SENSORWORX®

WIRELESS CEILING MOUNT DAYLIGHT HARVESTING PHOTOCELL

INSTALLATION & OPERATION INSTRUCTIONS

MODEL NUMBERS	DESCRIPTION
SWX-250-B	WIRELESS CEILING MOUNT DAYLIGHT HARVESTING PHOTOCELL, BATTERY POWERED
SWX-299-JP	CEILING SENSOR TRIM RING FOR MOUNTING TO SINGLE GANG MUDRING, HANDY BOX, OR 4" OCTAGON BOX

OVERVIEW

The **SENSOR**WORX® wireless daylight harvesting photocell is a simple, yet reliable battery powered control solution. Preferred by contractors for their flexible mounting methods, **SENSOR**WORX wireless photocells greatly reduce total installation time and wireless pairing fuss. Requiring just a few seconds per device, **SENSOR**WORX wireless photocells can be linked to one or more wireless load controllers (such as the **SWX-851** wireless wall switch, or a **SWX-950** series wireless power pack). Additionally, these units provide an auto-setpoint selection mode that assists with choosing the controlled light level for a space.

BASIC OPERATION

SENSORWORX daylight harvesting sensors measure and transmit a space's overall illumination to wirelessly connected load controllers. The load controllers then process these light level measurements and adjust light levels according to the configured setpoint and operational modes. For example, a connected dimming power pack load controller will gradually lower controlled lighting during times of high daylight contribution to a space. During times of no or low daylight contribution, controlled lighting will increase back up to its maximum level. A connected power pack or wall switch load controller can also be configured to switch lighting off completely in maintained high daylight conditions.

Auto-set-point calibration, where the unit determines its ambient light threshold (e.g., setpoint) based on the measured amount of light it is controlling, is initiated from the wireless photocell. The connected load controllers also provide the option of selecting from a range of preset values of ambient light thresholds (e.g., setpoints).

FEATURES

- **Links in Seconds with Wireless Controllers**
- **Auto-Setpoint Selection Mode**
- **Daylight Harvesting and/or On/Off Photocell Control**
- **Multi-zone Configuration Ability**
- **10 Year Battery Life Design**
- **Compact Size and Matte Finish**
- **Four Contractor Friendly Mounting Methods**
- **Mounting Nipple Attachment with Integrated Hole Saw**

SPECIFICATIONS

ELECTRICAL & WIRELESS

BATTERY TYPE
Requires one CR123(A) Lithium Battery

BATTERY LIFE
Designed for 10 Year Life
(under default settings)
Non-Volatile Memory (saves all settings regardless of battery state)
Blink Warning @10% Life

RANGE
80' line of site w/o obstruction (walls)
40' with obstruction (walls/floors)

FREQUENCY
915 MHz ISM Band

WIRELESS LINKING
Simple 3 sec. Push Button Process

SECURITY
All Wireless Data is Encrypted

ENVIRONMENTAL

OPERATING TEMP
32°F to 122°F (0°C to 50°C)

RELATIVE HUMIDITY
0-95% Non-Condensing,
Indoor Use Only

CODE COMPLIANCE

These sensors can be used to meet ASHRAE 90.1, IECC, & Title 24 energy code requirements.

PHYSICAL

SIZE
4.00" Diameter x 1.25" H
(10.16 x 3.17 cm)

WEIGHT
4.75 oz

COLOR
White

LED INDICATION
Wireless Linking (Pairing)

OPERATION

OPERATING MODES
Daylight Harvesting
On/Off Photocell Control
Modes Configured in Linked Controller

COMPATIBLE LOAD CONTROLLERS
SWX-851 Wall Switch
SWX-950 Series Power Packs

WIRELESS TEST MODE
Button Toggles On/Off
Wirelessly Linked Loads

SET-POINT CONFIGURATION
Auto-Setpoint Mode or
Selection at Linked Controller

TAA COMPLIANT · MADE IN THE USA · BAA COMPLIANT · LEAD FREE RoHS COMPLIANT · TITLE 20 LISTED TITLE 24 COMPLIANT

DAYLIGHT SENSOR PLACEMENT

Typically, a daylight harvesting sensor should be located in the innermost area of a daylighting zone. This assures that the setpoint is maintained at a minimum across the entire daylight zone. Additionally, the lights being controlled should be visible from the sensor as this will improve the tracking accuracy. This is referred to as closed-loop operation. Using the sensor where it is not able to monitor the lights it is controlling (i.e. open loop operation) will result in lights being either at full bright level or full dim level, but no levels in between. Placement directly above indirect lighting fixtures is not recommended.

INSTALLATION INSTRUCTIONS

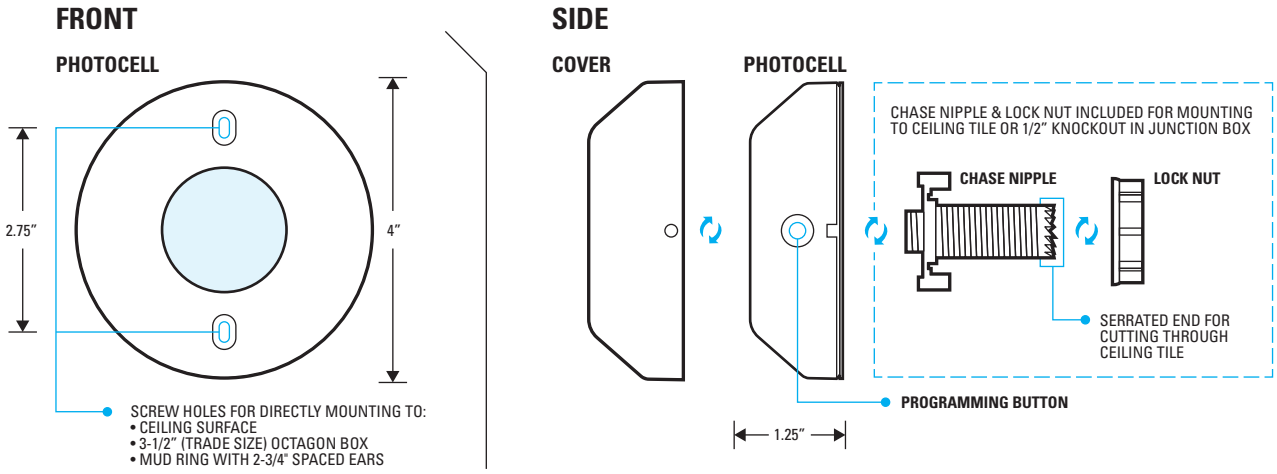
MOUNTING OPTIONS

A. Chase nipple & lock nut (included) for mounting unit to ceiling tile or 1/2" knockout in junction box. See Side Diagram below.

B. Screw holes for directly mounting to ceiling surface, 3-1/2" (trade size) octagon box, or mud ring with 2-3/4" spaced ears. See Front Diagram below.

INSTALLATION NOTES

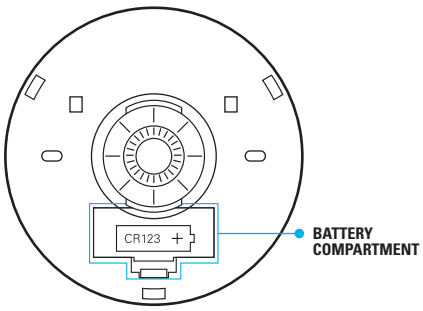
- If mounting to ceiling tile, use the serrated end of the chase nipple to cut a 7/8" hole. Screw chase nipple into rear of photocell. Install assembly into hole and screw plastic nut onto chase nipple from back side of tile.
- To install cover, line up dimples with indents on photocell and turn clockwise.



Note: If mounting to a Single Gang Mudring, Handy Box, or 4" Octagon Box, a trim ring is required. Part Number: **SWX-299-JP.**

BATTERY INFORMATION

- The photocell runs on one CR123(A) Lithium Battery (included).
- 10 year battery life design.
- Install battery prior to mounting photocell. Polarity is indicated on the battery compartment door.
- If the photocell's battery life reaches 10%, all wirelessly linked load controllers will blink lights on/off/on upon initial occupancy as a replacement warning.
- Replacement batteries are available at most retailers or home centers where batteries are sold or from **SENSOR**WORX.



COMPATIBLE WIRELESS DEVICES

The below chart lists the devices that can be used in a **SENSOR**WORX wireless application. Note that photocell, occupancy sensors, and remote switch & dimmers are transmit only devices and therefore must be linked to a load controller for switching or dimming of lighting.

MODEL #	DESCRIPTION	WIRELESS TYPE	POWER TYPE
SWX-201-B	Small Motion 360° Sensor, PIR	Transmit	Battery
SWX-211-B	Small Motion 360° Sensor, PIR w/ Integrated Daylight Harvesting Photocell	Transmit	Battery
SWX-221-B	Dual Technology Sensor (PIR/Acoustic), Small Motion 360°	Transmit	Battery
SWX-401-B	Wide View Sensor, PIR	Transmit	Battery
SWX-421-B	Dual Technology (PIR/Acoustic) Wide View Sensor	Transmit	Battery
SWX-402-B	Long Range Hallway Sensor, PIR	Transmit	Battery
SWX-250-B	Daylight Harvesting & On/Off Photocell	Transmit	Battery
SWX-851-xx	Wall Switch Load Controller, No Neutral Required, <xx = color>	Transmit & Receive	120-277 VAC
SWX-852-B-xx	Remote Switch (On/Off), <xx = color>	Transmit	Battery
SWX-854-B-xx	Remote Dimming Switch (On/Off, Raise/Lower), <xx = color>	Transmit	Battery
SWX-950	Power Pack Load Controller, 20A	Transmit & Receive	120/277 VAC
SWX-950-D2	Power Pack Load Controller, 20A, 0-10V Dimming	Transmit & Receive	120/277 VAC
SWX-950-AX	Hybrid Wireless/Wired Power Pack Load Controller, 20A	Transmit & Receive	120/277 VAC
SWX-950-AX-D2	Hybrid Wireless/Wired Power Pack Load Controller, 20A, 0-10V Dimming	Transmit & Receive	120/277 VAC

WIRELESS LINKING (PAIRING)

Linking a wireless photocell with a wireless load controller (e.g. **SWX-950** series power pack or **SWX-851** wall switch) is quickly done via the following procedure:

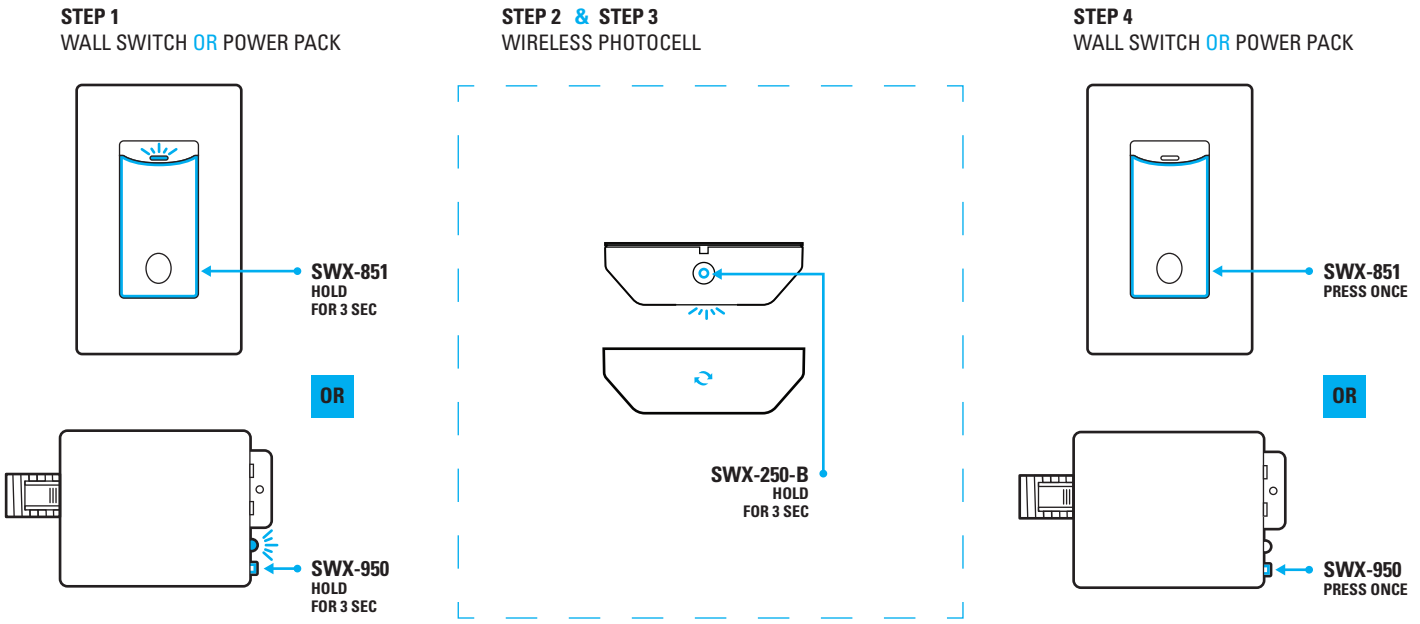
Step 1. Enter learn mode by holding down the wireless load controller button for 3 seconds until the LED starts alternating white then blue, then release.

Step 2. At the photocell, hold down the programming button for 3 seconds until the LED starts alternating white then blue. Releasing will link the photocell with any device in learn mode (see note 1 below) and. The lighting load being controlled will also be toggled off/on as a visual indication of success. Once linking is complete the photocell sensor will automatically run the auto-setpoint calibration procedure.

Step 3. Repeat step 2 to link another sensor or device.

Step 4. When all devices have been linked, exit learn mode on the wireless load controller by pressing the button 1 time. Learn mode will also be automatically closed after 15 minutes of no new devices being linked.

Note 1: When in learn mode, the alternating LED colors on the wireless load controller will periodically pause and blink out the total number of linked devices. There will be no blinks during the pause until the first device is linked.



CONFIGURATION

PHOTOCELL AUTO-SETPOINT

The minimum overall light level that is to be maintained in a space is referred to as the "setpoint". The setpoint value is stored in the paired wireless controller (i.e. **SWX-950** series power pack, and/or **SWX-851** wall switch) and is compared to the light level value being transmitted from the photocell every 15 seconds. The controller will then adjust the level of the connected lighting in order to maximize energy savings while maintaining desired minimum light level. The setpoint value initially is established by the running the Auto-Setpoint calibration procedure that is built into the wireless photocell. This procedure is run automatically whenever a photocell is linked to a controller. Once initially determined, the setpoint can be manually changed at the linked controller by selecting from a list of values.

RUNNING THE AUTO-SETPOINT CALIBRATION PROCEDURE

SETTING #	DESCRIPTION	
1	Run Auto-Setpoint	
2	Photocell Enabled	(default)

Once a wireless photocell is wirelessly linked with a load controller, it will automatically run the auto-setpoint calibration procedure. However, manually running the auto-setpoint calibration is also possible by performing the following procedure. Note, it is recommended to test the pairing using the TESTING WIRELESS LINKING procedure on the next page before continuing to the below steps.

Step 1. Press and release the unit's pushbutton **3 times**. By default the White LED will blink back twice indicating the photocell is enabled. This blink back will repeat 3x before exiting the function.

Step 2. Before the unit exits, interrupt the blink back by pressing the button **1 time** (corresponding to **SETTING #1 = Run Auto-Setpoint**).

The photocell will confirm this selection by flashing white once, pausing, then repeating. After the third confirmation sequence, the unit will begin flashing its LED White then Blue for 30 seconds. During this time the user should move away from the photocell. Lights will then be cycled in order for the photocell to take measurements with the controlled lighting both on and off. These readings allow the photocell to calculate the controlled (artificial) light level and select its optimum setpoint. When the photocell has completed its calibration procedure the LED will rapid flash White twice. Lighting will then be controlled according to the photocell operational mode (see below) and setpoint.

OPERATIONAL MODE DETAILS

There are four types of photocell operation supported; DAYLIGHT HARVESTING CONTROL, DAYLIGHT HARVESTING w/ ON/OFF CONTROL, ON/OFF PHOTOCELL CONTROL, and INHIBIT PHOTOCELL CONTROL (see descriptions below). These operational modes are selected at the linked wireless power pack (**SWX-950 Series**) or wall switch controller (**SWX-851**). A photocell sensor can be the only device wirelessly linked to a load controller or can be wirelessly linked along with wireless occupancy sensors to the same load controller(s).

DAYLIGHT HARVESTING CONTROL

- Recommend for spaces where it is important to not distract occupants (e.g., offices, classrooms).
- Lights will gradually dim in order to maximize energy savings while maintaining desired overall lighting level.
- After dimming to low trim level by default the lights will stay at the low trim level.
- Optionally, lighting can be configured to turn off completely when sufficient daylight is present.
- Requires that the wireless photocell is linked to a wireless power pack load controller with dimming (i.e. **SWX-950-D2**).

DAYLIGHT HARVESTING w/ ON/OFF CONTROL

- Same as Daylight Harvesting control except lights will turn off completely when sufficient daylight is present.

ON/OFF PHOTOCELL CONTROL

- Recommended for public spaces (hallways, entryways, etc) where fully switching of lighting off and on will not cause distraction of occupants.
- Lights are switched off if ambient light level surpasses threshold and back on if level drops.
- To prevent cycling of lights back on after lighting is turned off, a "deadband" level equal to the measured level of light being controlled is continously maintained. For lighting to turn off the ambient light level must be higher than the sum of the setpoint and the deadband.

INHIBIT ONLY PHOTOCELL CONTROL

- Upon initial occupancy, lighting is inhibited (i.e. held off) if ambient light level surpasses setpoint threshold.
- Lighting will be turned on if light level drops below set-point.
- Lighting will never turn off from daylight.

ADDITIONAL OPERATION NOTES

- Every ~15 seconds the photocell transmits the light level it is measuring in the space.
- Dimming from high trim to low trim (or in reverse) due to daylight harvesting requires ~1.5 minutes.
- The wirelessly linked wall switch load controller and/or power pack controller compares the received light level to the setpoint and controls the connected lighting accordingly.
- Wireless load controllers will only listen to a single wireless photocell sensor. If more than one is wirelessly linked, the unit that last ran the auto-setpoint calibration procedure will be used.
- The photocell control algorithm compensates for the contribution of the controlled lighting to the overall light level of the space. This prevents lights from cycling back on shortly after they are switched off by the photocell operation.
- Refer to the instruction sheets of the wirelessly linked controllers for information on their respective LED blink out behavior when controlled lights are transitioning on or off from photocell operation.
- To accomodate multi-zone photocell applications, power pack load controllers can be configured to track according to the received daylight level, but control lights a fixed percentage brighter.

TESTING & TROUBLESHOOTING

TESTING WIRELESS LINKING (PAIRING)

1. Press and release the button one time.

Lighting controlled by any/all linked load controller(s) will toggle one time as confirmation.

RESTORING FACTORY DEFAULTS / UNPAIRING

To return a wireless sensor to its original factory default settings or to unpair from all linked wireless load controllers the following commands can be executed.

SETTING #	DESCRIPTION
3	Restore Factory Defaults
4	Send a "Forget Me" Message to all Paired Controllers

ENTERING A RESTORE FACTORY DEFAULTS OR FORGET ME COMMAND

1. Read through the above list and note the number of the desired command

2. Press and release the unit's pushbutton **8 times**, then wait 2 seconds. The White LED will blink back 2 times, pause and repeat.

3. Interrupt the blink back and press the pushbutton the number times equal to the desired command (e.g. 3 times to Restore Factory Defaults).

4. The LED will flash back the command number as confirmation and will be executed after three confirmations. Two sets of rapid White flashes indicates success. If the Blue LED rapid flashes twice, the command was unsuccessful and process should be started over.

FCC INFORMATION (FCC ID: 2AVRY-SWX0002)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:
1. This device many not cause harmful interference, and
2. This device must accept any interference received, Including interference that may cause undesired operation
Changes and Modifications not expressly approved by BLP Technologies can void your authority to operate this equipment under Federal Communications Commission's rules.
In order to comply with FCC/ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

ISED CANADA INFORMATION (IC: 26012-SWX0002)

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.
In order to comply with FCC/ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
3. Afin de se conformer aux exigences d'exposition RF FCC / ISED, cet appareil doit être installé pour fournir au moins 20 cm de séparation du corps humain en tout temps