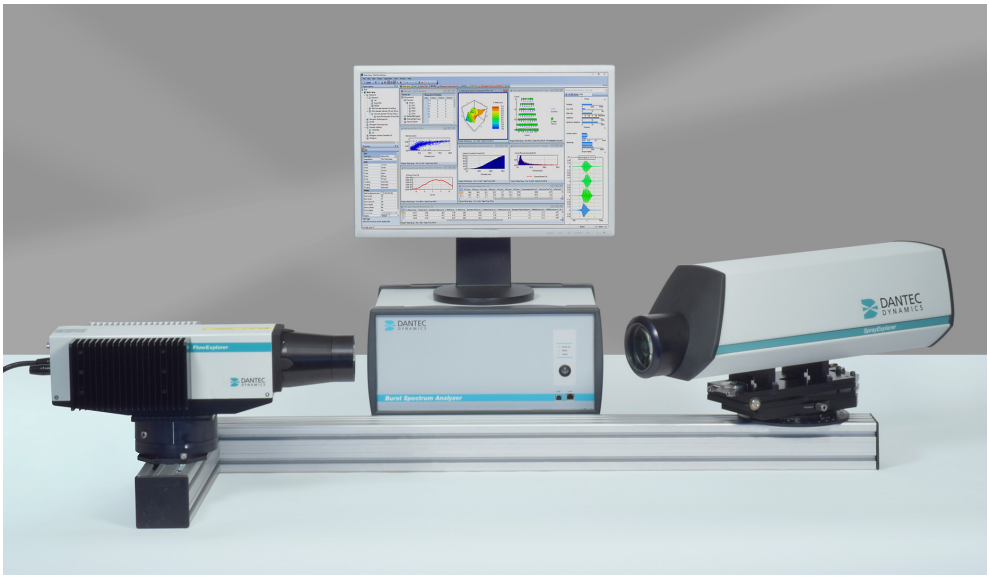
SOLUTION SHEET

DANTEC DYNAMICS

SprayExplorer PDA system

Computer controlled particle size and velocity measurement solution



High performance PDA system for challenging measurement applications

PDA (Particle Dynamics Analyzer) – also known as PDPA (Phase Doppler Particle Analyzer) and PDI (Phase Doppler Interferometer) – is a well-established technique for the simultaneous measurement of particle size and velocity. The SprayExplorer PDA solution represents the latest advance in PDA technology. The result is a high performance computer controlled system for particle size and velocity measurement applications.

Key benefits

- Wide measurement range – velocity up to supersonic and size down to microns
- Transmitter with powerful, software controlled and factory aligned laser
- Receiving probe includes internal detectors for minimum signal loss
- Computer controlled mask/slit selection to match size range & particle density conditions
- Built-in camera and LED illumination for optimal alignment
- State-of-art signal processor to handle the most demanding applications
- Advanced, flexible, and feature rich software platform with a user-friendly interface
- Automatic phase calibration for accurate size measurements

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The SprayExplorer PDA system

The SprayExplorer PDA system is a complete solution designed to meet the most challenging particle size and velocity measurement applications. The solution is based on the SprayExplorer receiver probe, FlowExplorer or FiberFlow transmiting optics, a powerful all-in-one signal processor (BSA P800), and the comprehensive BSA Flow software.
The system can be configured for 1, 2 or 3 velocity component measurements, and integrated with a 1D, 2D, or 3D traversing units for spatial mapping.
Existing LDA/ PDA transmitting optics can be upgraded with SprayExplorer receivers, BSA P600/800 processors, and software to take advantage of the latest innovations and improved performance.
Options include advanced synchronization, analog inputs, velocity/particle size monitoring, independent processor control and more, offering flexibility to customize the solution to unique measurement requirements.

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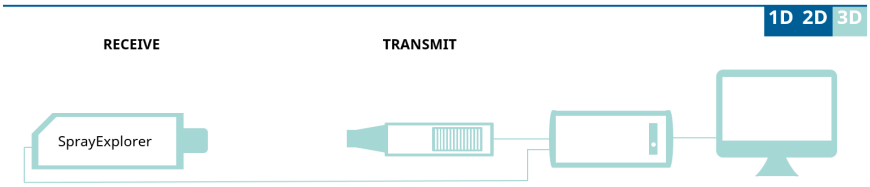
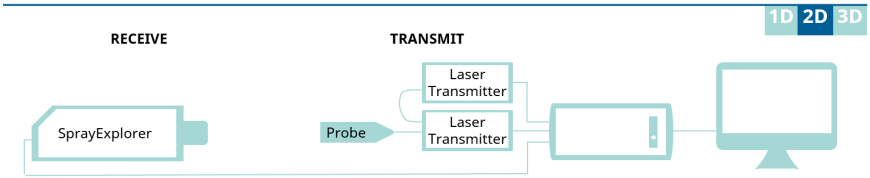


SprayExplorer PDA system – basic setup for 1D and 2D solutions. Also available as 3D solution.

The SprayExplorer PDA system can also be configured with fiber-based transmission optics from the FiberFlow range.



SprayExplorer PDA system – setup with fiber-based transmission (2D). Also available as 1D and 3D solution.

Existing LDA/PDA transmitting optics can be upgraded with SprayExplorer receivers, BSA P600/800 processors, and software to take advantage of the latest innovations and improved performance. Various options are available for advanced synchronization, analog inputs, velocity/particle size monitoring, independent processor control, and more allowing additional flexibility to customize the solution to meet unique measurement requirements.

Transmitting Optics

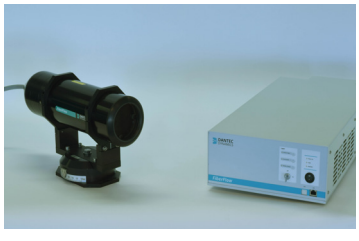
FlowExplorer – turn-key, compact and calibrated laser transmitter

The FlowExplorer is a compact, turn-key LDA/PDA transmitter which uses diode or DPSS lasers available with a range of laser power from 35 mW to 500 mW for each component. All FlowExplorer systems are factory aligned and calibrated. Standard front lenses are available from 150 mm to >1000 mm to match the velocity and size range as well as test facility dimensions.

The FlowExplorer DPSS transmitter – compact, powerful and factory-aligned.

FiberFlow - fiber optic transmitter equipped with DPSS or fiber lasers

The SprayExplorer PDA system can also be configured using FiberFlow laser transmitters and probe.
The FiberFlow laser transmitter is easy to align, compact and powerful.
Several transmitter probe sizes are available with a wide range of front lenses and optional beam expanders to match the required velocity and size range.
Beam steering and variable beam spacing options are available for maximum flexibility. Factory aligned probes are provided with calibration certificates.



FiberFlow laser transmitter + 112 mm diameter probe.

Receiving optics

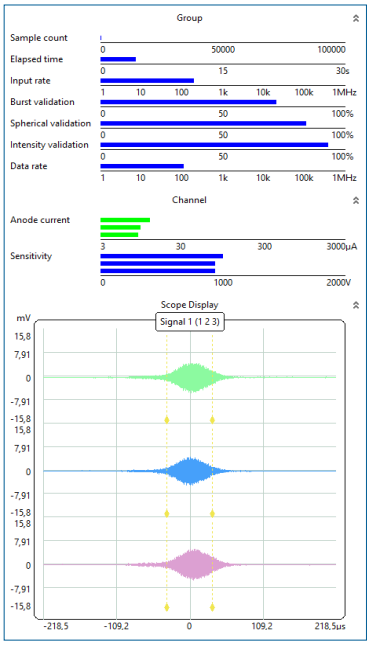
SprayExplorer PDA receiver

The SprayExplorer PDA receiver is designed to enhance particle size and velocity measurements in a wide range of applications while simplifying the setup and use. To this end, the SprayExpwlorer PDA receiver includes a large aperture front lens, software controlled selection of masks and spatial filters, together with integrated photodetectors supporting particle size and up to 3 velocity components. Optimal alignment of the SprayExplorer PDA receiver is easy thanks to a built-in camera and illumination system. The high resolution camera is focused on the slit which is illuminated by an LED allowing the user to easily find the ideal focus and position of the measurement volume during alignment. The camera image is streamed to the computer for real-time feedback during the alignment procedure.

Software-controlled SprayExplorer PDA receiver.

The size range is defined by a mask in the receiver. The software controls the size range by switching between 3 masks. The PDA technique requires that only one particle at a time is present in the measurement volume. Dense sprays thus require small measurement volumes. The size of the measurement volume is controlled by a spatial filter, either a slit or a pinhole, in the receiver. The software controls the measurement volume size by switching between 3 slits and a pinhole.

You can pre-program the mask and slit/pinhole combinations for different conditions as the measurement point is traversed through various regions of the spray.



Real time display of signals, data rate, valiation rate.

Processor

Burst Spectrum Analyzer (BSA) – fast and powerful all-in-one processor

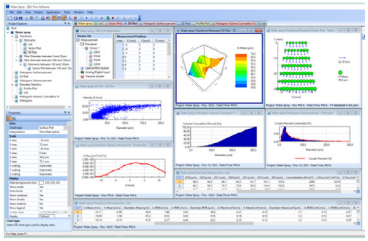
The SprayExplorer PDA solution includes the new third generation Burst Spectrum Analyzer (BSA) signal processor. The BSA P600 and P800 use the latest developments in digital signal processing technology which makes our PDA system the fastest and most powerful ever.

The BSA P800 processor handles high velocities and large velocity fluctuations thanks to its maximum input frequency of 200 MHz and maximum bandwidth of 160 MHz. For high velocity dense sprays, continuous ink jet printing, and other applications with very high data (particle arrival) rates, the BSA can handle date rates up to 100 kHz continuously and peak rates of 1 MHz

Since the signals are analyzed by hardware/firmware inside the processor, the SprayExplorer PDA solution can provide real-time measurements, and the user can monitor Doppler bursts, spectra, size and velocity data, data rate, validation rate and other information on-line and in real time.

PDA systems require an accurate measurement of the phase differences of light signals detected from different perspectives, which are then used to provide the particle size measurements. Therefore, calibration of the electronics is required to find and store the phase delays before data acquisition. This process is handled automatically by the BSA processor whenever required.

The BSA processor includes an automatic overload protection feature for the photomultipliers (PM's). This protection quickly reduces the high voltage to the PM's when too much light is detected which prevents damage and extends the lifetime of these sensitive components. Please refer to separate data sheet for further details on the BSA processor.



The Dantec Dynamics BSA Flow Software is the most flexible and comprehensive analyzing software for PDA measurements.

Data Analysis

The most flexible and comprehensive software for PDA measurements

The hardware of SprayExplorer PDA solution is managed by the Windows 10-based BSA Flow Software which also acquires, post processes, and presents data with extensive graphical features. Measurement results can be displayed on-line during acquisition in several formats such as Histograms, 2D/3D plots, Lists (individual result statistics), and a signal monitor to verify the measurement quality.
BSA Flow Software includes an automatic report function to help you quickly organize and export the results. The user defines the plots and statistics to be included in the report in a PDF or html formats. Please refer to separate data sheet for further details on the BSA Flow Software.

Specifications

Level	Category	Specification
System	Velocity range	From -350 m/s to 2,000 m/s (depending on optics configuration)
	Particle size range	From 1 um to 1 mm
	Data rate	> 100 kHz continuous to 1 MHz for short duration
Receiver	Receiver	SprayExplorer PDA receiver: Built-in PMs and Optics color separators to match transmitters, alignment camera and LED; Software controlled slits & masks; 5m cable
	Lens options (focal length)	240 mm, 310 mm, 500 mm, 800 mm, 1000 mm
Transmitter Optics	Transmitter	FlowExplorer transmitter (Diode or DPSS lasers) FiberFlow laser transmitters and probe
	Laser wavelength	561, 532 and 660 nm (FlowExplorer) 532, 546 and 520 nm (FiberFlow) 561, 532 and 553 nm (FiberFlow)
	Laser power	FlowExplorer DPSS: Up to 500 mW for each laser FiberFlow: 1 W for each laser
	Lens options	150 mm, 300 mm, 500 mm, 750 mm (FlowExplorer DPSS). 240 mm, 310 mm, 500 mm, 800 mm, 1000 mm (FiberFlow 112 mm diameter probe)
Processor	Max. Bandwidth	80 MHz (BSA P600) / 160 MHz (BSA P800)
	Max. Frequency	120 MHz (BSA P600) / 200 MHz (BSA P800)
	Min. transit time	< 42 ns (BSA P600) / < 84 ns (BSA P800)
	Burst processing	12 bit FFT with zero padding and curve fitting
	Data outputs	Frequency: 32 bit / Phase: 32 bit / Time stamp: 64 bit / Transit time: 32 bit
	Options	Synchronization / Analog input / BSA processor driver/ Velocity-Particle Size Monitor
Data Analysis	BSA Flow Software	Includes user-defined data analysis sequences, traverse grid generation, statistical criteria for stopping the acquisition, automatic report and calculation tool
	Add-on: Advanced Graphics	Includes profile plots with confidence interval, vector plots, contour plots, 2D plots, and more
	Add-on: Particle Sizing	Enables PDA measurement, data analysis and result presentation

DANTEC DYNAMICS Turn Measurements into Knowledge

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