

PHAROS

High-Power Femtosecond Lasers



FEATURES

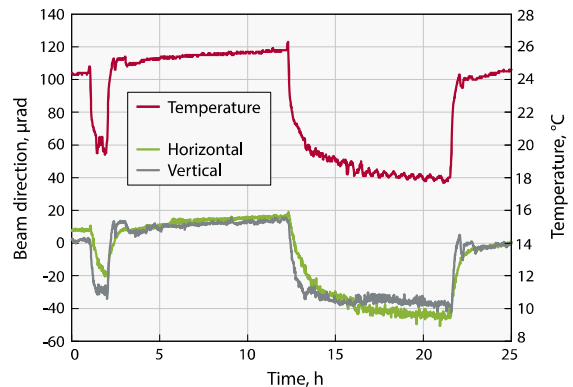
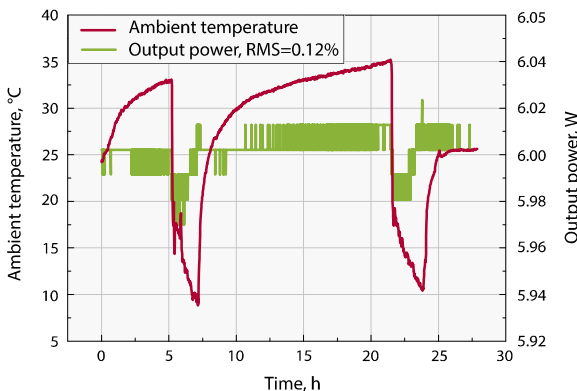
- 190 fs – 10 ps tunable pulse duration
- Up to 2 mJ pulse energy
- Up to 20 W average power
- Single pulse – 1 MHz tunable repetition rate
- Includes pulse picker for pulse-on-demand operation
- Rugged, industrial grade mechanical design
- Automated harmonic generators (2H, 3H, 4H, 5H)

PHAROS is a single-unit integrated femtosecond laser system combining millijoule pulse energies and high average power. PHAROS features a mechanical and optical design optimized for industrial applications such as precise material processing. Market-leading compact size, integrated thermal stabilization system and sealed design allows PHAROS integration into machining workstations. The use of solid state laser diodes for pumping of Yb medium significantly reduces maintenance cost and provides long laser lifetime.

Most of the PHAROS output parameters can be easily set via PC tuning the laser for a particular application in seconds. Tunability of laser output parameters allows PHAROS system to cover applications normally requiring different classes of lasers. Tunable parameters include: pulse duration (190 fs – 10 ps), repetition rate (single pulse to 1 MHz), pulse energy (up to 2 mJ) and average power (up to 20 W). Its deliverable power is

abundant for most of material processing applications at high machining speeds. The built-in pulse picker allows convenient control of the laser output in pulse-on-demand mode. It comes along with an extensive external control interface dedicated for easy laser integration into larger setups and machining workstations. PHAROS compact and robust optomechanical design includes easy to replace modules with temperature stabilized and sealed housings ensuring stable laser operation across varying environments. PHAROS is equipped with an extensive software package, which ensures smooth hands-free operation as well as allows fast and easy integration into various processing devices.

PHAROS is built upon the conventional chirped pulse amplification technique, employing the seed oscillator, regenerative amplifier and pulse stretcher/compressor modules.



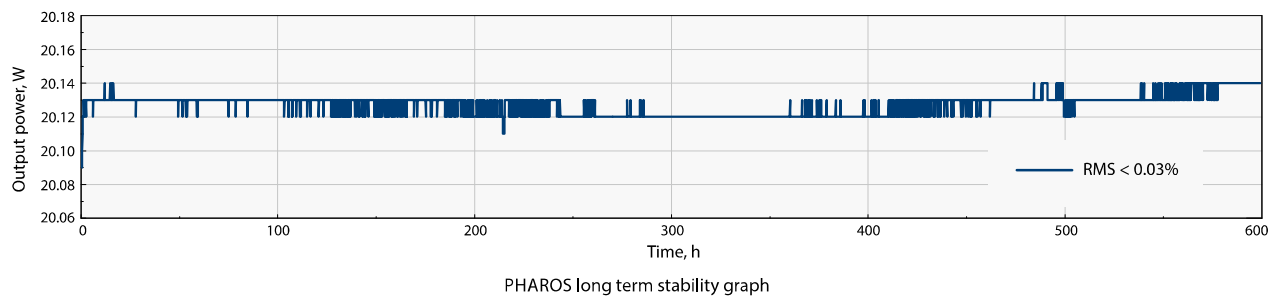
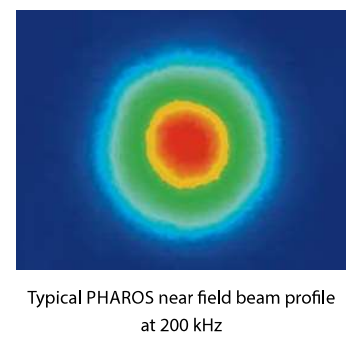
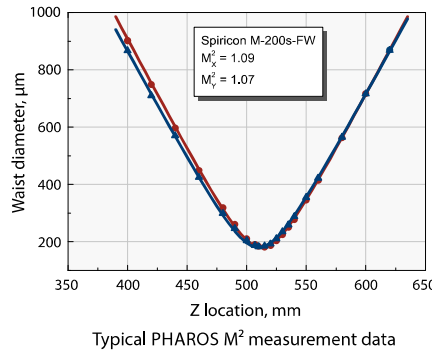
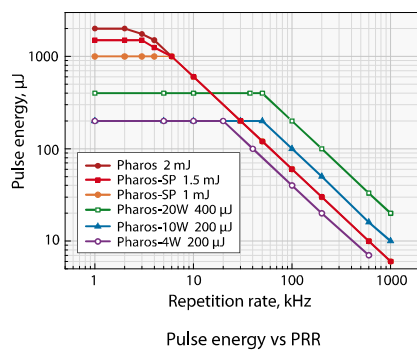
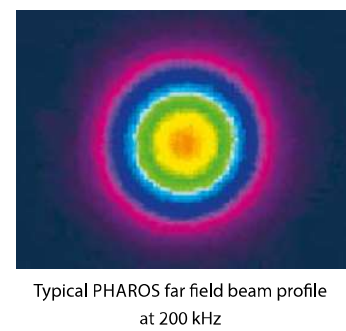
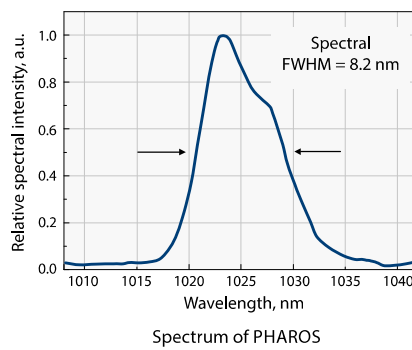
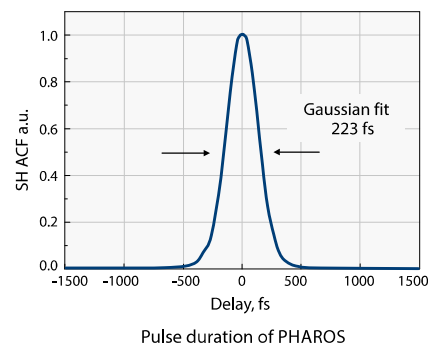
PHAROS output power with power lock on under unstable environment

SPECIFICATIONS

Model	PHAROS-4W	PHAROS-6W	PHAROS-10W	PHAROS-15W	PHAROS-20W	PHAROS SP	PHAROS SP 1.5	PHAROS 2mJ
Max. average power	4 W	6 W	10 W	15 W	20 W	6 W		6 W
Pulse duration (assuming Gaussian pulse shape)	< 290 fs					< 190 fs		< 300 fs
Pulse duration range	290 fs – 10 ps					190 fs – 10 ps		300 fs – 10 ps
Max. pulse energy	> 0.2 mJ	> 0.2 mJ / > 0.4 mJ				> 1.0 mJ	> 1.5 mJ	> 2 mJ
Beam quality	TEM ₀₀ ; M ² < 1.2				TEM ₀₀ ; M ² < 1.3			
Base repetition rate	1 kHz – 200 kHz (extendable to 1 MHz) ¹⁾							
Pulse selection	Single-Shot, Pulse-on-Demand, any base repetition rate division							
Centre wavelength	1028 nm ± 5 nm							
Output pulse-to-pulse stability	< 0.5 % rms over 24 hours ²⁾							
Power stability	< 0.5 % over 100 h							
Pre-pulse contrast	< 1 : 1000							
Post-pulse contrast	< 1 : 200							
Polarization	Linear, horizontal							
Beam pointing stability	< 20 μrad/°C							
Oscillator output	Optional, please see specifications of FLINT oscillators on page 14							

¹⁾ Some particular repetition rates are software denied due to system design.

²⁾ Under stable environmental conditions.



INDUSTRIAL LASERS

OSCILLATORS

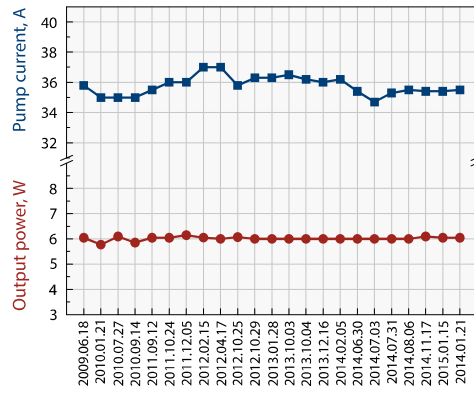
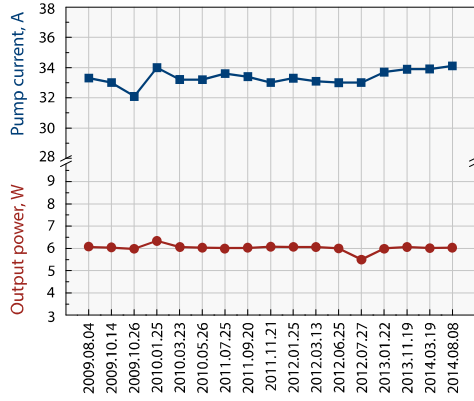
HARMONICS GENERATORS

OPTICAL PARAMETRIC AMPLIFIERS

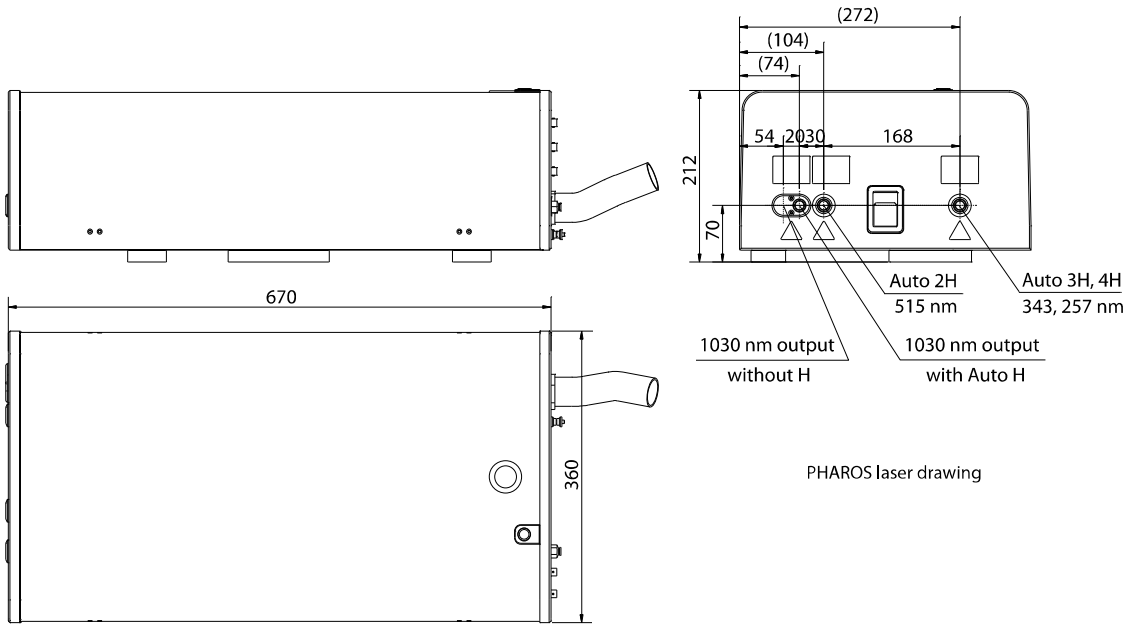
TOPAS DEVICES

SPECTROMETERS

AUTOCORRELATORS



Output power of industrial PHAROS lasers operating 24/7 and current of pump diodes during the years



PHYSICAL DIMENSIONS (mm)

Laser head	670 L x 360 W x 212 H
Power supply rack for PHAROS-4W	640 L x 520 W x 530 H
Power supply rack for other PHAROS models	640 L x 520 W x 660 H

UTILITY REQUIREMENTS

Electric	110 VAC, 50-60 Hz, 20 A or 220 VAC, 50-60 Hz, 10 A
Room temperature	15-30 °C (air conditioning recommended)
Relative humidity	20-80 % (non condensing)