

TOPODRONE P61

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Attention

TOPODRONE P61 is a photogrammetric camera designed for surveying terrain objects. Processing of the obtained data is performed in any photogrammetric software. Geodetic receiver TOPODRONE UAV PPK UPGRADE Kit, allows you to obtain high-precision coordinates of the photo centers, synchronizing both devices by cable. A record of "raw" measurements in *.UBX format and shutter time stamps is created on the GNSS receiver.

DO NOT store TOPODRONE P61 in direct sunlight, in areas with poor ventilation or near a heat source.

DO NOT turn the device on for short periods of time. Wait at least 30 seconds before turning the device on or off.

Photogrammetric camera TOPODRONE P61 has no protection against moisture and dust, so using the equipment in a humid and dusty environment may cause it to malfunction.

When TOPODRONE P61 is not in use, keep it in a protective case. It is recommended to store the equipment in conditions of relative humidity no higher than 40% and temperature of $20 \pm 5^{\circ}\text{C}$.

DO NOT insert or remove the memory card while the camera is running.

To avoid damaging the lens surface, do not touch it with your hands or other objects.

DO NOT detach the lens while the camera is in operation.

Product parameters

Photogrammetric camera TOPODRONE P61 is equipped with a full-frame CMOS sensor with a global mechanical shutter and the ability to change lenses. This camera can be mounted on a 3-axis suspension or together with one of the TOPODRONE laser scanners.



TOPODRONE P61 on a 3-axis suspension system



TOPODRONE P61 with TOPODRONE laser scanner installation option

Supply package

1. Photogrammetric camera TOPODRONE P61
2. Lens for TOPODRONE P61*
3. 3-axis suspension*
4. GNSS receiver TOPODRONE UAV PPK UPGRADE Kit with MicroSD card 16 GB*
5. Power and shutter connection cable LEMO 4 PIN / LEMO 6 PIN*

6. USB to LEMO 6 PIN cable for connecting the camera to the internet and diagnostics
7. GNSS antenna plate with cable and mounting screws*
8. External GNSS antenna*
9. SD XC-I 64 GB memory card*
10. Protective case for transportation*
11. L-shaped platform with screws for attaching the camera to the laser scanner*
12. Skyport-SHLD adapter*

* - depends on the delivery package.





1. TOPODRONE P61 camera body
2. SD memory card
3. Lens
4. SHLD - for connecting cameras with a 3-axis suspension or connecting to a drone via a Skyport-SHLD adapter
5. LEMO 6 pin connector for camera maintenance and connection to the TOPODRONE laser scanner when used together.
6. Connector for 3-axis stabilizer X-Port
7. LEMO 4 pin - for connection to TOPODRONE UAV PPK Upgrade Kit or TOPODRONE laser scanner.
8. Camera rotation motor
9. Tilt axis motor
10. Roll axis motor
11. Micro HDMI - for connecting camera to monitor
12. USB type-C connector
13. Multi/Micro USB

Supported drone

The TOPODRONE P61 photogrammetric camera can be used on almost any drone.

Full control and transmission of the video stream in real time to the remote control is possible only on DJI Matrice 2** and 3** series drones.

Compatible lenses

TOPODRONE P61 supports lenses with Sony E mount. The camera can be supplied with one of the following lenses: Sony FE 24mm f/2.8 G or Voigtlander Color-Skopar 21mm f/3.5. Specifications are shown in the table below.

Characteristic	Sony FE 24mm f/2.8 G	Sigma AF 24mm F/3.5 DG DN Contemporary	Voigtlander Color-Skopar 21mm f/3.5
Bayonet	Sony E	Sony E	Sony E
Focal length, mm	24	24	21
Angle of view (APS-C), °	84,0	84	91,2
Minimum aperture value	2,8	3,5	3,5
Maximum aperture value	22	22	22
Minimum focusing distance, m	0,24	0,11	0,20
Size (diameter × length), mm	68 × 45	64 x 48.8	62,8 × 39,9
Weight, g	162	230	230

Technical specifications TOPODRONE P61

Camera type	Mirrorless with interchangeable optics
Bayonet	Sony E
Image stabilization	Disconnected
Number of megapixels	61
Matrix size	Full frame (35.7x23.8 ??)
Maximum photo size, pixel	9504 x 6336
Matrix Type	CMOS
Crop factor	1
Shooting modes	Shutter speed priority, aperture priority, Manual, auto ISO
ISO range	100-32000
Shutter speed range, s	30 – 1/8000

Supported memory card formats	Memory cardsSD, SDHC (with support UHS-I/II), SDXC (with support UHS-I/II), microSD, microSDHC, microSDXC
The maximum amount of supported memory, Gb	512
Supported file system type	FAT32
Built-in battery	Absent
The weight of the camera without 3-axis suspension, g	685
Weight of the camera with 3-axis suspension, g	1045
The ability to shoot videos	Absent
Operating temperature range, °C	-20 ... +40
Stabilizer tilt angle range, °	-130 ... +140
Stabilizer rotation angle range, °	±320

Technical specifications TOPODRONE UAV PPK Upgrade Kit

The TOPODRONE AV PPK Upgrade Kit is a small GNSS receiver with the ability to connect an external GNSS antenna and integrate with various payloads.



Supported GNSS systems and frequencies	GPS: L1C/A, L2C; GLONASS: L1OF, L2OF; GALILEO: E1B/C, E5b; BEIDOU: B1I, B2I
Raw measurement recording frequency, Hz	10
Number of GNSS receiver channels	184
Supported memory card formats	microSD, microSDHC, microSDXC
Maximum amount of supported memory, GB	16
Supported file system type	FAT32
Minimum number of satellites for initialization	8

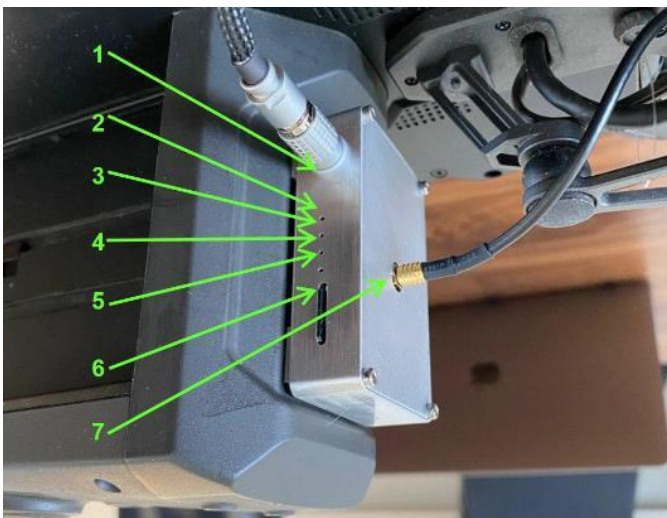
Turning on and initializing TOPODRONE P61 and GNSS receiver

After successful installation of TOPODRONE P61, place the drone on a flat, hard, stable surface. High grass, sandy beaches, metal structures (such as car hoods or ship decks), slush, and puddles are unsuitable for takeoff. There is a high probability of interference with the drone's compass or affecting the initialization of the camera mount.

The takeoff location should be in an open area away from trees, buildings, power lines and other obstacles. Turn on the drone. 5-7 seconds after the power supply, the suspension with the TOPODRONE P61 camera will begin initialization, calibrating, rotating in different directions. Do not obstruct the rotation or move the drone at this moment. Wait for the suspension calibration procedure to finish, it usually takes 10-15 seconds.

Simultaneously with the suspension, the TOPODRONE GNSS receiver initializes and searches for the GPS signal when receiving power. If there is even a small GNSS signal from several satellites, TOPODRONE will start recording kinematics data on the internal Micro-SD memory card. Normal initialization time of the TOPODRONE receiver is 15-60 seconds.

Main elements of the TOPODRONE GNSS receiver



1. Cable connecting the GNSS receiver module and pendant to the TOPODRONE 61 camera.
2. Green colored LED. Indicates that power is being supplied to the GNSS receiver.
3. Orange color LED. Indicates the status of recording to the memory card. During recording, the LED blinks rapidly. Each blink corresponds to the recording of 4 KB of data
4. LED blue. Indicates the signal quality of the GNSS antenna
5. Red LED Indicates that there are errors in the system. If an error occurs, check the memory card. If replacing or formatting the micro-SD card does not solve the problem, contact support.
6. Micro-SD card slot.
7. GNSS antenna coaxial cable.

Each time the receiver is turned on, a new .ubx file is created in the folder named DD-MM-YY (day-month-year) with the format name HH-MM-SS (hours-minutes-seconds).

SIGNAL STATUS	DESCRIPTION
is off	PDOP>10
flashing slowly	3<PDOP<10
flashing fast	2<PDOP<3
continuously on	PDOP<2

Indication of blue LED of TOPODRONE GNSS receiver

The time is recorded in UTC format. The file is created only after the GNSS receiver catches the signal from the satellites. Do not insert or remove a memory card while the receiver is operating. This operation should only be performed with the power off. The maximum allowable memory card capacity is 64 GB. The format is FAT32. The GNSS receiver records a UBX file at 10 Hz and receives GPS and GLONASS signal on L1 and L2 frequencies. After successful initialization, the following LEDs should be lit on the TOPODRONE receiver: green (constant), blue (constant), orange (flashing).

Memory card: recommendations, installation, data uploading

TOPODRONE P61 uses SD XC-II memory cards as the internal storage medium. Due to the high resolution of images and the high frequency of photography, it is recommended to use only SD XC-II format memory cards. A distinctive feature of the SD XC-II format is the presence of the second row of pins. Turn off the power to the drone. Lower the camera in the Pitch axis by 90 degrees. Remove the memory card.



Step 1: Turn off the drone's power, make sure that the suspension does not work.



Step 2: Turn and tilt the camera with the lens facing downward as shown in the photo



Step 3: Press the memory card with your finger until it clicks into place.



Step 4: Remove the memory card by pulling it toward you.

Do not delete all files or format the memory card. To free up space, delete only .JPEG image files in the DCIM folder, otherwise it may cause the device to malfunction.

Requirements and operating conditions

TOPODRONE P61 is designed for use in open areas in weather without precipitation.

Do not operate the TOPODRONE P61 in rain, snow, sleet, hail or fog.

TOPODRONE P61 does not have IP protection, and if this recommendation is violated, moisture may get on the surface of the camera lens and inside the device. This may degrade the data received quality, as well as damage the internal structure of the TOPODRONE P61. If precipitation starts during the flight, we recommend to stop operating, land the drone, and wipe it with paper towels and put it in the transportation case.



Icing of the drone during flight at -18°C
M200 propeller

Icing of the DJI

Operating TOPODRONE P61 in sub-zero temperatures and high humidity (above 80%) can lead to icing of the equipment and drone. This may deteriorate the quality of the acquired data, as well as cause damage to the structure of TOPODRONE P61 in case of falling due to icing of the supporting propellers. It is strongly recommended to warm up the device for 3-5 minutes in a warm room before starting the operation.

Application of TOPODRONE P61 for water surface photography is not effective due to small number of connecting points on water surface at the stage of photogrammetric post-processing.

For correct post-processing of data it is necessary to perform at least 4 parallel flights with side and frontal overlaps of at least 65% relative to each other. Performing the route in one or two flights is not

efficient and will result in large distortions and low accuracy of the final materials. The recommended flight speed is 5 to 15 m/s depending on the height, the size of the frontal overlaps.

In case of insufficient quality or complete absence of GNSS signal, operation of TOPODRONE P61 makes no sense. The minimum number of visible satellites is 8. It is strongly recommended to check the weather conditions and the number of visible (caught) GNSS satellites before the flight, for example, in the UAV Forecast service.

Operation of TOPODRONE P61 requires careful attitude to the main lens of the camera lens. Do not allow sand, dirt, dust, water, metal chips and other fluid, abrasive and chemically active substances to get on any components of TOPODRONE P61.

The manufacturer is not liable for any damage to the equipment if it is used outside the recommended operating conditions.

Frequently Asked Questions

What should I do if my camera does not show up as a payload in the DJI Pilot 2 app?

What should I do if my camera does not show up as a payload in the DJI Pilot 2 app?

Disconnect the camera power by unplugging the X-Port from the Skyport connector, reboot the drone, check if the cable is securely inserted into the SHLD connector, otherwise contact technical support by email support@topodrone.com

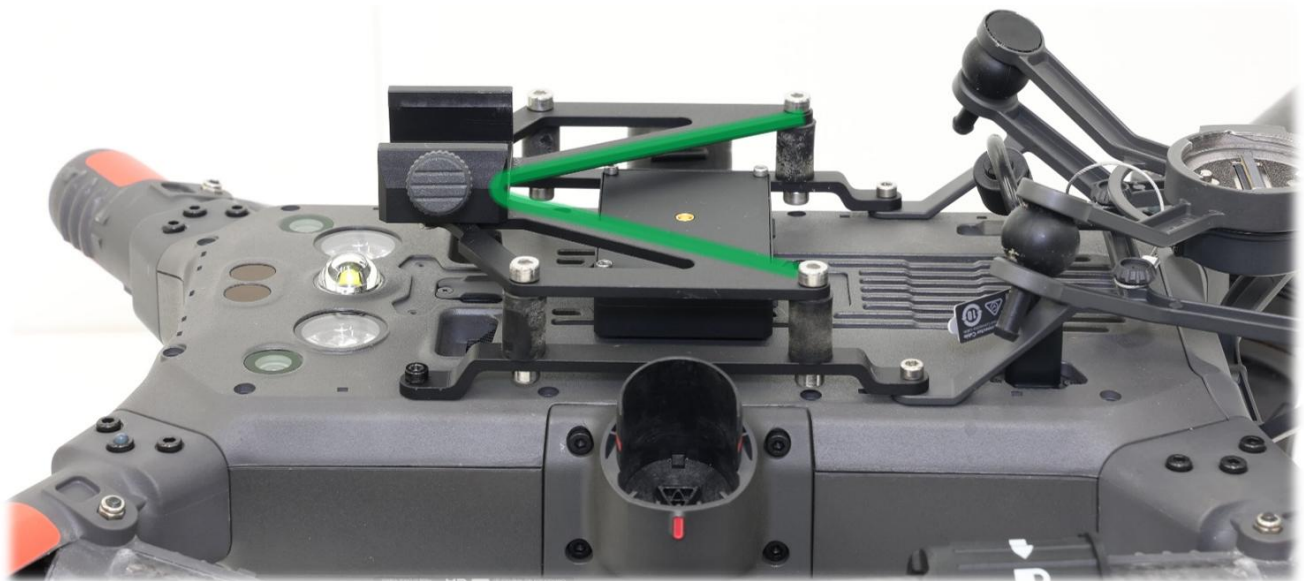
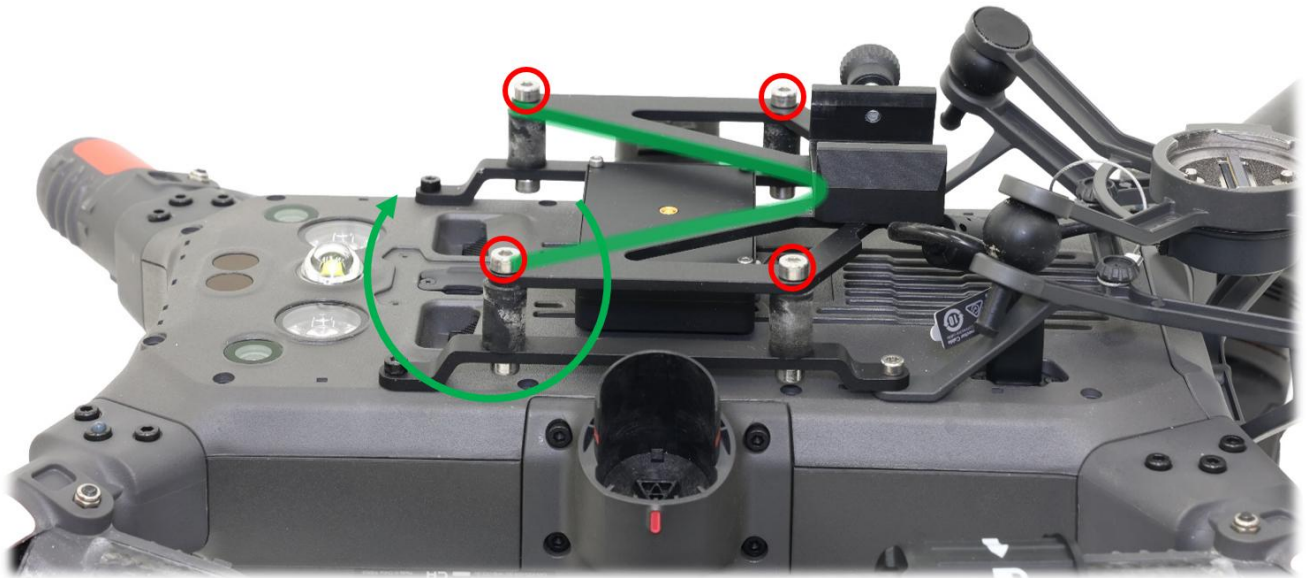
or by phone +7(499)938-79-18

What to do if the delivery set provides for the joint use of TOPODRONE P61 camera and laser scanner, but you need to perform a flight without collecting photogrammetric data and get only a cloud of laser scanning points?

In this case there are 2 options:

1. Remove the TOPODRONE P61 camera from the laser scanner to reduce the payload weight, but do not remove the L-shaped pad. In this case, when processing the high-precision path of the laser scanner, choose the installation option with the TOPODRONE P61 camera.

2. Place the V-shaped plate of the laser scanner mount in such a way that the tip looks in the opposite direction of the drone movement, and the skis are not twisted. The screenshots below show the correct installation of the V-plate.



3. As a result of studying and following all points of this manual, the user is able to perform installation and setup of the TOPODRONE P61 camera.