TRK2XX

Initiation Manual

NB-IOT / LTE-M / EGPRS Low Power Tracker

Rev. TRK2XX V0.9

Date: 2019-10-17

For any assistance please contact:

Email: info@accent-systems.com

For more information or technical support please visit:

https://accent-systems.com/support/

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HISTORY

Revision	Date	Description
TRK2XX V0.1	2019-04-18	Initial
TRK2XX V0.2	2019-05-06	Added battery warnings. Minor changes in support email.
TRK2XX V0.3	2019-07-29	Added mandatory FCC and CE statements
TRK2XX V0.4	2019-07-31	Added caution message in battery warnings and changed FCC distance to 30 cm
TRK2XX V0.5	2019-09-12	Added “How TRK210 and TRK230 work” and “How to use TRK devices”
TRK2XX V0.6	2019-10-03	Added warning in “FCC exposure warning” and updated “How to use TRK devices” and “How TRK210 and TRK230 work”
TRK2XX V0.7	2019-10-07	Updated “How to use TRK devices”, added transmission intervals
TRK2XX V0.8	2019-10-15	Updated “How TRK210 and TRK230 work”
TRK2XX V0.9	2019-10-17	Added “Device duty cycle” in FCC statements

1. Summary

2. Steps to initiate the device

1. **Get a Micro SIM Card (3FF).**

   · Needed information (from your operator):

   - MCC and MNC.
   - IoT-NB band ; GSM band ; LTE-M band.
   - APN configuration (APN user, password, APN context type, APN authentication method.

2. **Insert the SIM Card.** Shown in point 6, page 9.

   Opening and closing of the device shown in point 5, page 8.

3. **Download Inmolecular TRK APP.** Shown in point 12, page 14

4. **Set the connection settings.** Shown in point 12, page 14

5. Set the advanced settings. Shown in TRK2XX Advanced Configuration Manual.

(The annexed file)

3. Introduction

TRK2XX series are a family of low power tracker devices conceived to have very long battery life without recharging or replacing the batteries. This document is a guide to set up and maintain TRK2XX devices.

TRK2XX family is composed of 2 models, TRK210 and TRK230. TRK210 is a non rechargeable and provides an outstanding long battery life. TRK230 is a rechargeable battery model that provides a very flexible TRK that is possible to recharge using a standard micro USB cable.

4. Device specifications

- Bluetooth Low Energy interface for configuration and indoor navigation
- WiFi scanner for WiFi based location services 802.11bgn
- GPS+Glonass
- Multitechnology communications module NB-IOT + LTE-M + GPRS.
- Multiband
  - NB-IOT: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28
  - LTE-M: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28/B39
  - GPRS 850/900/1800/1900MHz
- Micro SIM (3FF) SIM card slot
- Temperature sensor
- Accelerometer for movement and shock detector
- RGB led indicator
- Non-rechargeable battery for TRK210 model, capacity 7800 mAh
- Rechargeable battery for TRK230 model, capacity 1500 mAh
- Operating temperature from -20ºC to 50ºC for TRK230
- Operating temperature from -40ºC to 85ºC for TRK210

5. How TRK210 and TRK230 work

TRK210 and TRK230 devices are a low power devices that wake up every a fixed interval to perform a GPS location/WiFi location. WiFi location is operated in client mode, scanning nearby Wi-Fi network to have the location information as a sniffer.

When the localization information is collected the device sends this information to the cloud platform using some of the cellular communication technologies that the device have, the technology used (GPRS,NB-IOT or LTE-M) is selected in function of the availability of it in each country. To improve the location capabilities of the device the BTS CELL ID is also sent to cloud platform in order to have a coarse location of the device in case that no GPS or WiFi networks data available.

The cellular transmission interval to report data to cloud can vary for once every 8 minutes up to once every 1440 minutes.

6. How to use TRK devices

TRK devices are very easy to use, just put one device among your goods and let the device track them.

The following advises will help you to extract the better performance of TRK2XX devices:

- Is recommended to stick the device to some flat surface of your goods or goods container using the back side 3M sticker.
- TRK210 and TRK230 have a long battery life, but is recommended to charge the battery before the to use it.
- The device could transmit data cloud platform at maximum rate once every 8 minutes and up to once every 1440 minutes. The transmission time could take 20 seconds, all other time the device is in flight mode. If the device is not moving, the device detects this inactivity and remains in flight mode to save battery.
- To improve the GPS performance is recommend to put the device in some place that could have vision of the sky, avoiding metallic parts between the device and the sky. In case that is not possible the device have a powerful GPS amplifier that helps to get GPS signal in the most adverse conditions.
- This device is not suited to track people.

7. Back cover removal

Removal of the back cover is necessary when a SIM card needs to be inserted or in the specific case of TRK210, when the batteries need have to be replaced. To do that unscrew the 4 HEX bolts. To unscrew the bolts a 1.5mm HEX key is required.

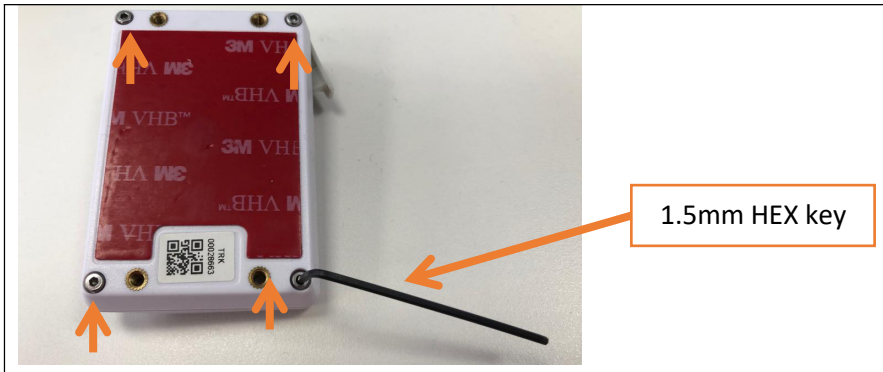


Figure 1 - TRK back cover bolts position.

The steps to reinstall the back cover are:

1. Check the back cover position against the top part of the TRK device. See Figure 2 for more details of correct alignment.

2. Before to close check that the o-ring seal is in the correct position. The o-ring have to be placed all over the TRK top part edge.

3. Place the back cover over top part and screw the 4 HEX screws.

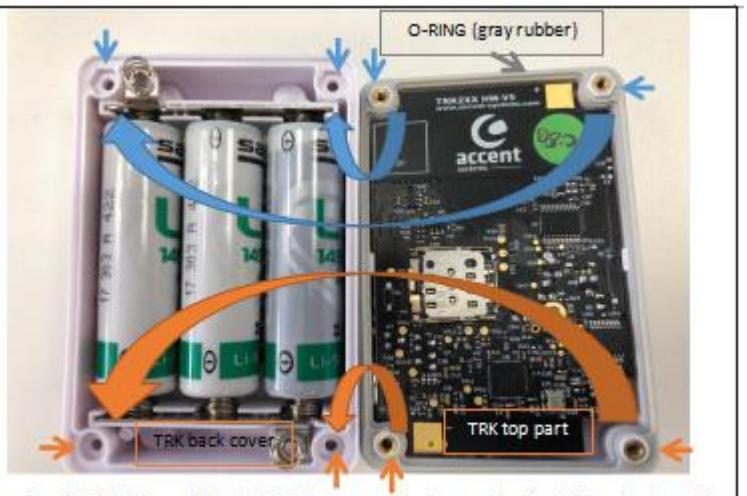


Figure 2 - TRK210 (also valid for TRK230) upper and bottom parts align before to close. Blue arrows show hexagonal shapes ⏲, orange arrows for circular shapes ⌀.

8. SIM card installation

TRK2XX series uses cellular technology to communicate with cloud based platform. To enable this communications is mandatory to insert a SIM card. The steps to install a sim card are:

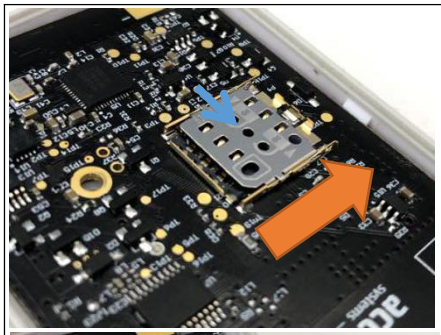
1. Remove back cover as described in the section number 3 of this document.

2. Open SIM card holder as is shown in the figure 3.

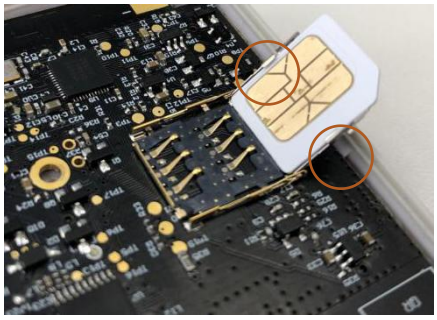
3. Insert a Micro SIM (3FF) in the SIM card holder.

4. Close SIM card holder as is shown in the figure 3.

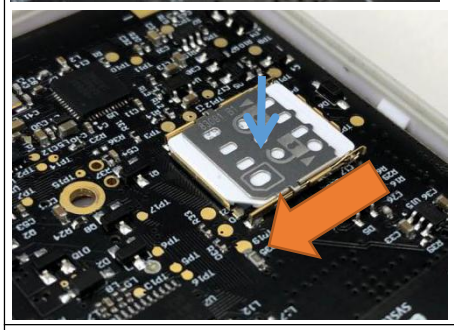
5. Reinstall the back cover as is explained in the section 3 of this document.



Slide metallic SIM card holder hinge (market with blue arrow) to the direction of orange arrow.



Insert the SIM card into the guides of the hinge.



Close the hinge making pressure over it in as is indicated by the blue arrow and sliding in the direction of orange arrow.

Figure 3 - SIM card installation

9. Battery installation (only for TRK210 model)

For the TRK210 model, the steps to replace the batteries are:

1. Remove back cover as described in the section number 3 of this document.

2. Ensure to use Saft LS14500 or compatible 3.6 V Primary lithium-thionyl chloride battery. If any doubt please contact Accent Systems.

3. Use the same batch batteries, do not mixed used batteries with new ones.

4. Insert the batteries in the correct position as is shown in figure 4.

Figure 4 - TRK210 battery compartment with the batteries in the right position. Blue arrows mark positive pole and orange arrows mark negative pole.

10. Battery recharging (only for TRK230 model)

For TRK230 the steps to recharge batteries are:

1. Open USB lid

2. Insert a Micro USB plug. The power supply current have to be 2 A.

3. Refer to section 7 of this document to know the battery charge status via RGB LED.

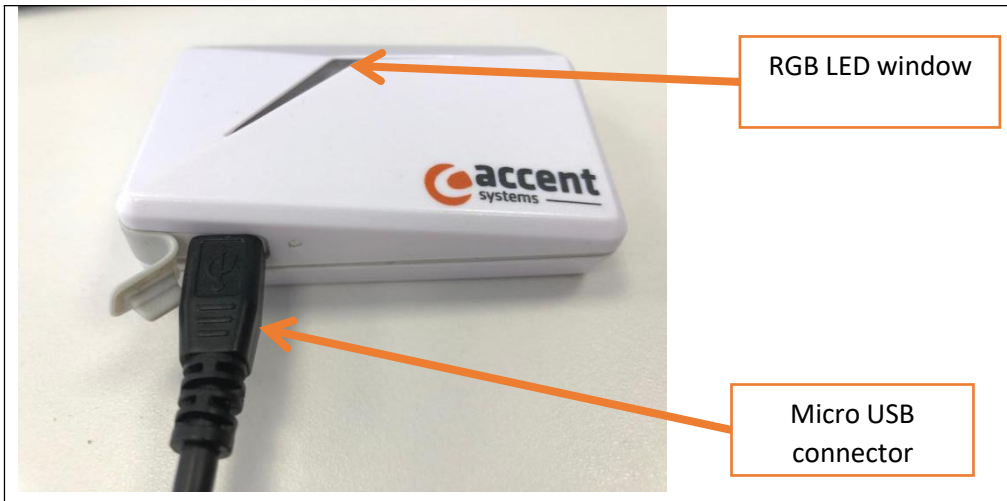


Figure 5 - TRK230 recharging

BATTERIES SAFETY WARNINGS

• Caution: Risk of explosion if the battery is replaced by an incorrect type (for TRK210)

• Do not disassemble or open, drop (mechanical abuse), crush, bend or deform, puncture, or shred.

• Do not modify or remanufacture, attempt to insert foreign objects into the battery, immerse or expose to water or other liquids, or expose to fire, excessive heat including soldering irons, or put in microwave oven.

• Only use the battery with a charging system specified by the manufacturer/supplier.

• Do not short-circuit a battery or allow metallic or conductive objects to contact both battery terminals simultaneously.

• Dispose of used batteries promptly according to the manufacturer/supplier's instructions.

• Improper battery use may result in a fire, explosion, or other hazard.

• Battery usage by children should be supervised.

- Maintain the device between the operating temperatures specified in this manual to keep the battery in safe conditions.
- Do NOT Disposal the device into fire or hot oven, mechanical crushing or cutting, that can result in an explosion.
- Leaving the device in an extremely high temperate surrounding environment that can result in an explosion or leakage of flammable liquid or gas.

- A battery subject to extremely low air pressure (low air pressure at high altitude) that may result in a explosion or the leakage of flammable liquid or gas
- WARNING: Never attempt to open the battery for any reason. If battery case is cracked or damaged, do not insert into charger. Do not crush, drop or damage battery.

11.Human interfaces

The TRK2XX devices have three different elements to interact with the user. The different elements are:

- Button(SOS button): the first time that the TRK is on is used to perform the the key provisioning with the TRK. After it is used to report SOS function to the Inmolecular platform.

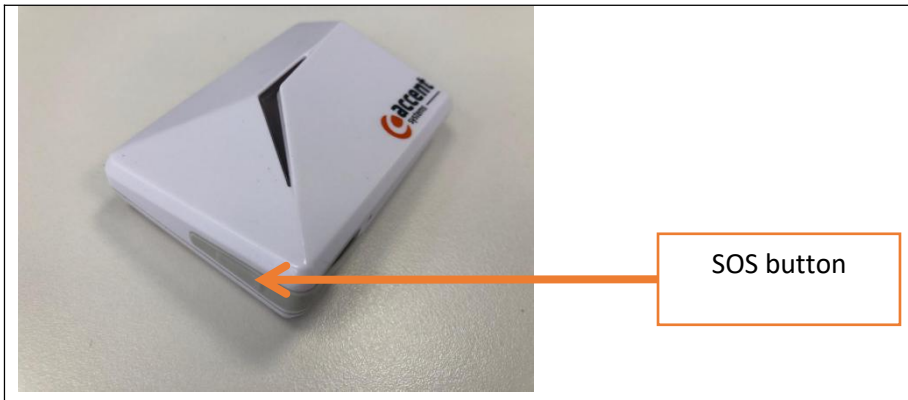


Figure 6 - Button position

- Buzzer: every time that the button is pressed there is feedback from the buzzer to indicate to the user that the button is being pressed.
- RGB LED: is used to indicate to the user various states:
  - Blinking blue normal mode, just to indicate the correct behaviour of the TRK device.
  - Blinking red: low battery, less than 10%.
  - Blinking yellow: battery charging
  - Static green: battery fully charged.
- Additionally in the autotest process, the possible led state indication could be.
  - Blinking yellow: autotest in process, it only happens the first time that TRK powers ON.
  - Static wait during two seconds: attaching to network failed

- Blink green: sharing keys in process.

12. Autotest and key provisioning

Autotest and key provisioning is a process that is only carried the first time that TRK starts in order to check all the peripherals and exchanges the secret keys with Inmolecular platform. This feature is only present on the firmware version TRK V1.2019-04-9.0 and the following ones. Fore more info contact Accent Systems.

13. Inmolecular

Inmolecular by Accent Systems is the name of cloud platform that manages and collect all the information that TRK devices send. Fore more information visit http://www.inmolecular.com

14. TRK2XX connection configuration

TRK2XX parameters could be configured using a Smart phone compatible with Bluetooth Low Energy 4.1. To configure the TRK Accent Systems provides the APP for Android and iOS devices. This section explains how to set the communications between TRK2XX device and Inmolecular platform.

APP for IOS

https://itunes.apple.com/app/inmolecular-trk/id1451476916?mt=8

APP for Android

https://play.google.com/store/apps/details?id=com.accent_systems.Inmolecular

With anyone of the above mentioned APPs is possible to fully configure the TRK2XX devices. The basic configuration only comprises the different parameters to set up the configuration to Inmolecular platform.

The steps to perform the connection configuration of the TRK are the following ones:

1. Download and install Inmolecular TRK APP.

2. Login in the APP, this step is only needed the first time. If do not have login details, contact Accent Systems.

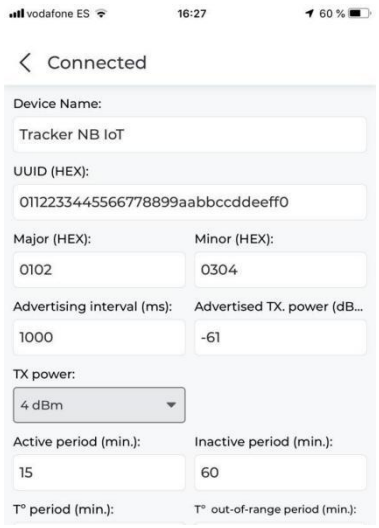
3. Click the icon  on the top left part of the screen.

4. Click “Trackers“ menu

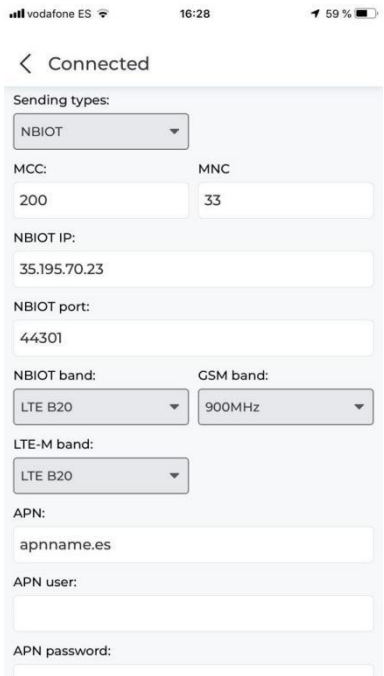
5. Put the device to configure close to the mobile phone.

6. Click Over the device that you want to connect.

7. A connection process starts and finish when appears the following screen



8. Scroll down “Sending types:” label. Here is the starting point of communications configuration.



The parameters to set are the following ones:

- Sending types: used to set the between all the possible technologies that the TRK2XX has: NB-IOT, LTE-M and GPRS or a combination of them.
- MCC and MNC: this values are provided by the operator. In the next firmware versions it will be possible to set it to automatic.
- NBIOT IP: is the IP address of Inmolecular platform, have to be 35.195.70.23
- NBIOT port: is the listen port of Inmolecular platform have to be 44301
- NBIOT band, GSM band and LTE-M: the device have multiple bands to operate depending on the operator infrastructure. Please, contact with your network operator to know exact bands operation for your TRK. Multiple choices could be used, but we recommend to only the ones that your SIM card allows.
- APN configuration: contact your network operator / SIM card provider to know your APN configuration.

With all the parameters in place, the TRK will report information to Inmolecular platform. To identify the TRK inside your Inmolecular dashboard, please check the QR code on the bottom of your TRK device.

Figure 10 - QR code and Inmolecular platform TRK serial number matching

15. TRK2XX advanced configuration

TRK2XX series advanced configuration depends on the firmware version. Please refer to TRK2XX Advanced configuration manual.

16.Accent Systems Support

Contact support@accent-systems.com

17.FCC

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.

FCCID: 2ABTTTRK230

FCC statement

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.

NOTE: Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

RF exposure warning

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

The device contains FCC IDs: XMR201707BG96 & 2AC7Z-ESPWROOM02

This device has NOT to be used to track people, do NOT attach it on human body.

Device duty cycle

The device minimum interval between two events of cellular data transmission is 8 minutes, the maximum interval is 1440 minutes, this boundaries can not be overridden by customer because the device's firmware controls these limits.

The worst case scenario for duty cycle calculation is that the device sends information using The transmission time every 8 minutes takes 20 seconds, for this reason the duty cycle is:

$$DutyCycle = \frac{20s}{60\frac{s}{\min}\cdot 8\min} = 0.0417$$

18.CE-RED statements

There are no restrictions of use.

Frequency bands and maximum transmitted power

LTE

Frequency	Max
LTE-FDD B1/B2/B3/B4/B5/B8/B12/B13/B18 /B19/B20/B26/B28	23dBm±2dB
LTE-TDD B39	23dBm±2dB
GSM850/GSM900	33dBm±2dB
DCS1800/PCS1900	30dBm±2dB
GSM850/GSM900 (8-PSK)	27dBm±3dB
DCS1800/PCS1900 (8-PSK)	26dBm±3dB

Bluetooth

PWR = up to 4 ± 1 dBm

WiFi

802.11b +20.5dBm±1dB

802.11g +16.5dBm±1dB

802.11n +13.5dBm±1dB

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