GOKU GM10 Nano V3.1

Flywoo · GPS module for FPV drones
User manual



Read this entire manual carefully before installation and first use, especially the safety instructions in Chapter 1.

Importer: Rotorama, s.r.o. · www.rotorama.com

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1. Safety instructions

1.1 Before you start

Read this entire manual before installation and first use, and keep it for future reference. The GPS module is a component that is installed in an FPV drone. Installation requires basic knowledge of electronics, soldering and configuration of the flight controller (FC).

- Carry out all wiring and soldering **only with the drone battery disconnected**.
- Power the module exclusively with **3.3–5 V DC** from the flight controller. Never connect it directly to the flight battery voltage – the module will be destroyed immediately and irreversibly.
- Check the wiring of the pins before switching on for the first time. Reversing power and ground (GND) will destroy the module.
- Electronics are sensitive to static electricity. Discharge yourself by touching a grounded object before handling and do not touch the components on the board.
- The product contains small parts that could be swallowed. Keep it out of the reach of children.

1.2 Reliability of navigation

Satellite positioning can be affected by buildings, trees, terrain, interference from other electronics in the drone and by the weather. Functions that use GPS (for example *GPS Rescue* – automatic return) **do not guarantee a safe return of the drone**.

- Always test the GPS Rescue function in a safe, open place without people before relying on it.
- The GPS function does not replace the pilot's attention or the obligation to keep the drone within visual line of sight according to the applicable regulations (Chapter 3).
- Never take off until the flight controller reports a sufficient number of satellites and a stored home position (Home).

2. Product description

2.1 What the module is for

Flywoo GOKU GM10 Nano V3.1 is a miniature receiver for global navigation satellite systems (GNSS) for FPV drones, including the very smallest ones (tinywhoops and drones up to 2"). The module measures 12 × 16 × 4.5 mm, weighs 2.5 g and is based on the tenth-generation M10050 chip.

The module is connected to the drone's flight controller via a serial link (UART). The flight controller obtains position, speed and altitude from it – data for display in the OSD (coordinates, distance and direction to the take-off point, speed), for telemetry and for the *GPS Rescue* function. Compared with version V3, the V3.1 additionally has a **connector**, so the module can be connected without soldering on the module. The module **has no compass** (magnetometer).



GOKU GM10 Nano V3.1 – size of the module compared with a finger

2.2 Package contents

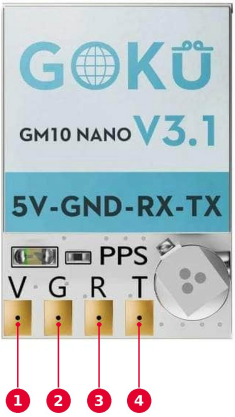
Qty	Item
1	GPS module GOKU GM10 Nano V3.1
1	Connection cable, length 100 mm
1	Copper foil

Not included: flight controller, drone, double-sided mounting tape, soldering equipment.

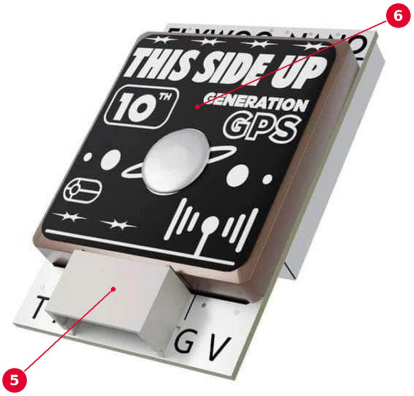


Package contents: module, cable and copper foil

2.3 Parts description



Top side of the module (label with designation)



Antenna side (THIS SIDE UP) with the connector

① **V** – power supply 3.3–5 V (marked 5V on the label)

② **G** – ground (GND)

③ **R** – RX, data input of the module (connect to TX of the flight controller)

④ **T** – TX, data output of the module (connect to RX of the flight controller)

⑤ **Connector** for the supplied connection cable – connection without soldering on the module

⑥ **Antenna** marked *THIS SIDE UP* – after installation this side must face the sky

On the top side of the module there is a yellow **PPS** indicator: it is off until the module has determined its position (fix); once the position is determined, it **flashes**.

2.4 Technical data

Data provided by the manufacturer Flywoo.

Parameter	Value
Model	GOKU GM10 Nano V3.1
Chip	M10050 (10th generation)
Supported systems	GPS, GLONASS, Galileo, BeiDou, QZSS and SBAS
Default systems	GPS, Galileo, BeiDou
Received signals	GPS L1, GLONASS L1, BeiDou B1, SBAS L1, Galileo E1
Number of channels	72 search channels
Sensitivity	tracking −162 dBm, reacquisition −160 dBm
Output frequency	1–10 Hz, default 10 Hz
Baud rate	4800–921600 bps, default 115200 bps
Signal level	TTL (default)
Protocol	UBLOX (UBX) or NMEA
Operational limits	altitude max. 50,000 m, velocity max. 500 m/s, acceleration less than 4 g
Supply voltage	3.3–5 V DC
Operating temperature	−40 °C to +85 °C
Storage temperature	−40 °C to +105 °C
Compass (magnetometer)	no
Pins	RX, TX, 3.3–5 V, GND (4 pads) + connector
Indicator	PPS, yellow
Dimensions	12 × 16 × 4.5 mm
Weight	2.5 g

3. Legal and operating notes

3.1 The law of the country where you fly applies

Regulations (EU) 2019/947 and 2019/945 apply in all member states of the European Union, but national implementing rules differ from country to country – registration portals, minimum pilot age, geographical zones, compulsory insurance, permitted frequency bands and maximum transmit power. The information in this chapter describes the situation in the Czech Republic. If you operate a drone in another country, you must follow the regulations of the country in which you fly.

3.2 GPS module and drone operating rules

- The module is a separately sold component. Installing it **does not give the drone a class label** C0–C6 under Regulation (EU) 2019/945.
- The module **does not provide direct remote identification** (Remote ID) or geo-awareness.
- A drone fitted with the module continues to be operated under Regulation (EU) 2019/947 and national regulations – in particular operator registration, the maximum height of 120 m, flying within visual line of sight and geographical zones.
- The *GPS Rescue* function is an emergency aid. It does not entitle you to fly beyond visual line of sight or in places where drone operation is prohibited.

3.3 Reception of radio signals

The module is radio equipment that **only receives** radio signals (the satellite navigation signals listed in Chapter 2.4) and **does not transmit anything**. Therefore no authorisation to use frequencies and no transmit power setting is required for its operation.

4. Installation and wiring

4.1 What else you need

- A drone with a flight controller that has a **free hardware UART** (a pair of RX and TX pads) and a 3.3 V or 5 V power output.
- A computer with the flight controller firmware configurator (Betaflight Configurator or INAV Configurator) and a USB data cable.
- Double-sided foam tape or soldering equipment.

4.2 Positioning the module

- Side marked **THIS SIDE UP** (antenna) **facing the sky**. There must be no carbon, metal or other electronics above the antenna.
- Ideally on top of the drone – on the stack or on the canopy. On small drones, stick the module onto the canopy with foam tape.
- As far as possible from the video transmitter (VTX), its antenna, the camera and the RC receiver. These parts are the most common source of GPS interference.
- Fix the module firmly so that it cannot come loose in flight or in a crash, and route the cable so that it cannot get into the propellers.

※ The manufacturer supplies copper foil but does not describe its use. In FPV practice, copper foil is used as shielding between the GPS module and interfering electronics below it. The foil is conductive – it must not touch the pads, pins or components.

4.3 Connecting to the flight controller

Connect the module to a free hardware UART of the flight controller. For newer Flywoo flight controllers the manufacturer typically recommends UART4 or UART6; for other flight controllers, follow their documentation. The data wires are connected **crosswise**:

Connect the power only to the 5 V or 3.3 V output of the flight controller – never to the battery voltage (VBAT).

GPS module		Flight controller (FC)
V (3.3–5 V)	→	5 V or 3.3 V
G (GND)	→	GND
T (TX)	→	RX of the selected UART
R (RX)	→	TX of the selected UART

- **Without soldering on the module:** plug the supplied cable into connector ⑤. The wire colours are not specified – check which wire leads to which pin (V, G, R, T).
- **By soldering:** solder the wires directly to pads ①–④.

5. Firmware setup

5.1 Betaflight

The manufacturer gives the following procedure for Betaflight (menu paths are given as they appear in the configurator):

① On the *Ports* tab, for the UART the module is connected to, set **GPS** in the *Sensor Input* column and the speed to **115200**. *Serial RX* or any other function must not be enabled on the same UART. Save.

② On the *Configuration* tab (in newer versions the *GPS* tab), turn on the **GPS** switch and select **UBLOX** as the protocol. Enable *Auto Baud* and *Auto Config*, and optionally *Use Galileo*. Save.

③ After restarting, satellites should start appearing on the *GPS* tab. The first position fix after a longer break may take longer.

The same settings can also be entered on the *CLI* tab:

```
set gps_provider = UBLOX
set gps_auto_config = ON
set gps_auto_baud = ON
set gps_ublox_use_galileo = ON
save
```

※ With older Betaflight versions that do not support the UBLOX protocol with this module, use the **NMEA** protocol. According to the manufacturer, there is no difference in performance between the protocols.

5.2 GPS Rescue in Betaflight

After loss of the RC link signal, or when activated by a switch, the *GPS Rescue* function attempts to return the drone to the take-off point. The manufacturer gives the following procedure:

① On the *Failsafe* tab, in the *Channel Fallback Settings* section, set the channel of the GPS Rescue mode switch to *Set* on signal loss so that the mode is activated.

② In the *Failsafe* section, select **GPS Rescue** as the procedure and set its parameters – angle, return altitude, speed, throttle and minimum number of satellites – according to your drone and flying site.

③ On the *Modes* tab you can also assign GPS Rescue to a switch and test the function safely.

Leave the “Allow arming without fix” option disabled. If you enable it, GPS Rescue will not be available when taking off without a fix.

The specific parameter values depend on the drone – the module manufacturer does not prescribe them. Details can be found in the Betaflight documentation at betaflight.com.

5.3 INAV

The module can also be used with INAV firmware. On the *Ports* tab, enable the **GPS** function for the relevant UART; on the *Configuration* tab, enable GPS and select the **UBLOX** protocol. INAV navigation modes usually require a compass – this module has no compass. The procedure and requirements of the individual modes can be found in the INAV documentation at github.com/iNavFlight/inav.

6. Use

6.1 Before the flight

- Switch on the drone in an open area with a view of the sky and let the module search for satellites. The yellow PPS indicator starts flashing once the position is determined.
- Wait until the flight controller reports a sufficient number of satellites and a stored home position (Home) in the OSD. Only then Arm (start the motors).
- The home position is stored at the moment of Arm. If you Arm before the module has a fix, return to home will not be available.
- Always insert a fully charged battery before the flight (4.20 V/cell for Li-Po, 4.35 V/cell for LiHV).

6.2 During the flight

- Watch the number of satellites and the distance from the take-off point in the OSD. If the number of satellites drops, return and land.
- End the flight at 3.5 V/cell at the latest – GPS Rescue needs enough energy for the return.
- If GPS Rescue activates, watch the drone and be ready to take over control as soon as the RC link signal is restored.

6.3 Finding the drone after a crash

If the OSD or telemetry displays coordinates, note the last known position (for example from the goggles recording or the radio telemetry) and search for the drone in its vicinity.

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- After a crash, check that the module is firmly attached, that the antenna, cable and connector are not damaged and that the solder joints are not cracked.
- Keep the antenna clean and dry. Protect the module from moisture and water.
- Store in a dry place within the storage temperature range of −40 °C to +105 °C.

7.2 Troubleshooting

Problem	Cause and solution
Flight controller does not see the GPS (*GPS* tab without data)	TX and RX wires swapped – connect them crosswise. On the *Ports* tab, GPS is set on a different UART than the one the module is connected to. *Serial RX* is enabled on the same UART. Check the module's power supply.
Module finds no or few satellites	You are trying indoors – go outside under open sky. The antenna is not facing the sky or is covered by carbon. Interference from the VTX, camera or receiver – move the module further away or use shielding. The first position fix may take longer.
PPS indicator does not flash	The module does not yet have a position fix. If it does not light up even after a longer time outdoors, check the power supply.
Unable to Arm	Betaflight may block Arm until GPS Rescue has enough satellites. Wait for a fix, or check the minimum satellites setting.
UBLOX protocol does not work	Older firmware version – use NMEA, or update the flight controller firmware.

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:** the type designation (GOKU GM10 Nano V3.1) is printed on the module label (the side marked GOKU).

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.