

SLC GNSS RTK System

User Manual

HI>TARGET

Hi-Target Surveying Instrument Co., Ltd.

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Manual Revision

Revision Date	Revision Level	Description
Nov.2016	1	YFZ-2016-0670 SLC GNSS RTK System User Manual

Name: Hi-Target Surveying Instrument Co., Ltd.

Add: 10th Floor, Chuangxin building, Tian'an Technology Zone, No.555, North of Panyu Road, Panyu District, Guangzhou city, China

Postcode: 511400

Tel: +86-20-22883930

Fax: +86-20-22883930

E-mail: info@zhdgps.com

Web: www.hi-target.com.cn

www.gnss-gps.com

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Preface

Introduction

Welcome to use SLC receiver, this introduction is applicable to SLC products. The introduction describes how to use SLC GNSS Receiver.

Experience Requirement

In order to help you use this products better, we suggests you carefully reading the instruction. If you are unfamiliar with SLC products, please refer to www.hi-target.com.cn

Tips for safe use

Notice: The contents here generally are special operations, needing your special attention. Please read the contents carefully.



Warning: The contents here generally are very important. Such wrong operation may make the machine damaged, make the data lost, even breaks down the system and endangers personal safety.



Exclusions

Before using the products, please carefully read the operating instruction, and it will help you better use the product. Hi-Target Surveying Instrument Co., Ltd will not assume the responsibilities if you fail to operate the

product according to the requirements in operating instruction, or operate the product wrongly because of failing to understand the operating instruction.

Hi-Target is committed to constantly perfect product functions and performance, improve service quality and reserve the rights to change the contents in operating instruction without separate notice.

We have checked the consistency between contents in instruction and software & hardware, without eliminating the possibility of deviation. The pictures in operating instruction are only used for reference. In case of inconformity with products, the products shall prevail.

Technology and Service

If you have any technical issues, you can call Hi-Target technology department for help, we will answer your question in time.

Relevant Information

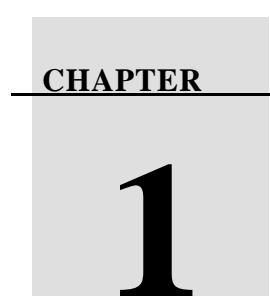
You can get this introduction in the following ways:

1. After purchasing SLC receiver, there will be “SLC GNSS RTK System User Manual” in the instrument container to guide you how to operate instrument.

2. Log in hi-target official website, download the electronic version introduction in “Download Center” → “Manual” → “Surveying Products”

Advice

If you have any advice or suggestion on SLC, please call us or Dial the national hotline: +86 400-678-6690. Your feedback information will improve the production quality.



Product Introductions

This chapter describes:

- Preface
- Production characters
- Cautions for use

1.1 Preface

SLC is a new GNSS receiver which is applied to GIS industry. SLC receivers configures different PAD devices to work for GIS, these PAD devices includes windows pad, android pad etc, which can connect to SLC receiver through Bluetooth; furthermore, the internal battery with large capacity offers long-time working in the field.

1.2 Product characters

- New structure.
- OEM 617, support GPS, GLONASS, BDS and GAL.
- Dual-band handset antenna.
- Communication ports : BD900 Bluetooth and USB
- Industrial processing platform (STM32 Cotex-M3) microcontroller.
- Internal 32GB SD card.
- Internal GPRS network module.

1.3 Cautions for use

SLC receiver used Chemical resistance and impact resistance design, but we also need carefully use and maintenance the sophisticated instruments.

Warning: The receiver shall be in stipulated temperature range upon using and storage. The detailed requirements are shown in ChapterIV: Technical Parameters —> Environment Characteristics.



In order to guarantee the quality of continuous tracking observation and satellite signals, it is required that the overhead observation station shall be

open, without flaky barriers above 15° elevating angle; in order to diminish the interference of electromagnetic wave to GNSS satellite signals, the observation station shall be free from strong electromagnetic wave within the range of 200m, such as television tower, microwave station and high-voltage transmission line; in order to avoid or reduce multiparty effect, the observation station shall be far away from the terrain and ground features with strong reflection against electromagnetic wave signal, such as high-rise buildings, waters, etc.

CHAPTER

2

Receiver Introductions

This chapter describes:

- Hardware structure
- Power supply system
- Button operation
- LED

2.1 Hardware structure

The product appearance is divided into two parts, upper cover and bottom cover.

Upper cover

Upper cover consists of three lamps and PAD fixed tray.

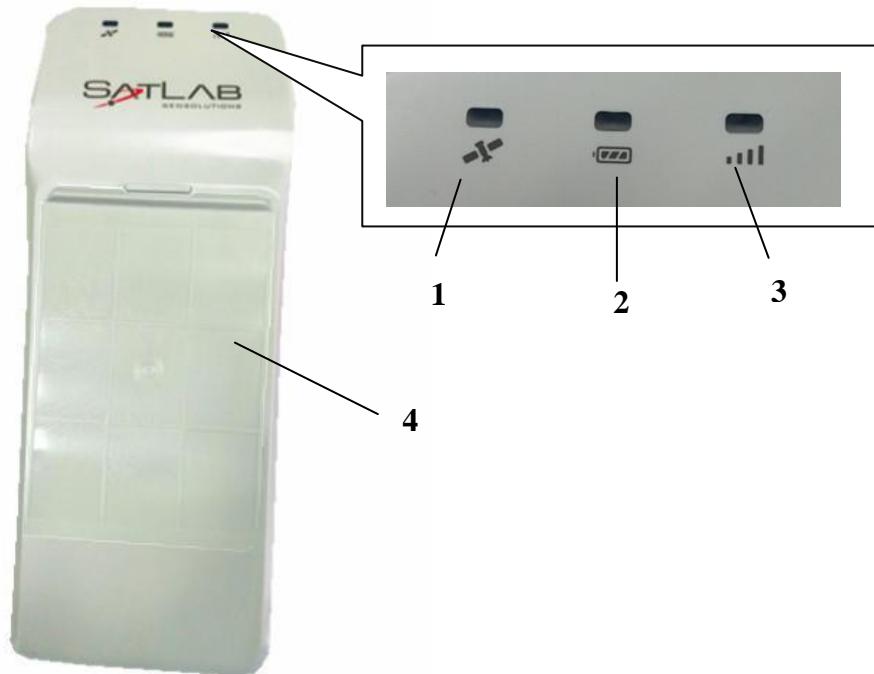


Figure 2.1

- ① Satellite LED
- ② Power LED
- ③ Signal LED
- ④ PAD fixed tray: For setting the PAD to work with SLC.

Bottom cover

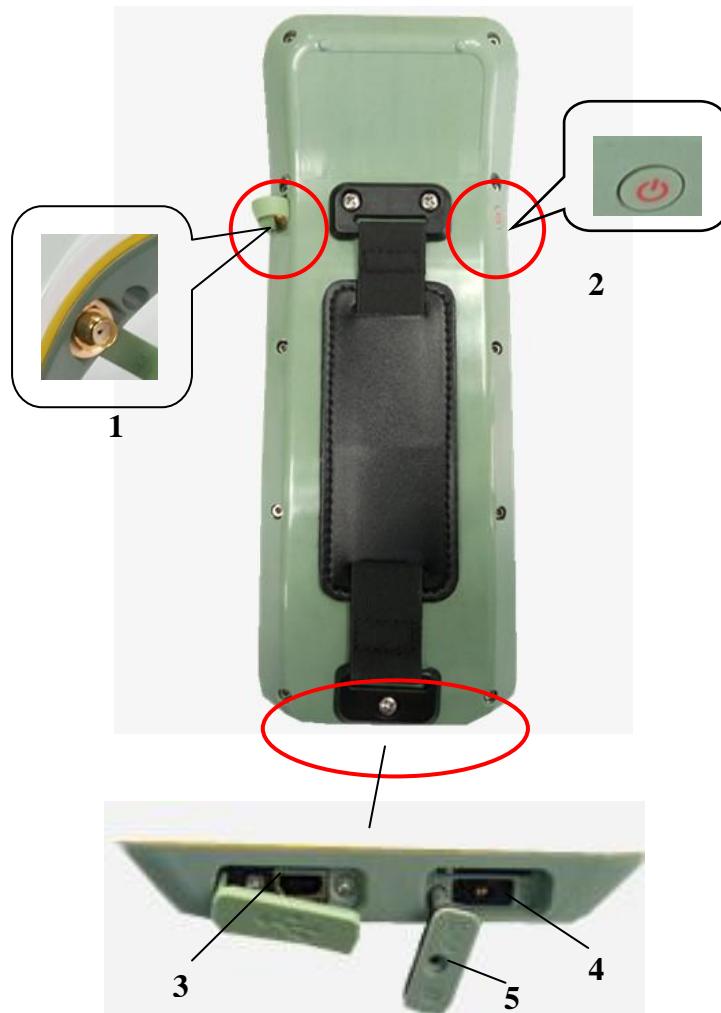


Figure 2.2

- ① SMA antenna port: For connect to external antenna;
- ② Power button: Startup & shutdown, force shutdown, reset motherboard.
- ③ Mini USB port: For connect to PC through USB cable to download data, update firmware and charge or supply electricity to the host; or connect to PC through serial cable.
- ④ Micro SIM port: For input micro card;
- ⑤ Protective plug: Socket for dust and waterproof.

2.2 Power supply system

Internal battery

We use non-removable lithium battery, which offers long-time work in field.

Adapter



Figure 2.3

Recharge

SLC lithium battery shall use PSAI10R-050Q power adapter to charge, about 6 hours of charging time.

Warning: Only the battery and charger configured by the manufacturer can be used.



2.3 Button operation

Most settings and operations of receiver are completed using the only one button on control panel.

Table 2.1

Operation name	Description
On	Shutdown status, long press the button two seconds to boot, all lights are on

On Shutdown status, long press the button two seconds to boot, all lights are on

Off	Boot status, long press the button two seconds, release the button
Reset motherboard	Boot status, long press the button more than five seconds, all lights second flash at the same time, release the button, it will reset motherboard.
Forced shutdown	Boot status, long press the button more than eight seconds, all lights are off.

2.4 LED

In different setting mode, it displays the different LED status.

Table 2.2

LED	Meaning	
Power LED (Yellow)	Long-term lighting	Full battery. Normal voltage: internal battery power > 75%
Power LED (Green)	Long-term lighting	Normal voltage: 50% < internal battery power ≤ 75%
Power LED (Red)	Long-term lighting	Normal voltage: 25% < internal battery power ≤ 50%
	Flash	Lower power. internal battery power ≤ 25%
Signal LED	Long-term lighting	RTK mode

(Green)	flash	Logging on server
Signal LED (Yellows)	flash	RTK mode: flash as difference data interval
Satellite LED (Green)	Long-term lighting	Satellite lock
	flash	Satellites are lost
Satellite LED (yellow)	flash	Temporary static mode: flash as sampling interval
Three LED	Fast flash	Satellite LED, Signal LED, Power LED all fast flash at the same time, when release power button, the motherboard will be reset.

CHAPTER**3**

Basic Operations

This chapter describes:

- Startup & Shutdown
- Reset motherboard
- Firmware upgrade
- Motherboard upgrade
- Base mode settings
- Rover mode settings
- Static data collection
- Static data storage

3.1 Startup & Shutdown

Startup

Shutdown status, long press the power button 2 seconds, when all three lamps turn to yellow, release the button.

Shutdown

Boot status, long press the power button 2 seconds, then release the button.

Force shutdown

Boot status, long press power button 8 seconds and all lights are off.

3.2 Reset motherboard

Long press the power button 5 seconds, when all lights flash the second time, release the button, all lights flash randomly about 30s.

Notice: If fail to reset motherboard, the satellite LED will always red.



3.3 Firmware upgrade

We can upgrade receiver firmware through U disk.

1. Open receiver, connect to PC by USB cable. Open "my computer", there will be "update" upgrading disk.

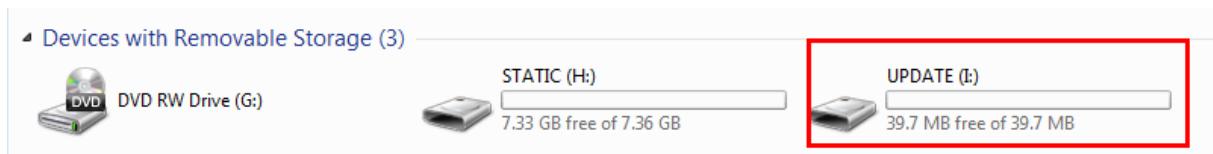


Figure 3.1

2. Copy firmware (it can be downloaded from the official website or

obtained from the technician) to "update" upgrading disk, then remove U disk, unplug the cable, restart the receiver to complete the upgrading.

3.4 Motherboard upgrade

The upgrade software “OEM-615 Upgrade -V8.exe” is used to upgrade the receiver motherboard.

1. Open receiver, connect to PC by serial port cable, and open the sscom32, send a command “24 24 53 42 01 00 00 10 0d 0a” to through motherboard.

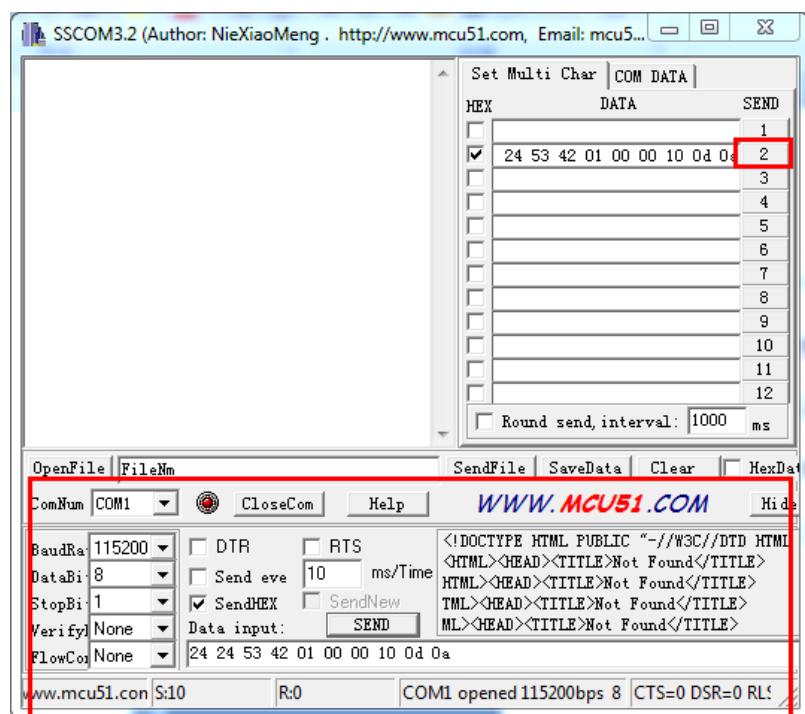


Figure 3.2

2. Convert motherboard firmware to a binary file through “ConvertToBinaryFile.exe”. It saves the upgrade time.

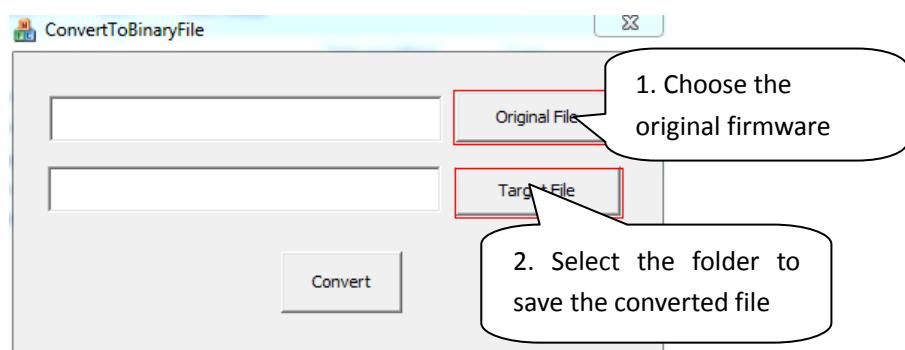


Figure 3.3

3. Open “OEM-615 Upgrade -V8.exe”.

- Choose port and baud rate;
- Click “open” to open port
- Click “open file” to select the firmware;
- Click “Upgrade”, it will spend about 7 minutes to complete the upgrade.

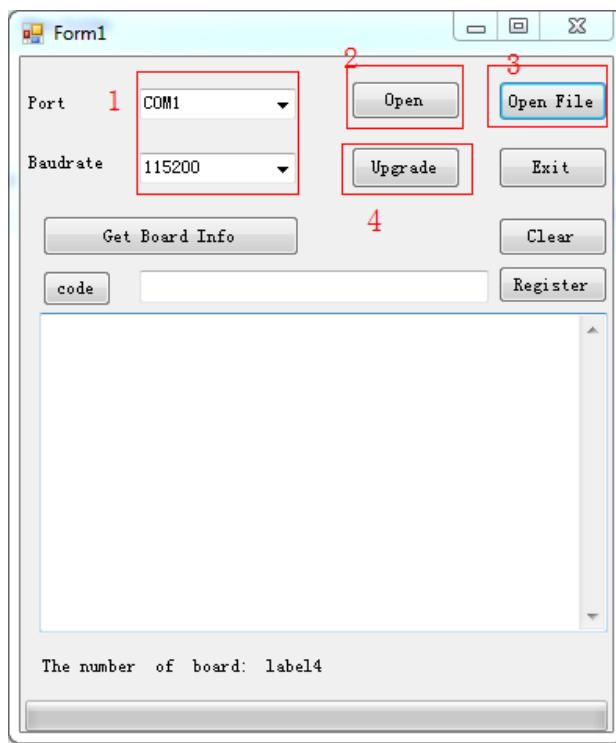


Figure 3.4

4. Unplug serial port cable, and restart the receiver.

3.5 Base mode settings

SLC receiver supports the RTK net data link for base mode. Now we set the parameters in SurvCE.

Before set parameters, please make sure your controller has SIM cards

installed.

1. Connect to SLC.

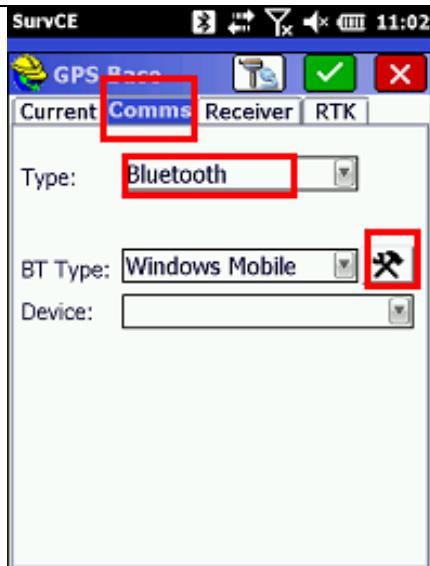


1. Press “GPS Base” to set base mode.



Select receiver type:

2. Manufacturer: Hi-Target;
3. Model: HiTarget H32.



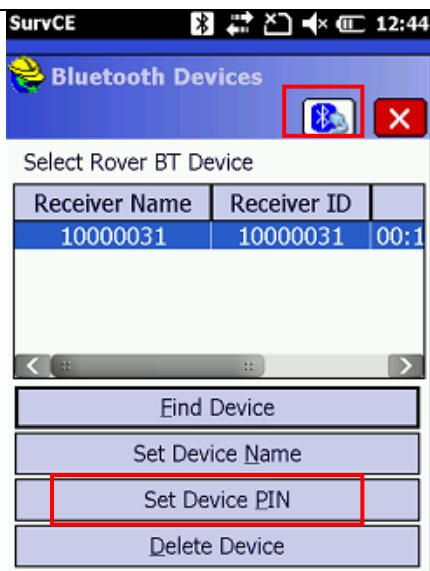
4. choose the connecting Type: Bluetooth;

5. Click “”;



6. Find Device.

7. Check the receiver s/n in the popup list, and click OK.



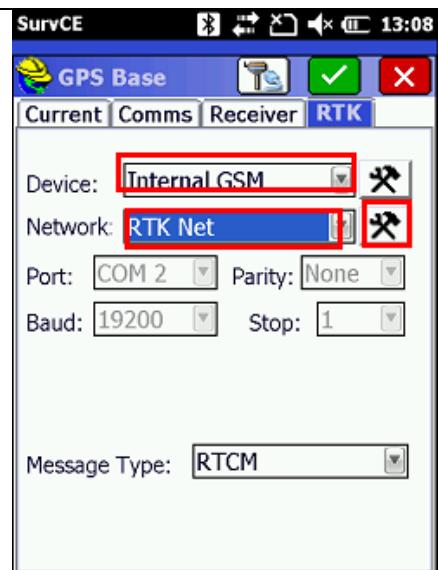
8. Set device PIN;

9. Input “1234” in the popup dialog.

10.OK

11. Click “” to connect to device.

2. Set parameters

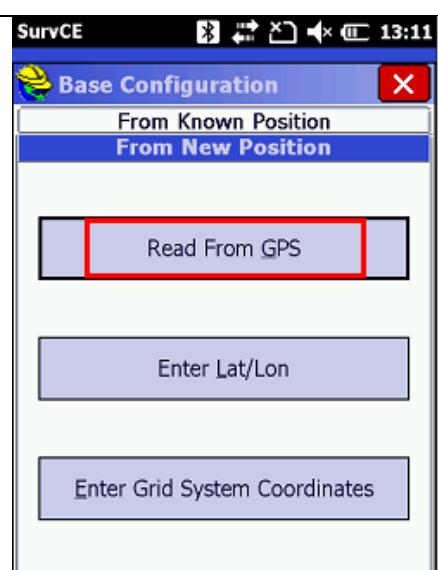


1. Set data-link: Internal GSM;
2. Network: RTK Net;
3. Click “”, it will pop up an interface to configure RTK Net.



4. Input IP, port, area ID, Group ID and select RTK Message.

5.OK



6. There are three modes to get the base position.

7. Finish settings

8. When base station sending the difference data, the signal LED will flash yellow light.

3.6 Rover mode settings

SLC receiver support Internal GSM and data collect Internet these two data link for rover mode.

1. Connect to receiver

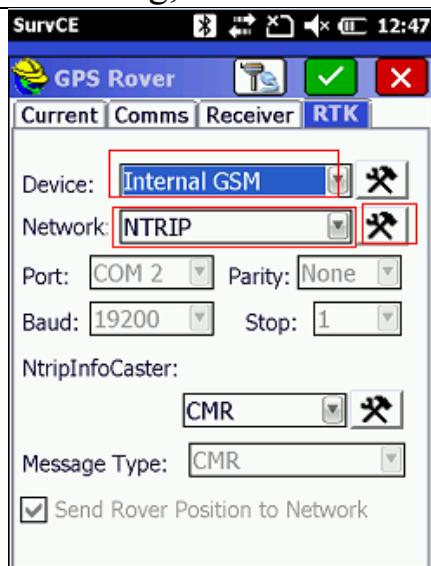
Please refer to base mode settings

2. Set parameters –Internal GSM

There are two network types: RTK Net and NTRIP.

Setting RTK Net parameters is similar to the base mode, and the IP, port, area ID, Group ID and RTK Message should be the same as the base mode.

Following, we will introduce the process of settings parameters for NTRIP.



1. Device: Internal GSM;
2. Network: NTRIP;
3. Click “”, it will pop up a interface to configure NTRIP.

4. Input IP, port, user name and password.

5.OK

6. There will pop up an interface that selects the mount point.

7. Select mount point.

8. OK. And return the main settings interface.

9. OK. Finish setting NTRIP.

3. Set parameters—Data Collect Internet

Compared to Internet GSM, Data collect internet is more efficient, it uses network of collector to get the difference, and reduce troubles for SIM card in receiver. There are two ways to connect a data collector to the internet: SIM card inserted into collector and connecting the Wi-Fi.



Before settings data collector internet, make sure an internet connection has already been established to the data collector.

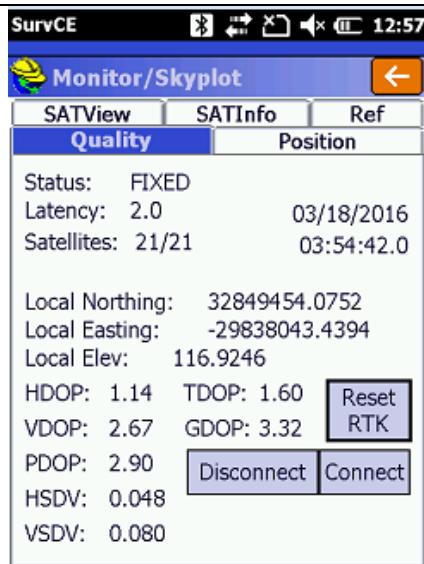
1. Device: data collector internet;
2. Network: NTRIP;
3. Click “

The next remainder steps is the same as Internet GSM—NTRIP.

4. View the solution in Monitor/Skyport.



1. Equip--- Monitor/Skyport



2. Quality

3.7 Static data collection

SLC receiver can collect static data. Relative operations are as below.

1. Connect to SLC

Please refer to the base mode.

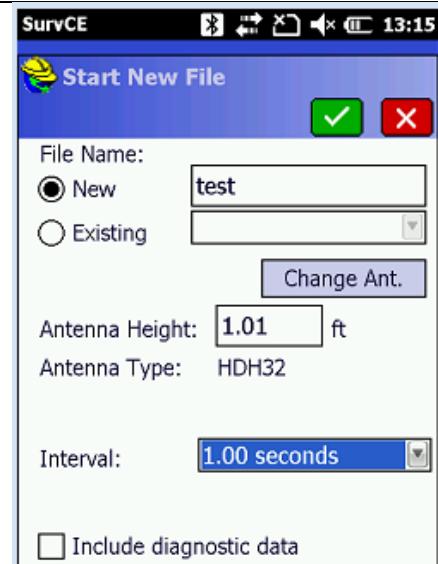
2. Set parameters



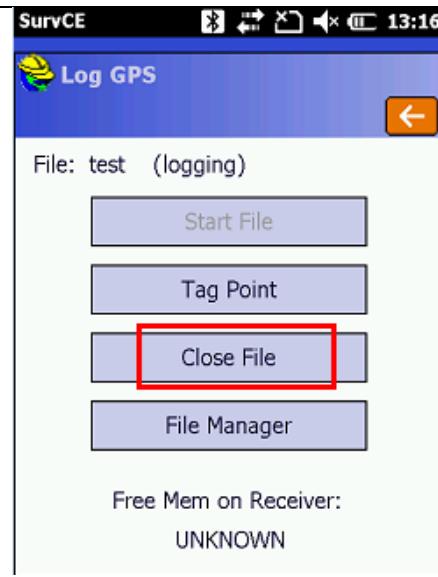
1. Survey—Log Raw GPS



2. Click “Start file” to set parameter



3. Set name, antenna height, interval
4. OK. And start collecting the static data.



5. Click “Close file” to stop collecting.



6. Click “file manager” to view the static files.

Notice: 1.The satellite LED flashes (yellow) in temporary static collection, its flashing interval depends on the setting sample interval.



2. The signal LED flash red light in static mode.

Warning: 1.Don't move the receiver or change the collecting set while the receiver is collecting data.



2.Don't plus USB cable when collecting static data

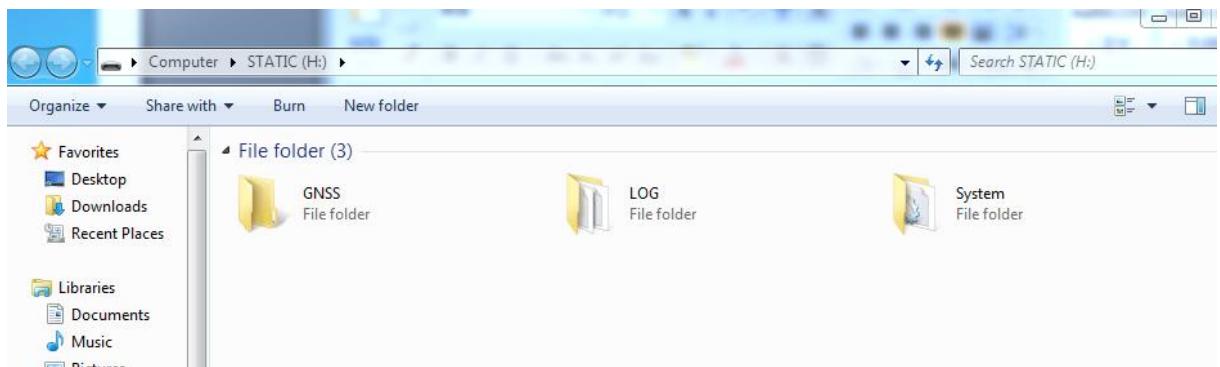
3. SLC receiver doesn't support recording Rinex format data.

3. Turn off the receiver after static data collected

3.8 Static data storage

Collected GNSS static data is stored in "static" disk that 30GB internal storage of SLC receiver, effective storage space is 29.6GB, includes three folders: LOG, GNSS and System, log folder stores log information, the data format storage in GNSS folder is * .gns. You can connect to PC

through USB cable, copy static data to your PC in U disk operation mode.



Notice: When the receiver storage space is less than 10MB, data light (red) fast flash, and it stop recording data, the existing data files will not be overwritten.



CHAPTER**4**

Technical parameters

This chapter describes:

- GNSS configuration
- System configuration
- Network parameter
- Data transmission
- Interface
- External port
- Electrical characteristics
- Product protection
- Environment characteristics

4.1 GNSS configuration

- BDS: B1, B2
- GPS: L1, L2, L2C
- GLONASS: L1, L2
- Galileo: E1, E5B;
- Precision & reliability:
 - RTK plane precision: $\pm 8\text{mm} + 1 \times 10^{-6}\text{D}$
 - RTK height precision: $\pm 15\text{mm} + 1 \times 10^{-6}\text{D}$;
- Initialization time: typical $< 8\text{s}$;
- Initialization reliability: $> 99.9\%$;
- Data update rate: position data: 20Hz, original data: 20Hz;
- Difference support: CMR、RTCM3.2.

4.2 System configuration

- Operation system: UC/OS-II real-time intelligent operation system;
- CPU: STM32F2 serial, Cotex-M3 core;
- Boot time: 1s;
- Data storage: Internal 32GB storage.

4.3 Network parameters

- Network type: union 3G(WCDMA) / mobile 2G /union 2G(GSM);
- Supported frequency band:
 - WCDMA: 900/1900/2100MHz;
 - GSM: 850/900/1800/1900MHz;

4.4 Data transmission

- Bluetooth
V3.0; Class 2; 3.3V; UART/I2C/SPI/PCM;
Internal antenna (transfer distance is no less than 10m in no occlusion condition);
- Serial communication
RS232; Baud rate: 19200; Data bits: 8 bits; Stop bits: 1 bit;
Verify: none; Flow control: none.

4.5 Interface

- Button: only one button, power button;
- LED: 3, satellite LED, power LED, signal LED.

4.6 External port

- One SMA antenna port;
- One Mini USB port;
- One Micro SIM port;

4.7 Electrical characteristics

- Data board Consumption: 0.64W (static mode);
- Internal battery: capacity: 800mAn/3.7V;
working time : static mode $\geq 7.5h$, rover mode: $\geq 7.5h$,
- Charging time: ≤ 6 hours;
- Power voltage input range: USB port: DC4.2-5.5 VDC/2A.

4.8 Product protection

- IP Protection class :GB4208-2008, IP67
- Measuring rob anti-drop: protect 2m height free fall, circumference random 4 times.

- Radom vibration: Grms=6.06g, 3 axles, 15min/axle, powered status;
- SHOCK: GB/T2423.6, half-sine wave, Acceleration:30g, frequency: 11ms, time: 3 times/side

4.9 Environment characteristics

- Working temperature: -40 °C ~ 65 °C
- Storage temperature:-40°C~75°C
- Relative humidity: 100%, anti-condensation

§ 15.19 Labelling requirements.

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

§ 15.21 Information to user.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

§ 15.105 Information to the user.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection 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 instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference 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.