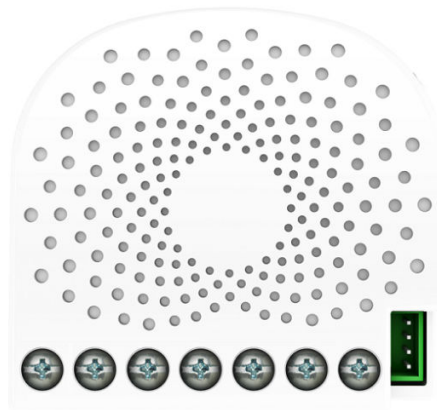


Aeotec

Aeotec Nano Shutter

(Z-Wave Nano Shutter)



Change history

| Revision | Date | Change Description |
|----------|------------|---------------------------------|
| 1 | 10/9/2017 | Initial draft. |
| 2 | 11/17/2017 | Update |
| 3 | 11/21/2017 | Update |
| 4 | 11/28/2017 | Update the wiring diagram |
| 5 | 12/13/2017 | Update the wiring diagram notes |
| 6 | 1/4/2018 | Update |
| 7 | 7/10/2018 | Update |
| 8 | 8/27/2018 | Update |
| 9 | 12/19/2018 | Update |
| 10 | 06/27/2019 | Update |

Aeotec Nano Shutter

Engineering Specifications and Advanced Functions for Developers

Aeotec Nano Shutter is a Z-Wave motor controller device based on Z-Wave enhanced 232 slave library V6.71.03.

You can use it to control your curtain/shutter motor up/down/stop. It can connect to 2 external manual switches/buttons to control the motor up/down/stop independently. Its surface has a pin socket, which can be used for connecting to the touch panel, so you can also use the touch panel to control the Nano Shutter. The wireless module is powered from the mains supply. In the event of power failure, non-volatile memory retains all programmed information relating to the units operating status.

It can also be included and operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

It is a security Z-Wave plus device, so a security enabled controller is needed for take full advantage of all functionally for the Nano Shutter. It also supports the Over The Air (OTA) feature for the product's firmware upgrade.

It can be a repeater in the Z-Wave network. Acting as a bridge for communication, it will forward Z-Wave command messages to their destinations if the originating controller is out of range from the destination node. By taking advantage of the Z-Wave mesh network, commands can be routed to their destination via intermediary "listening" Z-Wave products. Products that are Z-Wave certified can be used and communicate with other Z-Wave certified devices.

1. Library and Command Classes

1.1 SDK: 6.71.03

1.2 Library

- Generic Device class: GENERIC_TYPE_SWITCH_MULTILEVEL
- Specific Device Class: SPECIFIC_TYPE_CLASS_A_MOTOR_CONTROL

1.3 Commands Class

| | Non-Secure included | Secure included |
|---------------------|---|--|
| Node Info Frame | COMMAND_CLASS_ZWAVEPLUS_INFO V2 COMMAND_CLASS_ASSOCIATION V2 COMMAND_CLASS_ASSOCIATION_GRP_INFO V1 COMMAND_CLASS_TRANSPORT_SERVICE_V2, COMMAND_CLASS_CONFIGURATION V1 COMMAND_CLASS_SCENE_ACTUATOR_CONF, COMMAND_CLASS_SCENE_ACTIVATION, COMMAND_CLASS_SWITCH_BINARY, COMMAND_CLASS_SWITCH_MULTILEVEL, COMMAND_CLASS_VERSION V2 COMMAND_CLASS_MANUFACTURER_SPECIFIC V2 COMMAND_CLASS_DEVICE_RESET_LOCALLY V1 COMMAND_CLASS_POWERLEVEL V1 COMMAND_CLASS_SECURITY COMMAND_CLASS_SECURITY_2 COMMAND_CLASS_SUPERVISION, COMMAND_CLASS_FIRMWARE_UPDATE_MD COMMAND_CLASS_MARK V1 | COMMAND_CLASS_ZWAVEPLUS_INFO V2 COMMAND_CLASS_TRANSPORT_SERVICE_V2, COMMAND_CLASS_SUPERVISION, COMMAND_CLASS_SECURITY COMMAND_CLASS_SECURITY_2 |
| Security Command | - | COMMAND_CLASS_ASSOCIATION V2 COMMAND_CLASS_ASSOCIATION_GRP_INFO V1 |

| | | |
|------------------------|--|---|
| Supported Report Frame | | COMMAND_CLASS_CONFIGURATION V1 COMMAND_CLASS_SCENE_ACTUATOR_CONF, COMMAND_CLASS_SCENE_ACTIVATION, COMMAND_CLASS_SWITCH_BINARY, COMMAND_CLASS_SWITCH_MULTILEVEL, COMMAND_CLASS_FIRMWARE_UPDATE_MD V2 COMMAND_CLASS_POWERLEVEL V1 COMMAND_CLASS_VERSION V2 COMMAND_CLASS_MANUFACTURER_SPECIFIC V2 COMMAND_CLASS_DEVICE_RESET_LOCALLY V1 COMMAND_CLASS_MARK V1 |
|------------------------|--|---|

2. Technical specifications

Model number: ZW141.

Input: 120VAC to 240VAC, 50/ 60Hz, Max 2.5A.

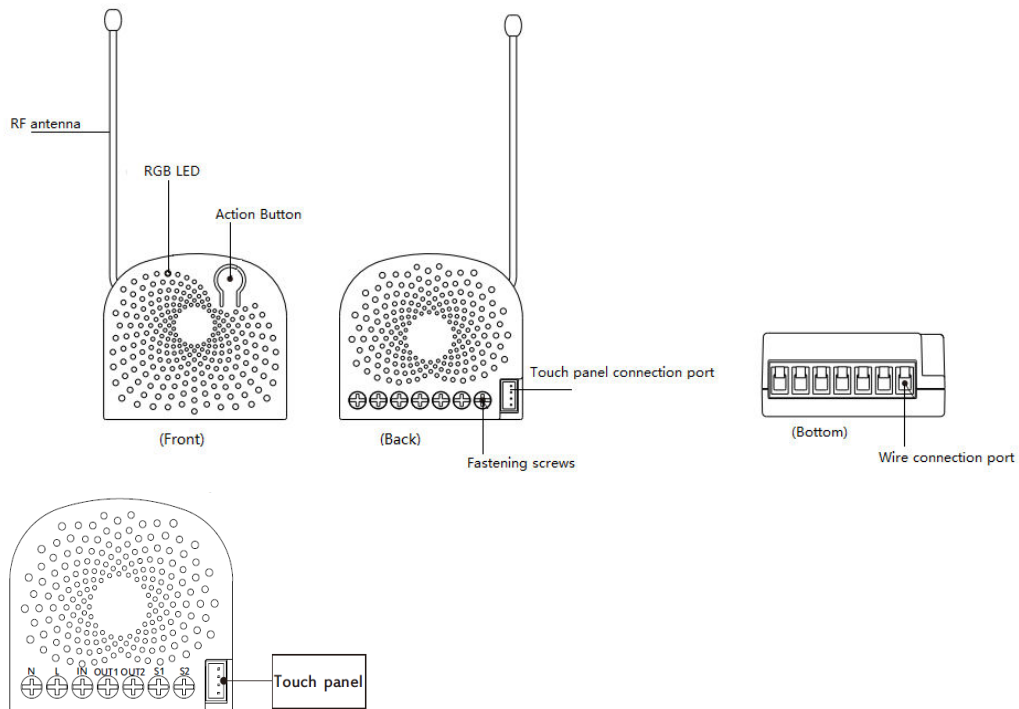
Operating temperature: 0°C to 40°C.

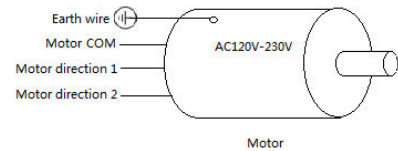
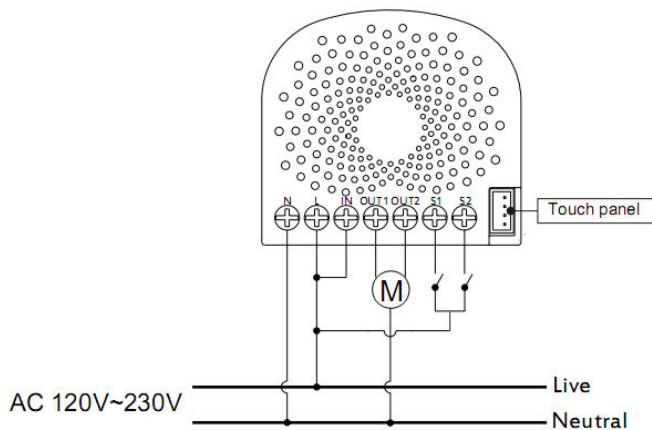
Relative humidity: 8% to 80%RH.

Operating distance: Up to 492 feet/150 meters outdoors.

3. Familiarize yourself with your Nano Shutter

3.1 Interface





Notes for the wire connection ports:

N – Power input for neutral

L – Power input for live

IN – Input for load power supply

OUT1 – Output for Motor direction 1

OUT2 – Output for Motor direction 2

S1 – External switch 1 control for Motor

S2 – External switch 2 control for Motor

4. All functions of each trigger

4.1 Function of Action Button

| Action | Description |
|---------------------|--|
| Click one time | <ol style="list-style-type: none"> 1. Send out a Node info. 2. Add Nano Shutter into a Z-Wave network: <ol style="list-style-type: none"> 1. Power on your Nano Shutter, the RGB LED will be colorful gradient status. 2. Let the primary controller into inclusion mode (If you don't know how to do this, refer to its manual). 3. Press the Action button. 4. If the inclusion is successful, the LED will be solid. Otherwise, the LED will remain colorful gradient status, in which you need to repeat the process from step 2. |
| Quick press 2 times | <p>Activate the automatic identification mode for external switch S1.</p> <p>The blue LED will fast blink to indicate the Nano Shutter is in this mode.</p> <p><i>Note:</i> When the Nano Shutter enters this mode, toggle the external switch S1 one time and wait 2 seconds for the Nano Shutter to detect the external switch type of S1.</p> |
| Quick press 4 times | <p>Activate the automatic identification mode for external switch S2.</p> <p>The green LED will fast blink to indicate the Nano Shutter is in this mode.</p> <p><i>Note:</i> When the Nano Shutter enters this mode, toggle the external switch S2 one time and wait 2 seconds for the Nano Shutter to detect the external switch type of S2.</p> |
| Quick press 6 times | <ol style="list-style-type: none"> 1. Send out a Node info. 2. Remove Nano Shutter from a Z-Wave network: |

| | |
|---------------------------|--|
| | <ol style="list-style-type: none"> 1. Power on your Nano Shutter, the LED will be solid. 2. Let the primary controller into remove mode (If you don't know how to do this, refer to its manual). 3. Quick press the Action button 6 times. 4. If the remove is successful, the LED will be colorful gradient status. If the LED is still solid, please repeat the process from step 2. |
| Press and hold 20 seconds | <p>Reset Nano Shutter to factory default:</p> <ol style="list-style-type: none"> 1. Make sure the Nano Shutter has been powered on. 2. Press and hold the Action Button for 20 seconds. 3. The green LED will be on for 2 seconds and then remain colorful gradient status, which indicates the reset is successful, otherwise please repeat from step 2. <p>Note:</p> <ol style="list-style-type: none"> 1. This procedure should only be used when the primary controller is missing or inoperable. 2. Reset the Nano Shutter to factory default will exclude the Nano Shutter from Z-Wave network, clear the Association settings, Scene configuration settings and restore the Configuration settings to the default. |

4.2 RGB LED indication when Nano Shutter is in RF Power Level Test Mode

| RGB | RGB indication | Status |
|---------|--|--|
| RGB LED | Blue LED fast blink | Enter into the wireless power level test mode |
| | Green LED is switched to ON state for 2 seconds | wireless power level is good |
| | Yellow LED is switched to ON state for 2 seconds | wireless power level is acceptable but latency can occur |
| | Red LED is switched to ON state for 2 seconds | wireless power level is insufficient |

5. Special rule of each command

5.1 Z-Wave Plus Info Report Command Class

| Parameter | Value |
|---------------------|--|
| Z-Wave Plus Version | 1 |
| Role Type | 5 (ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_ALWAYS_ON) |
| Node Type | 0 (ZWAVEPLUS_INFO_REPORT_NODE_TYPE_ZWAVEPLUS_NODE) |
| Installer Icon Type | 0x1A00 (ICON_TYPE_GENERIC_WINDOW_COVERING_POSITION_ENDPOINT_AWARE) |
| User Icon Type | 0x1A00 (ICON_TYPE_GENERIC_WINDOW_COVERING_POSITION_ENDPOINT_AWARE) |

5.2 Basic Command Class

Basic Set = 0x00 maps to Multilevel Switch Set/ Binary Switch Set =0x00, go to 0% position.

Basic Set = 0xFF maps to Multilevel Switch Set/ Binary Switch Set =0xFF, go to 100% position.

Basic Set = 0x01 to 0x63, ignored.

Basic Get/Report maps to Multilevel Switch Get/Report or Binary Switch Get/Report.

Basic Report = 0x00, at 0% position.

Basic Report = 0xFF, at 100% position.

Basic Report = 0xFE, unknown position.

5.3 Association Command Class

Nano Shutter supports 2 association groups and Max 5 nodes for every group.

| Association Group | Nodes | Send Mode | Send commands |
|-------------------|-------|-------------|---|
| Group 1 | [1,5] | Single Cast | When the state of Nano Shutter (turn on/off the load) is changed: 1. Set Configuration parameter 80 to 0: Send nothing (default). 2. Set Configuration parameter 80 to 1: Send the Basic Report. |
| Group 2 | [1,5] | Single Cast | Forward the Basic Set, Binary set, Scene Activation Set to associated nodes in Group 2 when the Nano Shutter receives the Basic Set, Binary set, Scene Activation Set commands from main controller. (E.g. Send/forward Basic Set to control the other nodes in association Group 2) |

5.4 Association Group Info Command Class

5.4.1 Association Group Info Report

Group 1: 01 01 00 00 01 00 00 00

Group 2: 01 02 00 00 00 00 00 00

5.4.2 Association Group Command List Report

Group 1: 20 03 82 01 5A 01

| | | |
|------------------------------------|-----------------------------------|-------|
| COMMAND_CLASS_BASIC | BASIC_REPORT | 20 03 |
| COMMAND_CLASS_DEVICE_RESET_LOCALLY | DEVICE_RESET_LOCALLY_NOTIFICATION | 5A 01 |

Group 2: 20 01 27 01

| | | |
|-----------------------------|-------------------|-------|
| COMMAND_CLASS_BASIC | BASIC_SET | 20 01 |
| COMMAND_CLASS_SWITCH_BINARY | SWITCH_BINARY_SET | 27 01 |

5.4.3 Association Group Name Report

Group 1: Lifeline (01 08 4C 69 66 65 6C 69 6E 65)

Group 2: Retransmit (02 0A 52 65 74 72 61 6E 73 6D 69 74)

5.5 Scene Actuator Conf Command Class

The Nano Shutter supports max 255 Scene IDs.

The Scene Actuator Conf Set command is effective, when only Level>=0 and Level<0x64 or Level=0xff, otherwise, it will be ignored.

The Scene Actuator Configuration Get Command is used to request the settings for a given scene, if scene ID is not setting, it will be ignored. If Scene ID =0, then the Nano Shutter will report currently the activated scene settings. If the currently activated scene settings do not exist, the Nano Shutter will reports Level = currently load status and Dimming Duration=0

5.6 Scene Activation Set Command Class

The Scene Activation Set Command is effective, when only Level>=0 and Level<0x64 or Level=0xff, otherwise, it will be ignored. If the requested Scene ID is not configured, it will be ignored too.

5.7 Manufacturer Specific Report

| Parameter | Value |
|-------------------|--|
| Manufacturer ID 1 | US/EU/AU=0x00 |
| Manufacturer ID 2 | US/EU/AU=0x86 |
| Product Type ID 1 | EU=0x00, US=0x01, AU=0x02 CN=0x1D (29) |
| Product Type ID 2 | 0x03 |
| Product ID 1 | 0x00 |
| Product ID 2 | 0x8D (141) |

5.9 Multilevel Switch Command Class

| | Multilevel Switch Set | | Multilevel Switch Level Change | | |
|--------|-----------------------|-------------------|--------------------------------|------------|------|
| Value | 0x00 | 0x01...0x63, 0xFF | Start Down | Start Up | Stop |
| Action | Go to 0% | Go to 100% | Go to 0% | Go to 100% | Stop |

| | Basic Set | | | | | |
|---------------|-----------|--------------|----------------|------------|--------------|----------------|
| Value | 0x00 | | | 0xFF | | |
| Current state | Stop | Moving to 0% | Moving to 100% | Stop | Moving to 0% | Moving to 100% |
| Action | Go to 0% | Go to 0% | Go to 0% | Go to 100% | Go to 100% | Go to 100% |

| | Basic Report /Multilevel Switch Report | | | | |
|---------------|--|--------------|----------------|---------|------------|
| Current state | At 0% | Moving to 0% | Moving to 100% | At 100% | Stop |
| State Value | 0x00 | 0x00 | 0x63 | 0x63 | 0x00/ 0x63 |

5.9 Binary Switch Set Command Class

| | Binary Switch Set | |
|-------|-------------------|-------------------|
| Value | 0x00 | 0x01...0x63, 0xFF |

| | | | | | | |
|-----------------------------|----------|--------------|----------------|------------|--------------|----------------|
| Current State | Stop | Moving to 0% | Moving to 100% | Stop | Moving to 0% | Moving to 100% |
| Action | Go to 0% | Go to 0% | Stop | Go to 100% | Stop | Go to 100% |
| Binary Switch Report | | | | | | |
| Current State | At 0% | Moving to 0% | Moving to 100% | At 100% | | |
| Value | 0x00 | 0x00 | 0xFF | 0xFF | | |

5.10 Security Command Class

5.10.1 Security 2 supported Command Class List:

- 85 - COMMAND_CLASS_ASSOCIATION
- 59 - COMMAND_CLASS_ASSOCIATION_GRP_INFO
- 70 - COMMAND_CLASS_CONFIGURATION
- 2C - COMMAND_CLASS_SCENE_ACTUATOR_CONF
- 2B - COMMAND_CLASS_SCENE_ACTIVATION
- 25 - COMMAND_CLASS_SWITCH_BINARY
- 26 - COMMAND_CLASS_SWITCH_MULTILEVEL
- 73 - COMMAND_CLASS_POWERLEVEL
- 7A - COMMAND_CLASS_FIRMWARE_UPDATE_MD
- 86 - COMMAND_CLASS_VERSION
- 72 - COMMAND_CLASS_MANUFACTURER_SPECIFIC
- 5A - COMMAND_CLASS_DEVICE_RESET_LOCALLY

5.10.2 Security level

| Security Levels | Support(Yes/No) |
|---------------------------------|-----------------|
| SECURITY_KEY_S0 | Yes |
| SECURITY_KEY_S2_UNAUTHENTICATED | Yes |
| SECURITY_KEY_S2_AUTHENTICATED | Yes |
| SECURITY_KEY_S2_ACCESS | No |

5.11 Configuration Set Command Class

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|----------|---|---|---|---|------|---|
| Command Class = COMMAND_CLASS_CONFIGURATION | | | | | | | |
| Command = CONFIGURATION_SET | | | | | | | |
| Parameter Number | | | | | | | |
| Default | Reserved | | | | | Size | |
| Configuration Value 1(MSB) | | | | | | | |
| Configuration Value 2 | | | | | | | |
| | | | | | | | |
| Configuration Value n(LSB) | | | | | | | |

Parameter Number Definitions (8 bit):

| Parameter Number Hex / Decimal | Description | Default Value | Size |
|--------------------------------------|---|---------------|------|
| 0x23 (35) | Set the moving time from up (left) to down (right) for curtain. Time unit: second. Range: 5 to 255 seconds. <i>Note:</i> This time value will not be reset after exclusion. | 150 | 1 |
| 0x50 (80) | To set which report would be sent to the associated nodes in association group 1 when the state of output load is changed. 0 = Nothing. 1 = Basic Report CC. | 0 | 1 |
| 0x55 (85) | Set the operation mode of external switch. 0 = Operation Mode 1. 1 = Operation Mode 2. For detailed instructions for Operation Mode 1 and 2, see end of this table. | 0 | 1 |
| 0x78 (120) | Set the external switch mode of S1 0 = Unidentified mode. 1 = 2-state switch mode. 2 = 3 way switch mode 3 = Push button mode 4 = Enter automatic identification mode (The blue Led will fast blink). <i>Note:</i> When the switch mode of S1 is identified or configured, this mode value will not be reset after exclusion. | 0 | 1 |
| 0x79 (121) | Set the external switch mode of S2 0 = Unidentified mode. 1 = 2-state switch mode 2 = 3 way switch mode 3 = push button mode 4 = enter automatic identification mode (The green Led will fast blink). <i>Note:</i> When the switch mode of S2 is identified or configured, this mode value will not be reset after exclusion. | 0 | 1 |

| | | | |
|------------|---|-----|---|
| 0xF8 (248) | Set the function of S1/S2. Bit 0 = 0, the function of sending NIF is disabled. Bit 0 = 1, the function of sending NIF is enabled. Bit 1 = 0, the function of entering RF power level test mode is disabled. Bit 1 = 1, the function of entering RF power level test mode is enabled. Bit 2 = 0, the function of factory reset is disabled. Bit 2 = 1, the function of factory reset is enabled. Bit 3- Bit 6 = reserved. Bit 7 = 0, the setting for Bit 0 –Bit 2 are ineffective. Bit 7 = 1, the setting for Bit 0 –Bit 2 are effective. | 83 | 1 |
| 0xFC (252) | Enable/disable the configuration parameters to be locked. 0 = disable. 1 = enable. | 0 | 1 |
| 0xFF (255) | 1, Value = 0x55555555, Default = 1, Size = 4 Reset to factory default settings and removed from the z-wave network | N/A | 4 |
| | 2, Value = 0, Default = 1, Size = 1 Reset all configuration parameters to factory default settings | N/A | 1 |

Operation Mode 1:

| Extern button 1 / Extern button 2 | | | | | |
|-----------------------------------|----------------|--------------|----------------|--------------|-----------------------------------|
| Current state | At 0% | Moving to 0% | Moving to 100% | At 100% | Stop |
| Press the button once | Moving to 100% | Stop | Stop | Moving to 0% | Moving in the opposite direction. |

Operation Mode 2:

| External Switch | Extern button 1 | | | Extern button 2 | | |
|--------------------------------|-----------------|----------------|----------------|-----------------|----------------|--------------|
| Current state | Stop | Moving to 0% | Moving to 100% | Stop | Moving to 100% | Moving to 0% |
| After Pressing the button once | Moving to 100% | Moving to 100% | Stop | Moving to 0% | Moving to 0% | Stop |