1.1.2.9 All-in-One Sensors

1.1.2.9.3 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
- Field replaceable protective window

Ariel with window attached

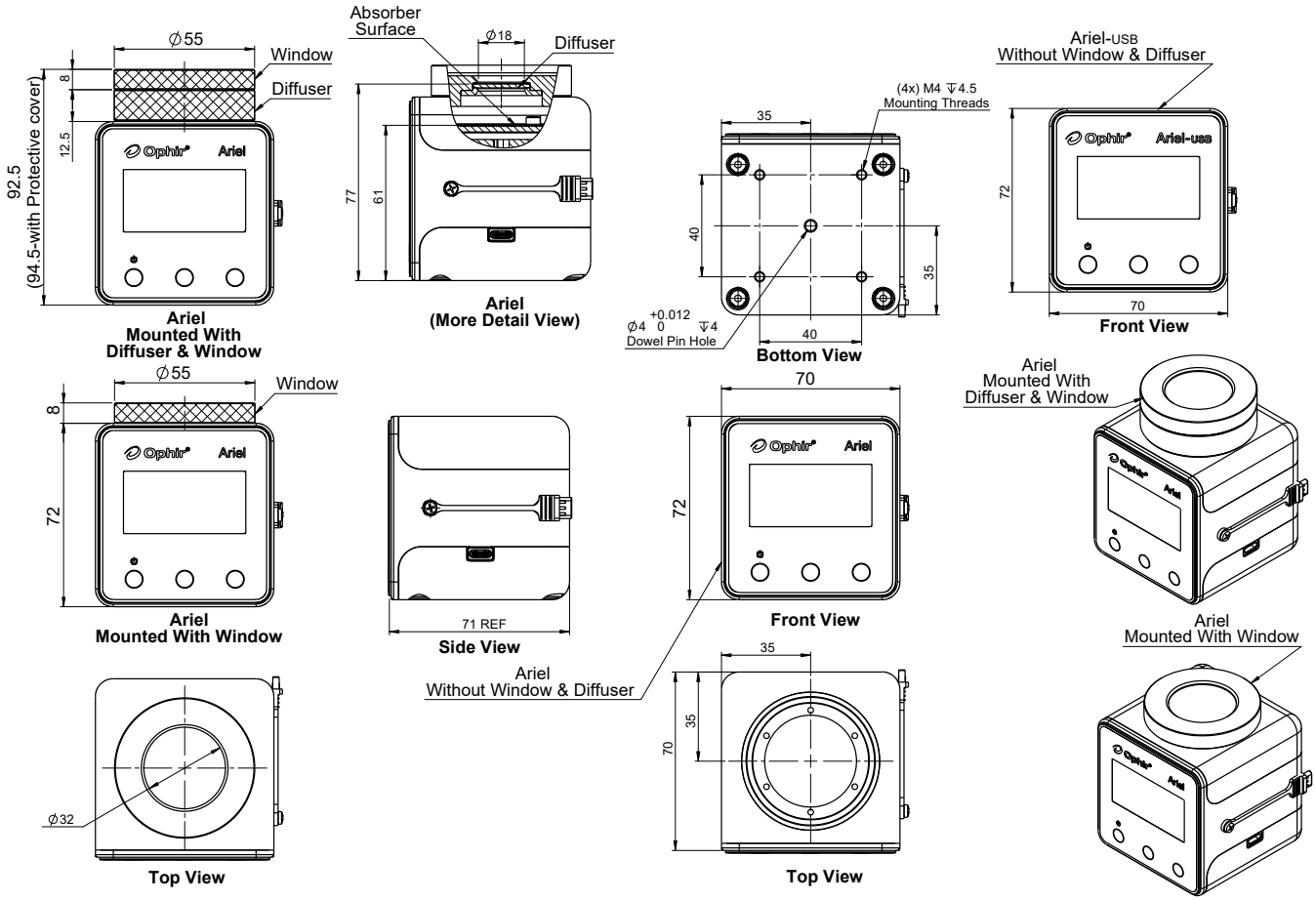
The Ariel measures high power industrial lasers of up to 8kW by measuring the energy of a short exposure to this power. The laser is set to deliver a pulse of from 0.05 to several seconds. It then measures the energy and duration of the laser pulse and calculates the power. Ariel can also measure continues 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. [a] CW mode: 10s to continuous depending on power level			
Wavelength Range	Window: 440 - 550nm, 900 - 1100nm [b] Diffuser + window: 440 - 550nm, 940 - 1100nm [b] Without window or diffuser: 2.94µm [c], 10.6µm [c]			
Aperture	Ø32mm. Maximum beam diameter for Gaussian beam 22mm. 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% [a] [b]			
Minimum Power for Pulse Width Measurement	440 - 800nm, >20W; 800 - 1100nm, >10W; >1100nm, not available [c]			
Maximum Beam Incidence Angle	Without diffuser: ±30 degrees for <12mm Gaussian beam, With diffuser + window: ±25 degrees for <10mm Gaussian beam [d]			
Backscattered Power	LP2 absorber: <2200nm: 4%; 2940nm: 10%; 10.6µm: 25% With window: 5% With diffuser+ window: 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 [e]			
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) [e]. Cooling down time before another 14kJ series of shots is ~10 minutes [f].			
Window Damage Threshold	1.5MW/cm² [g]			
Recommended Exposure Times and 1/e² Gaussian Beam Diameters	Laser Power W	Recommended Exposure s	Min 1/e² beam dia. on absorber (without diffuser) [mm]	Min 1/e² beam dia. on diffuser (max dia. is 10mm) [mm]
Continuous Power Measurement	30	Continuous [f]	1	0.3
	500	20 [f]	4	2
Power Measurement from Short Exposure	500	2	4	1
	1000	1	6	1
	2000	0.7	10	1.5
	4000	0.5	16	3.5
	8000	0.3	22	N.A.
Over Temperature Warning	Flashing display			
Cooling	Convection [f]			
Battery	Rechargeable, 1100mAh, lifetime >15 hours			
Interface for Ariel	128x64 pixel LCD Display, Bluetooth 5.1 (compatible with Bluetooth 4 and above), USB-C			
Interface for Ariel-USB	128x64 pixel LCD Display, 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)			
Optional Accessories	Name	Description		P/N
	Ariel Window Assembly	Fully pre-assembled unit for quick and easy installation		7Z08455
	Ariel Window Replacement Kit	Includes all necessary components for self-assembly and installation		7Z08424
Compliance	CE, UKCA, China RoHS			
Version	V2	-		
Model	Ariel	Ariel-USB		
Communications	Bluetooth and USB	USB		
Part number	**7Z07137**	**7Z07138**		

Notes: (a) The power is calculated by measuring the pulse energy and exposure time. A rectangular pulse is assumed for this calculation. Diffuser mode and window mode are calibrated with protective window, working without window (not recommended) will affect measurement results by 1-2%.
(b) May be used in the 550 - 900nm range 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.
(g) Window location -
Without diffuser - 17.35 mm above the disk absorber surface
With diffuser - 13.65 mm above the diffuser surface

* For drawings and pictures please see page 108

Ariel


Ø55
Window
Diffuser
8
12.5
92.5
(94.5-with Protective cover)
Ariel
Mounted With
Diffuser & Window
Absorber
Surface
Ø18
Diffuser
77
61
Ariel
(More Detail View)
(4x) M4 ↧4.5
Mounting Threads
35
40
35
+0.012
Ø4 0 ↧4
Dowel Pin Hole
Bottom View
Ariel-USB
Without Window & Diffuser
72
70
Front View
Ariel
Mounted With
Diffuser & Window
Ø55
Window
8
72
Ariel
Mounted With Window
71 REF
Side View
70
72
Front View
Ariel
Without Window & Diffuser
35
70
35
Top View
Ariel
Mounted With Window
Ø32
Top View


Window
With diffuser and protective window
Protective cover
Positioning hole
Heatsink
mounting
screw holes
USB rubber plug