FLYABILITY

ELIOS

ORIGINAL INSTRUCTIONS

VERSION 1.3.2
18/03/2021

FLYABILITY SA
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EPFL INNOVATION PARK BLDG C | 1015 LAUSANNE | SWITZERLAND

EU DECLARATION OF CONFORMITY

We,

Flyability SA
EPFL INNOVATION PARK BLDG C, 1015 Lausanne, Switzerland
Tel: +41 21 311 55 00

declare under our sole responsibility that the product:

ELIOS

to which this declaration relates is in conformity with the following standards or other normative documents:

Safety	Risk assessment per EN ISO 12100:2010 – Safety of machinery. General principles for design. Risk assessment and risk reduction.
EMC	EN 301 489-1 V1.9.2 EN 301 489-3 V1.6.1 EN 301 489-17 V2.2.1
Radio	EN 300 440-1 V1.6.17 EN 300 440-2 V1.4.1
Health	EN 62471 EN 62311:2008 (RF Exposure)

following the provisions of

- Machinery Directive (MD) 2006/42/EC, and
- Radio Equipment Directive (RED) 2014/53/EU

The Technical Construction File is maintained at:

Flyability SA
Route du Lac 3, 1094 Paudex, Switzerland

The authorized representative located within the Community is:

Dr Adrien Briod
Chief Technology Officer
Lausanne, Switzerland

Date: March 15th, 2017

FCC COMPLIANCE NOTICE

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC RF EXPOSURE INFORMATION

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm during normal operation.

IC RSS WARNING

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC RADIATION EXPOSURE STATEMENT

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This eqipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Ce matériel est conforme aux limites de dose d'exposition aux rayonnements, fic rss-102 énoncée dans un autre environnement.cette eqipment devrait être installé et exploité avec distance minimale de 20 entre le radiateur et votre corps.

DISCLAIMER

Terms with initial capital letters shall have the following meanings:

"Agreement"..... means the conditions of use of this Original Instructions and any other agreement between You and Flyability per which the Product has been delivered to You, including but not limited to Flyability's General Terms and Conditions.

"Flyability"..... means Flyability SA, a company incorporated in the Canton of Vaud in Switzerland under federal number CH-550.1.156.670-6 (IDE CHE-348.376.646) having its registered offices at EPFL Innovation Park BLDG C, 1015 Lausanne, Switzerland

"Product"..... means all goods and services described in this document.

"You"..... means the person or legal entity to which the Product is delivered or who is operating the aircraft

By using the Products, software and systems of Flyability, You fully accept and consent, without reserve, Flyability's warranty and liability terms state**d below and all other terms and conditions agreed between You and Flyability.**

1. Product limited warranty

By using the Product, You hereby signify that you have read, fully understood and agreed this disclaimer and the original instructions, and You agree that the Product:

(i) Can only be operated by Flyability Certified Elios Pilot and, if required by laws, with other drone pilot licences or any other certification necessary to pilot Elios; and

(ii) Presents a risk of physical injuries if wrongly used; and

(iii) Presents a risk of damaging Your and Third-parties' property if wrongly used; and

(iv) May be unfitted to Your needs and purposes; and

(v) Is intended to be used by Flyability Certified Elios Pilot for industrial and professional purposes only; and

(vi) Should not be used under influence of alcohol, drugs or any substances that may impair cognitive abilities; and

(vii) Is subject to local regulations that could prevent its use.

You shall pursue available remedies to You according to the Agreement. The warranty shall exclude defects due to misuse, non-observation of the Original Instructions, moisture or liquids, explosive gas, proximity or exposure to heat at temperatures exceeding the Operating temperature of 50 degrees Celsius, excessive strain, abuse, neglect, misapplication, repairs or modifications made by anyone other than Flyability or certified by Flyability. There are no express or implied warranties, representations or conditions other than those stated in this limited warranty and the Agreement. The remedy set forth herein and in the Agreement shall be the sole, exclusive remedy with respect to the Product.

2. Product liability

IN NO EVENT OR UNDER ANY CIRCUMSTANCE, UNLESS EXPRESSLY STATED IN THE AGREEMENT, SHALL FLYABILITY SA, ITS DIRECTORS, OFFICERS OR EMPLOYEES BE LIABLE TO YOU OR TO ANY THIRD PERSON CLAIMING RIGHTS DERIVED FROM YOUR RIGHTS, IN CONTRACT, TORT OR OTHERWISE, FOR INDIRECT, SPECIAL, INCIDENTAL, EXEMPLARY, PUNITIVE OR CONSEQUENTIAL DAMAGES OF ANY KIND WHATSOEVER EVEN IF ADVISED OF THE POSSIBILITY OF SUCH

DAMAGES INCLUDING, BUT NOT LIMITED TO, ANY DAMAGES CAUSED BY YOU OR A THIRD PARTY WHILE OPERATING OR USING THE PRODUCT, ANY DAMAGES CAUSED BY FAILURE OF THE ELECTRONICS OR SOFTWARE, ANY LOSS OF REVENUE, LOSS OF PROFIT, OR LOSS OF DATA WHETHER BASED UPON ANY ALLEGED BREACH OF WARRANTY, REPRESENTATION OR CONDITION, CONTRACT, OR ANY OTHER CONDUCT INCLUDING NEGLIGENCE (INTENTIONAL OR OTHERWISE), GIVING RISE TO SUCH CLAIM. A Party who relies on a breach of the other Party's obligations under this Agreement, shall take any and all reasonable measures in the circumstances to mitigate the consequences, including loss of profit, resulting from the breach. If it fails to take such measures, the Party in breach may claim a reduction in the damages in the amount by which the consequences should have been mitigated.

YOU SHALL NOT OPERATE THE PRODUCT IN AREAS OR UNDER CIRCUMSTANCES WHERE A FAILURE COULD CAUSE DAMAGES AND/OR HARM TO OBJECTS AND/OR PEOPLE. YOU SHOULD HAVE READ AND UNDERSTOOD THE ORIGINAL INSTRUCTIONS COMPLETELY BEFORE OPERATING THE PRODUCT. ANY DAMAGE AND/OR HARM ARISING FROM NOT ACCURATELY FOLLOWING THE PROCESSES AND GUIDANCE FROM THE ORIGINAL INSTRUCTIONS SHALL BE THE SOLE RESPONSIBILITY OF THE OPERATOR OF THE UAV.

ALL USE OF THE PRODUCTS IS UNDER YOUR SOLE REPONSIBILITY, INCLUDING BUT NOT LIMITED TO, THE COMPLIANCE WITH APPLICABLE LAW AND REGULATIONS OF THE COUNTRY IN WHICH THE PRODUCT IS OPERATED.

3. Data storage and usage

When You use the tablet application or any other software provided by Flyability, data regarding the use and operation of the product, such as flight telemetry data (e.g. battery life, altitude, hardware identification) and operations records may be automatically or manually uploaded to a Flyability designed server.

The provided data does not include personal data (e.g. name, address) but identification data, such as user name, that may become associated with, used to identify to such information we Flyability stores it. By using the product, the tablet application or any other software distributed by Flyability, or by manually providing data to Flyability, you consent to:

(i) Our storage of any telemetry data and other data uploaded or provided to us, including in combination with your user name; and
(ii) Our use of any such data uploaded or provided (including your user name) in connection with providing support and services to You and to improve our products.

Authorizations and regulations

SOME COUNTRIES MAY HAVE LAWS THAT LIMIT OR PROHIBIT THE USE OF UNMANNED AIRCRAFT. YOU ARE SOLE RESPONSIBLE FOR SECURING ALL AUTHORIZATIONS, CERTIFICATIONS AND LICENSES REQUIRED FOR THE USE OF THE PRODUCT. FLYABILITY SA DOES NOT PROVIDE ANY LEGAL ADVICE OR COUNSELING AND UNDER NO EVENT SHALL BE LIABLE FOR ANY INFRIGMENT OF ANY APPLICABLE LAW BY YOU.

Contents

1 Safety

Read carefully and understand these important safety instructions before flying to prevent any risk of accident and serious injuries.

1.1 Operational Safety

During operation and missions please observe the following rules. Make sure people around you have been briefed about safety accordingly.

Warning

Read the original instrucations

Wear eye protection

Wear head protection

Have protective gloves in vicinity

1. Everyone surrounding the operation must wear eye and head protection. They must have protective gloves in the vicinity[1]. They should not wear jewelry, loose clothing or long hair.
2. Apart from the camera operator, the spotter, or the inspector, no one should talk to the pilot. It may reduce his concentration.
3. When the propellers are spinning, the aircraft must not be touched. If not applicable, make sure the aircraft is stable, touch only the aircraft's protective cage with your hands wide open and your fingers straight to prevent any of them from entering the cage.
4. Avoid any presence of people directly below the aircraft.
5. In case of accident, do not try to catch the falling aircraft. Your safety is more important than the aircraft.
6. The area around the pilot, in addition to the takeoff and landing area should all be free from people and obstacles.

[1] A risk assessment should be made to state additional protection (e.g. respiratory protection in dusty environments)

1.2 General Guidelines

1. The pilot MUST have followed the mandatory training provided by Flyability or their certified agents prior to operating the Elios system.
2. The pilot should always act accordingly to his or her best judgment, focusing on the safety of the people and the environment he or she is flying in. The pilot MUST brief every personnel attending or surrounding the flight about safety. While piloting, the pilot should not move as it may cause him to slip, trip or fall causing personal injuries.
3. DO NOT fly over or near people, moving vehicles. Always give way to other aircrafts. Watch out for low flying helicopters
4. Operating the Elios system can be stressing, tiring and prone to muscular fatigue. The controller is equipped with a hook. Use the provided controller strap to relieve your muscles. It will also avoid you to lose, drop, or damage the ground control station.
5. DO NOT use Elios under influence of alcohol, drugs or any substances that may impair cognitive abilities.
6. A risk assessment MUST be performed before every flight
7. The pilot MUST always go through the checklists before, during and after each flight.
8. Elios, like any remotely piloted aircraft system, must be operated per the laws of the country it is used in. It is the sole responsibility of the pilot to be informed of the applicable restrictions. If you are flying in a public environment or around people, make sure to respect the rules of flight in line of sight.
9. Use only provided Flyability parts, genuine Flyability parts, or parts certified by Flyability. Using other devices or parts combination with Elios (e.g. batteries, propellers, etc.) or performing unauthorized modifications may result in system malfunctioning and/or compromise safety.
10. It is strongly recommended to avoid any operation inside the aircraft's cage when the battery is plugged in, except turning off the aircraft (unplugging the battery).
11. DO NOT wear jewelry, loose clothing or long hair when operating Elios or being in its vicinity.
12. Under no circumstances, objects, fingers or any other body parts may enter inside the aircraft's protective cage while it is armed (when the propellers are spinning). It may result in serious injuries for the person and damage the aircraft.
13. DO NOT perform the arming sequence or arm the aircraft (make propellers spin) before and during the removal or insertion of the battery.
14. When the propellers are spinning, the aircraft must not be touched. If not applicable, make sure the aircraft is stable, touch only the aircraft's protective cage with your hands wide open and your fingers straight to prevent any of them from entering the cage.
15. Propellers have sharp edges; protective gloves MUST be worn while changing a propeller.
16. If the aircraft is unresponsive due to malfunction, make the disarming sequence and DO NOT try put your hand or fingers into the cage during 1h after the incident. Wear protective gloves to disconnect the battery.
17. After a strong crash (more than 1m free fall), do not touch the aircraft as it may explode or catch fire. If the aircraft is in an enclosed place, or near to an explosive or flammable environment, you may carefully place it in a properly ventilated area. A risk assessment should be performed prior taking any actions.
18. It is recommended to use only transport cases approved by Flyability.

19. Carefully read the Battery Safety Guidelines and the Quick Start Guide before using the Elios system.

1.3 Environmental Limitations

Always fly within the specified conditions to avoid incidents and damage to ELIOS.

1. Elios is not waterproof. Do not fly under heavy rain/snow or in humid environments. Moisture can seriously damage the electronics of Elios.
2. Store the Elios system in a dry environment between 0°C and 30°C protected from sunlight.
3. Avoid flying in a dusty, or sandy environments as mechanical parts may deteriorate more rapidly. All personnel must wear eye protection and respiratory protection as the propulsion system may blow hazardous dust, vapor or gas towards you. Avoid flying near or over personnel in such environments.
4. Even if the cage protects the aircraft from impacts, smaller objects can penetrate the cage and damage the aircraft. Be sure while flying, that protruding objects and/or any falling objects will not go through the cage as it might break the propellers, damage the aircraft, and create high velocity projectiles. Always asses the risks and wear eye protection accordingly.
5. Flying in low air density environments, such as high altitudes above sea level, might reduce the flight time and stability of the aircraft. Flight can be sustained up to 2500m ISA density altitude.
6. The wind has serious effects on Elios. In wind speeds higher than 3m/s, it should be piloted in **Pro-mode**. In this mode and/or in wind speeds over 3m/s, Flyability cannot guaranty Elios capability to survive a collision without damage. In wind speeds over 5m/s, Flyability cannot guarantee the stability or flying capability of Elios.
7. Very cold temperatures lead to reduced flight times. Do not fly in temperatures below 0°C. If you need to fly in temperatures below 10°C, heat the batteries prior usage by keeping them on your body and observe safe practices as described in the Battery Safety Guidelines.
8. Hot temperatures – above 40°C – will interfere with the battery's performances. The pilot should observe the safe practices regarding the battery described in the Battery Safety Guidelines. In such temperatures, use gloves for changing the battery or wait for at least 10 minutes for the drone to cool down in a zone where the temperature is below 30°C.
9. Flyability cannot guarantee the collision tolerance of the aircraft in ambient temperatures above 40°C.

10. The aircraft should not be left switched on without propellers spinning in temperature above 40°C, the electronics needs to be cooled down by the airflow generated by the propulsion system.

11. Flyability only guarantees the aircraft's flight capability and stability in air temperatures between 0°C to 50°C.

12. It is not recommended to operate the aircraft close to power lines, power transformers or other areas with high electromagnetic disturbances as these may severely affect the sensors, impacting the aircraft's stability and flying capability.

13. The aircraft propulsion system produces noise levels of 85dB at 1m distance. Wearing ear protection is recommended when flying in enclosed areas or when the aircraft is operating close to personnel.

14. If you are flying in a confined or enclosed place, avoid being inside this environment with the aircraft flying. Do not forget this topic in your risk assessment.

15. In a biohazard, radioactive or chemical environment avoid flying close to people and have yourself and surrounding personnel wear eye protection and respiratory protection as the propulsion system may blow contaminated particles to you. Also, wear gloves and appropriate protection while manipulating the aircraft and its equipment until further decontamination. Do not forget this topic in your risk assessment.

16. The Elios system is not intrinsically safe. It should not be used in or near explosive or flammable environments. Obtain a hot work permit and perform continuous gas monitoring when flying in high risk areas. Flight in nitrogen atmosphere is permitted.

1.4 Pilot Guidelines

1. In civil airspace, flight beyond line of sight by using the video feedback from the tablet is only allowed if it is authorized by local laws or if a specific authorization was granted. In most countries, flying indoors is not in the jurisdiction of Civil Air Authorities, so no restrictions exist on BVLOS flight inside confined space.

2. Be careful to remain within the range of the video signal; if you lose the video signal, try to come back closer to the antenna's direct line of sight. The maximum range of the video feedback is about 500m Line of Sight. In non-line of sight, the range depends greatly on the obstacles between the transmitter and the drone. It is good practice to consider a maximum range of 200m if flying in non-line of sight. The control signal's range is greater than that of the video feedback, so loss of signal will affect the video first.

3. Use the red and green navigation lights as well as the front LEDs (if turned on) to help you determine the position and orientation of Elios. It is always easier to be oriented in the same direction as the aircraft.

4. It is the responsibility of the pilot to make sure that all the safety guidelines are respected.
5. The more you push a control stick away from its centre, the faster Elios will follow the command. Give gentle inputs to the control sticks to avoid any sudden, unexpected and uncontrollable behaviour changes.
6. While flying, always keep your fingers on both control sticks to improve the reaction time and feeling for the controls.
7. The altitude of the drone is measured by an on-board pressure sensor. In some cases, the pressure in an environment will not be stable and Elios will not be able to maintain a constant altitude. To have a better control, the pilot can disable the **Automatic Altitude Control** mode to have a direct control on the motors' thrust, called **Manual Thrust Control.** In this case, instead of controlling the height, the up/down stick will regulate the thrust power. **Operating in Manual Thrust Control mode is not covered by the warranty.**
8. The horizontal wind speed is limited to 3m/s (6.7mph) due to the drone's relatively low max airspeed of 6.5m/s (14mph). If Elios needs to fly in higher wind speed conditions the airspeed can be increased to 9m/s (20mph) by using the **PRO** mode. This allows the drone to operate in wind speeds up to 5m/s (11mph). **Operating Elios in PRO mode is not covered by the warranty**.
9. If you fly in a **steel environment** the signal will be very strong as it will reflect on walls and propagate around bends and corners.
10. If you fly in a **concrete environment** you must be more careful as the signal will be absorbed by the walls. The use of a range extender can be beneficial in this situation.
11. Before flying, adjust the lighting and camera settings to the current lighting conditions.
12. High ISO increases the digital noise on the picture. Whereas, long exposure time increases motion blur. Hence, it is always better to have high LED power and try to minimize the ISO and Exposure time.
13. When Elios is rolling on the ceiling, a high pitched noise can be heard. This means Elios overthrusts trying to reach a higher altitude. If this situation occurs, just reduce throttle until the high pitched noise disappears.
14. It is a good practice to always monitor the battery voltage level and the flight time as well as the battery % indication.

2 Checklists

The checklists are a proposed workflow to help operating the Elios system in a safe and efficient manner. They are often updated and the latest versions are available on the my.flyability.com platform.

2.1 Mission Planning Guidelines

This checklist presents the steps that must be followed whilst planning an operation.

1. Has the Method Statement been filled?

   The Method Statement (MS) is a document specifying all the different steps that will be performed during the inspection. It will also specify all the required equipment to fulfil the mission. The "Method Statement – Template" document offer a template to establish your own.

2. Has the Risk Assessment been filled?

   The Risk Assessment (RA) is a document specifying all the risks that can occur during the progress of the mission. It states as well the mitigation that can be made to limit the risk to occur. The "Risk Assessment – Template" document offer a template to establish your own.

3. Is the environment in which the Elios will be operated safe?

   Elios is sensible to its surroundings. The mission environment must comply to the limitation presented in the "Environment Awareness" section presented in the Original Instructions.
   The presence of dangerous elements must have been stated in the RA and MS documents.

4. Is there any biological hazard?

   If the Elios is flying in environment that can present bio-hazard (sewer, pandemic area, etc.), the risk should be listed within the MS or RA and appropriate measures must be taken (gloves, eye protection, mask, etc.).

5. Do you have the adequate Personal Protective Equipment (PPE)?

   Even if Elios is safe to fly close to human, whilst in operation some precaution might be taken. The following PPE must always be worn:
   - Eye protection
   - Head protection
   - Have protective gloves in vicinity.

   You must be aware of the effects of operating Elios in your working environment and dress accordingly:
   - If the environment is dusty, wear respiratory protection.
   - If the environment contains hazardous element, wear the corresponding PPE

   Those statements must have been defined in the MS document.

6. Do you have the proper flight authorization?

   If you perform outdoor flight, depending on the area and on the country in which you will conduct your flight, you will need a specific authorization. Contact the aeronautical agency in place in your country for more information.

7. Use of the aircraft

   Flyability's products are NOT listed as dual-use products. Ensure the system is not used with the intent to harm.

2.2 Cockpit Checklists

The following checklists are integrated into the Cockpit tablet app to verify that all necessary precautions have been taken before and after each flight.

2.2.1 Pre Flight Checklist

SAFETY BRIEFING PERFORMED	All persons involved should be aware of the risks posed by the drone
ENVIRONMENTAL CONDITIONS WITHIN LIMITS.	Check for conditions such as wind speeds, humidity, hazardous materials and temperature
CONTROLLER CHARGED	Battery of the GCS Controller should be fully charged
TABLET CHARGED	Battery of the GCS Tablet should be fully charged
SUFFICIENT FREE SPACE IN TABLET INTERNAL STORAGE	Internal memory of the GCS Tablet should be empty to be able to record new files
AIRCRAFT NOT DAMAGED	Pay attention to carbon parts and pastic battery compartment
PROPELLERS TIGHTENED AND IN CORRECT CONDITION	Propellers are tight on the motors and not damaged
MOTORS SPINNING FREELY	Make the motors rotate to make sure no dust, sand, or particles are inside
CAMERA LENS CLEAN	Clean the camera lens using the lens cleaner. It will ensure a better quality ur footage. Make also sure that the camera lens is free of stains.
BATTERY IN GOOD CONDITION, SECURED AND TIGHTLY PLUGGED	Battery is fully charged, in visually proper condition, plugged in and secured with the strap.

2.2.2 Take Off Checklist

FLIGHT PLAN IS DEFINED	Clearly define the flight path and objectives
CAMERA AND LIGHTS CONTROL WORKING	Check for conditions such as wind speeds, humidity, hazardous materials and temperature
AIRCRAFT HELD	Battery of the GCS Controller should be fully charged
CAGE IS CLEAR FROM OBJECTS / BODY PARTS	Battery of the GCS Tablet should be fully charged
ARM ELIOS	Internal memory of the GCS Tablet should be empty to be able to record new files
RECORD CLAPPERBOARD (OPTIONAL)"	Pay attention to carbon parts and pastic battery compartment

2.2.3 End of Flight Checklist

AIRCRAFT IS ON THE GROUND AND NOT MOVING	Propellers are tight on the motors and not damaged
DISARM AIRCRAFT	Make the motors rotate to make sure no dust, sand, or particles are inside
FLIGHT LOGGED IN FLIGHT LOGBOOK	Write down the flight time along with other notes about the flight
BATTERY REMOVED AND STORED IN BATTERY SAFE BAG	Make sure the propellers are not spinning. Then disconnect the battery and place it in a battery safe bag dedicated to the empty batteries.
CHECK FOOTAGE QUALITY (OPTIONAL)	Use the SD card reader of the tablet to review the HD footage of the previous flight

3 Technical Specifications

3.1 ELIOS System Specifications

Flight mode	
Types	Throttle: Altitude hold / Manual thrust Control: Attitude mode / Speed mode Speed: Slow / Fast / PRO mode
Availability	Switch between modes at any time
Fail safes	Controlled descent on low-battery (override available) Controlled descent on signal loss
Onboard Electronics	
Avionics-board	Autopilot, thermal video and system management
Power-board	Motor control
ELIOS Aircraft	
Type	Quadcopter configuration
Dimensions	Fits in 400 mm sphere
Motors	4 electric brushless DC motors
Propellers	4 propellers, 5 inches diameter
Take-off weight	700 g including battery, payload & protection
Flight time	Up to 10 minutes
Max. climb rate	1.5 m/s (in altitude hold mode) 5 m/s (in manual thrust mode)
Max. airspeed	6.5 m/s (in normal fast mode) 9 m/s (in pro mode)
Wind resistance	Max. 5 m/s (in pro mode)
Max. Flight Altitude	Sustained flight at 2500m density altitude Battery life allows up to 200m climb and descent
Flight sensors	IMU, magnetometer, barometer
Materials	Cage: carbon fiber + Epoxy, Polyolefin coating, TPU and PA12 Connectors Propellers: Polycarbonate Body: Polycarbonate, Magnesium, Aluminium, Steel Cameras: Glass and Germanium Dioxide optics
Operating temperature	10 ºC to 40 ºC (50F to 104F) 0°C to 50°C (32F to 122F) with some restrictions
Ingress Protection	Equivalent to IP53
Radiation Resistance	Tested at 800 Rem/Hour (8 Sv/Hour) during 10 minutes
Remote controller (ground control system)	
Type	Ergonomic joysticks and payload controls, integrated video outputs
Frequency	2.4GHz & 5.8GHz
Weight	810g
Operating temperature	0 ºC to 40 ºC (Tablet display max 35°C)
Output ports	HDMI, SDI, USB
Battery	6000 mAh, 2S
Controls	Payload settings and aircraft control

Options	Optional remote controller (camera operator) with video stream reception on a secondary screen, and dual control of camera settings. Range between the two remote controllers is 50m.
Wireless communication Remote Controller to UAV	
Type	Digital, bidirectional, long range, video and data downlink to remote controller (RC), command and data uplink to UAV
Frequency	2404 – 2480 MHz
Range	Up to 500 m in direct line of sight
EIRP RC to UAV	100mW
EIRP UAV to RC	CE Mode: 18dBm (60mW) EIRP on AirUnit. Limit is 20dBm FCC Mode: 26.6dBm (456mW) RF power on AirUnit. Limit is 30dBm
Wireless communication Remote Controller to Camera Operator Remote Controller	
EIRP RC to RC	4mW
Frequency	5738-5808 MHz 920.6 MHz to 928 MHz (Japan)
System power	
Type	Lithium polymer battery, 3 cells, 2800 mAh, 33.08 Wh
Charging time	1 h
Battery change time	< 1 mn
Integrated payload	
Payload (camera) head	Damped from vibrations
Upwards tilt	+65 degrees
Downwards tilt	-60 degrees
Main camera	
Video	FHD (1920 x 1080) at 30 fps, good low light performance, recorded on board and streamed to pilot and camera operator
Horizontal field of view	130 degrees
Vertical field of view	75 degrees
Total vertical field of view	215 degrees (considering payload up/down rotation)
Control modes	Auto with EV correction, full manual mode
Thermal camera	
Type	Uncooled FLIR camera core
Video	160x120 pixels at 9 fps, recorded on board
Horizontal field of view	56 degrees
Vertical field of view	42 degrees
Thermal sensitivity	<50mK
Range	10°C to 400°C
Wavelength	LWIR, 8 to 14 um
Lighting system	
Type	5 arrays of high-efficiency LEDs for even lighting in front, top, and bottom
Control	From remote controller, adaptive light beam controlled by camera pitch
Power	11.4 W nominal power for front lighting, 28 W total installed max.
Operational safety & Crashworthiness	
Navigation lights	Green (right) and red (left) lights

Protection cage	Carbon fiber cage with soft coating, modular subcomponents for maintenance ease, thermoplastic elastomer suspensions, size of openings: triangles of about 11 cm sides allowing for hand to access inside to swap batteries
Collision tolerance	Uniform all around the drone, up to 3 m/s on sharp objects, up to 4 m/s on flat objects
Decoupling	3-axes gimbal system, carbon fiber composite ring and transverse beam
Accessories	
Transport case	IATA compliant transport case for checked-in luggage, dimensions: 60 cm x 52 cm x 50 cm
Chargers	3A / 35 W lithium polymer battery balance charger, with charging status indicator, RC charger: 17.4 V, 57 W, tablet USB charger: 5 V
Mobile application used during flight (Elios Cockpit)	
Features	Real time video and UAV telemetry, status visualization (remaining battery, payload settings, warnings, etc.), control payload settings and various configurations.
Operating system	Android, optimized for tablet provided with UAV system
Post Flight Video, Thermal and Log Analysis (Flyability Inspector)	
Features	Video and Thermal video viewer (frame by frame), flight log analysis including point of interests recorded during flight, screenshots and flight data export.
Operating systems	Windows 7, 8 and 10 (64bit only)

3.2 ELIOS System transmitted Power

Elios:

Frequency band Tx	2406 – 2476 MHz
Maximum output power	60mW, 18dBm in 2.4GHz band (CE mode) 456mW, 26.6dBm in 2.4GHz band (FCC mode)
Designation of emissions	Digital bidirectional video and data downlink to remote controller, command and data uplink to to UAV
Technology	OFDM, wideband
Modulation type	OFDM
E-Field Strength	7.13V/m (measured at 20cm)

GCS:

Frequency band Tx	2404 – 2480 MHz 5738 – 5808MHz (CamOp, standard version) 920.6 MHz to 928 MHz (CamOp, Japan version)
Maximum output power	40mW, 16dBm in 2.4GHz band (CE and FCC mode) 6.3mW, 8dBm in 5.8GHz band (CE mode) 4.4mW, 6.4dBm in 5.8GHz band (FCC mode)
Designation of emissions	Radio Video Downlink and telemetry and uplink of the from Drone
Technology	OFDM, wide band
Modulation type	OFDM

To comply with both FCC and CE standards concerning transmission power, the ground unit uses a GPS module to determine its geographic location and the power is adjusted accordingly. FCC mode is used in the following regions: USA, Canada, Mexico, Australia, Brazil, Taiwan. In other regions, or if no GPS position can be obtained, the system uses the more conservative CE standard.