Technical Brochure

1. General information VALAQ *Patrol*

The VALAQ Patrol is the ideal unmanned aerial tool for long-range and autonomy security, surveillance and emergency operations. A combination of efficiency, flight time and capabilities.

It is a totally electric, vertical take-off and landing airplane, obtaining up to 1 hour minutes at best conditions (50 guaranteed) 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, integrated NextVision's *Colibri 2* gyrostabilized x40 visual and x4 thermal camera captures high-resolution images and records and streams HD video with automatic object tracking capability, adding invaluable data in high demanding missions.

In order to fulfill missions scenarios and requirements, control, telemetry and video stream can be managed independently, allowing sensible video streams being redirected to different ground stations or locations.

1.1.Operational advantages, and main features.

One click fast functions.

- Take-off and wait. If the pilot is waiting to receive orders, but knows that these are imminent, he can decide to make the plane take off and have it waiting in a circle over the take off point to start any immediate route when the order arrives.
- Target follow function (auto tracking). As soon as a target is identified in the image, the pilot with a single click is able to make the drone follow that target in motion automatically, not worrying about the flight control of the plane, since the camera talks directly to the autopilot and it interprets the orientation of the target by automatically following it.
- Go and show me. With just a couple of clicks on the screen pointing your finger on a specific map location, VALAQ Patrol will go there and will show the image from it flying around until next command is executed.
- Follow me function (convoy mode). Function especially aimed at convoys, where the pilot goes inside a land or marine vehicle and the drone always remains in a perimeter or advance observation position with respect to the convoy. The pilot configures a constant follow me flight and takes care and focuses on the observation camera.
- Follow a hidden device. You can use an external device (like a smartphone with our specific configuration) to be hidden in a vehicle to be followed by your VALAQ Patrol, whose camera will point it always at.
- Share aerial view. It may be interesting at one point to share the camera image with a third operation participant who just needs a cell phone or PC (such as centralized command post) with internet access and our own specific app. This is aimed at sharing the live images of the drone with ground forces, something tactically useful in assault, pursuit or perimeter closure operations. All VALAQ Patrol are equipped with 4G/LTE communication and direct link to the pilot's base control station.
- Fully autonomous operation. No RC pilot skills required. All flight is controlled automatically by the drone itself, just command orders and the VALAQ Patrol will do it. If manual control is necessary to take over, flip a switch and you will have all the plane control if needed.
- Longer flight times and high speed cruise. With the VALAQ Patrol you have at least 50 minutes guaranteed of flight time in airplane mode thanks to the increase of efficiency of the design. In addition cruise speed can be increased from the standard 70 km/h up to 120 km/h if the situation demands it, that's something not available in other unmanned systems.
- No take-off and landing infrastructures required. The VTOL capacity of the aircraft removes the need for runways, catapults or even having to hand-launch it. It is possible to perform a take off anywhere with a small safety zone around. In some conditions a take off and landing over the head holding it by hand is possible even if there is not a landing safe area, like in a small boat.

- Robustness. The mechanical simplicity, the full carbon fiber structure and our in-house design, manufacturing, assembly and test, guarantees that the VALAQ Patrol will perform as intended in all proved operation conditions.
- Quick release battery change. Battery change is done in less than 10 seconds, and it can be done without powering off the system so no delays between continuous flights.
- Silent operation. In cruise speed and at a height of 120 meters is aurally imperceptible in airplane mode. In addition, strobe lights can be turned off if needed for complete stealth missions

1.2 Standard Package includes:

- VALAQ *Patrol* VTOL aircraft.
- Integrated Colibri 2 EO-IR gyrostabilized camera.
- Two battery packs (2 complete flights).
- Compact ground control station with 10 km range direct link.
- Four ports battery charger and wires.
- Transport soft case.
- User manual (includes maintenance manual).

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: 4.5 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 endurance in plane mode: 1 hour.
- Guaranteed endurance in plane mode: 50 minutes.
- Combined maximum flight time for take-off and landing without reducing plane mode endurance: 2.2 minutes.

2.3. Aerodynamics and structure

- Full carbon fiber flying wing construction.
- Motor pylons in V inverted quadcopter configuration.
- Elevons aerodynamic control for both muticopter and plane modes.
- 3 point always-in-contact automatic retractable landing gear.
- Automatic retractable camera mount, protects the camera during takeoff and landing in case of accident.

2.4. Communications

- 4G LTE connection module for live control, telemetry and video stream over internet as standard.
- Direct datalink for control, telemetry and video stream up to 10 km as standard and 30 km if selected option.
- Strobe and navigation lights on wing tips (can be deactivated if needed by command).
- Communications antennas integrated into winglets.
- Data privacy is guaranteed. No data is sent to third parties.

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).
- Additional Linux computer for navigation and communication purposes.
- Additional 8 bit microcontroller for auxiliary tasks.
- GNSS system with 4 constellation support (UBLOX M8N), fast and precise location.
- Temperature compensated airspeed and barometer sensors.
- Current and voltage Hall-effect power sensor for precise battery monitoring.

3. Camera specs

3.1. Visible camera

- Visible spectrum range: 400-700 nm.
- Resolution: 1280x720 px.
- Zoom : x20 optical + x2 digital, (total x40) continuous zoom.
- HFOV : 60° WFOV – 3° NFOV – 1.5° DFOV.

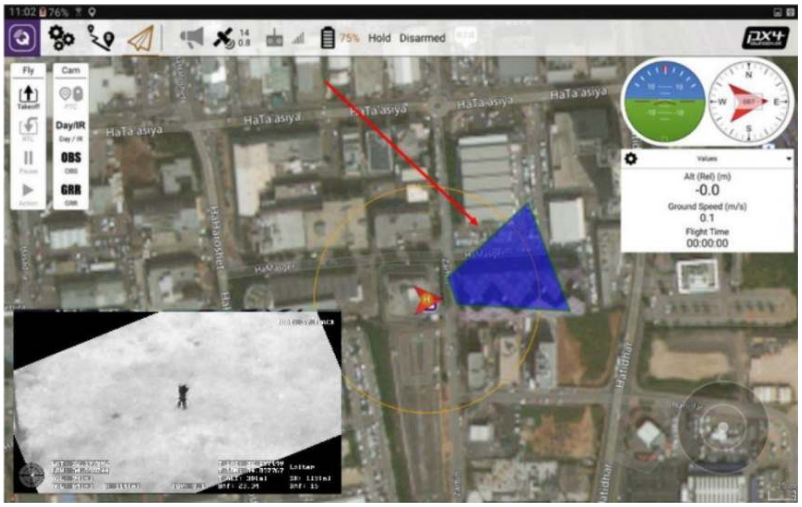
3.2. Thermal Camera

- Uncooled Infrared spectrum range: LWIR 8-12 µm.
- Resolution : 640 x 480 px.
- Zoom : x4 digital.
- HFOV : 32° W.FOV – 8° DFOV.

3.3. Additional data

- Camera mounted in aircraft nose. This increases the field of view of the gimbal, minimizing blind spots.
- Target geo reference, ground crossing location.
- Target tracking.
- Gyro and software stabilization.
- Easy interface commands.

3.4. Camera control user interface



4. Ground control station

4.1. Compact field station

- Touch screen support.
- Up to 5 hours of battery life.
- USB 3.0 hub for ethernet connection and extra USB.
- 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 Patrol batteries.
- Power supply.

6. Prices

Basic price with Standard package: 39.380€. Volume discounts might be applied depending on units ordered. Prices always EXWORKS and taxes and shipping are not included.

7. Extra or interchangeable options

Up to 30 km Datalink: 2.000€

Flight Case: hard transport case with wheels and handles for easy use and transportation. Dimensions: 1300 x 850 x 500 mm: 1.500€

Extra aircraft battery pack (2 Li-Ion + 1 Li-Po): 500€

Unlimited Operation Battery Pack and Charger (4 battery packs and 4 chargers): Consult us.