

CARBIDE



Femtosecond Laser for Industrial and Medical Applications



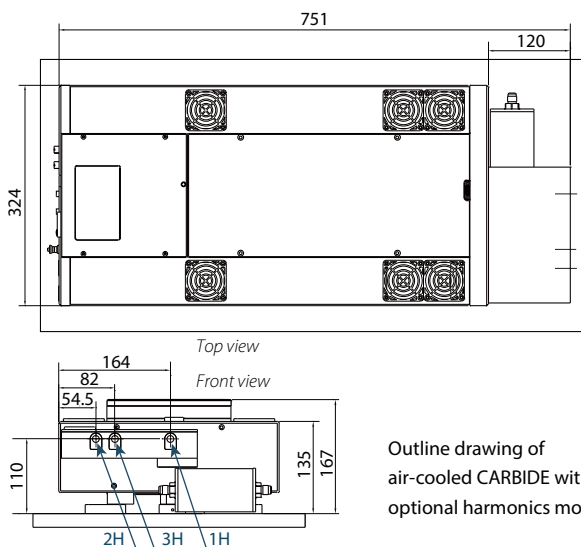
FEATURES

- <290 fs – 10 ps tunable pulse duration
- >100 μJ pulse energies
- >10 W output power
- 60 – 1000 kHz tunable base repetition rate
- Includes pulse picker for pulse-on-demand operation
- Rugged, industrial grade mechanical design
- Air or water cooling
- Automated harmonics generators (515 nm, 343 nm)

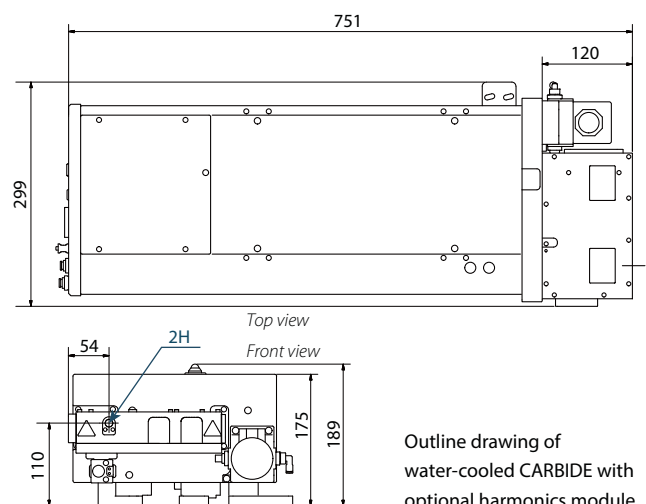
We offer CARBIDE industrial femtosecond laser. Featuring output power of >10 W at 1028 nm wavelength, with highest pulse energies of >100 μJ, it maintains all the best features of its predecessor PHAROS: variable pulse repetition rate in the range of 60–1000 kHz (amplifier internal clock) with the built-in pulse picker feature for pulse-on-demand control, computer controllable pulse duration 290 fs – 10 ps. In addition to usual parameters CARBIDE brings in a few new technologies. One of the most important being a few times higher output average power to wall plug efficiency. It also features novel approach to a cavity design where oscillator, stretcher/compressor and amplifier are integrated into a single housing, this way optimized for volume production. It also allows fast warm-up (important for medical applications), easy access to pump LD modules for replacement. Intra-cavity pulse picker allows reduction of cost and power consumption. Highly integrated LD driver and control electronics, along with embedded control computer now provide less electromagnetic

noise emission and allow faster assembly during production stage. However, one of the most impressive features of CARBIDE is its size of 631×324×167 mm including integrated power supply and air cooling unit. This represents about 7 times reduction in system volume as compared to PHAROS, already one of the most compact ultrafast lasers on the market.

CARBIDE features number of optional components complementing different application requirements: certified safety shutter, beam conditioning unit (beam expander with optional spatial filter), automated attenuator, harmonics unit, additional pulse picker for enhanced contrast. CARBIDE is primarily targeted to the industrial market where relatively low average power cost effective solution with ultrafast pulses is needed. In largest part this is biomedical application with a direct biological tissue processing or biomedical device manufacturing. In addition output parameters of CARBIDE are sufficient to support different wavelength converters starting with harmonic generators to parametric amplifiers.



Outline drawing of air-cooled CARBIDE with optional harmonics module



Outline drawing of water-cooled CARBIDE with optional harmonics module

SPECIFICATIONS

Cooling method	Air-cooled		Water-cooled	
Max. average power	>5 W	>4 W	>10 W	>8 W
Pulse duration (assuming Gaussian pulse shape)	<290 fs			
Pulse duration adjustment range	290 fs – 10 ps			
Max. pulse energy	>85 μJ	>65 μJ	>100 μJ	>80 μJ
Base repetition rate	60 – 1000 kHz ¹⁾		100 – 1000 kHz ¹⁾	
Pulse selection	Single-Shot, Pulse-on-Demand, any base repetition rate division			
Centre wavelength ²⁾	1028±5 nm			
Beam quality	TEM ₀₀ ; M ² < 1.2			
Pulse picker	included	included, enhanced contrast AOM ³⁾	included	included, enhanced contrast AOM ³⁾
Pulse picker leakage	<2 %	<0.1 %	<2 %	<0.1 %
Output power stability	<0.5% rms over 24 hours ⁴⁾			

PHYSICAL DIMENSIONS

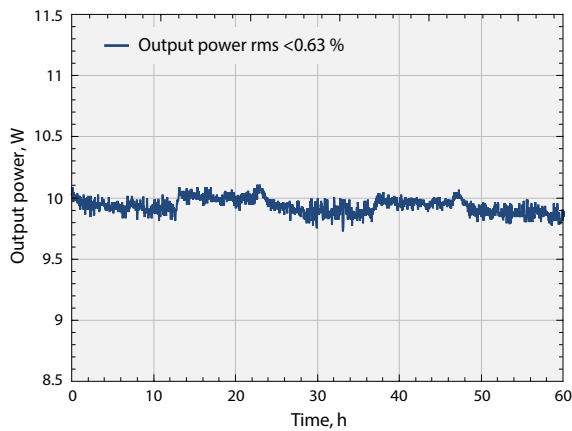
Laser head	631(L) × 324(W) × 167(H) mm	631(L) × 299(W) × 189(H) mm
Power supply	220(L) × 95(W) × 45(H) mm	

UTILITY REQUIREMENTS

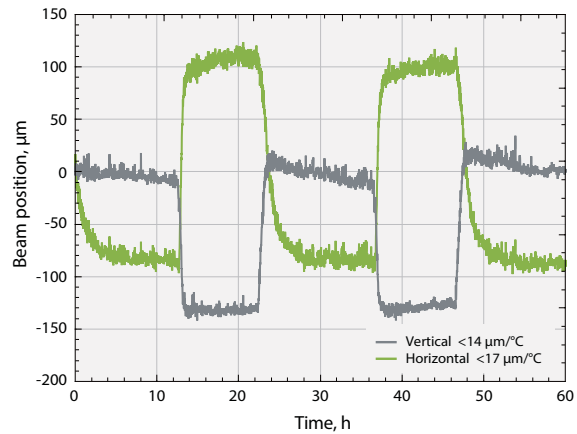
Electric	110 – 220 V AC, 50 – 60 Hz, up to 300 W
Operating temperature	17–27 °C (62–80 °F)
Humidity	non-condensing

¹⁾ Lower repetition rates are available by controlling pulse picker.
²⁾ 2nd (515 nm) and 3rd (343 nm) harmonic output also available.

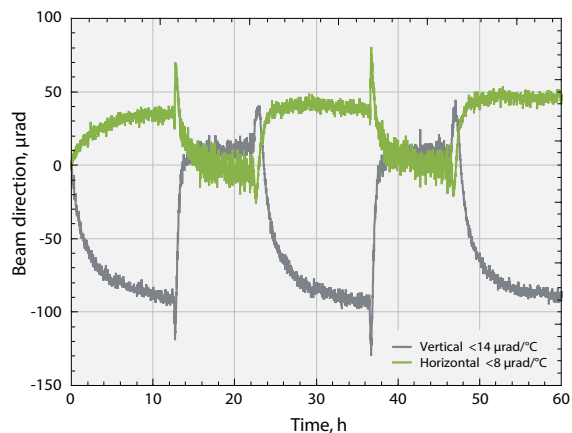
³⁾ Provides fast amplitude control of output pulse train.
⁴⁾ Under stable environmental conditions.



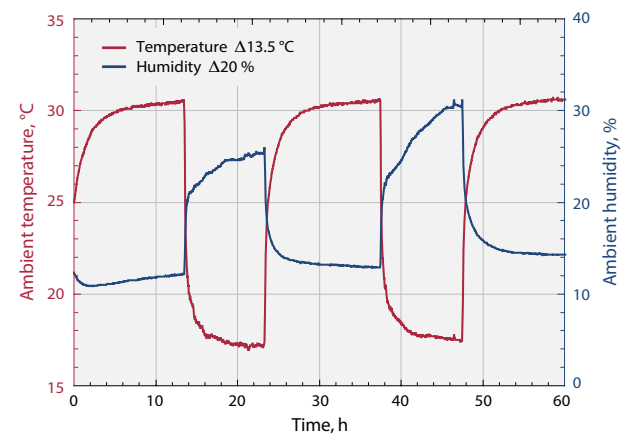
Output power under harsh environment conditions



Beam position under harsh environment conditions



Beam direction under harsh environment conditions



Harsh environment conditions