

ZigBee Light Switch: LS-1-ZBS(R) Series

Introduction

LS-1-ZBS(R) ZigBee Light Switch series include Master Light Switch and Slave Light Switch models. Depending on the models selected, the light switch can be deployed in single or 3-way installation according to requirement.

The Light Switch package is designed to be used in new installations or replace existing 3-way light switch to achieve home automation. After joining ZigBee network, the Light Switch package can be controlled via ZigBee network to activate remotely turn on/off household lighting.

The Master Light Switch utilizes ZigBee technology for wireless signal transmission. ZigBee is a wireless communication protocol that is reliable, has low power consumption and has high transmission efficiency. Based on the IEEE802.15.4 standard, ZigBee allows a large amount of devices to be included in a network and coordinated for data exchange and signal transmission.

The Master Light Switch can also be bound to a ZigBee Controller to toggle On/Off the connected lighting.

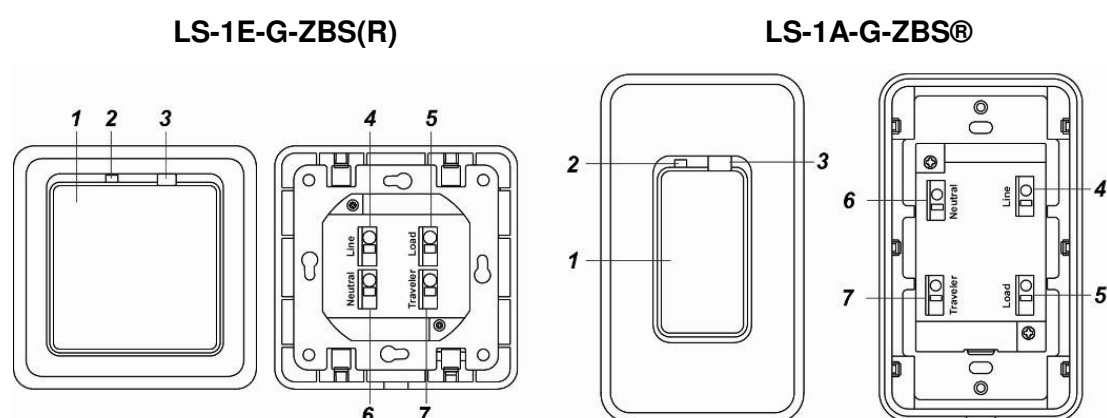
Models with router function (LS-1A-G-ZBSR and LS-1E-G-ZBSR) also serve as a router in the ZigBee network. After being included in the ZigBee network, it allows other ZigBee device to join the network through the Light Switch.

Caution

The devices are intended for installation in accordance with the local wiring regulations such as the National Electric Code in the United States, the Canadian Electrical Code, or CSA C22.1, etc.. If you are unsure or uncomfortable about installing this device, please consult a qualified electrician in your area.

Parts Identification

Master Light Switch: LS-1A/E-G-ZBS(R)



1. Function Button

- Pressing the button to toggle on/off the switch.
- Press and hold the button for 10 seconds then release to reset the Light Switch.
- Press and hold the button for 3 seconds then release to bind with a controller

2. LED indicator

The LED indicator is used to indicate Light Switch status:

- On:
The Light Switch is turned off.
- Off:
The Light Switch is turned on.
- Flashes twice:
The Light Switch has successfully joined a ZigBee network.
- Flashes five times
The Light Switch has successfully bound with a controller
- Flashes every 20 minutes

The Light Switch has lost connection to its current ZigBee network (**LS-1A-G-ZBS / LS-1E-G-ZBS only**)

- Flashing continuously
The Light Switch is overheated.

3. Air Gap Switch

- Pulled out:
Completely removes the power available to the load. This enables the connected lighting (bulb, tube, etc.) that is controlled by the light switch to be changed with minimal danger of electrical shock.
Use a flat-head screwdriver to pull the switch out.
- Pushed in:
For normal operation of the light switch.

Connection Terminals

Insert a flat-head screwdriver to open the clipper for each terminal and connect wiring. Remove the screwdriver to close the clipper and hold wire in place.

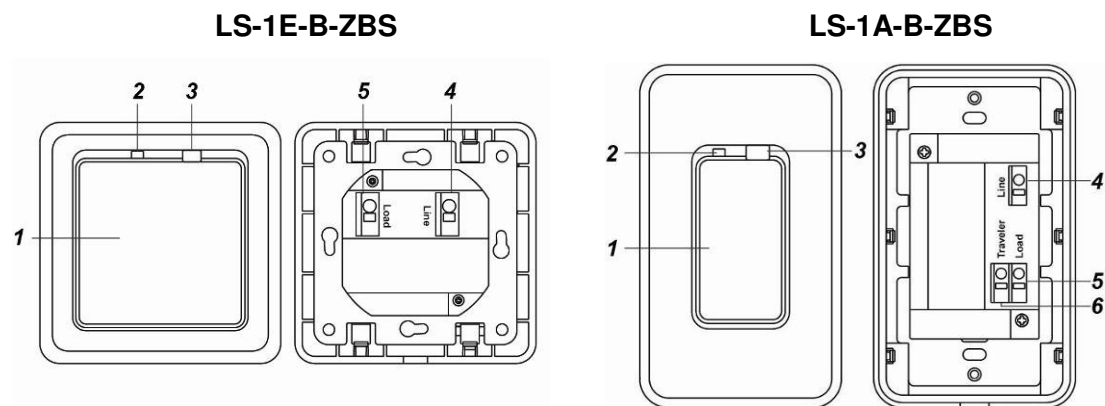
4. Line Terminal

5. Load Terminal

6. Neutral Terminal

7. Travel Terminal

Master Light Switch: LS-1A/E-B (Rechargeable Battery)



1. Function Button

- Pressing the button to toggle on/off the switch.
- Press and hold the button for 10 seconds then release to reset the Light Switch.
- Press and hold the button for 3 seconds then release to bind with a controller

2. LED indicator

The LED indicator is used to indicate Light Switch status:

- On:
The Light Switch is turned off.
- Off:
The Light Switch is turned on.
- Flashes twice:
The Light Switch has successfully joined a ZigBee network.
- Flashes five times
The Light Switch has successfully bound with a controller
- Flashes every 20 minutes
The Light Switch has lost connection to its current ZigBee network (**LS-1A-B-ZBS only**)

3. Air Gap Switch

- Pulled out:

Completely removes the power available to the load and charges the rechargeable battery of the Light Switch. This enables the connected lighting (bulb, tube, etc.) that is controlled by the light switch to be changed with minimal danger of electrical shock.

For the first time installation of LS-1A-B Light Switch, Air Gap Switch must be ***pulled out*** to charge the rechargeable battery of the Light Switch.

Use a flat-head screwdriver to pull the switch out.

- Pushed in:

For normal operation of the light switch.

Connection Terminals

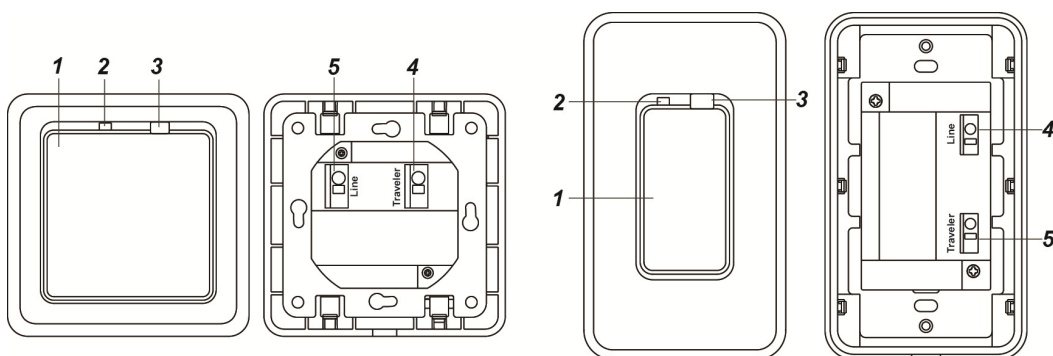
Insert a flat-head screwdriver to open the clipper for each terminal and connect wiring. Remove the screwdriver to close the clipper and hold wire in place.

4. Line Terminal

5. Load Terminal

6. Travel Terminal (LS-1A-B-ZBS Only)

Slave Light Switch: LS-1A/E-S



1. Switch Button

- Pressing the button to toggle on/off the connected lighting.

2. LED indicator

The LED indicator is used to indicate Light Switch status:

- On:

The Light Switch is turned off.

- Off:

The Light Switch is turned on.

3. Air Gap Switch

- Pulled out:

Completely removes the power available to the load. This enables the connected lighting (bulb, tube, etc.) that is controlled by the light switch to be changed with minimal danger of electrical shock.

Use a flat-head screwdriver to pull the switch out.

- Pushed in:

For normal operation of the light switch.

Connection Terminals

Insert a minus screwdriver to open the clipper for each terminal and connect wiring. Remove the screwdriver to close the clipper and hold wire in place.

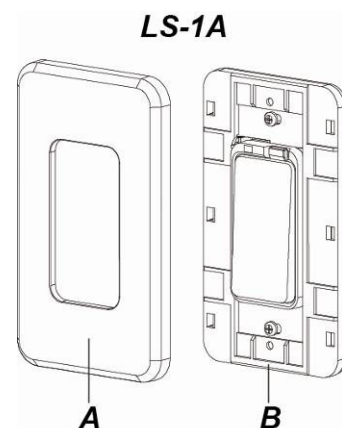
4. Line Terminal

5. Travel Terminal

Front Cover

A. Switch Cover

B. Light Switch Base



Installation

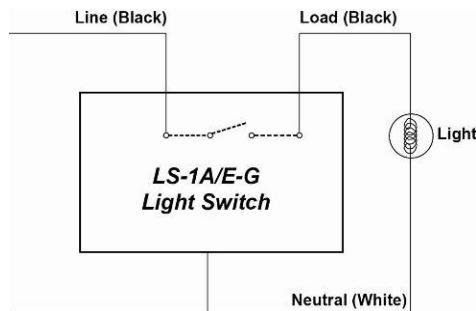
● **Wiring**

The insertion holes' wiring specification is AWG 14-24 or Ø 2.08-0.205 (mm²).

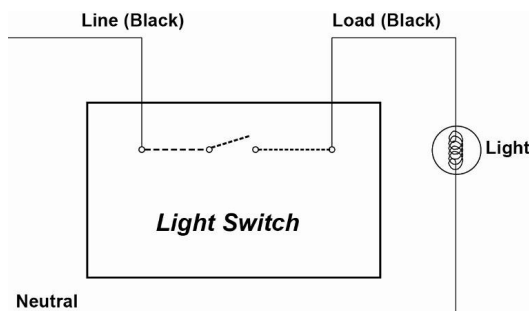
- Please make sure the main power is switched off (to prevent electrical shock). It is also recommended that you have an electrical tester to test whether the wires are hot or not.
- If applicable, remove the previously installed Light Switch first.
- Follow the schematics below to wire the Light Switch according to the desired installation.
- To connect the wires, insert a flat-head screwdriver to open the clipper for each terminal and connect wiring. Remove the screwdriver to close the clipper and hold wire in place.

Please note that the wiring color below are for references only, consult an electrician if you have trouble identifying the terminals of the desired wiring circuit or if you do not feel confident to convert the circuit.

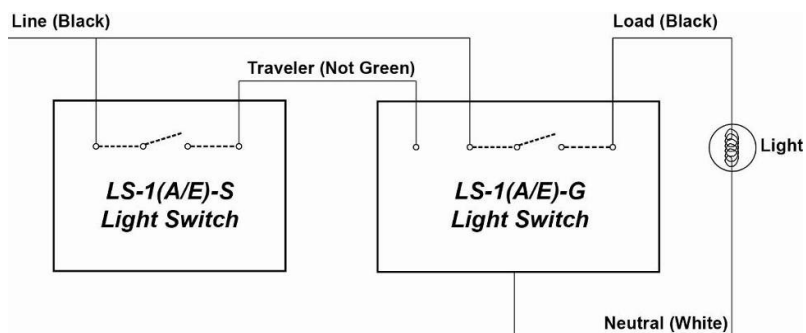
Single Switch Wiring (One Switch, One Load) using LS-1A/E-G-ZBS(R)



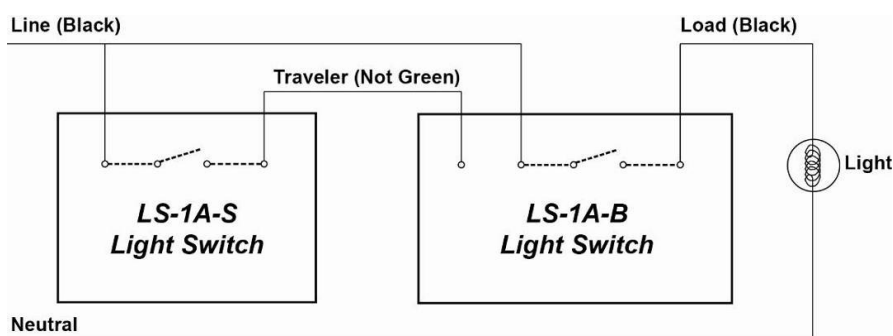
Single Switch Wiring (One Switch, One Load) using LS-1A/E-B-ZBS



3-Way Wiring (Two Switches, One Load) using LS-1A-G-ZBS and LS-1A-S or LS-1E-G-ZBS and LS-1E-S



3-Way Wiring (Two Switches, One Load) using LS-1A-B-ZBS and LS-1A-S

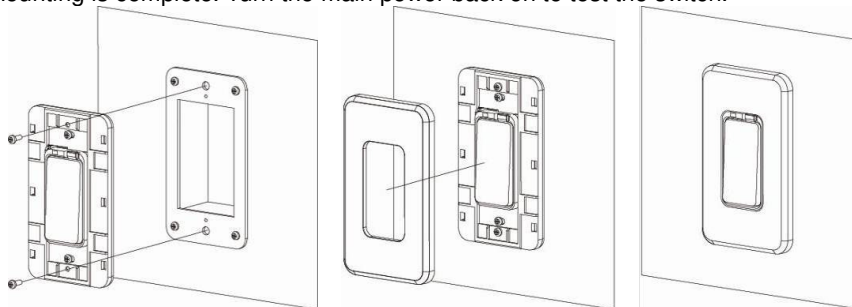


● **Mounting**

After connecting the wires, follow the steps below to mount the Light Switch on the wall. Usually, the wires are freely exposed (before connected) inside the hole of the wall. For some configurations, there is a box inside where the wires can be placed. The wall or box may also have one top screw hole and one bottom screw hole.

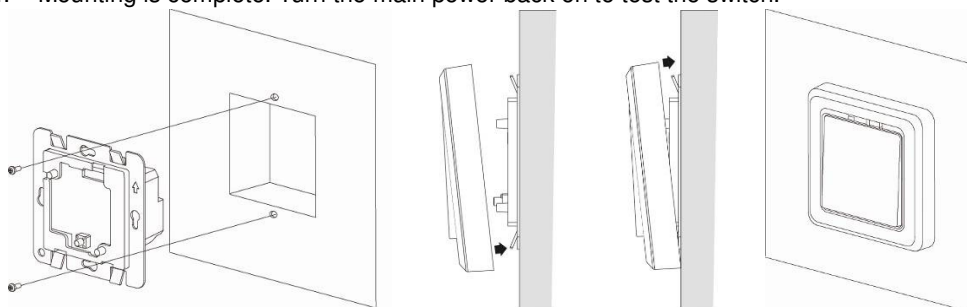
LS-1A Mounting

1. Insert the Light Switch Base into the hole (or box) in the wall and tighten the top and bottom screws using a Philips screwdriver as shown in diagram 1.
2. Push the Switch Cover onto the Light Switch as shown in diagram 2. If the Switch Cover is stabilized onto the switch, you should hear a Click sound.
3. Mounting is complete. Turn the main power back on to test the switch.



LS-1E Mounting

1. Insert the Light Switch Base into the hole (or box) in the wall and tighten the top and bottom screws using a Philips screwdriver.
2. Slide the Switch Cover from the bottom towards the Base to stabilize the Light Switch.
3. Push the Switch Cover onto the Light Switch Base. If the Switch Cover is stabilized onto the switch, you should hear a Click sound.
4. Mounting is complete. Turn the main power back on to test the switch.



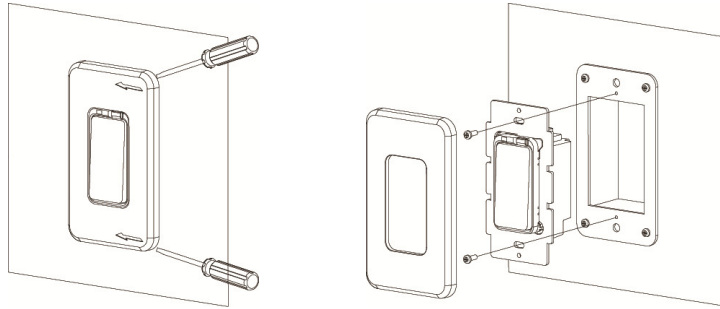
● **Dismounting**

Follow the steps below to dismount the Light Switch:
Please make sure the main power is switched off.

LS-1A Dismounting

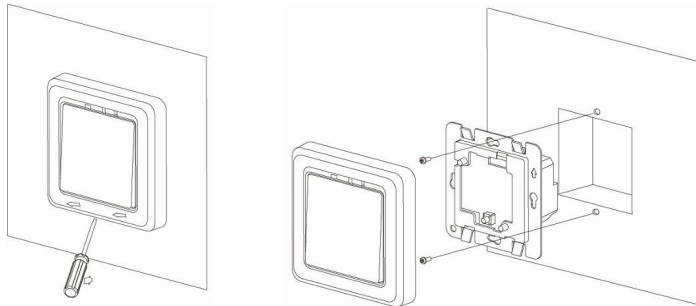
1. Insert a flat-head screwdriver to one corner of the Switch Cover and lift the Switch Cover.
2. Insert a flat-head screwdriver to another corner of the Switch Cover and lift the Switch Cover.
3. Lift the Switch Cover gently from the lifted side.
4. Lift the Switch Cover completely.

5. Loosen the top and bottom screws using a Philips screwdriver and remove the Light Switch Base.



LS-1A Dismounting

1. Insert a flat-head screwdriver to the caved in area of the Switch Cover and carefully lift the Switch Cover.
2. Slide the Switch Cover downwardly from the Base to remove the Switch Cover completely.
3. Loosen the top and bottom screws using a Philips screwdriver and remove the Light Switch Base.



ZigBee Network Setup (Master Switch only)

● ***ZigBee Device Guideline***

ZigBee is a wireless communication protocol that is reliable, has low power consumption and has high transmission efficiency. Based on the IEEE802.15.4 standard, ZigBee allows a large amount of devices to be included in a network and are coordinated for data exchange and signal transmission.

● ***Joining the ZigBee Network***

As a ZigBee device, the Master Light Switch needs to join a ZigBee network to receive commands. Please follow the steps below to join the Light Switch into a ZigBee network.

1. Connect power to the Light Switch according to Installation instruction above.
2. Press and hold the function button for 10 seconds as the Light Switch resets and starts searching for existing ZigBee network. Please make sure the permit-to-join feature on the router or coordinator of your ZigBee network is enabled.
3. If the Light Switch successfully joins a ZigBee network, the LED Indicator will flash twice.
4. After joining the ZigBee network, the Light Switch will be registered in the network automatically. Please check the ZigBee network coordinator, system control panel or CIE (Control and Indicating Equipment) to confirm if joining and registration is successful.
5. After joining the ZigBee network, if the Light Switch loses connection to the current ZigBee network, the LED indicator will flash every 20 minutes. Please check your ZigBee network condition and Light Switch signal range to correct the condition.

● ***Binding with Controller***

After joining the ZigBee network, the Master Light Switch can bind itself with a controller device which can be used to toggle on/off the connected lighting. To bind the Light Switch and the device:

1. Press and hold the Function Button for 3 seconds, then release the button. The Light Switch will send binding request to the coordinator.
2. Refer to your controller manual to send binding request for the device within 16 seconds.
3. If binding is successful, the Light Switch LED indicator will flash 5 times to confirm. You can now use the controller to toggle on/off the connected lighting.

- **Factory Reset**

If you want to remove the Light Switch from current network and join a new network, you need to use the Factory Reset function to clear the Light Switch from its stored setting and information first before it can join another network. To perform Factory Reset:

1. Press and hold the switch button for 10 seconds, release the button when the LED Indicator flashes once.
2. The Light Switch has been reset to factory default setting with all its previous network information removed. It will now actively search for available ZigBee network again and join the network automatically.
3. If the Light Switch successfully joins a ZigBee network, the LED Indicator will flash twice to indicate.

- **ZigBee Router Device Capacity (LS-1A-G-ZBSR / LS-1E-G-ZBSR Only)**

The Light Switch models with Router function (**LS-1A-G-ZBSR / LS-1E-G-ZBSR**) allow other ZigBee devices to join the ZigBee Network through the Router. The Light Switch Router has a maximum capacity of 40 devices/routers.

Features

- **Power Supply**

LS-1A/E-G-ZBS(R): The Light Switch is powered by the AC connections.

LS-1A/R-B-ZBS: The Light Switch uses a rechargeable battery pack as its main power source.

When the Light Switch is turned on, the Light Switch is powered by the rechargeable battery pack. Whenever the Light Switch is turned off or when the Air Gap Switch is pulled out, AC connection will start charging the battery pack. For the initial setup of LS-1A-B, please pull the Air Gap Switch out (using a flat-head screwdriver) and charge its rechargeable battery for at least 30 minutes. Please make sure Line, Load and the light bulb (or tube) are fully connected to ensure the battery is being charged.

- **Low Battery Detection (LS-1A/E-B-ZBS only)**

When the Light Switch is low on battery, it will transmit low battery signal along with the supervision signal to the ZigBee network coordinator or control panel to warn the user(s).

- **Supervision**

The Light Switch will transmit a supervision signal to report its condition regularly every 30 minutes. The user can also press the Function Button once to transmit a supervision signal manually.

Operation

- **Light Switch Control**

- After the Master Light Switch has successfully joined a ZigBee network, the coordinator/control panel can remotely control the Light Switch to toggle the connected lighting between On and Off. Please refer to your ZigBee coordinator/control panel for detail.
- You can also press the button on the Light Switch to toggle on/off the connected lighting.
- If you have bound a controller with the Light Switch, you can also use the controller to turn on/off the connected lighting.
- If there is a power shortage (e.g. wiring disconnected), its previous on/off status will be restored within 1 minute after the power is restored.

- **Maximum Operation Load**

- The Master Light Switch has a maximum capacity of **5A**.
- If the LS-1A-G-ZBS or LS-1E-G-ZBS(R) Light Switch is overheated, the circuit will cut off automatically as the connected lighting will turn off. The LED will start to flash.
During the overheated period, users cannot switch the light on (whether controlled by the ZigBee coordinator, controller or pressing the function button).
The LED will stop flashing when the Light Switch returns to normal operation condition. The Light Switch can then be turned on again.
- A fuse is installed in the LS-1A/E-B-ZBS Light Switch to protect from the harmful effects of over-currents. The fuse will blow if the connection causes an over-current.

Appendix (For developers only)

Light Switch Cluster ID

Device ID: Mains Power Outlet :0x0009	
Endpoint:0x0A	
Server Side	Client Side
Mandatory	
Basic (0x0000)	None
Identify(0x0003)	
Groups(0x0004)	
Scenes(0x0005)	
On/Off(0x0006)	
Optional	
Power Configuration(0x0001) (LS-1A-B only)	None

• Attribute of Basic Cluster Information

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0000	<i>ZCLVersion</i>	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x01	M
0x0001	<i>ApplicationVersion</i>	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x00	O
0x0003	<i>HWVersion</i>	Unsigned 8-bit integer	0x00 – 0xff	Read only	0	O
0x0004	<i>ManufacturerName</i>	Character String	0 – 32 bytes	Read only	Climax Technology	O
0x0005	<i>ModelIdentifier</i>	Character String	0 – 32 bytes	Read only	(Model Version)	O
0x0006	<i>DateCode</i>	Character String	0 – 16 bytes	Read only		O
0x0007	<i>PowerSource</i>	8-bit	0x00 – 0xff	Read only		M
0x0010	<i>LocationDescription</i>	Character String	0 – 32 bytes	Read / Write		O
0x0011	<i>PhysicalEnvironment</i>	8-bit	0x00 – 0xff	Read / Write	0x00	O
0x0012	<i>DeviceEnabled</i>	Boolean	0x00 – 0x01	Read / Write	0x01	M

• Attribute of Identify Cluster Information

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0000	<i>IdentifyTime</i>	Unsigned 16-bit integer	0x00 – 0xffff	Read / Write	0x0000	M

• Attributes of the Groups cluster Information

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0000	<i>NameSupport</i>	8-bit bitmap	x0000000	Read only	-	M

• Attributes of the Scenes cluster Information

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0000	<i>NameSupport</i>	8-bit bitmap	x0000000	Read only	0x00	M
0x0001	<i>CurrentScene</i>	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x00	M
0x0002	<i>CurrentGroup</i>	Unsigned 16-bit Integer	0x0000 – 0xffff7	Read only	0x00	M
0x0003	<i>SceneValid</i>	Boolean	0x00 – 0x01	Read only	0x00	M
0x0004	<i>NameSupport</i>	8-bit bitmap	x0000000	Read only	-	M

• Attribute of On/Off Cluster Information

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0000	<i>OnOff</i>	Boolean	0x00 – 0x01	Read only	0x00	M

• Attribute of Power Configuration Cluster Information (LS-1A-B only)

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0035	<i>BatteryAlarmMask</i>	Bitmap	0	Read / Write	0	O

Federal Communication Commission Interference Statement

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: To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example – use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

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

The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

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.