X5 PPK Phantom 4 Pro

Documentation

Download manual as PDF

The X5 PPK Module for Phantom 4 Pro is a-non intrusive GNSS adapter system to connect to a DJI Phantom 4 Pro v.1/v.2 or Advance Drone (not included). Positioning with centimeter accuracy in PPK. For precise UAV mapping with less GCPs. X5 PPK module is ready to use, and no configuration is needed, you can download the RAW data from the SD card.

Version: 1.0

Main advantages:

- No need to open or modify your Drone (keep your Drone's original warranty)

- The X5 PPK Module attaches and detaches in seconds

- No batteries required

- Ultra-fast image triggering detector sensor

- Lightweight device: 80 grams

Trigger sensor:

A sensor installed externally on the P4P drone detects the triggering of each photograph and records a time stamp in the log file. Timestamps and position events can be extracted from the module after flight and combined for geotagging using various specialized software options available on the market.

> If you have any questions that are beyond the scope of this documentation, Please feel free to contact our Mettatec X5 Support contact.

Included components

- GNSS X5 Module unit with Micro-USB cable for power up (plug and play)

- Multi-band Aerial Antenna HeliX5 for UAV

- Antenna mount, connection cable, and high resistance 3M synthetic velcro

- Photo Trigger Sensor attached to the module support

- 32 GB MicroSD memory card for recording GNSS data

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Technical specifications

Mechanical	• Dimensions: 52 × 37 × 13 mm • Weight: 80 g • Operation temperature: –40 to 85 °C
Electrical	• Input voltage: 4.75 – 5.5 V • Antenna DC bias: 3.3 V • Peak current consumption: 5V @ 500 mA • Average current consumption: 5V @ 250 mA • Current limit on USB OTG: 1000 mA
Positioning	• 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
Connectivity	• Wi-Fi 2.4 GHz 802.11b/g/n
Data	• Position output NMEA, RXM (for RINEX) • Data logging UBX file with events with update rate up to 20 Hz • External storage up to 64 GB
GNSS	• Concurrent reception of GPS, GLONASS, Galileo, and BeiDou • Receives both L1C/A and L2C bands • Signal tracked GPS/QZSS L1 C/A, L2 GLONASS L1OF, L2 BeiDou B1l, B2l Galileo E1-B/C, E5b • Number of channels 184 • Update rates 10 Hz GNSS • Time to First Fix: 25s (cold), 2s (hot) • Max Altitude: 50 km (31 miles) • Max Velocity: 500 m/s (1118 mph)

Ports and LEDs descriptions

- **MicroSD card slot**

    - Plug-in the SD card. Maximum capacity is 64 GB.

- **LOG LED (RED) SD indicator:**

    - Blinking: SD card is not found

    - Solid: Recording in SD card

- **NET LED (BLUE) Wi-Fi indicator:**

    - Blinking: Wi-Fi waiting for connection

    - Solid: Connected to Wi-Fi server

- **PPS LED (YELLOW) PPS indicator:**

    - Blinking: Fix GNSS position and time

- **Antenna connector**

    - MCX female connector for external GNSS antenna

- **USB-C type connector**

    - USB connection for debug, powering, and firmware updating.

    - The Metta X5 device can be powered by the micro USB cable or USB-C connector, but not both at the same time.

Utilization

Operation modes

- **Normal operation mode**

    - Wi-Fi connection is available:

        - SSID: X5 PPK XXXX, where XXXX is the MAC address

        - Password: 123456789

    - For RINEX post-processing, choose PPK mode

    - If data logging was paused, it is resumed in this mode (RED LED is on again).

- **Configuration mode**

○ You can access to the configuration by using the FindX5 App or using a web browser with the address http://192.168.4.1

○ During this mode, the data logging to the SD card is paused (LOG LED is off). In order to resume data logging, click 'exit' button in Web UI

Use and configuration

PPK Flight Operation Requirements:

For integration is required:

- One GNSS X5 PPK Module for Phantom 4 Pro

- Multi-band GNSS UAV Antenna HeliX5

- One Drone: DJI Phantom 4 Pro v1/v2 or Phantom 4 Advance (Not included)

- One RINEX compatible GPS Base Receiver (Not included)

Installation on the Drone:

1. Insert a MicroSD memory card into the X5 PPK Module

2. Plug the Micro-USB cable into the USB slot of the M2P for power.

3. Carefully insert the Trigger Sensor under the motor of the Drone's left front arm

4. Install the GNSS Antenna HeliX5 on top of the X5 PPK Module by screwing it to the short connector of the cable provided (unscrew the supplied fixing nut and save it, in case there is one)

5. Attach the X5 PPK Module into the drone's top side with the velcro included. Once placed, validate that the propellers of the Drone do not touch the support.

6. Connect the antenna cable to the X5 GNSS module. Be careful not to block the view of the Drone's anti-collision system

Drone Configuration:

Make sure that the front lights on the drone arms turn off when a camera shot is taken in photo mode. If this function is not activated, do the following:

1. Turn on the Drone Mavic 2 Pro and its remote control.

2. Enter the DJI GO 4 App and activate the front red lights of the Drone arms: Settings / MC Settings / Advanced Settings / Turn on Aircraft Arm LEDs.

Topographic Survey Flights

Before Flight:

1. Program your flight mission following the instructions of the flight control application you use: DJI GSP, Pix4D, DroneDeploy, MapsMadeEasy or others.

2. The provided MicroSD memory card (Max. 64 GB capacity) MUST BE INSERTED in the GNSS X5 PPK Module.

3. Turn ON the module by connecting the Micro-USB cable to the Drone.

4. Turn on your Phantom 4 Pro v.1/v.2 or Advance Drone.

5. Wait for the red LED of the GNSS X5 PPK Module light to be ON. It takes around 30 seconds to automatically start recording the data log file.

6. Once these verifications and recommendations have been made, you can now proceed to fly the Drone and capture the flight mission photos.

After Flight:

1. By the end of each flight, the GNSS X5 PPK Module will already have recorded one UBX file, so it is ready to be powered OFF without the need of stopping the recording.

2. All data logs (UBX files) are automatically saved in the MicroSD memory card.

3. The data logs can be downloaded by extracting the MicroSD memory card or via Wi-Fi in the configuration mode.

As a result of the flight session and in order to perform a correct processing in PPK, you must obtain the following data set:

- Photos captured by the Phantom 4 Pro v.1/v.2 or Advance

- RAW LOGS UBX of the X5 GNSS module of each flight performed

- RAW LOGS (UBX or RINEX) from a ground-based GNSS receiver

- List of Ground Control Point coordinates

- With this information, you will be ready to process the data through different photogrammetric software options.

Downloading data

The web configuration page allows you to see some information of the module like the satellites in view, position, and Firmware version.
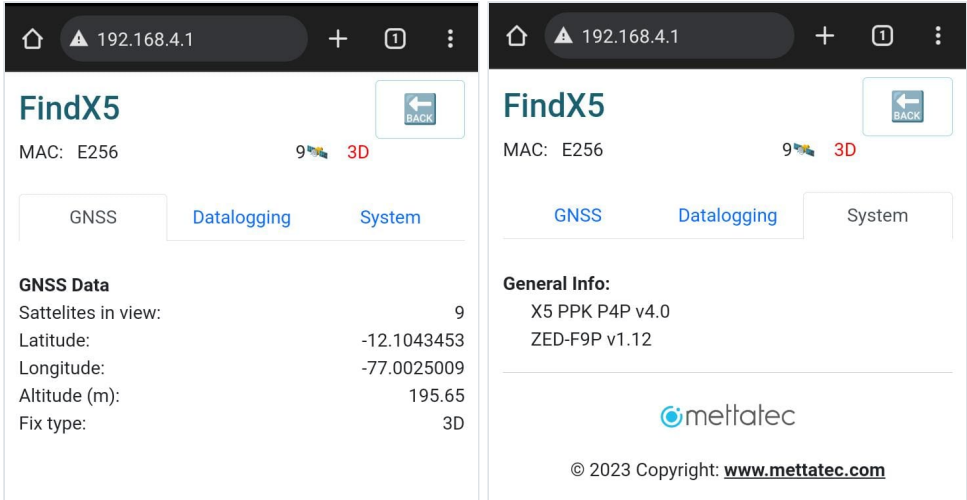
On the other hand, in the "Datalogging" section, you can find the generated UBX files and download them if needed. To exit the configuration mode and resume data logging, press the "Exit" button at the top of the page.
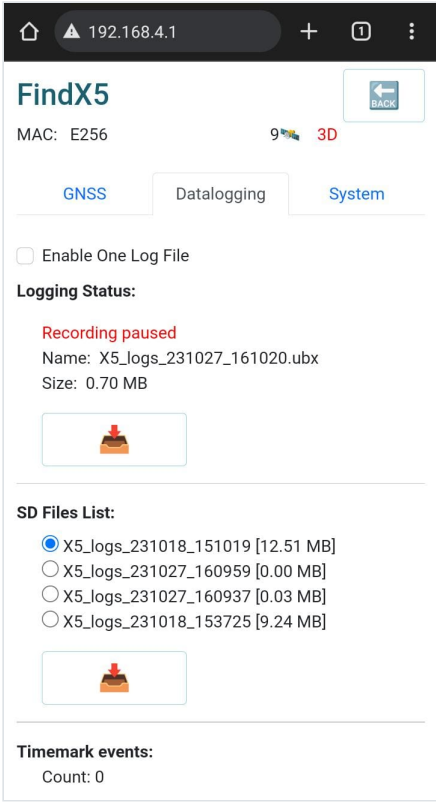
Post-processing

The final PPK (Post Processing Kinematic) mapping workflow can be performed using the following software options. Each of them has its own steps to follow at the user choice. This is a list of post-processing programs according to their degree of difficulty and knowledge requirement in topography:

- Toposetter 2.0 Pro (Trial Version / Paid Version)

- REDtoolbox (Trial Version / Paid Version)

- RTKLIB (Free Version)

- Emlid Studio (Free Version)

Once the information is processed, you can import the image set into any mapping software, such as Agisoft Metashape, DroneDeploy, Pix4D and others of your choice.

The UAV PPK App for event interpolation

The best online App for UAV PPK Event Interpolation. Corrects the millisecond difference between the DJI drone's camera trigger, the Drone's indicator LEDs and the event capture in the GNSS X5 PPK Module for maximum accuracy, so ground control points are no longer needed.

Two post processed files need to be input to the App: the RINEX post-processing file (.POS) and the event file (.POS). And the precalculated delay time in seconds for DJI Drone LEDs: 0.3. The resulting geotagged file can be downloaded in CSV and TXT format, ready to input into any popular photogrammetry software:

- Exports a photo geotagging file

- Exports a file with the flight path of the drone

Being an online service, you can use the App anywhere without the need for software installations or licence activation. Developed by our technological partner SolucionesGeográficas (Geographic Solutions). Link: https://campussolucionesgeograficas.com/uav-ppk/
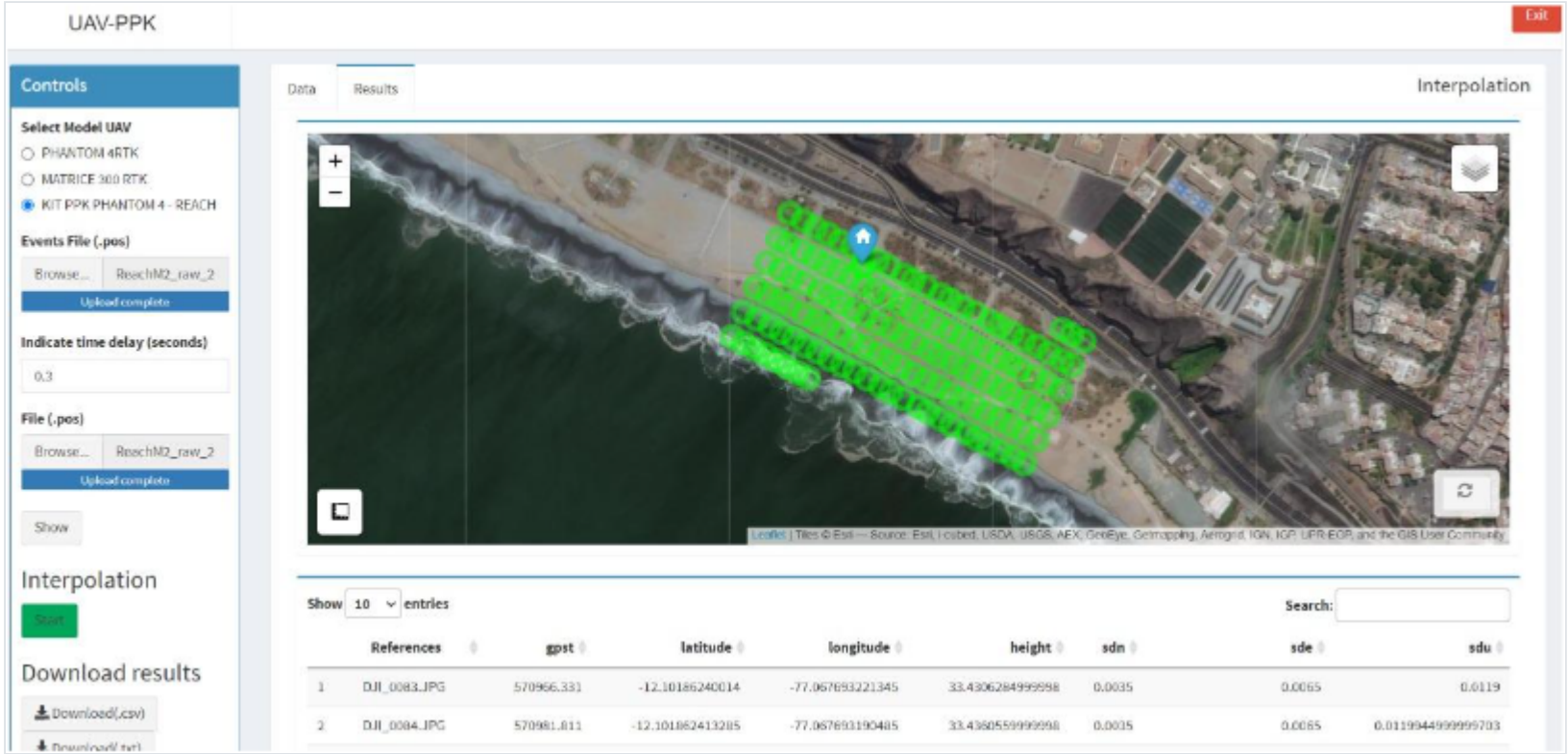

SD card formatting

This step is not strictly necessary, but this will permit avoiding future problems caused by the SD card. This process will erase all the content on your card, make sure you have safely saved all your important data on another device.

> **NOTE:** The following steps work in the Windows OS

1. Open "This PC"

2. Select the drive of your SD card (right click)

3. Select "Format"

4. Select the following configuration for the File system and Allocation unit size:
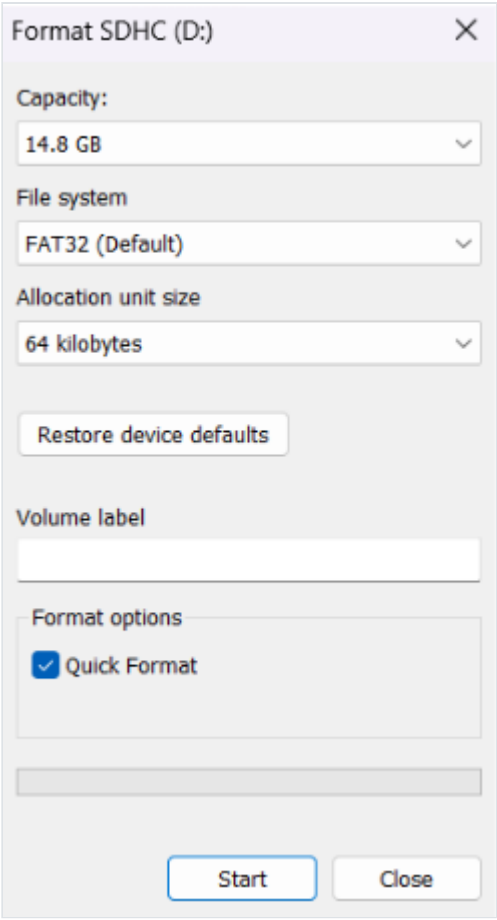
5. Select "Start"

Firmware update

Our devices are in continuous improvement and updates. Follow the next steps:

> **NOTE:** If it is the first time you connect the X5 PPK to your computer, it is required to install the X5 drivers [here](#).

    a. Connect the X5 PPK to your computer.

    b. Open the "X5 Updater" application.

    c. Browse the firmware file (*.bin) provided by Mettatec.

    d. Select the COM Port where the X5 Module is connected (USB–SERIAL CH340).

    e. Press the "Upload Firmware" button.

    f. The X5 PPK will start the firmware updating process.

    g. When the updating is finished, the X5 PPK will restart.

Video tutorials

@mettatec X5 Receiver & X5 PPK | Geotag...

▶

X5 Receiver & X5 PPK | Firmware upgrade

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Downloads

Download the necessary firmware updates and executable applications for your device.

- [X5 drivers](#)
- [X5 Updater](#)
- [Firwmare version 4.2](#)