

FiberFlow LDA systems

Fiber-based, highly flexible and top performing solution



FiberFlow LDA system

When flexibility, upgradeability and performance matters in flow measurements

The Dantec Dynamics FiberFlow LDA system is a highly flexible solution for non-intrusive measurements of velocity at a point in space as a function of time. This Laser Doppler Anemometry (LDA) solution uses fiber optics to connect the laser and the transceiver probe. Many applications benefit from or require a fiber optic connection for intrinsic safety, submersion, or remote locations. We offer a variety of probe sizes, laser types, and configurations of transmitter and processor, which allow you ultimate flexibility to meet your flow measurement needs.

The FiberFlow LDA can easily be upgraded and reconfigured to suit the requirements of existing and new applications. With a full range of options and accessories including our full featured software, our FiberFlow LDA solution is the best-in-class system.

Key benefits

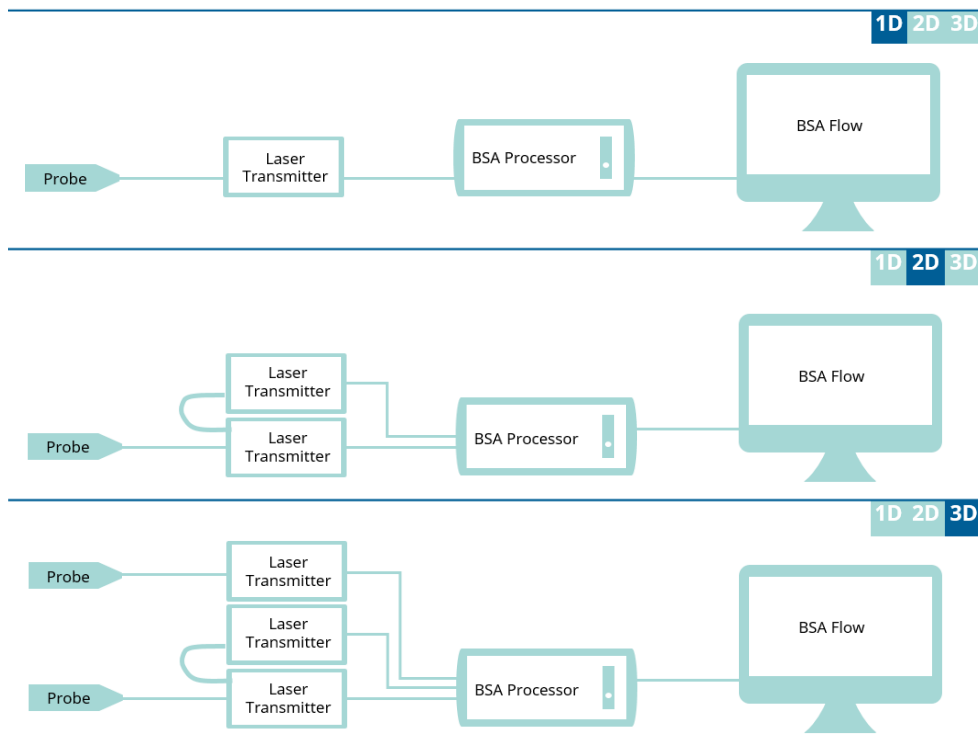
- Non-intrusive LDA technique makes measurements possible in flames and internal flows with moving parts such as pumps, turbines, engines etc.
- Fiber optic connection between laser and probe without electronics meets requirements for C1D1 and other challenging environments
- 1-, 2- and 3 velocity component configurations
- Compact all-in-one laser transmitter including power supply, controller and frequency shift optics
- Laser power up to 1W for high performance even at long measurement distances
- High transmission efficiency due to re-engineered optics with fewer components
- Four probe sizes with a range of front lenses to match flow rigs of any size
- Automatic laser safety shutters for user protection
- Output polarization selectable for PDA applications

The FiberFlow LDA solution in brief

Laser Doppler Anemometry (LDA) is an optical technique ideal for non-intrusive 1D, 2D and 3D point measurement of velocity and turbulence in flows in a wide range of fluid mechanical applications. It is based on the Doppler effect of laser light scattered from seed particles that follow the flow. The main benefits of LDA over other methods is that the transfer function is linear, small measurement volumes are possible, and the absolute accuracy of the measurement results are unmatched due to calibrated Doppler constant and signal processor performance.

The solution is based on four core components: Probe, transmitter/laser, signal processor, and software.

The modular design allows you to choose between two performance levels of the signal processor, three laser power levels, and optics for one, two, or three velocity components. Four sizes of probes allow measurements from distances of a few cm up to several meters.

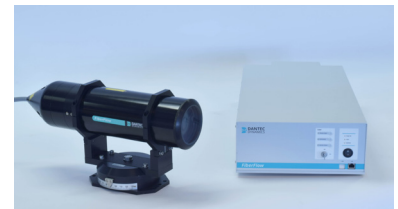


Standard 1D, 2D and 3D LDA FiberFlow solutions

Transmitting optics

Compact all-in-one optics

The LDA FiberFlow solution uses optical fibers to connect the lasers, probe, and detectors making the transceiver probes compact and easy to mount on a traverse. The fiber cable to the probe can be up to 20 m long. This makes it the ideal LDA solution for large facilities or where limited access to the test area is required.



The FiberFlow laser transmitter and a 60 mm probe.

Processor

Fast & powerful all-in-one processor

The BSA F600 processor is a fast and powerful all-in-one processor. With Ethernet, wifi and USB interfaces included, the processor can be connected to a PC via a local area network, wireless or cabled. In large facilities or where remote access is required, these features make it easy to have the processor near the experiment and separate the PC at a long distance away for safety and/or convenience.

The processor's 120 MHz bandwidth covers a wide velocity range, up to several hundred m/s depending on the optical configuration. System setup is very easy and user friendly: the setup is done directly in velocity units, based on a center velocity and a velocity span value.

The processor's on-line signal monitor provides immediate feedback about signal quality, data rate and validation, the coincidence between channels, PM anode current and high voltage. This is a powerful tool for optimizing set-up and monitoring of experiments.

For further details on the processing performance, please consult separate data sheet on "Burst Spectrum Analyzer (BSA)" on our website.

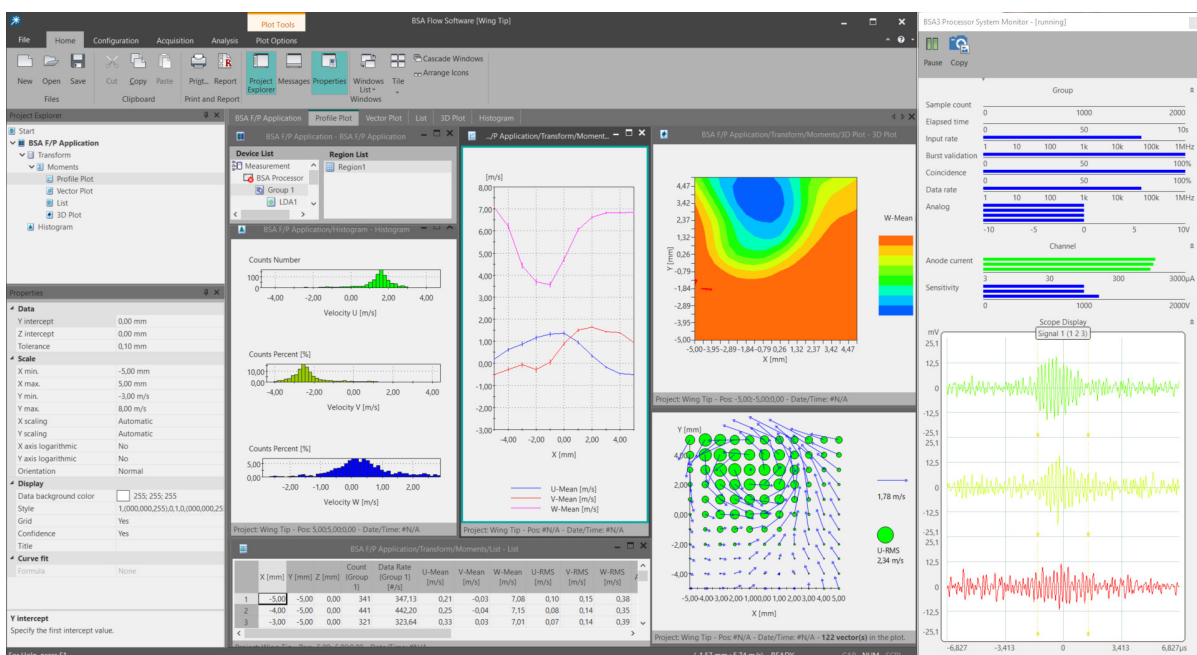
Data Analysis

The most flexible and comprehensive software for LDA measurements

The BSA Flow software is comprehensive, easy to use, and includes extensive graphics and data exchange features. The system setup including the optical configuration as well as processor settings is controlled via the software. Tools are provided which enables user-defined data analysis and display, which is dynamically updated during measurements.

Data analysis can be customized with a built-in Calculation module as well as a MatLab link for ultimate flexibility. Graphical output includes vector plots, 2D line and scatter plots, and 3D plots. Graphic results can be transferred to a measurement report in pdf or HTML format. Numerical output includes binary, ASCII, MS Excel, and TecPlot formats.

For further details on the software performance, please consult separate data sheet on "BSA Flow Software" on our website.



BSA Flow with Advanced Graphics add-on

FiberFlow LDA configurations

The FiberFlow LDA solution is offered in the following 1D, 2D and 3D configurations.

| Standard | Probe diameter | Transmitter & laser | Processor | Software |
|----------|----------------|--------------------------------|---|--|
| 1D | 60 mm | 532 nm 100 mW | BSA F600 (120 MHz max. frequency) | BSA Flow Software Advanced Graphics add-on |
| 1D | 60 mm | 532 nm 300 mW | | |
| 1D | 60 mm | 532 nm 500 mW | | |
| 1D | 60 mm | 532 nm 1W | | |
| 2D | 60 mm | 532/561 nm 100/100 mW | | |
| 2D | 60 mm | 532/561 nm 300/300 mW | | |
| 2D | 60 mm | 532/561 nm 500/500 mW | | |
| 2D | 60 mm | 532/561 nm 1/1W | | |
| 3D | 60 mm | 532/561/660 nm 100/100/100 mW | | |
| 3D | 60 mm | 532/561/660 nm 300/300 /300 mW | | |
| 3D | 60 mm | 532/561/660 nm 500/500/500 mW | | |
| 3D | 60 mm | 532/561/520 nm 1/1/1W | | |

Options

The modular design of the FiberFlow system provide for several configurations to meet the needs of the measurement application. The options include:

Probes: 14 mm and 27 mm probes are suitable for confined spaces and/or small flow rigs. 112 mm diameter probes are well suited for larger facilities with up to >1m measurement distance.

Beam Expanders: Improves the signal quality (SNR) and reduce the measurement volume size especially at longer measurement distances. Available for 60 mm and 112 mm probes.

Processors: A wider velocity range can be covered using the BSA F850 upgrade which offers 250 MHz max. frequency. Supersonic and Hypersonic speeds can be measured depending on the optical configuration.

Software: Spectrum/Correlation Add-on, Cyclic Phenomena Add-on, Scripting and MATLAB link Add-on, LIF and Parametric Analysis Add-on.

Traverse: Traversing mechanism can be added to the system, to be controlled from the software so that fully automated experiments are possible. Several standard traverse controllers are supported in the software. For further details on the software performance, please consult separate data sheet on our website.

Seeding: For air flows a range of liquid droplet and solid particle seeders are available. For liquid flows, we offer a variety of seeding particles. Please see separate data sheets on our website.

Calibration: Traceable calibration is available for systems with 60 mm probes. The calibration data is read directly into the Software from a CD provided with each lens. Please see separate data sheet on our website.

Technical specifications

| Probes | 14 mm | 27 mm | 60 mm | 112 mm |
|---|---|-----------------|-------------------|-------------------|
| Fiber cable length | 5 m, 10 m or 20 m (other length on request) | | | |
| Probe dimensions (incl. front lens, excl. cables) | Ø14 x 116 mm | Ø27 x 205 mm | Ø60 x 275 mm | Ø112 x 494 mm |
| Probe material | Stainless steel | Stainless steel | Anodized Aluminum | Anodized Aluminum |
| Probe weight (excl. front lens, incl. cables) | 0.1 kg | 0.4 kg | 2.0 kg | 4.5 kg |

| Processor | BSA F600 | BSA F850 |
|------------------------------|---------------------|-----------|
| Max. input frequency | 120 MHz | 250 MHz |
| Velocity range ^{*)} | 560 m/s | 1,331 m/s |
| Data rate | >100,000 bursts/sec | |
| Resolution | >16 bits | |

^{*)} depends on the optics, example for 60 mm probe with 500 mm focal length, 532 nm wavelength

| Software | Features |
|--------------------------|---|
| BSA Flow | <ul style="list-style-type: none"> Online oscilloscope display of signals Online display of data validation, data rate, coincidence rate, photomultiplier anode current Set up of BSA processor Acquisition of data from BSA, Control of traversing system Statistics of results (mean, RMS, Skewness and Flatness) Listing of results Set up of analysis sequences Export of data |
| Advanced Graphics Add-on | X-Y plots, vector plots, 3D plots, velocity profile plots |

