

Laser Timing Stabilizer

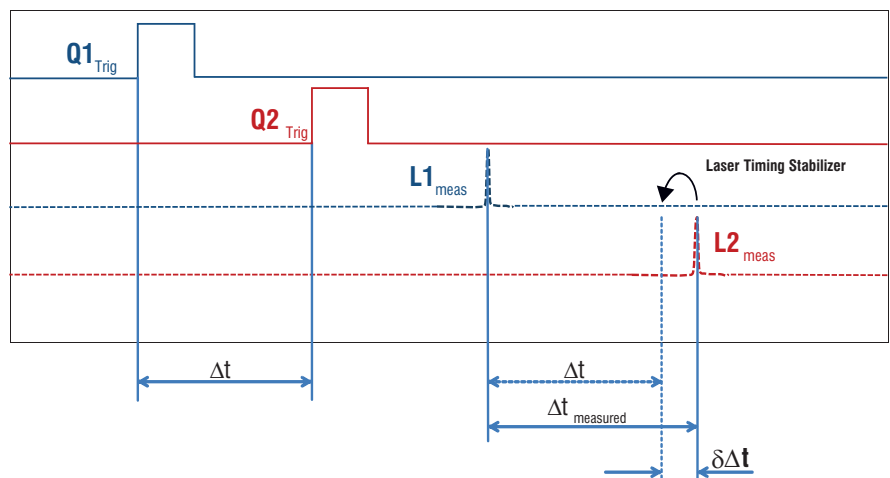
Add-on device for correcting systematic timing errors of PIV lasers

The **Laser Timing Stabilizer** is a simple Add-on device to mitigate the systematic timing errors of PIV lasers. It ensures a precise Δt (i.e. the time separation between the two laser pulses of a PIV laser) with any laser type at any working condition, without affecting the laser beam. Therefore an important source of uncertainties in the PIV measurement technique can be eliminated.



The **Laser Timing Stabilizer** consists of a fiber coupling mechanics which is mounted directly at the laser exit. A stable optical fiber leads the collected light to a controller where a fast photodiode measures the inherent time separation of the laser pulses.

During a calibration process the controller measures the effective time separation between the external trigger signal (Q-switch trigger coming from the Programmable Timing Unit PTU, for example) and the corresponding laser pulse. The Q-switch trigger is shifted that way to reach a fixed, well-known timing of the released laser pulse. For a PIV double-pulse laser this procedure is applied automatically to both laser cavities so the effective time separation Δt is equal to the set value. Systematic timing errors of the laser pulses are eliminated, for a highly accurate PIV result. Additionally, the device is capable to measure residual timing errors which are caused by pulse-to-pulse variations and jitters during the PIV recording.



Typical timing errors of Nd:YAG lasers are up to 50 ns; for Nd:YLF based laser systems this error goes up to 1000 ns.

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Specifications

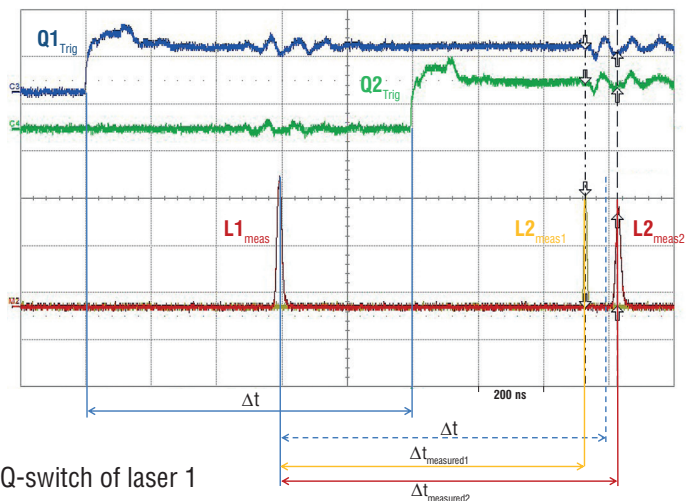
Wavelength range	300 - 900 nm
Max. beam diameter	19 mm
Resolution	55 ps
Min. correctable dt¹⁾	100 ns
Max. laser repetition rate	50 kHz
Lower detection limit²⁾	2.5 mJ/pulse
Mounting of fiber coupler	Thorlabs SM1 thread
Optical fiber	SMA coupling, metal coating
Dimensions	fiber coupler Ø 53 mm x 62 mm controller: 255 mm x 85 mm x 245 mm optical fiber length: 5 m
Interface	USB
Weight	1 kg
Operating temperature	40 °C

¹⁾for individual min. correctable dt the effective laser pulse length of the used laser has to be added
²⁾using the delivered fiber coupler in front of the laser exit

Features

- ▶ fully integrated in DaVis 11 software
- ▶ no adjustments or alignments required
- ▶ timing correction without influence to the laser beam
- ▶ upgradeable to existing PIV systems under DaVis 11
- ▶ parts included: controller, optical fiber, fiber coupler

Laser timing measurement for a common Nd:YAG double-pulse PIV laser



Q1_{Trig}: trigger pulse for Q-switch of laser 1
Q2_{Trig}: trigger pulse for Q-switch of laser 2
L1_{meas}, L2_{meas1}, L2_{meas2}: measured light pulses of laser 1 and 2 respectively with a photodiode
 L1 was operated at max. flashlamp energy and optimal Q-switch delay
 L2 with varying flashlamp energy and Q-switch delay

Data provided by LaVision is believed to be true. However, no responsibility is assumed for possible inaccuracies or omissions. All data are subject to change without notice.

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Ordering information

Part number	Description
1103310	Laser Timing Stabilizer

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