

# ORPHEUS | PS

## Narrow-Bandwidth Optical Parametric Amplifier

### FEATURES

- 210 – 4800 nm tuning range
- 1 – 4 ps pulse duration
- Nearly bandwidth-limited output,  $< 15 \text{ cm}^{-1}$  spectral bandwidth
- Up to 100 kHz repetition rate
- High stability by seeding with femtosecond white-light continuum

### APPLICATIONS

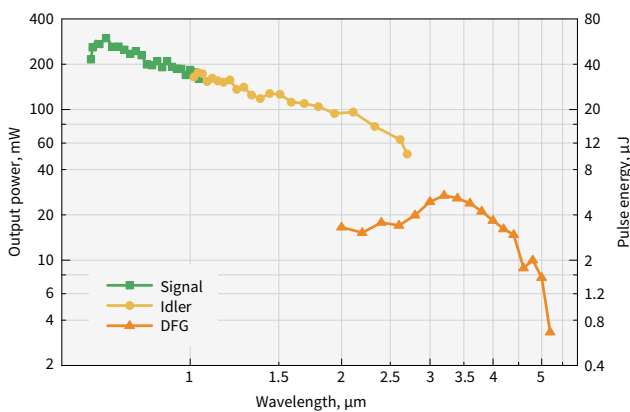
- Femtosecond stimulated Raman spectroscopy (FSRS)
- Sum-frequency generation (SFG) spectroscopy



ORPHEUS-PS is a narrow-bandwidth optical parametric amplifier, designed for PHAROS and CARBIDE lasers. This device is pumped by the picosecond pulses produced in a second harmonic bandwidth compressor SHBC and is seeded by a white-light continuum generated by femtosecond pulses. This enables very high pulse-to-pulse stability compared to other methods of generating tunable picosecond pulses. The white-light generation module is integrated into the same housing as the amplification modules, enabling even better

long-term stability and ease of use. The system features high conversion efficiency, bandwidth- and diffraction-limited output, and full computer control.

Part of the laser radiation can be split to simultaneously pump a femtosecond OPA, providing broad-bandwidth 630 nm – 16  $\mu\text{m}$  tunable pulses, giving access to the complete set of beams necessary for versatile spectroscopy applications such as femtosecond stimulated Raman spectroscopy (FSRS) and sum-frequency generation (SFG) spectroscopy.



Orpheus-PS tuning curves.  
Pump: 5 W, 1000  $\mu\text{J}$ , 5 kHz from PHAROS-SP.

## SPECIFICATIONS

Model	<b>ORPHEUS-PS</b>
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### OUTPUT FROM ORPHEUS-PS

Tuning range	640 – 1000 nm (Signal) 1060 – 2600 nm (Idler)
Conversion efficiency at peak	> 8% (Signal and Idler combined)
Spectral bandwidth	< 20 cm <sup>-1</sup> @ 700 – 2000 nm
Pulse duration	800 fs – 3 ps
Pulse-to-pulse energy stability <sup>1)</sup>	< 2% @ 700 – 960 nm & 1100 – 1500 nm
SHBC output	515 nm output port available, not simultaneous to OPA output Output pulse energy: > 15% of pump
Compressed pump output	1030 nm, < 300 fs, > 5 μJ

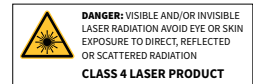
### OPTIONAL WAVELENGTH EXTENSIONS

SH option	Tuning range	320 – 500 nm (SHS) 530 – 640 nm (SHI)
	Conversion efficiency	> 3% at peak
FH option	Tuning range	210 – 250 nm (FHS) 265 – 320 nm (FHI)
	Conversion efficiency	> 0.3% at peak (for > 200 μJ pump energy)
DFG option	Tuning range	2400 – 4800 nm
	Conversion efficiency	> 0.25% at 3200 nm (for > 200 μJ pump energy)

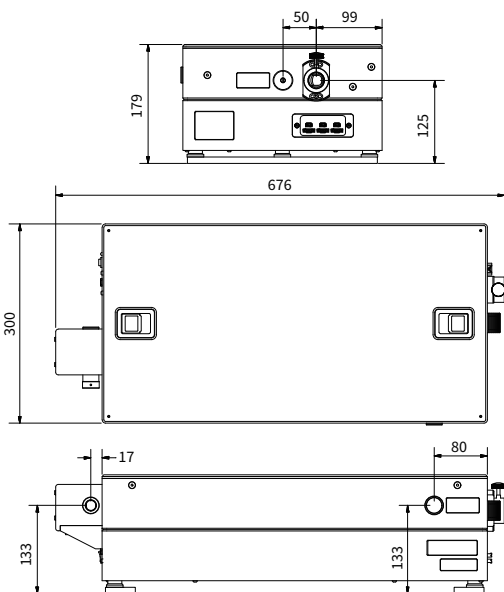
### PUMP LASER REQUIREMENTS

Pump source	PHAROS or CARBIDE with uncompressed output option
Wavelength	1030 nm
Repetition rate	Single-shot – 100 kHz
Maximum pump power	20 W
Pump pulse energy	100 μJ – 3.2 mJ

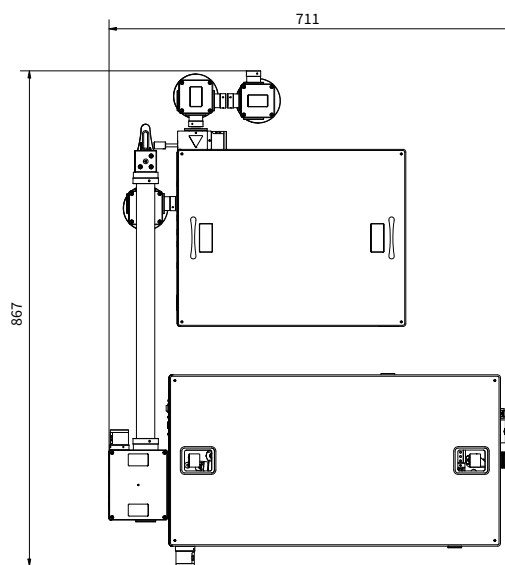
<sup>1)</sup> Expressed as NRMSD (normalized root mean squared deviation).



## DRAWINGS



ORPHEUS-PS drawings



ORPHEUS-PS with SHBC drawing