Two Color Balanced Optical Cross Correlator (TCBOC)

APPLICATION

- Tight synchronization of the repetition rate of two optical pulse trains at different wavelengths
- Tight synchronization of the repetition rate of an ultrafast laser to the output of a stabilized fiber link
- Tight synchronization of a pulsed laser to a master laser
- Compensation of jitter, introduced by amplifiers in a laser amplifier chain or in different setups

DESCRIPTION

The fully-automated TCBOC precisely detects the relative time delay between two separate optical pulse trains, with different center wavelengths. It is a natural extension to Cycle's well-known (one-color) BOC that is used for sub-femtosecond fiber link stabilization over kilometer distances. Due to a balanced optical detection scheme, the TCBOC provides exceptionally high timing sensitivity, attosecond timing resolution, amplitude invariance and robustness against environmental fluctuations. It produces a baseband voltage signal that is proportional to the relative time delay, which can then in turn be used in a phase locked loop configuration to synchronize two optical sources having different wavelengths (e.g. locking a Ti:Sapph oscillator to the output of a timing-stabilized fiber link). Standard wavelengths are 800nm, 1030nm and 1550nm. Please contact one of our timing experts for your customization needs.

SPECIFICATIONS

Parameter	Value	Unit	Comment
Timing sensitivity	> 10	mV / fs	At the detector output
Timing resolution	< 0.5	fs	Integrated detector noise floor within 10 kHz bandwidth
Optical input wavelength	< 2000	nm	Tailored for the wavelengths of interest
Optical input power	10 - 20	mW	Depending on wavelength range and other laser parameters
Optical input type	free space or fiber		
Pulse repetition rate	< 10	GHz	Tailored for the frequency of interest
Dimensions	300mm x 270mm x 66mm		
Weight	5	kg	

Digital Synchronization Unit for TCBOC			
Parameter	**Value**	**Unit**	**Comment**
Dimensions			Rack mountable, 19 inch width, 4 height units
Integrated feedback	included		Optimized PID parameters
Control system interface	included		Available in Epics, Tango…
Auto lock	included		

[1]when operated in an environment with maximum 0.5 K temperature and 3 % relative humidity deviation. Please note that the timing jitter between the lasers must be lower than the target precision above the locking bandwidth.