



ATMOS

Marlyn Cobalt

# Specifications

MARLYN COBALT SPECIFICATIONS V2.4 DECEMBER 2023  
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Atmos is a leader in geospatial drone technologies. With a deep awareness of our future challenges in resources, population growth, and climate change, our team of dedicated problem solvers are working hard to help you plan with efficiency, accuracy, and precision.

We specialise in high quality surveying and mapping VTOL drones, capable of operating in the roughest weather conditions.

Our flagship product Marlyn Cobalt is proudly designed, engineered, tested, and manufactured from our headquarters in Leiden, The Netherlands.



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# Marlyn Specifications

## OPERATION

<b>Take-off &amp; landing area</b>	2 x 2 m [7 x 7 ft] required
<b>Set-up time</b>	5 minutes
<b>Automatic Flight</b>	Fully automatic flight execution of preprogrammed mission; Automatic flight with position control by user.
<b>Take-off &amp; landing</b>	Automatic takeoff, Assisted landing <b>Weather dependent</b>
<b>Cruise speed</b>	Standard: 65 km/h [40 mph]    Lidar: 68 km/h [42 mph] <b>Indicated Airspeed</b>
<b>Wind resistance</b>	Take off: 45 km/h [28 mph] / Cruise: 55 km/h [34 mph] / Landing: 45 km/h [28 mph]
<b>Max flight time</b>	50 mins <b>Dependent on environmental conditions</b>
<b>Pre-flight checklist</b>	Yes (integrated in Navigator)
<b>Temperature range</b>	-10°C to +40°C [14°F to 104°F] <b>Above 35°C operating restrictions apply</b>
<b>GCPs</b>	Not required with optional PPK module
<b>Max. operating altitude</b>	5000m [16,000 ft] above mean sea level (high altitude propellers required above 1800m)

## SAFETY

<b>Safety Lights</b>	Lights indicate Marlyn's status. When they are off Marlyn is safe to approach
<b>Return to home</b>	Single tap function returns Marlyn to home
<b>Low Battery</b>	Automatic return to home (configurable) <b>Emergency Controls Possible</b>
<b>Lost Link</b>	Automatic return to home (configurable)
<b>Geofence</b>	Both horizontal and vertical (configurable)
<b>System Diagnostics</b>	Built-in comprehensive pre-flight and in-flight checks ensure a safe flight
<b>Avoidance Maneuvres</b>	Pause, abort mission, perform an upward, sideward, or downward manoeuvre. Resume if clear
<b>Manual flight override</b>	Intuitively fly Marlyn to safety in both airplane and helicopter mode
<b>Emergency Landing</b>	Immediately land Marlyn in helicopter mode in case of approaching aircraft
<b>Flight planning + Processing</b>	Navigator, Geotagger (In-house developed) <b>Included</b>
<b>System Requirements</b>	Windows. CPU: Quad core 1.20GHz (i5-7Y57 Kaby Lake) or equivalent; RAM: 8 GB; Graphics: Intel HD Graphics 615 or equivalent; HDD: 100 MB + space for caching maps.
<b>Flight Operation</b>	Automatic <b>Emergency Controls Possible</b>
<b>Input files</b>	.KML, .KMZ, .GeoTIFF, .MBTiles, .WMTS
<b>Mapping Options</b>	Polygon, Linear Corridor (Time based triggering, position based triggering)

# Marlyn

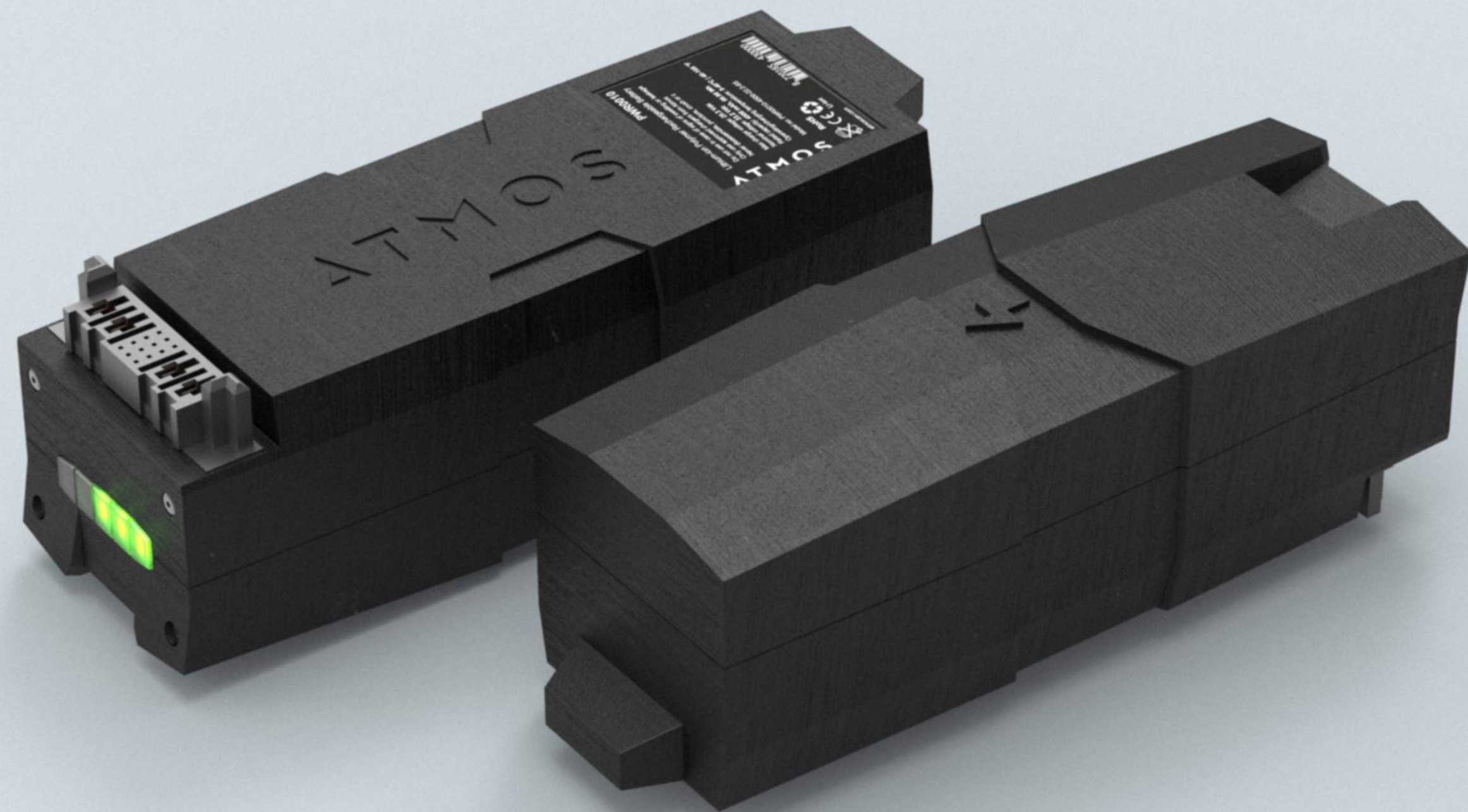
# Specifications

## HARDWARE

<b>Drone type</b>	Hybrid — VTOL (Vertical Take-Off and Landing) & fixed-wing
<b>Max takeoff weight</b>	6.4 kg [14.1 lbs] (Including batteries) <a href="#">Standard Configuration</a>
<b>Wingspan</b>	1.6 m [5.2 ft] (With detachable wings for easy transportation in Marlyn's backpack)
<b>Built in safety lights</b>	2 Navigation lights, 2 Anti-collision lights — Over 1km [0.6 miles] of visibility
<b>Motors</b>	4 brushless electric motors
<b>Telemetry link range</b>	Up to 7 km [4.3 miles] — Region Dependent <a href="#">Alternative configurations possible</a>
<b>RC link range</b>	Default 1 km [0.6 miles] (Alternative configurations possible)
<b>Included accessories</b>	Backpack, 4 batteries, battery charger, remote control, Navigator modem, in-field maintenance kit, battery case, Wind anemometer, cables, spare parts
<b>Materials</b>	Carbon fiber frame surrounded with durable structural EPP
<b>RC Battery</b>	3.7V 5000mAh Lithium-polymer battery. 8hrs Battery Life, 2.5hrs charge time. USB-C Charging. May be charged while in use.



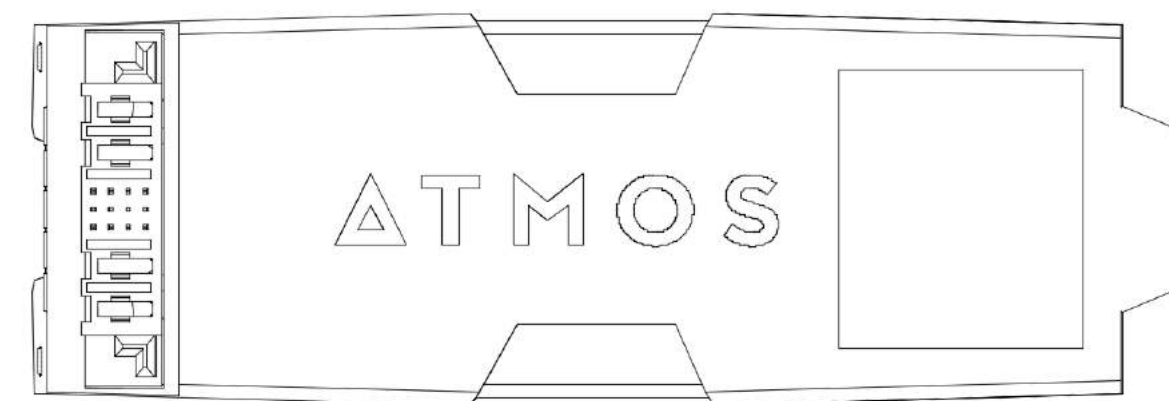
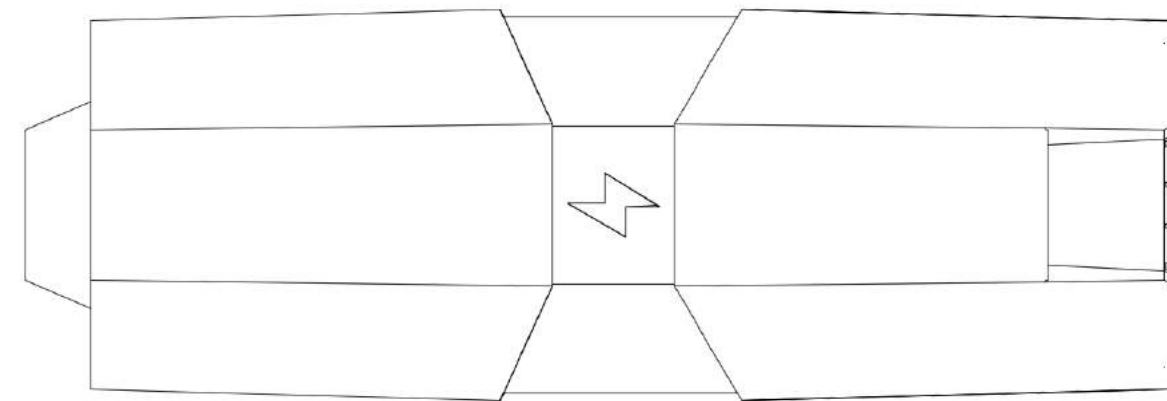
# Dual Smart Battery System



THE BATTERY SYSTEM IS  
A CRITICAL COMPONENT  
FOR SAFE OPERATION OF  
SURVEYING DRONES.

It also has a direct influence on the flight performance. To further increase the operational efficiency and reliability of Marlyn, Atmos' engineering team designed a dual smart battery system that results in redundancy, peace-of-mind, and durability.

# Safer Smarter Batteries



## REDUNDANCY

Each battery acts as a failsafe to the other to maximize reliability ensuring safe operation without any disruptions. The two batteries are used in parallel to create one integrated power system. Marlyn's smart power board can recognize any unexpected inconsistencies and initiate its predefined safety routine to land automatically.

## SPECIFICATIONS

Type of battery	Lithium-polymer battery	1 set (2 batteries) required to fly
Battery capacity	4500 mAh (99.9 Wh)	9000 mAh per battery set
Weight	670 g [24 oz] per battery	
Status lights	Transparent button with 5 imbedded LED status lights	
Size (LxHxW)	170 x 58 x 58 mm [6.7 x 2.3 x 2.3 in]	
Charging Time	30 - 60 min (60 min per battery set, when completely discharged)	
Air Travel Compliance	Meets standard conditions for air travel in carry-on luggage below 100Wh	

## PEACE OF MIND

Battery Management System (BMS) for optimal flight performance. Both batteries are closely monitored in terms of remaining energy capacity, voltage, and temperature. Complying with airline carryon luggage regulations making it easy to transport from one job to another

## DURABILITY

After 300 charges, you still have 80- 90% capacity remaining. The strengthened shell with rugged connectors eliminates potential failure points for increased safety and ease of use.

# Marlyn's Backpack

## SPECIFICATIONS

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<b>Size</b>	75cm x 45cm x 85cm
<b>Weight</b>	Backpack 11 kg + Marlyn +/- 17 kg + accessories +/- 19 kg
<b>Material</b>	Nylon exterior, protective foam interior
<b>Capacity</b>	Marlyn, 4 sets of batteries, laptop, pole/total station, extra payload module, telemetry module, RC module, and small accessories
<b>Travel</b>	Handled as standard luggage by airlines
<b>Water protection</b>	Water proof vinyl Base
<b>Straps</b>	Padded shoulder straps with waist belt

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# Why PPK?



Capturing high-resolution images with ultra-precise geotagging is crucial when converting aerial imagery into accurate point clouds.

When looking at the different options to increase the accuracy, Ground Control Points (GCPs) is the least effective method as it requires a lot of time in the field and more complex post-processing which results in higher costs in the end.

By choosing PPK, the accuracy of your image geotags is drastically improved. Data recorded by the PPK module is augmented by satellite corrections resulting in ultra-precise geotags. This ensures high precision datasets without the use of GCP's.

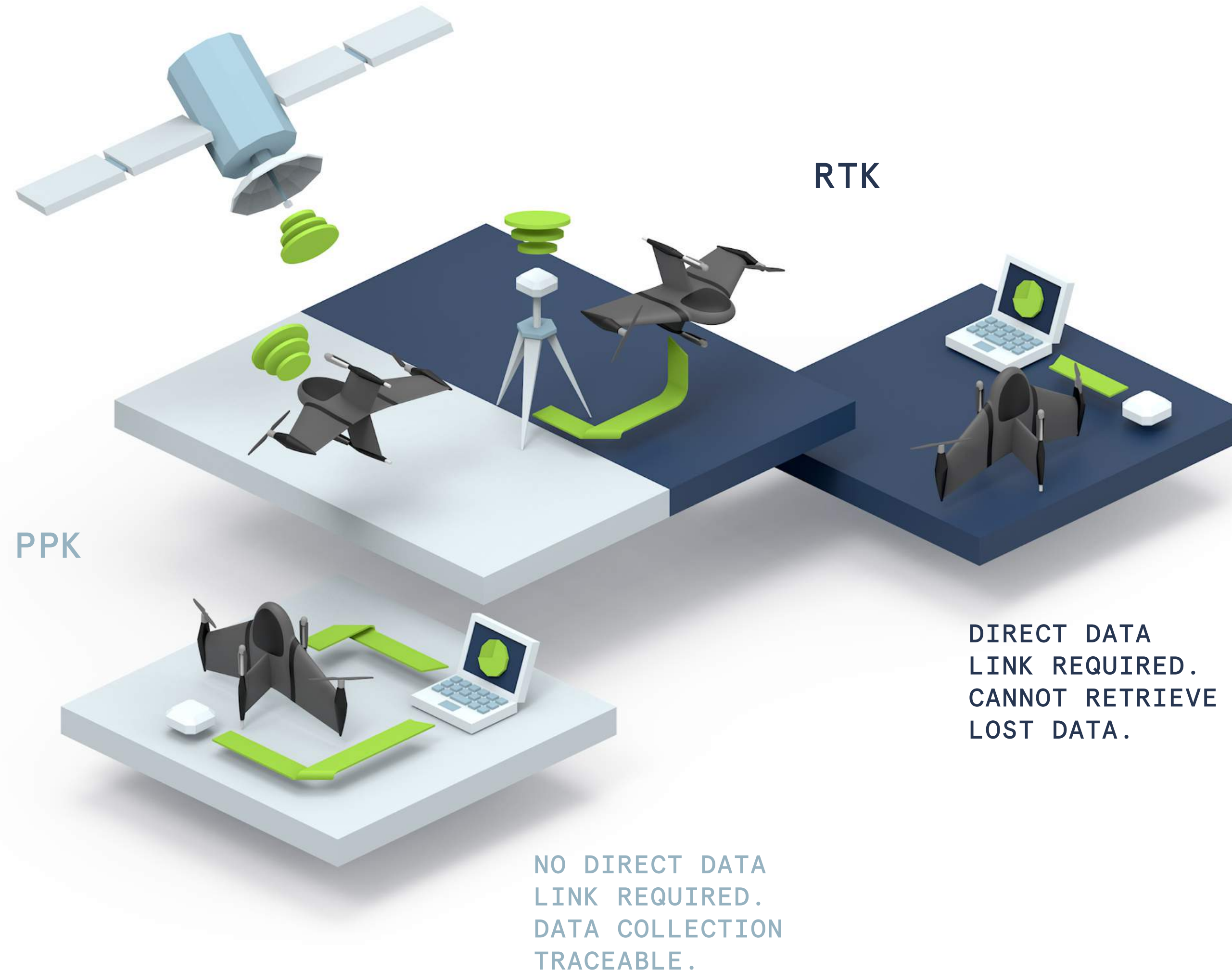
These accuracies can be achieved with any PPK enabled Marlyn with a properly located base station or CORS network.

## Accuracy and Efficiency

### REDUCE TIME AND COSTS WITH A PPK-ENABLED MARLYN

- Absolute accuracy down to cm-level, with no realtime datalink required.
- High data quality and consistency over your complete project without laying out GCPs.
- High end Topcon PPK featuring multi-constellation, multi frequency all-in-view satellite tracking.

# PPK Benefits



## PPK VS . RTK

The two most common methods of GPS correction technology are Real Time Kinematic (RTK) and Post Processing Kinematic (PPK).

RTK (Real Time Kinematic) relies on continuous link between a fixed GNSS base station (above a known point) and a GNSS rover on the UAV. During an RTK mission, the RTK module must stay connected to the base station while it's gathering data in order for the two-way communication to inform positioning.

Due to the long distances and obstructions between the drone and the base station, signals can be disrupted resulting in loss of correction data and a lower percentage of accurate camera positions in the flight.

PPK, on the other hand, processes the positioning information after the flight, not during. Data is logged in the aircraft and combined with data from the base station when the flight is completed. As a result, there is no risk of data or initialisation loss due to radio link disruptions. PPK drones therefore offer more flexibility in terms of how and where the drone is deployed.

Regarding the processing of the captured data, both technologies are similar, however PPK is more thorough as it traces back and forth through the data multiple times to give more comprehensive results.

# Payloads

## UPGRADEABLE & MODULAR

Marlyn's payloads are upgradable and swappable in minutes, no tools required! A variety of RGB and specialty camera modules are available to suit your project needs.



### LIDAR

#### Atmos LiDAR

Effective Point Rate	178,000 pts/s
Precision	2-3 cm [0.8-1.2 in]
Horizontal FoV	105°
Range	150 m [490 ft]

### RGB

#### Sony A7R IV

#### Sony A6100

Sensor Format	Full Frame	APS-C
Spectral bands	RGB	RGB
Pixel count	61 MP	24 MP
Lowest GSD	1.4 cm/px [0.6 in/px]	1.96 cm/px [0.8 in/px]

### MULTISPECTRAL

#### RedEdge-P

#### Altum PT

##### Multispectral EO Bands

#### Altum PT

##### Thermal Band

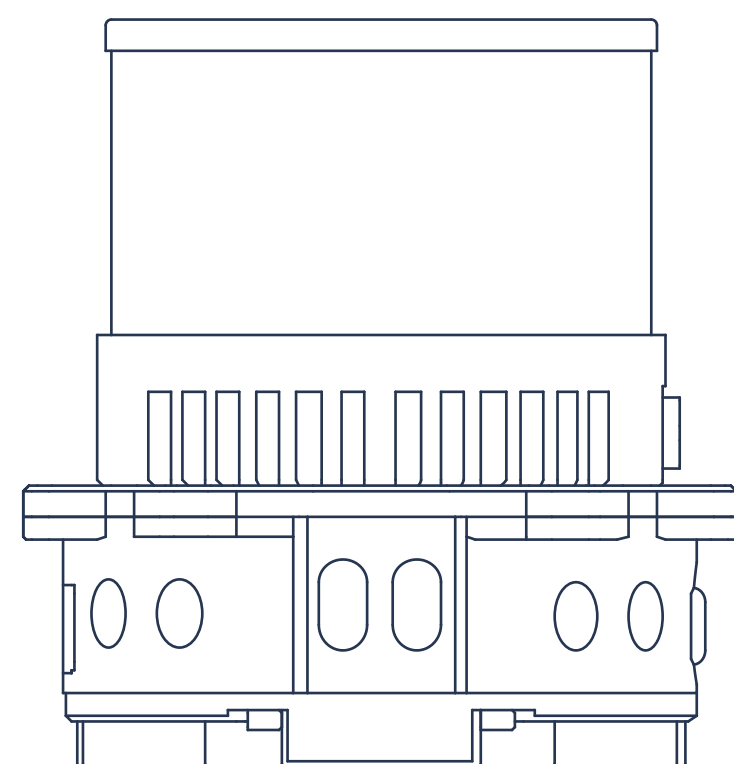
Sensor Layout	5 individual sensors +1 panchromatic sensor	5 individual sensors +1 panchromatic sensor	FLIR LWIR
Spectral bands	RGB, Red Edge, Near-IR	RGB, Red Edge, Near-IR	8-14 μm
Pixel count	Spectral 1.6 MP + Panchromatic 5.1 MP	Spectral 3.2 MP + Panchromatic 12 MP +	160 x 120 Pixels
Lowest GSD	2.6 cm/px [1 in/px]	1.69 cm/px [0.7 in/px]	21.3 cm/px [8.4 in/px]

# Atmos LIDAR

NEW

## REACH YOUR FULL POTENTIAL

Operating in vegetated areas or working on projects where you need a straight-to-point-cloud workflow? Then look no further! The Atmos Lidar is a custom-assembled spinning laser, with the most accurate LiDAR and IMU that is currently equipped on a VTOL drone.



## SPECIFICATIONS

Scanner	Hesai XT32M2X
IMU	Inertial Labs INS-D-OEM
GNSS	NovAtel OEM7720
Effective Point rate	178,000 pts/s
Number of Returns	up to 3 returns
Field of View (Vertical)	43°
Field of View (Horizontal)	105°

Ranging Accuracy	+/- 1cm
Precision	0.5 cm (typical, 1σ)
Point Density at 100m	53 pts/m <sup>2</sup> [4.9 pts/ft <sup>2</sup> ] (Single Return)
Max Altitude	150m [500ft]
Pitch, Roll Accuracy	<0.01°
Yaw Accuracy	0.05°
Wavelength	905nm

## POST PROCESSING

Post processing software included. Processing license supplied for one year, perpetual license optional.

## RESULTS

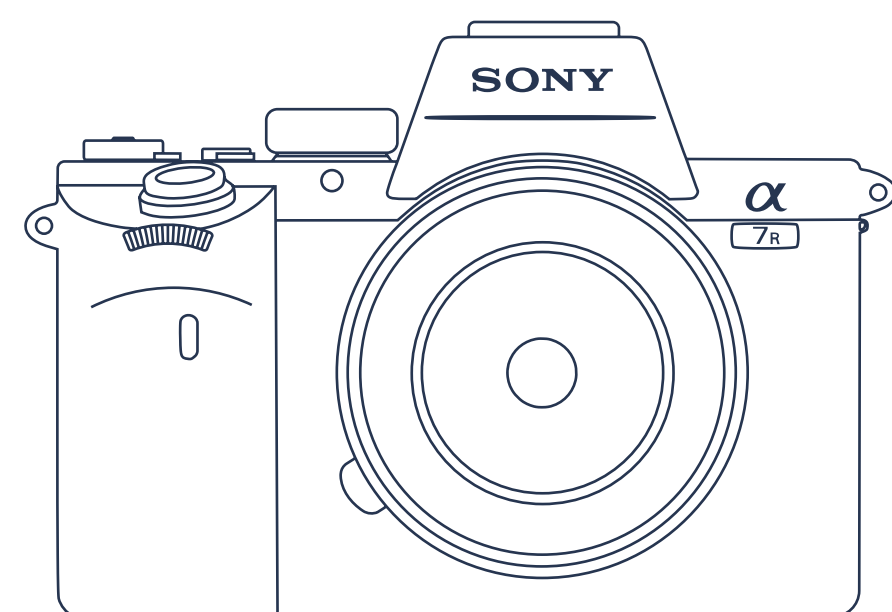
Altitude	Coverage*
60 m [200 ft]	310 ha [760ac]
80 m [260 ft]	400 ha [990 ac]
100 m [330 ft]	490 ha [1200 ac]
120 m [400 ft]	650 ha [1600 ac]
150 m [500 ft]	800 ha [1960 ac]

RESULTS DEPEND ON ENVIRONMENTAL CONDITIONS.  
\*ALL-ROUND MAPPING AT 20% SIDELAP.  
FOR HIGH VEGETATION DENSITY OR HIGHER  
DETAIL, WE RECOMMEND 50% SIDELAP OR A  
CROSS-PATTERN FLIGHT PLAN.

# SONY A7R IV

## CAPTURE THE LARGEST AREAS

Sony's 61 Megapixel Full-Frame sensor meets Zeiss' renowned 21mm lens, offering cm-level imagery and a whopping 350Ha coverage per flight. The A7RIV makes even the biggest areas part of your everyday offering.



## SPECIFICATIONS

<b>Sensor Format</b>	Full Frame	<b>Spectral bands</b>	RGB
<b>Pixel count</b>	61 MP	<b>Sensor size</b>	35.7 x 23.8 mm
<b>Focal length</b>	21 mm	<b>Pixels array</b>	9504 x 6336 px
<b>Shutter type</b>	Focal Plane Shutter	<b>Pixel pitch</b>	3.76 μm
<b>Trigger Frequency</b>	0.8 Hz (at full resolution)	<b>Integration</b>	Powered and controlled by Marlyn
<b>Vertical Accuracy</b>	3 cm [1.2 in]**	<b>Vertical field of view</b>	59° (-10.5°, +48.5°)
<b>Horizontal Accuracy</b>	1 cm [0.4 in]**	<b>Horizontal field of view</b>	81°

## RESULTS

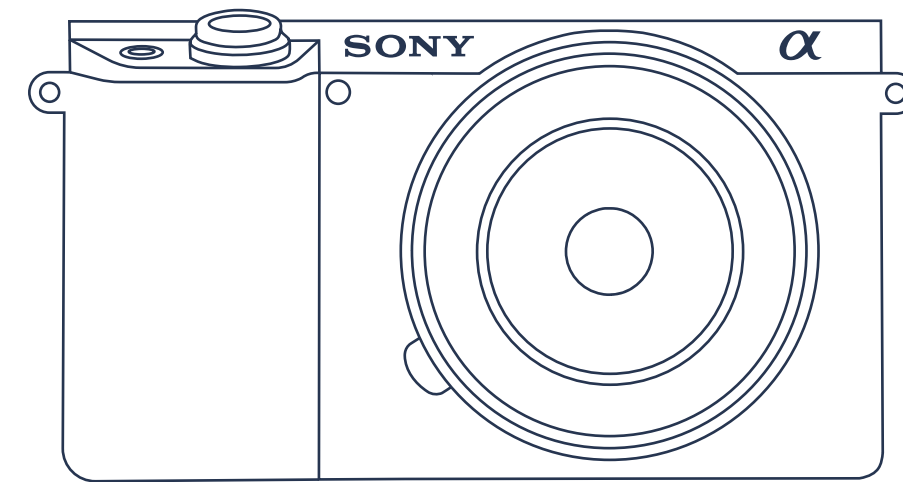
GSD	Altitude	Coverage*	Frontal Overlap* No wind condition
1.4 cm [0.6 in]	80 m [260 ft]	200 ha [500 ac]	76%
1.8 cm [0.7 in]	100 m [330 ft]	250 ha [600 ac]	81%
2.2 cm [0.9 in]	120 m [400 ft]	320 ha [790 ac]	84%
3.6 cm [1.4 in]	200 m [650 ft]	500 ha [1200 ac]	90%
5.4 cm [2.1 in]	300 m [990 ft]	700 ha [1700 ac]	94%

RESULTS DEPEND ON ENVIRONMENTAL CONDITIONS.  
 \*ALL-ROUND MAPPING AT 60% SIDELAP.  
 FOR OBLIQUE, 3D STRUCTURE MAPPING, WE  
 RECOMMEND 80% SIDELAP OR A CROSS-PATTERN.  
 \*\*ACHIEVED ON HARD SURFACES, WITH PPK-  
 ENABLED UNITS IN OPTIMAL CONDITIONS

# SONY A6100

## AFFORDABLE AND ACCURATE

A great camera for an even greater price! The Sony A6100 is a 24 MP sensor which provides GSD results as low as 1.96 cm. Fitted with a Meike 12mm wide-angle lens, it also provides fantastic coverage and is great for capturing oblique features for 3D mapping of urban sites.



## SPECIFICATIONS

<b>Sensor Format</b>	APS-C	<b>Spectral bands</b>	RGB
<b>Pixel count</b>	24 MP	<b>Sensor size</b>	23.5 x 15.6 mm
<b>Focal length</b>	12 mm	<b>Pixels array</b>	4000 x 6000 px
<b>Shutter type</b>	Focal Plane Shutter	<b>Pixel pitch</b>	3.85 μm
<b>Trigger Frequency</b>	1 Hz (at full resolution)	<b>Integration</b>	Powered and controlled by Marlyn
<b>Vertical Accuracy</b>	4 cm [1.6 in]**	<b>Vertical field of view</b>	67.4° (-7.7°, +49.7°)
<b>Horizontal Accuracy</b>	2 cm [0.8 in]**	<b>Horizontal field of view</b>	90°

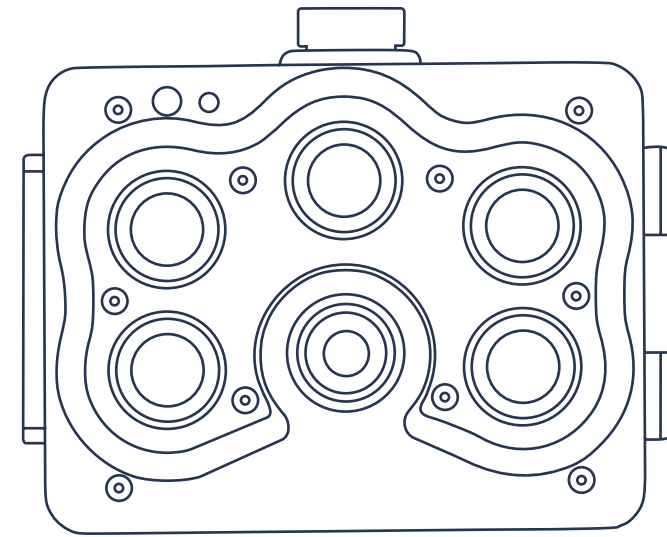
## RESULTS

GSD	Altitude	Coverage*	Frontal Overlap* No wind condition
2.6 cm [1 in]	80 m [260 ft]	250 ha [620 ac]	83%
3.3 cm [1.3 in]	100 m [330 ft]	300 ha [740 ac]	86%
3.9 cm [1.5 in]	120 m [400 ft]	350 ha [870 ac]	89%
6.5 cm [2.6 in]	200 m [650 ft]	650 ha [1600 ac]	93%
9.8 cm [3.9 in]	300 m [990 ft]	850 ha [2100 ac]	95%

RESULTS DEPEND ON ENVIRONMENTAL CONDITIONS.  
 \*ALL-ROUND MAPPING AT 60% SIDELAP.  
 FOR OBLIQUE, 3D STRUCTURE MAPPING, WE  
 RECOMMEND 80% SIDELAP OR A CROSS-PATTERN.  
 \*\*ACHIEVED ON HARD SURFACES, WITH PPK-  
 ENABLED UNITS IN OPTIMAL CONDITIONS

# MicaSense RedEdge-P

The RedEdge-P is the newest industry-standard Multispectral camera, built-to-last with 5 spectral bands and a high-res panchromatic sensor. The RedEdge-P has the ability to generate accurate & repeatable plant health indices and high-accuracy RGB images in one flight.



RESULTS DEPEND UPON ENVIRONMENTAL CONDITIONS.  
 \*SIDE OVERLAP OF 60% IS USED FOR CALCULATING RESULTS  
 \*\* BEST ACHIEVABLE IN NO WIND CONDITION

## RESULTS

### PANCHROMATIC

GSD	Altitude	Coverage*	Frontal Overlap**
2.6 cm [1 in]	80 m [260 ft]	100 ha [250 ac]	83%
3.3 cm [1.3 in]	100 m [330 ft]	120 ha [300 ac]	87%
3.9 cm [1.5 in]	120 m [400 ft]	140 ha [350 ac]	89%
6.6 cm [2.6 in]	200 m [650 ft]	240 ha [600 ac]	93%
9.8 cm [3.9 in]	300 m [990 ft]	360 ha [900 ac]	96%

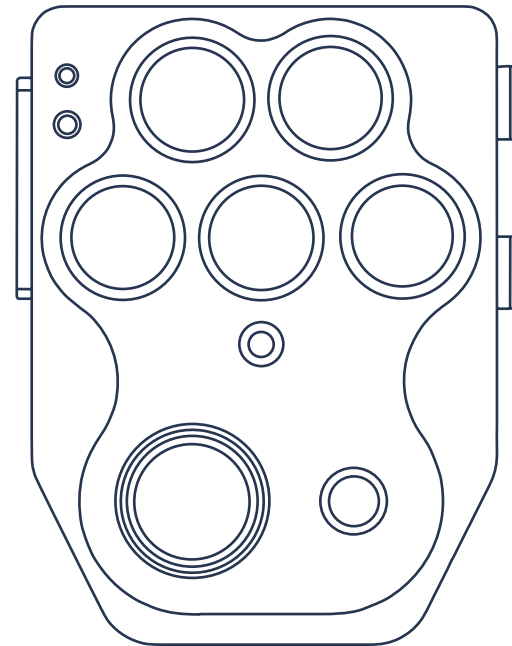
### MULTISPECTRAL

### PANCHROMATIC

	MULTISPECTRAL	PANCHROMATIC
Spectral bands	RGB, Red Edge, Near-IR	171.5 - 1097.5 nm
Pixel count	1.6 MP	5.1 MP
Sensor size	4.73 x 4.2 mm	8.33 x 7.4 mm
Focal length	5.5 mm	10.3 mm
Pixel size	3.45 μm	3.45 μm
Output bit depth	12-bit	12-bit
Field of view	49.6° HFOV x 38.3° VFOV	44.5° HFOV x 37.7° VFOV

# MicaSense Altum PT

The Altum-PT is the most advanced Agricultural sensor system on the market today, capturing synchronized multispectral, thermal, and panchromatic data for plant health indices and RGB outputs at leaf-level resolutions.



RESULTS DEPEND UPON ENVIRONMENTAL CONDITIONS.  
\*SIDE OVERLAP OF 60% IS USED FOR CALCULATING RESULTS  
\*\* BEST ACHIEVABLE IN NO WIND CONDITION

## RESULTS

### PANCHROMATIC

GSD	Altitude	Coverage*	Frontal Overlap**
1.7 cm [0.7 in]	80 m [260 ft]	100 ha [250 ac]	82%
2.1 cm [0.8 in]	100 m [330 ft]	120 ha [300 ac]	86%
2.5 cm [1 in]	120 m [400 ft]	160 ha [400 ac]	88%
4.2 cm [1.7 in]	200 m [650 ft]	260 ha [640 ac]	93%
6.4 cm [2.5 in]	300 m [990 ft]	360 ha [900 ac]	95%

	MULTISPECTRAL	THERMAL	PANCHROMATIC
Spectral bands	RGB, Red Edge, Near-IR	7.5 -13.5 $\mu\text{m}$	171.5 - 1097.5 nm
Pixel count	3.2 MP	320 x 256 Pixels	4112 x 3008 Pixels
Sensor size	7.12 x 5.33 mm	3.84 x 3.07 mm	14.18 x 10.37 mm
Focal Length	8 mm	4.5 mm	16.3 mm
Pixel size	3.45 $\mu\text{m}$	12 $\mu\text{m}$	3.45 $\mu\text{m}$
Output bit depth	12-bit	16-bit	12-bit
Field of view	48° HFOV x 36.8° VFOV	48° HFOV x 39° VFOV	46° HFOV x 35° VFOV





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