ALLYNAV R73 GNSS RECEIVER

operation manual

Shanghai AllyNav Technology Co.,Ltd.

Shanghai AllyNav Technology Co.,Ltd.

foreword

disclaimer

We are committed to continuously improving the function and performance of our products, and the product specifications and manual contents may change without prior notice.If there is any difference between the ICONS and pictures in the manual and the actual product, please refer to the actual product.The company reserves the right of final interpretation of all technical parameters and graphic information .

Before using this product, please read this manual carefully.For failure to follow the requirements of the manual or fail to correctly understand the requirements of the manual and misoperation of this product, the company will not be responsible for any loss.

The product is designed to withstand certain harsh environments.However, this device is a high-precision electronic instrument and should be treated with care.Operating or storing the receiver outside the specified temperature range may damage it .

Technology and service

If you have any questions and the product documentation fails to provide relevant information, please contact your local office Technology. Or go to the joint navigation website (http: / / www.allynav. Cn) query download the latest version of the product and related technical information, can also call the national service hotline:

400-1698-003 contact us, we will serve you wholeheartedly

Document revision record

version number	Revised records	Revised date
V1.0	found	2023.11.12
V1.1	Update the WEBUI configuration mode	2024.01.21
V1.2	Supplement the WEBUI function	2024.05.28
V1.3	updated parameter	2024.07.11

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Chapter1 Product overview

1.1product brief introduction

R73-GNSS receiver is one of the new positioning and orientation series products independently developed by Shanghai Lianshi Navigation Technology Co., LTD.The product has built-in dual satellite antenna, Beidou /GNSS high-precision board, radio communication module, inertial navigation module and 4G module, which realizes the function of single antenna positioning and double antenna orientation.The R73-GNSS receiver is suitable for aquatic applications, and can be widely used in construction machinery and agricultural navigation fields .

The product has the features of integrated design, simple installation, etc., and can be easily installed on the hull surface or bracket.Maintenance-free design eliminates the need for routine maintenance.The receiver provides heading information through the GNSS system and is free from geomagnetic interference, making it ideal for conventional Marine, river or land applications.

1.2main feature

- High precision, low power consumption, using Beidou, GPS, GLONASS, Galileo, QZSS full-system full-frequency high-precision positioning module, can ensure positioning accuracy in a variety of complex environments;
- Support SBAS, precise single point positioning PPP function, in the absence of a fixed base station to meet high-precision heading requirements;
- Compatible with a variety of Beidou /GNSS high-precision positioning directional board, can achieve a single Beidou solution;
- Wide voltage supply, voltage range 9 ~ 36V DC, with positive and negative polarity reverse protection;

- Built-in WiFi module, embedded web function, connect to the WiFi to configure the device;
- Integrated design, easy installation, standard IP67 waterproof and dustproof design;
- Built-in high-precision six-axis gyroscope to achieve high-precision attitude measurement;
- Optional built-in radio, satellite communication module ;
- Built-in eSIM card, CORS signal can be connected to achieve centimeter-level positioning 。

1.3inventory

The table is a detailed list of items included when the user purchases the R73 GNSS receiver.

Table 1-1, List of items

product name	specifications and models	quantity
GNSS receiver	R73（RS-232+RS-232）	1
The R73 data transmission power supply line	Optional option: 1.5m / 15m	1
12V appliances	12V 5A	1
mounting bracket	/	1

Table 1-2, List of items

product name	specifications and models	quantity
GNSS receiver	R73（RS-422）	1
The R73 data transmission power supply line	30m	1

12V appliances	12V 5A	1
mounting bracket	/	1

Chapter 2: Hardware Composition

2.1 Dimensions

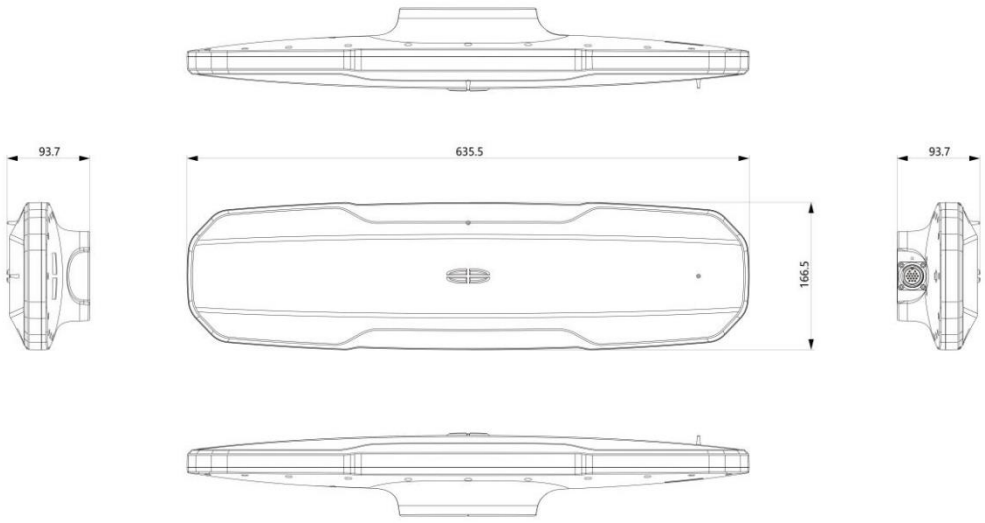


Figure 2-1 Structural dimensions of R 73

2.2 Interface definition

R73 GNSS The receiver adopts 18-PIN interface and supports RS-232 level. Figure 2-2 below shows the pin layout of the receiver interface. Table 2-1 lists the signal types for each pin.

Figure 2-2 R73 pin layout

Table 2-1 Specification table of cable pins

Aviation PIN order	definition	port
1	USB-DP	USB+
2	VCC12V	obligate
3	CAN-H	obligate
4	USB-DM	USB-
5	USB-VBUS	VBUS
6	VCC12V	positive pole
7	CAN-L	obligate
8	NC	Empty feet
9	GND	source GND
10	RS422-Y	Not connected when using RS232
11	RS422-Z	Not connected when using RS232
12	RS232-TX1	The RS232 emission is introduced
13	GND	source GND
14	RS232-RX2/RS422-A	Not using RS232
15	RS232-TX2/RS422-B	Not using RS232
16	RS232-RX1	The RS232 is received
17	GND-O	Serial port-dedicated GND
18	GND-O	Serial port-dedicated GND

2.3 Serial port communication

R73 GNSS The receiver has two serial ports of the RS232 level, where the serial port 1 is used to configure the receiver and is also available for firmware updates. Received IMU data default serial port 2 (not configurable, do only receive), IMU filter data and GNSS board card through the transmission statement. The serial port default configuration statement is as follows:

Table 2-2 Serial configuration of serial ports

gorge line	Baud rate	NMEA sentence	Data update rate
String mouth 1	115200	GPGGA ，GPVTG ，GPHDT ，GPGSA ，GPGSV	1hz
String mouth 2	115200	GPGGA ，GPVTG ，GPHDT ，GPGSA ，GPGSV	1hz

Serial port 1 is configured as a serial port, can be configured serial port 1 and serial port 2 output GNSS statement and IMU statement, output frequency and wave rate, etc., the user can be configured through the web page according to the actual requirements.

pay attention to:

1. The message output by IMU is filtered and transmitted from GNSS board card. The statements (GPGGA, GPVTDA, GPVTG, GPHDT, GPGSA, GPGSV) only support configuration (GPGGA, GPRMC, GPHDT, GPZDA), and other statements are sent to IMU by GNSS board card. Therefore, Serial port 2 output IMU filtering statements and GNSS board.

Chapter 3. Product Installation

This chapter describes the installation of R73 GNSS receiver, including matters needing installation, selection of installation direction and optional installation method.

3.1 Precautions

R73 GNSS The following factors should be considered during the installation of the receiver:

1. R73 GNSS receiver must be installed in the outdoor environment (to avoid shielding), otherwise the equipment can not work normally;

2, the power supply voltage of the receiver must be 9~36V DC, please pay attention to the positive and negative electrode corresponding correct;

3, the receiver cable connection must be firm, not virtual connection, wrong connection, otherwise affect the normal operation of the system;

4, electromagnetic environment notes, GNSS equipment may be disturbed by other radio equipment, such as wireless network bridge, wireless wiring, camera, intercom, car burglar alarm, mobile phone signal shield, etc., may interfere with GNSS signal and radio signal, the working area needs to consider the electromagnetic environment;

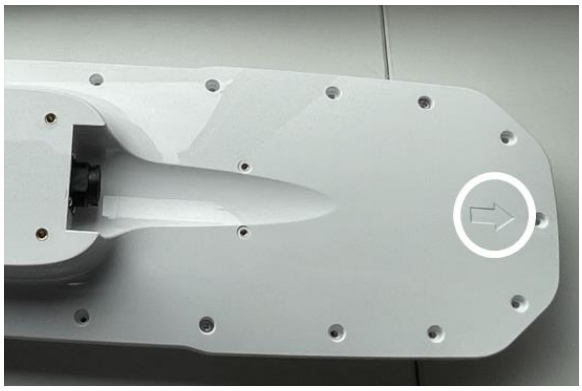
5. When configthe receiver, ensure that the power supply and positioning of the receiver are normal;

6. Please complete the installation of receiver related cable connection and SIM card before power on;

7. Please follow the arrow at the bottom of the shell as the bow direction when installing.

3.2 Installation direction

R73 GNSSS The receiver integrates two GNSS four-system full-frequency built-in measurement antennas, namely the main antenna and secondary antenna, in which the main antenna is used for positioning, and the main antenna and secondary antenna are combined to obtain heading information. R73 GNSS The arrow at the bottom of the receiver (marked in the white circle) indicates the relative position of the two antennas, pointing from the main antenna to the secondary antenna.



graph 3-1

Note: the R73 GNSS receiver can output the ship's heading regardless of the installation direction, but if the orientation of the R73 GNSS receiver is not consistent with the ship axis, an angle change positive value needs to be added when calculating the heading.

Parallel ship axis installation means that the R73 GNSS receiver is parallel to the ship axis. This direction measures the course as the actual heading, without the need to change the Angle to the positive value. Parallel installation method is recommended in actual use.

Installation direction calibration

R73 GNSS The receiver adopts visual calibration design, the top raised logo can be used to calibrate the installation direction, the long axis accuracy accuracy is about ± 1°, and the short axis calibration accuracy is ± 2.5°.

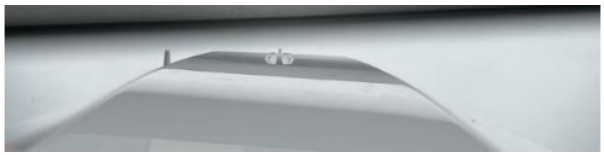


Figure 3-2 Long axis 1 visual calibration

Figure 3-3 Short axis 1 visual calibration

3.3 Installation method

R73 GNSS The receiver supports two kinds of installation methods: surface installation and rod installation.

a) Surface mounting ——R73 GNSS receiver has four mounting holes (M5x14 outer hexagonal) for the installation of the equipment on the surface of the carrier;

b) The rod mount ——R73 GNSS receiver has a mounting hole (5 / 8 British screw hole) at the bottom, which can be mounted on the support rod.

3.4 Data transmission and power supply line connection

R73 GNSS The receiver user can select the 1.5m / 15m / 30m data transmission power supply line according to the requirements. The specific steps of connecting the cable and the receiver are as follows:

A) Align the card slot at the interface of the data transmission power supply line with the buckle of the R73 GNSS receiver (as shown in the figure below), insert the cable into the interface of the R73 GNSS receiver, and rotate the cable ring at the cable interface clockwise until it is completely fixed;

B) Add the cable clip near the cable connection, and fix the cable clip at the bottom of the R73 GNSS receiver through screws;

Ct c) Cover the cable and secure it through screws.

Chapter 4 Functional introduction

4.1 G NSS Introduction

R73 GNSS The receiver integrates a high-precision positioning orientation board and two GNSS antennas, which can output precise positioning information and heading information. R73 GNSS The receiver built-in positioning orientation board card supports Beidou, GPS, GLONASS, Galileo, QZSS and other whole system full frequency high precision positioning orientation module, can ensure the positioning accuracy in a variety of complex environments;

The R73 integrates high-precision positioning orientation cards and two GNSS antennas to output precise positioning information and heading information. Two GNSS antennas are divided into main antenna and secondary antenna. The main antenna is used for positioning, and the secondary antenna (bottom arrow of R73) is used for heading determination.

4.2 Differential mode

RTK (Real Time Kinematic) real-time dynamic measurement technology

RTK uses a real-time differential technology based on carrier phase observation. A receiver is installed on the base station, and the base station collects satellite data, and transmits its observation value and the site coordinate information to the mobile station through the data chain. While the mobile station conducts real-time carrier phase differential processing on the satellite data collected and the received data chain, so as to obtain the centimeter-level

positioning result.

Precision for the single-point localization of the PPP-B2b

The PPP service B2b signal is broadcast by the Beidou 3 three geosynchronous orbit (GEO) satellites in China and surrounding areas, and can provide users with open and free high-precision services. It is also the first high-precision service signal released by the Beidou system (the positioning accuracy is less than 20cm).

Precision for the single-point localization of the PPP-E6HAS

The Galileo E6-B signal provides free Galileo and GPS (single-frequency and multi-frequency) high-precision PPP correction service to improve real-time user positioning performance (normal positioning accuracy is less than 20cm).

The SBAS star-based enhancement system

SBAS (Satellite-Based Augmentation System), namely star-based enhancement system, can carry satellite navigation enhanced signal forward in geostationary orbit (GEO) satellite, which can broadcast a variety of correction information such as satellite calendar error, satellite clock difference and ionosphere delay to users, so as to improve the positioning accuracy of the original satellite navigation system.

4.3 Introduction to the IMU

Built-in high-precision six-axis gyroscope, to achieve high-precision attitude measurement; used to filter heading data output, heading accuracy is less than 0.3 ° rms.

Chapter 5. Operating instructions

This chapter describes some basic operations of the R73 GNSS receiver, such as boot up, data communications, and firmware updates.

5.1 Start-up and startup

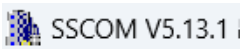
R73 GNSS After the receiver is normally connected with the external equipment, it can be connected with the power supply, and the power supply voltage is 9~36V DC, with positive and negative polarity reverse connection protection.

Warning: R73 GNSS The receiver has no overvoltage protection, and the power supply voltage cannot exceed 36V DC.

5.2 Firmware upgrade

The product firmware version is updated periodically to improve performance, fix errors, or add new features to the product.

Connect the computer to U turn string (RS-232), connect the serial port 1 for configuration, open the serial port software, select 115200 for port rate, add back to the car line, and send SYS UPDATE for system upgrade, as shown in Figure 5-1.



```
[15:08:09.382]发→◇SYS UPDATE
□
[15:08:09.386]收←◆

                SYS UPDATE Start...

usr fota update

[15:08:09.470]收←◆current version:  EC600UCNLBR02A07M08_OCPU
init file name:[UFS:fota.pack]
init file size:[0]
init file stage:[0]
start [1] times download fota packge
init file name:[UFS:fota.pack]
init file stage:[0]
init file download:[0]
init file file_size:[0]
init file real file_size:[0]
init file is_show:[1]
init file last_percent:[0]
init file space:[1]
over write file [UFS:fota.pack]
$command,SYS UPDATE,response: PARSING FAILD NO MATCHING FUNC  SYS*71

[15:08:10.250]收←◆content_length:[122864] totalsize=[122864]
$GNGGA,070810.00,3109.76322177,N,12118.41366150,E,1,19,1.0,-24.7123,M,11.0532,M,,*6C

[15:08:10.300]收←◆dload progress:===[5%]===total size[122864] file_size[6194] dload size[6194]
dload progress:===[8%]===total size[122864] file_size[10874] dload size[10874]
dload progress:===[11%]===total size[122864] file_size[13674] dload size[13674]

[15:08:10.453]收←◆dload progress:===[12%]===total size[122864] file_size[15074] dload size[15074]
dload progress:===[15%]===total size[122864] file_size[19274] dload size[19274]

[15:08:10.641]收←◆dload progress:===[19%]===total size[122864] file_size[24394] dload size[24394]
dload progress:===[24%]===total size[122864] file_size[29514] dload size[29514]

[15:08:10.788]收←◆dload progress:===[28%]===total size[122864] file_size[34634] dload size[34634]
dload progress:===[32%]===total size[122864] file_size[39754] dload size[39754]
dload progress:===[33%]===total size[122864] file_size[41674] dload size[41674]
```

```
[15:09:20.259]收←◆$GNGGA,070920.00,3109.76039145,N,12118.41656906,E,1,23,0.6,-23

[15:09:20.489]收←◆dload progress:===[84%]===total size[122864] file_size[104194]
dload progress:===[85%]===total size[122864] file_size[104674] dload size[104674]
dload progress:===[87%]===total size[122864] file_size[107474] dload size[107474]

[15:09:20.603]收←◆dload progress:===[91%]===total size[122864] file_size[112594]

[15:09:20.640]收←◆dload progress:===[95%]===total size[122864] file_size[117274]
dload progress:===[99%]===total size[122864] file_size[122394] dload size[122394]
dload progress:===[100%]===total size[122864] file_size[122864] dload size[122864]
===http transfer end!!!!
init file name:[UFS:fota.pack]
init file stage:[3]
init file download:[122864]
init file file_size:[122864]
init file real file_size:[122864]
init file is_show:[1]
init file last_percent:[100]
init file space:[1]
download is sucess ,system will reset power!
```

graph 5-1

The progress display percentage is completed, that is, the upgrade is completed, after the equipment restart is completed, the serial port will receive the system configuration information. See Figure Figure 5-2 below.

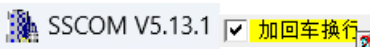
```
[13:17:49.480]收←◆
**** LS-GNSS-R73 V1.0.6 ****
ID: R73
PN: 315807914030010
SN: 1412901153
BASE ID:1120080068
MODE:0 SYS CONFIG MODE
232 <===> IMU
DIFF SRC  : NET BASE
SIM       : 1
RADIO baud: 115200 bps
GNSS  baud: 115200 bps
IMU   baud: 115200 bps
SIM76 baud: 115200 bps
SYS TEMP  :  31 C
CPU USAGE :  2% 42%
RUN TIME  : 00:01:29
********* SAVE LIST *********


[13:17:49.550]收←◆$command,SYS SAVE,response: PARSING FAILD NO MATCHING FUNC
SYS*61
```

Figure 5-2 System configuration information

Note: Do not disconnect the R73 GNSS receiver power supply. Do not interrupt the communication connection between the computer and the receiver until the firmware upgrade is complete, otherwise the receiver system upgrade will fail. If the upgrade fails, resend the instructions SYS UPDATE upgrade.

5.3 Configure the receiver

R73 GNSS The receiver can only be configured with serial port 1 by default, open the serial port software, U turn (RS-232) connects the serial port 1 (RS-232 full duplex), check "add return line", after the configuration, connect the serial port 1 to receive GNSS data, and the serial port 2 receives the data of IMU after filtering. Follow the following operation steps: 

Take 20Hz and 5Hz as examples (yellow font users configure according to actual requirements)

1）**Send SET UNLOG / / into configuration mode (GNSS statement and IMU statement configuration before emptying), and give instruction feedback as shown in Figure 5-3.**

```
[12:09:30.426]发→◇SET UNLOG
□
[12:09:30.429]收←◆Close NMEA output

[12:09:31.004]收←◆$command,SET UNLOG,response: PARSING FAILD NO
MATCHING FUNC  SET*3F
```

Figure 5-3 Close the GNSS and IMU statement output

2) Switch built-in or external cards (default configuration built-in SIM card SIM 1)

Users can choose to use the built-in card or the external card according to the actual situation. The external card is a standard SIM card, and the Internet of Things card and mobile phone card can be used. SIM 1 is built-in card and SIM 2 is external card.

The switching of the SIM 1 instruction is:

SYS CONFIG / / Start the configuration

SET SIM 1 / / Set to the built-in card SIM 1

SYS SAVE / / Save the configuration / read configuration

Instruction feedback such as 5-4 red marked as SIM 1 switching success.

```
**** LS-GNSS-R73 V1.0.5 ****
ID: R73
PN: 315807914030010
SN: 1412901153
BASE ID:1120080068
MODE:0 SYS CONFIG MODE
232 <===> GNSS
DIFF SRC  : NET BASE
SIM       : 1
RADIO baud: 115200 bps
GNSS  baud: 115200 bps
IMU   baud: 115200 bps
SIM76 baud: 115200 bps
SYS TEMP  :  28 C
CPU USAGE :  2% 30%
RUN TIME  : 00:04:41
********** SAVE LIST **********

$command,SAVE LIST,response: PARSING FAILD NO MATCHING FUNC  SAVE*62
```

graph 5-4

Send GET SIM to query SIM configuration and launch information, such as 5-5 "SIM 1 register success", 4G launch is successful.

```
SIM1 register success

SIM2 register failed

SIM1 IMSI:  460083417109037
SIM1 ICCID: 898604B41922D2319037

SIM2 IMSI:  460113432481837
SIM2 ICCID: 89861122229042268885
$command,GET SIM,response: PARSING FAILD NO MATCHING FUNC  GET*37
```

graph 5-5

The instruction to switch the external card SIM 2 is:

SYS CONFIG

SET SIM 2

SYS SAVE

The instruction feedback is marked in Figure 5-6 as SIM 2 switching successfully.

```
**** LS-GNSS-R73 V1.0.5 ****
ID: R73
PN: 315807914030010
SN: 1412901153
BASE ID:1120080068
MODE:0 SYS CONFIG MODE
232 <===> GNSS
DIFF SRC  : NET BASE
SIM       : 2
RADIO baud: 115200 bps
GNSS  baud: 115200 bps
IMU   baud: 115200 bps
SIM76 baud: 115200 bps
SYS TEMP  :  30 C
CPU USAGE :  2% 30%
RUN TIME  : 00:21:05
********* SAVE LIST *********

$command,SYS SAVE,response: PARSING FAILD NO MATCHING FUNC  SYS*61
```

graph 5-6

Send GET SIM to query SIM configuration and launch information, figure 5-7 "SIM 2 register success" is 4G online success.

```
SIM1 register failed

SIM2 register success

SIM1 IMSI:  460083417109037
SIM1 ICCID: 898604B41922D2319037

SIM2 IMSI:  460113432481837
SIM2 ICCID: 89861122229042268885
$command,GET SIM,response: PARSING FAILD NO MATCHING FUNC  GET*37
```

graph 5-7

3) Configure GNSS output statements and frequency

GPGGA 0.05 / / Output GPGGA (GNSS location information) at 20Hz

GPVTG 0.05 / / Output the GPVTG (ground speed information) statement at 20Hz

GPHDT 0.05 / / Output the GPHDT (heading information) statement at 20Hz

GPRMC 0.05 / / Output the GPRMC (recommended location information) statement at 20Hz

GPGLL 0.05 / / Output the GP GLL (latitude and longitude information) statement at 20Hz

GPZDA 0.2 / / Output the GPZDA (UTC time and date) statement at 5Hz frequency

G P GSA 0.2 / / Output the G P GSA (current satellite information) statement at 5Hz frequency

GPGST 0.2 / / Output the GPGST (false margin error statistics) statement at 5Hz frequency

GPGSV 0.2 / / Output the GPGSV (number of visible satellites) statement at 5Hz frequency

Configure the output GP form statement

CONFIG NMEA0183 V31

NMEATALKER GP

SAVECONFIG / / Save, motherboard instructions

Send a LOGLIST to view the GNSS configuration statement and frequency, as shown in Figure 5-8.

```
[19:02:10.250]发→◇LOGLIST
□
[19:02:10.375]收←◆$command,LOGLIST,response: OK*18

[19:02:10.424]收←◆<LOGLIST COM2 9984 23.000000 FINE 2291 212546.250000 356788 16 18
<       13
<       GPGGA COM2 0.05
<       GPVTG COM2 0.05
<       GPHDT COM2 0.05
<       GPRMC COM2 0.05
<       GPGLL COM2 0.05
<       GPGSA COM2 0.2
<       GPGST COM2 0.2
<       GNGSV COM2 0.2
<       GPZDA COM2 0.2
<       GPGGA COM3 0.1
<       HEADINGB COM3 0.1
<       PSRVELB COM3 0.1
<       BESTPOSB COM3 0.1
```

Figure 5-8 Configure GNSS output statements and frequency, and output GP form statements

4) Configure the IMU output statement and frequency (send successively, one at a time)

AT + GPGGA = 20 / / Output the GPGGA (GNSS location information) statement at 20Hz

AT + GPRMC = 20 / / Output the GPRMC (recommended location information) statement at 20Hz

AT + GPHDT = 20 / / Outputs the GPHDT (heading information) statement at 20Hz

AT + GPV TG = 20 / / to output the GPV TG (ground speed information) statement at 20Hz

AT + GPZDA = 5 / / to output the GPZDA (UTC time and date) statement at a rate of 20Hz

AT + SAVE / / to save

Instruction feedback is shown in Figure Figure 5-9.

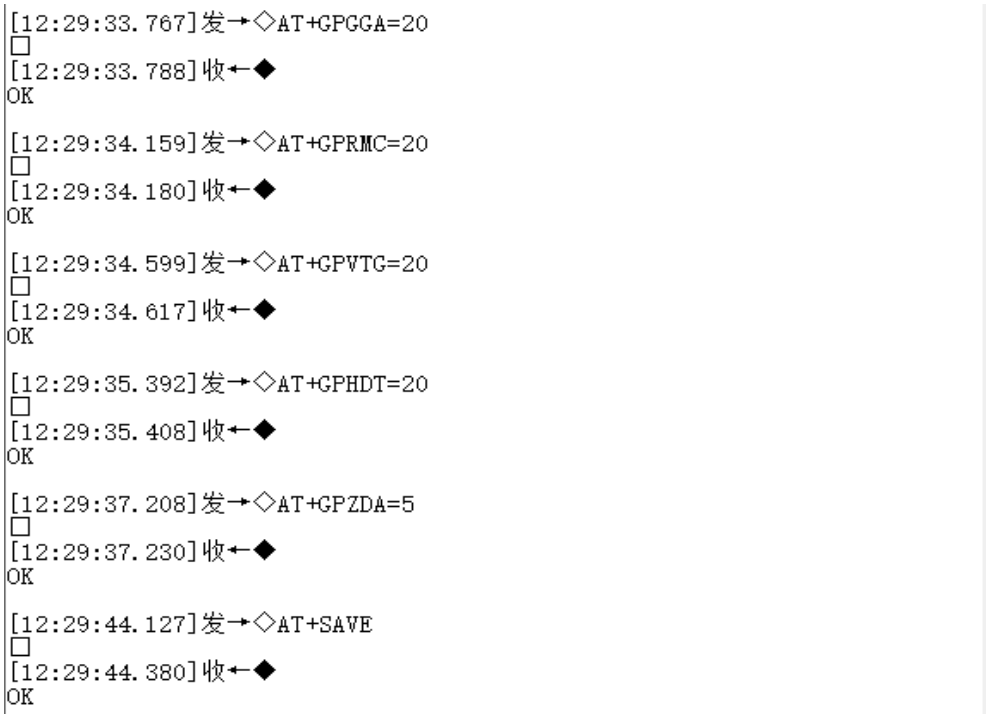


Figure 5-9 Configure the IMU output statements and frequencies

matters need attention:

The IMU statement sends one sentence at a time and returns the result display "OK".

5) Configure to connect CORS base station, instructions (yellow font user according to the actual use)

SYS CONFIG / / Start the configuration

SET DIFFSRC 8 / / Set the difference source format as CORS

SET IPADDR 1,47.104.236.222,18654 / / Set up the 1st route, IP address, port

SET CORS 1, AFXJ, AFXJ, AFXJ / / Set up the 1st route IP, user name, password, and mount point

SYS SAVE / / Save the configuration / read configuration

Instruction feedback is shown in Figure 5-10.

```
[15:24:33.208]收←◆
**** LS-GNSS-R73 V1.0.6 ****
ID: R73
PN: 315807914030010
SN: 1412901153
BASE ID:1120080068
MODE:0 SYS CONFIG MODE
232 <===> GNSS
DIFF SRC  : CORS
SIM       : 1
RADIO baud: 115200 bps
GNSS  baud: 115200 bps
IMU   baud: 115200 bps
SIM76 baud: 115200 bps
SYS TEMP  :  33 C
CPU USAGE : 15% 40%
RUN TIME  : 00:05:22
********* SAVE LIST *********

$command,SYS CONFIG,response: PARSING FAILD NO MATCHING FUNC  SYS*6A
$command,SET DIFFSRC 8,response: PARSING FAILD NO MATCHING FUNC  SET*37
$command,SET IPADDR 1,47.104.236.222,18654,response: PARSING FAILD NO MATCHING FUNC
SET*58
$command,SET CORS 1,AFXJ,AFXJ,AFXJ,response: PARSING FAILD NO MATCHING FUNC  SET*45
$command,SYS SAVE,response: PARSING FAILD NO MATCHING FUNC  SYS*61
```

Figure 5-10 Configure network information

Send the GET NET to obtain the saved network configuration information, as shown in Figure 5-11.

```
[13:28:39.332]发→◇GET NET
□
[13:28:39.336]收←◆
************* IP 1 info***************
ipLen :15
ipAddr : 047.104.236.222
ipPort : 18654
Trans mode : ntrip client(1-TCP client 2-NTRIP client 3-NTRIP server)
BaseStation start mode: base
Satellite cutoff angle : -1
BEIDOU  : ENABLE
GLONAS  : ENABLE
GPS     : ENABLE
GALILEO : ENABLE
QZSS    : ENABLE
SBAS    : ENABLE
Diff peripartum : 255
DataType : NMEA
RTCM ver : 3.0
GGA upload time : 1s
RMC upload time : 1s
GSV upload time : 1s
CORS ACCT:AFXJ
CORS PASSWD:AFXJ
CORS MOUNTP:AFXJ
************************************

[13:28:39.754]收←◆$command,GET NET,response: PARSING FAILD NO MATCHING FUNC  GET*3F
```

Figure 5-11 Query the network configuration information

Send SET LOGALL after configuration, open GNSS and IMU output statements, and return to the mode before shutdown, with feedback as shown in Figure 5-12.

```
[15:34:48.849]发→◇SET LOGALL
□
[15:34:48.854]收←◆Open NMEA output
```

Figure 5-12 Open the GNSS and IMU output statements

6) Set the sending command to mobile station mode and restart the receiver. After the restart, wait to be fixed.

SYS CONFIG / / Start the configuration

SET MODE 1: / / Set up the mobile station mode

SYS SAVE / / Save the configuration / read configuration

SYS RESET / / System reboot

In Figure Figure 5-14, "E4" is fixed, and the difference delay of "M, 1.0" is basically unchanged, and the value is very small. At this time, the serial port 2 can output the gyro corrected data.

```
[16:47:35.722]收←◆$GNGGA,084734.00,3109.73974475,N,12118.42224761,E,4 28,0.6,25.5181,M,11.0541,M,1.0,0*58
$GPGSA,M,3,16,27,28,31,04,26,,,,,,,1.5,0.6,1.4,1*2E
$GPGSA,M,3,83,71,73,,,,,,,,,,1.5,0.6,1.4,2*2E
$GPGSA,M,3,02,30,07,08,,,,,,,,,1.5,0.6,1.4,3*28
$GPGSA,M,3,45,39,03,29,59,07,09,10,30,16,22,36,1.5,0.6,1.4,4*20
$GPGSA,M,3,40,21,06,,,,,,,,,,1.5,0.6,1.4,4*20
$GPVTG,55.136,T,61.429,M,0.03064,N,0.05675,K,D*2A
$GPHDT,312.4303,T*01
$GPGSV,2,1,06,16,66,299,32,26,61,012,34,27,42,185,33,28,39,092,32,1*67
$GPGSV,2,2,06,31,58,065,30,04,39,309,36,1*6C
$GPGSV,2,1,05,26,61,012,33,27,42,185,38,28,39,092,31,31,58,065,32,4*67
$GPGSV,2,2,05,04,39,309,33,4*50
$GPGSV,1,1,02,26,61,012,16,27,42,185,20,8*65

[16:47:36.729]收←◆$GNGGA,084735.00,3109.73974422,N,12118.42224761,E,4 28,0.6,25.5376,M,11.0541,M,1.0,0*51
$GPGSA,M,3,16,27,28,31,04,26,,,,,,,1.5,0.6,1.4,1*2E
$GPGSA,M,3,83,71,73,,,,,,,,,,1.5,0.6,1.4,2*2E
$GPGSA,M,3,02,30,07,08,,,,,,,,,1.5,0.6,1.4,3*28
$GPGSA,M,3,45,39,03,29,59,07,09,10,30,16,22,36,1.5,0.6,1.4,4*20
$GPGSA,M,3,40,21,06,,,,,,,,,,1.5,0.6,1.4,4*20
$GPVTG,275.834,T,282.126,M,0.00508,N,0.00941,K,D*25
$GPHDT,311.7925,T*0F
$GPGSV,2,1,06,16,66,299,35,26,61,012,34,27,42,185,35,28,39,092,32,1*66
$GPGSV,2,2,06,31,58,065,31,04,39,309,36,1*6D
$GPGSV,2,1,05,26,61,012,33,27,42,185,39,28,39,092,30,31,58,065,32,4*67
$GPGSV,2,2,05,04,39,309,32,4*51
$GPGSV,1,1,02,26,61,012,16,27,42,185,20,8*65

[16:47:37.721]收←◆$GNGGA,084736.00,3109.73974747,N,12118.42225342,E,4 28,0.6,25.4822,M,11.0541,M,1.0,0*5D
$GPGSA,M,3,16,27,28,31,04,26,,,,,,,1.5,0.6,1.4,1*2E
```

graph 5-14

1. Note that the instructions can be referred to Annex C in the last chapter: Commands and messages;

2. If it is not fixed for a long time, it may be a signal problem, please place the

receiver in an open place;

3. All instructions in the text add return replaced by default;

Appendix A:, FAQ

Appendix A introduces some common problems and possible solutions during the use of the R73 GNSS receiver.

Problem 1: The R73 GNSS receiver could not start normally

Problem screening:

- Check the polarity of the power supply;
- Check whether the power cord is connected normally;
- Check whether the input voltage is within the allowable range;
- Check the voltage value of the cable end connector;
- Check whether the power supply has a current limit;

Problem 2: The R73 GNSS receiver has no data output

Problem screening:

Check the power status of R73 GNSS receiver to ensure the receiver

Check that the required message has set the output;

Ensure that the port rate of the receiver matches the port rate of the receiving device;

Check that the power cord and the data cable are connected normally.

Problem 3: R73 GNSS Receiver data output is scrambled

Problem screening:

Check whether the port rate of the R73 GNSS receiver is consistent with the port rate

of the receiving equipment;

Ensure that the output message volume is less than the current set baud rate;

Problem 4: The GNSS cannot lock it up

Problem screening:

Confirm that the R73 GNSS receiver is placed in an open and unsheltered environment;

Check the number of visible satellites and satellite SNR using UPrecise software;

Problem 5: No heading output or heading output

Problem screening:

Direction from the main antenna to the secondary antenna, the bottom arrow of the R73 GNSS receiver should point to the bow;

Check whether there is a configured gyro output instruction;

The message output may be greater than the currently set baud rate.

Appendix B: Technical specifications

Annex B lists the detailed technical specifications of the R73 GNSS receivers in Appendix B

Table B-1 R73 GNSS receiver performance index

parameter	specifications
channel	1408 channel, based on the NebulasIV
signal tracing	BDS B1I/B2I/B3I /B1C/B2b GPS L1C/A /L2P(Y)/L2C/L5 Galileo E1/E5a/E5b /E6 GLONASS G1/G2 QZSS L1C/A /L2C /L5 SBAS L1C/A
Cold start time	＜30s
Initialization time	<5s (typical value)
Initialization reliability	＞99.9%
Speed accuracy(RMS)	0.03m/s
Course accuracy (RMS)	＜0.3°
positioning accuracy	Single Point Location (RMS): Plane: 1.5m Elevation: 2.5m DGPS（RMS）： Plane: 0.4m Elevation: 0.8m RTK (RMS)： Level of surface: 0.8cm + 1ppm[Note 1] Elevation: 1.5cm + 1ppm

	PPP（RMS）： Plane: 5cm Elevation: a value of 10cm

B-2 communication parameters

parameter	frequency range
4G	LTE-FDD B1/3/5/8 LTE-TDD B34/38/39/40/41
WIFI	Support for 2.4 GHz IEEE 802.11b/g/n

B-3 data communication

parameter	specifications
gorge line	2 RS-232 (1 full-duplex, one half-duplex) 1 RS-422 (half-duplex)
Baud rate	9600～460800
data format	NMEA-0183, Unicore
Data refresh rate	20HZ
networking protocol	TCP、NTRIP

B-3 Electrical indicators

parameter	specifications
working voltage	9～36V DC
power dissipation	<4W
working current	0.21A
Anti-connection protection	have
Power lamp	1 Red

B-4 mechanical indicators

parameter	specifications
size	634mm×165mm×94mm
weight	About 1.5kg
data transmission interface	18-pin
gyroscope	Provide heading information

B-5 Environmental indicators

parameter	specifications
working temperature	-45℃～+75℃
Storage temperature	-55℃～+85℃
levels of protection	IP67

Appendix C: commands and messages

Appendix C describes the common commands and messages for R73 GNSS receivers.

Please refer to the serial port instructions in the table below.

（1）String command

Table C-1, serial port command

order	description
SYS CONFIG	Unlock configuration. The SET command must have the command unlocked, such as: SET MODE
SYS SAVE	Lock the configuration and save the current configuration, save the power without loss.
GET MODE	Get the working mode configuration help information
SET MODE x	Set working mode, x: Working mode to be set, available via GET MODE to get help information mode declaration: Mode 0: Pass-through configuration mode. For the configuration of various modules and upgrade firmware; Mode 1: Mobile station mode;; Mode 2: manually set the reference station; Mode 3:60S automatic positioning reference station mode; Mode 4: Monitoring mode; Mode 5: Static recording mode.
GET CONCOM	Get the pass-through configuration help information
SET CONCOM xx	Set up the through channel, xx: through channel, can pass GET CONCOM The Command Help information.
SYS RESET	System restart
SYS UPDATE	EC600 Firmware upgrade
GET NET	Gets the saved network configuration information

GET DIFFSRC	Get the differential source configuration help information
SET DIFFSRC x	Set up the differential data source, through the GET DIFFSRC, to obtain the configuration help letter breath
SET IPMODE x,y	Set a certain road ip transmission mode X: A certain road, ip The y: Transport mode (1. TCP _ Client 2. Ntrip _ Client 3. Ntrip _ Server)
SET IPADDR x,y,z	Set an ip information X: A certain road, ip y:IP address Z: Port number (be omitted)
GET SIM	Get the SIM configuration help information
SET SIM x	Set the SIM where two SIM cards can be switched by this command. And x: 1,2 represent, respectively, SIM1, SIM2
SET BAUD x,bps	Set a specific baud rate, x: channel (0-3), bps: specific baud rate Example: SET BAUD 0,38400 (set the station Baud rate)
LOG LOGLIST	View the motherboard configuration statement information
LOG VERSION	Version and authorization information
FRESET	Clear card data
SAVECONFIG	Save motherboard instructions
AT+SAVE	Save gyro statements
AT+SETNO	Turn off all the top statements
SET UNLOG	Go to Configuration mode (GNSS statement and IMU statement configuration before emptying)
SET LOGALL	Turn on the output statement
SET UART x, bps	Set serial port 1 or serial port 2 baud rate, x: channel (1-2), bps: specific serial port baud rate, example: SET UART 1,38400 (set serial port 1, serial port baud rate is 38400)

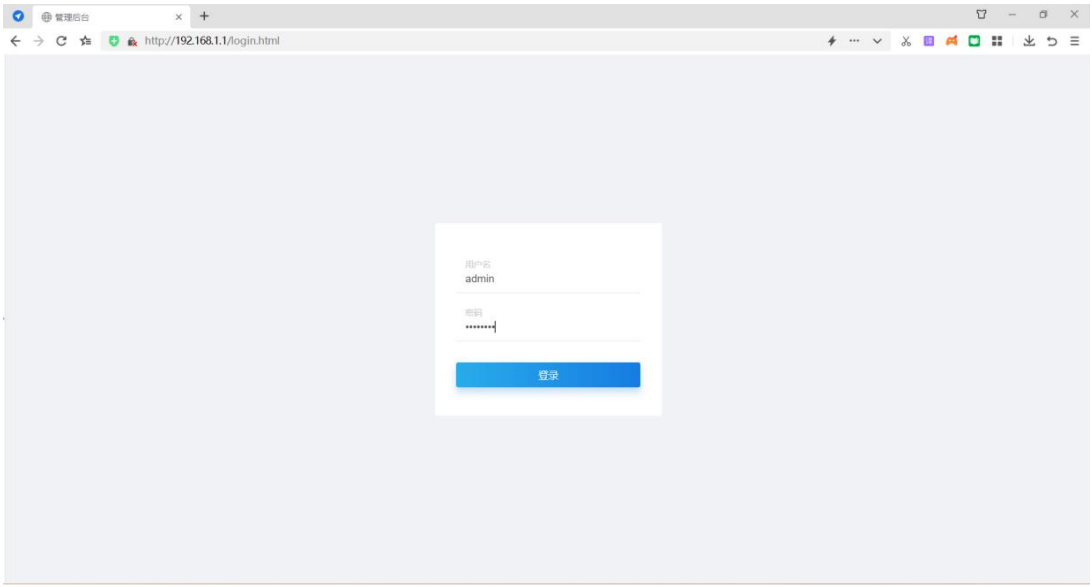
Chapter 6 WEBUI Web page Configuration

6.1 Log in to the WEBUI

Receiver WEBUI web page configuration, mainly through the receiver configuration. Users can connect the WiFi wireless signal sent by the receiver through a mobile phone or computer, enter the IP address in the open browser, enter the receiver web page configuration interface, and realize the configuration of the receiver.

1) Open the device WIFI switch, search the device SN number, connect the WIFI, password 88888888.

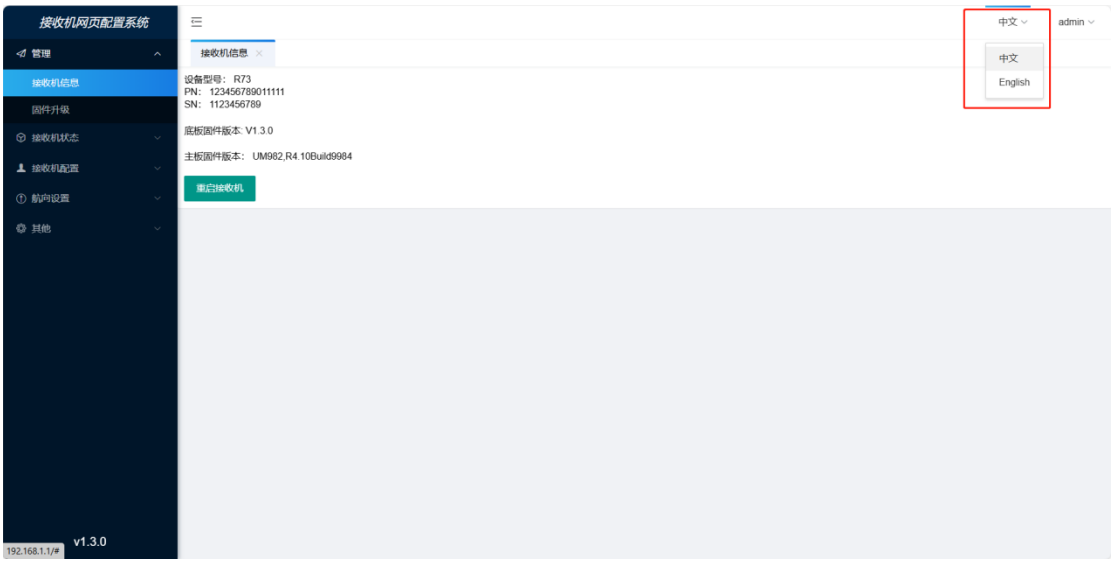
2) After connecting to the receiver through WIFI, enter the IP address (192.168.1.1) in the browser and then enter the login interface. Account number: admin password: 88888888 Click Login to enter the receiver configuration interface.



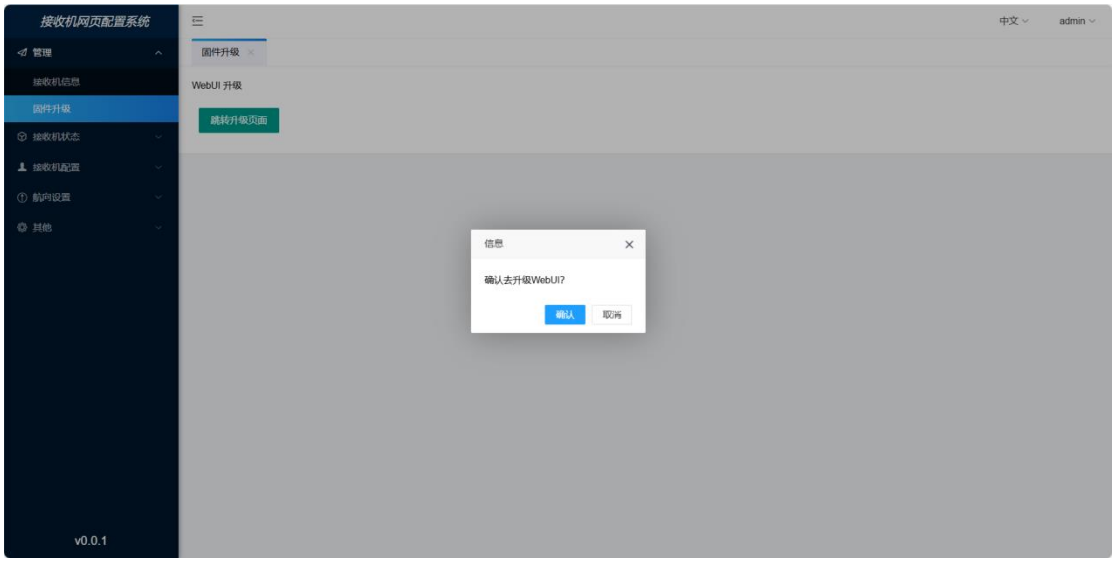
6.2 Receiver information

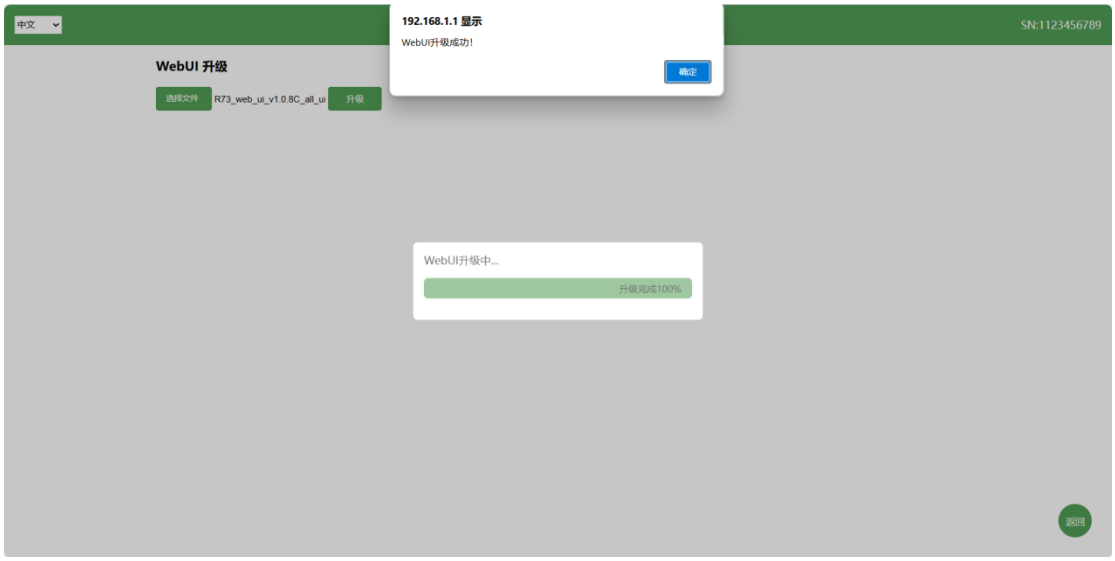
1) Chinese / English languages.

2) Display the hardware parameters information of the connected receiver, restart the receiver, and upgrade the web page function.



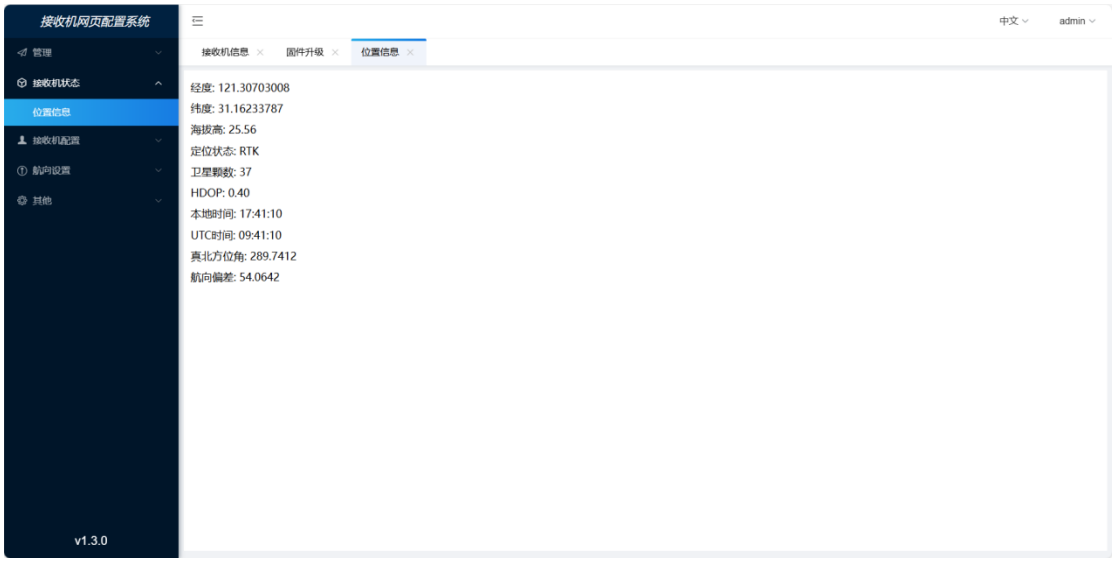
3) Firmware upgrade, click, click confirm upgrade, select WEBUI firmware click upgrade, upgrade complete click confirm, return to the refresh page.





6.3 Receiver status

1) Location information: display the receiver's current longitude, latitude, high altitude, difference state, number of satellites, HDOP, UTC time, true north azimuth, and heading deviation.



6.4 Receiver configuration

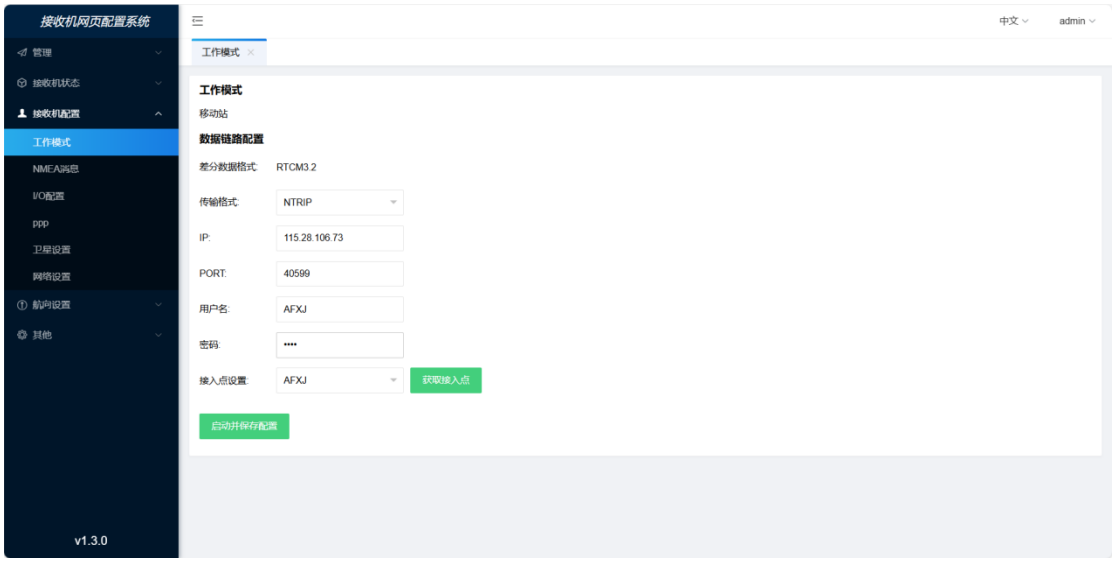
6.4.1 Working mode- -mobile station configuration

Differential format: RTCM 3.2

Transmission protocol: There are two communication protocols: NTRIP and TCP, and the default is NTRIP protocol.

TCP setting: the server IP, enter the address of the server IP; the port number sets the base station port number.

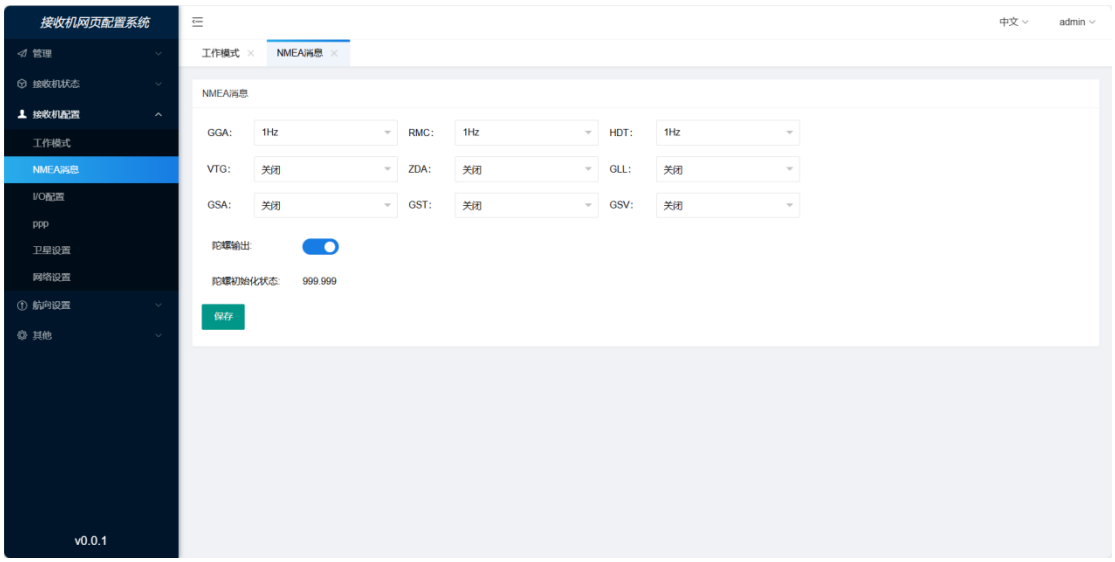
NTRIP setting: Set IP, port, user name, password, and access point setting click to get the access point column. Select after the table.



6.4.2NMEA message

1) NMEA statement and frequency configuration, support GGA, RMC, HDT, VTG, ZDA, GLL, GSA, GST, GSV statement, support up to 20Hz, users can configure according to the actual use requirements.

2) Gyro output: default output GNSS card data. After the IMU switch is opened, the gyroscope heading accuracy is displayed, 999.999 is not initialized, and the serial port 1 and 2 output the IMU filtered data.



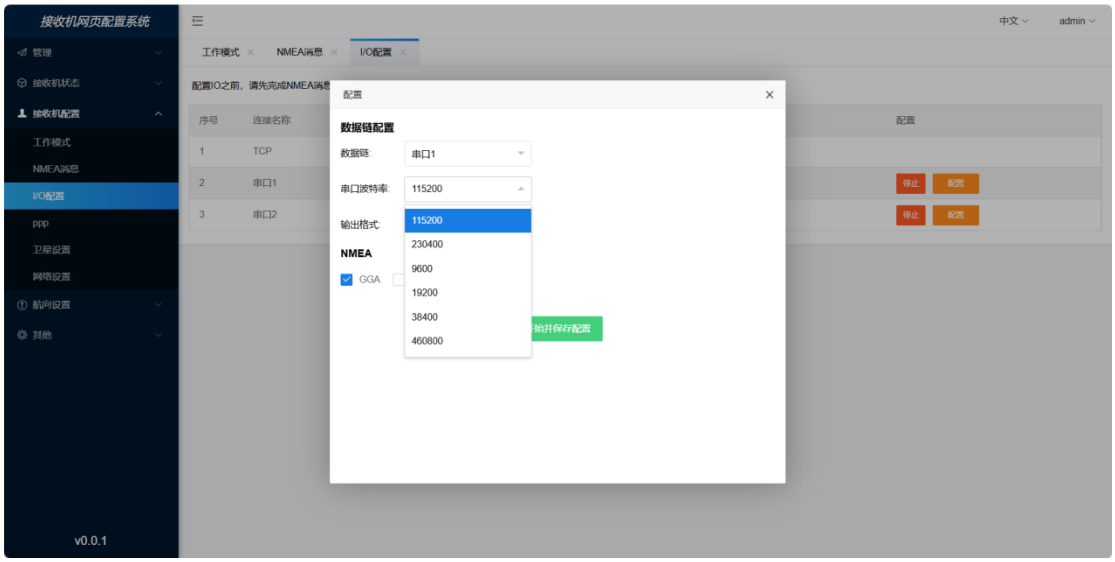
6.4.3 I / O configuration

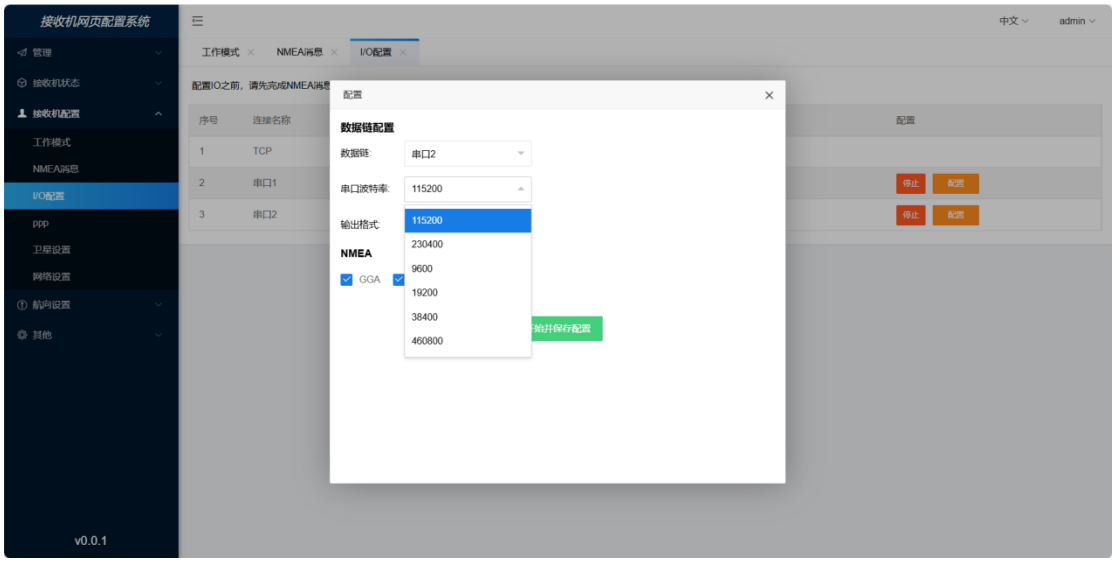
Data chain serial port 1 and port 2

Serial port rate: select 9600,19200,38400,115200,230400,460800

Output format: NMEA-0183 statement

NMEA: Before configuring I / O, the NMEA statement information is displayed in IO, and the NMEA-0183 statement output of each serial port can be selected according to the requirements.





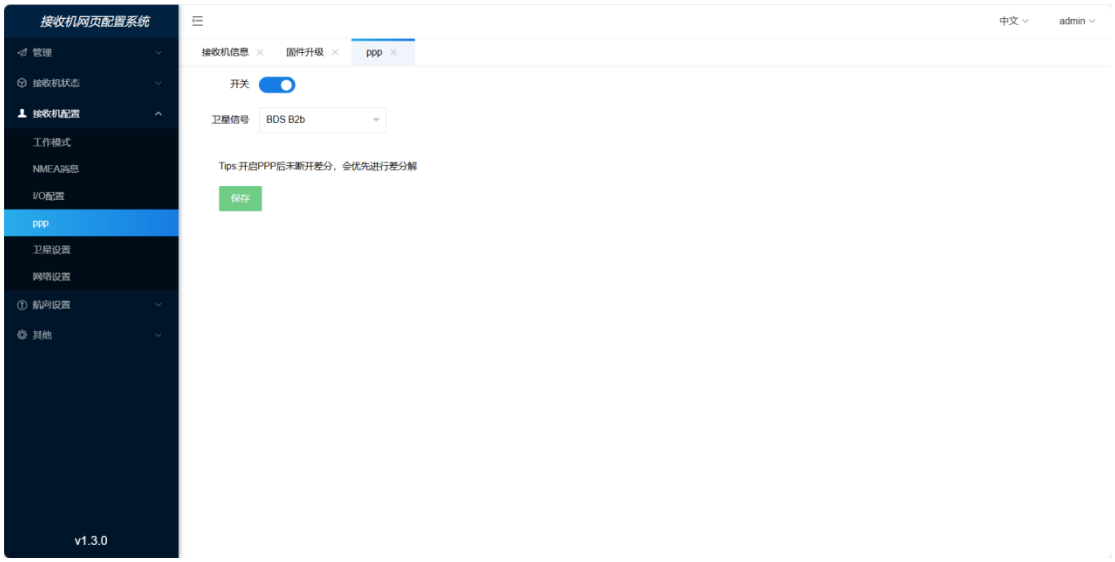
6.4.4 PPP

1) Open the precision single-point positioning of PPP-B2b and PPP-E6Has.

pay attention to:

1. B2B and E6, the function is one choice, that is, the board sets B2B and then E6, and the output of the card is the coordinate of E6;

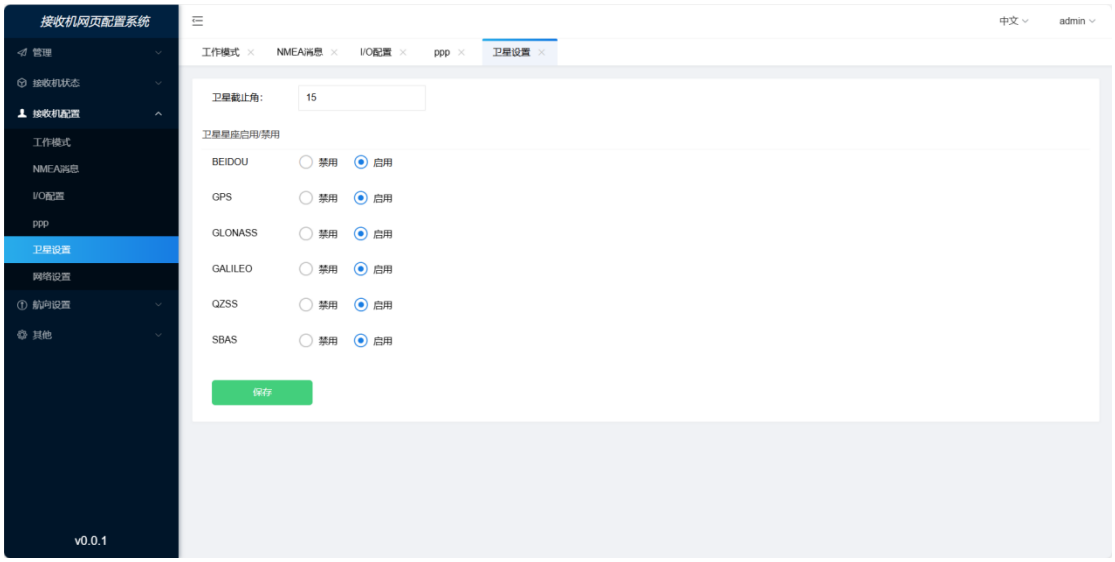
2. SBAS can be opened by default, set B2B or E6, and output the solution coordinates of B2B or E6 first.



6.4.5 Satellite Settings

1) Satellite cut-off angle: the cut-off angle of the receiver can be set, and the default is an integer with an input range of 0-90.

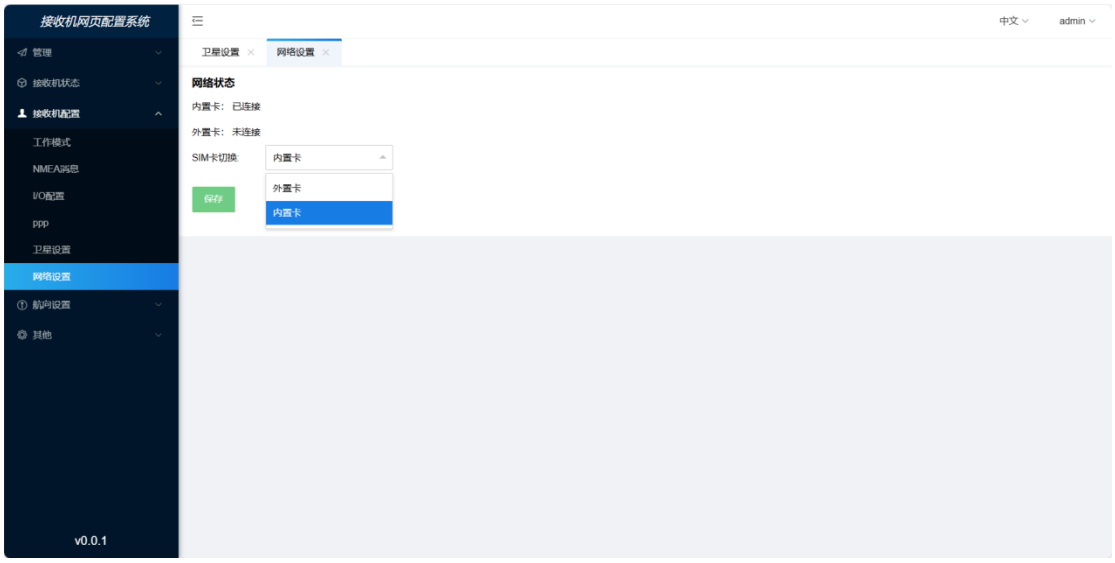
2) Satellite Settings: Satellite systems that can be enabled or disabled are all enabled by default.



6.4.6 Network Settings

1) Network status: display the network connection status of the internal card / external card.

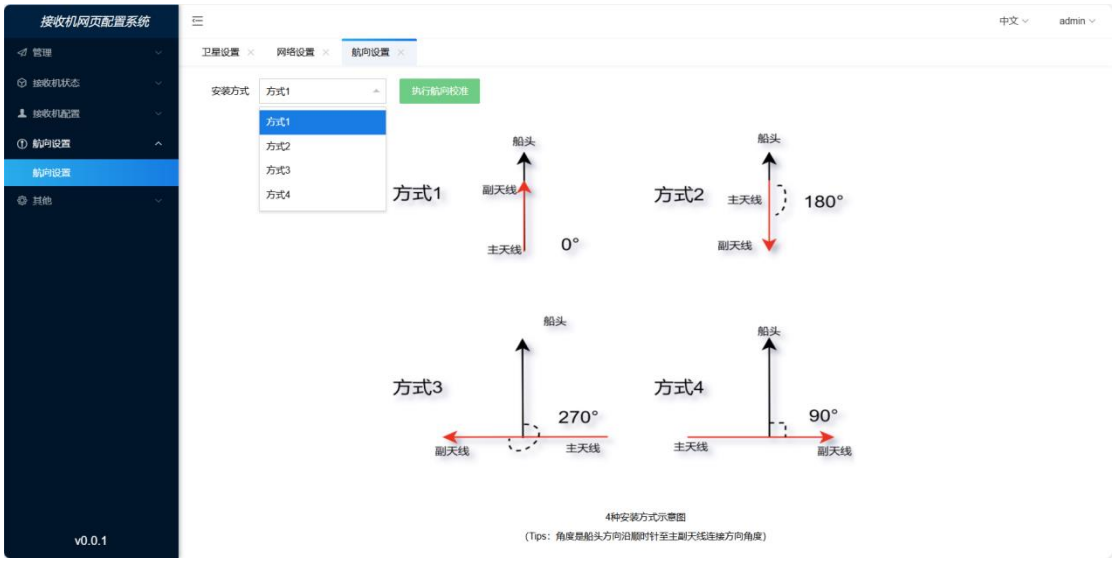
2) Switch between built-in cards / external cards.



6.5 Course setting

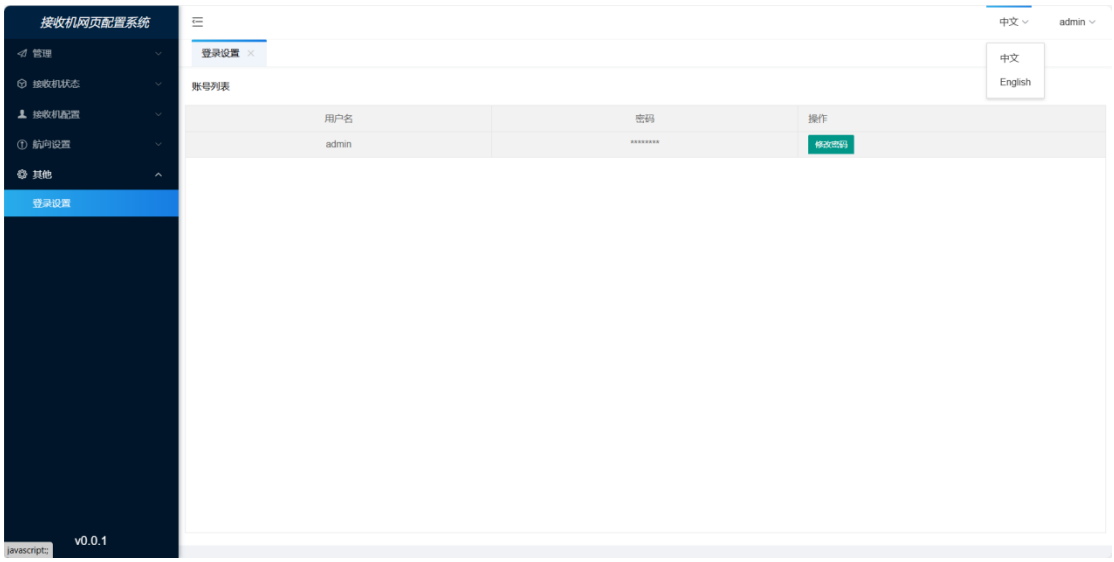
1) Select the corresponding installation Angle for heading correction;

Note: Start the power off and restart after setting the installation direction.



6.6 Password modification

1) Change the password of the login WEBUI web page.



FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital de vice, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protec tion against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructi ons, may cause harmful interference to radio communications. However, there is no guarantee th at interference will not occur in a particular installation. If this equipment does cause harmful int erference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Important Note:

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.