LW001-BG PRO

APP Guide

MOKO TECHNOLOGY LTD.

CONTENT

1 About this Manual

The purpose of this manual is to outline how to use MKLoRa APP for LW001-BG PRO.

2 MKLoRa APP

For the detailed operation of the MKLoRa app to configure and read device information, please refer to the following instructions:

2.1 Install MKLoRa APP

User can get the APP download link by search "MKLoRa" in your phone APP store: Please allow Bluetooth to be enabled during the installation process. This APP communicates with the device via Bluetooth, and it only supports above android 4.4 and IOS 9.0 system.

Note: After the successful installation of the APP, the APP will request some mobile phone permissions, such as Bluetooth access permissions. Please click "OK", otherwise the APP will not work well.

2.2 Connect to LW001-BG PRO

After the device is turned on, the device Bluetooth will start broadcasting. Open the MKLoRa APP and choose LW001-BG PRO, then you can search the LW001-BG PRO device by click the refresh icon. The default broadcast name of the device: LW001-BG PRO-XXXX.

The Edit Filter at the top can help user filter the keywords and RSSI. RSSI ranges from -100dBm to 0dBm;
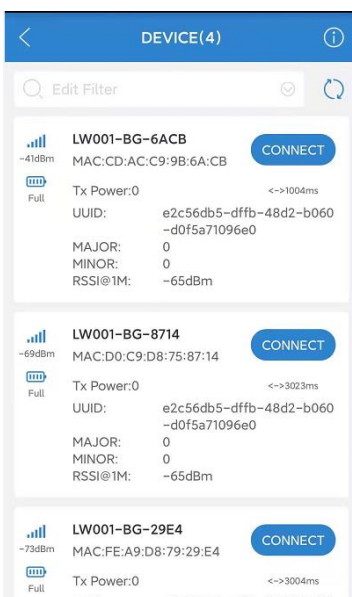
After the device is turned on, the device Bluetooth will start broadcasting. Open the MKLoRa APP and choose LW001-BG PRO, then you can search the LW001-BG PRO device by click the refresh icon. The default broadcast name of the device: LW001-BG PRO-XXXX.

The Edit Filter at the top can help user filter the keywords and RSSI. RSSI ranges from -100dBm to 0dBm;

Note: If a password is not entered within one minute, the login box will disappear, you should click "CONNECT" again.

Note: If there is no action within 3 minutes after login, the system will automatically login out.
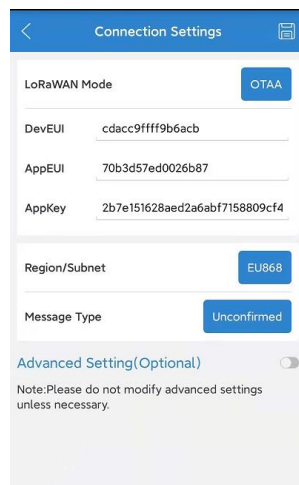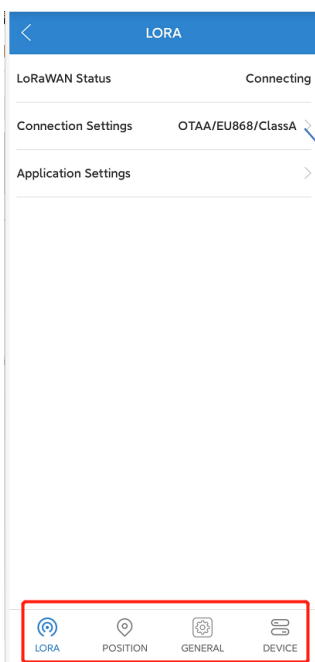
2.3 Configure LW001-BG PRO Parameters
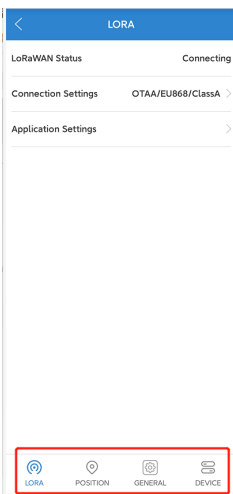
When you log into the device successfully, you will enter the main page. There are four parts of the parameter configuration: LORA, POSITION, GENERAL and DEVICE.

2.3.1 LORA Parameters

In this page, you can configure parameter for LoRa Part:

In the connection settings page, we can get and configure the LoRaWAN Mode, DevEUI, AppEUI, AppKey, DevAddr, AppSKey, NwkSKey, Region/Subnet, Message Type.

Click the Advanced Setting (Optional) button, you can set some advanced parameters:

CH: Channel Setting, Generally, the default value is fine.

Duty-Cycle: It is only used for EU868, CN779, EU433 and RU864. The default is off.

DR for join: It is only used for CN470, CN779, EU433, EU868, KR920, IN865, RU864. DR selection for Join Request of OTAA mode.

Uplink Strategy:
Option1: ADR on, ADR mechanism following the standard protocol stack.

Option2: ADR off, if the Transmissions are 2, device will use the two set DRs to send payload once each, If the two DRs are the same, the data is sent twice with this DR.

Option3: ADR off, if the Transmission is 1. The device will choose the DR to send the payload within the set DR range, and will try to ensure that the time taken to send the payload is the same every time.
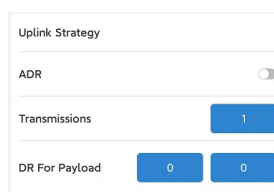
Note: If the data length of the current payload exceeds the transmission capacity of the selected DR, it will automatically make the DR plus one
Note: Please do not modify advanced settings unless necessary.
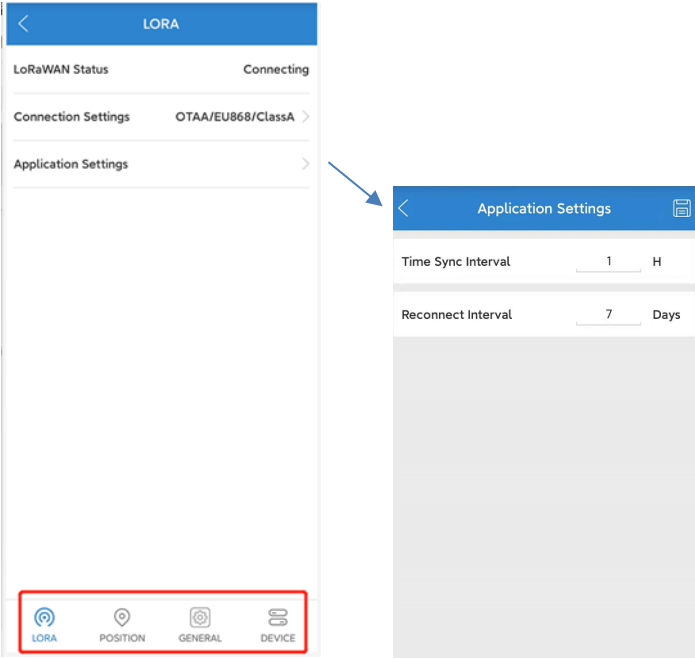
Time Sync interval: It is used to sync the device time via mac command.

The default value is 1, means that the device's time will be synchronized every 1 hour via LoRaWAN MAC commands.

0 means disable.
The value ranges from 0 -254H.

Reconnect interval: The device will periodically reconnect to the network.
The value ranges from 0 -30 days, 0 means disable.

2.3.2 POSITION Parameters

In this page, you can configure parameter for POSITION Part:

2.3.2.1 WIFI Fix
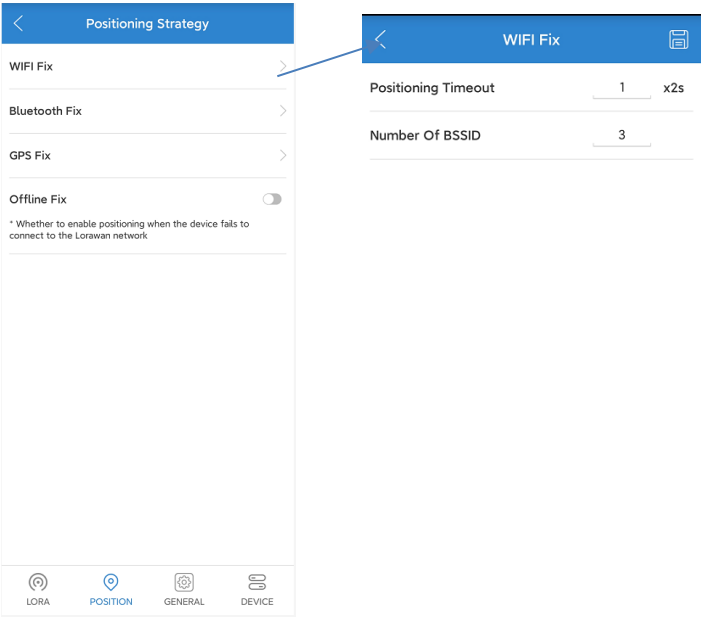
Positioning Timeout:
WIFI positioning maximum scan time.
The value ranges from 1 -5, that is 2s - 10s.
The default is 2s.

Number of BSSID: Number of devices required for successful WIFI positioning.
The value ranges from 1 -5.
The default is 3.

2.3.2.2 Bluetooth Fix

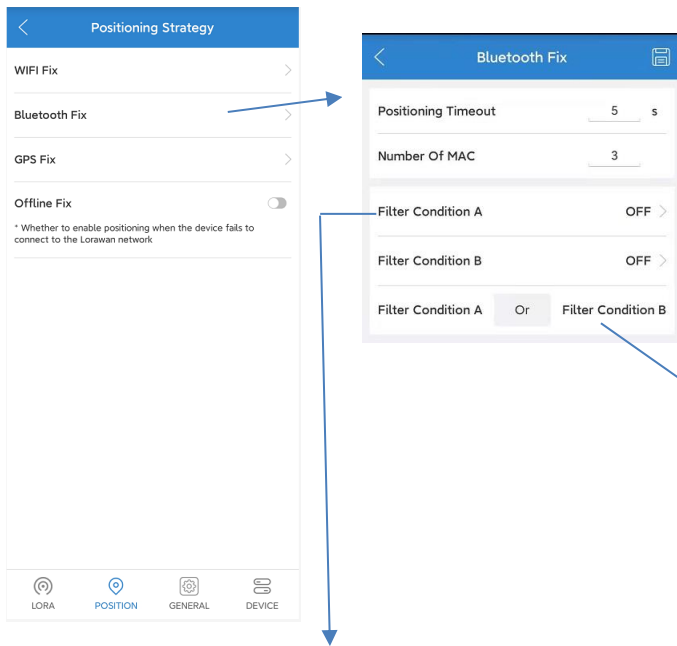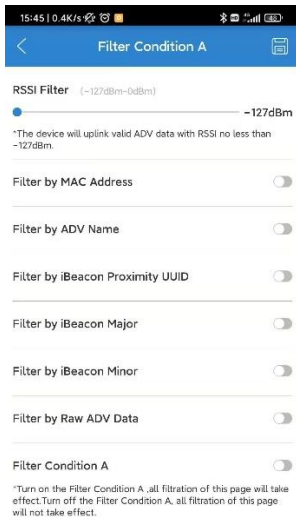**Positioning Timeout:**
Bluetooth positioning maximum scan time.
The value ranges from 1s -10s.
The default is 5s.

Number of MAC: Number of devices required for successful Bluetooth positioning.
The value ranges from 1 -5.
The default is 3.

The relationship between Location Beacon Filter Condition A and Location Beacon Filter Condition B can be set OR or AND.

RSSI Filter: The default value is -127 dBm, the range of this value is from -127dBm to 0 dBm. For example, if user set this value to -100dBm, the device will store valid ADV data which's RSSI is bigger than -100dBm.

Whitelist: Checking this box means reverse filter.

Filter by MAC Address: The default status is off. When we click the button on the right, the status will be on and user can edit the Keyword that include part or all of MAC Address. The device will store valid ADV data that meets the filter content. For example, the Filter content is AA BB and whitelist is open. Suppose there is a beacon whose MAC is CC AA BB DD EE FF, then it does not meet the filter content and will not be saved and uploaded

Filter by ADV Name: The default status is off. When we click the button on the right, the status will be on and user can edit the Keyword that include part or all of ADV name. The device will store valid ADV data that meets the filter content.

Filter by iBeacon Proximity UUID: The default status is off. When we click the button on the right, the status will be on and user can edit the Keyword that include part or all of UUID. The device will store valid ADV data that meets the filter conditions.

Filter by iBeacon major: The default status is off. When we click the button on the right, the status will be on and user can set the min value and max value of iBeacon Major. Both of these values range from 0-65535, and the max value must be no less on the min value. The device will store valid ADV data whose major value meets the scope requirements.

Filter by iBeacon minor: The default status is off. When we click the button on the right, the status will be on and user can set the min value and max value of iBeacon Minor. Both of these values range from 0-65535, and the max value must be no less on the min value. The device will store valid ADV data whose minor value meets the scope requirements.

Filter by Raw ADV Data: The default status is off. When we click the button on the right, the status will be on, and it can add five different filter data types in total when click "+", each with a length of 5 to 33 bytes.
Data Type: 1byte, the data type value should meet Bluetooth Generic Access Profile. Data type definitions please refer to https://www.bluetooth.com/specifications/assigned-numbers/generic-access-profile/.

Byte: the byte range under the data type, the max value is 62 bytes, the maximum byte range difference is 26.

Raw data field: the length should match with the byte range.

2.3.2.3 GPS Fix
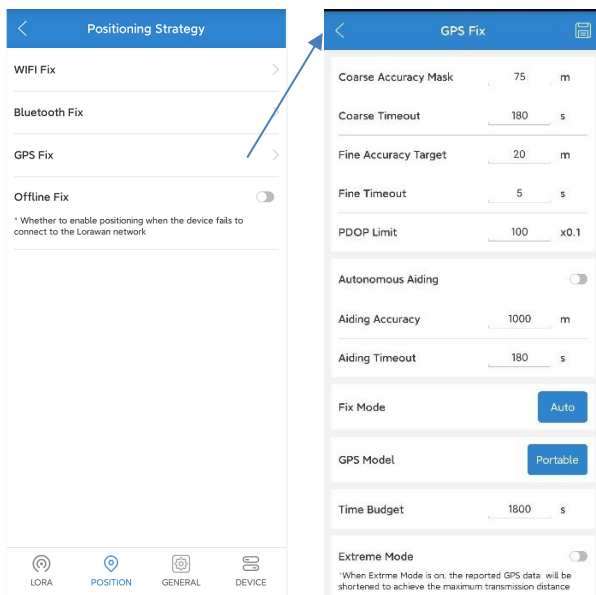
Coarse Accuracy Mask: This is the required position accuracy for a position fix to be considered valid. It provides a lower bound on accuracy. Please note that it works on the estimated accuracy, and it is not uncommon for position fix errors to occasionally be two or three times larger than the mask. Also note that values lower than 20 will be difficult to achieve in practice. The value ranges from 5m -100m.The default is 75 meters.

Coarse Timeout: The maximum time to spend waiting for the GPS to get a coarse position fix, per attempt. This limits the battery drain if there is no GPS signal. Values lower than 60 are likely to be problematic in practice, with 35 being an absolute minimum in very good signal. This setting is augmented by the GPS signal validator described in GPS Detect Time below. Note that the first fix attempt after battery insertion will always try for at least 10 minutes, regardless of any configured limits. If a fix times out the fix failed flag will be set and a message with the last known coordinates will be sent. The value ranges from 1s - 7620s. The default is 180s.

Fine Accuracy Target: This is the target accuracy for the GPS Fine Timeout setting. Note that values lower than about 6 are not reliably achievable with consumer GPS technology, and will lead to the full GPS Fine Timeout elapsing on each fix attempt. The value ranges from 5m -100m. The default is 20 meters.

Fine Timeout: The maximum time to spend waiting for the GPS accuracy to improve, after a coarse fix is achieved. Once the GPS manages to get a fix satisfying the minimum accuracy targets (Pos Acc Mask below), it waits up to GPS Acc Timeout for the accuracy to improve to GPS Acc Target. This allows you to set an opportunistic accuracy goal, and fall back to a lower accuracy if the goal can't be met. Zero disables the feature. The value ranges from 0s -7620s. The default is 5 seconds.

PDOP Limit: The PDOP is a measure of how imprecise a GPS fix is, due to the satellites used being too close together to triangulate effectively. This parameter sets an upper bound on the imprecision, for a fix to be considered valid. You can safely use the default value, and specify the Coarse Accuracy Mask instead. The value ranges from 2.5 -10. The default is 10.

Autonomous Aiding: This enables a GPS feature that predicts future satellite movements, so that position fixes can proceed without listening for all of the satellite information the next time the satellite is in view. It can help fixes succeed in low signal levels, but greatly decreases the accuracy of the fixes. The default is off.

Aiding Timeout: The maximum time to spend waiting for the GPS to get a coarse position fix via Autonomous Aiding, per attempt. The value ranges from 1s -7620s. The default is 180s.

Fix Mode: GPS positioning mode selection. It can set to 2D, 3D or Auto. The default is Auto.

GPS Model: This informs the GPS module of what sort of motion to expect from the asset, allowing it to make better estimates when moving. The Automotive setting is a safe default, but the Pedestrian and Stationary settings may be useful as well. Setting the model appropriately allows the GPS to filter out noise more effectively. The default is Portable.

Time Budget: This setting allows you to set a daily GPS on-time budget. When non-zero, the device will refuse to spend more than this number of total seconds per day trying to get GPS fixes. This prevent the battery being run down if a lot of unforeseen movement occurs. Once the budget for the day is expended, further GPS fixes and LoRaWAN transmissions are skipped. The default is zero, which disables the feature. The value ranges from 0s -76200s. The default is 1800s.

Extreme Mode: When Extreme Mode is on, the reported GPS data will be shortened to achieve the maximum transmission distance. The default is off.
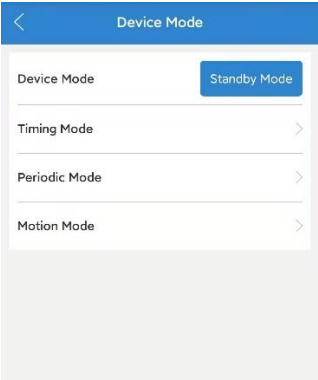
2.3.3 GENERAL Settings

In this page, you can configure parameter for general settings:
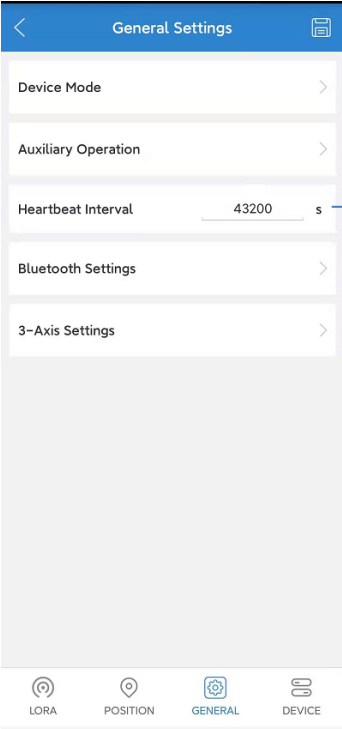
Heartbeat Interval: The Report interval of heartbeat payload. The value ranges from 300s -86400s. The default is 43200s.

2.3.3.1 Device Mode Settings

Device Mode: Users can choose different working modes according to different application scenarios. It can be set to standby mode, periodic mode, timing mode or motion mode. The default is standby mode.
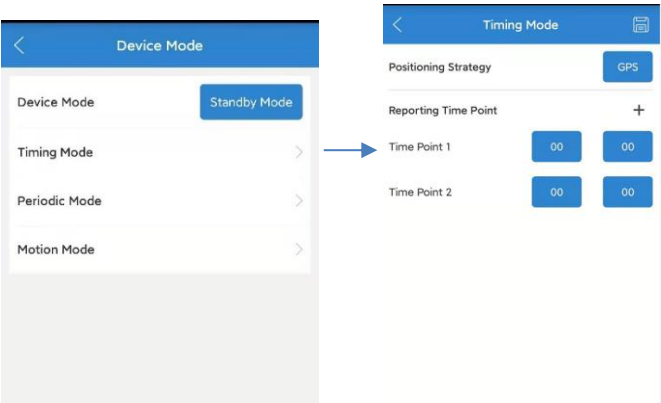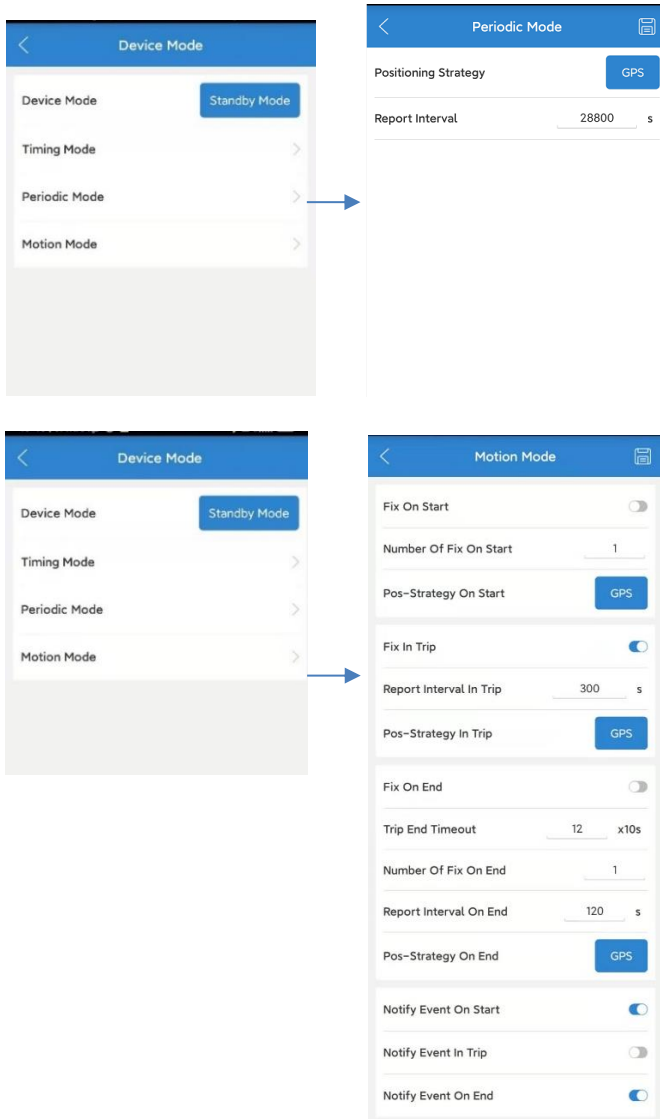
Positioning Strategy: Position strategy selection in Timing mode, the default is GPS.

Report Time Point: Reporting time point setting, up to 10 groups can be set, every 15 minutes for a time point.

Click on the + sign to add a set of time points.

Swipe your finger left to right on the mobile screen to delete a group of time points.

Positioning Strategy: Position strategy selection in periodic mode, the default is GPS.

Report Interval: Location payload reporting interval in periodic mode. The value ranges from 300s -86400s. The default is 28800s.

Fix on start: Whether the beginning of the movement requires positioning. The default is off.

Number of fix on start: Number of times positioning data is reported at the start of the movement. The value ranges from 1 -255. The default is 1.

Pos-Strategy on start: Position strategy selection during the start of the movement. The default is GPS.

Fix in trip: Whether in the movement requires positioning. The default is off.

Report interval in trip: Location payload reporting interval in the movement. The value ranges from 10s - 86400s. The default is 300s.

Pos-Strategy in trip: Position strategy selection in the movement. The default is GPS.

Fix on end: Whether the end of the movement requires positioning. The default is off.

Trip end timeout: The time threshold for judging the motion stop, when the device does not move in N seconds continuously, the device is considered to enter the end of movement. The value ranges from 3 -180, the unit is 10s. The default is 120s.

Number of fix on end: Number of positioning at the end of movement state. The value ranges from 1 -255. The default is 1.

Report interval on end: Location payload reporting interval at the end of movement state. The value ranges from 10s -300s. The default is 120s.
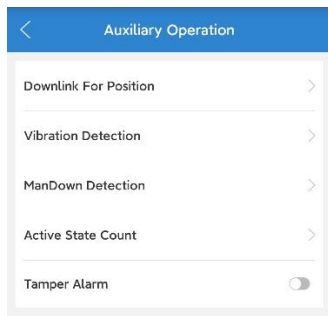
Pos-Strategy on end: Position strategy selection at the end of movement state. The default is GPS.

Notify event on start: Event message can be sent when the preset moving trigger condition (Motion Threshold & Motion Duration) is reached. The default is on.
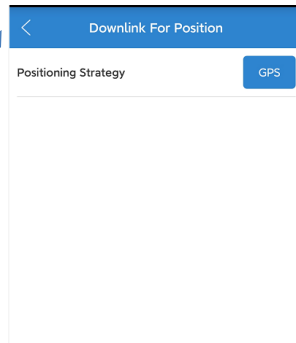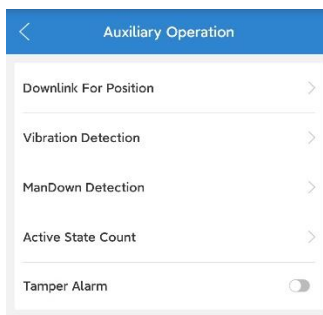
Notify event in trip: When the device is in movement, Event messages can be sent whenever the device starts positioning. The default is off.

Notify event on end: Event message can be sent when the device come into End of movement state. The default is on.
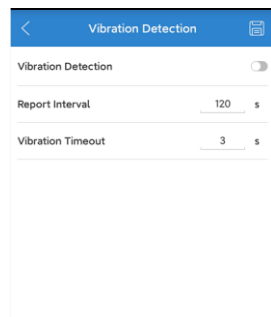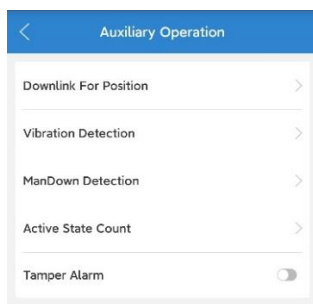
2.3.3.2 Auxiliary Operation Settings

Tamper Alarm: The switch for the Tamper alarm function. The default is off.

Positioning Strategy: Position strategy selection in *Downlink For Position* function, the default is GPS.

Vibration Detection: The switch for the vibration detection function. The default is off.

Report Interval: Reporting interval of vibration payloads. The value ranges from 3s -255s. The default is 120s.

Vibration Timeout: The number of vibration timeout time, if the device is in continuous vibration, each N second is counted as one vibration. The value ranges from 1s -20s. The default is 3s.
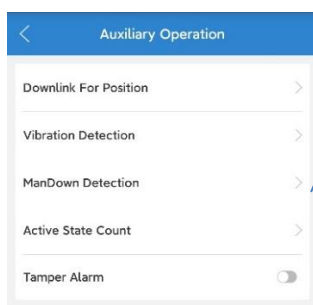
Man Down Detection: The switch for the Man Down detection function. The default is off.

Idle Detection Timeout: If the duration of the stationary time exceeds idle detection timeout, the device will be considered to enter the idle state. The value ranges from 1H -8760H. The default is 168H.

Idle Status: Users can reset the idle status through the APP
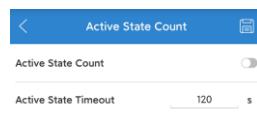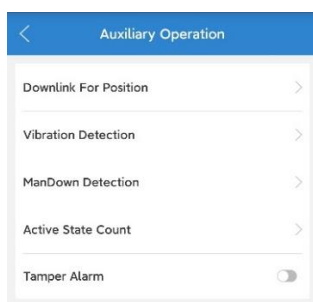
Active State Count: The switch for the active state count function. The default is off.

Active State Timeout: Whenever the state of the LW001-BG PRO changes stationary to motion, the activity count will be increased by one. One or more moves within Activity State Timeout will be judged as one activity, and Activity State Timeout can be set according to different application scenarios.

2.3.3.3 Bluetooth Settings
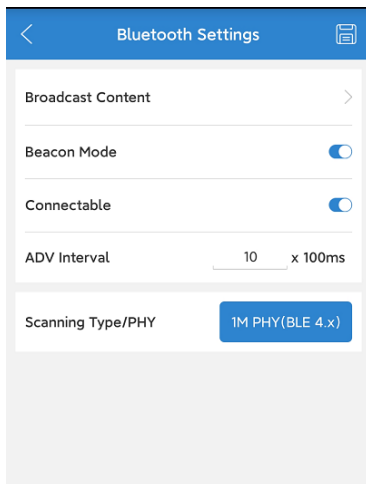
**Beacon Mode:** The device can be set to beacon mode or configuration mode. The default is off.

Connectable: When the device is in beacon mode, the user can select the connectable state or the unconnectable state.

ADV interval: When the device is in beacon mode, user can set Bluetooth broadcast interval. The value ranges from 1 -100. The default is 10, the unit is 100ms.

Scanning Type/PHY: It can be set 1M PHY (BLE 4.X), 1M PHY (BLE 5), 1M PHY (BLE 4.X + BLE 5) or Coded PHY (BLE 5).
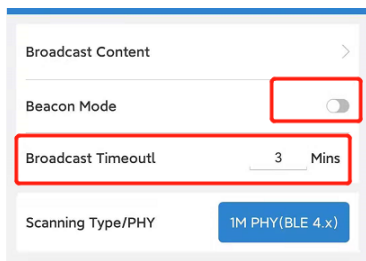
Broadcast Timeout: When the device is in configuration mode, the time of each broadcast. The value ranges from 1min - 50 mins. The default is 3 mins.

2.3.3.4 3-Axis Settings
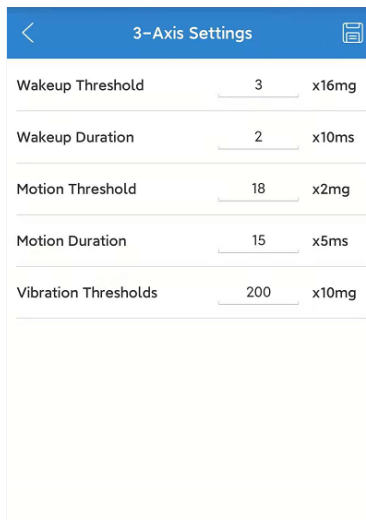
Wakeup Threshold: The wake-up threshold of the tri-axis function will automatically increase the sampling frequency when the tri-axis is woken up. The value ranges from 1 - 2, the unit is 16mg. The default is 48mg.

Wakeup Duration: The device will be woken up when the motion reaches the wake-up threshold and lasts for a period of time. The value ranges from 1 - 10, the unit is 10ms. The default is 20ms.

Motion Threshold: Judgment threshold for device motion. The value ranges from 10 - 250, the unit is 2mg. The default is 36mg.

Motion Duration: When the device motion reaches the motion threshold and lasts for a period of time, the device is considered to be in motion. The value ranges from 1 - 50, the unit is 5ms. The default is 75ms.

Vibration Threshold: When the vibration amplitude of the device reaches this value, the device is considered to be in vibration.

2.3.4 DEVICE Settings
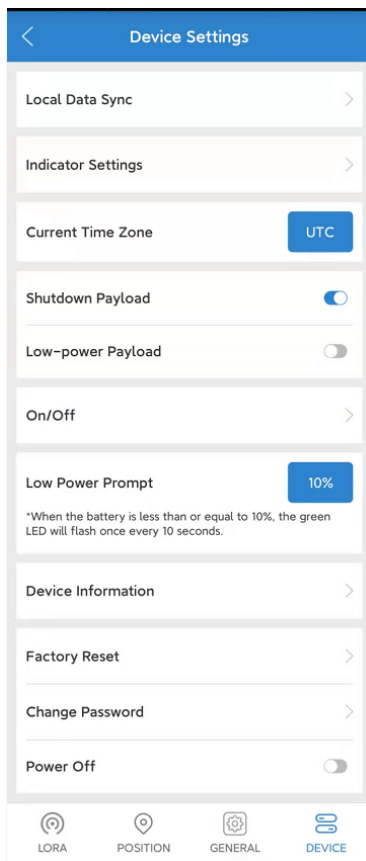
Current Time Zone: Selection of the time zone in which the current device is located. The value ranges from UTC-12 to UTC-12. The default time zone is UTC.

Shutdown Payload: Whether to report shutdown payload when the device turns off. The default is on.

Low-power Payload: Whether to report heartbeat payload when the device enters low power.

Change password: User can change the login password of MKLoRa APP.

Power off: Power off: User can use the APP to shut down the device.
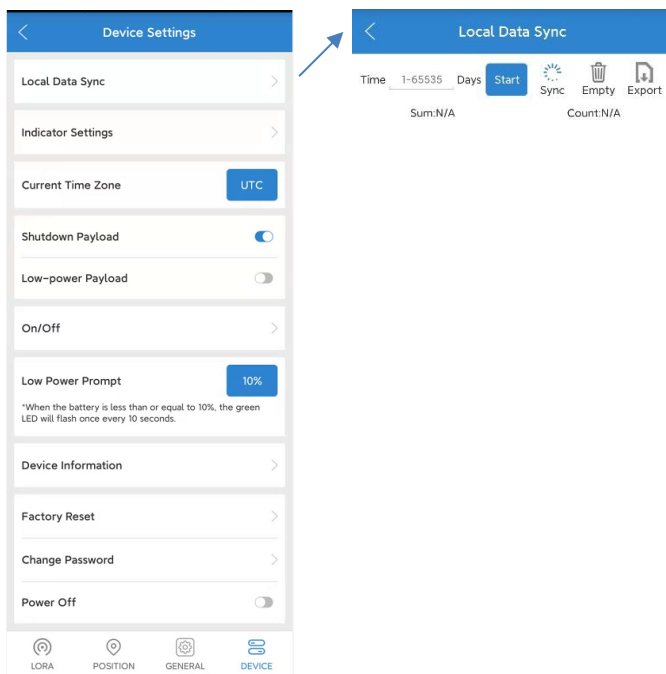
Local Data Sync: Users can read the last 1 to 65,536 days of stored data.
After selecting the number of days, click Start, and the device will automatically read the data, and the Sync icon will rotate continuously. Users must manually click the Sync icon to stop data synchronization, and when the value of sum appear, it means that the data is synchronized completely.

After the data is synchronized completely and click the Sync icon to stop data synchronization, the user can delete and export the data.

Device Settings

- Local Data Sync
- Indicator Settings
- Current Time Zone — UTC
- Shutdown Payload
- Low-power Payload
- On/Off
- Low Power Prompt — 10%
  *When the battery is less than or equal to 10%, the green LED will flash once every 10 seconds.
- Device Information
- Factory Reset
- Change Password
- Power Off

LORA POSITION GENERAL DEVICE

Indicator Settings

- Tamper
- Low-power
- In WIFI Fix
- WIFI Fix Successful
- Fail To WIFI Fix
- In Bluetooth Fix
- BT Fix Successful
- Fail To BT Fix
- In GPS Fix
- GPS Fix Successful
- Fail To GPS Fix

Indicator settings: LED indication of various status, user can choose to turn off and on, default is both on

Device Settings

- Local Data Sync
- Indicator Settings
- Current Time Zone — UTC
- Shutdown Payload
- Low-power Payload
- On/Off
- Low Power Prompt — 10%
  *When the battery is less than or equal to 10%, the green LED will flash once every 10 seconds.
- Device Information
- Factory Reset
- Change Password
- Power Off

LORA POSITION GENERAL DEVICE

On/off Settings

- Off By Magnet
- Default Mode — OFF
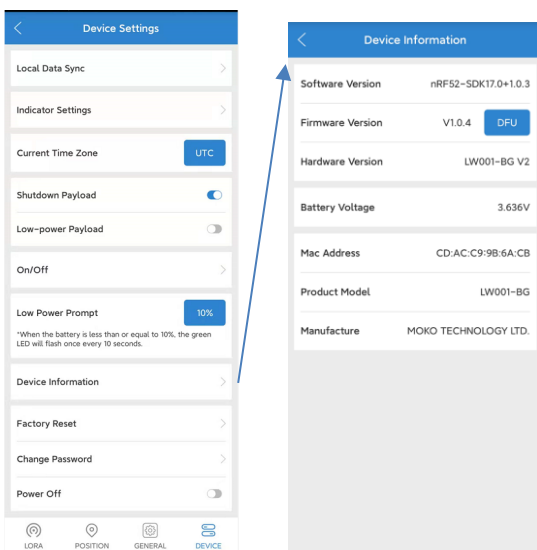 *Default Operating mode after the device is repowered

Off by magnet: Can the device be shut down by a magnet. The default is on.

Default Mode: Which mode the device is in after the battery is re-charged or replaced.

- ➢ OFF: Configure LW001-BG PRO to turn off, after the battery is replaced.
- ➢ Revert to last mode: Configure LW001-BG PRO to return to last working mode it was in, after the battery is replaced.

The default is OFF.

Device Settings

- Local Data Sync
- Indicator Settings
- Current Time Zone — UTC
- Shutdown Payload
- Low-power Payload
- On/Off
- Low Power Prompt — 10%
  *When the battery is less than or equal to 10%, the green LED will flash once every 10 seconds.
- Device Information
- Factory Reset
- Change Password
- Power Off

LORA POSITION GENERAL DEVICE

Device Information

Software Version	nRF52-SDK17.0+1.0.3
Firmware Version	V1.0.4 DFU
Hardware Version	LW001-BG V2
Battery Voltage	3.636V
Mac Address	CD:AC:C9:9B:6A:CB
Product Model	LW001-BG
Manufacture	MOKO TECHNOLOGY LTD.

Update Firmware (DFU): To update the firmware via the DFU should use the upgrade package that MOKO provides with ZIP format. If you use an android phone, place the ZIP file of firmware upgrade package into the phone folder, select the upgrade package file from the OTA page of the APP, and click to upgrade.

IOS phones need to share the upgrade package file with MKLoRa via computers and iTunes tools. and then select the upgrade package file from the OTA page of the APP, and click to upgrade.

3 Revision History

Version	Description	Editor	Date
1.1	Suitable for firmware version V1.0.4	Allen	2021-09-08

3 Revision History

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