



# Spirit®

## Component Selection Guide



The Spirit laser platform offers flexible, high average power and high repetition rate femtosecond lasers. With superior beam quality, high pulse energy and industry-leading stability, Spirit's innovative and robust architecture offers truly unique performance and value.

The Spirit platform offers impressive versatility to serve the needs of our industrial customers. Starting with one of the most compact and cost efficient, all-in-one lasers available on the market (Spirit One™), to the performance leading Spirit HE with 30 W average power, 120  $\mu$ J pulse energy and up to 1 MHz repetition rate, the Spirit platform offers ideal solutions for a wide variety of applications. Every Spirit laser comes with an industry-standard Ethernet interface and an integrated pulse picker, which offers the possibility to gate the output pulse train, as well as modulate the output power.

An optional, high efficiency Second Harmonic Generation (SHG) stage, available for all Spirit lasers, enables the fabrication of smaller and more precise structures. The Spirit lasers are designed and tested to rigorous quality standards for reliable 24/7 operation. The built-in data logging and analysis capability allows monitoring of all relevant laser parameters over the life time of the system. As such, this represents an indispensable diagnostics tool for service and preventive maintenance which significantly enhances uptime and thus productivity of the tool.

### Recommended Optics & Optomechanics

It is critical to choose the right optics and optomechanical components that work best with your Spirit laser. Spirit's high IR and green average output power, and in particular the high peak power of femtosecond pulses necessitate optics that have a high damage threshold. MKS Newport offers a wide selection of the highest quality optics and optical components covering the entire spectrum UV, VIS, NIR and IR wavelengths to help you with your most challenging applications. In addition, for more than 30 years, we have manufactured the world's most comprehensive line of optical mounts and mechanics. Our precision optomechanics help our customers stay at the leading edge. MKS also offers LaserClean™ components for low-contamination applications.




Please use the recommendations below to determine which components best serve your needs. If you need help making a selection or have questions about the tables below, please contact us at [tech@newport.com](mailto:tech@newport.com).

# Spirit Component Selection Guide

## Recommended Optics & Optomechanics

Optics					Optomechanics		Spirit One	Spirit HE				
Optics Type	$\lambda$	Part Number	LIDT*	Description	Mount P/N	Mount Description	One 1040-8	One 1040-8-SHG	HE 1040-16	HE 1040-16-SHG	HE 1040-30	HE 1040-30-SHG
 Mirrors	505-530 nm	100M20UFF55	2J/cm <sup>2</sup> @ 532 nm, 10 nsec, 10 Hz	Ytterbium Laser Low GVD Mirror, 45° AOI, 25.4 mm	HVM-1i	Vertical Drive, Thin Optic Industrial Mount, 1 in., 2 Locking Allen-Keys		•		•		•
	1020-1050 nm	100M20UFF15	10J/cm <sup>2</sup> @ 1064 nm, 10 nsec, 10 Hz	Ytterbium Laser Low GVD Mirror, 45° AOI, 25.4 mm	SN100C-F2K	Suprema Clear Edge Mirror Mount, 1.0 in, (2) 127-TPI Locking Actuators	•		•		•	
	505-530 and 1020-1050 nm	100M20UFD55	2J/cm <sup>2</sup> @ 1064 nm, 8 nsec, 20 Hz	Ytterbium Laser Low GVD Mirror, 45° AOI, 25.4 mm	9814-6	Stability Black Anodized Mirror Mount, 1.0 in., 2 Knob Top Adjust	•	•	•	•	•	•
 Waveplates	520 nm	10RP02-49	2 J/cm <sup>2</sup> @ 532 nm, 10 ns, 10 Hz	Zero-Order Half Wave Plate, Quartz, Ø 25.4 mm	9401	Rotary Mount, 1 inch Waveplates or Polarizers,		•		•		•
	520 nm	10RP04-49	2 J/cm <sup>2</sup> @ 532 nm, 10 ns, 10 Hz	Zero-Order Quarter Wave Plate, Quartz, Ø 25.4 mm	GM-1RA	Gimbal Tip/Tilt Rotation Mount, Ø 1 in., 100 TPI		•		•		•
	1030 nm	10RP02-50	2 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 10 Hz	Zero-Order Quarter Wave Plate, Quartz, Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity						
	1030 nm	10RP04-50	2 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 10 Hz	Zero-Order Quarter Wave Plate, Quartz, Ø 25.4 mm	9401	Rotary Mount, 1 inch Waveplates or Polarizers,						
	1040 nm	10RP02-51	2 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 10 Hz	Zero-Order Half Wave Plate, Quartz, Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity	•		•		•	
	1040 nm	10RP04-51	2 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 10 Hz	Zero-Order Quarter Wave Plate, Quartz, Ø 25.4 mm	RSP-1T	360° Continuous Rotation Stage, 1 in Aperture, Coarse & Fine Adj.	•		•		•	
 Achromatic Waveplates	400-700 nm	10RP52-1B	5 J/cm <sup>2</sup> with 10 nsec pulses @ 1064 nm	Half Wave Plate, Quartz-MgF <sub>2</sub> , Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity		•		•		•
	400-700 nm	10RP54-1B	5 J/cm <sup>2</sup> with 10 nsec pulses @ 1064 nm	Quarter Wave Plate, Quartz-MgF <sub>2</sub> , Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity		•		•		•
	1000-1600 nm	10RP52-3B	5 J/cm <sup>2</sup> with 10 nsec pulses @ 1064 nm	Half Wave Plate, Quartz-MgF <sub>2</sub> , Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity	•		•		•	
	1000-1600 nm	10RP54-3B	5 J/cm <sup>2</sup> with 10 nsec pulses @ 1064 nm	Quarter Wave Plate, Quartz-MgF <sub>2</sub> , Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity	•		•		•	
 Lenses (AR.14 for 515/520 nm, AR.33 for 1030/1040 nm, and uncoated if using both wavelengths)	Uncoated	SPXxxx	42 J/cm <sup>2</sup> @ 1064 nm, 10 ms, 10 Hz	Plano-convex lens, fused silica, 25.4 mm	(M-)LH-1A	A-LINE Fixed Lens Mount, Ø 1.0 in., 8-32(M4) Thd.	•	•	•	•	•	•
	430-700 nm	SPXxxxAR.14	7.5 J/cm <sup>2</sup> @ 532 nm, 10 ns, 20 Hz	Plano-convex lens, fused silica, 25.4 mm	LA1V-XY	XY Compact Lens Positioner, Ø 1.0 in.		•		•		•
	1064 nm	SPXxxxAR.33	7.5 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 20 Hz	Plano-convex lens, fused silica, 25.4 mm	LPV-1	XYZ ØXØY Compact Lens Positioners, Ø 1.0 in.	•		•		•	
	Uncoated	SBXxxx	42 J/cm <sup>2</sup> @ 1064 nm, 10 ms, 10 Hz	Bi-convex lens, fused silica, 25.4 mm	P100-At38	Kinematic, Thin Optic Mount, 25.4 mm, 3 Locking Allen-Key, 80 TPI	•	•	•	•	•	•
	430-700 nm	SBXxxxAR.14	7.5 J/cm <sup>2</sup> @ 532 nm, 10 ns, 20 Hz	Bi-convex lens, fused silica, 25.4 mm	HVM-1t	Vertical Drive, Thin Optic Industrial Mount, 1 in., 2 Locking Allen-Keys		•		•		•
	1064 nm	SBXxxxAR.33	7.5 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 20 Hz	Bi-convex lens, fused silica, 25.4 mm	LP-1A-XY	XY Lens Positioner, Ø 1.0 in.	•		•		•	
	Uncoated	SPCxxx	42 J/cm <sup>2</sup> @ 1064 nm, 10 ms, 10 Hz	Plano-concave lens, fused silica, 25.4 mm	LP-1A-XYZ	XYZ Lens Positioner, Ø 1.0 in.	•	•	•	•	•	•
	430-700 nm	SPCxxxAR.14	7.5 J/cm <sup>2</sup> @ 532 nm, 10 ns, 20 Hz	Plano-concave lens, fused silica, 25.4 mm	LP-1A	XYZ ØXØY Lens Positioner, Ø 1.0 in.		•		•		•
	1064 nm	SPCxxxAR.33	7.5 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 20 Hz	Plano-concave lens, fused silica, 25.4 mm	LP-1A	XYZ ØXØY Lens Positioner, Ø 1.0 in.	•		•		•	
	Uncoated	SBCxxx	42 J/cm <sup>2</sup> @ 1064 nm, 10 ms, 10 Hz	Bi-concave lens, fused silica, 25.4 mm	LP-1A	XYZ ØXØY Lens Positioner, Ø 1.0 in.	•	•	•	•	•	•
	430-700 nm	SBCxxxAR.14	7.5 J/cm <sup>2</sup> @ 532 nm, 10 ns, 20 Hz	Bi-concave lens, fused silica, 25.4 mm	LP-1A	XYZ ØXØY Lens Positioner, Ø 1.0 in.		•		•		•
	1064 nm	SBCxxxAR.33	7.5 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 20 Hz	Bi-concave lens, fused silica, 25.4 mm	LP-1A	XYZ ØXØY Lens Positioner, Ø 1.0 in.	•		•		•	

## Recommended Optics & Optomechanics Continued


Optics						Optomechanics		Spirit One	Spirit HE		
Optics Type	$\lambda$	Part Number	LIDT*	Description	Mount P/N	Mount Description	One 1040-8	One 1040-8-SHG	HE 1040-16	1040-16-SHG	HE 1040-30
 Nano-Texture Surface Lenses	500-1100 nm	SPxxxRAR.L	35 J/cm <sup>2</sup> @ 1064 nm, 10 ms, 10 Hz	Plano-Convex Lens, Nano-Textured Fused Silica, 12.7 mm	LP-05A	XYZ 6X6Y Lens Positioner, 0.5 in. Diameter	•	•	•	•	•
	500-1100 nm	SPCxxxRAR.L	35 J/cm <sup>2</sup> @ 1064 nm, 10 ms, 10 Hz	Plano-Concave Lens, Nano-Textured Fused Silica, 12.7 mm	LP-05A-XYZ	XYZ Lens Positioner, 0.5-in.Diameter	•	•	•	•	•
 Beam Samplers	440-700 nm	10Q20NC.1	1 J/cm <sup>2</sup> @ 1064 nm, 10 ms, 10 Hz	Broadband Beam Sampler, UVFS, 25.4 mm, $\lambda/10$	9774	Top Actuated Mirror Mount, Ø 1.0 in., 2 Knob Adjustment		•		•	•
	1010-1550 nm	10Q20NC.3	1 J/cm <sup>2</sup> @ 1064 nm, 10 ms, 10 Hz	Broadband Beam Sampler, UVFS, 25.4 mm, $\lambda/10$	HVM-1i-LC	Top Adjust Mirror Mount, LaserClean, Ø 1 in.	•		•		•
 Broadband Retroreflector	650-16,000 nm	UBBR1-1I	1 mJ/cm <sup>2</sup> @ 1064 nm, 10 ms, 10 Hz	Broadband Hollow Retroreflector, 1.0 in, 1 arc sec parallelism	PS-T series Posts	1.0 in. Optical Post & Peg System	•		•		•
	450-10,000 nm	UBBR1-1S	1 mJ/cm <sup>2</sup> @ 1064 nm, 10 ms, 10 Hz	Broadband Hollow Retroreflector, 1.0 in, 1 arc sec parallelism	Q-TMS Series Post Holders	1.0 in. Optical Post Holders	•	•	•	•	•

\* The listed LIDT values are for ns pulses. The nano, pico or femtosecond regimes have different damage mechanisms. Typically, the higher the ns LIDT, the better performance in the ultrafast regime. Please design your beam path so that the beam on the optic has optimum size. If you need assistance, please contact your local MKS sales representative

\*\* Multiple lenses can be mounted with Newport's lens tubes and spacers

\*\*\* Additional optics types and sizes are available – please go to <http://www.newport.com> or contact your local MKS sales representative

\*\*\*\* The optics listed in this guide will meet the requirements of most customer applications for the Spirit laser. Not all optics have been tested for all potential Spirit applications, so compatibility with all applications cannot be guaranteed. When selecting optics, please evaluate suitability for requirements of your application. If you need assistance, please contact your local MKS sales representative

Optics						Optomechanics		Spirit One	Spirit HE		
Optics Type	$\lambda$	Part Number	LIDT	Description	Mount P/N	Mount Description	One 1040-8	One 1040-8-SHG	HE 1040-16	HE 1040-16-SHG	HE 1040-30
 Attenuators	355 nm	VA-355 VA-355-CB	2 J/cm <sup>2</sup> @355 nm, 10 ns, 10 Hz	Manual Variable Attenuator	PS- series Pedestal Posts	1.0 in. Optical Pedestals, Graduated Diameter	•	•	•	•	
	355 nm	VA-355-CONEX VA-355-CONEX-CB	2 J/cm <sup>2</sup> @355 nm, 10 ns, 10 Hz	Motorized Variable Attenuator, CONEX	PX Forkless Pedestal Posts	1.0 in. PX Forkless Optical Pedestals and Post	•	•	•	•	•
	532 nm	VA-532 VA-532-CB	2 J/cm <sup>2</sup> @532 nm, 10 ns, 10 Hz	Manual Variable Attenuator	Pedestal Forks	1.0 in. Pedestal Base Clamping Forks					
	532 nm	VA-532-CONEX VA-532-CONEX-CB	2 J/cm <sup>2</sup> @532 nm, 10 ns, 10 Hz	Motorized Variable Attenuator, CONEX	PS-series Pedestal Spacers	1.0 in. Pedestal Spacers & Extensions					

\* Multiple lenses can be mounted with Newport's lens tubes and spacers

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\*\*\*\* The removeable PL15 beam dump that is included with the VA-CB- (-CONEX) variable attenuators/splitters has a damage threshold of 30 W/cm<sup>2</sup> and can't be used with these lasers. The reflected beam will need to be controlled using external beam routing or an external high power beam dump.

# Spirit Component Selection Guide

Optics					Optomechanics		Spirit NOPA				Spirit OPA	
Optics Type	$\lambda$	Part Number	LIDT*	Description	Mount P/N	Mount Description	NOPA-3H	NOPA-2H	NOPA-1R	NOPA-VISIR	OPA-8	OPA-30
 Flat Mirrors	470-1000 nm	10B20EAG.2	0.19 J/cm² @ 5 fsec, single shot	Femtosec Optimized Silver Mirror, 0-45° AOI, 25.4 mm dia	M1	Mirror Mount, Lab Standard, 1.0 in. Diameter, 2 Knob Actuators	•					
	600-1000 nm	10B20EAG.1	0.19 J/cm² @ 5 fsec, single shot	Femtosec Optimized Silver Mirror, 0-45° AOI, 25.4 mm dia	SU100TW-F2K	Thermally Compensated Mirror Mount, 25.4 mm, Low Wavefront Distortion			•	•		
	650-20,000 nm	10D20ER.4	0.5 J/cm² @ 1064 nm, 10 ns, 20 Hz	Broadband Gold Mirror, 25.4 mm dia	U100-A2H	Ultima Clear Edge Mirror Mount, 1 in., 2 Locking Allen-Key Adjustment			•	•	•	•
	450-10,000 nm	10D20ER.1	0.5 J/cm² @ 532 nm, 10 ns, 20 Hz	Broadband Aluminum Mirror, 25.4 mm dia	9809NF	Classic Corner Mirror Mount, 1 in., 3 Knob Adjustment		•	•	•	•	•
	480-20,000 nm	10D20ER.2	1 J/cm² @ 1064 nm, 10 ns, 20 Hz	Broadband Silver Mirror, 25.4 mm dia	U100-A2K	Ultima Clear Edge Mirror Mount, 1.0 in., 2 Locking Knob Adjustment	•	•	•	•	•	•
 Achromatic Waveplates	400-700 nm	10RP52-1B	5 J/cm² @ 1064 nm, 10 nsec pulses	Half Wave Plate, Quartz-MgF2, Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity	•		•		•	•
	700-1000 nm	10RP52-2B	5 J/cm² @ 1064 nm, 10 nsec pulses	Half Wave Plate, Quartz-MgF2, Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity	•	•			•	•
	1000-1600 nm	10RP52-3B	5 J/cm² @ 1064 nm, 10 nsec pulses	Half Wave Plate, Quartz-MgF2, Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity				•	•	•
	400-700 nm	10RP54-1B	5 J/cm² @ 1064 nm, 10 nsec pulses	Quarter Wave Plate, Quartz-MgF2, Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity	•		•		•	•
	700-1000 nm	10RP54-2B	5 J/cm² @ 1064 nm, 10 nsec pulses	Quarter Wave Plate, Quartz-MgF2, Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity	•	•			•	•
	1000-1600 nm	10RP54-3B	5 J/cm² @ 1064 nm, 10 nsec pulses	Quarter Wave Plate, Quartz-MgF2, Ø 25.4 mm	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity				•	•	•
 Fused Silica Lenses (uncoated)	Uncoated	SPXxxx	42 J/cm² @ 1064 nm, 10 ms, 10 Hz	Plano-convex lens, fused silica, 25.4 mm	(M-)JLH-1A	A-LINE Fixed Lens Mount, Ø 1.0 in., 8-32(M4) Thd.	•	•	•	•	•	•
	Uncoated	SBXxxx	42 J/cm² @ 1064 nm, 10 ms, 10 Hz	Bi-convex lens, fused silica, 25.4 mm	P100-At38	Kinematic, Thin Optic Mount, 25.4 mm, 3 Locking Allen-Key, 80 TPI	•	•	•	•	•	•
	Uncoated	SPCxxx	42 J/cm² @ 1064 nm, 10 ms, 10 Hz	Plano-concave lens, fused silica, 25.4 mm	LP-1A-XYZ	XYZ Lens Positioner, Ø 1.0 in.	•	•	•	•	•	•
	Uncoated	SBCxxx	42 J/cm² @ 1064 nm, 10 ms, 10 Hz	Bi-concave lens, fused silica, 25.4 mm	LP-1A	XYZ ØXØY Lens Positioner, Ø 1.0 in.	•	•	•	•	•	•
 Nano-Texture Surface Lenses	250-550 nm	SPXxxxRAR.S	35 J/cm² @ 1064 nm, 10 ms, 10 Hz	Plano-Convex Lens, Nano-Textured Fused Silica, 12.7 mm	LP-05A-XY	XY Lens Positioner, 0.5-in. Diameter	•					
	250-550 nm	SPCxxxRAR.S	35 J/cm² @ 1064 nm, 10 ms, 10 Hz	Plano-Concave Lens, Nano-Textured Fused Silica, 12.7 mm	LP-05A-XYZ	XYZ Lens Positioner, 0.5-in.Diameter	•					
	500-1100 nm	SPXxxxRAR.L	35 J/cm² @ 1064 nm, 10 ms, 10 Hz	Plano-Convex Lens, Nano-Textured Fused Silica, 12.7 mm	LP-05A	XYZ ØXØY Lens Positioner, 0.5 in. Diameter		•	•		•	•
	500-1100 nm	SPCxxxRAR.L	35 J/cm² @ 1064 nm, 10 ms, 10 Hz	Plano-Concave Lens, Nano-Textured Fused Silica, 12.7 mm	LP-05A-XYZ	XYZ Lens Positioner, 0.5-in.Diameter		•	•		•	•
 Beam Samplers	440-700 nm	10Q20NC.1	1 J/cm² @ 1064 nm, 10 ms, 10 Hz	Broadband Beam Sampler, UVFS, 25.4 mm, $\lambda/10$	9774	Top Actuated Mirror Mount, Ø 1.0 in., 2 Knob Adjustment	•	•			•	•
	660-1000 nm	10Q20NC.2	1 J/cm² @ 1064 nm, 10 ms, 10 Hz	Broadband Beam Sampler, UVFS, 25.4 mm, $\lambda/10$	M1	Mirror Mount, Lab Standard, 1.0 in. Diameter, 2 Knob Actuators			•	•	•	•
	1010-1550 nm	10Q20NC.3	1 J/cm² @ 1064 nm, 10 ms, 10 Hz	Broadband Beam Sampler, UVFS, 25.4 mm, $\lambda/10$	HVM-1i-LC	Top Adjust Mirror Mount, LaserClean, Ø 1 in.				•	•	•
 Broadband Retroreflector	650-16,000 nm	UBBR1-1I	1 mJ/cm² @ 1064 nm, 10 ms, 10 Hz	Broadband Hollow Retroreflector, 1.0 in, 1 arc sec parallelism	PS-T series Posts	1.0 in. Optical Post & Peg System			•	•	•	•
	450-10,000 nm	UBBR1-1S	1 mJ/cm² @ 1064 nm, 10 ms, 10 Hz	Broadband Hollow Retroreflector, 1.0 in, 1 arc sec parallelism	Q-TMS Series Post Holders	1.0 in. Optical Post Holders	•	•			•	•

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\*\* Multiple lenses can be mounted with Newport's lens tubes and spacers

\*\*\* Additional optics types and sizes are available – please go to <http://www.newport.com> or contact your local MKS sales representative

\*\*\*\* The optics listed in this guide will meet the requirements of most customer applications for the Spirit laser. Not all optics have been tested for all potential Spirit applications and/or limited by the wavelength range listed, so compatibility with all applications cannot be guaranteed. If you need assistance, please contact your local MKS sales representative

## Recommended Laser Measurement Sensors\*



For optimal application results, it is critical to ensure that the delivered laser power at the sample is precisely controlled. Laser power sensor is a detector that absorbs a laser beam and outputs a signal proportional to the beam's power. MKS Newport offers a wide selection of power sensors to accurately measure the Spirit laser power delivered to the sample. The specific type of sensor depends on the details of the laser beam being measured, including power level, spectral region, beam size, etc.

Spirit Type	Spirit Model	Recommended Sensor	Laser Damage Threshold	Aperture	Power Management Range	Spectral Range	Description
Spirit NOPA	NOPA-3H	919P-003-10 for Output Only (919P-030-18 for Pump)	1 kW/cm <sup>2</sup>	9.5mm	40 μW to 3W	0.19 to 11 μm	<ul style="list-style-type: none"><li>• Spectrally flat broadband coating</li><li>• NIST-traceable calibration included</li><li>• Insensitive to beam position</li><li>• Sensitive with low noise &amp; drift</li></ul>
	NOPA-2H						
	NOPA-IR						
	NOPA-VISIR	919P-003-10 for Output Only (919P-150-26 for Pump)	1 kW/cm <sup>2</sup>	9.5mm	40 μW to 3W		
Spirit HE	HE 1040-16	919P-030-18	20 kW/cm <sup>2</sup>	17.5 mm	20mW to 30W		
	HE 1040-16-SHG						
	HE 1040-30	919P-050-26	12 kW/cm <sup>2</sup>	26 mm	40mW to 50W		
	HE 1040-30-SHG						
Spirit OPA	OPA-8	919P-030-18	20 kW/cm <sup>2</sup>	17.5 mm	20mW to 30W		
	OPA-30	919P-050-26	12 kW/cm <sup>2</sup>	26 mm	40mW to 50		
Spirit One	One 1040-8	919P-030-18	20 kW/cm <sup>2</sup>	17.5 mm	20mW to 30W		
	One 1040-8-SHG						

\* Order a 3" optical post holder VPH-3, and a mounting base B-2SA to mount the sensor at beam height. A 2.25" long post is included in the detector model

\*\* Additional options from MKS Ophir are available. Please visit [www.ophiropt.com](http://www.ophiropt.com) or contact your Ophir sales representative for consultation


## Recommended Power Meter\*

1919-R is one of MKS Newport's most feature rich and technologically advanced power meters. It offers a plug-and-play functionality and is compatible with almost any of the wide range of Newport sensors. 1919-R is also the most precisely calibrated unit on the market thus measuring with the highest accuracy. With its versatility, ease of use, and user-friendly interface, the sensor can be used stand-alone or interfaced with LabVIEW or the user's own software.

Power Meter	Part Number	Description
	1919-R	<ul style="list-style-type: none"> <li>Compatible with all standard Newport thermal sensors</li> <li>USB and RS232 interfaces with PMManager PC applications and User Commands document</li> <li>LabVIEW driver and COM Object Interface</li> <li>Select between English, Japanese, Russian, and Chinese interfaces</li> </ul>

## PC Interface (optional)

A PC interface allows you to connect your laser power sensor directly to the PC. The Model 841-PE-USB is a Power Meter with a USB connection to use a computer as the monitor, allowing the user to access the full computing power of the PC.

PC Interface	Part Number	Description
	844-PE-USB	<ul style="list-style-type: none"> <li>Optical Power and Energy Meter, Virtual, USB</li> <li>Ideal when equipment space is tight or there is a need to control multiple power meter channels</li> <li>Has a USB output and 0-1 V analog output. Application installation is simple &amp; takes care of the USB driver installation</li> </ul>

\* Other Newport display meters are available – please contact your local MKS sales representative

## Recommended Beam Profiler & Attenuators\*



In addition to the average or instantaneous Watts or Joules of the laser beam, it is critical to understand how the power is spatially distributed in the cross-section of the beam. A beam profiler can help detect laser performance issues such as beam wander, jitter, divergence and astigmatism. MKS is the market leader with the largest installed base of laser beam profilers. With our unmatched accuracy, customizable layout, cutting edge R&D and global support system, we are ready to help our customers solve their most challenging problems.

Spirit Type	Spirit Model	Recommended Beam Profiler	Recommended Attenuator	Description	
Spirit NOPA	NOPA-3H	LBP2-HR-VIS3 and LBP2-HR-IR3	LBP2-SAM-BB2	<ul style="list-style-type: none"><li>The LBP2-HR-VIS3 &amp; LBP2-HR-IR3 Laser Beam Profiler is a powerful software driven system with comprehensive beam diagnostic measurement features. It features a 1624 x 1224 pixel CCD camera for the wavelength range between 190 and 1100 nm. The easy to use graphical user interface includes all of the accuracy and ISO approved quantitative results</li></ul>	
	NOPA-2H				
	NOPA-IR	LBP2-HR-VIS2 and LBP2-HR-IR2			
	NOPA-VISIR				
Spirit HE	HE 1040-16	LBP2-HR-VIS2		<ul style="list-style-type: none"><li>The LBP2-HR-IR2 Laser Beam Profiler is a powerful software driven camera with comprehensive beam diagnostic measurement features. It features a 1924 x 1448 pixel CCD camera with phosphor coating for near IR sensitivity between 1440 and 1605 nm.</li></ul>	
	HE 1040-16-SHG				
	HE 1040-30				
	HE 1040-30-SHG				
Spirit OPA	OPA-8				<ul style="list-style-type: none"><li>The LBP2-SAM-BB2 beam sampler operates by reflecting the incoming beam from the front surfaces of a pair of wedges through 90 degrees into the camera. Approximately 97% of the beam is transmitted through the beam sampler with 0.25% passed on to the available filter slides where you can add an additional attenuation up to ND6.</li></ul>
	OPA-30				
Spirit One	1040-8				
	1040-8-SHG				

\* Additional options from MKS Ophir are available. Please visit [www.ophiropt.com](http://www.ophiropt.com) or contact your Ophir sales representative for consultation



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The laser measurement sensors, power meter & PC interface, beam profilers & attenuators listed in this document are RoHS compliant.

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