

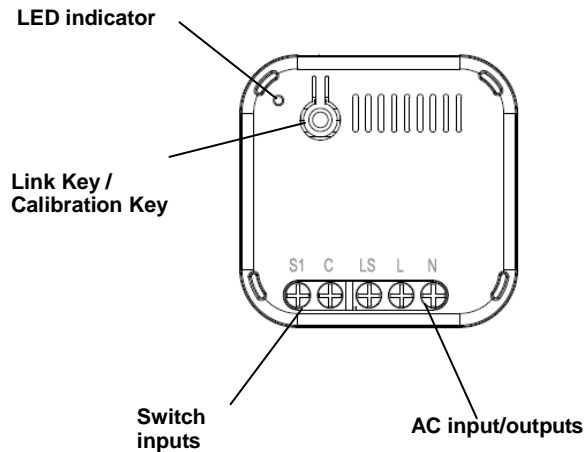
General Introduction

AD370 is an inwall dimmer module to dim lighting appliances by Z-Wave™ wireless control. It uses MOS technology to achieve both Trailing-edge dimming for LED lighting and Leading-edge dimming for older lamps. Compact in design, yet certified for safety makes it suitable for installation in cramped electrical box located behind wall switches. 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.

Main Features:

- Latest Z-Wave 700 series
- MOS technology for Trailing/Leading edge phase dimming
- Suitable for 3-wire and 2-wire (no neutral) connections
- Self -detect whether 3-wire or 2-wire installation
- Installer friendly; no need for loopback cable when 2-wire (Patent-pending)
- Usable dimming range set through Auto Calibration
- Overload and overheat protection
- Integrated scheduler controller
- Power consumption reporting
- Auto-detect load type: resistive, inductive, capacitive

Product Overview



Compatibility table

Supported loads are listed below. Before installation the load connected, do not exceed the limits below.

Load Type	Maximum Load(@230V)	Suitable Operation Mode
Resistive load	276W	Trailing Edge
Incandescent load	200W	Trailing Edge
Dimmable LED	10W~200W, if 2-Wire 2W~200W, if 3-Wire	Trailing Edge
ELV halogen lamps and dimmable LED bulbs with Electronic transformers	10W~200W	Trailing Edge
MLV halogen lamps with Ferromagnetic transformers	10W~200W	Leading Edge *
Non-dimmable LED	Max 60W (3-Wire only)	On/off mode, no dimming function

* **Attention:** Forcing this to Trailing edge may result in damage to the load or the dimmer module

Installation

Safety Precautions

To ensure your safety, please read this manual carefully before installing the device; follow the instructions exactly. The manufacturer shall not be legally responsible for any equipment damage or personal injury caused by incorrect installation or operation other than that covered in the manual.

IMPORTANT

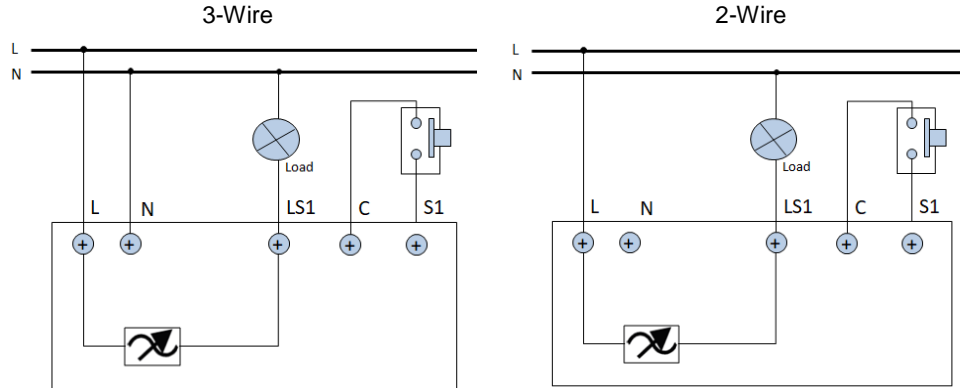
- Avoid installing the unit in storming or raining weather.
- Installation must be performed by skilled technicians who are informed about the standards and technical requirements of the appliance and its proper installation. Note that the In-Wall On/Off Module is designed to be installed in a wall switch box to operate
- Check your local codes as they apply to your situation. If the house wiring is of aluminum, consult with an electrician about proper wiring methods.
- Before proceeding with the installation, turn off the power to the lighting circuit at the circuit breaker or fuse box to avoid electrical shock.
- Do not connect the device to loads exceeding the recommended values. Connect the device exactly as shown in the provided diagrams. Improper wiring may be dangerous and result in equipment damage.
- Be sure to isolate or switch off power source before installing or maintenance.
- Do ensure that the power supply circuit is protected by a 16 amp circuit breaker or suitable equivalent fuse. Electronic switch is designed to operate in electrical home installation. Faulty connection or use may result in fire or electric shock.
- Do not connect different types of light sources simultaneously.
- Do not connect the power supply without a load.

Not added to Z-Wave network		Red LED 2-second on, 2-second off
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Connecting the Wires

WARNING : BEFORE INSTALLATION, TURN OFF AC POWER BY TURNING OFF CIRCUIT BREAKER.

1. Connect the wires from electrical wall box to the module, the module supports either 2-wire or 3-wire connections. Refer to the wiring diagram below to wire accordingly.



Note: Unlike other solutions in the market, wiring AD370 for 2-wire connection does not need a loopback cable between output and N terminal. The module's patented technology inside will self-detect which wiring configuration was used.

Warning: S1 is meant for external switches only. Never connect any form of load to S1, which may cause electrical hazard and damage.

2. Once wiring is complete, turn back on the mains power. Do not seal the module inside the wall box yet.
3. When first powered on, the module will attempt some calibration with the lamp. User may notice dimming and perhaps flickering during this period.
 - For Calibration status/results, refer to the LED indicator table below
 - Calibration can also be cancelled or started anytime using the Link key.

LED Indicator

Table below shows the LED indicator and operation for

Status	Operation	LED Indicator
Calibration	Link key: Press over 2 seconds	Orange LED blinking
Calibration cancel	Link key: Press once	Orange LED stop blinking
Calibration finish		Green LED flash 3 times, means lamp is Dimmable. See "a. Dimming Control" Red LED flash 3 times means lamp is Non-dimmable. See "b. On/Off Control".
a. Dimming control	Switch at S1: Press and hold Switch at S1: Double click to set to Maximum or Minimum level.	Dimming: Green
b. On/Off control	Switch at S1: Short press	ON: Green LED ON OFF: LED OFF

Adding to Z-Wave Network

The unit supports SmartStart function, where inclusion is initiated automatically on power-on, and repeated at dynamic intervals for as long as the device is not included into a Z-Wave network. The Z-Wave Controller must support SmartStart for this to work.

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.

If the Controller does not support SmartStart function, follow the steps for manual Inclusion

1. Put the Z-Wave Controller into Inclusion mode.
2. Press the link key or external switch three times within 1.5 seconds to put the unit into inclusion mode.

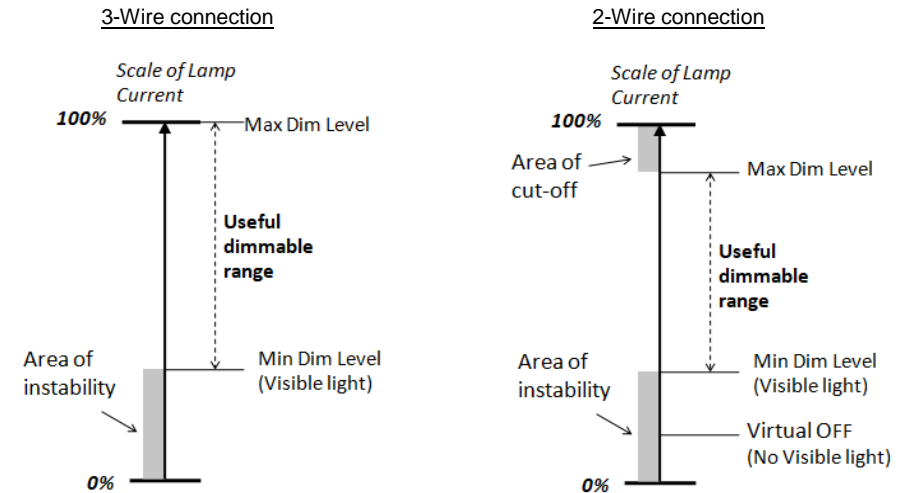
Note: If the Z-Wave Controller utilizes S2 security protocol, you may be asked to enter a 5 digit Device Specific Key (DSK). This can be found in one of two places:
on the QR code label on the back of the unit
on the insert card inside the packaging

3. Once calibration and Z-Wave setup is complete, tuck the module inside the wall box and seal it.

Calibration

For dimmable electronic lamps such as LEDs, the range of brightness adjustment available to the user varies greatly across different manufacturers, lamp wattage and complicated further by method of connection whether it's 3-wire or 2-wire (sometimes called non-neutral). Adding to the confusion, sometimes even LEDs sold as non-dimmable lamp can be dimmed.

The figure below compares dimming range between two connection methods for the same lamp.



The calibration feature of AD370 attempts to simplify this by setting automatically, for every lamp, the useful

dimmable range without negative effects seen by the user. To do so, it will detect the load type and then apply the appropriate control method, trailing edge or leading edge, when adjusting brightness.

The calibration is initiated when,

- module is powered on,
- user press and hold the Link key on the module for more than 2 secs,
- command sent from Controller

Detail results of the calibration will be reported through Controller, see Z-Wave Configuration settings in **Programming** section. Calibration outcome is also indicated on the module's LED; Green for load is dimmable, Red for non-dimmable load, defaulting to a simple on/off operation only.

Following the Calibration, user can still modify the settings to fine tune if needed.

Operation

Dimming

Dimming is operated by external switch connected to S1. Press and hold the switch and the dimmer will increase/decrease the brightness of the lamp. Release the switch at desired brightness.

Max/Min

Using the switch connected to S1, activating the switch quickly two times will set to Maximum brightness and repeating again will set brightness to Minimum.

Metering:

Power measurement is reported in Watts at periodic intervals set through the Controller. It can report any sudden change power consumption when exceed a set threshold.

Note: In 2-wire connection, the voltage setting in Parameter 13 needs to be set correctly to report proper power consumption value.

Save and restores the last status after a power failure:

The unit can be set to remember the last brightness level before AC power is cut off (such as power black-out). When AC is restored, the unit will return to the last level automatically.

Overload protection:

If the software detects the maximum power is exceeded for more than 30 seconds, the dimmer will turn off to protect the load. An over-current notification will be sent to the Controller.

Over-temperature protection:

If the internal temperature of dimmer exceed 80°C, the dimmer will turn off automatically. A "System emergency shutoff" notification will be sent to the Controller.

Programming

Z-Wave Plus™ Info

Role Type	Node Type	Installer Icon	User Icon
Slave Always On	Z-Wave Plus node	Light Dimmer Switch Device Type	Light Dimmer Switch Device Type

Version

Protocol Library	0x03 (Slave_Enhance_232_Library)
Protocol Version	7.10 (SDK 7.16.03)

Manufacturer

Manufacturer ID	Product Type	Product ID
0x0060	0x0033	0x0001

AGI (Association Group Information) Table

Group	Profile	Command Class & Command (List) N bytes	Group Name(UTF-8)
1	General	Notification Report, Device Reset Locally Notification Switch Multilevel Report Meter Report Configuration Report Indicator Report Application Rejected	Lifeline
2	Control (0x2001)	Basic Set	On/Off control
3	Control (0x2002)	Switch Multilevel Start/Stop	Switch Multilevel Start/Stop

Action	Report to Group	Command
Reset	1	Device Reset Locally Notification
First time power on	1	Notification Report
Overload	1	Notification Report
Hardware Fail	1	Notification Report
Over temperature	1	Notification Report
Dimming value change	1	Switch Multilevel Report
Wattage auto report	1	Meter Report
Calibrate start/end report	1	Configuration Report

Association Command Class

Group	Max Node
3	5

Switch Multilevel command

Value
0x00: Off
0x01~0x63: 1~99%
0xFF: the last dimmer level
Duration
0x00: Instantly
0x01~0x7F: 1~127 seconds
0x80~0xFE: 1~127 minutes
0xFF: Factory default duration
0xFE: Unknown

Metering command

Meter Type	Scale	Size	Precision
Electric meter	kWh(0)	2	1
	W (2)	2	1
	V (4)	2	0
	A (5)	2	3

Notification

Event	Type	Event	Event Parameters Length
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Power applied for first time	0x08	0x01	0x00
Over load detected	0x08	0x08	0x00
System hardware failure	0x09	0x01	0x00
System emergency shutoff	0x09	0x07	0x00

Z-Wave Configuration settings

The configurable values are as following:

Par. No.	Parameter Function	Size	Range	Default
1	Switch Type	2	0: Momentary 1: Toggle	0
2	Auto-on time	2	0~32767 (sec.)	0 (not auto-on)
3	Auto-off time	2	0~32767 (sec.)	0 (not auto-off)
4	Remember last status	2	0:do not remember , 1: remember	1
5	Interval for wattage/kWh auto report	2	60~32767 (sec.)	600 sec.
6	Report when exceed % change of wattage	2	10~100 (%)	25%
7	Maximum dimming value	2	1~100 (%)	100%
8	Minimum dimming value	2	1~100 (%)	10%
9	MOS operation mode	2	0: Disabled, (unknown load) 2: Trailing edge dimming 1: On/off only, no dimming 3: Leading edge dimming	2
10	Calibration Mode	2	0:IDLE , 1: Calibrate	0
11	Auto Calibration	2	0: not calibrate automatically 2: Calibrate after first power on when module is included; 1: Calibrate after first power on when module is excluded 3: Calibrate after first power on	1
12	Dimming speed	2	1~600 (sec.)	4 sec.
13	Set voltage when in 2-wire	2	1~500 (V)	230V
14	Use external switch for Inclusion and Exclusion	2	0:Disable 1:Enable	1
15	Lamp type detected	2	0:Unknown 2: Lamp recognized as dimmable 1: Lamp recognized as non-dimmable	Read only
16	Wire connection type	2	0: Unknown 1: Unknown 2: 2-Wire 3: 3-Wire	Read only
17	Power auto report threshold	2	0~300 (W)	0: Disable
18	Dimming curve	2	0: Linear 1: Logarithmic	0
19	Load type detected	2	0: Unknown 2: capacitive load 1: resistive load 3: inductive load	Read only

Command Classes

Command Class	Version	Required Security Class
ZWAVEPLUS_INFO	2	None
ASSOCIATION	2	Highest granted Security Class
MULTI_CHANNEL_ASSOCIATION	3	Highest granted Security Class
ASSOCIATION_GRP_INFO	3	Highest granted Security Class
TRANSPORT_SERVICE	2	None
VERSION	3	Highest granted Security Class
MANUFACTURER_SPECIFIC	2	Highest granted Security Class
DEVICE_RESET_LOCALLY	1	Highest granted Security Class
INDICATOR	3	Highest granted Security Class
POWERLEVEL	1	Highest granted Security Class
SECURITY	1	None
SECURITY 2	1	None
SUPERVISION	1	None
FIRMWARE_UPDATE_MD_	5	Highest granted Security Class
NOTIFICATION	8	Highest granted Security Class
SWITCH_MULTILEVEL	4	Highest granted Security Class
METER	5	Highest granted Security Class
CONFIGURATION	4	Highest granted Security Class
APPLICATION STATUS	1	None

Additional Command Classes Supported

- Indicator: To manipulate indicator resources in a supporting node. An indicator may be an LED.
- Firmware Update: For OTA function.

Troubleshooting

Table below lists typical problems encountered:

Symptom	Cause of Failure	Recommendation
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Device not responding and LED not displaying	Wiring to AC mains may be incorrect	Check if wiring is correct, or voltage is too high or too low
Cannot turn on/off the lamp, but LED indicator is normal	The connected load has its own on/off switch	Turn on the switch at the load
Cannot control by Z-Wave but switch control works.	Lost wireless connection with Controller	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.

Manual Inclusion/Exclusion

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

Action/Status	Description	Red LED indication
No node ID(0x50)	The Z-Wave Controller does not allocate a node ID to the unit.	2-second on, 2-second off
Inclusion	1. Put the Z-Wave Controller into inclusion mode.	
	2. Press the link key or external switch three 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 key or external switch three times within 1.5 seconds to put the unit into exclusion mode.	
Reset (This procedure should only be used when the network primary controller is inoperable.)	1. Press the link key or external switch three times within 1.5 seconds to put the unit into exclusion mode.	
	2. Within 1 second of step 1, press link key or external switch again and hold until LED is off (about 5 seconds).	
	3. Node ID is excluded. The device reverts to factory default state and will be in auto-inclusion mode for 4 minutes.	
* Failed or successful results 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 to enter a 5 digit Device Specific Key (DSK) that is unique to each unit by your controller. 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

Specifications

Frequency Range	EU: 868.42MHz
Power Input	AC230V,50Hz
Maximum Power Load(AC230V)	Resistive load: 276W Incandescent load: 200W Dimmable LED: 10W~200W (2-Wire); 2W~200W (3-Wire) Dimmable electronic transformer for 12V ELV halogen lamps and dimmable bulbs: 10W~200W Ferromagnetic transformers for 12V operated MLV halogen lamps: 10W~200W Non-dimmable LED(support on/off): 60W (3-Wire)
Transmission Range	100 meters (Indoor open area with antenna outside of wall box)

Working Temperature	0°C - 40°C
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**Specifications are subject to change without notice*



Warning:

Do not dispose of electrical appliances as unsorted municipal waste. Please use separate collection facilities instead.

Contact your local government for information regarding the available collection systems.

If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get in to the food chain, damaging your health and well-being.

When replacing old appliances, the retailer is legally obligated to take back your old appliances for disposal free of charge.



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