User Manual

Wireless Asset Tag
Model: Z311E

Table of Contents

1. Introduction

Netvox Z311E, an asset tag for monitoring in a security system, 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. Z311E is featured to play a role of the sensor (Zone device) in the ZigBee security system. It is for installing on an object. When the object is moved, Z311E will notify the central security unit, CIE (Control and Indicating Equipment) device, to send commands to a siren device to trigger an alarm.

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

Indicator (Red/Green)

Light Sensor

Binding Key

Auxiliary Key

3. Specification

- Fully IEEE 802.15.4 compliant

- Utilizes 2.4GHz ISM band; up to 16 channels

- Power supply: 2 CR2450 3.0V batteries

- Operating consumption: $\leq$ 43mA

- Standby consumption: $\leq$ 7.6uA

- Up to 70 meters wireless transmission range in non-obstacle space

- Easy installation and configuration

4. Installation

- Remove the battery cover, insert the batteries, and then mount the cover to complete the installation.

- This device is NOT truly waterproof/ resistant and is for indoor use.

5. Setting up Z311E

5-1. Turn On/ Turn Off Z311E

Under the circumstances Z311E is first time used or after resetting, when it is powered on and cannot successfully search a network, Z311E will go into turn-off mode.

To manually turn on or turn off Z311E, 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 **red** **10 times** within 5 seconds. Press the *Binding Key* again **within the 10 red flashes** to turn the device off.

5-2. Join the ZigBee Network

After Z311E is turned on, it will search for an existing ZigBee network and send a request to join the network automatically. While Z311E is under the coverage from a coordinator or a router whose **permit-join feature is enabled**, Z311E 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 Z311E. It will start to search and join the network.

Step3. The indicator will flash **green** **once** when it finds out a network to join.

Step4. The indicator will flash **green** **5 times** after it is joined successfully. Otherwise, the indicator will not flash.

5.3. Enroll in the ZigBee Security System

Z311E is a Zone device in the ZigBee security system. Right after Z311E join the ZigBee network, it will automatically find out a CIE (Control and Indicating Equipment) device (i.e. Netvox Z201B) and send a registration request to the CIE device to enroll in the security system. The enrollment has these 3 situations:

A. There is no CIE device or no compatible CIE device in the network → the indicator flashes **red** **twice**.

B. There is a compatible CIE device in the network, but it is failed to enroll → the indicator flashes **red** **4 times**. Users can press the *Auxiliary Key* to initiate the registration.

C. The enrollment is completed → the indicator flashes **red** **6 times**.

NOTE: Users had better NOT enroll multiple Zone devices at the same time to prevent registration failure.

5-4. Sleeping Mode

Z311E 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 → Z311E will go to sleeping mode. It will wake up every 15 minutes to search a network to join.
C. Once Z311E was joined to a network and by any chance the network is no longer existed or the device is out of the network → Z311E 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 Z311E

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. Release the keys after the indicator flashes **red** **twice**.
Step3. The indicator will flash **green** **5 times** when Z311E is online.
Step4. Z311E will broadcast the device data to the ZigBee network.

Z311E would be in active status for 2 minutes for communication.

5-6. Asset Tag

• Z311E's Zone Type: Vibration/Movement sensor (ID: 0x002D)
• The value of Alarm1 is 1 when the vibration/movement is detected.
• The value of Alarm2 is 1 when the environmental illumination is changed.

Under the circumstances that Z311E has enrolled to the security system, it will send the warning command to the command center after the vibration/movement is detected. The Warning Device will send out alarm sound or lighting alert for warning. Z311E will also send the warning command to the command center when the environmental illumination is changed.

Under the circumstances that Z311E hasn't enrolled to the security system, it will try enroll in a security system after triggering. After the enrollment, Z311E will send the warning command to the command center.

After any button is applied, the vibration/movement/lighting sensing features will be disabled for 20 seconds.

ZoneStatusChange commands: 0x00.

The command list:

Bits:8	8	8	var	
Frame control	Transaction Sequence number	Command identifer	Frame payload	
			16-Bit Enumeration	8-Bit Enumeration
0x09		0x00	ZoneStatus	ExtendedStatus

（Clusterid：0x 0500）

Values of the ZoneStauts payload

ZoneStatus Attribute Bit Number	Meaning	Values
0	Alarm1	1 – opened or alarmed 0 – closed or not alarmed
1	Alarm2	1 – opened or alarmed 0 – closed or not alarmed
2	Tamper	1 – Tampered 0 – Not tampered
3	Battery	1 – Low battery 0 – Battery OK
4	Supervision reports	1 – Reports 0 – Does not report
5	Restore reports	1 – Reports restore 0 – Does not report restore
6	Trouble	1 – Trouble/Failure 0 – OK
7	AC (mains)	1 – AC/Mains fault 0 – AC/Mains OK
8-15	Reserved	

Values of the ExtendedStatus payload

ExtendedStatus Attribute Bit Number	Meaning	Values
0-6	ZoneID	
7	**ZoneStatusChange Or Heartbeat**	**1 – HeartBeat** **0 – ZoneStatusChange**

5.7. HeartBeat Technique

In a security system, it is important that Zone devices report the conditions to the central security unit (the CIE device). To meet this need, Netvox came up with a technique called "**HeartBeat**".

Right after Z311E enrolls to a security system, it sends a HeartBeat signal to the CIE device. Afterward, it will send HeartBeat data every hour by default settings.

5-8. Battery

When the operating voltage is lower than 2.1V, Z311E will send a low-power report to the ZigBee network. The related data:

• Power configuration cluster (ID:0x0001)
• Battery voltage attribute (ID:0x0020)

5-9. Restore to Factory Setting

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

Step1. Press and hold both *Binding Key* and *Auxiliary Key*.
Step2. The indicator will flash **red twice.** Keep pressing and holding the both buttons.
Step3. Until the indicator starts flashing **red** again, release both buttons to complete the restore.
Step4. After 20 **red** flashes, it will go into turn-off mode.

6. Home Automation Clusters for Z311E

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 Z311E.

    1.End Point(s)：0x01:

    2.Device ID：IAS Zone（0x0402）

    3.EndPoint Cluster ID

Cluster ID for Z311E	
Server side	**Client side**
EP 0x01 (Device ID: IAS Zone(0x0402))	
Basic(0x0000)	*None*
Power configuration(0x0001)	
Identify(0x0003)	
commissioning(0x0015)	
IAS zone (0x0500)	
Poll Control（0x0020）	
Diagnostics（0x0B05）	

This lists the attributes of the basic information.

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0000	*ZCLVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x03	M
0x0001	*ApplicationVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x14	O
0x0002	*StackVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x33	O
0x0003	*HWVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x0B	O
0x0004	*ManufacturerName*	Character string	0 – 32 bytes	Read only	netvox	**O**
0x0005	*ModelIdentifier*	Character string	0 – 32 bytes	Read only	Z311E3ED	**O**
0x0006	*DateCode*	Character string	0 – 16 bytes	Read only	20131227	**O**

0x0007	*PowerSource*	8-bit Enumeration	0x00 – 0xff	Read only	0x03	M
0x0010	*LocationDescription*	Character string	0 – 16 bytes	Read/write	16	O
0x0012	*DeviceEnabled*	Boolean	0x00 – 0x01	Read/write	0x01	M

7. 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