ComNav Technology

User Guide

M300Plus GNSS Receiver

2021 January

CONTENTS

1. Introduction

Thank you for choosing the M300Plus GNSS receiver.

This Getting Started Guide will provide useful information about M300Plus. It will also guide you through your first step of using M300Plus GNSS receiver.

1.1 Warning and Cautions

An absence of specific alerts does not mean that there are no safety risks involved. A Warning or Caution information is intended to minimize the risk of personal injury and/or damage to the equipment.

WARNING-A Warning alerts you to a potential misused or wrong setting of the equipment.

CAUTION- A Caution alerts you to a possible risk of serious injury to your person and/or damage to the equipment.

1.2 Use and Care

The M300Plus is designed to withstand the rough environment that typically occurs in the field. However, the M300Plus is high-precision electronic equipment and should be treated with reasonable care.

1.3 Technical Assistance

If you have any questions and can't find the answer that you need in this manual, please contact your local dealer from which you purchased the M300Plus. Alternatively, please request technical support using the ComNav Website at: *www.comnavtech.com* or technical support email: *support@comnavtech.com*.

1.4 Your Comments

Your feedback about this Getting Started Guide will help us to improve it with future revisions. Please email your comments to: *support@comnavtech.com*.

2. Overview

This chapter will introduce the main features, technical specifications and basic kit of M300Plus receiver.

2.1 Receiver features

The M300Plus is designed as a multi-purpose GNSS receiver for a wide range of applications. With its powerful integration ability, the M300Plus serves as a key part of positioning infrastructure, active geodetic network, deformation monitoring system, machine guidance, harbor construction, land surveying, marine surveying and in any project that accuracy and reliability matter the most. A standard SinoGNSS M300Plus smart antenna provides the following features:

- 574 GNSS tracking channels
- Working with all the running constellations
- Advanced QUANTUM™ technology
- Optimized narrow band technologies targeting at higher data quality
- LED status indicator
- Compact and rugged housing with flexible interfaces for external devices
- Integrated Ethernet and 4G modem guarantees the stability internet communications
- PPS and Event
- SBAS differential correction compatibility

2.2 Technical specifications

Signal Tracking • 574 channels with simultaneously tracked Satellite signals - GPS: L1 C/A code, L1/L2 P code, L2C, L5 - BeiDou: B1, B2, B3 - BeiDou Global Signal: B1C, B2a - GLONASS: L1, L2 - Galileo: E1, E5-A, E5-B - QZSS: Reserved	- Extended NMEA-0183 BDGGA, GPNTR, GPCDT, GPHPR • Observations ComNav binary, BINEX, RTCM3.X, compatible with major CORS software (VRS, FKP and iMax). **Data logging** • Loop recording data function

- SBAS: WAAS, EGNOS, MSAS, GAGAN
• Advanced multipath mitigation technology
• Low noise carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
• High precision multiple correlates for GNSS pseudorange measurements
• Signal Noise Ratios reported in dB-Hz

Time Precision

• GPS+Glonass+Beidou 20ns

Positioning Specifications

• Post Processing Static
- Horizontal: 2 mm + 0.5ppm RMS
- Vertical: 4 mm +0.5 ppm RMS
• Single Baseline RTK(<30KM)
- Horizontal: 8 mm + 1 ppm RMS
- Vertical: 15 mm + 1 ppm RMS
• Network RTK
- Horizontal: 8 mm +0.5 ppm RMS
- Vertical: 15 mm + 0.5 ppm RMS
• E-RTK
- Horizontal: 0.2 m +1 ppm RMS
- Vertical: 0.4 m + 1 ppm RMS
• DGPS : 0.5 m 3D RMS
• SBAS : 1 m 3D RMS
• Standalone : 1.5 m 3D RMS

Communications

• 3 Lemo Ports
- One Lemo port(2 pin): power supply and battery charging
- One Lemo ports(7 pin): USB UART port for system debugging and static data download
- One Lemo ports(7 pin): RS485 Protocol for configuring and connecting with external device(meteorological supports long time record)
• Data logging frequency, maximum 50Hz
• Storage capacity
- 32 GB internal memory
- 1TB External memory maximum
• File format
- Rinex 3. X or 2.X or ComNav binary format
• File log session
- Days or hours can be set by user
• Data transfer
- FTP and USB

Physical

• Size (L x W x H): 225mm x 176mm x 67mm
• Weight: 2 kg
•Housing: Rugged aluminum housing

Environmental

• Operating temperature: -40°C to +80°C
• Storage temperature: -45°C to +85°C
• Humidity: 100% no condensation
• Water proof and dust proof: IP67, survives the temporary immersion to a depth of 1 m
• Shock: rugged aluminum case plus plastic ring seal, designed to survive a 1m drop onto concrete

Electrical

•Power consumption: <5W
•External power input: 7-36 VDC, with over-voltage protection

sensor/barograph/inclinometer)
• 1 DB9 male port
- Standard RS232 protocol
• 1 Standard USB port,
- Connect with external storage card
• 1 RJ45 LAN Ethernet port (10/100M Bit) supports
protocols HTTP, HTTPS, TCP/IP, UDP, FTP, NTRIP
• 5 SMA male connectors
- 1 PPS output
- Event input
- Reserve for WLAN
- Frequency-marker oscillator input connector
- GPRS antenna connector
• 1 TNC connectors
- GNSS Antenna connector
• 1 SIM Card Slot
- Nano-SIM card

Data Format

• Correction data I/O:
- RTCM 2.x, 3.x, RTCM3.2, MSM4, MSM5, CMR (GPS only), CMR+(GPS only)
• Positioning data outputs:
- ASCII: NMEA-0183 GSV, RMC, HDT, VHD, GGA, GSA, ZDA,
VTG, GST, PJK, PTNL

Antenna

• AT340 GNSS Geodetic Antenna
• AT350 GNSS Choke Ring Antenna
• AT500 GNSS Choke Ring Antenna
• AT600 GNSS Choke Ring Antenna

User Interface

• 4 LEDS in front panel
• ComNav M300 Plus Web Server

Specifications subject to change without notice.

2.3 M300Plus Basic Kit

The table below provides an overview of items included in the M300Plus basic Kit.

Items	Picture
M300Plus GNSS Receiver	
Charger	
Network Cable	
GNSS Antenna Cable/ Special cable can be provided if you require	
Transport Case	

Lemo to USB cable	
Double Female DB9 Serial Port Cable	

ComNav also supply various types of antennas, for additional introduction please see *chapter 3.1.3*.

3. Setting up the receiver

3.1 Guidelines

Please follow these guidelines when setting up your receiver.

3.1.1 Environmental requirements

To keep the receiver with a reliable performance, it is better to use the receiver in safe environmental conditions.

- Operating temperature: -40°C to +80°C
- Storage temperature: -45°C to +85°C
- Out of corrosive fluids and gases

3.1.2 Power supply

If you set M300Plus as a permanent site (reference station), an uninterruptible power supply (UPS) is recommended to protect receivers from power surges and power outage.

3.1.3 Mounting the antenna

Choosing the optimal location for the GNSS antenna is critical to the performance quality of your M300Plus receiver. Poor or incorrect placement of the antenna may

impact the accuracy and reliability of observation, resulting a degraded performance of normal operation.

Follow these guidelines to select the antenna location:

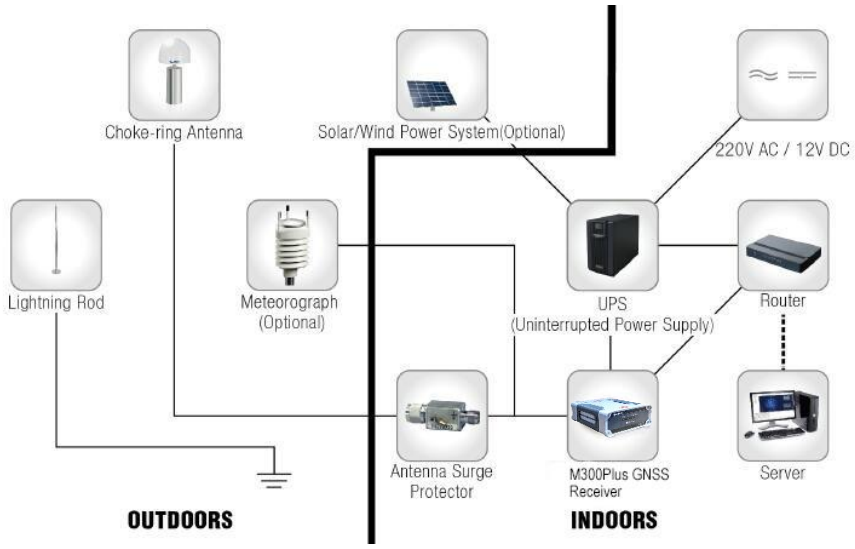
- If the application is mobile / kinematic, place the antenna on a flat surface along the centerline of the vehicle.
- Choose an area with an open view to the sky and far from metallic objects.
- Avoid areas with high vibration, excessive heat, electrical interference or strong magnetic fields.
- Avoid mounting the antenna close to electrical cables, metal masts and generally close to other antennas

Antenna type	AT340	AT350	AT500	AT500 3D
Description	Geodetic, Mobile survey, machine control	Mini chock ring GNSS antenna, mainly used as monitoring	Chock ring antenna, high accuracy geodetic antenna, CORS station antenna	Chock ring antenna, very high accuracy, national CORS reference station antenna
Picture				

AT-series antenna is recommended, if you use other kinds of antenna, please check the specifications with the ComNav support team.

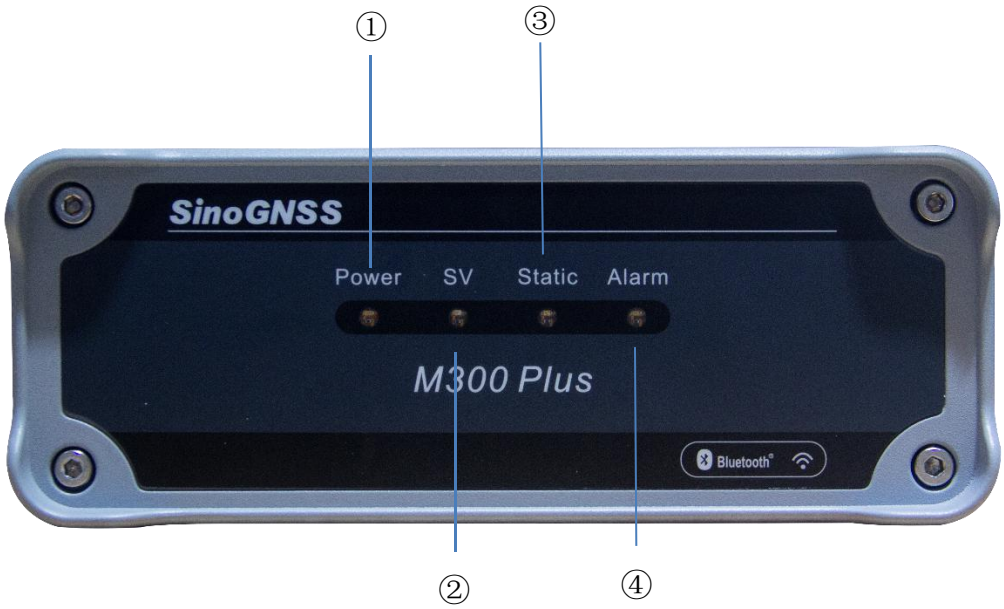
3.1.4 M300Plus connection view

M300Plus is mainly used as a CORS reference station. The below figure explains the connection of each equipment. The GNSS antenna and lighting rod are fixed on the ground or top of building, inner devices including the M300Plus, the power supply and internet, are settled in the office.



3.2 Front Panel

There are 4 LEDs in front panel, which indicate M300Plus work status.



① Power indicator, it will always on when the power turn on.

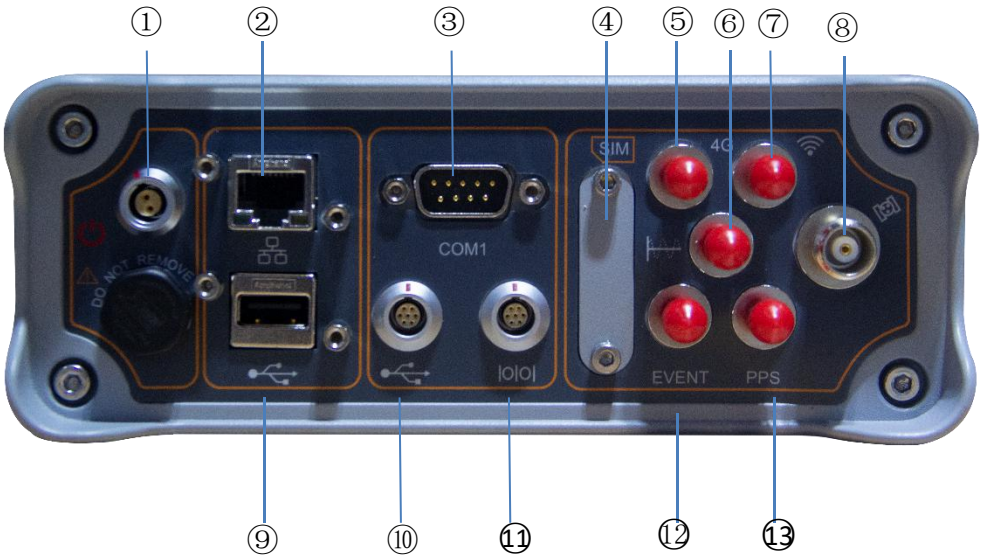
② Satellites indicator, flashes N times every 5 seconds, n is the number of tracked satellites

③ Static indicator, flashing means it is recording the raw data.

④ Alarm indicator, it will always on when receiver send the alarm message.

3.3 Rear connectors

All connectors are located on the back of the receiver, you can connect other external devices through these connectors.



① Port for external power supply, and internal battery charging of the receiver

② Ethernet Port

Connect to internet

③ Com1 Port of Main Board (RS232 port)

Control the mainboard and request data from this port

④ SIM card slot

Install sim card

⑤ 4G antenna Connector

Connect to 4G antenna

⑥ 10 MHz frequency input

10MHz external frequency input, Used for precision timing

⑦ WIFI Antenna connector(Reserved)

⑧ GNSS Antenna Connector

Connect to the GNSS antenna

⑨ USB

Connect to external USB drive for external data logging

⑩ Lemo to USB Data Download Connector

Connect with PC to download raw data from the internal memory

⑪ Com2 Port of Main Board

Connect with Meteorological sensor, RS-485 communication protocol; receive and save meteorological data in RINEX format

⑫ EVENT Signal Connector

Access Event signal trigger and can be configured through a web browser

⑬ PPS Signal Connector

Output PPS signal and can be configured through a web browser

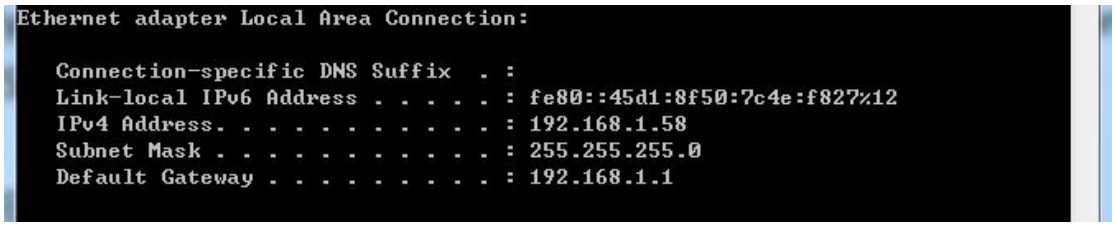
4. Receiver configuration through a Web Browser

M300Plus has an advanced built-in web server, you can access the web setting page and do configurations remotely. This section describes how to change receiver's settings through a web server.

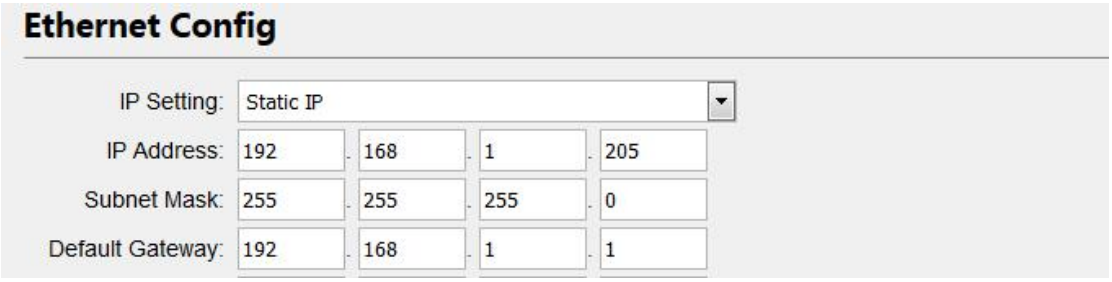
4.1 Login the configuration page of M300Plus

The M300Plus receiver can connect to an Ethernet network through its Ethernet port. It means that you can configure and monitor the receiver's settings without a serial cable connection.

1. Firstly, make sure that the M300Plus and your computer are within the same Local Area Network (LAN). Then change your receiver's IP address by commands based on your office computer. For example IP address on your computer:

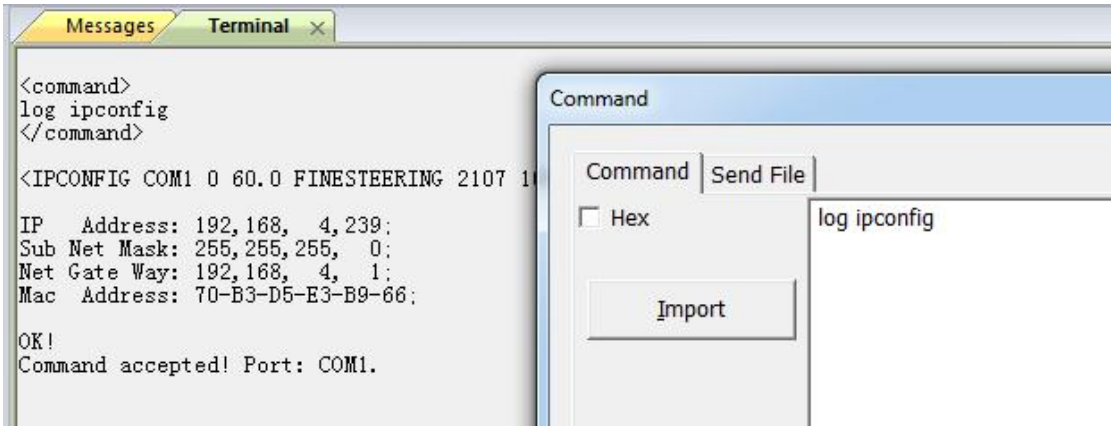


IP address of M300Plus:



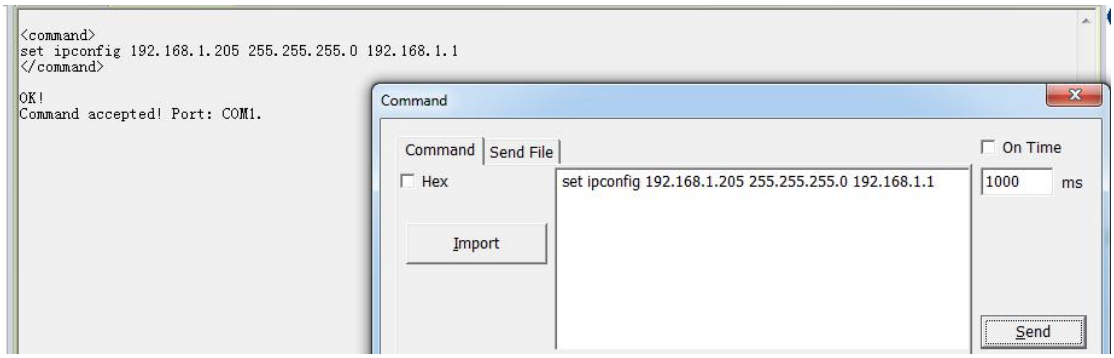
For configuring the IP, Subnet Mask, Gateway, please send the commands to M300Plus by com port, CRU software is recommended. You can get it from our website: http://www.comnavtech.com/companyfile/1/

Log ipconfig # Check current IP settings



Set ipconfig XXX(IP) XXX(mask) XXX(gateway) # confige M300Plus IP

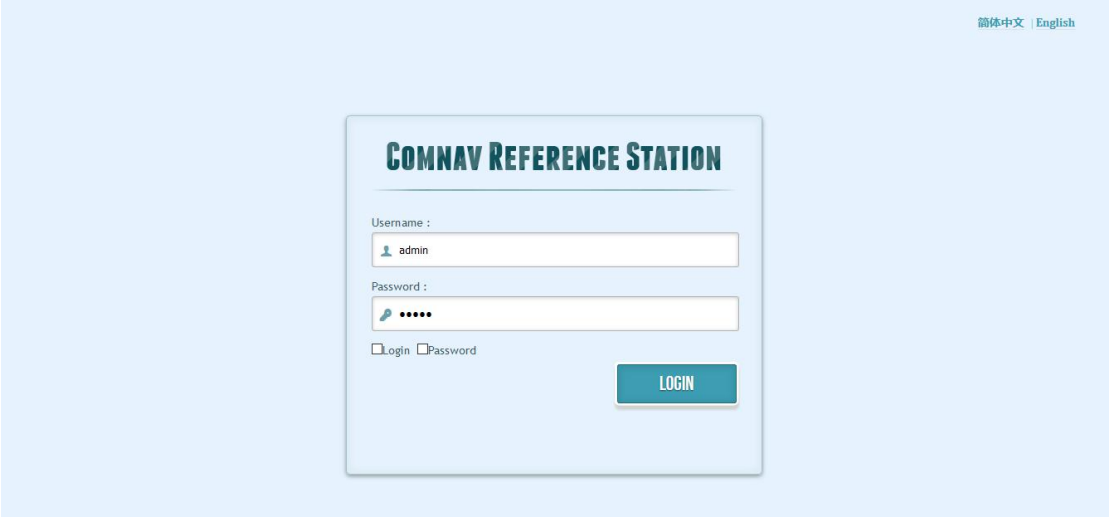
e.g. **set ipconfig 192.168.1.205 255.255.255.0 192.168.1.1**



2. Enter the IP address and HTTP port of the receiver into the address bar, you will access the configuration page of M300Plus. The default setting for the HTTP port is 80, which is the standard port for web servers. However, HTTP port needs to be changed in some cases.

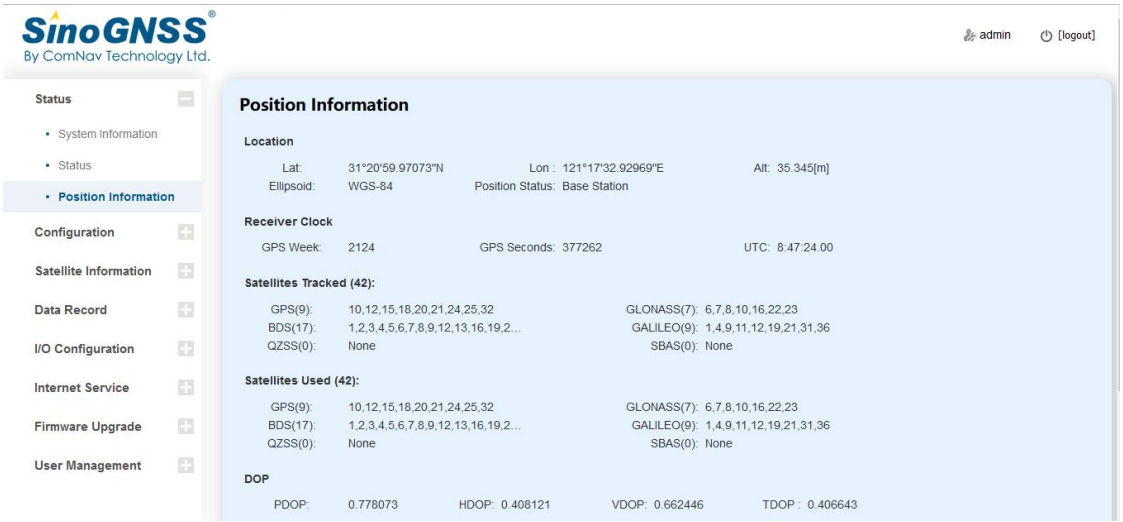
For example, using default port 80:http://192.168.1.205

If your receiver has a port other than 80, you must enter the IP address followed by port number. As example showed above: http://192.168.1.205:8000



3. Enter the default login settings to access the main page:
   - Username: admin
   - Password: admin

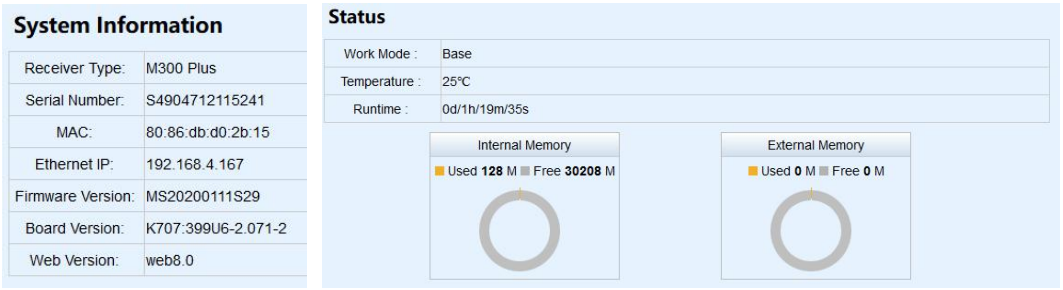
After accessing the main page, configuration menus are listed on the left, and receiver's settings on the right. Each configuration menu will be demonstrated in the following sections.



4.2 Checking the receiver status

Click ***Status***->***System Information***, ***Status*** or ***Position information***, you can check the corresponding receiver status, including:

- System information: IP address, SN, Firmware Version, Web Version etc.
- Status: work mode (Base or Rover), Disk Capacity etc.
- Position Information: GNSS constellation system tracked etc.



4.3 Receiver Configuration

Use ***configuration*** menu to do basic configurations of your receiver.

4.3.1 General Config

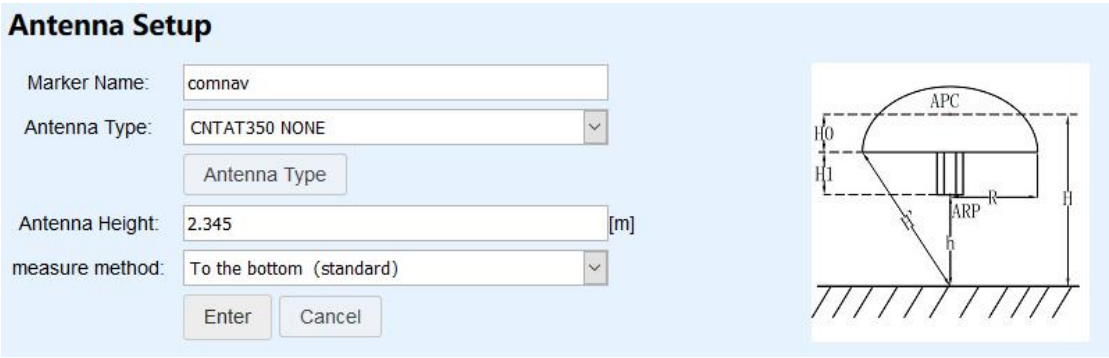
There are 2 work modes you can choose:

- Base station: configure the receiver as a Base station, you can change its settings in *Base Setup* menu
- Rover: setting the receiver as a rover, and *Base Setup* menu is not available for rover mode.

Also, active the external input/output as 1pps, please enable Event Marker and External clock only when the external clock or events are connected.

4.3.2 Antenna Setup

Enter the proper values of marker name and antenna height (height limited 0 to 6.5535m), select the antenna type and measurement method.

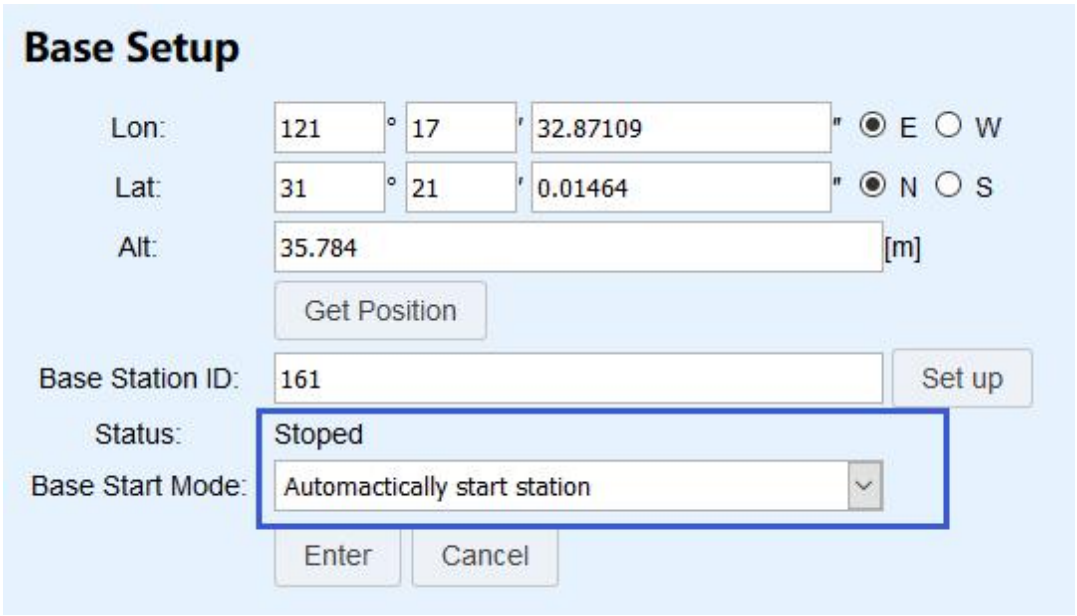


4.3.3 Base setup

After setting the work mode as base station, the *base setup* menu is available for you. However, you can change the base setup only when it's on ***manually start station*** mode with ***stopped*** status.

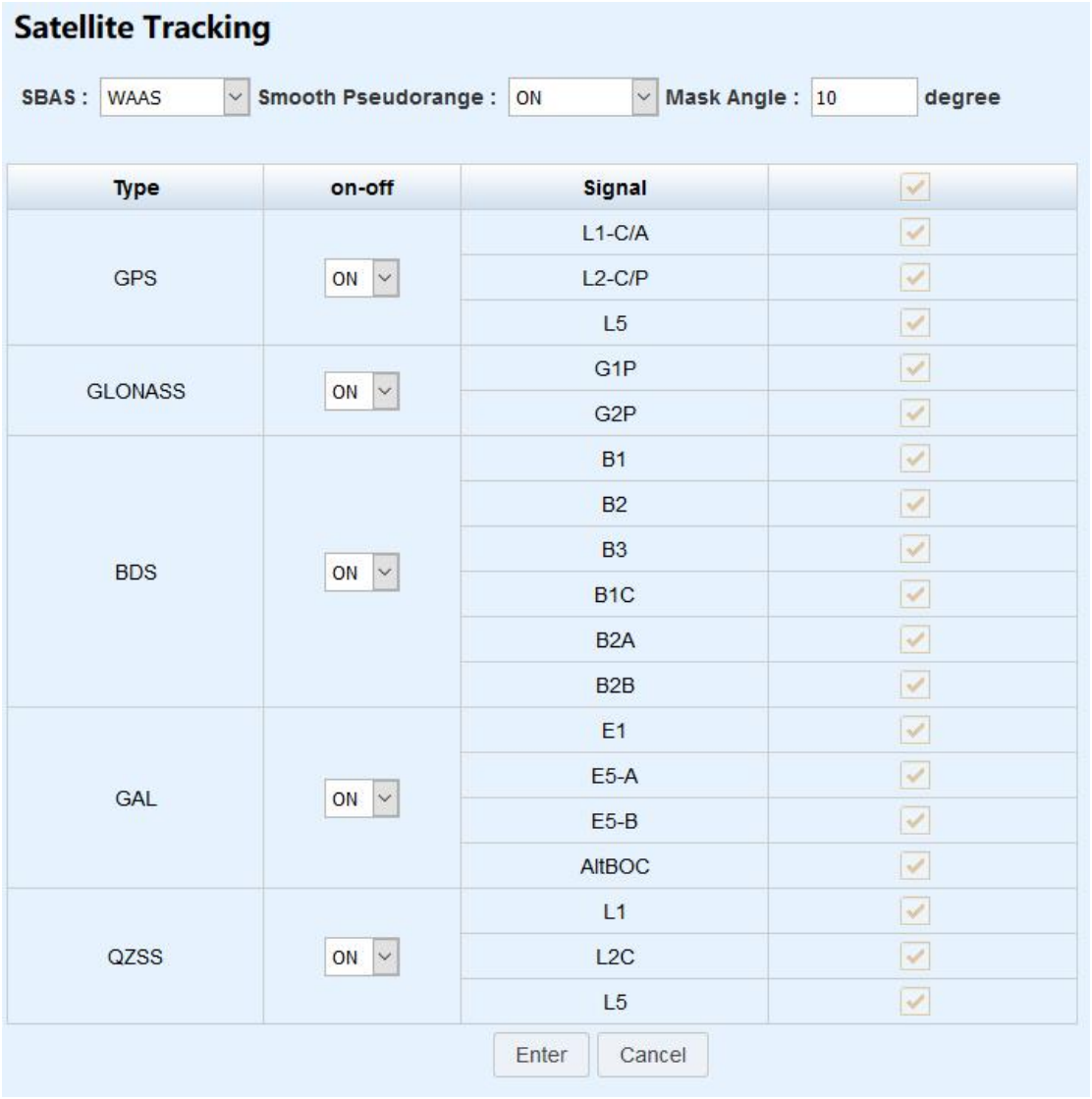
To configure the base station:

- Change base start mode from ***automatically to manually*** -> press ***enter***, ensure that Base Start Mode is on manual
- Press ***Stop*** to restart editing
- Then input coordinates of known sites, or press ***Get Position*** button to get coordinates of the current position
- Set proper base station ID based on your project planning
- Change base start mode from ***manually to Automatically***, then click ***Start*** to active configuration



4.3.4 Satellite Tracking

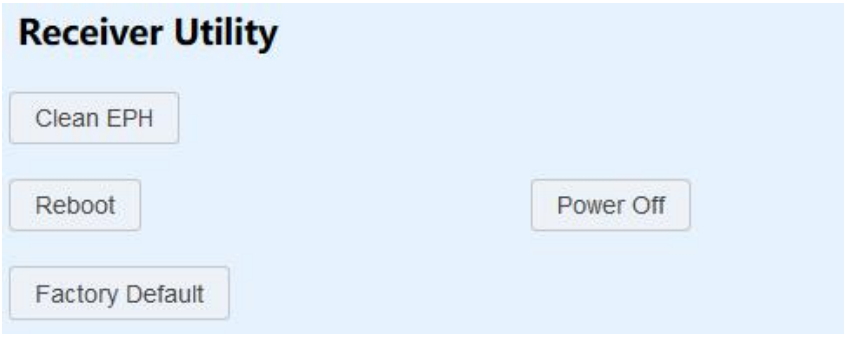
Select SBAS and smooth pseudorange, setup the mask angle and select the types of the tracking signal based on surveying requirements.



4.3.5 Receiver Utility

In this section, you can control M300Plus remotely, including:

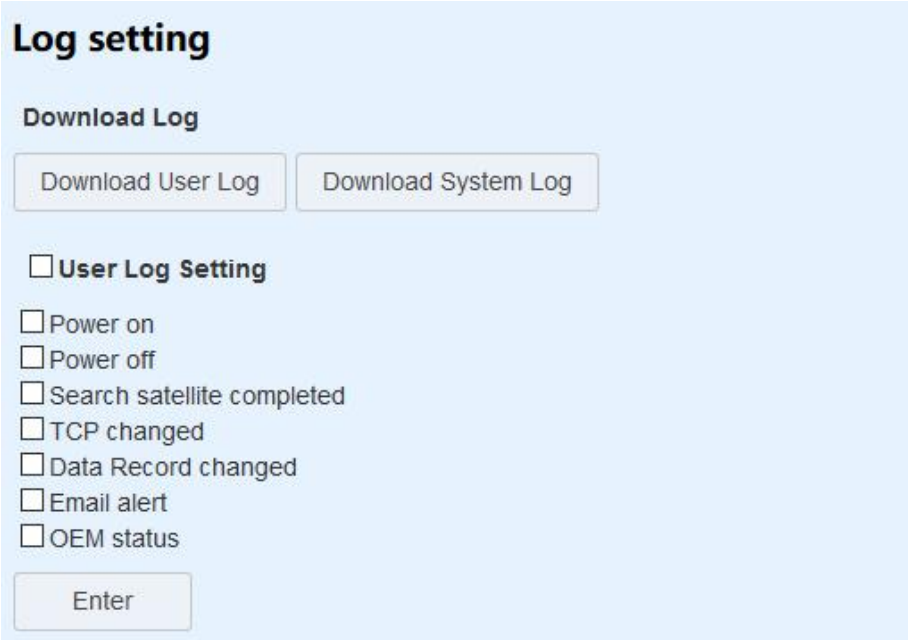
- Clean EPH: delete ephemeris information saved in the receiver
- Reboot: Restart the receiver
- Power Off: Turn off the receiver
- Factory Default: recover the receiver to factory default setting



4.3.6 Running Log

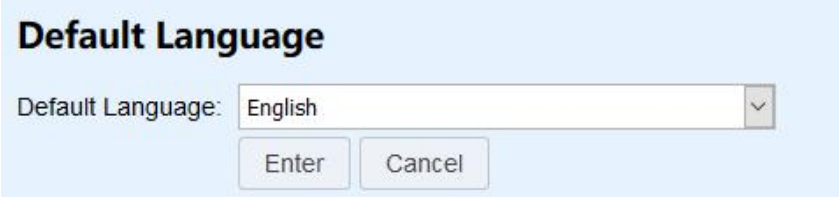
Download user/system log to local;

- User Log contains power on/off, search satellite completed, TCP changed, data record changed, email alert, OEM status
- System Log contains system warning and system info.



4.3.7 Default Language

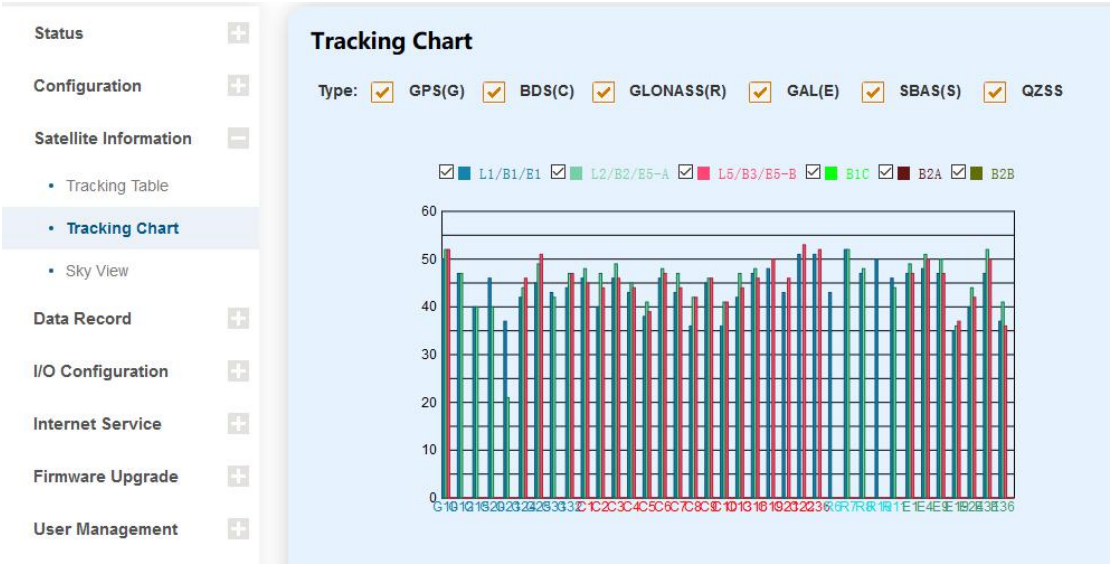
Two language options are available: Chinese/English

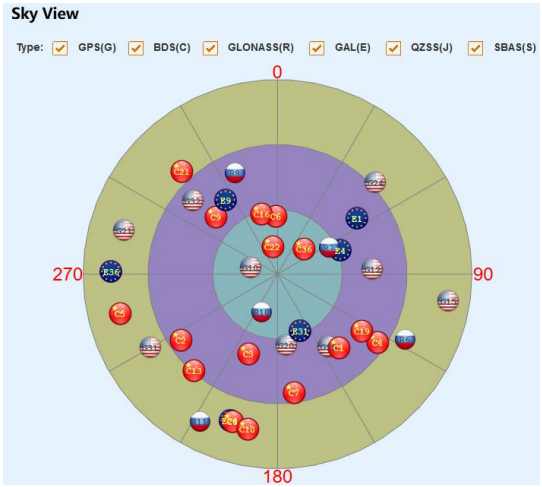


4.4 Satellite Information

Satellite information menus provide you an overall view of satellite tracking details, including Tracking Table, Tracking Chat and Sky View. You can enable/disable GPS, BDS, GLONASS, GAL, QZSS and SBAS (WAAS/SDCM/EGNOS/MSAS/GAGAN) satellites' display without stopping tracking status.

These displays refresh every 5 seconds, always keeping satellites information up to date.





SV	Type	Elev.[Deg]	Azim.[Deg]	L1-C/No[dBHz]	L1	L2-C/No[dBHz]	L2	L5-C/No[dBHz]	L5	Status
G10	GPS	77	283	50	C/A	52	P	52	L5	Using
G12	GPS	46	87	47	C/A	47	P	0	-	Using
G20	GPS	57	173	47	C/A	40	P	0	-	Using
G21	GPS	16	286	38	C/A	21	P	0	-	Using
G24	GPS	27	47	39	C/A	44	P	47	L5	Using
G25	GPS	49	144	46	C/A	49	P	50	L5	Using
G31	GPS	22	240	42	C/A	42	P	0	-	Using
G32	GPS	39	312	45	C/A	45	P	47	L5	Using
C1	BDS	46	140	46	B1	48	B2	45	B3	Using
C2	BDS	36	236	40	B1	48	B2	44	B3	Using
C3	BDS	51	200	45	B1	49	B2	46	B3	Using
C4	BDS	34	124	43	B1	45	B2	44	B3	Using
C5	BDS	15	256	38	B1	41	B2	40	B3	Using
C6	BDS	63	358	47	B1	49	B2	47	B3	Using
C7	BDS	35	172	42	B1	47	B2	44	B3	Using
C8	BDS	18	197	36	B1	43	B2	42	B3	Using
C9	BDS	51	313	45	B1	46	B2	46	B3	Using
C10	BDS	17	191	36	B1	42	B2	39	B3	Using
C13	BDS	31	221	42	B1	46	B2	43	B3	Using
C16	BDS	61	345	46	B1	48	B2	46	B3	Using

4.5 Data Record

Use the *data record* menu to set the storage mode (internal/external) for surveying date, and download data to your office computer, especially for the remote receiver

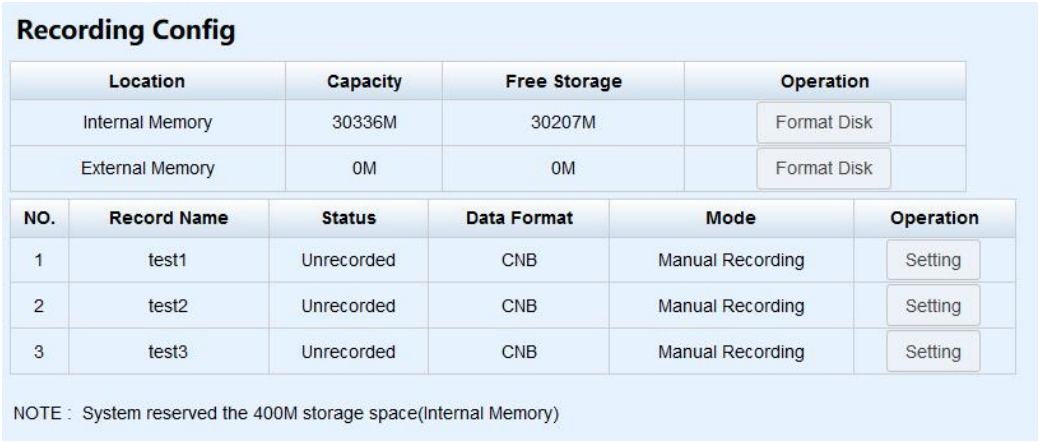
control.

4.5.1 Recording Config

Information is showed below：

- Internal Memory: 32 GB, 1 Hz sample frequency could be used for 8-month record.
- External Memory: If set as external memory without inserting a USB drive, it will be prompted with a message that “Storage space is overrun. Please set according to the notes”.
- Show record name, status, data format, record mode and operation in table, click **Setting** button to configure the data recording settings.

CAUTION - Please be careful to click the *Format Disk* button. It will empty all your data files in M300Plus.



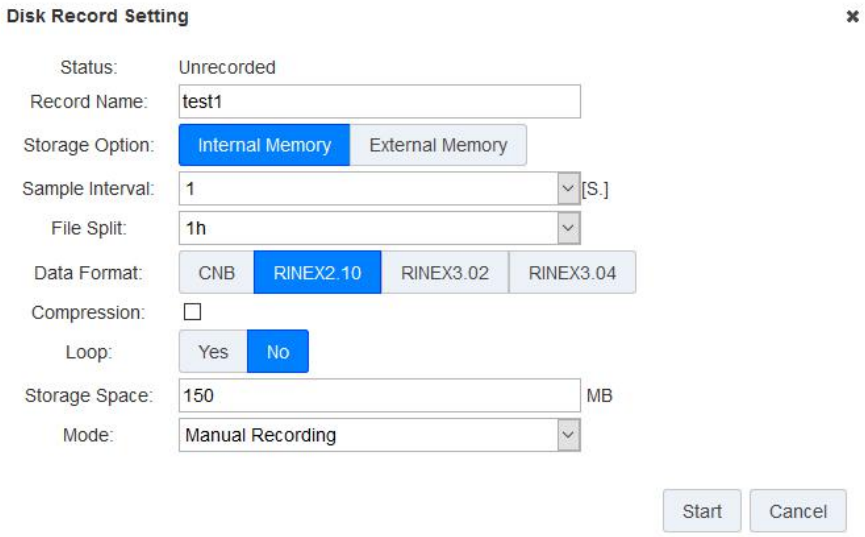
To configure the data recording settings, please make sure that recording mode is on ***manual*** with ***unrecorded status***.

Setting options are showed below:

- Record Name: Support only number or letter
- Storage Option: Choose storage location to internal memory or external memory
- Sample Interval: Choose sample frequency, support0.05\0.1\0.2\0.5\1\2\5\15\30\60 S.
- File Split: Choose file split, support every 15 minutes or 1\2\4\24 hours to save a file. If you select 24 as file split, it will create two data files when it occurs to 24 o'clock (UTC Time). One is from start time to 24 o’clock, another is from 0 o’clock to end time.
- Data Format: Support CNB\ Rinex2.10\Rinex3.02\ Rinex3.04.
- Compression: Because RINEX data may be very large, when choosing to store RINEX data, provide compression options. But the compression option only

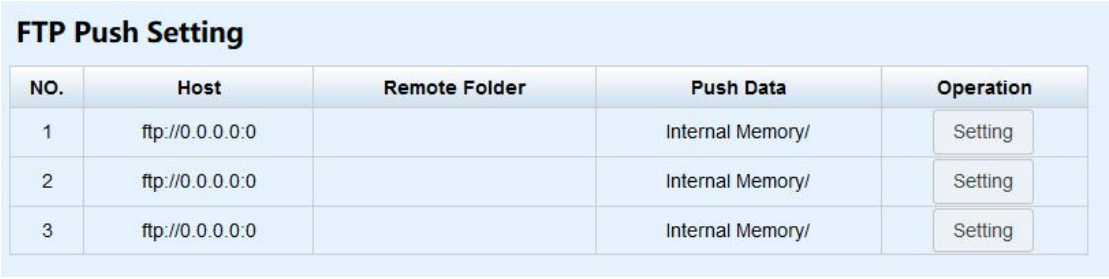
exists in the first storage area.

- Loop: When storage is full, ***Yes*** means delete earliest data and store continually, ***No*** means stop recording
- Storage Space: Separate storage space in internal memory\external memory
- Mode: Support manually and automatically recording mode.



4.5.2 FTP Push Setting

FTP push can send data to another FTP server through the FTP address. You can click **Setting** button to configure the FTP push feature.



Setting options are showed below:

Use: Check USE checkbox to enable FTP push feature

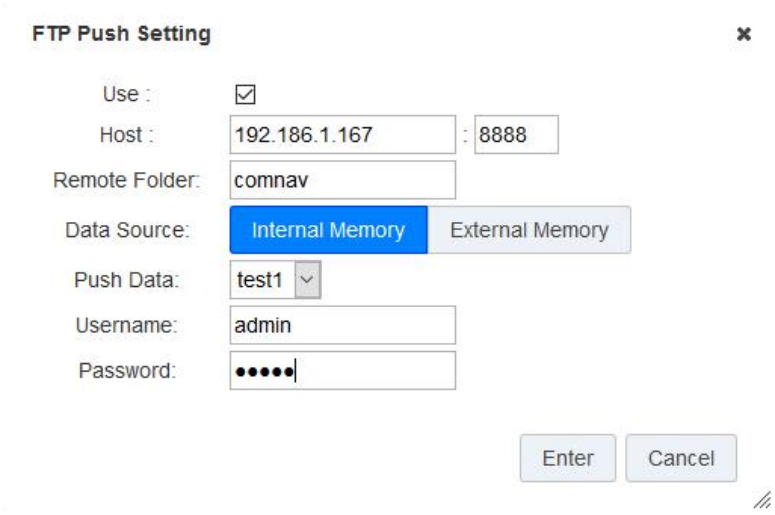
Host: The FTP address and port of specified FTP server

Remote Folder: Create a new folder to save the transferred data

Data Source: Choose data in internal memory or external memory

Push Data: Choose the data you want to push

Username and Password: username and password of another FTP server

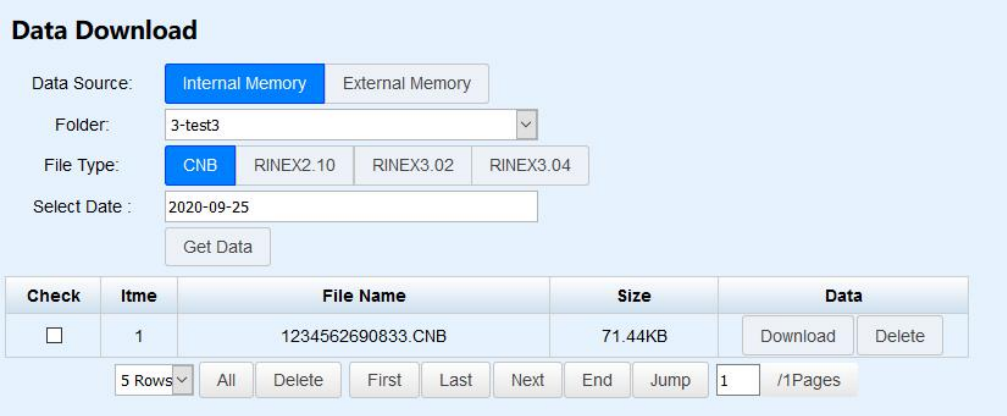


4.5.3 Data Download

You can download internal data files through a web server, USB drive or FTP.

1. Data download through a web server

Firstly, select data source (Internal or external memory), folder name, file type (CNB\ Rinex3.04\Rinex3.02\Rinex2.10) and date. Then click ***Get Data***, you will see data files meet the demand. Click ***Download*** icon to download the data file you need, or click ***Delete*** icon to delete this file.



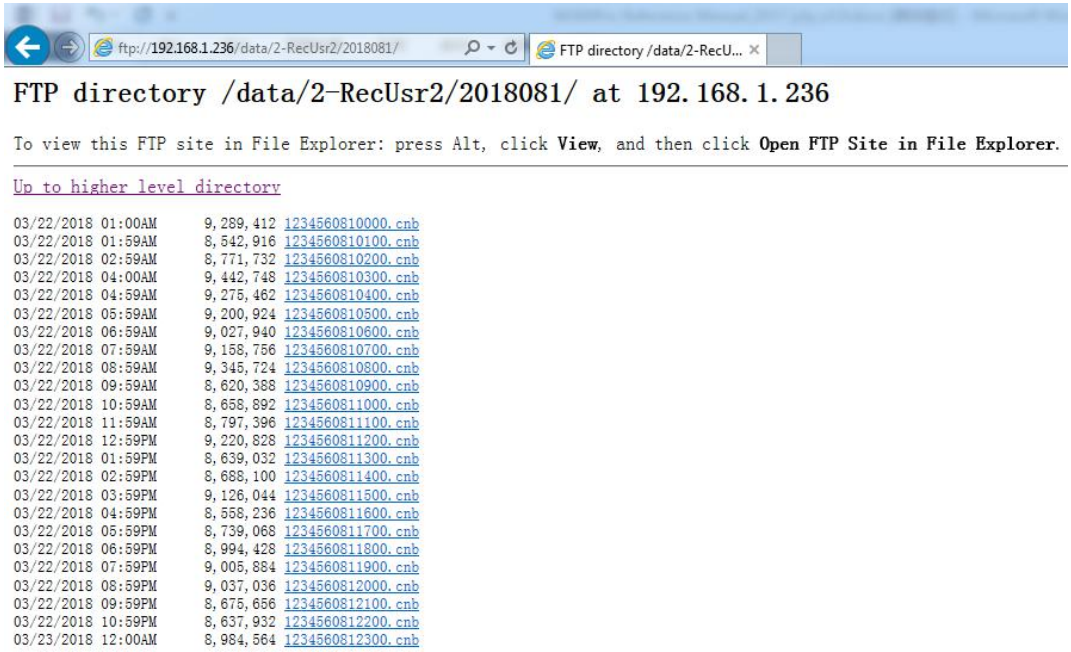
2. Data download through a USB port

Use Lemo to USB cable to connect M300Plus with your office computer, internal memory will be identified automatically as a removable disk. Double click to open disk, and copy raw data files out.

3. Data download through FTP

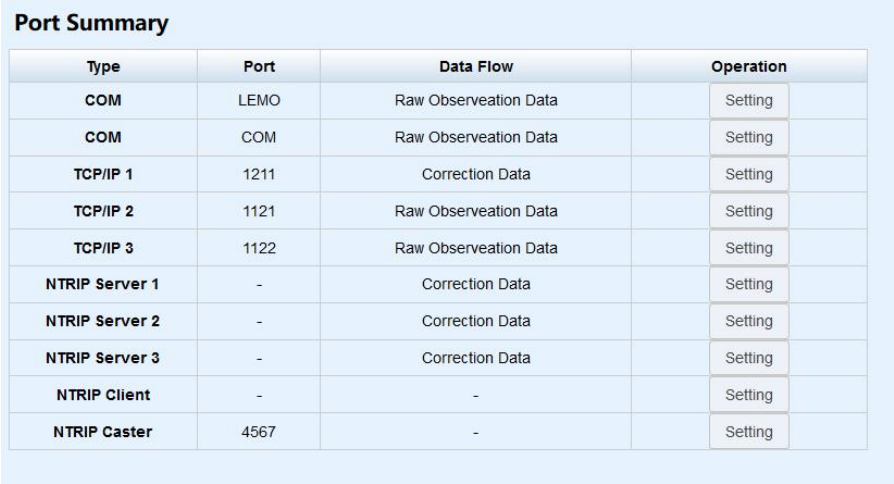
Input FTP address in your browser, for example: ftp://192.168.1.236. Then download

your files.



4.6 I/O Configuration

There are two ways to transfer raw data from the M300Plus receiver to your office computer, LAN ports or serial ports. Serial ports support RS232 (com1, DB9 port) and RS485 (com2, Lemo port) protocol; the LAN ports support TCP and Ntrip protocol.



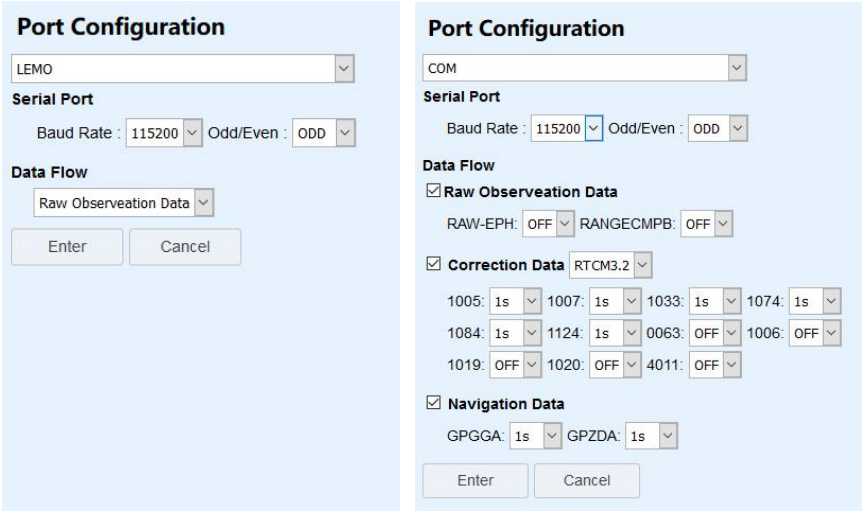
Port Summary

Type	Port	Data Flow	Operation
COM	LEMO	Raw Observeation Data	Setting
COM	COM	Raw Observeation Data	Setting
TCP/IP 1	1211	Correction Data	Setting
TCP/IP 2	1121	Raw Observeation Data	Setting
TCP/IP 3	1122	Raw Observeation Data	Setting
NTRIP Server 1	-	Correction Data	Setting
NTRIP Server 2	-	Correction Data	Setting
NTRIP Server 3	-	Correction Data	Setting
NTRIP Client	-	-	Setting
NTRIP Caster	4567	-	Setting

4.6.1 Serial Port Config

The data will output from the Lemo or COM port of the receiver when you complete the serial port settings. Select proper baud rate and data flow, and click ***Enter***, the corresponding serial port will output data. The format of Data flow includes:

- Raw observation data: ComNav binary format raw data
- Correction data: format from RTCM
- Navigation data: GPGGA and GPZDA message

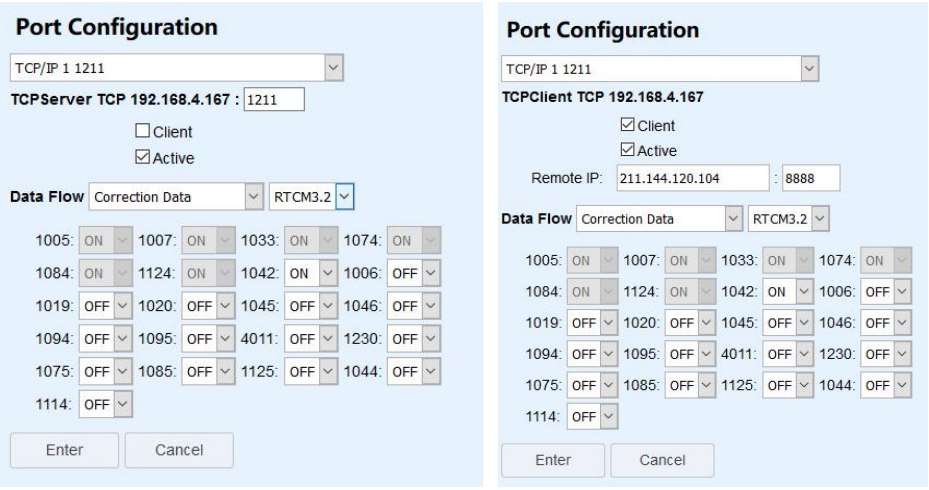


COM--- COM1, RS232 (DB9 port), Lemo—COM2, RS485 (Lemo port)

4.6.2 TCP/IP Config

Dataflow can be transferred via the internet by using TCP Server or TCP Clients.
TCP Server: Any user can receive the data through TCP Clients protocol
TCP Clients: Send data to the specified IP address and port
For data flow:

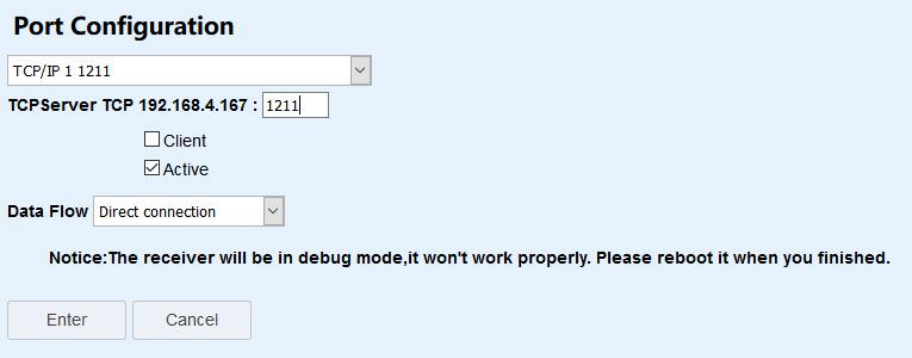
- Correction data: Choose the format and the corresponding message
- Navigation data: GPGGA message
- Raw observation data: ComNav binary format raw data
- Direct connection: Please refer to **4.6.2.1 Direct connection model**



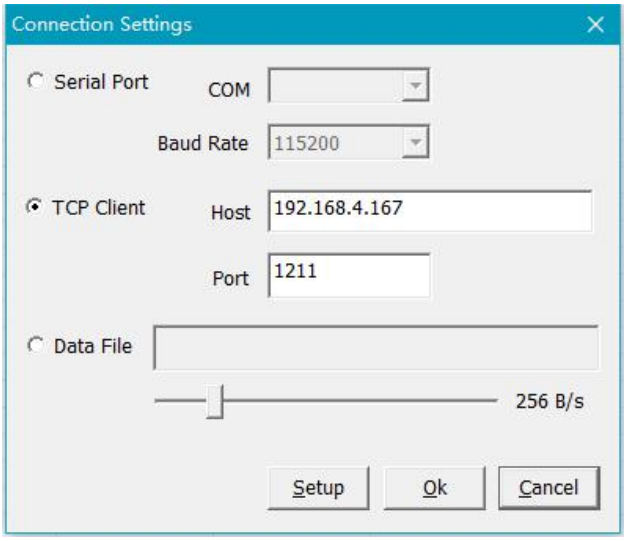
4.6.2.1 Direct connection model

The M300Plus provides a more machine friendly method for users to check and configure receivers by TCP/IP. This function only can be used in TCP/IP1.

- Enable ***Active*** button
- Enter TCP server port
- Select Direct connection in data flow
- Click ***Enter*** button



Then connect it by TCP Client in CRU software.



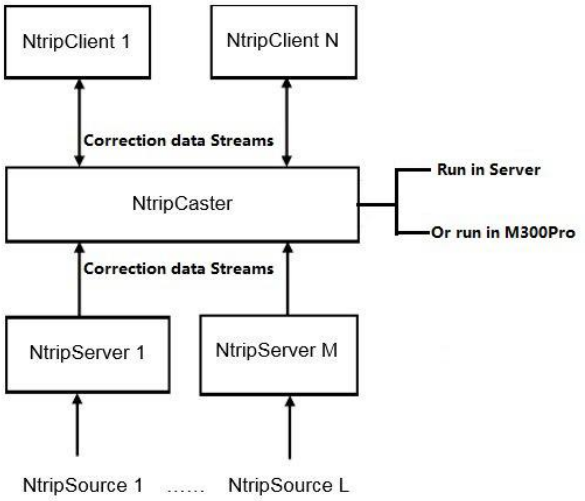
For programmatic commands, Please refer to **5.1 Frequently used commands**.

4.6.3 Ntrip Config

The M300Plus can support Ntrip Client, Ntrip Server and Ntrip Caster protocols. You can acquire correction data from CORS through Ntrip Client protocol if setting the receiver as a rover. It is also very easy to transmit correction data as the base station by using Ntrip Server and Ntrip Caster protocols.

For a base station, you can broadcast correction data by using Ntrip Server protocol or the data forward software (supporting Ntrip Caster protocol, such as SinoGNSS's

CDC+ software) running in the server. If you have a static IP address, you can use Ntrip Server and Ntrip Caster of M300Plus simultaneously to create a single reference station. This mode does not need any software to support, and is very convenient for using.

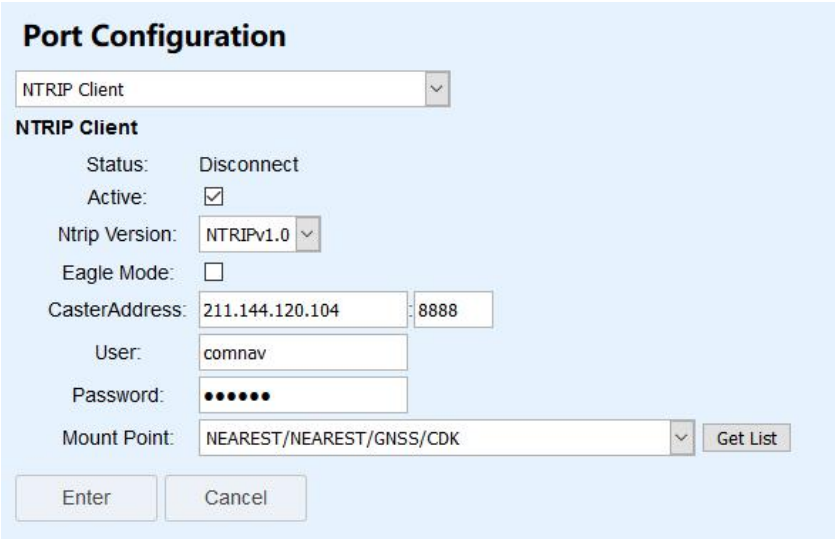


*Tips: You need to uncheck all **Active** (Client, Server and Caster), and click **Enter** button to disconnect them before you configure this interface.*

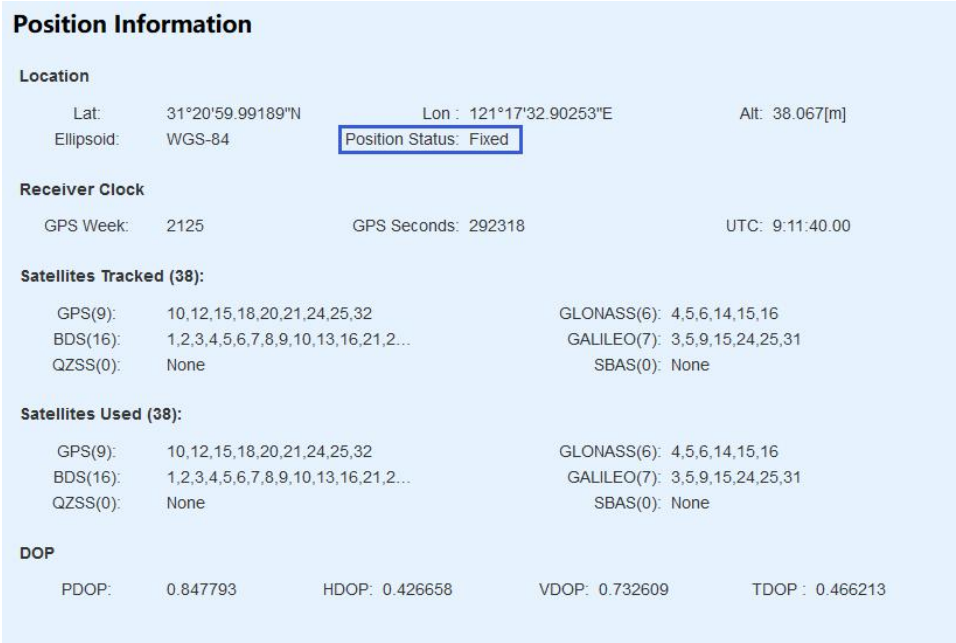
1. Ntrip Client

Before setting the Ntrip Client, you should configure the receiver as Rover mode.

- Enable ***Active*** button
- Enter IP address, Port, User name and Password of CORS
- Click Get List to acquire the Mount Point list
- Choose one of mount point and click ***Enter*** button, you will receive correction data from CORS.



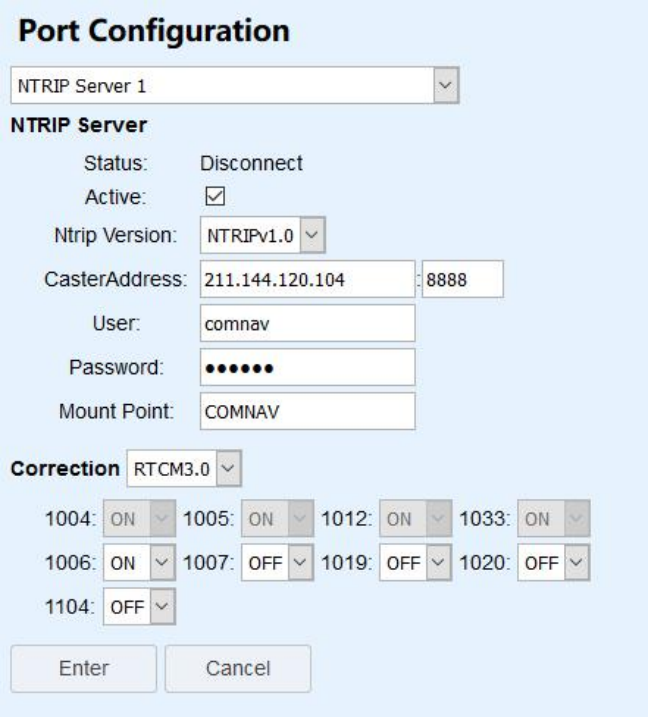
Click ***position information*** in ***Status menu*** to check the rover's status, and position status should be Fixed.



2. Ntrip Server

Before setting the Ntrip Server, you should configure the receiver as *Base mode*, also select correction data format as RTCM3.0 or RTCM3.2 (recommended). Then start Ntrip Server configuration:

- Enable ***Active*** button
- Enter the server IP address as Ntrip Caster address and Ntrip Caster port. As the example showed above, our company's server is under running: 211.144.120.104: 8888
- Set custom username and password (Username and password of our server can be anything you choose).
- Mount point: Ntrip caster mount point
- Correction: Choose the format and the corresponding message
- Click ***Enter*** button, you will transmit the correction data to server.



3. Ntrip Caster

M300Plus can also work as a single reference station and send correction data through Ntrip Caster protocol. You need to configure both Ntrip Server and Ntrip Caster when you use this protocol. The setting is shown below:

1. Configuration of Ntrip Server:

- Enable ***Active*** button of Ntrip Server
- Set the Ntrip Caster address and Nrtip Caster port; this IP address is the same as M300Plus IP address, and the port should be mapped by router.
- Enter custom username and password
- Access point: the Ntrip Caster mount point

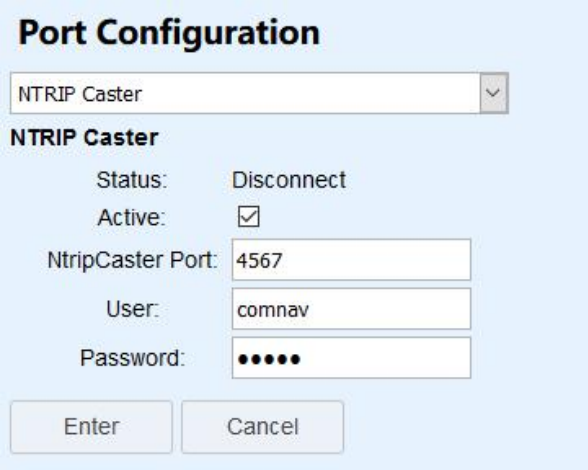
Press ***Enter*** to save the configuration

2. Configuration of Ntrip Caster:

Enable ***Active*** button of Ntrip Caster

- Enter port, this port should be same with Ntrip Server
- Enter Username and Password, this Username and Password should be also same with Ntrip Server
- Press ***Enter*** to save configuration

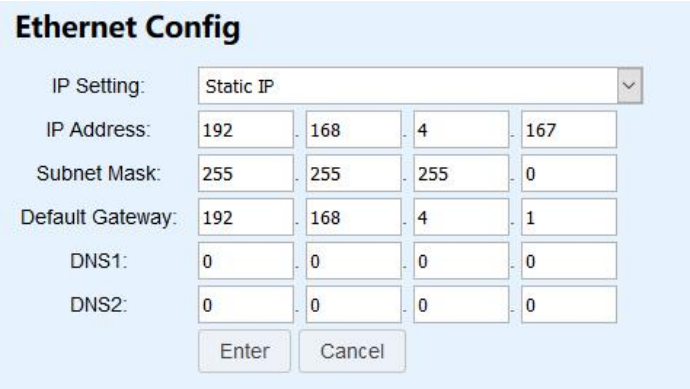
All configurations of Ntrip Caster Protocol are shown above, then you can use a rover to get correction data.



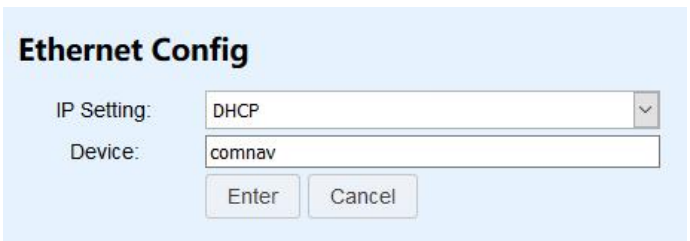
4.7 Internet Service

4.7.1 Ethernet Config

Use the *Ethernet Config* menu to set IP Setting, IP address, subnet mask, default gateway and DNS. After changing those settings, you need to change your computer's IP address and relogin configuration webpage based on the new IP address.



You can choose IP Setting as DHCP(Dynamic Host Configuration Protocol).And set a device name. After pressing ***Enter*** button, M300plus will randomly generate a new valid IP address.

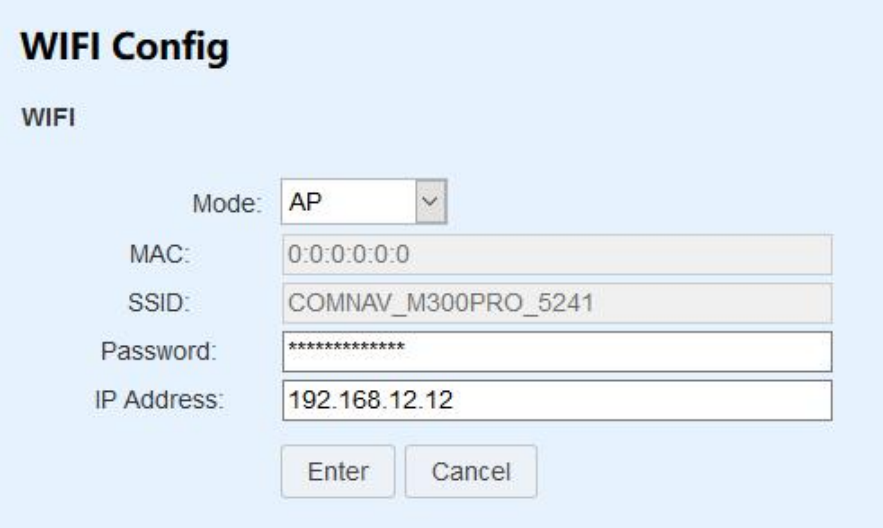


4.7.2 WIFI Config

After setting WIFI Config, you can search the WIFI of this M300plus. After connecting to WIFI, you can log in to the web interface through the IP address you set.

- Two mode options are available: AP/Shut down. When you want to turn off this feature, you can select the mode as *Shut down*.
- MAC and SSID are default values and cannot be changed. SSID is also the WIFI name.
- Password: WIFI password
- IP Address: Set the IP address that can log in to the web interface

Press ***Enter*** to save the configuration



4.7.3 Port Forwarding

A port forward is a way of making a computer on your home or business network accessible to computers on the internet.

In fact, the router has rules to send your request on particular ports to a certain host (defined by you). Servers listen for incoming connections on certain ports but without telling your router where to send these connections they will never arrive. Port forwarding sets up your router to correctly redirect external inbound service requests to the correct internal computer on your network. After that, when you try to connect by ip and port, router will follow the rules, then everything will goes fine.

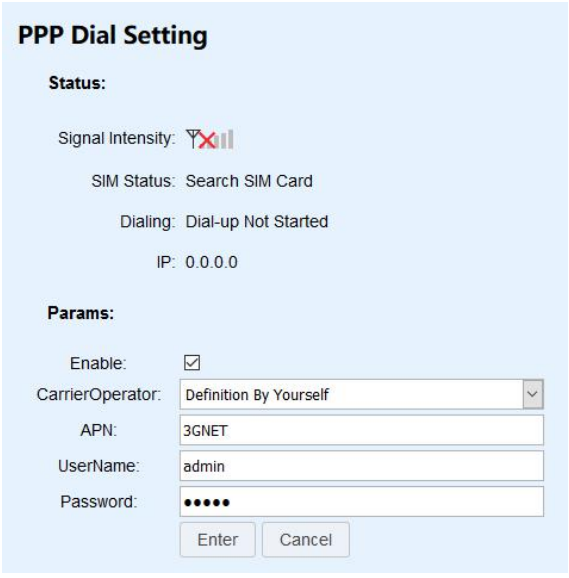
You can set HTTP and FTP ports to log in to the web interface and ftp interface.

4.7.4 PPP Dial Setting

When you use a SIM card, you must enable this feature. It is best to insert the SIM card before turning on the power, and connect the 4G antenna.

- Check ***Enable*** checkbox to enable PPP dial
- Carrier Operator: choose the carrier operator of your SIM card. If there is no option you want to choose, you can choose *Definition By Yourself*.
- VPN: Enter VPN according to the carrier of your SIM card.
- UseName and Password: Username and password of your SIM card

Press ***Enter*** to save the configuration



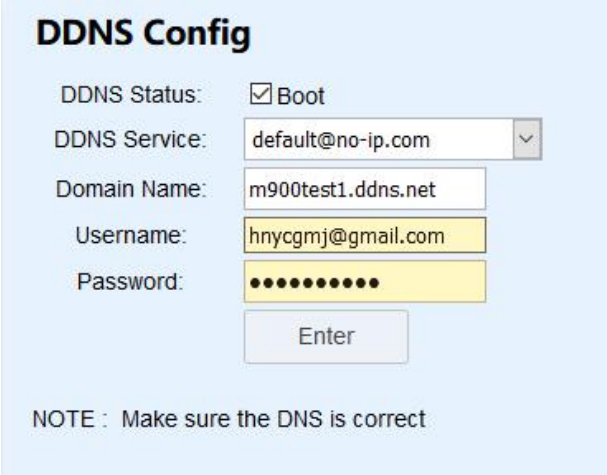
When ***Status*** becomes as shown in the figure below, it means the dialing is successful.

4.7.5 DDNS

Dynamic DNS (DDNS) is a method of automatically updating a name server in the Domain Name System (DNS). M300plus has built-in Dynamic DNS capabilities, which means that it is capable of sending an update to your DDNS account when your IP address changes. After registering the DDN account, you can set it up in M300plus. Before setting, you should ensure network cable is connected and routing setting is eth0 now. Importantly, you need to register a DDNS account.

- Check ***Boot*** checkbox to enable DDNS
- Choose your DDNS Service, M300plus supports no-ip, dyndns and freedns.
- Input your Username, Password and Domain name.
- Click ***Enter*** to active DDNS feature.

After setting, you can input Domain Name in the browser to remote check the webpage of M300plus. (When using this function, do not let the remote device and M300plus be in the same LAN.)

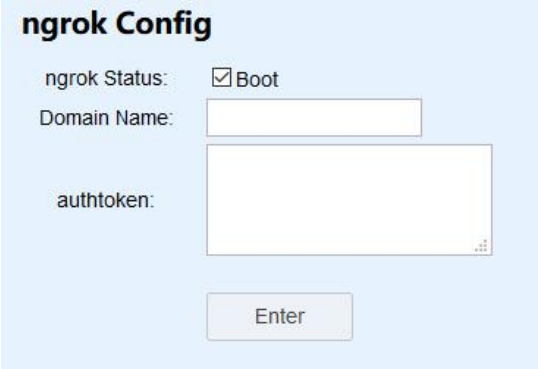


4.7.6 natapp and Ngrok

Network Address Translation (NAT) is the process where a network device, usually a firewall, assigns a public address to a computer (or group of computers) inside a private network. Ngrok exposes local servers behind NATs and firewalls to the public internet over secure tunnels. After registering the Ngrok or natapp account, you can set it up in M300plus.

Before setting, you should ensure PPP dial is set successfully and routing setting is ppp0 now.

- Check ***Boot*** checkbox to enable ngrok
- Input Domain Name and authtoken.
- Click ***Enter*** to active Natapp/ ngrok service.



4.7.7 Routing Setting

The routing setting provides a function to select the main network source. It is also possible to switch the network source automatically. Currently only supports switching from SIM card to network cable.

- Routing strategy: M300plus supports default and customize.
- Main route: eth0 means using the network cable first, ppp0 means using SIM card first.(If you want to use SIM card, please set PPP dial first)

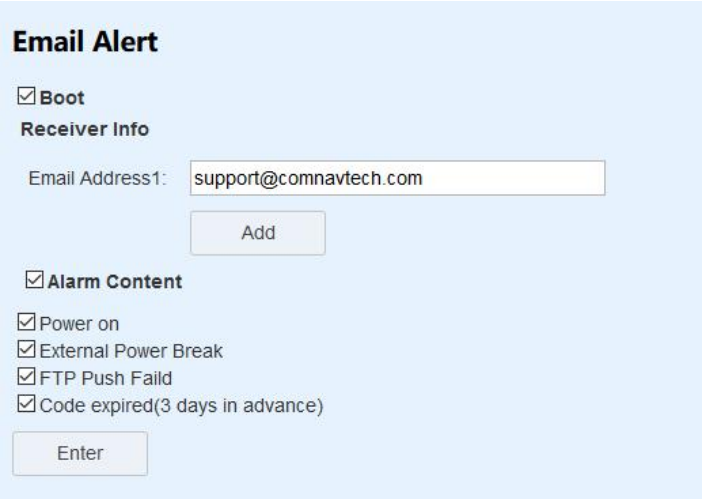
When routing strategy is default, main route defaults to the network cable and can't change. If you want to use SIM card first, you just need to set routing strategy as customize and main route as ppp0.

4.7.8 Email Client

Before setting a Email Client, open your mail client SMTP authorization firstly, then set SMTP Server, SMTP Port, Email Address and password. Enable Enter button to save configuration.

4.7.9 Email Alert

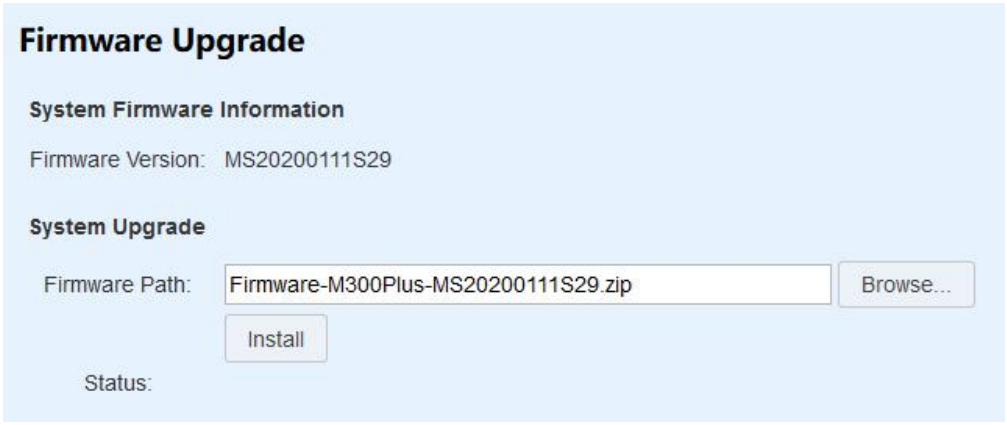
After set the Email Client, you can add no more than 3 email addresses to receive M300Plus's alarm, including Power on/External Power Break/Battery low/FTP Push Failed/Code expired.

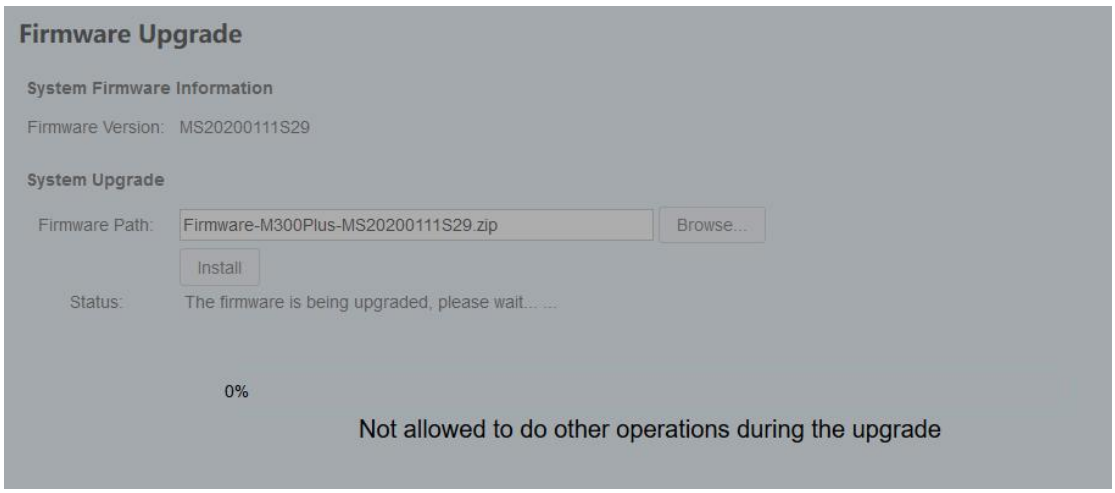


4.8 Firmware Update

You can update the system firmware, board firmware and front panel firmware in this menu.

Select system, board or front panel upgrade according to your demand, then click ***Browse*** to select the latest firmware version. Click ***Install***, a progress bar shows 0 to 100% and status will be "Not allowed to do other operations during the upgrade". When completing firmware update, the receiver will restart automatically and information prompted below:

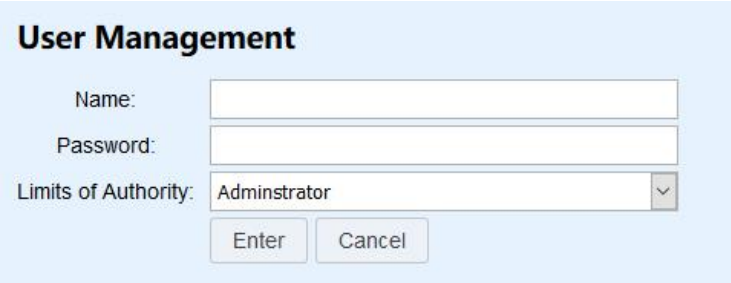




4.9 User Management

Use *user management menu* to add, delete users or edit limits of authority.

Click ***Add User*** button, enter the name, password, and choose limits of authority, then click ***Enter***, you will add a user successfully. The maximum number of user is 100.



5. Programmatic Interface

This section describes a method of controlling M300Plus receiver through programmatic commands. It provides a more machine friendly method for users to check and configure receivers, such as base/rover, NMEA data output. Please read these tips before sending commands to your M300Plus receiver.

- Select and send proper commands, all commands are case insensitive: Log version=LOG VERSION
- Press ***Enter*** button at the end of every command to check receivers' feedback information or input another command
- For More detailed programmatic commands, please refer to ***ComNav OEM CARD REFERENCE MANUAL***

WARNING-These commands are only suitable for COM1. The COM2 and COM3 are connected to the web interface, please do not change the baud rate and the data output of these two ports.

5.1 Frequently used commands

- **Check Version Information**

log version // Version information about the board

```
<VERSION COM1 0 60.0 UNKNOWN 1869 200404.500 00000000 0000 1114
<     1<          GPSCARD "S32030K708" "02801074" "CRDK-708AA-TTT-0" "2.20R-
2.032-1" "5.000" "2015/Aug/25" "17:27:16"
OK!
Command accepted! Port: COM1.
```

- **Check Port Information**

log com configa // Information of the port.

```
=============================================================================
=
Port| Baud |Parity|Databits|Stopbits|Handshake|Echo|Breaks|RxType|TxType|
Response|
=============================================================================
=
COM1|115200|     0|       8|       1|        0|   0|     1|     1|     1|
1|
COM2|921600|     0|       8|       1|        0|   0|     1|     1|     1|
1|
COM3|115200|     0|       8|       1|        0|   0|     1|     1|     1|
1|
COM4|115200|     0|       8|       1|        0|   0|     1|     1|     1|
1|
OK!
Command accepted! Port: COM1.
```

- **Change the serial port baud rate**

com com1 9600// Change the baud rate of com1 to 9600

- **Check System Information**

log sysconfiga //All the configuration of the system can be viewed by this command.

- **Check the Output data Information**

log loglista//View the output data information about all the ports.

```
<command>
log loglista
</command>
#LOGLISTA,COM1,0,60.0,UNKNOWN,1869,201015.800,00000000,0000,1114;
COM2,RAWEPHEM,BINARY,ONCHANGED,1.000,
COM2,BESTPOS,BINARY,ONTIME,120.000,
COM2,BD2EPHEM,BINARY,ONCHANGED,1.000,
COM2,RANGECMP,BINARY,ONTIME,1.000,
COM2,PSRDOP,BINARY,ONTIME,2.000,
COM2,BD2RAWEPHEM,BINARY,ONCHANGED,1.000,
COM2,GPSEPHEM,BINARY,ONCHANGED,1.000,
COM2,GLOEPHEMERIS,BINARY,ONCHANGED,1.000,
COM2,GLORAWEPHEM,BINARY,ONCHANGED,1.000,
COM2,M925,BINARY,ONTIME,10.000,
COM3,GPGGA,ABBASCII,ONTIME,1.000,
COM3,GPGSA,ABBASCII,ONTIME,1.000,
COM3,GPGSV,ABBASCII,ONTIME,1.000,
COM3,GPZDA,ABBASCII,ONTIME,1.000,
```

- **Lockout/unlockout satellite system**

Command	Description
(un)lockout bd2	(un)lockout Beidou system
(un)lockout gps	(un)lockout GPS system
(un)lockout GLONASS	(un)lockout Glonass
Unlockoutall	Unlock all GNSS system

- **NMEA data output**

The serial port is for COM1, you can output any NMEA data through COM1.

For example:
log com1 gpgga ontime 1
log com1 gpgsv ontime 1

- **Raw data output**

Log com1 rawephemb onchanged //Output GPS ephemeris
Log com1 glorawephemb onchanged //Output Glonass ephemeris
Log com1 bd2rawephemb onchanged //Output Beidou ephemeris
Log com1 galephemerisb onchanged //Output Galileo ephemeris

Log com1 rangecmpb ontime 1//Set com1 output ***cmp***[1] data, the frequency is 1Hz.

Saveconfig //Save configuration

- **Base setup & Rover setup**

Output/Input correction data from serial port(com1).
For base(RTCM3):
fix auto
log com1 rtcm1004b ontime 1 //Extended L1&L2 GPS RTK Observables
log com1 rtcm1104b ontime 1 //Extended B1, B2, B3 BD2 RTK Observables
log com1 rtcm1012b ontime 1 //Extended L1&L2 GLONASS Observables
log com1 rtcm1005b ontime 5 // Base station coordinate
saveconfig //Save configuration
For rover:
interfacemode com1 auto auto on //Config com1 to detect RTCM corrections
log com1 gpgga ontime 1 //Com1 output GPGGA data
saveconfig //Save configuration

5.2 Commands related to external devices

5.2.1 Event marker

The M300Plus receiver supports the event marker function. Use the command *MARKCONTROL* to control the event functions.

Format

MARKCONTROL signal switch [polarity] [timebias [timeguard]]

Description

At present, *Signal* only supports *mark1, and Switch* supports *ENABLE* and *DISABLE. Polarity* supports *POSITIVE (*positive pulse triggering) and *NEGATIVE* (negative pulse

triggering). Timebias and timeguard are not available currently.

Example

markcontrol mark1 enable negative 0 0

After configuration, you can save and check settings via command *saveconfig* and *logsysconfig*.

Output Messages

Markpos and *marktime* provide the position and accurate time of the event moment.The two messages support binary and ASCII formats, so the messages provide formats *markposa*, *markposb*, *marktimea* and *marktimeb*.

Examples

logcom1 markposa onnew

logcom1 marktimea onnew

Once you trigger the Event signal connector, it will output the event information from the serial port(com1). The event information(marktime&markpos) will record the raw data once it is triggered if you have enabled the event function.

```
#MARKPOSA,COM1,0,60.0,FINESTEERING,1869,266789.692,00000000,0000,1114;SOL_COMPUTED,FIXEDPOS,3
1.17449545000,121.38782552000,47.6820,0.0000,WGS84,0.1361,0.5493,1.3065,"0008",99.000,658.000
,26,26,26,26,0,0,0,25*3dd5ce03
#MARKTIMEA,COM1,0,60.0,FINESTEERING,1869,266789.692,00000000,0000,1114;1869,266789.692000000,
4.895151192e-04,8.062574872e-04,-17.000000001,VALID*8169c4d9
```

5.2.2 PPS output

The M300Plus receiver supports the PPS output. Use the command *PPSCONTROL* to configure the PPS output.

Format

PPSCONTROL <*switch*><*polarity*><*period*><*pulse-width*>

Description

This command can be used to set the polarity, period and pulse-width of PPS output.

Parameters

<*switch*>: switch ‘enable’ or ‘disable’, the switch should be set to ‘enable’, and ‘disable’ is not allowed.

<*polarity*>: Select ‘positive’ if with a high level pulse, and ‘negative’ mode if a low level pulse.

<*period*>: fixed to 1 second

<*pulse-width*>: in microseconds, should be less than half of period.

Example

PPSCONTROL ENABLE POSITIVE 1 1000

5.2.3 10 MHz frequency input

This port is used for external clock input, and it can be an external atomic clock. Command:

Set atom on/off // on: use the external atomic clock; off: use the internal atomic clock.

Appendix A： Advantages of Beidou B3 signal

ComNav technology is a high-tech company with CORE GNSS Positioning technology, in China. So we have a better understanding of Beidou signal, providing reliable receivers and positioning solutions for you. ComNav declares that Beidou B3 signal is only used for customers in China with its two advantages:

E-RTK: long baseline RTK(supper wide int solution), which can reach 100km distance.

RTK initialization time and RTK stability: the Beidou B3 can improve the RTK fix time.