# 1.1.2.9 IPM Industrial High Power Sensor

## 1.1.2.9.1 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 µm [a] | 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 Sheild, ~1% [b]<br>Without IPM-SHUTTER10 or 10K-W/15K-W Scatter Sheild 3.5 [b] |
| Maximum Average Power Density kW/cm² | See note [c] and table [1] 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 [a] |
| 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/cm² | See table [1] below |
| Cooling | Water [d] |
| Minimum Water Flow Rate | 8 liter/min at full power [d] |
| Water Connectors | Quick connector for 12mm OD nylon tubing (see page 102) |
| Weight kg | 5 |
| Connectors [e]  | Interlock, M8 male, 3-pin<br>RS232, M12 female 5-pin<br>Flow meter – M8 female, 6-pin<br>Power/IPM-COM, M12 male, 5-pin |

Cables [e]

| 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 [a] [b]

| 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 1.07µm and 10.6µm. When working at 10.6µm (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 - 0.95µm and 1.1 - 2µm, add up to ±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 ±5 degrees.
For rectangular beam please consult Ophir representative.

Note: (d) Water temperature range 18-30°C. Water temperature rate of change <1°C/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.

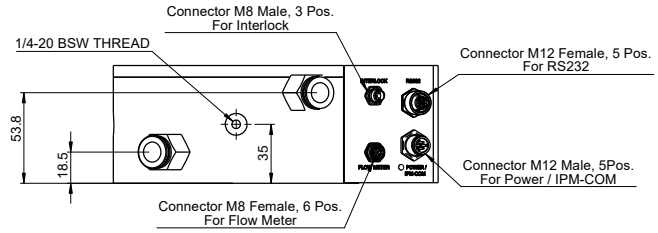
Note: (e) See IPM User Manual for details of connectors and cables

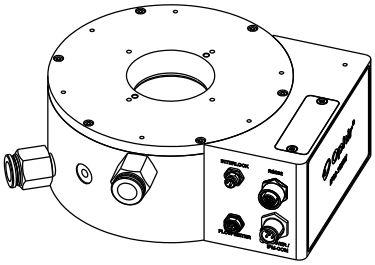
Table (1)

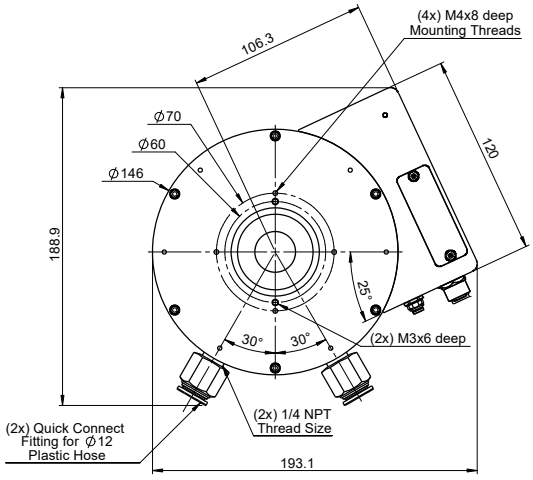
| Beam diameter | Max power density | Max energy density – by pulse width | | | |
|---|---|---|---|---|---|
| | | 1ms PW | 3ms PW | 10ms PW | 100ms PW |
| <15mm | 10kW/cm² | 30J/cm² | 60J/cm² | 150J/cm² | 1350 J/cm² |
| 15 – 20mm | 7kW/cm² | 20J/cm² | 40J/cm² | 100J/cm² | 900 J/cm² |
| 20 – 40mm | 5kW/cm² | 15J/cm² | 30J/cm² | 70J/cm² | 600 J/cm² |
| 40 – 45mm | 4kW/cm² | 12J/cm² | 25J/cm² | 60J/cm² | 500 J/cm² |

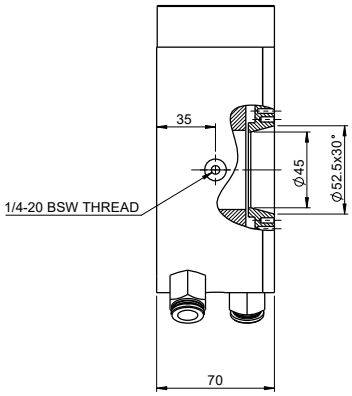
* For drawings please see page 95

**IPM-10KW**


Connector M8 Male, 3 Pos.
For Interlock
1/4-20 BSW THREAD
Connector M12 Female, 5 Pos.
For RS232
53.8
18.5
35
Connector M12 Male, 5Pos.
For Power / IPM-COM
Connector M8 Female, 6 Pos.
For Flow Meter




106.3
(4x) M4x8 deep
Mounting Threads
Ø70
Ø60
Ø146
120
188.9
25°
30°
30°
(2x) M3x6 deep
(2x) 1/4 NPT
Thread Size
(2x) Quick Connect
Fitting for Ø12
Plastic Hose
193.1


35
Ø45
Ø52.5x30°
1/4-20 BSW THREAD
70