

## 1.1.2.12 Short Exposure High Power Sensors

### 1.1.2.12.2 Ariel

200mW to 8000W

#### Features

- Measures up to 8000W
- Wavelengths: 440 - 550nm, 900 - 1100nm, 2.94µm, 10.6µm
- No Water Cooling IP62 rated
- Only 3 seconds to display measurement
- High thermal capacity of 14KJ for uninterrupted consecutive measurements

Ariel with window attached



The Ariel measures high power industrial lasers of up to 8kW by measuring the energy of a short exposure to this power. The laser is set to deliver a pulse of from 0.05 to several seconds. It then measures the energy and duration of the

laser pulse and calculates the power. Ariel can also measure continues power up to 500W intermittently. It is ideal for usage in tight spaces such as additive manufacturing chambers as well as for production process quality control and R&D.

| Model   | Ariel   |                           |  |  |
|---|---|---------------------------|--|--|
| Use   | High power laser measurement by short exposure  |                           |  |  |
| Absorber Type   | LP2   |                           |  |  |
| Power Range   | 200mW - 8,000W  |                           |  |  |
| Exposure Time (see table below)   | Pulsed Mode: 0.05 - 2s. <sup>(a)</sup> CW mode: 10s to continuous depending on power level  |                           |  |  |
| Wavelength  | Window: 440 - 550nm, 900 - 1100nm <sup>(b)</sup><br>Diffuser: 440 - 550nm, 940 - 1100nm <sup>(b)</sup><br>Without window or diffuser: 2.94µm <sup>(c)</sup> , 10.6µm <sup>(c)</sup>                                 |                           |  |  |
| Aperture  | Ø32mm. Maximum beam diameter for Gaussian beam 22mm.<br>With diffuser Maximum beam diameter for Gaussian beam 10mm.   |                           |  |  |
| Calibration Uncertainty ±%  | 1.9   |                           |  |  |
| Power Accuracy  | 900 - 1100nm, 2.94µm, 10.6µm: ±3%; 440 - 550nm: ±3.5% <sup>(a)</sup> <sup>(b)</sup>   |                           |  |  |
| Minimum Power for Pulse Width Measurement                               | 440 - 800nm, >20W; 800 - 1100nm, >10W; >1100nm, not available <sup>(c)</sup>  |                           |  |  |
| Maximum Beam Incidence Angle  | Without diffuser: ±30 degrees for <12mm Gaussian beam,<br>With diffuser: ±25 degrees for <10mm Gaussian beam <sup>(d)</sup>   |                           |  |  |
| Backscattered Power   | LP2 absorber: <2200nm: 4%; 2940nm: 10%; 10.6µm: 25%<br>With window: 5%<br>With Diffuser: 25%  |                           |  |  |
| Reproducibility   | ±1%   |                           |  |  |
| Power Range vs. Irradiation Time  | 200mW - 30W: CW; 500W: up to 20s; 1,000W - 8,000W: 0.05 - 1s.   |                           |  |  |
| Linearity   | ±1.5%   |                           |  |  |
| Time to Reading   | 3s after end of exposure  |                           |  |  |
| Waiting Time for Next Measurement                                       | 12s   |                           |  |  |
| Maximum Energy for Single Pulse   | 2.4kJ <sup>(e)</sup>  |                           |  |  |
| Maximum Exposure Before Cooling Down is Necessary                       | Maximum operating temperature of 60°C will be reached after exposure to 14kJ (e.g. 10 shots at 2,000W, 0.7s) <sup>(e)</sup> . Cooling down time before another 14kJ series of shots is ~10 minutes <sup>(f)</sup> . |                           |  |  |
| Over Temperature Warning  | Flashing display  |                           |  |  |
| Cooling   | Convection <sup>(f)</sup>   |                           |  |  |
| Battery   | Rechargeable, 1100mAh, lifetime >15 hours   |                           |  |  |
| Interface   | 128x64 pixel LCD Display, Bluetooth 5.1 (compatible with Bluetooth 4 and above), USB-C  |                           |  |  |
| Dimensions (L x W x H)  | 70 x 70 x 80 mm (see drawing)   |                           |  |  |
| Weight  | 0.8kg   |                           |  |  |
| Operating Temperature   | 10 - 40°C   |                           |  |  |
| Permissible Relative Humidity (non-condensing)                          | 10 - 80%  |                           |  |  |
| Ingress Protection  | IP62  |                           |  |  |
| Compatible Client Applications  | StarLab (PC, USB), StarViewer (iOS or Android, Bluetooth)   |                           |  |  |
| Recommended Exposure Times and 1/e <sup>2</sup> Gaussian Beam Diameters | Laser Power W   | Recommended Exposure s    | Min 1/e <sup>2</sup> beam dia. Without diffuser [mm] | Min 1/e <sup>2</sup> beam dia. With diffuser (max dia. is 10mm) [mm] |
| Continuous Power Measurement  | 30  | Continuous <sup>(f)</sup> | 1  | 0.3  |
|   | 500   | 20 <sup>(f)</sup>         | 4  | 2  |
|   | 500   | 2                         | 4  | 1  |
|   | 1000  | 1                         | 6  | 1  |
| Power Measurement from Short Exposure                                   | 2000  | 0.7                       | 10   | 1.5  |
|   | 4000  | 0.5                       | 16   | 3.5  |
|   | 8000  | 0.3                       | 22   | N.A.   |
| Compliance  | CE, UKCA, China RoHS  |                           |  |  |
| Version   | V2  |                           |  |  |
| Part number   | 7Z07137   |                           |  |  |

Notes: (a) The power is calculated by measuring the pulse energy and exposure time. A rectangular pulse is assumed for this calculation. Diffuser mode is calibrated with protective window, working without window may have small effect on measurement results.

(b) May be used at 550 - 900nm with decreased accuracy and higher reflection (up to 10%).

(c) Use without window or diffuser. The sensor does not measure pulse width above 1100nm. For pulsed power measurement at >1100nm, a short pulse with known duration should be applied. A pulse energy measurement is performed and divided by the known pulse width to obtain the power. When working without window and without diffuser, the sensor is not sealed against dust or water.

(d) With diffuser, reading will be up to 10% lower than vertical beam and beam should be offset from center in opposite direction to beam incidence by ~10mm.

(e) At room temperature.

(f) Faster cooling can be achieved by attaching the Ariel to a heat sink using the mounting threads at the bottom.

\* For drawings and pictures please see page 107

Ariel

