WS-M181 GPS

Walksnail GPS module with compass
User manual



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

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1. Product description

1.1 Intended use

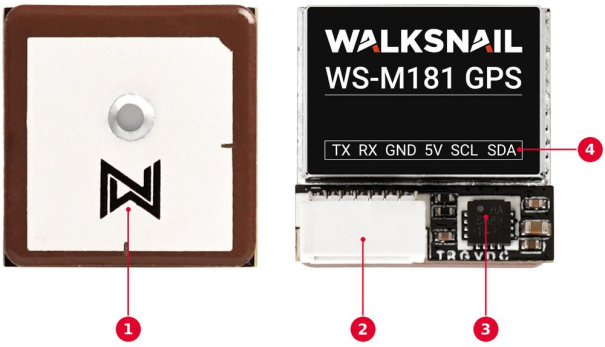
The Walksnail WS-M181 is a small, lightweight GNSS (GPS) module with a built-in compass (magnetometer) for FPV drones, multicopters, RC airplanes and other models. It connects to the flight controller (FC) and supplies it with position, speed and time from satellite navigation systems. The flight controller uses this data for the OSD, for return-to-home functions (e.g. GPS Rescue in Betaflight) or for the navigation modes of the INAV firmware.

The module uses an M10 (10th generation) GNSS chip and a ceramic antenna with a surface finish that protects it against scratches and oxidation. The built-in backup battery enables a so-called hot start – after a short power interruption the module acquires its position faster. The module **only receives satellite signals and does not transmit anything**.



Walksnail WS-M181 GPS module – ceramic antenna side

1.2 Parts



Left: antenna side (top side); right: bottom side with connector

① ceramic GNSS antenna – must face up towards the sky when installed

② six-pin connector for connection to the flight controller

③ magnetometer (compass) chip

④ pin labels: TX, RX, GND, 5V, SCL, SDA

1.3 Specifications and package contents

Parameter	Value
Product designation	Walksnail WS-M181 GPS (manufacturer code C0PJ-18GPS)
Manufacturer	Walksnail (CaddxFPV), www.caddxfpv.com
GNSS chip	M10 (10th generation)
Received signals	GPS L1, GLONASS L1, BDS B1, GALILEO E1, SBAS L1, QZSS L1
Positioning modes	6 system combinations; default GPS + GLONASS + BDS
Receiving channels	72
Compass (magnetometer)	built-in, I2C bus (SCL, SDA) – chip type see note
Antenna	ceramic
Power supply	5 V
Communication with FC	UART (TX, RX), 115200 Bd
Output protocol	dual-protocol GNSS output (NMEA compatible)
Output rate	1–10 Hz, default 10 Hz
Speed accuracy	0.05 m/s
Horizontal position accuracy	1.5 m (2D, open sky)
Sensitivity	tracking −162 dBm, acquisition −160 dBm
Dynamic limits	altitude 50,000 m, speed 500 m/s, acceleration 4 g
Dimensions	18 × 18 × 4.6 mm
Weight	approx. 4.3 g
Operating temperature	−40 °C to +85 °C
Storage temperature	−40 °C to +105 °C

※ The manufacturer's description of the module states an IST8310 magnetometer, but the chip shown in the manufacturer's photos is marked as a 5883-series part. Therefore set magnetometer detection to automatic (*AUTO*) in the flight controller; the firmware will identify the chip type itself.

▶ Package contents

- 1× Walksnail WS-M181 GPS module with compass

▶ Not included

- flight controller (FC), drone or any other model,
- module mount and fastening material,
- a connection cable is not listed in the package contents – if there is none in the package, use a six-pin cable with a matching connector.

2. Use

2.1 Safety and operation

- Connect and disconnect the module only with the flight controller **powered off** (battery and USB disconnected).
- Power the module with **5 V** only. A higher voltage (e.g. directly from the battery) will permanently damage the module.
- Protect the module against water, moisture, dust and mechanical damage. Do not cover the ceramic antenna with metal or carbon.
- Satellite navigation does not guarantee a safe flight. Test return-to-home functions and navigation modes in a safe area before first use and always be ready to take over manual control.
- Installing the module changes the equipment of the drone. The operator is responsible for operating the drone; **the regulations of the country in which you operate the drone always apply** (in the EU in particular Regulation (EU) 2019/947 and national implementing rules).
- The module contains a built-in backup battery. Do not expose it to fire or high temperatures and do not dispose of it with mixed waste (see Chapter 5.2).

2.2 Mounting position on the drone

- Mount the module so that the ceramic antenna ① has a **clear view of the sky** – facing up, ideally at the highest point of the drone.
- There must be no carbon, metal, wires or other electronics above the antenna. A plastic cover or a 3D-printed mount is fine.
- Because of the compass, place the module as far as possible from the battery power leads, electronic speed controllers (ESC), motors, video transmitter (VTX) and magnets. High currents and magnets distort the compass readings.
- Fasten the module firmly so that it cannot move in flight – if the module's orientation changes, the compass will give wrong readings. Note the orientation; you will set it in the firmware (Chapter 3.3).
- Do not mount the module directly on sources of interference, e.g. right next to the VTX antenna or a digital video camera.

2.3 Connection to the flight controller

The GPS connects to a free serial port (UART) of the flight controller, the compass to the I2C bus. If you do not use the compass, only the first four wires need to be connected.

GPS pin	Connect to FC	Note
TX	RX of the selected UART	data from GPS to FC (crossed)
RX	TX of the same UART	data from FC to GPS (crossed)
GND	GND	common ground
5V	5 V output (4V5)	5 V only
SCL	SCL (I2C)	compass only
SDA	SDA (I2C)	compass only

- The **TX and RX wires are crossed** – TX of the module to RX of the flight controller and vice versa.
- The pin order is printed on the module label ④. Before connecting, check which cable wire corresponds to which pin – wire colours are not standardised and cables from different manufacturers differ.
- Note the number of the UART to which you connect the module; you will need it when configuring the firmware.
- On some flight controllers the 4V5 output is also powered from USB. The GPS then works when connected to a computer without a battery, which makes the initial setup easier.

Before switching on for the first time, check that there is no higher voltage on the 5V pin and that the 5V and GND wires are not swapped. Incorrect power wiring will damage the module and is not a product defect.

3. Firmware configuration

The module uses a 10th generation GNSS chip. The flight controller therefore needs up-to-date firmware with support for M10 chips; older firmware may fail to communicate with it via UBLOX. Tab and option names may differ slightly depending on the configurator version.

3.1 Betaflight

① In Betaflight Configurator, on the *Ports* tab, for the UART the module is connected to, select *GPS* in the *Sensor Input* column and the baud rate *AUTO* (or 115200). Save with *Save and Reboot*.

② On the *Configuration* tab (*GPS* in newer versions), enable the *GPS* feature, select *UBLOX* as the protocol and enable *Auto Baud* and *Auto Config*. Save and check on the *GPS* tab that satellites and position are displayed.

③ Compass: the firmware must be built with magnetometer support (option *MAG* when building in the cloud). In the *Magnetometer* setting select *AUTO*.

④ Set up the *GPS Rescue* function on the *Failsafe* tab and add GPS data (satellite count, distance and direction to home, speed) to the OSD on the *OSD* tab.

3.2 INAV

① On the *Ports* tab, for the relevant UART select *GPS* in the sensors column and the baud rate 115200. Save and reboot.

② On the *Configuration* tab enable *GPS*, select *UBLOX* as the protocol and leave the magnetometer at *AUTO*. Save, reboot and check on the *Setup* tab that the GPS and MAG sensors are active.

③ Assign navigation modes (e.g. RTH, Position Hold) to switches on the *Modes* tab. Test them in a safe area before first use.

3.3 First fix and compass calibration

- Perform the first fix (cold start) outdoors, away from buildings and trees. It may take several minutes; after a short power interruption the backup battery speeds it up.
- Do not take off until the flight controller reports a valid position (fix) and a sufficient number of satellites.
- **Compass orientation:** if the module is not mounted in the default orientation relative to the flight controller, set its orientation (parameter *mag_align* in Betaflight, the *Alignment Tool* in INAV).
- **Compass calibration:** after installation start the calibration (*Calibrate Magnetometer* in Betaflight, *Calibrate Compass* in INAV) and slowly rotate the drone in all axes during it. Calibrate outdoors, away from metal objects and cars, then check that the heading in the configurator matches the drone.
- Recalibrate after moving the module or the power leads.

4. Troubleshooting and maintenance

▶ Maintenance and storage

- Keep the antenna clean and dry; do not clean it with solvents.
- Check the condition of the cable and connector, especially after a crash.
- Store in a dry place within the storage temperature range given in Chapter 1.3.

Problem	Possible cause and solution
GPS does not appear in the configurator at all	TX and RX wires swapped – connect them crossed. Check that the correct UART is selected on the *Ports* tab and that the module has 5 V power.
GPS communicates but reports no satellites	You are indoors or the antenna has no view of the sky. Perform the first fix outdoors and wait several minutes.
Few satellites, position drifts	Interference from the VTX, camera or other electronics, antenna covered by carbon. Move the module higher and further from sources of interference.
Compass not detected	Firmware without magnetometer support, SCL/SDA not connected. Try swapping the SCL and SDA wires – the labelling on the label and on the module board may differ.
Drone circles or flies in the wrong direction when returning	Incorrect compass orientation or interference from power leads. Check *mag_align*, recalibrate the compass and move the module away from the power leads.
Fix takes a long time after a longer break	After longer storage without power the first fix is a cold start. Wait under open sky until the module acquires satellites.

5. Information for the EU and Czech Market

5.1 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

5.2 Disposal of electrical equipment and batteries



- 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 product contains a built-in rechargeable battery. Where possible, hand it over together with the device – do not dispose of the battery in mixed waste or in fire.
- 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.

6. 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 5.1.
- 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.