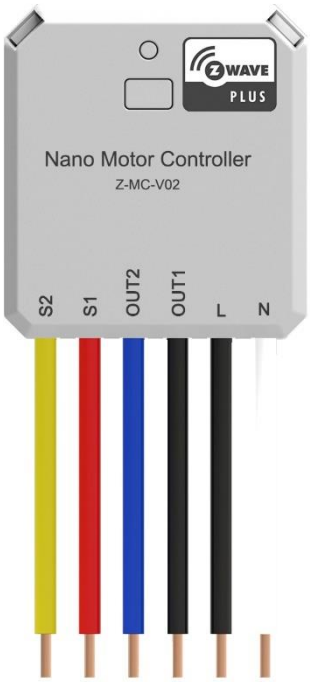
Nano AC Motor Controller Engineering Specifications



The Nano Motor Controller based on Z-wave™ Slave library of V7.16.03. This Micro Motor Controller integrated Z-Wave communication module to connect with Z-Wave gateway.
The Motor Contoller can 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.
The Motor Contoller is a security Z-Wave device (S2), so a security enabled controller is needed for take full advantage of all functionally for the Motor Contoller.

Features:

- The Nano Motor Controller Support moving time calibration.
- Manual or Z-Wave motor control with instant status updates.
- Installs behind your existing wall Motor (single pole or 3-way).
- 700 series Z-Wave chip for better range and faster control.
- Scene control: trigger actions with multi-tap (select hubs only).
- Remembers and restores on/off status aer power failure.
- Built-in Z-Wave timer functionality and signal repeater.
- SmartStart and S2 Security for a safer network.

1 Technical Specifications

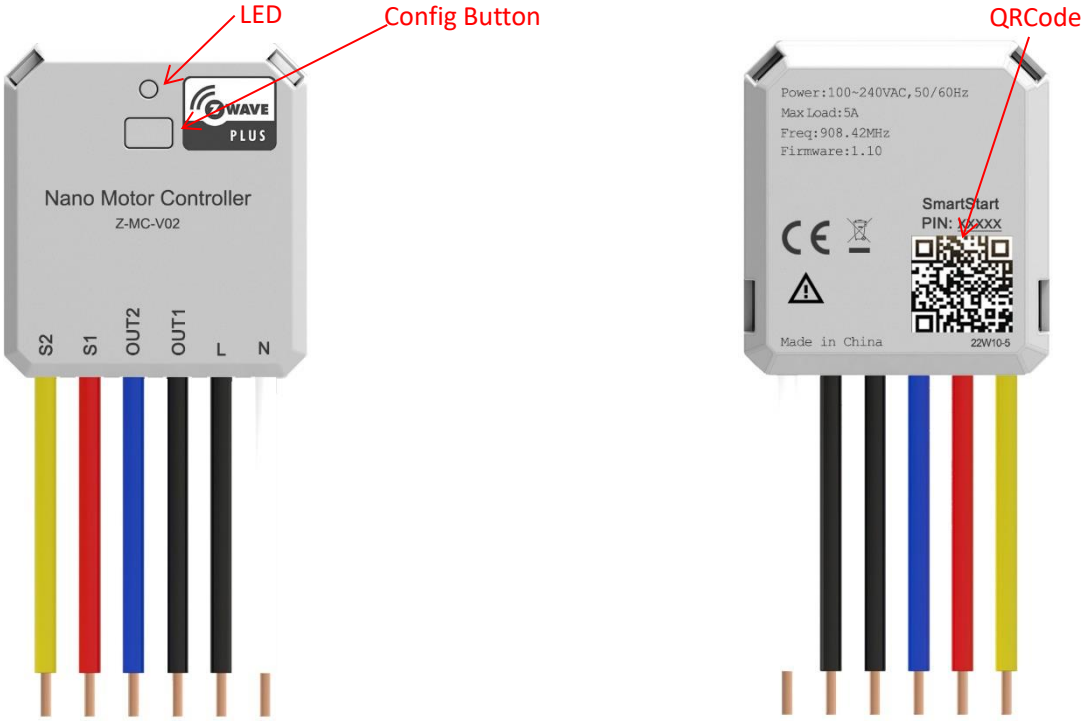
Model Number	Z-MC-V02
Communication Protocol	Z-Wave
Radio Frequency	908.42MHz(US Frequency) 921.42MHz(AU Frequency) 868.42MHz (EU Frequency) 865.2 MHz (IN Frequency)
Wireless Range	Up to 492 feet outdoors. Up to 150 metres outdoors.
Input Voltage	100~240VAC,50/60Hz
Power Output	Motor type: Single-phase AC asynchronous motor. Max load rating: 100-240VAC, 50/60Hz, Max:5A.
Operating Temperature	32-104° F (0-40° C)
Operating Humidity	8% to 85% non-condensing

2 Z-Wave Specifications

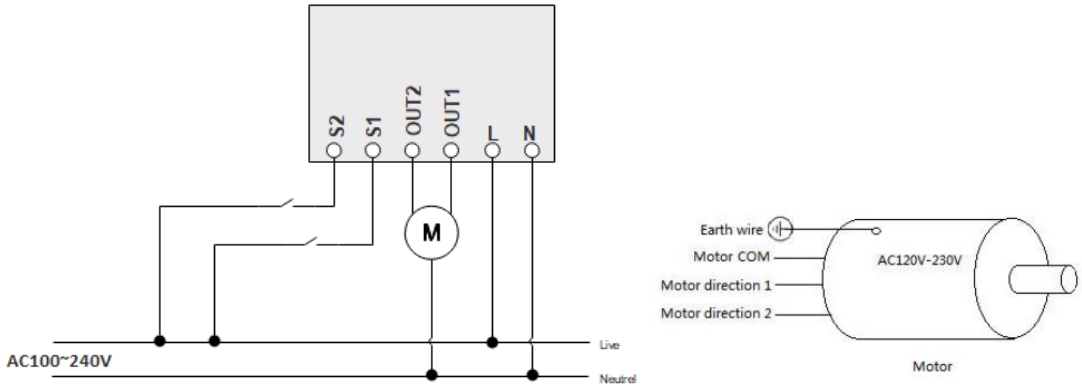
SDK Version	7.16.03
SDK Library	libZWaveSlave

Explorer Frame Support	Yes
Routing	Yes
SmartStart	Yes
Device Type	Window Covering
Basic Device Class	BASIC_TYPE_ROUTING_SLAVE
Generic Device Class	GENERIC_TYPE_SWITCH_MULTILEVEL
Specific Device Class	SPECIFIC_TYPE_CLASS_C_MOTOR_CONTROL
Role Type	Always On Slave (AOS)

3 Familiarize yourself with Motor Contoller



3.1 Installation



N – Power input for neutral
L – Power input for live
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 Security and non-Security features

This device is a security enabled Z-Wave Plus™ product that is able to use encrypted Z-Wave Plus messages to communicate to other security enabled Z-Wave Plus products.
When a node includes into a S2 Z-Wave network, the node supports S2 unauthenticated class, S2 authenticated and so do the supported CCs.
This product can be operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers. All mains operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

4.1 Supported Security Levels

- SECURITY_KEY_S2_AUTHENTICATED_BIT
- SECURITY_KEY_S2_UNAUTHENTICATED_BIT

4.2 Commands List

Command Classes	Version	Required Security Class
COMMAND_CLASS_ZWAVEPLUS_INFO_V2	2	None
COMMAND_CLASS_TRANSPORT_SERVICE_V2	2	None
COMMAND_CLASS_SECURITY_2_V1	1	None
COMMAND_CLASS_APPLICATION_STATUS_V1	1	None
COMMAND_CLASS_SUPERVISION_V1	1	None
COMMAND_CLASS_BASIC_V2	2	S2 Authenticated/Unauthenticated
COMMAND_CLASS_SWITCH_MULTILEVEL_V4	4	S2 Authenticated/Unauthenticated
COMMAND_CLASS_WINDOW_COVERING_V1	1	S2 Authenticated/Unauthenticated
COMMAND_CLASS_CONFIGURATION_V4	4	S2 Authenticated/Unauthenticated
COMMAND_CLASS_ASSOCIATION_V2	2	S2 Authenticated/Unauthenticated
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V1	1	S2 Authenticated/Unauthenticated
COMMAND_CLASS_VERSION_V2	2	S2 Authenticated/Unauthenticated
COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2	2	S2 Authenticated/Unauthenticated

COMMAND_CLASS_DEVICE_RESET_LOCALLY_V1	1	S2 Authenticated/Unauthenticated
COMMAND_CLASS_POWERLEVEL_V1	1	S2 Authenticated/Unauthenticated
COMMAND_CLASS_FIRMWARE_UPDATE_MD_V5	5	S2 Authenticated/Unauthenticated
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3	3	S2 Authenticated/Unauthenticated
COMMAND_CLASS_INDICATOR_V3	3	S2 Authenticated/Unauthenticated
COMMAND_CLASS_CENTRAL_SCENE_V3	3	S2 Authenticated/Unauthenticated

5 All functions of each trigger

5.1 SmartStart

SmartStart enabled products can be added into a Z-Wave network by scanning the Z-Wave QR Code present on the product with a controller providing SmartStart inclusion. No further action is required and the SmartStart product will be added automatically within 10 minutes of being switched on in the network vicinity.

Add the Motor Contoller into the Z-Wave network via SmartStart (SmartStart Inclusion):

a. Scan the QR code on Motor Contoller using your Z-Wave gateway/contorllers app.

b. Power On the Motor Contoller.

c. Your Motor Contoller will automatically pair to your Z-Wave network.

5.2 Short press Config Button three times

Add the Motor Contoller into the Z-Wave network (Manual Inclusion):

a. Power on your Motor Contoller.

b. Set your Z-Wave controller into pairing mode.

c. Short Press Config Button 3 times or external switch 3 times on the Motor Contorller, the green LED will fast blink to indicate the Motor Contorller is entering into pairing mode.

d. If the Motor Contorller has been successfully added to your Z-Wave network, its greed LED will on for 2 seconds. If pairing was unsuccessful, the red LED will be on 2 seconds and then remain green LED slow blink, repeat the instructions above from step b.

e. If your Z-Wave Contorller supports S2 encryption, enter the PIN(first 5 digits of DSK) into. The PIN is printed on Motor Contoller.

- If pairing succeeds, its greed LED will on for 2 seconds.
- If pairing fails, its red LED will be on 2 seconds and then remain green LED slow blink. repeat steps b to e if this happens.

With your Motor Contoller now working as a part of your smart home, you'll be able to configure it from your home control software/phone application. Please refer to your software or gateway user guide for further instructions on configuring Motor Contoller to your needs.

Remove Motor Contoller from a Z-Wave network (Manual Exclusion):

a. Power on your Motor Contoller.

b. Set your Z-Wave controller into remove/exclusion mode.

c. Short Press Config Button 3 times or external switch 3 times on the Motor Contorller, the green LED will fast blink to indicate the Motor Contorller is entering into removal mode.

d. If the Motor Contorller has been successfully removeed from your Z-Wave network, its greed LED will on for 2 seconds. If the removal was unsuccessful, the red LED will be on 2 seconds, repeat the instructions above from step b.

5.3 Reset Motor to factory default

If at some stage, your primary controller is missing or inoperable, you may wish to reset all of your Motor Contorller settings to their factory defaults.

To do this, press Config button 2 times quickly and hold for at least 15 seconds and then release it. The Motor Contorller will reset itself to factory default by sending a “Device Reset Locally Notification” to gateway when the button is released.

Note: Please use this procedure only when the network primary controller is missing or otherwise inoperable.

6 Manual calibration

Calibration for Motor controller has 2 modes: Shutter Mode and Venetian Mode.

The default cycle control time of the motor is 60 seconds for Shutter Mode and cycle control time of the motor is 1.5 seconds for Venetian Mode, which can be configured through the configuration parameter 4 and 5. It can also be calibrated manually; the calibration is used to calculate the during time of it fully closed to fully open.

1. Shutter Mode

Used for standard roller blinds that move up and down only. The calibration process is as follows:

A) Enter calibration mode.

- By short pressing the Config button 4 times or short pressing the S1 switches 5 times.
- Or by sending a CONFIGURATION SET Parameter 6 [1 byte] to value 1.

B) The curtain will begin to move to the end in one direction (full open) **reference point A**.

- Press the Config button or S1/S2 external switches once the curtain is at max open to tell Motor controller to perform the next step.

C) The motor/curtain will reverse to other direction; **reference point B**.

- Press the Config button or S1/S2 external switches once the current is at the max close to finalizing the calibration.

D) Calibration is completed.

- Motor controller records the run time from the **reference point A to B**, which is the time between max open and the max close of the curtain (this time can be read and modified through the Configuration 3 if additional readjustments are needed).

2. Venetian Mode

Motor controller in Venetian Mode can be set to open the blinds up/down, as well as the angle of rotation of the blinds separately. The calibration process is as follows:

B) Enter calibration mode.

- By short pressing the Config button 5 times or short pressing the S2 switches 5 times.
- Or by sending a CONFIGURATION SET Parameter 6 [1 byte] to value 2.

C) The curtain will begin to move to the end in one direction (full open) **reference point A**.

- Press the Config button or S1/S2 external switches once the curtain is at max open to tell Motor controller to perform the next step.

D) The motor/curtain will reverse to other direction; **reference point B**.

- Press the Config button or S1/S2 external switches once the current is at the max close to finalizing the calibration.

E) Calibration is completed.

- Motor controller records the run time from the **reference point A to B**, which is the time between max open and the max close of the curtain (this time can be read and modified through the Configuration 3 if additional readjustments are needed).

3. Repositioning

Motor controller may experience positional deviation after a long-term operation or external force. Errors can be eliminated by repositioning.

a) Send a Configuration Set (Parameter 7 [1 byte] to value 1) command to enter repositioning;

b) The percentage position at which the product motor starts is recorded and motor moves to reference point A for a duration of Shutter Trip Time + Venetian Turn Time;

c) The motor reverses and returns to the starting percentage position and the repositioning is complete.

7 Special Rule of Each Command

7.1 Basic Command Class

Basic Set = 0x00 maps to Multilevel Switch Set, go to 0% position.
Basic Set = 0xFF maps to Multilevel Switch Set, go to 100% position.
Basic Set =0x01 to 0x63, go to 1% -99% position.
Basic Get/Report maps to Multilevel Switch Get/Report.
Basic Report = 0x00, at 0% position.
Basic Report = 0xFF, at 100% position.
Basic Report = 0xFE, unknown position.

7.2 Z-Wave Plus Info Report Command Class

Z-Wave Plus Version: 0x02

Role Type: 0x06 (ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_ALWAYS_ON)

Node Type: 0x00 (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)

7.3 Association Command Class

The Motor Contoller support 1 association groups and max 5 nodes.

Grouping Identifier	**Max Nodes**	**Send Commands**
Group 1(Lifeline)	0x05	**1. Basic Report** The Motor will send Basic Report(Configurable) when motor status changed. **2. Switch Multilevel Report** The Motor will send Switch Multilevel Report(Configurable) when motor status changed. **3. Device Reset Locally Notification** The Motor will send Device Reset Locally Notification when press Config button 2 times quickly and hold for at least 15 seconds and then release it **4. Central Scene Notification** The Motor will send Central Scene Notification (Configurable) when Button action. **5.Indiator Report.**
Group 2(On/Off Control)	0x05	**Basic Set** a. The Motor will send Basic Set when S1 or S2 Switch Short pressed.
Group 3(Multilevel Set)	0x05	**Switch Multilevel Set** a. The Motor will send Switch Multilevel Set when S1 or S2 Switch Short pressed.
Group 4(Multilevel Start/Stop)	0x05	**Switch Multilevel Start Level Change/ Switch Multilevel Stop Level Change** a. The Motor will send Switch Multilevel Start Level Change when S1 or S2 Switch press and hold. b. The Motor will send Switch Multilevel Stop Level Change when S1 or S2 Switch release. c. The Motor will send Switch Multilevel Stop Level Change when Config Button Short pressed and Motor is runing. d. The Motor will send Switch Multilevel Stop Level Change when S1 or S2 Switch Short pressed and Motor is runing.

7.4 Central Scene Capability

Motor should send the following **CentralSceneNotification** Reports when the indicated button is pressed the indicated number of times

External Button 1

Action	Report Content
Held	keyAttributes: 2, sceneNumber: 1 (Push Button Supported Only)
Released	keyAttributes: 1, sceneNumber: 1 (Push Button Supported Only)
1x	keyAttributes: 0, sceneNumber: 1

External Button 2

Action	Report Content
Held	keyAttributes: 2, sceneNumber: 2 (Push Button Supported Only)
Released	keyAttributes: 1, sceneNumber: 2 (Push Button Supported Only)
1x	keyAttributes: 0, sceneNumber: 2

Note: Only Push Button mode switch support Attribute Key Held Down/Key Released.

7.5 Indicator Command Class

The Receptacle support the Indicator Command Class, version 3 and support the Indicator ID 0x50 (Identify) and Properties ID 0x03, 0x04 and 0x05

7.6 Configuration Set Command Class

#	Name	Size	Range	Description	Default
1	Restores state after power failure	1	0~100	The state the Motor should return to once power is restored after power failure. 0 = off 1~99 = level is 1-99 100 = Returns to level before Power Outage	100
2	Led indicator load status	1	0~1	Led indicator load status. 0 = Disable 1 = Enable	1
3	Set the Motor mode	1	0~2	Set the Curtain Mode 0 = Shutter mode without positioning	1

				1 = Shutter mode with positioning 2 = Venetian mode	
4	Motor moving time	2	0~65535	Motor moving up/down time, unit is 10ms. 0 – moving time disabled (working with limit switches). 1~65536 = 10ms – 655350ms	6000(60 s)
5	Blade Turn Time (Venetian mode)	2	0~65535	Blade Turn Time (Venetian mode), unit is 10ms. 0 – moving time disabled (working with limit switches). 1~65536 = 10ms – 655360ms	150(1.5 s)
6	Moving time Calibration	1	0~2	Moving time Calibration 0 = Exit calibration 1 = Start Shutter Mode calibration 2 = Start Venetian Mode calibration	0
7	Set repositioning begins	1	0~1	Moving time Calibration 0 = Exit Repositioning 1 = Start Repositioning	0
8	External Switch control Way	1	0~1	Set the operation mode of external switch. 0 = Control Way 1 1 = Control Way 2 For detailed instructions for Operation Mode 1 and 2, see end of this table.	0
9	Enable External Switch Pair	1	0~1	Enable/disable to add the device to pair through External Switch. 0 = disable 1 = enable	1

10	Enable or Disable Scene	1	0~1	Enable/disable to send scene notification command when the switches S1 and S2 action. 0 = disable 1 = enable	0
11	Inverts the orientation of Motor	1	0~1	Inverts the orientation of both S1 and S2. Useful when the Motor is installed upside down. Essentially up becomes down and down becomes up. 0 = Disabled 1 = Enabled	0
12	Auto turn-on timer	4	0~4294967295	Automatically turns the motor up after this many minutes. When the motor is turned down a timer is started that is the duration of this setting. When the timer expires, the motor is turned up. 0 = timer disabled 1 ~ 65535 = (minutes) timer enabled	0
13	Auto turn-off timer	4	0~4294967295	Automatically turns the motor down after this many minutes. When the motor is turned up a timer is started that is the duration of this setting. When the timer expires, the motor is turned down. 0 = timer disabled 1 ~ 65535 = (minutes) timer enabled	0
14	Auto turn-on/off timer units	1	0~1	Timer for auto up seconds or minutes 0 = seconds 1 = minutes	0
15	External switch type for S1	1	0~2	External switch type for S2 0 = 2-state switch 1 = 3-way impulse control 2 = Momentary switch	0
16	External switch type for S2	1	0~2	External switch type for S2 0 = 2-state switch 1 = 3-way impulse control 2 = Momentary switch	0

17	Impulse time for par 15=1	1	2~200	Impulse time for par 15=1.	10
18	Impulse time for par 16=1	1	2~200	Impulse time for par 16=1.	10
19	Association Reports	1	0~1	To set which report would be sent to the associated nodes in association group 1 when the state of output load is changed. 0 = Z-Wave control: Switch Multilevel Report Manual control: Basic repor t 1 = Z-Wave control: Switch Multilevel Report Manual control: Switch Multilevel Report	1

Name	Info	Parameter Number	Default Value(dec)	Max Value(dec)	Min Value(dec)	Size	ReadOnly	Format	Altering capability
Restores state after power failure	Restores state after power failure	0x01	100	100	0	1	No read-only	Unsigned integer	false
Led indicator load status	Led indicator load status	0x02	1	1	0	1	No read-only	Unsigned integer	false
Set the Motor mode	Set the Motor mode	0x03	1	2	0	1	No read-only	Unsigned integer	false
Motor moving time	Motor moving time	0x04	1000	65535	0	2	No read-only	Unsigned integer	false
Blade Turn Time (Venetian mode)	Blade Turn Time (Venetian mode)	0x05	150	65535	0	2	No read-only	Unsigned integer	false
Moving time Calibration	Moving time Calibration	0x06	0	2	0	1	No read-only	Unsigned integer	false
Set repositioning begins	Set repositioning begins	0x07	0	1	0	1	No read-only	Unsigned integer	false
External Switch control Way	External Switch control Way	0x08	0	2	0	1	No read-only	Unsigned integer	false
Enable External Switch Pair	Enable External Switch Pair	0x09	1	1	0	1	No read-only	Unsigned integer	false
Enable or Disable Scene	Enable or Disable Scene	0x0A	0	1	0	1	No read-only	Unsigned integer	false
Inverts the orientation of Motor	Inverts the orientation of Motor	0x0B	0	1	0	1	No read-only	Unsigned integer	false
Auto turn-on timer	Auto turn-on timer	0x0C	0	4294967295	0	4	No read-only	Unsigned integer	false
Auto turn-off timer	Auto turn-off timer	0x0D	0	4294967295	0	4	No read-only	Unsigned integer	false

Auto turn-on/off timer units	Auto turn-on/off timer units	0x0E	0	1	0	1	No read-only	Unsigned integer	false
External switch type for S1	External switch type for S1	0x0F	0	2	0	1	No read-only	Unsigned integer	false
External switch type for S2	External switch type for S2	0x10	0	2	0	1	No read-only	Unsigned integer	false
Impulse time for par 15=1	Impulse time for par 15=1	0x11	10	200	2	1	No read-only	Unsigned integer	false
Impulse time for par 16=1	Impulse time for par 16=1	0x12	10	200	2	1	No read-only	Unsigned integer	false
Association Reports	Association Reports	0x13	1	1	0	1	No read-only	Unsigned integer	false

Control Way 1：

	Extern button 1			Extern button 2		
Current state	Stop	Moving to 100%	Moving to 0%	Stop	Moving to 0%	Moving to 100%
Press	Moving to 100%	Stop	NC	Moving to 0%	Stop	NC
Hold(Push Button Supported Only)	Moving to 100%	Moving to 100%	Moving to 100%	Moving to 0%	Moving to 0%	Moving to 0%
Relase(Push Button Supported Only)	Stop	Stop	Stop	Stop	Stop	Stop

Control Way 2：

	Extern button 1/ Extern button 2				
Current state	At 0%	Moving to 0%	Moving to 100%	At 100%	Stop
Press	Moving to 100%	Stop	Stop	Moving to 0%	Toggle
Hold(Push Button Supported Only)	Moving to 100%	Moving to 100%	Moving to 0%	Moving to 0%	Toggle
Relase(Push Button Supported Only)	Stop	Stop	Stop	Stop	Stop