



# PowerMax-Pro HP Sensor

## 1W to 15 kW

PowerMax-Pro (Patent #9,059,346) represents a dramatic technological advancement in laser power sensing that combines the broad wavelength sensitivity, dynamic range and laser damage resistance of a thermopile with the response speed of a semiconductor photodiode.

Coherent has invented a novel, thin-film technology to create a device which rapidly senses thermal changes due to incident laser energy. Unlike traditional thermopile detectors, in these new PowerMax-Pro sensors, heat flows vertically through a film which is only microns thick, rather than radially to the edge of the device over a distance of several centimeters. The result is a measurement response time below 10  $\mu$ s, as compared to over 1 second for traditional thermopiles. This HP model incorporates a ZnSe diffuser to enable peak power measurements up to 15 kW.

The high response speed of PowerMax-Pro sensors is particularly advantageous in commercial applications, where it enables CW laser power and pulsed laser energy to be sampled much more frequently, resulting in increased throughput and improved process control.



## FEATURES

- Measures power in tens of microseconds
- High power up to 350W continuous, 600W intermittent, 15 kW peak
- Supports lasers from the Near-IR to Far-IR wavelengths
- Capable of tracing the individual pulse shape of modulated and long pulse lasers
- Large active area

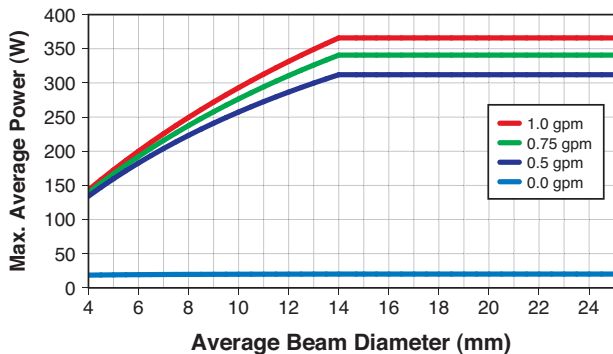
## APPLICATIONS

- Laser Processing including Cutting, Drilling, and Welding
- Medical Systems including Long Pulse Aesthetic applications
- Diode LIV Testing - increase resolution and shorten test time
- Scientific and Engineering
- Production and QA Testing

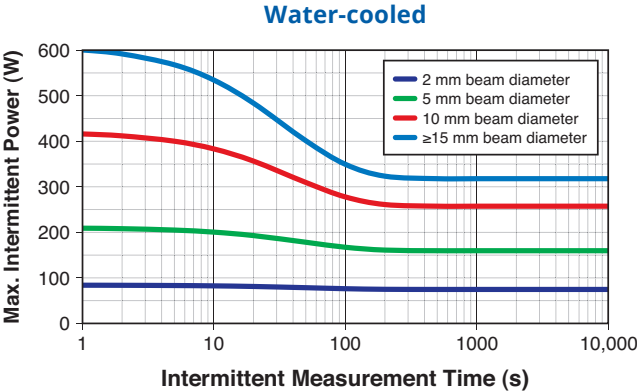
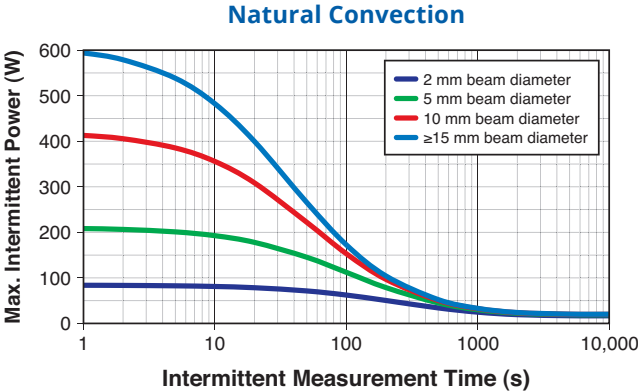
SPECIFICATIONS	PowerMax-Pro HP
Wavelength Range	700 nm to 1070 nm; 10.6 μm
Average Power Range <sup>1</sup> (W)	1 to 350 (22W max air-cooled, cont.) (75W max air-cooled, 5 min.)
Max. Pulsed Peak Power (W)	15000 (<10 msec burst) 1500 (continuous)
Noise Equivalent Power (mW) Standard Mode (10 Hz) High Speed Mode (20 kHz) Snapshot Mode (625 kHz)	<25 <100 <300 (low 5 kW range) <1.5W (high 40 kW range)
Max. Power Density (kW/cm <sup>2</sup> )	1.2 (150W)
Max. Peak Power Density (kW/cm <sup>2</sup> )	50 (1 ms; 1064 nm)
Max. Energy Density (J/cm <sup>2</sup> )	30 (3 ms; 755 nm)
Rise Time (μs)	≤10
Fall Time (μs)	≤10
Detector Coating	HD
Diffuser	ZnSe
Active Area (mm)	25 dia.
Minimum Beam Size (mm)	Set by damage threshold
Maximum Beam Size <sup>2</sup> (mm)	18
Calibration Uncertainty (%) (k=2) at 810 nm	±2
Spectral Compensation Accuracy (%)	±5
Power Linearity <sup>3</sup> (%)	±2 (1W to 10 kW) 3 to 10 (10 to 15 kW)
Spatial Uniformity (%) (center 64% of aperture; 2.5 mm beam)	±5
Calibration Wavelength (nm)	810
Cooling Method	Water/Air (intermittent)
Cable Type	DB25
Cable Length	2.5 m (8.2 ft.)
Part Number	1286588

<sup>1</sup> Beam size dependent. See steady-state and intermittent power charts.  
<sup>2</sup> See spatial uniformity and beam diameter charts for larger beams.  
<sup>3</sup> Beam size and pulse length dependent. See peak power and pulse length charts.

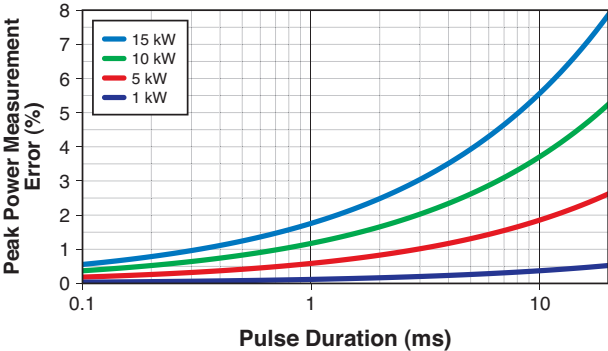
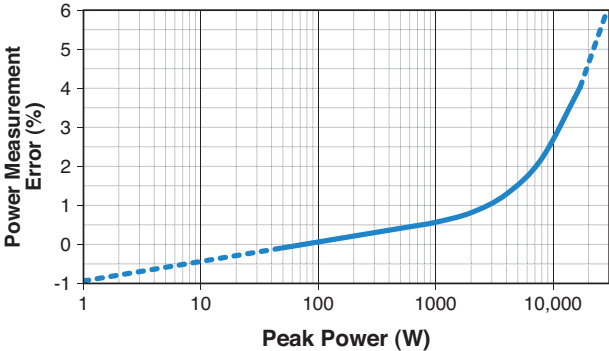
**PowerMax-Pro HP Maximum Steady-State Average Power**



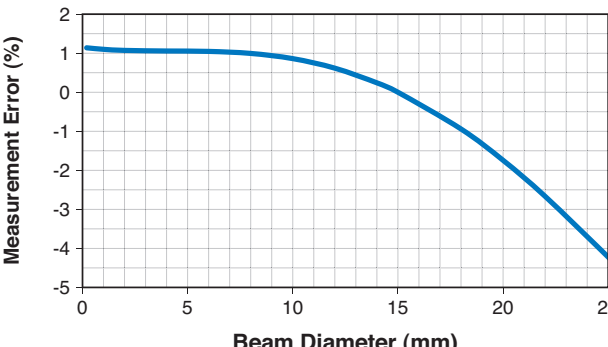
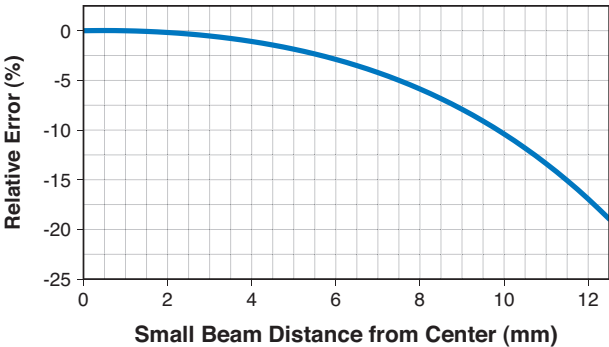
PowerMax-Pro HP Intermittent Average Power



PowerMax-Pro HP Measurement Error with Peak Power and Pulse Length

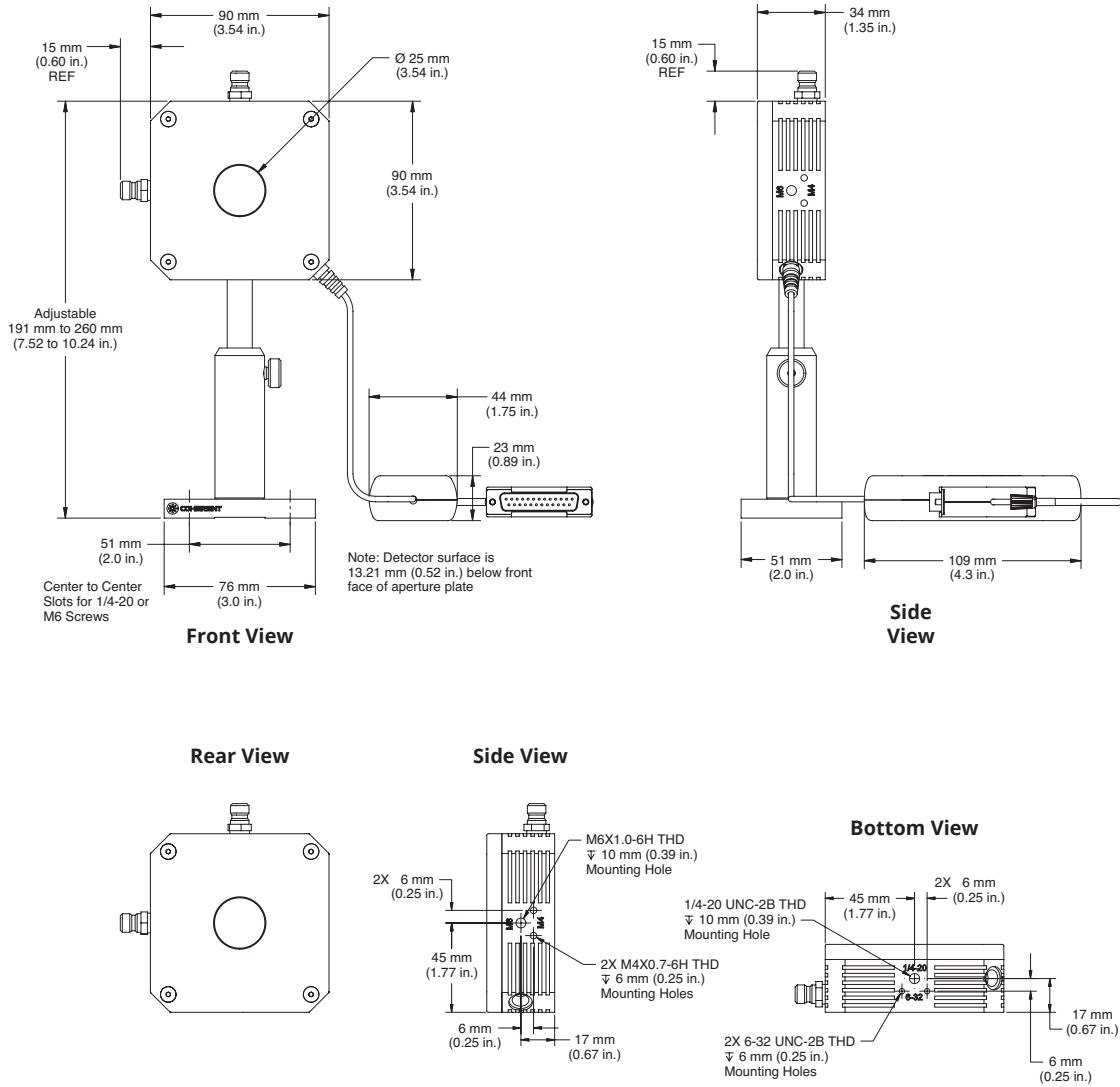


PowerMax-Pro HP Spatial Non-uniformity and Beam Diameter



# MECHANICAL SPECIFICATIONS

## PowerMax-Pro HP



SPECIFICATIONS	PowerMax-Pro USB/RS HP 2K
Wavelength Range	700 nm to 1070 nm; 10.6 $\mu\text{m}$
Average Power Range <sup>1</sup> (W)	3 to 350 (22W max air-cooled, cont.) (75W max air-cooled, 5 min.)
Max. Pulsed Peak Power (W)	2000
Noise Equivalent Power (mW)	
Standard Mode (10 Hz)	<150
High Speed Mode (20 kHz)	<200
Snapshot Mode (625 kHz)	<300
Max. Power Density (kW/cm <sup>2</sup> )	1.2 (150W)
Max. Peak Power Density (kW/cm <sup>2</sup> )	50 (1 ms; 1064 nm)
Max. Energy Density (J/cm <sup>2</sup> )	30 (3 ms; 755 nm)
Rise Time ( $\mu\text{s}$ )	$\leq 10$
Fall Time ( $\mu\text{s}$ )	$\leq 10$
Detector Coating	HD
Diffuser	ZnSe
Active Area (mm)	25 dia.
Minimum Beam Size (mm)	Set by damage threshold
Maximum Beam Size <sup>2</sup> (mm)	18
Calibration Uncertainty (%) (k=2) at 810 nm	$\pm 2$
Spectral Compensation Accuracy (%)	$\pm 5$
Power Linearity <sup>3</sup> (%)	$\pm 2$
Spatial Uniformity (%) (center 64% of aperture; 2.5 mm beam)	$\pm 5$
Calibration Wavelength (nm)	810
Cooling Method	Water/Air (intermittent)
Cable Type	USB/RS-232
Cable Length	4.2 m (13.8 ft.)
Part Number	1315456 (USB) 1315457 (RS-232)

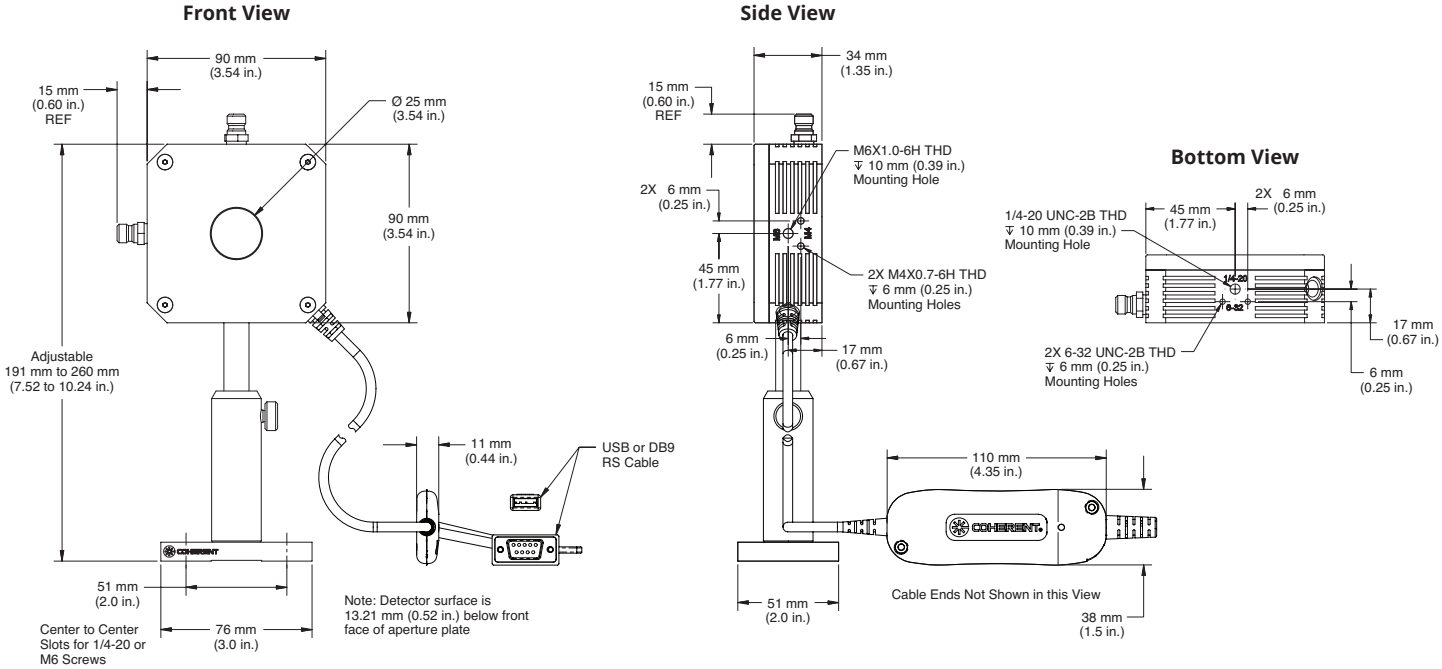
<sup>1</sup> Beam size dependent. See steady-state and intermittent power charts.

<sup>2</sup> See spatial uniformity and beam diameter charts for larger beams.

<sup>3</sup> Beam size and pulse length dependent. See peak power and pulse length charts.

MECHANICAL SPECIFICATIONS

PowerMax-Pro  
USB/RS HP 2K



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Coherent offers a limited warranty for all PowerMax-Pro sensors. For full details of this warranty coverage, please refer to the Service section at [www.Coherent.com](http://www.Coherent.com) or contact your local Sales or Service Representative. Printed in the U.S.A. MC-006-16-0M0117Rev.A Copyright ©2017 Coherent, Inc.