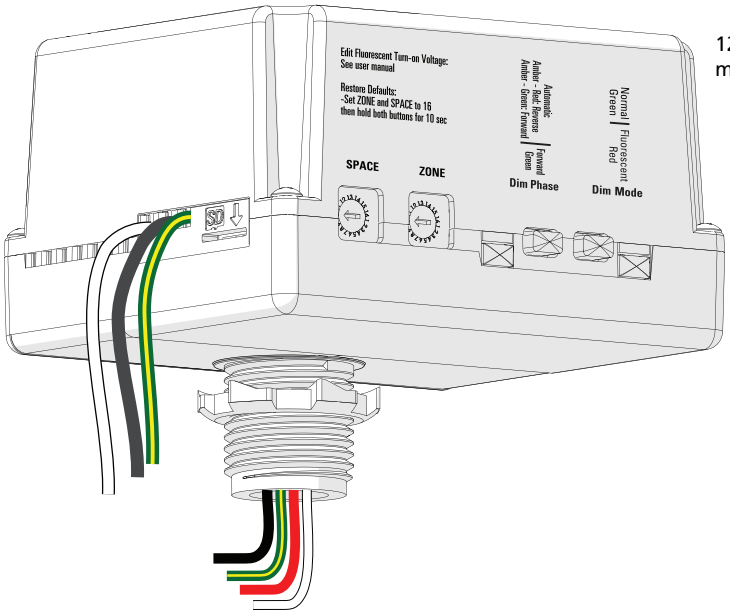
Echoflex Installation Guide
Elaho Phase-Adaptive Dimmer–Gen 2

Overview

The Elaho Phase-Adaptive Dimmer provides control for individual fixtures or zone power for 120V and 277V line voltage loads that require forward-phase or reverse-phase dimming, up to 600 watts.

The Phase-Adaptive Dimmer automatically provides reverse-phase or forward-phase dimming based on the connected load type. The Phase-Adaptive Dimmer is compatible with all Elaho control products, including daylight and occupancy/vacancy sensors and manual control stations on the EchoConnect® control bus.



120VAC model shown

The Phase-Adaptive Dimmer controls lighting loads based on the following:

- Preset and Zone controls received from connected Elaho control stations
- Ambient light levels as monitored by Elaho Light Sensors
- Occupancy state as monitored by Elaho Occupancy/Vacancy Sensors
- Input from other Elaho control devices

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Custom Configuration

This document guides you through the installation and local configuration of the Phase-Adaptive Dimmer. You can access advanced functionality using the ElahoAccess Mobile App. For more information, see the ElahoAccess integrated help system.

EchoConnect

EchoConnect is a two-wire topology free system that provides the Phase-Adaptive Dimmer with the flexibility to connect in a system with up to 16 Elaho control products and up to 15 other Elaho output products over 500 m (1,640 ft) of control wire.

Plug-and-Play Functionality

Using the Phase-Adaptive Dimmer on the EchoConnect control system allows simple plug-and-play functionality, where no software or external programming is required. The connected control stations or sensors provide the control message and the Phase-Adaptive Dimmer responds.

Note: *2-wire fluorescent loads may require additional configuration for proper dimming performance.*

See the *Elaho Inspire Station Installation Guide*, *Elaho Occupancy/Vacancy Sensor Installation Guide*, or *Elaho Light Sensor Installation Guide* for more information about how to set levels and controls. You can download Echoflex manuals free of charge from the Echoflex website (see page 1).

Specifications

For use with Echoflex dimming and relay products.

Ambient Environment

For indoor use only. Rated for plenum use.

- 32°F to 122°F (0°C to 50°C) operating temperatures in 5–95% non-condensing humidity

Electrical Specification

Two models are available:

- 120 VAC, +/- 10% at 60 Hz, maximum load 600W (5A)
- 277 VAC, +/- 10% at 60 Hz, maximum load 600W (2.17A)

Note: *The Phase-Adaptive Dimmer requires a minimum load of 1W and has an idle draw of 0.4W.*

Supported load types

- Tungsten
- 2-wire Fluorescent
- LED
- Electronic low voltage transformer
- Magnetic low voltage transformers (120V only). Transformers should be correctly loaded to their rated current.

CAUTION: *Echoflex does not support the use of the Phase-Adaptive Dimmer with magnetic loads at 277V.*

Connecting underloaded magnetic transformers at 120V to the Phase-Adaptive Dimmer may result in damage to the Phase-Adaptive Dimmer . This damage is not covered under warranty.

Compliance

- UL and cUL listed
- Conforms to UL 508 (Industrial Control Equipment), UL 916 (Energy Management Equipment), UL 2043 (Plenum rated), and CSA C22.2 No. 14

Prepare for Installation

The Phase-Adaptive Dimmer is designed for mounting directly to an electrical junction box or panel (provided by others) at the electrical lighting load, upstream of the load in the circuit.

Note: *If your installation requires Class 2 wiring to be installed in separate conduit, a voltage barrier installation box is available from Echoflex. Order Echoflex part number 7187A1000.*

EchoConnect Control Wiring

The Phase-Adaptive Dimmer connects to the EchoConnect station communication bus for control. EchoConnect is a bidirectional protocol that uses one pair of wires (data + and data -) for both data and power. Echoflex recommends using Belden 8471 (or approved equal) Class 2 wire. The total combined length of an EchoConnect wire run (using Belden 8471, or equal) may not exceed 1,640 feet (500 m).

Note: *All control wiring should be installed and terminated by a qualified installer and should follow standard wiring installation practices.*

Leave approximately 8" (20 cm) of wiring in the back box for connection and to allow slack for future service needs.

Note: *Echoflex requires that all Elaho stations and devices be grounded for ESD protection. Pull an additional 14 AWG (2.5 mm^2) wire for grounding when control wires are not installed in grounded metal conduit.*

Installation

Installation should follow all local codes and standard electrical practices. Ensure that the junction box is clean and free of obstructions and that all wiring is installed correctly.

WARNING: Risk of electric shock! This device utilizes high voltage and should only be installed by a qualified installer or electrician. Follow all local codes for installation. Before terminating the AC power wiring verify that the main breaker is in the off position and follow the proper lockout/tag out procedures per NFPA Standard 70E.

WARNING: For indoor use only! Must install to an electrical junction box or wireway.

1. Locate the circuit breaker panel and turn off the power to the lighting circuit.
2. To gain access to the line voltage wiring, remove the cover plate and other hardware from the junction box at the load.
3. Mount the Phase-Adaptive Dimmer to the exterior of the junction box or panel using the 1/2 in threaded nipple. Use the provided 1/2 in conduit locknut to secure the Phase-Adaptive Dimmer to the junction box or panel.

Note: *Follow all local code requirements for terminating wire.*

- *Notice that the harness wires on the controller are pre-stripped for your installation convenience.*
- *Use appropriately sized wire nuts (not provided) to secure each termination.*

Connect EchoConnect

The EchoConnect wire terminations are bound together and include a black wire (data -), a white wire (data +), and a green/yellow wire (ESD). Because EchoConnect is topology free, you can install the wires in any combination of bus, star, loop, or home-run.

Note: *When using Category5 (or equivalent) cable on the EchoConnect communication bus, please note the following:*

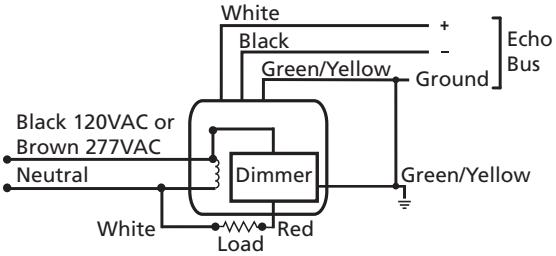
- *Not all topologies are supported using Cat5; plan carefully to ensure that the proper termination kits are available and the wire is pulled appropriately.*
- *Terminate Cat5 wiring using the EchoConnect Cat5 Station Termination Kit, and install it using a bus topology. See the installation guide that is provided with the Cat5 Station Termination Kit (8186A1707) for information on terminating Cat5 wiring.*

1. Pull all required wiring (data +, data -, and the ESD ground wire) to the junction box.
2. Connect the incoming ground wire to the ESD green/yellow ground wire on the unit.
3. Connect the black (data -) wire to the incoming data - (typically black).
4. Connect the white (data +) wire to the incoming data + (typically white).

Connect Power Input and Dimmer Output

The power input wiring exits the Phase-Adaptive Dimmer through the knockout mount on the enclosure.

1. Connect the power input wiring. The dimmer is supplied with inputs specific to the input voltage, either 120 VAC or 277 VAC.
   a. Connect the green/yellow striped wire (14 AWG) from the controller to the ground wire from the breaker panel and the ground wire from the lighting load.
   b. Connect the white wire (14 AWG) to the incoming neutral wire from the breaker panel and the neutral wire of the lighting load.
   c. Connect the power input wire (14 AWG) to the line input feed wire (hot) from the breaker panel. Power input wire is black for 120 VAC or brown for 277 VAC.
2. Connect the red dimmed output wire (14 AWG) to the dimmed line of the lighting load.



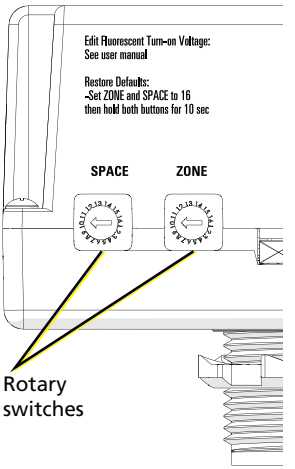
3. Reinstall the junction box cover plate.

Assign Zones and Spaces

You can assign zones and spaces using the two rotary switches on the side panel of the controller.

By default, these switches are set to Zone 1, Space 1. Control inputs from the connected stations, sensors, and other controls are shared by all devices within a space.

1. Set the **Zone** rotary switch to the desired Zone address for this controller.
2. Set the **Space** rotary switch to the desired Space for this controller.



Power Up and Test

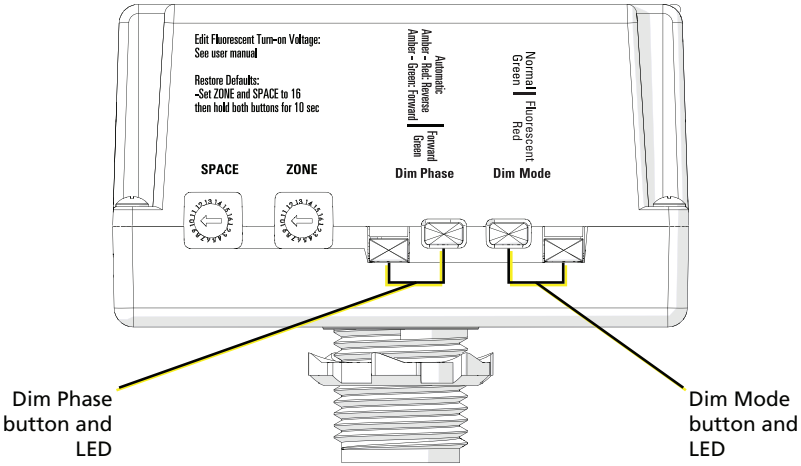
1. Restore power to the circuit. The Phase-Adaptive Dimmer will power up and turn on all connected loads to full output.
2. Test the circuit by activating the associated Elaho station preset or by changing the zone intensity control.
3. Test the controller response. Use station controls to alter preset or zone status, and ensure that the Phase-Adaptive Dimmer responds.

Power-Up Behavior

In the event of a power loss to the Phase-Adaptive Dimmer, the controller will return to its last output level when power is restored.

Set the Dimming Phase

Use the **Dim Phase** button to manually set the phase. The related LED indicates which dimming phase is currently active.



WARNING: Manually setting the dimmer to the incorrect mode for the connected load will result in damage to the dimmer.

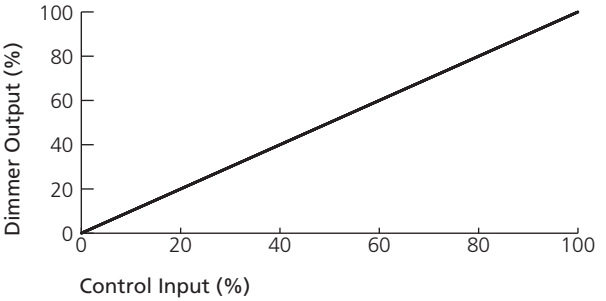
- Press the **Dim Phase** button to cycle through the available phase options:
  - Automatic
  - Forward
- The **Dim Phase** LED provides visual status of the currently selected phase setting:
  - Automatic dimming mode (default setting) = Amber, with intermittent color blinks to indicate phase (Green = Forward, Red = Reverse)
  - Forward-phase dimming = Green

Set the Dimming Mode

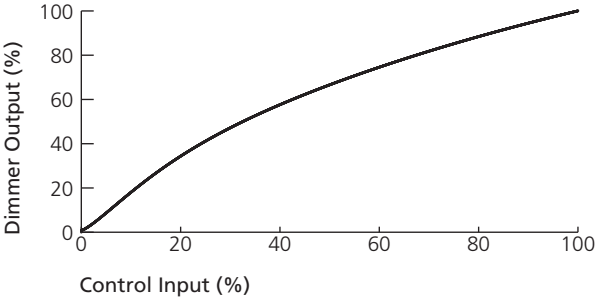
Use the **Dim Mode** button to manually set the dimming mode or to enter Fluorescent Voltage Adjustment mode. The related LED indicates which mode is currently active.

Press the **Dim Mode** button to toggle the dimming mode:

- **Linear**: The linear curve matches the control input percentage to Root Mean Squared (RMS) voltage output. Each percent increase in control level increases dimmer voltage output by the same amount.



- **Modified Square Law (Mod-Square)**: A standard square law curve may overcompensate for infrared loss, resulting in "steppy" response to incremental control changes at low levels. This modified square law curve applies a second multiple to the standard square law curve for more uniform response to control levels changes across the entire range of dimmer output.



The **Dim Mode** LED provides visual status of the selected dimming mode:

- Green = Standard (modified square law) dimming curve (default setting)
- Red = Fluorescent (linear) dimming curve

Fluorescent Voltage Adjustment Mode

This mode adjusts the minimum turn-on voltage used by Fluorescent dimming mode. Press and hold the **Dim Mode** button for 5 seconds to enter Fluorescent Voltage Adjustment mode. The LED is amber when this mode is active.

Note: *The allowed range is 0–100% of the input voltage. By default, 120 VAC models are set to turn on at 56 VAC, and 277 VAC models are set to turn on at 129 VAC.*

Press the **Dim Mode** button again to increase the "turn on" voltage by 2%, or press the **Dim Phase** button to decrease the "turn on" voltage by 2%. Because the Phase-Adaptive Dimmer outputs at the current turn-on level while in Fluorescent Voltage Adjustment mode, you can make adjustments with the loads on, regardless of the input control state.

Press and hold the **Dim Mode** button for 5 seconds to save the setting and exit Fluorescent Voltage Adjustment mode.

Troubleshooting

Error Indicators

The **Dim Phase** LED and **Dim Mode** LED (see image on *page 9*) blink red in unison when one of the following errors occurs.

LED Indicator	Error	Description
Red single blink	Over current	Dimmer is drawing too much current. Check the outgoing load for short circuits or loads above 600W.
Red double blink	Over temperature	Dimmer is too hot. Ensure that the dimmer is in a suitably air-conditioned space and that free air is able to move around the heat sink.
Red triple blink	Multiple voltage spikes	Load on the dimmer output is too inductive. (See *Supported load types on page 3*.) Ensure that the load is correct for the dimmer.

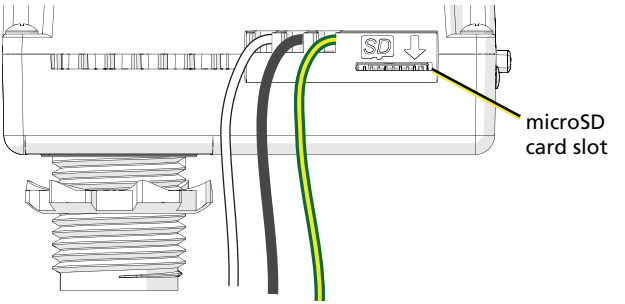
Restore Defaults

To return the Phase-Adaptive Dimmer to factory defaults, set both rotary switches to 16 and then press and hold both the **Dim Mode** and the **Dim Phase** buttons for 10 seconds. The LEDs will blink red quickly to indicate that the factory defaults have been restored.

Note: *After you return the Phase-Adaptive Dimmer to factory defaults, reset the rotary switches to the appropriate values for the controller zone and space.*

Update Firmware

If updated firmware is required, you can update the firmware on the Phase-Adaptive Dimmer by using ETC UpdaterAtor software and a microSD card. You can download UpdaterAtor from the ETC website at etcconnect.com.

Note: *Plan to update firmware when troubleshooting any issues with the Phase-Adaptive Dimmer.*

1. Get the firmware update file using UpdaterAtor.
2. Save the firmware update file to the root directory of a microSD card.
3. Ensure that power is supplied to the controller.
4. Insert the microSD card in the SD slot on the side of the Phase-Adaptive Dimmer enclosure (see image below).
   - The Dim Mode LED will illuminate amber in a triple-blink pattern while the firmware is updating, and then will return to its previous state when the update is complete.
   - If the LED illuminates red in a double-blink pattern, an error has occurred. Ensure that the firmware file has not been renamed and is located at the root directory on the microSD card, and then attempt the firmware update again. If the LED continues the double-blink pattern, contact Echoflex Technical Services using the information at the bottom of page 1.
5. When the LED returns to its previous state, remove the microSD card.