Count every photon
ID1000 Time Controller Series

All-in-one time-tagging, coincidence correlation and delay/pulse generation

The latest addition to IDQ's Photonic Quantum Sensing range: a unifying force for your single-photon experiments and applications.

Observe detection rates for up to five single-photon detectors, generate up to four coincidence histograms between any pair of connected detectors or trigger signals, and record every arrival time for an exceptionally high number of detected photons, all with picosecond precision.

Beyond measurement, the ID1000 is also a delay/pulse generator. With four output channels of customizable and conditional pulses, you can control and react to your experiment and single-photon detectors in real time.

Preparing for advanced single-photon applications such as scalable photonic quantum computing, the ID1000 Time Controller Series includes sophisticated internal processing for real-time conditional filtering to your coincidence measurements. With this, you can directly record three- or four-fold coincidences without the need for any data post-processing or post-selection.

Simpler than ever to use and integrate into your laboratory, ID1000 Time Controller Series devices come with a new-and-improved suite of LabView virtual instruments and Python scripts, and are available in six combinations depending on your needs (see Specifications below) that are upgradeable at any time.

Get the most out of your photonic experiments and applications with the ID1000 Time Controller Series today.

Key Features

- Five interchangeable input and reference channels
  - High-resolution mode: up to 300 MHz across all inputs, with 3 ps resolution
  - High-speed mode: up to 100 MHz per input, with 100 ps resolution
- Measure four coincidence histograms in parallel
- Record the precise arrival time of every detection event, with or without coincidence filtering
- Tailored pulses (NIM or TTL) from four output channels, with customizable patterns and widths
- Advanced integrated logic: filter events for two-, three- and four-fold coincidences in real time
- Quick and easy lab integration: suite of LabView and Python scripts

New

- Measure more: multi-device synchronisation for over 64 input channels
- Enhanced precision: 3 ps resolution with < 4 ps jitter, and excellent DNL for low-signal applications

Applications

- QKD and quantum communication
- Quantum optics and computing
- Single-photon source characterisation
- Fluorescence lifetime measurements
- Failure analysis of integrated circuits
- VIS, NIR and MIR spectroscopy

SPECIFICATIONS

Functional specifications	High Speed	High Resolution [1]	MASTER	TCSPC
# Inputs channels per device	5		✓	✓
# Input channels in multi-device mode [2]	> 64		✓	
Min. time bin width	100 ps	3 ps	✓	✓
Timing jitter (single-channel, RMS) [3]	< 28 ps	< 4 ps	✓	✓
Max. DNL (RMS)	< 10 ps	< 0.2 ps	✓	✓
Max. input count rate [4]	5 x 100 MHz	300 MHz	✓	✓
Max. timestamp rate [5]	10 M events/s		✓	✓
Input voltage range	-2 V to +2 V		✓	✓
Input channel delay	1 ps to 4 ms (in 1 ps steps)		✓	✓
# Output channels	4		✓	
Output pulse format	NIM or TTL		✓	
Max. rate per output channel	250 MHz		✓	
Min. output pulse width	6 ns (TTL), 1 ns (NIM)		✓	
Input – Output latency	400 ns	1500 ns	✓	

[1] HR add-on license required.

[2] Number of accessible input channels when 16 Time Controllers are synchronised.

[3] Measured as the width of a two-channel start-stop histogram with fast input pulses, divided by a factor of √2 to give the single-channel jitter. Timing jitter for high-speed mode is a worst-case estimate with an assumed Gaussian instrument response profile.

[4] Count rates available for single-channel counters, coincidence counters, and histogram processing, across all input channels of a single device.

[5] Measure up to four sets of timestamps in parallel, in total up to the max. timestamp rate.

Electrical & Environmental specifications	
Power supply requirements	100 V to 240 V, 50 Hz to 60 Hz, 1 A to 2.5 A
Operational temperature	5°C to 40°C
Max. environment humidity	80% up to 31°C, 50% up to 40°C
Device dimensions (W x H x L)	380 mm x 63 mm x 255 mm

Additionally, the functionality of the three versions of the ID1000 Time Controller (MASTER, TCSPC) can all be enhanced with remote add-on upgrades on request:

Available add-ons	Core ID1000 version	
	MASTER	TCSPC
HR – Access to 'high resolution' (3 ps resolution, < 4 ps jitter) mode for the 5 input channels	🔺	🔺
PRCSG – Access to the internal FPGA logic, to configure real-time selection filters for up to four-fold coincidences	✅	🔺
4OUT – Access to the 4 output channels and the internal delay / pulse generator functionality	✅	🔺

🔺 Available upgrade   ✅ Already available