# E800 GNSS Receiver

# User Manual



# V2.0\_202011

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### E800 User Manual

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# Our survey

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

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#### 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:



		1	+12V	Power
	$\left(2^{4}\right)$	2	GND	Power ground
5 Pin	3 (1)	3	TXD	Device out
		4	SGD	Signal ground
	Front View	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.	
	Long press button for two seconds then release,	
Power Off	will hear the voice "Power off?" Then press the	
	button again to confirm.	
Broadcast Current Working	Receiver will broadcast current working mode	
Mode	when press the power button.	

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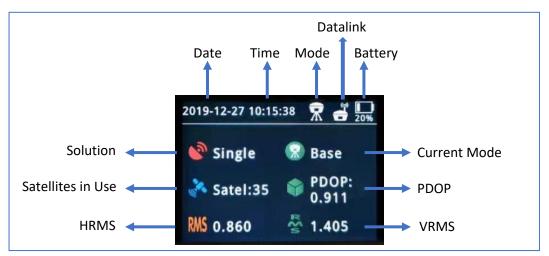
	Long press button for two seconds then release,
Self-check	will hear the voice "Power off?" Then long press
Sell-check	button for three seconds, will hear the voice "self-
	check".

#### 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.

2019-12-27 10:16:02 😨 💣 🛄	2019-12-27 10:16:07 🏾 👷 🚽 🛄	2019-12-27 10:16:11 🕱 🚽 🛄	2019-12-27 10:16:16  🛣 🛄
Lon:121.530395949	HDOP:0.463	Hard_Version:E800-V1.22	MCU_Version3.11
Lat:31.084422304	Satellites:36	BOOT_Version:1.12	Expire_Data:20200226
Height:60.657	Dev_Model:E800	OS_Version:1.12	LCD_Version:02.11
PDOP:0.882	Dev_Ser:E800131900007	P_Version:0.22.191210A	Sensor Version:1.1.2

#### 1.6.3 Work Mode Setting



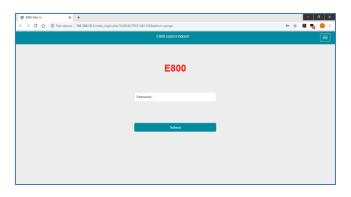
Start	Start/Stop	Start/Stop current working mode
		Sample Interval
	Static	Cut-off Angle
Mode		Auto Record: Yes/No
woue	Base	Auto Record: Yes/No
		PDOP Limit
		Base ID: Change from software



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

9 EBOD Web UI 🗙	+		- 0
→ C ① Not secure	192.168.10.1/main.php?action=purge	☆ <b>5</b>	n 📭 🌖
800 E800131900007			English
Status Position Dataink Seletites Information Seletitys Satellites Satellite Settings Device Configuration NNEEA Massage View Logs Configuration Sett Deviced Configuration Set	• Stystem Mode: Base (Base Idea) 58mt • Longstude: 121:500566248 * • Lantoue: 310.8424355 * • Height: 59:595 m • Status: Single • POOP 0.515 • TOOP: 0.568 • HRVIS: 1.020 • HRVIS: 1.021 • Local Time: 2019-12.27 12.21.05 • UTC Time: 2019-12.27 04.21.06		中文 English 한국어 Pyccssi Türkpe 日本語



#### 2.2 Satellites

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

EB00 Web UI	+	- a >
→ C ① Not secure	192.168.10.1/main.php?action=purge#	÷ 🖪 🗗 🧿
800 E800131900007		English
Status 💙		
Position	Cutoff Angle 5 [0-45] Submit	
Datalink	Satellites Table Satellites Skypiot	
Satellites	Parameter index - Subsection of prov	
Information	N BLOWASS	
Settings	p.	
Working Mode		
Satellite Settings	A	
Device Configuration		
NMEA Message		
View Logs	w <sup>b</sup> 2 90' 90' \$E	
Configuration Set		
Download Y		

### 2.3 Information

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

E800 E800131900	007			English
II Status	*	Receiver:		
		Device Model: E800	Serial No.: E800131900007	
Position		Hardware Version: V1.22	BOOT Version: 1.12	
Datalink		Firmware Version: 0.22.191210A	OS Version: 1.12	
		MCU Version: 3.11	Sensor Version: 1.1.2	
Satellites	_	Battery Power: 16%	Power Source: battery	
Information		Data Memory: Internal Storage Total 28.58 GB; Free 28.58 GB	Manufacture Date: 2019-11-21	
© Settings	*	Antenna:		
		Antenna Type: UNIG990X105A	R: 770	
Working Mode		H: 465	HL1: 196	
Satellite Settings		HL2: 229		
Device Configuration		GNSS Board:		
NMEA Message		GNSS Model: BD990	GNSS Serial 5849C00250	
		GNSS BOOT Version: 5.38	GNSS Firmware Version: 5.37	
View Logs				
Configuration Set		Network:		
		NETWORK Model: EG25-G	IMEI: 867698040627468	
& Download	*	Firmware Version: EG25GGBR07A07M2G	Local IP:	
Raw Data		Network Provider: Undefined	Network Type:	
Raw Data		Signal Level: 0%	Protocol: NTRIP	
Backup Data		Caster Address: :	Mountpoint: E600131900007	
Management		UHF:		
		Radio Model: TRM501	Serial: TRM519050152	
		Firmware Version: G001.02.16Q	Channel: 1 [441.0000 MHz, L]	
		Radio Protocot TrimTalk 450S		



### 2.4 Working Mode

Configurate working mode: base, rover or static.

🖉 E800 Web UI	×	+			- 6	×
€ → C ☆ ③	Not secure	192.168.10.1/main.php?action=purge#	\$	入	<b>5</b> 1 ()	÷
E800 E8001319	00007				English -	A
-	~					
Status	•	System Mode	Static Rover Base			
Position		Current Datalink	UHF O Network O External O Bluetooth O Dual			
Datalink						
Satellites		Automatically Start Base	NO VES			- 1
Information		Data Type	RTCM3.2 *			
Settings	*	Site ID	111			
Working Mode		Pdop Threshold	3.00 [1-99]			
Satellite Settings		Base Position	Single      Repeat Position      SMARTBASE			
Device Configuratio	n					
NMEA Message		Record Raw Data	NO VES			
View Logs						- 1
Configuration Set		Radio Channel	1 * 441.0000 MHz Default Frequency			
A Download	*	Radio Protocol	TrimTalk 450S •			
Raw Data		Radio Protocol	TrimTalk 450S  Channel Spacing 25 IKHZI			-

### 2.5 Satellite Setting

Configurate the satellites to be used.

EB00 Web UI	×	+				-	ø	×
	D Not secure	192.168.10.1/main.php?action=purge#			\$		. 0	
E800 E800131	900007					E	nglish	
II Status	*	Cutoff Angle	5	* [0-45]				
Position		GPS	Enable      Disable					
Datalink		GLONASS	Enable  Disable					
Information		Beidou	Enable ① Disable					
© Settings	~	GALILEO	Enable      Disable     Enable      Disable					
Working Mode		Receiver Dynamic model	Kinematic      Static					
Satellite Settings		RTK Timeout	30	[1-300]				
Device Configurat	tion	Sav	Cancel					
View Logs								
Configuration Set								



#### 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.

EB00 Web UI	×	+			-	6	1
- > C Q (	Not secure	192.168.10.1/main.php?action=purge#		合	Л		0
E800 E8001319	900007					English	
II Status	*	Time Zone	GMT+8.00 •				
Position		Direct Link Mode	Disable •				
Datalink		Sensor	5Hz •				
Satellites		5-pin Serial Port Baud Rate	115200 •				
		Speaker	Enable Disable				
© Settings	*	Base Alert	Enable Disable				
Working Mode		Device Debug	Enable     Disable				
Satellite Settings Device Configuration	ion	Power on automatically when connected 5-pin cable	Enable     Disable				
NMEA Message		Network Enable	Enable  Disable				
View Logs		WIFI Hotspot Share Network	Enable  Disable				
Configuration Set		Static File Naming Way	RINEX 3.02      RINEX 2.11				
L Download	~	Save	Cancel				
Raw Data							

#### 2.7 NMEA Message

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

🕲 EB00 Web UI 🛛 🗙	+	6 )
← → C ① Not secure	2 192.168.10.1/main.php?action=purge#	n ()
E800 E800131900007		English -
🖬 Status 🛛 👻	Output Genaral	
Position	GGA: 1HZ Y ZDA: 1HZ GEDOP: Off Y	
	GSA: 1HZ * GSV. 5S * GEREF: 5S * GST: 1HZ * VTG: 1HZ * GESNR: 5S *	
Datalink	RMC: Off + GLL: Off + GEVCV: 1HZ +	
Satellites		
Information	External Port Output NMEA	
✿ Settings	Save	
Working Mode		
Satellite Settings		
Device Configuration		
NMEA Message		
View Logs		
Configuration Set		
🛓 Download 🛛 👻		
Raw Data		



#### 2.8 View Logs

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

EB00 Web UI	×	+				- 7	
	Not secure   1	92.168.10.1/main.php?action=pu	rge#			\$ A	Ð
E800 E8001319	00007						Eng
Status	*						
Position		View Logs					
Datalink		1. APP Log	Download	View			
Satellites		2. OS Log	Download	View			
Information							
O Settings	~						
Working Mode							
Satellite Settings							
Device Configuratio	n						
NMEA Message	_						
View Logs							
Configuration Set							
A Download	*						

#### 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.

	Carries -								M 📲 🌖
E800 E8001319	00007								English
Status	<								
Settings	*	Select	Name	Size (MB)	Antenna Height (m)	Start Time	End Time	Operati	JN
Working Mode		0	00073611.dat	0.001	1.800	2019-12-27 11:12:40	2019-12-27 11:12:41	Convert Download	Delete Edit
Satellite Settings		8	00073612.dat	0.007	1.800	2019-12-27 11:12:42	2019-12-27 11:12:47	Convert Download	Delete Edit
Device Configuratio	n	0	00073613.dat	0.062	1.800	2019-12-27 11:23:14	2019-12-27 11:23:40	Convert Download	Delete Edit
NMEA Message		8	selftest.log	0.001	121	2		Download	Delete
View Logs		Select	All Packag	Datate	Selected				
Configuration Set		obeu	All Pathay	Delete	secular				
Download	*								
Raw Data									
Backup Data									



#### 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.

🕑 E800 Web UI	×	+			- a ×
+ → C ① ①	Not secure   19	92.168.10.1/main.php?action=purge	*		🖈 📕 👦 😗 E
E800 E80013190	0007				English -
Status	٠.				
Settings	~	Select	Name	Size (MB)	Operation
Working Mode		Select All Package	Delete Selected		
Satellite Settings					
Device Configuration					
NMEA Message					
View Logs					
Configuration Set					
Ł Download	*				
Raw Data					
Backup Data					
Management					

#### 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.

🖉 E800 Web UI 🛛 🗙 -	+		– a >
← → C ☆ ③ Not secure   1	92.168.10.1/main.php?action=purge	* \$	d 🖪 📭 🚺 🗄
E800 E800131900007			English -
III Status			
	Install New Firmwa	re 9	
Settings	Choose File No file chosen		
Working Mode	under nu no ne eneren	Upload File	
Satellite Settings	Registration		
Device Configuration	Expire Date:	20200226	
NMEA Message	Expire Date: Function:	20200225 L1+L2_GPS+BelDou+Galileo.50Hz_TiltOn	
View Logs	AuthCode:		
Configuration Set	AuthCode:	Submit	
🛃 Download 🛛 👻			
Raw Data	RTX/XTRa License	Information	
Backup Data	RTX Start Date:	-	
Management	RTX Expiration Date:	88	
	XTRa Start Date: XTRa Expiration Date:	2019-04-15 2030-12-31	
	Security		
	Enable Login Authenticati	on	
	Old Password:		
	New Password: Confirm Password:		
	Change		
	Enable WIFI Connect Auth	entication The length of the wifi password must be greater than 7.	
	Change		
	sharge		
	Format Internal Disk	OK	
	Self Test	OK	
	Restore Factory Settings	OK	
	Reset	OK	
-			

# Our Sector Se

### 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





B: Pole height

# Our survey

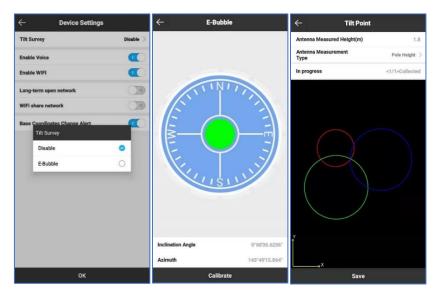
#### 3.5 Sensor

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.



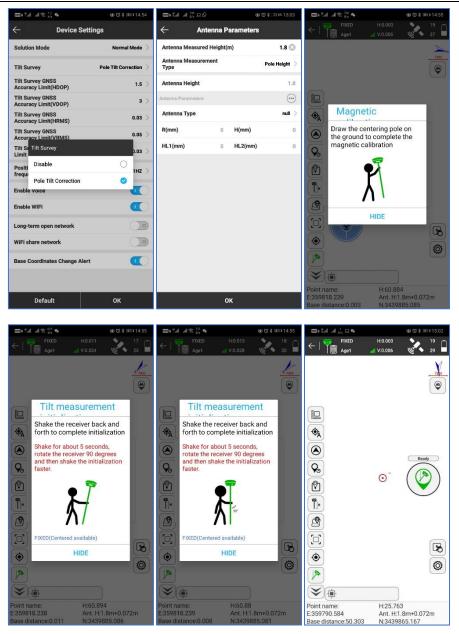
#### 3.5.2 MEMS Tilt Survey

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"

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### 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	0
PCC-GMSK	0
TrimTalk 450S	0
South 9600	$\bigcirc$
HiTarget 9600	0
HiTarget 19200	0
TrimMask III(19200)	0
South 19200	0
TrimTalk(4800)	0
GEOTALK	0
GEOMARK	0



## 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	D,				
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			۲				
9	Tray	1			0				
10	Warranty Card	1			breas Beneficial Control Automatic				

#### 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		Туре-С то Туре-С	D.				
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			٢				
9	Warranty Card	1			And a second sec				

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# 6. Technical Specifications

### 6.1 E800 (P40 Version)

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



### 6.2 E800 (BD990 Version)

GNSS		Channel Spacing	12.5 KHz / 25 KHz
Satellites Tracking	GPS: L1CA/L2E/L2C/L5 BDS: B1/82/83 GLONASS: L1CA/L2CA/L3 CDMA GALILEO: E1/E5a/E5b/E6/ALTBOC QZSS: L1CA/L1 SAIF/L1C/L2C/LEX NAVIC: L5 SBAS <sup>1</sup> : L1/L5 L DBC/DTY	Emitting Power	5 W
		Operation Range	8 ~ 10 Km typically 15Km with optimal conditions <sup>2</sup>
		Protocol	Satel, PCC, TrimTalk, TrimMark III, South, HiTarget
		Internet Modem	
Channels	L-Band: RTX 336	<ul> <li>Support Band</li> </ul>	Global GSM /WCDMA/LTE
Signal Reacquisition	<1 sec	-	
Cold Start	< 10 sec	- Communication	
Warm Start	< 10 sec	- Bluetooth	BT 5.0, BLE
Hot Start	< 10 sec	WIFI	802.11 ac/n(HT20)/a/b/g
RTK Signal Initialization	< 8 sec	SIM Card	Micro SIM card
Initialization Reliability	> 99.9%	 5-pin Port	Connect to external radio and power,
Update Rate	50 Hz standard, up to 50 Hz		NMEA output
Operation System	Linux	Type-C Port	Charge and internal storage access
Internal Memory	32 GB	TNC Port	Connect to internal radio antenna
Performance		Web UI	View status, update firmware, set up working mode, download data
renormance	H: 2mm + 0.1 ppm	Intelligent Voice	Broadcast working status
High Precision Static	V: 3mm + 0.4 ppm	NMEA Output	GGA, ZDA, GSA, GSV, GST, VTG, RMC, GLL, Binary
Static/Fast Static	H: 2.5mm + 0.1 ppm V: 3.5mm + 0.4 ppm	Correction Data	CMR, CMR+, RTCM2, RTCM3, RTCM3
RTK	H: 8mm + 1.0 ppm V: 15mm + 1 ppm	MEMS	Fast initialization, dynamic tilt survey up to $60^\circ$
Code Differential	H: 0.25 m V: 0.45 m	Physical	
SBAS	H: 0.3 m	Dimension	Φ154 mm x H76 mm
	V: 0.6 m	Weight	1.5 kg
	•	Screen	1.45" colorful touchable screen
Power Supply		<b>Operating Temperature</b>	-40°C ~ +65°C
Battery	Rechargeable and built-in Lithium-ion	Storage Temperature	<b>-45°</b> C ~ +80°C
	battery, 7.2 V ~ 13.6 Ah	_ Water/Dust Proof	IP67
Voltage	9~28 V DC	Shock	Survive a 2 m drop on concrete floor
	with over-voltage protection	<ul> <li>Vibration</li> </ul>	Vibration resistant
Working Time	Up to 15 hours	<ul> <li>Humidity</li> </ul>	Up to 100%
Charging Time	Typically 5 hours	<ul> <li>Indicators</li> </ul>	Satellites, datalink, battery, Bluetooth
Internal Radio		Button	Power button, short press to voice broadcast status
Туре	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 extrafee.

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.

# Survey

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.