

TRINITY F90+



TRINITY F90+

eVTOL. Fixed-wing. Mapping UAS.

Starting with the first version of the Trinity in 2016, we provided the basis for a highly efficient and at the same time affordable VTOL UAS without compromising on features. The Trinity F90+ leverages this platform and improves many aspects to offer professional users even more functionality at an unbeatable price.

The perfect weight balance keeps the rear rotor, which is solely used for the cruise flight during the mission, in the ideal thrust-to-size ratio in both VTOL and forward flight modes. The Trinity F90+ uses less energy, achieves longer flight times and thereby shows its outstanding value compared to other drones.

Our Trinity F90+, due to its refined aerodynamics, reaches a flight time of 90 minutes. This makes it the system of choice for the broad variety of mapping and surveying applications. Flying large areas (700 ha / 1730 acres) or long distances (100 km / 62 miles) per flight is easy with this efficiently working transition aircraft.

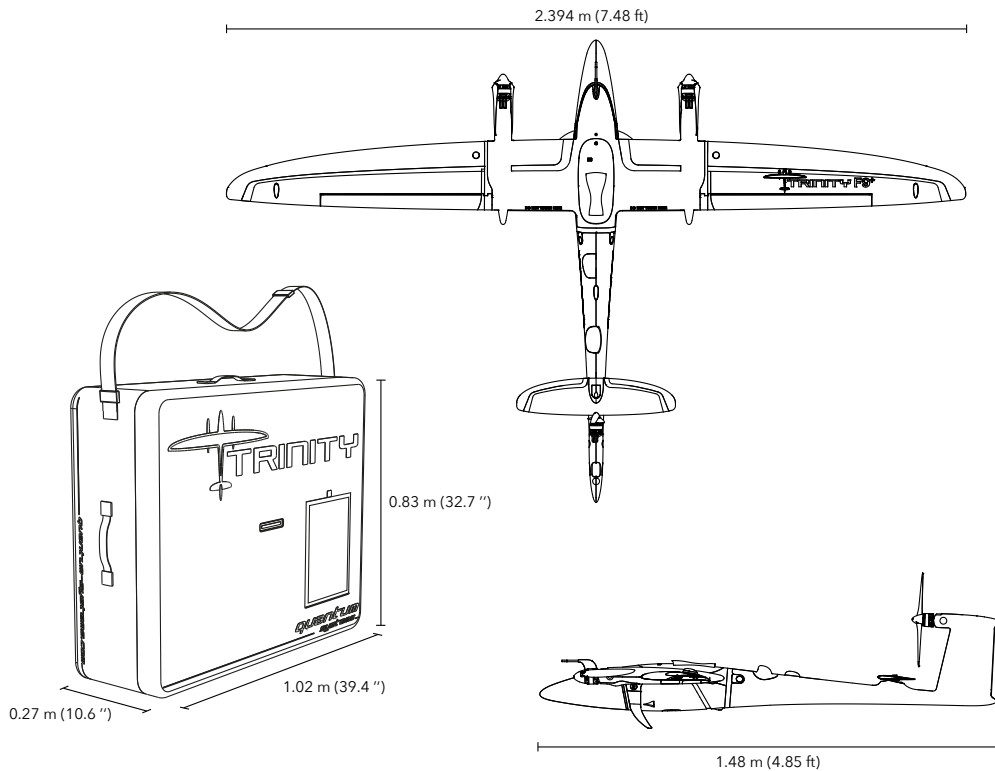
In order to collect aerial data to make better decisions we support our customers' missions by the continuous integration of high precision sensors into our drones. This gives our customers the flexibility to choose the payload that perfectly fits their daily needs.

FEATURES

- 90+ minutes flight time
- High precision sensors
- PPK including Quantum-System iBase ground reference station
- Best-in-class sensors, including dual RGB & Multispectral payload and 42 MP HighRes RGB
- Powerful motors for even more reserves in all situations
- Live Air Traffic (ADS-B IN) incl. QBase 3D Mission Planning
- 2.4 GHz telemetry with up to 7 km command & control and optional ADS-B OUT Mode-S Transponder



TECHNICAL DATA



Trinity F90+

Max. Take-off Weight	5.0 kg (11.0 lbs)	1 Subject to export regulation, may require export permission.
Max. Flight Time	90+ min ¹	2 Please be aware that the flight time and max. wind tolerance are reduced with increasing flight altitude. Depending on the weather conditions; tested at 15° C (59° F). For further details read the user manual chapter 3.1.
Max. Range = Max. Coverage	100 km = 700 ha	3 Under optimal conditions.
Maximum Take-Off Altitude (MSL)	4000 m (13123.4 ft) ²	4 Please follow the local regulations for the maximum allowed transmission power.
Command and Control Range	5 - 7.5 km (3.1 - 4.7 mi) ³	5 For outside temperature < 10°C (<50°F): • Heat up the battery to 25°C (77°F) for at least 5 hours For outside temperature < 0°C (<32°F) the flight time will be reduced to max. 70 minutes.
Payload	max. 700 g (1.54 lbs)	
Optimal Cruise Speed	17 m/s (33 kn)	
Wind Tolerance (ground)	up to 9 m/s (17.5 kn)	
Wind Tolerance (cruise)	12 m/s (23.3 kn)	
Battery Weight	1.5 kg (3.3 lbs)	
Telemetry link & RC Transmitter Frequency	2.4 GHz	
Telemetry link (QBase Modem) Power	max. 1 W ⁴	
Operating Temperature Range	-12°C to 50°C (10.4°F to 122°F) ⁵	
Wingspan	2.394 m (7.85 ft)	
Transport Case Dimension	1002 x 830 x 270 mm (39.4 x 32.7 x 10.6 inch)	



SCENARIOS



Mapping

- Geo-referenced aerial images
- Surface models
- Point cloud
- Distance and volume measure
- Land and infrastructure environment
- Archeological surveys and excavation monitoring



Inspection

- Thermal inspection
- Optical inspection
- Multispectral inspection
- Crop inspection



Agriculture

- Pest infestation detection
- Quantity moisture levels
- Analyze wildlife damage
- Vegetation index creation like NDVI
- Crop counting



Mining

- Site planning
- Contour maps
- Stockpile and slope analysis
- High accuracy without GCPs
- Safe landing despite rough terrain



Monitoring

- Mine or quarry monitoring
- Land cover classification
- Monitoring and documentation of the construction progress
- Monitoring of linear infrastructure



Industrial

- 3D models of sites
- Aerial inspection
- Construction site surveys



SENSORS

Sony UMC 20 mm

Spectral Channels:
RGB
Resolution (@100m AGL):
2.1 cm (20.1 MP)



Sony UMC 16 mm

Spectral Channels:
RGB
Resolution (@100m AGL):
2.6 cm (20.1 MP)



Sony RX1RII.

Spectral Channels: RGB
Resolution (@100m AGL):
1.3 cm (42.0 MP)

Double Payload

Sony UMC + TX Thermal 19 mm







Sensor Format: 640 x 512
Field of View: 32° x 26°
Frame Rate: 8.33Hz
Spectral Band 7.5 - 13.5 μm





LiDAR Qube 240

Spectral Channels:
LiDAR
Resolution (@100m AGL):
50 - 100 points per m²

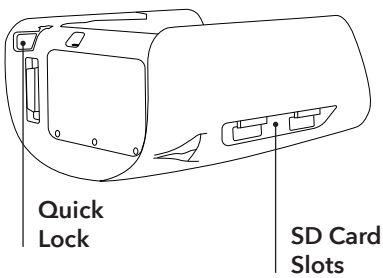
Sensors and their application

Application Scenarios	Sony UMC	Sony RX1RII	Sony UMC + TX Thermal	LiDAR Qube 240	Mica Sense RedEdge-MX	Sony UMC + RedEdge-MX	Mica-Sense RedEdge-MX Dual	Mica-Sense Altum
 Mapping	●	●		●		○		
 Mining	●	●		●				
 Inspection	●	●	●	●	○	●	○	○
 Monitoring	●	●		○		●		●
 Agriculture					●	○	●	●
 Industrial	●	●	●	○				○

○ = optional choice
● = perfect choice

	<p>Double Payload Sony UMC + MicaSense RedEdge-MX Spectral Channels: RGB & RGB NIR RE Resolution (@100m AGL): 2.6 cm (20.1 MP) + 7cm per band</p>		<p>MicaSense Altum Spectral Channels: RGB NIR RE / LWIR: thermal infrared 8 - 14 μm Resolution (@100m AGL): 4.3 cm per band ca. 60 cm thermal</p>
<p>MicaSense RedEdge-MX Spectral Channels: RGB NIR RE Resolution (@100m AGL): 7 cm per band</p>		<p>MicaSense RedEdge-MX Dual Spectral Channels: RGB NIR RE Resolution (@100m AGL): 7 cm per band</p>	

Payload Compartment



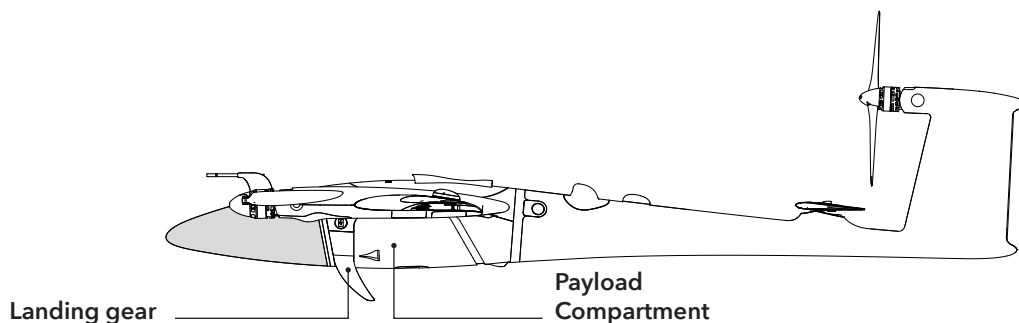
Camera integration done right - easily exchangeable and accessible

Easy payload swapping. Payloads can easily be swapped in seconds by using the Quick Lock mechanism. No tools are required and the sensors are highly integrated to support the pilots' mission planning.

Easy access to your data. Access to the recorded data is uncomplicated via external card slots.

Payload damping. All cameras are damped against in-flight vibrations to guarantee highest image quality.

No belly landings. Rough landings should be avoided at any time. We unconditionally rely on vertical take-off and landing to guarantee smooth landings and therefore a long service life. The landing gear additionally supports the safety of the components by offering additional flex.

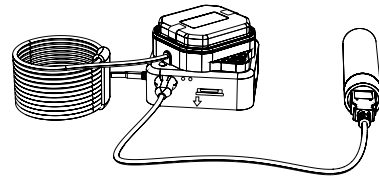


HIGH VALUE DATA OUTPUT

PPK accuracy. Large coverage. High resolution.

PPK capability in every situation. PPK and RTK (post-processing kinematics and real-time kinematics) are the algorithms that allow the user to cancel most of GNSS errors via processing data from two receivers that are close enough to each other. They share the same common errors for most error sources such as ionospheric and tropospheric influence on the signal transmission, satellites ephemeris and clock errors. As it is clear from the names, RTK is performed in real time, PPK - in post-processing. When properly applied, these algorithms reduce positioning errors from several meters (typical for standalone GNSS receivers) down to centimeters.

Geo referencing on the go with the Quantum-Systems iBase included. iBase is an entry level GNSS reference station. It automatically logs GNSS reference measurements on the ground to a file on a micro SD card. This file enables the post processing software to do PPK processing of the data collected in flight. All Quantum-Systems Trinity F90+ systems are equipped with the accessories necessary for doing PPK. This includes iBase, cabling and QBase 3D software for post processing.



Geotagging of flights with various post processing options. Our software QBase 3D supports RINEX files (Receiver Independent Exchange Format e.g. RINEX 2 and RINEX 3) from various sources for the PPK process in planning and post processing.

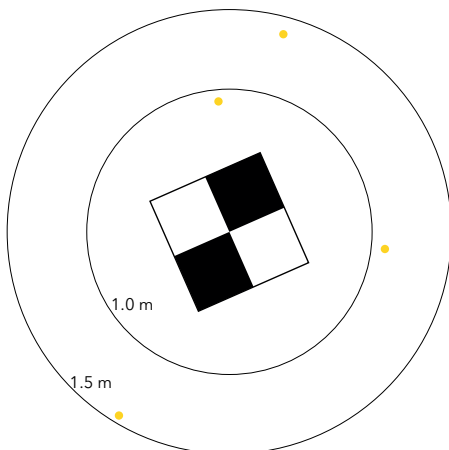
The correction file for the PPK process can either be supplied by the base station iBase or a base station of another manufacturer like Trimble, Topcon or Leica. RINEX data from virtual reference stations of national data providers are also supported.

PPK ACCURACY

PPK enables the geotagging relative precision of down to 2 - 5 cm in respect to the antenna placement point. With the provided iBase it is especially easy. Just power up the station and it does the rest.

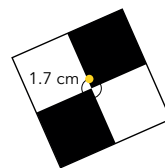
Accuracy without PPK

Trinity F90+
Sony RX1 RII



Accuracy with PPK

Trinity F90+
Sony RX1 RII

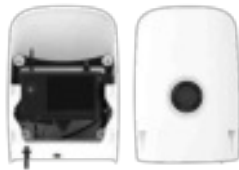


● GCP (survey grade
Ground Check Point)

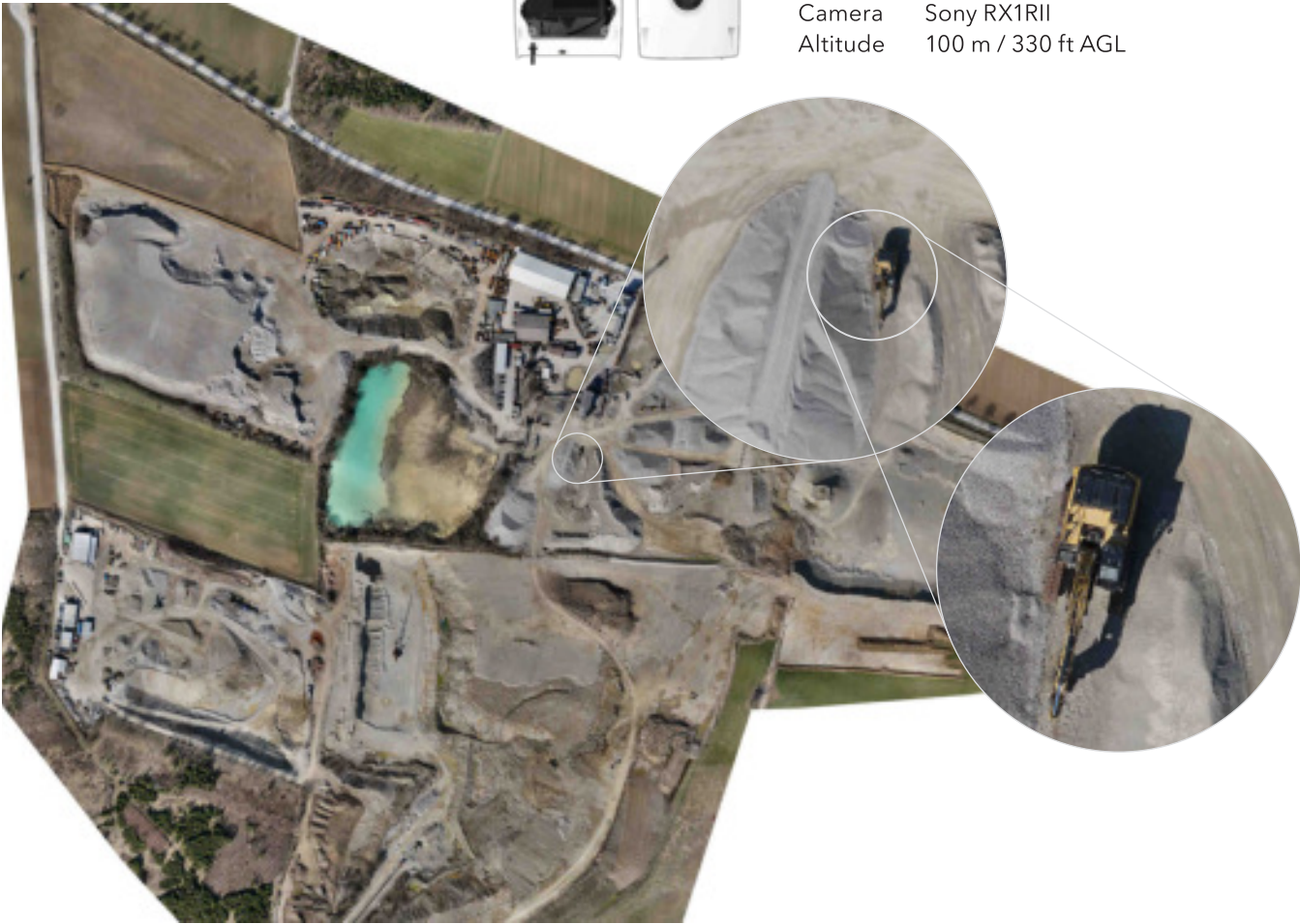
LARGE COVERAGE

More survey data in less time. Whether in the agricultural sector, in the mining business or when inspecting industrial plants and construction progress, more data can be recorded in shorter time than it was previously possible with conventional systems. The Trinity F90+ demonstrates its range advantage in comparison to classic multi copters and other fixed-wing drones due to the longer flight time and covers up to 20x larger areas. The larger the area to be covered, the more attractive the use of the Trinity F90+ gets.

With the Sony RX1R II (42 MP) or Sony UMC-RC10 (20.1 MP), the Trinity F90+ provides ideal payload configurations to efficiently map large landfills, gravel pits, open pit mines or construction sites in high resolution. Together with its high PPK accuracy very precise data sets like orthomosaics, DTMs (digital terrain model), DSMs (digital surface model), stockpile volumes or excavation volumes can be created.



Coverage 81 ha / 200 acres
 GSD 1.29 cm / 0.4 inch/px
 Camera Sony RX1RII
 Altitude 100 m / 330 ft AGL



Sony UMC-R10C

GSD 3.2 cm / 1.26 inch/px
 Coverage 700 ha / 1729 acres
 Camera Sony UMC-R10C
 20 MP RGB
 Altitude 120 m AGL

Sony RX1R II - Large area

GSD 3.2 cm / 1.26 inch/px
 Coverage 1050 ha / 2594.6 acres
 Camera Sony RX1 RII
 42 MP RGB
 Altitude 250 m AGL

Sony RX1R II - High resolution

GSD 1.55 cm / 0.6 inch/px
 Coverage 550 ha / 1359 acres
 Camera Sony RX1 RII
 42 MP RGB
 Altitude 120 m AGL