# KRONOS 300 GPS RECEIVER

# USER MANUAL

# Chapter1 Introduction

## §1.1 K300 GPS System Summary

K300 combines the advantages of Horizon RTK products, follows advanced technology and the concept of continuous innovation, bring the most advanced surveying solution to surveyors, offers higher accuracy and more reliability, makes surveying work easier and simpler.

This manual takes K300 measuring system for example to explain how to install, set up and use the RTK system as well as the use of the accessories. We recommend that you read these instructions carefully before using the instrument.

## §1.2 Features

### Horizon RTOS platform，High Frequency CPU

Horizon RTOS is a new embedded real-time operating system with high efficiency and low power，which is professionally applied on GNSS RTK products; it has strong and rapid ability to process instructions, start with lightning. Main frequency of CPU reaches up to 200 m, can handle complex satellite encoded data rapidly in real time, reliable and steady.

The transceiver integrated built-in radio, base station and rover

station completely interchangeable

K300 has a built-in transceiver integrated built-in radio, the transmitted power of which is 0.5W～2W，and it makes switching between base station and rover station freely.

Double high capacity battery

Dual battery pack design, consist of two 4400mAh battery, total capacity is 8800mAh; needn't to disassemble, and charge the mainframe directly.

Full color OLED display, more suitable for field work

K300 adopts LCD screen, which is one of the most popular function of this model. K300 uses 1.54 inch OLED color screen, with high brightness and low power, and more suit to field work.

The new network architecture, with fast and stable data link

Standard UHF data transceiver integrated module and GPRS communication service module (optional 3G module) seamless compatibility with CORS system.

Performance of high-strength engineering

Professional PBT+PC industrial shell and high-quality materials, green rubber waterproof ring, unique industrial design, IP67 class

protection, anti 3-meter drop, the quality is better.

## §1.3 Configuration

- Rover Configuration

Mainframe

UHF antenna & GPRS antenna

Psion controller

Psion adapter and charger battery

Mainframe charger

Tribrach and connector

Measuring tape

Height Plate

Retractable pole

Multi-function communication cable

Connecting rod

Bracket for controllers

## Base Configuration

Mainframe

UHF antenna & GSM antenna

Mainframe charger

Tribrach and connector

Measuring tape

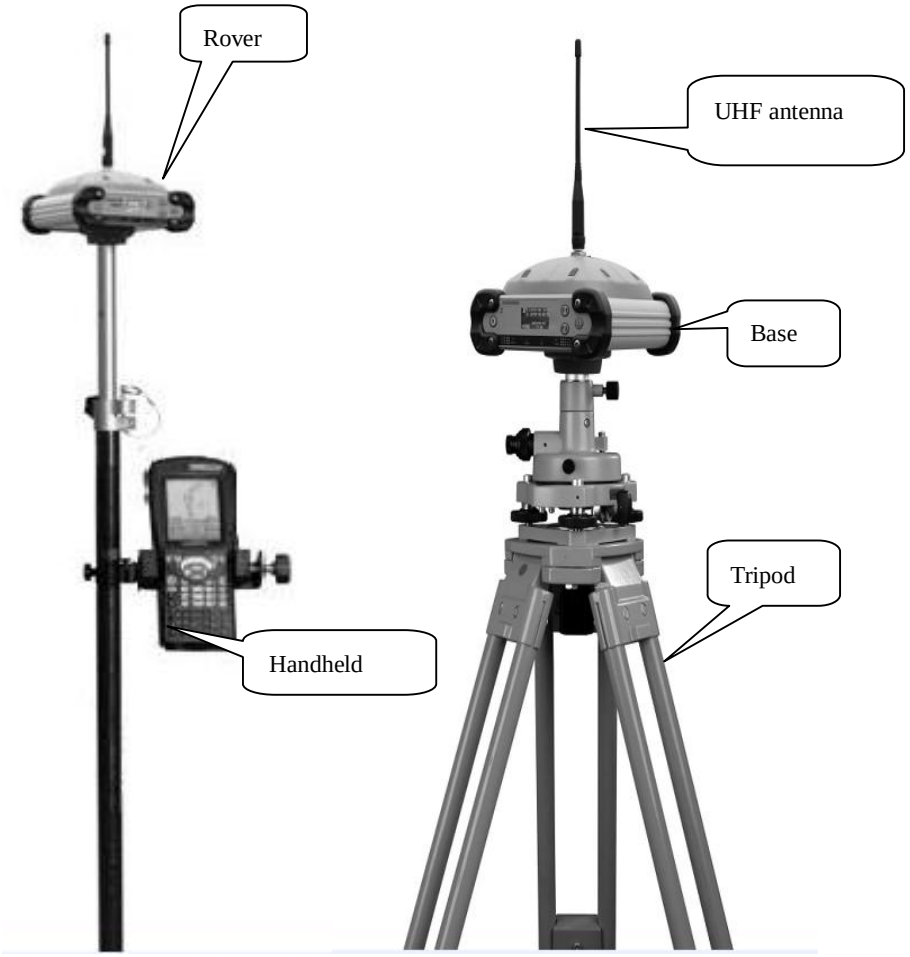
Height Plate

# Chapter2 K300 Measuring System

This chapter will help you know the constitute，installation and functions of K300 measuring system in detail.

## §2.1 Introduction

K300 mainly consists of Base station，Rover station and Handheld.




K300 Measuring System

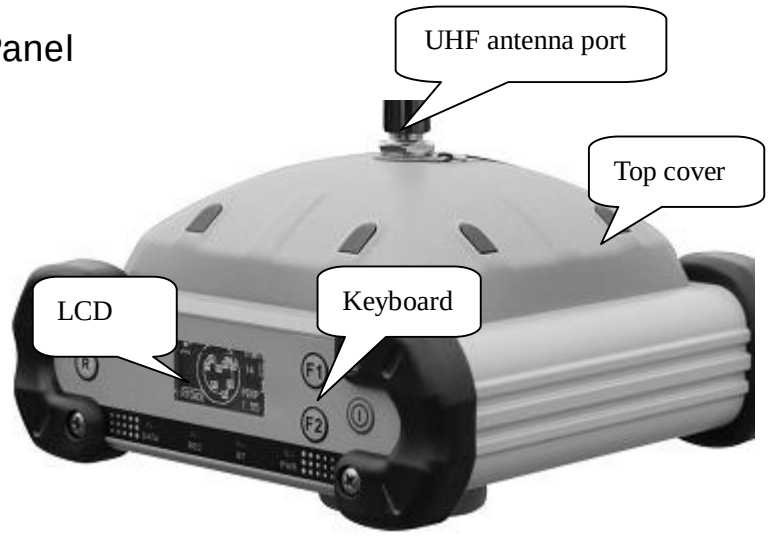
## §2.2 K300 mainframe

### §2.2.1 The Mainframe appearance

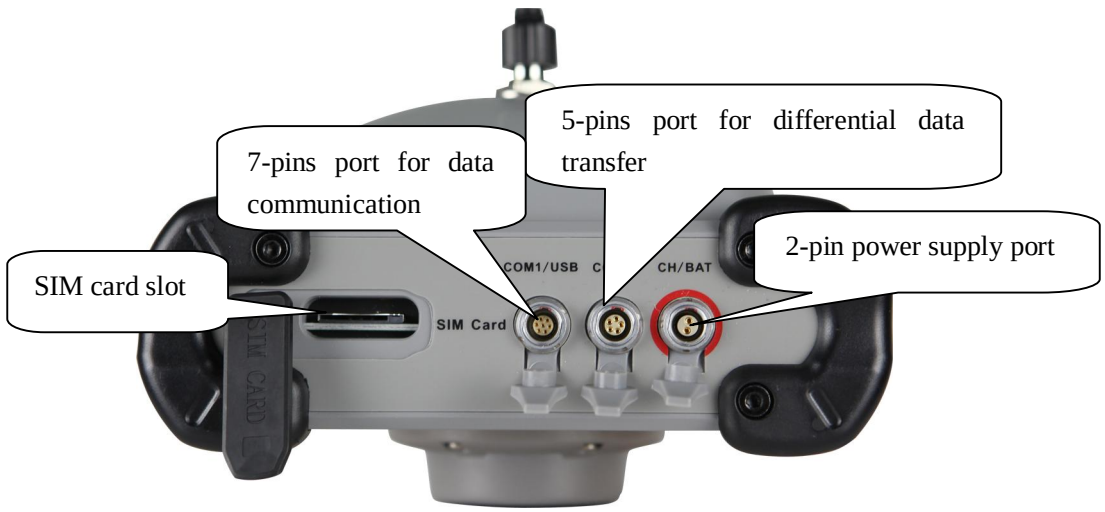
The mainframe is a flat square column, 165mm in length, 168mm in width, and 122m in height. The front panel is buttons and OLED screen. The port for UHF radio is on the top of it, there is SIM card

port, power supply port, data output port and data communication port on the back panel. At the bottom of the mainframe，there is a barcode encoding, which is the serial number of the receiver.

- Front Panel




- Back panel



## §2.2.2 Port at the bottom


UHF antenna port：install UHF antenna；

2-pin power supply port(CH/BAT)： charge the mainframe;

5-pins port for differential data transfer (COM2): connect the external transmitted radio to Base station;

7-pins port for data communication(COM1/USB)： Communicate data between the mainframe and computer or handheld.

SIM card slot: Put SIM card when use GSM/ 3G network;

Connection screw: it is to fix the mainframe to tribrach or pole;

Serial number of mainframe: apply register code; recognize the mainframe with handheld bluetooth.

### §2.2.3 Buttons and indicator light

The keys from left to light are Reset key, two Function keys and Power key.


Keys

The indicator lights are located below the LCD; the lights from left to right are DATA light, REC light, BT light and PWR light.


Indicator lights

BT light indicates the status of Bluetooth; DATA light is the data transmitting/receiving light.

| Items | Functions | Status |
|---|---|---|
|  Power key | Power on/off, confirm，modify | Power on/off mainframe，confirm edit items，select modified items |
|  &  | Page up/down, Return | Choose the items to modify, return to the upper interface |
|  Reset | Force to shut down | Power key in particular cases, without effect on the data has been collected |
| DATA light | Data indicator light | blink in accord with the time intervals of data acquisition and data transmission |
| BT light | Bluetooth light | BT light keeps on when connected with bluetooth |

1. Static mode

DATA light and REC light blinks as collecting data interval time.

2. Base mode(Radio)

DATA lights blink as transmitting interval time.

3. Rover mode(Radio)

DATA light blink as transmitting interval time after receiving differential signal.

BT light keeps on after Bluetooth connected.

4. GPRS module work mode

DATA light will blinks as transmitting interval time after receiving differential signal.

## §2.3 Operation

### §2.3.1 Initialization interface

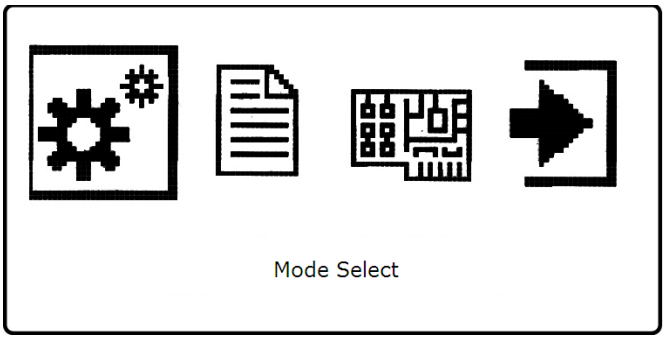
After you power on K300 receiver, the initialization interface show the Horizon logo, then you have two choices: setting mode and collection mode; When you enter this interface, you can click “F2” to enter setting mode, otherwise, the countdown on the upper-left ends, it will enter collection mode automatically.

### §2.3.2 Setting mode

Enter “Module Select” interface, Press 

or 

to choose one items， then press  to confirm. See figure below:



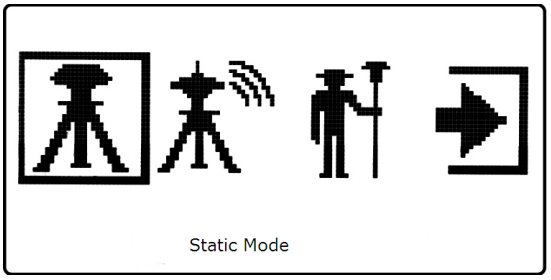

Choose Mode

After press  enter into Mode Select interface, you can choose

Static mode, Base mode, Rover mode or back to Main Menu via press 

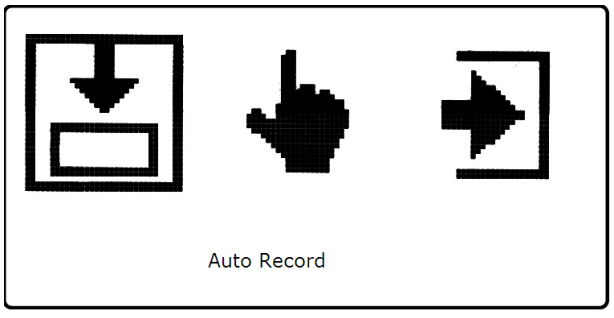
or 

, see from the picture below ：

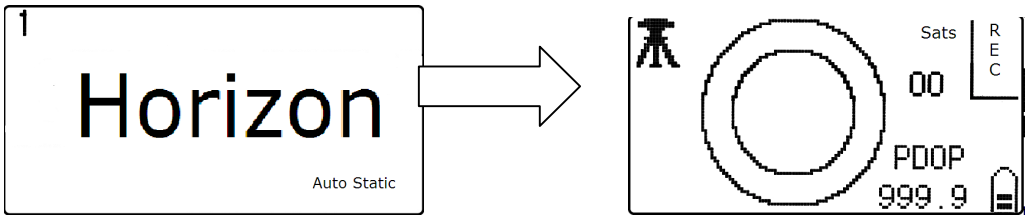



（1） Parameter setting in Static mode

Press  to enter into the parameter setting of Static mode, choose Auto Record, see figure below:

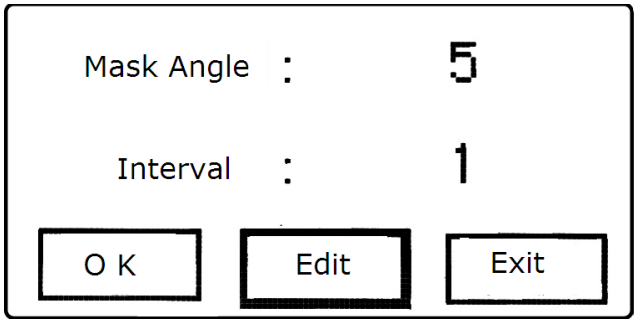


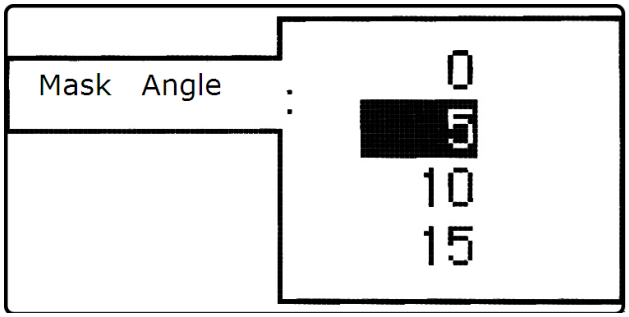

Press  , enter into the interface below:

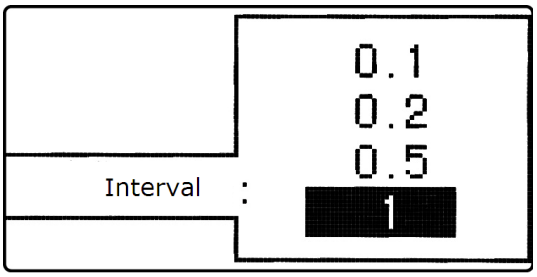


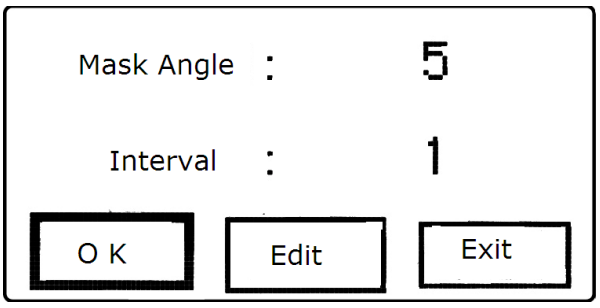

Press  , enter into the acquisition parameter setting interface:

Mask Angle and Interval, see figure below:



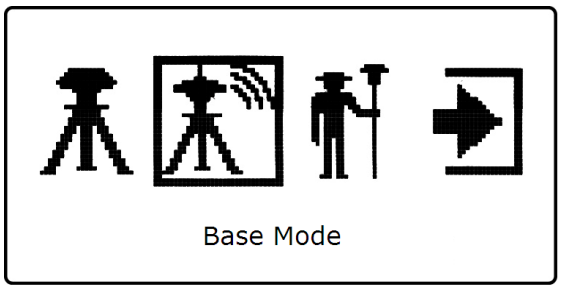

Press  to confirm the parameter setting, when the acquisition

conditions is good, the receiver will start recording automatically.

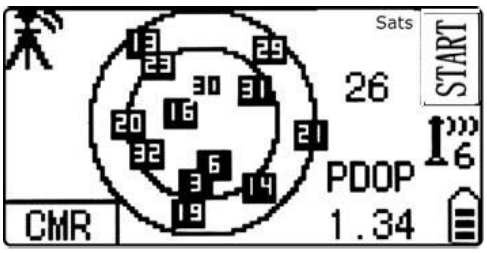
*Pay special attention：You should set the same Mask angle value and intervals for K300 receivers working at the same time.*

(2)Parameter setting in Base mode

Under Mode Select interface, choose Base mode:

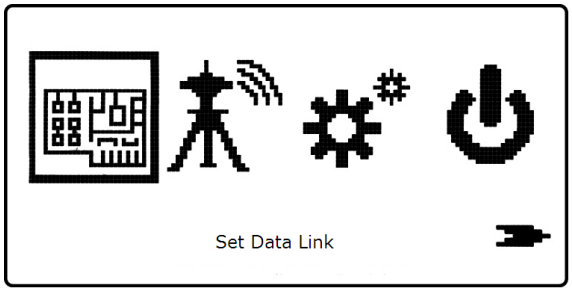



Enter into Base Mode setting, choose Auto Base, see figure blow:

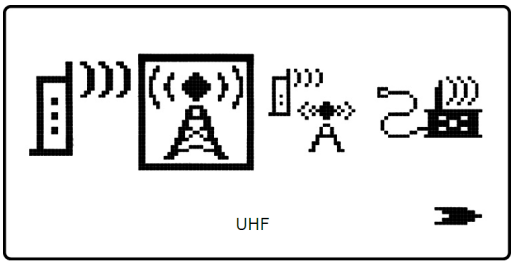




Press  , enter into the parameter setting interface:

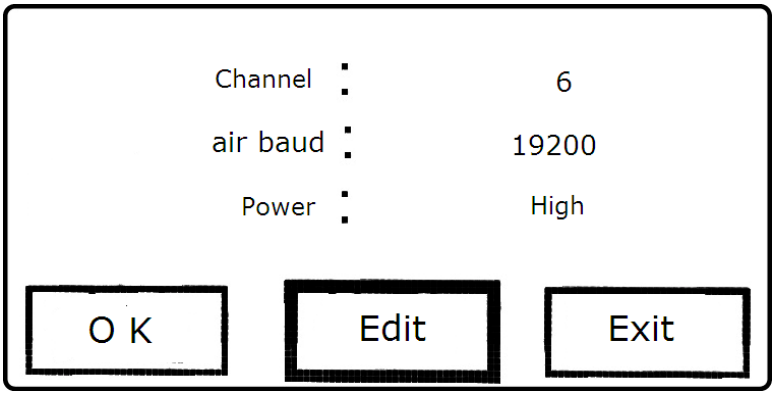
Set Data Link：



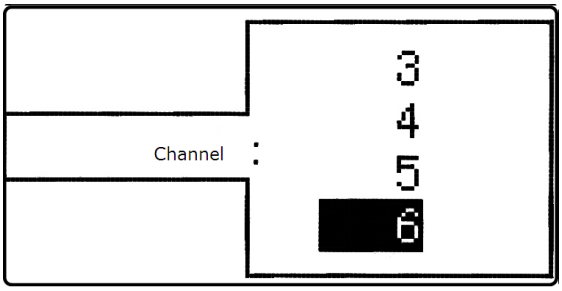

Press  to set Data link-UHF module, see figure below：

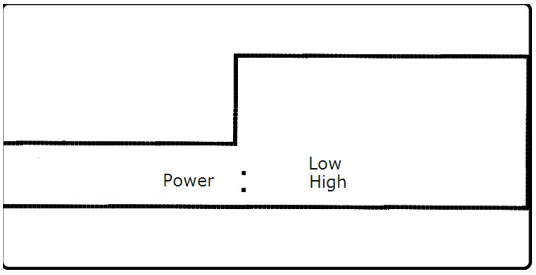



Set UHF parameters：

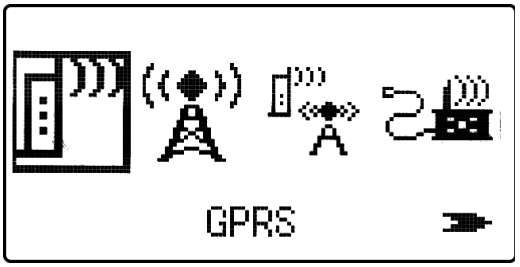


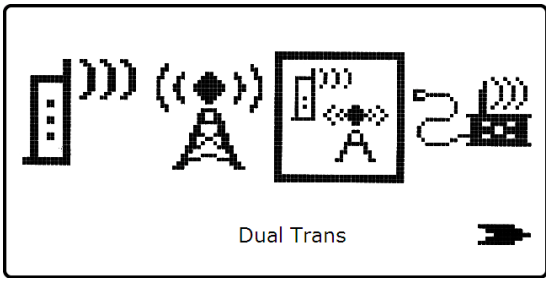

Choose Edit to modify the Channel and Power, see figure below：

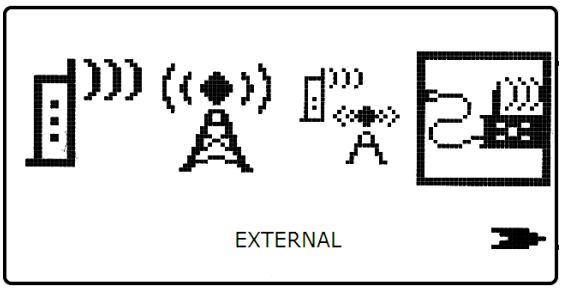



Choose GPRS、Dual Trans or External module, see from the figures followed:



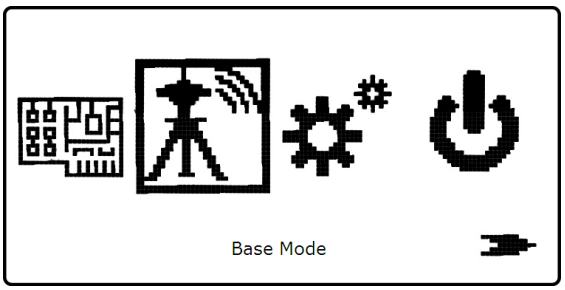



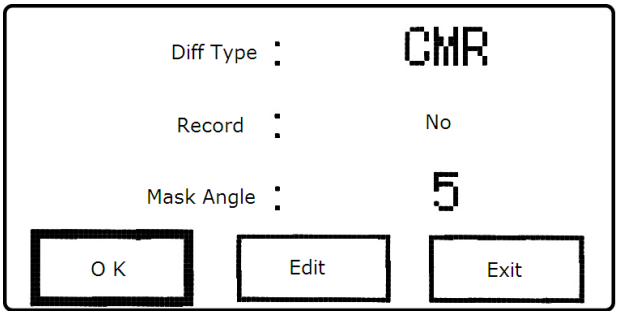



*Pay special attention:* When use EXTERNAL radio, please choose EXTERNAL.

Base mode setting：

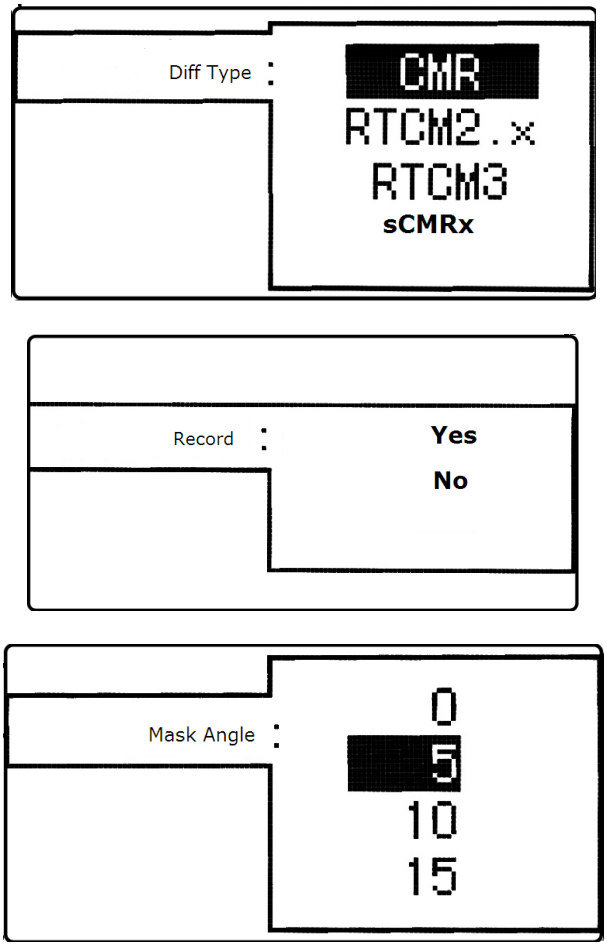
When finish the above parameter setting, back to the Base mode setting interface, press to enter into module setting interface, see figure below:




Choose Edit to modify the Differential Type, Record data, Mask angle, when finished, select “OK” and press to confirm the

setting, see figure below：



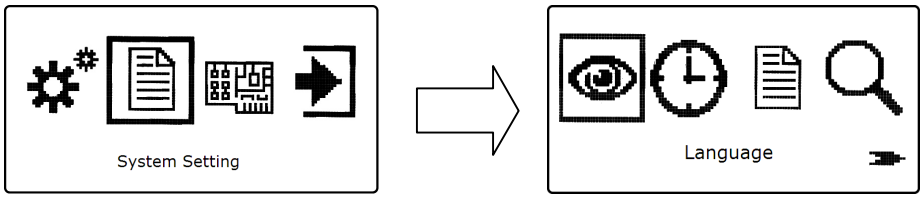

(3) Parameter setting in Rover Mode

Parameter setting in Rover Mode is nearly the same with the Base mode; please refer to the corresponding setting in Base mode.

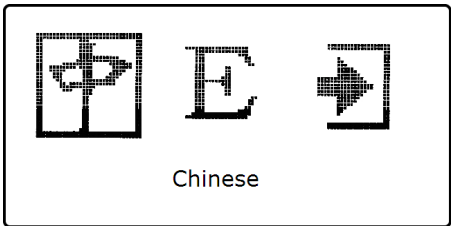
System Setting

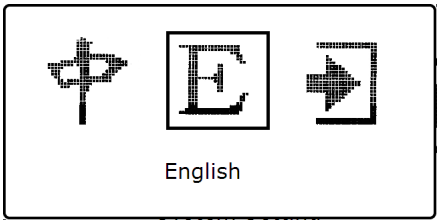
Press F1 or F2 to enter into the System Setting interface，then

press  enter into it, see figure below：



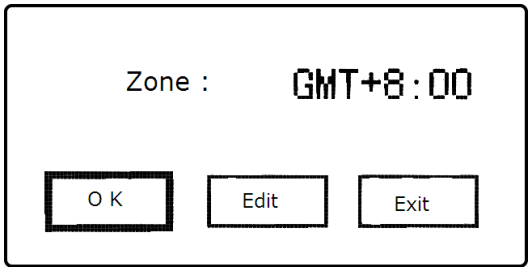

（1）Set language  , there are two language version offered: Chinese or English：



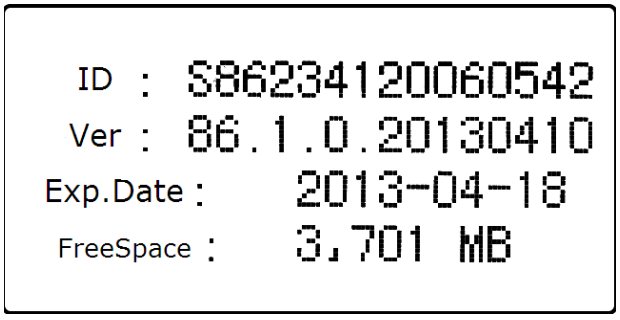




After finished, return to the previous menu.

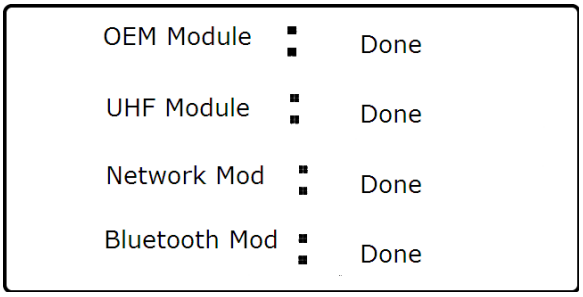
（2）Set Time Zone  :



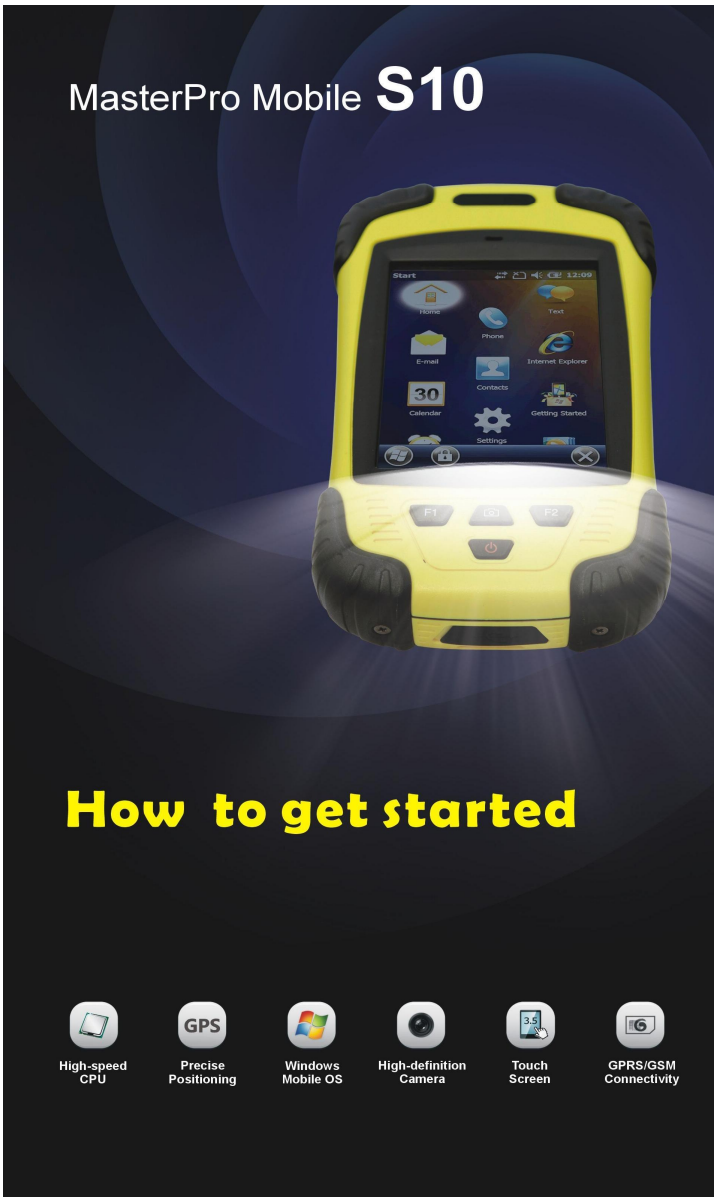
（3）System information  , they are ID(that is serial number of the receiver) 、 Ver(Firmware version) 、 Exp.Date(Expire date), FreeSpace(The remaining storage)：




（4）Self check  , include the self-test of OEM module, UHF module, Network module and Bluetooth module, see figure below:



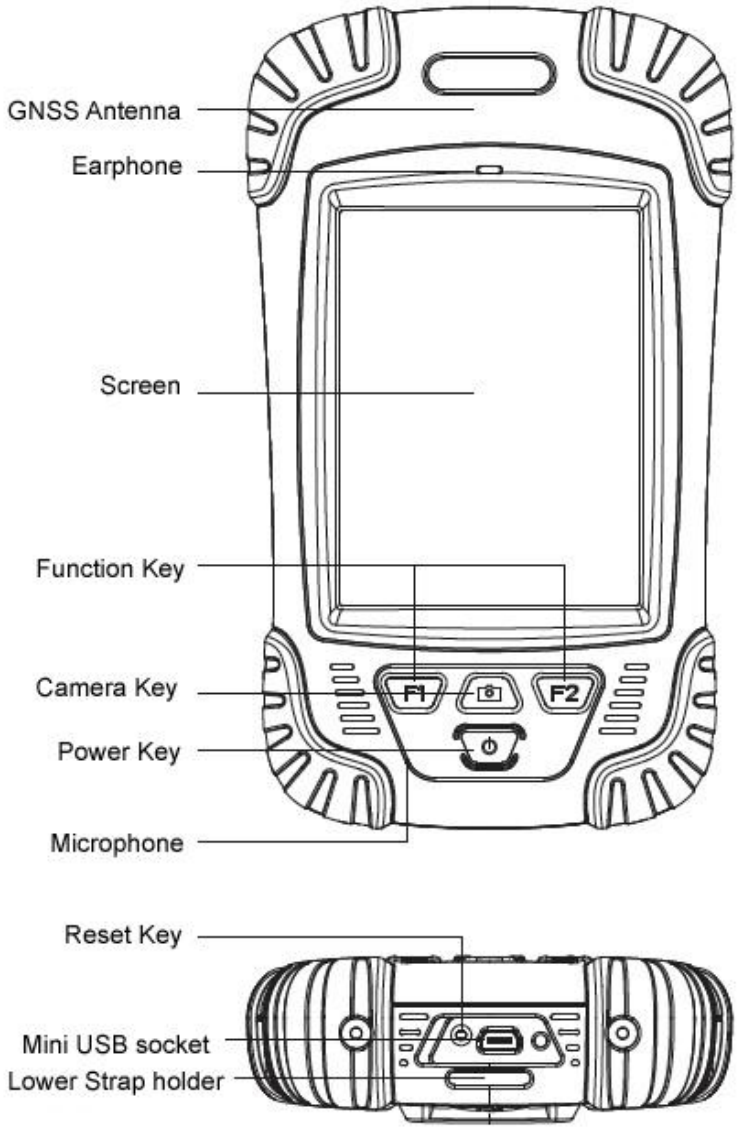
## §2.4 Handheld（S10/Psion, Optional）




### §2.4.1 Basic introduction to the handheld

Here takes S10 for example (If you want to know more about Psion controller, please refer to the manual for Psion controller), appearance

of S10:




| Standard Configuration | Description |
|---|---|
| Li-ion Battery | 3.7V/ 3000 mA/h |

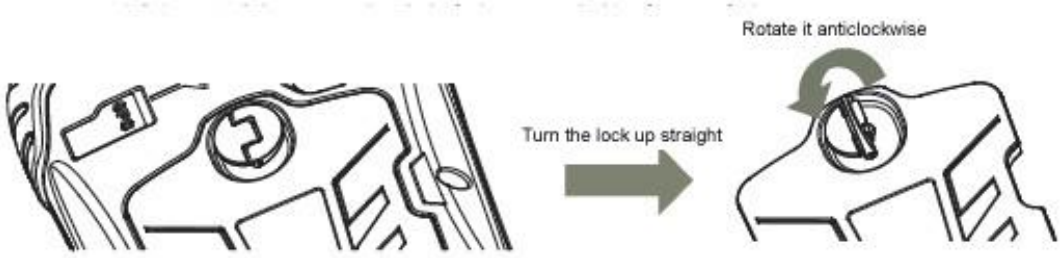
| | |
|---|---|
| Strap | Black, 180*12mm |
| Touch Pen | Black, 12.7mm |
| USB data cable | 1.5m |
| USB Charger | 5V/1A |
| Disc | |

1. Charging

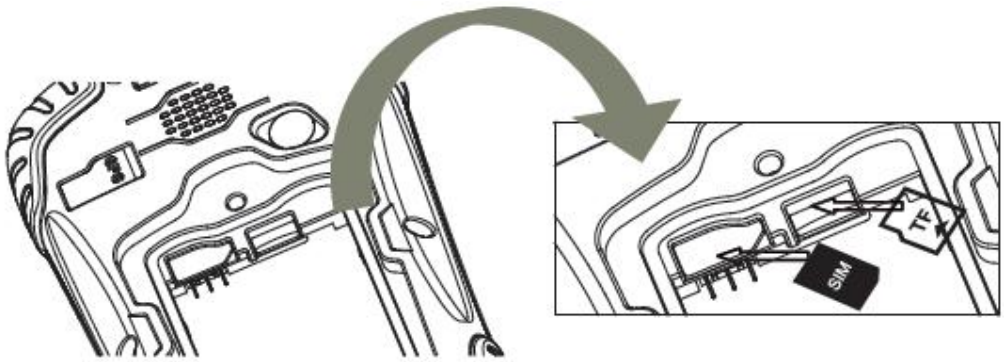
Connect the charger with collector by the USB Link cable to recharge. Main Screen (Upper right corner) will show the Charging Icon in power off (on) status.(Once you connect Collector with PC to recharge; the charging time will be longer).

2. Installing Battery, SIM Card and Storage Card

Turn the lock up straight and rotate it anticlockwise, you can take off the battery cover.




There are two sockets upon the battery position, left is for SIM Card and right is for Storage Card.




Installing the battery, turn the lock clockwise to the end.

(SIM Card: The Missing Angle Corner of SIM Card will be at the lower right corner)

3. Power on/off

Make sure that the battery is fully charged or you can connect the Collector to PC via the USB Cable. (Collector should be with battery).

Press Power Key for 3-5 seconds to power on/off.

(If there is no any response from Collector or other unusual situations happened, press the Reset Key besides the USB socket in the bottom of Collector with the Touch Screen Pen).

4. Connect to PC

Make sure that you've installed Microsoft ActiveSync 4.5 or higher version on your PC.

Connect the Collector to PC via the Mini USB Data Cable.

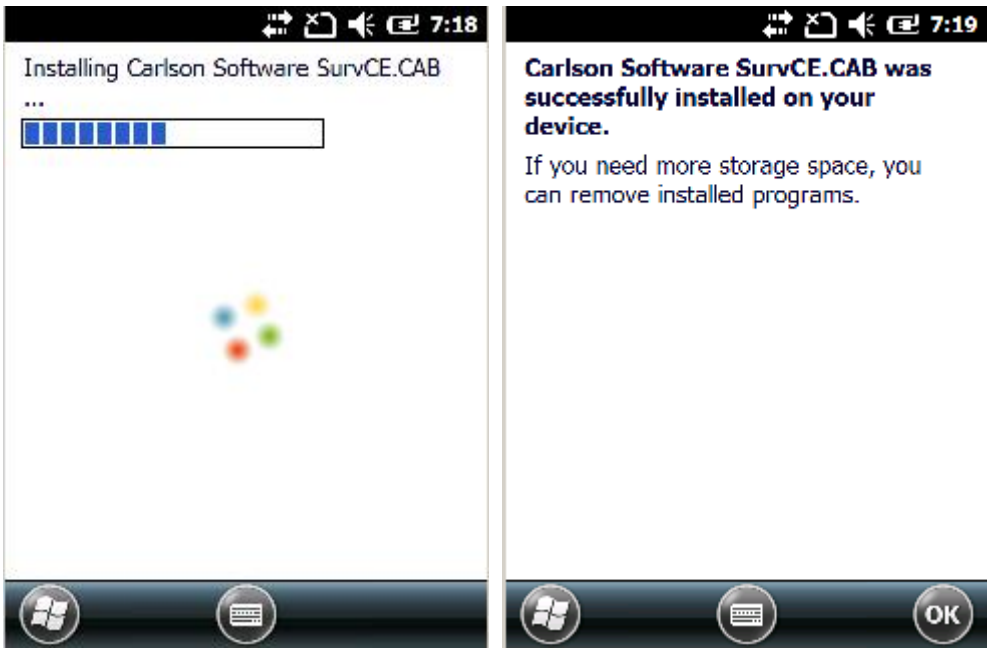
Connection will be preceded automatically by Microsoft ActiveSync.

Icon will turn green and an interface of Setting will come out, you can just click “Cancel”. After this, you can manage and edit the data in Collector.

5. Installing Program

Make sure that Collector is synchronized with PC. Run the Installation file at PC side.

If the Installation Program is also suitable for Collector, you can copy the installation program into Collector to install. You can just copy the files into Collector when you need.

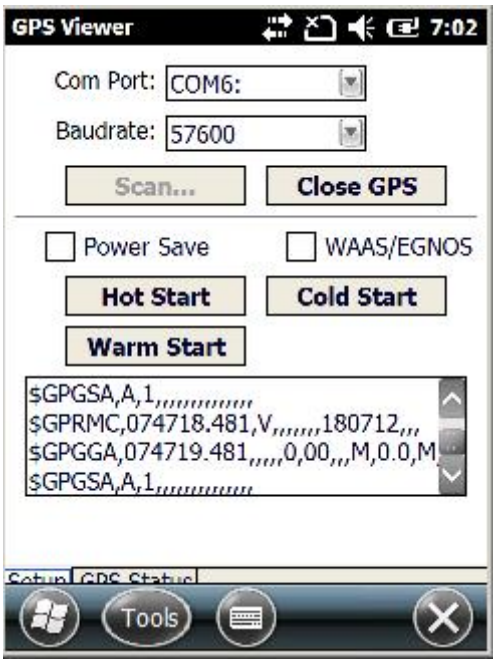



(The two operations: Upper→ Equipment, Lower→ Storage Card)

We suggest you installing programs into Flash Memory and save data into Storage Card.

## 6. How to use GPS

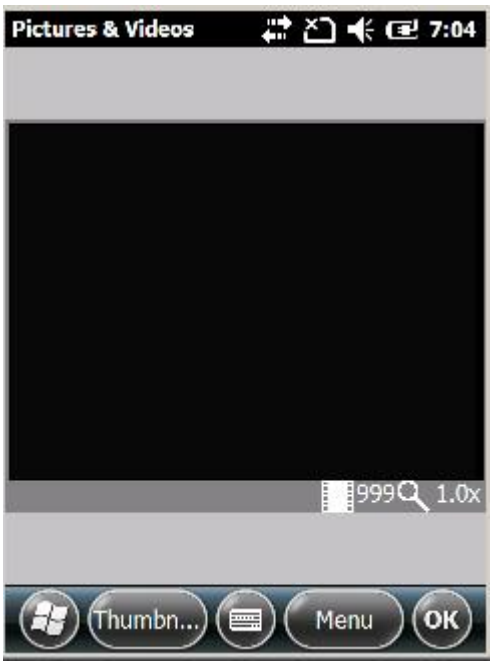
If you want to check the working status of GPS via checking or collecting software, please set the COM Port to COM6 and the Baud rate to 57600.




## 7. Camera

Get into the Camera Mode by pressing the Camera Key for 3 or more seconds.

Press Camera Key to take a photo and click “OK” on the screen to save.




*Note: If you want to know more information about S10, Please refer to S10 manual.*

## §2.4.2 Blue-tooth connection

The short-range wireless Bluetooth communication facilities are for the Wireless exchange of information among a variety of Bluetooth-enabled devices.

Tap on the Start menu (Settings) → (control panel) to open (Bluetooth Device Manager). tap on the(scanning device) after setting the Bluetooth device, and the surrounding Bluetooth devices will be listed in the search list. And then input the passcode 1234 to

have pair between controller and receiver. As shown below:


After the pair, select an available com port for the receiver (usually COM 8 and COM 5 are OK). As shown below:


After the establishment of the virtual serial port, other applications can use the serial port for data communication with a Bluetooth device.

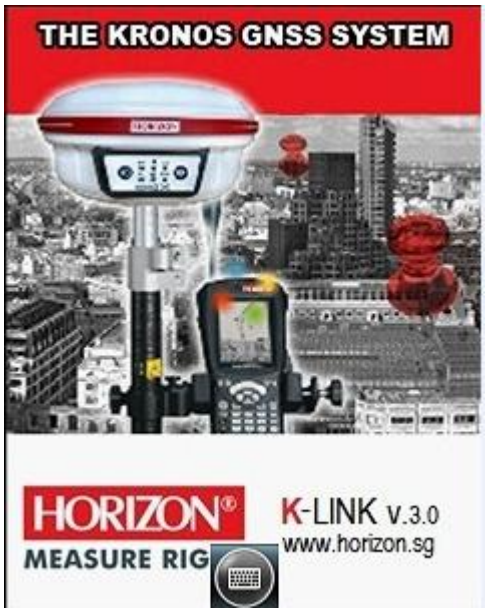
## §2.4.3 Software installation and connecting

Professional surveying and mapping software are made for measurement applications for different industry:"K-link 3.0", Here takes K-link 3.0 for example:

K-link 3.0 is the specific software for K300 measuring system, mainly for the Collection and Calculation of the measuring points.

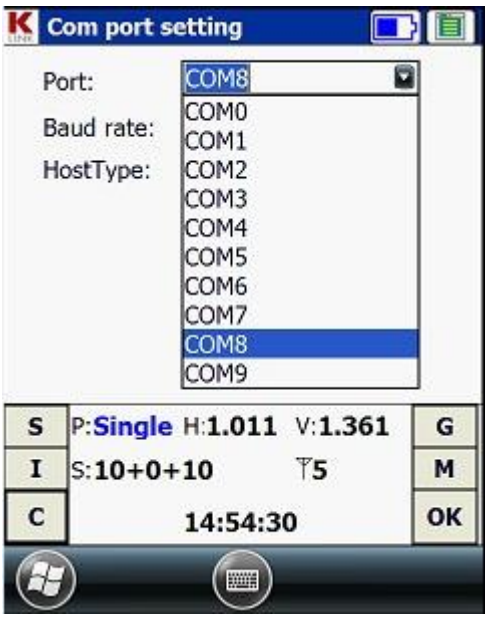
Before installation of K-link 3.0, you need to install Microsoft Active Sync. After install it on your computer, connect handheld controller to computer with a cable, and install K-link 3.0 into the handheld, at the same time, keep the mainframe power on, then set as follows:

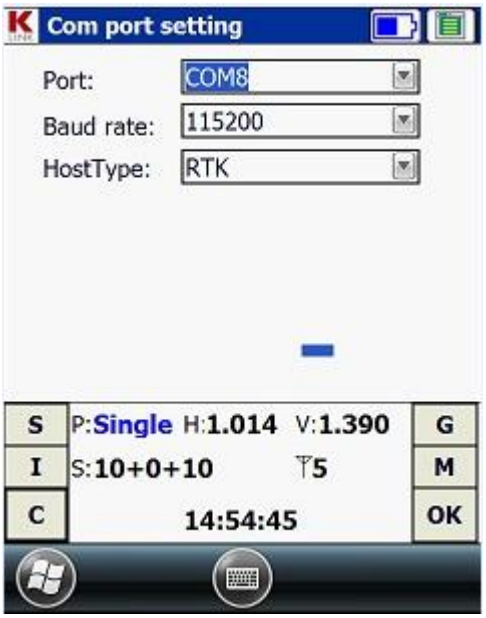
Open K-LINK 3.0 software enter the main interface. Click “OK” on the "prompt" window.





"Configure" → "Port Config", in the "Port Configuration “dialog box, select the port “COM8 ", with the same serial number which you use to connect the Bluetooth serial port service. Click "OK." If the connection is successful, the status bar will display related data. If there is barrier, exit K-link 3.0 to reconnect (If the above settings are correct, then link directly). Handheld connecting with the host PC can do the follow-up measurement.




## §2.5 External radio (Optional)

### §2.5.1 Radio features

The radio is a high-speed semi-manual wireless data transmission radio, whose air transfer rate can be up to 19200 bps and the RF transmitter power is larger, used in RTK measurement system.

Radio FOR EXTERNAL adopts GMSK modulation, 19200bps transfer rate, low bit error rate. RF frequency can cover 450-470MHz band. Data transmission mode of FOR EXTERNAL is transparent mode, that is, the received data is sent to the RTKGPS system unchanged.

Radio FOR EXTERNAL data interface is a standard RS-232 interface, which can be connected to any RS-232 terminal equipment for data

exchange. FOR EXTERNAL digital radio research employs advanced radio frequency technology, digital signal processing technology and baseband processing technology, carefully selected high quality components to organize production, to ensure the long-term stable and reliable operation;

Have a forward error correction control, digital error correction function.

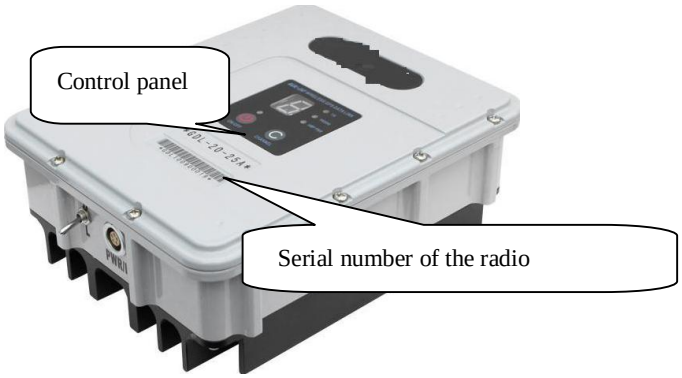
There are eight transmitting and receiving channels. Can be changed according to the actual use of the channel frequency, transmit power adjustable interval is 0.5MHz

FOR EXTERNALprovide 8 radio channels, the frequency of each channel can be modified in reality. The form below shows the default frequency of the channels:

| Channel number | Frequency（450-470MHz） |
|---|---|
| Channel 1 | 463.125 |
| Channel 2 | 464.125 |
| Channel 3 | 465.125 |
| Channel 4 | 466.125 |
| Channel 5 | 463.625 |
| Channel 6 | 464.625 |
| Channel 7 | 465.625 |

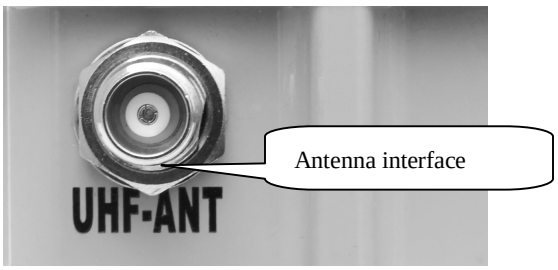
| | |
|---|---|
| Channel 8 | 466.625 |

## §2.5.2 Radio Appearance

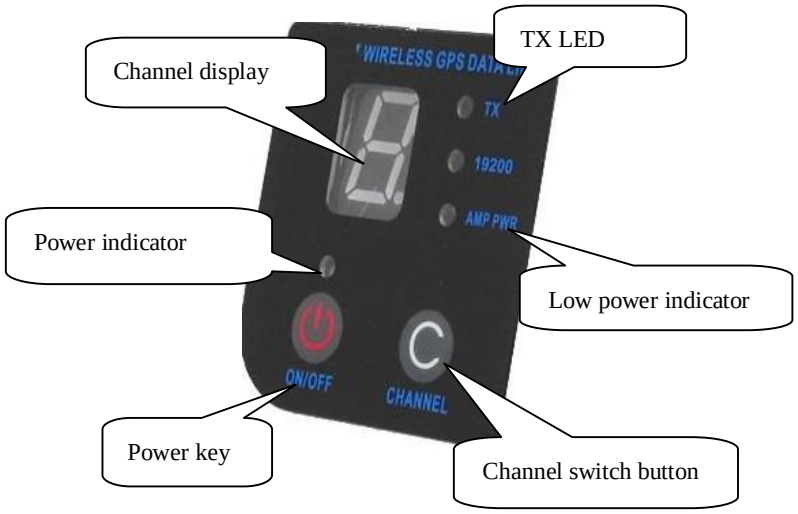



Mainframe Interface: 5-pin jack for connecting a GPS receiver and power supply


Antenna interface：for connecting the transmitter antenna




Control Panel: control panel lights display the status of the radio, the key operation is simple and convenient, one-to-one interface can effectively prevent connection errors.




Control panel

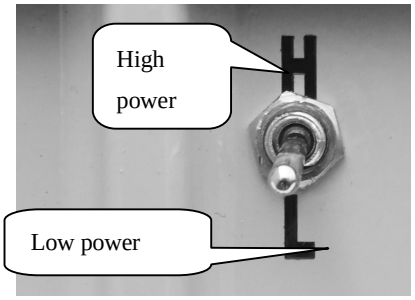
CHANNEL button: by pressing this switch, you can switch channels 1-8.

ON / OFF power key: This key controls the unit's power switch. The red light on the left indicates the power status of the machine.

AMP PWR indicator: Indicates the level of radio power, light on indicates low-power, light off indicates high-power.

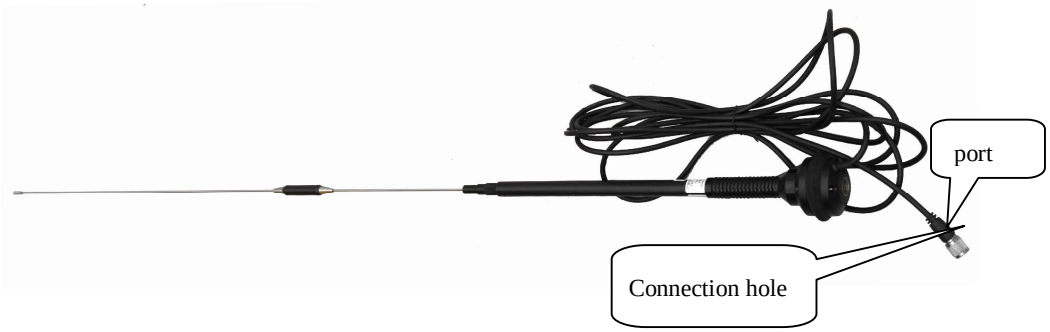
TX red light indicator: This indicator flashes once per second means that the radio is transmitting data; the transmitting interval is 1 second;

Power switch (Shown in picture below): switch to adjust the radio power, AMP PWR lights on the panel indicate the radio power level, light on indicates low power, lights off high power.




## §2.5.3 Radio transmitting antenna

The UHF transmitting antenna is particularly suitable for field use; the receiving antenna is 450MHz omni-directional antenna, light and durable.




## §2.5.4 Application Notice

The battery power is too low: When the flashing channel indicator appears on the control panel, which means the lack of battery power, replace the battery in time, otherwise there would be data link unstable or unable to launch.

FOR EXTERNAL radio power supply: voltage 12-15V (typical 13.8V) RF transmitter power 25W, current 7.0A.

Radio transmitted power: radio transmit power based on the voltage of the power supply, check the voltage before use.

High and low power use: use low-power transmitter when low power can satisfy the operation as high-power transmitter will exponentially consume battery power, excessive use will reduce battery life. Install the radio station as high as possible.

Power corrugated coefficient: power ripple coefficient must be less than 40mV, the smaller the ripple factor is, the smaller will the beam spectrum be and the higher communication quality will be.

Power Connection: Power of positive and negative connected correctly.

Electromagnetic environment: Before using the radio, it is better to perform electromagnetic environment measurement, to avoid the communications blackout.

Radio match antenna: the basic parameters of the antenna selection are the band width, frequency, gain, directivity, impedance, VSWR and other indexes .Usually the effective bandwidth of the antenna is 3-5MHz,antenna selecting should be based on the frequency bands

used by the to be selected channel. For the long-distance transmission, it is better to use a directional antenna and high-gain antenna, and pay attention to the impedance of the antenna and feeder to match with the Radio FOR EXTERNAL antenna interface (50 ohms).

We recommend:

Recommend that you use plug-in battery which is more than 12/36Ah, the use of maintain a regulated current of 10A during the operation.

Recommend that you charge it in time, do not overuse the battery, otherwise it will reduce battery life.

Recommend that you replace the batteries after six months to a year, to ensure the radio distance

## §2.6 Accessories

### §2.6.1 Case


Case

There are two layers of packing for K300: the inner layer is filled with anti-collision foam, the host and other accessories can be dispersed and embedded; the outer layer is a hard instrument case, sealing-strong, wear-resistant anti-wrestling. Compact, durable, can effectively prevent the impact, easy to clean.

### §2.6.2 Battery & Charger

（1）K300 battery package

The batteries packages are embedded on the two sides of mainframe. After charged full, the built-in radio can work continuously for more

than 10 hours.

（2）K300 Charger


①——220V AC plug

②、③——connect part

④——4 pins plug, when you charge, you need insert it to the charging port on the mainframe.

⑤——Indicator light of charger. When the light“CH1”、“CH2”become red, it means the battery is in charge. After the indicator turn green, it means the battery full charged or the charger disconnect with mainframe； When you charge, you can turn on the mainframe or not, it’s doesn’t have any influence, but we recommend to turn off it when charge.

## §2.6.3 Antennas


## §2.6.4 Multi-function communication cable and data cable

Communication cable is for communication between mainframe and external radio, also has power supply function,which make sure mainframe and external radio work for long time.


LE52X- cable to connect K300 with external radio

Data communication cable（L797Y） is to download data, one head is 7 pins port, the other head is USB plug and serial port plug, which

mainly used to connect RTK receiver with computer for data transmission and the upgrade of the firmware.


L797Y data communication cable

Notice: *when you insert the 7 pins plug to mainframe, you need to make sure the red point on plug must align with the red point on mainframe. Serial port plug is designed for external function with special use.*

# Chapter 3 Operations

Reading this chapter, you can grasp in detail how to use K300 measurement to do system static, RTK operations.

GNSS receiver operating program is divided into two types: static measurement and RTK dynamic measurement (including the base station and rover station).

Test environment requirements:

(1) Observation stations (ie, the receiving antenna settlements) should stay away from high-power radio transmitters and high voltage transmission lines in order to avoid the magnetic field around the GPS satellite signal interference. Receiver antenna and its distance shall not be less than 200 m;

(2) Observation stations should not be near to the large area waters or objects which can strongly reflect (or absorb) electromagnetic wave to weaken the effects of multi-path;

(3) Observation stations should be located in places where the receiving device can be installed easily, and good vision available. Elevation angle of obstacles in view should generally be greater than

10° to 15°, in order to weaken the effects of troposphere refraction;

(4)Observation stations should be selected in a convenient place, and easy to use other means of measuring, joint measurement and expansion;

(5) For the long baseline GPS network, should also consider the vicinity good communication facilities (telephone and telegraph, post and telecommunications) and power supply, for power between the stations and equipments.

## §3.1 Static operating

### §3.1.1 Static Measurement Profile

- Static measurements:
- A GPS positioning measurement by installing three (or more) GNSS receiver to perform simultaneous observation and determine the relative position between stations

- Scope:

  The establishment of a national geodetic control network (second or less);

  The establishment of precision engineering control network,

such as bridge measurement ,tunnel measurements, etc;

The establishment of a variety of encryption control network, such as city measurements, Drawing Point measurement, road surveying, demarcation measurements.

For the GPS measurements of small and medium-sized cities, towns, as well as mapping, cadastral, land information, real estate, geophysical exploration, surveying, construction and other control measurement, should meet the accuracy requirements of the D, E grade GPS measurements.

## §3.1.2 Operating procedures

Pre-measurement

Project approval

Program design

Construction design

Surveying and mapping data collection and arrangement

Instrument test, test

Reconnaissance, choice of site, buried stone

Measurement

Operating team stationed in

Satellite status Forecast

Observation planning

Dispatch of operation and field work observation

After the measurement

Data transmission, dump, backup,

Baseline Solution and quality control

Network adjustment (data processing, analysis) and quality control

Finishing results, technical summary

Project acceptance

## §3.1.3 Field operation notes

1) The receiver is set to static mode (see section 2.1.4); check the mainframe memory capacity via the Mask angle and the sampling interval parameters set by the computer (see 4.1).
2) Set up a tripod on the Control point, levelling and centering strictly on the measuring point.
3) Measure the instrument height three times, the difference of the

results shall not be more than 3 mm, and average the results. The instrument height should be measured from the center of the control point to the mark line on the instrument.(see 3.4)

4) Record instrument number, point name, instrument height, and start time.

5) Power on, confirm the static mode, the mainframe begins to search satellites and satellite lights begin to flash. Recording condition reached, the status light flashes in accordance with the set sampling interval, flashing once indicates the acquisition of an epoch.

6) After the test, the mainframe shuts down, and then begins data transmission and data processing (data transmission sees Chapter IV, data processing, please read another manual GPS data processing software operation manual).

## §3.1.4 GPS net design

1) GPS net generally constitutes a closed figure by independent observation edge, such as a triangle, polygon or annexed line, to increase the checking conditions, and improve the reliability of the

network.

2) The points of the GPS network should coincide as close as possible with that of the original ground control network. Coincidence point generally should not be less than three (should perform levelling conjunction when not enough) and should be evenly distributed in the network in order to reliably determine the transformation parameters between the GPS and Ground Networks.

3) The points of the GPS network coinciding with the leveling points should be considered. Non-coincidence point should generally perform levelling conjunction method (or methods of equivalent accuracy), or set a certain density levelling conjunction point in the network, to provide information for the study of the geoid.

4) In order to facilitate the observation and perform levelling conjunction, GPS outlets should generally be located in unobscured and easy -to -reach places.

5) In order to facilitate the classical levelling conjunction or extension, emplace near the outlet a good view orientation point, to establish levelling conjunction direction. The distance between the point and the station should generally be greater than 300 meters.

6) According to the different purpose of GPS measurements, the

independent observations edge of GPS network should be certain geometry. The basic forms of the graph are as follows: triangular network, ring network, stellate network.

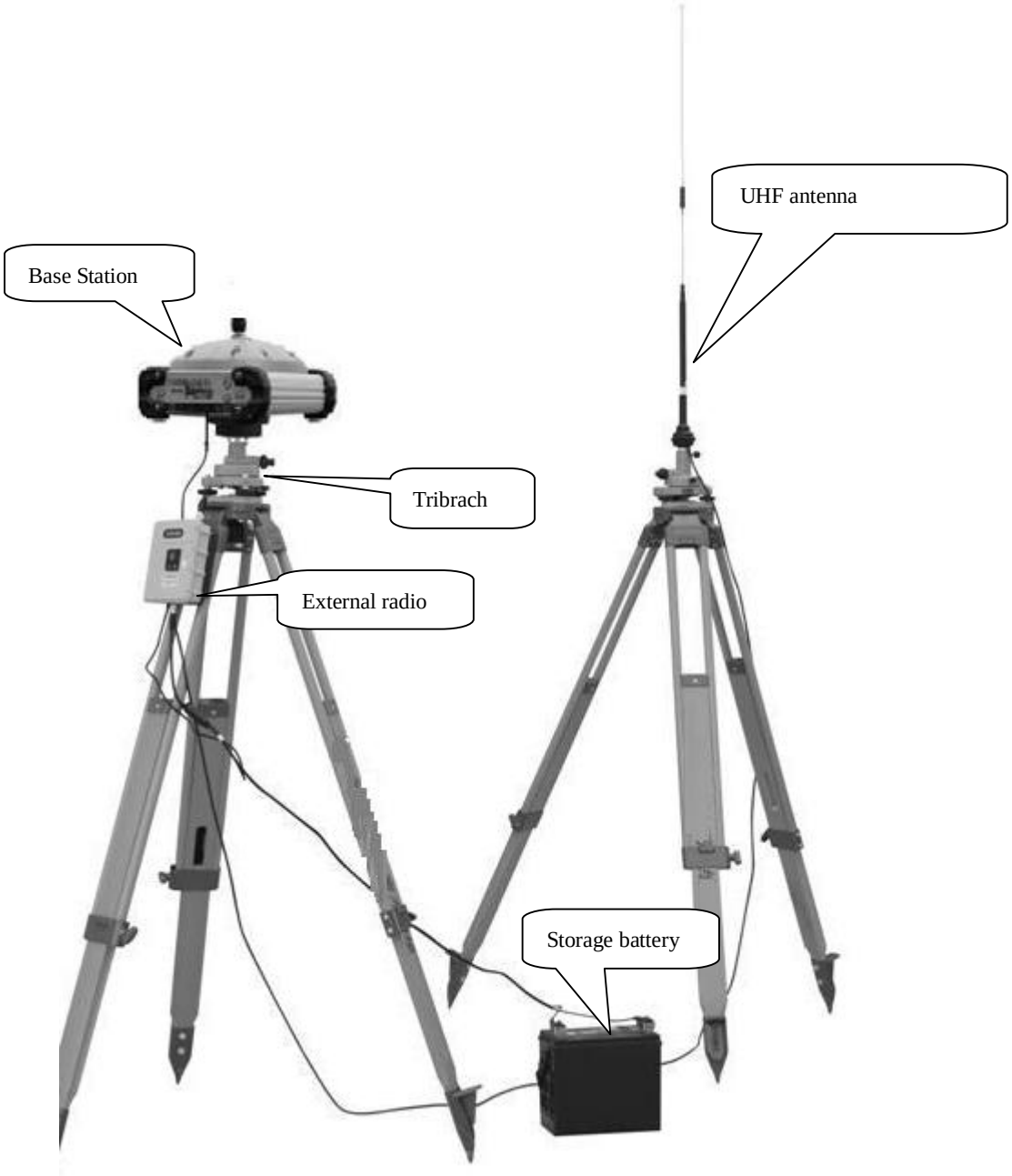
## §3.2 RTK operations (Radio mode)

Real-time dynamic measurements, for short: RTK.

RTK technology is the real-time dynamic differential carrier phase positioning technology, combining global satellite navigation and positioning technology with data communication technology which includes base station and rover station. Base station transmits the data by radio or network to the rover station, which will perform differential analysis, thus providing real-time coordinates of the measurement point in the specified coordinate system.

Depending on the modes of transmission of the differential signal, RTK is divided into the radio mode and network mode.

This section first describes the radio mode, as shown below:




Base mode with external radio

## §3.2.1 Mounting the Base Station

Base station shall be set up in the broad view, unobscured and higher places; avoid the vicinity of the high-voltage power

transmission equipment and the transmitting and receiving antennas of radio communication equipment, the shade of trees, and the sides of waters, all of which will produce different degrees of impact on the GPS signal reception and emission of radio signals.

1) The receiver is set to the base station with external radio mode;

2) Set up tripods, the tripod on which to put the radio antenna should be placed at a higher point, the least distance between the two tripods should be 3metres.

3) fix the tribrach and the base station receiver, (if set at a known point, a strict levelling should be done), power on the base station receiver.

4) Install the radio transmitting antenna, hang the radio on the tripod, place the storage battery at the bottom of the radio station.

5) Connect the radio, mainframe and battery with the multi-function cable, which is a "Y"-shaped cable used to connect the base station mainframe (5-pin red jack), transmitting radio (black jack) and external battery (red and black clip).Playing the role of power supply and data-transmission.

Important:

Please check the red dot on the five-pin port when you use the

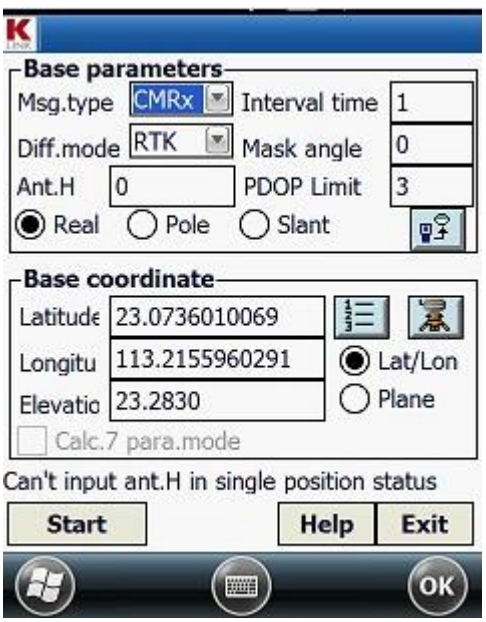
multifunction cable, aligning the red dot with the red mark on the mainframe will help it insert easily. Follow the same instruction when connecting to the radio.

## §3.2.2 Start the base station

The first time you start the base station, you need to set the start parameters, set as follows:

1）Connect to the base station with K-link 3.0 in the handheld;

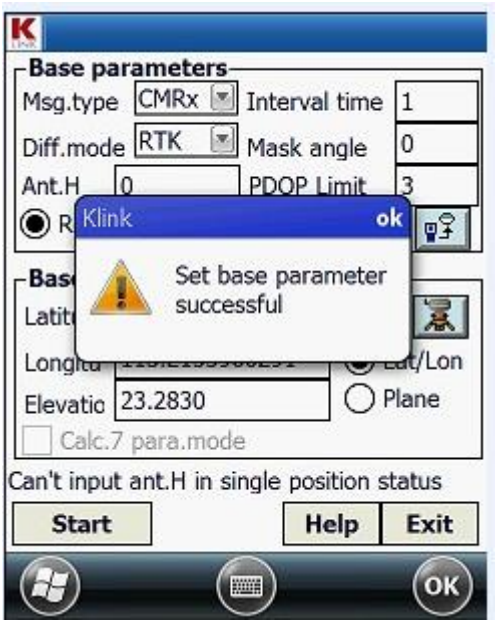
2）Operation: Configuration → instruments Config → Base Station (the mainframe must be Base mode);

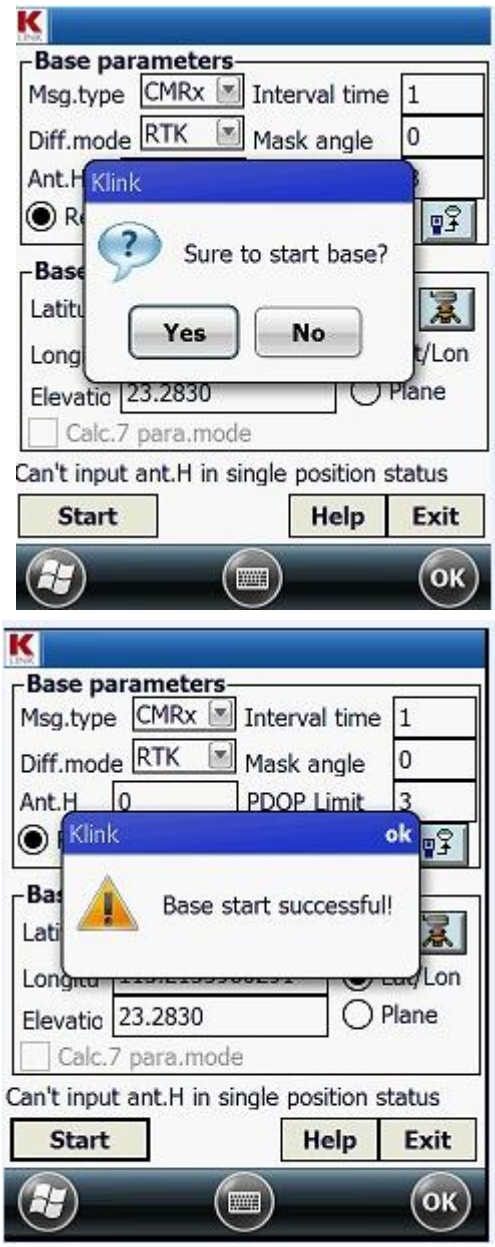



3) Set the base station parameters. Normally you only need to set differential mode（that is Diff.mode） in parameter

settings while others using the default parameters. After setting click , the base station setting finish.

4) After setting the parameters, click "Start" (in general, the base station are arbitrarily set up, Base coordinates do not need to be input)






Base start successfully

Note: *If you start the base station successfully the first time, you can directly open the base station mainframe and it will operate automatically if you don't want to change the configuration.*

5）The radio channel setting

Set the radio channel on control panel of the external radio.

- ✧ Set the radio channel, there are eight channels to choose from；
- ✧ Set the radio power, if the working distance is not far, and interference is low, you can choose the low power transmitting；
- ✧ If the radio is successfully transmitted, the TX indicator will flash at intervals；

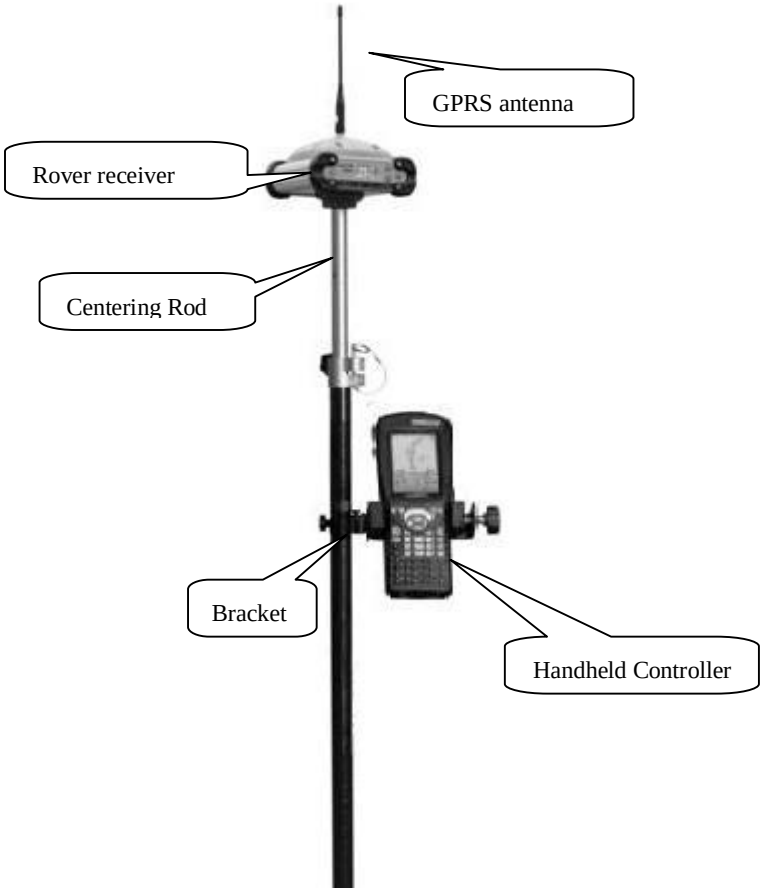
## §3.2.3 Mounting the Rover Station

After verifying the successful transmitting of the base station, you can start the erection of the rover station. The steps are as follows:

1) set the receiver to the rover station radio mode;

2) Power on the rover station mainframe, fix it on the centering rod of the carbon fiber pole, and screw on the UHF differential antenna;

3）Install the handheld bracket and the handheld controller；




## §3.2.4 Rover settings (ROVER station Radio mode)

When finish the mounting of Rover station, then set Rover Station, in order to reach fixed status, steps are as follows：

1) Install K-link 3.0 on handheld controller and connect it with the Rover receiver;
2) Rover station setting： Configure→Instrument config→Rover station（The receive must be Rover mode）
3) Set the Rover station parameters. Normally you only need to set

the differential data format（that is Diff.mode） in parameter settings while others using the parameters same with the Base station settings, confirm and return to the main interface.

4) Channel setting： Config→Instrument config→Channel setting, switch the channel same to the Base station.

Setting finished, after the Rover receiver reaches fixed solution, and then high-precision coordinates appear on the handheld controller. The follow-up creating new job and setting conversion parameters; Please refer to the other manual <<K-link 3.0 3.0 User Manual >>

## §3.3 RTK operation（GPRS mode）

The mainly difference between RTK GPRS mode and RTK Radio mode is that, GPRS mode transmit differential data via network. Therefore, the mounting method is similar to Radio mode, but the settings on K-link 3.0 are much different.


Built in GPRS or GPRS/3G module Base Station

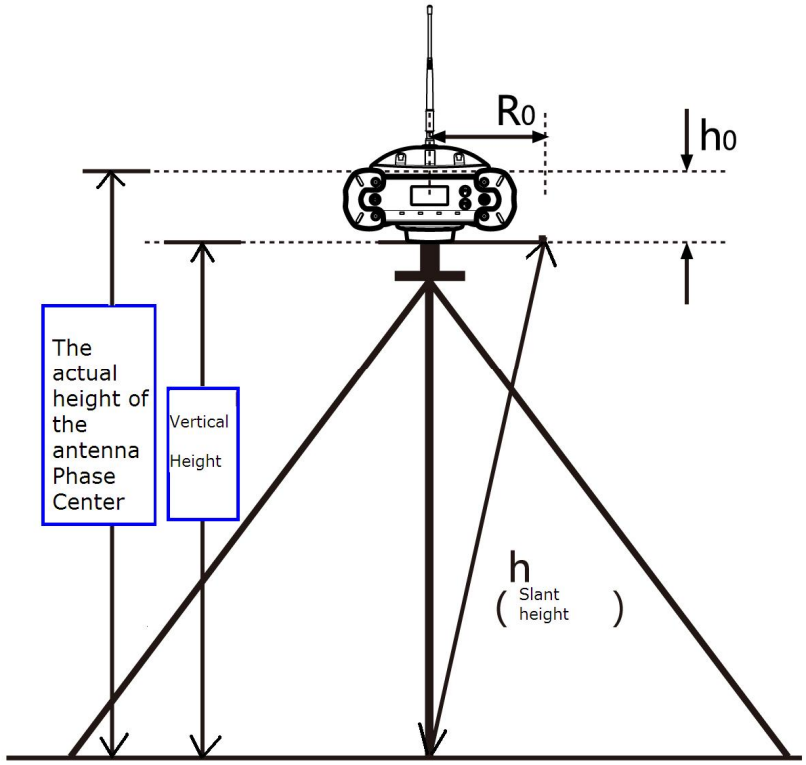
## §3.3 The antenna height measuring

The antenna height is related to static operations and RTK operations, the following is the introduction separately.

Antenna height is actually the vertical height of the phase center to ground measurement point, measurement methods of antenna height in dynamic mode includes rod height, vertical height and slant height;

- ✧ Rod height: the height of the centering rod, which can be read from the rod scale;
- ✧ Vertical Height: the vertical height from the ground to the bottom of the main mainframe + antenna phase center to the bottom of the mainframe;
- ✧ Slant height: measure to the middle of the rubber ring, In the hand-held software, select the antenna height mode to the slant height, then input the value;

Static mode antenna height measurement: measure from the ground to the middle of the mainframe rubber ring; select the appropriate type of antenna in the post-processing software.




The antenna height measuring for K300

# Chapter 4 Connecting to PC

Reading this chapter, you can grasp in detail how to connect K300 to the computer for data transfer, and the mainframe setting.

## §4.1 Mainframe data transfer

The receiver document management of K300 uses U disc storage, plug and play, do not need to download the program, directly drag and download. The multi-function data cable is used to download, connect one end to USB, the other end to the nine-pin socket at the bottom of the mainframe. After connected, there will be a new drive on the computer, like a flash disk, can copy the appropriate file directly.


Open the "Removable Disk" you can see the data and system files in the mainframe memory

As shown in Figure, DAT file is the data files acquired by K300 mainframe, the modification time is the end of the data collection time. The original files can be copied directly to the PC, you can also download In-star to copy data to PC, using the In-Star software to modify the file name and the antenna height, the next section will introduce the In-Star in detail.

## §4.2 In-Star Operation

In-Star is a multi-functional setting tool, which can perform data transfer, firmware upgrades, parameter settings, radio settings, network settings, mainframe register. This tool is simple and easy.

Install In-Star to the computer

- Perform “Data Output” and “Parameter settings” via USB port;
- Via serial port, the function options are Radio Settings, Network Settings, and Receiver Register. Both can do firmware upgrades;

✧ Important Note

When using USB, you must open In-Star first; otherwise it cannot connect to the mainframe!

Instar is software to help you configure RTK, to communicate Instar with receivers, you need L997Y \L797Y cable (depends on the receiver) to connect receivers along with PC.

There are 6 functions.


Data output: to copy static data from receiver (USB port);

Firmware update: to upgrade firmware of receiver (COM port);

Parameter setting: to configure some basic collection parameters of receiver (USB port);

Radio setting: to configure radio module of receiver (COM port, radio direct-on mode);

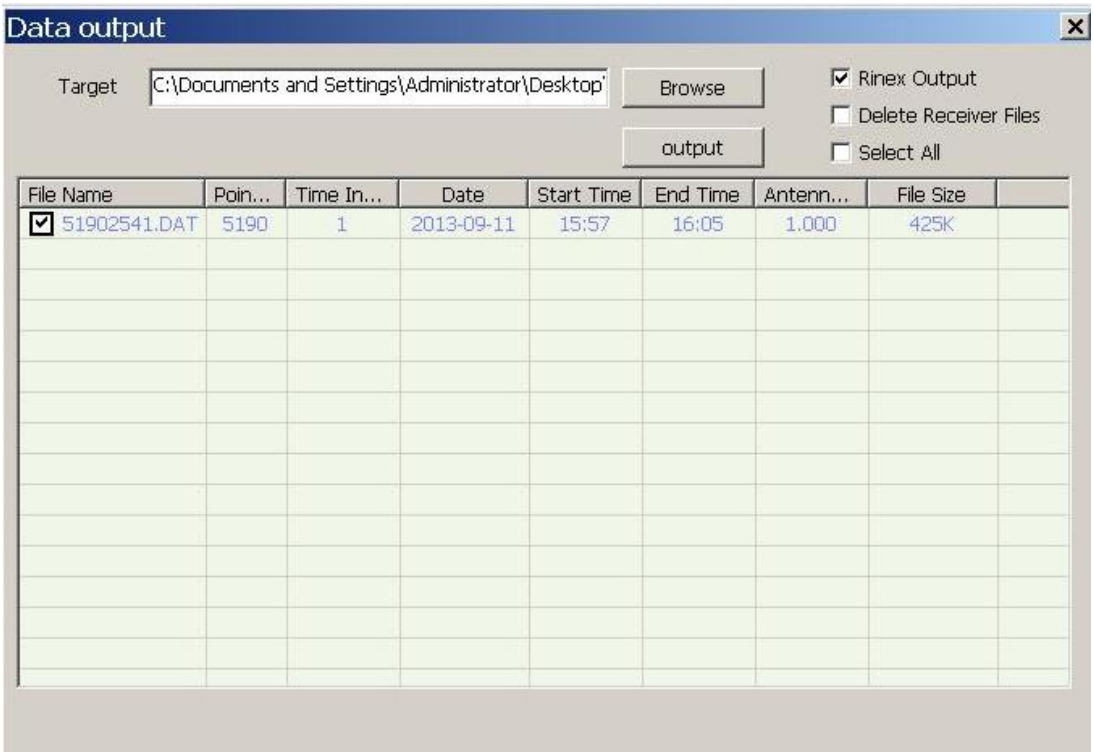
Network setting: to configure network module of receiver (COM port, network direct-on mode)

Receiver register: to input register code (COM port);

## §4.2.1 Data Output

Power off receiver and connect it to PC with L997Y USB port, the receiver type and SN will show at the bottom

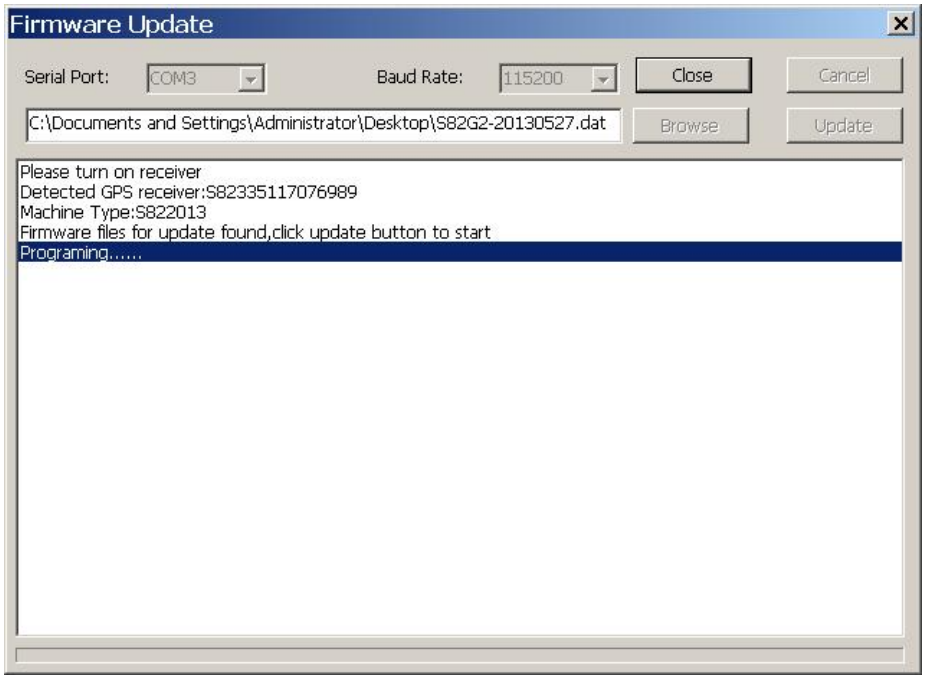

Go into Data output, you can see the data stored in the receiver. Select the data you need and output target, then you can output the data in DAT format or in Rinex format



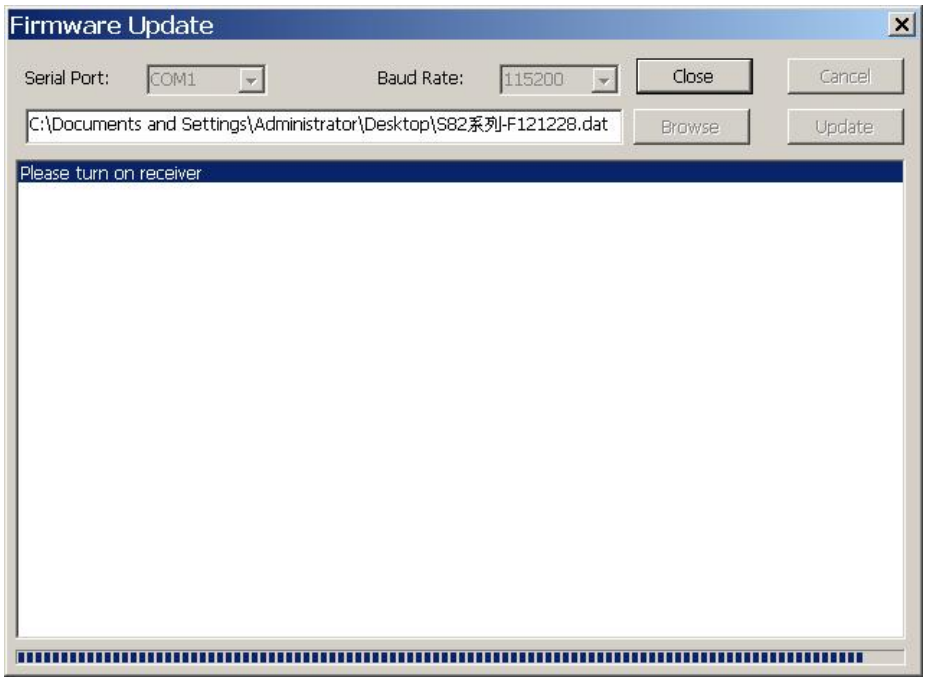

## §4.2.2 Firmware update

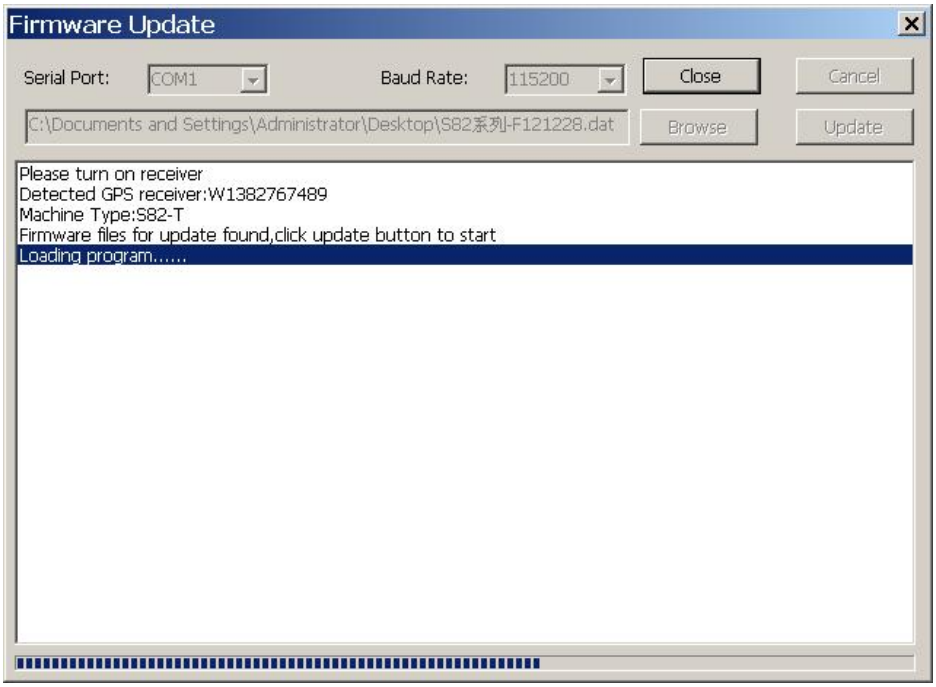
Power off the receiver and connect it to PC with L997Y COM port

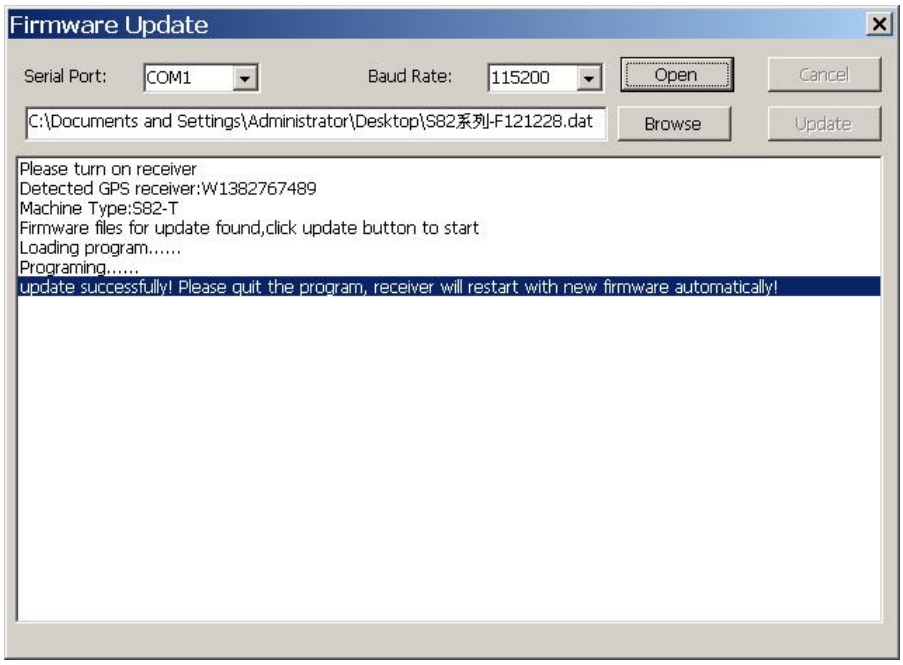
Click browse to find the update firmware




Select the right port and baud rate 115200, open, then power on the receiver





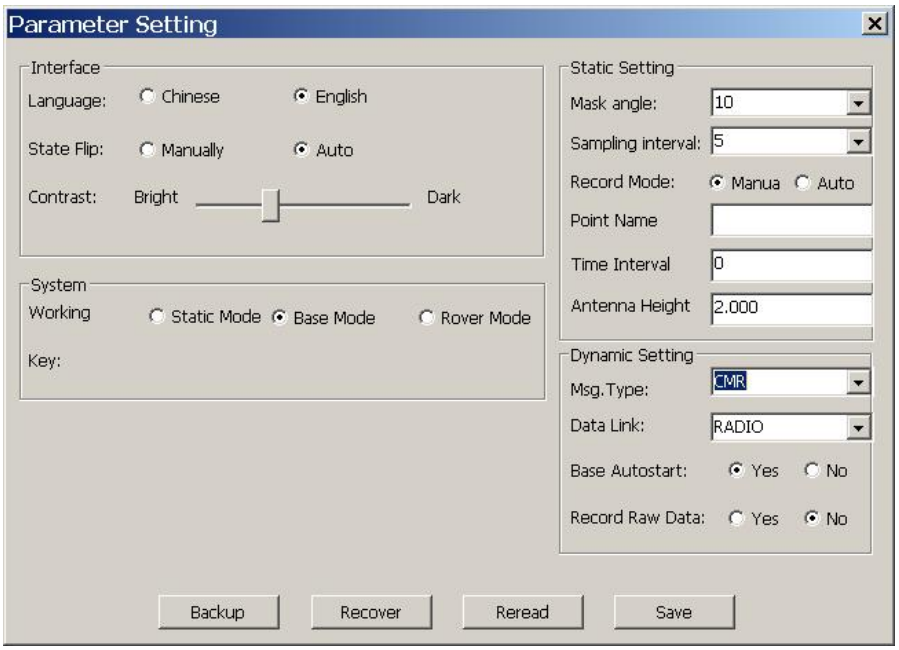




Then the receiver will restart automatically

## §4.2.3 Parameter setting

Power off the receiver and connect it with L997Y USB port

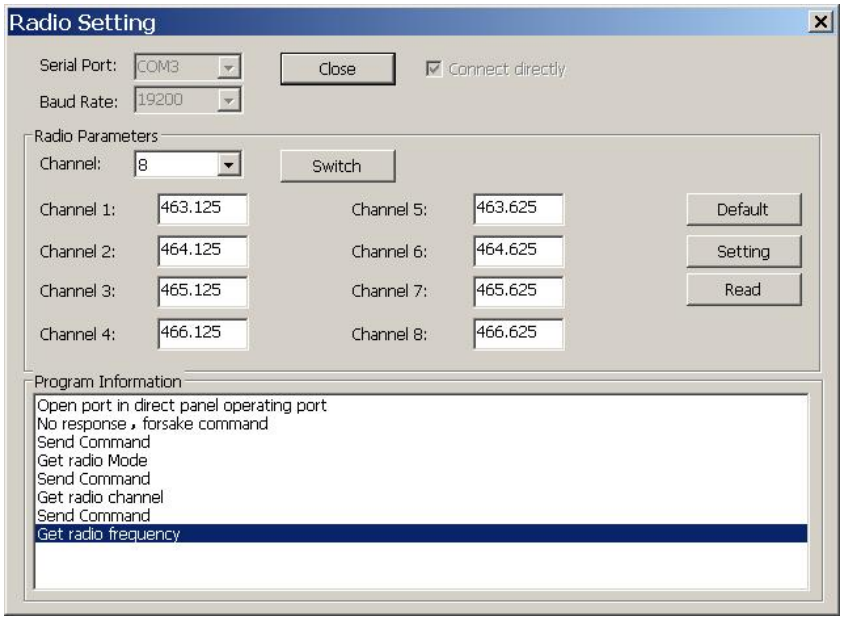
In parameter setting, you can edit the mask angle and sample interval in static survey and differential message type, data link, whether to record raw data in dynamic survey




## §4.2.4 Radio setting

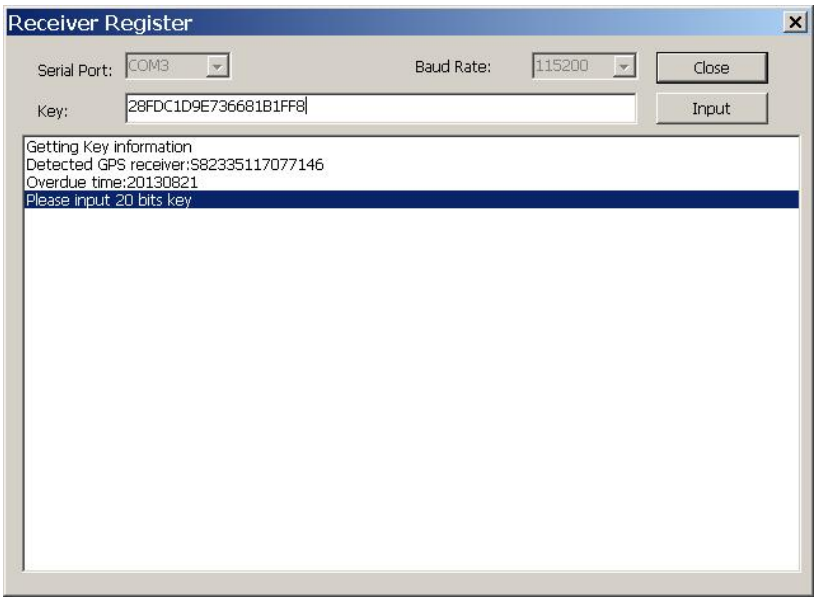
Power on the receiver and switch it to radio direct-on mode, connect to PC through L997Y COM port

Select the right port and baud rate 19200, tick connect directly, then you can read the radio frequency and current channel, switch channel, setting configuration.




## §4.2.5 Receiver register

Power on the receiver and connect to PC with L997Y COM port, and then input register code directly



# Appendix A K300 main technical specifications

| | |
|---|---|
| GNSS Features | |
| 220 channel | |
| GPS | L1C/A、L1C、L2C、L2E、L5 |
| GLONASS | L1C/A、L1P、L2C/A、L2P、L3 |
| SBAS | L1C/A、L5（for SBAS satellites supporting L5） |
| Galileo | GIOVE-A and GIOVE-B、E1、E5A、E5B |
| The whole constellation receiver technology, support all existing and planned GNSS constellation signals. | |
| Highly reliable carrier tracking technology, greatly improves the accuracy of the carrier, to provide users with high-quality original observation data | |
| intelligent dynamic sensitivity positioning technology, adapt to a variety of environmental transformation, suitable for worse, more long-range positioning environment | |
| High-precision positioning processing engine | |
| Intelligent solutions | |
| Positioning output frequency | 1Hz~20Hz |
| initialization time | <10 sec |
| Initialization reliability | ＞99.9% |
| Data format | |
| Differential format support | CMR、CMR+、SCMRX、RTCM2.1、RTCM2.2、RTCM2.3、RTCM3.0、RTCM3.1 |
| Output format support | NMEA 0183、PJK Horizontal coordinates 、binary code |
| GPRS support | VRS、FKP、MAC， Support NTRIP |
| Accuracy specifications | |
| Static Horizontal accuracy | ±2.5mm+1ppm |
| Static Vertical accuracy | ±5mm+1ppm |
| RTK Horizontal accuracy | 8cm+1ppm |
| RTK Vertical accuracy | 15cm+1ppm |

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| Code differential positioning accuracy | 0.45m（CEP） |
| Stand-alone positioning accuracy | 1.5m（CEP） |
| Data link communication | |
| Built-in transmitting radio | transceiver built-in radio, transmitted power is 0.5W~2W |
| UHF data link | transceiver built-in radio, typical operating distance of 5km |
| GPRS data link | high-end radio module, SMT assembly, high integration, and enhance the operational distance of the radio. |
| External data link | GPRS (3G/CDMA optional) network communication module, Internationally accepted, automatic landing network, compatible with various CORS system access |
| Bluetooth | Optional external GPRS / CDMA dual-mode communication module, free to switch to adapt to various work environment |
| Data Storage | |
| Standard configuration 4G internal memory，maximum extended storage is up to 32G | |
| High-speed USB plug-and-play without installing drivers, directly connect a computer to transfer data | |
| Input and output port | |
| one external UHF antenna interface | |
| one 7-pin port for data transfer | |
| one 5-pin port for differential data communication | |
| one 2-pin power supply port | |
| Electrical, physical characteristics | |
| Battery | Built-in double battery package 8800mAH |
| Voltage | 7.2V |
| Power consumption | 2W |
| Mainframe size | 165mm×168mm×122mm(L×W×H) |
| weight | 1.85kg（battery included） |
| Operational interface | |
| Screen | 128×64 solution，1.54 inch OLED |
| Four buttons operation | Visualization operation, switch operational mode directly |

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| Indicator | Four indicators |
| Environment characteristics | |
| Waterproof | IP67 standard, protect from temporary immersion to depth of 1m |
| Dustproof | IP67 standard, protect from dust |
| Shockproof | Survive a 3m free drop |
| Working temperature | －45℃~60℃ |
| Storage temperature | －55℃~85℃ |