

E800 GNSS Receiver

User Manual



V2.0_202011

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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%

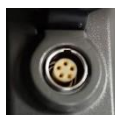
1.3 Interface

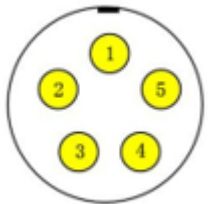
E800 GNSS receive bottom interface is shown as below. The 5-pin port is used to connect external radio and external power, or output NMEA messages. Type-C port can be used for data download (internal storage access) or charging.



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.

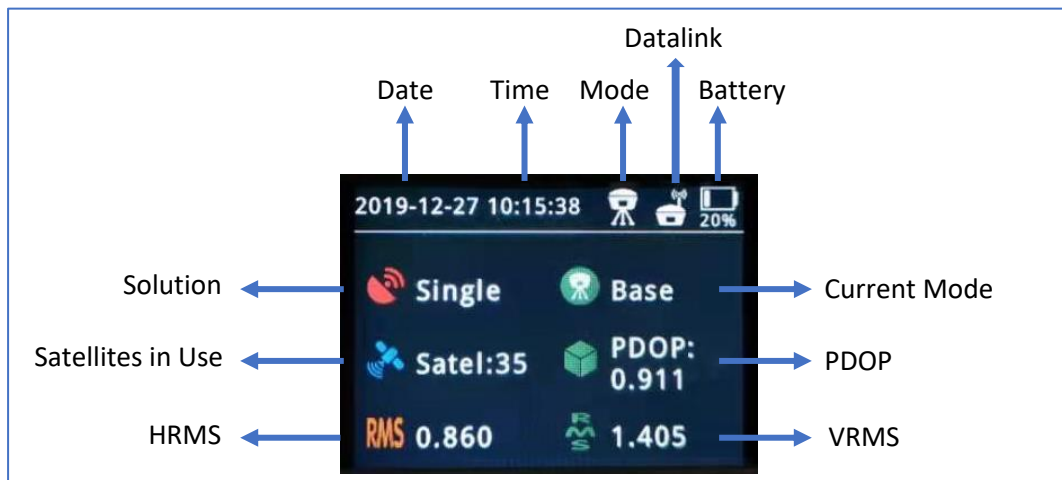
Self-check	Long press button for two seconds then release, will hear the voice "Power off?" Then long press button for three seconds, will hear the voice "self-check".
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1.6 Touch Screen

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.

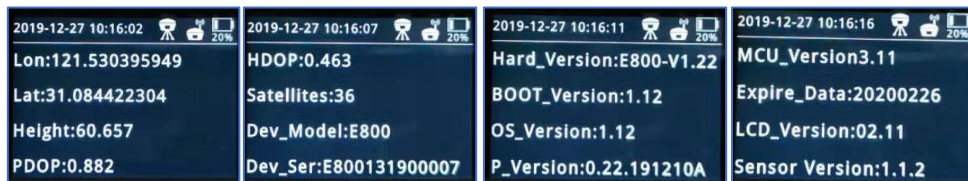
1.6.1 Main Screen

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

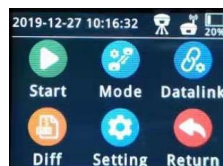


1.6.2 Device Information

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

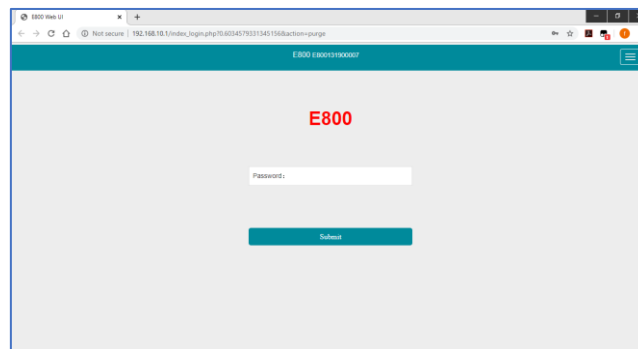


Start	Start/Stop	Start/Stop current working mode
Mode	Static	Sample Interval Cut-off Angle Auto Record: Yes/No
	Base	Auto Record: Yes/No PDOP Limit Base ID: Change from software

	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

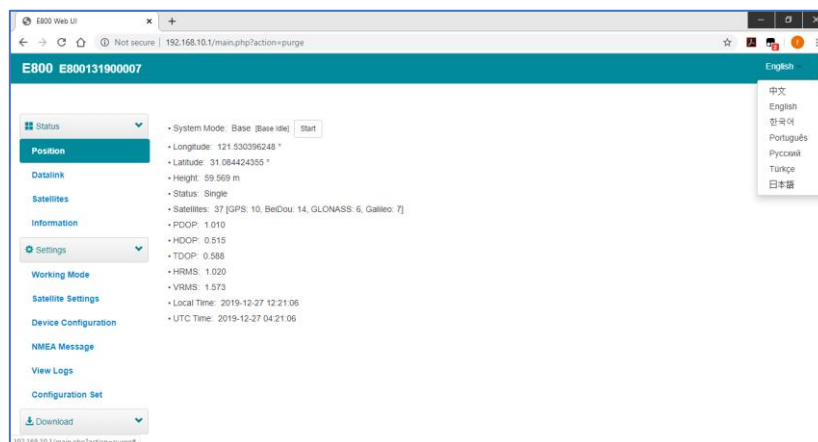
2. Web User Interface

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.



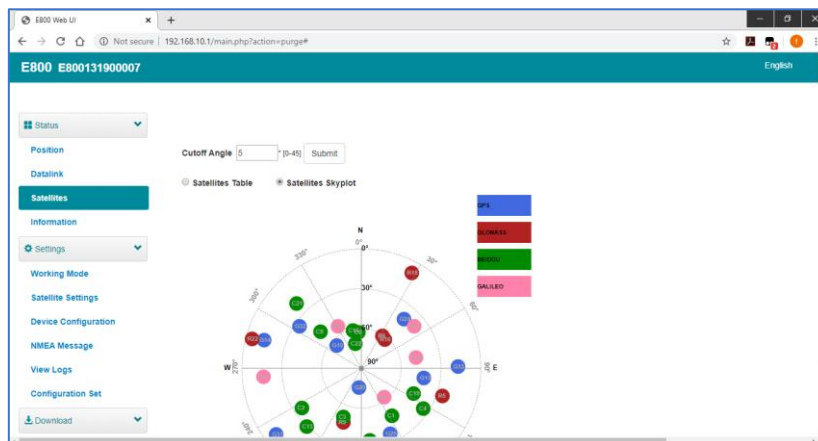
2.1 Position

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.



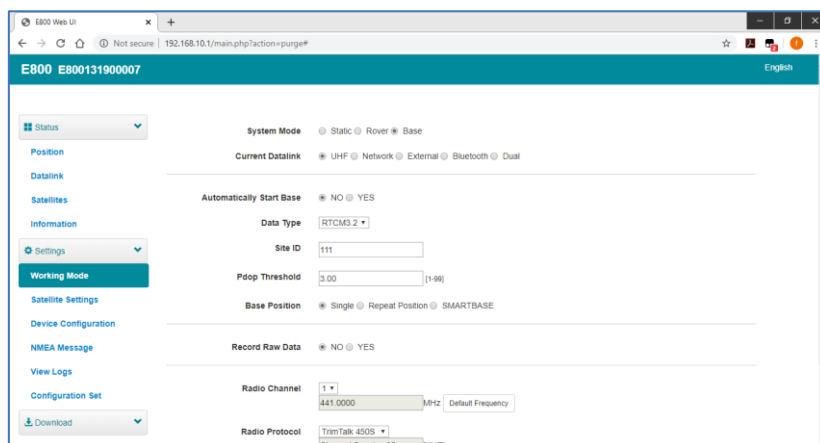
2.3 Information

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

E800 E800131900007		English
Status Position Datalink Satellites Information Settings Working Mode Satellite Settings Device Configuration NMEA Message View Logs Configuration Set Download Raw Data Backup Data Management	Receiver: Device Model: E800 Hardware Version: V1.22 Firmware Version: 0.22.191210A MCU Version: 3.11 Battery Power: 16% Data Memory: Internal Storage Total 28.58 GB, Free 28.58 GB Serial No.: E800131900007 BOOT Version: 1.12 OS Version: 1.12 Sensor Version: 1.1.2 Power Source: battery Manufacture Date: 2019-11-21 Antenna: Antenna Type: UNIG990X105A H: 465 HL2: 229 R: 770 HL1: 196 GNSS Board: GNSS Model: BC990 GNSS BOOT Version: 5.36 GNSS Serial: 5849C00250 GNSS Firmware Version: 5.37 Network: NETWORK Model: EQ25-G Firmware Version: EQ25GGBR07A07M2G Network Provider: Undefined Signal Level: 0% Caster Address: : IMEI: 867698040627468 Local IP: Network Type: Protocol: NTRIP Mountpoint: E800131900007 UHF: Radio Model: TRM501 Firmware Version: G001.02.16Q Radio Protocol: TrimTalk 450S Serial: TRM519050152 Channel: 1[441.0000 MHz, L]	

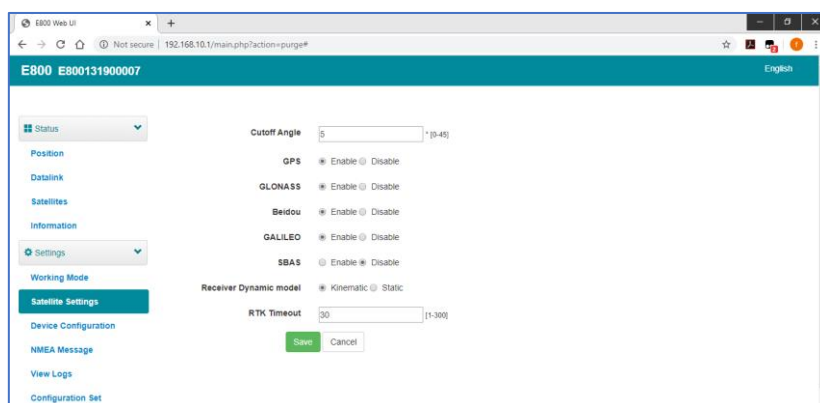
2.4 Working Mode

Configure working mode: base, rover or static.



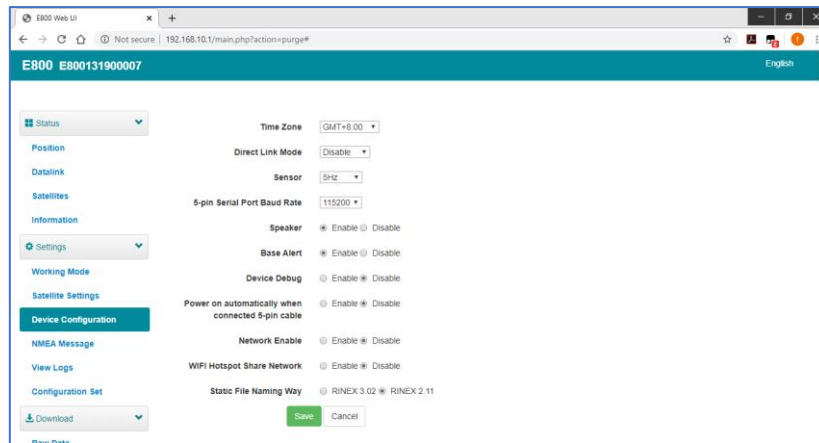
2.5 Satellite Setting

Configure the satellites to be used.



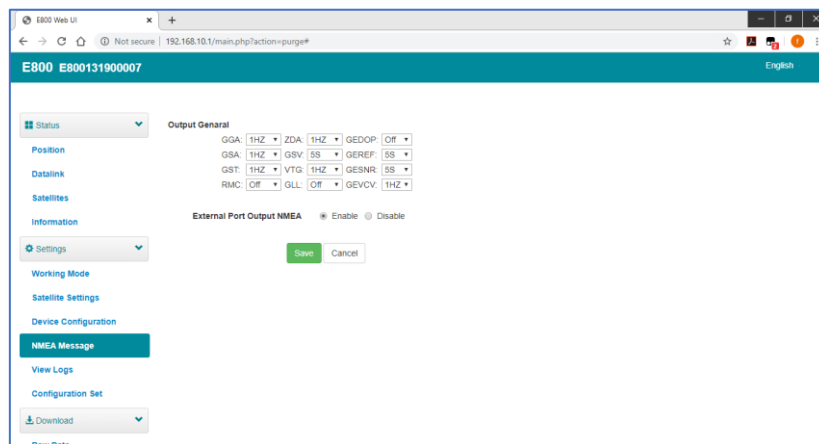
2.6 Device Configuration

Configure 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.



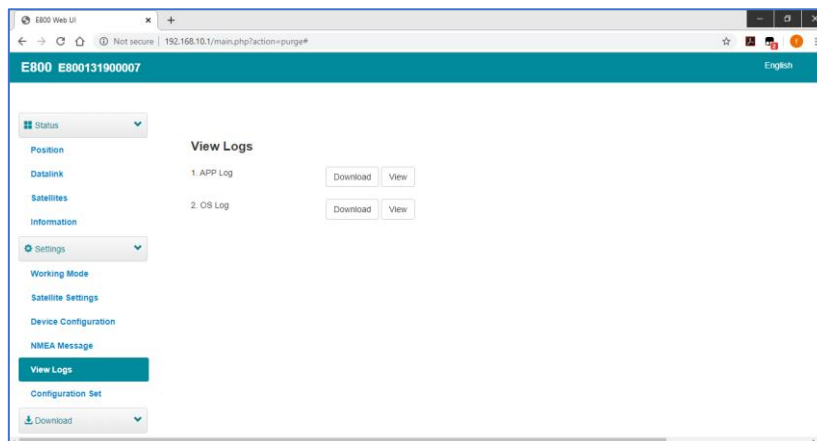
2.7 NMEA Message

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



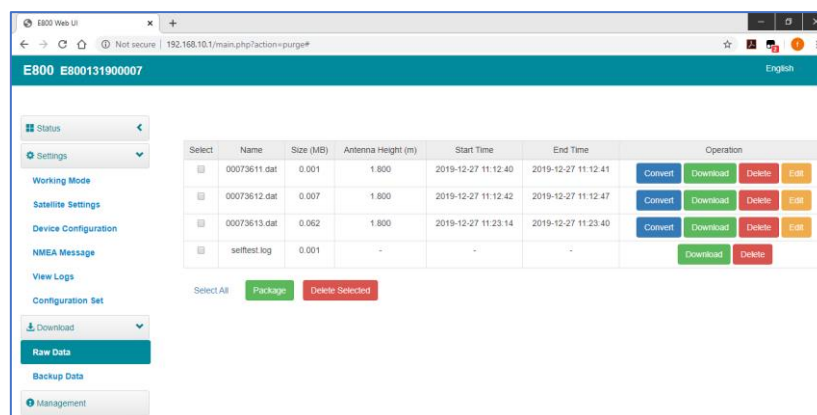
2.8 View Logs

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



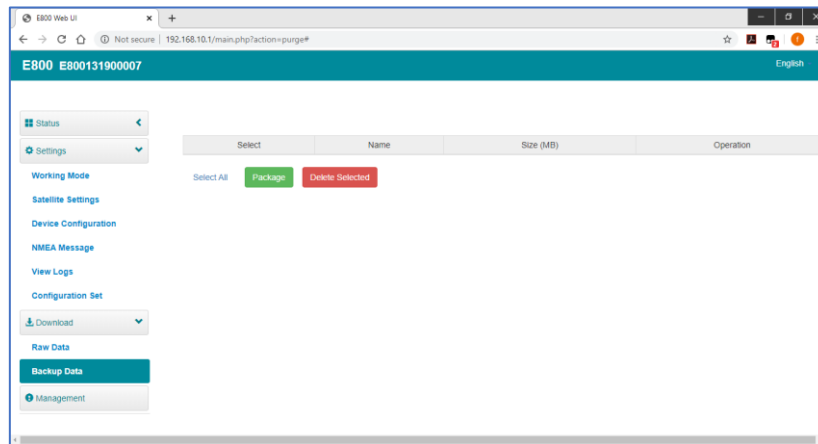
2.9 Raw Data

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



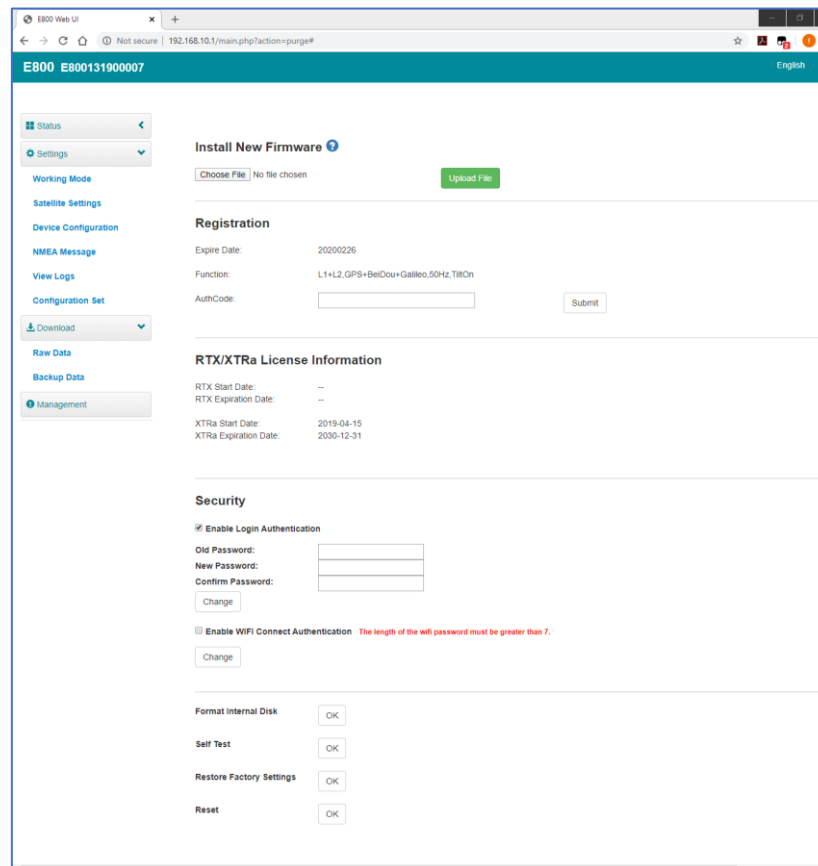
2.10 Backup Data

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

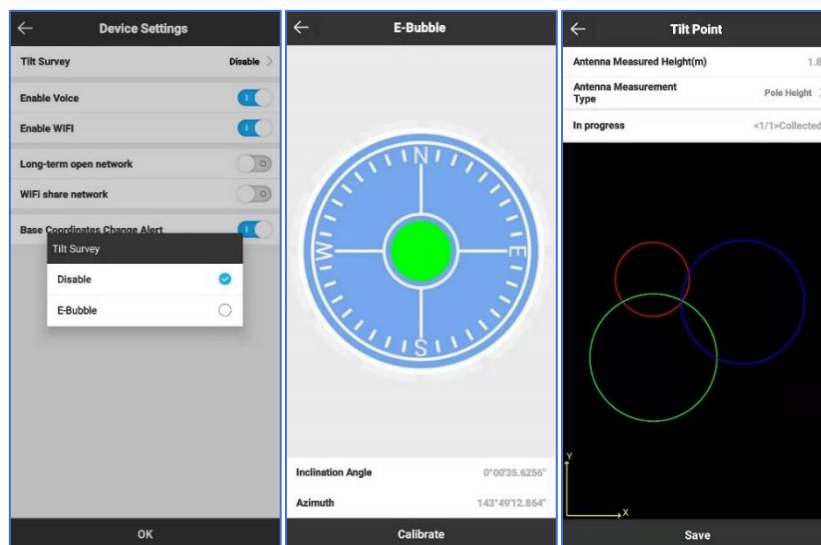
3.5 Sensor

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.

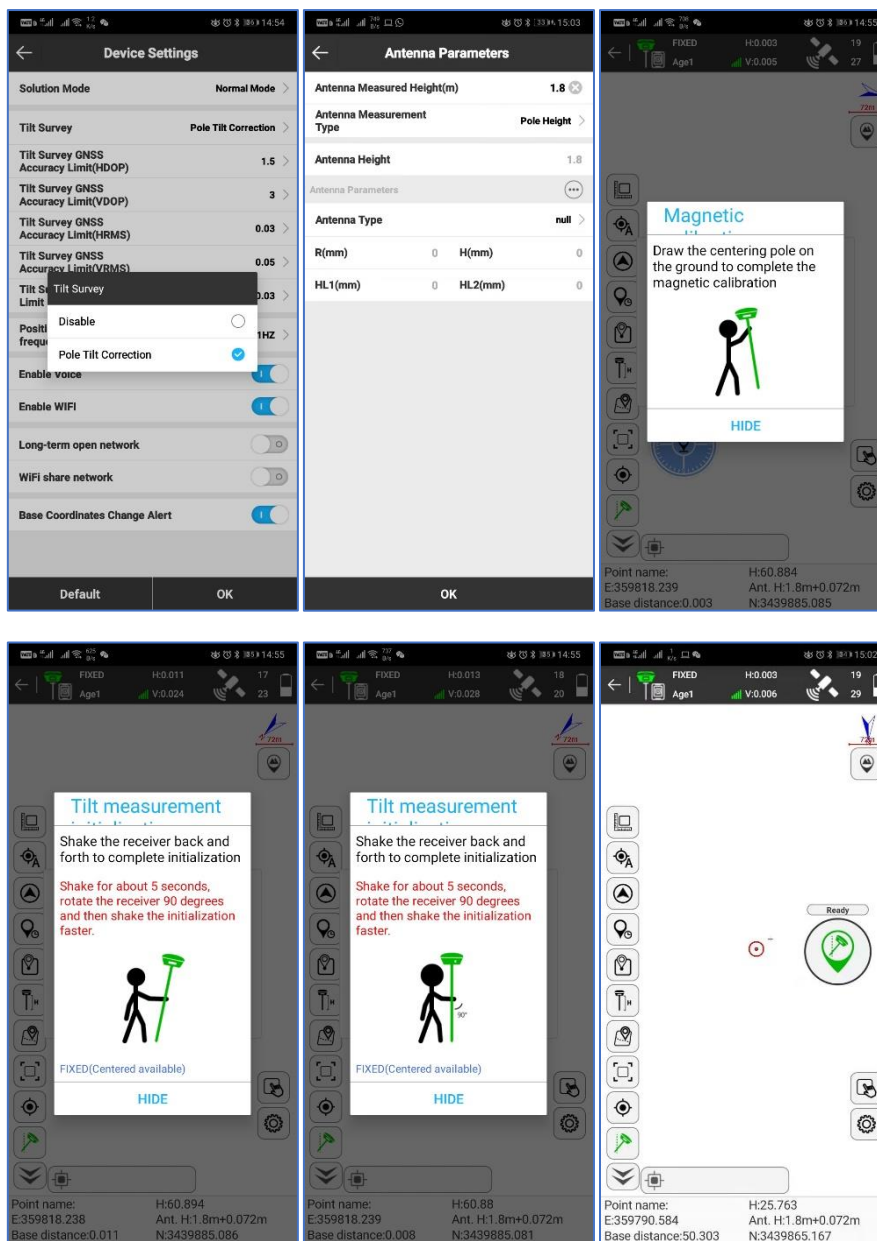
To use tilt survey function, go to "Survey" -> "Point Survey" page, select "Tilt Point". Then click survey button to start data collection. After collect three points on the same location, the software will calculate a final result.



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"



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.

Protocol	
SATEL	☐
PCC-GMSK	☐
TrimTalk 450S	☒
South 9600	☐
HiTarget 9600	☐
HiTarget 19200	☐
TrimMask III(19200)	☐
South 19200	☐
TrimTalk(4800)	☐
GEOTALK	☐
GEOMARK	☐

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, TNC	
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, TNC	
8	Screw Connector	1	---	---	
9	Warranty Card	1	---	---	

6. Technical Specifications

6.1 E800 (P40 Version)

GNSS		Channel Spacing	12.5 KHz / 25 KHz
Satellites Tracking	GPS: L1CA/L1P/L1C/L2P/L2C/L5	Emitting Power	5 W
	BDS: B1I/B2I/B3I/B1C/B2a/B2b/	Operation Range	8 ~ 10 Km typically 15Km with optimal conditions ²
	ACEBOC	Protocol	Satel, PCC, TrimTalk, TrimMark III, South, HiTarget
	GLONASS: G1/G2/G3, P1/P2	Internet Modem	
	GALILEO: E1/E5a/E5b/E6/ALTB0C	Support Band	Global GSM /WCDMA/LTE
	QZSS: L1CA/L1C/L2C/L5/LEX	Communication	
IRNSS: L5		Bluetooth	BT 5.0, BLE
SBAS1: L1/L5		WIFI	802.11 ac/n(HT20)/a/b/g
L-Band: Atlas H10/H30/Basic		SIM Card	Micro SIM card
Channels	800	5-pin Port	Connect to external radio and power, NMEA output
Signal Reacquisition	< 1 sec	Type-C Port	Charge and internal storage access
Cold Start	< 10 sec	TNC Port	Connect to internal radio antenna
Warm Start	< 10 sec	Web UI	View status, update firmware, set up working mode, download data
Hot Start	< 10 sec	Intelligent Voice	Broadcast working status
RTK Signal Initialization	< 8 sec	NMEA Output	GGA, ZDA, GSA, GSV, GST, VTG, RMC, GLL, Binary
Initialization Reliability	> 99.9%	Correction Data	CMR, CMR+, RTCM2, RTCM3, RTCM32
Update Rate	10 Hz standard, up to 50 Hz	MEMS	Fast initialization, dynamic tilt survey up to 60°
Operation System	Linux	Physical	
Internal Memory	32 GB	Dimension	Φ154 mm x H76 mm
Performance		Weight	1.5 kg
High Precision Static	H: 2mm + 0.1 ppm V: 3mm + 0.4 ppm	Screen	1.45" colorful touchable screen
Static/Fast Static	H: 2.5mm + 0.1 ppm V: 3.5mm + 0.4 ppm	Operating Temperature	-40℃ ~ +65℃
RTK	H: 8mm + 1.0 ppm V: 15mm + 1 ppm	Storage Temperature	-45℃ ~ +80℃
Code Differential	H: 0.25 m V: 0.45 m	Water/Dust Proof	IP67
SBAS	H: 0.3 m V: 0.6 m	Shock	Survive a 2 m drop on concrete floor
Power Supply		Vibration	Vibration resistant
Battery	Rechargeable and built-in Lithium-ion battery, 7.2 V ~ 13.6 Ah	Humidity	Up to 100%
Voltage	9~28 V DC with over-voltage protection	Indicators	Satellites, datalink, battery, Bluetooth
Working Time	Up to 15 hours	Button	Power button, short press to voice broadcast status
Charging Time	Typically 5 hours	Certificate	CE, FCC, NGS Calibration
Internal Radio			
Type	TX and RX		
Frequency Range	410 ~ 470 MHz		

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

6.2 E800 (BD990 Version)

GNSS		Channel Spacing	12.5 KHz / 25 KHz
Satellites Tracking	GPS: L1CA/L2E/L2C/L5 BDS: B1/B2/B3 GLONASS: L1CA/L2CA/L3 CDMA GALILEO: E1/E5a/E5b/E6/ALTB0C QZSS: L1CA/L1 SAIF/L1C/L2C/LEX NAVIC: L5 SBAS ¹ : L1/L5 L-Band: RTX	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
Channels	336	WiFi	802.11 ac/n(HT20)/a/b/g
Signal Reacquisition	< 1 sec	SIM Card	Micro SIM card
Cold Start	< 10 sec	5-pin Port	Connect to external radio and power, NMEA output
Warm Start	< 10 sec	Type-C Port	Charge and internal storage access
Hot Start	< 10 sec	TNC Port	Connect to internal radio antenna
RTK Signal Initialization	< 8 sec	Web UI	View status, update firmware, set up working mode, download data
Initialization Reliability	> 99.9%	Intelligent Voice	Broadcast working status
Update Rate	50 Hz standard, up to 50 Hz	NMEA Output	GGA, ZDA, GSA, GSV, GST, VTG, RMC, GLL, Binary
Operation System	Linux	Correction Data	CMR, CMR+, RTCM2, RTCM3, RTCM32
Internal Memory	32 GB	MEMS	Fast initialization, dynamic tilt survey up to 60°
Performance		Physical	
High Precision Static	H: 2mm + 0.1 ppm V: 3mm + 0.4 ppm	Dimension	Φ154 mm x H76 mm
Static/Fast Static	H: 2.5mm + 0.1 ppm V: 3.5mm + 0.4 ppm	Weight	1.5 kg
RTK	H: 8mm + 1.0 ppm V: 15mm + 1 ppm	Screen	1.45" colorful touchable screen
Code Differential	H: 0.25 m V: 0.45 m	Operating Temperature	-40℃ ~ +65℃
SBAS	H: 0.3 m V: 0.6 m	Storage Temperature	-45℃ ~ +80℃
Power Supply		Water/Dust Proof	IP67
Battery	Rechargeable and built-in Lithium-ion battery, 7.2 V ~ 13.6 Ah	Shock	Survive a 2 m drop on concrete floor
Voltage	9~28 V DC with over-voltage protection	Vibration	Vibration resistant
Working Time	Up to 15 hours	Humidity	Up to 100%
Charging Time	Typically 5 hours	Indicators	Satellites, datalink, battery, Bluetooth
Internal Radio		Button	Power button, short press to voice broadcast status
Type	TX and RX	Certificate	CE, FCC, NGS Calibration
Frequency Range	410 ~ 470 MHz		
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 repaircenter.
- 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 confirmed 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-survey.

■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.