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**ZigBee™- Dimmer Light Switch**

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# User Manual

**Dimmer Light Switch**

**Model: Z311H**

**Firmware:V4.0**

**Hardware:V1.1**

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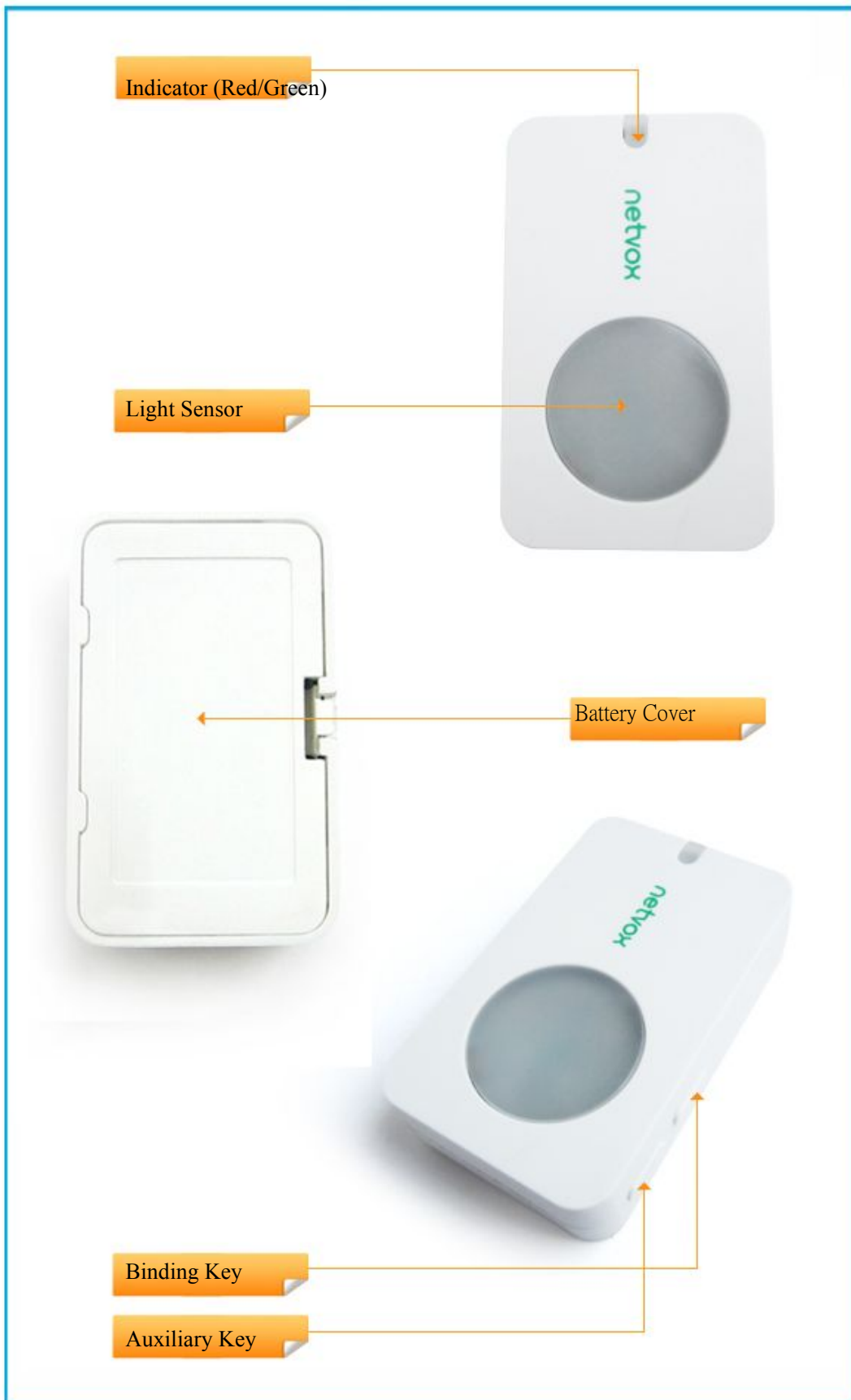
## 1. Introduction

Netvox Z311H, a dimmer light switch, acts as an End Device in ZigBee network. It does not perform permit-join function as a coordinator or a router for other devices to join the network. According to the brightness level detected by Z311H, it sends the light-level-control command to the ZigBee network to turn the light on and control the light level for remaining the room light intensity. The light sensitivity can be adjusted by user.

### *What is ZigBee?*

ZigBee is a short range wireless transmission technology based on IEEE802.15.4 standard and supports multiple network topologies such as point-to-point, point-to-multipoint, and mesh networks. It is defined for a general-purpose, cost-effective, low-power-consumption, low-data-rate, and easy-to-install wireless solution for industrial control, embedded sensing, medical data collection, smoke and intruder warning, building automation and home automation, etc.

## 2. Product Appearance



### 3. Specification

- Fully IEEE 802.15.4 compliant
- Utilizes 2.4GHz ISM band; up to 16 channels
- Power supply: 2 x CR2450 button cell batteries. 715 days battery life\*
- Operating consumption:  $\leq 43\text{mA}$
- Standby consumption:  $\leq 0.8\mu\text{A}$
- Sensing level range: 1~3000 lux
- Sensing accuracy: Natural light:  $\pm 5\% @ 1\sim 600\text{ lux}$ ;  $\pm 10\% @ 600\sim 1000\text{ lux}$

Energy saving lamp:  $\pm 10\% @ 1\sim 1000\text{ lux}$

Filament lamp:  $\pm 5\% @ 1\sim 600\text{ lux}$ ;  $\pm 11\% @ 600\sim 1000\text{ lux}$

At a certain calibration environment, it can not adapt to another environment. Under different light sources, it is required to be calibrated

- Up to 70 meters wireless transmission range in non-obstacle space
- Easy installation and configuration

*\* Battery life may vary based on operating conditions.*

### 4. Installation

- Remove the battery cover, insert the batteries, and then mount the cover to complete the installation.
- Do not aim the sensor to the light/lamp which Z311H controls.

## 5. Setting up Z311H

### 5-1. Turn On/ Turn Off Z311H

Under the circumstances Z311H is first time used or after resetting, when it is powered on and cannot successfully search a network, Z311H will go into [turn-off mode](#).

To manually turn on or turn off Z311H, please use the following instructions:

- A. **Turn it on:** Press the *Binding Key* once. The indicators will flash **red once**, and the device is ready to be used.
- B. **Turn it off:** Press the *Binding Key*. The indicator will flash 10 times within 5 seconds. Press the *Binding Key* again **within the 10 flashes** to turn the device off.

### 5-2. Join the ZigBee Network

After Z311H is turned on, it will search for an existing ZigBee network and send a request to join the network automatically. While Z311H is under the coverage from a coordinator or a router whose **permit-join feature is enabled**, Z311H will be permitted to join the network.

- Step1. Enable the permit-join function (valid for 60 seconds) of a coordinator or a router (please refer to the user manual of the coordinator or the router to enable the permit-join feature).
- Step2. Turn on Z311H. It will start trying to search and join the network for 3 times.
- Step3. The indicator will flash **green 5 times** after it is joined successfully. Otherwise, the indicator will not flash.

### 5-3. Binding

To make Z311H work with the ON/OFF (0x0006) /Level Control (0x0008) device such Z903, users need to bind the two devices:

- Step1. Press and hold the *Binding Key* for 3 seconds to broadcast the binding request. The indicator will flash **red once**.
- Step2. Within 13 seconds, enable the binding feature of the ON/OFF/Level Control device.
- Step3. The indicator flashes **red 5 times** after the binding is completed; otherwise, it flashes **red 10 times**.

### 5-4. Sleeping Mode

Z311H is designed to go into sleeping mode for power-saving in some situations:

- A. While the device is in the network → the sleeping period is 5 minutes; it will wake up every 5 minutes to keep online.
- B. When it doesn't find a network to join → Z311H will go to sleeping mode. It will wake up every 15 minutes to search a network to join.
- C. Once Z311H was joined to a network and by any chance the network is no longer existed or the device is out of the network → Z311H will wake up every 15 minutes to find the network it joined before.

It never keeps in sleeping mode and continues to find out a network every 15 minutes. This condition would consume up to 30 times power spending compared to normal-operating status. To prevent this unwanted power consumption, we recommend that users remove the batteries to power off the device.

### 5-5. Wake up Z311H

When users would like to setup or acquire data from the device which is in sleeping mode, we have to wake up the device as the following steps:

- Step1. Press and hold both *Binding Key* and *Auxiliary Key*.
- Step2. Until the indicator flashes **red twice**, release both buttons.
- Step3. The indicator will flash **5 times** while broadcasting.

### 5-6. Battery

When the operating voltage is lower than 2.1V, the indicator will flash **red once** per hour. Z311H will send a low-power report to the ZigBee network.

### 5-7. Change the Light Detection Interval

Z311H detects the light level every 5 minutes by default after binding. Users can switch the detection interval to 5-minute or 2-second. There are 2 methods to switch the light detection interval:

- A. Using netvox ZigBee application ZiG-BUTLER (please refer to Chapter 7).
- B. Through the *Auxiliary Key*. Press and hold the *Auxiliary Key* for 3 seconds to switch the interval.
  - The indicator flashes **red once** → Z311H is in 2-second interval
  - The indicator flashes **red 3 times** → Z311H is in 5-minute interval

### 5-8. Light Sensitivity

After Z311H joins the ZigBee network, it will detect the surrounding brightness level right away and send the command once. The light level which Z311H can detect is 1~3000 lux. It is divided into 8 levels. The default settings of illuminance ranges are:

- Level 0 → {0, 33}

- Level 1 → {42, 52}
- Level 2 → {65, 80}
- Level 3 → {90, 109}
- Level 4 → {123, 151}
- Level 5 → {168, 206}
- Level 6 → {228, 279}
- Level 7 → {311, --}

Users could adjust the settings for light level through netvox ZigBee application ZiG-BUTLER (please refer to Chapter 7). The values of the 2 levels are better not too close to prevent frequent switching.

Based on the brightness level detected by Z311H, it sends the light-level-control command to the ZigBee network to control the light level for remaining the room light intensity. The table below is the corresponding control-level of the 8 ranges.

Brightness level Z311H detected		Light level Z311H controls (lux)
Level 0	→	255
Level 1	→	210
Level 2	→	175
Level 3	→	140
Level 4	→	105
Level 5	→	70
Level 6	→	35
Level 7	→	0

For example, when Z311H detects the brightness with 188 (level 5), it will control the light to 70 lux to keep the light intensity.

## 5-9. Switch On/Off the Light

After binding the On/Off device, users are able to switch On/Off the light by pressing the *Auxiliary Key*.

## 5-10. Restore to Factory Setting

To restore it to factory setting, please follow the steps:

- Step1. Press and hold both *Binding Key* and *Auxiliary Key* for 5 seconds.
- Step2. Release the button after the indicator shows fast **red** flashes.
- Step3. The indicator will flash **red 20 times**, and the restore is completed.



## 5-11. Low Battery Detection and Alarm Functions

1. Working voltage of Z311H is between 2.1-3.6V.
2. Once Z311H is joined into ZigBee network successfully, the battery voltage will be detected immediately. And then battery voltage will be detected once every hour; voltage detection will be carried out when the button is pressed. Once the voltage is less than 2.1V, Z311H will make warning once every hour. Z311H will make low voltage announcement to all the device in the same network, in the mean time, the red indicator flashes once.
3. Default low-voltage threshold:  
BatteryVoltageMinThreshold: 2.1V (0x15)  
BatteryVoltageThreshold1: 2.2V (0x16)  
BatteryVoltageThreshold2: 2.3V (0x17)  
BatteryVoltageThreshold3: 2.4V (0x18)
4. When the voltage is lower than BatteryVoltageMinThreshold, it will issue alarmcode = 0x10 the alarm broadcast command;  
When the voltage is lower than BatteryVoltageThreshold1, it will issue alarmcode = 0x11 the alarm broadcast command;  
When the voltage is lower than BatteryVoltageThreshold2, it will issue alarmcode = 0x12 the alarm broadcast command;  
When the voltage is lower than BatteryVoltageThreshold3, it will issue alarmcode = 0x13 the alarm broadcast command.

## 5-12. Indication of The Remaining Battery Charge

Once Z311H is joined into ZigBee network successfully, the battery voltage will be detected immediately. And then battery voltage will be detected once every hour; voltage detection will be carried out when the button is pressed to calculate the remaining battery charge. The battery can be read in current information on percentage of electricity of Z311H.

## 5-13. Rejoin to Network

When the router device is not working in the network, Z311H will immediately look for a new router to join back to network. If Z311H fails to join back to original network, it will enter sleeping mode for 15 minutes. To manually add Z311H back to original network; activate Z311H and it will search the network to join again.

## 5-14. Sleeping Mode

- ① After Z311H is joined into ZigBee network, the device enters the 5 minutes cycle sleeping mode.
- ② After powering on, if there is no ZigBee network to join, the device enters power off mode automatically.
- ③ After Z311H is joined into ZigBee network, if the device is out of network, it will enter 15 minutes cycle sleeping mode. It will try to seek for previous network to join. If Z311H is at status ③, it will consume about 30 times power of status ①. In order to save power, if Z311H is at status ② or ③, it is suggested to remove the battery or power on the device.

## 5-15. Report Configuration for Developer Only

10 seconds after powering on, Z311B will detect battery voltage, if the device report has been previously configured, it will issue 1 or 2 reports within 1-60 seconds randomly on the device, and thereafter it will report according to the configuration.

If the device was already bound related report clusterID to report according to configuration, it would issue a corresponding report (Max! = 0xFFFF) immediately after completed configuration.

Battery voltage report Default: min = 3600s, max = 3600s, reportchange = 0.1,

Battery status report Default: min = 3600s, max = 0xFFFF (off), reportchange = 0.

### Report setting table:

Min Interval (Unit:second)	Max Interval (Unit:second)	Reportable Change	Change rate $\geq$ Reportable Change	Change rate $<$ Reportable Change
1-65534	1-65534	$\neq 0$	To report per Minimum interval	To report per Maximum interval
		0	To report per Minimum interval	To report per Minimum interval
0	1-65534	$\neq 0$	To report instantly	To report per Maximum interval
		0	To report per second	To report per second
1-65534	0	$\neq 0$	To report per Minimum interval	No report
		0	To report per Minimum interval	To report per Minimum interval
0	0	$\neq 0$	To report instantly	No report
		0	To report per second	To report per second
Any	65535	Any	Stop reporting	
65535	Any	Any	Stop reporting	

**Note: (1) It is not suggested to set:**

**Min Interval =0,**

**Reportable Change=0.**

**Otherwise, ZB311B will report very densely (every second) to block up the network.**

**(2) Different attributes have different units, please refer to the product specific instructions for units of reportable change.**

## 6. Home Automation Clusters for Z311H

A cluster is a set of related attributes and commands which are grouped together to provide a specific function. A simple example of a cluster would be the On/Off cluster which defines how an on/off switch behaves. This table lists the clusters which are supported by Z311H.

1. End Point(s) : 0x01
2. Device ID : Dimmer Switch ( 0x0104 )
3. EndPoint Cluster ID

Cluster ID for Z311H	
Server side	Client side
<b>EP 0x01 (Device ID: Dimmer Switch ( 0x0104 ) )</b>	
Basic(0x0000)	On/off (0x0006)
Identify(0x0003)	Level Control (0x0008)
Commissioning(0x0015)	
power configure(0x0001)	
Diagnostics Information(0x0B05)	
Poll Control(0x0020)	

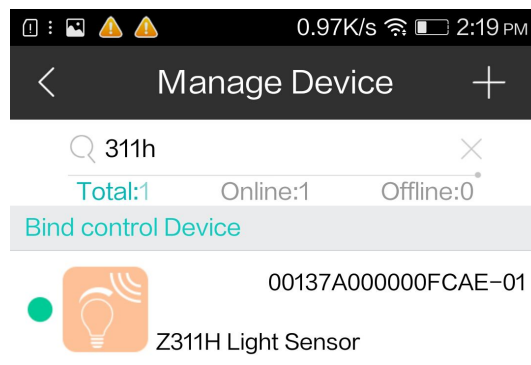
### (1) Attributes of the Basic Information

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0000	<i>ZCLVersion</i>	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x03	M
0x0001	<i>ApplicationVersion</i>	Unsigned 8-bit integer	0x00 – 0xff	Read only	40	O
0x0002	<i>StackVersion</i>	Unsigned 8-bit integer	0x00 – 0xff	Read only	56	O
0x0003	<i>HWVersion</i>	Unsigned 8-bit integer	0x00 – 0xff	Read only	11	O
0x0004	<i>ManufacturerName</i>	Character string	0 – 32 bytes	Read only	netvox	O
0x0005	<i>ModelIdentifier</i>	Character string	0 – 32 bytes	Read only	Z311HE3ED	O

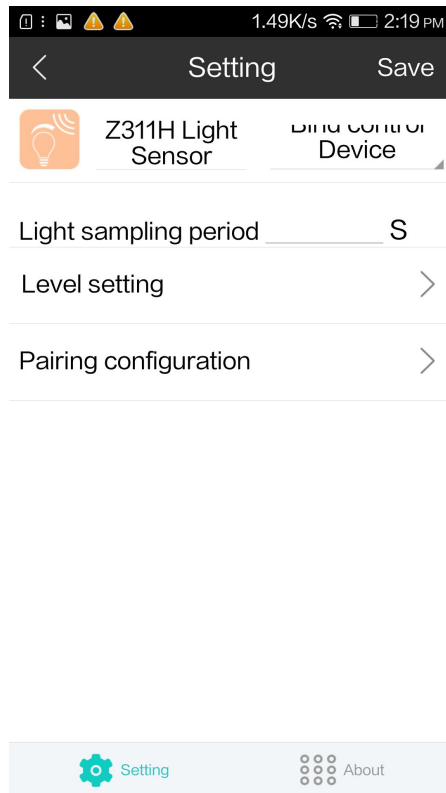
0x0006	<i>DateCode</i>	Character string	0 – 16 bytes	Read only	20160302	O
0x0007	<i>PowerSource</i>	8-bit Enumeration	0x00 – 0xff	Read only	0x03	M
0x0010	<i>LocationDescription</i>	Character string	0 – 16 bytes	Read/write		O
0x0011	<i>PhysicalEnvironment</i>	8-bit Enumeration	0x00 – 0xff	Read/write	0x00	O
0x0012	<i>DeviceEnab Indicator</i>	Boolean	0x00 – 0x01	Read/write	0x01	M

## 7. Netvox App Control

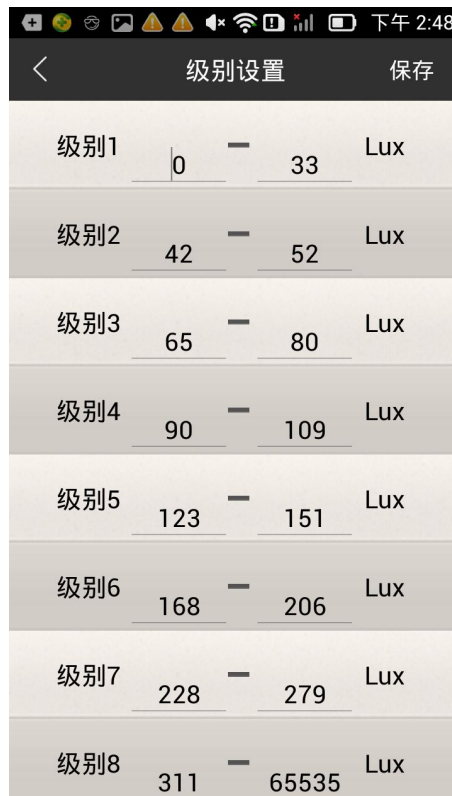
1. After joining in Netvox App system, device IEEE address will show up in device management interface. For example, 311H (Dimmer Switch) shows information as an EP, a dimmer switch as shown below:



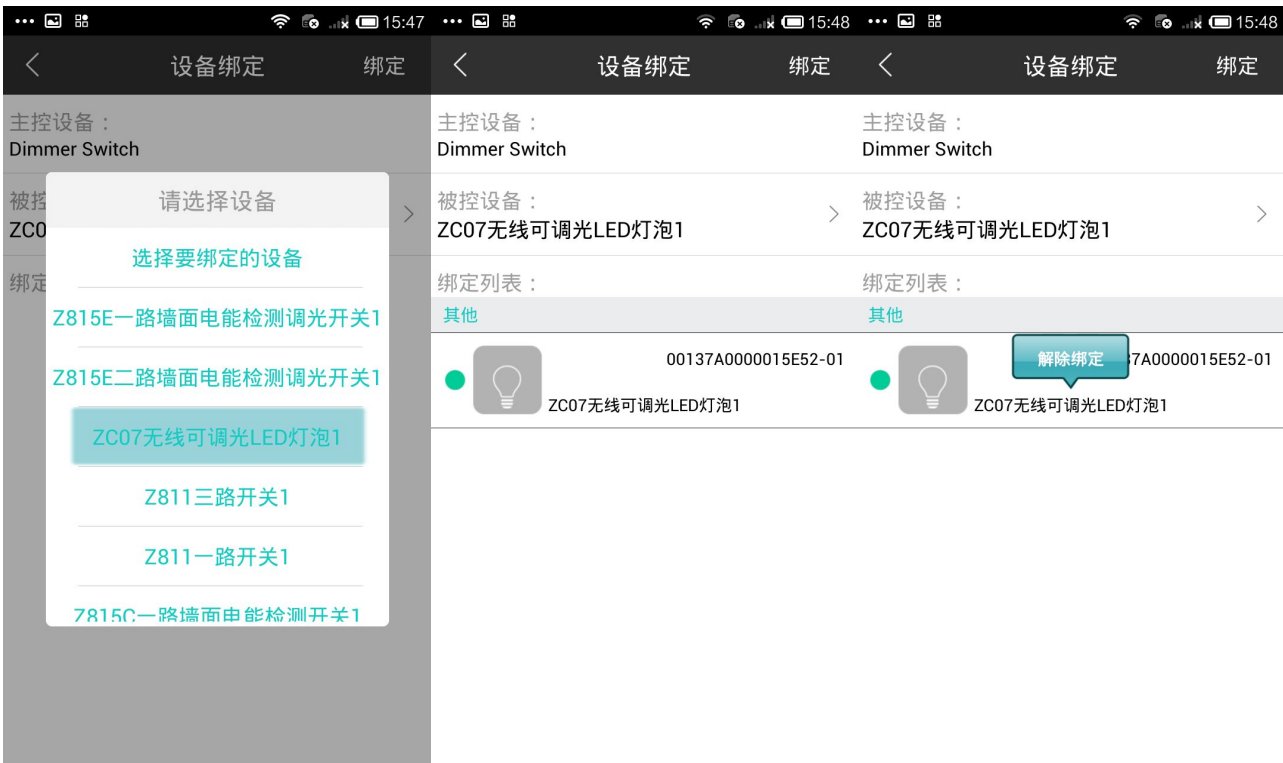
2. Select EP1 (Dimmer Switch) to enter setting interface. In the setting interface, respectively, users can configure light sampling period, binding equipment, light level settings as shown below:



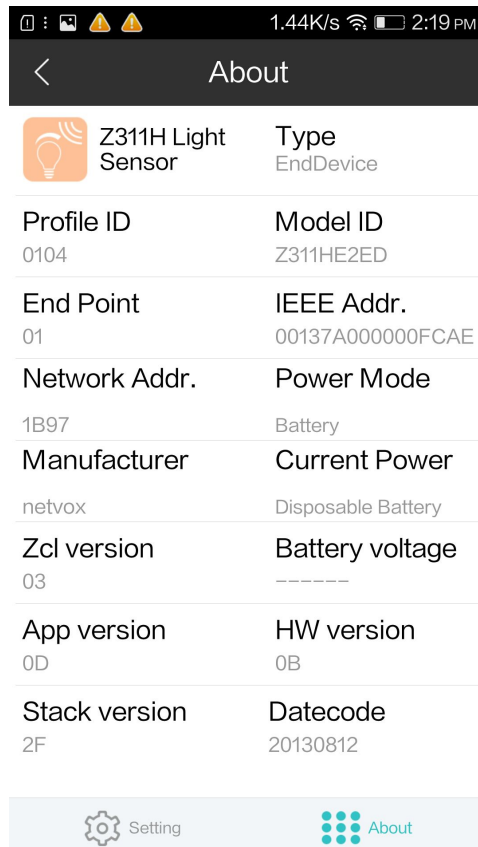
3. Select the level setting interface: it is divided into 1-8 light levels, respectively, users can set the minimum and maximum threshold values in certain environment as below:



4. Enter device bind interface: Select the "controlled device" to binding devices. Select the device to be bound, such as wireless ZC07 dimmable LED bulb 1, and then click on the upper right corner to bind (before binding operation, make sure the device is in the activated state, if the device is in sleep mode, users need to activate the device). To unbind, touch and hold the bound device column till "unbind" shows up, click "unbind" (as shown below):



5. Click EP1 into the basic information interface, by clicking on the bottom of the "Basic Information" "Settings" "About Device" interface to switch interfaces to check detail information of the device. As shown below.



## 8. Important Maintenance Instructions

- Please keep the device in a dry place. Precipitation, humidity, and all types of liquids or moisture can contain minerals that corrode electronic circuits. In cases of accidental liquid spills to a device, please leave the device dry properly before storing or using.
- Do not use or store the device in dusty or dirty areas.
- Do not use or store the device in extremely hot temperatures. High temperatures may damage the device or battery.
- Do not use or store the device in extremely cold temperatures. When the device warms to its normal temperature, moisture can form inside the device and damage the device or battery.
- Do not drop, knock, or shake the device. Rough handling would break it.
- Do not use strong chemicals or washing to clean the device.
- Do not paint the device. Paint would cause improper operation.

Handle your device, battery, and accessories with care. The suggestions above help you keep your device operational. For damaged device, please contact the authorized service center in your area.

FCC Statement:

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.

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.

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



Note:

1. Use the product in the environment with the temperature between -10°C and 50°C.

For the following equipment:

**CE 0700**

Is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC,  
The equipment was passed. The test was performed according to the following European standards:

**EN 301 489-1 V1.9.2: 2011-09**

**ETSI EN 301 489-17 V2.1.1: 2009-05**

**ETSI EN 300 328 V1.7.1:2006-10**

**EN62311:2008**

**EN 60950-1:2006+A11:2009+A1:2010+A12:2011**

**CAUTION  
RISK OF EXPLOSION IF BATTERY IS REPLACED  
BY AN INCORRECT TYPE.  
DISPOSE OF USED BATTERIES ACCORDING  
TO THE INSTRUCTIONS**