SL600 GNSS RTK Manual

Manual Revision

Revision Date	Revision Level	Description
Apr.2014	1	SL600 GNSS RTK Manual1.0

Content

CHAPTER

1

Preface

- Instruction
- Your Suggestions

1. Instruction

Welcome to SL600 Series GNSS RTK system manual. This manual is designed for SL600 GNSS RTK system, and use SL600 GNSS RTK as an example to explain the installation, setup, and usage of the GNSS RTK system.

If you have used other GNSS RTK system before, we suggests you read this manual carefully and this manual will help you to understand our SL600 GNSS RTK system easily.

2. Your Suggestions

If you have any suggestions or comments on the manual, please feel free to contact us, it will help us to improve our manual quality greatly.

CHAPTER

2

Summary

- Introduction
- Products Features
- Usage and Notes

1. Introduction

SL600 GNSS RTK system adopts modularized design, so as to enable users to change into different differential transmission modules according to various requirements. Meanwhile the designed self-diagnosis function can automatically check the working status of all hardware and software of the SL600 receiver while working, and arouse the problem part by its intelligent voice messenger in case of some problem.

Data collection controller can be connected with receiver mainframe via Bluetooth or cable; built-in high-capacity battery is suitable for long-time field work; static data can be stored in the built-in memory card of receiver and downloaded via USB port to your PC.

Tips: 1. SL600 GNSS RTK system has many modules. This manual does not represent standard configuration. Users need to notify their own requirements for the different configuration due to different applications.

2. And before using, we suggest users firstly to check whether the package box is damaged, and then open careful and check whether inner items matched with the order list of their own. If there are some missing or damaging cases exist for products and accessories, please contact with the local distributor Immediately.

3. Last but not least, please carefully read manual before carrying, handling and using!

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2. Product Features

1. BD970 mother board of Pacific Crest, a Trimble Company, multi-satellite, multi-system kernel.

2. 1+X multi-module communication units.
3. PCC Radio module (optional) compatible with Trimble/Leica RTK.
4. Double battery capacity as 5000mAh, 12 hours for RTK operating.
5. The highest performance in waterproof, dustproof and anti-drop.
6. Adjustable to be single GNSS system or multi-GNSS system: GPS, GLONASS, GALILEO.

3. Usage and Notes

Although SL600 receiver using chemical and impact resistance material, but necessary taking care and maintenance is still required for such a precise instrument.

Warning: The receiver must be used and stored in the specified temperature.

To ensure the quality of continuous tracking satellites and signals, surveying work should be in open air, while there should no any obstacle in space above 15° altitude angle; in order to reduce all kinds of electrical interference to the GNSS satellite signals. Besides, there should not be strong electrical interference around within about 200m range, such as the television tower, microwave stations, high voltage transmission line. Also, in order to avoid or reduce the occurrence of multi-path effect, stations should be away from terrain or geographical objects, which will strong effect electrical signal, such as high-rise buildings, big pool, etc.

Receiver Introduction

CHAPTER

3

- Introduction
- Receiver Appearance
- Control Panel
- Upper Cover
- Lower Cover
- Battery
- Environmental Requirement
- Electric Interference

1. Introduction

This Chapter mainly introduces SL600 receiver appearance, buttons and indicator led and so on.

2. Receiver Appearance

Receiver Appearance mainly including 4 parts: upper cover, lower cover, guard collar and control panel, as Figure 3-1

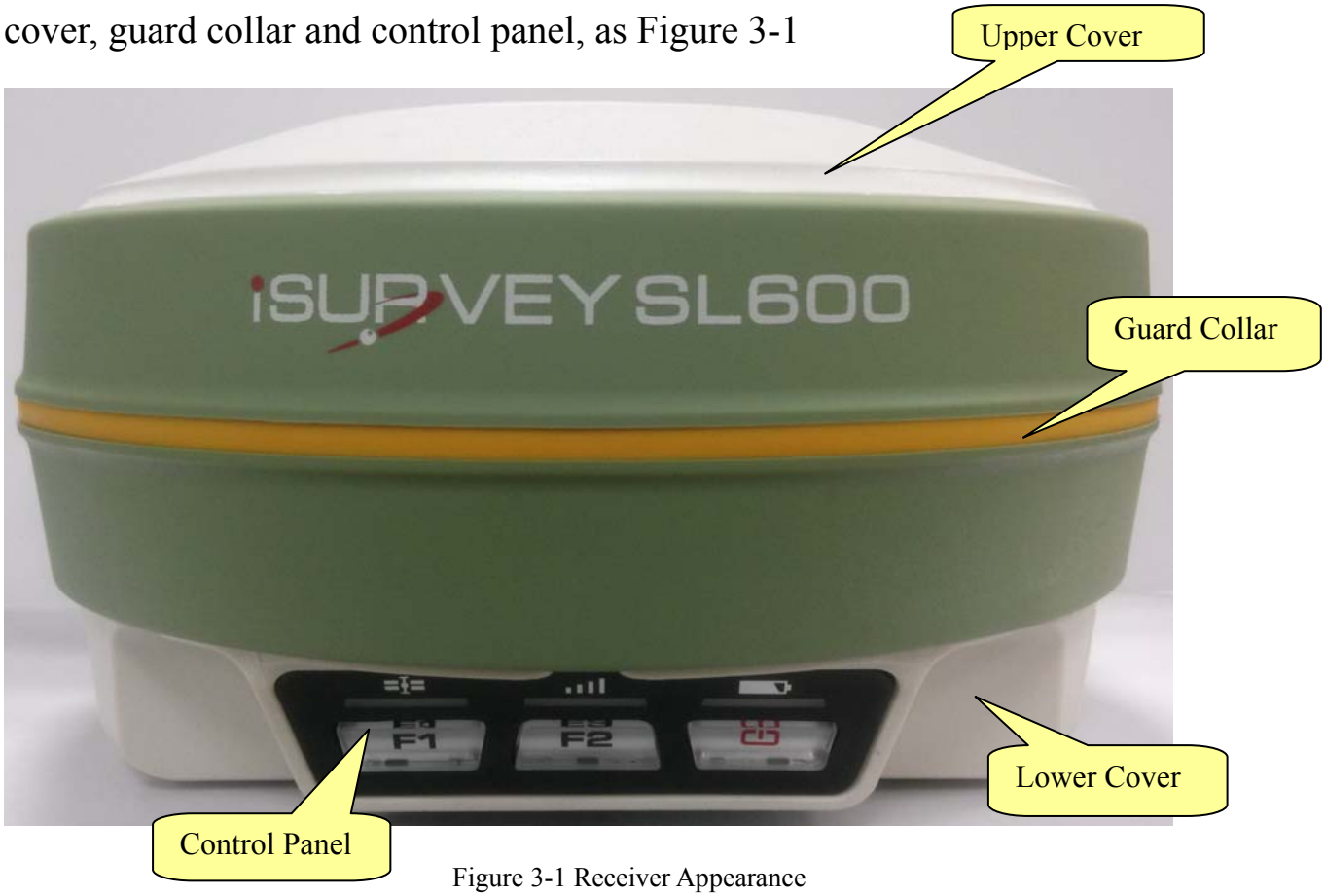

Figure 3-1 Receiver Appearance

3. Control Panel

Figure 3-1, in the middle of red frame of SL600 receiver is control panel. And the control panel contains the F1 key (function key 1), F2 key (function key 2) and the power button, 3 indicator leds which are respectively satellite led, the status led (dual-color led), the power led (dual-color led). The simple three buttons include all the features setting of the SL600 receiver.

 Satellite led（green led）

 Status led（red-green dual-color led）

 Power led(red-green dual-color led)

 Power Key: setting confirmation, automatically base setting and so on.

4. Upper Cover

Figure 3-2 indicates the upper cover of SL600 receiver, the main function of which is anti-drop and anti-scratch.

Figure 3-2 Upper Cover

5. Communication module connector: connect communication module and mainframe

- ✧ Battery Groove: install 5000mAh lithium battery
- ✧ Five-pin port: connect mainframe with external data link or with external power supply
- ✧ Eight-pin Port: connect SL600 receiver with computer, or controller for data download and delete
- ✧ Protection Plug: anti-dust and waterproof for socket.
- ✧ SD Card Slot: install SD card to save large volume data.
- ✧ Joint Nut: fix instrument with tribrach and centering pole.
- ✧ Loudspeaker: voice broadcast for real-time operation and status.

Tips: 1. if no need to use five-pin port, eight-pin port and differential antenna port, please affix rubber plugs to achieve waterproof and dustproof.

2. when water comes in loudspeaker, maybe it becomes silent or sound hoarse. But it will be back to normal after drying.

6. Battery

As figure 3-4, the appearance of 5000mAh lithium Battery

Figure 3-4 Battery Front

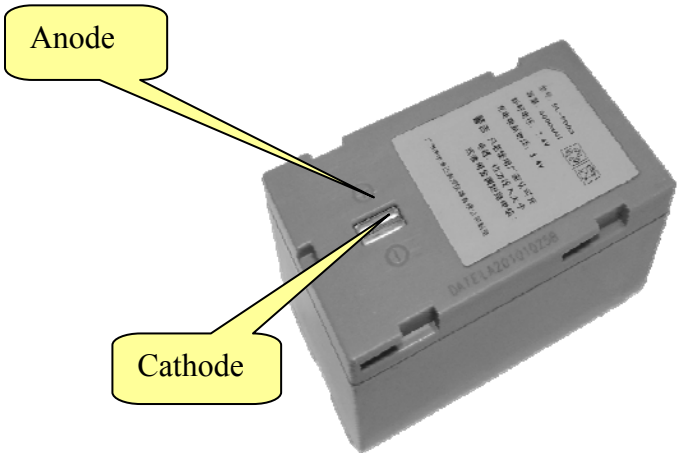

Figure 3-5 Battery Back

CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.

DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS

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7. Environmental Requirement

Even though SL600 receiver uses waterproof materials, maintaining in a dry environment is still helpful. In order to improve the stability, and duration of the receiver, please avoid exposing the receiver in extreme

environments, such as:

- ✧ Moist
- ✧ Temperature higher than 65 Celsius degrees
- ✧ Temperature lower than -40 Celsius degrees
- ✧ Corrosive liquid or gas

8. Electrical Interference

Do not place GNSS receiver around a strong power interference signal source, such as:

- ✧ Oil duct (spark plug)
- ✧ Television and computer monitor
- ✧ Generator
- ✧ Electric motor
- ✧ DC-AC power conversion equipment
- ✧ Fluorescent Light
- ✧ Power switcher

CHAPTER

4

General Operations

- Introduction
- Button Functions
- Led Status Instructions
- Static Data Storage
- RTK Data Storage
- Self-inspect and reset Receiver
- Format Receiver
- Power Supply System

1. Introduction

Most of the operations of SL600 receiver can be done by the three buttons on the mainframe panel.

Buttons on the panel:

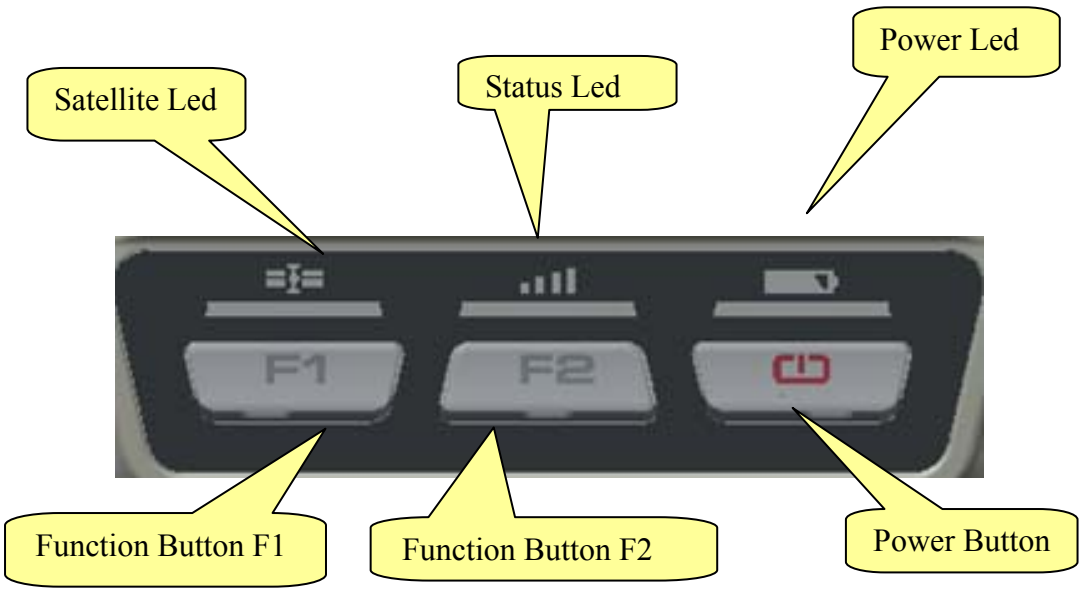

Figure4-1 Mainframe Panel

Explanations of buttons operations and leds hints as below:

Operations	Explanation
Single click button	Press a button less than 1 second
Double click button	Double click the button while the clicking interval should be between 0.2 to 1 second
Long pressing button	Pressing button more than 3 second
Super long pressing	Pressing button more than 6 second

Slow flash of led	Flashing interval more than 0.5 second
Fast flash of led	Flashing interval less than 0.3 second

2. Button functions

Factions		**Button operations**	**Introduction**
Work mode		Double click F1	Then single click F1 to choose the receiver work mode among “base”, “rover”, “static”
Static	Elevation angle	Long pressing F1	Single press F1 to set elevation angle to be 5 degrees,10 degrees, or 15 degrees
	Collection interval	Long pressing F2	Single press F2 to set collectioninterval to be 1s,5s,10s,15s
	Static data collection	Double click F2	Double click F2 to start collecting static data
Confirm setting		Single press power button	Then the receiver will speak out its current work mode, data link, radio

		transmit power, channel; meanwhile the power led will flash to hints its power status
Auto-set base	F1+Power button to turn receiver	Press F1 while than press power buttonat the same time to turn on the receiver until hearing “Dingdong”. Then the receiver speak out its current status.
Reset receiver and selfinspection	Long press F1	Single press F1 to selfinspection.
		Single press F2 to reset the mother board.
Back receiver to original settings	Long press F2	Single press F2, it will automatically rectify, correct and reset to the original settings.
Check currect work status	Single click power button in non-settings status	The receiver will speak out the work mode and data link, at the same time the power led flashing times hints the power status.

3. Led Status Instructions

Led	Instruction	
Power led (yellow)	Always on	In normal voltage: internal battery voltage >7.6V, external battery voltage >12.6V
Power led (red)	Always on	In normal voltage: 7.2V < internal battery voltage ≤7.6V, 11V < external battery voltage ≤12.6V
	Slow flash	Low power-pressure: inter≤7.2V，external≤11V
	Fast flash	Power status hints: one to four times of one minute
	Fast flash	Error in static mode (typically for no more flash memory)
	Always on	Communication module in error for getting data, mainly resulted by problem in module so that no data output
Satellite led (green)	Always on	More than 4 satellites tracked successfully
	Slow flash	Loss satellites and try re-tracking
	Off	1. mother board error resulting in no data output while resetting receiver

		2. mother board error resulting in no data output while in static mode

4. Static Data Storage

The GNSS static data collected by SL600 receiver will be stored in its memory or the SD card, in *.GNS format.

You can connect the SL600 receiver with PC by USB port of GC-3 cable and then just copy the static data into your PC.

Note: in case of no more memory, the data led (the middle led) will be fast flashing while stopping the current static data collection.

5. RTK Data Storage

The controller can be connected with the receiver via Bluetooth or cable, the data will be stored in the memory of the controller.

After fieldwork finished, you can connect the controller with PC by the data cable, and then download the RTK data from the controller to PC by copying.

6. Self-inspect and reset Receiver

Long press F1 button for more than 6 seconds, and then single press F1 to self-inspect or single press F2 to reset the mother board.

Warning: reset receiver will make the next tracking satellite

time longer while needs users to set receiver work mode again.

7. Format Receiver

Format SL600 receiver by Receiver Management Software:

- ✧ Connect SL600 with PC by serial port of GC-3 cable
- ✧ Turn on SL600 receiver
- ✧ Choose right serial port and open port
- ✧ After connecting successfully: the S/N will be showed in the below
- ✧ Click "Format/Delete All" to complete format receiver. After this operation, all current data will be deleted forever.

Warning: Make sure all useful data has been copied to another place for spare, because all data will be deleted forever after this format.

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8. Power Supply System

- ✧ **Install and Uninstall Battery**

Install:

1. Match  with the  in the battery slot to put in the battery.

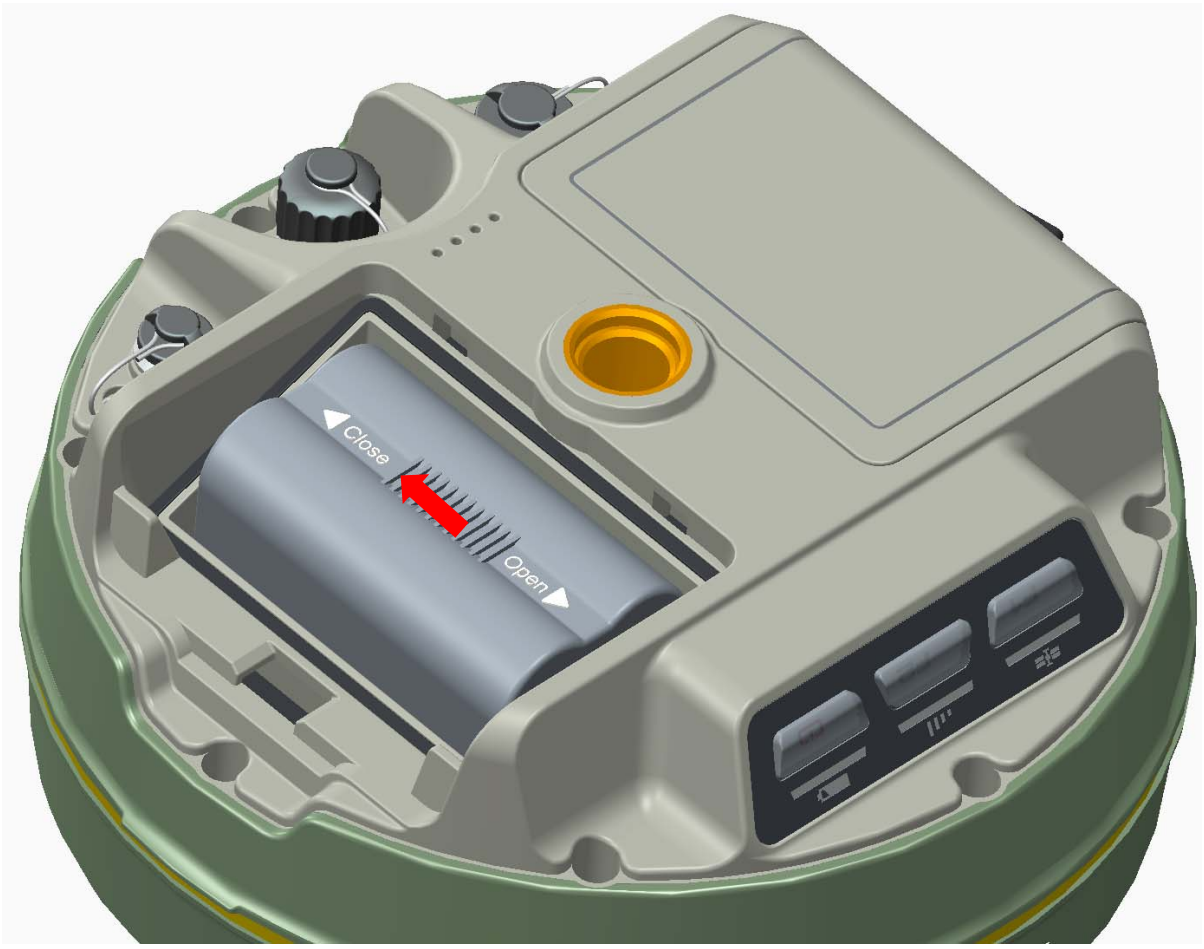

Figure 4-2

2. Insert battery towards “Close” end (see red arrow) to install it ok.

3. Close the battery cover.

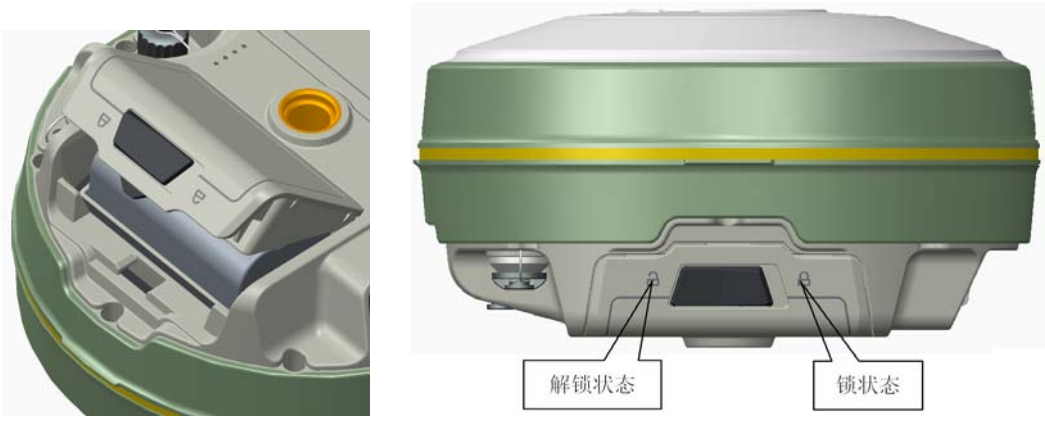

Figure 4-3

Uninstall:

Slide the battery towards to the “Open” end, and then pull out battery.

✧ SL600 Receiver Battery Name and Model

Name	Model
5000mAh lithium battery	BL-5000
Lithium battery charger	CL-8410

✧ Power Supply

Power supply	Power supply way	1. lithium battery; 2. eight-pin port and five-pin port on the mainframe for external power supply
	Power range	6V ~ 36V

If use external power supply for SL600 by the eight-pin port and five-pin port on the mainframe, the power supply should be 6 ~ 36V with current no less than 500 mAh.

When using both lithium battery and external battery, the receiver will check the power pressure of both batteries and choose the higher one.

And please note that if use external power supply, must use the specified external power supply from to avoid any destroy to the receiver.

✧ Battery charging

BL-5000 lithium battery must be charged in specified CL-8410 charger for about 7.5 hours. The indicator led of the charger will be in red while charging, and then green when charging finished.

Warning: 1. Only using specified charger and do not put the battery into fire nor make it short circuit.

2. If heating, deformed, leaking, bad smells happens while charging, using or storing, please stop using the battery right now and change another one.

3. If the working time obviously become very short, please stop using the battery right now and change another one.

CHAPTER

5

Technical Parameters

- Introduction
- Receiver
- Ports
- Function Key and Indicator Led
- Intelligent Voice Module
- Accuracy
- Physical Feature
- Working Environment

1. Introduction

Here we list out all Technical Parameters of SL600 GNSS RTK SYSTEM. The Technical Parameters will be a little different according to your purchase order. Please make sure about your configuration then find out Technical Parameters correspondingly.

2. Receiver

◎ GPS : Synchronous tracking L1 C/A, L2E, L2C, L5

◎ GLONASS: Synchronous tracking L1 C/A, L1 P, L2 C/A(only for GLONASS M) and L2P

◎ SBAS: Synchronous tracking L1 C/A, L5

◎ GIOVE-A: synchronous tracking L1 BOC, E5A, E5B and E5AltBOC（optional）

◎ GIOVE-B：synchronous L1 CBOC, E5A, E5B and E5AltBOC（optional）

◎ GALILEO:（Upgrade）

◎ A high precision measurement in the relevant organs using for global navigation satellite system

◎ Very low noise GNSS carrier phase in Surveying, Accuracy < 1 mm within 1 HZ wide band

◎ Mature low elevation-angle tracking technology

◎ Initialization time < 10 S

◎ Initialization Reliability > 99.9%

◎ 1 Hz, 2 Hz, 5 Hz, 10 Hz, 20Hz and 50 Hz output （default 10Hz）

◎ Differential data format: sCMRx、CMR、CMR+、RTCM 2.1、2.2、2.3、3.0、3.1、3.2

◎ Navigation Output Format: ASCII: NMEA-0183 GSV、AVR、RMC、HDT、VGK、VHD、ROT、GGK、GGA、GSA、ZDA、VTG、GST、PJT、PJK、BPQ、GLL、GRS、GBS

5. Ports

◎ 2 RS-232 serial ports
◎ 1 USB port
◎ 1 port for wireless blue-tooth communication
◎ 2 port for external DC power supply (Multiplex)
◎ 1 SIM card slot
◎ 1 SIM card slot
◎ 1 SD card slot
◎ 2 built-in Li-ion battery groove
◎ 1 built-in communication module port

6. Function Key and LED

◎ 3 Panel buttons: 1 power switch key, 2 functional keys, with these combination you can set all the function with voice and Indicator Led flexibility

◎ 3 LEDs: 1 Satellite LED (Single color), 1 Communication LED (Dual Color) ,1 Power LED (Dual Color)

7. Intelligent Voice Module

◎ Broadcasting function for each operation in English
◎ Support user defind voice

8. Accuracy

◎ Static, Fast Static: Horizontal: ±(2.5 + 1×10-6D) mm
Vertical: ±(5 + 1×10-6D) mm
◎ RTK Accuracy: Horizontal: ±(10 + 1×10-6D) mm
Vertical: ±(20 + 1×10-6D) mm

9. Physical Feature

◎ With ARM9 Core Control Chip, built-in 1GB Flash Memory
◎ Dimension: φ182mm×h96mm
◎ Weight: 1.25 kg(Incl. li-ion battery)
◎ Anti-impact from 2 meters free-falling, waterproof in 2 meters deep water
◎ 6~28V external DC power supported, external and internal power supply exchanged automatic
◎ Receiver Power Consumption: 2.5W

10. Environment

◎ IP Standard: IP67, waterproof, dust-proof and anti-impact.
◎ Working temperature: -40℃ ~ 65℃, storage temperature: -40℃ ~ 75℃
◎ 100% Humidity non-condensing

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

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 followingmeasures:
-- 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.

FCC RF Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction