

M68KPro GNSS RECEIVER USER MANUAL



V1.0

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FCC warning:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 80 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter, End-Users must be provided with transmitter operation conditions for satisfying RF exposure compliance.

Revision History

Revised Edition	Revision History	Date
V1.0	Initial Release	2023-5-31

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I . Before You Start

Dear customers,

Thank you for purchasing our device. Before you start, please carefully read the following:

2. This user manual is for your device only. If the actual situation does not match with the situation in the user manual, the actual situation shall prevail.

3. For safety and instructions on how to use this device, please carefully read the precautions, exemptions from responsibility and instructions in the user manual.

4. The information in this user manual is subject to change without notice. We reserve the right to change or improve the device as well the content in the user manual without further notification.

1.1 Precautions For Safe Operation

For the safety of your products, operators and other persons, please read this part carefully before using your product.

Precautions can be divided into the following levels according to the degree of loss or injury under negligence or omission circumstances:

 **Warning:** Precautions requiring special attention. Ignoring this indication may result in death or serious injury to the operator.

 **Caution:** Precautions mainly for informing, such as supplementary instructions and using limitations. Ignoring this indication may result in personal injury or property damage.

2.2.1 Warning

1. Do not disassemble and open the device by yourself.
2. Please do not cover the charger when charging.
3. Please do not place the device near burning gas or liquid, and do not place it in an open flame or high temperature environment. Otherwise an explosion may occur.
4. Please avoid battery short circuit. Otherwise a fire may occur.

5. Please avoid the interference of severe electrostatic discharge. Otherwise, the device may experience some performance degradation, such as automatic opening/closing, etc.

2.2.2 Caution

1. Please fix the device firmly on the pole.

2. To avoid accidental damage, only use original accessories. Otherwise, the device may be damaged.

3. When transporting, please try to reduce the vibration of the equipment.

4. Do not touch the device with wet hands. Otherwise, electric shock may occur.

5. Please do not stand or sit on the carrying case, and do not turn it over, otherwise the device may be damaged.

1.2 Exemption From Liability

You should follow all operating instructions and periodically check the performance of this equipment.

We disclaim all liability for any damages and lost profits caused by:

1. False or Intentional Use or Misuse.

2. Any irresistible natural disasters, such as earthquakes, storms, floods, etc.

3. Data change, data loss, business interruption, etc.

4. Delivery error.

5. Use non-original accessories.

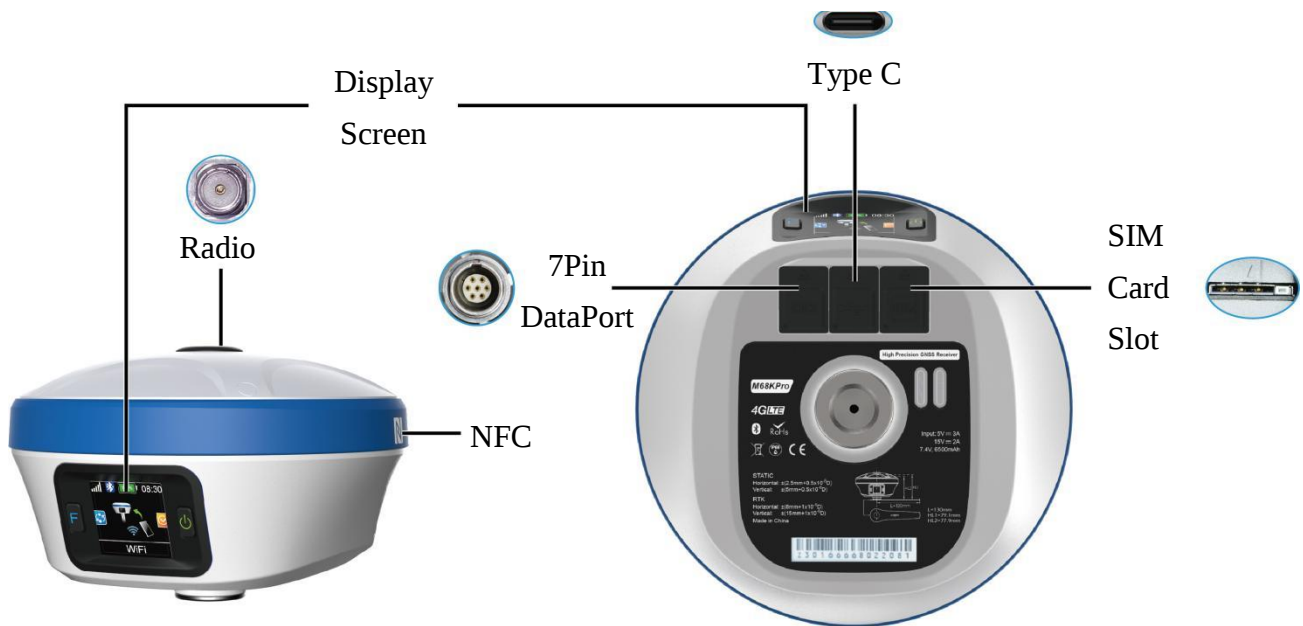
6. Operations not described in the user manual.

II. M68KPro At A Glance

The body of the M68KPro is designed with magnesium alloy material, which is durable and has better heat dissipation effect, and weighs only 900g. It supports IP68 dustproof and waterproof, and can work continuously for 20 hours when fully charged.

2.1 Appearance

The main body of M68KPro is as follows:

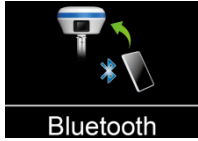
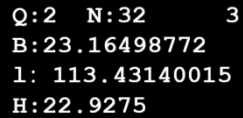


Projects	Function	Role or Status
	1.Battery level broadcast 2.On/Off Key 3.Configure confirmation	Short press to broadcast power; Long press to turn on/off; Short press to confirm the configuration item in configuration mode.
	Setting, next, back	After booting: Short press to broadcast working status Long press to enter configuration mode In configuration mode: Short press to switch configuration items Long press to cancel the configuration

	Network status	The mobile network is not turned on.
	Network status	The mobile network online.
	Bluetooth status	when Bluetooth is not connected.
	Bluetooth status	when Bluetooth is connected.
	Battery information	The remaining battery of the device.
	Battery information	The device battery is charging.
	Local time	UTC+Zone
	7Pin DataPort	RS232 serial port, baudrate support 1200, 2400, 4800, 9600, 19200, 38400, 115200 and 230400bps.
	Type C charging port	Supports up to 18W PD fast charging, see 2.5.
	SIM Card Slot	Support for the whole Netcom, see 2.4 for operation.
	Radio	Low power: 1W High power: 5W

2.2 Display Screen

The screen switches to display the current mode, data link and positioning status information of the device in 5 seconds.

Display Screen	Display information	Details
 Rover	Mode	Rover/Base/Static
 Bluetooth	Data link	Bluetooth/Built-in Network/Built-in Radio
 Q: 2 N: 32 3 B: 23.16498772 L: 113.43140015 H: 22.9275	GNSS status	Positioning status, Number of used satellites, Latitude, Longitude, Ellipsoid height.

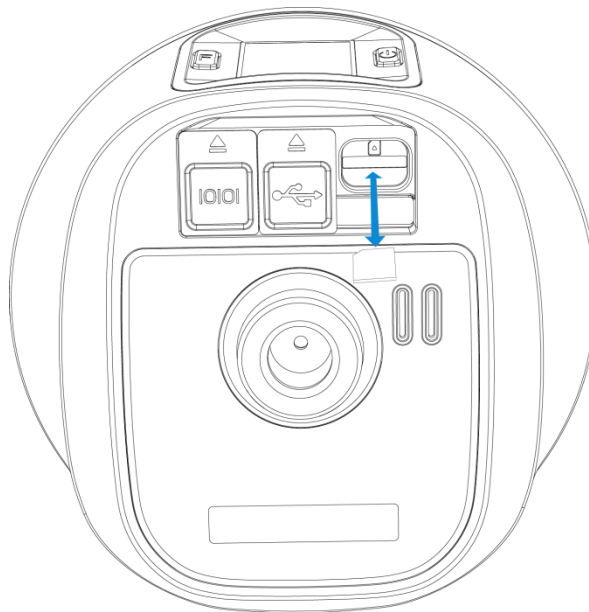
2.3 Power On And Off

Power on: Press and hold the power button for 3 seconds until the buzzer "beeps". Release the button, the device starts to power on, and the panel light flashes. The device will not start until the buzzer emits a "beep" for 3 times.

Shutdown: Press and hold the power button for 3 seconds until the buzzer "beeps". Release the button and the device starts to shut down. The unit will power off until all panel lights go out.

Forced shutdown: In case of unexpected failure, press and hold the power button for 10 seconds, and the device will automatically shut down.

2.4 Insert A SIM Card



The device supports network working mode. Insert SIM card:

1. Open the rubber cover;
2. Insert the SIM card slot according to the instructions (the chip faces the bottom center, the notch faces the card slot);
3. Cover the rubber sleeve.

2.5 Charge The Battery

The device is equipped with a Type-C charger that supports up to 18W PD fast charging.

It takes 4 hours to fully charge the battery:

1. Red light: The battery is charging.
2. Green indicator light: The battery is fully charged.

To charge the battery, open the type-C cover, connect one end of the data cable to the type-C interface, and the other end to the charger.

Note: For the safety of your device, please use the standard adapter in the package or a 3C-certified brand adapter to charge the host.

2.6 Install The Radio Antenna

The antenna is required when the datalink is set to internal radio.

To plug in radio antenna, open the cover of UHF radio, and install the radio antenna.

2.7 Packing Checklist

After the user arrives and unpacks the box, please press the list in the form to check whether all accessories and equipment are complete.

Num	Name	Model	Quantity	Image	Remark
1	GNSS receiver	M68KPro	1		Standard
2	450-470M radio antenna	AT0038	1		Standard
3	USB 3.0 to type-c cable	L0602-1	1		Standard
4	European 5V/2A USB power adapter (fast charging)	CG0025	1		Standard
5	Base connector	BB0031	1		Optional
6	Altimeter	BB0039	1		Optional

7	M68KPro yellow toolbox mobile station packaging		1		Optional
8	30 cm extension rod (yellow)	BBO036	1		Optional
9	Thin hand (5 inches) - with touch pen	DP0031	1		Optional
10	Book shelf	BB0037	1		Optional
11	7-pin to USB and serial ports	L0609-15	1		Optional
12	Multi-function RTK battery bar (with charger + 7-pin power cord)	CG0033	1		Optional

III. Web UI

The device WIFI can be used as a hotspot, and a PC, smartphone or tablet can be connected to the hotspot. After connecting to the hotspot, you can manage the working status, change the working mode, con basic settings, download raw data, update firmware and register devices, etc.

Take the interface of your PC as an example, enter the Web UI, and perform the following operations:

1. Use the computer to find the WIFI hotspot of the device. Hotspot name: device serial number, default password is empty.

2. Open a web browser and enter the IP address 10.10.10.10. The following interface displays:

The screenshot displays the web interface for a device with serial number Z33046861000017. The interface has a blue header with the device ID and a language selector set to English. A left sidebar contains navigation options: Simple UI, Status, Info, Skyplot, Data Stream, Command, Mode Config, Others Config, File, and Firmware. The main content area is titled 'Status' and is divided into three sections: System, Mode, and GNSS.

System	
Battery Info	100%
Charge State	Full
Scheme	None
Exception	None

Mode	
Working Mode	Rover Mode
Station Name	Z33046861000017
Elev Cutoff	15
Diff Age Max	60s
Data Link	Bluetooth
Diff Stream	0 B/s 1268459 B

GNSS	
Local Time	2023-05-06 18:28:33
UTC Time	2023-05-06 10:28:33
Quality	Differential
Latitude	23.16500456°
Longitude	113.43138321°
Height	-6.7221+25.2824-0.0791=18.4812m
Satellite	32/51

3.1 Status

- ① **System:** Battery Info, Charge State, Scheme, Exception;
- ② **Mode:** Working Mode, Elev Cutoff, Data Link;
- ③ **GNSS:** Time, Quality, Latitude, Longitude, Height, Satellite.


Z33046861000017
[Advance UI] English

Simple UI

Status

Info

Skyplot

Data Stream

Command

Mode Config

Others Config

File

Firmware

Status

System		
Battery Info	97%	
Charge State	Sleep	
Scheme	None	
Exception	None	

Mode		
Working Mode	Rover Mode	
Station Name	Z33046861000017	
Elev Cutoff	15	
Diff Age Max	60s	
Data Link	Bluetooth	
Diff Stream	0 B/s	2388466 B

GNSS		
Local Time	2023-05-06 18:41:23	
UTC Time	2023-05-06 10:41:23	
Quality	Differential	
Latitude	23.16500108°	
Longitude	113.43139098°	
Height	-6.7221+24.7242-0.0791=17.9230m	
Satellite	33/53	

3.2 Info

The info mainly displays the device information. For example, SN, GNSS Type, GNSS Hardware, IMEI, Expired Date, as shown below:


Z33046861000017
[Advance UI] English

Simple UI

Status

Info

Skyplot

Data Stream

Command

Mode Config

Others Config

File

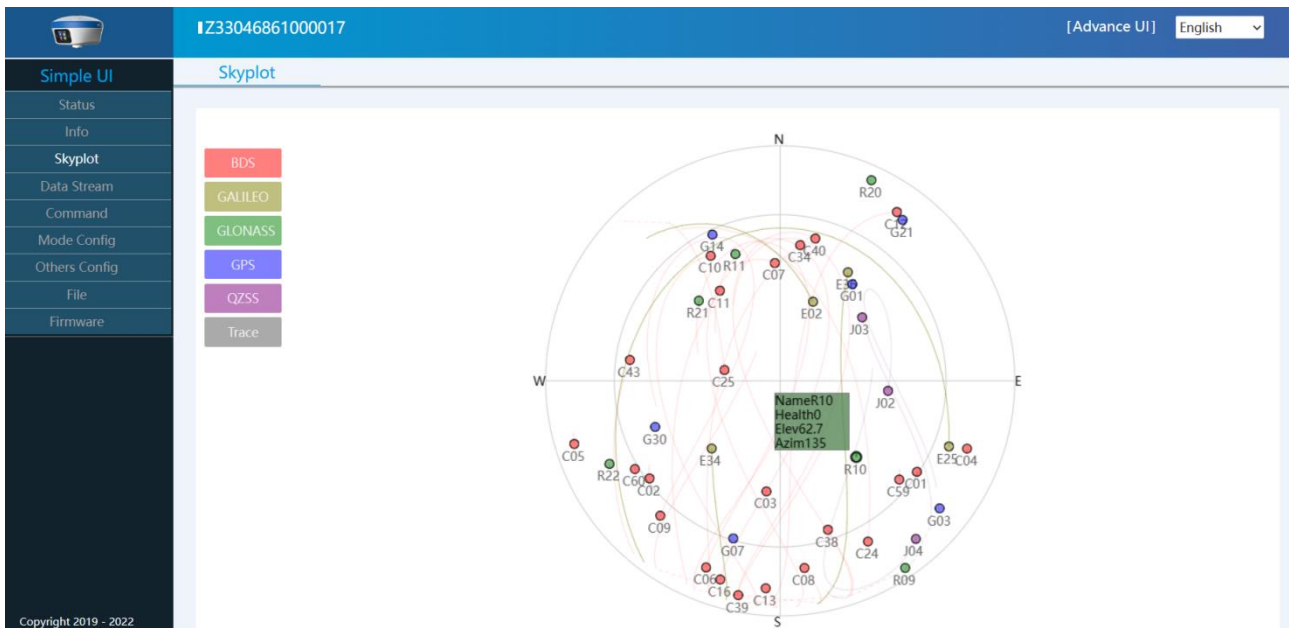
Firmware

Info

Info	
SN	Z33046861000017
Hardware	1.1.221212.230103/G4K8M1N1P2S2T7J1
Firmware	M68-FMW3.2.422.2305.1701
GNSS Type	UM980
GNSS SN	MD22B2222511487
GNSS Hardware	2310415000001
GNSS Firmware	R4.10Build7676
IMEI	865167069004118
Expired Date	2023-07-07

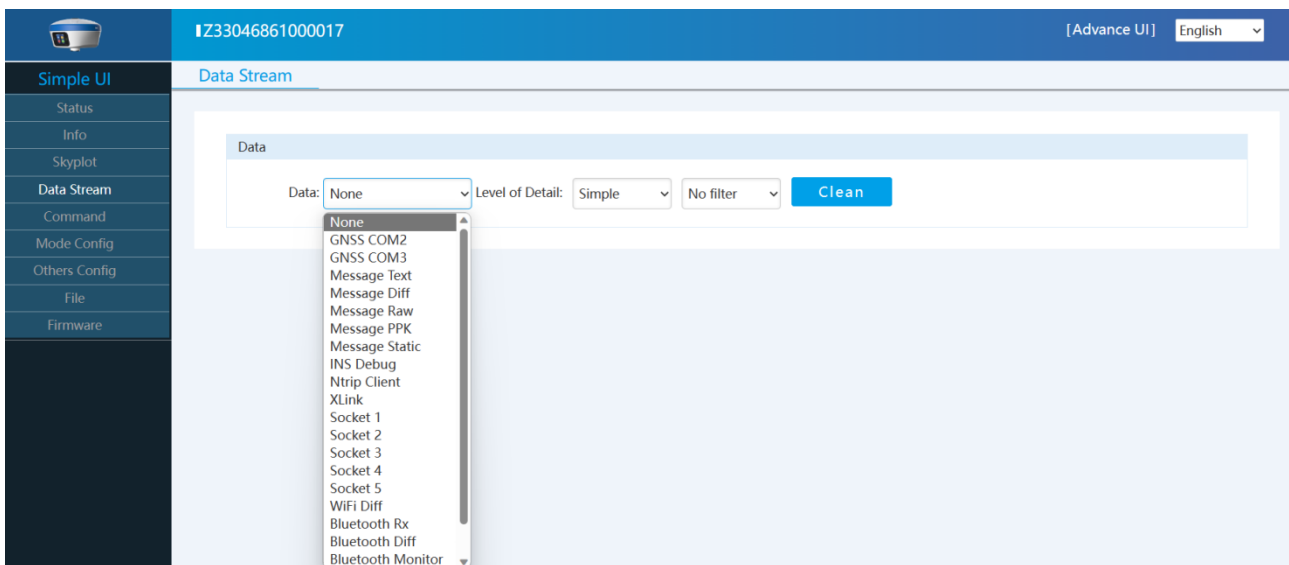
3.3 Skyplot

The skyplot mainly shows the satellite trajectory satellite status map. For example, Trace, Name, Health, Elev, Azim, as shown below:



3.4 Data Stream

The data stream is mainly used to debug data information; you can view the current data status, as shown below:



For example:

1. Message Text: see 3.11 in this section for the configuration of text data.


I233046861000017
[Advance UI]
English

Simple UI

Status

Info

Skyplot

Data Stream

Command

Mode Config

Others Config

File

Firmware

Data Stream

Data

Data: Message Text

Level of Detail: Simple

No filter

Clean

```

1: $GPGST,030703.00,1.2593,0.0,0.0,0.0,0.3578,0.4316,1.1276*56
2: $GPGGA,030703.00,2309.89938340,N,11325.88431828,E,2,32,0.6,28.9639,M,-6.7220,M,00.0*70
3: $GPRMC,030703.00,A,2309.8993834,N,11325.8843183,E,0.004,191.10,300523,,D*62
4: $GPGSA,M,3,1,3,6,14,17,30,,,,,,,,,1.8,0.6,1.7*03
5: $GDLGSA,M,3,74,75,85,86,,,,,,,,,1.8,0.6,1.7*29
6: $GAGSA,M,3,2,30,34,,,,,,,,,1.8,0.6,1.7*10
7: $BDGSA,M,3,1,2,3,7,8,10,11,13,23,25,34,38,1.8,0.6,1.7*10
8: $BDGSA,M,3,40,43,59,60,,,,,,,,,1.8,0.6,1.7*2F
9: $GQGSV,M,3,194,195,196,,,,,,,,,1.8,0.6,1.7*09
10: $GPGSV,2,1,7,1,29,33,38,3,43,91,42,6,36,237,40,7,17,181,38*45
11: $GPGSV,2,2,7,14,75,357,44,17,42,328,40,30,35,211,40*76
12: $GGLSV,1,1,4,74,29,162,35,75,79,234,46,85,39,2,40,86,46,293,40*50
13: $GAGSV,2,1,5,2,73,113,44,15,31,238,38,30,47,326,43,34,72,310,44*6F
14: $GAGSV,2,2,5,36,34,31,39*57
15: $BDGSV,6,1,23,1,45,123,39,2,46,233,37,3,62,187,41,4,32,109,36*66
16: $BDGSV,6,2,23,5,23,253,35,6,18,199,34,7,65,8,42,8,52,183,38*66
17: $BDGSV,6,3,23,9,24,216,35,10,57,338,40,11,48,8,42,13,41,193,41*54
18: $BDGSV,6,4,23,14,16,152,33,16,15,194,35,23,47,297,35,25,59,202,42*63
19: $BDGSV,6,5,23,34,36,34,40,38,65,171,41,40,56,28,42,22,126,34*6E
20: $BDGSV,6,6,23,43,52,323,42,59,48,129,42,60,44,239,42*59
21: $GQGSV,1,1,3,194,61,121,42,195,60,44,42,196,35,131,35*74

```

2. Message Raw


I233046861000017
[Advance UI]
English

Simple UI

Status

Info

Skyplot

Data Stream

Command

Mode Config

Others Config

File

Firmware

Data Stream

Data

Data: Message Raw

Level of Detail: Simple

No filter

Clean

```

1: binary: size=4932 time=2023-05-30 03:08:54.000/160 id= 43. RANGE amount=112
2: binary: size=4932 time=2023-05-30 03:08:55.000/160 id= 43. RANGE amount=112
3: binary: size=4932 time=2023-05-30 03:08:56.000/160 id= 43. RANGE amount=112
4: binary: size=4932 time=2023-05-30 03:08:57.000/160 id= 43. RANGE amount=112
5: binary: size=4932 time=2023-05-30 03:08:58.000/160 id= 43. RANGE amount=112
6: binary: size=4932 time=2023-05-30 03:08:59.000/160 id= 43. RANGE amount=112
7: binary: size= 72 time=2023-05-30 03:09:00.000/160 id= 42. BESTPOS type=SBAS
8: binary: size= 44 time=2023-05-30 03:09:00.000/160 id= 99. BESTVEL type=DOPPLER_VELOCITY
9: binary: size= 44 time=2023-05-30 03:09:00.000/160 id= 101. TIME st=1
10: binary: size=4932 time=2023-05-30 03:09:00.000/160 id= 43. RANGE amount=112
11: binary: size=4932 time=2023-05-30 03:09:01.000/160 id= 43. RANGE amount=112
12: binary: size=4932 time=2023-05-30 03:09:02.000/160 id= 43. RANGE amount=112
13: binary: size=4932 time=2023-05-30 03:09:03.000/160 id= 43. RANGE amount=112
14: binary: size=4932 time=2023-05-30 03:09:04.000/160 id= 43. RANGE amount=112
15: binary: size=4932 time=2023-05-30 03:09:05.000/160 id= 43. RANGE amount=112

```

3. Message Diff: when the device is the base station, you can check whether there is differential data output here.


I233046861000017
[Advance UI]
English

Simple UI

Status

Info

Skyplot

Data Stream

Command

Mode Config

Others Config

File

Firmware

Data Stream

Data

Data: Message Diff

Level of Detail: Simple

No filter

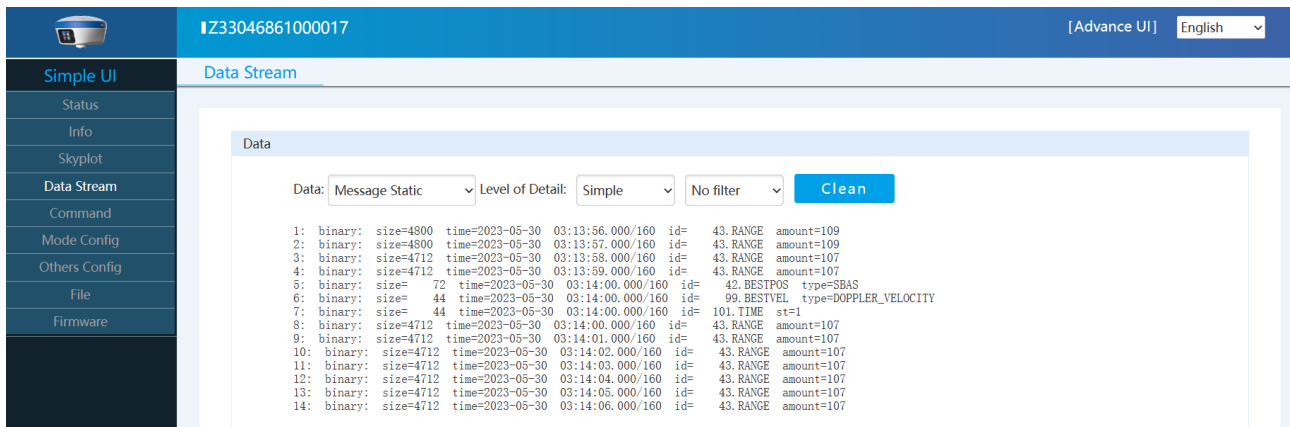
Clean

```

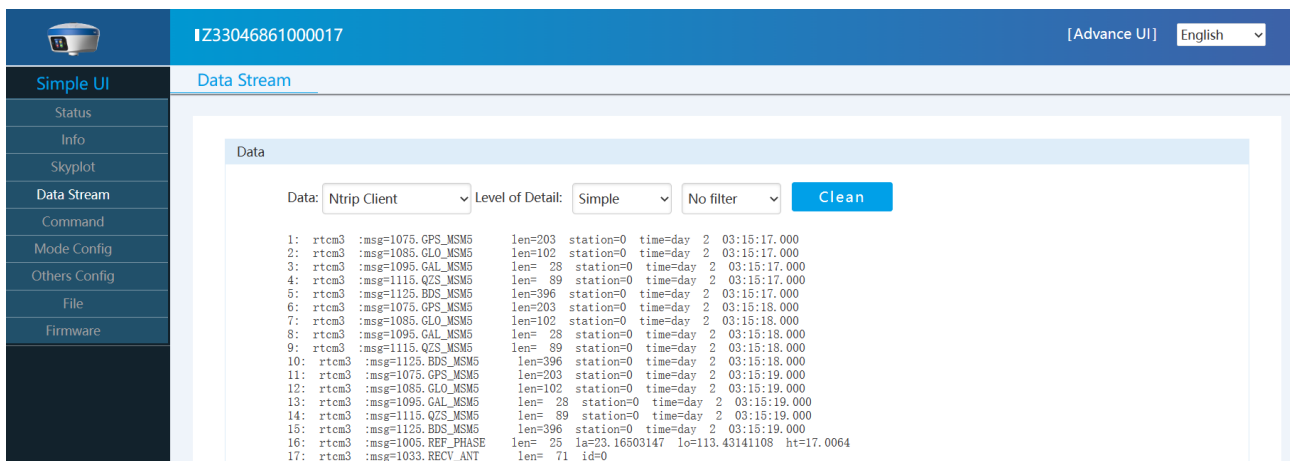
1: rtcm3 :msg=1074. GPS_MSM4 len=129 station=0 time=day 2 03:12:26.000
2: rtcm3 :msg=1084. GLO_MSM4 len= 80 station=0 time=day 2 03:12:26.000
3: rtcm3 :msg=1094. GAL_MSM4 len=100 station=0 time=day 2 03:12:26.000
4: rtcm3 :msg=1124. BDS_MSM4 len=360 station=0 time=day 2 03:12:26.000
5: rtcm3 :msg=1124. BDS_MSM4 len=140 station=0 time=day 2 03:12:26.000
6: rtcm3 :msg=1074. GPS_MSM4 len=129 station=0 time=day 2 03:12:27.000
7: rtcm3 :msg=1084. GLO_MSM4 len= 80 station=0 time=day 2 03:12:27.000
8: rtcm3 :msg=1094. GAL_MSM4 len=100 station=0 time=day 2 03:12:27.000
9: rtcm3 :msg=1124. BDS_MSM4 len=360 station=0 time=day 2 03:12:27.000
10: rtcm3 :msg=1124. BDS_MSM4 len=140 station=0 time=day 2 03:12:27.000
11: rtcm3 :msg=1074. GPS_MSM4 len=129 station=0 time=day 2 03:12:28.000
12: rtcm3 :msg=1084. GLO_MSM4 len= 80 station=0 time=day 2 03:12:28.000
13: rtcm3 :msg=1094. GAL_MSM4 len=100 station=0 time=day 2 03:12:28.000
14: rtcm3 :msg=1124. BDS_MSM4 len=360 station=0 time=day 2 03:12:28.000
15: rtcm3 :msg=1124. BDS_MSM4 len=140 station=0 time=day 2 03:12:28.000
16: rtcm3 :msg=1074. GPS_MSM4 len=129 station=0 time=day 2 03:12:29.000
17: rtcm3 :msg=1084. GLO_MSM4 len= 80 station=0 time=day 2 03:12:29.000
18: rtcm3 :msg=1094. GAL_MSM4 len=100 station=0 time=day 2 03:12:29.000
19: rtcm3 :msg=1124. BDS_MSM4 len=360 station=0 time=day 2 03:12:29.000
20: rtcm3 :msg=1124. BDS_MSM4 len=140 station=0 time=day 2 03:12:29.000
21: rtcm3 :msg=1005. REF_PHASE len= 25 le=23.16499139 lo=113.43140325 ht=22.0012
22: rtcm3 :msg=1033. REC_VANT len= 73 id=0

```

4. Message Static: When the device is static mode, you can check whether there is static data output here.



5. Ntrip Client: When the device is a rover station and uses Ntrip Client to obtain differential data, you can check whether there is differential data output here



3.5 Command

- ① **System** : Reboot, Shutdown;
- ② **Config and Data** : Reset Config, Clean Storage, Export Config, Import Config;
- ③ **Register Code** : The registration code is a valid time code that authorizes the location function of the device. When it is found that the registration code has expired and the device positioning function is unavailable, you can obtain a new registration code from the supplier by providing the device SN, and enter it on this page and click [Register] to register.

Simple UI | Command

System

Reboot Shutdown

Config and Data

Reset Config Clean Storage Export Config Import Config

Feature Code

Write

Gns Auth

Write

HRPT00-S10C-P

Register Code

Register

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3.6 Mode Config

① **Working Mode** : You can choose Rover Mode/ Base Mode/ Static Mode, and select the Elev Cutoff at the same time;

1. Rover Mode: the following parameters (Station Name, Elev Cutoff, Diff Age Max, Height Type, Antenna Height, Record, PPK) can be cond.

Simple UI | Mode Config

Working Mode

Mode: Rover Mode

Station Name: Z33046861000017

Elev Cutoff: 15 Degree

Diff Age Max: 60 Second

Height Type: Bottom

Antenna Height: 0 Meter

Record: Enable

PPK: Disable not affect by Record

2. Base Mode: the following parameters (Station Name, Elev Cutoff, Station ID, PDOP Threshold, Diff Type, Base Mode, Height Type, Antenna Height, Record) can be cond.

Simple UI | Z33046861000017 | [Advance UI] | English

Mode Config

Working Mode

Mode: Base Mode

Station Name: Z33046861000017

Elev Cutoff: 15 Degree

Station ID: 0

PDOP Threshold: 3.0000

Diff Type: RTCM32

Base Mode: Auto

Height Type: Phase

Antenna Height: 0.0791 Meter

Record: Enable

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3. Static Mode: the following parameters (Station Name, Elev Cutoff, PDOP Threshold, Sample Interval, Height Type, Antenna Height, Record) can be cond.

Simple UI | Z33046861000017 | [Advance UI] | English

Mode Config

Working Mode

Mode: Static Mode

Station Name: Z33046861000017

Elev Cutoff: 15 Degree

PDOP Threshold: 3.0000

Sample Interval: 1 s

Height Type: Phase

Antenna Height: 0.0791 Meter

Record: Enable

File Type: GNSS

② **Data link** : You can choose No Data link/ Bluetooth/ Wifi/ Built-in Network/ Built-in Radio/ External Radio/ XLink.

Data Link

Data Link: No Data Link

- No Data Link
- Bluetooth
- Wifi
- Built-in Network
- External Radio
- Built-in Radio
- XLink

Apply

1. Bluetooth: the device obtains the differential data of tSurvey software accessed by the manual network through Bluetooth connection to the manual;

2. Built-in Network: the device receives or sends data through the built-in network. To select this data link, first insert the SIM card into the device;

3. Built-in Radio: the device receives data through the built-in radio. To select this data link, first connect the radio antenna to the device.

3.7 Others Config

① **GNSS System** : The small box behind a single point can turn on or off the corresponding satellite system. If it is found that the device receives fewer satellites under normal environment, you can enter this page to check whether all satellite systems have been turned on.

② **WiFi** : You can choose three types of Disable/AP/Station, and you can set the WiFi name and password by yourself. When the device WiFi is used as the Station, you can access the network by entering the name and password of the external hotspot.

The screenshot displays the 'Others' configuration page. At the top, there's a header bar with a device icon, the ID 'Z33046861000017', and options for '[Advance UI]' and 'English'. A left sidebar lists menu items: Simple UI, Status, Info, Skyplot, Data Stream, Command, Mode Config, Others Config (highlighted), File, and Firmware. The main content area is titled 'Others' and contains two sections. The first section is a table for GNSS systems:

System	Enable
GPS	☒ Enable
GLONASS	☒ Enable
BDS	☒ Enable
GALILEO	☒ Enable
QZSS	☒ Enable
SBAS	☒ Enable
PPP	☒ Enable

The second section is 'WiFi'. It features a 'WiFi:' dropdown menu currently set to 'AP'. Below it is an 'SSID:' text field with the value 'Z33046861000017'. At the bottom is a 'PSK:' text field with a note 'Empty or Length not less than 8'.

③ **Others** : Time Zone, Voice.

This screenshot shows a portion of the 'Others' configuration page. It includes a 'Time Zone:' dropdown menu set to 'UTC+08:00' and a 'Voice:' section with a checked checkbox and the text 'Enable'.

3.8 File

File management can delete and download data of each channel in batches , as shown below:

The screenshot shows the 'File' management section of the web UI. The top bar displays the device ID 'I233046861000017' and options for '[Advance UI]' and 'English'. The left sidebar lists various configuration options, with 'File' selected. The main content area shows a table of files in the 'Root/' directory. Each row includes a checkbox, the file name, its size, and an 'Operation' column with a 'Delete' link. A 'Batch Delete' link is also present in the top right of the table area.

	Name	Size	Operation
☐	20230516/		Delete
☐	20230518/		Delete
☐	20230522/		Delete
☐	20230526/		Delete
☐	20230530/		Delete

3.9 Firmware

① **Version** : System, GNSS, INS, Radio, Firmware.

② **Local Upgrade** : Click Local Upgrade below to automatically identify and upgrade the positioning board firmware, tilt module firmware, and device firmware. There will be a prompt below during the upgrade process, and the device will restart after the upgrade is complete. The operation steps are as follows:

1. Click [Local Upgrade];
2. Select the correct device firmware in the pop-up window, flash the firmware and wait for the device to restart;
3. After the restart is complete, the firmware upgrade is completed;
4. Reconnect the device WiFi, enter the webui, and check whether the firmware has been upgraded successfully.

The screenshot shows the 'Firmware' section of the web UI. The top bar displays the device ID 'I233046861000017' and options for '[Advance UI]' and 'English'. The left sidebar lists various configuration options, with 'Firmware' selected. The main content area shows a table of firmware versions. Below the table is a 'Local Upgrade' button.

Version	
System	2.11.2305.21
Linux Version	3.18.44 Fri Apr 14 15:26:12 CST 2023
GNSS	R4.10Build7676
INS	B2.2_A5.7_83a3609aaf13aa0716623
Radio	R4.C029.00.00
Firmware	2.422.2305.1701

Local Upgrade

3.10 Log

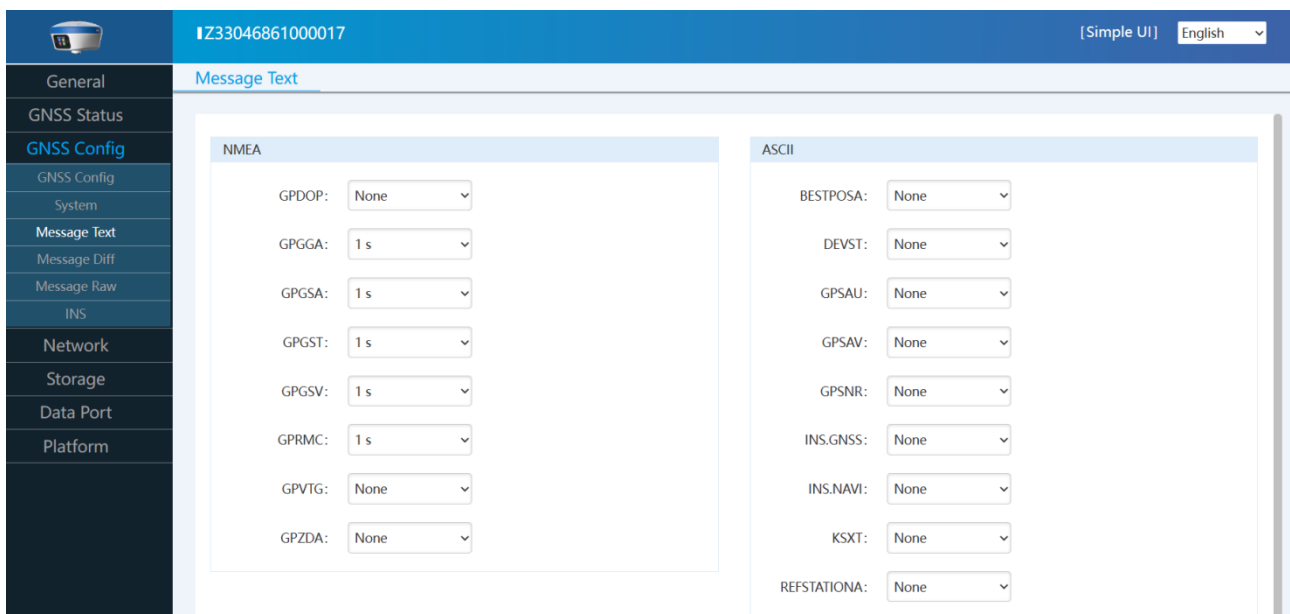
It provides the download of the operation log of the device. When the device is abnormal during use, you can download the log generated at the corresponding time here to the supplier for troubleshooting. As shown below:



File Name	Size	Time Modified	Operation
Z33046861000017-0066.zlog	1.27MB	2023-05-30 10:46:56	Download
Z33046861000017-0065.zlog	154.02kB	2023-05-22 16:57:42	Download
Z33046861000017-0064.zlog	542.43kB	2023-05-19 21:40:59	Download
Z33046861000017-0063.zlog	356.51kB	2023-05-19 09:48:06	Download
Z33046861000017-0062.zlog	619.43kB	2023-05-18 04:51:51	Download
Z33046861000017-0061.zlog	410.23kB	2023-05-16 16:48:08	Download
Z33046861000017-0060.zlog	67.78kB	2023-05-15 17:13:03	Download
Z33046861000017-0059.zlog	59.21kB	2023-05-15 16:53:14	Download
Z33046861000017-0058.zlog	66.43kB	2023-05-15 16:51:51	Download
Z33046861000017-0057.zlog	357.92kB	2023-05-13 16:38:19	Download
Z33046861000017-0056.zlog	254.35kB	2023-05-12 13:49:46	Download
Z33046861000017-0055.zlog	135.17kB	2023-05-11 18:49:23	Download
Z33046861000017-0054.zlog	62.42kB	2023-05-11 15:39:43	Download
Z33046861000017-0053.zlog	67.45kB	2023-05-11 15:38:24	Download
Z33046861000017-0052.zlog	61.57kB	2023-05-09 18:01:33	Download

3.11 Message Text

You can set the type and frequency of output data in text format, as shown below. After configuration, you can check whether there is corresponding text data output in 3.4 of this section.



NMEA	ASCII
GPDP: None	BESTPOSA: None
GPGGA: 1 s	DEVST: None
GPGSA: 1 s	GPSAU: None
GPGST: 1 s	GPSAV: None
GPGSV: 1 s	GPSNR: None
GPRMC: 1 s	INS.GNSS: None
GPVTG: None	INS.NAVI: None
GPZDA: None	KSXT: None
	REFSTATIONA: None

The following are the formats of several common message text:

GPGLA	\$GPGLA,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,M,<10>,M,<11>,<12>*hh
<1>	UTC time, hhmmss (hour minute second) format, 8 hours different from Beijing time
<2>	Latitude ddmn.mmmn (degrees and minutes) format (the previous 0 will also be transmitted)
<3>	Latitude Hemisphere N (Northern Hemisphere) or S (Southern Hemisphere)
<4>	Longitude dddmn.mmmn (degrees and minutes) format
<5>	Longitude Hemisphere E (East Longitude) or W (West Longitude)
<6>	GPS status: 0=no positioning, 1=single point positioning, 2=SBAS differential positioning, 4=RTK fixed solution, 5=RTK floating point solution, 6=inertial navigation positioning
<7>	The number of satellites (00~12) using the solution position
<8>	HDOP horizontal precision factor (0.5~99.9)
<9>	Altitude (- 9999.9~99999.9)
<10>	Height of earth ellipsoid relative to geoid
<11>	Differential time (the number of seconds since the last differential signal was received. If it is not differential positioning, it will be null)
<12>	Differential station ID No. 0000~4095 (the previous 0 will also be transmitted, otherwise it will be null)

GPGLA	\$GPGLA,<1>,<2>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<4>,<5>,<6>*hh
<1>	Mode, M>manual, A=automatic
<2>	Positioning type, 1=no positioning, 2=2D positioning, 3=3D positioning
<3>	PRN code (pseudo-random noise code), the satellite number (01~32, the previous 0 will also be transmitted) being used to calculate the position.
<4>	PDOP position precision factor (0.5~99.9). The spatial geometric intensity factor of satellite distribution. Generally, the better the satellite distribution is, the smaller the PDOP value is, which is generally less than 4.

<5>	HDOP horizontal precision factor (0.5~99.9)
<6>	VDOP vertical precision factor (0.5~99.9)

GPGLSV	\$GPGLSV,<1>,<2>,<3>,<4>,<5>,<6>,<7>,...<4>,<5>,<6>,<7>*hh
<1>	Total number of GSV statements
<2>	Number of GSV in this sentence
<3>	Total number of visible satellites (00~12, the previous 0 will also be transmitted)
<4>	PRN code (pseudo-random noise code) (01~32, the previous 0 will also be transmitted), which can be understood as satellite number.
<5>	Satellite elevation (00~90 degrees, the front 0 will also be transmitted)
<6>	Satellite azimuth (000~359 degrees, the front 0 will also be transmitted)
<7>	Signal to noise ratio (00~99dB, empty when no satellite is tracked, and the previous 0 will also be transmitted), 50 is better.

3.12 Data Config

The device has 24G storage space (recyclable storage) and supports five channels (CH01/CH02/CH03/CH04/CH05) to save various files, as shown in the below. We can con the data source, file period, file name and file format of each channel for storage as required.

Note: Do not change the mode after the device data configuration is completed, or the default storage configuration will be restored.

The screenshot shows a web-based configuration interface for a GNSS device. The top bar includes a logo, the device ID 'IZ33046861000017', and language/ UI options. A left sidebar contains navigation links: General, GNSS Status, GNSS Config, Network, Storage (selected), Status, Data Config, FTP Upload, File, Data Port, and Platform. The main area is titled 'Channel Config' and features tabs for CH01, CH02, CH03, CH04, and CH05. The CH01 tab is active, showing an 'Enable' checkbox (checked) and four dropdown menus: 'Data' (Message Raw), 'Period' (Single File), 'Name' (SITE-CH-yyyyMMdd-hhmmss), and 'Format' (*.gnss).

Data:

None
 GNSS COM2
 Message Text
 Message Diff
Message Raw
 Message PPK
 Message Static
 INS Debug
 Ntrip Client
 XLink
 Socket 1
 Socket 2
 Socket 3
 Socket 4
 Socket 5
 WiFi Diff
 Bluetooth Rx
 Bluetooth Diff
 Bluetooth Monitor
 Built-in Radio

Period:

Single File

1 hour
 2 hours
 3 hours
 4 hours
 6 hours
 8 hours
 12 hours
 24 hours

Name:

SN-CH-yyyyMMdd-hhmmss
 SN-yyyyMMdd-hhmmss
 SITE-SSSS-yyyyMMdd-hhmmss
 yyyyMMddhhmmss
 SSSSDOYX
 SITEDOYhhmm
 SITEDOYX
 SITEDOYXmm
 SITEDOYhh
SITE-CH-yyyyMMdd-hhmmss

Format:

***.gnss**
 *.data
 *.txt
 *.dev
 RINEX2.10
 RINEX2.11
 RINEX3.02
 RINEX3.03
 RINEX3.04
 RINEX3.05
 RINEX3.05 (.D)
 RINEX3.05 (.gz)

File name naming rules :

also be automatically configured by default to store location post-processing data, as shown in the following .



Z33046861000017

[Simple UI] English

General

GNSS Status

GNSS Config

Network

Storage

Status

Data Config

FTP Upload

File

Data Port

Platform

Storage Status

General

Capacity: 24.000000 GB

Occupy: 510.052 MB

Free: 23.501902 GB

Occupy Rate: 2.08%

Write Speed: 4.85 kB/s

File List

	Channel	Data	Name	Size
1	CH02	Message Raw	Z3304686100001 ... 30-031020.gnss	147.72 kB
2	CH04	Bluetooth Monitor	Z3304686100001 ... 530-004804.txt	5.194 MB

3. Static (CH03)

When the device is set to the static mode, the device will automatically connect to CH03 to store static positioning data by default, as shown in the following .



Z33046861000017

[Simple UI] English

General

GNSS Status

GNSS Config

Network

Storage

Status

Data Config

FTP Upload

File

Data Port

Platform

Storage Status

General

Capacity: 24.000000 GB

Occupy: 511.577 MB

Free: 23.500413 GB

Occupy Rate: 2.08%

Write Speed: 4.63 kB/s

File List

	Channel	Data	Name	Size
1	CH03	Message Static	Z3304686100001 ... 30-031349.gnss	690.03 kB
2	CH04	Bluetooth Monitor	Z3304686100001 ... 530-004804.txt	5.194 MB

Note: Whenever the QTSurvey software connects to the device through Bluetooth, the device will automatically connect to CH04 to store Bluetooth monitor data. If there is any problem with the settings of the Bluetooth connection device, you can download the recorded Bluetooth monitor data for troubleshooting.


I Z33046861000017
[Simple UI] English

General
GNSS Status
GNSS Config
Network
Storage
Status
Data Config
FTP Upload
File
Data Port
Platform

Storage Status

General

Capacity: 24.000000 GB
Occupy: 512.211 MB
Free: 23.49794 GB
Occupy Rate: 2.08%
Write Speed: 0 B/s

File List

	Channel	Data	Name	Size
1	CH04	Bluetooth Monitor	Z3304686100001 ... 530-004804.txt	5.194 MB

3.13 ZXVPN

ZXVPN can provide a virtual LAN, connect the device to the server, and conduct WEBUI access in the background to provide corresponding remote technical support and services. The operation steps are as follows:

1. Insert the mobile network card into the device;
2. Open the mobile network and confirm that the mobile network is online;
3. Click [Use Default Value] to apply.


I Z33046861000017
[Simple UI] English

General
GNSS Status
GNSS Config
Network
Storage
Data Port
Platform
ZXVPN

ZXVPN

CH01 CH02 CH03

CH01 ☒ Enable

Host: [Use Default Value](#)
Port:
Network:
Username:
Password:

Apply

State

State: Online
IP Address: FD00:7983:5376::1002

IV. QTSurvey Basic Operations

It describes the basic operations to start using the device.

4.1 DP0031 Data Controller



The DP0031 TD-LTE wireless computer is a rugged, multi-function wireless computer designed with a 5-inch sunlight readable HD touch screen and alphanumeric keypad, equipped with a powerful octa-core processor and Android operating system for perfect adaptability with measuring handbook software. The DP0031 TD-LTE has professional IP68 grade protection, which is suitable for harsh outdoor environments. The large-capacity lithium battery can guarantee more than 10 hours of field work and complete multiple survey tasks throughout the day.

It's Key features:

- 5" sunlight-readable HD touchscreen;
- Octa-core 2.0GHz CPU;
- Pre-installed with Android 8.1 operating system
- 4GB RAM + 64GB ROM;
- 5 megapixel front + 13 megapixel rear camera;

- IP68 protection, waterproof/shockproof/dustproof;
- Wi-Fi, Bluetooth, NFC;
- 4G all-network support;
- 7000 mAh battery with 14 hours of battery life;
- Universal Type-C connector;
- Charging time: less than 4 hours (fast charging).

4.2 Device Connect

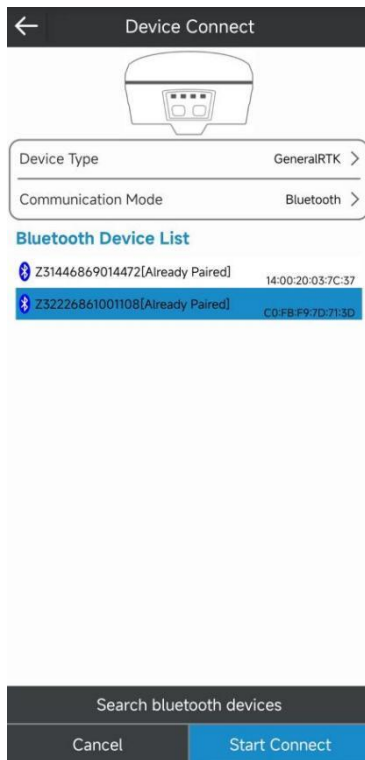
Click [Configure]->[Device Connect], enter the device connection interface, as shown in 4.2-1. Select device type (GeneralRTK), Communication Mode (Bluetooth) , click again [Search bluetooth devices], as shown in 4.2-2. View a list of bluetooth devices, select the corresponding device SN number, click [Start Connect] complete the device connection, as shown in 4.2-3. After connecting the device successfully, it will directly return to the main configuration interface, as shown in 4.2-4. Then enter the device connection, Click [Disconnect] will disconnect the device, as shown in 4.2-5. Click [Communication Debug] to view the data of the communication between the software and the device, as shown in 4.2-6.

1. The types include [Local GPS], [General/Horizon/TokNav/Meridian RTK], and [GeneralRTK] is selected by default.

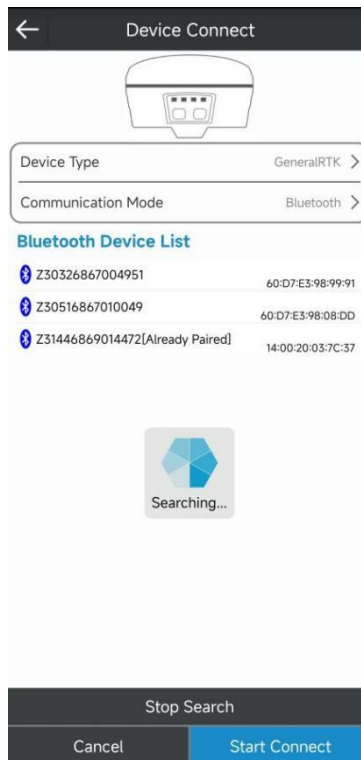
2. Connection Methods include [Bluetooth], [TCP], [Serial port], [Demo mode].

3. Click [Search bluetooth devices] to search for Bluetooth, enter Bluetooth search and selection, and click the corresponding device serial number to select the device to be connected.

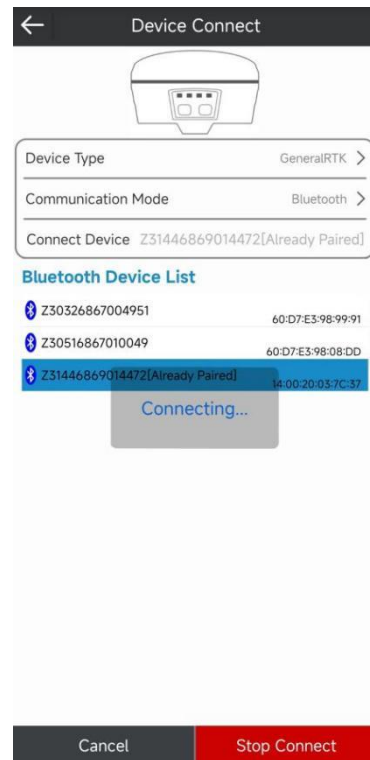
4. After the device is successfully connected, click [Communication Debug] to view the data of the communication between the software and the device, or send debugging commands to the device to troubleshoot and analyze the problems related to device positioning.



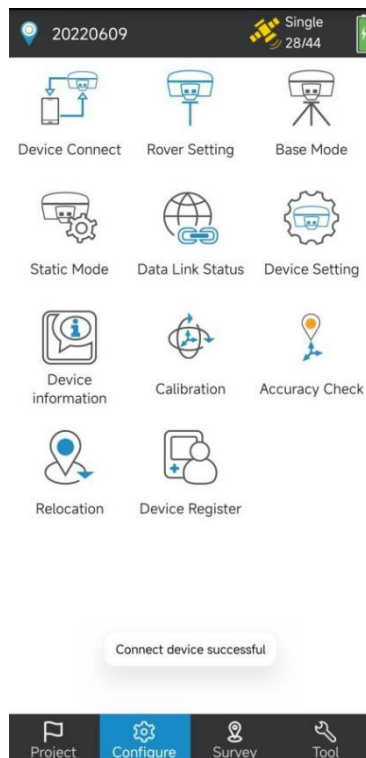
4.2-1



4.2-2



4.2-3



4.2-4



4.2-5



4.2-6

4.3 Project Manage

Click [Project] -> [Project Manage], as shown in 4.3-1. Project management includes functions such as new, delete, and open.

Click the project shown in the project list, and the delete and open functions will appear, as shown in 4.3-2. Click [Delete], as shown in 4.3-3, click [Cancel], the project will not be deleted from the list. If you click [OK], the project will be deleted from the list, as shown in 4.3-4.

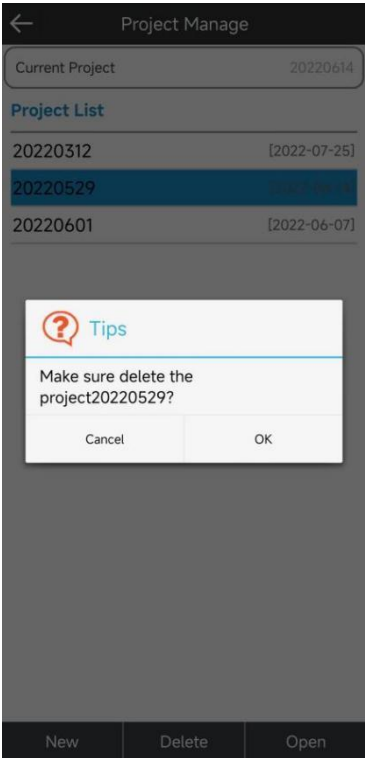
Click [New], as shown in 4.3-5, to create a new project, you need to fill in basic project information such as project name, operator, device, etc., click [OK] to set the coordinate system parameters used by the project, as shown in 4.3-6, Then click [OK] to complete the new project.



4.3-1



4.3-2



4.3-3

4.3-4

4.3-5

4.3-6

4.4 Points Library

Click [Project] -> [Points Library], as shown in 4.4-1. Here, you can view and manage the point data in the project, including functions such as add, edit, delete, import, and delete tape numbers.

Click [Add], as shown in 4.4-2, you can manually enter the point name, code and corresponding coordinates;

Select the coordinate point, click [Edit], as shown in 4.4-3, you can edit and modify the name and code of the coordinate point; Select the coordinate point, click [Delete] and [OK], as shown in 4.4-4, you can delete the corresponding coordinate point;

Click [...] in the lower right corner, an operation will pop up, as shown in 4.4-5, you can select import point library, Batch Delete, Delete All, Delete B and Number and other functions as needed;

Click [Import from data file], as shown in 4.4-6, select the file format to import point data, and then select the data file to complete the data import.

Point Library

Input point name

Name	North/Lat	East/Lon	Height/A
P1	2562924.807	441784.939	18.488
P2	2562924.806	441784.941	18.487
P3	2562924.806	441784.941	18.487
P4	2562924.809	441784.944	18.483
BL_P1_P4	2562925.786	441784.733	18.486

Add Edit Delete ...

4.4-1

New Point

Name P5

North

East

Height

Code

Coordinate Type Local Coordinate

Cancel OK

4.4-2

Edit Point

Name P1

North 2562924.8074

East 441784.9393

Height 18.4883

Code

Coordinate Type Local Coordinate

Cancel OK

4.4-3

Point Library

Input point name

Name	North/Lat	East/Lon	Height/A
P1	2562930.607	441752.239	40.933
P3	2562930.613	441752.238	40.928
P4	2562930.613	441752.237	40.930
P6	2562930.618	441752.242	40.928
P7	2562930.618	441752.234	40.934

Confirm delete[P1]?
Cancel OK

Add Edit Delete ...

4.4-4

Point Library

Input point name

Name	North/Lat	East/Lon	Height/A
P1	2562930.607	441752.239	40.933

Operation

- Import from survey point library(xyh)
- Import from survey point library(BLH)
- Import from stakeout point library
- Import from survey file(xyh)
- Import from survey file(BLH)
- Import from data file
- Batch Delete
- Delete All
- Delete B and Number

Add Edit Delete ...

4.4-5

File Import

File Format Local Coordinate File

Name, North, East, Height, Code

File Format

- Measurement data file
- Cass File
- Geodetic Coordinate File
- Local Coordinate File
- Stakeout Point Library File
- Survey Point Library File

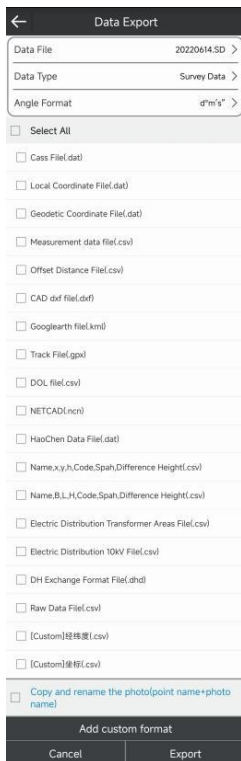
Cancel OK

4.4-6

4.5 Data Export

Click[Project]->[Data Export], as shown in 4.5-1, choose to export Data File, Data Type and Angle Format as required. Click [Export], as shown in 4.5-2, enter the name, select the path to export the file, click [OK], and a prompt to share the file will

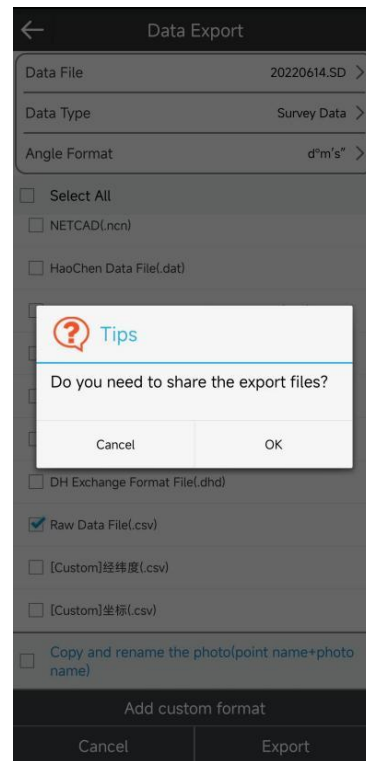
pop up, as shown in 4.5-3, click [OK], you can use Bluetooth, WeChat, etc. to instantly share the exported data files.



4.5-1



4.5-2



4.5-3

4.6 Localization

Click [Project]->[Localization], as shown in 4.6-1. The high-precision position obtained by the software from the GNSS device is the latitude and longitude coordinates of satellite positioning. In actual engineering operations, the plane coordinates of the ground are ultimately used for measurement and application. If the customer has coordinate conversion parameters, they can directly set the coordinate system parameter values in the Coordinate System (detailed 4.3). If the customer does not have specific coordinate system parameters, but has the corresponding latitude and longitude coordinates and the corresponding values of the plane coordinates, we call for the control point. In the presence of control point data, conversion parameters can be calculated through this function and applied to engineering operations.

In the calculation of conversion parameters, click [Add] to manually input the added control point, as shown in 4.6-2. Select the data item and click [Edit] to modify the coordinates of the edit control point; click [Delete] to delete the control point. Click [...] in the lower right corner, options will pop up, as shown in 4.6-3, click

[Import COT], you can import control point parameters, click [Export COT], you can also export the control point data into a file, Provided to third-party software for use;Click [Calculate Option] to enter the conversion parameter setting, as shown in 4.6-4 and 4.6-5, you can set parameters such as Mode, Plane Mode, Height Mode, Horizontal Accuracy Limitation and Height Accuracy Limitation.After editing the coordinates of the control point and selecting the calculation option, calculate the conversion parameters of the control point, click [Cal.], and the calculation result of the conversion parameters will be displayed, as shown in 4.6-6, the horizontal and elevation accuracy meet the requirements. After the parameters are applied to the project, the normal measurement operation can be performed.The parameter conversion process includes ellipsoid datum conversion, horizontal correction and vertical correction. The conversion parameters that can be calculated can be combined in whole or in part. As long as the corresponding accuracy is achieved within the allowable accuracy range, the calculated conversion parameters are considered to be available.The ellipsoid datum transformation is usually seven-parameter, which are the transformation parameters of the spatial cartesian coordinates between two ellipsoids, The plane mode includes four-parameter and horizontal adjustment,the height mode includes weighted mean 、 plane fitting, surface fitting and vertical adjustment. Under normal circumstances, if the working range is very wide, it is necessary to use the ellipsoid datum transformation to meet the accuracy requirements of all control points. If the working range is relatively small, the corresponding accuracy can usually be achieved by plane correction.

Name	North	East	Height
P1	2562924.807	441784.939	18.48
P2	2562924.806	441784.941	18.48

Buttons: Add, Edit, Delete, Cal., ...

4.6-1

Local Known Coordinate

Name: P1
 North: 2562930.6066
 East: 441752.2392
 Height: 40.933

Source Geodetic Coord.

Name: G20220802_164145
 Lat: 023°09'53.998920"
 Lon: 113°25'53.070240"
 Alt: 22.6663

Using Plane: ☒ Using Height: ☒

Buttons: Cancel, OK

4.6-2

Option

Import COT

Export COT

Delete All

Calculate Option

Buttons: Add, Edit, Delete, Cal., ...

4.6-3

Mode: Plane Correct+Height Correct >

Plane Mode: Four-Parameter >

Height Mode: Surface Fitting >

Horizontal Accuracy Limitation: 0.1 >

Height Accuracy Limitation: 0.1 >

Buttons: Cancel, OK

4.6-4

Mode: Seven Par >

Seven Parameter Mode: Bursa-Wolf >

Horizontal Accuracy Limitation: 0.1 >

Height Accuracy Limitation: 0.1 >

Buttons: Cancel, OK

4.6-5

Ellipsoid Par

Ellipsoid name: CGCS2000
 Semimajor axis: 6378137
 1/f: 298.257

Projection Par

Projection Mode: Gauss Kruger
 Central Meridian: 114°00'00.0000"
 Northing constant: 0.0000
 Easting constant: 500000.0000
 Scale Factor: 1.000000
 Projection Height: 0.000000
 Latitude of Origin: 0°00'00.0000"
 Standard Parallel 1: 0°00'00.0000"
 Standard Parallel 2: 0°00'00.0000"

Seven Par

Whether to use: Used
 Mode: Bursa-Wolf
 ΔX: -6061.994962
 ΔY: -22641.130508
 ΔZ: -74484.487150
 Δα(s): -1783.5980454765
 Δβ(s): -877.2338371326
 Δγ(s): 471.3653419769
 Scale(ppm): 7220.07009145092500

Plane Correct Parameter

Whether to use: Not used

Height Fitting Par

Whether to use: Not used

Vertical Adjustment Par

Whether to use: Not used

Translation Par

Whether to use: Not used

Buttons: Apply

4.6-6

4.7 Rover Mode

Click [Configure] -> [Rover Setting], as shown in 4.7-1. GNSS positioning equipment can calculate the positioning coordinates by receiving satellite signals, In the absence of other conditions. Due to the influence of the atmosphere on the signal,

the positioning device can only obtain the coordinate position of the single-point solution, the accuracy is not high. In order to ensure that GNSS can obtain high-precision positions, in addition to the GNSS equipment itself receiving satellite signals to calculate the position, it is also necessary to receive a signal from another nearby fixed-position GNSS device. Using the signal of another device as the reference signal, since the influence of the atmosphere on the signal is basically the same in a certain area, when the coordinate position of the reference signal is known, the two sets of GNSS can solve the high-precision position. The GNSS equipment with a fixed position is called a reference station, and the position The fixed GNSS equipment is called a mobile station. Compared with the GNSS satellite signal of the mobile station, the data transmitted by the base station is called differential data, and the data transmission method is called data link. The rover mode setting is to set the GNSS as a rover, and con certain parameters to transmit the GNSS satellite signals of the base station to the GNSS device in a certain way, so that the GNSS device can obtain a high-precision positioning position.

In addition to the differential data transmission configuration, you can also set basic parameters such as the GNSS altitude cutoff angle and whether to enable PPK, as shown in 4.7-2. It can be set that the satellite signal will not be received when the altitude angle is lower than a certain value. In the case of poor satellite signals at a low angle, it is beneficial to the precision solution. The PPK parameter is to record the GNSS raw observation data to the GNSS receiver and use post-processing. The algorithm solves the high-precision coordinates.

Differential data parameter settings, the main purpose is to set the differential data of the base station to be transmitted to the current device in a certain way, so as to provide the necessary solution conditions for the device to solve the high-precision coordinates. The data link mode mainly includes built-in network, built-in radio, external radio, mobile phone network. E.g:

1. Built-in network: click [DataLink], select [Built-in Network], as shown in 4.7-3, refers to the SIM card network through the GNSS device, obtain differential data from the specified server address according to a certain protocol, perform high-precision solutions. The connection mode is a differential data transmission protocol,

usually NRTIP, TCP. If the SIM network is a private network, you need to con APN Setting, enter name, account, password, you can also click to the right of APN Settings , enter the operator management interface, as shown in 4.7-4. Select the corresponding APN account or click [Add], as shown in 4.7-5, fill in the operator, name, user, and password, and click [OK]. The CORS setting is to obtain differential data from the access point from the specified server address, and perform high-precision calculation. We can directly enter the corresponding server IP, port, user, password, or click on the right side of CORS settings , enter the CORS configuration management interface, as shown in 4.7-6, Click [Add], as shown in 4.7-7, Fill in the name, server IP, port, user, password and click [OK], as shown in 4.7-8, after selecting the CORS account, click [Get mountpoint list], as shown in 4.7-9, in addition to obtaining it through the RTK network, if the mobile phone has a network, it can also be obtained through the network corresponding to the mobile phone. After acquiring the access point, select the correct access point and click [OK] to complete the differential acquisition and determine if the host is fixed.

4.7-1

4.7-2

4.7-3

Operator	Name	User
----------	------	------

Add Edit Delete OK

4.7-4

Operator

Name

User

Password

OK

4.7-5

Name	IP	Port
120.77.83.81(6061)	120.77.83.81	6061

Add Edit Delete Select

4.7-6

Name a

IP 120.77.83.81

Port 2010

User u

Password p

Cancel OK

4.7-7

Name	IP	Port
120.77.83.81(2010)	120.77.83.81	2010
120.77.83.81(6061)	120.77.83.81	6061
a	120.77.83.81	6060

Add Edit Delete Select

4.7-8

Mountpoint

YJP_0527_XLTEST001

YJP_0739_CSTEST001

YJP_430500_WUGANG

YJP_510700_XL001

YJP_511300_NANCHONG

Z30346667004508

Z31326667027031

Z31426669013255

Z31426669013266

Z31426669013288

Z31426669013312

Z32183624000671

Z32183624000682

Z32203660000077

Z32206661000654

Z39316668000095

Z39396668000077

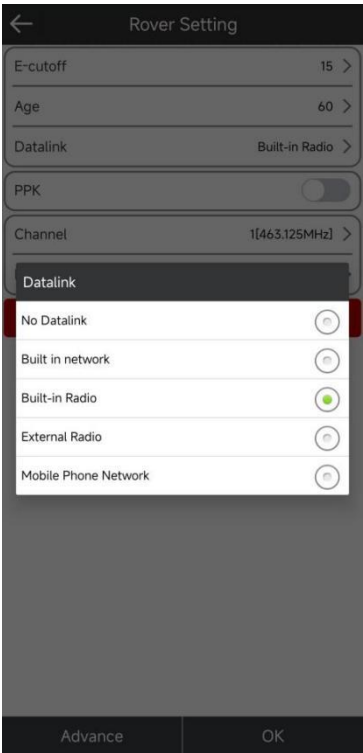
Z39456668000198

Add Edit Delete Select

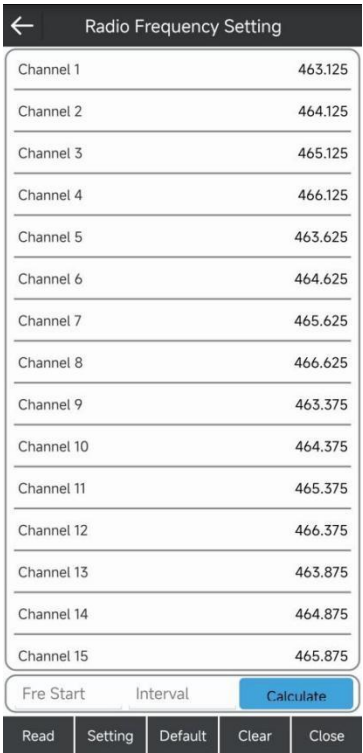
4.7-9

2. Built-in radio: Click [Data Link], Select [Built-in radio], as shown in 4.7-10, It refers to receiving the differential data of the radio station according to a certain protocol and frequency through the built-in radio of the GNSS device, and performing high-precision calculation. It must be ensured that the protocol and frequency of the radio station are consistent with the protocol and frequency of the transmitting station, so that the normal receiving station data can be received. If the frequency corresponding to the channel is inconsistent with the channel frequency of the

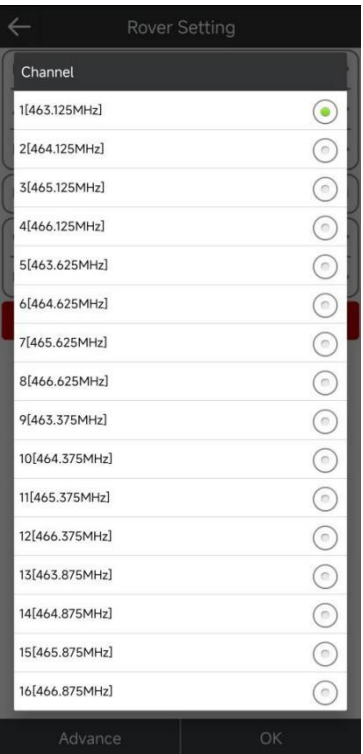
transmitting station, you can click [Radio Frequency Setting], as shown in 4.7-11, modify the frequency corresponding to each channel of the radio. Click [Channel] to select the corresponding radio transmission channel frequency, as shown in 4.7-12; click [Protocol] to select the corresponding radio transmission protocol, as shown in 4.7-14.



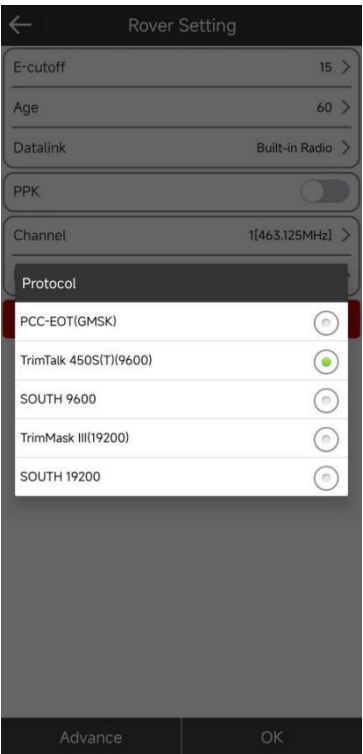
4.7-10



4.7-11

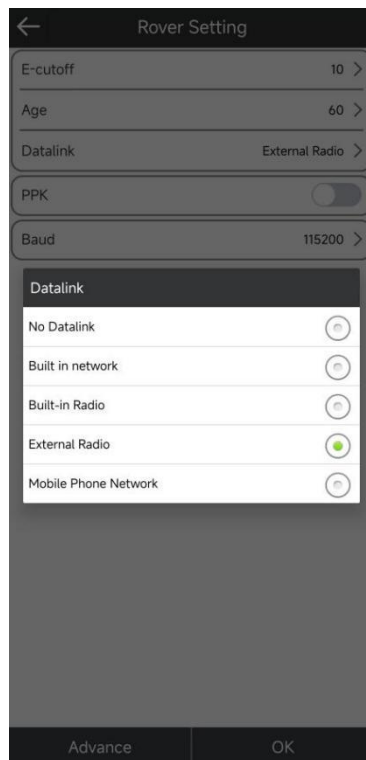


4.7-12

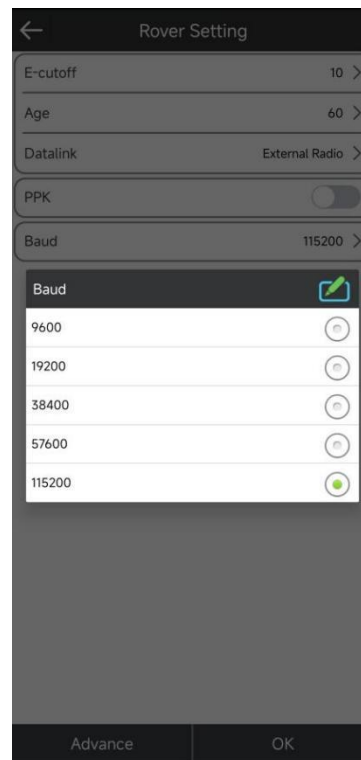


4.7-13

3. External radio: Click [Datalink], select [External Radio], as shown in 4.7-14, it means that the GNSS device is connected to an external independent radio device through the serial port, and after the external radio device receives the differential data Introduce into GNSS equipment for high-precision solution. Click [Baud] to select the corresponding serial port baud rate, as shown in 4.7-15, in addition to ensuring that the serial port parameters of the device connected to the external radio are correct, it is also necessary to ensure that the protocol and frequency of the external radio are the same as those of the transmitting radio. The protocol and frequency remain the same.

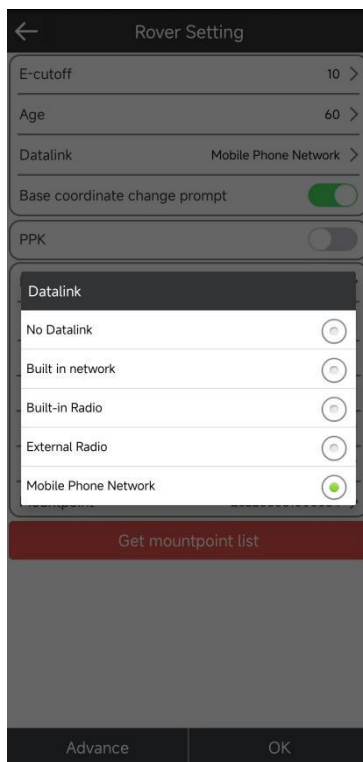


4.7-14



4.7-15

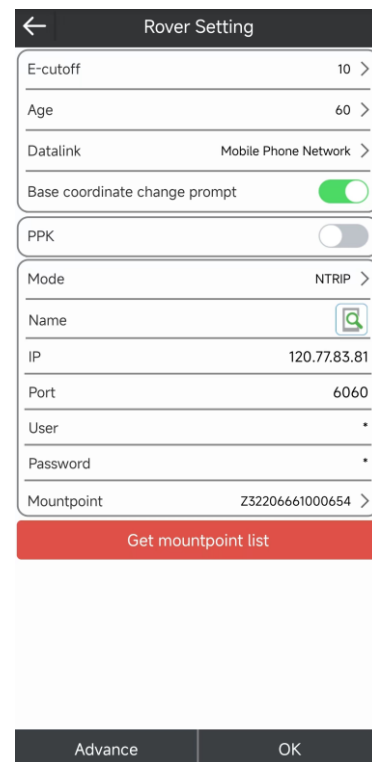
4. Mobile Phone Network: Click [Datalink], select [Handbook Network], as shown in 4.7-16, it means to obtain differential data from the specified server address according to a certain protocol through the network of the device where the software is located. Then, it is sent to the device through the communication connection between the software and the GNSS device for high-precision calculation. The CORS configuration is similar to the host network. You can directly enter the CORS account, or click on the right side of the name to select a server or add a differential server, as shown in 4.7-17. After configuration, select the corresponding name, as shown in 4.7-18, click [Get mountpoint list], select the correct access point, and click [OK] to complete the differential acquisition and determine if the host is fixed.



4.7-16



4.7-17



4.7-18

Note: The built-in radio and the external radio data link can be set to indicate whether the coordinates of the base station change, mainly because the radio is one-way transmission. There may be multiple radio transmission sources on the same frequency, which will cause the radio signal to interfere. If other radio sources are received signal, may cause the coordinates to be inaccurate, and remind the user to check and confirm.

4.8 Base Mode

Click [Configure]-> [Base Mode], as shown in 4.8-1, This function is that the GNSS device acts as a reference station to send satellite information data through a certain method, and provides it to the mobile station for reception, providing it with high-precision solution conditions. The host as the base station needs to set the start condition parameters, start mode and data broadcast parameters.

Note: During the startup of the base station, the device is not allowed to move, otherwise the coordinates calculated by the mobile station will be wrong.

The starting conditions include parameters such as base station ID, height cutoff angle, differential data format, PDOP restriction, etc. The differential data format

includes CMR, RTD, RTCM23, RTCM30, RTCM32, RTCM33 and other common differential data encoding formats, as shown in 4.8-2;

The startup mode includes using single-point coordinates, specifying base station coordinates, etc., among which:

1. Use single-point coordinates: It means that the GNSS equipment outputs differential broadcast data for the start coordinates according to the current positioning value (not high accuracy);

2. Designated base station coordinates: Refers to the location where the user sets up the equipment. The user knows the coordinate location in advance, and uses this coordinate value as the starting coordinate to output differential broadcast data. Click [Using Specify Coordinates], Enter the interface for setting base station coordinates, As shown in 4.8-3, click  The measure icon measures a point in real time, You can also click  Select a coordinate value from the point library.

The data broadcast parameters are mainly that the differential data output by the device after starting the base station is transmitted through a certain method and received and used by the mobile station. The main methods include host network, built-in radio, and external radio. The parameter setting is similar to that of the mobile station, and the differences are:

1. The built-in radio will have transmit power. The higher the transmit power, the longer the working distance and the greater the power consumption;

2. The Built-in network NTRIP protocol, the base station is the base station access point that is set to start transmission, and the mobile station is to obtain the access point list, and select the corresponding base station access point to connect, as shown in 4.8-4;

3. The base station cannot use the handbook network to broadcast differential data;

4. Other data link configurations refer to the mobile station data link for corresponding configuration.

← Base Setting

Base ID 666

Start-up Mode Using specify coordinate >

Difference Mode RTCM32 >

E-cutoff 15 >

PDOP Limit 3.0 >

Datalink Built-in Radio >

Channel 1[463.125MHz] >

Protocol TrimTalk 450S(T)(9600) >

Power Low >

Radio Frequency Setting

Note: When Base station power is set to Low, RTK range will be reduced!

Advance OK

4.8-1

← Base Setting

Base ID 0

Start-up Mode Using single position coordinate >

Difference Mode RTCM32 >

E-cutoff 10 >

PDOP Limit 3.0 >

Datalink >

Difference Mode

CMR

RTD

RTCM23

RTCM30

RTCM32

RTCM33

Name Custom >

IP rove.devecent.com

Port 6060

Base Mountpoint Z32226861001108

Password *

Advance OK

4.8-2

← Set Base Coordinate

Specify Base Coordinate

Lat 023°09'53.998992"

Lon 113°25'53.070312"

Alt 22.6583

Antenna Parameter 1.657[Height of Pole1.6m] >

OK

4.8-3

← Base Setting

Base ID 0

Start-up Mode Using single position coordinate >

Difference Mode RTCM32 >

E-cutoff 10 >

PDOP Limit 3.0 >

Datalink Built in network >

APN Setting

Operator Custom >

Name

Account

Password

CORS Setting

Name Custom >

IP host

Port 2101

Base Mountpoint Z32226861001108

Password pwd

Advance OK

4.8-4

4.9 Static Mode

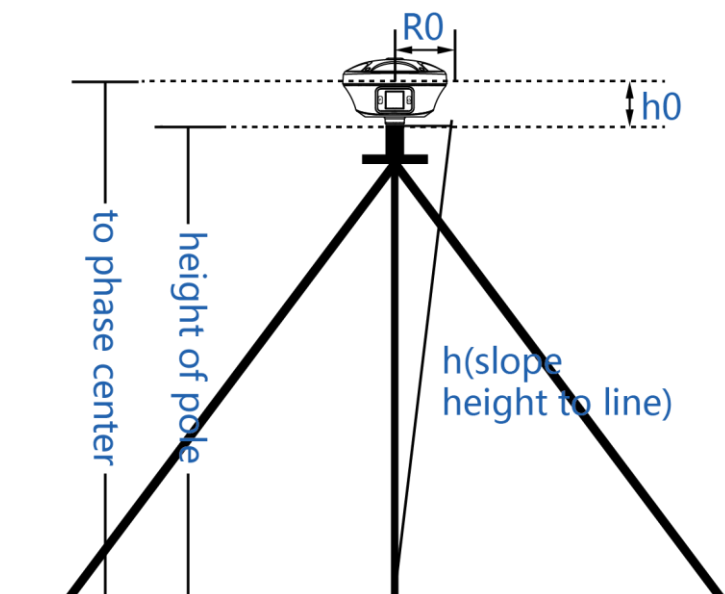
Click [Configure]-> [Static Mode], as shown in 4.9-1. This function is to store the satellite raw observation data of GNSS equipment in the setting disk file, and record the observation data of a time for calculating the high-precision coordinate

position using static post-processing software, which is usually used for control point acquisition. To start the static mode, you need to set the static file point name and recording conditions such as PDOP limit, E-cutoff, Sampling Interval, and Antenna Parameters. The status will display the record status, start time, number of epochs, record file name and other information. Click [Start] or [OK] to start static collection, and click [Stop] to end static collection, as shown in 4.9-2.

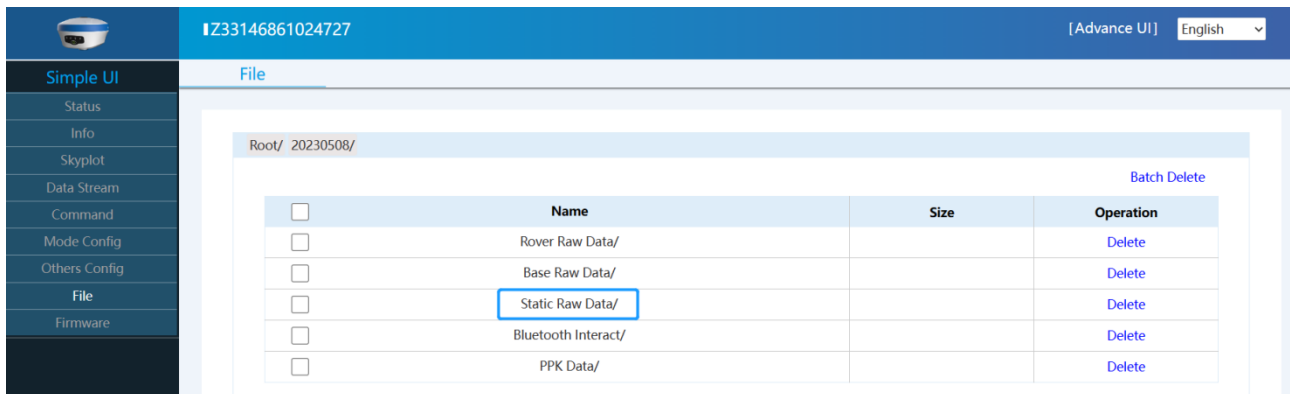
Note: During static recording, the device is not allowed to move, otherwise the coordinates calculated by the post-processing will be wrong.

4.9-1

4.9-2



Log in to the device web page (see **III.WebUI** for details), click [File]. Find the folder corresponding to the time to download the static data.

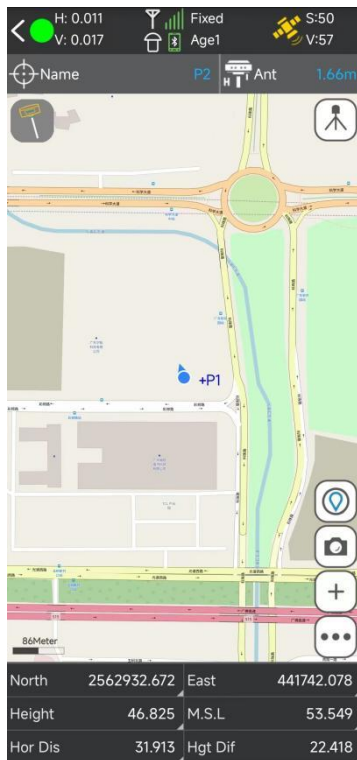


4.10 Collect Point

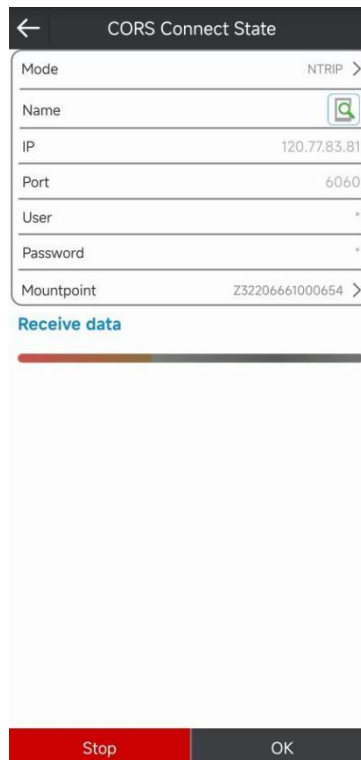
Click [Survey] -> [Collect Point] to enter the point measurement interface, as shown in 4.10-1. In the top column of the point measurement display interface, you can view the current positioning accuracy of the host (H: horizontal accuracy, V: elevation accuracy), CORS connection status (as shown in 4.10-2), and positioning information status. The left side of the following column shows the point name currently to be collected, click to enter the acquisition setting, as shown in 4.10-3 , set the point name, point name accumulation step and default code; the right side shows the antenna height parameter setting, click to enter Antenna parameters, as shown in 4.10-4 , take the height according to the actual operation input and select the corresponding measuring method. There are six display columns at the bottom of the interface. The display order and display content of these display columns can be set according to your own needs (the stored coordinates of the measurement will not change). Click the display column, and a selection box will appear: North Coordinates, East Coordinates, Elevation, Longitude, Latitude, Geodetic Height, Speed, Time, Upper Point Slope Distance, Upper Point Horizontal Distance, Upper Point Height Difference and Base Station Distance, as shown in 4.10-5 , select the desired display content.

Collect Point display interface are as follows:

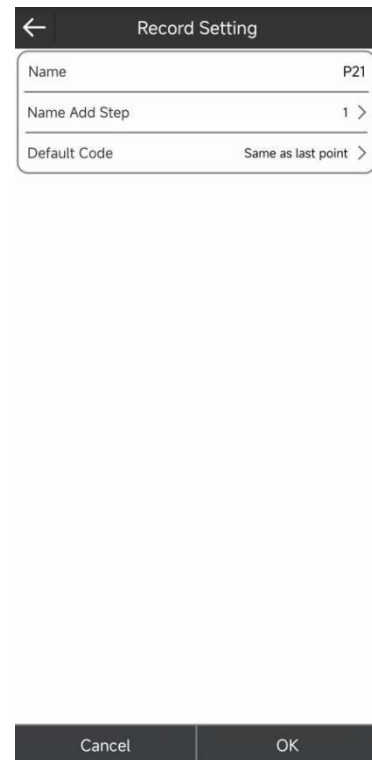
	Control point measurement (as shown in 4.10-6) : Currently RTK technology can be applied to primary and secondary traverse, root traverse measurement and root elevation measurement. Since RTK data has certain contingency, we have implemented the function of control point measurement to improve the reliability of the data.
	Set the acquisition parameters for the control point measurement.
	Quick point: Click to directly collect and save the measurement point information.
	Take pictures: Take pictures at the measurement site and add annotations.
	Entity record (as shown in 4.10-7) : collect data such as point, line, surface, etc. , click [OK] to save the collected measurement data to the record list and stakeout point library.
	Full image: Click the full image icon to display all measurement points in the view.
	Positioning: Click the positioning icon to position the map to the current device location.
	Record list (as shown in 4.10-8) : View the point coordinates of the current project "Coordinate Management Library", which is the same as the "Measurement Data" function in "Project".
	Settings (as shown in 4.10-9) : Set the current acquisition parameters, including state limit, HRMS limit, VRMS limit, PDOP limit, delay limit, smooth points , network map, etc.



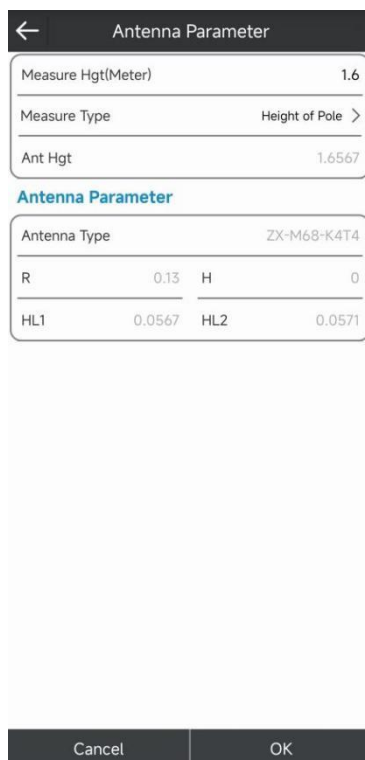
4.10-1



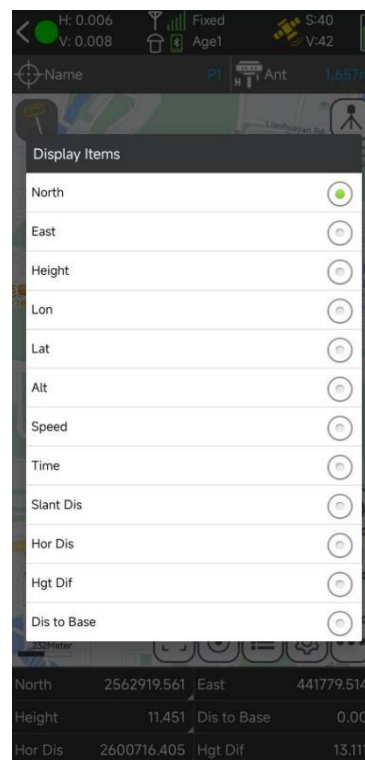
4.10-2



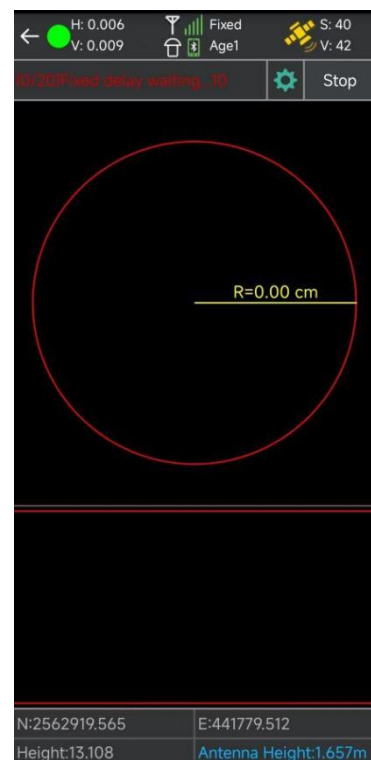
4.10-3



4.10-4



4.10-5



4.10-6

Entity Record

Ant Hgt: 1.657(Height of Pole1.6m) >

Type: Survey Point >

Name: P21

Code: >

Save the coordinates in the stakeout point library: ☒

(1/1)Data Collect Finish

Lat	23°09'54.0902"	State	Fixed
Lon	113°25'53.1010"	Sat	40/42
Alt	19.5803	Delay	1
Tilt Angle	-	Azimuth	-
N	2562919.5615	HRMS	0.0057
E	441779.5173	VRMS	0.0085
Height	11.4545	PDOP	1.30
Dis to last	2600716.405	HDOP	0.70
D H to last	13.115	VDOP	1.10
Base Dis.	0.004	Base ID	0
Date	2022-07-27	Time	17:51:47.00

Cancel Setting OK

4.10-7

Record List

Please input entity name >

Name: P8	Code:
N:2562930.628	E:441752.237
H:40.925	Ant Hgt:1.660
Name: P9	Code:
N:2562930.616	E:441752.238
H:40.920	Ant Hgt:1.660
Name: P10	Code:
N:2562922.371	E:441776.758
H:24.312	Ant Hgt:1.660
Name: P11	Code:
N:2562922.371	E:441776.754
H:24.299	Ant Hgt:1.660
Name: P12	Code:
N:2562922.372	E:441776.758
H:24.311	Ant Hgt:1.660
Name: P13	Code:
N:2562922.374	E:441776.757
H:24.320	Ant Hgt:1.660
Name: P14	Code:
N:2562922.371	E:441776.755
H:24.313	Ant Hgt:1.660
Name: P15	Code:
N:2562922.368	E:441776.755
H:24.320	Ant Hgt:1.660
Name: P16	Code:
N:2562922.370	E:441776.757
H:24.312	Ant Hgt:1.660
Name: P17	Code:
N:2562922.371	E:441776.756
H:24.319	Ant Hgt:1.660
Name: P18	Code:
N:2562922.373	E:441776.755
H:24.310	Ant Hgt:1.660

Edit Delete ...

4.10-8

Setting

State Limit: Fixed >

HRMS Limit: 0.05 >

VRMS Limit: 0.1 >

PDOP Limit: 3.0 >

Delay Limit: 5 >

Smooth Interval: 3s >

Smooth Number: 1 >

Network Map: Google Map >

Map Mode: Network Vector Map >

Default OK

4.10-9

4.11 Tilt measurement

Click [Survey] -> [Collect Point] to enter the Collect Point page, click the upper right corner to input the Antenna Parameter (Height of pole), and then light the tilt measurement icon  in the upper left corner to enable the tilt measurement function. Red, as shown in 4.11-1 or 4.11-2, at this time, the host needs to be in the fixed state, shake back and forth for 5~10s, then rotate 90°, continue to shake the centering rod back and forth, until the tilt measurement icon turns green, as shown in 4.11-3, the tilt measurement can be performed.

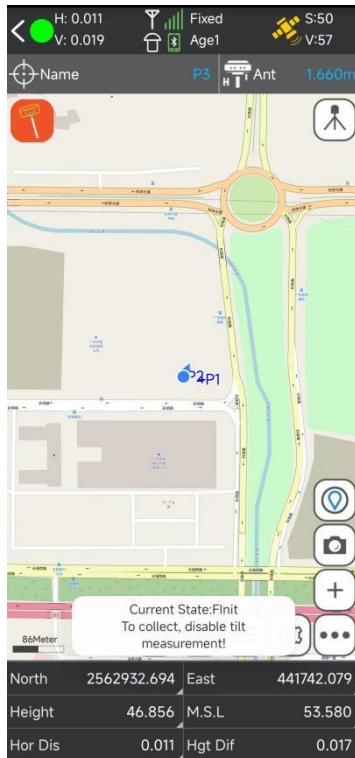
Alignment rod calibration For the same mainframe and the same alignment rod, only one calibration is required. Each mainframe has been calibrated before leaving the factory. If the configuration remains unchanged in the future, no further alignment is required. Rod calibration.

Note: The tilt measurement function requires the host to have a tilt module. A host with this function can do:

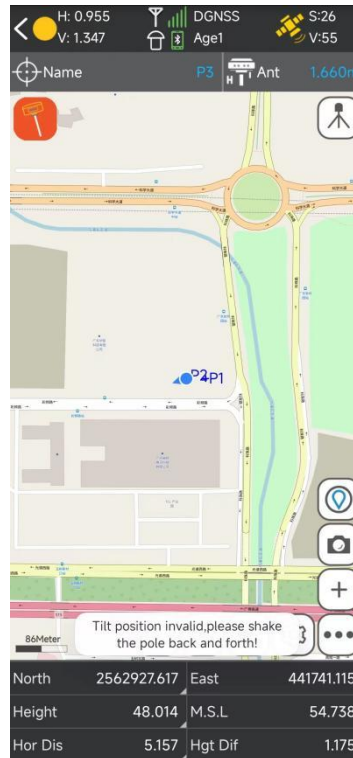
2. It can ensure that the accuracy of the host is maintained within 2cm in the 60° tilt range;

3. The calibration process is simple, just shake the centering rod back and forth in place;

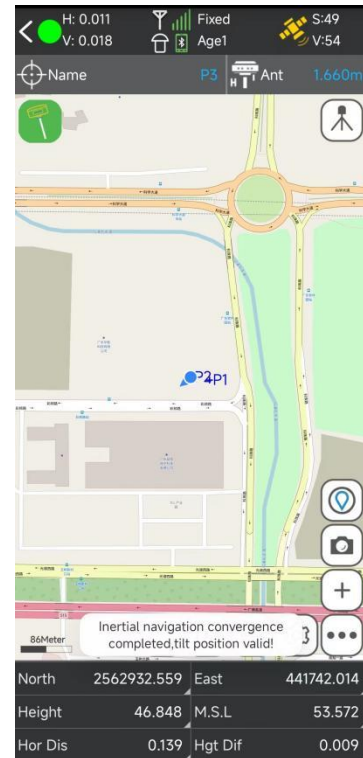
4. Support alignment rod calibration, which can eliminate the measurement error caused by the curvature of the alignment rod.



4.11-1



4.11-2



4.11-3

4.12 Device Register

Click [Configure]-> [Device Register], Check the device ID and expiration date as shown in 4-12. If the GNSS device has expired, you can authorize the device here after obtaining the registration authorization code from the dealer.

Registration

Input registration code

Registration information

Dev ID	Z32226861001108	Copy
Expiration date	2022-08-11	

Create ID QR Code Register

4-12

4.13 About Software

Click[Project]->[About software], as shown in 4.13-1, you can view software version information and copyright information.

Click [Check for new version], if there is a new version, the new version update information will pop up, click Update to update the software to the latest version. If there is no new version, it will prompt that it is already the latest version.

Click [Software registration], it will jump to the software registration interface, as shown in 4.13-2, check the software ID and the corresponding software expiration time, click [Create ID QR Code] in the lower left corner to obtain the corresponding authorization code more conveniently, enter the authorization code above or scan the QR code of the authorization code and click [Register] to activate the software.



4.13-1



4.13-2

V. Internal Radio

M68KPro is equipped with 5 watt internal radio. User can select the transmission power 1 watt or 5 watt. There are 16 default channel frequency and the frequency of each channel is changeable. With new firmware update, lots of mainly used protocols in survey industrial are supported.

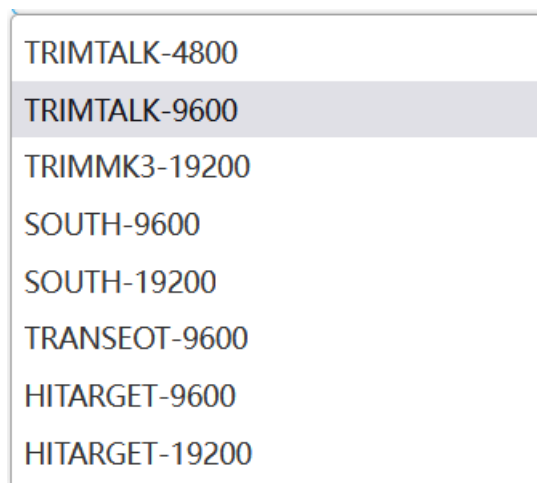
5.1 Default Channel Frequency

Channel	Frequency/MHz
1	463.125
2	464.125
3	465.125
4	466.125
5	463.625

6	464.625
7	465.625
8	466.625
9	463.375
10	464.375
11	465.375
12	466.375
13	463.875
14	464.875
15	465.875
16	466.875

5.2 Supported Radio Protocol

Some of the protocols may require firmware update.



V. Technical Indicator

Item		Specification	remarks
Hardware		Qualcomm Cortex-A7	
OS		Linux	
GNSS	GPS	L1C/A, L1C, L2P(Y), L2C, L5	
	GLONASS	L1, L2, L3	
	BDS	B1I, B2I, B3I, B1C, B2a, B2b	
	GALILEO	E1, E5a, E5b, E6	
	QZSS	L1, L2, L5	
	SBAS	L1	
	NavIC(IRNSS)*	L5*	IRNSS support in future
	Channel	1408	
	Data format	NMEA-0183	
	Correction I / O Protocol	RTCM3.X	
	Data update frequency	20Hz(max)	
	Recapture Time	<1s	
	Cold Boot	≤40s	
POSITIONING ACCURACY	Single(RMS)	Horizontal : 1.5m Vertical : 2.5m	
	DGPS(RMS)	Horizontal : 0.4m Vertical : 0.8m	
	RTK(RMS)	Horizontal : ±(8mm+1ppm) Vertical : ±(15mm+1ppm)	
	Time Accuracy(RMS)	20ns	
	Static Accuracy(RMS)	Horizontal : ±(2.5mm+0.5ppm) Vertical : ±(5mm+0.5ppm)	
	Speed Accuracy(RMS)	0.03m/s	
	Tilt compensation Accuracy(within 60°)	≤2cm	
SYSTEM	Bluetooth	BR+EDR+BLE	
	WIFI	802.11 b/g/n	
	Network	LTE FDD: B2/B4/B5/B7/B12/B13/B25/B26 LTE TDD: B38/B41 WCDMA: B2/B4/B5 GSM: 850MHz PCS: 1900MHz	
	Data Radio	Frequency : 410~470MHz Protocol : TRIMTALK, TRIMMK3, SOUTH, TRANSEOT RF transmit power : 1W/5W Air baud rate : 9600 / 19200bps	
	Storage	32GB, User Storage Space 24GB	
INDICATOR	Power Indicator	Show power status	
	Bluetooth Indicator	Show Bluetooth status	
	Network Indicator	Show network signal status	
	Satellite Indicator	Show position status	
	Data link Indicator	Show differential signal status	
BATTERY	Battery	7.4V, 6500mAh	
	Work time	More than 18 hours (Typical, Rover, GSM)	The static working mode supports continuous data collection for 26 hours under full power
	Charge	USB PD 15V/2A 5V/3A	Support fast charging adapter and adaptively and dynamically adjust

			charging current
ENVIRONMENTAL	Work Temperature	-20°C~+60°C	
	Storage Temperature	-40°C~+85°C	
	Shock	Withstand 1.5M pole drop	
	Protection	IP68	
PHYSICAL	Material	Magnesium alloy main body, ABS/PC top cover	
	Dimension	Φ143.5mm*90.7mm	
	Weight	≤0.90kg	
A Full Set	M68K Device	1 SET	
	USB power adapter	1 PCS	
	USB A To Type-C	1 PCS	
	Radio Antenna	1 PCS	

Website: <https://www.devecent.com/>

