Manual Revision

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Preface

Introduction

Welcome to use Hi-target V100 receiver, this introduction is applicable to Hi-Target V100 products. V100 is a new type of GNSS receiver used for measurement. The introduction describes how to install, set and use V100 products.

Experience Requirement

In order to help you better use Hi-Target series products, Hi-Target suggests you carefully reading the instruction. If you are unfamiliar with V100 products, please refer to www.hi-target.com.cn

Tips for safe use

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

Warning: the contents here generally are very important. In case of failing to operate based on warning contents, it will damage the machine, lose the data, break down the system and endanger 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 company 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 hi-target V100 receiver,there will be “V100 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 V100, please call us or Dial the national hotline: 400-678-6690. Your feedback information will improve the production quality more.

Content

CHAPTER

1

Product Introduction

This chapter describes:

- Preface
- Product Characteristics
- Cautions for Use

Preface

V100 is a new subminiaturized type of GNSS receiver used for measurement pushed forward by Hi-Target Brand, used a delicate design, Magnesium alloy construction, multi-satellite and multi-frequency technique, built-in constellation motherboard, Bluetooth both with dual-mode and long-distance , it is a realization of quick, efficient , safe measurement GNSS receiver.

Warning: the instruction represents no standard configuration. The articles within the box can be adjusted according to different user requirements. The specific configuration shall be subject to the outgoing list upon purchasing. The suggestions before using the machine: check whether the product package is damaged; please open the package carefully and confirm whether the articles are consistent with outgoing list; in case of loss or damage in the product and its accessories, please immediately contact with local office or dealers; please carefully read the operating instruction before carrying, transporting and using the

product.

Product Characteristics

- ✧ A new generation of subminiaturized GNSS RTK，equipped with new efficient intelligent real-time core platform;
- ✧ Using BDS constellation system, Support BDS, GPS, GLONASS;
- ✧ Subminiaturized zero-phase antenna ;
- ✧ Built-in 4.0 standard long-distance dual-mode Bluetooth, backward compatible 2.1standard Bluetooth;
- ✧ Built-in 8GB large capacity data memory;
- ✧ Equipped with iHand20 intelligent hand held or industrial tablet PC;
- ✧ Handbook controller receives differential signal;
- ✧ Designed for the Android development of customized smart metering software--Hi-Survey；
- ✧ A key Multifunction；
- ✧ New subminiaturized fuselage，Magnesium alloy structure，more solid；

Cautions for Use

V100 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 form strong electromagnetic wave within the range of 200m, such as television tower, microware 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

Introductions to Receiver

This chapter describes:

- Receiver Appearance
- Control Panel
- Upper Cover
- Bottom Cover
- Power Supply System
- Environmental Requirements
- Electronic Jamming

Receiver Appearance

The product appearance is divided into three sections， upper cover, bottom cover and control panel.

Figure 2-1

Control Panel

The control panel includes a power switch button, three indicators, namely satellite lights, power light (bi-color light), signal light (bi-color light).

 Satellite light  power light

 signal light

Power Button Functions: Startup, shutdown, operating mode switching, automatically set the base station, reset the board

and so on.

Upper Cover

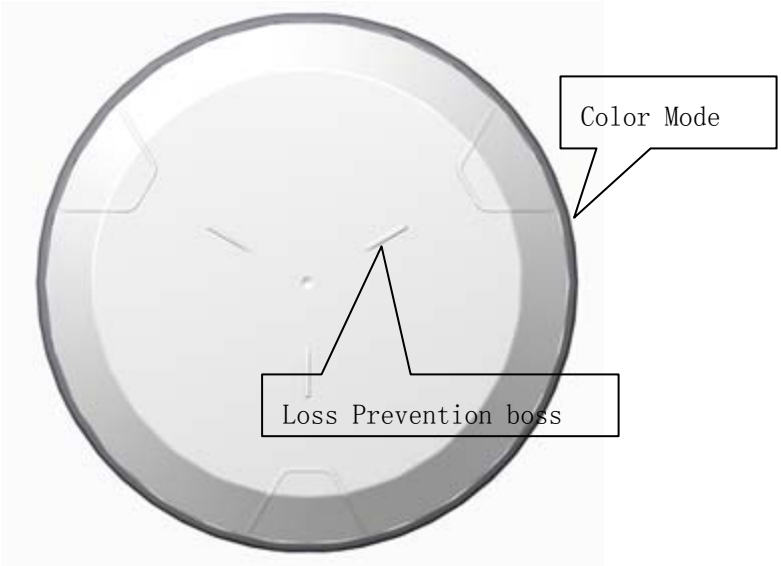

Figure 2-2

- ✧ Loss Prevention boss: boss can effective anti-wear;
- ✧ Color Mode: appearance of the structure, Clear , beautiful, drop

Bottom Cover

Including battery compartment, five-pin socket,Mini USB interface.

1- Screw connection 2- Battery compartment 3- Five-pin socket 4-Mini USB interface 5- protective plug

Figure 2-3

- ✧ Connection screw: for the instrument fixed to the base or the pole.
- ✧ Battery compartment: for housing lithium batteries.
- ✧ Five-pin socket: For connection to the host and external data links and external power source.
- ✧ Mini USB interface: For connection to the host and external devices, upgrade firmware and download
- ✧ The static data can also charge or supply electricity to the host.

✧ Protective plug: socket for dust and waterproof.

Note: If it is unnecessary to use five-pin socket, and USB interface, please cover the rubber plug to prevent dust.

Power Supply System

Battery and adapter

Table 2.1 Battery, adapter type

name	type
lithium battery	BLP-6300S
Power adapter	PSAI10R-050Q

Lithium battery appearance:

Figure 2-4

Figure 2-5

Recharge

V100 lithium battery shall use PSAI10R-050Q power adapter to charge, about 7 hours of charging time.

Warning: 1. only the battery and charger configured by the manufacturer can be used; the battery shall not be thrown into fire or used in metal short circuit electrode.

2. It shall stop using in case of heating, deformation, liquid leakage, smelling or other abnormal reactions during using, charging or storage process. It shall exchange new battery.

3. It shall stop using in case of the service time of battery is shortened , the battery is aged, it shall exchange new battery.

4. Charge environment can't be higher than 40℃.

Battery installation and removal

■ Installation

1) Push up the battery cover button, then uncover it.

Figure 2-6

2) Align battery pole with battery compartment pole, boost until it flush with battery cover and the mental button upspring.

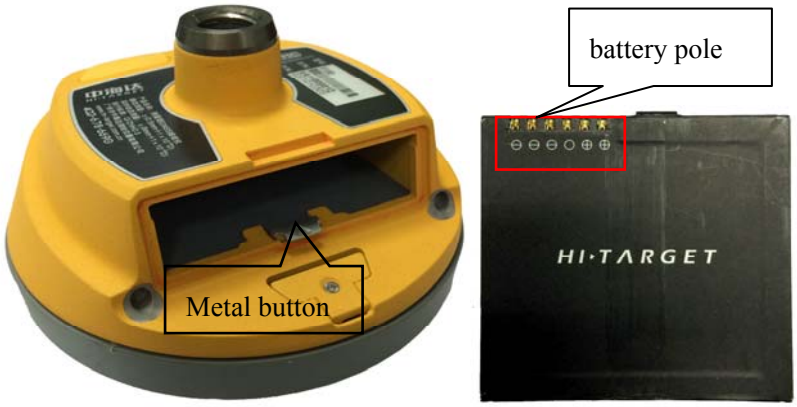

Figure 2-7

Figure 2-8

3) Close the battery cover to finish installing.

■ **Removal**

Push up the battery cover button to uncover it, then press the metal button and remove battery.

Power supply

Table 2.2 power supply mode

power supply	power supply mode	internal：lithium battery external：USB, Five-pin socket
	scope of external power supply	USB socket：DC power 4.2-5.5V/1.5A Five-pin socket：DC power 6-28V/1A

Upon external power supply, the host will automatically detect the voltage of lithium battery and external power supply, and supply power choosing higher voltage. As for external power supply, it shall use the special power specified by Hi-Target.

NOTE: 1. The service life of lithium battery will decrease along with the decrease in temperature and increase in charging-discharging times. A new 6300 mAh lithium battery can be used for 7 hours upon collection of static data or rovel operation.

2. In order to prolong the service life of battery, it shall charge the battery within 24 hours after using up, or the battery performance will be damaged.

3. When the battery is not used for a long time, please charge once every month to prolong the service life of battery.

Environmental Requirements

The receiver shall operate in dry working environment regardless of waterproof materials. In order to advance the stability and service cycle of receiver, the receiver shall be prevented from extreme environment, such as:

✧ Moisture

✧ Temperatures above 60 degrees centigrade

✧ Below - 40 degrees centigrade

✧ Corrosive liquids or gases

Electronic Jamming

The receiver shall not be installed in the place near to strong electric power and interference signal, such as:

✧ Oil duct (spark plugs)

✧ Television and computer display

✧ Generator

✧ Battery-operated motor cycle

✧ DC-AC power supply changeover equipment

✧ Fluorescent lamp

✧ Power supply

CHAPTER

3

Elementary Operation

This chapter describes:

- Control Panel
- Function Key
- LED Function
- Working Pode Switch
- Rovel Handheld Difference
- Static Collection
- Static Data Storage
- Static Data Download
- Firmware Upgrading

Control Panel

Most settings and operations of receiver are completed using a key on control panel.

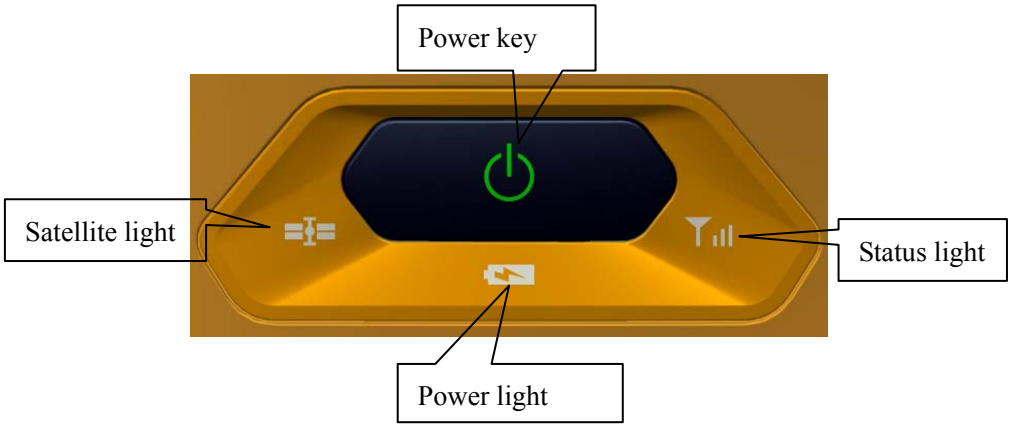

Figure 3-1

Function Key

Table 3.1 Description of power key operation

Operation name	Note
on	Shutdown state, long press the button one second boot, all light are on
off	Boot mode, long press the button three seconds, all lights double fast flash, release the button,
Automatic setting station	Shutdown mode, press the button six seconds long, all lights double fast flash, release the button, the instrument will

	automatically set the base station
Operating mode switching	Double-click the button to enter the operating mode switching, double-click each time a working mode switch(switch between static and RTK mode)
Status Inquiry	Click power light ,red light flash flashing, displays power
Reset Motherboard	Boot state, long press the button more than 6 seconds, all lights flash at the same time, release the button, reset motherboard

LED Function

Different settings mode indicator displays the status of different.

Table 3.2 LED Function Description

Operating	Meaning	
Power Light (Green)	Long-term lighting	Full battery
Power Light (Yellow)	Long-term lighting	Full battery voltage: internal battery≥ 3.9V（100% power）
Power Light (Red)	Long-term lighting	Normal voltage: 6% <internal battery power ≤99%
	Slow flash	Undervoltage: internal battery≤5%
	fast flash	Tip Power: 1-4 flash per minute under the direction of electricity

		1：0%~25% 2：25%~50% 3：50%~75% 4：75%~100%
Signal light (Status Green)	Off	Static mode
	Long-term lighting	RTK mode
Data light (Status Red)	Slow flash	1. RTK mode: flash as difference data interval 2. static mode:flash as sampling interval
	Fast flash	Static mode, storage space<10MB
Satellite lights (Green)	Long-term lighting	Satellite lock
	Slow flash	satellites are lost
Three lights	Fast flash	Satellite light, signal light, power light fast flash at the same time,release power button, reset motherboard.

Working Mode Switch

Double-click power button to enter the operating mode switching, double-click each time a working mode switch (switch between static and RTK mode). In static mode, signal light(green) is off, signal light (red) flash as sampling interval; In RTK, signal light(green) is long-term lighting,

signal light (red) flash as difference data interval.

NOTE: Working mode switch: You can also switch by handheld, please refer to the specific operation "Hi-Survey Software User's Guide" RTK mode setting : equipment → base\rovel → data line; static mode: setting equipment → Accessibility → static capture settings.

Rovel Handheld Difference

When the host working mode is rovel, the data line has two types: external data link and handheld difference. Handheld difference refers to connect server by handheld network and regard it as the RTK, use handheld network module to dial-up. After connecting server, it transmits the received difference data through Bluetooth, the host can be the network RTK without SIM card. The capability apples to the existing network module of handheld.

Figure 3-2

Figure 3-3

Handheld difference rovel working mode setting: In rovel setting interface, select data line “handheld”, select server, setting IP, port, group number and other parameters, click “setting” to finish setting.

“Operator”: Hangheld automaticly acquires it according to SIM card network operator.

“Server IP”: manual input server IP, port; you can also acquire by clicking “select”, select the server you need from list.

“Group number”: respectively 7 digits and 3 digits, group number less than 255,it only work when the

base and rovel should setting the same parameters.

"Network": ZHD and CORS, select ZHD when using hi-target server, select CORS when using CORS network.

Figure 3-4

Figure 3-5

Checking difference transmitting state: check difference transmitting state in suspend:

 :handheld difference(transmitting)

 : handheld difference (not transmitting)

Checking difference network state: click  to the "difference network state" interface.

If user have connected receiver and set as rovel handheld difference operation,click directly "disconnect" to stop handheld transmitting difference; click "connect to server" to transmits difference.

Figure 3-6

Static Collection

1. Set up the instrument at the measurement point, the point is to strictly, and leveling.
2. Measure instrument height, High measuring instrument

shall be measured to the center point mark stone on top of the instrument of measurement reference member.V100 receiver measuring reference member radius 0.130m.

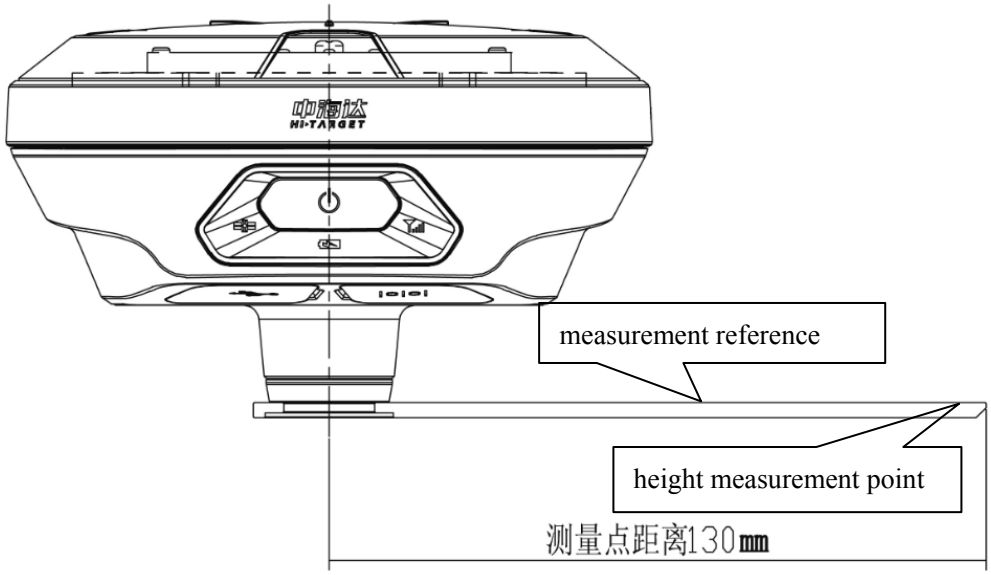

Figure 3-7

3. Record point name, instrument number, instrument height, beginning observing time.

4. Boot, set the host to the static measurement mode. Satellite light flashing indicates it is searching for satellites. Satellite light turn to long-term lighting from the flashing status indicates locked satellites. In static mode, signal light (red) flashes once based to setting

sampling interval, indicating that the acquisition of one epoch.

5. After the measurement is completely shutdown, record shutdown time.

6. Download processing data.

Note : You cannot move the base equipment and change acquisition parameters in the data collection.

Static Data Storage

Collected GNSS static data is stored in "static" disk that 8GB internal storage of V100 receiver, effective storage space is 6.6GB, includes two folders: log and gnss, log folder stores log information, the data format storage in gnss folder is * .gns. You can connect to computer through USB data cable of random configuration, copy static data to your computer in U disk operation mode.

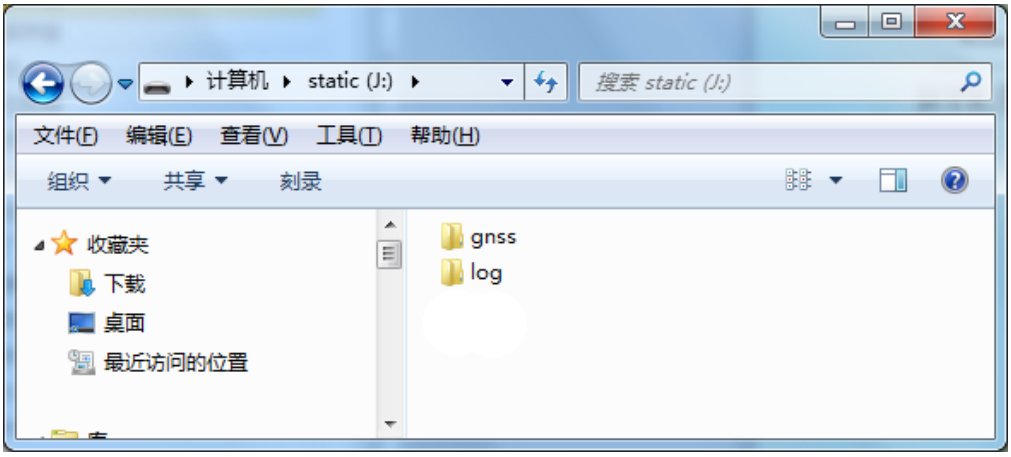

Figure 3-8

Note: 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.

Static Data Download

Receiver file management download directly without download programs in the way of U disk storage. It can only download static data and can't write or read the receiver.

The receiver can download data like U disk , it need Mini USB data cable, one end of Mini USB data cable is connected to computer USB port and the other end is connected to Mini USB port of receiver. It will appear "static" disk after connection, then opening the disk, copy the collected static

file.

Figure 3-9

The steps of modify point name and antenna height of downloaded static file are:

1. Choose *. GNS files and double click the mouse.

2. Modify point name and input antenna height in the popping up dialogue of “file edit”, and then click “OK”.

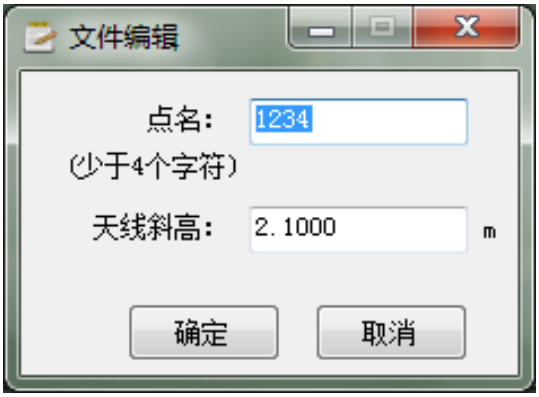

Figure 3-10

Note: The static files in removable disk can be deleted by handheld software rather than deleting directly.

Firmware Upgrading

Host firmware can be manually upgraded through the U disk

way.

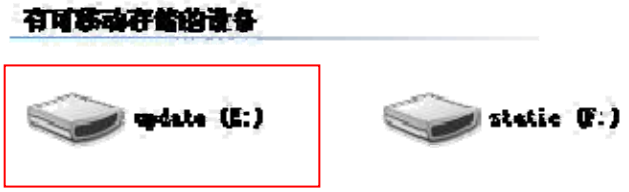

Figure 3-11

1. Open receiver, connect to computer by a random configuration USB cable. Open “my computer”, there will be "update" upgrading disk.

2. Copy host 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.

CHAPTER

4

Technical Parameters

This chapter describes:

- GNSS Configuration
- System Configuration
- Built-in Communication
- Control Panel
- External Interface
- Electric Characteristics
- Physical Characteristics
- Environment Characteristics
- Private Cloud Service

GNSS Configuration

- ✧ System core：use international first-class PCC new efficient intelligent real-time core
- ✧ Channel number：220
- ✧ BDS：B1、B2
- ✧ GPS：L1 C/A、L2E、L2C、L5
- ✧ GLONASS：L1 C/A、L1 P、L2 C/A（Limited GLONASS M and L2P）
- ✧ GALILEO：Upgrading reserve
- ✧ Output format：ASC Ⅱ：NMEA-0183 and binary : Trimble GSOF
- ✧ Difference support：sCMRx、CMR、CMR+、RTCM2.1/2.2/2.3/3.0/3.2
- ✧ RTK positioning accuracy：

  Plane：$\pm(8mm+1\times10^{-6}D)$

  Height：$\pm(15\ mm+1\times10^{-6}D)$
- ✧ Static, rapid static accuracy：

  Plane：$\pm(2.5\ mm+1\times10\text{-}6D)$

  Height：$\pm(5\ mm+1\times10\text{-}6D)$
- ✧ Code difference：0.4m
- ✧ SBAS difference：1.2m
- ✧ Initialization time：typical 8s

- ✧ Initialization reliability : >99.9%
- ✧ Data update rate : <20Hz

System Configuration

- ✧ Operation system：intelligent real-time system
- ✧ boot time: 1s
- ✧ Data storage：built-in 8GB storage

Built-in Communication

- ✧ Daul mode Bluetooth communication

Control Panel

- ✧ Panel: one key
- ✧ Indicator：three bi-color LED lights

External Interface

- ✧ 1 USB interface
- ✧ 1 five-pin interface

Electric Characteristics

- ✧ Battery : high capacity lithium 6300mAh/3.7V, removable, continuously operating time reaches above 7 hours
- ✧ Voltage: USB interface:DC 4.2-5.5V/1.5A; five-pin interface: DC6-28V/1A
- ✧ Power consumption: 3.2W

Physical Characteristics

- ✧ Core control chip CotexA8, built-in 16GB Flash memory
- ✧ Size：127.5mm×57mm
- ✧ Weight: ≤700g (lithium battery)
- ✧ Material：magnesium alloy material

Environment Characteristics

- ✧ Protection class：IP67; protect 2m temporary soaking underwater, Completely prevent dust
- ✧ Working temperature: -40 ℃ ～60 ℃
- ✧ Storage temperature:-40℃～75℃
- ✧ Relative humidity: 100%, anti-condensation

Private Cloud Service

The cloud service supports for 24 hours,realizes integrated technique of indoor work and field work, remote manage serve and support equipment. it manages team project, shares parameters and control points, post backs real-time verify and note track of result data by cloud background. After the user's authorization, terminal servers can remotely provide customers with technical support, including system version upgrading, system registration, remote debugging and other services .

CHAPTER

5

Socket and Main Accessories

This chapter describes:

- Preface
- Five-pin Socket
- Five-wire
- Mini USB Wire
- Measurement Bench Marker

Preface

The chapter will introduce the appearance and application of main interface and accessories of V100. The following equipment does not represent all V100 users purchased. There will be different according to different configurations, the specific configuration shall be subject to the delivery order upon purchasing.

Five-pin Socket

Figure 5-1

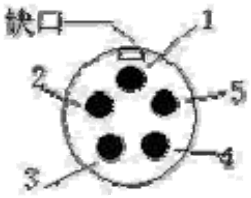

Figure 5-2

1. Five-pin socket:Also known as COM2 socket, normally used to connect the host and external data link and external power.

Table5.1 five-pin socket Signal Description

Five-core signal

1	GND
2	GND
3	Vin
4	RXD
5	TXD

2. All the circular sockets of this company start numbering pin in counterclockwise positive; circular pins start numbering pin in welding face counterclockwise.
3. All the above data out(TXD), in(RXD) signals explain by receivers. TXD is transmitting receiver data signal line, RXD is receiving receiver data signal line.
4. In addition, the computer serial port DB9 pin connector signals: 2 (RXD computer data reception signal line), 3 (TXD computer data transmission signal line), 5 (GND signal ground). Referred to as "2 reception 3 transmission."

Note: Above all are facing the host, the bottom socket of host is front icon (ie plug weld surface).

Five-wire

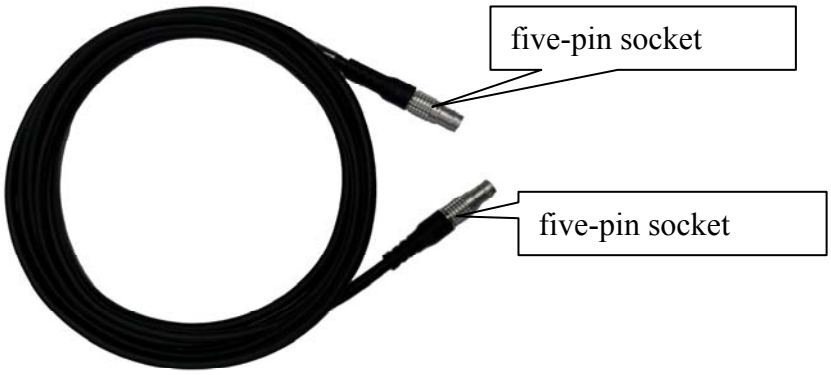

Figure 5-3

Five-wire: Connecting host and External radio, transmitting difference data;

Figure 5-4

Warning: 1. when connecting various plugs of receiver, it shall align the red point in line joint at the red point in receiver

socket, or it will damage the receiver socket and plugs of various lines.

2. When plug out the plug, directly grasp the sliding collar and pull out the plug with effort. It shall not rotate the plug.

3. After using the cable it shall place the cable in the place that are difficult for extrusion to prevent damaging the plug.

Mini USB Cable

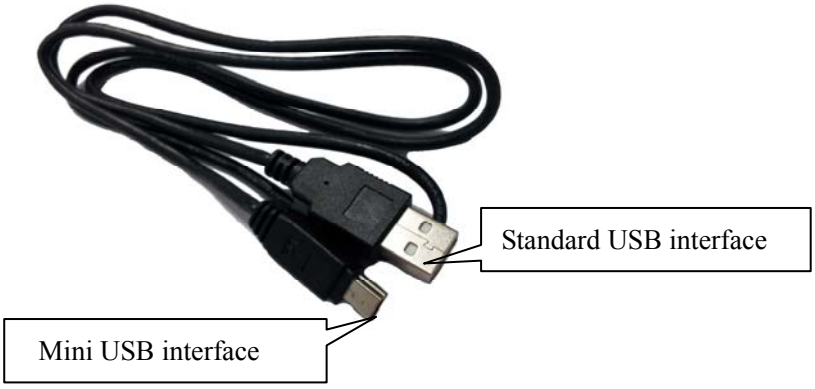

Figure 5-6

Mini USB cable, one end is a standard USB connector on

one end and Mini USB interfaces.

Measurement Bench Marker

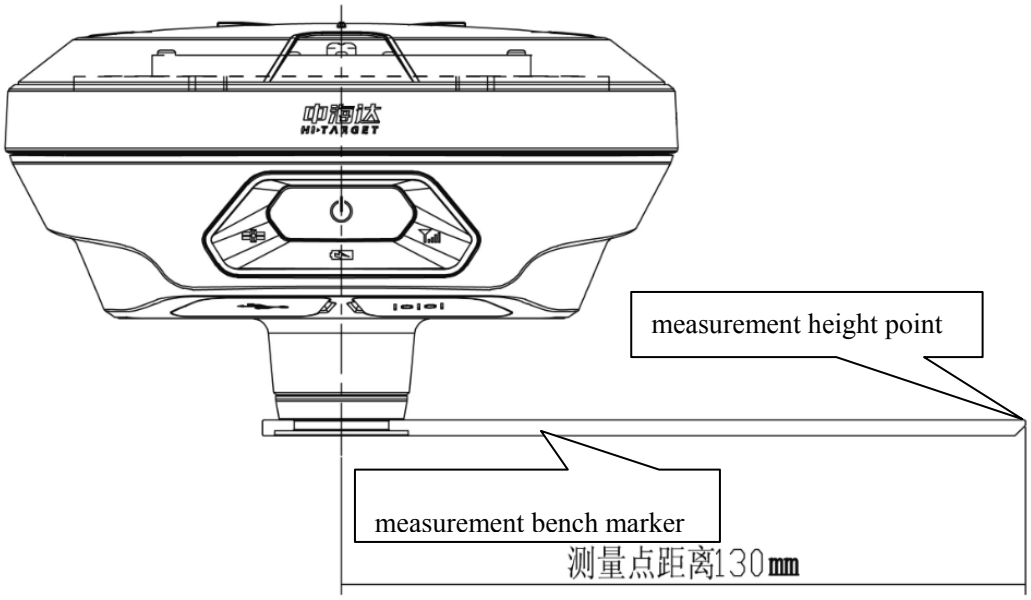

Figure 5-7

Figure 5-8

Schedule 1 control panel lights

Table 1 control panel lights illustrate

Operating	Meaning	
Power Light (Green)	Long-term lighting	Full battery
Power Light (Yellow)	Long-term lighting	Full battery voltage: internal battery≥3.9V（100% power）
Power Light (Red)	Long-term lighting	Normal voltage: 6% <internal battery power ≤99%
	Slow flash	Undervoltage: internal battery≤5%
	fast flash	Tip Power: 1-4 flash per minute under the direction of electricity 1：0%~25% 2：25%~50% 3：50%~75% 4：75%~100%
Signal light (Status Green)	Off	Static mode
	Long-term lighting	RTK mode
Data light (Status Red)	Slow flash	1. RTK mode: flash as difference data interval 2. static mode:flash as sampling interval
	Fast flash	Static mode, storage space<10MB
Satellite lights (Green)	Long-term lighting	Satellite lock
	Slow flash	satellites are lost
Three lights	Fast flash	Satellite light, signal light, power light fast flash at the same time,release power button, reset motherboard.

Schedule2 factory default parameters

Table 2 Factory default parameters

Options Content		**The factory set parameters**
System parameters	Working mode	Rover
	Data Link	Handheld difference
	Differential Mode	RTK
	Text format	RTCM(3.2)
	Height cut-off angle	10
	GPS	boot
	BDS	boot
	GLONASS	boot
	Static collection interval	5s
	Static Elevation angle	10
other	none	

Schedule3 Key accessories information

Table 3 key accessories information

name	version	manufacturer	Main performance index
Motherboard	BD970	Trimble	220channels
Antenna	Small measuring zero phase antenna	Hi-Target Surveying Instrument Co., Ltd.	51dB
Databoard	ZHD20150010B [PCBA]	Hi-Target Surveying Instrument Co., Ltd.	_

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.
This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

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.