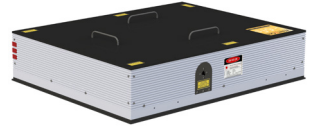


venteon^{CEP5}

Sub 5fs CEP stabilised laser



- Pulse duration <5fs (FTL), <5.5fs (measured)
- Fully configured CEP locked laser
- Octave spanning output spectrum
- Integrated pump laser with CEPLoQ™ technology
- Average output power >220mW

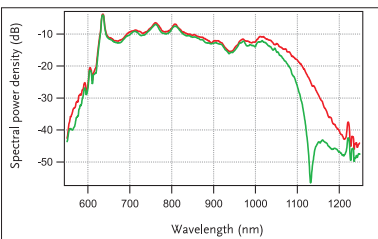


Overview

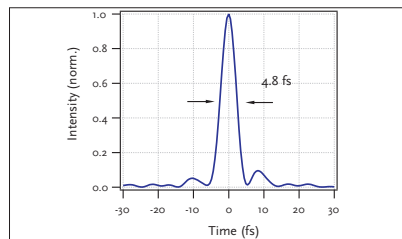
The **venteon CEP5** is a fully configured ultra-short pulse carrier envelope phase (CEP) stabilised laser system. Comprising the **venteon ultra** octave spanning laser, the **venteon CEP5** system includes an f-to-2f interferometer for f_{CEO} beat generation and the ultra-low noise **finesse pure CEP** pump laser featuring CEPLoQ™ technology that enables CEP stabilisation without AOM modulation control and all the electronic controls necessary.

The spectral bandwidth of this laser system supports pulse durations well below 5fs directly from the oscillator. Its octave-spanning output is sufficiently broad for a direct CEP stabilisation of the pulses, realising the f-to-2f beating without any additional spectral broadening by either a PCF or PPLN device. Only 10% of the output power is used by filtering the edges of the output spectrum, leaving more than 220mW for subsequent experiments. This is the most natural, direct and reliable approach for realising a CEP stabilisation without distorting the laser output beam and giving an excellent long-term locking performance.

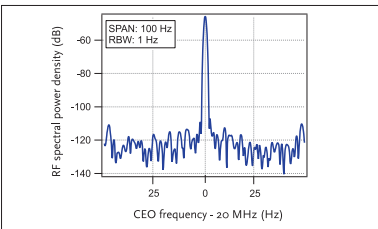
Laser Quantum supports clarity in reporting pulse duration and detailing whether our figures are theoretical values based on Fourier transform calculations or actual measured durations using SPIDER technology and instrumentation. In the case of the **venteon CEP5**, the Fourier transform specification is <5fs, with a measured pulse of <5.5fs. The small difference between these two values demonstrates the excellent phase control of the laser.



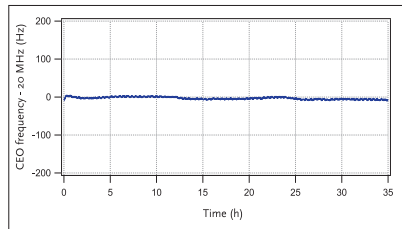
Laser output spectrum without filter for CEP stabilisation (red) and usable CEP stable output spectrum (green).




Typical few-cycle pulse with a duration as short as 4.8fs (measured with a **SPIDER**).




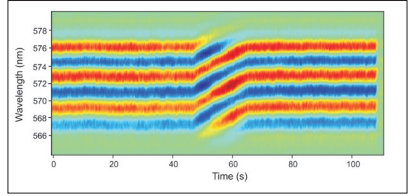
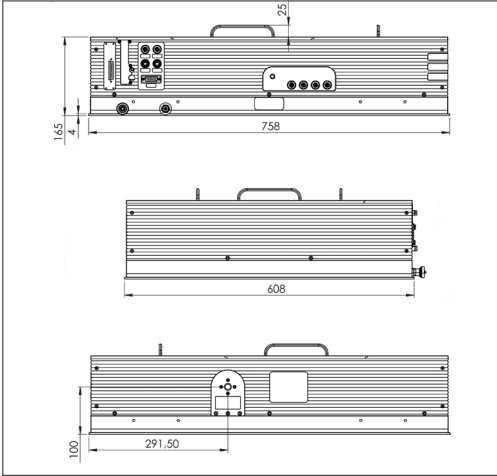
Stabilised f_{CEO} -beat at 20MHz shown in a 100MHz span with 1Hz resolution bandwidth featuring a unique SNR >60dB.



Long term tracking of a stabilised CEO frequency beat note at 20MHz showing the exceptional stability.

 CEPLoQ™ technology that directly modulates the pump power to maintain phase stabilisation without the use of an AOM, allowing faster responses than the traditional method.

 The **venteon CEP5** pump laser can be controlled across the internet via the RemoteApp™ software that also allows connection to the Laser Quantum support team for monitoring laser performance, diagnosing opportunities for and carrying out laser optimisation.



Out-of-loop measured interference of 10^{11} oscillator pulses generated with a CEP Zero lock proving an excellent performance of this technology. The phase is tuned by inserting glass wedges in the extra-cavity beam as shown in the middle part of the picture.

Rausch et al. Optics express 17,20282-20292 (2009)



Other information

- Water cooling included
- Weight 95kg
- 2 year warranty

Drawings are for illustrative purposes only. Please contact Laser Quantum for complete engineer's drawings.

Specifications*

	venteon CEP5
Wavelength	800nm \pm 20nm
Average power output	>220mW
Pulse energy	>2.75nJ (@80MHz)
Spectral bandwidth (@-10dBc)	>380nm
Pulse duration (Measured)	<5.5fs
Pulse duration (FTL)	<5fs
rms noise ¹	<0.03%
Integrated pump	finesse pure CEP
Power stability (24hours)	<1%
Divergence	<1mrad
M-Squared	<1.2
CEP phase noise	<100mrad
SNR ² for f_{CEO} -beat	>30dB (@ 100kHz RBW ³)
Repetition rate	80MHz

* Laser Quantum operates a continuous improvement programme which can result in specifications being improved without notice.

¹ Noise bandwidth 1Hz to 10MHz measure using **finesse pure** pump laser

² Signal to noise ratio.

³ Resolution bandwidth

Variants and upgrades

Oscillator only: The system can be supplied without pump laser or with integration of customer source.

PZ option: Preparation for repetition rate stabilisation, including a slow and fast piezo/stepper motor unit to add fine control of cavity length and repetition rate.

TS option: Locking electronics, photodiode, RF analyser and oscilloscope needed for full timing stabilisation of the laser system (requires PZ option).

CEP Zero: Locked to zero generating a pulse train with constant CEP. This system allows for field sensitive experiments at full oscillator power and repetition rate without the need for sophisticated pulse picking.

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