SE Devices – AMD / AD1-10V v3

Standalone Dimmer Z-Wave Units

User Manual

Introduction

The SE Devices Standalone Z-Wave Dimmers are a series of units which can be used to add remote control functionality to an electrical installation. The units are designed to be hidden within Wall Boxes and is exclusively controlled via a Z-Wave network.

This product can be operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers. All non-battery operated nodes within the network will act as repeaters regardless of vendor, to increase reliability of the network. The devices are Security Enabled Z-Wave Plus Products. A Security Enabled Z-Wave Controller must be used to fully utilize the products.

There are 2 different dimmer units available; 230V Mosfet Dimmer and 1-10V Dimmer. They are designed to be remote controlled by Z-Wave controllers, or by other Z-Wave devices via Association. Both Dimmer units are functionally identical seen from a Z-Wave perspective, and the only difference is the Dimmer control technology implemented by the device.

DISCLAIMER and WARNINGS

The SE Devices Standalone Z-Wave Devices are powered from Mains voltage (230V), and MUST ONLY be installed by authorized electricians. Mains Voltage is very dangerous and can cause serious injury or death if mishandled. If the devices are not correctly installed, the devices can in the worst case pose a fire hazard.

SE Devices can NOT be held responsible for injuries or accidents resulting from incorrect installation and configuration, or installations performed by unauthorized installers.

The SE Devices units provide functionality for automatic shut-down in overload situations. SE Devices can however not be held responsible for any damage caused by controlled light fixtures, even when configuration and installation is technically correct. Always hire professionals to install the devices, to reduce the risk of damage caused by the heating system.

Installation

Please refer to the “Standalone Z-Wave Devices” Installation Manual, for information on device assembly and installation.

Basic Default Operation

Both Dimmer Standalone Units are functionally identical, and provides functionality for remote controlling Light intensity. They do however use two different technologies for controlling the Light Level:

- **230V Mosfet Dimmer**
  This device use AC Phase cutting technology, to limit the power output for a Light Fixture, causing the Light Level to become controllable. The dimmer unit works with most 230V light fixtures, except fluorescent types. Standard bulbs, Halogen Bulbs and most Dimmable LED lights are mostly compatible with this dimmer.

- **1-10V Dimmer**
  This dimming technology uses a 1-10V control signal to control Light Fixtures, and a Relay for ON/OFF control. It is required that the Light Fixture is fitted with a 1-10V driver unit, which is normally an integrated part of such fixtures. This dimmer will NOT work correctly with standard Light Fixtures.

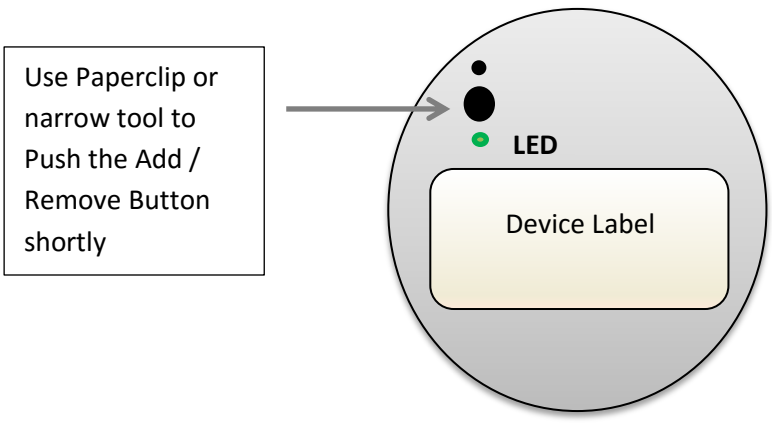
Adding and Removing from Z-Wave Network

The Standalone Z-Wave units have a button located at the top left part of the unit, on the opposite side of the connector (the widest center hole).

To add the device to a Z-Wave network, the Z-Wave Controller must first be set into Add (Learn) mode. Then use a paperclip or a small pointy tool to push and hold the button in the button hole for approximately a second. The device LED will blink twice to indicate that it sends information to the Controller.

The Controller should now discover the device and add it to the Z-Wave network. Once added, the device should respond to Basic ON / OFF commands, Binary Switch Commands and additionally Multilevel Switch commands.

Removal is done by setting the Controller in Remove Mode (instead of Add mode), and then follow the exact same procedure on the device itself.



Push the indicated button shortly, to execute an Add or Remove procedure.

Troubleshooting Inclusion problems

If the device is not added when following this procedure, please first make sure that the device LED blinks twice when pushing the Add button. If you did not see the LED blink, make sure you pushed and held the button for at least one second. Do not release the button before you see the LED blink twice.

If the Add procedure still fails (no response from the controller), it may be caused by the device thinking it is already added in another Z-Wave network. This can happen if the device has been added to a different controller before, or if the controller was only able to partially add the device (usually caused by radio coverage problems covered below). Before you proceed, try executing a Remove procedure on the device first, and then execute the Add procedure once more. It is good practice to always do this (Remove first, then re-add) if you have tried and failed to add a device at least once.

Radio Coverage and Network Wide Inclusion

The most common problem when adding fails, is insufficient radio coverage. Z-Wave devices have a minimum line of sight radio range of 40 meters. But depending on the building materials in the surroundings, the experienced range may be less. Typically reinforced concrete walls may cause problems, as such walls can block the Radio signal almost completely. The Z-Wave technology however makes it possible to add devices out of range to the controller, using Network Wide Inclusion mode. If this is supported by your controller, you should try to add other devices with better radio conditions first, and then add the most troublesome devices afterwards. Doing this may provide a "route" for the troublesome devices, via other devices with sufficient radio coverage.

Always work your way outwards from the controller, adding the closest devices first and moving farther and farther away from the controller as you go. Note that concrete walls can be troublesome, and devices mounted on such walls should never be the first to be added (except if they are in close vicinity to the Controller).

Use a Secondary Z-Wave Plus Controller for Adding the devices

This procedure is recommended for professional installers, as they can keep a Secondary Hand held Controller as part of his installation Tool Kit.

First add the Secondary Hand-held Controller to the Z-Wave network. This should be done close to the Primary Controller. Then bring the Secondary Controller close to the troublesome device, and execute the device add procedure from the Secondary (hand held) controller (remember to first execute a Remove procedure, then do another Add procedure. If you do not intend to continue using the Secondary Controller in the Z-Wave network, make sure you Remove the Secondary Controller from the network when you are done.

Z-Wave Command Classes and Features

The device is a Z-Wave Plus Device, and thus support all command classes required for Z-Wave Plus. In addition the device supports Basic and Multilevel Switch control commands for light control.

Z-Wave Specific Device Information

The device reports the following Z-Wave device specific information:

Property	Reported value
Device Type	Light Dimmer Switch
Basic Device Class	ROUTING_SLAVE
Generic Device Class	GENERIC_TYPE_SWITCH_MULTILEVEL
Specific Device Class	SPECIFIC_TYPE_POWER_SWITCH_MULTILEVEL
Z-Wave Plus Node Type	NODE_TYPE_ZWAVEPLUS_NODE
Z-Wave Plus Role Type	ROLE_TYPE_SLAVE_ALWAYS_ON
Z-Wave Plus Icon Type	GENERIC_LIGHT_DIMMER_SWITCH
Z-Wave Plus User Icon Type	GENERIC_LIGHT_DIMMER_SWITCH

Manufacturer Specific Device Information:

Property	Reported value
Manufacturer ID	0x024F
Product Type ID	0x0003
Product ID (1-10V Dimmer)	0x1011
Product ID (230V Dimmer)	0x1012

Supported Z-Wave Command Classes

The following table lists all the supported Command Classes supported by the device. The usage of each command class is covered in the following sections. The device supports S0 and S2-Unauthenticated security.

Supported Command Classes	Insecure Inclusion	Insecure on Secure Inclusion	Secure on Secure Inclusion
COMMAND_CLASS_ZWAVEPLUS_INFO (V2)	Yes	Yes	
COMMAND_CLASS_TRANSPORT_SERVICE (V2)	Yes	Yes	
COMMAND_CLASS_SECURITY	Yes	Yes	
COMMAND_CLASS_SECURITY_2	Yes	Yes	
COMMAND_CLASS_SUPERVISION (V1)	Yes	Yes	
COMMAND_CLASS_ASSOCIATION (V2)	Yes		Yes
COMMAND_CLASS_ASSOCIATION_GRP_INFO (V1)	Yes		Yes
COMMAND_CLASS_BASIC (V1)	Yes		Yes
COMMAND_CLASS_CONFIGURATION (V1)	Yes		Yes
COMMAND_CLASS_DEVICE_RESET_LOCALLY (V1)	Yes		Yes
COMMAND_CLASS_FIRMWARE_UPDATE_MD (V4)	Yes		Yes
COMMAND_CLASS_MANUFACTURER_SPECIFIC (V2)	Yes		Yes
COMMAND_CLASS_METER (V2)	Yes		Yes
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION (V3)	Yes		Yes
COMMAND_CLASS_POWERLEVEL (V1)	Yes		Yes
COMMAND_CLASS_SENSOR_MULTILEVEL (V5)	Yes		Yes
COMMAND_CLASS_SWITCH_MULTILEVEL (V1)	Yes		Yes
COMMAND_CLASS_VERSION (V2)	Yes		Yes

Supported Light Control Related Command Classes

The following Control command classes are supported for Light (or Load) control:

Command Class	Supported Units	Functionality
Basic	All	Used for ON/OFF and Dimmer Control
Multilevel Switch v1	All	Used for ON/OFF and Dimmer Control
Sensor Multilevel	All	Reports the current Voltage, Current and Power consumed by the Load connected to the Back Unit. Power is reported periodically.
Meter	All	Reports Accumulated Power Consumption (Energy) over time. One report is sent every 15 minutes, and the current consumption can be requested any time.

Effect of Basic Set Command Values

When the Basic Set Command Class is used for Light Control, the command values have the following effect:

Values	Effect on Dimmer
0	Turns OFF
1 – 99	Sets Dimmer Level 1 – 100% (99)
100 – 254	Ignored
255	Turns ON to last Dimmer level

Supported Management Command Classes

This table defines all supported command classes not required explicitly by the Z-Wave Plus standard.

Command Class	Functionality
Association **Multichannel Association**	Supports associating other devices to be controlled by state changes on the local device.
Configuration	Used to control operational functionality of the device beyond the simple Default operation.
Version	Provides Hardware and Software version information for the device
Firmware Update	Makes it possible to update the firmware of the device Over The Air

Multilevel Sensor Command Class and Events

The device supports the Sensor Multilevel Command Class (V5), which is used to report the following parameters:

- **Power –** Reports the Power consumption on the device output. Reported unsolicited once every minute, and can otherwise be requested at any time via the Sensor Multilevel Get command.

- **Voltage –** Reports the supply voltage of the device. Only Reported as a response to a Sensor Multilevel Get command.

- **Current –** Reports the current draw on the device output. Only Reported as a response to a Sensor Multilevel Get command.

Association Groups

The Standalone devices have two Association groups. One is for Lifeline Reports, and the other will mirror any state changes performed by the device. This makes it possible to link multiple devices together, and control them as one single device. Both groups support Multichannel Association.

Association Group	Node Limit	Functionality
1	Max 5 Nodes (Lifeline Group)	The Lifeline group where all Root Device events are reported. All unsolicited Reports for the supported command classes will be issued to this group. Commands Issued: - **Sensor Multilevel Report** - Reports Power Consumption and Temperatures - **Meter** - Reports power consumption to the Controller every 15 minutes. - **Device Reset Locally** – Reports factory resets to the Controller
2	Max 5 Nodes (Light Control)	Associated devices will be controlled according to local state changes. Supports Multichannel Association in addition to standard association. Command Issued: **Basic Set**

Configuration

All functionality except for the Default Operation is controlled via Configuration SET commands. All available configurations are described in the following sections, in relation to the functionality each configuration controls.

Advanced Device Functionality

This section details all the Advanced functionality available on the device, and also explains the Z-Wave Configuration Parameters which controls the specific functionality.

Advanced Dimmer Operation Configuration

It is often necessary to adjust Dimmer Settings in order to make Light fixtures operate correctly. The default settings are normally OK for standard Light Bulbs and Halogen lamps, but may cause problems with LED type Light fixtures. Such problems are mostly an issue with the 230V mosfet dimmer, as the 1-10V dimmer normally always work fine with the defaults.

Dimmer operation parameters are set via Configuration Parameters, and the following settings can be configured for dimmer operation:

Config Register	Value Size	Default Value	Configuration Name	Description
13	1	15	**Minimum Level**	The Minimum Light Level of the dimmer. This should be adjusted so the controlled Light is still ON and stable. Remember that LED type lights may work if dimmed down to a low value, but may not start if the light is turned OFF and ON again. Range 1-99.
12	1	90	**Maximum Level**	The Maximum Light level of the dimmer. Typically there is no visible difference when the dimming level reaches a point in the range 75 - 90, and the installer should set this value to the lowest value where no change is visible. The default value of 90 is usually OK. Range 1-99.
11	1	LE	**Dimmer Mode**	[Leading Edge (LE) = 0, Tailing Edge (TE) = 1] Defines if Dimmer should operate in Leading or Tailing Edge mode. Most Lights work quite OK in the default Leading Edge mode, but this mode also usually cause some noise from the dimmer unit. During installation it is therefore recommended to try TE mode, and use this if the Light operates properly. Tailing Edge mode is known to cause instability in some LED type Lights! This configuration does not have an effect on 1-10V Dimmer Back Units!
10	2	300 (3 second)	**Dimming Speed**	Defines the "fade" time when setting a dim level from a controller. Fade time is defined as the time it takes to dim from MIN level to MAX level, which means an increase of 10% in light level takes 1/10th of the configured time. The value defines the dim time in 1/100'th of a second, which means a value of 200 means the Dimming Speed is 2.0 seconds from MIN to MAX. Max time

Config Register	Value Size	Default Value	Configuration Name	Description
				is 327.67 seconds (almost 5 and a half minute). Values below 30(0.3 seconds) are ignored¸ and values below 100(1 second) are discouraged.
44	1	20	**Cold Start Minimum Level**	Sets the minimum level the Dimmer should go to when the light is switched ON. This is typically used for LED lamps which does not switch ON correctly when the dimming level is at the Minimum. See detailed description below. NOTE! This only have an effect on the Mosfet Dimmer (AMD), as this is not needed by a 1-10V dimmer.

Guidelines for Configuring Dimmer Back Units

NOTE! Normally 1-10V dimmers do not require any special mode configurations, and the defaults work fine. Only adjust the defaults in case Speed, MIN and MAX levels are not satisfactory with 1-10V dimmers.

After installation start by tuning the MIN and MAX limit of the Dimmer, to provide a noticeable change in the Dimming level over the full dimming range. This is easiest to test by setting Dimmer levels via Z-Wave, where a 1 value is the MIN level and a 99 value is the MAX level. It may be necessary to turn down the MAX level, and turn UP the MIN level in order to get the best result. This is done by adjusting the values in **Configuration Parameters 13 (MIN level) and 12 (MAX level)**.

When you are satisfied with the MIN and MAX levels, set the Dimmer level to the Minimum (1), and verify that the Light operates stably. Then switch the Light OFF and back ON again at the Minimum Level (1), and verify that the Light turns ON stably. If not, you may need to increase the Cold Start Minimum Level until the Light switches ON as it should

When the MIN and MAX levels are as desired, continue by adjusting the Dimming speed as desired. By default, the dimming speed is 2 seconds from MIN to MAX level, which normally gives good Dimming control from external control devices as the Multifunction Switch or Wheel Controller. Adjust the value of **Configuration Parameter 10** UP to slow the speed down, and DOWN to speed the dimming up. If you use the Multifunction Switch or Wheel Controller to control a Dimmer via Association, make sure you configure the SAME dimming speed on BOTH the controlling device and the Standalone unit. Different Dimming speeds will cause unwanted side effects, like one dimmer lagging behind the other (speed is too slow), or overshooting the desired level (speed is too high).

Troubleshooting 230V Dimmer problems

230V Phase Cutting dimmers can (by their nature of operation) cause problems with some types of Light fixtures. The 230V Dimmer Standalone unit supports Standard Bulbs, Halogen and (most) Dimmable LED type lights, but may not always operate correctly with the default settings. The defaults have been chosen to provide the widest possible range of compatibility, but they may also cause some unwanted effects. The most common problems are:

- **Buzzing Noise from Dimmer or Light Fixture**
  This is caused by the Dimmer Mode being Leading Edge, and is usually not very prominent. Try changing the dimmer mode to Tailing Edge Mode by setting **Configuration Parameter 11** to **Value 1**, to solve the problem. Turn the Lights OFF and ON again for the configuration to take effect!
  WARNING! Some light fixtures operate poorly in Tailing Edge mode. If you experience general instability (not only at Low Dimmer levels) or a loss of usable Dimming range, it's recommended to switch back to Leading Edge mode. For some light fixtures, the buzzing noise is simply not possible to fix!

- **Light is unstable at low Dimmer levels**
  This can be fixed by increasing the MIN level via **Configuration Parameter 13**. Start by increasing the MIN level by steps of 5, until the Lights stops flickering at the Minimum Dimmer level. Then try adjusting the level down 1 step at a time, until the Flickering or instability returns. Finally increase the MIN level by 1 to get stable Operation.
  WARNING! Make sure that the Light will turn ON when the Level is at its minimum. Dial the Dimmer Level down to the Minimum, and turn the Light OFF. Then turn it back ON and verify that the light turns ON. If the Light does not turn back ON, or becomes unstable, increase the Cold Start Minimum Level configuration up until the Dimmer starts consistently at the Minimum level.

- **Light Dimming Range is very Narrow**
  If the range from MIN level to MAX level is very low (some times not even noticeable) or only change in the lower part of the dimming range, the culprit is usually one of the following:

    - The Light fixture does not operate well in Tailing Edge Mode. Switch the mode back to Leading Edge (**Configuration Parameter 11, value 0**) and check if this solves the problem (Remember to turn Light OFF and ON to activate the change). Note that in some cases, buzzing from the Dimmer and/or Light Fixture is impossible to remove completely.

    - The MAX level is too high. Some Light Fixtures have no noticeable dimmer level change above MAX level 60-70 (in rare cases even lower), and the MAX level should be adjusted down accordingly. Please note that MIN and MAX level change DOES NOT affect the "resolution" of the dimming, only the maximum and minimum voltage output. The resolution is fixed to 99 steps regardless of MIN and MAX

settings.

- The MIN level is too high. Note that some Light fixtures will only dim significantly below a certain level, but may not start stably at that same level. Try adjusting the MIN level down, but make sure the light turns ON at the MIN level after being switched off. If the light does not turn ON at the lowest dim level, adjust the Cold Start Minimum level configuration up until it turns ON consistently. In some rare cases there is no way to improve the Dimming Range of the Light fixture due to this problem.

NOTICE! It is very important to know that there are Light Fixtures on the market which claim to be "dimmable" which in reality is not (or does not perform very well). It is highly recommended that Light Fixtures intended for Dimming is acquired from Light Fixture professionals or professional Electrical equipment suppliers with experience with dimmable Light Fixtures. This includes Light Bulbs and replaceable LED Bulbs as well.

Other Configuration Parameters

The device has a couple of Read-Only parameters which can be used to retrieve additional information from the device. These parameters cannot be changed by the user, and only provides information about the current device combination.

Config Param	Value Size	Configuration Name	Description
1	1	**Hardware Combination Identifier**	Byte which uniquely describes the combination of formfactor and functionality for the current device. The first nibble (4 bits) Identifies the Controlling Unit type, which is always 0x1 for the Stand alone Pucks. The combined Byte then yields the following: - 0x10 – 2-Pole 8A Relay - 0x11 – 1-10V Dimmer - 0x12 – 230V MOSFET Dimmer - 0x13 – 1-Pole 16A Relay
16	1	**Back Unit type**	Provides an Identifier for the device functionality, which is the same across all devices in the SEdevices product range (including Front Units). - 0x00 – 2-Pole 8A Relay - 0x02 – 230V MOSFET Dimmer - 0x04 – 1-10V Dimmer - 0x06 – 1-Pole 16A Relay

Factory Reset

Follow this procedure to Factory Reset the Wheel Controller. This will restore all configuration parameters back to the default settings, and resmove the device from the Z-Wave network.

WARNING! Executing a Factory Reset on a device may make it stop working as wanted, and will disable remote control of the device. The device will have to be re-added to the Z-Wave network and reconfigured afterwards, to regain the previous operation of the device. Please DO NOT execute this procedure unless it is absolutely necessary.

Push and Hold the Add/Remove button for about 15 seconds – until the LED indicator turns OFF. Then release the button. The device is now Factory Reset, and removed from the Z-Wave network.

The button is located some 5 mm down in the middle of the three holes on the front. A thin tool (a very small screwdriver, a toothpick, a paper clip or similar) is needed to access the button.