



PowerMax-Pro Sensors

100 mW to 150W

PowerMax-Pro (Patent #9,012,848) 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 μ s, as compared to over 1 second for traditional thermopiles. Plus, these detectors can operate over a spectral range as broad as 400 nm to 11 μ m, and incorporate a large 30 mm x 30 mm active area.

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. And, their broad spectral response and large active area make these detectors useful with virtually all commercial, scientific, and medical lasers operating in the visible, near infrared and far infrared, including CO₂ lasers at 10.6 μ m.

FEATURES

- Measures power in tens of microseconds
- High power up to 150W for HD models and 200W for BB models
- Supports lasers from Visible to Far-IR wavelengths
- Capable of tracing the individual pulse shape of modulated and long pulse lasers
- Large 30 x 30 mm 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 150 BB	PowerMax-Pro 150 HD	PowerMax-Pro 150 BB Nano ¹	PowerMax-Pro 150 HD Nano ¹
Wavelength Range ²	400 nm to 11 μm	400 nm to 1100 nm; 9 μm to 11 μm	400 nm to 11 μm	400 nm to 1100 nm; 9 μm to 11 μm
Power Range Water-cooled ³ Air-cooled (65W max air-cooled, 5 min.)			100 mW to 150W 100 mW to 17W	
Maximum Peak Power (W) (use for >1 μsec pulses up to CW)	170	170	200 ⁴	200 ⁴
Maximum Intermittent Power (W) (<5 min.)			65 (air-cooled)	
Noise Equivalent Power (mW) Standard Mode High Speed Mode Snapshot Mode			<1 <4 <9	
Maximum Power Density (kW/cm ²)			0.2 (150W)	
Maximum Peak Power Density (kW/cm ²)			14	
Maximum Energy Density (mJ/cm ²)			33 (10 ns; 1064 nm)	
Rise & Fall Time (μs)	≤50	≤10	≤350	≤350
Detector Coating	BB	HD	BB	HD
Active Area (mm)			30 x 30	
Minimum Beam Size (mm)			2.0 (1.0 mm - up to 3% error)	
Calibration Uncertainty (%) (k=2)			±2	
Power Linearity (%)			±3	
Spectral Compensation Accuracy (%)			±3	
Spatial Uniformity (%) (center 75% of aperture; 2.5 mm beam)			±5	
Calibration Wavelength (nm)			810	
Cooling Method			Water/Air (intermittent)	
Cable Type			DB25	
Cable Length			2.5m (8.2 ft.)	
Part Number	1323849	1266709	1325550	1325549

¹ Choose a "Nano" model PowerMax-Pro sensor when measuring the average power of industrial short pulsed (nanosecond and picosecond) lasers. The amplifier in the "Nano" is adjusted to account for the high peak impulse powers associated with those types of lasers. Lasers of this type within the Coherent portfolio include the Matrix QS, Avia NX, Flare NX, Helios (the regular "HD" models are not appropriate for these short pulsed, high energy lasers).

² Contact Coherent for 355nm usage guidelines.

³ Water flow rate for water-cooled sensors must be >0.5 GPM (>2 LPM).

⁴ For pulses shorter than 1 μsec, use the maximum pulse energy density and average power specifications instead of peak power.

SPECIFICATIONS	PowerMax-Pro 150F BB	PowerMax-Pro 150F HD	PowerMax-Pro 150F Nano ¹
Wavelength Range ²	400 nm to 11 μ m	400 nm to 1100 nm; 9 μ m to 11 μ m	400 nm to 1100 nm; 9 μ m to 11 μ m
Power Range Water-cooled ³ Air-cooled (65W max air-cooled, 5 min.)		- 100 mW to 150W	
Maximum Peak Power (W) (use for >1 μ sec pulses up to CW)	170	170	200 ⁴
Maximum Intermittent Power (W) (<5 min.)		150 (maximum)	
Noise Equivalent Power (mW) Standard Mode High Speed Mode Snapshot Mode		<1 <4 <9	
Maximum Power Density (kW/cm ²)		0.2 (150W)	
Maximum Peak Power Density (kW/cm ²)		14	
Maximum Energy Density (mJ/cm ²)		33 (10 ns; 1064 nm)	
Rise & Fall Time (μ s)	\leq 50	\leq 10	\leq 350
Detector Coating	BB	HD	HD
Active Area (mm)		30 x 30	
Minimum Beam Size (mm)		2.0 (1.0 mm - up to 3% error)	
Calibration Uncertainty (%) (k=2)		\pm 2	
Power Linearity (%)		\pm 3	
Spectral Compensation Accuracy (%)		\pm 3	
Spatial Uniformity (%) (center 75% of aperture; 2.5 mm beam)		\pm 5	
Calibration Wavelength (nm)		810	
Cooling Method		Fan	
Cable Type		DB25	
Cable Length		2.5m (8.2 ft.)	
Part Number	1323848	1266708	1331019

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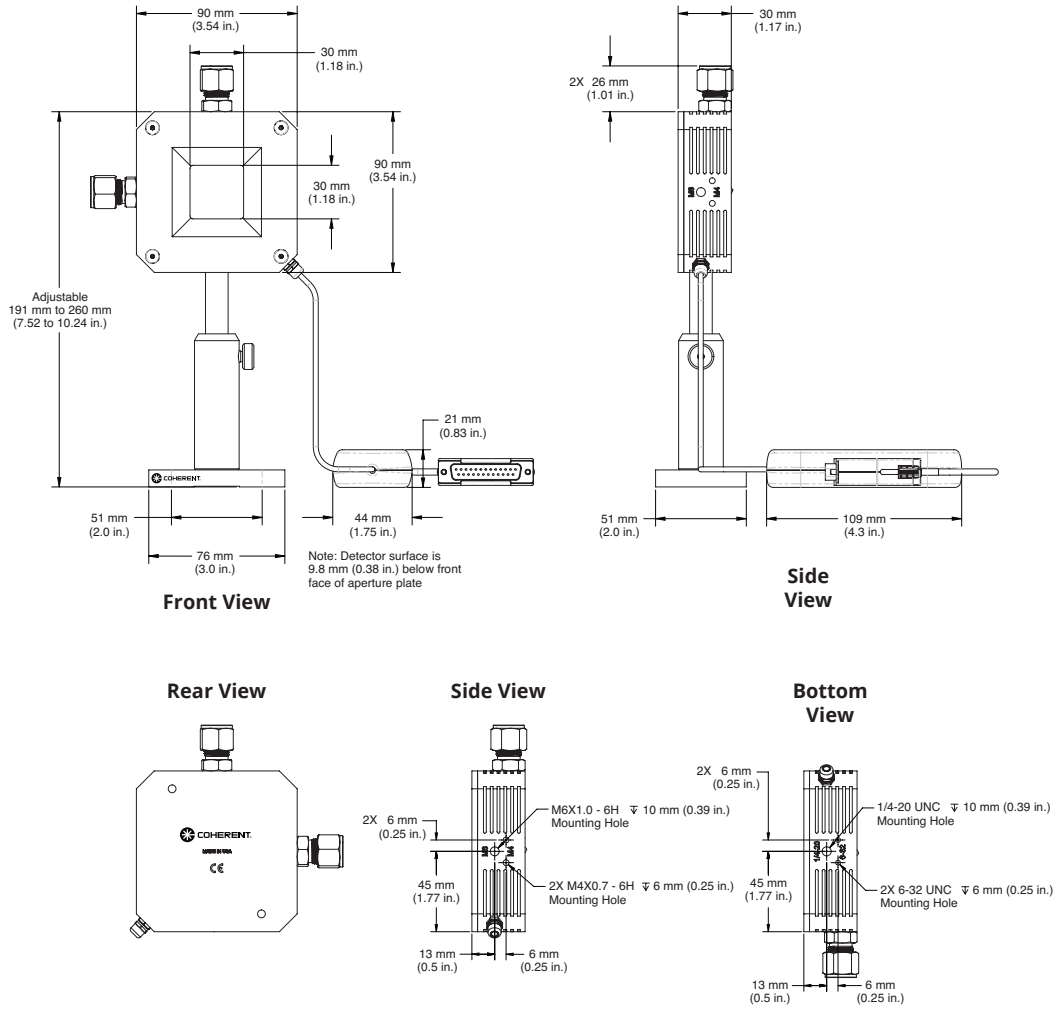
² Contact Coherent for 355nm usage guidelines.

³ Water flow rate for water-cooled sensors must be >0.5 GPM (>2 LPM).

⁴ For pulses shorter than 1 μ sec, use the maximum pulse energy density and average power specifications instead of peak power.

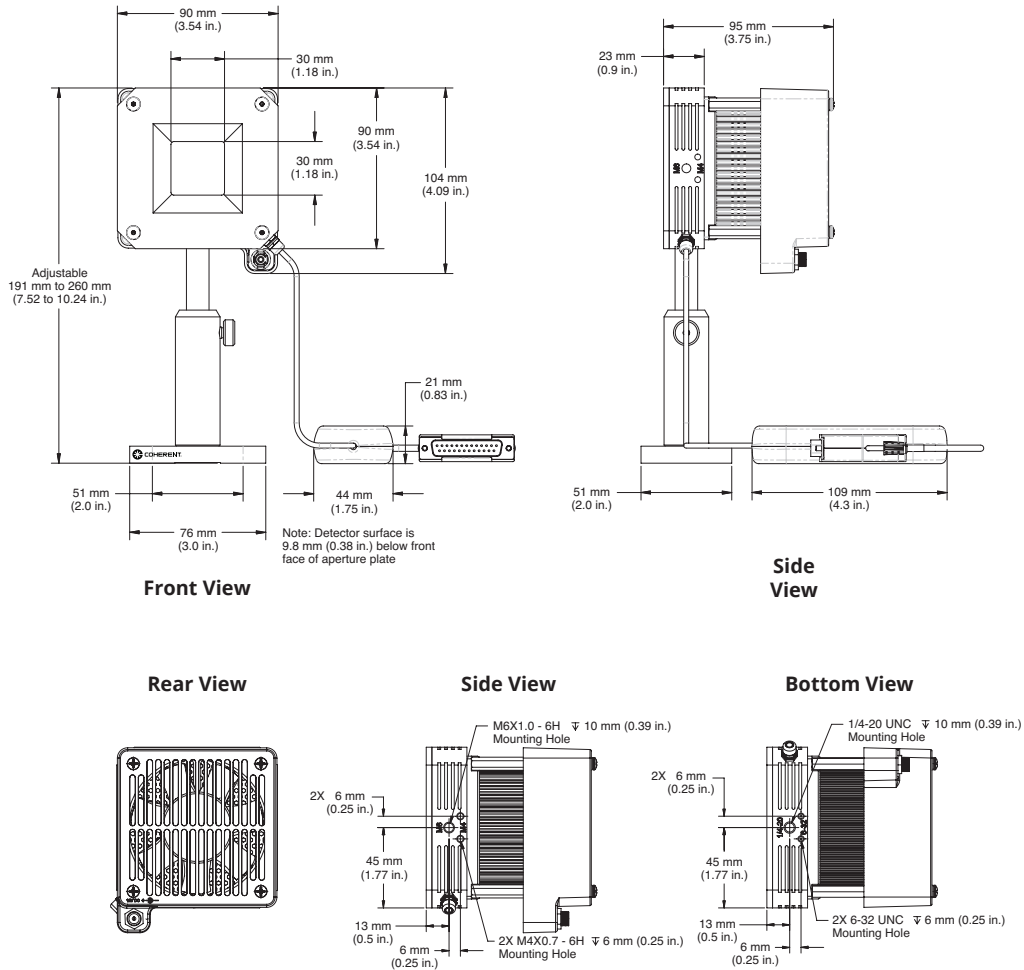
MECHANICAL SPECIFICATIONS

Pro 150 HD and BB



MECHANICAL SPECIFICATIONS

Pro 150F HD and BB



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Coherent follows a policy of continuous product improvement. Specifications are subject to change without notice. Coherent's scientific and industrial lasers are certified to comply with the Federal Regulations (21 CFR Subchapter J) as administered by the Center for Devices and Radiological Health on all systems ordered for shipment after August 2, 1976.

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 or contact your local Sales or Service Representative. Printed in the U.S.A. MC-002-14-0M0917Rev.D Copyright ©2017 Coherent, Inc.



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 μ 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

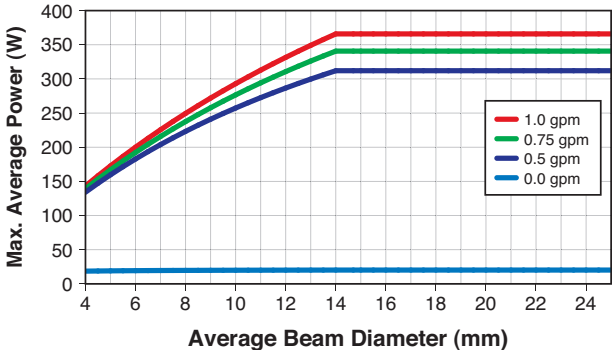
APPLICATIONS

- 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

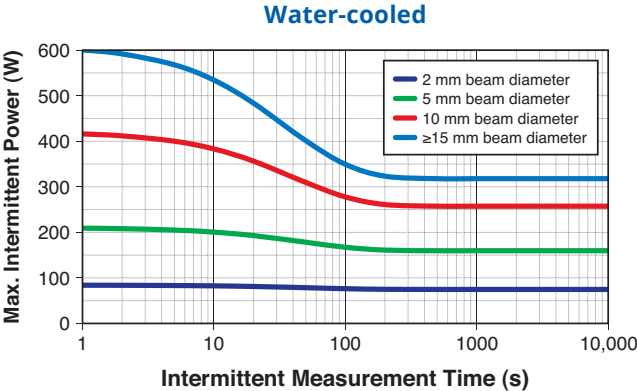
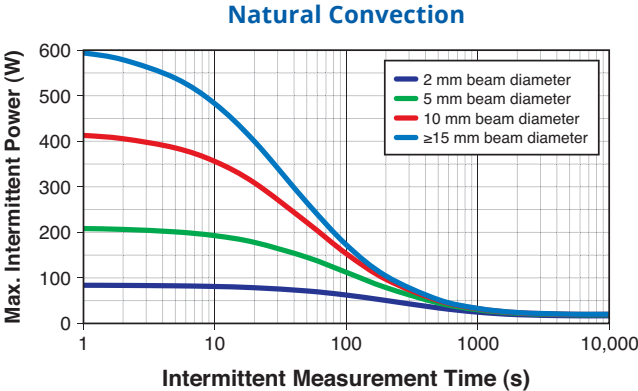
SPECIFICATIONS	PowerMax-Pro HP
Wavelength Range	700 nm to 1070 nm; 10.6 μm
Average Power Range ¹ (W)	1 to 350 (22W max air-cooled, cont.) (75W max air-cooled, 5 min.)
Max. Pulsed Peak Power (W)	15000 (<10 msec burst) 1500 (continuous)
Noise Equivalent Power (mW) Standard Mode (10 Hz) High Speed Mode (20 kHz) Snapshot Mode (625 kHz)	<25 <100 <300 (low 5 kW range) <1.5W (high 40 kW range)
Max. Power Density (kW/cm ²)	1.2 (150W)
Max. Peak Power Density (kW/cm ²)	50 (1 ms; 1064 nm)
Max. Energy Density (J/cm ²)	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 ² (mm)	18
Calibration Uncertainty (%) (k=2) at 810 nm	±2
Spectral Compensation Accuracy (%)	±5
Power Linearity ³ (%)	±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

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

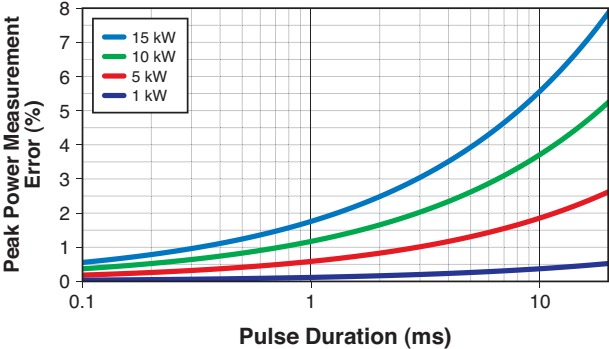
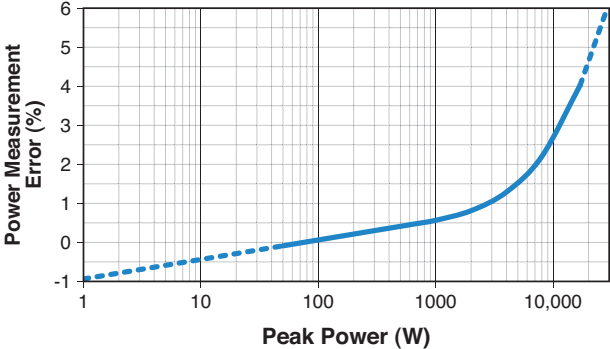
PowerMax-Pro HP Maximum Steady-State Average Power



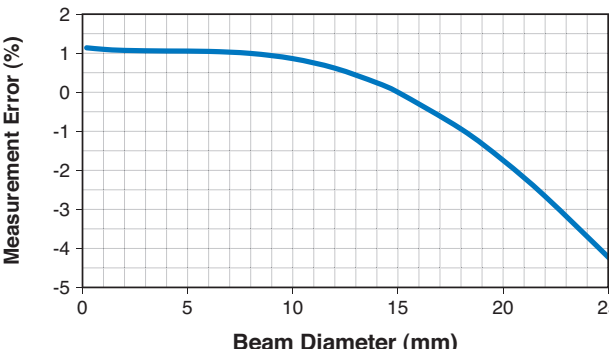
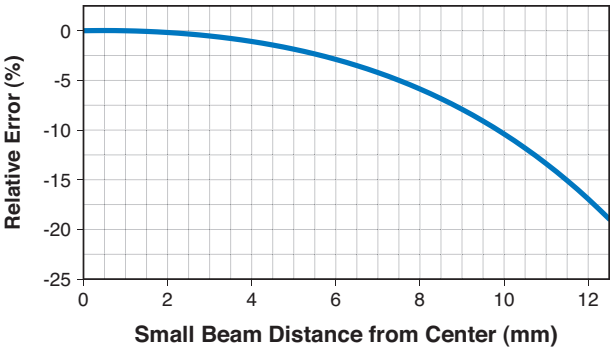
PowerMax-Pro HP Intermittent Average Power



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

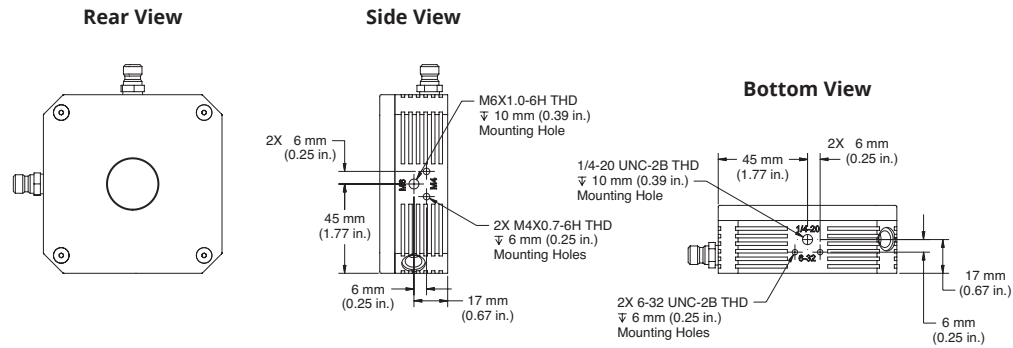
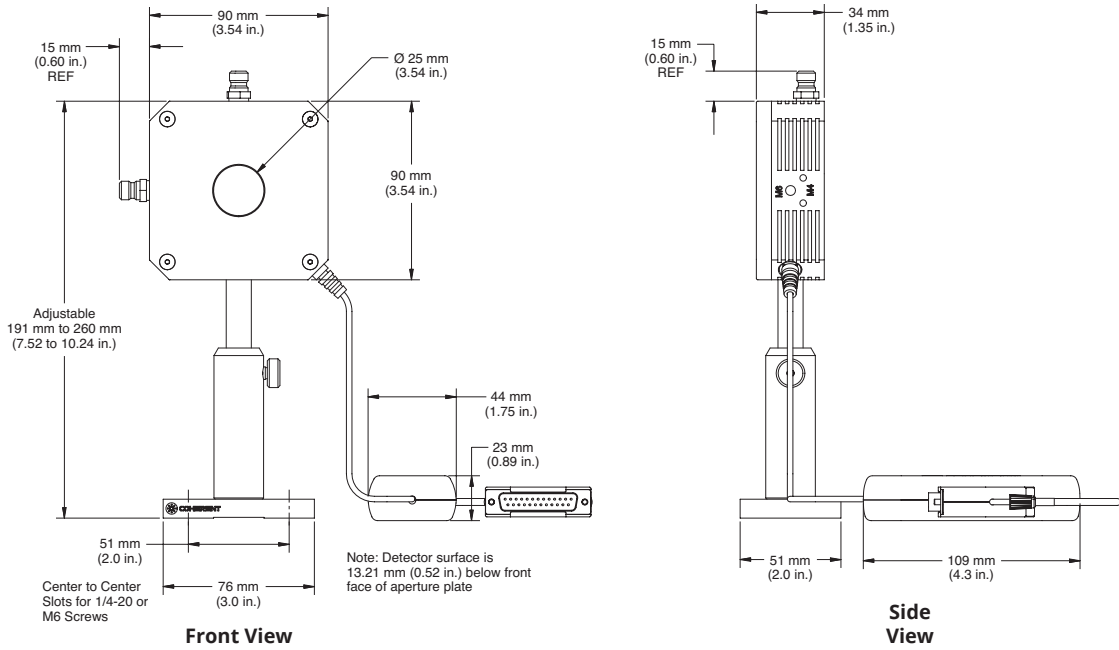


PowerMax-Pro HP Spatial Non-uniformity and Beam Diameter



MECHANICAL SPECIFICATIONS

PowerMax-Pro HP



SPECIFICATIONS	PowerMax-Pro USB/RS HP 2K
Wavelength Range	700 nm to 1070 nm; 10.6 μm
Average Power Range ¹ (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^2)	1.2 (150W)
Max. Peak Power Density (kW/cm^2)	50 (1 ms; 1064 nm)
Max. Energy Density (J/cm^2)	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 ² (mm)	18
Calibration Uncertainty (%) ($k=2$) at 810 nm	± 2
Spectral Compensation Accuracy (%)	± 5
Power Linearity ³ (%)	± 2
Spatial Uniformity (%) (center 64% of aperture; 2.5 mm beam)	± 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)

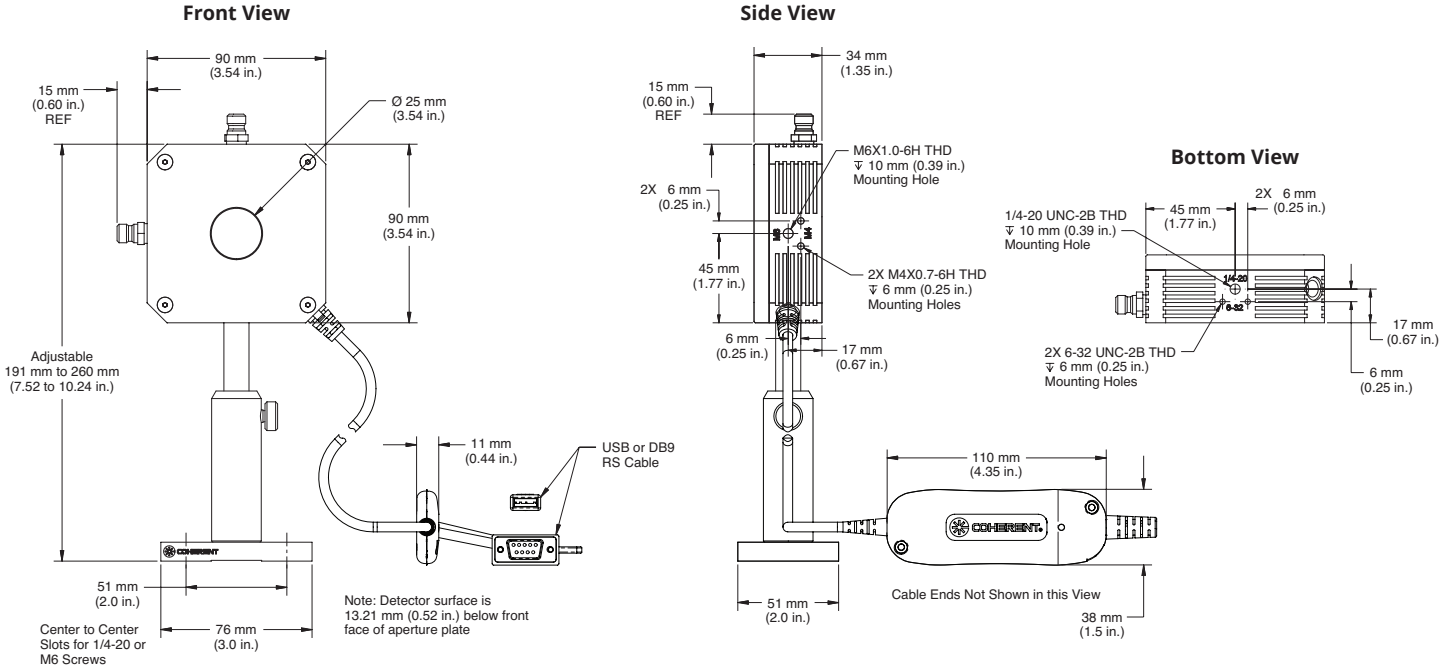
¹ Beam size dependent. See steady-state and intermittent power charts.

² See spatial uniformity and beam diameter charts for larger beams.

³ 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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