

# ORPHEUS-HP

## High Power Optical Parametric Amplifier



### FEATURES

- 190 nm – 16000 nm tunable wavelength
- Single pulse – 1 MHz repetition rate
- Up to 40 W pump power
- Up to 0.4 mJ pump energy
- Automated wavelengths separation
- Integrated spectrometers for monitoring the output wavelength

ORPHEUS-HP and ORPHEUS-ONE-HP are collinear optical parametric amplifiers of white light continuum pumped by femtosecond Ytterbium based laser amplifiers. The device is a modified version of the ORPHEUS.

ORPHEUS-HP is available with UV VIS tuning range frequency mixers integrated into a thermally stabilized monolithic housing. Also provides the option of generating deep ultraviolet pulses (190–215 nm), in addition to 210–2600 nm as well as DFG extension available (tuning range 2200–16000 nm). Where ORPHEUS-ONE-HP can provide DFG extension (tuning range 4500–16000 nm).

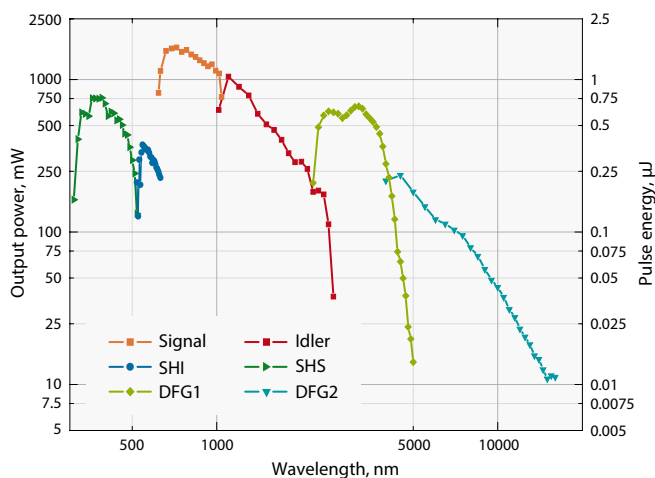
ORPHEUS-HP provides tunable OPA output (630–2600 nm). While ORPHEUS-ONE-HP provides tunable OPA output (1350–4500 nm).

The scheme used in ORPHEUS ONE-HP can generate  $> 150 \text{ cm}^{-1}$  when OPA is configured for broad bandwidth amplification.

The design of this OPA offers completely hands free wavelength tuning and automatic wavelength separation, also ensuring the same position and direction for all wavelengths in UV near IR region. ORPHEUS HP integrates a mini spectrometer for online monitoring of output wavelength and comes with specialized software that enables wavelength feedback and automatic calibration.

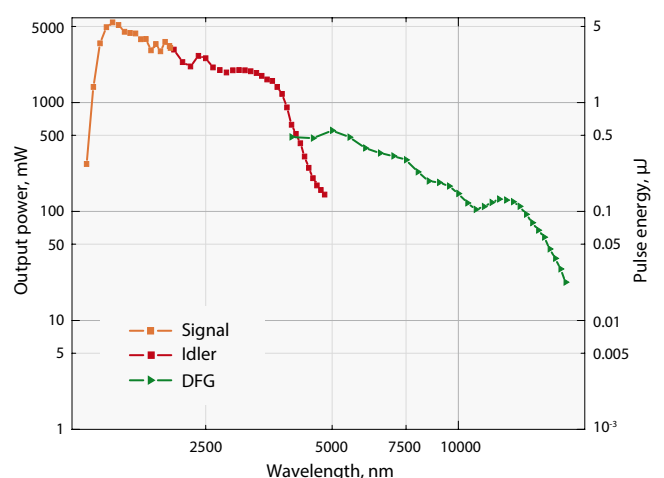
ORPHEUS HP is highly recommended over standard ORPHEUS if the input power is more than 8 W or whenever the necessary tuning range requires both UV and mid infrared generation (for example 315–5000 nm).

In comparison to standard ORPHEUS-HP + DFG configuration, the ORPHEUS ONE-HP provides higher conversion efficiency into the infrared range.



### ORPHEUS-HP

Typical tuning curve of ORPHEUS-HP.  
Pump: 40 W, 40 µJ, 1000 kHz



### ORPHEUS-ONE-HP

Typical tuning curve of ORPHEUS-ONE-HP.  
Pump: 40 W, 40 µJ, 1000 kHz

For custom tuning curve value visit <http://toolbox.lightcon.com/tools/tuningcurves/>

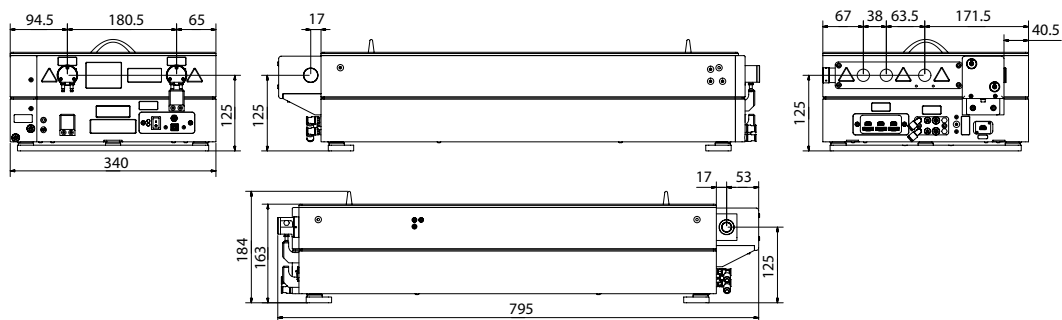
**SPECIFICATIONS**

Product name		<b>ORPHEUS-HP</b>		<b>ORPHEUS-ONE-HP</b>		<b>ORPHEUS-ONE-HP (BB)</b>	
<b>OUTPUT FROM ORPHEUS-HP</b>							
Tuning range	Signal	630 – 1020 nm		1350 – 2060 nm		1350 – 2060 nm	
	Idler	1040 – 2600 nm		2060 – 4500 nm		2060 – 4500 nm	
Pump power (maximum)		40 W		40 W		40 W	
Pump energy	When pump energy	8 – 20 µJ	20 – 400 µJ	12 – 30 µJ	30 – 400 µJ	12 – 30 µJ	30 – 400 µJ
Conversion efficiency at peak	Signal	> 4.5 %	> 9 %	—		—	
	Idler	> 2.8 %	> 4 %	—		—	
	Signal + Idler combined	—		> 10 %	> 14 %	> 10 %	> 14 %
Pulse duration		Pharos Carbide	Pharos-SP	—		—	
		150 – 290 fs	120 – 190 fs				
Pulse bandwidth	700 – 960 nm	Pharos Carbide	Pharos-SP	—		—	
		80 – 150 cm <sup>-1</sup>	100 – 220 cm <sup>-1</sup>				
	1450 – 1550 nm	—		60 – 150 cm <sup>-1</sup>		> 200 cm <sup>-1</sup>	
	1550 – 2000 nm	—		60 – 150 cm <sup>-1</sup>		60 – 140 cm <sup>-1</sup>	
Long term power stability	8 hours	< 2 % @ 800 nm		< 2 % @ 1550 nm		< 2 % @ 1550 nm	
Pulse energy stability	1 min	< 2 % @ 800 nm		< 2 % @ 1550 nm		< 2 % @ 1550 nm	

**OUTPUT FROM WAVELENGTH EXTENSIONS**

At peak	When pump energy	8 – 20 µJ	20 – 400 µJ	12 – 30 µJ	30 – 400 µJ	12 – 30 µJ	30 – 400 µJ	
	315 – 510 nm (SH of Signal)	> 1.2 %	> 2.4 %	—		—		
	520 – 630 nm (SH of Idler)	> 1.2 %	> 2.4 %	—		—		
	720 – 970 nm (SH of Signal)	Is covered by Signal from ORPHEUS-HP		70 – 150 cm <sup>-1</sup> @ 800 – 970 nm > 2 %		70 – 150 cm <sup>-1</sup> @ 800 – 970 nm > 2 %		
	190 – 215 nm (FH of Signal)	n/a	> 0.3 % <sup>1)</sup>	—		—		
	210 – 315 nm (TH of Signal)	> 0.4 %	> 0.8 %	—		—		
	2200 – 4200 nm (DFG1)	3000 nm > 1.5 %		Is covered by Signal and/or Idler from ORPHEUS-ONE-HP		Is covered by Signal and/or Idler from ORPHEUS-ONE-HP		
	4000 – 16000 nm (DFG2)	10000 nm > 0.1 %		60 – 120 cm <sup>-1</sup> @ 5000 – 8000 nm 10000 nm > 0.2 %		60 – 120 cm <sup>-1</sup> @ 5000 – 8000 nm 10000 nm > 0.3 %		
			> 0.2 %	> 3.0 %	> 0.3 %	> 0.3 %	> 0.2 %	> 0.3 %

<sup>1)</sup> DeepUV conversion efficiency is specified only when pump input to OPA is < 10 W. In case of higher pump power, DeepUV efficiency decreases, the maximum output power is limited to ~40 mW @ 200 nm



ORPHEUS-HP outline drawings