# M1G2 Receiver

User Manual

Edition: V2.0_202011

## Statement

**Please read carefully:**

Thank you very much for purchasing our product. For instructions on how to use this product, please be sure to read the user manual.

This user manual is for your receiver only. If your receiver does not match the situation in the user manual, the actual situation of the receiver shall prevail.

The information in this document is subject to change without notice; We reserve the right to change or improve its products as well the content without any obligation to notify individual or organization of such changes or improvements. For any questions, please contact the customer service center or contact our authorized dealer.

Customer safety is important. Please read carefully the precautions and instructions in the user manual. To avoid accidental damage, use only original supplied parts. If you do not use the system or connect incompatible accessories in accordance with the correct procedures, it may cause damage to the equipment and may even endanger others and your safety. In this regard, the company does not assume any responsibility

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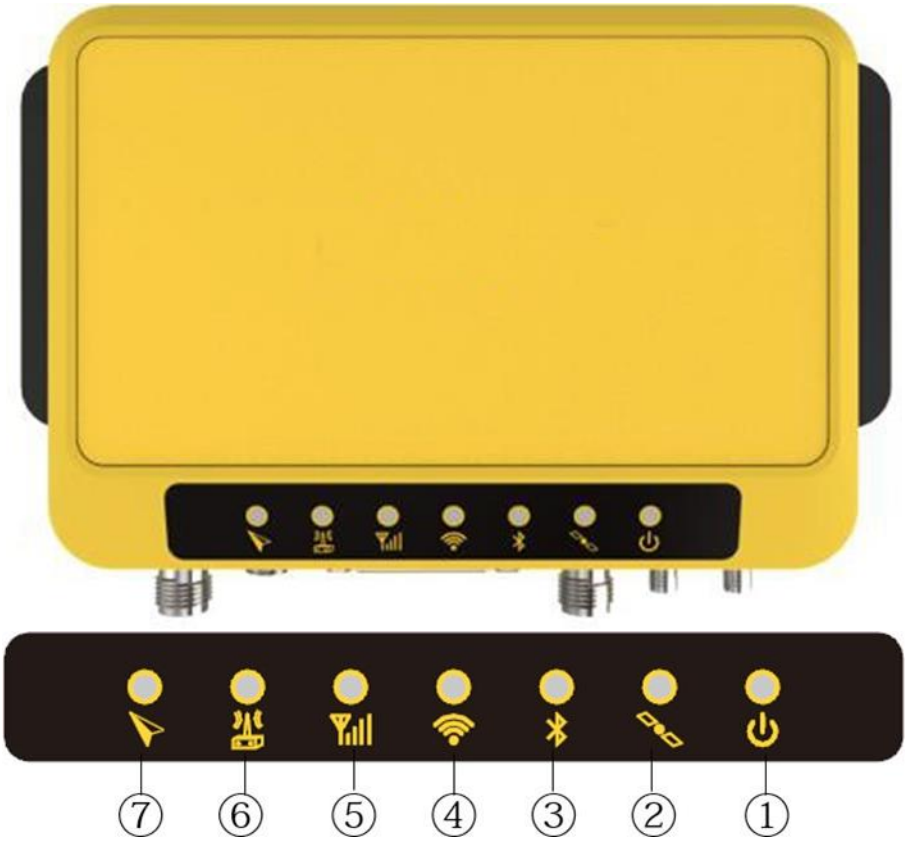
# 1. Product Description

The device is a high-precision GNSS receiver for engineering, monitoring, and other applications. The product is suitable for project applications such as vehicle monitoring, engineering inspection, and automated data collection. This chapter provides basic information to help you become familiar with this GNSS receiver.

Main features:

- Robust housing
- Support 4G LTE, UHF and Bluetooth / WLAN data link
- Easy host configuration via Web UI and remote server
- Adaptable power requirements to various environments
- Smart chain connection
- IP67

## 1.1 Top View



| | | | |
|---|---|---|---|
| ❶ | Power | Red | Lights up red when power is on, lights off when power is off, no alarm status (cannot turn on below 9V, automatically turns on above 9V)； |
| ❷ | Satellite | Yellow | At single point solution, flashing yellow light at 1s interval;<br>At floating point solution / fixed solution, the satellite light is always on;<br>Invalid solution / below 4 satellites, satellite lights are off; |
| ❸ | Bluetooth | Blue | Bluetooth connection, Bluetooth light is always on; off when Bluetooth is disconnected； |
| ❹ | WiFi | Green | Client / AP is steady green when turned on； |
| ❺ | 4G Network | Green | Lights green when 4G is turned on, and turns off when 4G is turned off; |
| ❻ | Radio | Green | Lights up green when the function is on and off when the function is off; |
| ❼ | Heading | Green | Lights up green when the function is on and off when the function is off; |

## 1.2 Front View

| | | |
|---|---|---|
| ❶ | **GNSS2** | TNC，External antenna connector |
| ❷ | **PWR** | 2 core LEMO Connector, power interface |

| | | |
|---|---|---|
| ❸ | **D-SUB 26** | 2 RS485 Serial port<br>1 RS232 Serial port<br>1 USB2.0 Port (supports OTG)<br>1 1PPS Output Interface<br>1 EVENT Port<br>1 CAN Port<br>1 100M Ethernet Port |
| ❹ | **GNSS1** | TNC, External GNSS Main antenna interface |
| ❺ | **LTE** | SMA，4G Antenna Port |
| ❻ | **UHF** | External UHF Antenna interface |

### 1.3 Right side sight

| | | |
|---|---|---|
| ❶ | TF Card slot | MicroSD Card slot |
| ❷ | SIM Card slot | Standard size SIM card slot |

### 1.4 Left side sight

## 1.5 Sight from the Bottom

# 2. Technical Specifications

| GNSS Performance | | | |
|---|---|---|---|
| | PRO | | STD |
| Channel | 555 | Channel | 72 |
| Satellite Tracking | GPS: L1 C/A, L1C, L2C, L2P | Satellite Tracking | GPS : L1C/A |
| | GLONASS: L1 C/A, L2 C/A, L2P | | GLONASS: L1OF |
| | BeiDou: B1,B2 | | BeiDou: B1 |
| | Galileo: E1, E5b | | Galileo: E1B/C |
| | NavIc: L5 | | - |
| | SBAS: L1,L5 | | SBAS: L1,L5 |
| | QZSS: L1 C/A, L1C, L2C | | QZSS: L1C/A: WAAS, EGNOS, MSAS, GAGAN |
| Update rate | 5Hz | Update rate | 4Hz |
| Timing accuracy | 20ns RMS | Timing accuracy | 30ns RMS |
| RTK accuracy | 10mm + 1ppm | RTK accuracy | 3.0m（Float） |
| SBAS accuracy | 60cm RMS | SBAS accuracy | Horizontal: 2.0m |
| DGPS accuracy | 40cm RMS | | Vertical: 2.5m |
| Velocity accuracy | <0.03m/s RMS | DGPS accuracy | - |
| Heading accuracy | 2m baseline: 0.08 degrees | Cold start | <30s |
| | 4m baseline: 0.05 degrees | Warm start | <2s |
| Hot start | ＜19s | Hot start | <1s |
| Reacquisition | ＜1s | Max Elevation | 500m/s |
| Max Speed | 1,850km/h | Max speed | 500m/s |
| **System** | | **Communication** | |
| Operation system | Linux | Network Modem | Integrated 4G Modem |
| Processor | AM335X Sitara ARM Cortex-A8 | Bluetooth | V2.1+EDR / V4.1, Class2 |
| Internal memory | 512MB RAM+8GB storage | WLAN | WIFI IEEE 802.11 b/g/n |
| Expanded memory | Up to 32GB | UHF | TX/RX: 410MHz – 470MHz |
| Radio Modem | TRM101 (Channel 555) | | Transmit Power: 1 W |
| **Electical** | | Ports | D-SUB 26 interface: 2 x RS485 port , 1 x RS232 port , |
| Power input | 10 to 28V DC | | 1 x USB2.0 port（OTG supported） |
| **Physical & Environmental** | | | 1 x 1PPS port , 1 x EVENT interface |
| Weight | 550g | | 1 x CAN interface, 1 x 100M ethernet port |
| Size | 150mm*105mm*34mm | | PWR: 2-pin LEMO for power input |
| Operation temperature | -30℃ to +65℃ | | GNSS1: TNC port for main GNSS antenna |
| Storage temperature | -40℃ to +80℃ | | GNSS2: TNC, TNC for auxiliary GNSS antenna（Channel 555） |
| IP Level | IP67 | | LTE: SMA, 4G antenna port |
| Shock | Withstands 1.5m drop on concrete | | UHF: external UHF antenna port |
| Vibration | 50Hz, 0.5mm, 5mins | Others | SIM card slot, TF card slot |

Illustrations and technical specifications are subject to change without notice.

## 2.1 Port

| | |
|---|---|
| • D-SUB 26 | 2 RS485 Port<br>1 RS232 Port<br>1 USB2.0 Port（Support OTG）<br>1 1PPS Output Interface<br>1 EVENT Port<br>1 CAN Port<br>1 100M Ethernet interface |
| • PWR | 2 core LEMO power Connector Port |
| • GNSS1 | TNC, External GNSS Main antenna Port |
| • GNSS2 | TNC，External antenna connector |
| • LTE | SMA，4G Antenna Port |
| • UHF | External UHF antenna interface |
| • SIM | Standard size SIM card Slot |
| • TF card | MicroSD Slot |

## 2.2 Data Record

- Storage

| Device | description |
|---|---|
| In Built storage | 8G |
| External storage | MicroSD card |

- Data Types: Binary, RINEX, BINEX
- Transmission rate: 2S, 5S, 10S, 15S, 30S, 60S 1Hz, 2Hz, 5Hz, (Optional 10Hz, 20Hz)

## 2.3 Data Flow

| | |
|---|---|
| • Stream number | One NTRIP Server stream, one NTRIP Client stream, 5 Serial port (TCP / UDP) flow |
| • Stream port | WIFI, Wireless, UHF, Ethernet, COM1, COM3 |
| • Navigation output | GGA, ZDA, GSA, GSV, GST, VTG, RMC, GLL |
| • Differential output | RTCM 2.3, 3.0, 3.2, CMR, CMR+, DGPS, BINEX, RAW |

## 2.4 User Interface

| | |
|---|---|
| • LEDs | 7 LED Lights, showing power, satellite, Bluetooth respectively、WIFI, network, radio, and heading status |

## 2.5 System Configuration

| | |
|---|---|
| • operating system | Linux |
| • Bluetooth | Bluetooth 2.1+EDR, V4.0 |
| • WIFI | 802.11 b/g/n, Hotspot/client mode |
| • Ethernet | 100M |

## 2.6 The internet

| System | Frequency |
|---|---|
| **LTE FDD** | B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28 |
| **LTE TDD** | B38/B39/B40/B41 |
| **UMTS** | B1/B2/B4/B5/B6/B8/B19 |
| **GSM** | B2/B3/B5/B8 |

| | |
|---|---|
| • NTRIP | Server / client |
| • Remote management | GNSS.NET Remote configuration |
| • FTP server | For data download |
| • E-mail alert | Used for low storage and other warning messages |

# 3. Operating instructions

## 3.1 Insert the card

If you need a SIM card, please insert the SIM card before turning on the device. Please see the figure below. Firstly, open the card holder, then insert the SIM card and micro SD card as a note in the card holder.

## 3.2 Connect external accessories

In order to achieve the working state, the device needs to be connected to an external antenna, which can be connected to the GNSS 1 / 2.

If you need to power on the device, it must be connected to a 2-pin power cable.

If you need a SIM card, insert SIM card and connect the 4G antenna to the LTE interface.

If you need to use the radio, you should connect the radio antenna to the radio interface.

### 3.3 Power On / Off

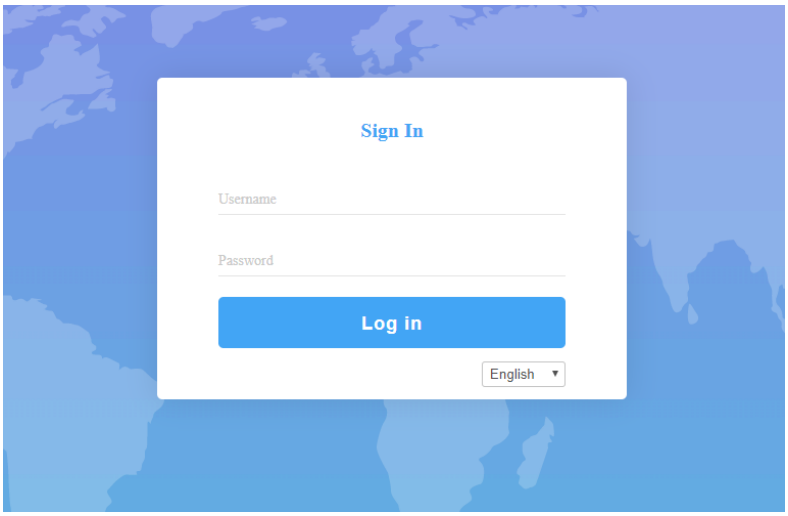
Once device is connected to the 2-pin power cable, it will automatically power on after the power has been turned on.

After power is on, the indicator will show the devices status. For example, the power light is red. If you turn on WIFI, WIFI will turn green. When the device has no power supply, it will automatically shut down.

## 4. Web UI

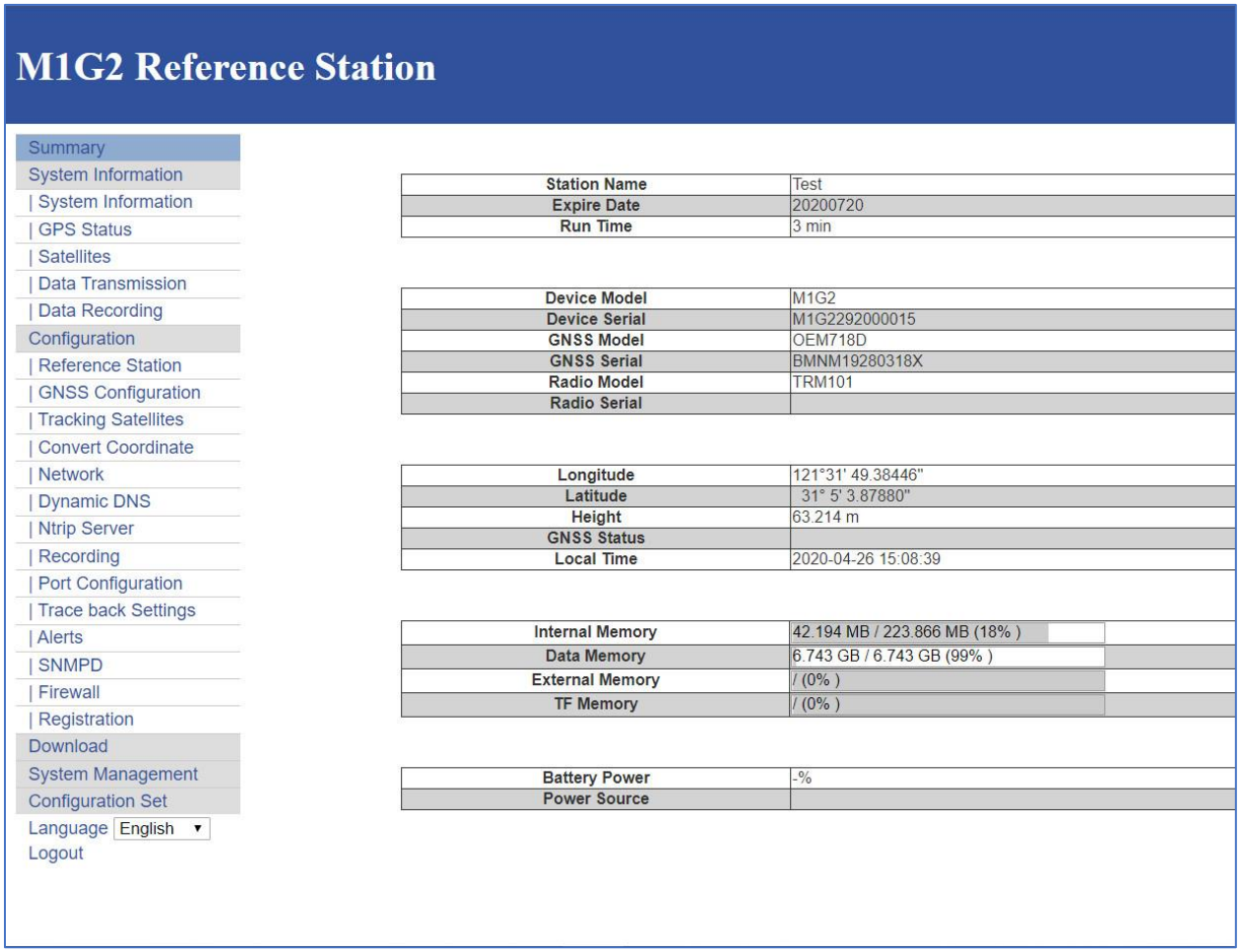
The device has Web user interface function, you can connect to device with WIFI to log into the Web interface to view device information and settings. The WIFI hotspot name is the serial number of the device. Enter the IP address: 192.168.10.1. When the user logs in, a window will pop up, and the account and password will need to be filled in.

- Username: admin
- Password: password.



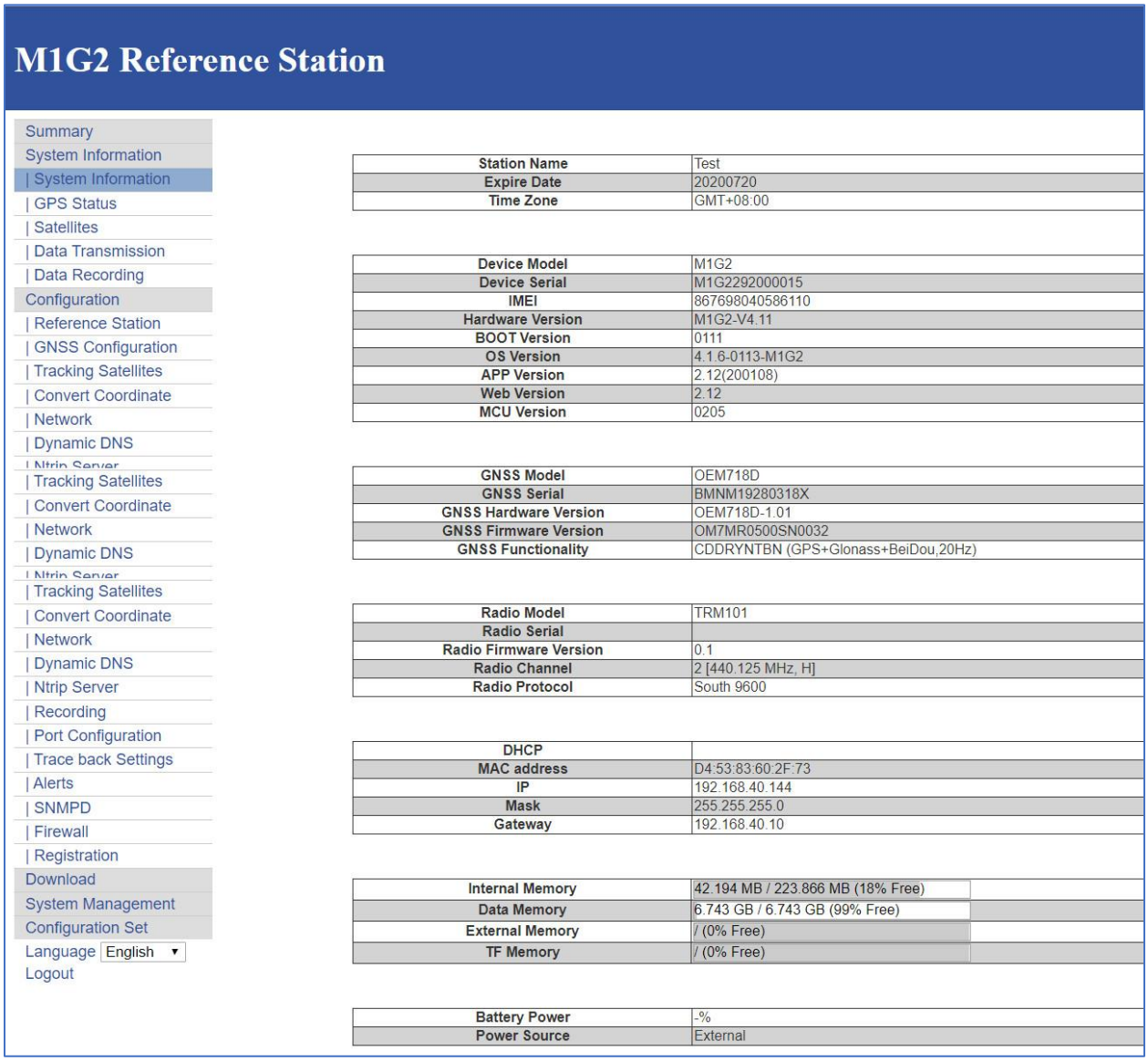
## 4.1 Summary

After verifying the login information, you can log in to the device web interface. The homepage content includes station name, expiration date, running time, equipment model, equipment serial number, GNSS model, GNSS serial number, radio model, radio serial number, and receiver location information. As shown below:



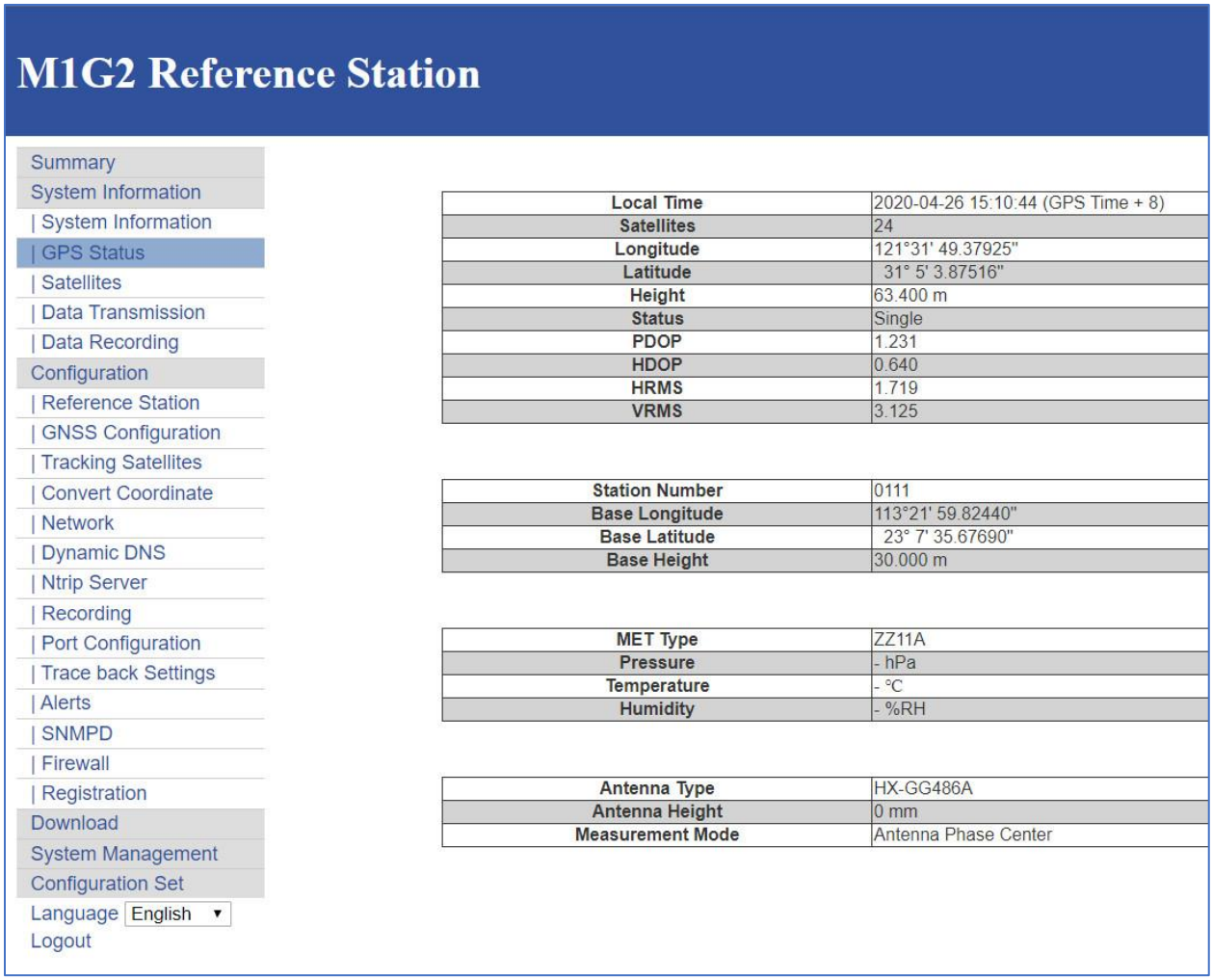
## 4.2 System Information

The system information interface will display the reference station name, device model, serial number, system version, application version information, built-in OEM Board information, built-in station information, storage parameter information.



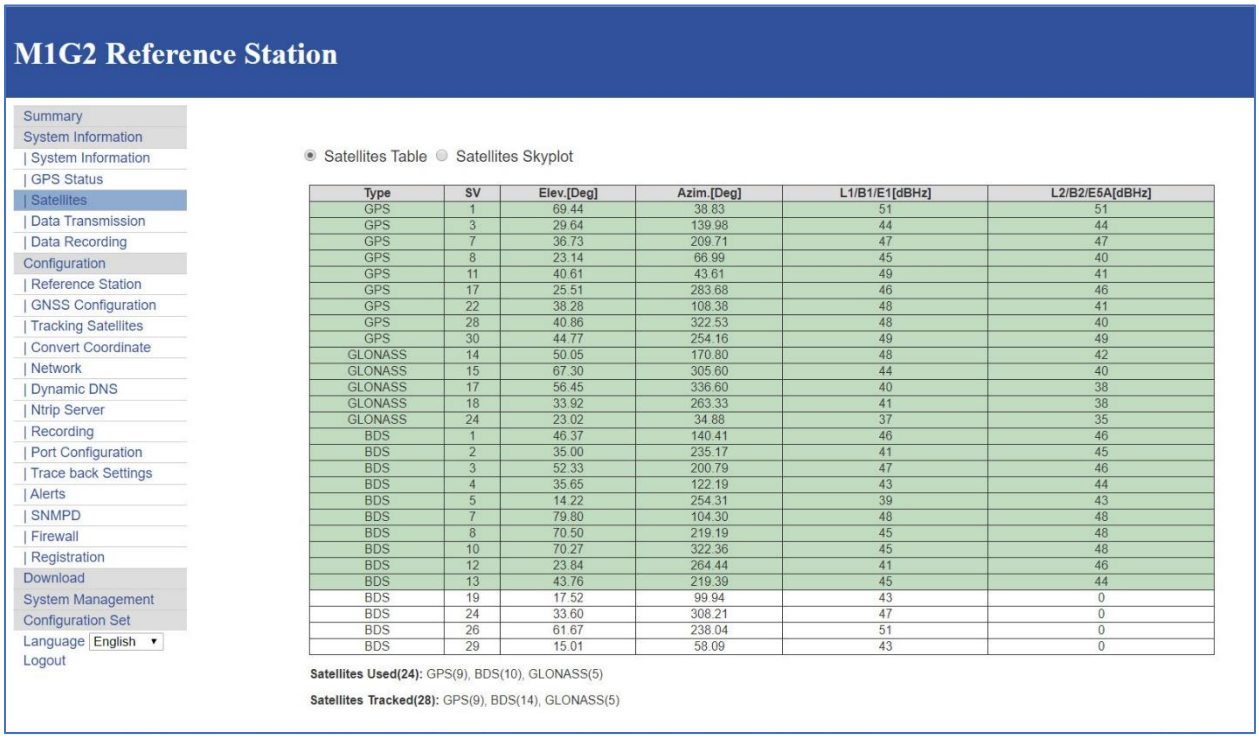
## 4.3 GNSS Status

The status page shows the current device positioning status, base station coordinates, weather meter type and antenna type usage information.



## 4.4 Satellite Information

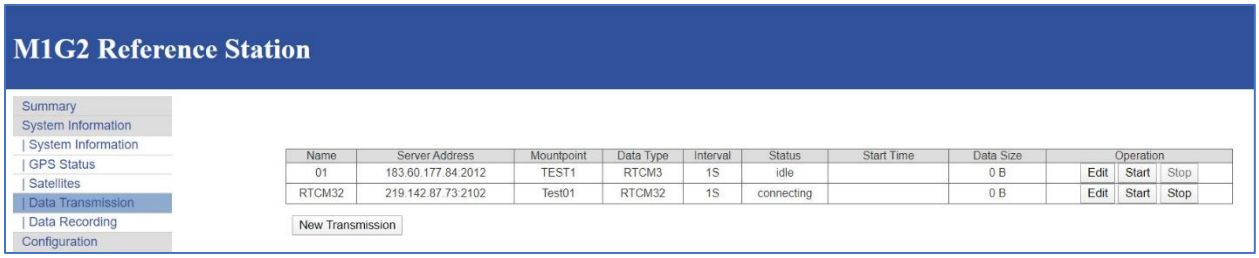
On this page you can see satellite maps and satellite lists.



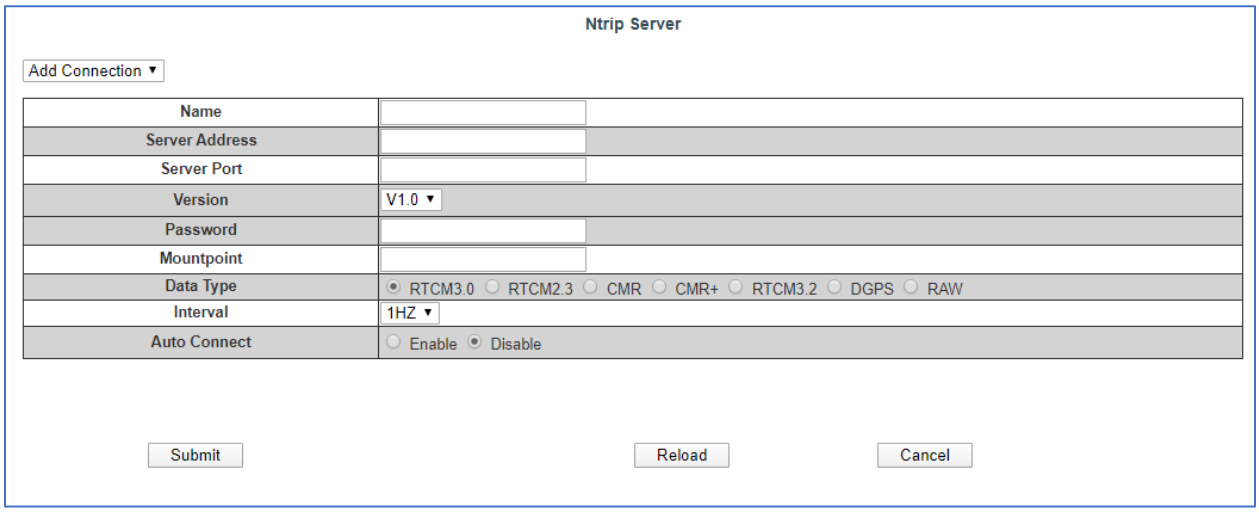

| Type | SV | Elev.[Deg] | Azim.[Deg] | L1/B1/E1[dBHz] | L2/B2/E5A[dBHz] |
|---|---|---|---|---|---|
| GPS | 1 | 69.44 | 38.83 | 51 | 51 |
| GPS | 3 | 29.64 | 139.98 | 44 | 44 |
| GPS | 7 | 36.73 | 209.71 | 47 | 47 |
| GPS | 8 | 23.14 | 66.99 | 45 | 40 |
| GPS | 11 | 40.61 | 43.61 | 49 | 41 |
| GPS | 17 | 25.51 | 283.68 | 46 | 46 |
| GPS | 22 | 38.28 | 108.38 | 48 | 41 |
| GPS | 28 | 40.86 | 322.53 | 48 | 40 |
| GPS | 30 | 44.77 | 254.16 | 49 | 49 |
| GLONASS | 14 | 50.05 | 170.80 | 48 | 42 |
| GLONASS | 15 | 67.30 | 305.60 | 44 | 40 |
| GLONASS | 17 | 56.45 | 336.60 | 40 | 38 |
| GLONASS | 18 | 33.92 | 263.33 | 41 | 38 |
| GLONASS | 24 | 23.02 | 34.88 | 37 | 35 |
| BDS | 1 | 46.37 | 140.41 | 46 | 46 |
| BDS | 2 | 35.00 | 235.17 | 41 | 45 |
| BDS | 3 | 52.33 | 200.79 | 47 | 46 |
| BDS | 4 | 35.65 | 122.19 | 43 | 44 |
| BDS | 5 | 14.22 | 254.31 | 39 | 43 |
| BDS | 7 | 79.80 | 104.30 | 48 | 48 |
| BDS | 8 | 70.50 | 219.19 | 45 | 48 |
| BDS | 10 | 70.27 | 322.36 | 45 | 48 |
| BDS | 12 | 23.84 | 264.44 | 41 | 46 |
| BDS | 13 | 43.76 | 219.39 | 45 | 44 |
| BDS | 19 | 17.52 | 99.94 | 43 | 0 |
| BDS | 24 | 33.60 | 308.21 | 47 | 0 |
| BDS | 26 | 61.67 | 238.04 | 51 | 0 |
| BDS | 29 | 15.01 | 58.09 | 43 | 0 |

## 4.5 Data transmission

This page displays the current data transmission status. Click [Edit] to set the transmission parameters.




When you click "New Transfer", this page will pop up to prompt you to add a connection.



## 4.6 Data Records

Data records are used to store static data for data analysis, static results, and other post-processing results. On this page, the user can view the current data recording status and click [Edit] to set the recording parameters.

| Schedule Name | Interval | Path | Status | Start Time | Duration Tme | File Size | Operation |
|---|---|---|---|---|---|---|---|
| Test | 1S | | idle | undefined | 60 min | 0 B | Edit Start Stop |

New Session

**Raw Data Recording Configuration**

**Compress(Global) :** Off

**Data Type :** RANGE

Add Recording

| | |
|---|---|
| Schedule Name | |
| Path Type | Session/Date |
| File Name | sssdddf.yyt |
| File System | /Internal |
| Interval | 1HZ |
| Duration Tme | 1 hour |
| Pool | Off |
| Auto | Enable Disable |
| Integral Point Record | Enable Disable |
| File Push | Enable Disable |
| **Push Parameters** | |
| Protocol | FTP GEO RADIO |
| FTP Server Address | |
| FTP Server Port | |
| FTP User | |
| FTP Password | |
| Remote Directory | |

| | |
|---|---|
| Convert | Enable Disable |

Submit Reload Cancel

## 4.7 Configuration

### 4.7.1 Base station settings

This page mainly sets the reference station name, mark number, receiver number, country code and time zone, etc.

| | |
|---|---|
| Observer Name | OBSERVER |
| Agency Name | AGENCY |
| Station Name | Test |
| Marker Number | 0 |
| Marker Type | GEODETIC |
| Receiver Number | 0 |
| Country Code | CHN - China |
| Site ID | |
| Time Zone | GMT+08:00 |
| HTTP Server Port | 80 |

Working mode: Set device to reference station or mobile station.

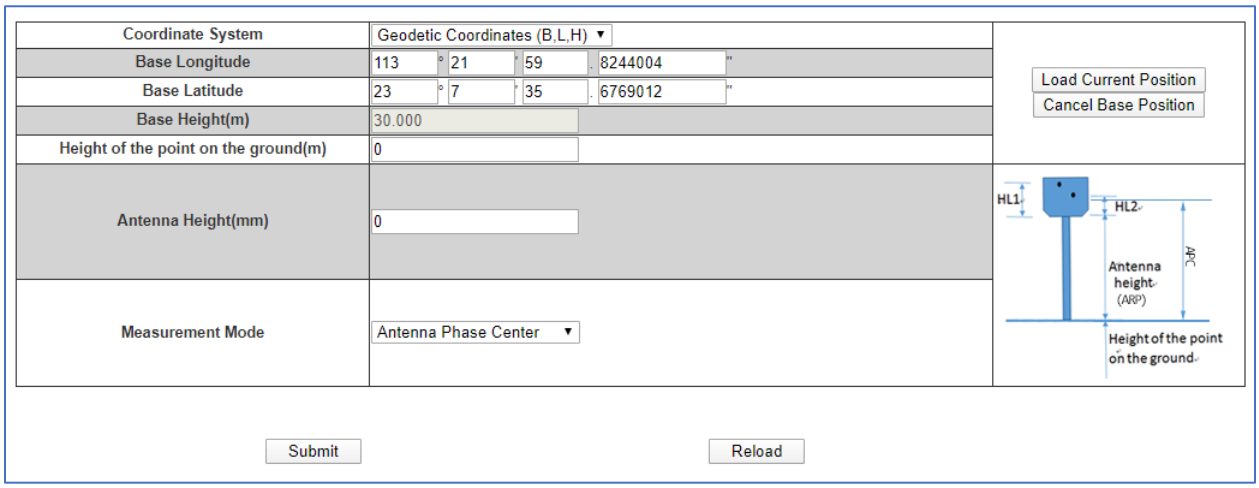
| | |
|---|---|
| Working Mode | Base Rover |

Antenna parameters: Select the corresponding antenna type and then enter the actual antenna height of the station.

| | |
|---|---|
| Antenna Type | HX-GG486A |
| Antenna Serial | |
| R(mm) | 0 |
| H(mm) | 0 |
| HL1(mm) | 116 |
| HL2(mm) | 142 |

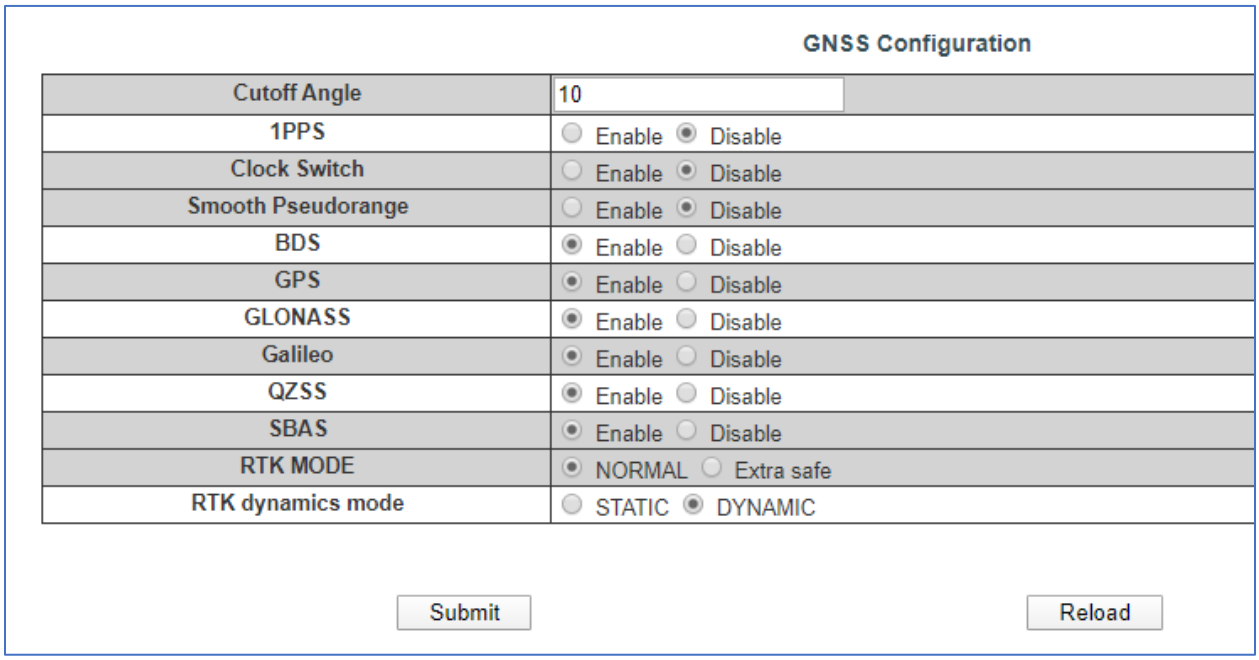
Reference station coordinates: If you don't need a known coordinate to start the reference station, click "Get the current coordinate" as a reference Check the coordinates.

However, if you need a known coordinate to start the reference station, follow the correct format to enter the known point coordinates.



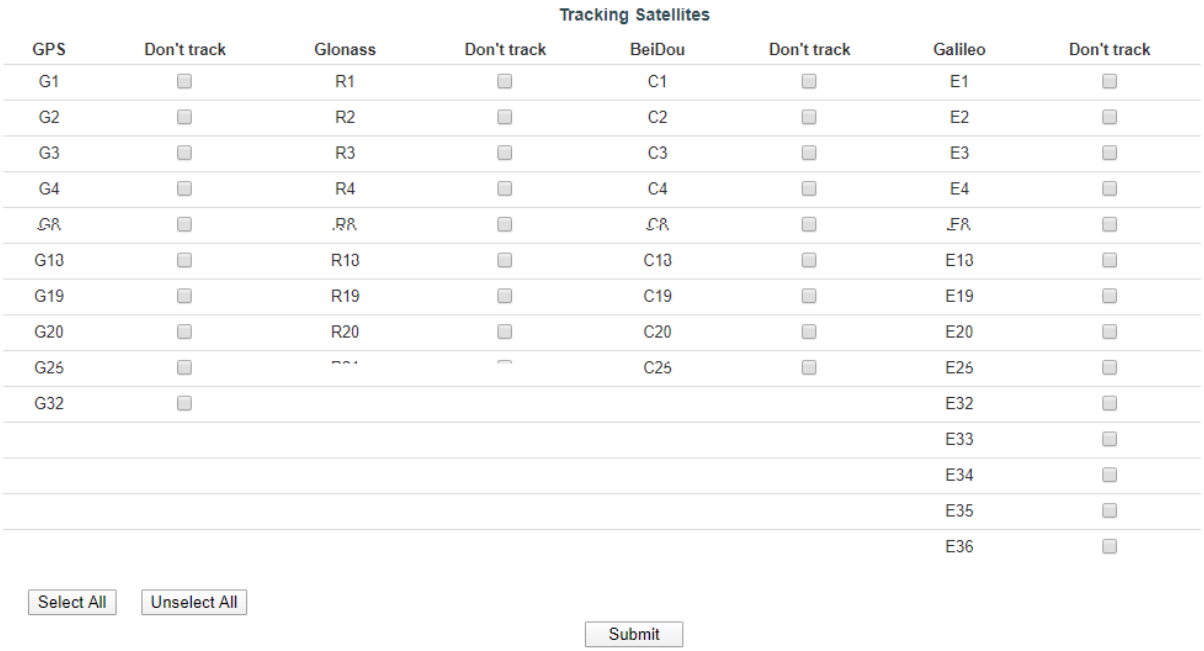

### 4.7.2 Satellite system settings

On this page, you can set the information of tessellate system and the cut off angle height.



### 4.7.3 Satellite tracking settings

On this page, you can choose the satellite you want.



### 4.7.4 Coordinate conversion parameter settings

This page is used to convert coordinate parameters.

**Convert Coordinate**

| | |
|---|---|
| Enable Output | Enable / Disable |
| **Destination Datum** | |
| Datum | WGS84 |
| Semi-Major Axis(a) | 6378137 |
| Bot-Flattening(1/f) | 298.257223563 |
| **Seven Parameter** | |
| Use Seven Parameter | ☑ |
| dX(m) | 0 |
| dY(m) | 0 |
| dZ(m) | 0 |
| RotateX(") | 0 |
| RotateY(") | 0 |
| RotateZ(") | 0 |
| Scale(ppm) | 0 |
| **Projection Parameter** | |
| Projection Type | Gauss |
| CenterMeridian(°) | 0.0000000000 |
| Scale | 1 |
| North(m) | 0 |
| East(m) | 0 |
| Ref-Height | 0 |
| Base-Lat(°) | 0 |
| Base-Lon(°) | 0.0000000000 |
| Parellel1 | 0 |
| Parellel2 | 0 |
| **Four Parameter** | |
| Use Four Parameter | ☐ |
| dX(m) | 0 |
| dY(m) | 0 |
| Rotate(") | 0 |
| Scale(ppm) | 0 |

Submit Reload

### 4.7.5 Network settings

This page is mainly set for the data chain mode used by device.

**The Running Network**

| | |
|---|---|
| Priority Network | ◉ Wired Net ○ Wireless Net ○ Mobile Net |
| Current Network | WAN |
| Default Gateway | 192.168.28.253 |
| DNS | 114.114.114.114\|8.8.8.8 |
| PING | Timeout : (s) Counts : |

**Device Network Settings**

| | |
|---|---|
| Wired Net | ◉ WAN |
| DHCP | ◉ Enable ○ Disable |
| IP | 192.168.28.59 |
| Mask | 255.255.255.0 |
| Gateway | 192.168.28.253 |
| MAC address | 04:79:B7:E3:E1:CE |
| Link Status | Link disconnected |
| Status | Route disconnected |

| | |
|---|---|
| Wireless Net | ○ Client ◉ Hotspot ○ Disable |
| MAC address | D4:53:83:60:2F:73 |
| SSID | M1G2292000015 |
| Password | 12345678 |
| IP | 192.168.10.1 |

| | |
|---|---|
| Mobile Net | ○ Enable ◉ Disable |

**FTP Server Settings**

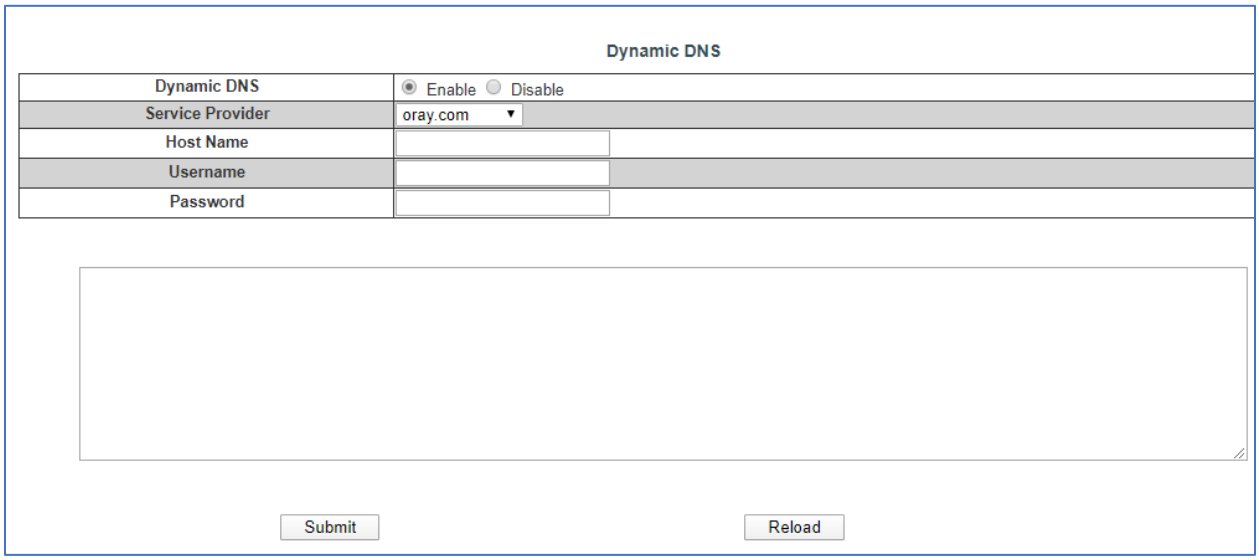
| | |
|---|---|
| Anonymous Access | Disable |
| User | 123 |
| Password | ••• |

**NTP**

| | |
|---|---|
| NTP Server | ○ Enable ◉ Disable |

### 4.7.6 Dynamic domain name

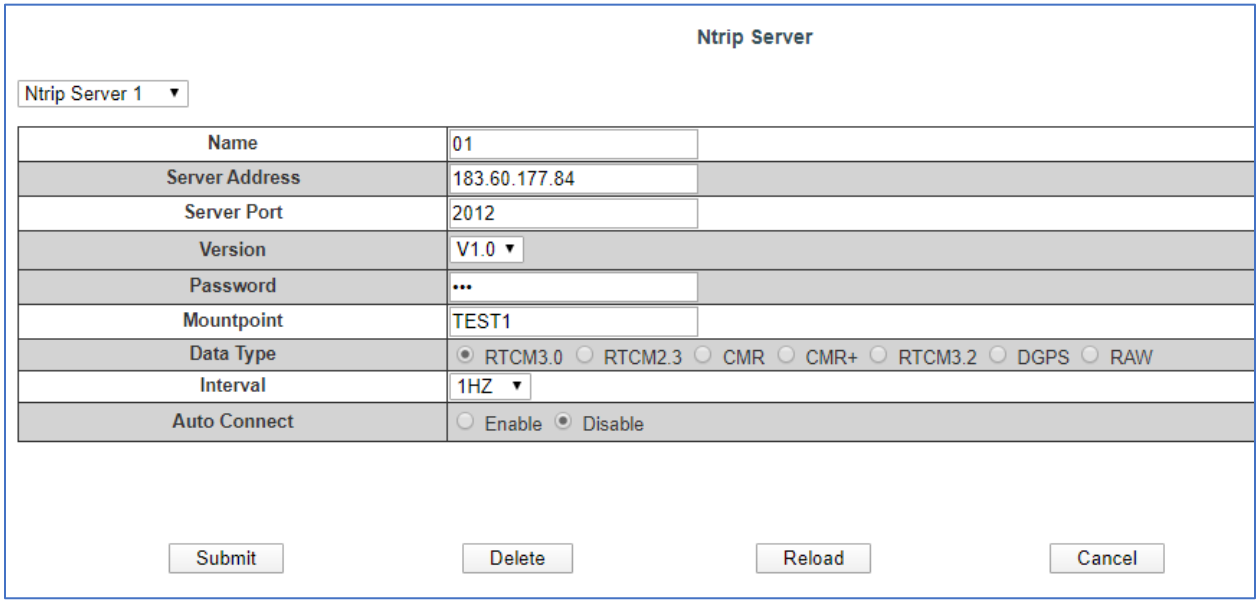
This page is mainly used to set dynamic domain name, service, host name, user name, password and so on.




### 4.7.7 Data transfer settings

In this page, you can set the transfer content and server for reference station.

Note: Passwords in this page can be entered arbitrarily, but cannot be empty.



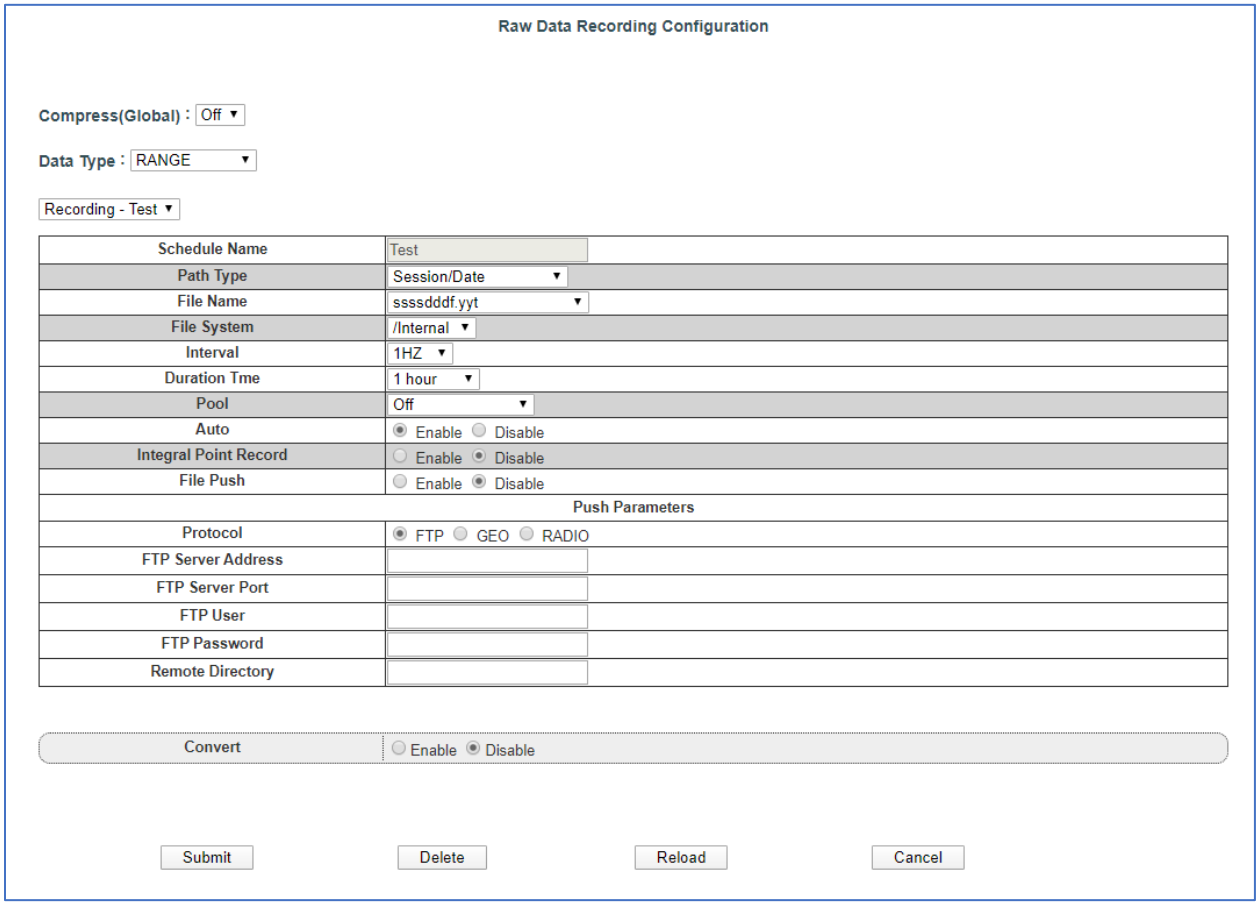

- When select [Automatic Connection] to open, after the network is disconnected, it will automatically connect the data transmission, otherwise it needs to manually start the transmission.

- Before setting the parameters, please go back to the reference station page to confirm that the base station coordinates are correct. If you need to start with a known coordinate, please enter a known coordinate.

- When the parameter settings are completed, click submit and the data transmission opens. In the status bar, you can see that the data transmission status is shown as "being transferred ". the host front panel differential transmission indicator starts flashing. The above process is to establish a base station transmission mode.

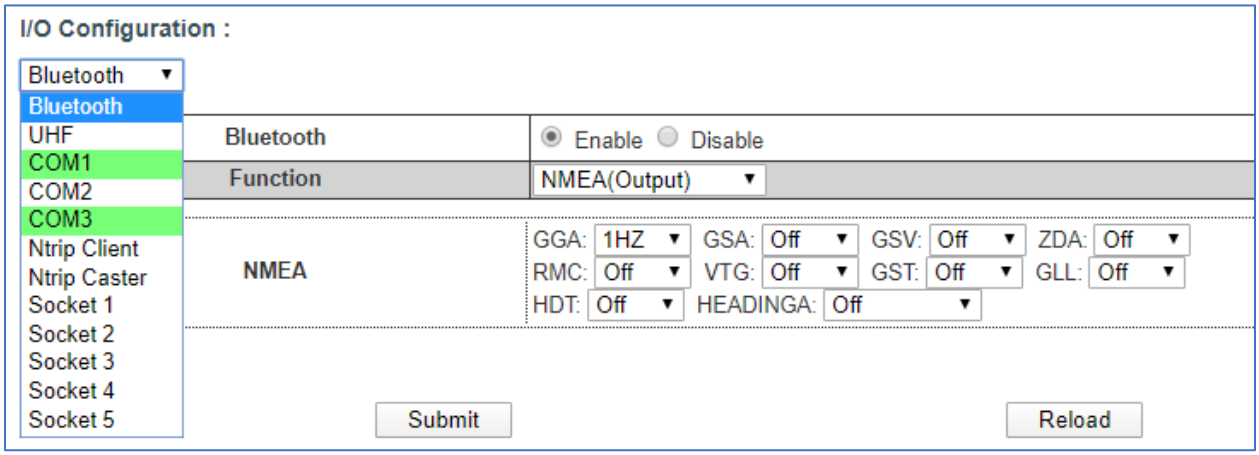
### 4.7.8 Data record

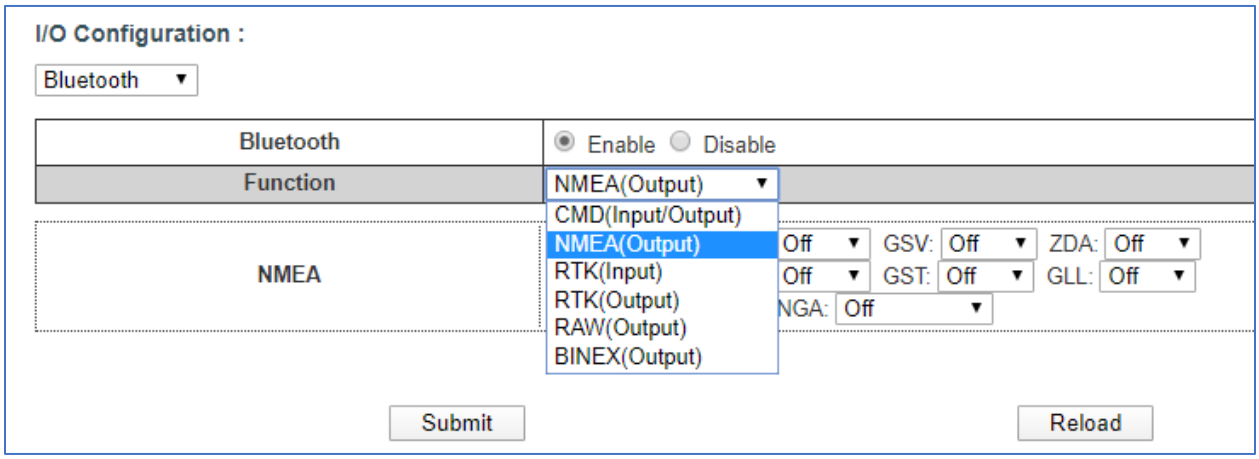
In this page, you can set up compressed storage, data format, time period name, path form and so on, and you can also choose the protocol.

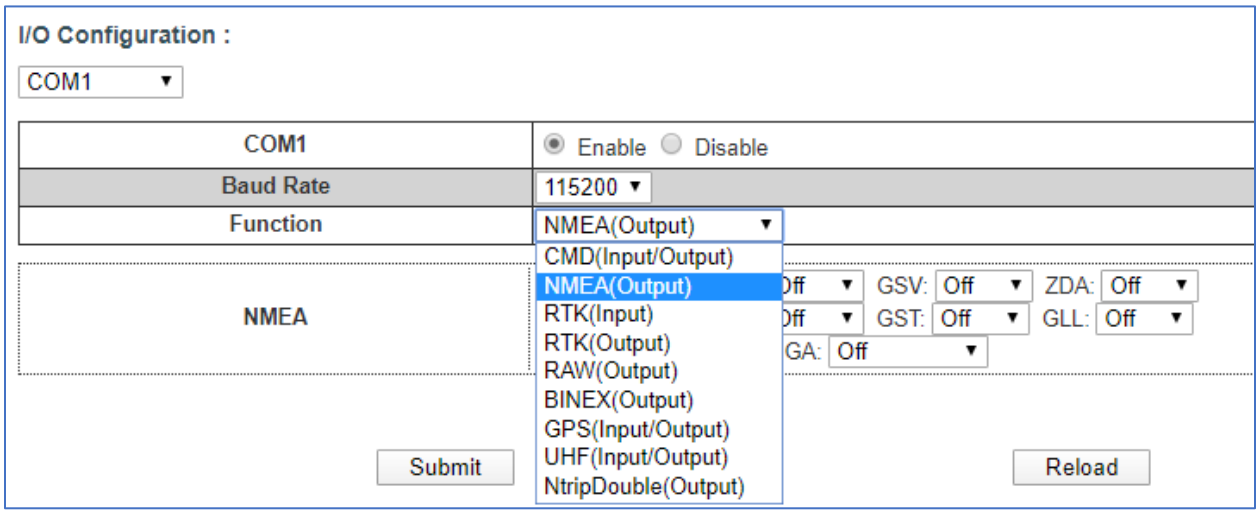


### 4.7.9 Port configuration

This page is mainly used to set up Bluetooth, Radio, COM1, COM3, NTRIP client, NTRIP server, Socket 1, Socket 3, Socket 4, Socket 5.



**I/O Configuration :**

UHF

| | |
|---|---|
| UHF | Enable Disable |
| Radio Channel | 2 440.125 MHz Default Frequency |
| Radio Protocol | South 9600 |
| Radio Power | High |
| Channel Spacing | 25 |
| Function | RTK(Output) |
| Data Type | RTCM3.0 |
| Interval | 1HZ |

Submit Reload

**I/O Configuration :**

Ntrip Client

| | |
|---|---|
| Ntrip Client | Enable Disable |
| IP:Port | 183.60.177.84:2012 |
| Version | V1.0 |
| Mountpoint | TEST Get Mountpoint |
| Upload GGA | 10S |
| User | user |
| Password | •••• |

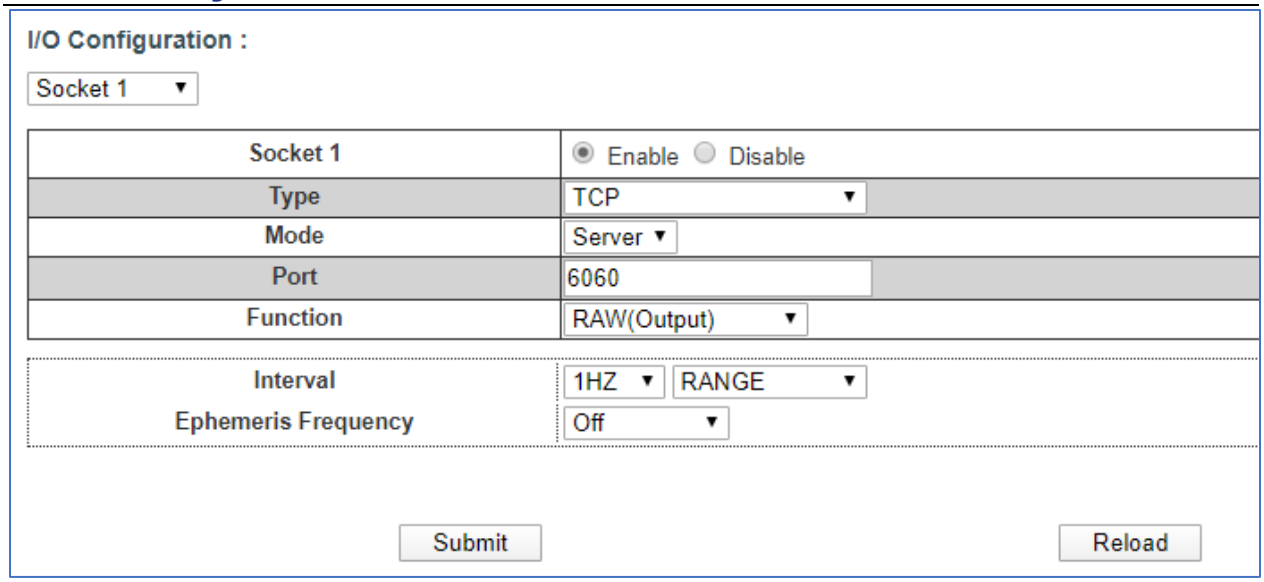
Submit Reload

**I/O Configuration :**

Ntrip Caster

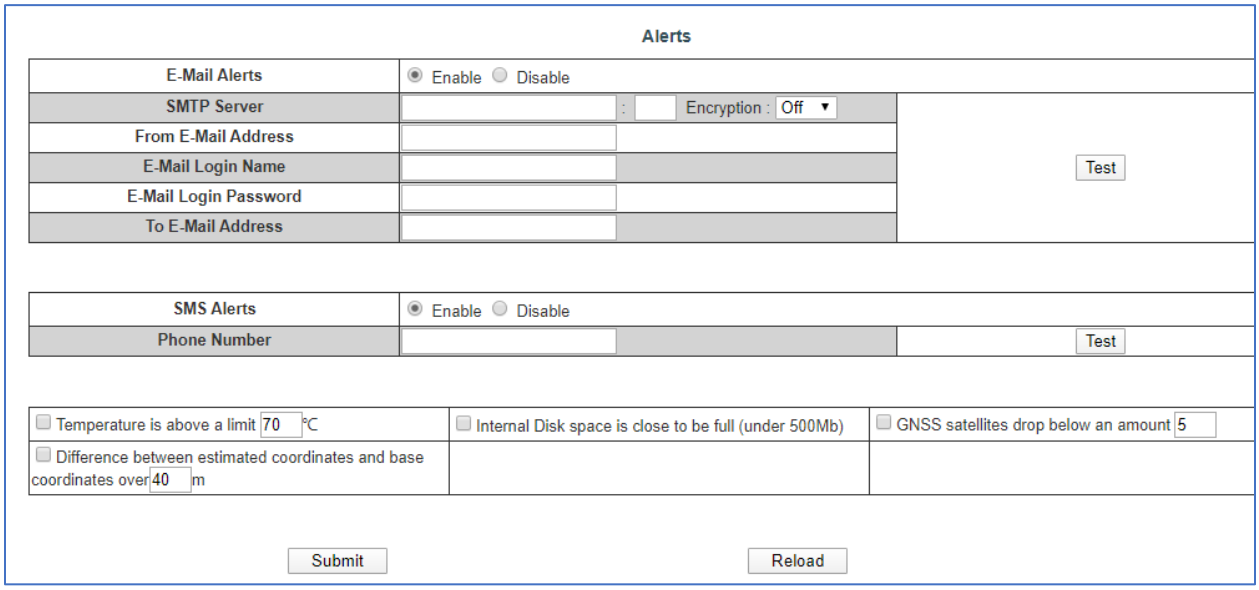
| | |
|---|---|
| Ntrip Caster | Enable Disable |
| Port | 6070 |

Submit Reload




### 4.7.10 Reminder Settings

This page is mainly used to install e-mail, text messages, telephone numbers. If you want to send message, you need to use the mobile network.

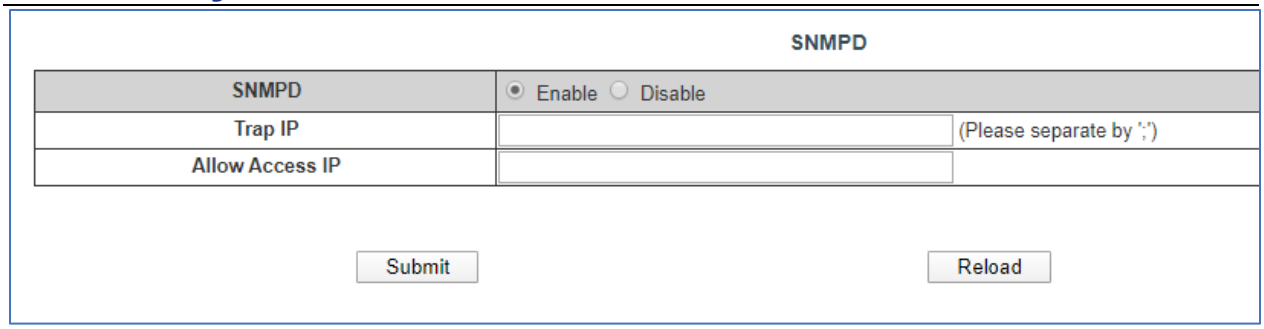



### 4.7.11 SNMP Proxy settings

When you come to SNMPD, you can see [Trap IP]and [Allow Access IP].

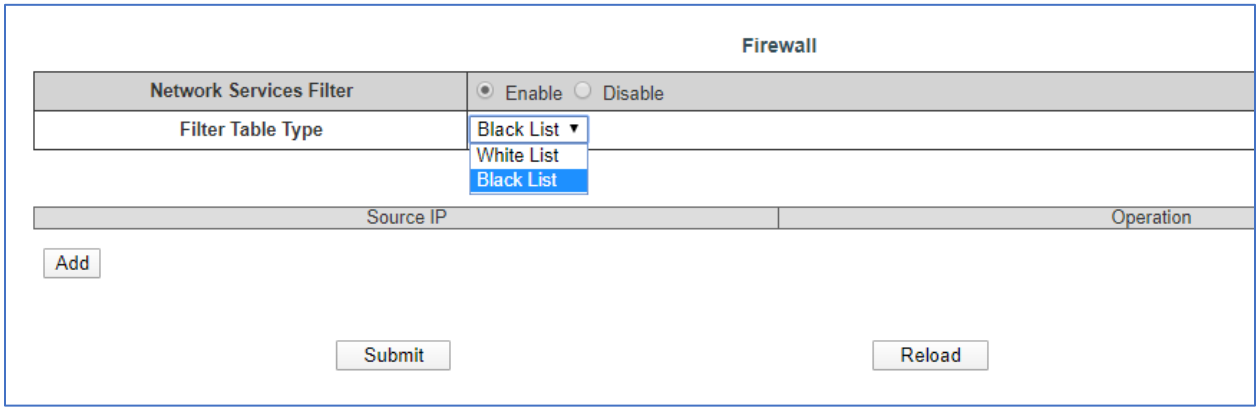
[Trap IP]: Receivers can specify some IPS and then automatically send information to those IPS.

[Allow Access IP]: Receivers can allow some devices to proactively obtain information about receivers through IP addresses.

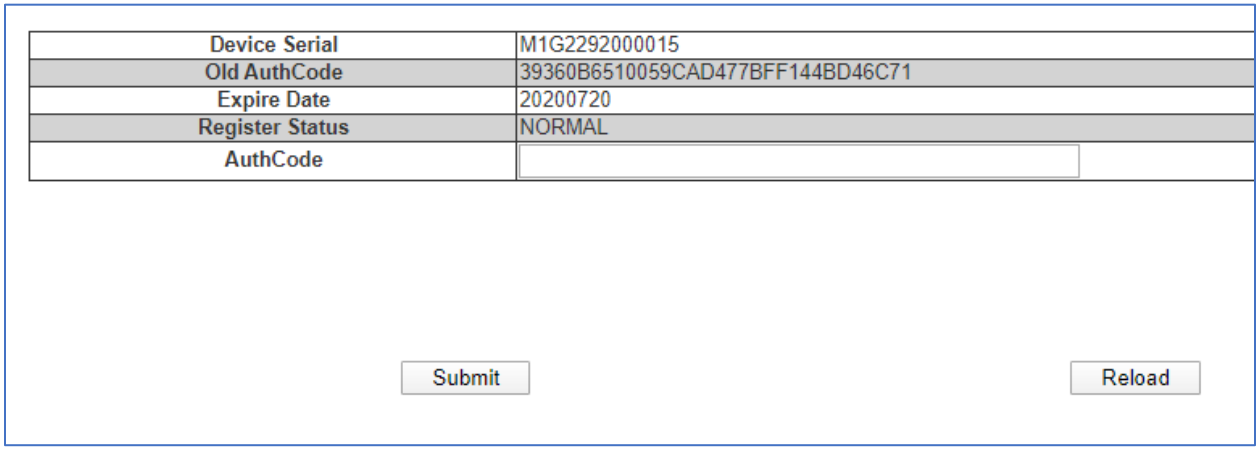



### 4.7.12 Firewall Setting

On this page, you can choose whether to open a firewall.

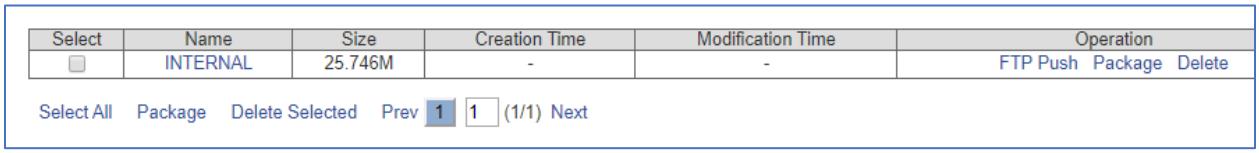



### 4.7.13 Registration of Device



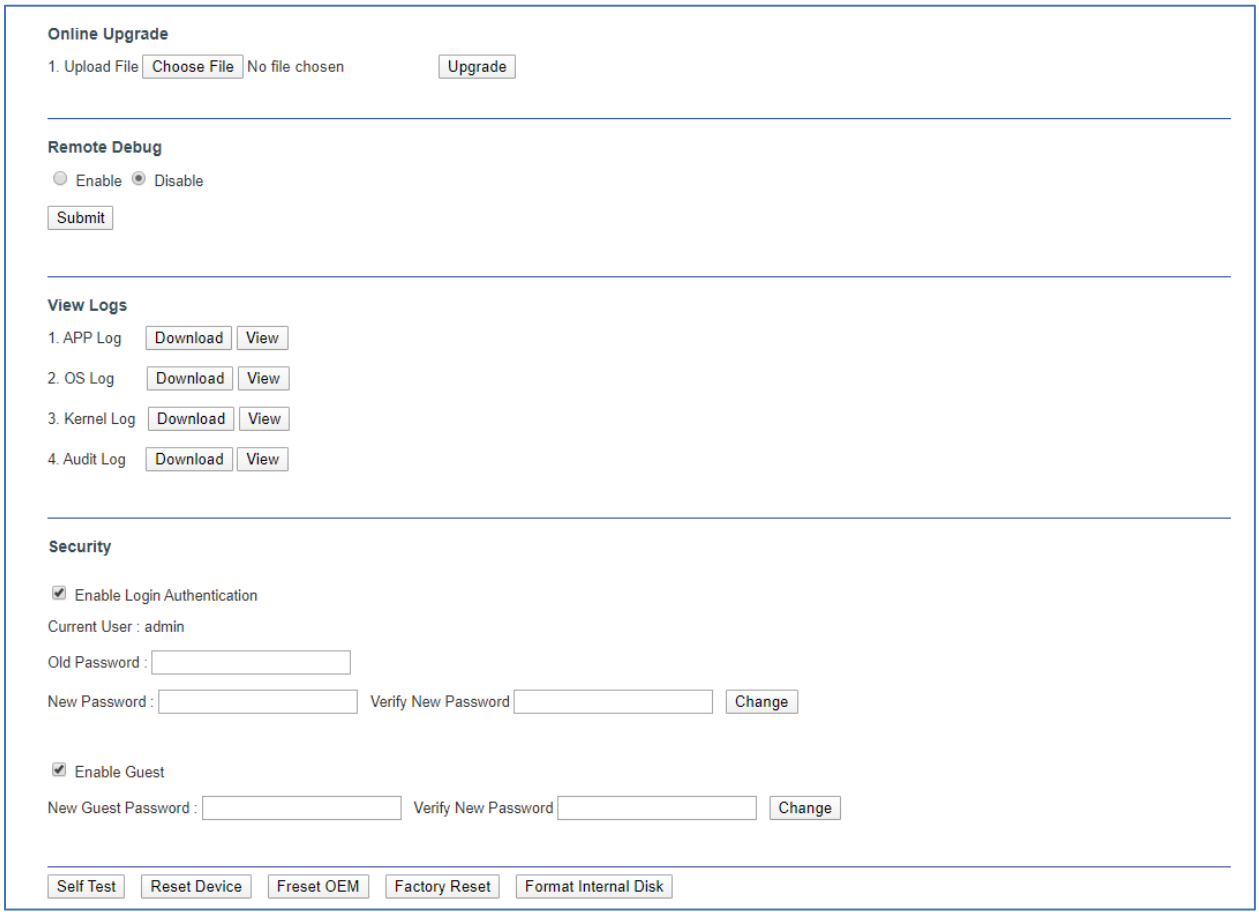

### 4.7.14 Data Download

On this page, you can download observations and ephemeris.



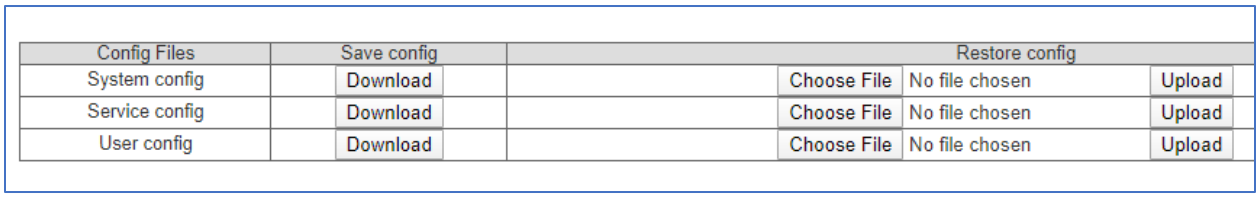
## 4.8 System Management

On this page you can set up online upgrade, remote debugging, view log, security.



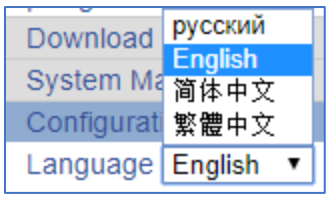

## 4.9 Configuration set

You can set a profile on this page.



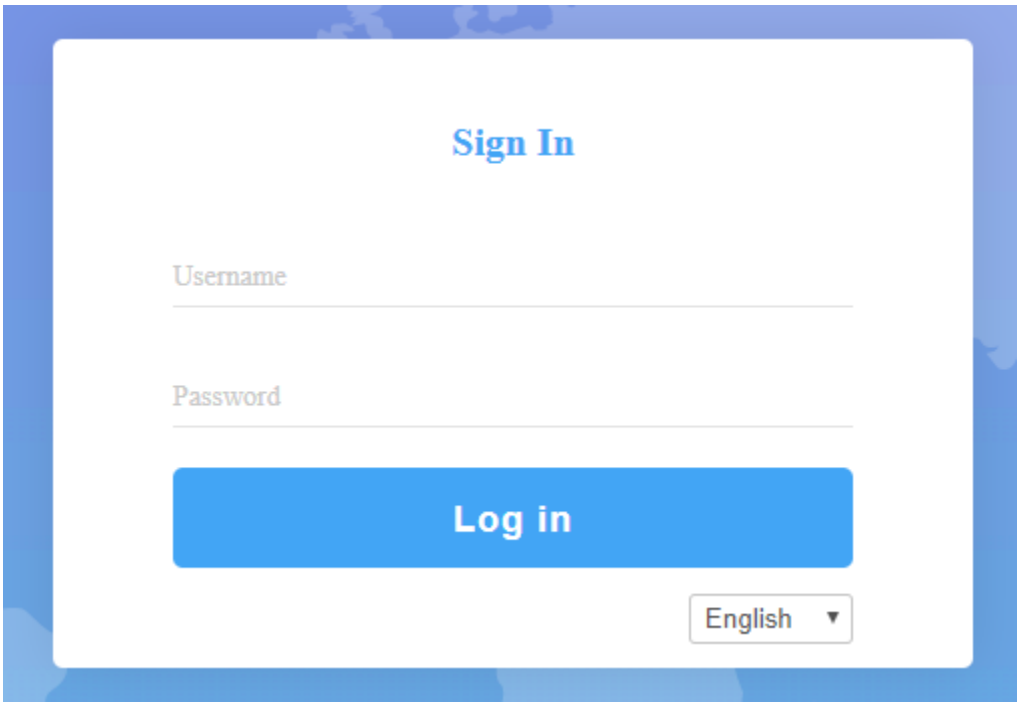

## 4.10 Language

It can be seen that MG 10 S has four languages available. Russian, English, Simplified Chinese, Traditional Chinese.



## 4.11 Logout

When you click log out, you will exit and return to the page.



# Warranty Policy

## The Guarantees Rights

- e-survey supports free exchange or refund within 7 days from the day when you have received the products, where the device appears "performance failure", which confirmed by e-survey repair center.

- e-survey supports free maintenance or exchange within 15 days from the day when you have received the products, where the device appears "performance failure", which confirmed by e-survey repair center.

- e-survey supports free maintenance or exchange the same type of device within one year from the day when you have received the products, where the device appears "performance failure", which is still not in working conditions after two repairs.

- e-survey supports a 24-month warranty service for the device host and a 3-month free warranty service for the accessory from the day when you have received the products.

## Warranty service

If the device host meets the warranty conditions, the warranty service can be obtained according to the warranty card and the purchasing invoice. If the proof of purchase and the warranty card cannot be provided, and e-survey will use the delivery time as the standard for the warranty period.

- If it is a non-warranty product, and the repair center will handle the maintenance of the extra-fee.

- After the device is repaired, the same fault is con- firmed by the repair center and e-survey will provide a 3-month free warranty service.

- The transportation, delivery and disposal costs incurred during the delivery or inspection of the product to e-survey shall be borne by the user. The freight generated by the repair or inspection equipment returned to the user shall be borne by e-sur- vey.

- Equipment that needs to be repaired or sent for inspection, please back up the data in the machine in time.

- During the warranty period, the parts normally used for maintenance are free.

- The parts that have been replaced during the repair are owned by e-survey.

- e-survey is not responsible for non-product standard and software or applications that are not certified by the company.

## Following conditions are not within the scope of the warranty and service

The device host and accessories have been subjected to: abnormal or improper use, improper storage of abnormal conditions, unauthorized disassembly or alteration, accidents, damage caused by improper installation.

- Damage caused by improper use of user, such as liquid injection, damage due to external force, etc.

- Failure to use, repair or transport caused by the equipment's instruction manual.

- Damage to the product is caused by external, including but not limited to, abnormal and unpredictable factors such as satellite systems, geomagnetism, static electricity, physical pressure, etc.

- Damage caused by force majeure such as earth- quakes, floods, wars, etc.

- Other conditions that cannot comply with the relevant provisions of the Guarantees Rights.