F9P H-RTK Series

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DroneCAN F9P

Overview

Overview

Overview

The DroneCAN H-RTK F9P is the latest differential high-precision GNSS positioning system from Holybro. This system provides multi-band RTK with fast convergence times and reliable performance, concurrent reception of GPS, GLONASS, Galileo and BeiDou, and a fast update rate for highly dynamic and high volume applications with centimeter-accuracy. It has adopted the DroneCAN protocol for communication.

With the adoption of the DroneCAN Protocol, it has up to an 8 Hz navigation update rate, upgradeability, noise immunity, real-time features, and is more robust than UART due to its increased resistance to electromagnetic interference. It does not occupy any serial port of the flight controller, and multiple CAN devices can be connected to the same CAN bus via a hub.

The DroneCAN-F9P uses a u-blox F9P module, a BMM150 compass, and a tri-colored LED indicator. It is equipped with either the STM32G4 processor running at 170 MHz with 512 KByte Flash or 96KByte RAM or the the NXP S32K14 processor with 1MB Flash and 128 KB RAM. Compatible with the open source *Pixhawk* series flight controller with both PX4 & Ardupilot Firmware

Features

We have designed two models of DroneCAN H-RTK F9P for you to choose, each with different form factor and antenna design to meet different customer needs.

DroneCAN F9P Rover
The Rover model has a flatter profile and stronger water resistance. It uses a dual band patch antenna and comes with an integrated cable to connect to the CAN bus. It excels in spaces where there are few obstructions.

DroneCAN F9P Helical
This model uses a helical antenna, which has slightly better performance in space with obstructions than the Rover version. The antenna of this module can either be attached to the module directly

or connected via a SMA cable, giving you the ultimate flexibility. It also has a UART2 port exposed, allowing you to do YAW/Heading (aka moving baseline).

This model can be used either on the rover (aircraft) or as a base station. However, when used as Base Station, RTK communicate with the Ground Control Station via USB, so the DroneCAN protocol is not used. You can consider using the standard H-RTK Helical Base model as Base Station.

> □□ _[Image — to be added]_ > □□ _[Image — to be added]_ > □□ _[Image — to be added]_

> □□ *[Image — to be added]*

Specification

Specification

Hardware Specification

Product Model	DroneCAN H-RTK F9P Rover	DroneCAN H-RTK F9P Helical
Intended Application	Rover (aircraft) only	Rover (aircraft) or Base station
GNSS Receiver	U-blox ZED-F9P high precision GNSS module	U-blox ZED-F9P high precision GNSS module
Antenna	Ceramic Patch Antenna with 20dB LNA	Helical Antenna with 36dB LNA
Processor	STM32G473	Available with • STM32-G473 or • NXP-S32k146
Magnetometer	BMM150 or IST8310	BMM150 or IST8310
GNSS	BeiDou, Galileo, GLONASS, GPS / QZSS	BeiDou, Galileo, GLONASS, GPS / QZSS
GNSS Band	B1I, B2I, E1B/C, E5b, L1C/A, L1OF, L2C, L2OF	B1I, B2I, E1B/C, E5b, L1C/A, L1OF, L2C, L2OF
Positioning accuracy	3D FIX: 1.5 m / RTK: 0.01 m	3D FIX: 1.5 m / RTK: 0.01 m
Communication Protocol	DroneCAN 1Mbit/s	DroneCAN 1Mbit/s
Antennas Peak Gain (MAX)	L1: 4.0dBi L2:1.0 dBi	L1: 2dBi L2: 2dBi
Time-TO-First Fix	Cold start: ≤29s Hot start: ≤1s	Cold start: ≤25s Hot start: ≤1s
Navigation Update Rate	RAW: 20Hz Max RTK: 8Hz Max	RAW: 20Hz Max RTK: 8Hz Max Moving Base RTK: 5Hz Max
Cable Length	27cm or 50cm	N/A

Product Model	DroneCAN H-RTK F9P Rover	DroneCAN H-RTK F9P Helical
Antenna Connection Type	N/A	Board: SMA female Antenna: SMA male
Working voltage:	4.75V~5.25V	4.75V~5.25V
Current Consumption	~250mA	~250mA
Dimensions	Diameter: 80mm Height: 20mm	Board (G4): 51.1*35*22.9mm Board (S32k1): 51.1*35*24.3mm Antenna Diameter: 27.5mm Antenna height: 59mm
Weight	123g	58g
Operating Temperature	-20℃ to 85℃	-20℃ to 85℃

Pinout

Pinout

> *[Image: DroneCAN F9P Rover — to be added]*

> *[Image: DroneCAN F9P Helical — to be added]*

> *[Image: DroneCAN F9P Helical (S32K1 Version) — to be added]*

Dimension

Dimension

> [Image: DroneCAN F9P Rover — to be added]

> [Image: DroneCAN F9P Helical — to be added]

> [Image: DroneCAN F9P Helical (S32K1) — to be added]

Setup & Getting Started

Setup & Getting Started

> **i Info**
>
> The setup process is the same as the ZED-F9P, please refer to the link below.

{% content-ref url="/pages/tV9bcdRhYS4L8MWIaGBU" %} Setup & Getting Started (PX4) {% endcontent-ref %}

{% content-ref url="/pages/P59ZJKFtlbTcjwM0HlUe" %} Setup & Getting Started (Ardupilot) {% endcontent-ref %}

DroneCAN FW Upgrade

DroneCAN FW Upgrade

> **i Info**
>
> For U-blox Firmware Upgrade, please see here.

> **i Info**
>
> As of September 1, 2024, the Holybro AP-Periph DroneCAN stable firmware does not support the IST8310 and RM3100 sensors. However, support is available in the latest (master) firmware and will be included in the upcoming stable release.
>
> You can download the latest firmware here: HolybroG4_GPS Latest Firmware.
>
> If you are working with a custom firmware, you can refer to the following pull request for the necessary code changes: ArduPilot Pull Request #27878.

DroneCAN MCU Firmware Upgrade

Please use Mission Planner 1.3.74 or higher.

Close the parameter setting page, click “Menu>Update” to check available updates. Update the DroneCAN MCU firmware.

After clicking “Update”, it will ask whether to search for updates from the Internet. Click “Yes”. (Automatically searches for upgrades to the latest stable version firmware).

> *[Image — to be added]*

If “No update available” appears when searching updates. You can try to turn off your firewall in the system setting and try again.

> □□ _[Image — to be added]_

Alternatively, If you have already downloaded the firmware on your local computer from ArduPilot Firmware (name of firmware folder is “HolybroG4-GPS” , and file to download is “AP_Periph.bin”) , Click “No” and you will be presented with a selection dialog box and then select the firmware file from your local drive.

> □□ *[Image — to be added]*

After the upgrade, check whether the version is successfully upgraded.

> □□ *[Image — to be added]*

Download

Download

H-RTK F9P Helical CAD Files

> [Downloadable file — to be added]

> [Downloadable file — to be added]

H-RTK F9P Rover CAD Files

> [Downloadable file — to be added]

Standard F9P (UART)

Overview

Overview

> [Image — to be added]

Overview

H-RTK F9P is the latest differential high-precision GNSS positioning system series from Holybro. This system provides multi-band RTK with fast convergence times and reliable performance, concurrent reception of GPS, GLONASS, Galileo and BeiDou, and fast update rate for highly dynamic and high volume applications with centimeter-accuracy.

It uses a UBLOX F9P module, a IST8310 compass, and a tri-colored LED indicator. It also has a integrated safety switch for a simple and convenient operation.

Features

We have designed three models of H-RTK F9P for you to choose, each with different size and antenna design to meet different customer needs.

F9P Rover Lite

F9P Rover Lite

H-RTK F9P Rover Lite

> **i Info**
>
> There are two version available.
>
> ***Standard**** version** comes with 10 Pin connector for Pixhawk **GPS1** port. (Connector not compatible with CubePilot)
>
> &#xNAN;***2nd GPS**** version** comes with 8 pin connector for Pixhawk **GPS2** Port or **GPS2** Port on the CubePilot

This model is low profile, lower cost, and has high performance, It can meet the needs of general DIY users. Due to the lower cost, this model can also greatly minimize the cost of large swarm drone projects such as swarm light shows.

It has an integrated safety switch and a tri-colored LED indicator, and it is compatible with the open source *Pixhawk* series flight controller.

> *[Image — to be added]*

F9P Helical

F9P Helical

This model uses a helical antenna, which has better performance than the Rover Lite version. This model can be used both on a rover (aircraft) or as a base station. The aluminum alloy shell design also has an integrated safety switch and a tri-colored LED indicator, and it is compatible with the open source *Pixhawk* series flight controller.

> □□ _[Image — to be added]_ > □□ _[Image — to be added]_

F9P Base

F9P Base

The board itself is the same as F9P Helical, but it is equipped with a much better high-gain antenna. This model is best suited to use as base station. The search speed and positioning accuracy are the highest among the three models.

> *[Image — to be added]*

H-RTK with CubePilot Controller

H-RTK with CubePilot Controller

The Standard H-RTK F9P GPS can be used with CubePilot controller by connecting to **GPS 2** port.

If using Ardupilot with The Cube, set `Serial3_Protocol` **to -1** so that Ardupilot will read GPS2 port for GPS data if there is nothing connected on the GPS1 port.

> **i Info**
>
> **Note:** GPS2 port on both Pixhawk & Cube does not support Safety Switch function. You can use an external safety switch or disable the safety switch on ground control station application.

> *[Image — to be added]*

> *[Image — to be added]*

Standard F9P (UART)

Specification & Comparison

Specification & Comparison

> □□ *[Image — to be added]* > □□ *[Image — to be added]* > □□ *[Image — to be added]*

Specification & Comparison

Product Model	H-RTK F9P Rover lite	H-RTK F9P Helical	H-RTK F9P Base
SKU	SKU12017 & SKU12025	SKU12018	SKU12022
Application	Rover (aircraft) only	Rover (aircraft) or base station	Base station only
GNSS	GPS L1C/A GPS L2C GLONASS L1Oz GLONASS L2OFz) BeiDou B1 BeiDou B2Hz) Galileo E1-B/CH Galileo E5b	GPS L1C/A GPS L2C GLONASS L1Oz GLONASS L2OFz) BeiDou B1 BeiDou B2Hz) Galileo E1-B/CH Galileo E5b	GPS L1C/A GPS L2C GLONASS L1Oz GLONASS L2OFz) BeiDou B1 BeiDou B2Hz) Galileo E1-B/CH Galileo E5b
Antennas Peak Gain (MAX)	L1: 4.0dBi L2:1.0 dBi	2dBi	5.5dBi
LNA Gain (typical)	20.5±1dB	33±2dB	40±2dB
Time-TO-First Fix	Cold start:≤29s Hot start:≤1s	Cold start:≤25s Hot start:≤1s	Cold start:≤24s Hot start:≤1s
RTK-SurveyIn-Time	N/A	≤5 minute @2.0mCEP	≤5 minute @1.5mCEP
Data and Update Rate	RAW: 20Hz Max RTK: 8Hz Max	RAW: 20Hz Max RTK: 8Hz Max Moving Base RTK: 5Hz Max	RAW: 20Hz Max RTK: 8Hz Max Moving Base RTK: 5Hz Max

Port	GH1.25 10pin cable or GH1.25 6pin cable	Port 1: GH1.25 10-pin Port 2: USB Type-c Port 3: UART 2 (GH1.25 6pin)	Port 1: GH1.25 10-pin Port 2: USB Type-c Port 3: UART 2 (GH1.25 6pin)
Cable Length	26cm	GH 10P: 150mm GH 10P: 400mm GH 10P to 6P: 300mm	SMA-TNC: 5m
Antenna Connection Type	N/A	Board: SMA female Antenna: SMA male	Board: SMA female Antenna: TNC female Male-male SMA-TNC cable length: 5m (included)
Baud rate:	115200 5Hz (default) can be set	115200 5Hz (default) can be set	115200 5Hz (default) can be set
Working voltage:	4.75V~5.25V	4.75V~5.25V	4.75V~5.25V
Current Consumption	~250mA	~250mA	~250mA
Dimensions	Diameter: 76mm Height: 20mm	Board: 34.8*52.7*12.9mm Antenna Diameter: 27.5mm Antenna height: 59mm	Board: 34.8*52.7*12.9mm Antenna Diameter: 152mm Antenna height: 62.2mm
Weight	106g	49g	469g

> **i Info**
>
> There are two version of **Rover Lite** available.
>
> ***Standard**** version** comes with 10 Pin connector for Pixhawk **GPS1** port. (Connector not compatible with CubePilot)
>
> * ***2nd GPS**** version** comes with 8 pin connector for Pixhawk **GPS2** Port or **GPS2** Port on the CubePilot

Comparing F9P to M8P

> *[Image — to be added]*

Setup & Getting Started

Setup & Getting Started

> *[Image — to be added]*

Getting started

This manual is split into two parts; the first is an overview of the basic setup of the GPS units. In the following examples the H-RTK M8P is used but the setup and operation of M8P and F9P GPS units are the same. The second part of this manual explains how to update and change the settings on your GPS unit. Although this section is optional, it is recommended that you run update your GPS units to ensure it has the latest firmware for the best possible performance.

> ⚠ **Warning**
>
> ### Ardupilot User:
>
> If unable to preform normal compass calibration "compass dance" for any reason, set parameter **COMPASS_ORIENT=6** (Yaw270) for proper compass orientation..

Plug and Play Installation

In this section of the manual, we will cover the basic setup of the units. To setup the GPS units you will need Mission Planner installed on your computer & ArduPilot V4.03 or later installed on your flight controller.

If you are using PX4 firmware and QGroundControl ground station software, please refer to the link for more information: https://docs.px4.io/main/en/gps_compass/rtk_gps

>

> □□ *[Image — to be added]*

Before you start

Make sure you have the following pieces handy before you start this process:

- H-RTK M8P/F9P Rover-Lite/Helical and H-RTK M8P/F9P Helical/Base
- A compatible Pixhawk flight controller (HolyBro Pixhawk Series or Holybro Durandal is recommended)
- A configured telemetry radio set so the GPS data can be continually sent to and from the flight controller while flying (Sik Telemetry Radio is used in this guide)
- A laptop computer

> “ □□ *[Image — to be added]*

Connect both the ground station GPS unit (H-RTK M8P Helical or H-RTK M8P Base) and the telemetry radio to your laptop using the supplied USB cables.

> “ □□ *[Image — to be added]*

On the UAV side connect the H-RTK M8P Rover-Lite/Helical to the GPS port on your flight controller using the 10 pin connector cable. Connect another telemetry radio to the TELEM1 interface of the flight controller. Be aware that older Pixhawk flight controllers may have different connector type.

Before you start the setup, make sure both units have a good view of the sky so they can receive the best signal from the GPS satellites.

Basic configuration

For this step Mission Planner needs to be installed and running on your Laptop (https://ardupilot.org/planner/). Note that the Pixhawk/Durandal flight controller and attached H-RTK M8P Rover-Lite/Helical unit do not need to be powered when the base unit is being configured.

Open Mission Planner and go to **Optional Hardware** and select the **RTK/GPS Inject** tab.

> “ □□ *[Image — to be added]*

Check the box for Inject MSG Type, Send GCA, M8P/F9P Autoconfig and M8P FW 130+/F9P.

Select the correct base module com port in the top left corner and click connect. In the **SurveyIn Acc** section, enter the absolute geographic accuracy that you expect your H-RTK M8P base station to achieve. In the **Time** column, enter the minimum survey time you expect. Click on Restart, the ground station will transfer the data you have entered to the H-RTK M8P base module and the base module will start a new round of surveying for GPS satellites.

> *[Image — to be added]*

As part of the search, the box on the right side of the Mission Planner displays the current star search position. Below are some of the status messages you may see:

- **Position is invalid**: the base station has not been effectively positioned yet
- **Duration**: the number of seconds in which a star search has been performed
- **Observation**: Number of observations obtained
- **Current Acc**: Absolute geographic accuracy that the base station is able to achieve

The green bar below the Mission Planner shows the current satellite search and satellite signal strength.

The GPS base station will need some time to find enough GPS satellites to achieve the level of accuracy you selected, less accuracy requires less GPS satellites. With a good view of the sky, it can take several minutes to achieve the absolute accuracy of 2m, about an hour to achieve the absolute accuracy of 30cm, and several hours to achieve the accuracy of 10cm.

It should be noted that the absolute geographic accuracy of the base station here will affect the absolute geographic accuracy of the mobile station (as they act as a pair) but will not affect the relative accuracy of the base station and Rover module. If you don’t need the higher accuracy, then do not set it as this will dramatically increase the time taken for the system to establish a GPS lock of sufficient quality. Note that even if the accuracy of the base station is 1.5m to 2m, the position accuracy of Rover module relative to the base station can still reach centimeter level.

After the star search for H-RTK M8P Base station is completed, the Mission Planner will display the following page:

> *[Image — to be added]*

The indicator statuses should look like this. All green. This shows status of base station (BASE) is ready, along with GPS and GLONASS satellite systems.

When your screen looks like this, store the Current location on Mission Planner: Click **Save Current Pos**, before opening the plan.

Enter a name in the box for the save and click OK. In the following figure, you can see where you stored in the list. You can now select this location using this saved file.

> *[Image — to be added]*

With the Use button corresponding to the stored location, the base station will enter the fixed-point mode and display the status in the box on the right. When you set the base station at the same location in the future, you don't need to search again; just click on your **Saved location** the **Use** button corresponding to the location to load the location data.

After the base station is set up, you can turn on the UAV.

Using Mission Planner to connect to the UAV via telemetry radios

The RTCM GPS data of the base station will be transferred to the H-RTK M8P Rover Lite module on the UAV through the telemetry radios.

> *[Image — to be added]*

On the Mission Planner's main page, you can see that the current GPS status of the UAV is shown as RTK Float/RTK Fixed/3D RTK (as shown above), showing that the positioning of the UAV has entered the RTK status.

RTK Float is a floating-point solution, and RTK Fixed is a fixed solution. RTK Fixed has a higher accuracy and only available then the signal is good enough. 3D RTK is the uniform display mode of RTK Float/RTK Fixed for the Chinese version of Mission Planner. Refer to the latest Mission Planner documentation for the latest updates.

TIP: If you use F9P Base and Rover, the orange RTK FIX led on F9P Rover Lite module will blink when receiving RTCM data. And the RTK FIX led will stay on when the Rover module has entered the RTK status.

> *[Image — to be added]*

Congratulations, you successfully have setup the Holybro H-RTK GPS system!

Updating your GPS units

This step is optional but **highly** recommend for the optimum performance of your new Holybro GPS products. To update your GPS units, you will need to download and use the free u-Center software.

To download u-Center, please go to the official website then follow the prompts to install the U-Center software onto your computer. During installation, you will be prompted to install a windows driver. On newer u-center, select "Use Windows USB Serial Driver". On the older version it will ask which driver you want to install, make sure ‘Standard Driver for Windows’ is checked.

Downloading the firmware for the GPS Units

The shipped firmware version of the H-M8P module supports other satellite systems (Glonass/ Beidou) and GPS fusion for RTK computing that increases the performance of RTK positioning, and also supports the function of mobile base stations, that is, base stations do not need to be fixed in one place, but can be moved whenever they are in use. If a new firmware version of Ublox is available, it is recommended that all users upgrade to the latest version of the firmware before using the H-M8P module.

Before the firmware update, download the latest Firmware from u-blox's website

- For M8P - https://www.u-blox.com/en/product/neo-m8p-series
  - Scroll down and go to Documentation & resources
  - Click on the dropdown bar "File Category" and check "Firmware Update"
  - Find the latest Firmware for both "Rover" & "Reference" (ex. file name "FW 3.05 HPG 1.43 for NEO-M8P, rover" & "FW 3.05 HPG 1.43 for NEO-M8P, reference")
- For F9P - https://www.u-blox.com/en/product/zed-f9p-module
  - Scroll down and go to Documentation & resources
  - Click on the dropdown bar "File Category" and check "Firmware Update"
  - Find the latest Firmware (ex. file name "ZED-F9P HPG 1.32 firmware", Rover & Base both use the same FW)

F9P Firmware Update

For information on how to update the F9P firmware, please see link below.

{% content-ref url="/pages/U78J7ol8JELmVOCjvSb8" %} u-blox F9P Firmware Upgrade {% endcontent-ref %}

Using U-Center for Real Time Recording and Playback

U-Center can record the data of the currently connected GNSS module for later analysis and use.

To do this make sure that the GNSS module is connected to U-Center (the connection mode is the same as the upgrade process above), click the bug icon below to open the Debug Message:

> *[Image — to be added]*

Then, click enter view-> message view-> UBX-> RXM-> RTCM input status, and right-click to enable message.

> _[Image — to be added]_Click the red record icon in the upper left corner of the interface (as shown), select an address to save the recorded content and click on OK to start the recording. Select STOP when you no longer want to record the data.

To play the recorded data, click the green play icon, select play speed, and select save in the specified file, you can start playing.

Using U-Center for diagnostics

You can also use the more advanced features of the U-Center software to see how the GPS units are performing and working. This can be especially useful for troubleshooting.

To do this, connect the base station to the U-Center software, and check whether the Fix Mode column is displayed as TIME in the box in the upper right corner of the software interface.

In Fix mode the screen will display all of the statuses of your GPS unit including the position, accuracy and HDOP details. In the figure below, Fix Mode is displayed as **3D Mode**, so it has not yet reached the RTK standard needed for more accuracy.

There are a number of common reasons for the base station not entering TIME Mode:

The signal received by the base station is not strong enough.

Check the current star search signal of the base station and view the dialog box at the bottom right corner of the software interface. The bar in the dialog box represents the current satellite received by the base station, and one bar represents a satellite (GPS or Beidou /GLONASS, depending on the navigation system you choose to receive). The requirements for the base station to enter TIME Mode are as follows: 5 GPS satellite signals +2 GLONASS satellite signals with a strength above 40; Or 5 GPS satellite signals +3 Beidou satellite signals above 40. In the figure below, if only one satellite has a strength higher than 40, the signal condition fails to meet the RTK standard.

Try repositioning the GPS unit to get a clearer view of the sky.

The star searching precision of survey-IN set in advance is too strict, or the base station has not completed the star searching process.

Use U-Center to set up the specific survey-in. See the following section for more detail on common errors, issues, and tips for operation.

Check whether Rover module receives base station data (Timeout)

After the base station enters TIME Mode, RTCM data needs to be transmitted to the Rover module before the Rover module can enter RTK Mode. Therefore, the real-time and efficient data transmission of Rover module and base station is an important part to ensure the system is ready.

Check whether there is delay in data transmission between the Rover module and the base station and connect the Rover module to U-Centre (or read the previously stored log of the Rover module). Enter the Messages view-> nmea-> GxGGA directory and observe the Age of DGNSS Corr parameter parameters. This parameter represents the time when the Rover module has not received the base station data. In the case of the default base station extinction transmission frequency of 1HZ, if this parameter exceeds 1s, it means that the data transmission has a certain delay. Check your telemetry radio setup as a first step.

Set the base station as star search mode/fixed mode

Similar to the page used by RTK in The Mission Planner, the time and accuracy of star searching by base station can also be set in u-Centre. Enter the Messages View option, UBX CGF menu, and enter the **TMODE3** TAB for setting. Select Survey-in in the Mode dropdown option, and then set the time of star search (and the minimum time required by base station for star search), as well as the absolute precision to be achieved when star search is completed. The higher the

absolute accuracy of the base station, the longer the star search time will take. The data of star search and location of base station can be viewed in the nav-> SVIN page in Message View.

The base station can also be set to fixed-point mode. When the current precise geographic coordinates of the base station are known you can manually input those into the base station.

This can be used instead of waiting for the base station GPS to establish a lock of sufficient accuracy. You only need to change the Mode to Fixed Mode on the **TMODE3** tab, and then enter the known base station location as shown below.

After setting the star search and fixed-point mode, please click the **Send** button at the bottom left of the page to transfer the modified data to the base station.

Changing the GPS satellite systems (GPS+GLONASS)

By default, the uBlox 1.30 firmware uses the GPS+GLONASS navigation system for location services. If you want to change to GPS+ Beidou navigation system, then you need to enter Messages view-> Cancel the Enable option, and then check Beidou's Enable option. After selecting, click **Send** to store the changes.

To make sure the current settings are saved, go to the **Messages** view -> UBX -> CFG (Configuration) page and click **Save Current Configuration** option, then click **Send** (as shown below).

Note: The base station and Rover module must have the same Settings and use the same navigation system configuration; otherwise, the system will not be able to use RTK.

Base station input/output ports and protocol Settings problems

The uBlox M8P chip supports a variety of input and output protocols, including USB, UART, I2C, and more. H-RTK base station module USES USB protocol for data communication by default and gets and outputs RTK data.

If the current setting needs to be confirmed, enter the Messages view-> UBX-> CGF-> PRT directory to set it and select USB in the target column. The correct input and output protocols are shown in the figure below:

You can select the type of output you want and the protocol you want on this page.

In addition to these settings, you can also set a specific string of messages to be output under multiple protocols. To set this up, enter Messages view-> ubx-> cgf-> MSG directory, select a specific message, and then check the type of protocol you want to use.

To ensure that the current Settings have been saved, go to the Messages view - > ubx-> CFG (Configuration) page, click **Save Current Configuration** option, and then click **Send**.

Change the output frequency of mobile station

In the default frequency of position information output by Rover module is 1HZ. If you need to speed up the position output frequency, you can enter the Messages view -> ubx -> cgf-> RATE setting and change the Measurement Period. For example, change the Measurement Period to 200ms and the Measurement output Frequency will rise to 5HZ.

To make sure the current Settings are saved, go to the Messages view -- > ubx-> CFG (Configuration) page and click **Save Current Configuration** option, and then click **Send**.

Dimension

Dimension

> **i Info**
>
> Dimension in Millimeter

H-RTK F9P Rover lite(SKU12017) & H-RTK F9P Rover lite 2nd GPS(SKU12025)

> *[Image — to be added]*

Applicable to H-RTK F9P Helical & Base

Current Version

> *[Image — to be added]*

Previous Version

> *[Image — to be added]*

Antennas: CH7604A (Applicable for H-RTK F9P Helical)

> *[Image — to be added]*

Antennas: CS7624A (Applicable for H-RTK F9P Base)

>

> *[Image — to be added]*

Pinout

Pinout

H-RTK F9P Rover lite

> *[Image — to be added] > [Image — to be added]*

H-RTK F9P Helical & Base

> *[Image — to be added]*

Standard GPS Port

802980655c9348c58312d974189d41ab		
Pin	**Signal**	**Voltage**
1(red)	VCC	Power +5V
2	RX(in)	TTL 3.3V
3	TX(out)	TTL 3.3V
4	SCL1	TTL 3.3V
5	SDA1	TTL 3.3V
6	SAFETY_SWITCH	TTL 3.3V
7	SAFETY_SWITCH_LED	TTL 3.3V
8	VDD_3V3	Power +3.3V
9	BUZZER-	Open drain Output 0~5V

Pin	Signal	Voltage
10	GND	GND

2nd GPS Port

(For "2nd GPS" version)

802980655c9348c58312d974189d41ab

Pin	Signal	Voltage
1(red)	VCC	Power +5V
2	RX(in)	TTL 3.3V
3	TX(out)	TTL 3.3V
4	SCL1	TTL 3.3V
5	SDA1	TTL 3.3V
6	GND	GND

UART 2 Port

(Available in Helical Version)

Pin	Signal	Voltage
1(red)	VCC	Power +5V
2	RX2 (in)	TTL 3.3V
3	TX2 (out)	TTL 3.3V
4	NC	-
5	PPS	3.3V
6	GND	GND

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Standard H-RTK F9P Rover STP Files

> *[Downloadable file — to be added]*

> *[Downloadable file — to be added]*

Standard H-RTK F9P Helical STP Files

> *[Downloadable file — to be added]*

> *[Downloadable file — to be added]*

> *[Downloadable file — to be added]* Antenna 3D CAD {% endfile %}

Standard H-RTK F9P Base STP Files

> *[Downloadable file — to be added]*

Standard H-RTK F9P Ultralight STP File

> [Downloadable file — to be added]

u-blox F9P Firmware Upgrade

u-blox F9P Firmware Upgrade

> **i Info**
>
> The Firmware upgrade process is the same as the ZED-F9P, please refer to the link below.

{% content-ref url="/pages/LTckthEwh0hzW9e9iH0y" %} u-blox F9P Firmware Upgrade {% endcontent-ref %}

{% content-ref url="/pages/DnZN7IB1niqjIN9SAyRQ" %} DroneCAN FW Upgrade {% endcontent-ref %}

GPS Heading/Yaw (aka Moving Baseline)

GPS Heading/Yaw (aka Moving Baseline)

PX4 Guide for RTK

> **i Info**
>
> **PX4 Firmware**
> GPS Heading with Dual u-blox F9P is supported in the both DroneCAN and UART version. The DroneCAN version requires a different firmware and can be found in the guide below.

https://docs.px4.io/main/en/gps_compass/u-blox_f9p_heading.html

https://docs.px4.io/main/en/advanced_features/rtk-gps.html

https://docs.px4.io/main/en/dronecan/holybro_h_rtk_zed_f9p_gps.html

Ardupilot Wiki for RTK

https://ardupilot.org/copter/docs/common-gps-for-yaw.html

https://ardupilot.org/copter/docs/common-positioning-landing-page.html#rtk-gps

Setup guide for Multiple Aircraft

Setup guide for Multiple Aircraft

{% content-ref url="/pages/vF2JA5FKkXIYrbLOnXbp" %} Multiple Point to Point Setup with Sik Radio {% endcontent-ref %}

{% content-ref url="/pages/KNo8vrX4INZRpqTwhfMf" %} Point-to-Multipoint Setup with Microhard Radio {% endcontent-ref %}

Ardupilot IST8310 Compass Orientation

Ardupilot IST8310 Compass Orientation

Ardupilot IST8310 Compass Orientation

For any Holybro GPS Module with IST8310 compass, if you are unable to preform normal compass calibration "compass dance" for any reason, set parameter COMPASS_ORIENT=6 (Yaw270) for proper compass orientation.