

# ORPHEUS | PS

## Narrow-Bandwidth Optical Parametric Amplifier

### FEATURES

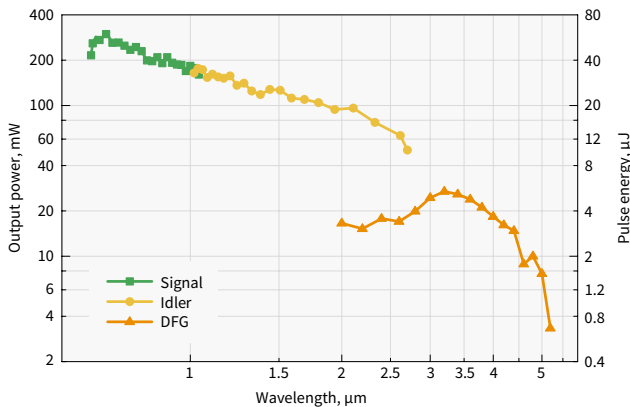
- 210 – 4800 nm tuning range
- 800 fs – 3 ps pulse duration
- $< 20 \text{ cm}^{-1}$  spectral bandwidth
- Nearly bandwidth-limited output
- Up to 100 kHz repetition rate
- High output stability



ORPHEUS-PS is a narrow-bandwidth optical parametric amplifier, designed for PHAROS and CARBIDE lasers. ORPHEUS-PS 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, enabling high

long-term stability and ease of use. The system also features high conversion efficiency, bandwidth- and diffraction-limited output, and complete 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 set of beams necessary for versatile spectroscopy applications such as femtosecond stimulated Raman spectroscopy (FSRS) and sum-frequency generation (SFG) spectroscopy.



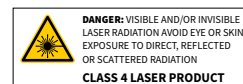
Orpheus-PS tuning curves.  
 Pump: 5 W, 1000  $\mu\text{J}$ , 5 kHz from PHAROS-SP.

## SPECIFICATIONS

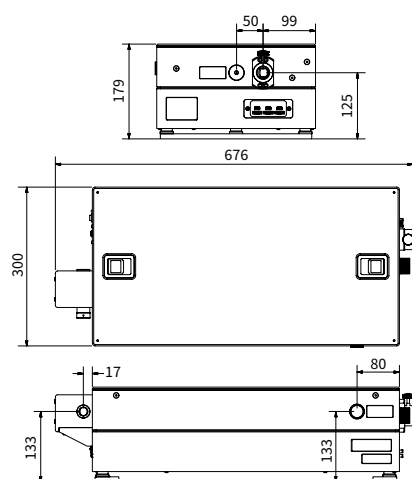
Model	<b>ORPHEUS-PS</b>
<b>MAIN OUTPUT</b>	
Tuning range	640 – 1000 nm (Signal) 1060 – 2600 nm (Idler)
Conversion efficiency at peak	> 8% (Signal and Idler combined)
Pulse duration	800 fs – 3 ps
Spectral bandwidth	< 20 cm <sup>-1</sup> @ 700 – 2000 nm
Pulse-to-pulse energy stability <sup>1)</sup>	< 2% @ 700 – 960 nm, 1100 – 1500 nm
<b>AUXILIARY OUTPUT 1 (515 nm)</b>	
Wavelength <sup>2)</sup>	515 nm ± 5 nm
Generation efficiency <sup>3)</sup>	> 15%
<b>AUXILIARY OUTPUT 2 (1030 nm)</b>	
Wavelength <sup>4)</sup>	1030 ± 10 nm
Pulse duration	< 300 fs
Pulse energy	> 5 μJ
<b>WAVELENGTH EXTENSION</b>	
SH package at peak (320 – 500 nm (SHS), 530 – 640 nm (SHI))	> 3%
FH package at peak (210 – 250 nm (FHS), 265 – 320 nm (FHI))	> 0.3% <sup>5)</sup>
2400 – 4800 nm (DFG)	> 0.25% @ 3200 nm <sup>5)</sup>
<b>PUMP LASER REQUIREMENTS</b>	
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).  
<sup>2)</sup> Direct SHBC output, not simultaneous to OPA; see details in SHBC specifications.

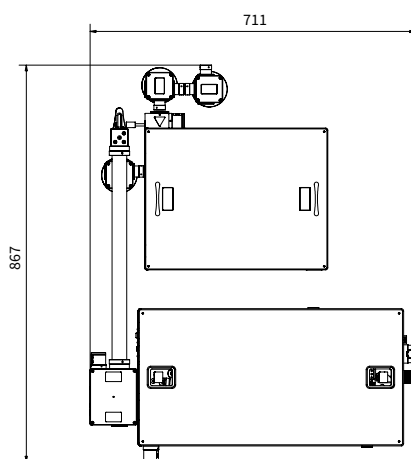
<sup>3)</sup> Specified as percentage of pump pulse energy.  
<sup>4)</sup> Compressed pump output.  
<sup>5)</sup> For > 200 μJ pump pulse energy.



## DRAWINGS



ORPHEUS-PS drawings



ORPHEUS-PS with SHBC drawing