

# V30 GNSS RTK System Manual

# **HI▶TARGET**

## Manual Revision

Revision Date	Revision Level	Description
Feb.2014	2	V30 GNSS RTK System Manual

Hi-Target Surveying Instrument Co., Ltd.

All Rights Reserved

# Content

<b>Preface</b> .....	1
Instruction .....	2
Relative Information .....	2
Your Suggestions .....	2
<b>Summary</b> .....	3
Introduction.....	4
Product Features.....	5
Usage and Notes .....	5
<b>Receiver Introduction</b> .....	7
Introduction.....	8
Receiver Appearance .....	8
Control Panel .....	9
Upper Cover.....	10
Lower Cover .....	11
Communication Module .....	12
Battery .....	13
Environmental Requirement .....	14
Electrical Interference.....	15
<b>General Operations</b> .....	16
Introduction.....	17
Button functions.....	18

---

Led Status Instructions.....	21
Turn On/Off Receiver .....	27
Static Data Storage.....	27
RTK Data Storage.....	27
Reset Receiver .....	28
Module checking.....	28
Format Receiver .....	28
Power Supply System .....	29
Communication Module .....	36
SIM Card/ USIM Card.....	40
Firmware .....	41
<b>Configuration of Fieldwork .....</b>	<b>44</b>
Introduction.....	45
Diagram for base working .....	45
Diagram for rover working .....	48
Fast Operation Guide .....	49
<b>Static Collecting .....</b>	<b>53</b>
Instruction .....	54
The procedure of V30 static survey.....	54
Download data with USB drive.....	55
Management software operation for static survey.....	55
<b>Technical Parameters .....</b>	<b>58</b>
Introduction.....	59

---

Receiver .....	59
UHF Radio Communication .....	60
3G/GPRS Network Communication .....	62
Ports .....	62
Function Key and LED .....	62
Intelligent Voice Module .....	62
Accuracy .....	62
Physical Feature .....	63
Environment.....	63
<b>Ports and Main Accessory.....</b>	<b>64</b>
Introduction.....	65
Five-pin Port and Eight-pin Port.....	65
Differential Antenna .....	67
Y Type Data Cable.....	68
<b>Regulatory Information .....</b>	<b>70</b>
Notes .....	71

**CHAPTER****1**

# Preface

## Chapter Instruction

- Instruction
- Relative Information
- Your Suggestions

## **Instruction**

Welcome to Hi-Target V30 Series GNSS RTK system manual. This manual is designed for V30 GNSS RTK system, and use V30 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, Hi-Target suggests you read this manual carefully and this manual will help you to understand our V30 GNSS RTK system easily. If you do not familiar with GNSS RTK, please check Hi-Target website: <http://www.hi-target.com.cn/en/>

## **Relative Information**

You can get the manual from: 1, the complement CD when purchasing Hi-Target V30 equipment. You can get this manual from folder named Manual; 2, Download from Hi-Target website, Go to “Support” -> “Manual” -> “Surveying Products”.

## **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**

### **Chapter Introduction**

- Introduction
- Products Features
- Usage and Notes

## Introduction

V30 GNSS RTK system adopts modularized design, so as to enable users to change into different differential transmission modules according to various requirements. Those are traditional radio transmission, GPRS and 3G communication functions. Meanwhile the designed self-diagnosis function can automatically check the working status of all hardware and software of the V30 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. V30 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 or Hi-Target Foreign Trade Dep.  
Immediately.

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

## **Product Features**

1. BD970 mother board of Pacific Crest, a Trimble Company, multi-satellite, multi-system kernel.
2. Built-in transmit-receive UHF, exchangeable Base and Rover.
3. The radio power is adjustable to be 0.1w, 1w, 2w.
4. 1+X multi-module communication units.
5. PCC Radio module (optional) compatible with Trimble/Leica RTK.
6. Double battery capacity as 4400mAh, 12 hours for RTK operating.
7. The highest performance in waterproof, dustproof and anti-drop.
8. Adjustable to be single GNSS system or multi-GNSS system: GPS, GLONASS, GALILEO.

## **Usage and Notes**

Although V30 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. More details please refer to Chapter 7: Technical Parameters.

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  $15^\circ$  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.

## CHAPTER

## 3

# Receiver Introduction

## Chapter Introduction

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

## Introduction

This Chapter mainly introduces V30 receiver appearance, buttons and indicator led and so on.

## 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

## Control Panel

Figure 3-2, in the middle of red frame of V30 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 v30 receiver.



Figure 3-2 Control Panel



Satellite led (green led)



Status led (red-green dual-color led)




Power led (red-green dual-color led)



Function Key: settings of working mode, UHF radio

transmitting power, satellite elevation angle, automatically base setting, reset receiver and so on.

**F2** Function Key: settings of data link, UHF radio channels, collection interval, back to original setting.

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

## Upper Cover

Figure 3-3 indicates the upper cover of V30 receiver, the main function of which is anti-drop and anti-scratch.

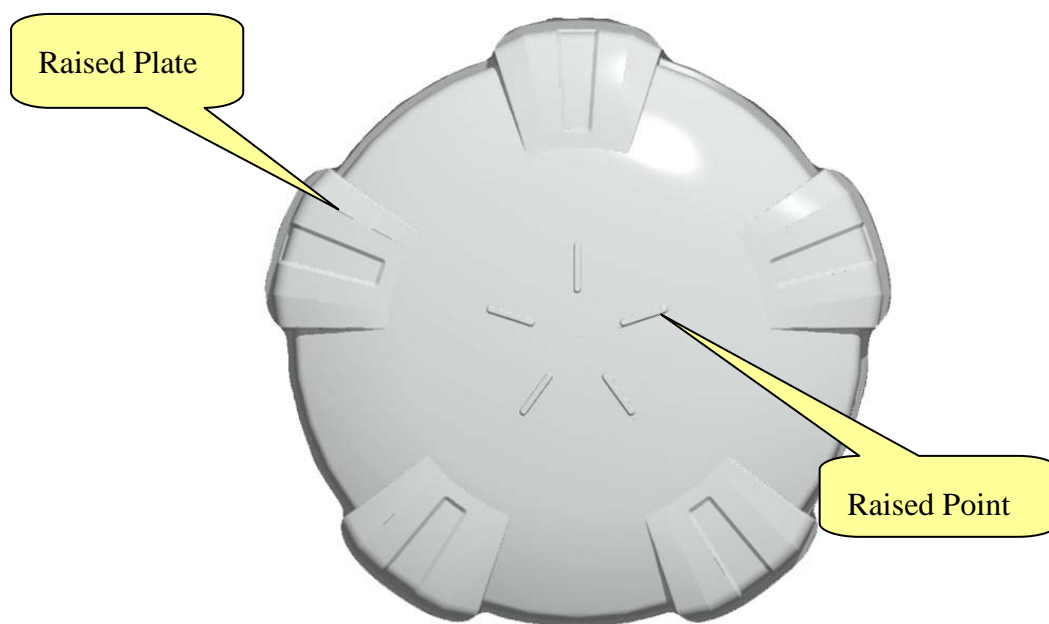


Figure 3-3 Upper Cover

- ✧ Raised Point: anti-wear point to avoid instrument being scratched
- ✧ Raised Plate: 5 raised plates can avoid wear-out and falling

## Lower Cover

As figure 3-4, lower cover of V30 includes communication module slot, battery groove, five-pin port, eight-pin port, loudspeaker and so on.

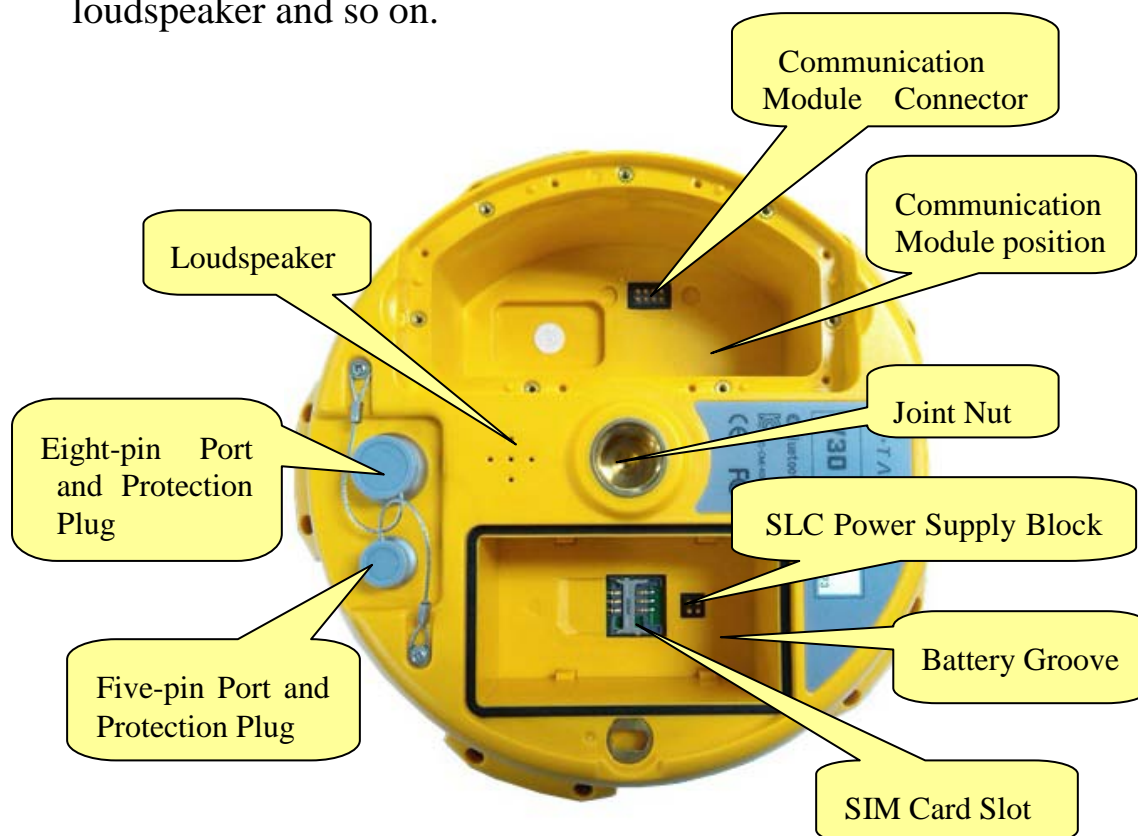


Figure 3-4 Lower Cover

- ✧ Communication Module: according to different requirements, traditional UHF radio, GPRS and 3G communication module can be chosen
- ✧ Communication module connector: connect communication module and mainframe
- ✧ Battery Groove: install 4400mAh lithium battery
- ✧ Five-pin port: connect mainframe with external data link or

with external power supply

- ✧ Eight-pin Port: connect V30 receiver with computer, or controller for data download and delete
- ✧ Protection Plug: anti-dust and waterproof for socket
- ✧ SIM card slot: when choose GSM communication, install SIM card.
- ✧ 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.

## Communication Module

As figure 3-5 of the appearance of communication module, according to different requirements, V30 receiver can be installed with traditional UHF radio, GPRS and 3G communication module.



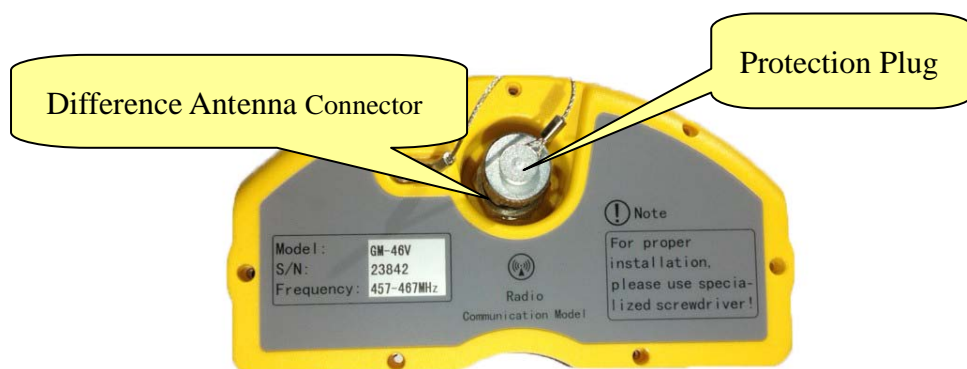


Figure 3-5 Communication Module 1

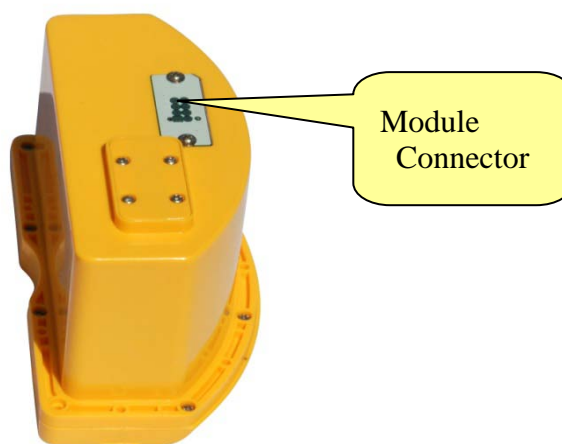


Figure 3-6 Communication Module 2

## Battery

As figure 3-7, the appearance of 4400mAh lithium Battery



Figure 3-7 Battery Front

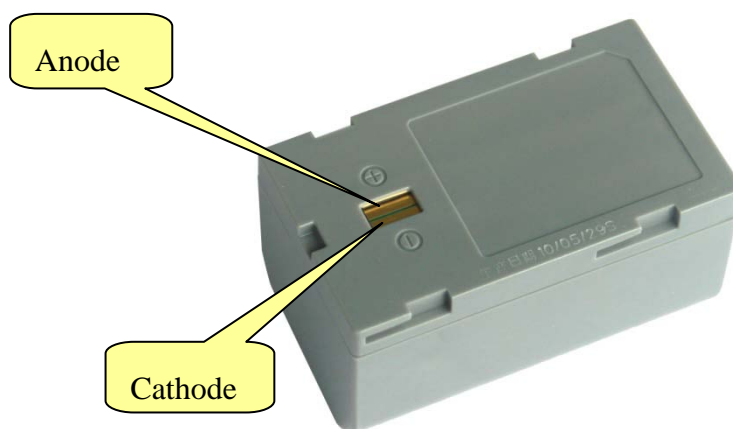


Figure 3-8 Battery Back

## Environmental Requirement

Even though V30 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

## **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**

## **Chapter Introduction**

- Introduction
- Button Functions
- Led Status Instructions
- Turn On/Off Receiver
- Static Data Storage
- RTK Data Storage
- Reset Receiver
- Back to Original Settings
- Format Receiver
- Power Supply System
- Communication Module
- SIM Card/ USIM Card
- Firmware

## Introduction

Most of the operations of V30 receiver can be done by the three buttons on the mainframe panel.

Buttons on the panel:

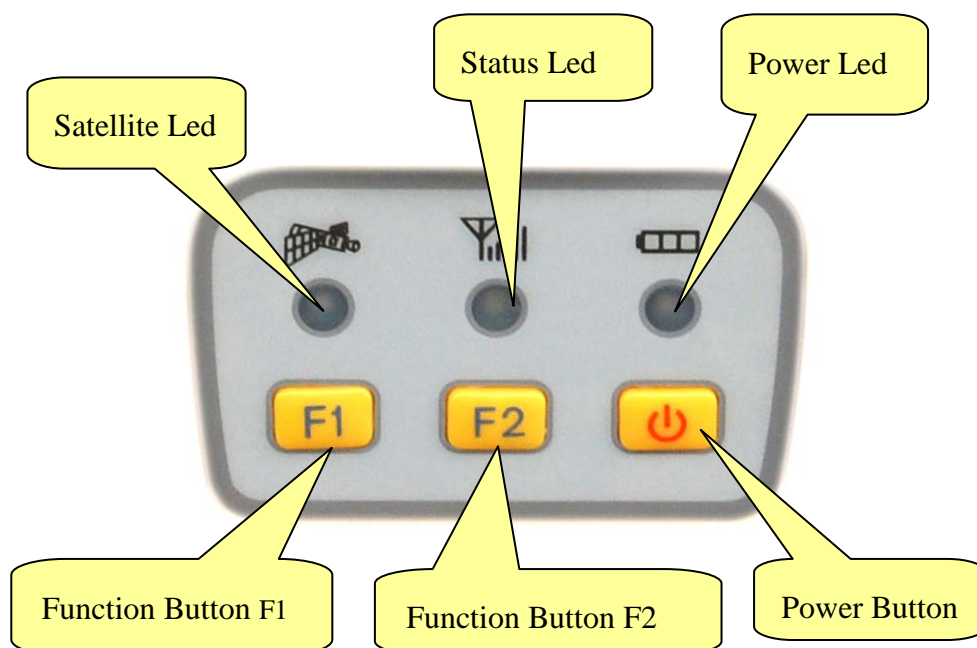


Figure4-1 Mainframe Panel

Explanations of buttons operations and leds hints as below:

Operations	Explanation
Single click button	Press a button less than 0.5 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

## Button functions

Factions		Button operations	Introduction
<b>Work mode</b>		Double click F1	Then single click F1 to choose the receiver work mode among “base”, “rover”, “static”
<b>Data link</b>		Double click F2	Then single click F2 to choose the data link among “GSM”, “UHF”, “External”
<b>UHF mode</b>	Power	Long pressing F1	Then single click F1 to set the transmit power to be high, middle, or low
	Channel	Long pressing F2	Then single click F1 to choose channel by minus 1; or you can long pressing F1 to choose channel by minus 10; or single click F2 to choose channel by plus 1; or you can long pressing F2 to choose channel by plus 10
<b>Static</b>	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 collection interval to be 1s, 5s, 10s
	Static data collection	Double click F2	Double click F2 to start collecting static data
<b>Confirm setting</b>		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 hint its power status
<b>Auto-set base</b>		F1+Power button to turn receiver	Press F1 while then press power button at the same time to turn on the receiver until hearing “Dingdong”. Then the receiver speak out its current status.
<b>Reset receiver</b>		Long press F1	Reset the mother board
<b>Back receiver to original settings</b>		Long press F2	Then it will automatically rectify, correct and reset to the original settings.
<b>Check current work status</b>		Single click any button in non-settings status	For static mode : receiver speaks out “static”, collection interval, elevation angle; at the same time the power led flashing times hint the power status and the satellites led flashing times hint tracked satellites number  For base in external mode: receiver

		<p>speaks out “external, base”; at the same time the power led flashing times hints the power status</p> <p>For rover in external mode: receiver speaks out “external, rover”; at the same time the power led flashing times hints the power status</p> <p>For base in internal UHF: receiver speaks out “UHF, base, channel **, power **”; at the same time the power led flashing times hints the power status</p> <p>For rover in internal UHF: receiver speaks out “UHF, base, channel **” ; at the same time the power led flashing times hints the power status</p> <p>For base in GSM mode: receiver speaks out “GSM, base”; at the same time the power led flashing times hints the power status</p> <p>For rover in GSM mode: receiver speaks out “GSM, rover”; at the same time the power led flashing times hints the power status</p>
--	--	---



## 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: $7.2V < \text{internal battery voltage} \leq 7.6V$ , $11V < \text{external battery voltage} \leq 12.6V$
	Slow flash	Low power-pressure: inter $\leq 7.2V$ , external $\leq 11V$
	Fast flash	Power status hints: one or four times of one minute
Status led (green led for status)	Off	In external radio, UHF mode, and static mode
	Always on	GSM module has been connected to internet server successfully
	Slow flash	GSM module has been connected to internet successfully
	Fast flash	GSM module is trying to connect to internet server
Data led (red led for status)	Slow flash	1. getting correction data via GSM or radio (only receiving corrections for rover while transmitting for base)  2. collection static data in static mode
	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

### Led displaying in different mode:

**1. Work Mode** (double click F1 to enter work mode setting, then single click F1 to choose work modes among static, rover and base. After that single click power button to confirm the current setting. If no confirming within 10 seconds, the receiver will automatically confirm the current settings.) :

● on    ○ off

Mode	Satellite led (green led)	Status led (green led of the dual-color led)
Base	●	○
Rover	○	●
Static	●	●

**2. Data Link** (double click F2 to enter data link setting, then single click F2 to choose from GSM, UHF, and external, After that single click power button to confirm the current setting. If

no confirming within 10 seconds, the receiver will automatically confirm the current settings.) :

● on      ○ off

Data link	Satellite led (green led )	Status led (green led of dual-color led )
UHF/GSM/CMDA module	●	○
Internal GSM/CMDA	○	●
External	●	●

**3. Transmitting Power** (must be set in UHF mode. Long press F1 to enter transmitting power setting, then single click F1 to choose among high, middle, and low. After that single click power button to confirm. If no confirming within 10 seconds, the receiver will automatically confirm the current settings.) :

● on      ○ off

Choice	Satellite led (green led )	Status led (green led of dual-color led )
Low	●	○
Middle	○	●
High	●	●

**4. Radio Channel** (must be in UHF mode. Long press F2 to enter radio channel setting. Then single press F1 to choose channel by minus 1; or long press F1 to choose channel by minus 10; or single click F2 by plus 1; or long press F2 by plus 10. After that single click power button to confirm. If no confirming within 10 seconds, the receiver will automatically confirm the current settings.) :

● on      ○ off

Channel	Satellite led (green led)	Status led (green led of dual-color led)	Data led (red led of dual-color led)	Power led (red led of dual-color led)	Power led (green led of dual-color led)
0	○	○	○	○	○
1	●	○	○	○	○
2	○	●	○	○	○
3	●	●	○	○	○
4	○	○	●	○	○
5	●	○	●	○	○
6	○	●	●	○	○
7	●	●	●	○	○
8	○	○	○	●	○
9	●	○	○	●	○

10	○	●	○	●	○
11	●	●	○	●	○
12	○	○	●	●	○
13	●	○	●	●	○
14	○	●	●	●	○
15	●	●	●	●	○
more	○	○	○	○	●

**5. Elevation Angle** (must be in static work mode. Long press F1 to enter elevation angle setting. Then single click F1 to choose elevation angle. After that single click power button to confirm. If no confirming within 10 seconds, the receiver will automatically confirm the current settings.) :

● on      ○ off

Choice	Satellite led (green led)	Status led (green led of dual-color led)
5	●	○
10	○	●
15	●	●

**6. Collection Interval** (must be in static work mode. Long press F2 to enter collection interval setting. Then single click F2 to choose collection interval. After that single click power button to confirm. If no confirming within 10 seconds, the receiver will automatically confirm the current settings.)

● on      ○ off

Choice	Satellite led (green led)	Status led (green led of dual-color led)
1	●	○

5	○	●
10	●	●

## Turn On/Off Receiver

Turn on	Press power for 1 second	All leds on	With turning on music, receiver speaks out the last settings of work mode, data link etc.
Turn off	Long press power button for 3 seconds	All leds on	With turning on music

## Static Data Storage

The GNSS static data collected by V30 receiver will be stored in its memory, in \*.GNS format.

You can connect the V30 receiver with PC by USB port of Y 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.

## 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.

## Reset Receiver

Long press F1 button for more than 6 seconds 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.

---

## Module checking

Long press F2 for more than 6 seconds to check the module in current work mode.

## Format Receiver

Format V30 receiver by Hi-Target V30 Receiver Management Software:

- ✧ Connect V30 with PC by serial port of Y data cable
- ✧ Turn on V30 receiver
- ✧ Choose right serial port and open port
- ✧ After connecting successfully as figure 4-2: 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.



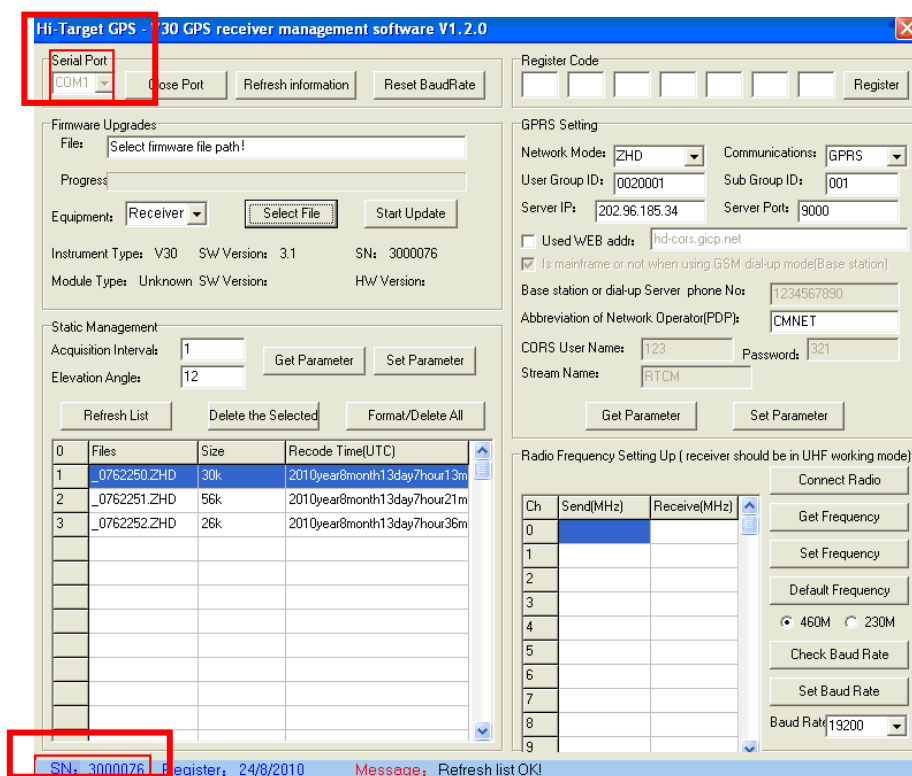


Figure 4-2



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

## Power Supply System

### ✧ Assembly and Disassembly of Battery Cover

#### Assembly:

1. Firstly insert one side

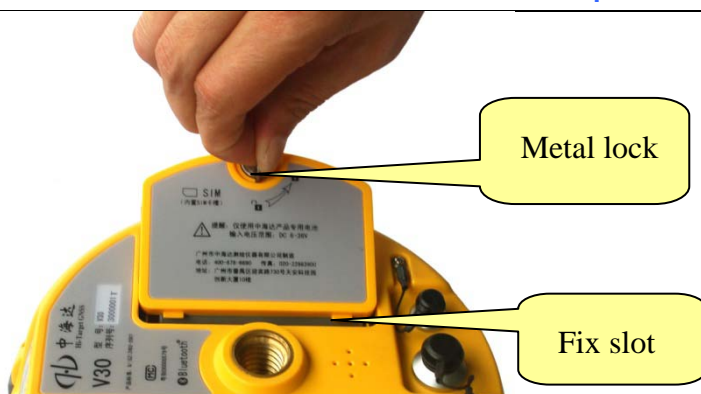


Figure 4-3

2. Turn the metal lock by 90° to the panel side and press it to be ok.



Figure 4-4

**Disassembly:**

1. Pull the metal lock up and turn to the two ports direction by 90°



Figure 4-5



2. Pull the metal lock to get off the battery cover



Figure 4-6

## ✧ Install and Uninstall Battery

### Install:

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

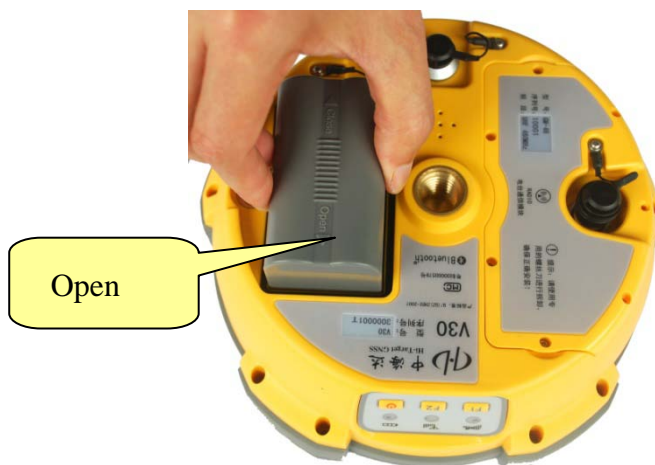


Figure 4-7

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

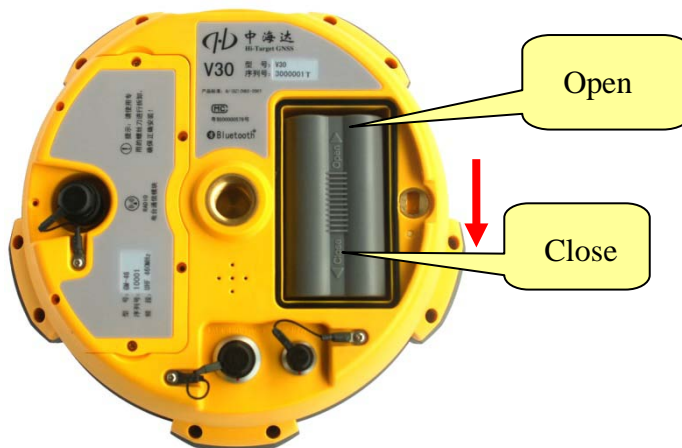


Figure 4-8

## Uninstall:

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

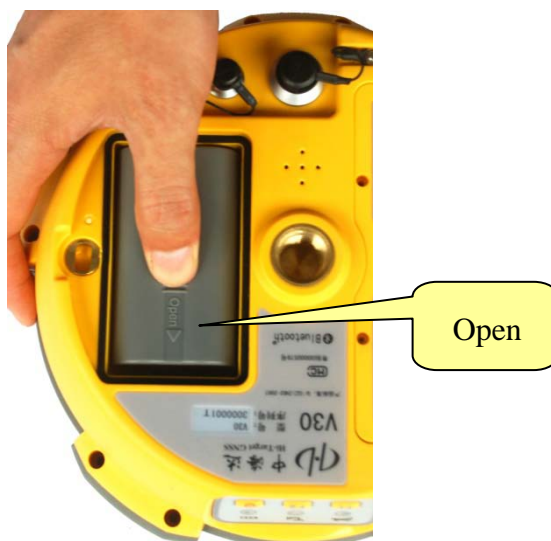


Figure 4-9

## ✧ V30 Receiver Battery Name and Model

Name	Model
4400mAh lithium battery	BL-4400
V30 lithium battery charger	CL-4400

## ✧ 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 V30 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 Hi-Target to avoid any destroy to the receiver.



Note: usually one V30 lithium battery can last 13 hours for static, 12 hours for RTK while 9 hours for base in UHF work mode with 2 W internal radio. But the working time will be decreased along with the more and more charging times or in very low temperature.

## ✧ Battery charging

BL-4400 lithium battery must be charged in specified CL-4400 charger of Hi-Target for about 6 hours. The indicator led of the charger will be in red while charging, and then green when charging finished.

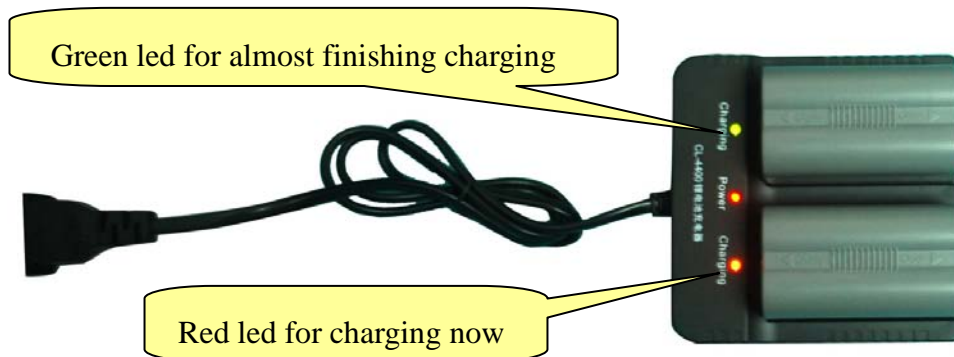


Figure 4-10

## ✧ Charging Operations



1. Matching the  in the battery with  in the charger, put the battery in.



Figure 4-11

2. Slide battery towards to “Close” end (as the above arrow direction) until battery is locked
3. After connecting battery with the charger, the “Charging” led becomes red.



**Warning:** 1. Only using Hi-Target 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.

## Communication Module

### ✧ Module type:

Module type	Instruction
GM-46V	460MHz radio, compatible with V9 UHF
GM-46PV	430MHz ~ 470MHz radio, compatible with Trimble, Leica
GM-42PV	390MHz ~ 430MHz radio, compatible with Trimble, Leica



## ✧ Install and Uninstall Communication Modules

Communication modules are radio module, and GPRS/3G module.

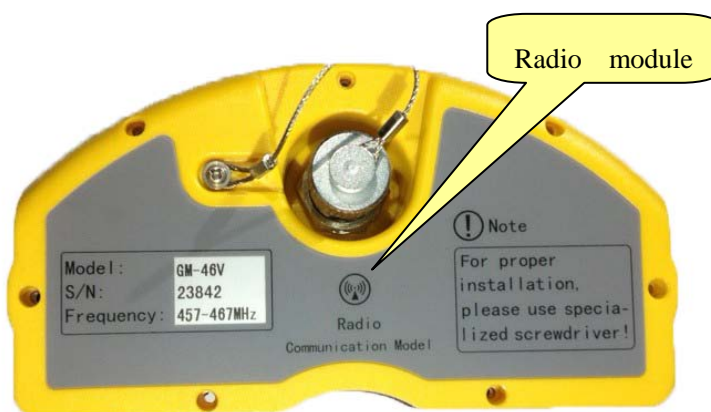


Figure 4-12 Radio module

### Installation:

1. Put the module into the module slot.



Figure 4-14

2. There are 7 screws in the module. Please screw them down using the screw driver.



Figure 4-15

---

**Uninstall:**

Screw out the 7 screws and pull the module out.

**✧ Radio Channel Setting**

For the GM-46Vradio of 455~465MHz or 440~450MHz, which is compatible with V9, there are 100 channels for users' choice; for the GM-46PV radio of 430 ~ 470MHz and GM-42PV radio of 390MHz~430MHz, which are compatible with Trimble Leica, there are 32 channels for users' choice.

There are two methods to set the radio frequency:

1. Long press F2 on the V30 mainframe to set.
2. After connected with controller, using Hi-RTK software to set.

Note:

1. The channel of rover must be the same as that of base, only in which case they can cooperate together.

2. Try to use the channel in a good environment with less interference. The below way is offered for users to find a good channel:

- Firstly don't set base, just set the rover in one channel
- Check the data led (the middle led) of the rover. If the red led flashes, it hints that there are some other transmitting data around in this channel. You should change to another channel until you find a channel with no interference.
- After you find a good channel, setting your base

to this channel and start your work.

## SIM Card/ USIM Card

Either SIM card or USIM card can be used in V30:

USIM Card	WCDMA (ZHD/VRS)
	GPRS (ZHD /VRS)
	GSM
SIM Card	GPRS (ZHD /VRS)
	GSM

### ✧ Card installation

#### For built-in GPRS SIM card:

1. Take out the battery, then you can see the SIM card slot

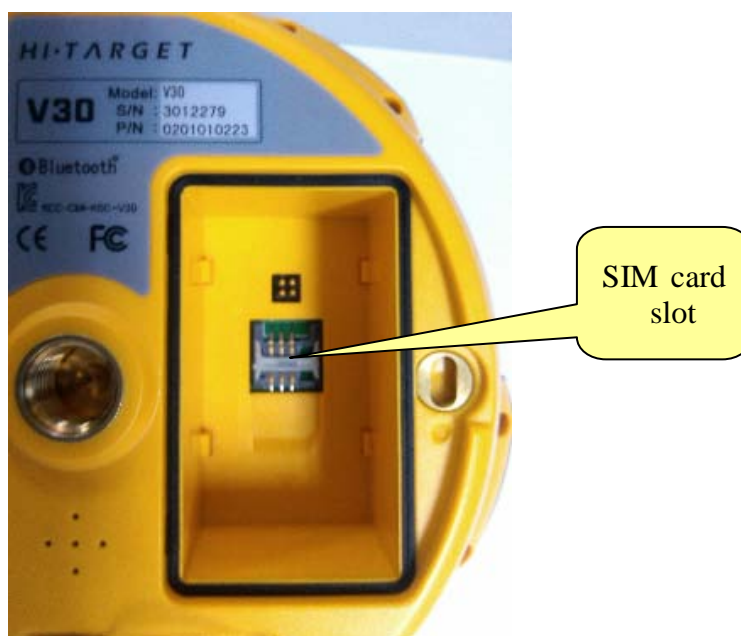


Figure 4-16

2. Insert SIM card as below:



Figure 4-17



Note: 3G card can also be installed here.

## Firmware

### ✧ Firmware upgrading

There are two kinds of upgrading for V30: 1. Mainframe upgrading. 2. Radio module upgrading. Except the difference of choosing upgrading device, all the other operations are the same. You can see the difference below:

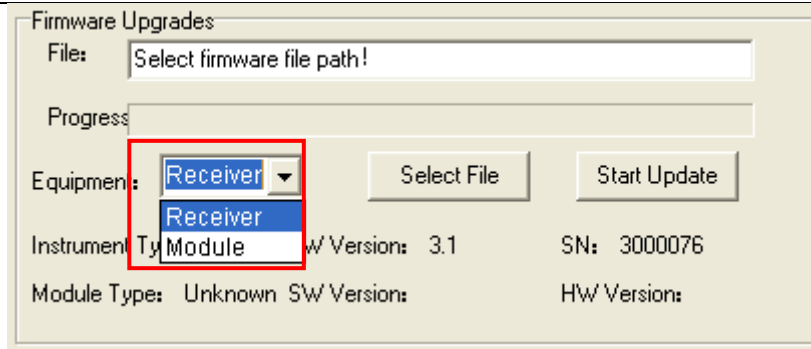


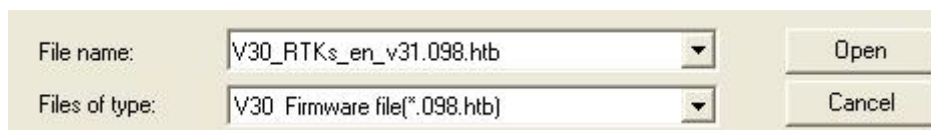
Figure 4-18

Steps for upgrading:

1. Connect V30 with PC by serial port of Y type data cable
2. Turn on V30 receiver
3. Choose the right serial port and open port
4. After connecting successfully as figure 4-2: the S/N will be shown in the bottom
5. Choose the “upgrade device” to be “receiver” or “module” as you need, and then click “select file” to find the firmware file in you PC



Warning: The firmware file must be with the postfix as \*.098.htb, or the upgrading will be failed.



6. Click “upgrade” and then the receiver will be turned off automatically, then start again and it will start upgrading.
7. You can see the three leds on the panel will flash in turn while upgrading.
8. When the software pop up information of upgrading successfully, then restart your receiver.

## CHAPTER

## 5

# Configuration of Fieldwork

## Chapter Introduction

- Introduction
- Diagram for base working
- Diagram for rover working
- Fast Operation Guide



## Introduction

In this section, the working program and Easy of Use for the base and rover of V30 GNSS RTK are introduced. According to the system of V30 GNSS RTK which is required by the customer, only the customer who buys the module can get the relative configuration of working program and the configuration of working program. The below is not for all the customers who buy the system of V30 GNSS RTK. Please refer to the relative configuration of working program for the instrument which you buy.

### Diagram for base working



Figure5-1 working mode for base with built-in GPRS/3G

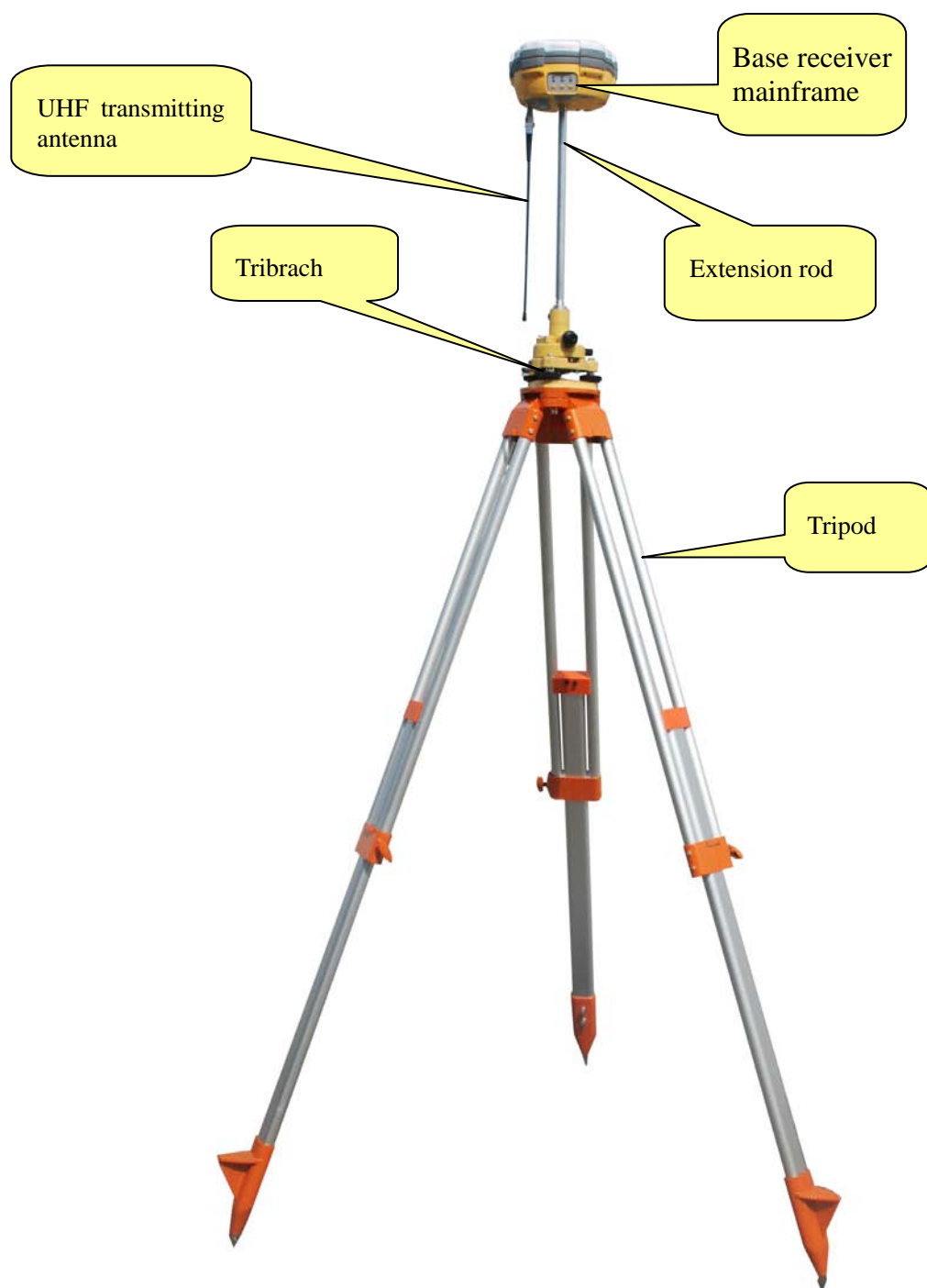


Figure 5-2 working mode for base with built-in radio

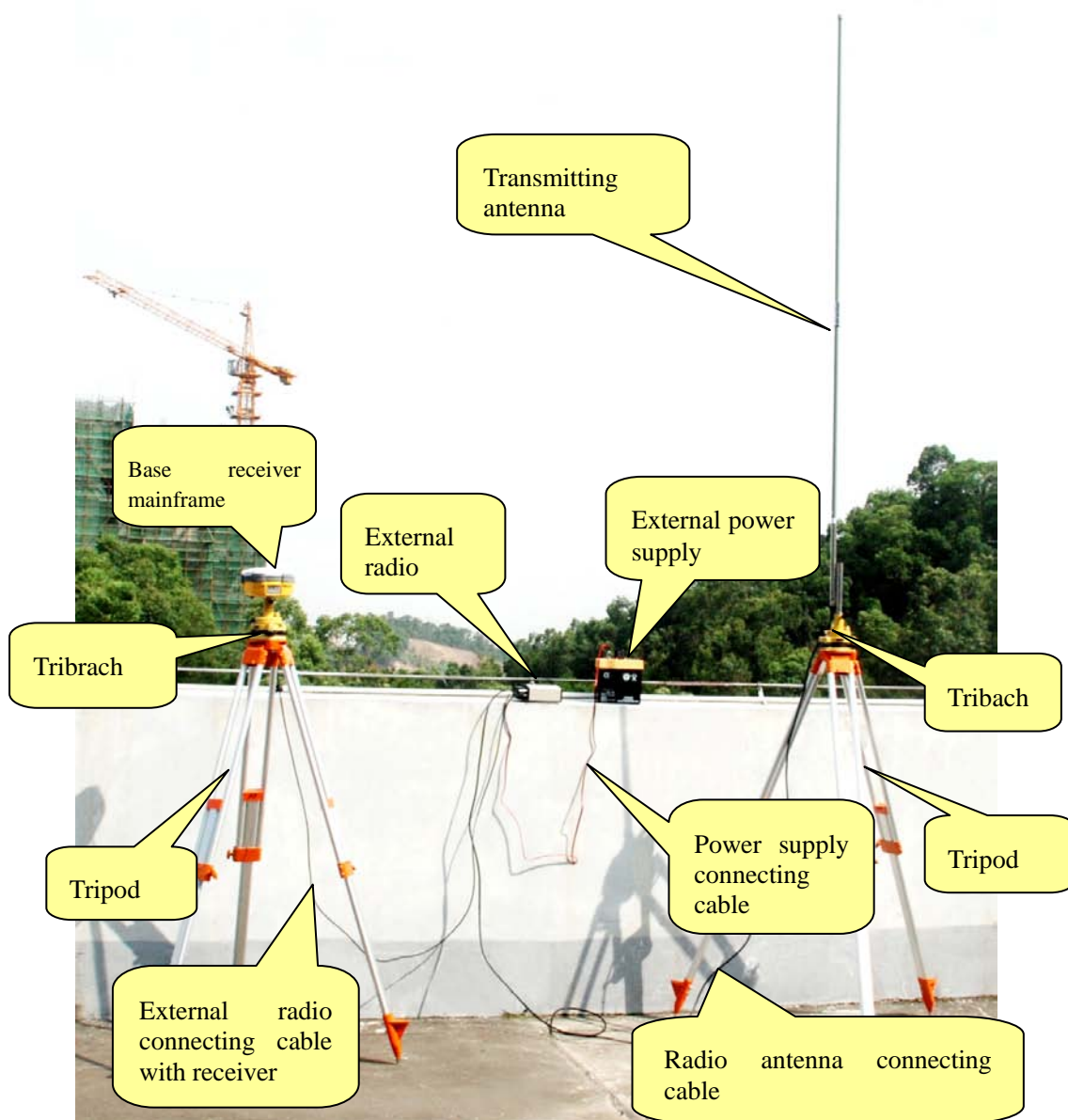


Figure 5-3 working mode for base with external radio

## Diagram for rover working

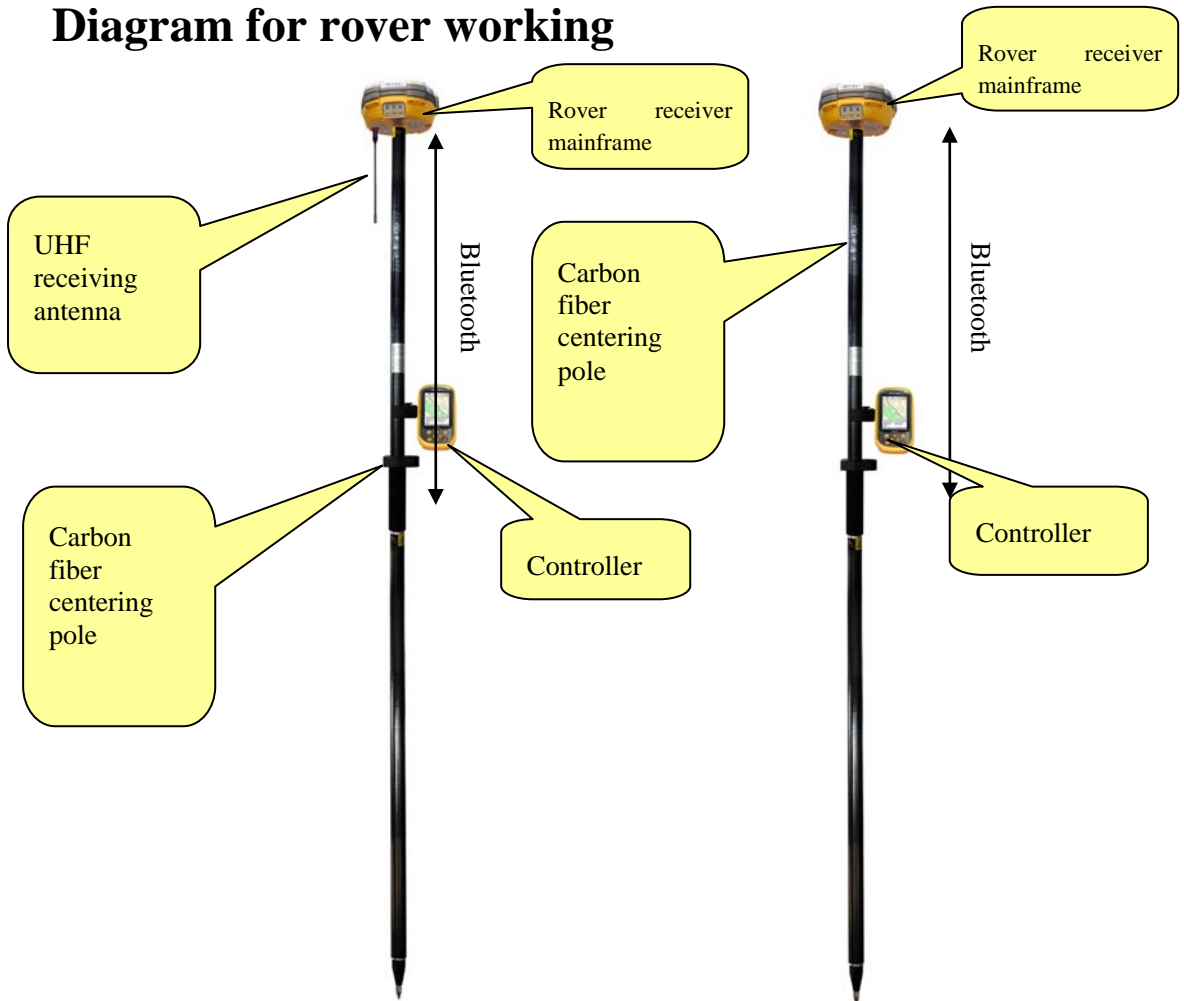


Figure 5-4 UHF rover

Figure5-5 GPRS/3G rover

## Fast Operation Guide

### ✧ Rover or base mode with built-in GPRS or 3G module.

#### 1. Set base/rover

Double click F1 with the voice prompt “base”, “rover” and “ static” to choose the working mode you need, press power button to confirm the setting.

#### 2. Set GSM data link

Double click F2, then choose GSM mode from UHF,GSM and external radio then click the power button to confirm.

#### 3. GPRS setting

There are two ways. One is using the Controller with Hi-RTK software, please refer to Hi-RTK manual to find more details on how to do the settings. The other way is by using the management software. Connecting the receiver to PC with Y type cable, then open the management software of V30 receiver, choose the serial port and then open it. After the instrument is connected, do the settings through the management software of V30 receiver. Refer to figure 5-6.

GPRS Setting

Network Mode:  Communications:

User Group ID:  Sub Group ID:

Server IP:  Server Port:

☐ Used WEB addr:

☒ Is mainframe or not when using GSM dial-up mode(Base station)

Base station or dial-up Server phone No:

Abbreviation of Network Operator(PDP):

CORS User Name:  Password:

Stream Name:

Figure 5-6 GPRS Setting

Netw ork mode	Communicat ing way	Setting Contents
ZHD	GPRS/CDMA	Group ID, IP, port and APN
	GSM	The dialing function, input the phone number of base. Make sure that the SIM cards have opened the calling function
VRS	CDMA/CDMA	IP address, port, network operator (APN), VRS user name, pass word, mount point list

Notes: If the server does not provide IP, you can tick “use server website” and then input the website to log in.

### ✧ Base or rover mode with UHF radio module

#### 1. Set base/rover

Double click F1 with the voice prompt “base”, “rover” and “ static” to choose the working mode you need, press power button to confirm the setting.

## 2. Set UHF data link

Double click F2, then choose UHF mode from UHF,GSM and external radio then click the power button to confirm.

## 3. Set UHF radio channel

Hold F2 button with voice prompt to choose the channel in need, press power button to confirm.



Note: Base and rover must be in the same channel for a normal work.

---

The differential signal is being transmitted while the signal light (red) is flashing once at one second. Meanwhile, the rover have received the signal while the signal light (red) of rover is flashing synchronously once at one second. Now RTK work can be started. If the signal led (red) of rover does not flash, that means it has not received the differential signal.

## 4. Set the power of radio:

When the working distance becomes farther, you can set the power of the radio of the base through the control panel. Pressing F1 button until hearing the voice prompt: high, medium, low, the working distance is getting lower in

sequence.

✧ **Base or rover mode with external data link.**

1. Set base/rover:

Double click F1 with the voice prompt “base”, “rover” and “ static” to choose the working mode you need, press power button to confirm the setting.

2. Set External data link:

Double click F2, then choose External radio from UHF,GSM and external radio then click the power button to confirm.

3. Setting the radio channel of external data link in base.

Do this through adjusting the external UHF radio to the right channel.

4. Setting the UHF radio channel of rover:

Hold F2 button with voice prompt to choose the channel in need and press power button to confirm.



## CHAPTER

## 6

# Static Collecting

## Chapter Introduction

- Introduction
- The procedure of V30 static survey
- Download data with USB
- Management software operation for Static Survey

## Instruction

V30 receiver can be used as dual-frequency static surveying instrument. The collected static survey data is saved in the memory in the main frame. The static survey data have to be downloaded to PC with post-processing software to process.

### The procedure of V30 static survey

1. Locate the instrument on a point, centering and leveling it.
2. Measure the height of instrument for three times, on condition that the difference of each measuring is less than 3mm and the final height of the instrument should be the average height. The height of instrument should be defined from the controlling point of base centre to upper edge of marker line. The antenna radius of V30 receiver is 0.087 meter; the height of phase center is 0.065 meter.



Figure 6-1 Instrument height measure point

3. Record the point name, instrument S/N, instrument height and observing initiated time.

4. Turn on the instrument and set it to static surveying mode. The satellite led flashing means the instrument is tracking the satellites. The satellites are locked once the satellite led turns into constant on. Status led flashes due to your collection interval. If setting the interval to 1 second the led will flash once a second.

5. Turn off the instrument after the static survey is finished and record the turn-off time.

### ✧ Download and post-process the data



Note: Don't move or change the collecting setting while the instrument is collecting data.

---

## Download data with USB drive

The data of V30 receiver can be downloaded with USB drive, use the Y type data cable, connect one side to USB port of PC and the other side to the 8-pin jack of main frame. After connecting, you will see a folder named GNSS in the PC, the static data are here, you can copy the according files directly.



Note: The series port can not be used to download data, but can delete static data.

---

## Management software operation for static survey

## The main function of static file management software of V30 receiver:

- ✧ Delete original data
- ✧ Delete and format the whole memory
- ✧ Read parameters
- ✧ Set parameters
- ✧ Refresh list

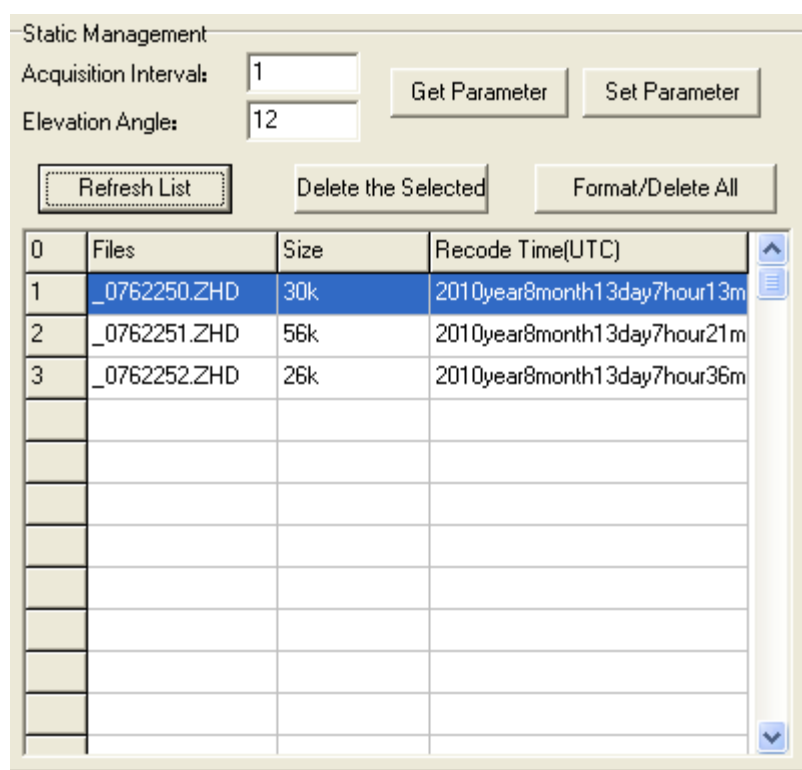


Figure 6-2

### Operating steps:

1. Connect Y type data cable to 8-pin port of V30 receiver and the series port of PC

2. Choose the right PC port and click “connect port”
3. Refresh list, the observation data files will be in the list
4. File name: 8 digit character: the first char is replaced by underline, the second, third, and forth are the last two numbers of S/N number of the receiver from which the data is collected; the fifth, sixth, and seventh is the year-accumulated-date; the last char is the collecting period of the day
5. Set up time: GNSS time.
6. Delete data: choose the data need to be deleted, click delete files.
7. Change collecting interval and satellite cutoff/elevation angle: input value and click set parameters. Click read parameters to view the original collecting interval and satellite cutoff angle.

### **Static data post processing:**

The new post processing software of Hi-Target is Hi-Target Geomatics Office (HGO), use this software to do post processing.

Please refer to “Hi-Target Geomatics Office Data Post Processing Software Manual” for detailed information of data processing.

**CHAPTER****7**

# Technical Parameters

## Chapter Introduction

- Introduction
- Receiver
- UHF Radio Communication
- 3G/GPRS/CDMA/Internet Communication
- Ports
- Function Key and Indicator Led
- Intelligent Voice Module
- Accuracy
- Physical Feature
- Working Environment

## Introduction

Here we list out all Technical Parameters of V30 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.

## Receiver

- ◎ 220 channels
- ◎ 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)
- ◎ Trimble Maxwell 6 of advanced user-defined GNSS Technology
- ◎ 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: CMR, CMR+, RTCM 2.1, 2.2, 2.3, 3.0, 3.1
- ◎ Navigation Output Format: ASCII: NMEA-0183 GSV, AVR, RMC, HDT, VGK, VHD, ROT, GGK, GGA, GSA, ZDA, VTG, GSTPJT, PJK, BPQ, GLL, GRS, GBS and binary system: Trimble GSOF

## **UHF Radio Communication**

### **GM-46V Module**

- ◎ Compatible with V8 and the other products of Hi-Target with transmitting or receiving radio in 460 MHz
- ◎ With difference transmit-receiver function and transmit power can be adjustable among 0.1w, 1w and 2w
- ◎ Radio Frequency bands of 450~470MHz with 100 flexible switching channels
- ◎ Reference to Radio Frequency list
- ◎ With top 19.2 Kbps wireless transmit speed

### **PCC Radio Module**

- ◎ Compatible with Trimble/Leica RTK Radio
- ◎ With difference transmit-receiver function and transmit power can be adjustable to be 0.1 w, 0.5w or 1 w
- ◎ Radio Frequency bands 430 MHz~470MHz with 32 flexible switching channels and the frequency of each channel can be customized.
- ◎ With top 19.2 Kbps wireless transmit speed
- ◎ Support the below protocol, convenient for user to work compatible with their own products:



- o Transparent EOT Timeout
- o Transparent EOC Character
- o Packet Switched
- o TRIMTALK 450S
- o TRIMMARK II/Ile
- o TRIMTALK 3
- o TT450S
- o SATEL

### **External PCC Radio**

- ◎ Original import PCC radio
- ◎ Input power: DC 9~30 V
- ◎ Transmit-receiver radio. The top transmit power has different optional as 4W or 35 W
- ◎ Radio Frequency bands 430 MHz ~ 470MHz with 32 flexible switching channels and the baud rate of each channel can be customized.
- ◎ With top 19.2 Kbps wireless transmit speed
- ◎ Support the below protocol, convenient for user to work compatible with their own products:
  - o Transparent EOT Timeout
  - o Transparent EOC Character
  - o Packet Switched
  - o TRIMTALK 450S
  - o TRIMMARK II/Ile

- o TRIMTALK 3
- o TT450S
- o SATEL

## **3G/GPRS Network Communication**

- ◎ Default Configuration with built in GPRS Internet Communication, with optional of 3G Module.

## **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 for GSM or CDMA
- ◎ 1 built-in Li-ion battery groove
- ◎ 1 built-in communication module port

## **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)

## **Intelligent Voice Module**

- ◎ Broadcasting function for each operation in English

## **Accuracy**

- ◎ Static, Fast Static: Horizontal:  $\pm(2.5 + 1 \times 10^{-6}D)$  mm  
Vertical:  $\pm(5 + 1 \times 10^{-6}D)$  mm

- ◎ RTK Accuracy: Horizontal:  $\pm(10+1\times10^{-6}D)$  mm  
Vertical:  $\pm(20+1\times10^{-6}D)$  mm

## Physical Feature

- ◎ With ARM7 Core Control Chip, built-in 64 M Flash Memory
- ◎ Dimension:  $\phi 19.5\text{cm} \times h10.4\text{cm}$
- ◎ Weight: 1.3 kg( Incl. li-ion battery)
- ◎ Anti-impact from 3 meters free-falling, waterproof in 2 meters deep water
- ◎ Lithium battery. With 2 standard battery in 4400 mAh , Voltage:7.4 V; One Single battery can work continuously for 13 hours in static mode, 12 hours in GPRS mode, and 8 hours in 2 W transmitting power
- ◎ 6~36V external DC power supported, external and internal power supply exchanged automatic
- ◎ Receiver Power Consumption: 2.5W

## Environment

- ◎ IP Standard: IP67, waterproof, dust-proof and anti-impact.
- ◎ Working temperature:  $-45^{\circ}\text{C} \sim 65^{\circ}\text{C}$ , storage temperature:  $-55^{\circ}\text{C} \sim 85^{\circ}\text{C}$
- ◎ 100% Humidity non-condensing

## CHAPTER

## 8

## Ports and Main Accessory

### Chapter Introduction

- Introduction
- 5-pin Port and 8-pin Port
- Differential Antenna
- Y Style Data Cable

## Introduction

This Section will introduce the outlook and operation for the main ports and accessory of V30 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.

### Five-pin Port and Eight-pin Port



Figure 8-1 Five-pin Port and Eight-pin Port

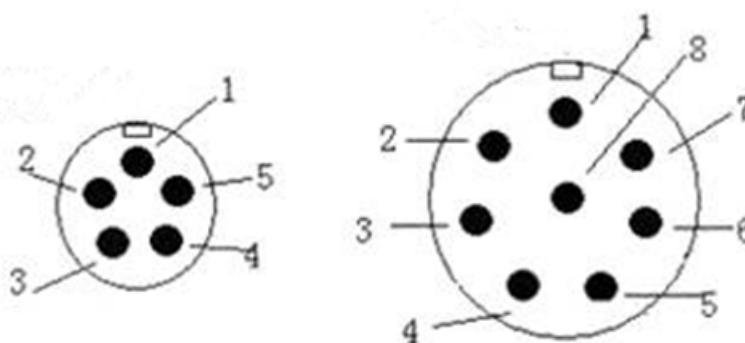


Figure 8-2 Five-pin Port

Eight-pin Port

1. **Five-pin port:** named as COM2/PW2, Generally used for the connection between the receiver mainframe and the external data link or the external power supply

**Eight-pin port:** Named as COM 1/USB/PW1, Generally used for the connection between the receiver mainframe and computer, controller, or for data download and data delete.

**Signal Definition**

Small Five-pin Signal		larger Eight-pin Signal	
	GND Earth		RXD Data Input
	GND Earth		USB D-
	Vin Power Input		USB D+
	RXD Data Input		USB V+
	TXD Data Output		Vin Power Input
			GC-2 Cable Insert Mark
			TXD Data Output
			GND Earth

2. Cable Insert Mark GC-1, GC-2 signal can work with the cable connect earth internal only.
3. All the round plug seats from Hi-Target name the pin by positive counterclockwise; round plug name the pin by welding face counterclockwise.
4. All above data output (TXD) and input( RXD) signal are base on receiver. TXD is a signal transmit line for receiver and RXD is receive line for receiver.
5. The connect signal for PC serial port DB9 are: 2 (RXD computer data signal to receive), 3( TXD computer data signal to transmit),5(GND earth). In a simple word “2 for receiver 3 for transmit”



Point: All above are for facing the main frame, it's the face icon for the socket of bottom main frame ( The plug welding surface)

---

## Differential Antenna



Figure 8-3 Differential Antenna

Refer to Figure 8-3, the differential antenna is an essential part both to Base and Rover with internal UHF radio, which transmits the UHF differential signal for Base while receiving the UHF differential signal for Rover.

### ✧ Differential Antenna Installation

Refer to Figure 8-4, holding the bottom of differential antenna and assemble it with clockwise rotation. On the contrary you can disassemble the differential antenna.



Figure 8-4 Differential Antenna installation



Warning: When install the differential antenna, make sure rotating the right bottom fixed nut of differential antenna, don't grip the top parts of differential antenna, Otherwise, it will make poor connect and reduce the working distance.

## Y Type Data Cable



Figure 8-5 Y Type Data Cable



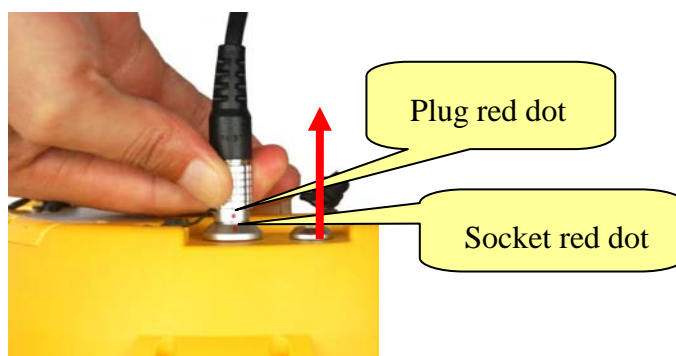
- ✧ Eight-pin Port: to connect with the eight-pin port of V30 receiver
- ✧ USB Port: to connect with PC USB for data downloading from V30
- ✧ Serial Port: to connect with PC serial port for V30 firmware upgrade, receiver settings, manage static data file, set radio parameters, etc.



Warning: 1. When connecting plugs of all the V30 GNSS RTK system,( See below) please make sure to make two red points aligned , one on plug and the other in the V30 receiver socket, otherwise, it will bring damage both to socket and plug.

2. When finish your work, please take out of plug directly. Don't spin the plug.

3. In order to protect the plug, please store the cable in a good status and places without extruding.



**CHAPTER**

---

**9**

# **Regulatory Information**

## **Chapter Introduction**

### **■ Notes**

---

## Notes

**Warning:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**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:

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

Shielded cables must be used with this unit to ensure compliance with the Class B FCC limits.