Technical Brochure

1. General information VALAQ *Mapper*

The VALAQ *Mapper* is the ideal unmanned aerial tool for long-range and autonomy photogrammetry, cartography and general mapping operations. A combination of efficiency, flight time and capabilities.

It is a totally electric, vertical take-off and landing airplane, obtaining up to 50 (40 guaranteed) minutes of continuous flight with the payload on board and with a MTOW of 4.1 kg.

The benefits of this aircraft concept are clear: longer flight times, mechanical and operational simplicity combined with the ease of operation of a multicopter in terms of takeoff and landing.

In addition, a lightweight version of the 36.4Mpx Sony a7R camera captures high-resolution images while the high accuracy Reach M2 UAV Mapping PPK GNSS system is used to georeference the images with astonishing precision and accuracy for high demanding missions.

In order to fulfill missions' scenarios and requirements, control and telemetry are carried through a long range system capable of 20 km of sustained data connection and providing the pilot with all the necessary interface with the drone. It is also possible to receive telemetry, perform flight commands and prepare missions over the internet through an onboard 4G - LTE modem as an extra option, this enables remote monitoring of the flight and redundancy if needed.

1.1. Key features

- Fully autonomous operation.
- Centimetric PPK (Post-Processing Kinematics) EMLID GNSS system.
    - Longer flight times.
    - No take-off and landing infrastructures required.
    - Safe automatic landings with dynamic 3 point always-in-contact retractable landing gear
    - Flight efficiency increased.
    - Mechanical simplicity.
    - Low maintenance.
    - Control and telemetry through long range point to point system and 4G-LTE option.
    - In house design, manufacturing, assembly and test.
    - Full carbon fiber structure.
    - Plug and play battery change.

1.2. Standard Package

- VALAQ *Mapper* VTOL aircraft.
- High precision EMLID Reach M2 UAV GNSS system.
- Pre-installation for Sony a7R camera.
- Two battery packs (2 complete flights).
- H16 Pro Ground Control portable station.
- Four ports battery charger and wires.
- Transport soft case.
- User manual (includes maintenance manual).

Optional:

- EMLID Reach RS+ or EMLID Reach RS2 base for PPK post processing if no GNSS fixed facility is in range (CORS o VRS network).
- Lightweight Sony a7R camera.
- Onboard 4G LTE connection for telemetry, command and mission planning.
- Transport Hard Case.
- Extra aircraft battery pack (2 Li-Ion + 1 Li-Po).
- Unlimited Operation Battery Pack and Charger (4 battery packs and 4 chargers).
- Extra propellers pack.

2. Aircraft specs

2.1. Physical

- Wingspan: 1220 mm
- Height (landed): 720 mm
- Width (landed): 530
- Width (flying): 410 mm
- Package dimensions: 1300 x 850 x 500 mm
- Weight: 4.1 kg

2.2. Performance

- Cruise speed: 65 - 80 km/h
- Maximum speed: 120 km/h
- Maximum wind take-off and landing speed: 30 km/h
- Maximum service ceiling (ASL): 2500 m
- Operational temperature range: -10 to 55 °C
- Maximum flight time in plane mode: 50 minutes.
- Guaranteed flight time in plane mode: 40 minutes.
- Combined maximum flight time for take-off and landing: 3 minutes.

2.3. Aerodynamics and structure

- Full carbon fiber flying wing construction.
- Motor pylons in V inverted quadcopter configuration.
- Elevons aerodynamic control for both multicopter and plane modes.
- 3 point always-in-contact automatic retractable landing gear.
- Automatic retractable camera protection mount.

2.4. Communications

- Point-to-point datalink for live control and telemetry up to 30 km as standard.
- Strobe and navigation lights on wing tips.
- Communications antennas integrated into winglets.
- 4G LTE connection module for live control and telemetry over internet as option.

2.5. Propulsion and electric system

- Brushless motors with combined power of 3000 W.
- 9 inches propellers.
- Flight mode dependent batteries, allowing for maximum use of capacity.
- Two 22.2 V Li-Ion batteries over wings for plane cruise mode.
- One 22.2 V Li-Po battery on the fuselage for take-off and landing.
- Total Li-Ion capacity for plane cruise mode: 284 Wh.
- Total Li-Po capacity for take-off and landing: 46.6 Wh.
- Battery charger with 4 ports as standard.
- Redundant and independent regulated power supply for internal and payload electronics.

2.6. Flight control and sensors

- Hex Technology-ProfiCNC Pixhawk 2.1 The Cube autopilot.
- 3 IMU and dual 32 bit micro controller (main and backup).
- Optional Linux computer for navigation and IoT communication purposes.
- Additional 8 bit microcontroller for auxiliary tasks.
- GNSS navigation system with 4 constellation support (UBLOX M8N), fast and precise navigation.
- EMLID high accuracy PPK GNSS system with integration with the camera shutter for no delay errors from shoot command to real position in the moment of the image capture.
- Temperature compensated airspeed and barometer sensors.
- Current and voltage Hall-effect power sensor for precise battery monitoring.

3. Camera and Georeference system specs

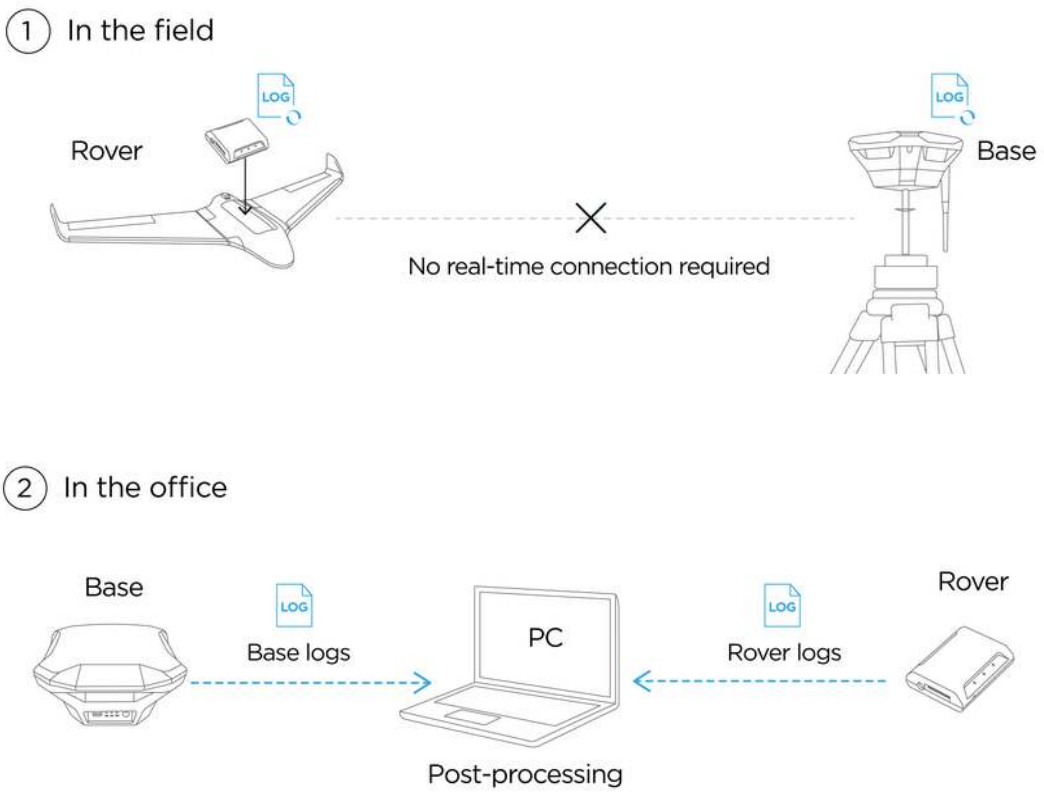
3.1. Camera (Sony a7R)

- Sensor: 35mm full frame Exmor CMOS sensor(35.9x24mm)
- Number of Pixels (effective): 36.4Mpx
- Lens compatibility: E-mount lenses
- Hot Shoe signal: Supported
- Shutter Trigger: High level/low level/PWM
- Shutter Speed: 30-1/8000sec
- Continuous shooting: 4FPS
- Storage Card Type: SD/SDHC/SDXC Card/MS
- Storage: SD Card (maximum support 640G)
- Parameter Setting: Button/US
- Data Reading: SD card/USB
- Interface: HDMI USB2.0
- Power: 7.5-8V
- Size: 97x74x34mm
- Weight: 232g (lens excluded)
- 35mm Lens Weight: 87g
- Image sensor aspect ratio: 3:2
- Image Size (pixels):

3.2. GNSS system EMLID M2

PPK mapping with centimeter accuracy. Use fewer GCPs.

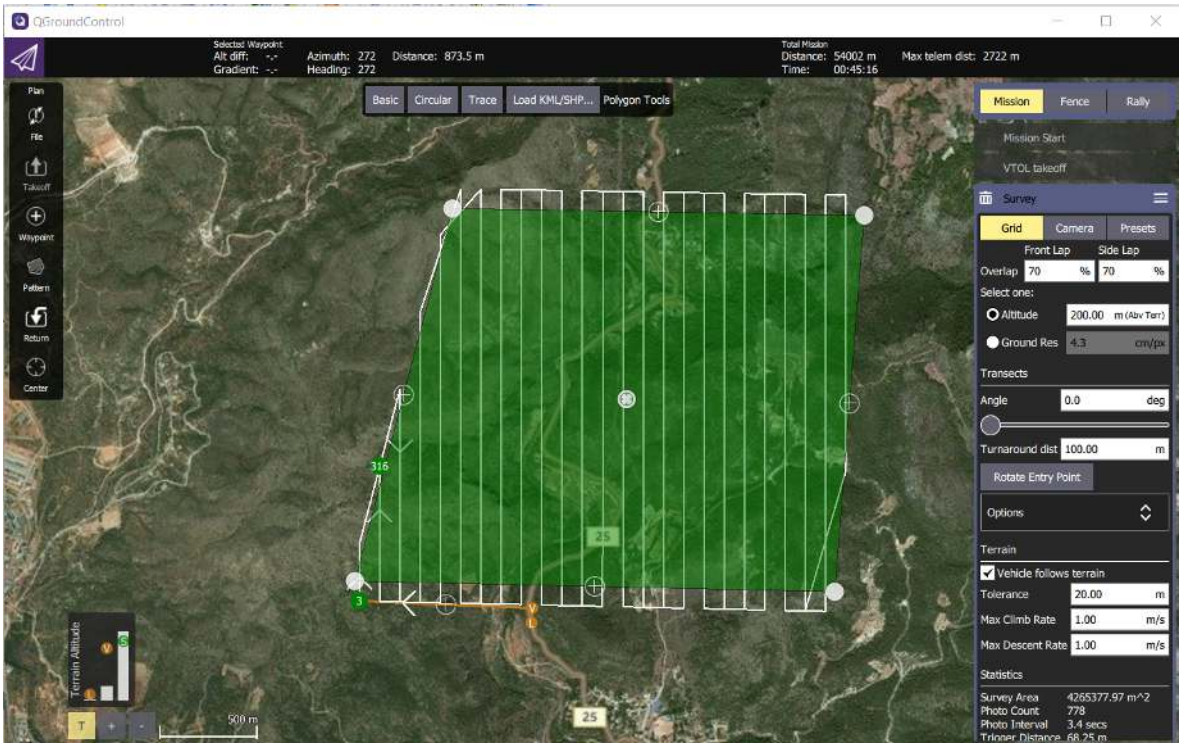
Post-Processed Kinematic (PPK) is an alternative technique to Real-Time Kinematic (RTK). With PPK workflow, accurate positioning doesn't happen in real time, all algorithms are applied afterwards. Both base on the ground and rover (usually on a UAV) record raw GNSS logs, which are then processed to receive an accurate positioning track.



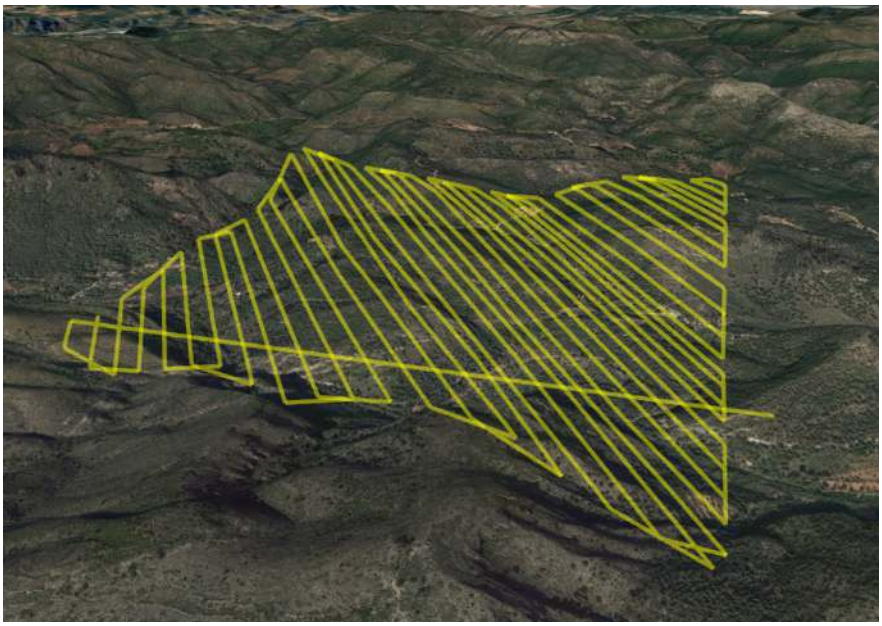
- GNSS
- GPS/QZSS, GLONASS L1, L2; BeiDou B1, B2; Galileo E1, E5
- Static horizontal 4 mm + 0.5 ppm
- Static vertical 8 mm + 1 ppm
- Kinematic horizontal 7 mm + 1 ppm
- Kinematic vertical 14 mm + 1 ppm

3.3. Drone control user interface

Full interface for drone control and mission planning using QgroundControl software.



Prepare ground following missions, to map accurately difficult terrains.



4. Ground control station

4.1. SkyDroid H16 Pro control station

- Touch screen support.
- Up to 5 hours of battery life.
- USB and ethernet connection.
- Android OS.
- Preconfigured with needed software.
- 3 Control Joysticks.
- 4 control switches.
- 6 modes independent buttons.
- Possibility of generating a 5 GHz local wi-fi network sharing video stream.

5. Battery Charger

- Multi chemical battery charger.
- Four independent ports with needed cables for VALAQ Mapper batteries.
- Power supply.

6. Prices

Basic price with **Standard** package: **16.970 €**

Volume discounts:

- from 3 units ordered a 5% discount is applied (16.121 € per unit)
- from 6 units ordered a 8% discount is applied (15.612 € per unit)
- from 10 units ordered a 10% discount is applied (15.273 € per unit)

Optional equipment:

EMLID Reach RS+	800 €
EMLID Reach RS2	2.000 €
Lightweight Sony a7R camera with 35mm lens	2.500 €
Onboard 4G LTE and onboard computer	395 €
Transport Hard Case	990 €
Extra aircraft battery pack (2 Li-Ion + 1 Li-Po)	350 €
Extra propellers pack	50 €
Unlimited Operation Battery Pack and Charger	Contact us

*Prices may be changed without notice.