Artium

Advanced Instruments for Energy and Environmental Applications

LDV-200TRX

Laser Doppler Velocimeter (LDV)

Particle Velocity and Turbulence Measurements

Compact optical transceiver

Built-in high power DPSS lasers

Free-space optics; eliminates optical fibers

FFT based signal processing

Auto-setup

Artium Technologies Inc. continues to advance the state-of-the-art in Laser Doppler Velocimeter (LDV) instrumentation. Artium's LDV systems offer turnkey operation with a fully automated setup feature. The optical transceiver can be used for the real-time, non-intrusive measurement of individual particle velocity and turbulence measurement (1 or 2 velocity components) in a variety of flow applications. An optional 1-D transceiver can be used along with the 2-D transceiver for the simultaneous measurement of 3- components of velocity.

The complete instrument includes an optical transceiver, ASA signal processors, data management computer and the AIMS system software. The high powered DPSS lasers built into the transmitter provide stability, compactness, ruggedness, and high reliability; it eliminates the need for inefficient and unreliable fiber optics and bulky Ar-ion lasers.

The Fourier transform based **Advanced Signal Analyzer (ASA)** incorporates a proprietary digital signal burst detection technique and adaptive Doppler burst sampling approach to provide high accuracy in signal detection and measurement.

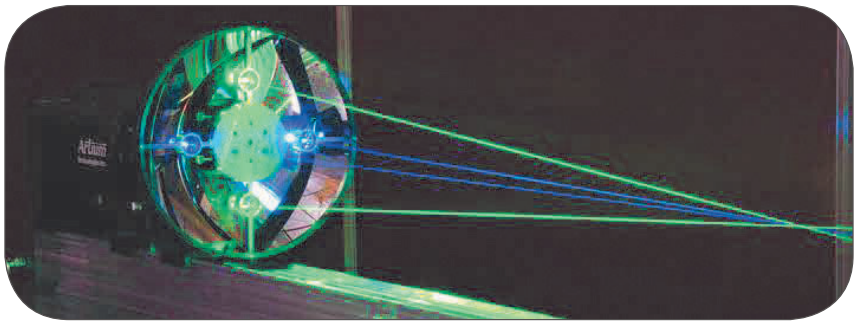
The Automated Instrument **Management System (AIMS)** provides fully automatic setup and operation of the instrument. A variety of standard and user-configurable views are available to analyze the data. It also offers remote operation and monitoring via the Internet.

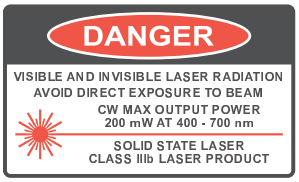
The compact LDV design incorporates several features aimed at ease-of-use and data accuracy. A new version of the ASA is now available featuring further improvement of data accuracy at high speeds and in difficult environments. The AIMS software includes an auto-setup feature that automatically selects the processor and optics settings for optimal performance in complex flows.

Technical Specifications

LDV-200TRX

Velocity measurement range	-400 to 1200 m/s
Velocity accuracy	+/- 0.1%
Transceiver focal Length	100 mm, 200 mm, 350 mm, 500 mm, 750mm, 1000 mm, or 2000 mm
Laser type	Diode pumped solid state (DPSS)
Wavelength	491 nm, 532 nm, 561 nm, 660 nm





ASA

Maximum Input Frequency	200 MHz
Processor bandwidth	160 MHz
Input voltage	200 µV to 1V
Minimum transit time	100 ns
Max sampling frequency	Quadrature, 320 MHz
Measurement resolution	0.01% of the sampling frequency (frequency)
Minimum SNR	-6 dB
Maximum data rate	>250,000 per second
Number of ADC samples	Adaptive 16 to > 100,000 quadrature
Burst detection	Frequency domain burst detector Quadrature analog burst detector
Run time	64 bits, 0.5 µs resolution
Transit time	32 bits, 0.1 µs resolution
High pass filters	10 MHz
Low pass filters	8 filters, software selectable, 100 KHz to 80 MHz
Mixers	Variable (10MHz to 45 MHz) , 80 MHz
Bragg cell driver (frequency shift)	40 or 45 MHz, 0.5V into 50 Ohm
Coincidence	Hardware, Software
External Input	One analog signal and one 16-bit digital signal may be synchronized with data collection
PC Interface	Optical Link

Typical Measurement Ranges

Tranciever Focal length	Velocity	Range (m/s)
mm	min	max
350	-70	200
500	-100	300
750	-150	450
1000	-200	600
2000	-400	1200

Parameters that affect the measurement of velocity with the LDV method are laser beam wave length, intersection angle and signal processing electronics. The laser beam intersection angle is often measured in the factory by projecting the beams to a distant wall and measuring the distance to the surface and the spacing between the beams. This method of calibration has been shown to have less than 0.2% measurement uncertainty. For improved accuracy (lower uncertainty), a spinning disk apparatus is generally used. With this approach, a carefully machined and balanced metal disk is used. The disk has a small aperture in it at a radius known to within +/-0.01 % uncertainty. For backscatter LDV Transceiver calibration, a glass bead attached to a fine needle is used.

The National Institute of Standards and Technology (NIST) in the US currently uses an Artium LDV system as a standard reference for air velocity sensors.

80 mm Beam Separation

Spinning Disk Calibration