

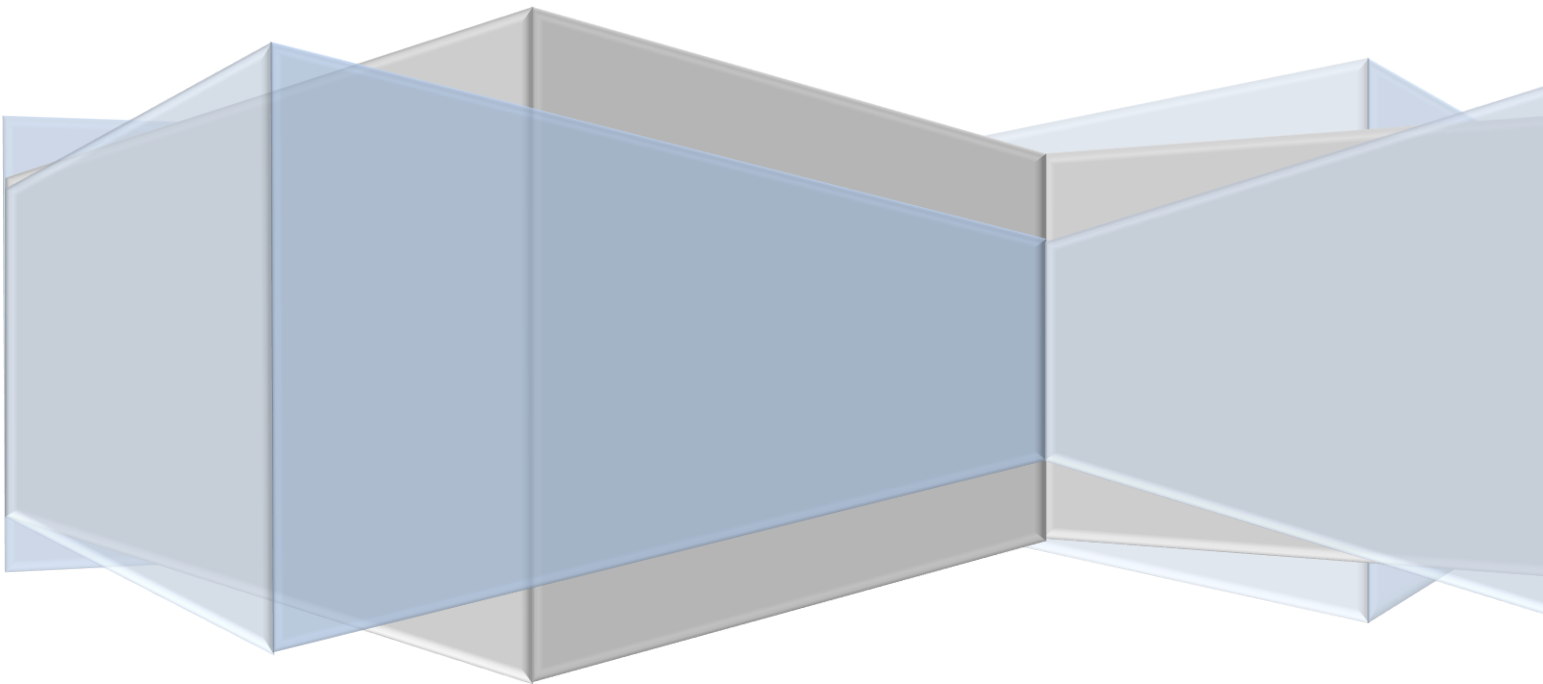
# User Manual

Version V1.0-20171103

# User Manual

## For MatrixRTK

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# Preface

## Introduction

Welcome to use Tersus' MatrixRTK.

This manual provides detail about how to power on, install and configure MatrixRTK.

## Experience Requirement

To help you make better use of Tersus' products, it's recommended that you read this instruction carefully. If you are unfamiliar with the products, please go to [www.tersus-gnss.com](http://www.tersus-gnss.com) or mail to [support@tersus-gnss.com](mailto:support@tersus-gnss.com) for more support.

## Tips for Safe Use



**Note:** The contents here need your special attention. Please read the contents carefully.

---



**Warning:**

The contents here are very important. Any wrong operation may damage the machine, lost the data, break down the system, or even make safety issue.

---

# 1. Introduction

## 1.1 Introduction

MatrixRTK is a GNSS receiver with powerful microprocessors, high-capacity high-speed flash memory and battery, multi-communication ports, military grade standard design, firewall inside, data encryption transmission. All the features make it more accurate, easy to operate and have better availability. The MatrixRTK receiver is an ideal solution for CORS/VRS.

---

**Note:**



- 1.1 The specific configuration is provided in this manual.
- 1.2 Please open the box package carefully. If you find any loss of this product and accessories, or damage, please contact your local dealer or Tersus immediately.
- 1.3 Please read the manual carefully before operating the MatrixRTK.

---

## 1.2 Features

- ◆ Based on the Linux operating system

Based on the embedded Linux operating system kernel. Linux is a real multi-user, multi-tasking, multi-platform operating system. This stable system has management and powerful network functions. The embedded microprocessors, small size and low power consumption make it suitable for long time work.

- ◆ Support all GNSS signals

Adequate parallel receive channels supporting GPS, GLONASS, BDS, GALILEO and other global satellite navigation and positioning system. Thereby it improves the measurement accuracy and real-time RTK measurement performance.

- ◆ 20Hz data update rate

Supports up to 20Hz solution and raw measurements update.

- ◆ Multi-task running simultaneously

The GNSS receiver can support multiple task operations simultaneously. It can download/output different types of RTK or RTD corrections while continuously tracking and recording satellite data, without causing data interrupted or lost.

- ◆ Versatile communication ports supported.



Six kinds of data transmission ports are provided, including: UHF radio, data line Modem, broadband port, Fax Modem, TCP/IP, built-in 3G/2G wireless communication function. It can use the Internet, wireless network and other means of communication for data transmission and broadcast differential data.

- ◆ Massive data storage, data download, data streaming transmission

Built-in 64GB high-performance storage and can support the maximum of 1TB industrial-grade U disk storage or external USB storage devices; support U disk download, FTP download and remote download; and the receiver also has a loop storage function.

- ◆ High-precision measurement technology

The use of high-performance high-precision GNSS measurement technology to measure the engine, the accuracy reaches millimeter, the measurement data with the highest level of quality assurance.

- ◆ Excellent compatibility

With excellent compatibility, real-time output CMR, RTCM, RTCMV3, RTCM3.2, Rinex and other formats of correction data to compatible with other GNSS receivers seamlessly. It can output high-precision real-time GNSS raw data, too.

- ◆ Network remote access



Figure 1 network remote access

- ◆ Military grade standard design

- ◆ Supports several data interfaces, including three RS-232 ports, two USB ports, a Wi-Fi, a 4G communication port, an Ethernet port, an RS485 port, an external clock port, a PPS output port, can meet the reference Station or peripheral data input and output requirements fully;

◆ Wide voltage multi-mode power supply

Built-in large capacity lithium battery, can work for 24 hours (related to configuration); external two wide voltage power supply: 7VDC ~ 36VDC; support battery, solar and wind power. And if there is failure supply of power, the receiver can recover to the final settings, and continue to work after power on.

## 1.3 Use and Precautions

Although MatrixRTK GNSS receiver is based on military standard design and it is anodized with an aluminum alloy, the precision instrument requires careful use and maintenance.



**WARNING:** The receiver must be used and stored within the specified environment. Please refer to the

The MatrixRTK GNSS receiver uses anodized aluminum alloy for the box, but it should also be kept as dry as possible. And in order to improve the stability of the receiver and extend the service life, please avoid the receiver exposed to extreme environments, such as:

1. Damp
2. The temperature is higher than 75°C
3. The temperature is less than -40°C
4. Corrosive liquid or gas

Do not install the GNSS antenna nearby to the following sources of electricity or strong noise signals:

1. Oil (spark plug)
2. TV and computer monitors
3. Generator
4. Electric motorcycle
5. DC - AC power conversion equipment
6. Fluorescent light
7. Power switch

When selecting the position of the GNSS reference station for continuous operation, pay attention to the following condition:

The site should be easy to install the receiving device and have a good view of sky. There is no GNSS signals blockage above 10 degrees, as shown in Figure 2:

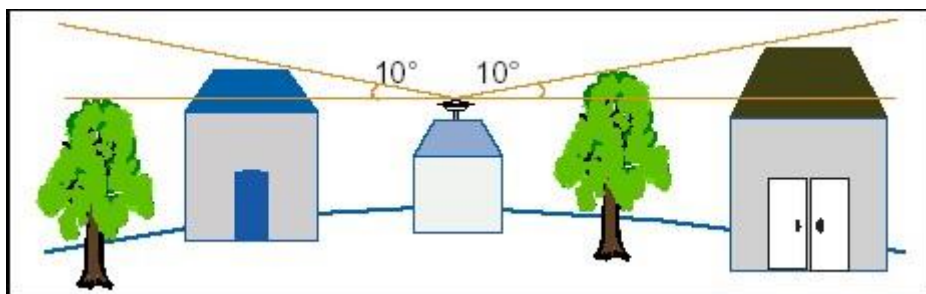


Figure 2 Antenna location

1. The location should be far away from a large area of water or possible noise source to the satellite signals.
2. The site should be away from high-power radio transmission sources (such as television stations, microwave stations, etc.). It's better to keep a distance greater than 200m; away from high-voltage power lines, the distance should be greater than 50m to avoid electromagnetic interference on the GNSS signals.
3. Can provide a stable device to fix the antenna.

4. Can provide reliable and stable power supply and communication network.
5. Can provide protection of GNSS reference station equipment.
6. A place easy to arrive for inspection and maintenance.

## 2. MatrixRTK Receiver Introduction

### 2.1 Front Panel



Figure 3 Overall appearance of the receiver



Figure 4 Front panel

1. Mini-USB port: Reserved
2. TF card slot: Install TF (micro SD) card to expand storage capacity;
3. SIM card slot: Install standard SIM card for 4G wireless network communication
4. LCD: Display receiver status information and boot button operation
5. Indicator light: Indicates tracking status, network status, recording and power status;
6. USB port: Connect a USB flash drive or USB storage device for storing/downloading data and upgrading the firmware;
7. Button panel: Used to get status and configure the receiver.

## 2.2 Back Panel



Figure 5 back panel

1. DB9 port: Data output and connect to external devices;
2. GNSS antenna: Used to connect a GNSS antenna;
3. Power port: Power input;
4. External clock: TNC port for connecting an external atomic clock;
5. Ventilation holes: Water-proof ventilation holes;
6. External extension: 12V DC power output, RS-232 debugging port, RS-485/RS-422 communication port, hardware restart port;
7. LAN port: Cable connection port;
8. 4G antenna: The 4G cellular antenna port;
9. Five-core socket: Differential data output, host and external data link connection; auxiliary power supply input;
10. PPS output: a SMA connector for PPS signal output;
11. Lighting-proof grounding port

## 2.3 Mainframe

The mainframe uses an all-aluminum alloy metal housing and uses an anodizing process, as shown in Figure 6:








Figure 6 Mainframe

## 2.4 Button Function

Table 1 Button Description




Operation	Description
Click	button operation < 0.5s
Double Click	button operation interval < 1s
Press	button operation > 6s


Table 2 Button Function Description

Button	Name	Function	status
	Power button	turns off/on the LCD when double-click;	See on the LCD
		Boots, verify or modify the parameters when clicked;	
		Turns off MatrixRTK when held for 6s;	
	Left button	Moves left or up when clicked;	
	Right button	Moves right or down when clicked;	
	Function Button	Cancels or page switch when clicked	see on the LCD
	Combination Button	Press the Fn button and click the power button to upgrade the kernel;	The satellite lights are flashing

## 2.5 Indicator lights

Table 3 Indicator light definition

IF the	is	Then
 Satellite lights	Always ON	Satellite locked
	Always off	Satellite unlocked
 Record lights	Blinks for 0.5 s	Record interval < 1 second
	Blinks for 1s	Recording interval ≥ 1s
	Always off	Recording stops
 Network lights	Always ON	Connect the network

	Always off	No network connection
Power/Alarm Light	Red and Blinks for 0.5s	Alarm
	Always Yellow	External power supply is connected.
	Always Green	Battery is used.



**Note:** double-click the power button to open the LCD display, the lights will turn off except for the network lights;

## 2.6 LCD

### Status Display

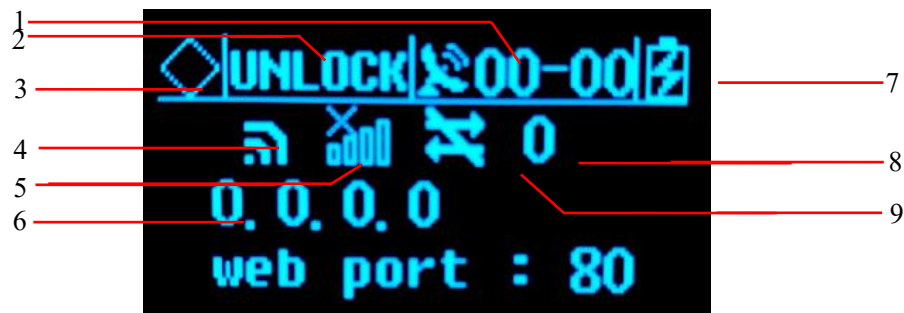













Figure 7 Main parameter information

- 1 -Satellite number of board 1;
- 2 -Satellite lock status;
- 3 -Alarm status;
- 4 -Wi-Fi status;
- 5 -4G network status;
- 6 -IP address;
- 7 -Power supply/battery power;
- 8 -Cellular signal strength;
- 9 -Cellular network transmission status;

IF the LCD	Shows	Which mean
Alarm status		Normal status
		Alarm
Satellite lock status	UNLOCK	Satellite unlock
	LOCK	Satellite lock
Wi-Fi status		Wi-Fi is disable
		Wi-Fi is enable



Cellular network status		The cellular module is off
		The cellular module is on
		Connected to a public network
Power supply		External power supply
		Battery powered
Cellular network transmission status		No data transmission
		Data transmission is ON

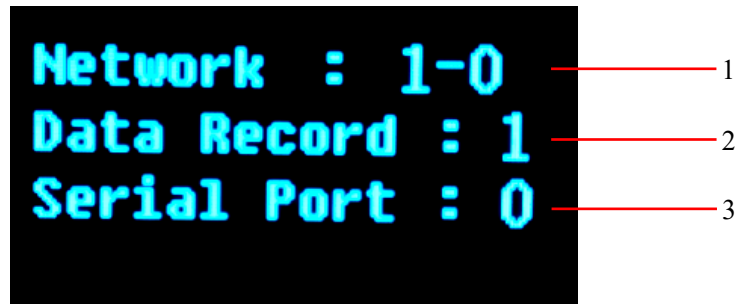


Figure 8 Data transfer status

1- Total Network number - Enable Network number; 2- Data records number; 3- Serial port number

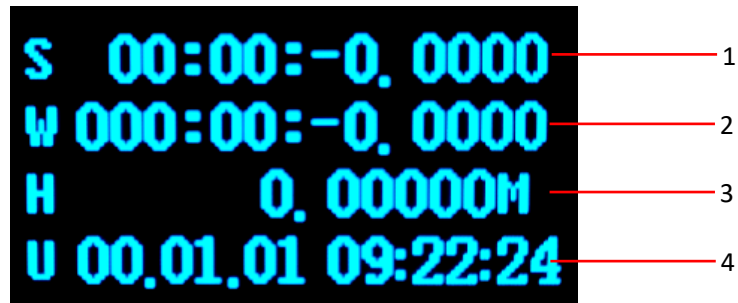


Figure 9 Position information

1-Longitude; 2-Latitude; 3-Height; 4-UTC time



Figure 10 Satellite information

- 1 -Satellite number of BDS; 2-Satellite number of GPS; 3-Satellite number of GLONASS;
- 4 -Satellite number of other constellations; 5-Satellite map in the sky

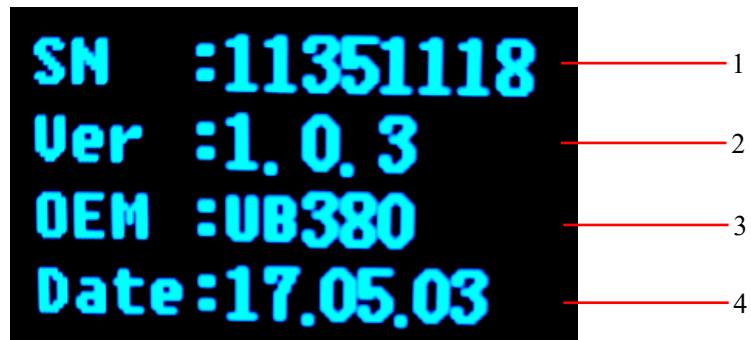


Figure 11 Receiver status information

- 1-Receiver SN number; 2-Version; 3 -Motherboard version; 4-Expire data;

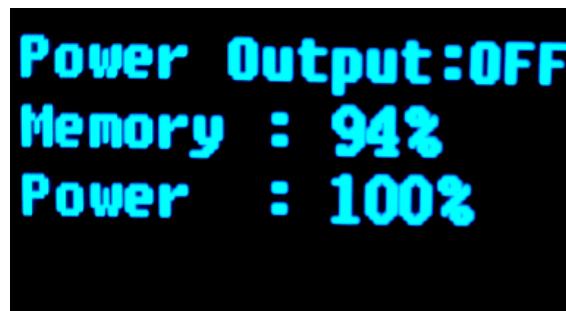


Figure 12 Status information

### 3. Display setting



Figure 13 Setup menu

- 1-Data record; 2-Network settings; 3-Data download; 4-System settings;




Figure 14 System settings

1 -Firmware Upgrade; 2 -Restore the default IP; 3-Reset; 4 -Reset the motherboard;

## 2.7 External port

Table 4 External port descriptions

Panel	Panel Name	Panel instructions	Physical port	Function
Front Panel	Mini-USB port	/	Mini-USB	/
	USB port	/	USB-A	Data storage/download, upgrade firmware available U disk and USB removable storage
	TF/SIM Card slot		TF/SIM Card slot	TF card: storage data and ROM; SIM card: 4G wireless network communication;
Back Panel	GNSS antenna	GNSS ANT	TNC	Connect to a GNSS antenna
	External clock input	OSC	TNC	Connect to an external atomic clock
	4G antenna	4G ANT	SMA	Connect to a 4G cellular antenna
	PPS output	PPS	SMA	PPS signal output
	DB9 Serial port	COM1	DB9	GNSS data output and external sensor interface
	LAN port	LAN	RJ45	Wired access to local area networks
	External extension	EXT Port	Fourteen core port (LEMO)	RS-485: GNSS data output and external sensor interface; RS-232: debug serial port; EX12: 12VDC output; PW_RST: hardware reboot; EVT: external event input (reserved);
power input	PW1	Two core	Main power supply input;	

			port (LEMO)	
	Five-core socket	PW2 COM2	Small five core port (LEMO)	Auxiliary power supply input; Differential data output;
	Ground point	GND	/	Lightning protection grounding

## 3. WEB Administration

### 3.1 User login

After network setting is successful, GNSS receiver can be accessed by LAN through the IP Address.

For the convenience of management, all users are divided into three groups.

- Guest: users can log in without entering an ID or a password. They are authorized to basic status check only.
- Normal users: Must provide an ID and a password to log in, being authorized to check system status, change parameters, browse, download, and delete data file. Users are prioritized while the amount of online users reach the maximum supported.
- Administrator: Must log in with an ID and a password. Holding the highest level of authority and being able to add/delete accounts and change password of other users. It is prioritized while the amount of online users reach the maximum supported.

Table 5 Authority class with different user groups

Authority	Guest	Normal user	Administrator
Check status	✓	✓	✓
Check navigation info and satellite status	✓	✓	✓
Check logging file	✓	✓	✓
Check data transporting status	✓	✓	✓
Modify configuration	✗	✓	✓
Set coordinate system and parameters for observation	✗	✓	✓
Control and revise file logs	✗	✓	✓
Download or delete observation file	✗	✓	✓
Modify data output configuration	✗	✓	✓
Change password	✗	✓	✓

Add or delete account	x	x	✓
Disconnect other user	x	x	✓
Restart the system	x	x	✓
Restart the device	x	x	✓
Upgrading OS and Apps	x	x	✓

When accessing the WEB administration page of MatrixRTK, a login page will show as the figure 3-1 below.

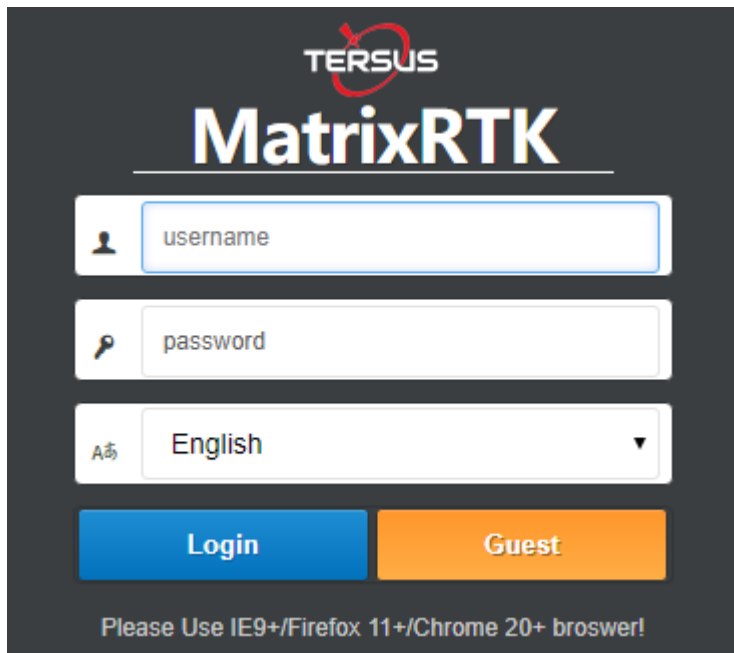


Figure 15 Login page



**Note:** WEB administration of MatrixRTK support PC, server, tablet, smart phone, etc. Please use IE 9+/Firefox 11+/Chrome 20+ to access to the WEB system.

Input ID and password and click [log in] to enter the WEB system. Or just click [Guest] to log in as a guest with basic authority.

After initialization, the system creates an administrator account automatically with user name *Tersus\_gnss* and password *Tersus\_gnss*. Normal user accounts can be created by administrator with different authority level.



**Note:** only one administrator account is allowed and only password can be changed. We advise the customer to change that after the instrument installation. If you forget the password, please contact Tersus for administrator account or contact the administrator to reset normal users' passwords.

## 3.2 WEB page for administration

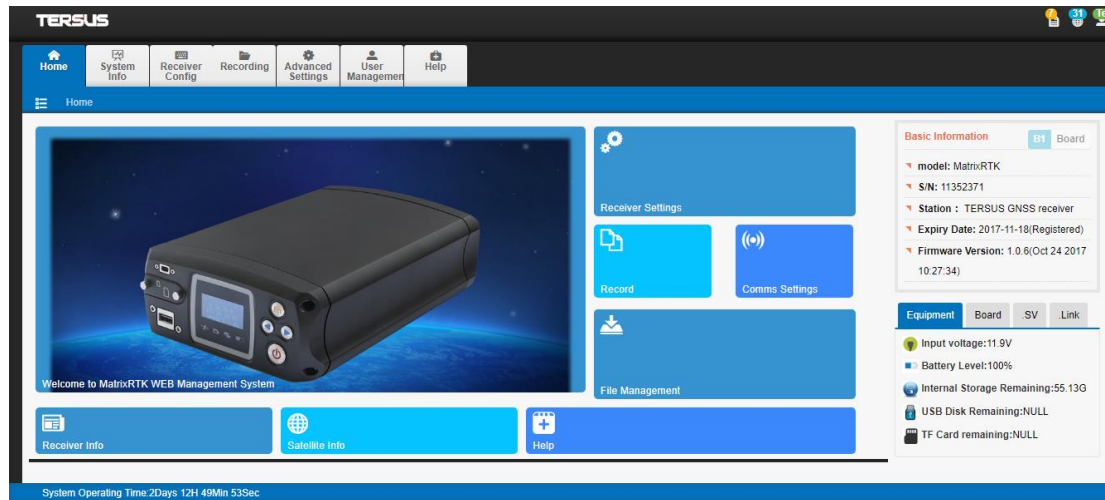


Figure 16 WEB page

The following info is given in the WEB page:

1. Logo of Tersus
  2. Navigation bar
  3. Menu
  4. Display & configuration
  5. Operating time
  6. Status bar
  7. Basic information
- Tersus logo: by clicking on it, page can directly go to main page.
  - Navigation bar: the primary menu, consisting of status of the receiver and 7 menus.
  - Menu: the secondary menu which makes more detailed categorizing.
  - Display & configuration: receiver status displaying and parameters setting.
  - Operating time: To display the time the receiver has continuously operating.
  - Status bar: the displaying of satellite status, login account and language setting.
  - Basic information: displaying the receiver's model, serial number, firmware version, registration, instrument status, motherboard info, amount of observing satellite, communication

of receivers, etc.

### 3.3 Basic information

This sector is at the right side of the WEB page, showing the receiver's model, S/N, firmware version, input voltage, amount of observing satellite, communication of receivers, etc. This information is always on the page for convenience.

The screenshot displays the 'Basic Information' section of a receiver's web interface. It features several tabs: 'Basic Information', 'Equipment', 'Board', '.SV', and '.Link'. The 'Basic Information' tab is active, showing details such as model (MatrixRTK), S/N (11352371), station name (TERSUS GNSS receiver), expiry date (2017-11-18), and firmware version (1.0.6). Below this, there are three more panels. The first panel, under the 'Equipment' tab, shows input voltage (11.9V), battery level (100%), internal storage (55.13G), USB disk (NULL), and TF card (NULL). The second panel, under the 'Board' tab, shows model (BD970), S/N (5651C00688), and module (G125B12R12EJ). The third panel, under the '.SV' tab, shows satellite counts: GPS (10), BDS (12), GLN (8), GAL (0), SBAS (0), and Total (30). The final panel, under the '.Link' tab, shows connection status: Serial Connection (0), Network Connection (4), and Data Recording (0).

**Basic Information** B1 Board

- model: MatrixRTK
- S/N: 11352371
- Station : TERSUS GNSS receiver
- Expiry Date: 2017-11-18(Registered)
- Firmware Version: 1.0.6(Oct 24 2017 10:27:34)

**Equipment** Board .SV .Link

- Input voltage:11.9V
- Battery Level:100%
- Internal Storage Remaining:55.13G
- USB Disk Remaining:NULL
- TF Card remaining:NULL

Equipment **Board** .SV .Link

- Model:BD970
- S/N:5651C00688
- Module:G125B12R12EJ

Equipment Board **.SV** .Link

- GPS: 10 BDS: 12
- GLN: 8 GAL: 0
- SBAS: 0
- Total:30

Equipment Board .SV **.Link**

- Serial Connection:0
- Network Connection:4
- Data Recording:0

Figure 17 Basic information





**Note:** The display of satellite amount and data transmission will not be given for an unregistered GNSS receiver or an expired registration code.

Please contact with Tersus for new code before it expires.

### Status bar

At the up-right side of the WEB page, a status bar shows data recording items, number of tracking satellites and login account. You can press the login account in the status bar to log out.

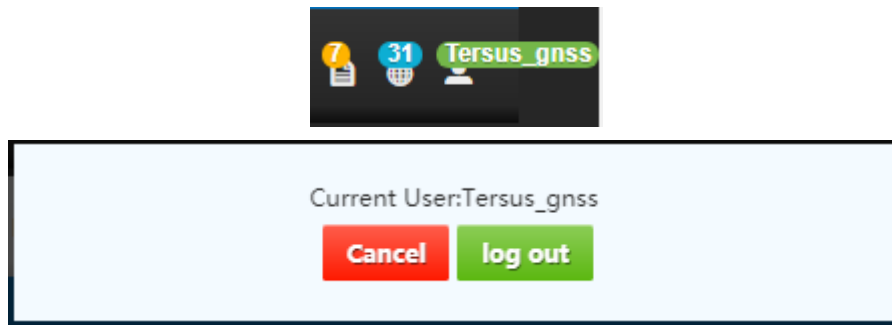


Figure 18 Status bar

## 3.4 Home page

This tab is comprised of welcome page, reference station configuration, data recording, online transmission, files downloading, instrument info, satelliteview and hyperlink option. By clicking the icon in hyperlink option sector, users can directly reach the corresponding page for further operation.



Figure 19 Main page

## 3.5 System info

This tab contains three sub-menus: receiver info, satellite info and location map.

- **Receiver info**

This sub-menu includes information about the equipment, the motherboard, the storage device, the power supply and the network info, as shown in Figure 20.

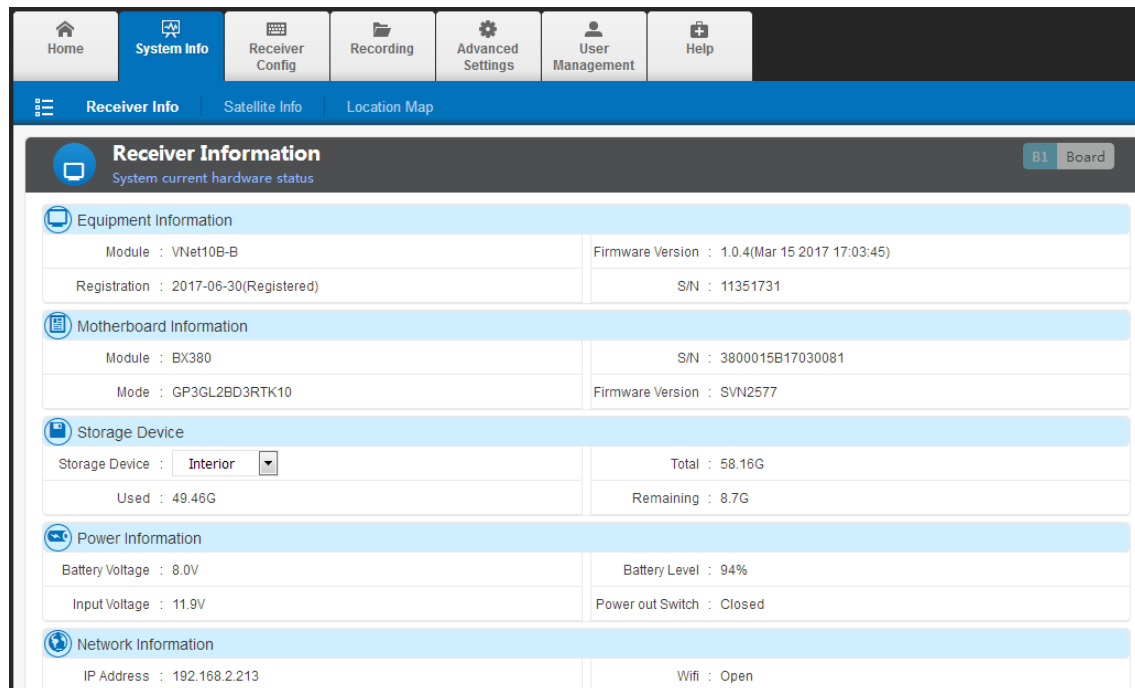


Figure 20 Equipment info

In the storage device item, different storage address (internal storage, U-disk, TF card) can be chosen by the pull-down menu. When the storage device is chosen, storage information will be updated and displayed automatically.

- **Satellite info**

This sub-menu shows the sky plot of satellites' ID from all the constellation system, as well as the Satellites' elevation angle, azimuth, carrier-noise ratio (CNR), etc.

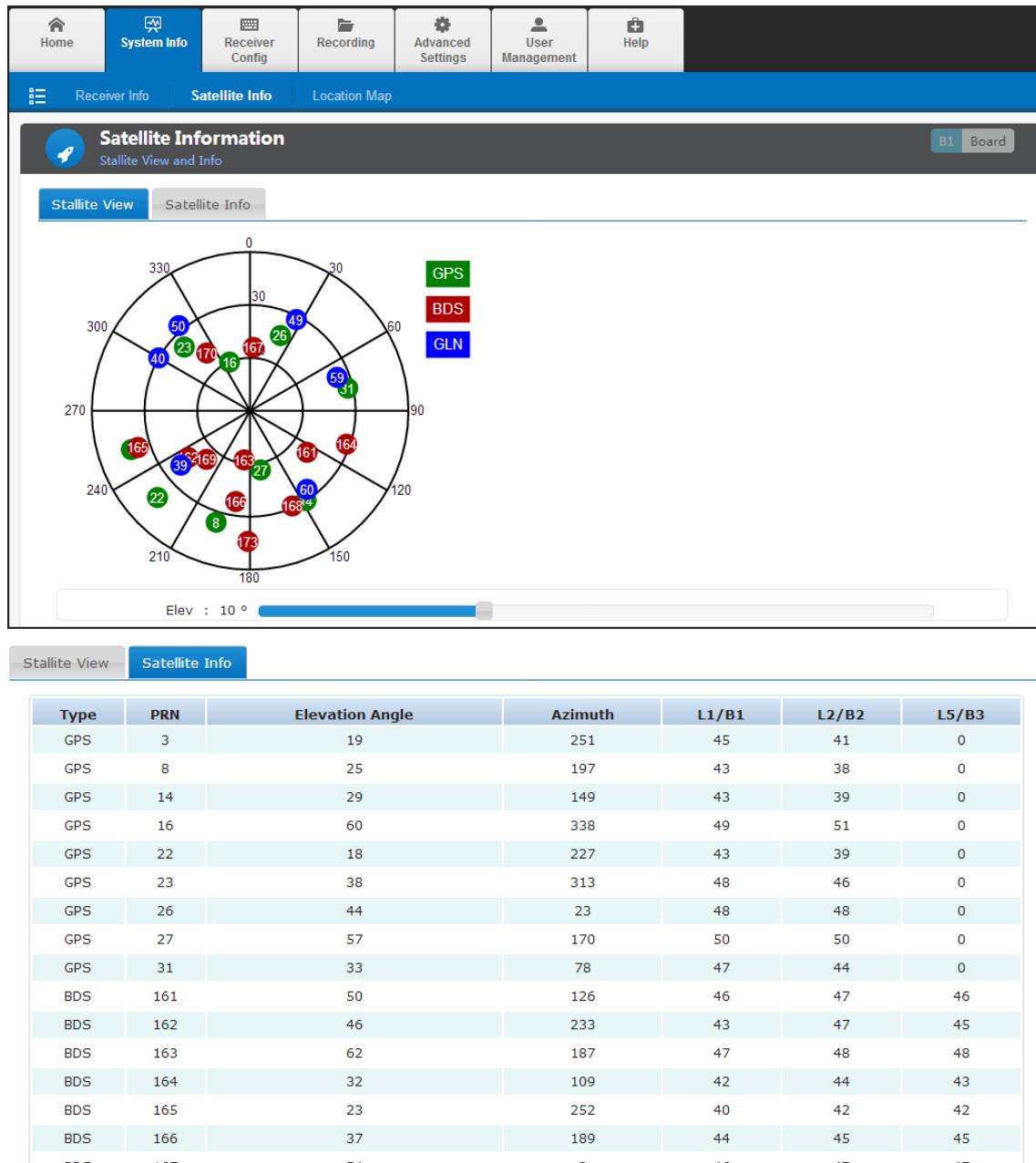


Figure 21 Satellite info

- **Location map**

The position of the device is shown in this sector and displayed with base map (satellite image as default, refer to Figure 22).

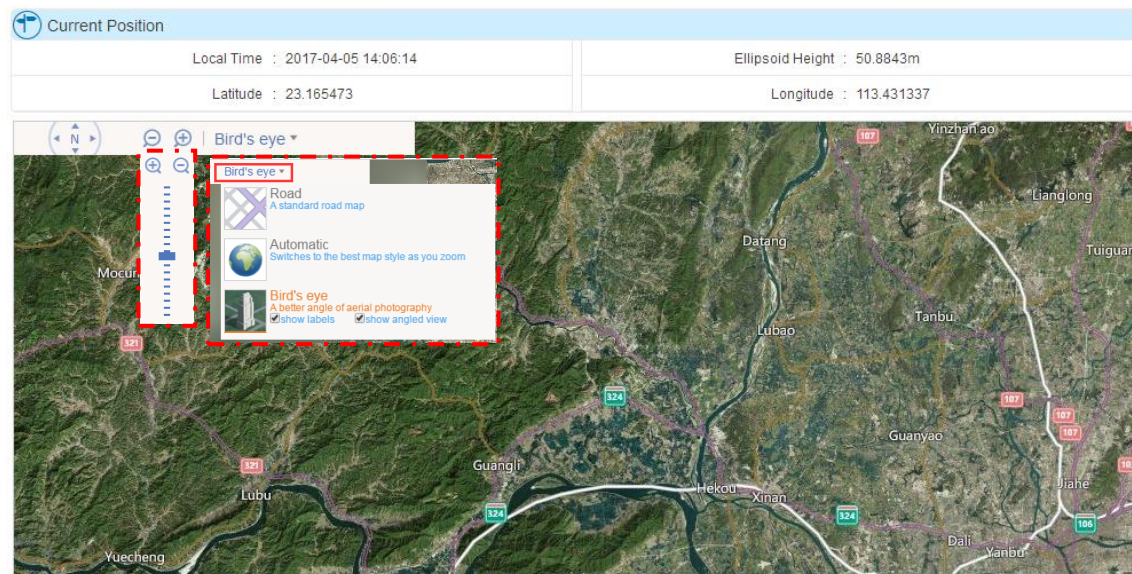





Figure 22 Navigation info

Under the display with a map, press the arrow key in icon  to move the map, press  for zoom in/out. And 2D digital map and satellite image can be chosen with sub-menu **Bird's eye**.

### 3.6 Receiver config

This tab is comprised of configuration of satellite, reference station, serial ports as well as online transmission and data recording module.

- **Satellite setting**

Satellite system switch on/off and cut-off angle setting: [OFF] means a system is disabled, and [ON] means this system is being used. To drag icon  will change the cut-off angle. Clicking [Confirm] to enter the parameter setting and reset to default configure by pressing[reset]. The page will be shown as the following figure.

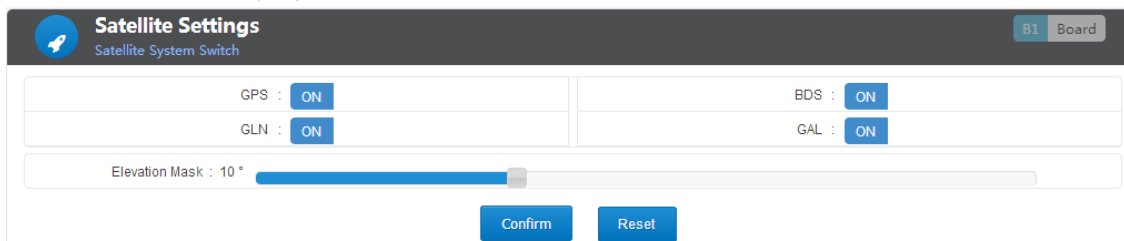


Figure 23 Satellite setting

- **Receiver setting**

This menu displays the positioning status, antenna parameters and working mode. The local time, latitude/longitude, elevation, HDOP, PDOP and VDOP are displayed in present positioning status whereas reference station configuration is categorized into antenna setting and working mode setting.

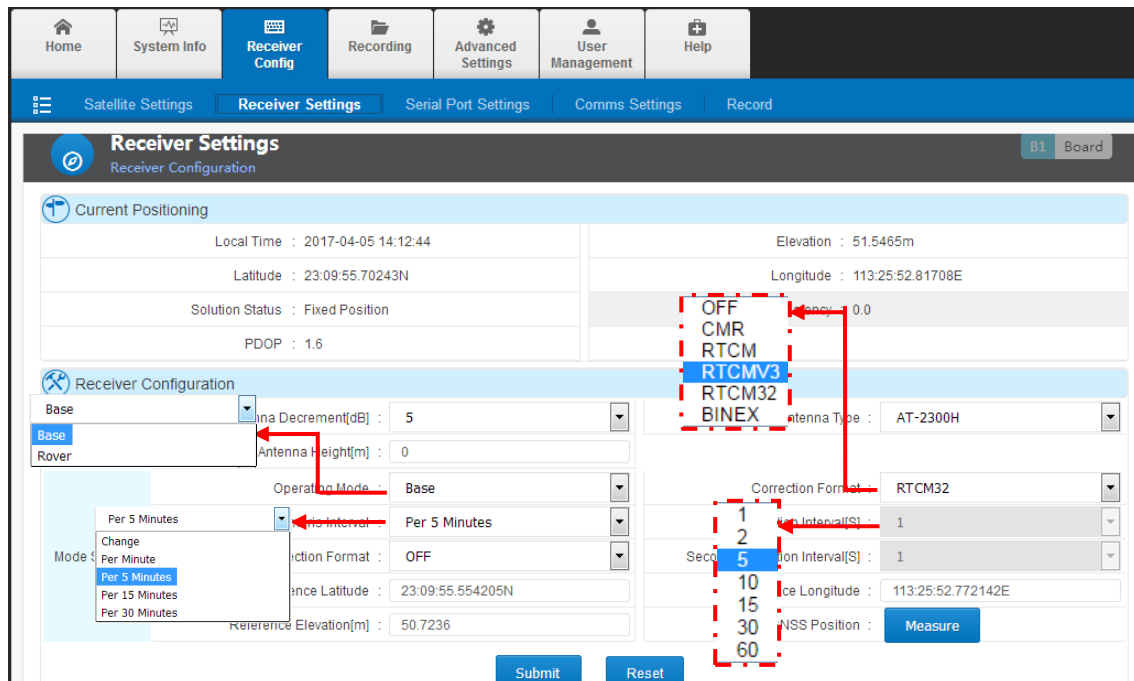


Figure 24 Receiver setting

Antenna type, height and antenna decrement can be configured in ‘Antenna setting’.

- Antenna decrement; the value can be set between 5dB and 20dB according to the motherboard model and antenna type. Here is the calculating formula below:

$$\text{Antenna decrement} = \text{antenna gain} - \text{motherboard gain} - \text{coax gain}$$

- Antenna type: in base mode, the right antenna type can be used to calibrate the phase centre position.
- Antenna height: in base mode, height is used to calibrate measured elevation value.

The receiver can be set as a base station or a rover in operating mode menu. Other settings about data recording, GNSS data output via serial port, network transmitted data are given in the following table.

Table 6 reference station setting and data output

Operating mode	Second correction	Time tag	Raw data option	Correction option

Base	off	off	Output raw data	Output correction
	on	off	Output correction	Output correction
	off	on	Output raw data	Output time tab
	on	on	Output correction	Output time tab
Rover	-	off	Output raw data	Output GGA data
	-	on	Output raw data	Output time tag

#### a. Base station

Base station setting contains correction data format, correction interval, ephemeris output interval, 2nd correction output and station coordinates setting & auto-acquire.

The screenshot shows the 'Receiver Configuration' window with the following settings:

- Antenna Settings:** Antenna Decrement[dB] : 5, Antenna Height[m] : 0, Antenna Type : AT-2300H
- Mode Settings:** Operating Mode : Base, Ephemeris Interval : Per 5 Minutes, Second Correction Format : OFF, Reference Latitude : 23:09:55.554205N, Reference Elevation[m] : 50.7236
- Correction Settings:** Correction Format : RTCM32, Correction Interval[S] : 1, Second Correction Interval[S] : 1, Reference Longitude : 113:25:52.772142E
- Buttons:** Submit, Reset, Measure (under GNSS Position)

Figure 25 base station setting

Ephemeris interval; interval can be 1min, 5mins, 15mins or 30mins.

Correction data format/2nd correction output; setting as OFF (no correction data output), CMR, RTCM(RTCM2.3), RTCMV3(RTCM3.0), RTCM32(RTCM3.2) and Rinex;

If the coordinates is input manually, the format is DD:MM:SS and the decimal of the second value is no more than 8.

If coordinates auto-acquire is chosen, please set operating mode as rover first and then change to base (do not submit). Then click [click to acquire] button to smooth the measured coordinates and automatically input to the correspondingly place. Press [submit] to finish the configure.

#### b. rover

In rover operating mode, correction data format, ephemeris interval and GGA output are set here. Refer to the base station setting, correction data format, ephemeris interval are identical. GGA messages outputs by correction message channel.

The image shows a 'Receiver Configuration' interface. It is divided into two main sections: 'Antenna Settings' and 'Mode Settings'.  
 Under 'Antenna Settings':  
 - Antenna Decrement[dB] is set to 5.  
 - Antenna Height[m] is set to 0.  
 - Antenna Type is set to HITAT35101CR(NONE).  
 Under 'Mode Settings':  
 - Operating Mode is set to Rover.  
 - Ephemeris Interval is set to Per 30 Minutes.  
 - Correction Format is set to RTCM32.  
 - GGA Output Interval[S] is set to 1.  
 At the bottom, there are 'Submit' and 'Reset' buttons.

Figure 26 Rover setting



**Note:** 1. In base mode, set correction format to RTCM if RTD correction is needed.  
 2. Raw data cannot be recorded and transmitted if the 2<sup>nd</sup> correction is enabled. Refer to Table 6 for more details.

- **Serial port setting**

RS-232 and RS485 ports have the same function that can be used for GNSS data output and sensor data input. They have the same setting method e.g. serial port baud rate, data bits, stop bits, check bits, etc.

The image shows a 'Serial Port Settings' interface for RS232 and RS485 ports. It has two main sections: 'Com1 -- RS232 Settings' and 'EXT Port -- RS485 Settings'.  
 Under 'Com1 -- RS232 Settings':  
 - Port Status is ON.  
 - Baud Rate is 115200.  
 - Stop Bits is 1.  
 - Data Type is Correction Data(CMR).  
 - Connecting Device is GNSS Data Input/Output.  
 - Data Bits is 8.  
 - Check Bits is Null.  
 Under 'EXT Port -- RS485 Settings':  
 - Port Status is ON.  
 - Baud Rate is 115200.  
 - Stop Bits is 1.  
 - Data Type is NMEA-0183.  
 - Connecting Device is GNSS Data Input/Output.  
 - Data Bits is External Sensor.  
 - Check Bits is ZZ11A-3 Meteorological instrument.  
 - Interval[S] is 2.  
 - NMEA Output Type is GGA.  
 Both sections have 'Submit' and 'Reset' buttons at the bottom.

Figure 27 Serial port setting

The introduction below is an example to set RS-232 as sensor data input and RS485 as GNSS data output.

External sensor: set [serial port status] to [ON]. In [Connecting Device], choose [external sensor]. Then set baud rate, data bits, stop bits and check bits according to the equipment parameters and confirm by clicking [submit].

GNSS data output: set [port status] to [ON], In [Connecting Device], choose [GNSS Data Output] and choose corresponding [data type], set baud rate, data bits, stop bits and check bits and confirm

by clicking [submit].

- **Comms transmission**

This menu is used to check the online transmission status, add/delete, switch on/off transmission and revising parameters, etc.

Network transmission consists of:

1. Serial number: the order code for online transmission.
2. Utilization: showing the status of chosen online transmission (on/off).
3. Status: connecting or connected.
4. Network type: the transmission means, can be wired, Wi-Fi or 2G/3G.
5. Protocol: the network protocol, including Ntrip Client, TCP/IP Client, UDP Client, Ntrip Server, Ntrip caster, UDP server and TCP/IP Server.
6. IP address: this receiver's IP address.
7. Operation: can be used to edit or delete a transmission.

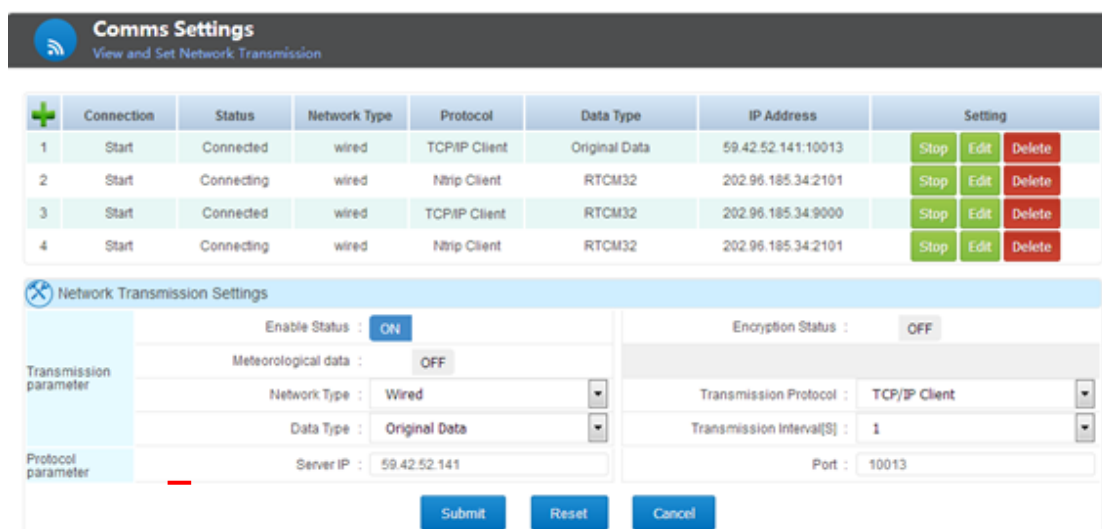



Figure 28 Comms transmission

Click  button to add a transmission. Click [edit] to edit the transmission. The transmission configuration page will show when a transmission is added or edited.

Encryption status: when set to ON, the data is encrypted and can only be processed with Tersus'



software.

Relevant definitions in [Comms transmission setting]

Network; cable, Wi-Fi, 2G/3G are available. Please make sure the corresponding network configuration is available with right setting while choosing this method.

Data type: NMEA-0183, correction data, raw data, RS-232 data, RS485 data. Raw data output can set [transmission interval] to (0.05s, 0.1s, 0.2s, 0.5s, 1s, 2s, 5s, 10s, 15s, 30s, 60s).

There are 7 protocols in network setting and data type. The setting steps are related to different protocol, examples are given below:

Ntrip Client and Ntrip Server have the same setting items; refer to Figure 29 for detail about the parameters.

The screenshot shows the 'Network Transmission Settings' interface. It is divided into two main sections: 'Transmission parameter' and 'Protocol parameter'.  
Under 'Transmission parameter':  
- Enable Status: ON (button)  
- Meteorological data: OFF (button)  
- Network Type: Wired (dropdown menu)  
- Data Type: Original Data (dropdown menu)  
Under 'Protocol parameter':  
- Server IP: 192.168.1.112 (text input)  
- Username: 11351731 (text input)  
- Mount Point: 1135017031 (text input)  
On the right side:  
- Encryption Status: OFF (button)  
- Transmission Protocol: Ntrip Client (dropdown menu)  
- Transmission Interval[S]: 1 (dropdown menu)  
- Port: 12345 (text input)  
- Password: zhdgps (text input)  
At the bottom, there are three buttons: Submit, Reset, and Cancel.

Figure 29 Ntrip Client and Ntrip Server setting

TCP/IP Client and UDP Client have the same setting items, shown as Figure 30.

The screenshot shows the 'Network Transmission Settings' interface, similar to Figure 29 but with different protocol settings.  
Under 'Transmission parameter':  
- Enable Status: ON (button)  
- Meteorological data: OFF (button)  
- Network Type: Wired (dropdown menu)  
- Data Type: Original Data (dropdown menu)  
Under 'Protocol parameter':  
- Server IP: 192.168.1.112 (text input)  
- Username: (empty text input)  
- Mount Point: (empty text input)  
On the right side:  
- Encryption Status: OFF (button)  
- Transmission Protocol: TCP/IP Client (dropdown menu)  
- Transmission Interval[S]: 1 (dropdown menu)  
- Port: 12345 (text input)  
- Password: (empty text input)  
At the bottom, there are three buttons: Submit, Reset, and Cancel.

Figure 30 TCP/IP Client and UDP Client setting

TCP/IP Server, UDP Server transport protocol are applied with receivers as server. In this configuration, IP address is the receiver's address, only port is needed.

Figure 31 TCP/IP Server and UDP Server setting

**Note:** 1. For network transmission, different protocol cannot be set connecting to the same server IP and port.



2. Correction data output is related to receiver's operating mode. In Base mode, it outputs correction message while GGA data will be output for Rover mode.

3. When outputting data with RS-232 or RS485 port, they have to be set to ON and connecting External Sensor.

- **Data logging**


In the Record menu, Click  to add a new data record, it is similar to the network transmission function, and each data record can be edited/deleted.

Figure 32 Data logging

Enable the data record and then set the flag name (the file name of data file header, the default setting is the latter 3 digits of the SN), select the record data type, we provide the original data and Rinex two formats.

Data records can be set to a different recording interval, recording methods are recorded every day, manual recording and planning time records, etc. When the daily record mode is enabled, record file can also choose a file every day, every hour, every two hours. The Select the data record format as needed. After setting, click the [Submit] button.

[Start] and [Stop] are the status of existing records.

Press [Delete] to erase the record.

## 3.7 File management

File management is used to manage the stored file, including File list and FTP push function. It is capable of storing, checking, downloading, deleting all data files. This page is only accessible for Normal users and Administrator.

### ● File lists

In this sub-menu, users can check and manage the recording files stored in different device. Those files can be auto deleted via setting 'Auto clean time'.

The screenshot displays the 'File Management' interface. The top section, 'File Lists', shows a table with columns for File Name, Type, Size, Start Recording Time, End Recording Time, and Operation. A single entry is visible: '17310820.GNS', Original Data, 103.355MB, 2017-03-23 00:00:00, 2017-03-23 17:02:57. Below the table are buttons for 'FTP Download', 'Delete Selected', and 'Format'. The 'Storage Management' section below shows 'Storage Location Status' (Current Storage Location: Internal) and 'Storage Settings' (Storage Location: Internal, Auto Clean Time: The First Day). Red dashed boxes highlight the 'Internal' dropdown menu in both sections, and a red arrow points from the 'Storage Location' dropdown in the settings to the 'Auto Clean Time' dropdown.

File Name	Type	Size	Start Recording Time	End Recording Time	Operation
17310820.GNS	Original Data	103.355MB	2017-03-23 00:00:00	2017-03-23 17:02:57	Download Delete

Figure 33 File list

File list: checking, downloading, deleting data categorized by stored directory and date. Stored directory can choose internal (internal storage), U-disk and TF card. Once the record date is chosen, the page will update correspondingly.

Items contained in File list:

1. File name: the name of recorded data files.
2. Type: the data type of files, normally they are RINEX file or Original data (raw data) file.
3. Size: Disk storage space.

4. Start recording time: the time when file was created.
5. End recording time: the time when this recording stop.
6. Operation: To download or delete this data record.

The downloading function of file list can be conducted by ordinary download or FTP download, refer to chapter 4 basic operations.

Three ways for data deleting:

Simple delete: only to delete a single file, directly clicking [Delete] button on the recording item.

Selective delete: when delete more than one file, select the ones by ticking them on the row head then click [Delete selected]. All items can be selected by tick the header tick box.

Format: deleting all data file existing in the current storage device.

### FTP push

FTP push function can send the data file recorded between 00:00 and a fixed time to a server.

Detailed configuration displayed below:

Figure 34 FTP push

Click [Submit] to apply the setting and [Reset] button will reset the setting as factory default.

## 3.8 Advanced setting

The Advanced page provides advanced commands/operations for the device, including host settings, motherboard settings, network settings and log management viewing.

Advanced pages are available to administrators only.

- **System Settings**

System settings is composed of system settings, data download password and system control.

**System Settings**  
Set Receiver main parameters

**System Settings**

Station Name : 科学城-BX380

UTC Time Zone : UTC+8

Five-Pin Serial Trend : Motherborad1 com2

Power Output : OFF

**Data Download Password**

New Password:  Please input a new four-digit numeric password

Confirm New Password:  Please re-enter new password

**System Control**

Factory Data Reset Reboot Reset Motherboard

Upgrade Firmware Receiver Registration Remote Control

Figure 35 System settings

### 1. System settings

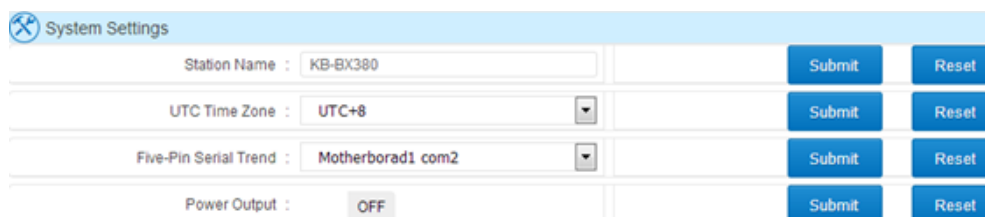
- Station name settings: set the station name, the default value is "Station A". To change it, just directly input the name and then click [submit] button.
- UTC time zone: from there are 25 zones in total from UTC -12 to UTC + 12, the default value is UTC +8; to change it, select the right one and click [submit].
- Five-pin serial Trend: this five-pin serial port has been connected with the motherboard directly, which makes it possible to obtain data from the motherboard but limited from sending command or message. To change it, select the port and click [submit].



**Note:** COM1 is for NMEA data output e.g. GGA, GSV, etc.  
COM2 is for correction message/time tag.  
COM3 is for raw data/second correction message output.

---

d. Power output: This function can supply power (12VDC, 5W Max) to an external equipment, you can click [submit] to switch between on/off.

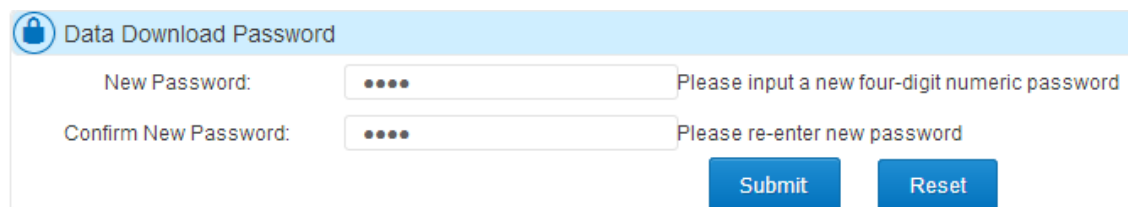


Setting	Value	Submit	Reset
Station Name	KB-BX380	Submit	Reset
UTC Time Zone	UTC+8	Submit	Reset
Five-Pin Serial Trend	Motherborad1 com2	Submit	Reset
Power Output	OFF	Submit	Reset

Figure 36 System settings

## 2. Data download password

The password is for security of local data downloading. File downloading can be done with the buttons on the front panel. This password is composed of four digits, the default is 1234. To change it, enter the new password and click [submit]. Clicking [Reset] and [submit], the password will be reset back to 1234.



Field	Label	Submit	Reset
New Password	Please input a new four-digit numeric password	Submit	Reset
Confirm New Password	Please re-enter new password	Submit	Reset

Figure 37 Data download password

## 3. System control

You can access remotely to the receiver via this web page. This page includes: restore factory settings, restart, and reset the motherboard, upgrading firmware, receiver registration and remote control.

- To restore the factory settings: Click [Restore Factory Settings], the dialog box will pop up. Click [OK] to enter the factory default configure and the receiver will restart. After the restart, all the data and settings are erased except the wired network IP address and registration code.
- Reboot: Receiver restart, click [restart], select [OK] in the pop-up dialog box. The receiver will restart within 10 seconds and restart for approximately 1 minute.

Restart operations include the end of the application and restart the device two links. During this period, the receiver stops all data recording and data transmission, etc., after the completion of the restart the receiver automatically restore the original settings and working status (restart the data record to re-establish the log file).

- Reset the motherboard: the GNSS board will restore to the factory settings, click [reset motherboard], and select [OK] in the pop-up dialog box. After reset the application restarts, the

data record re-creates the log file.

- d. Upgrade the firmware: Upgrade the receiver firmware, please note the file name is "MatrixRTK\_Update.bin" and it cannot be modified. Click [Upgrade Firmware] to expand the following page, click [Browse] to select the file and click [Upload]. For details, see [Basic Operation] → [Firmware Upgrade].



Figure 38 Upgrading the firmware

- e. Receiver registration: When the registration code expires, data transfer and data logging will stop and the number of satellites will not be displayed. Detailed Operation about the Receiver Registration, please refer to section [Registration Receiver] in chapter 4 Basic Operation.
- f. Remote control: Click [Remote control] and the following page will show:

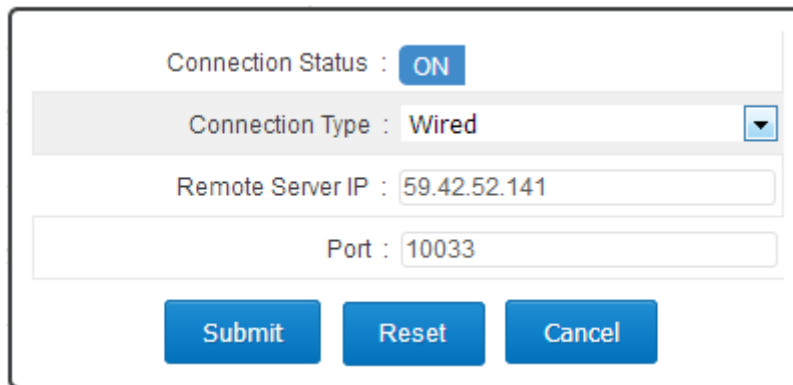


Figure 39 Remote control

Closing remote control by shift state to [OFF] and click [Submit]

Opening remote control by shift state to [ON], choose the way of connecting, IP and port and click [Submit].

- **Event settings**

This section is composed of Event marker setting and PPS setting.

Figure 40 Event settings

Event Marker Setting: setting Event input and External clock input.

- Event input: switch it on/off and trigger (Rising Edge or Falling Edge).
- External Clock input: to input an external clock, please make sure you have an external clock connected before switch on and click [Submit]. The switch has to be off before disconnecting the external clock.



**Note:** Enable the external clock with cautions. All operation has to follow the instruction, or it may damage the motherboard.

PPS setting: the output frequency is per second. This tab is capable of setting PPS switch on/off, trigger mode (Rising Edge or Falling Edge), PPS Satellite System (GPS, BDS, GLONASS), time-tag, pulse width.

Figure 41 PPS setting

When the time-tag is ON, this data is output as correction message. If you prefer get that info from the five-pin serial port, the [Five-pin serial trend] should be set as COM2. Pulse width can be 1000us, 5000us or 10000us.



Time-tag :	OFF
Pulsewidth(us) :	1000
	<input type="button" value="Reset"/> <ul style="list-style-type: none"> <li>1000</li> <li>5000</li> <li>10000</li> <li>Self-Define</li> </ul>

Figure 42 Event Marker Setting

● **Network Status and Setting**

Network setting consists of wired settings, Wi-Fi Hotspot settings, Bluetooth transmission switch, 2G/3G settings, server port settings and Firewall switch.

**Wired Settings**

IP Access :	Static IP	DHCP	IP Address :	192.168.2.213
Subnet Mask :	255.255.255.0	Static IP	Gateway :	192.168.2.1
DNS :	202.96.134.133		DNS1 :	192.168.2.1
MTU :	1500			

**WiFi Hotspot Settings**

Status :	ON	Channel :	9
SSID :	11351731	Password :	11351731
IP Address :	192.168.9.1		

**bluetooth transmission switch**

bluetooth transmission switch : OFF

**2G/3G Settings**

Mode : OFF

OFF  
Auto  
APN

**Server Port Settings**

Port: 80 (This Option default 80,should not change)

**Firewall Switch**

Firewall Switch : OFF

Figure 43 Network status and settings

Wired setting: there are two ways to obtain IP address via wired connection, DHCP (automatic detecting) and static IP (set manually). The receiver will set all parameters automatically under DHCP mode, and all parameters have to be input manually in Static IP, such as IP address, subnet mask, Gateway, DNS, etc. The configuration page is shown as Figure 44.

Figure 44 Wired settings

Wi-Fi Hotspot Setting: several parameters can be configured in this sub-menu, including channel, password and IP address of the receiver. The default setting for SSID and Password are SN and '192.168.9.1'. Users are able to visit Web administration page after connecting Wi-Fi.

Figure 45 Wi-Fi Hotspot Setting

2G/3G setting: this tab is to set 2G/3G function and settings (APN or Auto mode). Access point, Username and Password must be input manually in APN mode, and all the fields can be set automatically under Auto mode.

Figure 46 2G/3G Setting

- **Log Files**

System log files records all user operation during the operating time and they're listed according to time sequence. The content mainly contains users logging in, page switching, setting changing, data file downloading, transmitting, deleting. As well as the network setting, restart and FW upgrading, etc.

On the log files page, setting time zone above the table to inspect all the log files generated during this time zone. [Delete] button is used to delete all the files shown on the form.

Fields on the list:

1. Time: the time point of record under 24-hour system.
2. User: the logged user of corresponding operation.
3. IP: the IP address of recorded user.
4. Event: recorded event.

Time	User	IP	Event
2017/05/18 11:32:47	zhdgps	183.3.132.35	Success:Sign in
2017/05/18 11:32:38	zhdgps	183.3.132.35	Error:Check Authentication
2017/05/18 10:55:10	zhdgps	183.3.132.35	Success:Sign in
2017/05/17 00:34:37		101.199.108.57	Error:Check Authentication
2017/05/17 08:53:57	zhdgps	202.96.185.34	Success:Sign in
2017/05/16 16:10:20	zhdgps	183.3.132.35	Success:Sign in
2017/05/16 16:10:10	zhdgps	183.3.132.35	Error:Check Authentication
2017/05/16 15:30:07	zhdgps	183.3.132.35	Success:Sign in
2017/05/16 15:29:58	zhdgps	183.3.132.35	Error:Check Authentication
2017/05/16 14:47:40	zhdgps	59.42.52.139	Success:Sign in

Figure 47 Log files

### 3.9 User management

This menu has two sub-menus, Users and Admin.

- **Users**

Reset the current user's password.

**Users**  
Change current user's password

Original Password  Please input current password

New Password  Please input a new password of 6-12 characters

Check new password  Please input new password again

Figure 48 Users

- **Admin**

This tab is authorized to administrator (Tersus\_gnss) only and being allowed to add/delete normal users only.

Adding new user: define user name and password on the User Account Management tab (user name is must composed of numbers, letters and underline, starts with letters with the length of 5~16 digits. The password must be 6~12 digits long). Click [Submit] to finish the creation.

Deleting user: Deleting account by clicking [Delete] button.

**Admin**  
Administrator access only

Username	Role	Relative Operation
Tersus_gnss	Administrator	

**User Account Management**

Username :

Password :

Role :

Check Password :

## 4. Basic operations

### 4.1 Architecture model

GNSS receiver products can be used for ground-based augmentation systems and CORS. A weather sensor or other sensors can be input to a receiver, which is connected to the data service center through the network cable or cellular network. Its typical architecture is shown in Figure 49:

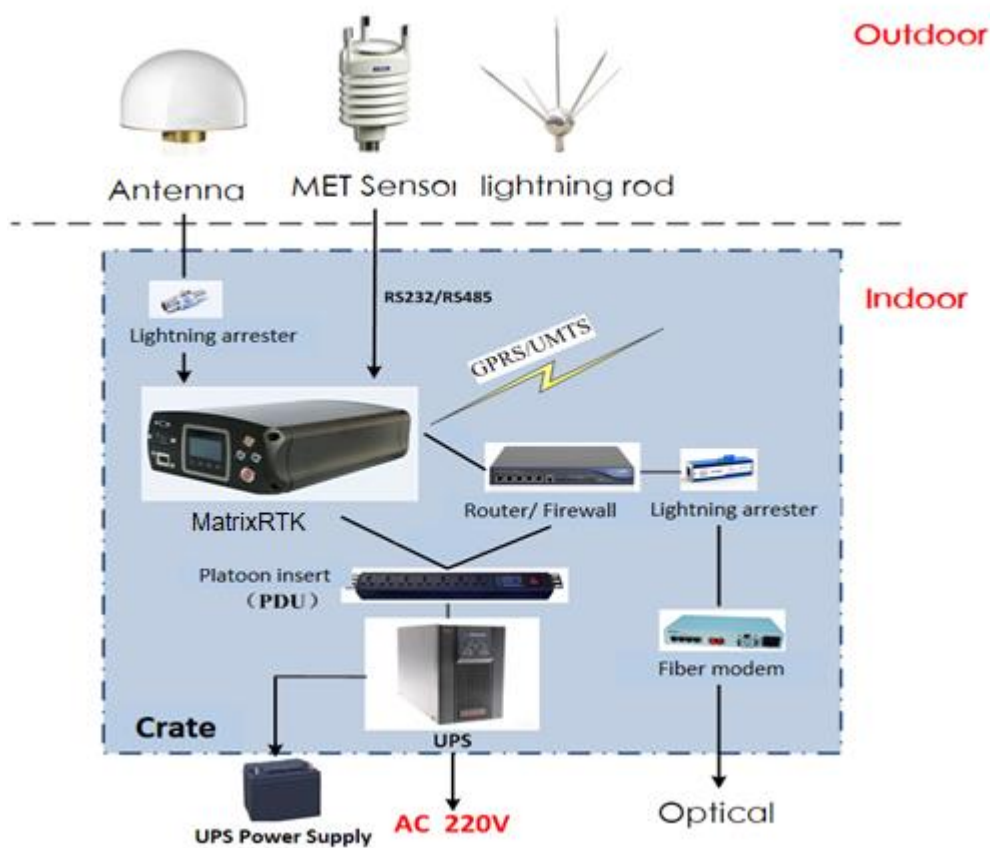


Figure 49 A typical architecture

### 4.2 Basic composition and connection

The kit includes: a GNSS receiver, a data/power cable (VS-3P), a 4G cellular antenna, a GNSS antenna cable, a power adapter (CL-1233), an Ethernet cable. The connection is shown in Figure 50.

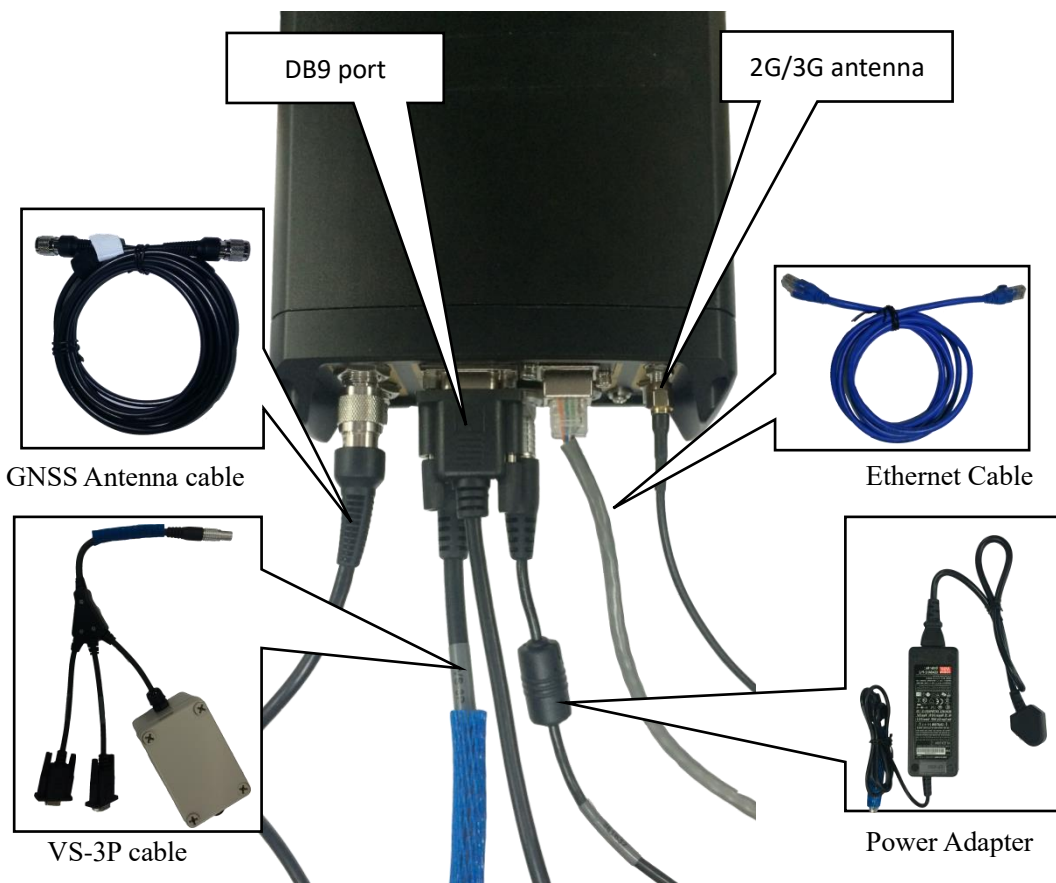


Figure 50 Receiver connection

### 4.3 Connector installation

The MatrixRTK receiver has three self-locking sockets, they're a five core socket, an external expansion socket and a power input socket. Please ensure the red dot on cable connector is aligned with the red dot on the receiver socket, or it cause damage to the receiver and cable connector.

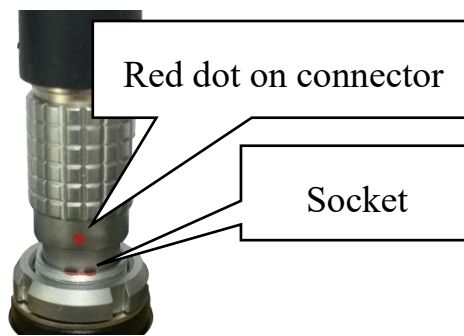


Figure 51 Connector installation

## Install/uninstall the SIM/TF card

1. In the front panel, the SIM/TF card slot is protected with a metal cover, remove it with a screw driver.
2. Install the SIM/TF card: the contact of the SIM card is up, the contact of the TF card is down. When a sound is heard, installation is successful.
3. Uninstall the SIM/TF card: push the card inward, the card will be rejected.



Figure 52 Install/uninstall the SIM/TF card

## 4.4 Network connection

### 1. LAN network connection

You can use the cable to connect the GNSS receiver with the LAN, input GNSS receiver wired network IP address (default: 192.168.0.200) in the browser, then enter the Web management system login page.

GNSS receiver and INTERNET can be directly accessed, you can also map through the LAN external network IP to access.

Directly access: in the local connection under the Internet protocol, click [Advanced], in the pop-up page, input the IP address and gateway into WAN IP and gateway, as shown in Figure 53 below.

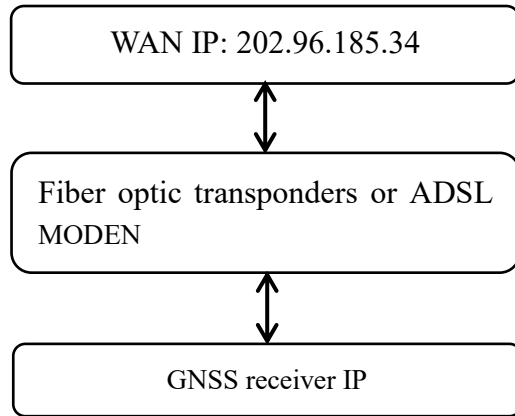


Figure 53 Line connection method

The GNSS receiver base station connects to the network by mapping the external network IP. As shown in Figure 54:

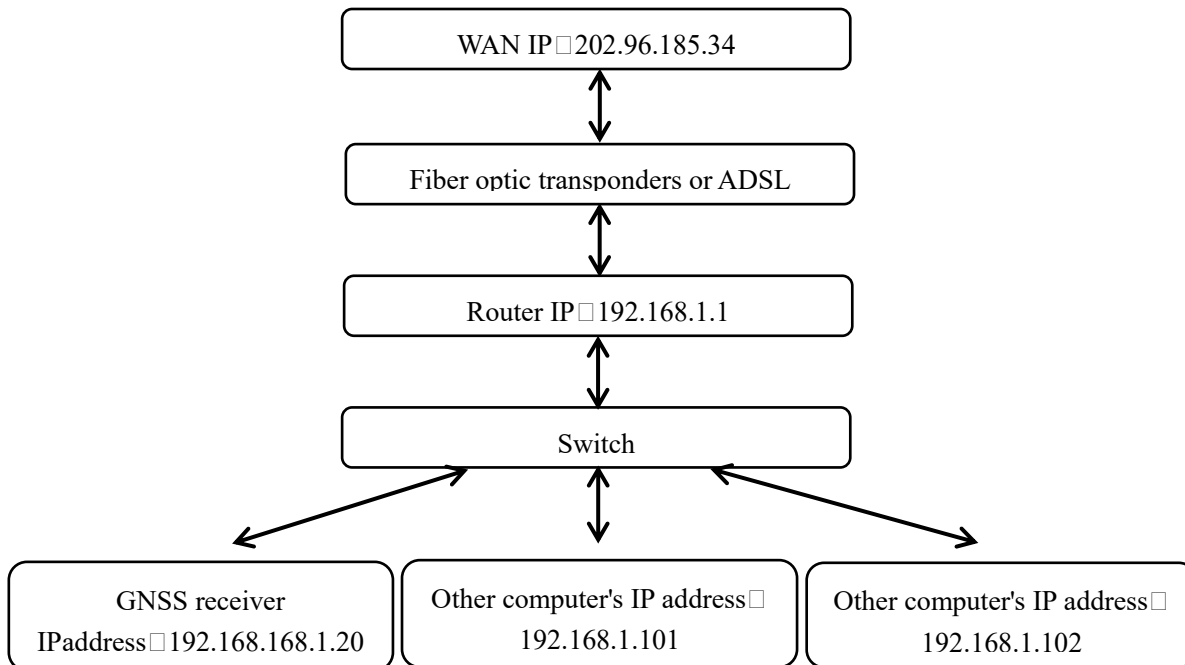


Figure 54 Mapping the external network connection method

### 1. Change the IP of the GNSS receiver

There are two ways to change the IP address of a GNSS receiver: Manual settings and match automatically acquire settings;

#### A. Manual settings

Firstly, obtain GNSS receiver's local IP, such as the default value is 192.168.0.200 (if you do not know the receiver's IP, double-press the “power button” to open the LCD, then see the receiver IP address). Use a network cable to connect PC and GNSS receiver, set PC IP and GNSS receiver IP in the same network



segment, but different IP; such as 192.168.0.148, then the PC login and access the GNSS receiver WEB management system using IP 192.168.0.200.

Go to [Advanced Settings] - [Network Settings] - [Cable Settings], set the GNSS receiver's IP address, subnet mask, gateway, DNS (DNS cannot set), and Click [submit], as shown in Figure 55:

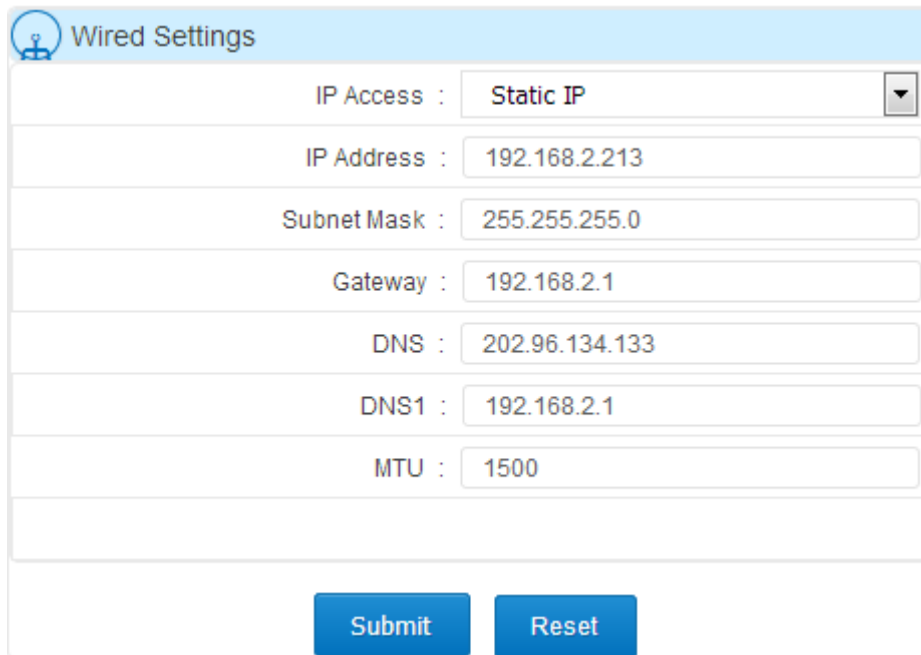


Figure 55 Set the IP address settings manually

#### B. Match automatically acquire settings

Double-press the “power button” to open the LCD, click the "Fn button" to enter the menu options, click "right" select [network settings], press the “power button” to enter and select [wired network], press the “power button” to set the Receiver wired network mode to [DHCP]. The system will automatically obtain the IP and wired network-related parameters; then press the "Fn button" to return to the status display main page to check the IP. The GNSS receiver web management system can be accessed with this IP address.

Go to [Advanced Settings] - [Network Settings] - [Cable Settings] - [IP Acquisition Mode] - [Static IP], and set the receiver IP address, subnet mask, gateway, DNS (DNS does not set), and click [submit], see Figure 56:

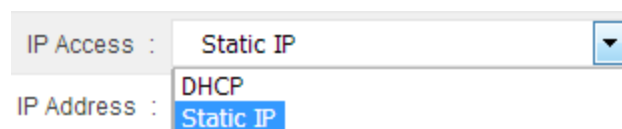


Figure 56 Automatically obtain the IP address settings

## 2. Mapping the external network IP

Open the page and enter the address: http://192.168.1.1 (default IP address) pop up following dialog box (if cannot enter the login screen, please consult network administrator).

Enter the user name and password, the general TP-LINK initial default user name: admin, password: admin. Set the local LAN LAN port, and set the IP address as the GNSS receiver IP address.

Wi-Fi network

Wi-Fi network can be operated by LCD with button operation and WEB management system, WEB management system also can set the Wi-Fi network password, channel and login IP address;

A. LCD display and key operation: double-press the “power button” to open the LCD display, click the "Fn button" to enter the menu options, click the "right button" to select [network settings], press the “power button” to enter and select [WIFI], press the “power button” to control the Wi-Fi network switch, as shown in Figure 57:



Figure 57 LCD button operation Wi-Fi network on/off

B. WEB management system: log in WEB management system, set the [Advanced Settings] - [Network Status and Settings] - [Wi-Fi Hotspot Settings]; shown in Figure 58

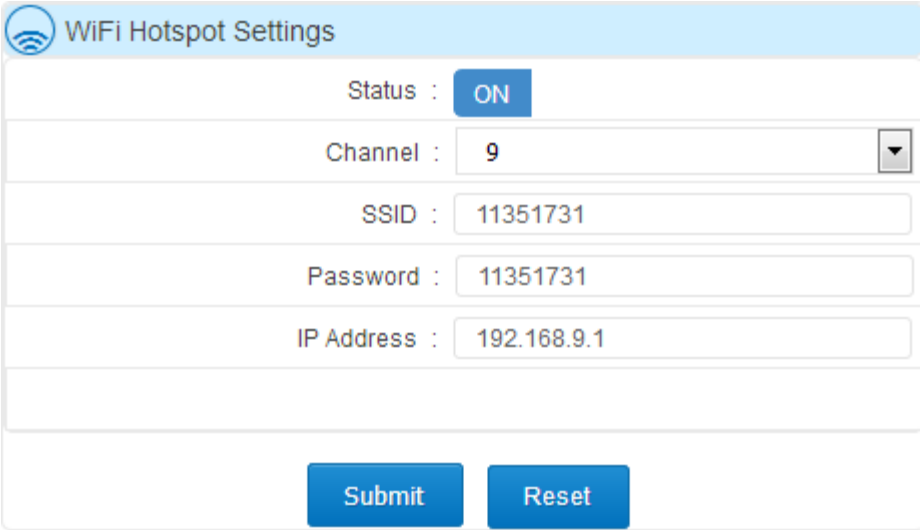


Figure 58 Web management system Wi-Fi settings

After the MatrixRTK's Wi-Fi is enabled, use a device to search the Wi-Fi SSID, then enter the password (default: SN number). Then input the IP address of the GNSS receiver (default: 192.168.9.1). The mobile will show the page in Figure 59 after logging in. (Account and password same with the PC side)

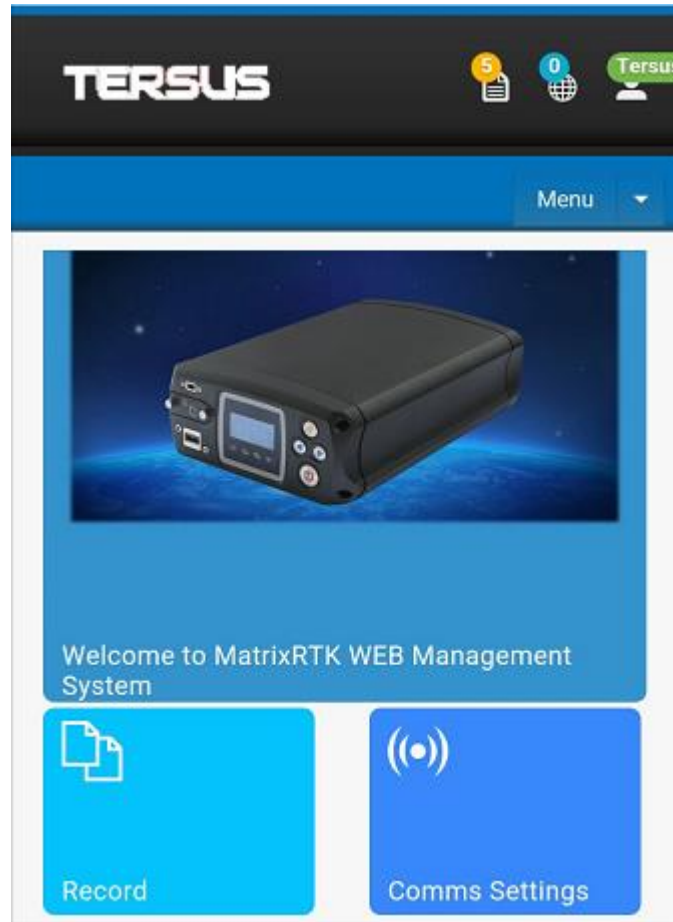


Figure 59 Mobile device home page

#### 4G cellular network

To do FTP push, remote control and network transmission with 4G cellular network, you need to connect the 4G antenna, install the SIM card. Go to [Advanced Settings] - [Network Status and Settings], open 2G/3G network.

If Non-APN (green line) card is used, please select [2G/3G settings] - [Auto] and [submit], the system will automatically dial and connect.

If APN line card is used, the users need to obtain the access point, user name and password from the network operator, and select [APN] mode to fill in the access point, user name and password (as shown below), click [submit], system will automatically load the data and connect the data, shown in Figure 60:

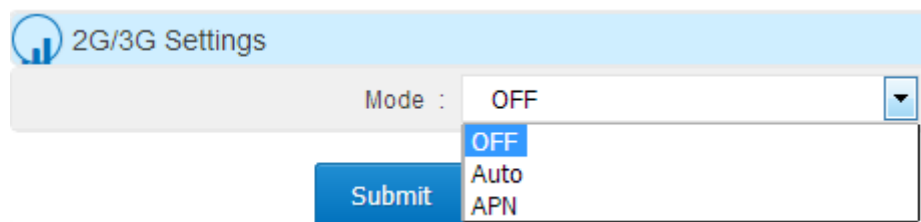


Figure 60 2G/3G network settings

## 4.5 LCD and button operation

Table 7 LCD and button operation

Function	Operation	Content
Turn on/off the LCD	Double-press the power button	Displays the home page of the status information
Switch status information	Press the left/right button	View the status information of the receiver
Switch status and settings display	Press the Fn button	Status and setting page loop switch
Return to the upper menu/Cancel	Press the Fn button	
Switch the menu	Press the left/right button	Menu page: Data record, network setting, data download, system setting; System Settings menu page: Firmware upgrade, restore the default IP, reset, restoring the motherboard, the language selection; operating cycle through the menu;
Go to the menu subordinate	Press the power button	The main menu: Data record, network setting, data download, system setting System Setup menu: Upgrade firmware, restore default IP, restore factory settings, restore motherboard, language selection;
Data record	Press the left/right button	Move options
	Press the power button	Modify the record mode or confirm the settings
Network settings	Press the left/right button	Move options
	Press the power button	Modify the parameter value
Data download	Press the power button	Set, move to the next step and confirm the settings
	Press the left/right button	Password: left button plus 1, right minus 1; number of days: switch the number of days options;
U disk upgrade	Press the power button	Upgrade firmware, firmware to be placed in the root directory of U disk;
language selection	Press the power button and press the left/right button	
Restore the default IP; Reset; Reset the motherboard	Press the power button	Reset: Press the “power button” to enter the confirmation reset prompt page, press the “power button”; Reset the motherboard and restore the default IP the same.

---

**Note:**

1. If there is no operation for 60s, the LCD will be OFF and the indicator light will be ON.
2. Button set data record is temporary record, the record will be deleted after restart; but the data



will not lost;

3. When a text or icon is surrounded by a box, it means that the text is selected, you can modify or enter the subordinate settings;

4. If a menu has not a confirming option, it means the configure will take effect immediately after modification, such as network settings.

## 4.6 Set the base station

Login WEB management page, click the Reference station settings link or Click [work mode] - [Settings] to set;

### 1. Antenna settings

According to the actual parameters of the antenna information, set the antenna attenuation, antenna type, and antenna height:

Antenna Settings	Antenna Decrement[dB] :	5	▼
	Antenna Type :	AT-2300H	▼
	Antenna Height[m] :	0	

Figure 61 Antenna settings

### 2. Base settings

Set the work mode of the reference station as [rover] and submit it; as shown in Figure 62:

Mode Settings	Operating Mode :	Rover	▼
	Correction Format :	RTCM32	▼
	Ephemeris Interval :	Per 5 Minutes	▼
	GGA Output Interval[S] :	1	▼

Figure 62 Rover setting


Set the work mode of the reference station as [Base Station], choose [Correction Format] according to actual needs (OFF, CMR, RTCM, RTCMV3, RTCM32, RINEX for selection), ephemeris interval is recommended to select [every 30 minutes], enter the known latitude, longitude and elevation, and click [submit], see Figure 63:

Mode Settings	Operating Mode :	Base	▼
	Correction Format :	RTCM32	▼
	Ephemeris Interval :	Per 5 Minutes	▼
	Correction Interval[S] :	1	▼
	Second Correction Format :	OFF	▼
	Second Correction Interval[S] :	1	▼
	Reference Latitude :	23:09:55.554205N	
	Reference Longitude :	113:25:52.772142E	
	Reference Elevation[m] :	50.7236	
	GNSS Position :	Measure	


Figure 63 Base setting

## 4.7 Add data record

Log in WEB management system page, click on the data record quick link or click [work mode] - [data record] to set.

Click the button  in this page to pop up [Data Logging Settings] dialog box, enable the status dial to [ON], set the file [Identification name] (the first four digits and the last four of the file is serial numbers added by the system) [Data type] Select [raw data] or [Rinex] according your needs, [record interval [S]] is recommended to 1, [record type] can be Per Day, manual and planned ways, then click[submit]. Record ways are shown below:

Record every day (24 hours record without break up, or record a file every hour, or record a file every two hours), as shown in Figure 64.


Data Recording Settings

Enabled Status :

File Prefix :

Data Type :  ▼

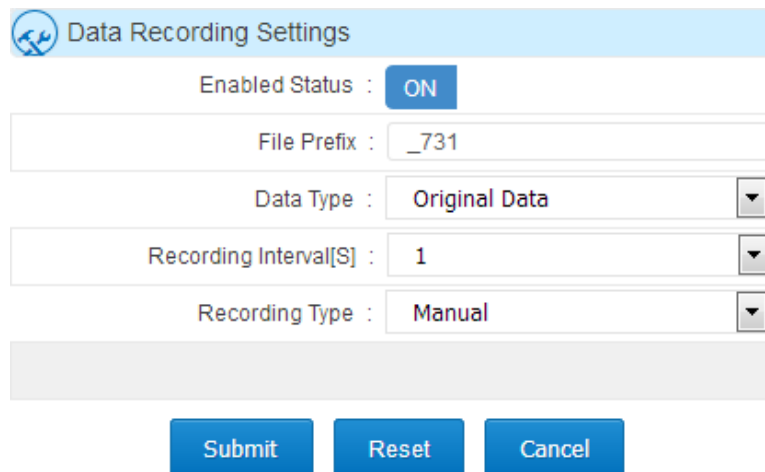
Recording Interval[S] :  ▼

Recording Type :  ▼

Sliced Time :  ▼

Figure 64 Daily Data Logging Settings

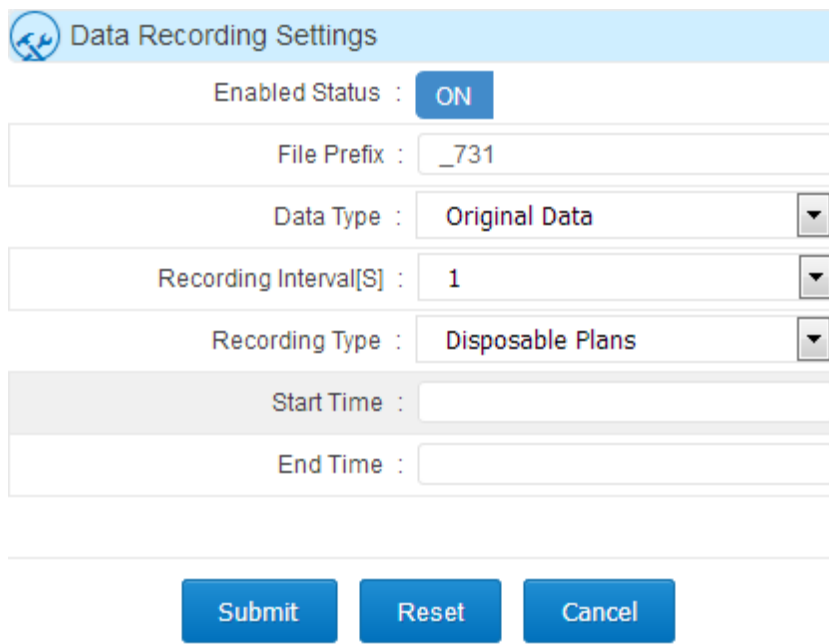
Configure for manual recording is shown in Figure 65.



The screenshot shows a 'Data Recording Settings' dialog box. At the top, there is a blue header with a wrench icon and the text 'Data Recording Settings'. Below the header, the 'Enabled Status' is set to 'ON' in a blue button. The 'File Prefix' is a text input field containing '\_731'. The 'Data Type' is a dropdown menu set to 'Original Data'. The 'Recording Interval[S]' is a dropdown menu set to '1'. The 'Recording Type' is a dropdown menu set to 'Manual'. At the bottom, there are three blue buttons: 'Submit', 'Reset', and 'Cancel'.

Figure 65 Manual data logging setting

Disposable plan records (need to input start/end time), shown in Figure 66:




The screenshot shows a 'Data Recording Settings' dialog box. At the top, there is a blue header with a wrench icon and the text 'Data Recording Settings'. Below the header, the 'Enabled Status' is set to 'ON' in a blue button. The 'File Prefix' is a text input field containing '\_731'. The 'Data Type' is a dropdown menu set to 'Original Data'. The 'Recording Interval[S]' is a dropdown menu set to '1'. The 'Recording Type' is a dropdown menu set to 'Disposable Plans'. Below this, there are two text input fields: 'Start Time' and 'End Time'. At the bottom, there are three blue buttons: 'Submit', 'Reset', and 'Cancel'.

Figure 66 Disposable plans data logging settings

## 4.8 Add network transmission

Log in WEB management system page, click the network transmission quick link or click [work mode] - [network transmission] to set.

Click the  button in this page, the [Network Transfer Settings] dialog box will pop up, put the state dial to [ON], [Encryption state] sets according your need, [Network] Recommended [Wired] (wired, Wi- Fi, 2G/3G), [transmission protocol] sets according to your need, [data type] sets according to your needs (choose from raw data, NMEA-0183, correction data, RS-232 serial data, RS485 serial port data), [Transmission

interval [S]] is recommend to 1, the server IP, Port, user name and other settings are related to transmission protocol, see the specific[work mode] - [network transmission] of the [WEB management system introduced], set as shown in Figure 67:

Network Transmission Settings	
Transmission parameter	Enable Status : <input type="button" value="ON"/>
	Encryption Status : <input type="button" value="OFF"/>
	Meteorological data : <input type="button" value="OFF"/>
	Network Type : <input type="text" value="Wired"/>
	Transmission Protocol : <input type="text" value="TCP/IP Client"/>
	Data Type : <input type="text" value="Original Data"/>
	Transmission Interval[S] : <input type="text" value="1"/>
Protocol parameter	Server IP : <input type="text" value="192.168.1.112"/>
	Port : <input type="text" value="12345"/>
<input type="button" value="Submit"/> <input type="button" value="Reset"/> <input type="button" value="Cancel"/>	

Figure 67 Add network transmission

**Note:**



1. The three kinds of network modes can exist at the same time, but the IP address transmitted to the server must be different.
2. When opening the second correction output, the [original data] turn into the second correction.

## 4.9 Data download

### Normal download

In the WEB management system [File Management] - [File List], select the location of the data storage and the date of the record; pop up intraday data list, click the right side of data list [operation] - [download] then download the corresponding data, shown in Figure 67:



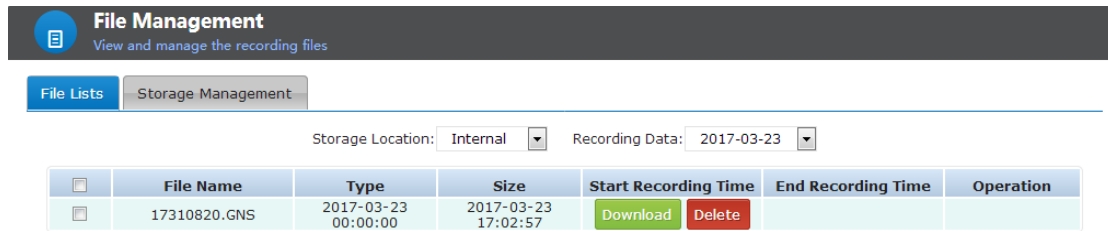


Figure 68 Normal data download

### FTP download

Before FTP download data, make sure the routing and LAN has opened the FTP port. In the WEB management system [file management] - [file list], click [FTP download] button, automatically go to the FTP download list; the home page download list shown in Figure 68:

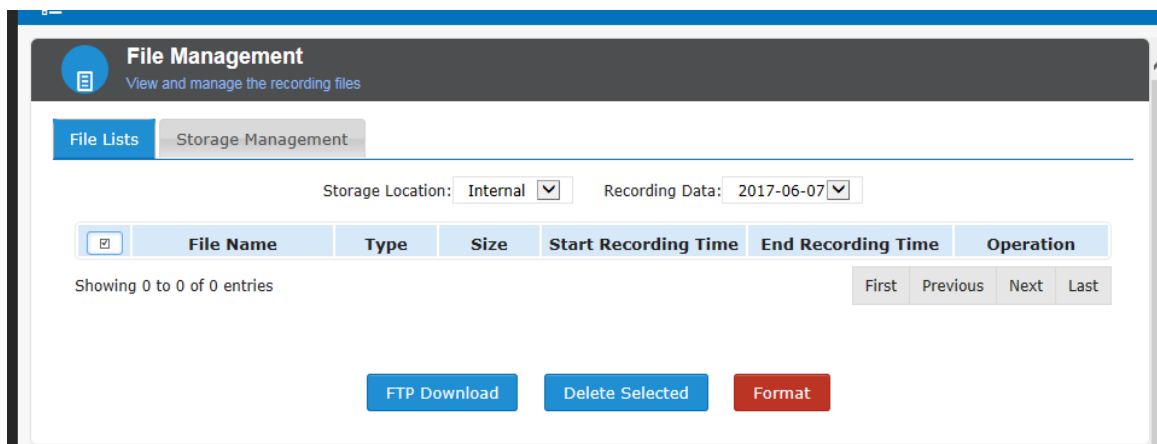


Figure 69 FTP download directory

Click the catalog folder of the storage (select it according to the actual requirements), enter the date list, and then click the corresponding date

### FTP push

FTP push can periodically push the data file to the server. Set the parameters as shown in Figure 70:

**FTP Push**  
Push intraday data according to setting time

Enable : OFF

Anonymity : OFF

Sever IP : 192.168.0.201

Username : anonymous

Server Port : 21

Password : anonymous

Connection Type : Wired

Push Time : 23:59

Submit Reset

Figure 70 FTP push

First, enable the FTP push function, set anonymous or non-anonymous user, server IP and port (data to be pushed to FTP server IP and port), push mode (select cable, Wi-Fi or 4G) and push time, as shown above.

Push time page for quick selection of time and customization. When the first click, pop-up time check box; you can click hour to modify hour, pop up hour selection box, select the desired hour; modify second is the same, and finally click "OK"; finally, click [submit]. Shown in Figure 71:

Push Time : 10:26

Quick Selection

09:00

09:30

10:00

10:30

11:00

Time 10:26:00

Clear Today OK

Figure 71 FTP push time selection

## U disk download

In order to protect the security of data, a password is needed (the default password is: 1234. This password can be modified in [advanced settings] - [Data download password] )

In the LCD menu, select [Data Download], press the “power button” to enter the password input page; enter the password, press the “power button”, then display the box into the first underlined, then the first figure of the password can be modified, click the "right button" to plus 1, click the "left button" to minus 1. After that,

press the “power button” to modify the second password, until password input completely, press the “power button” to enter the download page.

Press the “power button” to the download days selection, click the left/right button to change the number of days, press the “power button” to confirm, then press the “power button” to download (before U disk data downloading, make sure an U disk has been properly installed, or "no U disk" will be prompted). After the download is done, the LCD shows "Download Complete";

---

**Note:**



1. When downloading the Rinex file data, you need to download \*.17p and \*.17o files to the same folder, or the solution will be abnormal;
  2. In FTP server local (internal memory) folder, the folder named by date is for the receiver to collect the raw data and Rinex data; log is the system log folder; mail folder is the mailbox receive the corresponding file; lost + found Folder is the system folder;
  3. Prohibit of use download tools to download.
  4. Download time is related to the size of file and your network's connection speed, please be patient. When downloading, you can close the page and browser, do not disconnect the network or reboot the device.
- 

## 4.10 Firmware upgrade

### Web page upgrade firmware

In the WEB management system select [advanced settings] - [Host settings] - [System control] click [Upgrade the firmware] Expand the dialog box, as shown in Figure 72.

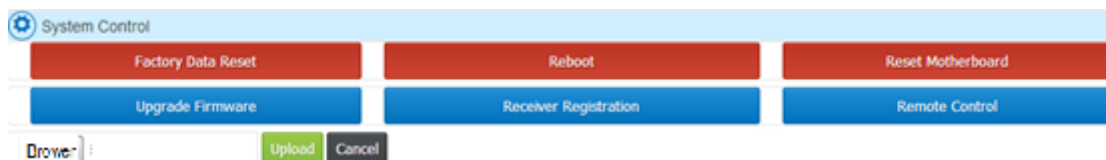


Figure 72 Firmware upgrade

---

**Note:**



1. Update the firmware with file *MatrixRTK\_Update.bin*. Please don't modify this file name, or firmware upgrade will fail;
  2. Upload firmware package, please do not close the browser, or firmware upgrade the will fail.
  3. The time of firmware upgrade is related to your computer, generally is about 10 seconds.
- 

### U disk upgrade firmware

Firstly, copy the firmware file *MatrixRTK\_Update.bin* to the U disk root directory, and then insert the U disk into the UAB-A port at the front panel of the receiver; as shown in:



Figure 73 U disk installation diagram

In the LCD menu, go to [System settings] - [Upgrade the firmware], press "Power button", Pop-up prompt box". Please confirm the insertion of U disk" after confirmation, press the "power button" prompt sending successfully (if U disk is not inserted identify as error, it will prompt "no U disk" and return to [upgrade firmware] selection page) about 1 minute later, the receiver restart after the firmware upgrade is successful.

## 4.11 Register the receiver

In the WEB management system, select [advanced settings] - [Host settings] - [System control] - [Receiver registration] to expand the dialog box as shown in Figure 74.

Registration Status:Registered  
Registration expiry date is: 2017-06-30  
Please input registration code  
{         }

Submit Reset Cancel

Figure 74 Receiver registration

The receiver license format is 24 digits, divided into 8 groups, each group contains 3 digits. Enter the registration code (the system will ignore blanks of the registration code while entering), confirm and click [submit].

## Appendix

### Reset

Major items	Content	The parameters after recovery
Reference station	UTC Time zone	UTC+8
	Antenna attenuation [dB]	5
	Antenna type	AT-1200B
	Antenna high [m]	0
	Reference station work mode	Rover
	Ephemeris interval	Every 30min
	Correction data format	RTCMV3
	Satellite system	All open
	Height cutoff angle	10°
	Storage device	Internal storage
Receiver function	4G internet	OFF
	RS-232/RS485 Serial port	OFF
	Server port settings	80
	Firewall	OFF
	Time input	OFF
	External clock input	OFF
	PPS output	OFF
	FTP Push	OFF
	User	Only retain administrator privileges, and restore the default password
	Automatic cleaning time after full	1 day
	Small five-core serial port pointing	Motherboard 1COM2
Power output	OFF	
Network transmission	Delete all	
Data management	Data record	Delete all
	Internal data	Delete all
	Log management	Delete all

## MatrixRTK technical performance parameters table

GNSS features	Constellations	GPS: L1, L2, L5 GLONASS: G1, G2 BDS: B1, B2, B3 Galileo: L1BOC, E5a, E5b, E5AltBOC SBAS: L1 C/A, L5
	Accuracy	RTK horizontal accuracy: $\pm(8\text{mm} + 1\text{X}10^{-6}\text{D})$ RTK vertical accuracy: $\pm(15\text{mm} + 1\text{X}10^{-6}\text{D})$ Static horizontal accuracy: $\pm(2.5\text{mm} + 1\text{X}10^{-6}\text{D})$ Static vertical accuracy: $\pm(5\text{mm} + 1\text{X}10^{-6}\text{D})$
	Initialization time	Typical <10S
	Initialization reliability	>99.9%
Ports	3 RS232 port 1 USB port 1 Wi-Fi, Bluetooth communication port 1 3G/2G Communication port 1 RS485/RS422 port 1 Ethernet interface 1 PPS Output Interface	
Internal storage	64GB	
External storage	Maximum support 1TB	
Correction format	CMR, RTCM2.x, RTCM3.0 and RTCM3.2	
Interaction	Web management system	
	LCD, indicator, button	
Battery	External power: 7V – 36VDC Build-in battery: 24h continuous work (depend to configure) Power consumption: <5W	
Environmental	Operating temperature	-40C – 75C
	Storage temperature	-40C – 80C
	Relative humidity	100%
	Protection class	IP67
	Anti-corrosion	GJB150.11
	Vibration	GJB 1032
	Shock	JB/T 9329 30g 3 times/axis
	Bump	JB/T 9329 10g 1000 times
Drop	GB-T 2423.8 protect from 1 meter's drop	

## Standard configuration table

Item Name	Number
GNSS Receiver	1
Power Adapter	1
AC power cord	1
Data cable	1
Direct cable	1
Ground reinforcement system product manual	1
Aluminum lugs	3
Cross plate head machine wire [M3*6]	3
Warranty Card	1
Factory inspection certificate	1