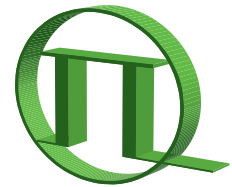


# HydraHarp 400



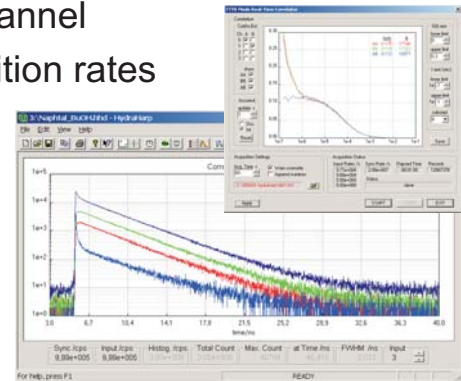
**PICOQUANT**  
Unternehmen für optoelektronische  
Forschung und Entwicklung

<http://www.picoquant.com>

## Multichannel Picosecond Event Timer & TCSPC Module with USB Interface

- Compact box with modular, scalable design \*
- Up to eight identical synchronized but independent input channels
- Common sync for all input channels
- 65536 histogram bins per channel, minimum width 1 ps, 32 bits deep
- Count rate up to 12.5 million counts/sec per channel
- Multi-stop capability for efficiency at slow repetition rates
- Histogrammer measurement range from 65 ns to 65  $\mu$ s
- Time-Tagged Time-Resolved (TTTR) mode
- External marker signals for imaging or other experiment control
- External reference clock input

\* patent pending



## Applications

- Quantum cryptography and related research
- Diffuse optical tomography and molecular imaging
- Coincidence correlation
- Time-resolved fluorescence and luminescence spectroscopy
- Fluorescence Lifetime Imaging (FLIM)
- Single Molecule Spectroscopy (SMS)
- Time-of-flight measurements, LIDAR and ranging

# Multichannel Event Timer & TCSPC Module

The HydraHarp 400 is a high-end, easy-to-use, plug and play Time-Correlated Single Photon Counting (TCSPC) system with scalability for multiple channels \*. Dependent on the chosen frame size, up to 4 or up to 8 channels can be installed. It is connected to a PC through a USB 2.0 high speed interface. It provides identical synchronized but independent input channels. They can be used as detector inputs for coincidence correlation experiments as well as independent stop inputs for TCSPC. A dedicated common sync input is provided for TCSPC with fast excitation sources. This allows forward start-stop operation at the full repetition rate of mode locked lasers with stable repetition rate up to 150 MHz. Experiments with low repetition rate benefit from the HydraHarp's multi-stop capability.

The design allows high measurement rates up to 12.5 million counts/sec per channel and provides a highly stable, crystal calibrated time resolution of 1 ps. Optionally, an external time base can be used. The instrument's timing resolution is well matched to SPAD detectors of the PDM series or micro-channel plate photomultiplier tubes (MCP). All input channels are equipped with constant fraction discriminators (CFD), sensitive on the falling edge. A Time-Tagged mode for recording of individual photon events with their arrival time on all channels allows the most sophisticated offline analysis of the photon dynamics. TTTR data can also be correlated in real-time for monitoring of FCS experiments at count rates up to 1.000.000 counts/sec. In TTTR mode, the device can be synchronized with other hardware such as scanners. External hardware such as monochromators can be controlled via CAN bus.

The HydraHarp software provides functions such as the setting of measurement parameters, display of results, loading and saving of measurement parameters and measurement curves. Important measurement characteristics such as count rate, count maximum, position and peak width are displayed continuously. A comprehensive online help function shortens the users' learning curve. A library for custom programming e.g. with LabVIEW™ is also provided, both for Windows™ and Linux™.

\* patent pending

## Options

Small / large frame for up to 4 / 8 channels  
Data Analysis Software

## Specifications

<b>Input Channels and Sync</b> .....	Constant Fraction Discriminator
Input voltage range .....	0 to -800 mV, optimum: -200 mV to -400 mV
Trigger point .....	Falling edge
Trigger pulse width .....	0.5 to 30 ns
Trigger pulse rise/fall time .....	2 ns max.
<b>External Reference Clock</b>	
Input .....	10 MHz, min. 200 mV, max. 1 V pp, 50 Ohms, AC coupled
Output .....	10 MHz, 300 mV pp, 50 Ohms, AC coupled
<b>Time to Digital Converters</b>	
Minimum time bin width .....	1 ps
Electrical time resolution .....	<12 ps rms
Full scale range - Histogram mode .....	65 ns to 65 $\mu$ s (depending on chosen resolution)
Full scale range - Time-Tagged mode .....	Infinite
Maximum count rate per input channel .....	12.5 $\times$ 10 <sup>6</sup> counts/sec
Maximum sync rate .....	150 MHz
Sustained throughput Time-Tagged mode .....	typ. 9 $\times$ 10 <sup>6</sup> events/sec
Dead time .....	<80 ns
Differential non-linearity .....	<2% peak, <0.2% rms
<b>Histogrammer</b>	
Count depth per time bin .....	4.294.967.296 (32 bit)
Maximum number of time bins .....	65536
Collection time .....	1 ms to 100 hours
<b>Operation</b>	
PC interface .....	USB 2.0 high speed
PC requirements .....	1 GHz min. CPU clock, 512 MB memory
Operating system .....	Windows™ 2000/XP/Vista/7
Power consumption .....	Small frame <50 W, large frame <100 W at 100 to 240 VAC

All Information given here is reliable to our best knowledge. However, no responsibility is assumed for possible inaccuracies or omissions. Specifications and external appearances are subject to change without notice. Trademarks or corporate names are used for explanation and identification, to the owner's benefit and without intent to infringe.

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