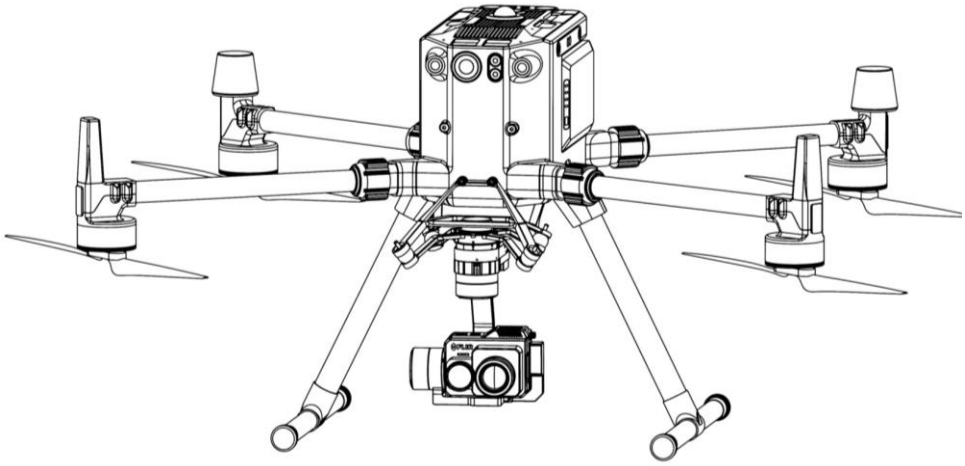
GPORT USER MANUAL



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Revision Number: 1.0.2

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Overview

Developed based on PSDK and a high-performance embedded computer, gPort is an add-on accessory enabling users to integrate Gremsy gimbals with DJI's enterprise drone platforms, adding a new level of efficiency to commercial missions.

This guide shows you how to mount, connect, configure and control Gremsy gimbals (Pixy F, Pixy WS) to collect images & videos on M300/M200 V2 series using gPort. It also covers steps to set up your application with DJI's Drones.

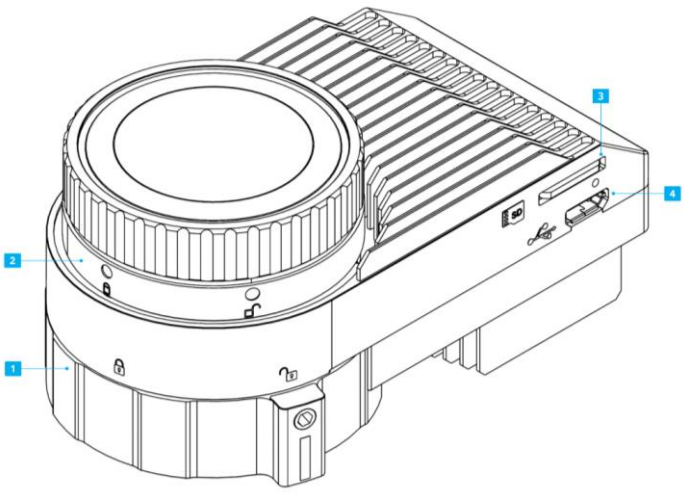
Overview

[1]. Hyper Quick Release

[2]. Skyport V2 Connector

[3]. Micro SD Card Slots

[4]. Micro USB



Supported Gimbal & Camera

- Pixy F (Flir Duo Pro R camera)
- Pixy WS (Wiris Security camera)

Supported Aircraft

- Matrice 300
- Matrice 200 V2 Series

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Specification

Name	gPort
Weight	Approx. 116 gram
Dimensions	83 x 45 x 36 mm
SDCard	Up to 256 GB
I/O	Reserved: For debugging upgrades (gPort)
USB	Micro USB x 1: For debugging upgrades (Gimbal)
Power	Approx. 5 - 25W
Power Supply	13.6 – 17V
Operating Temperature	32° F ~ 122° F (0° C ~ 50° C)
Supported Video Format	Wiris Security: 720p50fps Flir Duo Pro R: 1080p60fps

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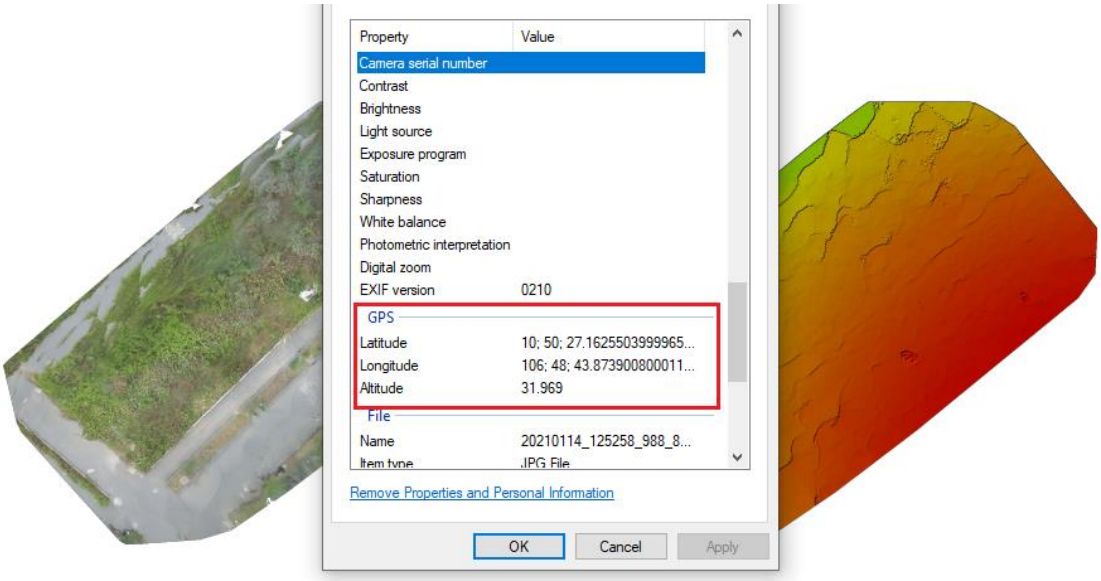
Features

Capturing and live streaming video from DJI drone system

gPort lets your payload (including camera & Gremsy gimbal) communicate with DJI drone's transmission system to capture and live stream video in real-time as well as provides high quality video with efficient H.264 encoding.

Gathering data from the Drone and Gimbal to tag your pictures



Controlling and configuring the Gimbal

gPort allows users to control gimbal from remote controller and set gimbal parameters through the DJI Pilot app during the flight.

Controlling and configuring the Camera

FLIR Duo Pro R

Full alternative for the FLIR UAS App. This allows users to adjust the MSX, IR Color Palette, Display Video Mode (**Visible** stream only, thermal infrared **IR** stream only and a **Picture-In-Picture** stream), and advanced settings:

- Recalibrate: To maintain optimum performance
- Digital Display Format
- Recorded Video
- IR Format
- Still File Type

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- Radiometry
- And more…

Please refer to FLIR DUO PRO R User Guide.

Workswell Wiris Camera

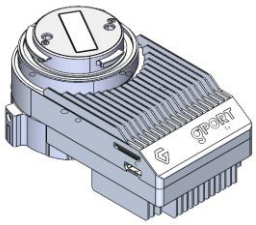
Taking advantage of Wiris protocol supported for Wiris Security and Wiris Pro. Using DJI app can eliminate the keyboard and display for setting and configuring parameters for the WIRIS camera.

CANBus & UART SDK gives the user option to control WIRIS PRO, WIRIS PRO SC, or WIRIS Security with simple widgets on the DJI Pilot App.

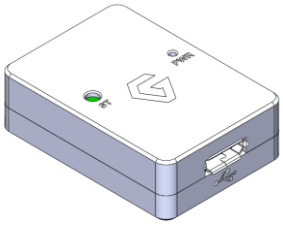
- Record/capture
- Muli-camera modes (Ful screen mode, IR only, VIS only, Picture-In-Picture)
- Set palette
- Set camera zoom
- And more…

What's in the box?

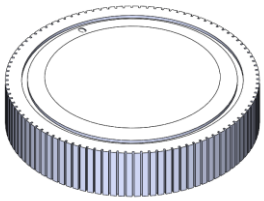
1. gPort module



2. Interface module for gPort



3. gPort cap



4. Interface cable for gPort

5. Micro USB Cable

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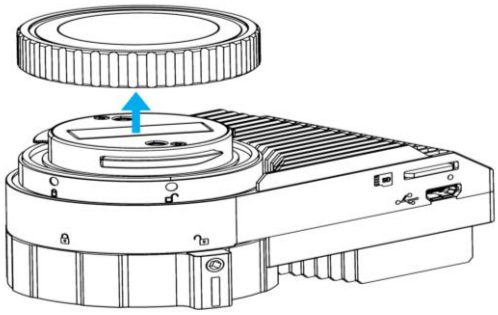
Let's get started!

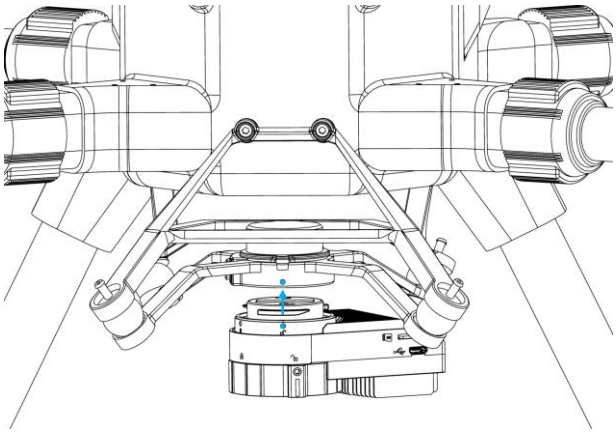
1. Mounting the gPort to M300

*Note: If you use Pixy WS gimbal, please purchase the damping extension and follow this Guide to custom the DJI standard damping before mounting gPort to M300.

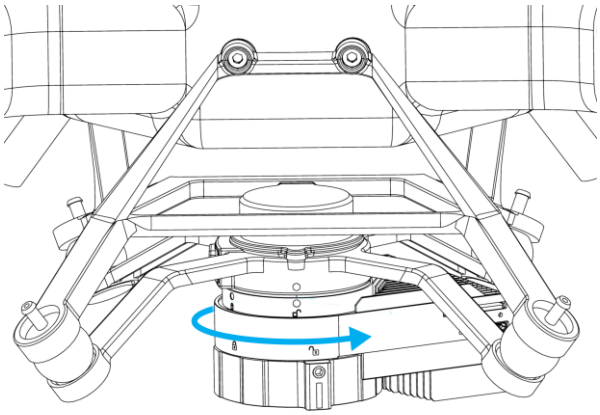
STEP 1: Remove the cover of the gPort



STEP 2: Align the white and insert the gPort



STEP 3: Rotate the gPort lock to the locked position.



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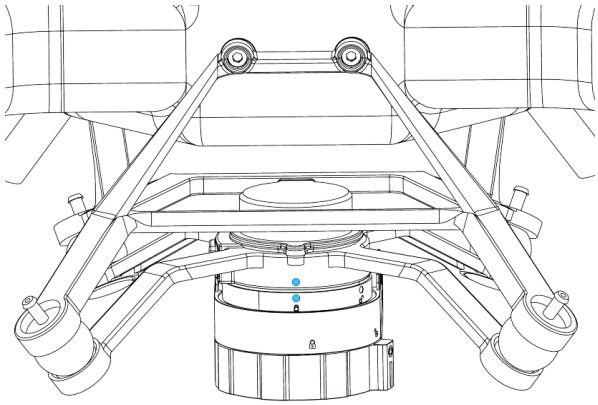
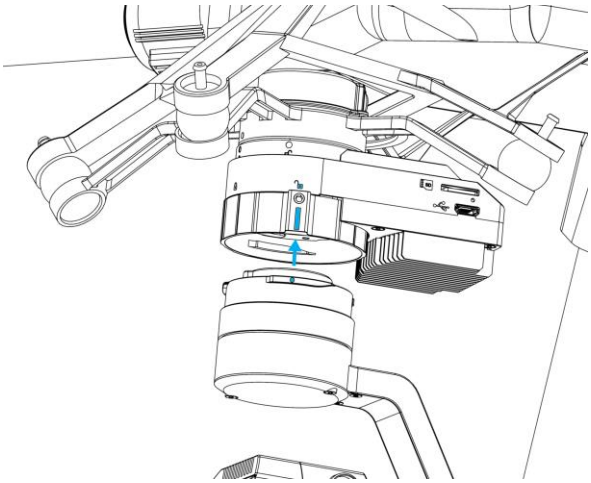
STEP 4: Check the locked position

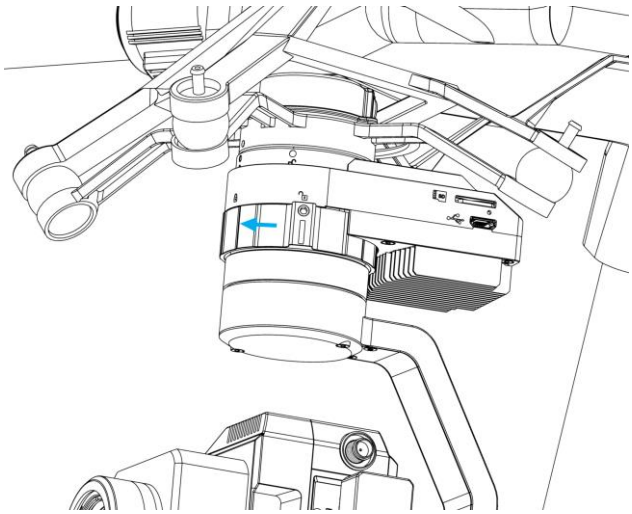


2. Mounting the gPort and Gimbal Camera

STEP 1: The marks on the top part and bottom part must be aligned. The mark on the ring should be aligned with the unlocked icon as shown in the first picture.



STEP 2: Keep everything aligned and attach the bottom part to the top part.



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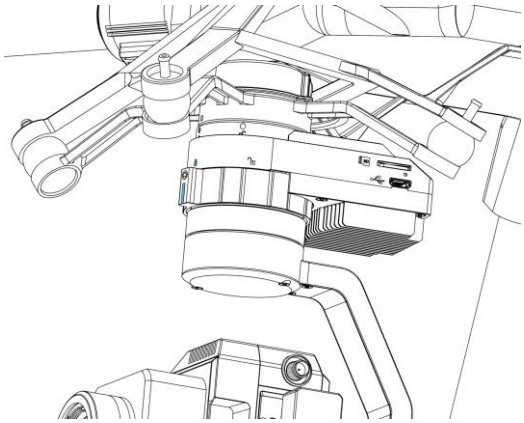
STEP 3: Rotate the ring clockwise until the mark on the ring aligned with the locked icon.



gPort for a specific Camera

gPort is used for mounting a variety of cameras like Pixy F (Flir Duo Pro R camera), Pixy WS (Workswell Wiris Security) on M300/M200 V2 series. Users need to configure and flash the firmware again if using gPort for another camera.

Preconditions: Follow the instructions above to mount the gPort and Gimbal.

SoM (System-on-Modules)

Configure HDMI Camera Input Resolution

1. Download extract the GremsyFlashTools_v1.0.0. (Web-Link)
2. Plug the interface cable for gPort into the USB port of the PC. Reserved Port connects to gPort. (**Note:** Switch the button to S)

3. Power on the Aircraft.
4. Start the GremsyFlashTools. In the MainWindow. Select the COM port, then press Connect.
5. Press Login button **(1)** → Select HDMI resolution **(4)** then press Set Video Input **(5)** → press Reboot button **(6).**

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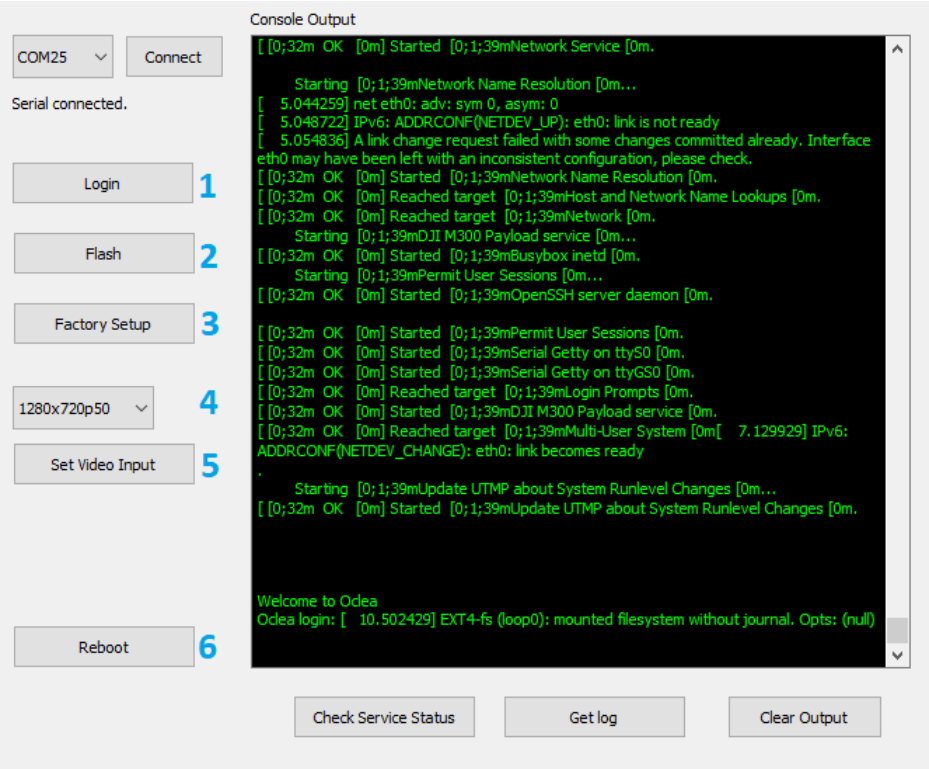
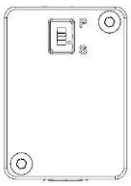


<u>NOTE:</u> The HDMI resolution is set to gPort. It must be the same with the camera HDMI setting.

Upgrading new firmware for SoM

1. Copy the firmware file 'upgrade' in the HDIM_Ethernet_M300 folder to SD card.
2. Insert SD card and power on the aircraft.
3. Plug the interface cable for gPort into the USB port of the PC and Reserved Port connects to gPort. (**<u>Note:</u>** Switch the button to S)



4. Power on the Aircraft.
5. Start the GremsyFlashTools. In the MainWindow. Select the COM port then press Connect.
6. Press Login button **(1)** → Press Flash button **(2).** Waiting for process → Press Factory Setup **(3)** → press Reboot button **(6).**

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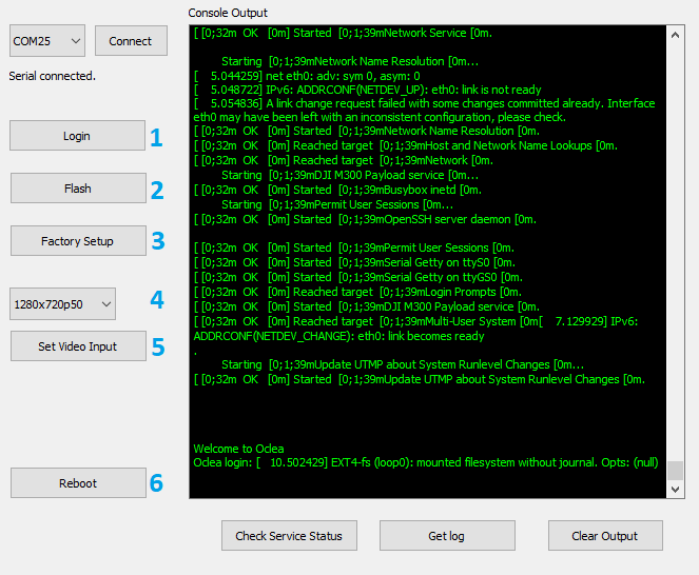


gPort firmware upgrade by ST-Link Utility

1. Mounting gPort to the Aircraft
2. Power on the aircraft. Connect the gPort to a PC with the interface cable for gPort.

3. Run the STM32 ST-Link Utility (Web-Link).

   Download the STM32 ST-Link Utility from Web-Link and install it on your machine. (This is the recommended option for Windows users).

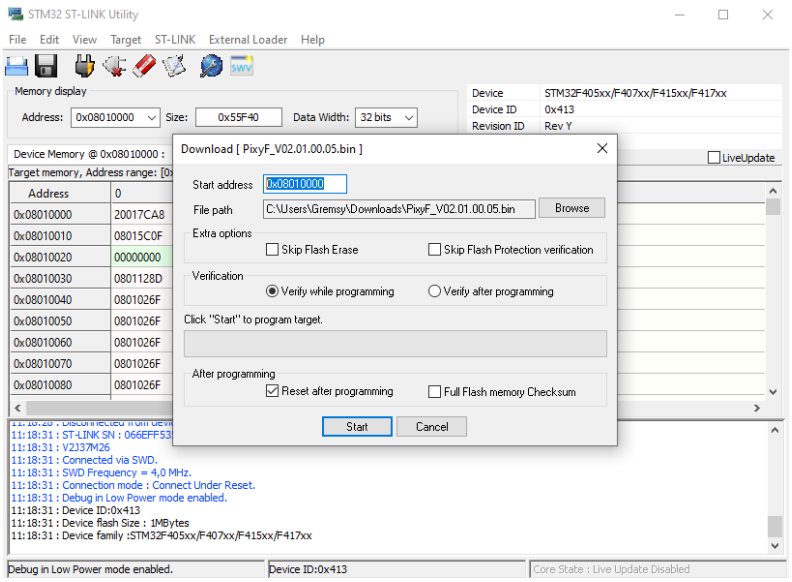
4. Download the firmware for your camera **(Web-Link)**

   Firmware Name: PixyF_V02.01.00.04 or above

   Firmware Name: PixyWS_V02.01.00.04 or above

5. Launch the ST-Link Utility that you've just installed and connect to the gPort with a Debug Module.

   - Load the firmware file and hit the "Program and Verify button" (CTRL + P)
   - Set Start Address: **0x08010000**



   - Press Start button and wait a second

4. Disconnect when upgrading completely.

gPort firmware upgrade by DJI Assistant 2

<u>NOTE:</u> Only Matrice 300 RTK

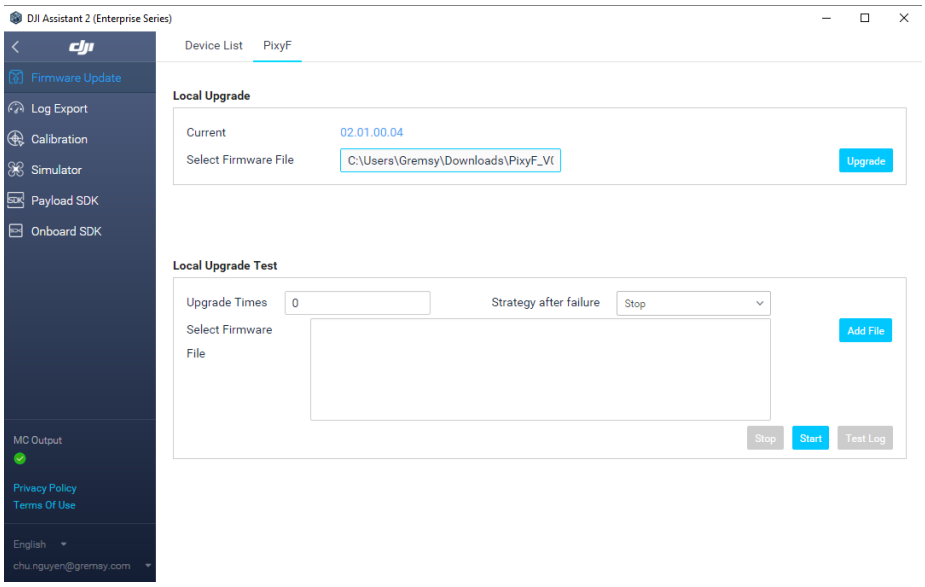
1. Mounting gPort to the Aircraft.

2. Power on the aircraft. Connect the aircraft to a PC with a Type-C USB cable
3. Download the firmware for your camera **(Web-Link)**

   Firmware Name: PixyF_V02.01.00.05 or above

   Firmware Name: PixyWS_V02.01.00.05 or above
4. Run the DJI Assistant 2. Click your gimbal device. Choose the new firmware and press the upgrade button.

   NOTE: Choose the new firmware upgrade to the gPORT with the specific camera.



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Flir Duo Pro R

Checking Camera Operation

Firmware Upgrade Version: V01.03.03 or above

Led Indicator

When power is applied to the camera, the Status LED blinks red for approximately 15 seconds, then changes to solid blue.

When this happens, Bluetooth becomes enabled. FLIR Duo Pro R beeps three times and the Record LED goes from off to solid green. (If the FLIR Duo Pro R is connected to a computer, or if no SD card is inserted, the Record LED blinks yellow.)

Camera Status and Record LED Description	
Status LED at power-up	Blinking RED
Record LED at power-up	OFF
Status LED at ready	Solid BLUE, Bluetooth is enabled; Solid GREEN, Bluetooth disabled
Record LED at ready	Solid GREEN
Record LED	Blinking RED during recording Blinking YELLOW if recording alert (microSD card not present, is full, or is in use by PC)
Status LED during firmware update	Blinking PURPLE
Press the Record button to initiate recording	The Record LED will blink RED when recording video or still imagery

Configure Mavlink Connection

The Duo Pro R can be configured to use the MAvlink serial protocol by using the UAS. Interfacing with gPort, FLIR uses this bus to capture available telemetry data provided by gPort like (GPS, Altimeter, Gimbal Data, …). Suggested mapping application.

The FLIR UAS App is the primary control interface available for the Duo Pro R camera. It is compatible with many mobile devices equipped with Bluetooth LE running iOS 9.0 or later and Android v4.3 or above.

The Duo Pro R can be configured to capture available telemetry data provided by GPS, altimeter, accelerometers, etc.

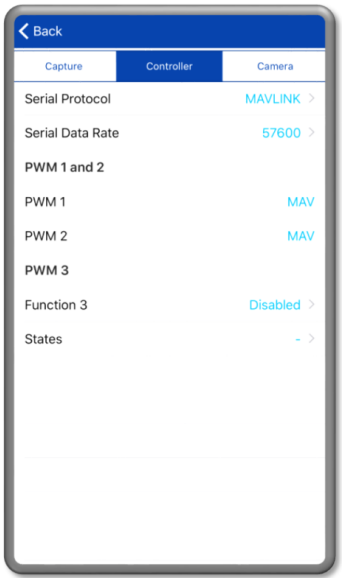
Step 1: Install FLIR UAS App

- IOS APP store (Web Link)
- Android APP store (Web Link)
- Android APK file direct DL (Web Link)

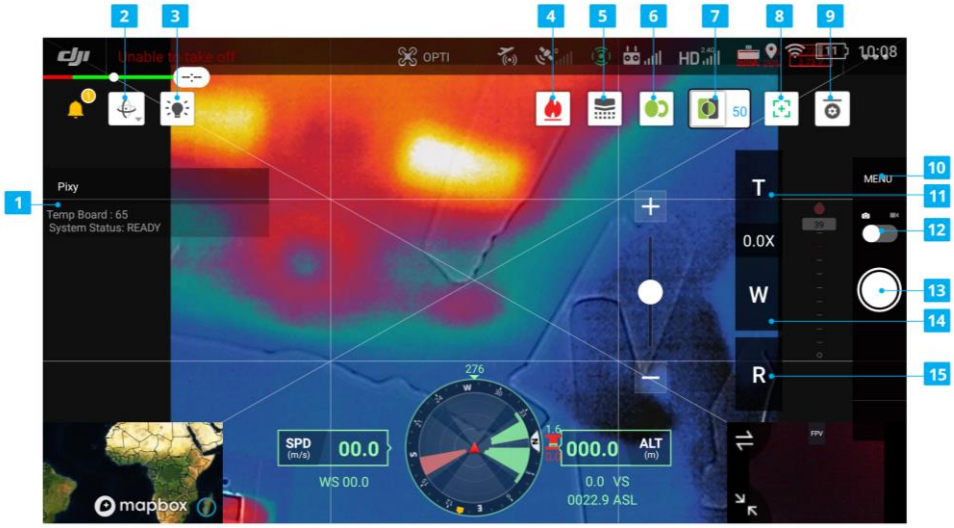
Step 2: To (re)enable Bluetooth

Press the Bluetooth button on the top of the camera

Step 3: Set Serial Protocol and Serial Data Rate



Camera View



[1]. Floating Window

Display the status of the gPort system (Including Camera and Gimbal)

[2]. Gimbal Orientation Adjustment

Tab to select the Gimbal Orientation Adjustment as Gimbal Recenter, Recenter Gimbal Yaw, Gimbal Yaw Downward or Gimbal Downward.

[3]. Beacon

Tab to turn on/off the beacons, then the Discreet Mode icon will change.

[4]. View Mode

Select Video Mode: Selection of the display video mode toggles between a Visible stream only, thermal infrared (IR) stream only, and a Picture-In-Picture (Pip) stream that shows a full-screen visible stream with a thermal stream display in an inset window.

[5]. FFC

To maintain optimum performance, thermal imaging cameras occasionally must perform an internal calibration of Flat Field correction (FFC). During re-calibration, an audible “click” can be heard and live video is momentarily frozen.

[6]. MSX

Multi-Spectral Dynamic Imaging (MSX). It provides extraordinary detail in real-time thermal images by embossing visible camera image information onto thermal video and stills.

[7]. MSX Length

Select the degree of fusion

[8]. Zoom Settings

[9]. Payload Settings

FLIR DUO PRO Camera Parameters

Gimbal Tuning

[10]. Camera Settings

[11]. T: Zoom Tele

Tab to zoom increases

[12]. Photo / Video Toggle

Tab to switch between photo and video recording modes.

[13]. Shutter / Record Button

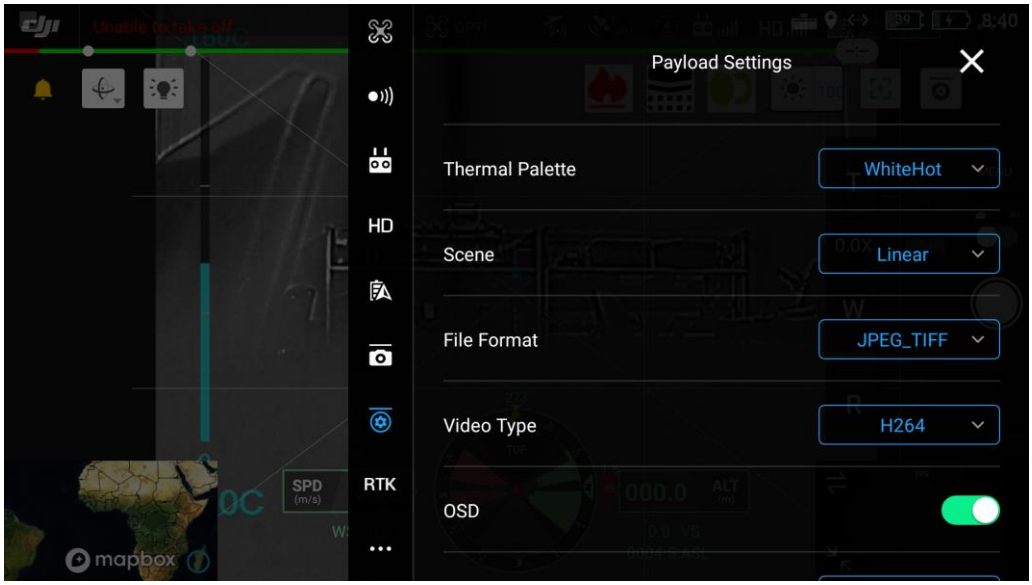
Tab to shoot photos or start/stop recording. Users can also press the Shutter or Record button on the remote controller to shoot photos or record video.

[14]. W: Zoom Wide

Tab to zoom decreases

[15]. R: Zoom Resets

Payload Settings



- **Thermal Palette:**

  The Duo Pro R detects and images long-wave infrared radiation.

- **Scene**

  Each Scene preset provides a combination of automatic gain control (AGC) settings optimized by FLIR system to provide the best image for a specific application.

- **File Format**

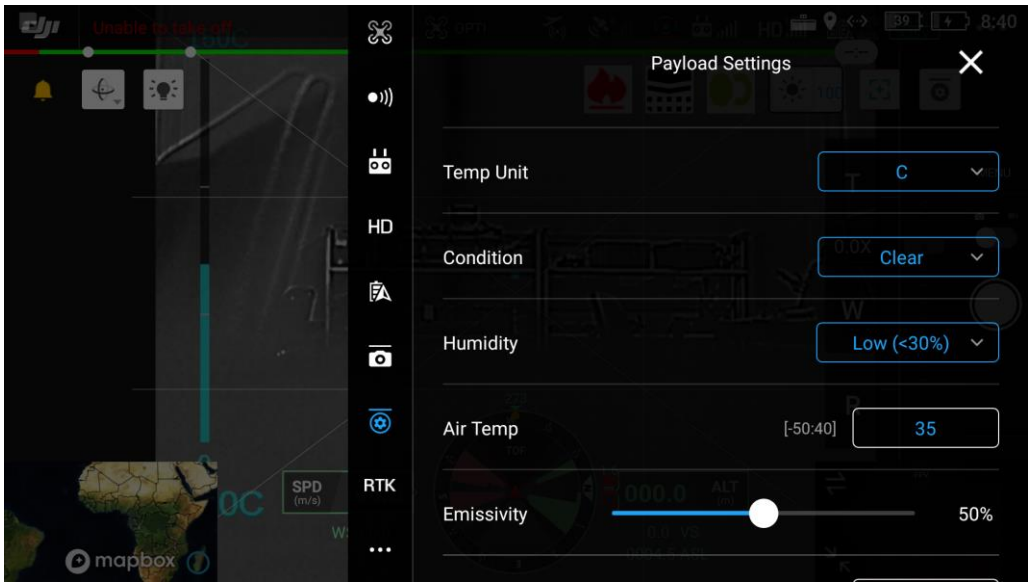
  JPEC & TIFF or FFF

- **Video Type**

  H264 or TIFF

- **Spot Meter**

  Turns on or off the spot meter (fixed 4x4 pixel array) in the center of the image, the on-screen thermometer on the left edge.



- **Temp Unit**

  Temperature Unit: Units of measure displayed on the analog video stream. Select between Celsius and Fahrenheit

- **Sky Condition**

  Measure of the cloud over above the operating site. This affects the background radiation incident on the scene. Clear, Scattered and Cloudy.

- **Humidity**

  Relative moisture content of the air. Three settings are available; Low (<30%), Medium (~45%), High (>60%).

- **Air Temp**

  Ambient temperature of the operating environment. Values from 0 to 40 C (32 to 104 F) can be configured.

- **Emissivity**

Measure of the target surface ability to emit thermal energy. Values from 50 – 100% can be configured.

- **Subject Distance**

  Distance from the camera to the target in the scene. Values from 0 – 200m (0 – 218 yards) can be configured.

Workswell Wiris Security

Firmware Version: V1.5.4 or above

GPORT only supports Workswell Wiris Security with the firmware Version V1.5.4 or above.

Camera View

[1]. Floating Window

Display the status of the gPort system (Including Camera and Gimbal)

[2]. Gimbal Orientation Adjustment

Tab to select the Gimbal Orientation Adjustment as Gimbal Recenter, Recenter Gimbal Yaw, Gimbal Yaw Downward or Gimbal Downward.

[3]. Beacon

Tab to turn on / off the beacons, then the Discreet Mode icon will change.

[4]. Layouts

WIRIS SECURITY implements several different Layouts – different arrangement of elements on the screen. Each layout is best suited for a particular situation or a use case. The

selection of the layout is up to the preference of the user. The underlying functionality of the camera remains mostly the same in all layouts.

- **Security**

  The SECURITY layout aims to make camera screens as large as possible simultaneously. It's primarily intended for situations when it's desired to view both camera streams simultaneously but not in the PIP mode.

- **Fullscreen**

  The FULLSCREEN layout shows only one of the camera streams at a time over the entire screen.

- **PIP**

  The Picture-In-Picture Fusion layout is the most advanced, presenting a superimposed view that displays both cameras simultaneously across the entire screen.

[5]. Main Camera

Camera for main display: Thermal or Visible

[6]. Thermal Camera Transparency

Thermal camera transparency in PIP Fusion layout.

[7]. Zoom Settings

Select the degree of fusion

[8]. Payload Settings

FLIR DUO PRO Camera Parameters

Gimbal Tuning

[9]. Camera Settings

[10]. T: Zoom Tele

Tab to zoom increases

[11]. Photo / Video Toggle

Tab to switch between photo and video recording modes.

[12]. Shutter / Record Button

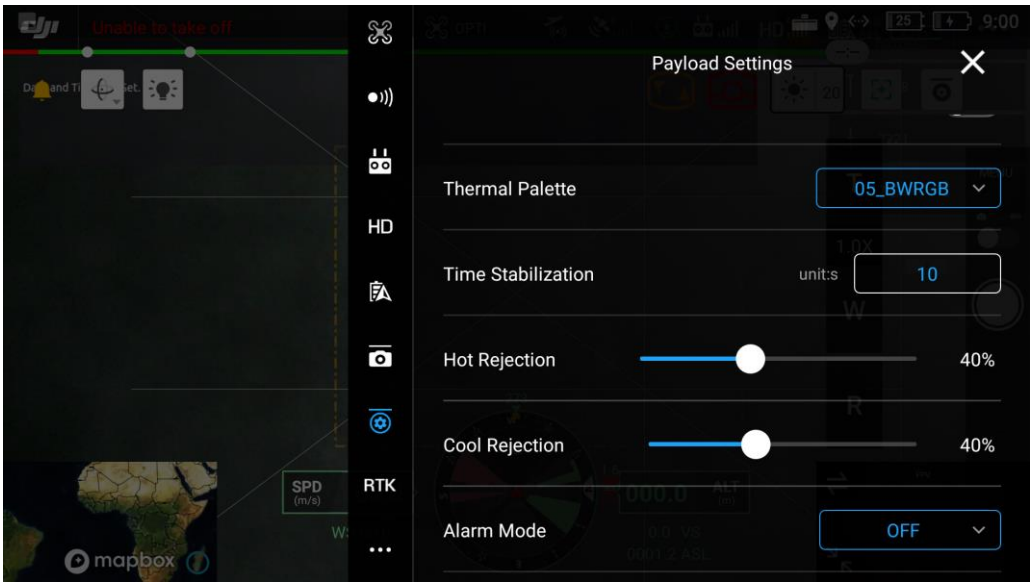
Tab to shoot photos or start/stop recording. Users can also press the Shutter or Record button on the remote controller to shoot photos or record video.

[13]. W: Zoom Wide

Tab to zoom decreases

[14]. R: Zoom Resets

Payload Settings



- **Thermal Palette**

  Color palettes that can be applied to the infrared image.

- **Range**

  The WIRIS SECURITY camera is a non-radiometric device and relies on a fully automated range setting (so virtually visual brightness and contrast) for the thermal image. The automatic thermal image processing allows the user to adjust the functioning of the automatic value range setting algorithm in two ways.

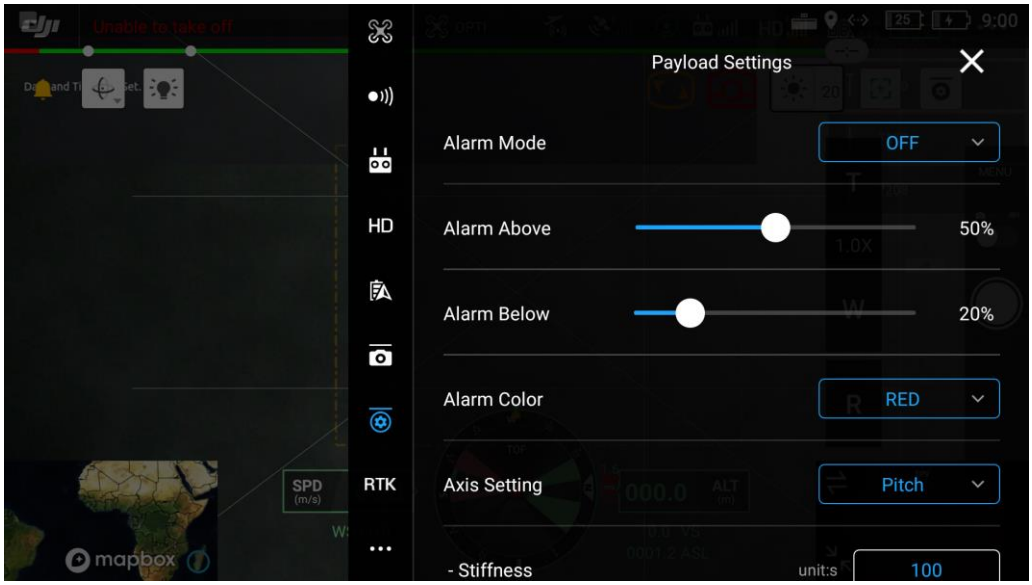
  Range menu consists of the following items:

  - **Time Stabilization**

    Apply a lag filter on the minimal and maximal edges of the value mapping function, leading to less intense reaction on rapid changes in extreme values within the scene.

  - **Hot & Cold Rejection**

    Use a histogram mapping of all the pixel values found in the frame and then culls some amount of the outlier extremes before determining the value range to map the data.



- **Alarms**

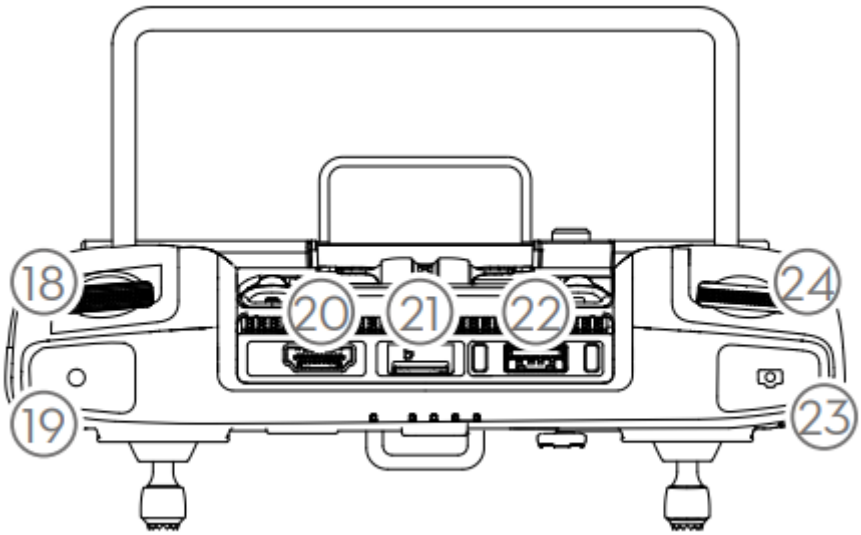
  ALARMS allows the user to further specify the ALARMS display's appearance as defined and invoked within the MEASURE menu.

  - **Alarm Mode:** OFF, ABOVE, BELOW, BETWEEN, or OUTSIDE
  - **Alarm Above & Below:** Threshold values
  - **Alarm Color:** ABOVE, BETWEEN, BELOW. Possible colors are RED, GREEN, BLUE. Cycles through the color options will be used to mark areas with temperatures below the upper and above the lower threshold.

Gimbal

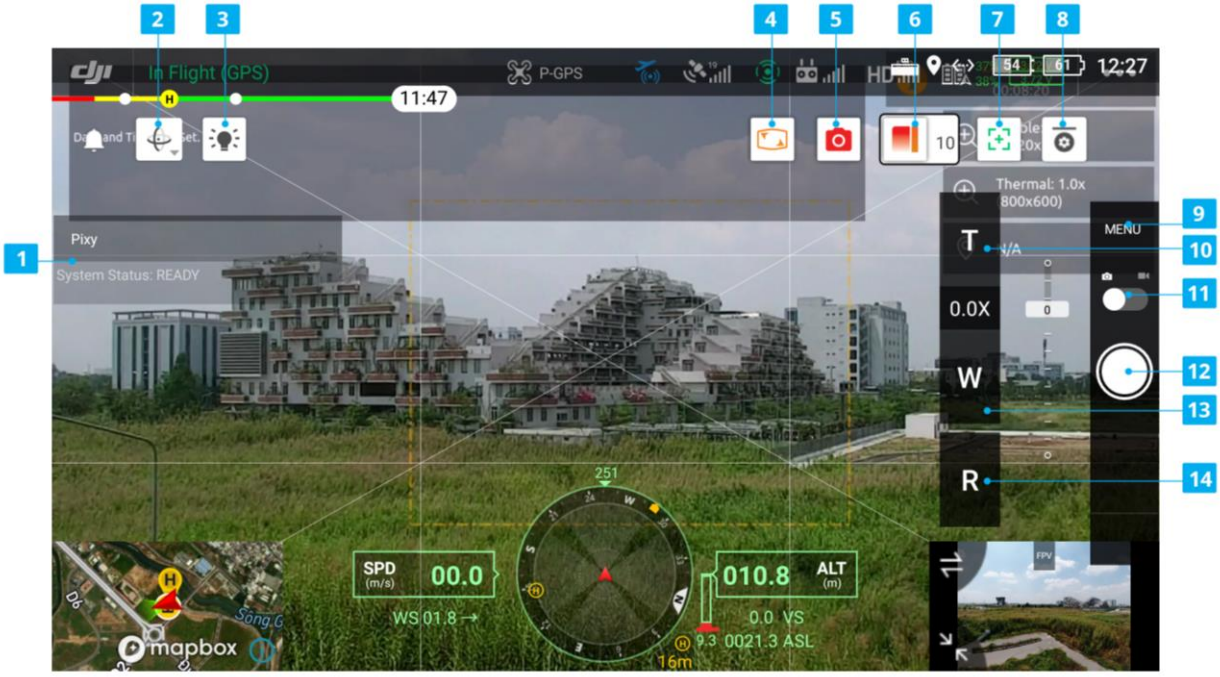
Operating the Gimbal

The DJI Smart Controller Enterprise supports two buttons: Gimbal Pan Control Dial and Gimbal Pitch Control Dial to control Pan and Pitch of the Gimbal. Besides, widgets are shown on the screens.



LEFT DIAL (18) controls the gimbal Pitch. Turn the dial to the right and the gimbal will shift to point upwards. Turn the dial to the left, and the gimbal will shift to point downwards. The camera will remain in its current position when the dial is static.

RIGHT DIAL (24) controls the gimbal Pan. Turn the dial to the right. And the gimbal will shift clockwise. Turn the dial to the left, and the gimbal will shift counterclockwise. The camera will remain in its current position when the dial is static.



Gimbal Orientation Adjustment (2): Tab to select the Gimbal Orientation Adjustment as Gimbal Recenter, Recenter Gimbal Yaw, Gimbal Yaw Downward or Gimbal Downward.

Gimbal Settings

Here you can adjust how your gimbal moves.

Gimbal Mode

There are 2 choices Free-mode and Follow mode

- **Follow Mode:** Yaw will follow the aircraft heading.
- **Free Mode:** Meaning the gimbal can move independently of the aircraft's yaw. In this mode, even if the aircraft yaw changes, the gimbal will ignore the movement of aircraft

Gimbal Pitch Smooth Start/Stop

Smooth factor for gimbal controller, using to smooth control. The larger the value, the smoother gimbal movement is (higher latency response).

Max Gimbal Pitch Speed

This controls the max speed percentage at which the gimbal pitch. A higher value means a faster-moving gimbal and a lower value means a slower gimbal.

Gimbal Yaw Smooth Start/Stop

Smooth factor for gimbal controller, using to smooth control. The larger the value, the smaller the acceleration of gimbal.

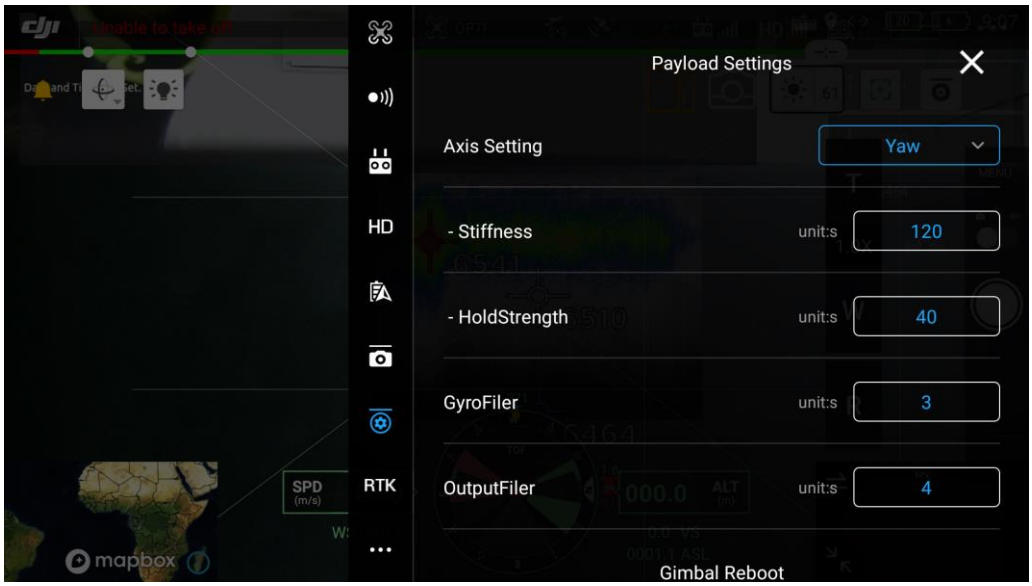
Max Gimbal Yaw Speed

This controls the max speed percentage at which the gimbal yaw. A higher value means a faster-moving gimbal and lower value means a slower gimbal.

Gimbal Advanced settings

TODO: List default params for specific camera.

After mounting and connecting the gPort, gimbal, camera to the aircraft. It’s time to fine-tune some parameters for the best performance.



Axis Setting

There are three choices: Pitch, Roll, Yaw.

Stiffness

Stiffness setting has a significant impact on the performance of the gimbal. This setting adjusts the degrees the gimbal tries to correct for unwanted camera movement and hold the camera stable. The higher you can run the setting without vibration or oscillation, the better it is.

General Method

Start with a low value of 20 for all axes, then turn the motors ON. Slowly increase this setting until you feel an oscillation in each axis, then reduce it until the oscillation subsides. You can touch the camera to feel the oscillation during tuning. Increase the stiffness setting 5-10 points until oscillation appears, then reduce 5 points until oscillation subsides.

Hold Strength

For heavy cameras, it's suggested to increase hold strength for each axis by around 10% than the default values. This option is only recommended for advanced users.

Default Settings			
Hold Strength	**Pitch**	**Roll**	**Yaw**
	40	40	40
Gain	120		

Gyro Filter

Defines the strength of the filter applied to Gyro sensor output. If the gimbal has oscillation that cannot be corrected by adjusting stiffness settings, the Gyro Filter is used to further tune the gimbal and remove the oscillation.

Output Filter

Define the strength of the filter applied to motor output. If the gimbal has oscillations that cannot corrected by adjust stiffness settings, the Output Filer is used to tune the gimbal and remove the oscillation.

Vibration

If the gimbal is vibrating at a high frequency after turning, increase the filter values.

Oscillation or rocking

If the gimbal is oscillating or rocking at a low frequency after tuning, decrease the filter values.

Default Values	
Gyro Filter	2
Output Filter	3

Upgrading Firmware

NOTE:

- Only USB connection allows upgrading firmware.
- Make sure Silab USB driver is already installed. The driver can be found at HERE

How to Upgrade

- Mount gimbal to the aircraft with gPort.
- Power on the aircraft
- Connect USB cable from gPort to Mac/PC.
- Run the gTune Desktop Software
- In the software, select “Serial” option on “CONNECTION” tab
- Select the port in the list
- Click on the “CONNECT” button
- “Browse” to firmware file for your gimbal from your computer
    - **NOTE: Firmware version must be v7.5.7 or above HERE**
- Click “Upgrade” button. The process will take about 2 minutes. When the firmware is upgraded successfully, the gimbal will be restarted automatically.

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Troubleshooting

Status LED Indicator

STATE	LED STATUS	DESCRIPTION
01	Blink	Video Transmission Error
02	Solid	System Error (Camera, Gimbal, SOM)
03	Blink	Camera Not Found
04	Solid	
05	Blink	
06	Blink	System Ready
07	Solid	
08	Blink	
09	Solid	
10	Blink	Gimbal Not Found
11	Solid	

Display Real-time Data

STATE	SYSTEM STATUS	DESCRIPTION
01	READY	Ready to flight
02	ERROR	System Error (Camera, Gimbal, SOM)
03	CAM ERROR	Camera Not Found
04	GMB ERROR	Gimbal Not Found
05	SOM ERROR	Video Transmission Error

PROBLEM	POSSIBLE CAUSES	SOLUTION
System Error	Camera, Gimbal, gPort are damaged	Check each component.
Camera Not Found	Connection is loose	Check the connection. Check MAVLINK setting for FLIR is set.
Gimbal Not Found	Gimbal Error	Open gTune to check the operation of the gimbal.
Video Transmission error	Connection is loose or gPort is damaged.	Reboot GPORT system by using DJI PILOT APP. Waiting for the video stream (Approx: 50 seconds)

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No Video Stream

➔ Reboot system: After checking the setting and connection, please reboot the system and wait a second.