



# PowerMax-Pro kW Sensors

## 1W to 3 kW

PowerMax-Pro laser detectors have been enhanced to enable multi-kW continuous power measurement of laser beams.

PowerMax-Pro detectors, first introduced in 2014, are based on Coherent's proprietary thin film sensor technology that combines the broad wavelength sensitivity, dynamic range and laser damage resistance of a thermopile, with the response speed of a semiconductor photodiode. These sensors are compatible with the LabMax-Pro SSIM meter that has software available for both desktop and mobile platforms.

Traditional thermopile detectors typically take at least sixty seconds for a stable kilowatt power reading. PowerMax-Pro accomplishes this measurement within microseconds with no overshoot, saving significant time for engineers, production and QA staff, and enables increased process throughput when built into systems.

Another important aspect of kilowatt class power measurements is dealing with back reflection from the detector. Traditional thermopiles can reflect 10-15% back toward the source and must be a major consideration when setting up for a measurement. The PowerMax-Pro kW sensor's unique optical design traps >99% of the light inside the enclosure, and when used with a direct QBH fiber adapter option 100% of the light is captured, resulting in a Class 1 measurement system.

The new PowerMax-Pro kW models will be particularly useful for welding, cutting, drilling, and engraving with high power fiber lasers, CO<sub>2</sub> lasers, or solid state lasers.

## FEATURES

- Very fast 20  $\mu$ sec response time
- Measures high average power to 3 kW
- Large 30 mm active area
- Less than 1% back reflection
- QBH adapter available for Class 1 measurement

## APPLICATIONS

- Welding
- Cutting
- Engraving
- Marking



SPECIFICATIONS	PMP 1 kW	PMP 3 kW
Average Power Range <sup>1</sup> (continuous)	1W to 1 kW	1W to 3 kW
Maximum Pulsed Peak Power (kW)	1	5
Noise Equivalent Power		
Standard Mode (10 Hz)		<50 mW
High Speed Mode (20 kHz)		<0.5W
Snapshot Mode (625 kHz)		<1.5W
Maximum Power Density (kW/cm <sup>2</sup> )	5.0 at 1 kW avg. power	2.4 at 3 kW avg. power
Rise Time (μs)		≤20
Fall Time (μs)		≤20
Protective Front Window	Available for 1070 nm model (see part number below)	
Active Area (mm)		
Horizontal Axis	30 (element is 57 mm from front plate)	
Vertical Axis	27.5 (element is 57 mm from front plate)	
Minimum Beam Size (mm)	10 at 1 kW avg. power	20 at 3 kW avg. power
Calibration Uncertainty (%) (k=2)		±2.5
Power Linearity (%)		±3
Back Reflection (%)		<1
when used with QBH Adapter (Class 1)		0
Wavelength Range (nm)	Fixed calibration point ±50	
Calibration Wavelength <sup>2</sup>	810 nm, 1070 nm, 10.6 μm	
Cooling Method <sup>3</sup>	Water	
Cable Type	DB25	
Cable Length	3m (9.8 ft.)	
Part Number		
810 nm (no window)	1324794	1325222
10.6 μm (no window)	1324795	1325223
1070 nm (no window)	1324796	1325224
810 nm, 1070 nm and 10.6 μm (no window)	1324797	1325225
1070 nm (with window)	1325221	1325226
Optional Accessories		
QBH Adapter Plate		1319787
C-Mount Adapter Plate		1319788
Replacement 1070 nm Window		1324793

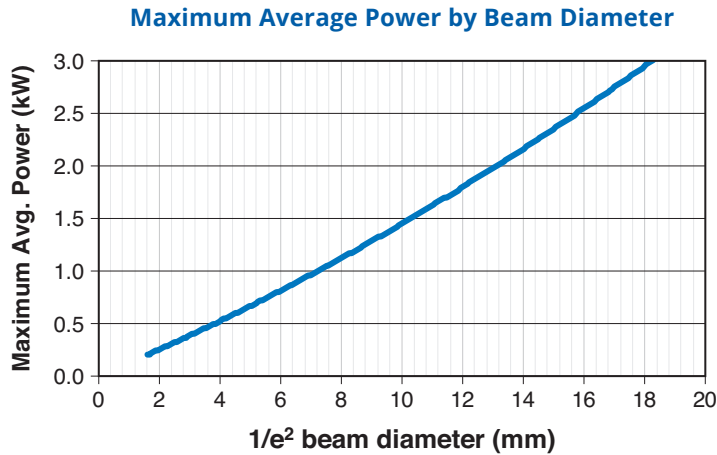
<sup>1</sup> See power handling curve for beam size requirements.

<sup>2</sup> Wavelengths typical; model dependent.

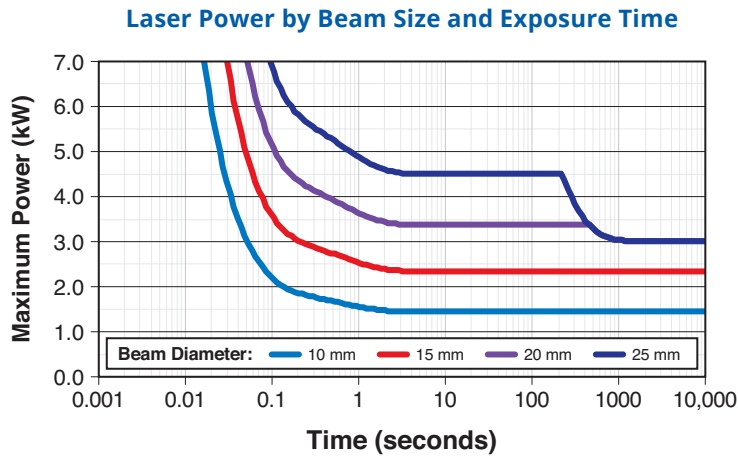
<sup>3</sup> 1 gpm water flow with less than 10 PSI back pressure.

### TYPICAL PERFORMANCE DATA

This chart indicates the maximum average power the sensor can handle based upon beam diameter.



This chart can be used to determine intermittent power handling capability at powers above 3 kW. The plot shows the length of time the sensor can be exposed to particular powers with several beam diameters.

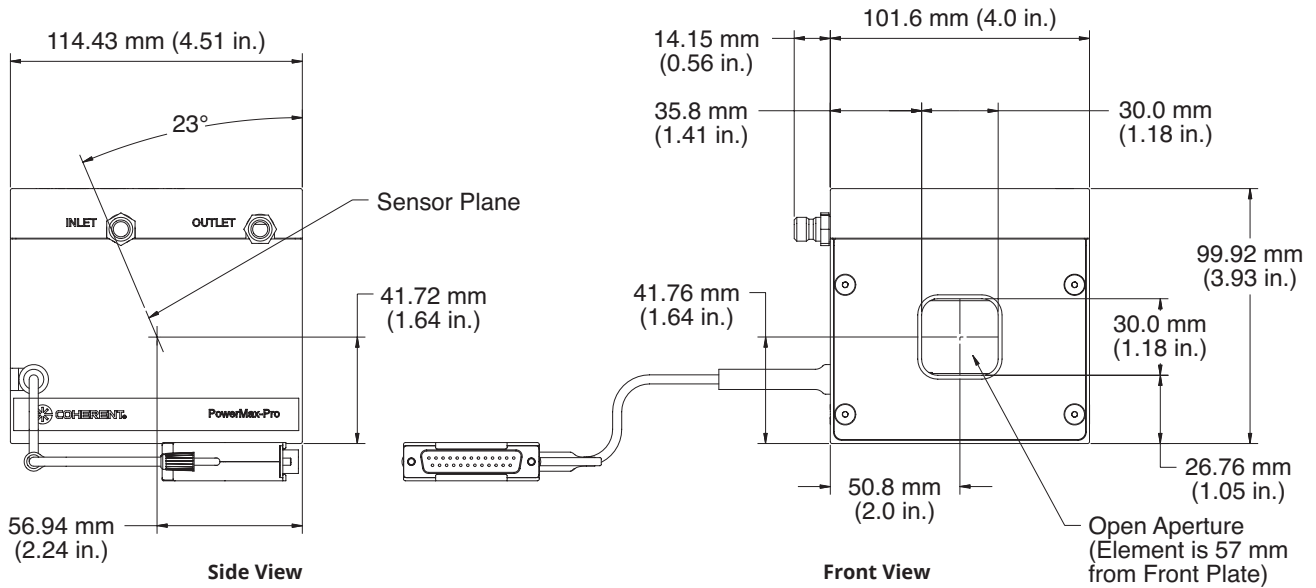


**NOTES:**

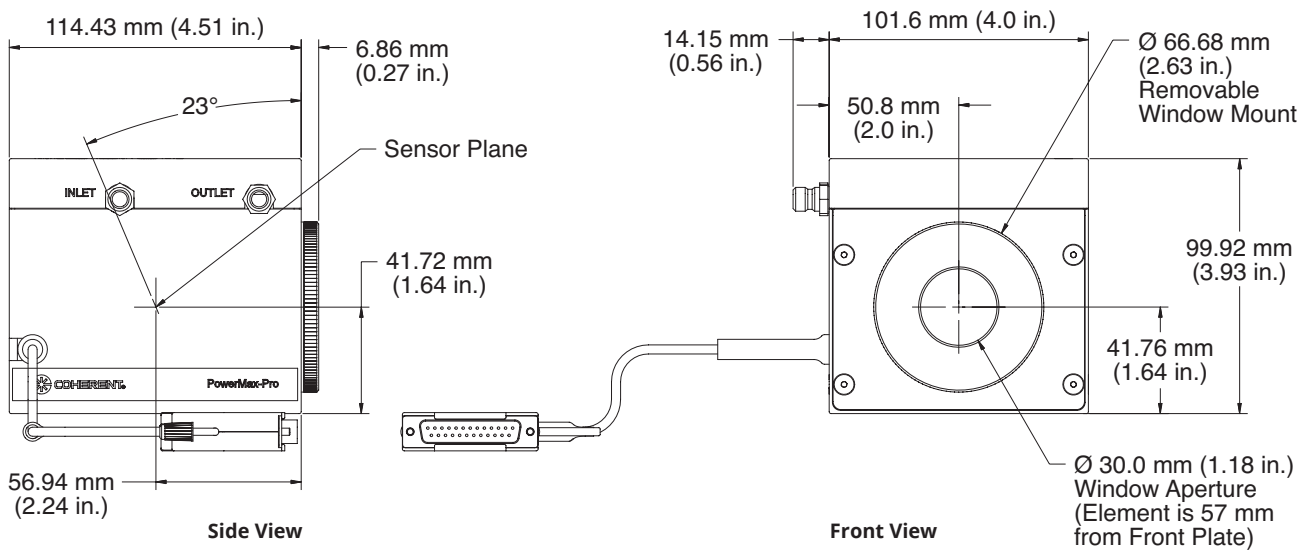
- 1) We do not recommend any long term usage above 3 kW average power because the housing can become too hot and the heat sink absorber can easily damage. At 3 kW the top front portion of the enclosure will reach 83°C in approximately 1000 seconds (at 2 kW average power the enclosure will reach 61°C at 1000 seconds and at 1 kW the enclosure reaches 51°C at 1000 seconds).
- 2) The sensor can be used above 3 kW intermittently for up to 200 to 400 seconds with increasingly larger beams.
- 3) With a 20 mm diameter beam, this sensor can be used safely with modulated sources with peak powers up to 5 kW and pulse lengths up to 100 milliseconds.
- 4) If care is taken to increase the beam size to 25 mm, the sensor could be used with modulated peak power up to 7 kW for 100 milliseconds.
- 5) These curves are for Gaussian beam profiles. Flatter beams can handle higher powers (~5%) for longer lengths of time, and beams with hot spots or "super Gaussian" beams the curves must be de-rated by up to 30%. Contacting Coherent LMC applications engineering for more detailed information.

## MECHANICAL SPECIFICATIONS

### PowerMax-Pro 1 kW and 3 kW Free Space Models

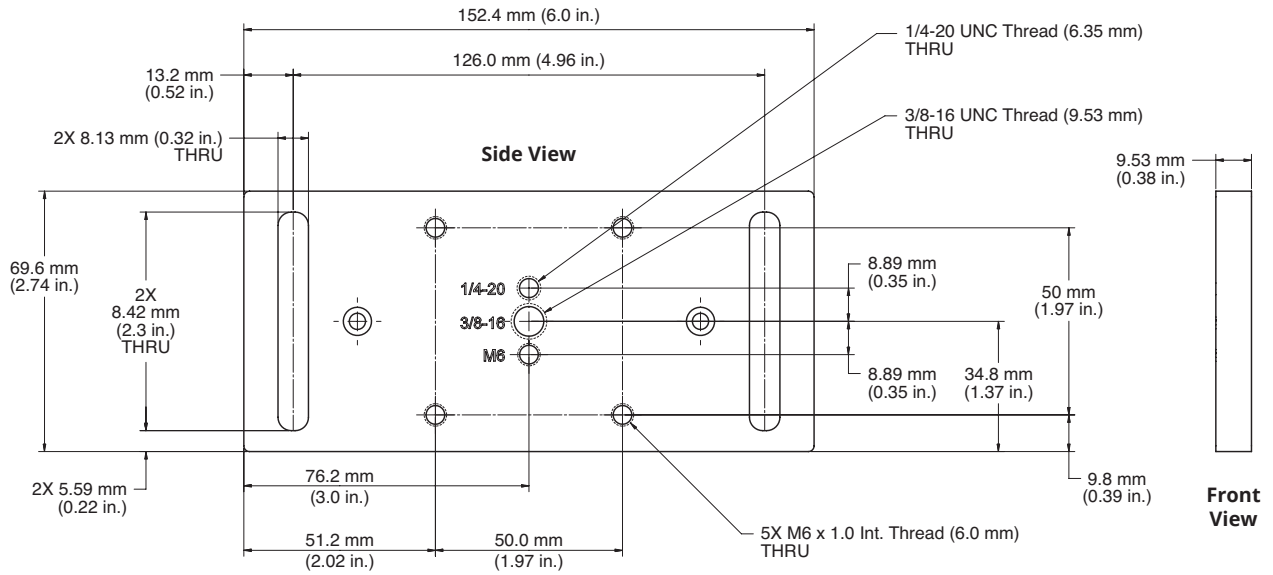


### PowerMax-Pro 1 kW and 3 kW with Window Models

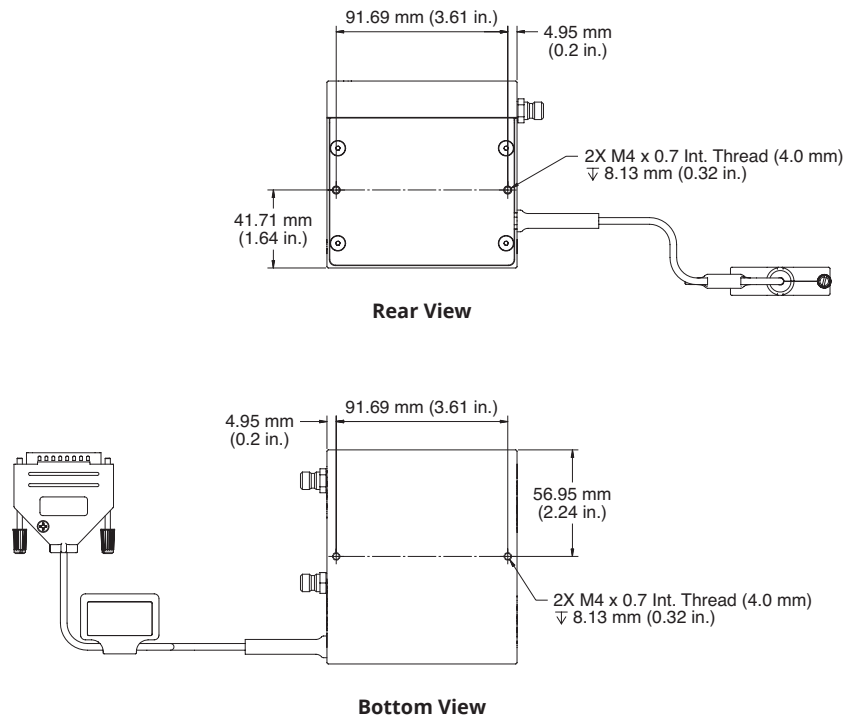


**MECHANICAL SPECIFICATIONS (cont.)**

**Mounting Plate Accessory (included with all models)**

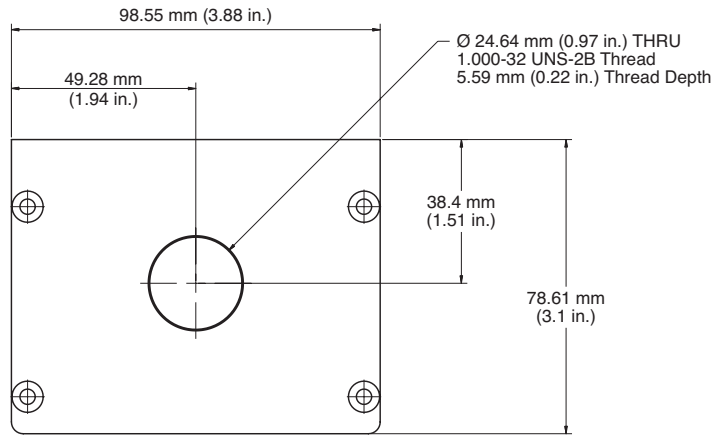


**Mounting Features on Rear of all PowerMax-Pro kW Sensors**

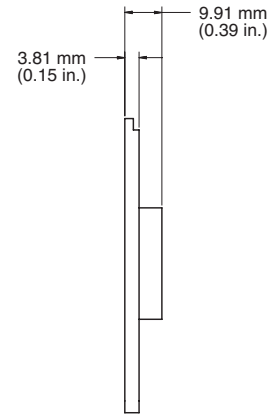


**OPTIONAL ACCESSORIES**

**C-Mount Front Plate (for use with free space models)**

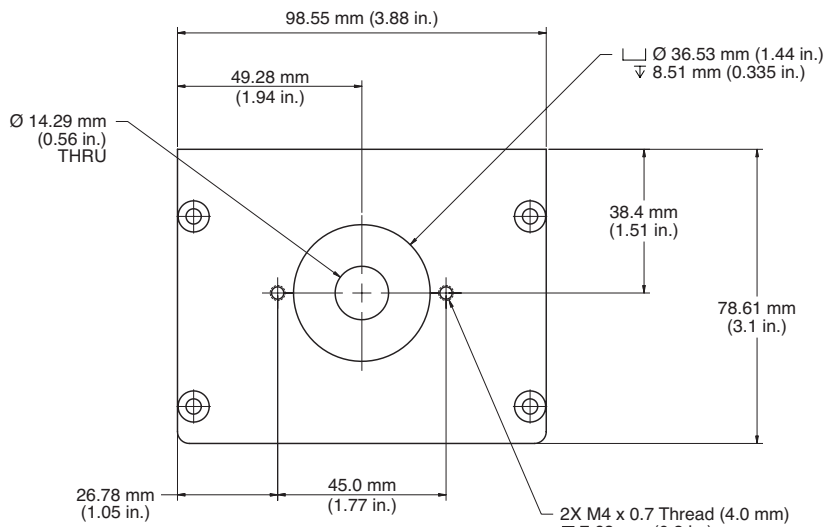


**Front View**

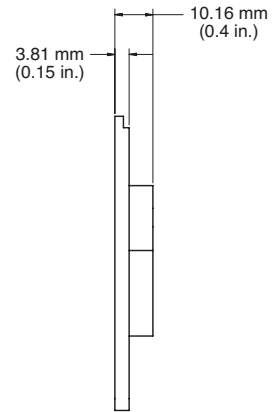


**Side View**

**QBH-Mount Front Plate (for use with free space models)**



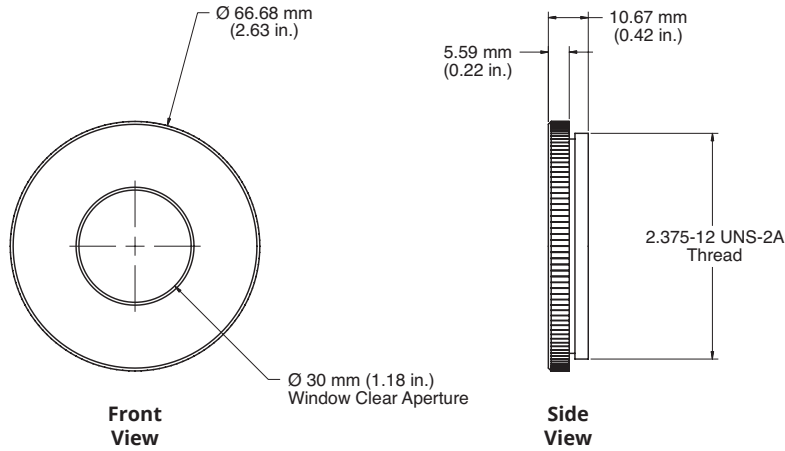
**Front View**



**Side View**

**OPTIONAL ACCESSORIES (cont.)**

**Replacement Window Assembly**



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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](http://www.Coherent.com) or contact your local Sales or Service Representative. Printed in the U.S.A. MC-002-14-0M0417Rev.C Copyright ©2017 Coherent, Inc.