



# ToggleLinc™

A classic toggle looking wall switch that's smart!

For models:

- 23896W ToggleLinc Plus Dimmer (White)
- 23896I ToggleLinc Plus Dimmer (Ivory)
- 23894W ToggleLinc PLC Dimmer (White)
- 23894I ToggleLinc PLC Dimmer (Ivory)
- 23895W ToggleLinc Switch (White)
- 23895I ToggleLinc Switch (Ivory)
- 23897W ToggleLinc Deluxe Dimmer (White)
- 23897I ToggleLinc Deluxe Dimmer (Ivory)

**SMARTHOME™**  
MAKING LIFE MORE CONVENIENT, SAFE AND FUN

# Congratulations!

You've just purchased a smart, high quality wall switch that has the classic toggle operation to match your home's existing décor. The ToggleLinc™ is the latest version of our popular SwitchLinc™ series of dimmers and switches. In fact, the ToggleLinc operates and programs just like the SwitchLinc product line.

ToggleLinc is available in several models to fit specific applications and to help you stay within budget. Most ToggleLinc models include the ability to be remotely control by powerline signals, commonly known as X10. The *Dimmer* models will control incandescent and inductive (transformer-based) lighting loads up to 600-or 1000-watts. For applications where the lighting shouldn't be dimmed, the *Switch* models are ideal for fluorescent, flood, and motor loads (like ceiling fans).

The ToggleLinc *Plus* models can also be controlled remotely from a powerline transmitter for powerful scene lighting control. Each ToggleLinc Plus can be a member of up to 64 lighting scenes, allowing one powerline signal to set elegant "mood lighting." Use ToggleLinc *Deluxe Dimmer* for situations where a low-cost dimmer is needed, without any automation functions like hallways, garages, basements, attics, and bedrooms.

ToggleLinc dimmers and switches are easy to install. They simply attach into a regular wall box and connect to home wiring just like a regular mechanical light switch. ToggleLincs can be installed in both existing and new homes.

When working with anything electrical, always take your time and work slowly. Make sure the power to the circuit is turned off at the circuit breaker panel. Check the Preparation section for more guidelines.

Features	Plus	PLC	PLC	Deluxe
Switch or Dimmer	Dimmer	Switch	Dimmer	Dimmer
Dimming at the Switch	•		•	•
Wires like a Standard Switch	•	•	•	•
Non-volatile Memory	•	•	•	•
True Toggle Action	•	•	•	•
Status LED/Set Button	•	•	•	•
Responds to PLC Commands	•	•	•	
Stores up to 64 Scenes	•			

## Other Smarthome Products

Your ToggleLinc dimmer or switch is compatible with many of our other home automation products. If you need a more modern looking wall switch, check out the original SwitchLinc series of wall switches or the new SwitchLinc RX, which is ideal for retrofit applications where there isn't a neutral wire at the switch's wall box. The KeypadLinc™ Wall Mounted Transmitter allows you to control multiple devices from one location at the press of a single button. And for plug-in devices, the LampLinc™ and ApplianceLinc™ modules will automate just about anything that plugs in. Please visit the Smarthome web site or your distributor for more information.

# CAUTION!!

Read and understand these instructions before installing! This device is intended for installation in accordance with the National Electric Code and local regulations. For indoor use only. Connect only copper or copper-clad wire to this device. Before installing the control, disconnect power at the circuit breaker or remove the fuse to avoid shock or damage to the control or to the installer. It is recommended that a qualified electrician perform this installation. Retain these instructions for future reference.

## Quick Start Instructions

DEFAULT

Setting the Pre-set On Level <i>(Dimming-enable models)</i>	<ol style="list-style-type: none"> <li>1. Adjust the light level to the desired level <span style="float: right;">100%</span></li> <li>2. Tap the Set Button ONCE (see page 6 for more detailed instructions)</li> </ol>
Setting the Dimming Fade-on Rate <i>(Dimming-enable models)</i>	<ol style="list-style-type: none"> <li>1. Adjust the light level <span style="float: right;">2 Seconds</span> (Brighter = faster dimming)</li> <li>2. Double-Tap the Set Button (press it TWICE quickly) (see page 6 for more detailed instructions)</li> </ol>
Setting the Dimmer's Primary Address <i>(Powerline models)</i>	<ol style="list-style-type: none"> <li>1. Press and hold the Set Button for 3 seconds <span style="float: right;">A-1</span></li> <li>2. Send the PLC signal from any transmitter within 30 seconds (see page 6 for more detailed instructions)</li> </ol>
Programming a Scene <i>(Plus models)</i>	<ol style="list-style-type: none"> <li>1. Transmit the "clear" sequence:  <div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>O16</span> <span>N16</span> <span>M16</span> <span>P16</span> <span>M16</span> </div> </li> <li>2. Turn on the ToggleLinc to the desired brightness</li> <li>3. Send the following command sequence:  <div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>M16</span> <span>N16</span> <span>O16</span> <span>P16</span> </div> </li> <li>4. Transmit the desired scene address (house and unit code) to lock-in new scene (see page 8 for more detailed instructions)</li> </ol>
Factory Reset	<ol style="list-style-type: none"> <li>1. Gently pull the Set Button out to remove power for 5 seconds</li> <li>2. Push and hold in the Set Button for 5 seconds, then release <span style="float: right;">Resets to default settings</span></li> <li>3. When the LED Indicator comes on, the ToggleLinc is reset (see page 10 for more detailed instructions)</li> </ol>

## Preparation

Before installing ToggleLinc, please familiarize yourself with the following and take the necessary precautions listed here:

- Be sure that power to the load being controlled has been disconnected by removing the fuse or turning the circuit breaker off. Installing ToggleLinc with the power on may expose you to dangerous voltages and may damage the product.
- Refer to the ToggleLinc Wiring Diagrams on page 5 to determine the wire colors of the connections to ToggleLinc.
- Wiring for 3-way, 4-way, & up circuits follow conventional (standard, non-remote) wiring practice. Wiring companion switches, sometimes called "slave" switches, requires the Line (Black) wire be accessible and be the same 110V leg of the house wiring. The White wire on the multi-way companion switch is to be connected to NEUTRAL ONLY. If neutral is not available, cap the White wire (which simply causes the LED not to function).
- ToggleLinc may feel warm during operation. The amount of heat generated is within OSHA approved limits and poses no hazards. To minimize heat build-up, ensure that the area surrounding the rear of the ToggleLinc has adequate ventilation (i.e., clear away excess insulation).
- Installation should be performed only by a qualified electrician, or by a homeowner who is familiar and comfortable with electrical circuitry.
- Follow all routine safety precautions.

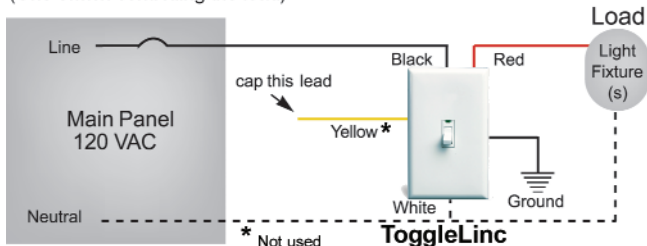
## Step-by-step Instructions

1. Disconnect the power for the existing switches at the circuit breaker. Verify that the power has been removed by trying to turn on the lights controlled by the switches.
2. Remove the trim plate from the existing switches.
3. Unscrew and pull the existing switches from the wall box.
4. Disconnect the wires from the existing switches.
5. If the ToggleLinc is being installed into a 3/4/5-way circuit, a Multi-way Companion Switch must be installed in the wall box where power comes into the circuit. Follow the instructions included with the Multi-way Companion Switch to identify the "Hot," "Traveler," "Ground" and "Neutral" (if present).
6. Before making any connections to the ToggleLinc, gently pull its Status LED/Set Button until a click is heard. This will open the "air gap" and isolate the ToggleLinc from the electricity when the circuit breaker is turned back on.
7. Orient ToggleLinc so the LED is at the top, and make connections according to the "ToggleLinc Wiring Diagram" on the next page.
8. After all connections have been made, ensure that all wire connectors are firmly attached and that there is no exposed copper except for the Ground wire.
9. Gently place the wires and the ToggleLinc into the wall box and screw into place.
10. Restore power to the circuit and press in the Status LED/ Set Button top until it is even with the front plastic trim ring. Power will be supplied to the ToggleLinc and after a few seconds, the green Status LED will come on.
11. After testing ToggleLinc for proper operation, install the faceplate (sold separately).

**Tip:**  
For additional help installing 3-way circuits, see the Multi-way Companion Switch manual.

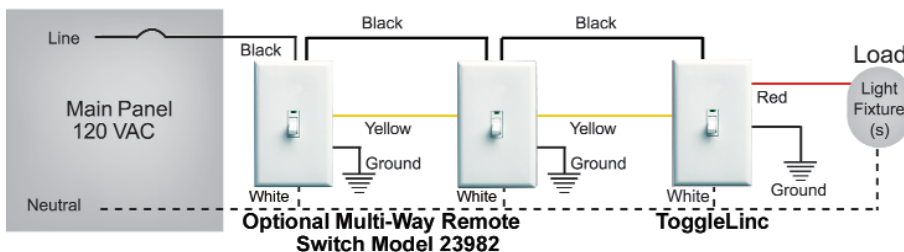
## ToggleLinc - Wiring Diagram

(One switch controlling the load)



## ToggleLinc - Multi-Way Wiring Diagram

(Two or more switches controlling the load)



Note: When installing multiple ToggleLincs in a J-box, or many on the same circuit breaker, please see specifications at the end of this manual for limitations and recommendations.

## Operations

Basic Operations	
Input at Switch	Output at Bulb
Tap top of toggle (when light is off)	Light ramps up to preset ON-level
Tap top of toggle (when light is on)	Light ramps up to full brightness
Press & hold top of toggle	Light brightens until rocker is released
Tap bottom of toggle	Light ramps down to OFF
Press & Hold bottom of toggle	Light dims until rocker is released

Advanced Operations	
Input at Switch	Output at Bulb
Double-tap top of toggle	Light ramps fast to full brightness
Double-tap bottom of toggle	Light dims fast to OFF

Double tapping a ToggleLinc will cause the light to ramp at a two-second rate. Only programmed ramp rates greater than two seconds are affected.

## Setting the Fade-On Rate *(Dimming-enable models only)*

The "Fade-On Rate" is the speed that ToggleLinc brings the brightness of the connected light(s) up or down when activated at the dimmer or when it receives a powerline carrier (PLC) ON-command to its primary address (Plus and PLC models). From the ToggleLinc, the rate is adjustable between .1 and 9 seconds, (the factory default rate is 2 seconds).

1. Adjust the brightness level of the lights to correspond to the desired fade-on rate (brighter = faster) according to the table.
2. Tap the Status LED/Set Button TWICE.  
The light(s) will blink indicating that it has set the new fade-on/off rate.

Brightness Level	Fade-on Rate (sec.)
90-100%	0.1
77-87%	0.2
65-74%	0.3
52-61%	0.5
39-48%	2.0
26-35%	4.5
13-23%	6.5
1-10%	8.5
0%	9

(Powerline dimmer models only: See Advanced Primary Address Programming for instructions on remotely setting the primary address ramp rate in smaller increments or longer than 9 seconds.)

## Setting the Dimmer's Preset On-Level *(Dimming-enable models only)*

The On-Level is the brightness level that ToggleLinc will adjust to when activated at the dimmer or when it receives a powerline carrier (PLC) ON-command to its primary address (for powerline models). It can be set to come on at the same brightness level each time or to the previous brightness level before it was turned off.

Setting a fixed brightness level:

1. Adjust the brightness of the load at the ToggleLinc (or remotely with dim commands for powerline models) to the desired level.
2. Tap the Status LED/Set Button ONCE.

The light(s) will blink indicating that it has set the new on-level.

Setting the Resume Dim mode:

1. Turn the light off.
2. Tap the Status LED/Set Button ONCE.

(ToggleLinc PLUS models only: See Advanced Primary Address Programming for instructions on remotely setting the ON-level.)

## Setting the Primary Address *(Powerline models only)*

The powerline ToggleLinc models require a primary address to operate remotely. It ships from the factory with "A1" as the default address; it will also have this address after performing a factory reset. Any of the 256 PLC addresses can be programmed.

The ToggleLinc does not use code wheels or dials to set its primary address. Instead, it will accept the first address it finds on the powerline once the programming mode is started. Any PLC transmitter can be used to set the primary address.

- Using the tip of a very small screwdriver or your finger, press and hold the Status LED/ Set Button for approximately 3 seconds then release. The green Status LED/ Set Button will begin blinking and the load will come on.
- Within 30 seconds, transmit the desired primary address (housecode and unit code) from any transmitter.

The light(s) controlled by the ToggleLinc will blink and the Status LED will stop flashing.

### Advanced Primary Address Programming (ToggleLinc PLUS Dimming Models only)

The ToggleLinc Plus Dimmers' Fade-On/Off-Rate and Default On-Level can be remotely set using a ControlLinc™ Duo (Smarthome #4071), a Maxi-Controller (#4020) or an equivalent transmitter capable of sending Housecode and Unit Code without ON or OFF. These procedures and all the following ones will not work with a transmitter that sends the address with a command. Transmitters in which one button is pressed to turn on or off a load will not work.

#### Remotely Setting the Fade-On/Off Rate (Optional)

- Transmit the "clear" sequence:

O16	N16	M16	P16	M16
-----	-----	-----	-----	-----

- Send the house/unit code for the ToggleLinc followed by the PRESET DIM from the table below. (Alternatively, send BRIGHT or DIM signals to change the light's brightness to a comparable level.)

Preset Dim Level	Ramp Rate in Seconds
100%	0.1
97%	0.2
94%	0.3
90%	0.5
87%	2.0
84%	4.5
81%	6.5
77%	8.5
74%	19.0
71%	21.5
68%	23.5

Preset Dim Level	Ramp Rate in Seconds
65%	26.0
61%	28.0
58%	30.0
55%	32.0
52%	34.0
48%	38.5
45%	43.0
42%	47.0
39%	60.0
35%	90.0
32%	120.0

Preset Dim Level	Ramp Rate in Seconds
29%	150.0
26%	180.0
23%	210.0
19%	240.0
16%	270.0
13%	300.0
10%	360.0
6%	420.0
3%	480.0
0%	540.0

- Send the following command sequence to lock-in the new Fade-On/Off rate

O16	P16	N16	M16	O16
-----	-----	-----	-----	-----

The light(s) will blink indicating that it has set the new Fade-On/Off rate.

#### Remotely setting the Default On-Level (Optional)

This is the alternative method for setting the dimmer's default on-level.

- Transmit the "clear" sequence:

O16	N16	M16	P16	M16
-----	-----	-----	-----	-----

- Send the house/unit code for the lamp module and adjust the dim level or send preset dim level.
- Send the following command sequence to lock-in the new on-level.

P16	N16	M16	O16	M16
-----	-----	-----	-----	-----

The light(s) will blink indicating that it has set the new on-level.

## Scene Address Programming *(Plus models only)*

The ToggleLinc Plus Dimmer can be a member of up to 64 scenes. A scene address is a single address (just like a primary address), and is set at the time scene membership is programmed. Using a single command to trigger a scene is much less complicated than using an intelligent computer controller to initiate a macro that in turn sends dozens of commands over the next few minutes to turn on multiple receivers and set brightness levels (for dimming-enabled modules).

When an ON signal is transmitted to scene-enabled modules, all members programmed to that address will turn on to their independent ON-levels *and* at their independent fade-on rates for that scene. Transmitting an OFF for a scene address will turn off all modules that are members of that scene. Modules will react to dim and bright commands after the scene address is sent, however, they will ignore All Light On and All Units Off commands for the scene address' house code. (The 23895 ToggleLinc PLC Switch does not have dimming abilities, but some other Smarthome scene-enabled products do.)

ToggleLinc Plus is compatible with these other scene-enabled Smarthome products:

- SwitchLinc™ 2-Way and Plus Dimmers
- SwitchLinc Relay 2-Way
- ToggleLinc 2-Way Dimmers and Switch
- LampLinc™ 2-Way & Plus Modules
- ApplianceLinc™ 2-Way & Plus Modules
- KeypadLinc™ Wall Mounted Controllers with Integrated Dimmer
- SwitchLinc 2-Way Switches
- SwitchLinc Timer
- SwitchLinc RX Plus Dimmers

The scenes for all these modules can be setup simultaneously using the same programming sequence. Signals sent by transmit-enabled Smarthome products, like those above, will be received and understood by the ToggleLinc Plus!

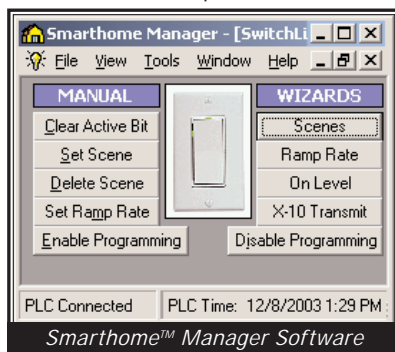
### Transmitters that can set up scenes

Scenes can be programmed with a ControlLinc, a Maxi-Controller or any transmitter capable of sending Housecode and Unit Code address without an ON or OFF command. Transmitters in which one button is pressed to turn a load on or off WILL NOT WORK. When using one of these equivalent transmitters, be careful when pressing the buttons. Programming will be ignored if some commands are not sent in the proper sequence. "Fat-Fingering" or accidentally pressing the same button twice may prevent the programming from being accepted.

If KeypadLinc controllers are installed in the house and one of their buttons is programmed to transmit to Smarthome scene-enabled receivers, it can be used to quickly set up scenes (see the KeypadLinc manual for more information).

Smarthome TouchLinc™ Touchscreens have a built-in wizard to help automate the scene setting process.

Many computer programs like Smarthome Manager (pictured), Indigo for Macintosh, HCA, and HomeSeer have tools to aid in setting up scenes and many other features. Please check with your automation software supplier for availability.



## Programming Scene Membership and On-Levels:

1. Transmit the “clear” sequence:

O16	N16	M16	P16	M16
-----	-----	-----	-----	-----

2. Activate the ToggleLinc (manually or remotely) by turning it on and adjusting the brightness to the desired brightness level for the scene. (Hint: a scene can trigger a module to go off by setting the dim level to 0%.)
3. Send the following command sequence:

M16	N16	O16	P16
-----	-----	-----	-----

4. Transmit the desired scene address (house and unit code) to lock-in new scene. The light(s) will blink to indicate that it has set the new scene.

## Removing the ToggleLinc from a Scene:

1. Transmit the “clear” sequence:

O16	N16	M16	P16	M16
-----	-----	-----	-----	-----

2. Using a controller, send the primary address of the ToggleLinc plus an ON or OFF *or* press either the ON or OFF button on the ToggleLinc.
3. Send the following command sequence:

O16	P16	M16	N16
-----	-----	-----	-----

4. Transmit the scene address (house and unit code) that is to be removed. The light(s) will blink (if they are still on) indicating that the scene has been removed.

## Programming Scene Fade-on/off Rates (optional):

The fade-on/off rate of each in each scene is individually adjustable from .1 to 540 seconds (9 minutes). If this setting is not adjusted, the ToggleLinc will use the fade-on/off rate of the primary address for the scene.

1. Transmit the “clear” sequence:

O16	N16	M16	P16	M16
-----	-----	-----	-----	-----

2. Using a controller, send the primary address of the ToggleLinc and adjust the dim level corresponding to the fade-on/off rate time you want using the table on page 7 (brighter=faster).
3. Send the following command sequence:

N16	O16	P16	M16
-----	-----	-----	-----

4. Transmit the scene address (house and unit code).

The light(s) will blink indicating that the new fade-on/off rate has been set.

**Tip:** If you have trouble communicating to the ToggleLinc, there may be a lot of signal activity on the powerline. Unplug transmitters whose signals that might be intercepted by ToggleLinc during the programming sequences. RF transceivers, computer controllers, and X10 thermostats should be unplugged to avoid interference.

## Other Features

### Disable Programming

Once the ToggleLinc is set up, it can be programmed to lockout any changes. Any changes made at the unit or remotely will be ignored. Please note that all ToggleLincs, SwitchLincs, KeypadLincs, LampLincs, and ApplianceLincs that are plugged in or electrically active will receive these commands and be locked out.

1. Send the following command sequence to disable the programming

M16	O16	P16	N16	P16
-----	-----	-----	-----	-----

The light(s) will blink (if they are on) indicating the command was received.

### Re-Enable Programming

1. Send the following command sequence to enable programming:

N16	M16	O16	P16	P16
-----	-----	-----	-----	-----

The light(s) will blink (if they are on) indicating the command was received.

### Power Restore

In the event of a power loss, the ToggleLinc will automatically return the lighting circuit being controlled to its last brightness level when the power was interrupted.

## Factory Reset

If the ToggleLinc begins to operate strangely, the factory reset procedure can be used to clear the EEPROM's memory and restore its factory default settings. Doing this procedure will clear the unit of all scene addresses and fade rates.

1. Gently pull out the Status LED/Set Button on the ToggleLinc until a click is heard. This completely removes the power from the ToggleLinc.
2. Wait five seconds, push in **and hold in** the Status LED/Set Button.
3. Release the Status LED/Set Button after five seconds.
4. WAIT approximately 25 seconds until the Status LED/Set Button illuminates before using the switch. During this time, the Status LED/Set Button and the load will remain off. When the reset procedure is complete, the load will come on and the ToggleLinc is ready for initial programming or use.

## How Powerline Signals Travel Around A Home and How To Improve Reliability

Most homes in North America have two lines of 120 volts coming into the home from the utility company. This split-single phase electricity is divided out at the home's breaker box into the circuits that feed light switches, plug-in outlets, and appliances. Half of the electricity outlets and wall switches are fed by one of the 120-volt lines and the second 120-volt line feeds the other half. The intermittent operation of PLC/X10 modules usually happens when the transmitter is sending signals on one line and the receiver module is plugged into an outlet on the other line. For the signals to get to the receiver, it must leave the home, travel to the utility company transformer then come back in on the other AC line. By the time the signal gets back to the home, travels through the electrical meter and circuit breaker box, there may not be enough signal left to trigger the module.

## How To Improve Reliability (continued)

The first order of business will be to install a coupler-repeater, also known as amplifier. A coupler-repeater will 'see' the incoming signal, re-generate it, and blast it out over both lines of the 120 volts. We recommend that any home larger than 3000 square feet install a coupler-repeater. In smaller homes, a passive phase coupler also known as a signal bridge may give satisfactory results.

Once the signal has been amplified, it's time to preserve it. Since PLC signals go everywhere in the home, some electrical devices will have more of an effect on the signal strength than other devices. PLC signals are like water pressure in pipes, it actually goes everywhere it can, not just to the receiving module. In the last 20 years, an explosion of electrical devices has invaded our homes. Computers, video gear, and fancy high-end electronics are more present than in years past. The more complicated the electrical power supply is in a device, the more likely it is to absorb PLC signals. Engineers who design power supplies build in traps to filter out and kill electrical noise. Unfortunately, the PLC signals looks like electrical noise to these devices. The result is that a large percent of the transmitted signal is lost to these devices leaving less for the receivers. The most common sources of signal loss are:

- Televisions
- Computer systems
- Audio/Video gear
- Computer UPS's and power strips
- Power supplies for laptops and cell phones

Testing for the problem is simple. If a device is suspected of causing signal absorption, unplug the device and then re-transmit the signal. It is very important that the device is unplugged and not just turned off! If the controlled product begins working after the appliance is unplugged, then a filter will be needed on that device to keep PLC signals from being absorbed and raise the signal strength of the entire home. Smarthome has many filters that will fix the problem. An average home will need between three and five filters. If you are in the business of installing automation systems and not in the 'call-back' business, include some of these in your bid as part of the standard package.



## Smarthome's BoosterLinc™ can solve localized problems



SignalLinc Repeater is ideal for improving the home automation signal strength throughout all the outlets in a home. But, as the PLC signals travel down a circuit and away from the repeater, it will weaken by the same factors listed above. Additionally, the signal will get weaker as it passes installed PLC transmitters. Each PLC transmitter contains a tuned circuit that when it's not sending signals it's absorbing them! In addition to plug-in transmitters, LampLinc™ 2-Ways, SwitchLinc™ 2-Ways, ToggleLinc™ 2-Ways, ApplianceLinc™ 2-Ways,

KeypadLinc™ Controllers, or any module with 2-way abilities will load down the available signal. With so many transmitters installed, the signal is loaded down to a point where some modules will be unable to receive a signal. Installing multiple 2-way devices on one branch circuit may necessitate the use of local amplifier like Smarthome's BoosterLinc.

## Helpful Tools

Here are a few tools that will make your projects run smoother:

### Maxi-Controller

This plug-in transmitter has the ability to send individual PLC commands. The buttons are separated into Addresses and Command functions. To use this controller, you have to press the address (for example, "5"), then the command (ON, OFF, BRIGHT, etc.). Many of the features found in Smarthome products need to be programmed with individual button presses. Using a controller that sends the address and command with one button press will not work.

### Signal Meter

This is an invaluable tool when it comes to installing and diagnosing problems. By knowing the signal's strength at a specific location, you can make sure that the signal will always trigger that module. Generally, it is ideal to have at least 100mV at each location. Conservative installers will want even more; perhaps 250mV just in case the homeowner installs a new big-screen TV after final installation. These units can also be used to measure the effects of signal absorption. Plug in the signal meter and measure the signal's strength, then unplug any devices that are plugged into nearby outlets. If 10% or greater change is observed, install a filter (like FilterLinc™) on that device.



### Voltmeter or Voltage Tester

During the installation of a home automation wall switch or controller, it may be necessary to identify the wires inside the wall box. Knowing for sure which wire is the HOT or LINE wires can reduce the guesswork when installing a single switch and it is absolutely necessary when working with 3-way lighting circuits. A voltmeter is ideal for this application.

A simpler measurement tool, available at most home improvement centers, is a voltage sensor. This device, often costing less than \$20, can sense voltage when placed near a wire. The tip of the voltage sensor can tell if voltage is on the wire without touching the bare copper conductor or breaking the insulation.

When using these tools, be certain to read and understand the safety instructions. Often when these tools are used, the power to the circuit will need to be turned on. When working around live electrical wires, take your time and concentrate on the task.

## Helpful Hints for New Construction

By design, X10 (also known as PLC) equipment does not need much in the way of special wiring. The following are six items we recommend for all homes with PLC installations:

1. Ask the builder or electrician to run the neutral wire to each wall switch location. This wiring may be a code requirement or a regular practice in your area, but unless explicitly specified, it may get omitted. Most SwitchLincs and all KeypadLinc controllers require the neutral connection.
2. Specify the installation of deep J-boxes in all locations where PLC switches, receptacles, or transmitters will be used. While all PLC products fit in the spacing offered by all North American electrical boxes, the deep models have extra working space and make the installation go a little easier. Deep boxes only costs a few cents more than normal depth models. Look for single gang boxes that are 22cu or higher (cubic inches) and double gang boxes that are 36cu. or higher.

3. If the automation switch is dimming-enabled and is going to be controlling 400 watts or more, do not place insulation around the wall box and consider using metal junction boxes. Dimmers that control high loads will dissipate heat, which may be felt through the switch faceplate. Metal boxes will more efficiently draw out the heat and spread it over all the surfaces of the box. By keeping wall insulation a few inches from the box, free air will help move the heat away.
4. Install a whole-house surge suppressor. Adding a good whole-house surge protector at the breaker will help protect against costly damage to the PLC components and other delicate electrical equipment.
5. Install a PLC phase coupler (signal bridge) or coupler-repeater (amplifier) at the incoming electrical service. A common problem with PLC signals is getting the signals between the two legs of electricity that service the home. A coupler-repeater is recommended for homes of 3,000 square feet or greater. Smaller homes will generally work well with a passive phase coupler.
6. Work with the electrician to isolate non-automation loads. Ask the electrician to place the non-PLC carrying lines on one of the two incoming lines. Having the kitchen and laundry appliances plus the heating systems on one phase will help keep potential noise off the signal-carrying lines. He probably won't be able to accommodate 100% of the loads on one phase or another, but an attempt should be made.

## Glossary of Terms

- X10 Address-** The Address part of an X10 signal contains the House and Unit code. An Address can be Unit codes 1 to 16 and House codes A - P. There are 256 total X10 addresses. Examples of X10 Addresses are A-1, B-5, P-15, O-9.
- X10 Command-** The Command is action part of an X10 signal. It tells the module what to do when it sees its address. Examples of a command are ON, OFF, Bright, DIM, PREdim, All Light ON, and All Units OFF. There are other rarely used commands, but these are the most common ones.
- Resume Dim Level-** If set, the ToggleLinc can come on to the level it was at before it was turned off.
- PreDim Level-** One of 32 brightness levels the ToggleLinc supplies to lights. When a scene address is received, the ToggleLinc can instantly (or slowly) change the lights brightness to a predefined brightness level.
- Scenes in ToggleLinc-** ToggleLincs 2-Way and Plus models can be set up to respond to multiple X10 signals and when received come onto a predefined brightness level all with one signal. One scene signal from a KeypadLinc or any transmitter can instantly (within seconds) change the lighting mood in your home.
- Maxi Controller-** An X10 transmitter that has separate buttons for the unit codes and the commands. In some of the advanced set up functions for the ToggleLinc, it is necessary for only a unit code to be sent. The X10 SC-503 and Leviton 6320 are examples of Maxi-Controllers. We recommend having a Maxi Controller to set up the ToggleLinc.
- X10 Keypress-** This is an X10 signal that only contains the house and unit code WITHOUT a command. The Maxi-Controller, some TouchLinc LCD controllers, and home automation interfaces can produce a keypress command.
- Hot or Line-** The wire in the junction box that contains the incoming electricity from the electrical panel. It is usually black and may be tied with a wire nut to other black wires in the rear of the box.
- Load-** The wire in the junction box that goes to the light(s). Usually, there is just one load wire in a junction box and it is black. It has no voltage when the switch is off.
- Neutral-** While not used on a mechanical switch to control a load, ToggleLinc will need a neutral wire to operate. Generally, the neutral wires are white and located in the rear of the junction box. There may be two or more wires tied together by a wire nut.

## Troubleshooting & Technical Support

Problem	Possible Cause	Solution
Light controlled by ToggleLinc turned itself ON	ToggleLinc was triggered by a scene	Check scene membership and remove unwanted scenes from ToggleLinc, or perform a Factory Reset to reset ToggleLinc to factory defaults
		Install a X10 Signal Blocker for the home
Light does not appear to turn ON or OFF when is tapped (manually)	Primary address fade-on rate may be set too slow	Increase fade-on rate if desired (see page 6)
ToggleLinc will not take programming of scene, ramp rate, etc.	ToggleLinc may be in Program Disable mode	Re-enable Program mode or perform a Factory Reset to reset ToggleLinc to factory defaults
	ToggleLinc may not be "activated" within the 4 minute window	Manually turn ToggleLinc ON or OFF or send its X10 address during Step 2 of programming (see page 9)
ToggleLinc is not transmitting to other modules	Make sure that ToggleLinc can transmit	The similar-looking ToggleLinc Plus and PLC switches can't transmit
LED is not visible and or ToggleLinc is not controlling the light	It is in system off position	Press in the Set Button/Status LED
	Incomplete (open) wire connection in wall box	Check wall box wires to ensure all connections are tight and no bare wire is exposed
ToggleLinc is locked up	Incomplete (open) wire connection at fixture	Check fixture to ensure all connections are tight and no bare wire is exposed
	Surge in power line	Reset ToggleLinc by pulling out the Set Button for a minute and then pressing it in
Existing switch only has two wires	ToggleLinc needs a neutral wire in order to operate. Use SwitchLinc RX #2386W2	Look in the rear of the junction box for a group of white wires all tied together with a wire nut. Those are the neutral wires, connect the ToggleLinc's white wire there
Difficulty setting scenes with a maxi-controller	The CLEAR or SET commands were not sent in the correct order	Don't hold down the buttons too long, it may send duplicate codes (i.e. two O16 codes)
ToggleLinc is not receiving signals	Check the Status LED	It will blink when there is signal activity on the line
	Move the transmitter to another outlet	ToggleLinc needs at least 10mV of signal strength for reliable operation, a coupler-repeater or a signal bridge may be needed (see pg.10)
The load is buzzing when on or dimmed	The triac dims the load by 'chopping' up the sine wave	The bulb's filaments are vibrating. Use rough service, 130-volt, or appliance grade bulbs to reduce the noise
		Run the ToggleLinc in the full-on mode, or consider getting one of the ToggleLinc <b>Switch</b> models that have no-dimming abilities
ToggleLinc turns on, but not off by remote control	The load is producing electrical noise that is interfering with reception of X10/PLC signals	Install a noise filter like Smarthome #4835 between the load and the ToggleLinc or increase the signal strength with a coupler-repeater to overcome the line noise
The switch is getting too warm to the touch	It is normal for wall dimmers to get warm	ToggleLinc will dissipate 1-watt per 100 watts controlled. Using metal junction boxes, removing insulation around the outside of the box, or using a small load can help lessen the heat

If these solutions have been tried, the manual has been reviewed and you still cannot resolve an issue you're having with the ToggleLinc;

- Search our on-line knowledge base at: <http://smarthome.custhelp.com>
- E-mail [tech@smarthome.com](mailto:tech@smarthome.com)
- Call our Technical Support Dept. at 949-221-9200

## Specifications

- Load types: Permanently installed incandescent and general inductive loads
- Operation: Dimming Triac (12-amp Rated)
- Maximum load: 600 watts
- Input power: 125 VAC, 60 Hz
- Connections (16 AWG): Black (to line), Red (to load), White (to neutral, required)  
Yellow (to optional Multi-way Companion Switches, 23892)
- Addresses:  
*(Powerline models)* 1 PLC (X-10) Base (Primary) Address of 256 possible  
Up to 64 PLC (X-10) Scene Addresses of 255 possible *(Plus models)*
- On-Level:  
*(Dimming enabled models)* (Primary Address) 1 of 31 possible (3.2%-100%) or resume dim  
(Scene Address) 1 of 32 possible (0%-100%) *(Plus models)*
- Ramp Rate:  
*(Dimming enabled models)* 0.12 to 9 seconds if programmed locally  
0.12 sec. to 9 minutes if programmed remotely *(Plus models)*
- Maximum ToggleLincs per gang box: 4
- Maximum number of ToggleLincs per circuit: No Limit (up to the rating of the circuit breaker)
- Minimum load: No minimum load required
- Operating temperature: 40° F to 104° F
- Minimum PLC receive level: 10mV *(Powerline models)*
- Mounting: Mounts in single or multiple-ganged J-box. 200W of load control is lost for each immediately adjacent switch or dimmer installation; e.g., 600W max load control becomes 400W maximum with a switch to the immediate right or left.  
To avoid downgrading load control, use a triple-gang box.
- Status indicator: Green LED
- Dimensions:
 

	Front Bracket	Main Body
(width)	1.73"	1.74"
(height)	4.14"	2.71"
(depth)	1.73"	1.40"
- Weight: 4.0 oz.
- ETL Listed for use in the U.S. and Canada

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## Invest in Better Home Automation Products

Unlike most electric items, many PLC-based products haven't changed much over the years.

Our Marketing and Customer Service teams surveyed our customers, like you, and our engineers have invented new and better wall switches and plug-in modules. We include more features, higher load handling, and better signal sensitivity for a superior user experience. While in some cases, they cost more; we hope you'll agree that not having to replace a dead module every couple years is worth the added expense and reduced aggravation. Please visit a retailer or distributor for the complete line of automation products from Smarthome Design. Check out our web site at:

<http://www.smarthome.com/smarthomedesignstore.html>



**KeypadLinc 6 with  
450W integrated  
dimmer**

## About ToggleLinc's Certification

ToggleLinc has been thoroughly tested by ITS ETL SEMKO, a nationally recognized independent third-party testing laboratory. Products bearing North American ETL Listed mark signifies that the product has been tested to and has met the requirements of a widely recognized consensus of U.S. and Canadian product safety standards, that the manufacturing site has been audited, and that the manufacturer has agreed to a program of quarterly factory follow-up inspections to verify continued conformance.



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Smarthome warrants to the original consumer purchaser of this product that, for a period of two years from the date of purchase, this product will be free from defects in material and workmanship and will perform in substantial conformity to the description of the product in this Owner's Manual. This warranty shall not apply to defects or errors caused by misuse or neglect.

If the product is found to be defective in material or workmanship or if the product does not perform as warranted above during the warranty period, Smarthome will either repair it, replace it or refund the purchase price, at its option, upon receipt of the product at the address below, postage prepaid, with proof of the date of purchase and an explanation of the defect or error. The repair, replacement, or refund that is provided for above shall be the full extent of Smarthome's liability with respect to this product.

For repair or replacement during the warranty period, call Smarthome customer service to receive an RA# (return authorization number), properly package the product (with the RA# clearly printed on the outside of the package) and send the product, along with all other required materials to:

Smarthome  
ATTN: Receiving Dept.  
16542 Millikan Ave  
Irvine, CA 92606-5027

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