SA301 UNIVERSAL MODULE WITH 3 In 3 Out

The Universal Module is used to translate wired products into wireless Z-Wave™ protocol, integrating them into the Z-Wave network of a smarthome environment. It has 3 sets of input terminals and 3 sets of relay output. Through the Universal Module, the Z-Wave Controller can read the input signal from wired sensors and control the output of wired actuators. This product can be operated in any Z-Wave network with other Z-Wave certified devices from other manufactures. All mains operated nodes within the network will act as repeater regardless of vender to increase reliability of the network.

Main features:

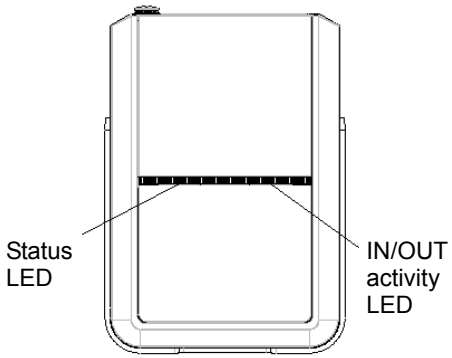
- 3 sets of input terminals, supporting dry contact or analog input
- Threshold level can be set for each input
- Notifies controller when input triggers
- 3 sets of relay output terminals, delivering NC/NO dry contact output*
- Output can be set to activate automatically when input terminals trigger
- Backup battery during power loss
- Notifies controller if power loss/recovers and when backup battery becomes low
- Tamper switch to detect removal from its mount
- Supports Z-Wave S2 security protocol with security-enabled Controller

*Note: Do not connect the output to high voltage AC mains (100V AC/220V AC).

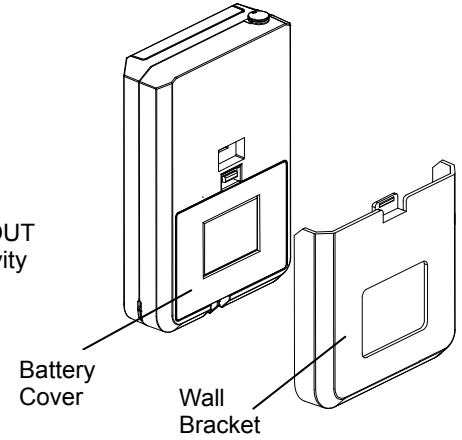
The SmartStart enabled products can be added into a Z-Wave network by scanning the Z-Wave QR code present on the product with a controller provide SmartStart include. No further action is required and the SmartStart product will be added automatically with in 10 minutes of being switched on in the network vicinity. But users should use Auto or Manual Inclusion if their controller does not support SmartStart.

Product Overview

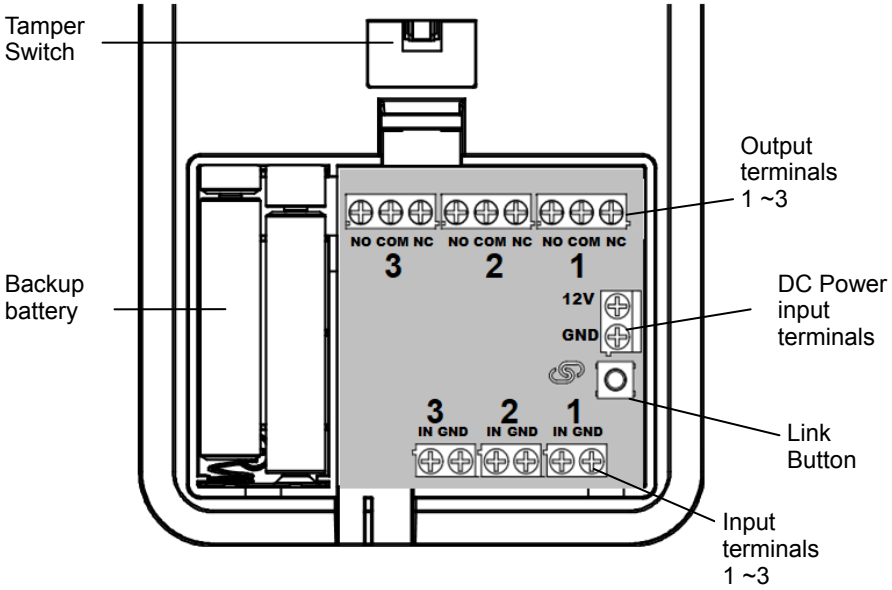
Front View



Rear View



View with Battery Cover removed



Adding to Z-Wave Network

Auto Inclusion

The Universal Module supports Auto Inclusion feature where it will automatically enter Inclusion mode when first powered up after a factory reset.

1. Remove its battery cover
2. Set the Z-Wave controller into Inclusion mode.
3. Insert the battery into the battery compartment. Note the correct polarity of battery as indicated.
4. The Status LED will start to blink. The duration of Inclusion mode is 30 seconds.
5. The Inclusion process should be completed when the LED stops blinking.

Note: If you are connecting this unit to a Z-Wave Controller that utilizes the S2 security protocol, you may be asked by your controller to enter a 5-digit PIN that is unique to each unit. This can be found in one of two places:
- on the QR code label on the back of the unit
- on the insert card inside the packaging.

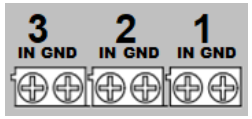
If Auto Inclusion fails, refer to the Troubleshooting section regarding Manual Inclusion.

Connecting wired devices

1. Connect the terminals to external devices according to input or output channels

Input channels

Channels IN1, IN2, IN3, each with its GND terminals.



Input type specification :

- Analog : 0~12V
- Digital : 0~12V
- Dry contact output, NC (Normally Close) and NO (Normally Open) type
- Open collector transistor

Features:
- Selectable voltage level trigger threshold (see Configuration settings)
- Internal pull high voltage 3.3V enable/disable
- Input over voltage protection (works even if input voltage is over supply voltage)
- periodic report of voltage level to gateway
- Configure for alarm panels (see Parameter 18 in Configuration settings)

Output channels

Channel OUT1, OUT2, OUT3 each with NO-COM-NC terminals

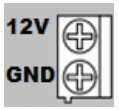
Output specification:
- SPDT type relay
- Relay current limit as follows (at 24V DC)

Relay	NO terminal	NC terminal
OUT1	10A	5A
OUT2	3A	3A
OUT3	3A	3A

Note: not suitable for AC mains high voltage applications such as 100VAC/220VAC.

Features:
- Configurable timer to automatically turn off after preset period (default is 500msec)
- Output can be set to activate automatically when input terminals trigger (see Configuration setting No. 1, 6, 11)

2. Power : Connect an external DC power source, 9V~12V range. Typical 12V / 1A min.



Operation

LED display

Table below describe the LED indication:

Status LED:

LED display	Indicates
ON, Red	External DC power connected
Slow blink, Red, every 3 secs	External DC power disconnected, running on backup battery
Slow blink, Green, every 2 secs	Factory reset state
Fast blink, Green, every 1 secs	Z-Wave Inclusion/Exclusion

3. IN/OUT Activity LED:

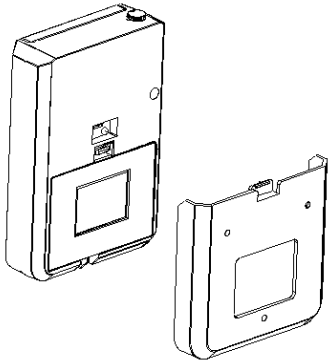
LED display	Indicates
Blink green, twice	Input signal detected
Blinks red, twice	Relay output activated

Tamper Protection:
Pressing the tamper switch over 6 secs activates the tamper detection mechanism. Once activated, releasing the switch will send a notification to the Controller, and if configured, will activate relay on OUT1~ 3. (see Configuration setting No. 17)

Mounting the Unit

The Universal Module can be used only in an indoor environment

1. After wiring the terminal blocks, route the wires neatly through the slot at the bottom of the unit.
2. If necessary, fit 4 AAA size 1.5 alkaline batteries to the battery compartment.
3. Place the rear cover to the battery compartment.
4. To mount the unit to the wall, first use the wall bracket supplied as a template to mark and drill the position of two mounting holes on the wall.
5. Secure the bracket to the wall using the plastic wall plugs and fixing screws provided.
6. Slide the unit down to its bracket to secure into place. This will also activate the Tamper protection.



Programming

Z-Wave specification

1. Z-Wave protocol : SDK 6.81.06
2. Support SmartStart ; activated when powered on.
3. Supports firmware update by OTA.

Endpoint description

	Root	Endpoint 1~3	Endpoint 4~6
Role Type	Always On Slave		
Device Type	Notification Sensor	Notification Sensor	Binary Switch
Generic Type	Sensor Notification	Sensor Notification	Binary Switch
Specific Type	Notification Sensor	Notification Sensor	Not Used
Requested security keys	S0、S2 Un-Authenticated、S2-Authenticated		

Endpoint	Basic Command	Mapped
1~3	Basic Command	no
4~6	Basic Set (value)	Binary Switch Set (Value)
4~6	Basic Report(Value)	Binary Switch Report (Value)

Z-Wave Plus Info

Endpoint	Role Type	Node Type	Installer Icon	User Icon
Root	Slave Always On	Z-Wave Plus node	Notification type Home Security	Notification type Home Security
1~3	Slave Always On	Z-Wave Plus node	Notification type Home Security	Notification type Home Security
4~6	Slave Always On	Z-Wave Plus node	On/Off Power Switch Device Type	On/Off Power Switch Device Type

AGI (Association Group Information)

Group	Name	Max Node	Supports the following command classes
1	Lifeline	5	1. Device Reset Locally 2. Notification Report 3. Switch Binary Report 4. Sensor Multilevel Report 5. Battery Report
2	Alarm IN 1	5	Mirror of endpoint 1, group 2
3	Alarm IN2	5	Mirror of endpoint 2, group 2
4	Alarm IN3	5	Mirror of endpoint 3, group 2

Association Command Class

- Multi Channel Association Command Class

Group	Name	Max Node	Supports the following command classes
1	Lifeline	5	1. Device Reset Locally 2. Notification Report 3. Switch Binary Report 4. Sensor Multilevel Report 5. Battery Report
2	Alarm IN 1	5	Mirror of endpoint 1, group 2
3	Alarm IN2	5	Mirror of endpoint 2, group 2
4	Alarm IN3	5	Mirror of endpoint 3, group 2
Endpoint 1			
1	Lifeline	0	Mirror of root device
2	Alarm IN 1	5	Basic Set
Endpoint 2			
1	Lifeline	0	Mirror of root device
2	Alarm IN2	5	Basic Set
Endpoint 3			
1	Lifeline	0	Mirror of root device
2	Alarm IN3	5	Basic Set

For Association Groups 2, 3 and 4 :
When signal input is detected in ports IN1~3, SA301 will first send a BASIC Set ON. When the preset timer is up, it will send a BASIC Set OFF.

Multi Channel：Root map (Association Group Information)

Sensor Multilevel Command Class	Endpoint 1
Switch Binary Command Class	Endpoint 4
Basic Command Class	Endpoint 4

Version

Protocol Library	Slave_Enhance_232_Library
Protocol Version	SDK 6.81.06 or later
Firmware 0 Version	xVy (x=1,y=0 means 1V0)
Hardware Version	1

Manufacturer data

Manufacturer ID	Product Type	Product ID
0x0060	0x0016	0x0001

Command Classes

The module supports Command Classes including…

Non-SecureNode Info

- COMMAND_CLASS_ZWAVEPLUS_INFO_V2
- COMMAND_CLASS_ASSOCIATION_V2
- COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3
- COMMAND_CLASS_ASSOCIATION_GRP_INFO_V1
- COMMAND_CLASS_MULTI_CHANNEL_V4
- COMMAND_CLASS_TRANSPORT_SERVICE_V2
- COMMAND_CLASS_VERSION_V3
- 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_V4
- COMMAND_CLASS_NOTIFICATION_V8
- COMMAND_CLASS_SENSOR_MULTILEVEL_V5
- COMMAND_CLASS_SWITCH_BINARY
- COMMAND_CLASS_CONFIGURATION
- COMMAND_CLASS_BATTERY

Endpoint 1~3

- COMMAND_CLASS_ZWAVEPLUS_INFO_V2,
- COMMAND_CLASS_NOTIFICATION_V8,
- COMMAND_CLASS_SENSOR_MULTILEVEL_V5,
- COMMAND_CLASS_ASSOCIATION_V2,
- COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3,
- COMMAND_CLASS_ASSOCIATION_GRP_INFO,
- COMMAND_CLASS_SUPERVISION

Endpoint 4~6

- COMMAND_CLASS_ZWAVEPLUS_INFO_V2,
- COMMAND_CLASS_SWITCH_BINARY,
- COMMAND_CLASS_ASSOCIATION_V2,
- COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3,
- COMMAND_CLASS_ASSOCIATION_GRP_INFO,
- COMMAND_CLASS_SUPERVISION

Z-Wave Configuration Settings

For IN-1, OUT1

Config. No.	Name	Default Value	Description
1	IN1 Mode	Bit [7..4][3..0] 0x40 (64)	Size =1, Default Value = 0x40 **Bit 7**：Corresponds to values in Config 4, 5 - 0 = Trigger on when voltage under Low-threshold, Trigger off when over Hi-threshold - 1 = Trigger on when voltage over Hi-threshold, Trigger off when under Low-threshold **Bit 6**：IN1 3.3V pull-high On/Off , 0 = Off, 1 = On **Bit 5-4**：Fixed at 0. **Bit 3**：1 = Activate OUT3 relay when IN1 trigger **Bit 2**：1 = Activate OUT2 relay when IN1 trigger **Bit 1**：1 = Activate OUT1 relay when IN1 trigger **Bit 0**：Fixed at 0.
2	OUT1 relay Trigger ON time	0x05 (5)	Relay1 turn on period. Size =1, Default Value = 0x05 (500ms) Step of 100ms, '0' = remain on
3	Group 2 turn on time when triggered by IN1	0xB4 (180)	Group 2 turn on period. Size =1, Default Value = 0xB4 (Off after 180 secs) Step of 1 sec, '0' = remain on
4	IN1 Hi-threshold Voltage Trigger Level	0x19 (25)	High threshold voltage level for trigger on (or trigger off, depending on mode). Size =1, Default Value = 0x19 (IN1 trigger off when over 2500mV). Step of 100mV.
5	IN1 Low-threshold Voltage Trigger Level	0x0A (10)	Low threshold voltage level for trigger on (or trigger off, depending on mode). Size =1 Default Value = 0xA (IN1 trigger on when under 1000mV)

For IN-2, OUT2

6	IN2 Mode	0x40 (64)	Same as for IN1 **Bit 7**：Corresponds to values in Config 9, 10
7	OUT2 relay Trigger ON time	0x05 (5)	Same as for OUT1 relay but applies to OUT2
8	Group 3 turn on time when triggered by IN2	0xB4 (180)	Same as Group 2 but applies to Group 3 with IN2
9	IN2 Hi-threshold Voltage Trigger Level	0x19 (25)	Same as for IN1 but applies to IN2
10	IN2 Low-threshold Voltage Trigger Level	0x0A (10)	

For IN-3, OUT3

11	IN3 Mode	0x40 (64)	Same as for IN1 **Bit 7**：Corresponds to values in Config 14, 15
12	OUT3 relay Trigger ON time	0x05 (5)	Same as for OUT1 relay but applies to OUT3
13	Group 4 turn on time when triggered by IN3	0xB4 (180)	Same as Group 2 but applies to Group 4 with IN3
14	IN3 Hi-threshold Voltage Trigger Level	0x19 (25)	Same as for IN1 but applies to IN3
15	IN3 Low-threshold Voltage Trigger Level	0x0A (10)	

OTHERS

16	Auto Report Voltage time	0x1E (30)	Periodic auto report for voltage input at IN1~3. Size =1, Default Value = 0x1E (30mins) Step= 1 min.
17	Tamper Mode	0x00	Size =1, Default Value = 0x00 **Bit 3**：1 = Activate OUT3 Relay when Tamper **Bit 2**：1 = Activate OUT2 Relay when Tamper **Bit 1**：1 = Activate OUT1 Relay when Tamper
18	Set ARM/DISARM Input	0x00	0: No ARM/DISARM Input 1: IN 1 is ARM/DISARM Input 2: IN 2 is ARM/DISARM Input 3: IN 3 is ARM/DISARM Input

Notification report

1. Notification report are sent during these events:

Event		Type	Event	Length	Parameters
Signal Input trigger ON		0x07	0x02	0x00	
Signal Input trigger OFF		0x07	0x00	0x01	0x02
Tamper Open		0x07	0x03	0x00	
Tamper Close (pressed over 6 secs)		0x07	0x00	0x01	0x03
If IN1~3 is set as Arm/DISARM in Config #18 above	ARM (manual Lock)	0x06	0x01	0x00	
	DISARM (manual unlock)	0x06	0x02	0x00	
Power on		0x08	0x01	0x00	
Mains Power Disconnected		0x08	0x02	0x00	
Mains Power Re-connected		0x08	0x03	0x00	

2. Sensor Multilevel report : Voltage level at Signal Input (periodic report)

3. Switch Binary : Reports when relays at OUT1~3 turns on/off. (For automatic turn off, there will be a 2 secs delay after the turn off is complete).

4. Backup Battery level report. Notification will be sent when battery reaches low level.

Battery report values	Description
20～100	Battery Level %
0xFF	Low Battery

5. At reset, A "Device Reset Locally" message will be sent to Gateway when SA301 is reset.

Troubleshooting

The table below lists the several steps involved when adding or removing the voice siren from the Z-Wave network.

Action/Status	Description	Status LED indication
No node ID	The Z-Wave Controller does not allocate a node ID to the unit.	Slow Blink in Green, 2-second on, 2-second off
Auto Inclusion	The power is applied for the first time and no node ID has been stored in the module, or after executing reset.	
Manual Inclusion	1. Put the Z-Wave Controller into inclusion mode. 2. Press the Link button 3 times within 1.5 seconds to put the unit into inclusion mode.	

Exclusion	1. Put the Z-Wave Controller into exclusion mode.	
	2. Press the Link button 3 times within 1.5 seconds to put the unit into exclusion mode.	
Factory Reset (This procedure should only be used when the controller is inoperable.)	1. Press the Link button 3 times within 1.5 seconds to put the unit into exclusion mode.	
	2. Within 1 second of step 1, press the Link button again and hold for 5 seconds.	
	3. Node ID is excluded. The unit reverts to factory default state.	2-second on, 2-second off For 2 minutes
※ Failed or successful results in including/excluding the ID can be viewed on the Z-Wave Controller.		

Note: If you are connecting this unit to a Z-Wave Controller that utilizes the S2 security protocol, you may be asked by your controller to enter a 5 digit PIN that is unique to each unit. This can be found in one of two places:
- on the QR code label on the back of the unit
- on the insert card inside the packaging

Table below lists typical problems encountered:

Symptom	Possible Cause	Recommendation
Cannot carry out inclusion and association	Device has been paired to other Z-Wave controller.	1. Perform Exclusion from other controller first then carry out inclusion with new controller. 2. Perform Factory Reset on device and then carry out Inclusion with new controller
	Device is out of range.	1. Relocate the controller closer to the unit. 2. Install a Z-Wave repeater such as smart plugs or other AC devices that can operate as a Repeater.

Specifications

Power	9V-12V DC, 1A min.
Battery	AAA battery x 4
Range	Up to 100 meters line of sight
Frequency Range	EU: 868.42HMz, US: 908.42 MHz
Operating temperature	-10 ~ 40℃
Operating humidity	0 ~ 80%RH
Dimensions	143mm x 100mm x 32 mm

Specifications are subject to change without notice

Federal Communication Commission Interference 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 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.

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

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Industry Canada statement:
This device complies with ISED's license-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d' ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement:
This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations:
Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

WARNING:
Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available.
If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being.
When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliance for disposal at least for free of charge.

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