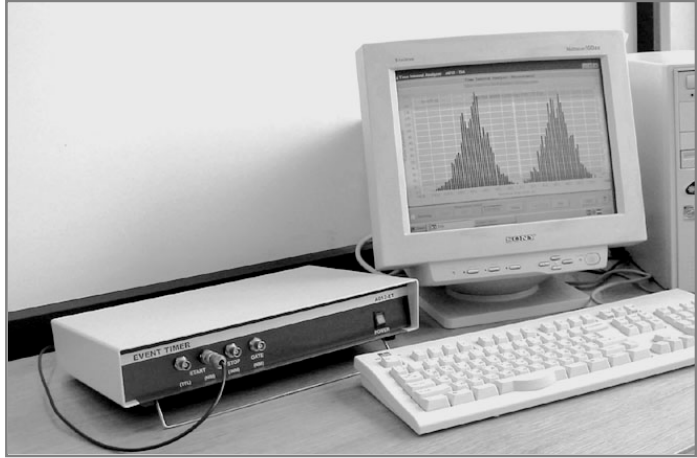


# TIME INTERVAL COUNTER A013

- <10 ps Single-Shot Time Interval RMS Resolution
- 10 MSPS Maximum Continuous Measurement Rate
- Memory Size to 4680 Samples for every measurement cycle

Time Interval Counter A013 is a high-performance PC-based instrument adapted to embedding in various specific application measurement systems (e.g. for Satellite Laser Ranging). The counter A013 is capable of measuring continuously a sequence of time intervals between Start pulse and Stop pulses at the separate inputs or between adjacent Start-stop pulses at the common input.

The counter's operation can be controllable both by external signals (input pulse gating, measurement cycle synchronization) and by a user's program. The counter A013 contains built-in means for expeditious precision testing and re-calibration under time-varying operating conditions.



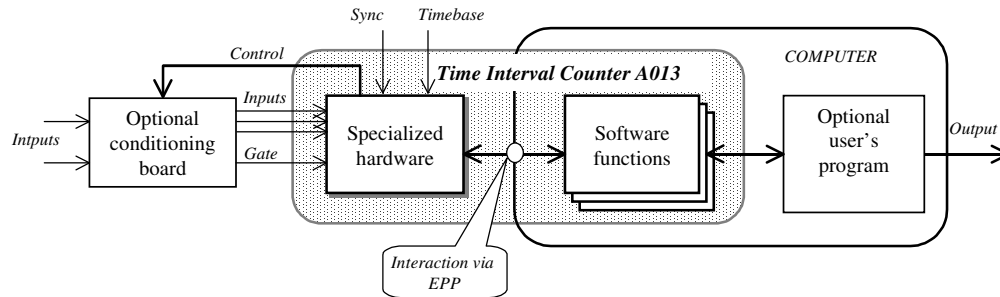
Distinguishing feature of the counter A013 is excellent RMS resolution of time interval measurement in combination with high temporal stability, making it one of the highest precision counters available.

## A013 Specification

Inputs:	Start (Start-stop)	NIM pulses (falling edges)
	Stop	NIM pulses (falling edges)
	Gate	NIM pulses (high level)
	Epoch	TTL pulses (high level); 1 pps
	Sync	TTL pulses (high level)
		<i>Fast mode</i>
		<i>Precise mode</i>
Time interval range		100 ns to 209 ms
Time interval RMS resolution		1 $\mu$ s to 209 ms
Time interval RMS resolution		< 20 ps
Time interval RMS resolution		<10 ps (6-8 ps typically)
Linearity		< $\pm$ 3 ps
Linearity		< $\pm$ 2 ps
Sample number in one cycle		1 to 4680
Sample number in one cycle		1 to 520
Temporal stability		< $\pm$ 0.1ps/hr (common input); < $\pm$ 2 ps/hr (separate inputs)
Warm-up time		3 hr
Measurement cycle control		By user program or externally by Sync pulse
Application software		Windows based "Time Interval Analyzer"
Software support		Example program in C
Special feature		Start pulse timing with 12.5 ns LSD resolution
Timebase		External - 10 MHz; internal - 10 MHz/100 ppm
Hardware connection to PC		Via PC printer port working in EEP mode
Hardware dimension		375x60x233 mm
Power supply		100 - 240 VAC

## Application Notes

The counter A013 can be made either as a stand-alone custom-made instrument or as a set of hardware-software tools for embedding the counter in specific application measurement systems. To adapt the counter to a specific application, the software functions should be called out in a specific order defined by the user (see below).

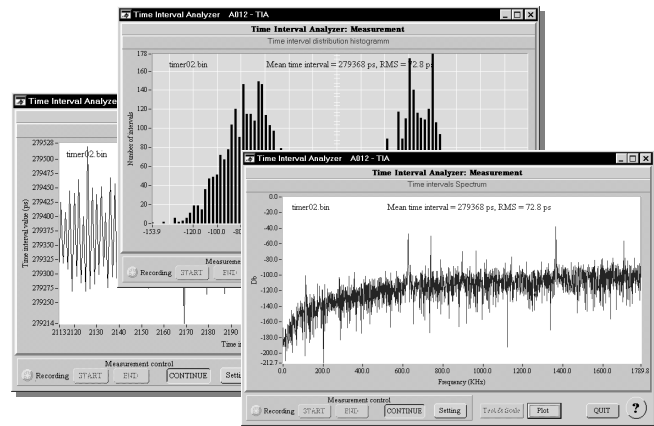


*Fundamental architecture of based on A013 specific application systems*

Various specific application measurement systems can be created in this way. Two presented below virtual instruments illustrate this approach to a complete system design.

### ***Time Interval Analyzer A013-TIA***

The analyzer A013-TIA offers a high performance signal analysis in Modulation Domain. Depending on the selected analyzing mode, the analyzer A013-TIA measures and displays a sequence of time interval estimates, their histogram, and spectrum (FFT) of time interval variation. Such operation is performed cyclically at defined intervals. The measurement results can be saved. Software of the analyzer A013-TIA operates under MS-Windows'95 and higher versions.



### ***Time Interval Counter A013-TIC***

The counter A013-TIC functionally is near to the conventional time interval counters adapted to discontinuous measurement of single-shot time intervals. Specifically, the counter A013-TIC measures cyclically single-shot time intervals determined by separate Start and Stop pulses and displays in real time the measurement results, their current mean and RMS deviation. Measurement of every time interval is attended by Start pulse timing using internal real time clock (12.5 ns LSD). Maximum measurement rate is limited mainly by the measured time interval duration; maximum number of the measured time intervals is unlimited. Software of the counter A013-TIC operates under MS-Windows'95 and higher versions.

