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# **T20Pro GNSS RECEIVER USER GUIDE**



TokNav Information Technology Co., Ltd.

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#### Certificate

# CE

This product has been tested and found to comply with European Council Directive 2014/53/EU, thereby satisfying the requirements for CE Marking and sale within the European Economic Area (EEA).

# **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.

#### **Revision History**

Revised Edition	Revision History	Date
V1.0	Initial Release	2023-06-02

# Contents

IV. tSurvey	y Basic Operations	27
4.1 D	P0031 Data Controller	27
4.2 Co	ommunication	28
4.3 No	ew Project	29
4.4 In	nport Data	29
4.5 Ex	xport Data	30
4.6 Lo	ocalization	31
4.7 Ro	over Mode Setting	34
4.8 Ba	ase Mode Setting	36
4.9 St	atic Mode Setting	
4.10 F	Point Survey	40
4.117	Filt Survey	41
4.12 I	Device Activation	43
4.13 \$	Software Activation	44
V. Technic	cal Indicator	45

# I. Before You Start

Dear customers,

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

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

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

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

#### **1.1 Precautions for Safe Operation**

For the safety of your products, operators and others, 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 negligence 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.

#### **1.1.1 Warning**

1. Do not disassemble and open the device by yourself. Only TokNav Information Technology authorized distributors can disassemble or rebuild the device.

2. Please do not cover the charger when charging.

3. Please do not use a wet charger, defective power cable, socket or plug, or any power cable not recommended by TokNav Information Technology. Using such cables may result in fire or electric shock.

1

4. Keep the device away from burning gas or liquid, and avoid placing it in an open flame or high-temperature environment. This may cause an explosion..

5. Avoid short-circuiting the battery to prevent the risk of fire..

6. To prevent potential performance degradation, avoid severe electrostatic discharge, which may lead to issues like automatic opening/closing.

#### 1.1.2 Caution

1. Please fix the device firmly on the pole.

2. To avoid accidental damage, use only original accessories. Using non-original accessories may result in device damage.

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 avoid turning it over, as it may cause damage to the device.**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 errors.

5. Use non-original accessories.

6. Operations not described in the user guide.

# II. T20Pro At a Glance

The body of the T20Pro 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 T20Pro is as follows:



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

ት	Network status	The mobile network is not turned on.
ull.	Network status	The mobile network online.
*	Bluetooth status	when Bluetooth is not connected.
*	Bluetooth status	when Bluetooth is connected.
92%	Battery information	The remaining battery of the device.
100%	Battery information	The device battery is charging.
08:30	Local time	UTC+Zone
٢	7Pin DataPort	RS232 serial port, baud rate 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.
0	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				
Mode Rover		Rover/Base/Static				
Rover       Data link		Bluetooth/Built-in Network/Built-in Radio				
Q:2 N:32 3 B:23.16498772 1: 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" 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. 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 into the slot according to the instructions (with the chip facing towards the bottom center and the notch aligned with 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 attach radio antenna, open the cover of UHF radio and install the radio antenna.

## **2.7 Packing Checklist**

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

Num	Name	Model	Quantity	Image	Remark
1	GNSS receiver	T20Pro	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	Ô	Optional

6	Altimeter	BB0039	1	Î	Optional
7	T20Pro 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	<b>3</b> ~	Optional
11	7-pin to USB and serial ports	L0609-15	1	-	Optional

# III. Web UI

The device WIFI can be used as a hotspot, allowing connection from a PC, smartphone, or tablet. Once connected, you can manage the working status, change the working mode, configure 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. The hotspot name is the device's serial number, and the default password is empty.

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

Z330468610	00017	System Vie	0 W Device F	9 Irmware	<i>i</i> ¢ Skyplot	-d≠ Data Stream	() Mode Config	⊖ Others Config	Pi Fil	le
③ 2023-05-31 15:41:46	<b>₽</b> 32/52	§ 37.6 °C	⊘ 0.000 V	A 4.860 V	6 8.390	V CSD 100	96	[Advance UI]	English	~
GNSS Status					Register In	fo				
Quality	Differential					SN	Z3304686100001	7		
Diff	0					Model	T20Pro			
Longitude	113.431396	70° σ = 0.400	06m		Regi	ster Code	6EAA165F80322	AD3		
Latitude	23.1650203	5° σ = 0.435	i3m		Exp	pired Date	2023-07-07			
Height	-6.7221+34	3253-2.0778=	25.5254m		Fur	octionality	0x0000			
PDOP	1.90					Scheme	None			
HDOP	0.66					Exception	None			
HRMSE	0.5915m				0	Reset	Confin Clev	in Storage		
VRMSE	1.2997m						coming cree	in storage		
Refstation ID								Register		
					Export C	onfig I	mport Config			
Warking Mode										
Working Mode	Rover Mode									
Station Name	2330466610	00017								
Elev Cutoff	15									
Diff Age Mex	GON									
Data Link	Hartooth									

Meaning of icons arranged horizontally above the interface:

₽ 39/42	₿ 39.3 °C	🟈 0.042 V	러 5.326 V	🗎 4.271 V	<b>[5]</b> 100%
Satellite Used/Tracked	Temperature	External Voltage	Supply Voltage	Battery Voltage	Battery Info

# 3.1 System View

GNSS Status: Quality, Latitude, Longitude, Height, Satellite, Ref station ID;

#### 2 **Register Info:** SN, Expired Date, Scheme, Exception;

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, we 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.

③ Working Mode: Working Mode, Elev Cutoff, Data Link.

Z330468610	00017		G Device F	Ð inmware	& Skyplot	مریہ Data Stream	) m Mode Config	⊖ Others Config	Fil	e le
() 2023-05-31 15:41:46	<b>₽</b> 32/52	§ 37.6°C	⊙ 0.000 V	A 4.860	V 🖽 8.39	0 V 650 100	196	[Advance UI]	English	-
GNSS Status					Register I	nfo				
Quality	Differential					SN	Z3304686100001	7		
Diff	0					Model	T20Pro			
Longitude	113.4313967	'0° σ = 0.4006	5m		Reg	gister Code	6EAA165F80322/	AD3		
Latitude	23.16502035	σ = 0.4353	im		Ð	pired Date	2023-07-07			
Height	-6.7221+34.	3253-2.0778=2	5.5254m		Fu	inctionality	0x0000			
PDOP	1.90					Scheme	None			
HDOP	0.66					Exception	None			
HRMSE	0.5915m					O Rese	Confin Clea	in Storage		
VRMSE	1.2997m					- nese	coming circo	in storage		
Refstation ID							F	legister		
					Export	Config	mport Config			
Working Mode										
Working Mode	Rover Mode									
Station Name	2330468610	00017								
Elev Cutoff	15									
Diff Age Max	60a									
Data Link	Bluebsoth									
Diff Stream	0.8,9 72	807.8								

## **3.2 Device Firmware**

- 1 **Device Info:** SN, Hardware, GNSS Type, GNSS Hardware;
- 2 System Version: System, GNSS Firmware, INS Firmware, Firmware.

Click Upgrade Firmware 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 [Upgrade Firmware];

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 finished;

4. Reconnect the device WiFi, enter the WebUI, and check whether the firmware has been upgraded successfully.

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() 2023-05-31 194458	JE 19/40	8.34AX	Ø 0.000 ¥	Asmov	EB 6.120	V 60 100%	9)	[Advance Lit]	English		
Device Info											
5N	21304686100	0017			Feature						
Hattware	1.1.221212.2	3010.1/G4K3M	1110192521771		Product Date	2023-01	23				
GNSS Type	UM950				Brand	Tokfeine					
GNSS SN	MD22822229	515467			Model	T20Pro					
GNS5 Hardware	23104150000	101			Board1 SN	6100000	901				
IMD	86516706900	4118			Board2 SN	00,99,000	00152-01.01				

System Version

System	2.11.2305.21	
inux Version	3.18.44 Fri Apr 14.15:26:12 C5T 2023	
GN55	84.10Build/676	
INS	82.2_A5.7_83a3609aaf13aa60716623	
Ratio	84.CD29.00.00	
Firmwire -	2.422.2305.1701	

# **3.3 Skyplot**

① Skyplot: Trace, Name, Health, Elev, Azim;

#### TokNav Information Technology CO., LTD.

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anes5				Health - Dev - Di Agrm - 2	0 9				
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		cis			C10	1.10	0 004		
		EQU	5. 180 C	<b>3</b>	0.00		101		
			11	OR		en en	ดใช		

② GNSS System: Elev Cutoff, System, Table, Chart.

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.

Z3304686100	30017	System Vie	Device Fi	-	A. Skystet	Deta Stream	(B) Mode Config	Others Config	in File
(1) 2023-05-31 19.40:15	AT 19/47	8.147X	Ø 0.000 V	A 0.000	v 🖽 67	70 V 🛛 📾 100%	i i	(Advence UII)	English 💌
Skyplot									
Skyplot GNSS System									
Elev Cutoff	15	Ŷ							
System	<b>BD</b> 5	GALLEO	C GLONA	ss 🖬 a	es 🖪 (	255			
SBAS	Auto		-						
	Apply								



# 3.4 Data Stream

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

	Z3304686100	0017	System Vier	W Device F	9 Berware	A. Skypiot	-14 Deta Stream	() Mode Contig	Others Coefig	in the
O mai (	05-11 19:55:05:	PT 19/46	& HITE	🛞 0.000 V	A 1000 V	E3 6,750	V ED 100%		(Advance UI)	English
Data St	ream									
Config										
Data	Nose	- Level o	of Detail: See	ple Nom	al Detail	No.10	ter	- Clean		
Data	GNSS COM2 GNSS COM2 GNSS COM1 Message Tint Message Diff Message Diff Message PPK Message Static UNS Debug Ntop Client XUmk Socket 1 Socket 1 Socket 1 Socket 2 Socket 3 Socket 4 Socket 5 WFr Diff Bioetooth Riff Bioetooth Riff									

For example:

1. Message Text: see 3.9 in this section for the configuration of text data.

Z33046861000017	(2) System View	(C) Device Firmmare	A. Skypiot	24 Dela Strom	(E) Mode Config	Others Config	, in	i.
3023 06 01 08 41:02 \$7 12:49	5 314T @	0.000 V A 0.000	V EB 7.260	V 80 40%	-	[Advance UI]	Logish	
Data Stream								
Config								
Data: Message Text - Level of	Detail Single	Normal Deta	ii No Si	lier	Clives			
Data	dia and a second	20						
<ol> <li>BEPERT, HERRITZ, DR. L. 1975, J. A., B. O., O. P.</li> <li>BEPERA, HERRITZ, DR. L. 1975, J. A., B. O., O. P., J.</li> <li>BEPERA, BERRITZ, DR. J. 1998, BERRET, D. N. 111, J. J.</li></ol>	pin, 1990, 49, 49, 49, 41, 41, 41, 41, 41, 41, 41, 41, 41, 41	0001754 12,0,0,7,20,1004,0,-6,- 007,54,66,030023,.,77 6 ,57,38740 ,55,227,46754 ,55,227,46754 ,55,206,45748 ,51,110,35768 ,10,005,35768 ,10,005,35768 ,10,005,35768 ,59,48,129,46767	1220, H, MI, M <sup>I</sup> , M <sup>I</sup> , M					

# 2. Message Raw

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

(@KI	עפר						TokNav I	nformatior	n Technolog	y CO., LT
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Config										
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Bi rtial	(HEQ: \$118.805, HEH)	1441-308	stationed tim	e-day # 48-181	18.008					
f) Alimit	100-01238. RES. 14144	1 min-1/44	ADACIDENCE ATTAC	e-day # #8-18;	319.18(80)					

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

Z33046861000017	System Mere	(C) Device Firmware	A Septer	ini Dela Streem	(E) Mode Config	Others Coefig	in File
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A Bingry size 71 time 2023-00-0	1 00-34:10.000/100	ide 42-0457000 typ					
8: Birary: 4222- 42 120-2929-00-0	1 00-34138.000/200	Die WERKTWE AV	-DOTLIN_F1003	TV .			
8. Binary: slas- 48 time-3023-00-0	5 88-141 DR. 006/143	10.101.7300 (01.1					
<ol> <li>bitary: Alig-Alth time-1813-00-0</li> </ol>	1 00.54(10.000/360	Lite di tabli anno	4-105				
8. Binery/ blog(d354. tlas-2023-06-0	E 88-54111.000/368	TUP 41, MARK second	4.+108				
0. birsey: signaline time-2012-00-0	C. BR-S4112, BBB/268	10- 41.44MA second	41×1000				
ar belory: cire-4756 time-2023 HD-	H1 00 54:13.000/10	a life of binds and	102-1200				
11: 61-69 Street/16 Line-2013 100	03 00 54 12 000/30	e tos an entry and	- 1000				
The strate transmiss free Okly-00-	ar ad 24:24:12:000121	o TO. 41 CONT. MAD	N.C 706				

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

®หกอง						TokNav I	nformation	Technolog	y CO., LT
z330468610	000017	(3) System Mer	Device fil	maan	A Skypiot	ev Deta Stream	(E) Mode Config	Cthers Config	a File
2023-06-01 00.47/34	\$112/50	& 35 Y	Ø 0.000 V	A 0.000 V	前7.80	V 80-40%	-	[Advance10]	English 🗢
Data Stream									
Config									
Data: Ntrip Client	- Level	of Detail: Sin	Norma	i Detail	No fi	lter	Cem		
Data									
ti Hual (eq:107.05)	Sec. Inc. Inc.	stational the		0.000					
<pre># rtusi eqrifies.dub_ i ctusi engrifies.dub_</pre>	Hart Jane 10	stationed the	-Day 8 0014714	7.809					
41 rtusi eng-1113-003.	ter lare P	stationed ton	-des # 481.4714	3. 1000					
Lorton) ang-1111.000	ties line 171	stationed time	nday # 00.017.0	0.000					
Activity mig-1005.007	PART Jame 23	5a-27. 1014112	1-1-110.413410	10 14-17.000	1.4				
TI HEAD INGHAUST.MIN	ALL ADDA TO	1.0-6							

# 3.5 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 configured.

233046861000017	System View	Device Firmware	Skyplot	Deta Stimam	(D) Mode Config	Others Config	in File
(1) 2023-06-01 00.4633	8 HST 9	0.000 V A 0.00	0V E87,200	V 82+40%		(Advance UI)	Englids -
Mode Config							
Working Mode							
Mode	Tkner Mode	Base Mode Static	Mode				
Station Name	Z3304686100001	Xo					
Elev Gutoff	15		Degrine				
Diff Age Mak:	60		Second				
Height Type:	Bottom						
Antenna Height:	0		Meter				
Record	Enable						
PPK.	Disable	÷	not affect by Re	tood			

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 configured.

τ@κηδν				TokNav I	nformation	Technolog	y CO., LTD
Z33046861000017	System View	(C) Device Formulae	A. Skyskol	AF Deta Strum	(2) Mode Config	(C) Others Config	a rite
(1) 2023 DG-01 00-89.36 (2) 11/50	6 335 X (2)	000 V 🖻 0.000	V 🖽 7.24	0 V 100 40%		[Advance UI]	English -
Mode Config							
Working Mode							
Mode:	Nover Mode Des	e Mode Static	Mode				
Station Name	733046861000017						
Eley Cutoff:	15	3	Degron				
Staticm (D)	0						
PDOP Threshold	3.0000						
Diff Type:	RTCM32	•					
Base Mode	Auto	*					
Height Type	llottom	( <del>4</del> )					
Antenna Height	0	1	Meter				
Fascord:	Enable	4					

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

Z33046861000017	System View	Device Firmware	A Skyplot	Data Stenam	() Mode Config	(C) Others Config	in the
() 2023-06-01 00:5250 () £1 12/	0 A 185 C	Ø0000 A00	0V ₿7.7	20 V ( 100 10%)		(Advance UI)	English 📼
Mode Config							
Working Mode							
Mode	Rover Mode	Base Mode Mat	e Mode				
Station Name	2330468610000	11Z :					
Elev Cutoff	15		Degree				
PDOP Theesbold	3.0000						
Sample Interval	1.6						
Height Type	Battom						
Antenna Height	0		Meter				
Record	Ematele						
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:	fluit-in ladio	
Channel:	No Data Link Riveteeth	Edit Channel
Distoret	Will	
	Built-in Network Externut Ractio	
To Provent	Bullt in Radio	
	XLink	

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.

## **3.6 Others Config**

① **GNSS System:** The small box behind a single point can turn on or off the corresponding satellite system;

2 **WIFI:** You can choose three types of Disable/AP/Station, and you can set the WIFI name and password by yourself;

Note: when the device WIFI is used as the Station, you can access the network by entering the name and password of the external hotspot.

Z33046861	000017	System Vie	e w.u.Device.i	9 Irmwent	Sloplot	Dete	er. Stream	Mode Config	Others Config	ne -
③ 2023-06-01-09:16:57	₽ <sup>6</sup> 12/50	\$ 11275	⊙ 0.000 V	A 0,000 V	El 7.24	av I	D 385	¥	(Advance UI)	( trigitett
GNSS System					WiFi					
System	Enable					with	Deside		ana.	
GPS	Enable E						Longo		actori	
GEDNASS	🖬 triable					SSID.	23304	6661000017		
BOS	Enable					PSK				
GALILEO	Instale						Trepty o	e længth not le	ss than 8	
0255	Inishe									
SBAS	Enøble									
ppp	Inible									



③ Others: Time Zone, Voice.
Others

Time Zone	UTC+0800	
Vericity	Enable	

# **3.7 File**

File management can delete and download data of each channel in

batches, as shown below:

Z33046861000017	System View	© Device farment	Skyplot	ide Data Stream	(B) Mode Config	Gr Others Config	-	
(1) 2023 06-01 09 1925	\$ 112 X @	0.000 V 🛱 0.000	V 🖽7,240	V ED JEN	1	(Advance UI)	English	•
File								
Root/								
Select All			Natch Dole	be :				
2023051eV			Clearte					
20230518/			Delete					
102305231			Defete					
S05306500			Tiefete					
202305302			Delete					
20230531/			Defete					
20230601/			Desite					

# 3.8 Log

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

233046861000017		System View	⊜ ~ Device	<b>Q</b> GNSS	∎ v Network	¥ ∽ Storage	⊖ ~ Data Port
© 2023-06-01 09:19:57 🖉 13/50 👌 33.2 ℃	⊗ 0.000 V	A 0.000 V	Device Fit	mware		[Simple UI] (	English v
Log			Feat	ire			
File Name	Size	Time	Marker	Info dia	n		
233046861000017-0071.zlog	290.30	0kB 2023-	Others (	Config <sub>pa</sub>	d		
233046861000017-0070.zlog	118.12	2kB 2023-	Scher	me <sub>pa</sub>	d		
Z33046861000017-0069.zlog	102.31	1kB 2023-	Log	<b>7</b> 30	d		
C33046861000017-0068.zlog	123.40	0kB 2023-0	05-31 10:17:40	Downloa	d		
C33046861000017-0067.zlog	264.7	9kB 2023-0	05-31 06:23:06	Downloa	d		
233046861000017-0066.zlog	1.32M	B 2023-0	05-30 12:03:02	Downloa	d		

# 3.9 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.

23304686	1000017			System View	8 - Device	Benice CNSS Retwork		34 - Storage	Data Port
(1) 2023-06-01 09/203	a (B 1949)	\$ 3125	🔘 0.000 V	A 0.000 V	E37340V	Styp	ci .	[Simple UI]	English 🔹
Message Text						016816	and a		
						Message	lint		
NN/EA					ASCII	Data St	evens		
GPDOP:	None		Ť		IIESTPOP	MensingerD	HI/Raw	~	
GPGGA:	15		*		DEV	ers	ŝ	*	
GPG5A:	15		÷		GPSAU	None		+	
GPGST	15		~		GPSAV	Norw		4	
GPG5V:	14		2		GPSNR:	None		÷	
GPRMC:	15		.e		INS.GN55	None		ų	
GPVTG	None		3		INS.NAVI	None		¥	
GPZDA:	None		÷		RSXT	None		~	
					REFSTATIONA	None		÷	

The following are the formats of several common message text:

GPGGA	\$GPGGA,<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 ddmm.mmmm (degrees and minutes) format (the previous 0 will also be transmitted)
<3>	Latitude Hemisphere N (Northern Hemisphere) or S (Southern Hemisphere)
<4>	Longitude dddmm.mmmm (degrees and minutes) format
<5>	Longitude Hemisphere E (East Longitude) or W (West Longitude)

# <u>אבחא®ד</u>

<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)

GPGSA	\$GPGSA,<1>,<2>,<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 3.
<5>	HDOP horizontal precision factor (0.5~99.9)
<6>	VDOP vertical precision factor (0.5~99.9)

GPGSV	\$GPGSV,<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.

## **3.10 Remote Assistance**

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.



IP Address: 700039835578:1002

## 3.11 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 figure below. We can configure 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.

#### TokNav Information Technology CO., LTD.



#### Data:

None
GNSS COM2
Message Text
Message Diff
Message Raw
Message PPK
Message Static
INS Debug
Ntrip Client
XLink
Socket 1

#### Name:

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

# **Period:**

Single File
1 hour
2 hours
3 hours
4 hours
6 hours
8 hours
12 hours
24 hours
Format:

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

#### File name naming rules:

1.The time ir GPS time dir	n file name is converted from rectly.	Assume GPS +08:00, Then	leap second is 18, Time Zone offset is 00:00:18 means 08:00:00 of local lime.
2.Key words	in file name		
yyyy => year		DOY	=> day of year, 000~366
MM	=> month, 01~12	X	=> hour, a~x, 0 when one file per day
dd	=> day, 01~31	SN	=> Serial Number
hh	=> hour, 00~23	SITE	=> Marker Name
mm => minute, 00~59		SSSS	=> Marker Number
SS	=> second, 00~59		

When the device is set as rover station, base station or static mode, the device will automatically configure the corresponding channel for data storage by default.

#### **1. Rover (CH01)**

When the device is set as a rover station, the device will automatically configure CH01 to store and locate the original data by default. If PPK is enabled, CH05 will also be automatically configured by default to store post positioning data, as shown in the following figure.

#### TokNav Information Technology CO., LTD.

Z33046861000017					System View	e - Device	o - cres	- B Network	34 Storage	Data Port
() 2023-00-0	01 09 27:37	2011/0	37.00C	Ø 0.000 V	A 0.000.V	687,220 V	ED 37%	1	Storage	Status.
Storage S	tatus								Date C	iontia.
8 8									FIFTU	pload
General									:0	
100	Capa	ecity:	4.00 GR					the state		_
45		ccupy:	124.582 MII							
1.0	- 1 B	wei i	E3.10 GB							
	Writ	e Speed: 4	172 iild/s							
File List										
Channel	Data	- 23	Name		Size					
CH01 Message Raw 23304686100001 _ 01-01272					.gms177.15 kill					

#### 2. Base (CH02)

τ@κηδν

When the device is set as the reference station, the device will automatically configure CH02 to store and locate the original data by default. If PPK is enabled, CH05 will also be automatically configured by default to store location post-processing data, as shown in the following figure.

233046861000017				System View	8 - Derice	Q - GNSS	Network	34 Skinage	⊖ - Deta Port	
() 2023-00-	01 09.2621	<b>F</b> 13/40	\$ mix	🔘 0.000 V	A 0.000 V	<b>⊞7,230 V</b>	ED 17%	- 1	[Semple UI]	English -
Storage S	itatus									
General										
1	Сари	city: 24	00 Git							
-45	<b>0</b> 0	cupy: 02	4.214 MB							
	Fn Fn	ee: 23	10 GB							
	Write	Speed: 4.7	2 htt/s							
File List										
Channel	Deta	N	ime.		Size					
CH05	Message Rø	N	30468610000	1_01-005617	7.grive6.637 MB					

## 3. Static (CH03)

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

@KNZ	ענ				Тс	okNav Info	rmation '	<b>Fechnolog</b>	y CO., LTE
Z33	046861000017			System View	8 - Device	Q - GNSS	- Network	34 Situnge	Deta Fort
() 2025-06-0	1 09 29 41 🛛 🕅 12/	40 & 13.0 °C	🔘 0.000 V	A 0.000 V	€97.230 V	ED 17%		(Seeple UI)	English
Storage Sta	atus								
General									
1	Capacity:	24.00 GB							
45	Cocupy:	325.187 MB							
	From:	23.10 GB							
	Write Speed	4.80 kB/s							
File List									
Channel I	Data	Name		Size					
CH03 1	Message Static	Z330466610000	1 - 01-01295	1.grea61.92 kB					

Note: Whenever the tSurvey software connects to the device through Bluetooth, the device will automatically configure 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.

Z3304686100001	System View	Berke	Q - GNSS	Network	¥ Storage	⊖ - Dela Port		
© 2023-06-01 09:31:10	12/49 👌 33.0 °C	(C) 0.000 V	A 0.000 V	<b>⊞7230</b> ¥	ED 17%		[Sample UI]	(Logish -
Storage Status								
General								
Capacity:	24.00 GB							
Cecup	y: 025.645 MB							
I Free:	23.10 GB							
Write Sp	eed: 424 IU/s							
File List								
Channel Data	Name		Size					
CH04 Illustooth Monit	ur 2130468610000	0 = 601-0131	Bit 50.05; bit; f					

# **IV. tSurvey 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 Communication**

Operation: Device  $\rightarrow$  Communication

The device manufacturer selects [TokNav], the device type defaults to [RTK(T20Pro/T20Plus/T5/T5Lite/T20/T20Pro)], and the connection type selects [Bluetooth].

Click the Bluetooth name in the device parameters to jump to the device search interface, find the Bluetooth name of the corresponding device in the available devices (the default is the device computer number) and click to automatically return to the communication setting interface. Click Connect to pop up the connection progress box, indicating that the connection is in progress. After successful connection, automatically return to the main interface of the instrument. If the Bluetooth name of the corresponding device is not found in the available devices, click Search, switch to Refresh, and click Refresh.



# 4.3 New Project

Action: Project  $\rightarrow$  Project Manager  $\rightarrow$  New

Enter the name of the item. Others are additional information and can be left blank. Fill in by default or according to actual data. Click [Next].Jump to the coordinate system parameter interface. The ellipsoid parameter in China is CGCS2000, projected by Gauss by default. For other parameters, you can set the coordinate system according to the actual operation requirements.

	< Project Hanager	< Create Project	C Creme Project
	Current Progett	Bala Mermatur Paratas antes	Refer Televadori Contantante Construito susterio
And the set of the set	2022 Proceedings of the second	Negati Mali Antonio Sociaja Murovo Mugari A Registi Narros Senare Senare Deter Channel Antonio Social Antonio Social Muroz Muroz Senare Narros	Animatics (generalised animatics) (generalised (generalis
			Aver factor (20000000) Ingene factor factor (2000) Lance of Days (2000) Factor factories Factor (2000) Factor (2000) Factor (2000) Factor (2000) Factor (2000) Factor (2000)
the loss we	A CONTRACT OF A CONTRACT OF	And A Contract of	Company of the local sector of the local secto

# 4.4 Import Data

Actions: Project  $\rightarrow$  Import Data

Copy the data file to be imported to the internal storage of the notebook, select the data type, length unit, angle format and data format, click Next, go to the storage directory, select the corresponding file, and click OK.

#### TokNav Information Technology CO., LTD.



# **4.5 Export Data**

# Operation: Project $\rightarrow$ Export Data

Confirmation export path, input file name, select length unit, angle format and data format, click export to export data file.

all vent and 🛔 🛨	< Export data
(C) (C) (C)	Export Path internal StragertSurvey/Export >
	File Name Project are 1 +
Preset Manager Localization Calibrate Point	Choose Export File Format
	Cass formatidat) Part Nera Columnia Verting Verting Devalue
Cooktruite Polints Dutatione Code Litrary Textern Manager	Export Para
	Distance Unit Meier 0
Esport data Introve Introvet data Introvet data Introvet data	
	Export

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# **4.6 Localization**

Example: four-parameter conversion.

Correctly configure the rover station to obtain fixed state, click [Collect Point] to measure two known control points in the survey area.



Operation: Project  $\rightarrow$  Localization

Localization is a special design of software, which is designed for specific survey work in China. When the survey is carried out in the same operation area, the position of the base station is changed due to moving the base station or re-erecting the base station, so it is necessary to calculate the translation parameters of the base station on the basis of using four or seven parameters, that is, only one common control point is used to calculate the difference between two sets of coordinate systems.

Select Item  $\rightarrow$  Calculate Conversion Parameters, first click the Add button at the lower left corner, enter the name, fill in the coordinates and whether to enable the option on the page to be jumped to, click OK to automatically return to the previous page, then click the calculation button at the lower right corner, select the coordinate conversion method, horizontal precision limit and elevation precision limit on the page to be jumped to, click OK to obtain the conversion parameter calculation result, and click Apply.

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Note: In the parameter report, the plane conversion parameters and elevation conversion parameters can be checked.

The scale parameter is generally infinitely close to 1. If the value does not match, please check the operation whether there is any operation error or coordinate error in the process.

# **4.7 Rover Mode Setting**

Operation: Device  $\rightarrow$  Rover

Set basic parameters such as height cut-off angle, differential delay and whether PPK is enabled. Click "Data Link" to select the required data link.

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	Bant para		18	Cut-off Avge	19.1
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#### **4.7.1 Phone Internet Data Link**

Select "Manual network" for data link, enter parameter setting, select connection mode and CORS setting, click "OK" to automatically return to rover station setting interface, click "Get ", select access point base station, click" Start "or" Apply ", return to instrument main page to check whether the solution is fixed.



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#### **4.7.2 Device Internet Data Link**

Insert the SIM card into the device, select "device Network" for the data link, enter the parameter setting, select the connection mode, CORS setting and APN setting, click "OK" to automatically return to the rover station setting interface, click "Get ", select the access point base station, click "Apply" to automatically return to the instrument main page to check whether the solution is fixed.

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			Paraword	
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#### 4.7.3 Internal Radio Data Link

Plug in the radio antenna of the device, select "built-in radio station" for the data link, enter the parameter setting, click "Default radio station setting" in the lower left corner to configure the radio station channel, select the channel and protocol content, click "OK" to automatically return to the rover station setting interface, click "Application" to automatically return to the main page of the instrument to check whether the solution is fixed.

Rover mode settings	< Parameter Sett	ings	< Default radio setting	
Bailt pero	Internal Radio		Radio Channel Setting	100
Cut-off Angect0 AGE.60 Disable IMM	Channel	12	4	465.125
Datalitis flettings	Preparey	exim	1	464.575
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These Constructions Channess March			5	465.625
			A	464.625
			1	465.625
				468.625
Stare Colection Apply	Defeail radio settings	OK	- 24	

#### 4.8 Base Mode Setting

Operation: Device  $\rightarrow$  Base

Enter base ID, set differential mode, altitude cutoff angle, PDOP limit, start mode parameter, whether to enable PPK, click "Data Link ", and select the required data link.

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#### **4.8.1 Device Internet Data Link**

Insert the SIM card into the device, select "device Network" for the data link, enter the parameter setting, select CORS setting and APN setting, click "OK" to automatically return to the reference station setting interface, the base station access point is the machine number by default, click "Start Base Station" to automatically return to the instrument main page and check whether the base station is started.

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#### 4.8.2 Internal Radio Data Link

Plug in the radio antenna of the device, select "Built-in radio" for the data link, enter the parameter setting, click "Default radio setting" at the lower left corner to configure the radio channel, select the channel and protocol content, click "OK ", and automatically return to the reference station setting interface, click" Start base station ", and automatically return to the instrument main page to check whether the base station is started.



## 4.9 Static Mode Setting

Operation: Device  $\rightarrow$  Static

Set options such as point name (the default is the equipment number), PDOP limit, altitude cut-off angle, acquisition interval, observation time, and operation after completion, input antenna survey to take altitude, select antenna survey mode, click "Start", switch to "Stop", and "Wait for recording" change to countdown to start static data acquisition. Click "Stop" to finish static data collection.



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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.

Z33046861000017	System View	Device fil		A Skyplot	der Deta Strevern	(B) Mode Config	Others Config	
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# 4.10 Point Survey

Operation: Survey  $\rightarrow$  Point Survey

Open the point survey page, and view the current power of the device in the upper right of the survey display interface. Amount, CORS connection status, positioning accuracy (H: horizontal accuracy and, V: elevation accuracy), satellite information status, the following column displays the current optimal position of the device (north coordinate, east coordinate, elevation, base station distance and other information), and the bottom of the interface displays the name, code and antenna height to be collected (click to set antenna parameters).

	< PDED HEADY 26 -	K Antenna Parameters
	N 2562924.4721 H-4.9983 E-441778.0494 Base distance 0.1719	Arterna Heaved Heightini UEX
	74	Anterne Heessement Type
Port Garvey Detail Garvey Garvey		Ammellege Laste
		Antenna Parametera
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<b>E</b>	2	
Kailu Seen Auton	(A)	
Sectorescon	-1	
	HOBC	
OF THE DESCRIPTION OF	Name P()4 X Code	
	Antenna Height 1.6+0.0587m	196

Each icon in the point survey page has the following meaning:

A	Click this icon to automatically center the current anchor point.
图	Click the icon to display the network map.
利用	Click this icon to display all survey points in the view.

1	Click this icon to turn tilt survey on or off.						
ŝ	Click the icon to set acquisition parameters, information display and function menu.						
1 1 1 1 1	Click this icon to view the coordinate point library of the current project and the collected point coordinates, which are the same as the function of "coordinate point library" in "project ".						
	Click the icon to collect point, line, surface and other data.						
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Picture Settings

Picture Display Info

Picture Tool Bar

# 4.11 Tilt Survey

Operation: Survey  $\rightarrow$  Point Survey

The tilt survey function requires a tilt module on the device. The device with this function can:

1. The accuracy of the device machine can be maintained within 2cm within the range of  $60^{\circ}$  inclination;

2. The calibration process is simple, just shake the centering rod in place;

3. Support calibration of centering rod, and eliminate survey error caused by curvature of centering rod.

Open the point survey page, click the bottom column to input the antenna height parameter (height of the centering rod), and then light up the tilt survey icon at the lower left corner, that is, turn on the tilt survey function. The icon is green when it is turned on. At this time, the device needs to shake the centering rod 5~10S according

to the pop-up window prompt under the fixed state, until the icon *solution* turns green *solution*, the tilt survey can be performed.

When using the tilt survey for the first time, the alignment rod needs to be calibrated to eliminate the alignment rod curvature band for the error. Click "Device" $\rightarrow$  click "Inspection accuracy"  $\rightarrow$ click "Pole calibration", then set the antenna height parameter, and calibrate the centering rod according to the calibration steps and pop-up prompt.

For the same device and the same centering rod, the centering rod calibration only needs to be carried out once, and the centering rod calibration can be eliminated when the matching is kept unchanged.



Precautions:

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1. When the tilt survey is started, sometimes with the movement and rotation, the tilt icon will change from green to red. At this time, the centering rod needs to shake according to the prompt, and the sampling can be carried out until the icon turns green;

2. In the process of inclination survey, if the inclination is greater than  $60^{\circ}$ , it will indicate that the inclination is too large, and the accuracy of the collected points cannot be guaranteed within 2cm;

3. To calibrate the centering rod, set the antenna height parameter first, otherwise the calibration data will be wrong;

4. Initialization of tilt survey can be completed only when it is in fixed solution state.

## **4.12 Device Activation**

Operation: Device  $\rightarrow$  Device Activation

After the device Bluetooth connection is successful, you need to confirm whether the device registration code is valid. If it has expired, you need to register. Click "Device" $\rightarrow$  "Device Activation" to query the valid time of the device registration code. If it has expired, you need to input or scan the new device registration code.

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# 4.13 Software Activation

Operation: Project  $\rightarrow$  About Software

In the process of using the software, you need to pay attention to the expiration date of the software. If it has expired, you need to activate. Click "Project" $\rightarrow$  "About Software" to query the software expiration time. If it has expired, click Software Activation and enter or scan a new software activation code on the jump page.



# V. Technical Indicator

Item		Specification	remarks
Hardv	vare	Qualcomm Cortex-A7	
09	S	Linux	
	GPS	L1C/A, L1C, L2P(Y), L2C, L5	
	GLONASS	L1, L2, L3	
	BDS	B1I, B2I, B3I, B1C, B2a, B2b	
	GALILEO	E1, E5a, E5b, E6	
GNSS	QZSS	L1, L2, L5	
	SBAS	L1	
	NavIC(IRNSS)*	L5*	IRNSS support in future
	Channel	1408	
	Data format	NMEA-0183	
	Correction I / U	RTCM3.X	
	Data undate		
	frequency	20Hz(max)	
	Recapture Time	<15	
	Cold Boot	≤40s	
	Single(RMS)	Horizontal : 1.5m Vertical : 2.5m	
	DGPS(RMS)	Horizontal : 0.4m Vertical : 0.8m	
	DTV/DMC)	Horizontal :±(8mm+1ppm)	
	רו ה(הואוס)	Vertical :±(15mm+1ppm)	
DOCITIONING	Time Accuracy(RMS)	20ns	
POSITIONING	Static Accuracy (DNAS)	Horizontal :±(2.5mm+0.5ppm)	
ACCORACT	Static Accuracy(RIVIS)	Vertical :±(5mm+0.5ppm)	
	Speed	0.02	
	Accuracy(RMS)	0.03m/s	
	Tilt compensation	<2cm	
	Accuracy(within 60°)	32011	
	Bluetooth	BR+EDR+BLE	
	WIFI	802.11 b/g/n	
		LTE FDD: B2/B4/B5/B7/B12/B13/B25/B26	
		LTE TDD: B38/B41	
	Network	WCDMA: B2/B4/B5	
		GSM: 850MHz	
SYSTEM		PCS: 1900MHz	
		Frequency : 410~470MHz	
		Protocol : TRIMTALK, TRIMMK3, SOUTH, TRANSEOT	
	Data Radio	RF transmit power : 1W/5W	
		Air baud rate : 9600 / 19200bps	
	Storage	32GB, User Storage Space 24GB	
	Power Indicator	Show power status	
	Bluetooth Indicator	Show Bluetooth status	
	Network Indicator	Show network signal status	
INDICATOR			
	Satellite Indicator	Snow position status	
	Data link Indicator	Show differential signal status	
	Battery	7.4V, 6500mAh	
			The static working mode
	Work time	More than 18 hours (Typical, Rover, GSM)	collection for 26 hours
BATTERY			under full power
	Charge	USB PD 15V/2A	adapter and adaptively
	charge	5V/3A	and dynamically adjust

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			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	Ф143.5mm*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	

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.

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