

### 1.1.2.8 IPM Industrial High Power Sensor


#### 1.1.2.8.1 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 ±%	1.9		
Power Accuracy ±%	5 <sup>(a)</sup>		
Repeatability ±%	0.4		
Linearity with Power ±% (0-100% range)	2		
Linearity with Power ±% (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 100)		
Weight kg	5		
Connectors <sup>(e)</sup>	 Interlock, M8 male, 3-pin RS232, M12 female 5-pin Flow meter – M8 female, 6-pin Power/IPM-COM, M12 male, 5-pin		
Cables <sup>(e)</sup>	Part		P/N
	RS232 cable, M12 male 5-pin to D9 female, 1.8m (supplied with sensor)		7Z10532
	Power cable, M12 female 5-pin to flying leads, 1.5m (supplied with sensor)		7E01519
	Interlock cable, M8 female 3-pin to flying leads, 1.5m (not supplied)		7E01513
	Water Flow Meter cable, M8 male 6-pin to flying leads, 1.5m (not supplied)		7E01536
Related Products <sup>(a) (b)</sup>	Name	Description	P/N
	IPM-SHUTTER10	Combined protective shutter with built in scatter shield, IP62 rated	7Z08409
	IPM-SHUTTER10 Window replacement kit	Replacement anti reflective coated window	7Z08411
	10K-W / 15K-W Scatter Shield	Scatter Shield for mounting on front flange	7Z08295
	IPM-COM-Profinet	Profinet communications adapter with AIDA connectors	7Z08404
	IPM-COM-EtherNet/IP-M	EtherNet/IP communications adapter with circular connectors (M12 & 7/8)	7Z08405
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 $\mu\text{m}$  (CO<sub>2</sub>), if using the SHUTTER10 unit, the window should be removed.

Note: (b) IPM-SHUTTER10: When installed, use the NIRS or CO<sub>2</sub>S setting to compensate for slightly higher reading.

Note: (c) 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: (d) 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: (e) 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: (f) See IPM User Manual for details of connectors and cables

Table (1)	Beam diameter	Max power density	Max energy density – by pulse width			
			1ms PW	3ms PW	10ms PW	100ms PW
	$< 15\text{mm}$	10kW/cm <sup>2</sup>	30J/cm <sup>2</sup>	60J/cm <sup>2</sup>	150J/cm <sup>2</sup>	1350 J/cm <sup>2</sup>
	15 – 20mm	7kW/cm <sup>2</sup>	20J/cm <sup>2</sup>	40J/cm <sup>2</sup>	100J/cm <sup>2</sup>	900 J/cm <sup>2</sup>
	20 – 40mm	5kW/cm <sup>2</sup>	15J/cm <sup>2</sup>	30J/cm <sup>2</sup>	70J/cm <sup>2</sup>	600 J/cm <sup>2</sup>
	40 – 45mm	4kW/cm <sup>2</sup>	12J/cm <sup>2</sup>	25J/cm <sup>2</sup>	60J/cm <sup>2</sup>	500 J/cm <sup>2</sup>

\* For drawings please see page 93

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