

# FLUID MECHANICS SOLUTIONS

State-of-the-art hardware, software and complete measurement systems for fluid mechanics and particle diagnostics researchers.

JUNE 2025



# FLUID MECHANICS SOLUTIONS

The study of fluid mechanics is extremely challenging and complex - though, amazingly, it is based on only a few straightforward underlying principles. TSI equips fluid mechanics and particle diagnostics researchers with state-of-the-art hardware, software and complete measurement systems, providing diagnostics of fluid flow and particle/droplet sizing in a wide range of applications to meet your unique measurement requirements.

## Applications

- Hydrodynamics
- Aerodynamics
- Turbulence
- Spray Diagnostics
- Bio-locomotion studies
- Biomedical studies
- Combustion studies
- Multi-phase Flow

## BUILDING YOUR SYSTEM: CHOOSE YOUR SOLUTION

TSI's fluid mechanics systems have been specifically entrusted by researchers to take measurements of fluid flow velocity, droplet size and all the associated flow and sizing statistics at a point, over a planar region or for a complete three-dimensional volume, in a wide range of environments.

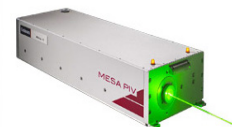
The systems reliably measure three components of velocity, particle/droplet size and shape, number density, volume flux, temperature, concentration and many other parameters to provide you with the solution needed to resolve the problem you are working on. Many of our systems are laser based which are non-invasive, meaning that the systems will have no disturbance to the parameters you want to measure, giving the most accurate and reliable measurement results.

**Kenelec Scientific can work with you to design a new system, or upgrade and expand your existing system with the latest technology and combination of measurement techniques:**

- **PIV** - Particle Image Velocimetry,
- **LDV** - Laser Doppler Velocimetry
- **PDPA** - Phase Doppler Particle Analysis
- **PLIF** - Planar Laser Induced Fluorescence
- **TA** - Thermal Anemometry (or Hot Wire Anemometry)

**We also offer on-site services for a range of laser equipment within Australia and New Zealand to ensure ongoing accuracy of measurement with minimal downtime.**

**Contact our team to discuss the solution that best suits your needs.**



# PIV SYSTEMS

Particle Image Velocimetry (PIV) is an optical imaging technique used to measure velocity at thousands of points in a flow field simultaneously. The measurements are made in “Planar slices” of the flow field to give two components or three components of velocity. This technique provides accurate results with very high spatial resolution, while TSI’s Time-resolved PIV system allows for high temporal resolution of the velocity field.

The PIV technique can be applied to measure flow fields in many environments, from microchannels to large scale wind tunnels, and for 2D to 3D with high spatial and temporal resolution, with systems including:

- **2D PIV**

Measure the instantaneous global velocity field in a flowing fluid, 2D PIV incorporates the most advanced analysis schemes in a completely re-engineered software platform built for flexibility and expansion.

- **Stereo PIV**

A natural extension of 2D PIV, Stereo PIV provides enhanced understanding of a flow by offering insight into the three-dimensional structure within the illumination plane. Upgrading from 2D PIV to Stereo PIV is easy, and is also a convenient stepping stone for upgrade towards a V3V system.

- **Time Resolved-PIV**

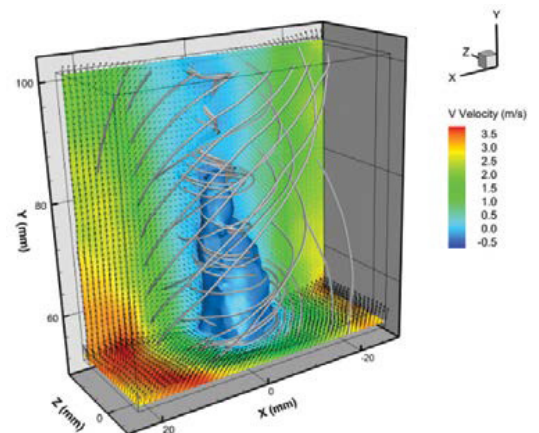
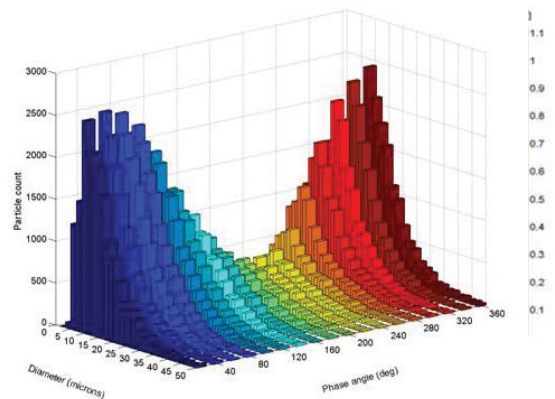
TSI offers PIV systems capable of operation across a very broad spectrum of repetition rates, from traditional low-speed (1-15 Hz), mid-speed (~90 Hz), and high-speed systems. Recently, TSI systems have even been able to reach repetition rates in the 10’s of kilohertz range, with pulse energies as high as 20 mJ/pulse.

- **MicroPIV**

A unique system specifically engineered for measuring flows in MEMS devices, microchannels, vessels, and other small-scale flow devices, TSI’s MicroPIV system makes use of the same core principles and components of a traditional 2D-PIV system, but with specific modifications ideal for high-magnification applications.

- **Volumetric PIV (V3V)**

With the flexible system configuration, Volumetric PIV users can select specific camera models as well as the V3V camera mounting frame. Create unique experimental setups, ensuring the most appropriate pixel resolution, frame rate, spatial resolution and volume size for accurate three-dimensional results.

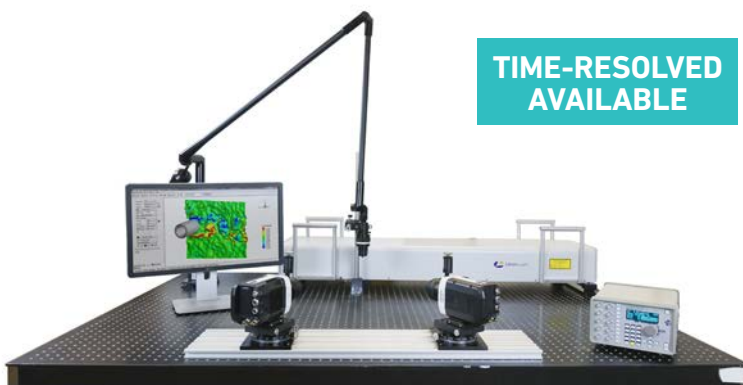


Combustion flow (non-reacting), ICARE CNRS, France

## LIMITED BY REPETITION RATE?

TSI offers **time-resolved** versions of all of their global imaging systems including 2D-PIV, Stereoscopic PIV, V3V Volumetric PIV and PLIF.

Already have an existing system? **Upgrading your core system to time-resolved is an easy and cost-effective solution compared to buying a new system outright. Ask our team how.**



Example TSI Time-Resolved PIV System

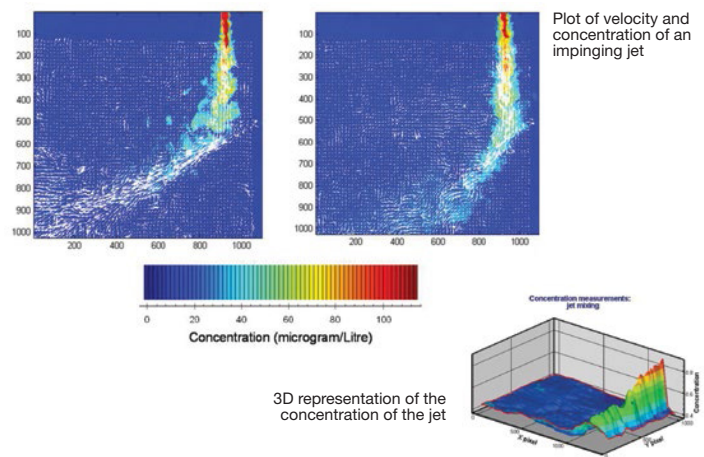
**TIME-RESOLVED  
AVAILABLE**



# PLIF SYSTEMS

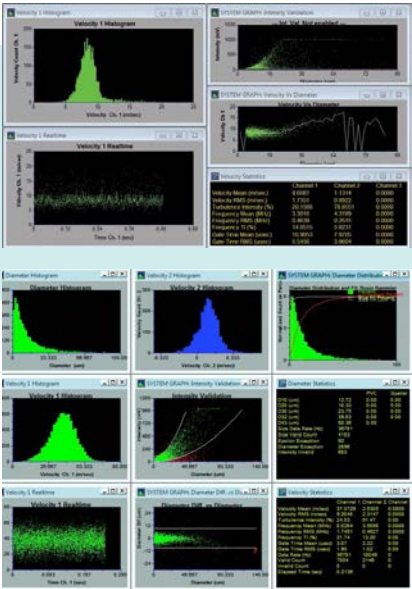
**Planar Laser Induced Fluorescence (PLIF)** systems from TSI provide measurements of scalar quantities: concentration, temperature and combustion, in addition to fluid velocity in a flow which is needed to understand flows and their transport behaviour. Similar to the measurement technique behind TSI’s Particle Image Velocimetry (PIV), extending a PIV system to allow for measurement of some scalar quantities is easy.

TIME-RESOLVED AVAILABLE

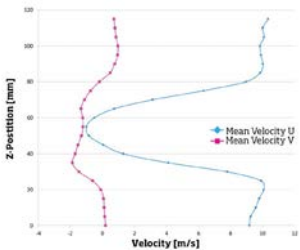
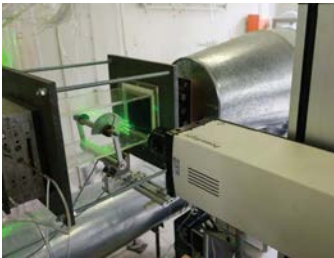


# LDV SYSTEMS

TSI’s pre-configured one-component, two-component or three-component (1D, 2D or 3D) **Laser Doppler Velocimetry (LDV)** system, with the new PowerSight Solid State Laser, will get you up and running in a hurry. This new and improved setup features the PowerSight module, which includes the latest in solid state lasers, transmitting and receiving optics, and all control electronics for use as a standalone solution.



The FlowSizer software package is designed to be used with the PowerSight Ar-ion laser-based LDV and PDPA systems. It supports all the FSA processors and PDM modules. It also has an easy-to-use interface, full-featured rotating machinery support, full traverse support, user-defined customizable graphics, user-defined statistics, power spectrum features, and data export. FlowSizer software provides all the features for the most accurate measurements of velocity and sizing of droplets.



| SYSTEM                  | 1-COMPONENT            | 2-COMPONENT            | 3-COMPONENT             |
|-------------------------|------------------------|------------------------|-------------------------|
| PowerSight Laser Module | TR-SS-1D-561           | TR-SS-2D               | TR-SS-2D & TR-SS-1D-553 |
| Photodetector Module    | PDM1000-1SS            | PDM1000-2SS            | PDM1000-3SS             |
| Signal Processor        | FSA3500-1 or FSA4000-1 | FSA3500-2 or FSA4000-2 | FSA3500-3 or FSA4000-3  |
| Software Package        | FlowSizer64            | FlowSizer64            | FlowSizer64             |

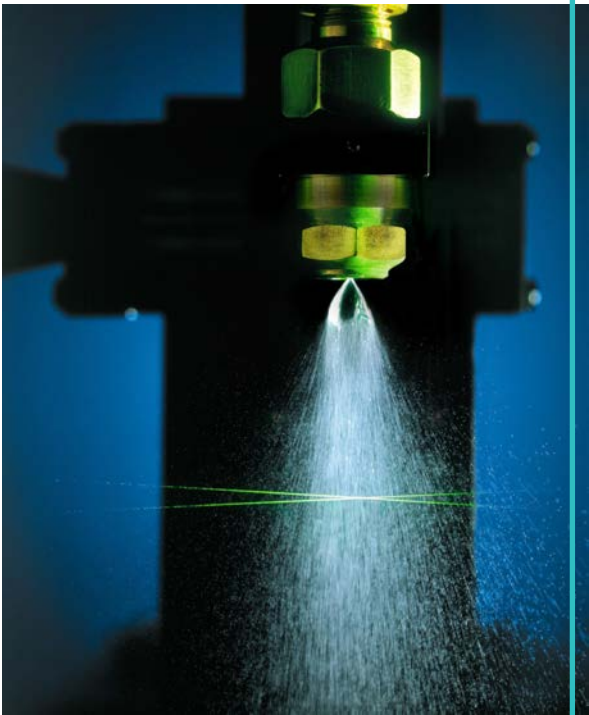
# PDPA SYSTEMS

TSI's **Phase Doppler Particle Analyzer** (PDPA) systems provide accurate and reliable flow velocity and particle size data from all measurement situations. With up to 800MHz sampling rate and photon-counting level sensitivity, only TSI electronics have the speed and versatility to handle all your PDPA measurement needs.

Upgrading a PowerSight LDV System to a PDPA System is very straightforward due to the same PowerSight solid-state laser module used by either configuration, providing the flexibility of utilizing the system for either LDV or PDPA.

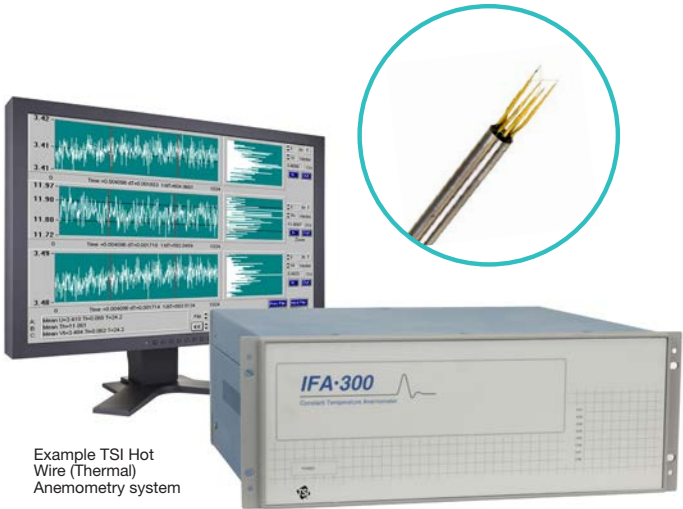
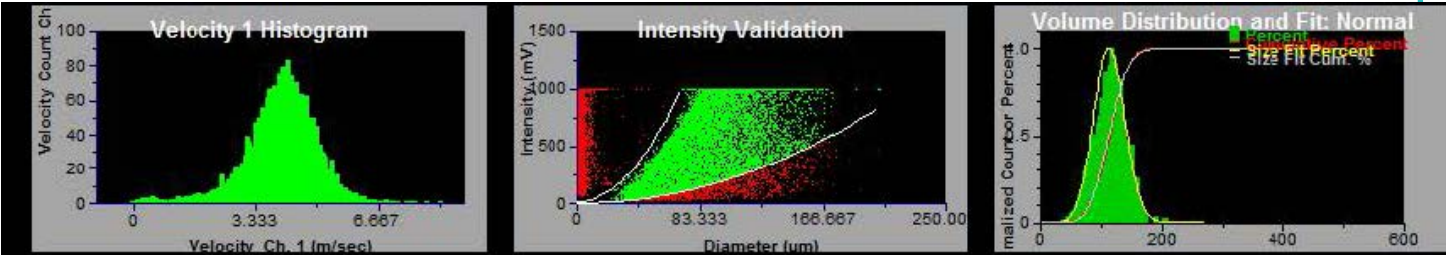


Example TSI PDPA System



PDPA beams crossing in the spray downstream of the nozzle; screenshot of dataset taken from the spray nozzle

| SYSTEM                  | 1-COMPONENT              | 2-COMPONENT              | 3-COMPONENT              |
|-------------------------|--------------------------|--------------------------|--------------------------|
| PowerSight Laser Module | TR-SS-1D-561             | TR-SS-2D                 | TR-SS-2D & TR-SS-1D-553  |
| Receiver Probe          | RV1070 or RV1100         | RV2070 or RV2100         | RV3070 or RV3100         |
| Photodetector Module    | PDM1000-1PSS             | PDM1000-2PSS             | PDM1000-3PSS             |
| Signal Processor        | FSA3500-1P or FSA4000-1P | FSA3500-2P or FSA4000-2P | FSA3500-3P or FSA4000-3P |
| Software Package        | FlowSizer64              | FlowSizer64              | FlowSizer64              |



Example TSI Hot Wire (Thermal) Anemometry system

# HOT WIRE ANEMOMETRY SYSTEMS

There are many different types of sensors, wire or film, for 1D, 2D, and 3D velocity components, and for gaseous and liquid flows. The **Hot Wire Anemometry** - also known as **Thermal Anemometry** - system is an excellent tool for turbulent flow because of its high frequency response to measure the fluctuation of the flow and many versions of sensors used in different flow environments.

## UPGRADING YOUR SYSTEM: COMPONENTS AND ACCESSORIES

Looking to expand the capabilities of your current system?

Kenelec Scientific sell and support a diverse range of high quality components and accessories, and we can work with you to expand your existing system. With the modular design of our Fluid Mechanics systems, upgrading individual components may give your system a new lease on life, avoiding the costs of buying a new one outright.

Discover some of the brands and options below, or contact our team to discuss the solution that best suits your needs.

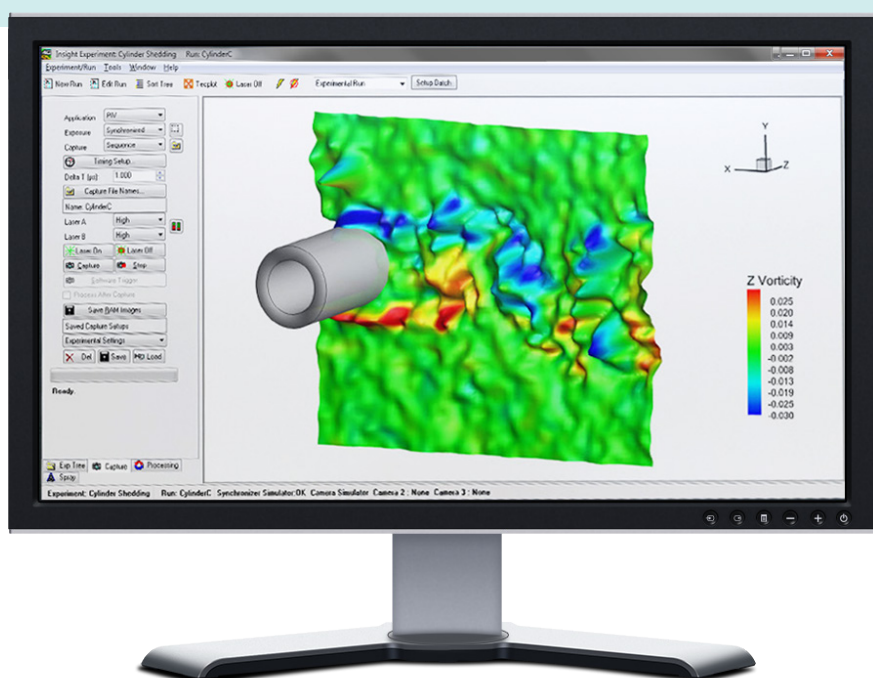


## SOFTWARE PACKAGES

State-of-the-art software packages ensure easy operation and control of your Fluid Mechanics system, combined with quick and accurate analysis of results.

| SOFTWARE     | INSIGHT 4G™ | INSIGHT™ V3V 4D | FLOWSIZER64 | THERMALPRO |
|--------------|-------------|-----------------|-------------|------------|
| PIV SYSTEMS  | •           |                 |             |            |
| V3V SYSTEMS  |             | •               |             |            |
| LDV SYSTEMS  |             |                 | •           |            |
| PDPA SYSTEMS |             |                 | •           |            |
| HWA SYSTEMS  |             |                 |             | •          |

**Dense Particle Identification and Reconstruction (DPIR)** is a 4D PTV algorithm that builds on the recent advances in Computer Vision and is the first to integrate for **Volumetric PIV (V3V)** measurements through Peaks, Projections, Paths—a novel technique applicable to both time-resolved and non-time-resolved cases.





## CAMERA OPTIONS

We supply a full range of cameras including the **Powerview** range - built to meet the most challenging PIV and PLIF applications, with option to increase frame rate allowing it to be used in some time-resolved measurements with higher sensitivity.

Add cameras to perform stereo or volumetric PIV measurements, or upgrade your existing cameras to maximize your system capability, with options and support for all main brands, including **Phantom** and **Photon**.



PowerView™ CCD Cameras for  
PIV and PLIF Measurements



Example TSI 4-Camera V3V-Flex  
Volumetric PIV System



Example TSI V3V™ Volumetric  
3-Component PIV System

## LASER OPTIONS

Powerful high speed and low speed laser options from trusted manufacturers, including the **PowerSight** from **TSI** as well as a large range from trusted suppliers for all fluid mechanics applications.



TSI PowerSight Module

YLF30-3000-CON High speed YLF laser with  
dual cavities, 30 mJ (x2) at 527 nm at 3KHz



For our full range of components and accessories, visit our website: [www.kenelec.com.au](http://www.kenelec.com.au) or contact our team for details.

# KENELEC SCIENTIFIC

## Our company:

Established in 1962, Kenelec Scientific is one of Australia's leading scientific and environmental technology companies. Based in Melbourne, with distributors located throughout Australia and New Zealand, we are industry leaders in the supply of globally sourced, latest generation technologies at competitive prices.

## Our services:

### Sales

Buy the latest equipment from some of the most trusted brands in the industry.

### Rental

Short and long term hire available on an extensive range of instruments.

### Calibration

Professional calibration of your instruments in our accredited laboratories.

### Validation

Wide range of validation services to ensure compliance with regulations.

### Service & Repairs

Local after-sales service and support from our experienced technicians.

### Education

Product education and support available in-house, onsite or online.

### Financing

Secure your equipment without relying on up-front capital funding.

## More Solutions:

As well as your core Fluid Mechanics system, we can also supply a range of:

- Traverse systems
- Breadboards
- Upgrades

**Contact us to  
find out more.**



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We look forward to  
working with you.

