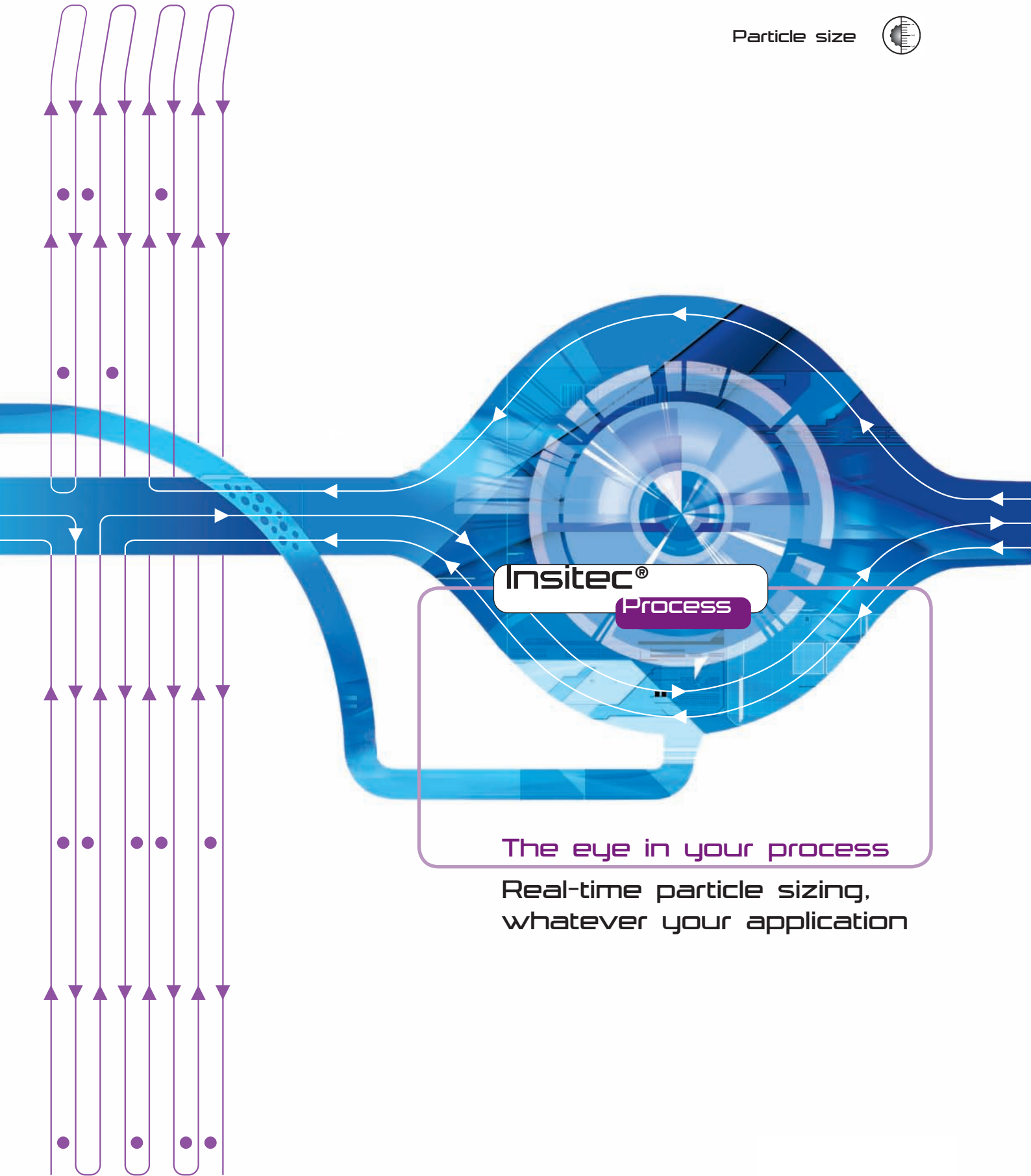


Particle size



The eye in your process

Real-time particle sizing,
whatever your application

A watchful eye to help optimize your process

Malvern Insitec analyzers can measure particle size distributions from 0.1 to 1000µm, wet or dry, at-line, in-line or on-line, including mobile or static solutions for most industrial applications.

Using advanced laser diffraction technology pioneered and developed by Malvern, our comprehensive range of instruments are now standard in most particulate processing industries including toners, pharmaceuticals, cement, minerals, powder coatings, pigments and metal powders.

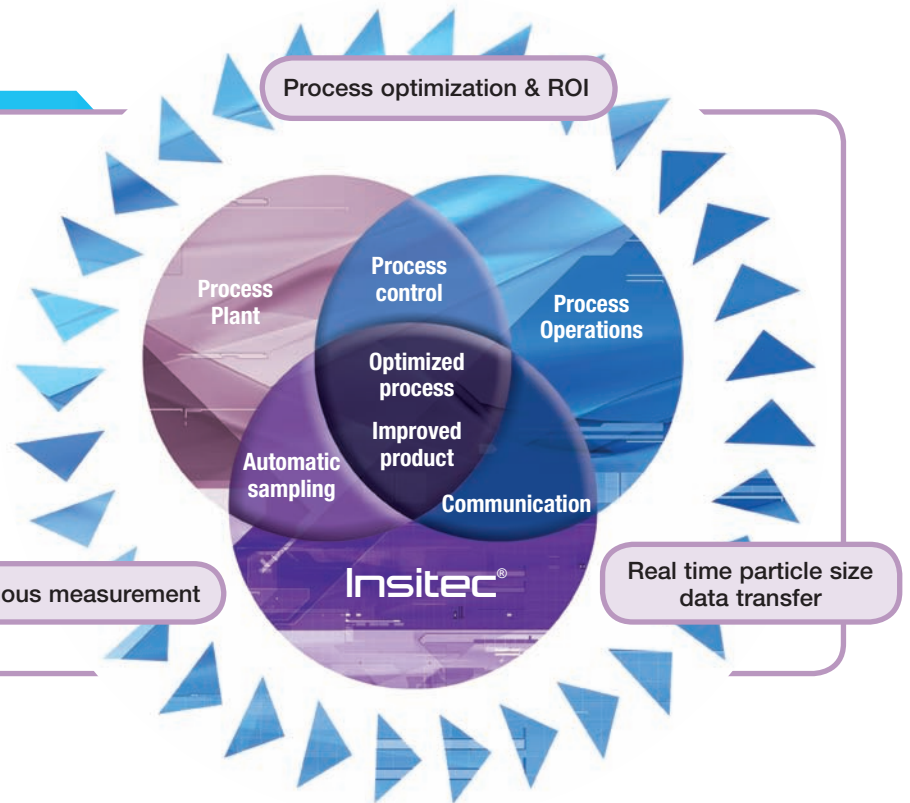
Their rugged construction and robust technology reflect the exacting demands placed on analytical instrumentation that is in continuous use in such process environments as milling, classification, spray drying, atomization, filtration and granulation.

Capable of taking scattering patterns every second and delivering the particle size distribution in real-time, an Insitec analyzer can make more than a million measurements every year – effectively becoming your ever watchful **'eye in the process'**. The result of which is to increase the manufacturing ROI by helping to:

- produce batches of raw materials that are 'right first time', reducing waste and the amount of material to be recycled
- reduce batch-to-batch variation, thereby improving quality
- control and maintain quality continually
- 'close the loop' and ensure the mill operates closer to target limits

Continuous measurement

Process optimization & ROI



Real time particle size data transfer

The range of Malvern Insitec analyzers, the process interface, analysis software, automation and data reporting can all be customized to your individual needs.

Furthermore, Malvern offers a 5-day trial period to demonstrate the potential of a dedicated on-line Insitec system for your process. Please see page 15 for further details.

Dry

Wet

Spray

Zone

On-line

In-line

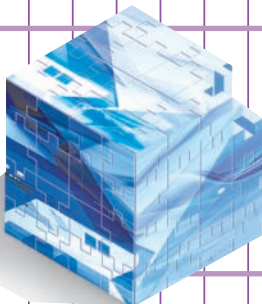
At-line

Insitec T

- Size range 0.1 to 1000µm
- Model independent analysis
- Patented high concentration sizing method using a correction for multiple scattering
- 4 measurements per second of the complete particle size distribution based on thousands to millions of particles per minute
- First principles measurement using rigorous Mie theory and needing no calibration
- Rigorous measurement technique has been validated for pharmaceutical use
- Changeable lenses in the sensor allow configuration of instrument resolution to individual process needs
- CE badged
- Watertight and dustproof to industrial protection rating IP65 (optical head to IP66)
- Optical head and sample path certified to Pressure Shock Resistance of 11bar(g)
- Compliant with industrial-grade electromagnetic compatibility (EMC) requirements for safe, reliable operation

The Insitec T is the base model of the Insitec range. Widely used within industries as diverse as cement production and metal powder atomization it is an on-line laser diffraction particle size analyzer manufactured to GAMP4 standards. Delivering accurate, continuous measurement for dry powder streams, the Insitec T provides an excellent, fully automated solution for a broad range of applications. Easy-to-use software and fully automated operation minimize training requirements and deliver integration with existing control platforms. Maintenance requirements are minimal and reliability is extremely high. Most installations of the Insitec T generally provide a payback time of 6-12 months.

<http://www.malvern.com/insitecT>



Our 5-day trial offer is based on the Insitec T mounted on our mobile Voyager (see page 9) to explore the potential of a dedicated on-line system, demonstrated on your process.

Dry

Wet

Spray

Zone

On-line

In-line

At-line

ATEX
22

Insitec □

- Size range 0.1 to 1000µm
- Model independent analysis
- Patented high concentration sizing method using a correction for multiple scattering
- 4 measurements per second of the complete particle size distribution based on thousands to millions of particles per minute
- First principles measurement using rigorous Mie theory. No calibration required
- Rigorous measurement technique has been validated for pharmaceutical use
- Changeable lenses in the sensor allow configuration of instrument resolution to individual process needs
- ATEX badged (Ex II 3 D EEx tD A22 IP65 T120°C)
- CE badged
- Watertight and dustproof to industrial protection rating IP65 (optical head to IP66)
- Optical head and sample path certified to Pressure Shock Resistance of 11bar(g)

ATEX approved for use in Zone 22 rated areas, the Insitec D is an on-line laser diffraction particle size analyzer designed in accordance with the latest international standard for electrical equipment in dusty areas – IEC 61241.

A category 3 rated instrument, it offers accurate continuous measurement for dry particulate streams. Easy-to-use software and fully automated operation minimize training requirements, deliver integration with existing control platforms and allow data presentation to be customized to meet the requirements of the user. Maintenance requirements are minimal and reliability extremely high, making the instrument ideal for the process environment.

<http://www.malvern.com/insitecD>



Dry	Wet	Spray	Zone	On-line	In-line	At-line
●			ATEX 0,1 2,20 21,22	●	●	●

Insitec X

- Size range 0.1 to 1000µm
- Model independent analysis
- Patented high concentration sizing method using a correction for multiple scattering
- 4 measurements per second of the complete particle size distribution based on thousands to millions of particles per minute
- First principles measurement using rigorous Mie theory and needing no calibration
- Rigorous measurement technique has been validated for pharmaceutical use
- Changeable lenses in the sensor allow configuration of instrument resolution to individual process needs
- ATEX badged (EEx ia IIC T4)
CE badged
- Watertight and dustproof to industrial protection rating IP65 (optical head to IP66)
- Optical head and sample path certified to Pressure Shock Resistance of 11bar(g)
- Compliant with industrial-grade electromagnetic compatibility (EMC) requirements for safe, reliable operation

- FM badged
Class I, Division 1, Groups A, B, C & D
Class II, Division 1, Groups E, F & G

For zone information, please contact Malvern Instruments.

Approved for use in zones 0, 1 and 2, 20, 21 and 22 the Insitec X is the world's first intrinsically safe on-line laser diffraction particle size analyzer. Manufactured to GAMP4 standards and designed to fully meet requirements for CIP and SIP it is particularly suitable for hygienic applications.

The Insitec X delivers accurate continuous measurement for dry particulate streams. Easy-to-use software and fully automated operation minimize training requirements, deliver integration with existing control platforms and allow data presentation to be customized to meet the requirements of the user. Maintenance requirements are minimal and reliability extremely high making the instrument ideal for the process environment.

<http://www.malvern.com/insitecX>



Dry

Wet

Spray

Zone

On-line

In-line

At-line

Insitec S & SX

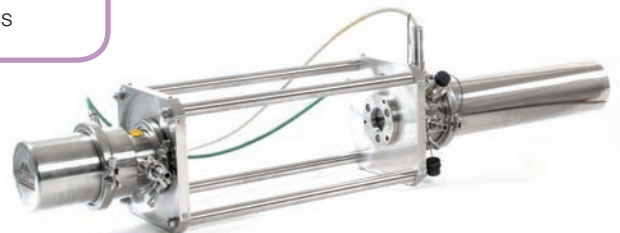
- Droplet range 0.1 to 1000µm
- High speed data acquisition. Real time spray measurement at up to 4 measurements per second, reveals fine temporal fluctuations in spray patterns
- High concentration measurement capability. Patented ‘multiple scattering’ analysis routine allows measurements of sprays with light obscurations up to 95% (5% transmission)
- User-friendly software. Time history display allows ‘frame by frame’ inspection of a spray event. Flexible data filtering options. Compliance with 21 CFR Part 11
- Instrument configuration flexibility and customizable specification enables aerosol and spray researchers to configure an instrument to meet their precise need
- CE badged
- Purgeable optics to counter spray contamination. Separate control and electronics unit gives robustness of operation in machinery area
- IQ/OQ available as per GAMP guidelines

The Insitec S is a rugged laser diffraction particle size analyzer for the continuous measurements of sprays. Configuration flexibility allows the instrument to be customized to meet the requirements of an individual application while a patented algorithm ensures that even high concentration sprays can be accurately measured. An air purge prevents build-up of spray droplets on the optics, delivering high reliability; maintenance requirements are minimal. Easy-to-use software allows data presentation to be tailored to meet customer needs. The Insitec S can be used to monitor conditions in wind tunnels, atmospheric chambers, atomizer performance and unit operations such as spray drying.

<http://www.malvern.com/insitecS>

● ATEX
0,1
2,20
21,22

Insitec SX can be configured to operate successfully in a wide range of hazardous or hostile locations



Dry
Wet
Spray
Zone
On-line
In-line
At-line

Insitec L & SX (with wet flow cell)

- Size range 0.1 to 1000µm
- Automatic on-line continuous, or at-line manual
- Mobile installation
- Model independent analysis
- Patented high concentration sizing method using a correction for multiple scattering
- 4 measurements per second of the complete particle size distribution based on thousands to millions of particles per minute
- First principles measurement using rigorous Mie theory and needing no calibration
- Rigorous measurement technique has been validated for pharmaceutical use
- Changeable lenses in the sensor allow configuration of instrument resolution to individual process needs
- CE badged
- Watertight and dustproof to industrial protection rating IP65 (optical head to IP66)
- Optical head and sample path certified to Pressure Shock Resistance of 11bar(g)
- Compliant with industrial-grade electromagnetic compatibility (EMC) requirements for safe, reliable operation

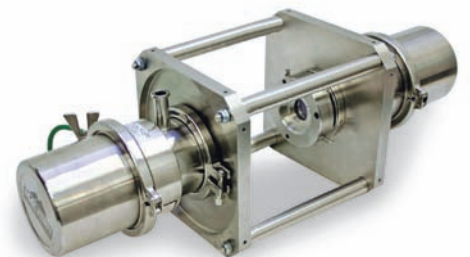
Designed for real-time measurement of solid particulates and emulsions in dilute and concentrated liquid streams e.g. pharmaceuticals and minerals. The Insitec L is manufactured to GAMP4 standards. The hardware is designed to be compatible with CIP and SIP requirements.

<http://www.malvern.com/insitecL>

Insitec L



Insitec SX (with wet flow cell)



● ATEX
0,1
2,20
21,22

For liquid application in hazardous or hostile locations, the Insitec SX is configurable with a wet flow cell

Dry

Wet

Spray

Zone

On-line

In-line

At-line

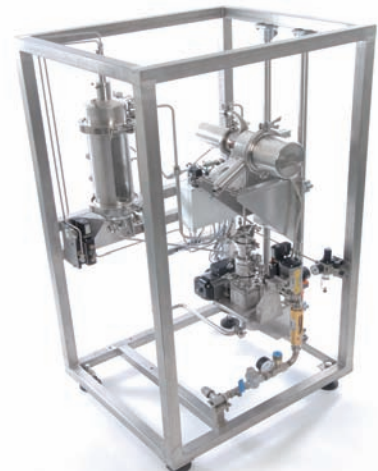
● ATEX
1,21 ●

Insitec LPS

- Size range 0.1 to 1000µm
- Model independent analysis
- Patented high concentration sizing using automatic correction for multiple scattering
- 4 measurements per second of the complete particle size distribution based on thousands to millions of particles per minute
- First principles measurement using rigorous Mie theory and needing no calibration
- Changeable lenses in the sensor allow configuration of instrument resolution to individual process needs
- CE badged
- Watertight and dustproof to industrial protection rating IP65 (optical head to IP66)
- Optical head and sample path certified to Pressure Shock Resistance of 11bar(g)
- Zones 1, 21 version available on request

The Insitec LPS brings the reliability and accuracy of laser diffraction particle size analysis to wet processes. Incorporating a sampler, pre-diluter, cascade diluter and measurement cell it is a fully automated, integrated solution for almost any wet stream - from hot, sticky, concentrated slurries to lipid emulsions. Each component of the system is customized for a given operability. Designed for off-, at- or on-line use the Insitec LPS is suitable for solid-liquid or liquid-liquid streams. It has easy to-use software and can be easily integrated with existing control platforms. Maintenance requirements are minimal and reliability extremely high making the instrument ideal for continuous use in the process environment.

<http://www.malvern.com/insitecLPS>



Dry

Wet

Spray

Zone

On-line

In-line

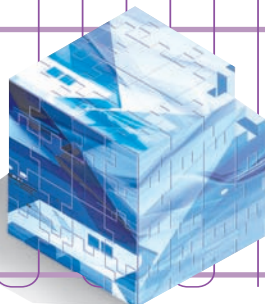
At-line

Insitec Voyager™

- Size range 0.1 to 1000µm
- Model independent analysis
- Patented high concentration sizing method using a correction for multiple scattering
- 4 measurements per second of the complete particle size distribution based on thousands to millions of particles per minute
- First principles measurement using rigorous Mie theory and needing no calibration
- Rigorous measurement technique has been validated for pharmaceutical use
- Changeable lenses in the sensor allow configuration of instrument resolution to individual process needs
- CE badged
- Watertight and dustproof to industrial protection rating IP65 (optical head to IP66)
- Optical head and sample path certified to Pressure Shock Resistance of 11bar(g)
- Compliant with industrial-grade electromagnetic compatibility (EMC) requirements for safe, reliable operation

The award-winning Insitec Voyager is a neatly packaged mobile laser diffraction particle size analyzer for at- or on-line use. A fully integrated system for dry streams, it is ideal for commissioning, process optimization studies and multiple unit facilities. Simple to attach to any process line with the required tappings, the Insitec Voyager delivers continuous real-time data that gives an insight into the process and allows the potential of a dedicated on-line system to be demonstrated. Analytical procedures are fully automated and results presentation is easily customized. Maintenance requirements for the instrument are low and reliability is extremely high.

<http://www.malvern.com/insitecVoyager>



Our 5-day trial offer is based on the Insitec T mounted on this mobile platform to allow the potential of a dedicated on-line system to be demonstrated (see page 15).

Insitec Voyager™ Pharma

Dry

Wet

Spray

Zone*

On-line

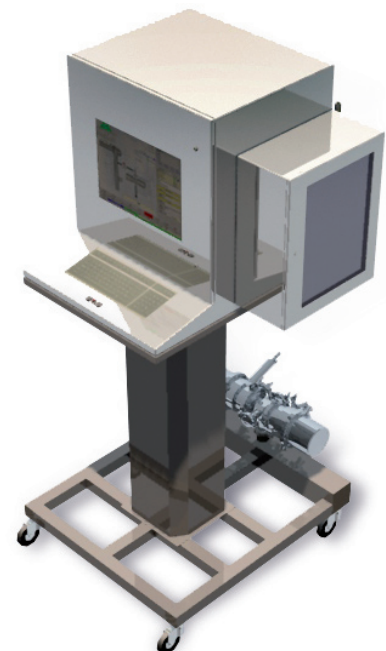
In-line

At-line

- Size range 0.1 to 1000µm
- Model independent analysis
- Patented high concentration sizing method using a correction for multiple scattering
- 4 measurements per second of the complete particle size distribution based on thousands to millions of particles per minute
- First principles measurement using rigorous Mie theory and needing no calibration
- Rigorous measurement technique has been validated for pharmaceutical use
- Changeable lenses in the sensor allow configuration of instrument resolution to individual process needs
- CE badged
- Watertight and dustproof to industrial protection rating IP65 (optical head to IP66)
- Optical head and sample path certified to Pressure Shock Resistance of 11bar(g)
- Compliant with industrial-grade electromagnetic compatibility (EMC) requirements for safe, reliable operation.

The Insitec Voyager Pharma is a specialized version that has been modified to industry specifications including polished connections and an easy-to-clean build to meet both CIP and SIP requirements. It can incorporate all Insitec dry powder analyzer systems (X, D or T). All necessary measurement electronics, cabling and pneumatics are in a compact mobile system with a human machine interface (HMI). The Pharma Voyager is ideal for pilot plant operation or Process Analytical Technology (PAT) research where mobility, cleanability, and ease of operation are required. The Voyager can be easily moved between production suites at any point as it is designed for the plant environment.

<http://www.malvern.com/insitecPharmaVoyager>



The version depicted above is FM approved and is available on request.

*For zone information, please contact Malvern Instruments.

Parsum In-line Particle Probe IPP70

Dry

Wet

Spray

Zone

On-line

In-line

At-line



ATEX
0,1
2,20
21,22



- Size range 50 to 6000µm
- Small optics optimized for high particle loadings
- Lower sensitivity to loading fluctuations delivers more reliable measurements
- Measurement rate up to 15000 particles per second for greater performance
- Optional casing LEDs clearly indicate status of instrument for ease of use
- Robust laser holder to help prevent mis-alignment during use
- Integrated air pipe for the In-line Disperser D22/23
- ATEX badged (E Exib IIBT4)
- CE badged
- Optional user interface – Standard output (Dv10, 50 and 90) for general process control
- Operating temperature at measuring point –20°C to 85°C
- Operating temperature on probe housing –10°C to 60°C

The Parsum IPP70 offers an alternative solution for in-line particle size analysis using advanced spatial filter velocimetry for processes involving larger particulate sizes of up to 6000µm.

Robust and easy to use, the rugged IPP70 probe can be inserted directly into a process line or vessel. Measuring at rates of up to 15000 particles per second, the instrument continuously tracks Dv(10), Dv(50) and Dv(90) making it ideal for endpoint detection, process control and process optimization for a range of applications including wet and dry granulation, coating and spray drying, from pharmaceuticals to detergents.

The small fiber optics at the heart of the IPP70 deliver consistent, highly accurate measurement with low sensitivity to fluctuations at high particle loadings, making this an extremely robust and reliable solution.

<http://www.malvern.com/parsum>



Dry

Wet

Spray

Zone

On-line

In-line

At-line

Insitec ALISS™

- Size range 0.1 to 1000µm
- Model independent analysis
- Patented high concentration sizing method using a correction for multiple scattering
- Measurement of the complete particle size distribution (based on thousands to millions of particles) in less than a minute
- First principle measurement using rigorous Mie theory and needing no calibration
- Changeable lenses in the sensor allow configuration of instrument resolution to individual process needs
- CE badged
- Watertight and dustproof to industrial protection rating IP65 (optical head to IP66)
- Optical head and sample path certified to Pressure Shock Resistance of 11bar(g)

The award-winning Insitec ALISS is a robust at-line laser diffraction particle size analyzer designed specifically for the process environment. It has a large sample volume handling capability, fully automated analytical protocols and requires no sample preparation making it the ideal choice for automated labs and multiple unit processing facilities. Suitable for measuring dry particulate streams, the Insitec ALISS is used in the manufacture of a range of products including cement, coffee, and powder coatings. Easy-to-use software delivers customized results presentation, an essentially de-skilled analytical process and integration with existing control platforms. The simplicity of an upgrade to continuous on-line analysis provides capital protection.

No complex sample preparation or disposal procedures are required

Automated version

The automated package is primarily designed for integration into an automated laboratory. Samples can be loaded by the feeding system (typically up to 100g) without subdivision, avoiding the introduction of errors associated with sub-sampling procedures.

<http://www.malvern.com/insitecALISS>



Manual version

The manual package is primarily designed for use by plant operators in the production environment. Plant operators can make measurements of a full grab sample (typically up to 100g) without subdivision, avoiding the introduction of errors associated with sub-sampling procedures.

As would be expected from an industrial instrument, maintenance requirements are minimal. Ceramic linings protect critical, high-velocity areas of the sample pathway and purging ensures that windows are kept free from dust.

Malvern Link – the complete solution

Our process analyzers are capable of working every minute of every day to keep a constant eye on your process. Malvern Link, our software interface, can enable full integration with your plant control system and is the key to fully unlocking the potential of in-process particle characterization alongside system automation.

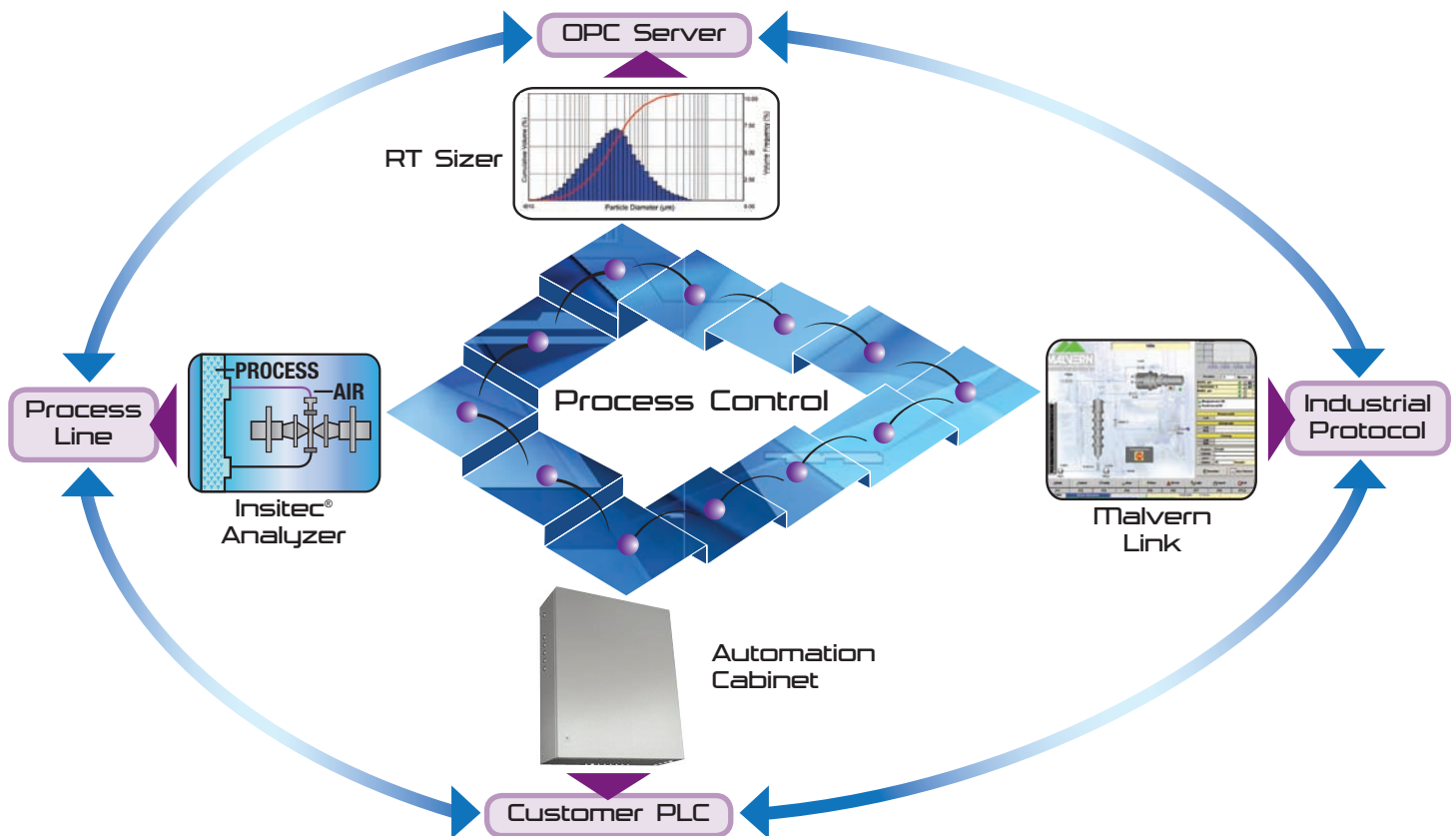
Through Malvern Link we can deliver results in real-time to your control room and allow automation of routine tasks such as cleaning, maintenance and background checks.

Our Malvern Link software package:

- Simplifies plant operation through automatic process control and by streaming data in real-time to the control room
- Increases system reliability and up-time
- Minimizes training requirements
- Reduces time and manpower required to maintain and operate the instrument

Malvern Insitec analyzers, the Malvern Link interface, analysis software, automation and data reporting can all be customized to the unique needs of individual clients.

Our comprehensive package not only provides for specialists to install and set up the system but also includes training key personnel in maintenance operations, for your complete peace of mind.



<http://www.malvern.com/malvernlink>

An Insitec solution, whatever the application

	Dry	Wet	Spray	Zone	On-line	In-line	At-line	Insitec instrument
	●				●	●	●	T (page 3)
	●			ATEX 22	●	●	●	□ (page 4)
	● ATEX/ FM*			ATEX 0,1 2,20 21,22	●	●	●	X (page 5)
			●			●	●	S (page 6)
			●	ATEX 0,1 2,20 21,22		●	●	SX (page 6)
		●			●	●	●	L (page 7)
		●		ATEX 0,1 2,20 21,22	●	●	●	SX (with wet flow cell) (page 7)
		●		ATEX 1,21	●	●	●	LPS (page 8)
	●				●		●	Voyager™ (page 9)
	●	●		ATEX 0,1 2,20 21,22		●	●	Parsum IPP70 (page 11)
	●				●		●	ALISS™ (page 12)

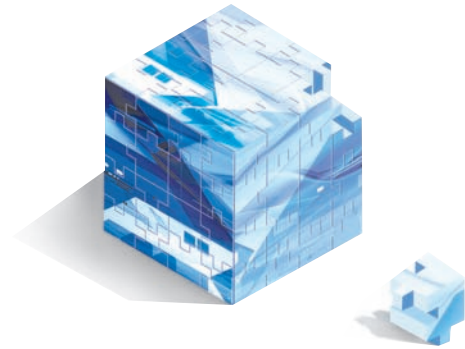
***FM badged**
Class I, Division 1, Groups A, B, C & D
Class II, Division 1, Groups E, F & G

The rugged construction and robust technology of our Insitec systems lends itself to continuous monitoring and control of operations such as milling, classification, spray drying, atomization, filtration and granulation in a wide variety of industries.

In fact, whatever the application, there's a Malvern Insitec solution waiting to enhance your process and improve your return on investment.

Evaluation and consultancy

An opportunity to assess the value of on-line particle size analysis and to optimize your process set-up without any commitment to purchase.



5 days to find the answers for one small fixed fee



Call Malvern to schedule a pre-trial meeting to discuss and agree your particular needs and to identify the goals you wish to achieve. After that, arrangements will be made for an Insitec Voyager™ to be delivered accompanied by a Specialist consultant from Malvern.

On-site support from a Malvern Specialist throughout

Day 1

Installation of the Voyager and optimising set-up

Day 2

Preliminary results from initial process configuration

Day 3 & 4

Evaluate potential improvement and subsequent ROI by running defined test program

Day 5

Final data output, recording and report generated. Voyager removed

Malvern provides:

The Insitec Voyager
On-site Specialist
Consultant support
Weld stubs, consumables
Data communication cables

You provide:

Venturi and purge air
(compressed air or nitrogen
at 6-10 bar, dust and oil free)
16A, 110-230V power supply

<http://www.malvern.com/consultancy>

Insitec®

Process

Advanced process analysis in real-time

To check availability and to arrange your evaluation and consultancy, please contact your Malvern Specialist Representative

Malvern Instruments Limited

Groewood Road • Malvern • Worcestershire • UK • WR14 1XZ

Telephone: +44 (0)1684 892456 • **Facsimile:** +44 (0)1684 892789

Malvern Instruments Worldwide

Sales and service centres in over 50 countries. For details visit www.malvern.com/contact

Insitec®

Process

Advanced technology made simple

distributor details

Malvern Instruments is part of Spectris plc, the Precision Instrumentation and Controls Company.

spectris

All information supplied within is correct at time of publication

Insitec, Malvern and the 'green hills' logo are international Trade Marks owned by Malvern Instruments Ltd.

detailed specifications at www.malvern.com

© 2007 MRK967-03


Malvern