



FLYABILITY
ELIOS 2 GOV

USER MANUAL

VERSION 1.2
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1 Before starting

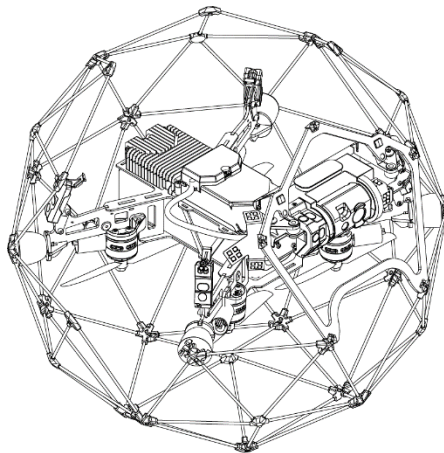
This manual focuses on the features specific to the transmission system used in Elios 2 GOV. It complements the following documents, which the Elios 2 GOV user must also read and understand fully:

ELIOS 2 GOV Original Instructions – certification compliance, safety guidelines and checklists

ELIOS 2 User Manual – Complete user guide

ELIOS 2 Smart Battery Guidelines – safety guidelines

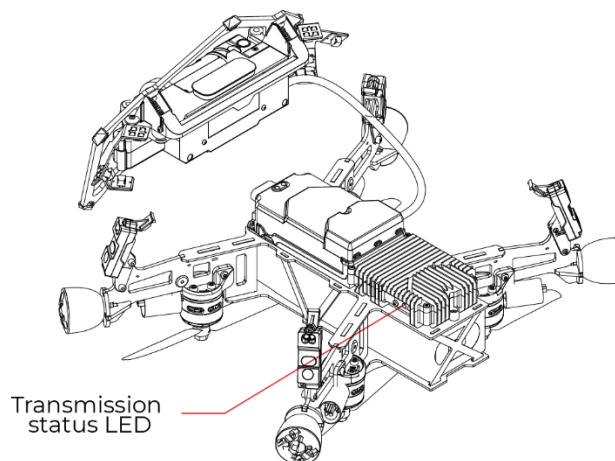
2 Elios 2 GOV



Elios 2 GOV is designed to comply to the restrictions imposed by NDAA section 889(a)(1)(B), EO13981 and the American Security Drone Act of 2021. As such it does not contain critical flight components or communication equipment, manufactured in countries which the USA considers to be adversary nations.

To satisfy these requirements, Elios 2 GOV is equipped with a different radio transmission system, consisting of the ground controller and transmission unit on the drone. All other aspects of the system remain unchanged and are described in detail in the Elios 2 User Manual.

3 ELIOS 2 GOV Transmission system



RIGHT LED

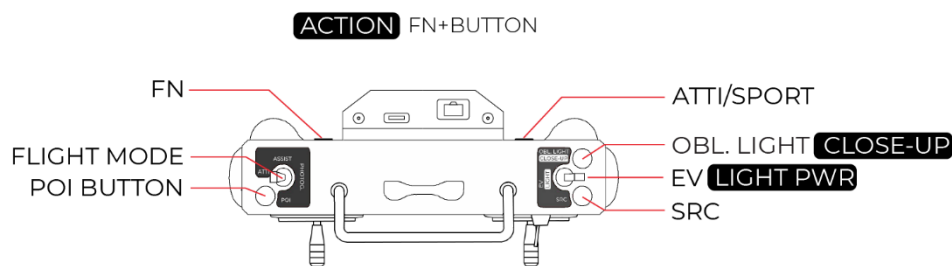
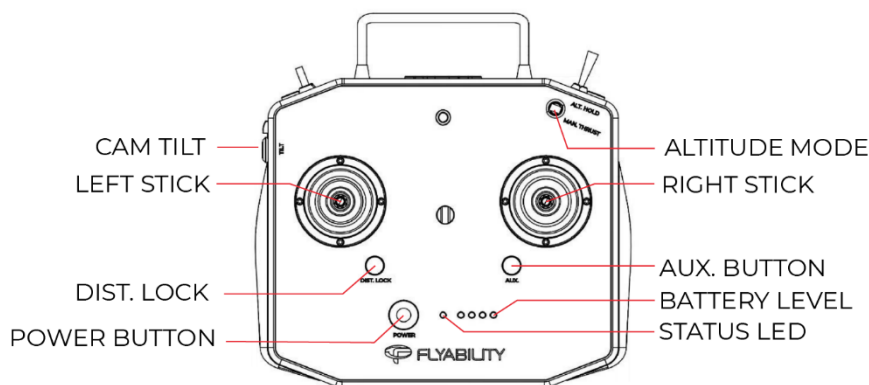
- Solid Green: system operating normally
- Blinks White: Not linked to drone
- Blinks Green: Internal connection error
- Solid Purple: Firmware error

LEFT LED

- Solid Green: System operating normally
- Solid Red: No radio connection between the Ground station and drone
- Blinking Green: Binding mode
- Solid Purple: Firmware error
- Blinking Purple: Overheating error

4 ELIOS 2 GOV Controller

4.1 Control Inputs



The controller is set to Mode 2 by default, consult the Cockpit App manual for information on how to switch to other stick mapping modes.

LEFT STICK

In mode 2 (default) controls the aircraft altitude and yaw.

RIGHT STICK

In mode 2 (default) controls the aircraft horizontal motion (forward/backward, left/right).

The more you push a control stick away from its center, the faster the aircraft will follow the command. Give gentle and measured inputs to avoid any jerky and uncontrollable behavior changes. While flying, always keep your fingers on both control sticks to improve the reaction time and feeling for the controls.

POWER BUTTON

Turns the Controller on/off and displays the battery level of the controller. Tap once to view the battery level, tap again and hold to turn on or off.

STATUS INDICATOR

Indicates the connection status between the controller and Elios:

- Green: Controller is operational
- Blue: Calibration mode
- Violet: Updating
- Red: Error

BATTERY LEVEL INDICATOR

Displays the controller's battery level. Each LED corresponds to a 25% remaining charge.

DISTANCE LOCK

- Short press: activates the distance lock mode. If a distance has been previously set and is within $\pm 500\text{mm}$ from the current front distance, the aircraft will use this value. If not, the aircraft will use the current front distance value.
- Long press: activates the distance lock mode and resets the distance value to the current front distance.
- The set lock distance can be increased or decreased with the “forward/backward” control stick.

ALTITUDE MODE

Down: **MANUAL THRUST CONTROL** mode, gives direct control over the thrust

Up: **ALTITUDE CONTROL** mode, the altitude is automatically maintained.

An onboard pressure sensor measures the altitude of the drone. In some cases, the pressure in an environment will not be stable, and ELIOS 2 will not be able to maintain a constant altitude. To have better control, the pilot can disable the Automatic Altitude Control mode to have 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. Due to the unrestricted climb and descent speeds achievable when operating in Manual Thrust Control mode, any impact damage will not be covered by the warranty.

CAM TILT

Controls the tilt of the camera:

- Rotate up, the camera tilts upwards
- Rotate down, the camera tilts downwards

There is a small detent in the knob to indicate the neutral zero degree tilt camera position.

FN BUTTON

Press and hold this button to use secondary functions of other buttons.

EV | LIGHTING PWR SWITCH

- Default: Increases or decreases the EV of the camera
- While the FN button is pressed, it increases or decreases the onboard lighting intensity

OBLIQUE LIGHT | CLOSE UP LIGHT

- Default: cycle oblique lighting (left, right, or both LED panels)
- While the FN button is pressed, it toggles the close up light

FLIGHT MODE SWITCH

This 3 position switch selects the flight mode of the drone.

POI BUTTON

Press to take a 12MP still image. This will also create a Point Of Interest which can be reviewed after the flight in the Flyability Inspector software.

SRC BUTTON

Switches the video feed between the 4K optical camera and Thermal camera. Both cameras will continue to record continuously, regardless of the feed setting.

ATTI/SPORT

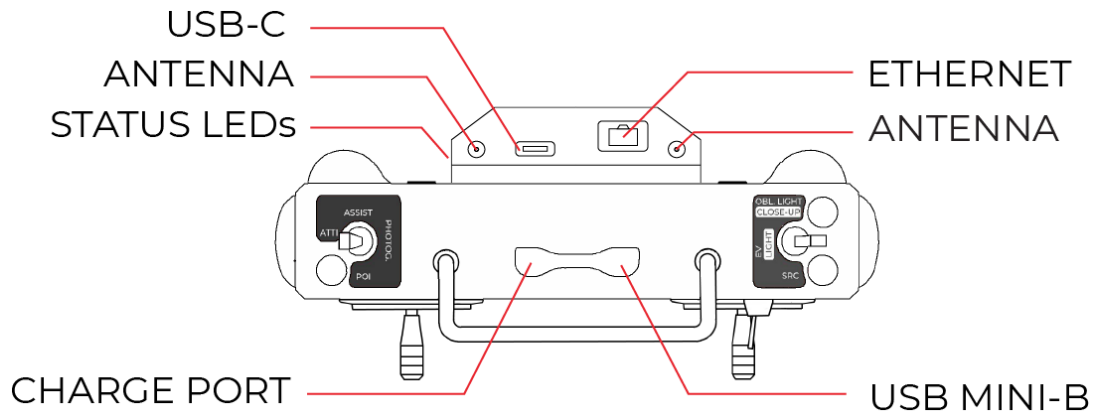
Press and hold to switch to the ATTI flight mode, all optical stabilization sensors will be switched off. In this state, the ELIOS 2 is stabilized only by the accelerometers and gyroscopes.

Press twice and hold to enable SPORT mode, this is identical to ATTI mode, but allows for greater bank and pitch angles, increasing the forward speed of the drone. In this flight mode, the maximum speed exceeds the impact resistance of the cage, any impact damage will not be covered by the warranty.

AUX BUTTON

This button is needed to calibrate the RC. It currently has no other function.

4.2 Connections



USB-C PORT

Use this connector to connect the RC to the tablet

ANTENNA

Connect the antennas here, we recommend attaching the antennas before powering on the unit. Operating the system without the antennas attached will significantly reduce range and might damage the controller.

ETHERNET

Can be used to connect to the tablet via a USB dongle, has the same function as the USB-C connector.

CHARGE PORT

Connect to the controller charger to charge the internal battery of the controller.

USB MINI-B

This USB connection can be used to connect the controller to a PC for potential firmware updates.

RIGHT STATUS LED

- Solid Green: system operating normally
- Blinks White: Not linked to drone
- Blinks Green: Internal connection error
- Solid Purple: Firmware error
- Solid Red: HDMI camera input not detected
- Blinking Red: Analog camera input not detected

LEFT STATUS LED

- Solid Green: System operating normally
- Solid Red: No radio connection between the Ground station and drone
- Blinking Green: Binding mode
- Solid Purple: Firmware error
- Blinking Purple: Overheating error

4.3 Calibration

The calibration process will redefine the centre position and travel range of the input sticks and the camera tilt lever. Controllers are calibrated during production, and recalibration should never be necessary.

To calibrate, press the POWER and AUX buttons simultaneously for 5 seconds to enter the calibration mode. The status LED will turn blue. The three right battery level LEDs each represent one controller input, and will flash if they are off center:

- The right LED represents the right control stick
- The LED second from right represents the left control stick
- The LED third from right represents the camera tilt knob

Move all inputs through their entire range of motion, and leave them centered for 5 seconds. The Leftmost battery level LED will blink for 3 seconds, indicating that the inputs are now calibrated. Turn off the controller to save the new calibration.

4.4 Pairing

Every drone is paired to its own GCS controller, if you wish to pair a drone to another GCS controller then you must first follow this procedure. The pairing procedure will link a specific controller to a specific drone. Once a controller and a drone are paired, they will remain paired with each other until either one is re-paired to another unit.

The pairing procedure:

1. On the GCS, go to the pairing menu tab in the cockpit app and press *start*.
2. On the drone, press the pairing button for about. 7 seconds.

The pairing button is located next to the status LEDs, it is covered by a T6 screw which needs to be removed first. The button must be pressed using the Sim card remover tool provided in the Tool kit (or with a paperclip).

5 ELIOS 2 GOV System specifications

AIRCRAFT

CONFIGURATION	Quadcopter
DIMENSIONS	Fits in a < 400 mm sphere; 15.75 in
MOTORS	4 fast reversing electric brushless motors
MOTOR POWER RATING	120W average power, 750W nominal peak power
PROPELLERS	4 propellers, 5 inches
TAKE-OFF WEIGHT	< 1450 g; < 3,2 lbs.
	Includes battery, payload & protection
MAX FLIGHT TIME	Up to 10 min
MAX ASCENT SPEED	1.3 m/s; 4.3 ft/s
MAX DESCENT SPEED	1.3 m/s; 4,3 ft/s
MAX SPEED	1.3 m/s (Assist mode); 4,3 ft/s 4 m/s (Atti mode); 13 ft/s 6.5 m/s (Sport mode); 21 ft/s
MAX PITCH/ROLL ANGLES	0.15 rad (Attitude mode) 0.2 rad (Assist mode) 0.3 rad (Sport mode)
MAX WIND RESISTANCE	3 m/s (Assist mode); 10 ft/s 5 m/s (Sport mode); 16,4 ft/s
FLIGHT CONTROL SENSORS	IMU, magnetometer, barometer, 7 vision and distance sensors
MATERIALS	Carbon fiber composites, magnesium alloy, aeronautical grade aluminum, high-quality thermoplastics
OPERATING TEMP.	0 °C to 50 °C (32 °F to 122 °F) additional precautions must be taken below 10°C and above 50°C. Stability, flight performance and flight time might be reduced.
FLIGHT MODES	ASSIST - Assist mode ATTI - Attitude mode SPORT - Sport mode
FAIL-SAFE	Auto-landing on signal lost Forced-descent when battery critically low
OPERATING FREQUENCY	2403 – 2481 MHz
EIRP	2.4 GHz: ≤ 32 dBm (FCC); ≤10 dBm/MHz (MIC)
INGRESS PROTECTION	Splash and dust resistant
NOISE LEVEL	99 dB(A) hover 120 dB(A) max @ 1m

SMART BATTERY

RATED CAPACITY	5200 mAh
NOMINAL VOLTAGE	19 V
BATTERY TYPE	LiPo 5S HV Smart Battery: - Improved safety (protection for: overcharge, overcurrent, over/under- temperature) - Plug-and-play charging - Self-balancing - Storage self-discharge - Cycle counter - Battery ID
ENERGY	98.8 Wh
CHARGING TIME	1.5 h
BATTERY CHANGE TIME	< 1 min
COMPLIANCE	Approved for carry-on luggage. Complies with IATA Dangerous Good Regulation.
NET WEIGHT	550 g ; 1.2 lbs
OPERATING TEMPERATURE	0 °C to 50 °C (32 °F to 122 °F) additional precautions must be taken below 10°C and above 50°C. Stability, flight performance and flight time might be reduced.
CHARGING TEMPERATURE	10 - 40°C ; 50°F - 113°F
MAX CHARGING POWER	150 VA AC power
CHARGER	Elios 2 Smart Battery Charger

PAYLOAD CHASSIS

PAYLOAD HEAD	Damped for vibrations
CAMERA POD UPWARD TILT	+90 degrees
CAMERA POD DOWNWARD TILT	-90 degrees
PAYLOAD PROTECTION	Load limiting mechanism to protect the payload in the case of a frontal shock.

MAIN CAMERA

SENSOR	1/2.3" CMOS Effective Pixels: 12.3 M Sensitivity: Optimized for low light performance
PHOTO FORMATS	JPG
VIDEO FORMATS	MOV
VIDEO RECORDING RESOLUTIONS	4k Ultra HD: 3840 x 2160 at 30 fps FHD: 1920 x 1080 at 30 fps
VIDEO STREAMING RESOLUTION	Max 720p 25 FPS
MOVIE FOV	114° horizontal, 130.8° diagonal
PHOTO FOV	118.8° horizontal, 148.6° diagonal
TOTAL VERTICAL FOV	approximately 260° including camera tilt
LENS	2.71 mm focal length Fixed focal
CONTROL MODES	Auto mode with manual EV compensation
FILE STORAGE	MicroSD card (onboard the aircraft) Min Capacity: 64GB Max capacity: 128 GB Recommended model: Sandisk Extreme micro SDXC UHS-I V30
SUPPORTED FILE SYSTEM	exFAT

THERMAL CAMERA

SENSOR	Lepton 3.5 FLIR
VIDEO RECORDING RESOLUTION	160 x 120 at 9 fps
LENS	FOV 56° x 42°, Depth of field 15cm to infinity
SENSITIVITY (NETD)	<50 mK
TEMPERATURE RANGE	-10°C to 140°C (14°F to 284°F)
WAVELENGTH (LWIR)	8-14 μm
FILE STORAGE	MicroSD card (onboard the aircraft) Max capacity: 32 GB Recommended model: Sandisk Extreme micro SDXC UHS-I V30
SUPPORTED FILE SYSTEM	FAT32

LIGHTING SYSTEM

TYPE	High-efficiency LEDs for even lighting in front, top and bottom, optimized for low impact of dust on picture quality. IR light used for stabilization system.
CONTROL MODES	From the remote controller, adaptive light beam controlled by camera pitch Indirect/dustproof lighting Close up lighting Selective/oblique lighting
LIGHT OUTPUT	Max 10k lumens

OPERATION SAFETY AND CRASHWORTHINESS

NAVIGATION LIGHTS	Green (starboard) and red (port) lights.
PROTECTION CAGE	Carbon fiber cage with soft coating, modular subcomponents for maintenance ease, thermoplastic elastomer suspensions, front opening dimensioned for easy battery access.
COLLISION TOLERANCE	Uniform all around the drone, up to 3 m/s on flat objects, up to 1.5 m/s on sharp objects

REMOTE CONTROLLER

OPERATING FREQUENCIES	2403 - 2481 MHz
MAX TRANSMISSION DISTANCE	Up to 500 m in direct line of sight
EIRP	2.4 GHz: ≤ 32 dBm (FCC); ≤10 dBm/MHz (MIC)
WEIGHT	1630g
OPERATING TEMP.	0 °C to 40 °C
OUTPUT PORT	Ethernet, USB
BATTERY	2x 6700mAh 1s
CONTROLS	Aircraft control and payload settings
BATTERY CHARGER	12V / 24W

TABLET

MODEL	Samsung Galaxy Tab Active 2
BATTERY CHARGER	USB Charger 5V
OPERATING TEMP.	-15 °C to 40 °C
CHARGING TEMP.	-15 °C to 40 °C
CHARGING TIME	5 hours
WORKING TIME	4 hours (when receiving video stream) to 76 hours (idle)
WEIGHT	415 g

TRANSPORT CASE

DIMENSIONS	61 x 44 x 53 cm
WEIGHT	11.5 kg
COMPLIANCE	IATA compliant for checked-in luggage.

COCKPIT SOFTWARE

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 the ELIOS 2 system

INSPECTOR SOFTWARE

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 SYSTEM	Windows 7, 8 and 10 (32 and 64 bits)

ELIOS 2 GOV System transmitted Power

ELIOS 2 model 107324

FREQUENCY BAND TX	2403 – 2481 MHz
MAXIMUM OUTPUT POWER	FCC: 500mW, 27dBm in 2.4GHz ISM band MIC: 50mW, 17dBm in 2.4 GHz ISM band
DESIGNATION OF EMISSIONS	Digital unidirectional video and data downlink to remote controller, command and data uplink to UAV
TECHNOLOGY	OFDM, wideband
MODULATION TYPE	OFDM
FCC ID	2ALM7M-MAGICKAYAKD2

GCS GOV model no. 108060

FREQUENCY BAND TX	2403 – 2481 MHz
MAXIMUM OUTPUT POWER	FCC: 500mW, 27dBm in 2.4GHz ISM band MIC: 50mW, 17dBm in 2.4 GHz ISM band
DESIGNATION OF EMISSIONS	Command and data uplink to UAV
TECHNOLOGY	OFDM, wideband
MODULATION TYPE	OFDM
FCC ID	2ALM7M-MAGICKAYAKRC2

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Content subject to change.

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