Malvern Panalytical
a spectris company

Mastersizer 3000+

Malvern laser diffraction technology

The smartest way to measure particle size

Class-leading performance with added intelligence

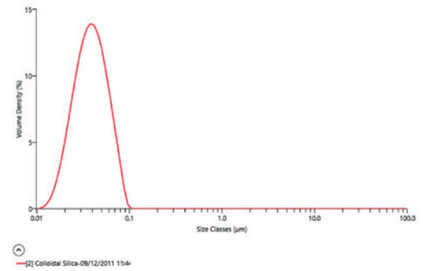
Mastersizer 3000+ builds on the trusted and market-leading Malvern Panalytical platform to define the next evolutionary step in particle size analysis. The plus embodies groundbreaking easy-to-use capabilities that boost your confidence during your work and in your results. Smart Manager harnesses the power of IoT to ensure instrument health and makes the Mastersizer 3000+ more connected than ever. Data Quality Guidance gives real-time feedback and troubleshooting advice, whereas SOP Architect, fueled by automated data analysis algorithms, guides you to develop optimized settings for your methods. The truly innovative Size Sure algorithm gives you certainty in your size results and the OmniTrust unified software application supports compliance with regulatory requirements and data integrity.

Impressive particle sizing performance

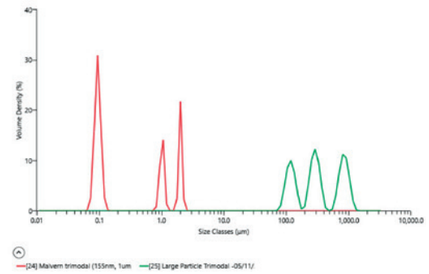
The Mastersizer 3000+'s core foundation is its excellent particle sizing performance, for particles ranging from 10 nm to 3.5 mm. With superior accuracy in sub-micron measurements, excellent measurement reproducibility, and unrivaled resolution for multimodal size distributions, this instrument is ready for any challenge.

Software that eases your workload

You don't need to be an expert to get great-quality data from the Mastersizer 3000+. A range of intelligent, user-friendly digital features in our new Mastersizer Xplorer software, provide an intuitive interface, streamlined method development, and expert advice on your results. So you can not only get excellent results, but use them to make excellent decisions.



Ludox



Trimodal particles

Compact footprint

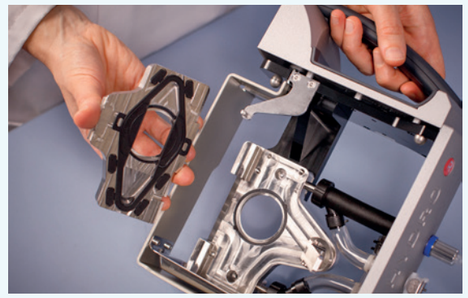
The Mastersizer 3000+ uses industry-leading design and ergonomics to deliver a stylish modern look in a practical, compact footprint. Measuring only 69 cm x 30 cm, it enables efficient, productive use of your valuable bench space.

Automatic alignment and cell location

Correct optical alignment is critical to getting accurate and repeatable particle size results. The Mastersizer 3000+ was designed with this in mind. It auto-aligns before every measurement. And for additional security, each time a sample measurement cell is inserted, an auto-locking mechanism ensures it is correctly positioned.

Easy access for cleaning

The sample measurement cells feature a quick-release window-sealing mechanism, allowing easy access to the sample windows without special tools. This makes cleaning the windows extremely simple, improving productivity and allowing regular maintenance for top performance.



A system built with brilliance

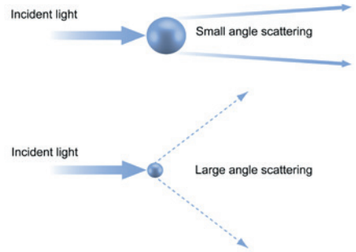
Quality data you can rely on

The Mastersizer 3000+ uses laser diffraction to measure particle size distributions from 10 nm to 3.5 mm. Its optical core design delivers measurements in as little as a few seconds, enabling high sample throughput.

Laser diffraction

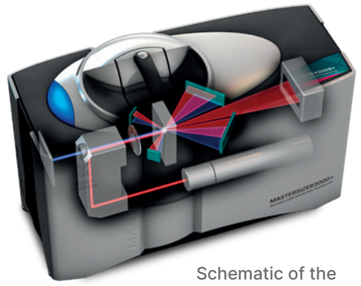
In a laser diffraction measurement, a laser beam passes through a dispersed particulate sample and the angular variation in intensity of the scattered light is measured. Large particles scatter light at small angles relative to the laser beam, and small particles scatter light at large angles.

The angular scattering intensity data is then analyzed to calculate the size of the particles that created the scattering pattern using the Mie theory of light scattering. The particle size is reported as a volume equivalent sphere diameter.



Wide dynamic range

The patented folded optical design in the Mastersizer 3000+ provides an impressive particle size range from 10 nm up to 3.5 mm using a single optical measurement path. The Mastersizer 3000+ uses a sequential combination of measurements with red and blue light sources to measure across the entire particle size range. Measurement of large particulates is provided by an advanced focal plane detector design able to resolve very small diffraction angles. Sensitivity to sub-100 nm particles, scattering light at wide angles, is achieved using advanced optics and a powerful 10 mW solid-state blue light source.



Schematic of the Mastersizer 3000+ Ultra

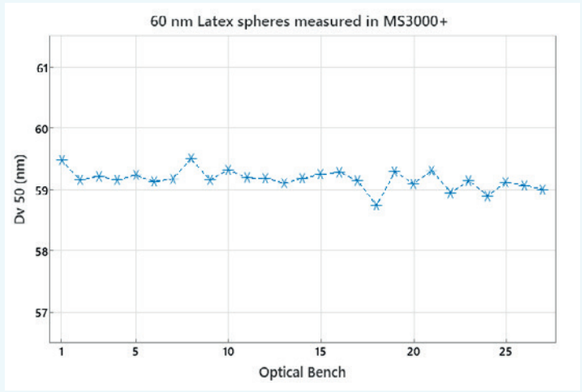
Verifiable accuracy and repeatability

Mastersizer particle size analyzers are used every day in production-critical environments around the world. The Mastersizer 3000+ delivers verifiable particle sizing performance that you can rely on:

- 0.6% accuracy for polystyrene latex standard measurements
- Better than 0.5% repeatability on polystyrene latex standards
- Better than 1% reproducibility on polydisperse standards, exceeding ISO 13320:2020 and USP recommendations

Thermal management for dispersant stability

The Mastersizer 3000+ also now incorporates an innovative new design to achieve and maintain a stable dispersant temperature in record time. This means you get the same quality data without having to wait, freeing time for other tasks.



Reproducibility data for Mastersizer 3000+ Ultra

Mastersizer Auto-Lab

Saving valuable time

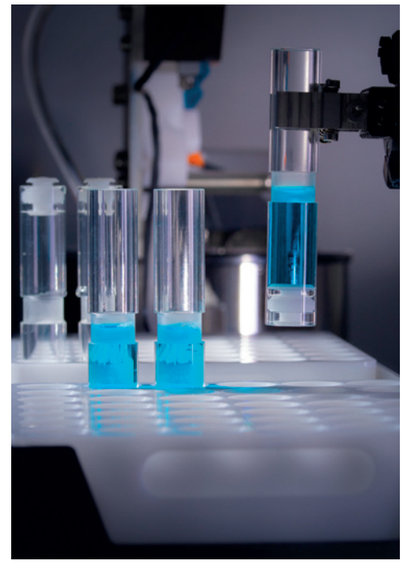
The Mastersizer Auto-Lab measures up to 42 samples and you can utilize the same great measurement performance and flexibility as the Mastersizer whilst minimizing manual operating time. Freeing your team to be where they will add most value to your business. For this and more Mastersizer automation opportunities, contact your Malvern Panalytical representative!

Continuity and reproducibility

The Mastersizer Auto-Lab is designed to house the Mastersizer range and uses the same reliable SOPs developed for your manual measurements

A robot selects a pre prepared sample vial from the input sample tray and moves it to the dispersion unit. Using a plunger and rinse system we ensure all your sample is measured. This ensures no sampling bias or cross contamination.

The sample tray can accommodate 3 priority samples meaning you can interrupt the sequence to get the data you need when you most need it.



Specification

Sample specification	
Sample number	42 plus 3 in a priority tray
Size range	* 1500 µm (MV) 2100 µm (LV)
Sample volume	0.5 ml to 10 ml

General	
Measurement time	5 minutes (SOP dependent)
Dimensions	845 mm (h) x 995 mm (w) x 1370 mm (l)
Notes	LIMS integration possible (optional)

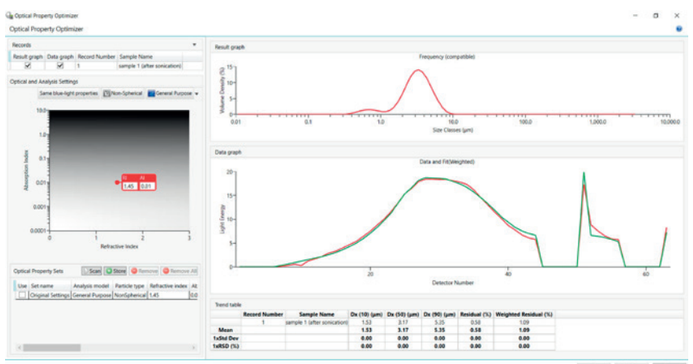
Mastersizer Xplorer

Guidance through every measurement stage

In today's busy laboratory environments, with more and more demands on instruments and users, software that is intuitive and easy to use is essential. The Mastersizer Xplorer software guides users through every stage of a measurement, from method development to result reporting. This reduces training requirements and makes fast, routine particle-size measurements possible.

Key Mastersizer Xplorer features that make high-quality particle size measurements easier than ever include:

- Intuitive look and feel
- Rapid method development with the measurement manager dashboard
- Immediate feedback on your data with Data Quality Guidance
- Simple, customizable reporting to present your data the way you want it
- Method development and support tools, including SOP Architect and a unique optical property optimizer
- Automated measurement sequencing with SOP Player



Measurement Manager

Method development made simple

Being able to view how particle-size results change with dispersion conditions is essential to rapid method development within ISO and USP guidelines. With the Measurement Manager window, users can observe, control, and optimize measurement conditions in real time, making the method development process as efficient and straightforward as possible.

Measurement manager

1. Measurement progress bar
2. Laser obscuration gauge
3. Live scattering data display
4. Live PSD display
5. Trend display
6. Accessory control panel
7. Data Quality Guidance tab

Data Quality Guidance

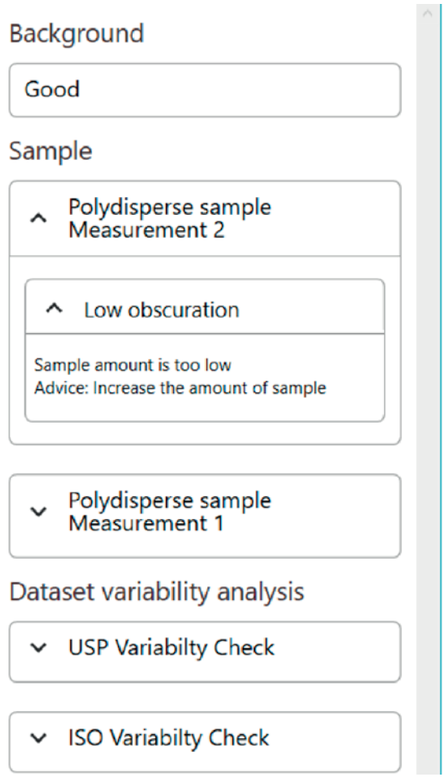
Making good data excellent

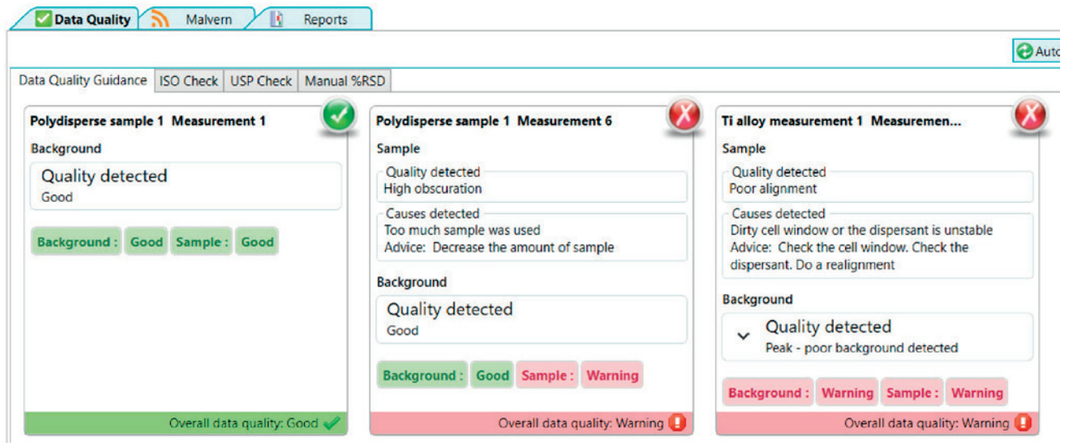
Any scientist will know that, to ensure robust results, it's good experimental practice to assess measurement quality. The Data Quality Guidance feature within the Mastersizer Xplorer software supports this, providing an immediate assessment of your data quality. This means you can spend less time troubleshooting and more time working with results you are confident in.

Using the power of machine learning, this feature continually screens for a wide array of potential data quality issues. Data Quality Guidance clearly flags any potential issues with a list of causes and solutions ranked from most to least likely, so you can get back on track.

Data Quality Guidance takes users through the full analytical process, including:

- Background suitability
- Individual sample measurements (obscuration, alignment, negative data, data fit, and optical model selection)
- Dataset sample measurement completion (%RSDs relative to ISO 13320:2020, USP <429> and user-specified acceptance criteria)





SOP Architect

Method matters

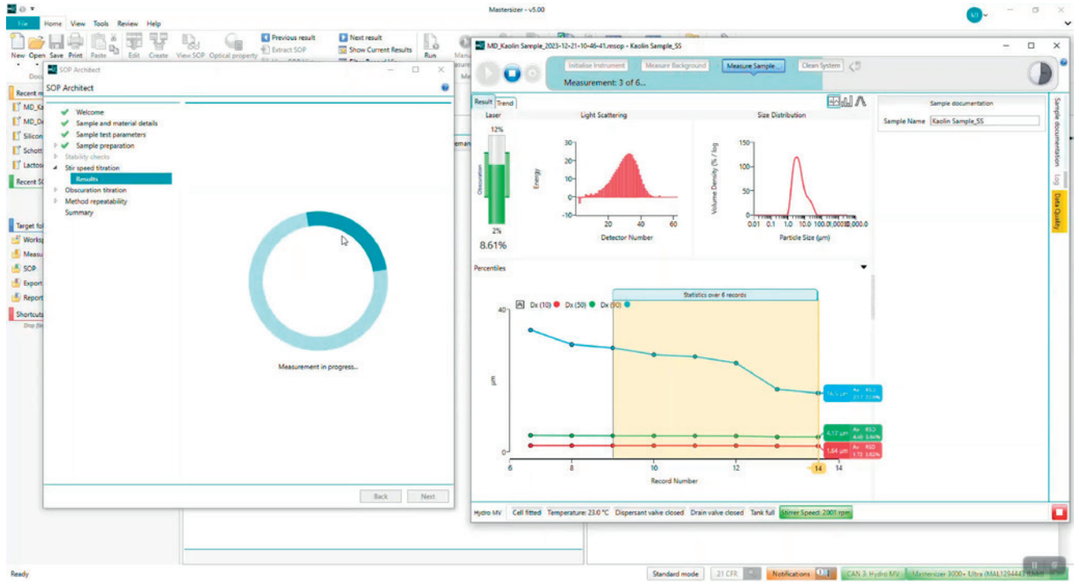
Without support, the method development process can be challenging: there are many experiments to perform and many decisions to make when reviewing data. SOP Architect provides that support so that you can develop better methods more quickly.

This AI-driven application guides you through a standardized workflow that supports novice users and validates experts' decision-making. Its specialized tests and smart algorithms give you the best possible starting point for your research method or SOP.

With Malvern Panalytical expertise built in, the tool helps you embed best practices into your workflow and avoid errors and inconsistencies. A clear, step-by-step process acts as a self-contained training session, making future development even easier.

SOP Architect is available as a standard feature of the Mastersizer 3000+ Pro and Ultra, and covers all core components of the method development process for wet dispersed samples:

- Sample preparation
- Dispersion stability
- Stir speed titration
- Obscuration titration
- Method repeatability



Adaptive Diffraction and Size Sure

Deeper analysis for smarter insights

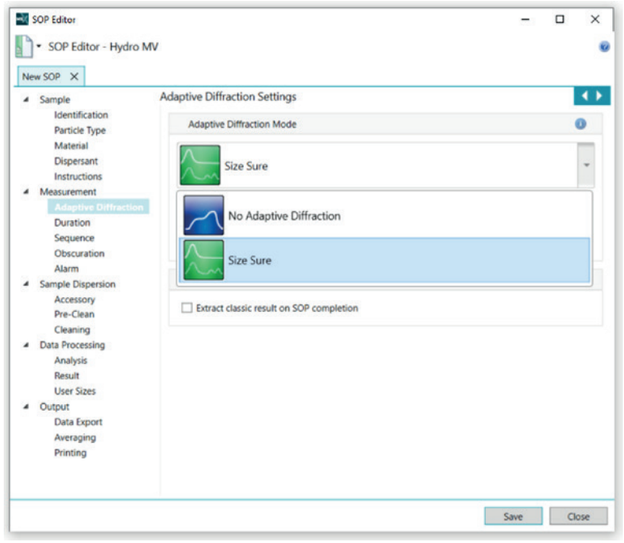
In real-world applications, outside influences can make your laser diffraction measurements more difficult. Contaminants, bubbles, and dust can all interfere and contribute to the measured scattering signal, resulting in misleading particle size distributions.

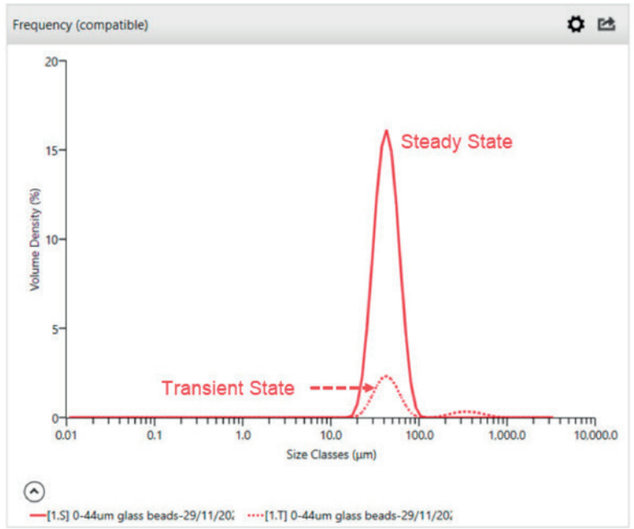
Adaptive Diffraction, Malvern Panalytical's patent-pending digital technology based on machine learning, mitigates these outside influences to enable more reproducible results. Made possible by the Mastersizer's lightning-fast acquisition rate of 10 kHz, this software application provides a new way of presenting your data. It displays data from outside transient influences separately from the steady-state sample data.

The Size Sure measurement mode in Mastersizer Xplorer uses Adaptive Diffraction to store sub-run measurement data and then applies machine-learning classification of the data as either 'steady state' or 'transient state'. The steady state is a reliable description of your sample, whereas the transient state also reveals any temporary events – particles or otherwise.

By using Size Sure in your analyses, you can characterize your samples quickly and reliably. You get a clear view of steady-state sample results vs transient events, which reduces the time you spend troubleshooting misleading results. In this way, Size Sure allows you to make better-informed decisions.

Size Sure is a standard feature of the Mastersizer 3000+ Ultra.





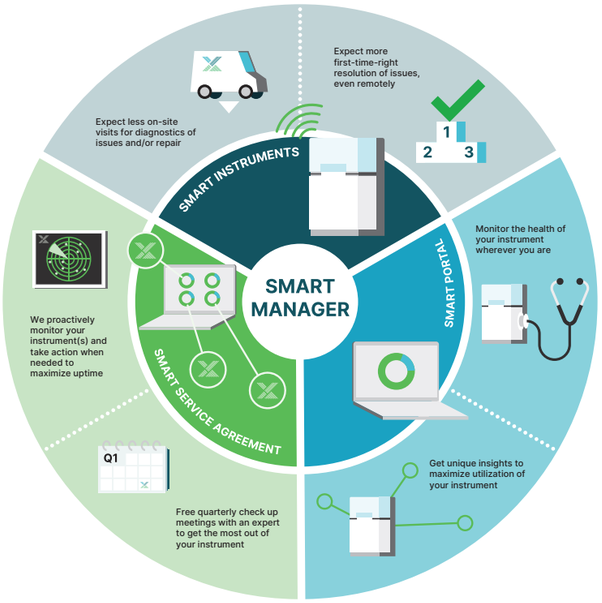
Smart Manager

Daily support to optimize uptime

Smart Manager is a cloud based background service that performs a regular 'health check' on several of Malvern Panalytical's Instruments. The Mastersizer 3000+ has the ability to connect to this cloud platform, reporting any problems to our engineers at the Tech Support Center so you don't have to think about it. Our online customer support help desk can warn you before a failure happens, or reorder failed parts without the need for an on-site service visit. By reducing the need for service travel, this option saves time, money, and emissions. Smart Manager's lifetime remote support capability comes as standard with every Mastersizer 3000+.

By upgrading your smart instrument to Smart Service Agreement you receive proactive monitoring and multiple checks each week from our Global Tech Center suited to your requirements and notified when there is a warning or error. You'll get a quarterly report of any actions taken to balance insight with peace of mind.

Do you look after multiple instruments? The Smart Portal can help you proactively manage your Instrument portfolio from one convenient Digital Dashboard. Contact your Malvern Panalytical representative to find out more about Smart Service Agreement and Smart Portal in your area!



OmniTrust

Streamlined compliance you can trust

The Ultra version of the Mastersizer 3000+ works with OmniTrust: our unified software application that can form part of your solution for regulatory compliance and data integrity. In particular, OmniTrust helps in achieving 21 CFR Part 11 compliance.

You can opt to upgrade from your previous feature keys for 21 CFR Part 11. Record audit data will remain viewable through the new software.

This software requires valid license keys.

OMNITRUST

Mastersizer 3000+ Lab, Pro and Ultra

The flexibility to suit your application and budget

Every application area – and budget! – is different. That's why the Mastersizer 3000+ range contains options that cater to multiple needs. The Mastersizer 3000+ Lab, Pro, and Ultra options are all based on the same class-leading hardware and easy-to-use software, and offer different levels of functionality and compatibility:

Mastersizer 3000+ Lab

- Measures particles ranging from 0.1 – 1,000 µm
- Manual wet and dry dispersion units only
- Basic software with updates and bug fixes only
- Upgrade to Mastersizer 3000+ Pro or Ultra at any time

Mastersizer 3000+ Pro

- Measures particles ranging from 0.1 – 1,000 µm
- Supports automated wet sample dispersion units
- Advanced software functionality with updates and bug fixes
- Upgrade anytime to Mastersizer 3000+ Ultra

Mastersizer 3000+ Ultra

- Measures particles ranging from 0.01 to 3,500 µm
- Supports automated wet and dry sample dispersion units
- Advanced software functionality with updates and bug fixes
- Compatible with Adaptive Diffraction technology

This quick reference table can help you decide which instrument in the Mastersizer 3000+ product family best suits your application.

Description	LAB	PRO	ULTRA
Hardware compatibility			
Particle size range	0.1 µm to 1000 µm	0.1 µm to 1000 µm	10 nm to 3500 µm
Manual wet dispersion units (Hydro EV, SM and SV)	✓	✓	✓
Manual dry powder dispersion unit (Aero M)	✓	✓	✓
Automated wet dispersion units (Hydro MV and LV)		✓	✓
Automated dry powder dispersion unit (Aero S)			✓
Software compatibility			
SOP operation	✓	✓	✓
Customisable reporting	✓	✓	✓
Compatibility with entry-level legacy system results	✓	✓	✓
Smart Manager	✓	✓	✓
Advanced method development tools (e.g., SOP Architect)		✓	✓
Data Quality Guidance assessment and reporting tools		✓	✓
Advanced measurement manager functions		✓	✓
Measurement sequencing / SOP player		✓	✓
Ability to use software on multiple workstations		✓	✓
Size Sure measurement mode			✓
IQ/OQ Validation			✓
21CFR Part 11 Support via OmniTrust (licensed)			✓

Main system specifications

Particle size distribution	Suspensions, emulsions, dry powders	
General		
Principle	Laser light scattering	
Analysis	Mie and Fraunhofer scattering	
Data acquisition rate	10 kHz	
Typical measurement time	<10 sec	
Optics	**Mastersizer 3000+ Ultra**	**Mastersizer 3000+ Lab/Pro**
Red light source	Max. 4 mW He-Ne, 632.8 nm	Max. 4 mW He-Ne, 632.8 nm
Blue light source	Nominal 10mW LED, 470nm	None
Lens arrangement	Reverse Fourier (convergent beam)	Reverse Fourier (convergent beam)
Effective focal length	300 mm	300 mm
Detector		
Arrangement	Log-spaced array	Log-spaced array
Angular range	0.015 - 144 degrees	0.032 - 60 degrees
Alignment	Automatic	Automatic
Size		
Size range	10 nm - 3.5 mm *	0.1 to 1000 µm *
Number of size classes	100 (user adjustable)	100 (user adjustable)
Accuracy	0.6% **	0.6% **
Repeatability	Better than 0.5% variation *	Better than 0.5% variation *
Reproducibility	Better than 1% variation *	Better than 1% variation *
Software		
21 CFR Part 11	Enables an operating mode that assists with ER/ES compliance	-
System compliance		
Laser class	Class 1, IEC60825-1 and CRF Chapter I: Sub-chapter J: Part 1040 (CDRH)	
Regulatory	Designed to meet RoHS and WEEE requirements CE / FCC / ICE5-003 / VCCI compliant. Designed to meet C-Tick	
Optics		
Dimensions	690 mm x 300 mm x 450 mm (L x W x H)	
Mass	30 kg	
System		
Supply voltage	100/240V, 50/60Hz	
Product storage temperature	-20°C to +50°C (non-condensing)	
Operational temperature range	+5°C to +40°C (non-condensing)	
Computer specification (recommended)	**Software**	
Computer interface	At least 1 high speed USB2 or USB 3 port required	
Operating system	Intel Core i7 Processor, 16GB, 250 GB HD, CD-ROM or DVD +/- RW drive, Wide screen monitor, Windows 10	
Hardware specification	Intel Core i7 Processor, 4GB RAM, 250GB HD, CD-ROM or DVD +/-RW drive, Wide screen monitor	

Notes: *Sample and sample preparation dependent. **Accuracy defined for the measurement of monomodal latex standards. This specification accounts for the manufacturer's uncertainty in the latex size. Sample and sample preparation dependant.

Mastersizer 3000+ sample dispersion overview

Sample dispersion is controlled by a range of wet and dry dispersion units. These ensure the particles are delivered to the measurement area of the optical bench at the correct concentration and in a suitable, stable state of dispersion to make accurate and reliable particle size measurements.

Aero
Redefining dry powder dispersion

Setting new standards for dry powder dispersion, the Aero has been designed from the ground up based upon fundamental powder dispersion theory. The modular design ensures rapid and reproducible dispersion of cohesive powders for both fragile and more robust materials.

The Aero is available with two performance levels:

Aero M - entry-level, manually-operated dry powder dispersion unit for use with the Mastersizer 3000+ Lab and Pro.

Aero S - fully automated dry powder dispersion unit for the Mastersizer 3000+, designed with the flexibility to meet the widest possible range of applications.

Aero M

Aero S

Hydro - Rapid and effective wet dispersion accessories

Hydro LV - A large volume automated dispersion unit suitable for applications where sample availability is not an issue or where larger volumes are required to ensure good sampling.

Hydro MV - A medium volume automated dispersion unit specifically designed for applications where sample is in short supply and/or non-aqueous dispersants are necessary.

Hydro SV - A small volume dispersion unit designed to enable particle size analysis when dispersant use needs to be minimised or the amount of sample available for analysis is limited.

Hydro EV - A unique dip-in, semi-automated wet sample dispersion unit that can be used with 250 mL, 600 mL and 1000mL standard laboratory beakers.

Hydro SM - Entry level medium volume sample measurements, suitable for applications where samples need to be dispersed in non-aqueous dispersants.

Aero S dry powder disperser

State-of-the art dry powder dispersion

Specifications*

Parameter	Specification
Measurements modes	Automated and manual measurement sequence control
Size range (dry powder mode)	0.1 - 3500 µm †
Dispersion pressure range	0 - 4 bar
Pressure setting precision	+/- 0.1 bar
Pressure setting accuracy	+/- 0.03 bar
Feed rate range	0 - 58 ms-2 (expressed as 0-100%)
Feed rate precision	+/- 2% FS
Materials in contact with sample ††	316 stainless 410 hardened stainless Borosilicate glass EPDM PTFE Polyurethane Carbon filled acetal Aluminium Neoprene
Maximum particle size	3500 µm †
Minimum time between measurements	less than 60 sec †
Dimensions	260 mm x 180 mm x 380 mm (L x W x H)
Mass	10.5 kg

† Sample dependent

†† Ceramic venturi dispersers are available for use with abrasive samples

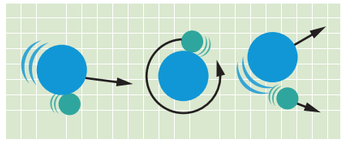
*Not available for Mastersizer 3000+ Lab and Pro

The Aero S dry powder disperser has been developed using state-of-the-art powder dispersion understanding. Modular in design, it is easily configured for different applications, delivering efficient sample dispersion for both robust and fragile materials.

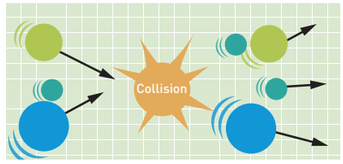
Disperse fragile and cohesive powders with ease

In a dry powder disperser, sample dispersion is achieved by accelerating the dry powder particles through a venturi using compressed air.

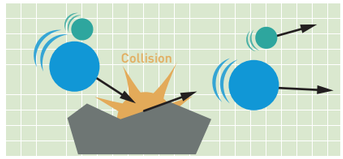
Three different dispersion mechanisms can act upon the sample:



Velocity gradients caused by shear stress



Particle-to-particle collisions



Particle-to-wall collisions

- The most dominant dispersion mechanism will depend upon the geometry of the disperser. The Aero S is provided with:
- Standard dispersers for both cohesive and fragile particles
- Impaction-based dispersers for robust, agglomerated materials.
- A range of sample trays is available to ensure reproducible delivery of powders to the disperser during measurements

Aero M dry powder disperser

Bulk dry powder dispersion

The Aero M is an entry-level dry powder disperser for the Mastersizer 3000+ Lab and Pro, enabling particle size distribution measurements to be made for bulk dry powder samples. Its design achieves robust particle size measurements in industrial applications and also ensures it is easy to maintain during routine use.

The use of dry powder dispersion for particle size measurements is advantageous when measuring bulk materials, as a large mass of powder can be measured. This ensures effective sampling is achieved. In addition, dry powder dispersion avoids the need for liquid dispersants, reducing the cost of measurement and increasing sample through-put.

- Measures dry powder particle size distributions over a 0.1-1000 µm range
- Manual measurement control, with appropriate user prompts provided to help ensure reproducible measurements are made
- Configurable for different applications through the purchase of additional sample trays and powder hoppers
- Abrasive samples can be measured through the use of ceramic venturi dispersers

Specifications

Parameter	Specification
Measurement modes	Manual measurement sequence control
Measurement size range	0.1 - 1000 µm †
Dispersion pressure range	0 - 4 bar
Pressure setting precision	+/- 0.1 bar
Pressure setting accuracy	+/- 0.03 bar
Feed rate range	0 - 58 ms-2 (expressed as 0-100%)
Feed rate precision	+/- 2% FS
Materials in contact with sample ††	316 stainless 410 hardened stainless Borosilicate glass EPDM PTFE Polyurethane Carbon filled acetal Aluminium Neoprene
Maximum particle size	1000 µm †
Minimum time between measurements	less than 60 sec*
Dimensions	260 mm x 180 mm x 380 mm (L x W x H)
Mass	10.5 kg

† Sample dependent. Relates to the use of the unit with the Mastersizer 3000+ Lab and Pro, which also has an upper size limit of 1000 µm

†† Ceramic venturi dispersers are available for use with abrasive samples

Hydro LV

Large volume wet sample dispersion

Intended for applications where sample availability is not an issue, the Hydro LV is ideal for measuring larger particles and broad size distributions, which demand larger sample volumes to ensure representative measurement.

- 600 mL dispersant volume
- Patented 40 W in-line sonication probe, for rapid agglomerate dispersion
- Powerful centrifugal pump system ensures bias-free sampling
- Automated dispersant supply
- Full software control of all measurement functions, including dispersant supply, sample dispersion and cleaning
- Chemically compatible with a wide choice of organic and inorganic dispersants
- Integral sample tank light

Specifications*

Parameter	Specification
Pump speed range	0-3500 rpm †
Pump speed resolution	+/- 10 rpm
Pump speed accuracy	+/- 50 rpm
Maximum flow rate	2.0 L/min †
Sonication power & frequency	40 W max, 40 kHz (nominal) †
Maximum volume	600 mL
Materials in contact with sample	316 stainless Borosilicate glass Tygon® FKM (cell seal only - FFKM upgrade available) PTFE PEEK FEP Titanium Nitride Aluminium (tubing connectors only) Acrylic (splash guard only)
Maximum particle size	2100 µm † †
Minimum time between measure-ments	less than 60 sec † †
Dimensions	280 mm x 180 mm x 300 mm (L x W x H)
Mass	5 kg

† Dispersant dependent †† Sample dependent

* Not available for Mastersizer 3000+ Lab

Hydro MV

Medium volume automated dispersion unit

The Hydro MV is medium volume unit for the controlled, automated wet dispersion of samples for particle size analysis. Designed for applications that require smaller sample sizes, the Hydro MV is especially valuable when the supply of test material is limited or when dispersant usage must be minimized.

- 120 mL dispersant volume
- Patented 40 W in-line sonication probe, for rapid agglomerate dispersion
- Powerful centrifugal pump system ensures bias-free sampling
- Automated dispersant supply
- Chemically compatible with a wide choice of organic and inorganic dispersants
- Full software control of all measurement functions, including dispersant supply, sample dispersion and cleaning
- Integral sample tank light

Specifications*

Parameter	Specification
Pump speed range	0-3500 rpm †
Pump speed resolution	+/- 10 rpm
Pump speed accuracy	+/- 50 rpm
Maximum flow rate	2.0 L/min †
Sonication power & frequency	40 W max, 40 kHz (nominal) †
Maximum volume	120 mL
Materials in contact with sample	316 stainless Borosilicate glass Tygon® FKM (cell seal only - FFKM upgrade available) PTFE PEEK FEP Titanium Nitride Aluminium (tubing connectors only) Acrylic (splash guard only)
Maximum particle size	1500 µm † †
Minimum time between measurements	less than 60 sec † †
Dimensions	280 mm x 180 mm x 300 mm (L x W x H)
Mass	5 kg

† Dispersant dependent †† Sample dependent

* Not available for Mastersizer 3000+ Lab

Hydro EV

Flexible volume wet dispersion

The Hydro EV has a unique dip-in centrifugal pump and stirrer design that achieves full and rapid dispersion in standard laboratory beakers, allowing close matching of the dispersant volume to the application requirements. Following measurement, the dispersion head can be raised out of the beaker, enabling quick cleaning and sample recovery.

- Compatible with 250 mL, 600 mL and 1000mL laboratory beakers
- Patented 40 W in-line sonication probe, for rapid agglomerate dispersion
- Dip-in centrifugal pump and stirrer design
- Sample easily recovered following analysis
- Chemically compatible with a wide choice of organic and inorganic dispersants
- Full software control of pump / stirrer and sonication
- Integral sample tank light

Specifications

Parameter	Specification
Pump speed range	0-3500 rpm †
Pump speed resolution	+/- 10 rpm
Pump speed accuracy	+/- 50 rpm
Maximum flow rate	1.7 L/min †
Sonication power & frequency	40 W max, 40 kHz (nominal) †
Volume	250 mL / 600 mL / 1000 mL (using lab beaker)
Materials in contact with sample	316 stainless Borosilicate glass Tygon® FKM (cell seal only - FFKM available) PTFE PEEK Titanium Nitride
Maximum particle size	2100 µm † †
Minimum time between measurements	less than 60 sec † †
Dimensions	220 mm x 150 mm x 300 mm (L x W x H)
Mass	4 kg

† Dispersant dependent †† Sample dependent

Hydro SV

Small volume wet sample dispersion

The Hydro SV is a simple, cost effective dispersion unit designed to enable particle size analysis using small volumes of sample and dispersant. It is particularly useful where the amount of sample available for analysis is very limited, or where there are significant environmental or health and safety issues associated with the use of the dispersant required to measure the sample.

- 5.6 mL - 7 mL dispersant volume
- Safe and easy sample introduction
- High chemical compatibility
- Software controlled magnetic stirrer for dispersion control
- Sample and dispersant retained for recovery or disposal
- Wash station provided for quick and easy cleaning

Specifications

Parameter	Specification
Stirrer speed range	0 rpm and 500 – 1800 rpm †
Stirrer speed resolution	+/- 10 rpm
Stirrer speed accuracy	+/- 50 rpm
Sonication power & frequency	N/A
Minimum volume	5.6 mL
Maximum volume	7 mL
Materials in contact with sample	316 stainless steel Borosilicate glass PTFE (magnetic stirrer bar only)
Maximum particle size	200 µm † †
Minimum time between measurements	less than 60 sec † †
Dimensions	110 mm x 280 mm x 210 mm (L x W x H)
Mass	3.05 kg

† Dispersant dependent †† Sample dependent

Hydro SM

Manual entry level wet dispersion unit

The Hydro SM is a cost effective wet sample dispersion unit designed for measuring samples in non-aqueous dispersants where solvent usage needs to be minimized.

- Sample volume from 50 mL -120 mL
- Continuously variable single shaft pump and stirrer with digital readout
- Software driven SOPs with appropriate user prompts to assist with adherence to GLP and ensure reproducibility of measurements
- Manual fill, drain and cleaning
- High chemical compatibility

Specifications

Parameter	Specification
Pump speed range	350-3500 rpm †
Pump speed resolution	+/- 10 rpm
Pump speed accuracy	+/- 20 rpm
Maximum flow rate	2.3 L/min †
Sonication power & frequency	N/A
Maximum volume	120 mL
Materials in contact with sample	316 stainless steel Borosilicate glass Tygon® FFKM FKM (cell seal only-FFKM upgrade available) Aluminium (cell connectors only)
Maximum particle size	600 µm † †
Minimum time between measurements	less than 60 sec † †
Dimensions (dispersion unit)	175 mm x 140 mm x 390 mm (L x W x H)
Dimensions (controller unit)	180 mm x 225 mm x 80 mm (L x W x H)
Mass (dispersion unit)	8.75 kg
Mass (controller unit)	1 kg

† Dispersant dependent †† Sample dependent

Hydro Insight

Dynamic particle imaging in real time

Scientists, researchers, and quality control managers around the world use laser diffraction for particle size analysis. But, to develop truly high-performance products, you often need deeper insights than laser diffraction alone can provide. In particular, to understand what influences packing, flow, and dissolution rate, you need to understand how both particle size and shape affect your materials' behavior.

How does it work?

Particles dispersed by the Mastersizer 3000's wet accessories flow through the Hydro Insight, and are then photographed by a high-resolution digital camera at up to 14 frames per second. The camera takes images of the suspended particles in the analysis cell, converts them to a digital format, and sends the information to the software for final analysis in real time. Individual particle images are viewed directly and captured as image files for post-run processing.

The Hydro Insight accessory provides this – combining Vision Analytical's dynamic imaging expertise with Malvern Panalytical's flow cell technology. Sitting alongside our Mastersizer 3000 laser diffraction system, the Hydro Insight provides real-time images of your liquid particle dispersions and individual particles, as well as quantitative data on particle shape. This helps you understand your materials better, troubleshoot more easily, and develop particle sizing methods more quickly – ultimately improving the performance of your products.

Specifications*

Parameter	Specification
Principle	Dynamic imaging
Illumination	Xenon Flashlamp
Detector type	CMOS Sensor
Detector	5 MP (2592 × 1944 pixels), pixel size 2.2 µm
Data acquisition rate	14 fps at 5MP (max 127fps)
Measurable size range	
Standard Magnification Lens	1 to 300µm**
Low Magnification Lens	10 to 800µm**
Size and Shape parameters	31
Typical measurement time	As per laser diffraction
Materials in contact with the sample***	Tygon® SE-200 FEP Inner lining, Stainless Steel 316,Quartz Glass Window, Glass n-BK7 (Glass Plug), Perlast® G60A FFKM Seals
Regulatory	RoSH and REACH compliant. EMC compliance to FCC, ICES and EN standards. LVD Safety compliance to EN standards 21 CFR Part 11

* Wet dispersions only **Sample dependent ***Hydro Insight only

Be more confident in your product quality

Just a few oversized particles can make a big difference to your materials' quality. To detect them, some applications require a higher resolution than laser diffraction alone provides. Combining the resolution of imaging for larger particles with the wide dynamic range of laser diffraction means you can be completely confident of your materials' properties.

Understand your materials better

Material behavior is often influenced by a combination of particle size and shape. To develop high-performance products, you need to understand both. The Hydro Insight gives you the full picture by providing shape data from imaging to complement the particle size distributions from laser diffraction.

Optimize your method development

Perhaps you often need to develop and validate new particle sizing methods. The Hydro Insight's real-time imaging helps accelerate this process, since you can see your dispersion as you develop a new method. There's no need to prepare secondary samples, saving you time for other projects.

Quickly troubleshoot unexpected results

Are your out-of-spec particle size results caused by oversized particles, agglomerates, or something else?

With the Hydro Insight's particle images – of both your dispersion and individual particles – you can easily identify the cause, saving you valuable time.

Speed up your method transfer

Switching from sieving to high-speed laser diffraction can be complicated, especially when non-spherical particles are involved.

The Hydro Insight's particle width and elongation data make this process much quicker and easier, helping you understand how shape affects the way you measure your particles.

About Malvern Panalytical

We draw on the power of our analytical instruments and services to make the invisible visible and the impossible possible.

Through the chemical, physical and structural analysis of materials, our high precision analytical systems and top-notch services support our customers in creating a better world. We help them improve everything from the energies that power us and the materials we build with, to the medicines that cure us and the foods we enjoy.

We partner with many of the world's biggest companies, universities and research organizations. They value us not only for the power of our solutions, but also for the depth of our expertise, collaboration and integrity.

We are committed to Net Zero in our own operations by 2030 and in our total value chain by 2040. This is woven into the fabric of our business, and we help our employees and customers think about their part in creating a healthier, cleaner, and more productive world.

With over 2300 employees, we serve the world, and we are part of Spectris plc, the world-leading precision measurement group.

Malvern Panalytical. We're BIG on small™

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 with us, and ensure that as your laboratory and analytical needs grow, we are 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.

- Local and remote support
- Full and flexible range of support agreements
- Compliance and validation support
- Onsite or classroom-based training courses
- e-Learning training courses and web seminars
- Sample and application consultancy

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