

## 1.1.2.9 All-in-One Sensors

### 1.1.2.9.1 IPM Industrial High Power Sensor

#### 1.1.2.9.1.1 IPM-10KW – Industrial Sensor

##### Features

- ISO/IEC 17025:2017, NIST traceable calibration
- Measure up to 11kW
- Modular architecture
- Heavy duty design with industrial interface and connectors
- Interlock to protect from overpower or cooling water failure
- Real time visibility, traceability and logging for predictive maintenance

IPM-10KW



Model	IPM-10KW			
Use	Laser power measurement in industrial environment up to 11kW			
Control	RS232			
Absorber Type	Beam deflector + broadband absorber			
Spectral Range $\mu\text{m}$ <sup>(a)</sup>	0.9-1.1, 10.6			
Aperture mm	Ø45mm			
Power Mode				
Power Range	100W – 11kW			
Power Scales	11kW / 6kW / 600W			
Power Noise Level W	5			
Backscattered Power	With IPM-SHUTTER10 or 10K-W/15K-W Scatter Shield, ~1% <sup>(b)</sup> Without IPM-SHUTTER10 or 10K-W/15K-W Scatter Shield 3.5 <sup>(b)</sup>			
Maximum Average Power Density kW/cm <sup>2</sup>	See note <sup>(c)</sup> and table <sup>(1)</sup> below			
Response Time with Meter (0-95%) typ. s	2.7			
Response Time with Meter (0-99%) typ. s	10			
Calibration Uncertainty $\pm\%$	1.9			
Power Accuracy $\pm\%$	5 <sup>(a)</sup>			
Repeatability $\pm\%$	0.4			
Linearity with Power $\pm\%$ (0-100% range)	2			
Linearity with Power $\pm\%$ (0-90% range)	1.5			
Energy Mode				
Energy Range	60J – 10kJ			
Energy Scales	10kJ / 5kJ / 500J			
Energy Accuracy	Additional 2% error to power accuracy			
Minimum Energy J	60			
Maximum Energy Density J/cm <sup>2</sup>	See table <sup>(1)</sup> below			
Cooling	Water <sup>(d)</sup>			
Minimum Water Flow Rate	8 liter/min at full power <sup>(d)</sup>			
Water Connectors	Quick connector for 12mm OD nylon tubing (see page 116)			
Weight kg	5			
Connectors <sup>(e)</sup>				
Cables <sup>(e)</sup>	Part RS232 cable, M12 male 5-pin to D9 female, 1.8m (supplied with sensor) Power cable, M12 female 5-pin to flying leads, 1.5m (supplied with sensor) Interlock cable, M8 female 3-pin to flying leads, 1.5m (not supplied) Water Flow Meter cable, M8 male 6-pin to flying leads, 1.5m (not supplied)			
Related Products <sup>(a) (b)</sup>	Name IPM-SHUTTER10 IPM-SHUTTER10 Window replacement kit 10K-W / 15K-W Scatter Shield IPM-COM-Profinet IPM-COM-EtherNet/IP-M	Description Combined protective shutter with built in scatter shield, IP62 rated Replacement anti reflective coated window Scatter Shield for mounting on front flange Profinet communications adapter with AIDA connectors EtherNet/IP communications adapter with circular connectors (M12 & 7/8)		
Compliance	CE, UKCA, China RoHS			
Part number	7Z07106			
Note: (a) Calibrated at 1.07 $\mu\text{m}$ and 10.6 $\mu\text{m}$ . When working at 10.6 $\mu\text{m}$ (CO2), if using the SHUTTER10 unit, the window should be removed. IPM without the IPM-SHUTTER10: For other wavelengths in the ranges of 0.8 – 0.95 $\mu\text{m}$ and 1.1 – 2 $\mu\text{m}$ , add up to $\pm 2\%$ to the calibration error. Note: (b) IPM-SHUTTER10: When installed, use the NIRS or CO2S setting to compensate for slightly higher reading. 10K-W / 15K-W Scatter Shield: When installed, use the NIRS setting to compensate for slightly higher reading. When not installed, use the NIR setting. Note: (c) For circular beam centered within 25% of beam diameter. IMPROPERLY CENTERED BEAM CAN CAUSE DAMAGE TO SENSOR. Maximum tilt angle $\pm 5$ degrees. For rectangular beam please consult Ophir representative. Note: (d) Water temperature range 18–30°C. Water temperature rate of change $<1^\circ\text{C}/\text{min}$ . Pressure drop across sensor 0.1MPa. The recommended flow rate can be lowered proportionately at lower than full power but should not be below 3 liter/min. The response time will be optimal with the recommended flow rate. For solutions for prolonged usage with untreated water (tap water, non DI water), please, contact Ophir. Note: (e) See IPM User Manual for details of connectors and cables				
Table (1)	Beam diameter	Max power density	Max energy density – by pulse width	P/N
		10kW/cm <sup>2</sup>	30J/cm <sup>2</sup>	10ms PW
<15mm		10kW/cm <sup>2</sup>	60J/cm <sup>2</sup>	150J/cm <sup>2</sup>
15 – 20mm		7kW/cm <sup>2</sup>	20J/cm <sup>2</sup>	40J/cm <sup>2</sup>
20 – 40mm		5kW/cm <sup>2</sup>	15J/cm <sup>2</sup>	100J/cm <sup>2</sup>
40 – 45mm		4kW/cm <sup>2</sup>	12J/cm <sup>2</sup>	70J/cm <sup>2</sup>
			25J/cm <sup>2</sup>	600 J/cm <sup>2</sup>
			60J/cm <sup>2</sup>	500 J/cm <sup>2</sup>

\* For drawings please see page 101

## IPM-10KW

