ATMOS

Marlyn Cobalt

Specifications

MARLYN COBALT SPECIFICATIONS V2.1 APRIL 2023

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

Take-off & landing area	2 x 2 m [7 x 7 ft] required	
Set-up time	5 minutes	
Automatic Flight	Fully automatic flight execution of preprogrammed mission; Automatic flight with position control by user.	
Take-off & landing	Automatic takeoff, Assisted landing	Weather dependent
Cruise speed	65 km/h [40 mph]	Indicated Airspeed
Wind resistance	Take off: 45 km/h [28 mph] / Cruise: 55 km/h [34 mph] / Landing: 45 km/h [28 mph]	
Max flight time	50 mins	Dependent on environmental conditions
Pre-flight checklist	Yes (integrated in Navigator)	
Temperature range	-10°C to +40°C [14°F to 104°F]	Above 35°C operating restrictions apply
GCPs	Not required with optional PPK module	
Max. operating altitude	5000m [16,000 ft] above mean sea level (high altitude propellers required above 1800m)	
Ingress protection	IP54 — It is not recommended to fly in fog, rain and snow	

SAFETY

Safety Lights	Lights indicate Marlyn's status. When they are off Marlyn is safe to approach	
Return to home	Single tap function returns Marlyn to home	
Low Battery	Automatic return to home (configurable)	Emergency Controls Possible
Lost Link	Automatic return to home (configurable)	
Geofence	Both horizontal and vertical (configurable)	
System Diagnostics	Built-in comprehensive pre-flight and in-flight checks ensure a safe flight	
Avoidance Maneuvres	Pause, abort mission, perform an upward, sideward, or downward maneuvre. Resume if clear	
Manual flight override	Intuitively fly Marlyn to safety in both airplane and helicopter mode	
Emergency Landing	Immediately land Marlyn in helicopter mode in case of approaching aircraft	

SOFTWARE

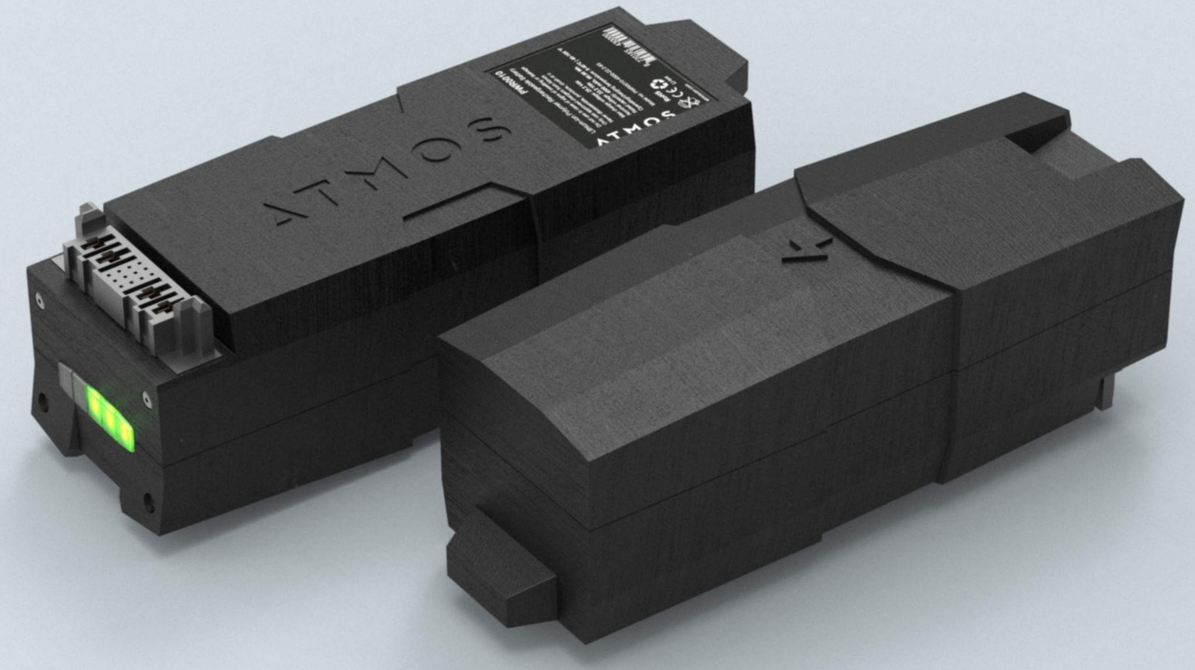
Flight planning + Processing	Navigator, Geotagger (In-house developed)	Included
System Requirements	Windows. CPU: Quad core 1.20GHz (i5-7Y57 Kaby Lake) or equivalent; RAM: 8 GB; Graphics: Intel HD Graphics 615 or equivalent; HDD: 100 MB + space for caching maps.	
Flight Operation	Automatic	Emergency Controls Possible
Input files	.KML, .KMZ, .GeoTIFF, .MBTiles, .WMTS	
Mapping Options	Polygon, Linear Corridor (Time based triggering, position based triggering)	

Marlyn Specifications

HARDWARE

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

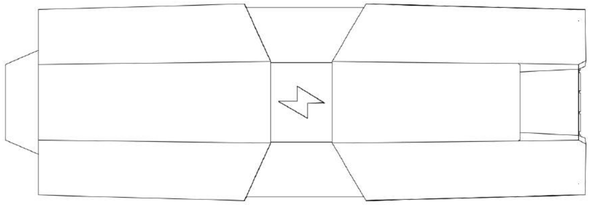
Dual Smart Battery System

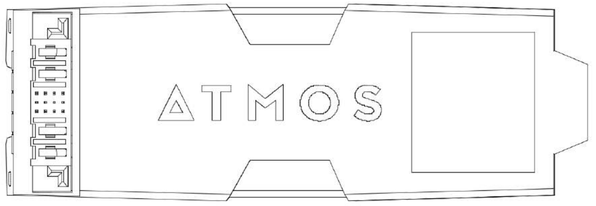


THE BATTERY SYSTEM IS THE MOST COMMON SOURCE OF FAILURE IN SURVEYING DRONES.

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.

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 geotagging 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.

Using GPS correctional technology, the data is improved drastically by achieving ultra-precise geotagging as the aircraft’s satellite positioning is fully augmented with supportive base station/VRS information.

Accuracy

REDUCE TIME AND COSTS WITH A PPK- ENABLED MARLYN

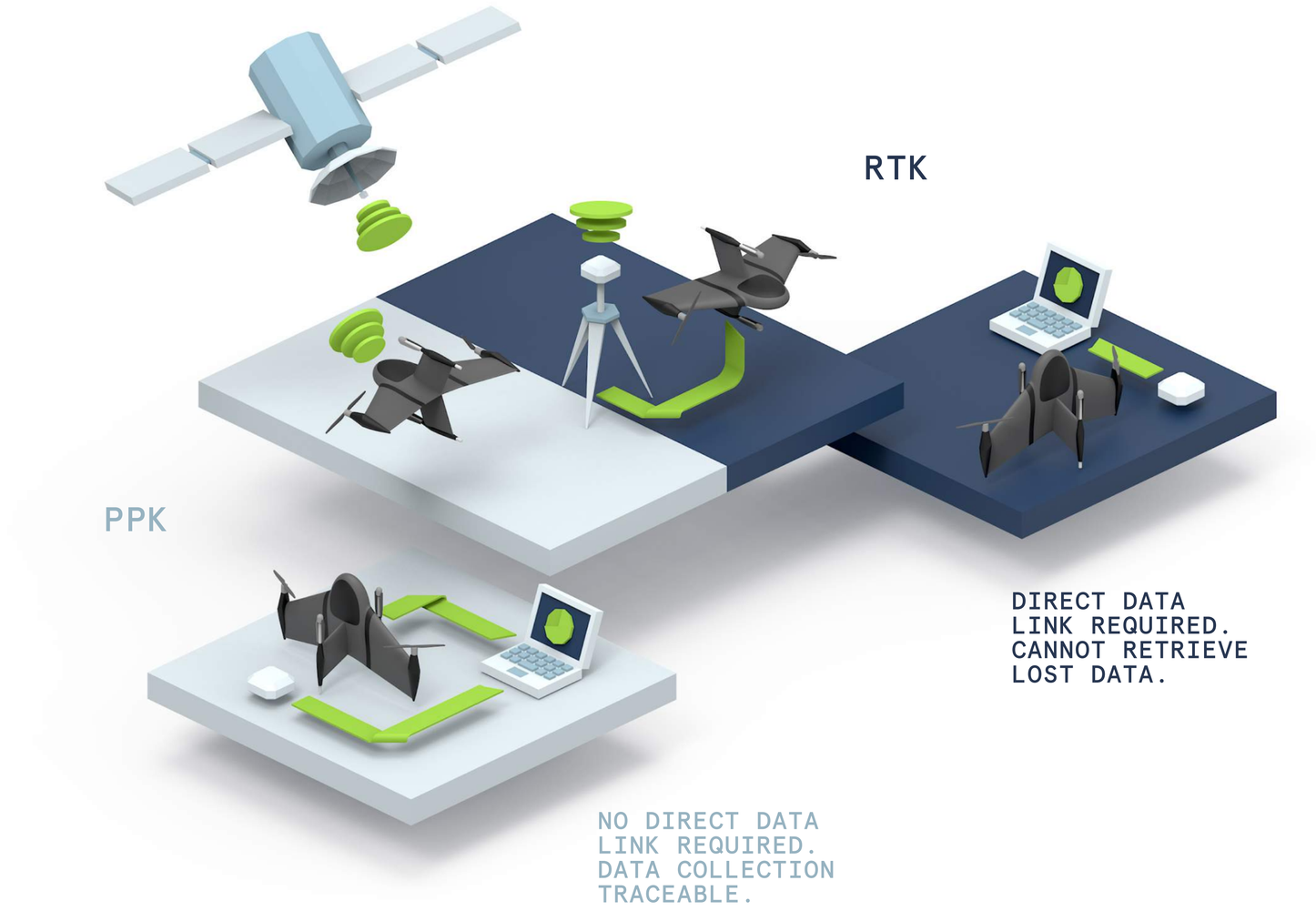
- Multi-constellation, multi-frequency all-in-view satellite tracking.
- Centimeter-level position accuracy with or without a realtime datalink.
- Precise camera shutter synchronisation.

Marlyn + PPK

HOW DOES IT WORK?

A Global Navigation Satellite System (GNSS) is a constellation of satellites providing signals from space that transmit positioning and timing data to the GNSS receiver (PPK module). Each satellite constantly sends its position and the time to the reciever. The receiver then uses this data, correlated from multiple satellites, to precisely determine its location.

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 GNNS 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.

RGB

	Sony A7R IV	Sony A7R III
Sensor Layout	Full Frame	Full Frame
Spectral bands	RGB	RGB
Pixel count	61.0 MP	42.4 MP
Lowest GSD	1.4 cm/px	1 cm/px

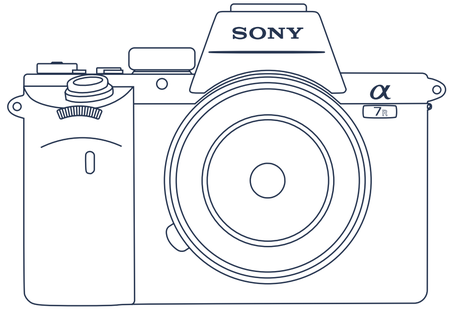
MULTISPECTRAL

	RedEdge-P	Altum PT	
		Multispectral EO Bands	**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 + Panchromatic 5.1	Spectral 3.2 MP + Panchromatic 12MP +	160 x 120 Pixels
Lowest GSD	2.6 cm/px	1.69 cm/px	21.3 cm/px

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 60% more area than the A7RIII per flight. The A7RIV makes even the biggest areas part of your everyday offering.



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

SPECIFICATIONS

Sensor layout	Full Frame
Pixel count	61.0 MP
Focal length	21 mm
Shutter type	Focal Plane Shutter
Trigger Frequency	0.8 Hz (at full resolution)

Spectral bands	RGB
Sensor size	35.7 x 23.8 mm
Pixels array	9504 x 6336 px
Pixel pitch	3.76 µm
Integration	Powered and controlled by Marlyn

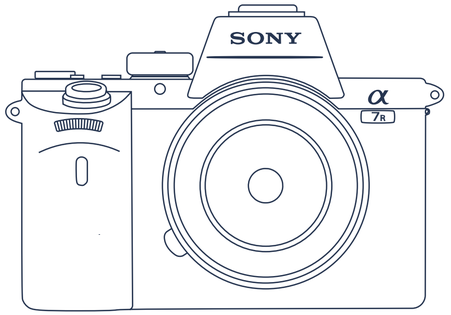
RESULTS

GSD	Altitude	Coverage*	Frontal Overlap**
1.43 cm [0.56 in]	80 m [262 ft]	200 ha [494 ac]	76%
1.79 cm [0.7 in]	100 m [328 ft]	243 ha [600 ac]	81%
2.15 cm [0.85 in]	120 m [393 ft]	292 ha [721 ac]	84%
3.58 cm [1.41 in]	200 m [656 ft]	474 ha [1171 ac]	90%
5.37 cm [2.11 in]	300 m [984 ft]	717 ha [1772 ac]	94%

SONY A7R III

CAPTURE THE SMALLEST DETAIL

The ideal survey camera, with a 42 Megapixel Full-Frame sensor capable of producing crystal-clear images down to 0.85cm GSD. With the A7RIII you're assured of the best data on all your survey applications.



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SPECIFICATIONS

Sensor layout	Full Frame
Pixel count	42.4 MP
Focal length	35 mm
Shutter type	Focal Plane Shutter
Trigger Frequency	1.2 Hz (at full resolution)

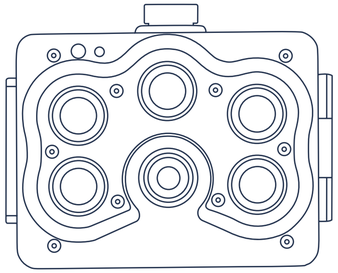
Spectral bands	RGB
Sensor size	35.9 x 24 mm
Pixels array	7952 x 5304 px
Pixel pitch	4.51 µm
Integration	Powered and controlled by Marlyn

RESULTS

GSD	Altitude	Coverage*	Frontal Overlap**
1.03 cm [0.41 in]	80 m [262 ft]	117 ha [289 ac]	74%
1.29 cm [0.51 in]	100 m [328 ft]	152 ha [376 ac]	79%
1.55 cm [0.61 in]	120 m [393 ft]	179 ha [442 ac]	82%
2.58 cm [1.02 in]	200 m [656 ft]	295 ha [729 ac]	89%
3.87 cm [1.52 in]	300 m [984 ft]	437 ha [1080 ac]	93%

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.



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	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

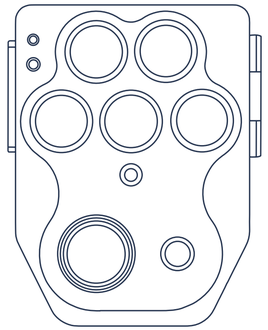
RESULTS

PANCHROMATIC

GSD	Altitude	Coverage*	Frontal Overlap**
2.62 cm [1.03 in]	80 m [262 ft]	95 ha [235 ac]	83%
3.28 cm [1.29 in]	100 m [328 ft]	121 ha [299 ac]	87%
3.94 cm [1.55 in]	120 m [393 ft]	139 ha [343 ac]	89%
6.56 cm [2.58 in]	200 m [656 ft]	241 ha [595 ac]	93%
9.84 cm [3.87 in]	300 m [984 ft]	364 ha [899 ac]	96%

MicaSense Altum PT

TheAltum-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.



	MULTISPECTRAL	THERMAL	PANCHROMATIC
Spectral bands	RGB, Red Edge, Near-IR	7.5 -13.5 µm	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 µm	12 µm	3.45 µm
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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RESULTS

PANCHROMATIC

GSD	Altitude	Coverage*	Frontal Overlap**
1.69 cm [0.67 in]	80 m [262 ft]	100 ha [247 ac]	82%
2.12 cm [0.83 in]	100 m [328 ft]	124 ha [306 ac]	86%
2.54 cm [1 in]	120 m [393 ft]	157 ha [388 ac]	88%
4.23 cm [1.67 in]	200 m [656 ft]	255 ha [630 ac]	93%
6.35 cm [2.5 in]	300 m [984 ft]	364 ha [899 ac]	95%

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