



## echoflex BBS-702SW Dual Tech Switch-Mount Occupancy Sensor Installation Guide

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**echoflex BBS-702SW Dual Tech Switch-Mount Occupancy Sensor**

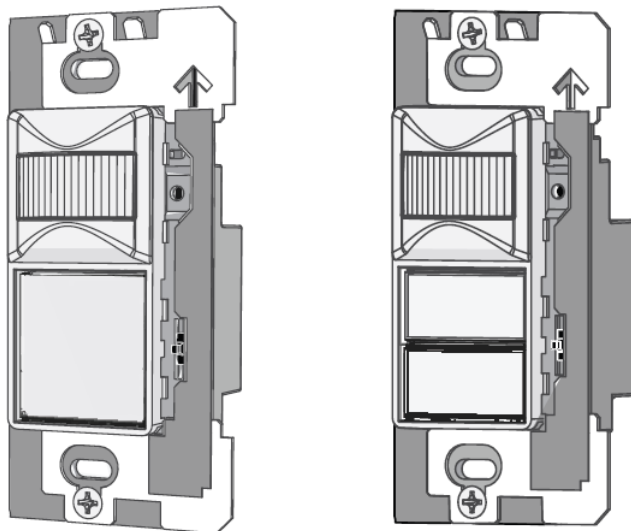


## Echoflex Installation Guide

### Dual Tech Switch-mount Occupancy Sensor

#### Overview

The Elaho Dual Tech Switch-mount Occupancy Sensor is a switch station with a built-in sensor that uses passive infrared (PIR) and acoustic detection to provide reliable occupancy and vacancy sensing for lighting control.



The Dual Tech Switch-mount Occupancy Sensor is available in one- and two-button models, and is available with white, black, cream, or gray wall plate.

Each button is backlit by both blue and amber LEDs to show changes in status. The sensor provides a 180 degree field of view with up to 13.7 m (45 ft) radius for large motion detection. This document guides you through the installation and local configuration and setup of the Dual Tech Switch-mount Occupancy Sensor.

#### Custom Configuration

For more information about the custom configuration options available using ElahoAccess, reference the ElahoAccess Mobile App integrated help system.

**Note:** Settings made using ElahoAccess are applied only when the function selection switch is set to Custom (middle position). Reference Function Switch on page 11.

## Prepare for Installation

Elaho Dual Tech Switch-mount Occupancy Sensors ship with electronics, a decorator style wall plate, and a termination kit. The sensor may be installed into an industry-standard back box (provided by others) or surface-mounted back box (sold separately and available from Echoflex).

## Environment Ambient

For indoor, commercial controls use only. Indoor installation only. The sensor operates in ambient temperatures of 0°C to 40° C (32°F to 104°F), with a maximum of 90% non-condensing humidity.

## Installation

Echoflex recommends paying special attention to the installation environment:

- When operating in PIR only modes, the sensor must have an unobstructed view of the room. Do not mount behind or near tall cabinets, shelves, hanging light fixtures, etc.
- Do not install the sensor within 2.4 m (8 ft) of an HVAC airflow duct/vent.
- Install the sensor where it cannot easily sense movement in areas outside of the intended space, such as hallways, glass partitions, or adjacent rooms.

**Note:** In areas of increased noise activity, enabling PIR only mode may allow for better vacancy detection results. Reference DIP Switch Settings on page 6.

## Wire Specification

The Dual Tech Switch-mount Occupancy Sensor connects to the EchoConnect communication bus. EchoConnect is a bi-directional protocol that uses one pair of wires (data + and data -) for both data and power. Echoflex recommends using Belden 8471 Class 2 wire (or approved equal see the Echoflex cable cross database [echoflexsolutions.com/files/Elaho\\_Data\\_Cable\\_Wire\\_Specs](http://echoflexsolutions.com/files/Elaho_Data_Cable_Wire_Specs) for equal alternatives). The total combined length of an EchoConnect wire run using Belden 8471 may not exceed 500 m (1,640 ft), with a maximum distance of 400 m (1,312 ft) between any two devices.

**Note:** All control wiring should be installed and terminated by a qualified installer and should follow standard wiring installation practices. Leave approximately 25.4 cm (10 in) of wiring in the back box for connection and to allow slack for future service needs.

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

**Note:** When using Category 5 (or equivalent) cable on the EchoConnect communication bus, please note the following:

- Cat5 wiring must be terminated using EchoConnect Cat5 Termination Kits and must be installed using a bus topology. Refer to the installation guide that is provided with the Cat5 Termination Kit (8186A1207) for information to terminate Cat5 wiring.
- Not all topologies are supported using Cat5; careful planning is required to ensure the proper termination kits are available and the wire is pulled appropriately.

## Parts and Supplies

The following parts and supplies are included with the sensor:

- mounting screws

- EchoConnect termination kit
- WAGO 221 Series LEVER-NUTS® (wire termination connectors)
- decorator style wall plate

## Installation

Installation should follow all local codes and standard electrical practices.

**Note:** NEC Class 2 product to be wired in accordance to NEC Article 725 and local jurisdiction requirements. The back box should be installed plumb and square for best results. Ensure that the box is clean and free of obstructions and that all wiring is installed correctly.

Dual Tech Switch-mount Occupancy Sensors ship with a termination kit for use with Belden 8471 (or equivalent wire), and include power and ground wire pigtails, receptacle spacers, and all required wire termination connectors for installation.

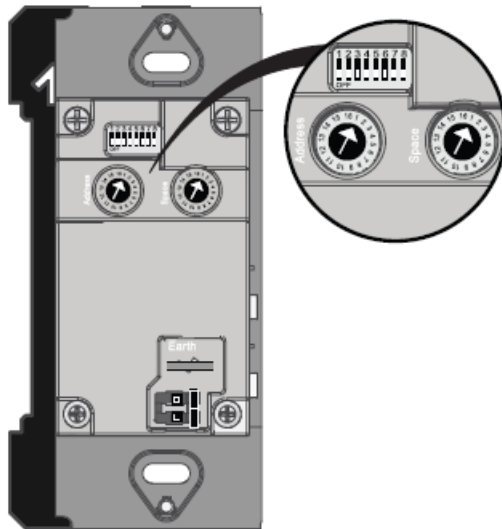
## Connect Wiring

1. Pull all required wiring (data+, data-) into the back box. As needed, pull an additional ESD ground wire (required only when the station is not installed in grounded metal conduit).
2. Connect the station ESD ground wire pigtail.
  - Strip 11 mm (7/16 in) of insulation from the ends of the station ground wire pigtail, provided in the termination kit, and the incoming ground wire.
  - Use one WAGO connector, provided in the termination kit, to connect the station ESD ground pigtail and the incoming ground. For stations using grounded metal conduit, connect the ground pigtail to the metal back box ground location.
  - Install the ESD ground wire pigtail FASTON connector to the mating receptacle on the station electronics.
3. Terminate Echo Connect wires. Echo Connect is topology free; you may install the wires in any combination of bus, star, loop, or home-run.
  - Strip 11 mm (7/16 in) from the ends of each power pigtail wire provided in the termination kit and the installed control wires.
  - Use the provided WAGO connectors to connect the power pigtail wires and the installed Belden 8471 control wires. One WAGO should be used for the white wire pair (data +) and one for the black wire pair (data -). Open the terminal levers on the WAGO connector and insert the installed Belden 8471 wire and the lead from the power pigtail into the terminals, and then close the levers.
  - Install the two-pin connector from the power pigtail to the mating receptacle on the station electronics.

## Rotary and DIP Switches

Rotary and DIP switch settings are accessible on the rear of the station.

## Set Space and Address



The two rotary switches provide for assignment of the sensor space and address. Each sensor must be set to a unique station address for the assigned space. By default, these switches are set to Address 1, Space 1. Commands are shared by all devices within an assigned space.

1. Set the Space rotary switch to the desired number (1 through 16) for the space you want the sensor to control.
2. Set the Address rotary switch to desired address (1 through 16) for the sensor identification in the selected space.

**CAUTION:** Each device on the bus must have its address set to a unique number (1 through 16) for the space it controls. If two or more devices use the same address for the same space, the system will not function properly.

#### DIP Switch Settings

DIP switches provide for designation of “Off” functionality, the ability to disable amber button LEDs, and the ability to restore the sensor to its factory defaults.

Switch #	Use

1	<p>One-button Dual Tech Switch-mount Occupancy Sensor only</p> <ul style="list-style-type: none"> <li>• When set to On, and the Function switch is set to Preset, enables Sequence toggle mode. Default position is Off.</li> </ul> <p>Two-button Dual Tech Switch-mount Occupancy Sensor only</p> <ul style="list-style-type: none"> <li>• When set to On (default), and the Function switch is set to Preset, the bottom button provides a Space Off command.</li> <li>• When set to Off, the bottom button controls the next consecutive preset after the preset assigned to the top button.</li> </ul>
2	<p>Amber LED Disable – provides the ability to disable use of the amber button LEDs.</p> <ul style="list-style-type: none"> <li>• When set to On, the amber button LEDs on the station are disabled. Only blue LEDs will illuminate.</li> <li>• When set to Off (default), the amber button LEDs on the station are enabled. Amber LEDs are provided as the default so the station glows in darkened spaces, allowing it to be easily located.</li> </ul>
3 and 4	<p>Vacancy Timeout</p> <ul style="list-style-type: none"> <li>• 5 min = Switches 3 and 4 are Off</li> <li>• 15 min = Switch 3 is Off and Switch 4 is On (default)</li> <li>• 30 min = Switch 3 is On and Switch 4 is Off</li> <li>• Auto = Both switches are On</li> </ul>

5	<p>Detection LEDs</p> <ul style="list-style-type: none"> <li>• When set to On (default), the occupancy detection LED illuminates when movement is detected.</li> <li>• When set to Off, the occupancy detection LED is disabled unless the unit is in Walk Test mode.</li> </ul>
6	<p>PIR Only Mode</p> <ul style="list-style-type: none"> <li>• When set to On, acoustic detection technology is disabled for the sensor.</li> <li>• When set to Off (default), both PIR and acoustic detection technologies are used by the sensor.</li> </ul>
7	Unused
8	<p>Restore to Defaults at boot</p> <ul style="list-style-type: none"> <li>• When set to On, then cycling power to the switch-mount station, the unit restores to its factory default settings.</li> <li>• Off is the default setting</li> </ul>

**Note:** When the sensor Function switch is set to Custom, only DIP switch number 8 applies. All other DIP switch settings are ignored.

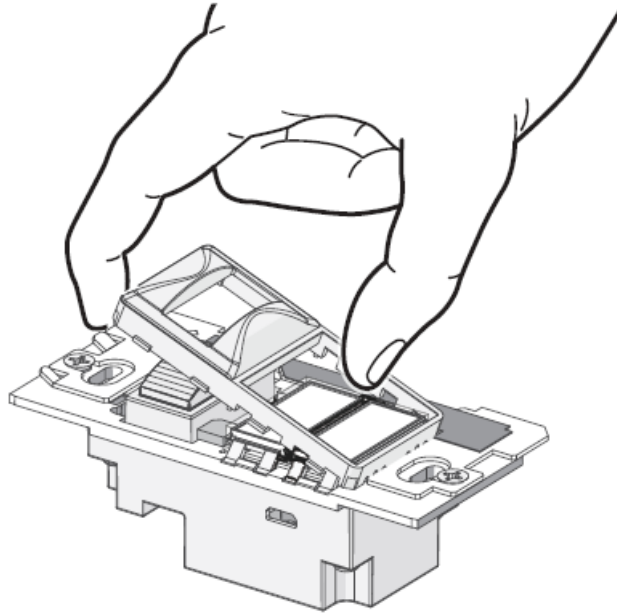
Reference Station Configuration on page 11 for local configuration settings on your Dual Tech Switch-mount Occupancy Sensor. Reference the ElahoAccess Mobile App integrated help system for details about custom configuration using the ElahoAccess Interface.

## Install Button Legends

Elaho Dual Tech Switch-mount Occupancy Sensors ship with standard button legends installed beneath a clear lens.

**Note:** Customize and print your own button legends on standard transparency. Download the button legend template provided on the Echoflex website [echoflexsolutions.com](http://echoflexsolutions.com).

Each button can have a legend, installed beneath the button lens. To remove, install, or replace a button legend you must first remove the bezel and button lens from the station electronics.

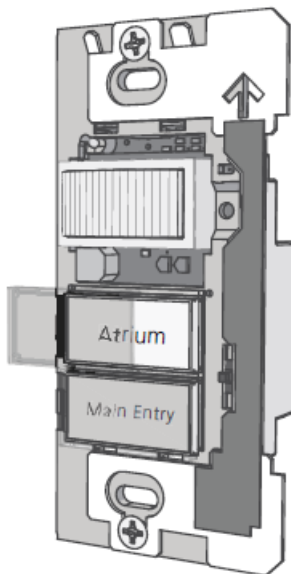


1. Remove the bezel from the station electronics.

- Each corner of the bezel is provided with a notch to assist with bezel removal. Use a finger nail to lift a corner free, then gently remove the bezel from the station.

2. Remove the button lens.

- Using the pad of your thumb, press on the lens and slide the lens left, toward the hinge points.



3. Once the lens is removed, remove the existing legend and insert a custom legend.

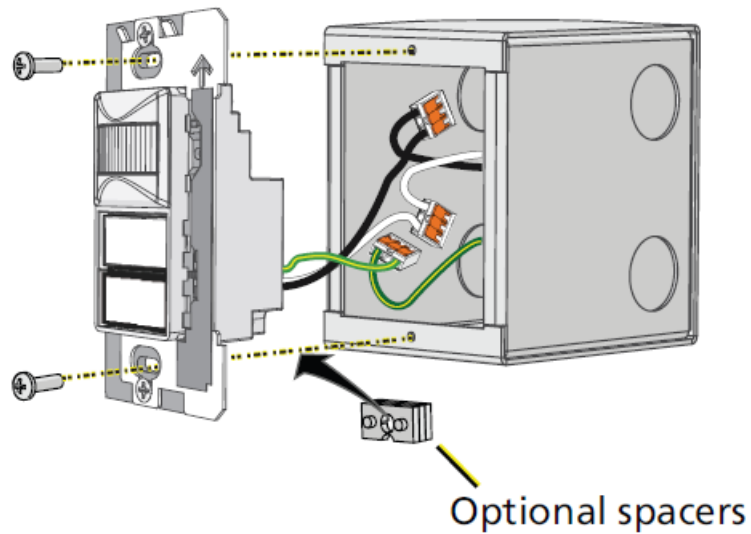
4. Replace the lens onto the button by aligning the rim grooves of the lens to the button, then sliding the lens in place starting at the hinge. Slide the lens in Entry until it covers the entire button and clicks into place.

5. Replace the bezel to the station electronics when all legends and lenses are in place.



## Install the Station

Receptacle spacers are provided for use in flush mount applications to help align the station and cover flush against the wall.

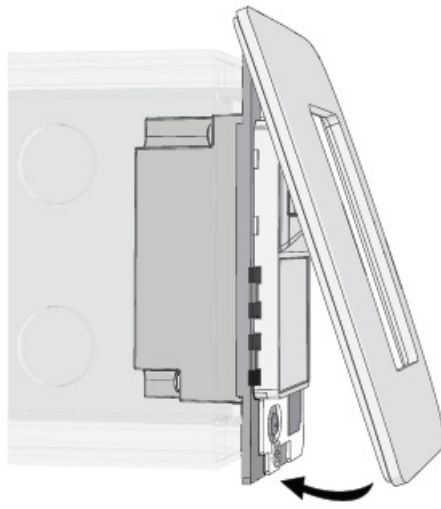


1. Insert the station electronics and wiring into the back box. To install multiple stations (multi-gang), insert the station electronics into the box from the right to the left side for the best alignment and fit. The alignment bracket will slightly overlap the station to the right when properly installed.
2. Use spacers as needed to provide a flush mounted station.
  - Fold the spacer in a zig-zag fashion and press the stack together to achieve the thickness needed to fill the gap between the station, wall surface, and the back box.
  - Cut off and discard the excess.
  - Place the stack between the station electronics and the flush mounted back box.
3. Secure each station electronics in place using the two screws provided. If using spacers, insert the screws through the spacers as well.

**CAUTION:** To improve successful station and wall plate installation, do not over tighten the screws. If screws are over tightened, button activation can be negatively impacted.

## Install the Wall Plate

The wall plate is secured to the station with built-in magnets.



1. Align the top of the wall plate to the station and angle the bottom approximately 20 degrees.
2. Hook the top of the wall plate to the tabs located on the station electronics assembly. To ensure the wall plate is hooked properly on the top hook, wiggle it slightly side to side.
3. Swing the bottom of the wall plate down until the magnets engage.
4. If the wall plate does not fully attach automatically, wiggle the bottom of the plate until all of the magnets are seated properly to the station and the plate is secure.

**Note:** When installing a multi-gang wall plate and the stations are misaligned in the mounting box, the wall plate will not attach properly. Loosen the screws that secure the station to the box, adjust each station to improve the alignment, secure the screws, then retry wall plate installation.

## **Power Up and Test**

### **Power Up**

All EchoConnect terminations in the system must be made before applying power to the system and sensor. When the sensor is powered up, the PIR and acoustic detection LEDs illuminate for one minute for calibration and warm-up.

Both the PIR and acoustic detection features of the sensor will automatically adjust the sensitivity threshold to eliminate nuisance tripping. During this time, configuration is not allowed and no events are triggered.

### **Dual Technology Detection**

When both PIR and acoustic detection are used, the following logic is used:

- When the space is vacant, PIR detection and manual control can switch the state to occupied.
- When the space is occupied, PIR, acoustic detection, and manual control can reset the vacancy timeout.
- When occupancy in the space has only been triggered by acoustic detection for 60 minutes, acoustic detection is disabled until the next PIR detection event.

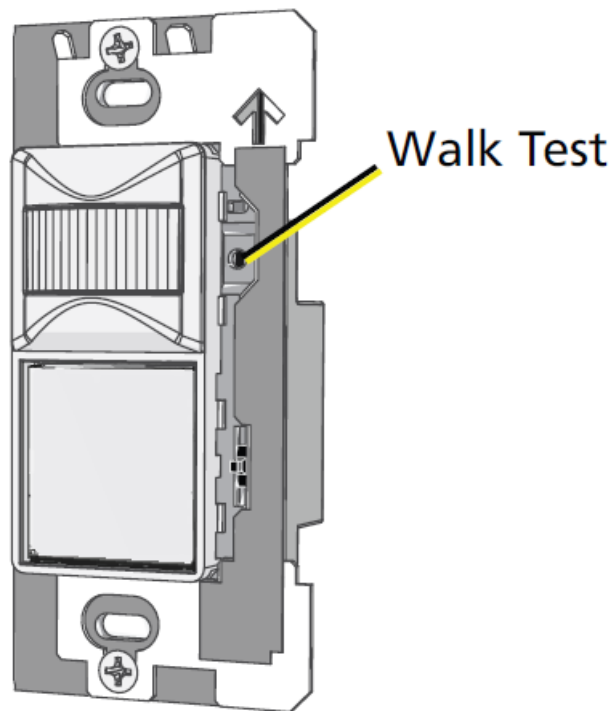
### **PIR (Only) Detection**

When acoustic detection is disabled (DIP switch 6 set to On), the following logic is used:

- When the space is vacant, PIR detection and manual control can switch the state to occupied.
- When the space is occupied, PIR detection and manual control can reset the vacancy timeout.

## Walk Test

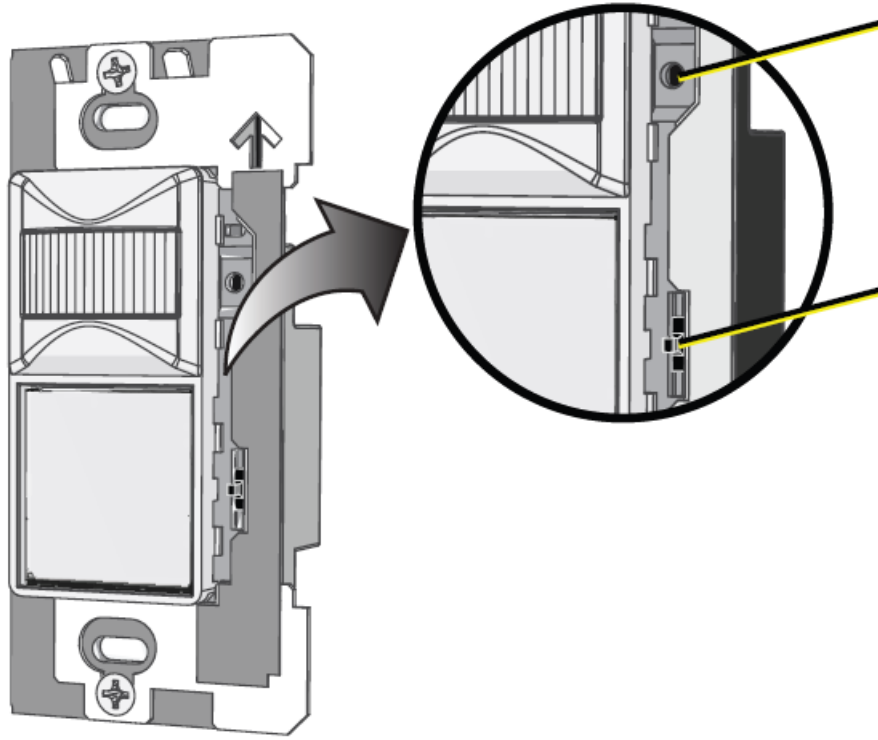
The sensor offers a Walk Test mode, which shortens the vacancy timer to 10 seconds and allows for simple and quick verification of the sensor's coverage and range in the installed space.



1. Prepare the site for configuration.
  - Make certain the sensor and lighting loads are powered and connected for control by the Elaho control system.
  - You will need direct access to the sensor in order to place it into Walk Test mode.
2. Remove the sensor wall plate to gain access to the Walk Test button.
3. Press the Walk Test button on the top right of the sensor to enable the Walk Test feature. A green LED flashes, indicating Walk Test is enabled and the vacancy timer is shortened to 10 seconds.
4. Move throughout the space, including corners and areas that may be obscured from line of sight to the sensor. Each time the sensor detects movement, the lens illuminates red. If acoustic detection is enabled, any sound detected illuminates the lens green.
5. Walk Test mode automatically exits and the sensor returns to normal operation after five minutes. You can also manually terminate by pressing the Walk Test button again.

## Station Configuration

The Dual Tech Switch-mount Occupancy Sensor has on-board switch and button settings that are available from the front of the station when it is installed and the wall plate is removed.



**Program Mode** Press and hold the Walk Test button three seconds to enter Program Mode

#### **Function Switch**

Preset Custom

Zone

#### **Program Mode**

Program Mode allows adjustment of the consecutive range of presets or zones assigned to the station. Placing the station in Program Mode allows you to set a new starting preset or zone number for the station.

The programmed preset or zone that is associated to the first button control is also the event/action that will occur with occupancy and vacancy detection. Reference Program Preset Start (Basic Mode, Preset, or Zone) on page 13.

#### **Function Switch**

The Function switch determines how the controls of the sensor function. It has behavior settings of Preset, Custom, and Zone.

#### **Function Switch: Preset**

Setting the Function switch to Preset allows you to perform preset related actions dependent on the switch-mount sensor type. Reference Station Functionality on page 15 for complete details of the button actions when the switch-mount sensor is placed in Preset mode.

#### **Preset Toggle Functionality**

Preset toggle control functionality allows you to toggle the preset on and off by pushing the assigned preset button.

- A single button push activates/deactivates the preset that is assigned to that button using a two second fade time.
- A double button push activates/deactivates the preset that is assigned to that button using a 1/2 second fade time.

When a preset is active, the button LED lights blue to indicate its active state. If preset levels are altered while the

preset is still active, the related button LED will return to its default state, either off or amber. Reference DIP Switch Settings on page 6.

### **Use Off Functionality (Two-button Switch-mount Sensor Only)**

“Use Off” functionality enables the last button on the station with a dedicated space off action.

- A single push of the “Off” button sets the level of all zones to zero using a two second fade time.
- A double push of the “Off” button sets the level of all zones to zero using a 1/2 second fade time.

“Use Off” functionality is enabled when DIP switch 1 is set to On. Reference DIP Switch Settings on page 6.

**Note:** The one-button switch-mount sensor does not recognize “Use Off” functionality.

### **Function Switch: Custom**

Setting the Function switch to Custom (the middle switch setting) allows for varied features either with or without ElahoAccess, although the presence of ElahoAccess in the control system allows for an expanded feature set.

#### **With ElahoAccess**

ElahoAccess provides complete customization of the switch-mount sensor when it is in Custom control mode. For more information on the configurable device parameters and actions available, reference the ElahoAccess Mobile App integrated help system.

**Note:** Changes made in ElahoAccess impact the Custom Function switch setting of the sensor only. Preset and Zone Function switch settings remain unaffected by the changes made while using ElahoAccess configuration tools.

#### **Without ElahoAccess**

Reference Station Functionality on page 15 for default functions when the switch-mount sensor Function switch is set to Custom control mode and you do not have ElahoAccess to customize the features.

### **Function Switch: Zone**

Setting the Function switch to Zone (the lowest switch setting) allows you to manually control the level of a zone using on/off and space raise or space lower (two-button switch-mount sensor only) functionality.

### **Zone Toggle Functionality**

While the Function switch is set to Zone, the station allows you to toggle the zone on and off. The controlled zone level raises to full or toggles off using a 1/2 or two second fade time, depending on the station type. Reference Station Functionality on page 15.

### **Zone Raise/Lower Functionality**

Zone raise/lower functionality varies depending on the switch-mount sensor type. The one-button switch-mount sensor provides zone raise functionality only. The two-button switch-mount sensor provides both zone raise and zone lower functionality. Reference Station Functionality on page 15.

### **Program Preset Start (Basic Mode, Preset, or Zone)**

**Note:** Program Mode only affects station behaviors when the Function switch is set to Preset or Zone and does not affect any behaviors in Custom mode.

**Note:** The preset that is configured to the first button control on the sensor is also the event that will occur with occupancy detection. Space Off will occur with vacancy detection.

1. Set the station Function switch to Preset (the highest switch position).
2. Press and hold the Walk Test/Program Mode button for three seconds to enter Program Mode. The “Mode” LED illuminates (steady amber) and the first button control LED for the station flashes the current (first) preset controlled. (For example, if the first preset controlled is Preset 3, the button LED will flash three times.)

3. Push button 1 to increase the starting preset number by one; any new count always begins at 1. The station updates the LED indication, flashing the LED to reflect the new preset number. (For example, pushing the button control eight times sets the first preset for the station to Preset 8.) All station preset controls are consecutively assigned beginning with the specified count.
4. When the desired preset number is set, press and release the Walk Test/Program Mode button to save the new setting. The “Mode” LED turns off and the button LED blinks the new setting before returning to normal operation.

**Note:** To change the assignment to a lower number than what is currently set, exit Program Mode then reenter Program Mode; the preset count will restart at 1.

### **Program Zone Start**

**Note:** The zone that is configured to the button controls is also the zone that will be activated at full with occupancy detection and deactivated with vacancy detection.

1. Set the station Function switch to Zone (the lowest switch position).
2. Press and hold the Walk Test/Program Mode button for three seconds to enter Program Mode. The “Mode” LED illuminates (steady amber) and the first button control LED for the station flashes the current (first) zone controlled. (For example, if the first zone controlled is Zone 5, the button LED flashes five times.)
3. Push button 1 to increase the starting zone number by one; any new count always begins at 1. The station updates the LED indication, flashing the LED to reflect the new zone number. (For example, pushing the button control three times sets the first zone for the station to Zone 3.) All station zone controls are consecutively assigned beginning with the specified count.
4. When the desired zone number is set, press and release the Walk Test/Program Mode button to save the new setting. The “Mode” LED turns off and the button LED blinks the new setting before returning to normal operation.

**Note:** To change the assignment to a lower number than what is currently set, exit Program Mode then reenter Program Mode; the zone count will restart at 1.

### **Station Functionality**

#### **One-button Switch-mount Sensor**

The one-button switch-mount sensor offers control of a single preset or zone as determined by the Function switch setting.

#### **Factory Defaults**

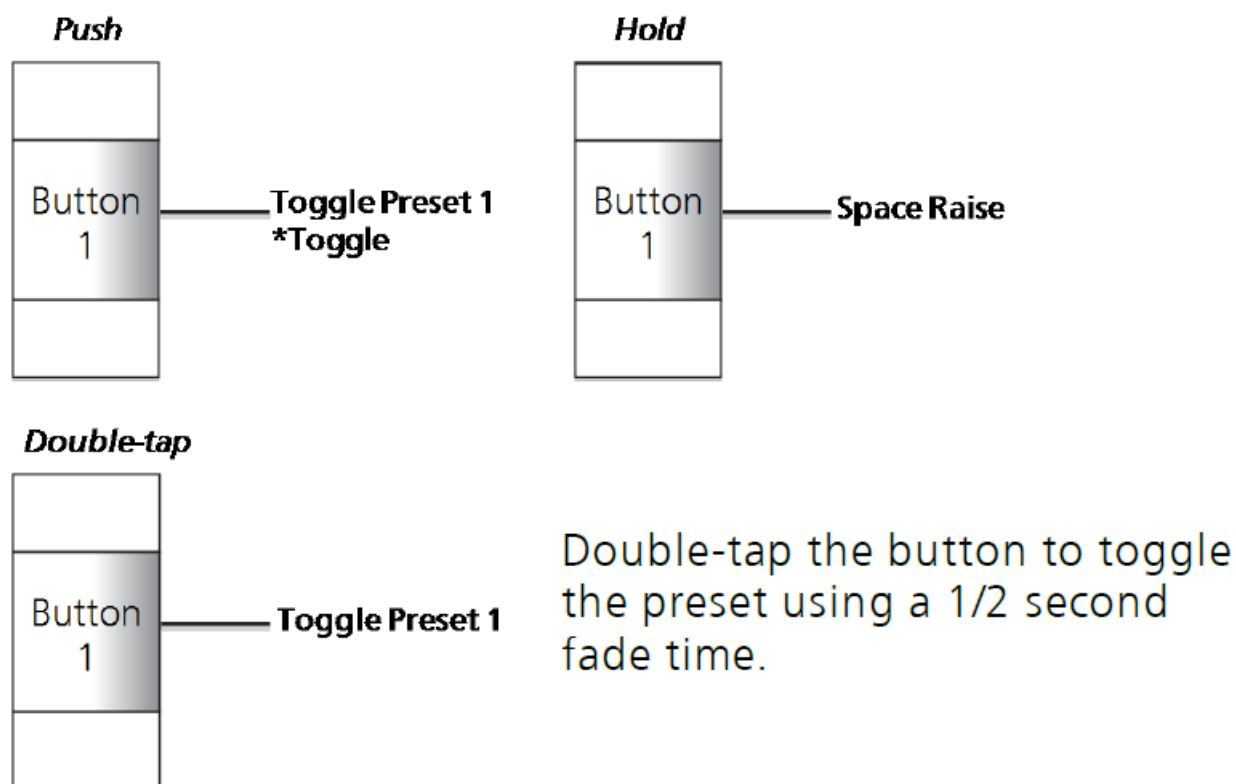
The one-button switch-mount sensor ships from the factory in the following default settings:

- Rotary switches are set to Address 1, Space 1. Reference Set Space and Address on page 5.
- DIP switches 4 and 5 are set to On. All other switches are set to Off. Reference DIP Switch Settings on page 6.
- With the Function switch set to Preset, Preset 1 is the default.
- With the Function switch set to Zone, Zone 1 is the default.
- With the Function switch set to Custom, Zone 2 is the default.

### **Preset**

In Preset mode, an occupancy detection event plays the preset that is configured to button 1, and the vacancy detection event plays Space Off.

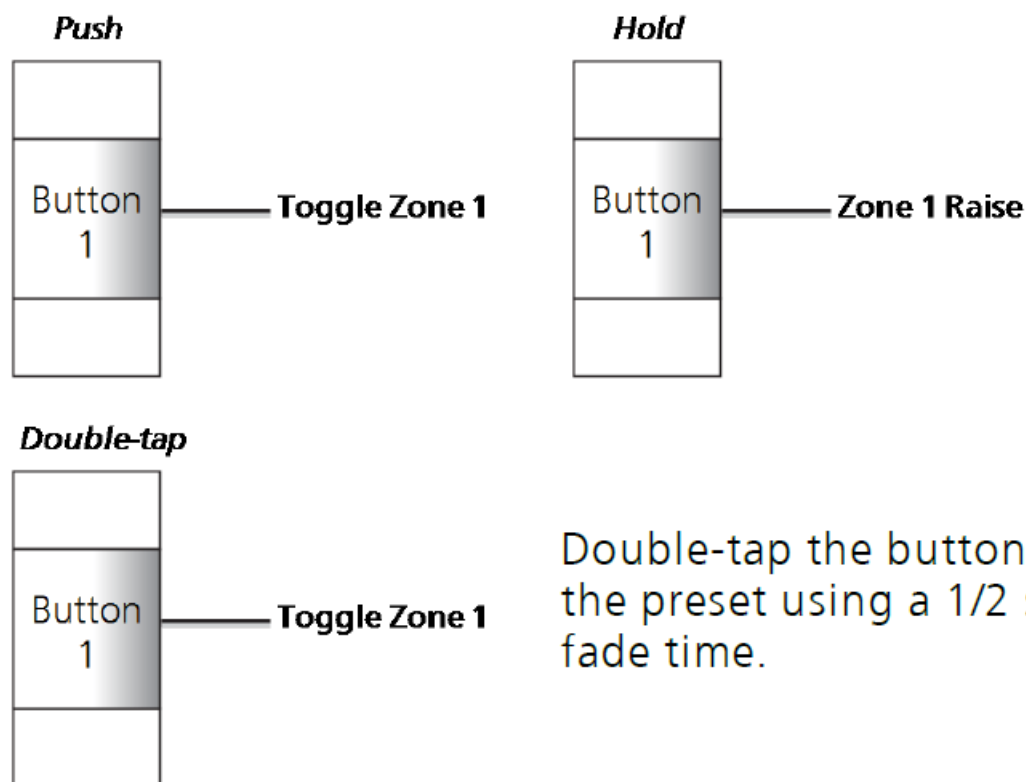
The one-button switch-mount sensor supports the following button actions:



**Note:** When DIP switch 1 is set to On, Sequence toggle is enabled. Reference DIP Switch Settings on page 6.

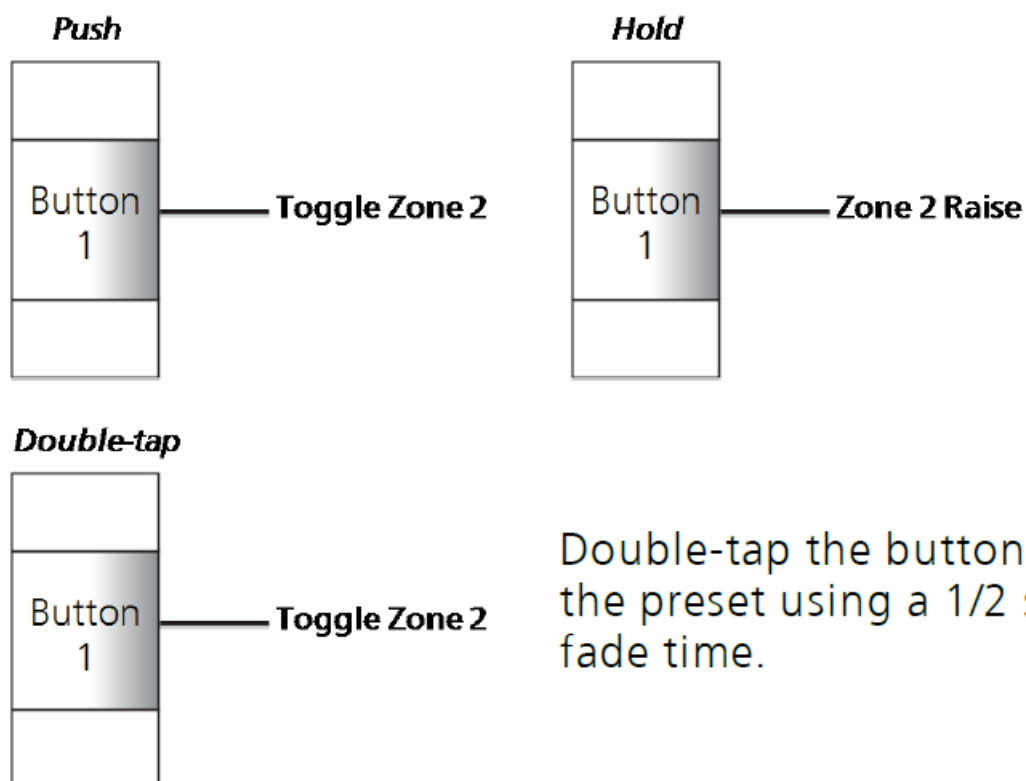
### Zone

In Zone mode, an occupancy detection event activates the zone that is configured to button 1 at full, and the vacancy detection event deactivates the Zone (set to 0%). The one-button switch-mount sensor supports the following button actions:



### Custom

While the one-button switch-mount sensor supports the following default button actions in Custom mode, complete customization is available when using Elaho Access. In Custom mode using default behaviors, an occupancy event activates the zone that is configured to button 1 at full, and the vacancy detection event deactivates the Zone (set to 0%).



### Two-button Switch-mount Sensor

The two-button switch-mount sensor offers control of two presets or zones as determined by the Function and DIP switch settings.



## Factory Defaults

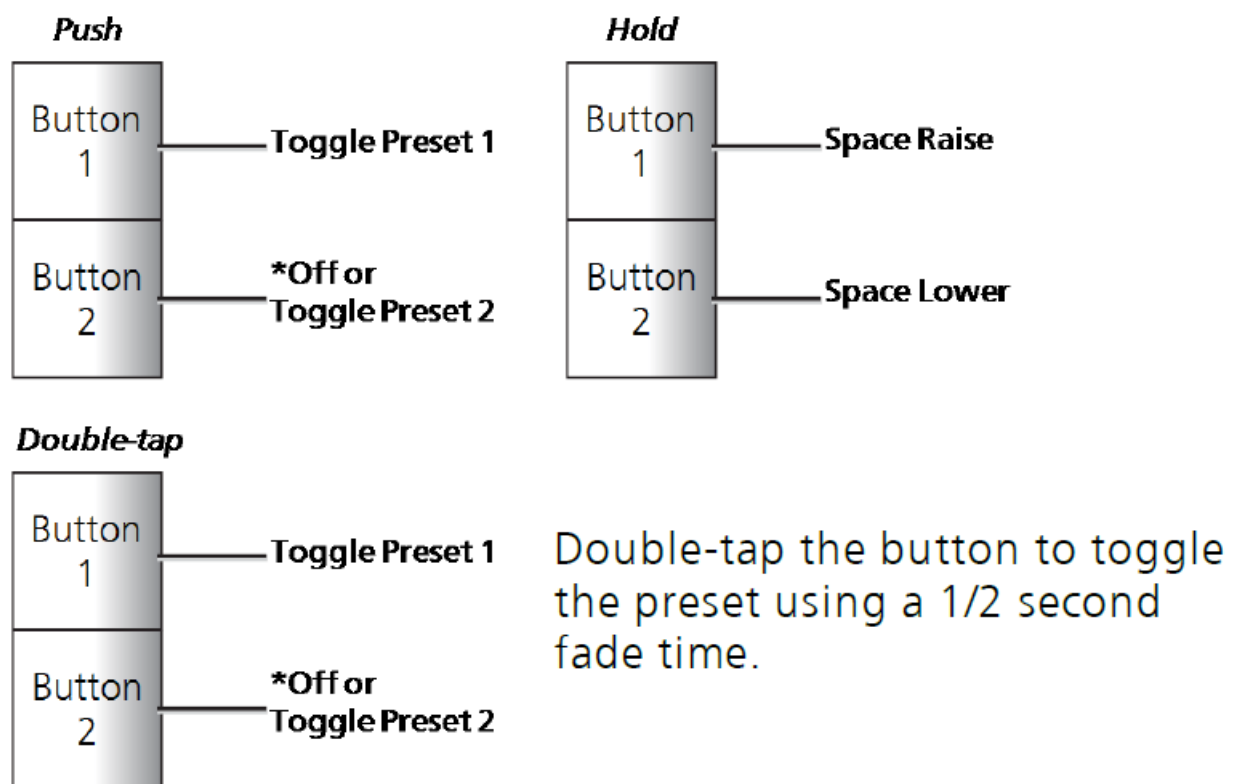
The two-button switch-mount sensor ships from the factory in the following default settings:

- Rotary switches are set to Address 1, Space 1. Reference Set Space and Address on page 5.
- DIP switches 1, 4, and 5 are set to On. All other switches are set to Off. Reference DIP Switch Settings on page 6.
- With the Function switch set to Preset, Preset 1 is the default.
- With the Function switch set to Zone, Zone 1 is the default.
- With the Function switch set to Custom, Zone 2 is the default.

## Preset

In Preset mode, an occupancy detection event plays the preset that is configured to button 1, and the vacancy detection event plays Space Off.

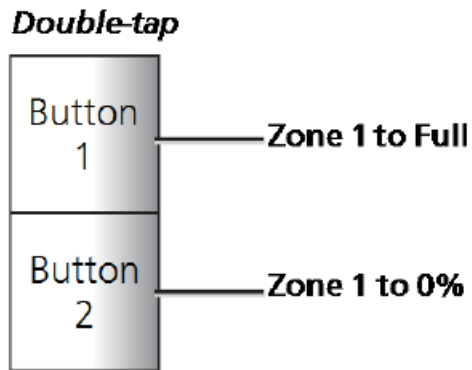
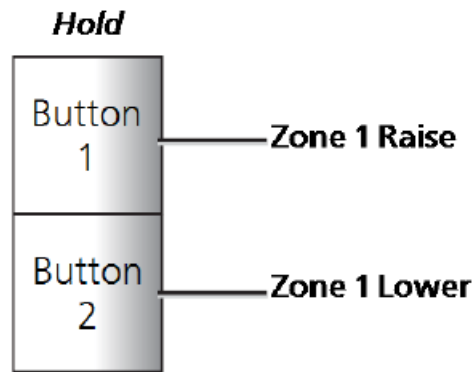
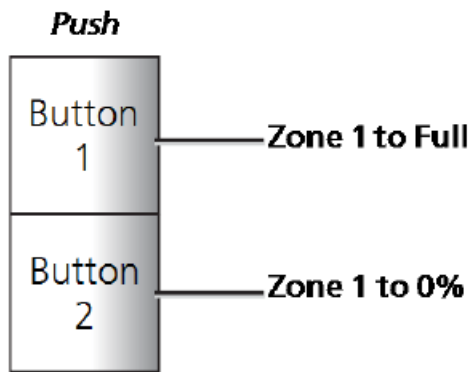
The two-button switch-mount sensor supports the following button actions:



**Note:** DIP switch 1 is set to On by factory default, which reserves button control 2 for Off functionality. Reference DIP Switch Settings on page 6 for instructions to change this default setting.

## ZONE

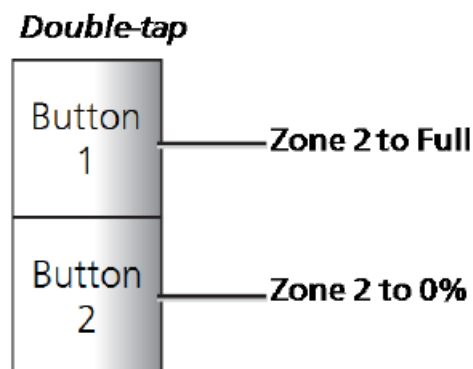
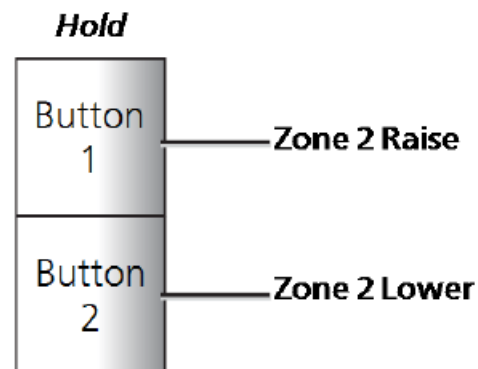
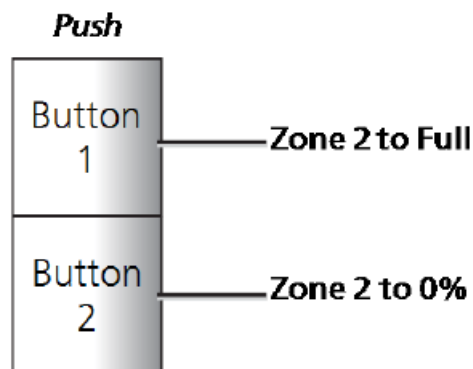
Zone In Zone mode, an occupancy detection event activates the zone that is configured to button 1 at full, and the vacancy detection event deactivates the Zone (set to 0%). The two-button switch-mount sensor supports the following button actions:



Double-tap the button to toggle the preset using a 1/2 second fade time.

#### Custom

While the two-button switch-mount sensor supports the following default button actions in Custom mode, complete customization is available when using Elaho Access. In Custom mode using default behaviors, an occupancy event activates the zone that is configured to button 1 at full, and the vacancy detection event deactivates the Zone (set to 0%).

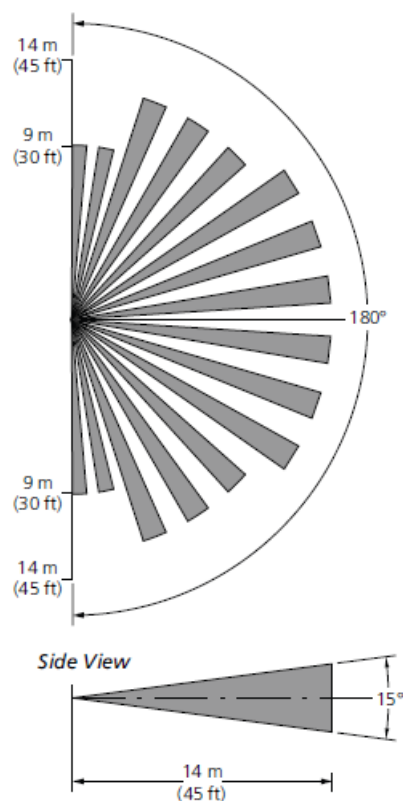


Double-tap the button to toggle the preset using a 1/2 second fade time.

**Note:** These are the default button actions for the switch mount sensor when the Function switch is set to Custom. For custom configuration using Elaho Access, reference the Elaho Access Mobile App integrated help system.

## Sensor Coverage


### Top View



### Compliance

The Dual Tech Switch-mount Occupancy Sensor is for use with Echoflex dimming and relay products. For current and complete compliance information, view the product datasheet at [echoflexsolutions.com](http://echoflexsolutions.com). For complete product documentation, including compliance documentation, visit [echoflexsolutions.com/products](http://echoflexsolutions.com/products).

### Documents / Resources

	<a href="#">echoflex BBS-702SW Dual Tech Switch-Mount Occupancy Sensor</a> [pdf] Installation Guide BBS-702SW Dual Tech Switch-Mount Occupancy Sensor, BBS-702SW, Dual Tech Switch-Mount Occupancy Sensor
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### References

- [The future of intelligent spaces | Echoflex](#)
- [The future of intelligent spaces | IP | Echoflex](#)
- [The future of intelligent spaces | Products | Echoflex](#)
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