

919P Series Thermopile Sensors



Wide Range of sensors for Power Measurement

Newport's 919P Thermopile Detector Series provide a full range of sensors to meet the power measurement needs for CW or pulsed lasers. They offer broadband, spectrally flat response, with the maximum power range up to 5000 Watts.

Absorption over Broad Wavelength Range

The thermopile detector's response to the input laser beam is characterized by its absorption. Newport thermopile sensors use four different types of coating in the sensors. The broadband BB type is employed in most of the 919P models and has an excellent absorption throughout the responsive wavelength range. The CM and SV types are used mainly with high repetition lasers with ultra-short pulses and have a relatively flat response. The 919P sensors using BB and SV absorbers can measure wavelengths up to 11 μm , while the CM sensors can measure up to 9.4 μm . The PF type has wavelength dependent response, and it is employed in the sensor 919P-050-18HP, which is specially designed for high energy density pulses and can measure up to 2.2 μm .

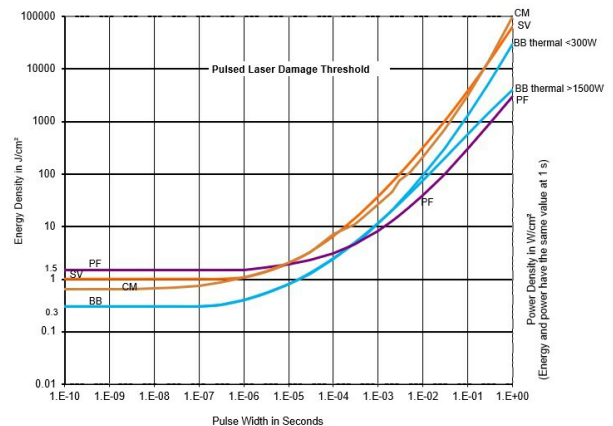
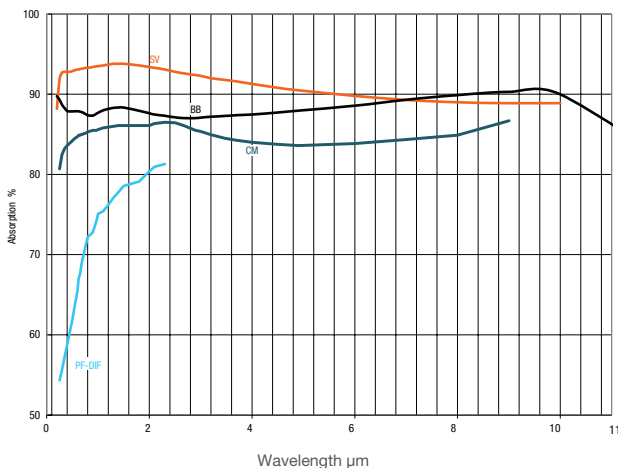


Features and Benefits

- Broadband spectral response from 0.19–11 μm
- NIST-traceable calibration included
- Insensitive to beam position
- Compatible with Newport power meters

Extensively Tested for Damage Threshold vs. Pulse Width

The 919P series thermopile detectors have been extensively tested for the damage threshold with a variety of lasers. You can trust our specifications and have your mind at ease.



NIST Traceability

Each 919P thermopile sensor includes a DB15 connector and internal EEPROM for storing factory calibration data. Most sensors (BB) are calibrated at three different wavelengths at 532 nm, 1.070 μm , and 10.6 μm . Other

sensor types (CM and SV) use other or additional wavelengths for their calibration for example: 0.19 μm , 0.248 μm , 0.355 μm and 2.1 μm . Calibration of the thermopile detectors is recommended annually to assure NIST traceability.

919P Specifications

Compatible meters:

843-R/843-R-USB/1919-R/1938-R/2938-R/844-PE-USB/845-PE-RS/1936-R and 2936-R

Model	919P-003-10	919P-010-16	919P-020-12	919P-030-18	919P-040-50
Absorber Type	Low power broadband	Broadband	Broadband	Broadband	Broadband
Spectral Range (μm)	0.19 to 11	0.19 to 11	0.19 to 11	0.19 to 11	0.19 to 11
Max. Measurable Power (W)	3	10	20	30	35
Power Noise Level (mW)	0.001	0.2	0.2	0.5	15
Rise Time (s) ⁽¹⁾	1.8	0.8	0.8	0.8	2.5
Calibration Uncertainty (%)	± 1.9	± 1.9	± 1.9	± 1.9	± 1.9
Repeatability (%)	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5
Linearity (%)	± 1	± 1	± 1	± 1	± 1
Uniformity (%)	± 2	± 2	± 2	± 2	± 2
Maximum Average Power (W) (continuous)	3	10	4 / 20 ⁽³⁾	30	35
Maximum Average Power (W) (minutes)	N/A	N/A	20 (1.8 minutes)	N/A	250 (1.5 minutes) 150 (3 minutes) 80 (6 minutes)
Minimum Energy ⁽²⁾	20 μJ	6mJ	6mJ	6mJ	100mJ
Maximum Energy ⁽²⁾	2J	2J	10J	30J	4000J
Power Density, Maximum Average (kW/cm ²)	1	28	23	20	10
Max Energy Density (J/cm ²)					
<100ns	0.3	0.3	0.3	0.3	0.3 ⁽⁴⁾
0.5ms	1	2	2	2	5 ⁽⁴⁾
2ms	2	2	2	2	10 ⁽⁴⁾
10ms	4	2	2	2	30 ⁽⁴⁾
Active Diameter (mm)	$\varnothing 9.5$	$\varnothing 16$	$\varnothing 12$	$\varnothing 17.5$	$\varnothing 50$
Active Area (cm ²)	0.71	2.01	1.13	2.40	19.63
Cooling Method	Heat Sink	Heat Sink	Heat Sink	Heat Sink	Heat Sink
Dimensions (L x W x D) [In. (mm)]	2.76x1.18 ($\varnothing 70$ x30)	2.56x1.32 ($\varnothing 65$ x33.5)	1.50x1.50x0.55 (38x38x14)	2.52x2.52x1.93 (64x64x49)	3.54x3.54x1.30 (90x90x33)
Weight [lb (kg)]	0.44 (0.2)	0.44 (0.2)	0.44 (0.2)	0.66 (0.3)	1.32 (0.6)

Notes:

1) With all compatible meters except 1936-R and 2936-R for which the rise time is twice as long

2) With all compatible meters except 1936-R and 2936-R.

3) 4 W free standing, 20 W heat sinked to chassis.

4) Measured at 1064 nm. Derate 80 % at 532 nm, 60 % at 355 nm, 40 % at 266 nm

For Gaussian beams multiply power and energy density by a factor of 2 when comparing to online damage threshold specifications. For beams with hot spots multiply power and energy density by a factor of 3 when comparing to online damage threshold specifications.

Model	919P-050-18HP	919P-050-26	919P-150-26	919P-250-35	919P-600-65	919P-5KW-50
Absorber Type	PF type + diffuser	Broadband	Broadband	Broadband	Broadband	Broadband
Spectral Range (µm)	0.24 to 2.2	0.19 to 11	0.19 to 11	0.19 to 11	0.19 to 11	0.19 to 11 ⁽⁴⁾
Max. Measurable Power (W)	50	50	150	250	600	5000
Power Noise Level (mW)	7	2	3	15	200	1000
Rise Time (s) ⁽¹⁾	2	1.5	1.5	2	4	3
Calibration Uncertainty (%)	±1.9	±1.9	±1.9	±1.9	±1.9	±1.9
Repeatability (%)	±1	±0.5	±0.5	±0.5	±0.5	±1
Linearity (%)	±1.5	±1.5	±1	±1 ⁽⁵⁾	±1.5	±2 ⁽⁷⁾
Uniformity (%)	±2	±2	±2	±2	±2	±2
Maximum Average Power (W) (continuous)	50	50	150	250	600	5000
Maximum Average Power (W) (minutes)	N/A	150 (1.5 minutes)	N/A	N/A	N/A	N/A
Minimum Energy ⁽²⁾	60mJ	20mJ	20mJ	50mJ	600mJ	N/A
Maximum Energy ⁽²⁾	200J	100J	100J	300J	600J	N/A
Power Density, Maximum Average (kW/cm ²)	>10	12	12	10	7	1.7
Max Energy Density (J/cm ²)						
<100ns	4 ⁽³⁾	0.3	0.3	0.3	0.3	0.3
0.5ms	15 ⁽³⁾	5	5	5	4	5
2ms	25 ⁽³⁾	10	10	2	10	10
10ms	50 ⁽³⁾	30	30	30	30	30
Active Diameter (mm)	Ø17.5	Ø26	Ø26	Ø35	Ø65	Ø50
Active Area (cm ²)	2.40	5.31	5.31	9.62	33.17	19.63
Cooling Method	Heat Sink	Heat Sink	Fan	Fan	Fan	Water
Dimensions (L x W x D) [In. (mm)]	2.52x2.52x2.95 (64x64x75)	2.52x2.52x2.52 (64x64x64)	2.52x2.52x3.66 (64x64x93)	2.52x2.52x 3.74 (64x64x95)	5.0x5.0x4.6 (128x128x116)	Ø5.75x1.85 (Ø146x47)
Weight [lb (kg)]	0.77 (0.35)	0.66 (0.3)	0.77 (0.35)	0.88 (0.4)	5.29 (2.4)	6.16 (2.8)

Notes:

1) With all compatible meters except 1936-R and 2936-R for which the rise time is twice as long.

2) With all compatible meters except 1936-R and 2936-R.

3) Measured at 1064 nm. Derate 80 % at 532 nm, 60 % at 355 nm, 40 % at 266 nm.

4) Calibrated at 1.064µm and 10.6µm only.

5) With all compatible meters except 1936-R and 2936-R for which nonlinearity may reach ±2.5%.

6) With all compatible meters except 1936-R and 2936-R for which nonlinearity may reach ±2%.

7) With all compatible meters except 1936-R and 2936-R for which nonlinearity may reach ±3.5%.

For Gaussian beams multiply power and energy density by a factor of 2 when comparing to online damage threshold specifications. For beams with hot spots multiply power and energy density by a factor of 3 when comparing to online damage threshold specifications.

High Repetition Lasers with Ultra Short Pulses

Model	919P-150-16HR	919P-80-17HR	919P-30-17HD
Absorber Type	CM	CM	SV
Spectral Range (µm)	0.248-9.4 ⁽¹⁾	0.248 to 9.4 ⁽¹⁾	0.19 to 11
Max. Measurable Power (W)	150	80	30
Power Noise Level (mW)	15	5 ⁽³⁾	5
Rise Time (s) ⁽⁴⁾	3	2	1.7
Calibration Uncertainty (%)	±1.9	±1.9	±1.9
Repeatability (%)	±0.5	±0.5	±0.5
Linearity (%)	±1.5 ⁽⁵⁾	±1.5	±1
Uniformity (%)	±2	±2	±2
Maximum Average Power (W) (continuous)	150	80	30
Maximum Average Power (W) (minutes)	200 (1 minute)	120 (1 minute)	150 (1.5 minutes)
Minimum Energy ⁽²⁾	50µJ	50mJ	50mJ
Maximum Energy ⁽²⁾	200J	200J	300J
Power Density, Maximum Average (kW/cm ²)	2 ⁽⁶⁾	7 at 80W (& at 120W for 1 minute) ⁽⁶⁾	60
Pulsed Maximum Average Power Density (kW/cm ²) ⁽⁷⁾	35 at 25W for ns pulses 7 at 20W for ps pulses	35 at 25W for ns pulses 7 at 20W for ps pulses	100 at 25W for ns pulses 20 at 20W for ps pulses
Max Energy Density (J/cm ²) ⁽⁸⁾			
<100ns	0.7	0.7	1
0.5ms	16	16	20
2ms	45	45	50
Active Diameter (mm)	Ø16	Ø17.5	Ø17
Active Area (cm ²)	2.01	2.40	2.27
Cooling Method	Fan	Fan	Heat Sink
Dimensions (L x W x D) [In. (mm)]	2.52x2.52x3.66 (64x64x93)	2.52x2.52x3.66 (64x64x93)	2.52x2.52x1.89 (64x64x48)
Weight [lb (kg)]	1.19 (0.54)	1.19 (0.54)	0.66 (0.3)

Notes:

- 1) The sensor is only calibrated in the spectral range 0.25-2.2µm.
- 2) With all compatible meters except 1936-R and 2936-R.
- 3) With all compatible meters except 1936-R and 2936-R for which noise level = 8mW, min power=150mW.
- 4) With all compatible meters except 1936-R and 2936-R for which the rise time is twice as long.
- 5) At 200W add additional linearity error of ±0.5%.
- 6) At 1064nm.
- 7) For repetition rates ≥ 100kHz.
- 8) At 1064nm. For shorter wavelengths derate maximum energy density to:
355nm 50% of above values
266nm 50% of above values (for HR type 30% of above values)
193nm 10% of above values

For Gaussian beams multiply power and energy density by a factor of 2 when comparing to online damage threshold specifications. For beams with hot spots multiply power and energy density by a factor of 3 when comparing to online damage threshold specifications.

Ordering Information

Model	Description	Model	Description
919P-003-10	Thermopile Sensor, 3 W, 10 mm Diameter, 0.19-11µm	919P-150-26	Thermopile Sensor, 150 W, 26 mm Diameter, 0.19-11 µm
919P-010-16	Thermopile Sensor, 10 W, 16 mm Diameter, 0.19-11µm	919P-250-35	Thermopile Sensor, 250 W, 35 mm Diameter, 0.19-11 µm
919P-020-12	Thermopile Sensor, 20 W, 12 mm Diameter, 0.19-11 µm	919P-600-65	Thermopile Sensor, 600 W, 65 mm Diameter, 0.19-11µm
919P-030-18	Thermopile Sensor, 30 W, 18 mm Diameter, 0.19-11 µm	919P-5KW-50	Thermopile Sensor, 5 kW, 50 mm Diameter, 0.19-11 µm
919P-040-50	Thermopile Sensor, 35 W cw, 50 mm Diameter, 0.19-11 µm	919P-150-16HR	Thermopile Sensor, 150 W, 16 mm Diameter, 0.248-9.4 µm
919P-050-18HP	High Peak Power Thermopile Sensor, 50 W, 17.5 mm Diameter, 0.24-2.2 µm	919P-80-17HR	Thermopile Sensor, 80 W, 17.5 mm Diameter, 0.248-9.4 µm
919P-050-26	Thermopile Sensor, 150 W, 26 mm Diameter, 0.19-11 µm	919P-30-17HD	Thermopile Sensor, 30 W, 17 mm Diameter, 0.19-11 µm