High-precision HandheldPositioning End PointUser Manual

Preface

This device is a handheld high-precision positioning device with built-in 4G and CORS services and cloud data synchronization function , using high-precision GNSS module, supporting signal reception from satellite navigation systems such as GPS, Beidou, Galileo, QZSS, etc. The positioning accuracy in RTK fixed solution state can reach 1-2 cm, suitable for precise measurement applications.

This device in industrial applications has functions such as point collection and location, sharing of points A and B, topographic survey, polygon area, perimeter area, straight line and curve length, etc. It supports WGS84, China 2000, Beijing 54, Xi'an 80, UTM, MGRS , custom , etc. many coordinate systems. It also has functions such as an electronic compass and barometer suitable for outdoor sports.

Chapter 1 Button Instructions



The system status indicator bar is located at the very top of the screen, and from left to right, it is as follows: 4G signal strength, satellite signal strength, time, WiFi or data icon, and battery icon.

Chapter 2 Map

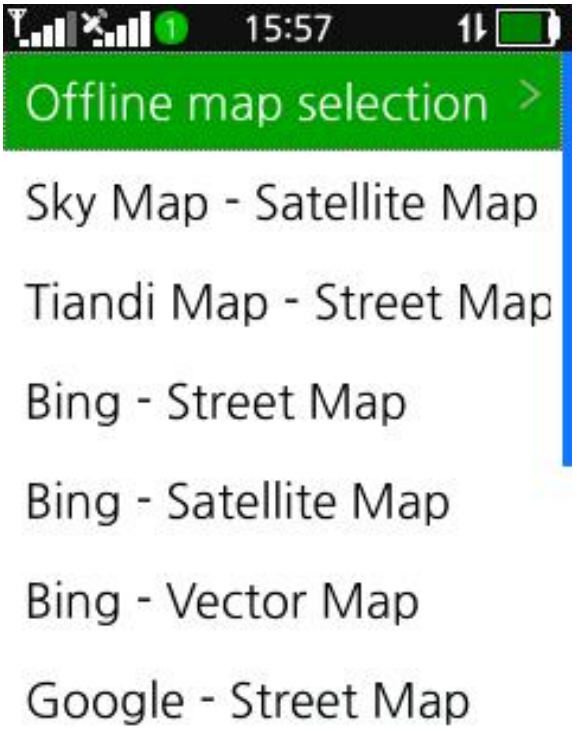
The map interface is used to display information such as maps and walking trajectories. On the map interface, you can use the [arrow keys] to move the crosshair cursor and view

information such as the coordinates of the position where the crosshair cursor is located, the orientation and distance from the current position, etc.

Offline maps support raster maps and vector maps , online maps support multiple map sources such as Tianditu, Bing Maps, Google Maps, etc. Some online map functions cannot be used in China.

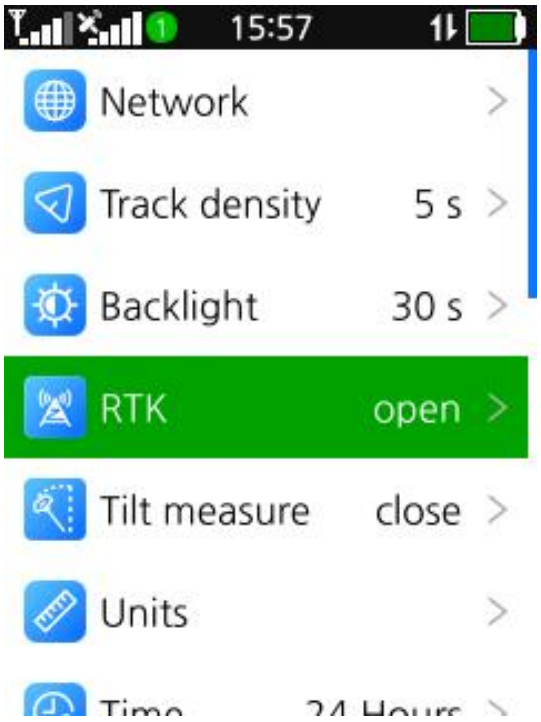
Precautions: The name of the map folder is "Maps", not "maps"; the first letter must be capitalized, and the rest should be in lowercase; moreover, the "Maps" folder cannot be placed in the root directory but must be placed in the "datafile/" directory.

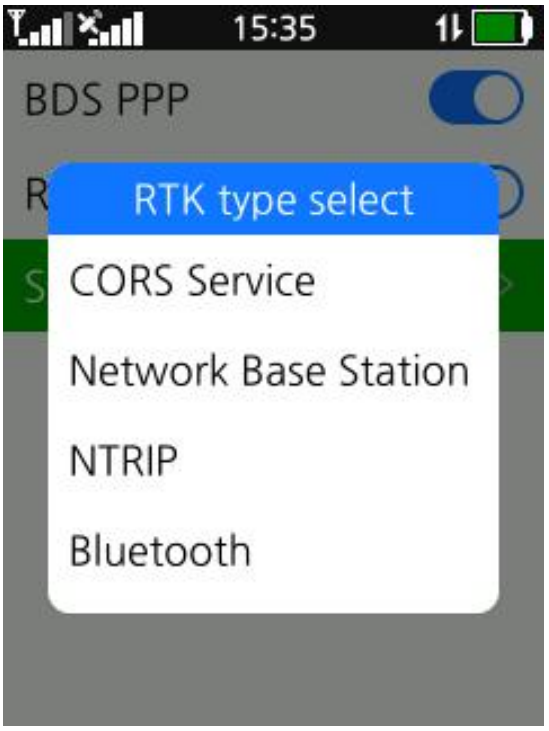




Chapter 3 Difference Settings

Set up the network on the network settings interface, and then set the differential mode on the differential settings interface





Beidou PPP:

Beidou PPP (Precise Point Positioning) is a high-precision positioning technology based on the Beidou Satellite Navigation System, which is available for free use in China and its surrounding areas. When using it, you need to wait 5-10 minutes for initialization, and the positioning accuracy is 5-10 centimeters.

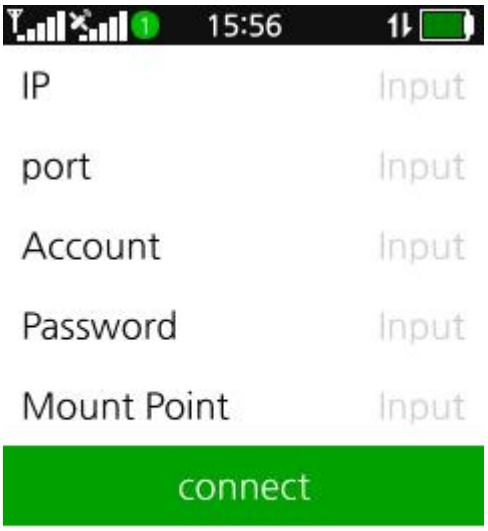
CORS: Use WeChat to scan the QR code for top-up and renewal.





Glacial Network Base Station Differential: Differential requires connection to the Glacial Network Base Station

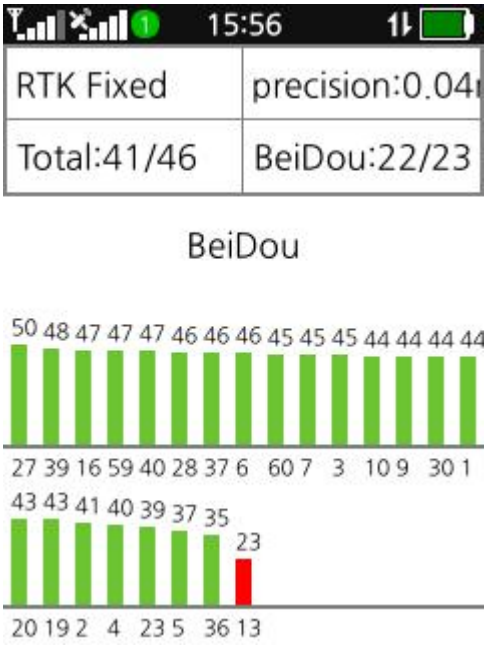
NTRIP: Differential positioning can be performed after entering the complete NTRIP account;



Bluetooth Differential: A differential account needs to be configured on the measurement APP;

Chapter 4 Satellite Status

Press the left and right keys to view different GNSS satellite systems.



Chapter 5 Location

The Location Interface is used to display the coordinate information of the location, with six coordinate formats displayed simultaneously by default, including three forms of latitude and longitude: degrees, degrees-minutes, degrees-minutes-seconds, as well as the Beijing 54, Xi'an 80, and China 2000 coordinate systems. Users can select the data they need through the menu.

The latitude and longitude and the China 2000 coordinate system do not require adjustment, while the Beijing 54 and Xi'an 80 coordinate systems require setting corresponding parameters.



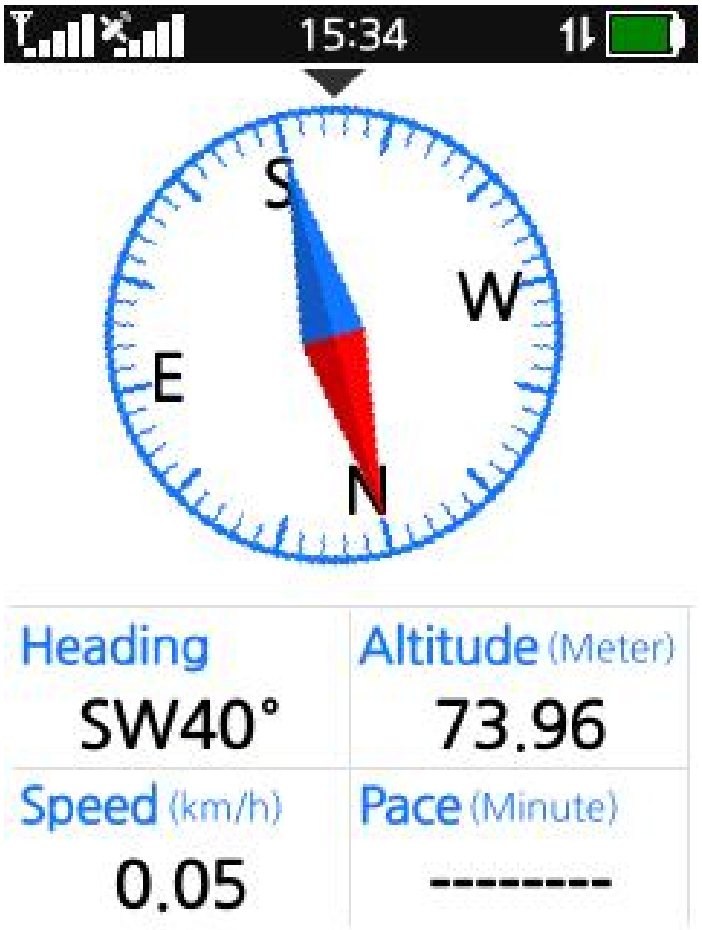
Coordinate Display



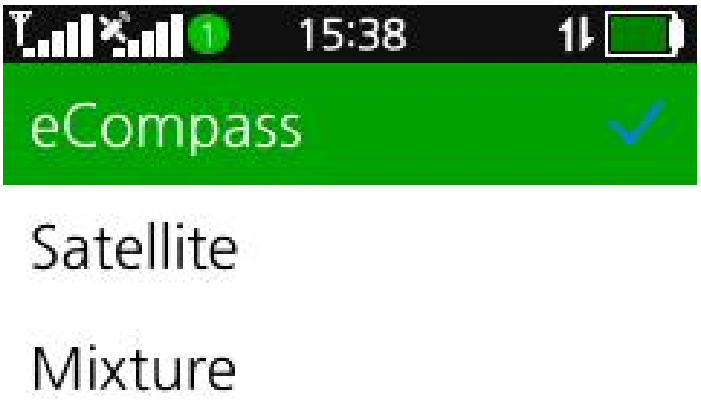
Coordinate Selection

Chapter 6 Compass

The compass interface is used to display direction; the available orientation methods include electronic compass orientation, satellite orientation, and combined orientation; When using satellite orientation, the device needs to be able to locate normally and be in a moving state



Compass

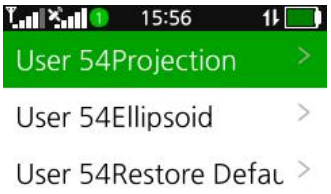


Orientation Method

Chapter VII Coordinate System

Used to set the conversion parameters for the Beijing 54, Xi'an 80, and China 2000 coordinate systems or to customize a coordinate system.









Coordinate System Setup

Projection Parameters

Ellipsoid Parameters

- Beijing 54, Xi'an 80, China 2000

In the Beijing 54, Xi'an 80, and China 2000 coordinate systems, projection parameters, ellipsoid parameters, and translation parameters can be set . Among them, the projection parameter section only needs to set the map zoning method , the ellipsoid parameter section

needs to set DX, DY, DZ, and the offset of the XY axes can be set in the ellipsoid parameters . Incorrect parameter settings may cause the machine to display incorrect projection coordinates, or even fail to display valid projection coordinates at all .

- Custom Coordinate System Settings

  The central meridian mode can be manually entered or automatically calculated.

  Custom projection parameters allow setting the central meridian and parallel (the central longitude and latitude values of the local coordinate zone), east-west offset (within China, this value is generally 500,000), north-south offset (within China, this value is generally 0), scale factor (this value is generally set to 1), and map zone (three-degree zone or six-degree zone).

  Custom ellipsoid parameters allow setting DA, DF, DX, DY, and DZ, and can be selected from pre-stored map datums.

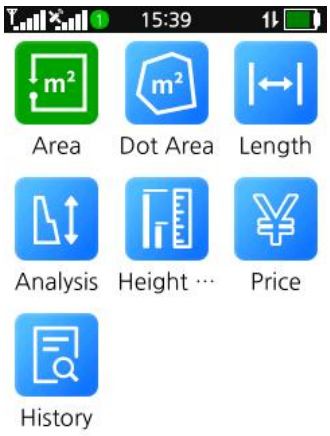
Chapter 8 Measurement

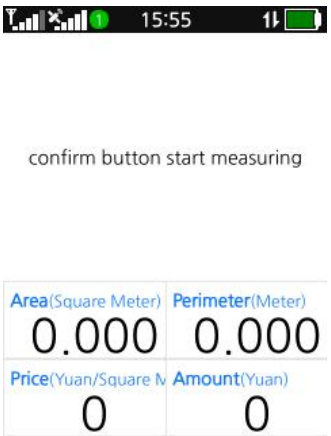
The measurement function is used to measure area , length , and elevation difference.

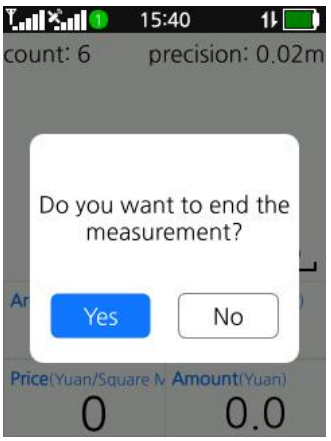
- It can measure the area of irregular plots, and the measurement route cannot cross. .
- Tall buildings and tall trees around the measurement area can block satellite signals and reduce measurement accuracy.

8.1 Enclosed Area

Used to measure the area and perimeter of irregular regions .









8.2 Dotting Area

Used to measure thearea and perimeter ofregularregions,also known as polygon area.

8.3 Length Measurement

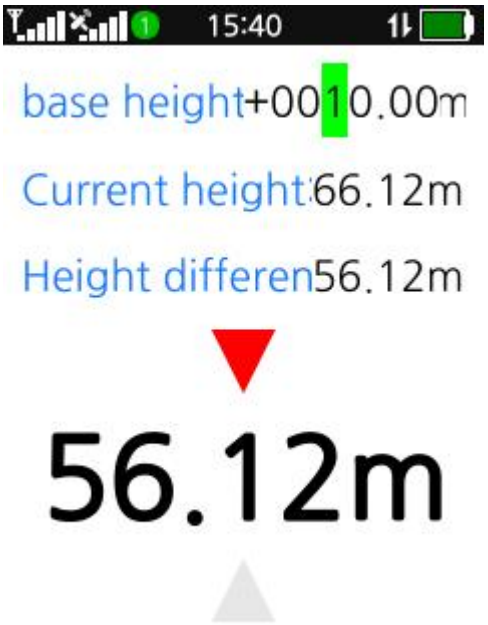
is used to measure the planar straight-line distance and curved distance between two points, as well as the spatial straight-line distance .

8.4 Terrain Analysis

Used to analyze the terrain of a plot, press the menu button to switch between manual and automatic point marking, measure the highest and lowest elevations, and calculate the average elevation;

8.5 Height Difference Measurement

Enter the reference height and calculate the height difference between the current height and the reference height;



8.6 Precautions:

- The better the signal, the more accurate the measurement. To ensure measurement accuracy, please make sure to conduct the measurement in the RTK fixed state.
- Area units and unit prices can be modified in the system settings.

8.7 Result Viewing

View and export historical measurement data, which can be exported as a CSV file or a CAD file;

8.8 Unit Price Setting

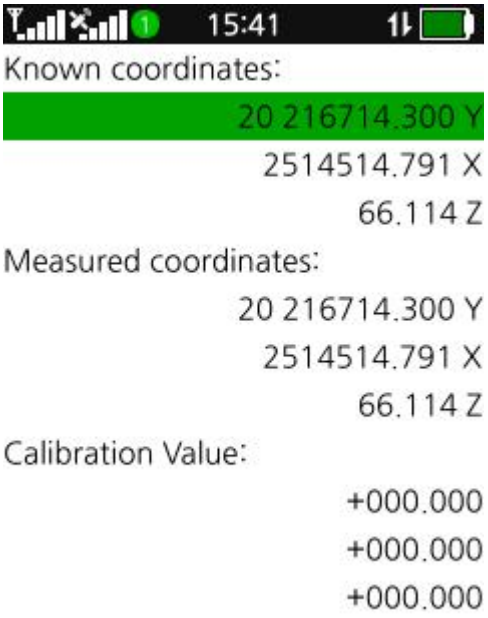
If you want to calculate the amount when measuring area, you need to set the unit price. The area unit can be set in the system settings section.

Chapter 9 Tools

9.1 Single Point Calibration

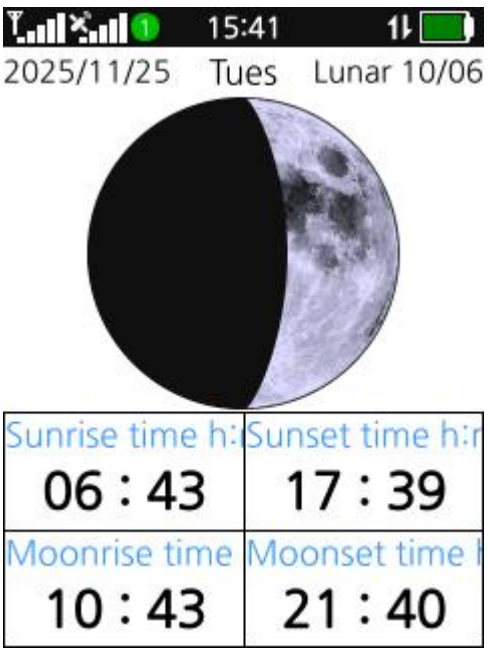
Since the Beijing 54 and Xi'an 80 coordinate systems rely on correct transformation parameters, but whether they are three-parameter or seven-parameter, they are difficult for ordinary users to obtain. Therefore, this device provides a simple and easy-to-use translation parameter calculation function. As long as the WGS84 coordinates and corresponding Beijing 54 coordinates of a location are known, the local translation parameters can be calculated. The same applies to Xi'an 80 coordinates.

Example: The user can manually input the WGS84 coordinates of a known point and the corresponding Beijing 54 coordinates to obtain the Beijing 54 translation parameters.



9.2 Sun and Moon

The Sun and Moon interface provides information on sunrise time, sunset time, moonrise time, moonset time, and lunar phase for the current location. The arrow keys can change the date.

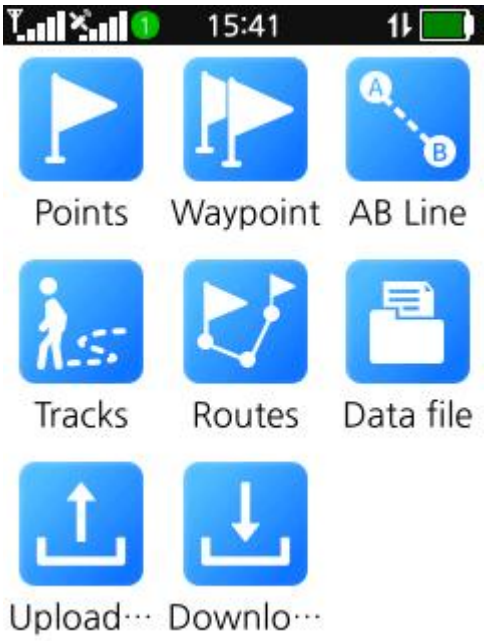


Chapter 10 Data Management

Data management is used to manage data related to waypoints, tracks, and routes, perform operations such as addition, deletion, modification, and query, and can be exported in formats such as CSV, GPX, CAD, etc.;

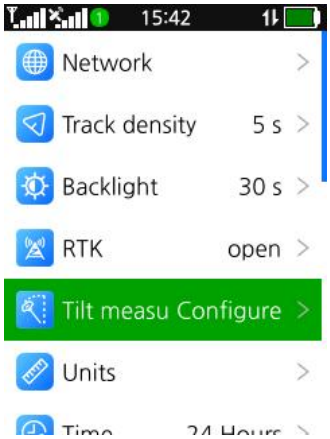
Waypoint data is stored in the "Points" folder, track data is stored in the "Tracks" folder, and route data is stored in the "Routes" folder;

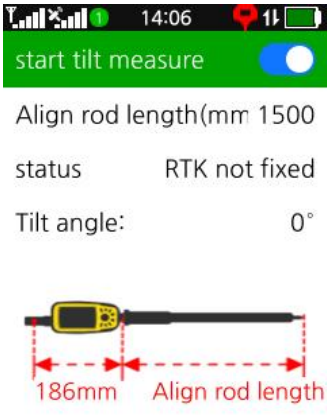
Data can be uploaded to the cloud for backup and downloaded from the cloud for backup retrieval, and uploaded data can be viewed or edited using a browser.



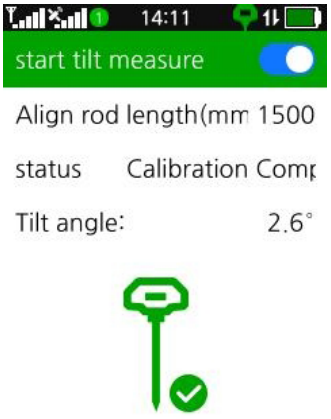
Chapter 11 Tilt Measurement Settings

After starting tilt measurement , , set the length of the centering rod ; in the RTK fixed state, wait for the status display to show "uncalibrated" and then shake the centering rod for calibration;



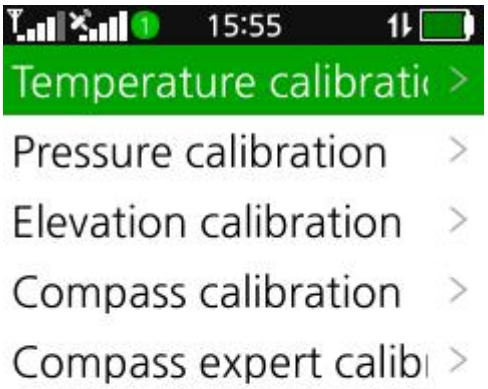






11.1 sensor

Used for calibrating the sensor. Please follow the prompts during calibration.



Chapter 12 Technical Specifications

Model	BDS660	GPS660	RTK660-B/RTK980-B	RTK660-D/RTK980-D	RTK660-F/RTK980-F	RTK660-T/RTK980-T
Function Configuration						
RTK			√	√	√	√
Beidou PPP						√
Tilt Measurement						√
Physical Specifications						
Volume	70×143×36mm					
Screen Size	3.2 inches					
screen definition	240*320					

Weight	271 grams
Shell material	ABS
Battery Capacity	5000mAh Lithium Battery
sensor	Electronic compass, accelerometer, barometer, thermometer
External Interface	Type-C
Protection Class	IP65
Performance Specifications	
Endurance Time	12H
Memory Card	TF card, up to 128G, FAT32 file system
Bluetooth	Supports SPP
Network Communication	4G/WIFI
Operating System	Linux Qt
System Language	Chinese/English/Korean
Operating Environment	
Operating Temperature	-20°C ~ 70°C
Storage Temperature	-20°C ~ 70°C