchers and scientists seeking competitive advantage in the market.

We have a high-performance culture - empowering teams, quick decision-making and serving customers more effectively - grounded in agility, clarity and transparency, with speed and focus critical to our success, all shaped by our values: Own it. Aim High. Be True.

We are committed to helping to solve our customers' greatest challenges to make the world cleaner, healthier and more productive for the future.

Service & Support

Malvern Panalytical provides the global training, service and support you need to continuously drive your analytical processes at the highest level. We help you increase the return on your investment, and ensure that as your analytical requirements grow, we're there to support you.

Our worldwide team of specialists adds value to your business processes by ensuring applications expertise, rapid response, and maximum instrument uptime.

- Proactive local and remote support
- Full and flexible range of service agreements
- Compliance and validation support
- Onsite or classroom-based training courses
- e-Learning training courses and web seminars
- Digital services, including MyStore and My Customer Support Portal
- Sample analysis, method development, and applications consultancy

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