

# PowerMax BB+ kW Sensors

## Large Area Water-Cooled kW Thermopile Sensors with BB+ Coatings

This line of high power water-cooled kW thermopiles incorporates the BB+ broadband coating, which provides a higher power density threshold than previous kW sensors. These sensors can sustain power densities up to 14 kW/cm<sup>2</sup> at 1 kW and up to 2.3 kW/cm<sup>2</sup> at 6 kW. There are several models available with maximum power limits of 1 kW, 3 kW, and 6 kW in USB, RS-232, and DB25 cable configurations (DB25 cables are used with Coherent's stand-alone power meters).

### FEATURES & BENEFITS

- Power handling up to 6 kW (model dependent)
- BB+ Coating with high power density threshold
- Broadband coating from 190 nm to 11 microns
- Large 50 mm diameter active area
- USB, RS-232, and DB25 configurations

### APPLICATIONS

- Laser power monitoring of CW or modulated lasers
- Manufacturing, QA, and Engineering Applications
- Commercial OEM integration



SPECIFICATIONS	PM1K+	PM3K+	PM6K+
Wavelength Range (μm)	0.19 to 11	0.19 to 11	0.19 to 11
Power Range <sup>1,2</sup> (W)	5 to 1000	5 to 3000	10 to 6000
Max. Intermittent Power (<5 min.)	2000	3000	6000
Noise Equivalent Power <sup>3</sup> (mW)	<100	<100	<100
Maximum Power Density (kW/cm <sup>2</sup> )	20 at 500 W 10 at 1 kW	12 at 1 kW 5.8 at 2 kW 3.8 at 3 kW	14 at 1 kW 4.7 at 3 kW 2.3 at 6 kW
Recommended Minimum Beam Size (mm)	2.6 at 100 W 5 at 500 W 7 at 1 kW	6 at 1 kW 10 at 2 kW 15 at 3 kW	8 at 1 kW 17 at 3 kW 31 at 6 kW
Minimum Water Flow Rate <sup>4</sup> (GPM)	0.75 at 1 kW (1 GPM recommended)	2 at 3 kW	2.5 at 5 kW 3 at 6 kW
Response time (0 to 95%)			
Speed-up On (seconds)	5	5	5
Speed-up Off (seconds)	14	15	20
Maximum Energy Density (mj/cm <sup>2</sup> ) (1064 nm, 10 ns)	600	600	600
Detector Coating	BB+	BB+	BB+
Detector Element	Thermopile	Thermopile	Thermopile
Diffuser	None	None	None
Detector Diameter (mm)	50	50	50
Calibration Uncertainty (%)	±3	±3	±3
Power Linearity (%)	±2	±2	±2
Spectral Compensation Accuracy (%)	±1.5	±1.5	±1.5
Calibration Wavelength (nm)	1070 and 10,600	1070 and 10,600	1070 and 10,600
Cooling Method	Water	Water	Water
Cable Type	PM DB25, USB, RS-232 models	PM DB25, USB, RS-232 models	PM DB25, USB, RS-232 models
Cable Length (m)			
DB25	2.0	2.0	2.0
USB	2.5	2.5	2.5
RS-232	2.5	2.5	2.5
Part Number			
DB25	1409621	1409627	1402728
USB	1409622	1409628	1402729
RS-232	1409623	1409629	1402730

1 Lower power measurements are possible for short durations (down to ~20x electrical NEP) or when water temp is very stable. Minimum power reflects typical water flow variation with chiller in lab environment.

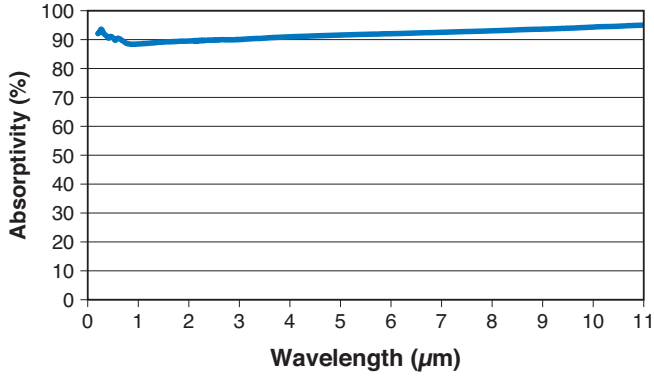
2 Max power is beam size dependent at ~5 mm/kW. See Power Level by Beam Size plots.

3 NEP is pure electrical noise without water.

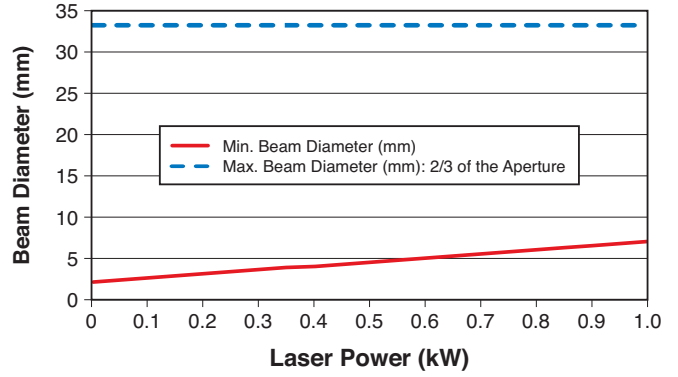
4 Water temperature should be stable to <1°C change per minute and <2% variation in flow rate per minute for greatest accuracy. Expect ~5 PSI pressure drop at 2.5 GPM and 10 PSI at 3 GPM.

TYPICAL PERFORMANCE DATA

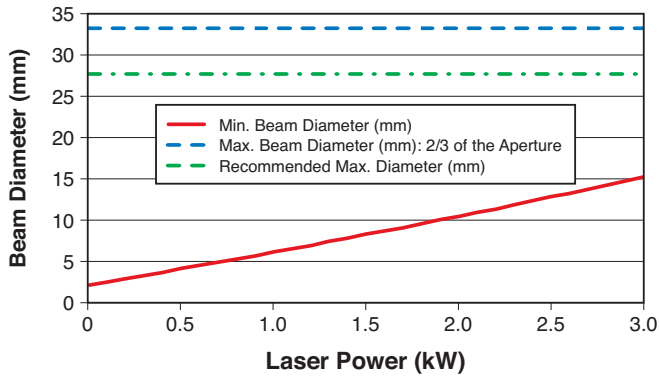
BB+ Absorber Coating Optical Absorptivity



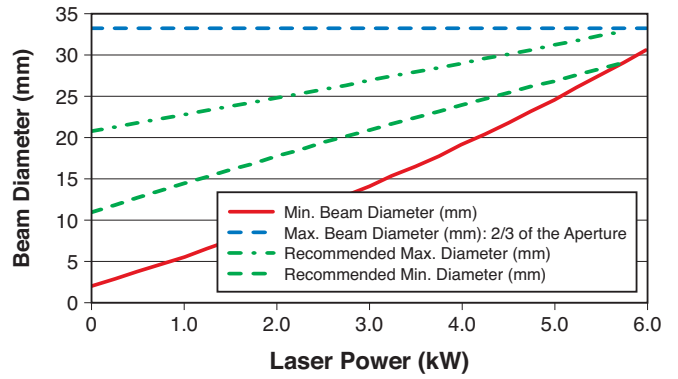
PM1K+ Beam Size<sup>1,2</sup> vs Power Plot



PM3K+ Beam Size<sup>1,3</sup> vs Power Plot



PM6K+ Beam Size<sup>1,4</sup> vs Power Plot

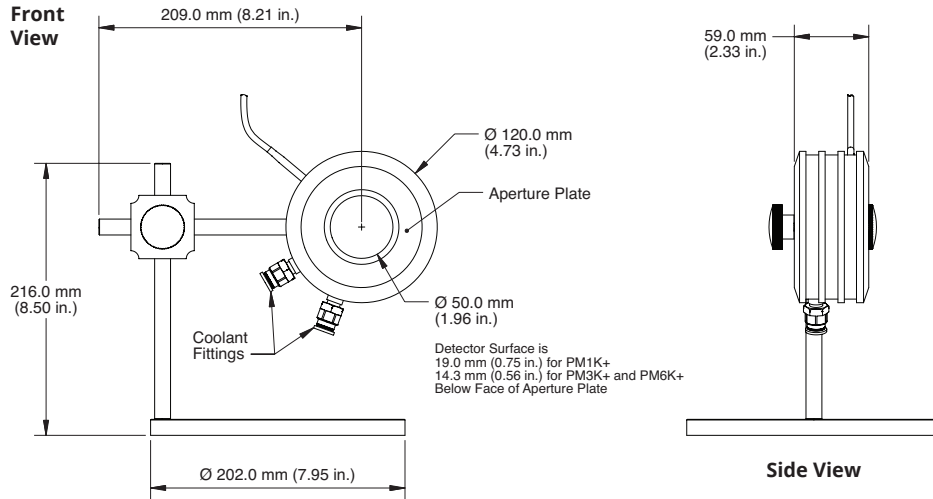


NOTES:

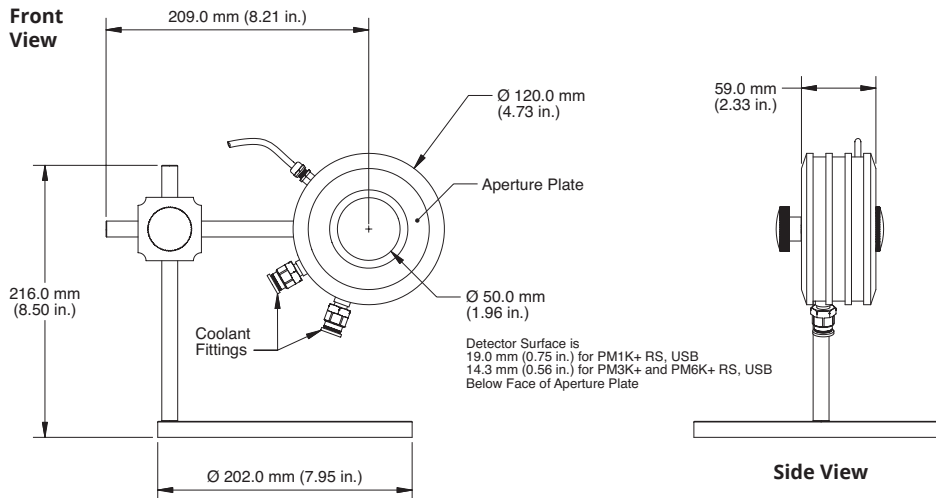
- <sup>1</sup> Beam diameters are for Gaussian beams.
- <sup>2</sup> Choose a beam size smaller than Recommended Max. Diameter and larger than Min. Beam Diameter for greatest accuracy and to avoid laser damage.
- <sup>3</sup> Choose a beam size smaller than Recommended Max. Diameter and larger than Min. Beam Diameter for greatest accuracy. Beam size must be larger than Min. Beam Diameter to avoid laser damage.
- <sup>4</sup> Choose a beam size between the Recommended Max. and Min. Diameter curves for greatest accuracy. Beam size must be larger than Min. Beam Diameter to avoid laser damage.

## MECHANICAL SPECIFICATIONS

### PowerMax BB+ DB25 kW Sensor



### PowerMax BB+ USB/RS-232 kW Sensor



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