E800 GNSS Receiver

User Manual

V2.0_202011

Contents

1. Introduction

This is the user manual for survey E800 GNSS receiver. It gives basic description and operation guide which may help user to operate device properly.

1.1 Appearance

The E800 main body is designed with magnesium alloy material to provide durable usage and better heat dispersion. The receiver is also equipped with 1.45" touch screen and 5watt internal radio to meet different kind of working environment.

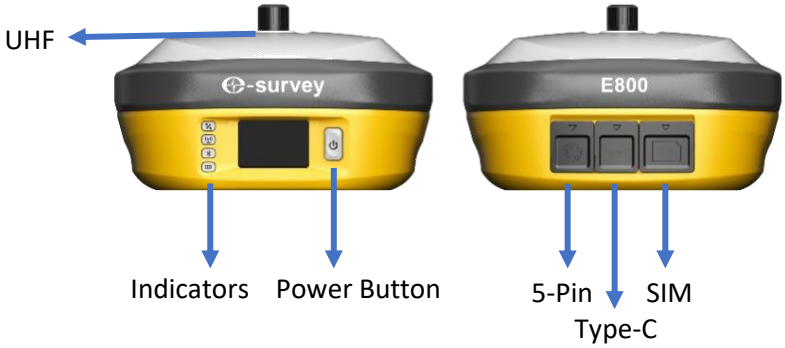
1.2 Indicator

Working status is viewable through the indicators. The meaning of each indicator:

Indicator	Color	Meaning
Satellite 	Red and Green	• Off: no receiving satellites • Flash red: receiving satellites but no solution status • Flash green: have solution but not fixed • Solid green: fixed solution • Flash red and green alternately: mainboard abnormal
Data link 	Green and Blue	• Solid green: datalink is ready to start • Flash green: datalink is transmitting data normally • Flash Blue: when raw data recording is enabled, the LED will flash according to the interval
Bluetooth 	Blue	• Off: no Bluetooth connection • Solid blue: has Bluetooth connection
Battery 	Green and Red	• Solid green: battery level between 30%~100% • Flash green: battery level between 10%~30%, speaker will beep • Flash red: battery level below 10%

1.3 Interface

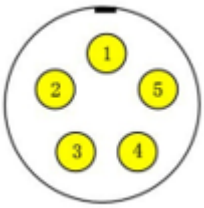
E800 GNSS receive bottom interface is shown as below. The 5-pin port is used to connect external radio and external power, or output NMEA messages. Type-C port can be used for data download (internal storage access) or charging.



5-Pin Type-C SIM Card

1.4 Pin definition

The 5-pin port is defined as below:

5 Pin	 Front View	1	+12V	Power
		2	GND	Power ground
		3	TXD	Device out
		4	SGD	Signal ground
		5	RXD	Device in

1.5 Power button

There is a power button on E800 control panel, the main function as below:

Power On	Long press button for three seconds to power on receiver, all the indicators will on.
Power Off	Long press button for two seconds then release, will hear the voice “Power off?” Then press the button again to confirm.
Broadcast Current Working Mode	Receiver will broadcast current working mode when press the power button.

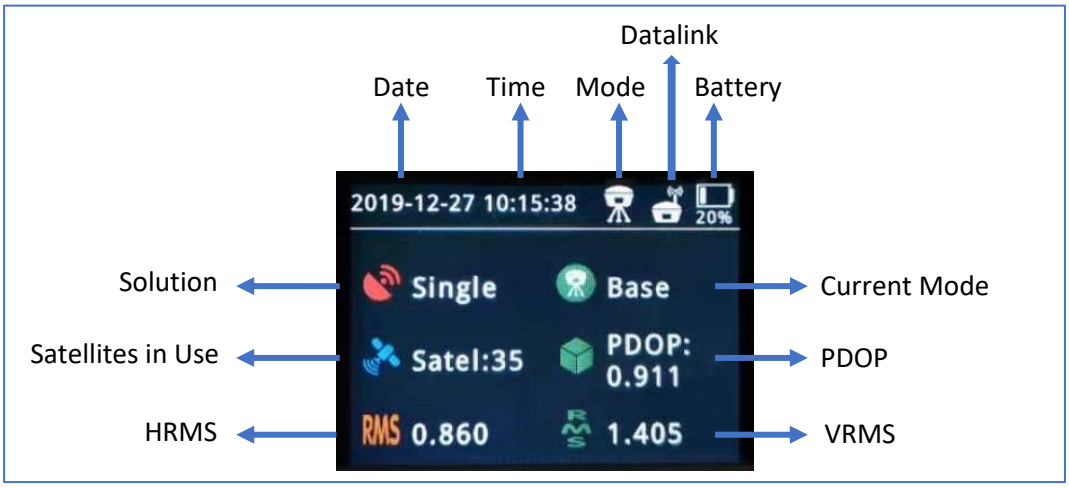
Self-check	Long press button for two seconds then release, will hear the voice “Power off?” Then long press button for three seconds, will hear the voice “self-check”.

1.6 Touch Screen

E800 1.45” colorful screen supports touch operation. User can view device status or operate device by simply touch the screen. The screen includes three parts: the main page, device information and work mode setting.

1.6.1 Main Screen

Press the power button to weak the screen, user will see the main page.



1.6.2 Device Information

Slide the screen to the right, the device information can be found. There are four pages as below pictures. User can view basic position information, firmware version and device expire date.

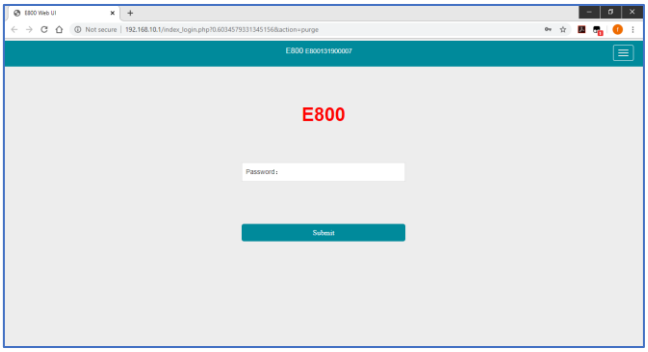
1.6.3 Work Mode Setting

Start	Start/Stop	Start/Stop current working mode
Mode	Static	Sample Interval Cut-off Angle Auto Record: Yes/No
	Base	Auto Record: Yes/No PDOP Limit Base ID: Change from software

	Rover	Change to rover setting
Datalink	Radio	Channel: Channel frequency Power: Low(2W)/High(5W) Protocol: Radio Protocol
	GPRS	Auto APN: Yes/No
	External Radio	Baud Rate
Diff	Diff Mode	Available in base mode
Setting	Setting	Backlight Time Language: wait for 3 seconds to apply setting

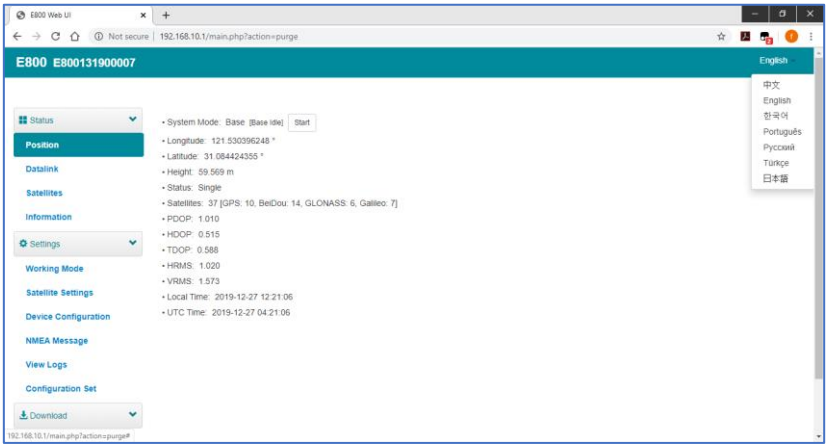
2. Web User Interface

User can connect to receiver WIFI hotspot with PC, smart phone or tablet. The hotspot name is the device serial number, can be found under the bottom of the device label. Open web browser and input the IP address “192.168.10.1”. The default password is “password”. From the website, user can manage working status, change working mode, configurate basic settings, download raw data, update firmware and register device.



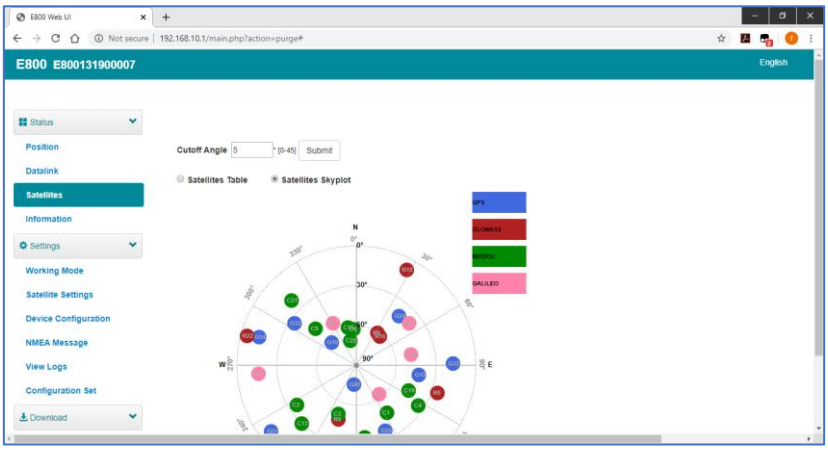
2.1 Position

View basic position information, satellite number, PDOP and time. In static mode, can start and stop recording here.



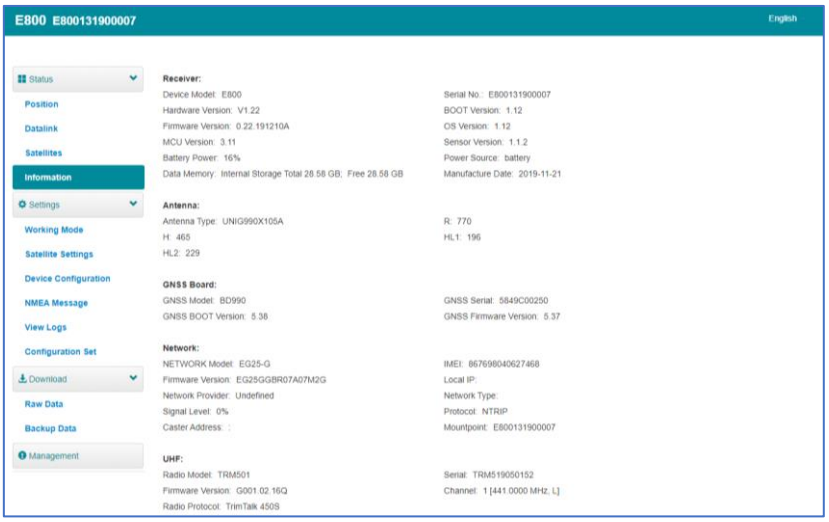
2.2 Satellites

View satellite list and satellite map, set cut-off angle.



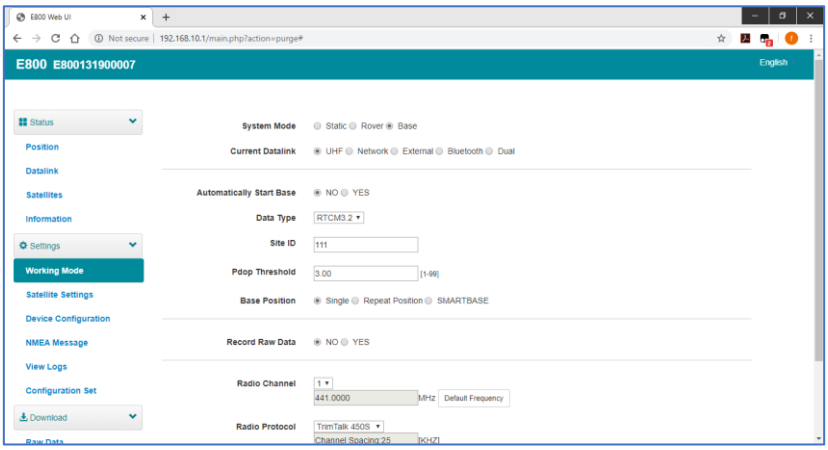
2.3 Information

View receiver information: firmware version, GNSS board, and network module.



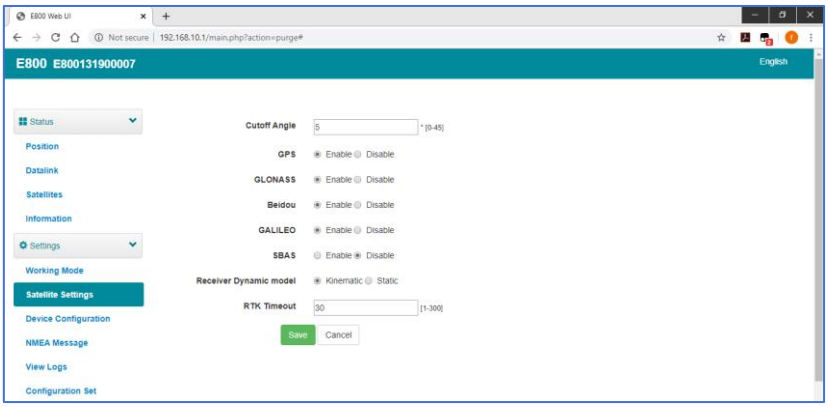
2.4 Working Mode

Configurate working mode: base, rover or static.



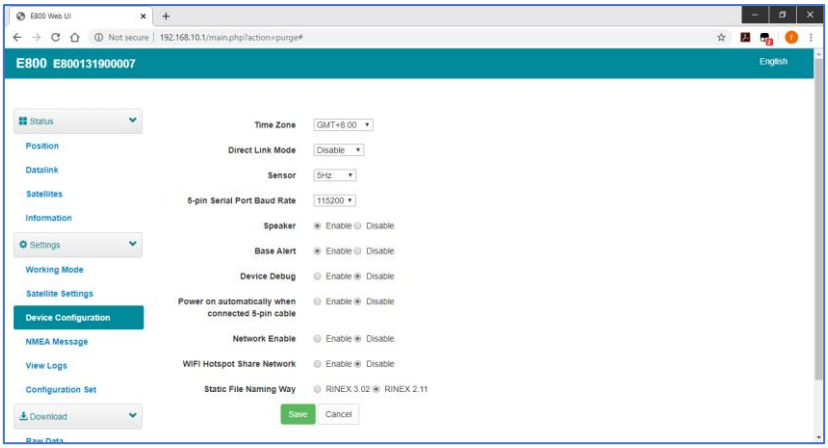
2.5 Satellite Setting

Configurate the satellites to be used.



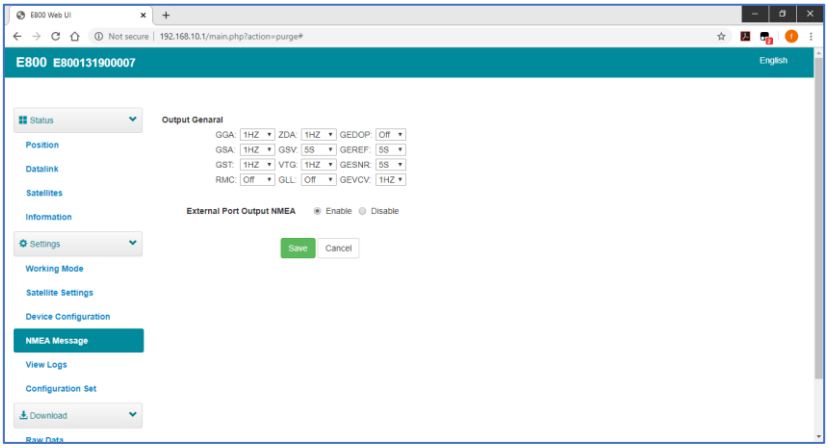
2.6 Device Configuration

Configurate receiver settings: User can set time zone. Sensor means MEMS sensor data output. Also, the 5-pin port baud rate is changeable. Speaker “Smart voice broadcast” can be disabled. Base Alert is enabled, the rover will receive message when base is moved. When SIM card is insert and “WIFI share network” is enabled, PC can surf the internet when connected to device hotspot by using SIM data.



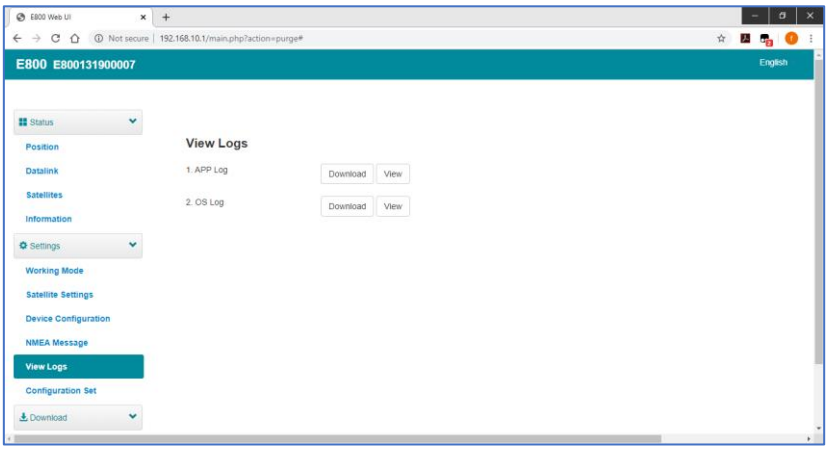
2.7 NMEA Message

Configurate NMEA data output through Bluetooth or 5-pin port.



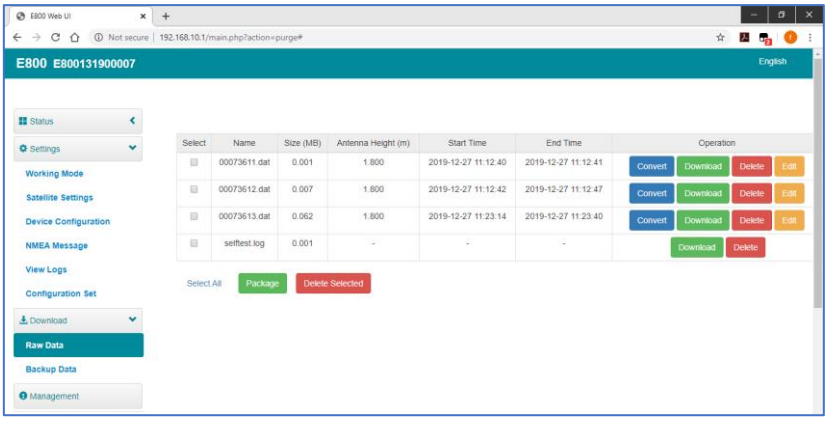
2.8 View Logs

The log files can be used to diagnose issues. Click “download” to download the files.



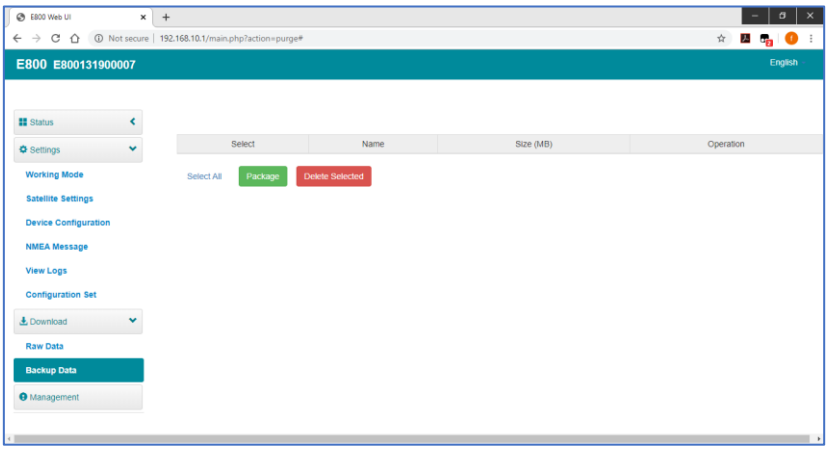
2.9 Raw Data

Download raw data or convert data to RINEX format. User can use check box, then click “Package” to download multiple files.



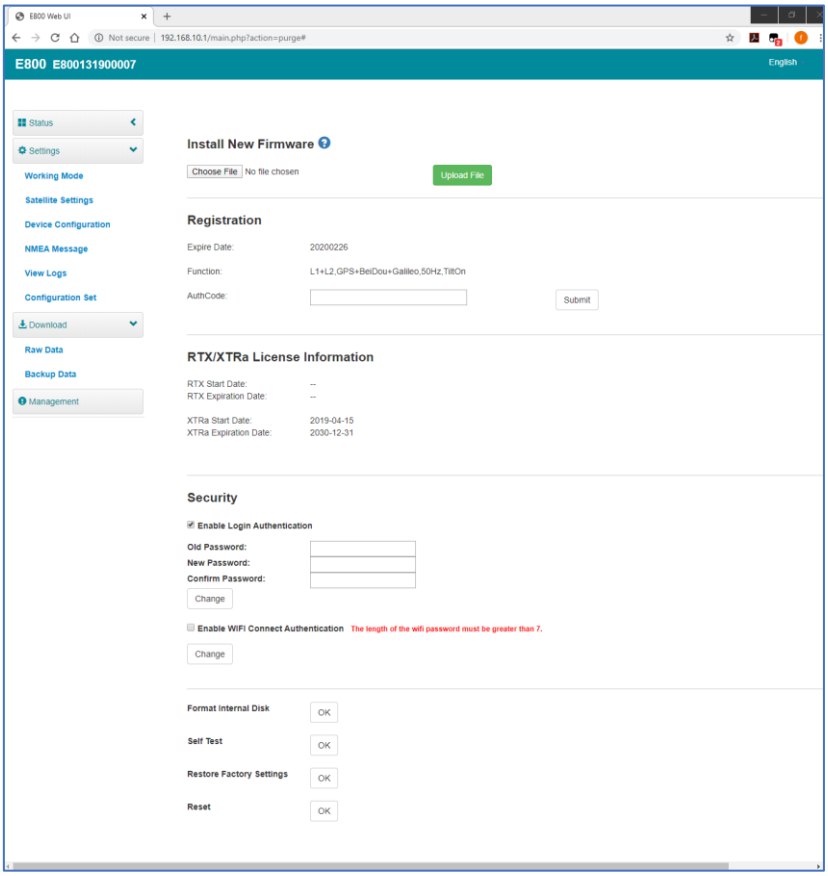
2.10 Backup Data

The points collected in SurPad4.0 will be backup in receiver storage automatically to avoid data loss. Can restore the data to SurPad software.



2.11 Management

User can update receiver and GNSS firmware as well as register device, format internal disk, restore factory setting, restart device. To update the firmware, click “Chose File” to import the firmware, then click “Upload File” to start updating.



3. Basic Operation

This part shows user some basic operations to start working with E800.

3.1 Insert SIM card

E800 supports network working mode. Open the cover and insert Micro SIM card.

3.2 Charge the battery

E800 is equipped with Type-C charger which support maximum 45w PD quick charge. The capacity is 13600mAh, fully charge the battery will take 8 hours typically. The battery indicator is red when charging, will turn green when fully charged.

3.3 Insert radio antenna

The antenna is required in radio working mode.

3.4 Measure antenna height

In order to get correct elevation value, we need to know the correct phase center height of the receiver. However, it is almost not possible to measure the phase center directly. Normally, the software will read the receiver antenna offset parameters. Once user input the measurement height, software will calculate the phase center height automatically. Typically, there are two ways to measure the height:

A: Slant height (to measurement line)

- Centering and leveling the tripod on known point, then measure slant height from the ground point to the arrow at the side of the receiver.

B: Pole height (straight height to device bottom)

- Read the straight pole height

A: Slant height

Measurement Line

B: Pole height

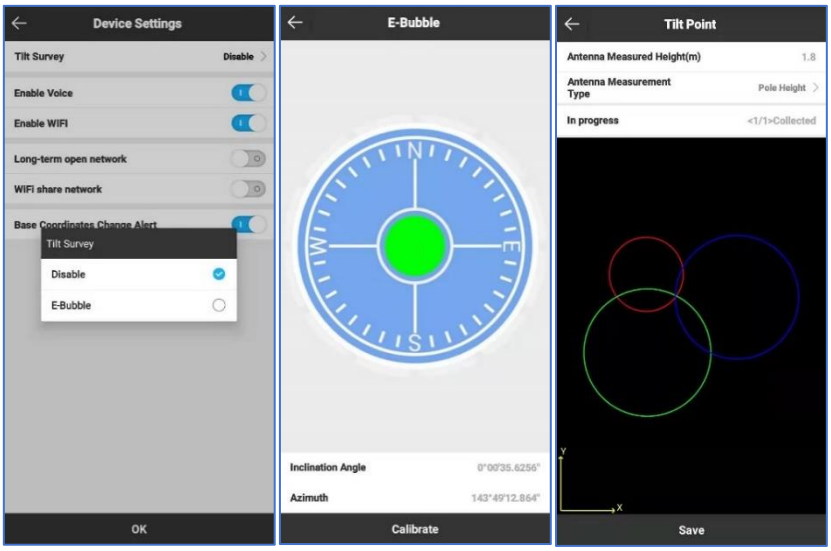
3.5 Sensor

The **new E100** supports E-bubble and MEMS. It is determined by the activation code for which sensor is activated. Please note only one of the sensors can be activated. If you purchase E-bubble code, you can update to MEMS later by contacting with salesman.

3.5.1 E-bubble Calibration

When e-bubble is activated on E100. To calibrate the e-bubble, put the device on flat table or pole (ensure the bubble on the pole is normal before calibration, then centering the pole bubble). In SurPad4.0 software, connect device and click “Device” -> “Device Settings”, open “E-Bubble” function. Then, go to “Device” -> “Calibrate Sensor”, click “Calibrate” to calibrate the e-bubble.

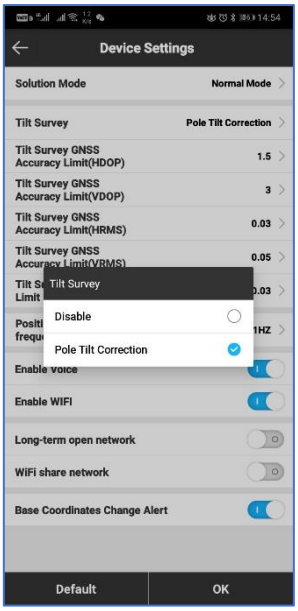
To use tilt survey function, go to “Survey” -> “Point Survey” page, select “Tilt Point”. Then click survey button to start data collection. After collect three points on the same location, the software will calculate a final result.

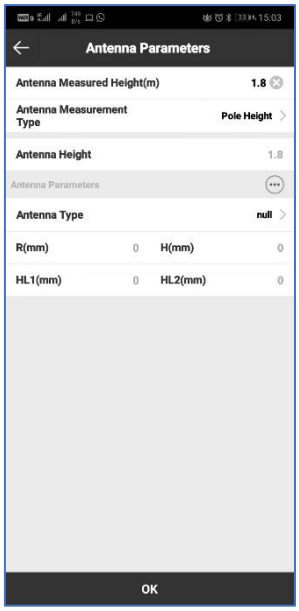


3.5.2 MEMS Tilt Survey

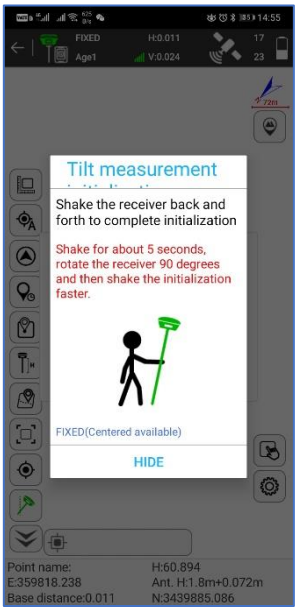
When MEMS sensor is activated on E100. To calibrate the MEMS sensor, receiver must be in Fixed solution. In SurPad4.0 software, connect device and click “Device” -> “Device Settings”, enable “Pole Tilt Correction” function. Then, go to “Survey” -> “Point Survey” page. The software will guide user to calibrate the sensor.

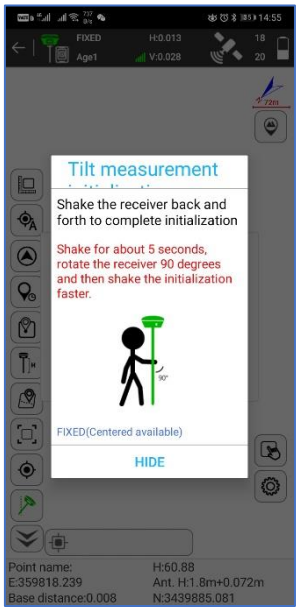
- Input the correct pole height
- Draw circle on the ground using the pole
- Follow the guide and shake the pole back and forth for around 5-10 seconds or walk in straight line around 10 meters until it shows “Ready”

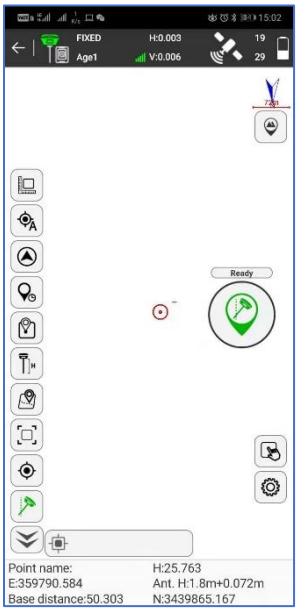

Device Settings
Solution Mode
Normal Mode
Tilt Survey
Pole Tilt Correction
Tilt Survey GNSS Accuracy Limit(HDOP)
1.5
Tilt Survey GNSS Accuracy Limit(VDOP)
3
Tilt Survey GNSS Accuracy Limit(HRMS)
0.03
Tilt Survey GNSS Accuracy Limit(VRMS)
0.05
Tilt Survey
Disable
Pole Tilt Correction
Enable voice
Enable WIFI
Long-term open network
WiFi share network
Base Coordinates Change Alert
Default
OK


Antenna Parameters
Antenna Measured Height(m)
1.8
Antenna Measurement Type
Pole Height
Antenna Height
1.8
Antenna Parameters
Antenna Type
null
R(mm)
H(mm)
HL1(mm)
HL2(mm)
OK


Magnetic
Draw the centering pole on the ground to complete the magnetic calibration
HIDE
Point name:
H:60.884
E:359818.239
Ant. H:1.8m+0.072m
Base distance:0.003
N:3439885.085


Tilt measurement
Shake the receiver back and forth to complete initialization
Shake for about 5 seconds, rotate the receiver 90 degrees and then shake the initialization faster.
FIXED(Centered available)
HIDE
Point name:
H:60.894
E:359818.238
Ant. H:1.8m+0.072m
Base distance:0.011
N:3439885.086


Tilt measurement
Shake the receiver back and forth to complete initialization
Shake for about 5 seconds, rotate the receiver 90 degrees and then shake the initialization faster.
FIXED(Centered available)
HIDE
Point name:
H:60.88
E:359818.239
Ant. H:1.8m+0.072m
Base distance:0.008
N:3439885.081


Ready
Point name:
H:25.763
E:359790.584
Ant. H:1.8m+0.072m
Base distance:50.303
N:3439865.167

4. Internal Radio

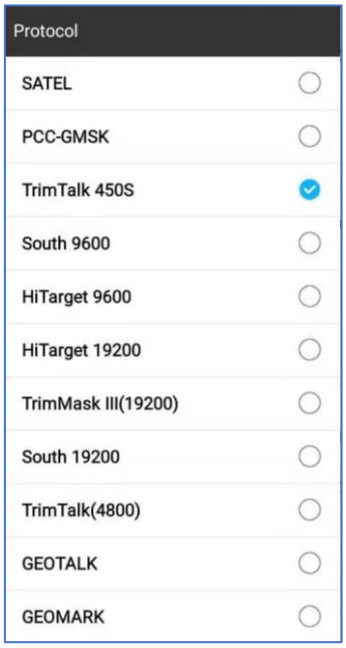
E800 is equipped with 5-watt internal radio. User can select the transmission power 2 watt (Low) or 5 watt (High). There are 8 default channel frequency and the frequency of channel "8" is changeable. With new firmware update, lots of mainly used protocols in survey industrial are supported.

4.1 Default channel frequency

Channel	Frequency/MHz
1	431
2	432
3	433
4	434
5	435
6	436
7	437
8	438, Changeable

4.2 Supported radio protocol

Some of the protocols may require firmware update.



5. Standard Accessories

E800 base and rover are using the same hard carrying case.

Base:

E800 Base					
NO.	Items	Quantity	Model	Description	Picture
1	Base Carrying Case	1	---	Carry case for E800	
2	E800 GNSS Receiver	1	---	---	
3	Charger	1	KSA-45P-45W D5	Type-C port	
4	Power Cable	1	---	Type-C to Type-C	
5	Charger Plug	4	---	---	
6	Measure Tape	1	---	3m/10ft-16mm	
7	UHF Antenna	1	QT440A	Internal UHF Antenna, 430-450MHz, 4dBi, TNCJ	
8	Screw Connector	1	---	---	
9	Tray	1	---	---	
10	Warranty Card	1	---	---	

Rover:

E800 Rover					
NO.	Items	Quantity	Model	Description	Picture
1	Rover Carrying Case	1	---	Carry case for E800	
2	E800 GNSS Receiver	1	---	---	
3	Charger	1	KSA-45P-45W D5	Type-C port	
4	Power Cable	1	---	Type-C to Type-C	
5	Charger Plug	4	---	---	
6	Measure Tape	1	---	3m/10ft-16mm	
7	UHF Antenna	1	QT440A	Internal UHF Antenna, 430-450MHz, 4dBi, TNCJ	
8	Screw Connector	1	---	---	
9	Warranty Card	1	---	---	

6. Technical Specifications

6.1 E800 (P40 Version)

GNSS	
Satellites Tracking	GPS: L1CA/L1P/L1C/L2P/L2C/L5 BDS: B1I/B2I/B3I/B1C/B2a/B2b/ ACEBOC GLONASS: G1/G2/G3, P1/P2 GALILEO: E1/E5a/E5b/E6/ALTBOC QZSS: L1CA/L1C/L2C/L5/LEX IRNSS: L5 SBAS1: L1/L5 L-Band: Atlas H10/H30/Basic
Channels	800
Signal Reacquisition	< 1 sec
Cold Start	< 10 sec
Warm Start	< 10 sec
Hot Start	< 10 sec
RTK Signal Initialization	< 8 sec
Initialization Reliability	> 99.9%
Update Rate	10 Hz standard, up to 50 Hz
Operation System	Linux
Internal Memory	32 GB
Performance	
High Precision Static	H: 2mm + 0.1 ppm V: 3mm + 0.4 ppm
Static/Fast Static	H: 2.5mm + 0.1 ppm V: 3.5mm + 0.4 ppm
RTK	H: 8mm + 1.0 ppm V: 15mm + 1 ppm
Code Differential	H: 0.25 m V: 0.45 m
SBAS	H: 0.3 m V: 0.6 m
Power Supply	
Battery	Rechargeable and built-in Lithium-ion battery, 7.2 V ~ 13.6 Ah
Voltage	9~28 V DC with over-voltage protection
Working Time	Up to 15 hours
Charging Time	Typically 5 hours
Internal Radio	
Type	TX and RX
Frequency Range	410 ~ 470 MHz
Channel Spacing	12.5 KHz / 25 KHz
Emitting Power	5 W
Operation Range	8 ~ 10 Km typically 15Km with optimal conditions[2]
Protocol	Satel, PCC, TrimTalk, TrimMark III, South, HiTarget
Internet Modem	
Support Band	Global GSM /WCDMA/LTE
Communication	
Bluetooth	BT 5.0, BLE
WIFI	802.11 ac/n(HT20)/a/b/g
SIM Card	Micro SIM card
5-pin Port	Connect to external radio and power, NMEA output
Type-C Port	Charge and internal storage access
TNC Port	Connect to internal radio antenna
Web UI	View status, update firmware, set up working mode, download data
Intelligent Voice	Broadcast working status
NMEA Output	GGA, ZDA, GSA, GSV, GST, VTG, RMC, GLL, Binary
Correction Data	CMR, CMR+, RTCM2, RTCM3, RTCM32
MEMS	Fast initialization, dynamic tilt survey up to 60°
Physical	
Dimension	Φ154 mm x H76 mm
Weight	1.5 kg
Screen	1.45'' colorful touchable screen
Operating Temperature	-40℃ ~ +65℃
Storage Temperature	-45℃ ~ +80℃
Water/Dust Proof	IP67
Shock	Survive a 2 m drop on concrete floor
Vibration	Vibration resistant
Humidity	Up to 100%
Indicators	Satellites, datalink, battery, Bluetooth
Button	Power button, short press to voice broadcast status
Certificate	CE, FCC, NGS Calibration

1. SBAS supports WAAS, EGNOS, GAGAN, SDCM, MSAS.
2. Depend on the environment and electromagnetic interference.

6.2 E800 (BD990 Version)

GNSS	
Satellites Tracking	GPS: L1CA/L2E/L2C/L5 BDS: B1/B2/B3 GLONASS: L1CA/L2CA/L3 CDMA GALILEO: E1/E5a/E5b/E6/ALTBOC QZSS: L1CA/L1 SAIF/L1C/L2C/LEX NAVIC: L5 SBAS[1]: L1/L5 L-Band: RTX
Channels	336
Signal Reacquisition	< 1 sec
Cold Start	< 10 sec
Warm Start	< 10 sec
Hot Start	< 10 sec
RTK Signal Initialization	< 8 sec
Initialization Reliability	> 99.9%
Update Rate	50 Hz standard, up to 50 Hz
Operation System	Linux
Internal Memory	32 GB
Performance	
High Precision Static	H: 2mm + 0.1 ppm V: 3mm + 0.4 ppm
Static/Fast Static	H: 2.5mm + 0.1 ppm V: 3.5mm + 0.4 ppm
RTK	H: 8mm + 1.0 ppm V: 15mm + 1 ppm
Code Differential	H: 0.25 m V: 0.45 m
SBAS	H: 0.3 m V: 0.6 m
Power Supply	
Battery	Rechargeable and built-in Lithium-ion battery, 7.2 V ~ 13.6 Ah
Voltage	9~28 V DC with over-voltage protection
Working Time	Up to 15 hours
Charging Time	Typically 5 hours
Internal Radio	
Type	TX and RX
Frequency Range	410 ~ 470 MHz
Channel Spacing	12.5 KHz / 25 KHz
Emitting Power	5 W
Operation Range	8 ~ 10 Km typically 15Km with optimal conditions[2]
Protocol	Satel, PCC, TrimTalk, TrimMark III, South, HiTarget
Internet Modem	
Support Band	Global GSM /WCDMA/LTE
Communication	
Bluetooth	BT 5.0, BLE
WIFI	802.11 ac/n(HT20)/a/b/g
SIM Card	Micro SIM card
5-pin Port	Connect to external radio and power, NMEA output
Type-C Port	Charge and internal storage access
TNC Port	Connect to internal radio antenna
Web UI	View status, update firmware, set up working mode, download data
Intelligent Voice	Broadcast working status
NMEA Output	GGA, ZDA, GSA, GSV, GST, VTG, RMC, GLL, Binary
Correction Data	CMR, CMR+, RTCM2, RTCM3, RTCM32
MEMS	Fast initialization, dynamic tilt survey up to 60°
Physical	
Dimension	Φ154 mm x H76 mm
Weight	1.5 kg
Screen	1.45'' colorful touchable screen
Operating Temperature	-40℃ ~ +65℃
Storage Temperature	-45℃ ~ +80℃
Water/Dust Proof	IP67
Shock	Survive a 2 m drop on concrete floor
Vibration	Vibration resistant
Humidity	Up to 100%
Indicators	Satellites, datalink, battery, Bluetooth
Button	Power button, short press to voice broadcast status
Certificate	CE, FCC, NGS Calibration

3. SBAS supports WAAS, EGNOS, GAGAN, SDCM, MSAS.
4. Depend on the environment and electromagnetic interference.

7. Warranty Policy

The Guarantees Rights

- e-survey supports free exchange or refund within 7 days from the day when you have received the products, where the device appears "performance failure", which confirmed by e-survey repair center.

- e-survey supports free maintenance or exchange within 15 days from the day when you have received the products, where the device appears "performance failure", which confirmed by e-survey repair center.

- e-survey supports free maintenance or exchange the same type of device within one year from the day when you have received the products, where the device appears "performance failure", which is still not in working conditions after two repairs.

- e-survey supports a 24-month warranty service for the device host and a 3-month free warranty service for the accessory from the day when you have received the products.

Warranty service

If the device host meets the warranty conditions, the warranty service can be obtained according to the warranty card and the purchasing invoice. If the proof of purchase and the warranty card cannot be provided, and e-survey will use the delivery time as the standard for the warranty period.

- If it is a non-warranty product, and the repair center will handle the maintenance of the extra-fee.

- After the device is repaired, the same fault is con- firmed by the repair center and e-survey will provide a 3-month free warranty service.

- The transportation, delivery and disposal costs incurred during the delivery or inspection of the product to e-survey shall be borne by the user. The freight generated by the repair or inspection equipment returned to the user shall be borne by e-sur- vey.

- Equipment that needs to be repaired or sent for inspection, please back up the data in the machine in time.

- During the warranty period, the parts normally used for maintenance are free.

- The parts that have been replaced during the repair are owned by e-survey.

- e-survey is not responsible for non-product standard and software or applications that are not certified by the company.

Following conditions are not within the scope of the warranty and service

The device host and accessories have been subjected to: abnormal or improper use, improper storage of abnormal conditions, unauthorized disassembly or alteration, accidents, damage caused by improper installation.

- Damage caused by improper use of user, such as liquid injection, damage due to external force, etc.

- Failure to use, repair or transport caused by the equipment's instruction manual.

- Damage to the product is caused by external, including but not limited to, abnormal and unpredictable factors such as satellite systems, geomagnetism, static electricity, physical pressure, etc.

- Damage caused by force majeure such as earth- quakes, floods, wars, etc.

- Other conditions that cannot comply with the relevant provisions of the Guarantees Rights.