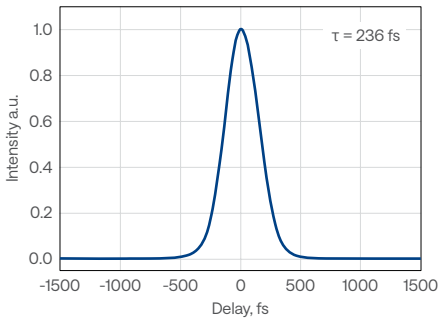
PHAROS

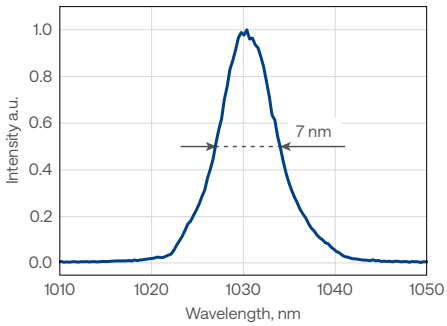
High-Energy Femtosecond Lasers

- NEW: Maximum pulse energy of up to 5 mJ
- Down to < 100 fs right at the output
- Tunable pulse duration, 100 fs – 20 ps
- Pulse-on-demand and BiBurst for pulse control
- Automated harmonics up to the 5th and wavelength-tunable extensions

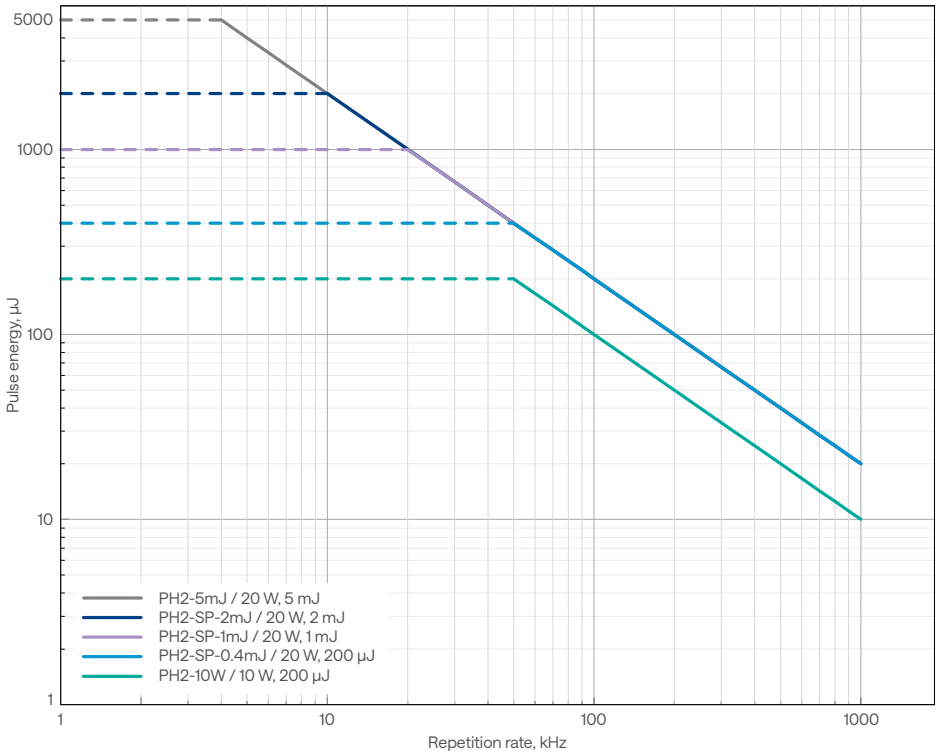
PHAROS-PH2-5mJ
Typical pulse duration



PHAROS-PH2-5mJ
Typical spectrum



PHAROS
Pulse energy vs fundamental repetition rate



Specifications

NEW

Model	PH2-10W	PH2-SP			PH2-5mJ	PH2-UP	
OUTPUT CHARACTERISTICS							
Center wavelength [1]	1030 ± 10 nm						
Maximum output power	10 W	20 W					
Pulse duration [2]	< 290 fs	< 190 fs			< 250 fs	< 100 fs	
Pulse duration tuning range	290 fs – 10 ps (20 ps on request)	190 fs – 10 ps (20 ps on request)			n/a	100 fs – 10 ps	
Maximum pulse energy	0.2 mJ	0.4 mJ	1 mJ	2 mJ	5 mJ	0.4 mJ	1 mJ
Repetition rate	Single-shot – 1 MHz						
Pulse selection	Single-shot, pulse-on-demand, any fundamental repetition rate division						
Polarization	Linear, horizontal						
Beam quality, M^2	< 1.2	< 1.3				< 1.2	
Beam diameter [3]	3.3 ± 0.5 mm	4.0 ± 0.5 mm	4.5 ± 0.5 mm	6.8 ± 0.7 mm	11 ± 0.5 mm	4.5 ± 0.5 mm	6 ± 0.5 mm
Beam pointing stability	< 20 µrad/°C						
Pre-pulse contrast	< 1 : 1000						
Post-pulse contrast	< 1 : 200						
Pulse-to-pulse energy stability, 12 h [4]	< 0.5%						
Long-term power stability, 100 h [4]	< 0.5%						
MAIN OPTIONS							
Oscillator output [5]	1 – 7 W, 50 – 250 fs, ≈ 1035 nm, ≈ 76 MHz						
Harmonic generator [6]	515 nm, 343 nm, 257 nm, or 206 nm; refer to PHAROS HG or HIRO						
Optical parametric amplifier [7]	UV – MIR; refer to I-OPA or ORPHEUS						
BiBurst option	Tunable GHz and MHz burst with burst-in-burst capability; refer to BiBurst						
CEP stabilization	Refer to CEP & RRL Option						
Repetition rate locking							
PHYSICAL DIMENSIONS							
Laser head (L × W × H) [8]	730 × 419 × 230 mm				827 × 492 × 250 mm	770 × 419 × 230 mm	
Chiller (L × W × H)	590 × 484 × 267 mm						
24 V DC power supply (L × W × H) [8]	280 × 144 × 49 mm						
ENVIRONMENTAL & UTILITY REQUIREMENTS							
Operating temperature	15 – 30 °C (air conditioning recommended)						
Relative humidity	< 80% (non-condensing)						
Electrical requirements – Laser	100 V AC, 12 A – 240 V AC; 5 A, 50 – 60 Hz						
Electrical requirements – Chiller	100 – 230 V AC; 50 – 60 Hz						
Rated power – Laser	1000 W						
Rated power – Chiller	1400 W						
Power consumption – Laser	600 W						
Power consumption – Chiller	1000 W						

[1] *Precise wavelengths for specific models are available upon request.*

[2] *Assuming a Gaussian pulse shape.*

[3] *FW 1/e^2, measured at laser output, using maximum pulse energy.*

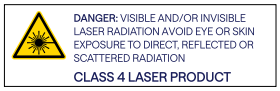
[4] *Under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD).*

[5] *Available simultaneously. Contact sales@lightcon.com for more details or customized solutions.*

[6] *Integrated except for PH2-5mJ. For an external harmonic generator, refer to HIRO.*

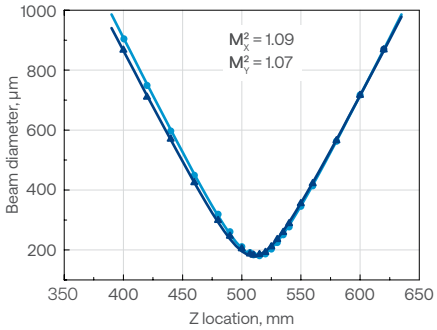
[7] *Integrated except for PH2-5mJ. For more options and OPAs for -5mJ and -UP models, refer to the ORPHEUS series of OPAs.*

[8] *Dimensions depend on the laser configuration and integrated options.*



Beam properties

PHAROS
Typical M^2 measurement data



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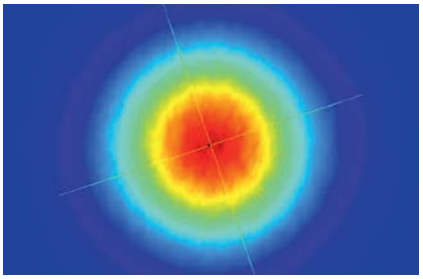
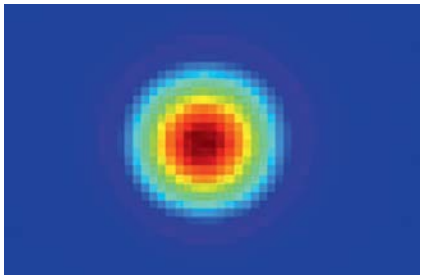
Typical near-field beam profile



PHAROS
Typical far-field beam profile



Stability measurements

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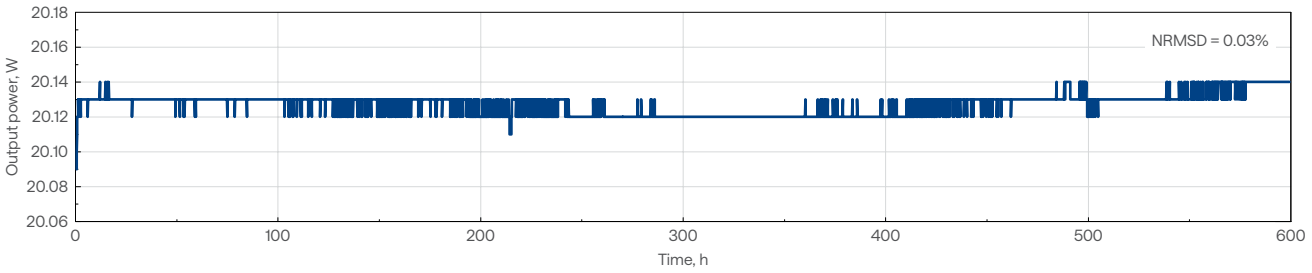
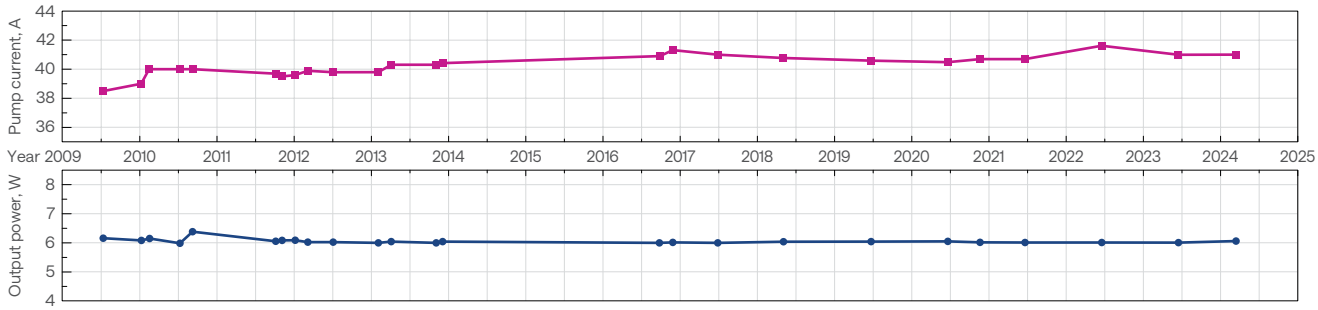
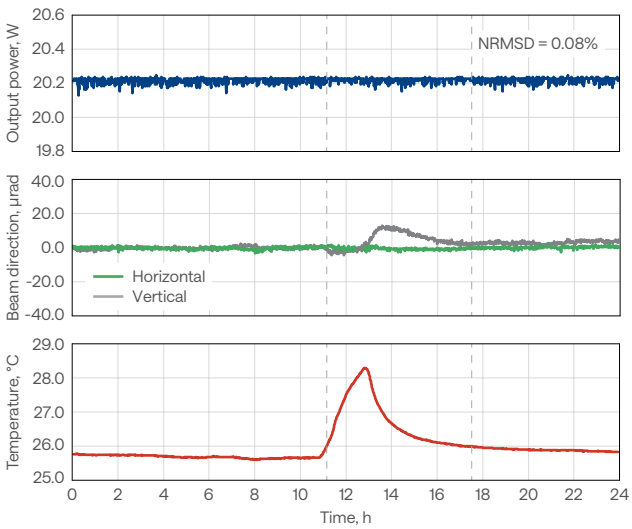
Long-term power stability



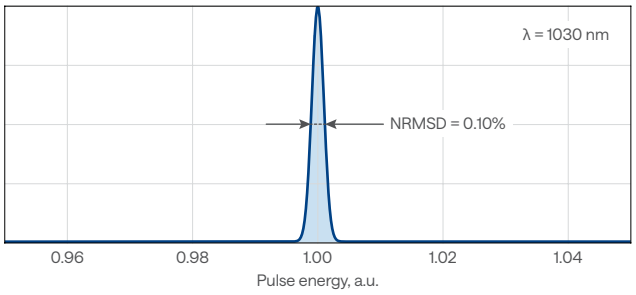
Output power of industrial-grade **PHAROS** lasers operating 24/7 and the current of the pump diodes over the years



PHAROS output power and beam pointing stability with power lock enabled, across varying environmental conditions



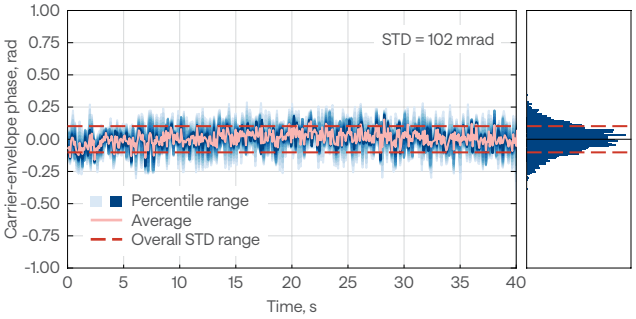
PHAROS
Typical pulse-to-pulse energy stability



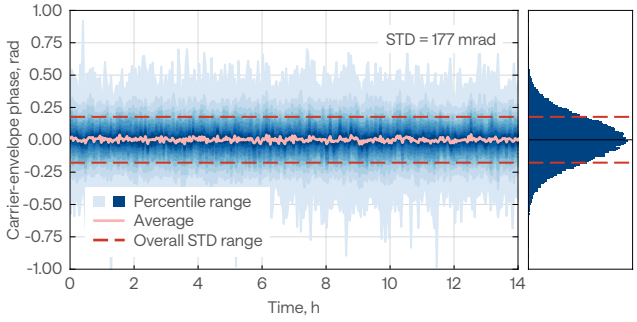
CEP stabilization

PHAROS lasers can be equipped with feedback electronics for carrier-envelope phase (CEP) stabilization of the output pulses. The carrier-envelope offset (CEO) of the **PHAROS** oscillator is actively locked to 1/4th of the repetition rate with a < 100 mrad standard deviation. The CEP stable pulses from the synchronized amplifier have a < 350 mrad standard deviation. The CEP drift occurring inside the amplifier and the user's setup can be compensated with an out of loop f-2f interferometer, which is a part of the complete **PHAROS** active CEP stabilization package.

PHAROS
Short-term CEP stability operating at 200 kHz repetition rate



PHAROS
Long-term CEP stability operating at 200 kHz repetition rate

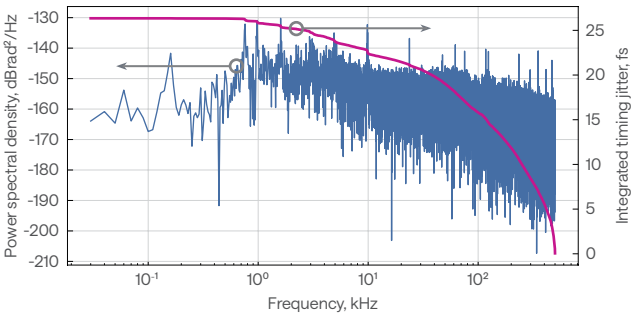


Repetition rate locking

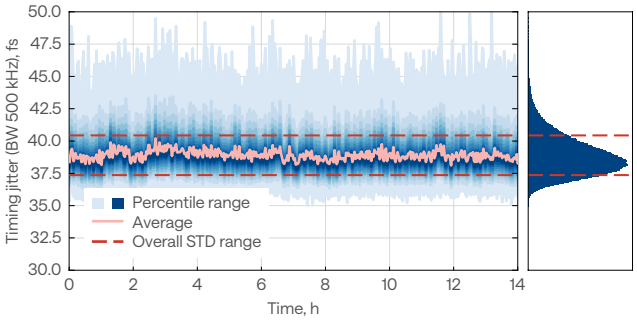
The oscillators in **PHAROS** lasers can be customized for repetition rate locking applications. Coupled with the necessary feedback electronics, the oscillator's repetition rate can be synchronized to an external RF source using the two piezo stages installed within the cavity.

The repetition rate locking system ensures an integrated timing jitter of less than 200 fs for RF reference frequencies above 500 MHz. Additionally, continuous phase shifting is available upon request.

Phase noise data of **PHAROS** oscillator
locked to a 2.8 GHz RF source

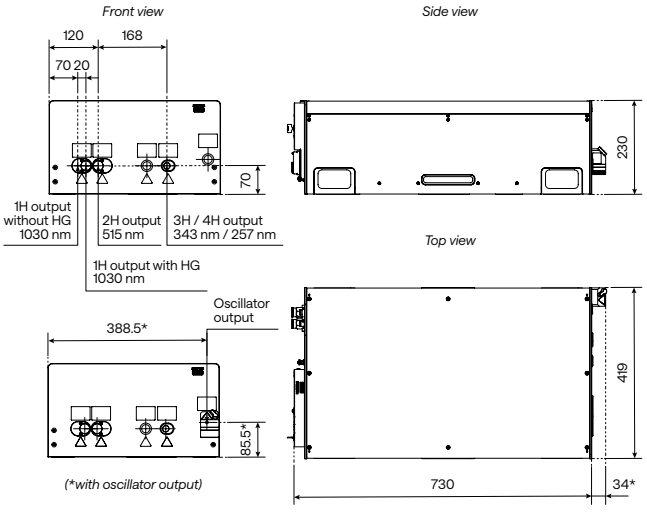


Timing jitter stability over 14 h
PHAROS oscillator locked to a 2.8 GHz RF source

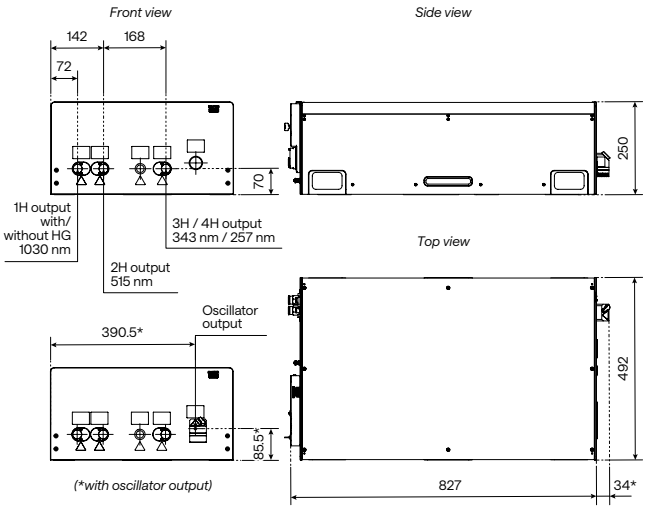


Drawings

PHAROS-PH2-730
-10W or -20W-SP with a FEC or BiBurst option, or a harmonic generator



PHAROS-PH2-827
-10W with an -HE harmonic generator option, or -5mJ



The drawings depend on the exact configuration. If crucial for integration, please contact sales@lightcon.com.