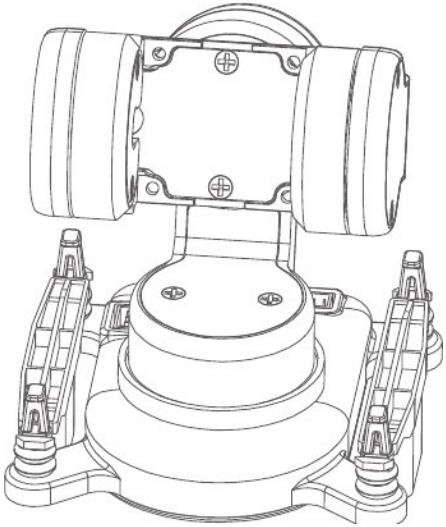
CADDX GM3 V2-20

3-axis stabilization gimbal for Walksnail Avatar / Ascent cameras

User manual



Read this manual carefully before first use and keep it for future reference.

www.rotorama.com

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1. Introduction and specifications

1.1 Product description

This product is a mechanical stabilization gimbal designed to provide real-time image stabilization and camera angle adjustment. It is compatible with Walksnail Avatar / Ascent series cameras with a mounting width of 20 mm. The gimbal supports stabilization and adjustment along the **pitch**, **roll** and **yaw** axes.

Users need to design their own mounting holes on the vehicle to fit the gimbal mounting bracket (see Chapter 3.2). The gimbal can automatically recognize upright and inverted installations.

1.2 Specifications

Parameter	Value
Model	GM3 V2-20
Camera compatibility	Walksnail Avatar / Ascent series, 19/20 mm
Power supply	9–25.2 V DC (3S–6S LiPo battery)
Stabilization accuracy	±0.005°
Maximum controllable speed	±1500 °/s
Controllable rotation range	Yaw: ±160° Pitch: ±120° Roll: ±60°
Control method	UART / S.BUS / CRSF / MAVLink / PWM
Head tracking control	Supported
Static power	1.6 W
Stall power	18 W
Dimensions	61.5 × 47 × 46 mm
Weight	48 g

2. Safety instructions

2.1 Product precautions

① Ensure the external power supply to the gimbal is within the specified range (**9–25.2 V DC**, 3S–6S LiPo battery). Operating outside this range may cause malfunction or damage.

② Do not short-circuit the power and GND wires, as this will damage the device.

③ Make sure the coaxial cable connected to the gimbal is not fastened too tightly. Leave enough slack to allow free movement during the gimbal's damping and operation. The gimbal must not collide or interfere with other objects during self-check or movement after powering on.

④ When using the gimbal with the Moonlight camera, it must be paired with the Moonlight VTX.

⑤ When using the gimbal head-tracking feature, some Avatar/Ascent VTX units may not support it. Please refer to the corresponding VTX product manual for details.

⑥ The gimbal bracket must be securely mounted to the vehicle using the included damping balls or compatible third-party damping balls. Ensure the installation is stable.

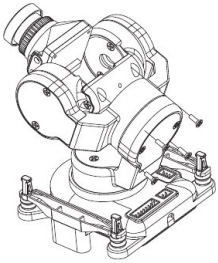
⑦ The head-tracking UART cannot be controlled simultaneously by other protocols.

2.2 General rules

- The product is intended for persons over 14 years of age. Keep it out of the reach of small children.
- Always install and wire the gimbal **with the power disconnected**. Before switching on for the first time, check the wiring and the polarity of all wires.
- After power-on the gimbal performs a self-check and moves the camera. Do not touch the moving parts, do not obstruct their movement and keep fingers, hair and loose cables away from the motors.
- Protect the product from moisture, dust, drops and impacts. Do not use it if it is mechanically damaged or if the cables are damaged.
- Do not open the electronics or modify them.
- Route the gimbal cables along the shortest possible path and as far as possible from the antennas of the receiver, the VTX and the GPS to minimise mutual interference. Use only the cables supplied with the gimbal.
- Handle the battery that powers the gimbal according to the battery's instructions. Do not leave the powered device unattended.
- Do not interrupt the power supply or the connection to the computer during a firmware upgrade.

3. Installation

3.1 Camera installation



Mounting the camera on the gimbal

① Use a Phillips screwdriver to remove the back cover of the camera.

② Use tweezers to disconnect the coaxial cables from both sides of the camera's coaxial interface.

③ Connect the gimbal's coaxial cables to the camera.

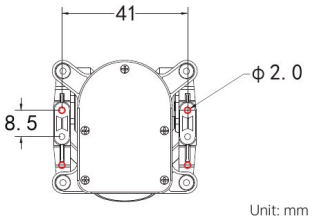
④ Mount the camera onto the gimbal, rotating the cable outlet on the back cover of the camera by 90 degrees to align with the cable outlet direction of the gimbal. Make sure not to leave excessive length of the coaxial cable to avoid compressing it.

⑤ Secure the four screws and check whether the camera can smoothly rotate to its maximum pitch angle. If there is noticeable resistance, please reinstall the camera.

⑥ Installation is complete.

3.2 Installation dimensions

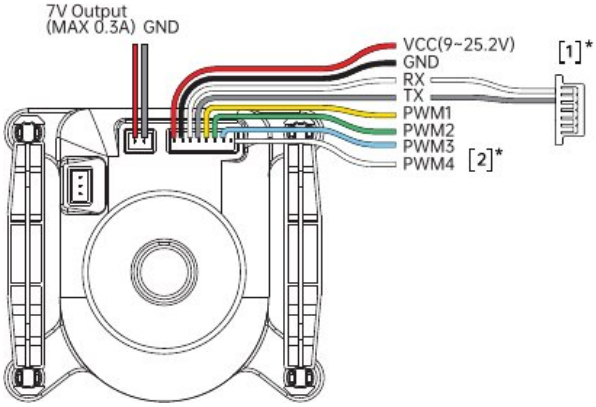
The gimbal is attached to the vehicle via the mounting bracket with damping balls (Chapter 2.1, item ⑥). Design the mounting holes for the bracket according to the dimensions in the drawing.



Bracket installation dimensions (unit: mm, holes ⌀ 2.0 mm)

4. Connection and control methods

4.1 Cables and connectors



Gimbal wiring: cable [1] VCC (9–25.2 V), GND, RX, TX; cable [2] PWM1–PWM4; 7 V output (max. 0.3 A) and GND

[1] To enable the head-tracking feature, connect the gimbal to the **USB** port of the **Avatar V2 VTX** and use it together with Avatar Goggles that support head tracking (Chapter 5.1).

[2] Inputs PWM1–PWM4 are used to control the gimbal from a radio transmitter (Chapter 4.2).

4.2 PWM channels

▶ PWM1 – gimbal mode

The channel is used to select the gimbal's working mode. There are three modes available:

1. **Translation Mode** – pitch and roll remain level, while the yaw axis follows.
2. **Translation Roll Mode** – pitch remains level, while roll and yaw axes follow.
3. **Three-Axis Follow Mode** – pitch, roll and yaw axes all follow.

▶ PWM2 – follow sensitivity

The channel is used to adjust the gimbal follow sensitivity, controlling how fast or slow the gimbal responds. Please use the dial channel on the remote controller to make the adjustments.

▶ PWM3 – pitch axis

This channel controls the gimbal's pitch axis. Please use the dial switch on the remote controller to operate it. You can adjust the gimbal's rotation angle range by modifying the channel travel settings on the remote controller.

▶ PWM4 – yaw axis

This channel controls the gimbal's yaw axis. Please use the dial switch on the remote controller to operate it. You can adjust the gimbal's rotation angle range by modifying the channel travel settings on the remote controller.

It is also possible to control the gimbal via a third-party head-tracking module by assigning the control channels to PWM3 and PWM4, enabling head-tracking control of the gimbal.

4.3 Control methods and their priority

The three-axis gimbal supports the following control methods. The priority of these control methods decreases in the order listed:

① direct head-tracking connection / S.BUS / CRSF,

② PWM,

③ MAVLink.

※ The head-tracking UART cannot be controlled simultaneously by other protocols.

5. Head tracking

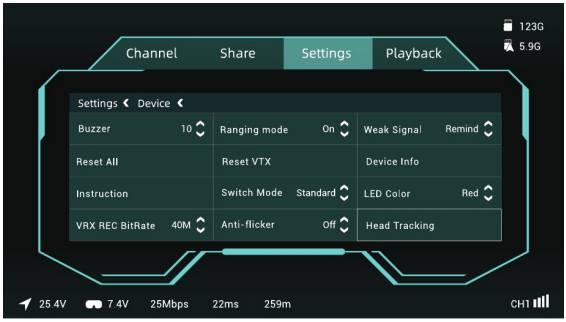
The gimbal supports head-tracking functionality (the camera follows the movement of the pilot's head) via both **UART** and **PPM** control protocols.

5.1 Direct head-tracking connection (UART)

① Upgrade the Avatar goggles and the Avatar V2 VTX to the current firmware. Connect the gimbal and the VTX with the UART cable according to the wiring diagram in Chapter 4.1.

② Open the goggles menu and select “Gimbal” for head tracking: *Settings* → *Head Tracking* → *Gimbal*. After setup, the gimbal will follow the movements of the goggles.

③ Quickly press the Return button on the goggles three times to center the gimbal.



Avatar goggles menu – Head Tracking item

※ Some Avatar/Ascent VTX units may not support UART head tracking – check the manual of your VTX.

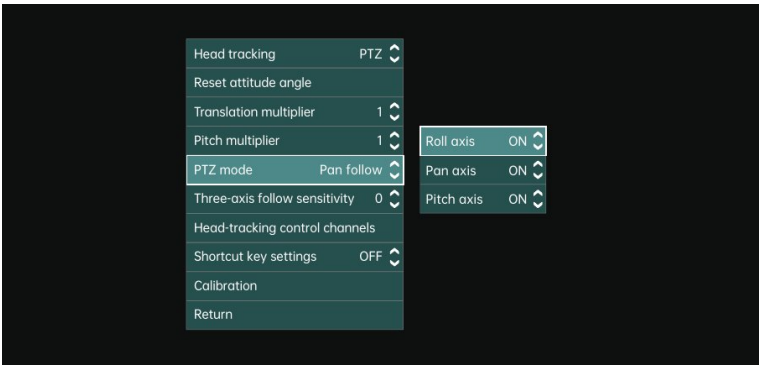
5.2 PPM control protocol

① Use a 5-pin to 2-pin AV cable: connect the 5-pin end to the goggles' AV IN port and the 2-pin end to the remote controller's DSC port. Solder the gimbal's Rx wire to the CRSF receiver's Tx pin (for S.BUS receivers, solder the signal wire to the gimbal's PWM1 signal input). Set the PPM channels on the goggles accordingly. In the remote controller's mixing settings, enable the corresponding TR channels (for example, if the PPM channels are CH5 and CH6, assign two switches mapped as TR5 and TR6).

② Connect the gimbal to the computer and in the configuration software assign the remote control channels for gimbal mode and sensitivity (Chapter 7.3).

③ The PPM protocol can only control any two axes – head tracking via PPM cannot output all three axes simultaneously.

5.3 Menu settings



Head Tracking menu in the Avatar goggles

① **Head tracking** – select the output signal and choose the gimbal (PTZ).

② **Reset attitude angle** – restores the gimbal orientation to its default neutral position.

③ **Translation multiplier** (Pan Rate) – adjusts the gimbal's pan follow rate.

④ **Pitch multiplier** (Tilt Rate) – adjusts the gimbal's tilt follow rate.

⑤ **PTZ mode** – gimbal mode: (1) tilt and roll remain level, yaw follows; (2) tilt remains level, roll and yaw follow; (3) all three axes follow.

⑥ **Three-axis follow sensitivity** – higher sensitivity results in faster gimbal response to aircraft movement but reduces stabilization against aircraft vibration. Effective only in 3-axis follow mode.

⑦ **Head-tracking control channels** – independently enable or disable head-tracking channels for the roll, pan and tilt axes.

⑧ **Shortcut key settings** – gimbal lock. This function requires current gimbal firmware and the gimbal preset set to MODE = M0 and SENS = 1 in the gimbal configuration software. When the menu is closed, double-press the lower direction on the 5-way button to enable/disable the gimbal lock. When locked, stabilization is disabled – suitable for takeoff and landing.

⑨ **Calibration** – do not calibrate under normal circumstances. If the gimbal angle drifts for a long time, calibrate the gyroscope, accelerometer and magnetometer following the on-screen prompts.

⑩ **Return** – exits the head-tracking menu.

6. Remote gimbal control

6.1 Connection methods

① **UART** – connect the gimbal's UART_Rx and UART_Tx to a UART port's Tx and Rx on the flight controller (FC). The gimbal function can be enabled in the INAV firmware by selecting *gimbal* as the peripheral for that port. In the configuration, assign remote control channels for sensitivity, pitch, roll and yaw. In the mode settings, find *gimbal* and assign remote control channels for the gimbal's three modes.

② **CRSF / S.BUS** – connect the gimbal's PWM1 to the receiver's S.BUS signal, or connect the gimbal's RX to CRSF_TX. Five channels are required to control the gimbal mode, follow sensitivity, pitch, roll and yaw. Channel mapping is configured in the gimbal configuration software (Chapter 7.3).

③ **PWM** – PWM1 to PWM4 correspond to the gimbal mode, three-axis follow sensitivity, gimbal pitch and gimbal yaw control channels, respectively (Chapter 4.2).

④ **MAVLink** – connect the gimbal's UART_Rx and UART_Tx to a UART port's Tx and Rx on the flight controller. This method uses five channels to control gimbal mode, follow sensitivity, pitch, roll and yaw; channel mapping is done in the gimbal configuration software. MAVLink control is only supported on PX4/ArduPilot firmware.

6.2 ArduPilot and PX4 configuration

▶ **ArduPilot**

Parameter	Value
SERIAL1	
SERIAL1_BAUD	115
SERIAL1_OPTIONS	1024
SERIAL1_PROTOCOL	2

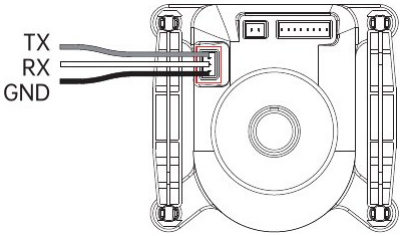
▶ **PX4**

Parameter	Value
MavLink	
MAV_1_CONFIG	TELEM2
MAV_1_MODE	Custom/Gimbal
MAV_1_CONFIG	115200 B/s
Serial	
SER_TEL2_BAUD	115200 8N1

7. Upgrade and controller setup

Gimbal firmware upgrades and channel assignment are done in the **Caddx PC Tool** software. The software and firmware are available on the manufacturer's website www.caddxfpv.com.

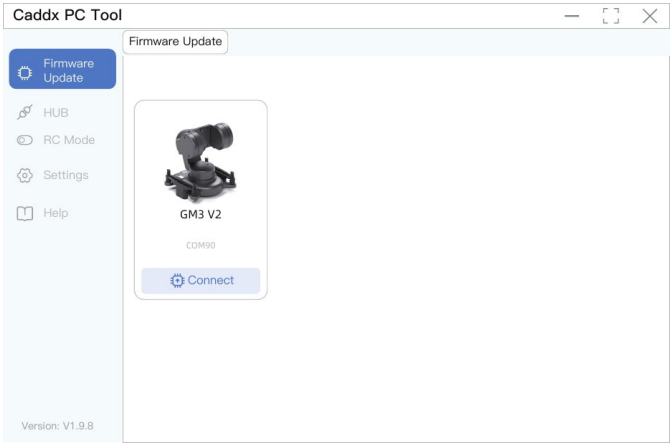
7.1 Connecting to the computer



Gimbal upgrade port (TX, RX, GND)

① Connect the upgrade cable to the gimbal's upgrade port and the other end to your computer. The gimbal must be powered.

② Open the upgrade tool Caddx_PC_Tool and click *Connect* under **GM3 V2**.

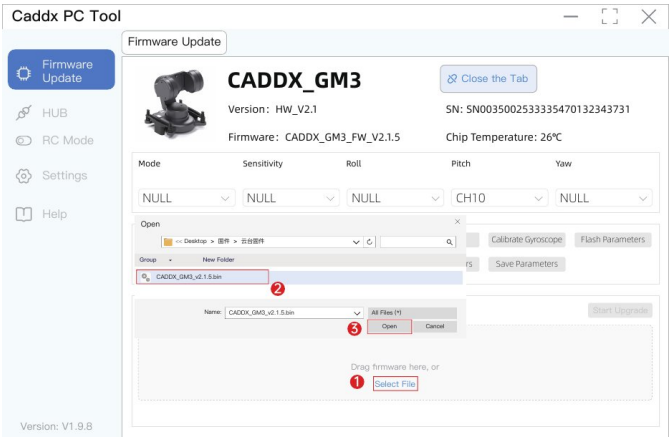


Caddx PC Tool – connecting the GM3 V2 gimbal

7.2 Firmware upgrade

③ Follow the order shown in the picture: ❶ *Select File*, ❷ select the firmware file, ❸ *Open*. Select the firmware corresponding to your hardware version.

④ Click *Start Upgrade* and wait for the progress bar to finish. Do not restart or power off the gimbal during the upgrade to avoid upgrade failure.



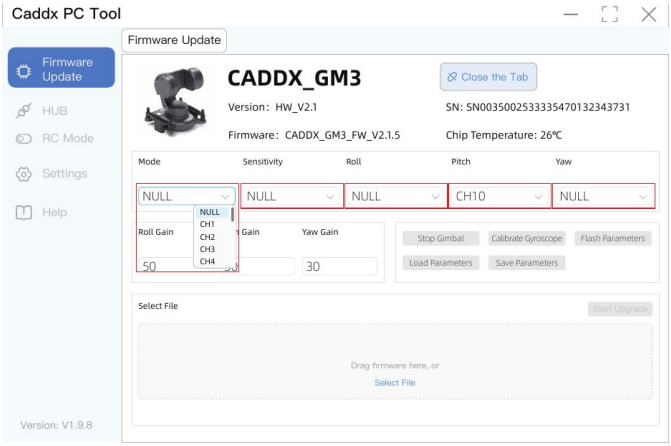
Caddx PC Tool – selecting the firmware file

During the update, the status LED may flash abnormally or the device may restart on its own. These are normal phenomena – please wait patiently until the update is complete. Keep the computer connected to the network, keep the device connected via USB and make sure it is powered on with a sufficiently charged power source.

7.3 Channel assignment

⑤ When using CRSF, S.BUS or MAVLink, select in the remote control channel assignment settings the corresponding channels for the five functions in sequence: *Mode*, *Sensitivity*, *Roll*, *Pitch* and *Yaw*.

⑥ Click *Flash Parameters* and wait for the progress bar to complete.



Caddx PC Tool – channel assignment

7.4 Troubleshooting

- **The gimbal does not follow the goggles** – check that the goggles, the VTX and the gimbal run current firmware, that *Head Tracking → Gimbal* is selected in the goggles menu, that cable [1] is connected to the USB port of the VTX and that your VTX supports head tracking (Chapter 2.1, item ⑤).
- **The gimbal does not respond to the radio** – check the channel assignment in Caddx PC Tool and make sure the gimbal is not controlled at the same time by UART head tracking, which has a higher priority (Chapter 4.3).
- **The camera moves stiffly or collides** – check the routing of the coaxial cable and the camera installation (Chapter 3.1).
- **The gimbal angle drifts over time** – perform a calibration (Chapter 5.3, item ⑨).
- Manufacturer technical support: support@caddxfpv.com.

8. Information for the EU and Czech Market

8.1 Importer and responsible person in the EU

The product is placed on the European Union market by the importer stated below, who is at the same time the responsible person within the meaning of Article 16 of Regulation (EU) 2023/988 of the European Parliament and of the Council on general product safety (GPSR).

Importer / responsible person in the EU	Rotorama, s.r.o.
Company ID (IČO)	051 57 692
VAT ID (DIČ)	CZ05157692
Registered office	Okrajová 1351, 674 01 Třebíč, Czech Republic
E-mail	info@rotorama.cz
Phone	+420 252 252 098
Website	www.rotorama.com

8.2 Product conformity

CE

- The product bears the **CE** marking and complies with the requirements of the applicable European Union harmonisation legislation.
- A copy of the **EU Declaration of Conformity** is available from the importer at the address stated above or at the e-mail address info@rotorama.cz.
- **Product identification:** type designation (GM3 V2-20); the serial number and firmware version are displayed by Caddx PC Tool after the gimbal is connected (fields *SN* and *Firmware*).

8.3 Disposal of electrical equipment



- The crossed-out wheeled bin symbol on the product, its packaging or in the documentation means that at the end of its service life the product **must not be disposed of together with mixed municipal waste**.
- Hand it over at a take-back point for electrical equipment – at a collection yard, at a take-back point of a collective system, or at the retailer when purchasing a new equivalent product. Take-back is free of charge for the end user.
- The obligations under Act No. 542/2020 Coll., on end-of-life products, are fulfilled by the importer through a collective take-back system.
- Proper disposal helps prevent negative impacts on the environment and human health and contributes to the reuse of secondary raw materials.

Through its contractual partner **ASEKOL a.s.**, the company ensures the take-back of waste electrical equipment from households and the separate collection of waste electrical equipment, batteries and accumulators in accordance with the applicable legislation. The customer is entitled to hand over old electrical equipment or a battery or accumulator at any collection point of the above contractual partner. The addresses of these take-back points are listed at www.asekol.cz, www.ecobat.cz and also https://visoh2.mzp.cz/RegistrMistZO/RegistrMistZOPublic/MapaMistZpetOdberu.

9. Warranty and rights arising from defective performance

The rights and obligations of the contracting parties are governed by Czech law, in particular by Act No. 89/2012 Coll., the Civil Code, and Act No. 634/1992 Coll., on consumer protection.

- The seller is liable to the buyer for the product being free of defects on receipt. If the buyer is a consumer, a defect may be notified **within two years of receipt** of the product (Section 2165 of the Civil Code).
- If a defect appears within **one year** of receipt, the product is deemed to have been defective already at the time of receipt (Section 2161(5) of the Civil Code).
- When purchasing online, a consumer has the right to **withdraw from the contract within 14 days** of receiving the goods without giving a reason (Section 1829 of the Civil Code).
- Claims should be made with the retailer from whom you purchased the product. The importer's contact details are given in Chapter 8.1.
- The competent body for out-of-court settlement of consumer disputes is the **Czech Trade Inspection Authority**, Štěpánská 796/44, 110 00 Prague 1, www.coi.cz.