STONEX

STONEX SC2000
GNSS Receiver
User Manual

(November 2017)-Ver.1-Rev.0 – Firmware Version: 0.22.170401

www.stonex.it

Statement

Please read carefully:

The final interpretation of this user manual belongs to STONEX.

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

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Please carefully read the notes and instructions in User Manual. In order to avoid unexpected damage, you should only use original supplied parts. If you do not use the system with the correct procedure or connect incompatible accessories, cause the equipment damage and may even endanger other person and your safety. In this regard, the Company does not assume any responsibility.

Contents

1. Technical Specification

1.1 Overview

SC2000 is a high-precision CORS reference station receiver. LINUX system as its development platform, and it supports for secondary development. It has powerful and stable function, and can be used in many fields.

1.2 Main features

- 555 channels with Multi-constellation GNSS support.
- Superior carrier phase observations of less than 1mm accuracy
- Internal battery for more than 20 hours operation.
- 4G LTE and Bluetooth / WLAN datalink support.
- Easy configuration from webUI and remote server.
- NTRIP server/caster support.

1.3 Technical Specifications

1.3.1 Physical

- Weight：2KG
- Dimension：222mm*164mm*79mm

1.3.2 Environmental

- Operating temperature：-40℃-65℃
- Storage temperature：-40℃-80℃
- Humidity：0%-100% non-condensing

1.3.3 Electrical

- Input：9-28V
- Power：2.8W

1.3.4 GNSS

（1）Channels：555

（2）Tracking signals:

- GPS：L1 C/A, L1C, L2C, L2P, L5
- GLONASS：L1 C/A, L2C, L2P, L3, L5
- BeiDou：B1, B2, B3
- Galileo：E1, E5 AltBOC, E5a, E5b, E6
- IRNSS：L5
- SBAS：L1, L5
- QZSS：L1 C/A, L1C, L2C, L5, L6
- L-Band up to 5 channels

（3）Positioning accuracy

Table 1-1 Positioning accuracy

Positioning mode	**Accuracy**	
	Horizontal	**Vertical**
static	3mm + 0.1ppm	3.5mm + 0.4ppm
RTK	8mm + 1ppm	15mm + 1ppm

（4）initialization time：＜10s

（5）initialization reliability：＞99.9%

1.3.5 Ports

- 3 RS232 serial ports(DB9 and 2 LEMO 5pin).
- 1 RJ45 Ethernet port.
- 1 power port.
- 1 USB port.
- 1 4G LTE antenna port.
- 1 UHF antenna port.(Optional)
- 1 EVENT port.
- 1 1PPS port.
- 1 SIM card slot.
- 1 GNSS antenna port.

1.3.6 Data and Storage

- Output data format: NMEA-0183, binary, RINEX, RTCM2.x, RTCM3.x
- Internal memory：32G
- External storage：32G

2. Hardware Structure

2.1 Receiver appearance

Figure 2-1

2.1.1 Front panel

The front panel of SC2000 receiver includes seven buttons, four LED indicators, and one OLED display.

Figure 2-2

After switching on SC2000 receiver, current time information and GPS status are displayed in the main interface. The default language is English, and you can press the left and right arrow keys to obtain the current IP information.

Table 2-1 Function table

Name	**Function**
F1	Save the current setup and return to the previous menu
F2	Enter the main menu
	Move the cursor up and down, modify parameters when entering modify items
	Move the cursor left and right
Power key	Switch on/off the receiver and confirmation key
Bluetooth indicator	It will be light blue when SC2000 is connected via Bluetooth
Differential transmission indicator	When the differential data output, the differential indicator blinks evenly at 1-second interval
Static recording indicator	When start static recording, static recording indicator blinks evenly at 1-second interval
Power indicator	After switching on SC2000 receiver, the power light is on

2.1.2 Back panel

SC2000 receiver provides a variety of communication interfaces to facilitate users in different application scenarios.

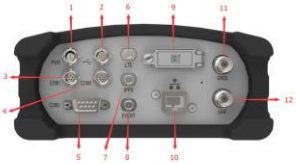


Figure 2-3 Back panel

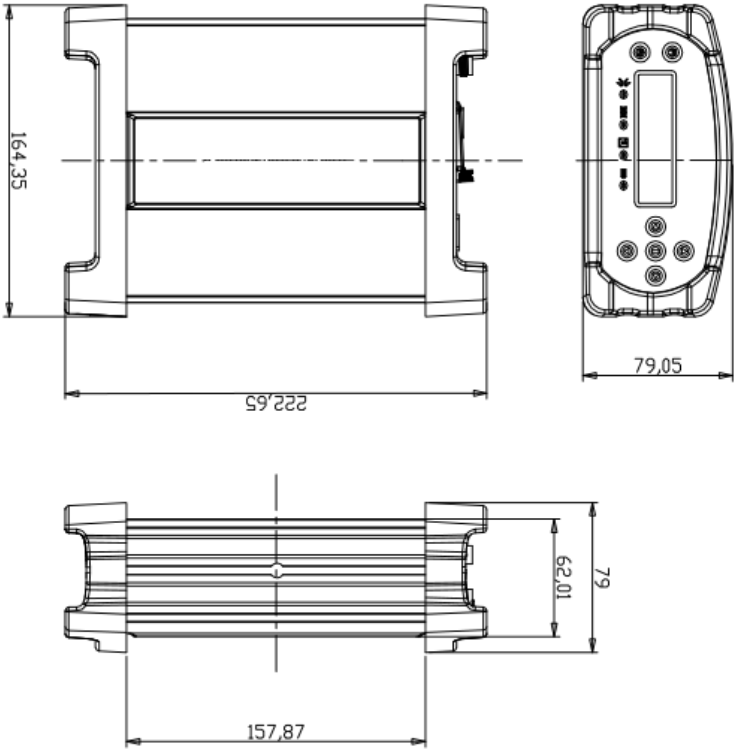
Table 2-2 Interface function table

No.	Name	Function
1	PWR	Receiver power supply interface, input voltage DC 9V-28V.
2	USB	USB interface
3	COM1	RS232 serial port
4	COM2	RS232 serial port（Optional RS485 serial port）
5	COM3	DB9 serial port
6	LTE	GPRS antenna interface
7	1PPS	1 Pulse Per Second output
8	EVENT	EVENT input
9	SIM	Standard size SIM card interface
10	RJ45	Wired Ethernet port
11	GNSS	GNSS External receiver antenna connector
12	UHF	UHF External receiver antenna connector

Note:

The UHF interface is replaced by the OSC interface in the SC2000N.

2.2 Structural drawings / mounting dimensions



(Dimensions in mm)

Figure 2-4

3. WEB UI

There are two ways to login into the WEB interface, which are Ethernet port login and WIFI login. The WEB interface content of the two login modes is same.

（1）Ethernet port login: Connect the RJ45 network port with the computer host and enter the IP address in the browser. Enter user name and password in the pop-up dialog box; the default username is *admin* and the default password is *password*.

（2）WIFI login: when SC2000 WIFI hotspot is enable, the user can log in into the WEB interface by connecting to its WIFI network. The hotspot name is the serial number of the receiver. Enter the IP address: 192.168.10.1, a window will pop up, the default username is *admin* and the default password is *password*.

3.1 Summary

After a succesful authentication to the WEB interface of SC2000, the main page contents: Reference information, device version, system version, network parameters, memory status and so on. It is shown as below:

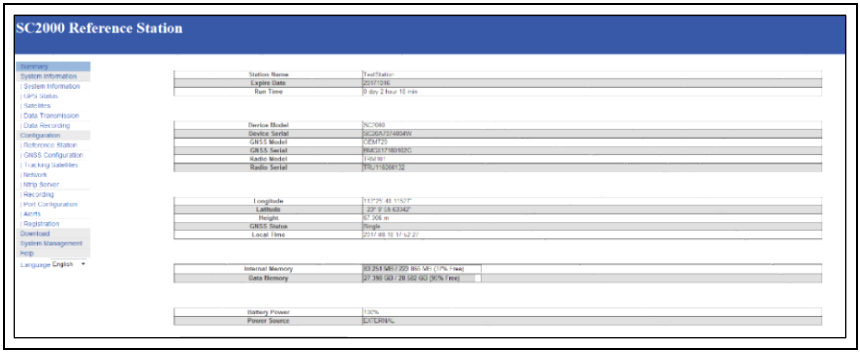


Figure 3-1

Note: The effect of different browsers display may be slightly different, recommend using Google Chrome or IE.

3.2 System Information

3.2.1 System Information

The system information screen will display the station name, device model, device serial number, system version, application version information, built-in OEM board model and network parameter information.

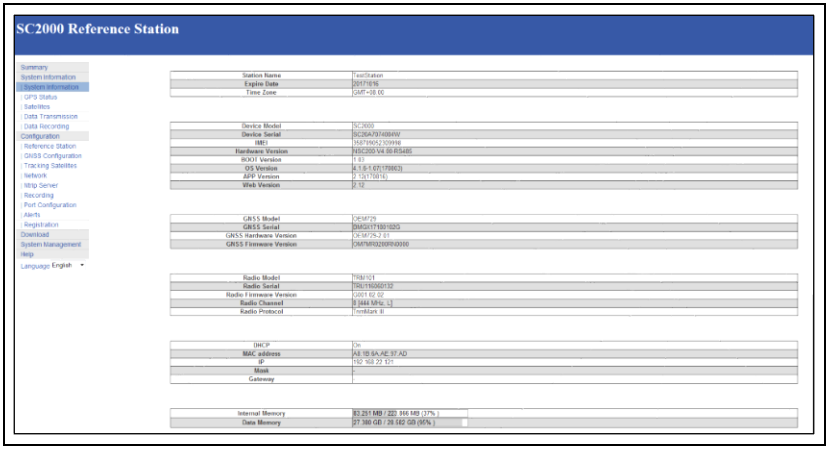


Figure 3-2

3.2.2 GPS Status

The GPS Status page displays the current SC2000 positioning, the base station coordinates and antenna type.

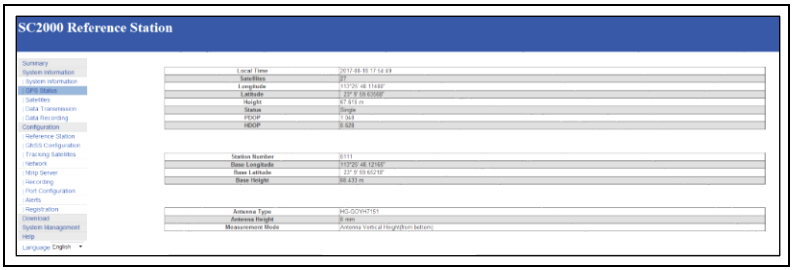


Figure 3-3

3.2.3 Satellites

This page shows the current satellite signal-to-noise ratio, elevation mask angle, azimuth and other information. The information of GPS, BEIDOU, GLONASS and GALILEO are displayed separately.

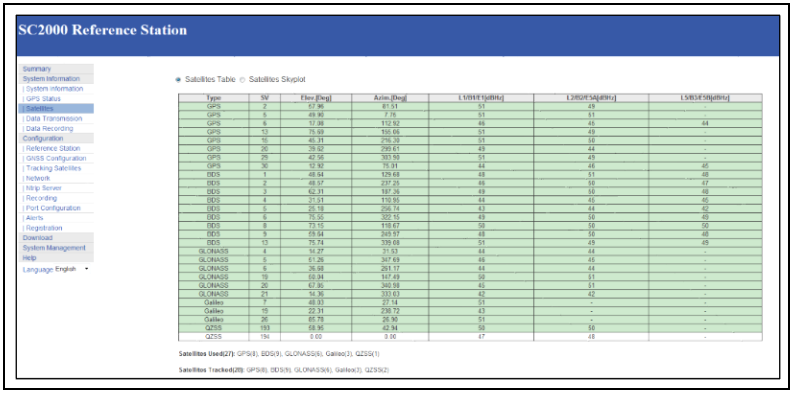


Figure 3-4

3.2.4 Data Transmission

After setting up the data transmission, the user can see the current data transfer status on the page as shown in figure 3-5. Click [Edit] to directly jump to [Ntrip Server].

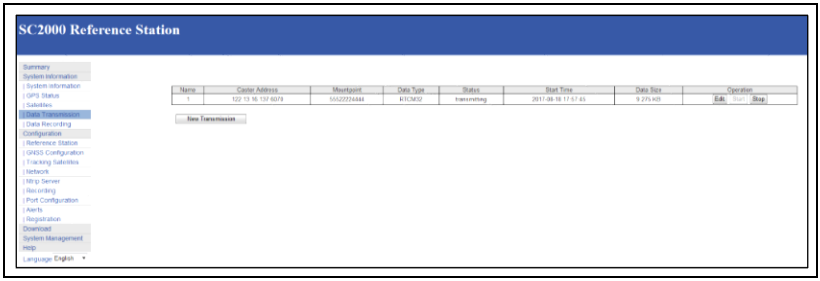


Figure 3-5

3.2.5 Data Recording

In this page, the user can see the specific data recording information as shown in figure 3-6. Click [Edit], the user could modify the parameters like path type, file name, interval, duration time, etc. as shown in figure 3-7.

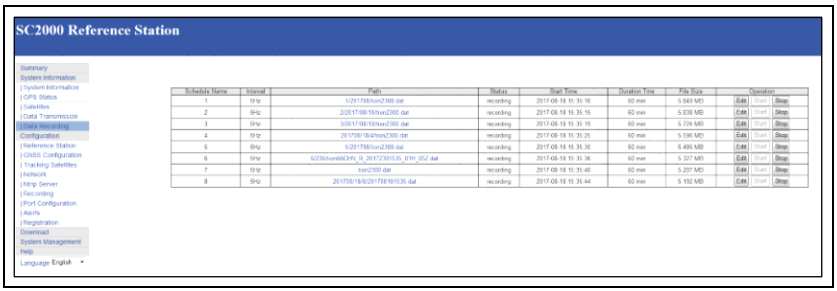


Figure 3-6

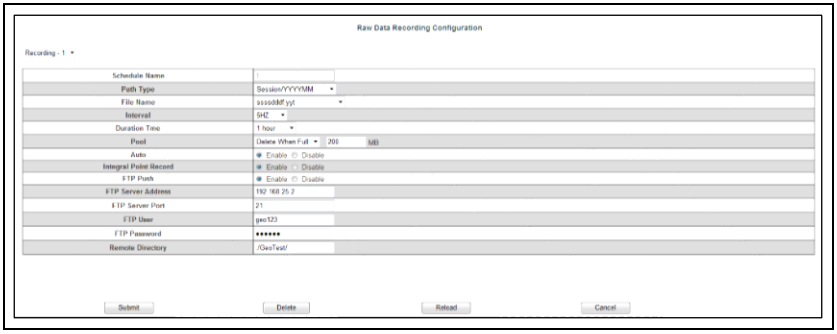


Figure 3-7

3.3 Configuration

3.3.1 Reference Station

On this page the user mainly can set the reference station, antenna, coordinate system and station coordinates, as shown in figure 3-8.

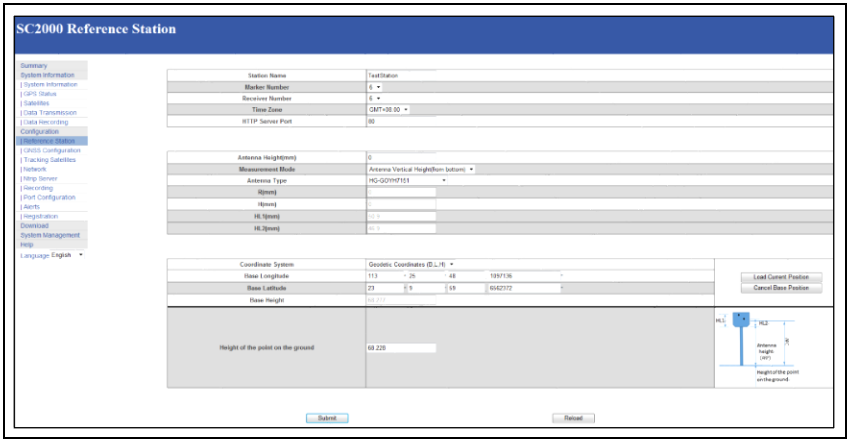


Figure 3-8

Reference station coordinates: If you do not need known coordinates to start the reference station, then click on "Load Current Position" to get the reference station coordinates approximately. However, if you need known coordinates, please input them according to to the appropriate format.

The web access port is 80. After setting mapping in the router device, then you can access the SC2000 by Internet, enter the ip address and the port, e.g. 113.109.179.180:80

3.3.2 GNSS configuration

This menu is mainly for the satellite systems and the cutoff angle settings, as shown in figure 3-10.

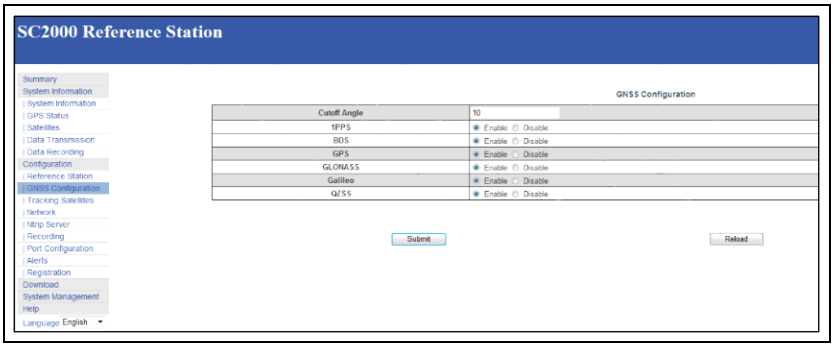


Figure 3-10

3.3.3 Tracking satellites

In this page, the user can select the satellites they want to track, as shown in figure 3-11.

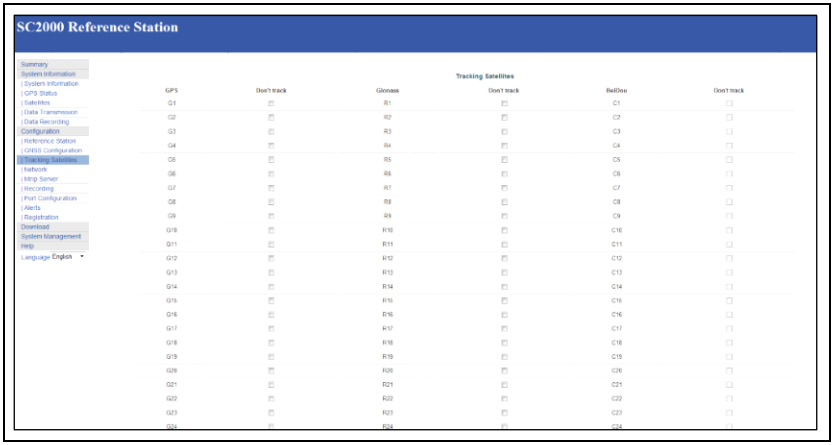


Figure 3-11

3.3.4 Network

From Network option, the user can set the device network and FTP server settings as shown in figure 3-12.

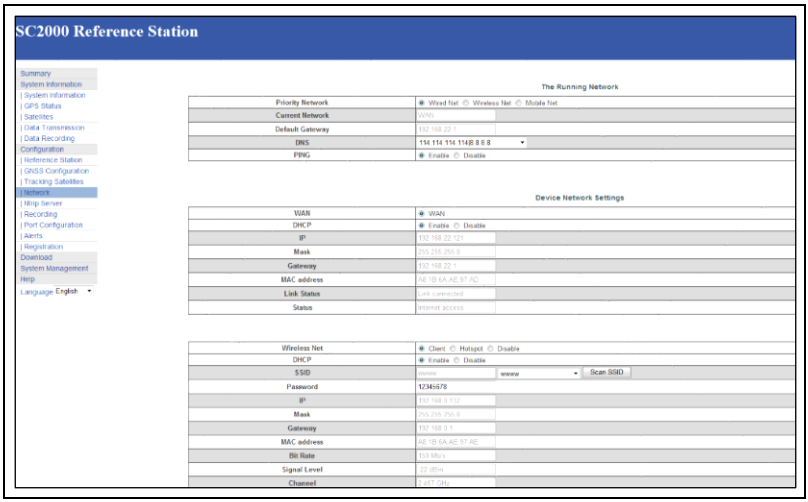


Figure 3-12

DHCP : If the mode DHCP is enable, the SC2000 receiver will auto get an IP address, otherwise it uses the static IP.

WIFI hotspot: If WIFI hotspot option is enable, then you can use other devices equipped with WIFI to search and connect to the SC2000 receiver. The hotspot is named by the serial number of the receiver. You don't need to input a password. Access SC2000 by IP address 192.168.10.1. The hotspot only play the role of control and can't access to internet.

WIFI Client: When selecting WIFI client, in SSID box input a name of WIFI hotspot can be used for the search, and in the Password box input the password for connecting to WIFI hotspot, then submit. After connecting to the connection WIFI, the password can be seen in system terminal or panel interface (the displayed place will be different in different versions).

Mobile network: enable Mobile Net to use the SIM card into the SC2000, it supports 4G network. Users can set the user name and password if required.

FTP download: You can set the parameters of the FTP server. If anonymous access is turned on, it does not require a user name and password to connect to the SC200. If anonymous access is turned off, enter the user name and password.

After using the FTP tool to connect to the SC2000, the data appears as follows:

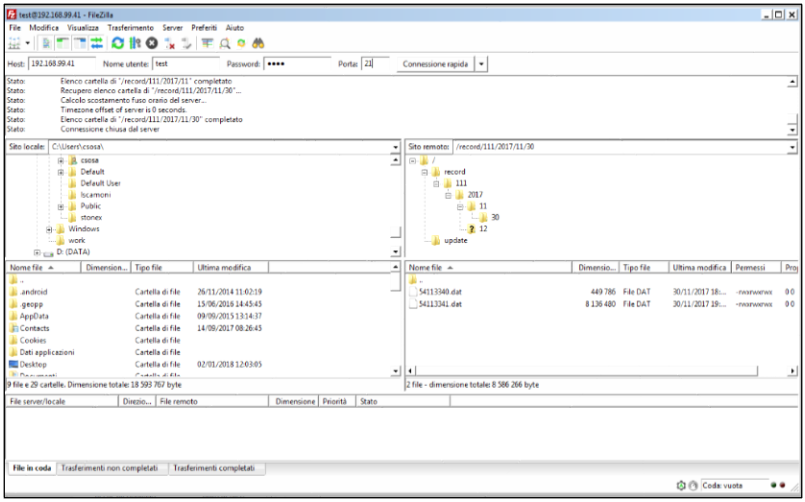


Figure 3-13

3.3.5 Ntrip Server

In this page, the user can set the NTRIP connection parameters of the reference station:

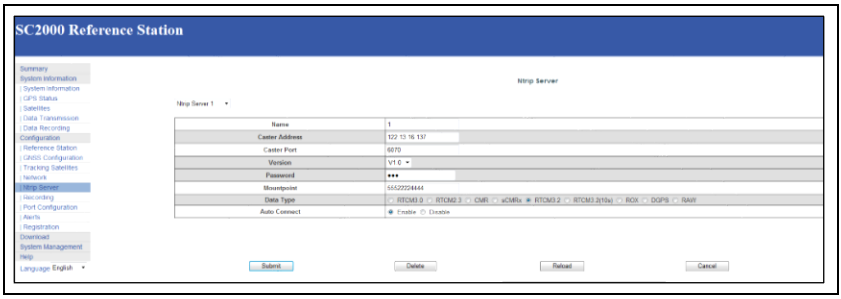


Figure 3-14

Remarks:

a) The password in this page must match the password of the server NTRIP if it is required. If the password is not required by the server you can enter any value.

b) When the [Auto Connect] option is chosen, after the network is disconnected, the data transmission will be automatically connected. If the option is disable will be necessary to start the connection manually from the Data Transmission menu by clicking on start.

c) Before setting the parameters, check in the page Reference Station if the coordinates are correct. Wrong coordinates cannot allow to transmit data to the server.

Click "Submit" to start the data transmission. In the Data Transmission page you can see the data transfer status displayed as "transmitting". The differential transmission indicator in the front panel of the receiver starts to blink.

3.3.6 Recording

In this page, the user can set the data recording parameters:

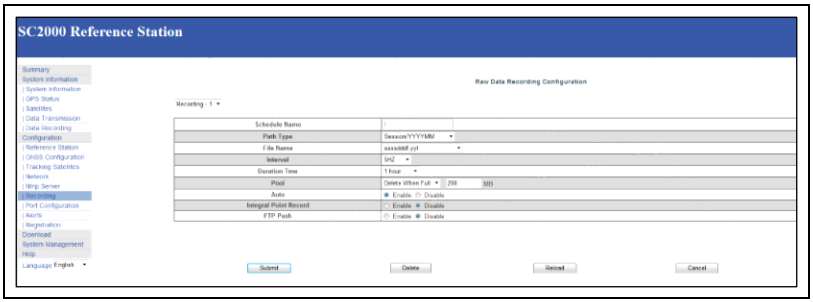


Figure 3-15

File name: The static date can be recorded in 4 ways.

Table 3-1 The rules of Static record file name

File name	Annotation
YYYYMMDDhhmmss.dat	Date and when, minute and second
YYYYMMDDhhmm.dat	Date and when, minute
DOYhhmm.dat	Day of year, hour and minute
YYYYDOY?.dat	Year, day of year, period of time
ssssdddf.yyt	Station name, day of year, period of time
Rinex302.dat	Named by rinex3.02 standard
Custom	Manually input the file name by the way of name + .dat

Duration time: After setting the record length, the file will be recorded depending on the setting time, and it will be stopped at the end of the record length. If you enable the auto record option, the SC2000 will start a new file automatically.

FTP push : First you should set the FTP server parameters. When it records the data in the internal memory, SC2000 will also send the data to FTP server automatically.

3.3.7 Port Configuration

Port setting includes Bluetooth port, COM1 port and Socket settings. They can support the function as follow:

- CMD(INPUT/OUTPUT)： SC2000 commands
- NMEA(OUTPUT)： Output Specified NMEA sentences
- RTK(INPUT): Differential Input
- RTK(OUTPUT): Differential Output
- RAW(OUTPUT)： Raw data output
- BINEX(OUTPUT) Output Specified BINEX sentences

COM1 can be used also to establish the comunication with OEM.

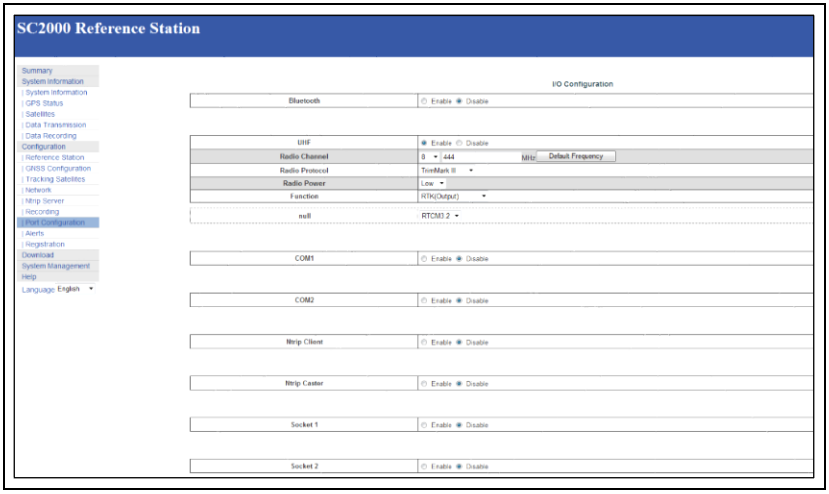


Figure 3-16

3.3.7.1 Bluetooth

After opening the Bluetooth and choosing the output/input type, then click "submit", you can use Bluetooth driver to scan the SC2000. The Bluetooth of SC2000 is named by driver serial. Now we use the PDA to access the SC2000 by Bluetooth. The page of PDA will be shown as follow:

Figure 3-17

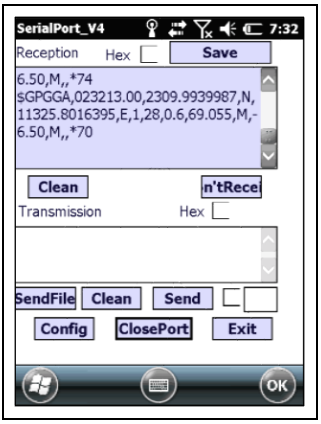


Figure 3-18

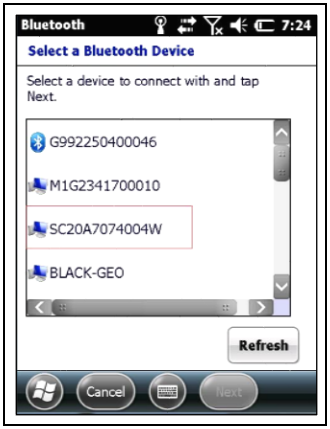


Figure 3-19

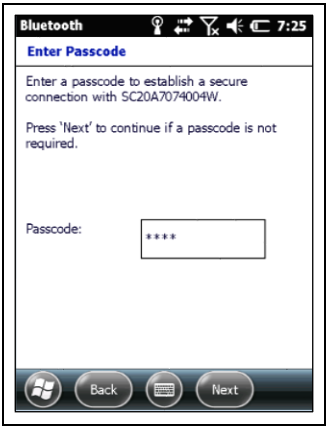


Figure 3-20

3.3.7.2 COM1

Note:

a: When data transmission on com1 is enabled, use the standard seven-pin cable to connect seven-pin interface in the back panel.

b: The baud rate of com1 must be consistent with the baud of receiving device.

Figure 3-21and Figure 3-22 are the process of the COM1 port output RTCM3.2.

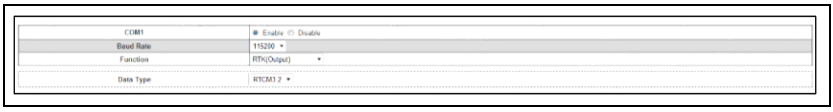


Figure 3-21

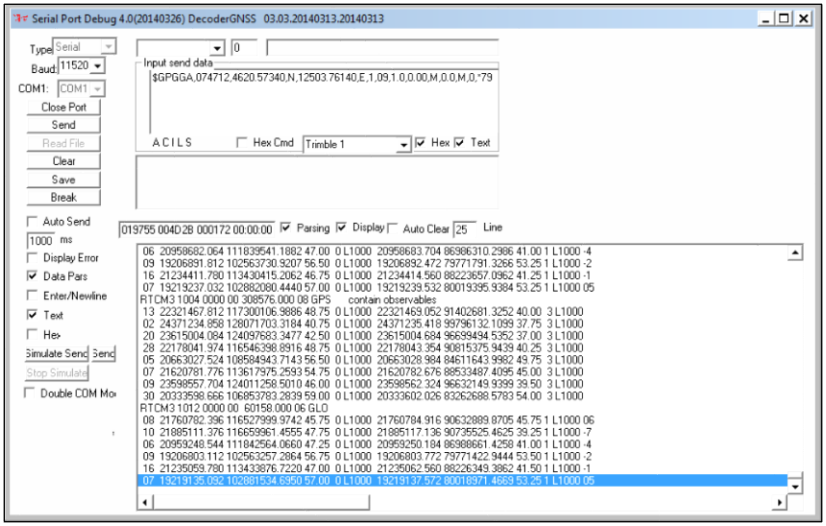


Figure 3-22

3.3.7.3 SOCKET

Figure 3-25 and Figure 3-26 are the process of output RAW data via socket.

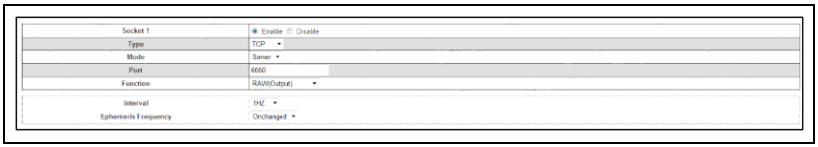


Figure 3-25

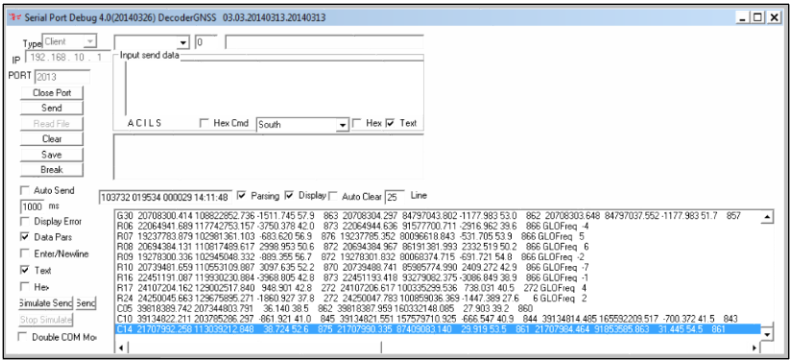


Figure 3-26

3.3.8 Alerts

When SC2000 system or program exception occurs, SC2000 will use e-mail or cell phone text messages to notify manager in time for maintenance.

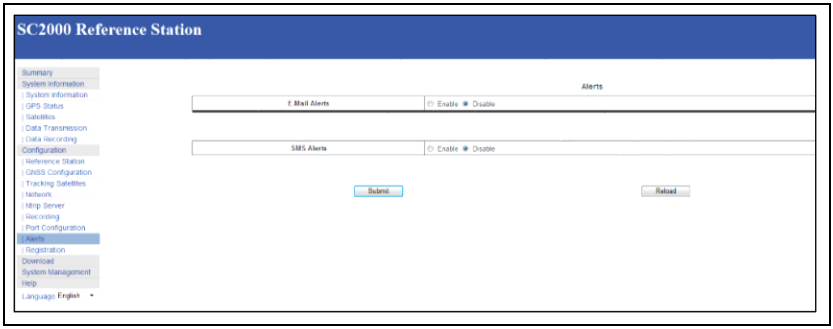


Figure 3-27

3.3.9 Registration

When SC2000 receiver expires, you need to register it. Enter the registration code and click Submit, then instrument registration will be completed.

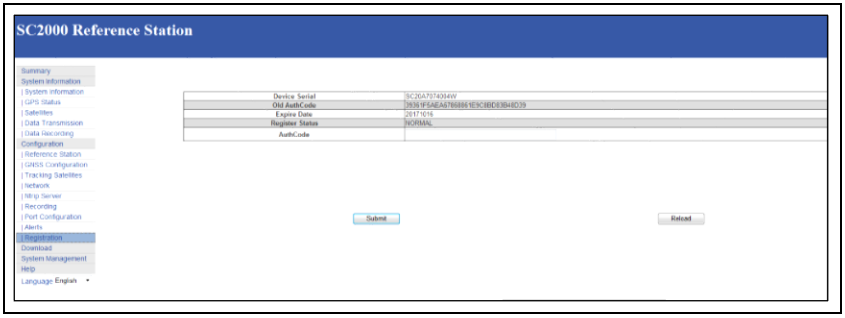


Figure 3-28

3.4 Download

Download data stored in the SC2000 receiver through the network connection;

Alternatively, you can connect to SC2000 receiver for copying data via USB cable;

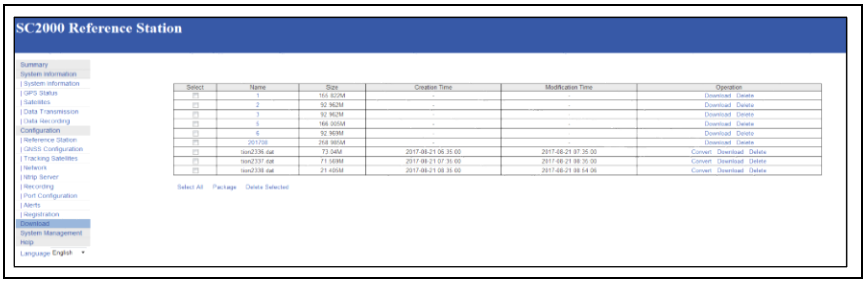


Figure 3-29

3.5 System Management

The users can upgrade the firmware, view logs, enable or disable the login, and format internal disk.

Figure 3-30

Note:

1. Log view part are abnormal operation of storage systems and procedures of a record;

2. When setting the security login, the admin account is the administrator account and the guest account can only view the information.

3.6 Help

Here provide operating guidelines for SC2000 introductory guiding.

4. Operation

4.1 Power on

Press the red power button on the panel, and until the initialization is completed, you can see the main menu display on OLED screen as shown in figure 4-1.

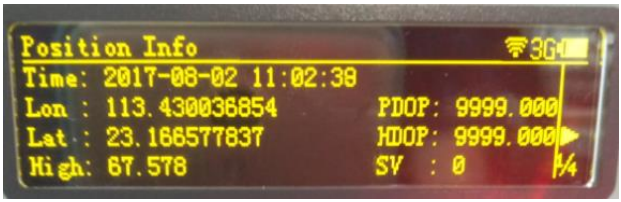


Figure 4-1

Press left or right soft key to view the current IP information of Ethernet, WIFI, and GPRS.

Figure 4-2

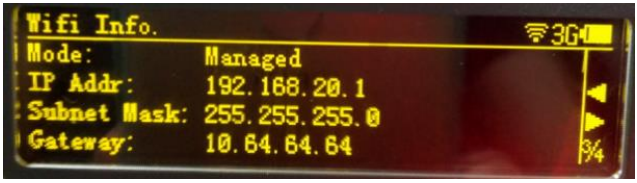


Figure 4-3

Figure 4-4

4.2 Quick setting

You can quickly set the receiver by the panel key. It includes six parts: device infor, start record, transmit data, network settings, antenna settings and other settings.

Start Record: In the main interface, lightly press F2 key you can see the options shown in figure 4-5.

Figure 4-5

Lightly press power key to confirm, then enter into “Start Record”, you can see the page shown in figure 4-6.

Figure 4-6

When the static is stopped, the cursor stops at the row of "Start Record";

Transmit Data:

When you transmit data by the panel, first you need to set the transmission parameters in the WEB UI page, then you can operate the panel. There are not transmission parameters settings on the setup panel.

Figure 4-7

Figure 4-8

You can quickly set differential type, start and stop transmit data.

Network Settings:

SC2000 network settings can be set to automatically obtain the IP or choose a static IP mode;

Figure 4-9

Figure 4-10

Figure 4-11

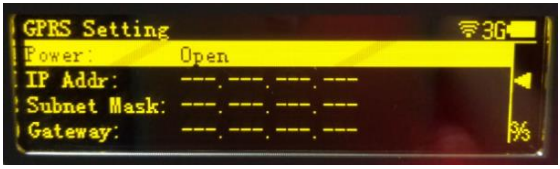


Figure 4-12

Antenna settings:

Not supported at the moment.

Figure 4-13

Figure 4-14

Other settings:

Other settings could set the OLED language display, OLED brightness, OLED turned off interval.

Figure 4-15

Figure 4-16

Device information:

In this page, you can get the information of device model, device serial, hardware version and BOOT version.

Figure 4-17

Figure 4-18

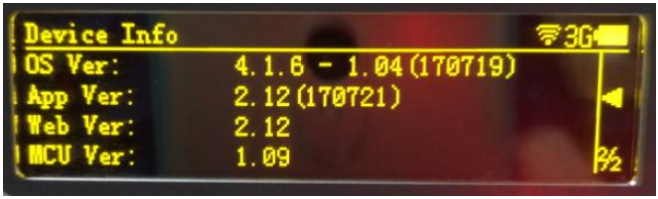


Figure 4-19

5. Accessories

Table 5-1 Accessories of SC2000

Categories	Model	Description	Quantity
Standard accessories			
Adaptor	PSAA30R-150-2P	Power Adaptor with 4 plugs (US, UK, AU and EU), 15V/2A, 2PIN	1
Cable	TC.GK428.ABL	Lemo 7 to USB	1
Cable	LM.GK183.ABL	lemo 5 to DB-9 serial	1
Cable	CV-0088-3.0	DB9 female-DB9 female, to debug and transfer data	1
Cable	NETC3	Network cable 3M	1
Antenna	GA.110.101111	4G LTE antenna, male SMA connector	1
Optional accessories			
Antenna	HX-CG7601A	Chock ring GNSS antenna	1
Cable	Geo10-35-01	Cable for choke ring antenna (35m)	1
Cable	TC.GK427.ABL	lemo 5 to DB-9 serial(RS485)	1
Antenna	QC410A	UHF antenna for external radio, TNC connector, 410-430MHz	1

Antenna	QC430A	UHF antenna for external radio, TNC connector, 430-450 MHz	1
Antenna	QC450A	UHF antenna for external radio, TNC connector, 450-470 MHz	1

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