TOPFLYtech SolarGuardX 100 GPS E-Lock

User Manual

20220329

Thanks for your purchasing of the high-quality GPS tracker from TOPFLYtech. Please read this user manual carefully before installation and operation. Information in this manual is the property of TOPFLYtech. Changes to the specifications and features in this manual may be made by TOPFLYtech without prior notice. No part of this manual could be reproduced, copied, translated, transmitted, or published in any form or by any means without TOPFLYtech's prior written permission.

SolarGuardX 100

The GPS E-Lock is using GNSS & LTE technologies and could collect device coordinates then transfer them via LTE network to the server. It provides customer with cost-effective, efficient and safety management. It has been widely used in commercial transportation, company vehicle fleet management, intelligent transportation, logistics, car rental, engineering machinery, marine transportation, animal/pet tracking and other segments.

Contents

1. Quick Reference

SolarGuardX 100

Attention

i. SolarGuardX 100 obtains power through sunlight to extend the battery life.

ii. Please make sure that the device is exposed to direct sunlight every day. This will be very useful to extend the battery life. If the device is not charged for more than three months, it may cause permanent damage to the internal battery.

iii. Please give the device a fully charging before installation.

iv. Only when the solar panel output voltage value is 0.3V higher than device battery voltage value, the solar panel will start to charge the battery. Otherwise, the solar charging will stop.

v. To ensure the battery life for longer period, please be careful to set the reporting intervals. Lower reporting rates will maintain the balance between the power consumption and gaining (from solar panel). We usually recommend set the tracker reporting ⩾every 5 mins when moving, and ⩾every 1 hour when standstill. Customer may also contact with TOPFLYtech for further advice.

Equipment power consumption and solar panel charging current

i. The normal device power consumption is around 40mAh when the device is in working mode without sleep.

ii. The typical charging rate of the solar panel under direct sunlight at noon (in summer) is about 330mAh (different sunlight illumination, different charging current).

Disclaimer: Before using this device, customers should fully understand their usage scenarios and installation environment. TOPFLYtech will not be responsible for any lost caused by using the device in a wrong scenario or reporting rate. It is highly recommended that customers should contact TOPFLYtech before deployment. We are glad to give suggestions.

Intelligent Power Management

To extend the battery life, we designed an intelligent power management algorithm. This algorithm allows the tracker working under a lower reporting rate when battery is low. Once the battery is charged back, the tracker will report as normal. This function is enabled in default. Customer can disable it by command. The detail working logic is:

- When the battery voltage value is down to 3.4V, then the tracker will report at every 24 hours no matter moving or standstill.
- When the battery is charged back to 3.5V, the device will report as what are set by customer.

FOTA (firmware over the air) Notification

TOPFLYtech is committed to providing clients with the best user experience. We are offering automatic firmware update feature for every device. This feature allows devices always having the latest version firmware. It can save clients the time and effort of updating firmware manually. Please note that this feature is enabled in default. If you want to turn it off, please contact with TOPFLYtech. If this feature is disabled, the FW update only can be done by sending upgrade command manually.

2. Product Specifications

Network Specifications	
Operating Band	LTE FDD Cat M1: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/ B20/B25/B26/B28/B66/B85 LTE FDD Cat NB2: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/ B25/B28/B66/B71/B85 GSM/EDGE: 850/900/1800/1900MHz
Data Transmission	eMTC: Max. 588 (DL), Max. 1119 (UL) NB1: Max. 32Kbps (DL), Max. 70Kbps (UL) NB2: Max. 127 (DL), Max. 158.5 (UL) EDGE: Max. 296Kbps (DL), Max. 236.8Kbps (UL) GPRS: Max. 107Kbps (DL), Max. 85.6Kbps (UL)
GNSS Specifications	

GNSS Chipset	MediaTek High Gain GNSS receiver
GNSS System	GPS+Glonass or GPS+Beidou
Receiver type:	33 tracking / 99 acquisitions- channel GNSS receiver
Sensitivity	Cold start: -149 dBm Tracking: -167 dBm
Horizontal Position Accuracy	< 2.5m CEP
TTFF @ -130 dBm with (without) EASY™	Cold Start: < 15s (32s) Warm Start: < 8s (28s) Hot Start: < 1s (1s)
Interfaces	
Charging Port	2 Pin 5V/DC
E-Lock Configuring Port	Type-C connector
Network, GNSS Antenna	Internal only
Indicator LED	Battery, Network, GNSS, RFID
FOTA	Yes
Physical Power Switch	1
Temperature Sensor	1 temperature sensor
BLE 5.1	Yes
General Specifications	
Waterproof	IP67
Dimensions	207.5mm*110.2mm*48.1mm(8.17"*4.39"*1.9")
Weight	1050g (37oz)
Battery	Rechargeable Li-Polymer 14400 mAh/ 3.6V
Standby Time (Without solar charging, 2 hours active tracking per day)	10 minutes reporting: 402 Days 5 minutes reporting: 315 Days 1 minute reporting: 144 Days
Charging	2 PIN (Recommend using 5V 1A adaptor, 30 hours charging)
Operating Temperature	-25℃ ~ +70℃ (-13°F ~ 158°F)
Mounting	Built-in Magnet
Air Interface Protocol	
Transmit Protocol	TCP, UDP, MQTT, SMS
Data Security & Encryption Option	MD5/ AES256
BLE Accessory Support	Yes
Scheduled Timing/angle/distance Report	Report position and status at preset intervals
Geo-fence	Support up to 64 internal geo-fence regions
Alarms	Rope cut, Moving, Stop, Lock, Unlock
Industry Certifications (Planning)	
CE, RCM, IC, FCC, PTCRB, AT&T, US Cellular, T-Mobile, Verizon	

3. Standard Accessories Introduction

4. LED indicator

Note: Indicator lights will go out automatically after the tracker turns on for 70 seconds without connecting to the external power via USB cable.

LED indicator working status:
Solid on: LED indicator on and no flashing
Fast flashing: 0.25 second on and 0.25 second off
Slow flashing: 1 second on and 1 second off

Unlock: Unlock successfully, RFID LED indicator will show **solid on** until plug out the lock rope. If

the rope isn't taken out in 60 seconds, device will lock again, and LED indicator goes off.

Lock: After lock successfully, RFID LED indicator will be **fast flashing** for 2 seconds then off.

Wake up the device: Device gets the wake up info, RFID LED indicator will show **slow flashing** 300 seconds or get the unlock command from server side then switch to unlock process.

Incorrect RFID Card or Correct RFID Communication Error: Network & GNSS & RFID LED **Fast flashing** 5 seconds.

Lock Error: Network & GNSS & RFID LED on (The maximum duration of continuous light is 300 seconds then off or the error disappear) – This is mechanical failure.

Unlock Error: GNSS & RFID LED on (The maximum duration of continuous light is 300 seconds then off or the error disappear) – This is mechanical failure.

5. Installation Guide

5.1 SIM card pre-installation note

5.1.1 SIM card data service should be enabled.

5.1.2 If SIM card is locked via PIN, please unlock it first.

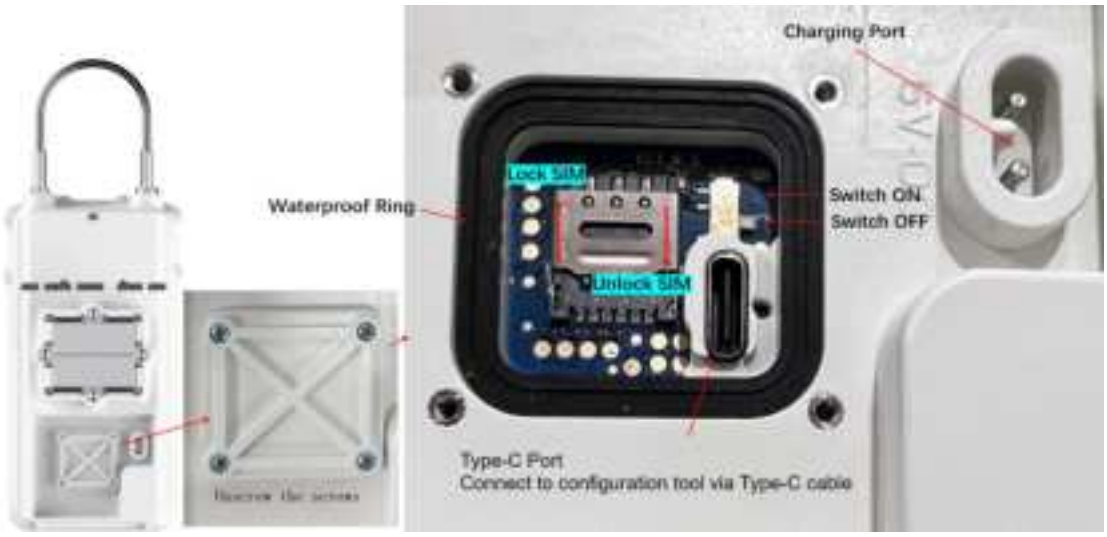
5.1.3 Ensure there is sufficient balance in the SIM card.

5.2 SIM card installation and tracker power switch

5.2.1 Open the tracker SIM card cover with the screwdriver.

5.2.2 Unlock SIM cover and insert sim card then lock. Turn the power switch from off to on.

5.2.3 Put the cover back and use screwdriver to fix the cover tightly.



5.3 Fix Screws

5.3.1 It is **VERY IMPORTANT** to fix the 4 SIM card cover screws to prevent water from leaking inside and cause damage to device.

5.3.2 TOPFLYtech offers the electric screwdriver (TA38) as an optional accessory to help customer standardize the screw fixing strength.

5.3.3 Please use **strength level 8** if using TOPFLYtech electric screwdriver (TA38)

5.3.4 For third party electric screwdriver, please use torque 3.5kgf.cm.

5.4 Installation

5.4.1 Away from emission source such as all kinds of sensors, burglar alarm and other communication devices.

6. Tracker Operation

6.1 Physical power on or off

6.1.1 Turn the power switch to on or off position.

6.1.2 Physical power off is recommended when the tracker is stored in the warehouse.

6.2 The battery

6.2.1 Place the tracker solar panel side on the desk

6.2.2 Recommend connecting the device to a 5V 1A (cellphone) adaptor through magnet USB cable for 30 hours charging to make sure the battery is fully charged.

6.2.3 Customer also can connect the tracker to other USB connectors. But lower current output will cause longer charging time.

6.2.4 When the battery voltage value drops to 3.3V, usually a battery charging is needed to avoid unexpected shutdown due to low power. If the battery runs out completely, please keep the tracker charging for 24 hours first. Only when the battery is charged to 3.5V, the device will power on again.

6.3 Get Current Position

6.3.1 SMS Query (only when the device in working mode and registered on the network) Device default PIN is 0000. Send a location inquiry SMS command (google,0000#) to the tracker. The location information will be sent back through SMS (the tracker SIM card must support receiving and sending SMS first).

6.3.2 Platform Query

Connect your tracker to the tracking platform then check the real-time position online. (Additional tracking service charge may happen. Contact with your service provider to get more details)

7. Alarm Configuration

Alarm configuration please via the TOPFLYtech configuration tool.

8. Quick Trouble Shooting

8.1 Unable to Connect to the Tracking Platform

8.1.1 Check the APN and IP settings.

8.1.2 Check the SIM card data service whether enabled.

8.1.3 Make sure there is no limitation or already added server IP to the SIM card IP whitelist when using a M2M SIM card.

8.1.4 Check the balance/data of the SIM card.

8.2 Tracker Shows Offline

8.2.1 Check the battery remaining power

8.2.2 Check if the device entered into network blind area.

8.2.3 Check the SIM card balance.

8.2.4 If the connection lost happens on the last several days of the month, check whether the network service is terminated by carrier because of exceeding the max data usage volume.

8.3 Unable to Locate

8.3.1 The device may shield by metallic things.

8.3.2 The device may enter into an area with no satellite signal coverage. (Underground, building, etc)

8.4 Position Drift

In an area with poor GNSS signal (like the areas with lots of high buildings), position drift may happen. When the device moves to open area, the drift will no longer exist.

8.5 No Command Reply

8.5.1 Check the command format. Make sure it's correct.

8.5.2 The device may be in network blind area.

8.5.3 Ensure the SIM card is properly inserted.

9. Warranty and Stock

The device standard warranty period is 12 months starting from the date of purchasing. If the device will be stored for a long time, please connect it to the external power and recharge the internal battery (20 hours) every 3 months. It will be helpful to extend the internal battery life.

10. Frequently Used Commands

Commands are not case-sensitive and can be sent via mobile phone. The content is separated

by comma and ends with #. When set successfully, the tracker will return OK and execute it. Otherwise, there will be no message returned.

Function	Command Format
Unlock	**Unlock,***Unlock PIN*#
APN Setting	**APN,***Current PIN*,*APN Name*,*Username*,*Password*#
Server Setting	**IP,***Current PIN*,*Server Domain Name or IP*,*Port Number*#
Upload Interval Setting	**TIMER,***Current PIN*,*Upload Time(ACC on)*:*Upload Time(ACC off)*:*Angle Compensation*:*Distance Compensation*#
Heartbeat Setting	**HBT,***Current PIN*,*Heartbeat Interva*#
PIN Setting	**PASSWORD,***Current PIN*,*New PIN*#
Google Map Search	**GOOGLE,***Current PIN*#
Forgot the PIN	**MYSELF#**

10.1 Unlock Setting

Unlock,*Unlock PIN*#

Unlock PIN:

Range: 6 numbers

Length Limit: 6

Note: The unlock PIN is different from device PIN

10.2 APN Setting

APN,*Current PIN,APN Name,Username,Password#*

APN Name:

Range: APN of service provider

Length Limit: 1~32

Username:

Range: Letters and Numerals

Length Limit: 0~32

Password:

Range: Letters and Numerals

Length Limit: 0~32

Note:

1) Tracker will return “SET APN OK” when received this command.
2) If there is no Username and Password, the SMS setting is:
   APN,Current PIN,APN Name,,#
3) If there is no APN PIN, the SMS setting is:
   APN,Current PIN,APN Name,Username,#

10.3 Server Setting

IP,*Current PIN,Server Domain Name or IP,Port Number#*

Server Domain Name or IP:

Range: Letters, Numerals and Symbols

Length Limit: 1~128

Port Number:

Range: Positive Integer

Length Limit: 0~65535

Note: Tracker will return “SET IP OK” when received this command.

10.4 Upload Interval Setting

TIMER,*Current PIN,Upload Time(ACC on):Upload Time(ACC off):Angle Compensation:Distance Compensation#*

Upload Time (ACC on):

Range: Positive Integer

Range Limit: 0, 3~65535 second

Upload Time (ACC off):

Range: Positive Integer

Range Limit: 0, 1200~ 4294967295 second

Angle Compensation:

Range: Positive Integer

Range Limit: 0~90 degrees

Distance Compensation:

Range: Positive Integer

Range Limit: 0 ~ 65535 meters

Note: Tracker will return “SET TIMER OK” when received this command.

10.5 Heartbeat Setting

HBT,*Current PIN,Heartbeat Interval#*

Heartbeat Interval:
Range: Positive Integer
Range Limit: 1 ~ 255 minutes
Default: 30 minutes

Note: Tracker will return "SET HBT OK" when received this command.

10.6 PIN Setting
PASSWORD,*Current PIN,New PIN#*

PIN:
Range: Letters and Numerals
Length Limit: 1 ~ 10
Default: 0000

Note: Tracker will return "SET PASSWORD OK" when received this command.

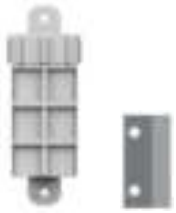
10.7 Google Map Search
GOOGLE,*Current PIN#*

Note: Tracker will return below message when received this command.
http://maps.google.com/maps?q=<Latitude>, <Longitude>

10.8 Forgot the PIN
MYSELF#
Note:
1) If the manager phone number has been set, only the manager can use "MYSELF#". If no manager setting, the tracker will return the IMEI and current PIN when it received "MYSELF#" from any mobile phone.
2) This command can be used to retrieve password.

11. Optional Accessories List

Product Sku	Description	Photo for Reference
TSTH1-B	BLE 5.0 Wireless Temperature and Humidity Sensor	

TSDT1-B	BLE 5.0 Wireless Door and Temperature Sensor	
TSR1-B	BLE 5.0 Wireless Relay	
TR021	Lock Rope (400mm)	

12. FCC Warning

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.

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

Caution!

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IMPORTANT NOTICE:

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

13. ISEDC Warning

This device complies with Innovation, Science, and Economic Development Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d' Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil nedoit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device is compliance with RF exposure guidelines, users can obtain Canadian information on RF exposure and compliance.The minimum distance from body to use the device is 20cm.

Le présent appareil est conforme Après examen de ce matériel aux conformité ou aux limites d'intensité de champ RF, les utilisateurs peuvent sur l'exposition aux radiofréquences et la conformité and compliance d'acquérir les informations correspondantes. La distance minimale du corps à utiliser le dispositif est de 20cm.

